CITY OF AUSTIN
Capital Delivery Services

PROJECT MANUAL
Contract Documents and Technical Specifications

VOLUME 1 of 2

Boggy Creek - MLK TOD Stormwater Conveyance Improvements Phase 3

C.I.P. PROJECT NUMBER: 8598.014
SOLICITATION NUMBER: CLMC1173

CITY OF AUSTIN
Capital Delivery Services
505 Barton Springs Road, Suite 800
Austin, TX 78704

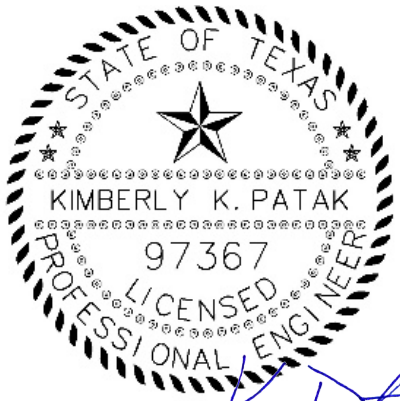
The City of Austin is committed to compliance with the Americans with Disabilities Act.
Reasonable modifications and equal access to communications will be provided upon request.

CITY OF AUSTIN
(Austin Capital Delivery Services)

PROJECT MANUAL
Contract Documents and Technical Specifications

VOLUME 1 of 2

BOGGY CREEK - MLK TOD STORMWATER CONVEYANCE IMPROVEMENTS PHASE-3



9/2/2026

FREESE AND NICHOLS, INC.
TEXAS REGISTERED
ENGINEERING FIRM
F-2144

The City of Austin is committed to compliance with the Americans with Disabilities Act. Reasonable modifications and equal access to communications will be provided upon request.

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City Standard Technical Specifications

Series 100 – Earthwork

Spec. #	Description	Adopted
101S	Preparing Right-of-Way	3/25/2021
110S	Street Excavation	11/18/04
130S	Borrow	9/26/12
132S	Embankment	8/20/07

Series 200 – Subgrade and Base Construction

Spec. #	Description	Adopted
203S	Lime Treatment for Materials in Place	9/14/21
210S	Flexible Base	2/24/10
236S	Proof Rolling	8/20/07

Series 300 – Street Surface Courses

Spec. #	Description	Adopted
301S	Asphalts, Oils and Emulsions	8/20/07
	Milling Asphaltic Concrete Pavement and Non-Portland Cement	
306S	Prime Coat	2/24/10
307S	Tack Coat	2/24/10
315S	Concrete Bases	9/26/12
340	Hot Mix Asphaltic Concrete Pavement	3/20/24
360S	Concrete Pavement	9/26/12

Series 400 – Concrete Structures and Misc Concrete

Spec. #	Description	Adopted
401S	Structural Excavation and Backfill	9/26/12
402	Controlled Low Strength Material	9/13/22
403	Concrete for Structures	4/14/25
406S	Reinforcing Steel	9/26/12
410S	Concrete Structures	9/14/21
425S	Prestressed Concrete Structures	9/26/12
430S	P.C. Concrete Curb and Gutter	11/15/11
432S	P.C. Concrete Sidewalks	1/4/10
433S	P.C. Concrete Driveways	12/9/08
434S	P.C. Concrete Medians and Islands	11/13/07
480S	Concrete Paver Units for Sidewalks and Streetscape Requirements	4/4/12

Series 500 – Pipe and Appurtenances

Spec. #	Description	Adopted
503	Frames, Grates, Rings and Covers	11/7/22
505S	Concrete Encasement and Encasement Pipe	2/24/10
506	Manholes	2/22/21
508S	Miscellaneous Structures and Appurtenances	2/24/10
509S	Excavation Safety Systems	9/26/12
510	Pipe	6/2/25
511	Water Valves	3/10/25
559S	Portland Concrete Box Culverts	10/3/13

Series 600 – Environmental Enhancement

Spec. #	Description	Adopted
601S	Salvaging and Placing Topsoil	11/14/16
602S	Sodding for Erosion Control	6/16/08
610S	Preservation of Trees and Other Vegetation	4/14/25
628S	Sediment Containment Dike	12/31/13
639S	Rock Berm	8/18/10
641S	Stabilized Construction Entrance	3/25/21
648S	Mulch Sock	3/1/22

Series 700 – Incidental Construction

Spec. #	Description	Adopted
700S	Mobilization	9/26/12
702S	Removal and Relocation of Existing Fences	5/20/02
720	Metal for Structures	9/26/12
721S	Steel Structures	9/26/12
723	Structural Welding	9/26/12

Series 800 – Urban Transportation

Spec. #	Description	Adopted
802S	Project Signs	9/14/21
803S	Barricades, Signs and Traffic Handling	11/15/11
824S	Traffic Signs	2/24/10
829S	Designated Bicycle Lane Markings	8/20/03
863S	Reflectorized Pavement Markers	9/26/12
864S	Abbreviated Pavement Markings	6/21/07
870S	Work Zone Pavement Markings	11/21/05
871S	Reflectorized Pavement Markings	6/21/07
874S	Eliminating Existing Pavement Markings and Markers	4/3/09

Special Provisions to City Standard Technical Specifications

Spec. #	Description
SP402S	Controlled Low Strength Material
SP 432S	Portland Cement Concrete Sidewalks
SP433S	P.C. Concrete Driveways
SP506	Manholes
SP510	Pipe
SP628S	Sediment Containment Dike
SP702S	Removal and Relocation of Existing Fences
SP870S	Work Zone Pavement Markings
SP871S	Reflectorized Pavement Markings

Special Specifications

Spec. #	Description
SS01025	Private Lateral Relocation
SS1540	By-pass Pumping
SS4150	Contaminated Soil and Water
SS6001	Portable Changeable Message Sign
SS000465	Junction Boxes, Manholes, and Inlets
SS000512	Portable Traffic Barrier
SS000658	Delineator and Object Marker Assemblies

VOL. 2 of 2 08/2019 **MBE/WBE Procurement Program Package**

END

1. OVERVIEW AND PROJECT INFORMATION

Following is a summary of information for this Project. Bidder is cautioned to refer to other sections of the Project Manual, Drawings and Addenda (Bid Documents) for further details.

The City of Austin, hereafter called OWNER, is requesting Bids for furnishing all labor, materials, equipment, supervision, and incidentals, and for performing all Work required for the following:

Project:	Boggy Creek – MLK TOD Stormwater Conveyance Improvements – Phase 3
Located at:	Manor Road, Walnut Ave. to Alexander Ave. Larry Lane, Merrie Lynn Ave., and Randolph Rd.
CIP ID No.:	8598.014
Solicitation No.:	CLMC1173

The Work consists of but is not limited to, storm drain, roadway, and utility improvements associated with the installation of a new storm drain trunk line spanning from Walnut Ave to Alexander Ave along Manor Road and connecting to systems along Larry Lane, Merrie Lynn, and Randolph Road.

2. BID DOCUMENTS

Bid Documents are obtained through the City's Vendor Connection website, log on https://financeonline.austintexas.gov/afo/account_services/solicitation/solicitations.cfm. A complete set of Bid Documents, including all sections of the Project Manual and Drawings, are included in the attachments section of each solicitation.

All addenda and answers to Bidders' questions will also be posted in the attachments section for each solicitation on the City's Vendor Connection website.

3. SUBMISSION OF BIDS

Bids must be submitted electronically via Austin Finance Online eResponse (see eResponse Instructions).

Disclaimer: The result of the bid opening does not become final until all bids are verified, and the bid tab is certified. The pencil bid tab and certified bid tab will be posted in Austin Finance Online at the following link:

https://financeonline.austintexas.gov/afo/account_services/solicitation/solicitations.cfm

ALL BIDS AND COMPLIANCE PLANS ARE DUE PRIOR TO (Austin time) 2:00 PM ON THURSDAY, OCTOBER 22, 2026.
BIDS WILL BE OPENED AT (Austin time) 3:00 PM ON THURSDAY, OCTOBER 22, 2026.

ALL BIDS AND COMPLIANCE PLANS NOT RECEIVED PRIOR TO THE DATE AND TIME SET FORTH ABOVE WILL NOT BE ACCEPTED FOR CONSIDERATION. The time of record is the time received in Austin Finance Online.

4. VENDOR REGISTRATION AND NON-DISCRIMINATION

To create, edit, or submit an eResponse Bid, you must be logged in to your vendor account as the primary contact. You are eligible to submit an eResponse Bid after creating a user account and providing the business information of your organization. All CONTRACTORS must be registered to do business with OWNER prior to the Contract Award. All Subcontractors must be registered with the OWNER prior to execution of a contract. Prime Contractors are responsible for ensuring that their Subcontractors are registered as vendors with the City of Austin. Registration can be done through the OWNER's on-line Vendor Registration system. Log onto and follow directions:

https://financeonline.austintexas.gov/afo/account_services/account/login.cfm

The City of Austin, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. §§ 2000d to 2000d-4) and the Regulations, hereby notifies all bidders that it will affirmatively ensure that any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

5. MBE/WBE PROCUREMENT PROGRAM

All City procurements are subject to the City's Minority-Owned and Women-Owned Business Enterprise Procurement Program found at Chapter 2-9-A of the City Code, as amended. The Program provides Minority-Owned and Women-Owned Business Enterprises (MBEs/WBEs) or Disadvantaged Business Enterprises (DBEs) full opportunity to participate in all City contracts. Goals for MBE/WBE or DBE participation are stated for each solicitation. Information on achieving the goals or documenting good faith efforts to achieve the goals are contained in the MBE/WBE Procurement Program Package or DBE Procurement Program Package attached to the solicitation. When goals are established, Bidders are required to complete and return the MBE/WBE or DBE Compliance Plan with their Bid. If a Compliance Plan is not submitted prior to the date and time set forth in the solicitation, the Bid will not be accepted for consideration. (See Section 00820 for MBE/WBE requirements on "no goal" solicitations.)

6. BID GUARANTY

All Bids shall be accompanied by an acceptable Bid guaranty in an amount of not less than five percent (5%) of the total Bid, as specified in Section 00100, Instructions to Bidders.

7. BONDS AND INSURANCE

Performance and payment bonds when required shall be executed on forms furnished by OWNER. Each bond shall be issued in an amount of one hundred percent (100%) of the Contract Amount by a solvent corporate surety company authorized to do business in the State of Texas, and shall meet any other requirements established by law or by OWNER pursuant to applicable law.

Minimum insurance requirements are specified in Section 00810, Supplemental General Conditions.

8. WAGE COMPLIANCE

Minimum wage rates have been established and are specified in Section 00830, Wage Rates and Payroll Reporting.

9. CONTRACT TIME

Contract Time is of the essence and all Work shall be substantially completed within seven hundred and thirty (730) Calendar Days after date specified in the Notice to Proceed, in accordance with the Bid Form, Section 00300.

Final completion shall be achieved within ninety (90) Calendar Days after substantial completion.

Liquidated damages are one thousand eight hundred ($1800) per Calendar Day for failure to substantially complete the work and one thousand four hundred and fifty dollars ($1450) per Calendar Day for failure to achieve final completion within ninety (90) Calendar Days after substantial completion, in accordance with the Bid Form, Section 00300.

10. OWNER'S RIGHTS

OWNER reserves the right to reject any or all Bids and to waive any minor informality in any Bid or solicitation procedure (a minor informality is one that does not affect the competitiveness of the Bid).

11. PRE-BID CONFERENCE

A **non-mandatory** Pre-Bid Conference will be held on **September 24th, 2026 at 10:00 A.M.** (Austin time), via webinar and teleconference.

Attendance is not mandatory unless otherwise stated. Bidders must attend any mandatory Pre-Bid Conference and are encouraged to attend any non-mandatory Pre-Bid Conference to ensure their understanding of OWNER's bidding and contracting requirements, particularly MBE/WBE or DBE Procurement Program requirements. If the Pre-Bid Conference is mandatory the Bidder must arrive and sign-in within fifteen (15) minutes of the scheduled start time of the meeting, otherwise the Bidder will not be allowed to submit a Bid for the project.

A **non-mandatory** Pre-Bid Conference will be held on **September 24th, 2026 at 10:00 A.M.** (Austin time), via webinar and teleconference. Bidders may participate in the virtual pre-bid conference by clicking this link: Prebid Meeting Link or by calling +1 512-831-7858,,403437324# United States, Austin (Toll), Conference ID: 403 437 324#. For those calling in, please send an email to Alejandro Foubelo (Alejandro.Foubelo@austintexas.gov) with the subject line CLMC 1173, indicate in the body of the email your name, the firm you are representing, your contact information and whether you are a prime firm or subcontractor. Please send this by **5:00 pm** on the day of the virtual pre-bid meeting.

12. ANTI-LOBBYING AND PROCUREMENT

On June 14, 2018, the Austin City Council adopted Ordinance No. 20180614-056 replacing Chapter 2.7, Article 6 of the City Code relating to Anti-Lobbying and Procurement. The policy defined in this Code applies to Solicitations for goods and/or services requiring City Council approval under City Charter

Article VII, Section 15 (Purchase Procedures). The City requires Offerors submitting Offers on this Solicitation to certify that the Offeror has not in any way directly or indirectly had communication restricted in the ordinance section 2-7-104 during the No-Lobbying Period as defined in the Ordinance. The text of the City Ordinance is posted on the Internet at:

https://assets.austintexas.gov/purchase/downloads/New_ALO_Ordinance_No_20180614-056.pdf

13. AUTHORIZED CONTACT PERSONS

The persons listed below may be contacted for information regarding the Invitation for Bid.

PROJECT MANAGER: Paulinda Lanham, phone 512-974-7974, email Paulinda.Lanham@austintexas.gov

CAPITAL PROCUREMENT CONTACT: Alejandro Foubelo, phone 512-974-5636, email Alejandro.Foubelo@austintexas.gov

SMALL & MINORITY BUSINESS RESOURCES DEPARTMENT CONTACT: Lauren Williams, phone 512-974-6537, email Lauren.williams2@austintexas.gov

END

INSTRUCTIONS TO BIDDERS
Section 00100

1. PREPARATION OF BID

1.1 Bid Documents. Each Bidder must prepare its Bid on forms furnished by OWNER or as otherwise specified or permitted. Blank spaces for each item in Bid form must be filled. Bidder must submit a price for each item in Bid. In case of conflict between unit prices and extensions, unit prices shall govern. The Bid must be executed in the complete and correct legal name of individual, partnership, firm, corporation or other legal entity constituting the Bidder.

1.2 Vendor Registration. To create, edit, or submit an eResponse Bid, you must be logged in to your vendor account as the primary contact. You are eligible to submit an eResponse Bid after creating a user account and providing the business information of your organization. All CONTRACTORS must be registered to do business with OWNER prior to Contract Award. All Subcontractors must be registered with the OWNER prior to execution of a contract. Prime Contractors are responsible for ensuring that their Subcontractors are registered as vendors with the City of Austin. Registration can be done through the OWNER's on-line Vendor Registration system. Log onto https://financeonline.austintexas.gov/afo/afo_content.cfm?s=17 and follow the directions.

1.3 Pre-Bid Conference. Unless otherwise notified, Bidders must attend the Pre-Bid Conference to ensure their understanding of OWNER's bidding and contracting requirements, particularly MBE/WBE Procurement Program requirements.

1.4 Sales Tax Exemption. The Owner is a tax-exempt organization as defined by Chapter 11 of the Property Tax Code of Texas. Bid prices shall not include sales tax on materials, supplies, or equipment that are incorporated into the real property interest of the OWNER or are otherwise completely used and consumed in the performance of the Contract. OWNER will furnish CONTRACTOR with a Sales Tax Exemption Certificate to be issued to Suppliers in lieu of the tax.

1.5 Minimum Wages. Workers on Project shall be paid not less than wage rates, including fringe benefits, as published by the Department of Labor (DOL) for Building Construction and Heavy and Highway Trades "AS APPLICABLE" and/or the minimum wage required by City of Austin Ordinance No. 20160324-015, whichever is higher. The Total Minimum Wage required can be met using any combination of cash and non-cash qualified fringe benefits provided the cash component meets or exceeds the minimum wage required.

1.6 Addenda. Bidder shall be knowledgeable of all Addenda issued and shall acknowledge all Addenda in spaces provided on Bid form. Further information regarding the Bid documents and the Project may be obtained from the Project Manager listed at the end of Section 00020, Invitation for Bids.

1.7 Required Items. Bids must include all specified items in this section and be submitted in accordance with paragraph No. 7 below. Any additional requirement to the bid submittal is specified in Section 00820. Any corrections to a Bid shall be initialed by the person signing the Bid.

1.8 Professional Services. Bidders must secure any required professional services that are defined as professional services under the Professional Services Procurement Act, Chapter 2254 of the Texas Government Code (for example: registered professional land

surveyors and professional engineers) using the qualifications based selection process prescribed by that chapter. (Note: It is a violation of State Law to solicit Bids for professional services.)

1.9 Further Information. Prospective Bidders desiring further information or interpretation of Project Manual or Drawings must make a written request for such information to OWNER addressed to the Authorized Contact Person listed in Section 00020 no later than seven (7) Working Days before Bid opening. Interpretation of Project Manual or Drawings will be made by Addendum only and obtained through the City's Vendor Connection website. Log on to:
https://financeonline.austintexas.gov/afo/account_services/solicitation/solicitations.cfm.
Any verbal communications will not be binding on the OWNER.

1.10 Anti-Lobbying and Procurement. Article 6, Chapter 2-7, City Code, repealed and replaced effective on June 25, 2018, prohibits lobbying activities or representations by Offerors during the No Lobbying Period as defined in the Ordinance.

1.10.1. FINDINGS; PURPOSE.

(A) The council finds that persons who enter a competitive process for a city contract voluntarily agree to abide by the terms of the competitive process, including the provisions of this article.

(B) The council finds that it is in the City's interest:

(i) to provide the most fair, equitable, and competitive process possible for selection among potential vendors in order to acquire the best and most competitive goods and services; and

(ii) to further compliance with State law procurement requirements.

(C) The council intends that:

(i) each response is considered on the same basis as all others; and

(ii) respondents have equal access to information regarding a solicitation, and the same opportunity to present information regarding the solicitation for consideration by the City.

1.10.2. APPLICABILITY.

(A) This article applies to all solicitations except:

(i) City social service funding;

(ii) City cultural arts funding;

(iii) federal, state or City block grant funding;

(iv) the sale or rental of real property;

(v) interlocal contracts or agreements; and

(vi) solicitations specifically exempted from this article by council.

(B) Absent an affirmative determination by the council, the purchasing officer has the discretion to apply this article to any other competitive process.

(C) City Code Section 1-1-99 (*Offenses; General Penalty*) does not apply to this article.

1.10.3. DEFINITIONS.

In this article:

(A) AGENT means a person authorized by a respondent to act for or in place of the respondent in order to communicate on behalf of that respondent. Each of the following is presumed to be an agent:

(i) a current full-time or part-time employee, owner, director, officer, member, or manager of a respondent;
(ii) a person related within the first degree of consanguinity or affinity to a current fulltime or part-time employee, owner, director, officer, member, or manager of a respondent;
(iii) a person related within the first degree of consanguinity or affinity to the respondent, if a respondent is an individual person; and Section 0200 V2, Solicitation Instructions 4 Rev. 06-26-2018
(iv) a lobbyist, attorney, or other legal representative of the respondent that has been retained by the respondent with respect to the subject matter of either the solicitation or the respondent's response to the solicitation.

(B) AUTHORIZED CONTACT PERSON means a City employee designated in a City solicitation as the point of contact for all purposes for that solicitation.
(C) CITY EMPLOYEE is defined in Section 2-7-2 (*Definitions*), and further includes an independent contractor hired by the City with respect to the solicitation.
(D) CITY OFFICIAL is defined in Section 2-7-2 (*Definitions*).
(E) NO-LOBBYING PERIOD means the period of time beginning at the date and time a solicitation is published and continuing through the earliest of the following:
(i) the date the last contract resulting from the solicitation is signed;
(ii) 60 days following council authorization of the last contract resulting from the solicitation; or
(iii) cancellation of the solicitation by the City
(F) PURCHASING OFFICER means the City employee authorized to carry out the purchasing and procurement functions and authority of the City.
(G) RESPONSE means a submission in reply to a solicitation.
(H) RESPONDENT means a person or entity that has timely submitted or subsequently timely submits a response to a City solicitation, even if that person subsequently withdraws its response or has been disqualified by the City for any reason. Respondent includes:
(i) a subsidiary or parent of a respondent;
(ii) a joint enterprise, joint venture, or partnership with an interest in a response and in which a respondent is a member or is otherwise involved, including any partner in such joint enterprise, joint venture, or partnership; and
(iii) a subcontractor to a respondent in connection with that respondent's response.
(I) SOLICITATION means an opportunity to compete to conduct business with the City that requires council approval under City Charter Article VII Section 15 (*Purchase Procedure*), and includes, without limitation:
(i) an invitation for bids;
(ii) a request for proposals;
(iii) a request for qualifications;
(iv) a notice of funding availability; and
(v) any other competitive solicitation process for which the purchasing officer, in the purchasing officer's sole discretion, affirmatively determines this article should apply in accordance with Section 2-B.

1.10.4. RESTRICTION ON LOBBYING.

Subject to the exclusions in Section 5 (*Permitted Communications*), during a no-lobbying period,

(A) a respondent or an agent shall not communicate directly with a City official or a City employee, or both in order to:

(i) provide substantive information about any respondent or response with respect to the solicitation to which the communication relates;

(ii) encourage the City to reject one or more of the responses to the solicitation to which the communication relates;

(iii) convey a complaint about the solicitation to which the communication relates; or

(iv) ask any City official or City employee to favor or oppose, recommend or not recommend, vote for or against, consider or not consider, or take action or refrain from taking action on any vote, decision, or agenda item regarding the solicitation to which the communication relates.

(B) a City official shall not contact or communicate with a respondent regarding a response or the solicitation to which the no-lobbying period applies;

(C) a City employee, other than the authorized contact person, shall not contact or communicate with a respondent regarding a response or the solicitation to which the no-lobbying period applies.

1.10.5. PERMITTED COMMUNICATIONS.

The following communications are permitted under this article at any time:

(A) any communication between a respondent or agent and any authorized contact person, including, without limitation and in accordance with regulation, any complaint concerning the solicitation;

(B) any communication between a respondent or agent and any person to the extent the communication relates solely to an existing contract between a respondent and the City, even when the scope, products, or services of the current contract are the same or similar to those contained in an active solicitation;

(C) any communication between a respondent or an agent and a City employee to the extent the communication relates solely to a non-substantive, procedural matter related to a response or solicitation;

(D) any communication required by or made during the course of a formal protest hearing related to a solicitation;

(E) any communication between a respondent or an agent and the City's Small & Minority Business Resources Department, that solely relates to compliance with Chapters 2-9A through 2-9D (*Minority-Owned and Women-Owned Business Enterprise Procurement Program*) of the City Code;

(F) any communication between an attorney representing a respondent and an attorney authorized to represent the City, to the extent the communication is permitted by the Texas Disciplinary Rules of Professional Conduct;

(G) any communication made by a respondent or an agent to the applicable governing body during the course of a meeting properly noticed and held under Texas Government Code Chapter 551 (*Open Meetings Act*);

(H) any communication between a respondent or an agent and a City employee whose official responsibility encompasses the setting of minimum insurance requirements for the solicitation to which the communication relates, to the extent the communication relates solely to the insurance requirements established by the City in the solicitation; and

(I) any contribution or expenditure as defined in Chapter 2-2 (*Campaign Finance*).

1.10.6. MODIFICATION OF RESTRICTION.

The purchasing officer may waive, modify, or reduce the requirements in Section 4 (*Restrictions on Lobbying*) in order to allow respondents to communicate with a City employee or a City official other than the authorized contact person when the purchasing officer determines, in writing, that the solicitation must be conducted in an expedited manner, including but not limited to a solicitation conducted for reasons of health or safety under the shortest schedule possible with no extensions. Any such modification authorized by the purchasing officer shall be stated in the solicitation.

1.10.7. NOTICE.

(A) Each solicitation shall include a notice advising respondents and prospective respondents:

(i) of the requirements of this article;

(ii) that any communication initiated by a City employee or City official, other than the authorized contact person, during the no-lobbying period regarding a response or the solicitation may result in a violation of Section 4(A) if the respondent subsequently lobbies that City employee or City official.

(B) The purchasing officer, or a City employee designated by the purchasing officer, shall provide weekly written notice, accessible to all City employees and City officials, of each solicitation for which the no-lobbying period is in effect.

1.10.8. DISCLOSURE OF VIOLATION.

A City official or a City employee other than the authorized contact person that becomes aware of a violation of Section 4 (*Restrictions on Lobbying*) shall notify the authorized contact person in writing as soon as practicable.

1.10.9. ENFORCEMENT.

(A) A respondent that has been disqualified pursuant to Section 10(A) (*Disqualification; Contract Voidable*) may appeal such disqualification to a subcommittee that is less than a quorum of the Ethics Review Commission established in Chapter 2-7, Article 2 (*Ethics Review Commission*), whose decision on appeal shall be final and binding. Any appeal must be filed in the manner prescribed by the Ethics Review Commission within 5 calendar days of the notice given by the purchasing officer pursuant to Section 10(B).

(B) The purchasing officer shall waive a violation of Section 4(A) if the violation was solely the result of communications initiated by a City official or a City employee other than the authorized contact person.

(C) The purchasing officer has the authority to enforce this article through rules promulgated in accordance with Chapter 1-2 (*Adoption of Rules*), which at a minimum shall include a notice and protest process for respondents disqualified pursuant to Section 10 (*Disqualification;Contract Voidable*), including:

(1) written notice of the disqualification imposed pursuant to Section 10 (*Disqualification;Contract Voidable*);

(2) written notice of the right to protest the disqualification imposed; and

(3) written notice of the right to request an impartial hearing process.

1.10.10. DISQUALIFICATION; CONTRACT VOIDABLE.

(A) If the purchasing officer finds that a respondent has violated Section 2-7-104(1), the respondent is disqualified from participating in the solicitation to which the violation related.

(B) The purchasing officer shall promptly provide written notice of disqualification to a disqualified respondent.

(C) If a respondent is disqualified from participating in a solicitation as a result of violating Section 2-7-104(1) and the solicitation is cancelled for any reason, that respondent is also disqualified from submitting a response to any reissue of the same or similar solicitation for the same or similar project. For the purposes of this section, the purchasing officer may determine whether any particular solicitation constitutes a "same or similar solicitation for the same or similar project".

(D) If a respondent violates Section 104(1) and is awarded a contract resulting from the solicitation to which the violation relates, the City may void that contract.

(E) Respondents that violate Section 2-7-104(1) three or more times during a five year period may be subject to debarment from participating in any new contracts with the City for a period of up to three years.

1.11 City's Minority-Owned and Women-Owned Business Enterprise / Disadvantaged Business Enterprise (MBE/WBE or DBE) Program Requirements.

Good Faith Efforts. When a bidder cannot achieve the MBE/WBE or DBE goals or subgoals established for the project, the bidder must document its Good Faith Efforts to meet the goals or subgoals. Good Faith Effort evaluations will consider, at a minimum, the bidder's efforts to do the following:

1.11.1 Soliciting through at least two reasonable, available and verifiable means MBEs/WBEs within the Significant Local Business Presence boundaries at least seven (7) business days prior to the bid opening date to allow the MBEs/WBEs or DBEs to respond to the bid.

1.11.2 Providing interested MBEs/WBEs or DBEs adequate information about the bid documents and requirements, including addenda, in a timely manner to assist them in responding to the bid.

1.11.3 Negotiating in good faith with interested MBEs/WBEs DBEs that have submitted bids to the bidder.

1.11.4 Publishing notice in a local publication such as a newspaper, trade association publication or via electronic/social media.

1.11.5 Not rejecting MBEs/WBEs or DBEs as being unqualified without sound reasons based on a thorough investigation of their capabilities.

1.11.6 Making economically feasible portions of the work available to MBE/WBE or DBE subcontractors and suppliers and to select those portions of the work or material needs consistent with the available MBE/WBE or DBE subcontractors and suppliers, so as to facilitate meeting the goals or subgoals.

1.11.7 The ability or desire of the bidder to perform the project work with its own

organization does not relieve the bidder of the responsibility to make Good Faith Efforts.

1.11.8 Bidders are not required to accept higher quotes in order to meet the goals or subgoals.

1.11.9 Effectively using the services of Minority Person/Women community organizations; Minority Person/Women Contractors groups; local, state and federal Minority Person/Women business assistance offices; and other organizations to provide assistance in solicitation and utilization of MBEs, WBEs and/or DBEs.

1.11.10 In assessing minimum Good Faith Efforts, the OWNER may consider (1) whether the bidder sought guidance from the City of Austin Small and Minority Business Resources Department (SMBR) on any question regarding compliance with these requirements; and (2) the performance of other bidders in meeting the goals.

For additional information, refer to the MBE/WBE or DBE Compliance Program Requirements Volume of the Project Manual.

Bid shopping is not allowed in conjunction with this solicitation and may result in the disqualification of prospective bidders and subcontractors.

2. ESTIMATES OF QUANTITIES (UNIT PRICE CONTRACTS ONLY)

Quantities listed in unit price Bid form are to be considered approximate quantities and will be used only for comparison of Bids. Payment to CONTRACTOR will be made only for actual quantities of Work performed or materials furnished in accordance with Contract and it is understood that quantities may be increased or decreased as provided in Section 00700, General Conditions, and as may be modified by Section 00810, Supplemental General Conditions.

3. DRAWINGS, PROJECT MANUAL AND SITE (S) OF WORK

Before submitting a Bid, the Bidder shall carefully examine the Bid Documents, site(s) of the proposed Work, soils, and other conditions that may affect the performance of the Work to satisfy the Bidder as to character, quality and quantities of Work to be performed and materials to be furnished. By submitting a Bid, the Bidder will be deemed to have certified that the Bidder has complied with these requirements. If, during preparation of the Bid, the Bidder discovers any suspected discrepancies or errors, the Bidder must immediately notify the Authorized Contact Person in writing of the suspected discrepancy or error. Failure to provide written notice of any suspected discrepancies or errors may be cause for rejection of the Bid.

4. BID GUARANTY

All Bids shall be accompanied by a Bid guaranty in an amount of not less than five percent (5%) of the total Bid. Bid guaranty will be a Bid bond with Power of Attorney attached, issued by a solvent surety authorized under laws of the State of Texas and acceptable to OWNER. For Bidders electing to submit Bids and Bid Guaranties electronically via Austin Finance Online, Bid Guaranties will be verified by the Owner prior to bid certification and electronic copies of Bid Guaranties will not be returned to Bidders.

The Bid guaranty accompanying the Bid of the three (3) apparent low Bidders will be retained until Contract is awarded and successful Bidder executes Contract and furnishes required

bonds and insurance, after which Bid guaranties will be returned to the Bidders. All other Bid guaranties will be returned after Bid certification. In the event that the Bidder to whom the Contract is awarded fails to execute the Contract within five (5) working days of receipt of a complete set of Contract Documents the Bidder agrees that the OWNER in its discretion may rescind the initial award and award the Contract to the next lowest responsible Bidder.

5. PERFORMANCE AND PAYMENT BONDS

When performance and/or payment bonds are required, each shall be issued in an amount equal to the Contract Amount as security for the faithful performance and/or payment of all Contractor's obligations under the Contract Documents. Performance and payment bonds shall be issued by a solvent corporate surety authorized to do business in the State of Texas, and shall meet any other requirements established by law or by OWNER pursuant to applicable law.

6. CONSIDERATION OF BID AMOUNT

For purpose of award, after Bids are opened, reviewed, and certified, the total amount of the Bid, including accepted Bid alternates, will be considered the amount of the Bid. Certified Bid tabulations will be made available to the public through the City's Vendor Connection website, log on
https://financeonline.austintexas.gov/afo/account_services/solicitation/solicitations.cfm.
OWNER reserves the right to reject any or all Bids and to waive any minor informality in any Bid or solicitation procedure (a minor informality is one that does not affect the competitiveness of the Bids).

7. SUBMISSION OF BID

Each Bid must be completed and signed by person(s) authorized to bind individual, partnership, firm, corporation, or any other legal entity submitting the Bid, and, shall include the following electronically via Austin Finance Online eResponse:

7.1 One copy of Bid form (Section 00300L or 00300U) completed and signed.

7.2 Acknowledgment of receipt of Addenda issued in spaces provided in Bid form.

7.3 One copy of Required Bid guaranty

7.4 Required Information indicated in Drawings or Project Manual as specified in Section 00820.

7.5 One copy of Total Bid Form.
Bid must be accompanied by an MBE/WBE or DBE Compliance Plansubmitted electronically via Austin Finance Online, prior to the date and time set forth in Section 00020, Invitation for Bids. The Compliance Plan forms are included in the MBE/WBE Procurement Program Package or DBE Procurement Program Package (a separately bound volume).

Bid shall include all specified items in this section submitted electronically via Austin Finance Online.

In submitting its Bid, Bidder certifies that it has not lobbied the City or its officials, managers, employees, consultants, or contractors in such a manner as to influence or to attempt to influence the bidding process. In the event it reasonably appears that the Bidder influenced or attempted to influence the bidding process, the City may, in its discretion, reject

the Bid.

8. WITHDRAWAL OF BID

For withdrawal of an electronic bid see eResponse Instructions.

9. REJECTION OF BIDS

9.1 The following **will** be cause to reject a Bid:

9.1.1 Failure to submit Section 00300 (Bid Form) and signed by an individual empowered to bind the Bidder.

9.1.2 Bids which are not accompanied by acceptable Bid guaranty, with Power of Attorney attached, or a letter certifying the Bidder's ability to be bonded, from a surety company, in accordance with Paragraph 4 above.

9.1.3 More than one Bid for same Work from an individual, firm, partnership or corporation.

9.1.4 Evidence of collusion among Bidders.

9.1.5 Sworn testimony or discovery in pending litigation with OWNER which discloses misconduct or willful refusal by contractor to comply with subject contract or instructions of OWNER.

9.1.6 Failure to submit MBE/WBE or DBE Compliance Plan in accordance with the separately bound volume titled MBE/WBE Procurement Program Package or DBE Procurement Program Package.

9.1.7 Failure to have an authorized agent of the Bidder attend the mandatory Pre-Bid Conference, if applicable.

9.1.8 Bids received from a Bidder who has been debarred or suspended by OWNER's Purchasing Officer.

9.1.9 Bids received from a Bidder when Bidder or principals are currently debarred or suspended by Federal, State or City governmental agencies. (Applicable for Bid amounts equal to or in excess of $25,000.00).

9.1.10 Bids received from a Bidder, who is identified on a list maintained by the Texas Comptroller of Public Accounts as a company known to have contracts with or provide supplies or services to a foreign terrorist organization, unless otherwise exempted from sanctions by the United States government.

9.2 The following **may** be cause to reject a Bid:

9.2.1 Poor performance in execution of work under a previous City of Austin contract.

9.2.2 Failure to achieve reasonable progress on an existing City of Austin contract.

9.2.3 Default on previous contracts or failure to execute Contract after award.

9.2.4 Evidence of failure to pay Subcontractors, Suppliers or employees in accordance with Contract requirements.

9.2.5 Bids containing omissions, alterations of form, additions, qualifications or conditions not called for by OWNER, or incomplete Bids may be rejected. In any case of ambiguity or lack of clarity in the Bid, OWNER reserves right to determine most advantageous Bid or to reject the Bid.

9.2.6 Failure to acknowledge receipt of Addenda.

9.2.7 Failure to submit any of the items specified below in paragraph 11, "Submission of Post Bid Information".

9.2.8 Failure to identify a dollar amount (price) of a unit price(s) in the 00300U including all Bid Alternates in the Bid Form 00300U or 00300L.

9.2.9 Failure to submit post-Bid information within the allotted time(s) (see paragraph 11 for post-Bid requirements).

9.2.10 Failure to timely execute Contract after award.

9.2.11 Previous environmental violations resulting in fines or citations by a governmental entity (i.e. U.S. Environmental Protection Agency, Texas Commission on Environmental Quality, etc.).

9.2.12 Safety record as set forth in Section 00410, Statement of Bidder's Safety Experience.

9.2.13 Failure of Bidder to demonstrate the minimum experience required as specified in Section 00400 if that Section is included in the bidding documents.

9.2.14 Evidence of Bidder's lack of sufficient resources, workforce, equipment or supervision, if required by inclusion of appropriate attachments in Section 00400.

9.2.15 Evidence of poor performance on previous Projects as documented in Owner's project performance evaluations.

9.2.16 Unbalanced Unit Price Bid: "Unbalanced Bid" means a Bid, which includes a Bid that is based on unit prices which are significantly less than cost for some Bid items and significantly more than cost for others. This may be evidenced by submission of unit price Bid items where the cost are significantly higher/lower than the cost of the same Bid items submitted by other Bidders on the project.

10. PROTEST PROCEDURES

The OWNER's Chief Procurement Officer or designee has the authority to settle or resolve any claim of an alleged deficiency or protest. The procedures for notifying the City of an alleged deficiency or filing a protest are listed below. If you fail to comply with any of these requirements, the Chief Procurement Officer or designee may dismiss your complaint or protest.

10.1 Protest regarding the Solicitation (Pre-Submittal of Bid Protest). Any protest regarding the Solicitation by the City shall be filed no later than five (5) days prior to the due

date and time for Bids. Any protest filed after that date which raises issues regarding the Solicitation will not be considered.

10.2 Protests regarding the evaluation of Bids. Any protest regarding the evaluation of Bids by the City shall be filed with the City no later than five (5) days after the notification of award recommendation is posted on Austin Finance Online, or notification that the protestor's status as a Bidder has changed, such as notification that a Bid has been found to be non-responsive or a Bidder has been found to be non-responsible. Any protest filed after such date which raises issues regarding the evaluation will not be considered. Bidders may only protest the evaluation of their Bid.

10.3 Protest Regarding Award of Contract (Post-Award Protest). Any protest regarding the award of the contract shall be filed no later than ten (10) days after the date of award. Any protest regarding the award of the contract filed after such date will not be considered.

10.4 You shall submit your protest in writing and it shall include the following information: (i) your name, address, telephone, and email address; (ii) the Solicitation number; (iii) the specific facts and/or law upon which the protest of the Solicitation or the award is based, including all pertinent documents and evidence thereto; and (iv) the form of relief requested.

10.5 Your protest shall be concise and presented logically and factually to help with the City's review.

10.6 When the City receives a timely written protest, the Chief Procurement Officer or designee will determine whether the grounds for your protest are sufficient. If the Chief Procurement Officer or designee decides that the grounds are sufficient, the Chief Procurement Officer or designee will schedule a protest hearing, usually within five (5) working days. If the Chief Procurement Officer or designee determines that your grounds are insufficient, the City will notify you of that decision in writing.

10.7 The protest hearing is informal and is not subject to the Open Meetings Act. The purpose of the hearing is to give you a chance to present your case, it is not an adversarial proceeding. Those who may attend from the City are: representatives from the department that requested the purchase, the Department of Law, the Financial Services Department, and other appropriate City staff. You may bring a representative or anyone else that will present information to support the factual grounds for your protest with you to the hearing.

10.8 A decision will usually be made within fifteen (15) calendar days after the hearing.

10.9 The City will send you a copy of the hearing decision after the appropriate City staff has reviewed the decision.

10.10 When a protest is filed, the City usually will not make an award until a decision on the protest is made. However, the City will not delay an award if the City Manager or the Chief Procurement Officer or designee determines that the City urgently requires the supplies or Services to be purchased, or failure to make an award promptly will unduly delay delivery or performance. In those instances, the City will notify you and make every effort to resolve your protest before the award.

10.11 The protest shall be submitted in writing to the Authorized Contact Person – Capital Contracting Contact identified in the Invitation for Bids, Section 00020.

11. SUBMISSION OF POST BID INFORMATION

11.1 Prior to determination of the certified low Bidder, the three (3) apparent low Bidders must submit to OWNER the following information within three (3) business days of receipt of notice of apparent low Bidder status by the OWNER:

11.1.1 One copy of Attachments A-I and any other specifically designated Attachments of the Statement of Bidder's Experience (Section 00400), completed and signed. (Unless provided to the contrary in Section 00820 Modifications to Bidding Requirements and Contract Forms). (Note: OWNER reserves the right to solely determine whether the comparable experience documentation provided by the Bidder is sufficient and relevant to the Work described in the Contract Documents for the Bidder to be considered a responsible Bidder.)

11.1.2 One Copy of the Certificate of Non-Suspension or Debarment (Section 00405), completed and signed. (Applicable for Bid amounts equal to or in excess of $25,000.00.)

11.1.3 One copy of Section 00410, Statement of Bidder's Safety Experience, including required attachments, completed and signed.

11.1.4 One copy of the Title VI Assurances Appendix A (Section 00631), completed and signed.

11.1.5 One copy of the Title VI Assurance Appendix E (Section 00632), completed and signed.

11.1.6 One copy of Exhibit A Federal Provisions (Section 00810A) completed and signed. (Federal projects only)

11.1.7 Such other information as is required to evaluate Bid or Bidder.

11.2 Upon notification of status as certified low Bidder, Bidder shall submit the following information to OWNER within three (3) business days:

11.2.1 Confirmation Letters between Bidder and all subcontractor(s) and all supplier(s) identified in the MBE/WBE Compliance Plan.

11.2.2 Section 00425A, Insurance Cost Form. For ROCIP projects.

11.2.3 Section 00425B, Contractor Affidavit of Receipt and Provision of ROCIP Information, and Subcontractor Affidavit of Receipt and Provision of ROCIP Information (for Subcontractor(s) of all tiers identified in the MBE/WBE Compliance Plan). For ROCIP projects.

11.2.4 Section 00830WT, Wage Theft Certification Form.

11.2.5 Such other information as required. In addition, the Bidder acknowledges and agrees that the failure to timely provide the additional information required by this section will result in a determination that, for the purposes of this solicitation, the Bidder has not provided sufficient information for the OWNER to be able to determine that the Bidder is a responsible Bidder.

12. AWARD AND EXECUTION OF CONTRACT

OWNER will process Bids expeditiously. Award of Contract will be to the lowest, responsible Bidder meeting all requirements of the Bid Documents. OWNER may not award Contract to a nonresident Bidder unless the nonresident underbids the lowest Bid submitted by a responsible resident Bidder by an amount that is not less than the amount by which a

resident Bidder would be required to underbid the nonresident Bidder to obtain a comparable contract in the state in which the nonresident's principal place of business is located.

Award of Contract will occur within the period identified on the Bid form, unless mutually agreed between the parties. Capital Contracting Officer shall submit recommendation for award to the City Council for those project awards requiring City Council action. Contract will be signed by City Manager or his/her designee after award and submission of required documentation by Bidder. Contract will not be binding upon OWNER until it has been executed by both parties. OWNER will process the Contract expeditiously. However, OWNER will not be liable for any delays prior to the award or execution of Contract.

Upon contract award, the selected Bidder must submit either their existing or an updated personnel policy (on letterhead) documenting conformity with City Code, Chapter 5-4, § 5-4-2. If the company does not submit a copy of their personnel policy incorporating the non-discrimination policy, the City of Austin Nondiscrimination Policy (Section 00630) will be considered the Bidder's nondiscrimination policy.

In any case of ambiguity or lack of clarity in the Bid, OWNER reserves the right to determine the most advantageous Bid or to reject the Bid.

Notwithstanding anything in this Section 00100 to the contrary, the OWNER may award a contract for construction services in an amount of less than $100,000 to a bidder whose principal place of business is in the City of Austin and whose bid is within 5% of the lowest bid price received from a bidder whose principal place of business is not within the City of Austin, if the City finds that the local bidder offers the City the best combination of contract price and additional economic development opportunities for the City created by the contract award including the employment of resident of the City and increased tax revenues to the City.

13. PARTNERING

In order to complete the Work in a manner that is most beneficial to the OWNER and CONTRACTOR, OWNER and CONTRACTOR may form a "Partnering Team", which will include the E/A, and any major Subcontractors. This partnering relationship will draw on the strength of all parties to identify and achieve mutual goals. The objectives of this partnering relationship are effective and efficient communication and Contract performance, which is intended to ensure that the Project is completed within budget, on schedule, and in accordance with the Drawings and Specifications and other Contract requirements. While the partnering relationship will be multilateral in makeup and participation will be totally voluntary, the OWNER and CONTRACTOR agree to cooperate and use reasonable good faith efforts to discuss and resolve any and all Project issues and disputes. Section 01100, Special Project Procedures and/or Section 01200, Project Meetings contain additional information regarding the intent of the partnering relationship and responsibilities of the entities entering into the partnering charter.

14. ROCIP REQUIREMENTS

If the insurance on this Project will be under the Rolling Owner Controlled Insurance Program (ROCIP), the Bidder is directed to Section 00810, Supplemental General Conditions, Section 00820, Modifications to Bidding Requirements and Contract Forms, and the Project Safety Manual included with these contract documents for information and bidding requirements.

The Insurance Cost Form, Section 00425A must be accurately completed and submitted by the certified low bidder as a post bid submittal to indicate insurance was removed from the Base Bid and Alternates. CONTRACTOR shall remove from the Bid the cost of insurance for the CONTRACTOR and Subcontractors of all tiers working on site.

The Rolling Owner Controlled Insurance Program Information, Section 00425B, Contractor Affidavit of Receipt and Provision of ROCIP Information and Subcontractor Affidavit of Receipt and Provision of ROCIP Information for subcontractor(s) of all tiers identified in the MBE/WBE Compliance Plan must be accurately completed and submitted by the certified low bidder as a post bid submittal. Subcontractor Affidavits must be submitted throughout the duration of the Contract as Subcontractor(s) are added.

15. SIGNATURE REQUIREMENTS

The Bid and any subsequent supporting Bid documents and Contract must be executed in the Bidder's full name and legal entity status by an authorized representative of the Bidder. Accordingly, a partnership/joint venture must file its partnership/joint venture agreement, a corporation must file its articles and bylaws, a limited liability company must file its certificate of organization and article of organization and regulations, and a limited partnership must file not only limited partnership agreement and the certificate of limited partnership, but also the documentation for its general partner, and any Bidder must file a copy of any assumed name certificate, or such limited portion of such documents reasonably establishing signature authority.

16. CONTRACTOR EVALUATION

The Owner will review and evaluate the Contractor's Work and performance on the Project and provide the Contractor with a written Contractor Evaluation Report in accordance with City of Austin Administrative Rule R161-13.37. Rule R161-13.37 provides an appeal process. http://www.austintexas.gov/department/contract-management

17. TEXAS ETHICS COMMISSION CERTIFICATE OF INTERESTED PARTIES DISCLOSURE FORM

17.1 Definitions:

17.1.1 "Interested Party" – means a person who has a controlling interest in a Business Entity with whom the Owner contacts or who actively participates in facilitating the Contract or negotiating the terms of the Contract, including a broker, intermediary, adviser, or attorney for the Business Entity.

17.1.2 "Business entity" - includes an entity through which business is conducted with a governmental entity or state agency, regardless of whether the entity is a for-profit or nonprofit entity. The term does not include a governmental entity or state agency.

17.2 As a condition to entering the Contract, the Business Entity constituting the successful Bidder must provide a Texas Ethics Commission Certificate of Interested Parties Form to the Owner at the time the Business Entity/Bidder submits the signed Contract to the Owner in full compliance with the following requirements under which the successful Bidder shall:

17.2.1 Go to the Ethics Commission's website (www.ethics.state.tx.us),

17.2.2 Complete the "Interested Parties" information, in accordance with the requirements of the Texas Ethics Commission Rules published at Title 1, Part 2, Chapter 46, of the Texas Administrative Code and available on the referenced website,

17.2.3 Include the City's contract identification number,

17.2.4 Include a short description of the goods or services to be used by the City, and

17.2.5 Indicate whether each interested party has a controlling interest in the business entity, is an intermediary in the contract for which the disclosure is being filed, or both.

17.3 In accordance with the Commission Rules, the Certificate of Filing and completed Certificate of Interested Parties must be (i) printed, (ii) signed by an authorized agent of the business entity, and (iii) submitted to the City at the time of the submission of the signed contract to the City. The City then must notify the Ethics Commission in electronic format of receipt of the document within 30 days of contracting and the Commission will make the disclosure of interested parties available to the public on its website.

END

GEOTECHNICAL DATA
Section 00220

1. OVERVIEW

Depending on Project requirements, OWNER may have obtained geotechnical information, which may include laboratory test results and logs of borings from geotechnical consultants. That information will be included in this section and/or on the Drawings. The CONTRACTOR shall be familiar with the subsurface materials and conditions on the Project and shall be knowledgeable of how they will affect the Work. The following is a partial listing of sources of information available to the CONTRACTOR about subsurface materials and conditions: the geotechnical information provided by the OWNER; geologic maps, publications and reports available from the University of Texas Bureau of Economic Geology at the J.J. Pickle Research Center in Austin, Texas; subcontractors familiar with local ground conditions; and, local consulting geologists and geotechnical engineers. The CONTRACTOR may make their own subsurface investigations.

- ***Geotechnical Data Report MLK TOD Stormwater Conveyance Improvements Phase 3***
    - Report No. AG 13 16240.3, Prepared by HVJ South Central Texas, Dated February 4, 2025.
- ***Geotechnical Design Report MLK TOD Stormwater Conveyance Improvements Phase 3***
    - Report No. AG 13 16240.3, Prepared by HVJ South Central Texas, Dated February 4, 2025.
- ***Pavement Design Report MLK TOD Stormwater Conveyance Improvements Phase 3***
    - *Report No. AP 13 16240.3,* Prepared by HVJ South Central Texas, Dated September 3, 2025.

The requirements in the Drawings and Specifications shall be used in the event of a conflict between this report and the Drawings and Specifications.

END

GEOTECHNICAL DATA REPORT
MLK TOD STORMWATER CONVEYANCE IMPROVEMENTS PHASE 3
AUSTIN, TEXAS

SUBMITTED TO
FREESE AND NICHOLS, INC.
10431 MORADO CIRCLE
BUILDING 5, SUITE 300
AUSTIN, TEXAS 78759

BY
HVJ SOUTH CENTRAL TEXAS- M& J, INC.
FEBRUARY 4, 2025

REPORT NO. AG 13 16240.3

4201 Freidrich Lane, Suite 110
Austin, Texas 78744
512.447.9081 Ph
512.443.3442 Fax
www.hvj.com

February 4, 2025

Mr. Will Huff, PE, CFM
Freese and Nichols, Inc.
10431 Morado Circle
Building 5, Ste. 300
Austin, Texas 78759

Re: Geotechnical Investigation Data Report
MLK TOD Stormwater Conveyance Improvements Phase 3
Owner: City of Austin
HVJ Proposal No. AG 13 16240.3

Dear Mr. Huff:

Submitted herein is the final geotechnical data report for the above referenced project. This study was performed in accordance with Master Subconsultant Agreement executed on March 27, 2017 between Freese And Nichols, Inc. and HVJ South Central Texas - M&J, Inc., and the proposal number AG 13 16240.3 dated April 15, 2021 (Revised May 19, 2021, June 3, 2021, June 3, 2022, and October 12, 2022*).*

It has been a pleasure to work for you on this project and we appreciate the opportunity to be of service. Please notify us if there are questions or if we may be of further assistance.

Sincerely,

HVJ South Central Texas – M&J, INC.
Texas Firm Registration No. F-18091

Leo Ruiz, PE
Vice President of Geotechnical

STATE OF TEXAS
BHUPENDRA CHAND
142143
LICENSED PROFESSIONAL ENGINEER
2/4/2025

Bhupendra Chand, PE
Project Manager

This seal appearing on this document was authorized by Bhupendra Chand, PE 142143 on February 4, 2025. Alterations of a sealed document without proper notification to the responsible engineer is an offense under the Texas Engineering Practice Act.

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I. EXECUTIVE SUMMARY

HVJ South Central Texas-M&J, Inc. (HVJSCTx), was retained by Freese and Nichols, Inc. (FNI) to perform a geotechnical investigation for the MLK TOD Stormwater Conveyance Improvements Phase 3 Project in Austin, Texas. It is our understanding that, as part of this MLK TOD project, FNI will be expanding the project area to include a new storm drain system as well as any associated utility relocations and roadway reconstruction along Manor Road, including Larry Lane, Merrie Lynn Avenue, and Alexander Avenue. A storm drain will also be included along Randolph Road; however, we understand this area will only require trench repair for the roadway. The proposed water and wastewater lines are expected to have diameter ranging from 18-48 inches and invert depths ranging from 5-15 feet below the existing grade. A map of the Site Vicinity is provided on Plate 1.

A brief summary of the investigational finding is presented below.

1. Four (4) borings were drilled to depths of 20 feet below the existing grade for a total of 80 linear feet to characterize the subsurface conditions and the properties of the soils.

2. The borings were drilled through the existing pavement sections consisting of 2 to 5-inches of asphaltic concrete overlying 8 to 12-inches of tan flexible base.

3. In general, the soil conditions encountered in the borings B-1 thru B-3 consisted of fill soils classified as very stiff to hard, brown Sandy Fat Clay (CH) with gravel and calcareous deposits to the depths of 6 feet below the surface grade. Below the fill material, soils of Upper Colorado River Terrace Deposits (Qucr) formation classified as stiff to hard, light brown to brown Lean Clay (CL) and Fat Clay (CH) with various amount of sands and calcareous deposits were encountered to the termination depth of 20 feet. Soils of Upper Colorado River Terrace Deposits (Qucr) formation encountered in boring B-4 from the surface level to the termination depth of 20 feet were classified as light brown to brown, hard Fat Clay (CH).

4. Two (2) borings on Manor Road and a boring on Randolph Road were previously drilled as a part of City of Austin Upper Boggy West Water Line Improvements Phase I project. The boring data obtained from theses borings will be included in this Geotechnical Data Report to aid in design recommendations for the Pavement Design Report which will be submitted under a separate cover. These borings are presented in Appendix B.

5. Groundwater was not encountered during drilling operations. Groundwater levels may fluctuate seasonally, in response to climatic conditions and with precipitation events. Perched groundwater conditions may also exist at the clay and sand layer interface.

   Please note that this executive summary does not fully relate our findings and opinions. Those findings and opinions are only presented though our full report.

1 INTRODUCTION

1.1 General

HVJ South Central Texas-M&J, Inc. (HVJSCTx), was retained by Freese and Nichols, Inc. (FNI) to perform a geotechnical investigation for the MLK TOD Stormwater Conveyance Improvements Phase 3 Project in Austin, Texas. It is our understanding that, as part of this MLK TOD project, FNI will be expanding the project area to include a new storm drain system as well as any associated utility relocations and roadway reconstruction along Manor Road, including Larry Lane, Merrie Lynn Avenue, and Alexander Avenue. A storm drain will also be included along Randolph Road; however, we understand this area will only require trench repair for the roadway. The proposed water and wastewater lines are expected to have diameter ranging from 18-48 inches and invert depths ranging from 5-15 feet below the existing grade. A map of the Site Vicinity is provided on Plate 1.

HVJ Associates, Inc. will perform a pavement design report utilizing this Geotechnical Data Report (GDR) and will be submitted under a separate cover.

1.2 Scope of Work

The primary objective of this study was to gather information on subsurface conditions at the project site and prepare a data report summarizing our findings.

This objective was accomplished by:

- Drilling four (4) borings to depths of 20 feet below the existing grade to determine soil stratigraphy and to obtain samples for laboratory testing.

- Performing laboratory tests on select soil samples to determine the physical and engineering properties of the subsurface materials; and

- Compile the findings from the geotechnical investigation into a Geotechnical Data Report (GDR).

Subsequent sections of this report contain descriptions of the field exploration, laboratory testing program, general site and subsurface conditions, groundwater conditions, and limitations.

2 FIELD EXPLORATION

2.1 General

Drilling operations for the field exploration program were performed on March 22, 2023. The borings were advanced using a truck mounted drill rig equipped with standard soil sampling equipment. The boring locations were selected by the client, FNI with agreement by HVJ Associates, Inc. and HVJSCTx. The boring locations are shown on the Plan of Borings, Plate 3 and the following table provides the detail boring information.

Table 2-1: Boring Information

Boring	Street Address (Approximate)	Depth (ft)	Northing	Easting	Elevation (ft)
B-1	3203 Larry Lane	20	10077351.27	3123534.26	586.98
B-2	2779 Manor Road	20	10077252.02	3123676.84	584.88
B-3	3203 Merrie Lynn Avenue	20	10077394.91	3123840.70	575.66
B-4	2219 Alexander Avenue	20	10077260.88	3124468.53	567.81
B-12**	Randolph Rd.	70	10077599.3	3124107.4	586.28
B-13**	Manor Rd.	60	10077361.29	3124223.13	573.3
B-14**	Manor Rd.	55	10077374.67	3124441.67	565.86

Note: Boring locations were professionally surveyed, and grid coordinates and elevations were provided by the client.
Units: Survey Feet
** Previously drilled boring as a part of City of Austin Upper Boggy West Water Line Improvements Phase I project.

2.2 Sampling Methods

Fine-grained, cohesive soils encountered were sampled using a 3-inch diameter thin-walled tube, which was pushed into the soil in general accordance with ASTM standard D 1587 -*Thin Walled Tube Sampling of Soils*. The samples were extruded in the field and a calibrated pocket penetrometer was used to obtain an estimate of the unconfined compressive strength of the sample.

Standard Penetration Tests (SPTs) were conducted within very stiff cohesive, and non-cohesive soils. The SPTs were performed in accordance with ASTM D 1586 – *Penetration Test and Split-Barrel Sampling of Soils*. This consisted of driving a standardized 1.50 ± 0.005 inch inner diameter split-spoon sampler into undisturbed soil with a safety 140-pound hammer falling 30 inches. A safety hammer with a 30 inch drop was used to perform the test. The split-spoon sampler was first seated 6 inches to penetrate any loose cuttings, and then driven an additional 12 inches with blows from the hammer. The number of hammer blows required to drive the sampler each 6-inch increment was recorded. The penetration resistance "N-value" is defined as the number of hammer blows required to drive the sampler the final 12 inches and was used in the field to estimate the density of granular soils or consistency of cohesive soils. In very dense material such as completely weathered rock material, the SPT test was typically stopped after 50 blows from the hammer and the measurement was recorded as 50 blows per distance penetrated (e.g. 50 over 3 inches).

The split-spoon and tube samples were logged in the field, which included providing a visual description in accordance with ASTM D 2488 – *Description and Identification of Soils*. After field documentation/logging was complete, the individual soil samples were wrapped in plastic bags to prevent loss of moisture and transported to our laboratory for further examination and testing.

The sampling information recorded in the field was used in conjunction with additional laboratory examination and testing to generate the final boring log, which is provided in Plate 4 to 7. A key of terms and symbols for the boring log is provided on Plate 8.

2.3 Groundwater Conditions

Groundwater was not encountered during drilling operations. Groundwater levels may fluctuate seasonally, in response to climatic conditions and with precipitation events. Perched groundwater conditions may also exist at the clay layer interface.

2.4 Borehole Completion

The borings were backfilled with soil cuttings and bentonite chips, and top two feet was backfilled with mixture of sand and gravel; and then the pavement section was topped with a single lift of cold mix asphalt to match the existing grade.

3 FIELD AND LABORATORY TESTING

Soil samples transported to our laboratory were further examined and described and a preliminary soil classification was assigned to each soil sample based on ASTM D 2487 – *Classification of Soil for Engineering Purposes.*

Classification testing, which included moisture content, Atterberg limits, and percent passing the No. 200 sieve, was subsequently conducted on select soil samples. In addition, unconfined compressive strength tests with wet and dry unit weight determinations were performed on select soil samples. All testing was performed in accordance with the relevant ASTM and TxDOT Standards as required. The results of these tests were used to confirm or modify the preliminary soil classifications.

3.1 Atterberg Limits

Select samples were tested to determine the Atterberg Limits of the selected samples in accordance with ASTM D 4318. The Atterberg Limit test is used to classify the soil using the Unified Soil Classification System (USCS). The Atterberg Limit test consists of two parts: a liquid limit test and a plastic limit test. The liquid limit equipment setup consists of a brass cup partially filled with soil, grooved with a specialized grooving tool, and then dropped freely from a specified height to the rubber base below at a constant rate of 2 drops per second. The liquid limit test is performed on soil that has been sieved through the No. 40 sieve and brought to a moisture content that would close the ½-inch groove within 20 to 30 blows for two consecutive tests. The moisture content of the soil is then measured and recorded as the liquid limit. The second part of the test consists of rolling a remolded sample between the tips of the fingers and a glass plate until transverse cracks appear at a rolled diameter of 1/8-inch. The moisture content of the rolled sample is taken and recorded as the plastic limit.

3.2 Moisture Content

Moisture content testing was performed on select soil samples to determine the in-situ state of moisture. Fresh samples are weighed before being placed in an oven with a controlled temperature of 230°F and dried back to a constant mass. Upon the drying and reweighing of the sample, the total mass of water lost was recorded. The ratio of the water lost to the dried mass is recorded as the moisture content. This test was performed in accordance with ASTM D 2216.

3.3 Percent Passing the No. 200 Sieve

In accordance with ASTM D 1140, a soil specimen is washed over a 75-μm (No. 200) sieve, removing silt, clay and other water-soluble materials. The loss in mass resulting from the washing process is calculated as mass percent of the original sample and is reported as the percentage of material finer than a 75-μm (No. 200) sieve. The results are used in conjunction with the Atterberg Limits determination to classify the soil using the Unified Soil Classification System (USCS).

3.4 Unconfined Compressive Strength Testing

Cohesive sample was tested for unconfined compressive strength in accordance with ASTM D2166-06. The intact specimen is placed in a loading device and is subjected to a load producing an axial strain at a rate between ½% and 2% per minute. The load is applied until failure occurs at the maximum rate of strain. The maximum axial strain is then used to calculate the soil's unconfined compressive strength.

4 SITE CHARACTERIZATION

4.1 General Geology

Austin, Texas is bounded by the Edwards Plateau to the west and the Gulf Coastal Plains to the east and southeast. These physiographic provinces are separated by the Balcones Fault Zone (BFZ), a belt of inactive faults, which trends generally southwest to northeast through central Texas. Though the BFZ is not considered seismically active, it is important in that subsurface conditions may vary significantly across the fault boundaries. Highly plastic clays and limestone rock can be expected next to each other in faulted areas, and the fractures associated with faulting have the potential for increased permeability. No mapped faults are present along the project alignment, however there is a mapped fault 2 miles north that extends in a south-west to north-east direction. Based on review of available geological information, and the field exploration program, the project alignment lies within the Upper Colorado River Terrace Deposits (Qucr) and Austin Group (Kau) as shown on the Geology Map, Plate 2. However, soils of Austin Group (Kau) were not encountered in the drilled borings but were encountered in previously drilled borings of City of Austin Upper Boggy West Water Line Improvements Phase I project.

The Upper Colorado River Terrace Deposits (Qucr) generally consist of gravel, sand, silt and clay in various proportions, with gravel more predominant in older, higher terrace deposits. This formation is locally indurated with calcium carbonate (caliche) in terraces along streams and Colorado River which contains mostly limestone, chert, quartz, and various igneous and metamorphic rocks from Llano Region and Edwards Plateau. The gravel content is generally higher in the upper terrace deposits and consists primarily of re-worked limestone and chert fragments.

The Austin Group (Kau), which generally consists of light gray to white chalk, marl, limestone and marly limestone, ranges in thickness from 325 feet to 420 feet in the Austin area. Seven formations are recognized within the Austin Group; however, these formations are not mapped separately. The limestone of the Austin Group varies from hard, fine-grained limestone to chalky and clayey limestone. Fossils and fossil shells are abundant throughout this group.

4.2 Subsurface Stratigraphy

Soil conditions at the project site described herein are based on information obtained at the boring locations only. Significant variations at areas not explored by the project borings may require reevaluation of our findings and conclusions. Subsurface soils encountered along the project alignment are discussed below.

The borings were drilled through the existing pavement section consisting of 2 to 5 inches of asphaltic concrete overlying 7 to 12 inches of tan flexible base. Table 4-2a below provides the pavement and base thicknesses.

Table 4-2a: Existing Pavement Details

Boring	Street Address (Approximate)	Asphalt Thickness (in)	Base Thickness (in)
B-1	3203 Larry Lane	2	8
B-2	2779 Manor Road	4	10
B-3	3203 Merrie Lynn Avenue	5	12
B-4	2219 Alexander Avenue	5	7

The soil conditions encountered in the borings B-1 thru B-3 consisted of fill soils classified as very stiff to hard, brown Sandy Fat Clay (CH) with gravel and calcareous deposits to the depths of 6 feet below the surface grade. Below the fill material, soils of Upper Colorado River Terrace Deposits (Qucr) formation classified as stiff to hard, light brown to brown Lean Clay (CL) and Fat Clay (CH) with various amount of sands and calcareous deposits were encountered to the termination depth of 20 feet. Soils of Upper Colorado River Terrace Deposits (Qucr) formation encountered in boring B-4 from the surface level to the termination depth of 20 feet were classified as light brown to brown, hard Fat Clay (CH).

Detailed descriptions of the materials encountered in the borings are displayed on the final boring logs presented in Plates 4-7. A summary of the laboratory test statistics is shown below in Table 4-2b. A complete summary of the laboratory test results can be found in Appendix A.

Table 4-2b: Laboratory Test Results Summary

Laboratory Test	Average	Maximum	Minimum	Standard Deviation	No. of Tests
Fill Soils					
Moisture Content (%)	25.2	27.3	21.2	4	3
Liquid Limit (%)	70	79	60	10	3
Plasticity Index (%)	52	60	46	7	3
% Passing No. 200 Sieve	62	65	58	4	3
Upper Colorado River Terrace Deposits (Qucr)					
Moisture Content (%)	15.6	18.3	11.6	2	9
Liquid Limit (%)	47	59	36	8	8
Plasticity Index (%)	32	48	20	9	8
% Passing No. 200 Sieve	75	89	54	12	8

Laboratory Test	Average	Maximum	Minimum	Standard Deviation	No. of Tests
Wet Unit Weight (pcf)	128	133	122	5	4
Unconfined Compressive Strength (tsf)	7	13	4	4	4

5 LIMITATIONS

This study was performed for the exclusive use of Freese and Nichols, Inc. (FNI) and MLK TOD Stormwater Conveyance Improvements Phase 3 Project located in Austin, Texas. HVJSCTx has endeavored to comply with generally accepted geotechnical engineering practices common in the local area. HVJSCTx makes no warranty, express or implied. Any analysis and recommendation contained in this report are based on data obtained from subsurface exploration, and laboratory testing performed and our experience with similar soils and site conditions.

The methods used indicate subsurface conditions only at the specific locations where samples were obtained, only at the time they were obtained, and only to the depths penetrated. Samples cannot be relied on to accurately reflect the strata variations that usually exist between sampling locations. Should any subsurface conditions other than those described in our boring logs be encountered, HVJSCTx should be immediately notified so that further investigation and supplemental recommendations can be provided.

In the event that any changes in the nature, design, or location of the project are made, any conclusion and recommendation in this report should not be considered valid until the changes are reviewed and the conclusions and recommendations modified or verified in writing by HVJSCTx.

PLATES

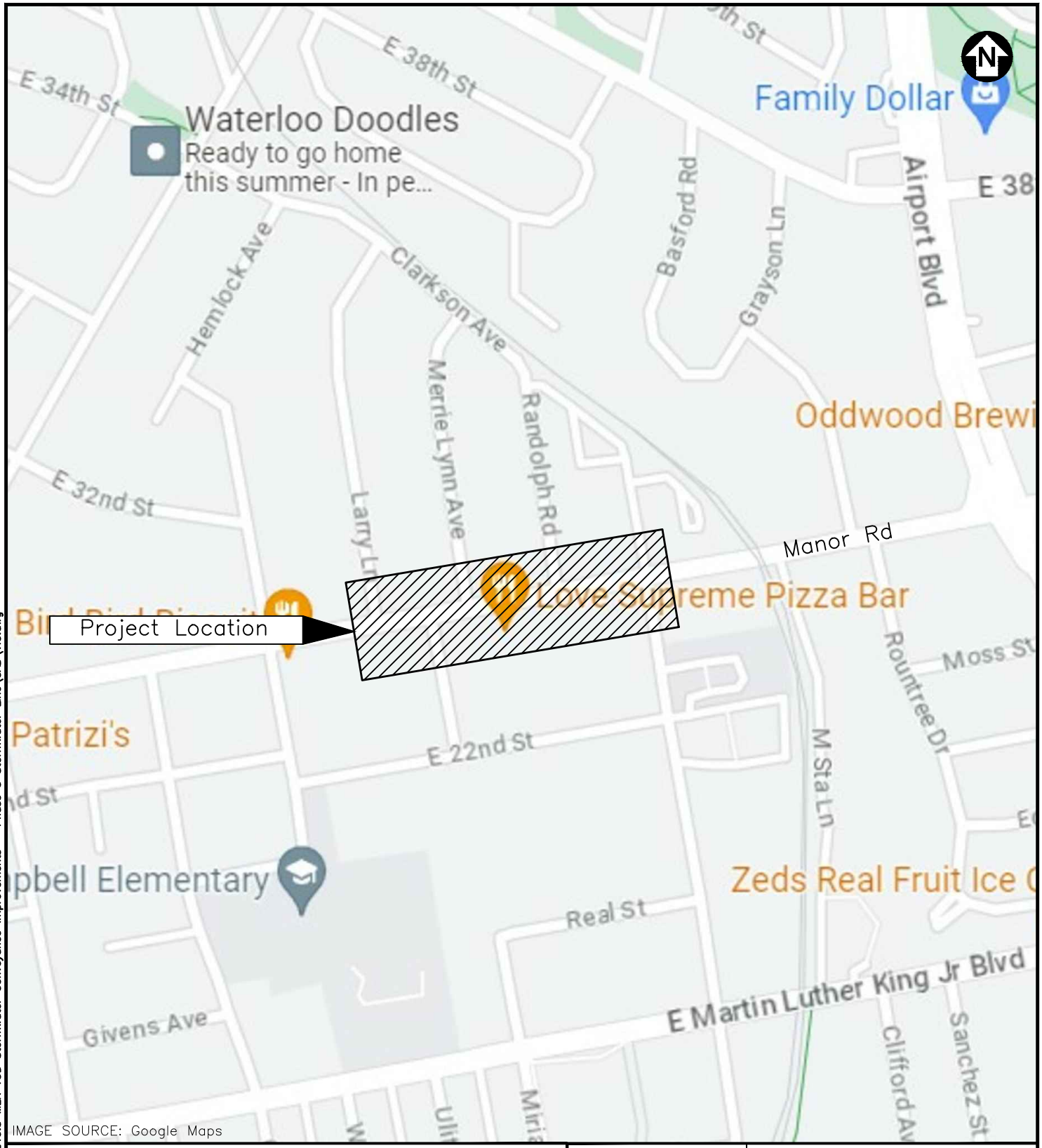

IMAGE SOURCE: Google Maps



MAP LOCATION

HVJ ASSOCIATES

SCALE: NTS		
DATE: 4/20/2023		
DRAWN BY: NGM	PROJ. CHK: BC	APPRV. BY: LR

SITE VICINITY MAP
MLK TOD STORMWATER CONVEYANCE IMPROVEMENTS – PHASE 3
AUSTIN, TEXAS

PROJECT NO.: AG 13 16240.3	FILENAME: VIC	PLATE 1

DATE: 3/3/2022 11:15AM
FILE: P:\GEO\Projects\2013\AG 13 16240.3 MLK TOD Stormwater Conveyance Improvements – Phase 3 Stormwater Line\CAD\VIC.dwg

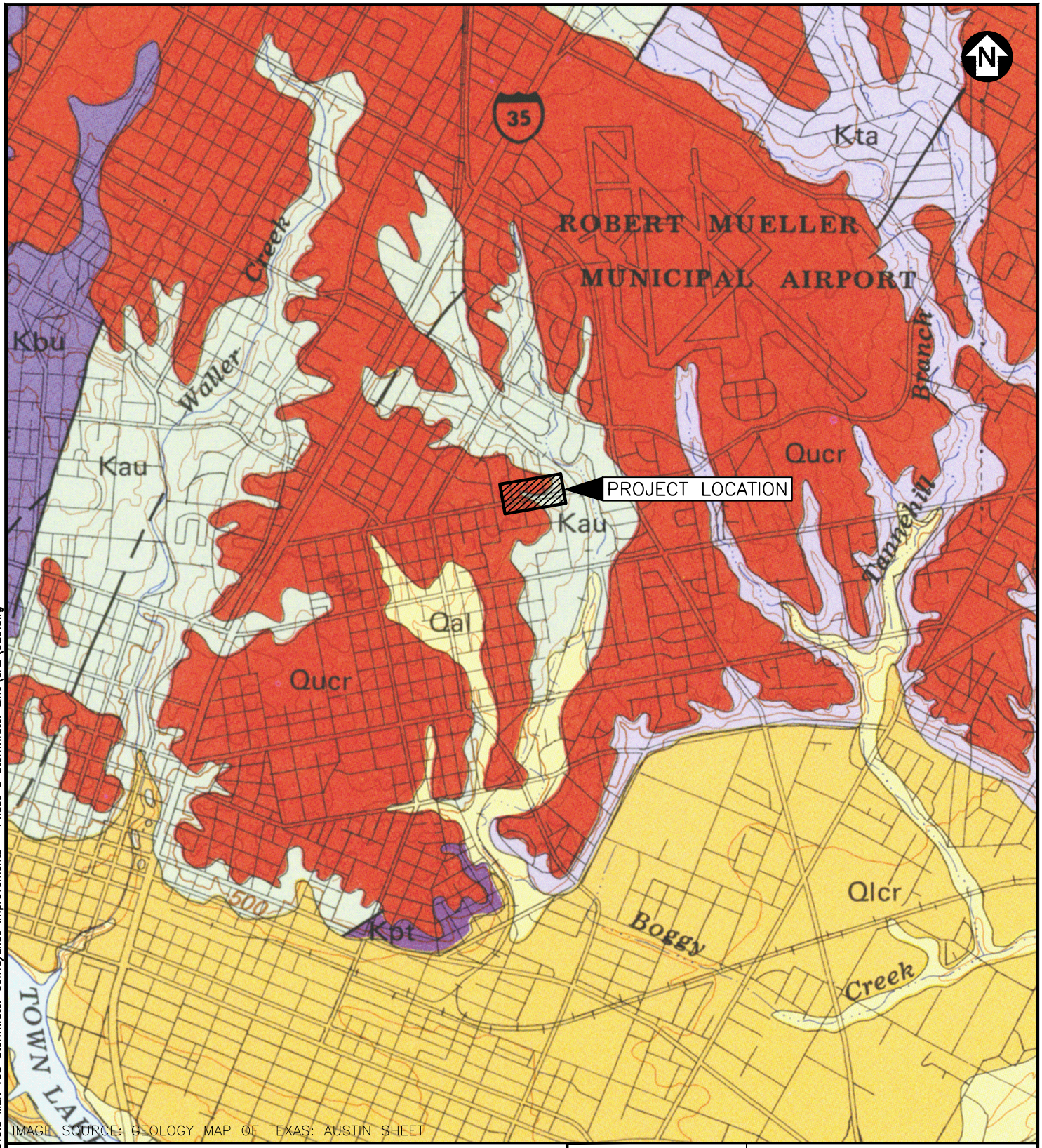

IMAGE SOURCE: GEOLOGY MAP OF TEXAS: AUSTIN SHEET

LEGEND

Kau	Austin Group
Qal	Alluvium
Qucr	Upper Colorado River Terrace Deposits
Qlcr	Lower Colorado River Terrace Deposits
Kta	Taylor Group
Kbu	Buda Formation
Kpt	Pilot Knob Tuff



MAP LOCATION

HVJ ASSOCIATES

SCALE: NTS		
DATE: 4/20/2023		
DRAWN BY: NGM	PROJ. CHK: BC	APPRV. BY: LR

GEOLOGY MAP
MLK TOD STORMWATER CONVEYANCE
IMPROVEMENTS – PHASE 3
AUSTIN, TEXAS

PROJECT NO.: AG 13 16240.3	FILENAME: GEO	PLATE 2

DATE: 9/24/2015 2:50 PM
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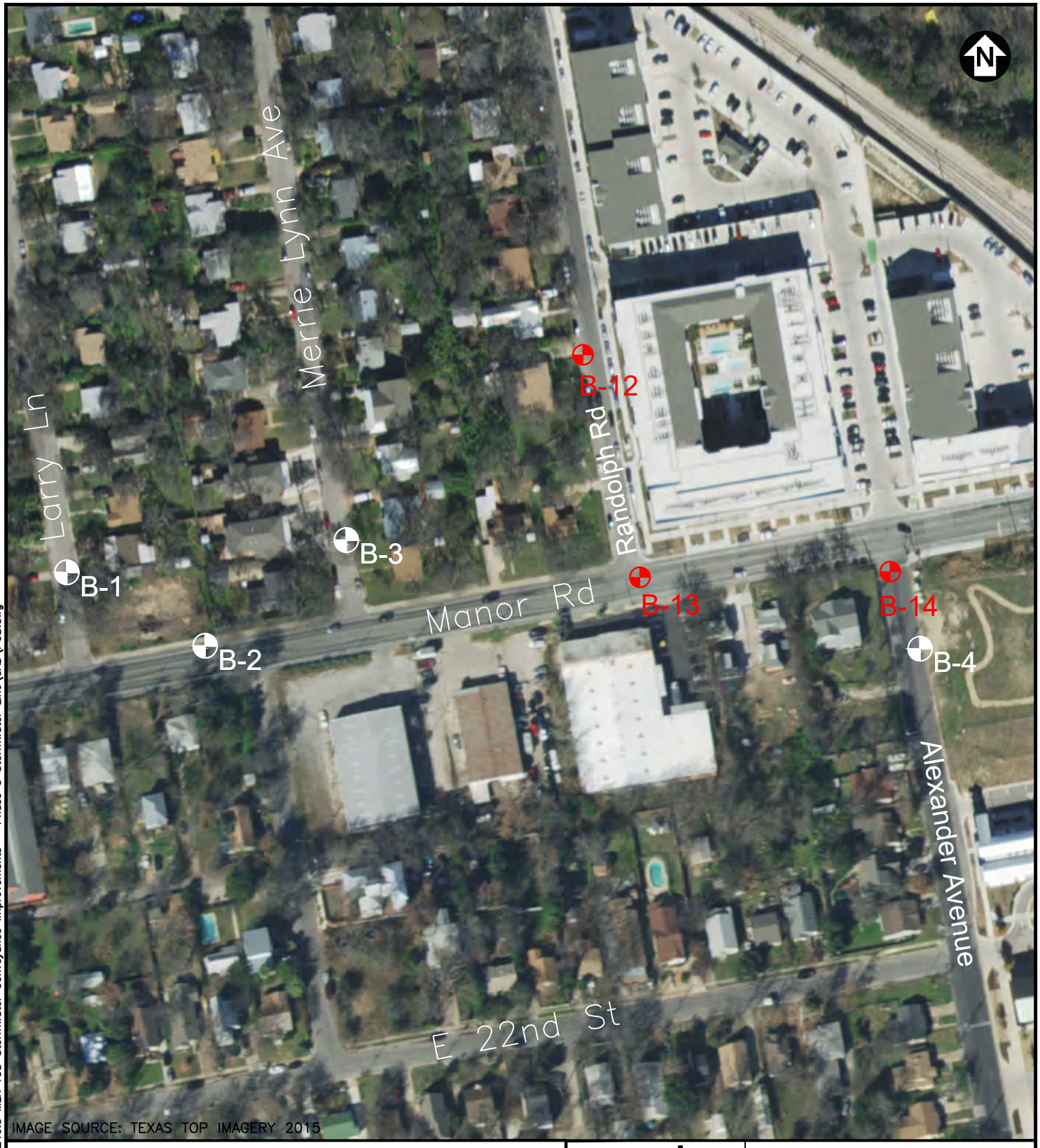


Boring Location

Boring Location-COA Upper Boggy West WW Line Project Borings



MAP LOCATION

HVJ ASSOCIATES

SCALE: 1"=150'		
DATE: 4/14/2023		
DRAWN BY: NGM	PROJ. CHK: BC	APPRV. BY: LR

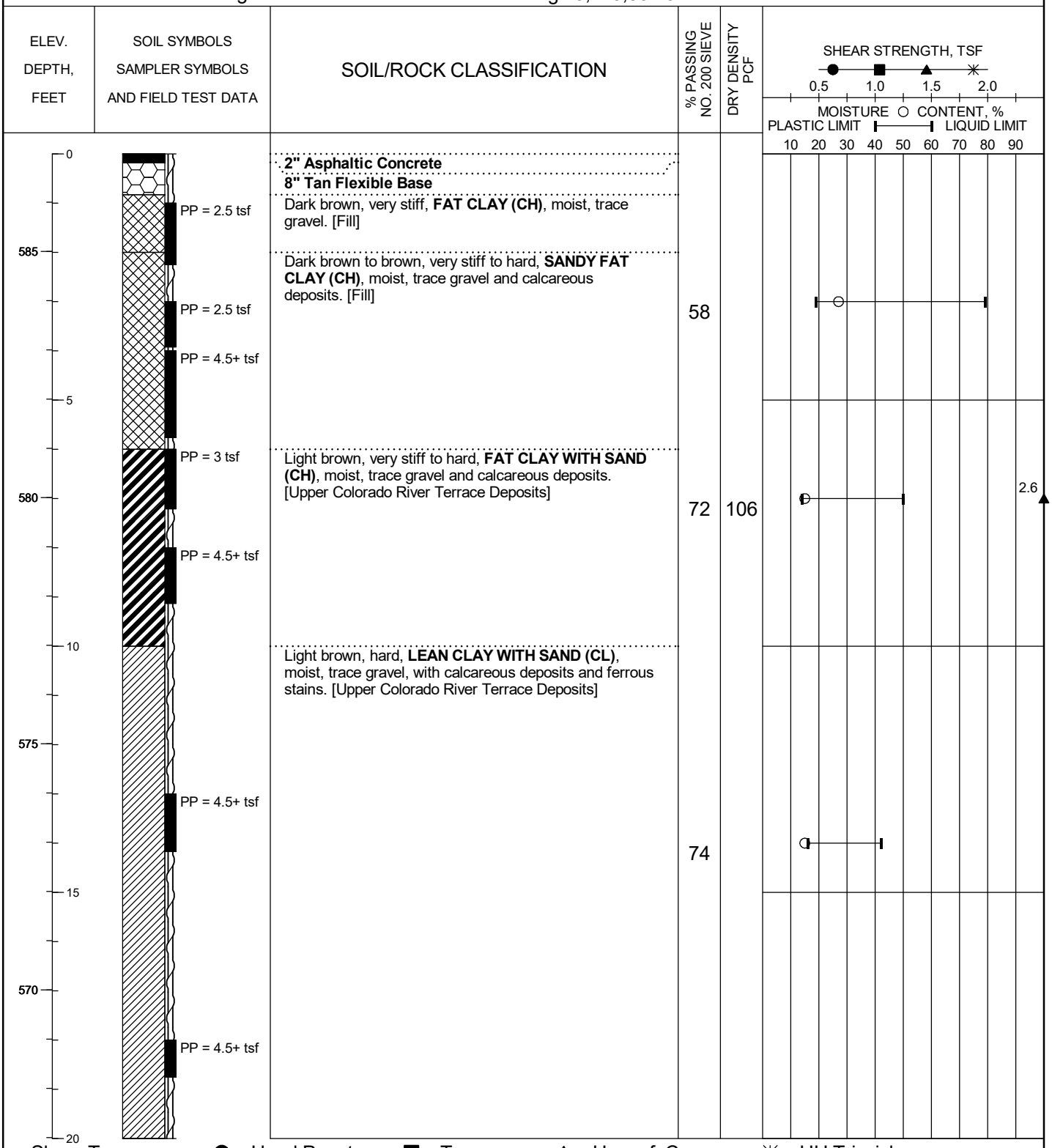
PLAN OF BORINGS
MLK TOD STORMWATER CONVEYANCE IMPROVEMENTS – PHASE 3
AUSTIN, TEXAS

PROJECT NO.: AG 13 16240.3	FILENAME: POB	PLATE 3

DATE: 3/3/2022 1:45PM
FILE: P:\GEO\Projects\2013\AG 13 16240.3 MLK TOD Stormwater Conveyance Improvements – Phase 3 Stormwater Line\CAD\POB.dwg

LOG OF BORING

Project: MLK TOD Stormwater Coveyance Improvements - Phase 3 | Project No.: AG 13 16240.3
Boring No.: B-1 (3203 Larry Lane) | Date: 3/22/2023 | Elevation: 586.98 feet
Groundwater during drilling: --- | Northing: 10,077,351.3 | Station: --
Groundwater after drilling: --- | Easting: 3,123,534.3 | Offset: --



Shear Types: ● = Hand Penet. ■ = Torvane ▲ = Unconf. Comp. ✳ = UU Triaxial

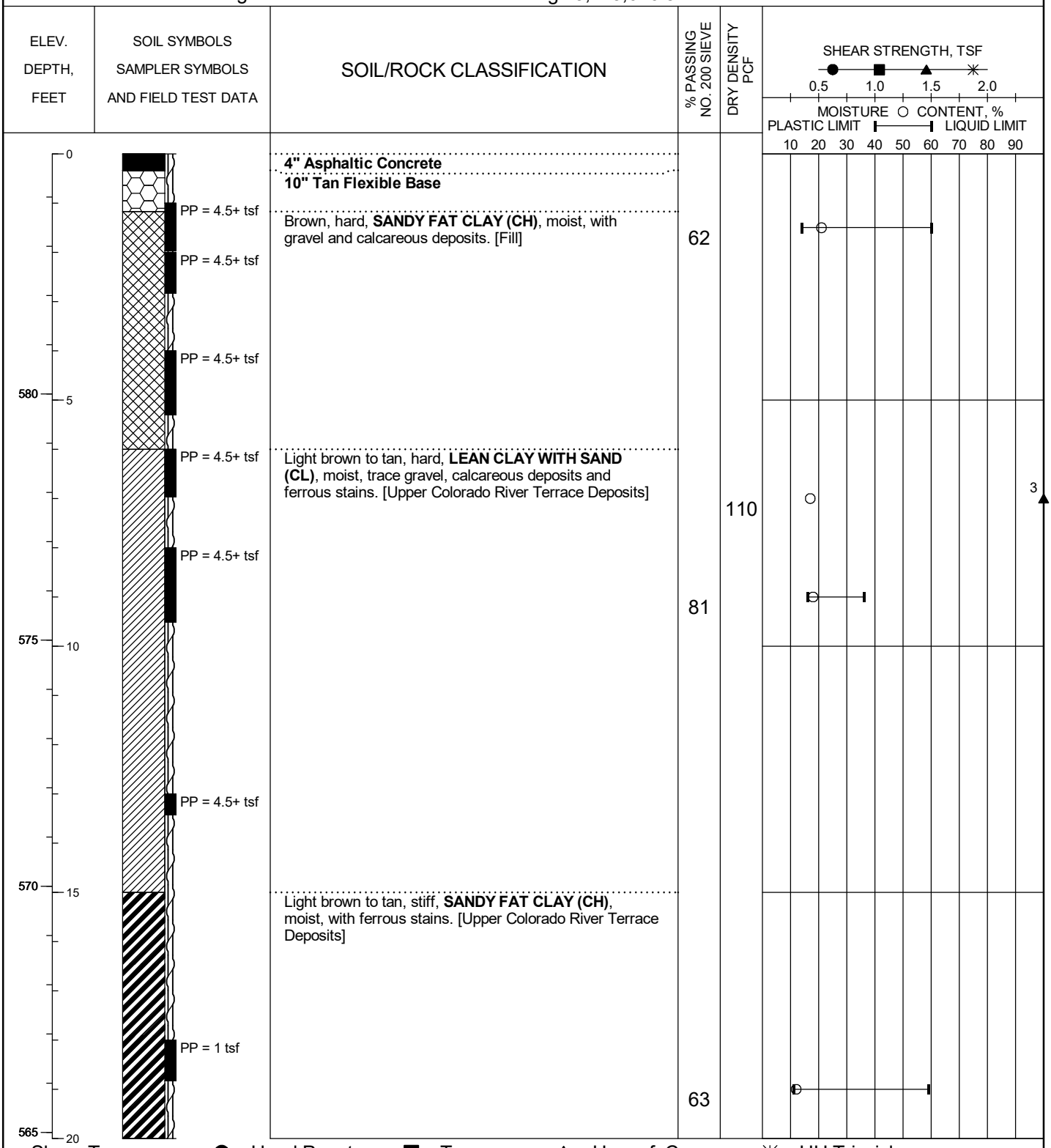
PLATE 4

HVJ ASSOCIATES

LOG OF SOIL BORING AG 13 16240.3 MLK TOD STORMWATER CONVEYANCE IMPROVEMENTS - PHASE 3 STORMWATER LINE.GPJ HVJ.GDT 7/11/23

LOG OF BORING

Project: MLK TOD Stormwater Coveyance Improvements - Phase 3 | Project No.: AG 13 16240.3
Boring No.: B-2 (2779 Manor Road) | Date: 3/22/2023 | Elevation: 584.88 feet
Groundwater during drilling: --- | Northing: 10,077,252.0 | Station: --
Groundwater after drilling: --- | Easting: 3,123,676.8 | Offset: --



Shear Types: ● = Hand Penet. ■ = Torvane ▲ = Unconf. Comp. ✳ = UU Triaxial

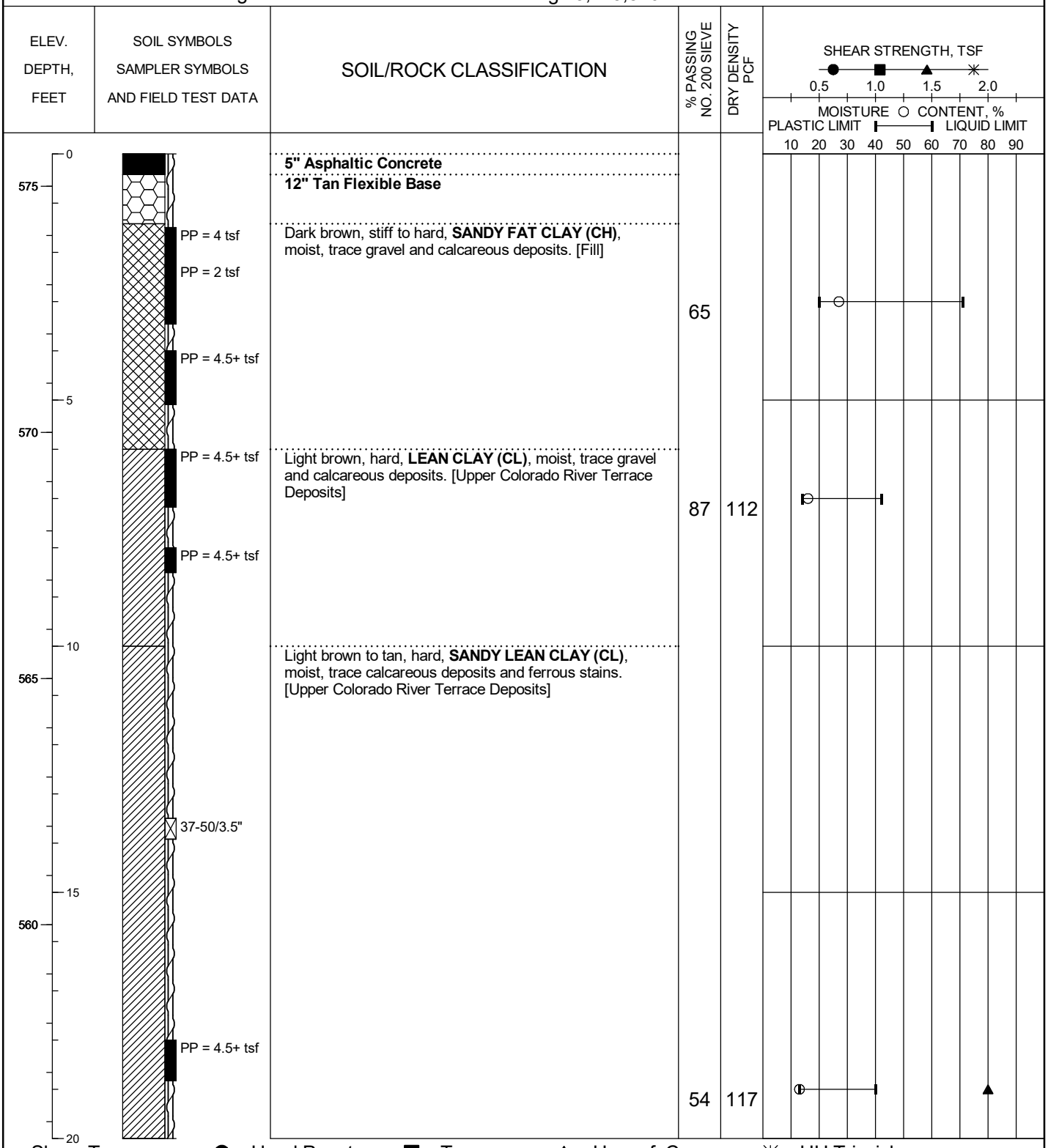
PLATE 5

HVJ ASSOCIATES

LOG OF SOIL BORING AG 13 16240.3 MLK TOD STORMWATER CONVEYANCE IMPROVEMENTS - PHASE 3 STORMWATER LINE.GPJ HVJ.GDT 7/11/23

LOG OF BORING

Project: MLK TOD Stormwater Coveyance Improvements - Phase 3 | Project No.: AG 13 16240.3
Boring No.: B-3 (3203 Merrie Lynn Avenue) | Date: 3/22/2023 | Elevation: 575.66 feet
Groundwater during drilling: --- | Northing: 10,077,394.9 | Station: --
Groundwater after drilling: --- | Easting: 3,123,840.7 | Offset: --



Shear Types: ● = Hand Penet. ■ = Torvane ▲ = Unconf. Comp. ✳ = UU Triaxial

PLATE 6

HVJ ASSOCIATES

LOG OF SOIL BORING AG 13 16240.3 MLK TOD STORMWATER CONVEYANCE IMPROVEMENTS - PHASE 3 STORMWATER LINE.GPJ HVJ.GDT 7/11/23

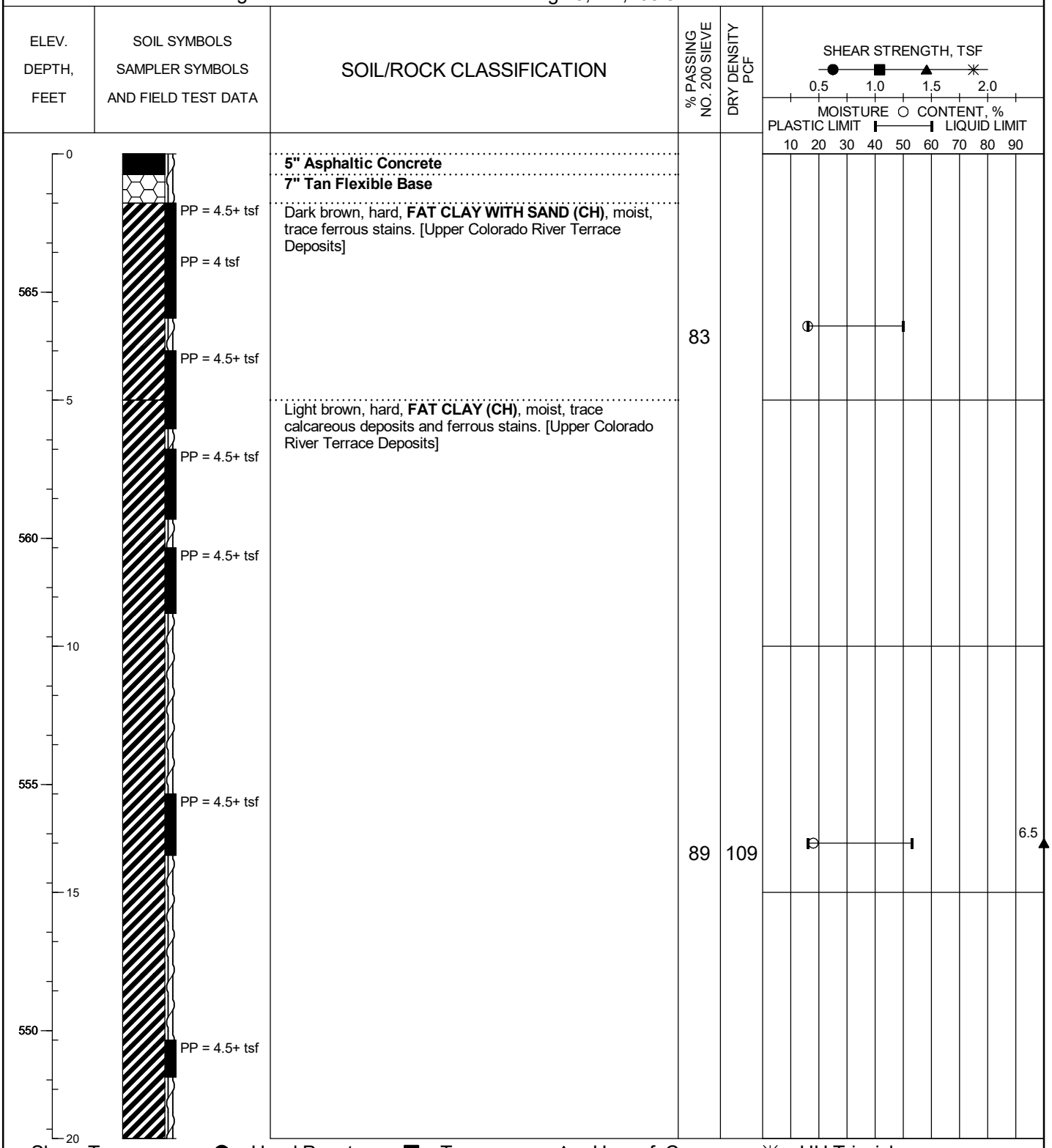
LOG OF BORING

Project: MLK TOD Stormwater Coveyance Improvements - Phase 3 | Project No.: AG 13 16240.3

Boring No.: B-4 (2219 Alexander Avenue) | Date: 3/22/2023 | Elevation: 567.81 feet

Groundwater during drilling: --- | Northing: 10,077,260.9 | Station: --

Groundwater after drilling: --- | Easting: 3,124,468.5 | Offset: --



Shear Types: ● = Hand Penet. ■ = Torvane ▲ = Unconf. Comp. ✳ = UU Triaxial

PLATE 7

HVJ ASSOCIATES

LOG OF SOIL BORING AG 13 16240.3 MLK TOD STORMWATER CONVEYANCE IMPROVEMENTS - PHASE 3 STORMWATER LINE.GPJ HVJ.GDT 7/11/23

SOIL SYMBOLS

Soil Types


Clay


Silt


Sand


Fill

Modifiers


Clayey


Silty


Sandy Clay


Cemented

Construction Materials


Asphaltic Concrete


Stabilized Base


Fill or Debris


Base

SAMPLER TYPES


Thin Walled Shelby Tube


No Recovery


Split Barrel


Auger


THD Cone Penetration Test


Jar Sample

WATER LEVEL SYMBOLS


Groundwater level determined during drilling operations


Groundwater level after drilling in open borehole or piezometer

SOIL GRAIN SIZE

Classification	Particle Size	Particle Size or Sieve No. (U.S. Standard)
Clay	< 0.002 mm	< 0.002 mm
Silt	0.002 - 0.075 mm	0.002 mm - #200 sieve
Sand	0.075 - 4.75 mm	#200 sieve - #4 sieve
Gravel	4.75 - 75 mm	#4 sieve - 3 in.
Cobble	75 - 200 mm	3 in. - 8 in.
Boulder	> 200 mm	> 8 in.

DENSITY OF COHESIONLESS SOILS

Descriptive Term	Penetration Resistance "N" * Blows/Foot
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	> 50

CONSISTENCY OF COHESIVE SOILS

Consistency	Undrained Shear Strength (tsf)
Very Soft	0 - 0.125
Soft	0.125 - 0.25
Firm	0.25 - 0.5
Stiff	0.5 - 1.0
Very Stiff	1.0 - 2.0
Hard	> 2.0

PENETRATION RESISTANCE

3/6	Blows required to penetrate each of three consecutive 6-inch increments per ASTM D-1586 *
50/4"	If more than 50 blows are required, driving is discontinued and penetration at 50 blows is noted
0/18"	Sampler penetrated full depth under weight of drill rods and hammer

* The N value is taken as the blows required to penetrate the final 12 inches

TERMS DESCRIBING SOIL STRUCTURE

Slickensided	Fracture planes appear polished or glossy, sometimes striated
Fissured	Breaks along definite planes of fracture with little resistance to fracturing
Inclusion	Small pockets of different soils, such as small lenses of sand scattered through a mass of clay
Parting	Inclusion less than 1/4 inch thick extending through the sample
Seam	Inclusion 1/4 inch to 3 inches thick extending through the sample
Layer	Inclusion greater than 3 inches thick extending through the sample
Laminated	Soil sample composed of alternating partings of different soil type
Stratified	Soil sample composed of alternating seams or layers of different soil type
Intermixed	Soil sample composed of pockets of different soil type and laminated or stratified structure is not evident
Calcareous	Having appreciable quantities of calcium carbonate
Ferrous	Having appreciable quantities of iron
Nodule	A small mass of irregular shape

HVJ ASSOCIATES

PROJECT NO.: AG 13 16240.3

DRAWING NO.: PLATE 8

KEY TO TERMS AND SYMBOLS
USED ON BORING LOGS FOR SOIL

DATE: 4/20/2023 8:17:57 AM
FILE: C:\Users\tsmur\OneDrive\Desktop\CAD_MLK\SOIL_ROCK.dwg

APPENDIX A
LABORATORY TEST RESULTS SUMMARY

LABORATORY TEST RESULTS SUMMARY
Project Name: MLK TOD Stormwater Conveyance Improvements Phase 3
Project Number: AG 13 16240.3

Boring Number	Depth (ft)	% Passing No. 200 Sieve	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	Unconfined Compressive Strength (tsf)	Pocket Penetrometer Test (tsf)
B-1	0-2								2.5
	2-4	58	79	60	27.2				2.5
	4-6								4.5+
	6-8	72	50	36	15.2	122	106	5	3.0
	8-10								4.5+
	13-15	74	42	26	14.9				4.5+
	18-20								4.5+
B-2	1-2	62	60	46	21.2				4.5+
	2-4								4.5+
	4-6								4.5+
	6-8				17.1	129	111	6	4.5+
	8-10	81	36	20	18.1				4.5+
	13-15								4.5+
	18-20	63	59	48	11.6				1.0
B-3	1-2								4.0
	2-4	65	71	51	27.3				2.0
	4-6								4.5+
	6-8	87	42	28	15.6				4.5+
	8-10								4.5+
	18-20	54	40	27	13.3	133	117	4	4.5+
B-4	1-2								4.5+
	2-4	83	50	34	16.3				4.0
	4-6								4.5+
	6-8								4.5+
	8-10								4.5+
	13-15	89	53	37	18.3	129	109	13	4.5+
	18-20								4.5+

APPENDIX B
CITY OF AUSTIN UPPER BOGGY WEST WATER LINE IMPROVEMENTS PHASE I PROJECT BORING LOGS

LOG OF BORING

Project: Upper Boggy West Wastewater Line Improvements Phase 1 | Project No.: AG1910153.2.1

Boring No.: B-12 | Date: 2/9/2021 | Elevation: 586.28 feet

Groundwater during drilling: --- | Northing: 10,077,599.3 | Station: --

Groundwater after drilling: --- | Easting: 3,124,107.4 | Offset: --

ELEV. DEPTH, FEET	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	SOIL/ROCK CLASSIFICATION	% PASSING NO. 200 SIEVE	DRY DENSITY PCF
0 / 585	12-12-12	5" Asphaltic Concrete over 8" Tan Flex Base		
		Light tan, compact, **SILTY SAND (SM)**, moist. [Fill]		
		Brown and tan, very stiff to hard, **LEAN CLAY WITH SAND (CL)**, moist, with calcareous deposits, ferrous staining and silt seams. [Upper Colorado River Terrace Deposits]	81	
5 / 580	PP= 4.5+ tsf 12-14-18			
	PP= 4.5+ tsf	Brown and tan, hard, **FAT CLAY (CH)**, moist, with calcareous deposits, ferrous staining and silt seams. [Upper Colorado River Terrace Deposits]	88	
10 / 575				
	50/5"	Light brown to tan, hard, **SANDY LEAN CLAY (CL)**, moist, with limestone fragments and trace calcareous deposits. [Completely Weathered Limestone]		
15 / 570				
	36-37-20			
20 / 565				
	50/6"			
25				

SHEAR STRENGTH, TSF

0.5 1.0 1.5 2.0

MOISTURE ○ CONTENT, %

PLASTIC LIMIT — LIQUID LIMIT

10 20 30 40 50 60 70 80 90

Shear Types: ● = Hand Penet. ■ = Torvane ▲ = Unconf. Comp. ✳ = UU Triaxial

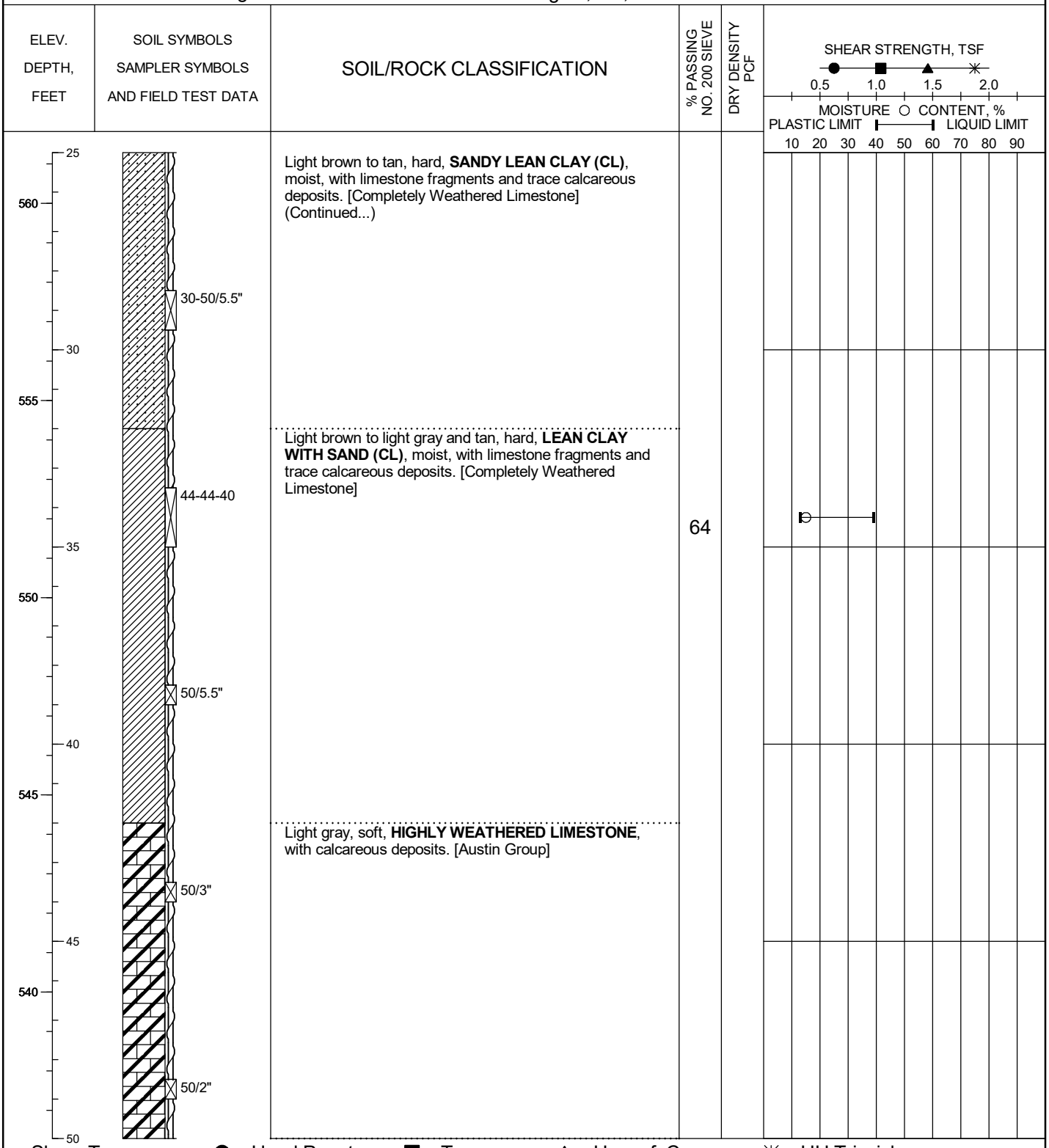
PLATE 20a

HVJ ASSOCIATES

LOG OF SOIL BORING AG1910153.2.1 LOG.GPJ HVJ.GDT 1/14/22

LOG OF BORING

Project: Upper Boggy West Wastewater Line Improvements Phase 1 | Project No.: AG1910153.2.1
Boring No.: B-12 | Date: 2/9/2021 | Elevation: 586.28 feet
Groundwater during drilling: --- | Northing: 10,077,599.3 | Station: --
Groundwater after drilling: --- | Easting: 3,124,107.4 | Offset: --



Shear Types: ● = Hand Penet. ■ = Torvane ▲ = Unconf. Comp. ✳ = UU Triaxial

PLATE 20b

LOG OF SOIL BORING AG1910153.2.1 LOG.GPJ HVJ.GDT 1/14/22

HVJ ASSOCIATES

LOG OF BORING

Project: Upper Boggy West Wastewater Line Improvements Phase 1 | Project No.: AG1910153.2.1

Boring No.: B-12 | Date: 2/9/2021 | Elevation: 586.28 feet

Groundwater during drilling: --- | Northing: 10,077,599.3 | Station: --

Groundwater after drilling: --- | Easting: 3,124,107.4 | Offset: --

ELEV. DEPTH, FEET	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	SOIL/ROCK CLASSIFICATION	% PASSING NO. 200 SIEVE	DRY DENSITY PCF	SHEAR STRENGTH, TSF (0.5, 1.0, 1.5, 2.0) MOISTURE ○ CONTENT, % PLASTIC LIMIT — LIQUID LIMIT (10 20 30 40 50 60 70 80 90)
50 / 535	Run: 50'-55' Rec: 100% RQD: 63%	Light gray, low hardness, **LIMESTONE**, moderately to heavily fractured, with silt seams. [Austin Group] -Proposed Pipeline= 50 to 52 ft.			
55 / 530	Run: 55'-60' Rec: 100% RQD: 25%	-with clay seams and fossilferrous below 55 ft.			
60 / 525	Run: 60'-65' Rec: 100% RQD: 38%				
65 / 520	Run: 65'-70' Rec: 100% RQD: 70%	-Unconfined compressive strength = 15.5 TSF Light gray, hard, **LIMESTONE**, moderately fractured, fossiliferous. [Austin Group]		122	○
70 / 515					
75					

Shear Types: ● = Hand Penet. ■ = Torvane ▲ = Unconf. Comp. ✳ = UU Triaxial

PLATE 20c

HVJ ASSOCIATES

LOG OF SOIL BORING AG1910153.2.1 LOG.GPJ HVJ.GDT 1/14/22

LOG OF BORING

Project: Upper Boggy West Wastewater Line Improvements Phase 1
Project No.: AG1910153.2.1
Boring No.: B-13
Date: 2/8/2021
Elevation: 573.3 feet
Groundwater during drilling: ---
Northing: 10,077,361.29
Station: --
Groundwater after drilling: ---
Easting: 3,124,223.13
Offset: --

ELEV. DEPTH, FEET	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	SOIL/ROCK CLASSIFICATION	% PASSING NO. 200 SIEVE	DRY DENSITY PCF
0		5" Asphaltic Concrete over 8" Tan Flex Base		
	PP= 4.5+ tsf	Brown to light brown, hard, **FAT CLAY WITH SAND (CH)**, moist, with trace gravel and calcareous deposits. [Upper Colorado River Terrace Deposits]	76	
	PP= 4.5+ tsf			
575	PP= 2.0 tsf	Tan, very stiff to hard, **LEAN CLAY WITH SAND (CL)**, moist, with trace calcareous deposits and ferrous staining. [Upper Colorado River Terrace Deposits]		
5				
	PP= 4.5+ tsf		78	
570	13-15-25	Tan to light tan, hard, **LEAN CLAY WITH SAND (CL)**, moist, with silt seams, trace calcareous deposits and ferrous staining. [Completely Weathered Limestone]		
10				
565	26-31-39			
15				
560	27-25-31		74	
20				
555	29-44-50/4"	Light tan, soft, **HIGHLY WEATHERED LIMESTONE**, with light gray limestone seams, ferrous staining, speckled and calcareous deposits. [Austin Group]		
25				

SHEAR STRENGTH, TSF
0.5 1.0 1.5 2.0
MOISTURE ○ CONTENT, %
PLASTIC LIMIT — LIQUID LIMIT
10 20 30 40 50 60 70 80 90

Shear Types: ● = Hand Penet. ■ = Torvane ▲ = Unconf. Comp. ✳ = UU Triaxial

PLATE 21a

LOG OF SOIL BORING AG1910153.2.1 LOG.GPJ HVJ.GDT 1/14/22

HVJ ASSOCIATES

LOG OF BORING

Project: Upper Boggy West Wastewater Line Improvements Phase 1
Project No.: AG1910153.2.1
Boring No.: B-13
Date: 2/8/2021
Elevation: 573.3 feet
Groundwater during drilling: ---
Northing: 10,077,361.29
Station: --
Groundwater after drilling: ---
Easting: 3,124,223.13
Offset: --

ELEV. DEPTH, FEET	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	SOIL/ROCK CLASSIFICATION	% PASSING NO. 200 SIEVE	DRY DENSITY PCF
25		Light tan, soft, **HIGHLY WEATHERED LIMESTONE**, with light gray limestone seams, ferrous staining, speckled and calcareous deposits. [Austin Group] (Continued...)		
550	50/4"			
30	Run: 30'-35' Rec: 93% RQD: 58%	Light tan, low hardness, **LIMESTONE**, slightly weathered, moderately fractured, with trace ferrous staining. [Austin Group] -Unconfined compressive strength = 16.9 TSF		111
545				
35	Run: 35'-40' Rec: 72% RQD: 27%	Light tan, low hardness, **LIMESTONE**, moderately weathered, heavily fractured, with ferrous staining. [Austin Group] - silty seams at 38.5'-39' -Unconfined compressive strength = 20 TSF		121
540		Light gray, low hardness, **LIMESTONE**, moderately fractured, with trace fossils. [Austin Group]		
40	Run: 40'-45' Rec: 100% RQD: 60%	-Proposed Pipeline= 39.5 to 41.5 ft.		
535				
45	Run: 45'-50' Rec: 100% RQD: 50%	- silty seams at 45.5'-46.5'		
530				
50				

SHEAR STRENGTH, TSF
0.5 1.0 1.5 2.0
MOISTURE ○ CONTENT, %
PLASTIC LIMIT — LIQUID LIMIT
10 20 30 40 50 60 70 80 90

Shear Types: ● = Hand Penet. ■ = Torvane ▲ = Unconf. Comp. ✳ = UU Triaxial

PLATE 21b

LOG OF SOIL BORING AG1910153.2.1 LOG.GPJ HVJ.GDT 1/14/22

HVJ ASSOCIATES

LOG OF BORING

Project: Upper Boggy West Wastewater Line Improvements Phase 1
Project No.: AG1910153.2.1
Boring No.: B-13
Date: 2/8/2021
Elevation: 573.3 feet
Groundwater during drilling: ---
Northing: 10,077,361.29
Station: --
Groundwater after drilling: ---
Easting: 3,124,223.13
Offset: --

ELEV. DEPTH, FEET	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	SOIL/ROCK CLASSIFICATION	% PASSING NO. 200 SIEVE	DRY DENSITY PCF
525 / 50	Run: 50'-55' Rec: 100% RQD: 71%	Light gray, low hardness, **LIMESTONE**, moderately fractured, with trace fossils. [Austin Group] (Continued...)		
		-Unconfined compressive strength = 35.1 TSF		127
520 / 55	Run: 55'-60' Rec: 100% RQD: 95%	Light gray, low hardness, **LIMESTONE**, slightly fractured. [Austin Group]		
515 / 60				
510 / 65				
505 / 70				
75				

SHEAR STRENGTH, TSF
0.5 1.0 1.5 2.0
MOISTURE ○ CONTENT, %
PLASTIC LIMIT — LIQUID LIMIT
10 20 30 40 50 60 70 80 90

Shear Types: ● = Hand Penet. ■ = Torvane ▲ = Unconf. Comp. ✳ = UU Triaxial

PLATE 21c

HVJ ASSOCIATES

LOG OF SOIL BORING AG1910153.2.1 LOG.GPJ HVJ.GDT 1/14/22

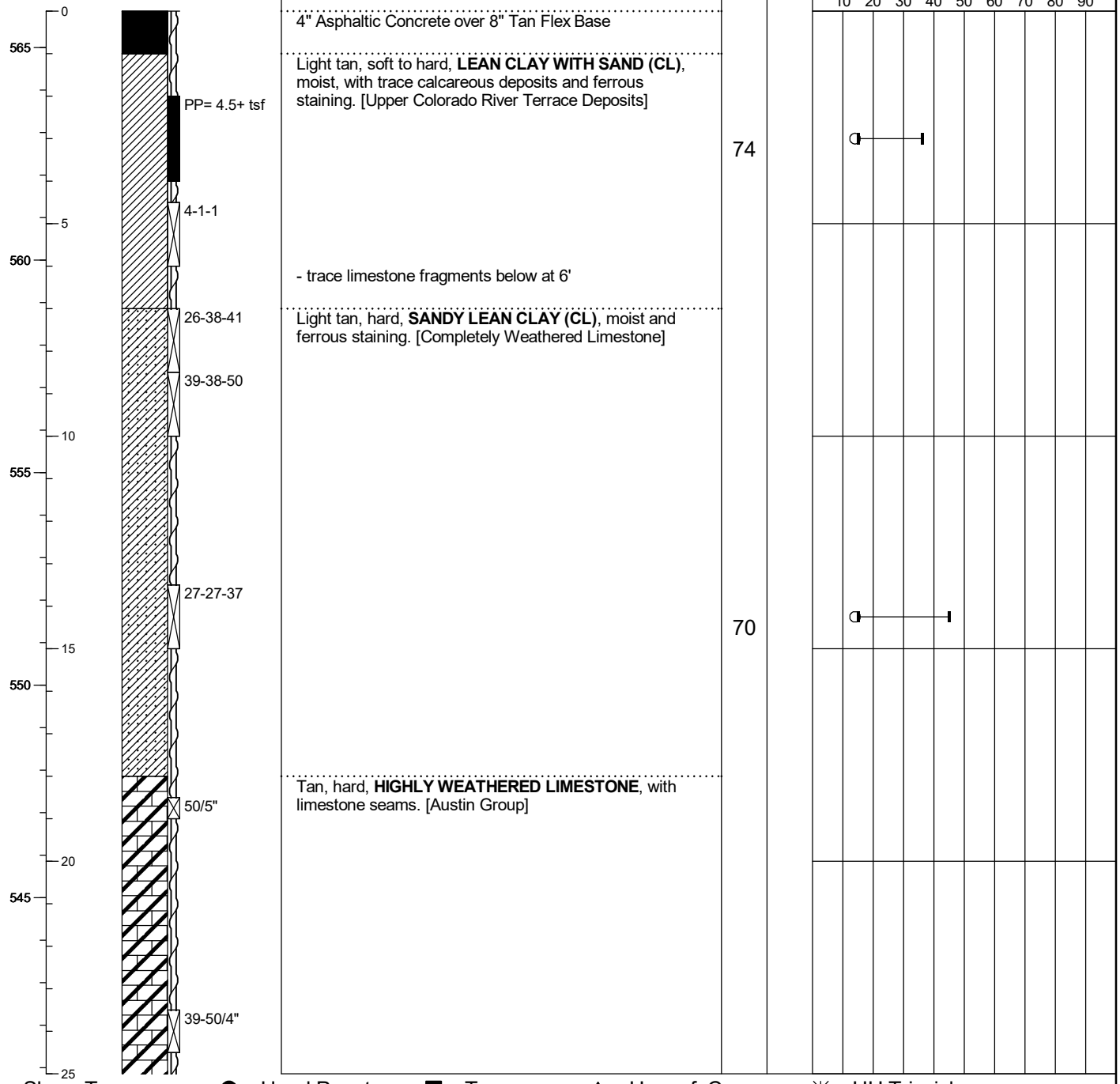
LOG OF BORING

Project: Upper Boggy West Wastewater Line Improvements Phase 1 | Project No.: AG1910153.2.1

Boring No.: B-14 | Date: 2/5/2021 | Elevation: 565.86 feet

Groundwater during drilling: --- | Northing: 10,077,374.7 | Station: --

Groundwater after drilling: --- | Easting: 3,124,441.7 | Offset: --



Shear Types: ● = Hand Penet. ■ = Torvane ▲ = Unconf. Comp. ✳ = UU Triaxial

PLATE 22a

HVJ ASSOCIATES

LOG OF SOIL BORING AG1910153.2.1 LOG.GPJ HVJ.GDT 1/14/22

LOG OF BORING

Project: Upper Boggy West Wastewater Line Improvements Phase 1 | Project No.: AG1910153.2.1
Boring No.: B-14 | Date: 2/5/2021 | Elevation: 565.86 feet
Groundwater during drilling: --- | Northing: 10,077,374.7 | Station: --
Groundwater after drilling: --- | Easting: 3,124,441.7 | Offset: --

ELEV. DEPTH, FEET	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	SOIL/ROCK CLASSIFICATION	% PASSING NO. 200 SIEVE	DRY DENSITY PCF
25 / 540	50/1.5"	Tan, hard, **HIGHLY WEATHERED LIMESTONE**, with limestone seams. [Austin Group] (Continued...)		
30 / 535	Run: 30'-35' Rec: 90% RQD: 40%	Light gray, low hardness, **LIMESTONE**, slightly weathered, heavily fractured, with trace fossils and silt seams. [Austin Group] -Unconfined compressive strength = 32.2 TSF		122
35 / 530	Run: 35'-40' Rec: 82% RQD: 43%	-Proposed Pipeline= 34 to 36 ft.		
40 / 525	Run: 40'-45' Rec: 66% RQD: 0%	-completely fractured from 40-45 ft.		
45 / 520	Run: 45'-50' Rec: 90% RQD: 72%	Gray, low hardness, **LIMESTONE**, slightly weathered, moderately fractured, with trace fossils. [Austin Group]		
50				

SHEAR STRENGTH, TSF
● 0.5 ■ 1.0 ▲ 1.5 ✳ 2.0
MOISTURE ○ CONTENT, %
PLASTIC LIMIT ⊢—⊣ LIQUID LIMIT
10 20 30 40 50 60 70 80 90

Shear Types: ● = Hand Penet. ■ = Torvane ▲ = Unconf. Comp. ✳ = UU Triaxial

PLATE 22b

LOG OF SOIL BORING AG1910153.2.1 LOG.GPJ HVJ.GDT 1/14/22

HVJ ASSOCIATES

LOG OF BORING

Project: Upper Boggy West Wastewater Line Improvements Phase 1 | Project No.: AG1910153.2.1

Boring No.: B-14 | Date: 2/5/2021 | Elevation: 565.86 feet

Groundwater during drilling: --- | Northing: 10,077,374.7 | Station: --

Groundwater after drilling: --- | Easting: 3,124,441.7 | Offset: --

ELEV. DEPTH, FEET	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	SOIL/ROCK CLASSIFICATION	% PASSING NO. 200 SIEVE	DRY DENSITY PCF	SHEAR STRENGTH, TSF / MOISTURE CONTENT, %
515 — 50	Run: 50'-55' Rec: 100% RQD: 68%	Gray, low hardness, **LIMESTONE**, slightly weathered, moderately fractured, with trace fossils. [Austin Group] (Continued...) -Unconfined compressive strength = 6.3 TSF		109	
510 — 55		- silty seams from 51'-55'			
505 — 60					
500 — 65					
495 — 70					
75					

SHEAR STRENGTH, TSF: 0.5 1.0 1.5 2.0

MOISTURE ○ CONTENT, %

PLASTIC LIMIT — LIQUID LIMIT

10 20 30 40 50 60 70 80 90

Shear Types: ● = Hand Penet. ■ = Torvane ▲ = Unconf. Comp. ✳ = UU Triaxial

PLATE 22c

HVJ ASSOCIATES

LOG OF SOIL BORING AG1910153.2.1 LOG.GPJ HVJ.GDT 1/14/22

GEOTECHNICAL DESIGN REPORT
MLK TOD STORMWATER CONVEYANCE IMPROVEMENTS PHASE 3
AUSTIN, TEXAS

SUBMITTED TO
FREESE AND NICHOLS, INC.
10431 MORADO CIRCLE
BUILDING 5, SUITE 300
AUSTIN, TEXAS 78759

BY
HVJ SOUTH CENTRAL TEXAS- M& J, INC.
FEBRUARY 4, 2025

REPORT NO. AG 13 16240.3

4201 Freidrich Lane, Suite 110
Austin, Texas 78744
512.447.9081 Ph
512.443.3442 Fax

February 4, 2025

Mr. Will Huff, PE, CFM
Freese and Nichols, Inc.
10431 Morado Circle
Building 5, Ste. 300
Austin, Texas 78759

Re: Geotechnical Investigation Design Report
MLK TOD Stormwater Conveyance Improvements Phase 3
Owner: City of Austin
HVJ Proposal No. AG 13 16240.3

Dear Mr. Huff:

Submitted herein is the final geotechnical design report for the above referenced project. This study was performed in accordance with Master Subconsultant Agreement executed on March 27, 2017 between Freese and Nichols, Inc. and HVJ South Central Texas - M&J, Inc., and proposal number AG 13 16240.3 dated April 15, 2021 (Revised May 19, 2021, June 3, 2021, June 3, 2022, and October 12, 2022*).*

It has been a pleasure to work for you on this project and we appreciate the opportunity to be of service. Please notify us if there are questions or if we may be of further assistance.

Sincerely,

HVJ South Central Texas – M&J, INC.
Texas Firm Registration No. F-18091

Leo Ruiz, PE
Vice President of Geotechnical

STATE OF TEXAS
BHUPENDRA CHAND
142143
LICENSED PROFESSIONAL ENGINEER
2/4/2025

Bhupendra Chand, PE
Project Manager

This seal appearing on this document was authorized by Bhupendra Chand, PE 142143 on February 4, 2025. Alterations of a sealed document without proper notification to the responsible engineer is an offense under the Texas Engineering Practice Act.

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I. EXECUTIVE SUMMARY

HVJ South Central Texas-M&J, Inc. (HVJSCTx), was retained by Freese and Nichols, Inc. (FNI) to perform a geotechnical investigation for the MLK TOD Stormwater Conveyance Improvements Phase 3 Project in Austin, Texas. It is our understanding that, as part of this MLK TOD project, FNI will be expanding the project area to include a new storm drain system as well as any associated utility relocations and roadway reconstruction along Manor Road, including Larry Lane, Merrie Lynn Avenue, and Alexander Avenue. A storm drain will also be included along Randolph Road; however, we understand this area will only require trench repair for the roadway. The proposed water and wastewater lines are expected to have diameter ranging from 18-48 inches and invert depths ranging from 5-15 feet below the existing grade. A brief summary of the full report is presented below.

1. The proposed water and wastewater lines will generally have invert depths ranging from approximately 5 to 15 feet below the existing grade.

2. The pipes should be installed in a bedding envelope in accordance with City of Austin Standard Specifications Item No. 510.3.

3. Fill soils were encountered to the depths of 6 feet below the surface grade in Borings B-1, B-2 and B-3. Fill soils encountered should be excavated and replaced with recommended backfill material. Trench backfill should conform to City of Austin Utilities Criteria Manual Section No. 5.8.3 and City of Austin Standard Specification Item No. 510.3(25).

4. Manholes and junction boxes will be installed at depths varying from 6 to 14 feet and 8 to 14.5 feet respectively, below the existing grade. The bearing strata for these structures will be stiff to hard clays. Allowable bearing capacity of 2,000 psf can be used for the various strata encountered at this project site, assuming a safety factor of 3.

5. It is recommended that either Class A or Class B borrow material, as defined in City of Austin Standard Specification 130S.3 be used as backfill around the proposed structures. Design lateral pressures may be calculated for each of the backfill types using the following equivalent fluid weights:

Backfill Type	**Assumed Moist Unit Weight (pcf)**	**Lateral Earth Pressure Coefficient, K**			**Equivalent Fluid Weight, (pcf) Above Water Table**			**Equivalent Fluid Weight, (pcf) Below Water Table**		
		At Rest	**Active**	**Passive**	**At Rest**	**Active**	**Passive**	**At Rest**	**Active**	**Passive**
Class A (< 15% fines)	125	0.5	0.33	3	63	41	375	93	83	249
Class B (PI < 20)	120	0.55	0.37	2.66	66	44	384	94	83	217
On-Site Soils (PI<20)	120	0.58	0.4	3.4	70	48	408	95	85	258

6. Trench excavation operations for this project will initially extend through surface materials (i.e. existing pavement section or fill) and then into stiff to hard clayey soils. The soils encountered at this site can be removed using standard excavation equipment, e.g. excavators and/or backhoes.

Please note that this executive summary does not fully relate our findings and opinions. Those findings and opinions are only presented through our full report.

1 INTRODUCTION

1.1 General

HVJ South Central Texas-M&J, Inc. (HVJSCTx), was retained by Freese and Nichols, Inc. (FNI) to perform a geotechnical investigation for the MLK TOD Stormwater Conveyance Improvements Phase 3 Project in Austin, Texas. It is our understanding that, as part of this MLK TOD project, FNI will be expanding the project area to include a new storm drain system as well as any associated utility relocations and roadway reconstruction along Manor Road, including Larry Lane, Merrie Lynn Avenue, and Alexander Avenue. A storm drain will also be included along Randolph Road; however, we understand this area will only require trench repair for the roadway. The proposed water and wastewater lines are expected to have diameter ranging from 18-48 inches and invert depths ranging from 5-15 feet below the existing grade.

The Site Vicinity Map, Plate 1 is included in the Geotechnical Data Report (GDR)[1] issued by HVJ Associates® on February 4, 2025.

1.2 Objectives and Scope n of Work

The primary objectives of this study were to gather information on subsurface conditions at the project and provide recommendations on open cut excavations, pipe bedding, backfill, particle migration, as well as bearing support and uplift for the proposed manhole structures.

The design recommendations and construction considerations were based in part on subsurface investigation data provided in the aforementioned GDR for this project.

2 OPEN CUT RECOMMENDATIONS

2.1 General

Based on information provided by Freese and Nichols, Inc. (FNI), the proposed water and wastewater lines are expected to have diameters ranging from 18-48 inches and invert depths ranging from 5-15 feet below the existing grade.

2.2 Pipe Bedding

The pipe should be installed in a bedding envelope in accordance with City of Austin Standard Details No. 510.3. As per City of Austin Standard Specifications Item 510.3(14), natural or manufactured sand, pea gravel or uncrushed gravel can be used as standard bedding materials for wastewater PVC or concrete lines. Also, sand alone should not be used in water courses, in trenches where groundwater is present, or in trenches with grades greater than 5 percent. Pea gravel or bedding stone, alone, shall not be used in the street right-of-way within 5 feet of subgrade elevation in trenches that are 3 feet or wider. The bedding envelope should extend the full trench width, to a depth of at least 6 inches below the pipe and to a depth of at least 12 inches above the pipe. The

[1] "Geotechnical Data Report, MLK TOD Stormwater Conveyance Improvements Phase 3 Stormwater Line", Ruiz, Leo. HVJ Associates®, February 4, 2025.

bedding should be placed in lifts not exceeding 8 inches in loose thickness and compacted thoroughly to provide uniform support of the pipe barrel and to fill all voids around the pipe.

Item 510.3(14)c requires that the bedding material must be compatible with the materials in the trench bottom, walls, and backfill so that particle migration from, into, or through the bedding is minimized. Under the action of hydraulic gradient from groundwater flow, smaller particle may migrate into coarse materials or voids. Based on the project borings, the utility lines will lie in soils consisting of clay; and particle migration may not be an issue. If the sandy soils are encountered, we recommend that water stops in conjunction with filter fabric or flowable fill be used to minimize the potential for particle migration. Furthermore, in order to prevent particle migration with the sandy soils above the wastewater lines, we recommend the bedding and pipe be enveloped with filter fabric. We also recommend water stops need to be installed as outlined in the next section. It should also be noted that where groundwater is present, sand alone is not permitted as bedding material and for concrete storm water pipe, if pea gravel, uncrushed gravel, crushed gravel, crushed stone, or combination thereof is used for pipe bedding material, a geotextile filter fabric shall be placed around the perimeter of the joint as per Item 510.3(14)(c).

2.3 Water Stops

Large changes in elevation allow migrating water to develop extreme head pressure in the pipe bedding material. Excessive head pressure accelerates particle migration and causes failure in asphalt and base due to large hydrostatic pressures. To help minimize the hydrostatic pressure and particle migration, HVJSCTx recommends water stops be constructed in the trench. Water stops should be installed along the trench spaced at 250 feet for 1-3% grades, 150 feet for 3-5% grades. For steeper grades, water stops should be more closely spaced such that the elevation difference of the water stops does not exceed 15 feet. Water stops should also be installed whenever sudden elevation changes occur. Unusual changes in soil stratigraphy such as sandy layers may warrant additional water stops. Water stops typically consist of a 24-in minimum section of concrete, bentonite clay, or controlled low strength concrete material. Water stops should extend a minimum of 12 inches above the pipe bedding and penetrate trench walls a minimum of 18 inches on all sides.

Controlled low strength concrete material when used around closely spaced valve boxes or manholes (500 feet or less) can limit the number of water stops necessary. The material must extend at least to each edge of the undisturbed soil. In addition, it must surround the entire manhole, meaning the material should be placed under and around the inlet and outlet. Wherever shallow groundwater near the invert depth is encountered, closely spaced water stops may be necessary to reduce hydrostatic head pressure.

2.4 Trench Backfill

Fill soils were encountered to the depths of 6 feet below the surface grade in Borings B-1, B-2 and B-3. Fill soils encountered should be excavated and replaced with recommended backfill material. All backfill for arterial, collectors, and new streets should conform to City of Austin Utilities Criteria Manual Section No. 5.8.3 -Backfill for Arterial, Collectors, and New Streets. Excavated trenches with widths less than 12 inch should be backfilled with a stabilized backfill consisting of Controlled Low Strength Material (Standard Specification Item No. 402S) and Class J p.c. concretes (Standard Specification Item No. 403, "Concrete For Structures").

All backfill should be a stabilized backfill consisting of "Controlled Low Strength Material" (CLSM) over the utility bedding material. The CLSM should be a minimum of 12 inch (300 mm) in thickness. The next layer of backfill should be 7-inch layer of Class J mix (2-sack mix). The remaining areas should be backfilled with a pavement structure equivalent to the pavement thickness for the functional classification of the street. Excavated trenches with widths greater than 12 inches should be backfilled according to City of Austin Utilities Criteria Manual Section No. 5.8.3.1-Backfill for Arterial, Collectors, and New Streets.

Backfill material that will not support any portion of a sidewalk, driveway, paved alley, or roadway should be restored to original condition or a condition better than existed prior to excavation. Trench backfill should conform to City of Austin Standard Specifications Item 510.3(25) and standard details No. 510S-3 and 510S-5. HVJSCTx would like to note that Item 510 is somewhat inconsistent in relation to the use of cohesive backfill soils with a plasticity index (PI) greater than 20. Item 510.3(25)c allows select trench material among other materials. Item 510.2(6) defines select backfill or borrow as a soil with a plasticity index of less than 20, among other characteristics. This would prohibit material with a PI greater than 20 to be used as backfill and necessitate removal and replacement of the materials.

However, HVJSCTx understands it is common practice in the City of Austin to use the material excavated from the trench as backfill regardless of the plasticity index of the soil excavated from the trench. Item 510.3(25)d presents compaction requirements for swelling soil defined as soil with a PI greater than 20; therefore, the specification does provide for the use of such material to some extent. HVJSCTx suggests that special provisions to Item 510 be provided to clarify this inconsistency.

The material should be compacted not less than 95% of the maximum dry density as determined by TxDOT Test Method Tex-114-E. Special emphasis should be placed upon the need to obtain uniform density throughout the backfill material. In addition, no heavy equipment, which might damage the pipe, should be allowed over the pipe until sufficient cover has been placed and compacted. At existing pipe crossings, flowable fill (or Controlled Low Strength Material (CLSM) conforming to City of Austin Standard Specifications Item 402S.1) should be used for trench backfill or where utilizing compaction equipment is impractical.

HVJSCTx also suggests that a special provision to Item 510.3(25)g requiring a loose lift thickness for higher PI soils (i.e. greater than 20) be limited to a maximum of 8 inches. We further recommend the moisture content at the time of compaction be within 2 percent of optimum, as determined by the referenced test method. This should provide for better compaction of higher plasticity backfill. In addition, the maximum dry density should be limited to 102% for materials with a PI over 20.

2.5 Manholes and Junction Boxes

The following sections discuss bearing capacity, uplift, and lateral earth pressure design criteria for manholes and junction boxes. We anticipate the manholes and junction boxes will be constructed by open-cut excavation methods.

Bearing Capacity

Manholes and junction boxes will be installed at depths varying from 6 to 14 feet and 8 to 14.5 feet respectively, below the existing grade. The bearing strata for these structures will be stiff to hard

clays. Allowable bearing capacity of 2,000 psf for the various strata encountered at this project site will be satisfactory, assuming a safety factor of 3.

Uplift

Buoyant uplift pressures will act on the structures extending below groundwater. Groundwater was not encountered during drilling; however, it should be noted that groundwater observations made during a short time period may not reflect true groundwater conditions.

In consideration of the field data and our experience, the structures at times may be fully submerged or nearly fully submerged as a result of an elevated short term groundwater table or even possibly from the buildup of water within backfill materials around these structures. For design purposes, it is recommended to use a groundwater level consistent with the ground surface. Since buoyant uplift pressure is a function of the depth to groundwater, the largest uplift pressure will occur when the groundwater is at the ground surface.

HVJSCTx recommends the manholes and junction boxes should be designed to resist the buoyant uplift based on the dead weight of the structure, the weight of any soil backfilled above the structure, and the interface friction between the backfill material and the outside surface of the sides of the structures. If the resisting forces are inadequate to resist uplift forces, a toe may be constructed into the soil at the base of the structure. Construction of a toe is appropriate when open-cut excavation methods are used. The toe may consist of a bottom slab that extends into adjacent backfill. The weight of the material above the extension can then be relied upon to resist the uplift forces. The unit weight of soils above and below the water table for a compacted backfill can be approximated as 120 and 58 pcf, respectively. Table 2-5, below, can be used to approximate the resisting force acting on the manhole or junction box walls from interface friction. The resisting force can be calculated by multiplying the friction values in the table by the surface area of the outside surface on the sides of the manholes and junction boxes. These values are applicable for Class A or Class B materials.

Table 2-5: Uplift Resistance from Interface Friction

Depth Below Surface, ft.	Uplift Resistance Friction*, psf.	Uplift Resistance Friction*, psf.
	Class A	Class B
0-5	26	26
5-10	79	77
10-15	132	128
15-20	195	190

*Uplift resistance friction represents ultimate values. Approximate safety factors (generally at least 2.5) should be applied when utilizing this table.

Lateral Earth Pressures

The backfill will exert lateral pressures on the exterior walls of the manholes and junction boxes. The magnitude of the pressure distribution will depend on the type of backfill and the construction technique. If the construction method encompasses backfilling along the exterior walls of the underground structure, then the lateral earth pressures become a function of the type of backfill and its method of placement.

Utilizing highly plastic, expansive clay as backfill will produce the highest lateral earth pressures on the exterior walls of the structure. It is recommended that either Class A or Class B borrow material, be used as backfill. It is recommended that the Class A borrow contain less than 15% fines, liquid limit should not exceed 45, plasticity index should not exceed 15 and the bar linear shrinkage should not be less than 2. Class B material have a plastic index less than 20, and in both cases be free of debris, vegetation, and clay lumps or balls greater than 4 inches in diameter.

Backfill materials should be placed in loose lifts not exceeding 8 inches and compacted to no less than 95% and not more than 100 % of the maximum dry density as defined by Test Method Tex-113-E for Class A or Class B borrow. Over-compaction of the backfill should be avoided to prevent an increase in lateral earth pressures on the walls of the structure. Compaction conducted within four feet of the structure should be performed with a manually propelled compactor (weighing less than 500 pounds) to reduce lateral pressure applied to the wall. Fill in this zone should be placed in six-inch or less loose lifts and compacted as described above.

The compacted backfill around the junction box and manholes will impose lateral earth pressures against the exterior walls of the structure. Design lateral pressures may be calculated for each of the recommended backfill types using the following equivalent fluid weights and lateral earth pressure coefficients. Friction coefficient of 0.42 can be used between concrete and soil interface.

Table 5-3: Equivalent Fluid Density per Backfill Type

Backfill Type	Assumed Moist Unit Weight (pcf)	Lateral Earth Pressure Coefficient, K			Equivalent Fluid Weight, (pcf) Above Water Table			Equivalent Fluid Weight, (pcf) Below Water Table		
		At Rest	Active	Passive	At Rest	Active	Passive	At Rest	Active	Passive
Class A (< 15% fines)	125	0.5	0.33	3	63	41	375	93	83	249
Class B (PI < 20)	120	0.55	0.37	2.66	66	44	384	94	83	217
On-Site Soils (PI<20)	120	0.58	0.4	3.4	70	48	408	95	85	258

The effects of traffic or general surcharge loads can be treated as an additional two feet of equivalent fluid extending above the top of the structure. The above equivalent fluid densities include backfill material both above and below the water table.

2.6 Potential Vertical Rise

Locally, the encountered Fat Clay (CH) and Lean Clay (CL) are considered to have a very high tendency to swell or expand when the moisture content increases. Similarly, when the moisture content decreases, there is an overall shrinkage of the soil mass. The shrink-swell movement may be assessed by estimating Potential Vertical Rise (PVR). The PVR represents the potential ability of a

soil material at a specific density, moisture and loading condition to swell. PVR values were calculated by the TEX 124-E method for the upper 15 feet of soils explored at the site. The PVR value is provided to demonstrate the relative severity of the swell potential of the clays at the site. PVR values with existing conditions, and necessary cut and replace depth with select fill at the boring locations are provided in Table 2-6 below.

Table 2-6: Potential Vertical Rise

Boring Location	PVR (in.) Existing Moisture Condition	Cut and Replace Depth(ft.) to reduce PVR=1-inch	Cut and Replace Depth (ft.) for PVR=1.5- inch	Cut and Replace Depth(ft.) for PVR=2- inch
B-1	2.3	3	2	1
B-2	1.5	2	1	--
B-3	1.9	2	2	--
B-4	1.8	3	2	--

3 OTHER CONSIDERATIONS

3.1 Trench Excavation

Trench excavation operations for this project will initially extend through surface materials (i.e. existing pavement section or fill) and then into stiff to hard clay soils. The soils encountered at this site should be removable using standard excavation equipment, e.g. excavators and/or backhoes.

3.2 Water Control

Groundwater was not encountered during drilling operations. Groundwater levels may fluctuate seasonally, in response to climatic conditions and with precipitation events. A certain amount of groundwater may be expected to enter the trench excavations as well as precipitation and possible runoff. Trench subgrade that is allowed to become inundated will rapidly soften, potentially causing instability of the excavation or poor pipe/foundation support. Consequently, inundated subgrade materials may need to be removed and replaced with compacted fill.

To minimize the above concerns, it is recommended that the project specifications require the contractor to employ measures for controlling the amount of water that enters the excavation, as well as promptly remove any water that does enter the excavation. Based on the types of materials to be encountered during excavation, a pump and sump arrangement should be adequate to maintain dry conditions within the excavations.

4 DESIGN REVIEW

HVJSCTx should review the design and construction plans and specifications prior to release to confirm the geotechnical recommendations presented herein have been properly interpreted. Our current scope of services does not include an allowance for such review; however, this can be provided as additional services.

5 LIMITATIONS

This study was performed for the exclusive use of Freese and Nichols, Inc. (FNI), and the City of Austin for the MLK TOD Stormwater Conveyance Improvements Phase 3 project located in Austin, Texas. HVJSCTx has endeavored to comply with generally accepted geotechnical engineering practices common in the local area. HVJSCTx makes no warranty, express or implied. Any analysis and recommendation contained in this report are based on data obtained from subsurface exploration, and laboratory testing performed and our experience with similar soils and site conditions.

The methods used indicate subsurface conditions only at the specific locations where samples were obtained, only at the time they were obtained, and only to the depths penetrated. Samples cannot be relied on to accurately reflect the strata variations that usually exist between sampling locations. Should any subsurface conditions other than those described in our boring logs be encountered, HVJSCTx should be immediately notified so that further investigation and supplemental recommendations can be provided

In the event that any changes in the nature, design, or location of the project are made, any conclusion and recommendation in this report should not be considered valid until the changes are reviewed and the conclusions and recommendations modified or verified in writing by HVJSCTx.

PAVEMENT DESIGN REPORT
MLK Transit Oriented Development (TOD)
Storm Water Conveyance Improvements
Phase 3
Austin, Texas

SUBMITTED TO
Freese and Nichols, Inc.
10431 Morado Circle, Building 5, Suite 300
Austin, Texas 78759

BY
HVJ SOUTH CENTRAL TEXAS – M&J, INC.
Austin, Texas
September 3, 2025

REPORT NO. AP1316240.3

HVJ ASSOCIATES

4201 Freidrich Lane, Suite 110
Austin, Texas 78744
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September 3, 2025

Mr. Bryan Pham, PE
Transportation Design
Freese and Nichols, Inc.
10431 Morado Circle, Building 5, Suite 300
Austin, Texas 78759

Re: MLK Transit Oriented Development (TOD) Storm Water Conveyance Improvements
Phase 3 – Pavement Design Services
Owner: City of Austin
HVJSCTx Project No. AP1316240.3

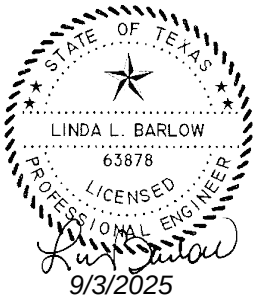
Dear Bryan:

HVJ South Central Texas – M&J, Inc. (HVJSCTx) has updated the pavement design report and addressed the comments from the QMD reviewer. Please let us know if you have any other comments.

It has been a pleasure to work for you on this project and we appreciate the opportunity to be of service. Please notify us if there are questions or if we may be of further assistance.

Sincerely,

HVJ South Central Texas – M&J, Inc.
Texas Firm Registration No. 18091



Linda Barlow, PE
Senior Project Manager

Copies submitted: (1) Electronic

The seal appearing on this document was authorized by Linda L. Barlow, P.E. 63878 on September 3, 2025. Alteration of a sealed document without proper notification to the responsible engineer is an offense under the Texas Engineering Practice Act.

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APPENDIX A: FPS21 OUTPUTS I

1 GENERAL PROJECT INFORMATION

HVJ South Central Texas – M&J, Inc. (HVJSCTx) was contracted by the Freese and Nichols, Inc. (FNI) to provide pavement design services for full depth reconstruction and mill/overlay designs for several streets associated with the MLK TOD Storm Water Improvements.

As part of the MLK TOD project, FNI will be expanding the project area to include a new storm drain system as well as any associated utility relocations and roadway reconstruction along Manor Road, including Larry Ln, Merrie Lynn Ave, and Alexander. The proposed storm drain is expected to be fairly deep, ranging from 7-15' in depth. FNI identified pavement limits anticipated to need full depth reconstruction due to the extents of the proposed storm drain trench. The project also includes proposed storm drain along Randolph Rd which will be standard trench repair for which HVJSCTx has no scope to design.

HVJSCTx reviewed available data from several sources of current and past geotechnical studies and pavement designs performed in this area. Additionally, data was reviewed from a study performed on failed pavement in another phase of the MLK TOD project located along MLK either side of the railroad tracks approximately 1400 feet south of the Manor Road limits and within 700 feet of the Alexander Rd portion of the Phase 3 limits.

HVJSCTx designed full depth reconstruction as well as mill and overlay sections utilizing available information. The information reviewed, design inputs and results, and recommendations follow.
Seven cores were collected from Manor Rd to capture the pavement structure and variability. The asphalt layer averages 4.3 inches and varies from 2.8 to 6.6 inches. The asphalt layer is supported by a flex base of varied thickness averaging 12 inches. The base thickness at C1 is estimated, as a concrete utility encasement was encountered.

2 SUMMARY OF AVAILABLE GEOTECHNICAL DATA

HVJSCTx reviewed historical geotechnical information as well and the geotechnical investigation completed for this project. The following documents were reviewed:

1. Geotechnical Data Report MLK TOD Stormwater Conveyance Improvements, Phase 3 Stormwater Line, Austin, Texas, prepared for Freese and Nichols, Inc. by HVJ South Central Texas – M&J, Inc. Draft, February 4, 2025.
2. Pavement Design Report, City of Austin Mobility Program, Manor Road from French Place to Airport Boulevard, Austin, Texas, prepared for City of Austin, by HVJ South Central Texas – M&J, Inc., March 29, 2022.
3. Geotechnical Investigation and Pavement Design Report, MLK TOD Stormwater Conveyance Improvements, Austin, Texas, prepared for Freese and Nichols, Inc. by HVJ Associates, November 21, 2014, updated August 21, 2015 [*project limits MLK Blvd between Ulit Ave and Clifford Ave*].
4. Geotechnical Data Report, MLK TOD Stormwater Conveyance Improvements, Austin, Texas prepared for Freese and Nichols, Inc. by HVJ Associates, Inc., July 21, 2015 [*project limits MLK Blvd between Ulit Ave and Clifford Ave*].

Based on these reports, the existing pavement thicknesses along the roadways considered for full depth reconstruction are summarized below. The range in thickness for Manor Rd is 3.3" to 6.6" HMAC over 8 to 11.3" Base for a total pavement thickness ranging from 12" to 16".

Table 1. Summary of Existing Thickness - Full Depth Reconstruction Limits.

Street	Approx. Area	Classification	Approx. Location	HMAC, in	Base, in	total, in
Manor Rd	3,654 SY	Level 3 - Minor Arterial	at Larry Ln	6.6	9.4	16
			btwn Larry Ln and Merrie Lynn	4	10	14
			btwn Merrie Lynn and	3.3	11.3	14.6
			at Randolph	5	8	13
			at Alexander	4	8	12
			average	*4.58*	*9.34*	*13.92*
Larry Ln	461 SY	Level 1 - Local	north of Manor Rd	2	8	10
Merrie	257 SY	Level 1 - Local	north of Manor Rd	5	12	17
Alexande	512 SY	Level 2 - Collector	south of Manor Rd	5	7	12

The range in surface thickness for the roadways considered for mill and overlay are summarized below.

Table 2. Summary of Existing Surface Thickness - Mill and Overlay Limits.

Street	Approx. Area	Classification	Approx. Location	HMAC, in
Manor Rd	2,011 SY	Level 3 - Minor Arterial	unknown	3.3 to 6.6
Larry Ln	350 SY	Level 1 - Local	north of Manor Rd	2
Merrie Lynn	154 SY	Level 1 - Local	north of Manor Rd	5
Alexander	400 SY	Level 2 - Collector	south of Manor Rd	5

The underlying subgrade soils include sandy fat clay (CH) with gravel, fat clay (CH), sand with clay (SC), sandy lean clay (CL). The Plasticity Index (PI), which can be indicative of swell capacity of soil, ranges from 21 to 33 for the CL soils and 34 to 60 for the CH soils. A summary by street follows.

Table 3. Summary of Subgrade Classification.

Street	Approx. Location	Soil Classifications	PI, upper 4'
Manor	btwn Larry Ln and Merrie Lynn	CH	46
	at Randolph	CH	47
	at Alexander	CL	21
Randolph	north of Manor Rd	CL	33
Larry Ln	north of Manor Rd	CH	60
Merrie Lynn	north of Manor Rd	CH	51
Alexander	south of Manor Rd	CH	34

HVJSCTx also collected FWD data along eastbound and westbound Manor Rd as part of the COA Street Rehabilitation Program (Mobility Program) from Airport Blvd to French Place. The limits of the MLK TOD project along Manor Rd were extracted and re-analyzed with the additional pavement thickness data obtained. The overall averages for the existing in-situ subgrade materials are summarized below. The value selected for subgrade design strength for Manor Rd (based on

back-calculation analysis) and Alexander (based on lower PI) is 10ksi. Due to the higher PIs for Larry Ln and Merrie Lynn, the design subgrade strength selected for design is 5ksi.

Table 4. Summary of Manor Rd Subgrade Strength Based on NDT.

Manor Rd Core/Bore Location	Subgrade Back Calculated Stiffness, ksi - based on NDT data at Core/Bore Location		
	Eastbound	Westbound	Average
C-4 @ Larry	6.0	3.9	5.0
C-5 btwn Merrie Lynn & Randolph	18.9	13.8	16.4
B13 at Randolph	6.0	10.8	8.4
B14 at Alexander	52.3	182.3	117.3
B-2 btwn Larry and Merrie Lynn	20.4	16.4	18.4
Average*	12.8	11.2	12.0
Minimum	6.0	3.9	5.0
Maximum*	20.4	16.4	18.4

** Not considering B14 results at NDT Station due to atypical results*

Additionally, the geotechnical report for MLK TOD Phase 3 included calculations of Potential Vertical Rise (PVR) and depth of removal and replacement to reduce the PVR to various levels, with the understanding that the City Transportation Criteria Manual considers the limiting criteria to be ≤2.0" for Arterial/Collector and ≤3.0" for Local/Residential streets. The resulting PVR calculations from the geotechnical investigation are summarized in the following table.

Table 5. Summary of PVR Calculations.

Boring	Street	Road Classification	PVR (in.), TEX 124-E Existing Moisture Condition
B-1	Larry	Local	2.3
B-2	Manor Rd	Minor Arterial	1.5
B-3	Merrie Lynn	Local	1.9
B-4	Alexandria	Collector	1.8

3 REVIEW OF PREVIOUS PAVEMENT FAILURES

The prior pavement failures along MLK as part of Phase 1 MLK TOD construction were considered to minimize the potential of similar failures occurring with the MLK TOC Phase 3

construction. There are three documents prepared during the evaluation and recommendations for the prior pavement failures that were reviewed:

1. Freese and Nichols Pavement Inspection Memo, dated August 31, 2022

2. Pavement Engineering Services, Boggy Creek – MLK prepared for Texas Material Group by Terracon, dated March 31, 2023

3. HVJSCTx MLK Phase 1 Pavement Evaluation, dated April 21, 2023

The constructed pavement section in the Phase 1 limits (~70' to ~80' either side of the railroad tracks east of Alexander Ave) included 4" HMAC Ty C surface, over 10" HMAC Ty B base, over 8" flexible base, over geogrid sheeting as per Terracon's investigation. Pavement distress was evident less than one year after completion of final paving with rutting observed along wheel paths for the length of the paving area.

Multiple factors were identified as contributing to the rutting, several of which include settlement related to backfill of trenches, low stiffness of flexible base, low density of HMAC Ty B, asphalt binder, and lack of lime stabilization. Lime stabilization was included in the original design, however due to the constricted work area, it was decided to replace the lime stabilized layer with flexible base and geogrid sheeting to separate the clay soils and attempt to limit moisture variability under the pavement section.

The takeaways from the additional evaluation of the failed pavement, as applicable to the Phase 3 project are:

- Proper compaction over trenches. If the trench backfill is not properly compacted, the roadways will settle and deteriorate.
- Confirm uniform support layer for subgrade and flexible base by proof rolling and meeting required density throughout to minimize differential movement.
- Recommendation of a PG76-22 binder for the surface HMAC, which may be less susceptible to rutting under the stop-and-go traffic.
- Proper sampling and testing of HMA mixture to confirm gradation, asphalt content and stability as well as in place density.
- Consideration of constructability of lime stabilized subgrade based on construction phasing and size of reconstruction areas.

4 TRAFFIC DATA

Available traffic data for the roads in the project limits were researched. HVJSCTx had collected traffic count data for Manor Rd just east of Alexander, related to the COA Street Rehabilitation Program project, therefore relatively recent data was available for Manor Rd, including truck percentages. Historical traffic volume data was obtained for Alexander Ave, Merrie Lynn Ave, and Larry Ln; however, this data is from 2004 to 2008 and does not include truck percentages. HVJSCTx also reviewed the Representative ADT ranges and 20-year ESALs for the various street classifications in the City of Austin Transportation Criteria Manual (TCM).

A 20-year projection of traffic was generated based on available information. The number of Equivalent Single Axle Loads (ESALs) induced by each vehicle type were found using American Association of State Highway Transportation Officials methodology (the AASHTO formula). An average truck factor based on the vehicle breakdown for Manor Rd was assumed for the other roadways with no classification count. Additionally, an estimate of truck percentages was assumed for collector (Alexander Ave) and local (Merrie Lyn Ave, and Larry Ln) roads. ESALs were totaled, considering the traffic volume in each vehicle class expected over a 20-year period. Traffic counts and 20-year ESAL projections are summarized in Table 6.

Table 6. Summary of Available Traffic Data and Design ESALs.

Count Location	24 hours Count, VPD (2021)	Truck & Bus %	Projected VPD (2041)	Design Lane Traffic (20 Year ESALs)	TCM Representative ESALs **	ESALs Selected for Design
Manor Rd, East of Alexander	12,507	3.8	27,404	2,652,501	2,500,000	2,650,000
Alexander Ave, 2100 blk - South of E. 22nd St*	3,538	2	7,751	415,593	700,000	600,000
Merrie Lynn Ave, 3200 blk - North of Manor Rd*	531	1	1,164	31,187	150,000	100,000
Larry Ln, 3200 blk - North of Manor Rd*	567	1	1,243	33,301	150,000	100,000

** Daily count estimated based on 4% growth from traffic count date, estimated truck %*

*** Also considers typical construction equipment loading*

5 FLEXIBLE PAVEMENT DESIGN

The City of Austin TCM[1], the TxDOT Pavement Manual[2], and TxDOT software were utilized to develop pavement rehab designs. All FPS21 outputs are shown in Appendix A.

Pavement Thickness Design Criteria and Performance Constraints

Flexible pavement design was performed using TxDOT's flexible pavement design software FPS-21. Input values were selected in accordance with TCM, Section 14 – Pavement Design. A 20-year design life is sought, with a minimum of maintenance issues in the first 15 years. The pavement is designed to accommodate a 4% yearly increase in traffic.

Material Properties

The existing subgrade stiffness was based on a review of the back-calculated values from FWD deflection data collected along Manor Rd (for the MLK TOD limits). A design modulus for the new dense-graded HMAC layer, is dependent on the total thickness. Design moduli for the new HMAC, new and estimated existing flexible base and subgrade are also shown in Table 7 below.

[1] Austin Transportation Criteria Manual, July 12, 2022, Section 14

[2] Pavement Manual, Texas Department of Transportation; Revised June 2021

Table 7. Material Design Inputs.

Material	Design Modulus	Poisson's Ratio
New Dense-Graded HMAC	850,000 psi (for Total HMAC≥ 8") 650,000 psi (for 4" < T < 8" Total HMAC) 500,000 psi (≤ 4" Total HMAC)	0.35
Controlled Low-Strength Material (CLSM)	25,000 psi	0.30
Existing/New Flexible Base	40,000 psi	0.35
Stabilized Subgrade	25,000 psi	0.30
Subgrade – Manor Rd, Alexander	10,000 psi	0.40
Subgrade – Larry Ln, Merrie Lynn Ave	5,000 psi	0.40

Basic Design Criteria

The basic design criteria for the pavement section design as per the TCM and previous discussion are shown in Table 8 for each street/classification.

Table 8: FPS 21 - Basic Design Criteria.

Parameter	Value – Arterial (Manor Rd)	Value – Collector (Alexander)	Value – Local (Larry, Merrie Lynn)
Design Confidence Level (%)	95	90	90
Design life (yrs)	20	20	20
Initial Serviceability Index	4.5	4.5	4.2
Terminal Serviceability Index	3.0	2.5	2.0
Minimum Time to First Overlay (yrs)	15	15	15
Minimum Time between Overlays (yrs)	10	10	10
ESALs in Design Lane	2,650,000	600,000	100,000

Pavement Design – Manor Rd (Minor Arterial)

The design inputs described above for Manor Rd were run using FPS21 for a new reconstruction pavement design. The resulting section, which also passes the mechanistic and triaxial design checks, is as follows:

- 3" HMAC Ty C
- 5" HMAC Ty B
- 9" Flexible Base

  17" total thickness

Based on the Transportation Criteria Manual, a representative section for an Urban Arterial Low Traffic and moderate subgrade swell is 5.5" HMAC on 14" Flex Base for a total of 19.5" thickness. Although the overall thickness of the Manor Rd design is thinner, the HMAC is thicker which allows a thinner flexible base and overall reduction in thickness.

Because the existing pavement section ranges from a total of 12" to 16" depth, the excavation for the proposed reconstruction section will expose the underlying subgrade. Although the underlying subgrade near Alexander is classified as a lean clay (CL) with a PI of only 21, the subgrade for the rest of the Manor Rd project limits is classified as a fat clay (CH), with a PI of 46 to 47. However, based on the geotechnical calculations, the PVR for Manor Rd is 1.5", less than the maximum criteria of 2" for an arterial roadway. Although not required for structural or PVR considerations, it is recommended that lime stabilization of the subgrade be used for a working platform to facilitate construction should the soils be variable (i.e., locations of soils with higher plasticity indices), possible wet weather conditions be encountered, etc. A review was made of the current project phasing to assess constructability issues in terms of work area needed for the stabilization efforts and it was confirmed there should be adequate working area to conduct the lime stabilization. If the existing conditions change and result in constraints that impact lime stabilization construction, a controlled low strength material (CLSM) item number 402S as per to City of Austin standard specification may be considered as a replacement of the lime stabilized subgrade layer; however, each site-specific instance must be reviewed and approved by the Engineer prior to its use. Moreover, this CLSM option is not recommended for overall use.

For a mill and overlay design on Manor Rd (limits unknown at this time), it is recommended to consider the rehabilitation designed for the COA Street Rehabilitation Program for Manor Rd. The design is a 7-inch mill replaced by a 4-inch HMAC Type B base and 3-inch HMAC Type C surface. However, HVJSCTx will need to confirm the overlay thickness once the limits are defined for this option.

Pavement Design – Alexander Ave (Collector)

Alexander Ave is classified as a collector street. The resulting FPS21 solution to meet the design criteria and mechanistic and triaxial design checks is 3.5" HMAC over 14" Flexible Base, which matches the representative section for an Urban Collector Low Traffic and moderate subgrade swell in the TCM. Although not required for structural or PVR considerations, it is suggested that stabilization of the subgrade be considered for a working platform to facilitate construction should the soils be variable (i.e., locations of soils with higher plasticity indices), possible wet weather conditions, etc. It is understood that stabilizing the subgrade can become a constructability issue depending on required phasing of the construction.

For a mill and overlay design on Alexander Ave, it is recommended that 3" of the existing 5" HMAC surface be milled and replaced based on the typical surface thickness considered for an Urban Collector Low Traffic and moderate subgrade in the TCM. It should be noted that the existing section of 5" HMAC on 7" flexible base (12" total section) is less than the 17.5" required total reconstruction section based on Texas Triaxial Design check; so, a mill and overlay option will not have the same performance as the reconstruction section if there are any heavy loading situations.

Pavement Design – Merrie Lynn Ave (Local)

Based on the design inputs described herein the resulting FPS21 solution is 3.5" HMAC over 13.5" Flexible Base over 8" Stabilized Subgrade. This design thickness is to match the existing pavement thickness. The design is controlled by the Texas Triaxial Check which requires 19.44" of total pavement section to protect the subgrade from heavy loads. This design section matches the representative section for an Urban Local and high swell subgrade in the Transportation Criteria Manual.

For a mill and overlay design on Merrie Lynn, it is recommended that 2" be considered based on the typical surface thickness considered for an Urban Collector Low Traffic and moderate subgrade in the TCM. This will leave 3" of the 5" existing HMAC on Merrie Lynn. It should be noted that the existing sections on Merrie Lynn is less than the 19.44" required total reconstruction section based on Texas Triaxial design check; therefore, a mill and overlay option will not have the same performance as the reconstruction section if there are any heavy loading situations.

Pavement Design – Larry Ln (Local)

Considering the high PI value of 60 and based on the design inputs described herein the resulting FPS21 solution for Larry Ln is 3.5" HMAC over 10" Flexible Base over 8" Stabilized Subgrade. This design thickness was made to pass both the triaxial check and the mechanistic check, as the current condition of this street is failing according to the FPS21 triaxial check. This design requires the removal of all the existing pavement in addition to 1.5" of an extra excavation. Moreover, the design follows the Texas Triaxial Check, which mandates a total pavement thickness of 19.44 inches to safeguard the subgrade against heavy loads. This pavement section aligns with the standard section specified for an Urban Local roadway with a high swell subgrade in the Transportation Criteria Manual.

For a mill and overlay design on Larry Ln, it is recommended that 2" be considered based on the typical surface thickness considered for an Urban Collector Low Traffic and moderate subgrade in the TCM. This will remove all HMAC on Larry Ln. It should be noted that the existing sections on Larry Ln is less than the 19.44" required total reconstruction section based on Texas Triaxial design check and failing. Therefore, a mill and overlay option will not have the same performance as the reconstruction section if there are any heavy loading situations. Therefore, the mill and overlay option is not recommended by HVJSCTx.

6 RECOMMENDATIONS

A summary of the recommendations for reconstruction and for mill and overlay by street are shown in Table 9 below.

Table 9. Summary of Pavement Reconstruction Recommendations.

Street	Reconstruction Section	COA Specification
Manor Rd	3" HMAC Ty C Surface (PG76-22 Binder)	340S
	Tack Coat	307S
	5" HMAC Ty B Base	340S
	Prime Coat	306S
	9" Flexible Base	210S
	8" Lime Stabilized Subgrade for working platform	203S
Alexander Ave	3.5" HMAC Ty C Surface (PG76-22 Binder)	340S
	Prime Coat	306S
	14" Flexible Base	210S
	8" Lime Stabilized Subgrade for working platform	203S
Merrie Lynn Ave	3.5" HMAC Ty D Surface	340S
	Prime Coat	306S
	13.5" Flexible Base	210S
	8" Lime Stabilized Subgrade	203S
Larry Ln	3.5" HMAC Ty D Surface	340S
	Prime Coat	306S
	10" Flexible Base	210S
	8" Lime Stabilized Subgrade	203S

Table 10. Summary of Mill and Overlay Recommendations

Street	Mill/Overlay	COA Specification
Manor Rd	7" Mill	315S
	Prime Coat	306S
	4" HMAC Ty B Base	340S
	Tack Coat	307S
	3" HMAC Ty C Surface (PG76-22 Binder)	340S
Alexander Ave	3" Mill	315S
	Tack Coat	307S
	3" HMAC Ty C Surface (PG76-22 Binder)	340S
Merrie Lynn Ave	2" Mill	315S
	Tack Coat	307S
	2" HMAC Ty D Surface	340S
Larry Ln	2" Mill	315S
	Prime Coat	306S
	2" HMAC Ty D Surface	340S

7 LIMITATIONS

This study was performed for the exclusive use of FNI for specific application to the MLK TOD project in Austin, Texas. HVJSCTx has endeavored to comply with generally accepted engineering practice common in the local area. HVJSCTx makes no warranty, express or implied. The analyses and recommendations contained in this report are based on data obtained from subsurface exploration, laboratory testing, the project information provided to us, and our experience with similar soils and site conditions. If any of the engineering information changes, the design will not be applicable and will need to be revised to incorporate the new information.

APPENDIX A: FPS21 OUTPUTS

Texas Department of Transportation

TEXAS DEPARTMENT OF TRANSPORTATION

F P S21-1.5 *FLEXIBLE PAVEMENT SYSTEM* *Release:12-12-2018*

PAVEMENT DESIGN TYPE # 4 -- ACP + ASPH STAB BASE + FLEX BASE OVER SUBGRADE

PROB	DIST.-14	COUNTY-227	CONT.	SECT.	JOB	HIGHWAY	DATE	PAGE
01	**Austin**	**TRAVIS**	**xxxx**	**xx**	**xxx**	**Manor Rd**	**8/27/2025**	**1**

COMMENTS ABOUT THIS PROBLEM

Manor Road

BASIC DESIGN CRITERIA

LENGTH OF THE ANALYSIS PERIOD (YEARS)	20.0
MINIMUM TIME TO FIRST OVERLAY (YEARS)	15.0
MINIMUM TIME BETWEEN OVERLAYS (YEARS)	10.0
DESIGN CONFIDENCE LEVEL (95.0%)	C
SERVICEABILITY INDEX OF THE INITIAL STRUCTURE	4.5
FINAL SERVICEABILITY INDEX P2	3.0
SERVICEABILITY INDEX P1 AFTER AN OVERLAY	4.2
DISTRICT TEMPERATURE CONSTANT	31.0
SUBGRADE ELASTIC MODULUS by COUNTY (ksi)	10.00
INTEREST RATE OR TIME VALUE OF MONEY (PERCENT)	7.0

PROGRAM CONTROLS AND CONSTRAINTS

NUMBER OF SUMMARY OUTPUT PAGES DESIRED (8 DESIGNS/PAGE)	3
MAX FUNDS AVAILABLE PER SQ.YD. FOR INITIAL DESIGN (DOLLARS)	99.00
MAXIMUM ALLOWED THICKNESS OF INITIAL CONSTRUCTION (INCHES)	99.0
ACCUMULATED MAX DEPTH OF ALL OVERLAYS (INCHES) (EXCLUDING LEVEL-UP)	6.0

TRAFFIC DATA

ADT AT BEGINNING OF ANALYSIS PERIOD (VEHICLES/DAY)	12507.
ADT AT END OF TWENTY YEARS (VEHICLES/DAY)	27404.
ONE-DIRECTION 20YEAR 18 kip ESAL (millions)	2.650
AVERAGE APPROACH SPEED TO THE OVERLAY ZONE(MPH)	30.0
AVERAGE SPEED THROUGH OVERLAY ZONE (OVERLAY DIRECTION)(MPH)	30.0
AVERAGE SPEED THROUGH OVERLAY ZONE (NON-OVERLAY DIRECTION) (MPH)	30.0
PROPORTION OF ADT ARRIVING EACH HOUR OF CONSTRUCTION (PERCENT)	6.0
PERCENT TRUCKS IN ADT	3.8

PAVEMENT DESIGN TYPE # 4 -- ACP + ASPH STAB BASE + FLEX BASE OVER SUBGRADE

PROB	DIST.-14	COUNTY-227	CONT.	SECT.	JOB	HIGHWAY	DATE	PAGE
01	**Austin**	**TRAVIS**	**xxxx**	**xx**	**xxx**	**Manor Rd**	**8/27/2025**	**2**

INPUT DATA CONTINUED

CONSTRUCTION AND MAINTENANCE DATA

MINIMUM OVERLAY THICKNESS (INCHES)	1.5
OVERLAY CONSTRUCTION TIME (HOURS/DAY)	12.0
ASPHALTIC CONCRETE COMPACTED DENSITY (TONS/C.Y.)	1.98
ASPHALTIC CONCRETE PRODUCTION RATE (TONS/HOUR)	200.0
WIDTH OF EACH LANE (FEET)	12.0
FIRST YEAR COST OF ROUTINE MAINTENANCE (DOLLARS/LANE-MILE)	125.00
ANNUAL INCREMENTAL INCREASE IN MAINTENANCE COST (DOLLARS/LANE-MILE)	30.00

DETOUR DESIGN FOR OVERLAYS

TRAFFIC MODEL USED DURING OVERLAYING	1
TOTAL NUMBER OF LANES OF THE FACILITY	2
NUMBER OF OPEN LANES IN RESTRICTED ZONE (OVERLAY DIRECTION)	1
NUMBER OF OPEN LANES IN RESTRICTED ZONE (NON-OVERLAY DIRECTION)	1
DISTANCE TRAFFIC IS SLOWED (OVERLAY DIRECTION) (MILES)	0.30
DISTANCE TRAFFIC IS SLOWED (NON-OVERLAY DIRECTION) (MILES)	0.00
DETOUR DISTANCE AROUND THE OVERLAY ZONE (MILES)	0.00

PAVING MATERIALS INFORMATION

LAYER	CODE	MATERIALS NAME	COST PER CY	E MODULUS	POISSON RATIO	MIN. DEPTH	MAX. DEPTH	SALVAGE PCT.
1	A	ASPH CONC PVMT	115.00	850000.	0.35	3.00	4.00	30.00
2	B	ASPH STAB BASE	100.00	850000.	0.35	5.00	10.00	90.00
3	C	FLEXIBLE BASE	37.00	40000.	0.35	9.00	14.00	75.00
4	D	SUBGRADE(200)	2.00	10000.	0.40	200.00	200.00	90.00

PAVEMENT DESIGN TYPE # 4 -- ACP + ASPH STAB BASE + FLEX BASE OVER SUBGRADE

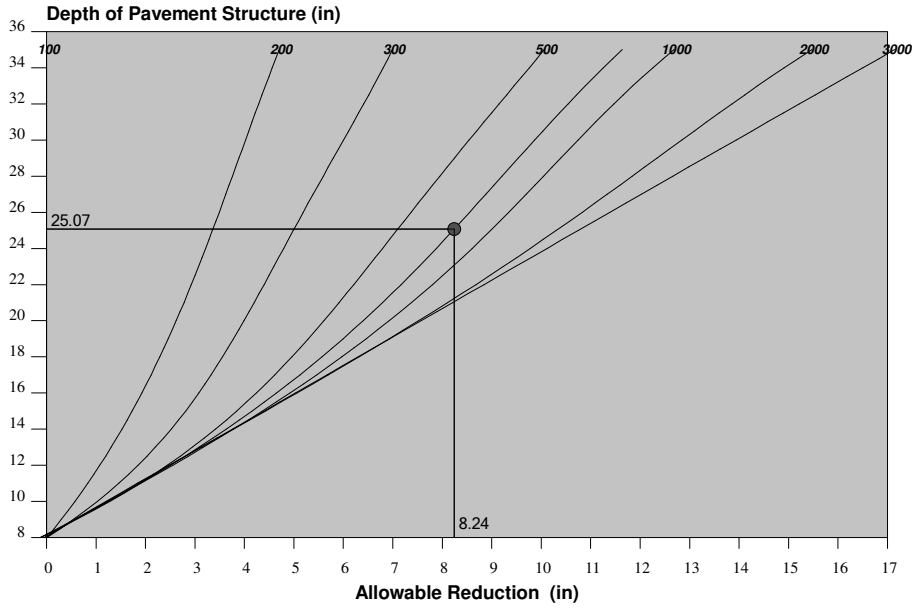
PROB	DIST.-14	COUNTY-227	CONT.	SECT.	JOB	HIGHWAY	DATE	PAGE
01	**Austin**	**TRAVIS**	**xxxx**	**xx**	**xxx**	**Manor Rd**	**8/27/2025**	**3**

C. LEVEL C SUMMARY OF THE BEST DESIGN STRATEGIES
IN ORDER OF INCREASING TOTAL COST
1

MATERIAL ARRANGEMENT	ABC
INIT. CONST. COST	32.72
OVERLAY CONST. COST	0.00
USER COST	0.00
ROUTINE MAINT. COST	0.55
SALVAGE VALUE	-5.77
TOTAL COST	27.51
NUMBER OF LAYERS	3
LAYER DEPTH (INCHES)	
D(1)	3.00
D(2)	5.00
D(3)	9.00
NO.OF PERF.PERIODS	1
PERF. TIME (YEARS)	
T(1)	33.
OVERLAY POLICY(INCH) (INCLUDING LEVEL-UP)	

THE TOTAL NUMBER OF FEASIBLE DESIGNS CONSIDERED WAS 363

	Thickness (inches)	Modulus (ksi)	Poisson's Ratio	Material Name
ASPH CONC PVMT	3.00	850.00	0.35	ASPH CONC PVMT
ASPH STAB BASE	5.00	850.00	0.35	ASPH STAB BASE
FLEXIBLE BASE	9.00	40.00	0.35	FLEXIBLE BASE
SUBGRADE(200)	200.00	10.00	0.40	SUBGRADE(200)
Bed Rock		1000.00	0.15	Bed Rock



Thickness Reduction Chart for Stabilized Layers

INPUT PARAMETERS:

The Heaviest Wheel Loads Daily (ATHWLD)	11500.0 (lb)
Percentage of TandemAxles	49.0 (%)
Modified Cohesionmeter Value	800.0
Design Wheel Load	11500.0 (lb)
Subgrade Texas Triaxial Class Number (TTC) Calculated TTC based on input soil PI	5.98
User Input Sub-Grade Plasticity Index (PI)	47.00

RESULT:

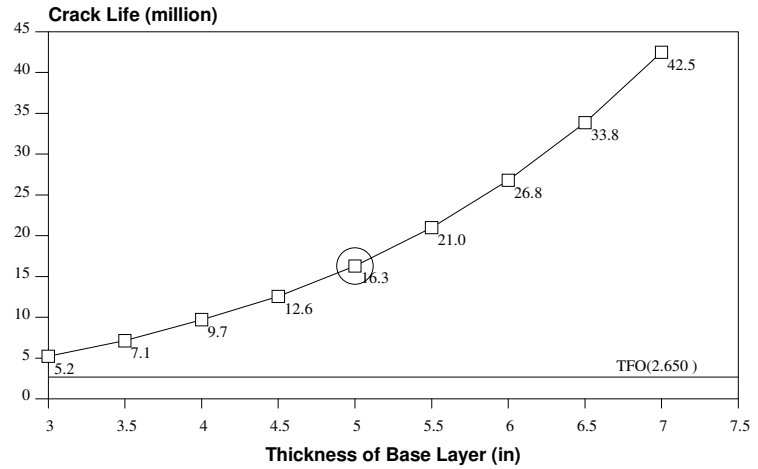
Triaxial Thickness Required	25.1 (in)
The FPS Design Thickness	17.0 (in)
Allowable Thickness Reduction	8.2 (in)
Modified Triaxial Thickness	16.8 (in)

TRIAXIAL CHECK CONCLUSION:

The Design OK !

FPS 21 Triaxial Design Check Output		**(FPS21-1.5Release:12-12-2018)**	
Highway	Manor Rd	Problem	01
C-S-J	xxxx - xx - xxx	Date	8/27/2025
District	Austin	County	TRAVIS
Design Type:Asphalt concrete + Asphalt Stabilized Base + Flexible Base over Subgrade			

	Thickness (inches)	Modulus (ksi)	Poisson's Ratio	Material Name
AC	3.00	850.00	0.35	ASPH CONC PVMT
Base	5.00	850.00	0.35	ASPH STAB BASE
Subbase	9.00	40.00	0.35	FLEXIBLE BASE
Subgrade	200.00	10.00	0.40	SUBGRADE(200)



Fatigue Crack Model:

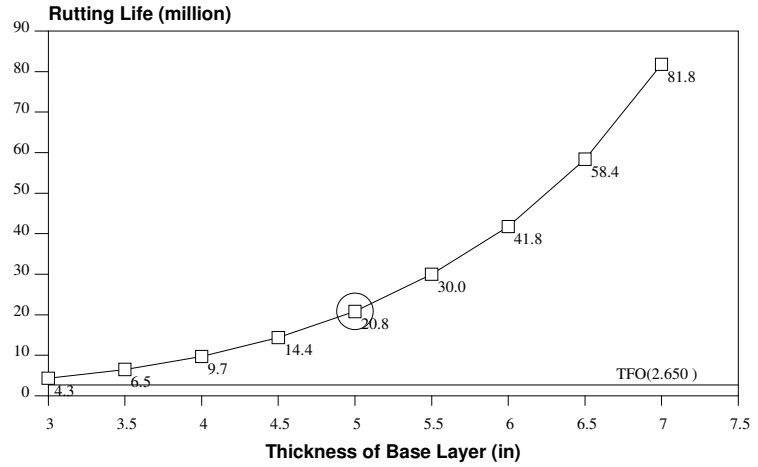
$$N_f = f_1 (\varepsilon_t)^{-f_2} (E_1)^{-f_3}$$

f_1 =7.96E-02
f_2 = 3.291
f_3 = .854

Rutting Model:

$$N_d = f_4 (\varepsilon_v)^{-f_5}$$

f_4 =1.37E-09
f_5 = 4.477



TFO(Traffic to 1st Overlay): 2.65 (million)

Crack Life: 16.28 (million) ε_τ = 86.30 (με)

Rut Life: 20.81 (million) ε_v = -243.00 (με)

Traffic to 1st Overlay is calculated by analysis period: 20years and 18 kips:2.65millions.
Also the start ADT:12507.0 and ending ADT:27404.0

Mechanistic Check Conclusion:

The design is OK !

FPS 21 Mechanistic Design Check Output (FPS21-1.5Release:12-12-2018)			
Highway	Manor Rd	Problem	01
C-S-J	xxxx - xx - xxx	Date	8/27/2025
District	Austin	County	TRAVIS
Design Type:Asphalt concrete + Asphalt Stabilized Base + Flexible Base over Subgrade			

Texas Department of Transportation

TEXAS DEPARTMENT OF TRANSPORTATION

F P S21-1.5 *FLEXIBLE PAVEMENT SYSTEM* *Release:12-12-2018*

PAVEMENT DESIGN TYPE # 7 -- USER DEFINED PAVEMENT

PROB	DIST.-14	COUNTY-227	CONT.	SECT.	JOB	HIGHWAY	DATE	PAGE
01	**Austin**	**TRAVIS**	**xxxx**	**xx**	**xxx**	**Manor Rd**	**8/27/2025**	**1**

COMMENTS ABOUT THIS PROBLEM

Manor Road_CLSM

BASIC DESIGN CRITERIA

LENGTH OF THE ANALYSIS PERIOD (YEARS)	20.0
MINIMUM TIME TO FIRST OVERLAY (YEARS)	15.0
MINIMUM TIME BETWEEN OVERLAYS (YEARS)	10.0
DESIGN CONFIDENCE LEVEL (95.0%)	C
SERVICEABILITY INDEX OF THE INITIAL STRUCTURE	4.5
FINAL SERVICEABILITY INDEX P2	3.0
SERVICEABILITY INDEX P1 AFTER AN OVERLAY	4.2
DISTRICT TEMPERATURE CONSTANT	31.0
SUBGRADE ELASTIC MODULUS by COUNTY (ksi)	10.00
INTEREST RATE OR TIME VALUE OF MONEY (PERCENT)	7.0

PROGRAM CONTROLS AND CONSTRAINTS

NUMBER OF SUMMARY OUTPUT PAGES DESIRED (8 DESIGNS/PAGE)	3
MAX FUNDS AVAILABLE PER SQ.YD. FOR INITIAL DESIGN (DOLLARS)	99.00
MAXIMUM ALLOWED THICKNESS OF INITIAL CONSTRUCTION (INCHES)	99.0
ACCUMULATED MAX DEPTH OF ALL OVERLAYS (INCHES) (EXCLUDING LEVEL-UP)	6.0

TRAFFIC DATA

ADT AT BEGINNING OF ANALYSIS PERIOD (VEHICLES/DAY)	12507.
ADT AT END OF TWENTY YEARS (VEHICLES/DAY)	27404.
ONE-DIRECTION 20YEAR 18 kip ESAL (millions)	2.650
AVERAGE APPROACH SPEED TO THE OVERLAY ZONE(MPH)	30.0
AVERAGE SPEED THROUGH OVERLAY ZONE (OVERLAY DIRECTION)(MPH)	30.0
AVERAGE SPEED THROUGH OVERLAY ZONE (NON-OVERLAY DIRECTION) (MPH)	30.0
PROPORTION OF ADT ARRIVING EACH HOUR OF CONSTRUCTION (PERCENT)	6.0
PERCENT TRUCKS IN ADT	3.8

PAVEMENT DESIGN TYPE # 7 -- USER DEFINED PAVEMENT

PROB	DIST.-14	COUNTY-227	CONT.	SECT.	JOB	HIGHWAY	DATE	PAGE
01	**Austin**	**TRAVIS**	**xxxx**	**xx**	**xxx**	**Manor Rd**	**8/27/2025**	**2**

INPUT DATA CONTINUED

CONSTRUCTION AND MAINTENANCE DATA

MINIMUM OVERLAY THICKNESS (INCHES)	1.5
OVERLAY CONSTRUCTION TIME (HOURS/DAY)	12.0
ASPHALTIC CONCRETE COMPACTED DENSITY (TONS/C.Y.)	1.98
ASPHALTIC CONCRETE PRODUCTION RATE (TONS/HOUR)	200.0
WIDTH OF EACH LANE (FEET)	12.0
FIRST YEAR COST OF ROUTINE MAINTENANCE (DOLLARS/LANE-MILE)	125.00
ANNUAL INCREMENTAL INCREASE IN MAINTENANCE COST (DOLLARS/LANE-MILE)	30.00

DETOUR DESIGN FOR OVERLAYS

TRAFFIC MODEL USED DURING OVERLAYING	1
TOTAL NUMBER OF LANES OF THE FACILITY	2
NUMBER OF OPEN LANES IN RESTRICTED ZONE (OVERLAY DIRECTION)	1
NUMBER OF OPEN LANES IN RESTRICTED ZONE (NON-OVERLAY DIRECTION)	1
DISTANCE TRAFFIC IS SLOWED (OVERLAY DIRECTION) (MILES)	0.30
DISTANCE TRAFFIC IS SLOWED (NON-OVERLAY DIRECTION) (MILES)	0.00
DETOUR DISTANCE AROUND THE OVERLAY ZONE (MILES)	0.00

PAVING MATERIALS INFORMATION

LAYER	CODE	MATERIALS NAME	COST PER CY	E MODULUS	POISSON RATIO	MIN. DEPTH	MAX. DEPTH	SALVAGE PCT.
1	C	DENSE-GRADED HMA T	150.00	850000.	0.35	3.00	12.00	90.00
2	C	DENSE-GRADED HMA T	150.00	850000.	0.35	5.00	12.00	90.00
3	M	FLEXIBLE BASE	54.00	40000.	0.35	9.00	12.00	75.00
4	P	CLSM	65.00	25000.	0.30	8.00	12.00	70.00
5	T	SUBGRADE	2.00	10000.	0.40	200.00	200.00	90.00

WARNING :
THERE ARE MORE THAN 1000 FEASIBLE INITIAL DESIGNS FOR THIS SET OF MATERIALS

CONSTRAINTS SHOULD BE REVISED - PROBLEM CONTINUES

PAVEMENT DESIGN TYPE # 7 -- USER DEFINED PAVEMENT

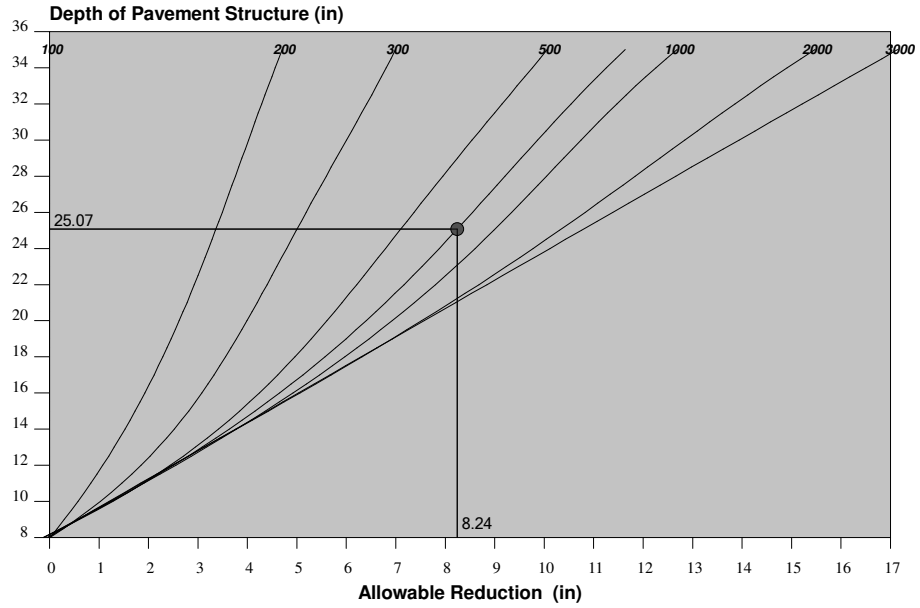
PROB	DIST.-14	COUNTY-227	CONT.	SECT.	JOB	HIGHWAY	DATE	PAGE
01	**Austin**	**TRAVIS**	**xxxx**	**xx**	**xxx**	**Manor Rd**	**8/27/2025**	**3**

C. LEVEL C SUMMARY OF THE BEST DESIGN STRATEGIES
IN ORDER OF INCREASING TOTAL COST
1

MATERIAL ARRANGEMENT	CCMP
INIT. CONST. COST	61.28
OVERLAY CONST. COST	0.00
USER COST	0.00
ROUTINE MAINT. COST	0.55
SALVAGE VALUE	-12.98
TOTAL COST	48.85
NUMBER OF LAYERS	4
LAYER DEPTH (INCHES)	
D(1)	3.00
D(2)	5.00
D(3)	9.00
D(4)	8.00
NO.OF PERF.PERIODS	1
PERF. TIME (YEARS)	
T(1)	36.
OVERLAY POLICY(INCH) (INCLUDING LEVEL-UP)	

THE TOTAL NUMBER OF FEASIBLE DESIGNS CONSIDERED WAS 1000

	Thickness (inches)	Modulus (ksi)	Poisson's Ratio	Material Name
DENSE-GRADED HMA TY C	3.00	850.00	0.35	DENSE-GRADED HMA TY C
DENSE-GRADED HMA TY B	5.00	850.00	0.35	DENSE-GRADED HMA TY B
FLEXIBLE BASE	9.00	40.00	0.35	FLEXIBLE BASE
CLSM	8.00	25.00	0.30	CLSM
SUBGRADE	200.00	10.00	0.40	SUBGRADE
Bed Rock		1000.00	0.15	Bed Rock



Thickness Reduction Chart for Stabilized Layers

INPUT PARAMETERS:

The Heaviest Wheel Loads Daily (ATHWLD)	11500.0 (lb)
Percentage of TandemAxles	49.0 (%)
Modified Cohesionmeter Value	800.0
Design Wheel Load	11500.0 (lb)
Subgrade Texas Triaxial Class Number (TTC) Calculated TTC based on input soil PI	5.98
User Input Sub-Grade Plasticity Index (PI)	47.00

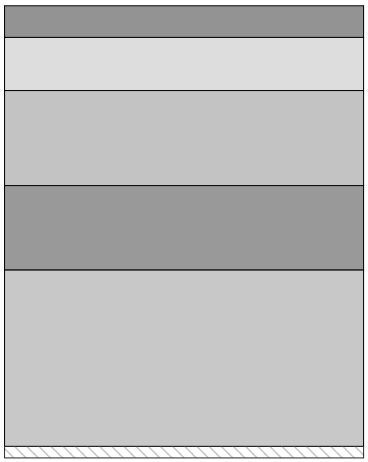
RESULT:

Triaxial Thickness Required	25.1 (in)
The FPS Design Thickness	25.0 (in)
Allowable Thickness Reduction	8.2 (in)
Modified Triaxial Thickness	16.8 (in)

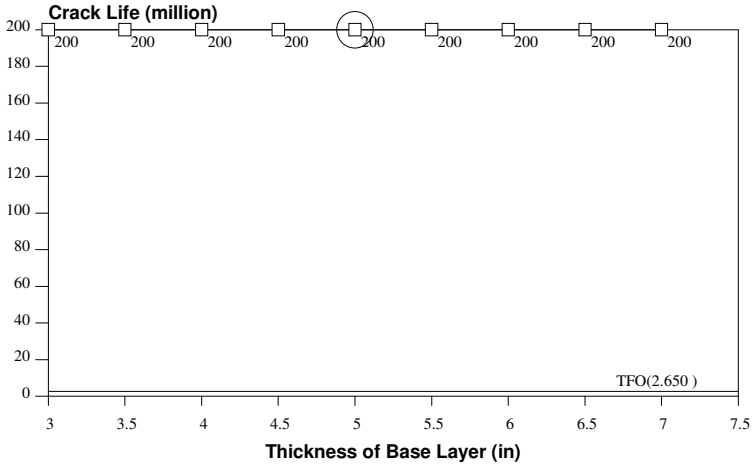
TRIAXIAL CHECK CONCLUSION:

The Design OK !

FPS 21 Triaxial Design Check Output		**(FPS21-1.5Release:12-12-2018)**	
Highway	Manor Rd	Problem	01
C-S-J	xxxx - xx - xxx	Date	8/27/2025
District	Austin	County	TRAVIS
Design Type:User Defined Pavement Design			



Thickness (inches)	Modulus (ksi)	Poisson's Ratio	Material Name
3.00	850.00	0.35	DENSE-GRADED HMA TY C
5.00	850.00	0.35	DENSE-GRADED HMA TY B
9.00	40.00	0.35	FLEXIBLE BASE
8.00	25.00	0.30	CLSM
200.00	10.00	0.40	SUBGRADE



Fatigue Crack Model:

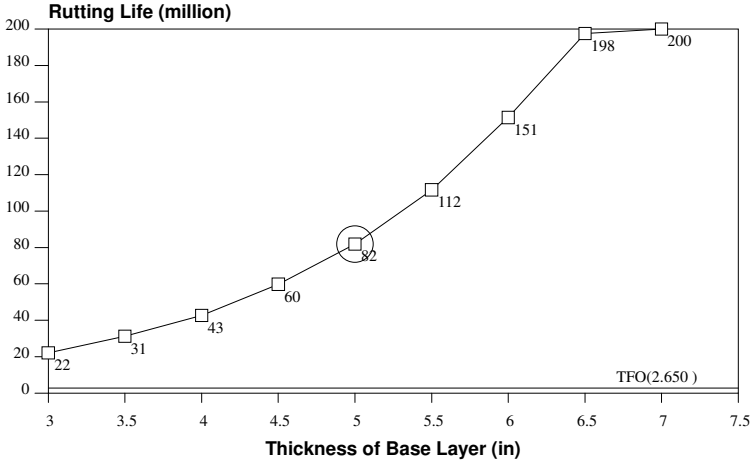
$$N_f = f_1 (\varepsilon_t)^{-f_2} (E_1)^{-f_3}$$

f_1 =7.96E-02
f_2 = 3.291
f_3 = .854

Rutting Model:

$$N_d = f_4 (\varepsilon_v)^{-f_5}$$

f_4 =1.37E-09
f_5 = 4.477



TFO(Traffic to 1st Overlay): 2.65 (million)

Crack Life: 200.00 (million) ε_τ = 7.67 (με)

Rut Life: 81.79 (million) ε_v = -179.00 (με)

Traffic to 1st Overlay is calculated by analysis period: 20years and 18 kips:2.65millions.
Also the start ADT:12507.0 and ending ADT:27404.0

Mechanistic Check Conclusion:

The design is OK !

FPS 21 Mechanistic Design Check Output (FPS21-1.5Release:12-12-2018)			
Highway	Manor Rd	Problem	01
C-S-J	xxxx - xx - xxx	Date	8/27/2025
District	Austin	County	TRAVIS
Design Type:User Defined Pavement Design			

Texas Department of Transportation

TEXAS DEPARTMENT OF TRANSPORTATION

F P S21-1.5 *FLEXIBLE PAVEMENT SYSTEM* *Release:12-12-2018*

PAVEMENT DESIGN TYPE # 2 -- ACP + FLEX BASE OVER SUBGRADE

PROB	DIST.-14	COUNTY-227	CONT.	SECT.	JOB	HIGHWAY	DATE	PAGE
01	**Austin**	**TRAVIS**	**xxxx**	**xx**	**xxx**	**Manor Rd**	**8/27/2025**	**1**

COMMENTS ABOUT THIS PROBLEM

Alexander Ave

BASIC DESIGN CRITERIA

LENGTH OF THE ANALYSIS PERIOD (YEARS)	20.0
MINIMUM TIME TO FIRST OVERLAY (YEARS)	15.0
MINIMUM TIME BETWEEN OVERLAYS (YEARS)	10.0
DESIGN CONFIDENCE LEVEL (90.0%)	B
SERVICEABILITY INDEX OF THE INITIAL STRUCTURE	4.5
FINAL SERVICEABILITY INDEX P2	2.5
SERVICEABILITY INDEX P1 AFTER AN OVERLAY	4.2
DISTRICT TEMPERATURE CONSTANT	31.0
SUBGRADE ELASTIC MODULUS by COUNTY (ksi)	10.00
INTEREST RATE OR TIME VALUE OF MONEY (PERCENT)	7.0

PROGRAM CONTROLS AND CONSTRAINTS

NUMBER OF SUMMARY OUTPUT PAGES DESIRED (8 DESIGNS/PAGE)	3
MAX FUNDS AVAILABLE PER SQ.YD. FOR INITIAL DESIGN (DOLLARS)	99.00
MAXIMUM ALLOWED THICKNESS OF INITIAL CONSTRUCTION (INCHES)	99.0
ACCUMULATED MAX DEPTH OF ALL OVERLAYS (INCHES) (EXCLUDING LEVEL-UP)	6.0

TRAFFIC DATA

ADT AT BEGINNING OF ANALYSIS PERIOD (VEHICLES/DAY)	3538.
ADT AT END OF TWENTY YEARS (VEHICLES/DAY)	7751.
ONE-DIRECTION 20YEAR 18 kip ESAL (millions)	0.600
AVERAGE APPROACH SPEED TO THE OVERLAY ZONE(MPH)	30.0
AVERAGE SPEED THROUGH OVERLAY ZONE (OVERLAY DIRECTION)(MPH)	30.0
AVERAGE SPEED THROUGH OVERLAY ZONE (NON-OVERLAY DIRECTION) (MPH)	30.0
PROPORTION OF ADT ARRIVING EACH HOUR OF CONSTRUCTION (PERCENT)	6.0
PERCENT TRUCKS IN ADT	2.0

PAVEMENT DESIGN TYPE # 2 -- ACP + FLEX BASE OVER SUBGRADE

PROB	DIST.-14	COUNTY-227	CONT.	SECT.	JOB	HIGHWAY	DATE	PAGE
01	**Austin**	**TRAVIS**	**xxxx**	**xx**	**xxx**	**Manor Rd**	**8/27/2025**	**2**

INPUT DATA CONTINUED

CONSTRUCTION AND MAINTENANCE DATA

MINIMUM OVERLAY THICKNESS (INCHES)	1.5
OVERLAY CONSTRUCTION TIME (HOURS/DAY)	12.0
ASPHALTIC CONCRETE COMPACTED DENSITY (TONS/C.Y.)	1.98
ASPHALTIC CONCRETE PRODUCTION RATE (TONS/HOUR)	200.0
WIDTH OF EACH LANE (FEET)	12.0
FIRST YEAR COST OF ROUTINE MAINTENANCE (DOLLARS/LANE-MILE)	125.00
ANNUAL INCREMENTAL INCREASE IN MAINTENANCE COST (DOLLARS/LANE-MILE)	30.00

DETOUR DESIGN FOR OVERLAYS

TRAFFIC MODEL USED DURING OVERLAYING	1
TOTAL NUMBER OF LANES OF THE FACILITY	2
NUMBER OF OPEN LANES IN RESTRICTED ZONE (OVERLAY DIRECTION)	1
NUMBER OF OPEN LANES IN RESTRICTED ZONE (NON-OVERLAY DIRECTION)	1
DISTANCE TRAFFIC IS SLOWED (OVERLAY DIRECTION) (MILES)	0.30
DISTANCE TRAFFIC IS SLOWED (NON-OVERLAY DIRECTION) (MILES)	0.00
DETOUR DISTANCE AROUND THE OVERLAY ZONE (MILES)	0.00

PAVING MATERIALS INFORMATION

LAYER	MATERIALS CODE	NAME	COST PER CY	E MODULUS	POISSON RATIO	MIN. DEPTH	MAX. DEPTH	SALVAGE PCT.
1	A	ASPH CONC PVMT	150.00	500000.	0.35	3.50	8.00	30.00
2	B	FLEXIBLE BASE	54.00	40000.	0.35	14.00	16.00	75.00
3	C	SUBGRADE(200)	2.00	10000.	0.40	200.00	200.00	90.00

NOTE -- THE CALCULATED BASE VALUE WAS OVER-WRITTEN BY THE USER FOR PAVEMENT DESIGN TYPE #1

NOTE -- THE CALCULATED BASE VALUE WAS OVER-WRITTEN BY THE USER FOR PAVEMENT DESIGN TYPE #1

PAVEMENT DESIGN TYPE # 2 -- ACP + FLEX BASE OVER SUBGRADE

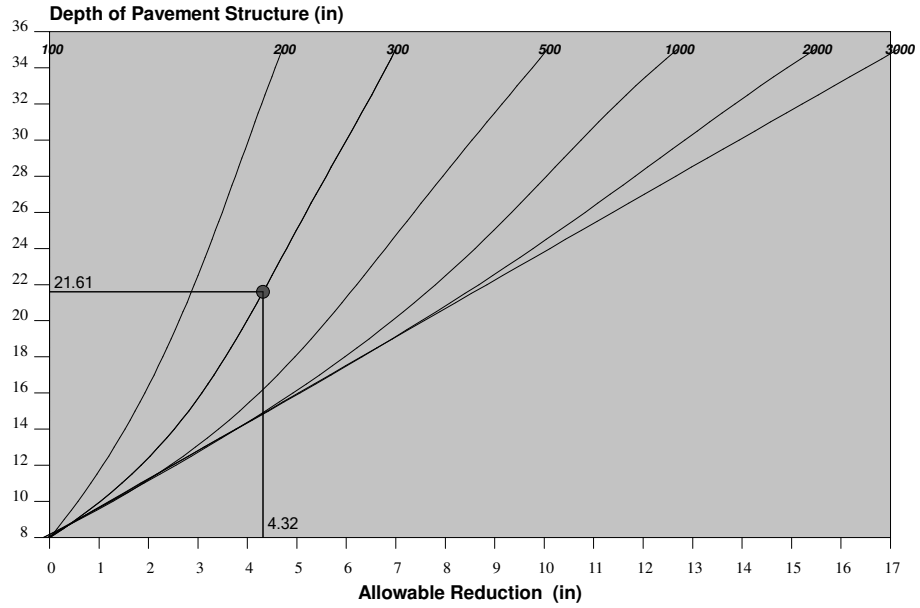
PROB	DIST.-14	COUNTY-227	CONT.	SECT.	JOB	HIGHWAY	DATE	PAGE
01	**Austin**	**TRAVIS**	**xxxx**	**xx**	**xxx**	**Manor Rd**	**8/27/2025**	**3**

C. LEVEL B SUMMARY OF THE BEST DESIGN STRATEGIES
IN ORDER OF INCREASING TOTAL COST
1

MATERIAL ARRANGEMENT	AB
INIT. CONST. COST	35.58
OVERLAY CONST. COST	0.00
USER COST	0.00
ROUTINE MAINT. COST	0.55
SALVAGE VALUE	-5.20
TOTAL COST	30.94
NUMBER OF LAYERS	2
LAYER DEPTH (INCHES)	
D(1)	3.50
D(2)	14.00
NO.OF PERF.PERIODS	1
PERF. TIME (YEARS)	
T(1)	40.
OVERLAY POLICY(INCH) (INCLUDING LEVEL-UP)	

THE TOTAL NUMBER OF FEASIBLE DESIGNS CONSIDERED WAS 50

	Thickness (inches)	Modulus (ksi)	Poisson's Ratio	Material Name
ASPH CONC PVMT	3.50	500.00	0.35	ASPH CONC PVMT
FLEXIBLE BASE	14.00	40.00	0.35	FLEXIBLE BASE
SUBGRADE(200)	200.00	10.00	0.40	SUBGRADE(200)
Bed Rock		1000.00	0.15	Bed Rock



Thickness Reduction Chart for Stabilized Layers

INPUT PARAMETERS:

The Heaviest Wheel Loads Daily (ATHWLD)	10000.0 (lb)
Percentage of TandemAxles	49.0 (%)
Modified Cohesionmeter Value	300.0
Design Wheel Load	10000.0 (lb)
Subgrade Texas Triaxial Class Number (TTC) Calculated TTC based on input soil PI	5.67
User Input Sub-Grade Plasticity Index (PI)	34.00

RESULT:

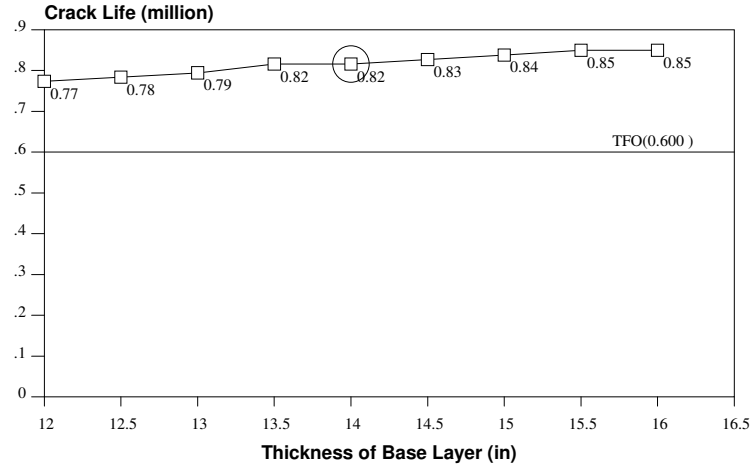
Triaxial Thickness Required	21.6 (in)
The FPS Design Thickness	17.5 (in)
Allowable Thickness Reduction	4.3 (in)
Modified Triaxial Thickness	17.3 (in)

TRIAXIAL CHECK CONCLUSION:

The Design OK !

FPS 21 Triaxial Design Check Output		**(FPS21-1.5Release:12-12-2018)**	
Highway	Manor Rd	Problem	01
C-S-J	xxxx - xx - xxx	Date	8/27/2025
District	Austin	County	TRAVIS
Design Type:Asphalt concrete + Flexible Base over Subgrade			

	Thickness (inches)	Modulus (ksi)	Poisson's Ratio	Material Name
AC	3.50	500.00	0.35	ASPH CONC PVMT
Base	14.00	40.00	0.35	FLEXIBLE BASE
Subgrade	200.00	10.00	0.40	SUBGRADE(200)



Fatigue Crack Model:

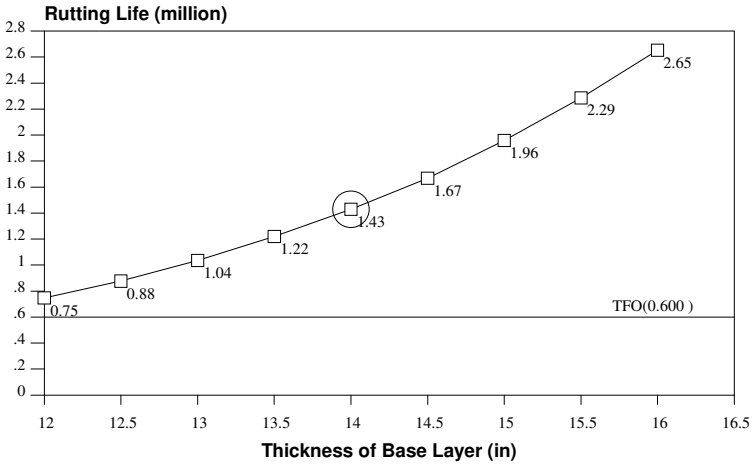
$$N_f = f_1 (\varepsilon_t)^{-f_2} (E_1)^{-f_3}$$

f_1 =7.96E-02
f_2 = 3.291
f_3 = .854

Rutting Model:

$$N_d = f_4 (\varepsilon_v)^{-f_5}$$

f_4 =1.37E-09
f_5 = 4.477



TFO(Traffic to 1st Overlay): 0.60 (million)

Crack Life: 0.82 (million) ε_τ = 246.00 (με)

Rut Life: 1.43 (million) ε_v = -442.00 (με)

Traffic to 1st Overlay is calculated by analysis period: 20years and 18 kips:.60millions.
Also the start ADT:3538.0 and ending ADT:7751.0

Mechanistic Check Conclusion:

The design is OK !

FPS 21 Mechanistic Design Check Output (FPS21-1.5Release:12-12-2018)			
Highway	Manor Rd	Problem	01
C-S-J	xxxx - xx - xxx	Date	8/27/2025
District	Austin	County	TRAVIS
Design Type:Asphalt concrete + Flexible Base over Subgrade			

Texas Department of Transportation

TEXAS DEPARTMENT OF TRANSPORTATION

F P S21-1.5 *FLEXIBLE PAVEMENT SYSTEM* *Release:12-12-2018*

PAVEMENT DESIGN TYPE # 5 -- ACP + FLEX BASE + STAB SBGR OVER SUBGRADE

PROB	DIST.-14	COUNTY-227	CONT.	SECT.	JOB	HIGHWAY	DATE	PAGE
01	**Austin**	**TRAVIS**	**xxxx**	**xx**	**xxx**	**Manor Rd**	**8/27/2025**	**1**

COMMENTS ABOUT THIS PROBLEM

Local St 1 - Merrie Lynn

BASIC DESIGN CRITERIA

LENGTH OF THE ANALYSIS PERIOD (YEARS)	20.0
MINIMUM TIME TO FIRST OVERLAY (YEARS)	15.0
MINIMUM TIME BETWEEN OVERLAYS (YEARS)	10.0
DESIGN CONFIDENCE LEVEL (90.0%)	B
SERVICEABILITY INDEX OF THE INITIAL STRUCTURE	4.2
FINAL SERVICEABILITY INDEX P2	2.0
SERVICEABILITY INDEX P1 AFTER AN OVERLAY	4.2
DISTRICT TEMPERATURE CONSTANT	31.0
SUBGRADE ELASTIC MODULUS by COUNTY (ksi)	5.00
INTEREST RATE OR TIME VALUE OF MONEY (PERCENT)	7.0

PROGRAM CONTROLS AND CONSTRAINTS

NUMBER OF SUMMARY OUTPUT PAGES DESIRED (8 DESIGNS/PAGE)	3
MAX FUNDS AVAILABLE PER SQ.YD. FOR INITIAL DESIGN (DOLLARS)	99.00
MAXIMUM ALLOWED THICKNESS OF INITIAL CONSTRUCTION (INCHES)	99.0
ACCUMULATED MAX DEPTH OF ALL OVERLAYS (INCHES) (EXCLUDING LEVEL-UP)	6.0

TRAFFIC DATA

ADT AT BEGINNING OF ANALYSIS PERIOD (VEHICLES/DAY)	531.
ADT AT END OF TWENTY YEARS (VEHICLES/DAY)	1164.
ONE-DIRECTION 20YEAR 18 kip ESAL (millions)	0.100
AVERAGE APPROACH SPEED TO THE OVERLAY ZONE(MPH)	30.0
AVERAGE SPEED THROUGH OVERLAY ZONE (OVERLAY DIRECTION)(MPH)	30.0
AVERAGE SPEED THROUGH OVERLAY ZONE (NON-OVERLAY DIRECTION) (MPH)	30.0
PROPORTION OF ADT ARRIVING EACH HOUR OF CONSTRUCTION (PERCENT)	6.0
PERCENT TRUCKS IN ADT	1.0

PAVEMENT DESIGN TYPE # 5 -- ACP + FLEX BASE + STAB SBGR OVER SUBGRADE

PROB	DIST.-14	COUNTY-227	CONT.	SECT.	JOB	HIGHWAY	DATE	PAGE
01	**Austin**	**TRAVIS**	**xxxx**	**xx**	**xxx**	**Manor Rd**	**8/27/2025**	**2**

INPUT DATA CONTINUED

CONSTRUCTION AND MAINTENANCE DATA

MINIMUM OVERLAY THICKNESS (INCHES)	1.5
OVERLAY CONSTRUCTION TIME (HOURS/DAY)	12.0
ASPHALTIC CONCRETE COMPACTED DENSITY (TONS/C.Y.)	1.98
ASPHALTIC CONCRETE PRODUCTION RATE (TONS/HOUR)	200.0
WIDTH OF EACH LANE (FEET)	12.0
FIRST YEAR COST OF ROUTINE MAINTENANCE (DOLLARS/LANE-MILE)	125.00
ANNUAL INCREMENTAL INCREASE IN MAINTENANCE COST (DOLLARS/LANE-MILE)	30.00

DETOUR DESIGN FOR OVERLAYS

TRAFFIC MODEL USED DURING OVERLAYING	1
TOTAL NUMBER OF LANES OF THE FACILITY	2
NUMBER OF OPEN LANES IN RESTRICTED ZONE (OVERLAY DIRECTION)	1
NUMBER OF OPEN LANES IN RESTRICTED ZONE (NON-OVERLAY DIRECTION)	1
DISTANCE TRAFFIC IS SLOWED (OVERLAY DIRECTION) (MILES)	0.30
DISTANCE TRAFFIC IS SLOWED (NON-OVERLAY DIRECTION) (MILES)	0.00
DETOUR DISTANCE AROUND THE OVERLAY ZONE (MILES)	0.00

PAVING MATERIALS INFORMATION

LAYER	MATERIALS CODE	NAME	COST PER CY	E MODULUS	POISSON RATIO	MIN. DEPTH	MAX. DEPTH	SALVAGE PCT.
1	A	ASPH CONC PVMT	115.00	500000.	0.35	3.50	3.50	30.00
2	B	FLEXIBLE BASE	37.00	40000.	0.35	13.50	13.50	75.00
3	C	STABILIZED SUBGR	15.00	25000.	0.30	8.00	8.00	90.00
4	D	SUBGRADE(200)	2.00	5000.	0.40	200.00	200.00	90.00

PAVEMENT DESIGN TYPE # 5 -- ACP + FLEX BASE + STAB SBGR OVER SUBGRADE

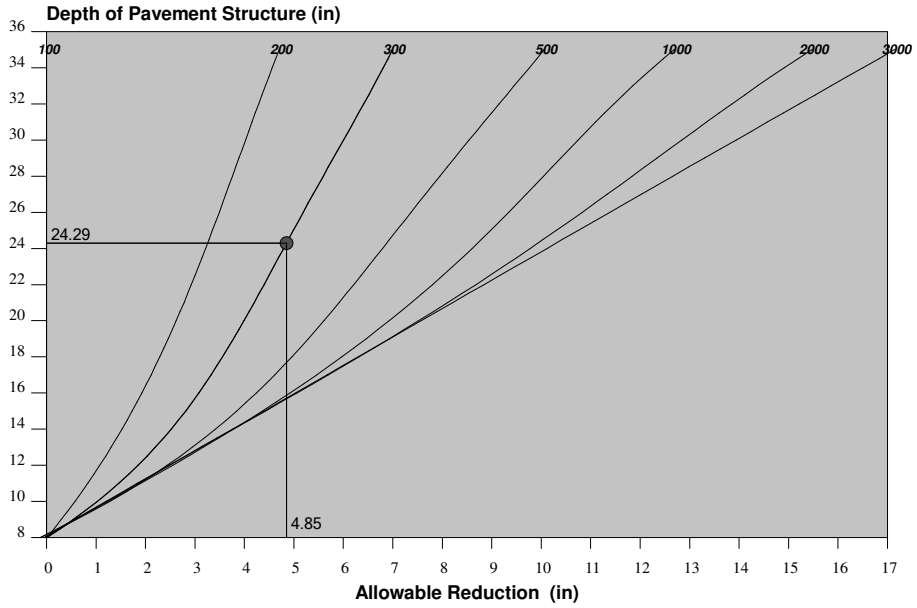
PROB	DIST.-14	COUNTY-227	CONT.	SECT.	JOB	HIGHWAY	DATE	PAGE
01	**Austin**	**TRAVIS**	**xxxx**	**xx**	**xxx**	**Manor Rd**	**8/27/2025**	**3**

C. LEVEL B SUMMARY OF THE BEST DESIGN STRATEGIES
IN ORDER OF INCREASING TOTAL COST
1

MATERIAL ARRANGEMENT	ABC
INIT. CONST. COST	28.39
OVERLAY CONST. COST	0.00
USER COST	0.00
ROUTINE MAINT. COST	0.55
SALVAGE VALUE	-4.33
TOTAL COST	24.61
NUMBER OF LAYERS	3
LAYER DEPTH (INCHES)	
D(1)	3.50
D(2)	13.50
D(3)	8.00
NO.OF PERF.PERIODS	1
PERF. TIME (YEARS)	
T(1)	40.
OVERLAY POLICY(INCH) (INCLUDING LEVEL-UP)	

THE TOTAL NUMBER OF FEASIBLE DESIGNS CONSIDERED WAS 1

	Thickness (inches)	Modulus (ksi)	Poisson's Ratio	Material Name
ASPH CONC PVMT	3.50	500.00	0.35	ASPH CONC PVMT
FLEXIBLE BASE	13.50	40.00	0.35	FLEXIBLE BASE
STABILIZED SUBGR	8.00	25.00	0.30	STABILIZED SUBGR
SUBGRADE(200)	200.00	5.00	0.40	SUBGRADE(200)
Bed Rock		500.00	0.15	Bed Rock



Thickness Reduction Chart for Stabilized Layers

INPUT PARAMETERS:

The Heaviest Wheel Loads Daily (ATHWLD)	10000.0 (lb)
Percentage of TandemAxles	49.0 (%)
Modified Cohesionmeter Value	300.0
Design Wheel Load	10000.0 (lb)
Subgrade Texas Triaxial Class Number (TTC) Calculated TTC based on input soil PI	6.08
User Input Sub-Grade Plasticity Index (PI)	51.00

RESULT:

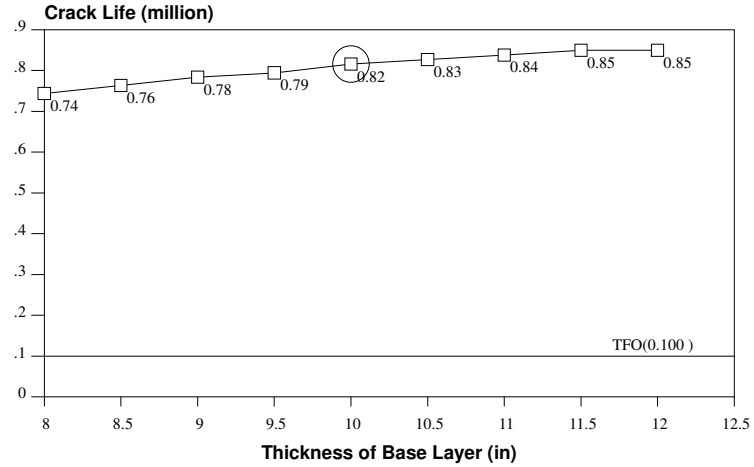
Triaxial Thickness Required	24.3 (in)
The FPS Design Thickness	25.0 (in)
Allowable Thickness Reduction	4.9 (in)
Modified Triaxial Thickness	19.4 (in)

TRIAXIAL CHECK CONCLUSION:

The Design OK !

FPS 21 Triaxial Design Check Output		**(FPS21-1.5Release:12-12-2018)**	
Highway	Manor Rd	Problem	01
C-S-J	xxxx - xx - xxx	Date	8/27/2025
District	Austin	County	TRAVIS
Design Type:Asphalt concrete + Flexible Base + Stabilized Subgrade over Subgrade			

	Thickness (inches)	Modulus (ksi)	Poisson's Ratio	Material Name
AC	3.50	500.00	0.35	ASPH CONC PVMT
Base	10.00	40.00	0.35	FLEXIBLE BASE
Subbase	8.00	25.00	0.30	STABILIZED SUBGR
Subgrade	200.00	5.00	0.40	SUBGRADE(200)



Fatigue Crack Model:

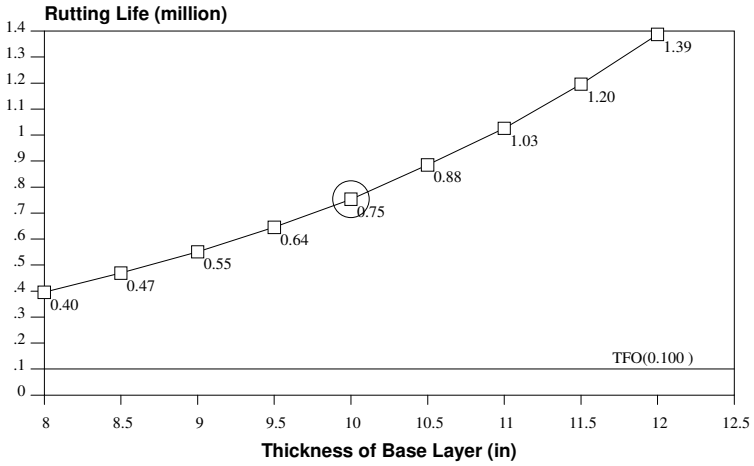
$$N_f = f_1 (\varepsilon_t)^{-f_2} (E_1)^{-f_3}$$

f_1 =7.96E-02
f_2 = 3.291
f_3 = .854

Rutting Model:

$$N_d = f_4 (\varepsilon_v)^{-f_5}$$

f_4 =1.37E-09
f_5 = 4.477



TFO(Traffic to 1st Overlay): 0.10 (million)

Crack Life: 0.82 (million) ε_τ = 246.00 (με)

Rut Life: 0.75 (million) ε_v = -510.00 (με)

Traffic to 1st Overlay is calculated by analysis period: 20years and 18 kips:.10millions.
Also the start ADT:567.0 and ending ADT:1243.0

Mechanistic Check Conclusion:

The design is OK !

FPS 21 Mechanistic Design Check Output (FPS21-1.5Release:12-12-2018)			
Highway	Manor Rd	Problem	01
C-S-J	xxxx - xx - xxx	Date	8/27/2025
District	Austin	County	TRAVIS
Design Type:Asphalt concrete + Flexible Base + Stabilized Subgrade over Subgrade			

Texas Department of Transportation

TEXAS DEPARTMENT OF TRANSPORTATION

F P S21-1.5 *FLEXIBLE PAVEMENT SYSTEM* *Release:12-12-2018*

PAVEMENT DESIGN TYPE # 5 -- ACP + FLEX BASE + STAB SBGR OVER SUBGRADE

PROB	DIST.-14	COUNTY-227	CONT.	SECT.	JOB	HIGHWAY	DATE	PAGE
01	**Austin**	**TRAVIS**	**xxxx**	**xx**	**xxx**	**Manor Rd**	**8/27/2025**	**1**

COMMENTS ABOUT THIS PROBLEM

Local St 2 - Larry Ln

BASIC DESIGN CRITERIA

LENGTH OF THE ANALYSIS PERIOD (YEARS)	20.0
MINIMUM TIME TO FIRST OVERLAY (YEARS)	15.0
MINIMUM TIME BETWEEN OVERLAYS (YEARS)	10.0
DESIGN CONFIDENCE LEVEL (90.0%)	B
SERVICEABILITY INDEX OF THE INITIAL STRUCTURE	4.2
FINAL SERVICEABILITY INDEX P2	2.0
SERVICEABILITY INDEX P1 AFTER AN OVERLAY	4.2
DISTRICT TEMPERATURE CONSTANT	31.0
SUBGRADE ELASTIC MODULUS by COUNTY (ksi)	5.00
INTEREST RATE OR TIME VALUE OF MONEY (PERCENT)	7.0

PROGRAM CONTROLS AND CONSTRAINTS

NUMBER OF SUMMARY OUTPUT PAGES DESIRED (8 DESIGNS/PAGE)	3
MAX FUNDS AVAILABLE PER SQ.YD. FOR INITIAL DESIGN (DOLLARS)	99.00
MAXIMUM ALLOWED THICKNESS OF INITIAL CONSTRUCTION (INCHES)	99.0
ACCUMULATED MAX DEPTH OF ALL OVERLAYS (INCHES) (EXCLUDING LEVEL-UP)	6.0

TRAFFIC DATA

ADT AT BEGINNING OF ANALYSIS PERIOD (VEHICLES/DAY)	567.
ADT AT END OF TWENTY YEARS (VEHICLES/DAY)	1243.
ONE-DIRECTION 20YEAR 18 kip ESAL (millions)	0.100
AVERAGE APPROACH SPEED TO THE OVERLAY ZONE(MPH)	30.0
AVERAGE SPEED THROUGH OVERLAY ZONE (OVERLAY DIRECTION)(MPH)	30.0
AVERAGE SPEED THROUGH OVERLAY ZONE (NON-OVERLAY DIRECTION) (MPH)	30.0
PROPORTION OF ADT ARRIVING EACH HOUR OF CONSTRUCTION (PERCENT)	6.0
PERCENT TRUCKS IN ADT	1.0

PAVEMENT DESIGN TYPE # 5 -- ACP + FLEX BASE + STAB SBGR OVER SUBGRADE

PROB	DIST.-14	COUNTY-227	CONT.	SECT.	JOB	HIGHWAY	DATE	PAGE
01	**Austin**	**TRAVIS**	**xxxx**	**xx**	**xxx**	**Manor Rd**	**8/27/2025**	**2**

INPUT DATA CONTINUED

CONSTRUCTION AND MAINTENANCE DATA

MINIMUM OVERLAY THICKNESS (INCHES)	1.5
OVERLAY CONSTRUCTION TIME (HOURS/DAY)	12.0
ASPHALTIC CONCRETE COMPACTED DENSITY (TONS/C.Y.)	1.98
ASPHALTIC CONCRETE PRODUCTION RATE (TONS/HOUR)	200.0
WIDTH OF EACH LANE (FEET)	12.0
FIRST YEAR COST OF ROUTINE MAINTENANCE (DOLLARS/LANE-MILE)	125.00
ANNUAL INCREMENTAL INCREASE IN MAINTENANCE COST (DOLLARS/LANE-MILE)	30.00

DETOUR DESIGN FOR OVERLAYS

TRAFFIC MODEL USED DURING OVERLAYING	1
TOTAL NUMBER OF LANES OF THE FACILITY	2
NUMBER OF OPEN LANES IN RESTRICTED ZONE (OVERLAY DIRECTION)	1
NUMBER OF OPEN LANES IN RESTRICTED ZONE (NON-OVERLAY DIRECTION)	1
DISTANCE TRAFFIC IS SLOWED (OVERLAY DIRECTION) (MILES)	0.30
DISTANCE TRAFFIC IS SLOWED (NON-OVERLAY DIRECTION) (MILES)	0.00
DETOUR DISTANCE AROUND THE OVERLAY ZONE (MILES)	0.00

PAVING MATERIALS INFORMATION

LAYER	MATERIALS CODE	NAME	COST PER CY	E MODULUS	POISSON RATIO	MIN. DEPTH	MAX. DEPTH	SALVAGE PCT.
1	A	ASPH CONC PVMT	115.00	500000.	0.35	3.50	4.00	30.00
2	B	FLEXIBLE BASE	37.00	40000.	0.35	10.00	12.00	75.00
3	C	STABILIZED SUBGR	15.00	25000.	0.30	8.00	8.00	90.00
4	D	SUBGRADE(200)	2.00	5000.	0.40	200.00	200.00	90.00

PAVEMENT DESIGN TYPE # 5 -- ACP + FLEX BASE + STAB SBGR OVER SUBGRADE

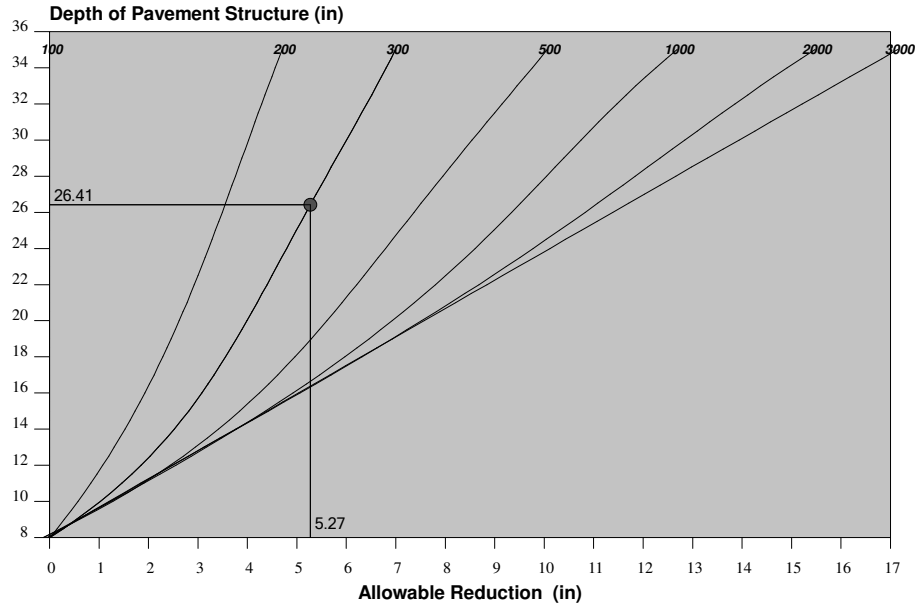
PROB	DIST.-14	COUNTY-227	CONT.	SECT.	JOB	HIGHWAY	DATE	PAGE
01	**Austin**	**TRAVIS**	**xxxx**	**xx**	**xxx**	**Manor Rd**	**8/27/2025**	**3**

C. LEVEL B SUMMARY OF THE BEST DESIGN STRATEGIES
IN ORDER OF INCREASING TOTAL COST
1

MATERIAL ARRANGEMENT	ABC
INIT. CONST. COST	24.79
OVERLAY CONST. COST	0.00
USER COST	0.00
ROUTINE MAINT. COST	0.55
SALVAGE VALUE	-3.63
TOTAL COST	21.71
NUMBER OF LAYERS	3
LAYER DEPTH (INCHES)	
D(1)	3.50
D(2)	10.00
D(3)	8.00
NO.OF PERF.PERIODS	1
PERF. TIME (YEARS)	
T(1)	40.
OVERLAY POLICY(INCH) (INCLUDING LEVEL-UP)	

THE TOTAL NUMBER OF FEASIBLE DESIGNS CONSIDERED WAS 10

	Thickness (inches)	Modulus (ksi)	Poisson's Ratio	Material Name
ASPH CONC PVMT	3.50	500.00	0.35	ASPH CONC PVMT
FLEXIBLE BASE	10.00	40.00	0.35	FLEXIBLE BASE
STABILIZED SUBGR	8.00	25.00	0.30	STABILIZED SUBGR
SUBGRADE(200)	200.00	5.00	0.40	SUBGRADE(200)
Bed Rock		500.00	0.15	Bed Rock



Thickness Reduction Chart for Stabilized Layers

INPUT PARAMETERS:

The Heaviest Wheel Loads Daily (ATHWLD)	10000.0 (lb)
Percentage of TandemAxles	49.0 (%)
Modified Cohesionmeter Value	300.0
Design Wheel Load	10000.0 (lb)
Subgrade Texas Triaxial Class Number (TTC) Calculated TTC based on input soil PI	6.28
User Input Sub-Grade Plasticity Index (PI)	60.00

RESULT:

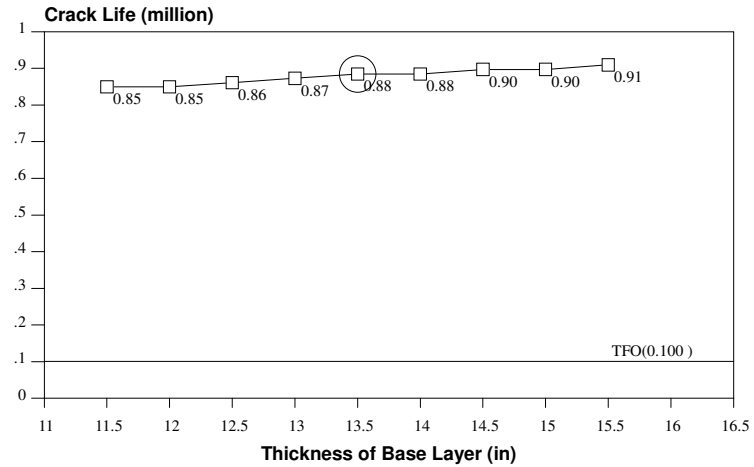
Triaxial Thickness Required	26.4 (in)
The FPS Design Thickness	21.5 (in)
Allowable Thickness Reduction	5.3 (in)
Modified Triaxial Thickness	21.1 (in)

TRIAXIAL CHECK CONCLUSION:

The Design OK !

FPS 21 Triaxial Design Check Output		**(FPS21-1.5Release:12-12-2018)**	
Highway	Manor Rd	Problem	01
C-S-J	xxxx - xx - xxx	Date	8/27/2025
District	Austin	County	TRAVIS
Design Type:Asphalt concrete + Flexible Base + Stabilized Subgrade over Subgrade			

	Thickness (inches)	Modulus (ksi)	Poisson's Ratio	Material Name
AC	3.50	500.00	0.35	ASPH CONC PVMT
Base	13.50	40.00	0.35	FLEXIBLE BASE
Subbase	8.00	25.00	0.30	STABILIZED SUBGR
Subgrade	200.00	5.00	0.40	SUBGRADE(200)



Fatigue Crack Model:

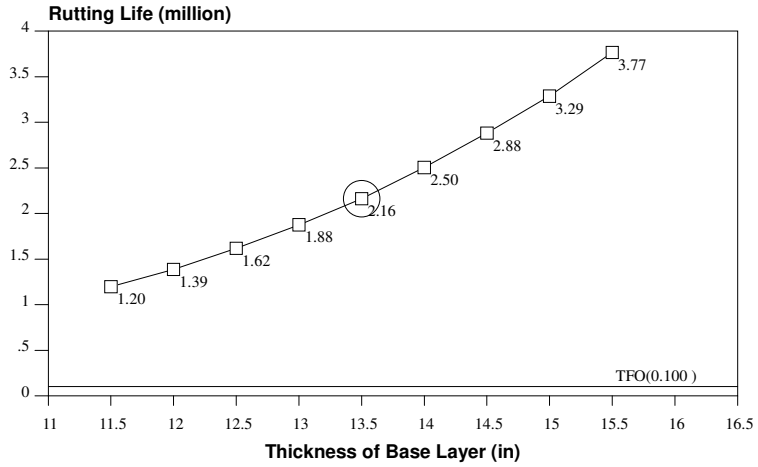
$$N_f = f_1 (\varepsilon_t)^{-f_2} (E_1)^{-f_3}$$

f_1 =7.96E-02
f_2 = 3.291
f_3 = .854

Rutting Model:

$$N_d = f_4 (\varepsilon_v)^{-f_5}$$

f_4 =1.37E-09
f_5 = 4.477



TFO(Traffic to 1st Overlay): 0.10 (million)

Crack Life: 0.88 (million) ε_τ = 240.00 (με)

Rut Life: 2.16 (million) ε_v = -403.00 (με)

Traffic to 1st Overlay is calculated by analysis period: 20years and 18 kips:.10millions.
Also the start ADT:531.0 and ending ADT:1164.0

Mechanistic Check Conclusion:

The design is OK !

FPS 21 Mechanistic Design Check Output (FPS21-1.5Release:12-12-2018)			
Highway	Manor Rd	Problem	01
C-S-J	xxxx - xx - xxx	Date	8/27/2025
District	Austin	County	TRAVIS
Design Type:Asphalt concrete + Flexible Base + Stabilized Subgrade over Subgrade			

UNIT PRICE BID FORM
Section 00300U

The undersigned, in compliance with the Invitation for Bids for construction of the following Project for the City of Austin, Texas:

Solicitation No.:	CLMC1173
Project:	Boggy Creek – MLK TOD Stormwater Conveyance Improvements – Phase 3
CIP ID No.:	8598.014

Having examined the Project Manual, Drawings and Addenda, the site of the proposed Work and being familiar with all of the conditions surrounding construction of the proposed Project, having conducted all inquiries, tests and investigations deemed necessary and proper; hereby proposes to furnish all labor, permits, material, machinery, tools, supplies and equipment, and incidentals, and to perform all Work required for construction of the Project in accordance with the Project Manual, Drawings and Addenda within the time indicated.

Note: The Bidder will enter the line item subtotal in the "Amount" column below, which is the product of the estimated "Quantity" multiplied by the "Unit Price". Any mathematical errors will be corrected for the purpose of determining the correct Amount to be entered in the Bid Form. The Amounts, including any corrected Amounts, will then be totaled to determine the actual amount of the Bid.

Bid Item	Quantity	Unit	Item Description	Unit Price	Amount
101S-B	23	STA	PREPARING RIGHT OF WAY	$	$
110S-B	3374	CY	STREET EXCAVATION, PLAN QUANTITY	$	$
130S-B	150	CY	CLASS B (BORROW), PLAN QUANTITY	$	$
132S-A	150	CY	EMBANKMENT	$	$
203S-A	4584	SY	LIME TREATED SUBGRADE (8 IN. THICK)	$	$
203S-L	92	TON	LIME	$	$
210S-A	1436	CY	FLEXIBLE BASE	$	$
315S-A	3717	SY	SURFACE MILLING	$	$
340-B-2-B	2836	SY	HOT MIX ASPHALTIC CONCRETE PAVEMENT, TYPE B (2 IN)	$	$
340-B-3-B	2635	SY	HOT MIX ASPHALTIC CONCRETE PAVEMENT, TYPE B (3 IN)	$	$
340-B-4-B	2707	SY	HOT MIX ASPHALTIC CONCRETE PAVEMENT, TYPE B (4 IN)	$	$
340-B-7-B	78	SY	HOT MIX ASPHALTIC CONCRETE PAVEMENT, TYPE B (7 IN)	$	$
340-B-3-C	2635	SY	HOT MIX ASPHALTIC CONCRETE PAVEMENT, TYPE C (3 IN)	$	$

340-B-3.5-C	1042	SY	HOT MIX ASPHALTIC CONCRETE PAVEMENT, TYPE C (3.5 IN)	$	$
340-B-2-D	998	SY	HOT MIX ASPHALTIC CONCRETE PAVEMENT, TYPE D (2 IN)	$	$
340-B-3-D	2707	SY	HOT MIX ASPHALTIC CONCRETE PAVEMENT, TYPE D (3 IN)	$	$
340-B-3.5-D	478	SY	HOT MIX ASPHALTIC CONCRETE PAVEMENT, TYPE D (3.5 IN)	$	$
360S-AH	78	SY	10 IN. CONCRETE PAVEMENT, HIGH EARLY STRENGTH	$	$
401S-B	600	CY	COMMON STRUCTURAL EXCAVATION	$	$
403-CY-A	12	CY	CLASS A: INVERT CONCRETE FILL GI-04, SI-02, AND CONCRETE RETAINING WALLS	$	$
403-CY-S	65	CY	CLASS S: GI-04, SI-02, CIP SLAB & RETAINING WALL AT CURB INLETS, SLAB & RETAINING WALL	$	$
403-EA	3	EA	SPECIAL CURB INLETS CI-69, CI-70, CI-72 INCLUDING PC INLETS, SHORING	$	$
432S-4	3019	SF	NEW P.C. CONCRETE SIDEWALKS, 4 INCH THICKNESS	$	$
432S-RP-1B	10	EA	P.C. SIDEWALK CURB RAMP WITH PAVERS (TYPE 1B)	$	$
434S	446	SF	6 INCH P.C. CONCRETE MEDIANS AND ISLANDS	$	$
480-NS	72	SF	CONCRETE PAVER UNITS FOR SIDEWALK, MM	$	$
505S-B 12-STL-WW	167	LF	ENCASEMENT PIPE, 12-IN STEEL, TYPE B, WW LINE	$	$
505S-B 16-STL-W	10	LF	ENCASEMENT PIPE, 16-IN STEEL, TYPE B, WATER LINE	$	$
505S-B 16-STL-WW	136	LF	ENCASEMENT PIPE, 16-IN STEEL, TYPE B, WW LINE	$	$
506 CNSW-RCP-SD	2	EA	CONNECTION TO EXISTING RCP	$	$
506 MSW-48-SD	1	EA	STANDARD PRE-CAST MANHOLE W/ PRE-CAST BASE, 48 IN DIA.	$	$
506 MSW-72-SD	1	EA	STANDARD PRE-CAST MANHOLE W/ PRE-CAST BASE, 72 IN DIA.	$	$
506 M-48-WW	6	EA	STANDARD PRE-CAST MANHOLE W/ PRE-CAST BASE, 48 IN DIA.	$	$
506 M-60-WW	1	EA	STANDARD PRE-CAST MANHOLE W/ PRE-CAST BASE, 60 IN DIA.	$	$

506M1-48-WW	1	EA	STANDARD PRE-CAST MANHOLE WITH CAST-IN-PLACE BASE, 48 IN DIA	$	$
506M1-60-WW	1	EA	STANDARD PRE-CAST MANHOLE WITH CAST-IN-PLACE BASE, 60 IN DIA	$	$
506-D-60-WW	6	EA	DROP MANHOLE W/PRE-CAST BASE, 60-INCH DIA	$	$
506-D1-60-WW	1	EA	DROP MANHOLE W/CIP BASE, 60-INCH DIA	$	$
506-EDM48-WW	26	VLF	EXTRA DEPTH MANHOLE, 48-INCH DIA	$	$
506-EDM60-WW	65	VLF	EXTRA DEPTH MANHOLE, 60-INCH DIA	$	$
508S-I10S-SD	11	EA	INLET, STANDARD, 10'	$	$
508S-I15S-SD	5	EA	INLET, STANDARD, 15'	$	$
509S-1-SD	2295	LF	TRENCH EXCAVATION SAFETY PROTECTIVE SYSTEMS, STORM DRAIN (ALL DEPTHS)	$	$
509S-1-W	2468	LF	TRENCH EXCAVATION SAFETY PROTECTION SYSTEMS, WATER (ALL DEPTHS)	$	$
509S-1-WW	2190	LF	TRENCH EXCAVATION SAFETY PROTECTIVE SYSTEMS, WASTEWATER (ALL DEPTHS)	$	$
510-ASD18Dia-SD	726	LF	PIPE, 18" DIA. RCP (ALL DEPTHS), INCLUDING EXCAVATION AND BACKFILL	$	$
510-ASD24Dia-SD	247	LF	PIPE, 24" DIA. RCP (ALL DEPTHS), INCLUDING EXCAVATION AND BACKFILL	$	$
510-ASD36Dia-SD	128	LF	PIPE, 36" DIA. RCP (ALL DEPTHS), INCLUDING EXCAVATION AND BACKFILL	$	$
510-ASD42Dia-SD	193	LF	PIPE, 42" DIA. RCP (ALL DEPTHS), INCLUDING EXCAVATION AND BACKFILL	$	$
510-ASD48Dia-SD	956	LF	PIPE, 48" DIA. RCP (ALL DEPTHS), INCLUDING EXCAVATION AND BACKFILL	$	$

510-VIDEO	2295	LF	VIDEO INSPECTION OF NEWLY INSTALLED BOX CULVERTS AND STORM DRAIN PIPE	$	$
510-AW-2-W	320	LF	PIPE, 2-INCH DIA. TYPE K COPPER TUBING, (ALL DEPTHS), INCLUDING EXCAVATION AND BACKFILL	$	$
510-AWRJ-6-W	109	LF	FACTORY RESTRAINED JOINT PIPE, 6-INCH DIA. CLASS 350, DUCTILE IRON, (ALL DEPTHS), INCLUDING EXCAVATION AND BACKFILL	$	$
510-AWRJ-8-W	1752	LF	FACTORY RESTRAINED JOINT PIPE, 8-INCH DIA. CLASS 350, DUCTILE IRON, (ALL DEPTHS), INCLUDING EXCAVATION AND BACKFILL	$	$
510-AWRJ-12-W	130	LF	FACTORY RESTRAINED JOINT PIPE, 12-INCH DIA. CLASS 350, DUCTILE IRON, (ALL DEPTHS), INCLUDING EXCAVATION AND BACKFILL	$	$
510-AWRJ-24-W	477	LF	FACTORY RESTRAINED JOINT PIPE, 24-INCH DIA. CLASS 350, DUCTILE IRON, (ALL DEPTHS), INCLUDING EXCAVATION AND BACKFILL	$	$
510-AWW-6-WW	440	LF	PIPE, 6-INCH DIA. SDR26 PVC (ALL DEPTHS), INCLUDING EXCAVATION AND BACKFILL	$	$
510-AWW-8-WW	1750	LF	PIPE, 8-INCH DIA. SDR26 PVC (ALL DEPTHS), INCLUDING EXCAVATION AND BACKFILL	$	$
510-BW 2.0x2.0 DIA-W	16	EA	CONNECTING NEW 2.0-INCH SERVICE TO EXISTING 2.0-INCH PRIVATE SERVICE	$	$
510-BWW-6X6-WW	22	EA	CONNECTING NEW 6-INCH WASTEWATER SERVICE TO EXISTING 6-INCH PRIVATE SERVICE	$	$
510-JW 6X6 DIA-W	5	EA	WET CONNECTIONS, 6-INCH DIA X 6-INCH DIA	$	$
510-JW 8X8 DIA-W	8	EA	WET CONNECTIONS, 8-INCH DIA X 8-INCH DIA	$	$
510-JW 12X12 DIA-W	4	EA	WET CONNECTIONS, 12-INCH DIA X 12-INCH DIA	$	$
510-JW 24X24 DIA-W	3	EA	WET CONNECTIONS, 24-INCH DIA X 24-INCH DIA	$	$
510-KW-W	3	TON	DUCTILE IRON FITTINGS	$	$
511-A6-W	11	EA	VALVES, RESILIENT SEATED GATE TYPE 6" DIA	$	$
511-A8-W	21	EA	VALVES, RESILIENT SEATED GATE TYPE 8" DIA	$	$

511-A12-W	2	EA	VALVES, RESILIENT SEATED GATE TYPE 12" DIA	$	$
511-B-W	5	EA	FIRE HYDRANTS (SEE STANDARD NO. 511-AW-02)	$	$
559S-3X3-SD	45	LF	PRECAST CONCRETE BOX CULVERTS, 3 FT X 3 FT	$	$
602S-A	928	SY	BERMUDA BLOCK SODDING	$	$
610-A	2575	LF	PROTECTIVE FENCING TYPE A CHAIN LINK FENCE (TYPICAL APPLICATION-HIGH DAMAGE POTENTIAL)	$	$
628S-B	370	LF	SEDIMENT CONTAINMENT DIKES WITH FILTER FABRIC	$	$
639S	10	LF	ROCK BERM	$	$
641S	4	EA	STABILIZED CONSTRUCTION ENTRANCE	$	$
648S	1325	LF	MULCH SOCK	$	$
700S-TM	1	LS	TOTAL MOBILIZATION PAYMENT	$	$
802S-BC.I.P.	3	EA	C.I.P. PROJECT SIGN	$	$
803S-CD	730	CD	BARRICADES, SIGNS & TRAFFIC HANDLING	$	$
803S-SF	2630	LF	SAFETY FENCING	$	$
824S	5	EA	TRAFFIC SIGNS	$	$
829S-A-4	3765	LF	TYPE I BICYCLE LANE MARKINGS, 4 INCHES IN WIDTH, WHITE IN COLOR	$	$
829S-B	11	EA	TYPE I BICYCLE LANE PREFERENTIAL (DIRECTIONAL ARROW) SYMBOLS, WHITE IN COLOR	$	$
863S-3	46	EA	REFLECTORIZED PAVEMENT MARKERS (TYPE II-A-A)	$	$
870S-A-4W	1055	LF	WORK ZONE PAVEMENT MARKINGS (REMOVABLE), 4 INCHES IN WIDTH, WHITE IN COLOR	$	$
870S-A-4Y	3030	LF	WORK ZONE PAVEMENT MARKINGS (REMOVABLE), 4 INCHES IN WIDTH, YELLOW IN COLOR	$	$
874S-A-4IN	2886	LF	ELIMINATING EXISTING PAVEMENT MARKINGS, 4 INCHES IN WIDTH	$	$
874S-A-24IN	240	LF	ELIMINATING EXISTING PAVEMENT MARKINGS, 24 INCHES IN WIDTH	$	$
874S-B	4085	LF	ELIMINATING EXISTING WORK ZONE PAVEMENT MARKINGS: 4 INCHES IN WIDTH	$	$

874S-E	11	EA	ELIMINATING EXISTING REFLECTORIZED THERMOPLASTIC PAVEMENT MARKINGS, 24 INCHES IN WIDTH	$	$
SP402S-1	270	CY	CLSM - STRUCTURAL BACKFILL FOR CI-69, CI-70, CI-72, SI-02, AND CONCRETE RETAINING WALLS	$	$
SP402S-2	10	CY	CLSM - PIPE CROSSINGS	$	$
SP402S-3	25	CY	CLSM - FULL TRENCH BACKFILL	$	$
SP432S-5-BIKE	1138	SF	NEW P.C. CONCRETE OFF-STREET BIKE FACILITY, 5 IN THICKNESS (COLOR INTEGRATED)	$	$
SP433S-CH	1104	SF	TYPE II P.C. CONCRETE DRIVEWAY (HIGH EARLY STRENGTH)	$	$
SP434S-A	89	SF	STAMPED P.C. CONCRETE MEDIANS AND ISLAND	$	$
SP510-CGB	415	LF	CELLULAR GROUT BACKFILL	$	$
SP510-REM	6510	LF	EXISTING UTILITY AND STORM DRAIN PIPE REMOVAL	$	$
SP702S-I	230	LF	REMOVING AND REPLACING EXISTING 4 FT. WIRE FENCE	$	$
SP871S-A-4WD	454	LF	REFLECTORIZED TYPE I THERMOPLASTIC PAVEMENT MARKINGS, 4 INCHES IN WIDTH, 90 MILS IN THICKNESS, WHITE IN COLOR (DOTTED)	$	$
SP871S-A-4YS	1036	LF	REFLECTORIZED TYPE I THERMOPLASTIC PAVEMENT MARKINGS, 4 INCHES IN WIDTH, 90 MILS IN THICKNESS, YELLOW IN COLOR (SOLID)	$	$
SP871S-A-4YB	1396	LF	REFLECTORIZED TYPE I THERMOPLASTIC PAVEMENT MARKINGS, 4 INCHES IN WIDTH, 90 MILS IN THICKNESS, YELLOW IN COLOR (BROKEN)	$	$
SP871S-A-24WS	240	LF	REFLECTORIZED TYPE I THERMOPLASTIC PAVEMENT MARKINGS, 24 INCHES IN WIDTH, 90 MILS IN THICKNESS, WHITE IN COLOR (SOLID)	$	$
SP871S-C-36G	16	EA	REFLECTORIZED TY I THERMOPLASTIC PAVEMENT MARKINGS, 36 IN, 90 MILS IN THICKNESS, GREEN (SHAPE)	$	$

SP871S-D-36W	15	EA	REFLECTORIZED TY I THERMOPLASTIC PAVEMENT MARKINGS, 36 IN, 90 MILS IN THICKNESS, WHITE (SYMBOL)	$	$
SS4150-CLIL	1	GAL LON	CL I CONTAMINATED LIQUID PER GALLON	$	$
SS4150-CLIS	1	TON	CL I CONTAMINATED SOIL PER TON	$	$
SS4150-CLIIL	1	GAL LON	CL II CONTAMINATED LIQUID PER GALLON	$	$
SS4150-CLIIS	1	TON	CL II CONTAMINATED SOIL PER TON	$	$
SS6001	730	CD	PORTABLE CHANGEABLE MESSAGE SIGN	$	$
SS01025-B	1	EA	PRIVATE LATERAL RELOCATION - TYPE B	$	$
SS000465-A	1	EA	4FT X 4FT JUNCTION BOX	$	$
SS000465-B	2	EA	5FT X 5FT JUNCTION BOX	$	$
SS000465-C	6	EA	6FT X 5FT JUNCTION BOX	$	$
SS000465-D	1	EA	6FT X 6FT JUNCTION BOX	$	$
SS000512-7009	460	LF	PORTABLE, CONCRETE TRAFFIC BARRIER - FURNISH AND INSTALL, LOW PROFILE, TYPE 1	$	$
SS000512-7010	80	LF	PORTABLE, CONCRETE TRAFFIC BARRIER - FURNISH AND INSTALL, LOW PROFILE, TYPE 2	$	$
SS000512-7033	780	LF	PORTABLE, CONCRETE TRAFFIC BARRIER - MOVE, LOW PROFILE TYPE 1	$	$
SS000512-7034	200	LF	PORTABLE, CONCRETE TRAFFIC BARRIER - MOVE, LOW PROFILE TYPE 2	$	$
SS000512-7057	460	LF	PORTABLE, CONCRETE TRAFFIC BARRIER - REMOVE, LOW PROFILE, TYPE 1	$	$
S000512-7058	80	LF	PORTABLE, CONCRETE TRAFFIC BARRIER - REMOVE, LOW PROFILE, TYPE 2	$	$
SS000658-7047	60	EA	INSTALL DELINEATOR ASSEMBLY (DOUBLE WHITE REFLECTORS), SIZE 1, WHITE FLEXIBLE POST, SURFACE MOUNT	$	$
SS000658-7050	12		INSTALL DELINEATOR ASSEMBLY (DOUBLE YELLOW REFLECTORS), SIZE 1, YELLOW FLEXIBLE POST, SURFACE MOUNT	$	$
SS000658-7051	8		INSTALL DELINEATOR ASSEMBLY (ZILCA ZEBRA SEPARATOR)	$	$

BASE BID		**$**
	(Words)	(Figures)

- The "Base Bid" amount must be used in the MBE/WBE Compliance Plan Summary Page to determine subcontractor participation levels for the established MBE/WBE procurement goals.
- The "Base Bid" amount becomes the Bidder's "TOTAL BID" if allowances and/or alternates are not included.

In the event of a mathematical error, the correct product, determined by using the "Unit Price" and "Quantity", and the correct sum, determined by totaling the correct line item Amounts, will prevail over the amount entered by the Bidder. The unit prices shown above will be the unit prices used to tabulate the Bid and used in the Contract, if awarded by the City.

Notes:

1. MINIMUM WAGES: Workers on Project shall be paid not less than wage rates, including fringe benefits, as published by the Department of Labor (DOL) for Building Construction and Heavy and Highway Trades "AS APPLICABLE" and/or the minimum Wage required by City of Austin Ordinance No. 20160324-015, whichever is higher. The Total Minimum Wage required can be met using any combination of cash and non-cash qualified fringe benefits provided the cash component meets or exceeds the minimum wage required.

Optional Information on Bid Prices Submitted by Computer Printout: In lieu of handwritten unit prices in figures in ink on the Bid forms above, Bidders, at their option, may submit an original computer printout sheet bearing certification by, and signature for, the Bidding firm. The unit prices shown on acceptable printouts will be the unit prices used to tabulate the Bid and used in the Contract if awarded by the City. As a minimum, computer printouts must contain all information and in the format shown on the attached page: "Example of Bid Prices Submitted by Computer Printout" form.

If a computer printout is used, the Bidder must still execute that portion of the unit price Bid form which acknowledges the Bid Guaranty, Time of Completion, Liquidated Damages, and all addenda that may have been issued.

Bids with unit prices by computer printout may be rejected, if:

1. The computer printout does not include the required certification, set forth in the attached "Example".
2. The computer printout is not signed in the name of the firm to whom the Project Manual was issued.
3. The computer printout is non-responsive or otherwise omits required Bid items or includes items not shown on the Bid forms in the Project Manual.
4. The other required Bid documents issued by the City are not fully executed as provided above.
5. The signed Section 00300U is not returned with the signed computer printout.

If the Bid submitted by the Bidder contains both the form furnished by the City, completed according to the instructions, and also a computer printout, completed according to the instructions, unit prices of only one will be considered. In this situation, the unit Bid prices shown on the computer printout will be used to determine the Bid.

BID GUARANTY: A Bid guaranty must be enclosed with this Bid, as required in Section 00020, in the amount of not less than five percent (5%) of the total Bid. Following the Bid opening, submitted Bids may not be withdrawn for a period of one hundred twenty (120) Calendar Days. Award of Contract will occur within this period, unless mutually agreed between the parties. The Bid guaranty may become the property of the OWNER, or the OWNER may pursue any other action allowed by law, if:

- Bidder withdraws a submitted Bid within the period stated above;
- Bidder fails to submit the required post Bid information within the period specified in Section 00020 or 00100, or any mutually agreed extension of that period; or,
- Bidder fails to execute the Contract and furnish the prescribed documentation (bonds, insurance, etc.) needed to complete execution of the Contract within five (5) Working Days after notice of award, or any mutually agreed extension of that period.

TIME OF COMPLETION: The undersigned Bidder agrees to commence work on the date specified in the written "Notice to Proceed" to be issued by the OWNER and to substantially complete construction of the improvements, as required by the Project Manual, Drawings and Addenda for the Work within seven hundred and thirty (730) Calendar Days.

If a Substantial Completion date has been specified, the Bidder further agrees to reach Final Completion within ninety (90) Calendar Days after Substantial Completion as required by the Project Manual, Drawings and Addenda for the work.

The Bidder further agrees that should the Bidder fail to substantially complete the Work within the number of days indicated in the Bid or as subsequently adjusted, Bidder shall pay the liquidated damages for each consecutive day thereafter as provided below; unless the OWNER elects to pursue any other action allowed by law.

WAIVER OF ATTORNEY FEES: In submitting the Bid, in consideration for the waiver of the Bidder's right to attorney's fees by the OWNER, the Bidder knowingly and intentionally agrees to and shall waive the right to attorney's fees under Section 271.153 of the Texas Local Government Code in any administrative proceeding, alternative dispute resolution proceeding, or litigation arising out of or connected to any Contract awarded pursuant to this solicitation process.

LIQUIDATED DAMAGES: The Bidder understands and agrees that the timely completion of the described Work is of the essence. The Bidder and OWNER further agree that the OWNER's actual damages for delay caused by failure to timely complete the Project are difficult, if not impossible to measure. However, with respect to the additional administrative and consultant costs to be incurred by OWNER, the reasonable estimate of such damages has been calculated and agreed to by OWNER and Bidder.

Therefore, the Bidder and the OWNER agree that for each and every Calendar Day the Work or any portion thereof, remains incomplete after the Substantial Completion date as established by the above paragraph, "Time of Completion", payment will be due to the Owner in the amount of one thousand eight hundred dollars ($1800) per Calendar Day as liquidated damages, not as a penalty, but for delay damages to the OWNER.

If both Substantial and Final Completion dates have been specified, the Bidder and the OWNER further agree that for each and every Calendar Day the Work or any portion thereof, remains incomplete after the Final Completion date as established by the above paragraph, "Time of Completion", payment will be due to the OWNER in the amount of one

thousand four hundred and fifty ($1450) per Calendar Day as liquidated damages, not as a penalty, but for delay damages to the OWNER. Such amount shall be deducted by the OWNER from any Contract payment due.
In the event of a default or breach by the CONTRACTOR and demand is made upon the surety to complete the project, in accordance with the Contract Documents, the surety shall be liable for liquidated damages pursuant to the Contract Documents in the same manner as the CONTRACTOR would have been.

MINOR INFORMALITY: OWNER reserves the right to reject any or all Bids and to waive any minor informality in any Bid or solicitation procedure (a minor informality is one that does not affect the competitiveness of the Bids).

ADDENDUM: The undersigned acknowledges receipt of the following addenda:

Addendum No. 1 dated		Received	
Addendum No. 2 dated		Received	
Addendum No. 3 dated		Received	
Addendum No. 4 dated		Received	

BID DOCUMENT EXECUTION AND ACKNOWLEDGEMENT: The undersigned Bidder certifies that the Bidder has read and understands Section 00020 Invitation for Bids, Section 00100 Instructions to Bidders, and all other requirements applicable to the Bidding process provided in the Bid and Contract Documents.

BIDDER's CERTIFICATION OF NON-COLLUSION, NON-CONFLICT OF INTEREST, AND ANTI-LOBBYING (Section 00440): The undersigned Bidder, by its signature, represents and certifies that it has read and can affirmatively swear and subscribe to the statements in Section 00440 Non-Collusion, Non-Conflict of Interest, and Anti-Lobbying Certification. If the Bidder cannot affirmatively swear and subscribe to any of the statements in Section 00440, Bidder represents and certifies that it has provided a detailed written explanation with its Bid on separate pages annexed hereto. The undersigned Bidder further certifies that it has not in any way directly or indirectly had communication restricted in the City Code Chapter 2-7, Article 6 (Anti-Lobbying and Procurement) during the No-Lobbying Period as defined in Chapter 2-7.

BIDDER's CERTIFICATION AS TO NONRESIDENT PROVISIONS: Bidder must provide the following information in accordance with Vernon's Texas Statutes and Codes Annotated Government Code § 2252.002, as amended. A Texas Resident Bidder is a bidder whose principal place of business is in Texas and includes a Contractor whose ultimate parent company or majority owner has its principal place of business in Texas. The undersigned **Bidder certifies that Bidder is a resident of _____** (*Bidder must write in the blank the state of which Bidder is a resident*).

Bidder will initial the blank set forth below to represent and certify that the Bidder has completed and enclosed the corresponding Bid Documents with the Bid.

_____ MBE/WBE Compliance Document

_____ One copy of Total Bid Form if Bid is submitted electronically via Austin Finance Online

_____ Bid Guaranty

The undersigned, by their signature, represents that they are submitting a binding offer and are authorized to bind the respondent to fully comply with the solicitation documents contained herein. The Respondent, by submitting and signing below, certifies that they have received and read all sections of the entire solicitation document including all revisions, addenda and documents incorporated by reference, and agree to be bound by the terms therein.

_____ _____

Corporate Secretary, *if Bidder is a Corporation Bidder

_____ _____

Email for Secretary Authorized Signature/Print Name

_____

(Seal) Title

_____

Date

_____

Address

_____

Telephone Number / FAX Number

_____

Email for Person Signing Bid

_____

Email for Bidder's Primary Contact Person

EXAMPLE: BID PRICES SUBMITTED BY COMPUTER PRINTOUT

Project Name:

CIP ID #:

IFB #:

Bid Item #	Bid Item Description	Unit	Qty	Unit Bid Price	Total Amount
Proposal:				Total	

(YOUR FIRM'S NAME) certifies that the unit prices shown on this completed computer printout for all of the Bid items and the alternates contained in this proposal are the unit prices intended and that its Bid will be tabulated using these unit prices and no other information from this printout. (YOUR FIRM'S NAME) acknowledges and agrees that the total Bid amount shown will be read as its total Bid. In the event of a mathematical error, the correct product, determined by using the "Unit Price" and "Quantity", and the correct sum, determined by totaling the correct line item Amounts, will prevail over the amount entered by the Bidder.

Signed: _____

Title: _____ Date: _____

END

TOTAL BID FORM

Solicitation No.:	
Project:	
Bidder:	
Total Bid Amount: (includes Base Bid plus any Allowances or Alternates shown in Section 00300)	

Notes:

1. This form will be displayed publicly in Austin Finance Online approximately one hour after the solicitation closes.
2. In the case of discrepancies between this form and Section 00300, Section 00300 takes precedence.

Project Name:	Boggy Creek – MLK TOD Stormwater Conveyance Improvements Phase 3
Name of Bidder:	
Solicitation Number:	CLMC1173

Bidder must complete all Attachments to Section 00400 clearly and comprehensively. If necessary, responses may be continued on separately attached sheets.

To be considered a responsive and responsible bidder, the apparent three (3) low Bidders must complete and submit within three (3) working days of notification of low bidder status Attachments A through I in accordance with Article 11, Section 00100. Contractor Performance Evaluations for previous work with the City will be included in the assessment of the Bidder's experience. Any information in Attachments A through I and in the Contractor's Performance Evaluations that indicates the Bidder or a "Subcontractor" is not responsible or that might negatively impact a Bidder's ability to complete the Work within the Contract Time and for the Contract Price may result in the Bid being rejected.

The Bidder is responsible for the accuracy and completeness of all of the information provided by the Bidder or a proposed Subcontractor in response to this Invitation for Bids.

POST-BID SUBMITTALS

ATTACHMENT A – BIDDER'S INFORMATION

ATTACHMENT B – EXPERIENCE REQUIREMENTS (GENERAL CONTRACTOR)

ATTACHMENT C – PROJECT MANAGER AND SUPERINTENDENT EXPERIENCE

ATTACHMENT D – EXPERIENCE REQUIREMENTS (SPECIFIC CONSTRUCTION OR TECHNICAL EXPERIENCE)

ATTACHMENT E – AVAILABLE EQUIPMENT

ATTACHMENT F – AVAILABLE WORKFORCE

ATTACHMENT G – CURRENT PROJECTS

ATTACHMENT H – COMPLETED PROJECTS

ATTACHMENT I – BIDDER'S AUTHENTICATION

ATTACHMENT A
BIDDER'S INFORMATION

Attention Bidder: Complete and return within three (3) days of notification of the three (3) low bidders' status.

Solicitation Number:	CLMC1173

A.	**Name of Bidder:**	
B.	**Bidder's Permanent Address:**	
C.	**Bidder's Phone Number:**	
D.	**Number of years in business under current company name:**	

(Note: Bidder must have been in existence for a minimum of one (1) year under its current company name. Changes in company name during the experience period are acceptable, if the continuity of the company can be demonstrated. Attach separate documentation, if applicable.)

If Bidder answers "Yes" for <u>any</u> of questions E through H, Bidder must attach separate sheets with a brief description or explanation of the answer and provide pertinent contact information (parties' names, addresses and telephone numbers).

E.	**Has the Bidder ever defaulted on a contract?**	**❒ Yes**	**❒ No**
F.	**Are there currently any pending judgements, claims, or lawsuits against the Bidder?**	**❒ Yes**	**❒ No**
G.	**Does Bidder currently have any pending claims, judgements or lawsuits against any prior client?**	**❒ Yes**	**❒ No**
H.	**Is the Bidder or its principals involved in any bankruptcy or reorganization proceedings?**	**❒ Yes**	**❒ No**

ATTACHMENT B
EXPERIENCE REQUIREMENTS (GENERAL CONTRACTOR)

Attention Bidder: Complete and return within three (3) days of notification of the three (3) low bidders' status.

Solicitation Number:	CLMC1173

GENERAL CONTRACTOR EXPERIENCE:

Bidder must list and describe Bidder's (not proposed subcontractors') construction experience as a general contractor for a minimum of three (3) successfully completed projects of comparable size, scope and complexity to the Work described in the Contract Documents. Bidder should refer to the Work description in Section 01010 Summary of Work and Section 00020/00020 IDIQ to determine what is reasonably comparable. Comparability requirements may be spread among the three (3) projects submitted, e.g. One Project may demonstrate comparable size, another Project may demonstrate comparable scope and another may demonstrate comparable complexity. Decisions on "comparability" are at the complete discretion of the OWNER.

Bidder must have completed the projects within the past ten (10) years.

Attention Bidder: Duplicate this form for each of the three (3) projects.

PROJECT NO. _____		
Name of Project:		
Location:		
OWNER's Name and Address:		
OWNER's Contact Person (Print):		
Phone		
Initial Contract Price:		
Final Contract Price:		
Contract Start Date: *(Date of Notice to Proceed)*		
Contract Time:	Calendar Days:	Working Days:
Contract Substantial Completion Date:		
Actual Substantial Completion Date:		
If contract time extensions were added to the contract as a result of Bidder's responsibilities, provide a short explanation of each:		
Project Description and why it is comparable to this Contract:		

ATTACHMENT C
PROJECT MANAGER & SUPERINTENDENT EXPERIENCE

Attention Bidder: Complete and return within three (3) days of notification of the three (3) low bidders' status.

Name of Bidder:	
Solicitation Number:	

Bidder must attach resumes for the Project Manager and Superintendent who will be assigned to this project. The resumes must demonstrate that these individuals have worked on at least three (3) similar, successfully completed projects in the capacity of Project Manager or Superintendent, or other responsible supervisory capacity, as applicable, during the last 10 years.

Project Manager (name): _____

Superintendent (name): _____

Note: Attach Resumes & Experience

Attention Bidder: Complete and return within three (3) days of notification of the three (3) low bidders' status.

SPECIFIC CONSTRUCTION EXPERIENCE (GENERAL CONTRACTOR OR SUBCONTRACTOR PERFORMING THE WORK)

Bidder must provide the following project history information for each Construction Experience requirement listed below. OWNER may in its reasonable discretion deem the provided experience information insufficient and reject the Bid.

For each Construction Experience item listed below, list and describe the applicable Construction Experience for a minimum of three (3) successfully completed projects of comparable size, scope, and complexity to the Work described for this project. Comparability requirements may be spread among the three (3) projects per item submitted, e.g. One Project may demonstrate comparable size, another Project may demonstrate comparable scope and another may demonstrate comparable complexity. Decisions on "comparability" are at the complete discretion of the OWNER.

The Work must have been performed within the past ten (10) years.

Bidder must provide all requested information in a complete, clear, and accurate manner. If necessary, additional information may be provided on separate attached sheets. Failure to provide any requested information may cause the Bid to be rejected by OWNER as non-responsive.

If the Bidder proposes to fulfill any specific construction experience requirement with subcontracted resources, the applicable Subcontractor must be included in the Bidder's Original MBE/WBE Compliance Plan. Failure to include subcontractors on the MBE/WBE Compliance Plan may render your bid non-responsive.

SPECIFIC CONSTRUCTION EXPERIENCE ITEMS REQUIRED:

ITEM 1. Furnish and/or installation of large diameter storm drains, box culverts, and junction boxes.
ITEM 2. Furnish and/or installation of new water/wastewater utilities.
ITEM 3. Furnish and/or installation of roadway full depth roadway reconstruction and asphalt mill & overlay.

The Bidder shall complete and duplicate the following specific Construction Experience Form as required to provide the requested documentation for a minimum of three (3) successfully completed projects for each of the above specific Construction Experience requirements. A project may demonstrate experience with multiple experience items.

CONSTRUCTION EXPERIENCE DOCUMENTATION FORM		
EXPERIENCE ITEM NUMBER:		
Project Number:		
Does Bidder plan to self-perform this work?	☐ **Yes** ☐ **No**	
If "NO", provide the following Subcontractor's information:		
Company's Address:		
Permanent Address:		
Phone No.		
# of years Subcontractor has been in business under current company name:		
Name of Project:		
Location:		
OWNER's Name:		
OWNER's Address:		
OWNER's Contact Person (Print):		
Phone/Fax No.:		
Initial Contract Price:		
Final Contract Price:		
Contract Start Date: *(Date of Notice to Proceed)*		
Contract Time:	Calendar Days:	Working Days:
Contract Substantial Completion Date:		
Actual Substantial Completion Date:		
If contract time extensions were added to the contract as a result of Bidder's responsibilities, provide a short explanation of each:		
Project Description and why it is comparable to this Contract:		

ATTACHMENT E
AVAILABLE EQUIPMENT LIST

Attention Bidder: Complete and return within three (3) days of notification of the three (3) low bidders' status.

Name of Bidder:	
Solicitation Number:	

Provide a list of equipment that is available to the CONTRACTOR or its Subcontractor(s) and is specifically intended to be used on the Work under this Contract. Also indicate whether the equipment is owned or will be leased by the CONTRACTOR and/or Subcontractor(s).

EQUIPMENT	**OWNED OR LEASED**	**COMMITTED TO ANOTHER PROJECT?** (Yes / No)	**AVAILABLE / RELEASE DATE**

Use additional pages, as necessary

ATTACHMENT F
AVAILABLE WORKFORCE

Attention Bidder: Complete and return within three (3) days of notification of the three (3) low bidders' status.

Name of Bidder:	
Solicitation Number:	
CIP ID Number:	

Provide a list of the available workforce for the various disciplines and crafts required for the Work on this Project, including the number of work crews, and number and worker classification for each equipment operator, mechanic, and laborer for that portion of the Work that Bidder will actually perform.

Number of Anticipated Work Crews: _____

DISCIPLINE OR CRAFT	**NO. OF EMPLOYEES**	**COMMITTED TO ANOTHER PROJECT?** (Yes / No)	**AVAILABLE / RELEASE DATE**
Professional (specify)			
Superintendent			
Technical (specify)			
Skilled Workers (specify)			
Semiskilled Workers (specify)			
Equipment Operators (list)			
Other			

Use additional pages, as necessary

ATTACHMENT G
CURRENT PROJECT LISTING (INCLUDING ALL CITY OF AUSTIN PROJECTS)

Attention Bidder: Complete and return within three (3) days of notification of the three (3) low bidders' status.

Name of Bidder:	
Solicitation Number:	CLMC1173
CIP ID Number:	8598.014

Provide a list of <u>all current projects</u>, including *<u>all City of Austin projects</u>*. Include the following for all jobs that Bidder is currently committed to or has currently underway: brief statement regarding the job type; estimated project duration; project contact; and project description**.

Name of Project:		
Location:		
Type of Job:		
City of Austin Job?	☐ **Yes**	☐ **No**
Project Start Date		
Estimated Completion Date:		
Project Contact:		
Brief Description:		

Name of Project:		
Location:		
Type of Job:		
City of Austin Job?	☐ **Yes**	☐ **No**
Project Start Date		
Estimated Completion Date:		
Project Contact:		
Brief Description:		

ATTACHMENT H
COMPLETED PROJECTS (INCLUDING ALL CITY OF AUSTIN PROJECTS)

Attention Bidder: Complete and return within three (3) days of notification of the three (3) low bidders' status.

Name of Bidder:	
Solicitation Number:	CLMC1173
CIP ID Number:	8598.014

Provide a list of <u>all completed projects</u>, including <u>all City of Austin projects</u> that Bidder has completed in the past five (5) years by calendar year (or life of company if less than five (5) years). Include the following: a brief statement regarding the job type, the estimated project duration, project contact, and project description.

Calendar Year of _____

Name of Project:		
Location:		
Type of Job:		
City of Austin Job?	☐ **Yes**	☐ **No**
Project Duration:		
Project Contact:		
Brief Description:		

Name of Project:		
Location:		
Type of Job:		
City of Austin Job?	☐ **Yes**	☐ **No**
Project Duration:		
Project Contact:		
Brief Description:		

Use additional pages as necessary to achieve a representative listing covering 5 years

ATTACHMENT I
BIDDERS AUTHENTICATION

(Attention Bidder: Complete and return within three (3) days of notification of the three (3) low bidders' status)

Solicitation Number:	CLMC1173
CIP ID Number:	8598.014

THE STATE OF TEXAS
COUNTY OF TRAVIS

I certify that my responses and the information provided in Attachments A-H are true and correct to the best of my personal knowledge and belief and that I have made no willful misrepresentations in this Section, nor have I withheld any relevant information in my statements and answers to questions. I am aware that any information given by me in this Section may be investigated and I hereby give my full permission for any such investigation and I fully acknowledge that any misrepresentations or omissions in my responses and information may cause my bid to be rejected.

Bidder's full name and entity status:

_____
Company's Name

_____
Signature, Authorized Representative of Bidder

_____
Title

_____
Date

END

CERTIFICATE OF NON-SUSPENSION OR DEBARMENT

Section 00405

Solicitation Number: _____ (to be filled in by Contractor)

The City of Austin is prohibited from contracting with or making prime or sub-awards to parties that are suspended or debarred or whose principals are suspended or debarred from Federal, State, or City of Austin Contracts. Covered transactions include procurement contracts for goods or services equal to or in excess of $25,000.00 and all non-procurement transactions. This certification is required for all bidders on all City of Austin Contracts to be awarded with values equal to or in excess of $25,000.00 and all non-procurement transactions.

The CONTRACTOR hereby certifies that its firm and its principals are not currently suspended or debarred from bidding on any Federal, State, or City of Austin Contracts.

Contractor's full name and entity status:

_____

_____

(Name/Signature of Authorized Official)

_____

Title

_____

Date

END

BIDDER'S SAFETY EXPERIENCE
(To Be Submitted Post-Bid)

Solicitation Number: _____ (to be filled in by Contractor)

NAME OF BIDDER: _____

Pursuant to Section 252.0435 of the Local Government Code, the OWNER will consider the safety records of bidders prior to awarding a City contract. Upon request, a bidder is required to provide information to demonstrate the safety and health performance of their company. The information obtained from a bidder or from other sources will be used to determine the bidder's safety record will not be used to automatically exclude the bidder from consideration for this or any future procurement. The OWNER will consider the responses to this Section 00410 document separately when making a discretionary determination of whether to disqualify a bidder and may also consider the cumulative impact of the information generated by the bidder's responses in making the determination. Bidders are responsible for reviewing the safety records of proposed subcontractors.

Upon notification from the OWNER, the three (3) apparent low bidders are required to provide the following information:

WORKERS' COMPENSATION EXPERIENCE MODIFICATION RATE DATA			
Provide bidder's Workers' Compensation **Experience Modification Rate (EMR)** Data using the loss experience that occurred within the past five years. Attach bidder's NCCI workers compensation experience rating sheets for the past five (5) years.		**Policy Year**	**EMR**
	Current EMR:		
	1 Year Ago:		
	2 Years Ago:		
	3 Years Ago:		
	4 Years Ago:		
Bidder's initialing here certifies that bidder does not have an EMR: _____ *(Submit a copy of bidder's Insurance Loss Run Reports for the last five years if bidder does not have an EMR.)*			
Bidder may include additional information explaining any circumstances that may have affected the company's EMR rate.			
Evaluation: Bidders are not required to have a specified EMR or any certain EMR average in order to be awarded the contract.			

REGULATORY NOTICE AND CITATION HISTORY DATA	
Provide bidder's information regarding regulatory **OSHA and/or Environmental Protection Agency Notices and Citations** as follows: Describe federal or state OSHA citations issued to or received by the bidder, a joint venture in which the bidder was participating, or another party participating with bidder in a joint venture in the past seven years or any notices from any environmental protection agency, including any notices or citations from any state agency or local government responsible for enforcing environmental protection or other health and safety laws or regulations of any state of the United States, received within the past seven years. Also, list any criminal charges filed against the bidder, a joint venture in which the bidder was participating, or another party participating with bidder in a joint venture, or its employees, directors or officers in the last seven years related to workplace health and safety or environmental violations. *****ROCIP Projects only***** Please list all incidents or inspections resulting in a finding of imminent danger or willful violations of OSHA and/or City of Austin ROCIP Project Safety Manual regulations within the last seven years.	**Provide a description of each on the OSHA/EPA form on the following page to include:** • Date of Citation/Notices • Issuing agency • Standard cited • Level of violation (i.e. serious, willful) • Dates and brief description(s) of the event(s) • Brief description(s) of actions taken to correct the violation(s) • Current status (Open, Closed, Contested) • If Closed, date of Closure • If Open, estimated date of Closure
Bidder may include additional information explaining any related circumstances.	
Evaluation: Information may be verified by referring to respective agency. More than two serious, more than one willful violation (investigation completed) within the past three years or an accumulation of serious or willful violations over the past seven years may deem the Bidder non-responsive.	

OSHA and/or Environmental Protection Agency Notices Within Past Three Years						
Date of Citation or Notice	Issuing Agency	Violation Level (i.e. serious, willful)	Brief description of event	Brief description of actions taken to correct violation(s)	Current Status (Open, Closed, Contested)	Closed Date, or if Open, estimated Close Date

INJURY AND ILLNESS INCIDENCE RATE DATA	
Provide bidder's ***Total Case Incidence Rate(s) (TCIR)** for the 3 most recent calendar years. Attach bidder's OSHA 300 and 300A logs for the past 3 years.	**TCIR Rates:** Current Rate: _____ 1 Year Ago: _____ 2 Years Ago: _____
DAYS AWAY, RESTRICTED, AND TRANSFER RATE DATA	
Provide bidder's ****Days Away, Restricted, and Transfer Rate(s) (DART)** for the three most recent calendar years.	**DART Rates:** Current Rate: _____ 1 Year Ago: _____ 2 Years Ago: _____
Bidder may include additional information explaining any circumstances that may have affected the submitted rates and/or their associated three year trends.	
Evaluation: Rates will be compared to the most recently published Bureau of Labor Statistics (BLS) national average for the Standard Industrial Classification code (SIC) or North American Industrial Classification Systems (NAICS) code for the construction industry. For consideration of another code within the construction industry, the Bidder must provide the code and justification. Bidders with a 3-year TCIR or DART average that exceeds the 3-year TCIR or DART industry average may be deemed non-responsive.	

**TCIR – To calculate the calendar year TCIR, determine the total number of all recordable injuries and illnesses that occurred during the year in question, divide that total by the total number of hours worked by all employees during that year, and multiply the result by 200,000.*

*** DART – To calculate the calendar year DART, determine the total number of recordable injuries and illnesses resulting in days away from work, restricted work activity, and/or job transfer that occurred during the year in question, divide that total by the total number of hours worked by all employees during that year, and multiply the result by 200,000.*

ACKNOWLEDGEMENT

THE STATE OF TEXAS

COUNTY OF TRAVIS

I certify that my responses and the information I have provided are true and correct to the best of my personal knowledge and belief and I have made no willful misrepresentations in this, or withheld any relevant information in my statements. I am aware that any information given by me in response to this Section 00410 may be investigated and I hereby give my full permission for any such investigations, and I fully acknowledge that any misrepresentations or omissions in my responses and information may cause my bid to be rejected or cause any contract based on misrepresentations to be cancelled.

Contractor's full name and entity status:

_____

_____

(Name/Signature of Authorized Official)

_____

Title

_____

Date

END

NON-COLLUSION, NON-CONFLICT OF INTEREST AND ANTI-LOBBYING

State of Texas

County of Travis

The term **"Bidder"**, as used herein, includes the individual or business entity submitting the bid includes the directors, officers, partners, managers, members, principals, owners, agents, representatives, employees, other parties in interest of the Bidder, and anyone or any entity acting for or on behalf of the Bidder, including a subcontractor in connection with this bid.

The terms **"City"** and **"Owner"** are synonymous.

1. **Anti-Collusion Statement.** The Bidder has not and will not in any way directly or indirectly:

   a. colluded, conspired, or agreed with any other person, firm, corporation, bidder or potential bidder to the amount of this bid or the terms or conditions of this bid.
   b. paid or agreed to pay any other person, firm, corporation bidder or potential bidder any money or anything of value in return for assistance in procuring or attempting to procure a contract or in return for establishing the prices in the attached bid or the bid of any other bidder.

2. **Preparation of Invitation for Bid and Contract Documents**. The Bidder has not received any compensation or a promise of compensation for participating in the preparation or development of the underlying bid or contract documents., In addition, the Bidder has not otherwise participated in the preparation or development of the underlying bid or contract documents, except to the extent of any comments or questions and responses in the bidding process, which are available to all bidders, so as to have an unfair advantage over other bidders, provided that the Bidder may have provided relevant product or process information to a consultant in the normal course of its business.

3. **Participation in Decision Making Process.** The Bidder has not participated in the evaluation of bids or proposals or other decision making process for this solicitation, and, if Bidder is awarded a contract hereunder, no individual, agent, representative, consultant or sub contractor or consultant associated with Bidder, who may have been involved in the evaluation or other decision making process for this solicitation, will have any direct or indirect financial interest in the Contract, provided that the Bidder may have provided relevant product or process information to a consultant in the normal course of its business.

4. **Present Knowledge.** Bidder is not presently aware of any potential or actual conflicts of interest regarding this solicitation, which either enabled Bidder to obtain an advantage over other bidders or would prevent Bidder from advancing the best interests of OWNER during the performance of the Contract.

5. **City Code.** As provided in Sections 2-7-61 through 2-7-65 of the City Code, no individual with a substantial interest in Bidder is a City official or employee or is related to any City official or employee within the first or second degree of consanguinity or affinity.

6. **Chapter 176 Conflict of Interest Disclosure.** In accordance with Chapter 176 of the Texas Local Government Code, the Bidder:

   a. does not have an employment or other business relationship with any local government officer of OWNER or a family member of that officer that results in the officer of family member receiving taxable income;
   b. has not given a local government officer of OWNER one or more gifts, other than gifts of food lodging transportation or entertainment accepted as a guest, that have an aggregate value of more than $100 in the twelve-month period preceding the date the officer becomes aware of the execution of the Contract or that OWNER is considering doing business with the Bidder; and
   c. does not have a family relationship with a local government officer of OWNER in the third degree of consanguinity or the second degree of affinity.

   As required by Chapter 176, Bidder must file the Conflicts of Interest Questionnaire with the Purchasing Department no later than the seventh business day after the commencement of contract discussions or negotiations with the City or the submission of a Bid, response to a request for proposals, or other writing related to a potential contract with OWNER. The questionnaire must be updated not later than the seventh day after the date of an event that would make a statement in the questionnaire inaccurate or incomplete. There are statutory penalties for failure to comply with Chapter 176.

7. **Anti-Lobbying Ordinance.** On June 14, 2018, the Austin City Council adopted Ordinance No. 20180614-056 replacing Chapter 2.7, Article 6 of the City Code relating to Anti-Lobbying and Procurement. The policy defined in this Code applies to Solicitations for goods and/or services requiring City Council approval under City Charter Article VII, Section 15 (Purchase Procedures). The City requires Offerors submitting Offers on this Solicitation to certify that the Offeror has not in any way directly or indirectly had communication restricted in the ordinance section 2-7-104 during the No-Lobbying Period as defined in the Ordinance. The text of the City Ordinance is included in Section 00100 of this solicitation and is also posted on the Internet at:

   https://assets.austintexas.gov/purchase/downloads/New_ALO_Ordinance_No_20180614-056.pdf

8. Pursuant to Texas Government Code §2271.002, the City is prohibited from contracting with any "company" for goods or services unless the following verification is included in this Contract

   a. For the purposes of this Section only, the terms "company" and "boycott Israel" have the meaning assigned by Texas Government Code §2271.001.
   b. If the Bidder qualifies as a "company," then Bidder verifies that it:
      i does not "boycott Israel"; and
      ii will not "boycott Israel" during the term of this Contract.
   c. Bidder's obligations under this Section, if any exist, will automatically cease or be reduced to the extent that the requirements of Texas Government Code Chapter 2271 are subsequently repealed, reduced, or declared unenforceable or invalid in whole or in part by any court or tribunal of competent jurisdiction or by the Texas Attorney General, without any further impact on the validity or continuity of this Contract.

9. Bidder certifies that it is aware of City Council Resolution No. 20191114-056, which prohibits the City from contracting with entities that engage in certain practices related to conversion therapy. By bidding and accepting this Contract, the Bidder agrees that: (1) its firm and its principals are not currently and will not during the term of the Contract engage in practicing LGBTQ+ conversion therapy; referring persons to a healthcare provider or other person or organization for LGBTQ+ conversion therapy; or contracting with another entity to conduct LGBTQ+ conversion therapy; and that (2) if the City determines in its sole discretion that Bidder has during the term of this Contract engaged in any such practices, the City may terminate this Contract without penalty to the City.

10. Pursuant to Texas Government Code Chapter 2275, Bidder certifies that if it has or will have remote or direct access to communication infrastructure systems, cybersecurity systems, the electric grid, hazardous waste treatment systems, or water treatment facilities as a result of any City contract, that Bidder is not:

    a. owned by or the majority of stock or other ownership interest of its firm is not held or controlled by:
        i individuals who are citizens of China, Iran, North Korea, Russia, or a Governor-designated country; or
        ii a company or other entity, including a governmental entity, that is owned or controlled by citizens of or is directly controlled by the government of China Iran, North Korea, Russia, or a Governor-designated country; or
        iii headquartered in China, Iran, North Korea, Russia, or a Governor-designated country.

11. Pursuant to ERCOT Protocols Section 16.1.4(1)(b), we verify that if we provide Critical Electrical Grid Equipment (CEGE) or Critical Electric Grid Services (CEGS), any CEGE or CEGS we provide were not manufactured, produced, created, or otherwise provided by a Lone Star Infrastructure Protection Act (LSIPA) Designated Company.

    Critical Electric Grid Equipment (CEGE). (1) Equipment accessible by means of routable connectivity that, as installed, can be used to gain remote access to or control of ERCOT System Infrastructure, the ERCOT Wide Area Network (WAN), or Market Information System (MIS), if such equipment, if destroyed, degraded, misused, or otherwise rendered unavailable would, within 15 minutes or less of its mis-operation, non-operation, or required operation, adversely impact the reliable operation of ERCOT System Infrastructure. Redundancy of affected facilities, systems, and equipment shall not be considered when determining adverse impact. (2) For Load Resources, this definition only applies to equipment used to send and receive ERCOT telemetry and ERCOT Dispatch Instructions. (3) For purposes of this definition, "reliable operation of ERCOT System Infrastructure" means operating elements of ERCOT System Infrastructure within equipment and electric system thermal, voltage, and stability limits so that instability, uncontrolled separation, or cascading failures of ERCOT System Infrastructure will not occur as a result of a sudden disturbance, including a cybersecurity incident, or unanticipated failure of system elements.

    Critical Electric Grid Services (CEGS). Services and software provided by a vendor for the operation, control, monitoring, maintenance, or use of Critical Electric Grid Equipment (CEGE), excluding access specifically allowed by the purchaser for product warranty or support purposes.

    ERCOT System Infrastructure. The Transmission Facilities, distribution facilities, Resources, Settlement Only Generators (SOGs), and Emergency Response Service (ERS) Resources that comprise the ERCOT System and the physical and virtual cyber assets used to control the ERCOT System.

Lone Star Infrastructure Protection Act (LSIPA) Designated Company. An Entity (including an LSIPA Affiliate) that meets any of the company ownership or headquarters criteria listed in Texas Business and Commerce Code, Section 117.002(a)(2)(A)-(b)(2)(B) or Texas Government Code Section 2275.0102(a)(2)(A)-(b)(2)(B).

Lone Star Infrastructure Protection Act (LSIPA) Designated Country. China, Iran, North Korea, Russia, or a country designated by the Governor as a threat to critical infrastructure pursuant to Texas Business and Commerce Code, Section 117.003 or Texas Government Code, Section 2275.0103.

Lone Star Infrastructure Protection Act (LSIPA) Affiliate. An Entity that, directly or indirectly, through one or more intermediaries, controls, is controlled by, or is under common control with the LSIPA Designated Company. For purposes of this definition, "controls," "controlled by," or "under common control with" shall mean (1) the ownership of 20 percent or more of the outstanding securities of an Entity or (2) the power of an Entity, directly or indirectly, through one or more intermediaries, to direct the management and/or policies and procedures of another Entity. Ownership by an Entity of equity securities (whether publicly traded or not) of another Entity shall not result in control for purposes of this definition if the holder owns (in its name or via intermediaries) 20 percent or more of the outstanding securities of the Entity, and: (a) the securities are held as a passive investment; (b) the holder does not have representation on the Entity's board of directors (or equivalent governing body) or vice versa; and (c) the holder does not in fact exercise influence over day-to-day management decisions.

12. Pursuant to Texas Government Code Chapter 2274, Bidder certifies that, if it has 10 or more full-time employees, Bidder: (1) it does not have a practice, policy, guidance, or directive that discriminates against a firearm entity or firearm trade association; and (2) will not discriminate during the term of the resulting contract against a firearm entity or firearm trade association.

13. Pursuant to Texas Government Code Chapter 2276, Bidder certifies that, if Bidder has 10 or more full-time employees, Bidder: (1) does not boycott energy companies; and (2) will not boycott energy companies during the term of the contract.

END

STATE OF TEXAS
COUNTY OF TRAVIS

THIS AGREEMENT is made and entered into by and between the City of Austin, Texas, a municipal corporation, organized and existing under laws of State of Texas, acting through its City Manager or other duly authorized designee, hereinafter referred to as the "OWNER," and _____, of the City of _____, County of _____, and State of_____, hereinafter referred to as the "CONTRACTOR."

In consideration of the promises, performances, payments and agreements set forth herein CONTRACTOR hereby agrees to commence and complete the following Project:

_____
_____

and all Work in accordance with the Project Manual, Drawings and Addenda, which are incorporated herein by reference and made a part hereof and which have been prepared by _____ and approved by OWNER, and OWNER agrees to pay the CONTRACTOR the total amount of:

$	
(Figures)	**(Words)**

The CONTRACTOR hereby agrees to commence work on the date specified in the written "Notice to Proceed" to be issued by the OWNER and to <substantially> <finally> complete construction of the improvements, as required by the Project Manual, Drawings and Addenda for the Work within _____ (___) <Working> <Calendar> Days. <If a Substantial Completion date has been specified, the CONTRACTOR further agrees to reach Final Completion within <_____> (<___>) <Working> <Calendar> Days after Substantial Completion as required by the Project Manual, Drawings and Addenda for the work.> Waiver of any breach of this Contract shall not constitute waiver of any subsequent breach.

In consideration of the award and execution of this Contract, and in consideration of the waiver of its right to attorney's fees by the OWNER, the CONTRACTOR knowingly and intentionally waives its right to attorney's fees under Section 271.153 of the Texas Local Government Code in any administrative proceeding, alternative dispute resolution proceeding, or litigation arising out of or connected to this Contract.

OWNER agrees to pay CONTRACTOR from available funds for performance of the Contract in accordance with the Bid and the provisions of the Contract Documents, subject to additions and deductions, as provided therein.

The OWNER's payment obligations are payable only and solely from funds available for the purposes of this Agreement.

Although drafted by OWNER, this Agreement, in event of any disputes over its meaning or application, shall be interpreted fairly and reasonably, and neither more strongly for nor against either party.

This Agreement is executed to be effective upon the date of the last party to sign.

SAMPLE

The undersigned, by their signature, represents that they are authorized to bind the Contractor to fully comply with the Contract. The Contractor, by signing below, acknowledge that they have read the entire contract and agree to be bound by the terms contained herein.

OWNER

By:_____
(Signature)

_____
Date

_____
Title of Signatory

CONTRACTOR

By:_____
(Signature)

_____
Date

_____
Printed Name of Signatory

_____
Title of Signatory, Authorized Rep

ATTEST (as applicable)

_____

***Corporate Secretary of Corporate Bidder or Corporate General Partner**

END

SAMPLE

PERFORMANCE BOND

Section 00610

STATE OF TEXAS
COUNTY OF _____

Bond No. _____
C.I.P. ID No. _____

Project Name_____

Know All Men By These Presents: That _____ of the City of _____, County of _____, and State of _____, as Principal, and _____, a solvent company authorized under laws of the State of Texas to act as surety on bonds for principals, are held and firmly bound unto _____ (OWNER), in the penal sum of _____U.S. Dollars ($ _____U.S.) for payment whereof, well and truly to be made, said Principal and Surety bind themselves and their heirs, administrators, executors, successors and assigns, jointly and severally, by these presents:

Conditions of this Bond are such that, whereas, Principal has entered into a certain written contract with OWNER, dated the _____ day of _____, _____, which Agreement is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

Now, therefore, the condition of this obligation is such, that if said Principal shall faithfully perform said Agreement and shall in all respects duly and faithfully observe and perform all and singular covenants, conditions and agreements in and by said contract agreed and covenanted by Principal to be observed and performed, and according to true intent and meaning of said Agreement hereto annexed, then this obligation shall be void; otherwise to remain in full force and effect. If OWNER notifies Principal and Surety the OWNER is considering declaring Principal in default, Surety agrees to meet with OWNER and Principal no later than fifteen days after receipt of such notice to discuss methods of performing the Work of the Contract.

Provided, however, that this bond is executed pursuant to provisions of Chapter 2253, Texas Government Code as amended and all liabilities on this bond shall be determined in accordance with provisions of said Article to same extent as if it were copied at length herein.

Surety, for value received, stipulates and agrees that no change in Contract Time or Contract Amount shall in anywise affect its obligation on this bond, and it does hereby waive notice of any such change in Contract Time or Contract Amount.

In witness whereof, said Principal and Surety have signed and sealed this instrument this _____day of _____, _____.

_____	_____
Principal	Surety
By_____	By_____
(Signature)	(Signature)
Title_____	Title_____
Address_____	Address_____
_____	_____

SAMPLE

_____ _____

Telephone _____ Fax_____
E-Mail Address _____

Name and address of Resident Agent of Surety:

_____
_____

Note: Bond shall be issued by a solvent Surety company authorized to do business in Texas, and shall meet any other requirements established by law or by OWNER pursuant to applicable law. A copy of surety agent's "Power of Attorney" must be attached hereto.

END

SAMPLE

PAYMENT BOND

Section 00620

STATE OF TEXAS
COUNTY OF _____

Bond No. _____
C.I.P. ID No. _____

Project Name: _____

Know All Men By These Presents: That _____ of the City of _____, County of _____, and State of _____ as Principal, and _____, a solvent company authorized under laws of the State of Texas to act as surety on bonds for principals, are held and firmly bound unto _____ (OWNER), and all Subcontractors, workers, laborers, mechanics and suppliers as their interests may appear, all of whom shall have right to sue upon this bond in the penal sum of _____ U.S. Dollars ($_____ U.S.) for payment whereof, well and truly to be made, said Principal and Surety bind themselves and their heirs, administrators, executors, successors and assigns, jointly and severally, by these presents:

Conditions of this Bond are such that, whereas, Principal has entered into a certain written contract with OWNER, dated the _____ day of _____, _____, which Agreement is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

Now, therefore, condition of this obligation is such, that if the said Principal shall well and truly pay all Subcontractors, workers, laborers, mechanics, and suppliers, all monies to them owing by said Principals for subcontracts, work, labor, equipment, supplies and materials done and furnished for the construction of improvement of said Agreement, then this obligation shall be and become null and void; otherwise to remain in full force and effect.

Provided, however, that this bond is executed pursuant to provisions of Chapter 2253, Texas Government Code as amended and all liabilities on this bond shall be determined in accordance with provisions of said Article to same extent as if it were copied at length herein.

Surety, for value received, stipulates and agrees that no change in Contract Time or Contract Amount shall in anywise affect its obligation on this bond, and it does hereby waive notice of any such change in Contract Time or Contract Amount.

In witness whereof, said Principal and Surety have signed and sealed this instrument this _____day of _____, _____.

_____	_____
Principal	Surety
By_____	By_____
(Signature)	(Signature)
Title_____	Title_____

Address_____ Address_____
_____ _____
_____ _____

Telephone_____Fax_____

E-Mail Address _____

Name and address of Resident Agent of Surety:
_____
_____

Note: Bond shall be issued by a solvent Surety company authorized to do business in Texas and shall meet any other requirements established by law or by OWNER pursuant to applicable law. A copy of surety agent's "Power of Attorney" must be attached hereto.

END

NON-DISCRIMINATION AND NON-RETALIATION CERTIFICATE

Section 00630

City of Austin, Texas
Equal Employment/Fair Housing Office

To: City of Austin, Texas, ("OWNER")

Our firm conforms to the Code of the City of Austin Section 5-4-2 as reiterated below:

Chapter 5-4. Discrimination in Employment by City Contractors.

Sec. 4-2 Discriminatory Employment Practices Prohibited. (B) As an Equal Employment Opportunity (EEO) employer, the Contractor will conduct its personnel activities in accordance with established federal, state and local EEO laws and regulations and agrees:

(1) Not to engage in any discriminatory employment practice defined in this chapter.
(2) To take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without discrimination being practiced against them as defined in this chapter. Such affirmative action shall include, but not be limited to: all aspects of employment, including hiring, placement, upgrading, transfer, demotion, recruitment, recruitment advertising; selection for training and apprenticeship, rates of pay or other forms of compensation, and layoff or termination.
(3) To post in conspicuous places, available to employees and applicants for employment, notices to be provided by OWNER setting forth the provisions of this chapter.
(4) To state in all solicitations or advertisements for employees placed by or on behalf of Contractor, that all qualified applicants will receive consideration for employment without regard to race, creed, color, religion, national origin, sexual orientation, gender identity, disability, veteran status, sex or age.
(5) To obtain a written statement from any labor union or labor organization furnishing labor or service to Contractors in which said union or organization has agreed not to engage in any discriminatory employment practices as defined in this chapter and to take affirmative action to implement policies and provisions of this chapter.
(6) To cooperate fully with OWNER's Equal Employment/Fair Housing Office in connection with any investigation or conciliation effort of said Equal Employment/Fair Housing Office to ensure that the purpose of the provisions against discriminatory employment practices are being carried out.
(7) To require compliance with provisions of this chapter by all subcontractors having fifteen or more employees who hold any subcontract providing for expenditure of $2,000.00 or more in connection with any contract with OWNER subject to the terms of this chapter.

For the purposes of this Bid and any resulting Contract, Contractor adopts the provisions of the City's Minimum Standard Nondiscrimination and Non-Retaliation Policy as set forth below.

City of Austin
Minimum Standard Non-Discrimination and Non-Retaliation in Employment Policy

As an Equal Employment Opportunity (EEO) employer, the Contractor will conduct its personnel activities in accordance with established federal, state and local EEO laws and regulations.

The Contractor will not discriminate against any applicant or employee based on race, creed, color, national origin, sex, age, religion, veteran status, gender identity, disability, or sexual orientation. This policy covers all aspects of employment, including hiring, placement, upgrading, transfer, demotion, recruitment, recruitment advertising, selection for training and apprenticeship, rates of pay or other forms of compensation, and layoff or termination.

The Contractor agrees to prohibit retaliation, discharge or otherwise discrimination against any employee or applicant for employment who has inquired about, discussed or disclosed their compensation.

Further, employees who experience discrimination, sexual harassment, or another form of harassment should immediately report it to their supervisor. If this is not a suitable avenue for addressing their complaint, employees are advised to contact another member of management or their human resources representative. No employee shall be discriminated against, harassed, intimidated, nor suffer any reprisal as a result of reporting a violation of this policy. Furthermore, any employee, supervisor, or manager who becomes aware of any such discrimination or harassment should immediately report it to executive management or the human resources office to ensure that such conduct does not continue.

Contractor agrees that to the extent of any inconsistency, omission, or conflict with its current non-discrimination and non- retaliation employment policy, the Contractor has expressly adopted the provisions of the City's Minimum Non-Discrimination Policy contained in Section 5-4-2 of the City Code as set forth above and the City's Non-Retaliation Policy, as the Contractor's Non-Discrimination and Non-Retaliation Policy or as an amendment to such Policy and such provisions are intended to not only supplement the Contractor's policy, but will also supersede the Contractor's policy to the extent of any conflict.

UPON CONTRACT AWARD, THE CONTRACTOR SHALL PROVIDE A COPY TO THE CITY OF THE CONTRACTOR'S NON-DISCRIMINATION AND NON-RETALIAITON POLICY ON COMPANY LETTERHEAD, WHICH CONFORMS IN FORM, SCOPE, AND CONTENT TO THE CITY'S MINIMUM NON-DISCRIMINATION AND NON-RETALIATION POLICY, AS SET FORTH HEREIN, ***OR*** *THIS NON-DISCRIMINATION AND NON-RETALIATION POLICY, WHICH HAS BEEN ADOPTED BY THE CONTRACTOR FOR ALL PURPOSES (THE FORM OF WHICH HAS BEEN APPROVED BY THE CITY'S EQUAL EMPLOYMENT/FAIR HOUSING OFFICE), WILL BE CONSIDERED THE CONTRACTOR'S NON-DISCRIMINATION AND NON-RETALIATION POLICY WITHOUT THE REQUIREMENT OF A SEPARATE SUBMITTAL.*
(http://austintexas.gov/page/bid-docs).

Sanctions:
Our firm understands that non-compliance with Chapter 5-4 may result in sanctions, including termination of the contract and suspension or debarment from participation in future City contracts until deemed compliant with the requirements of Chapter 5-4.

Term:
The Contractor agrees that this Section 00630 Non-Discrimination and Non-Retaliation Certificate or the Contractor's separate conforming policy, which the Contractor has executed and filed with the Owner, will remain in force and effect for one year from the date of filing. The Contractor further agrees that, in consideration of the receipt of continued Contract payments, the Contractor's Non-Discrimination Policy will automatically renew from year-to-year for the term of the underlying Contract.

END

TITLE VI ASSURANCES APPENDIX A

Section 00631

Solicitation Number: _____ (to be filled in by Contractor)

During the performance of this contract, the contractor, for itself, its assignees and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1. Compliance with Regulations: The contractor (hereinafter includes consultants) will comply with the Acts and the Regulations relative to Nondiscrimination in Federally-assisted programs of the U.S. Department of Transportation, the Federal Highway Administration, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.

2. Nondiscrimination: The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate either directly or indirectly in the discrimination prohibited by the Acts and the Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 C.F.R. part 21.

3. Solicitations for Subcontracts, Including Procurements of Materials and Equipment: In all solicitations, either by competitive bidding or negotiation made by the contract for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the contractor of the contractor's obligations under this contract and the Acts and the Regulations relative to Nondiscrimination on the grounds of race, color, or national origin.

4. Information and Reports: The contractor shall provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its book, records, accounts, other sources of information, and its facilities as may be determined by the Recipient or the Federal Highway Administration to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information the contractor will so certify to the Recipient, or the Federal Highway Administration, as appropriate, and will set forth what efforts it has made to obtain the information.

5. Sanctions for Noncompliance: In the event of the contractor's noncompliance with the Nondiscrimination provisions of this contract, the Recipient will impose such contract sanctions as it or the Federal Highway Administration may determine to be appropriate, including, but not limited to:

    (a) withholding of payments to the contractor under the contract until the contractor complies, and or
    (b) cancelling, terminating or suspending a contract, in whole or in part.

6. Incorporation of Provisions: The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as the Recipient or the Federal Highway Administration may direct as a means of enforcing such provisions including sanctions for non-compliance: Provided, that if a

contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier because of such direction, the contractor may request the Recipient to enter into any litigation to protect the interests of the Recipient. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

(Source: DOT 1050.2A, Updated DOT Standard Title VI Assurances and Non-Discrimination Provisions 10/22/2013. Must be inserted into every contract/agreement regardless of funding sources.)

Contractor's full name and entity status:

_____

_____
(Name/Signature of Authorized Official)

_____
Title

_____
Date

END

TITLE VI ASSURANCES APPENDIX E
Section 00632

Solicitation Number: _____ (to be filled in by Contractor)

During the performance of this contract, the contractor (hereinafter includes consultants), for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees to comply with the following nondiscrimination statutes and authorities; including but not limited to:

Pertinent Nondiscrimination Authorities:

1. Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d et seq., 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin); and 49 C.F.R. Part 21.

2. The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C.§ 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);

3. Federal-Aid Highway Act of 1973, (23 U.S.C. § 324 et seq.), (prohibits discrimination on the basis of sex);

4. Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 et seq.), as amended, (prohibits discrimination on the basis of disability); and 49 C.F.R. Part 27;

5. The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 et seq.), (prohibits discrimination on the basis of age);

6. Airport and Airway Improvement Act of 1982, (49 U.S.C. § 4 71, Section 4 7123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);

7. The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, subrecipients and contractors, whether such programs or activities are Federally funded or not);

8. Titles II and III of the Americans with Disabilities Act, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131-12189) as implemented by Department of Transportation regulations at 49 C.F.R. parts 37 and 38;

9. The Federal Aviation Administration's Nondiscrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);

10. Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures nondiscrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;

11. Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP).

12. To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);

13. Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. 1681 et seq).

(Source: DOT 1050.2A, Updated DOT Standard Title VI Assurances and Non-Discrimination Provisions 10/22/2013. Must be inserted into every contract/agreement regardless of funding sources.)

Contractor's full name and entity status:

_____

_____
(Name/Signature of Authorized Official)

_____
Title

_____
Date

END

CERTIFICATE OF INSURANCE

Section 00650

This Certificate shall be completed by a licensed insurance agent:

Name and Address of Agency:

_____
_____
_____
Phone: _____ / _____

Name and Address of Insured:

_____
_____
_____
Phone: _____/ _____

Prime or Sub-Contractor?: _____

Name of Prime Contractor, if different from Insured: _____

City of Austin Reference:
Project Name:
C.I.P. No.:
Project Location:

Managing Dept.:

Contract No.:
Project Mgr.:

Insurers Affording Coverages:

Insurer A: _____

Insurer B: _____

Insurer C: _____

Insurer D: _____

INSR LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFE-CTIVE DATE (MM/DD/YYYY)	POLICY EXPIR-ATION DATE (MM/DD/YYYY)	LIMITS OF LIABILITY	
	Commercial General Liability Policy As defined in the Policy, does the Policy provide:				Each Occurrence	$
					General Aggregate	$
	☐ Yes ☐ No -- Completed Operations/Products				Completed Operations /Products Aggregate	$
	☐ Yes ☐ No -- Contractual Liability				Personal & Advertising Injury	$
	☐ Yes ☐ No -- Explosion				Deductible or Self Insured Retention	$
	☐ Yes ☐ No -- Collapse					
	☐ Yes ☐ No -- Underground					
	☐ Yes ☐ No -- Contractors/ Subcontractors Work					
	☐ Yes ☐ No -- Aggregate Limits per Project Form CG 2503					
	☐ Yes ☐ No -- Additional Insured Form – CG 2010 and CG2037					
	☐ Yes ☐ No -- 30 Day Notice of Cancellation Form – CG 0205					
	☐ Yes ☐ No -- Waiver of Subrogation Form – CG 2404					
	Pollution/ Environmental Impairment Policy				Occurrence	$
					Aggregate	$

INSR LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFE-CTIVE DATE (MM/DD/YYYY)	POLICY EXPIR-ATION DATE (MM/DD/YYYY)	LIMITS OF LIABILITY	
	Auto Liability Policy As defined in the Policy, does the Policy provide:				CSL	$
					Bodily Injury (Per Accident)	$
	☐ Yes ☐ No -- Any Auto				Bodily Injury (Per Person)	$
	☐ Yes ☐ No -- All Owned Autos				Property Damage (Per Accident)	$
	☐ Yes ☐ No -- Non-Owned Autos					
	☐ Yes ☐ No -- Hired Autos					
	☐ Yes ☐ No -- Waiver of Subrogation – CA0444					
	☐ Yes ☐ No -- 30 Day Notice of Cancellation – CA0244					
	☐ Yes ☐ No -- Additional Insured – CA2048					
	☐ Yes ☐ No -- MCS 90					
	Excess Liability ☐ Umbrella Form ☐ Excess Liability Follow Form				Occurrence	$
					Aggregate	$
	Workers Compensation and Employers Liability As defined in the Policy, does the Policy provide:				☐ Statutory	
					Each Accident	$
	☐ Yes ☐ No -- Waiver of Subrogation – WC420304				Disease – Policy Limit	$
	☐ Yes ☐ No -- 30 Day Notice of Cancellation – WC420601				Disease – Each Employee	$
	Is a Builders Risk or Installation Insurance Policy provided? ☐ Yes ☐ No					$
	☐ Yes ☐ No -- Is the City shown as loss payee/mortgagee?					
	Professional Liability As defined in the Policy, does the Policy provide:				Each Claim	$
	☐ Yes ☐ No -- 30 Day Notice of Cancellation Retroactive Date: _____				Deductible or Self Insured Retention	$

This form is for informational purposes only and certifies that policies of insurance listed above have been issued to insured named above and are in force at this time. Not withstanding any requirements, term or condition of any contract or other document with respect to which this certificate may be issued or may pertain, insurance afforded by policies described herein is subject to all terms, exclusions and conditions of such policies.

CERTIFICATE HOLDER:

City of Austin
Capital Contracting Office
P.O. Box 1088
Austin, Texas 78767

DATE ISSUED: _____

_____
AUTHORIZED REPRESENTATIVE SIGNATURE
Licensed Insurance Agent

END

TEXAS SALES AND USE TAX EXEMPTION CERTIFICATE

Section 00670

City of Austin, Texas

P.O. Box 1088

Austin, Texas 78767

CONTRACTOR/PURCHASER:

Street Address:

City, State, ZIP Code:

Project:

Project Manager:

FDU No.:

CIP ID No.:

Description of items to be purchased or as described on the attached order or invoice:

_____

_____

The Contractor may purchase all labor, materials, supplies, and equipment to be incorporated in the City of Austin realty, including easements, or completely consumed at the Project jobsite and services required by or integral to the performance of the contract for the Project without paying sales or use tax in accordance with State Comptroller Rule 3.291.

Contractor/Purchaser claims this exemption for the following reason: This contract is to be performed for the City of Austin, a tax exempt entity under the Texas Tax Code.

I understand that I will be liable for payment of sales and use taxes which may become due for failure to comply with the provisions of the Tax Code. I also understand that it is a criminal offense to give an exemption certificate to the contractor for taxable items that I know, at the time of purchase, will be used in a manner other than that expressed in this certificate and depending on the amount of tax evaded, the offense may range from a Class B misdemeanor to a felony of the second degree.

City of Austin, Texas	Title
Ed Van Eenoo	Chief Financial Officer

CONTRACTOR/PURCHASER: _____

By: _____

Title: _____

Date: _____

NOTE: This certificate cannot be issued for the purchase, lease, or rental of a motor vehicle.

THIS CERTIFICATE DOES NOT REQUIRE A NUMBER TO BE VALID. Sales and Use Tax "Exemption Numbers" or "Tax Exempt" Numbers do not exist. This certificate should be furnished to the supplier. Do not send the completed certificate to the Comptroller of Public Accounts.

End

NON-USE OF ASBESTOS AFFIDAVIT (CONTRACTOR PRIOR TO CONSTRUCTION)

Section 00680

STATE OF TEXAS
COUNTY OF TRAVIS

BEFORE ME, the undersigned authority, personally appeared the Affiant who, being by me first duly sworn, upon oath deposed and stated:

"My name is _____, hereinafter known as Affiant. "I am over the age of 18 years and I have never been convicted of a crime. I am the _____of_____ hereinafter known as CONTRACTOR.

"I am fully competent to make this affidavit. I have personal knowledge of the facts set forth below and they are all true and correct.

"WHEREAS CONTRACTOR has submitted a bid to the City of Austin as the Prime CONTRACTOR and anticipates being awarded a contract for the construction of _____located at_____, Austin, Texas, hereinafter known as Project, for the City of Austin, Texas, hereinafter known as OWNER, and "WHEREAS asbestos in a dust form is a recognized health hazard, and "WHEREAS the OWNER desires not to have any asbestos containing materials used or incorporated into the construction of the Project; "THEREFORE the CONTRACTOR affirms and understands the following:

1. The CONTRACTOR, any person, firm or organization representing or represented by the CONTRACTOR, or employed by the CONTRACTOR shall not cause or allow any material to be incorporated into the construction of the project, or allow any building material on the project site that is an asbestos containing material or any other material defined as containing asbestos by any laws, rules or regulations promulgated by the United States Government, the State of Texas or any governmental organization or agency operating under the authority of either of those entities.

2. Realizing that there might be some materials in which a satisfactory non-asbestos containing material could not be obtained, the Consultant has received prior approval from the OWNER before specifying any such asbestos containing material. Those approved materials are the only asbestos containing materials that are exempt from the above prohibition.

3. The CONTRACTOR certifies and affirms their understanding that if any asbestos containing materials not approved by the City of Austin for inclusion into the Project, are determined, as a result of any inspection and sample analysis performed by an individual(s) and/or firm(s) certified and/or licensed to perform such inspection by the United States Government and/or the State of Texas, to have been incorporated into the construction of the Project, or brought onto the site of the Project, the OWNER shall look to the CONTRACTOR for reimbursement of any and all costs incurred in the removal and/or other abatement of said asbestos containing materials.

4. CONTRACTOR further understands that OWNER shall also look to the CONTRACTOR for any and all damages to OWNER which result from the inability of the OWNER to use any portion or all of the Project due to the incorporation of asbestos containing materials that have not been approved by OWNER.

5. CONTRACTOR further understands that OWNER will pursue reimbursement of any said cost and compensation for any said damages from the CONTRACTOR by any and every means within OWNER's right and power.

Signature of Affiant: _____

STATE OF TEXAS
COUNTY OF TRAVIS

ON _____, 20___, personally appeared_____ and been duly sworn by me, subscribed to the foregoing affidavit and has stated that the facts stated therein are true and correct.

_____
Notary Public, State of Texas

_____
Printed Name of Notary

My Commission Expires:_____

END

NON-USE OF ASBESTOS AFFIDAVIT (CONTRACTOR AFTER CONSTRUCTION)

Section 00681

STATE OF TEXAS
COUNTY OF TRAVIS

BEFORE ME, the undersigned authority, personally appeared the Affiant who, being by me first duly sworn, upon oath deposed and stated:

"My name is _____, hereinafter known as Affiant. "I am over the age of 18 years and I have never been convicted of a crime. I am the _____of_____ hereinafter known as CONTRACTOR.

"I am fully competent to make this affidavit. I have personal knowledge of the facts set forth below and they are all true and correct.

"WHEREAS CONTRACTOR was awarded a Contract for, and was the Prime CONTRACTOR for the construction of _____ located at _____, Austin, Texas, hereinafter known as Project, for the City of Austin, Texas, hereinafter known as OWNER, and "WHEREAS asbestos in a dust form is a recognized health hazard, and "WHEREAS the OWNER desires not to have any asbestos containing materials used or incorporated into the construction of the Project; "THEREFORE the CONTRACTOR affirms and understands the following:

1. The CONTRACTOR, any person, firm or organization representing or represented by the CONTRACTOR, or employed by the CONTRACTOR has not caused or allowed any material to be incorporated into the construction of the project, or allowed any building material on the project site that is an asbestos containing material or any other material defined as containing asbestos by any laws, rules or regulation promulgated by the United States Government, the State of Texas or any governmental organization or agency operating under the authority of either of those entities.

2. Realizing that there were some materials in which a satisfactory non-asbestos containing material could not be obtained, the Consultant received prior approval from the OWNER before specifying any such asbestos containing material. Those approved materials were the only asbestos containing materials incorporated into the construction of the Project and are listed below, with their locations:

_____

_____

_____

3. The CONTRACTOR certifies and affirms their understanding that if any asbestos containing materials not approved by the City of Austin for inclusion into the Project, are determined, as a result of any inspection and sample analysis performed by an individual(s) and/or firm(s) certified and/or licensed to perform such inspection by the United States Government and/or the State of Texas, to have been incorporated into the construction of the Project, or brought onto the site of the Project, the OWNER shall look to the CONTRACTOR for reimbursement of any and all costs incurred in the removal and/or other abatement of said asbestos containing materials.

4. CONTRACTOR further understands that OWNER shall also look to the CONTRACTOR for any and all damages to OWNER which result from the inability of the OWNER to use any portion or all of the Project due to the incorporation of asbestos containing materials that have not been approved by OWNER.

5. CONTRACTOR further understands that OWNER will pursue reimbursement of any said cost and compensation for any said damages from the CONTRACTOR by any and every means within OWNER's right and power.

Signature of Affiant:_____

STATE OF TEXAS
COUNTY OF TRAVIS

On _____, 20___, personally appeared_____ and been duly sworn by me, subscribed to the foregoing affidavit and has stated that the facts stated therein are true and correct.

_____
Notary Public, State of Texas

_____
Printed Name of Notary

My Commission Expires: _____

END

Bidding Requirements, Contract Forms and Conditions of the Contract

GENERAL CONDITIONS OF THE CONTRACT

Section 00700

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ARTICLE 1 – DEFINITIONS

Whenever used in these General Conditions or in the other Contract Documents the following terms have the meanings indicated which are applicable to both the singular and plural thereof:

1.1 Addendum - Written instruments issued by the Contract Awarding Authority which clarify, correct or change the bidding requirements or the Contract Documents prior to the Due Date. "Addenda" is the plural form of Addendum.

1.2 Agreement - Prescribed form, Section 00500.

1.3 Alternative Dispute Resolution - The process by which a disputed Claim may be settled if the OWNER and the CONTRACTOR cannot reach an agreement between themselves, as an alternative to litigation.

1.4 Bid - A complete, properly signed response to an Invitation for Bid that, if accepted, would bind the Bidder to perform the resultant Contract.

1.5 Bidder - A person, firm, or entity that submits a Bid in response to a Solicitation. Any Bidder may be represented by an agent after submitting evidence demonstrating the agent's authority. The agent cannot certify as to his own agency status.

1.6 Bid Documents - The advertisement or Invitation for Bids, instructions to Bidders, the Bid form, the Contract Documents and Addenda.

1.7 Calendar Day - Any day of the week; no days being excepted. Work on Saturdays, Sundays, and/or Legal Holidays shall be coordinated with OWNER.

1.8 Change Directive - A written directive to CONTRACTOR, signed by OWNER, ordering a change in the Work and stating a proposed basis for adjustment, if any, in the Contract Amount or Contract Time, or both. A Change Directive may be used in the absence of total agreement on the terms of a Change Order. A Change Directive does not change the Contract Amount or Contract Time, but is evidence that the parties expect that the change directed or documented by a Change Directive will be incorporated in a subsequently issued Change Order.

1.9 Change Orders - Written agreements entered into between CONTRACTOR and OWNER authorizing an addition, deletion, or revision to the Contract, issued on or after the Execution Date of the Agreement.

1.10 Claim - A written demand seeking, as a matter of right, adjustment or interpretation of Contract terms, payment of money, extension of time or other relief with respect to the terms of the Contract.

1.11 Contract - The binding legal agreement between the OWNER and the CONTRACTOR. The Contract represents the entire and integrated agreement between OWNER and CONTRACTOR for performance of the Work, as evidenced by the Contract Documents.

1.12 Contract Amount - The moneys payable by OWNER to CONTRACTOR for completion of the Work in accordance with the Contract Documents.

1.13 Contract Awarding Authority - A City department authorized to enter into Contracts on behalf of the City.

1.14 Contract Documents - Project Manual, Drawings, Addenda and Change Orders.

1.15 Contract Time - The number of days allowed for completion of the Work as defined by the Contract. When any period is referred to in days, it will be computed to exclude the first and include the last day of such period. A day of twenty-four hours measured from midnight to the next midnight will constitute a day.

1.16 CONTRACTOR - The individual, firm, corporation, or other business entity with whom OWNER has entered into the Contract for performance of the Work.

1.17 Critical Path - The longest series of tasks that runs consecutively from the beginning to the end of the project, as determined by duration and workflow sequence. This longest path sets the managerial standard for how quickly a project can be completed, given appropriate resources.

1.18 Drawings - Those portions of the Contract Documents which are graphic representations of the scope, extent and character of the Work to be furnished and performed by CONTRACTOR and which have been approved by OWNER. Drawings may include plans, elevations, sections, details, schedules and diagrams. Shop Drawings are not Drawings as so defined.

1.19 Due Date - The date and time specified for receipt of Bids.

1.20 Engineer/Architect (E/A) - The OWNER's design professional identified as such in the Contract. The titles of "Architect/Engineer," "Architect" and "Engineer" used in the Contract Documents shall read the same as Engineer/Architect (E/A). Nothing contained in the Contract Documents shall create any contractual or agency relationship between E/A and CONTRACTOR.

1.21 Equal - The terms "equal" or "approved equal" shall have the same meaning.

1.22 Execution Date - Date of last signature of the parties to the Agreement.

1.23 Field Order - A written order issued by Owner's Representative which orders minor changes in the Work and which does not involve a change in the Contract Amount or the Contract Time.

1.24 Final Completion - The point in time when OWNER determines that all Work has been completed and final payment to CONTRACTOR will be made in accordance with the Contract Documents.

1.25 Force Account - a basis of payment for the direct performance of Work with payment based on the actual cost of the labor, equipment and materials furnished and consideration for overhead and profit as set forth in Section 11.5.

1.26 Inspector - The authorized representative of any regulatory agency that has jurisdiction over any portion of the Work.

1.27 Invitation for Bid (IFB) - a Solicitation requesting pricing for a specified Good or Service which has been advertised for Bid in a newspaper and/or the Internet.

1.28 Legal Holidays

1.28.1 The following are recognized by the OWNER:

Holiday	Date Observed
New Year's Day	January 1
Martin Luther King, Jr.'s Birthday	Third Monday in January
President's Day	Third Monday in February
Memorial Day	Last Monday in May
Juneteenth	June 19
Independence Day	July 4
Labor Day	First Monday in September
Veteran's Day	November 11
Thanksgiving Day	Fourth Thursday in November
Friday after Thanksgiving	Friday after Thanksgiving

Christmas Eve	December 24
Christmas Day	December 25

1.28.2 If a Legal Holiday falls on Saturday, it will be observed on the preceding Friday. If a Legal Holiday falls on Sunday, it will be observed on the following Monday.

1.28.3 Christmas Eve is observed only if it falls on a Monday through Thursday. If Christmas Eve falls on a Friday, that day is observed as the Christmas Day holiday.

1.29 Milestones - A significant event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

1.30 Notice to Proceed - A Written Notice given by OWNER to CONTRACTOR fixing the date on which the Contract Times will commence to run and on which CONTRACTOR shall start to perform CONTRACTOR's obligations under the Contract Documents.

1.31 OWNER - City of Austin, Texas, a municipal corporation, home rule city and political subdivision organized and existing under the laws of the State of Texas, acting through the City Manager or his/her designee, officers, agents or employees to administer design and construction of the Project.

1.32 Owner's Representative - The designated representative of the OWNER. The Owner's Representative will be identified at the pre-construction conference.

1.33 Partial Occupancy or Use - Use by OWNER of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work, provided OWNER and CONTRACTOR have accepted in writing the responsibilities assigned to each of them for payments, retainage if any, security, maintenance, utilities, corrective work, insurance and warranties.

1.34 Project - The subject of the Work and its intended result.

1.35 Project Manual - That portion of the Contract Documents which may include the following: introductory information; bidding requirements, Contract forms and General and Supplemental General Conditions; General Requirements; Specifications; Drawings; MBE/WBE or DBE Procurement Program Package; Project Safety Manual; and Addenda.

1.36 Resident Project Representative - The authorized representative of E/A who may be assigned to the site or any part thereof.

1.37 Shop Drawings - All drawings, diagrams, illustrations, schedules and other data or information which are specifically prepared or assembled by or for CONTRACTOR and submitted by CONTRACTOR as required by the Contract Documents.

1.38 Specifications - Those portions of the Contract Documents consisting of written technical descriptions as applied to the Work, which set forth to CONTRACTOR, in detail, the requirements which must be met by all materials, equipment, construction systems, standards, workmanship, equipment and services in order to render a completed and useful project.

1.39 Solicitation - Solicitation means, as applicable, an Invitation for Bid or a Request for Proposal.

1.40 Substantial Completion - The stage in the progress of the Work when the Work, or designated portion thereof, is sufficiently complete in accordance with the Contract Documents so OWNER can occupy or utilize the Work for its intended use, as evidenced by a Certificate of Substantial Completion approved by OWNER.

1.41 Subcontractor - An individual, firm, corporation, or other business entity having a direct contract with CONTRACTOR for the performance of a portion of the Work under the Contract.

1.42 Sub-Subcontractor - A person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the work.

1.43 Superintendent - The representative of CONTRACTOR authorized in writing to receive and fulfill instructions from the Owner's Representative, and who shall supervise and direct construction of the Work.

1.44 Supplemental General Conditions - The part of the Contract Documents which amends or supplements the General Conditions. All General Conditions which are not so amended or supplemented remain in full force and effect.

1.45 Supplier - An individual or entity having a direct contract with CONTRACTOR or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by CONTRACTOR or any Subcontractor.

1.46 Time Extension Request - An approved request for time extension on a form acceptable to OWNER.

1.47 Work - The entire completed construction, or the various separately identifiable parts thereof, required to be furnished under the Contract Documents.

1.48 Working Day - Any day of the week, not including Saturdays, Sundays, or Legal Holidays in which conditions under the CONTRACTOR's control will permit work for a continuous period of not less than seven (7) hours between 7:00 a.m. and 6:00 p.m. If other contract documents reduce the continuous period available for work to less than seven (7) hours, those reduced hours shall be considered a Working Day. Upon agreement with Owner's Representative, work on Saturdays, Sundays, and/or Legal Holidays may be allowed and will be considered a Working Day.

1.49 Working Hours

1.49.1 Working Day Contract: All Work shall be done between 7:00 a.m. and 6:00 p.m. unless otherwise authorized by Owner's Representative. However, emergency work may be done without prior permission as indicated in paragraph 6.11.5. If night Work is authorized and conditions under CONTRACTOR's control will permit Work for a continuous period of not less than seven (7) hours between 12:00 a.m. and 11:59 p.m. it will be considered a Working Day. Night Work may be revoked at any time by OWNER if CONTRACTOR fails to maintain adequate equipment and supervision for the prosecution and control of the night Work.

1.49.2 Calendar Day Contract: All Work shall be done between 7:00 a.m. and 6:00 p.m. unless authorized by Owner’s Representative. However, emergency work may be done without prior permission as indicated in paragraph 6.11.5. Night Work may be revoked at any time by OWNER if CONTRACTOR fails to maintain adequate equipment and supervision for the prosecution and control of the night Work.

1.50 Written Notice - Written communication between OWNER and CONTRACTOR. Written Notice shall be deemed to have been duly served if delivered in person to Owner's Representative or CONTRACTOR's duly authorized representative, or if delivered at or sent by registered or certified mail to the attention of Owner's Representative or CONTRACTOR's duly authorized representative at the last business address known to the party giving notice.

ARTICLE 2 - PRELIMINARY MATTERS

2.1 Delivery of Agreement, Bonds, Insurance, etc.: Within five (5) Working Days after written notification of award of Contract, CONTRACTOR shall deliver to OWNER signed Agreement, Bond(s), Insurance Certificate(s) and other documentation required for execution of Contract.

2.2 Copies of Documents: OWNER shall furnish to CONTRACTOR (1) copy of the executed Project Manual, one (1) set of Drawings and one (1) copy of the Contract Documents in .pdf format. Additional copies will be furnished, upon request, at the cost specified in the Supplemental General Conditions."

2.3 Commencement of Contract Times; Notice to Proceed: The Contract Time(s) will begin to run on the day indicated in the Notice to Proceed. Notice to Proceed will be given at any time within sixty (60) calendar days after the Execution Date of the Agreement, unless extended by written agreement of the parties.

2.4 Before Starting Construction:

2.4.1 No Work shall be done at the site prior to the preconstruction conference without OWNER's approval. Before undertaking each part of the Work, CONTRACTOR shall carefully study the Contract Documents to check and verify pertinent figures shown thereon compare accurately to all applicable field measurements. CONTRACTOR shall promptly report in writing to Owner's Representative any conflict, error, ambiguity or discrepancy which CONTRACTOR may discover and shall obtain a written interpretation or clarification from Owner's Representative before proceeding with any Work affected thereby. CONTRACTOR shall be liable to OWNER for failure to report any conflict, error, ambiguity or discrepancy in the Contract Documents of which CONTRACTOR knew or reasonably should have known.

2.4.2 It is mutually agreed between CONTRACTOR and OWNER that successful completion of the Work within the Contract completion date is of primary importance. Therefore, the CONTRACTOR hereby agrees to submit to the Owner's Representative for review and approval, or acceptance, as appropriate, all information requested within this section, including a Baseline Schedule, no later than five working days prior to the preconstruction conference. The Owner's Representative will schedule the preconstruction conference upon the timely submittal of the required documents, unless time is extended by written mutual agreement. CONTRACTOR will submit the following:

.1 A proposed Baseline Schedule developed using Microsoft Project software, unless otherwise approved by Owner's Representative ("Baseline Schedule") to confirm that all Work will be completed within the Contract time. The Baseline Schedule must (i) indicate the times (number of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents, (ii) identify the Critical Path for completing the Work, (iii) identify when all Subcontractors will be utilized, and (iv) take into consideration any limitations on Working Hours, including baseline Rain Days on Calendar Day Contracts, and (v) be prepared accordance with Section 01310, Schedules and Reports, if applicable; otherwise in accordance with Section 01300, Submittals. This Baseline Schedule, a copy of which shall be made available at the job site(s), must contain sufficient detail to indicate that the CONTRACTOR has properly identified required Work elements and tasks, has provided for a sufficient and proper workforce and integration of Subcontractors, has provided sufficient

resources and has considered the proper sequencing of the Work required to result in a successful Project that can be completed within the Contract time;

.2 An organizational chart showing the principals and management personnel who will be involved with the Work, including each one's responsibilities for the Work;

.3 To the extent not set forth in the Section 00400 Statement of Contractor's Experience, a complete listing of the CONTRACTOR's employees proposed for the Work. List each one by name and job title, and show length of employment with CONTRACTOR;

.4 To the extent not set forth in the Section 00410 Statement of Bidder's Safety Experience, a discussion and confirmation of the CONTRACTOR's commitment to safety by providing a copy of its employee's safety handbook and the safety records for the past three years of CONTRACTOR's proposed project manager and Superintendent;

.5 A preliminary schedule of Shop Drawing and sample submittals;

.6 A preliminary schedule of values for all of the Work, subdivided into component parts in sufficient detail to serve as the basis for progress payments during construction. Such prices will be deemed to include an appropriate amount of overhead and profit applicable to each item of Work;

.7 To the extent not set forth in the Section 00400 Statement of Contractor's Experience, a letter designating CONTRACTOR's Superintendent and project manager, and a confirmation of past project experience for the CONTRACTOR's Superintendent and project manager specifically intended for the Work;

.8 A letter from CONTRACTOR and Subcontractor(s) listing salaried specialists. A salaried specialist is anyone except an hourly worker whose wage rate is governed by Section 00830 of this agreement;

.9 A letter designating the project's Safety Representative along with a copy of their Department of Labor-issued OSHA card proving completion of the OSHA 30-hour Construction Safety and Health training class in the OSHA Outreach Training Program;

.10 If applicable, an excavation safety system plan;

.11 If applicable, a plan illustrating proposed locations of temporary facilities;

.12 A completed Non-Use of Asbestos Affidavit (Prior to Construction);

.13 A letter designating the Texas Registered Professional Land Surveyor for layout of the Work, if the Work requires the services of a surveyor; and

.14 Copies of the Department of Labor-issued OSHA cards proving completion of the OSHA 10-hour Construction Safety and Health training class in the OSHA Outreach Training Program for each worker (defined as a person covered by a prevailing wage determination) that will initially be on site. Note that workers must possess other OSHA-required training as the work dictates in accordance with the OSHA Act; and specifically, the contractor must meet the required provisions in 509S Excavation Safety Systems required prior to commencing excavation;

.15 A certificate of worker's compensation insurance coverage for all persons providing services on the Project (refer to 5.2.1.3 in Section 00700 for definition of persons providing services on the Project);

.16 A Construction Equipment Emissions Reduction Plan.

2.4.3 Neither the acceptance nor the approval of any of the submittals required in paragraph 2.4.2, above, will constitute the adoption, affirmation, or direction of the CONTRACTOR'S means and methods.

2.5 Preconstruction Conference: Prior to commencement of Work at the site, CONTRACTOR must attend a preconstruction conference with Owner's Representative and others, as set forth in Division 1. Additionally, prior to commencement of work, the CONTRACTOR shall host a preconstruction conference for the Subcontractors identified on the originally approved compliance plan, Owner's Representative and others, as set forth in Division 1. The CONTRACTOR shall notify all Subcontractors five (5) working days prior to the preconstruction conference. If the CONTRACTOR has included Subcontractors in the initial preconstruction conference, the additional Subcontractor preconstruction conference will not be required.

2.6 Initially Acceptable Schedules: Unless otherwise provided in the Contract Documents, CONTRACTOR shall obtain approval of Owner's Representative on the Baseline Schedule submitted in accordance with paragraph 2.4.2.1 and Division 1 before the first progress payment will be made to CONTRACTOR. The Baseline Schedule must provide for an orderly progression of the designated portion of the Work to completion within any specified Milestones and Contract Times. Acceptance of the schedule by Owner's Representative will neither impose on Owner's Representative responsibility or liability for the sequencing, scheduling or progress of the Work nor interfere with or relieve CONTRACTOR from CONTRACTOR's full responsibility for such Work. CONTRACTOR's schedule of Shop Drawings and sample submissions must provide an acceptable basis for reviewing and processing the required submittals. CONTRACTOR's schedule of values must conform to the requirements set forth in Division 1.

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.1 Intent:

3.1.1 The intent of the Contract Documents is to include all information necessary for the proper execution and timely completion of the Work by CONTRACTOR. The CONTRACTOR will execute the Work described in and reasonably inferable from the Contract Documents as necessary to produce the results indicated by the Contract Documents. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all. In cases of disagreement, the following order of precedence shall generally govern (top item receiving priority of interpretation):

Signed Agreement
Addendum to the Contract Documents, including approved changes
Supplemental General Conditions
General Conditions
Other Bidding Requirements and Contract Forms
Special Provisions to the Standard Technical Specifications
Special Specifications
Standard Technical Specifications

Drawings (figured dimensions shall govern over scaled dimensions)
Project Safety Manual (if applicable),

with the understanding that a common sense approach will be utilized as necessary so that the Contract Documents produce the intended response.

3.1.2 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

3.2 Reporting and Resolving Discrepancies: If, during the performance of the Work, CONTRACTOR discovers any conflict, error, ambiguity or discrepancy within the Contract Documents or between the Contract Documents and any provisions of any such law or regulation applicable to the performance of the Work or of any such standard, specification, manual or code or instructions of any Supplier, CONTRACTOR shall report it to Owner's Representative in writing at once, and CONTRACTOR shall not proceed with the Work affected thereby until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in paragraph 3.3.1 or 3.3.2. CONTRACTOR shall be liable to OWNER for failure to report any such conflict, error, ambiguity or discrepancy of which CONTRACTOR knew or reasonably should have known.

3.3 Modifying and Supplementing Contract Documents:

3.3.1 The Contract Documents may be modified to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions by change order or contract amendment.

3.3.2 In addition, the requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, in one or more of the following ways:

.1 Field Order.

.2 Review of a Shop Drawing or sample.

.3 Written interpretation or clarification.

3.4 Reuse of Documents Prohibited: CONTRACTOR and any Subcontractor or Supplier or other person or organization performing or furnishing any of the Work under a direct or indirect contract with OWNER: (i) shall not have or acquire any title to or ownership rights in any of the Drawings, Specifications or other documents (or copies of any thereof) prepared by or bearing the seal of E/A or E/A's consultant, and (ii) shall not reuse any of such Drawings, Specifications, other documents or copies on extensions of the Project or any other project without written consent of OWNER and E/A.

3.5 In the event of the breach by the OWNER or CONTRACTOR of any of its obligations under the Contract, so as to support a claim by the other party, the provisions of this Contract will be equitably construed to allow the resolution of such a claim and all of the other provisions of this Contract shall continue in full force and effect as to the rights, responsibilities, and remedies of the OWNER and CONTRACTOR.

ARTICLE 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

4.1 Availability of Lands: The OWNER will provide access to all land and interests in land required for the Work and will notify CONTRACTOR of any restrictions in such access. CONTRACTOR may make a claim if OWNER fails to provide timely access to the Work.

CONTRACTOR must obtain any additional temporary construction facilities, stockpiling or storage sites not otherwise provided.

4.2 Subsurface and Physical Conditions:

4.2.1 CONTRACTOR specifically represents that it has carefully examined the plans, the geotechnical report, if any, and the site of the proposed Work and is thoroughly familiar with all of the conditions surrounding construction of the Project, having had the opportunity to conduct any and all additional inquiry, tests and investigation that he/she deems necessary and proper. CONTRACTOR acknowledges the receipt of the geotechnical report, if any, and agrees that the report, while it is an accurate record of the geotechnical conditions at the boring locations, is not a guarantee of specific site conditions which may vary between boring locations.

4.2.2 CONTRACTOR must notify OWNER in writing as soon as reasonably possible, but no later than three (3) calendar days, if unforeseen conditions are encountered at the site which are (i) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (ii) unknown physical conditions of an unusual nature, that differ materially from those normally encountered in the type of work being performed under this Contract. CONTRACTOR may not disturb the conditions until OWNER conducts an investigation. Owner's Representative and E/A will promptly investigate such conditions with E/A. If it is determined that such conditions differ materially and cause an increase or decrease in the CONTRACTOR's cost of or time required for performance of any part of the Work, Owner's Representative will recommend an equitable adjustment in the Contract Amount or Contract Time, or both. If it is determined that such conditions are not materially different from those indicated in the Contract Documents, Owner's Representative will notify CONTRACTOR in writing of such findings and the Contract will not be adjusted. CONTRACTOR may dispute such a determination in accordance with Article 16.

4.2.3 Notwithstanding any other provision of this Contract, CONTRACTOR is solely responsible for the location and protection of any and all public utility lines and utility customer service lines in the Work area. "Public utility lines" means the utility distribution and supply system, and "utility customer service lines" means the utility lines connecting customers to the utility distribution and collection system. Generally, existing utility customer service line connections are not shown on the Drawings. CONTRACTOR shall notify "One Call" and exercise due care to locate, mark, uncover and otherwise protect all such lines in the construction zone and any of CONTRACTOR's work or storage areas. CONTRACTOR's responsibility for the location and protection of utilities is primary and nondelegable. **CONTRACTOR shall indemnify or reimburse such expenses or costs (including fines that may be levied against OWNER) that may result from unauthorized or accidental damage to all public lines and utility customer service lines in the work area. OWNER reserves the right to repair any damage CONTRACTOR causes to such utilities at CONTRACTOR's expense. If a public line and/or customer service line is damaged by CONTRACTOR, CONTRACTOR shall give verbal notice within one (1) hour and written notice within twenty-four (24) hours to the Owner's Representative.**

4.2.4 CONTRACTOR shall take reasonable precaution to avoid disturbing primitive records and antiquities of archaeological, paleontological or historical significance. No objects of this nature shall be disturbed without written permission of OWNER and Texas Historical Commission. When such objects are uncovered unexpectedly, CONTRACTOR shall stop all Work in close proximity and notify Owner's Representative and Texas Historical Commission of their presence and shall not disturb them until written permission and permit to do so is granted. All primitive rights and antiquities uncovered on OWNER's property shall remain property of State of Texas, Texas Historical Commission conforming to Texas Natural Resources Code. If it is determined by OWNER, in consultation with Texas Historical Commission, that exploration or excavation of primitive records or antiquities on Project site is necessary to avoid loss, CONTRACTOR shall cooperate in salvage work attendant to preservation. If the Work stoppage or salvage work causes an increase in CONTRACTOR's cost of, or time required for, performance of the Work, the Contract Amount and/or Contract Time will be equitably adjusted.

4.3 Reference Points: Unless otherwise specified, all control lines and bench marks suitable for use in layout will be furnished by OWNER. Lay out of the Work shall be performed in accordance with Division 1. Controls, bench marks and property boundary markers shall be carefully preserved by CONTRACTOR by use of flags, staffs or other visible devices and in case of destruction or removal by CONTRACTOR or its employees, such controls and bench marks shall be replaced by a Registered Professional Land Surveyor at CONTRACTOR's expense. City of Austin survey monuments damaged by CONTRACTOR will be reestablished by OWNER at CONTRACTOR's expense.

4.4 Hazardous Materials:

4.4.1 To the extent provided by applicable law, OWNER shall be responsible for any hazardous material uncovered or revealed at the site which was not shown, indicated or identified in the Contract Documents to be within the scope of the Work and which may present a substantial danger to persons or property exposed thereto in connection with the Work at the site. CONTRACTOR shall immediately notify Owner's Representative of any suspected hazardous materials encountered before or during performance of the Work and shall take all necessary precautions to avoid further disturbance of the materials.

4.4.2 CONTRACTOR shall be responsible for any hazardous materials brought to the site by CONTRACTOR, Subcontractor, Suppliers or anyone else for whom CONTRACTOR is responsible.

4.4.3 No asbestos-containing materials shall be incorporated into the Work or brought on Project site without prior approval of OWNER. The CONTRACTOR shall not knowingly use, specify, request or approve for use any asbestos containing materials or lead-based paint without the OWNER'S written approval. When a specific product is specified, the CONTRACTOR shall endeavor to verify that the product does not include asbestos containing material.

4.4.4 Refer to Division 1 for hazardous material definitions and procedures.

.1 Unless otherwise expressly provided in the Contract Documents to be part of the Work, CONTRACTOR is not responsible for any unexpected Hazardous Materials encountered at the site. Upon encountering any Hazardous Conditions, CONTRACTOR must stop Work immediately in the affected area and duly notify OWNER and, if required by applicable law or regulations, all government or quasi-government entities with jurisdiction over the Project or site.

.2 Upon receiving notice of the presence of suspected Hazardous Materials, OWNER shall take the necessary measures required to ensure that the Hazardous Materials are remediated or rendered harmless. Such necessary measures shall include OWNER retaining qualified independent experts to (i) ascertain whether Hazardous Materials have actually been encountered, and, if they have been encountered, (ii) prescribe the remedial measures that OWNER must take either to remove the Hazardous Materials or render the Hazardous Materials harmless.

.3 CONTRACTOR shall be obligated to resume Work at the affected area of the Project only after OWNER's Representative provides written certification that (i) the Hazardous Materials have been removed or rendered harmless and (ii) all necessary approvals have been obtained from all government and quasi-government entities having jurisdiction over the Project or site. The CONTRACTOR shall be responsible for continuing the Work in the unaffected portion of the Project and site.

.4 CONTRACTOR will be entitled, in accordance with these General Conditions, to an adjustment in its Contract Amount and/or Contract Time(s) to the extent CONTRACTOR's cost and/or time of performance have been adversely impacted by the presence of Hazardous Materials.

.5 Notwithstanding the preceding provisions of this Section 4.1, OWNER is not responsible for Hazardous Materials introduced to the Site by CONTRACTOR, Subcontractors or anyone for whose acts they may be liable. **CONTRACTOR shall indemnify, defend and hold harmless OWNER and OWNER's officers, directors, employees and agents from and against all claims, losses, damages, liabilities and expenses, including attorneys' fees and expenses, arising out of or resulting from those hazardous materials introduced to the site by CONTRACTOR, Subcontractors or anyone for whose acts they may be liable.**

4.4.5 CONTRACTOR shall be responsible for use, storage and remediation of any hazardous materials brought to the Site by CONTRACTOR, Subcontractors, Suppliers or anyone else for whom CONTRACTOR is responsible.

ARTICLE 5 - BONDS AND INSURANCE

5.1 Surety and Insurance Companies: All bonds and insurance required by the Contract Documents shall be obtained from solvent surety or insurance companies that are duly licensed by the State of Texas and authorized to issue bonds or insurance policies for the limits and coverages required by the Contract Documents. The bonds shall be in a form acceptable to OWNER and shall be issued by a surety which complies with the requirements of Texas Insurance Code, Title 12, Chapter 3503. The surety must obtain reinsurance for any portion of the risk that exceeds 10% of the surety's capital and surplus. For bonds exceeding $100,000, the surety must also hold a certificate of authority from the U.S. Secretary of the Treasury or have obtained reinsurance for any liability in excess of $1,000,000 from a reinsurer that is authorized as a reinsurer in Texas or holds a certificate of authority from the U.S. Secretary of the Treasury. In the event that the proposed surety for a contract award in excess of $100,000 does not hold a certificate of authority from the

U.S. Secretary of the Treasury and/or its proposed reinsurer does not hold a certificate of authority from the U.S. Secretary of the Treasury, the OWNER may require additional financial solvency information from the Bidder/Contractor and the proposed surety company and/or reinsurer as part of the 00400 Statement of Bidders Experience and determination of bidder responsibility in the award of the Contract.

5.2 Workers' Compensation Insurance Coverage:

5.2.1 Definitions:

.1 Certificate of coverage ("certificate") - A copy of a certificate of insurance, a certificate of authority to self-insure issued by the commission, or a coverage agreement (DWC-81, DCW-82, DCW-83, or DCW84), showing statutory workers' compensation insurance coverage for the person's or entity's employees providing services on the Project, for the duration of the Project.

.2 Duration of the Project - includes the time from the beginning of the Work on the Project until the CONTRACTOR's/ person's Work on the Project has been completed and accepted by OWNER.

.3 Persons providing services on the Project ("subcontractor" in Texas Labor Code, Section 406.096) - includes all persons or entities performing all or part of the services the CONTRACTOR has undertaken to perform on the Project, regardless of whether that person contracted directly with the CONTRACTOR and regardless of whether that person has employees. This includes, without limitation, independent contractors, Subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity, or employees of any entity which furnishes persons to provide services on the Project. "Services" include, without limitation, providing, hauling, or delivering equipment or materials, or providing labor, transportation, or other service related to a project. "Services" does not include activities unrelated to the Project, such as food/beverage vendors, office supply deliveries, and delivery of portable toilets.

5.2.2 CONTRACTOR shall provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011(44) for all employees of the CONTRACTOR providing services on the Project, for the duration of the Project.

5.2.3 CONTRACTOR must provide a certificate of coverage to OWNER prior to being awarded the Contract.

5.2.4 If the coverage period shown on the CONTRACTOR's current certificate of coverage ends during the duration of the Project, the CONTRACTOR must, prior to the end of the coverage period, file a new certificate of coverage with OWNER showing that coverage has been extended.

5.2.5 CONTRACTOR shall obtain from each person providing services on the Project, and provide to OWNER:

.1 A certificate of coverage, prior to that person beginning Work on the Project, so OWNER will have on file certificates of coverage showing coverage for all persons providing services on the Project; and

.2 No later than seven (7) days after receipt by CONTRACTOR, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the Project.

5.2.6 CONTRACTOR shall retain all required certificates of coverage for the duration of the Project and for one (1) year thereafter.

5.2.7 CONTRACTOR shall notify OWNER in writing by certified mail or personal delivery, within ten (10) days after CONTRACTOR knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the Project.

5.2.8 CONTRACTOR shall post on each Project site a notice, in the text, form and manner prescribed by the Texas Workers' Compensation Commission, informing all persons providing services on the Project that they are required to be covered, and stating how a person may verify coverage and report lack of coverage.

5.2.9 CONTRACTOR shall contractually require each person with whom it contracts to provide services on a Project, to:

.1 Provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011(44) for all of its employees providing services on the Project, for the duration of the Project;

.2 Provide to CONTRACTOR, prior to that person beginning Work on the Project, a certificate of coverage showing that coverage is being provided for all employees of the person providing services on the Project, for the duration of the Project;

.3 Provide CONTRACTOR, prior to the end of the coverage period, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the Project;

.4 Obtain from each other person with whom it contracts, and provide to CONTRACTOR: a) a certificate of coverage, prior to the other person beginning Work on the Project; and b) a new certificate of coverage showing extension of coverage, prior to the end of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the Project;

.5 Retain all required certificates of coverage on file for the duration of the Project and for one (1) year thereafter;

.6 Notify OWNER in writing by certified mail or personal delivery, within ten (10) days after the person knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the Project; and

.7 Contractually require each person with whom it contracts, to perform as required by paragraphs 5.2.9.1 - 5.2.9.7, with the certificates of coverage to be provided to the person for whom they are providing services.

5.2.10 By signing this Contract or providing or causing to be provided a certificate of coverage, CONTRACTOR is representing to OWNER that all employees of the CONTRACTOR who will provide services on the Project will be covered by workers' compensation coverage for the duration of the Project, that the coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of a self-insured, with the Texas Worker’s Compensation Commission's Division of Self- Insurance Regulation. Providing false or misleading information

may subject CONTRACTOR to administrative penalties, criminal penalties, civil penalties, or other civil actions.

5.2.11 CONTRACTOR's failure to comply with any of these provisions is a breach of Contract by CONTRACTOR which entitles OWNER to declare the Contract void if CONTRACTOR does not remedy the breach within ten (10) days after receipt of notice of breach from OWNER.

5.3 Other Bond and Insurance Requirements: For additional insurance requirements, refer to the Supplemental General Conditions.

5.4 Bonds:

5.4.1 General.

.1 Bonds, when required, shall be executed on forms furnished by or acceptable to OWNER. All bonds signed by an agent must be accompanied by a certified copy of such agent's authority to act.

.2 If the surety on any bond furnished by CONTRACTOR is declared bankrupt or becomes insolvent or its right to do business is terminated in the State of Texas or it ceases to meet the requirements of the preceding paragraph, CONTRACTOR shall within ten (10) days thereafter substitute another bond and surety, both of which must be acceptable to OWNER.

.3 When Performance Bonds and/or Payment Bonds are required, each shall be issued in an amount of one hundred percent (100%) of the Contract Amount as security for the faithful performance and/or payment of all CONTRACTOR's obligations under the Contract Documents. Performance Bonds and Payment Bonds shall be issued by a solvent surety company authorized to do business in the State of Texas, and shall meet any other requirements established by law or by OWNER pursuant to applicable law. Any surety duly authorized to do business in Texas may write Performance and Payment Bonds on a project without reinsurance to the limit of ten percent (10%) of its capital and surplus. Such a surety must reinsure any obligations over ten percent (10%).

5.4.2 Performance Bond.

.1 If the Contract Amount exceeds $100,000, CONTRACTOR shall furnish OWNER with a Performance Bond in the form set out in Section 00610.

.2 If the Contract Amount exceeds $25,000 but is less than or equal to $100,000, CONTRACTOR shall furnish OWNER with a Performance Bond in the form set out in Section 00610, unless the original Contract Time is 60 Calendar Days/40 Working Days or less, in which case CONTRACTOR can agree to the following terms and conditions for payment in lieu of providing a Performance Bond: no moneys will be paid to CONTRACTOR until completion and acceptance of the Work by OWNER; CONTRACTOR shall be entitled to receive 95% of the Contract Amount following Final Completion, and the remaining 5% of the Contract Amount following the one (1) year warranty period.

.3 If the Contract Amount is less than or equal to $25,000, CONTRACTOR will not be required to furnish a Performance Bond; provided that no moneys will be paid to CONTRACTOR until completion and acceptance of the Work by OWNER under the following terms and conditions: CONTRACTOR shall be entitled to receive 95% of the Contract Amount following Final Completion, and the remaining 5% of the Contract Amount following the one (1) year warranty period.

.4 If a Performance Bond is required to be furnished, it shall extend for the one (1) year warranty period.

5.4.3 Payment Bond.

.1 If the Contract Amount exceeds $50,000, CONTRACTOR shall furnish OWNER with a Payment Bond in the form set out in Section 00620.

.2 If the Contract Amount is less than or equal to $50,000, CONTRACTOR will not be required to furnish a Payment Bond; provided that no moneys will be paid to CONTRACTOR until completion and acceptance of the Work by OWNER under the terms and conditions specified in paragraph 5.4.2.3.

5.4.4 **Maintenance Bond:** If the Contract Documents contemplate a period of maintenance beyond the one (1) year contractual warranty period, OWNER agrees that any bond to be required for such maintenance work will be in the amount of the maintenance work during any extended maintenance period.

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

6.1 Supervision and Superintendence:

6.1.1 CONTRACTOR shall supervise, inspect and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. CONTRACTOR shall be solely responsible for the means, methods, techniques, sequences and procedures of construction. CONTRACTOR shall be responsible to see that the completed Work complies accurately with the Contract Documents.

6.1.2 CONTRACTOR shall have a competent, qualified Superintendent on the Work at all times that work is in progress. To be qualified, at a minimum, the Superintendent must be effective at (a) communicating both verbally and in writing with the OWNER's representative; (b) receiving and fulfilling instructions from the Owner's Representative; (c) supervising and directing the construction of the Work; (d) reading and interpreting the plans and specifications; (e) writing, preparing and submitting necessary paperwork; and (f) understanding work sequencing and scheduling. The Superintendent will be CONTRACTOR's representative on the Work and shall have the authority to act on the behalf of CONTRACTOR. All communications given to the Superintendent shall be as binding as if given to CONTRACTOR. Either CONTRACTOR or the Superintendent shall provide a cellular telephone number and an emergency and home telephone number at which one or the other may be reached if necessary when work is not in progress. The Superintendent must be an employee of the CONTRACTOR, unless such requirement is waived in writing by the Owner's Representative. If the CONTRACTOR proposes a management structure with a Project Manager supervising, directing, and managing construction of the work in addition to or in substitution of a Superintendent, the requirements of these Construction Documents with respect to the Superintendent shall likewise apply to any such Project Manager.

.1 CONTRACTOR shall present the resume of the proposed Superintendent to the Owner's Representative showing evidence of experience and successful superintendence and direction of work of a similar scale and complexity. If, in the opinion of the Owner's Representative, the proposed Superintendent does

not indicate sufficient experience in line with the Work, he/she will not be allowed to be the designated Superintendent for the Work.

.2 The Superintendent shall not be replaced without Written Notice to Owner's Representative. If CONTRACTOR deems it necessary to replace the Superintendent, CONTRACTOR shall provide the necessary information for approval, as stated above, on the proposed new Superintendent.

.3 A qualified substitute Superintendent may be designated in the event that the designated Superintendent is temporarily away from the Work, but not to exceed a time limit acceptable to the Owner's Representative. CONTRACTOR shall replace the Superintendent upon OWNER's request in the event the Superintendent is unable to perform to OWNER's satisfaction.

6.2 Labor, Materials and Equipment:

6.2.1 CONTRACTOR shall maintain a work force adequate to accomplish the Work within the Contract Time. CONTRACTOR agrees to employ only orderly and competent workers, skillful in performance of the type of Work required under this Contract. CONTRACTOR, Subcontractors, Sub-subcontractors, and their employees may not use or possess any alcoholic or other intoxicating beverages, illegal drugs or controlled substances while on the job or on OWNER's property, nor may such workers be intoxicated, or under the influence of alcohol or drugs, on the job. Subject to the applicable provisions of Texas law, CONTRACTOR, Subcontractors, Sub-subcontractors, and their employees may not use or possess any firearms or other weapons while on the job or on OWNER'S property. If OWNER or Owner's Representative notifies CONTRACTOR that any worker or representative of Contractor is incompetent, disorderly, abusive, or disobedient, has knowingly or repeatedly violated safety regulations, has possessed any firearms in contravention of the applicable provisions of Texas law, or has possessed or was under the influence of alcohol or drugs on the job, CONTRACTOR shall immediately remove such worker or representative, including an officer or owner of CONTRACTOR, from performing Contract Work, and may not employ such worker or representative again on Contract Work without OWNER's prior written consent. CONTRACTOR shall at all times maintain good discipline and order on or off the site in all matters pertaining to the Project. Workers on Project shall be paid not less than wage rates, including fringe benefits, as published by the Department of Labor (DOL) for Building Construction and Heavy and Highway Trades "AS APPLICABLE" and/or the minimum wage required by City of Austin Ordinance No. 20160324-015, whichever is higher. The Total Minimum Wage required can be met using any combination of cash and non-cash qualified fringe benefits provided the cash component meets or exceeds the minimum wage required.

6.2.2 Unless otherwise specified in Division 1, CONTRACTOR shall provide and pay for all materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities and all other facilities and incidentals necessary for the furnishing, performance, testing, start-up and completion of the Work.

6.2.3 All materials and equipment shall be of good quality and new (including new products made of recycled materials, pursuant to Section 361.426 of the Texas Health & Safety Code), except as otherwise provided in the Contract Documents. If required by Owner's Representative, CONTRACTOR shall furnish satisfactory evidence (reports of required tests, manufacturer's certificates of compliance with material requirements, mill reports, etc.) as to the kind and quality of materials and equipment. All materials and equipment shall be applied, installed, connected,

erected, used, cleaned and conditioned in accordance with instructions of the applicable Supplier, except as otherwise provided in the Contract Documents.

6.2.4 Substitutes and "Approved Equal" Items:

.1 Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function and quality required. Unless the specification or description contains words reading that no like, equivalent or "approved equal" item or no substitution is permitted, other items of material or equipment of other Suppliers may be submitted by CONTRACTOR, at CONTRACTOR'S sole risk, including disruptions to the Critical Path of the Progress Schedule, to E/A through Owner's Representative under the following circumstances:

.1.1 "Approved Equal": If in E/A's sole discretion an item of material or equipment proposed by CONTRACTOR is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by E/A as an "approved equal" item, in which case review of the proposed item may, in E/A's sole discretion, be accomplished without compliance with some or all of the requirements for evaluation of proposed substitute items. CONTRACTOR shall provide E/A with the documentation required for E/A to make its determination.

.1.2 Substitute Items: If in E/A's sole discretion an item of material or equipment proposed by CONTRACTOR does not qualify as an "approved equal" item under subparagraph 6.2.4.1.1, it will be considered a proposed substitute item. CONTRACTOR shall submit sufficient information as provided in Division 1 to allow E/A to determine that the item of material or equipment proposed is essentially equivalent to that named and a substitute therefor.

.2 Substitute Construction Methods and Procedures: If a specific means, method, technique, sequence or procedure of construction is shown or indicated in and expressly required by the Contract Documents, CONTRACTOR may, at CONTRACTOR'S sole risk, including disruptions to the Critical Path of the Progress Schedule, with prior approval of E/A furnish or utilize a substitute means, method, technique, sequence, or procedure of construction. CONTRACTOR shall submit sufficient information to Owner's Representative to allow E/A, in E/A's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The procedure for review by E/A will be same as that provided for substitute items in Division 1.

.3 E/A's Evaluation: E/A will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to subparagraphs 6.2.4.1.1 and 6.2.4.1.2. E/A will be the sole judge of acceptability. No "approved equal" or substitute shall be ordered, installed, or utilized until E/A's review is complete, which will be evidenced by either a Change Order or completion of the Shop Drawing review procedure. OWNER may require CONTRACTOR to furnish at CONTRACTOR's expense a special performance guarantee or other surety bond with respect to any "approved equal" or substitute or for any other delay or disruption to the Critical Path of the Project Schedule attributable to any such substitution. OWNER shall not be responsible for any delay due to review time for any "approved equal" or substitute.

.4 CONTRACTOR's Expense: All data and documentation to be provided by CONTRACTOR in support of any proposed "approved equal" or substitute item will be at CONTRACTOR's expense.

.5 The approval of the E/A will not relieve the CONTRACTOR from primary responsibility and liability for the suitability and performance of any proposed substitute item, method or procedure and will not relieve CONTRACTOR from its primary responsibility and liability for curing defective Work and performing warranty work, which the CONTRACTOR shall cure and perform, regardless of any claim the CONTRACTOR may choose to advance against the E/A or manufacturer.

6.2.5 CONTRACTOR agrees to assign to OWNER any rights it may have to bring antitrust suits against its Suppliers for overcharges on materials incorporated in the Project growing out of illegal price fixing agreements. CONTRACTOR further agrees to cooperate with OWNER should OWNER wish to prosecute suits against Suppliers for illegal price fixing.

6.3 Progress Schedule: Unless otherwise provided in Division 1, CONTRACTOR shall adhere to the Baseline Schedule established in accordance with paragraph 2.6 as it may be adjusted from time to time as provided below:

6.3.1 CONTRACTOR shall submit to Owner's Representative for review and approval any proposed adjustments in the Progress Schedule that will not change the Contract Times or Milestones on a monthly basis. Any such proposed adjustments must be substantiated with documentation of any changes to the underlying logic of the Progress Schedule. CONTRACTOR’s Progress Schedule must show how the CONTRACTOR will consistently advance the progress of the Work in accordance with the Critical Path of the Work and the Contract Time or Milestones. Such adjustments will conform generally to the Progress Schedule then in effect and additionally will comply with any provisions of Division 1 applicable thereto.

6.3.2 Proposed adjustments in the Progress Schedule that will change the Contract Times or Milestones shall be submitted in accordance with the requirements of Article 12. Any such proposed adjustments must be substantiated with documentation of any changes to the underlying logic of the Progress Schedule. Such adjustments may only be made by a Change Order or Time Extension Request in accordance with Article 12.

6.4 Concerning Subcontractors, Suppliers and Others:

6.4.1 Assignment: CONTRACTOR agrees to retain direct control of and give direct attention to the fulfillment of this Contract. CONTRACTOR agrees not to, by Power of Attorney, or otherwise, assign said Contract without the prior written consent of OWNER. In addition, without OWNER’S written consent, the CONTRACTOR will not subcontract the performance of the entire Work or the supervision and direction of the Work.

6.4.2 Award of Subcontracts for Portions of the Work: CONTRACTOR shall not employ any Subcontractor, Supplier or other person or organization, whether initially or as a substitute, against whom OWNER may have reasonable objection. OWNER will communicate such objections by Written Notice. If OWNER requires a change without good cause of any Subcontractor, person or organization previously accepted by OWNER, the Contract Amount shall be increased or decreased by the difference in the cost occasioned by any such change, and appropriate Change Order shall be issued. CONTRACTOR shall not substitute any Subcontractor, person or

organization that has been accepted by OWNER, unless the substitute has been accepted in writing by OWNER. No acceptance by OWNER of any Subcontractor, Supplier or other person or organization shall constitute a waiver of any right of OWNER to reject defective Work.

6.4.3 CONTRACTOR shall enter into written agreements with all Subcontractors and Suppliers which specifically binds the Subcontractors or Suppliers to the applicable terms and conditions of the Contract Documents for the benefit of OWNER and E/A. The OWNER reserves the right to specify that certain requirements shall be adhered to by all Subcontractors and Sub-subcontractors as indicated in other portions of the Contract Documents and these requirements shall be made a part of the agreement between CONTRACTOR and Subcontractor or Supplier. Subject to and in accordance with the above requirements, the CONTRACTOR must provide and will be deemed for all purposes to have provided in its contracts with major Subcontractors or Suppliers on the Project (those contracts of more than $10,000) the following specific provision: alternative dispute resolution (paragraphs 16.2 and 16.3), which shall be mandatory in the event of a subcontractor or supplier claim and a prerequisite for the submission of any derivative claim. The CONTRACTOR's standard subcontract form is subject to the OWNER's review and approval. The OWNER may request and the CONTRACTOR will provide within five (5) working days a copy of any subcontract requested by the OWNER.

6.4.4 CONTRACTOR shall be fully responsible to OWNER for all acts and omissions of the Subcontractors, Suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with CONTRACTOR just as CONTRACTOR is responsible for CONTRACTOR's own acts and omissions. Nothing in the Contract Documents shall create for the benefit of any such Subcontractor, Supplier or other person or organization any contractual relationship between OWNER and any such Subcontractor, Supplier or other person or organization, nor shall it create any obligation on the part of OWNER or E/A to pay or to see to the payment of any moneys due any such Subcontractor, Supplier or other person or organization except as may otherwise be required by laws and regulations.

6.4.5 CONTRACTOR shall be solely responsible for efficiently scheduling and coordinating the Work of Subcontractors, Suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with CONTRACTOR in order to avoid any delays or inefficiencies in the prosecution of the Work. CONTRACTOR shall require all Subcontractors, Suppliers and such other persons and organizations performing or furnishing any of the Work to communicate with Owner's Representative through CONTRACTOR.

6.4.6 The divisions and sections of the Specifications and the identifications of any Drawings shall not control CONTRACTOR in dividing or delineating the Work to be performed by any specific trade.

6.4.7 CONTRACTOR shall pay each Subcontractor and Supplier their appropriate share of payments made to CONTRACTOR not later than ten (10) Calendar Days of CONTRACTOR's receipt of payment from OWNER. Upon request from Owner, the CONTRACTOR has two (2) Working Days to provide documentation verifying Payment to Subcontractor(s). The CONTRACTOR is required to notify the Subcontractor(s) in writing of rejection of Application for Payment within two (2) Working Days following notification by Owner. Failure of CONTRACTOR to make payments to Subcontractors or for labor, materials or equipment in accordance to this contract, may be cause to reject future Bids by the CONTRACTOR in accordance

with Section 00100 9.B.4 and may be cause to reject payment in accordance with 00700 14.4.1.3.

6.4.8 To the extent allowed by Texas law, the OWNER shall be deemed to be a third party beneficiary to each subcontract and may, if OWNER elects, following a termination of the CONTRACTOR, require that the Subcontractor(s) perform all or a portion of unperformed duties and obligations under its subcontract(s) for the benefit of the OWNER, rather than the CONTRACTOR; however, if the OWNER requires any such performance by a Subcontractor for the OWNER's direct benefit, then the OWNER shall be bound and obligated to pay such Subcontractor the reasonable value for all Work performed by such Subcontractor to the date of the termination of the CONTRACTOR, less previous payments, and for all Work performed thereafter. In the event that the OWNER elects to invoke its right under this section, OWNER will provide notice of such election to the CONTRACTOR and the affected Subcontractor(s).

6.5 Patent Fees and Royalties:

6.5.1 CONTRACTOR shall be responsible at all times for compliance with applicable patents or copyrights encompassing, in whole or in part, any design, device, material, or process utilized, directly or indirectly, in the performance of the Work or the formulation or presentation of its Bid.

6.5.2 CONTRACTOR shall pay all royalties and license fees and shall provide, prior to commencement of Work hereunder and at all times during the performance of same, for lawful use of any design, device, material or process covered by letters, patent or copyright by suitable legal agreement with the patentee, copyright holder, or their duly authorized representative whether or not a particular design, device, material, or process is specified by OWNER.

6.5.3 CONTRACTOR shall defend all suits or claims for infringement of any patent or copyright and shall save OWNER harmless from any loss or liability, direct or indirect, arising with respect to CONTRACTOR's process in the formulation of its Bid or the performance of the Work or otherwise arising in connection therewith. OWNER reserves the right to provide its own defense to any suit or claim of infringement of any patent or copyright in which event CONTRACTOR shall indemnify and save harmless OWNER from all costs and expenses of such defense as well as satisfaction of all judgments entered against OWNER.

6.5.4 OWNER shall have the right to stop the Work and/or terminate this Agreement at any time in the event CONTRACTOR fails to disclose to OWNER that CONTRACTOR's work methodology includes the use of any infringing design, device, material or process.

6.6 Permits, Fees: Unless otherwise provided in the Supplemental General Conditions, CONTRACTOR shall obtain and pay for all construction permits, licenses and fees required for prosecution of the Work.

6.7 Laws and Regulations:

6.7.1 CONTRACTOR shall give all notices and comply with all laws and regulations applicable to furnishing and performing the Work, including arranging for and

obtaining any required inspections, tests, approvals or certifications from any public body having jurisdiction over the Work or any part thereof. Except where otherwise expressly required by applicable laws and regulations, neither OWNER nor E/A shall be responsible for monitoring CONTRACTOR's compliance with any laws and regulations.

6.7.2 Maintaining clean water, air and earth or improving thereon shall be regarded as of prime importance. CONTRACTOR shall plan and execute its operations in compliance with all applicable Federal, State and local laws and regulations concerning control and abatement of water pollution and prevention and control of air pollution.

6.7.3 If CONTRACTOR performs any Work knowing or having reason to know that it is contrary to laws or regulations, CONTRACTOR shall bear all claims, costs, losses and damages arising therefrom; however, it shall not be CONTRACTOR's primary responsibility to make certain that the Specifications and Drawings are in accordance with laws and regulations, but this does not relieve CONTRACTOR of CONTRACTOR's obligations under Article 3.

6.8 Taxes:

6.8.1 CONTRACTOR shall pay only those sales, consumer, use and other similar taxes required to be paid by CONTRACTOR in accordance with the laws and regulations of the State of Texas in the performance of this public works contract.

6.8.2 OWNER is an exempt organization as defined by Chapter 11 of the Property Tax Code of Texas and is thereby exempt from payment of Sales Tax under Chapter 151, Limited Use Sales, Excise and Use Tax, Texas Tax Code, and Article 1066 (C), Local Sales and Use Tax Act, Revised Civil Statutes of Texas.

6.9 Use of Premises:

6.9.1 CONTRACTOR shall confine construction equipment, the storage of materials and equipment and the operations of workers to the site and land and areas identified in and permitted by the Contract Documents and other land and areas permitted by laws and regulations, right-of-way, permits and easements, and shall not unreasonably encumber the premises with construction equipment or other materials or equipment. CONTRACTOR shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof or of any adjacent land or areas, resulting from the performance of the Work. Should any claim be made by any such owner or occupant because of or in connection with the performance of the Work, CONTRACTOR shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law. **CONTRACTOR shall indemnify, defend and hold harmless OWNER, E/A, E/A'S Consultants and anyone directly or indirectly employed by any of them from and against all claims, costs, losses and damages (including court costs and reasonable attorney's fees) arising out of or resulting from any claim or action, legal or equitable, brought by any such owner or occupant against OWNER, E/A or any other party indemnified hereunder to the extent caused by or based upon performance of the work or failure to perform the Work.**

6.9.2 During the progress of the Work and on a daily basis, CONTRACTOR shall keep the premises free from accumulations of waste materials, rubbish and other debris resulting from the Work. At the completion of the Work, CONTRACTOR shall remove all waste materials, rubbish and debris from and about the premises as well as all tools, appliances, construction equipment and machinery and surplus materials. CONTRACTOR shall leave the site clean and ready for occupancy by OWNER at Substantial Completion of the Work. CONTRACTOR shall, at a minimum, restore to original condition all property not designated for alteration by the Contact Documents. If the CONTRACTOR fails to clean up at the completion of the Work, OWNER may do so and the cost thereof will be charged against the CONTRACTOR.

6.9.3 CONTRACTOR shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall CONTRACTOR subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.10 Record Documents: CONTRACTOR shall maintain in a safe place at the site, or other location acceptable to OWNER, one (1) record copy of all Drawings, Specifications, Addenda, Change Orders, Change Directives, Field Orders and written interpretations and clarifications (issued pursuant to paragraph 9.5) in good order and annotated to show all changes made during construction. These record documents together with all final samples and all final Shop Drawings will be available to OWNER and E/A for reference during performance of the Work. Upon Substantial Completion of the Work, these record documents, samples and Shop Drawings shall be promptly delivered to Owner's Representative.

6.11 Safety and Protection:

6.11.1 CONTRACTOR shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Upon request, and prior to installation of measures, CONTRACTOR shall submit a site security plan for approval by OWNER. By reviewing the plan or making recommendations or comments, OWNER will not assume liability nor will CONTRACTOR be relieved of liability for damage, injury or loss. CONTRACTOR shall take all necessary precautions for the safety of and shall provide the necessary protection to prevent damage, injury or loss to:

.1 all persons on the Work site or who may be affected by the Work;

.2 all the Work and materials and equipment to be incorporated therein, whether in storage on or off the site; and

.3 other property at the site or adjacent thereto, including, but not limited to, trees, shrubs, lawns, walks, pavements, roadways, structures, utilities and underground facilities not designated for removal, relocation or replacement in the course of construction.

6.11.2 CONTRACTOR shall comply with all applicable laws and regulations of any public body having jurisdiction for safety of persons or property or to protect them from damage, injury or loss; and shall erect and maintain all necessary safeguards for such safety and protection. CONTRACTOR shall notify owners of adjacent property and of underground facilities, and utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation and replacement of their property. All damage, injury or loss to any property referred to in paragraph 6.11.1.2 and 6.11.1.3 caused, directly or indirectly, in whole or in part, by CONTRACTOR, Subcontractor, Supplier or any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, shall be remedied by CONTRACTOR (except damage or loss attributable to the fault of Drawings or

Specifications or to the acts or omissions of OWNER, or E/A, or E/A's consultant or anyone employed by any of them or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the faults or negligence of CONTRACTOR or any Subcontractor, Supplier or other person or organization directly or indirectly employed by any of them). CONTRACTOR's duties and responsibilities for safety and protection of the Work shall continue until such time as all the Work is completed and Owner's Representative has issued a notice to OWNER and CONTRACTOR in accordance with Article 14 that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion). Without limitation, CONTRACTOR shall comply with the following specific provisions:

It shall be the duty and responsibility of CONTRACTOR and all of its subcontractors to be familiar with and comply with 29 USC Section 651, et seq., the Occupational Safety and Health Act of 1970, as amended ("OSHA") and to enforce and comply with all provisions of this Act.

The CONTRACTOR and all of its subcontractors shall comply with all applicable requirements of Subpart P of Part 1926 of 29 C.F.R, OSHA Safety and Health Standards, Texas Health and Safety Code Section 756.023, as amended, and shall submit a unit price for the particular excavation safety systems to be utilized by the Contractor for all excavations which exceed a depth of five feet (5').

Before commencing any excavation which will exceed a depth of five feet (5'), the CONTRACTOR shall provide the Owner with detailed plans and specifications regarding the safety systems to be utilized. Said plans and specifications shall include a certification from a Texas licensed professional engineer indicating full compliance with the OSHA provisions cited above.

6.11.3 Safety Representative: CONTRACTOR shall designate in writing a qualified and experienced safety representative (the "Safety Representative") at the site whose duties and responsibilities shall include safety training; identifying and mitigating hazardous conditions and unsafe work practices; and developing, maintaining and supervising the implementation of safe work practices and safety programs as deemed necessary and appropriate for the Project. The term "Safety Representative" includes any designated Safety Supervisor, Superintendent or Safety Manager. The Safety Representative shall exercise due diligence in the execution of all Project related safety duties. Upon request of OWNER, CONTRACTOR shall provide certifications or other acceptable documentation of the Safety Representative's qualifications. The following requirements will be effective as of September 1, 2010:

.1 The Safety Representative shall present certification of completion of the OSHA 30-hour Construction Industry Training Outreach Program described at: http://www.osha.gov/dte/outreach/construction_generalindustry/construction.html

.2 The Safety Representative shall verify that all construction workers (defined as persons covered by a prevailing wage determination) on the job site, whether employed by the CONTRACTOR or subcontractors, have completed the OSHA 10-hour Construction Industry Training Outreach Program described at: http://www.osha.gov/dte/outreach/construction_generalindustry/construction.html. The Safety Representative must receive a certificate of training completion before allowing a worker on site and shall have all such certificates available for inspection by the OWNER.

.3 The Safety Representative shall ensure that workers, including designated competent persons, have completed all applicable OSHA specific or other training needed to perform their job assignments. Training topics applicable

to the scope of the current Project may include, but are not limited to, scaffolds, fall protection, cranes, excavations, electrical safety, tools, concrete and masonry construction, steel erection, operation of motor vehicles and mechanized equipment.

.4 The Safety Representative shall post notice on the site of the Work stating that all workers shall have completed OSHA Construction Industry Training. The Owner may require, and the Safety Representative should consider providing a means of readily identifying workers who have completed the required training to monitor compliance with these requirements.

.5 The Safety Representative shall ensure that all required OSHA and Workers Compensation notices to workers are posted in English and Spanish at one or more conspicuous locations on the work site.

6.11.4 Hazard Communication Programs: CONTRACTOR shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the site in accordance with laws and regulations.

6.11.5 Emergencies:

.1 In emergencies affecting the safety or protection of persons or the Work at the site or adjacent thereto, CONTRACTOR, without special instruction or authorization from OWNER or E/A, is obligated to act reasonably to prevent threatened damage, injury or loss and to mitigate damage or loss to the Work. CONTRACTOR shall give Owner's Representative telephone notification as soon as reasonably practical and a prompt written notice if CONTRACTOR believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby. If Owner's Representative determines that a change in the Contract Documents is required because of the action taken by CONTRACTOR in response to such an emergency, a Change Directive or Change Order will be issued to document the consequences of such action; otherwise OWNER will not be responsible for CONTRACTOR's emergency action.

.2 Authorized agents of CONTRACTOR shall respond immediately to call-out at any time of any day or night when circumstances warrant the presence on Project site of CONTRACTOR or his agent to protect the Work or adjacent property from damage, restriction or limitation or to take such action or measures pertaining to the Work as may be necessary to provide for the safety of the public. Should CONTRACTOR and/or their agent fail to respond and take action to alleviate such an emergency situation, OWNER may direct other forces to take action as necessary to remedy the emergency condition, and OWNER will deduct any cost of such remedial action from the funds due CONTRACTOR under this Contract.

.3 In the event there is an accident involving injury to any individual or damage to any property on or near the Work, CONTRACTOR shall provide to Owner's Representative verbal notification within one (1) hour and written notification within twenty-four (24) hours of the event and shall be responsible for recording the location of the event and the circumstances surrounding the event through photographs, interviewing witnesses, obtaining medical reports, police accident reports and other documentation that describes the event. Copies of such documentation shall be provided to Owner's Representative, for OWNER's and E/A's records, within forty-eight (48) hours of the event.

Contractor shall cooperate with OWNER on any OWNER investigation of any such incident.

6.11.6 Rest Breaks:

.1 Except as provided in subsection 6.11.6.2 below, an employee performing construction activity at a construction site is entitled to a rest break of not less than ten (10) minutes for every four (4) hours worked. No employee may be required to work more than 3.5 hours without a rest break. A rest break means a break from work within working hours, excluding meal breaks, during which an employee may not work. A rest break shall be scheduled as near as possible to the midpoint of the work period.

.2 An employee is not entitled to a rest break under subsection 6.11.6.1 on any day the employee works less than 3.5 hours or spends more than half of his or her work time engaged in non-strenuous labor in a climate controlled environment.

.3 A sign describing the requirements of this Section 6.11.6 in English and Spanish shall be posted by the employer in each establishment subject to the requirement of a rest break in a conspicuous place or places where notices to employees are customarily posted, in accordance with the OWNER's then current rules for size, content, and location of such signage.

.4 The violation of Ordinance No. 20100729-047, enacted July 29, 2010, which establishes the rest break requirements set forth above, may be enforced with criminal penalties and civil remedies, as set forth in the Ordinance.

6.11.7 If the Contractor fails to carry out the Work in accordance with the Contract Documents so that a safety violation has occurred, the Owner may order the Contractor to stop the Work or any portion thereof, until the cause for such order has been eliminated. However, the right of the Owner to stop the Work under this paragraph shall not give rise to a duty on the part of the Owner to supervise the Contractor's Work or to control the Contractor's means and methods or to exercise this right for the benefit of the Contractor or any other person or entity. All time lost due to Project shut down will be the Contractor's sole responsibility, will be charged against the Contract Time, and the Contractor will be responsible for any and all expenses incurred. This provision is in addition to and supplemental to the applicable provisions of the Project's ROCIP Safety Manual.

6.11.8 Confined Space Program

.1 Contractor acknowledges and agrees that the Owner is temporarily transferring management and control of the site of the Work to the Contractor for the purpose of constructing the Project. The Contractor's responsibilities to manage the Work includes the responsibility to manage the property for purposes of compliance with 29 CFR 1926 subpart AA. To the best of Owner's knowledge and belief, Owner has provided the following information in the plans and specifications and other Contract Documents: (i) the location of each known permit space, (ii) the hazards or potential hazards in each space or the reason it is a permit space; and (iii) any precautions that the Owner or any previous contractor has implemented for the protection of employees in the permit space. This transfer will result in the Contractor being both the host employer and the controlling contractor for this portion of the Work.

6.12 Continuing the Work: CONTRACTOR shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with OWNER. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as OWNER and CONTRACTOR may otherwise agree in writing.

6.13 CONTRACTOR's General Warranty and Guarantee:

6.13.1 CONTRACTOR warrants and guarantees to OWNER that all Work will conform to the plans and specifications, be performed in a good and workmanlike manner in accordance with the Contract Documents and will not be defective. This warranty will survive the termination or expiration of the Contract. CONTRACTOR's warranty and guarantee hereunder excludes defects or damage caused by:

.1 abuse, modification or improper maintenance or operation by persons other than CONTRACTOR, Subcontractors or Suppliers; or

.2 normal wear and tear under normal usage.

6.13.2 CONTRACTOR's obligation to perform and complete the Work in a good and workmanlike manner in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of CONTRACTOR's obligation to perform the Work in accordance with the Contract Documents:

.1 observations by Owner's Representative and/or E/A;

.2 recommendation of any progress or final payment by Owner's Representative;

.3 the issuance of a certificate of Substantial Completion or any payment by OWNER to CONTRACTOR under the Contract Documents;

.4 use or occupancy of the Work or any part thereof by OWNER;

.5 any acceptance by OWNER or any failure to do so;

.6 any review of a Shop Drawing or sample submittal;

.7 any inspection, test or approval by others; or

.8 any correction of defective Work by OWNER.

6.14 INDEMNIFICATION:

6.14.1 CONTRACTOR shall defend, indemnify and hold harmless OWNER, E/A, E/A'S Consultants and Sub consultants and their respective officers, directors, partners, employees, agents and other Consultants and any of them (the "INDEMNIFIED PARTIES") from and against all claims, costs, losses and damages (including but not limited to all fees and charges of engineers, architects, attorneys and other professionals and all court or arbitration or other dispute resolution costs) arising out of or resulting from the performance of the Work, provided that any such claim, cost, loss or damage:

.1 Is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the work itself), including the loss of use resulting therefrom, and

.2 Is caused in whole or in part by any negligent act or omission of CONTRACTOR, any Subcontractor, any Supplier, any person or organization directly or indirectly employed by any of them to perform or furnish any of the work or anyone for whose acts any of them may be liable, regardless of whether or not caused in part by any negligence or omission of the INDEMNIFIED PARTIES hereunder or whether liability is imposed upon such INDEMNIFIED PARTY by laws and regulations regardless of the negligence of any such person or entity.

In the event that indemnification of the INDEMNIFIED PARTIES is prohibited by law, CONTRACTOR shall nonetheless be solely responsible for any liability arising out of or resulting from the performance of the Work, subject to the limitations set forth above, and shall indemnify and hold harmless the remaining INDEMNIFIED PARTIES, who may be legally indemnified, from such liability of the CONTRACTOR and the associated costs described above.

6.14.2 The indemnification obligation under paragraph 6.14.1 shall not be limited in any way by any limitation on the amount or type of damages, or compensation or benefits payable by or for CONTRACTOR or any such Subcontractor, Supplier or other person or organization under workers' compensation acts, disability benefit acts or other employee benefit acts.

6.14.3 The obligations of CONTRACTOR under paragraph 6.14.1 shall not extend to the liability of OWNER, E/A, E/A's consultants, and their officers, directors, partners, employees or agents caused primarily by negligent preparation of maps, drawings, surveys, designs or specifications upon which is placed the applicable state-authorized design professional seal of OWNER's, E/A's or E/A's consultant's officers, directors, partners, employees or agents.

6.14.4 In the event CONTRACTOR fails to follow OWNER's directives concerning use of the site, scheduling or course of construction, or engages in other conduct which proximately causes damage to property based on inverse condemnation or otherwise, then and in that event, CONTRACTOR shall indemnify OWNER against all costs resulting from such claims.

6.14.5 In the event CONTRACTOR unreasonably delays progress of the work being done by others on the site so as to cause loss for

which OWNER becomes liable, then CONTRACTOR shall indemnify OWNER from and reimburse OWNER for such loss.

6.15 Survival of Obligations: All representations, indemnifications, warranties and guarantees made in, required by or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion and acceptance of the Work and termination or completion of the Agreement.

6.16 **Losses from Natural Causes:** Unless otherwise specified, all loss or damage to CONTRACTOR arising out of the nature of the Work to be done or from action of the elements, floods or from unforeseeable circumstances in prosecution of the Work or from unusual obstructions or difficulties which may be encountered in prosecution of the Work, shall be sustained and borne by CONTRACTOR at its own cost and expense.

6.17 **Notice of Claim:** Should CONTRACTOR suffer injury or damage to person or property because of any error, omission or act of OWNER or of any of OWNER's employees or agents or others for whose acts OWNER is liable, a Claim must be made to the other party within thirty (30) calendar days of the event giving rise to such injury or damage. The provisions of this paragraph 6.17 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitations or statute of repose.

6.18 **Liquidated Damages:** CONTRACTOR or its Surety shall be liable for liquidated damages for the failure of the CONTRACTOR to timely complete the Work or any portion thereof within the Contract Time.

ARTICLE 7 - OTHER WORK

7.1 OWNER may perform other work related to the Project at the site by OWNER's own forces, or let other contracts therefor, or have other work performed by utility owners. CONTRACTOR and OWNER agree to and shall use best efforts to cooperate and coordinate the Work with others performing work and other work related to the Project in order to avoid conflicts and delays in the Work. If CONTRACTOR believes that delay or additional cost is involved because of such action by OWNER, CONTRACTOR may make a Claim as provided in Article 11 or 12.

7.2 CONTRACTOR shall afford other contractors who are in a contract with OWNER and each utility owner (and OWNER, if OWNER is performing the additional work with OWNER's employees) proper and safe access to the site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work and shall properly connect and coordinate the Work with theirs. Unless otherwise provided in the Contract Documents, CONTRACTOR shall do all cutting, fitting and patching of the Work that may be required to make its several parts come together properly and integrate with such other work. CONTRACTOR shall not endanger any work of others by cutting, excavating or otherwise altering their work and will only cut or alter their work with the written consent of Owner's Representative and the other contractors whose work will be affected. CONTRACTOR shall promptly remedy damage wrongfully caused by CONTRACTOR to completed or partially completed construction or to property of the OWNER or separate contractors.

7.3 If the proper execution or results of any part of CONTRACTOR's Work depends upon work performed by others under this Article 7, CONTRACTOR shall inspect such other work and promptly report to Owner's Representative in writing any delays, defects or deficiencies in

such other work that render it unavailable or unsuitable for the proper execution and results of CONTRACTOR's Work. CONTRACTOR's failure to report will constitute an acceptance of such other work as fit and proper for integration with CONTRACTOR's Work except for latent or non-apparent defects and deficiencies in such other work.

7.4 OWNER shall provide for coordination of the activities of the OWNER's own forces and of each separate contractor with the Work of CONTRACTOR, who shall cooperate with them. CONTRACTOR shall participate with other separate contractors and Owner's Representative in reviewing their construction Progress Schedules when directed to do so. On the basis of such review, CONTRACTOR shall make any revisions to the construction Progress Schedule deemed necessary after a joint review and mutual agreement. The agreed upon construction Progress Schedules shall then constitute the Progress Schedules to be used by CONTRACTOR, separate contractors and OWNER until subsequently revised.

7.5 Costs caused by delays or by improperly timed activities or defective construction shall be borne by the party responsible therefor.

ARTICLE 8 - OWNER'S RESPONSIBILITIES

8.1 Prior to the start of construction, OWNER will designate in writing a person or entity to act as Owner's Representative during construction. Except as otherwise provided in these General Conditions, OWNER shall issue all communications to CONTRACTOR through Owner's Representative.

8.2 OWNER will not supervise, direct, control or have authority over or be responsible for CONTRACTOR's means, methods, techniques, sequences or procedures of construction or the safety precautions and programs incident thereto. OWNER is not responsible for any failure of CONTRACTOR to comply with laws and regulations applicable to furnishing or performing the Work. OWNER is not responsible for CONTRACTOR's failure to perform or furnish the Work in accordance with the Contract Documents. Failure or omission of OWNER to discover, or object to or condemn any defective Work or material shall not release CONTRACTOR from the obligation to properly and fully perform the Contract.

8.3 OWNER is not responsible for the acts or omissions of CONTRACTOR, or of any Subcontractor, any Supplier, or of any other person or organization performing or furnishing any of the Work. CONTRACTOR acknowledges and agrees that OWNER'S direction to perform Work in accordance with the approved Progress Schedule is not a demand for acceleration or a dictation of CONTRACTOR'S means or methods.

8.4 Information or services under the OWNER's control shall be furnished by the OWNER with reasonable promptness to avoid delay in orderly progress of the Work. The OWNER shall have a reasonable amount of time to investigate site conditions, review submittals, analyze requests for changes, and to make other decisions in the orderly administration of the Contract. CONTRACTOR must notify the OWNER in writing, if the time for the investigation, review, analysis of any submittals, required for changes or otherwise required for OWNER'S decision, impacts in any way the Critical Path of the approved Progress Schedule.

8.5 The foregoing are in addition to other duties and responsibilities of the OWNER enumerated herein and especially those in respect to Article 4 (Availability of Lands; Subsurface and Physical Conditions; Reference Points), Article 7 (Other Work) and Article 14 (Payments to CONTRACTOR and Completion).

8.6 **Notice of Claim:** Should OWNER suffer injury or damage to person or property because of any error, omission or act of CONTRACTOR or of any of CONTRACTOR's employees or agents or others for whose acts CONTRACTOR is liable, a Claim will be made to the other

party within thirty (30) calendar days of receipt of actual or constructive notice of the event giving rise to such injury or damage. The provisions of this paragraph 8.6 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitations or statute of repose.

ARTICLE 9 - ENGINEER/ARCHITECT'S STATUS DURING CONSTRUCTION

9.1 E/A's Authority and Responsibilities:

9.1.1 The duties and responsibilities and the limitations of authority of E/A during construction, as set forth in the Contract Documents, may be assigned or assumed by the OWNER, but shall not be extended without written consent of OWNER and/or E/A. The assignment of any authority, duties or responsibilities to E/A under the Contract Documents, or under any agreement between OWNER and E/A, or any undertaking, exercise or performance thereof by E/A, is intended to be for the sole and exclusive benefit of OWNER and not for the benefit of CONTRACTOR, Subcontractor, Supplier, or any other person or organization, or for any surety or employee or agent of any of them.

9.1.2 E/A will not supervise, direct, control or have authority over or be responsible for CONTRACTOR's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto. E/A is not responsible for any failure of CONTRACTOR to comply with laws and regulations applicable to the furnishing or performing the Work. E/A is not responsible for CONTRACTOR's failure to perform or furnish the Work in accordance with the Contract Documents. Failure or omission of E/A to discover, or object to or condemn any defective Work or material shall not release CONTRACTOR from the obligation to properly and fully perform the Contract.

9.1.3 E/A is not responsible for the acts or omissions of CONTRACTOR, or of any Subcontractor, any Supplier, or of any other person or organization performing or furnishing any of the Work.

9.1.4 If OWNER and E/A agree, E/A will review the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds and certificates of inspection, tests and approvals and other documentation required to be delivered by Article 14, but only to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests and approvals that the results certified indicate compliance with, the Contract Documents.

9.1.5 The limitations upon authority and responsibility set forth in this paragraph 9.1 shall also apply to E/A's Consultants, Resident Project Representative and assistants.

9.2 E/A as Owner's Representative: E/A may be designated as the Owner's Representative under paragraph 8.1.

9.3 Visits to Site: If OWNER and E/A agree, E/A will make visits to the site at intervals appropriate to the various stages of construction as E/A deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of CONTRACTOR's executed Work. Based on information obtained during such visits and observations, E/A will endeavor for the benefit of OWNER to determine, in general, if the Work is proceeding in accordance with the Contract Documents. E/A will not be required to make exhaustive or continuous on-site

inspections to check the quality or quantity of the Work. E/A's efforts will be directed toward providing for OWNER a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and on-site observations, E/A will keep OWNER informed of the progress of the Work and will endeavor to guard OWNER against defective Work. E/A's visits and on-site observations are subject to all the limitations on E/A's authority and responsibility set forth in paragraph 9.1.

9.4 Resident Project Representative: If OWNER and E/A agree, E/A will furnish a Resident Project Representative to assist E/A in providing more continuous observation of the Work. The responsibilities and authority and limitations of any such Resident Project Representative and assistants will be as provided in paragraph 9.1 and in the Supplemental General Conditions. OWNER may designate another representative or agent to represent OWNER at the site who is not E/A, E/A's consultant, agent or employee.

9.5 Clarifications and Interpretations: E/A may determine that written clarifications or interpretations of the requirements of the Contract Documents (in the form of drawings or otherwise) are necessary. Such written clarifications or interpretations will be consistent with the intent of and reasonably inferable from the Contract Documents, will be issued with reasonable promptness by Owner's Representative and will be binding on OWNER and CONTRACTOR. If OWNER or CONTRACTOR believes that a written clarification or interpretation justifies an adjustment in the Contract Amount or the Contract Times, OWNER or CONTRACTOR may make a Claim therefor as provided in Article 11 or 12.

9.6 Rejecting Defective Work: E/A will recommend that OWNER disapprove or reject Work which E/A believes to be defective, or believes will not produce a completed Project that conforms to the Contract Documents or will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

9.7 Shop Drawings: Refer to Division 1 for E/A's authority concerning Shop Drawings.

ARTICLE 10 - CHANGES IN THE WORK

10.1 Changes:

10.1.1 Without invalidating the Contract and without notice to any surety, OWNER may, at any time or from time to time, order additions, deletions or revisions in the Work. Such changes in the Work will be authorized by Change Order, Change Directive or Field Order. In the event that the OWNER and the CONRACTOR are unable to negotiate the terms of a Change Order for the performance of additional Work, the OWNER may, at its election, perform such additional Work with its own forces or with another contractor and such work will be considered "Other Work" in accordance with Article 7.

10.1.2 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and CONTRACTOR shall proceed promptly, unless otherwise provided in the Change Order, Change Directive or Field Order. CONTRACTOR’s proposals for changes in the Contract Amount and/or Contract Time shall be submitted within ten (10) Calendar Days of request by Owner’s Representative, including impacts to the approved Progress Schedule, unless Owner’s Representative grants an extension. OWNER will review each proposal and respond to CONTRACTOR within ten (10) Calendar Days. After review by OWNER, CONTRACTOR shall provide any supporting data requested by Owner’s Representative within seven (7) Calendar Days, unless Owner’s Representative grants an extension. OWNER will determine within seven (7) Calendar Days whether to pursue the change in Work.

10.1.3 CONTRACTOR shall not be entitled to an increase in the Contract Amount or an extension of the Contract Times with respect to any Work performed that is not required by the Contract Documents as amended, modified and supplemented as provided in paragraphs 3.3.1 and 3.3.2, except in the case of an emergency as provided in paragraph 6.11.5 or in the case of uncovering Work as provided in paragraph 13.4.

10.1.4 Except in the case of an emergency as provided in paragraph 6.11.5, a Change Order or Change Directive is required before CONTRACTOR commences any activities associated with a change in the Work which, in CONTRACTOR 's opinion, will result in a change in the Contract Amount and/or Contract Times.

10.1.5 If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Amount or Contract Times) is required by the provisions of any Bond to be given to a surety, the giving of any such notice will be CONTRACTOR's responsibility, and the amount of each applicable Bond will be adjusted accordingly.

10.2 Change Orders:

10.2.1 OWNER and CONTRACTOR shall execute appropriate written Change Orders covering:

.1 a change in the Work;

.2 the amount of the adjustment in the Contract Amount, if any; and

.3 the extent of the adjustment in the Contract Time, if any.

10.2.2 An executed Change Order shall represent the complete, equitable, and final amount of adjustment in the Contract Amount and/or Contract Time owed to CONTRACTOR or OWNER as a result of the occurrence or event causing the change in the Work encompassed by the Change Order.

10.3 Change Directives:

10.3.1 Without invalidating the Contract, OWNER may, by written Change Directive, using the Force Account method, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Amount and Contract Time being adjusted as necessary. "Force Account" means a basis of payment for the direct performance of Work with payment based on the actual cost of the labor, equipment and materials furnished and consideration for overhead and profit as set forth in Section 11.5, below. A Change Directive shall be used in the absence of complete and prompt agreement on the terms of a Change Order. Where practicable, any items of Work that may be agreed upon, prior to the performance of Work under this Section, will be included in a separate Change Order. For example, the cost of the installation of additional asphalt may be agreed upon based on the unit prices in the Bid.

10.3.2 If the Change Directive provides for an adjustment to the Contract Amount, the adjustment shall be based on the method provided in paragraph 11.5.

10.3.3 A Change Directive shall be effective immediately and shall be recorded later by preparation and execution of an appropriate Change Order.

10.3.4 Upon receipt of a Change Directive, CONTRACTOR shall promptly proceed with the change in the Work involved, provided, prior to the commencement of any Work under this section, the CONTRACTOR must submit its proposed Work plan, anticipated schedule, and a list of its work force and equipment proposed to be

used in the Work for OWNER'S approval. Upon such approval, CONTRACTOR must promptly commence and make continuous progress in the Work. The OWNER reserves the right to withhold payment for low production or lack of progress.

10.4 Field Order:

10.4.1 Owner's Representative may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Amount or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These shall be accomplished by written Field Order and shall be binding on OWNER and on CONTRACTOR who shall perform the Work involved promptly.

10.4.2 If CONTRACTOR believes that a Field Order would require an adjustment in the Contract Amount and/or Contract Times, CONTRACTOR shall make a prompt written request to Owner's Representative for a Change Order. Any request by CONTRACTOR for an adjustment in Contract Amount and/or Contract Times must be made in writing prior to beginning the work covered by the Field Order.

10.5 No Damages for Delay: CONTRACTOR shall receive no compensation for delays or hindrances to the Work, except when direct and unavoidable extra cost to CONTRACTOR is caused by failure of OWNER to provide information or material, if any, which is to be furnished by OWNER or access to the Work and only to the extent that such acts continue after the CONTRACTOR furnishes OWNER with written notice of such failure. When such extra compensation is claimed a written statement thereof shall be presented by CONTRACTOR to OWNER and if by OWNER found correct shall be approved. If delay is caused by specific orders given by OWNER to stop work or by performance of extra Work or by failure of OWNER to provide material or necessary instructions for carrying on the Work, then such delay will entitle CONTRACTOR to an equivalent extension of time, CONTRACTOR's application for which shall, however, be subject to approval of OWNER. No such extension of time shall release CONTRACTOR or surety on its performance bond from all CONTRACTOR's obligations hereunder which shall remain in full force until discharge of the Contract. In no event shall the CONTRACTOR be entitled to any compensation or recovery of any special damages in connection with any delays, including without limitation: consequential damages, lost opportunity costs, impact damages, or other similar damages. The OWNER'S exercise of any of its rights or remedies under the Contract Documents (including without limitation ordering changes in the Work, or directing suspension, rescheduling, or correction of the Work), regardless of the extent or frequency of the OWNER'S exercise of such rights or remedies, shall not be construed as active interference in the CONTRACTOR'S performance of the Work. Except as otherwise provided herein, an extension of Contract Time, to the extent permitted under Article 12, shall be the sole remedy of the CONTRACTOR for any acknowledged delays.

ARTICLE 11 - CHANGE OF CONTRACT AMOUNT

11.1 The Contract Amount is stated in the Agreement and, including authorized adjustments, is the total amount payable by OWNER to CONTRACTOR for performance of the Work under the Contract Documents.

11.2 The original Contract Amount may not be increased by more than twenty-five percent (25%) and it may not be decreased more than twenty-five percent (25%) without the consent of the CONTRACTOR to such decrease, except in the event of a termination for convenience under paragraph 15.2 or the failure of the City Council to appropriate sufficient

funding for the Project, in which events it is agreed that the consent of the CONTRACTOR will not be required.

11.3 The Contract Amount shall only be changed by a Change Order. Any claim for an adjustment in the Contract Amount shall be made by Written Notice delivered by the party making the Claim to the other party promptly (but in no event later than thirty (30) calendar days) after the start of the occurrence or event giving rise to the Claim and stating the general nature of the Claim. Notice of the amount of the Claim with supporting data shall be delivered within thirty (30) calendar days after Written Notice of Claim is delivered by claimant, and shall represent that the adjustment claimed covers all known amounts to which claimant is entitled as a result of said occurrence or event. If OWNER and CONTRACTOR cannot otherwise agree, all Claims for adjustment in the Contract Amount shall be determined as set out in Article 16.

11.4 Determination of Value of Work:

11.4.1 The value of any Work covered by a Change Order for an adjustment in the Contract Amount will be determined by one or more of the following methods:

.1 by application of unit prices contained in the Contract Documents to the quantities of the items involved.

.2 by a mutually agreed unit price, or lump sum properly itemized and supported by sufficient substantiating data, including documentation by subcontractors performing the work, to permit evaluation.

.3 by cost of Work plus CONTRACTOR's fee for all overhead costs and profit (determined as provided in paragraph 11.5).

.4 No cost will be included in the change order for time spent preparing the change order, nor will costs be included for an estimate of time to negotiate the change order costs for machinery, tools, or equipment as described in subparagraph 11.5.3

11.4.2 Before using the method described in paragraph 11.4.1.3, OWNER and CONTRACTOR agree to negotiate a Change Order using the methods identified in paragraphs 11.4.1.1 and 11.4.1.2, as appropriate, to determine the adjustment in the Contract Amount.

11.5 Cost of Work: If neither of the methods defined in paragraphs 11.4.1.1 nor 11.4.1.2 can be agreed upon before a change in the Work is commenced which will result in an adjustment in the Contract Amount, then the change in the Work will be performed by Change Directive, using the Force Account method, and payment will be made as follows:

11.5.1 For all personnel, CONTRACTOR will receive actual field cost wage rates for each hour that said personnel are actually engaged in such Work, as substantiated by its certified payroll, to which will be added an amount equal to twenty-five percent (25%) of the sum thereof as compensation for CONTRACTOR's total overhead, profit, and small tools. No separate charge will be made by CONTRACTOR or its Subcontractor(s) for organization or overhead expenses. In no case will the rate of wage be less than the minimum shown in the Contract for a particular category. CONTRACTOR will also receive an amount equal to 55% of the wages paid personnel, excluding the 25% compensation provided above, for CONTRACTOR’s and any effected Subcontractor’s cost of premiums on public liability insurance, workers' compensation insurance, social security and unemployment insurance. The cost for superintendence, project management, and other salaried employees are considered as included in the twenty five percent (25%) total overhead, profit, and small tools mark-up unless considered necessary and ordered by Owner.

11.5.2 CONTRACTOR will receive the actual cost, including freight charges, of the materials used and installed on such Work, to which costs will be added a sum equal to twenty-five percent (25%) thereof as compensation for CONTRACTOR's and any affected Subcontractor's total overhead and profit. In case material invoices indicate a discount may be taken, the actual cost will be the invoice price minus the discount.

11.5.3 For machinery, trucks, power tools, or other similar equipment (the "equipment") agreed to be necessary by OWNER and CONTRACTOR, OWNER will allow CONTRACTOR the Regional and Model Year adjusted Monthly Ownership Cost divided by 176 plus the Hourly Estimated Operating Costs as given in the latest edition of the "Rental Rate Blue Book" as published by EquipmentWatch (1-800-669-3282) for each hour that said equipment is in use on such work. The established equipment rates will be paid for each hour that the equipment is utilized in the Work. In the event that the equipment is used intermittently during the Work, full payment for an eight-hour day will be made if the equipment is not idle more than four (4) hours of the day. If the equipment is idle more than four (4) hours in a day, then payment will be made only for the actual hours worked. No additional compensation will be allowed on the equipment for CONTRACTOR's or any affected Subcontractor's overhead and profit. OWNER may accept an actual rental invoice in lieu of the method of calculation set forth in paragraph 11.5.3 for equipment rented exclusively for Force Account Work or for equipment not included in the Rental Rate Blue Book.

11.5.4 For Subcontractors, CONTRACTOR will receive the approved actual invoice cost plus 5% as compensation for CONTRACTOR's total overhead and profit.

11.5.5 CONTRACTOR will receive an additional 1% of the total of 11.5.1, 11.5.2, 11.5.3, and 11.5.4 as compensation for increased bond costs.

11.5.6 The compensation, as herein provided for, shall be received by CONTRACTOR and any affected Subcontractor as payment in full for work done by Change Directive and will include use of small tools, and total overhead expense and profit. CONTRACTOR and Owner's Representative shall compare records of work done by Change Directive at the end of each day. Copies of these records will be made upon forms provided for this purpose by OWNER and signed by both Owner's Representative and CONTRACTOR, with one copy being retained by OWNER and one by CONTRACTOR. Refusal by CONTRACTOR to sign these records within two (2) working days of presentation does not invalidate the accuracy of the record.

11.6 Unit Price Work:

11.6.1 Where the Contract Documents provide that all or part of the Work is to be unit price Work, initially the Contract Amount will be deemed to include for all unit price work an amount equal to the sum of the established unit price for each separately identified item of unit price work times the estimated quantity of each item as indicated in the Bid. The estimated quantities of items of unit price work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Amount. Determinations of the actual quantities and classifications of unit price work performed by CONTRACTOR will be made by Owner's Representative. Owner's Representative will review with CONTRACTOR the preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise).

11.6.2 When "plan quantity" is indicated for a Bid item, CONTRACTOR shall be paid amount specified in the Contract Documents without any measurements.

11.6.3 Each unit price will be deemed to include an amount considered by CONTRACTOR to be adequate to cover CONTRACTOR's overhead and profit for each separately identified item.

11.6.4 A Major Item is any individual Bid item in the Contract that has a total cost equal to or greater than five percent (5%) of the original Contract Amount or $50,000, whichever is greater, computed on the basis of Bid quantities and Contract unit prices or Change Orders.

11.6.5 OWNER or CONTRACTOR may make a Claim for an adjustment in the Contract Amount in accordance with Article 11 if:

.1 the actual quantity of any Major Item should become as much as twenty percent (20%) more than or twenty percent (20%) less than that in the Bid; or

.2 CONTRACTOR presents documentation contesting accuracy of "plan quantity" and Owner's Representative verifies quantity and determines original value is in error by five percent (5%) or more;

Provided, however, in the event a Major Item is reduced by twenty percent (20%) or more of the amount in the Bid, no additional Article 11 profit or overhead will be added, if, due to other additions in the Work, the net value of the Contract Amount is not reduced.

ARTICLE 12 - CHANGE OF CONTRACT TIMES

12.1 Working Day and Calendar Day Contracts:

12.1.1 The Contract Times (or Milestones) may only be changed by Change Order or Time Extension Request duly executed by both CONTRACTOR and Owner's Representative. Any claim for an adjustment of the Contract Times (or Milestones) shall be made by Written Notice delivered by the party making the Claim to the other party promptly (but in no event later than thirty (30) calendar days after the start of the occurrence or event giving rise to the delay) and stating the general nature of the delay. Notice of the extent of the delay with supporting data shall be delivered within thirty (30) calendar days after Written Notice of Claim is delivered by claimant, and shall represent that the adjustment claimed is the entire adjustment to which claimant is entitled as a result of said occurrence or event. If OWNER and CONTRACTOR cannot otherwise agree, all Claims for adjustment in the Contract Times (or Milestones) shall be determined as set out in Article 16. No Claim for an adjustment in the Contract Times (or Milestones) will be valid if not submitted in accordance with the requirements of this paragraph.

12.1.2 When CONTRACTOR is at fault and OWNER stops the Work, so that corrections in the Work can be made by CONTRACTOR, no extension in time will be allowed.

12.1.3 When CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of both OWNER and CONTRACTOR, an extension of the Contract Times (or Milestones) in an amount equal to the time lost due to such delay shall be CONTRACTOR's sole and exclusive remedy for such delay. If performance by the CONTRACTOR or OWNER is interrupted by any occurrence not occasioned by its own conduct, whether such occurrence be an act of god or the result of war, riot, civil commotion, sovereign conduct, or the conduct of a third party, then such performance will be excused for a period of time necessary to remedy its effects, provided, however, in such an

event, a conference will be held within three (3) business days to establish a proposed new Progress Schedule for the Project.

12.1.4 OWNER will consider time extension requests and may grant CONTRACTOR an extension of time because of:

.1 Changes ordered in the work which justify additional time.

.2 Failure of materials or products being at the Project site due to delays in transportation or failures of Suppliers, which are not the result of CONTRACTOR's, Subcontractor's or Supplier's negligence. The request for an extension of time shall be supported by a citation of acts demonstrating that the delays are beyond CONTRACTOR's control, including, but not limited to, CONTRACTOR's efforts to overcome such delays documented as follows:

a) Copy of purchase order for delayed item(s) indicating date ordered by CONTRACTOR/ Subcontractor and date purchase order received by Supplier.

b) If item(s) require Shop Drawings or other submittal information in accordance with the Contract Documents, provide record of date submittal(s) forwarded to Owner's Representative, date submittal(s) returned to CONTRACTOR, and date submittal(s) forwarded to Supplier.

c) Copy of document(s) from Supplier, on Supplier's letterhead, indicating date(s) item(s) would be ready for shipment and/or actual shipment date(s).

d) Copies of all correspondence between CONTRACTOR / Subcontractor and Supplier indicating CONTRACTOR / Subcontractor's efforts to expedite item(s).

e) If item(s) are being purchased by a Subcontractor, provide correspondence, meeting notes, etc., that reflect CONTRACTOR's efforts with the Subcontractor to expedite delivery of the item(s).

.3 When acts of OWNER, E/A, utility owners or other contractors employed by OWNER delay progress of work through no fault of CONTRACTOR. The CONTRACTOR will only be entitled to an extension of time for delays that affect the Critical Path of the Work and that are not caused by the CONTRACTOR.

.4 When CONTRACTOR is delayed by strikes, lockouts, fires, losses from natural causes, or other unavoidable cause or causes beyond CONTRACTOR's control.

12.2 Calendar Day Contracts:

12.2.1 Under a Calendar Day Contract, CONTRACTOR may be granted an extension of time because of unusual inclement weather, including but not limited to unusual rainfall events, which are beyond the normal rainfall recorded and expected for Austin, Texas. However, the CONTRACTOR will not be granted an extension of time for "normal rainfall", as described below.

12.2.2 "Unusual Inclement Weather" is defined as a rain event or other weather related event which occurs at the site and is of sufficient magnitude to prevent CONTRACTOR from performing units of Work critical to maintaining the Progress Schedule.

12.2.3 Baseline Rain Day Determination. "Normal rainfall" compiled by the State climatologist, based on U.S. Weather Bureau Records for Austin, Texas, is considered a part of the Calendar Day Contract, and is not a justification for an extension of time. Listed below are the number of days in each month for which no compensatory days for rainfall events ("Rain Days") in such months may be claimed:

January..... 8 days

February..... 8 days

March..... 7 days

April..... 7 days

May..... 9 days

June..... 6 days

July..... 5 days

August..... 5 days

September..... 7 days

October..... 7 days

November..... 7 days

December..... 7 days

Rain Days in addition to the baseline Rain Day determination described above will be measured with the Owner's Representative's approval at the nearest operational public weather data collection facility to the site, including but not limited to the OWNER's early warning flood gauge system.

12.2.4 CONTRACTOR may receive credit in any month for Unusual Inclement Weather, and specifically for any Rain Days in that month which exceed the number of Rain Days allocated to that month, if a Claim is made in accordance with paragraph 12.1.1 and the weather event meets the definition for "Unusual Inclement Weather", and as applicable, "Rain Day" and such claimed day is a day on which Work critical to maintaining the Progress Schedule is scheduled to be performed and is otherwise capable of being performed.

ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.1 **Notice of Defects:** Prompt notice of all defective Work of which OWNER or E/A has actual knowledge will be given to CONTRACTOR. All defective Work may be rejected, corrected or accepted as provided in Article 13. CONTRACTOR must give OWNER and E/A prompt notice of any defective Work of which CONTRACTOR has actual knowledge.

13.2 **Access to Work:** OWNER, E/A, E/A's Consultants, other representatives and personnel of OWNER, independent testing laboratories and governmental agencies having jurisdiction will have access to the Work at reasonable times for observing, inspecting and testing. CONTRACTOR shall provide them proper and safe conditions for such access, and advise them of CONTRACTOR's site safety procedures and programs so that they may comply therewith as applicable.

13.3 Tests and Inspections:

13.3.1 CONTRACTOR shall give timely notice of readiness of the Work for all required inspections, tests or approvals, and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

13.3.2 OWNER shall employ and pay for services of an independent testing laboratory to perform all inspections, tests or approvals required by the Contract Documents except:

.1 for inspections, tests or approvals covered by paragraphs 13.3.3 and 13.3.4 below;

.2 that costs incurred for tests or inspections conducted pursuant to paragraph 13.4.3 shall be paid as provided in paragraph 13.4.3;

.3 for reinspecting or retesting defective Work, including any associated costs incurred by the testing laboratory for cancelled tests or standby time; and

.4 as otherwise specifically provided in the Contract Documents.

13.3.3 If laws or regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested or approved by an employee or other representative of such public body, CONTRACTOR shall assume full responsibility for arranging and obtaining such inspections, tests or approvals, pay all costs in connection therewith and furnish Owner's Representative the required certificates of inspection or approval.

13.3.4 CONTRACTOR shall also be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests or approvals required for OWNER's and E/A's review of submittals covering materials, equipment, and mix designs to be incorporated in the Work.

13.3.5 All testing laboratories shall meet the requirements of ASTM E-329.

13.4 Uncovering Work:

13.4.1 If any Work (or the work of others) that is to be inspected, tested or approved is covered by CONTRACTOR without written concurrence of Owner's Representative, or if any Work is covered contrary to the written request of Owner's Representative, it must, if requested by Owner's Representative, be uncovered and recovered at CONTRACTOR's expense.

13.4.2 Uncovering Work as provided in paragraph 13.4.1 shall be at CONTRACTOR's expense unless CONTRACTOR has given Owner's Representative timely notice of CONTRACTOR's intention to cover the same and Owner's Representative has not acted within five (5) working days to such notice.

13.4.3 If Owner's Representative considers it necessary or advisable that covered Work be observed, inspected or tested, CONTRACTOR shall uncover, expose or otherwise make available for observation, inspection or testing that portion of the Work in question, furnishing all necessary labor, material and equipment. If it is found that such Work is defective, CONTRACTOR shall pay all claims, costs, losses and damages caused by, arising out of or resulting from such uncovering, exposure, observation, inspection and testing and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and OWNER shall be entitled to an appropriate decrease in the Contract Amount, and may make a Claim therefor as provided in Article 11. If,

however, such Work is not found to be defective, CONTRACTOR shall be allowed an increase in the Contract Amount or an extension of the Contract Times (or Milestones), or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement and reconstruction; and CONTRACTOR may make a Claim therefor as provided in Articles 11 and 12.

13.5 OWNER May Stop the Work:

13.5.1 If the Work is defective, or CONTRACTOR fails to supply sufficient skilled workers, suitable materials, and/or equipment; or fails to furnish or perform the Work in such a way that the Work in progress or the completed Work will conform to the Contract Documents, OWNER may order CONTRACTOR to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of OWNER to stop the Work shall not give rise to any duty on the part of OWNER to exercise this right for the benefit of CONTRACTOR or any surety or other party.

13.5.2 If CONTRACTOR fails to correct defective Work or submit a satisfactory plan to take corrective action, with procedure and time schedule, OWNER may order CONTRACTOR to stop the Work, or any portion thereof, until cause for such order has been eliminated, or take any other action permitted by this Contract. A notice to stop the Work, based on defects, shall not stop calendar or working days charged to the Project.

13.6 Correction or Removal of Defective Work: If required by OWNER, CONTRACTOR shall promptly, as directed, either correct all defective Work, whether or not fabricated, installed or completed, or, if the Work has been rejected by Owner's Representative, remove it from the site and replace it with Work that is not defective. CONTRACTOR shall correct or remove and replace defective Work, or submit a plan of action detailing how the deficiency will be corrected, within the time frame identified in the notice of defective Work. CONTRACTOR shall pay all claims, costs, losses and damages caused by or resulting from such correction or removal (including but not limited to all costs of repair or replacement of work of others).

13.7 Warranty period:

13.7.1 If within one year after the date of Substantial Completion or such longer period of time as may be prescribed by laws or regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents (e.g. paragraph 14.11.2), any Work, including work performed after the Substantial Completion date, is found to be defective, CONTRACTOR shall promptly, without cost to OWNER and in accordance with OWNER's written instructions:

(i) correct such defective Work, or, if it has been rejected by OWNER, remove it from the site and replace it with Work that is not defective, and

(ii) satisfactorily correct or remove and replace any damage to other Work or the work of others resulting therefrom.

If CONTRACTOR does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, OWNER may have the defective Work corrected or the rejected Work removed and replaced, and all claims, costs, losses and damages caused by or resulting from such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by CONTRACTOR. The warranty period will be deemed to be renewed and recommenced in connection with the completed items of Work requiring correction.

13.7.2 In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the warranty period for that item may start to run from an earlier date if so provided in the Contract Documents.

13.7.3 If correction of defective Work will affect the function or use of the facility CONTRACTOR shall not proceed with correction of defective Work without prior coordination and approval of OWNER.

13.7.4 The obligations of the CONTRACTOR to perform warranty work will survive the acceptance of the Work and any termination of the Contract.

13.8 Acceptance of Defective Work: If, instead of requiring correction or removal and replacement of defective Work, OWNER decides to accept it, OWNER may do so. CONTRACTOR shall pay all claims, costs, losses and damages attributable to OWNER's evaluation of and determination to accept such defective Work. If any such acceptance occurs prior to recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents and compensating OWNER for the diminished value of the defective Work. If the acceptance occurs after such recommendation, an appropriate amount will be paid by CONTRACTOR to OWNER after a calculation by OWNER of the diminution in value of the defective Work.

13.9 OWNER May Correct Defective Work: If CONTRACTOR fails within a reasonable time after Written Notice of OWNER to correct defective Work, or to remove and replace rejected Work, or if CONTRACTOR fails to perform the Work in accordance with the Contract Documents, or if CONTRACTOR fails to comply with any other provision of the Contract Documents, OWNER may, after seven (7) calendar days' Written Notice to CONTRACTOR, correct and remedy any such deficiency. If, in the opinion of the Owner's Representative, significant progress has not been made during this seven (7) calendar day period to correct the deficiency, the OWNER may exercise any actions necessary to remedy the deficiency. In exercising the rights and remedies under this paragraph, OWNER shall proceed expeditiously. In connection with such corrective and remedial action, OWNER may exclude CONTRACTOR from all or part of the site, take possession of all or part of the Work, and suspend CONTRACTOR's services related thereto, and incorporate in the Work all materials and equipment stored at the site or for which OWNER has paid CONTRACTOR but which are stored elsewhere. CONTRACTOR shall allow OWNER, its agents and employees, OWNER's other contractors, E/A and E/A's consultants access to the site to enable OWNER to exercise the rights and remedies under this paragraph. All claims, costs, losses and damages incurred or sustained by OWNER in exercising such rights and remedies will be charged against CONTRACTOR and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work. Such claims, costs, losses and damages will include but not be limited to all costs of repair or replacement of work of others destroyed or damaged by correction, removal or replacement of CONTRACTOR's defective Work. CONTRACTOR shall not be allowed an extension of the Contract Times (or Milestones), or claims of damage because of any delay in the performance of the Work attributable to the exercise by OWNER of OWNER's rights and remedies hereunder.

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

14.1 Application for Progress Payment:

14.1.1 Within 45 days from when the work was performed by the Contractor and Subcontractors, but not more often than once a month, CONTRACTOR shall submit to Owner's Representative for review an Application for Payment, in a form

acceptable to OWNER, filled out and signed by CONTRACTOR covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents.

14.1.2 Such applications shall not include requests for payment on account of changes in the Work which have been properly authorized by Change Directives but not yet included in Change Orders.

14.1.3 Such applications shall not include requests for payment of amounts the CONTRACTOR does not intend to pay to a Subcontractor or Supplier because of a dispute or other reason.

14.1.4 If payment is requested on the basis of materials or equipment not incorporated in the Work but delivered and suitably stored at the site or at another location agreed to in writing, the Application for Payment shall be accompanied by such bills of sale, data and other procedures satisfactory to OWNER substantiating OWNER's title to such materials or equipment or otherwise protecting OWNER's interest. Payment on account of such materials or equipment will not include any amount for CONTRACTOR's overhead or profit or relieve CONTRACTOR of its obligation to protect and install such materials or equipment in accordance with the requirements of the Contract and to restore damaged or defective Work. If materials or equipment are stored at another location, at the direction of the OWNER they shall be stored in a bonded and insured facility, accessible to E/A and OWNER, and shall be clearly marked as property of OWNER. Title to materials delivered to the site of the Work or a staging area will pass to OWNER upon payment by OWNER without the necessity for further documentation. Risk of loss will not pass to OWNER until acceptance.

14.1.5 Where the original Contract Amount is less than $400,000, OWNER will pay CONTRACTOR total amount of approved Application for Payment, less ten percent (10%) of amount thereof, which ten percent (10%) will be retained until final payment, less all previous payments and less all other sums that may be retained by OWNER under the terms of this Agreement. Where the original Contract Amount is $400,000 or more, OWNER will pay CONTRACTOR total amount of approved Application for Payment, less five percent (5%) of amount thereof, which five percent (5%) will be retained until final payment, less all previous payments and less all other sums that may be retained by OWNER under the terms of this Agreement. In either case, if the Work is near completion and delay occurs due to no fault or neglect of CONTRACTOR, OWNER may pay a portion of the retained amount to CONTRACTOR. CONTRACTOR, at OWNER's option, may be relieved of the obligation to complete the Work and, thereupon, CONTRACTOR shall receive payment of the balance due under the Contract subject to the conditions stated under paragraph 15.2. A Subcontractor may submit a written request to the CONTRACTOR and Project Manager requesting release of retainage for work by the Subcontractor that has been completed and approved. The Project Manager will evaluate the request and if it is approved, the Project Manager will request the CONTRACTOR to include the request for release of an appropriate amount of retainage in the next Pay Application.

14.1.6 Applications for Payment shall include the following documentation:

.1 updated Progress Schedule;

.2 monthly subcontractor report;

.3 any other documentation required under the Supplemental General Conditions.

14.2 CONTRACTOR's Warranty of Title: CONTRACTOR warrants and guarantees that title to all Work, materials and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to OWNER free and clear of all Liens no later than the time of payment to CONTRACTOR.

14.3 Review of Applications for Progress Payment:

14.3.1 Owner's Representative will, within seven (7) calendar days after receipt of each Application for Payment, either indicate a recommendation for payment and forward the Application for processing by OWNER, or return the Application to CONTRACTOR indicating Owner's Representative's reasons for refusing to recommend payment. In the latter case, CONTRACTOR shall make the necessary corrections and resubmit the Application.

14.3.2 Owner's Representative's recommendation of any payment requested in an Application for Payment will constitute a representation by Owner's Representative, based upon Owner's Representative's on-site observations of the executed Work and on Owner's Representative's review of the Application for Payment and the accompanying data and schedules, that to the best of Owner's Representative's knowledge, information and belief:

.1 the Work has progressed to the point indicated; and

.2 the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for unit price Work, and to any other qualifications stated in the recommendation).

14.3.3 By recommending any such payment, Owner's Representative will not thereby be deemed to have represented that:

.1 exhaustive or continuous on-site inspections have been made to check the quality or the quantity of the Work;

.2 examination has been made to ascertain how or for what purpose CONTRACTOR has used money previously paid on account of the Contract Amount;

.3 CONTRACTOR's construction means, methods, techniques, sequences or procedures have been reviewed; or

.4 that there may not be other matters or issues between the parties that might entitle CONTRACTOR to be paid additionally by OWNER or entitle OWNER to withhold payment to CONTRACTOR.

14.4 Decisions to Withhold Payment:

14.4.1 OWNER may withhold or nullify the whole or part of any payment to such extent as may be necessary on account of:

.1 defective Work not remedied;

.2 third party Claims filed or reasonable evidence indicating probable filing of such Claims;

.3 failure of CONTRACTOR to make payments properly to Subcontractors for labor, materials or equipment;

.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Amount;

.5 damage to OWNER or another contractor;

.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;

.7 failure of CONTRACTOR to submit a schedule of values in accordance with the Contract Documents;

.8 failure of CONTRACTOR to submit a submittal schedule in accordance with the Contract Documents;

.9 failure of CONTRACTOR to submit and update a construction Progress Schedule in accordance with the Contract Documents;

.10 failure of CONTRACTOR to maintain a record of changes on drawings and documents;

.11 failure of CONTRACTOR to maintain weekly payroll reports and, as applicable, provide copies of reports in a timely manner upon request of OWNER;

.12 failure of CONTRACTOR to submit monthly subcontractor reports;

.13 CONTRACTOR's neglect or unsatisfactory prosecution of the Work, including failure to clean up;

.14 failure of CONTRACTOR to comply with the Austin City Code, Chapter 2-9-A, as amended, "Minority-Owned and Women-Owned Business Enterprise Procurement Program;" or

.15 failure of CONTRACTOR to comply with any provision of the Contract Documents.

14.4.2 When the above reasons for withholding payment are removed, CONTRACTOR shall resubmit a statement for the value of Work performed. Payment will be made within thirty (30) calendar days of receipt of approved Application for Payment.

14.4.3 Subcontractors may request Partial Payment when the OWNER withholds payment of an invoice to the CONTRACTOR for any reason listed in Section 14.4.1. If payment is withheld by the OWNER, the CONTRACTOR shall notify all affected Subcontractors within two (2) working days of notice that payment is being withheld. Upon notification, Subcontractors may submit a formal written request for Partial Payment to the CONTRACTOR and OWNER. If directed by the OWNER, the CONTRACTOR shall within three (3) working days resubmit to the OWNER an invoice for the same period that includes only the work performed by the requesting Subcontractors during this period. The OWNER will review this resubmitted invoice in accordance with Section 14.3.1. Upon receipt of payment for the resubmitted invoice, CONTRACTOR shall pay the subcontractor within ten (10) Calendar Days in accordance with Section 6.4.7.

14.5 Delayed Payments: Should OWNER fail to make payment to CONTRACTOR of sum named in any Application for Payment within thirty (30) calendar days after the day on which OWNER received the mutually acceptable Application for Payment, then OWNER will pay to CONTRACTOR, in addition to sum shown as due by such Application for Payment, interest thereon at the rate specified in Government Code, Section 2251.025(b) from date due until fully paid, which shall fully liquidate any injury to CONTRACTOR growing out of such delay in payment.

14.6 Arrears: No money shall be paid by OWNER upon any claim, debt, demand or account whatsoever, to any person, firm or corporation who is in arrears to City for taxes; and City shall be entitled to counterclaim and automatically offset against any such debt, claim, demand or account in the amount of taxes so in arrears and no assignment or transfer of such debt, claim, demand or account after said taxes are due, shall affect the right of OWNER to so offset said taxes, and associated penalties and interest if applicable, against the same.

14.7 Substantial Completion:

14.7.1 When the CONTRACTOR considers that the Work, or a portion thereof which the OWNER agrees to accept separately, is substantially complete, the CONTRACTOR shall notify Owner's Representative and request a determination as to whether the Work or designated portion thereof is substantially complete. If Owner's Representative does not consider the Work substantially complete, Owner's Representative will notify CONTRACTOR giving reasons therefor. After performing any required Work, CONTRACTOR shall then submit another request for Owner's Representative to determine Substantial Completion. If Owner's Representative considers the Work substantially complete, Owner's Representative will prepare and deliver a certificate of Substantial Completion which shall establish the date of Substantial Completion, shall include a punch list of items to be completed or corrected before final payment, shall establish the time within which CONTRACTOR shall finish the punch list, and shall establish responsibilities of the OWNER and CONTRACTOR for security, maintenance, heat, utilities, damage to the Work, warranty and insurance. Failure to include an item on the punch list does not alter the responsibility of CONTRACTOR to complete all Work in accordance with the Contract Documents. If a Certificate of Occupancy is required by public authorities having jurisdiction over the Work, said certificate shall be issued before the Work or any portion thereof is considered substantially complete. The certificate of Substantial Completion shall be signed by OWNER and CONTRACTOR to evidence acceptance of the responsibilities assigned to them in such certificate.

14.7.2 OWNER shall have the right to exclude CONTRACTOR from the Work after the date of Substantial Completion, but OWNER will allow CONTRACTOR reasonable access to complete or correct items on the punch list and complete warranty work.

14.8 Partial Utilization: Use by OWNER, at OWNER's option, of any substantially completed part of the Work which: (i) has specifically been identified in the Contract Documents, or (ii) OWNER and CONTRACTOR agree constitutes a separately functioning and usable part of the Work that can be used by OWNER for its intended purpose without significant interference with CONTRACTOR's performance of the remainder of the Work, may be accomplished prior to Substantial Completion of all the Work in accordance with the following:

14.8.1 OWNER at any time may request CONTRACTOR to permit OWNER to use any such part of the Work which OWNER believes to be ready for its intended use and substantially complete. If CONTRACTOR agrees that such part of the Work is substantially complete, CONTRACTOR shall certify to Owner's Representative that such part of the Work is substantially complete and request Owner's Representative to issue a certificate of substantial Completion for that part of the Work. CONTRACTOR at any time may notify Owner's Representative that CONTRACTOR considers any such part of the Work ready for its intended use and substantially complete and request Owner's Representative to issue a certificate of Substantial Completion for that part of the Work. The provisions of paragraphs 14.7.1 and 14.7.2 will apply with respect to certification of Substantial Completion

of that part of the Work and the division of responsibility in respect thereof and access thereto.

14.8.2 Such partial utilization is authorized by public authorities having jurisdiction over the Work.

14.9 Final Inspection: Upon Written Notice from CONTRACTOR that the entire Work or an agreed portion thereof is complete, Owner's Representative will make a final inspection with CONTRACTOR and provide Written Notice of all particulars in which this inspection reveals that the Work is incomplete or defective. CONTRACTOR shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.10 Final Application for Payment: CONTRACTOR may make application for final payment following the procedure for progress payments after CONTRACTOR has completed all such corrections to the satisfaction of Owner's Representative and delivered the following documents:

14.10.1 Affidavit by CONTRACTOR certifying the payment of all debts and claims;

14.10.2 Three (3) complete operating and maintenance manuals, each containing maintenance and operating instructions, schedules, guarantees, and other documentation required by the Contract Documents;

14.10.3 Record documents (as provided in paragraph 6.10);

14.10.4 Consent of surety, if any, to final payment. If surety is not provided, complete and legally effective releases or waivers (satisfactory to OWNER) of all claims arising out of or filed in connection with the Work;

14.10.5 Certificate evidencing that insurance required by the Supplemental General Conditions will remain in force after final payment and through the warranty period;

14.10.6 Non-Use of Asbestos Affidavit (After Construction);

14.10.7 Subcontractor report and all other documentation necessary for evaluation of CONTRACTOR’s fulfillment of the Contract MBE/WBE or DBE goals;

14.10.8 Documentation of notice to claimants, to the extent applicable and subject to subparagraph 14.11.4;

14.10.9 Proof of performance Bond extension through warranty period, if a performance Bond was required; and

14.10.10 Any other documentation called for in the Contract Documents.

14.11 Final Payment and Acceptance:

14.11.1 If, on the basis of observation of the Work during construction, final inspection, and review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Owner's Representative is satisfied that the Work has been completed and CONTRACTOR's other obligations under the Contract Documents have been fulfilled and there are no outstanding claims, Owner's Representative will recommend the final Application for Payment and thereby notify the OWNER, who will pay to CONTRACTOR the balance due CONTRACTOR under the terms of the Contract. If the sole remaining unfinished item to complete the Work is the reestablishment of vegetation, CONTRACTOR may execute a revegetation letter with fiscal posted (letter of credit) to ensure completion of this item. This Work must be accomplished within one hundred twenty (120) Calendar Days of the date of Final Completion of the Work. When

the permanent erosion control has been established, OWNER will initiate an inspection for final acceptance of the erosion controls. If the revegetation is not completed within the one hundred twenty (120) Calendar Days, OWNER, at its option, may complete the Work using the posted fiscal.

14.11.2 If the Contract measures Contract Time to Final Completion, rather than Substantial Completion, Owner's Representative will issue a letter of final acceptance to CONTRACTOR which establishes the Final Completion date and initiates the one-year warranty period. If the sole remaining unfinished item to complete the Work is the reestablishment of vegetation and CONTRACTOR has executed a revegetation letter with fiscal posted (letter of credit) to ensure completion of this item, the Owner's Representative will issue a letter of conditional acceptance to CONTRACTOR which established the Final Completion date and initiates the one-year warranty period.

14.11.3 Final payment is considered to have taken place when CONTRACTOR or any of its representatives negotiates OWNER's final payment check, whether labeled final or not, for cash or deposits check in any financial institution for its monetary return.

14.11.4 The OWNER will withhold funds sufficient to cover the amount of any unresolved contract claims from final payment for six months under the following limited conditions:

.1 CONTRACTOR must provide written notice to the claimant (via certified mail or hand delivery) that (i) OWNER will hold funds in the amount of the disputed claim for six (6) months from the date of the receipt of the notice and (ii) CONTRACTOR and the claimant have certain alternative dispute resolution rights; and

.2 CONTRACTOR must provide OWNER with a copy of the receipted notice.

Provided the claimant has received notice under this section, OWNER will release the withheld funds, if the CONTRACTOR provides a bond in substantial compliance with the provisions of Section 52.231 of the Texas Property Code; when the OWNER receives a settlement or release of the claim with accompanying instructions regarding payment; upon resolution of the claim in litigation, if suit is filed within such six (6) month period and the OWNER receives written notice of such filing; or when such six (6) month period has passed, if no such bond, settlement, release, or notice of filing of suit have been received. The above provisions notwithstanding, if efforts to timely resolve a disputed claim are not being made to OWNER'S reasonable satisfaction, OWNER may, in its complete discretion, file an interpleader action and deposit the withheld funds in the registry of a court of competent jurisdiction. In addition, CONTRACTOR must include a provision in each of its subcontracts that the prevailing party in any litigation arising thereunder will be entitled to recover its costs of court and reasonable attorney's fees.

14.12 Waiver of Claims: The making and acceptance of final payment will constitute:

14.12.1 a waiver of claims by OWNER against CONTRACTOR, except claims arising from unsettled claims, from defective Work appearing after final inspection, from failure to comply with the Contract Documents or the terms of any warranty specified therein, or from CONTRACTOR's continuing obligations under the Contract Documents; and

14.12.2 a waiver of all claims by CONTRACTOR against OWNER other than those previously made in writing and still unsettled.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

15.1 OWNER May Suspend Work Without Cause: At any time and without cause, OWNER may suspend the Work or any portion thereof for a period of not more than ninety (90) calendar days by Written Notice to CONTRACTOR which will fix the date on which the Work will be resumed. CONTRACTOR shall resume the Work on the date so fixed. CONTRACTOR shall be allowed an adjustment in the Contract Amount or an extension of the Contract Times, or both, directly attributable to any such suspension if CONTRACTOR makes an approved Claim therefor as provided in Articles 11 and 12.

15.2 OWNER May Terminate Without Cause: Upon seven (7) calendar days' Written Notice to CONTRACTOR, OWNER may, without cause and without prejudice to any right or remedy of OWNER, elect to terminate the Agreement. In such case, CONTRACTOR shall be paid (without duplication of any items):

15.2.1 for completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination;

15.2.2 for reasonable demobilization costs; and

15.2.3 for anticipated profits on completed and accepted Work not previously paid and not included in separate pay items calculated to date of termination but not for anticipated profit on the entire Contract not previously paid, unabsorbed overhead, or lost opportunity.

15.3 OWNER May Terminate With Cause:

15.3.1 Upon the occurrence of any one or more of the following events:

.1 if CONTRACTOR persistently fails to perform the Work in accordance with the Contract Documents;

.2 if CONTRACTOR disregards laws or regulations of any public body having jurisdiction;

.3 if CONTRACTOR disregards the authority of Owner's Representative;

.4 if CONTRACTOR makes fraudulent statements;

.5 if CONTRACTOR fails to maintain a work force adequate to accomplish the Work within the Contract Time;

.6 if CONTRACTOR fails to make adequate progress and endangers successful completion of the Contract; or

.7 if CONTRACTOR otherwise violates in any substantial way any provisions of the Contract Documents;

OWNER may, after giving CONTRACTOR (and the surety, if any) seven (7) calendar days Written Notice terminate the services of CONTRACTOR. OWNER, at its option, may proceed with negotiation with surety for completion of the Work. Alternatively, OWNER may under these circumstances exclude CONTRACTOR from the site and take possession of the Work (without liability to CONTRACTOR for trespass or conversion), incorporate in the Work all materials and equipment stored at the site or for which OWNER has paid CONTRACTOR but which are stored elsewhere, and finish the Work as OWNER may deem expedient. In such case CONTRACTOR shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Amount exceeds all claims, costs,

losses and damages sustained by OWNER arising out of or resulting from completing the Work, such excess will be paid to CONTRACTOR. If such claims, costs, losses and damage exceed such unpaid balance, CONTRACTOR or surety shall pay the difference to OWNER. In the event that a termination for cause is found to be wrongful, the termination shall be converted to a termination without cause as set forth in Section 15.2 and CONTRACTOR'S remedy for wrongful termination is limited to the recovery of the payments permitted for termination without cause as set forth in Section 15.2.

15.3.2 Where CONTRACTOR's services have been so terminated by OWNER, the termination will not affect any rights or remedies of OWNER against CONTRACTOR and surety then existing or which may thereafter accrue. Any retention or payment of moneys due CONTRACTOR by OWNER will not release CONTRACTOR from liability. In the event OWNER terminates Contract with cause, OWNER may reject any and all Bids submitted by CONTRACTOR for up to three (3) years after the date of such termination. These sanctions will be administered in accordance with the City of Austin Purchasing Office Probation, Suspension, and Debarment Procedures for Vendors, which include notice and an opportunity for a hearing.

15.4 CONTRACTOR May Stop Work or Terminate: If through no act or fault of CONTRACTOR, the Work is suspended for a period of more than ninety (90) calendar days by OWNER or under an order of court or other public authority, or (except during disputes) Owner's Representative fails to forward for processing any mutually acceptable Application for Payment within thirty (30) calendar days after it is submitted, or (except during disputes) OWNER fails for sixty (60) calendar days after it is submitted to pay CONTRACTOR any sum finally determined by OWNER to be due, then CONTRACTOR may, upon seven (7) calendar days' Written Notice to OWNER, and provided OWNER does not remedy such suspension or failure within that time, terminate the Agreement and recover from OWNER payment on the same terms as provided in paragraph 15.2. In lieu of terminating the Agreement and without prejudice to any other right or remedy, if (except during disputes) Owner's Representative has failed to forward for processing any mutually acceptable Application for Payment within thirty (30) calendar days after it is submitted, or (except during disputes) OWNER has failed for sixty (60) calendar days after it is submitted to pay CONTRACTOR any sum finally determined by OWNER to be due, CONTRACTOR may upon seven (7) calendar days' Written Notice to OWNER stop the Work until payment of all such amounts due CONTRACTOR, including interest thereon. The provisions of this paragraph 15.4 are not intended to preclude CONTRACTOR from making a Claim under Articles 11 and 12 for an increase in Contract Amount or Contract Times or otherwise for expenses or damage directly attributable to CONTRACTOR's stopping Work as permitted by this paragraph.

15.5 Discretionary Notice to Cure: In its complete discretion, OWNER may, but is not required to, provide a Notice to Cure to CONTRACTOR and its surety to cure an event of default described above and/or an anticipatory breach of contract and, if required by OWNER, to attend a meeting with OWNER, regarding the Notice to Cure, the event of default, and/or the anticipatory breach of contract. The Notice to Cure will set forth the time limit in which the cure is to be completed or commenced and diligently prosecuted. Upon receipt of any Notice to Cure, CONTRACTOR shall prepare a report describing its program and measures to affect the cure of the event of default and/or anticipatory breach of contract within the time required by the Notice to Cure. The CONTRACTOR'S report must be delivered to OWNER at least three (3) days prior to any requested meeting with the OWNER and surety.

15.6 Bankruptcy: If CONTRACTOR declares bankruptcy or is adjudged bankrupt or makes an assignment for the benefit of creditors or if a receiver is appointed for the benefit of creditors or if a receiver is appointed by reason of CONTRACTOR'S insolvency, CONTRACTOR may be unable to perform this Contract in accordance with the Contract

requirements. In such an event, OWNER may demand CONTRACTOR or its successor in interest provide OWNER with adequate assurance of CONTRACTOR'S future performance in accordance with the terms and conditions of the Contract. If CONTRACTOR fails to provide adequate assurance of future performance to OWNER'S reasonable satisfaction within ten (10) days of such a request, OWNER may terminate the CONTRACTOR'S services for cause or without cause, as set forth above. If CONTRACTOR fails to provide timely adequate assurance of its performance and actual performance, OWNER may prosecute the Work with its own forces or with other contractors on a time and material or other appropriate basis and the cost of which will be charged against the Contract balance.

15.7 Duty to Mitigate: In the event of any termination or suspension under this Contract, the CONTRACTOR agrees to and shall take all reasonable actions to mitigate its damages and any and all claims which may be asserted against the OWNER.

15.8 Responsibility during Demobilization: While demobilizing, the CONTRACTOR will take all necessary and reasonable actions to preserve and protect the Work, the site and other property of the OWNER or others at the site.

ARTICLE 16 - DISPUTE RESOLUTION

16.1 Filing of Claims:

16.1.1 Claims arising from the circumstances identified in paragraphs 3.2, 4.1, 4.2.2, 4.2.4, 6.4.2, 6.11.5.2, 6.17, 7.5, 8.6, 9.5, 10.4.2, 13.4.3, 13.8, 13.9, 15.1, 15.2, 15.3, or 15.4, or other occurrences or events, shall be made by Written Notice delivered by the party making the Claim to the other party within thirty (30) calendar days after the start of the occurrence or event giving rise to the Claim and stating the general nature of the Claim. Notice of the amount of the Claim with supporting data shall be delivered in writing within thirty (30) calendar days after Written Notice of Claim is delivered by claimant and shall represent that the adjustment claimed covers all known amounts and/or extensions of time to which claimant is entitled.

16.1.2 Within thirty (30) calendar days of receipt of notice of the amount of the Claim with supporting data, Owner's Representative and CONTRACTOR shall meet to discuss the Claim, after which an offer of settlement or notification of no settlement offer will be made to claimant. If claimant is not satisfied with the proposal presented, claimant shall have thirty (30) calendar days in which to: (i) submit additional supporting data requested by the other party; (ii) modify the initial Claim; or (iii) request Alternative Dispute Resolution.

16.2 Alternative Dispute Resolution:

16.2.1 If a dispute exists concerning a Claim, the parties agree to use the following procedure prior to pursuing any other available remedies. OWNER reserves the right to include the E/A as a party.

16.2.2 Negotiating with Previously Uninvolved Personnel: Either party may make a written request for a meeting to be held between representatives of each party within fourteen (14) Calendar Days of the request or such later period that the parties may agree to. Each party shall endeavor to include, at a minimum, one (1) previously uninvolved senior level decision maker (an owner, officer, or employee of each organization) empowered to negotiate on behalf of their organization. If a previously uninvolved senior level decision maker is unavailable due to the size of the CONTRACTOR'S organization or any other reason, the

CONTRACTOR shall nonetheless provide an appropriate senior level decision maker for the meeting. The purpose of this and any subsequent meetings will be good faith negotiations of the matters constituting the dispute. Negotiations shall be concluded within thirty (30) Calendar Days of the first meeting, unless mutually agreed otherwise. This step may be waived by a written agreement signed by both parties, in which event the parties may proceed directly to mediation as described below.

16.2.3 Mediation:

.1 If the procedure described in 16.2.2 proves unsuccessful or is waived pursuant to its terms, the parties shall initiate the mediation process. OWNER and CONTRACTOR agree to select within thirty (30) calendar days a mediator trained in mediation skills, to assist with resolution of the dispute. OWNER and CONTRACTOR agree to act in good faith in the selection of the mediator and to give consideration to qualified individuals nominated to act as mediator. Nothing in this agreement prevents the parties from relying on the skills of a person who also is trained in the subject matter of the dispute and/or a contract interpretation expert. Should the parties fail to agree on a mediator within thirty (30) calendar days of initiation of the mediation process, the parties agree to ask the Travis County Dispute Resolution Center to select a qualified individual, which selection shall be binding on the parties.

.2 Mediation is a forum in which an impartial person, the mediator, facilitates communication between parties to promote reconciliation, settlement, or understanding among them. The parties hereby agree that mediation, at a minimum, shall provide for (i) conducting an on-site investigation, if appropriate, by the mediator for fact gathering purposes, (ii) a meeting of all parties for the exchange of points of view and (iii) separate meetings between the mediator and each party to the dispute for the formulation of resolution alternatives. The parties agree to participate in mediation in good faith for up to thirty (30) calendar days from the date of the first mediation session, unless mutually agreed otherwise. Should the parties fail to reach a resolution of the dispute through mediation, then each party is released to pursue other remedies available to them.

16.3 Resolution of Disputes between Contractor and Subcontractor or Supplier: If a dispute exists concerning a claim between a CONTRACTOR and a Subcontractor or Supplier, the CONTRACTOR agrees to participate with such Subcontractor and/or Supplier in a process substantially paralleling the steps set out in paragraphs 16.1 and 16.2 above, including the delivery of written notices, submission of supporting data, negotiation with previously uninvolved personnel, and, if such alternative dispute resolution process is unsuccessful, mediation between the parties to the claim. If the CONTRACTOR and Subcontractor or Supplier agreement provides an alternative dispute resolution process, which provides substantially equivalent rights to those set forth herein, it may be followed, unless the CONTRACTOR and affected Subcontractor or Supplier agree to follow the process outlined above. The OWNER is not a party to the alternative dispute resolution process between the CONTRACTOR and Subcontractor or Supplier and will not pay any costs incurred in the process. Each party will be responsible for its own expenses incurred in the process, which will include an equal share of the mediation expenses, unless otherwise determined by the mediator. NOTICE: THE PROCESS SET FORTH HEREIN IS NOT A SUBSTITUTE FOR THE STATUTORY PAYMENT BOND CLAIM PROCESS.

16.4 Claim Calculation:

16.4.1 Delay Claims: The intent of paying for delay damages is to reimburse the CONTRACTOR for actual expense arising out of a compensable delay. No profit or force account markups, other than labor burden, will be allowed for delay claims by the CONTRACTOR seeking reimbursement for expenses arising out of an alleged event of delay. No consequential damages will be allowed to the CONTRACTOR in connection with any claimed delays. If the CONTRACTOR requests compensation for delay damages and the delay is determined to be compensable, then standby equipment costs and project overhead compensation will be based on the duration of the compensable delay and the following:

.1 Standby equipment costs will not be allowed during periods when the equipment would have otherwise been idle. Standby equipment time will not exceed more than eight (8) hours per twenty-four (24) hour day, forty (40) hours per week, and one hundred seventy-six (176) hours per month. Standby equipment costs will be paid at 50 percent (50%) of the applicable Rental Rate Blue Book rates and calculated by dividing the monthly rate by one hundred seventy-six (176), multiplying the result by the number of standby hours and multiplying that number by the regional adjustment factor and the rate adjustment factor contained in the Blue Book. Operating costs will not be allowed.

.2 Project overhead will be determined from actual costs that the CONTRACTOR will be required to document. Project overhead is defined as the administrative and supervisory expenses incurred at the work site and will not include home office overhead.

16.4.2 General: Except as limited with respect to delay claims, as set forth above, the criteria set forth in Section 11.4.1 may be used as a basis to calculate an adjustment in the Contract Amount in the resolution of a claim, provided that there will be no compensation for home office overhead.

16.5 MBE/WBE Program Progressive Sanctions: CONTRACTOR is subject to progressive sanctions for failure of CONTRACTOR to comply with Austin City Code, Chapter 2-9A, as amended: "Minority-owned and Women-owned Business Enterprise Procurement Program." Available sanctions for Program violations are set forth in Program rules adopted by the Small and Minority Business Resources Department (SMBR), as amended, and may include the following progressive sanctions for Program violations within a rolling 24-month period: (i) a period of probation for up to six (6) months for the first violation (ii) a period of suspension from bidding for up to 24 months for the second violation, and (iii) a period of debarment for up to five (5) years for the third violation. If the CONTRACTOR engages in more than one of the violations listed below at any given time, OWNER has the discretion to determine whether such actions should be counted as multiple violations of the MBE/WBE Ordinance. Program violations include:

.1 providing false or misleading information to the OWNER in connection with the submission of a Bid, responses to request for qualifications or Proposals, Good Faith Efforts documentation, post award compliance or other Program operations;

.2 substituting M/WBE Subcontractors without first receiving approval for such substitutions;

.3 failure to comply with the approved Compliance Plan without an approved request for a change, an approved Change Order or other approved change to the Contract;

.4 violation of any other provision of the "Minority-owned and Women-owned Business Enterprise Procurement Program";

.5 providing false or misleading information to the OWNER in connection with an application for or challenge to certification, recertification or decertification as a MBE/WBE; and

.6 bid shopping.

The Progressive Sanctions will be administered in accordance with the City of Austin Purchasing Office Probation, Suspension, and Debarment Procedures for Vendors, which includes notice and an opportunity for a hearing.

ARTICLE 17 – MISCELLANEOUS

17.1 Venue: In the event of any suit at law or in equity involving the Contract, venue shall be exclusively in Travis County, Texas and the laws of the State of Texas shall apply to the interpretation and enforcement of the Contract.

17.2 Extent of Agreement: This Contract represents the entire and integrated agreement between the OWNER and CONTRACTOR with respect to the subject matter hereof and supersedes all prior negotiations, representations or agreements, either written or oral.

17.3 Cumulative Remedies: The rights and remedies available to the parties are not to be construed in any way as a limitation of any rights and remedies available to any or all of them which are otherwise imposed or available by laws or regulations, by special warranty or guarantees or by other provisions of the Contract Documents, and the provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right and remedy to which they apply. Specifically, the OWNER is not required to only assess liquidated damages, and OWNER may elect to pursue its actual damages resulting from the failure of the CONTRACTOR to complete the Work in accordance with the requirements of the Contract Documents.

17.4 Severability: If any word, phrase, clause, sentence or provision of the Contract, or the application of same to any person or set of circumstances is for any reason held to be unconstitutional, invalid or unenforceable, that finding shall only effect such word, phrase, clause, sentence or provision, and such finding shall not affect the remaining portions of this Contract; this being the intent of the parties in entering into the Contract; and all provisions of the Contract are declared to be severable for this purpose.

17.5 Independent Contractor: The Contract shall not be construed as creating an employer/employee relationship, a partnership, or a joint venture. CONTRACTOR is an independent contractor and CONTRACTOR's services shall be those of an independent contractor. CONTRACTOR agrees and understands that the Contract does not grant any rights or privileges established for employees of OWNER.

17.6 Prohibition of Gratuities: OWNER may, by Written Notice to CONTRACTOR, terminate the Contract without liability if is determined by OWNER that gratuities were offered or given by CONTRACTOR or any agent or representative of CONTRACTOR to any officer or employee of OWNER with a view toward securing the Contract or securing favorable treatment with respect to the awarding or amending or the making of any determinations with respect to the performing of such Contract. In the event the Contract is terminated by OWNER pursuant to this provision, OWNER shall be entitled, in addition to any other rights

and remedies, to recover or withhold the amount of the cost incurred by CONTRACTOR in providing such gratuities.

17.7 Prohibition Against Personal Interest in Contracts: No officer, employee, independent consultant, or elected official of OWNER who is involved in the development, evaluation, or decision-making process of the performance of any solicitation shall have a financial interest, direct or indirect, in the Contract resulting from that solicitation. Any violation of this provision, with the knowledge, expressed or implied, of CONTRACTOR shall render the Contract voidable by OWNER.

17.8 OWNER'S Right to Audit:

17.8.1 Records means all records generated by or on behalf of CONTRACTOR and each Subcontractor and Supplier of CONTRACTOR, whether paper, electronic, or other media, which are in any way related to performance of or compliance with this Contract, including, without limitation:

.1 accounting records;

.2 written policies and procedures;

.3 subcontract files (including proposals of successful and unsuccessful Bidders, Bid recaps, etc.);

.4 original estimates and estimating work sheets;

.5 correspondence;

.6 Change Order files (including documentation covering negotiated settlements);

.7 back charge logs and supporting documentation;

.8 general ledger entries detailing cash and trade discounts earned, insurance rebates and dividends;

.9 lump sum agreements between CONTRACTOR and any Subcontractor or Supplier;

.10 records necessary to evaluate: Contract compliance, Change Order pricing, and any Claim submitted by CONTRACTOR or any of its payees; and

.11 any other CONTRACTOR record that may substantiate any charge related to this Contract.

17.8.2 CONTRACTOR shall allow OWNER'S agent or its authorized representative to inspect, audit, and/or reproduce, or all three, all Records generated by or on behalf of CONTRACTOR and each Subcontractor and Supplier, upon OWNER'S written request. Further, CONTRACTOR shall allow OWNER'S agent or authorized representative to interview any of CONTRACTOR'S employees, all Subcontractors and all Suppliers, and all their respective employees.

17.8.3 CONTRACTOR shall retain all its Records, and require all its Subcontractors and Suppliers to retain their respective Records, during this Contract and for three (3) years after final payment, until all audit and litigation matters that OWNER has brought to the attention of CONTRACTOR are resolved, or as otherwise required by law, whichever is longer. OWNER'S right to inspect, audit, or reproduce Records, or interview employees of CONTRACTOR or its respective Subcontractors or Suppliers exists during this Contract, and for three (3) years after final payment, until all audit and litigation matters that OWNER has brought to CONTRACTOR'S attention are resolved, or as otherwise required by law, whichever is longer, and at

no cost to OWNER, either from CONTRACTOR or any of its Subcontractors or Suppliers that may furnish Records or make employees available for interviewing.

17.8.4 CONTRACTOR must provide sufficient and accessible facilities during its normal business hours for OWNER to inspect, audit, or reproduce Records, or all three, and to interview any person about the Records.

17.8.5 CONTRACTOR shall insert these requirements in each written contract between CONTRACTOR and any Subcontractor or Supplier and require each Subcontractor and Supplier to comply with these provisions.

17.9 Survival: The terms and conditions of this Contract, which contemplate a period of time beyond completion or termination will survive such completion or termination and not be merged therein or otherwise terminated.

17.10 No Waiver: The waiver of any provision of this Contract will not be deemed to be a waiver of any other provision of this Contract. No waiver of any provision of this Contract will be deemed to constitute a continuing waiver unless expressly provided in writing, nor will a waiver of any default be deemed a waiver of any subsequent defaults of the same type. The failure at any time to enforce this Contract, whether the default is known or not, shall not constitute a waiver or estoppel of the right to do so.

17.11 Conditions Precedent to Right to Sue: Notwithstanding anything herein to the contrary, the CONTRACTOR will have at least 90 days to give notice of a claim for damages as a condition precedent to the right to sue on the Contract, subject to the contractual claim and alternative dispute resolution processes set forth herein.

17.12 Waiver of Trial by Jury: OWNER and CONTRACTOR agree that they have knowingly waived the right to trial by jury and have instead agreed that, in the event of any litigation arising out of or connected to this Contract, to proceed with a trial before the court, unless both parties subsequently agree otherwise in writing.

17.13 Contractor Evaluation: The Owner will review and evaluate the Contractor's Work and performance on the Project and provide the Contractor with a written Contractor Evaluation Report in accordance with City of Austin Administrative Rule R161-13.37. Rule R161-13.37 provides an appeal process.

http://www.austintexas.gov/department/contract-management

End

The Supplemental General Conditions contained herein amend or supplement the General Conditions, Section 00700.

ARTICLE 1 – DEFINITIONS

Add to the following definition:

1.20 Engineer/Architect (E/A) - The OWNER's design professional for this contract is:
Name: Kimberly K. Patak, P.E., CFM; Freese and Nichols, Inc,
Address: 10431 Morado Circle, Building 5, Suite 300, Austin, TX 78759

Add the following definition:

1.51 Mobilization Prompt Payment Program - The Owner's Mobilization Prompt Payment Program will allow bimonthly payments during "critical mobilization stages" as specified in the Contract Documents by the Prime Contractor. The Mobilization Prompt Payment Program will only apply to projects with a construction cost greater than $2,000,000.

ARTICLE 2 - PRELIMINARY MATTERS

Add the following modification to the end of 2.4.2.1:

.**1** The Baseline Schedule and schedule submittals for Projects in the Mobilization Prompt Payment Program must identify periods of 'critical mobilization.' The periods of critical mobilization will include the first two months of the Contract Time and additional periods identified by the Contractor and approved by Owner when peak Subcontractor mobilization will occur.

ARTICLE 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

4.1 Availability of Lands: *Add the following as a second paragraph to 4.1*:
Field Notes and Special Provisions to Easements, where applicable, are attached to Section 00810. All Work associated with Special Provisions to Easements shall be subsidiary to the entire Bid, unless otherwise specified. Should the actions of the CONTRACTOR, or its Subcontractors, Vendors, or Suppliers, cause the Work to be delayed to the point that the ending date of an easement has been exceeded, the CONTRACTOR shall be responsible to reimburse the OWNER for any additional costs required to extend the period of rights to the easement in order to complete the Work. This delay shall be considered to be any period of time required by the CONTRACTOR to fully and satisfactorily execute the Work that is in addition to the original Contract duration, as modified by any executed Contract change orders.

ARTICLE 5 - BONDS AND INSURANCE

5.3 Other Bond and Insurance Requirements:

5.3.1 CONTRACTOR Provided Insurance

5.3.1.1 General Requirements.

.1 CONTRACTOR shall carry insurance in the types and amounts indicated below for the duration of the Contract, which shall include items owned by OWNER in the care, custody and control of CONTRACTOR prior to and during construction and warranty period.

.2 CONTRACTOR must complete and forward the Certificate of Insurance, Section 00650, to OWNER before the Contract is executed as verification of coverage required below. CONTRACTOR shall not commence Work until the required insurance is obtained and until such insurance has been reviewed by OWNER. Approval of insurance by OWNER shall not relieve or decrease the liability of CONTRACTOR hereunder and shall not be construed to be a limitation of liability on the part of CONTRACTOR. CONTRACTOR must also complete and forward the Certificate of Insurance, Section 00650, to OWNER whenever a previously identified policy period has expired as verification of continuing coverage.

.3 CONTRACTOR's insurance coverage is to be written by companies authorized to do business in the State of Texas at the time the policies are issued and shall be written by companies with A.M. Best ratings of B+VII or better, except for hazardous material insurance which shall be written by companies with A.M. Best ratings of A- or better.

.4 All endorsements naming the OWNER as additional insured, waivers, and notices of cancellation endorsements as well as the Certificate of Insurance shall indicate: City of Austin, Capital Procurement, P.O. Box 1088, Austin, Texas 78767.

.5 The "other" insurance clause shall not apply to the OWNER where the OWNER is an additional insured shown on any policy. It is intended that policies required in the Contract, covering both OWNER and CONTRACTOR, shall be considered primary coverage as applicable.

.6 If insurance policies are not written for amounts specified below, CONTRACTOR shall carry Umbrella or Excess Liability Insurance for any differences in amounts specified. If Excess Liability Insurance is provided, it shall follow the form of the primary coverage.

.7 OWNER shall be entitled, upon request and without expense, to receive certified copies of policies and endorsements thereto and may make any reasonable requests for deletion or revision or modification of particular policy terms, conditions, limitations, or exclusions except where policy provisions are established by law or regulations binding upon either of the parties hereto or the underwriter on any such policies.

.8 OWNER reserves the right to review the insurance requirements set forth during the effective period of this Contract and to make reasonable adjustments to insurance coverage, limits, and exclusions when deemed necessary and prudent by OWNER based upon changes in statutory law, court decisions, the claims history of the industry or financial condition of the insurance company as well as CONTRACTOR.

.9 CONTRACTOR shall not cause any insurance to be canceled nor permit any insurance to lapse during the term of the Contract or as required in the Contract.

.10 CONTRACTOR shall be responsible for premiums, deductibles and self-insured retentions, if any, stated in policies. All deductibles or self-insured retentions shall be disclosed on the Certificate of Insurance.

.11 CONTRACTOR shall provide OWNER thirty (30) days written notice of erosion of the aggregate limits below occurrence limits for all applicable coverages indicated within the Contract.

.12 If OWNER owned property is being transported or stored off-site by CONTRACTOR, then the appropriate property policy will be endorsed for transit and storage in an amount sufficient to protect OWNER's property.

.13 The insurance coverages required under this contract are required minimums and are not intended to limit the responsibility or liability of CONTRACTOR.

5.3.1.2 Business Automobile Liability Insurance. Provide coverage for all owned, non-owned and hired vehicles. The policy shall contain the following endorsements in favor of OWNER:

a) Waiver of Subrogation endorsement CA 0444;
b) 30 day Notice of Cancellation endorsement CA 0244; and
c) Additional Insured endorsement CA 2048.

Provide coverage in the following types and amounts:

.1 A minimum combined single limit of $1,000,000 minimum per occurrence for bodily injury and property damage.

5.3.1.3 Workers' Compensation And Employers' Liability Insurance. Coverage shall be consistent with statutory benefits outlined in the Texas Workers' Compensation Act (Section 401). CONTRACTOR shall assure compliance with this Statute by submitting two (2) copies of a standard certificate of coverage (e.g. ACCORD form) to Owner's Representative for every person providing services on the Project as acceptable proof of coverage. The Certificate of Insurance, Section 00650, must be presented as evidence of coverage for CONTRACTOR. CONTRACTOR's policy shall apply to the State of Texas and include these endorsements in favor of OWNER:

a) Waiver of Subrogation, form WC 420304; and
b) 30 day Notice of Cancellation, form WC 420601.

The minimum policy limits for Employers' Liability Insurance coverage shall be as follows:

.1 $100,000 bodily injury per accident, $500,000 bodily injury by disease policy limit and $100,000 bodily injury by disease each employee.

5.3.1.4 Commercial General Liability Insurance. The Policy shall contain the following provisions:

a) Contractual liability coverage for liability assumed under the Contract and all contracts relative to this Project.
b) Completed Operations/Products Liability for the duration of the warranty period.
c) Explosion, Collapse and Underground (X, C & U) coverage.
d) Independent Contractors coverage (Contractors/ Subcontractors work).
e) Aggregate limits of insurance per project, endorsement CG 2503.
f) OWNER listed as an additional insured, endorsements CG 2010 and CG 2037 or equivalent.
g) 30 day notice of cancellation in favor of OWNER, endorsement CG 0205.
h) Waiver of Transfer of Recovery Against Others in favor of OWNER, endorsement CG 2404.

Provide coverages A&B with minimum limits as follows:

.1 A combined bodily injury and property damage limit of $1,000,000 per occurrence.

5.3.1.5 Professional Liability Insurance. For Work which requires professional engineering or professional survey services to meet the requirements of the Contract, including but not limited to excavation safety systems, traffic control plans, and construction surveying, the CONTRACTOR or Subcontractors, responsible for performing the professional services shall provide Professional Liability Insurance with a minimum limit of $500,000 per claim and in the aggregate to pay on behalf of the

assured all sums which the assured shall become legally obligated to pay as damages by reason of any negligent act, error, or omission committed with respect to all professional services provided in due course of the Work of this Contract. CONTRACTOR's policy shall include the following endorsement in favor of the OWNER:

a) 30 day Notice of Cancellation endorsement CA 0244

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

6.6 Permits, Fees: *Add the following*:
OWNER will obtain and pay for the following permits, licenses and/or fees:

6.6.1 Site Development Permit.

6.7 Laws and Regulations: *Add the following*:

6.7.4 This Work is subject to the Texas Pollution Discharge Elimination System (TPDES) permitting requirements for the installation and maintenance of temporary and permanent erosion and sediment controls and storm water pollution prevention measures throughout the construction period.
OWNER has prepared a Storm Water Pollution Prevention Plan (SWPPP). Reference Section 01096 for this SWPPP.

CONTRACTOR's responsibilities are as follows:

.1 Obtain a signed certification statement from all Subcontractors responsible for implementing the erosion / sedimentation controls and other best management practices that are part of the SWPPP. This statement shall indicate that the Subcontractor understands the permit requirements. The certified statement forms shall be attached to and become part of the SWPPP.

.2 Fill out the TCEQ's "Construction Site Notice" form, which is Attachment 2 to the TPDES General Permit TXR150000 (form available from OWNER or on the Internet for a small construction site at https://www.tceq.texas.gov/downloads/permitting/stormwater/forms-tools/20964.pdf and a large construction site at https://www.tceq.texas.gov/downloads/permitting/stormwater/forms-tools/20961.pdf. Post notice near the main entrance of the Work, or at multiple postings if the Work is linear. Mail a copy of the completed Construction Site Notice form to the local Municipal Separate Storm Sewer Systems (MS4) representative:

TPDES Program Coordinator
City of Austin – WPD – ERM
P.O. Box 1088
Austin, TX 78767

.3 Maintain all erosion/sedimentation controls and other protective measures identified in the SWPPP in effective operating condition.

.4 Perform inspections every five (5) working days and after every ½ inch rainfall event, noting the following observations on an inspection form provided by OWNER:

a) Locations of discharges of sediment or other pollutants from the site.
b) Locations of storm water / erosion / sedimentation controls that are in need of maintenance.
c) Locations of storm water / erosion / sedimentation controls that are not performing, failing to operate, or are inadequate.
d) Locations where additional storm water / erosion / sedimentation controls are needed.

.5 Maintain at Work site at all times a copy of the SWPPP (with all updates, as described below) and inspection reports.

.6 Update the SWPPP as necessary to comply with TPDES permitting requirements, which includes noting changes in erosion / sedimentation controls and other best management practices that are part of the SWPPP and which may be necessary due to the results of inspection reports. Any SWPPP revisions or updates must be signed and certified by a Certified Professional in Erosion and Sedimentation Control (CPESC) or a Registered Professional Engineer. If the SWPPP includes engineering calculations, then SWPPP must be sealed and signed by a Registered Professional Engineer.

.7 Upon completion of the Work, provide TPDES records to OWNER.

ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.7 Warranty Period: *Add the following*:

13.7.5 OWNER will utilize a "Warranty Item Form" (attached at the end of this Section) for the purpose of providing Written Notice of warranty defects to CONTRACTOR. CONTRACTOR shall date, sign, complete and return the form to OWNER when the defect is corrected, including such information on or attached to the form to describe the nature of the repairs or corrections that were made. If the defect cannot be corrected in seven (7) Calendar Days, CONTRACTOR shall provide a written explanation to the Owner's Representative describing the repairs needed and the time required to complete the repairs.

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

14.1 Application for Progress Payment: *Delete 14.1.1 and replace with the following (changes to the original text are identified by underlining)*:

14.1.1 No more often than once a month, unless authorized as part of the Mobilization Prompt Payment Program, CONTRACTOR shall submit to Owner's Representative for review a completed and executed Application for Payment, in a form acceptable to OWNER, covering the Work completed as of the date of the Application and not previously paid and accompanied by such supporting documentation as required by the Contract Documents.

Add the following paragraph to 14.1.1:

.1 Mobilization Prompt Payment Program. During critical mobilization periods, as identified by the CONTRACTOR and as approved by OWNER in accordance with 00700 2.4.2.1 of this Contract, CONTRACTOR shall submit bi-monthly Applications for Payment. The additional Pay Applications will include any costs accrued during the periods of critical mobilization. The Program will allow the CONTRACTOR and Subcontractors to invoice for costs as they are accrued during periods of critical mobilization. The CONTRACTOR shall submit bimonthly invoices to the OWNER for such costs. The CONTRACTOR shall pay Subcontractors for costs within 10 days of receipt of payment from OWNER.

14.7 Substantial Completion: *Reference 14.7.1, and add the following*:

14.7.1.1 For water and wastewater lines construction, Substantial Completion means that the Work, including all testing and disinfection, has been completed and accepted and the line(s) placed into service. A certificate of Substantial Completion will not be issued. Work that remains after Substantial Completion could include the final pavement of roadways, adjustment of structures to final grade and

revegetation. Owner's Representative will issue a notice specifying what portion of the Work is partially completed for the purpose of payment and what Work remains to be done on the portion being accepted as Substantially Complete. This subsection 14.7.1.1 changes the 00700 General Conditions definition of Substantial Completion.

14.7.1.2 For roadway construction and/or reconstruction, Substantial Completion means that the Work, including the final surface course, all permanent traffic control devices (pavement markings, signs, etc.), and substantial clean-up have been completed, accepted, and placed into service, and, any traffic signal or street lighting conduit that has been installed, lowered or relocated must be inspected for usability by, and must have received written approval from, the City's traffic signal section and/or street lighting section, as well as having been completed, accepted, and placed into service. A certificate of Substantial Completion will not be issued. Work that remains after Substantial Completion could include final clean up. Owner's Representative will issue a notice specifying what portion of the Work is partially completed for the purpose of payment and what Work remains to be done on the portion being accepted as Substantially Complete. This subsection 14.7.1.1 changes the 00700 General Conditions definition of Substantial Completion.

14.8 Partial Utilization: *Delete 14.8.1 and replace with the following (changes to the original text are identified by underlining)*:

14.8.1 OWNER at any time may request CONTRACTOR to permit OWNER to use any such part of the Work which OWNER believes to be ready for its intended use and substantially complete. If CONTRACTOR agrees that such part of the Work is substantially complete, CONTRACTOR will certify to Owner's Representative that such part of the Work is substantially complete and request Owner's Representative to issue a notice specifying what portion of the Work is substantially complete for the purpose of payment and what Work remains to be done on the portion being accepted. CONTRACTOR at any time may notify Owner's Representative that CONTRACTOR considers any such part of the Work ready for its intended use and substantially complete and request Owner's Representative to issue a notice specifying what portion of the Work is partially completed for the purpose of payment and what Work remains to be done on the portion being accepted. The provisions of paragraphs 14.7.1 and 14.7.2 will apply with respect to the notice specifying what portion of the Work is partially completed for the purpose of payment and what Work remains to be done on the portion being accepted."

14.10 Final Application for Payment: *Add the following paragraph(s) to 14.10*:

14.10.11 TPDES records in accordance with 6.7.4.

14.11 Final Payment and Acceptance: *Add the following to paragraph 14.11.1*:
If the Contract Documents require the maintenance of any trees and tree support infrastructure for two (2) years following Final Completion, the CONTRACTOR may execute a zero-cost "Tree Maintenance Change Order" for such Work and post fiscal security acceptable to OWNER to ensure completion of the tree maintenance. The fiscal security will be a bond, letter of credit, or cash escrow in a form promulgated by OWNER and posted with OWNER's Parks and Recreation Department. If the CONTRACTOR does not complete the tree maintenance work as required, the OWNER, at its option, may complete the Work using the posted fiscal security.

WARRANTY ITEM NO. _____ (PROJECT NAME)

The General Conditions of the Contract require that Warranty Defects be corrected within 7 days after written notice is received.

TO: _____

contractor name address / telephone / fax / email

ATTENTION OF: _____

FROM: _____

project manager name / address / telephone / fax / email

PROJECT: _____

name / location / CIP ID number

END OF ONE YEAR WARRANTY:_____

SUBJECT:_____

[ ] If checked, the damage requires immediate attention. The Contractor has been called.
[ ] If checked, the Consultant has been asked to consult with the Contractor on the problem.

PLEASE CORRECT OR REPAIR THE FOLLOWING ITEM(S):

DATE OF REQUEST_____ **SIGNATURE** _____

Project Manager

xc:

[ ] _____Phone No._____
[ ] _____Phone No._____
[ ] _____Phone No._____
[ ] _____Phone No._____

RESPONSE FROM CONTRACTOR: DATE CORRECTION WAS MADE:_____

The Contractor must endeavor to correct the defect within 7 calendar days after written notice is given. If the defect cannot be corrected in that time, Contractor shall provide a written explanation to the Owner's Representative describing the repairs needed and the time required to complete the repairs.

Description of corrections made:

DATE OF REPLY_____**SIGNATURE**_____

When the repair is complete, the contractor should return a copy to each of the following:

[ ] _____Phone No._____
[ ] _____Phone No._____
[ ] _____Phone No._____
[ ] _____Phone No._____

END

1. PAYMENT

1.1. Classification Definitions, Building and Heavy and Highway

1.1.1. Definitions for Building Construction and Heavy and Highway classifications shall conform to the current "Occupational Information Network (O*NET)" as approved by the U.S. Department of Labor. For interpretive guidance, the Core Task list in O*NET will be used to make prevailing wage determinations. Final classification of workers will be made by the OWNER.

1.2. Minimum Wages

1.2.1. Workers on Project shall be paid not less than wage rates, including fringe benefits, as published by the Department of Labor (DOL) or the $22.15 minimum wage required by City of Austin Ordinance No. 20160324-015, whichever is higher. The Total Minimum Wage required can be met using any combination of cash and non-cash qualified fringe benefits provided the cash component meets or exceeds the $22.15 minimum wage required.

1.2.2. Such wage rates shall be used throughout the Contract. If a classification is to be used, which is not listed in the attached wage rates, CONTRACTOR shall submit to OWNER rates and classification proposed for use, for approval, prior to performance of the Work.

1.2.3. All laborers and mechanics working upon the Work for this Project shall be paid weekly, unconditionally and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by Secretary of Labor under the Copeland Act, Title 29 CFR, Part 3) full wages accrued and when due, computed at rates not less than wage rates bound herein pertaining to type of Work being performed. When Work is of such a nature that both Building and Heavy and Highway wage scales are incorporated into contract, CONTRACTOR shall pay wage rates to mechanics or laborers performing Work in more than one classification at the rate indicated for each classification for time actually worked as determined by area practice applicable to type (Site Construction Crafts or Building Construction Crafts) of Work being performed without regards to skill. Salaried specialists (project superintendent and administrative personnel only) in the permanent employment of CONTRACTOR do not fall under any Wage Classification. A supervisor/foreman who is not exempt under 29 CFR Part 541 and who spends more than a substantial amount of time (20 percent) in a given workweek as a laborer or mechanic must be paid the applicable Wage Rate for the classification of work performed for all hours engaged in such work as a laborer or mechanic.

1.2.4. Wage rates shall be posted by CONTRACTOR at site(s) of Work in prominent, easily accessible places where they can be seen by all workers. The following shall also be posted by the CONTRACTOR: City of Austin wage contact posters (English and Spanish), City of Austin Equal Employment Opportunity posters (English and Spanish), Workers' Compensation Notice (English and Spanish), Texas Payday Law (English and Spanish), City Rest Break Ordinance (English and Spanish), City of Austin Non-Discrimination Statement (related to Title VI of the Civil Rights Act), and Federal Notices, as appropriate.

1.3. Overtime Requirements

1.3.1. No CONTRACTOR, Subcontractor, or Sub-subcontractor contracting for any part of contract Work which may require or involve the employment of laborers or mechanics shall require or permit any laborer or mechanic in any workweek in which he is employed on such Work, to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times their basic rate of pay for all hours in excess of forty hours in such workweek.

1.3.2. Overtime wages must be calculated using the Adjusted Wage Rate specified in the Wage Rate Determination or the actual basic rate of pay, whichever is higher.

2. APPRENTICES

2.1. Locally and Federally Funded Projects

2.1.1. The terms journeyman and apprentice apply to both union and independent workers, and are not intended to imply that these positions are union workers only.

2.1.2. Apprentices and Trainees will be permitted to work as such only when they are registered, individually, under a bonafide Apprenticeship or Trainee program registered with the Bureau of Apprenticeship and Training, United States Department of Labor. The allowable ratio of Apprentices or Trainees to journeymen in any craft classification shall not be greater than the ratio permitted to CONTRACTOR as stated in the registered apprenticeship program standards. Any employee listed on a payroll at an Apprentice or Trainee wage rate, who is not registered as above, shall be paid the wage rate provided in Contract for Work employee actually performed. CONTRACTOR, Subcontractor, or Subsubcontractor shall furnish to OWNER written evidence of registration of his program for Apprentices and Trainees as well as of the appropriate ratios and wage rates, for the area of construction prior to using any Apprentices or Trainees on this Contract.

3. WITHHOLDING PAYMENTS

3.1. OWNER may withhold or cause to be withheld from CONTRACTOR as much of the accrued payments as necessary to pay laborers and mechanics employed by CONTRACTOR, Subcontractors, or Sub-subcontractors the amount of wages required to comply with the Contract. In the event of nonpayment of wages to laborers or mechanics working on the site of the Work of this Contract, OWNER may, after Written Notice to CONTRACTOR, take such action as may be necessary to cause suspension of any further payments or advance of funds to CONTRACTOR until such violations have ceased and until restitution has been made. Payments may also be withheld if CONTRACTOR fails to maintain weekly payroll reports or fails to provide copies in a timely manner upon request of OWNER.

4. PAYROLLS

4.1. CONTRACTOR shall keep records showing:

4.1.1. The name, address, e-mail address, and occupation of each worker employed by the CONTRACTOR or subcontractor(s) in the construction of the public work.

4.1.2. The actual per diem wages paid to each worker.

4.1.3. Employee Certification. CONTRACTOR, all levels of Subcontractors shall identify in writing, the classification agreed to by all laborers and mechanics employed by them in the execution of the Contract, and pay not less than rates specified in the

attached Wage Rate Determination(s). Contractor shall prepare a completed form for the signature of Employee and a witness shall sign the form in the presence of Employee. If work performed by worker is different than the trade classification agreed upon, the worker shall be paid for that work no less than the minimum prevailing wage for that specified trade.

4.1.4. Payroll Deduction Authorization Form. CONTRACTOR, Subcontractor, and Sub subcontractor shall prepare for employee signature a payroll deduction authorization form to identify all payroll deductions excluding those required by statute, such as federal income taxes, Medicare and social security.

4.2. The record shall be open at all reasonable hours to inspection by the officers and agents of the OWNER as requested. CONTRACTOR will be responsible to provide copies of records as requested by the OWNER within two (2) working days. Payrolls relating to this Work shall be maintained during term of Contract and preserved for a period of three (3) years thereafter by CONTRACTOR for all laborers and mechanics working on the Work.

4.3. A Statement of Compliance, a letter signed and dated by party responsible for supervising the payment of persons employed by CONTRACTOR or subcontractor shall accompany payrolls required by OWNER. The Statement of Compliance letter shall identify but is not limited to:

4.3.1. Name of signatory party and title

4.3.2. Name of project, payroll period and

4.3.3. Name of CONTRACTOR or Subcontractor

4.4. The signed letter attests that the payroll complies with 29CFR issued by the Secretary of Labor.

4.5. Federal Funding. In the event that federal funding is used:

4.5.1. Contractor and all levels of Subcontractors shall submit weekly certified payroll reports and signed wage compliance statements to the OWNER's designated office no later than seven (7) calendar days after the scheduled payday.

4.5.2. Contractors and all levels of Subcontractors shall pay all "mechanics and laborers" not less often than once per week, for work performed the previous week.

4.5.3. Submit to the OWNER's designated office Standard Form 1413, Statement and Acknowledgement, from each subcontractor prior to the subcontractor performing work on the project.

4.5.4. Contractor is responsible for providing a prevailing wage compliance software or application for this project, such as LCPtracker, eMars, or equivalent. Contractor is responsible for all costs associated with purchasing the prevailing wage compliance software or application and should include this cost in their Bid. At a minimum, the software or application must meet the following requirements:

- A web or cloud based, secure system providing an automated process for collecting certified payroll reports
- Provide OWNER access to review certified payrolls for compliance with Section 00830
- Incorporate the contract specific Wage Rates (Section 00830HH and/or BC)
- Provide initial training, setup, and support to all users
- Provide the mapping and capability to import payrolls from both the prime

and all subcontractors

- No additional cost for multiple users or subcontractors
- Provide error messages and remedies for potential areas of non-compliance
- Store and provide access to worker apprenticeship or trainee certificates

5. NONCOMPLIANCE

5.1. According to Chapter 2258 Texas Government Code Title 10A, a CONTRACTOR or subcontractor(s) who violates this section shall pay to the political subdivision on whose behalf the contract is made, $60 for each worker employed for each calendar day or part of the day that the worker is paid less than the wage rates stipulated in the contract. A public body shall use any money collected under this section to offset the costs incurred in the administration of this chapter.

5.2. Confirmed Disciplinary action taken by CONTRACTOR against employees who provide information during an interview or investigation by the OWNER on wages received, may result in suspension or debarment from consideration of award of City contracts.

5.3. All employers are required to complete Wage Theft Training within 30 days of being awarded a City contract and certify they have not been adjudicated for certain offenses related to the City of Austin's Wage Theft Ordinance No. 20221002-031.

5.4. The misclassification of employees as independent contractors may deny workers City of Austin minimum wage, overtime pay, and other protections. Any worker who does not have statutory deductions taken out of his pay is considered a subcontractor and must be on the approved compliance plan through ASMBR.

6. AREA PRACTICE

6.1. Heavy and Highway Construction Rates shall be used on this Project, unless the Project consists primarily of Building Construction and Building Construction Rates are to be used.

6.1.1. Building Construction consists generally of all aspects of construction of buildings, which are sheltered enclosures with walk-in access for the purpose of housing persons, machinery, equipment or supplies, including without limitation the installation of utilities and equipment, both above and below grade level, as well as incidental demolition, grading, utilities, paving and other site work. Buildings need not be "habitable" to be classified as Building Construction and the installation of heavy machinery and/or equipment will not generally change a Building Construction project's classification.

6.1.2. The determination of Building Construction Wage Rates includes all construction trades and work necessary to complete a building, regardless of the number of contracts involved, so long as all such contracts are closely related in purpose, time and place.

6.2. For projects that involve both Building Construction and Heavy and Highway trades, the following classifications shall be used:

6.2.1. A multiple classification shall be used if Building Construction items are more than 20% of the Heavy and Highway project cost.

6.2.2. A multiple classification shall be used if Heavy and Highway Construction items are more than 20% of the Building Construction Project cost.

6.3. Split classifications/multiple wage rate schedules: When construction work requires that

an employee perform work under multiple classifications or multiple wage scales, the employer must pay that worker (at least) the highest prevailing wage or the employer payroll records must accurately set forth the times spent performing the work of each classification and under each scale. For those projects that involve both Building Construction and Heavy and Highway trades, the Heavy and Highway wage rates may only be applied to workers when engaged in site work at least five (5) feet beyond the building.

7. WAGE UPDATES AFTER CONTRACT AWARD

7.1. A wage determination modification issued after contract award, or the start of construction will generally not apply to the contract. However, in certain circumstances, such as substantial contract modifications or the exercise of options, an updated wage determination modification must be included in the contract after contract award.

7.2. Wage determinations must be updated after contract award when:

7.2.1. The contract or order is changed to include additional, substantial construction not within the scope of work, or

7.2.2. The contract or order is changed to require the contractor to perform work for an additional time period not originally obligated, including when an option is exercised on a contract or order.

7.3. Wage determinations in contracts requiring construction over a period of time that are not tied to the completion of any particular project (such as IDIQ contracts, schedule contracts, or long-term operations and maintenance contracts) must be updated annually.

7.4. Delivery orders issued under such IDIQ-type contracts must incorporate the most recent wage determination modification in the master contract at the time the delivery order is awarded.

8. TEXAS OPEN RECORDS ACT

8.1. Unless covered by an exception to mandatory disclosure under the Texas Public Information Act, Chapter 552, Texas Government Code, any and all documents submitted to the City of Austin become Public Records and are, therefore, subject to public disclosure.

END

WAGE RATE DETERMINATION

Heavy and Highway
County Name: TRAVIS

Wages based on DOL General Decisions: TX20260291 and TX20260007 01/02/2026 and City of Austin Ordinance #20160324-015 Resolution #20160324-020

DOL Rate column is for information only. The Total Minimum Wage Rate is derived from the Adjusted Wage Rate Required pursuant to City Ordinance and can be met using any combination of cash and non-cash qualified fringe benefits, provided the cash component is at least $22.15/hour.

Classification	**DOL Rate** For info Only	**Adjusted Wage Rate Required** Pursuant to City Ordinance	**Total Minimum Wage Rate Required**
Agricultural Tractor Operator	$19.14	$22.15	$22.15
Asphalt Distributor Operator	$24.07	$24.07	$24.07
Asphalt Paving Machine Operator	$22.12	$22.15	$22.15
Asphalt Raker	$19.40	$22.15	$22.15
Boom Truck Operator	$27.82	$27.82	$27.82
Broom or Sweeper Operator	$18.09	$22.15	$22.15
Cement Mason/Concrete Finisher	$20.61	$22.15	$22.15
Concrete Pavement Finishing Machine Operator	$22.81	$22.81	$22.81
Concrete Saw Operator	$25.97	$25.97	$25.97
Crane, Hydraulic, 80 tons or less	$29.24	$29.24	$29.24
Crane, Lattice Boom, 80 tons or less	$26.47	$26.47	$26.47
Crane, Lattice Boom, over 80 tons	$28.87	$28.87	$28.87
Crawler Tractor	$20.92	$22.15	$22.15
Directional Drilling Locator	$21.39	$22.15	$22.15
Directional Drilling Operator	$25.19	$25.19	$25.19
Electrician	$30.54	$30.54	$30.54
Excavator 50,000 lbs. or less	$22.93	$22.93	$22.93
Excavator, over 50,000 lbs.	$22.90	$22.90	$22.90
Flagger	$15.52	$22.15	$22.15
Form Builder/Form Setter - Paving & Curb	$19.18	$22.15	$22.15
Form Builder/Form Setter – Structures	$20.63	$22.15	$22.15
Foundation Drill Operator, Truck Mounted	$24.28	$24.28	$24.28
Front End Loader Operator, 3CY or less	$20.33	$22.15	$22.15
Front End Loader, over 3CY	$20.20	$22.15	$22.15

Laborer, Common	$17.52	$22.15	$22.15
Laborer, Utility	$19.05	$22.15	$22.15
Loader/Backhoe Operator	$20.32	$22.15	$22.15
Mechanic	$26.15	$26.15	$26.15
Milling Machine	$21.73	$22.15	$22.15
Motor Grader Operator - Fine Grade	$26.56	$26.56	$26.56
Motor Grader Operator, Rough	$22.95	$22.95	$22.95
Painter - Structures	$23.76	$23.76	$23.76
Pavement Marking Machine Operator	$22.00	$22.15	$22.15
Pipelayer	$19.23	$22.15	$22.15
Reclaimer/Pulverizer	$19.05	$22.15	$22.15
Reinforcing Steel Setter	$22.46	$22.46	$22.46
Roller Operator, Asphalt	$20.24	$22.15	$22.15
Roller Operator, Other	$17.52	$22.15	$22.15
Scraper Operator	$17.52	$22.15	$22.15
Servicer	$23.75	$23.75	$23.75
Sign Erector	$17.52	$22.15	$22.15
Spreader Box Operator	$19.31	$22.15	$22.15
Structural Steel Worker	$19.29	$22.15	$22.15
Traffic Signal Installer/Light Pole Worker	$21.99	$22.15	$22.15
Trenching Machine Operator, Heavy	$18.48	$22.15	$22.15
Truck Driver Tandem Axle Semi-Trailer	$21.71	$22.15	$22.15
Truck Driver, Lowboy/Float	$25.96	$25.96	$25.96
Truck Driver, Single Axle	$19.70	$22.15	$22.15
Truck Driver, Off Road Hauler	$17.52	$22.15	$22.15
Truck Driver, Single or Tandem Axle Dump	$20.91	$22.15	$22.15
Welders	$23.38	$23.38	$23.38
Work Zone Barricade Servicer	$17.75	$22.15	$22.15

The Wage Compliance information detailed below was excerpted from DOL General Decisions TX20260291 and TX20230007 or other sources.

1. ADDITIONAL TRADE INFORMATION

Unlisted classifications needed for work not listed within the scope of the classifications listed may be added upon the advance approval of Contract Procurement. CONTRACTOR shall submit to City of Austin Contract Procurement the following: classification, a bona fide definition of work to be performed and a proposed wage with sample payrolls conforming to area practice **prior** to the start of the job for that type of work. Proposed trade may not be performed by any trade already listed.

2. WAGES

The Total Minimum Wage Rate may be met by any combination of cash wages and credible "bona fide" fringe benefits paid for by the employer. Overtime must be used in computing overtime pay. Wages must be calculated using the Total Minimum Wage Rate specified in the Wage Rate Determination or the actual basic rate of pay, whichever is higher.

City of Austin Ordinance No. 2016324-015 requires that construction workers are paid a minimum Wage of at least $22.15/hour. The cash portion of their compensation must meet or exceed this amount.

3. PROPER DESIGNATION OF TRADE

A work classification from the Prevailing Wage Poster for each worker must be made based on the actual type of work he/she performed on the job. In summary the work performed, not the "title" determines the correct worker classification and wage. Each worker must be paid no less than the adjusted wage rate on the wage decision for that classification **regardless** of his/her level of skill (exclusive of a bona fide apprentice currently registered in a DOL approved apprentice program - proof of individual registration must be supplied in advance to the City of Austin).

4. SPLIT CLASSIFICATION

If a firm has employees that perform work in more than one classification, it can pay the adjusted wage rates specified for each classification ONLY if it maintains accurate time records showing the amount of time spent in each classification. If accurate time records are not maintained, these employees must be paid the highest adjusted wage rate of all the classifications of work performed by each worker. Accurate time records tracking how many hours a worker performed the work of one trade and then switched to another trade must be accounted for on a daily basis and reflected on Employer Certified Payroll accordingly.

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

Workers in this classification may be entitled to a higher minimum wage under Executive Order 13658 ($13.65). Please see the Note at the bottom of the wage determination for more information.

==========

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

In the listing above, the "SU" designation means that rates listed under the identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be prevailing.

5. WAGE DETERMINATION APPEALS PROCESS

5.1 Has there been an initial decision in the matter? This can be:

.1 A survey underlying a wage determination

.2 An existing published wage determination

.3 A Wage and Hour Division letter setting forth a position on a wage determination matter

.4 A conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in **.2** and **.3** should be followed.

5.2 With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations via Email: BCWD-Office@dol.gov or Write to:

Branch of Construction Wage Determination
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W. Washington, DC 20210

5.3 If the answer to the question in **.1** is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7) via Email: dba.reconsideration@dol.gov or Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W. Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

5.4 If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W. Washington, DC 20210

5.5 All decisions by the Administrative Review Board are final.

END

EMPLOYER WAGE THEFT CERTIFICATION FORM

Any Employer that submits an offer to the City seeking award of a city contract prior to awarding a contract are required to certify that they have not been adjudicated for certain offenses related to wage theft. See City of Austin Ordinance No. 20221201-031. "Wage theft" and "adjudicated" are to be understood per the definitions set forth in Austin City Code Chapter 4, § 4-22-1 (G) and (H).

Solicitation or Agreement Title: _____

Solicitation Posting Date or Agreement Start Date: _____

All Employers are required to complete the City of Austin Wage Theft Training within 30 days of being awarded a contract with the City. Contact the Wage Theft Coordinator to register for a class at wagetheft@austintexas.gov.

I hereby certify, under penalty of perjury under the laws of the State of Texas, that the below certification is true and correct and that I am authorized to make the following certification on behalf of the firm listed herein.

CERTIFICATION:

This firm has NOT been adjudicated for wage theft related incidents as defined in Austin City Code Chapter 4, § 4-22-1 (G) & (H) within five (5) years prior to the above-stated date. Furthermore, this firm agrees to abide by the items outlined in Section 4-22-5 (B) and Section 4-22-6 (A) of the Austin City Code.

Firm Name: _____
Name of Employer - Print Full Legal Entity Name of Firm

Signed: _____ _____
Signature of Authorized Person — Print Name of Person Making Certification for Firm

Title: _____ Place: _____
Title of Person Making Certificate — Print City and State Where Signed

Date: _____

CONSTRUCTION TRAINING PROGRAM REQUIREMENTS
Section 00840

The **City of Austin (OWNER) Construction Training Program (CTP)** is intended to train workers on City construction projects to develop a pool of qualified, ready-to-work skilled and semi-skilled construction workers and promote local economic opportunities.

CTP Requirements. The CTP is required for all City construction projects with a total solicitation value of $500K and above as shown in **Chart A** below. The requirements will be established prior to solicitation, or during contract negotiations depending upon solicitation type. Exceptions to the trainee requirement can be considered based on the criteria outlined in **Chart B** below.

Chart A. CTP Trainee Requirements

Total Solicitation Value	Trainee Requirement	Trainees must be a Current Enrollee, or Graduate* of a COA Approved:
$500K - $2.5M	2	• Pipeline Organization or • DOL-Registered/Approved/Certified Apprenticeship, OJT, or Bilingual Training Program
Over $2.5M - $5M	4	• Pipeline Organization or • DOL-Registered/Approved/Certified Apprenticeship, OJT, or Bilingual Training Program
Over $5M - $10M	6	• Pipeline Organization or • DOL-Registered/Approved/Certified Apprenticeship, OJT, or Bilingual Training Program
Over $10M	15% of Total Workforce or a minimum of 10, whichever is greater	• DOL-Registered/Certified Apprenticeship or Bilingual Training Program for Vertical (BC) • DOL-Approved/Certified OJT or Bilingual Training Program for Horizontal (HH) Projects

* Graduates cannot satisfy more than 50% of the trainee requirement

Chart B. CTP Criteria for Consideration of Exceptions to Trainee Requirements

1. Material Cost vs. Labor Cost
2. Scope of Work
3. Project Duration and Schedule
4. Availability of Training Opportunities
5. Other Circumstances Presented

1. DEFINITIONS

1.1 **Apprentice** – a worker currently enrolled in a DOL-Registered Apprenticeship Program.

1.2 **Apprentice Graduate** – a graduate of a DOL-Registered Apprenticeship or DOL-Certified Bilingual Training Program.

1.3 **Apprenticeship Program** – a training program used to meet CTP requirements that is registered with the DOL conforming to 29 CFR Part 30.

1.4 **DOL** – The Department of Labor is cabinet-level department of the U.S. Federal Government whose mission is to foster, promote, and develop the welfare of the wage earners, job seekers, and retirees of the United States; improve working conditions; advance opportunities for profitable employment; and assure work-related benefits and rights.

1.5 **Horizontal Construction/Heavy & Highway (HH) Project** – civil construction, such as roads, bridges, and utilities.

1.6 **Journeyman** – a fully-trained tradesperson, who may or may not have completed apprenticeship training through a DOL-Registered Apprenticeship Program.

1.7 **Labor Forecast** – a template provided by the OWNER for projects with a total solicitation value above $10M and used by the CONTRACTOR to forecast the project's workforce, including those of all subcontractors. The Labor Forecast is submitted with the required Training Plan and is used by the OWNER to determine the 15% trainee requirement.

1.8 **On-The-Job-Training (OJT) Program** – a training program used to meet CTP requirements that is registered by the DOL conforming to 29 CFR Part 5.16.

1.9 **Pipeline Organizations** – These organizations are approved by the OWNER to meet CTP requirements for projects with a total solicitation value of $10M or below and can provide upskilled training to a contractor's current workforce, or staff augmentation as needed.

1.10 **Procurement Programs Division (PPD)** – The City of Austin's Division responsible for administration of the Construction Training Program.

1.11 **Trainee** – individuals enrolled in, or graduate of, a DOL-Registered Apprenticeship Program, a DOL-Approved OJT Program, DOL- Certified Bilingual Training Program, or OWNER approved Pipeline Organization.

1.12 **Training Plan** – provided by the OWNER and used by the CONTRACTOR to identify how they intend to meet the CTP requirements. This is required to be reviewed and approved by the OWNER prior to issuance of Notice to Proceed.

1.13 **Training Report** – provided by the OWNER and used by the CONTRACTOR to document the hours worked for each trainee. This is required to be submitted monthly to be reviewed for compliance and approved by the OWNER until substantial completion is met.

1.14 **Upskill Employee** – a current employee of a contractor's workforce enrolled in training at an OWNER approved Pipeline Organization for the intent of expanding their existing skill set.

1.15 **Vertical Construction/Building Construction (BC) Project** – a project which includes significant vertical structural components or buildings requiring building construction trades.

1.16 **Workforce** – the number of workers to be employed on the project to include those employed by subcontractors.

2. **TRAINING REQUIREMENTS**

2.1 For projects with a total solicitation value of $10M or below, trainees must be enrolled in an OWNER approved Pipeline Organization, or a current enrollee or graduate of a DOL-Registered Apprenticeship Program, DOL-Approved OJT Program, or DOL-Certified Bilingual Training Program. The required number of trainees are determined by Chart A and graduates may not satisfy more than half of the training requirement.

2.2 Trainees enrolled in a DOL-Registered Apprenticeship Program, DOL-Approved OJT Program, or DOL-Certified Bilingual Training Program must at least be paid the prevailing wage rate as specified in the DOL Program for that trade but may NOT be paid less than the City's Approved Minimum Wage Rate.

2.3 Trainees enrolled in training with an OWNER approved Pipeline Organization must at least be paid the City's Approved Minimum Wage Rate.

2.4 The trainee requirement for this project is 6.

3. **CONTRACTOR'S RESPONSIBILITIES**

3.1 The CONTRACTOR shall provide a Training Plan to the OWNER for review and approval within **10 business days** of the contract award by council and will not be granted Notice to Proceed until the Training Plan is approved by the OWNER.

3.2 The CONTRACTOR shall submit the first Training Report to OWNER no later than 30 calendar days after issuance of Notice to Proceed and then monthly thereafter until substantial completion on the project is met. If a Trainee is no longer working on the project, the CONTRACTOR is required to make a reasonable effort to replace the Trainee within 30 calendar days.

3.3 The CONTRACTOR shall submit to OWNER proof of training completion or program enrollment as outlined below:

3.3.1 A certificate of training from an OWNER approved Pipeline Organization upon completion of training.

3.3.2 Proof of Trainee enrollment/graduation from a DOL-Registered Apprenticeship Program, DOL-Approved OJT Program, or DOL-Certified Bilingual Training Program no later than 30 calendar days after issuance of Notice to Proceed.

3.4 Trainees enrolled in an OWNER approved Pipeline Organization must complete a minimum of one training course. **NOTE: OSHA-10 certification is a COA requirement, therefore, OSHA-10 does not meet the training requirements of the CTP.**

3.5 Trainees enrolled in a DOL Program do not require additional training outside of what is provided by the DOL-Registered Apprenticeship Program, DOL-Approved OJT Program, or DOL-Certified Bilingual Training Program.

3.6 If a subcontractor is used, the CONTRACTOR shall determine if the requirements of the CTP will be assumed by the subcontractor; however, the CONTRACTOR retains responsibility for submitting all required documentation as outlined in this section of the contract.

3.7 The CONTRACTOR is required to contact OWNER approved Pipeline Organizations and/or DOL Programs (as applicable)to coordinate training opportunities from the lists provided on the COA Vendor Services Website.

4. **COMPLIANCE**

4.1 To meet CTP requirements, the CONTRACOR shall submit the required documentation as outlined above in section 3.

4.2 If there are fewer trainees employed on the project than specified in the OWNER approved Training Plan, the CONTRACTOR must submit evidence of Reasonable Efforts to Comply with the CTP requirements including email of training opportunities/recruitment efforts, or additional supporting documentation as applicable.

4.3 A lack of demonstrated Reasonable Efforts to Comply with the CTP will be reflected in the Contractor's Performance Evaluation and may impact future business opportunities with the City of Austin.

Notice to Bidders: *This form, Addendum, Section 00900, is included for your information only. If an actual Addendum is issued for this project, the format shown below will be used. Additionally, issued addenda will be bound at the beginning of the Project Manual following the Table of Contents at the time of contract execution.*

ADDENDUM NO. _____

Date _____, _____

City of Austin

Project Name _____

C.I.P. No. _____ IFB No.: _____

This Addendum forms a part of the Contract and corrects or modifies original Bid Documents, issued on _____, ____. **Acknowledge receipt of this addendum in space provided on bid form.** Failure to do so may subject bidder to disqualification.

A. Project Manual Revisions:

B. Drawing Revisions:

This addendum consists of ____ page(s)/sheet(s).

_____
Approved by OWNER

_____
Approved by ENGINEER/ARCHITECT (as applicable per license requirements)

END

SAMPLE

The Work of this Contract includes sustainability requirements as shown in the Division 1 Sections 01352 and/or 01505 and all other applicable specification sections. It is the intent of the Owner to work in partnership with the Contractor in implementing sustainable construction practices to the greatest extent possible.

PART 1 - GENERAL

1.1. RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General Conditions, Section 00700, and Supplemental General Conditions, Section 00810, and Division 1 requirements.

1.2. DESCRIPTION OF WORK

1.2.1. Scope of Work

A. This section describes the Project in general and provides an overview of the extent of the Work to be performed by the CONTRACTOR. Detailed requirements and extent of Work is stated in the applicable Specification Sections and shown on the Drawings. CONTRACTOR shall, except as otherwise specifically stated herein or in any applicable part of these Contract Documents, provide and pay for all labor, materials, equipment, tools, construction equipment, and other facilities and services necessary for proper execution, testing, and completion of the Work.

B. Any part or item of the Work which is reasonably implied or normally required to make the installation satisfactorily operable shall be performed by the CONTRACTOR and the expense thereof shall be included in the applicable unit prices or lump sum prices bid for the Work. It is the intent of these Specifications to provide the OWNER with the complete system. All miscellaneous appurtenances and other items of Work that are incidental to meeting the intent of the Specifications shall be considered as having been included in the applicable unit prices or lump sum prices bid for the Work even though these appurtenances and items may not be specifically called for in the Bid Documents.

C. The Work shall include furnishing all tools, labor, materials, equipment, and miscellaneous items necessary for the complete construction of stormdrain, roadway, and utility improvements associated with the installation of a new stormdrain trunk line spanning from Walnut Avenue to Alexander Avenue along Manor Road and connecting to systems along Larry Lane, Merrie Lynn, and Randolph Road.

1.2.2. Location of Project

A. The Project begins on Alexander Avenue about 200 feet south of Manor Road, to Manor Road, then West along Manor Road to Walnut Avenue. The project also includes areas along Larry Lane, Merrie Lynn, and Randolph Road. The project location/route is shown on the Drawings.

1.2.3. Contractor's Responsibilities

A. Execute all Work, including excavation, installing pipe, backfill, miscellaneous concrete and testing. The Work of this Contract is specified in the City of Austin Standard Specifications, Special Provisions and Special Specifications listed in the Table of Contents.

B. Secure all construction-related permits, other than those provided by OWNER as described in paragraph 6.6 of Section 00810, Supplemental General Conditions, and pay for the same.

C. Arrange for the necessary temporary water and electric service and pay for these services and all water and electricity consumed during the construction Work.

D. Provide adequate temporary sanitary facilities.

1.2.4. Easements and Rights-Of-Way

CONTRACTOR shall confine his construction operations within the limits indicated on the Drawings, and shall use due care in placing construction tools, equipment, excavated materials, and pipeline materials and supplies so as to cause the least possible damage to property and interference with traffic. If the CONTRACTOR requires additional easement for his operations, the CONTRACTOR is solely responsible for acquisition and maintenance of the easement. No additional compensation will be provided by the OWNER.

A. **Easements -** Easements across private property are indicated on the Drawings. CONTRACTOR shall set stakes to mark the boundaries of construction easement across private property. The stakes shall be protected and maintained until completion of construction and cleanup.

B. **Rights-of-Way -** Permits for Work in rights-of-way shall be obtained by the CONTRACTOR. All Work performed and all operations of CONTRACTOR, his employees, or subcontractors, within the limits of railroad and highway rights-of-way, shall be in conformity with the requirements and be under the control (through OWNER) of the railroad or highway authority owning, or having jurisdiction over and control of, the right-of-way in each case.

1.2.5. Operation of Existing Facilities

Existing water and wastewater facilities shall be kept in continuous operation throughout the construction period. No interruption will be permitted which adversely affects the degree of service provided. Provided permission is obtained from OWNER in advance, portions of the existing facilities may be taken out of service for short periods corresponding with periods of minimum service demands.

CONTRACTOR shall provide temporary facilities and make temporary modifications as necessary to keep the existing facilities in operation during the construction period.

1.2.6. Connections to Existing Facilities

Unless otherwise specified or indicated, CONTRACTOR shall make all necessary connections to existing facilities including structures, drain lines, and utilities. In each case, CONTRACTOR shall receive

permission from OWNER or the owning utility prior to undertaking connections. CONTRACTOR shall protect facilities against deleterious substances and damage.

Connections to existing facilities which are in service shall be thoroughly planned in advance, and all required equipment, materials and labor shall be on hand at the time of undertaking the connection. Work shall proceed continuously (around the clock) if necessary to complete connections in the minimum time. Operation of valves or other appurtenances on existing utilities, when required, shall be by or under the direct supervision of the owning utility.

1.2.7. Unfavorable Construction Conditions

No portion of the Work shall be constructed under conditions which adversely affect the quality or efficiency thereof, unless special means or precautions are taken by CONTRACTOR to perform the Work in a proper and satisfactory manner.

END

1. CONTRACTOR shall perform all layout work to transfer all controls for grades, lines, levels and measurements from a minimum of two reference points provided by OWNER. All survey work will be performed under the direct supervision of a Texas Registered Professional Land Surveyor (RPLS).

2. Within 5 work days of the Notice To Proceed date, or within 10 Working Days of initiating work based on the approved Schedule in a new area of the Project, the CONTRACTOR shall survey and stake the locations of all proposed improvements behind the curb and within the ROW (examples: manholes, storm inlets, fire hydrants, etc.), or any other improvements identified by the OWNER'S REPRESENTATIVE, for the purpose of identifying the nature and location of these improvements to the adjacent property owner(s). The OWNER'S REPRESENTATIVE will identify to the CONTRACTOR the improvements to be staked.

3. OWNER will not stake for construction and will not be on site for survey layout activities, except to perform quality control checks.

4. CONTRACTOR shall be required to set elevation hubs (blue tops) for subgrade and base course on centerline, at quarter points and curb lines or edge of pavement at intervals not exceeding 50 feet.

5. The construction plans will include horizontal and vertical control points. References to approved COA benchmarks used in establishing controls on the drawings will be provided by the Owner's E/A. In addition, on building projects and/or projects not built within an existing public ROW, a boundary survey will be supplied together with a legal description of the property and all easements where Work will take place.

6. CONTRACTOR shall submit construction staking layout sheets sealed by a Professional Engineer or Registered Professional Land Surveyor registered in the State of Texas. CONTRACTOR shall use a qualification based selection process consistent with the Professional Services Procurement Act, Chapter 2254.004 of the Texas Government Code, when securing the services of a Professional Engineer or Registered Professional Land Surveyor. It is a violation of State Law to solicit bids for the services of a Professional Engineer of Registered Professional Land Surveyor.

   6.1 Any discrepancies found with the construction documents' dimensional layout will be corrected. CONTRACTOR shall assure that the Owner's Representative and E/A are notified so that the appropriate actions are taken to correct the Contract drawings.

   6.2 All Work shall be done to the lines, grades and elevations indicated on the drawings. Information concerning basic horizontal and vertical control points will be provided by the E/A, Freese and Nichols, INC. . These points shall be used as the datum basis under this Contract.

   6.3 All work to transfer all controls for grades, lines, levels, layout and measurements shall be performed under the supervision of a Texas Registered Professional Land Surveyor, provided by the CONTRACTOR. Such work shall conform to the standards for construction staking in the most recent edition of the Texas Society

of Professional Surveyors Manual of Practice for Land Surveying, Category 5, Sections 1-12 inclusive.

6.4 The centerline and offset centerline stakes will be set at no greater than fifty (50) foot intervals on both sides of the right-of-way and at points of alignment or grade changes. References to lines and grades as established by the CONTRACTOR's surveyor shall be in reference to these stake lines. The CONTRACTOR is required to provide a sealed statement from their RPLS that the controls are correct and the site layout has been done by their professional staff.

6.5 The CONTRACTOR shall place grade stakes and submit construction staking layout sheets. The CONTRACTOR shall allow a minimum of ten (10) days after submission to the Owner's Representative for review of construction staking layout sheets. Construction staking layout sheets shall include, at a minimum, the information contained in the form included at the end of this section. No Work shall be performed without Owner's Representative review and return to CONTRACTOR of construction staking layout sheets. The Owner's Representative, E/A and the CONTRACTOR shall review the survey controls on the ground.

6.6 Prior to any excavation, the CONTRACTOR shall establish the elevation to top of ground at centerline of the pipe as well as cuts and offset stakes at the distance deemed appropriate by the CONTRACTOR to preclude disturbance of offset stakes during construction. The CONTRACTOR shall set all blue tops for subgrade and base courses on centerline at quarter points, at curb lines or edge of pavement, and other points that may be indicated on the Drawings, all at intervals not to exceed 50 feet.

6.7 The CONTRACTOR shall furnish, without charge, experienced personnel and such calibrated survey equipment, tools, stakes, and other materials that the Owner's Representative may require in establishing or checking control points, or in checking survey, layout, and measurement work performed by the CONTRACTOR.

6.8 The CONTRACTOR shall keep the Owner's Representative informed in a reasonable time in advance of the times and places at which they wishes to do work, so that any checking deemed necessary by the OWNER may be done with minimum inconvenience to the E/A and minimum delay to the CONTRACTOR. Surveying will be coordinated between the Owner's Representative and CONTRACTOR in a manner convenient to both.

6.9 During layout, CONTRACTOR shall field verify the elevation and alignment of all tie-in points to existing infrastructure. This work shall be performed sufficiently in advance of construction so that any conflicts may be resolved without delay. Any work done without being properly located may be ordered removed and replaced at the CONTRACTOR's expense.

6.10 The CONTRACTOR shall carefully preserve all monuments, benchmarks, reference points, and stakes. In case of the destruction thereof, the CONTRACTOR shall bear the cost of replacement and shall be responsible for any mistake or loss of time that may be caused. Permanent monuments or benchmarks, which must be removed or disturbed, shall be protected until properly referenced for relocation. The CONTRACTOR shall furnish materials and assistance for the proper replacement of such monuments or benchmarks.

6.11 The CONTRACTOR shall satisfy themselve before commencing work as to the meaning and correctness of all survey control stakes, marks, etc., and no claim will be entertained by the OWNER for or on account of any alleged inaccuracies, unless the CONTRACTOR notifies the OWNER in writing before commencing the affected Work.

7. As needed for necessary documentation of the work progress, the CONTRACTOR shall maintain and/or protect offset or survey staking for the duration of the project. Any re-staking required to meet this requirement shall be done at the CONTRACTOR'S expense.

8. This item is subsidiary to the work as a whole.

9. Upon completion of construction, or at intervals specified in the Contract, CONTRACTOR shall provide a record survey of the work in progress or completed. This information will be submitted to the Owner's Representative and shall be supplied electronically and on a separate full size plan sheet to be transmitted to the E/A for evaluation and merging into the Record Drawings.

End See attached "Construction Staking Layout Sheet"

CONSTRUCTION STAKING LAYOUT SHEET

Project Name: _____ **Date:** _____
C.I.P. ID#: _____ **Instrument No.:** _____
Person Recording: _____ **Weather Conditions:** _____
Crew Members: _____
General Purpose & Scope of Survey: _____

STATION	B.S.	H.I.	F.S.	LEVEL LOOP ELEVATION	ROD READING	HUB ELEVATION AT STATION	(TARGET) (eg., pipe invert) ELEVATION	C - CUT OR F - FILL	% GRADE	NOTES: INDICATE WHETHER CENTERLINE HUB OR _____ FT. OFFSET HUB

DEFINITIONS

General: Basic Contract definitions are included in the General Conditions, Section 00700 included herein.

Approved: The term approved, when used in conjunction with the Owner's Representative's action on the CONTRACTOR'S submittals, applications, and requests, is limited to the Owner's Representative's duties and responsibilities as stated in the Conditions of the Contract. A stamp reading "No Exceptions Taken" shall have the same intent as "Approved".

Furnish: The term furnish means supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

Indicated: The term indicated refers to graphic representations, notes, or schedules on the Drawings, or other paragraphs or schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as shown, noted, scheduled, and specified are used to help the reader locate the reference. There is no limitation on location.

Install: The term install describes operations at the Project site including the actual unloading, unpacking, assembly, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

Installer: An Installer is the CONTRACTOR or another entity engaged by the CONTRACTOR, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in operations they are engaged to perform.

Project Site: The space available to the CONTRACTOR for performing construction activities either exclusively or in conjunction with others performing other work as part of the Project. The extent of the Project site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.

Provide: The term provide means to furnish and install, complete and ready for the intended use.

Regulations: The term regulations includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

Trades: Using terms such as carpentry is not intended to imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as carpenter. It also does not imply that requirements specified apply exclusively to trades persons of the corresponding generic name.

INDUSTRY STANDARDS

Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

Publication Dates: Comply with the standards in effect as of the date of the Contract Documents.

Conflicting Requirements: Where compliance with two or more standards is specified and where the standards may establish different or conflicting requirements for minimum quantities or quality levels, refer to the Owner's Representative for a decision before proceeding.

Copies of Standards: Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

Abbreviations and Names: Trade association names, titles of general standards, and names and titles of government agencies are frequently abbreviated. Where such acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards-generating organization, authority having jurisdiction, or other entity applicable to the context of the text provision. Refer to the "Encyclopedia of Associations," published by Gale Research Co., available in most libraries.

AA	Aluminum Association
AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturer's Association
AAN	American Association of Nurserymen.
AASHTO	American Association of State Highway and Transportation Officials.
AATCC	American Association of Textile Chemists and Colorists
ACI	American Concrete Institute
ACIL	American Council of Independent Laboratories
ACPA	American Concrete Pipe Association
ADC	Air Diffusion Council
AFBMA	Anti-Friction Bearing Manufacturers Association
AGA	American Gas Association
AGC	Associated General Contractors of America
AGMA	American Gear Manufacturers Association
AHA	American Hardboard Association
AHAM	Association of Home Appliance Manufacturers
AI	Asphalt Institute
AIA	American Institute of Architects
AIHA	American Industrial Hygiene Association
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction.
ALCA	Associated Landscape Contractors of America
ALI	Associated Laboratories, Inc.
ALSC	American Lumber Standards Committee
AMCA	Air Movement and Control Association
ANSI	American National Standards Institute.

AOAC	Association of Official Analytical Chemists
AOSA	Association of Official Seed Analysts
APA	American Plywood Association
API	American Petroleum Institute.
AREA	American Railroad Engineers Association
ARI	Air Conditioning and Refrigeration Institute
ARMA	Asphalt Roofing Manufacturers Association
ASA	Acoustical Society of America
ASA	American Standards Association.
ASC	Adhesive and Sealant Council
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating & Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASPE	American Society of Plumbing Engineers
ASSE	American Society of Sanitary Engineering
ASTM	American Society for Testing and Materials.
AWCMA	American Window Covering Manufacturers Association
AWG	American Wire Gage
AWI	Architectural Woodwork Institute
AWPA	American Wood Preservers Association
AWPB	American Wood Preservers Bureau
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Institute of America
BIFMA	Business and Institutional Furniture Manufacturers Association
CAGI	Compressed Air and Gas Institute
CAUS	Color Association of the United States
CBM	Certified Ballast Manufacturers

CCC	Carpet Cushion Council
CDA	Copper Development Association
CE	Corps of Engineers
CFR	Code of Federal Regulations
CGA	Compressed Gas Association
CISCA	Ceiling and Interior Systems Construction Association
CISPI	Cast Iron Soil Pipe Institute
CPSC	Consumer Product Safety Commission
CRI	Carpet and Rug Institute
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standard of NBS (U.S. Dept. of Commerce)
CTI	Ceramic Tile Institute
DFPA	Douglas Fir Plywood Association
DHI	Door and Hardware Institute
DLPA	Decorative Laminate Products Association
DOC	U.S. Department of Commerce
DOT	Department of Transportation
ECSA	Exchange Carriers Standards Association
EIA	Electronic Industries Association
EIMA	Exterior Insulation Manufacturers Association
EJMA	Expansion Joint Manufacturers Association
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FGMA	Flat Glass Marketing Association
FHA	Federal Housing Administration
FM	Factory Mutual Research Organization
FS	Federal Specifications
FSC	Forest Stewardship Council
FTI	Facing Tile Institute
GA	Gypsum Association

GSA	General Services Administration
HEI	Heat Exchange Institute
HI	Hydronics Institute
H.I.	Hydraulic Institute
HMA	Hardwood Manufacturers Association
HPMA	Hardwood Plywood Manufacturers Association
IBD	Institute of Business Designers
ICEA	Insulated Cable Engineers Association, Inc.
IEEE	Institute of Electrical and Electronic Engineers, Inc.
IESNA	Illuminating Engineering Society of North American
IGCC	Insulating Glass Certification Council
ILI	Indiana Limestone Institute of America
IMSA	International Municipal Signal Association
IRI	Industrial Risk Insurers
ISA	Instrument Society of America
ITE	Institute of Transportation Engineers
LEED™	Leadership in Energy and Environmental Design
LIA	Lead Industries Association, Inc.
LPI	Lightning Protection Institute
MBMA	Metal Building Manufacturer's Association
MCAA	Mechanical Contractors Association of America
MFMA	Maple Flooring Manufacturers' Association
MIA	Marble Institute of America
ML/SFA	Metal Lath/Steel Framing Association
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry
MUTCD	Texas Department of Transportation Manual on Uniform Traffic Control Devices
NAAMM	National Association of Architectural Metal Manufacturers
NAIMA	North American Insulation Manufacturers Association
NAPA	National Asphalt Pavement Association

NBFU	National Board of Fire Underwriters
NBGQA	National Building Granite Quarries Association
NBS	National Bureau of Standards (U.S. Dept. of Commerce)
NCMA	National Concrete Masonry Association
NCRPM	National Council on Radiation Protection and Measurements
NCSPA	National Corrugated Steel Pipe Association
NEC	National Electrical Code (Published by NFPA)
NECA	National Electrical Contractors Association
NEII	National Elevator Industry, Inc.
NEMA	National Electrical Manufacturers Association
NETA	International Electrical Testing Association
N.F.P.A.	National Forest Products Association
NFPA	National Fire Protection Association
NHLA	National Hardwood Lumber Association
NIST	National Institute of Standards and Technology
NLGA	National Lumber Grades Authority
NOFMA	National Oak Flooring Manufacturers Association
NPA	National Particleboard Association
NPCA	National Paint and Coatings Association
NRCA	National Roofing Contractors Association
NWMA	National Woodwork Manufacturers Association
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Precast/Prestressed Concrete Institute
PDI	Plumbing and Drainage Institute
PE	Professional Engineer
REA	Rural Electrification Administration
RFCI	Resilient Floor Covering Institute
RMA	Rubber Manufacturing Association
RPLS	Registered Professional Land Surveyor
SDI	Steel Deck Institute

S.D.I.	Steel Door Institute
SFPA	Southern Forest Products Association
SGCC	Safety Glazing Certification Council
SIGMA	Sealed Insulating Glass Manufacturers Association
SJI	Steel Joist Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SPIB	Southern Pine Inspection Bureau
SPRI	Single Ply Roofing Institute
SSPC	Steel Structures Painting Council
SSPMA	Sump and Sewage Pump Manufacturers Association
SWI	Steel Window Institute
SWPA	Submersible Wastewater Pump Association
TCA	Tile Council of America
TEX TEST	TxDOT Laboratory Test
TIMA	Thermal Insulation Manufacturers Association
TPI	Truss Plate Institute
TxDOT	Texas Department of Transportation
UL	Underwriters Laboratory, Inc.
USDA	U. S. Department of Agriculture
USGBC	U. S. Green Building Council
USPS	U. S. Postal Service
WCLIB	West Coast Lumber Inspection Bureau
WCMA	Wallcovering Manufacturers Association
WIC	Woodwork Institute of California
WLPDIA	Western Lath, Plaster, Drywall Industries Association
WRI	Wire Reinforcement Institute
WSC	Water Systems Council
WSFI	Wood and Synthetic Flooring Institute
WWPA	Western Wood Products Association
W.W.P.A.	Woven Wire Products Association

END

STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

The Storm Water Pollution Prevention Plan for this project is attached.

STORMWATER POLLUTION PREVENTION PLAN

TEXAS POLLUTANT DISCHARGE ELIMINATION SYSTEM
CONSTRUCTION GENERAL PERMIT TXR150000

Prepared for:

Freese and Nichols, Inc.
10431 Morado Circle, Suite 300
Austin, TX 78759

MLK TOD Stormwater Conveyance Improvements – Phase 3

Project Name

City of Austin Permit No.

May 19, 2025

Plan Date

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Note to Users and Reviewers:

The format of this plan is based upon:

- *Texas Commission on Environmental Quality, Construction General Permit (CGP) Stormwater Pollution Prevention Plan Worksheets, May 2023. The project specific information has been inserted onto the worksheets as provided by TCEQ and noted with "CGP Part #"; and,*
- *City of Austin, Texas, Environmental Criteria Manual, Appendix P-1, Erosion Control Notes.*

The information from the Contractor (to be inserted after contract award) is highlighted in yellow in this SWPPP.

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Appendices

APPENDIX A: Erosion & Sedimentation Control Plan (City of Austin, Appendix P-1)
APPENDIX B: Location Map
APPENDIX C: Certificate and Site Notice
APPENDIX D: TPDES Construction General Permit No. TXR 150000
APPENDIX E: Inspection of Controls and Corrective Action Report/ Certification Form
(Includes City of Austin, Appendix P-8 form items)
APPENDIX F: SWPPP Amendment and Update Log (City of Austin, Appendix P-9 form)
APPENDIX G: Record of Construction Activity (City of Austin, Appendix P-8 form)
APPENDIX H: Inspector Certifications (as per City of Austin, Appendix P-1)
APPENDIX I: Dewatering Observation and Evaluation

A. CERTIFICATION PAGE

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signatories will be authorized as required by 30 TAC §305.44(b).

Primary Operator:
The primary operator with on-site day-to-day operational control of those activities at the construction site that are necessary to ensure compliance with the Stormwater Pollution Prevention Plan (SWPPP) and the Texas Pollutant Discharge Elimination System (TPDES) Construction General Permit TPDES TXR150000 for the site or other permit conditions is:

CONTRACTOR

Signed: _____ Date: _____ TPDES #: _____

Name: _____

Title: _____

Secondary Operator (if applicable):
The Secondary Operator with the ability to approve or disapprove changes to construction plans and specifications, but who does not have day-to-day on-site operational control over construction activities at the site is:

Signed: _____Date: _____

Name: _____

Title: _____

Other Primary Operator (if applicable):

Signed: _____ Date: _____ TPDES #: _____

Name: _____

Title: _____

B. DELEGATION OF SIGNATORIES

The Texas Commission on Environmental Quality (TCEQ) requires that authorized personnel sign reports, SWPPPs, certifications, other information requested by the Executive Director, or required by the general permit, as set forth by 30 TAC 305.128. The Contractor will submit a letter to the TCEQ delegating signatories that will sign the weekly and/or post-rain inspection reports and provide a copy of this letter on the next page.

Small construction site operators should submit the Delegation of Signatories form via mail.

Contractor is to insert copy of the letter sent to the TCEQ delegating signatories here.

C. CONTACT INFORMATION/RESPONSIBLE PARTIES

Owner(s) *Watershed Protection Department* *505 Barton Springs Road Ste. 1200* *Austin, TX 78704*	**Contractor** *Contractor Name* *Contractor Address* *Contractor Contact Info*
Owner's Representative Glen Taffinder *Watershed Protection Department* *505 Barton Springs Road Ste. 1200* *Austin, TX 78704* *(512) 974-3381*	**SWPPP Contacts** *Contractor SWPPP Contact* *Mobile phone #*
Design Engineer Kimberly Patak, PE *Freese and Nichols, Inc.* *10431 Morado Circle, Ste. 300* *Austin, TX 78759* *512-617-3100*	**Emergency 24-hour Contact** *Contractor SWPPP Contact* *Mobile Phone #*
Municipal Separate Storm Sewer System (MS4) *City of Austin* *TPDES_Coordinator@austintexas.gov* *Watershed Protection Department* *505 Barton Springs Road* *Austin, TX 78704*	

SITE DESCRIPTION

1. Nature of Construction and List of Pollutants

CGP Part III, Sect. F.1.(a)& (b)

The project includes the construction of new stormwater infrastructure throughout the Martin Luther King (MLK) Transit Oriented Development (TOD) area, as well as roadway reconstruction and water/wastewater relocations associated with the new stormwater infrastructure. Phase 3 includes work along Manor Road, Larry Lane, Merrie Lynn Avenue, Randolph Road, and Alexander Avenue.

POTENTIAL POLLUTANTS	SOURCE
Sediment in Runoff	Sheet flow over areas with soil disturbed by construction activities could increase the rate of erosion for loosened sediment which could be transported and deposited elsewhere, including fill or spoils.
Sediment Tracking	Construction vehicles, machinery, and/or heavy equipment entering the site and traversing unimproved roads could increase the rate of sediment displacement on site. Vehicles exiting the site could inadvertently transport sediment lodged in the tires, wheel wells, and undercarriage off-site as "track-out."
Dust	Airborne particulates could be generated from dislodged sediment caused from demolition, spoils, excavation, grading, and wind.
Demolition waste	Demolition of concrete, pavement, and storm drain.
Solid Waste	Trash, debris, material storage.
Concrete	Pouring for roadway, driveways, and sidewalks.
Fuel	On-site storage totes (if present), generators, and other equipment.
Hydraulic Fluids	On-site equipment.
Paint	Miscellaneous buckets and/or totes (if present).

2. Construction Schedule

CGP Part III Sect. F.1.(c)

The project schedule will depend on the available funding. The exact dates are unknown at this time.

Project Start Date:
Project Completion Date:

General Construction Sequence

This sequence of construction, modified from the COA Environmental Criteria Manual (ECM) Appendix P-4, is provided as a guideline. The Contractor will provide a work schedule to complete the work in the specified time while meeting the requirements of the contract documents (Appendix A). Contractor shall refer to the contract documents for additional items which may be required in addition to the list below.

1. Hold pre-construction conference.

2. Temporary erosion and sedimentation controls are to be installed as indicated on the approved site plan or subdivision construction plan and in accordance with the SWPPP that is required to be posted on the site. Install tree protection and initiate tree mitigation measures.

3. The environmental project manager or site supervisor must contact the Watershed Protection Department, Environmental Inspection, at 512.974.2278, 72 hours prior to the scheduled date of the required on-site preconstruction meeting.

4. The environmental project manager, and/or site supervisor, and/or designated responsible party, and the general contractor will follow the SWPPP posted on the site. Temporary erosion and sedimentation controls will be revised, if needed, to comply with City inspectors' directives and revised construction schedule relative to the water quality plan requirements and erosion plan.

5. Temporary erosion and sedimentation controls will be inspected and maintained in accordance with the SWPPP posted on the site.

6. Begin site clearing/construction (or demolition) activities.

7. Permanent water quality ponds or controls will be cleaned out and filter media will be installed prior to/concurrently with revegetation of site.

8. Complete construction and start revegetation of the site and installation of landscaping.

9. Upon completion of the site construction and revegetation of a project site, the design engineer shall submit an engineer's letter of concurrence to the Watershed Protection Department indicating that construction, including revegetation, is complete and in substantial conformity with the approved plans. After receiving this letter, the appropriate city inspector will schedule a final inspection.

10. Upon completion of landscape installation of a project site, the landscape architect shall submit a letter of concurrence to the Watershed Protection Department indicating that the required landscaping is complete and in substantial conformity with the approved plans. After receiving this letter, the appropriate city inspector will schedule a final inspection.

11. After a final inspection has been conducted by the city inspector and with approval from the city inspector, remove the temporary erosion and sedimentation controls and complete any necessary final revegetation resulting from removal of the controls. Conduct any maintenance and rehabilitation of the water quality ponds or controls.

3. Acreage, Material Storage, and Soil Type

CGP Part III, Sect. F.1.(d-e)

MATERIAL STORAGE	MATERIAL(S)	ACREAGE	LOCATION
Onsite	Concrete pipe and structures (i.e., junction boxes, manholes, inlets, etc.), water and wastewater utility pipe, excess backfill material, and temporary storage (not to exceed 1,000 Cubic Yards) of waste concrete and asphalt.	**Total Area** within the LOC: 3.05 • Paved Area: 2.15 • Unpaved Area: 0.90 • Area within the LOC that will not be disturbed: 0	Materials will be stored at the Staging and Storage Areas, APPENDIX A.
Offsite	N/A	N/A	N/A
Other areas used as part of the project	N/A	N/A	N/A
			Total acreage of disturbed soil: 3.05 Acres

CGP Part III, Sect. F.1.(e)

Soils and Slopes

According to the U.S. Department of Agriculture, Web Soil Survey, the native soils mapped in the project area comprises of three soil groups. The soil series description for this soil, as defined in the Travis County Soil Survey, is provided below.

Houston Black soils and Urban land, 0 to 8 percent slopes (HsD):

This soil group occupies ridges, foot slopes and urban areas. It consists of about 56 percent Houston Black clay, 30 percent Urban land, and about 14 percent other soils, including Heiden clay and Burleson clay. The Houston Black soils have a surface layer of very dark gray clay or gravelly clay about 30 inches thick. The next layer reaches about 75 inches and consists of dark-gray clay.

Urban land Austin and Brackett soils, 1 to 8 percent slopes (UtD):

This undifferentiated group occupies narrow ridges and side slopes. More than 80 percent of the acreage has slopes greater than 2 percent. Urban land makes up about 40 percent of the acreage, Austin soils, about 30 percent; Brackett soils, about 25 percent; and other soils, about 5 percent. Austin soils have a surface layer of very dark grayish-brown silty clay about 15 inches thick. Brackett soils have a surface layer of light brownish-gray clay loam about 6 inches thick. The next layer is light yellowish-brown clay loam about 8 inches thick. The underlying material is soft limestone. About 85 percent has been altered by cutting and shaping during urban development.

Lewisville soils and Urban land, 0 to 2 percent slopes (LeB):

This undifferentiated group occupies nearly level to gently sloping areas along stream terraces. It consists of about 68 percent Lewisville soils, about 25 percent Urban land, and about 7 percent other

soils. Undisturbed areas of Lewisville soils have a surface layer of grayish-brown silty clay about 12 inches thick. In places the surface layer is clay loam. The next layer is brown silty clay to a depth of about 30 inches. The underlying material is pale-brown silt loam. Where these soils are used for construction, slopes are so gentle that little or no cutting or filling is necessary. About 10 percent of the yard surfaces in the newer additions have a layer of about 2 to 4 inches of imported loamy materials. These thin foreign surface covers do not appreciably alter the basic characteristics of the Lewisville soils as they are used in urbanization.

References

Soil Conservation Service, 1974, Soil Survey of Travis County, Texas; U.S. Department of Agriculture, Soil Conservation Service, Washington D.C.

NRCS (Natural Resources Conservation Service), 2019. Web Soil Survey. Accessed online 2/28/2025. https://websoilsurvey.sc.egov.usda.gov/

4. Location Map

CGP Part III Sect. F.1.(f)

A project location map is provided in APPENDIX B.

5. Detailed Site Maps

CGP Part III Section. F.1.g(i)-(x)

Detailed site plan maps are provided in APPENDIX A.

6. Site Description – Construction Support Activities

CGP Part III Sect. F.1-(h)& (n)

Construction support activities are construction-related activities that specifically support construction activity, which can involve earth disturbance or pollutant-generating activities of its own. The table below lists the support activities providing support to the construction site that is authorized under the CGP.

CONSTRUCTION SUPPORT ACTIVITY	DESCRIPTION	LOCATION
Asphalt Plants	None	N/A
Concrete Plants	None	N/A
Rock Crushers	None	N/A
Equipment Staging and Storage Areas	Two Staging and Spoils storage areas are located within the LOC.	Near the intersection of Airport Boulevard and East Martin Luther King Boulevard. Shown in Appendix A.
Vehicle Repair or Fueling Areas	None	N/A
Chemical Storage Areas	None	N/A

Construction Support Activity	Description	Location
Material Storage Areas	Materials will be stored in designated areas throughout the Site.	To be determined by Contractor.
Material Borrow Areas	None	N/A
Excavated Material Disposal Areas	Excavated materials will be temporarily stockpiled and may be reused during construction.	To be determined by Contractor.

CGP Part III Sect. F.1-(i)

Name of Receiving Water	Will Receiving Water Be Disturbed?	Location of Receiving Water
Boggy Creek (TCEQ Segment ID 1428A)	No, see description below	0.1 miles east of the project area.

Runoff from paved rights-of-way flows overland and via storm sewer system into one segment within a mile of the site. This portion of Boggy Creek is not listed as an impaired waterway by the Environmental Protection Agency (EPA). Controls will be in place to prevent sediment from leaving the site.

References

https://www.tceq.texas.gov/assets/public/waterquality/swqm/assess/14txir/2014_303d.pdf
Texas Commission on Environmental Quality, Implementation Plan for Five TMDLs for Bacteria in Four Austin Streams, 2015.https://www.tceq.texas.gov/assets/public/waterquality/tmdl/101austinbacteria/101A_AustinIPlanApproved2015-01-21.pdf

7. Copies of Construction General Permit TXR150000 NOI, Certificate, Edwards Notification, Site Notice, and NOT

CGP Part III Sect. F.1 (j-l) and F.5

The disturbed acreage is **not greater than 5 acres**.

A Notice of Intent (NOI), Notice of Change (NOC), or Notice of Termination (NOT), and a Large Construction Site Notice **will not** be required for this site. A Small Construction Site Notice **will be** required for this site.

This site is **not** located within the TCEQ or Austin Edwards Aquifer recharge zone and it is not subject to Edwards Aquifer Protection Program requirements.

Appendix C is reserved for a copy of the construction site notice.
Appendix D includes a copy of the TXR150000 CGP.

BEST MANAGEMENT PRACTICES (BMPs)

8. BMPs – Erosion and Sedimentation Controls

CGP Part III Section F.2, F.3. and Part IV Section A

BMP Activity	Applicable BMP	Spec/ SWPPP Section	Applicable Plan Sheet
3.1 Minimize Disturbed Area, Protect Natural Features, and Protect Soil.	1. Tree protection will be installed to protect existing trees.	COA Spec 610S	ESC Plans and Details (APPENDIX A)
	2. Staging and Spoils Area is to be surrounded by Mulch Sock.	N/A	ESC Plans and Details, Staging Area Note 2 (APPENDIX A)
3.2 Control Stormwater Flowing Onto/Through the Site.	1. Where work is actively ongoing, place Triangular Filter Dike in front of all Storm Drain Inlets and Mulch Sock around both Staging Areas.	COA Spec 628S	ESC Plans and Details (APPENDIX A)
	2. Protect downstream limits of project with Triangular Filter Dike as appropriate within Traffic Control Setup.	N/A	ESC Plans and Details, Special Erosion Controls Note 9 (APPENDIX A)
3.3 Stabilize Soils.	1. All disturbed areas that are not landscaped will be sodded per COA specs for temporary vegetative stabilization.	COA Spec 604S, 606S, 609S	ESC Plans and Details (APPENDIX A)
3.4 Protect Slopes.	1. If disturbed area is not worked on for more than 14 days, then disturbed area needs to be stabilized by revegetation, mulch, tarp, or matting.	N/A	COA Environmental Criteria Manual, Section 1.4.4 ESC Plans and Details (APPENDIX A)
3.5 Protect Storm Drain Inlets.	1. All existing inlets are to be protected with Rock Berms or Triangular Filter Dikes.	N/A	ESC Plans and Details (APPENDIX A)
	2. Rock berms or Triangular Filter Dikes shall be placed upgradient of curb inlets to minimize sediment entering the inlet.	N/A	ESC Plans and Details, Special Erosion Controls Note 2 (APPENDIX A)
3.6 Establish Perimeter Controls and Sediment Barriers.	1. Where work is actively ongoing, place Rock Berm in front of all Storm Drain Inlets and Mulch Sock around both Staging Areas.	COA Spec 628S	ESC Plans and Details (APPENDIX A)
	2. Protect downstream limits of project with Triangular Filter Dike as appropriate within Traffic Control Setup.	N/A	ESC Plans and Details, Special Erosion Controls Note 9 (APPENDIX A)

BMP Activity	Applicable BMP	Spec/ SWPPP Section	Applicable Plan Sheet
3.7 Retain Sediment on Site.	1. Tracking debris must be swept from the street upon discovery.	N/A	ESC Plans and Details ESC Plans and Details, Special Erosion Controls Note 4 (APPENDIX A)
	2. Contractor shall utilize dust control measures during construction such as mulching, vegetative cover, spray-on adhesives, tillage, irrigation, or barriers.	N/A	COA Environmental Criteria Manual, Section 1.4.8(c) ESC Plans and Details, Special Erosion Controls Note 7 (APPENDIX A)
	3. Install Mulch Sock around the perimeter of the Staging Areas.	N/A	ESC Plans and Details (APPENDIX A)
	4. After temporary spoils are removed from the street all remaining debris shall be swept.	N/A	ESC Plans and Details, Special Erosion Controls Note 4 (APPENDIX A)
	5. If there is dewatering, inspectors must observe and evaluate the dewatering controls once per day while dewatering occurs and complete the form in Appendix I.	CGP Part IV, Section C	ESC Plans and Details (APPENDIX A)
	6. Discharges from dewatering activities, including discharges from dewatering of trenches and excavations, are prohibited, unless managed by appropriate controls to address sediment and prevent erosion.	CGP Part IV, Section C	ESC Plans and Details (APPENDIX A)
	7. Dewatering after a rain event or due to groundwater may be required and shall be conducted in a manner that does not cause erosion or sedimentation. The contractor is responsible for dewatering the work area. The contractor must secure City of Austin approval of proposed dewatering procedures prior to installation or use.	CGP Part IV, Section C	ESC Plans and Details (APPENDIX A)
	8. Dewatering shall be completed by using a pump to pump out groundwater from an excavation area. The Contractor shall use a Sediment Tank or Sump Pit as described in the COA ECM Section 1.4.5(M).	N/A	COA Environmental Criteria Manual, Section 1.4.5(M)
3.8 Establish Stabilized Construction Entrances (SCE).	1. Install Stabilized Construction Entrance for transition areas from unpaved to paved surfaces.	N/A	ESC Plans and Details (APPENDIX A)

BMP Activity	Applicable BMP	Spec/ SWPPP Section	Applicable Plan Sheet
3.9 Additional BMPs.	1. Daily inspection shall be made by the Contractor and silt accumulation must be removed when depth reaches 2-inches.	N/A	ESC Plans and Details (APPENDIX A)
	2. No fuel storage allowed on site.	N/A	ESC Plans and Details, Staging Area Note 3 (APPENDIX A)
	3. BMPs must be inspected weekly, and after ½ inch or greater of rainfall occurs.	COA Spec 610S	ESC Plans and Details (APPENDIX A)
	4. Contractor may store spoils in temporary spoils storage area only during periods of time when rainfall is not forecasted within 24 hours.	N/A	ESC Plans and Details (APPENDIX A)
	5. Concrete Washout Box is to be surrounded by Mulch Sock.	N/A	ESC Plans and Details (APPENDIX A)

BMP Inspection / Maintenance Schedule

The Contractor is responsible for installing erosion and sedimentation controls and tree protection prior to start of soil disturbance. Contractor is responsible for maintaining erosion and sedimentation control measures and BMPs identified in this SWPPP in effective operating condition. The controls and BMPs will be inspected and identified for maintenance according to the inspection form in APPENDIX E.

BMP Modifications / Replacement Activities

Modifications to BMPs that are not performing satisfactorily will be completed as soon as feasible prior to the next anticipated storm event. If impracticable, then the necessary modifications will be performed when feasible. Erosion and sedimentation control devices that have been intentionally disabled, run over, removed, or otherwise rendered ineffective must be replaced or repaired immediately. Amendments and updates to the SWPPP will be listed in APPENDIX F.

If inspections or other information indicate that a control is performing inadequately, or is damaged, then the Contractor must replace or modify the control as soon as practicable after making the discovery.

Sediment trapped behind a silt fence will be removed before or upon reaching 50% of the aboveground height of the fence. Sediment from ponds must be removed before the design capacity has been reduced by 50%.

Accumulations will be removed at a frequency that minimizes off-site impacts. Accumulations will be removed prior to the next storm event (if feasible).

Are there sedimentation basins or traps?* Yes ☐ No ☒ If yes, list the measures taken to reduce the pollutants transported offsite by pumping activities.		
Prevention Measure	**Location Onsite**	**Implementation Date**
The project area is less than 10 acres, no sedimentation basins are needed.	N/A	N/A

CGP Part III Section F.2.a.(iii)

As applicable, sediment deposits will be removed from sediment traps and basins before the design capacity has been reduced by 50 percent.

9. BMPs – Off-Site Transfer of Pollutant Controls

CGP Part III Section F.2.a (iii) and b (i) and Part IV, Section D, 3

LITTER CONTROLS	
Good Housekeeping Activity	**Location(s) Onsite**
Collect litter daily to avoid dispersal of trash, construction debris, and construction materials offsite.	Construction, Staging, and Spoils Areas
Close waste container lids at the end of the workday. For containers that do not have lids, provide a cover to minimize exposure of wastes to precipitation and the discharge of pollutants.	Construction Area and Staging and Spoils Area
CONSTRUCTION DEBRIS CONTROLS	
Good Housekeeping Activity	**Location(s) Onsite**
Contractor will properly manage demolition waste and spoils stored onsite.	Staging and Spoils Area
CONSTRUCTION MATERIAL CONTROLS	
Good Housekeeping Activity	**Location(s) Onsite**
Stockpiles (fill, spoils, etc.) will be located at designated staging areas.	Staging and Spoils Area
No road base, fill, spoils, concrete, debris, wash out water, oil or chemical products will be allowed to enter into or be placed where it may be washed by rainfall into inlets, channels, vegetated ditches, or nearby creek.	Staging and Spoils Area
Store small quantity containers inside Conex storage units. (If contractor deems necessary)	Staging and Spoils Area
Close construction materials waste container lids at the end of the workday. For containers that do not have lids, provide a cover to minimize exposure of wastes to precipitation and the discharge of pollutants.	Construction Area and Staging and Spoils Area
No fuel storage is allowed onsite.	N/A

10. BMPs – Stabilization and Erosion Control Practices

CGP Part III Section F.2.b.(i) & (iii) and Part IV Section B

STABILIZATION PRACTICES	LOCATION ONSITE	IMPLEMENTATION DATE	INTERIM OR PERMANENT
If disturbed area is not worked on for more than 14 days, then disturbed area needs to be stabilized by revegetation, mulch, or tarp.	Throughout the Site	14 days after no work activity	Interim
Disturbed areas that are not paved will be revegetated following the City of Austin standard specifications.	Throughout the Site	After end of construction	Permanent

11. BMPs – Major Grading Activities and Construction Stoppage

CGP Part III Section F.2.b.(ii)

If you do not list activities in tables below, then either attach documentation or state where records for the activities can be found.

Documentation attached? Yes ☒ No ☐

The Contractor will maintain a current log of the dates and location of major construction activities using the form provided in APPENDIX G*.*

DATES WHEN MAJOR GRADING ACTIVITIES WILL OCCUR AND LOCATIONS ONSITE		
Activity	Location	Dates when activity is scheduled
See APPENDIX G		

DATES WHEN CONSTRUCTION ACTIVITY WILL TEMPORARILY OR PERMANENTLY CEASE			
Location onsite	Date activity is to be stopped	Temporary or permanent?	Stabilization initiation date
See APPENDIX G			

12. BMPs – Sediment Control Practices

CGP Part III Section F.2 (c)

Will the project disturb greater than or equal to 10 acres at one time? Yes ☐ No ☒

13. BMPs – Permanent Stormwater Controls

CGP Part III Section F.3.

The following measures will be constructed to control post-construction runoff:

CONTROL MEASURE	LOCATION OF PROJECT SITE	CONTROL RUNOFF FROM WHAT AREAS
Construction is limited to the improvement of stormwater infrastructure within existing roadways. All final grading work will be designed to tie into existing contours and mimic natural topography. No new permanent stormwater controls will be installed besides the re-vegetation of unpaved disturbed areas (APPENDIX A). The runoff from this construction project eventually discharges into Boggy Creek.	Throughout project Site.	Throughout the project Site.

14. BMPs – Other Stormwater Controls

CGP Part III Section F.4 (a)

Controls to minimize dust generation and off-site tracking of sediment include the following:

Control Practices Used	Location(s) on Site
All projects approved through the City of Austin must comply with the code of the City of Austin and the Environmental Criteria Manual requirements to control airborne dust. Compliance is required for entire project site as well as associated operations.	Throughout construction site
Vehicle tire washing – when necessary to prevent tracking, vehicle wheels will be cleaned to remove sediment prior to entrance onto public roadway. When washing is required, it will be done on an area stabilized with crushed stone and drains into an approved trap or sediment basin. Sediment will be prevented from entering storm drains, ditches or watercourses using approved methods.	Throughout construction site

CGP Part III Section F.4 (b)

The following construction and waste materials will be stored onsite.

Materials Stored Onsite	Average Amount Stored	Location Onsite	Controls Used to Prevent Pollutants
Concrete pipe and structures (i.e., junction boxes, manholes, inlets, etc.), water and wastewater utility pipe, excess backfill material, and temporary storage (not to exceed 1,000 Cubic Yards) of waste concrete and asphalt.	To be determined by the Contractor.	Staging and Spoil Areas	Keep in designated storage areas surrounded by Mulch Sock. See ESC Plans, Appendix A.

CGP, Part III Section F.4 (c)

Pollutant Sources include the following:

TYPE OF POLLUTANT SOURCE	POLLUTANT(S)	CONTROL(S) OR MEASURE(S) USED TO MINIMIZE POLLUTANTS
Incidental leaks and spills	Fuel from construction vehicles, contaminated water, wastewater, chemicals of concern.	Use onsite spill kit and follow the spill procedures in the Spill Response Plan.

CGP, Part III Section F.4 (d)

Description of the velocity dissipation devices that will be placed at discharge locations and/or along the length of channel outfalls includes the following:

DISSIPATION DEVICE (HAY BALES, SILT FENCE, POND, ETC.)	OUTFALL DISCHARGING TO (MS4, BAR DITCH, CREEK/STREAM)	AT OUTFALL OR CHANNEL (DISTANCE INTERVAL FOR CHANNEL)
Mulch sock and Triangular Filter Dike, will be used around the perimeter of the Site.	Runoff from paved rights-of-way flows overland and via storm sewer system of one watershed: Boggy Creek	N/A

15. BMPs – Inspection of Controls – Forms/Report/Certification

CGP Part III Section F.8 (a)-(g)

Inspection of Controls Forms / Report

In accordance with the TCEQ General Permit and COA, inspections will be conducted once every seven days, or a minimum of once every 14 days and within 24 hours following a single storm event where the rainfall produced was 0.5 inches or more, or when multiple smaller storms over 24 hours produce 0.5 inches or more of rainfall. If there are multiple storms over several days where 0.5 inches or more of rainfall is produced within 24 hours, then inspections should occur once on the first day and once after the last day of the storm event.

Inspectors will complete the inspection form, or equivalent, in APPENDIX E. The form identifies the areas of concern, and project-specific erosion and sedimentation controls and BMPs. Inspection reports will be completed within 24 hours of the inspection and maintained as part of the SWPPP.

If there is dewatering, then inspectors must observe and evaluate the dewatering controls once per day while the dewatering discharge occurs and complete the form in APPENDIX I. Per Part IV, Section C of the CGP, discharges from dewatering activities, including discharges from dewatering of trenches and excavations, are prohibited, unless managed by appropriate controls to address sediment and prevent erosion.

Inspection Narrative Description/Certification
The weekly SWPPP inspections will be carried out every:

_____
Contractor is to insert the day of week that inspections will be conducted.

In the event of flooding or other prohibitive circumstances, the inspections will be conducted as soon as access is practicable. Changes to the inspection schedule will be in accordance with the following provisions:

a) The inspection schedule can be changed a maximum of once per month;
b) The schedule change must be implemented at the beginning of a calendar month; and
c) The reason for the schedule change must be recorded in the SWPPP.

Inspections may be temporarily suspended for adverse conditions (e.g., high wind, excessive lightning, flooding, or freezing). Adverse conditions must be documented, documentation must include:

(1) The date and time of the adverse condition;
(2) Names of the personnel that witnessed the adverse condition; and
(3) A narrative for the nature of the adverse condition.

In accordance with the General Permit, inspections *can decrease to only once per month if one of the following exceptions is met*:

a) The site has been temporarily stabilized; or
b) Runoff is unlikely due to snow or ice cover or frozen ground; or
c) In drought-stricken areas, inspections must be conducted at least once every month **AND** within 24 hours after rainfall events measuring more than 0.5 inches of precipitation. A drought-stricken area is defined as an area in which the National Oceanic Atmospheric Administration's U.S. Seasonal Drought Outlook indicates for the period during which construction will occur that one or more of the following conditions are likely:
    (1) "Drought to persist or intensify;"
    (2) "Drought ongoing, some improvement;"
    (3) "Drought likely to improve;" or
    (4) "Drought development likely."
    See *http://www.cpc.ncep.noaa.gov/products/expert_assessment/sdo_summary.php*
d) In arid or semi-arid areas, inspections must be conducted at least once every month **AND** within 24 hours after rainfall events measuring more than 0.5 inches of precipitation. Note: Austin is *not* classified as arid (0-10 inches annual rainfall) or semi-arid (10-20 inches annual rainfall).

Describe the inspector's qualifications to conduct the inspections
In accordance with the COA ECM Appendix P-1 item 6, the inspector must be a Certified Erosion, Sediment, & Stormwater Inspector (CESSWI), Certified Professional in Erosion and Sediment Control (CPESC), or a Certified Inspector of Sediment and Erosion Control (CISEC). Personnel conducting the site inspections must also be knowledgeable of the Construction General Permit TXR150000, the

construction activities, the construction support activities on-site, and this SWPPP. The names and qualifications of personnel performing the inspections are listed below. The Contractor will perform weekly inspections. Contractor is to insert names and qualifications of the personnel performing the inspections.

Copies of the inspector's certifications are included in APPENDIX H.

Describe your inspection methods
The inspector will review the BMPs and controls listed on the inspection form provided in APPENDIX E. The inspector will identify and describe BMPs and controls that are not operating or require maintenance or modification. The Contractor will maintain, repair, or modify the identified BMPs and controls.

Describe all incidents of non-compliance (i.e., major discharges, BMP failures)
The inspection form in APPENDIX E is used to note incidents of non-compliance.

Corrective Actions
Actions taken to correct deficiencies noted in the weekly inspection reports will be documented and kept in the SWPPP, APPENDIX E. Deficiencies should be corrected within 24 hours or as soon as feasible.

The certification statement is on the inspection form in APPENDIX E.

16. BMPs – Allowable Non-Stormwater Discharges

CGP Part III, Sect. F.9

ALLOWABLE NON-STORMWATER DISCHARGE INCLUDE:	USED? YES	USED? NO	POLLUTION PREVENTION MEASURE(S)	IMPLEMENTATION DATE
Emergency Fire-Fighting Activities	☐	☒		
Fire Hydrant Flushings	☐	☒		
Washing of Vehicles, Buildings, or Pavement without detergents or soap. (See description in Part II.3.[c].)	☐	☒		
Dust Control	☒	☐	*Use only potable water.*	*Start of construction*
Potable Water Sources (water line flushings)	☒	☐		
Air Conditioning Condensate	☐	☒		
Uncontaminated Ground/Spring Water	☐	☒		
Lawn Watering or Similar Irrigation Drainage	☐	☒		

ALLOWABLE NON-STORMWATER DISCHARGE INCLUDE:	USED? YES	USED? NO	POLLUTION PREVENTION MEASURE(S)	IMPLEMENTATION DATE
Other? (List)	☐	☒		

List other non-stormwater discharge permitted by NPDES, TPDES, or TCEQ Permit:

NON-STORMWATER DISCHARGE	POLLUTION PREVENTION MEASURE	IMPLEMENTATION DATE
Irrigation for Vegetation	*Use only potable water.*	*When installing landscape*

17. BMPs – Prohibited Discharges

CGP Part IV.E (1)-(5)

PROHIBITED DISCHARGE	POLLUTION PREVENTION MEASURE(S)	IMPLEMENTATION DATE
Wastewater from wash out of concrete, unless managed by an appropriate control.	*Concrete Washout*	*Prior to concrete pouring.*
Wastewater from wash out and cleanout of stucco, paint, form release oils, curing compounds, and other construction materials.	*N/A*	*N/A*
Fuels, oils, and other pollutants used in vehicle equipment operation and maintenance.	*Use on-site Spill Kit and follow the spill response procedures in the Spill Response Plan.*	*Start of construction*
Soaps or solvents used in vehicle and equipment washing.	*No vehicle or equipment washing is allowed onsite.*	*N/A*
Toxic or hazardous substances from a spill or other release.	*Use on-site Spill Kit and follow the spill response procedures in the Spill Response Plan.*	*Start of construction*

18. BMPs – Stormwater Runoff from Concrete Batch Plants

CGP Part V

Discharges of stormwater runoff from concrete batch plants present at regulated construction sites and operated as a construction support activity may be authorized under the provisions of the TCEQ Construction General Permit, provided that the requirements in Part V are met for concrete batch plant(s) authorized under this permit. Only the discharges of stormwater runoff and non-stormwater from concrete batch plants that meet the requirements of a construction support activity can be authorized in this SWPPP.

N/A.

19. BMPs – Observation of Dewatering Controls

CGP Part III Section F.7

Dewatering controls must be observed and evaluated once per day when dewatering discharge occurs. Include descriptions of the actions taken in response to the observation and evaluation findings. Your report must contain any incidents of non-compliance. If there are not any incidents of non-compliance, the report must contain a certification that the facility or site complies with the SWPPP and this permit. The observation and evaluation report needs to be signed by personnel with signatory authority. The inspection form can be found in Appendix I. Completed report forms should be kept in Appendix I.

20. BMPs – Concrete Truck Wash-Out Requirements

CGP Part VI, A-E

The general permit (TXR150000) authorizes the land disposal of washout from concrete trucks at construction sites regulated under the general permit, provided the following requirements are met. Discharge of concrete production wastewater to surface water in the state must be authorized under a separate TCEQ general permit or individual permit.

A concrete washout should have a minimum length and width of 10 feet and should be sized large enough to contain the amount of concrete washing for the project. The concrete wash-out should be constructed, maintained, and operated in accordance with USEPA guidance:

https://www3.epa.gov/npdes/pubs/concretewashout.pdf

Additionally, the Contractor will comply with the following requirements:

- Discharge of concrete truck washout to a creek, surface water, or a storm sewer is prohibited.
- Concrete truck wash out water shall be disposed in areas at the construction site where structural controls have been established to prevent discharge to surface water in the state, or to areas that have a minimal slope that allow infiltration and filtering of wash out water to prevent discharge to surface water in the state. Structural controls may consist of temporary berms, temporary shallow pits, temporary storage tanks with slow rate release, or other reasonable measures to prevent runoff from the construction site.
- Washing out concrete trucks during rainfall events will be minimized. The direct discharge of concrete truck wash-out water is prohibited. The operator will ensure its BMPs are sufficient to prevent the discharge of concrete truck wash-out as the result of rainfall or stormwater runoff.
- The disposal of wash-out water from concrete trucks made under the authorization of the general permit will not cause or contribute to groundwater contamination.

APPENDIX A
EROSION & SEDIMENTATION CONTROL PLANS

Attached are selected plan sheets from the MLK TOD Stormwater Conveyance Improvements – Phase 3 Plan Set:

- Cover Sheet and General Notes Sheet
- ESC Plan Sheets

SHEET INDEX

SHEET NO.	DESCRIPTION
1	COVER
2	GENERAL NOTES 1 OF 3
3	GENERAL NOTES 2 OF 3
4	GENERAL NOTES 3 OF 3
5	EROSION AND SEDIMENT CONTROL NOTES
6	TREE PROTECTION AND ENVIRONMENTAL NOTES
7	SYMBOLS, LEGEND, AND ABBREVIATIONS
8	BOUNDARY MAP
9	BOUNDARY MAP NORTHING AND EASTING TABLES
10	EROSION AND SEDIMENT CONTROL AND TREE PROTECTION PLAN
11	DRAINAGE AREA MAP
12	DRAINAGE CALCULATIONS
13	INLET CALCULATIONS
14	STORMCAD PIPE HYDRAULICS RESULTS
15	SITE PLAN
16-17	DEMOLITION PLANS
18-20	EXISTING TYPICAL ROADWAY SECTIONS
21-24	PROPOSED TYPICAL ROADWAY SECTIONS
25	HORIZONTAL ALIGNMENT DATA
26-33	ROADWAY PLAN AND PROFILE
34-38	ROADWAY CROSS SECTIONS
39-40	PAVEMENT MARKING PLANS
41-44	DRAINAGE PLAN AND PROFILE - SD LINE-I
45	DRAINAGE PLAN AND PROFILE - SD LINE-J
46	DRAINAGE PLAN AND PROFILE - SD LINE-K
47-50	DRAINAGE LATERALS
51	PROPOSED WATER LINE OVERALL PLAN
52	PROPOSED WATER LINE TEMPORARY BYPASS PLAN
53-55	PROPOSED WL-I PLAN AND PROFILE
56	PROPOSED WL-J PLAN AND PROFILE
57	PROPOSED WL-H PLAN AND PROFILE
58	PROPOSED WL-K PLAN AND PROFILE

SHEET NO.	DESCRIPTION
59	PROPOSED WL-I-1 PLAN AND PROFILE
60	PROPOSED WL-L PLAN AND PROFILE
61	PROPOSED WL-I-2 PLAN AND PROFILE
62-63	PROPOSED WL-I-3 PLAN AND PROFILE
64	PROPOSED WL-I-4 PLAN AND PROFILE
65	PROPOSED WASTEWATER OVERALL PLAN
66	PROPOSED WW- I PLAN AND PROFILE
67-69	PROPOSED WW-I-1 PLAN AND PROFILE
70	PROPOSED WW-K PLAN AND PROFILE
71	PROPOSED WW-H PLAN AND PROFILE
72	PROPOSED WW-J PLAN AND PROFILE
73-75	DEEP WASTEWATER SERVICE PROFILES
76-83	STANDARD DETAILS (ROADWAY)
84-86	STANDARD DETAILS (STORMWATER)
87-90	STANDARD DETAILS (WATER & WASTEWATER)
91	PROPOSED WL-I-3 CONNECTION DETAIL
*92	TxDOT PRECAST BASE AND JUNCTION BOX-PDD
*93	TxDOT PRECAST BASE-PB
*94-95	TxDOT PRECAST SLAB LID
96	MISCELLANEOUS DETAILS
97	WALL MODIFICATIONS AT CURB INLETS
98	TWO SIDED CURB INLET DETAILS
99	STRUCTURAL NOTES & TYPICAL CONCRETE DETAILS
100	ROW MANAGEMENT STANDARD NOTES
101	STREET AND BRIDGE STANDARD NOTES
102	TCP PHASING NARRATIVE
103	TRAFFIC CONTROL PHASING
104	ADVANCE WARNING PLAN
105	DETOUR & ADVANCE WARNING LAYOUT BICYCLE DETOUR
106-112	SEQUENCE OF WORK
113-133	TCP AND DETOUR LAYOUTS
134-142	TRAFFIC CONTROL DETAILS

*THE TxDOT STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN SELECTED BY THE ENGINEER OF RECORD OR UNDER THEIR RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

HELPFUL WEBSITES

AUSTIN WATER PIPELINE ENGINEERING
https://www.austintexas.gov/page/pipeline-engineering

CITY OF AUSTIN EASEMENT TEMPLATES
https://www.austintexas.gov/department/forms-applications#spanclassckanchorideasementspanEasementandRestrictiveCovenantTemplates

SERVICE EXTENSION REQUEST (SER)
https://www.austintexas.gov/department/service-extension

NOTES:

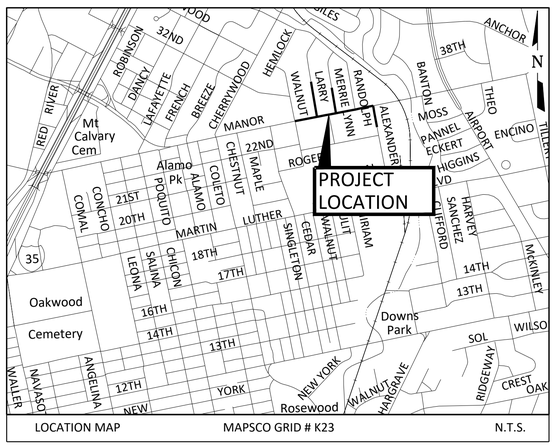
1. CONTRACTOR SHALL NOTIFY THE PUBLIC WORKS DEPARTMENT 24 HOURS PRIOR TO STARTING CONSTRUCTION OR CLEARING OPERATIONS.
2. CONTRACTOR SHALL CALL "ONE CALL" AT 1-800-344-8377 FOR UTILITY LOCATIONS AT LEAST 48 HOURS PRIOR TO ANY WORK IN CITY EASEMENTS OR STREET RIGHT OF WAYS.
3. THIS PROJECT IS LOCATED WITHIN THE BOGGY CREEK WATERSHED (CLASSIFIED AS SUBURBAN) AND SHALL BE DEVELOPED, CONSTRUCTED AND MAINTAINED IN ACCORDANCE WITH CHAPTER 25 OF THE CODE OF THE CITY OF AUSTIN.
4. NO PORTION OF THIS SITE IS LOCATED WITHIN PARKLAND OR LAND USED FOR PARK PURPOSES. (IF SUCH LAND IS INCLUDED, DOCUMENTATION OF PARKS AND RECREATION DEPT APPROVAL IS REQUIRED AT THE TIME OF SUBMITTAL FOR GENERAL PERMIT PROGRAM APPROVAL.)
5. NO PORTION OF THIS SITE IS LOCATED WITHIN THE 100-YEAR FLOODPLAIN, PER CITY OF AUSTIN AND FEDERAL EMERGENCY MANAGEMENT AGENCY FLOOD INSURANCE RATE MAPS.
6. THIS PROJECT IS NOT WITHIN THE EDWARDS AQUIFER RECHARGE ZONE AS DEFINED BY THE CITY OF AUSTIN. THIS PROJECT IS NOT WITHIN THE EDWARDS AQUIFER RECHARGE ZONE AS REGULATED BY THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ).
7. THERE ARE NO KNOWN CRITICAL ENVIRONMENTAL FEATURES WITHIN 150' OF ANY PORTION OF THIS PROJECT. A FIELD INVESTIGATION HAS NOT BEEN PERFORMED AS PART OF THIS PROJECT AND IS NOT REQUIRED.
8. THE STANDARD SHEETS INCLUDED IN THIS PLAN SET WERE PROVIDED BY THE GENERAL PERMIT PROGRAM OFFICE FOR USE ON GENERAL PERMIT PROJECTS ONLY. IF ANY MODIFICATIONS TO THE SHEETS WERE MADE, THEY ARE CLEARLY INDICATED ON THE SHEET ITSELF AND IN THE COVER SHEET INDEX.
9. ADDITIONAL TRENCH E/S CONTROL: TRIANGULAR SEDIMENT FILTER DIKE WILL BE INSTALLED ACROSS FULL WIDTH OF TRAFFIC CLOSURE AND DOWNSTREAM OF CONSTRUCTION AREA, PERPENDICULAR TO CURB. FILTER DIKE TO FOLLOW ACTIVE CONSTRUCTION. REMOVING AND RE-SETTING FILTER DIKE IS CONSIDERED SUBSIDIARY TO BARRICADES AND TRAFFIC HANDLING.
10. PROJECT SCHEDULE MUST BE APPROVED BY THE GENERAL PERMIT PROGRAM (GPP) COORDINATOR. INSTALLATION AND REMOVAL OF TEMPORARY AND PERMANENT EROSION/SEDIMENTATION CONTROLS MUST BE REFLECTED IN THE SCHEDULE, BY STATION NUMBER. GPP REPRESENTATIVE MUST BE NOTIFIED A MINIMUM OF 48 HOURS IN ADVANCE OF TRANSITION BETWEEN PHASES.
11. APPROPRIATE EASEMENTS/APPROVALS MUST BE SECURED AND DOCUMENTED FOR PROJECT AREAS LOCATED OUTSIDE OF RIGHT OF WAYS. NO WORK SHALL BE PERFORMED WITHIN THESE AREAS UNTIL ASSOCIATED RIGHT OF ENTRY HAS BEEN SECURED. ADDITIONALLY, PROJECT PORTIONS IMPACTED BY LACK OF RECORDED DOCUMENT NUMBERS WILL NOT BE CONSIDERED FOR FORMAL GPP REVIEW.
12. CONTRACTOR SHALL STAKE ALL PROPOSED SERVICE CONNECTIONS LOCATED WITHIN THE CRITICAL ROOT ZONE OF TREES 8" IN CALIPER AND LARGER AT LEAST 21 CALENDAR DAYS PRIOR TO CONSTRUCTION OF SUCH SERVICES. STAKING SHALL CONSIST OF A LATH WITH NAIL AND PAINT MARKINGS. IN CASES WHERE A STAKE CANNOT BE PLACED WITHOUT DAMAGING PROPERTY, CONTRACTOR MAY USE PAINT ONLY. ONCE STAKING IS COMPLETED, IT IS THE CONTRACTOR'S RESPONSIBILITY TO INFORM THE CITY OF AUSTIN'S CONSTRUCTION INSPECTOR WITHIN TWENTY-FOUR HOURS. THE CITY OF AUSTIN'S CONSTRUCTION INSPECTOR WILL THEN COORDINATE A FIELD REVIEW OF THE SERVICE LOCATIONS WITH THE GENERAL PERMIT PROGRAM COORDINATOR AND PROPERTY OWNERS. SERVICE LINE LOCATIONS MAY BE ADJUSTED BASED ON THE REVIEW AND WILL BE RESTAKED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE CONTRACT. ALL SERVICE LINE STAKING SHALL BE MAINTAINED UNTIL THE SERVICE IS INSTALLED.
13. TO THE BEST OF MY KNOWLEDGE, I THOMAS R. HEINEMANN, TX LICENSE NUMBER 119073, VERIFY THAT THIS SET OF PLANS IS COMPLETE, ACCURATE, AND IN COMPLIANCE WITH CHAPTER 25-8 SUBCHAPTER A OF THE LAND DEVELOPMENT CODE.
14. CITY OF AUSTIN AUSTIN WATERSHED PROTECTION HAS GRANTED WAIVERS TO THEIR DCM TO THE FOLLOWING CRITERIA:

DCM Waiver Section	Date Approved	DCM Waiver Sheet	DCM Waiver Location
4.1.0.D.(Curb Inlet Transition Length)	2/9/2026	45-46	CI-58, CI-59, and CI-63
3.2.0 (Permissible Spread of Water)	1/15/2026	41	CI-72
5.6.1 (Manhole Spacing)	1/15/2026	43	STA 12+77.33 and STA 12+68.53
5.7.1 (Storm Drain Clearance)	1/15/2026	96	Detail 1 and Detail 2

15. THIS PROJECT CONSISTS OF APPROXIMATELY 2,266 LINEAR FEET OF STORM DRAIN, WATER LINE, WASTEWATER LINE, AND ROADWAY RECONSTRUCTION. THE LOC COVERS 107,901 SQUARE FEET.
16. THERE ARE POTENTIAL CONFLICTS WITH SPECIAL EVENTS AROUND THE PROJECT AREA. PLEASE CONTACT THE CITY OF AUSTIN OFFICE OF SPECIAL EVENTS FOR COORDINATION AT LEAST 6 WEEKS PRIOR TO THE START OF CONSTRUCTION. EMAIL KRIS.NEWMAN@AUSTINTEXAS.GOV & CC TPWOSECOORDINATION@AUSTINTEXAS.GOV.

CITY OF AUSTIN
AUSTIN WATERSHED PROTECTION
C.I.P. NO. 8598.014

BOGGY CREEK MLK TOD STORMWATER CONVEYANCE IMPROVEMENTS
PHASE-3
JUNE 2026
90% RESPONSE TO COMMENTS SUBMITTAL



LOCATION MAP MAPSCO GRID # K23 N.T.S.

MAYOR
KIRK WATSON

CITY COUNCIL MEMBERS

NATASHA HARPER-MADISON	DISTRICT 1
VANESSA FUENTES	DISTRICT 2
JOSÉ VELÁSQUEZ	DISTRICT 3
JOSÉ "CHITO" VELA	DISTRICT 4
RYAN ALTER	DISTRICT 5
KRISTA LAINE	DISTRICT 6
MIKE SIEGEL	DISTRICT 7
PAIGE ELLIS	DISTRICT 8
ZOHAIB "ZO" QADRI	DISTRICT 9
MARC DUCHEN	DISTRICT 10

NOTES:

GENERAL PERMIT PROGRAM APPROVAL DOES NOT CONSTITUTE UTILITY ALIGNMENT/ASSIGNMENT APPROVAL.

RELEASE OF THIS APPLICATION DOES NOT CONSTITUTE A VERIFICATION OF ALL DATA, INFORMATION AND CALCULATIONS SUPPLIED BY THE APPLICANT. THE ENGINEER OF RECORD IS SOLELY RESPONSIBLE FOR THE COMPLETENESS, ACCURACY AND ADEQUACY OF HIS/HER SUBMITTAL, WHETHER OR NOT THE APPLICATION IS REVIEWED FOR CODE COMPLIANCE BY CITY ENGINEERS.

GENERAL PERMIT PROGRAM CORRECTIONS RECORD

No.	DESCRIPTION	BY	CORRECT (C) ADD (A) VOID (V) SHEET Nos.	TOTAL No. SHEETS IN CORRECTION PLAN SET	CITY OF AUSTIN APPROVAL/DATE	DATE IMAGED

PROJECT INFORMATION:

STREET ADDRESS:
MANOR ROAD, ALEXANDER AVENUE, LARRY LANE, AND MERRIE LYNN AVENUE
AUSTIN, TEXAS 78702

OWNER:
CITY OF AUSTIN

CONTACT:
MR. GLEN TAFFINDER P.E.
PROJECT SPONSOR
505 BARTON SPRINGS ROAD STE. 1200
AUSTIN, TX 78704
(512) 974-3381

LAURIE THERING
PROJECT MANAGER
P.O. BOX 1088, OTX-CPMD, AUSTIN, TX 78767
AUSTIN, TEXAS 78744

SUBMITTAL PREPARED BY:

FREESE and NICHOLS
10431 Morado Circle, Suite 300
Austin, Texas 78759
Phone – (512) 617–3100
Fax – (512) 617–3101
Web – www.freese.com

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144
FNI PROJECT NUMBER AU314361
CONTACT:
THOMAS R. HEINEMANN, P.E.
PHONE (737) 285-0472
TOM.HEINEMANN@FREESE.COM

NOT FOR CONSTRUCTION
THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF THOMAS R. HEINEMANN P.E. TEXAS NO: 119073 ON DATE: 06/08/2026 IT IS NOT TO BE USED FOR CONSTRUCTION, BIDDING OR PERMIT PURPOSES.

SUBMITTED FOR APPROVAL BY:

ENGINEER OF RECORD DATE

GENERAL PERMIT CERTIFICATION:

DEPARTMENT: AUSTIN WATERSHED PROTECTION

EXECUTIVE OF RECORD, CERTIFIES THAT THEIR DEPARTMENTS COMPONENTS OF THIS PROJECT MEET THE CONDITIONS NECESSARY TO BE ELIGIBLE FOR GENERAL PERMIT

EXECUTIVE PRINTED NAME: JANAE SPENCE

SIGNED DATE

CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY DATE

UCC CASE NUMBER: 230629-06-03

GENERAL PERMIT PROGRAM

ACAD Rel: 25.1s (LMS Tech)
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Last Saved: 6/2/2026 2:11 PM Saved By: no

Plot Date: 6/2/2026 2:50 PM Plot By: no Filename: N:\SW\Larry Lane\Standards\GN-AU-ALL-COVER.dwg

GENERAL PERMIT GENERAL NOTES:

1. THIS PROJECT CONSISTS OF DRAINAGE IMPROVEMENTS AND WATER LINE AND WASTEWATER LINE REPLACEMENTS. THE PROJECT INCLUDES, BUT IS NOT NECESSARILY LIMITED TO THE FOLLOWING: STORM DRAIN INSTALLATION, RECONSTRUCTION, MILLING, CURB AND GUTTER, SIDEWALK AND DRIVEWAY RECONSTRUCTION, SIDEWALK AND ADA RAMP CONSTRUCTION, WATER LINES, WASTEWATER LINES, AND PAVEMENT MARKINGS.
2. THE CITY OF AUSTIN STANDARD SPECIFICATIONS CURRENT AT THE TIME OF ADVERTISEMENT FOR BIDS SHALL GOVERN MATERIALS AND METHODS USED TO PERFORM THIS WORK. ALL CONSTRUCTION OPERATIONS SHALL BE ACCOMPLISHED IN ACCORDANCE WITH APPLICABLE STATE STATUTES AND U.S. OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION REGULATIONS (O.S.H.A.). ALL TRAFFIC CONTROL SHALL BE IN ACCORDANCE WITH THE 2011 TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
3. THE CONTRACTOR MUST BE LICENSED AND MUST OBTAIN A STREET CUT PERMIT FROM THE PUBLIC WORKS DEPARTMENT PRIOR TO THE START OF CONSTRUCTION WITHIN THE RIGHT-OF-WAY OF A PUBLIC STREET OR ALLEY.
4. THE ESTIMATED QUANTITIES PUBLISHED WITH THESE CONSTRUCTION DOCUMENTS ARE FURNISHED AS AN AID IN THE BIDDING PROCESS AND ARE NOT TO BE SUBSTITUTED FOR THE CONTRACTOR'S QUANTITY TAKEOFFS.
5. THE BIDDER (CONTRACTOR AFTER AWARD) SHALL IMMEDIATELY NOTIFY THE ENGINEER OF ANY OBSTACLES THAT MAY IMPEDE OR PREVENT THE PROPER CONSTRUCTION OF THE PROJECT.
6. THE CONTRACTOR SHALL ARRANGE THE OPERATION IN SUCH A MANNER AS TO AVOID UNNECESSARY INCONVENIENCE TO THE PUBLIC IN CONSTRUCTION AREAS.
7. ACCESS TO ALL SIDE STREETS AND DRIVEWAYS SHALL BE MAINTAINED AT ALL TIMES AT THE SOLE EXPENSE OF THE CONTRACTOR UNLESS OTHERWISE DIRECTED BY THE OWNER'S REPRESENTATIVE.
8. PORTIONS OF THE CONSTRUCTION OF THIS PROJECT AUTHORIZED BY PERMIT OR LICENSE AGREEMENT WILL BE SUBJECT TO SUCH INSPECTION AND TESTS AS MAY BE DEEMED NECESSARY BY THE PERMIT GRANTING AUTHORITIES. CONTRACTOR SHALL FURNISH INFORMATION TO AUTHORITIES AS REQUIRED. CONTRACTOR SHALL ALSO FURNISH INCIDENTAL LABOR AND EQUIPMENT TO ALLOW TESTING PERSONNEL TO ACCESS THE WORK AND COOPERATE FULLY WITH THESE AUTHORITIES IN CONDUCTING THE TESTING AND INSPECTION PROGRAM. UNLESS STATED OTHERWISE IN THE PLANS OR PROJECT MANUAL, COSTS OF TESTING WILL BE AS SPECIFIED IN SECTION 00700 OF THE STANDARD SPECIFICATIONS.
9. THE CONSTRUCTION INSPECTION DIVISION OF THE PUBLIC WORKS DEPARTMENT SHALL ARRANGE A PRE-CONSTRUCTION MEETING NOT LESS THAN FOURTEEN (14) DAYS PRIOR TO BEGINNING CONSTRUCTION. CONTRACTOR SHALL NOTIFY INSPECTOR FORTY-EIGHT (48) HOURS IN ADVANCE OF BEGINNING ANY CONSTRUCTION IN THE R.O.W. OR IN EASEMENTS. CONTRACTOR SHALL NOTIFY INSPECTOR TWENTY-FOUR (24) HOURS IN ADVANCE OF MAKING ANY SUPPLEMENTARY CONNECTION OR CLOSING OFF ANY WATER OR WASTEWATER SERVICES TO PROPERTY OWNERS.
10. CONTRACTOR SHALL NOTIFY PRINCIPLES OF EACH OF THE FOLLOWING ENTITIES OF THE CONSTRUCTION SCHEDULES AT LEAST TWO WEEKS IN ADVANCE OF PROPOSED CONSTRUCTION OPERATIONS. CONTRACTOR SHALL PROVIDE PERTINENT INFORMATION ABOUT LANE CLOSURES AND DETOURS AND ANY OTHER CONSTRUCTION RELATED ACTIVITY WHICH MAY INTERFERE WITH NORMAL SERVICES.

AUSTIN FIRE DEPARTMENT	476-1050
AUSTIN POLICE DEPARTMENT	974-5283
EMERGENCY MEDICAL SERVICES (EMS)	269-2046
AUSTIN INDEPENDENT SCHOOL DISTRICT	414-3191
CAPITAL METRO DISPATCHER	389-7418
US POSTAL SERVICE	342-1236
COA TRANSPORTATION DIVISION	974-7024
UNIVERSITY OF TEXAS (PHYSICAL PLANT DIRECTOR)	471-4110
STATE OF TEXAS GENERAL SERVICES COMMISSION	463-7934
CAPITAL POLICE (DPS)	463-3473
CITY OF AUSTIN DISPATCHER	322-9500

11. CONTRACTOR SHALL MAINTAIN THE JOB SITE IN A SAFE, NEAT, AND WORKMANLIKE MANNER AT ALL TIMES. JOB SITE SAFETY SHALL NOT BE COMPROMISED, ANY ATTRACTIVE NUISANCE SHALL BE REMOVED OR CAMOUFLAGED BY CONTRACTOR WHEN DIRECTED BY THE OWNER OR ENGINEER. CONTRACTOR SHALL REMOVE OR CAMOUFLAGE ANY CHILD ATTRACTIVE NUISANCE. AT THE END OF EACH DAY THE CONTRACTOR MUST REMOVE ALL CONSTRUCTION SPOILS AND EQUIPMENT FROM THE SITE.
12. THE ATTENTION OF ALL PROSPECTIVE BIDDERS IS DIRECTED TO SECTION 00700, PARAGRAPHS 6.1, 6.7, AND 6.11 OF THE GENERAL CONDITIONS OF THE AGREEMENT, CITY OF AUSTIN STANDARD SPECIFICATIONS, THE STATE LAW (VERNON'S ANNOTATED TEXAS STATUTES, ARTICLE 1436(C)), AND THE NEED FOR EFFECTIVE PRECAUTIONARY MEASURES WHEN OPERATING IN THE VICINITY OF ELECTRICAL LINES. IF THE CONTRACTOR CHOOSES TO USE EQUIPMENT WITH THE POTENTIAL OF COMING WITHIN THE DISTANCES PRESCRIBED BY STATUTE, THE CONTRACTOR IS RESPONSIBLE FOR THE COORDINATION OF THE WORK WITH THE APPROPRIATE ELECTRIC/UTILITY COMPANY.
13. ALL CONSTRUCTION EQUIPMENT INVOLVED IN ROADWAY WORK SHALL BE EQUIPPED WITH A PERMANENTLY-MOUNTED, 360-DEGREE REVOLVING OR STROBE WARNING LIGHT WITH AMBER LENS IN WORKING ORDER. THIS LIGHT SHALL HAVE A MINIMUM LENS HEIGHT OF 5" AND A DIAMETER OF 5". THIS LIGHT SHALL HAVE MOUNTING HEIGHT OF NOT LESS THAN 6 FEET ABOVE THE ROADWAY SURFACE AND SHALL BE VISIBLE FROM ALL SIDES. THIS EQUIPMENT SHALL ALSO HAVE ATTACHED AT EACH SIDE OF THE REAR END OF THE VEHICLE AN APPROVED ORANGE WARNING FLAG MOUNTED NOT LESS THAN 6 FEET ABOVE THE ROADWAY SURFACE.
14. ALL DAMAGE CAUSED BY THE CONTRACTOR DIRECTLY OR INDIRECTLY TO THE STREET SURFACE OR SUBSURFACE OUTSIDE OF THE PAVEMENT CUT AREA SHALL BE REGARDED AS A PART OF THE STREET CUT REPAIR. THIS INCLUDES ANY SCRAPES, GOUGES, CUTS, CRACKING, DEPRESSIONS, AND/OR ANY OTHER DAMAGE CAUSED BY THE CONTRACTOR DURING THE EXECUTION OF THE WORK. THESE AREAS WILL BE INCLUDED IN THE TOTAL AREA OF REPAIR. THE AREAS OF REPAIR NEAR UTILITY TRENCHES SHALL BE SAW CUT IN STRAIGHT, NEAT LINES PARALLEL TO THE UTILITY TRENCH. ALL REPAIRS SHALL BE AT THE CONTRACTOR'S EXPENSE AND SHALL MEET ALL CITY TESTING REQUIREMENTS.
15. ALL EXISTING SIDEWALKS, CURB AND GUTTER, DRIVEWAYS, LANDSCAPING, OR DRAINAGE FACILITIES DISTURBED OR DAMAGED BY THE CONTRACTOR SHALL BE REMOVED AND RESTORED WITH MATERIALS EQUAL TO OR BETTER THAN THE ORIGINAL AND SHALL BE AT THE CONTRACTOR'S EXPENSE.
16. BLASTING WITHIN THE PROJECT AREA WILL NOT BE ALLOWED.
17. CONTRACTOR WILL MINIMIZE USE OF STREET PARKING BY HIS/HER EMPLOYEES AND SUBCONTRACTORS IN THE VICINITY OF THE CONSTRUCTION AREA.
18. CONTRACTOR WILL PROVIDE, INSTALL, AND MAINTAIN "LOCAL BUSINESS ACCESS" SIGNS AT EACH BUSINESS WHEN LANE CLOSURES ARE IN PLACE.
19. CONTRACTOR SHALL MAINTAIN PEDESTRIAN ACCESS ACROSS ALL INTERSECTIONS WITH EXISTING PEDESTRIAN ACCESS.
20. CONTRACTOR SHALL PROVIDE AND MAINTAIN SAFETY FENCING ALONG THE RIGHT-OF-WAY LINE BETWEEN ALL DRIVEWAYS ADJACENT TO THE CONSTRUCTION AREA. SAFETY FENCING IS REQUIRED ALONG ANY EXCAVATION AREAS, ANY CONSTRUCTION AREAS SPECIFICALLY IDENTIFIED ON THE PLANS, AND AREAS IDENTIFIED BY THE ENGINEER BASED ON SITE SPECIFIC CONDITIONS. IF SIDEWALK IS PRESENT IN AN AREA REQUIRING SAFETY FENCING, A TEMPORARY FENCE MOUNTING SYSTEM SHALL BE USED TO PLACE SAFETY FENCING BETWEEN THE CONSTRUCTION AND THE PEDESTRIAN PATHWAY OF THE SIDEWALK.
21. THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT ALL LOCATIONS USED FOR STORING CONSTRUCTION EQUIPMENT, MATERIALS, AND STOCKPILES OF ANY TYPE WITHIN THE CONSTRUCTION LIMITS SHALL BE APPROVED, IN ADVANCE, BY THE OWNER'S REPRESENTATIVE. USE OF THE AREA WITHIN THE CONSTRUCTION LIMITS FOR THESE PURPOSES WILL BE RESTRICTED TO THOSE LOCATIONS WHERE DRIVER SIGHT DISTANCE TO BUSINESSES AND SIDE STREET INTERSECTIONS IS NOT OBSTRUCTED AND AT OTHER LOCATIONS WHERE AN UNSIGHTLY APPEARANCE, AS DETERMINED BY THE OWNER'S REPRESENTATIVE, WILL NOT EXIST.
22. THE CONTRACTOR SHALL FURNISH, INSTALL AND MAINTAIN BARRICADES, WARNING SIGNS, FLASHERS AND OTHER DEVICES OF THE TYPE AND SIZE AS INDICATED IN THE LATEST EDITION OF THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" OR AS DIRECTED BY THE ENGINEER.
23. IF CULTURAL RESOURCES ARE ENCOUNTERED DURING CONSTRUCTION (ARCHEOLOGICAL FINDINGS UNEARTHED) CONTRACTOR SHALL STOP WORK IN THAT AREA AND IMMEDIATELY CONTACT THE TEXAS HISTORICAL COMMISSION AT (512) 463-6100.
24. CONTRACTOR WILL COORDINATE ALL TRAFFIC CONTROL ACTIVITIES THROUGH THE CITY OF AUSTIN TRANSPORTATION DIVISION.
25. ALL MATERIAL, EQUIPMENT, STAGING AND WORK WILL TAKE PLACE WITHIN THE LIMITS OF CONSTRUCTION (LOC). IF THE CONTRACTOR REQUIRES USE OF ANY AREAS OUTSIDE OF THE DESIGNATED LOC AN APPLICATION MUST BE SUBMITTED TO THE GENERAL PERMIT OFFICE AND APPROVAL OBTAINED BEFORE ANY WORK COMMENCES.

GENERAL PERMIT UTILITY NOTES:

1. UTILITIES SHOWN REFLECT THE BEST INFORMATION AVAILABLE AT THE TIME THAT PROJECT WAS DESIGNED/SURVEYED. THE CONTRACTOR SHALL CONTACT THE AUSTIN AREA "ONE CALL" SYSTEM AT 1-800-344-8377 (DIG TESS) 48 HOURS PRIOR TO BEGINNING ANY EXCAVATION FOR EXISTING UTILITY LOCATIONS.
2. THE INFORMATION SHOWN ON THESE DRAWINGS INDICATING TYPE AND LOCATION OF UNDERGROUND, SURFACE, AND AERIAL UTILITIES IS NOT GUARANTEED TO BE EXACT OR COMPLETE. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE EXACT TYPE AND LOCATION OF ALL UTILITIES AFFECTED BY CONSTRUCTION FOR THIS PROJECT IN ORDER TO AVOID DAMAGING THOSE UTILITIES. THE CONTRACTOR SHALL IMMEDIATELY ARRANGE FOR REPAIR AND RESTORATION OF CONTRACTOR-DAMAGED UTILITIES, AND THE CONTRACTOR SHALL PAY FOR SUCH REPAIRS. THE CONTRACTOR IS REQUIRED TO PERFORM SPOT POT HOLING AT HIS EXPENSE IN ADVANCE OF THE PROJECT TO VERIFY LOCATION OF UTILITIES.
3. UTILITY RELOCATION WORK HAS BEEN OR WILL BE ACCOMPLISHED TO CLEAR THE WORKSPACE. THE RELOCATIONS ARE NOT REFLECTED IN THESE DRAWINGS.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COORDINATION BETWEEN HIMSELF AND OTHER CONTRACTORS AND UTILITIES IN THE VICINITY OF THIS PROJECT. THIS INCLUDES, BUT IS NOT LIMITED TO GAS, WATER, WASTEWATER, ELECTRICAL, TELEPHONE, COMMUNICATIONS NETWORKS, CABLE TELEVISION, THE UNIVERSITY OF TEXAS SYSTEM FACILITIES, PETROLEUM PIPELINES, AND STREET AND DRAINAGE WORK. ONCE THE CONTRACTOR BECOMES AWARE OF A POSSIBLE CONFLICT, IT IS THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE CONSTRUCTION INSPECTOR WITHIN TWENTY-FOUR (24) HOURS.
5. WHEN EXISTING WATERLINE SHUT OFF IS NECESSARY OR POSSIBLE, THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION INSPECTOR, WHO WILL THEN NOTIFY THE WATER UTILITY. THE UTILITY REQUIRES A MINIMUM OF SEVENTY-TWO (72) HOURS ADVANCE NOTICE FOR ALL SHUT OFFS.
6. BEFORE DISCONNECTING ANY WASTEWATER AND/OR WASTEWATER SERVICE LINE, CONTRACTOR MUST PROVIDE AN ALTERNATE MEANS OF WASTEWATER CONVEYANCE FOR THE INTERRUPTED SECTION AT THE CONTRACTOR'S EXPENSE. ANY DAMAGE CAUSED BY BACK FLOW OF WASTEWATER SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
7. EACH LOT IS SERVED BY AT LEAST ONE (1) GAS SERVICE LINE. THE EXACT LOCATIONS OF THE GAS SERVICE LINES ARE NOT SHOWN ON THE CONSTRUCTION PLANS. TEXAS GAS SERVICE WILL LOCATE THEIR SERVICE LINES DURING THE "ONE CALL" PROCESS. CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE TO THE GAS SERVICE LINES DURING CONSTRUCTION.
8. CONTRACTOR WILL BE RESPONSIBLE FOR THE COST INCURRED AS A RESULT OF UTILITY RELOCATIONS PERFORMED FOR THE CONTRACTOR'S CONVENIENCE.
9. DEBRIS CAPS SHALL BE PLACED AS REQUIRED AFTER CONTRACTOR HAS SET UP BARRICADES. FOR NEW WATER LINE, DEBRIS CAPS SHALL BE PLACED UPON COMPLETION OF WATER LINE. DEBRIS CAPS MUST BE INSTALLED IN EXISTING VALVES PRIOR TO BEGINNING WORK AND IN NEW VALVES IMMEDIATELY FOLLOWING THEIR CONSTRUCTION.
10. ANY WATER OR WASTEWATER PIPE EXPOSED DURING OPEN EXCAVATION SHALL BE REBEDDED TO EXISTING STANDARD AND SPECIFICATION, OR EXISTING CONDITION, WHICHEVER IS GREATER.
11. CONTRACTOR MUST OBTAIN UTILITY EXCAVATION PERMITS, FOR EACH RIGHT-OF-WAY EXCAVATED, FROM THE CITY OF AUSTIN PUBLICS WORKS DEPARTMENT - CONSTRUCTION INSPECTION DIVISION (512-974-7265) PRIOR TO COMMENCEMENT OF WORK. CONTRACTOR SHALL PROVIDE A ONE CALL CENTER CONFIRMATION NUMBER.

GENERAL PERMIT CONSTRUCTION NOTES:

1. CONTRACTOR MUST CONTACT (OB.MCKOWN@AUSTINTEXAS.GOV) FOR PERMITTING OF EACH SITE.
2. WHERE REMOVAL OF BASE AND PAVEMENT IS NECESSARY FOR THIS PROJECT, ALL BASE AND PAVEMENT SHALL BE REPLACED IN ACCORDANCE WITH THE CONSTRUCTION DOCUMENTS, CITY OF AUSTIN STANDARD SPECIFICATIONS AND STANDARD DETAILS FOR CUT IN PUBLIC RIGHT-OF WAY. ALL PAVEMENT CUTS SHALL BE SAW-CUT PRIOR TO PLACEMENT OF HMAC.
3. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REMOVE, PRESERVE AND RESET STREET MARKERS AND TRAFFIC CONTROL SIGNS THAT ARE WITHIN THE CONSTRUCTION LIMITS TO THE LINE AND HEIGHT AS DESCRIBED IN THE 2011 TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES BEFORE ANY SIDEWALK OR STREET EXCAVATION IS BEGUN AND DURING ALL CONSTRUCTION PHASES. SIGNS SHALL NOT BE LAID ON THE GROUND. THE TRAFFIC SIGN ACTIVITY SECTION OF THE URBAN TRANSPORTATION DIVISION 974-0170, EXT. 7024) SHALL BE NOTIFIED A MINIMUM OF TWO WORKING DAYS PRIOR TO THE COMPLETION OF THE PROJECT SO THAT THE SIGNS OR POSTS SHALL BE PAID FOR BY THE CONTRACTOR.
4. ALL STRUCTURAL CONCRETE SHALL BE CLASS A (5 SACK, 3000-PSI AT 28 DAYS), AND ALL REINFORCING STEEL SHALL BE GRADE SIXTY, UNLESS OTHERWISE NOTED.
5. IN AREAS EXISTING CURBS AND GUTTERS ARE TO REMAIN, THE OLD PAVING AND BASE MUST BE REMOVED AND THE NEW BASE AND PAVING PLACED AND COMPACTED SO AS NOT TO DISTURB EXISTING CURBS AND GUTTERS.
6. CONTRACTOR SHALL SAW-CUT OR USE ENGINEER APPROVED ALTERNATIVE METHOD TO REMOVE CONCRETE PAVEMENTS, TO RECONSTRUCT CURBS, TO DELINEATE MILLING EDGES, AND TO TIE TO EXISTING PAVEMENT. WHERE CUTTING INTO BASE MATERIALS, SAW-CUT OR APPROVED ALTERNATIVE METHOD SHALL BE OF SUFFICIENT DEPTH TO ACHIEVE A SMOOTH, VERTICAL FACE DURING EXCAVATION IN THE BASE.
7. ALL LOOSE MATERIALS SHALL BE COMPLETELY REMOVED FROM THE ROADWAY BY MECHANICAL SWEEPER AND/OR MANUAL BROOMING PRIOR TO OPENING TO TRAFFIC AND FOR THE DURATION OF THE PROJECT. ALL LOOSE MATERIAL SHALL BE COMPLETELY REMOVED FROM THE ADJACENT SIDEWALK AREAS FOR THE DURATION OF THE PROJECT AND SIDEWALKS SHALL BE COMPLETELY CLEAR OF ANY CONSTRUCTION DEBRIS PRIOR TO FINAL COMPLETION OF THE PROJECT. LOOSE AND SURPLUS AGGREGATE SHALL BE BROOMED OFF THE SURFACE AS DIRECTED BY THE PROJECT MANAGER.
8. ALL RECONSTRUCTION, PREPARATION WORK AND PAVING SHALL BE COMPLETED IN A MANNER SO AS TO PROVIDE A SMOOTH RIDING SURFACE FREE OF BUMPS, DIPS, AND RIPPLES AND A SMOOTH, UNIFORM APPEARANCE. THE FINISHED SURFACE SHALL APPROXIMATE THE EXISTING PROFILE. DIPS AND RISES MAY EXIST DUE TO SUBSURFACE OR OTHER CONDITIONS. THE CONTRACTOR SHALL ATTEMPT TO SMOOTH OUT THE PROFILE DURING MILLING AND OVERLAY OPERATIONS TO IMPROVE RIDEABILITY.
9. THE CONTRACTOR SHALL OBTAIN AND INSTALL BLUE REFLECTORIZED PAVEMENT MARKERS ON PAVED STREETS OPPOSITE (PERPENDICULAR TO) EXISTING/PROPOSED FIRE HYDRANTS. THESE DELINEATORS SHALL BE PLACED AT A ONE (1) FOOT OFFSET FROM THE CENTERLINE TOWARD THE SIDE OF THE STREET WHERE THE FIRE HYDRANT IS LOCATED.
10. THE CONSTRUCTION AND PHASING SHALL BE IN ACCORDANCE WITH THE TRAFFIC CONTROL PLANS. ANY CHANGES TO THE SEQUENCE OF WORK ON THE APPROVED PLANS WILL REQUIRE APPROVAL OF THE CITY AND ENGINEER. NO EXTRA PAYMENT WILL BE PROVIDED FOR THESE CHANGES.
11. CONTRACTOR SHALL TRIM ANY SHRUBS AND TREES TO PROVIDE PEDESTRIAN CLEARANCE IN ORDER TO COMPLY WITH T.A.S.

GENERAL PERMIT SIDEWALK NOTES:

1. SIDEWALK AND DRIVEWAY CONCRETE THICKNESS SHALL BE 5 INCHES THICK UNLESS IT IS A COMMERCIAL DRIVEWAY THAT PROVIDES ACCESS TO A BUSINESS OR APARTMENT COMPLEX, THEN THE THICKNESS OF THE DRIVEWAY AND SIDEWALK SHALL BE 6 INCHES IN THAT AREA.
2. CONCRETE FOR SIDEWALKS AND RAMPS SHALL BE PLACED NO LATER THAN 4 WORKING DAYS AFTER EXCAVATION AT ANY SITE.
3. EXPANSION JOINTS SHALL BE PROVIDED AT THE TIE-IN OF NEW CURB AND GUTTER TO EXISTING CURB AND GUTTER AND AT OTHER LOCATIONS TO BE DETERMINED BY THE ENGINEER.
4. EXPANSION JOINT MATERIALS SHALL BE AS PER ITEM 408 AND EXTEND THE FULL DEPTH OF THE CONCRETE FOR WET JOINTS AND 1/2" BITUMEN FILLED FIBER AND COLD JOINTS OR AS DIRECTED BY THE ENGINEER.
5. ALL FILL AREAS SHALL BE COMPACTED TO A UNIFORM DENSITY OF NOT LESS THAN 95 PERCENT OF THE MAXIMUM DRY DENSITY AT NOT LESS THAN OPTIMUM MOISTURE AS DETERMINED BY THE TEST METHOD TEX-113-E.
6. ALL FLAT CONCRETE SHALL BE BROOM FINISHED.
7. PIPE SLEEVE EXPANSION JOINTS SHALL BE PLACED IN HANDRAILS TO CORRESPOND TO EXPANSION JOINTS IN THE SIDEWALK OR CONCRETE STRUCTURE. THE PIPE SLEEVE EXPANSION JOINT SHALL BE PLACED AT A POST UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
8. CONTRACTOR SHALL MAINTAIN A MINIMUM 3 FOOT CLEARANCE AT ALL OBSTRUCTIONS IN SIDEWALKS SUCH A TELEPHONE POLES, SIGNS, ETC.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING AND REPLACING MAIL BOXES THAT ARE IN THE CONSTRUCTION AREA WHILE ENSURING THAT MAIL DELIVERY WILL NOT BE INTERRUPTED AS A RESULT OF THE CONSTRUCTION ACTIVITIES. MAILBOXES SHALL NOT BE LAID ON THE GROUND.
10. EXISTING PVC PIPE DRAINS IN AND BEHIND CURB SHALL BE REMOVED AND REPLACED IN NEW CURB AND GUTTER AND/OR SIDEWALK. IN AREAS OF PROPOSED SIDEWALK, WHERE CURB AND GUTTER IS TO REMAIN, EXISTING PVC SHALL BE CUT FAR ENOUGH BEHIND BACK OF CURB TO ALLOW ROOM FOR JOINT FITTINGS TO CONNECT TO NEW PVC PIPE.
11. LIMITS OF SIDEWALK CONSTRUCTION THROUGH ASPHALT OR GRAVEL AREAS SHALL BE 1' BEYOND THE SIDEWALK EDGES. ANY DAMAGE BEYOND THIS POINT SHALL BE REPAIRED BY THE CONTRACTOR AT HIS EXPENSE. BACKFILL OF THE SIDEWALK IN THESE AREAS SHALL BE WITH MATERIAL EQUAL TO OR BETTER THAN THAT REMOVED.
12. TIE-IN ELEVATIONS SHOWN ON THE PLANS ARE APPROXIMATE, CONTRACTOR TO MATCH EXISTING SIDEWALK AT ALL TIE POINTS.

GENERAL PERMIT PROGRAM

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

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CITY OF AUSTIN
AUSTIN WATERSHED PROTECTION
BOGGY CREEK MLK TOD SW CONVEYANCE IMPROVEMENTS-PHASE 3

GENERAL NOTES 1 OF 3

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DATE 12/12/2025
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GENERAL NOTES

ALL RESPONSIBILITY FOR THE ADEQUECY OF THESE PLANS REMAINS WITH THE ENGINEER. APPROVAL OF THESE PLANS BY THE CITY OF AUSTIN DOES NOT REMOVE THESE RESPONSIBILITIES.

"REVIEWED BY AUSTIN WATER" APPLIES ONLY TO AW PUBLIC INFRASTRUCTURE, ALL OTHER WATER AND WASTEWATER INFRASTRUCTURE INSIDE PRIVATE PROPERTY ARE UNDER THE JURISDICATION OF BUILDING INSPECTIONS.

USE OF ELECTRONIC FILES GENERAL DISCLAIMER: USE OF THE ATTACHED FILES IN ANY MANNER INDICATES YOUR ACCEPTANCE OF TERMS AND CONDITIONS AS SET FORTH BELOW. IF YOU DO NOT AGREE TO ALL OF THE TERMS AND CONDITIONS, PLEASE CONTACT AUSTIN WATER PIPELINE ENGINEERING, PROJECT COORDINATOR PRIOR TO USE OF THE REFERENCED INFORMATION. PLEASE BE ADVISED THAT THE ATTACHED FILES ARE IN A FORMAT THAT CAN BE ALTERED BY THE USER. DUE TO THIS FACT, ANY REUSE OF THE DATA WILL BE AT THE USER'S SOLE RISK WITHOUT LIABILITY OR LEGAL EXPOSURE TO THE CITY OF AUSTIN AND USER SHALL INDEMNIFY AND HOLD HARMLESS THE CITY OF AUSTIN FROM ALL CLAIMS, DAMAGES, LOSSES AND EXPENSES INCLUDING ATTORNEY'S FEES ARISING OUT OF OR RESULTING FROM USING THE DIGITAL FILE. IN ADDITION, IT IS THE RESPONSIBILITY OF THE USER TO COMPARE ALL DATA WITH THE PDF VERSION OF THIS DRAWING. IN THE EVENT THERE IS A CONFLICT BETWEEN THE PDF VERSION DRAWING AND THE ELECTRONIC FILE, THE PDF VERSION DRAWING SHALL PREVAIL.

AUTOMATED METERING INFRASTRUCTURE: EFFECTIVE MARCH 2022, NEW WATER METERS INSTALLED SHALL BE IN CONFORMANCE WITH AW'S AUTOMATED METERING INFRASTRUCTURE TECHNOLOGY, AND WITH THE APPLICABLE STANDARD PRODUCT LIST. APPLICANTS FILING A SITE PLAN OR SUBDIVISION PLAN WILL BE REQUIRED TO COORDINATE WITH THE AUSTIN WATER PLAN REVIEWER FOR DETAILS ON APPROVAL AND INSTALLATION.

PRIOR TO THE HANDLING AND DISPOSAL OF ASBESTOS PIPE, THE CONTRACTOR'S WORK PLAN WILL BE REVIEWED AND COORDINATED THROUGH COA BUILDING SERVICES DEPARTMENT - ASBESTOS, LEAD AND MOLD MANAGEMENT GROUP MANAGER WHO CAN BE REACHED AT 512-974-7137. IT IS THE CONTRACTOR'S RESPONSIBILITY TO USE A TRAINED, CERTIFIED AND LICENSED ASBESTOS ABATEMENT CONTRACTOR IN ACCORDANCE WITH THE FEDERAL, STATE AND LOCAL REGULATIONS.

MODIFICATIONS TO AUSTIN WATER SIGNED AND STAMPED SHEETS ARE NOT PERMITTED. ALL DESIGN MODIFICATIONS SHALL BE SUBMITTED VIA THE ABC PORTAL FOR A PLAN CORRECTION OR REVISION. ALL UNETHICAL ENGINEERING PRACTICES, INCLUDING MODIFYING CITY STAMPED PLAN SHEETS, SHALL BE REPORTED TO THE TEXAS BOARD OF PROFESSIONAL ENGINEERS AND LAND SURVEYORS (TBPELS).
REFERENCE: TEXAS ENGINEERING PRACTICE ACT AND RULES, SUBCHAPTER C: PROFESSIONAL CONDUCT AND ETHICS

AW INFRASTRUCTURE INFORMATION

PROPOSED PRODUCT TYPE (TO BE INSTALLED)	LENGTH OF PIPE (L.F.)	SIZE OF PIPE (INCH)	NO. OF SERVICES
WATER MAIN	94	6"	NA
WATER MAIN	1752	8"	26
WATER MAIN	130	12"	NA
WATER MAIN	477	24"	NA
WASTEWATER MAIN	1750	8"	22
RECLAIMED WATER MAIN	NA	NA	NA
WATER SERVICE	320	2"	NA
WASTEWATER SERVICE	440	6"	NA

EXPAND OR REDUCE TABLE AS NEEDED*
THE INFORMATION INCLUDED IN THIS TABLE ARE APPROXIMATE VALUES ESTIMATED BASED ON GENERAL ENGINEERING GUIDELINES

STANDARD CONSTRUCTION NOTES REVISED FEBRUARY 7, 2025

1. **THE CITY STANDARD CONSTRUCTION SPECIFICATIONS CURRENT AT THE TIME OF BIDDING SHALL COVER MATERIALS AND METHODS USED TO DO THIS WORK.**
2. **CONTRACTOR MUST OBTAIN A ROW PERMIT FROM AUSTIN TRANSPORTATION AND PUBLIC WORKS DEPARTMENT, RIGHT OF WAY MANAGEMENT DIVISION BEFORE BEGINNING CONSTRUCTION WITHIN THE RIGHT-OF-WAY OF A PUBLIC STREET OR ALLEY. ACTIVITY WITHIN RIGHT-OF-WAY SHALL COMPLY WITH APPROVED TRAFFIC CONTROL PLAN (TCP).**
3. **AT LEAST 48 HOURS PRIOR TO BEGINNING ANY UTILITY CONSTRUCTION ACTIVITY IN PUBLIC ROW OR PUBLIC EASEMENT, THE CONTRACTOR SHALL NOTIFY THE APPLICABLE CITY OF AUSTIN INSPECTION GROUP (AUSTIN TRANSPORTATION AND PUBLIC WORKS DEPARTMENT (TPW), OR DEVELOPMENT SERVICES). SEE CURRENT NOTIFICATION REQUIREMENTS AT WWW.AUSTINTEXAS.GOV.**
4. **THE CONTRACTOR SHALL CONTACT THE AUSTIN AREA "ONE CALL" SYSTEM AT 1-800-344-8377 FOR EXISTING UTILITY LOCATIONS PRIOR TO ANY EXCAVATION IN ADVANCE OF CONSTRUCTION. THE CONTRACTOR SHALL VERIFY THE LOCATIONS OF ALL UTILITIES TO BE EXTENDED, TIED TO, OR ALTERED, OR SUBJECT TO DAMAGE/INCONVENIENCE BY THE CONSTRUCTION OPERATIONS. THE CITY OF AUSTIN WATER AND WASTEWATER MAINTENANCE RESPONSIBILITY ENDS AT R.O.W./EASEMENT LINES.**
5. **NO OTHER UTILITY SERVICE/APPURTENANCES SHALL BE PLACED NEAR THE PROPERTY LINE, OR OTHER ASSIGNED LOCATION DESIGNATED FOR WATER AND WASTEWATER UTILITY SERVICE THAT WOULD INTERFERE WITH THE WATER AND WASTEWATER SERVICES.**
6. **MINIMUM TRENCH SAFETY MEASURES SHALL BE PROVIDED, AS REQUIRED BY OSHA, CITY SPECIFICATION 509S, AND CITY/COUNTY CONSTRUCTION INSPECTORS.**
7. **PRESSURE TAPS WILL ONLY BE ALLOWED ON A CASE BY CASE BASIS, AS DETERMINED BY THE DIRECTOR'S DESIGNEE. NORMALLY PRESSURE TAPS 4 INCHES AND LARGER SHALL BE ALLOWED IN THE FOLLOWING CASES: A) A TEST SHUT OUT INDICATES AN ADEQUATE SHUT OUT TO PERFORM THE WORK IS NOT FEASIBLE B) MORE THAN 30 CUSTOMERS OR A SINGLE CRITICAL CUSTOMER (AS DEFINED BY AUSTIN WATER) WOULD BE IMPACTED BY THE SHUT OUT OR C) THE EXISTING WATER LINE WARRANTS IT.**
8. **WATER LINE TESTING AND STERILIZATION SHALL BE PERFORMED IN ACCORDANCE WITH CITY STANDARD SPECIFICATION ITEMS 510.3 (27)-(29). FORCE MAIN PRESSURE TESTING SHALL BE CONDUCTED AND FALL UNDER THE SPECIFICATIONS AS WATER LINES (PRESSURE PIPE) OR AS DIRECTED BY THE PROJECT SPECIFICATIONS.**
9. **ALL MATERIAL USED ON THIS PROJECT MUST BE LISTED ON THE STANDARD PRODUCTS LISTING. ANY MATERIAL NOT LISTED HAS TO GO THROUGH THE REVIEW OF THE STANDARDS COMMITTEE FOR REVIEW AND APPROVAL PRIOR TO START OF PROJECT. TESTING AND EVALUATION OF PRODUCTS ARE REQUIRED BEFORE APPROVAL WILL BE GIVEN ANY CONSIDERATION.**
10. **WHEN WATER SERVICES ARE DAMAGED AND THE SERVICE MATERIAL IS POLYETHYLENE (PE), THE LINE SHALL BE REPAIRED ONLY BY HEAT FUSION WELD, AT BRASS FITTINGS, OR THE FULL LENGTH SHALL BE REPLACED PER CURRENT STANDARD DETAIL(S). WHEN POLYBUTYLENE (PB) TUBING IS DAMAGED OR TAMPERED WITH IN ANY WAY, THE FULL LENGTH OF SERVICE LINE SHALL BE REPLACED. (NOTE: FULL LENGTH IS FROM THE CORPORATION STOP TO THE METER.) REPAIR COUPLINGS ARE NOT ALLOWED FOR ANY WATER OR WASTEWATER SERVICE LINE REPAIR, RECONNECT, OR REPLACEMENT.**
11. **WHEN AN EXISTING WATERLINE SHUT OUT IS NECESSARY AND POSSIBLE, THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION INSPECTOR WHO WILL THEN NOTIFY AUSTIN WATER DISPATCH AND THE AFFECTED CUSTOMERS A MINIMUM OF FORTY-EIGHT (48) HOURS IN ADVANCE.**
12. **THE INSPECTOR SHALL NOTIFY AUSTIN WATER AT 972-1000 AT A MINIMUM OF 72 HOURS PRIOR TO RELOCATING ANY DOMESTIC OR FIRE DEMAND WATER METERS.**
13. **PROJECT-SPECIFIC SHOP DRAWINGS SHALL BE SUBMITTED FOR AW APPROVAL FOR PRE-CAST CIRCULAR VERTICAL MANHOLE SECTIONS LARGER THAN 48" DIAMETER. THE SHOP DRAWINGS SHALL INCLUDE THE FLOWLINE ELEVATION OF ALL CONNECTING PIPES; ELEVATIONS OF TRANSITIONS FROM LARGE DIAMETER SECTIONS TO 48" DIAMETER SECTIONS; TOP OF MANHOLE AND SURROUNDING GROUND ELEVATIONS; AND DETAILS OF SPECIAL CONSTRUCTION CONSIDERATIONS SPECIFIED IN THE CONTRACT DOCUMENTS.**
14. **WHEN CONCRETE MANHOLES LARGER THAN 48 INCH DIAMETER ARE USED, DRAWINGS THAT ARE SEALED BY A PROFESSIONAL ENGINEER SHALL BE SUBMITTED FOR BASE SLABS, FLAT TOP LIDS (IF USED), AND FLAT TYPE CONCRETE PIECES USED TO TRANSITION FROM LARGER TO SMALLER DIAMETER MANHOLE SECTIONS.**
15. **ALL FIRE HYDRANTS AND VALVES THAT ARE TO BE ABANDONED SHALL BE REMOVED, SALVAGED AND RETURNED TO AUSTIN WATER. NOTICE SHOULD BE GIVEN 48 HOURS PRIOR, TO PIPELINE OPERATIONS DISTRIBUTION SYSTEM -VALVES AND HYDRANT SERVICES SUPERVISOR AT AWDSM-ASSET-RECOVERY@CITYOFAUSTIN.ONMICROSOFT.COM.**
16. **ALL EXISTING WATER METERS IDENTIFIED TO BE RELOCATED OR ABANDONED AT THE DEVELOPMENT SHALL BE REMOVED FROM THE METER BOX PRIOR TO CONSTRUCTION AND GIVEN IMMEDIATELY TO THE CITY OF AUSTIN INSPECTOR.**
17. **THE ENGINEER SHALL CALL OUT THE SIZE, TYPE AND USE (DOMESTIC, IRRIGATION OR RECLAIM) OF ALL EXISTING WATER METERS TO BE RELOCATED OR REPURPOSED. WATER METER NUMBERS WILL NOT BE REQUIRED TO BE PLACED ON THE PLAN SHEET. A SEPARATE UTILITY PERMITTING OFFICE FORM CAN BE USED TO PROVIDE RELEVANT DATA FOR THE EXISTING INFORMATION ON EXISTING METERS TO RECEIVE APPROPRIATE CREDITS. THIS FORM SHALL BE DIRECTLY SUBMITTED TO UTILITY PERMITTING OFFICE FOR REVIEW AND PROCESSING.**
18. **NO CONNECTION MAY BE MADE BETWEEN THE PRIVATE PLUMBING AND AUSTIN WATER INFRASTRUCTURE UNTIL A CITY APPROVED WATER METER HAS BEEN INSTALLED.**
19. **METER BOXES AND CLEAN OUTS SHALL NOT BE LOCATED WITHIN PAVED AREAS SUCH AS DRIVEWAYS AND SIDEWALKS.**
20. **NO SOIL COMPACTION EQUIPMENT SHALL COME WITHIN 24-INCHES FROM THE TOP OF THE WATER OR WASTEWATER PIPE. BETWEEN 24-36 INCHES FROM TOP OF THE PIPE, ONLY LIGHT SOIL COMPACTION EQUIPMENT (E.G., RAMMERS OR "WHACKER PACKERS", VIBRATING PLATE COMPACTORS, WALK-BEHIND HAND-GUIDED ROLLERS) OR SMOOTH ROLLER COMPACTION EQUIPMENT WEIGHING LESS THAN 5,000 LBS. WILL BE ALLOWED. WHERE SOIL COMPACTION EQUIPMENT WILL BE 36-INCHES OR GREATER FROM THE TOP OF THE PIPE, HS20 LOADS SHALL NOT BE EXCEEDED. PIPE DEPTHS SHALL BE VERIFIED THROUGH POTHOLING, LEVEL A SUE OR BY MH INVERT DATA.**
21. **THE DESIGN AND CONSTRUCTION OF RETAINING WALLS, BRIDGES, CULVERTS, HEADWALLS, JUNCTION STRUCTURES, SCREENING WALLS, AND STORMWATER DRAINAGE PIPE WITHIN THE VICINITY OF AW UTILITIES SHALL BE IN COMPLIANCE WITH SECTION 13 OF THE COA'S TRANSPORTATION CRITERIA MANUAL.**
22. **THRUST RESTRAINT SHALL BE IN ACCORDANCE WITH CITY STANDARD SPECIFICATION ITEM 510.3(22) AND SPL WW-27A, WW-27A-01, WW-27A-02 AND WW-27F.**
23. **ALL WATERLINE BRANCH CONNECTIONS SHALL HAVE AN MJ GATE VALVE POSITIVELY RESTRAINED TO THE MJ TEE BY USING A SWIVEL TEE, FOSTER ADAPTOR, OR SWIVEL X SOLID HYDRANT ADAPTOR (WITH SWIVEL GLAND).**

*** ON CITY SPONSORED PROJECTS, WHERE CONFLICTS ARE IDENTIFIED BETWEEN THESE CONSTRUCTION NOTES AND THE PROJECT CONTRACT DOCUMENTS, THE CONTRACT DOCUMENTS WILL TAKE PRECEDENCE.**

UTILITY CRITERIA MANUAL WAIVER SUMMARY NOTES AND EXCEPTION GUIDELINES

AW#	SHEET #	ALIGNMENT	AFFECTED PIPE SIZE	STATION(S)	WAIVER FOR	CRITERIA	DESCRIPTION AND JUSTIFICATION
AW-01	53	WL-I	8" DI	2+48.63	LESS THAN 5' HORIZONTAL SEPARATION FROM PROP 4" RCP SDJB (4.1')	UCM 2.9.1.B.2	PROP 8" DI WL LOCATION IS NEEDED TO MAINTAIN SEPARATION FROM PROP 4' RCP STORM JB AND FROM EX. 6" WL (1.5')
AW-02			8" DI	3+39.48	LESS THAN 5' HORIZONTAL SEPARATION FROM PROP 6'X5' RCP SDJB (3.2')		PROP 8" DI WL LOCATION IS NEEDED TO MAINTAIN SEPARATION FROM PROP 6'X5' RCP STORM JB AND FROM EX. 6" WL (1.5')
AW-03			8" DI	3+42.16 THRU 3+68.22	LESS THAN 5' HORIZONTAL SEPARATION FROM PROP 48" RCP SD (4.4')		PROP 8" DI WL LOCATION IS NEEDED TO MAINTAIN SEPARATION FROM PROP 48" RCP SD AND FROM EX. 6" CI WL (1.5')
AW-04	54		8" DI	6+53.53	LESS THAN 5' HORIZONTAL SEPARATION FROM PROP 4' RCP SDJB (4.3')		PROP 8" DI WL LOCATION IS NEEDED TO MAINTAIN SEPARATION FROM EXISTING 3" GAS LINE (5') AND FROM 48" RCP STORM (5.2')
AW-05			8" DI	5+13.77 THRU 8+67.13	LESS THAN 4.0' COVER BETWEEN EXISTING GROUND AND PROPOSED 8" DI WL (3.0' - 3.99')	UCM 2.9.1.B.4	PROP 8" DI WL-I LOCATION IS NEEDED TO TIE INTO EXISTING WATER SERVICE, CONNECT TO WL-I-1, AND REMAIN ABOVE THE PROP 48" RCP SD AND 18" RCP SI-02 LATERAL
AW-06			8" DI	7+05.79 - 7+20.35	LESS THAN 5' HORIZONTAL SEPARATION FROM PROP 48" RCP STORM (4')	UCM 2.9.1.B.2	PROP 8" DI WL-I LOCATION IS NEEDED TO REMAIN 5FT HORIZONTALLY FROM PROP 48" RCP SD AND SI-02
AW-07			8" DI	7+20.35	LESS THAN 5' HORIZONTAL SEPARATION FROM PROP 6'X5' RCP SDJB (3.1')		PROP 8" DI WL-I LOCATION IS NEEDED TO REMAIN 5FT HORIZONTALLY FROM PROP 48" RCP SD AND SI-02, STL CASING ADDED
AW-08	54, 55		8" DI	7+20.35 THRU 9+10.89	LESS THAN 5' HORIZONTAL SEPARATION FROM EXIST 48" RCP STORM (4.0' - 4.4')		PROP 8" DI WL-I LOCATION IS NEEDED TO REMAIN 5FT HORIZONTALLY FROM CI-78 AND CI-79
AW-09	54		8" DI	7+40.99	LESS THAN 1.5' VERTICAL SEPERATION FROM PROP 18" RCP STORM CROSSING BELOW THE PROP 8" DI WL (1.20')	UCM 2.9.1.B.3	PROP 8" DI WL-I LOCATION IS NEEDED TO TIE INTO EXISTING WATER SERVICE, CONNECT TO WL-I-1, AND REMAIN ABOVE THE PROP 48" RCP SD AND 18" RCP SI-02 LATERAL. WL HAS 3.4' OF COVER
AW-10	55	WL-I	8" DI	9+13.72	LESS THAN 5' HORIZONTAL SEPARATION FROM PROP 6'X5' RCP SDJB (3.4')	UCM 2.9.1.B.2	PROP 8" DI WL-I LOCATION IS NEEDED TO REMAIN 5FT HORIZONTALLY FROM CI-78 AND CI-79, STL CASING ADDED
AW-11	56	WL-J	8" DI	2+27.49	LESS THAN 5' HORIZONTAL SEPARATION FROM PROP CI-59 (4.5')		PROP 8" DI WL LOCATION IS NEEDED TO BE SEPARATED FROM BOTH CURB INLET CI-59 AND 5'X5' SDJB
AW-12			8" DI	2+27.49	LESS THAN 5' HORIZONTAL SEPARATION FROM PROP 5'X5"' RCP SDJB (4.8')		PROP 8" DI WL LOCATION IS NEEDED TO BE SEPARATED FROM BOTH CURB INLET CI-59 AND 5'X5' SDJB
AW-13			8" DI	3+37.60	LESS THAN 5' HORIZONTAL SEPARATION FROM PROP CI-58 (4.3')		PROP 8" DI WL LOCATION IS NEEDED TO BE SEPARATED FROM BOTH CURB INLET CI-58 AND EX. 8" PVC WL
AW-14	57	WL-H	8" DI	1+00 THRU 1+42.66, 1+68.94 THRU 1+80.32	LESS THAN 4.0' COVER BETWEEN EXISTING GROUND AND PROPOSED 8" DI WL (3.4' - 3.99')	UCM 2.9.2.B.4	PROP 8" DI WL-I LOCATION IS NEEDED TO TIE INTO PROPOSED WL-I WHILE REMAINING ABOVE THE PROP 48" RCP SD, AND CONNECT TO EX. 6" DI WL
AW-15	58	WL-K	8" DI	2+31.67 - 2+51.67	LESS THAN 4.0' COVER BETWEEN EXISTING GROUND AND PROPOSED 8" DI WL (3.0')	UCM 2.9.2.B.4	PROP 8" DI WL-K LOCATION IS NEEDED TO TIE INTO EXISTING 6" CI WL
AW-16	59	WL-I-1	8" DI	1+00 - 1+14.35	LESS THAN 4.0' COVER BETWEEN EXISTING GROUND AND PROPOSED 8" DI WL (3.4' - 3.8')	UCM 2.9.2.B.4	PROP 8" DI LOCATION IS NEEDED TO TIE INTO PROPOSED WL-I AND REMAIN ABOVE PROP 48" RCP SD
AW-17	60	WL-L	8" DI	1+07.50 THRU 1+14.00, 1+83.26 THRU 2+14.37	LESS THAN 4.0' COVER BETWEEN EXISTING GROUND AND PROPOSED 8" DI WL (3.7' - 3.99')	UCM 2.9.2.B.4	PROP 8" DI LOCATION IS NEEDED TO TIE INTO EXISTING 6" DI WL
AW-18	61	WL-I-2	12" DI	3+32.21 THRU 3+70.40	LESS THAN 5' HORIZONTAL SEPARATION FROM PROP 48" RCP STORM LINE(4')	UCM 2.9.1.B.2	PROP 12" DI WL LOCATION IS NEEDED TO TIE INTO EXIST 12 " DI, AND AVOID BOTH 24" DI WL AND 48" RCP SD. ADDED CONCRETE TRENCH FILL
AW-19			12" DI	3+47.47 THRU 3+83.44	LESS THAN 5' HORIZONTAL SEPARATION FROM PROP 24" DI WL (4')		PROP 12" DI WL LOCATION IS NEEDED TO TIE INTO EXIST 12 " DI, AND AVOID BOTH 24" DI WL AND 48" RCP SD. , ADDED CONCRETE TRENCH FILL
AW-20	62	WL-I-3	24" DI	1+00 THRU 1+24.18	LESS THAN 4.0' COVER BETWEEN EXISTING GROUND AND PROPOSED 24" DI WL (3.7')	UCM 2.9.2.B.4	PROP 24" DI LOCATION IS NEEDED TO TIE INTO EXISTING 24" CSC WL
AW-45	63		24" DI	2+73.06 THRU 4+18.29	LESS THAN 5' HORIZONTAL SEPARATION FROM EXISTING 3" GAS LINE (3.6')	UCM 2.9.1.B.2	PROP 24' WL-I-3 LOCATION IS NEEDED TO AVOID EXISTING GAS ALIGNMENT WHILE STAYING WITHIN BIKE LANE AND LOC.
AW-21			24" DI	4+50.08 THRU 4+86.05	LESS THAN 5' HORIZONTAL SEPARATION FROM PROP 12" DI WL(4')	UCM 2.9.1.B.2	PROP 24' WL-I-3 LOCATION IS NEEDED TO TIE INTO EX 24" WL. , ADDED PROPOSED CONC TRENCH FILL
AW-22	64	WL-I-4	8' DI	2+52.59 THRU 2+80.57	LESS THAN 4.0' COVER BETWEEN EXISTING GROUND AND PROPOSED 8" DI WL (2.7' - 3.23')	UCM 2.9.2.B.4	PROP 8" DI LOCATION IS NEEDED TO MAINTAIN VERTICAL SEPARATION FROM PROPOSED 48" RCP SD LINE I. ADDED STL CASING
AW-23			8" DI	2+67.16	LESS THAN 1.5' VERTICAL SEPERATION FROM PROP 48" RCP SD CROSSING BELOW THE PROP 8" DI WL (1.01')	UCM 2.9.1.B.3	PROP 8" DI LOCATION IS NEEDED TO MAINTAIN MAXIMUM COVER AND BE INSTALLED ABOVE PROPOSED 48" RCP SD LINE I. ADDED STL CASING
AW-24	66	WW-I	MH-I-01	1+00.00	LESS THAN 5' HORIZONTAL SEPARATION FROM EXIST PE GAS CROSSING (1.3')	UCM 2.9.1.B.2	PROP WW-I LINE LOCATION IS NEEDED TO TIE INTO EXIST 12" WW LINE, MH# 133450 IS "REPLACE IN PLACE"
AW-25			MH-I-01	1+00.00	LESS THAN 5" HORIZONTAL SEPARATION FROM PROP 48" RCP STORM LINE (3.4')		PROP WW-I LINE LOCATION IS NEEDED TO TIE INTO EXIST 12" WW LINE MAINTAINING SEPARATION FROM PROP 48" RCP STORM LINE (5.4') MH#300807 IS "REPLACE IN PLACE"
AW-26			8" PVC	3+86.03	LESS THAN 1.5' VERTICAL SEPARATION FROM EXIST 6-4" ATT COMM DB CROSSING BELOW THE PROP 8" PVC WWTR (1.00')	UCM 2.9.1.B.3	PROP 8" PVC WW LOCATION IS NEEDED TO MAINTAIN 1.59' OF VERTICAL SEPARATION FROM 48" RCP SD.
AW-27			MH-I-05	3+98.36	LESS THAN 5' HORIZONTAL SEPARATION FROM EXIST 6-4" ATT COMM DB LINE (3.6')	UCM 2.9.1.B.2	PROP MH-I-05 LOCATION IS NEEDED TO TIE PROP WW-I LINE TO PROP WW- I-1, CONCRETE TRENCH FILL IS PROVIDED AROUND PROPOSED WWMH.
AW-28			MH-I-05	3+98.36	LESS THAN 5' HORIZONTAL SEPARATION FROM EXIST 48" RCP STORM LINE (4.0')		PROP MH-I-05 LOCATION IS NEEDED TO TIE PROP WW-I LINE TO PROP WW- I-1, CONCRETE TRENCH FILL IS PROVIDED AROUND PROPOSED WWMH.
AW-29	67	WW-I-1	8" PVC	3+76.13	LESS THAN 5' HORIZONTAL SEPARATION FROM PROP STORM JB (4.7')		PROP WW-I-1 LINE LOCATION IS NEEDED TO MAINTAIN SEPARATION FROM PROP 6'X5' RCP STORM JB (4.7') AND ATT COMM VAULT (3.5')
AW-30			8" PVC	3+86.22	LESS THAN 5' HORIZONTAL SEPARATION FROM EXIST ATT COMM VAULT (3.5')		PROP WW-I-1 LINE LOCATION IS NEEDED TO MAINTAIN SEPARATION FROM PROP 6'X5' RCP STORM JB (4.7') AND ATT COMM VAULT (3.5')
AW-31			MH-I-07	4+62.72	LESS THAN 5' HORIZONTAL SEPARATION FROM EXIST 6-4" ATT COMM DB LINE (4.2')		PROP WW-I-1 LINE LOCATION IS NEEDED TO MAINTAIN SEPARATION FROM EXIST 6-4" ATT COMM DB LINE (4.2') AND PROP 6'X5' RCP STORM JB (4.7')
AW-32	70	WW-K	8" PVC	1+53.94	LESS THAN 5' HORIZONTAL SEPARATION FROM PROP CI-60 (3.8')		PROP WW-K LINE LOCATION IS NEEDED TO MAINTAIN SEPARATION FROM PROP 5'X5"' RCP STORM JB (5').
AW-33			MH-K-02	2+63.99	LESS THAN 5' HORIZONTAL SEPARATION FROM PROP 3" PE GAS LINE (4.3')		PROP MH-K-02 LOCATION IS NEEDED TO TIE INTO EXISTING 6" CONC WW LINE.
AW-34	72	WW-J	MH-J-02	3+86.99	LESS THAN 5' HORIZONTAL SEPARATION FROM PROP 3" PE GAS LINE (4.3')		PROP MH-J-02 LOCATION IS NEEDED TO TIE INTO EXISTING 6" CONC WW LINE
AW-35		WW-SERVICE J-4	6" WWCO	1+25.62 WW-J	PR. WWCO LOCATION IS IN EX. DRIVEWAY	UCM 2.9.4.G.6	PROP WWCO LOCATION IS NEEDED TO TIE INTO EXISTING WWTR SERVICE
AW-36		WW-SERVICE J-8	6" WWCO	3+30.13 WW-J	PR. WWCO LOCATION IS IN EX. DRIVEWAY		PROP WWCO LOCATION IS NEEDED TO TIE INTO EXISTING WWTR SERVICE
AW-37	73	WW-SERVICE I-2	6" WWCO	1+32.80	PROPOSED CO DEPTH IS GREATER THAN 6FT (14.31')	UCM 2.9.4.G.1	PROP WWCO DEPTH IS NEEDED FOR 6" PVC WWTR SERVICE TO GO UNDER THE PROPOSED 48" RCP SD (1.5')
AW-38		WW-SERVICE I-1-2	6" WWCO	1+36.07	PROPOSED CO DEPTH IS GREATER THAN 6FT (12.62')		PROP WWCO DEPTH IS NEEDED FOR 6" PVC WWTR SERVICE TO GO UNDER THE PROPOSED 48" RCP SD (2.0')
AW-39		WW-SERVICE K-2	6" WWCO	1+34.63	PROPOSED CO DEPTH IS GREATER THAN 6FT (9.75')		PROP WWCO DEPTH IS NEEDEDFOR 6" PVC WWTR SERVICE TO GO UNDER THE PROPOSED 8" DI WL (1.5')
AW-40	74	WW-SERVICE K-3	6" WWCO	1+33.84	PROPOSED CO DEPTH IS GREATER THAN 6FT (9.09')		PROP WWCO DEPTH IS NEEDEDFOR 6" PVC WWTR SERVICE TO GO UNDER THE PROPOSED 8" DI WL (1.5')
AW-41		WW-SERVICE J-2	6" WWCO	1+32.63	PROPOSED CO DEPTH IS GREATER THAN 6FT (10.23')		PROP WWCO DEPTH IS NEEDED FOR 6" PVC WWTR SERVICE TO GO UNDER THE PROPOSED 48" RCP SD (2.0')
AW-42	75	WW-SERVICE J-4	6" WWCO	1+32.63	PROPOSED CO DEPTH IS GREATER THAN 6FT (9.81')		PROP WWCO DEPTH IS NEEDEDFOR 6" PVC WWTR SERVICE TO GO UNDER THE PROPOSED 8" DI WL (1.5')
AW-43		WW-SERVICE J-6	6" WWCO	1+31.21	PROPOSED CO DEPTH IS GREATER THAN 6FT (9.93')		PROP WWCO DEPTH IS NEEDEDFOR 6" PVC WWTR SERVICE TO GO UNDER THE PROPOSED 8" DI WL (1.5')
AW-44		WW-SERVICE J-8	6" WWCO	1+29.89	PROPOSED CO DEPTH IS GREATER THAN 6FT (9.41')		PROP WWCO DEPTH IS NEEDEDFOR 6" PVC WWTR SERVICE TO GO UNDER THE PROPOSED 8" DI WL (1.5')

WAIVERS APPROVED BY:

AUSTIN WATER **DATE**

DOES THIS PROJECT NEED AULCC REVIEW ?
☒ YES
☐ NO
IF YES, PLEASE PROVIDE UCC# 230629-06-03

NOTE: IF THE PROJECT IS LOCATED WITHIN FULL PURPOSE JURISDICTION, A RIGHT-OF-WAY REVIEW, THROUGH THE AULCC PERMIT PROCESS WILL BE REQUIRED.

AW EXPIRATION STAMP
THREE YEARS FROM THE DATE OF SIGN-OFF

AUSTIN WATER REVIEW BLOCK

AUSTIN WATER GENERAL INFORMATION AND CONSTRUCTION NOTES FOR CAPITAL IMPROVEMENT PROJECTS

CITY OF AUSTIN
AUSTIN WATER
October 2021

NOT FOR CONSTRUCTION
THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF ANTHONY D. BLAKEDOWN, P.E. TEXAS NO. 135404 ON MAY 22, 2026. IT IS NOT TO BE USED FOR CONSTRUCTION, BIDDING OR PERMIT PURPOSES.

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TBPLS FIRM REGISTRATION NO. 10028800
WWW.MWMDESIGNGROUP.COM

CITY OF AUSTIN AUSTIN WATER WATERSHED PROTECTION
MLK TOD SW CONVEYANCE IMPROVEMENTS–PHASE 3
GENERAL NOTES SHEET 2 OF 3

NO.	ISSUE	BY	DATE

FAM JOB NO. AU314365
DESIGNED JCS
DRAWN JCS
REVISED JCS
CHECKED TDB

VERIFY SCALE Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.
0 1"

SHEET 3
SEQ. 3 OF 141

ACAD Rel: 25.0s (LMS Tech)
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Last Saved: 5/22/2026 11:05 AM Saved By: jake.spidle

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY NOTES:

1. NO TEMPORARY ABOVE GROUND HYDROCARBON AND HAZARDOUS SUBSTANCE STORAGE TANK SYSTEM IS INSTALLED WITHIN 150 FEET OF A DOMESTIC, INDUSTRIAL, IRRIGATION, OR PUBLIC WATER SUPPLY WELL, OR OTHER SENSITIVE FEATURE.
2. PRIOR TO COMMENCEMENT OF CONSTRUCTION, ALL TEMPORARY EROSION AND SEDIMENTATION (E&S) CONTROL MEASURES MUST BE PROPERLY SELECTED, INSTALLED, AND MAINTAINED IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS AND GOOD ENGINEERING PRACTICES. IF INSPECTIONS INDICATE A CONTROL HAS BEEN USED INAPPROPRIATELY, OR INCORRECTLY, THE CONTRACTOR MUST REPLACE OR MODIFY THE CONTROL FOR SITE SITUATIONS. THE CONTROLS MUST REMAIN IN PLACE UNTIL DISTURBED AREAS ARE REVEGETATED AND THE AREAS HAVE BECOME PERMANENTLY STABILIZED.
3. IF SEDIMENT ESCAPES THE CONSTRUCTION SITE, OFF-SITE ACCUMULATIONS OF SEDIMENT MUST BE REMOVED AT A FREQUENCY SUFFICIENT TO MINIMIZE OFFSITE IMPACTS TO WATER QUALITY (E.G., FUGITIVE SEDIMENT IN STREET BEING WASHED INTO SURFACE STREAMS OR SENSITIVE FEATURES BY THE NEXT RAIN).
4. SEDIMENT MUST BE REMOVED FROM SEDIMENT TRAPS OR SEDIMENTATION PONDS NOT LATER THAN WHEN DESIGN CAPACITY HAS BEEN REDUCED BY 50%. A PERMANENT STAKE MUST BE PROVIDED THAT CAN INDICATE WHEN THE SEDIMENT OCCUPIES 50% OF THE BASIN VOLUME.
5. LITTER, CONSTRUCTION DEBRIS, AND CONSTRUCTION CHEMICALS EXPOSED TO STORMWATER SHALL BE PREVENTED FROM BECOMING A POLLUTANT SOURCE FOR STORMWATER DISCHARGES (E.G., SCREENING OUTFALLS, PICKED UP DAILY).
6. ALL SPOILS (EXCAVATED MATERIAL) GENERATED FROM THE PROJECT SITE MUST BE STORED ON-SITE WITH PROPER E&S CONTROLS.
7. STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS PRACTICABLE IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, BUT IN NO CASE MORE THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED.

GENERAL NOTES:

1. LOCATIONS, SIZES, AND DEPTHS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN BASED ON INFORMATION PROVIDED TO THE ENGINEER BY OTHERS AND CANNOT BE GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING HIS OWN DETERMINATIONS AS TO THE TYPE AND LOCATION OF ALL UNDERGROUND AND OTHER UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERETO. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADVANCE NOTIFICATION OF UTILITY COMPANIES HAVING PROPERTY IN THE CONSTRUCTION AREA PRIOR TO ANY EXCAVATION. IF SITUATIONS ARE ENCOUNTERED DIFFERENT THAN SHOWN ON THE DRAWINGS THAT AFFECT THE INSTALLATION OF THE IMPROVEMENTS, THE CONTRACTOR SHALL CONTACT THE ENGINEER IMMEDIATELY AND PREPARE A REQUEST FOR INFORMATION OR CONTRACTOR'S MODIFICATION REQUEST.
2. THE CONTRACTOR SHALL UNCOVER AND VERIFY THE DEPTHS AND HORIZONTAL LOCATION OF ALL EXISTING WATER AND WASTEWATER MAINS TO BE EXTENDED TO, ALTERED OR SUBJECT TO DAMAGE OR INCONVENIENCE BY THIS PROJECT PRIOR TO COMMENCING CONSTRUCTION. NO SEPARATE PAY.
3. PRIOR TO BEGINNING ANY CONSTRUCTION ACTIVITIES, THE CONTRACTOR SHALL CAREFULLY REVIEW AND BECOME FAMILIAR WITH ALL PERMIT REQUIREMENTS ASSOCIATED WITH THE PROJECT. THE PERMITS CONTAIN SPECIAL CONDITIONS THAT THE CONTRACTOR WILL BE REQUIRED TO FOLLOW. ALL WORK ASSOCIATED WITH THE PERMIT REQUIREMENTS WILL BE CONSIDERED SUBSIDIARY TO THE PROJECT AND NO SEPARATE MEASUREMENT OR PAYMENT WILL BE MADE.
4. IF ANY CHANGES ARE PROPOSED TO THE PROJECT BY THE CONTRACTOR (I.E. ADDING A DIFFERENT STAGING AREA), THE CONTRACTOR SHALL SUBMIT A REVISED SITE LAYOUT TO THE ENGINEER FOR REVIEW.
5. FENCES, GATES, GROUND SURFACES, CURBS, DRIVEWAYS, MAIL BOXES, ETC. SHALL BE LEFT IN A CONDITION EQUAL OR BETTER THAN THAT FOUND. TEMPORARY LIVESTOCK FENCING (MATCH EXISTING WIRE) SHALL BE INSTALLED WHEN REQUIRED TO CONTAIN LIVESTOCK IN ADDITION TO ANY OTHER REQUIREMENTS OUTLINED IN THE SITE CERTIFICATES. COORDINATION SHALL BE WITH THE PROPERTY OWNER. ALL FENCES SHALL BE REINSTALLED IN ORIGINAL LOCATION OF THE SAME TYPE UNLESS OTHERWISE DIRECTED BY THE OWNER.
6. THE CONTRACTOR SHALL PROVIDE ALL TRAFFIC CONTROL AS NECESSARY TO PERFORM THE CONSTRUCTION IN A SAFE MANNER TO PROTECT THE PUBLIC SAFETY. THE CONTRACTOR IS TO OBTAIN PERMIT, IF REQUIRED, PRIOR TO BLOCKING ANY PORTION OF THE ROADWAY (NO SEPARATE PAY).
7. THE CONTRACTOR SHALL GIVE NOTICE TO ALL AUTHORIZED INSPECTORS, SUPERINTENDENTS, OR PERSONS IN CHARGE OF UTILITIES AFFECTED BY HIS OPERATIONS PRIOR TO COMMENCING WORK. THE CONTRACTOR IS RESPONSIBLE FOR ASSURING THAT ALL PERMITS NECESSARY TO LEGALLY CONSTRUCT THE PROJECT HAVE BEEN OBTAINED PRIOR TO COMMENCING WORK. REQUIRED PERMITS ISSUED TO THE CONTRACTOR ONLY WILL BE OBTAINED AT THE CONTRACTOR'S EXPENSE.
8. FINAL PAYMENT FOR THIS PROJECT IS CONTINGENT UPON ACCEPTANCE OF ALL FACILITIES BY THE CITY OF AUSTIN.
9. ALL CONCRETE SHALL BE TYPE A PER COA SPECIFICATION NO. 403S UNLESS OTHERWISE NOTED.
10. ENVIRONMENTAL TESTING MAY BE REQUIRED BY THE CONTRACTOR TO IDENTIFY ENVIRONMENTAL HAZARDS SUCH AS ASBESTOS, LEAD PAINT, ETC. PRIOR TO COMMENCING DEMOLITION ACTIVITIES. ANY ENVIRONMENTAL HAZARDS IDENTIFIED ARE REQUIRED TO BE REMEDIATED AND DISPOSED OF APPROPRIATELY PER THE APPLICABLE LOCAL, STATE AND FEDERAL REGULATIONS AT THE CONTRACTOR'S EXPENSE.
11. GEOTECHNICAL INFORMATION (I.E., SOIL BORINGS) WAS PREPARED FOR USE IN ESTABLISHING DESIGN CONTROLS FOR THIS PROJECT. GEOTECHNICAL INFORMATION INCLUDED IN THESE DOCUMENTS IS FOR INFORMATIONAL PURPOSES ONLY, AND IS NOT TO BE CONSTRUED AS BEING AN ACCURATE REPRESENTATION OF SUB SOIL. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE ACTUAL SUBSURFACE CONDITIONS.
12. ALL BACKFILL FOR ARTERIAL, COLLECTORS, AND NEW STREETS SHALL BE AS FOLLOWS: EXCAVATED TRENCHES WITH WIDTHS LESS THAN 12 INCH (300 MM) SHALL BE BACKFILLED WITH A STABILIZED BACKFILL CONSISTING OF CONTROLLED LOW STRENGTH MATERIAL (STANDARD SPECIFICATION ITEM NO. 402S) AND CLASS J P.C. CONCRETES (STANDARD SPECIFICATION ITEM NO. 403, "CONCRETE FOR STRUCTURES"). THE SURFACE SHALL BE FINISHED WITH AN ASPHALTIC CONCRETE SURFACE LAYER (STANDARD SPECIFICATION ITEM NO. 340, "HOT MIX ASPHALTIC CONCRETE PAVEMENT"). ALL BACKFILL SHALL BE A STABILIZED BACKFILL CONSISTING OF "CONTROLLED LOW STRENGTH MATERIAL" (CLSM) OVER THE UTILITY BEDDING MATERIAL. THE CLSM SHALL BE A MINIMUM OF 12 INCH (300 MM) IN THICKNESS. THE NEXT LAYER OF BACKFILL SHALL BE 7-INCH LAYER OF CLASS J MIX (2-SACK MIX). THE REMAINING AREAS SHALL BE BACKFILLED WITH A PAVEMENT STRUCTURE EQUIVALENT TO THE PAVEMENT THICKNESS FOR THE FUNCTIONAL CLASSIFICATION OF THE STREET. CUTS ADJACENT TO EXISTING CURB AND GUTTER SHALL BE COMPLETED IN ACCORDANCE WITH THE CITY OF AUSTIN UCM AND STANDARD DETAIL NO. 1100S-8B. CUTS ALONG AND ACROSS THE ROADWAY SHALL BE COMPLETED IN ACCORDANCE WITH THE CITY OF AUSTIN UCM AND STANDARD DETAIL NO. 1100S-6D.
13. IF "CLSM" AND CLASS J CONCRETE BACKFILL MATERIALS ARE NOT AVAILABLE, THE FOLLOWING BACKFILL METHOD MAY BE USED WITH PRIOR APPROVAL OF DIRECTOR. BACKFILL SHALL COMPLY WITH SECTION 510.3 (25) OF CITY OF AUSTIN STANDARD SPECIFICATION ITEM NO. 510, "PIPE."

SEQUENCE OF CONSTRUCTION:

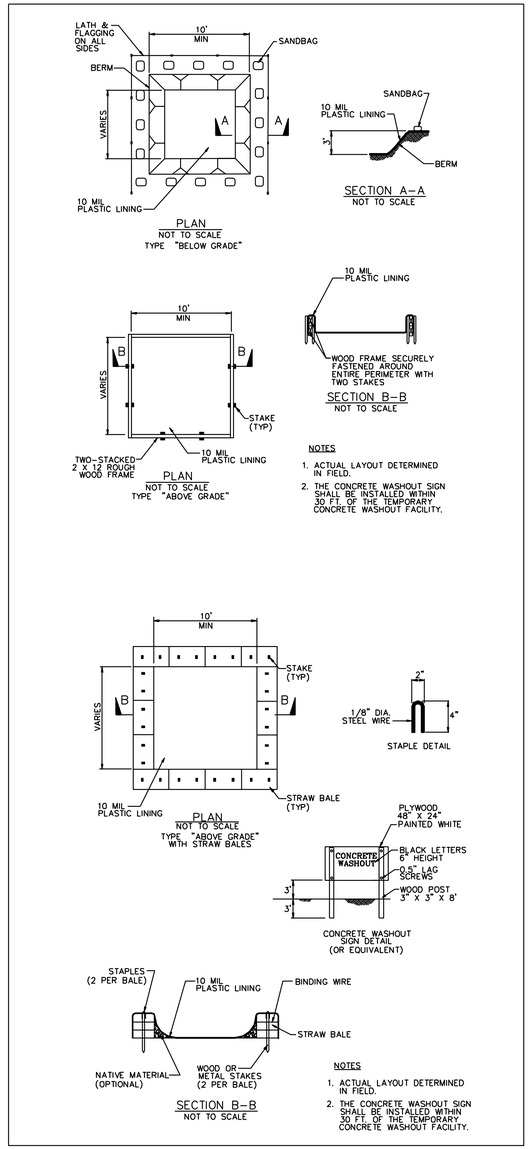
THE CONTRACTOR SHALL SUBMIT A DETAILED SCHEDULE OF CONSTRUCTION WHICH COMPLIES WITH THE FOLLOWING SEQUENCE FOR THE PROJECT:

A. HOLD PRE-CONSTRUCTION CONFERENCE.
B. INSTALL TEMPORARY EROSION AND SEDIMENTATION CONTROLS, AND C.I.P. SIGNS IMMEDIATELY PRIOR TO CONSTRUCTION.
C. CONTACT AUSTIN WATERSHED PROTECTION, ENVIRONMENTAL INSPECTION AT 512-974-2278, 72 HOURS PRIOR TO SCHEDULED DATE OF THE REQUIRED ON-SITE PRE-CONSTRUCTION MEETING.
D. HOLD ON-SITE PRE-CONSTRUCTION MEETING WITH THE ENVIRONMENTAL INSPECTOR AND THE CONSTRUCTION INSPECTOR. AT THIS MEETING, DISCUSS THE TREE PROTECTION, TREE REMOVAL AND TREE PRUNING DURING THE PHASE.
E. CONTRACTOR TO FIELD VERIFY LOCATION AND ELEVATION OF ALL EXISTING TIE-IN INFRASTRUCTURE WITHIN A MINIMUM OF TWO WEEKS OF MOBILIZATION TO THAT WORK AREA.
F. COMMENCE CONSTRUCTION AS SHOWN IN THE PLANS.
G. THERE ARE THREE UNKNOWN UTILITIES IN THE PROJECT, ONE EAST OF THE INTERSECTION OF LARRY LANE AND MANOR ROAD AND TWO BETWEEN THE INTERSECTIONS OF RANDOLPH ROAD AND MANOR ROAD AND ALEXANDER AVENUE AND MANOR ROAD AS INDICATED ON SHEETS 16 AND 17. TWO WEEKS PRIOR TO DOING WORK IN THESE AREAS CONTRACTOR SHALL IDENTIFY TYPE AND DEPTH OF UNKNOWN UTILITY AND INFORM THE ENGINEER.
H. FLAG RIGHT-OF-WAY WITHIN 2 WEEKS OF CONSTRUCTION NEAR THE DOUBLE-SIDED INLET ON LINE-I.
I. CONTACT LAURIE MICHEL AT LAURIE.SHAW@CAPMETRO.ORG WITH CAPMETRO AT LEAST TWO WEEKS IN ADVANCE OF STARTING CONSTRUCTION AROUND THE TRANSIT STATION.
J. CONTACT MARVIN LEWIS (MARVIN.LEWIS@AUSTINTEXAS.GOV) AND BRET CARR (BRET.CARR@AUSTINTEXAS.GOV) AT AUSTIN FIRE DEPARTMENT AT LEAST TWO WEEKS IN ADVANCE OF ANY TEMPORARY WATER LINE SHUTOUTS.
K. CCTV ALL NEW STORM DRAIN LINES AFTER CONSTRUCTION IS COMPLETE PER REQUIREMENTS IN COA STANDARD SPEC 510.3.26.G.
L. COMMENCE RESTORATION AND REVEGETATION AS EARLY AS FEASIBLE AND NECESSARY FOR TIMELY COMPLETION OF THE PROJECT. REVEGETATION OF DISTURBED AREAS CONSTITUTES THE PERMANENT EROSION AND SEDIMENTATION CONTROLS FOR THIS PROJECT. THE DESIGN ENGINEER SHALL SUBMIT AN ENGINEER'S LETTER OF CONCURRENCE TO THE WATERSHED PROTECTION DEPARTMENT INDICATING THAT CONSTRUCTION, INCLUDING REVEGETATION, IS COMPLETE AND IN SUBSTANTIAL CONFORMITY WITH THE APPROVED PLANS. AFTER RECEIVING THIS LETTER, THE APPROPRIATE CITY INSPECTOR WILL SCHEDULE A FINAL INSPECTION.
M. REMOVE ALL TEMPORARY EROSION AND SEDIMENTATION CONTROLS UPON COMPLETION OF ALL CONSTRUCTION ITEMS AND PERMANENT EROSION AND SEDIMENTATION CONTROLS.
N. DRESS UP AND RESTORE ANY AREAS DISTURBED BY ITEMS ABOVE.

THE GENERAL PERMIT PROGRAM OFFICE SHALL BE NOTIFIED BY THE CONTRACTOR VIA EMAIL IN ADVANCE OF TRANSITION BETWEEN PHASES.

WASHOUT NOTES:

1. ALL WASTE CONCRETE MATERIALS INCLUDING CONCRETE, CONCRETE SLURRY RESIDUE, PCC AND AC WASTE SHOULD BE COLLECTED AND DISPOSED OF IN A DESIGNATED TEMPORARY CONCRETE WASHOUT FACILITY. DO NOT ALLOW EXCESS CONCRETE TO BE DUMPED ONSITE, EXCEPT IN DESIGNATED AREAS.
2. DO NOT WASH OUT CONCRETE TRUCKS INTO STORM DRAINS, OPEN DITCHES, STREETS, STREAMS OR ONTO THE GROUND. PERFORM WASHOUT OF CONCRETE TRUCKS IN DESIGNATED AREAS ONLY, WHERE WASHOUT WILL NOT REACH STORMWATER.
3. DO NOT WASH SWEEPINGS FROM EXPOSED AGGREGATE CONCRETE INTO THE STREET OR STORM DRAIN. COLLECT AND RETURN SWEEPINGS TO AGGREGATE BASE STOCKPILE OR DISPOSE IN THE TRASH.
4. TEMPORARY CONCRETE WASHOUT FACILITIES SHOULD BE CONSTRUCTED ABOVE GRADE OR BELOW GRADE AT THE OPTION OF THE CONTRACTOR. TEMPORARY CONCRETE WASHOUT FACILITIES SHOULD BE CONSTRUCTED AND MAINTAINED IN SUFFICIENT QUANTITY AND SIZE TO CONTAIN ALL LIQUID AND CONCRETE WASTE GENERATED BY WASHOUT OPERATIONS.
5. TEMPORARY WASHOUT FACILITIES SHOULD HAVE A TEMPORARY PIT OR BERMED AREAS OF SUFFICIENT VOLUME TO COMPLETELY CONTAIN ALL LIQUID AND WASTE CONCRETE MATERIALS GENERATED DURING WASHOUT PROCEDURES.
6. A SIGN SHOULD BE INSTALLED ADJACENT TO EACH WASHOUT FACILITY TO INFORM CONCRETE EQUIPMENT OPERATORS TO UTILIZE THE PROPER FACILITIES.
7. WASHOUTS SHALL BE IMPLEMENTED IN A MANNER THAT PREVENTS LEACHING TO UNDERLYING SOILS. WASHOUT CONTAINERS MUCH BE WATER TIGHT AND WASHOUTS ON OR IN THE GROUND MUST BE LINED WITH A SUITABLE IMPERVIOUS LINER, TYPICALLY A PLASTIC TYPE MATERIAL.
8. THE BASE OF A WASHOUT SHOULD BE FREE OF ROCK OR DEBRIS THAT MAY DAMAGE A PLASTIC LINER.
9. PLASTIC LINING MATERIAL SHOULD BE A MINIMUM OF 10 MIL IN POLYETHYLENE SHEETING AND SHOULD BE FREE OF HOLES, TEARS, OR OTHER DEFECTS THE COMPROMISE THE IMPERMEABILITY OF THE MATERIAL.
10. ALTERNATIVELY, PORTABLE REMOVABLE CONTAINERS CAN BE USED AS ABOVE GRADE CONCRETE WASHOUTS. ALSO CALLED A "ROLL-OFF"; THIS CONCRETE WASHOUT FACILITY SHOULD BE PROPERLY SEALED TO PREVENT LEAKAGE AND SHOULD BE REMOVED FROM THE SITE AND REPLACED WHEN THE CONTAINER REACHES 75% CAPACITY.
11. TEMPORARY CONCRETE WASHOUT FACILITIES SHOULD BE MAINTAINED TO PROVIDE ADEQUATE HOLDING CAPACITY WITH A MINIMUM FREEBOARD OF 4 IN. FOR ABOVE GRADE FACILITIES AND 12 IN. FOR BELOW GRADE FACILITIES. MAINTAINING TEMPORARY CONCRETE FACILITIES SHOULD INCLUDE REMOVING AND DISPOSING OF HARDENED CONCRETE AND RETURNING THE FACILITIES TO A FUNCTIONAL CONDITION. WASHOUT FACILITIES MUST BE CLEANED, OR NEW FACILITIES MUST BE CONSTRUCTED AND READY FOR USE ONCE THE WASHOUT IS 75% FULL.
12. WHEN TEMPORARY CONCRETE WASHOUT FACILITIES ARE NO LONGER REQUIRED FOR THE WORK, THE HARDENED CONCRETE SHOULD BE REMOVED AND PROPERLY DISPOSED OR RECYCLED IN ACCORDANCE WITH FEDERAL, STATE OR LOCAL REGULATIONS. MATERIALS USED TO CONSTRUCT TEMPORARY CONCRETE WASHOUT FACILITIES SHOULD BE REMOVED FROM THE SITE OF THE WORK AND PROPERLY DISPOSED OR RECYCLED IN ACCORDANCE WITH FEDERAL, STATE OR LOCAL REGULATIONS.
13. HOLES, DEPRESSIONS OR OTHER GROUND DISTURBANCES CAUSED BY THE REMOVAL OF THE TEMPORARY CONCRETE WASHOUT FACILITIES SHOULD BE BACKFILLED AND REPAIRED.



CONCRETE WASHOUT DETAIL
NOT TO SCALE

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

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CITY OF AUSTIN
AUSTIN WATERSHED PROTECTION
BOGGY CREEK MLK TOD SW CONVEYANCE
IMPROVEMENTS-PHASE 3

GENERAL NOTES 3 OF 3

NO.	ISSUE	BY	DATE

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DATE 12/12/2025
DESIGNED PSK
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CITY OF AUSTIN - STANDARD NOTES
EROSION AND SEDIMENTATION CONTROL
(MODIFIED FOR USE ON GENERAL PERMIT PROJECTS)

1. THE CONTRACTOR SHALL INSTALL EROSION/SEDIMENTATION CONTROLS AND TREE/NATURAL AREA PROTECTIVE FENCING PRIOR TO ANY SITE PREPARATION WORK (CLEARING, GRUBBING, OR EXCAVATION).
2. THE PLACEMENT OF EROSION/SEDIMENTATION CONTROLS SHALL BE IN ACCORDANCE WITH THE ENVIRONMENTAL CRITERIA MANUAL AND THE APPROVED EROSION AND SEDIMENTATION CONTROL PLAN.
3. THE PLACEMENT OF TREE/NATURAL AREA PROTECTIVE FENCING SHALL BE IN ACCORDANCE WITH THE CITY OF AUSTIN STANDARD NOTES FOR TREE AND NATURAL AREA PROTECTION AND THE APPROVED GRADING/TREE AND NATURAL AREA PLAN.
4. A PRE-CONSTRUCTION CONFERENCE SHALL BE HELD ON-SITE WITH THE CONTRACTOR, DESIGN ENGINEER, PERMIT APPLICANT, AND GENERAL PERMIT PROGRAM REPRESENTATIVE AFTER INSTALLATION OF THE EROSION/SEDIMENTATION CONTROLS AND THE TREE/NATURAL AREA PROTECTION MEASURES AND PRIOR TO BEGINNING ANY SITE PREPARATION WORK. THE CONTRACTOR SHALL NOTIFY THE GENERAL PERMIT PROGRAM OFFICE AT 512/974-6330, AT LEAST 3 DAYS PRIOR TO THE MEETING DATE.
5. ANY SIGNIFICANT VARIATION IN MATERIALS OR LOCATIONS OF CONTROLS OR FENCES FROM THOSE SHOWN ON THE APPROVED PLANS MUST BE APPROVED BY THE REVIEWING ENGINEER AND THE GENERAL PERMIT PROGRAM REPRESENTATIVE.
6. THE CONTRACTOR IS REQUIRED TO INSPECT THE CONTROLS AND FENCES AT DAILY INTERVALS AND AFTER SIGNIFICANT RAINFALL EVENTS TO INSURE THAT THEY ARE FUNCTIONING PROPERLY. THE PERSON(S) RESPONSIBLE FOR MAINTENANCE OF CONTROLS AND FENCES SHALL IMMEDIATELY MAKE ANY NECESSARY REPAIRS TO DAMAGED AREAS. SILT ACCUMULATION AT CONTROLS MUST BE REMOVED WHEN THE DEPTH REACHES SIX (6) INCHES. SILT ACCUMULATION AT INLET DEVICES SHOULD BE REMOVED WHEN THE DEPTH REACHES TWO (2) INCHES.
7. PRIOR TO FINAL ACCEPTANCE BY THE CITY, HAUL ROADS AND WATERWAY CROSSINGS CONSTRUCTED FOR TEMPORARY CONTRACTOR ACCESS MUST BE REMOVED, ACCUMULATED SEDIMENT REMOVED FROM THE WATERWAY AND THE AREA RESTORED TO THE ORIGINAL GRADE AND REVEGETATED. ALL LAND CLEARING DEBRIS SHALL BE DISPOSED OF IN APPROVED SPOIL DISPOSAL SITES.
8. ALL WORK MUST STOP IF A VOID IN THE ROCK SUBSTRATE IS DISCOVERED WHICH IS ONE SQUARE FOOT OR LARGER IN TOTAL AREA, BLOWS AIR FROM WITHIN THE SUBSTRATE, AND/OR CONSISTENTLY RECEIVES WATER DURING ANY RAIN EVENT. AT THIS TIME, IT IS THE RESPONSIBILITY OF THE PROJECT MANAGER TO IMMEDIATELY CONTACT THE GENERAL PERMIT PROGRAM REPRESENTATIVE FOR FURTHER INVESTIGATION.
9. FIELD REVISIONS TO THE EROSION/SEDIMENTATION CONTROL PLAN MAY BE REQUIRED BY THE GENERAL PERMIT PROGRAM REPRESENTATIVE DURING THE COURSE OF CONSTRUCTION TO CORRECT CONTROL INADEQUACIES. ANY REVISIONS TO THE PERMITTED PLAN MUST BE APPROVED BY THE GENERAL PERMIT PROGRAM OFFICE OF THE PLANNING AND DEVELOPMENT REVIEW DEPARTMENT.
10. PERMANENT EROSION/SEDIMENTATION CONTROL: ALL DISTURBED AREAS SHALL BE RESTORED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. WHERE THE CRITERIA MANUAL AND CONTRACT DOCUMENTS DIFFER THE MOST ENVIRONMENTALLY BENEFICIAL MATERIALS/METHOD SHALL BE REQUIRED UNLESS OTHERWISE APPROVED BY THE GENERAL PERMIT PROGRAM REPRESENTATIVE.
11. DEVELOPER INFORMATION:

    PROJECT MANAGER: LAURIE THERING

    OWNER: CITY OF AUSTIN

    ADDRESS: P.O. BOX 1088, OTC-CPMD, AUSTIN, TX 78767

    OWNER: 512-974-7035

    FAX: TO BE DETERMINED

    OWNER'S REPRESENTATIVE RESPONSIBLE FOR PLAN ALTERATIONS:

    COMPANY: FREESE AND NICHOLS, INC.

    CONTACT: THOMAS R. HEINEMANN, P.E., CFM

    ADDRESS: 10431 MORADO CIRCLE STE. 300

    PHONE:737-285-0472

    FAX: (512) 617-3101

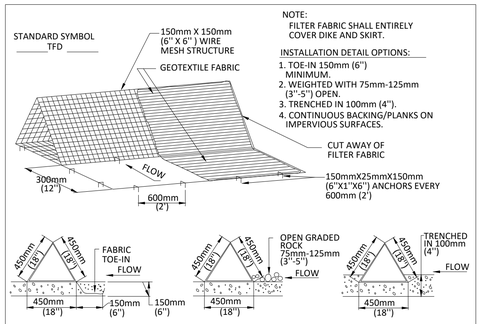
    PARTY RESPONSIBLE FOR EROSION/SEDIMENTATION CONTROL MAINTENANCE:

    CONTRACTOR TO BE DETERMINED PHONE # TO BE DETERMINED .

    PARTY RESPONSIBLE FOR TREE/NATURAL AREA PROTECTION MAINTENANCE:

    CONTRACTOR TO BE DETERMINED PHONE # TO BE DETERMINED .

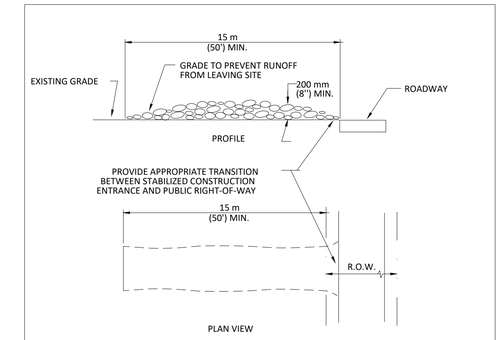
12. THE CONTRACTOR SHALL NOT DISPOSE OF SURPLUS EXCAVATED MATERIAL FROM THE SITE WITHOUT NOTIFYING THE GENERAL PERMIT PROGRAM INSPECTOR AT 974-6330 AT LEAST 48 HOURS PRIOR TO THE SPOILS REMOVAL. THIS NOTIFICATION SHALL INCLUDE THE DISPOSAL LOCATION AND A COPY OF THE PERMIT ISSUED TO RECEIVE THE MATERIAL.
13. INLET PROTECTION SHALL BE INSTALLED IMMEDIATELY PRIOR TO STREET WORK, AND WILL BE REMOVED AS SOON AS THE GENERAL PERMIT PROGRAM INSPECTOR AGREES THAT THERE IS NO POTENTIAL FOR SEDIMENTATION.



GENERAL NOTES

1. DIKES SHALL BE PLACED IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT DIKE.
2. THE FABRIC COVER AND SKIRT SHALL BE A CONTINUOUS WRAPPING OF GEOTEXTILE. THE SKIRT SHALL BE A CONTINUOUS EXTENSION OF THE FABRIC ON THE UPSTREAM FACE.
3. THE SKIRT SHALL BE WEIGHTED WITH A CONTINUOUS LAYER OF 75-125mm (3-5") OPEN GRADED ROCK OR TOED-IN 150mm (6") WITH MECHANICALLY COMPACTED MATERIAL. OTHERWISE, THE ENTIRE STRUCTURE SHALL BE TRENCHED IN 100mm (4").
4. DIKES AND SKIRT SHALL BE SECURELY ANCHORED IN PLACE USING 150mm (6") WIRE STAPLES ON 600mm (2') CENTERS ON BOTH EDGES AND SKIRT, OR STAKE USING 10M (3/8 ") DIAMETER RE-BAR WITH TEE ENDS.
5. FILTER MATERIAL SHALL BE LAPPED OVER ENDS 150mm (6") TO COVER DIKE TO DIKE JOINTS. JOINTS SHALL BE FASTENED WITH GALVANIZED SHOAT RINGS.
6. THE DIKE STRUCTURE SHALL BE MW40-150mmX150mm (6 GA. 6"X6") WIRE MESH, 450mm (18") ON A SIDE.
7. INSPECTION SHALL BE MADE WEEKLY OR AFTER EACH RAINFALL EVENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED BY THE CONTRACTOR.
8. ACCUMULATED SILT SHALL BE REMOVED WHEN IT REACHES A DEPTH OF 150mm (6") AND DISPOSED OF IN A MANNER WHICH WILL NOT CAUSE ADDITIONAL SILTATION.
9. AFTER THE DEVELOPMENT SITE IS COMPLETLY STABILIZED, THE DIKES AND ANY REMAINING SILT SHALL BE REMOVED. SILT SHALL BE DISPOSED OF AS INDICATED IN GENERAL NOTE 8 ABOVE.

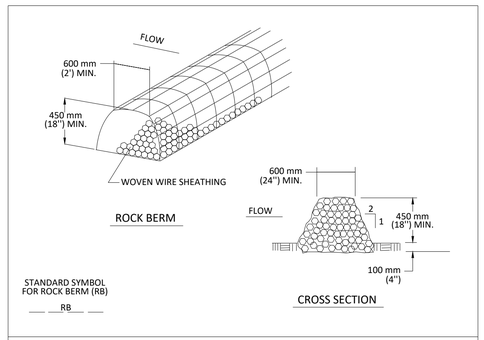
CITY OF AUSTIN WATERSHED PROTECTION DEPARTMENT		TRIANGULAR SEDIMENT FILTER DIKE	
RECORD COPY SIGNED BY J. PATRICK MURPHY	3/27/00 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD.	STANDARD NO. 628S



NOTES:

1. STONE SIZE: 75-125 mm (3-5") OPEN GRADED ROCK.
2. LENGTH: AS EFFECTIVE BUT NOT LESS THAN 15 m (50').
3. THICKNESS: NOT LESS THAN 200 mm (8").
4. WIDTH: NOT LESS THAN FULL WIDTH OF ALL POINTS OF INGRESS/EGRESS.
5. WASHING: WHEN NECESSARY, VEHICLE WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC ROADWAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE AND DRAINS INTO AN APPROVED TRAP OR SEDIMENT BASIN. ALL SEDIMENT SHALL BE PREVENTED FROM ENTERING ANY STORM DRAIN, DITCH OR WATERCOURSE USING APPROVED METHODS.
6. MAINTENANCE: THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC ROADWAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND, AS WELL AS REPAIR AND CLEAN OUT OF ANY MEASURE DEVICES USED TO TRAP SEDIMENT. ALL SEDIMENTS THAT IS SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC ROADWAY MUST BE REMOVED IMMEDIATELY.
7. DRAINAGE: ENTRANCE MUST BE PROPERLY GRADED OR INCORPORATE A DRAINAGE SWALE TO PREVENT RUNOFF FROM LEAVING THE CONSTRUCTION SITE.

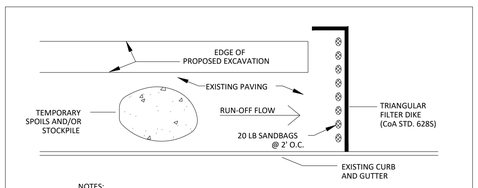
CITY OF AUSTIN WATERSHED PROTECTION DEPARTMENT		STABILIZED CONSTRUCTION ENTRANCE	
RECORD COPY SIGNED BY J. PATRICK MURPHY	5/23/00 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD.	STANDARD NO. 641S-1



NOTES:

1. USE ONLY OPEN GRADED ROCK 75 to 125 mm (3 to 5") DIAMETER FOR ALL CONDITIONS.
2. THE ROCK BERM SHALL BE SECURED WITH A WOVEN WIRE SHEATHING HAVING MAXIMUM 25 mm (1") OPENING AND MINIMUM WIRE DIAMETER OF 12.9 mm (20 GAUGE).
3. THE ROCK BERM SHALL BE INSPECTED DAILY OR AFTER EACH RAIN, AND THE STONE AND/OR FABRIC CORE-WOVEN SHEATHING SHALL BE REPLACED WHEN THE STRUCTURE CEASES TO FUNCTION AS INTENDED, DUE TO SEDIMENT ACCUMULATION AMONG THE ROCKS, WASHOUT, CONSTRUCTION TRAFFIC DAMAGE, ETC.
4. IF SEDIMENT REACHES A DEPTH EQUAL TO ONE-THIRD THE HEIGHT OF THE BERM OR 150 mm (6"), WHICHEVER IS LESS, THE SEDIMENT SHALL BE REMOVED AND DISPOSED OF ON AN APPROVED SITE AND IN A MANNER THAT WILL NOT CREATE A SEDIMENTION PROBLEM.
5. WHEN THE SITE IS COMPLETELY STABILIZED,THE BERM AND ACCUMULATED SEDIMENT SHALL BE REMOVED AND DISPOSED OF IN AN APPROVED MANNER.

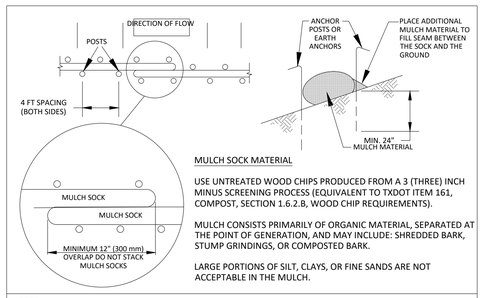
CITY OF AUSTIN WATERSHED PROTECTION DEPARTMENT		ROCK BERM	
RECORD COPY SIGNED BY MORGAN BYARS	8/24/2010 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD.	STANDARD NO. 639S-1



NOTES:

1. THE TEMPORARY SPOILS/STOCKPILE STORAGE AREA AND STAGING AREA MAY BE LOCATED DIRECTLY ADJACENT TO THE EXCAVATION AND ON THE PAVEMENT.
2. ANY SPOIL NOT INTENDED TO BE REUSED WILL BE HAULED TO AN APPROVED OR PERMITTED DISPOSAL SITE DAILY.
3. INSTALL TRIANGULAR SEDIMENT FILTER DIKE (DETAIL 682S) ACROSS FULL WIDTH OF TRAFFIC CLOSURE AND DOWNSTREAM OF CONSTRUCTION AREA, PERPENDICULAR TO CURB AND PLACED TO EFFECTIVELY CATCH AND CONTAIN SEDIMENT LADEN RUNOFF FROM THE EXCAVATED AREA. FILTER DIKE TO FOLLOW ACTIVE CONSTRUCTION. REMOVING AND RE-SETTING FILTER DIKE IS CONSIDERED SUBSIDIARY TO BARRICADES AND TRAFFIC HANDLING.

DETAIL A:
ADDITIONAL EROSION/SEDIMENTATION CONTROL FOR WORK IN PAVED AREAS FOR GENERAL PERMIT PROGRAM PROJECTS



MULCH SOCK MATERIAL

USE UNTREATED WOOD CHIPS PRODUCED FROM A 3 (THREE) INCH MINUS SCREENING PROCESS (EQUIVALENT TO TXDOT ITEM 161, COMPOST, SECTION 1.6.2.B, WOOD CHIP REQUIREMENTS).

MULCH CONSISTS PRIMARILY OF ORGANIC MATERIAL, SEPARATED AT THE POINT OF GENERATION, AND MAY INCLUDE: SHREDDED BARK, STUMP GRINDINGS, OR COMPOSTED BARK.

LARGE PORTIONS OF SILT, CLAYS, OR FINE SANDS ARE NOT ACCEPTABLE IN THE MULCH.

NOTES:

1. STEEL OR WOOD POSTS WHICH SUPPORT THE MULCH SOCK SHALL BE INSTALLED ON A SLIGHT ANGLE TOWARD THE ANTICIPATED RUNOFF SOURCE. POST MUST BE EMBEDDED A MINIMUM OF 600mm (24 inches). IF WOOD POSTS CANNOT ACHIEVE 600mm (24 inches) DEPTH, USE STEEL POSTS. EARTH ANCHORS ARE ALSO ACCEPTABLE.
2. THE TOE OF THE MULCH SOCK SHALL BE PLACED SO THAT THE MULCH SOCK IS FLAT AND PERPENDICULAR TO THE LINE OF FLOW. IN ORDER TO PREVENT WATER FROM FLOWING BETWEEN THE JOINTS OF ADJACENT ENDS OF MULCH SOCKS, LAP THE ENDS OF ADJACENT MULCH SOCKS A MINIMUM OF 300mm (12 inches).
3. MULCH MATERIAL MUST BE FREE OF REFUSE, PHYSICAL CONTAMINANTS, AND MATERIAL TOXIC TO PLANT GROWTH; IT IS NOT ACCEPTABLE FOR THE MULCH MATERIAL TO CONTAIN GROUND CONSTRUCTION DEBRIS, BIOSOLIDS, OR MANURE.
4. SOCK MATERIAL WILL BE 100% BIODEGRADABLE, PHOTODEGRADABLE, OR RECYCLABLE SUCH AS BURLAP, TWINE, UV PHOTOBIODEGRADABLE PLASTIC, POLYESTER, OR ANY OTHER ACCEPTABLE MATERIAL.
5. MULCH SOCKS SHOULD BE USED AT THE BASE OF SLOPES NO STEEPER THAN 2:1 AND SHOULD NOT EXCEED THE MAXIMUM SPACING CRITERIA PROVIDED IN CITY OF AUSTIN ENVIRONMENTAL CRITERIA MANUAL TABLE 1.4.5.F.1 FOR A GIVEN SLOPE CATEGORY.
6. ACCUMULATED SILT SHALL BE REMOVED WHEN IT REACHES A DEPTH OF 150mm (6 inches). THE SILT SHALL BE DISPOSED OF ON AN APPROVED SITE AND IN SUCH A MANNER THAT WILL NOT CONTRIBUTE TO ADDITIONAL SILTATION.

CITY OF AUSTIN WATERSHED PROTECTION DEPARTMENT		MULCH SOCK	
RECORD COPY SIGNED BY MORGAN BYARS	08/24/2010 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD.	STANDARD NO. 648S-1

GENERAL PERMIT PROGRAM

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

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CITY OF AUSTIN
AUSTIN WATERSHED PROTECTION
BOGGY CREEK MLK TOD SW CONVEYANCE IMPROVEMENTS-PHASE 3

EROSION AND SEDIMENT CONTROL NOTES

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DATE	12/12/2025
DESIGNED	PSK
DRAWN	NO
REVISED	TRH
CHECKED	KKP
FILE NAME	CV-AU-DT-EROS-01.dwg

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GENERAL PERMIT PROGRAM (GPP)
STANDARD ENVIRONMENTAL NOTES:

ADDITIONAL AREAS:
1. ANY ADDITIONAL AREAS REQUIRED FOR CONSTRUCTION OF THIS PROJECT SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. CONTRACTOR MUST SECURE CITY OF AUSTIN APPROVAL OF PROPOSED ADDITIONAL AREAS PRIOR TO USE. APPROVAL OF "CORRECTION REQUEST" MUST BE SECURED FROM THE GENERAL PERMIT PROGRAM OFFICE OF THE PLANNING AND DEVELOPMENT REVIEW DEPARTMENT.
2. ALL ASSOCIATED PERMITS AND FEES SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
3. IN ORDER TO SECURE APPROVAL FOR USE OF ADDITIONAL AREAS, CONTRACTOR MUST PROVIDE COMPLETE "CORRECTION REQUEST" SUBMITTAL TO GENERAL PERMIT PROGRAM OFFICE AND ALLOW A ONE WEEK COMMENT PERIOD FOR EACH REVIEW. CONTRACTOR SHOULD REQUEST INFORMATION ON THE ELEMENTS REQUIRED TO BE INCLUDED IN THE SUBMITTAL FROM THE OWNER'S REPRESENTATIVE OR THE GENERAL PERMIT PROGRAM OFFICE.
4. CONTRACTOR MUST INSTALL AND MAINTAIN EROSION/SEDIMENTATION CONTROLS AND TREE PROTECTION FOR ALL SUCH AREAS IN ACCORDANCE WITH THE CITY OF AUSTIN ENVIRONMENTAL CRITERIA MANUAL AND AS INCLUDED IN THE APPROVED SUBMITTAL OR DIRECTED IN THE FIELD BY THE GENERAL PERMIT PROGRAM REPRESENTATIVE.
5. A SIGNED COPY OF THE PLANS PERMITTED THROUGH THE GENERAL PERMIT PROGRAM MUST BE KEPT ON SITE AND ACCESSIBLE AT ALL TIMES DURING PROJECT CONSTRUCTION.

DEWATERING:
CONTRACTOR IS RESPONSIBLE FOR DEWATERING OF WORK AREA. CONTRACTOR MUST SECURE CITY OF AUSTIN APPROVAL OF PROPOSED DEWATERING PROCEDURES PRIOR TO INSTALLATION OR USE. APPROVAL MUST BE SECURED FROM THE GENERAL PERMIT PROGRAM (GPP) OFFICE OF THE PLANNING AND DEVELOPMENT REVIEW DEPARTMENT. CONTRACTOR MUST PROVIDE COMPLETE SUBMITTAL TO GPP OFFICE AND ALLOW AN ONE WEEK (MIN.) COMMENT PERIOD FOR EACH REVIEW. CONTACT THE GPP OFFICE FOR SUBMITTAL REQUIREMENTS.

FUEL STORAGE:
FUEL STORAGE IS PROHIBITED ON THIS PROJECT. ADDITIONALLY, THE CONTRACTOR IS REQUIRED TO NOTIFY THE GENERAL PERMIT PROGRAM OFFICE IMMEDIATELY FOLLOWING ANY SPILL OF FUEL OR OTHER TOXIC MATERIAL. CONTRACTOR IS REQUIRED TO FOLLOW-UP WITH WRITTEN DOCUMENTATION, INCLUDING A COMPLETE DESCRIPTION OF THE INCIDENT, MATERIAL SPILLED, AND ACTIONS TAKEN TO CONTAIN AND CLEAN-UP MATERIAL.

FUGITIVE DUST CONTROL:
ALL PROJECTS APPROVED THROUGH THE GENERAL PERMIT PROGRAM (GPP) MUST COMPLY WITH THE CODE OF THE CITY OF AUSTIN AND THE ENVIRONMENTAL CRITERIA MANUAL REQUIREMENTS TO CONTROL AIRBORNE DUST. COMPLIANCE IS REQUIRED FOR ENTIRE PROJECT SITE AS WELL AS ASSOCIATED OPERATIONS. CONTACT THE GPP OFFICE FOR RECOMMENDED CONTROL METHODS.

SPOILS STORAGE:
NO SPOILS STORAGE IS ALLOWED WITHIN A CRITICAL WATER QUALITY ZONE, A 100-YEAR FLOODPLAIN, OR ON A SLOPE WITH A GRADIENT OF MORE THAN 15 PERCENT.

E/S CONTROLS FOR BORE / RECEIVING PIT LOCATIONS:
TEMPORARY E/S CONTROLS MUST SURROUND THE ENTIRETY OF BORING OPERATIONS, INCLUDING PIT, EQUIPMENT, ETC. FOR LOCATIONS WITHIN IMPERVIOUS AREAS, TEMPORARY CONTROL WILL BE TRIANGULAR FILTER DIKE (COA STANDARD DETAIL #628S). DIKE FLAP WILL BE CONTINUOUSLY WEIGHTED DOWN THROUGH THE USE OF 1" BY 4" WOOD STRIPS NAILED TO THE PAVEMENT, EXCEPT FOR THE ACCESS POINT. PLACEMENT OF TEMPORARY E/S CONTROLS ACROSS ACCESS POINT WILL BE REQUIRED WHENEVER THE SITE IS NOT ACTIVELY USED. FOR LOCATIONS WITHIN PERVIOUS AREAS, TEMPORARY CONTROL WILL BE SILT FENCE (COA STANDARD DETAIL #642S-1) OR MULCH SOCKS (COA STANDARD DETAIL #648S-1), AS INDICATED ON APPROVED PLANS.

SOIL RETENTION BLANKET:
UNLESS OTHERWISE INDICATED IN THE PROJECT DOCUMENTS, INSTALLATION OF SOIL RETENTION BLANKET WILL BE REQUIRED FOR ALL IMPACTED SLOPES GREATER THAN 3:1 AND ALL IMPACTED AREAS WITHIN DRAINAGE CONVEYANCES. (CITY OF AUSTIN STANDARD SPECIFICATION ITEM 605S) SOIL RETENTION BLANKET SUBMITTAL MUST BE APPROVED BY PROJECT ENGINEER AND GENERAL PERMIT PROGRAM (GPP) REPRESENTATIVE PRIOR TO USE AND MUST INCLUDE PRODUCT AND INSTALLATION DETAILS PROVIDED BY MANUFACTURER. FINISH GRADING MUST BE INSPECTED AND APPROVED BY GPP INSPECTOR PRIOR TO BLANKET INSTALLATION. INSTALLATION MUST BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND MUST BE INSPECTED AND APPROVED BY GPP REPRESENTATIVE PRIOR TO ACCEPTANCE.

SOD INSTALLATION:
REVEGETATION WITHIN MANAGED TURF AREAS MUST BE ACCOMPLISHED THROUGH THE INSTALLATION OF SOLID BLOCK GRASS SOD. SOD TYPE MUST MATCH ADJACENT GRASS TYPE. QUESTIONS REGARDING SOD TYPE WILL BE RESOLVED BY THE GENERAL PROGRAM PERMIT REPRESENTATIVE. REFER TO CITY OF AUSTIN STANDARD SPECIFICATION ITEM NO. 602S: SODDING FOR EROSION CONTROL, UNLESS OTHERWISE NOTED ON THE APPROVED PLANS.

TxDOT RIGHTS-OF-WAY:
TOPSOIL (TxDOT ITEM NO. 160), SOIL RETENTION BLANKET (TxDOT ITEM NO. 169), AND REVEGETATION (TxDOT ITEM NO. 164) INSTALLED WITHIN TEXAS DEPARTMENT OF TRANSPORTATION (TxDOT) RIGHT-OF-WAY SHALL COMPLY WITH "REQUIREMENTS FOR INSTALLATION OF UTILITIES WITHIN THE STATE RIGHT-OF-WAY, AUSTIN DISTRICT".

PROJECT SEQUENCE:
(REFER TO FULL PLAN SET FOR PROJECT-SPECIFIC ADDITIONS, IF APPLICABLE.)

PRIOR TO CONSTRUCTION:
1. SECURE APPLICABLE COA PERMITS, INCLUDING APPROVAL UNDER GENERAL PERMIT PROGRAM AND RIGHT-OF-WAY EXCAVATION PERMIT.
2. NOTIFY GENERAL PERMIT PROGRAM REPRESENTATIVE PRIOR TO PLACEMENT OF E/S CONTROLS AND TREE PROTECTION FENCING. ALL PROPOSED PHASING OF CONTROLS MUST BE SUBMITTED TO AND APPROVED BY THE GENERAL PERMIT PROGRAM REPRESENTATIVE PRIOR TO THE FIELD PRE-CONSTRUCTION CONFERENCE.
3. NOTIFY COA TEMPORARY TRAFFIC CONTROL REPRESENTATIVE PRIOR TO PLACEMENT OF TEMPORARY TRAFFIC CONTROLS. ALL PROPOSED PHASING OF CONTROLS MUST BE INDICATED ON APPROVED TEMPORARY TRAFFIC CONTROL PLAN AND SEALED BY PROFESSIONAL ENGINEER.
4. PLACE TEMPORARY E/S CONTROLS AND TREE PROTECTION FENCING PRIOR TO BEGINNING ANY EXCAVATION. INSTALL C.I.P. SIGN, IF APPLICABLE.
5. HOLD ENVIRONMENTAL PRE-CONSTRUCTION CONFERENCE ON SITE WITH THE CONTRACTOR, OWNER'S REPRESENTATIVE, AND GENERAL PERMIT PROGRAM REPRESENTATIVE AFTER INSTALLATION OF E/S CONTROLS AND TREE PROTECTION FENCING AND PRIOR TO ANY TRENCHING OPERATIONS.
6. PLACE TEMPORARY TRAFFIC CONTROL DEVICES.

PROJECT CONSTRUCTION:
1. BEGIN CONSTRUCTION. NOTIFY GENERAL PERMIT PROGRAM REPRESENTATIVE A MINIMUM OF 48 HOURS IN ADVANCE OF TRANSITION BETWEEN PHASES.
2. CONTACT GENERAL PERMIT OFFICE TO SCHEDULE FIELD INSPECTION PRIOR TO BEGINNING INSTALLATION OF PERMANENT E/S CONTROLS.
3. COMPLETE RESTORATION OF ALL AREAS DISTURBED BY CONSTRUCTION ACTIVITIES FOR THIS PROJECT. (PERMANENT E/S CONTROLS)
4. REMOVE TEMPORARY TRAFFIC CONTROL DEVICES RELATED TO WORK AREAS OUTSIDE OF THE STREET.
5. HOLD ENVIRONMENTAL POST-CONSTRUCTION CONFERENCE ON SITE WITH THE CONTRACTOR, OWNER'S REPRESENTATIVE, AND GENERAL PERMIT PROGRAM REPRESENTATIVE. ALL PERMANENT E/S CONTROLS MUST BE ACCEPTED BY THE GENERAL PERMIT PROGRAM REPRESENTATIVE. PERMANENT CONTROLS SHALL CONSIST OF REVEGETATION PER DETAILS 602, 604S, AND 609S AS INDICATED ON APPROVED PLANS.
6. FOLLOWING FINAL ACCEPTANCE OF PERMANENT E/S CONTROLS BY THE GENERAL PERMIT PROGRAM REPRESENTATIVE, REMOVE TEMPORARY E/S CONTROLS. CLEAN EXISTING STORM DRAINAGE SYSTEMS AS NECESSARY DUE TO CONSTRUCTION OPERATIONS.
7. DRESS-UP AND RESTORE ANY AREAS DISTURBED BY REMOVAL OF TEMPORARY E/S CONTROLS DESCRIBED ABOVE. SUBMITTALS REQUIRED TO BE APPROVED BY GENERAL PERMIT PROGRAM REPRESENTATIVE INCLUDE: SUBMITTALS TRIGGERED BY CITY OF AUSTIN SERIES 600 SPECIFICATIONS AND RELATED SPECIAL PROVISIONS/SPECIFICATIONS, CONSTRUCTION SCHEDULE, TREE PROTECTION, P-6 AND OTHER ROOT ZONE PROTECTION/MITIGATION MEASURES, DEWATERING PLAN, WATERING SCHEDULE FOR REVEGETATION AREAS, AND ANY VEGETATIVE REPLACEMENT PROPOSALS, IF NOT ALREADY PART OF THE PERMITTED

REQUIRED SUBMITTALS:
SUBMITTALS REQUIRED TO BE APPROVED BY GENERAL PERMIT PROGRAM REPRESENTATIVE INCLUDE: SUBMITTALS TRIGGERED BY CITY OF AUSTIN SERIES 600 SPECIFICATIONS AND RELATED SPECIAL PROVISIONS/SPECIFICATIONS, CONSTRUCTION SCHEDULE, TREE PROTECTION, P-6 AND OTHER ROOT ZONE PROTECTION/MITIGATION MEASURES, DEWATERING PLAN, WATERING SCHEDULE FOR REVEGETATION AREAS, AND ANY VEGETATIVE REPLACEMENT PROPOSALS, IF NOT ALREADY PART OF THE PERMITTED PLAN SET

CITY OF AUSTIN - STANDARD NOTES TREE AND NATURAL AREA PROTECTION (MODIFIED FOR USE ON GENERAL PERMIT PROJECTS)

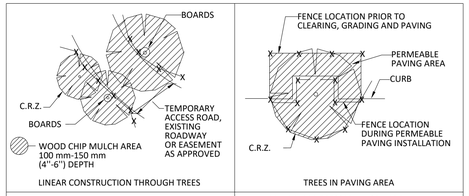
1. ALL TREES AND NATURAL AREAS SHOWN ON PLAN TO BE PRESERVED SHALL BE PROTECTED DURING CONSTRUCTION WITH TEMPORARY MEASURES.
2. PROTECTIVE MEASURES SHALL BE INSTALLED ACCORDING TO CITY OF AUSTIN STANDARDS FOR TREE PROTECTION.
3. PROTECTIVE MEASURES SHALL BE INSTALLED PRIOR TO THE START OF ANY SITE PREPARATION WORK (CLEARING, GRUBBING OR GRADING), AND SHALL BE MAINTAINED THROUGHOUT ALL PHASES OF THE PROJECT.
4. EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSTALLED OR MAINTAINED IN A MANNER WHICH DOES NOT RESULT IN SOIL BUILD-UP, COMPACTION OR CUTTING OF CRITICAL ROOT ZONE WITHIN TREE DRIP LINES.
5. TREE PROTECTION SHALL COMPLETELY SURROUND THE TREES OR GROUP OF TREES AND WILL BE LOCATED AT THE OUTERMOST LIMIT OF BRANCHES (DRIP LINE). FOR NATURAL AREAS, PROTECTIVE MEASURES SHALL FOLLOW THE LIMIT OF CONSTRUCTION LINE, IN ORDER TO PREVENT THE FOLLOWING:
   A. SOIL COMPACTION IN THE ROOT ZONE AREA RESULTING FROM VEHICULAR TRAFFIC OR STORAGE OF EQUIPMENT OR MATERIALS;
   B. ROOT ZONE DISTURBANCES DUE TO GRADE CHANGES (GREATER THAN 6 INCHES CUT OR FILL) OR TRENCHING NOT REVIEWED AND AUTHORIZED BY THE GENERAL PERMIT PROGRAM OFFICE OF THE PLANNING AND DEVELOPMENT REVIEW DEPARTMENT;
   C. WOUNDS TO EXPOSED ROOTS, TRUNK OR LIMBS BY MECHANICAL EQUIPMENT;
   D. OTHER ACTIVITIES DETRIMENTAL TO TREES SUCH AS CHEMICAL STORAGE, CEMENT TRUCK CLEANING, AND FIRES.
6. EXCEPTIONS TO INSTALLING PROTECTIVE FENCES AT CRITICAL ROOT ZONES MAY BE PERMITTED IN THE FOLLOWING CASES:
   A. WHERE THERE IS TO BE AN APPROVED GRADE CHANGE, IMPERMEABLE PAVING SURFACE, TREE WELL, OR OTHER SUCH SITE DEVELOPMENT, ERECT THE FENCE APPROXIMATELY 2 FEET BEYOND THE AREA DISTURBED;
   B. WHERE PERMEABLE PAVING IS TO BE INSTALLED, ERECT THE FENCE AT THE OUTER LIMITS OF THE PERMEABLE PAVING AREA
   C. WHERE TREES ARE CLOSE TO PROPOSED BUILDINGS, ERECT THE FENCE NO CLOSER THAN 6 FEET TO THE BUILDING
   D. WHERE THERE ARE SEVERE SPACE CONSTRAINTS DUE TO TRACT SIZE, OR OTHER SPECIAL REQUIREMENTS, CONTACT THE GENERAL PERMIT PROGRAM OFFICE AT 974-6330 TO DISCUSS ALTERNATIVES.

SPECIAL NOTE:
FOR THE PROTECTION OF NATURAL AREAS, NO EXCEPTIONS TO INSTALLING FENCES AT THE LIMIT OF CONSTRUCTION LINE WILL BE PERMITTED. WHERE ANY OF THE ABOVE EXCEPTIONS RESULT IN A FENCE 5 FEET OR CLOSER TO A TREE TRUNK, PROTECT THE TRUNK WITH STRAPPED-ON PLANKING TO A HEIGHT OF 8 FEET (OR TO THE LIMITS OF LOWER BRANCHING) IN ADDITION TO THE REDUCED FENCING.

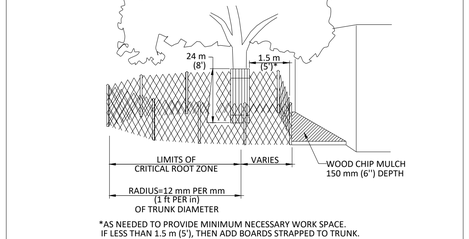
7. WHERE ANY OF THE ABOVE EXCEPTIONS RESULT IN AREAS OF UNPROTECTED ROOT ZONES, THOSE AREAS SHOULD BE COVERED WITH 12 INCHES OF ORGANIC MULCH TO MINIMIZE SOIL COMPACTION DURING CONSTRUCTION. FILTER FABRIC UNDERLAYMENT MAY BE REQUIRED AT DIRECTION OF GENERAL PERMIT PROGRAM REPRESENTATIVE BASED ON SITE CONDITIONS AND CONSTRUCTION ACTIVITIES. MAXIMUM FOUR (4) INCHES DEPTH MAY BE LEFT IN PLACE AFTER CONSTRUCTION WITH APPROVAL FROM THE GENERAL PERMIT PROGRAM REPRESENTATIVE.
8. ALL GRADING WITHIN PROTECTED ROOT ZONE AREAS SHALL BE DONE BY HAND OR WITH SMALL EQUIPMENT TO MINIMIZE ROOT DAMAGE. PRIOR TO GRADING, RELOCATE PROTECTIVE FENCES TO 2 FEET BEHIND THE GRADE CHANGE AREA.
9. ANY ROOTS EXPOSED BY CONSTRUCTION ACTIVITY SHALL BE PRUNED FLUSH WITH THE SOIL. BACKFILL ROOT AREAS WITH GOOD QUALITY TOP SOIL AS SOON AS POSSIBLE. IF EXPOSED ROOT AREAS ARE NOT BACKFILLED WITHIN 2 DAYS, COVER THEM WITH ORGANIC MATERIAL IN A MANNER WHICH REDUCES SOIL TEMPERATURE AND MINIMIZES WATER LOSS DUE TO EVAPORATION.
10. PRIOR TO EXCAVATION OR GRADE CUTTING WITHIN TREE DRIPLINES, MAKE A CLEAN CUT BETWEEN THE DISTURBED AND UNDISTURBED ROOT ZONES WITH A ROCK SAW OR SIMILAR EQUIPMENT TO MINIMIZE DAMAGE TO REMAINING ROOTS.
11. TREES MOST HEAVILY IMPACTED BY CONSTRUCTION ACTIVITIES SHOULD BE WATERED DEEPLY ONCE A WEEK DURING PERIODS OF HOT, DRY WEATHER. TREE CROWNS SHOULD BE SPRAYED WITH WATER PERIODICALLY TO REDUCE DUST ACCUMULATION ON THE LEAVES.
12. ANY TRENCHING REQUIRED FOR THE INSTALLATION OF LANDSCAPE IRRIGATION SHALL BE PLACED AS FAR FROM EXISTING TREE TRUNKS AS POSSIBLE.
13. NO LANDSCAPE TOPSOIL DRESSING GREATER THAN 4 INCHES SHALL BE PERMITTED WITHIN THE DRIPLINE OF TREES. NO SOIL IS PERMITTED ON THE ROOT FLARE OF ANY TREE.
14. PRUNING TO PROVIDE CLEARANCE FOR STRUCTURES, VEHICULAR TRAFFIC AND EQUIPMENT SHALL TAKE PLACE BEFORE CONSTRUCTION BEGINS. SEE NOTE THREE (3) OF SUPPLEMENTAL TREE PROTECTION NOTES FOR ADDITIONAL REQUIREMENTS.
15. ALL FINISHED PRUNING MUST BE DONE ACCORDING TO RECOGNIZED, APPROVED STANDARDS OF THE INDUSTRY (REFERENCE THE NATIONAL ARBORIST ASSOCIATION PRUNING STANDARDS FOR SHADE TREES AVAILABLE ON REQUEST FROM THE GENERAL PERMIT PROGRAM OFFICE).
16. DEVIATIONS FROM THE ABOVE NOTES MAY BE CONSIDERED ORDINANCE VIOLATIONS IF THERE IS SUBSTANTIAL NONCOMPLIANCE OR IF A TREE SUSTAINS DAMAGE AS A RESULT.
17. TREES APPROVED FOR REMOVAL SHALL BE REMOVED IN A MANNER WHICH DOES NOT IMPACT TREES TO BE PRESERVED.

SUPPLEMENTAL TREE PROTECTION NOTES

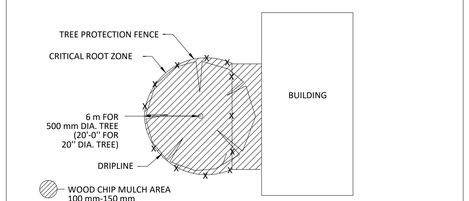
1. ALL TREE PROTECTION MUST COMPLY WITH CITY OF AUSTIN REQUIREMENTS AS OUTLINED IN THE ENVIRONMENTAL CRITERIA MANUAL AND AS INDICATED BY STANDARD COA NOTES AND DETAILS INCLUDED WITHIN THIS DOCUMENT SET. CONTRACTOR SHALL INSTALL PROTECTION PRIOR TO PRE-CONSTRUCTION CONFERENCE, MAKE ADJUSTMENTS TO PROTECTION AS DIRECTED BY THE GPP REPRESENTATIVE, AND MAINTAIN PROTECTION UNTIL PROJECT IS COMPLETE.
2. TYPE AND LOCATION OF ALL TREE PROTECTION MUST BE APPROVED IN THE FIELD BY THE GENERAL PERMIT PROGRAM (GPP) REPRESENTATIVE PRIOR TO CONSTRUCTION.
3. WALK-THROUGH: CONTRACTOR SHALL CONDUCT WALK-THROUGH MEETING WITH GENERAL PERMIT PROGRAM REPRESENTATIVE PRIOR TO PERFORMING ANY PRUNING ACTIVITIES ON TREES IN PROJECT AREA. PURPOSE OF WALK-THROUGH WILL BE TWOFOLD. ONE PURPOSE WILL BE TO DETERMINE THE MINIMUM AMOUNT OF PRUNING NECESSARY TO ALLOW CONSTRUCTION WORK TO BE COMPLETED. SECOND PURPOSE WILL BE TO DETERMINE AREAS OF PROJECT IN WHICH EXHAUST DIVERTERS WILL BE REQUIRED ON CONSTRUCTION EQUIPMENT TO PREVENT SCORCHING OF EXISTING TREES.
4. ALL PRUNING MUST BE PERFORMED IN ACCORDANCE WITH ANSI A300 (PART 1) - 2001 AMERICAN NATIONAL STANDARD FOR TREE CARE OPERATIONS (PRUNING), OR LATEST APPROVED VERSION. THIS DOCUMENT MAY BE OBTAINED ONLINE FOR A FEE AT WWW.ANSI.ORG.
5. PRUNING SHALL BE DONE WITH CLEAN, SHARP TOOLS. TO PREVENT BARK TEARS, THE WEIGHT OF THE BRANCH SHALL BE REMOVED BEFORE MAKING FINAL PRUNING CUT.
6. ALL PRUNING SHALL PRESERVE THE NATURAL CHARACTER OF THE TREE.
7. ONLY COLLAR CUTS ARE ACCEPTABLE. NO FLUSH CUTS OR STUB CUTS WILL BE ALLOWED.
8. ALL BRANCHES THAT ARE BROKEN OR DAMAGED DURING CONSTRUCTION SHALL BE REMOVED.
9. PRUNING CUTS OR DAMAGED AREAS ON AN OAK TREE SHALL BE PAINTED WITHIN FIVE MINUTES WITH A STANDARD TREE WOUND DRESSING. TREE WOUND DRESSING SHALL BE EITHER TREEKOTE AEROSOL OR TANGLEFOOT PRUNING SEALER (OR APPROVED EQUAL). THIS ALSO APPLIES TO WOUNDS CREATED BY CONSTRUCTION VEHICLES OR EQUIPMENT. ALL PRUNING MUST BE IN ACCORDANCE WITH COA OAK WILT PREVENTION POLICY.
10. ANY TREE ROOTS THAT ARE EXPOSED, CUT, OR TORN DURING CONSTRUCTION ACTIVITY SHALL BE PRUNED FLUSH WITH THE SURROUNDING SOIL. (REFER ALSO TO NUMBER 9 OF THE TREE AND NATURAL AREA PROTECTION NOTES INCLUDED IN THIS PLAN SET.)
11. ALL TRENCHING WITHIN THE CRITICAL ROOT ZONE OF A TREE TO BE PRESERVED WILL BE SAW CUT OR EXCAVATED BY HAND, AS APPROVED BY THE GENERAL PERMIT PROGRAM ARBORIST.
12. REFER TO ENVIRONMENTAL CRITERIA MANUAL APPENDIX P-6 FOR FURTHER REMEDIAL TREE CARE REQUIREMENTS. P-6 REMEDIAL TREE CARE WILL BE COORDINATED WITH AND APPROVED BY THE GENERAL PERMIT PROGRAM ARBORIST FOR PROJECTS PERMITTED THROUGH THE GENERAL PERMIT



CITY OF AUSTIN WATERSHED PROTECTION DEPARTMENT		TREE PROTECTION FENCE LOCATIONS
RECORD COPY SIGNED BY J. PATRICK MURPHY	11/15/99 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD.
		STANDARD NO. 610S-1



*AS NEEDED TO PROVIDE MINIMUM NECESSARY WORK SPACE. IF LESS THAN 1.5 m (5'), THEN ADD BOARDS STRAPPED TO TRUNK.



CITY OF AUSTIN WATERSHED PROTECTION DEPARTMENT		TREE PROTECTION FENCE MODIFIED TYPE A - CHAIN LINK
RECORD COPY SIGNED BY J. PATRICK MURPHY	11/15/99 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD.
		STANDARD NO. 610S-4

GENERAL PERMIT PROGRAM

CITY OF AUSTIN
AUSTIN WATERSHED PROTECTION
BOGGY CREEK MLK TOD SW CONVEYANCE IMPROVEMENTS-PHASE 3

TREE PROTECTION AND ENVIRONMENTAL NOTES

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

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FAH JOB NO. AU314361
DATE 12/12/2025
DESIGNED PSK
DRAWN NO
REVISED TRH
CHECKED KKP
FILE NAME CV-AU-DT-TREE.dwg

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SEQ. 6 OF 142

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LEGEND

- NEW STORM DRAIN PIPE
- NEW STORM DRAIN JUNCTION BOX
- NEW STORM DRAIN MANHOLE
- NEW WASTEWATER LINE
- NEW WATER LINE
- NEW CONTOUR
- NEW DRAINAGE EASEMENT
- NEW CURB AND GUTTER
- NEW CONCRETE SIDEWALK
- NEW INLET PROTECTION
- NEW FIRE HYDRANT
- NEW PLUG
- LIMITS OF CONSTRUCTION
- LIMITS OF CONSTRUCTION/MULCH SOCK (STAGING AREA)
- RIGHT-OF-WAY
- STABILIZED CONSTRUCTION ENTRANCE
- COA 100 YR-FLOODPLAIN
- FILTER DIKE
- PROPERTY LINE
- EX. STORM MANHOLE
- EX. WASTEWATER MANHOLE
- EX. FACE OF CURB
- EX. OVERHEAD ELECTRIC LINE
- EX. STORM DRAIN PIPE
- EX. WASTEWATER LINE
- EX. WATER LINE
- EX. UNDERGROUND DUCT BANK
- EX. UNDERGROUND GAS LINE
- EX. ABANDONED WATERLINE
- EX. ABANDONED WASTE WATER
- EX. 96 INCH WASTEWATER
- TREE TO REMAIN
- TREE PROTECTION FENCE

- PROJECT BENCHMARK
- SUE TEST HOLE
- BORE HOLE
- EX. STRUCTURES
- EX. SIGN POST
- EX. GUY ANCHOR
- EX. POWER POLE
- EX. FIRE HYDRANT
- EX. ELECTRIC CONDUIT
- EX. ELECTRIC JUNCTION BOX
- EX. ELECTRIC METER
- EX. FIBER OPTIC MARKER
- EX. TELEPHONE JUNCTION BOX
- EX. GAS VALVE
- EX. GAS METER
- EX. GAS MARKER
- EX. WATER METER
- EX. WATER VALVE
- EX. TRAFFIC CONTROL BOX
- EX. BOLLARD
- EX. CONCRETE
- GPS CONTROL POINT
- MAGNAIL
- EX. RISER
- EX. ELECTRIC JUNCTION BOX
- EX. FIBER OPTIC JUNCTION BOX
- EX. LIGHT POLE
- EX. NATURAL GAS VALVE
- EX. MAILBOX
- EX. CLEAN OUT
- EX. WATER VALVE
- EX. ELECTRIC MANHOLE
- EX. TELEPHONE MANHOLE
- RECOGNIZED ENVIRONMENTAL CONDITIONS

ABBREVIATIONS:

ABAN	ABANDONED
ASSY.	ASSEMBLY
BK	BACK
BM	BENCHMARK
BLDG	BUILDING
℄	CENTERLINE
CONC.	CONCRETE
CTMA	CAPITAL METRO TRANSPORTATION AUTHORITY
CWQZ	CRITICAL WATER QUALITY ZONE
DRWY	DRIVEWAY
DI	DUCTILE IRON
EG	EXISTING GROUND
ELEV.	ELEVATION
ESMT.	EASEMENT
EX.	EXISTING
F.H.	FIRE HYDRANT
F.V.	FIELD VERIFY
FLEX. BASE	FLEXIBLE BASE
℄	FLOW LINE
HORZ.	HORIZONTAL
INV.	INVERT
JTS.	JOINTS
LF	LINEAR FEET
LOC	LIMITS OF CONSTRUCTION
LP	LIGHT POLE
MH	MANHOLE
OHE	OVERHEAD ELECTRIC
PVMT.	PAVEMENT
PED	PEDESTRIAN
PP	POWER POLE
℄	PROPERTY LINE
PROP	PROPOSED
R	RADIUS
REC	RECOGNIZED ENVIRONMENTAL CONDITIONS
REF	REFERENCE
RCP	REINFORCED CONCRETE PIPE
RCB	REINFORCED CONCRETE BOX
R.O.E./ROE	RIGHT-OF-ACCESS EASEMENT
R.O.W./ROW	RIGHT-OF-WAY
SD	STORMDRAIN
SF	SILT FENCE
STD.	STANDARD
STA.	STATION
TBR	TO BE REMOVED
TOC	TOP OF CURB
TRANS.	TRANSITION
TYP.	TYPICAL
UKWN	UNKNOWN
WL	WATERLINE
WW	WASTEWATER
WWTR	WASTEWATER

BENCHMARKS:

MLK DRAINAGE PROJECT
CITY OF AUSTIN, TRAVIS COUNTY, TEXAS
McGRAY & McGRAY JOB No.: 19-007
DATE: DECEMBER 17, 2024

BM #1 - 5/8" IRON ROD WITH RED PLASTIC CAP ("M&M TRAV") SET IN THE GROUND AT THE NORTHWEST CORNER OF THE INTERSECTION OF WALNUT AVENUE AND MANOR ROAD, +/- 19 FT. SOUTHEAST OF A STOP SIGN AT THE INTERSECTION OF WALNUT AVENUE AND MANOR ROAD, AND +/- 17 FT. SOUTHWEST OF A WASTEWATER MANHOLE FOUND IN WALNUT AVENUE.

68 (GRID) N:10077171.53 E:3123173.06 ELEVATION:602.73

BM #3 - 5/8" IRON ROD WITH RED PLASTIC CAP ("M&M TRAV") SET IN THE GROUND AT THE INTERSECTION OF MANOR ROAD AND THE DRIVEWAY TO "ELAN EAST," +/- 7 FT. NORTHEAST OF UTILITY POLE LOCATED ALONG MANOR ROAD, AND +/- 32 FT. SOUTHWEST OF A STOP SIGN LOCATED AT THE INTERSECTION OF MANOR ROAD AND THE DRIVEWAY TO "ELAN EAST"

74 (GRID) N:10077419.08 E:3124391.93 ELEVATION:568.46

NOTES:

1. THIS PROJECT IS REFERENCED, FOR ALL BEARING AND COORDINATE BASIS, TO THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (2011) EPOCH 2010.00.
2. ALL COORDINATES SHOWN HEREON ARE GRID COORDINATES.
3. ALL ELEVATIONS SHOWN HEREON ARE NORTH AMERICAN VERTICAL DATUM (NAVD) 88 AND WERE DERIVED FROM GPS OBSERVATIONS.
4. UNITS: U.S. SURVEY FEET.
5. GRID TO SURFACE CONVERSION FACTOR: 1.000070
6. A PORTION OF THE INVERT DATA SHOWN WAS PROVIDED BY THE RIOS GROUP, INC. SOME STORM AND SANITARY SEWER MANHOLES WERE NOT INVERTED DUE TO TRAFFIC.

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

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CITY OF AUSTIN
AUSTIN WATERSHED PROTECTION
BOGGY CREEK MLK TOD SW CONVEYANCE IMPROVEMENTS-PHASE 3

SYMBOLS, LEGEND, AND ABBREVIATIONS

NO.	ISSUE	BY	DATE

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DATE 12/12/2025
DESIGNED PSK
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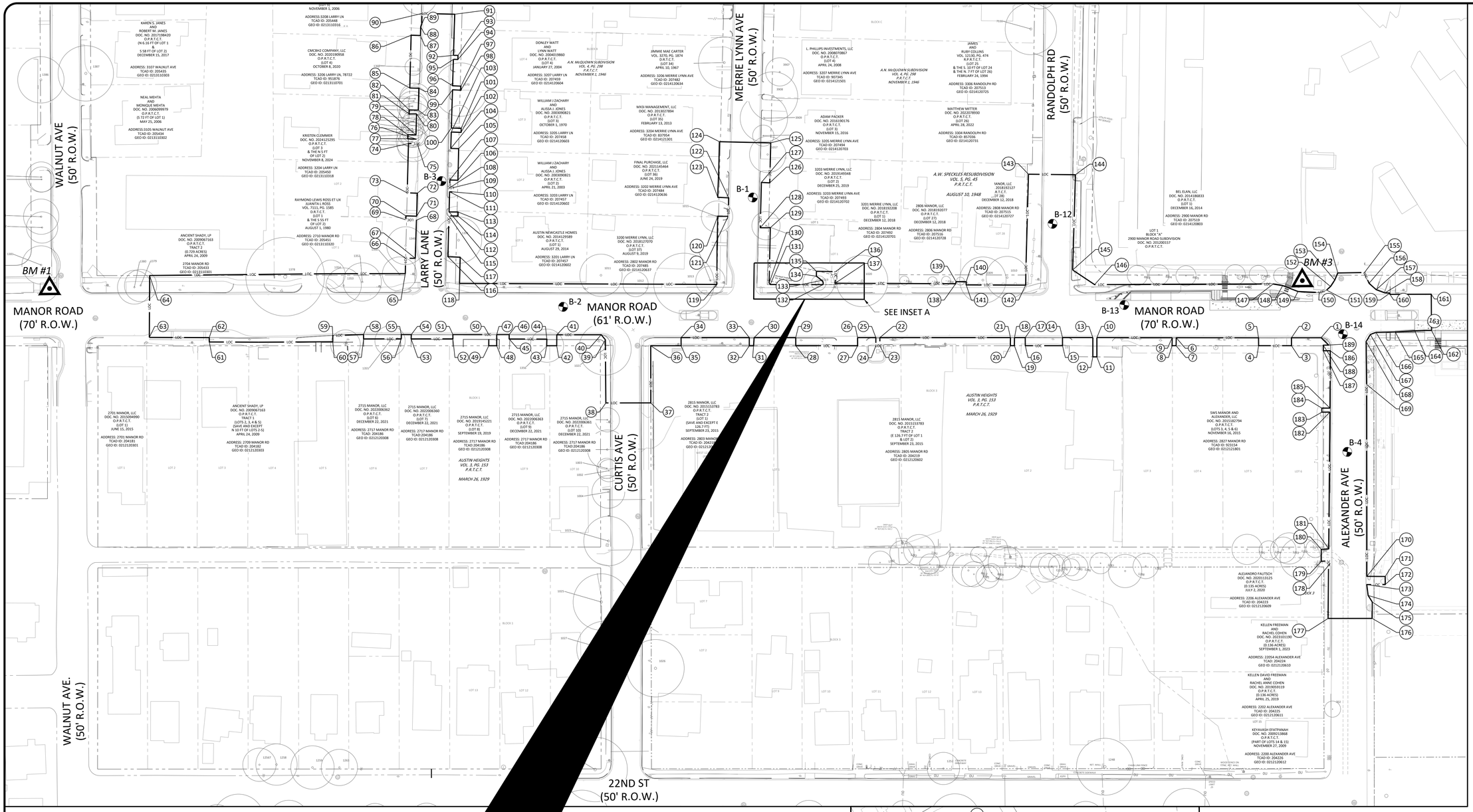
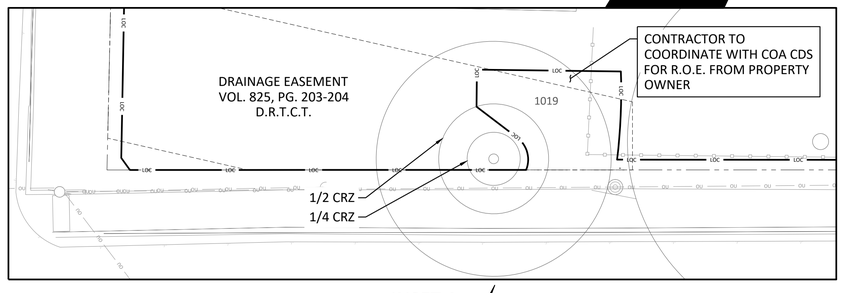
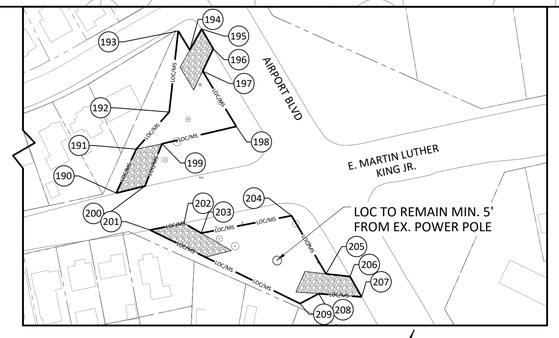




INSET A
1"=10'



STAGING AREA
1"=100'

NOTES:

1. BORINGS B-12, B-13 AND B-14 WERE PERFORMED AS PART OF THE AW 6943.045 UPPER BOGGY WEST - CHERRYWOOD WASTEWATER LINE IMPROVEMENTS PROJECT.
2. BENCHMARK AND COORDINATE SYSTEM INFORMATION CAN BE FOUND ON SHEET 7 - SYMBOLS, LEGEND, AND ABBREVIATIONS.

STAGING AREA NOTES:

1. CONTRACTOR SHALL MAKE ONLY RIGHT TURNS TO ENTER STAGING AREAS FROM PUBLIC ROADWAYS AND TO EXIT STAGING AREAS ONTO PUBLIC ROADWAYS. CONTRACTOR SHALL NOT BACK ONTO PUBLIC ROADWAYS FROM STAGING AREAS, NOR SHALL CONTRACTOR STOP TRAFFIC AT ANY TIME AT CONSTRUCTION ENTRANCES TO STAGING AREAS.

N

0 50' 100'
SCALE IN FEET

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

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FREESE NICHOLS
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Austin, Texas 78759
Phone – (512) 617–3100
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CITY OF AUSTIN
AUSTIN WATERSHED PROTECTION
BOGGY CREEK MLK TOD SW CONVEYANCE IMPROVEMENTS-PHASE 3

BOUNDARY MAP

NO.	ISSUE	BY	DATE

FAN/JOB NO. AU314361
DATE 12/12/2025
DESIGNED PSK
DRAWN NO
REVISED TRH
CHECKED KKP
FILE NAME CV-AU-PL-BNDY.dwg

VERIFY SCALE Bar is one inch on original drawing, if not one inch on this sheet, adjust scale.
0 1

SHEET 8
SEQ. 8 OF 142

ACAD Rel: 25.1s (LMS Tech)
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Plot Date: 6/2/2026 2:51 PM Plot By: no Filename: N:\SW\Larry Lane\Drawings\CV-AU-PL-BNDY.dwg

LOC POINTS TABLE		
Point #	NORTHING	EASTING
1	10077367.07	3124421.18
2	10077361.32	3124392.28
3	10077353.62	3124393.85
4	10077347.32	3124361.80
5	10077355.00	3124360.23
6	10077339.36	3124280.04
7	10077331.52	3124281.43
8	10077330.75	3124277.51
9	10077338.59	3124276.08
10	10077324.27	3124202.71

LOC POINTS TABLE		
Point #	NORTHING	EASTING
11	10077305.49	3124206.39
12	10077304.76	3124202.45
13	10077323.51	3124198.78
14	10077317.74	3124169.21
15	10077309.77	3124170.78
16	10077302.64	3124134.52
17	10077310.52	3124132.92
18	10077308.46	3124122.44
19	10077300.55	3124123.89
20	10077299.78	3124119.96

LOC POINTS TABLE		
Point #	NORTHING	EASTING
21	10077307.69	3124118.51
22	10077282.69	3123991.29
23	10077274.79	3123992.86
24	10077274.01	3123988.93
25	10077281.92	3123987.37
26	10077278.43	3123969.59
27	10077270.52	3123971.18
28	10077258.67	3123910.89
29	10077266.59	3123909.36
30	10077258.62	3123868.82

LOC POINTS TABLE		
Point #	NORTHING	EASTING
31	10077250.60	3123869.83
32	10077249.78	3123865.65
33	10077257.70	3123864.11
34	10077244.63	3123797.62
35	10077236.72	3123799.23
36	10077230.90	3123769.61
37	10077175.23	3123780.66
38	10077166.57	3123736.88
39	10077228.03	3123724.27
40	10077232.15	3123719.29

LOC POINTS TABLE		
Point #	NORTHING	EASTING
41	10077223.60	3123676.02
42	10077212.90	3123678.05
43	10077210.97	3123668.26
44	10077217.44	3123667.16
45	10077210.37	3123630.43
46	10077214.66	3123629.61
47	10077212.28	3123617.50
48	10077201.40	3123619.56
49	10077199.88	3123611.84
50	10077210.75	3123609.78

LOC POINTS TABLE		
Point #	NORTHING	EASTING
51	10077203.89	3123574.74
52	10077199.73	3123575.61
53	10077191.68	3123534.92
54	10077195.89	3123534.26
55	10077194.03	3123524.49
56	10077189.85	3123525.29
57	10077182.54	3123488.59
58	10077186.85	3123487.71
59	10077179.83	3123458.00
60	10077173.89	3123459.13

LOC POINTS TABLE		
Point #	NORTHING	EASTING
61	10077150.04	3123338.91
62	10077154.27	3123338.01
63	10077143.03	3123279.60
64	10077203.39	3123268.05
65	10077254.19	3123516.70
66	10077269.23	3123514.08
67	10077271.02	3123523.47
68	10077308.31	3123517.39
69	10077306.64	3123506.75
70	10077310.56	3123506.14

LOC POINTS TABLE		
Point #	NORTHING	EASTING
71	10077312.26	3123516.77
72	10077334.83	3123513.08
73	10077333.25	3123503.13
74	10077381.55	3123494.93
75	10077382.98	3123503.53
76	10077387.32	3123501.64
77	10077386.02	3123493.17
78	10077389.97	3123492.52
79	10077391.43	3123500.54
80	10077412.02	3123497.11

LOC POINTS TABLE		
Point #	NORTHING	EASTING
81	10077410.50	3123489.91
82	10077414.45	3123489.24
83	10077415.97	3123498.04
84	10077437.39	3123494.47
85	10077435.90	3123485.56
86	10077487.57	3123476.73
87	10077489.06	3123485.87
88	10077497.54	3123484.46
89	10077500.48	3123484.99
90	10077510.88	3123483.16

LOC POINTS TABLE		
Point #	NORTHING	EASTING
91	10077516.36	3123515.21
92	10077476.12	3123521.86
93	10077476.87	3123526.27
94	10077472.93	3123526.95
95	10077472.17	3123522.52
96	10077446.27	3123526.83
97	10077447.49	3123535.06
98	10077443.54	3123535.72
99	10077442.32	3123527.54
100	10077404.88	3123533.72

LOC POINTS TABLE		
Point #	NORTHING	EASTING
101	10077406.42	3123543.35
102	10077402.48	3123544.02
103	10077400.94	3123534.38
104	10077384.88	3123537.05
105	10077386.17	3123544.80
106	10077355.26	3123550.09
107	10077353.92	3123542.20
108	10077346.32	3123543.50
109	10077346.81	3123546.36
110	10077342.87	3123547.03

LOC POINTS TABLE		
Point #	NORTHING	EASTING
111	10077342.38	3123544.17
112	10077322.65	3123547.53
113	10077324.33	3123556.38
114	10077320.39	3123557.06
115	10077318.70	3123548.20
116	10077278.80	3123555.00
117	10077280.67	3123567.04
118	10077254.95	3123571.44
119	10077303.33	3123822.31
120	10077369.81	3123810.08

LOC POINTS TABLE		
Point #	NORTHING	EASTING
121	10077371.84	3123820.31
122	10077389.94	3123817.22
123	10077388.35	3123806.52
124	10077442.85	3123797.47
125	10077451.52	3123847.69
126	10077412.39	3123854.38
127	10077411.24	3123846.15
128	10077366.84	3123853.71
129	10077368.75	3123863.52
130	10077314.78	3123872.95

LOC POINTS TABLE		
Point #	NORTHING	EASTING
131	10077313.44	3123874.38
132	10077323.40	3123925.72
133	10077327.30	3123923.86
134	10077330.34	3123917.70
135	10077335.15	3123916.82
136	10077338.54	3123935.51
137	10077327.02	3123937.24
138	10077349.71	3124054.81
139	10077351.78	3124054.79
140	10077353.69	3124064.69

LOC POINTS TABLE		
Point #	NORTHING	EASTING
141	10077350.56	3124065.30
142	10077361.75	3124123.29
143	10077470.34	3124104.78
144	10077478.87	3124150.61
145	10077385.51	3124166.15
146	10077375.43	3124190.35
147	10077410.20	3124364.12
148	10077410.47	3124373.73
149	10077407.68	3124389.74
150	10077410.80	3124410.63

LOC POINTS TABLE		
Point #	NORTHING	EASTING
151	10077414.56	3124417.34
152	10077418.79	3124420.47
153	10077425.89	3124423.39
154	10077433.37	3124425.06
155	10077438.90	3124450.93
156	10077429.27	3124457.43
157	10077424.41	3124465.63
158	10077422.95	3124474.74
159	10077423.74	3124479.62
160	10077422.55	3124479.86

LOC POINTS TABLE		
Point #	NORTHING	EASTING
161	10077430.55	3124520.15
162	10077395.35	3124527.30
163	10077394.00	3124520.45
164	10077391.78	3124511.00
165	10077386.91	3124492.26
166	10077382.81	3124473.61
167	10077379.63	3124468.52
168	10077371.94	3124465.77
169	10077330.27	3124474.42
170	10077143.30	3124511.35

LOC POINTS TABLE		
Point #	NORTHING	EASTING
171	10077146.72	3124529.30
172	10077138.80	3124530.86
173	10077135.27	3124512.94
174	10077124.94	3124516.31
175	10077119.33	3124521.63
176	10077103.35	3124524.63
177	10077094.89	3124481.70
178	10077148.91	3124473.30
179	10077149.28	3124464.12
180	10077160.96	3124461.81

LOC POINTS TABLE		
Point #	NORTHING	EASTING
181	10077162.73	3124469.00
182	10077296.24	3124444.01
183	10077294.65	3124436.13
184	10077298.58	3124435.35
185	10077300.18	3124443.27
186	10077356.15	3124432.59
187	10077354.76	3124425.85
188	10077360.18	3124424.68
189	10077361.34	3124429.99
190	10076289.13	3126181.37

LOC POINTS TABLE		
Point #	NORTHING	EASTING
191	10076347.16	3126207.83
192	10076396.12	3126251.33
193	10076503.11	3126263.25
194	10076477.99	3126278.52
195	10076505.70	3126294.10
196	10076479.58	3126309.46
197	10076450.10	3126295.48
198	10076377.16	3126339.84
199	10076354.24	3126241.89
200	10076298.52	3126219.29

LOC POINTS TABLE		
Point #	NORTHING	EASTING
201	10076240.47	3126226.04
202	10076249.46	3126270.89
203	10076236.35	3126293.54
204	10076259.33	3126412.73
205	10076182.63	3126458.27
206	10076179.08	3126489.99
207	10076152.22	3126505.32
208	10076156.44	3126448.64
209	10076143.40	3126423.94

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CITY OF AUSTIN
AUSTIN WATERSHED PROTECTION
BOGGY CREEK MLK TOD SW CONVEYANCE IMPROVEMENTS-PHASE 3

BOUNDARY MAP NORTHING AND EASTING TABLES

NO.	ISSUE	BY	DATE

FAN/JOB NO. AU314361
DATE 12/12/2025
DESIGNED PSK
DRAWN NO
REVISED TRH
CHECKED KKP
FILE NAME CV-AU-PL-BNDY.dwg

VERIFY SCALE Bar is one inch on original drawing, if not one inch on this sheet, adjust scale.
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SHEET 9
SEQ. 9 OF 142

ACAD Rel: 25.1s (LMS Tech)
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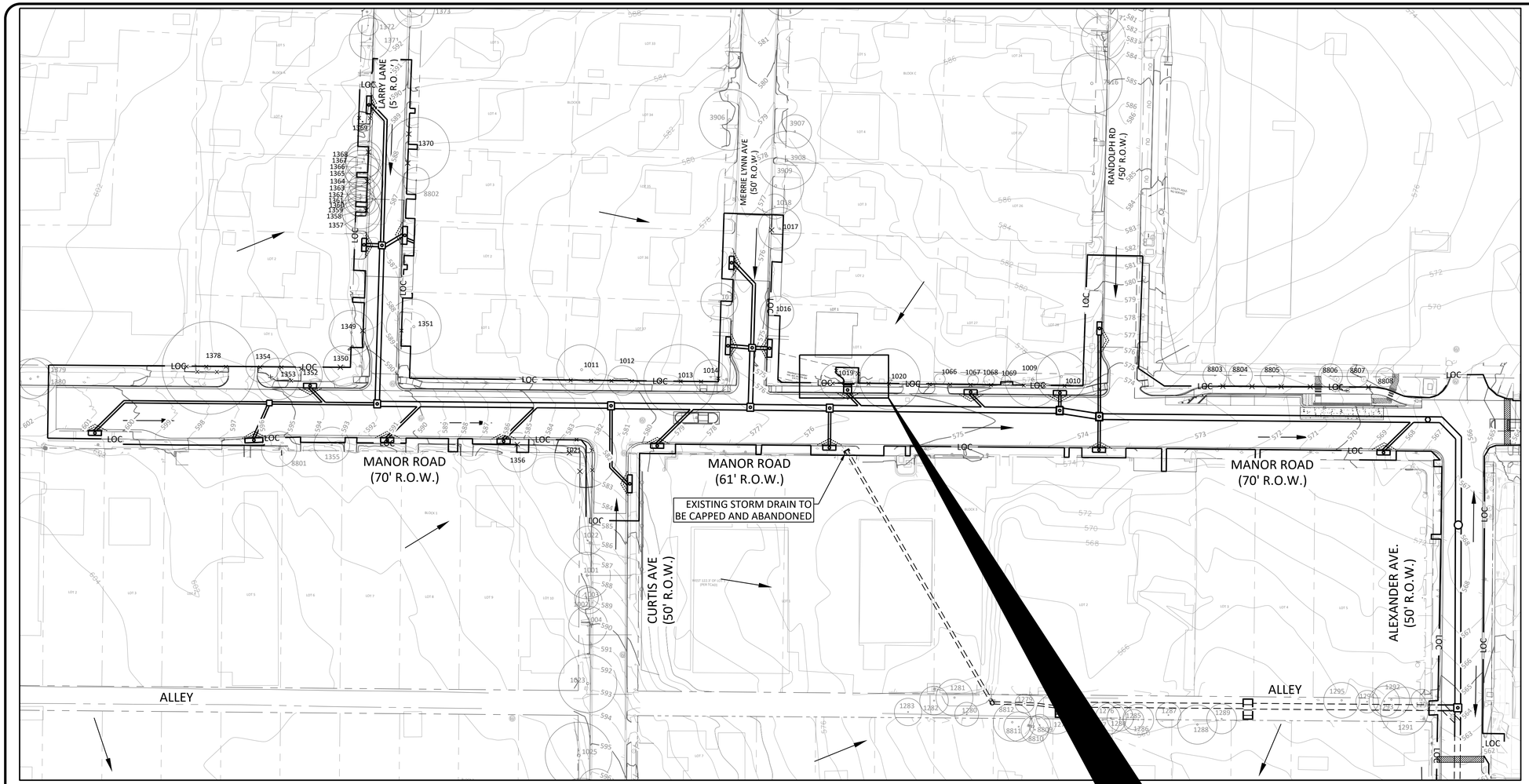
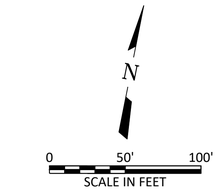




LEGEND

- LOC — LIMITS OF CONSTRUCTION
- TRIANGULAR FILTER DIKE
- FILTER DIKE
- EX. STORM DRAIN
- EASEMENT
- RIGHT-OF-WAY
- PROPERTY LINE
- FLOW ARROW
- XXX — TREE TO REMAIN
- TREE PROTECTION FENCE
- STABILIZED CONSTRUCTION ENTRANCE
- ROCK BERM

GENERAL NOTES:

1. REF. SHEET 5 FOR SEDIMENT CONTROL DETAILS.
2. ALL TREES WITHIN LOC SHALL HAVE PROTECTIVE FENCING INSTALLED.
3. ANY TREE DAMAGED DURING CONSTRUCTION REQUIRING MITIGATION SHALL BE MITIGATED WITH TRIMMING AND FERTILIZER OR REPLANTED AT THE DISCRETION OF THE CITY OF AUSTIN.
4. TRIM ALL TREES OVERHANGING AND WITHIN LOC TO A MINIMUM 14' CLEARANCE. CONTACT ALL AFFECTED PROPERTY OWNERS AND ENV INSPECTOR PRIOR TO TRIMMING.

SPECIAL EROSION CONTROL NOTES:

1. FOR WORK IN PAVED AREAS, SEE DETAIL A, SHEET 5.
2. TWO LINES OF TRIANGULAR FILTER DIKES SHALL BE PLACED UPGRADIENT OF CURB INLETS TO MINIMIZE SEDIMENT ENTERING THE INLET.
3. AFTER TEMPORARY SPOILS ARE REMOVED FROM THE STREET, ALL REMAINING DEBRIS SHALL BE SWEPT IMMEDIATELY.
4. TRACKING DEBRIS MUST BE SWEPT FROM THE STREET UPON DISCOVERY.
5. IF DISTURBED AREAS ARE NOT WORKED ON FOR MORE THAN 14 DAYS, DISTURBED AREAS NEED TO BE STABILIZED BY REVEGETATION, MULCH, TARP, OR MATTING.
6. ENVIRONMENTAL INSPECTOR HAS THE AUTHORITY TO ADD AND/OR MODIFY EROSION AND SEDIMENTATION CONTROLS ONSITE TO KEEP PROJECT IN COMPLIANCE WITH THE CITY OF AUSTIN RULES AND REGULATIONS.
7. CONTRACTOR SHALL UTILIZE DUST CONTROL MEASURES DURING CONSTRUCTION SUCH AS MULCHING, VEGETATIVE COVER, SPRAY-ON ADHESIVES, TILLAGE, IRRIGATION, OR BARRIERS AS PER CITY OF AUSTIN ECM 1.4.8(C).
8. REFERENCE GENERAL NOTES SHEET FOR SEQUENCE OF CONSTRUCTION.
9. PROTECT DOWNSTREAM LIMITS OF PROJECT WITH TRIANGULAR FILTER DIKE AS APPROPRIATE WITHIN TCP SETUP.

STAGING AREA NOTES:

1. CONTRACTOR SHALL MAKE ONLY RIGHT TURNS TO ENTER STAGING AREAS FROM PUBLIC ROADWAYS AND TO EXIT STAGING AREAS ONTO PUBLIC ROADWAYS. CONTRACTOR SHALL NOT BACK ONTO PUBLIC ROADWAYS FROM STAGING AREAS, NOR SHALL CONTRACTOR STOP TRAFFIC AT ANY TIME AT CONSTRUCTION ENTRANCES TO STAGING AREAS.
2. ALL SPOILS AREAS SHALL BE SURROUNDED BY A MULCH SOCK.
3. NO FUEL STORAGE ALLOWED ON SITE
4. INSTALL TEMPORARY CURB RAMPS AT STAGING AREA CONSTRUCTION ENTRANCES (SEE DETAIL SHEET 96).

TREE LIST

ACTION	TAG No.	TREE TYPE	BOLE DIAMETER	DRIPLINE DIAMETER
P,-	1001	Cedar Elm	19.5"	19.5'
-	1002	Hackberry	11"	11'
-	1003	Cedar Elm	10"	10'
-	1004	Hackberry	16.25"	16.25'
P,0	1009	Cedar Elm	23"	23'
P,0	1010	Hackberry	21"	21'
P,0	1011	Cedar Elm	21"	21'
-	1012	Cedar Elm	12.5"	12.5'
0	1012	Cedar Elm	12.5"	12.5'
H,0	1013	Cedar Elm	30"	30'
0	1014	Ash	14.5"	14.5'
-	1015	Cedar Elm	15.5"	15.5'
0	1016	Cedar Elm	14"	14'
0	1017	Cedar Elm	18"	18'
-	1018	Cedar Elm	10.5"	10.5'
0	1019	Pecan	15.5"	15.5'
H,0	1020	Cedar Elm	25.5"	25.5'
H,0	1021	Cedar Elm	26"	26'
-	1022	Cedar Elm	12"	12'
-	1023	Waxleaf Ligustrum	19.25"	19.25'
0	1066	Sycamore	4.5"	4.5'
0	1067	Sycamore	4.5"	4.5'
0	1068	Sycamore	4.5"	4.5'
0	1069	Sycamore	4"	4'
-	1276	Box Elder	13"	13'
-	1277	Hackberry	14.5"	14.5'
-	1278	Hackberry	17"	17'
-	1279	Chinaberry	8X6"	8X6'
-	1280	Live Oak	10"	10'
-	1281	Box Elder	15.5"	15.5'
-	1282	Elm	12"	12'
-	1283	Chinaberry	11.5"	11.5'

TREE LIST

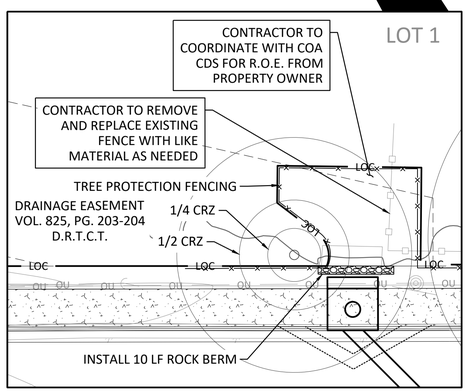
ACTION	TAG No.	TREE TYPE	BOLE DIAMETER	DRIPLINE DIAMETER
-	1284	Hackberry	11"	11'
-	1285	Box Elder	8.5"	8.5'
-	1286	Box Elder	13"	13'
-	1287	Box Elder	10.5"	10.5'
-	1288	Cedar Elm	16.5"	16.5'
-	1288	Cedar Elm	16.5"	16.5'
-	1289	Hackberry	12.5"	12.5'
-	1290	Hackberry	9"	9'
P,-	1291	Mesquite	20"	20'
-	1292	Cedar Elm	15.5"	15.5'
-	1293	Waxleaf Ligustrum	12.75"	12.75'
-	1294	Hackberry	9.5"	9.5'
-	1295	Chinaberry	15"	15'
0	1349	Ash	18.75"	18.75'
0	1350	Ash	17"	17'
P,0	1351	Cedar Elm	23"	23'
P,0	1352	Mesquite	19"	19'
0	1353	Mesquite	17.5"	17.5'
0	1354	Ash	14.25"	14.25'
-	1355	Pecan	15"	15'
0	1356	Cedar Elm	16.5"	16.5'
0	1357	Palm	16"	16'
0	1358	Palm	16"	16'
0	1359	Palm	12.5"	12.5'
0	1360	Palm	10"	10'
0	1361	Palm	16.5"	16.5'
0	1362	Palm	11"	11'
0	1363	Palm	10.5"	10.5'
0	1364	Palm	16.5"	16.5'
0	1365	Palm	15"	15'
0	1366	Palm	15"	15'
0	1367	Palm	14.5"	14.5'

TREE LIST

ACTION	TAG No.	TREE TYPE	BOLE DIAMETER	DRIPLINE DIAMETER
0	1368	Palm	15.5"	15.5'
0	1369	Pecan	8.5"	8.5'
P,0	1370	Hackberry	26.5"	26.5'
-	1371	Cedar Elm	17.5"	17.5'
-	1372	Cedar Elm	8.5"	8.5'
H,0	1378	Live Oak	39"	39'
H	3906	Cedar Elm	25.5"	25.5'
-	3907	Cedar Elm	14"	14'
H	3908	Cedar Elm	24.5"	24.5'
P	3909	Cedar Elm	23.5"	23.5'
-	8801	American Elm	14.75"	14.75'
-	8802	Chinese Pistache	11"	11'
0	8803	Shumard Oak	10"	10'
0	8804	Shumard Oak	10"	10'
0	8805	Shumard Oak	10"	10'
0	8806	Shumard Oak	10"	10'
0	8807	Shumard Oak	9"	9'
0	8808	Shumard Oak	8"	8'
-	8809	Box Elder	9"	9'
-	8810	Box Elder	11.5"	11.5'
-	8811	Hackberry	12.5"	12.5'
-	8812	Box Elder	16"	16'

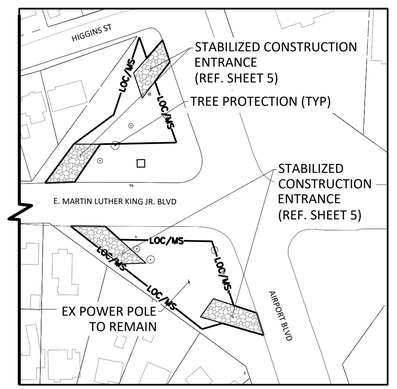
ACTION LEGEND	
*	TREE REMOVE
0	TREE PROTECT
-	NO ACTION
H	HERITAGE TREE
P	PROTECTED TREE

* ALL TREES TO BE PROTECTED. NONE TO BE REMOVED.



INSET A
1"=10'

INSET A NOTES:
1. EXCEPT FOR THE REMOVAL OF THE EXISTING INLET, NO CUT OR FILL >4" IS ALLOWED WITHIN THE 1/2 CRZ OF TREE NO. 1019.



STAGING AREA
1"=100'

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Texas Registered Engineering Firm F-2144

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CITY OF AUSTIN
AUSTIN WATERSHED PROTECTION
BOGGY CREEK MLK TOD SW CONVEYANCE IMPROVEMENTS-PHASE 3

EROSION AND SEDIMENT CONTROL AND TREE PROTECTION PLAN

NO.	ISSUE	BY	DATE

FAN/JOB NO. AU314361
DATE 12/12/2025
DESIGNED PSK
DRAWN NO
REVISED TRH
CHECKED KKP
FILE NAME CV-AU-PL-EROS-2.dwg

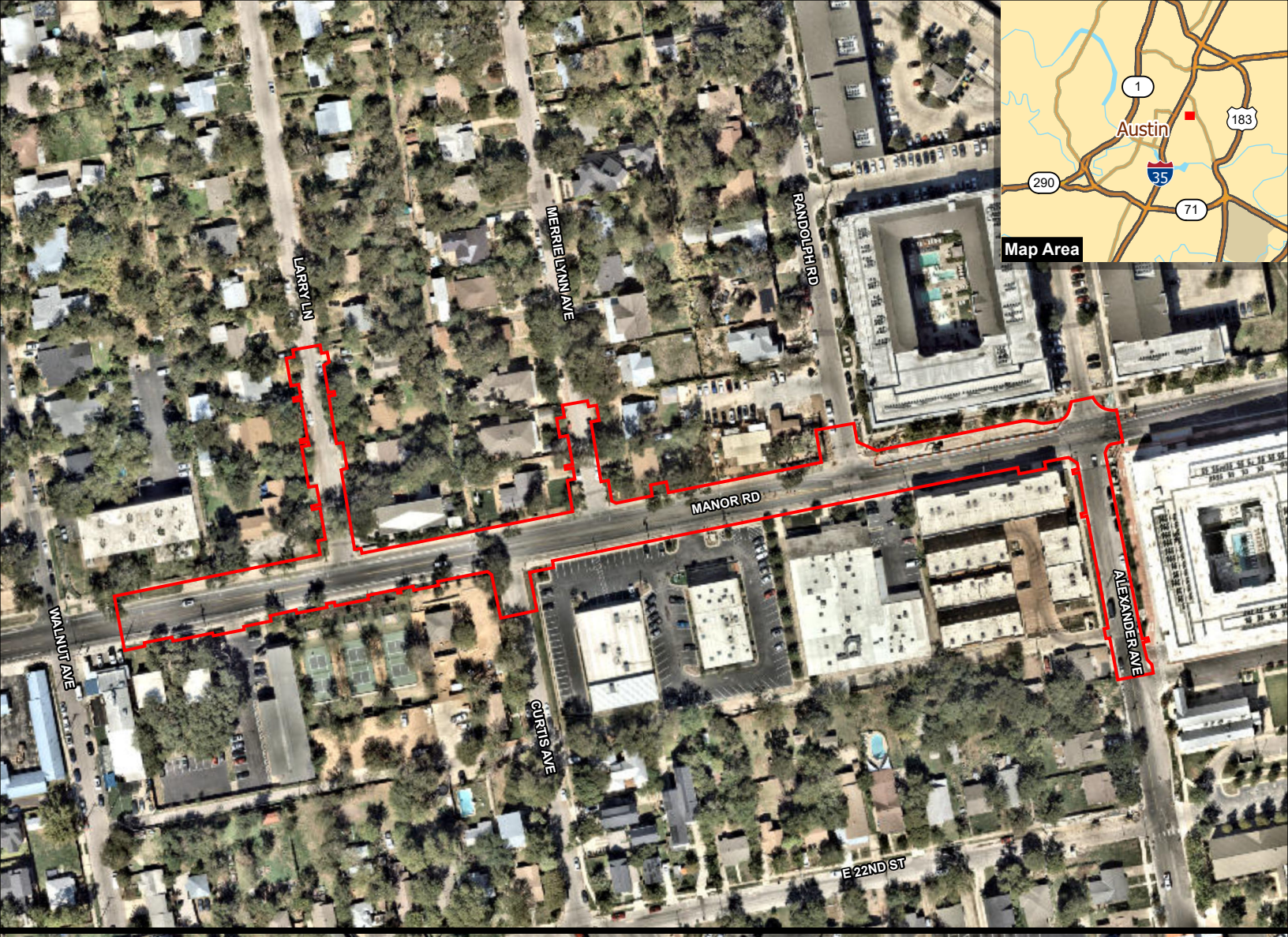
VERIFY SCALE Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.
0 1"

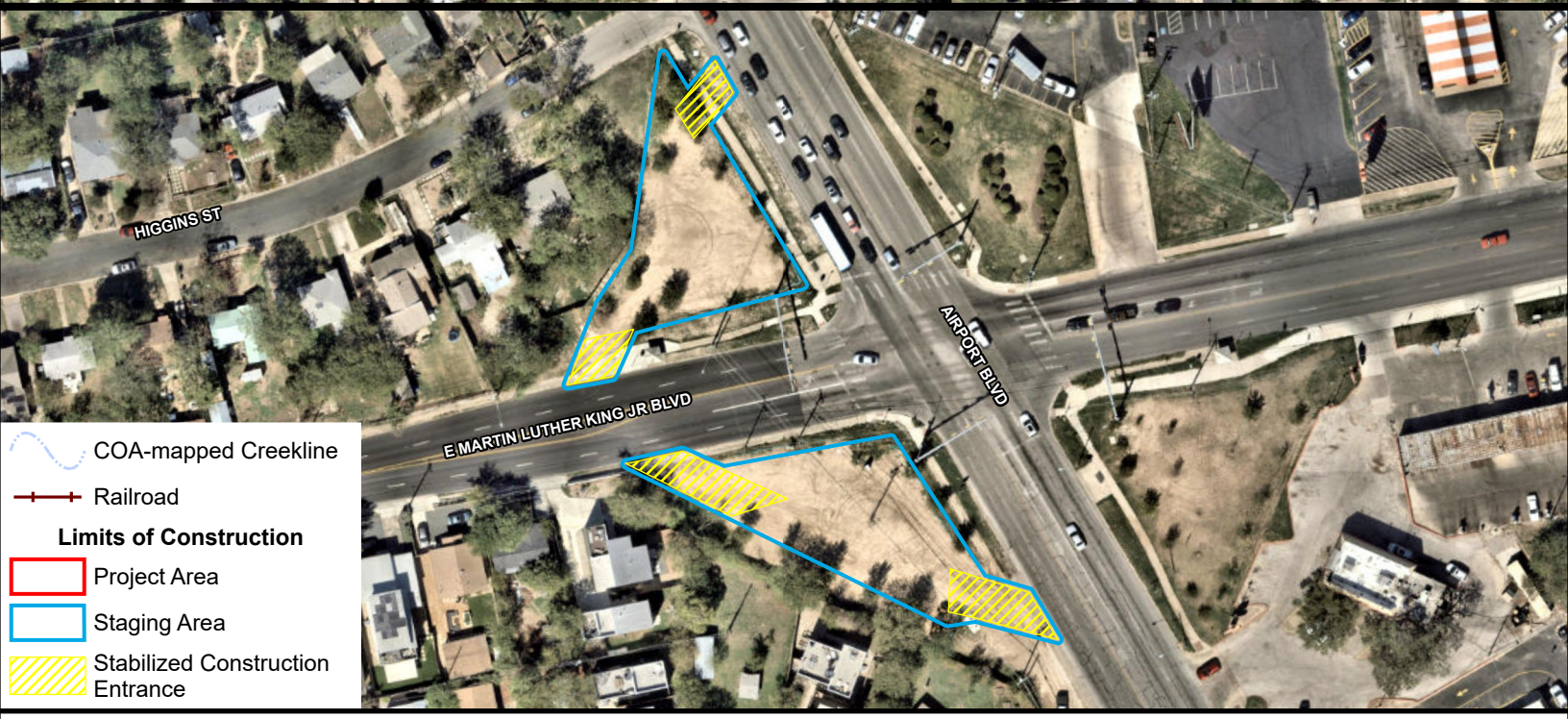
SHEET 10
SEQ. 10 OF 142

ACAD Rel: 25.1s (LMS Tech)
Filename: N:\SW\Larry Lane\Drawings\CV-AU-PL-EROS-2.dwg
Last Saved: 6/2/2026 2:10 PM Saved By: no

Plot Date: 6/6/2026 7:27 AM Plot By: no Filename: N:\SW\Larry Lane\Drawings\CV-AU-PL-EROS-2.dwg

APPENDIX B
LOCATION MAP





COA-mapped Creekline

Railroad

Limits of Construction

Project Area

Staging Area

Stabilized Construction Entrance

N

0 40 80 160 US Feet

Attachment B
Site Location

172046.02	Project #
4/25/2025	Date
ESRI World Imagery 2024	Basemap

Baer Engineering
and Environmental Consulting, Inc.
TBPE Firm No. F-3181 / TBPG Firm No. 50030

MLK TOD SW Conveyance Improvements
Phase 3

APPENDIX C
NOTICE OF INTENT, CERTIFICATE, SITE NOTICE, AND NOTICE OF TERMINATION

TCEQ Small Construction Site Notice

Small construction sites disturb at least one but less than five acres or are part of a larger common plan of development or sale that disturbs between one and five acres. Operators of small construction sites will fill out this notice. Operators will then post this notice at the construction site in a location where it is safely and readily available for viewing by the general public and local, state, and federal authorities. Additional information about the TCEQ Construction Stormwater General Permit may be found on TCEQ's webpage on Assistance Tools for Construction Stormwater General Permits.

Note: You must also develop a Stormwater Pollution Prevention Plan prior to the commencement of construction.

Operator Name: _____

Contact Name and Phone Number: _____

_____

Project Description:

Physical Location/Description _____

_____

Estimated Start Date _____

Projected End Date or Date Disturbed Soils Will Be Stabilized _____

Location of Stormwater Pollution Prevention Plan (SWP3): _____

_____

For Small Construction Activities Authorized Under Part II.E.2. (Obtaining Authorization to Discharge) the following certification must be completed:

I _____ (*Typed or Printed Name Person Completing This Certification*) certify under penalty of law that I have read and understand the eligibility requirements for claiming an authorization under Part II.E.2. of TPDES General Permit TXR150000 and agree to comply with the terms of this permit. A stormwater pollution prevention plan has been developed and will be implemented prior to construction, according to permit requirements. A copy of this signed notice is supplied to the operator of the Municipal Separate Storm Sewer Systems (MS4) if discharges enter an MS4. I am aware there are significant penalties for providing false information or for conducting unauthorized discharges, including the possibility of fine and imprisonment for knowing violations.

Signature and Title _____ Date _____

Name of MS4 Operator notified: _____ *and Date notified (per Part II.F.3.):* _____

Date Site Notice Removed _____

Note to Contractor: If the total disturbed acreage is five or more acres, the Contractor shall submit a Notice of Intent (NOI) to TCEQ for coverage under the Construction General Permit. The Contractor shall submit the NOI (if applicable) prior to the pre-construction conference and the Contractor will be a co-permittee for this project with the COA Watershed Protection Department. If there will be other Primary Operators besides the contractor, each primary operator must file an NOI and provide a copy to include in this Appendix. Parties who sign the certification form and NOI must be authorized signatories per 30 TAC §305.44.

The Contractor shall insert copies of their NOI into Appendix C.

APPENDIX D
TCEQ CONSTRUCTION GENERAL PERMIT NO. TXR 150000

For a full copy of the 2023 TCEQ Construction General Permit, refer to this link:

https://www.tceq.texas.gov/downloads/permitting/stormwater/general/construction/2023-cgp-txr150000.pdf

APPENDIX E
INSPECTION OF CONTROLS AND CORRECTIVE ACTION REPORT/CERTIFICATION FORM

(Includes COA, Appendix P-8 form items)

STORM WATER CONSTRUCTION SITE INSPECTION REPORT

General Information		
Location: MLK TOD Phase 3		
Date of Inspection:		Start/End Time:
Inspector's Name:		
Inspector's Title:		
Inspector's Qualifications:		
Inspector's Employer:		
Inspector's Signature:		
Inspector's Contact Information	Phone: E-mail:	
Describe Present Phase of Construction:		
Type of Inspection:	☐ Regular weekly	☐ Pre-storm event
	☐ During storm event	☐ Post-storm event

Weather Information	
Has there been a storm event since the last inspection?	
☐ Yes	Storm date and time: Storm duration (hours): Approximate amount of precipitation (inches):
☐ No	Number of days since last rainfall:
Weather at time of inspection: ☐ Clear ☐ Cloudy ☐ Rain ☐ Sleet ☐ Fog ☐ Snow ☐ High winds Other:	Temperature (° Fahrenheit):
Have any discharges occurred since the last inspection? ☐ Yes ☐ No If yes, describe and include the type of discharge (i.e. silt, mud, cement, asphalt, cloudy water):	

Site-specific Best Management Practices				
Identify the structural and non-structural BMPs listed below on the site map. Carry a copy of the site map with you during inspections. This list will ensure that all required BMPs are inspected. BMPs will be inspected to verify that they meet the descriptions provided in Sections 8 through 18 of the SWPPP.				
	BMP	BMP Installed?	BMP Maintenance Required?	Corrective Action Needed and Comments
1	Stabilized Construction Exits	☐Yes ☐No	☐Yes ☐No	
	Is sediment being tracked onto road?			
	Is the entry surface clean or sediment-filled?			
	Does all traffic use the entrance?			
2	Existing Vegetation	☐Yes ☐No	☐Yes ☐No	
3	Silt Fence	☐Yes ☐No	☐Yes ☐No	
	Is the bottom of the fabric buried?			
	Is the fabric torn or sagging?			
	Are the posts tipping over?			
	How deep is the sediment?			
4	Tracking on Roadways	☐Yes ☐No	☐Yes ☐No	
5	Check creeks and drainage ditches for sediment (post rain or dewatering event)		☐Yes ☐No	
6	Spoils and Stockpiles	☐Yes ☐No	☐Yes ☐No	
7	Staging and Materials Storage Area	☐Yes ☐No	☐Yes ☐No	
8	Dumpsters and Sanitary Facilities	☐Yes ☐No	☐Yes ☐No	
9	Concrete washout facilities are available, clearly marked, and maintained.	☐Yes ☐No	☐Yes ☐No	
10	Rock Berm	☐Yes ☐No	☐Yes ☐No	
11	Impacts of sediment-laden water from de-watering are mitigated, as required.	☐Yes ☐No	☐Yes ☐No	
12	Dust Control	☐Yes ☐No	☐Yes ☐No	

13	Tree Protection (City of Austin Requirement only)	☐Yes ☐No	☐Yes ☐No	
14	Triangular Filter Dike	☐Yes ☐No	☐Yes ☐No	
15	Grass Seeding, Sodding	☐Yes ☐No	☐Yes ☐No	

Listed below are overall site issues that will be assessed during inspections. BMPs will be inspected to verify they meet the descriptions provided in Sections 8 through 18 of this SWPPP.

	BMP / Activity	Implemented?	Maintenance Required?	Corrective Action Needed and Comments
1	Litter Control – Trash from work areas is collected and placed in covered dumpsters.	☐Yes ☐No	☐Yes ☐No	
2	Sediment, road base, select fill, spoils, concrete, or debris, are contained.	☐Yes ☐No	☐Yes ☐No	
3	Demolition debris is contained.	☐Yes ☐No	☐Yes ☐No	
4	Oil and chemical products are stored inside Conex.	☐Yes ☐No	☐Yes ☐No	
5	Are slopes and disturbed areas not actively being worked properly stabilized?	☐Yes ☐No	☐Yes ☐No	
6	Natural resource areas (e.g., streams, wetlands, mature trees, etc.) are protected with barriers or similar BMPs.	☐Yes ☐No	☐Yes ☐No	
7	Perimeter controls and sediment barriers are adequately installed (keyed into substrate) and maintained.	☐Yes ☐No	☐Yes ☐No	
8	Vehicle tire wash	☐Yes ☐No	☐Yes ☐No	
9	Vehicle and equipment fueling, cleaning, and maintenance areas are free of spills, leaks, and other deleterious material.	☐Yes ☐No	☐Yes ☐No	
10	Recordkeeping and Site Postings are being maintained.	☐Yes ☐No	☐Yes ☐No	

11	Other erosion and sedimentation control issues (describe):	☐Yes ☐No	☐Yes ☐No	
Describe any incidents of non-compliance not described above:				

All corrective actions shall be implemented before the following SWPPP inspection.

CERTIFICATION OF COMPLIANCE

I certify that this project is in compliance with the TPDES Construction General Permit TXR150000 for Storm Water Discharges from Construction Activities. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

I further certify that I am authorized under 30 Texas Administrative Code §305.44 to sign this document and can provide documentation in proof of such authorization upon request.

Name:

Title:

Signature: _____ Date: _____

APPENDIX F
SWPPP AMENDMENT AND UPDATE LOG

(City of Austin, Appendix P-9 form)

Project Name: MLK TOD SW Conveyance Improvements – Phase 3

SWPPP Contact:

SWPPP AMENDMENT LOG

Amendment No.	Date of Amendment	Description of the Amendment	Amendment Prepared by [Name(s) and Title]	Signature

Note to Contractor: The Contractor must record amendments or updates to the SWPPP throughout the project and keep this form current for review by TCEQ, upon request.

APPENDIX G
RECORD OF CONSTRUCTION ACTIVITY

(COA, Appendix P-8 form)

Project Name: MLK TOD Stormwater Conveyance Improvements – Phase 3

SWPPP Contact:

CONSTRUCTION ACTIVITIES LOG

Name of Supervisor or Inspector	Start Date (mm/dd/yy)	End Date (mm/dd/yy)	Major Grading Activities	Temporary Suspension of Construction Activities	Permanent Suspension of Construction Activities	Initiation of Stabilization Measures	Comments

Name of Supervisor or Inspector	Start Date (mm/dd/yy)	End Date (mm/dd/yy)	Major Grading Activities	Temporary Suspension of Construction Activities	Permanent Suspension of Construction Activities	Initiation of Stabilization Measures	Comments

Date	Additional Changes

Note to Contractor: The Contractor must record the dates of major construction activity throughout the project and keep this form current for review by TCEQ, upon request.

APPENDIX H
INSPECTOR CERTIFICATIONS

(As per City of Austin, Appendix P-1)

Note to Contractor: Insert copies of inspector's certifications. As per the City of Austin Notes for Erosion Control, Item 6 (see Plans in Appendix C), storm water inspections must be conducted by a Certified Erosion Sediment Storm Water Inspector (CESSWI), Certified Professional in Erosion and Sedimentation Control (CPESC) or Certified Inspector of Sedimentation and Erosion Controls (CISEC).

APPENDIX I
DEWATERING OBSERVATION AND EVALUATION

Dewatering Observation and Evaluation

Date of Observation and Evaluation:	Personnel Name:
Rate of Discharge Estimate: *Gallons per Day (GPD)*	Personnel Title:
Approximate Start: *Date and time*	Approximate End: *Date and time*

Observation and Evaluation Questions

Did you see any indications of pollutant discharge?

☐ Yes (describe below) ☐ No

Did you see any erosion?

☐ Yes (describe below) ☐ No

Did you see any instances of non-compliance?

☐ Yes (describe below) ☐ No

Are existing BMPs properly and completely implemented?

☐ Yes ☐ No (describe below)

Do you recommend any corrective actions or additional control measures?

☐ Yes (describe below) ☐ No

List any other observations:

Certification Statement:

30 TAC 305.128 "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Signature: _____ Date: _____

Printed Name: _____

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Documents related to this section will include the construction drawings and general provisions of the Contract, including the General Conditions, Section 00700, Supplemental General Conditions, Section 00810, and other Division 1 requirements.

1.2 SUMMARY

A. This section describes the preconstruction conference and other Project related meetings which may be held on a routine schedule throughout the duration of the Project.

B. The CONTRACTOR, or his authorized representative(s), shall attend all Project related meetings as indicated herein. The CONTRACTOR's representatives, as a minimum, shall include his Project Manager and Superintendent. Other CONTRACTOR's representatives may attend Project related meetings; however, there shall be a maximum of four (4) CONTRACTOR's representatives at any one meeting unless the ENGINEER/ARCHITECT approves a larger number.

C. The CONTRACTOR shall provide all pertinent reports, copies of reports, etc., for each meeting as may be required by this or other sections of the Contract.

1.3 PARTNERING WORKSHOP

A. To complete this work most beneficially for all parties, the Owner desires to form a Partnering Team among the Owner, Engineer/Architect, Contractor, and Subcontractor(s). This relationship will draw on the strength of all parties to identify and achieve mutual goals. The objectives are effective and efficient contract performance, intended to achieve completion within budget, on schedule, and in accordance with the drawings and specifications.

B. The Owner will schedule a Partnering Workshop independent of or in conjunction with the Preconstruction Conference, to facilitate the project objectives. The partnering relationship will be multilateral in makeup and participation will be totally voluntary.

1.4 PRECONSTRUCTION CONFERENCE

A. Attendees

A preconstruction conference shall be held as soon after the award and execution of the Contract as possible and before any Work at the site is started. The conference will be held at a location selected by the Owner's Project Manager. The Owner's Project Manager shall prepare and distribute the meeting agenda, preside over the conference, and may distribute meeting minutes. The conference shall be attended by:

1. CONTRACTOR's Project Manager.
2. CONTRACTOR's Superintendent.
3. Any Subcontractors' and/or Suppliers' representatives whom the CONTRACTOR may desire to invite or whom the ENGINEER/ARCHITECT or OWNER may request to attend.
4. ENGINEER/ARCHITECT's representative.
5. OWNER's Project Manager.
6. OWNER's REPRESENTATIVE

7. OWNER's Sponsor Department Representative.
8. Representative from the City of Austin, Transportation Department if a traffic management plan is required.
9. Representative from the City of Austin, Watershed Protection and Development Review Department, Environmental Inspection Division, if site erosion / sedimentation controls are required.
10. Representative from the City of Austin, Transportation Department if utility coordination has occurred through the Austin Utility Location and Coordination Committee.
11. Representative from the City of Austin, Contract Management Department, Contract Administration Division, to discuss wage.
12. Representative from the City of Austin, Small and Minority Business Resources Department to discuss M/WBE compliance.

B. Meeting topics

The topics to be discussed may include, but will not be limited to, the following items:

1. Introduction of persons attending the meeting.
2. General project description, including length of contract and liquidated damages.
3. Key personnel associated with the construction (may include, but is not limited to the following):
   - CONTRACTOR's Project Manager
   - CONTRACTOR's Superintendent
   - OWNER's Project Manager
   - ENGINEER/ARCHITECT's representative
   - OWNER's Sponsor Department Representative.
   - Representatives of the various utilities.
4. Lines of communication and chains of command.
5. Wage and personnel records and reporting requirements.
6. Subcontractors and suppliers.
7. Submittal review and approval procedure. Submittals may include, but are not limited to the following:
   - Letter stating the name and qualifications of the CONTRACTOR's Superintendent
   - Letter(s) from the Subcontractor(s) listing their salaried specialists
   - If applicable, a letter designating the Registered Professional Land Surveyor
   - If applicable, a letter designating the Safety Representative (for general project safety) and the "Competent Person" for excavation safety
   - Excavation Safety Systems Plan
   - Schedule of Values
   - Schedule for submittals
   - Shop drawings
   - Construction schedule (The schedule shall indicate the phases of work in which subcontractors will be participating. Subcontractors shall be indicated by name.)
   - Payroll reports
   - Substitution of subcontractors
   - Non-use of asbestos materials affidavit

- Appropriate safety training certificates for workers that will initially be on site
- Documentation for all workers initially on site who are governed by a prevailing wage classification as described in Section 00830.
- Construction Equipment Emissions Reduction Plan

8. Job and traffic safety.
9. Permits.
10. Utility coordination report.
11. Notification of property owners and other affected by the project
12. Job meetings.
13. Use of the site for construction, storage, staging, etc., and interrelationship with other contracts.
14. Equal opportunity requirements.
15. Laboratory testing of material requirements.
16. Inventory of materials stored on site provisions.
17. Progress estimate and payment procedure.
18. Posting of signs.
19. Project safety.
20. Prompt payment procedure.
21. Review of contract - addenda, supplementary general conditions, special provisions, special specifications, and other unique project items.
22. Other

1.5 JOB MEETINGS

A. General

Job meetings shall be held as deemed necessary by the ENGINEER/ARCHITECT or OWNER or as requested by the CONTRACTOR throughout the duration of the Project. The meetings shall be held at a location selected by or approved by the Owner's Representative. The OWNER's REPRESENTATIVE or CONTRACTOR, as agreed to, shall preside over the meeting and issue meeting minutes.

B. Attendees

Job meetings will be attended by the following:

1. CONTRACTOR's Project Manager, when requested to attend.
2. CONTRACTOR's Construction Superintendent.
3. Any subcontractors' and/or suppliers' representatives whom the CONTRACTOR may desire to invite or whom the ENGINEER/ARCHITECT or OWNER requests to attend.
4. OWNER's REPRESENTATIVE
5. ENGINEER/ARCHITECT's representative(s), if needed or required.
6. OWNER's PROJECT MANAGER, if needed or required
7. OWNER's Sponsor Department representative(s), if needed or required.

C. Meeting topics

The topics will include, but not necessarily be limited to, the following subjects:

1. Review of previous meetings' notes and update of pertinent information and Project status.
2. Identification and discussion of new job related construction problems. Such discussion will be toward resolving identified problems.
3. Review work accomplished to date and establish proposed construction activities for the upcoming week(s).
4. Discuss the status of or need for change orders.
5. Check of required bonds and insurance certificates (including Workers' Compensation Insurance verification for CONTRACTOR's, Subcontractor's, and Sub-Subcontractor's employees as stated in Section 00700, General Conditions, 5.2 Workers' Compensation).
6. Status of pay requests.
7. Work in progress.
8. Review and update construction schedule including three week look ahead.
9. Review of submittals schedule and status of submittals.
10. Status of SMBR Compliance Plan.
11. Status of Safety Training certificates for all new workers on project.
12. Other.

1.6 OTHER MEETINGS

Other meetings shall be held from time to time as may be requested by the CONTRACTOR, the ENGINEER/ARCHITECT, or the OWNER. The time and place of the meetings shall be as mutually agreed upon. The attendance at the meetings shall be as requested by the party requesting the meeting.

END

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

The Contractor prepares submittals. Drawings and general provisions of Contract, including Section 00700, "General Conditions"; Section 00810, "Supplemental General Conditions"; Division 1 requirements and City of Austin Technical Specifications and Special Provisions thereto, should be used as the related documents for this requirement.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for submittals required for performance of the Work, including the following:

1. Security plan.
2. Contractor's construction schedule.
3. Submittal schedule.
4. Shop drawings.
5. Product data.
6. Samples.
7. Quality assurance and quality control submittals, including calculations, mix designs and substantiating test results.

B. Administrative Submittals: Refer to other Division 1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to, the following:

1. Permits.
2. Applications for Payment.
3. Performance and Payment bonds.
4. Insurance certificates.
5. Monthly Subcontractors expense report.
6. Non-use of asbestos affidavits

C. Related Sections: The following Sections contain requirements that relate to this Section:

1. Section 00700, "General Conditions"; Section 00810, "Supplemental General Conditions"; and/or Division 1, Section 01025, "Measurement and Payment" specifies requirements for submittal of the Schedule of Values.

2. Division 1, Section 01200, "Project Meetings" specifies requirements for submittal and distribution of meeting and conference minutes.

3. Section 00700, "General Conditions"; Section 00810, "Supplemental General Conditions"; and/or Division 1, Section 01700, "Contract Close-out" specifies requirements for submittal of Project Record Documents and warranties at project close-out.

4. Section 00700, "General Conditions" Article 6.2.4 specifies requirements for Substitutes and "Approved Equal" Items.

D. Technical Submittals: Technical information required to be submitted by the Standard Specifications, Special Provisions or Special Specifications.

PART 2 - PRODUCTS - not used

PART 3 - EXECUTION

3.1 SUBMITTAL PROCEDURES

Contractor shall be responsible for the following:

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals or resubmittals concurrently.

    a. The E/A reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.

3. Processing: To avoid the need to delay installation as a result of the time required to process submittals, allow sufficient time for submittal review, including time for resubmittals.

    a. Allow fourteen (14) calendar days for initial review. Allow additional time if the Engineer must delay processing to permit coordination with subsequent submittals.

    b. If an intermediate submittal is necessary, process the same as the initial submittal.

    c. Allow fourteen (14) calendar days for processing each resubmittal.

    d. No extension of Contract Time will be authorized because of failure to transmit submittals to the E/A sufficiently in advance of the Work to permit processing.

B. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.

1. Provide a space approximately 4 inches by 5 inches (100 by 125 mm) on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.

2. Include the following information on the label for processing and recording action taken.

    a. Project name.
    b. Date.
    c. Name and address of the Contractor’s Engineer.
    d. Name and address of the Contractor.
    e. Name and address of the subcontractor.
    f. Name and address of the supplier.
    g. Name of the manufacturer.
    h. Number and title of appropriate Specification Section.
    i. Drawing number and detail references, as appropriate.

C. Number of Copies:

1. Two (2) copies of the proposed Construction schedule and subsequent revision are required.

2. Two (2) copies of the proposed Submittal schedule and subsequent revision are required.

3. Nine (9) copies of Shop Drawings, Product, Product Samples, Quality Assurance and Quality Control submittals are required.

D. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from the Contractor to the E/A through the Owner's Representative using a transmittal form (An example Transmittal Form is provided at the end of this section). The E/A will not accept submittals received from sources other than the Contractor.

1. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

2. Number transmittals in sequence for each Series of the Specifications thus: x-xxx. The number after the dash indicates the Section of the Specifications, and the number before the dash is the sequence number of the transmittal. For example, the first item submitted related to Specification Item No. 506, "Manholes" would be labeled **1-506**, the second item submitted would be labeled **2-506**, etc. If the submittal item relates to a Special Provision or Special Specification, use **SP506** or **SS5061**, for example, to indicate the applicable Specification Section. Identify resubmittals with a letter of the alphabet following the original sequence number, using "A" for the first resubmittal, "B" for the second resubmittal, etc. For example, the first resubmittal of the second item submitted for Specification SP506 would be labeled **2A-SP506**.

3.2 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Construction Schedule: As described in Section 2.4.2 of Section 00700 "General Conditions", prepare a fully developed Contractor's construction schedule ("Baseline Schedule") using Microsoft Project© software unless otherwise approved by Owner's Representative. Submit Baseline Schedule prior to or at the preconstruction conference, and submit updated schedules as specified by the E/A, usually at each regularly scheduled Project Meeting and with each pay application.

1. Detail each significant construction activity and use a weekly timeframe for the schedule. Use the same breakdown of units of the Work as indicated in the "Schedule of Values."

2. With each update, revise task completion percentage and mark completed tasks.

3. Prepare the schedule on a sheet, or series of sheets, of stable transparency, or other reproducible media, of sufficient width to show data for the entire construction period.

4. Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on the schedule with other construction activities; include minor elements involved in the sequence of the Work. Show each activity in proper sequence. Indicate graphically the critical path items and the sequences necessary for completion of related portions of the Work.

5. Indicate the phases of work in which subcontractors will be participating. Subcontractors shall be indicated by name.

6. Coordinate the Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittal Schedule, progress reports, payment requests, and other schedules.

7. Indicate substantial completion in advance of the date established for Final Completion to allow time for the E/A's procedures necessary for certification of Substantial and Final Completion.

B. Work Stages: Indicate important stages of construction for each major portion of the Work, including submittal review, testing, and installation.

C. Cost Correlation: Within the Baseline Schedule, provide cost information indicating planned and actual costs. On the appropriate task line(s), show dollar volume of Work performed as of the dates used for preparation of applications for payment. Refer to Section 00700, "General Conditions", Article 14 Payment to Contractor and Completion for cost reporting and payment procedures.

D. Distribution: Following response to the Baseline Schedule submittal, distribute electronic copies to the E/A, subcontractors, suppliers, and other parties required to comply with scheduled dates. Keep a copy at the Project Site at all times.

1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

E. Schedule Updating: Revise the schedule after each meeting, event, or activity where revisions have been recognized or made and as requested by the E/A. Issue the updated schedule concurrently with the report of each meeting, or as requested by the E/A.

F. Contractor shall provide a three week look ahead schedule in a format acceptable to the Project Manager at each Job Meeting as required in 1200 1.5 C.

3.3 SUBMITTAL SCHEDULE

A. Concurrently with the development of the Contractor's Construction Schedule, prepare a complete schedule of submittals. Submit the initial Submittal Schedule along with the Construction Schedule, at, or prior to, the Pre-construction Conference.

1. Coordinate Submittal Schedule with the list of subcontractors, Schedule of Values, and the list of products as well as the Contractor's Construction Schedule.

2. Prepare the schedule in chronological order. Provide the following information:

a. Scheduled date for the first submittal.
b. Related Section number or Specification number.
c. Submittal category (Shop Drawings, Product Data, Calculations, Test Results, or Samples).
d. Name of the subcontractor.
e. Description of the part of the Work covered.
f. Scheduled date for resubmittal.
g. Scheduled date for completion of the E/A's review.

B. Contractor's schedule of submittals will be reviewed to verify that the list of submittals provided is all inclusive and the schedule is reasonable and realistic for delivery of the project. Owner will provide a response to the Contractor based on the assessment of the schedule of submittals.

C. Distribution: Upon Owner's agreement with the schedule of submittals, print and distribute copies to the Owner's Representative, E/A, Owner, subcontractors, suppliers, and other parties required to comply with submittal dates indicated. Keep copies at the Project Site at all times.

1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

D. Schedule Updating: Revise the schedule after each meeting or activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting, or as requested by the E/A.

3.4 CONSTRUCTION SEQUENCE PLANS

The Contractor is required to submit construction sequence plans to the City at, or prior to, the pre-construction conference for approval. The Project shall be divided into phases according to the sequence of construction given in the Drawings and traffic control plans. The Contractor shall arrange his/her work schedule to complete all Work on each phase, including street repair, any valve casting or manhole adjustments, and street overlay before moving on to the next work area.

3.5 SHOP DRAWINGS

A. Submit newly prepared information drawn accurately to scale. Highlight, circle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not a Shop Drawing.

B. Shop Drawings include fabrication and installation Drawings, setting diagrams, schedules, patterns, templates and similar Drawings. Include the following information:

1. Dimensions;
2. Identification of products and materials included by sheet and detail number;
3. Compliance with specified standards;
4. Notation of coordination requirements; and
5. Notation of dimensions established by field measurement.
6. Sheet Size: Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 inches by 11 inches but no larger than 24 inches by 36 inches.
7. Do not use Shop Drawings without an appropriate stamp indicating action taken.

3.6 PRODUCT DATA

A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information, such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, applicable certifications and performance curves.

1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products that are not required, mark copies to indicate the applicable information. Include the following information:

   a. Manufacturer's printed recommendations;
   b. Compliance with trade association standards;
   c. Compliance with recognized testing agency standards;
   d. Application of testing agency labels and seals;
   e. Notation of dimensions verified by field measurement; and
   f. Notation of coordination requirements.

2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

3. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.

   a. Do not proceed with installation until a copy of the final submission of Product Data is in the Installer's possession.

b. Do not permit use of unmarked copies of Product Data in connection with construction.

4. Potable Water, Reclaimed Water, and Wastewater Items or Projects: The Contractor shall submit descriptive information and evidence that the materials and equipment the Contractor proposes for incorporation into the Work is of the kind and quality that satisfies the specified functions and quality. **Austin Water Utility Standard Products Lists (SPL)** are a part of the Specifications. Contractors shall use products specified in the Contract Documents, listed on the SPLs, or approved by AWU through the process in Section 2.4.0 of the Utilities Criteria Manual. Products contained in the SPL cannot be substituted for items shown on the Drawings, or called for in the specifications, unless approved by the E/A in conjunction with the Austin Water Utility Standards Committee. **Unless otherwise specified,** products current at the time of solicitation shall be installed except where an updated List has been issued to remove a product because of quality or performance issues.

3.7 SAMPLES

A. Submit full-size, fully fabricated Samples cured and finished when specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.

1. Mount or display Samples in the manner to facilitate review of qualities indicated. Include the following:

   a. Specification Section number and reference;
   b. Generic description of the Sample;
   c. Sample source;
   d. Product name or name of the manufacturer;
   e. Compliance with recognized standards; and
   f. Availability and delivery time.

2. Submit Samples for review of size, kind, color, pattern, and texture. Submit Samples for a final check of these characteristics with other elements and a comparison of these characteristics between the final submittal and the actual component as delivered and installed.

   a. Where variation in color, pattern, texture, or other characteristic is inherent in the material or product represented, submit at least 3 multiple units that show approximate limits of the variations.

   b. Refer to other Specification Sections for requirements of Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.

   c. Refer to other Sections for Samples to be returned to the Contractor for incorporation in the Work. Such Samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of Sample submittals.

   d. Samples not incorporated into the Work, or otherwise designated as the Owner's property, are the property of the Contractor and shall be removed from the site prior to Substantial Completion.

3. Maintain sets of Samples, as returned, at the Project Site, for quality comparisons throughout the course of construction.

   a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.

b. Sample sets may be used by Owner for final acceptance of the construction associated with each set.

B. Distribution of Samples: Prepare and distribute additional sets to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the Work. Show distribution on transmittal forms.

3.8 QUALITY ASSURANCE AND QUALITY CONTROL SUBMITTALS

A. Submit quality assurance and quality control submittals, including design data, certifications, manufacturer's instructions, manufacturer's field reports, materials test results, field testing and inspection reports, and other quality-control submittals as required under other Sections of the Specifications.

B. Certifications: Where other Sections of the Specifications require certification that a product, material, or installation complies with specified requirements, submit a certification from the manufacturer or responsible Engineer certifying compliance with specified requirements.

1. Signature: Certification shall be signed by an officer of the corporation or other individual authorized to sign documents on behalf of the company.

C. Calculations: When required in the technical specification, calculations shall be prepared and stamped by a Professional Engineer registered in the State of Texas.

D. Concrete, Controlled Low Strength Material, Asphalt Stabilized Base and Hot Mix Asphaltic Concrete Mix Designs and Substantiating Test Data: Requirements for submittal of mix designs and substantiating test data are specified in the applicable Technical Specification Section. Each separate batch plant supplying ASB, HMAC and/or concrete shall submit mix designs to the Owner's Representative for review.

3.9 ENGINEER/ARCHITECT'S ACTION

A. Except for submittals, for the record, or for information where action and return is not required, the E/A will review each submittal, mark to indicate action taken, and return within the time frame specified in Paragraph 3.1.A.3.

1. Compliance with specified characteristics is the Contractor's responsibility.

B. Action Stamp: The E/A will stamp each submittal with a uniform, action stamp. The E/A will mark the stamp appropriately to indicate the action taken, as follows:

1. "Reviewed": the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.

2. "Reviewed with Comments": the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Final payment depends on that compliance.

3. "Revise and Resubmit" or "Rejected": do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations and resubmit without delay. Repeat if necessary to obtain different action mark.

a. Do not use, or allow others to use, submittals marked "Revise and Resubmit" or "Rejected" at the Project Site or elsewhere where Work is in progress.

4. Other Action: Where a submittal is for information, or for record purposes, or for special processing, or for other activity, the E/A will return the submittal marked "Record Copy", "Action Not Required" or "No Action Taken."

C. Unsolicited Submittals: The E/A will return unsolicited submittals to the sender without action.

3.10 PREPARATION AND SUBMITTAL OF CONSTRUCTION RECORD DRAWINGS

The Owner's Representative and the Contractor's Superintendent will each maintain a set of bluelines noting any changes in ink during construction of the Project. The Owner's Representative and the Contractor's Superintendent will compare bluelines at least weekly (at a time mutually acceptable to both) to exchange information and compare notes to ensure all items installed and changes are documented. The following is a recommended minimum of items to be noted:

GENERAL

1. Notes should be sufficiently clear to allow a draftsperson to easily make the necessary changes without the need for field checks and interpretation.
2. One complete set of Construction Record bluelines will be submitted prior to the final pay request and forwarded to the Owner.

STREET RECONSTRUCTION AND OVERLAY PROJECTS

1. Location, type, and quantity of all work added or deleted from the Project including repair areas, milled areas, sidewalk, ramps, curb and gutter, etc.
2. Deviations in street, sidewalk, curb and gutter location and grades from Drawings.

WATER/WASTEWATER PROJECTS

1. Type, name and model numbers of all valves (with # of turns to open/close), air release valves, drain and fire hydrants noted at locations installed.
2. Installed locations of all assignments, appurtenances and elevations which differ from those indicated on the Drawings.
3. Pipe manufacturer type and classification noted in sufficient detail to determine location and extent of each type or classification installed.
4. Modification to any standard or special details noted.
5. Location and description of pipe closures.
6. Thrust blocking locations and restrained pipe lengths, approximate dimensions and quantities noted.
7. Location, type and quantity of all addition and deletions.
8. Changes in grade.

The above list is not intended to be complete. Any information noted which could be used for future maintenance, location and construction projects is encouraged to be noted on the bluelines.

3.11 CONSTRUCTION DIARIES

The Contractor shall prepare a daily construction diary recording as a minimum the following information concerning events at the site and submit duplicate copies to the Owner's Representative at weekly intervals. The copies are to be signed by the project Superintendent as defined in Section 00700, Article 6.1.2.

1. Work performed;
2. Approximate count of Contractor's personnel, by classification, on the site;
3. List by classification, of all Subcontractors, personnel and any professionals on the site that day;
4. List of all equipment on the site by make and model;
5. High and low temperatures together with general weather conditions;
6. Start time and finish time of day's work;
7. Accidents and / or unusual events;
8. Meetings and significant decisions made;
9. Stoppages, delays, shortages and / or losses;

10. Meter readings and / or similar recordings;
11. Emergencies procedures that may have been needed;
12. Orders and requests of governing authorities;
13. Change Orders received and implemented;
14. Services connected and / or disconnected;
15. Installed equipment and / or system tests and / or startups and results;
16. Partial completions and / or occupancies; and
17. Date of substantial completion certified.

Shop Drawing Transmittal

Month XX, 2008

Transmittal No. _____
Previous Transmittal No. _____
Previous Submittal Date _____

City of Austin
Construction Inspection Division
Public Works Department
P.O. Box 1088
Austin, Texas 78767

Project Name: Austin Lakeside Drive

Attention: Owner's Representative

Enclosed are nine (9) copies of the following items for your review:

Item No.	Description	Submittal Type	Specification Section	Subcontractor/Supplier
1.	6" DI Pipe	Produce Data	510	ABC Company
2.	8" Resilient Seat Gate Valve	Product Data	511	DEF Company

Example

NOTE: Item 1 above contains a deviation from the Specifications as indicated on the item

Submitted by: _____

XYZ Company
101 Ranch Road 2974
Austin, Texas 78759

END

Division 1 General Requirements

SUSTAINABLE CONSTRUCTION REQUIREMENTS

Section 01352

Non-Building Project – Watershed, Sitework, Landscape

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section. The requirements may or may not include reference to sustainability.

Related Sections include the following Division 1 Sections:

1. The contents of this Section are related to all Sections of these Specifications.
2. Section 01300 Submittals.
3. Section 01505 Construction and Demolition Waste Management and Disposal.

1.2 SUMMARY

A. This Section includes requirements and procedures for compliance with certain Sustainable Construction requirements.

1. Some Sustainability requirements are dependent on material selections and may not be specifically identified as sustainability requirements. Compliance with requirements may be used as one criterion to evaluate substitution requests.

2. Additional Sustainability Construction requirements are dependent on design and other aspects of the Project that are not part of the Work of the Contract.

1.3 DEFINITIONS

A. Regionally Manufactured Materials: Materials that are manufactured within a radius of 500 miles (800 km) from the Project location. Manufacturing refers to the final assembly of components into the product that is installed at the Project site.

B. Regionally Extracted, Harvested, or Recovered Materials: Materials that are extracted, harvested or recovered and manufactured within a radius of 500 miles (800 km) from the Project site.

C. Recycled Content: The percentage by weight of constituents that have been recovered or otherwise diverted from the solid waste stream, either during the manufacturing process (pre-consumer), or after consumer use (post-consumer).

D. Post-consumer recycled content: The percentage (by weight) of a reclaimed waste material contained in a product. A reclaimed waste material (e.g., newspaper, magazines, beverage containers, etc.) has already served a purpose to a consumer and has been diverted or separated from waste stream for recycling.

E. Pre-Consumer Recycled Content: (or Post-industrial recycled content). The percentage (by weight) of a waste material obtained from industrial processes that is contained in a product. Discarded materials from one manufacturing process that are used in another manufacturing process are pre-consumer recycled materials. Wastes from the original manufacturing process used in the same product after minimal reprocessing are <u>not</u> recycled material.

F. Recycled material: A material that would otherwise be destined for landfill disposal but is diverted or separated from the waste stream, reintroduced as material feedstock, and processed into marketed end products.

G. Reused Material: Any item that is salvaged or reused without significant reprocessing as in a recycling process.

H. Source reduction: Minimization of waste at the start of a process or activity so that there is a reduced amount of waste to recycle or dispose. Also called precycling.

I. Xeriscape: Quality landscaping that conserves water and protects the environment through its employment of seven principles: planning and design; soil analysis; appropriate plant selection; practical turf areas; efficient irrigation; use of mulches; and appropriate maintenance.

1.4 SUSTAINABILITY OBJECTIVES/GOALS

The City of Austin is committed to sustainability and expects the Project to reflect this commitment. The specific Sustainable (Design & Construction) goals for this project include:

1. Protection of the environment.
2. Limiting construction site area and disturbance of natural habitat and protection of trees and vegetation.
3. Reduction of waste created by construction activity through Source Reduction.
4. Increasing the use of materials and products with recycled content.
5. Chemically safe construction materials and pest management.
6. Construction materials that use less energy and create less pollution in manufacture, delivery, installation, renovation, and demolition.

1.5 SUBMITTALS

A. *Sustainability submittals* If required submitted item is identical to that submitted for another requirement, submit duplicate copies for each separate submittal.

B. *Sustainable Construction Action Plans*: Provide preliminary submittals within 14 calendar days of date established for the Notice to Proceed indicating how the following requirements will be met.

1. Construction & Demolition Waste Management Plan complying with Division 1 Section 01505 "Construction Waste Management."
2. List of proposed materials with recycled content, indicating cost, post consumer recycled content, and pre-consumer recycled content for each product having recycled content.
3. List of proposed regionally manufactured materials and regionally extracted, harvested, or recovered materials, identifying each regionally manufactured material and its source.

C. *Sustainability Contract Closeout Documentation*:

1. Comply with Division 1 Section 01505 "Construction Waste Management."
2. Provide manufacturer's product Data indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
3. Provide manufacturer's and or supplier's product Data indicating location of material manufacturer for regionally manufactured, harvested, recovered and extracted materials.

1.6 QUALITY ASSURANCE

A. Sustainability Coordinator: Engage a responsible person on the construction team who is familiar with Sustainable practices and procedures. The Coordinator may also serve as the Waste Management coordinator.

PART 2 – PRODUCTS

Provide and maximize to the greatest extent economically feasible, a combination of salvaged, refurbished, recycled, regional materials within the scope of the project.

PART 3 – EXECUTION

A. SITE DISTURBANCE - Special Site Practices:

1. Construction Activity Pollution Prevention: Comply with City of Austin standard requirements.

2. Protect and restore natural vegetation per division 1 Sections and plans.

3. Replace any removed or destroyed vegetation with equivalent species that are within City guidelines for native and adaptive plants.

4. Restrict construction activity only to defined site limits per plans and avoid activity and practices that would adversely affect environment, property, soils, vegetation and water courses.

END

CONSTRUCTION EQUIPMENT EMISSIONS REDUCTION PLAN
Section 01353

1. GENERAL

1.1. RELATED DOCUMENTS

A. This Section applies to Drawings and all provisions of Contract.

1.2. SUMMARY – CONSTRUCTION EQUIPMENT EMISSIONS PLAN

A. The OWNER, as part of the Council Resolution No. 20100211-019, has decided to take steps to reduce emissions associated with construction process including Nitrogen Oxides (NOx), particulate matter and greenhouse gas. Construction activity is a source of large quantities of particulate matter and ozone forming Nitrogen Oxides that adversely affect the health of our community and the natural environment.

B. The CONTRACTOR shall employ practices and take actions that reduce emissions from NOx, particulate matter (black soot) and greenhouse gases resulting from activities associated with new construction and demolition Projects.

C. The CONTRACTOR shall maximize the use of equipment and vehicles with advanced emission controls in support of the City's goals, utilizing equipment that meets defined EPA emissions standards.

1.3. DEFINITIONS

A. "Construction Equipment" means equipment powered by an internal combustion engine and used for performing or otherwise advancing the Work on the Project, other than motor vehicles intended for use on public highways and registered pursuant to Section 502.002 of the Texas Transportation Code.

B. The list of applicable Construction Equipment includes, but is not limited to excavators, backhoes, loaders, bulldozers, graders, rock saws, generators, and other similar equipment.

C. "EPA" means the United States Environmental Protection Agency.

D. "Low-Use Equipment" means any piece of construction equipment which is used for less than ten (10) hours per week on site for a single construction contract.

E. "Greenhouse Gases" are emissions that absorb and emit radiation within the atmosphere. Greenhouse Gases can be one or a combination of, these gases: carbon dioxide, methane, nitrous oxide and three groups of fluorinated gases (sulfur hexafluoride, hydro fluorocarbons, and perfluorocarbons)

1.4. REQUIREMENTS – Not Used

1.5. SUBMITTALS

A. CONSTRUCTION EQUIPMENT EMISSIONS REDUCTION PLAN:

1. The CONTRACTOR agrees to prepare a draft Emissions Reduction Plan (referred to as PLAN) prior to start of construction. This PLAN shall include an inventory report

containing identifying data for each piece of equipment to be used on the worksite and shall include the following:

- Vehicle/Equipment: Make & Model Year
- Vehicle/Equipment: Engine Make & Model Year
- Vehicle/Equipment: Fuel Type
- Vehicle/Equipment: Expected gallons or hours used for project duration

a) The OWNER will provide Emissions Reduction Toolkit to help the CONTRACTOR in preparation of the PLAN and inventory.

2. The CONTRACTOR shall develop a list of strategies to be used in this Project in order to reduce emissions from NOx, particulate matter and greenhouse gas (CO_2 equivalent). Once prepared, the agreed upon strategies shall be incorporated into the PLAN. The PLAN will then be signed by the CONTRACTOR and made ready for implementation. Implementation progress will be reviewed once a month in regularly scheduled project progress meetings. The PLAN may be modified during construction if changes are made to the Project, but adjustments shall be approved by the OWNER prior to implementation.

3. This PLAN may be used by the Owner's Representative or Inspector to conduct site inspections and/or verify compliance with specification elements.

4. If additional equipment is brought on-site after construction begins, the Contractor shall provide this same inventory information to the Owner's Representative for the new equipment on or before the day it begins work on-site. All additional equipment shall conform to the PLAN.

5. Reports shall be provided for all equipment used on-site.

B. EQUIPMENT EMISSIONS CLOSEOUT DOCUMENTATION:

1. Submit the following prior to final payment:

a) Record of changes made to the original PLAN and reasons.

b) Provide a summary and documentation of strategies used and estimated reductions in fuel & emissions.

c) Provide documentation of amount and % of alternative fuel used.

2. PRODUCTS

Not used

3. EXECUTION

3.1. GENERAL

A. Implement the submitted PLAN. Provide personnel, documentation, equipment, signage, transportation, and other items as required to implement the PLAN during the entire duration of the Contract.

3.2. EQUIPMENT EMISSIONS PLAN IMPLEMENTATION

A. Plan Coordinator (Could be same as superintendent): Designate an on-site person responsible for instructing workers on the Owner's intent to reduce emissions, overseeing implementation and documenting results of the PLAN for the Project.

B. Plan Review: Review the PLAN in monthly progress meeting and include comments in the meeting notes.

C. Instruction: Provide on-site instructions to all subcontractors of emissions reduction methods to be used by all parties for the appropriate activities of the Project.

D. Discuss Owner's goals and requirements at the following meetings:

1. Pre-bid conference.

2. Pre-construction conference.

3. Progress meetings (monthly).

3.3 EQUIPMENT EMISSIONS REDUCTION TOOLKIT

A. Equipment Emissions Reduction Toolkit available at:

1. Website: (http://austintexas.gov/department/capital-improvement-program)

2. City of Austin Public Works Department, Project Management Division, One Texas Center, Suite 900

3. Construction Job Site Office (after contract award)

B. Equipment Emissions Reduction Toolkit consists of:

1. A list of Construction Equipment Emissions Reduction Strategies

2. EPA fuel savings calculator by idling reductions

3. Posting of Anti-idling signs

4. Memorandum of Agreement by Local Area Governments

5. Equipment Inventory Form

3.4 A LIST OF EQUIPMENT EMISSIONS REDUCTION STRATEGIES

The following are suggested emissions reduction strategies and references. As per the specification section 01353, 1.5 Submittals, the CONTRACTOR shall develop a list of strategies to be used in this Project at the start of construction.

C-1 Anti-Idling Strategies:

1. Implement and enforce anti-idling practices for all equipment and vehicles on and adjacent to the site and associated with the project. City will provide a construction site sign and stickers for vehicles and equipment. Add Hyperlink to COA Idling flyer location TBD

Also refer to:

https://www.nctcog.org/trans/quality/air/for-everyone/engine-off-north-texas

Another potential resource for the COA website on emission specifications:
https://www.tceq.texas.gov/airquality/mobilesource/vehicleidling.html

2. Limit all idling of project associated vehicles and equipment operations to five (5) minutes unless the idling is applicable to one or more of the following exceptions:

   a) Idling is being used for emergency response purposes;

   b) Idling is necessary for component of mechanical operation, maintenance, or diagnostic purposes; or

   c) Idling is for the health or safety of the equipment operator.

3. Provide education to all staff, vendors and subcontractors about emissions hazards and anti-idling practices and encourage use of EPA calculator for fuel savings.

4. To the extent possible, do not stop or idle haulage trucks directly under tree limbs and foliage overhanging the street along the haul route. Further avoid such damage from truck exhaust by means of exhaust diversion devices to redirect or diffuse exhaust from being directed in a concentrated manner to tree limbs and foliage.

5. Avoid vehicle loitering or queuing outside or inside the gates of the work area to minimize degradation of localized air quality.

   (http://austintexas.gov/airquality/)

C-2 Alternative Fuels:

6. Utilize **alternative fuels** including, Texas LED Compliant B20 (or higher) biodiesel, Compressed Natural Gas (CNG), propane and electric. (Refer to EPA Energy Policy Act for full list).

7. Avoid unnecessary fuel use by providing on-site fuelling for alternate fuels.

   (http://www.tceq.texas.gov/airquality/mobilesource/txled/cleandiesel.html)

   (http://www.eere.energy.gov/cleancities)

   (http://lonestarcfa.org)

C-3 Vehicle/Equipment Improvements:

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8. It is recommended that CONTRACTOR takes advantage of the **Texas Emission Reduction Plan (TERP)** grant incentives to upgrade (replace or repower) vehicles with retrofitted emission reduction technologies. (http://www.tceq.texas.gov/airquality/terp/index.html) or (www.terpgrants.com)

9. Utilize **battery powered and/or solar powered equipment** where available. This strategy can be combined with anti-idling strategies by using this technology for sign boards. (evtransportal.org/dieselengineidlereduction.pdf)

10. Consider using voluntary and mandatory sections of the City of Chicago Clean Diesel Program related to https://www.chicago.gov/city/en/progs/env/clean-diesel.htmlfile:///C:/Users/user/Documents/Downloads/O2011-1418.pdf

11. Consider an air quality training section administered by a governmental entity to help comply with an updated

COA Construction Equipment Emission Reduction Plan by using the California Air Resources Board (CARB) training section in the link below:

https://ww2.arb.ca.gov/our-work/topics/construction-earthmoving-equipment

C-4 Maintenance Program:

1. Establish a preventative **maintenance program** addressing issues including but not limited to, fuel use, air emissions, tire pressure, smoke from exhaust and noise.
2. Make all efforts to **prevent oil/fuel spillage** on to site surfaces.

C-5 Resource Management:

3. Utilize equipment companies that are located closest to the construction site.
4. Store equipment on site during construction use or arrange for closest overnight storage including **temporary use of the Right of Way** if possible.
5. To the extent possible, CONTRACTOR shall maximize use of **local and regional materials** to reduce transportation emissions.
6. CONTRACTOR shall maximize **salvage and reuse** of appropriate on-site materials. (http://www.usgbc.org/ShowFile.aspx?DocumentID=1095)
7. To the greatest extent possible, stage equipment and vehicles away from, and minimize operation near, sensitive receptors including, but not limited to, operable windows, fresh air intakes, hospitals, schools, licensed day care facilities, residences and areas where people congregate.

END

Division 1 General Requirements

CONSTRUCTION PHOTOGRAPHY & VIDEOS
Section 01380

1. GENERAL

CONTRACTOR shall be responsible for producing pre-construction, construction progress and post-construction photographs as provided herein. Owner's Representative may also designate additional subjects for photographs in addition to the general guidelines identified below.

2. QUALITY

All photographs must be digital, high definition and in a format acceptable to the City. It is important that photos be in focus, the subject be clear and intentional, and lighting must be adequate so that all subject matter is visible and clear. Photos must be delivered in a digital format and OWNER may provide access to a cloud-based, project-specific location at which photos shall be uploaded at the frequency required herein. Instructions on how to identify and name each photo will be provided by the OWNER. Designations such as the name and CIP ID number for the Contract, name of CONTRACTOR, description and location of view, date taken, and identity of photographer may be required. In addition, appropriate descriptive information to properly identify the location/ orientation of view may be required (e.g. location of MH 5 - Line A or Sta. 2+00 - Line A, Room number, or location of Sedimentation Basin 5, sludge pump A).

3. VIEWS AND QUANTITIES

3.1. PRE-CONSTRUCTION VIDEO

STREET, RIGHTS OF WAY OR WATER/WASTEWATER/STORMWATER PROJECTS, EXISTING BUILDINGS, PROJECT SITES, OR OTHER

CONTRACTOR shall document by video, within the limits of construction, all pre-existing site conditions/elements as listed for the Pre-construction Photographs below. The video documentation shall provide a clear and continuous view of the project alignment showing all visible utilities and features within the limits of construction. The pre-construction video shall be in a format acceptable to the City and shall be shot prior to the occurrence of any site disturbance after Notice to Proceed. The pre-construction video shall be submitted within ten (10) calendar days of the Notice to Proceed.

3.2. PRE-CONSTRUCTION PHOTOGRAPHS

STREET, RIGHTS OF WAY OR WATER/WASTEWATER/STORMWATER PROJECTS

All pre-construction photographs must be submitted within ten (10) calendar days of the Notice to Proceed. Pre-construction photographs must be taken at sufficient intervals to be able to carefully document the pre-construction conditions of the Work, but in no case less than 100-foot intervals along the street, right of way, drainage easement or water/wastewater line route before commencement of Work. Each photograph location shall be taken from a minimum of two (2) views (one forward station view and one backward station view along the street, drainage, easement, or pipeline route) within the limits of construction. Particular attention must be devoted to pre-existing damage to structures such as landscape features, streets, curbs, sidewalks, driveways, signs, mailboxes, retaining walls, MSE walls, etc. All such damage shall be documented. An

identifier such as houses or businesses address/ signs, property numbers, mailboxes, landscaping, etc. shall be included in each view for ease of later identification. At a minimum, Pre-construction photographs must be taken of the following views:

- The entire street Right of Way (ROW)
- The entire easement width and length (both permanent and temporary)
- All curb lines (both sides of street) – all pre-existing curb damage not called for replacement within the Work and shall include major cracks
- All driveways, steps, and curbs and curb ramps (both sides of street)
- Fence and gate conditions
- Trees, ornamental shrubs, plantings/planter boxes and evidence of irrigation features
- Other privately or publicly owned features or facilities that might be disturbed by the construction
- Prominent utility features, such as: guy wires, poles, signs, valves, fire hydrants, meters, pull boxes, etc.
- Streams and stream banks within the limits of construction
- Other significant or prominent features in order to protect the OWNER and CONTRACTOR following construction (e.g. close up photographs of pre-existing broken curbs, cracked/failed pavement, damaged adjacent retaining walls, etc.)
- Views of structures, both inside and adjacent to the ROW/easement in areas where CONTRACTOR will be working within five (5) feet of said structure
- Other views as requested by the OWNER

3.2 CONSTRUCTION PROGRESS PHOTOGRAPHS

STREET, RIGHTS-OF-WAY OR WATER/WASTEWATER/STORMWATER PROJECTS

Construction Progress photos must be taken at least monthly showing the progress of the work for the month. Construction photographs of the same views taken during pre-construction photography must be taken during the progress of the Work and shall be submitted monthly with the Contractor's monthly progress payment application.

3.4 POST CONSTRUCTION PHOTOGRAPHS

Post-construction photographs must be taken of the same views taken during pre-construction photography to fully document the completed project. Post-construction photographs must be taken after cleanup and site restoration and must be submitted with the final payment.

1. PART 1 – GENERAL

1.1. Related Documents:

Drawings and general provisions of Contract, including General Conditions, Section 00700, and Supplemental General Conditions, Section 00810, and Division 1 requirements.

2. PART 2 – PRODUCTS (NOT USED)

3. PART 3 – EXECUTION

3.1. Office at the Work Site (Job Shack)

During the performance of this Contract, CONTRACTOR shall maintain a suitable office at or near the site of the Work which shall be the headquarters of their superintendent. Any communication given to the superintendent or delivered to CONTRACTOR's office at the site of the Work in their absence shall be deemed to have been delivered to CONTRACTOR.

3.2. Water for Construction

All water required for and in connection with the Work to be performed shall be furnished by and at the expense of the CONTRACTOR through meters installed on hydrants, except for water used in the "disinfection of potable water lines" process per Specification 510.3(29). All water used in the disinfection process shall not be metered, but rather shall be measured by calculation. Such water use does not require a meter, but a double-check valve assembly is required when connecting to a fire hydrant or a City main. CONTRACTOR shall submit a written plan for the disinfection process for review and approval by OWNER prior to commencing Work. The written plan shall include the CONTRACTOR's plan for final flushing and discharge of chlorinated water, and shall specify the quantities of potable water that will be required for the procedure and dosage plan proposed by the CONTRACTOR. Water used in the disinfection process shall be supplied by the OWNER through hydrants or connection through a City main at no charge to the CONTRACTOR for the initial disinfection procedure up to the quantities agreed to in the written plan for the disinfection process. Should the initial disinfection procedure fail to produce acceptable bacteriological sample test results, the cost of water at standard rates used for subsequent disinfection procedures shall be the responsibility of the CONTRACTOR with quantities determined through calculations.

For all water required for and in connection with the Work to be performed other than for the disinfection process, water and meters will be available from OWNER at standard rates. All costs for obtaining a water meter shall be the responsibility of the CONTRACTOR. The CONTRACTOR shall contact the Austin Water Utility and arrange to pick up the meter. CONTRACTOR shall install a double-check valve assembly on the fire hydrant between the hydrant and the meter, to prevent backflow in the event of pressure failure. CONTRACTOR shall supply all necessary tools, hose and pipe, and shall make necessary arrangements for securing and transporting such water and shall take water in such a manner, and at such times, that will not produce a harmful drain or decrease of pressure in the OWNER's water system. It shall be the CONTRACTOR's responsibility to make arrangements with the Austin Water Utility for the metering and reporting of the amount of water used. Water shall not be used in a wasteful manner. Standard hydrant wrenches shall be used for opening and closing of fire hydrants. In no case shall pipe wrenches be used for this purpose. Temporary lines shall be removed when no longer required.

"If applicable, after the installation of the City of Austin's water meter(s) for the Project, the CONTRACTOR has the option to utilize the water available from this service at the CONTRACTOR's expense. An

adjustment to the Contract amount will be made by Change Order at the end of the Project for the costs incurred by the City of Austin for the water."

3.3. Telephone Service

CONTRACTOR shall make all necessary arrangements and pay all installation charges for telephone lines in their offices at the site and shall provide all telephone instruments. The telephone service shall be available to the Owner's Representative for toll free calls.

3.4. Sanitary Facilities

CONTRACTOR shall furnish temporary sanitary facilities at the site, as provided herein, for the needs of all construction workers and others performing Work or furnishing services on the Project.

Sanitary facilities shall be of reasonable capacity, properly maintained throughout the construction period, and obscured from public view to the greatest practical extent. If toilets of the chemically treated type are used, at least one toilet shall be furnished for each 20 employees. CONTRACTOR shall enforce the use of such sanitary facilities by all personnel at the site.

3.5. Protection of Public and Private Property

CONTRACTOR shall protect, shore, brace, support and maintain all underground pipes, conduits, drains, and other underground construction uncovered or otherwise affected by the CONTRACTOR's operations. All pavement, surfacing, driveways, curbs, walks, buildings, utility poles, guy wires, fences, and other surface structures affected by construction operations, together with all sod and shrubs in yards, parkways, and medians, shall be restored to their original condition, whether within or outside the easement/right-of-way. All replacements shall be made with new materials.

CONTRACTOR shall be responsible for all damage to streets, roads, curbs, sidewalks, highways, shoulders, ditches, embankments, culverts, bridges, or other public or private property, which may be caused by transporting equipment, materials, or men to or from the Work, whether by him or their Subcontractors. CONTRACTOR shall make satisfactory and acceptable arrangements with the owner of, or the agency having jurisdiction over, the damaged property concerning its repair or replacement or payment of costs incurred in connection with the damage.

All fire hydrants and water control valves shall be kept free from obstruction and available for use at all times.

3.6. Tree and Plant Protection

All trees and other vegetation which must be removed to perform the Work shall be removed and disposed of by the CONTRACTOR; however, no trees or cultured plants shall be unnecessarily removed unless their removal is indicated on the Drawings. All trees and plants not removed shall be protected against injury from construction operations.

No tree shall be removed outside of permanent easement(s), except where authorized by the E/A. Whenever practicable, CONTRACTOR shall tunnel beneath trees in yards and parking lots when on or near the line of trenching operations. Hand excavations shall be employed as necessary to prevent injury to trees. Care shall be taken with exposed roots, unearthed during construction, so that roots do not dehydrate causing tree damage.

Trees considered by the E/A to have any significant effect on construction operations are indicated on the Drawings and those which are to be preserved are so indicated.

CONTRACTOR shall take extra measures to protect trees designated to be preserved, using methods shown on the Drawings and as specified in Standard Specification Item No. 610S "Preservation of Trees and other Vegetation".

3.7. Security

CONTRACTOR shall be responsible for protection of the site, and all Work, materials, equipment, and existing facilities hereon, against vandals and other unauthorized persons.

No claim shall be made against OWNER by reason of any act of an employee or trespasser, and CONTRACTOR shall make good all damage to the OWNER's property resulting from CONTRACTOR's failure to provide security measures as specified.

Security measures shall be at least equal to those usually provided by OWNER to protect existing facilities during normal operations, and shall also include such additional security fencing, barricades, lighting, and other measures as required to protect the site. When required, the CONTRACTOR shall provide a security plan to the OWNER for review as to appropriateness of the security measures proposed.

3.8. Access Roads

CONTRACTOR shall establish and maintain temporary access roads to various parts of the site as required to complete the Project. Such roads shall be available for the use of all others performing Work or furnishing services in connection with the Project.

3.9. Parking

CONTRACTOR shall provide and maintain suitable parking areas for the use of all construction workers and others performing Work or furnishing services in connection with the Project, as required, to avoid any need for parking personal vehicles where they may interfere with public traffic, the OWNER's operations, or construction activities.

3.10. Dust Control

Dust Control during construction of this Project shall conform to Standard Specifications Item No. 220S, “Sprinkling for Dust Control". No direct payment will be made for dust control. Dust Control shall be considered subsidiary work relating to various Bid items of the Contract.

3.11. Temporary Drainage Provisions

CONTRACTOR shall be responsible for providing for the drainage of stormwater and such water as may be applied or discharged on the site in performance of the Work. CONTRACTOR shall obtain E/A approval for temporary drainage facilities which will handle, carry through, or divert around their Work all drainage flow, including storm flow and flows created by construction activity, to prevent silting of waterways or flooding damage to the property and adjacent property.

3.12. Erosion Control

CONTRACTOR shall prevent erosion of soil on the site and adjacent property resulting from their construction activities. Effective measures shall be initiated prior to the commencement of clearing, grading, excavation, or other operations which will disturb the natural protection.

CONTRACTOR shall use controls found in "Environmental Criteria Manual" or developed from successful techniques elsewhere as approved by E/A.

3.13. Pollution Control

CONTRACTOR shall prevent the pollution of drains and watercourses by sanitary wastes, sediment, debris and the substances resulting from construction activities. No sanitary wastes will be permitted to enter any drain or watercourse. No sediment, debris or other substance will be permitted to enter sanitary sewers and reasonable measures shall be taken by CONTRACTOR to prevent such materials from entering any drain or watercourse.

CONTRACTOR shall observe the rules and regulations of the State of Texas and agencies of the U.S. Government prohibiting the pollution of any lake, stream, river, or wetland by the dumping of any refuse, rubbish, dredge material, or debris therein.

CONTRACTOR is specifically cautioned that disposal of materials into any water of the State must conform to the requirements of the Texas Commission on Environmental Quality (TCEQ), and any applicable permit from the U.S. Army Corps of Engineers.

3.14. Noise Control

CONTRACTOR shall comply with the City of Austin's Noise Ordinance. CONTRACTOR shall take reasonable measures to avoid unnecessary noise. Such measures shall be appropriate for the normal ambient sound level in the area during working hours. All construction machinery and vehicles shall be equipped with practical sound-muffling devices, and operated in a manner to cause the least noise consistent with efficient performance of the Work.

3.15. CIP Sign

CONTRACTOR shall erect install and maintain CIP signs as specified. Signs shall be constructed in accordance with City Standard Specification Item No. 802S "Project Signs," as indicated on the Drawings.

3.16. Fences

All existing fences affected by the Work shall be maintained by the CONTRACTOR until completion of the Work. Fences which interfere with construction operations shall not be relocated or dismantled until written permission is obtained from the owner of the fence, and the period the fence may be left relocated or dismantled has been agreed upon. Where fences must be maintained across any construction easement, adequate gates shall be installed. Gates shall be kept closed and locked at all times when not in use.

Upon completion of the Work across any tract of land, CONTRACTOR shall restore all fences to preconstruction, or to a better, condition and to their preconstruction location.

3.17. Mail Boxes

CONTRACTOR shall remove, reset temporarily, and relocate permanently all mail boxes that are within construction site limits conforming to requirements of United States Postal Service. Mailboxes shall not be laid on the ground, but shall be temporarily reset the same day as removed. Payment for removing and resetting of mail boxes will not be paid for directly, but will be considered subsidiary to the various Bid items. Any damage to mail boxes or posts shall be the responsibility of the CONTRACTOR.

3.18. Emergency Facilities

Free access shall be maintained at all times to fire lanes and emergency and utility control facilities such as fire hydrants, fire alarm boxes, police call boxes, and utility valves, manholes, junction boxes, etc. In the event that it is necessary to make one of these facilities temporarily inaccessible, CONTRACTOR shall obtain approval of such action and schedule of Work from the OWNER. CONTRACTOR shall also provide at least 24 hours prior notice to the Fire Department, Police Department, and City Department governing the affected utility. The same Department(s) shall be promptly notified by the CONTRACTOR when such facilities are placed back in unobstructed service.

3.19. Notification of Owners

Unless otherwise indicated, the OWNER will notify property owners abutting the right-of-way of impending construction. The CONTRACTOR shall exercise diplomacy and tact with individual property owners.

3.20. Maintenance of Traffic

CONTRACTOR shall conduct their Work to interfere as little as possible with public travel, whether vehicular or pedestrian. Whenever it is necessary to cross, obstruct, or close roads, driveways, and walks whether public or private, the CONTRACTOR shall provide and maintain suitable safe bridges, detours or other temporary measures to accommodate public and private travel, and shall provide reasonable notice

to owners of private drives before interfering with them. Such maintenance of traffic will not be required when CONTRACTOR has obtained written permission from the owner and the tenant of the private property, or from the authority having jurisdiction over public property involved, to obstruct traffic at the designated point. A copy of the initial written permission shall be provided to the Owner's Representative.

Safety and conveyance of traffic shall be regarded as prime importance. Unless otherwise directed, all portions of streets associated with this Project shall be kept open and provided a dust free, smooth and comfortable ride to traffic. It shall be the responsibility of the CONTRACTOR to ensure that two-way traffic may safely bypass the construction site and that access is provided to abutting private property. In making open cut street crossings, the CONTRACTOR shall not block more than one-half of the street at one time without approval of the OWNER. Whenever possible, CONTRACTOR shall widen the shoulder on the opposite side to facilitate traffic control. Temporary surfacing shall be provided as necessary on shoulders.

Prior to beginning Work, CONTRACTOR shall designate, in writing, a competent person who will be responsible and available on the Project site, or in the immediate area, to ensure compliance with the traffic control plan. CONTRACTOR shall provide documentation to demonstrate the sufficient training in Traffic Control for their competent person. Owner will designate a qualified person to observe implementation and who will have authority to assure compliance with the traffic control plan.

The CONTRACTOR shall perform the necessary cleanup and finishing immediately after all or a portion of the Work is completed. When the Work includes paving operations, the entire site shall be kept clean to facilitate placement of required traffic control devices. Temporary and permanent striping lay-out shall be approved by the Transportation Department prior to placement, when included in the Work.

3.20.1. Detours

Where indicated on the traffic control plan CONTRACTOR shall erect and maintain detours around construction activities. Should CONTRACTOR desire to propose a detour, not already included in the traffic control plan, it shall be their responsibility to prepare a revised traffic control plan showing the detour, and obtain approval of the revised traffic control plan from the Transportation Department, prior to implementation of the detour. The Transportation Department has final authority as to the acceptability of any proposed revisions to the traffic control plan. The CONTRACTOR shall bear all costs for revising the traffic control plan and for maintaining the proposed detour.

3.20.2. Barricades and lights

CONTRACTOR shall place and maintain in good condition, standard barricades at each end of the Project and at other locations where traffic is rerouted or blocked from using regular traffic lanes. Barricades and warning signs shall be in accordance with the Texas Manual on Uniform Traffic Control Devices (MUTCD) and City of Austin Standard Specification Item No. 803S, "Barricades, Signs and Traffic Handling". Signs, barricades, and warning devices informing the public of construction features will be placed and maintained by the CONTRACTOR, who shall be solely responsible for their maintenance. The decision to use a particular device at a particular location as indicated in the traffic control plan or as determined by the CONTRACTOR, shall be the sole responsibility of the CONTRACTOR.

All open trenches and other excavations shall have suitable barricades, signs, and lights to provide adequate protection to the public. Obstructions, such as material piles and equipment shall be provided with similar warning signs and lights.

All barricades and obstructions shall be illuminated with warning lights from sunset to sunrise. Material storage and conduct of the Work on, or along side, public streets and highways shall cause a minimum obstruction and inconvenience of the traveling public.

3.21. Required Job Site Postings and Notices

CONTRACTOR shall post the following postings and notices in English and Spanish at one or more conspicuous locations on the job site. In the case of Projects with multiple sites, the notices and postings must be displayed at each site. In the case of Projects that do not have a job shack or other temporary facility on the site, CONTRACTOR shall post all notices on a temporary bulletin board. Other special conditions are noted below.

Required for all Projects	
Poster	Available at:
Baseline Schedule for Project identifying when all subcontractors will be used	N/A (as required under Section 00700, paragraph 2.4.2.1.)
Wage Rates as required under Section 00830.	Section 00830BC and/or Section 008300HH
City of Austin Wage Contact posters	Provided at Pre-Construction meeting (English and Spanish)
City of Austin Equal Employment Opportunity posters	http://austintexas.gov/department/wage-compliance (English and Spanish)
Texas Commission on Environmental Quality "Construction Site Notice" form, if applicable, as required or the required TPDES information	https://www.tceq.texas.gov/downloads/permitting/stormwater/forms-tools/20964.pdf (Small Construction site) https://www.tceq.texas.gov/downloads/permitting/stormwater/forms-tools/20961.pdf (Large Construction site) (Option 1 – as required under Section 00810, 6.7.4.2) N/A (Option 2 – as required under Section 00810, 2.6.7.4.3)
OSHA poster "Job Safety and Health: It's the Law"	https://www.osha.gov/sites/default/files/publications/osha3165.pdf (English) https://www.osha.gov/sites/default/files/publications/osha3167.pdf (Spanish)
City of Austin Rest Break Ordinance Signs	https://www.austintexas.gov/sites/default/files/files/Contract_Management/Rest_Break_Ordinance_posters.pdf (English and Spanish) As required to be posted in English and Spanish under Ordinance No. 20100729-047
Texas Payday Law Poster	https://www.twc.texas.gov/sites/default/files/fdcm/docs/payday-law-poster-wh-10-twc.pdf (English) https://www.twc.texas.gov/sites/default/files/fdcm/docs/payday-law-poster-spanish-wh-10-twc.pdf (Spanish)
Texas Workers Compensation notice that the employer does or does not carry Workers Compensation insurance	Does not carry Workers Compensation Insurance: https://www.tdi.texas.gov/forms/dwc/notice5.pdf (English) https://www.tdi.texas.gov/forms/dwc/notice5s.pdf (Spanish) https://www.tdi.texas.gov/forms/dwc/notice5v.pdf (Vietnamese) Does carry Workers Compensation Insurance: https://www.tdi.texas.gov/forms/dwc/notice6.pdf (English) https://www.tdi.texas.gov/forms/dwc/notice6s.pdf (Spanish) https://www.tdi.texas.gov/forms/dwc/notice6v.pdf (Vietnamese)
TWC Employer's Notification of the Ombudsman Program to Employees	https://oiec.texas.gov/documents/employernotice.pdf (English) https://oiec.texas.gov/documents/employernoticesp.pdf (Spanish)
DOL – The Uniformed Services Employment and	http://www.dol.gov/vets/programs/userra/USERRA_Private.pdf (English) https://www.dol.gov/sites/dolgov/files/VETS/files/USERRA-Poster-Spanish-Language.pdf

Reemployment Rights Act (USERRA)	(Spanish)
"Know Your Rights: Workplace Discrimination is Illegal" formally known as: EEOC Equal Employment Act and the Americans with Disabilities Act (ADA)	https://www.eeoc.gov/sites/default/files/2023-06/22-088_EEOC_KnowYourRights6.12.pdf (English) https://www.eeoc.gov/sites/default/files/2023-06/22-088_EEOC_KnowYourRightsSp6.12.pdf (Spanish) https://www.eeoc.gov/poster (additional language options available)
Fair Labor Standards Act (FLSA) Minimum Wage Poster	https://www.dol.gov/sites/dolgov/files/WHD/legacy/files/minwagep.pdf (English) https://www.dol.gov/sites/dolgov/files/WHD/legacy/files/minwagesp.pdf (Spanish)
If applicable: Employee Rights for Workers with Disabilities/Special Minimum Wage Poster – Employment Standards	http://www.dol.gov/whd/regs/compliance/posters/disabc.pdf (English) http://www.dol.gov/whd/regs/compliance/posters/disabspanc3p.pdf (Spanish)
"Your Rights Under the Family and Medical Leave Act (FLMA)"	http://www.dol.gov/whd/regs/compliance/posters/fmlaen.pdf (English) http://www.dol.gov/whd/regs/compliance/posters/fmlasp.pdf (Spanish)
Title VI Rights Poster	https://www.austintexas.gov/sites/default/files/files/Capital%20Contracting/Bid%20Docs/Title%20VI.pdf (English and Spanish)
Additional Postings Required for Federally Funded Projects	
"Employee Rights Under the Davis-Bacon Act"	http://www.dol.gov/whd/regs/compliance/posters/fedprojc.pdf (English) http://www.dol.gov/whd/regs/compliance/posters/davispan.pdf (Spanish)
Applies to USDOT/FHWA funded projects: "Notice of False Statements Concerning Highway Projects"	https://www.fhwa.dot.gov/programadmin/contracts/fhwa1022.pdf (English) https://www.fhwa.dot.gov/programadmin/contracts/fhwa1022spa.pdf (Spanish) (as required in Section 00810A Standard Federal-Aid Assurances)
Applies to USDOT/FHWA funded projects; "Contractors EEO Policy"	N/A (as required in Section 00810A Standard Federal-Aid Assurances)

END

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT

SECTION 01505

Non-Building Projects – Water/Wastewater and Street Reconstruction

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

1. Division 01 Section 01200 "Project Meetings"
2. Division 01 Section 01500 "Temporary Facilities"

1.2 SUMMARY

A. The Owner has established that the Project shall minimize the creation of construction and demolition waste on the Project site and shall recycle and/or salvage non-hazardous construction, demolition, and land clearing debris to divert waste from Landfills. See 1.5 Waste Management Goals.

1. All profits resulting from salvaging and recycling shall go to the Contractor.

2. Where there is little cost difference between recycling/salvaging and land-filling of items, the Contractor is directed to recycle/salvage.

B. Hazardous materials are an exception to this Section. Comply with applicable requirements of Local, State and Federal regulations.

C. This Section includes administrative and procedural requirements for recycling, salvaging and disposing of non-hazardous demolition and construction waste

1.3 REFERENCES

A. The standards listed below form a part of this Section to extent referenced. Standards are referred to in the text by basic reference only.

1. Sustainable Building Sourcebook – Austin Energy Green Building:www.austinenergy.com/Energy%20Efficiency/Programs/Green%20Building/Sourcebook/constructionWasteManagement.htm

2. Resource Exchange Network for Eliminating Waste (RENEW), TCEQ (MC-112), Biannual catalog lists materials available and wanted; serves Texas and surrounding states; lists are posted on the Internet: http://www.tceq.state.tx.us/assistance/P2Recycle/renew/renew.html

3. Recycle Texas Online, A service of the Texas Commission on Environmental Quality. Contains information on about 1000 businesses and local governments handling materials from Texas. Organizations' information is self-reported and listings are free of charge. www.tceq.state.tx.us/assistance/P2Recycle/rtol/rtol.html

1.4 DEFINITIONS

A. Chemical Waste: Includes petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals, and inorganic wastes.

B. Clean: Untreated, unpainted, not contaminated with oils, solvents, caulk, or other materials.

C. Disposal: Acceptance of solid wastes at legally permitted and operating facility for the purposes of land-filling.

D. Diversion: Avoidance of demolition and construction waste sent for disposal to landfill or incineration. Diversion does not include using materials for landfill, alternate daily cover on landfills, or materials used as fuel in waste-to-energy processes.

E. Hazardous Waste: Byproducts of society that can pose a substantial or potential hazard to human health or the environment when improperly managed, and possessing at least 1 of 4 of the following characteristics, or appearing on a special Environmental Protection Agency (EPA) list.

1. Ignitability.

2. Corrosivity.

3. Reactivity.

4. Toxicity.

F. Landfill: Authorized land waste disposal site that is located to minimize waste pollution from runoff and leaching.

G. Recycling: The process of sorting, cleansing, treating, and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

H. Return: To give back reusable items or unused products to vendors for credit.

I. Reuse: A strategy to return materials to active use in the same or a related capacity.

J. Salvage: To remove a waste material from the Project site to another site for resale or reuse by others.

K. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become a waste.

L. Toxic: Poisonous to living beings either immediately or after a long period of exposure.

M. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

N. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes all materials removed from the Project site to be land-filled, recycled, or salvaged for reuse. Pallets, containers, packaging and packing materials in which construction products are delivered to the Project site are considered waste materials.

1.5 WASTE MANAGEMENT GOALS

A. The Owner has established that as much as is economically feasible of the "waste" materials produced as a result of the Work, shall be employed, salvaged, reused, or recycled in order to minimize the impact of construction and demolition waste on landfills and reducing disposal costs.

B. Contractor shall employ and encourage practices that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

C. Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, State and local, pertaining to legal disposal of all construction waste materials.

D. Contractor shall recycle and divert materials for secondary uses whenever economically feasible.

E. Acceptable methods of diversion include:
Recycling, reuse and salvage
Donation to nonprofit organizations
Removal from jobsite by staff or subcontractors for use (not disposal)
Return to supplier
Sale to organizations or individuals

F. The Contractor shall develop a Construction and Demolition Waste Management Plan of non-hazardous construction and demolition waste. The plan shall identify the materials to be diverted from disposal and define the materials to be separated on-site or off-site. Calculations can be done by weight or volume, but must be consistent throughout.

1.6 SUBMITTALS

A. ***Waste Management Plan:*** A Project-specific plan for the collection, transportation, and disposal of the waste generated at the construction site, shall be submitted for approval within 14 calendar days after notice to proceed, or prior to any waste removal, whichever occurs first. The approved Plan shall be distributed to all subcontractors and the owner and will not relieve the Contractor's responsibility for compliance with applicable environmental regulations.

An example template is included as "Appendix A" to this section.

1. The Waste Management Plan shall include the following:

a. Identify each type of waste material produced as a result of the Work on the Project Site.

b. Identify each type and quantity of demolished and waste material intended to be recycled, salvaged or reused.

c. Identify material separation requirements.

e. Identify location of temporary on-Site storage for recycled and reused materials.

f. Identify final destination means of transportation for each recycled and reused material.

h. Identify the name/phone number of the Contractor's on-site coordinator of the Waste Management Plan.

i. Indicate permit or license and the location of the municipal solid waste landfills and other disposal area(s) to be used.

j. List of materials that cannot be recycled or reused.

B. ***Construction Waste Management Closeout Documentation:*** Submit the following upon the completion of The Work and prior to final payment:

a. A Summary of Solid Waste Disposal and Diversion (refer example template "Appendix B") prepared and maintained through Project duration, demonstrating that 100% of all non-hazardous construction wastes were recycled, salvaged or disposed of properly and includes as a minimum the following information:

1. Dates
2. Materials Description and Quantity
3. Indicate whether recycled, salvaged, reused of sent to landfill for disposal.
4. Destination or Name and location of accepting facility.

b. Copies of all receipts, manifests, weight tickets, and other documentation that identify all materials recycled, salvaged, land-filled or incinerated.

PART 2 - PRODUCTS

Not used

PART 3 – EXECUTION

3.1 GENERAL

A. Implement the Waste Management Plan as approved by the City of Austin Project Manager. Provide handling, containers, storage, signage, transportation, and other items as required to implement Waste Management Plan during the entire duration of the Contract.

B. Satisfy the requirements outlined in Subsection 1.5, Waste Management Goals.

3.2 WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Plan Coordinator: Designate an on-site party (or parties) responsible for instructing workers, overseeing implementation and documenting results of the Waste Management Plan for the Project.

B. Plan Distribution: Provide copies of the Waste Management Plan to the Contractor's superintendent, each Subcontractor, the Owner, and the Engineer.

C. Meetings: Include Construction Waste Management in progress meetings to maintain the Plan for achieving the owners waste management goals:

D. Carefully order materials to avoid over supply.

E. Protect materials from contamination during handling, storage and transport to meet the requirements of the accepting facilities.

F. Assign and label a specific area to facilitate separation of materials for potential recycling, salvage, reuse, return and disposal. This area shall be kept neat and clean and clearly marked in order to avoid contamination of materials.

3.3 RECYCLING REQUIREMENTS

A. Materials: In general the contractor is encouraged to recycle the following types of construction waste materials generated during the course of this project, that are not salvaged or reused:

a. Asphalt concrete pavement.

b. Concrete materials.

c. Metals, including the following.

i. Banding straps.
ii. Reinforcing steel.
iii. Iron.
iv. Steel pipe.
v. Galvanized steel pipe.

d. Clean dimensional lumber.

e. Wood crates and pallets.

f. Glass and glass containers.

g. Plastics.

h. Electrical wiring.

i. Cardboard, paper, and packaging.

j. Beverage containers.

B. Methods: The following recycling methods, or a combination of, may be used.

1. On-site separation: Each material to be recycled shall be separated at the Project site and delivered to the recycling markets or directly from the Project site.

   a. If on-site separation method is used, designate a specific area or areas to facilitate separation of materials for potential reuse, salvage, recycling, and return.

   b. Maintain recycling and waste bin areas neat and clean and clearly marked, both in Spanish and in English, in order to avoid co-mingling of materials.

   c. Protect materials from contamination.

2. Off-site separation: Materials to be recycled are delivered unsorted from the Project site to a materials recovery facility or transfer station where recyclable materials are separated from other waste.

   a. Contractor shall verify that the entity responsible for the off-site separation has a market for all materials required to be recycled from the Project site.

   b. The same Submittals procedures shall apply.

   c. Protect materials from contamination.

3.4 REUSE

A. Contractor is encouraged to reuse as many demolished and waste materials as possible.

B. Reuse of waste materials includes the following:

a. Salvaging materials scheduled for disposal.

b. Off-Site storage of waste materials for future reuse by Contractor on other projects.

c. Returning unused and reusable materials, packaging and pallets, to vendor.

e. Assemble designated reuse items in a single location safe from damage, for review and approval by the owner's representative.

3.5 SALVAGE

A. Salvage Guidelines:

1. The contractor is encouraged to salvage as many items as deemed economically possible, considering reduction of land filling fees and possible use by others.
2. Assemble potentially salvageable items in one area and donate or sell to the public after review by the City of Austin Project Manager.
3. All proceeds from the sale of salvaged items shall go to the contractor.

Appendix A. Sample Construction Waste Management Plan

Construction Waste Management Plan

Project:
Contractor:
Date:
Contact:
Phone:
Prepared by:

Diversion Goal: Recycle, reuse and/or salvage as much land-clearing and construction waste as is economically feasible.

I. Coordination and Training

a. Name of Contractor's representative responsible for CWM implementation & coordination.

b. Describe method(s) of waste recycling management – on-site and/or off-site.

c. Describe how Contractor's staff and subcontractors will be informed regarding proper recycling and separation procedures

d. Describe and/or show on an attached site map where the temporary waste material storage area(s) will be located, and how will contamination of separated waste materials will be prevented?

II. Waste Minimization

a. What waste minimization techniques will be employed during the construction phase?

_____
_____
_____
_____

b. Which employees and / or subcontractors will be involved with each technique?

_____
_____
_____
_____

III. Construction Waste Analysis (including site / land-clearing materials, as applicable)

a. ***Diverted Materials***: For each material anticipated to be reused or recycled (diverted from the landfill), provide information to complete the table below. (Note: Whenever possible, attempt to use or donate construction waste materials rather than recycling.)

Material or Item	Storage Method (roll-off, bin, area, on pallet, etc.)	Quantity estimate (no., linear ft., square ft., etc.)	Proposed Recipient

Add rows (or paper pages) as required

b. ***Landfill***: For construction phase trash and materials / items that will not be diverted, complete the following table:

Quantity estimate (weight or volume)	Number and size of roll offs anticipated	Proposed landfill site

Appendix B. Summary of Solid Waste Disposal and Diversion

Project name _____ Project Number _____
Contractor Name _____ License Number_____
Contractor Address_____

Solid Waste Material	**Recycled, Reused, salvaged or disposed**	**Date Material Disposed** or diverted	**Amount Disposed/ Diverted** (Ton or cubic yd.)	**Municipal Solid Waste Facility** (Name, address, Phone)	**Recycling/Reuse Facility** Name Address Phone	**Comment** (If disposed state why not diverted)
Vegetation						
Soil						
Trench spoils						
Rock						
Asphalt						
Concrete						
Metal						
Wood						
Debris						
Glass						
Trash						
Other						

Signature _____ Date _____

Page / of / total pages

END SECTION 01505

PART 1 - GENERAL

1.1 Related Documents:

Drawings and general provisions of Contract, including General Conditions, Section 00700, and Supplemental General Conditions, Section 00810, and Division 1 requirements.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 General

CONTRACTOR shall maintain reasonable local vehicular and pedestrian dust free traffic, including use of driveways, to proceed safely with minimum inconvenience, except during actual construction operations. CONTRACTOR provided flaggers shall assist traffic when a street is operating under a single lane. Two-way traffic shall be maintained at all other times unless otherwise authorized by Owner.

CONTRACTOR shall provide, at the work zone location during temporary traffic control installation, a designated Competent Traffic Control Person to ensure compliance with the traffic control plans and the provisions of the Contract. Training Certificates for the designated Competent Person shall be provided with submittals at the Precon. Training certificates for competent persons shall be good for four (4) years from the date of training. After such time the competent person must show that additional training or re-certification has been completed to maintain competent person status.

CONTRACTOR shall maintain a smooth and safe ride for traffic by placing steel plates with Asphaltic concrete berms, temporary fill or bridging and temporary surfacing with cold or hot-mix Asphaltic concrete paving in accordance with applicable City Standards.

Sidewalks shall not be obstructed, except by special permission of Owner or E/A. Access to private dwelling and to commercial establishments shall be provided at all times.

CONTRACTOR shall plan and execute his operations in a manner that will cause a minimum interference with traffic. The CONTRACTOR shall place and maintain in good condition, standard barricades at each end of the Project and at other locations where traffic is rerouted or blocked from using regular traffic lanes. Barricades and warning signs shall be in accordance with Texas Manual on Uniform Traffic Control Devices (MUTCD) and the City of Austin Transportation Criteria Manual.

Signs, barricades and warning devices informing public of construction features shall be placed and maintained by the CONTRACTOR who shall be solely responsible for their maintenance.

Unless otherwise specified elsewhere in Division 1, neither explosives nor blasting shall be permitted on this Project.

If Project Manager elects to allow blasting on a Project, a special section in Division 1 shall need to be developed by the Project Manager.

3.2 Traffic Control

3.2.1 It shall be the sole responsibility of the CONTRACTOR to furnish, install, maintain and remove barricades, detour signs, warning signs, lights and all regulatory traffic control devices of the size and type specified, at locations indicated, or as directed or approved by the OWNER in accordance with the Texas Manual on Uniform Traffic Control Devices, (MUTCD), Part VI, Traffic Control for Street and Highway Construction and Maintenance Operations and the City of Austin Transportation Criteria Manual. Upon phase completion, the Contractor shall immediately revise the temporary traffic devices to reflect the next phase or if the project is complete remove them from the public right of way.

3.2.2 Throughout the life of the Contract, all existing roads and Traffic Control devices included in the Work shall be maintained by the CONTRACTOR to a condition, in the opinion of the OWNER, which is equal to or better than that which existed when Work commenced. Maintenance of existing roads and devices shall take priority over all other Work items and shall be subject to a seven-day-a-week, 24-hours-per-day time frame. The CONTRACTOR shall provide a smooth and safe riding surface for all vehicles along the route of this Project. This could include, but not be limited to, small cars, motorcycles, mopeds and bicycles. If the condition of the street surface deteriorates, for any reason, CONTRACTOR shall take necessary steps to insure immediate restoration.

3.2.3 During construction of streets, drainage, and utility projects, if conditions of existing street surface require maintenance to upgrade from their state when the Work began, a separate pay item may be included in Bid. Otherwise, maintenance work will not be paid for directly but will be considered subsidiary to various Bid items of this Contract.

3.2.4 In the event that CONTRACTOR fails, in opinion of OWNER, to maintain a smooth surface for public comfort, fails to provide ingress and egress to private property, and/or does not provide and maintain proper traffic control devices, OWNER may provide these services and deduct any cost thereof, including overtime and administrative expenses, from all estimates thereafter due the CONTRACTOR. Such action by the OWNER shall not relieve the CONTRACTOR of his liability to protect the public at construction site. Owner may also assess an investigation fee, as established by separate Fee Ordinance, for violations resulting in more than one deficiency report issued to Contractor.

3.2.5 A permit must be obtained from Texas Department of Transportation (TxDOT), prior to Work being performed on state highway routes passing through the City.

3.2.6 CONTRACTOR shall notify the Owner's Representative, Police Department, Fire Department, EMS, and Right of Way Management Division at least seven Calendar Days in advance of beginning proposed Work, with intention to close or partially block any street or any part thereof, or of any construction affecting free flow of traffic. The CONTRACTOR shall plan and adequately provide barricades and warning devices. The same parties shall be notified when normal traffic flow is restored.

3.2.7 Should the CONTRACTOR, in his operations, reduce an existing two-way roadway to less than 20 feet in width, CONTRACTOR shall provide a route through or around the narrowed area as approved by Owner or E/A.

3.2.8 The CONTRACTOR's Flaggers shall be required any time it is necessary for the CONTRACTOR's equipment to move into or across an open traffic lane, or at other such times as directed by the Owner's Representative. A flagger shall be utilized to aid exit of hauling equipment from open traffic lanes to the Work area, and entry of hauling equipment from Work area to open traffic lanes. Flaggers shall be dressed and conduct operations in accordance with Texas Manual on Uniform Traffic Control Devices and the Transportation Criteria Manual. Flagging operations shall be the sole responsibility of the CONTRACTOR.

3.2.9 The CONTRACTOR and Subcontractors shall confine their activities to the immediate area of the construction site and provide the following:

a. Appropriate temporary fences, barricades, and/or Metal Beam Guard Fence if required, for site work involving excavation, utility extensions, remote construction work or other circumstances involving safety of public or protection of the work in progress.

b. Warning lights at open trenches, excavations, etc., during hours from dusk to dawn each day. Protection of structures, utilities, sidewalks, pavements, and other facilities immediately adjacent to excavations, from damages caused by settlement, lateral movement, undermining, washout and other hazards.

3.3 Spoil Disposal

CONTRACTOR may make other arrangements for spoil disposal subject to E/A evaluation of the CONTRACTOR-supplied proof that the Owner(s) of the proposed site(s) has a valid fill permit issued by the appropriate governmental agency. Finally, the CONTRACTOR shall submit a haul route plan including a map of the proposed route(s) for the E/A and Owner's approval.

3.4 Restoration

WATER AND WASTEWATER CONSTRUCTION REQUIREMENTS

3.4.1 In order to minimize environmental and potential flood impacts, the sum of the amount of trench opened in advance of the completed line and the amount of trench left unfilled at any time shall be restricted to one (1) full block or 300 linear feet, whichever is less.

3.4.2 Restoration shall be an on-going process during construction operations and shall immediately precede completion of construction of each successive section of the line, which shall not exceed 1,200 linear feet without approval of the E/A.

3.5 Street Markers and Traffic Control Signs

It shall be responsibility of the CONTRACTOR to remove, preserve and reset, as required, Street Marker and Traffic Control Signs that are within construction limits to the line and heights as described in Texas Manual on Uniform Traffic Control Devices before any sidewalks or street excavation is begun. Signs shall not be laid on the ground. No payment will be made for this work but shall be considered subsidiary to the various Bid items. Traffic Sign Activity Section of the Transportation Department (457-4850) shall be notified a minimum of five Working Days prior to completion of the Project so that signs may be checked for damage. Any damage to signs or posts shall be paid for by the CONTRACTOR.

3.6 Burning Permit

Open burning within City limits will not be allowed. Trench burning shall require a permit from the Fire Marshal. Burning permits outside City limits shall be obtained from the appropriate authority.

The CONTRACTOR shall secure and pay for all burning permits.

3.7 Driveways

Unless otherwise indicated, the approach grade of existing driveways shall be modified as indicated and as directed by the Owner's Representative. The OWNER will contact property owners whose driveways require grade modification beyond street right-of-way and the OWNER will obtain their concurrence for approach grade modification. Within the right-of-way, all driveways shall be replaced with concrete driveways. Outside the right-of-way, when approach grade modifications are required, flexible base shall be placed by the CONTRACTOR to resurface existing dirt or gravel driveways; asphalt and concrete drives

shall be replaced in kind by the CONTRACTOR. Excavation, Flexible Base, Portland Cement Concrete and Asphaltic Concrete, used for driveways as prescribed above shall not be measured for payment but shall be considered subsidiary to various Bid items in the Contract unless payment is included as a separate Contract pay item.

3.8 Removal or Relocation of Fences and Sprinkler Systems

Removal or relocation of privately owned fences and sprinkler systems not specified in Bid, and within public right-of-way is the primary responsibility of the property owner. OWNER will cause property owners to be aware of any known conflicts and encourage them to make desired adjustments in advance of construction. In the event the property owner does not, or will not, make adjustments necessary for construction of improvements to be made under this Contract, CONTRACTOR, after receiving written approval from the OWNER, shall remove those portions that interfere with the Work, as follows:

3.8.1 Fences shall be disassembled, by hand, into hand manageable sizes and placed on the private property.

3.8.2 For sprinkler systems, the CONTRACTOR, after assuring that electrical and/or mechanical controls are disconnected, shall remove sprinkler heads, valves, controls, and any other miscellaneous items, including distribution pipe, or wire, saw cut from the system. The CONTRACTOR shall present these materials to the property owner. Where piping is cut, the pipe shall be permanently capped or plugged, unless otherwise directed by the OWNER.

Work for removal or relocation of fences and sprinkler systems shall not be paid for directly but shall be subsidiary to the various Bid items.

End

ARTICLE 1 - GENERAL

1.1 RELATED DOCUMENTS

The following documents are a part of this section:

All documents in Bidding Requirements, Contract Forms and Conditions of the Contract.

Other sections of Division 1 - General Requirements apply to this section.

1.2 DESCRIPTION AND INTENT OF THE WORK

No asbestos containing material (ACM) shall be brought onto the Project site, and/or incorporated into the Project construction without the written consent of the OWNER. Any asbestos containing material found at any time including after contract completion, to have been brought onto the site or incorporated into the Project construction by the CONTRACTOR, or any Subcontractors, Sub-Subcontractors or Suppliers, shall be removed and disposed of in accordance with the then current governmental regulatory standards.

All costs associated with the inspection, sampling, testing, removal and disposal of ACM as described above shall be paid by the CONTRACTOR.

1.3 DEFINITIONS

ASBESTOS: The asbestiform varieties of serpentine (chrysotile), riebeckite (crocidolite) cummingtonite-grunerite (amosite), anthophyllite, actinolite and tremolite.

ASBESTOS CONTAINING MATERIAL (ACM): Any material containing more than one percent (1%) by weight of asbestos of any type or mixture of types.

ASBESTOS CONTAINING BUILDING MATERIAL (ACBM): Any material used in the construction of, or incorporated into the construction of, any building that contains more than one percent (1%) by weight of asbestos of any type or mixture of types.

MSDS: A material safety data sheet (MSDS) is a form containing data regarding the properties of component substances that comprise a manufactured product. They are a basic hazard communication tool that gives details on chemical and physical dangers, safety procedures, and emergency responses for chemicals.

1.4 QUALITY ASSURANCE

PROHIBITION OF ASBESTOS CONTAINING MATERIALS

The E/A has been instructed to not permit any asbestos containing materials to be specified, requested or approved for use in conjunction with this Project.

ASBESTOS CONTAINING MATERIALS PROHIBITED FROM SITE

No asbestos containing materials will be permitted as part of the Project construction. The following list is intended to be used as a general guide to show which types of materials are suspected to contain asbestos:

- Cement Pipes
- Cement Wallboard
- Cement Siding
- Asphalt Floor Tile
- Vinyl Floor Tile
- Elevator Brake Shoes
- HVAC Duct Insulation
- Boiler Insulation
- Breeching Insulation
- Ductwork Flexible Fabric Connections

- Vinyl Sheet Flooring/vinyl wall coverings
- Flooring Backing
- Construction Mastics (floor tile, carpet, ceiling tile, etc.)
- Acoustical Plaster
- Decorative Plaster / stucco
- Textured Paintings/Coatings
- Ceiling Tiles and Lay-in Panels
- Spray-Applied Insulation
- Blown-in Insulation
- Fireproofing Materials
- Taping Compounds (thermal)
- Packing Materials (for wall/floor penetrations)
- High Temperature Gaskets
- Laboratory Gloves
- Fire Blankets
- Fire Curtains
- Elevator Equipment Panels
- Cooling Towers
- Pipe Insulation (corrugated air-cell, block, etc.)
- Heating and Electrical Ducts
- Electrical Panel Partitions
- Electric Cloth
- Electric Wiring Insulation
- Chalkboards
- Roofing Shingles / tiles / membranes
- Roofing Felt
- Roof Coatings
- Base Flashing
- Thermal Paper Products
- Fire Doors
- Caulking/Putties
- Adhesives / mastics
- Wallboard
- Joint Compounds
- Spackling Compounds
- Laboratory hoods/tabletops
- CMU block fill materials

If any of these suspect materials are specified for use on the Project, and if they do not have specific labelling identifying them as asbestos free, then the CONTRACTOR shall notify the OWNER immediately. Laboratory analysis of the material by an OWNER-approved laboratory shall be performed at CONTRACTOR's expense in order to warrant that the material does not contain asbestos. A copy of the package labelling or results of laboratory testing must be provided to the OWNER prior to inclusion of the specified material during construction. Contractor's construction submittals must include MSDSs for all new materials used in construction of buildings, facilties and infrastructure.

1.5 SUBMITTALS

NON-USE OF ASBESTOS AFFIDAVITS

At the time that the CONTRACTOR signs the Agreement, they shall sign a Non-Use of Asbestos Affidavit (Contractor Prior to Construction), Contract Document 00680. This Affidavit certifies that the CONTRACTOR agrees that they will not allow any asbestos containing materials to be incorporated into the construction of the Project or allow any asbestos containing building materials on the site for which the OWNER has not given prior written approval.

Prior to final payment, the CONTRACTOR will provide to the OWNER a Non-Use of Asbestos Affidavit (Contractor After Construction), Contract Document 00681. This Affidavit certifies that the CONTRACTOR did not allow asbestos containing materials to be incorporated into the construction or allowed any asbestos containing building materials on the site for which the OWNER of the Project did not give prior written approval.

ASBESTOS CONTAINING MATERIALS: When any asbestos containing materials are used on the Project, provide the following information:

A detailed description of the material containing the asbestos.

The type and percent of asbestos contained in the material.

The quantity of the materials used, including the square footage, or in the case of pipe insulation, the size and linear footage.

A drawing showing the exact location of any asbestos containing materials.

Final payment shall be withheld until the above described Affidavits, submittals and/or information are received and approved.

END

CITY OF AUSTIN

STATEMENT OF NON-INCLUSION OF ASBESTOS CONTAINING MATERIAL

STATE OF TEXAS
COUNTY OF TRAVIS

ENGINEER/ARCHITECT PRIOR TO DESIGN

"My name is Kimberly K Patak, hereinafter known as Authorized Representative.

"I am over the age of 18 years and I have never been convicted of a crime. I am the Engineer of Freese and Nichols, Inc. hereinafter known as ENGINEER/ARCHITECT.

"I am fully competent to make this statement. I have personal knowledge of the facts set forth below and they are all true and correct.

"WHEREAS ENGINEER/ARCHITECT has been selected to provide designs, to prepare the bid and construction documents, and to assist the City of Austin, Texas, hereinafter known as OWNER, during the construction of Boggy Creek - MLK TOD Phase 3 Stormwater Conveyance Improvements, located at Manor Rd. and Alexander Ave., Austin, Texas, hereinafter known as Project, and

"WHEREAS asbestos in a dust form is a recognized health hazard, and
"WHEREAS the OWNER desires not to have any asbestos containing materials used or incorporated into the construction of the Project;
"THEREFORE the ENGINEER/ARCHITECT affirms that to the best of its knowledge and belief:

1. The ENGINEER/ARCHITECT, any person, firm or organization representing or represented by the ENGINEER/ARCHITECT, shall not knowingly specify, request, or approve for use in conjunction with the Project, any asbestos containing materials or any other materials defined as containing asbestos by any laws, rules or regulations promulgated by the United States Government, the State of Texas or any governmental organization or agency operating under the authority of either of those entities.
2. Realizing that there might be materials required in which a satisfactory non-asbestos containing material cannot be obtained, the ENGINEER/ARCHITECT will do the following before specifying any asbestos containing material:
   A. Inform the OWNER's Project Manager for this Project, in writing, of any intent to specify asbestos containing materials.
   B. Receive written approval from the City of Austin Project Manager for the specifying of any asbestos containing materials.
   C. At the completion of the design phase, and before the OWNER receives any bids for this Project, provide to the Project Manager, in writing, the proposed location of any asbestos containing materials, the type of asbestos they contain, and the percent of asbestos by types.
3. The ENGINEER/ARCHITECT states its understanding that if any asbestos containing materials not approved by the OWNER for inclusion into the Project, are determined, as a result of any inspection and sample analysis performed by an individual(s) and/or firm(s) certified and/or licensed to perform such inspection by the United States Government and/or the State of Texas, to have been knowingly specified, requested and/or approved by the ENGINEER/ARCHITECT for inclusion in the Project, the OWNER shall look to the ENGINEER/ARCHITECT for reimbursement of any and all costs incurred in the removal and/or other abatement of said asbestos containing materials.
4. ENGINEER/ARCHITECT further understands that OWNER shall also look to the ENGINEER/ARCHITECT for any and all damages to OWNER which result from the inability of the OWNER to use any portion or all of the Project due to the incorporation of asbestos containing materials that have been knowingly specified, requested and/or approved by the ENGINEER/ARCHITECT.
5. ENGINEER/ARCHITECT further understands that OWNER will pursue reimbursement of any said cost and compensation for any said damages from the ENGINEER/ARCHITECT by any and every means within OWNER's right and power.

Signature of Authorized Representative: _____

STATE OF TEXAS
COUNTY OF TRAVIS

ON August 26, 2026 personally appeared Kimberly Patak and been duly sworn by me, subscribed to the foregoing statement and has stated that the facts stated therein are true and correct.

YVONNE MURDOCH
NOTARY PUBLIC
ID# 134334843
State of Texas
Comm. Exp. 05-01-2027

Notary Public, State of Texas Yvonne P. Murdoch

Printed Name of Notary Yvonne P. Murdoch

My Commission Expires: 5-1-2027

01605A.00/110392

CITY OF AUSTIN

STATEMENT OF NON-INCLUSION OF ASBESTOS CONTAINING MATERIAL

STATE OF TEXAS
COUNTY OF TRAVIS

ENGINEER/ARCHITECT AFTER DESIGN

"My name is Kimberly K Patak, hereinafter known as Authorized Representative.

"I am over the age of 18 years and I have never been convicted of a crime. I am the Engineer of Freese and Nichols, Inc. hereinafter known as ENGINEER/ARCHITECT.

"I am fully competent to make this statement. I have personal knowledge of the facts set forth below and they are all true and correct.

"WHEREAS ENGINEER/ARCHITECT has been selected to provide designs, to prepare the bid and construction documents, and to assist the City of Austin, Texas, hereinafter known as OWNER, during the construction of Boggy Creek - MLK TOD Phase 3 Stormwater Conveyance Improvements, located at Manor Rd. and Alexander Ave. Austin, Texas, hereinafter known as Project, and

"WHEREAS asbestos in a dust form is a recognized health hazard, and
"WHEREAS the OWNER desires not to have any asbestos containing materials used or incorporated into the construction of the Project;
"THEREFORE the ENGINEER/ARCHITECT affirms that to the best of its knowledge and belief:

1. The ENGINEER/ARCHITECT, any person, firm or organization representing or represented by the ENGINEER/ARCHITECT, shall not knowingly specify, request, or approve for use in conjunction with the Project, any asbestos containing materials or any other materials defined as containing asbestos by any laws, rules or regulations promulgated by the United States Government, the State of Texas or any governmental organization or agency operating under the authority of either of those entities.
2. The only exceptions to the above statement are the following materials that are required because a satisfactory non-asbestos containing material cannot be obtained. The inclusion of these materials has been approved by the OWNER's Project Manager for this Project.

   _____

   _____

   _____

   _____

3. The ENGINEER/ARCHITECT states its understanding that if any asbestos containing materials not approved by the OWNER for inclusion into the Project, are determined, as a result of any inspection and sample analysis performed by an individual(s) and/or firm(s) certified and/or licensed to perform such inspection by the United States Government and/or the State of Texas, to have been knowingly specified, requested and/or approved by the ENGINEER/ARCHITECT for inclusion in the Project, the OWNER shall look to the ENGINEER/ARCHITECT for reimbursement of any and all costs incurred in the removal and/or other abatement of said asbestos containing materials.
4. ENGINEER/ARCHITECT further understands that OWNER shall also look to the ENGINEER/ARCHITECT for any and all damages to OWNER which result from the inability of the OWNER to use any portion or all of the Project due to the incorporation of asbestos containing materials that have been knowingly specified, requested and/or approved by the ENGINEER/ARCHITECT.
5. ENGINEER/ARCHITECT further understands that OWNER will pursue reimbursement of any said cost and compensation for any said damages from the ENGINEER/ARCHITECT by any and every means within OWNER's right and power.

Signature of Authorized Representative: K Pat

STATE OF TEXAS
COUNTY OF TRAVIS

ON August 26, 2026, personally appeared Kimberly Patak and been duly sworn by me, subscribed to the foregoing statement and has stated that the facts stated therein are true and correct.

YVONNE MURDOCH
NOTARY PUBLIC
ID# 134334843
State of Texas
Comm. Exp. 05-01-2027

Notary Public, State of Texas Y P. Murdoch

Printed Name of Notary Yvonne P. Murdoch

My Commission Expires: 5-1-2027

01605B/110392

CITY STANDARD TECHNICAL SPECIFICATIONS

ITEM NO. 101S PREPARING RIGHT-OF-WAY 3-25-2021

101S.1 Description

This item shall govern the preparation of the right-of-way for construction operations by removal and disposal of all obstructions from the right-of-way and from designated easements, where removal of such obstructions is not otherwise indicated as a separate pay item.

Such obstructions shall be considered to include, but not be limited to, remains of houses not completely removed by others, foundations, floor slabs, concrete, brick, lumber, plaster, cisterns, water wells, septic tanks and drain fields, basements; abandoned utility pipes, conduits, underground service station tanks, fences, retaining walls, outhouses, shacks and all other debris.

This item shall also include, but not be limited to, the removal of trees, stumps, roots, bushes, shrubs, curb and gutter, driveways, paved parking areas, miscellaneous stone, brick, sidewalks, drainage structures, manholes, inlets, abandoned railroad tracks, scrap iron, and all rubbish and debris whether above or below ground. Care should be taken to identify and protect existing infrastructure.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text the inch-pound units are given preference followed by SI units shown within parentheses.

101S.2 Submittals

The submittal requirements of this specification item may include:

A. A permit when utility adjustments are made in the right-of-way, and

B. A plan for removal and deposition of all non-salvageable materials and debris.

101S.3 Construction Methods

Prior to commencement of this work, all required erosion controls and tree protection measures indicated on the Drawings shall be in place. The existing utilities shall be located and protected as specified in the Standard Contract Documents, Section 00700, "General Conditions" and/or as specified on the Drawings. A permit shall be required when utility adjustments are to be made in preparation for construction in the right-of-way, as specified in Section 5.2.0 of the City of Austin Utilities Criteria Manual.

Areas within the construction limits shall be cleared of all obstructions, abandoned structures, and other items as defined above. All vegetation, except trees or shrubs indicated for preservation, shall also be removed. Trees and shrubs, which are scheduled for preservation, shall be carefully trimmed as directed and shall be protected from scarring, barking or other injuries during construction operations in accordance with Item No. 610S, " Preservation of Trees and Other Vegetation". All exposed cuts over 2 inches (50 millimeters) in diameter, exposed ends of pruned limbs or scarred bark shall be treated with an approved asphalt material within 24 hours of the pruning or injury.

Construction equipment shall not be operated nor construction materials stockpiled under the canopies of trees, unless otherwise indicated on the Drawings and/or specified in the Contract Documents. Excavation or embankment materials shall not be placed within the drip line of trees until tree wells are constructed.

Culverts, storm sewers, manholes and inlets shall be removed in proper sequence for maintenance of traffic and drainage.

Unless otherwise indicated on the Drawings and/or Contract Documents, all underground obstructions, stumps and roots shall be removed to the following depths:

1. In areas to receive 6 inches (150 mm) or more embankment, a minimum of 12 inches (300 mm) below natural ground.
2. In areas to receive less than 6 inches (150 mm) of embankment, a minimum of 18 inches (450 mm) below the lower elevation of embankment, structure or excavation.
3. In areas to be excavated a minimum of 18 inches (450 mm) below the lower elevation of the embankment, structure or excavation.
4. In all other areas, a minimum of 12 inches (300 mm) below natural ground.

Holes remaining after removal of all obstructions, objectionable material, trees, stumps, etc. shall be backfilled with select embankment material and compacted by approved methods.

When a utility in service conflicts with the construction, it shall be modified as specified in the Standard Contract Documents, Section 00700, "General Conditions" and/or as specified on the Drawings.

Where an abandoned underground piped utility is found, it shall be cut and plugged with 6 inches (150 mm) of concrete (in accordance with Specification Item 403, "Concrete for Structures") brick and mortar (in accordance with Specification Item 506S, "Manholes") or a precast stopper grouted in place.

Material to be removed will be designated as salvageable or non-salvageable by the Engineer or designated representative prior to removal from the construction site by the Contractor. All material, which is located within the public right-of-way and is declared by the Engineer as salvageable, will remain the property of the City of Austin and will be stored at the site or loaded on city trucks as directed by the Engineer. All non-salvageable materials and debris shall become the property of the Contractor and shall be removed from the site and deposited at a permitted disposal site.

101S.4 Measurement

The preparation of right-of-way for new construction, when included in the contract as a pay item, will be measured by the acre (hectare: 1 hectare equals 2.471 acres), 100 foot (100 feet equals 30.5 meters) stations or lump sum, regardless of the width of the right-of-way.

Measurement for payment will be made only on areas indicated and classified as "Preparing Right-of-Way."

Source: Rule No. R161-21.01, 3-25-2021.

101S.5 Payment

The work and material presented herein will not be paid for directly, but shall be included in the unit price bid for the item of construction in which this item is used unless specified as a separate pay item in the contract bid form. When included for payment, it shall be paid for at the contract bid price for "Preparing Right-of-Way." This price shall include full compensation for work herein specified, including the furnishing of all materials, equipment, tools, labor and incidentals necessary to complete the work.

When payment is made under the Lump Sum pay item the total payment of this item shall not exceed 5% of the original contract amount until final payment. Any remainder will be paid as part of final payment.

Payment, when included as a contract pay item, will be made under one of the following:

Pay Item No. 101S-A:	Preparing Right-of-Way -	Per Acre.
Pay Item No. 101S-B:	Preparing Right-of-Way -	Per 100 foot Station.

Pay Item No. 101S-C:	Preparing Right-of-Way -	Per Lump Sum.

Source: Rule No. R161-21.01, 3-25-2021.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Specification 101S, "PREPARING RIGHT-OF-WAY"	
City of Austin Standard Contract Documents	
Designation	Description
00700	General Conditions
City of Austin Utilities Criteria Manual	
Designation	Description
Section 5.2.0	Permit for Excavation in the Public Right-of-Way
City of Austin Standard Specifications	
Designation	Description
Item No. 110S	Street Excavation
Item No. 111S	Excavation
Item No. 120S	Channel Excavation
Item No. 132S	Embankment
Item No. 403	Concrete for Structures
Item No. 506S	Manholes
Item No. 610S	Preservation of Trees and Other Vegetation

RELATED CROSS REFERENCE MATERIALS	
Specification 101S, "PREPARING RIGHT-OF-WAY"	
City of Austin Standard Contract Documents	
Designation	Description
01500	Temporary Facilities
01550	Public Safety and Convenience
The Code of the City of Austin, Code of Ordinances, Volume 2	
Designation	Description
Article 14-11-181	Permit Required
Article 14-11-189	Conditions for Permit Issuance
Article 14-11-190	Permit Term
City of Austin Standard Specifications	
Designation	Description
Item No. 102S	Clearing and Grubbing
Item No. 104S	Removing Portland Cement Concrete
Item No. 201S	Subgrade Preparation
Item No. 203	Lime Treatment for Materials In Place
Item No. 204S	Portland Cement Treatment for Materials In Place

Item No. 230S	Rolling (Flat Wheel)
Item No. 232S	Rolling (Pneumatic Tire)
Item No. 234S	Rolling (Tamping)
Item No. 236S	Rolling (Proof)
Item No. 602S	Sodding for Erosion Control
Item No. 604S	Seeding for Erosion Control
Item No. 622S	Diversion Dike
Item No. 628S	Sediment Containment Dikes
Item No. 642S	Silt Fence
City of Austin Standard Details	
Designation	Description
610S-1	Tree Protection Fence Locations
610S-2	Tree Protection Fence, Type B Chainlink
610S-3	Tree Protection Fence, Type B Wood
610S-4	Tree Protection Fence, Modified Type A
610S-5	Tree Protection Fence, Modified Type B
621S-1	Diversion
622S-1	Diversion Dike
624S-1	Earth Outlet Sediment Trap
625S-1	Grade Stabilization Structure
627S-1	Grass Lined Swale
627S-2	Grass Lined Swale With Stone Center
628S	Triangular Sediment Filter Dike
628S-1	Hay Bale Dike
629S-1	Brush Berm
630S-1	Interceptor Dike
631S-1	Interceptor Swale
632S-1	Storm Inlet Sediment Trap
633S-1	Landgrading
634S-1	Level Spreader
635S-1	Perimeter Dike
636S-1	Perimeter Swale
637S-1	Pipe Slope Drain (Flexible)
637S-2	Pipe Slope Drain (Flexible)
638S-1	Pipe Outlet Sediment Trap
639S-1	Rock Berm
641S-1	Stabilized Construction Entrance
642S-1	Silt Fence
643S-1	Stone Outlet Structure
644S-1	Stone Outlet Sediment Trap
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item No. 100	Preparing Right-of-Way
Item No. 110	Excavation

Item No. 112	Subgrade Widening
Item No. 132	Embankment
Item No. 150	Blading
Item No. 158	Specialized Excavation Work
Item No. 160	Furnishing and Placing Topsoil
Item No. 164	Seeding for Erosion Control
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item No. 204	Sprinkling
Item No. 210	Rolling (Flat Wheel)
Item No. 211	Rolling (Tamping)
Item No. 213	Rolling (Pneumatic Tire)
Item No. 260	Lime Treatment for Materials Used as Subgrade (Road Mixed)
Item No. 265	Lime-Fly Ash (LFA) Treatment for Materials Used as Subgrade
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
Tex-103-E	Determination of Moisture Content of Soil Materials
Tex-104-E	Determination of Liquid Limit of Soils
Tex-105-E	Determination of Plastic Limit of Soils
Tex-106-E	Method of Calculating the Plasticity Index of Soils
Tex-114-E	Laboratory Compaction Characteristics and Moisture-Density Relationship of Subgrade & Embankment Soil
Tex-115-E	Field Method for Determination of In-Place Density of Soils and Base Materials

ITEM NO. 110S STREET EXCAVATION 11-18-04

110S.1 Description

This item shall govern: (1) the excavation and proper utilization or otherwise satisfactory disposal of all excavated material, of whatever character, within the right-of-way or other limits of the work indicated and (2) the construction, compaction, shaping and finishing of all earthwork on the entire project in accordance with the specification requirements herein outlined, in conformity with the required lines, grades and typical cross sections indicated on the Drawings or as directed by the Engineer or designated representative. When not otherwise included in the Contract Documents, this item shall include the Work described in specification Item Nos. 101S, "Preparing Right-of-way", 102S, "Clearing and Grubbing", 104S, "Removing Portland Cement Concrete", 132S, "Embankment", 201S, "Subgrade Preparation" and 236S, "Proof Rolling".

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text inch-pound units are given preference followed by SI units shown within parentheses.

110S.2 Submittals

The submittal requirements of this specification item may include:

A. A permit when utility adjustments are made in the right-of-way,

B. A plan for removal and deposition of all 'Waste' materials, and

C. A Blasting Permit if blasting is required and allowed on the project.

110S.3 Classification

All excavation shall be unclassified and shall include all materials encountered regardless of their nature or the manner in which they are removed.

110S.4 Construction Methods

Prior to commencement of this work, all required erosion control and tree protection measures shall be in place. The existing utilities shall be located and protected as specified in the Standard Contract Documents, Section 00700, "General Conditions" and/or indicated on the Drawings. A permit shall be required when utility adjustments are to be made in preparation for construction in the right-of-way, as specified in Section 5.2.0 of the City of Austin Utilities Criteria Manual.

Construction equipment shall not be operated nor construction materials stockpiled under the canopies of trees, unless otherwise indicated on the Drawings. Excavation or embankment materials shall not be placed within the drip line of trees until tree wells are constructed, that conform to Item No. 610S, " Preservation of Trees and Other Vegetation ".

All street excavation shall be performed as specified herein and shall conform to the established alignment, grades and cross sections. The Contractor will be required to set blue-tops for the subgrade along centerlines, at quarter points and curb lines or edge of pavement at intervals not exceeding 50 feet (15 meters). Suitable excavated materials shall be utilized, insofar as practicable, in constructing any required embankments. The construction of all embankments shall conform to Item No. 132S, "Embankment".

All earth cuts for base and/or pavement structure construction shall be scarified to a uniform depth of at least 6 inches (150 millimeters) below the required finished subgrade elevation for the entire roadbed width. The material shall be mixed, reshaped by blading, sprinkled and then rolled in accordance with Section 2 of the City of Austin Specification Item 132S, "Embankment".

High PI materials (i.e. PI 20 %) which exhibit a Plasticity Index (PI) greater by 5 % than the surrounding materials or any materials with a moisture content greater than 2 percent (%) in excess of optimum moisture shall be classified as unsuitable and must be removed or manipulated to meet the above criteria before use.

Unsuitable excavated materials or excavation in excess of that needed for construction shall be known as "Waste" and shall become the property of the Contractor. Unsuitable material encountered below the subgrade elevation in roadway cuts, when declared "Waste" by the Engineer, shall be replaced with material from the roadway excavation or with other suitable material as approved by the Engineer or designated representative. It shall become the Contractor's responsibility to dispose of this material off the limits of the right-of-way in an environmentally sound manner at a permitted disposal site.

All blasting shall conform to the General Notes on the Drawings and to the Standard Contract Document Section 01550, "Public Safety and Convenience". In all cases where blasting is permitted, a Blasting Permit must be obtained in advance from the City of Austin Public Works Department.

110S.5 Measurement

All accepted street excavation will be measured by either Method A or B as follows:

A. Method A

Measurement of the volume of excavation in cubic yards (cubic meters: 1 cubic meter is equal to 1.308 cubic yards) by the average end areas. Cross sectional areas shall be computed from the existing ground surface to the established line of the subgrade over the limits of the right-of-way or other work limits shown on the Drawings, including parkway slopes and sidewalk areas.

B. Method B

Measurement of the volume of excavation in cubic yards (cubic meters: 1 cubic meter is equal to 1.308 cubic yards), based upon the average end areas taken from pre-construction cross sections and planned grades. The planned quantities for street excavation will be used as the measurement for payment of this item.

110S.6 Payment

This item will be paid for at the contract unit bid price for "Street Excavation", as provided under measurement Method A or B as included in the bid. The bid price shall include full compensation for all work herein specified, including subgrade preparation, unless specified otherwise, and the furnishing of all materials, equipment, tools, labor and incidentals necessary to complete the work.

Payment will be made under one of the following:

Pay Item No. 110S-A:	Street Excavation	Per Cubic yard.
Pay Item No. 110S-B:	Street Excavation, Plan Quantity	Per Cubic yard.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification Item 110S, "STREET EXCAVATION"
City of Austin Standard Contract Documents

Designation	Description
00700	General Conditions
01550	Public Safety and Convenience
City of Austin Utilities Criteria Manual	
Designation	Description
Section 5.2.0	Permit for Excavation in the Public Right-of-Way
City of Austin Standard Specifications	
Designation	Description
Item No. 101S	Preparing Right-of-way
Item No. 102S	Clearing and Grubbing
Item No. 104S	Removing Portland Cement Concrete
Item No. 132S	Embankment
Item No. 201S	Subgrade Preparation
Item No. 236S	Proof Rolling
Item No. 610S	Preservation of Trees and Other Vegetation

RELATED CROSS REFERENCE MATERIALS	
Specification Item 110S, "STREET EXCAVATION"	
City of Austin Standard Contract Documents	
Designation	Description
01500	Temporary Facilities
City of Austin Code of Ordinances, Volume 2	
Designation	Description
Article 14-11-181	Permit Required
Article 14-11-189	Conditions for Permit Issuance
Article 14-11-190	Excavation Sequence and Permit Term
City of Austin Standard Specifications	
Designation	Description
Item No. 111S	Excavation
Item No. 120S	Channel Excavation
Item No. 203S	Lime Treatment for Materials In Place
Item No. 204S	Portland Cement Treatment for Materials In Place
Item No. 230S	Rolling (Flat Wheel)
Item No. 232S	Rolling (Pneumatic Tire)
Item No. 234S	Rolling (Tamping)
Item No. 602S	Sodding for Erosion Control
Item No. 604S	Seeding for Erosion Control
Item No. 610S	Preservation of Trees and Other Vegetation
Item No. 622S	Diversion Dike
Item No. 628S	Sediment Containment Dikes
Item No. 642S	Silt Fence

City of Austin Standard Details	
Designation	Description
610S-1	Tree Protection Fence Locations
610S-2	Tree Protection Fence, Type B Chainlink
610S-3	Tree Protection Fence, Type B Wood
610S-4	Tree Protection Fence, Modified Type A
610S-5	Tree Protection Fence, Modified Type B
610S-6	Tree Protection, Tree Wells
621S-1	Diversion
622S-1	Diversion Dike
624S-1	Earth Outlet Sediment Trap
625S-1	Grade Stabilization Structure
627S-1	Grass Lined Swale
627S-2	Grass Lined Swale With Stone Center
628S	Triangular Sediment Filter Dike
628S-1	Hay Bale Dike
629S-1	Brush Berm
630S-1	Interceptor Dike
631S-1	Interceptor Swale
632S-1	Storm Inlet Sediment Trap
633S-1	Landgrading
634S-1	Level Spreader
635S-1	Perimeter Dike
636S-1	Perimeter Swale
637S-1	Pipe Slope Drain (Flexible)
637S-2	Pipe Slope Drain (Rigid)
638S-1	Pipe Outlet Sediment Trap
639S-1	Rock Berm
641S-1	Stabilized Construction Entrance
642S-1	Silt Fence
643S-1	Stone Outlet Structure
644S-1	Stone Outlet Sediment Trap
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item No. 100	Preparing Right-of-way
Item No. 110	Excavation
Item No. 112	Subgrade Widening
Item No. 132	Embankment
Item No. 150	Blading
Item No. 158	Specialized Excavation Work
Item No. 160	Furnishing and Placing Topsoil
Item No. 164	Seeding for Erosion Control
Item No. 204	Sprinkling
Item No. 210	Rolling (Flat Wheel)
Item No. 211	Rolling (Tamping)

Item No. 213	Rolling (Pneumatic Tire)
Item No. 260	Lime Treatment for Materials Used as Subgrade (Road Mixed)
Item No. 265	Lime-Fly Ash (LFA) Treatment for Materials Used as Subgrade
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
Tex-103-E	Determination of Moisture Content of Soil Materials
Tex-104-E	Determination of Liquid Limit of Soils
Tex-105-E	Determination of Plastic Limit of Soils
Tex-106-E	Method of Calculating the Plasticity Index of Soils
Tex-114-E	Laboratory Compaction Characteristics and Moisture-Density Relationship of Subgrade & Embankment Soil
Tex-115-E	Field Method for Determination of In-Place Density of Soils and Base Materials

ITEM NO. 130S BORROW 9-26-12

130S.1 Description

This item shall govern required excavation, removal and proper utilization of materials secured from sources, selected by the Contractor and approved by the Engineer or designated representative. The compaction of embankments constructed from borrow as provided herein shall conform to the appropriate sections of Specification Item Nos. 132S, "Embankment" and 236S, "Proof Rolling".

Borrow will be used only when indicated on the Drawings or directed by the Engineer or designated representative and shall only be acquired from approved sources.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text inch-pound units are given preference followed by SI units shown within parentheses.

130S.2 Submittals

The submittal requirements of this specification item may include:

A. Identification of Class, source and characteristics (P.I., linear shrinkage, etc.) of proposed borrow material, and

B. A plan for managing and maintaining borrow sites.

130S.3 Materials

All authorized borrow shall conform to one of the following classes:

Class A (Select Borrow)

Class A Borrow material shall consist of suitable granular material, free from vegetation or other objectionable matter and reasonably free from lumps of earth. When tested by standard TxDOT laboratory methods Tex-105-E, Tex-106-E and Tex-107-E, the Class A Select Borrow, shall meet the following requirements:

The Liquid Limit shall not exceed	45
The Plasticity Index shall not exceed	15
The bar linear shrinkage shall not be less than	2

Class B (Borrow)

Class B Borrow material shall consist of suitable non swelling [i.e. soils with a plasticity index (P.I.) less than 20] earth material such as loam, clay or other such materials that will form a stable embankment.

Class C (Topsoil) See Standard Specification Item No. 601S.3(A)

Class C Borrow material shall consist of approved soils, which shall be clean, friable and capable of supporting plant life. This material shall also be free of stones and all other debris.

130S.4 Construction Methods

Prior to commencing this work, all required erosion control and environmental measures shall be in place. All suitable materials removed from excavations shall be used, insofar as practicable in the formation of

embankments conforming to Specification Item No. 132S, "Embankment", as otherwise indicated on the Drawings or as directed by the Engineer or designated representative. The completed work shall conform to the established alignment, grades and cross section as shown on the Drawings. The additional material necessary to complete the work described above shall be "Borrow" of the class specified.

The Contractor shall arrange for borrow from one of the following sources:

1. Existing borrow pit,
2. New borrow pit, or
3. Surplus excavated material from a site, with a site development permit.

The Contractor shall notify the Engineer 3 weeks prior to opening a pit or any other borrow source to allow necessary testing for approval of materials. All borrow sites shall comply with the requirements of the site development permit.

During construction, borrow sources shall be kept drained to permit final cross sections to be measured, when required.

Borrow sites shall be managed and maintained to minimize the impact of the appearance of the natural topographic features and at no time create a potential hazard to the public.

130S.5 Measurement

Borrow will be measured by the cubic yard (cubic meters: 1 cubic meter is equal to 1.196 cubic yards) in its final position based upon the average end areas, calculated from pre-construction cross sections and plan grades. The plan quantities for Borrow or Topsoil will be used as the measurement for payment for this item.

130S.6 Payment

All work performed as required herein and measured as provided under "Measurement" will be paid for at the unit bid price. The bid prices shall include full compensation for furnishing all labor; all materials; all royalty and freight involved; all hauling and delivering on the road; and all tools, equipment and incidentals necessary to complete the work. Payment will not be made for unauthorized work.

Payment will be made under one of the following:

Pay Item No. 130S-A:	Class A (Select Borrow), Plan Quantity	Per Cubic Yard.
Pay Item No. 130S-B:	Class B (Borrow), Plan Quantity	Per Cubic Yard.
Pay Item No. 130S-T:	Class C (Topsoil), Plan Quantity	Per Cubic Yard.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Specification 130S, "BORROW"	
City of Austin Standard Specifications	
Designation	Description
Item No. 132S	Embankment
Item No. 236S	Rolling (Proof)
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description

Tex-105-E	Determination of Plastic Limit of Soils
Tex-106-E	Method of Calculating the Plasticity Index of Soils
Tex-107-E	Determination of Bar Linear Shrinkage of Soils

RELATED CROSS REFERENCE MATERIALS	
Specification 130S, "BORROW"	
City of Austin Standard Contract Documents	
Designation	Description
00700	General Conditions
City of Austin Standard Specifications	
Designation	Description
Item No. 101S	Preparing Right-of-way
Item No. 102S	Clearing and Grubbing
Item No. 110S	Street Excavation
Item No. 111S	Excavation
Item No. 230S	Rolling (Flat Wheel)
Item No. 232S	Rolling (Pneumatic Tire)
Item No. 234S	Rolling (Tamping)
Item No. 602S	Sodding for Erosion Control
Item No. 604S	Seeding for Erosion Control
Item No. 610S	Preservation of Trees and Other Vegetation
Item No. 622S	Diversion Dike
Item No. 628S	Sediment Containment Dikes
Item No. 642S	Silt Fence
City of Austin Standard Details	
Designation	Description
No. 610S-1	Tree Protection Fence Locations
No. 610S-2	Tree Protection Fence, Type B Chainlink
No. 610S-3	Tree Protection Fence, Type B Wood
No. 610S-4	Tree Protection Fence, Modified Type A
No. 610S-5	Tree Protection Fence, Modified Type B
No. 621-1	Diversion
No. 622-1	Diversion Dike
No. 624-1	Earth Outlet Sediment Trap
No. 625-1	Grade Stabilization Structure
No. 626-1	Grass Lined Swale
No. 627-1	Grass Lined Swale With Stone Center
No. 628S	Triangular Sediment Filter Dike
No. 628S-1	Hay Bale Dike
No. 629S-1	Brush Berm
No. 630S-1	Interceptor Dike
No. 631S-1	Interceptor Swale
No. 632S-1	Storm Inlet Sediment Trap
No. 633S-1	Landgrading

No. 634S-1	Level Spreader
No. 635S-1	Perimeter Dike
No. 636S-1	Perimeter Swale
No. 637S-1	Pipe Slope Drain (Flexible)
No. 637S-2	Pipe Slope Drain (Flexible)
No. 638S-1	Pipe Outlet Sediment Trap
No. 639S-1	Rock Berm
No. 641S-1	Stabilized Construction Entrance
No. 642S-1	Silt Fence
No. 643S-1	Stone Outlet Structure
No. 644S-1	Stone Outlet Sediment Trap
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item No. 100	Preparing Right-of-way
Item No. 110	Excavation
Item No. 132	Embankment
Item No. 158	Specialized Excavation Work
Item No. 160	Furnishing and Placing Topsoil
Item No. 164	Seeding for Erosion Control
Item No. 204	Sprinkling
Item No. 210	Rolling (Flat Wheel)
Item No. 211	Rolling (Tamping)
Item No. 213	Rolling (Pneumatic Tire)
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
Tex-103-E	Determination of Moisture Content of Soil Materials
Tex-104-E	Determination of Liquid Limit of Soils
Tex-114-E	Laboratory Compaction Characteristics and Moisture-Density Relationship of Subgrade & Embankment Soil
Tex-115-E	Field Method for Determination of In-Place Density of Soils and Base Materials

ITEM NO. 132S EMBANKMENT 8-20-07

132S.1 Description

This item shall govern the placement and compaction of suitable materials obtained from approved sources for utilization in the construction of street or channel embankments, berms, levees, dikes and structures. When not otherwise included in the Contract Documents or indicated on the Drawings, this item shall include the work described in Specification Item Nos. 101S, "Preparing Right-of-way", 102S, "Clearing and Grubbing", 104S, "Removing Portland Cement Concrete", 201S, "Subgrade Preparation" and No. 236S, "Proof Rolling.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text inch-pound units are given preference followed by SI units shown within parentheses.

132S.2 Submittals

The submittal requirements of this specification item may include:

A. A plan identifying source, material type, classification and characteristics (P.I., optimum moisture-density, etc.) of the proposed embankment material,

B. Type and size of equipment proposed to produce the required compaction, and

C. Compaction (Density-moisture, etc) test results for in-place embankment layers.

132S.3 Construction Methods

A. General

Prior to the placement of any embankment, all tree protection and tree wells and erosion control devices shall be in place and all operations involving Standard Specification Item No. 101S, "Preparing Right-of-way" and/or Standard Specification Item No. 102S, "Clearing and Grubbing" shall have been completed for the areas over which the embankment is to be placed. Stump holes or other small excavations encountered within the limits of the embankments shall be backfilled with suitable material and thoroughly tamped by approved methods before commencement of the embankment construction.

The area of embankment placement shall be proof rolled (Specification Item No. 236S, "Proof Rolling") and any unstable or spongy areas shall be undercut and backfilled with suitable material or otherwise mechanically manipulated and compacted by approved methods. Where shown on the Drawings or required by the Engineer or designated representative, the ground surface thus prepared shall be compacted by sprinkling and rolling. The surface of the ground, including those plowed and loosened or roughened by small washes, shall be restored to approximately its original slope and the ground surface thus prepared shall be compacted by sprinkling and rolling.

Construction equipment shall not be operated within the drip line of trees, unless otherwise indicated. Construction materials shall not be stockpiled under the canopies of trees. Excavation or embankment materials shall not be placed within the drip line of trees until tree wells are constructed in accordance with Item No. 610S, "Preservation of Trees and Other Vegetation".

Unless otherwise indicated on the Drawings and with the exception of rock, the surface of the ground of all unpaved areas, which are to receive embankment, shall be loosened by scarifying or plowing to a depth of not less than 4 inches (100 mm). The loosened material shall be re-compacted with the new embankment as hereinafter specified.

The surface of hillsides, which are to receive embankment, shall be loosened, by scarifying or plowing, to a depth of not less than 4 inches (100 mm) and benches constructed before the embankment materials are placed. The embankment shall then be placed in layers, as hereinafter specified, beginning at the low side with partial width layers and increasing the widths of the layers as the embankment is raised. The material, which has been loosened during preparation of the original ground surface, shall be re-compacted simultaneously with the embankment material placed at the same elevation.

Where embankments are to be placed adjacent to or over existing roadbeds, the roadbed slopes shall be plowed or scarified to a depth of not less than 6 inches (150 mm) and the embankment along the roadbed slopes shall be built up in successive layers, as hereinafter specified, to the elevation of the old roadbed. Then, if specified, the top surface of the old roadbed shall be scarified to a minimum depth of 6 inches (150 mm) and re-compacted along with the next layer of the new embankment. The total depth of the scarified and added material shall not exceed the permissible layer depth, specified hereinafter.

Trees, stumps, roots, vegetation or other unsuitable materials shall not be placed in embankment.

All embankment shall be constructed in layers approximately parallel to the finished grade and unless otherwise indicated, each layer shall be so constructed as to provide a uniform slope of 1/4 inch per foot (20 mm per meter) from the centerline of the roadbed to the outside. In the case of superelevated curves, each layer shall be constructed to conform to the specified superelevation or cross slope.

The embankment shall be continuously maintained at its finished section and grade until that portion of the work is accepted. After completion of the embankment to the finished section and grade, the Contractor shall proof roll the subgrade or finished grade in accordance with Specification Item No. 236S, "Proof Rolling". Any unstable or spongy areas shall be undercut and backfilled with suitable material or otherwise mechanically manipulated and compacted by approved methods. After acceptance of the embankment, re-vegetation activities shall commence immediately to minimize the soil loss and air pollution.

B. Earth Embankments

Earth embankments shall be defined as embankments composed of soil material other than rock and shall be constructed of acceptable material from approved sources.

Unless directed otherwise, earth embankments shall be constructed in successive layers, with a thickness of 8 inches (200 mm) or less in loose measure, for the full width of the individual cross section and in a length that is best suited to the sprinkling and compaction methods utilized.

Minor quantities of rocks with a maximum dimension of 4 inches (100 mm) may be incorporated in the earth embankment layers, provided that the rock is not placed immediately adjacent to structures.

Each layer of embankment shall be uniform as to material type and classification, density and moisture content before beginning compaction. Where layers of unlike materials abut each other, each layer shall be feathered on a slope of 1:20 or the materials shall be so mixed as to prevent abrupt changes in the soil. Any material placed in the embankment by dumping in a pile or windrows shall not be incorporated in a layer in that position. All such piles or windrows shall be incorporated in an embankment layer by blading and mixing or by similar methods. Clods or lumps of material shall be broken down into smaller sizes and the embankment material in a layer shall be mixed by blading, harrowing, discing or similar methods to insure that a uniform material of uniform density is secured in each layer.

The water required in sprinkling the layers, to obtain the moisture content necessary for optimum compaction, shall be evenly applied. It shall be the responsibility of the Contractor to secure uniform moisture content throughout the layer by such methods as may be necessary.

All earth cuts, whether full width or partial width side hill cuts and which are not required to be excavated below the subgrade elevation, shall be scarified to a uniform depth of at least 6 inches (150 mm) below grade. The material shall be mixed and reshaped by blading, sprinkled and rolled in accordance with the

requirements outlined above for earth embankments to the same density required for the adjacent embankment.

Compaction of embankments shall conform to Item No. 201S, "Subgrade Preparation". Each layer shall be compacted to the required density by any method, and/or type and size of equipment, which will produce the required compaction. Prior to and in conjunction with the rolling operation, each layer shall be brought to the moisture content necessary to obtain the required density and shall be kept leveled with suitable equipment to insure uniform compaction over the entire layer.

It is the intent of this specification to provide the required density and moisture control for each layer of earth embankment and select material based on the plasticity characteristics of the embankment soil. Each layer shall be sprinkled as required and compacted to the extent necessary to provide the density specified below, unless otherwise indicated.

Description	Density, Percent	Moisture
Non-swelling Soils (PI less than 20)	Not less than 95	
Swelling Soils (PI between 20 and 35)	Not less than 95 nor more than 102	Not less than optimum
Swelling Soils (P.I. greater than 35)	Not less than 95 nor more than 100	Not less than optimum

The Plasticity Index (PI) will be established in accordance with TxDoT Test Methods Tex-104-E, Tex-105-E and Tex-106-E and the density determination will be made in accordance with TxDoT Test Method Tex-114-E, "Laboratory Compaction Characteristics and Moisture-Density Relationship of Subgrade and Embankment Soil". Field density measurements will be made in accordance with TxDoT Test Method Tex-115-E, "Field Method for Determination of In-Place Density of Soils and Base Materials".

After each layer of earth embankment or select material is complete, tests, as necessary, will be conducted as directed by the Engineer or designated representative. If the material fails to meet the density specified, the course shall be reworked as necessary to obtain the specified compaction.

C. Rock Embankments

Rock embankments shall be defined as those composed principally of rock and shall be constructed of accepted material from approved sources. Rock embankments shall not be placed immediately adjacent to structures.

Except as otherwise indicated on the Drawings, rock embankments shall be constructed in successive layers of 18 inches (450 mm) or less in thickness for the full width of the cross section. When, in the opinion of the Engineer or designated representative, the rock sizes necessitate a greater thickness of layer than specified, the layer thickness may be increased as necessary, but in no case shall the thickness of layer exceed 2½ feet (750 mm). Each layer shall be constructed by starting at one end and dumping the rock on top of the layer being constructed then pushing the material ahead with a bulldozer in such a manner that the larger rock will be placed on either the ground or the preceding embankment layer. Each layer shall be constructed in such a manner that the interstices between the larger stones are filled with small stones and spalls which have been created by this operation and from the placement of succeeding layers of material.

The maximum dimension of any rock used in embankment shall be less than the thickness of the embankment layer and in no case shall any rock over 2 feet (600 mm) in its greatest dimension be placed in the embankment, unless otherwise approved by the Engineer or designated representative. All oversized rocks, which are otherwise suitable for construction, shall be broken to the required dimension and utilized in embankment construction where indicated. When preferred by the Contractor and acceptable to the Engineer or designated representative, oversized rocks may be placed at other locations where the embankment layer is of greater depth, thus requiring less breakage.

Each layer shall be compacted to the required density as outlined for "Earth Embankments", above, except in those layers where rock will make density testing difficult, the Engineer or designated representative may accept the layer by visual inspection or proof rolling conforming to Specification Item No. 236S, "Proof Rolling)".

Unless otherwise indicated, the upper 3 feet (1 meter) of the embankment shall not contain stones larger than 4 inches (100 mm) in their greatest dimension and shall be composed of material so graded that the density and uniformity of the surface layer may be secured in accordance with TxDoT Test Method Tex-114-E.

Exposed oversize material shall be broken up or removed.

D. At Culverts and Bridges

Embankment materials, which are to be placed adjacent to culverts and bridges and cannot be compacted by the blading and rolling equipment that was used in compacting the adjoining sections of embankment, shall be compacted in the manner prescribed under Item No. 401, "Structural Excavation and Backfill".

Embankment constructed around 'spill through' type abutments shall be constructed in 6 inch (150 mm) loose layers of a uniform suitable material and shall be placed so as to maintain approximately the same elevation on each side of the abutment. All materials shall be mixed, wetted and compacted as specified above. Embankment material placed adjacent to any portion of a structure or above the top of any culvert or similar structure shall be free of any appreciable amount of gravel or stone particles and shall be thoroughly compacted by mechanical compaction equipment.

132S.4 Measurement

All accepted embankment, when included in the contract as a separate pay item, will be measured in place and the volume computed in cubic yards (cubic meters: 1 cubic meter is equal to 1.196 cubic yards) by the method of average end areas. No allowance shall be made for shrinkage.

132S.5 Payment

The work and materials presented herein will generally not be paid for directly, but shall be included in the unit price bid for the item of construction in which this item is used. However, when specified in the contract bid form as a separate pay item, it shall be paid for at the contract unit bid price for "Embankment". The bid price shall include full compensation for all work herein specified, including the furnishing of all materials, (except "Borrow" when paid as a separate bid item) compaction, equipment, tools, labor, water for sprinkling, proof rolling and incidentals necessary to complete the work.

Payment, when included in the contract as a separate pay item, will be made under:

Pay Item No. 132S-A:	Embankment	Per Cubic Yard.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Specification 132S, "EMBANKMENT"	
City of Austin Standard Specifications	
Designation	Description
Item No. 101S	Preparing Right-of-way
Item No. 102S	Clearing and Grubbing
Item No. 104S	Removing Portland Cement Concrete

Item No. 110S	Street Excavation
Item No. 111S	Excavation
Item No. 130S	Borrow
Item No. 201S	Subgrade Preparation
Item No. 236S	Proof Rolling
Item No. 401	Structural Excavation and Backfill
Item No. 610S	Preservation of Trees and Other Vegetation
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
Tex-103-E	Determination of Moisture Content of Soil Materials
Tex-104-E	Determination of Liquid Limit of Soils
Tex-105-E	Determination of Plastic Limit of Soils
Tex-106-E	Method of Calculating the Plasticity Index of Soils
Tex-107-E	Determination of Bar Linear Shrinkage of Soils
Tex-114-E	Laboratory Compaction Characteristics and Moisture-Density Relationship of Subgrade & Embankment Soil
Tex-115-E	Field Method for Determination of In-Place Density of Soils and Base Materials

RELATED CROSS REFERENCE MATERIALS	
Specification 132S, "EMBANKMENT	
City of Austin Standard Contract Documents	
Designation	Description
00700	General Conditions
City of Austin Standard Specifications	
Designation	Description
Item No. 230S	Rolling (Flat Wheel)
Item No. 232S	Rolling (Pneumatic Tire)
Item No. 234S	Rolling (Tamping)
Item No. 602S	Sodding for Erosion Control
Item No. 604S	Seeding for Erosion Control
Item No. 622S	Diversion Dike
Item No. 628S	Sediment Containment Dikes
Item No. 642S	Silt Fence
City of Austin Standard Details	
Designation	Description
No. 610S-1	Tree Protection Fence Locations
No. 610S-2	Tree Protection Fence, Type B Chainlink
No. 610S-3	Tree Protection Fence, Type B Wood
No. 610S-4	Tree Protection Fence, Modified Type A
No. 610S-5	Tree Protection Fence, Modified Type B
No. 621S-1	Diversion
No. 622S-1	Diversion Dike
No. 624S-1	Earth Outlet Sediment Trap

No. 625S-1	Grade Stabilization Structure
No. 627S-1	Grass Lined Swale
No. 627S-2	Grass Lined Swale With Stone Center
No. 628S	Triangular Sediment Filter Dike
No. 628S-1	Hay Bale Dike
No. 629S-1	Brush Berm
No. 630S-1	Interceptor Dike
No. 631S-1	Interceptor Swale
No. 632S-1	Storm Inlet Sediment Trap
No. 633S-1	Landgrading
No. 634S-1	Level Spreader
No. 635S-1	Perimeter Dike
No. 636S-1	Perimeter Swale
No. 637S-1	Pipe Slope Drain (Flexible)
No. 637S-2	Pipe Slope Drain (Flexible)
No. 638S-1	Pipe Outlet Sediment Trap
No. 639S-1	Rock Berm
No. 641S-1	Stabilized Construction Entrance
No. 642S-1	Silt Fence
No. 643S-1	Stone Outlet Structure
No. 644S-1	Stone Outlet Sediment Trap
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item No. 100	Preparing Right-of-way
Item No. 110	Excavation
Item No. 132	Embankment
Item No. 158	Specialized Excavation Work
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item No. 160	Furnishing and Placing Topsoil
Item No. 164	Seeding for Erosion Control
Item No. 204	Sprinkling
Item No. 210	Rolling (Flat Wheel)
Item No. 211	Rolling (Tamping)
Item No. 213	Rolling (Pneumatic Tire)
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
Tex-103-E	Determination of Moisture Content of Soil Materials
Tex-107-E	Determination of Bar Linear Shrinkage of Soils

ITEM NO. 203S LIME TREATMENT FOR MATERIALS IN PLACE 9-14-21

203S.1 Description

This item shall govern the preparation and treatment of the subgrade, existing subbase or existing base by pulverizing the existing materials; furnishing and applying lime; mixing; mellowing for a minimum of 12 hours and compacting the mixed material to the required depth and density. This item applies to treatment of natural ground, embankment or existing pavement structure and shall be constructed as specified herein and in conformity with the typical sections, lines and grades on the drawings or as directed by the Engineer or designated representative. If the type of lime to be placed is not indicated on the drawings, the Contractor shall use Type B, Commercial Lime Slurry or Type C quick lime pebbles for all applications on areas larger than 100 square feet (10 square meters).

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text inch-pound units are given preference followed by SI units shown within parentheses.

203S.2 Submittals

The submittal requirements of this specification item may include:

A. Mix design information (Transportation Criteria Manual Section 3.2.1.A, "Lime Stabilization"),

B. Type of lime and rate of lime application, and

C. Equipment proposed for use in proof rolling, pulverizing, mixing, placement and compaction operations.

203S.3 Materials

A. Lime

The lime shall meet the requirements of Item No. 202S, "Hydrated Lime and Lime Slurry" for the type of lime specified in the drawings or as directed by the Engineer or designated representative.

When Type B, Commercial Lime Slurry, is specified, the Contractor shall select the "Dry Solids" content to be used in the slurry prior to construction and shall notify the Engineer in writing 5 working days before changing the "Dry Solids" content.

When dry placement of Type C quicklime pebbles are indicated on the Drawings or approved by the Engineer or designated representative, the pebbles shall conform to TxDOT Grade DS (TxDOT Specification Item 264) and shall have a gradation suitable for dry placement.

If lime is furnished in bags, each bag shall bear the manufacturer's certified weight (mass). Bags varying more than 5 percent from that weight (mass) may be rejected and the average weight (mass) of bags in any shipment, as shown by weighing 10 bags selected at random, shall not be less than the manufacturer's certified weight (mass).

B. Water

The water shall meet the material requirements of Standard Specification Item No. 220S, "Sprinkling for Dust Control".

C. Asphalt

The asphalt shall conform to the requirements of Standard Specification Item No. 301S, "Asphalts, Oils and Emulsions"

203S.4 Equipment

The pulverizing, mixing and proof rolling machinery, tools and equipment, which are necessary for the proper execution of the work, shall be approved by the Engineer or designated representative. The equipment shall be located on the project site prior to the initiation of construction operations.

During the conduct of the Work all in-use machinery, tools and equipment shall be maintained in a satisfactory manner.

Hydrated lime shall be stored and handled in closed, weatherproof containers up to the time that mixing is initiated to form a slurry for distribution on the areas to be treated. If storage bins are used, they shall be completely enclosed. Hydrated lime in bags shall be stored in weatherproof buildings with adequate protection from ground dampness.

If lime is furnished in trucks, each truck shall have the weight (mass) of lime certified on public scales or the Contractor shall place a set of standard platform truck scales or hopper scales at a location approved by the Engineer or designated representative.

203S.5 Construction Methods

A. General

Prior to commencement of the work, all required erosion control and tree protection measures shall be in place and the utilities located and protected as specified in the City of Austin Standard Contract Document Section 00700, "General Conditions". Construction equipment shall not be operated within the drip line of trees unless otherwise indicated on the drawings or directed by the Engineer or designated representative. Construction materials shall not be stockpiled under the canopies of trees. Excavation or embankment materials shall not be placed within the drip line of trees until appropriate tree wells are constructed.

The placement of lime shall not be allowed to adversely impact vegetation, drainageways or waterways, storm water inlets or overflow channels. Structures shall be screened, blocked or protected to prevent lime from entering any structure or waterway.

It is the primary requirement of this specification to secure a completed course of treated material, which contains a uniform lime mixture at the rate specified on the drawings or directed by the Engineer or designated representative, is free from loose or segregated areas, exhibits uniform density and moisture content, is well bound for its full depth and displays a smooth surface suitable for placement of subsequent courses. It shall be the responsibility of the Contractor to: regulate the sequence of his work, use the proper amount of lime, maintain the work and rework the courses as necessary to meet the above requirements.

B. Preparation of Subgrade or Existing Base.

Unless indicated otherwise on the drawings or directed otherwise by the Engineer or designated representative, the Contractor shall proof roll the roadbed/subgrade in accordance with Standard Specification Item No. 236S, "Rolling (Proof)" prior to pulverization or scarification of the existing material and/or subgrade. Any unstable or spongy subgrade areas identified by proof rolling shall be corrected either by additional re-working, drying and compaction, or by removal and replacement of unsuitable materials. When specifically directed by the Engineer or designated representative, the Contractor shall re-work the subgrade in accordance with Section 201S.3, "Construction Methods" of Standard Specification Item No. 201S, "Subgrade Preparation."

Prior to treatment of existing material and/or subgrade the layer to be treated shall be constructed shaped to conform to the typical sections, lines and grades as indicated on the Drawings or as established by the Engineer or designated representative. This work shall be done in accordance with the provisions of applicable bid items. When shown on the Drawings, any existing asphaltic concrete pavement shall be removed and the work will be paid for in accordance with the applicable bid items.

When the Contractor elects to use a cutting and pulverizing machine that will process the material to the specified depth, the Contractor will not be required to excavate to the secondary grade or windrow the material. This method will be permitted only if a machine is provided, which will insure that the material is cut uniformly to the proper depth and which has cutters that will plane the secondary grade to a uniform surface over the entire width of the cut. The machine shall provide a visible indication of the depth of cut at all times.

The material, either before or after lime is applied, shall be excavated to the secondary grade (i.e. proposed depth of lime treatment) and removed or windrowed to expose the secondary grade. The secondary grade shall be blue topped at the edge, 1/4 points and along the centerline at not more than 50-foot (15.25 meters) centers. Any wet or unstable materials, located below the secondary grade, shall be corrected, as directed by the Engineer or designated representative, by removing the unstable material or by scarifying, adding lime and compacting until uniform stability is attained.

The Contractor shall instruct their crews in the proper handling of lime to ensure that the workers and the public are adequately protected during lime handling and application operations.

C. Premixing Surface

When any material is uncovered during the premixing operation that exhibits properties different from the anticipated material, the Engineer or designated representative shall secure a sample of the material for appropriate testing to establish a suitable rate of lime application for the material.

D. Lime Application

The percentage of lime to be added by weight (mass) in pounds per square yard (kilograms per square meter) shall be as directed in this document or in accordance with the Lime mix design indicated on the Drawings and may be varied by the Engineer or designated representative if conditions warrant.

Unless otherwise approved by the Engineer or designated representative, the lime operation shall not be started when the air temperature is below 41oF (5oC) and falling, but may be started when the air temperature is above 35oF (2oC) and rising. The temperature will be taken in the shade and away from artificial heat.

Lime shall not be placed when weather conditions in the opinion of the Engineer or designated representative are unsuitable.

Lime shall only be applied to those areas that can be properly processed during the same working day.

The application and mixing of lime with the existing material shall be accomplished by the methods hereinafter described as "Dry Placement" or "Slurry Placement." Dry placement will only be permitted for small isolated areas as indicated on the drawings or as directed by the Engineer or designated representative. The minimum rate of lime solids application shall be seven (7) percent by weight (mass), unless indicated otherwise on the Drawings or as directed by the Engineer or designated representative.

Any lime exposed to the air for more than six (6) hours and any lime lost or damaged before application due to rain, wind or other cause will be rejected and replaced by the Contractor at its own expense.

1. Dry Placement

The lime shall be spread by a spreader approved by the Engineer or designated representative or by bag distribution at the rates shown on the Drawings or as directed by the Engineer or designated representative.

The lime shall be distributed at a uniform rate and in such manner as to reduce the scattering of lime by wind. Lime shall not be applied when the wind conditions, in the opinion of the Engineer or designated representative, are such that blowing lime becomes objectionable to adjacent property owners or dangerous to traffic. A motor grader will not be used to spread Type A Hydrated lime but may be used to spread Type C Quicklime Grade "DS" pebbles.

The material shall be sprinkled, as approved by the Engineer or designated representative, until the proper moisture content has been secured.

2. Slurry Placement

The lime shall be mixed with water in a mixer or trucks with approved distributors to form a slurry with a solids content approved by the Engineer or designated representative. Application of the slurry shall be attained by successive passes over a measured section of roadway until the proper moisture and lime content has been secured. The distributor truck shall be equipped with an agitator, which will keep the lime and water in a uniform mixture.

E. Mixing

The mixing procedure shall be the same for "Dry Placement" or "Slurry Placement" as herein described.

During the interval of time between application and mixing, hydrated lime that has been exposed to the open air for a period of 6 hours or more or to excessive loss due to washing or blowing will not be accepted and the area shall be retreated.

In addition to the above, when Type C Quicklime, Grade "DS", is used under "Dry Placing", the material and lime shall be mixed as thoroughly as possible at the time of the lime application. Sufficient moisture shall be added during the mixing to hydrate the quicklime. After mixing, and prior to compaction, the mixture of material, quicklime and water, shall be moist cured for two (2) to seven (7) days, as approved by the Engineer or designated representative. After curing, mixing shall continue until the material and lime are thoroughly blended to the satisfaction of the Engineer or designated representative.

The material and lime shall be thoroughly mixed by road pulverizer equipment approved by the Engineer or designated representative. The material and lime shall be brought to the proper moisture content and the mixing shall be continued until a homogeneous, friable mixture of material and lime is obtained. The lime-material mixture shall be free from all clods or lumps so that, when all nonslaking aggregates retained on the #4 (4.75 mm) sieve are removed, the remainder of the material shall meet the following pulverization requirements, when tested in accordance with TxDOT Test Method Tex-101-E, Part III:

	Percent
Minimum Passing the 1¾ inch (45 mm) Sieve	100
Minimum Passing the ¾ inch (19 mm) Sieve	85
Minimum Passing the No. 4 (4.75 mm) Sieve	60

When the lime-material mixture satisfies the requirements above, the mixture shall be allowed to "mellow" for a minimum of 12 hours prior to the initiation of compaction.

F. Compaction

Prior to initiation of compaction, the material shall be aerated or sprinkled as necessary to provide the optimum moisture. The lime-conditioned materials shall then be shaped and uniformly compacted to the sections; lines and grades indicated on the drawings or as directed by the Engineer or designated

representative. Compaction shall continue until the entire depth of mixture is uniformly compacted as shown on the Drawings, as specified herein, or as directed by the Engineer or designated representative.

When shown on the Drawings or approved by the Engineer or designated representative, multiple lifts will be permitted; however the 12-hour "mellowing" procedure is required for each lift. Individual lift thickness should not exceed 8 inches (200 mm).

The course shall be sprinkled as required and compacted to the extent necessary to provide the density specified below:

Description	Density, Percent
For lime-conditioned subgrade, existing subbase or existing base that will receive subsequent subbase or base courses.	Not less than 95% of 'optimum density' or as otherwise indicated on the drawings.
For lime-conditioned existing base that will receive surface courses	Not less than 98% of 'optimum density' or as otherwise indicated on the drawings.

Testing for the 'optimum density' used for compaction control shall conform to TxDOT Test Method Tex-113-E. In addition to the requirements specified for density, the full depth of the material indicated shall be compacted to the extent necessary to remain firm and stable under construction equipment. After each section is completed and proof rolled in accordance with Specification Section No. 236S, in place compaction tests will be conducted, as necessary, by the Engineer or designated representative in accordance with TxDOT Test Method, Tex 115-E. If the material fails to meet the density requirements, it shall be reworked as necessary to meet these requirements. Throughout the entire operation the shape of the course shall be maintained by blading and the surface upon completion shall be smooth and in conformity with the typical sections, lines and grades as shown on the Drawings or as established by the Engineer or designated representative.

If the lime-conditioned material, due to any reason or cause, loses the required stability, density and finish before the next course is placed, it shall be re-compacted and refinished at the sole expense of the Contractor.

G. Reworking a Section

When a section is reworked within 72 hours after completion of compaction, the Contractor shall rework the section to provide the required compaction. When a section is reworked more than 72 hours after completion of compaction, the Contractor shall add 25 percent of the original specified rate of lime application during the reworking operation.

Reworking shall include loosening, road mixing as approved by the Engineer or designated representative, compacting and finishing. When a section is reworked, a new optimum density will be determined from the reworked material in accordance with TxDOT Test Method Tex-113-E.

203S.6 Finishing, Curing and Preparation for Surfacing

After the final layer or course of the lime conditioned subgrade, subbase or base has been compacted, it shall be brought to the required lines and grades in accordance with the typical sections indicated on the drawings. The completed section shall then be "finished off" by rolling with a pneumatic tire or other suitable roller, approved by the Engineer or designated representative, that is sufficiently light in loading to prevent hair cracking.

The Contractor shall set blue tops at edges, 1/4 point, and along the centerline at not more than 50 foot (15.25 meter) spacing. The completed section shall be maintained in a moist cured condition for a minimum of 3 days either by maintenance of moist conditions by water sprinkling or by the prevention of moisture loss due to drying

by the addition of an asphalt prime coat as indicated on the drawings or as directed by the Engineer or designated representative at the rate of 0.05 to 0.20 gallons per square yard (0.2 to 0.9 liters per square meter) before further courses are added or any through traffic is permitted, unless otherwise directed by the Engineer or designated representative. Curing shall continue for a minimum of seven (7) days before further courses are added or traffic is permitted access, unless a shorter curing period is approved by the Engineer or designated representative.

If the drawings require the lime-conditioned material to be sealed or covered by other courses of material, the seal or other course shall be applied within 14 days after final mixing is completed, unless otherwise directed by the Engineer or designated representative. If the 14 day limit cannot be achieved because of insufficient strength gain or other problem with the lime-treated layer, the Contractor shall rework the section in accordance with Section 203S.5(G) above.

203S.7 Sampling and Testing

The lime-conditioned mixture shall be tested daily at the Project site for conformance to specification requirements. The Engineer or designated representative shall determine sample locations based on the Contractor's anticipated production. Each day's anticipated production shall be sectioned into three (3) equal, single-pass, sub-area lots. Each day's sample locations shall be equally distributed over the three (3) sub-areas. Also, no more than one location of the three (3) sub-areas is to be located in an irregular shaped area such as a cul-de-sac.

When, in the opinion of the Engineer or designated representative, test results appear unrepresentative, additional testing may be authorized. Retesting due to failures or to resolve unrepresentative results will be at the expense of the Contractor and the results of the retesting shall be averaged with the results of the original testing. If the results of retesting indicate that the original testing was erroneous, the original test results will be discarded.

The Engineer will obtain samples of completed work to conduct the following tests:

Testing Requirement	TxDOT Test Procedure
Optimum Moisture Density	Test Method Tex-113E
In-Place Density of Lime Conditioning	Test Method Tex 115-E
Thickness of Lime Conditioning	Test Method Tex-140-E & Tex-600-J
PI Reduction	Test Method Tex-106-E

The contractor shall repair areas disturbed while obtaining samples.

203S.8 Tolerances

A. In-Place Density

The Work may be accepted provided no more than one (1) out of the most recent five (5) density tests performed is below the specified density, provided that the failing test is not more than three (3) pounds per cubic foot (50 kilograms per cubic meter) below the specified density.

B. Dimensional

Areas of lime conditioning which do not meet the tolerances specified below will be delineated and shall be corrected to drawing dimensions by scarifying, remanipulating and recompacting the deficient areas at the Contractor's sole expense.

1. Thickness Requirements:

Under thickness shall not exceed ¾ inch (19 mm). Overthickness will be waived at no additional cost to the City.

2. Widths Requirements:

   Roadway under width shall not exceed six (6) inches (150 mm). Shoulder underwidth shall not exceed three (3) inches (75 mm). If lime conditioning for both roadway and shoulder is constructed at the same time, the 6-inch (150 mm) underwidth tolerance shall apply. Overwidth will be waived at no additional cost to the City.

203S.9 Measurement

When lime is furnished in trucks, the weight of lime will be determined on certified scales, or the Contractor must provide a set of standard platform truck scales at a location approved by the Engineer.

When lime is furnished in bags, each bag must indicate the manufacturer's certified weight. Bags varying more than 5% from that weight may be rejected. The average weight of bags in any shipment, as determined by weighing 10 bags taken at random, must be at least the manufacturer's certified weight.

1. Hydrated Lime.
   a. Dry. Lime will be measured by the ton (dry weight).
   b. Slurry. Lime will be measured by the ton (dry weight) of the hydrated lime used to prepare the lime slurry at the jobsite.
2. Commercial Lime Slurry. Lime slurry will be measured by the ton (dry weight) as calculated from the minimum percent dry solids content of the slurry, multiplied by the weight of the slurry in tons delivered.
3. Quicklime.
   a. Dry. Lime will be measured by the ton (dry weight).
   b. Slurry. Lime slurry will be measured by the ton (dry weight) of the quicklime used to prepare the slurry, multiplied by a conversion factor of 1.28 to give the quantity of equivalent hydrated lime, which will be the basis of payment.

"Lime Treated Subgrade," "Lime Treated Existing Subbase" and Lime Treated Existing Base," of the type, grade and rate of application on the subgrade, existing subbase and existing base shall be measured by the square yard (square meter: 1 square yard equals 0.836 square meters) to neat lines as shown on the typical sections.

Source: Rule No. R161-21.17, 9-14-2021.

203S.10 Payment

Work performed and materials furnished as prescribed by this item and measured as provided under "Measurement" will be paid for as follows:

"Lime" will be paid for at the unit bid price per ton. The unit bid prices for "Lime" shall include full compensation for: furnishing all materials; all freight involved; public scales weighing charges or furnishing scales and labor involved in weighing the material.

"Lime Treated Subgrade," "Lime Treated Existing Subbase" and "Lime Treated Existing Base" will be paid for at the unit bid price per square yard. The unit bid prices for "Lime Treated Subgrade," "Lime Treated Existing Subbase" and "Lime Treated Existing Base" shall include full compensation for preparing the roadbed; loosening, mixing, pulverizing, spreading, drying, application of lime, sprinkling, rolling, shaping, proof rolling, maintenance and all manipulations, reworking, labor, equipment, fuels, tools and incidentals necessary to complete the work.

Payment will be made under one of the following:

Pay Item No. 203S-L:	Lime	Per Ton.
Pay Item No. 203S-A:	Lime Treated Subgrade, (___ in. Thick)	Per Square Yard.
Pay Item No. 203S-B:	Lime Treated Existing Subbase, (___ in. Thick)	Per Square Yard.
Pay Item No. 203S-C:	Lime Treated Existing Base, (___ in. Thick)	Per Square Yard.

Source: Rule No. R161-21.17, 9-14-2021.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Specification 203S, "Lime Treatment for Materials in Place"	
City of Austin Contract Documents	
Designation	Description
Section 00700	General Conditions
City of Austin Standard Specifications	
Designation	Description
Item No. 202S	Hydrated Lime and Lime Slurry
Item No. 220S	Sprinkling for Dust Control
Item No. 236S	Proof Rolling
Item No. 301S	Asphalts, Oils and Emulsions
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
Tex-101-E, Part III	Preparation of Soil and Flexible Base Materials for Testing
Tex-106-E	Methods of Calculating the Plasticity Index of Soils
Tex-114-E	Laboratory Compaction Characteristics & Moisture Density Relationship of Subgrade & Embankment Soil
Tex-115-E	Field Method for Determination of In-Place Density of Soils & Base Materials
Tex-121-E, Part II	Soil Lime Testing
Tex-140-E	Measuring Thickness of Pavement Layer
Tex-600-J	Sampling and Testing of Hydrated Lime, Quicklime and Commercial Lime Slurry

RELATED CROSS REFERENCE MATERIALS	
Specification 203S, "Lime Treatment for Materials in Place"	
City of Austin Standard Specifications	
Designation	Description
Item No. 101S	Preparing Right-of-Way
Item No. 102S	Clearing and Grubbing
Item No. 110S	Street Excavation
Item No. 111S	Excavation
Item No. 130S	Borrow
Item No. 132S	Embankment
Item No. 210S	Flexible Base
Item No. 230S	Rolling (Flat Wheel)

Item No. 232S	Rolling (Pneumatic Tire)
Item No. 306S	Prime Coat
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item No. 100	Preparing Right-of-Way
Item No. 110	Excavation
Item No. 112	Subgrade Widening
Item No. 132	Embankment
Item No. 150	Blading
Item No. 158	Specialized Excavation Work
Item No. 204	Sprinkling
Item No. 210	Rolling (Flat Wheel)
Item No. 211	Rolling (Tamping)
Item No. 213	Rolling (Pneumatic Tire)
Item No. 264	Lime and Lime Slurry
Item No. 300	Asphalts, Oils and Emulsions
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
Tex-103-E	Determination of Moisture Content in Soil Materials
Tex-104-E	Determination of Liquid Limit of Soils
Tex-105-E	Determination of Plastic Limit of Soils

ITEM NO. 210S FLEXIBLE BASE 2-24-10

210S.1 Description

This item governs furnishing and placing a crushed stone base course for surfacing, pavement, or other base courses. "Flexible Base" shall be constructed on an approved, prepared surface in one or more courses conforming to the typical sections and to the lines and grades, indicated on the Drawings or established by the Engineer or designated representative.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text and accompanying tables, the inch-pound units are given preference followed by SI units shown within parentheses.

210S.2 Submittals

The submittal requirements of this specification item may include:

A. Source, gradation and test results for the crushed limestone material,

B. Notification that the crushed limestone stockpile is completed and ready for testing, and

C. Field density test results for in-place compacted flexible base,

210S.3 Material

A. Mineral Aggregate

The material shall be crushed argillaceous limestone meeting the requirements specified herein. The material shall be from sources approved by the City and shall consist of durable crushed stone that has been screened to the required gradation.

Flexible base materials shall be tested according to the following TxDoT standard test methods:

a) Preparation for Soil Constants and Sieve Analysis	Tex-101-E
b) Liquid Limit	Tex-104-E
c) Plastic Limit	Tex-105-E
d) Plasticity Index	Tex-106-E
e) Sieve Analysis	Tex-110-E
f) Wet Ball Mill	Tex-116-E
g) Triaxial Test	Tex-117-E, Part II

1. Plasticity Index shall be determined in accordance with Tex-107-E (Linear Shrinkage) when liquid limit is unattainable as defined in Tex-104-E.

2. When a soundness value is required on the drawings, the material shall be tested in accordance with Tex-411-A.

Base material shall be stockpiled after crushing, then tested by the City's designated laboratory and approved by the Engineer or designated representative prior to being hauled to the Project.

The material shall be well graded and shall meet the following requirements:

Sieve Designation	Other Requirements	% Retained	

US	SI			
1¾″	45 mm		0	
⅞″	22.4 mm		10—35	
⅜′	9.5 mm		30—50	
#4	4.75 mm		45—65	
#40	425 µm		70—85	
		Maximum Plasticity Index		10
		Maximum Wet Ball Mill		42
Maximum Increase in passing #40 (425 µm) sieve from Wet Ball Mill Test			20	

Minimum compressive strength when subjected to the triaxial test shall be 35 psi at 0 psi lateral pressure [240 kiloPascal (kPa) at 0 kPa lateral pressure] and 175 psi at 15 psi lateral pressure [1200 kiloPascal (kPa) at 100 kPa lateral pressure].

B. Asphaltic Material

Prime Coat. Prime Coat shall conform to the requirements of Standard Specification Item 306S, "Prime Coat", except for measurement and payment.

210S.4 Stockpiling, Storage and Management

A. Managing Material:

The stockpile shall be constructed on a relatively smooth area that has been cleared of debris, weeds, brush, trees and grass. Stockpiles shall contain between 25,000 and 50,000 cubic yards (19,100 to 38,200 cubic meters). The stockpile shall be constructed using scrapers, bottom dumps or other similar equipment that allows dumping and spreading without rehandling. The stockpile shall be constructed to allow dumping and spreading in one direction only. The height of the stockpile shall not exceed the capabilities of available equipment to make a full cut (bottom to top) on any of the four sides.

A stockpile shall be completed before being tested by the City. The Contractor's supplier shall notify the City when a stockpile has been completed and is ready to be tested. The stockpile shall not be added to after it has been tested.

The Contractor shall provide material only from stockpiles that have been inspected, tested and accepted by the City. A ticket showing the date, source, stockpile number, and net weight (mass) shall be provided to the Inspector with each load of material delivered to the Project.

Material shall be loaded from the stockpile by making successive vertical cuts through its entire depth.

B. Test Sampling:

The Contractor's supplier may choose the method of sample gathering for testing by the City's laboratory as follows:

1. The supplier shall make a full-height cut a sufficient distance into each side of the stockpile to obtain a uniform sample. The four samples (one from each side of the stockpile) shall then be combined and mixed into a single "test" specimen from which the City's laboratory can obtain a sample.

2. As the stockpile is constructed, a perpendicular cut will be made across the spreading direction at every two feet to four feet (0.6 to 1.2 meters) of height and the sample used to start a "mini" stockpile. The process shall be repeated in two feet to four feet (0.6 to 1.2 meter) increments of height, until the stockpile and the "mini" stockpile are completed. Samples shall be obtained from the "mini" stockpile in the same manner described in (1) above.

C. Testing and Acceptance:

When initial tests indicate that the material is unacceptable, the City may, if requested by the Contractor's supplier, sample and test the material one more time. The additional sampling and testing shall be paid for by the supplier.

210S.5 Construction Methods

A. Preparation of Subgrade:

Flexible base shall not be placed until the Contractor has verified by proof rolling that the subgrade has been prepared and compacted in conformity with Standard Specification Item 201S, "Subgrade Preparation," to the typical sections, lines and grades indicated on the Drawings. Any deviation shall be corrected and proof rolled prior to placement of the flexible base material.

The Contractor shall not place flexible base until the subgrade has cured to the satisfaction of the Engineer or designated representative, regardless of whether or not the subgrade has been successfully proof rolled. As a minimum, this will be after the surface displays no damp spots and there is no evidence of "sponginess" in the subgrade.

B. First Lift:

Immediately before placing the flexible base material, the subgrade shall be checked for conformity with grade and section. The thickness of each lift of flexible base shall be equal increments of the total base depth. No single lift shall be more than six inches (150 mm) or less than three inches (75 mm) compacted thickness.

The material shall be delivered in approved vehicles. It shall be the responsibility of the Contractor to deliver the required amount of material. If it becomes evident that insufficient material was placed, additional material as necessary shall be delivered and the entire course scarified, mixed and compacted.

Material deposited upon the subgrade shall be spread and shaped the same day unless otherwise approved by the Engineer or designated representative. In the event inclement weather or other unforeseen circumstances render spreading of the material impractical, the material shall be spread as soon as conditions allow.

Additionally, if the material cannot be spread and worked the same day it is deposited, the Contractor shall "close up" the dump piles before leaving the job site. "Closed up" shall be defined as the use of a motor grader to blade all dump piles together, leaving no open space between piles.

The material shall be spread, sprinkled, if required, then thoroughly mixed; bladed, dragged and shaped to conform to the typical sections indicated on the Drawings.

All areas and "nests" of segregated coarse or fine material shall be corrected or removed and replaced with well-graded material.

Each lift shall be sprinkled as required to bring the material to optimum moisture content, then compacted to the extent necessary to provide not less than the percent density specified in Section 210S.5.D, "Density." In addition to the requirements specified for density, the full depth of flexible base material shall be compacted to the extent necessary to remain firm and stable under construction equipment. After each section of flexible base material is completed, tests, as necessary, will be made by the Engineer or designated representative. As a minimum, three in-place density tests per section per day will be taken. If the material fails to meet the density requirements, it shall be reworked as necessary to meet these requirements. All initial testing will be paid for by the City. All retesting shall be paid for by the Contractor.

Throughout the entire operation, the surface of the material shall be maintained by blading and, upon completion, shall be smooth and shall conform to the typical section indicated on the Drawings and to the established lines and grades.

In that area on which pavement is to be placed, any deviation in excess of 1/4 inch (6.5 mm) in cross section or 1/4 inch in a length of 16 feet (6.5 mm in a length of 5 meters) measured longitudinally shall be corrected by loosening, adding or removing material, and by reshaping and recompacting. All irregularities, depressions or weak spots shall be corrected immediately by scarifying the areas affected, adding suitable material as required, and by reshaping and recompacting. Should the lift, due to any reason or cause, lose the required stability, density and/or finish before the surfacing is complete, it shall be recompacted and refinished at the Contractor's expense.

C. Succeeding Lifts:

Construction methods for succeeding lifts shall be the same as prescribed for the first lift. For that lift of the flexible base upon which the curb and gutter will be constructed, as well as the last flexible base lift (i.e. top of the flexible base), the Contractor shall check the surface of the lift for conformity to the lines and grades by setting "blue tops" at intervals not exceeding 50 feet (15 meters) on the centerline, at quarterpoints, at curb lines or edge of pavement, and at other points that may be indicated on the Drawings.

When the thickness of a particular lift of the flexible base is in question, the Contractor shall check the surface of the lift for conformity to the lines and grades by setting "blue tops" at intervals not exceeding 50 feet (15 meters) on the centerline, at quarter points, at curb lines or edge of pavement, and at other points that may be indicated on the Drawings

D. Density:

The flexible base shall be compacted to not less than 100 percent density as determined by TxDoT Test Method Tex-113-E.

Field density determination shall be made in accordance with TxDoT Test Method Tex-115-E unless otherwise approved by the Engineer or designated representative. Each lift of the flexible base shall also be tested by proof rolling in conformity with Standard Specification Item 236S "Proof Rolling."

E. Priming:

After the flexible base material has been compacted to not less than 100 percent density, and tested by proof rolling, a prime coat will be applied in accordance with Standard Specification Item 306S, "Prime Coat."

F. Curing:

Pavement materials, such as a tack coat or surface course, shall not be placed on the primed surface until the prime coat has been absorbed into the base course. At least 24 hours, or longer if designated by the Engineer or designated representative, shall be allowed when cutback asphalt is used as the prime coat.

210S.6 Measurement

"Flexible Base" will be measured by the cubic yard (cubic meter: 1 cubic meter equals 1.196 cubic yards), complete in place, as indicated in the Contract Documents.

210S.7 Payment

This item will be paid for at the contract unit bid price for "Flexible Base". The unit bid price shall include full compensation for all work specified herein, including the furnishing, hauling, placing and compacting of all materials; for rolling, proof rolling, recompacting and refinishing; for all water required; for retesting as necessary; for priming; and for all equipment, tools, labor and incidentals necessary to complete the Work.

Prime coat will not be measured nor paid for directly but shall be inculded in the unit price bid for Standard Specification Item 210S, "Flexible Base."

Payment will be made under one of the following:

Pay Item No. 210S-A:	Flexible Base	Per Cubic Yard.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Specification 210S, "Flexible Base"	
City of Austin Standard Specifications	
Designation	Description
Item No. 201S	Subgrade Preparation
Item No. 236S	Proof Rolling
Item No. 306S	Prime Coat
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Tex-101-E	Preparation of Soil and Flexible Base Materials for Testing
Tex-104-E	Determination of Liquid Limit of Soils
Tex-105-E	Determination of Plastic Limit of Soils
Tex-106-E	Method of Calculating the Plasticity Index of Soils
Tex-107-A	Determination of Bar Linear Shrinkage of Soils
Tex-110-E	Determination of Particle Size Analysis of Soils
Tex-113-E	Laboratory Compaction Characteristics and Moisture-Density Relationship of Base Materials and Cohesionless Sands
Tex-115-E	Field Method for Determination of In-Place Density of Soils and Base Materials
Tex-116-E	Ball Mill Method for Determination of the Disintegration of Flexible Base Material
Tex-117-E	Triaxial Compression Tests for Disturbed Soils and Base Materials
Tex-411-A	Soundness of Aggregate By Use of Sodium Sulfate or Magnesium Sulfate

RELATED CROSS REFERENCE MATERIALS	
Specification 210S, "Flexible Base"	
City of Austin Standard Details	
Designation	Description
No. 1000S-2	Flexible Base with Asphalt Surface Trench Repair-Existing Pavement
No. 510S-3	Typical Trench with Paved Surface
No. 1000S	Bus Stop Paving
No. 1000S-10	Local Street Sections
No. 1000S-11(1)	Residential and City of Austin Neighborhood Collector Street Sections
No. 1000S-11(2)	Industrial and Commercial Collector Street Sections
No. 1000S-12(1)	Primary Collector Street Sections
No. 1000S-12(2)	Primary Arterial Street Sections
No. 1000S-13(1)	Minor Arterial Street Sections (4 Lanes)
No. 1000S-13(2)	Minor Arterial Street Sections-(4 Lanes divided)

No. 1000S-14	Major Arterial Street Sections
City of Austin Utility Criteria Manual	
Designation	Description
Section 5.8.2	Flexible Base
Section 5.7.3	Flexible Base with Asphalt Surface
Section 5.9.1	Excavation in Alley
City of Austin Transportation Criteria Manual	
Designation	Description
Section 3.2.0	General Criteria
Section 3.4.3.D	Layer Data-Minimum Thickness
Table 3-1	Minimum Layer Thickness
Section 3.4.3.F	Layer Data- Minimum Thickness
Table 3-2	Layer Thickness Increment
Section 3.4.3.J	Layer Data-Stiffness Coefficient
Table 3-3	Stiffness Coefficient
Table 3-9	Recommended Salvage values
Table 3-10	AASHTO Layer Coefficients

ITEM NO. 236S PROOF ROLLING 8-20-07

236S.1 Description

This item shall govern furnishing and operating heavy pneumatic tired compaction equipment for locating unstable areas of embankment, subgrade and flexible base courses.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text, the inch-pound units are given preference followed by SI units shown within parentheses.

236S.2 Submittals

The submittal requirements of this specification item may include:

A. A plan describing the condition of each roller proposed for the work, as well as the type of traction (self propelled or drawn), Type of roller, size, weight, tire pressure (if appropriate) and configuration of each individual roller, and

B. The operating speed proposed for each individual roller.

236S.3 Equipment

A. Standard Proof Roller:

The proof rolling equipment shall have a loading platform or body suitable for ballast loading that is supported on a minimum of two (2) axles with not more than two (2) pneumatic tired wheels per axle. All wheels shall be arranged so that they will carry approximately equal loads when operating on uneven surfaces. Pneumatic proof rolling equipment with multiple pivotal axles and more than two tires along the front or rear axle axis shall have articulating axle supports to equally distribute the load to all tires over uneven surfaces.

The proof roller unit, under working conditions, shall have a minimum contact width of 7½ feet (2.3 meters) and shall be so designed that the gross roller weight may be varied uniformly from 25 tons to 50 tons (23 megagrams to 45 megagrams) by ballast loading. The tires shall be capable of operating under various loads with variable air pressures up to 145 psi (up to 1000 kiloPascals). The tires shall be smooth tread and shall impart a minimum ground contact pressure of 75 pounds per square inch (520 kiloPascals). Tires shall be practically full of liquid (i.e. when liquid will flow from the valve stem of a fully inflated tire with the stem in the uppermost position). The operating load and tire pressure shall be within the range of the manufacturer's chart as directed by the Engineer or designated representative.

The proof roller shall be drawn by a power train of adequate tractive effort or may be of a self-propelled type. The proof rolling equipment shall be equipped with a reverse mode transmission or be capable of turning 180 degrees in the street width. When a separate power train is used to draw the proof roller, the power train weight shall not be considered in the weight of the proof roller. The power train shall be rubber-tired when rolling subgrade and base materials. A cleated or track-type power train may be used on earth and rock embankments.

B. Alternate Equipment:

With the written approval of the Engineer or designated representative, the Contractor may utilize alternate equipment on embankment courses, subgrade and base courses subject to the requirements of the standard proof roller except with respect to minimum contact width, axle/tire arrangement and tire tread.

Alternate equipment for stability testing of embankments shall be restricted to equipment that can be shown to impart a stress distribution on the embankment structure equivalent to or greater than the stress induced by the concentrated weight of a standard proof roller.

C. Equipment Submittals:

All standard proof rollers and proposed alternate equipment must be approved by the Engineer or designated representative prior to their use. The Contractor shall furnish the Engineer or designated representative with charts or tabulations showing the contact areas and contact pressures for the full range of tire inflation pressures and for the full range of loadings for the particular tires furnished.

Alternate equipment submittals for proof rolling of embankments shall be signed and sealed by a registered Professional Engineer licensed in the State of Texas.

236S.4 Construction Methods

A. General:

Within the ranges set forth in Section 236S.3, the load and tire inflation pressures shall be adjusted as directed by the Engineer or designated representative. It is proposed to use a contact pressure corresponding as nearly as practical to the maximum supporting value of the earthwork or base. The entirety of prepared surfaces to be tested by this method shall be proof rolled by a minimum of two passes of the proof roller tires. Each succeeding trip of the proof roller shall be offset by not greater than one tire width.

When alternate equipment is proposed and only one axle meets minimum requirements, only the qualifying axle shall be used to proof roll. If the operation of the proof roller shows an area to be unstable, the substandard area shall be brought to satisfactory stability and uniformity by additional curing, compaction, or by removal and replacement of unsuitable materials. The re-worked area shall then be proof rolled.

Proof rollers shall be operated at speeds between 2 and 6 miles per hour (3 and 10 kilometers per hour) or as directed by the Engineer or designated representative.

Acceptable limits of elastic and plastic deformation of prepared subgrade courses shall be established by proof rolling Test Sections of representative soil conditions, previously tested and approved for density and moisture requirements of the governing subgrade and earth embankment items. Proof rolling of first course base over a plastic subgrade may be waived by the Engineer or designated representative if it is determined that the prepared first course base will be damaged by the proof roller.

B. Roadway Construction:

The subgrade and all lifts of base material shall be proof rolled in new roadway construction and in the reconstruction of existing streets. Proof rolling of the curb course base shall be substituted for proof rolling of final course base at the direction of the Engineer or designated representative. Proof rolling may be waived by the Engineer or designated representative where construction is limited to turn lanes, street widening less than 7½ feet (2.3 meters) in width, or where the site is otherwise congested.

C. Trenches:

Trenches shall be proof rolled where no limitations to the operation of the proof roller exist as may be determined by the Engineer subject to the provisions hereunder.

All trenches shall be proof rolled in new roadways or in existing roadways under reconstruction. Trenches shall be proof rolled at the street subgrade elevation by longitudinal and perpendicular passes of the roller as may be dictated by the width of the trench.

Proof rolling of trenches in existing paved streets shall be limited to pavement cross-sections capable of sustaining the weight of the proof rolling equipment without imparting damage to the remaining pavement

structure as determined by the Engineer. Trenches less than 4 feet (1.2 meters) in width shall be exempted of all proof rolling requirements. Only the final course base shall be proof rolled in trenches 4 feet (1.2 meters) or wider but narrower than the proof roller contact width. The subgrade, the first course and the final course base shall be proof rolled in trenches 7½ feet (2.3 meters) or wider.

D. Embankment Construction:

All embankment courses shall be proof rolled, unless otherwise directed by the Engineer or designated representative.

If required by the Engineer or designated representative, stability testing of embankments constructed to the finished cross-section and elevation or to interim elevations shall either be conducted with a standard proof roller or alternate equipment, which can be proven to impart a horizontal and vertical pressure distributions equivalent to or greater than those induced by a standard proof roller.

236S.5 Measurement and Payment

No direct payment will be made for the materials, equipment or labor required by this item, but shall be included in the unit price bid for the item of construction in which this item is used.

End

RELATED CROSS REFERENCE MATERIALS	
Specification Item 236S, "Proof Rolling"	
City of Austin Contract Documents	
Designation	Description
Section 00700	General Conditions
City of Austin Standard Specifications	
Designation	Description
Item No. 101S	Preparing Right-of-Way
Item No. 102S	Clearing and Grubbing
Item No. 110S	Street Excavation
Item No. 111S	Excavation
Item No. 130S	Borrow
Item No. 132S	Embankment
Item No. 201S	Subgrade Preparation
Item No. 202S	Hydrated Lime and Lime Slurry
Item No. 203S	Lime Treatment for Materials in Place
Item No. 204S	Portland Cement Treatment For Materials in Place
Item No. 206S	Asphalt Stabilized Base (Plant Mix)
Item No. 210S	Flexible Base
Item No. 230S	Rolling (Flat Wheel)
Item No. 232S	Rolling (Pneumatic Tire)
Item No. 234S	Rolling (Tamping)
Item No. 301S	Asphalts, Oils and Emulsions
Item No. 306S	Prime Coat
Item No. 307S	Tack Coat
Item No. 310S	Emulsified Asphalt Treatment
Item No. 320S	Two Course Surface Treatment
Item No. 340S	Hot Mix Asphaltic Concrete Pavement

Item No. 402S	Controlled Low Strength Material
Item No. 403S	Concrete for Structures
City of Austin Standard Details	
Designation	Description
No. 1000S-10	Local Street Sections
No. 1000S-11(1)	Residential and City of Austin Neighborhood Collector Street Sections
No. 1000S-11(2)	Industrial and Commercial Collector Street Sections
No. 1000S-12(1)	Primary Collector Street Sections
No. 1000S-12(2)	Primary Arterial Street Sections
No. 1000S-13(1)	Minor Arterial Street Sections (4 Lanes)
No. 1000S-13(2)	Minor Arterial Street Sections- (4 Lanes divided)
No. 1000S-14	Major Arterial Street Sections
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item No. 100	Preparing Right-of-Way
Item No. 110	Excavation
Item No. 112	Subgrade Widening
Item No. 132	Embankment
Item No. 150	Blading
Item No. 158	Specialized Excavation Work
Item No. 204	Sprinkling
Item No. 210	Rolling (Flat Wheel)
Item No. 211	Rolling (Tamping)
Item No. 213	Rolling (Pneumatic Tire)
Item No. 264	Lime and Lime Slurry
Item No. 300	Asphalts, Oils and Emulsions
Item No. 301	Asphalt Anti-stripping Agents
Item No. 310	Prime Coat (Cutback Asphaltic Materials)
Item No. 314	Emulsified Asphalt Treatment
Item No. 316	Surface Treatments
Item No. 345	Asphalt Stabilized Base (Plant Mixed)
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
Tex-101-E	Surveying and Sampling Soils for Highways
Tex-103-E	Determination of Moisture Content of Soil Materials
Tex-104-E	Determination of Liquid Limit of Soils
Tex-105-E	Determination of Plastic limit of Soils
Tex-106-E	Method of Calculating the Plasticity Index of Soils
Tex-114-E	Laboratory Compaction Characteristics & Moisture Density Relationship of Subgrade & Embankment Soil
Tex-115-E	Field Method for Determination of In-Place Density of Soils & Base Materials
Tex-117-E	Triaxial Compression Tests for Disturbed Soil and Base Materials
Tex-120-E	Soil Cement Testing

Tex-121-E	Soil Lime Testing
Tex-126-E	Molding, Testing and Evaluation of Bituminous Black Base Materials
Tex-207-F	Determination of Density of Compacted Bituminous Mixtures
Tex-210-F	Determination of Asphalt Content of Bituminous Mixtures
Tex-600-J	Sampling and Testing of Hydrated Lime, Quicklime & Commercial Lime Slurry

ITEM NO. 301S ASPHALTS, OILS, AND EMULSIONS 8-20-07

301S.1 Description

This item includes the requirements for cutback asphalts, emulsified asphalts, polymer modified asphalt cements, performance graded asphalt binders and other miscellaneous asphaltic materials and latex additives.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text the inch-pound units are given preference followed by SI units shown within parentheses.

301S.2 Submittals

Submittals shall include test results for each the materials described herein when specifically identified on the drawings and/or referenced in associated standard specification items and standard details.

Submittals may include samples of the base asphalt cement and polymer additives.

301S.3 Materials

When tested in accordance with designated TxDOT, AASHTO and/or ASTM test methods, the various materials shall meet the applicable requirements of this specification.

A. Acronyms

The acronyms used in this specification are defined in the following table.

Table 1: Acronyms

Acronym	Definition	Acronym	Definition
Test Method Prefix		Polymer Modifier	
Tex	TxDOT	SBR or L	Styrene-Butadiene Rubber (Latex)
T	AASHTO	SBS	Styrene-Butadiene-Styrene Block Copolymer
D	ASTM	TR	Tire Rubber, from ambient temperature grinding of truck and passenger tires
		P	Polymer Modified
AC	Asphalt Cement	SS	Slow Setting
RC	Rapid Curing	H-suffix	Harder Residue (Lower Penetration)
MC	Medium Curing	AE	Asphalt Emulsion
SCM	Special Cutback Material	S-suffix	Stockpile Usage
HF	High Float	AE-P	Asphalt Emulsion Prime
C	Cationic	EAP&T	Emulsified Asphalt Prime and Tack
RS	Rapid Setting	PCE	Prime, Cure, and Erosion Control
MS	Medium Setting	PG	Performance Grade

B. Asphalt Cement

The material shall be homogeneous, free from water, shall not foam when heated to 350°F (177°C) and shall meet the requirements in Table 2.

Table 2: Asphalt Cement Requirements

Viscosity Grade		AC-10		AC-20		AC-30	
Property	Test Method	Min	Max	Min	Max	Min	Max
Viscosity: 140°F, poises (60°C, pascals)	T 202	800 (80)	1200 (120)	1600 (160)	2400 (240)	2400 (240)	3600 (360)
Viscosity: 275°F, stokes (135°C, pascals)	T 202	1.9 (.19)	-	2.5 (.25)	-	3.0 (.30)	-
Penetration: 77°F (25°C), 100g, 5s	T 49	85	-	55	-	45	-
Flash Point, C.O.C. °F (°C)	T 48	450 (232)	-	450 (232)	-	450 (232)	-
% Solubility trichloroethylene	T44	99.0	-	99.0	-	99.0	-
Spot test	Tex 509-C						

Viscosity: 140°F stokes (60°C pascals)	T 202	-	3000 (300)	-	6000 (600)	-	9000 (900)
Ductility 77°F (25°C), 5 cm/min, cm	T 202	100	-	70	-	50	-

C. Polymer Modified Asphalt Cement

Polymer modified asphalt cement must be smooth, homogeneous, and shall comply with the requirements listed in Table 3.

Table 3: Polymer Modified Asphalt Cement Requirements

Polymer Modified Viscosity Grade		AC-5		AC-10		AC-15P		AC-45P*	
Polymer Type		SBR		SBR		SBS		SBS	
Property	Test Method	Min	Max	Min	Max	Min	Max	Min	Max
Polymer in % (solids basis)	Tex-533-C	2.0	-	2.0	-	3.0	-	3.0	-
Viscosity									
140°F, poise (60°C, pascals)	T 202	700 (70)	- -	1300 (130)	- -	1500 (150)	- -	4500 (450)	- -
275°F, poise (135°C, pascals)	T 202	- -	7.0 (0.7)	- -	8.0 (0.8)	- -	8.0 (0.8)	14.0 (1.4)	
Penetration, 77°F (25°C), 100 g, 5 s.	T 49	120	-	80	-	100	150	50	74
Ductility, 5cm/min., 39.2°F, cm	T 51	70	-	60	-	-	-	15	-
Elastic Recovery, 50°F (10°C), %	Tex-539-C	-	-	-	-	55	-		-
Polymer Separation, 48 hrs**.	Tex-540-C	None		None		None		None	
Flash Point, C.O.C., °F (°C),	T 48	425	-	425	-	425	-	425	-
		(218)	-	(218)	-	(218)	-	(218)	-
Tests on Residue from Thin Film Oven Test: (T179)									
Retained Penetration Ratio, 77°F (25°C), % original	T 49	-	-	-	-	0.60	1.00	0.60	0.90

* The SBS block copolymer may be pre-blended with a polymer processing oil (up to a 1:1 ratio of polymer to oil) to aid the solution of the polymer in the asphalt.

** A 350-gram (0.77 pound) sample of the asphalt-SBS blend is stored for 48 hours at 325°F (163°C). Upon completion of the storage time, the sample is visually examined for separation of the SBS from the asphalt (smoothness and homogeneity). If a question still exists about the separation of the SBS, samples shall be taken from the top and bottom of the sample for Infrared Spectroscopy analysis. A difference of 0.4% or more in the concentration of the SBS between the top and bottom samples shall constitute separation.

D. Cutback Asphalt

Cutback asphalt shall meet the requirements presented in Tables 4 and 5 for the specified type and grade.

Table 4: Rapid Curing Type Cutback Asphalt Requirements

Type-Grade	RC-250	RC-800	RC-3000

Properties	Test Method	Min	Max	Min	Max	Min	Max
Water, percent	T55	-	0.2	-	0.2	-	0.2
Flash Point, T.O.C., °F (°C)	T79	80 (27)	-	80 (27)	-	80 (27)	-
Kinematic viscosity @ 140°F, cst (60°C, mm^2/s)	T201	250	400	800	1600	3000	6000
Distillation Test:	T78						
Distillate, % by volume of total distillate to 680°F (360°C):							
to 437°F (225°C):		40	75	35	70	20	55
to 500°F (260°C):		65	90	55	85	45	75
to 600°F (316°C):		85	-	80	-	70	-
Residue from Distillation, Volume %		70	-	75	-	82	-
Tests of Distillation Residue:							
Penetration, 100g, 5 sec., 77°F (25°C), cm	T49	80	120	80	120	80	120
Ductility, 5 cm/min., 77°F, 5 cm/min., cm	T51	100	-	100	-	100	-
(25°C, 50 mm/min., mm)		1000	-	1000	-	1000	-
Solubility in trichloroethylene, %	T44	99.0	-	99.0	-	99.0	-
Spot Test	Tex 509-C	ALL NEGATIVE					

Table 5: Medium Curing Type Cutback Asphalt Requirements

Type		MC-30		MC-70		MC-250		MC-800		MC-3000	
Properties	Test Method	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Water, %	T55	-	0.2	-	0.2	-	0.2	-	0.2	-	0.2
Flash Point, T.O.C., °F (°C)	T79	100 (38)	-	100 (38)	-	150 (65)	-	150 (65)	-	150 (65)	-
Kinematic viscosity. @ 140°F. cst (60°C, mm^2/s)	T201	30	60	70	140	250	500	800	1600	3000	6000
Distillation Test:	T78										
Distillate, as % by volume to total distillate to 680°F(360°C):, shall be as follows:											
to 437°F (225°C):		-	25	-	20	-	10	-	-	-	-
to 500°F (260°C):		40	70	20	60	15	55	-	35	-	15
to 600°F (316°C):		75	93	65	90	60	87	45	80	15	≥75
Residue from 80°F (225°C) distillation											
Volume Percent		50	-	55	-	67	-	75	-	80	-
Tests on Distillation Residue:											
Penetration @77°F (25°C), 100g, s, 01 mm:	T49	120	250	120	250	120	250	120	250	120	250
Ductility	T51										

@ 77°F, 5 cm/min, cms		100*	-	100*	-	100*	-	100*	-	100*	-
(25°C, 50 mm/min., mm)		1000*	-	1000*	-	1000*	-	1000*	-	1000*	-
% Solubility in trichloroethylene	T44	99.0	-	99.0	-	99.0	-	99.0	-	99.0	-
Spot Test	Tex 509-C	ALL NEGATIVE									

* If penetration of residue is more than 200 and the ductility at 77°F (25°C) is less than 100 cm (1000 mm), the material will be acceptable if its ductility at 60°F (16°C) is more than 100cm (1000 mm).

E. Emulsified Asphalt

The material shall be homogenous. It shall show no separation of asphalt after thorough mixing and shall meet the requirements for the specified type and grade presented in Tables 6, 7 and 8.

Table 6: Anionic Emulsion Requirements

	Type	Medium Setting		Slow Setting			
	Grade	MS-2		SS-1		SS-1h	
Property	Test Method	Min	Max	Min	Max	Min	Max
Furol Viscosity @ 77°F (25°C), sec.	T72	-	-	20	100	30	100
@ 122°F(50°C), sec		100	300	-	-	-	-
Sieve Test, %.	T59	-	0.1	-	0.1	-	0.1
Miscibility (Standard Test)	T59	-	-	Passing		Passing	
Cement Mixing, %	T59	-	-	-	2.0	-	2.0
% Demulsibility: 35 cc 0.02N $CaCl_2$	T59	-	30	-	-	-	-
Storage Stability 1 day, %	T59	-	1	-	1	-	1
Freezing Test, 3 Cycles*	T59	Passing		Passing	Passing		
Distillation Test	T59						
Distillation Residue, %		65	-	60			
Distillate Oil Portion, %		-	½	-	½	-	½
Tests of Residue from Distillation:							
Penetration @ 77°F (25°C), 100g, 5s	T49	120	160	120	160	70	100
Solubility in Trichloroethylene, %	T44	97.5	-	97.5	-	97.5	-
Ductility @ 77F, 5 cm/min., cm	T51	100	-	100	-	80	-
(@ 25°C, 50 mm/min., mm)		1000	-	1000	-	800	-

* Applies only when Engineer or designated representative specifies the material for winter use.

Table 7: High Float anionic Emulsion Requirements

	Type	Rapid Setting	Medium Setting
	Grade	HFRS-2	AES-300

Property	Test Method	Min	Max	Min	Max
Viscosity, Saybolt Furol	T72				
@ 77°F (25°C), sec.		-	-	75	400
@ 122°F (50°C), sec.		150	400	-	-
Oil Portion of Distillate, %	T59	-	2	-	7
Sieve Test, %	T59	-	0.1	-	0.1
Particle Charge	T59	positive		positive	
Coating Ability and Water Resistance:	T59				
Coating, dry aggregate		-	-	good	
Coating, after spraying		-	-	fair	
Coating, wet aggregate				fair	
Coating, after spraying				fair	
% Demulsibility: 35 ml 0.02 N $CaCl_2$	T59	50	-	-	-
Storage Stability Test, 1 day, %	T59	-	1	-	1
Distillation Test	T59				
Residue by Distillation, % by weight		65	-	65	-
Oil Distillate, by volume of emulsion, %		-	1/2	-	5
Tests on Residue from Distillation:					
Penetration at 77°F (25°C), 100g, 5s	T49	100	140	300	-
Solubility in Trichloroethylene, %	T44	97.5	-	97.5	-
Ductility @ 77°F., 5 cm/min, cms	T51	100	-	-	-
(25°C., 50 mm/min, mm)		(1000)			
Float Test at 140°F (60°C), sec.	Tex 509-C	1200	-	1200	-

Table 8: Cationic Emulsion Requirements

	Type	Rapid Setting				Medium Setting				Slow Setting			
	Grade	CRS-2		CRS-2h		CMS-2		CMS-2s		CSS-1		CSS-1h	
Property	Test Method	Min	Max	Min	Max	Min.	Max	Min	Max	Min	Max	Min	Max
Viscosity, Saybolt Furol	T72												
@ 77°F (25°C), sec.		-	-	-	-	-	-	-	-	20	100	20	100
@ 122°F (50°C), sec.		150	400	150	400	100	300	100	300	-	-	-	-
Storage stability test, 1 day %	T59	-	1	-	1	-	1	-	1	-	1	-	1
% Demulsibility: *, **	T59	40	-	40	-	-	-	-	-	-	-	-	-
Coating, ability & water resistance	T59												
Coating, dry aggregate		-	-	-	-	good		good		-	-	-	-
Coating, after spraying		-	-	-	-	fair		fair		-	-	-	-
Coating, wet aggregate		-	-	-	-	fair		fair		-	-	-	-
Coating, after spraying		-	-	-	-	fair		fair		-	-	-	-

Particle charge test	T59	Positive		Positive		Positive		Positive		Positive		Positive	
Sieve test, %	T59	-	0.10	-	0.10	-	0.10	-	0.10	-	0.10	-	0.10
Cement Mixing test, %	T59	-	-	-	-	-	-	-	-	-	2.0	-	2.0
Distillation Test:	T59												
% Oil distillate, vol. of emulsion		-	1/2	-	1/2	-	7	-	5	-	1/2	-	1/2
Residue by Distillation,% by wt.		65	-	65	-	65	-	65	-	60	-	60	-
Tests on Residue from Distillation:													
Penetration, 77°F	T49	120	160	80	110	120	200	300	-	120	160	80	110
(25°C), 100g, 5s.													
Ductility,	T51												
77°F, 5 cm/min, cm		100	-	80	-	100	-	-	-	100	-	80	-
(25°C, 50 mm/min, mm)		1000	-	800	-	1000	-	-	-	1000	-	800	-
% Solubility in trichloroethylene	T44	97.5	-	97.5	-	97.5	-	97.5	-	97.5	-	97.5	-

* At a level of 35 ml 0.8% sodium dioctyl sulfosuccinate.

** The demulsibility test shall be made within 30 days from date of shipment.

F. Polymer Modified Emulsions

The material shall be homogenous. It shall show no separation of asphalt after thorough mixing and shall meet the requirements for the specified type and grade presented in Tables 9 and 10.

G. Specialty Emulsions

Specialty emulsions may be either asphaltic-based or resin-based and must meet the requirements included in Table 11.

H. Recycling Agent

Recycling agent and emulsified recycling agent must meet the requirements of Table 12. Additionally, recycling agent and residue from emulsified recycling agent, when added in the specified proportions to the recycled asphalt, must meet the properties specified on the drawings.

Table 9: Polymer Modified Emulsified Asphalt Requirements

Type-Grade		Rapid Setting				Medium Setting						Slow Setting	
		RS-1P		HFRS-2P		AES-150P		AES-300P		AES-300S		SS-1P	
Property	Test Method	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Viscosity, Saybolt Furol	T 72												
77°F, sec.		-	-	-	-	75	400	75	400	75	400	30	100
122°F, sec.		50	200	150	400	-	-	-	-	-	-	-	-

Sieve Test, %	T 59	-	0.1	-	0.1	-	0.1	-	0.1	-	0.1	-	0.1
Miscibility	T 59	-		-		-		-		-		pass	
Coating Ability and Water Resistance:	T 59												
dry aggregate/after spray		-		-		good/fair		good/fair		good/fair		-	
wet aggregate/after spray		-		-		fair/fair		fair/fair		fair/fair		-	
Demulsibility, 35 ml of 0.02 N $CaCl_2$, %	T 59	60	-	50	-	-	-	-	-	-	-	-	-
Storage Stability, 1 day, %	T 59	-	1	-	1	-	1	-	1	-	1	-	1
Breaking Index, g	Tex-542-C	-	80	-	-	-	-	-	-	-	-	-	-
Distillation Test:[1]	T 59												
Residue by Distillation, % by wt.		65	-	65	-	65	-	65	-	65	-	60	-
Oil Distillate, % by vol of emulsion		-	3	-	0.5	-	3	-	5	-	7	-	0.5
Tests: Residue from Distillation:													
Polymer Content, wt. % (solids basis)	Tex-533-C	-	-	3.0	-	-	-	-	-	-	-	3.0	-
Penetration, 77°F, (25°C) 100 g, 5 sec.	T 49	225	300	90	140	150	300	300	-	300	-	100	140
Solubility in Trichloroethylene, %	T 44	97.0	-	97.0	-	97.0	-	97.0	-	97.0	-	97.0	-
Viscosity, 140&degF, poise 60°C, Pa-s	T 202	-	-	1500	-	-	-	-	-	-	-	1300	-
Float Test, 140°F, sec.	T 50	-	-	1200	-	1200	-	1200	-	1200	-	-	-
Ductility[2],													
39.2°F, 5 cm/min., cm	T 51	-	-	50	-	-	-	-	-	-	-	50	-
(4°C, 5 cm/min., mm)		-	-	500	-	-	-	-	-	-	-	500	-
Elastic Recovery[2], 50°F,(10°C), %	Tex-539-C	55	-	55	-	-	-	-	-	-	-	-	-
Tests on RTFO Curing of	Tex-541-C												

Distillation Residue:													
Elastic Recovery, 50°F,(10&degF) %	Tex-539-C	-	-	-	-	50	-	50	-	30	-	-	-

[1] Exception to AASHTO T 59: Bring the temperature on the lower thermometer slowly to 350°F +/- 10°F. Maintain at this temperature for 20 min. Complete total distillation in 60 +/- 5 min. from the first application of heat.

[2] HFRS-2P must meet one of either the Ductility or Elastic Recovery.

Table 10: Polymer Modified Cationic Emulsified Asphalt Requirements

Type-Grade		Rapid Setting				Slow Setting	
		CRS-1P		CRS-2P		CSS-1P	
Property	Test Method	Min	Max	Min	Max	Min	Max
Viscosity, Saybolt Furol	T 72	-	-	-	-	20	100
77°F (25°C), sec.		50	150	150	400	-	-
122°F (50°C), sec.		-	0.1	-	0.1	-	0.1
Sieve Test, %	T 59	60	-	70	-	-	-
Demulsibility, 35 ml of 0.8% sodium dioctyl sulfosuccinate, %	T 59	-	1				
Storage Stability, 1 day, %	T 59	-	1	-	1	-	1
Breaking Index, g	Tex-542-C		80	-	-	-	-
Particle Charge	T 59	positive		positive		positive	
Distillation Test:[1]	T 59	65	-	65	-	62	-
Residue by Distillation, % by wt.							
Oil Distillate, % by volume of emulsion		-	3	-	0.5	-	0.5
Tests on Residue from Distillation:							
Polymer Content, wt. % (solids basis)	Tex-533-C	-	-	3.0	-	3.0	-
Penetration, 77°F (25°C), 100 g, 5 sec.	T 49	225	300	90	150	55	90
Viscosity, 140°F, poise (60°C, Pa-s)	T 202	-	-	1300	-	-	-
Solubility in Trichloroethylene, %	T 44	97.0	-	97.0	-	97.0	-
Softening Point, °F	T 53	-	-	-	-	135	-
Ductility, 77°F, 5 cm/min., cm (25°C, 5 cm/min., mm)	T 51	-	-	-	-	70 700	-
Ductility[2], 39.2°F, 5 cm/min., cm (4°C, 5 cm/min., mm)	T 51	-	-	50	-	-	-
Elastic Recovery[2], 50°F (10°C), %	Tex-539-C	45	-	55	-	-	-

[1] Exception to AASHTO T 59: Bring the temperature on the lower thermometer slowly to 350°F +/- 10°F. Maintain at this temperature for 20 min. Complete total distillation in 60 +/- 5 min. from the first application of heat.

[2] CRS-2P must meet one of either the Ductility or Elastic Recovery.

Table 11: Specialty Emulsion Requirements

Type-Grade		Medium Setting				Slow Setting	
		AE-P		EAP&T		PCE[1]	
Property	Test Method	Min	Max	Min	Max	Min	Max
Viscosity, Saybolt Furol	T 72						
77°F (25°C), sec.		-	-	-	-	10	100
122°F (50°C), sec.		15	150	-	-	-	-
Sieve Test, %	T 59	-	0.1	-	0.1	-	0.1
Miscibility[2]	T 59	-		pass		pass	
Demulsibility, 35 ml of 0.10 N CaCl2, %	T 59	-	70	-	-	-	-
Storage Stability, 1 day, %	T 59	-	1	-	1	-	-
Particle Size[3], % by volume ≤ 2.5 m	Tex-238-F	-	-	90	-	-	-
Asphalt Emulsion Distillation to 500°F (260°C) followed by Cutback Asphalt Distillation of Residue to 680°F (360°C):	T 59 & T 78						
Residue after both Distillations, % by wt.		40	-	-	-	-	-
Total Oil Distillate from both distillations, % by volume of emulsion		25	40	-	-	-	-
Distillation:	T 59						
Residue by Distillation, % by wt.		-	-	60	-	-	-
Evaporation:4	T 59						
Residue by Evaporation, % by wt.		-	-	-	-	60	-
Tests on Residue after all Distillation(s):							
Viscosity, 140°F, poise (60°C, Pa-s)	T 202	-	-	800	-	-	-
Kinematic Viscosity, 140°F, cSt (60°C, mm^2/s)	T 201	-	-	-	-	100	350
Flash Point, C.O.C., °F (°C)	T 48	-	-	-	-	400 204	-
Solubility in Trichloroethylene, %	T 44	97.5	-	-	-	-	-
Float Test, 122°F (50°C), sec	T 50	50	200	-	-	-	-

[1] Supply with each shipment of PCE:

a) a copy of a lab report from an approved analytical lab, signed by a lab official, indicating the PCE formulation does not meet any characteristics of a Resource Conservation Recovery Act (RCRA) hazardous waste;

b) a certification from the producer that the formulation supplied does not differ from the one tested and that no listed RCRA hazardous wastes or PCB's have been mixed with the product; and

c) a Materials Safety Data Sheet.

[2] Exception to AASHTO T 59: In dilution, use 350 ml of distilled or deionized water and a 1000-ml beaker.

[3] Tex-238-F, beginning at "Particle Size Analysis by Laser Diffraction," "Procedure" (using - medium: distilled or deionized water and dispersant: none), or other approved method.

[4] Exception to AASHTO T 59: Leave sample in the oven until foaming ceases, then cool and weigh.

Table 12: Recycling Agent and Emulsified Recycling Agent Requirements

Property	Test Method	Recycling Agent		Emulsified Recycling Agent	
		Min	Max	Min	Max
Viscosity, Saybolt Furol, 77°F, sec.	T 72	-	-	15	100
Sieve Test, %	T 59	-	-	-	0.1
Miscibility[1]	T 59	-		No Coagulation	
Evaporation Test:[2]	T 59				
Residue by Evaporation, % by wt.		-	-	60	-
Tests on Recycling Agent or Residue from Evaporation:					
Flash Point, C.O.C., °F	T 48	400	-	400	-
Kinematic Viscosity,	T 201				
140°F, cSt		75	200	75	200
275°F, cSt		-	10.0	-	10.0

[1] Exception to AASHTO T 59: Use 0.02 N CaCl2 solution in place of water.

[2] Exception to AASHTO T 59: Maintain sample at 300°F until foaming ceases, then cool and weigh.

I. Crack Sealer

This section sets forth the requirements for a polymer modified emulsion suitable for sealing fine cracks, and a rubber asphalt compound suitable for sealing cracks of 1/8 inch (3 mm) or greater width.

1. Polymer Modified Asphalt Emulsion Crack Sealer

For cracks on the order of 1/8 inch (3 mm) width, HFRS-2P polymer modified emulsion as described in the table included in Section F, Polymer Modified Emulsions of this item may be used. Requirements for the polymer modified emulsion and rubber-asphalt crack-sealing compound are presented in Table 13.

Table 13: Polymer Modified Asphalt Emulsion Crack Sealer Requirements

Property	Test Methods	Min	Max
Rotational Viscosity, 77°F, cP	ASTM D 2196, Method A	10,000	25,000
Sieve Test, %	T 59	-	0.1
Storage Stability, 1 day, %	T 59	-	1
Evaporation	Tex-543-C		
Residue by Evaporation, % by wt.		65	-
Tests on Residue from Evaporation:			
Penetration, 77°F, 100 g, 5 sec.	T 49	35	75
Softening Point, °F	T 53	140	-
Ductility, 39.2°F, 5 cm/min., cm	T 51	100	-

2. Rubber-Asphalt Crack Sealing Compound

This specification item may be a proprietary product. The compound shall be capable of being melted and applied at a temperature of 400°F (200°C) or less by a suitable oil jacketed kettle equipped with a pressure pump, a hose and a nozzle. It shall contain no water or highly-volatile matter. It shall not be tracked by vehicular traffic once it cools to road pavement temperature.

The rubber-asphalt crack sealing compound shall meet requirements in Table 14.

Table 14: Rubber-Asphalt Crack Sealer Requirements

Property	Test Methods	Class A		Class B	
		Min	Max	Min	Max
CRM Content, Grade A or B, % by wt.	Tex-544-C	22	26	-	-
CRM Content, Grade B, % by wt.	Tex-544-C	-	-	13	17
Virgin Rubber Content[1], % by wt.		-	-	2	-
Flash Point[2], COC, °F	T 48	400	-	400	-
Penetration[3], 77°F, 150g, 5 sec.	T 49	30	50	30	50
Penetration[3], 32°F, 200g, 60 sec.	T 49	12	-	12	-
Softening Point, °F	T 53	-	-	170	-
Bond[4], 3 cycles, 20°F	Tex-525-C	-	Pass		

[1] Provide certification that the min. % virgin-rubber was added.

[2] Before passing the test flame over the cup, agitate the sealing compound with a ⅜ to ½ in. (9.5 to 12.7 mm) wide, square-end metal spatula in a manner so as to bring the material on the bottom of the cup to the surface, i.e., turn the material over. Start at one side of the thermometer, move around to the other, and then return to the starting point using 8 to 10 rapid circular strokes. Accomplish agitation in 3 to 4 sec. Pass the test flame over the cup immediately after stirring is completed.

[3] Exception to AASHTO T 49: Substitute the cone specified in ASTM D 217 for the penetration needle.

[4] No crack in the crack sealing materials or break in the bond between the sealer and the mortar blocks over ¼ in. deep for any specimen after completion of the test.

a. Properties of Rubber Used in Sealer. The rubber shall be one of the following types;

   1) Type I - Ground tire rubber.

   2) Type II - A mixture of ground tire rubber and high natural reclaimed scrap rubber. The natural rubber content, determined by ASTM D 297, shall be a minimum of 25 percent.

b. Ground Rubber. The ground rubber shall comply with the following gradation requirements when tested by TxDOT Test Method Tex-200-F, Part I.

Table 15: Ground Rubber Gradation Requirements

Sieve Size		Percent Retained	
U.S.	SI	Type I	Type II
No. 8	2.36 mm	0	-
No. 10	2.00 mm	0-5	0
No. 30	600mm	90-100	50-70
No. 50	300mm	95-100	70-95
No. 100	150mm	-	95-100

The ground rubber shall be free from fabric, wire, cord or other contaminating materials.

c. Packaging. The rubber-asphalt crack sealing compound shall be packaged in boxes, which contain two 30-35 pound (14-16 kilogram) blocks that are individually packaged in a liner made of polyethylene, or other packaging approved by the Engineer or designated representative.

J. Performance Graded Binders

Performance graded binders must be smooth, homogeneous, show no separation when tested in accordance with Test Method Tex-540-C, and must meet the requirements in the following table.

Separation testing is not required if:

- a modifier is introduced separately at the mix plant either by injection in the asphalt line or mixer, or
- the binder is blended on site in continuously agitated tanks, or
- binder acceptance is based on field samples taken from an in-line sampling port at the hot mix plant after the addition of modifiers.

Table 16: Performance Graded Binder Requirements (Printer-friendly version in PDF)

Performance Grade	PG 58			PG 64				PG 70				PG 76				PG 82		
	-22	-28	-34	-16	-22	-28	-34	-16	-22	-28	-34	-16	-22	-28	-34	-16	-22	-28
Average 7-day Max Pavement Design Temperature, °C[1]	58			64				70				76				82		
Min Pavement Design Temperature, °C[1]	≥-22	≥-28	≥-34	≥-16	≥-22	≥-28	≥-34	≥-16	≥-22	≥-28	≥-34	≥-16	≥-22	≥-28	≥-34	≥-16	≥-22	≥-28
ORIGINAL BINDER																		
Flash Point, AASHTO T 48: Min,	230°C																	
Viscosity, AASHTO TP 48:[2, 3] Max, 3.0 Pas, Test Temperature,	135°C																	
Dynamic Shear, AASHTO TP 5:[4] G*/sin (δ), Min, 1.00 kPa Test Temperature @ 10 ead/sec.,	58°C			64°C				70°C				76°C				82°C		
Elastic Recovery, ASTM D 6084, 50°F, % Min	-	-	30	-	-	30	50	-	30	50	60	30	50	60	70	50	60	70
ROLLING THIN FILM OVEN (Tex-541-C)																		
Mass Loss, Max, %	1.0																	
Dynamic Shear, AASHTO TP 5: G*/sin (δ) in, 2.20 kPa Test Temperature @10 red/sec.,	58°C			64°C				70°C				76°C				82°C		
PRESSURE AGING VESSEL (PAV) RESIDUE (AASHTO PP 1)																		
PAV Aging Temperature	100°C																	
Dynamic Shear, AASHTO TP 5: G*/sin (δ) Max, 5000 kPa Test Temperature10 rad/sec., °C	25	22	19	28	25	22	19	28	25	22	19	28	25	22	19	28	25	22
Creep Stiffness, AASHTO TP 1:[5, 6] S, Max, 300 mPa, M - value, Min, 0.300 Test Temperature @ 60 sec., °C	-12	-18	-24	-6	-12	-18	-24	-6	-12	-18	-24	-6	-12	-18	-24	-6	-12	-18
Direct Tension, AASHTO TP 3:[6] Failure Strain, Min, 1.0% Test Temperature @1.0 mm/min., °C	-12	-18	-24	-6	-12	-18	-24	-6	-12	-18	-24	-6	-12	-18	-24	-6	-12	-18

[1] Pavement temperatures are estimated from air temperatures using an algorithm contained in the PGEXCEL3.xls software program, may be provided by the Department or by following the procedures as outlined in AASHTO MP 2 and PP 28.

[2] This requirement may be waived at the Department's discretion if the supplier warrants that the asphalt binder can be adequately pumped, mixed and compacted at temperatures that meet all applicable safety, environmental, and constructability requirements. At test temperatures where the binder is a Newtonian fluid, any suitable standard means of viscosity measurement may be used, including capillary (AASTHO T 201 or T 202) or rotational viscometry (AASHTO TP 48).

[3] Viscosity at 135°C is an indicator of mixing and compaction temperatures that can be expected in the lab and field. High values may indicate high mixing and compaction temperatures. Additionally, significant variation can occur from batch to batch. Contractors should be aware that variation could significantly impact their mixing and compaction operations. Contractors are therefore responsible for addressing any constructability issues that may arise.

[4] For quality control of unmodified asphalt binder production, measurement of the viscosity of the original asphalt binder may be substituted for dynamic shear measurements of G*/sin (δ) at test temperatures where the asphalt is a Newtonian fluid. Any suitable standard means of viscosity measurement may be used, including capillary (AASHTO T 201 or T 202) or rotational viscometry (AASHTO TP 48).

[5] Silicone beam molds, as described in AASHTO TP 1-93, are acceptable for use.

[6] If creep stiffness is below 300 mPa, direct tension test is not required. If creep stiffness is between 300 and 600 mPa, the direct tension failure strain requirement can be used instead of the creep stiffness requirement. The m-value requirement must be satisfied in both cases.

301S.4 Equipment.

All equipment necessary to transport, store, sample, heat, apply, and incorporate asphalts, oils and emulsions shall be provided.

301S.5 Construction

Typical materials used for specific applications are identified in Table 17. These are typical uses only and circumstances may require use of other material.

Table 17: Typical Material Use

Material Application	Typically Used Materials
Hot-Mixed, Hot-Laid Asphalt Mixtures	PG Binders, Modified PG Binders
Surface Treatment	AC-5, AC-10, AC-5 w/2% SBR, AC-10 w/2% SBR, AC-15P, AC-15-5TR, HFRS-2, MS-2, CRS-2, CRS-2H, HFRS-2P, CRS-2P,Surface Treatment
(Cool Weather)	RS-1P, CRS-1P, RC-250, RC-800, RC-3000, MC-250, MC-800, MC-3000, MC-2400L
Precoating	AC-5, AC-10, PG 64-22, SS-1, SS-1H, CSS-1, CSS-1H
Tack Coat	RC-250, SS-1, SS-1H, CSS-1, CSS-1H, EAP&T
Fog Seal	SS-1, SS-1H, CSS-1, CSS-1H
Hot-Mixed, Cold-Laid Asphalt Mixtures	AC-0.6, AC-1.5, AC-3, AES-300, AES-300P, CMS-2, CMS-2S
Patching Mix	MC-800, SCM I, SCM II, AES-300S
Recycling	AC-3, AES-150P, AES-300P, Recycling Agent, Emulsified Recycling Agent
Crack Sealing	SS-1P, Polymer Mod AE Crack Sealant, Rubber Asphalt Crack Sealers (Class A, Class B)
Prime	MC-30, AE-P, EAP&T, PCE
Curing Membrane	SS-1, SS-1H, CSS-1, CSS-1H, PCE
Erosion Control	SS-1, SS-1H, CSS-1, CSS-1H, PCE

301S.6 Storage, Heating and Application Temperatures

Asphaltic materials should be applied at the temperature, which provides proper and uniform distribution. Within practical limits higher temperatures than necessary to produce the desired results shall be avoided. Satisfactory application usually should be obtained within the recommended ranges shown below.

No material shall be heated above the following maximum temperatures:

Table:18 Recommended Temperature Ranges

	Recommended Range; °F (°C)	Maximum Temperature; °F (°C) for	
Type-Grade	Application/Mixing	Allowable Application	Storage
AC-5, 10,20,30	275—350 (135—177)	375 (191)	400 (204)
AC-5 or AC-10 + 2% SBR	300—375 (142—191)	390* (199)	375 (191)

AC-10 + 3% SBR, AC-45P	300—350 (142—191)	350 (177)	360 (182)
RC-250	125—180 (52—82)	200 (93)	200 (93)
RC-800	170—230 (77—110)	260 (127)	260 (127)
RC-3000	215—275 (102—135)	285 (141)	285 (141)
MC-30, AEP	70—150 (21—66)	175 (79)	175 (79)
MC-70	125—175 (52—79)	200 (93)	200 (93)
MC-250	125—210 (52—99)	240 (116)	240 (116)
MC-800, SCM I, SCM II	175—260 (79—127)	275 (135)	275 (135)
MC-3000 & MC-2400 Latex	225—275 (107—135)	290 (143)	290 (143)
HFRS-2, MS-2, CRS-2, CRS-2H, HFRS-2P, CRS-2P, CMS-2, CMS-2S, AES-300, AES-300S, AES-150P, AES-300P	120—160	180	180
SS-1, SS-1h, SS-1P, CSS-1, CSS-1h, PCE, EAP & T, SS-1P, RS-1P, CRS-1P, CSS-1P, recycling agent, emulsified recycling agent, polymer modified AE crack sealant.	50—130 (10—54)	140 (60)	140 (60)
RS-2, RS-2h, MS-2, CRS-2, CRS-2h, CRS-2p, CMS-2, CMS-2S, HFRS-2, HFRS-2p, AES-300	110—160 (43—71)	170 (77)	170 (77)
Special Precoat Material	125—250 (52—121)	275 (135)	275 (135)
PG Binders, Modified PG Binders	275—350	350	350
Rubber Asphalt Crack Sealers (Class A, Class B)	350—375	400	-
Rubber-Asphalt Crack Sealer	350—375 (177—191)	400 (204)	-

* AC-5 + 2% SBR and AC-10 + 2% SBR, which is designated for surface treatment work, may be heated to a maximum temperature of 390°F (200°C) by the supplier loading through an in-line heater, or with the permission of the Engineer or designated representative, these materials may be heated to maximum of 390°F (200°C) by the Contractor just prior to application. When any of the SBR-modified asphalt cements are used in asphaltic concrete, the storage temperature at the mix plant should not exceed 350°F (177°C).

Attention is called to the fact that asphaltic materials (except emulsions) are very flammable and constitute fire hazards. Proper precautions should be used in all cases, especially with RC cutbacks.

Utmost care shall be taken to prevent open flames from coming in contact with the asphaltic material or the gases of it. The Contractor shall be responsible for any fires or accidents, which may result from heating the asphaltic materials.

301S.7 Measurement and Payment

All asphaltic materials included in this specification will not be paid fr directly but shall be included in the unit price bid for the itme of construction in which this item is used.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Specification Item 301S "Asphalts, Oils and Emulsions"	
American Association of State Highway and Transportation Officials (AASHTO)	
Designation	Description
AASHTO T-44	Solubility of Bituminous Materials in Organic Solvents
AASHTO T-48	Flash and Fire Points by Cleveland Open Cup
AASHTO T-49	Penetration of Bituminous Materials
AASHTO T-50	Float Test for Bituminous Materials
AASHTO T-51	Ductility of Bituminous Materials
AASHTO T-53	Distillation of Road Tar
AASHTO T-55	Water in Petroleum Products and Bituminous Materials by Distillation
AASHTO T-59	Testing Emulsified Asphalt
AASHTO T-72	Saybolt Viscosity
AASHTO T-78	Distillation of Cut-Back Asphaltic (Bituminous) Products
AASHTO T-79	Flash Point with Tag Open-Cup Apparatus
AASHTO T-201	Kinematic Viscosity of Asphalts
AASHTO T-202	Viscosity of Asphalts by Vacuum Capillary Viscometer
AASHTO TP-1	Creep Stiffness
AASHTO TP-3	Direct Tension
AASHTO TP-5	Dynamic Shear
AASHTO TP-48	Rotational Viscometry
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
Tex-200-F	Sieve Analysis of Fine and Coarse Aggregates
Tex-238-F	Laser Diffraction Particle Size Distribution Analyzer
Tex-509-C	Spot Test of Asphaltic Materials
Tex-525-C	Tests for Asphalt and Concrete Joint Sealers
Tex-533-C	Determination of Polymer Additive Percentages in Polymer Modified Asphalt Cements
Tex-539-C	
Tex-540-C	
Tex-541-C	
Tex-542-C	
Tex-543-C	
Tex-544-C	
American Society for Testing and Materials (ASTM)	
Designation	Description
D 217	Test Methods for Cone Penetration of Lubricating Grease
D 297	Test Methods for Rubber Products-Chemical Analysis
D 2186 Method A	Test Methods for Deposit-Forming Impurities in Steam

D 6084	Test Method for Elastic Recovery of Bituminous Materials by Ductilolmeter

RELATED CROSS REFERENCE MATERIALS	
Specification Item 301S "Asphalts, Oils and Emulsions"	
City of Austin Standard Specifications	
Designation	Description
Item No. 206S	Asphalt Stabilized Base
Item No. 210S	Flexible Base
Item No. 302S	Aggregates for Surface Treatments
Item No. 306S	Prime Coat
Item No. 307S	Tack Coat
Item No. 310S	Emulsified Asphalt Treatment
Item No. 311S	Emulsified Asphalt Repaving
City of Austin Standard Specifications	
Designation	Description
Item No. 312S	Seal Coat
Item No. 313S	Rubber Asphalt Joint and Crack Sealant
Item No. 315S	Milling Asphaltic Concrete Paving
Item No. 320S	Two Course Surface Treatment
Item No. 340S	Hot Mix Asphaltic Concrete Pavement
Item No. 341S	Paving Fabric
Item No. 350S	Heating, Scarifying and Repaving
Item No. 351S	Recycling Agent
City of Austin Standard Details	
Designation	Description
1000S-10	Local Street Sections
1000S-11(1)	Residential and Neighborhood collector Street Sections
1000S-11(2)	Industrial and Collector Street Sections
1000S-12(1)	Primary Collector Street Sections
1000S-12(2)	Primary Arterial Street Sections
1000S-13(1)	Minor Arterial Street Sections (4 Lanes)
1000S-13(2)	Minor Arterial Street Sections (4 Lanes divided)
1000S-14	Major Arterial Street
Texas Department of Transportation: Standard Specifications for Construction And Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item 300	Asphalts, Oils and Emulsions
Item 301	Asphalt Antistripping Agents
Item 310	Prime Coat (Cutback Asphaltic Materials)
Item 314	Emulsified Asphalt Treatment
Item 316	Surface Treatments
Item 345	Asphalt Stabilized Base (Plant Mixed)
Item 354	Planing and/or Texturing Pavement

Item 520	Weighing and Measuring Equipment
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
Tex-126-E	Molding, Testing and Evaluation of Bituminous Black Base Materials
Tex-207-F	Determination of Density of Compacted Bituminous Mixtures
Tex-211-F	Recovery of Asphalt from Bituminous Mixtures by Abson
Tex-215-	Determination of Asphalt Content of Rock Asphalt Process by Hot Solvent Method
Tex-217-F	Determination of Deleterious Material and Decantation Test for Coarse Aggregates
Tex-224-F	Determination of Flakiness
Tex-400-A	Method of Sampling Stone, Gravel, Sand and Mineral Aggregates
Tex-410-A	Abrasion of Coarse Aggregate Using the Los Angeles Machine
Tex-411-A	Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
Tex-438-A	Accelerated Polish Test for Aggregate
Tex-460-A	Determination of Crushed Face Particle
Tex-501-C	Test for Water in Petroleum Products and Other Bituminous Materials
Tex-502-C	Test for Penetration of Bituminous Material
Tex-503-C	Test for Ductility of Bituminous Materials
Tex-504-C	Test for Flash and Fire Points of Petroleum Materials by Cleveland Open Cup
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
Tex-505-C	Test for Softening Point of Bituminous Materials by Ring-and-Ball Method
Tex-506-C	Test for Loss on Heating of Oils and Asphaltic Compounds
Tex-507-C	Proportion of Bitumen Soluble in Trichloroethylene
Tex-510-C	Determining the Effect of Heat and Air on Asphaltic Materials when Exposed in Thin Films
Tex-512-C	Test for Flash Points of Volative Flammable Materials by Tag Open-Cup Apparatus
Tex-513-C	Test for Saybolt Viscosity
Tex-515-C	Distillation of Cut-Back Asphalt Products
Tex-519-C	Float Test for Bituminous Materials
Tex-520-C	Test for Residue of Specified Penetration
Tex-521-C	Testing Emulsified Asphalts
Tex-528-C	Test for Absolute Viscosity of Asphalt Cements
Tex-529-C	Test for Kinematic Viscosity of Asphalts

ITEM NO. 306S PRIME COAT 2-24-10

306S.1 Description

This item shall govern the application of asphaltic material on the completed base course and/or other approved areas in accordance with the Drawings, these specifications or as directed by the Engineer or designated representative.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text, the inch-pound units are given preference followed by SI units shown within parentheses.

306S.2 Submittals

The submittal requirements of this specification item include:

A. List of recommended materials (i.e. prime material, dispersal agent, etc.).

B. Temperature Viscosity data and proposed temperature of application.

C. Characteristics (i.e. manufacturer, rate of application, speed, etc.) of the proposed pressure distributor including calibration documentation.

D. List of facilities and equipment proposed for temperature measurements.

E. List of facilities and equipment proposed for storage and handling of asphaltic materials.

306S.3 Materials

A. Asphalt Materials

The asphalt material for Prime Coat shall meet the requirements of Cutback Asphalt, MC-30, Emulsion, SS-1, Emulsion CSS-1 or AE-P, Standard Specification Item No. 301S, "Asphalts, Oils and Emulsions".

B. Water

Water shall be furnished by the Contractor and shall be clean and free from industrial wastes and other objectionable matter.

C. Dispersal Agent

Agent shall be added to water and sprayed on surfaces to be primed in accordance with asphalt manufacturer's recommendations.

306S.3 Construction Methods

When, in the opinion of the Engineer or designated representative, the base course or other surface is satisfactory to receive the prime coat, the surface shall be prepared by sweeping or other approved methods as directed by the Engineer or designated representative. The surface shall be lightly sprinkled with water just prior to application of the asphaltic material unless this requirement is waived by the Engineer or designated representative. The Contractor shall submit a list of prime material(s) recommended for application on the work to the Engineer or designated representative for approval. When emulsions are approved, a dispersal agent shall be added to the water before sprinkling.

The asphaltic material shall be applied on the clean surface by an approved type of self-propelled pressure distributor operated so as to distribute the prime coat at a rate ranging from 0.1 to 0.3 gallons per square yard (0.45 to 1.36 liters per square meter) of surface area. The material shall be evenly and smoothly distributed under pressure sufficient to assure proper distribution. During the application of prime coat, care shall be taken to prevent splattering of adjacent pavement, curb and gutters or structures. The Contractor shall be responsible for cleaning all splattered areas.

Prime Coat may be applied when the temperature of the surface on which the prime coat is to be placed is 60°F (16°C) or above and the air temperature is above 50°F (10°C) and rising; the air temperature being taken in the shade and away from artificial heat. Asphaltic material shall not be placed when general weather conditions, in the opinion of the Engineer or designated representative, are not suitable.

The Contractor shall provide all necessary facilities and equipment for determining the temperature of the asphaltic material in all of the heating equipment and in the distributor, for determining the rate at which it is applied, and for securing uniformity at the junction of two (2) distributor loads.

The distributor shall have been calibrated within three (3) years from the date it is first used on this project. The Engineer or designated representative shall be furnished an accurate and satisfactory record of such calibration. After beginning the work, if the yield on the asphaltic material applied appears in error, the distributor shall be calibrated in a manner satisfactory to the Engineer or designated representative before proceeding with the work.

The Contractor shall be responsible for the maintenance of the surface until the work is accepted by the Engineer or designated representative. No traffic, hauling or placement of any subsequent courses shall be permitted over the freshly applied prime coat for a minimum of 48 hours or until the prime coat is accepted as dry and cured completely by the Engineer or designated representative.

All storage tanks, piping, retorts, booster tanks and distributors used in storing or handling asphaltic material shall be kept clean and in good operating condition at all times and they shall be operated in such a manner that there will be no contamination of the asphaltic material with foreign material. It shall be the responsibility of the Contractor to provide and maintain in good working order a recording thermometer at the storage heating unit at all times.

The Engineer or designated representative will approve the temperature of application based on the temperature-viscosity relationship that will permit application of the asphalt within the limits recommended in Standard Specification Item No. 301S, "Asphalts, Oils and Emulsions". The Contractor shall apply the asphalt at a temperature within 150F (80C) of the temperature specified in Standard Specification Item No. 301S, "Asphalt, Oils and Emulsions".

306S.5 Measurement

The prime coat will be included in the unit price bid for Standard Specification Item No. 340S, "Hot Mix Asphaltic Concrete Pavement" unless included as a separate pay item in the contract. When included for payment, it shall be measured at point of delivery on the project in gallons (liters: 1 liter equals 0.264 gallons) at the applied temperature. The quantity to be paid for shall be the number of gallons used in the accepted prime coat.

306S.6 Payment

The work performed and materials furnished as prescribed by this item, when included as a contract pay item, will be paid for at the unit bid price per gallon for "Prime Coat". The price shall include full compensation for cleaning the base course or other surface, for furnishing, heating, hauling and distributing the prime coat specified; for all freight involved and for all manipulations, labor, tools, equipment and incidentals necessary to complete the work.

Payment, when included as a contract pay item, will be made under:

Pay Item No. 306S:	Prime Coat	Per Gallon.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Specification Item 306S "Prime Coat"	
City of Austin Standard Specifications	
Designation	Description
Item No. 301S	Asphalts, Oils and Emulsions
Item No. 340S	Hot Mix Asphaltic Concrete Pavement

RELATED CROSS REFERENCE MATERIALS	
Specification Item 306S "Prime Coat"	
City of Austin Standard Specifications	
Designation	Description
Item No. 206S	Asphalt Stabilized Base
Item No. 210S	Flexible Base
Item No. 307S	Tack Coat
Item No. 310S	Emulsified Asphalt Treatment
Item No. 311S	Emulsified Asphalt Repaving
Item No. 320S	Two Course Surface Treatment
City of Austin Standard Details	
Designation	Description
1000S-10	Local Street Sections
1000S-11 (1)	Residential and Neighborhood collector Street Sections
1000S-11 (2)	Industrial and Collector Street Sections
1000S-12 (1)	Primary Collector Street Sections
1000S-12 (2)	Primary Arterial Street Sections
1000S-13 (1)	Minor Arterial Street Sections (4 Lanes)
1000S-13 (2)	Minor Arterial Street Sections- (4 Lanes divided)
1000S-14	Major Arterial Street
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item 300	Asphalts, Oils and Emulsions
Item 301	Asphalt Antistripping Agents
Item 310	Prime Coat (Cutback Asphaltic Materials)
Item 314	Emulsified Asphalt Treatment
Item 345	Asphalt Stabilized Base (Plant Mixed)
Item 520	Weighing and Measuring Equipment

ITEM NO. 307S TACK COAT 2-24-10

307S.1 Description

This item shall govern the application of asphaltic material on completed base courses, existing pavement, bituminous surface, bridge deck, slab or prepared surface as indicated on the Drawings and as directed by the Engineer or designated representative. The application of asphaltic material on completed base courses shall only be applied after the prime coat has completely cured in accordance with Standard Specification Item No. 306S, "Prime Coat"

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text, the inch-pound units are given preference followed by SI units shown within parentheses.

307S.2 Submittals

The submittal requirements of this specification item include:

A. List of recommended materials (i.e. tack coat material, sand type, etc.).

B. Temperature Viscosity data and proposed temperature of application.

C. Characteristics (i.e. manufacturer, rate of application, speed, etc.) of the proposed pressure distributor including calibration documentation.

D. List of facilities and equipment proposed for temperature measurements.

E. List of facilities and equipment proposed for storage and handling of asphaltic materials.

307S.3 Materials

A. Asphalt Materials

The asphalt material for "Tack Coat" shall meet the requirements for Cutback Asphalt or Emulsified Asphalt, Standard Specification Item No. 301S, "Asphalts, Oils and Emulsions" as listed below. Cutback asphalt shall be made by combining 50 to 70 percent by volume of the asphaltic material as specified for the type of paving mixture with 30 to 50 percent by volume of gasoline and/or kerosene. The type of material shall be selected from the following table:

Temperature of Surface, °F (°C)	40—70°F (5 to 21°C)	Over 70°F (Over 21°C)
	RS-2	SS-1
	RS-2H	
	RC-250	MC-70
	CRS-2	CSS-1
	CRS-2H	CSS-1h

B. Water

Water shall be furnished by the Contractor and shall be clean and free from industrial wastes and other objectionable matter.

C. Sand

Sand may be Grade 1 conforming to Standard Specification Item No. 403S, "Concrete Structures" or washed sand, largely siliceous, with the following gradation:

Sieve Designation	Percent Retained by Weight (Mass) Natural Sand	
US		SI
No. 8	2.36 mm	0
No. 16	1.18 mm	0—40
No. 30	600mm	25—65
No. 50	300mm	65—85
No. 100	150mm	85—98
No. 200	75mm	98—100

There shall not be more than 50 percent of the aggregate retained between any 2 sieves listed above and not more than 25 percent of the aggregate retained between the No. 50 (300 µm) and the No. 100 (150 µm) sieves.

307S.4 Construction Methods

Tack coat shall be applied when the surface on which the tack coat is to be placed is 600 F (160C) or above and the air temperature is above 500F (100C) and rising, where the air temperature is measured in the shade and away from any artificial heat. Asphaltic material shall not be placed when general weather conditions, in the opinion of the Engineer or designated representative, are not suitable.

Before the tack coat is applied, the surface shall be cleaned thoroughly to the satisfaction of the Engineer or designated representative. The asphaltic material shall be applied on the clean surface by an approved type of self-propelled pressure distributor, so operated as to distribute the tack coat at a rate not to exceed 0.10 gallon per square yard (0.45 liters per square meter) of surface, evenly and smoothly with sufficient pressure to provide proper distribution.

In those instances where the pavement mixture will adhere to the surface on which it is to be placed without the use of a tack coat, the tack coat may be eliminated by the Engineer or designated representative. All contact surfaces of curbs and structures and all joints shall be cleaned thoroughly and painted with a thin uniform coat of the asphaltic material used for tack coat. The tack coat shall be rolled with a pneumatic tire roller to distribute the asphaltic material uniformly over the tacked area. During the application of tack coat, care shall be taken to prevent splattering of adjacent pavement, curb and gutters or structures. The Contractor shall clean splattered areas.

The distributor shall have been calibrated within three (3) years from the date it is first used on this project. The Engineer or designated representative shall be furnished an accurate and satisfactory record of such calibration. After beginning of the work, if the yield on the asphaltic material applied appears in error, the distributor shall be calibrated in a manner satisfactory to the Engineer or designated representative before proceeding with the work.

The Contractor shall provide all necessary facilities and equipment for determining the temperature of the asphaltic material in all of the heating equipment and in the distributor, for determining the rate at which it is applied, and for securing uniformity at the junction of two (2) distributor loads.

The Contractor shall be responsible for the maintenance of the surface until the HMAC is placed over the tack coat or the work is accepted by the Engineer or designated representative. No traffic, hauling or placement of any subsequent courses shall be permitted over the freshly applied tack coat unless it is blotted by the application of sand as directed by the Engineer or designated representative.

All storage tanks, piping, retorts, booster tanks and distributors used in storing or handling asphaltic material shall be kept clean and in good operating condition at all times and they shall be operated in such a manner that there will be no contamination of the asphaltic material with foreign material. It shall be the responsibility of the Contractor to provide and maintain in good working order a recording thermometer at the storage heating unit at all times.

The Contractor shall apply the asphalt at a temperature that will permit application of the asphalt within the limits recommended in Standard Specification Item No 301S, "Asphalts, Oils and Emulsions". The application temperature shall be within 150 F (80C) of 1600 F (710C).

307S.5 Measurement

The asphaltic material for "Tack Coat" will be included in the unit price bid for Standard Specification Item 340S, "Hot Mix Asphaltic Concrete Pavement" unless included as a separate pay item in the contract. When included for payment, "Tack Coat" shall be measured at point of delivery on the project in gallons (liters: 1 liter equals 0.264 gallons) at the applied temperature. The quantity to be paid for shall be the number of gallons used.

307S.6 Payment

The work performed and materials furnished as prescribed by this item, when included as a contract pay item, will be paid for at the unit bid price per gallon for "Tack Coat". The price shall include full compensation for cleaning the area to receive the "Tack Coat"; for furnishing, heating, hauling and distributing the tack coat specified; for all freight involved and for all manipulations, labor, tools, equipment and incidentals necessary to complete the work.

Payment, when included as a contract pay item, will be made under:

Pay Item No. 307S:	Tack Coat	Per Gallon.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Specification Item 307S "Tack Coat"	
City of Austin Standard Specifications	
Designation	Description
Item No. 301S	Asphalts, Oils and Emulsions
Item No. 340S	Hot Mix Asphaltic Concrete Pavement

RELATED CROSS REFERENCE MATERIALS	
Specification Item 307S "Tack Coat"	
City of Austin Standard Specifications	
Designation	Description
Item No. 206S	Asphalt Stabilized Base
Item No. 210S	Flexible Base
Item No. 306S	Prime Coat
Item No. 310S	Emulsified Asphalt Treatment
Item No. 311S	Emulsified Asphalt Repaving
Item No. 320S	Two Course Surface Treatment
City of Austin Standard Details	

Designation	Description
1000S-10	Local Street Sections
1000S-11(1)	Residential and Neighborhood collector Street Sections
1000S-11(2)	Industrial and Collector Street Sections
1000S-12(1)	Primary Collector Street Sections
1000S-12(2)	Primary Arterial Street Sections
1000S-13(1)	Minor Arterial Street Sections (4 Lanes)
1000S-13(2)	Minor Arterial Street Sections- (4 Lanes divided)
1000S-14	Major Arterial Street
Texas Department of Transportation: Standard Specifications for Construction And Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item 300	Asphalts, Oils and Emulsions
Item 301	Asphalt Antistripping Agents
Item 310	Prime Coat (Cutback Asphaltic Materials)
Item 314	Emulsified Asphalt Treatment
Item 345	Asphalt Stabilized Base (Plant Mixed)
Item 520	Weighing and Measuring Equipment

ITEM NO. 315S MILLING ASPHALTIC CONCRETE PAVEMENT AND NON-PORTLAND CEMENT CONCRETE BASES 9-26-12

315S.1 Description

This item shall govern for the planing or the planing and texturing of existing asphaltic concrete pavement, asphalt stabilized and other non Portland cement Concrete base to depths indicated at the locations shown on the Drawings or as directed by the Engineer or designated representative. The item shall also include removal, and disposal or salvage/stockpiling the milled materials at the locations designated by the Engineer or designated representative.

When shown on the Drawings, the salvaged asphaltic concrete pavement and/or stabilized base, including any accompanying surface treatment, plant mix seal and micro-surfacing, may be allowed or required for use in other construction items of this project

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text, the inch-pound units are given preference followed by SI units shown within parentheses.

315S.2 Submittals

The submittal requirements of this specification item include:

A. Characteristics (i.e. manufacturer, power, stability, speed, etc.) and capabilities (depth of cut, dust control, etc.) of the proposed milling equipment.

B. Proposed plan for grade reference, control point spacing and support system.

C. Proposed dust control plans including proposed equipment (type street sweeper, loader, water trucks, sprayers, etc.).

315S.3 Equipment

The equipment for removing the pavement surface shall be a power operated planing machine or grinder with a minimum 2 feet (1.8 meter) cutting width. For detail work and cutting widths less than 2 feet (1.8 meter), equipment with less than 2 feet (1.8 meter) cutting width shall be allowed. The equipment shall be self-propelled with sufficient power, traction and stability to maintain accurate depth of cut and slope. The equipment shall be capable of removing in one pass, asphaltic concrete pavement of a thickness of 1 inch and any required thickness less than 1 inch (25 millimeters) in a minimum 3 foot (0.9 meters) width. Machines capable of removing, in one pass, a depth greater than 1 inch (25 millimeters) will be permitted.

The grade reference used by the Contractor may be of any type approved by the Engineer or designated representative. Control points, if required by the Drawings, shall be set at intervals not to exceed 50 feet (15 meters). The Contractor shall set the grade reference from the control points. The grade reference shall have sufficient support so that the maximum deflection shall not exceed two millimeters (1/16 inch) between supports.

The machine shall have a manual system providing for uniformly varying the depth of cut while the machine is in motion, thereby making it possible to cut flush to all inlets, manholes, or other obstructions within the paved area. The speed of the machine shall be variable in order to leave the desired grid pattern as specified in sections 315S.4 and 315S.5.

The machine shall be equipped with an integral loading and reclaiming means to immediately remove material being cut from the surface of the roadway and discharge the cuttings into a truck, all in one operation. The machine shall be equipped with means to control dust created by the cutting action. Adequate backup equipment (mechanical street sweepers, loaders, water truck, sprayers, brooms etc.) and personnel will also be provided to keep flying dust to a minimum and to insure that all cuttings are removed from the street surface daily. Stockpiling of planed material will not be permitted on the project site.

Various machines may be permitted to make trial runs to demonstrate the capabilities of that machine and to determine the acceptability of that machine to the Engineer or designated representative. Any machine that is incapable, in the opinion of the Engineer or designated representative, of meeting these requirements will not be permitted.

315S.4 Construction Methods

A. General. The pavement surface shall be removed for the length, depth and width and to the typical section shown on the Drawings, and to the lines and grades established by the Engineer or designated representative. The planed surface shall provide a satisfactory riding surface free from gouges, continuous longitudinal grooves, ridges, oil film and other imperfections and shall have a uniform textured appearance.

   When an existing asphaltic concrete pavement overlay is to be removed from an underlying Portland cement concrete pavement, all of the asphaltic concrete pavement shall be removed, leaving a uniform surface of Portland cement concrete, unless otherwise directed by the Engineer or designated representative.

B. Surface Milling. Surface milling shall be taken to a minimum depth of 2 inches (50 mm) or deeper as may be dictated by delamination of asphalt layers during the milling operation, to a depth of 1 inch (25 millimeters) below the lip gutter transitioning to the existing surface in 3 feet (0.9 meter) or as indicated on the Drawings for resurfacing operations. The pavement surface shall be removed to the appropriate milling depths around all castings within the area to be milled. When milling is used for leveling without the addition of asphalt, the milled surface shall be free of ridges deeper than 3/16 inch (5 millimeters).

   Pavement, which is adjacent to steep curbs, inlets, manholes or other obstructions and that is not removed by the planing machine, shall be removed by other methods, acceptable to the Engineer or designated representative.

   The pavement and curb surfaces shall be swept with a street sweeper or other sweeping equipment approved by the Engineer or designated representative to remove all debris leaving a clean and presentable condition.

C. Edge Milling. Edge milling at the gutter lip shall be taken to a minimum depth of 1/4 inch (6 mm) less than the overlay thickness and shall transition to the existing surface in a minimum of 6 feet (1.8 meters).

D. Spot Milling. Milling for spot repairs shall be completed in successive passes to the depth specified. Ramping for spot repairs shall be minimized. "Transition milling required at the beginning and ending of the overlay shall be taken to a minimum depth of the overlay thickness and transition to the existing surface for the length specified in the plans.

E. Miscellaneous. Unless otherwise specified, the milling material shall remain the property of the Contractor. Temporary stockpiling shall not be permitted on site. Temporary pavement markings shall conform to Item No. 864S, "Abbreviated Pavement Markings".

315S.5 Surface Texture (Temporary Traffic Only)

In those areas where traffic will temporarily be permitted, the texture produced shall be a grid pattern or any other pattern with discontinuous longitudinal striations that will provide, in the opinion of the Engineer, a satisfactory riding surface.

When the planed pavement will not be overlaid, the minimum texture depth resulting from the number of measurements directed by the Engineer shall not be less than 3/64 inch (1.25 millimeters), unless specified otherwise on the Drawings. When these texture requirements are not met, the Contractor shall cease operations until the Engineer is satisfied that changes in the texturing procedures will produce an acceptable texture.

The Contractor shall take care to prevent damage to armor joints, sealed expansion joints and/or other appurtenances.

The surface of the pavement, after planing, shall have a smooth riding quality and shall be true to the established line, grade and cross section.

315S.6 Measurement

Work prescribed by this item will be measured by the square yard (square meter: 1 square meter equals 1.196 square yards) of surface area for actual quantities based on the neat dimensions indicated for surface and transition milling, spot repairs and edge milling to the specified width. Ramping for spot repairs shall not be measured for payment. Surface milling for spot repairs shall be included in the unit price bid for the spot milling area measured.

Measurement will be made only one time regardless of the number of passes required by the machine to secure the depth desired.

315S.7 Payment

The work performed in accordance with this item and measured as provided under "Measurement", will be paid for at the unit bid price per square yard for "Milling Asphaltic Concrete Paving and Non-Portland Cement Bases". The price shall include full compensation for removal of all materials to the depth shown; minimizing the dust escaping to the atmosphere; loading, hauling, unloading and satisfactorily storing or disposing of the material; and for all labor, tools, equipment, manipulation, temporary pavement markings and incidentals to complete the work, including mobilization of the milling machine.

No payment will be made for work done by any machine on a trial run to demonstrate its ability to meet this specification unless the work performed is acceptable under this specification.

Payment will be made under the following:

Pay Item No. 315S-A:	Surface Milling	Per Square Yard.
Pay Item No. 315S-B:	Profile Milling	Per Square Yard.
Pay Item No. 315S-C:	Transition Milling	Per Square Yard.
Pay Item No. 315S-D:	Edge Milling	Per Square Yard.
Pay Item No. 315S-E:	Spot Milling	Per Square Yard.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification Item 315S "Milling Asphaltic Concrete"

City of Austin Standard Specifications	
Designation	Description
Item No. 642S	Silt Fence (SF)
Item No. 864S	Abbreviated Pavement Markings

RELATED CROSS REFERENCE MATERIALS	
Specification Item 315S "Milling Asphaltic Concrete"	
City of Austin Standard Specifications	
Designation	Description
Item No. 206S	Asphalt Stabilized Base
Item No. 210S	Flexible Base
Item No. 301S	Asphalts, Oils and Emulsions
Item No. 306S	Prime Coat
Item No. 307S	Tack Coat
Item No. 310S	Emulsified Asphalt Treatment
Item No. 311S	Emulsified Asphalt Repaving
Item No. 312S	Seal Coat
Item No. 320S	Two Course Surface Treatment
Item No. 340S	Hot Mix Asphaltic Concrete Pavement
Item No. 341S	Paving Fabric
Item No. 350S	Heating, Scarifying and Repaving
Item No. 351S	Recycling Agent
City of Austin Standard Details	
Designation	Description
1000S-10	Local Street Sections
1000S-11(1)	Residential and Neighborhood collector Street Sections
1000S-11(2)	Industrial and Collector Street Sections
1000S-12(1)	Primary Collector Street Sections
1000S-12(2)	Primary Arterial Street Sections
1000S-13(1)	Minor Arterial Street Sections (4 Lanes)
1000S-13(2)	Minor Arterial Street Sections- (4 Lanes divided)
1000S-14	Major Arterial Street
Texas Department of Transportation: Standard Specifications for Construction And Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item 300	Asphalts, Oils and Emulsions
Item 301	Asphalt Antistripping Agents
Item 310	Prime Coat (Cutback Asphaltic Materials)
Item 314	Emulsified Asphalt Treatment
Item 345	Asphalt Stabilized Base (Plant Mixed)
Item 354	Planing and/or Texturing Pavement

ITEM NO. 340 ASPHALTIC CONCRETE PAVEMENT 03-20-24

340.1 Description

This item shall govern base, level up, and pavement surface courses composed of a compacted mixture of aggregate and asphaltic cement mixed hot in a mixing plant. The asphaltic (HMA) concrete pavement shall be constructed on a previously completed and approved subgrade, subbase material, base material, concrete slab or existing pavement.

Source: Rule No. R161-24.14, 1-2-2025.

340.2 Submittals

The submittal requirements of this specification item may include:

A. A mix design submittal including the plant corrected Job Mix Formula (JMF) for the hot mix asphaltic concrete.

B. Certification that the aggregate materials meet appropriate quality requirements.

C. Particle-size gradation and specific gravity tests on all aggregate materials.

D. Certification that the asphalt cement for paving materials meet appropriate quality requirements.

E. Trial batch for the verification of JMF.

Source: Rule No. R161-24.14, 1-2-2025.

340.3 Materials

The Contractor shall furnish materials to meet the requirements specified herein and shall be solely responsible for the quality and consistency of the product delivered to the Project.

The Contractor shall notify Engineer or designated City of Austin (COA) representative of all material sources and before changing any material source or formulation. The Engineer will verify that the specification requirements are met when the Contractor or producer makes a source or formulation change and may require a new laboratory mixture design, trial batch, or both. The Engineer may obtain the test samples or may require the Contractor to obtain the samples at any time during the project to verify compliance in accordance with the specification.

A. Aggregate: The aggregate shall be composed of coarse aggregate, a fine aggregate and, if required or allowed, mineral filler and reclaimed asphalt pavement (RAP).

   Aggregates shall meet the quality requirements of Table 1 and other requirements as specified herein. The aggregate contained in RAP will not be required to meet Table 1 requirements unless indicated otherwise on the Drawings. The Contractor shall perform all aggregate quality tests listed in Table 1 and determine aggregate gradations for mix design based on the washed sieve analysis given in Tex-200-F, Part II. The Contractor shall document all aggregate test results on the mix design submittal report.

   1. Coarse Aggregate: Coarse aggregate shall consist of clean, tough, durable fragments of crushed stone or crushed gravel of uniform quality throughout. Coarse aggregate stockpiles must have no more than 20% material passing the No. 8 sieve. Aggregates from sources listed in the TxDOT's Dituminous Rated Source Quality Catalog (BRSQC) are preapproved for use.

2. Fine Aggregate: Fine aggregates consist of manufactured sands, screenings, and field sands. Fine aggregate stockpiles must meet the gradation requirements in Table 2. Fine aggregate shall be free from organic impurities and of uniform quality throughout. A maximum of 15 percent of the total aggregate may be field sand or other uncrushed fine aggregate.

   Fine aggregate, with the exception of field sand shall be supplied from sources whose coarse aggregate meets the abrasion and magnesium sulfate soundness loss requirements shown in Table 1.

   Test the stockpile if 10% or more of the stockpile is retained on the No. 4 sieve and verify that it meets the requirements in Table 1 for crushed face count (Tex-460-A) and flat and elongated particles (Tex-280-F).

   Crushed gravel screenings may be used with, or in lieu of, stone screenings only when indicated on the Drawings. Crushed gravel screenings must be the product of crushing aggregate that was originally retained on the No. 4 sieve and must meet the gradation for fine aggregate shown below.

TABLE 1: Aggregate Quality Requirements[1]

Requirement	Test Method	Amount
COARSE AGGREGATE		
Deleterious Material, percent, maximum	Tex-217-F, I	1.5
Decantation, percent, maximum	Tex-217-F, II	1.5
Los Angeles Abrasion, percent, maximum	Tex-410-A	40
Magnesium Sulfate Soundness Loss 5 cycle, percent, maximum	Tex-411-A	30
Crushed face count[2], %, Minimum	Tex-460-A, Part I	85
Flat and elongated particles @ 5:1, %, Maximum	Tex-280-F	10
FINE AGGREGATE		
Linear Shrinkage, maximum	Tex-107-E, II	3
Sand Equivalent Value, minimum	Tex-203-F	45

1. Aggregates, without added mineral filler or additives, combined as used in the job-mix formula (Plant Corrected).
2. Only applies to crushed gravel

TABLE 2: Graduation Requirements for Fine Aggregate

Sieve Size	Percent by Weight (Mass)
Passing ⅜ inch sieve	100
Passing No. 8 sieve	70—100
Passing No. 200 sieve	0—30

3. Mineral Filler: Mineral filler shall consist of thoroughly dried stone dust, Portland cement, fly ash, lime or other mineral dust approved by the Engineer or designated COA representative. The mineral filler shall be free from foreign matter.

   Fly ash obtained from a source using a process fueled by hazardous waste shall be considered as an approved product if the production facility is authorized to operate under regulation of the Texas Natural Resource Conservation Commission (TNRCC) and the U. S. Environmental Protection Agency (EPA). Supplier shall provide current TNRCC and EPA authorizations to operate the facility.

The addition of baghouse fines or other collected fines will be permitted if the mixture quality is not adversely affected in the opinion of the Engineer or designated COA representative. In no case shall the amount of material passing the No. 200 sieve exceed the tolerances of the job-mix formula or the master gradation limits.

When tested by TEX-200-F (Part I or Part III, as applicable), the mineral filler shall meet the following gradation requirements. Baghouse fines are not required to meet the gradation requirements.

TABLE 3: Gradation Requirements for Mineral Filler

Sieve Size	% Passing by Wt. or Volume
#8	100
#200	55—100

B. Asphaltic Material:

1. Asphalt Binder: Asphalt binder for the paving mixture shall conform to the requirements of Standard Specification Item No. 301S, "Asphalts, Oils and Emulsions", unless otherwise shown on the plans. The selection of binder grade shall be based on the road classification as shown in Table 4.

TABLE 4: Binder Grade Based on Roadway Classification

Street Classification	Asphalt Binder Grade	
	Surface Course	Base Course
Arterials	PG76-22	PG64-22
Collectors with Bus		
Collector without Bus	PG64-22	
Residentials		

2. Tack Coat: Tack Coat shall conform to Standard Specification Item No. 307S, "Tack Coat".

C. Additives: Additives to facilitate mixing and/or improve the quality of the asphaltic mixture or tack coat may be used with the authorization of the Engineer or designated COA representative. The Contractor may choose to use either lime or a liquid anti-stripping agent to reduce moisture susceptibility of the aggregate.

D. Warm Mix Asphalt (WMA): Warm Mix Asphalt (WMA) is defined as HMA that is produced within a target temperature discharge range of 215°F and 275°F using approved WMA additives or processes from the Department's MPL. WMA is allowed for use when shown on the plans. When WMA is required, the maximum placement or target discharge temperature for WMA will be set at a value below 275°F.

TxDOT-approved WMA additives or processes may be used to facilitate mixing and compaction of HMA produced at target discharge temperatures above 275°F; however, such mixtures will not be defined as WMA.

E. Compaction Aid. Compaction Aid is defined as a chemical warm mix additive that is used to produce an asphalt mixture at a discharge temperature greater than 275°F.

Compaction Aid is allowed for use on all projects and is required when shown on the plans.

F. Reclaimed Asphalt Pavement (RAP): RAP is defined as a salvaged, milled, pulverized, broken or crushed asphaltic pavement. The RAP to be used in the mix shall be crushed or broken to the extent that 100 percent will pass the 2-inch sieve. Fractionated RAP is defined as a stockpile that contains RAP material with a minimum of 95.0% passing the ⅜-in. or ½-in. sieve, before burning in the ignition oven, unless otherwise

approved. The Engineer may allow the Contractor to use an alternate to the ⅜-in. or ½-in. screen to fractionate the RAP.

The RAP shall be stockpiled in such a manner that assures that it will not become contaminated by dirt or other objectionable materials. Unless indicated otherwise on the Drawings, stockpiled, crushed RAP must not exhibit a decantation more than 5 percent or a plasticity index more than 8, when tested in accordance with TxDOT Test Method Tex-406-A, Part I, or Test Method Tex-106-E, respectively.

The maximum allowable RAP percentages are shown in Table 5. Surface and base courses referenced in Tables 4 and 5 are defined as follows:

- Surface. The final HMA lift placed at the top of the pavement structure.
- Base. Layer between surface and subgrade. Unless otherwise shown on the plans, mixtures used for bond breaker are defined as base mixtures.

The asphalt binder content and the gradation of the RAP stockpiles is determined for mixture design purposes in accordance with Tex-236-F, Part I. The Engineer may verify the asphalt binder content of the stockpiles at any time during production. Asphalt binder from RAP is designated as recycled asphalt binder. The ratio of the recycled asphalt binder to total binder shall not exceed the percentage shown in Table 5 during mixture design and HMA production when RAP is used. A separate cold feed bin for each stockpile shall be used for each stockpile of RAP during HMA production.

TABLE 5: Maximum Allowable Amounts of RAP and Maximum Recycled Binder Ratios[1]

Maximum Allowable Fractionated RAP (%)		Maximum Ratio of Recycled Binder to Total Binder (%)	
Surface Course	**Base Course**	**Surface Course**	**Base Course**
20	35	15	30

1. All mixes must also meet the recycled binder to total binder ratio shown in Table 5.

Source: Rule No. R161-24.14, 1-2-2025.

340.4 Paving Mixtures Design

An asphalt mixture design is developed by a laboratory process, which includes the determination of the quality and quantity of the asphalt cement and the individual aggregates, and the testing of the combined mixture (Laboratory Design). The Laboratory Design is subsequently revised to produce an appropriate job mix formula (JMF). The Contractor may submit a new asphalt mixture design at any time during the project.

The performance of the mix design shall remain the responsibility of the Contractor.

A. Mixture Design Requirement: The mix shall be designed in accordance with Tex-204-F to conform with the requirements herein. The mixture shall meet the requirements listed in Tables 1, 2, 3, 4, 5, 6, 7, and 8. The master grading limits of the appropriate type and the JMF will be plotted on a graduated chart with sieve sizes raised to the 0.45 power and will be submitted to the Engineer or designated COA representative with the asphalt mixture design. The Contractor shall design the mixture using a Superpave Gyratory Compactor (SGC) unless otherwise shown on the plans.

   The blend of coarse aggregate, fine aggregate, and mineral filler, if allowed, that is established by TxDOT Test Method Tex-200-F, Dry Sieve Analysis, shall conform to the master gradation shown in Table 6 for the type of specified mixture. The voids in the mineral aggregate (VMA) will be determined as a mixture design requirement only, in accordance with TxDOT Test Method Tex-207-F, and shall not be less than the value indicated in Table 6.

B. Design Number of Gyration (N_{design}): The mixture shall be designed at 50 gyrations targeting laboratory-molded density to 96.0%. However, adjustment can be made to the N_{design} value within a range of 35-100 gyrations when shown on the plans or specification or when mutually agreed between the Engineer and Contractor. The N_{design} level may be reduced to at least 35 gyrations at the Contractor's discretion.

C. Performance testing: The contractor shall use an approved laboratory to perform the Hamburg Wheel test and Indirect Tensile Strength test and provide results with the laboratory mixture design.

TABLE 6: Master Grading - Percent Passing by Weight (Mass) or Volume and VMA Requirements

Sieve Size US	Type B Fine Base	Type C Coarse Surface	Type D Fine Surface	Type F Fine Mixture
2"	-	-	-	-
1½"	100[1]	-	-	-
1"	98—100	100[1]	-	-
¾"	84—98	95—100	100[1]	
½"	-	-	98—100	100[1]
⅜"	60—80	70—85	85—100	98—100
No. 4	40—60	43—63	50—70	70—90
No. 8	29—43	32—44	35—46	38—48
No. 30	13—28	14—28	15—29	12—27
No. 50	6—20	7—21	7—20	6—19
No. 200	2—7	2—7	2—7	2—7
Design VMA, % Minimum	13	14	15	16
Production (Plant-Produced) VMA, % Minimum	12.5	13.5	14.5	15.5
Min. Allowable lift thickness	3"	2"	1.25"	¾"
Max. Allowable lift thickness	6"	4"	3"	1.5"

1. Defined as maximum sieve size. No tolerance allowed.
2. Variance from these minimums and maximums will only be allowed with permission from the Office of the City Engineer.

Table 7: Laboratory Mixture Design Properties

Mixture Property	Test Method	Requirement
Target laboratory-molded density, % (SGC)	Tex-207-F	96.0
Design gyrations (N_{design} for SGC)	Tex-241-F	50[1]
Indirect tensile strength (dry), psi	Tex-226-F	85-200[2]

3. Adjust within a range of 35—100 gyrations when shown on the plans or specification or mutually agreed between the Engineer and Contractor.
4. The Engineer may allow the IDT strength to exceed 200 psi if the corresponding Hamburg Wheel rut depth is greater than 3.0 mm and less than 12.5 mm.

Table 8: Hamburg Wheel Test Requirements

High-Temperature Binder Grade	Test Method	Minimum # of Passes @ 12.5 mm[1] Rut Depth, Tested @ 50°C

PG 64 or lower	Tex-242-F	10,000[2]
PG 70		15,000[3]
PG 76 or higher		20,000

1. When the rut depth at the required minimum number of passes is less than 3 mm, the Engineer may require the Contractor to lower the N_{design} level to at least 35 gyrations.
2. May be decreased to at least 5,000 passes when shown on the plans.
3. May be decreased to at least 10,000 passes when shown on the plans.

D. Job Mix Formula (JMF) Submittal: The job-mix formula (JMF) is the combined aggregate gradation, target laboratory-molded density (N_{design}), and target asphalt percentage used to establish target values for hot-mix production. $JMF_{Initial}$ is the original laboratory mixture design used to produce the trial batch. The Contractor will verify laboratory design JMF ($JMF_{Initial}$) based on plant-produced mixture from the trial batch. The Engineer may accept an existing mixture design previously used on a city project and may waive the trial batch to verify $JMF_{Initial}$.

The laboratory design JMF ($JMF_{Initial}$) may subsequently be revised to produce an appropriate job-mix formula (JMF1). When WMA is used, $JMF_{Initial}$ may be designed and submitted to the Engineer without including the WMA additive. When WMA is used, document the additive or process used and recommended rate on the mix design submittal.

The Contractor shall submit to the Engineer on forms provided by the Engineer or designated COA representative, an asphalt mixture design reviewed, signed and sealed by a Registered Professional Engineer licensed in the State of Texas or certified by a TxDOT Level II Certified Asphalt Technician. An asphalt mixture design shall be submitted for a comprehensive review every two (2) years. Mix designs older than one year will not be accepted without a review of current test data of the proposed materials and current mix design to ensure that the materials meet specification requirements.

The Contractor shall provide the Engineer with an asphalt mixture design submittal which includes the following items:

- a unique identification number for the mixture design,
- the date the mixture design was performed,
- the combined aggregate gradation, source, specific gravity, and percent of each material used,
- asphalt binder content and aggregate gradation of RAP stockpiles,
- the target laboratory-molded density (or N_{design} level),
- results of all applicable tests,
- the mixing and molding temperatures, and
- the signature of the Level 2 person or persons that performed the design.

The JMF shall be submitted to the Engineer or designated COA representative on a form provided by the Engineer through the Construction Inspector or Project Manager of the Project for review, for each individual Project, a minimum of three (3) working days before the mixture is to be placed. Under no circumstances will a mixture be placed before its use is reviewed and approved by the Engineer or designated COA representative.

E. Trial batch Submittal: The Contractor shall provide the plant-produced trial batch for verification of $JMF_{Initial}$. The Contractor shall produce trial batches as necessary to obtain the mixtures that meets the specification requirements in Table 5, Table 6 and Table 7. The Contractor shall obtain a representative sample of the trial

batch in accordance with TEX-222-F and test the trial batch to ensure the mixture produced using $JMF_{Initial}$ meets the mixture requirements in Table 9 and in compliance with the Indirect Tensile Strength requirement in Table 7 and Hamburg Wheel requirement in Table 8. The engineer may also require the Contractor to deliver samples to the accredited laboratory as directed. The Contractor shall use only equipment and materials proposed for use on the project to produce the trial batch.

The Contractor shall submit a copy of trial batch test results to the Engineer or designated COA representative.

F. Ignition Oven Correction Factor: Determine the aggregate and asphalt correction factors from the ignition oven in accordance with Tex-236-F, Part II. Provide correction factors that are not more than 12 months old. Correction factors established from a previously approved mixture design may be used for the current mixture design if the mixture design and ignition oven are the same as previously used, unless otherwise directed.

G. Development of JMF1: The Engineer will approve $JMF_{Initial}$ if the mixture meets the requirements in Table 5 and the gradation meets the master gradation limits shown in Table 6. The Engineer will notify the Contractor that additional trial batch is required if the trial batch does not meet these requirements. The laboratory design JMF ($JMF_{Initial}$) may be revised to produce an appropriate job-mix formula (JMF1).

H. Job Mix Formula Field Adjustments: If it is determined by the City of Austin that adjustments to the JMF are necessary to achieve the specified requirements, the Engineer or designated COA representative may allow adjustments of the JMF within the limits specified in Table 9 without a laboratory redesign of the mixture. The adjusted JMF1 (JMF2) shall not exceed the master grading criteria for the type of mixture specified in Table 6.

When the proposed adjustments exceed the tolerance requirement shown in Table 9, and the Engineer or designated COA representative determines that the impact of these changes may adversely affect pavement performance, a new laboratory mixture design will be required.

Table 9. Tolerances Limit

Description	**Test Method**	**Allowable Difference Between Trial Batch and $JMF_{Initial}$target**	**Allowable Difference from Approved JMF1[2]**
Individual % retained for #8 sieve and larger	Tex-200-F or Tex-236-F	±5.0[1]	±5.0[1]
Individual % retained for sieves smaller than #8 and larger than #200		±3.0[1]	±3.0[1]
% Passing the #200 sieve		±2.0[1]	±1.6[1]
Asphalt binder content, %	Tex-236-F	±0.5	±0.3
Laboratory-molded density, %	Tex-207-F	±1.0	±1.0
1 - Must be within Master Grading Units in Table 9.			
2 - Only applies to field adjusted JMF.			

Source: Rule No. R161-24.14, 1-2-2025.

340.5 Equipment

The trucks that deliver the hot mix asphalt concrete material to the project shall be of sufficient number to insure a continuous paving operation. All equipment used for the production, placement and compaction of the mixture

shall be maintained in good repair and operating conditions to the satisfaction of the Engineer or designated COA representative. All equipment shall be made available for inspection. If the Engineer or designated COA representative expresses concern about the condition of any equipment, it shall not be used until it is repaired to the satisfaction of the Engineer or designated COA representative.

A. Mixing Plants: Plants may be of the weigh-batch type, the modified weigh-batch type or drum-mix type equipped with suitable material conveyers, power units, mixing equipment, aggregate proportioning devices, dryers, bins, dust collectors and sensing and recording devices as appropriate for the mixing plant type. The mixing plants shall meet the requirements specified in Section 320.2.1, "Production Equipment" of TxDOT Specification Item No. 320, "Equipment for Asphalt Concrete Pavement".

B. Spreading and Finishing Paving Machine: The paving machine shall be self-propelled and equipped with a heated compacting screed capable of producing a finish surface meeting the requirements of the street cross-section indicated on the Drawings and all surface criteria. Extensions to the screed shall have the same heating and compacting capabilities as the primary unit, except for use on variable depth tapered areas and/or as approved by the Engineer or designated COA representative.

   The paving machine shall be equipped with an approved automatic dual longitudinal screed control system and an automatic transverse screed control system. The longitudinal controls shall be capable of operating from any longitudinal grade reference including a string line, ski, mobile string line or matching shoe. Unless indicated otherwise on the Drawings, the Contractor may use any one of these grade references. The selected grade reference equipment shall be maintained in good operating condition by personnel trained in the use of the specific type of equipment.

   The Contractor shall furnish all labor and equipment required for establishing and maintaining appropriate grade reference.

C. Rollers: The Contractor shall select rollers conforming to Item 230S, "Rolling (Flat Wheel)" and Item 232S, "Rolling (Pneumatic Tire)". Rollers that do not conform to these requirements shall be immediately removed from the Project.

D. Motor Grader: A self-propelled power motor grader may only be used when its use is approved by the Engineer or designated COA representative. It shall have a blade of not less than 12 feet (3.66 meters) and a wheelbase of not less than 16 feet. Smaller graders may be used for small irregular areas when approved by the Engineer or designated COA representative.

E. Material Transfer Equipment: Equipment for transferring the HMA mixture from the hauling units or the roadbed to the spreading and finishing machine will be allowed unless indicated otherwise on the Drawings.

   Windrow pick-up equipment, if permitted by the Engineer or designated COA representative, shall be constructed in such a manner that substantially all of the HMA mixture deposited on the roadbed is picked up and loaded into the spreading and finishing machine. The HMA mixture shall not be contaminated with foreign material. The loading equipment shall be designed so that it does not interfere with the spreading and finishing machine in obtaining the required line, grade and surface without resorting to hand finishing.

F. Straightedges and Templates: The Contractor shall provide a ten-foot (3.05 meter) straightedge acceptable to the Engineer or designated COA representative for surface testing. Satisfactory templates shall be provided as required by the Engineer or designated COA representative.

Source: Rule No. R161-24.14, 1-2-2025.

340.6 Stockpiling Aggregates

Aggregates shall be stockpiled to facilitate blending. When the aggregate is not stockpiled on a hard, non-contaminant base, the bottom six-inch (150 mm) depth of the stockpiles shall not be used in asphaltic mixtures.

Where space is limited at the plant site, the aggregate stockpiles shall be separated by walls or other appropriate barriers.

Aggregates shall be stockpiled and handled in a manner that will insure minimization of segregation and contamination. Aggregate and RAP stockpiles shall only contain material from a single source.

Source: Rule No. R161-24.14, 1-2-2025.

340.7 Mixture Temperature

The Contractor shall select a target temperature for discharge of the HMA mixture from the mixer between 250°F (120°C) and 350°F (176°C) that is suitable to weather and Project conditions. The target temperature shall be reported to the Engineer or designated COA representative daily and recorded in the Daily Progress Report. The HMA mixture temperature shall not vary by more than 25°F (14°C) from the target temperature for discharge from the mixer. HMA mixtures that are discharged from the mixer at a temperature exceeding 360°F (182°C) or a temperature more than 50°F (28°C) below the target temperature shall not be accepted and shall not be placed on the Project.

Source: Rule No. R161-24.14, 1-2-2025.

340.8 Mixture Storage

A surge-storage system may be used to minimize production interruptions during a normal day of operation. When approved by the Engineer or designated COA representative, overnight storage of HMA mixture in insulated storage bins may be used provided that material temperature and physical properties of the HMA mixture are not adversely affected. HMA mixtures that include hardened lumps shall not be used. Stored HMA mixtures shall not be exempt from any requirements provided in this specification.

When a surge-storage system is used, it shall be equipped with a device such as a gob hopper or other device approved by the Engineer or designated COA representative to prevent segregation in the surge-storage bin.

Source: Rule No. R161-24.14, 1-2-2025.

340.9 Mixture Moisture Content

Hot mix asphalt (HMA) mixtures produced from any plant shall not have a moisture content in excess of 1 percent by weight (mass) when discharged from the mixer. The moisture content shall be determined in accordance with TxDOT Test Method Tex-212-F, Part II, except that the sample shall be left in the oven a total of not less than four (4) hours.

Source: Rule No. R161-24.14, 1-2-2025.

340.10 Construction Methods

A. General: The Contractor shall be responsible for the production, transportation, placement and compaction of the specified HMA paving mixture to the requirements of this specification. The Contractor shall also be responsible for providing a safe environment for inspection personnel to inspect the equipment and to acquire samples.

   All hot mix asphalt concrete pavement surface courses shall be placed with a spreading and finishing (lay-down) machine only. All hot mix asphalt concrete pavement base layers with the possible exception of the first lift of the base layer shall also be placed with a spreading and finishing (lay-down) machine. Longitudinal

pavement joints shall be located under the proposed lane lines. Density tests shall be taken prior to opening to traffic.

The first lift of a base layer may be placed with a motor grader if approved in advance by the Engineer or designated COA representative. The loose measure thickness of this first lift shall not exceed 6 inches (150 mm). If placed with a motor grader, the first lift shall achieve a minimum in-place relative density of 89% as determined by TxDOT test procedures TEX-207-F and TEX-227-F. All subsequent lifts should be placed with a spreading and finishing (lay-down) machine and shall be subject to the requirements of Section 340S.12, "Acceptance Plan". Density tests will be taken randomly to confirm compliance with the specification requirements.

For hot mix asphalt overlays, an automatic screed shall be used with outriggers.

Any material delivered to the Project that by visual inspection can reasonably be expected not to meet specification requirements (i.e. segregated or burned material, deficient or excess asphalt, low mixing temperature, visible contaminants, etc.), as determined by the Engineer or designated COA representative, shall not be used or left in place.

Equipment shall be inspected prior to use and, if found to be defective or in an operating condition that could potentially affect the quality of the finished pavement, as determined by the Engineer or designated COA representative, its use shall not be allowed. Leakage of fuels, oils, grease, hydraulic or brake fluids or other contaminants onto the prepared surface or newly-laid HMA layer will not be allowed and may require replacement of the affected pavement area.

The HMA paving mixture, when placed with a spreading and finishing machine, shall not be placed when the air temperature is below 50°F (10°C) and is falling, but it may be placed when the air temperature is above 40°F (4°C) and is rising.

The paving mixture, when used as a level-up course or when spread with a motor grader, shall not be placed when the air temperature is below 60°F (15°C) and is falling, but it may be placed when the air temperature is 50°F (10°C) and is rising. An HMA layer with a thickness of 1½ inches (37.5 mm) and less shall not be placed when the temperature of the surface on which the layer is to be placed is below 50°F (10°C). The temperature shall be taken in a shaded area away from artificial heat.

Additional surface temperature requirements may be included in the Contract Documents or indicated on the Drawings.

Surfaces to be paved shall be finished, primed, cured, broomed and tacked, as appropriate, to the satisfaction of the Engineer or designated COA representative. If the surface on which the first course of the paving mixture is to be placed is a flexible base course, and a cut-back asphalt is to be used as a prime coat, the flexible base shall have been primed and cured a minimum of 24 hours before the paving mixture may be placed. The 24-hour restriction will not apply to a flexible base that has been primed with material other than a cutback. However, the surface on which the tack coat and/or paving mixture are to be placed shall be in a dry condition.

Pavement shall be opened to traffic as soon as possible after temporary pavement markings or permanent markings are in place as indicated on the Drawings) or as directed by the Engineer or designated COA representative. Construction traffic allowed on pavements open to the public will be subject to all laws governing traffic on streets and highways.

B. Tack Coat: The surface upon which the tack is to be placed shall be cleaned thoroughly to the satisfaction of the Engineer or designated COA representative. The surface shall be given a uniform application of tack coat as governed by Standard Specification Item No. 307S, "Tack Coat". The tack coat shall be applied, as directed by the Engineer or designated COA representative, with an approved sprayer at a rate not to exceed 0.05 gallons per square yard, (0.225 liters per square meter) of surface area. Where the paving mixture will adhere to the surface on which it is to be placed without the use of a tack coat, the tack coat may be

eliminated when approved by the Engineer or designated COA representative. All contact surfaces of curbs, castings and all structures and all joints shall be painted with a thin uniform application of tack coat.

During the application of tack coat, care shall be taken to prevent splattering of adjacent pavement, curb and gutter and structures. Before the Work can be accepted, all splatter shall be removed by the Contractor at the Contractor's expense.

C. Transporting Hot Mix Asphaltic (HMA) Concrete: The HMA mixture shall be hauled to the Work site in tight vehicles that were previously cleaned of all foreign material. Dispatching of the vehicles shall normally be arranged so that all material delivered is placed and all rolling completed during daylight hours. Nighttime paving may be allowed, when approved in advance by the Engineer or designated COA representative.

In cool weather or for long hauls, truck bodies containing the HMA mixture shall be covered.

If necessary, to prevent the HMA mixture from adhering to the truck body, the inside of the truck may be given a light coating of a release agent satisfactory to the Engineer or designated COA representative.

D. HMA Placement: The HMA mixture shall be dumped and spread on the approved prepared surface with the spreading and finishing machine. When properly compacted, the finished pavement shall be smooth, of uniform texture and density and shall meet the requirements of the typical cross sections and the surface tests. In addition the placement of the HMA mixture shall be done without tearing, shoving, gouging or segregating the mixture and without producing streaks in the HMA layer.

Discharge of the HMA mixture into the finishing machine shall be controlled so that the spreading and finishing machine is not bounced or jarred and the required lines and grades shall be obtained without resorting to hand finishing except as permitted below in this Section.

Unless indicated otherwise on the Drawings, dumping of the HMA material in a windrow and then placing the HMA mixture in the finishing machine with windrow pick-up equipment will be permitted provided the temperature of the HMA mixture does not drop more than 50°F (28°C) below the target temperature before being placed by the finishing machine.

Under no circumstances will the HMA material be permitted to be dumped on or near the job site and then reloaded for hauling to the site of placement. Exceptions may be allowed if approved by the Engineer or designated COA representative.

The windrow pick-up equipment shall be operated in such a manner that substantially all the mixture deposited on the roadbed or prepared surface is picked up and loaded into the finishing machine without contamination by foreign material. The windrow pick-up equipment will also be so operated that the finishing machine will obtain the required line, grade and surface without resorting to hand finishing. Any operation of the windrow pick-up equipment resulting in accumulation and subsequent shedding of accumulated material into the HMA mixture will not be permitted.

When approved by the Engineer or designated COA representative, level-up courses may be spread with a motor grader that meets the requirements of this specification item.

The spreading and finishing machine shall be operated at a uniform forward speed consistent with the plant production rate, hauling capability and roller train capacity to result in a continuous operation. Stopping of the spreading and finishing machine between trucks is to be held to a minimum. If, in the opinion of the Engineer or designated COA representative, delivery of material is adversely affecting the condition of the HMA layer (excessive stopping of the spreading and finishing machine, loss of mixture temperature, etc.), the Engineer or designated COA representative may require paving operations to cease until acceptable methods are provided to minimize starting and stopping of the spreading and finishing machine.

The hopper gates of the spreading and finishing machine shall be adjusted to provide an adequate and consistent flow of material. This shall result in enough material being delivered to the augers so that they are operating approximately 85 percent of the time or more. The augers shall provide means to supply adequate

flow of material to the center of the paver. Augers shall supply an adequate flow of material for the full width of the mat being placed, as approved by the Engineer or designated COA representative. Augers should be kept approximately one-half to three-quarters full of HMA mixture at all times during the paving operation.

When the HMA mixture is placed in a narrow strip along the edge of an existing pavement or is used to level up small areas of an existing pavement or is placed in small irregular areas where the use of a finishing machine is not practical, the finishing machine may be eliminated when permitted by the Engineer or designated COA representative.

The paving material adjacent to castings and flush curb and gutter and structures shall be finished uniformly high so that when compacted, it will be slightly above but not more than ⅛ inch (3 mm) above the edge of the casting or gutter lip.

Construction joints of successive courses of HMA material shall be offset at least 6 inches (150 mm). Longitudinal joints in the layer shall be placed to coincide with lane lines as directed the Engineer or designated COA representative. Transverse joints shall be offset a minimum of 5 feet (1.5 meters).

E. Compaction: The pavement layers/lifts shall be compacted thoroughly and uniformly to obtain the compaction and cross section meeting the requirements indicated on the Drawings and this specification item.

Regardless of the method used for compaction, all rolling to achieve specified density shall cease before the temperature of the HMA mixture drops below 175°F (80°C).

Rolling with a pneumatic tire roller shall be used to seal the surface. Rolling with a tandem or other steel-wheel roller shall be provided if required to iron out any roller marks. Surface sealing and removal of roller marks may be accomplished at HMA temperatures below 175°F (80°C).

Vibratory rollers shall not be allowed in the vibrating mode on layers with a plan thickness less than 1½ inches (37.5 mm).

The motion of the rollers shall be slow enough to avoid other than usual initial displacement. If any displacement occurs, it shall be corrected to the satisfaction of the Engineer or designated COA representative.

The roller shall not be allowed to stand on pavement, which has not been compacted to minimum density requirements. In order to prevent adhesion of the surface mixture to the steel-wheel rollers, the wheels shall be thoroughly moistened with water; however an excess of water will not be allowed. Necessary precautions shall be taken to prevent the dropping of diesel, gasoline, oil, grease or other foreign matter on the pavement, either when the rollers are in operation or when standing.

The edges of the pavement along curbs, headers and similar structures, and all places not accessible to the roller, or in such positions as will not allow thorough compaction with the rollers, shall be thoroughly compacted with lightly oiled tamps.

Rolling with a trench roller will be required on widened areas, in trenches and other limited areas where satisfactory density cannot be obtained with the approved rollers.

Source: Rule No. R161-24.14, 1-2-2025.

340.11 Sampling and Testing

The HMA mixture shall be tested daily at the Project site for conformance to specification requirements. The Engineer or designated COA representative may request contractor to provide the daily quality control report. The Engineer or designated COA representative shall utilize a random selection method to determine sample locations

based on the Contractor's anticipated production. Each day's anticipated production shall be divided into three (3) essentially equal single-pass, sub-area lots. Each day's sample locations shall be equally distributed over the three (3) sub-areas. If, due to the weather or plant malfunctions, the Contractor's daily-anticipated production is not attained, the random locations will not be recalculated. Also, no more than one location of the three (3) sub-areas shall be located in an irregular shaped area such as a cul-de-sac.

Unless directed otherwise by the Engineer or designated COA representative, a minimum of three bag samples and three correlating 6-inch cores will be obtained from each day's production.

Bag samples shall be taken during lay-down operations. The primary sampling point for the bag samples shall be from the windrow if a windrow elevator is used. If a windrow elevator is not used, the sample shall be taken from the middle of the paving machine hopper. This sampling location will require a stoppage in the paving operation in order for the Inspector to safely secure a sample from the hopper. One core shall be taken for every 2,000 single-pass square yards with a minimum of three (3) cores for all projects. One core shall be taken at the same station and pass sampled for each of the bag samples. Cores shall be taken by the City's laboratory within 48 hours of pavement laydown unless otherwise directed by the Engineer or designated representative.

For total areas of less than 500 square yards (420 square meters), a total of only two bag samples and two correlating cores will be obtained. If the Contractor desires additional testing, it shall be at its own entire expense.

The Engineer or designated COA representative may alter, increase or waive the testing schedule to ensure that the Work performed and the material used meet specification requirements. Acceptability of the completed pavement shall be based on the average of test results for the Project as defined in Section 340S.12, "Acceptance Plan" of this item.

Gradation (Tex-200-F), asphalt content (Tex-210-F) and indirect tensile strength (Tex-226-F) value of the HMA mixture shall be reported for each of the bag samples. The indirect tensile strength value reported for each of the bag samples shall be the average of four (4) tests per bag.

Pavement thickness and density shall be determined from 6-inch field cores. For each day's placement, density of cores for which no corresponding bag samples were taken shall be determined by using the average Maximum Theoretical Density of the day's three (3) bag samples or as may otherwise be determined by the Engineer or designated COA representative.

When, in the opinion of the Engineer or designated COA representative, test results appear unrepresentative, additional testing may be authorized. The retesting will be at the expense of the Contractor and the results of the retesting shall be averaged with the results of the original testing. If the results of retesting indicate that the original test results were erroneous, the original test results will be discarded. In the instance of erroneous original test results the subsequent first set of retests will be at the expense of the City of Austin.

Pavements with low-density results may be recorded; but the pavement shall not receive any additional compactive effort.

Pavements that will not or cannot be cored within 48 hours shall be closed to both public and construction traffic.

Source: Rule No. R161-24.14, 1-2-2025.

340.12 Acceptance Plan

For the purpose of the Acceptance Plan only, the "Paving Project" of each of the specified mixture types shall be defined by the Engineer or designated COA representative before the paving operation begins

Considerations for defining the Paving Project shall include paving operations staged due to traffic considerations, pavement structural section (i.e. with varying layer thicknesses), time required for paving, changes to the Job Mix

Formula, phasing of large projects, or other factors affecting the consistency in the production, lay-down/compaction, use of completed portions, and/or aging of in-place material.

Acceptability of the completed pavement structure for a Paving Project shall be based on all daily averages of three test results and when approved by the Engineer or designated COA representative the overall average of all test results for each of the mixture/layer types specified on the Drawings.

Pay adjustments for two or more acceptance factors shall be accumulative. Pay adjustments of 100% unit price reduction shall require removal and replacement of the Work. Replacement materials shall be subject to all requirements of this specification. Alternatively, the Engineer or designated COA representative may allow the Work to remain in place without payment provided that the Work is warranted for an extended period under conditions as determined by the Engineer or designated COA representative. The decision of the Engineer or designated COA representative related to the removal and replacement of the Work shall be the final authority.

A. Non-Pay-Adjustment Acceptance Factors:

1. Surface Characteristics: Unless otherwise directed by the Engineer or designated COA representative, all pavements shall be tested for smoothness. Surfaces shall be tested with a 10-foot (3.05 meter) straightedge parallel to the roadway centerline and perpendicular to the centerline on flat, cross-slope sections. Maximum allowable deviation in 10 feet shall be ⅛ inch (1-mm per meter) parallel to the centerline and ¼ inch (2-mm per meter) perpendicular to the centerline. Sections exceeding these maximums shall be corrected to the satisfaction of the Engineer or designated representative. The completed surface must meet the approval of the Engineer or designated COA representative for surface smoothness, finish and appearance.

   If the surface ravels, ruts or deteriorates in any manner prior to the end of the warranty period, it will be the Contractor's responsibility to correct this condition at its own entire expense to the satisfaction of the Engineer or designated COA representative in conformance with the requirements of this specification.

   For HMAC rehabilitation and overlay projects, if cracks develop in the pavement surface within the one-year warranty period, the Contractor shall seal the cracks in accordance with Standard Specification Item No. 313S, "Cleaning and/or Sealing Joints and Cracks (Asphaltic Concrete)".

   For new HMAC roadways constructed in accordance with the Drawings and specifications, if cracks less than ¼ inch (6 mm) in width develop in the pavement surface within the one year warranty period the Contractor shall seal the cracks in accordance with Standard Specification Item No. 313S, "Cleaning and/or Sealing Joints and Cracks (Asphaltic Concrete)".

   If cracks equal to or greater than ¼ inch (6 mm) in width develop in the pavement surface within the one-year warranty period, the cracking shall be reviewed and evaluated by the Engineer or designated COA representative before corrective action is taken.

2. Laboratory Density: Laboratory density results as determined by TxDOT Test Method Tex-207-F shall be used as indicators of potential problems. Where laboratory density test results are less than 94.5% or more than 97.5% of mix design maximum density, additional tests shall be taken as directed by the Engineer or designated COA representative for further evaluation and monitoring of the paving mixture. This additional laboratory density testing will be at the expense of the Contractor. When, in the opinion of the Engineer or designated COA representative, the laboratory density is deemed unacceptable for the intended use of the pavement, the paving mixture shall be removed and replaced to the limits indicated by test results.

   The removal and replacement of the paving mixture shall be at the sole expense of the Contractor.

3. Limited Areas: Irrespective of an acceptable overall Paving Project average for any or all of the Pay-Adjustment Acceptance Factors, limited substandard portions of the Work, as determined by the

Engineer or designated COA representative, shall be remedied or removed and replaced to the satisfaction of the Engineer or designated COA representative at the sole expense of the Contractor.

B. Pay-Adjustment Acceptance Factors: Contract unit prices shall be adjusted for paving mixtures that fail to meet acceptance criteria for gradation, asphalt content, density and mat thickness in accordance with the following:

Gradation Acceptance Schedule (TEX-200-F)

Sieve	Deviation From Job Mix Formula		Percent Contract Unit Price Reduction
	Daily Average	Overall Average	
Individual % retained for #8 sieve and larger	±6.5 6.6±	±5.0 5.1±	0 10
Individual % retained for sieves smaller than #8 and larger than #200	±3.9 4.0±	±3.0 3.1±	0 5

Asphalt Content Acceptance Schedule (TEX-210-F, Part II)

Deviation from the Job Mix Formula		Percent Contract Unit Price Reduction	
Daily Average	Overall Average	Local Streets*	All Others
±0.5	±0.4	0	0
±0.51 to ±0.60	±0.41 to ±0.50	15	25
+0.61 to +0.70	+0.51 to +0.60	25**	100; Remove and Replace
-0.61 to -0.70	-0.51 to -0.60	100: Remove and Replace	100; Remove and Replace
Over ±0.70	Over ±0.60	100: Remove and Replace	100; Remove and Replace
*A local or residential street that serves as access to residence or other abutting property.			
**If the street has an ADT of 500, or less, with 1%, or less, of truck traffic, plus a 2-year warranty; otherwise, Remove and Replace.			

Density Acceptance Schedule (TEX-207-F/TEX-227-F)

*Percent Density		Percent Contract Unit Price Reduction	
Daily Average	Overall Average	1½" Thickness or Greater	Less than 1½" Thickness
Above 96.5	Above 96	100; Remove and Replace	100; Remove and Replace
90.5 to 96.5	91 to 96	0	0
90.4 to 89.5	90.9 to 90	0.625 per 0.10% deficiency in density[1]	0.50 per 0.10% deficiency in density
Less than 89.5	Less than 90	100: Remove and Replace	100; Remove and Replace
*Core bulk density divided by max. theoretical density.			
1 - Example for Percentage reduction for density of 90.3=0.625*10*(90.5-90.3)=1.3.			

Thickness Acceptance Schedule

Variance Percent of Thickness		Percent Contract Unit Price Reduction
Daily Average	Overall Average	
0—15.0	0—10	0
15.1—20.0	10.1—16	20
20.1—30.0	16.1—25	50
Over 30.0	Over 25	

		100; Remove and Replace or mill/overlay 1" (25 mm) minimum

The Density Acceptance Schedule for Irregularly Shaped Areas; Hike and Bike Trails and Utility Trenches (see following table) will apply to utility trenches of widths less than 4 feet and to irregular shaped areas and hike and bike trails in which an appropriate rolling pattern cannot be established making it difficult to achieve compaction.

Density Acceptance Schedule for Irregularly Shaped Areas; Hike and Bike Trails and Utility Trenches (TEX-207-F/TEX-227-F)

***Percent Density**	**Percent Contract Unit Price Reduction**	
Daily Average	1½" Thickness or Greater	Less than 1½" Thickness
Above 96.5 96.5 to 89.0 89.0 to 86.1 Less than 86.1	100; Remove and Replace 0 0.625 per 0.10% deficiency in density 100: Remove and Replace	100; Remove and Replace 0 0.50 per 0.10% deficiency in density 100; Remove and Replace
*Core bulk density divided by maximum theoretical density.		

The Density Acceptance Schedule will apply to utility trenches 4 feet or wider.

Core thicknesses greater than Drawing requirements shall be factored into the average thickness calculation as the Drawing required thickness. If total thickness of lift(s) proves to be less than required, the Contractor may remove and replace the overlay deficient areas as agreed to by the Engineer or designated COA representative. Overlays to correct thickness deficiencies shall be not less than one (1) inch thick. Overlays shall require milling of the asphalt in order to prevent a "featheredge" of the overlaying pavement.

The extent of the area to be overlaid or removed and replaced shall be determined by additional cores with thicknesses greater than or equal to the required thickness. All additional coring that is necessary to determine the area shall be paid for by the Contractor.

Source: Rule No. R161-24.14, 1-2-2025.

340.13 Measurement

Work performed and material placed shall be measured under one of the following methods. When Drawing quantity measurement is specified, adjustment of quantity may be made as follows. If the quantity measured as outlined vary from those shown on the Drawings by more than 5%, either party to the Contract may request in writing and adjustment of the quantity by each separate bid item. The party to the Contract which requests the adjustment shall present to the other party one copy of measurements and calculations showing the revised quantity in question. This revised quantity, when approved by the Engineer or designated COA representative, shall constitute the final quantity for which payment will be made. However, no adjustment will be made for any quantity, which exceeds the Drawing required thickness.

A. Method A: Asphaltic concrete pavement shall be measured by the ton (2,000 pounds) of the type actually used in completed and accepted Work in accordance with the Drawings and specifications.

   The measurement shall be made on approved truck scales that meet the requirements of the National Institute of Standards and Technology Handbooks 44 and 112 except that the required accuracy shall be 0.4 percent of the load being weighed. The Contractor shall furnish a report of calibration from a scale mechanic licensed by the Texas Department of Agriculture certifying that the scales meet this requirement.

B. Method B: Asphaltic concrete pavement shall be measured by the square yard of specified total thickness of the type of paving mixture actually used in completed and accepted Work in accordance with Drawings and specifications. Multiple lifts of the same type shall be considered as one for square yard measurement purposes.

C. Method C: Asphaltic concrete pavement shall be measured by the lineal foot of specified total thickness of the type of paving mixture actually used in completed and accepted Work in accordance with Drawings and specifications. Multiple lifts of the same type shall be considered as one for linear foot measurement purposes.

Source: Rule No. R161-24.14, 1-2-2025.

340.14 Payment

Work performed and materials furnished as prescribed by this item and measured as provided under "Measurement" will be paid for at the unit bid prices or pay adjusted unit price for Hot Mix Asphaltic Concrete Pavement, of the types and thicknesses specified. The unit bid prices shall include full compensation for furnishing all labor, equipment, time, materials and incidentals necessary to complete the Work.

Removal of existing hot mix asphalt concrete transition areas prior to overlay, tack coat, saw cutting and temporary pavement markings will not be measured or paid for directly but shall be included in the unit price bid for Standard Specification Item No. 340, "Hot Mix Asphaltic Concrete Pavement."

Payment for Work meeting these specifications will be made under one of the following:

Pay Item No. 340-A:	Hot Mix Asphaltic Concrete Pavement, Type ___,	Per Ton
Pay Item No. 340-B:	Hot Mix Asphaltic Concrete Pavement, ___ inches, Type ___.	Per Square Yard.
Pay Item No. 340-C:	Hot Mix Asphaltic Concrete Pavement, ___ Inches, Type ___.	Per Lineal Foot.
Pay Item No. 340-PQ:	Hot Mix Asphaltic Concrete Pavement, ___ Inches, Type ___, Plan Quantity.	Per Ton.
Pay Item No. 340-L:	Hot Mix Asphaltic Concrete Pavement, ___ in., Type ___, Level-up Course.	Lump Sum.
Pay Item No. 340-M:	Crack Sealing Mobilization.	Lump Sum.
Pay Item No. 340-S:	Crack Sealing.	per Lineal Foot.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Special Specification Item 340, "Hot Mix Asphaltic Concrete Pavement"	
City of Austin Standard Specifications	
Designation	Description
Item No. 230S	Rolling (Flat Wheel)
Item No. 232S	Rolling (Pneumatic Tire)
Item No. 301S	Asphalts, Oils and Emulsions
Item No. 307S	Tack Coat
Item No. 313S	Cleaning and/or Sealing Joints and Cracks (Asphaltic Concrete)
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description

Tex-106E	Method of Calculating the Plasticity Index of Soils
Tex-107E	Determination of Bar Linear Shrinkage of Soils
Tex-200-F	Sieve Analysis of Fine and Coarse Aggregates
Tex-203-F	Sand Equivalent Test
Tex-204-F	Design of Bituminous Mixtures
Tex-207-F	Determination of Density of Compacted Bituminous Mixtures
Tex-208-F	Test for Stabilometer Value of Bituminous Mixtures
Tex-210-F	Determination of Asphalt Content of Bituminous Mixtures by Extraction
Tex-212-F, Part II	Determination of Moisture Content of Bituminous Mixtures (by oven drying)
Tex-217-F	Determination of Deleterious Material and Decantation Test For Coarse Aggregates
Tex-227-F	Theoretical Maximum Specific Gravity of Bituminous Mixtures
Tex-236-F	Determining Asphalt Content from Asphalt Paving Mixtures by the Ignition Method
Tex-410-A	Abrasion of Coarse Aggregate Using the Los Angeles Machine
Tex-460-A	Determination of Crushed Face Particle
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item 341	Dense-Graded Hot-Mix Asphalt

RELATED CROSS REFERENCE MATERIALS	
Special Specification Item 340, "Asphaltic Concrete Pavement"	
City of Austin Standard Specifications	
Designation	Description
Item No. 206S	Asphalt Stabilized Base
Item No. 210S	Flexible Base
Item No. 306S	Prime Coat
Item No. 310S	Emulsified Asphalt Treatment
Item No. 311S	Emulsified Asphalt Repaving
Item No. 320S	Two Course Surface Treatment
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
Tex-224-F	Determination of Flakiness
Tex-400-A	Method of Sampling Stone, Gravel, Sand and Mineral Aggregates
Tex-411-A	Soundness of Aggregate by Use of Sodium Sulfate or magnesium Sulfate
Tex-438-A	Accelerated Polish Test for Aggregate

Source: Rule No. R161-24.14, 1-2-2025.

ITEM NO. 360S CONCRETE PAVEMENT 9-26-12

360S.1 Description

This item shall consist of a pavement and/or base of Portland Cement concrete, with or without reinforcement as indicated on the Drawings, with or without monolithic curbs, constructed as herein specified, on prepared subgrade or base course in conformity with the thickness and typical cross sections indicated on the Drawings. Concrete to be considered of satisfactory quality provided it is made (a) of materials accepted for job, (b) in the proportions established by the Contractor and (c) mixed, placed, finished and cured in accordance with the requirements of this specification.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text and accompanying tables, the inch-pound units are given preference followed by SI units shown within parentheses.

P360S.2 Submittals

The submittal requirements of this specification item may include:

A. Mix design option(s) of the class of concrete required on the project,

B. The supplier of the concrete mix design(s) and type of mixing equipment, and

C. Type of admixtures to be used with the concrete mixes.

360S.3 Materials

A. Cementitious Materials

Portland cement shall conform to ASTM C 150, Type I (General Purpose) and Type III (High Early Strength). Type III cement shall be used when high early strength concrete is indicated on the Drawings. If the use of high early cement is not specified and the Contractor desires to use it, the Contractor shall obtain written permission from the Engineer or designated representative prior to its use and shall assume all additional costs incurred by the use of such cement. All cement shall be of the same type and from the same source for a project unless written permission if first received from the Engineer or designated representative.

Portland cement manufactured in a cement kiln fueled by hazardous waste shall be considered as an approved product if the production facility is authorized to operate under regulation of the Texas Commission on Environmental Quality (TCEQ) and the United States Environmental Protection Agency (USEPA). Supplier shall provide current TCEQ and EPA authorizations to operate the facility.

Bulk or sacked cement may be used and a bag shall contain 94 pounds (42.6 KG) net. All bags shall be in good condition at the time of inspection. Bulk cement shall be weighed on approved scales as herein prescribed.

All cement shall be stored in a suitable weather tight building or bin, which will protect the cement from dampness. The cement shall be so stored as to provide easy access for proper inspection. Any cement, which has become partially set or which contains hard lumps or cakes or cement salvaged from discarded or used bags, shall not be used.

Fly ash (denoted by Texas DOT designations Type A and Type B) may replace 20 to 35 percent of a mix design's Portland cement content by absolute volume. Fly ash shall not be used in mix designs with less that 5 sacks of Portland cement per cubic yard [six and a half (6.5) sacks of Portland cement per cubic meter]

unless specifically permitted by the Contract plans of project manual. Fly ash shall conform to the requirements of Item No. 405S, "Concrete Admixtures."

B. Admixtures

Concrete admixtures conforming to Item No. 405S, "Concrete Admixtures" may be used when approved by the Engineer or designated representative to minimize segregation, improve workability, reduce the amount of mixing water and to provide normal hot weather concreting provisions. The use of admixtures shall not alter the approved mix designs, except for water content.

C. Coarse Aggregate

Coarse aggregate shall consist of durable particles of gravel, crushed blast furnace slag and/or crushed stone of reasonably uniform quality throughout, free from injurious amounts of salt, alkali, vegetable matter or other objectionable material, either free or as an adherent coating on the aggregate. It shall not contain more than 0.25 percent by weight of clay lumps nor more than 1.0 percent by weight of shale nor more than 5.0 percent by weight of laminated and/or friable particles when tested in accordance with TxDOT Test Method Tex-413-A.

Coarse aggregate shall have a wear of not more than 45 percent when tested according to TxDOT Test Method Tex-410-A and when tested by standard laboratory methods shall meet the following grading requirements:

Retained on 1¾ inch (43.75 mm) sieve	0%
Retained on 1½ inch (37.5 mm) sieve	0 to 5%
Retained on ¾ inch (19.0 mm) sieve	30 to 65%
Retained on ⅜ inch (9.5 mm) sieve	70 to 90%
Retained on No. 4 (4.75 mm) sieve	95 to 100%

Loss by Decantation TxDOT Test Method *Tex-406-A. 1.0% Maximum

* In the case of aggregate made primarily from crushing of stone. If the material finer than the 200 sieve is definitely established to be the dust of fracture essentially free from clay or shale as established by Part III of TxDOT Test Method Tex-406-A, the percent may be increased to 1.5.

When the plans do not require a monolithic pour of curb or curb and gutter, the Contractor may elect to use the following gradation of coarse aggregate for curb or curb and gutter:

Retained on 1½ inch (37.5 mm) sieve	0%
Retained on ⅜ inch (9.5 mm) sieve	5 to 30%
Retained on No. 4 (4.75 mm) sieve	75 to 100%

Where the coarse aggregate is delivered on the job in 2 or more sizes or types, each type and/or size shall be batched and weighed separately.

All aggregates shall be handled and stored in such a manner as to prevent size segregation and contamination by foreign substances and maintain as nearly as possible in a uniform condition of moisture. When segregation is apparent, the aggregate shall be remixed with suitable equipment as required. At time of its use, the aggregate shall be free from frozen material and aggregate containing foreign materials will be rejected. Coarse aggregate that contains more than 0.5 percent free moisture by weight shall be stockpiled for at least 24 hours prior to use.

Adequate storage facilities shall be provided for approved materials. The intermixing of non-approved materials with approved materials either in stockpiles or in bins will not be permitted. Aggregates from

different sources shall be stored in different stockpiles unless otherwise approved by the Engineer or designated representative.

D. Fine Aggregate

Fine aggregate shall be free from injurious materials of salt, alkali or vegetable matter. It shall not contain more than 0.5 percent by weight of clay lumps. When subjected to the color test for organic impurities, TxDOT Test Method Tex-408-A, the fine aggregate shall not show a color darker than standard.

Unless shown otherwise on the drawings, fine aggregate shall have an acid insoluble residue of at least 60% by weight when tested in accordance with Tex 612-J.

Unless specified otherwise, fine aggregate shall meet the following grading requirements:

Retained on ⅜ inch (9.5 mm) sieve	0%
Retained on No. 4 (4.75 mm) sieve	0 to 5%
Retained on No. 8 (2.36 mm) sieve	0 to 20%
Retained on No. 16 (1.185 mm) sieve	15 to 30%
Retained on No. 30 (600 µm) sieve	35 to 75%
Retained on No. 50 (300 µm) sieve	70 to 90%
Retained on No. 100 (150 µm) sieve	90 to 100%
Retained on No. 200 (75 µm) sieve	97 to 100%

Fine aggregate will be subjected to the Sand Equivalent Test, TxDOT Test Method Tex-203-F. The sand equivalent value shall not be less than 80.

E. Mineral Filler

Mineral filler shall consist of clean stone dust, crushed sand, crushed shell or other approved inert material. It shall meet the following requirements when tested in accordance with TxDOT Test Method Tex-401-A:

Retained on No. 30 (600 µm) sieve	0%
Retained on No. 200 (75 µm) sieve	0 to 35%

Where fine aggregate is delivered to the job in 2 or more sizes or types, each type and/or size of material shall be batched and weighed separately. Where mineral filler is used, it shall be batched and weighed separately. At the time of its use the fine aggregate shall be free from frozen material and aggregate containing foreign material will be rejected.

All fine aggregate shall be stockpiled for at least 24 hours prior to use.

F. Mixing Water

Water for use in concrete and for curing shall be free from oils, acids, organic matter or other deleterious substances and shall not contain more than 1,000 parts per million of chlorides as Cl nor more than 1,000 parts per million of sulfates as SO4.

Water from municipal supplies approved by the State Health Department will not require testing. Contractor shall sample and test water from other sources and submit test results to the Engineer or designated representative for approval 10 days prior to proposed use.

Tests shall be made in accordance with "Standard Method of Test for Quality of Water to be used in Concrete," AASHTO Method T-26.

G. Transit-mixed Concrete

The use of transit-mixed (ready-mixed) concrete will be permitted by the Engineer or designated representative provided the batching plant and mixer trucks meet requirements of quality specified herein.

When ready-mixed concrete is used, additional mortar (1 sack cement, 3 parts sand and sufficient water) shall be added to each batch to coat the drum of the mixer or agitator truck. Delivery of concrete to the site of the work and its discharge from the truck mixer, agitator or non-agitating equipment shall be in accordance with the requirements of Item No. 410S, "Concrete Structures."

Ready-mixed concrete, batching plant and mixer truck operation shall include the following:

1. A ticket system will be used that includes a copy for the construction inspector. The ticket will have machine stamped time/date of the concrete batch, weight of cement, sand and aggregates; exact nomenclature and written quantities of admixtures and water. Any item missing or incomplete on the ticket may be cause for rejection of the concrete.
2. Sufficient trucks will be available to support continuous slab placements. The Contractor will satisfy the Engineer or designated representative that adequate standby trucks are available to support monolithic placement requirements.
3. A portion of the mixing water, required by the batch design to produce the specified slump, may be withheld and added at the job site but only with the permission of the Engineer or designated representative and under the Inspector's observation. When water is added under these conditions, it will be thoroughly mixed before any slump or strength samples are taken.

H. Joint Sealer

Unless otherwise shown on the plans, joint sealant for concrete pavement used on airport runways and/or taxiways shall be TxDOT Class 5. All other joint sealant shall be TxDOT Class 2.

As a minimum, the joint sealant shall comply with the following. The manufacturer of the joint sealant shall furnish certification that the product to be supplied meets or exceeds the specification.

1. Class 2 (Hot Poured Rubber-Asphalt). This sealer shall conform to Standard Specification Item No. 313S, "Cleaning and/or Sealing Joints and Cracks (Asphaltic Concrete)". The sealer must be compatible with asphaltic concrete.
2. Class 5 (Low Modulus Silicone Sealant for Concrete Pavement). This material shall conform to Item 413S, "Cleaning and/or Sealing Joints and Cracks (PCC)" and shall be furnished in a one-part silicone formulation, which does not require a primer for bond to concrete. A backer rod shall be required which will be compatible with the sealant. No bond or reaction shall occur between the rod and sealant. The sealant shall adhere to the sides of the concrete joint. It shall not crack or break when exposed to temperatures below 32°F (0°C).

   The sealant material shall have the following properties:

Color	Gray
Flow, MIL-2-8802D, Sec 4.8.4, max	0.2
Working time, minutes	10
Tack-free time at 77°F ±2°F (25°C ±1.1°C), MIL-2-8802D	
Sec 4.8.7, minutes	60
Cure time at 77°F (25°C), days	7—14
Full Adhesion, days	14—21

As Cured - after 7 days at 77°F (25°C) and 40% Relative Humidity

Elongation, minimum percent	1200

Durometer Hardness, Shore A, ASTM D 2240, min	15
Joint movement capability, percent	+100/-50
Tensile Strength, maximum elongation, percent	100
Peal strength, psi	25 (172 kPa)

I. Backer Rod

Backer Rod shall be expanded closed cell polyethylene foam compatible with sealant. No bond or reaction shall occur between rod and sealant. Backer Rod shall be of sufficient width to be in compression after placement.

J. Joint Filler

Boards for expansion joint filler and for contraction and longitudinal joints shall be of the size, shape and type indicated.

Board shall be obtained from Redwood, Cypress, Gum, Southern Yellow Pine or Douglas Fir timber. They shall be solid heartwood and shall be free from sapwood, knots, clustered birdseye, checks and splits. Occasional sound or hollow birdseye, when not in clusters, will be permitted provided the board is free from any other defects that will impair its usefulness as a joint filler. With the exception of Redwood and Cypress, all boards shall have a creosote or pentachlorophenol treatment of 6 pounds per cubic foot (96 kg/m3). When oven dried at 230°F (110°C) to a constant weight, the weight of the board per cubic foot (minus treatment), shall not be less than 20 pounds nor more than 35 pounds (not less than 320 nor more than 561 kgs per cubic meter).

K. Asphalt Board

Asphalt board when used as indicated shall be of required size, full depth of concrete placement and uniform thickness. When used in transverse joints, it shall conform approximately to shape of the pavement crown as indicated. Asphalt board shall consist of 2 liners of 0.016-inch (0.4 mm) asphalt impregnated paper filled with a mastic mixture of asphalt and vegetable fiber and/or mineral filler. Boards shall be smooth, flat and straight throughout and shall be sufficiently rigid to permit easy installation. Boards that crack or shatter during installing and finishing operations will not be acceptable. Board shall be furnished in lengths equal to ½ the pavement width or in lengths equal to the width between longitudinal joints and may be furnished in strips or scored sheets of the required shape. When tested in accordance with TxDOT Test Method Tex-524-C the asphalt boards shall not deflect from the horizontal more than ¾ inch in 3½ inches (19.3 cm in 90 cm). The asphalt board shall be placed such that they will not interfere with the bonding of the joint sealer.

L. Load Transmission Devices for Expansion and Contraction Joints

Approved load transmission devices, when indicated, shall meet the requirements specified herein:

Smooth steel bar dowels, used when indicated, shall be of the size and type indicated and shall be open-hearth, basic oxygen or electric-furnace steel conforming to the properties specified for grade 60 in ASTM A 615. The free end of dowel bars shall be smooth and free of shearing burrs.

When indicated, one end of each dowel bar shall be encased in an approved cap having an inside diameter of 1/16 inch (16 mm) greater than the diameter of the dowel bar. The cap shall be of such strength, durability and design as to provide free movement of the dowel bar and shall be approved by the Engineer or designated representative prior to use. One end of the cap shall be filled with a soft felt plug or shall be void in order to permit free movement of the dowel bar for a distance equivalent to 150 percent of the width of the expansion joint used. The dowel caps and dowel bars shall be held securely in place by bar ties as indicated on the drawings. Mechanical methods of implanting dowel bars in the plastic concrete may be used when approved by the Engineer or designated representative.

Where required, dowel bars shall be coated with a plastic material meeting the requirements indicated.

Where red lead and oil bar coating is indicated, the red lead may be of any standard commercial grade and the oil shall be clean and no lighter than Standard No. 30 SAE grade. Approved thinner and dryer may be added to the red lead, but the material upon application shall be of such consistency that will provide a uniform and heavy coating on the bar. Where asphalt bar coating is indicated, the material may be any standard grade of oil asphalt and shall be applied hot. Cutback asphalt will not be permitted for bar coating.

M. Metal Installing Devices for Joint Assembly

Metal installing devices for expansion and contraction joint assemblies (such as welded wire bar chairs, bar stakes and marker channels, channel caps, etc.) shall be as indicated or may be similar devices of equivalent or greater strength, approved by the Engineer or designated representative, that will secure joint assembly in correct position during the placing and finishing of concrete. Load transmission devices used in joint assemblies shall be secured in position by a transverse metal brace of the type and design indicated or may be secured in position by other approved devices of equivalent or greater strength that will provide positive mechanical connection between the brace and each unit (or than by wire tie) and prevent transverse movement of each load transmission device.

N. Steel Reinforcement

Steel reinforcing bars as required including tie bars shall be open-hearth, basic oxygen or electric-furnace new billet steel of Grade 60 or Grade 40 for concrete reinforcement as indicated. Bars that require bending shall be Grade 40 conforming to the requirements of ASTM A 615.

High yield reinforcing steel shall be either (a) open-hearth, basic oxygen or electric-furnace new billet steel conforming to ASTM A 615 Grade 60 or (b) rail steel bars for concrete reinforcement, conforming to ASTM A 616 Grade 60. Bars produced by piling method will not be accepted. High yield reinforcing steel bars shall be further identified by a special marking rolled into each bar. All reinforcing steel shall be deformed bars conforming to the requirements of pertinent ASTM Specifications.

Where prefabricated deformed wire mats are indicated or permitted, the wire shall be cold worked deformed steel wire conforming to the requirements of ASTM A 496, except that steel shall be made by open-hearth, electric-furnace or basic oxygen processes. The prefabricated deformed wire mats shall conform to the requirements of ASTM A 497, except that wires used shall be deformed and transverse wires shall project beyond the centerline of each edge longitudinal wire as indicated. Mats that have been bent or wires dislocated or parted during shipping or project handling shall be realigned to within ½ inch (13 mm) of original horizontal plane of the mat. Mats with any portion of the wires out of vertical alignment more than ½ inch (13 mm) after realignment and/or wires dislocated or mutilated so that, in the opinion of the Engineer, they do not represent the original mat, shall be rejected. The reinforcement may be clamped or wired so that the reinforcement will retain the horizontal and vertical alignment as indicated or as approved by the Engineer or designated representative. Deformed wire may be used for tie bars and load transfer bars that require bending. The nominal size, area and theoretical weight of reinforcing steel wires covered by this provision are as listed in Table II. When fabricated steel bars or rod mats are indicated, the mats shall meet requirements of ASTM A 184.

Steel wire fabric reinforcement shall be of the gage and spacing indicated and shall conform to the requirements of ASTM A 82. Longitudinal and transverse wires shall be electrically welded together at all points of intersection and the welds shall be of sufficient strength that they will not be broken during handling or placing. All welding and fabrication of fabric sheets shall conform to the requirements of ASTM A 185. Welded steel wire fabric shall be furnished in sheets as indicated and steel having been previously bundled into rolls will not be accepted. An approved hinge will be permitted in each sheet to provide for each sheet longitudinally. When wire fabric is used, it will replace only the longitudinal and transverse bars. The tie bars and load transmission units at joints will not be affected.

Table II: DIMENSIONAL REQUIREMENTS FOR DEFORMED STEEL WIRE FOR CONCRETE REINFORCEMENT				
Deformed Wire Size No.	**Unit Weight Pounds Per Ft. (Kgs per Meter)**	**Diameter Inches (Centimeters)**	**Cross-Sectional Area, Sq. Inches (Sq. Centimeters)**	**Perimeter Inches (Centimeters)**
Column 1	Column 2	Column 3	Column 4	Column 5
D-1	0.034 (.051)	0.113 (.287)	0.01 (.06)	0.355 (.902)
D-2	0.068 (.101)	0.159 (.404)	0.02 (.13)	0.499 (1.267)
D-3	0.102 (.152)	0.195 (.495)	0.03 (.19)	0.612 (1.554)
D-4	0.136 (.202)	0.225 (.572)	0.04 (.26)	0.706 (1.793)
D-5	0.170 (.253)	0.252 (.640)	0.05 (.32)	0.791 (2.009)
D-6	0.204 (.304)	0.276 (.701)	0.06 (.39)	0.867 (2.202)
D-7	0.238 (.354)	0.296 (.752)	0.07 (.45)	0.936 (2.377)
D-8	0.272 (.405)	0.319 (.810)	0.08 (.52)	1.002 (2.545)
D-9	0.306 (.455)	0.338 (.859)	0.09 (.58)	1.061 (2.695)
D-10	0.340 (.506)	0.356 (.904)	0.10 (.65)	1.118 (2.840)
D-11	0.374 (.557)	0.374 (.950)	0.11 (.71)	1.174 (2.982)
D-12	0.408 (.607)	0.390 (.991)	0.12 (.77)	1.225 (3.112)
D-13	0.442 (.658)	0.406 (1.031)	0.13 (.84)	1.275 (3.239)
D-14	0.476 (.708)	0.422 (1.072)	0.14 (.90)	1.325 (3.366)
D-15	0.510 (.759)	0.437 (1.110)	0.15 (.97)	1.372 (3.485)
D-16	0.544 (.810)	0.451 (1.146)	0.16 (1.03)	1.416 (3.600)
D-17	0.578 (.860)	0.465 (1.181)	0.17 (1.10)	1.460 (3.708)
D-18	0.612 (.911)	0.478 (1.214)	0.18 (1.16)	1.501 (3.813)
D-19	0.646 (.961)	0.491 (1.247)	0.19 (1.23)	1.542 (3.917)
D-20	0.680 (1.012)	0.504 (1.280)	0.20 (1.29)	1.583 (4.021)
D-21	0.714 (1.063)	0.517 (1.313)	0.21 (1.35)	1.624 (4.125)
D-22	0.748 (1.113)	0.529 (1.344)	0.22 (1.42)	1.662 (4.221)
D-23	0.782 (1.164)	0.541 (1.375)	0.23 (1.48)	1.700 (4.318)
D-24	0.816 (1.214)	0.553 (1.405)	0.24 (1.55)	1.737 (4.412)
D-25	0.850 (1.265)	0.564 (1.433)	0.25 (1.61)	1.772 (4.500)
D-26	0.884 (1.316)	0.575 (1.461)	0.26 (1.68)	1.806 (4.587)
D-27	0.918 (1.366)	0.586 (1.488)	0.27 (1.74)	1.841 (4.676)
D-28	0.952 (1.417)	0.597 (1.516)	0.28 (1.81)	1.876 (4.765)
D-29	0.986 (1.467)	0.608 (1.544)	0.29 (1.87)	1.910 (4.851)
D-30	1.020 (1.518)	0.618 (1.570)	0.30 (1.94)	1.942 (4.933)
D-31	1.054 (1.569)	0.628 (1.595)	0.31 (2.00)	1.973 (5.011)

O. Polyethylene Film

Polyethylene film shall be opaque pigmented white in color and shall be manufactured from virgin resin without additives or scrap. It shall be sufficiently strong and tough to permit its use under the conditions existing on street paving work without being torn or otherwise rendered unfit for the purpose during the curing period. The film shall have a minimum thickness of 4 mils (0.004 inch), shall have a minimum tensile strength of 1,700 psi at 77°F (11,720 kPa at 25°C) in the longitudinal direction and 1,200 psi at 77°F (8,275 kPa at 25°C) in the transverse direction and shall have a minimum elongation of 200 percent at 77°F (25°C) in the longitudinal direction and 150 percent at 77°F (25°C) in the transverse direction. The permissible percent moisture loss shall not exceed 2 percent after 24 hours and 4 percent after 72 hours. Tests for tensile

strength and elongation will be conducted in accordance with ASTM Designation: D 882, Method A. Tests for moisture retention will be conducted in accordance with ASTM Designation: C 156.

P. Membrane Curing Compound

Membrane curing compound shall conform to Item No. 409S, "Membrane Curing," Type 2 white pigmented.

Q. Asphalt Curing

Where asphalt is to be placed on a concrete base, asphalt shall be used for curing concrete base, the material shall conform to Item No. 301S, "Asphalts, Oils and Emulsions" for RS-2 or RS-2h or as indicated on the drawings.

360S.4 Equipment

A. General

All equipment necessary for construction of this item shall be on the Project and shall be approved by Engineer or designated representative as to conditions before the Contractor will be permitted to begin construction operations on which the equipment is to be used. When approved by the Engineer or designated representative in writing, a commercial or independently operated batching plant for measuring materials outside limits of the project may be used.

B. Mixer

The mixer furnished may be either a paving mixer (operated at site of construction or centrally located), a stationary mixer (central mixer) or a paving mixer (truck mounted) that will produce adequately mixed concrete meeting the specified requirements. The mixer, or mixers, shall conform to the following requirements:

1. Each mixer shall have attached in a prominent place a manufacturer's plate showing rated capacity of the drum in terms of volume of mixed concrete and the recommended speed of rotation of the mixing drum or blades.
2. The stationary mixer (central mixer) or truck mounted paving mixer shall be operated at the manufacturer's recommended speed.
3. The size of the paving mixer shall not be less than that of a 27-E paver, as established by the Mixer Manufacturer's Bureau of Associated General Contractors. The paving mixer shall be operated at a drum speed of not less than 16 revolutions per minute and not more than 22 revolutions per minute. Pickup and throw over blades in the drum of the mixer shall be replaced when worn down 3/4 inch (19 mm) or more.
4. Each truck mounted paving mixer shall be approved by the Engineer or designated representative prior to use on the project. It shall be classified as a "paving mixer" by the manufacturer and shall be so designed that a uniform and low slump concrete (approximately 1½ inch [38 mm] slump) can be mixed without aggregate size segregation. The mixer shall be capable of discharging the low slump concrete at a speed of 10 seconds per cubic yard (13 seconds per cubic meter) or faster.
5. Each mixer shall be equipped with an approved automatic device for satisfactorily timing the mix and locking the discharging device in order to prevent the discharging of the mixer before the end of the required mixing period. This timing device shall operate a sounding device to signal plainly the completion of the mixing time. When permitted by the Engineer a light signal device may be used.
6. Multiple drum mixers will be permitted provided their operation is properly synchronized. The mixing time shall be determined exclusive of the time required to transfer concrete from one drum to the next drum.

7. Each mixer shall be equipped with a water-measuring device so constructed that it will measure the water within 1 percent of the total amount required for each batch. Unless the water is to be weighed, the water measuring equipment shall include an auxiliary tank with a capacity greater than that of the measuring tank and from which the measuring tank will be filled by gravity flow. The measuring tank shall be open to the atmosphere and shall be so placed and constructed that the water for a batch can be discharged into a calibrated tank or weighing device for checking the accuracy of water measurement without seriously delaying the paving operations. The Contractor shall have a calibrated tank or weighing device available at all times at a location satisfactory to the Engineer or designated representative.

8. If a paving mixer is furnished and operated at the site of construction, it shall be equipped with a power controlled boom and bucket, so designed as to permit uniform distribution of the concrete for the full width between pavement forms. Alternate equipment for distributing concrete may be substituted when approved by the Engineer in writing, provided uniform distribution is obtained without segregation.

9. If central mixed concrete is used on the project, the Contractor shall provide equipment designed to provide uniform distribution for the concrete for the full width between pavement forms without segregation.

C. Transit-mix Trucks

When transit-mix (ready-mix) concrete is used, additional mortar (1 sack cement, 3 parts sand and sufficient water) shall be added to the batch to coat the drum of the mixer or agitator truck. This shall be required for every load of concrete. The mixing speed shall be attained as soon as all ingredients are in the mixer. Each complete batch (containing all the required ingredients) shall be mixed not less than 70 nor more than 100 revolutions of the drum at mixing speed.

A portion of the mixing water, required by the batch design to produce the desired slump, may be withheld and added at the job site, but only with permission of the Engineer and under the Engineer's supervision. When water is added at the job site, 25 revolutions (minimum) at mixing speed, will be required to flush down the blades after charging shall be accurately measured and included in the quantity of mixing water. The introduction of the initial mixing water, except blade wash down water and that permitted in this Article shall be prior to or simultaneous with the charging of the aggregates and cementitious material.

Mixing and agitating speed shall be as designated by the mixer manufacturer. All revolutions after prescribed mixing shall be at agitating speed. Except for short periods of time during discharge, the drum shall be kept in continuous motion from the time the mixing is started until the discharge is completed.

Additional mortar, consisting of 1 sack cement, 3 parts sand and sufficient water, shall be added to the batch to coat the drum of the transit mixer or agitator truck. This shall be required for every load of concrete.

The loading of transit-mixers shall not exceed 63 percent of the drum volume. When used as an agitator only, the loading of truck mixers shall not exceed 80 percent of the drum volume.

The batching plant and transit-mix trucks shall operate under the following system:

1. A ticket system will be used that includes a copy for the construction inspector. The ticket will have machine stamped time/date of water/cement batch; weight of cement, fly ash (if applicable), water, sand and aggregates; exact nomenclature and quantities of admixture. Any item missing or incomplete on the ticket will be cause for rejection. Coded readouts may be used if approved in advance by the Engineer.

2. Sufficient trucks will be available to support continuous placements. The Contractor will satisfy the Engineer that adequate standby trucks are available to support monolithic placement when required.

3. A portion of the mixing water, required by the batch design to produce the desired slump, may be withheld and added at the job site, but only with the permission of the Engineer and under the Inspector's observation. When water is added under these conditions, it will be thoroughly mixed before any slump or strength samples are taken.

D. Hauling Equipment

Batch hauling equipment for the transportation of measured materials from the batching plant to the mixer shall be equipped with tight covers, which shall be used to prevent excessive evaporation of moisture or any loss of material.

If a central mixer is used, concrete may be transported to the point of delivery in truck agitators or non-agitating trucks.

If a truck mounted paving mixer is used, it may be used to transport the concrete after mixing is complete.

If non-agitator trucks are used they shall conform to the following requirements:

The bed of non-agitating hauling equipment shall be a smooth, mortar-tight, metal container. The hauling equipment shall be capable of delivering the concrete to the work site in a thoroughly mixed and uniform mass and capable of discharging the concrete at a satisfactory controlled rate without segregation. If in the opinion of the Engineer any appreciable segregation or accumulation of excess water and/or mortar occurs on the surface of the concrete, this may be cause for rejection and this method of transporting the concrete to the point of delivery shall be suspended as directed by the Engineer.

E. Subgrade or Subbase Planer and Templates

Unless a stabilized subbase is provided, an approved subbase planer shall be provided, mounted on visible rollers riding on the forms and having adjustable cutting blades which shall trim the subgrade to the exact section as indicated. The planer frame shall be heavy enough to remain on the forms at all times and shall be of such strength and rigidity that, under a test made by changing the support from the wheels to the center, it shall not develop a deflection for more than ⅛ inch (3 mm). Tractive power equipment used to pull the planer shall not be such as to produce ruts or indentations in the subgrade.

When the slip form method of paving is to be used, the subgrade planer will be operated on a prepared track grade or controlled by an electronic sensor system operated from a string line that establishes the horizontal alignment and the elevation of the subbase.

A template for checking the contour of the subbase shall be provided and operated by the Contractor. The template shall rest upon the side forms and shall be of such strength and rigidity that, under a test made by changing the support to the center, it shall not show a deflection of more than ⅛ inch (3 mm). It shall be provided with accurately adjustable rods projecting downward to the subgrade at 1-foot (30 cm) intervals and these rods shall be adjusted to the required cross section of the bottom of the slab when the template is resting upon the side forms. Where stabilized subbase is provided, use of a scratch template will be required.

F. Forms

Side forms shall be of metal of approved cross section. The preferred depth of the form shall be equal to the required edge thickness of the pavement. Forms with depth greater than the required edge thickness of the pavement will be permitted.

The length of form sections shall not be less than 10 feet (0.3 meters) and each section shall provide for staking in position with not less than 3 pins. Flexible or curved forms of wood or metal of proper radius shall be used for curves of 200-foot (61 meter) radius or less. Forms shall be of ample strength and shall be provided with adequate devices for secure setting so that when in place they will withstand, without visible springing or settlement, the impact and vibration of the spreading and finishing machinery. In no case shall the base be less than 6 inches (15.2 cm) for a form 6 inches (15.2 cm) or more in height. The forms shall be

free from warps, bends or kinks and shall be sufficiently true to provide a reasonably straight edge on the concrete. The top of each form section, when tested with a straightedge shall conform to the requirements specified for the surface of the completed pavement. Sufficient forms shall be provided for satisfactory prosecution of the work.

Outside curb forms shall be of wood or metal of a section satisfactory to the Engineer or designated representative, straight, free of warp and shall be in a depth at least equal to the depth of the curb. They shall be mounted on the paving forms and securely attached thereto and maintained in true position during the placing of the concrete. Inside curb forms, if required, shall be of approved material and of such design as to provide the curb required and shall be rigidly attached to the outside forms.

G. Concrete Spreader

Use of concrete spreader shall be required and it shall be a self-propelled machine having sufficient power and traction to spread and strike off concrete without slippage on the forms. It shall be equipped with a power driven device for spreading the concrete uniformly between the forms. The spreading device may be either a reciprocating blade, a screw conveyer or a belt conveyer. The spreader shall be capable of striking off the surface of the concrete between the forms in the longitudinal direction of the slab at any required elevation.

Mechanically operated concrete spreaders of other designs, which uniformly distribute the concrete with a minimum of segregation, may be used when approved by the Engineer.

H. Slipform Paver

With prior approval, the Contractor may place concrete with slip form paver. This paver shall be equipped with a longitudinal transangular finishing float adjustable to crown and grade and be satisfactory to the Engineer or designated representative. The float shall extend across the pavement practically to the side forms and/or the edge of slab. A "string line" shall be used to provide grade control for the paver.

I. Mechanical Vibratory Equipment

All concrete placed for pavement shall be consolidated by approved mechanical vibrators operated ahead of the transverse finishing machine and designed to vibrate the concrete internally and/or from the surface. Vibratory members shall extend across the pavement practically to, but shall not come in contact with the side forms. Mechanically operated vibrators shall be mounted in such manner as not to interfere with transverse or longitudinal joints. The internal-type vibrators shall be spaced at not more than 24 inches (61 cm) and shall be equipped with synchronized vibratory units. Separate vibratory units shall be spaced at sufficiently close intervals to provide uniform vibration and consolidation to the entire width of the pavement. The frequency in air of the interval spud type vibratory units shall be not less than 8,000 cycles per minute and not less than 5,000 cycles per minute for tube types and the method of operation shall be as directed by the Engineer or designated representative. The Contractor shall have a satisfactory tachometer available for checking vibratory the elements.

The pavement vibrators shall not be used to level or spread the concrete but shall be used only for purposes of consolidation. The vibrators will not be operated where the surface of the concrete, as spread, is below the elevation of the finished surface of the pavement, except for the first lift of concrete where double strike off method of placement is employed and the vibrators shall not be operated for more than 15 seconds while the machine upon which they are installed is standing still.

The pan type vibratory units shall apply the vibrating impulses directly to the surface of the concrete. The operating frequency shall be not less than 3,500 cycles nor more than 4,200 cycles per minute in air. The Contractor shall have a satisfactory tachometer available for checking the speed of the vibratory elements.

Approved hand manipulated mechanical vibrators shall be furnished in the number required for provision of proper consolidation of the concrete along forms, at joints and in areas not covered by mechanically

controlled vibrators. These vibrators shall be sufficiently rigid to insure control of the operating position of the vibrating head.

Complete and satisfactory consolidation of the concrete pavement is a most important requirement of this specification. Cores taken shall be carefully examined for voids, honeycombing or other evidence of incomplete consolidation. If such evidence is present, changes in the consolidation procedures and/or equipment will be made to insure satisfactory consolidation.

J. Finishing Equipment

1. Transverse Finishing Machine

The Transverse finishing machine shall be provided with 2 screeds accurately adjusted to the crown of the pavement, shall be self-propelled and mounted in a substantial frame equipped to ride on the forms, or may be slip form finished, and shall be so designed and operated as to strike off and consolidate the concrete.

2. Longitudinal Finishing

A transverse drag float may be used in lieu of the longitudinal finishing machine with the Engineer's approval. Finishing machines shall be maintained in a tight and good operating condition, accurately adjusted to the required crown or profile and free from deflection, wobble or vibration tending to affect the precision of finish. Machines failing to meet these requirements will be rejected by the Engineer or designated representative and the Contractor shall provide approved equipment.

Where hand finishing is permitted under this specification, the Contractor shall provide a strike template and a tamping template both of 4 by 10 inch (10 by 25 cm) lumber or equivalent metal section and at least 2 feet longer than the width of the pavement. Both templates to conform to the crown section of the pavement and the tamp, if of wood, shall have a steel face not less than ⅜ inch (9.5 mm) in thickness. The Contractor shall also provide a longitudinal float of approved design and not less than 14 feet (4.25 meters) in length.

The Contractor shall furnish and maintain at least two standard 10-foot (3.05 meter) steel straightedges on the work site at all times during the paving operations. The Contractor shall operate same in the presence of the Engineer or designated representative.

The Contractor shall furnish a sufficient number of bridges to ride on the forms and span the pavement for finishing operations and for the installation and finishing of joints. All necessary finishing and edging tools shall be furnished as may be required to complete the pavement as indicated.

360S.5 Proportioning of Concrete

A. Proportions

Concrete shall be composed of Cementitious Materials, fine aggregate, coarse aggregate, mineral filler and/or admixture if used and water, mixed in the proportions designated by the approved Mix Design and in the manner set forth in this specification. On the basis of job and laboratory investigations of the proposed materials, the Contractor will fix proportions by weight of water, coarse aggregate, fine aggregate, cementitious materials, admixture and mineral filler where required, in order to produce concrete of the specified strength and workability for the actual delivery time and site conditions to be encountered. Where curbs are placed separately, the Engineer or designated representative may allow aggregate gradation conforming to Class A Concrete, Item No. 403, "Concrete for Structures."

B. Concrete Strength

The concrete mix to be designed to produce a concrete with the following requirements:

Table 1: CONCRETE PAVEMENT		
Item	**Test**	**Value**
Entrained Air	Tex-416-A	3 to 6 percent
Water-Cement Ratio gal. (liter)/sack, Maximum		6.25 (23.66)
Sacks Cement, Minimum, 94 pounds (42.6 KG) ea		6 per cubic yard (7.85 per cubic meter)
Coarse Aggregate Factor		0.65 min—0.85 max.
Compressive Strength after 7 Days, psi (kPa)	Tex-418-A	4000 (27,600)
Compressive Strength after 28 Days, psi (kPa)	Tex-418-A	4500 (31,000)
Maximum Concrete Mix Temperature °F (°C)		95 (35)
Retarder: Regular Concrete increase in time over 360S.7(3), minutes, Maximum	60	

Table 2: HIGH EARLY STRENGTH CONCRETE		
Item	**Test**	**Value**
Cement Type		III
Entrained Air	Tex-416-A	3 to 6 percent
Water-Cement Ratio gal. (liter)/sack, Maximum		6.25 (23.66)
Sacks Cement, Minimum, 94 pounds (42.6 KG) ea		7 per cubic yard (9.16 per cubic meter)
Coarse Aggregate Factor		0.65 min-0.85 max
Slump, inches (Centimeters)	Tex-415-A	½ to 2 (1.25 to 5.0)
Compressive Strength, after 24 hours, psi (kPa)	Tex-418-A	2,100 (14,500)
Compressive Strength, after 3 Days, psi (kPa)	Tex-418-A	2,750 (19,000)
Compressive Strength, after 7 Days, psi (kPa)	Tex-418-A	4,500 (31,000)
Compressive Strength, after 28 Days, psi (kPa)	Tex-418-A	4,925 (34,000)
Maximum Concrete Mix, Temperature °F (°C)		95 (35)

The Contractor may submit a mix design using high range water reducing admixtures conforming to Item No. 405S, "Concrete Admixtures" in lieu of the concrete pavement mix specified and shall meet the following requirements:

Table 3: HIGH RANGE WATER REDUCING ADMIXTURES: SUPERPLASTERSIZER CONFORMING TO SPECIFICATION ITEM NO. 405S, "CONCRETE ADMIXTURES"		
Item	**Test**	**Value**
Entrained Air	Tex-416-A	3 to 6 percent
Water-Cement Ratio, gal. (liter)/sack, Maximum		6.25
Sacks Cement, Minimum, 94 pounds (42.6 KG) ea		6 per cubic yard (7.85 per cubic meter)
Coarse Aggregate Factor		0.65 min.—0.85 max.
Slump, inches (cms) before Admixture	Tex-415-A	½ to 2 (1.25 to 5)
Slump, Inches (cms) after Admixture	Tex-415-A	4 to 10 (2.5 to 25)
Compressive Strength, after 3 Days, psi (kPa)	Tex-418-A	3,125 (21,500)
Compressive Strength, after 7 Days, psi (kPa)	Tex-418-A	4,500 (31,000)
Compressive Strength, after 28 Days, psi (kPa)	Tex-418-A	4,925 (34,000)
Maximum Concrete Mix, Temperature, °F (°C)		100 (37.8)
Retarder, Regular Concrete Over 360S.7C, Minutes, Maximum	120	

Table 4: Over Design Required to Meet Compressive Strength Requirements[1]					
Number of Tests[2, 3]	Standard Deviation, psi (mPa)				
	300 (20.6)	400 (2.75)	500 (3.44)	600 (4.13)	700 (4.82)
15	470 (3.24)	620 (4.27)	850 (5.85)	1,120 (7.71)	1,390 (9.57)
20	430 (2.96)	580 (3.99)	760 (5.23)	1,010 (6.95)	1,260 (8.67)
30 or more	400 (2.75)	530 (3.65)	670 (4.61)	900 (6.20)	1,130 (7.78)

Notes:

1. When designing the mix, add the tabulated amounts to the minimum design strength in Tables 1, 2 or 3.Maximum water-cement or water-cementitious ratio by weight
2. Number of tests of a concrete mixture used to estimate the standard deviation of a concrete production facility. Test of another mix within 1,000 psi (6.88 MPa) of the specified strength may be used.
3. If less than 15 prior tests are available, the overdesign should be 1,200 psi (8.26 MPa) for specified strengths from 3,000 to 5,000 psi (20.65 to 34.42 MPa) and 1,400 psi (9.64 MPa) for specified strengths greater than 5,000 psi (34.42 MPa).

High range water reducing admixtures shall be capable of maintaining the original slump until placement and screeding, which may be 2 hours, without the addition of water, additional admixture or other retempering or remixing techniques.

C. Workability of Concrete

Concrete shall be uniformly plastic, cohesive and workable. Workable concrete is defined as concrete which can be placed without honeycomb and without voids in the surface of the pavement after the specified finishing machine has been over a given area twice. Workability shall be obtained without producing a condition such that free water appears on the surface of the slab when being finished as specified. Where water appears on the surface of the concrete after finishing and this condition cannot be corrected by reasonable adjustment in the batch design, the bleeding to be immediately corrected by one of the following measures or a combination of two or more of the following listed measures:

1. Redesign of the batch;
2. Addition of mineral filler to fine aggregates;
3. Increase of cement content; or
4. Use of an approved air entraining agent or approved admixture.

In the event that the measures taken do not eliminate the bleeding immediately, concrete placement operations will be suspended, as directed by the Engineer or designated representative, by placing a bulkhead or "header" as indicated and according to applicable requirements for intentional stoppage of placement of concrete under Item No. 360S, "Concrete Pavement" and will remain suspended until such time as additional trial mixes demonstrate that a non-bleeding batch design has been achieved. Failing to achieve a satisfactory laboratory batch design the Contractor will be required to use different materials and to submit samples thereof for additional trial mixes and pilot cylinders.

The mix will be designed with the intention of producing concrete, which will have a slump of 1½ inches (3.8 cms). The slump shall not be less than ½ inch (1.25 cms) nor more than 2 inches (5 cms).

D. Mix Design

The Contractor shall perform at the Contractor's own expense and be responsible for the design of the concrete mix. The mix design shall be prepared and sealed by a person qualified and experienced in such work. Establish proportions on the basis either of laboratory trial batches or of field experience with the materials to be employed.

When ice is used to lower the concrete temperature during hot weather, concrete placement (Section 13 of Standard Specification Item No. 410S, "Concrete Structures"), the Contractor shall furnish a mix design (Section 6 of Standard Specification Item No. 403S, "Concrete for Structures") acceptable to the Engineer or designated representative for class of concrete specified. The addition of ice shall not exceed 50 percent of the total mix water weight.

Complete concrete mix design data shall be submitted to the Engineer or designated representative for approval at least 10 days before concrete placement begins. Submittal of the mix shall be accompanied by such test data and certifications as may be necessary to demonstrate compliance with specification requirements. Approval of this mix design shall in no way relieve the Contractor of responsibility for the quality of the concrete.

It shall also be the responsibility of the Contractor to determine and measure batch quantity of each ingredient, including water, not only for batch designs but for all concrete produced for the project, so that the mix conforms to these specifications.

Trial batches shall be made and tested using all the proposed ingredients prior to the placing of concrete and also when the aggregate and/or type, brand or source of cement or admixture is changed. When the brand and/or source of cement only is changed, the Engineer or designated representative may waive trial batches only if a prior record of satisfactory performance of the cement has been established.

Mix designs used successfully on previous or concurrent jobs may be approved by the Engineer or designated representative without trial batches if it is shown that there is no substantial change in any of the proposed ingredients.

The Contractor shall prepare a minimum of four concrete test cylinders of each mix design, cure and test two each at the age of 7 and 28 days. From these preliminary tests the water-cement ratio required to produce concrete of the specified strength will be selected by the Contractor for approval by the Engineer or designated representative. The Contractor may at any time present in writing a suggested mix design and if the Engineer or designated representative concurs with the suggested design, the Contractor shall conduct trial batches necessary to determine its acceptability under these specification requirements.

The Contractor shall furnish and operate the mixer approved for use on this project unless the concrete is to be furnished from a transit mix (ready-mix) plant. For mixing the concrete to be used in making the preliminary test specimens, a minimum 1 cubic yard (1 cubic meter) batch shall be mixed or a batch of sufficient size to afford proper mixing, whichever is the greater. In lieu of the above mixer and procedure, the Contractor may furnish a portable mixer of sufficient rated capacity to mix a minimum 3-sack batch; in which case, the batch mixed for the preliminary test not to be less than the rated capacity of the mixer furnished. A coating batch will be mixed prior to mixing for test cylinders.

No additional compensation to be allowed for equipment, materials or labor involved in making job mix design test specimens.

After the mix proportions and water-cement ratio required to produce concrete of the specified strength have been determined, placing of the concrete may be started. The strength of the concrete in the completed pavement will be determined by a minimum of four compressive strength test specimens made, cured with a minimum of two each tested at 7 and 28 days as provided in TxDOT Bulletin C-11. Modifications of the mix design may be requested by the Contractor on basis of conformity of the strength of these test specimens with the requirements and intent of this specification.

Changes in the water-cement ratio and the mix design, including an increase in cement factor if necessary, will be made when the average 7 day and/or 28 day compressive strength of the concrete, as indicated by the last 10 compressive strength values obtained from tests of cylinders made from concrete of the same water-cement ratio, departs from the desired minimum average strength by more than 4 percent.

E. Construction Testing

Straightedge surface testing to be carried out as prescribed above.

The Engineer shall take test cylinders for compressive strength values on a random basis. The comparative results shall consist of the average of 2 cylinders each at 7 and 28 days for regular concrete, high early strength concrete and high range water reducing admixture concrete. Tests shall be made for each 500 square yards constructed, in accordance with TxDOT Bulletin C-11. Additional tests may be taken as determined by the concrete placement conditions or for adequately determining the strength of concrete where the early opening of the pavement to traffic is dependent upon concrete strength tests. No extra compensation will be allowed for materials and work involved in fulfilling these requirements.

360S.6 Construction Methods

A. Preparation of Subgrade

Where stabilized subbase is not provided, the subgrade shall be excavated as required, all unstable or otherwise objectionable material removed and all holes, ruts and depressions filled with approved material and compacted. Rolling and sprinkling shall be performed when and to the extent required and the roadbed shall be completed to or above the plane of the typical sections, lines and grades indicated or as established by the Engineer or designated representative. The subgrade shall be proof rolled and any soft areas shall be repaired before the forms are placed. In the event that the proof rolled subgrade is exposed to rainfall or other conditions, which may soften the subgrade, corrective measures shall be taken and the subgrade shall be proof rolled again.

The subgrade planer shall be operated from approved forms immediately ahead of paving operations and the subgrade shall be finished to the exact section of the bottom of the pavement as indicated. Where traveling form pavers are used, the subgrade planer shall operate on a prepared track grade or be controlled by electronic sensors operating from a stringline that establishes line and grade. It shall be tested with the approved template, operated and maintained by the Contractor. The subgrade shall be maintained in a smooth, compacted condition in conformity with the required section and established grade until the pavement is placed and shall be kept thoroughly wetted down sufficiently in advance of placing any pavement to insure its being in a firm and moist condition for at least 2 inches (5 cms) below the prepared surface. Sufficient subgrade shall always be prepared in advance to insure satisfactory prosecution of the work.

No equipment or hauling shall be permitted on the prepared subgrade, except by special permission of the Engineer or designated representative, which will be granted only in exceptional cases and only where suitable protection in the form of 2-ply timber mats or other approved material is provided.

B. Placing and Removing Forms

The subgrade under the forms shall be firm and cut true to grade so that each form section when placed will be firmly in contact for its whole length and base width and exactly at the established grade. Any subgrade under the forms below established grade shall be corrected, using suitable material, placed, sprinkled and rolled as directed. Forms shall be staked with at least 3 pins for each 10-foot (3-meter) section. A pin shall be placed at each side of every joint. Form sections shall be tightly joined and keyed to prevent relative displacement. Forms shall be cleaned and oiled each time they are used.

Forms shall be set for a sufficient distance in advance of the point where concrete is being placed to permit a finished and approved subgrade length of not less than 300 feet (90 meters) ahead of the mixer. Conformity of the grade and alignment of forms shall be checked immediately prior to placing concrete and necessary corrections made by the Contractor. Where any form has been disturbed or any subgrade becomes unstable, the form shall be reset and rechecked. In exceptional cases, the Engineer or designated representative may require suitable stakes driven to the grade of the bottom of the forms to afford additional support. Sufficient stability of forms to support the equipment operated and to withstand its vibration without springing or settlement shall be required. If forms settle and/or deflect over 1/8 inch (3 mm) under finishing operations, paving operations shall be stopped and the forms shall be reset to line and grade.

Forms shall be leveled using cement-stabilized material containing not less than 1½ sacks of cement per ton (1⅓ sacks of cement per MG) of mix as placed. The aggregate gradation and water content shall be determined by the Contractor. The cement-stabilized material shall be sufficiently plastic to insure filling voids underneath the paving forms. Paving equipment will not to be permitted on the forms until the cement-stabilized material has cured for at least 12 hours.

Forms shall remain in place for not less than 8 hours after the concrete has been placed. Forms shall be carefully removed in such a manner that little or no damage will be done to the edge of the pavement. Any damage resulting from this operation shall be immediately repaired. After the forms have been removed, the ends of all joints shall be cleaned and any honeycombed areas pointed up with approved mortar and the surfaces protected with curing material conforming to Item No. 409S, "Membrane Curing."

Immediately after pointing is complete, the form trench, if used, shall be filled with granular material or earth from the shoulders in such manner as to shed water from rainfall and prevent curing material from washing away from the edge of pavement. On completion of the required curing, the subgrade or shoulders adjacent to the pavement shall be placed and compacted in condition to maintain drainage.

360S.7 Concrete Mixing and Placing

A. Mixing Methods

The concrete shall be mixed in a mixer conforming to the requirements of this item.

B. Mixing

The aggregates, mineral filler if required, cementitious materials and water shall be measured separately, introduced into the mixer and mixed for a period of not less than 50 seconds nor more than 90 seconds, measured from the time the last aggregate enters the drum to the time discharge of the concrete begins. The required water shall be introduced into the mixing drum during the first 15 seconds of mixing. The entire contents of the drum shall be discharged before any materials of the succeeding batch are introduced.

The Engineer or designated representative may increase the minimum mixing time to that necessary to produce thoroughly mixed concrete based on inspection or appropriate uniformity tests. The mixing time may be varied at any time as necessary to produce acceptable concrete.

If a central mixer is used, the concrete shall be discharged into the specified hauling equipment and delivered to the road site. If truck agitators are used, the concrete shall be continuously agitated at not less than 1 nor more than 6 rpm as directed by the Engineer or designated representative.

The maximum size of the concrete batch, absolute volume, shall not exceed 120 percent of the rated size of the mixer (40.8 cubic feet maximum batch for 34 cubic foot paver - 1.2 cubic meter maximum batch for 1 cubic meter paver). Spilling of material from the mixer drum shall be corrected by reducing the size of the batch. Retempering or remixing of concrete will not be permitted.

The initial batch of concrete mixed after each time the mixer is washed out shall be enriched by additional mortar. The additional mortar shall be 1 sack of cement and 3 parts of sand.

When transit-mix (ready-mix) concrete is permitted, the batching plant shall meet the requirements of Item No. 403S, "Concrete for Structures."

C. Placement

Unless otherwise indicated, the concrete may be placed by using forms or by use of a slipform paver. Any concrete not placed as herein prescribed within 30 minutes after mixing shall be rejected and disposed of as directed except as provided otherwise herein. If in the opinion of the Engineer or designated representative, the temperature, wind and/or humidity conditions are such that the quality of concrete will not be adversely affected, the specified placing time may be extended by a maximum of 45 minutes. Concrete with high range water reducing admixture shall not be placed after the slump has dropped by 3 inches (7.5 cms) or more. Except by specific written authorization of the Engineer or designated representative, concrete shall not be placed when the temperature is below 40°F (4.5°C) and falling but may be placed when the temperature is above 35°F (1.7°C) and rising, the temperature being taken in the shade and away from artificial heat.

When the temperature of the air is above 85°F (29.4°C), an approved retarding agent will be required in concrete. The maximum temperature of all regular concrete placed shall not exceed 95°F (35.0°C), unless otherwise specified.

When concrete is being placed in cold weather, the Contractor shall have available a sufficient supply of an approved covering material to immediately protect concrete if the air temperature falls to 32°F (0°C) or below, before concrete has been placed 4 hours. Such protection shall remain in place during the period the temperature continues below 32°F (0°C) or for a period of not more than 5 days. Neither salt nor other chemical admixtures shall be added to the concrete to prevent freezing. The Contractor shall be responsible for the quality and strength of concrete under cold weather conditions and any concrete damaged by freezing shall be removed and replaced at the Contractor's expense. Concrete shall not be placed before sunrise and shall not be placed later than will permit finishing of the pavement during sufficient natural light.

Concrete shall be placed only on approved subgrade or subbase and unless otherwise indicated on the drawings, the full width of the pavement shall be constructed monolithically. The concrete shall be deposited on the subgrade or subbase in such manner as to require as little rehandling as possible. Where hand spreading is necessary, concrete shall be distributed to the required depth by use of shovels. The use of rakes will not be permitted. Workers will not be permitted to walk in the concrete with any earth or foreign material on their boots or shoes. The placing of concrete shall be rapid and continuous.

When the concrete is to be placed in separate lanes, the junction line shall not deviate from the true line more than ½ inch (1.25 cm) at any point and shall be finished as indicated on the drawings.

The mixer shall not be located on completed pavement, except as herein provided, but may be located on the subgrade of that lane of the pavement being constructed, as provided under "Preparation of Subgrade." When limited space, in the opinion of the Engineer or designated representative, requires operation of the mixer on completed pavement, the mixer may be so operated provided the concrete has attained the minimum average compressive strength required and provided suitable protection to the pavement in the form of 2 ply timber mats or otherwise approved material is provided.

Concrete shall be distributed to such depth that when consolidated and finished, the slab thickness indicated will be obtained at all points and the surface shall not, at any point, be below established grade. Special care shall be exercised in placing and spading concrete against forms and at all joints to prevent the forming of honeycombs and voids.

Concrete for the monolithic curbs shall be the same as for the pavement and if carried back from the paving mixer shall be placed within 20 minutes after being mixed. It may be placed from the separate mixer, if desired, but in any case must be placed while the pavement concrete is still plastic. When sawed joints are

used, curbs shall be doweled as indicated and poured after sawing. Curbs doweled on and placed separately may be placed with an extrusion machine.

If a central mixer or batcher is used, the Contractor shall provide a system satisfactory to the Engineer or designated representative for determining that concrete delivered to the road meets the specified requirements for mixing and time of placing.

Unless otherwise indicated, 2 mixers or transit mixers will be required where the double strike off method is employed.

D. Reinforcing Steel and Joint Assemblies

All reinforcing steel, including steel, welded wire fabric reinforcement, tie bars, dowel bars and load transmission devices used in accordance with plan provisions shall be accurately placed and secured in position in accordance with details indicated on the drawings. Reinforcing bars shall be securely wired together at alternate intersections, following a pattern approved by the Engineer or designated representative and at all splices and shall be securely wired to each dowel intersected. When wire fabric is used, it shall replace only the longitudinal and transverse bars and shall be securely wired together at all splices and to each dowel intersected. When welded wire fabric is selected, the Contractor shall pour the lower half of the slab, place the welded wire fabric and place the remaining concrete. Tie bars shall be installed in the required position by the method and device indicated. Bar coating indicated and of material specified, shall be completed and the bars and coating shall be free of dirt or other foreign matter at the time of installation in the concrete.

Tightly adhered scale or rust which resists removal by vigorous wire brushing need not be removed except that excessive loss of section to the reinforcement due to rust shall be cause for rejection. Excessive loss of section shall be defined as loss of section to the extent that the reinforcement will no longer meet the physical requirements for the size and grade of steel specified.

Where indicated on the drawings, an assembly of parts at pavement joints, the assembly shall be completed, placed at required location and elevated and all parts rigidly secured in required position by the method and devices indicated on the drawings. Dowel bars shall be accurately installed in joint assemblies as indicated on the drawings, each parallel to the pavement surface and to the center line of the pavement and shall be rigidly secured in the required position by such means as indicated that will prevent their displacement during placing and finishing of the concrete. Unless specifically authorized by the Engineer or designated representative in writing, the load transmission devices shall be accurately installed in joint assemblies indicated, each unit vertical with its length parallel to the center line of the pavement and all units shall be rigidly secured in required position by such means as indicated that will prevent their displacement during placing and finishing of the concrete. Header boards, joint filler and other material used for forming joints shall be accurately notched to receive each load transmission device. All load transmission devices shall be free of rust and clean when installed in the concrete.

The Contractor has the option of substituting welded wire fabric in place of reinforcement bars. The welded wire fabric selected shall have an area and distribution of steel at least equal to the plan requirements. The Contractor shall submit their proposed design to the Engineer for approval before any material is ordered.

If welded wire fabric is used, the entire width of the bottom layer of concrete shall be struck off to conform to the cross section and elevation indicated on the drawings. The reinforcement shall then be placed immediately upon the concrete, after which the top layer of concrete shall be placed, struck off and screeded. Any portion of the bottom layer of concrete which has been placed more than 15 minutes without being covered with the top layer of concrete shall be removed and replaced with freshly mixed concrete at the Contractor's expense.

E. Joints

1. General

All transverse and longitudinal joints when required in the pavement shall be of the types indicated and shall be at required location, on required alignment, in required relationship to tie bars and joint assemblies and in accordance with details indicated. When no transverse joints are indicated, joints shall not exceed 40 feet (13.1 meters). Such stakes, braces, brackets or other devices shall be used as necessary to keep the entire joint assembly in true vertical and horizontal position. Where concrete base is overlaid by asphaltic concrete, the joints to be prepared as specified herein, but joint sealing will not be required unless indicated.

If necessary for proper installation of the sealer, excessive spalling of the joint groove shall be repaired to the satisfaction of the Engineer.

Care shall be exercised during the construction of all joints to insure that the concrete sections are completely separated by an open joint or by the joint materials and to insure that the joints will be true to the outline indicated on the drawings. The Contractor shall install joint materials, which will function as a compatible system. Joint sealer shall not be placed where a bond breaker is present.

Green concrete or wet sawed joints are permitted provided the Contractor cleans the joint within 5 minutes after cutting with a 3,000 psi (20.7 mPa) water blast followed by a minimum of 7 day cure and sand blast the saw cut immediately prior to placing joint sealer.

Dry sawed joints are permitted provided the Contractor sand blasts the saw cut immediately prior to placing joint sealer.

2. Expansion Joints

Transverse expansion joints shall be formed perpendicular to the centerline and surface of pavement and shall be constructed in accordance with the sequence of operations indicated on the drawings. After the transverse finishing machine and before the longitudinal finishing machine have passed over the joint, the Contractor shall test the joint filler for correctness of position and make any required adjustment in the position of the filler and shall install the joint seal space form as indicated on the drawings. After removal of the joint seal form as indicated on the drawings, the joint seal space above the joint filler shall be thoroughly sandblasted or machine routed to remove all projecting concrete, laitance, dirt or foreign matter. The concrete faces of the joint seal space shall be left true to line and section throughout the entire length of the joint. On completion of curing of the pavement, the joint sealing filler of the type specified shall be placed as indicated. The faces of the joint seal space shall be clean and surface dry at the time joint sealing filler is placed. On completion of the joint seal, the pavement adjacent to the joint shall be left free of joint sealing material. The joint seal space shall be exactly above and not narrower than the joint filler with no concrete overhangings.

3. Weakened Plane Joints

Weakened plane joints shall consist of transverse contraction joints and longitudinal joints and shall be formed or sawed as indicated on the drawings. When the joints are sawed, the saw shall be power driven, shall be manufactured especially for the purpose of sawing concrete and shall be capable of performing the work. Saw blades shall be as indicated. Tracks adequately anchored, the chalk, string line or other approved methods shall be used to provide true alignment of the joints. The concrete saw shall be maintained in good operating condition and the Contractor shall keep a standby power saw on the project at all times when concrete operations are under way.

If membrane curing is used, the portion of the seal, which has been disturbed by sawing operations, shall be restored by the Contractor by spraying the areas with additional curing seal.

Forming, finishing and sealing of the joint seal space shall conform to this item, described above and details indicated on the drawings.

4. Contraction Joints

Transverse contraction joints shall be formed or sawed joints perpendicular to the centerline and surface of the pavement and shall be constructed by the method and in the sequence of operations as indicated. Where sawed joints are used, contraction joints at intervals indicated shall be sawed as soon as sawing can be accomplished without damage to the pavement and before 24 hours after the concrete has been placed, the exact time to be approved by the Engineer or designated representative. The remaining contraction joints shall be sawed in a uniform pattern as directed by the Engineer or designated representative and they shall be completed before uncontrolled cracking of the pavement takes place. All joints shall be completed before placing concrete in succeeding lanes and before permitting traffic to use the pavement.

5. Longitudinal Joints

Longitudinal joints shall be of the type or alternate types indicated and shall be constructed of specified materials in accordance with provisions indicated on the drawings. Longitudinal joints shall be constructed accurately to required lines, shall be perpendicular to the pavement surface at the joint and the pavement surface over and adjacent to the joint shall be finished as specified on the drawings.

Longitudinal joints shall be sawed as soon as sawing can be accomplished without damage to the pavement. Sawing shall not cause damage to the pavement and the groove shall be cut with a minimum of spalling. No traffic (including construction traffic) shall be permitted on pavement until the longitudinal joint is cut.

6. Construction Joints

Intentional stoppage of the placing of the concrete shall be at either an expansion joint or at a weakened plane joint. The following provisions shall govern for each type of joint at which the placing of concrete is stopped:

a) When the placing of concrete is stopped at an expansion joint, the complete joint assembly shall be installed and rigidly secured in required position as indicated. A bulkhead of sufficient cross sectional area to prevent deflection, accurately notched to receive the load transmission devices or dowels, as the case may be, and shaped accurately to the cross section of the pavement shall be provided and installed as a back-up for the joint filler and rigidly secured in required position to permit accurate finishing of the concrete up to the joint. After the concrete has been finished to the joint, formation of the joint seal space and finishing of the joint shall be executed as specified herein and as indicated. The backup bulkhead shall remain in place until immediately prior to the time when concrete placement is resumed, then it shall be carefully removed in such manner that no element of the joint assembly will be disturbed. The exposed portion of the joint assembly shall be free of adherent concrete, dirt or other material at the time placing of concrete is resumed.

b) When placing of concrete is stopped at a weakened plane joint, all applicable provisions of paragraph (a) above shall apply in addition to the following requirement:

The face of the bulkhead adjoining the slab end shall be notched and grooved to fit the exposed half section of the joint assembly and shall be shaped to form the slab end at the center of the joint as indicated on the drawings. The ½ width of joint seal space may be formed by a strip of required section placed and removed as indicated for construction of transverse contraction joints. The Contractor shall have available a bulkhead shaped to section of the pavement. This bulkhead must be drilled to permit the continuation of all longitudinal reinforcing steel through the construction joint and shall be of sufficient section and strength to prevent deflection.

c) When load transmission devices are not provided in the design, intentional stopping of placement of concrete shall occur in the middle of a slab. Provisions shall be made to provide a bulkhead, which will accommodate tie bars of the same length, size and spacing as tie bars used

for the longitudinal joints. When the concrete placement is resumed, the bulkhead shall be removed without bending tie bars or damaging the concrete. The joint seal space and sealer shall be the same as for longitudinal joints.

Immediately upon the unintended stoppage of the placing of concrete, the Contractor shall place the available concrete to a line and install the above-described bulkhead at right angles to the centerline of the pavement, perpendicular to the surface and at the required elevation. Concrete shall be placed and finished to this bulkhead. Any concrete remaining on the subgrade ahead shall be removed and disposed of as directed by the Engineer or designated representative. When placing of concrete is resumed before the concrete has set to the extent that the concrete will stand on removal of the bulkhead, the new concrete shall be rodded with the first. An edge created by a construction joint of this type shall have a joint seal space and shall be sealed as required for contraction joints.

F. Joint Sealers

1. Class 2 Material

This material shall conform to Standard Specification Item No. 313S, "Cleaning and/or Sealing Joints and Cracks (Asphaltic Concrete)".

For placement in vertical joints (curb faces, etc.) either of the following procedures may be used.

a) An amount of the mixed material may be set aside until partial curing has taken place and carefully trowelled into the joint with a suitable tool.

b) The portion of the joint in the roadway shall be poured and cured. The vertical curb faces shall then be taped or formed and the material poured into the vertical joint from the top.

2. Class 5 Material

This material together with backer rods shall be applied as indicated in accordance with manufacturer's recommendations.

G. Asphalt Board

Premolded materials, wherever used, shall be anchored to the concrete on one side of the joint by means of copper wire or nails not lighter than No. 12 B and S gage. Such anchorage shall be sufficient to overcome the tendency of the material to fall out of the joint. The Contractor shall not contaminate joints to receive Class 5 Joint Material with asphalt from the asphalt board.

H. Curbs

The curb shall be constructed in lengths equal to the adjoining pavement slab lengths and expansion joints shall be provided in the curb opposite each transverse expansion joint in the pavement. Expansion joint material shall be of the same thickness, type and quality as indicated for the pavement and shall be of the section as indicated for the curb. All expansion joints shall be carried through the curb, sidewalk and retaining walls when these items are indicated.

When sawed joints are provided for the pavement, the curb placement shall be delayed until all transverse joints have been sawed. To provide bond for the curb, dowel bars shall be placed as indicated on the drawings, while the pavement concrete is still plastic.

Weakened plane joints shall be formed in monolithic curbs at a spacing to coincide with the joints in the concrete pavement. The joints shall be formed by inserting in the curb an asphaltic board strip cut to conform to the shape of the curb. When the concrete is sufficiently set, the joint on the top and face of curb shall be grooved with an approved type of grooving tool.

A finish coat of mortar shall be applied on the exposed surfaces of the monolithic curbs. The mortar shall be composed of 1 part of Portland Cement and 2 parts of fine aggregate. A mortar coat will not be required for extruded curbs.

The curb face, lower radius and top of curb shall be plastered with the sand-cement mortar. The mortar shall be applied with a template or "mule" made to conform to the curb dimensions as indicated. All exposed surfaces of the curb shall be finished with a steel trowel and brushed to a smooth and uniform surface. The mortar finish as required shall be included in the unit price bid for this item.

I. Machine Finishing

All concrete pavement shall be finished mechanically with approved self-propelled machines, except as herein provided. Hand finishing will be permitted on the transition from a crowned section to a superelevated section without crown on curves, on straight line superelevation sections less than 300 feet (91.4 meters) in length, on that portion of a widened pavement outside normal pavement width and on sections where the pavement width is not uniform, isolated, narrow in width or required monolithic widths are greater than that of available finishing machines.

Machine finishing of pavement shall include the use of power-driven vibrators, power-driven transverse strike off and screed or such alternate equipment as may be substituted and approved under this item.

All concrete pavement shall be consolidated by a mechanical vibrator. As soon as concrete has been spread between the forms, the approved mechanical vibrator shall be operated to consolidate the concrete and remove all voids. Hand manipulated vibrators shall be used for areas not covered by the mechanical vibratory unit.

The transverse finishing machine shall first be operated to compact and finish pavement to the required section and grade, without surface voids. The machine shall be operated over each area as many times and at such intervals as directed. At least 2 trips will be required and the last trip over a given area shall be a continuous run of not less than 40 feet (12.2 meters). After completion of finishing with the transverse finishing machine, a transverse drag float may be used.

The consistency of the concrete as placed should allow completion of finishing operations without the addition of water to the surface. When field conditions are such that additional moisture is needed for the final concrete surface finishing operation, the required water shall be applied to surface by fog spray only and shall be held to a minimum.

After finishing is complete and the concrete still workable, the surface shall be tested by the Contractor for trueness with an approved 10 foot (3.05 meter) straightedge. The straightedge shall be operated from the side of the pavement, placed parallel to the pavement centerline and passed across the slab to reveal any high spots or depressions. The straightedge shall be advanced along the pavement in successive stages of not more than ½ its length. Practically perfect contact of the straightedge with the surface will be required and the pavement shall be leveled to this condition, in order to insure conformity with the surface test required below after the pavement has fully hardened. Any correction of the surface required shall be accomplished by adding concrete if required and by operating the longitudinal float over the area. The surface test with the straightedge shall then be repeated.

For one lane pavement placement and uniform widening, the equipment for machine finishing of concrete pavement shall be as directed by the Engineer or designated representative but shall not exceed requirements of these specifications.

After completion of the straightedge operation, as soon as construction operations permit, texture shall be applied with ⅛ inch (3 mm) wide metal tines with clear spacing between the tines being not less than ¼ inch (6.3 mm) nor more than ½ inch (12.7 mm).

If approved by the Engineer or designated representative, other equipment and methods may be used, provided that a surface texture meeting the specified requirements is obtained. The texture shall be applied transversely. It is the intent that the average depth resulting from the number of tests directed by the Engineer or designated representative be not less than 0.060 inch (1.52 mm) with a minimum texture depth of 0.050 inch (1.27 mm) for any one test when tested in accordance with TxDOT Test Method Tex-436-A. Should the texture depth fall below that intended, the finishing procedures shall be revised to produce the desired texture.

1. Emergency Procedures

   The Contractor shall have available at all times hand rakes with tines for the purpose of providing textures in the event of equipment breakdown.

   The Contractor also shall have available a conventional garden spray type can containing a commercially available monomolecular film compound. This shall be applied in the case of equipment breakdown or other emergencies to prevent the pavement from drying too rapidly. The use of this product will give the Contractor additional time to provide adequate texturing.

   After completion of texturing and about the time the concrete becomes hard, the edge of the slab and joints shall be carefully finished with an edger and the pavement shall be left smooth and true to line.

J. Hand Finishing

Hand finishing shall be resorted to only in those conditions provided for above and upon specific authorization by the Engineer or designated representative. When hand finishing is permitted, concrete shall be struck off with an approved strike off screed to such elevation that when consolidated and finished the surface of the pavement to conform to the required section and grade. The strike template shall be moved forward with a combined transverse and longitudinal motion in the direction work is progressing, maintaining the template in contact with the forms and maintaining a slight excess of material in front of the cutting edge. The Concrete shall then be tamped with an approved tamping template to compact the concrete thoroughly and eliminate surface voids and the surface screed to required section.

After completion of a strike off, consolidation and transverse screeding, a hand-operated longitudinal float shall be operated to test and level the surface to the required grade.

Workers shall operate the float from approved bridges riding on the forms and spanning the pavement. The longitudinal float shall be held in contact with the surface and parallel to the centerline and operated with short longitudinal strokes while being passed from one side of the pavement to the other. If contact with the pavement is not made at all points, additional concrete shall be placed, if required and screed and the float shall be used to produce a satisfactory surface. Care shall be exercised to keep the ends of the float from digging into the surface of the pavement. After a section has been smoothed so that the float maintains contact with the surface at all points in being passed from one side to the other, the bridges may be moved forward half the length of the float and the operations repeated.

Other operations and surface tests shall be as required for machine finishing.

K. Surface Testing

After the concrete has been placed 12 hours or more, the Engineer or designated representative will test the surface of the pavement with a 10-foot (3.05 meter) straightedge placed parallel to the centerline. Unless specified otherwise, the surface shall not vary from the straightedge by more than 1/16 inch per foot (5 mm per meter) from the nearest point of contact and in no case shall the maximum ordinate from a straightedge to the pavement be greater than 1/8 inch (3 mm). Any high spots causing a departure from the straightedge in excess of that specified shall be ground down by the Contractor to meet the surface test requirements. Where the texture of the pavement is removed by extensive grinding, the texture shall be restored by grooving the concrete to meet the surface finishing specifications.

L. Curing

All concrete pavement shall be cured by protecting it against loss of moisture for a period of not less than 72 hours from the beginning of the curing operations. Immediately after finishing operations have been completed, the entire surface of the newly laid concrete shall be covered and cured in accordance with the requirements specified for whichever of the following methods the Contractor may elect. Newly laid concrete base to be overlaid by asphaltic concrete shall not be cured by "Membrane Curing" and surfaces not to be overlaid by asphaltic concrete shall not be cured by "Asphalt Curing." In all cases in which curing requires the use of water, the curing shall have prior right to water supply or supplies. Failure to provide sufficient cover material of the type the Contractor elects to use, failure to maintain saturation in wet curing methods, lack of water to adequately take care of both curing and other requirements or other failures to comply with curing requirements shall be cause for immediate suspension of concreting operations. The covering material used in curing shall be removed as necessary to saw joints or to comply with the requirements for "Surface Test." The concrete surface shall be maintained wet with a water spray if indicated and the covering material replaced immediately on completion of sawing and testing and any required surface correction.

1. Waterproofed Paper Curing

Immediately after the finishing of the surface has been completed and the concrete has taken its initial set, it shall be wetted with water applied in the form of a fine spray and covered with waterproofed paper so placed and weighted as to cause it to remain in intimate contact with the surface. Waterproofed paper used for the curing of concrete pavement shall be of a type and quality approved by the Engineer. It shall be sufficiently strong and tough to permit its use under the conditions existing on street paving work without being torn or otherwise rendered unfit for the purpose during the curing period. The paper covering shall be maintained in place continuously for not less than the specified curing period.

The waterproofed paper shall be prepared to form blankets of sufficient width to cover the entire surface and both edges of the pavement slab and such blankets shall not be more than 60 feet in length. All joints in the blankets occasioned by joining paper sheets shall lap not less than 5 inches (12.7 cms) and shall be securely sealed with asphalt cement having a melting point of approximately 180°F (82.2°C). Blankets shall be placed to secure an overlap of at least 12 inches (30.5 cms) and this lap securely weighted to form a closed joint.

The waterproofed paper blankets shall be adequately weighted to prevent displacement or billowing due to wind and the paper folded down over the side of the pavement shall be secured by a continuous bank of earth. Plowing of this windrow into place will not be permitted.

All tears or holes appearing in the paper during the curing period shall be immediately repaired by cementing patches over such defects. It shall be the Contractor's responsibility to prevent damage to paper blankets, which would affect their serviceability and effectiveness as a concrete curing method. Blankets may be rejected by the Engineer or designated representative at any time if it appears they do not provide an airtight covering.

Paper blankets rejected on account of pinholes or minor tears may be continued in service by folding the blanket over lengthwise, first thoroughly spraying ½ the blanket with the asphalt cement used for seams. The 2 thicknesses shall be firmly pressed together and well cemented. Blankets shall be of a width sufficient to cover the pavement surface and both edges. Doubled blankets may be rejected for the same cause as provided for single blankets. All paper blankets rejected by the Engineer shall be immediately marked by the Contractor for identification and then destroyed or stored entirely separate from approved blankets.

No walking on paper shall be permitted at any time and, in locations where pedestrian traffic cannot be entirely controlled, the Contractor shall provide walkways and barricades or shall substitute other permissible curing methods on such sections of pavement.

2. Polyethylene Film Curing

Immediately after the finishing of the surface has been completed and the concrete has taken its initial set, it shall be wetted with water applied in the form of a fine spray and covered with the polyethylene film so placed and weighted as to cause it to remain in intimate contact with the surface. The polyethylene film covering shall be maintained in place continuously for not less than the specified curing period.

The film shall be prepared to form blankets of sufficient width to cover the entire surface and both edges of the pavement slab. All joints in the blankets occasioned by joining film sheets shall lap not less than 12 inches (30.5 cms). All joints shall be sealed in a manner acceptable to the Engineer or designated representative to provide a moisture-proof lap.

The polyethylene film blankets shall be adequately weighted to prevent displacement or billowing due to wind and the film folded down over the side of the pavement shall be secured by a continuous bank of earth. Plowing of this windrow into place not to be permitted.

All tears or holes appearing in the polyethylene film during the curing period shall be immediately repaired by placing acceptable moisture proof patches over such defects or by replacing the blankets. It shall be the Contractor's responsibility to prevent damage to the film blankets, which would affect their serviceability and effectiveness as a concrete curing method. Blankets may be rejected by the Engineer at any time if it appears they do not provide an airtight covering.

Polyethylene film blankets rejected on account of pinholes or minor tears may be continued in service when repaired to an airtight condition. All polyethylene film blankets rejected by the Engineer or designated representative shall be immediately marked by the Contractor for identification and then destroyed or stored entirely separate from approved blankets.

Should the film blanket be damaged or torn for any cause during the first 72 hours of the curing period such damage shall be repaired immediately.

3. Membrane Curing

Immediately after the finishing of pavement has been completed and after the free surface moisture has disappeared, the pavement shall be sprayed uniformly with a curing compound. Membrane curing shall conform to Standard Specification Item No. 409S, "Membrane Curing," Type 2 white pigmented. Should the film of compound be damaged from any cause before the expiration of 72 hours after original application, the damaged portions shall be repaired with additional compound. Unless otherwise indicated on the drawings, membrane curing shall be used when the concrete (except that concrete to be used as a base) is placed with a slip form paver.

4. Asphalt Curing

Where emulsified asphalt is used for curing concrete base, the material shall conform to Item No. 301S, "Asphalts, Oils and Emulsions," for the type and grade shown on the drawings. The rate of application may vary between the limits of 1 gallon per 180 square feet and 1 gallon per 90 square feet (1 liter per 4.4 square meters and 1 liter per 2.2 square meters). The rate of application will be determined by the Engineer or designated representative, after observation of sections where amounts varying between the above limits have been applied. If it is found necessary to add water to the emulsion for the proper distribution through the spray, this may be done upon approval of the Engineer or designated representative. When the emulsion is diluted with water the amount of the applied mixture shall be

increased to give a coverage of the original emulsion between the limits as set out herein. Care shall be taken to properly mix the emulsion and water and to keep the mixture well agitated during application.

M. Protection of Pavement

The Contractor shall erect and maintain the barricades indicated on the drawings and such other standard and approved devices as will exclude public traffic and traffic of the Contractor's employees and agents from the newly placed pavement for a minimum of 14 days. Portions of the roadway or crossings of the roadbed required to be maintained open for use by traffic shall not be obstructed by above required barricades. Crossings of the pavement indicated on the drawings or by construction sequence, during the period prior to opening to traffic as herein indicated, shall be provided with an adequate and substantial bridge approved by the Engineer or designated representative.

Curb shall be backfilled to the full height of the concrete, tamped and sloped as indicated on the drawings or as directed by the Engineer. The top 4 inches (10 cms) of backfill shall be of clean, friable soil capable of supporting plant life. This material shall also be free of stones and all other debris.

N. Opening Pavement to Traffic

The pavement shall be closed to traffic, including vehicles of the Contractor, until the concrete is at least 14 days old and has attained an average compressive strength acceptable to the Engineer or designated representative. This period of closure to traffic may be extended if, in the opinion of the Engineer or designated representative, weather or other conditions make it advisable to provide an extension of the time of protection.

At the end of the 14 day period and as long thereafter as ordered by the Engineer or designated representative and if so desired by the Contractor, the pavement may be opened for use by vehicles of the Contractor provided the gross weight (vehicle plus load) of such vehicles does not exceed 14,000 pounds (6,350 KGs). Such opening, however, shall in no manner relieve the Contractor from responsibility for the Contractor's work. On those sections of the pavement thus opened to traffic, all joints shall first be sealed, the pavement cleaned and topsoil placed against the pavement edges or behind the curb where turf or vegetation is to be established before permitting vehicles thereon.

After the concrete in any section is 14 days old or as long thereafter as ordered by the Engineer, such section of pavement may be opened to all traffic indicated on the drawings or when so directed by the Engineer or designated representative. On those sections of the pavement thus opened to traffic, all joints shall first be sealed, the pavement cleaned and 4 inches (10 cms) of top soil placed against the pavement edges and all other work performed as required for the safety of traffic. Such opening, however, shall in no manner relieve the Contractor from responsibility for the Contractor's work performed.

When High Early Strength Concrete, resulting from the use of Type III cement as indicated on the drawings is used, the pavement may be opened to all traffic after the concrete is 7 days old or as long thereafter as ordered by the Engineer or designated representative, subject to the same provisions governing the opening after 14 days as above indicated.

Where the Contractor desires to move any equipment not licensed for operation on public streets, on or across any pavement opened to traffic, the Contractor shall protect the pavement from damage by means of 2 ply timber mats of 2 inch (5 cm) stock or runways of heavier material laid on a layer of earth, all as approved by the Engineer or designated representative.

1. Emergency Opening to Traffic

The Engineer or designated representative may require the opening of pavement to traffic prior to the minimum time specified above under conditions of emergency, which in the Engineer's or designated representative's opinion require such action in the interest of the public. In no case will the Engineer or designated representative order opening of the pavement to traffic within less than 72 hours after the

last concrete in the section is placed. The Contractor shall remove all obstructing materials, place earth against pavement edges and perform other work involved in providing for the safety of traffic as required by the Engineer or designated representative in ordering emergency opening. Orders for emergency opening of the pavement to traffic will be issued by the Engineer or designated representative in writing.

360S.8 Penalty for Deficient Pavement Thickness or Strength

The adjustment in unit prices provided for in this item will apply only when measurement for payment is by the square yard.

It is the intent of this specification that the pavement be constructed in strict conformity with the thickness, strength and typical sections indicated on the drawings. Where any pavement is found not so constructed, the following rules relative to adjustment of payment for acceptable pavement and to replacement of faulty pavement shall govern.

A. Pavement

The pavement will be core drilled after any grinding operations have been completed for surface corrections prior to final acceptance. Locations of core tests may be selected by the Engineer or designated representative; however, spacing interval for core tests, as specified herein, shall be maintained. The thickness of the pavement will be determined by measurement of the cores in accordance with TxDOT Test Method Tex-424-A.

For the purpose of establishing an adjusted unit price for pavement, units to be considered separately are defined as 1,000 linear feet of pavement in each traffic lane starting at the end of the pavement bearing the smaller station number. The last unit in each lane shall be 1,000 feet plus the fractional part of 1,000 feet remaining. Traffic lane width will be as shown on typical sections and pavement design standards.

For the purpose of establishing an adjusted unit price for ramps, widening, acceleration and deceleration lanes that are machine placed, isolated pavements of traffic lane width but less than 1,000 feet in length and other areas designated by the Engineer or designated representative, units will be considered separately and are defined as 1,000 square yards of pavement or fraction thereof.

One core will be taken at the location selected by the Engineer or designated representative or at random in each unit. When the measurement of the core from any unit is not deficient more than 0.2 inches from the plan thickness, full payment will be made. When the measurement of the core from any unit is deficient more than 0.2 inch but not more than 0.75 inch from the plan thickness, 2 additional cores will be taken from the unit and the average of the 3 cores determined. The 2 additional cores from any 1,000-foot unit will be taken at intervals of not less than 300 feet. The 2 additional cores from any 1,000 square yard unit will be taken at locations such that the pavement in the unit will be well represented. If the average measurement of these 3 cores is not deficient more than 0.2 inches from the plan thickness, full payment will be made. If the average thickness of the 3 cores is deficient by more than 0.2 inch but not more than 0.75 inch from the indicated thickness, an adjusted unit price as provided below will be paid for the areas represented by these cores.

In calculating the average thickness of the pavement, measurements which are in excess of the specified thickness by more than 0.2 inch will be considered as the specified thickness plus 0.2 inch and measurements which are less than the specified thickness by more than 0.75 inch will be considered as the specified thickness less 0.75 inch.

When the measurement of any core is less than the specified thickness by more than 0.75 inch, the actual thickness of pavement in this area will be determined by taking additional cores at 10 foot intervals parallel to the center line in each direction from the deficient core until, in each direction, a core is taken which is not

deficient by more than 0.75 inch. Exploratory cores for deficient thickness will not be used in averages for adjusted unit price. Exploratory cores are to be used only to determine the length of pavement in a unit that is to be left in place without pay and/or removed and replaced as provided herein.

For new Concrete Pavement roadways, and for Concrete Pavement rehabilitation and overlay projects, if cracks develop in the pavement surface within the one year warranty period, the Contractor shall seal the cracks in accordance with Standard Specification Item No. 313S, "Cleaning and/or Sealing Joints and Cracks (Asphaltic Concrete)", or perform other corrective measures as directed by the Engineer. Payment for this work will be considered subsidiary to Concrete Pavement, unless included as a separate pay item in the Contract.

For new Concrete Pavement roadways, and for Concrete Pavement rehabilitation and overlay projects, if cracks develop in the pavement surface within the one year warranty period, the Contractor shall seal the cracks in accordance with Standard Specification Item No. 313S, "Cleaning and/or Sealing Joints and Cracks (Asphaltic Concrete)", or perform other corrective measures as directed by the Engineer. Payment for this work will be included in the unit price bid for Concrete Pavement, unless included as a separate pay item in the Contract.

Irrespective of an acceptable overall project average for any or all of the Pay-Adjustment Acceptance Factors, limited substandard portions of the work, as determined by the Engineer or designated representative, shall be remedied or removed and replaced to the satisfaction thereof.

B. Price Adjustments

After any grinding or milling operations have been completed to meet the surface-testing requirement of this specification, if average thickness of pavement is deficient in thickness by more than 0.2 inch, but not more than 0.75 inch, payment will be made at an adjusted price as specified in the following table:

Concrete Pavement Deficiency	
Deficiency in Thickness Determined by Cores, Inches	**Proportional Part of Contract Price Allowed**
0.00 to 0.20	100 percent
0.21 to 0.30	80 percent
0.31 to 0.40	72 percent
0.41 to 0.50	68 percent
0.51 to 0.75	57 percent

Any area of pavement found deficient in thickness by more than 0.75 inch but not more than 1 inch or ⅛ of the indicated thickness, whichever is greater, shall be evaluated by the Engineer. If, in the judgment of the Engineer, the area of such deficiency should not be removed and replaced, there will be no payment for the area retained. If, in the judgment of the Engineer, the area of such deficiency warrants removal, the area shall be removed and replaced at the Contractor's entire expense, with concrete of the thickness indicated on the drawings.

Any area of pavement found deficient in thickness by more than 1 inch or more than ⅛ of the indicated thickness, whichever is greater, shall be removed and replaced, at the Contractor's entire expense, with concrete of the thickness indicated on the drawings.

No additional payment over the Contract unit price will be made for any pavement of a thickness exceeding that indicated on the drawings.

If the average compressive strength based on concrete test cylinders at 28 days is less than the specified minimum strength of the concrete, then payment will be made at an adjusted price as specified in the following table.

Pay Adjustment Factor for Deficient Compressive Strength	
Ratio of Average Strength from Test Cylinders to Specified Minimum Compressive Strength both at 28 Days	Proportional Part of Contract Price Allowed
More then 0.95	100 percent
0.90 to 0.95	85 percent
0.85 to 0.90	70 percent
0.80 to 0.85	60 percent
Less than 0.80	0 percent (Remove & Replace)

When, in the opinion of the Engineer or designated representative, the compressive strength test results appear unrepresentative, additional testing of field cores may be authorized. To be considered acceptable for consideration the field cores shall be acquired, properly handled and tested in accordance with ASTM C 42/C 42M, "Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete" within 45 days of the original concrete placement date. The retesting will be at the expense of the Contractor and the results of the retesting shall be averaged with the results of the original testing. If the results of retesting indicate that the original test results were erroneous in the opinion of the Engineer or designated representative, the original test results will be discarded. In the instance of erroneous original test results the subsequent first set of retests will be at the expense of the City of Austin.

When, in the opinion of the Engineer or designated representative, the concrete compressive strength is deemed unacceptable for the intended use of the pavement, the concrete shall be removed and replaced to the limits indicated by test results.

360S.9 Measurement

A. When indicated, concrete pavement will be measured by the square yard of surface area of completed and accepted work. The surface area shall be so measured to also include that portion of pavement slab extending beneath the curb. When concrete pavement is to be measured by the square yard and monolithic curb is required, measurements for "Monolithic Curb" will be by the linear foot complete in place.

B. When indicated on the drawings, concrete pavement, including monolithic curb when required, will be measured by the cubic yard of absolute volume of materials entering the mixture.

360S.10 Payment

The work performed and materials furnished as prescribed by this item and measured as provided under "Measurement" will be paid for at the unit price bid for "Concrete Pavement," of the depth indicated on the drawings, "Concrete Pavement (High Early Strength)" of the depth indicated on the drawings and "Monolithic Curb" of the type indicated on the drawings (when pavement is measured by the square yard), as required or adjusted unit price for pavement of deficient thickness as provided under "Deficient Pavement Thickness", which price shall be full compensation for shaping and fine grading the roadbed, including furnishing and applying all water required; for furnishing, loading and unloading, storing, hauling and handling all concrete ingredients, including all freight and royalty involved; for placing and adjusting forms, including supporting material or preparing track grade; for mixing, placing, finishing, sawing, cleaning and sealing joints and curing all concrete; for furnishing and installing all reinforcing steel; for furnishing all materials for sealing joints and placing longitudinal, expansion and weakened plane joints, including all steel dowel caps and load transmission devices required and wire and devices for placing, holding and supporting steel bars, load transmission devices and joint filler material in proper position, for coating steel bars where complete the work.

Excavation required by this item in the preparation of the subgrade and for completion of the parkway will be measured and paid for in accordance with provisions governing the Items of "Street Excavation" and "Borrow," respectively, with provision that yardage to be measured and paid for once only, regardless of manipulations involved. Measurement of subgrade excavation for payment shall be limited to a total width of that of pavement plus 1 foot on each side.

Sprinkling and rolling required for the compaction of the rough subgrade in advance of fine grading will be measured and paid for as indicated in the governing items of excavation. Maintenance of a moist condition of the subgrade in advance of fine grading and concrete placing will not be paid for directly but shall be included in the unit price bid, as provided above.

Payment will be made under one of the following:

Pay Item No. 360S-A:	In. Concrete Pavement	Per Square Yard.
Pay Item No. 360S-AH:	In. Concrete Pavement (High Early Strength)	Per Square Yard.
Pay Item No. 360S-AS:	In. Concrete Pavement (High Range Water Reducing Admixture)	Per Square Yard.
Pay Item No. 360S-B:	Monolithic Curb	Per Linear Foot.
Pay Item No. 360S-C:	Concrete Pavement Including Monolithic Curb	Per Cubic Yard.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Standard Specification Item 360S, "Concrete Pavement"	
City of Austin Standard Specification Items	
Designation	Description
Item No. 301S	Asphalts, Oils and Emulsions
Item No. 313S	Cleaning and/or Sealing Joints and Cracks (Asphaltic Concrete)
Item No. 403S	Concrete for Structures
Item No. 405S	Concrete Admixtures
Item No. 410S	Concrete Structures
Item No. 411S	Surface Finishes for Concrete
Item No. 413S	Cleaning and/or Sealing Joints and Cracks (PCC)
American Society for Testing and Materials, ASTM	
Designation	Description
ASTM C 42/C 42M	Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete"
ASTM A 82	Specification for Steel Wire, Plain, for Concrete Reinforcement
ASTM A 184	Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A 185	Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
ASTM A 496	Specification for Steel Wire, Deformed, for Concrete Reinforcement
ASTM A 497	Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement
ASTM A 615	Specification for Deformed and Plain Billet-Steel Bars, for Concrete Reinforcement
ASTM A 616	Specification Rail-Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM C 94	Specification for Ready-Mixed Concrete
ASTM C 150	Specification for Portland Cement
ASTM C 156	Test Method for Water Retention by Concrete Curing Materials
ASTM D 2240	Test Method for Rubber Property-Durameter Hardness

ASTM D 882, Method A	Test Methods for Tensile Properties of Thin Plastic Sheeting
Texas Department of Transportation: Publications	
Designation	Description
Bulletin C-11	Construction Bulletin
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
TEX-203-F	Sand Equivalent Test
TEX-401-A	Sieve Analysis of Fine and Coarse Aggregate
TEX-406-A	Mineral Finer than 75 µm (No. 200) Sieve in Mineral Aggregates (Decantation Test for Concrete Aggregates)
TEX-408-A	Organic Impurities in Fine Aggregate for Concrete
TEX-410-A	Abrasion of Coarse Aggregate Using The Los Angeles Machine
TEX-411-A	Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
TEX-413-A	Determination of Deleterious Materials in Mineral Aggregate
TEX-415-A	Slump of Portland Cement Concrete
TEX-416-A	Air Content of Freshly-Mixed Concrete by the Pressure Method
Tex-418-A	Compressive Strength of Cylindrical Concrete
Tex-424-A	Obtaining and Testing Drilled Cores of Concrete
Tex-436-A	Measurement of Texture Depth by the Sand Patch Method
Tex-524-C	Testing Premolded Joint Filler for Concrete
Tex-612	Acid Insoluble Residue
Texas Department of Transportation: Departmental Material Specifications	
Designation	Description
DMS 8900	Fly Ash
American Association of State Highway & Transportation Officials, AASHTO Standard	
Designation	Description
Method T 26	Quality of Water to be Used in Concrete

RELATED CROSS REFERENCE MATERIALS	
Standard Specification Item 360S, "Concrete Pavement"	
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item 360	Concrete Pavement
Item 420	Concrete Structures
Item 421	Hydraulic Cement Concrete
Item 427	Surface Finishes for Concrete
Item 431	Pneumatically Placed Concrete
Item 520	Weighing and Measuring Equipment
Texas Department of Transportation: Departmental Material Specifications	
Designation	Description
DMS-4650	Hydraulic Cement Concrete Curing Materials and Evaporation Retardants"

DMS-6100	Epoxy and Adhesives
American Society for Testing and Materials, ASTM	
Designation	Description
ASTM C 685	Concrete Made By Volumetric Batching and Continuous Mixing
ASTM C-1260	Standard Test Method for Potential Alkali Reactivity of Aggregates
ASTM D-512	Test Methods for Chloride Ion in Water
ASTM D-516	Test Methods for Sulfate Ion in Water
ASTM D-4191	Test Method for Sodium in Water by Atomic Absorption
ASTM D-4192	Test Method for Potassium Water by Atomic Absorption
American Concrete Institute, ACI	
Designation	Description
ACI 211.1	Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
TEX-418-A	Compressive Strength of Cylindrical Concrete Specimens

ITEM NO. 401S STRUCTURAL EXCAVATION AND BACKFILL 9-26-12

401S.1 Description

This item shall govern the excavation for placement of structures, except pipe sewers, the disposal of such excavated material and the backfill around completed structures to the level of the original ground or grade indicated on the Drawings. The work shall include all necessary pumping or bailing, sheathing, drainage, and the construction and removal of any required cofferdams. Unless otherwise indicated on the Drawings, the work included hereunder shall provide for the removal of old structures or portions thereof (abutments, buildings, foundations, wingwalls, piers, etc.), trees and all other obstructions necessary to the proposed construction.

Where excavation is not classified, it will be grouped under "Unclassified Structural Excavation", which shall include the removal of all materials encountered regardless of their nature or the manner in which they are removed.

Where excavation is classified, it shall be classed as "Common Structural Excavation" or "Rock Structural Excavation" in accordance with the following criteria:

"Common Structural Excavation" shall include the removal of all materials other than rock.

"Rock Structural Excavation" shall include the removal of firm and compact materials that cannot be excavated with power equipment, without first being loosened or broken by blasting, sledging or drilling.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text and accompanying tables, the inch-pound units are given preference followed by SI units shown within parentheses.

401S.2 Submittals

The submittal requirements of this specification item may include:

Supplier and certified test results for fine aggregate/sand material

Supplier and certified test results for flexible base material

Mix design and test results for lime stabilized subgrade material

Mix design and test results for Class J Concrete Base

Supplier and certified test results for granular material (coarse aggregate, foundation rock and pea gravel)

Mix design and test results for cement-stabilized backfill

Mix design and test results for controlled low strength material (CLSM)

Excavation Safety System Plan for proposed cofferdams, trench excavation and special shoring installations

401S.3 Materials

A. **Sand**

1. Fine aggregate sand shall be Grade 1 conforming to Standard Specification Item No. 302S, "Aggregates for Surface Treatments".
2. Native Sand shall be local material obtained from approved sources and subject to the approval of the Engineer or designated representative.

B. **Flexible Base**

Flexible base shall conform to the requirements of Standard Specification Item No. 210S, "Flexible Base".

C. **Lime Stabilized Base**

Lime stabilized base shall conform to the requirements of Standard Specification Item No. 202S, "Hydrated Lime and Lime Slurry" and Item No. 203S, "Lime Treatment for Materials in Place".

D. **Concrete Base**

Concrete base shall conform to a Class J Concrete as defined in Standard Specification Item No. 403S, "Concrete for Structures".

E. **Granular Material**

1. Coarse aggregate shall conform to the requirements of section 403S.3.C of Standard Specification Item No. 403S "Concrete for Structures".

2. Foundation Rock

   Foundation rock shall be well graded, hard, durable coarse aggregate ranging in size from 2 to 6 inches (50 to 150 mm).

3. Pea Gravel

   Pea gravel shall consist of hard, durable, opaque gravel, free of clay, loam, sand or other foreign substances, ranging in size from ¼ inch to ⅜ inch (6.4 to 9.5 mm) conforming to ASTM C 33.

F. **Cement Stabilized Backfill**

Cement stabilized backfill shall contain aggregate, water and a minimum of 7% hydraulic cement based on the dry weight of the aggregate in accordance with TxDoT Test Method Tex-120-E, "Soil-Cement Testing. Unless directed otherwise on the Drawings, the aggregate shall be clean sand approved by the Engineer or designated representative.

G. **Controlled Low Strength Material**

Controlled low strength material (CLSM) shall conform to Standard Specification Item No. 402S, "Controlled Low Strength Material" and shall be approved by the Engineer or designated representative.

401S.4 Construction Methods

A. **Erosion Control and Tree Protection**

Prior to commencement of this work, all required erosion control and tree protection measures indicated on the Drawings shall be in place. The existing utilities shall be located and protected as specified in the Standard Contract Documents, Section 00700, "General Conditions" and/or indicated on the Drawings. A permit shall be required when utility adjustments are to be made in preparation for construction in the right-of-way, as specified in Section 5.2.0 of the City of Austin Utilities Criteria Manual.

Areas within the construction limits indicated on the Drawings shall be cleared of all trees, stumps, brush, etc., except trees or shrubs scheduled for preservation which shall be carefully trimmed as directed by the Engineer or designated representative, in accordance with Standard Specification Item No. 610S, " Preservation of Trees and Other Vegetation" and shall be protected from scarring, barking or other injuries during construction operations. All exposed cuts over 2 inches (50 millimeters) in diameter, exposed ends of pruned limbs or scarred bark shall be treated with an approved asphalt material within 24 hours of the pruning or injury.

Construction equipment shall not be operated nor construction materials stockpiled under the canopies of trees, unless otherwise indicated on the Drawings and/or specified in the Contract Documents. Excavation or embankment materials shall not be placed within the drip line of trees until tree wells are constructed.

Within the construction limits or areas indicated, all obstructions, stumps, roots, vegetation, abandoned structures, rubbish and objectionable material shall be removed to the following depths:

1. In areas to receive 6 inches (150 mm) or more embankment, a minimum of 12 inches (300 mm) below natural ground.
2. In areas to receive embankment less than 6 inches (150 mm), a minimum of 18 inches (450 mm) below the lower elevation of embankment, structure or excavation.
3. In areas to be excavated a minimum of 18 inches (450 mm) below the lower elevation of the embankment, structure or excavation.
4. In all other areas a minimum of 12 inches (300 mm) below natural ground.

When abandoned storm drains, sewers or other drainage systems are encountered they shall be removed as required to clear the new structure and plugged in a manner approved by the Engineer or designated representative.

Holes remaining after removal of all obstructions, objectionable material, trees, stumps, etc. shall be backfilled with select embankment material and compacted by approved methods. All cleared and grubbed material shall be disposed of in a manner satisfactory to the Engineer or designated representative. Unless otherwise provided, all materials as described above shall become the property of the Contractor and removed from the site and disposed of at a permitted disposal site.

Burning materials at the site shall conform to Standard Contract Document Section 01550, "Public Safety and Convenience".

B. **Excavation**

1. Excavation shall be done in accordance with the lines and depths indicated on the Drawings or as established by the Engineer or designated representative. Unless otherwise indicated on the Drawings or permitted by the Engineer or designated representative no excavation shall be made outside a vertical plane 3 feet (0.9 meter) from the footing lines and parallel thereto.

When structures are installed in streets, highways or other paved areas, the pavement and base shall be cut to neat lines. After completion of the excavation and backfilling, the pavement structure shall be restored to the satisfaction of the Engineer or designated representative.

2. Slopes, benching, sheeting, bracing, pumping and bailing shall be provided as necessary to maintain the stability and safety of excavations up to 5 feet (1.5 meters) deep. Excavation protection for excavations deeper than 5 feet (1.5 meters) shall be governed by Standard Specification Item No. 509S, "Excavation Safety Systems".
3. Excavation shall conform to elevations indicated on the Drawing or raised or lowered by written order of the Engineer or designated representative, when such alterations are judged proper. When it is deemed necessary to increase or decrease the plan depth of footings, the alterations in the details of the structure shall be as directed by the Engineer or designated representative. The Engineer or designated representative shall have the right to substitute revised details resulting from consideration of changes in the design conditions.
4. When a structure is to rest on an excavated surface other than rock, special care shall be taken not to disturb the bottom of the excavation and the final excavation to grade shall not be performed until just before the footing is placed. Equipment selected and used by the Contractor for excavation which results in disturbance of what was otherwise stable subgrade material, as shown by laboratory tests,

will not be used as a justification for payment for excavating to extra depth or for payment for stabilizing materials which may be ordered by the Engineer or designated representative.

5. Excavated material required to be used for backfill may be deposited by the Contractor in storage piles as indicated on the Drawing or at points convenient for its rehandling during the backfilling operations, subject to the approval of the Engineer or designated representative, who may require that the survey center line of the structure and the transverse or hub line of any unit of the structure be kept free of any obstruction. The Contractor shall adjust any stockpiles, to facilitate surveying and the work of other Contractors working in the immediate proximity, as directed by the Engineer or designated representative.

6. Excavated material required to be wasted shall be disposed of as directed by the Engineer or designated representative, in a manner which will not obstruct the stream or otherwise impair the efficiency or appearance of the structure or other part of the work.

7. For all single and multiple box culverts, pipe culverts, pipe arch culverts and box sewers of all types, where the soil encountered at established footing grade is a quicksand, muck or similar unstable material, the following procedure shall be used unless other methods are indicated:

    a) The depth to which unstable material is removed will be determined by the Engineer or designated representative. It will not exceed 2 feet (0.6 meter) below the footing of culverts that are 2 feet (0.6 meter) or more in height and will not exceed the height of culverts for those less than 2 feet (0.6 meter) high. Excavation shall be carried at least 1 foot (0.3 meter) horizontally beyond the limits of the structure on all sides. All unstable soil removed shall be replaced with suitable stable material, in uniform layers of suitable depth for compaction as directed by the Engineer or designated representative. Each layer shall be wetted, if necessary and compacted by rolling or tamping as required to provide a stable foundation for the structure. Soil, which has sufficient stability to properly sustain the adjacent sections of the roadway embankment, will be considered a suitable foundation material.

    b) When, in the opinion of the Engineer or designated representative, it is not feasible to construct a stable footing as outlined above, the Contractor shall construct it by the use of special materials, such as flexible base, cement stabilized base, cement stabilized rockfill or other material, as directed by the Engineer or designated representative. This work will be paid for as provided in Section 401S.9, "Payment".

8. When the material encountered at footing grade of a culvert is found to be partially rock or incompressible material and partially a compressible soil which is satisfactory for the foundation, the incompressible material shall be removed for a depth of 6 inches (150 mm) below the footing grade and backfilled with a compressible material similar to that used for the rest of the structure.

9. When the material encountered at footing grade of a bridge bent or pier is found to be partially of rock or incompressible material, and partially of a compressible material, the foundation shall not be placed until the Engineer or designated representative has inspected the footing and authorized such changes found necessary to provide an adequate foundation.

401S.5 Bridge Foundations and Retaining Walls

The material below the bottom of the footing grade shall not be disturbed. Backfill material shall not be used to compensate for excavation that is extended below the proposed footing grade. When excavation is carried below the proposed footing grade, the over excavated area shall be filled with concrete at the time the footing is placed. The additional concrete placement shall be at the Contractor's sole expense.

When required by the Engineer or designated representative, cores shall be taken to determine the character of the supporting material(s). The cores shall be taken when the excavation is nearing completion and shall be an intact sample adequate to judge the character of the founding material. The cores shall be acquired at a minimum depth of 5 feet (1.5 meters) below the proposed footing founding grade.

When the founding stratum is rock or other hard material, all loose material shall be removed and the founding grade cleaned and cut to a firm surface that is level, stepped or serrated as directed by the Engineer or designated representative. All soft seams shall be cleaned and filled with concrete at the time the footing is placed.

When the material at the footing grade of a retaining wall, bridge bent or pier is a mixture of compressible and incompressible material, the foundation shall not be placed until the Engineer or designated representative has inspected the excavation and authorized changes to provide a uniform bearing condition.

401S.6 Cofferdams

The term cofferdams, whenever used in this specification, designates any temporary or removable structure constructed to hold the surrounding earth, water or both, out of the excavation, whether the structure is formed of earth, timber, steel, concrete or a combination of these. It includes earthen dikes, timber cribs, any type of sheet piling, removable steel shells and the like and all necessary bracing and it shall be understood also to include the use of pumping wells or well points for de-watering. The cost of cofferdams, when required, shall be included as a part of the bid price for excavation.

It is the intent of this specification to require that a suitable cofferdam be provided, when necessary, to insure that the foundation may be placed in a dry condition, as to preclude sliding and caving of the walls of the excavation. The cofferdam shall conform with the requirements of Standard Specification Item No. 509S, "Excavation Safety Systems" and shall provide a safe work area with sufficient clearance for the construction, inspection and removal of required forms and, if necessary, sufficient room to allow pumping outside the forms. Where no ground or surface water is encountered, the cofferdam need be sufficient only to protect the workers and to avoid cave-ins or slides beyond the excavation limits.

Unless otherwise indicated on the Drawings, cofferdams shall be removed by the Contractor after the completion of the substructure without disturbing or marring the structure.

401S.7 De-Watering

Structures shall not be constructed or placed in the presence of water unless otherwise approved by the Engineer or designated representative. Precast members, pipe and concrete shall only be placed on a dry, firm surface. Water shall be removed by bailing, pumping, well-point installation, deep wells, underdrains or other approved method.

When structures are approved for placement in the presence of water, standing water shall be removed in a manner that shall preclude the possibility of the movement of water through or alongside any concrete being placed. Pumping or bailing will not be permitted during the placing of concrete or for a period of at least 36 hours thereafter, unless from a suitable sump separated from the concrete work by a water-tight wall.

Pumping or bailing during placement of seal concrete shall only be allowed to the extent necessary to maintain a static head of water within the cofferdam. De-watering inside a sealed cofferdam shall not commence until the seal has aged a minimum of 36 hours.

When the bottom of an excavation cannot be de-watered to the point that the subgrade is free of mud or it is difficult to keep the reinforcing steel clean a stabilizing material (e.g. flexible base, cement-stabilized-backfill or lean concrete) shall be placed in the bottom of the excavation. When a lean concrete is used, the concrete shall include a minimum of 275 Pounds of cement per cubic yard (163 kilograms of cement per cubic meter) and be

placed to a minimum depth of 3 inches (75 mm). Stabilizing material that is placed for the convenience of the Contractor will be at the Contractor's own expense.

401S.8 Backfilling

A. **General**

As soon as practicable, all portions of excavation not occupied by the permanent structure shall be backfilled. Back-fill material shall be free from stones large enough to interfere with compaction, large or frozen lumps that will not break down readily under compaction, wood or other extraneous material. Backfill material shall be approved by the Engineer or designated representative.

That portion of backfill which will support any portion of completed roadbed, retaining wall or embankment shall be placed in layers not more than 8 inches (200 mm) in depth (loose measurement) and shall be compacted to meet the density requirements of the roadbed, retaining wall, embankment material, or as indicated on the Drawings.

That portion of backfill which will not support any portion of completed roadbed or embankment shall be placed in layers not more than 10 inches (250 mm) in depth (loose measurement) and shall be compacted to a minimum of 95 percent of maximum density as determined by TxDoT Test Method Tex-114-E and the re-excavated to the proper grade and dimensions.

If the excavation has been made through a hard material resistant to erosion, the backfill around piers and in front of abutments and wings may be ordered by the Engineer or designated representative to be of stone or lean concrete. Unless otherwise indicated on the Drawings, such backfill shall be paid for as extra work.

That portion of the backfill which will support any portion of the roadbed, retaining wall or embankment shall be placed in uniform layers not more than 8 inches (200 mm) in depth (loose measurement) and shall be compacted to a minimum of 95 percent of maximum density, as determined by TxDoT Test Method Tex-114-E and then re-excavated to the proper grade and wetted uniformly to the moisture content required to obtain the specified density and shall be compacted to that density by means of mechanical tampers or rammers, except that the use of rolling equipment of the type generally used in compaction embankments will be permitted on portions which are accessible to such equipment.

All portions of embankment too close to any portion of a structure to permit compaction by the use of the blading and rolling equipment used on adjoining sections of embankment, shall be placed and compacted with mechanical tamps and rammers to avoid damage to the structure.

These provisions require mechanical compaction by means of either rolling equipment or mechanical tampers or rammers, of all backfill and embankment adjoining the barrels and wingwalls or culverts and adjoining all sides of bridge abutments and retaining walls, regardless of whether or not such embankment or backfill is above or below the original surface of the ground and regardless of whether the excavation at structure site was performed conforming to Standard Specification Item No.111S, "Excavation", this item 401S, "Structural Excavation", Standard Specification Item No. 110S, "Street Excavation" or Standard Specification Item No. 120S, "Channel Excavation". Unless otherwise indicated on the Drawings, hand tamping will not be accepted as an alternate for mechanical compaction.

As a general rule, material used in filling or backfilling the portions described in this paragraph shall be an earth, free of any appreciable amount of gravel or stone particles larger than 4 inches (100 mm) in greater dimension and of a gradation that permits thorough compaction. When, in the opinion of the Engineer or designated representative, such material is not readily available, the use of rock or gravel mixed with earth will be permitted, provided that no particles larger than 12 inches (300 mm) or smaller than 6 inches (150 mm) may be used. The percentage of fines shall be sufficient to fill all voids and insure a uniform and

thoroughly compacted mass of proper density. When required by the Drawings or by written order of the Engineer or designated representative, cement-stabilized-backfill material shall be used for backfilling.

All portions of fill and backfill described in the preceding paragraph shall be compacted to the same density requirements specified for the adjoining sections of embankment in accordance with the governing specifications. Where no embankment is involved on the project and no relevant specifications are included in the contract, all backfill shall be compacted to a density comparable with the adjacent undisturbed material.

No backfill shall be placed against any abutment or retaining wall until such structure has been in place at least 7 days. No backfill shall be placed adjacent to or over single and multiple boxes until the top slab has attained 500 psi (3450 kPa) flexural strength. Backfill placed around abutments and piers shall be deposited on both sides to approximately the same elevation at the same time.

Care shall be taken to prevent any wedging action of backfill against the structure and the slopes bounding the excavation shall be stepped or serrated to prevent such action. Backfill shall be uniformly placed around bridge foundations.

B. **Pipe Culverts**

The following requirements shall apply to the backfilling of pipe culverts in addition to the pertinent portions of the general requirements given in the preceding section.

Selected materials from excavation, borrow or other approved material shall be wetted, if required and placed along both sides of the pipe equally, in uniform layers not exceeding 8 inches (200 mm) in depth (loose measurement) and thoroughly compacted so that there shall be a berm of thoroughly compacted material on each side of the pipe. The method and degree of compaction shall be the same as specified above for portions of backfill within the limits of embankment or roadbed.

Filling and/or backfilling shall be continued in this manner to the elevation of the top of the pipe. Special care shall be taken to secure thorough compaction of the material placed under the haunches of the pipe to prevent damage or displacement of the pipe. All fill or backfill below the top of pipe shall be compacted mechanically in the manner and to the density prescribed above, regardless of whether or not such material is placed within the limits of the embankment or roadbed. In the case of pipe placed in trenches, that portion of the backfill above the top of the pipe which supports embankment or the roadbed shall receive mechanical compaction as specified above and the portion which will not support any portion of embankment or roadbed shall be placed in layers not more than 8 inches (200 mm) in depth (loose measurement) and shall be compacted by whatever means the Contractor chooses, to a density comparable with the adjacent, undisturbed material. Embankments above the top of pipe shall be placed conforming to Item No. 132S, "Embankment". During construction adequate cover must be provided to protect the structure from damage.

The Engineer or designated representative may reject backfill material that contains more than 20% by weight of material retained on a 3-in (75 mm) sieve, with large lumps not easily broken down, or that cannot be spread in loose layers. Material excavated by a trenching machine will generally meet the requirements of this Section as long as large stones are not present.

Where pipe extends beyond the toe of slope of the embankment and the depth of cover provided by backfill to the original ground level is less than the minimum required by the specifications for the type of pipe involved, additional material shall be placed and compacted until the minimum cover has been provided.

Whenever excavation is made for installing pipe culverts or box sewers across private property or beyond the limits of the embankment, the top soil removed in excavating the trench shall be kept separate and replaced as nearly as feasible in its original position and the entire area involved in the construction operations shall be restored to a presentable condition.

C. **Cement Stabilized Backfill**

When indicated on the Drawings, trenches shall be backfilled to the elevations shown with cement stabilized backfill. The cement-stabilized backfill shall be placed equally along the sides of structures to prevent strain on or displacement of the structure.

Cement stabilized backfill below the spring line of pipe culverts shall be sufficiently plastic to completely fill all voids in the trench. Hand operated tampers may be used if necessary to fill the voids. The pipe shall be held in alignment by jacks or other suitable means to prevent the mortared joints from cracking due to displacement caused by placing the backfill material.

Cement stabilized backfill above the spring line of pipe culverts may be dry enough to be transported without special mixing equipment.

On structures other than pipe culverts, special mixing equipment will not be required to transport the cement stabilized backfill unless otherwise indicated on the Drawings.

D. **Controlled Low Strength Material (CLSM)**

When indicated on the Drawings the excavation shall be backfilled with CLSM to the elevations shown. The structure shall be prevented from being displaced or "floated out" during the placement of CLSM. The CLSM shall be prevented from entering culverts and drainage structures.

401S.9 Measurement

Unless otherwise indicated on the Drawings, structural excavation for pipe headwalls, inlets, manholes, culvert widening (extensions), bridge abutments and side road and private entrance pipe culverts will not be measured in the field but shall be included in the Plan Quantity unit price bid by the cubic yard (cubic meters: 1 cubic meter is equal to 1.308 cubic yards) Determination of plan quantities for structural excavation shall be made by the method of average end-areas using the following limits to establish templates for measurement.

A. For all structures requiring measurement, except the barrels of pipe culverts, no material outside of vertical planes 1 foot (300 mm) beyond the edges of the footings and parallel thereto will be included.

B. For the barrels of pipe culverts of 42 inches (1.09 meters) or less nominal or equivalent diameter, no material outside of vertical planes 1 foot (300 mm) beyond the horizontal projection of the outside surfaces of the pipe and parallel thereto will be included. For the barrels of pipe culverts more than 42 inches (1.09 meters) in nominal or equivalent diameter, no material outside of vertical planes located 2 feet (600 mm) beyond the horizontal projection of the outside surfaces of the pipe and parallel thereto will be included.

C. If a cofferdam, as herein defined, is used, the limitations indicated above shall apply just as if no cofferdams were used.

D. Where excavation in addition to that allowed for the footings is required for other portions of the structure, such as for the cap, cross strut or tie beam of a pier or bent or for the superstructure, measurements for such additional excavation will be limited laterally by vertical planes 1 foot (300 mm) beyond the face of the member and parallel thereto and vertically to a depth of 1 foot (300 mm) below the bottom of such member.

E. Except as allowed by the above conditions, no account will be taken of any excavation necessary for placing forms or falsework.

F. Except at side road culverts, all street excavation called for on the contract drawings at all structure sites shall be assumed to be completed before starting the structural excavation and the measurement of structural excavation will include only material below or outside the limits of the completed street excavation. Excavation for side road and private entrance pipe culverts will not be measured for payment but shall be included in the unit price bid for this specification item.

G. On all structures of bridge classification where the contract drawings call for channel excavation at the structure site, it shall be assumed to have been completed before starting the structural excavation and the measurement of structural excavation will include only material below or outside the limits of the completed channel section. The method of measurement for payment will be in accordance with this procedure regardless of the actual construction methods followed.

H. Where excavation diagrams are indicated on the Drawings, they shall take precedence over these provisions.

I. Measurement will not include materials removed below footing grades to compensate for anticipated swellage due to pile driving and it will not include material required to be removed due to swellage beyond the specified limits during pile driving operations.

J. Measurement will not include additional yardage caused by slips, slides, cave-ins, siltings or fillings due to the action of the elements or the carelessness of the Contractor. Water will not be classed as excavated material.

K. Where rock, other incompressible or unstable material is undercut to provide suitable foundation for pipe or box culverts, such material below grade, ordered by the Engineer or designated representative to be removed, will be measured for payment.

L. Except for any required undercut, quantities for "Structural Excavation", as indicated on the Drawings, shall be considered as final quantities and no further measurement will be required, unless the alignment, grades or structure locations are revised by the Engineer or designated representative during construction. Final determination of quantities for individual structures will be made, if in the opinion of the Engineer or designated representative or upon evidence furnished by the Contractor, substantial variations exist between quantities indicated on the Drawings and actual quantities due to changes in cross sections or apparent errors. Excavation quantities for foundations indicated on the Drawings where cofferdams are required shall be considered as final quantities and no further measurement will be made.

M. For any footing, foundation or other structure unit within the scope of this specification, additional measurement will be made of the volume of excavation involved in the lowering or raising of the elevation of a footing, foundation or structure unit, when such grade change is authorized by the Engineer or designated representative. Measurement will be made by the addition to or the deduction from, the original quantities for the volume of excavation involved in the authorized grade change.

N. Cement stabilized backfill shall be measured by the backfill diagram as indicated on the Drawings. The quantity of "Cement Stabilized Backfill" as indicated on the Drawings shall be considered as final quantities and no further measurement will be required, unless alignment or grade elevations as indicated are revised by the Engineer or designated representative. If such revisions result in an increase or decrease in this quantity, the final quantity will be revised by the amount represented by the changes in alignment or grade elevations.

401S.10 Payment

Payment for all work prescribed under this item and measured as provided above will be made at the unit bid price per cubic yard for the particular class of excavation specified on the Drawings in the amount shown on the Drawings and in the proposal. Payment for revised quantities will be made as specified above and for the removal of unstable and incompressible material as noted below.

Payment for removal and replacement of unstable or incompressible material below the footing grades of culverts and box sewers as indicated above will be made as follows:

When indicated on the Drawings or the Engineer or designated representative directs the use of special materials such as flexible base, concretebase, cement stabilized backfill, controlled low strength material or other special material, payment for excavation below the footing grades shall be made at the unit bid price for "Unclassified Structural Excavation", "Common Structural Excavation" or "Rock Structural Excavation", as the case may be.

Payment for furnishing, hauling, placing and compacting the flexible base, concretebase, cement stabilized backfill, controlled low strength material or other special material will be made at the unit bid price for these items in the bid or in accordance with pertinent provisions for extra work.

Where special materials are not required or specified, the removal and replacement of the unstable material will be performed as described above. Payment therefore will be made at a price equal to 200 percent of the unit bid price per cubic yard for "Unclassified Structural Excavation", "Common Structural Excavation" or "Rock Structural Excavation", as the case may be. The unit bid price shall include full compensation for removing the unstable or incompressible material, for furnishing, hauling, placing and compacting suitable material required to replace it and for all labor, equipment, tools and incidentals necessary to complete the work.

Payment for "Concrete Base", "Cement Stabilized Backfill" and "Controlled Low Strength Material" measured as prescribed above shall be made at the unit bid price per cubic yard. The unit bid price shall include full compensation for furnishing all materials, tools, labor, equipment, sheathing and incidentals required to perform the applicable work prescribed herein.

When the Engineer or designated representative judges it necessary to lower the structure footings to an elevation below the grade indicated on the Drawings, payment for the "Unclassified Structural Excavation", "Common Structural Excavation" or "Rock Structural Excavation" as the case may be, required below plan grade down to and including an elevation 5 feet (1.525 meters) below drawing grade for any individual footing will be made at a unit price equal to 115 percent of the contract unit bid price. Payment for the excavation from an elevation over 5 feet (1.525 meters) below plan grade down to and including an elevation 10 feet (3.05 meters) below plan grade will be made at a unit price equal to 125 percent of the contract unit bid price for "Unclassified Structural Excavation", "Common Structural Excavation" or "Rock Structural Excavation" as the case may be. No increase in unit price will be allowed for other bid items of the contract and no additional compensation will be allowed for any required cofferdam adjustments made necessary by such lowering of footings. These provisions shall not apply to the lowering of culverts, except when the flow line grade is lowered 1 foot (300 mm) or more below plan grade.

In cases where the extra depths required for any footing or footings exceeds 10 feet (3.05 meters), a supplemental agreement shall be made covering the quantities removed from depths in excess of 10 feet (3.05 meters) below plan grade.

No direct payment will be made for filling or backfilling around structures. Payment for the backfilling and compacting of areas, which were removed as structural excavation shall be included in the unit bid prices for the various classes of structural excavation.

At the end of each estimate period, the Engineer or designated representative shall determine the completed portion of the total work under Standard Specification Item No. 401S "Structural Excavation and Backfill" and payment shall be made accordingly.

Filling or backfilling of areas above the natural ground level or above the limits of street excavation or channel excavation sections shall be considered as Standard Specification Item No. 132S, "Embankment" and payment therefore shall be included in the unit prices bid for the various classes of Standard Specification Item No. 110S, "Street Excavation", Standard Specification Item No. 120S, "Channel Excavation" or Standard Specification Item No. 130S, "Borrow".

Where no channel excavation is provided for at culvert sites and where it is necessary to excavate beyond the limits of structural excavation, as herein described in order that the culvert may function properly, such excavation shall be included with structural excavation as may be indicated on the Drawings.

Payment for all work prescribed under this item shall include full compensation for all excavation and backfill including compaction, all soundings, construction of all cofferdams, all dewatering and for furnishing all materials, labor, equipment, tools, sheathing, bracing, cofferdams, pumps, drills, explosives and incidentals necessary to complete the work, except for specific allowances stated above.

Special materials used or additional excavation made for the Contractor's convenience to expedite the work will not be paid for directly, but shall be included in the unit price bid for this specification item. In addition, if the Contractor's construction methods and equipment creates conditions necessitating usage of special materials or additional excavation, the work and materials will not be paid for directly, but shall be included in the unit price bid for this specification item.

When specified in the contract bid form as a separate pay item(s), the item(s) will be paid for at the contract unit price(s) for "Flexible Base", "Lime Stabilized Base" and "Controlled Low Strength Material". The bid prices shall include full compensation for all Work herein, specified, including the disposal of all material not required in the Work, the furnishing of all material, equipment, tools, labor and incidentals necessary to complete the Work.

Payment will be made under one of the following:

Pay Item No. 401S-A:	Unclassified Structural Excavation, Plan Quantity	Per Cubic Yard.
Pay Item No. 401S-B:	Common Structural Excavation	Per Cubic Yard.
Pay Item No. 401S-C:	Rock Structural Excavation	Per Cubic Yard.
Pay Item No. 401S-D:	Concrete Base	Per Cubic Yard.
Pay Item No. 401S-E:	Cement Stabilized Backfill	Per Cubic Yard.
Pay Item No. 401S-F:	Flexible Base	Per Cubic Yard.
Pay Item No. 401S-G:	Lime Stabilized Base	Per Square Yard.
Pay Item No. 401S-H:	Controlled Low Strength Material	Per Cubic Yard.
Pay Item No. 401S-I:	Cofferdams, type	Per Cubic Yard.
Pay Item No. 401S-J:	Dewatering	Per Cubic Yard.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Standard Specification Item 401S, "Structural Excavation and Backfill"	
City of Austin Standard Contract Documents	
Designation	Description
Section 00700	General Conditions
Section 01550	Public Safety and Convenience
City of Austin Utilities Criteria Manual	
Designation	Description
Section 5.2.0	Permit Information and Format
City of Austin Standard Specification Items	
Designation	Description
Item No. 110S	Street Excavation
Item No. 111S	Excavation
Item No. 120S	Channel Excavation
Item No. 130S	Borrow
Item No. 132S	Embankments
Item No. 202S	Hydrated Lime and Lime Slurry
Item No. 203S	Lime Treatment for Materials in Place
Item No. 210S	Flexible Base
Item No. 302S	Aggregates for Surface Treatments
Item No. 402S	Controlled Low Strength Material

Item No. 403S	Concrete for Structures
Item No. 509S	Excavation Safety Systems
Item No. 610S	Preservation of Trees and Other Vegetation
Texas Department of Transportation: Departmental Material Specifications	
Designation	Description
DMS-4640	Chemical Admixtures for Concrete
American Society for Testing and Materials, ASTM	
Designation	Description
ASTM C 33	Specification For Concrete Aggregates
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
Tex-114-E	Laboratory Compaction Characteristics & Moisture-Density Relationship of Subgrade & Embankment Soil
Tex-120-E	Soil-Cement Testing

RELATED CROSS REFERENCE MATERIALS	
Standard Specification Item 401S, "Structural Excavation and Backfill"	
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item 110	Excavation
Item 132	Embankment
Item 400	Excavation and Backfill for Structures
Item 401	Flowable Backfill
Item 402	Trench Excavation Protection
Item 403	Temporary Special Shoring
Item 421	Hydraulic Cement Concrete

ITEM NO. 402 CONTROLLED LOW STRENGTH MATERIAL 09-13-22

402.1 Description

This item governs Controlled Low Strength Material (CLSM) used for trench backfill and for filling abandoned culverts, pipes, other enclosures, and for other uses as indicated on the drawings, Standard Details or as approved by the Engineer or designated City of Austin (COA) representative. CLSM is a low strength, self-compacting, flowable, cementitious material used in lieu of soil backfill. It is intentionally prepared at low strength to allow for future removal using conventional excavation equipment.

The CLSM shall be composed of Portland cement or fly ash, or both, filler aggregate, admixtures (if needed), and water. The CLSM, specified for use in filling abandoned culverts, pipes, or other enclosures, shall contain a settlement compensator, in addition to the other ingredients, to minimize settlement of the CLSM within the enclosure.

Normal Set CLSM shall be specified whenever the material will remain uncovered or will not be subjected to traffic or other loads within 24 hours after placement. Fast Set CLSM shall be specified whenever the material will be covered, subjected to traffic or other loads within 24 hours, or needed to expedite construction.

CLSM can be used for permanent subgrade repairs below the base layer, but shall not be used for permanent pavement repairs. For temporary traffic applications, a minimum 2-inch cap composed of Hot Mix-Cold Laid Asphaltic Concrete (TxDOT Standard Specification Item 334) shall be placed on the CLSM.

Source: Rule No. R161-22.07, 9-13-2022.

402.2 Submittals.

The submittal requirements of this specification item include:

A. A mix design submittal including mix constituents and proportions, and the results of unconfined compressive strength tests, air entrainment (if applicable), flow consistency, unit weight, and timed Ball Drop and corresponding Penetrometer tests.

B. Sources, certifications and test results for the cement, fly ash, and admixtures.

C. Particle-size gradation and specific gravity tests on the filler aggregate.

Source: Rule No. R161-22.07, 9-13-2022.

402.3 Materials

A. Cement. Portland cement shall conform to ASTM C150, Type I, or ASTM C595, Type IL or IP.

Portland cement manufactured in a cement kiln fueled by hazardous waste shall be considered as an approved product if the production facility is authorized to operate under regulation of the Texas Commission on Environmental Quality (TCEQ) and the U. S. Environmental Protection Agency (EPA). Supplier shall provide current TCEQ and EPA authorizations to operate the facility.

B. Fly Ash. Fly ash shall conform to the requirements of TxDOT DMS-4610, Fly Ash.

C. Filler Aggregate. Filler aggregate shall consist of sand, stone screenings, pavement milling cuttings or other granular material that is compatible with the other mixture components. The filler aggregate shall be fine

enough to stay in suspension to the extent required for proper flow without segregation, and, in the case of filling of enclosures, for minimal settlement. Filler aggregate shall have a Plasticity Index (TxDOT Test Method Tex-106-E) less than 6 and shall conform to the following gradation:

Table 1: Aggregate Gradation	
Sieve Size	Percent Passing
⅜"	100
No. 200	0—10

Particle-size gradation shall be determined using a series of sieves that gives no fewer than five uniformly spaced points for graphing the entire range of particle sizes larger than a No. 200 sieve.

D. Mixing Water. Mixing water shall conform to the requirements of Standard Specification Item No. 403, "Concrete for Structures".

E. Settlement Compensator. An air entraining admixture with a higher than usual dosage, which meets the requirements of Standard Specification Item No. 405, "Concrete Admixtures", shall be used as a settlement compensator. The settlement compensator may be introduced to the CLSM at the job site by placement of prepackaged admixture in capsules or bags in the mixing drum in accordance with the admixture manufacturer's recommendations.

F. Chemical Admixtures. Accelerating admixtures, which meets the requirements of Standard Specification Item No. 405, "Concrete Admixtures", may be used to accelerate the rate of hardening. Chemical admixtures shall be used and proportioned in accordance with the manufacturer's recommendations.

Source: Rule No. R161-22.07, 9-13-2022.

402.4 Mix Design

The proportioning of CLSM shall be the responsibility of the Contractor. The Contractor shall furnish a mix design conforming to the requirements herein, for review and acceptance by the Engineer or designated COA representative. The mix design shall be prepared by an accredited laboratory and then reviewed and signed by a registered Professional Engineer licensed in the State of Texas.

Test results for unconfined compressive strength, air entrainment, flow consistency, and unit weight shall meet the requirements of Table 2, unless otherwise shown on the plans or specified by the Engineer or designated COA representative.

Table 2: CLSM Mix Design Requirements			
Property	Normal Set CLSM	Fast Set CLSM	Test Method
Unconfined Compressive Strength, 3 hours, psi	—	35 minimum	ASTM D4832
Unconfined Compressive Strength, 24 hours, psi	35 minimum	—	
Unconfined Compressive Strength, 28 days, psi	300 maximum	300 maximum	
Air Content (%)	15 to 25		ASTM D6023
Flow Consistency[1, 2], min. in.	8		ASTM D6103
Unit Weight, pcf	90 to 125		ASTM D6023

Notes:

1. Average diameter of spread.
2. Mixture must not segregate.

The submittal shall include Penetrometer tests (ASTM D6024) performed every thirty minutes until the Ball Drop test shows a 2-inch indentation, as well as the predicted Penetrometer reading that corresponds to a 3-inch Ball Drop indentation.

The Contractor shall perform the work required to substantiate the design at no cost to the City, including all testing. Approved mix designs shall be valid for one year, provided there are no changes in the type, source, or characteristics of the materials during that year.

At the end of one year, the mix design may be submitted for renewal, provided that:

A. field tests of the CLSM during the year have been satisfactory,

B. there have been no changes in type or source of the materials of the mix, and

C. the characteristics of the materials have not changed significantly since the original submittal.

The Contractor shall also submit certifications and test results for the cement, fly ash and admixtures, and particle-size gradation and specific gravity test results for the filler aggregate. The Contractor shall compare results of tests made on the filler aggregate at the end of the year to the results of tests reported in the original submittal. Gradation changes less than ten percent in percent passing any sieve and specific gravity changes less than five percent shall not be considered significant.

Source: Rule No. R161-22.07, 9-13-2022.

402.5 Field Strength Tests

Ball Drop or Penetrometer tests shall be used to determine, when the CLSM has developed sufficient strength to be covered or subjected to traffic or other loads as approved by the Engineer or designated COA representative.

An indentation diameter of three inches or less, and the absence of a sheen or any visible surface water in the indentation area shall indicate that the CLSM has achieved the desired strength. Because trench width and depth may affect the test results, the Contractor may perform this test on a control sample of CLSM in a two-foot square by six-inch deep container.

Penetrometer tests using a hand-held, spring reaction-type device commonly called a concrete pocket penetrometer, shall be performed on the surface of the CLSM. A Penetrometer reading, equal to or greater than the value established in the mix design (Section 402.4) for a Ball Drop test indentation of 3-inches, shall indicate that the CLSM has achieved the desired strength.

Source: Rule No. R161-22.07, 9-13-2022.

402.6 Delivery Tickets

Delivery tickets shall contain the following information:

1. Project designation.
2. Date and time of batch.
3. Mix design designation and quantity of CLSM.
4. Actual batch proportions.

5. Moisture content of aggregate.

A copy of ticket shall be provided to COA inspector in the field at the time of delivery. Any item missing or incomplete on ticket may cause rejection of CLSM.

Source: Rule No. R161-22.07, 9-13-2022.

402.7 Construction Methods

A. General. The height of free fall placement of the CLSM shall not exceed four feet. Since CLSM is considered to be self-compacting, a vibrator shall not be allowed. The CLSM shall not be covered with any overlying materials or subjected to traffic or other loads until the Ball Drop test, or the Penetrometer test shows acceptable results (Section 402.5) or until the CLSM has been in place a minimum of 24 hours for Normal Set CLSM and a minimum of 3 hours for Fast Set CLSM. Curing of the CLSM will not be required.

B. Utility Line Backfill. After the utility pipe has been placed and the proper bedding material placed in accordance with the details on the drawings, the trench may be immediately backfilled with the CLSM to the subgrade level shown on the drawings, Standard Details 1100S-6A, B, C & D, 430S-4, 511S-13A and 511S-13B or as directed by the Engineer or designated COA representative.

C. Culvert Backfill. Care shall be taken to prevent movement of the structure. If the pipe or structure moves either horizontally or vertically, the CLSM and the structure shall be immediately removed, and the pipe or structure re-laid to proper line and grade.

D. Other Backfill. CLSM may be used for backfill material in lieu of soil as shown on the drawings, Standard Details or as approved by the Engineer or designated COA representative.

E. Filling Abandoned Culverts, Pipe, or other Enclosures. The CLSM shall be placed in a manner that allows all air or water, or both, to be displaced readily as the CLSM fills the enclosure.

Source: Rule No. R161-22.07, 9-13-2022.

402.8 Acceptance Testing During Construction

The Engineer or designated COA representative may perform flow consistency, air entrainment, and unconfined compressive strength tests to determine if the CLSM meets the specification requirements. The number and frequency of acceptance tests will be determined by the Engineer or designated COA representative.

Source: Rule No. R161-22.07, 9-13-2022.

402.9 Measurement and Payment

The work and materials presented herein will generally not be paid for directly, but shall be included in the unit price bid for the item of construction in which this item is used.

When specified in the contract bid form as a separate pay item, the item will be paid for at the contract unit bid price(s) for "Controlled Low Strength Material". The bid prices shall include full compensation for all Work herein specified, including the furnishing of all materials, equipment, tools, labor, and incidentals necessary to complete the Work.

Payment will be made under the following:

Pay Item No. 402-A:	Controlled Low Strength Material	Per Cubic Yard

End

SPECIFIC CROSS REFERENCE MATERIALS	
Standard Specification Item 402, "Controlled Low Strength Material"	
City of Austin Standard Details	
Designation	Description
430S-4	Concrete Backfill Under Curb & Gutter
506-AW-04	Large Diameter Cleanout
506S-15	Abandoned Manhole
506S-15A	Abandoned Line at Active Manhole
511-AW-01	Typical Gate Valve 4"—16"
511-AW-04	Air Release and Air/Vacuum Valve
1100S-2	Flexible Base with Asphalt Surface Trench Repair - Existing Pavement
1100S-3	Asphalt Overlay of Reinforced and Non-Reinforced PC PVT - Trench Repair
1100S-3A	Asphalt Overlay of Non-Reinforced PC Pavement - Trench Repair
1100S-4	Temporary Trench Repair - Asphalt Surface
1100S-5	Full Depth Asphaltic Concrete Pavement Trench Repair
1100S-6B	Excavation Parallel to the Curb
1100S-6D	Transverse Excavations
1100S-8A	Traffic Lane Replacement for Outer Lane Excavations
1100S-8B	Traffic Lane Replacement for Interior Lane Excavations
City of Austin Standard Specification Items	
Designation	Description
Item No 403S	Concrete for Structures
Item No 405S	Concrete Admixtures
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item No. 334	Hot-Mix-Cold-Laid Asphaltic Concrete Pavement
Texas Department of Transportation: Departmental Material Specifications	
Designation	Description
DMS-4610	Fly Ash

RELATED CROSS REFERENCE MATERIALS	
Standard Specification Item 402, "Controlled Low Strength Material"	
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
Tex-106-E	Method Of Calculating the Plasticity Index of Soils
American Society for Testing and Materials (ASTM)	
Designation	Description
ASTM C150	Portland Cement
ASTM C595	Blended Hydraulic Cements
ASTM D4832	Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders
ASTM D6023	Density (Unit Weight), Yield, Cement Content, and Air Content (Gravimetric) of Controlled Low-Strength Material (CLSM)
ASTM D6024	Ball Drop on Controlled Low Strength Material (CLSM) to Determine Suitability for Load Application

ASTM D6103	Flow Consistency of Controlled Low Strength Material (CLSM)
City of Austin Standard Specification Items	
Designation	Description
Item No. 506S	Manholes
Item No. 510	Pipe

Source: Rule No. R161-22.07, 9-13-2022.

ITEM NO. 403 CONCRETE FOR STRUCTURES 04-14-25

403.1 Description

This item shall govern quality, storage, handling, proportioning and mixing of materials for hydraulic cement concrete construction of buildings, bridges, culverts, slabs, prestressed concrete and incidental appurtenances.

Source: Rule No. R161-25.04, 4-14-25.

403.2 Submittals

The submittal requirements of this specification item may include:

A. Mix design option(s) of the class of concrete required on the project,

B. The supplier of the concrete mix design(s) and type of mixing equipment, and

C. Type of admixtures to be used with the concrete mixes.

Source: Rule No. R161-25.04, 4-14-25.

403.3 Materials

Concrete shall be composed of hydraulic cement or hydraulic cement and supplementary cementing materials, water, aggregates (fine and coarse), and admixtures proportioned and mixed as hereinafter provided to achieve specified results.

A. Cementitious Materials

Hydraulic cement shall conform to ASTM C 150, Type I (General Purpose), Type II (General Purpose with Moderate Sulfate Resistance) and Type III (High Early Strength). Type I shall be used when none is specified or indicated on the drawings. Type I and Type III cements shall not be used when a Type II cement is specified or indicated on the drawings. Type III cement may be used in lieu of a Type I cement, when the anticipated air temperature for the succeeding 12 hours will not exceed 60°F (15.6°C). A Type III cement shall only be used in precast concrete or when otherwise specified or allowed. All cement shall be of the same type and from the same source for a monolithic placement.

Unless otherwise specified the cementitious material content shall be limited to no more than 700 lbs. per cubic yard. When supplementary cementing materials are used, cement is defined as "cement plus supplementary cementing material." Supplementary cementing materials include fly ash (DMS 4610), ultra-fine fly ash (DMS-4610), ground granulated blast furnace slag grade 100 or 120 (DMS-4620), silica fume (DMS-4630) and metakaolin (DMS-4635).

Supplementary cementing materials shall not be used when white hydraulic cement is specified.

Class C fly ash shall not be used in sulfate-resistant concrete.

Hydraulic cement manufactured in a cement kiln fueled by hazardous waste shall be considered as an approved product if the production facility is authorized to operate under regulation of the Texas Commission on Environmental Quality (TCEQ) and the U.S. Environmental Protection Agency (EPA). Supplier shall provide current TNRCC and EPA authorizations to operate the facility.

When sulfate-resistant concrete is required for a project, mix design options 1, 2, 3 or 4 presented in Section 403.8, "Mix Design Options" shall be used to develop appropriate mix design utilizing Type I/II, II, V, IP or IS cement.

B. Mixing Water

Water for use in concrete and for curing shall be potable water free of oils, acids, organic matter or other deleterious substances and shall not contain more than 1,000 parts per million of chlorides as Cl or sulfates as SO4.

Water from the City of Austin will not require testing. Contractor may request approval of water from other sources. Contractor shall arrange for samples to be taken from the source and tested at the Contractor's expense. When water from other sources is proposed, test reports shall be provided that indicates compliance with Table 1 before use.

Table 1: Chemical Limits for Mix Water

Contaminant	Test Method	Maximum Concentration (ppm)
Chloride (CL) Prestressed concrete Bridge decks & superstructure All other concrete	ASTM D-512	 500 500 1,000
Sulfate (SO_4)	ASTM D-516	1,000
Alkalies ($NA_2O + 0.658\ K_2O$)	ASTM D-4191 & D-4192	600
Total Solids	AASHTO T-26	50,000

Water that has an adverse effect on the air-entraining agent or any other chemical admixture or on strength or time of set of the concrete shall not be used. Water used in white Portland cement concrete shall be free from iron and other impurities, which may cause staining, or discoloration.

C. Coarse Aggregate

Coarse aggregate shall consist of durable particles of crushed or uncrushed gravel, crushed blast furnace slag, crushed stone or combinations thereof; free from frozen material or injurious amounts of salt, alkali, vegetable matter or other objectionable material either free or as an adherent coating. When white hydraulic cement is specified, the coarse aggregates used in the concrete shall be light colored. Quality shall be reasonably uniform throughout.

The coarse aggregate from each source shall not contain more than 0.25 percent by weight of clay lumps, nor more than 1.0 percent by weight of shale nor more than 5 percent by weight of laminated and/or friable particles when tested in accordance with TXDOT Test Method TEX-413-A. The coarse aggregate from each source shall have a wear of not more than 40 percent when tested in accordance with TXDOT Test Method TEX-410-A.

Unless otherwise indicated on the drawings, the coarse aggregate from each source shall be subjected to 5 cycles of the soundness test conforming to TXDOT Test Method TEX-411-A. The loss shall not be greater than 12 percent when sodium sulfate is used or 18 percent when magnesium sulfate is used.

Coarse aggregate shall be washed. The Loss by Decantation (TXDOT Test Method TEX-406-A), plus allowable weight of clay lumps, shall not exceed 1 percent or the value indicated on the drawings or in the project manual, whichever is less. If material finer than the #200 sieve is definitely established to be dust of fracture of aggregates made primarily from crushing of stone, essentially free from clay or shale as established by Part III of TXDOT Test Method TEX-406-A, the percent may be increased to 1.5. When crushed limestone coarse aggregate is used in concrete pavements, the decant may exceed 1% but not more than 3% if the

material finer than the #200 sieve is determined to be at least 67% calcium carbonate in accordance with TxDoT Test Method Tex-406-A, Part III.

The coarse aggregate factor may not be more than 0.82; however, when voids in the coarse aggregate exceed 48 percent of the total rodded volume, the coarse aggregate factor shall not exceed 0.85. The coarse aggregate factor may not be less than 0.68 except for a Class I machine extruded mix that shall not have a coarse aggregate factor lower than 0.61.

When exposed aggregate surfaces are required, the coarse aggregate shall consist of particles with at least 40 percent crushed faces. Uncrushed gravel, polished aggregates and clear resilient coatings are not acceptable for exposed aggregate finishes.

When tested by approved methods, the coarse aggregate including combinations of aggregates when used, shall conform to the grading requirements shown in Table 2.

Table 2: Coarse Aggregate Gradation Chart (Percent Passing)

Grade	Nom. Size	2½"	2"	1½"	1"	¾"	½"	⅜"	No. 4	No. 8
1	2"	100	80—100	50—85		20—40			0—5	
2 (467)*	1½"		100	95—100		35—70		10—30	0—5	
3	1"		100	95—100		60—90	25—60		0—5	
4 (57)*	1"			100	95—100		25—60		0—10	0—5
5 (67)*	¾"				100	90—100		20—55	0—10	0—5
6 (7)*	½"					100	90—100	40—70	0—15	0—5
7	⅜"						100	70—95	0—25	
8	⅜"						100	95—100	20—65	0—10

Notes:

1. Recycled crushed concrete fine aggregate shall be limited to a maximum of 20% of the fine aggregate.
2. The use of recycled crushed hydraulic cement concrete as a coarse aggregate shall be limited to Concrete Classes A, B and D (see Table 5).

D. Fine Aggregate

Fine aggregate shall be washed and consist of clean, hard, durable and uncoated particles of natural or manufactured sand or a combination thereof, with or without a mineral filler. When white hydraulic cement is specified, the fine aggregates used in the concrete shall be light colored. Quality shall be reasonably uniform throughout. It shall be free from frozen material or injurious amounts of salt, alkali, vegetable matter or other objectionable material and it shall not contain more than 0.5 percent by weight of clay lumps in accordance with TEX-413-A. When subjected to color test for organic impurities per TXDOT Test Method TEX-408-A, it shall not show a color darker than standard.

Unless indicated otherwise on the drawings the acid insoluble residue of fine aggregate used in slab concrete subject to direct traffic shall not be less than 60 percent by weight (mass) when tested conforming to TXDOT Test Method TEX-612-J.

Unless indicated otherwise on the Drawings, fine aggregate shall be blended, when necessary, to meet the acid insoluble residue requirement.

When blending the following equation shall be used:

Acid Insoluble (%) = {(A1)(P1)+(A2)(P2)}/100

Where:

A1 = acid insoluble (%) of aggregate 1,

A2 = acid insoluble (%) of aggregate 2,

P1 = % by weight of A1 of the fine aggregate blend, and

P2 = % by weight of A2 of the fine aggregate blend.

When tested in accordance with TxDoT Test Method Tex-401-A, the fine aggregate, including mineral filler and combinations of aggregates, when used, shall conform to the grading requirements shown in Table 3.

Table 3: Fine Aggregate Gradation Chart[1](Grade 1 - Percent Passing)							
⅜	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200
100	95—100	80—100	50—85	25—65	10—351	0—10	0—32

Notes:

1. Recycled crushed concrete fine aggregate shall be limited to a maximum of 20% of the fine aggregate.
2. The use of recycled crushed hydraulic cement concrete as a fine aggregate shall be limited to Concrete Classes A, B and D (see Table 5).
3. 6 to 35 when sand equivalent value is greater than 85.
4. 0 to 6 for manufactured sand.

Sand equivalent per TXDOT Test Method TEX-203-F shall not be less than 80 nor less than otherwise indicated on the drawings, whichever is greater.

The fineness modulus will be determined by adding the percentages by weight retained on sieve Nos. 4, 8, 16, 30, 50 and 100 and dividing the sum of the six sieves by 100. For all classes of concrete except K (see Table 5), the fineness modulus shall be between 2.30 and 3.10. For Class K concrete, the fineness modulus shall be between 2.40 and 2.90, unless indicated otherwise on the Drawings.

E. Mineral Filler

Mineral filler shall consist of stone dust, clean crushed sand or other approved inert material. When tested in accordance with TxDoT Test Method Tex-401-A, it shall conform to the following gradation:

Passing the No. 30 Sieve	100 percent
Passing the No. 200 Sieve	65 to 100 percent

F. Mortar and Grout

Unless otherwise specified, indicated on the drawings or approved by the Engineer or designated representative mortar and grout shall consist of 1 part cement, 2 parts finely graded sand and enough water

to make the mixture plastic. When required to prevent color difference, white cement shall be added to produce color required. When required by the Engineer or designated representative, approved latex adhesive may be added to the mortar. Mortar shall be provided with a consistency such that the mortar can be easily handled and spread by trowel. Grout shall be provided of a consistency that will flow into and completely fill all voids.

G. Admixtures

All chemical admixtures including water reducing, placticizers and air entrainment shall conform to TxDoT DMS-4640, "Chemical Admixtures for Concrete". Calcium chloride-based admixtures shall not be approved. Admixtures shall be included in the prequalified concrete admixtures list maintained by TxDot's Construction Division. High-range water-reducing admixtures (TxDoT Type F or G) and accelerating admixtures (TxDoT Type C or E) shall not be used in bridge deck concrete.

H. Air Entrainment

Unless indicated otherwise on the drawings, all concrete classes with the exception of Class B shall be air entrained in accordance with Table 8. If the air content is more than 1½ percentage points below or 3 percentage points above the required air, the load of concrete will be rejected. If the air content is more than 1½ but less than 3 percentage points above the required air, the concrete may be accepted based on strength test results.

Source: Rule No. R161-25.04, 4-14-25.

403.4 Storage of Materials

A. Cement, Supplementary Cementing Materials and Mineral Filler

All cement, supplementary cementing materials and mineral filler shall be stored in separate and well ventilated, weatherproof buildings or approved bins, which will protect the material from dampness or absorption of moisture. Storage facilities shall be easily accessible and each shipment of packaged cement shall be kept separated to provide for identification and inspection. The Engineer or designated representative may permit small quantities of sacked cement to be stored in the open for a maximum of 48 hours on a raised platform and under waterproof covering.

B. Aggregates

The method of handling and storing concrete aggregates shall prevent contamination with foreign materials. If the aggregates are stored on the ground, the sites for the stockpiles shall be clear of all vegetation and shall be level. Aggregates shall be stockpiled in sizes to facilitate blending. If the aggregate is not stockpiled on a hard, non-contaminant base, the bottom 6-inch layer of the stockpile shall not be used without recleaning the aggregate.

When conditions require the use of 2 or more grades of coarse aggregates, separate stockpiles shall be maintained to prevent intermixing. Where space is limited, stockpiles shall be separated by walls or other appropriate barriers.

Aggregate shall be stockpiled and protected from the weather a minimum of 24 hours prior to use to minimize free moisture content. When stockpiles are too large to protect from the weather, accurate and continuous means acceptable to the Engineer or designated representative shall be provided to monitor aggregate temperature and moisture. Aggregates shall be stockpiled and handled such that segregation and contamination are minimized.

The stockpiles shall be sprinkled to control moisture and temperature as necessary. A reasonably uniform moisture content shall be maintained in aggregate stockpiles.

C. Admixtures

Admixtures shall be stored in accordance with manufacturer's recommendations and shall be protected against freezing.

D. Hot Weather Concrete Mixes

Ice may be used during hot weather concrete placement (Section 13 of Standard Specification Item No. 410S, "Concrete Structures") to lower the concrete temperature; however, the Contractor shall furnish a mix design acceptable to the Engineer or designated representative for class of concrete specified. The addition of ice shall not exceed 50% of the total mix water weight.

Source: Rule No. R161-25.04, 4-14-25.

403.5 Measurement of Materials

Water shall be accurately metered. Fine and coarse aggregates, mineral filler, bulk cement and fly ash shall be weighed separately. Allowances shall be made in the water volume and aggregate weights during batching for moisture content of aggregates and admixtures. Volumetric and weight measuring devices shall be acceptable to the Engineer or designated representative. Measurement of materials in non-volumetric and volumetric mixers shall conform to Section 421.4.D of TxDot Specification Item 421, "Hydraulic Cement Concrete".

Batch weighing of sacked cement is not required; however, bags, individually and entire shipments, may not vary by more than 3 percent from the specified weight of 94 pounds per bag. The average bag weight of a shipment shall be determined by weighing 50 bags taken at random.

Source: Rule No. R161-25.04, 4-14-25.

403.6 Mix Design

The Contractor shall furnish a mix design acceptable to the Engineer or designated representative for the class of concrete required in accordance with Table 5. The mix shall be designed by a qualified commercial laboratory and signed/sealed by a registered Professional Engineer, licensed in the State of Texas to conform with requirements contained herein, to ACI 211.1 or TXDOT Bulletin C-11 (and supplements thereto). The maximum water-to-cementitious material ratio identified in Table 5 for specific classes of concrete shall not be exceeded.

A higher-strength class of concrete with equal or lower water-to-cementituous-material ratio may be substituted for the specified class of concrete.

The mix design shall be over-designed in accordance with Table 5 in order to account for production variability and to ensure minimum compressive strength requirements are met.

Allowable mix design options are presented in Section 403.8.

The Contractor shall perform, at the Contractor's expense, the work required to substantiate the design, including testing of strength specimens. Complete concrete design data shall be submitted to the Engineer or designated representative for approval. The mix design will be valid for a period of one (1) year provided that there are no changes to the component materials.

When there are changes in aggregates or in type, brand or source of cement, supplementary cementing material or chemical admixtures, the mix shall be evaluated as a new mix design. A change in vendor does not necessarily constitute a change in materials or source. When only the brand or source of cement is changed and there is a prior record of satisfactory performance of the cement with the ingredients, the submittal of new trial batches may be waived by the Engineer or designated representative.

At the end of one (1) year, a previously approved mix may be resubmitted for approval if it can be shown that no substantial change in the component materials has occurred and that test results confirming the adequacy of the mix designs have been acquired during the previous year. The resubmittal analysis must be reviewed, signed and sealed by a registered Professional Engineer, licensed in the State of Texas. This resubmittal shall include a reanalysis of specific gravity, absorption, fineness modulus, sand equivalent, soundness, wear and unit weights of the aggregates. Provided that the fineness modulus did not deviate by more than 0.20 or that the re-proportioned total mixing water, aggregate and cement (or cement plus fly ash) are within 1, 2, and 3 percent, respectively, of pre-approved quantities, a one-year extension on the approval of the mix may be granted by the Engineer or designated representative. Updated cement, fly ash, and admixture certifications shall accompany the resubmittal.

Approved admixtures that are included in the prequalified concrete admixtures list maintained by TxDot's Construction Division may be used with all classes of concrete at the option of the Contractor provided that specific requirements of the governing concrete structure specification are met. Water reducing and retarding agents shall be required for hot weather, large mass, and continuous slab placements. Air entraining agents may be used in all mixes but must be used in the classes indicated on Table 5. Unless approved by the Engineer or designated representative, mix designs shall not exceed air contents for extreme exposure conditions as recommended by ACI 211.1 for the various aggregate grades.

Source: Rule No. R161-25.04, 4-14-25.

403.7 Consistency and Quality of Concrete

Concrete shall be workable, cohesive, possess satisfactory finishing qualities and of stiffest consistency that can be placed and vibrated into a homogeneous mass within slump requirements specified in Table 4 without the development of segregation or honeycombing. No concrete will be permitted with a slump in excess of the maximums shown unless water-reducing admixtures have been previously approved. Concrete that exceeds the maximum acceptable placement slump at time of delivery will be rejected. Slump values shall be conducted in accordance with TXDOT Test Method TEX-415-A.

Consistency and quality of concrete should allow efficient placement and completion of finishing operations before initial set. Re-tempering (i.e. addition of water and reworking concrete after initial set) shall not be allowed. When field conditions are such that additional moisture is needed for final concrete surface finishing operation, the required water shall be applied to surface by fog spray only and shall be held to a minimum. Excessive bleeding shall be avoided and in no case will it be permissible to expedite finishing and drying by sprinkling the surface with cement powder.

Table 4: Slump Requirements

	Slump[1], inches	
Type of Construction	**Maximum**	**Minimum**
Cased Drilled Shafts	4	3
Reinforced Foundation Caissons and Footings	3	1
Reinforced Footings and Substructure Walls	3	1
Uncased Drilled Shafts	6	5
Thin-walled Sections; 9 inches (225 mm) or less	6½	4
Prestressed Concrete Members[1]	6½	4
Precast Drainage Structures	6	4
Wall Sections over 9 inches (225 mm)	5	3
Reinforced Building Slabs, Beams, Columns and Walls	4	1
Bridge Decks	4	2
Pavements, Fixed-form	6½	4
Pavements, Slip-form	3	1½

Sidewalks, Driveways and Slabs on Ground	4	2
Curb & Gutter, Hand-vibrated	3	1
Curb & Gutter, Hand-tamped or spaded	4	2
Curb & Gutter, Slip-form/extrusion machine	2	½
Heavy Mass Construction	2	1
High Strength Concrete	4	3
Riprap and Other Miscellaneous Concrete	6	1
Under Water or Seal Concrete	8½	6

1. Slump values when a high range water reducer (HRWR) is not used.
2. When a high range water reducer (HRWR) is used, maximum acceptable placement slump will be 9 in.

During progress of the work, the Engineer or designated representative shall cast test cylinders as a check on compressive strength of concrete actually placed. The Engineer or designated representative will perform slump tests, entrained air tests and temperature checks to ensure compliance with specifications.

Proportioning of all material components shall be checked prior to discharging. Excluding mortar material for pre-coating of the mixer drum [see section 403.8.B] and adjustment for moisture content of admixtures and aggregates, material components shall fall within the range of + 1% for water, + 2% for aggregates, + 3% for cement, + 2% for fly ash and within manufacturer recommended dosage rates for admixtures except that air entrainment shall be within + 1½ percentage points of the mix design requirements.

Unless otherwise specified or indicated on the drawings, concrete mix temperature shall not exceed 90°F except in mixes with high range water reducers where a maximum mix temperature of 100°F will be allowed. Cooling an otherwise acceptable mix by addition of water or ice during agitation will not be allowed.

Test cylinders will be required for small placements such as manholes, inlets, culverts, wing walls, etc. The Engineer or designated representative will determine number of tests to a minimum of 1 for each 25 cubic yards placed over a several day period.

Test cylinders shall be required for each monolithic placement of bridge decks or superstructures, top slabs of direct traffic culverts, cased drilled shafts, structural beams and as otherwise directed by Engineer or designated representative for design strength confirmation or early form removal. Test cylinders made for early form removal or for consideration of use of structure will be at Contractor's expense, except when required by Engineer or designated representative.

A strength test shall be defined as the average breaking strength of 2 cylinders. A minimum of four test cylinders shall be prepared; two each to be tested at 7 and 28 days. Specimens will be tested conforming to TXDOT Test Method TEX-418-A. If required strength or consistency of class of concrete being produced cannot be secured with minimum cementitious material specified or without exceeding maximum water/cementitious material ratio, Contractor will be required to furnish different aggregates, use a water reducing agent, an air entraining agent or increase the cement content in order to provide concrete meeting these specifications.

Slump tests will be performed in accordance with TxDoT Test Method Tex-415-A. Entrained air tests will be performed in accordance with TxDoT Test Method Tex-416-A.

Test specimens shall be cured using the same methods and under the same conditions as the concrete represented. Design strength cylinders shall be cured conforming to TXDOT Bulletin C-11 (and supplements thereto).

Concrete quality is by 28-day compressive tests, job control testing will be by 7-day compressive strength tests. Should the concrete fail to meet the 28-day required strength, the tolerance for acceptance shall follow ACI 301 and be acceptable to the Engineer of Record. The minimum strength requirement for seven (7) day test will be 70

percent of the specified minimum 28-day compressive strength. If the required 7-day strength is not secured the Engineer shall be notified within 3 days to determine how to proceed.

Table 5: Classes of Concrete						
Class	Cement Sks Per CY	Minimum Strength, psi (MPa)		Maximum W/C Ratio[1]	Coarse Aggr. Grade[2,3,4]	Air Entrain.
		28 Days	7 Days			
A	5.0	3000	2100	0.6	1,2,3,4,8	Yes
B	4.0	2000	1400	0.6	2,3,4,5,6,7	No
C[5]	6.0	3600	2520	0.45	1,2,3,4,5,6	Yes
D	4.5	2500	1750	0.6	2,3,4,5,6,7	No
H[5]	6.0	As indicated	As Indicated	0.45	3,4,5,6	Yes
I	5.5	3500	2450	0.45	2,3,4,5	Yes
J	2.0	800	560	N/A	2,3,4,5	No
S[5]	6.0	4000	2800	0.45	2,3,4,5	Yes

Notes:

1. Maximum water-cement or water-cementitious ratio by weight.
2. Unless otherwise allowed, Grade 1 coarse aggregate shall only be used in massive foundations with 4-in minimum clear spacing between reinforcing steel bars.
3. Grade 1 coarse aggregate grading shall not be used in drilled shafts.
4. Unless otherwise allowed, Grade 8 coarse aggregate shall be used in extruded curbs.
5. Structural concrete classes. Concrete from volumetric concrete trucks is not allowed for City of Austin structural concrete classes.
6. When Type II cement is used in Class C, S or A concrete, the 7-day compressive strength requirement will be 2310 psi for Class C, 2570 psi for Class S and 1925 psi for Class A minimum.

Table 6: Over Design Required to Meet Compressive Strength Requirements[1]					
Number Of Tests[2,3]	**Standard Deviation, psi**				
	300	400	500	600	700
15	470	620	850	1,120	1,390
20	430	580	760	1,010	1,260
30 or more	400	530	670	900	1,130

Notes:

1. When designing the mix, add the tabulated amounts to the minimum design strength in Table 5. Maximum water-cement or water-cementitious ratio by weight.
2. Number of tests of a concrete mixture used to estimate the standard deviation of a concrete production facility. Test of another mix within 1,000 psi of the specified strength may be used.
3. If less than 15 prior tests are available, the overdesign should be 1,000 psi for specified strength less than 3,000 psi, 1,200 psi for specified strengths from 3,000 to 5,000 psi and 1,400 psi for specified strengths greater than 5,000 psi.

Table 7: Expected Usage of Concrete Classes

Class	General Usage
A	Inlets, manholes, curb, gutter, curb & gutter, concrete retards, sidewalks, driveways, backup walls and anchors
B	Riprap, small roadside signs and anchors
C[5]	Drilled shafts, bridge substructure, bridge railing, culverts except top slab of direct traffic culverts, headwalls, wing walls, approach slabs, and cast-in-place concrete traffic barrier
D	Riprap
H[5]	Prestressed concrete beams, boxes, piling and precast concrete traffic barrier
J	Utility trench repair
S[5]	Bridge slabs and top slabs of direct traffic culverts

Table 8: Air Entrainment[1]		
Nominal Maximum Aggregate Size Inches	% Air Entrainment	
	Moderate Exposure	Severe Exposure
⅜ - Grades 7 & 8	6	7½
½ - Grade 6	5½	7
¾ - Grade 5	5	6
1 - Grade 4	4½	6
1½ - Grades 2 & 3	4½	5½
2 - Grade 2	4	5

1. For specified concrete strengths above 5,000 psi a reduction of 1 percentage point is allowed.

Source: Rule No. R161-22.01, 3-1-2022; Rule No. R161-25.04, 4-14-25.

403.8 Mix Design Options

For the structural concretes identified in Table 5 (Classes C, H and S) and any other class of concrete designed using more than 520 lbs. of cementitious material per cubic yard, one of the mix design options presented below shall be used.

For the non-structural concretes identified in Table 5 (Classes A, B, D and I) and any other class of concrete designed using less than 520 lbs. of cementitious material per cubic yard, one of the mix design options presented below will be used, except that Class C fly ash may be used instead of Class F fly ash for Options 1, 3 and 4 unless a sulfate-resistant concrete is required.

A. Option 1: Twenty (20) to thirty-five (35) percent of the cement may be replaced with Class F fly ash.

B. Option 2: Thirty-five (35) to fifty (50) percent of the cement may be replaced with ground granulated blast-furnace slag.

C. Option 3: Thirty-five (35) to fifty (50) percent of the cement may be replaced with a combination of Class F fly ash, ground granulated blast-furnace slag or silica fume. The combination may not include more than thirty-five (35) percent fly ash and no more than ten (10) percent silica fume.

D. Option 4: Type IP or Type IS will be used and up to ten (10) percent of the cement may be replaced with Class F fly ash, ground granulated blast-furnace slag or silica fume.

E. Option 5: Thirty-five (35) to fifty (50) percent of the cement may be replaced with a combination of Class C fly ash and at least six (6) percent of silica fume, ultra fine fly ash or metakaolin. The combination may not include more than thirty-five (35) percent fly ash and no more than ten (10) percent silica fume.

F. Option 6: A lithium nitrate admixture will be added at a minimum dosage of 0.55 gal. of thirty (30) percent lithium nitrate solution per pound of alkalis present in the hydraulic cement.

G. Option 7: When hydraulic cement only is used in the design, the total alkali contribution from the cement in the concrete does not exceed 4.0 lbs. per cubic yard, when calculated as follows:

alkali (lbs. per CY) = .01 (lbs. cement/CY) (% Na2O equivalent in cement).

where (% Na2O equivalent in cement) is assumed to be the maximum cement alkali content reported on the cement mill certificate.

H. Option 8: When there are deviations from Options 1 through 7, the following shall be performed:

1. Conduct tests on both coarse and fine aggregate separately in accordance with ASTM C 1260, using of the proposed cementitious in the same proportions of hydraulic cement to supplementary cementing material to be used in the mix.

2. Prior to use of the mix, a certified test report signed and sealed by a Professional Engineer, licensed in the State of Texas shall be submitted that demonstrates that ASTM C 1260 test results for each aggregate do not exceed 0.10 percent expansion.

Source: Rule No. R161-25.04, 4-14-25.

403.9 Mixing and Mixing Equipment

All equipment, tools and machinery used for hauling materials and performing any part of the work shall be maintained in such condition to insure completion of the work without excessive delays for repairs and replacement. Mixing shall be done in a mixer of approved type and size that will produce uniform distribution of material throughout the mass and shall be capable of producing concrete meeting requirements of ASTM C 94, Ready-mixed Concrete and these specifications. Mixing equipment shall be capable of producing sufficient concrete to provide required quantities. Entire contents of the drum shall be discharged before any materials are placed therein for a succeeding batch. Improperly mixed concrete shall not be placed in a structure. For all mixers an adequate water supply and an accurate method of measuring the water shall be provided.

The mixer may be batched by either volumetric or weight sensing equipment and shall be equipped with a suitable timing device that will lock the discharging mechanism and signal when specified time of mixing has elapsed.

A. Proportioning and Mixing Equipment

For all miscellaneous concrete placements, a mobile, continuous, volumetric mixer or a volumetric or weight batch mixer of the rotating paddle type may be used.

When approved by Engineer or designated representative in writing or when specified for use in other items, these mixers may be used for other types of concrete construction, including structural concrete, if the number of mixers furnished will supply the amount of concrete required for the particular operation in question.

These mixers shall be designed to receive all the concrete ingredients, including admixtures, required by the mix design in a continuous uniform rate and mix them to the required consistency before discharging.

For continuous volumetric mixers, the materials delivered during a revolution of the driving mechanism or in a selected interval, will be considered a batch and the proportion of each ingredient will be calculated in the same manner as for a batch type plant.

Mixing time shall conform to recommendations of manufacturer of mixer unless otherwise directed by Engineer or designated representative.

B. Ready-mixed Concrete

Use of ready-mixed concrete will be permitted provided the batching plant and mixer trucks meet quality requirements specified herein. When ready-mixed concrete is used, additional mortar (1 sack cement, 3 parts sand and sufficient water) shall be added to each batch to coat the mixer drum. Ready-mixed concrete, batching plant and mixer truck operation shall include the following:

1. A ticket system will be used that includes a copy for the Inspector. Ticket will have machine stamped time/date of concrete batch, a mix design designation, weight of cement, fly ash, sand and aggregates; exact nomenclature and written quantities of admixtures and water. Any item missing or incomplete on ticket may be cause for rejection of concrete.
2. Sufficient trucks will be available to support continuous placements. The Contractor will satisfy the Engineer or designated representative that adequate standby trucks are available to support monolithic concrete placement requirements.
3. A portion of mixing water required by the mix design to produce the specified slump may be withheld and added at the job site, but only with permission of the Engineer or designated representative and under the Inspector's observation. When water is added under these conditions, the concrete batch will be thoroughly mixed before any slump or strength samples are taken. Additional cement shall not be added at the job site to otherwise unacceptable mixes.
4. A metal plate(s) shall be attached in a prominent place on each truck mixer plainly showing the various uses for which it was designed. The data shall include the drum's speed of rotation for mixing and for agitating and the capacity for complete mixing and/or agitating only. A copy of the manufacturer's design, showing dimensions of blades, shall be available for inspection at the plant at all times. Accumulations of hardened concrete shall be removed to the satisfaction of the Engineer or designated representative.
5. The loading of the transit mixers shall not exceed capacity as shown on the manufacturer's plate attached to the mixer or 63 percent of the drum volume, whichever is the lesser volume. The loading of transit mixers to the extent of causing spill-out en route to delivery will not be acceptable. Consistent spillage will be cause for disqualification of a supplier.
6. Excess concrete remaining in the drum after delivery and wash water after delivery shall not be dumped on the project site unless approval of the dump location is first secured from the Engineer or designated representative.

C. Volumetric Batching

Use of volumetric batched concrete will be permitted provided the batching and continuous mixing operations conform to ASTM C 685, "Concrete Made By Volumetric Batching and Continuous Mixing". This type concrete shall be made from materials continuously batched by volume, mixed in a continuous mixer and delivered to the site in a freshly mixed and unhardened state. Tests and criteria for batching accuracy and mixing efficiency shall be as specified in ASTM C 685.

1. A ticket system will be used that includes a copy for the Inspector. The ticket will have machine stamped time/date of concrete batch, a mix design designation, weight of cement, fly ash, sand and aggregates; exact nomenclature and written quantities of admixtures and water. Any item missing or incomplete on ticket may be cause for rejection of concrete.
2. Each batching or mixing unit, or both, shall carry in a prominent place a metal plate or plates on which are plainly marked the gross volume of the unit in terms of mixed concrete, discharge speed and the weight-calibrated constant of the machine in terms of a revolution counter or other output indicator. The mixer shall produce a thoroughly mixed and uniform concrete.

3. The batcher-mixer unit shall contain in separate compartments all the necessary ingredients needed for the manufacture of concrete. The unit shall be equipped with calibrated proportioning devices to vary the mix proportions and it shall produce concrete as required by the Work and ASTM C 685.

D. Truck-mixed Concrete

The concrete shall be mixed in a truck mixer from 70 to 100 revolutions at the mixing speed designated by the manufacturer that will produce a uniform concrete mix. The concrete shall be delivered to the project in a thoroughly mixed and uniform mass and shall be discharged with a satisfactory degree of uniformity. Additional mixing at the job site, at the mixing speed designated by the manufacturer, may be allowed by the Engineer or designated representative as long as the concrete is discharged before the drum has revolved a total of 300 revolutions after the introduction of the mixing water to the cement and the aggregates.

Re-tempering or adding concrete chemical admixtures is only permitted at the job site when concrete is delivered in a truck mixer. Water shall not be added after introduction of mixing water at the batch plant except on arrival at the job site with approval of the Engineer or designated representative, in order to adjust the slump of the concrete. When this water is added, the mix design water-cementitious-material ratio shall not be exceeded. The drum or blades shall be turned at least 30 additional revolutions at mixing speed to ensure thorough and uniform mixing of the concrete. Water or chemical admixtures shall not be added to the batch after any concrete has been discharged.

When the concrete contains silica fume, mixing times and batching operations shall be adjusted as necessary to ensure that the material is completely and uniformly dispersed in the mix. The dispersion of the silica fume within the mix shall be verified in trial batches.

E. Hand-mixed Concrete

Hand mixing of concrete may be permitted for small placements or in case of an emergency and then only on authorization of the Engineer or designated representative. Hand-mixed batches shall not exceed a 4 cubic foot batch in volume. Material volume ratios shall not be leaner than 1 part cement, 2 parts large aggregate, 1 part fine aggregate and enough water to produce a consistent mix with a slump not to exceed 4 inches. Admixtures shall not be used unless specifically approved by the Engineer or designated representative.

Source: Rule No. R161-25.04, 4-14-25.

403.10 Excavation, Placing of Concrete, Finishing, Curing and Backfill

Excavation, placing of concrete, finishing, curing and backfill shall conform to Standard Specification Item No. 401S, "Structural Excavation and Backfill", Standard Specification Item No. 410S, "Concrete Structures" and Standard Specification Item No. 411S, "Surface Finishes for Concrete".

Source: Rule No. R161-25.04, 4-14-25.

403.11 Measurement

Where measurement of concrete for a structure is not provided by another governing pay item, measurement shall be made under this specification in accordance with the following:

The quantities of concrete of the various classifications which constitute the completed and accepted structure or structures in place will be measured by the cubic yard, each, square yard or linear foot as indicated in the Contract Documents. Measurement will be as follows:

A. General

1. Measurement based on dimensions shall be for the completed structure as measured in place. However, field-measured dimensions shall not exceed those indicated on the drawings or as may have been directed by the Engineer or designated representative in writing.
2. No deductions shall be made for chamfers less than 2 inches in depth, embedded portions of structural steel, reinforcing steel, nuts, bolts, conduits less than 5 inches in diameter, pre/post tensioning tendons, keys, water stops, weep holes and expansion joints 2 inches or less in width.
3. No measurement shall be made for concrete keys between adjoining beams or prestressed concrete planks.
4. No measurement shall be made for fill concrete between the ends or adjoining prestressed concrete planks/box beams at bent caps or between the ends of prestressed concrete planks/box beams and abutment end walls.
5. No measurement shall be made for inlet and junction box invert concrete.
6. No measurement shall be made for any additional concrete required above the normal slab thickness for camber or crown.

B. Plan Quantity. For those items measured for plan quantity payment, adequate calculations have been made. If no adjustment is required by Article 403.11, additional measurements or calculations will not be required or made.

C. Measured in Place. For those items not measured for Plan Quantity payment, measurement will be made in place, subject to the requirements of Article 403.10.A.1 above.

Source: Rule No. R161-25.04, 4-14-25.

403.12 Payment

The work performed and materials furnished as prescribed by this item and measured in accordance with the applicable provisions of "Measurement" above will be paid for as follows:

The quantity to be paid for will be that quantity indicated in the contract documents and/or shown on the drawings, regardless of errors in calculations, except as may be modified by the following.

Plan Quantities will be adjusted:

A. When a complete structure element has been erroneously included or omitted from the drawings, the quantity shown on the drawings for that element will be added to or deducted from the plan quantity and included for payment. A complete structure element will be the smallest portion of a total structure for which a quantity is included on the drawings. Quantities revised in this manner will not be subject to the provisions of the "General Conditions", Article 11.

B. When the plan quantity for a complete structure element is in error by 5 percent or more, a recalculation will be made and the corrected quantity included for payment. Quantities revised in this manner will not be subject to the provisions of the "General Conditions", Article 11.

C. When quantities are revised by a change in design, the "plan quantity" will be increased or decreased by the amount involved in the design change. Quantities revised in this manner will be subject to the provisions of the "General Conditions", Article 11.

The party to the contract requesting the adjustment shall present to the other, a copy of the description and location, together with calculations of the quantity for the structure element involved. When this quantity is certified correct by the Engineer or designated representative, it will become the revised plan quantity.

Payment for increased or decreased costs due to a change in design on those items measured as "Cubic Yard", "Each", "Square Foot", "Square Yard" or "Linear Foot" will be determined by Change Order. Quantities revised in this manner will be subject to the provisions of the "General Conditions", Article 11.

The unit prices bid for the various classes of concrete shown shall include full compensation for furnishing, hauling, and mixing all concrete material; placing, finishing and curing all concrete; all grouting, pointing and finishing; furnishing and placing drains; furnishing and placing metal flashing strips; furnishing and placing expansion joint material required by this item; and for all forms and false work, labor, tools, equipment and incidentals necessary to complete the work.

Pay Item No. 403-CY:	(Structure or Structural Component)	Per Cubic Yard.
Pay Item No. 403-EA:	(Structure or Structural Component)	Per Each.
Pay Item No. 403-SY:	(Structure or Structural Component)	Per Square Yard.
Pay Item No. 403-LF:	(Structure or Structural Component)	Per Lineal Foot.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Standard Specification Item 403, "Concrete For Structures"	
City of Austin Standard Specification Items	
Designation	Description
Item No. 401S	Structural Excavation and Backfill
Item No. 410S	Concrete Structures
Item No. 411S	Surface Finishes for Concrete
Texas Department of Transportation: Departmental Material Specifications	
Designation	Description
DMS-4640	Chemical Admixtures for Concrete
American Association of State Highway & Transportation Officials, AASHTO Standard Method of Test for	
Designation	Description
Method T 26	Quality of Water to be Used in Concrete
American Concrete Institute, ACI	
Designation	Description
ACI 211.1	Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
American Society for Testing and Materials, ASTM	
Designation	Description
ASTM C 94	Specification For Ready-Mixed Concrete
ASTM C 150	Specification For Portland Cement
ASTM C 685	Concrete Made By Volumetric Batching and Continuous Mixing
ASTM C-1260	Standard Test Method for Potential Alkali Reactivity of Aggregates
ASTM D-512	Test Methods for Chloride Ion in Water
ASTM D-516	Test Methods for Sulfate Ion in Water
ASTM D-4191	Test Method for Sodium in Water by Atomic Absorption
ASTM D-4192	Test Method for Potassium Water by Atomic Absorption

Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
TEX-203-F	Sand Equivalent Test
TEX-401-A	Sieve Analysis of Fine and Coarse Aggregate
TEX-406-A	Mineral Finer than (No. 200) Sieve in Mineral Aggregates (Decantation Test for Concrete Aggregates)
TEX-408-A	Organic Impurities in Fine Aggregate for Concrete
TEX-410-A	Abrasion of Coarse Aggregate Using The Los Angeles Machine
TEX-411-A	Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
TEX-413-A	Determination of Deleterious Materials in Mineral Aggregate
TEX-415-A	Slump of Portland Cement Concrete
TEX-416-A	Air Content of Freshly-Mixed Concrete by the Pressure Method
TEX-418-A	Compressive Strength of Cylindrical Concrete Specimens
TEX-612-J	Acid Insoluble Residue
Texas Department of Transportation: Publications	
Designation	Description
Bulletin C-11	Construction Bulletin
Texas Department of Transportation: Departmental Material Specifications	
Designation	Description
DMS-4610	Fly Ash
DMS-4620	Ground Granulated Blast-Furnace Slag
DMS-4630	Silica Fume
DMS-4635	Metakaolin

RELATED CROSS REFERENCE MATERIALS	
Standard Specification Item 403, "Concrete For Structures"	
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item 360	Concrete Pavement
Item 420	Concrete Structures
Item 421	Hydraulic Cement Concrete
Item 427	Surface Finishes for Concrete
Item 431	Pneumatically Placed Concrete
Item 520	Weighing and Measuring Equipment
Texas Department of Transportation: Departmental Material Specifications	
Designation	Description
DMS-4650	Hydraulic Cement Concrete Curing Materials and Evaporation Retardants
DMS-6100	Epoxy and Adhesives
DMS 8900	Fly Ash

Source: Rule No. R161-25.04, 4-14-25.

ITEM NO. 406S REINFORCING STEEL 9-26-12

406S.1 Description

This item shall govern furnishing and placement of reinforcing steel, deformed and smooth, of the size and quantity indicated on the drawings and in accordance with these specifications.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text and accompanying tables, the inch-pound units are given preference followed by SI units shown within parentheses.

406S.2 Submittals

The submittal requirements of this specification item may include:

A. Evidence that the steel reinforcement producer is included on the TxDoT list of approved producing mills

B. Listing of the size, grade, type and quantity of reinforcing steel proposed for the project.

C. If welding of reinforcing steel is proposed, evidence that carbon equivalent (C.E.) of the proposed steel is at least 0.55% with a report of chemical analysis showing the percentages of elements necessary to establish C.E.

D. If epoxy coated steel is proposed, evidence that the steel reinforcement producer is included on the TxDoT list of approved epoxy coating applicators

E. If epoxy coated steel is proposed, written certification that the epoxy-coated reinforcing steel meets the requirements of this Item with a copy of the manufacturer's control tests.

F. When mechanical splices are proposed, the types of couplers proposed for use.

406S.3 Materials

A. Approved Mills

Prior to furnishing reinforcing steel, the producing mills must be included on the list of approved producing mills that is maintained by the Construction Division of the State of Texas Department of Transportation

B. Deformed Bars and Wire Reinforcement

Unless indicated otherwise on the drawings, Bar reinforcement shall be Grade 60 and deformed. Reinforcing steel must conform to one of the following:

ASTM A615/615M, Grades 40 or 60 (300 or 420)

ASTM A996/996M, Type A, Grades 40 or 60 (300 or 420)

ASTM A996/996M, Type R, Grade 60 (420), permitted in concrete pavement only (furnished as straight bars only without bends. Bend tests are not required)

ASTM A706/706M

In cases where the provisions of this item are in conflict with the provisions of the ASTM Designation to which reference is made, the provisions of this item shall govern.

The nominal size, area and weight (mass) of reinforcing steel bars covered by these specifications are as follows:

Bar Size Number ⅛ ins (mm)	Nominal Diameter, inches (mm)	Nominal Area, Sq. ins. (mm^2)	Weight/Linear Foot Lbs. (kg)
2 (6)	0.250 (6.6)	0.05 (32)	0.167 (.075)
3 (10)	0.375 (9.5)	0.11 (71)	0.376 (.171)
4 (13)	0.500 (12.5)	0.20 (127)	0.668 (.303)
5 (16)	0.625 (15.5)	0.31 (198)	1.043 (.473)
6 (19)	0.750 (19.0)	0.44 (285)	1.502 (.681)
7 (22)	0.875 (22.0)	0.60 (388)	2.044 (.927)
8 (25)	1.000 (25.5)	0.79 (507)	2.670 (2.211)
9 (29)	1.128 (28.5)	1.00 (641)	3.400 (1.542)
10 (32)	1.270 (32.0)	1.27 (792)	4.303 (1.952)
11 (36)	1.410 (36.0)	1.56 (958)	5.313 (2.410)
14 (43)	1.693 (43.0)	2.25 (1552)	7.65 (3.470)
18 (57)	2.257 (57.5)	4.00 (2565)	13.60 (6.169)

Smooth, round bars shall be designated by size number through a No. 4. Smooth bars above No. 4 shall be designated by diameter in inches.

C. Smooth Bar and Spiral Reinforcement

Smooth bars and dowels for concrete pavement must have a minimum yield strength of 60 ksi (414 MPa) and meet ASTM A615/615M. Smooth bars that are greater in diameter than a No. 3 (10 mm) designation shall conform to ASTM A615 or meet the physical requirements of ASTM A36.

Spiral reinforcement shall be either smooth or deformed bars or wire of the minimum size or gauge indicated on the drawings. Bars for spiral reinforcement shall comply with ASTM A615 Grade 40(300), ASTM A996, Type A, Grade 40 (300); or ASTM A675, Grade 80(550), meeting dimensional requirements of ASTM A615. Smooth wire shall comply with ASTM A82, and deformed wire shall comply with ASTM A496.

D. Weldable Reinforcing Steel

Reinforcing steel to be welded must comply with ASTM A706 or have a carbon equivalent (C.E.) of at most 0.55%. A report of chemical analysis showing the percentages of elements necessary to establish C.E. is required for reinforcing steel that dose not meet ASTM A706 to be structurally welded. No tack welding will be allowed. All welding shall conform to the requirements of AWS D1.1/D1.1M.

Carbon Equivalent (C.E.) shall be calculated as follows:

C.E. = %C + 1.67*(% Mn) + .025*(% Cu) + .05*(% Ni) + .01*(%Cr) - .02*(%Mo) - .1*(%V)

Where C is carbon,

Mn is manganese

Cu is copper

Ni is nickel

Cr is chromium

Mo is molybdenum, and

V is vanadium.

The requirements above do not apply to the following miscellaneous welding applications:

Splicing reinforcing steel to extend bars in the bottom of a drilled shaft;

Attaching chairs to the reinforcing steel cage of a drilled shaft;

Armor joints and their supports;

Screed rail and form hanger supports where permitted on steel units;

Reinforcing steel to R-bars for lateral stability between prestressed beams, spirals, or bands of reinforcing bars in drilled shaft cages;

Permanent bridge deck forms;

Steel added in railing when slip-form construction is used; and

Other similar miscellaneous members that have no load carrying capacity in the completed structure.

E. Welded Wire Fabric

Wire shall conform to the requirements of the Standard Specifications for Cold-Drawn Steel Wire for Concrete Reinforcement, ASTM A 82 or A 496. Wire fabric, when used as reinforcement, shall conform to ASTM A 185 or A 497.

When wire is ordered by size numbers, the following relation between size number, diameter in inches and area shall apply unless otherwise indicated on the drawings:

Size, W Number 1/100 in^2 (mm^2)	Nominal Diameter inch (mm)	Nominal Area, sq. inches (mm^2)
31 (200)	0.628 (16.0)	0.310 (200)
30 (194)	0.618 (15.7)	0.300 (194)
28 (181)	0.597 (15.2)	0.280 (181)
26 (168)	0.575 (14.6)	0.260 (168)
24 (155)	0.553 (14.0)	0.240 (155)
22 (142)	0.529 (13.4)	0.220 (142)
20 (129)	0.505 (12.8)	0.200 (129)
18 (116)	0.479 (12.2)	0.180 (116)
16 (103)	0.451 (11.5)	0.160 (103)
14 (90)	0.422 (10.7)	0.140 (90)
12 (77)	0.391 (9.9)	0.120 (77)
10 (65)	0.357 (9.1)	0.100 (65)
8 (52)	0.319 (8.1)	0.080 (52)
7 (45)	0.299 (7.6)	0.070 (45)
6 (39)	0.276 (7.0)	0.060 (39)
5.5 (35)	0.265 (6.7)	0.055 (35)
5 (32)	0.252 (6.4)	0.050 (32)
4.5 (29)	0.239 (6.1)	0.045 (29)
4 (26)	0.226 (5.7)	0.040 (26)
3.5 (23)	0.211 (5.4)	0.035 (23)
3 (19)	0.195 (5.0)	0.030 (19)
2.5 (16)	0.178 (4.5)	0.025 (16)
2 (13)	0.160 (4.1)	0.020 (13)
1.5 (9)	0.138 (3.5)	0.015 (9.7)
1.2 (8)	0.124 (3.1)	0.012 (7.7)
1 (6)	0.113 (2.9)	0.010 (6.5)
0.5 (3)	0.080 (2.0)	0.005 (3.2)

Where deformed wire is required, the size number shall be preceded by D and for smooth wire the prefix W shall be shown.

Welded wire fabric shall be designated as follows: 6 x 12 - W16 x W8, which indicates a 6 in. (150 mm) longitudinal wire spacing and 12-in (300 mm) transverse wire spacing with smooth No. 16 (103) wire longitudinally and smooth no. 8 (52) wire transversely.

F. Epoxy Coating

Epoxy coating shall be required as indicated on the drawings. Prior to furnishing epoxy-coated reinforcing steel, the epoxy applicator must be included on the list of approved applicators that is maintained by the Construction Division of the State of Texas Department of Transportation.

The reinforcing steel shall be epoxy coated in accordance with the following.

Epoxy Coating Requirements for Reinforcing Steel

Material	Specification
Bar	ASTM A775 or A934
Wire or Fabric	ASTM A884 Class A or B
Mechanical Coupler	As indicated on the drawings
Hardware	As indicated on the drawings

The epoxy coating material and coating repair material shall comply with TxDoT's DMS-8130, "Epoxy Powder Coating for Reinforcing Steel". The applicator shall not patch more than ¼ inch total length in any foot (20 mm total length in any meter) at the applicator's plant.

The epoxy-coated reinforcing steel shall be sampled and tested in accordance with TxDoT Test Method Tex-739-I, "Sampling and Testing Epoxy Coated Reinforcing Steel".

The identification of all reinforcing steel shall be maintained throughout the epoxy coating and fabrication and until delivery to the project site.

Written certification that the epoxy-coated reinforcing steel meets the requirements of this Item shall be provided along with a copy of the manufacturer's control tests.

G. Mechanical Couplers

When mechanical splices in reinforcing steel bars are indicated on the drawings, the following types of couplers may be used:

Sleeve-filler

Sleeve-threaded

Sleeve-swaged, or

Sleeve-wedge.

H. Chairs and Supports

Chairs and Supports shall be steel, precast mortar or concrete blocks cast in molds meeting the approval of the Engineer or designated representative of sufficient strength to position the reinforcement as indicated on the drawings when supporting the dead load of the reinforcement, the weight of the workers placing concrete and the weight of the concrete bearing on the steel. Chairs shall be plastic coated when indicated on the drawings.

Chair Types and Applicable Uses	
Structural or Architectural Elements (columns, beams, walls, slabs) exposed to weather, not subjected to sand blasting, water blasting or grinding.	Galvanized steel or steel chairs with plastic coated feet.
Structural or Architectural Elements exposed to weather and subject to sand blasting, water blasting or grinding.	Stainless steel chairs.
Structural or Architectural Elements not exposed to weather or corrosive conditions.	Uncoated steel chairs
Slabs and grade beams cast on grade.	Steel chairs with a base with 9 inch^2 (58 cm^2) minimum area or sufficient area to prevent the chair from sinking into fill or subgrade. Precast mortar or concrete blocks meeting the requirements of this item may be used.

406S.4 Bending

The reinforcement shall be bent cold, true to the shapes indicated on the drawings. Bending shall preferably be done in the shop. Irregularities in bending shall be cause for rejection. Improperly fabricated, damaged or broken bars shall be replaced at no additional expense to the City. Damaged or broken bars embedded in a previous concrete placement shall be repaired using a method approved by the Engineer or designated representative.

Unless otherwise indicated on the drawings, the inside diameter of bar bends, in terms of the nominal bar diameter (d), shall be as follows:

Bends of 90 degrees and greater in stirrups, ties and other secondary bars that enclose another bar in the bend.

Bar Number in ⅛ inches (mm)	Diameter
3, 4, 5 (10, 13, 16)	4d
6, 7, 8	6d

All bends in main bars and in secondary bars not covered above.

Bar Number in ⅛ inches (mm)	Diameter
3 thru 8 (10 thru 25)	6d
9, 10, 11 (29, 32, 36)	8d
14, 18 (43, 57)	10d

406S.5 Tolerances

Fabricating tolerances for bars shall not be greater than shown on Standard (Detail) 406S-1.

406S.6 Storing

Steel reinforcement shall be stored above the surface of the ground upon platforms, skids or other supports and shall be protected as far as practicable from mechanical injury and surface deterioration caused by exposure to conditions producing rust. When placed in the work, reinforcement shall be free from dirt, paint, grease, oil or other foreign materials. Reinforcement shall be free from injurious defects such as cracks and laminations. Rust, surface seams, surface irregularities or mill scale will not be cause for rejection, provided the minimum dimensions, cross sectional area and tensile properties of a hand wire brushed specimen meets the physical requirements for the size and grade of steel indicated on the drawings.

406S.7 Splices

Splicing of bars, except when indicated on the drawings or specified herein, will not be permitted without written approval of the Engineer or designated representative. No substitution of bars will be allowed without the approval of the Engineer or designated representative. Any splicing of substituted bars shall conform to the requirements in the Table below.

Splices not indicated on the drawings will be permitted in slabs not more than 15 inches (380 mm) in thickness, columns, walls and parapets.

Splices will not be permitted in bars 30 feet (9.1 meters) or less in plan length unless otherwise approved. For bars exceeding 30 feet (9.1 meters) in plan length, the distance center to center of splices shall not be less than 30 feet (9.1 meters) minus 1 splice length, with no more than 1 individual bar length less than 10 feet (3 meters). Splices not indicated on the drawings, but permitted hereby, shall conform to the Table below. The specified concrete cover shall be maintained at such splices and the bars placed in contact and securely tied together.

Minimum Lap Requirements		
Bar Number in ⅛ inches (mm)	**Uncoated Lap Length**	**Coated Lap Length**
3 (10)	1 foot 4 inches (0.4 meters)	2 foot 0 inches (0.610 meters)
4 (13)	1 foot 9 inches (0.533 meters)	2 foot 8 inches (0.813 meters)
5 (16)	2 foot 2 inches (0.660 meters)	3 feet 3 inches (0.991meters)
6 (19)	2 foot 7 inches (0.787 meters)	3 feet 11 inches (1.194 meters)
7 (22)	3 feet 5 inches (1.041 meters)	5 feet 2 inches (1.575 meters)
No. 8 (25)	4 feet 6 inches (1.372 meters)	6 feet 9 inches (2.057 meters)
No. 9 (29)	5 feet 8 inches (1.727 meters)	8 feet 6 inches (2.591 meters)
No. 10 (32)	7 feet 3 inches (2.210 meters)	10 feet 11 inches (3.327 meters)
No. 11 (36)	8 feet 11 inches (2.718 meters)	13 feet 5 inches (4.089 meters)

Spiral steel shall be lapped a minimum of 1 turn. Bar No. 14 and No. 18 may not be lapped.

Welded wire fabric shall be spliced using a lap length that includes an overlap of at least 2 cross wires plus 2 inches (50 mm) on each sheet or roll.

Splices using bars that develop equivalent strength and are lapped in accordance with the table above are permitted.

Welding of reinforcing bars may be used only where indicated on the drawings or as permitted herein. All welding operations, processes, equipment, materials, quality of work and inspection shall conform to the requirements indicated on the drawings. All splices shall be of such dimension and character as to develop the full strength of the bar being spliced.

End preparation for butt-welding reinforcing bars shall be done in the field, except Bar No. 6 and larger shall be done in the shop. Delivered bars shall be of sufficient length to permit this practice.

For box culvert extensions with less than 1 foot (0.3 meters) of fill, the existing longitudinal bars shall have a lap with the new bars as shown in the table above. For box culvert extensions with more than 1 foot (0.3 meters) of fill, a minimum lap of 12 inches (300 mm) will be required.

Unless otherwise indicated on the drawings, dowel bars transferring tensile stresses shall have a minimum embedment equal to the minimum lap requirements shown in the table above. Shear transfer dowels shall have a minimum embedment of 12 inches (300 mm).

406S.8 Placement

Reinforcement shall be placed as near as possible in the position indicated on the drawings. Unless otherwise indicated on the drawings, dimensions shown for reinforcement are to the centers of the bars. In the plane of the steel parallel to the nearest surface of concrete, bars shall not vary from plan placement by more than 1/12 of the spacing between bars. In the plane of the steel perpendicular to the nearest surface of concrete, bars shall not vary from plan placement by more than ¼ inch (6 mm). Cover of concrete to the nearest surface of steel shall be as follows:

	Minimum Cover, Inches (mm)
(a) Concrete cast against and permanently exposed to earth	3 (76 mm)
(b) Concrete exposed to earth or weather:	
Bar No. 6 (19) through No. 18 bars (57)	2 (51 mm)
Bar No. 5 (16), W31 (W200) or D31 (D200) wire and smaller	1½ (38 mm)
(c) Concrete not exposed to weather or in contact with ground:	
Slabs, walls, joists:	
Bar No. 14 (43) and 18 (57)	1½ (38mm)
Bar No. 11 (36) and smaller	1 (25 mm)
Beams, columns:	
Primary reinforcement, ties, stirrups, spirals	1 ½ (38 mm)
Shells, folded plate members:	
Bar No. 6 (19) and larger	1 (25 mm)
Bar No. 5 (16), W31 (W200) or D31 (D200) wire, and smaller	1 (25 mm)

Vertical stirrups shall always pass around the main tension members and be attached securely thereto.

The reinforcing steel shall be located accurately in the forms and held firmly in place before and during concrete placement by means of bar supports that are adequate in strength and number to prevent displacement and to keep the steel at the required distance from the form surface. Bars shall be supported by means of approved galvanized metal spacers, metal spacers with plastic coated tips, stainless steel spacers, plastic spacers or approved precast mortar or concrete blocks when supports are in contact with removable or stay-in-place forms. Bright basic bar supports shall be used to support reinforcing steel placed in slab overlays on concrete panels or on existing concrete slabs. Bar supports in contact with soil or subgrade shall be approved.

For bar supports with plastic tips, the plastic protection must be at least 3/32 in. (2.4 mm) thick and extend upward on the wire to a point at least ½ in. (12.5 mm) above the formwork.

For approval of plastic spacers on a project, representative samples of the plastic shall show no visible indications of deterioration after immersion in a 5 percent solution of sodium hydroxide for 120 hours.

All accessories such as tie wires, bar chairs, supports, or clips used with epoxy-coated reinforcement shall be of steel, fully coated with epoxy or plastic. When approved by the Engineer or designated representative, plastic supports may also be used with epoxy-coated reinforcement.

All reinforcing steel shall be tied at all intersections, except that where spacing is less than 1 foot (300 mm) in each direction, alternate intersections only need be tied. For reinforcing steel cages for other structural members, the steel shall be tied at enough intersections to provide a rigid cage of steel. Mats of wire fabric shall overlap each other 1 full space as a minimum to maintain a uniform strength and shall be tied at the ends and edges.

Where prefabricated deformed wire mats are specified or if the Contractor requests, welded wire fabric may be substituted for a comparable area of steel reinforcing bar plan, subject to the approval of the Engineer or designated representative.

Mortar or concrete blocks shall be cast to uniform dimensions with adequate bearing area. A suitable tie wire shall be provided in each block, to be used for anchoring to the steel. Except in unusual cases and when specifically authorized by the Engineer, the size of the surface to be placed adjacent to the forms shall not exceed 2½ inches (63.5 mm) square or the equivalent thereof in cases where circular or rectangular areas are provided. Blocks shall be cast accurately to the thickness required and the surface to be placed adjacent to the forms shall be a true plane, free of surface imperfections. The blocks shall be cured by covering them with wet burlap or mats for a period of 72 hours. Mortar for blocks should contain approximately 1 part hydraulic cement to three parts sand. Concrete for blocks should contain 850 pounds of hydraulic cement per cubic yard (500 kilograms per cubic meter) of concrete

Individual bar supports shall be placed in rows at 4-ft (1.22 meters) maximum spacing in each direction. Continuous type bar supports shall be placed at 4-ft (1.22 meters) maximum spacing. Continuous bar supports shall be used with permanent metal deck forms.

The exposure of the ends of longitudinals, stirrups and spacers used to position the reinforcement in concrete pipe and in precast box culverts or storm drains is not a cause for rejection.

Reinforcing steel for bridge slabs, top slabs of direct traffic culverts, and top slabs of prestressed box beams at all intersections, except tie only alternate intersections where spacing is less than 1 ft. (300 mm) in each direction.

For steel reinforcing cages for other structural members, reinforcement shall be supported and tied in such a manner that a sufficiently rigid cage of steel is provided. Fasten mats of wire fabric securely at the ends and edges. If the cage is not adequately supported to resist settlement or floating upward of the steel, overturning of truss bars or movement in any direction during concrete placement, permission to continue concrete placement will be withheld until corrective measures are taken. Sufficient measurements shall be made during concrete placement to insure compliance with the above.

No concrete shall be deposited until the Engineer or designated representative has reviewed the placement of the reinforcing steel and all mortar, mud, dirt, etc, shall be cleaned from the reinforcement, forms, workers' boots and tools. Do not place concrete until authorized by the Engineer or designated representative

406S.9 Handling, Placement and Repair of Epoxy-coated Reinforcement Steel

A. Handling

Systems for handling coated-reinforcement with padded contact areas shall be provided. Handling bands shall be padded to prevent damage to the coating. Bundles of coated reinforcement shall be lifted with a strongback, spreader bar, multiple supports or a platform bridge. The bundled reinforcement shall be carefully transported and stored on protective cribbing. The coated reinforcement should not be dropped or drug during handling.

B. Construction Methods

Coated reinforcement shall not be flame-cut but shall be sawn or shear-cut only when approved. Cut ends shall be coated as specified in Section C, "Repair of Coating".

Coated reinforcement steel shall not be welded or mechanically coupled except where specifically indicated on the drawings. When welding or coupling is indicated on the drawing, the epoxy coating shall be removed at least 6 in. (150 mm) beyond the weld limits before welding and 2 in. (50 mm) beyond the limits of the mechanical coupler before assembly. After the welding or coupling operation is completed the steel shall be cleaned of oil, grease, moisture, dirt, welding contamination (slag or acid residue) and rust to a near-white finish. The existing epoxy coating shall be examined for damage and any damaged or loose epoxy shall be removed to expose sound epoxy coating.

After cleaning the coated-steel, the splice area shall be coated with epoxy repair material to a thickness of 7 to 17 mils (0.18 to 0.43 mm) after curing. A second application of the repair material shall be applied to the bar and coupler interface to ensure complete sealing of the joint.

C. Repair of Coating

The material used for coating repair shall comply with the requirements of this Item and ASTM D3963/D3963M, "Specification for Fabrication and Jobsite Handling of Epoxy-coated Reinforcing Steel Bars". Repairs shall be made in accordance with procedures recommended by the manufacturer of the epoxy coating powder. For areas to be patched, a minimum coating thickness as required for the original coating shall be applied. All visible damage to the coating shall be repaired.

Sawed and sheared ends, cuts, breaks and other damage shall be promptly repaired before additional oxidation occurs. The areas to be repaired shall be cleaned to ensure that they free from surface contaminants. Repairs shall be made in the shop or in the field as required.

406S.10 Measurement

The measurement of quantities of reinforcement furnished and placed will be based on the calculated weight of the steel actually placed as indicated on the drawings, with no allowance made for added bar lengths for splices requested by the Contractor nor for extra steel used when bars larger than those indicated on the drawings are used or for a higher grade of steel that is substituted with the permission of the Engineer or designated representative. Tie wires and supporting devices will not be included in the calculated weights. The calculated weight of bar reinforcement will be determined using the theoretical bar weight set forth in this item.

Measurement required by a change in design will be computed as described above for the actual steel required to complete the work.

406S.11 Payment

This item shall be paid for at the contract unit price bid per pound of "Reinforcing Steel". The unit bid price shall include full compensation for all work specified herein including furnishing, bending, fabricating, welding and placing reinforcement, for all clips, blocks, metal spacers, ties, chairs, wire or other materials used for fastening reinforcement in place and for all tools, labor, equipment and incidentals necessary to complete the work.

Reinforcing steel will generally not be paid for directly, but shall be included in the unit price bid for the items of construction in which the reinforcing steel is used.

When specified in the contract bid form as a separate pay item, this item shall be paid for at the contract unit price bid per pound of "Reinforcing Steel". The unit bid price shall include full compensation for all work specified herein including furnishing, bending, fabricating, welding and placing reinforcement, for all clips, blocks, metal spacers, ties, chairs, wire or other materials used for fastening reinforcement in place and for all tools, labor, equipment and incidentals necessary to complete the work.

Payment, when included as a contract pay item, will be made under:

Pay Item No. 406S-RC:	Reinforcing Steel	Per Pound.
Pay Item No. 406S-ERC:	Epoxy-Coated Reinforcing Steel	Per Pound.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Standard Specification Item 406S, "Reinforcing Steel"	
American Society for Testing and Materials, ASTM	
Designation	Description
ASTM A 36/A 36M	Carbon Structural Steel
ASTM A 82	Steel Wire, Plain, for Concrete Reinforcement
ASTM A 185	Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
ASTM A 496	Steel Wire, Deformed, for Concrete Reinforcement
ASTM A 497	Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement
ASTM A 615/A 615M	Deformed and Plain Billet-steel Bars for Concrete Reinforcement
ASTM A 675/A 675M	Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties
ASTM A 706/A 706M	Low- Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A 775/A 775M	Epoxy-Coated Reinforcing Steel Bars
ASTM A 884/A 884M	Epoxy-Coated Steel Wire and Welded Wire Fabric For Reinforcement
ASTM A 934/A 934M	Epoxy-Coated Prefabricated Reinforcing Steel Bars
ASTM A 996/A 996M	Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement
ASTM D3963/D3963M	Fabrication and Jobsite Handling of Epoxy-coated Reinforcing Steel Bars
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
Tex-739-I	Sampling and Testing Epoxy Coated Reinforcing Steel
City of Austin Standard (Details)	
Designation	Description
Standard 406S-1	Reinforced Steel Tolerances
Texas Department of Transportation: Departmental Material Specifications	
Designation	Description
DMS 8130	Epoxy Powder Coating for Reinforcing Steel
American Welding Society	
Designation	Description
AWS D1.1/D1.1M	Structural Welding Code

RELATED CROSS REFERENCE MATERIALS	
Standard Specification Item 406S, "Reinforcing Steel"	
City of Austin Standard Specification Items	
Designation	Description
Item No. 360	Concrete Pavement
Item No. 403	Concrete for Structures

Item No. 410S	Concrete Structures
Item No. 414S	Concrete Retaining Walls
Item No. 420S	Drilled Shaft Foundations
Item No. 830S	Traffic Signal Controller Foundation
Item No. 831S	Traffic Signal Drilled Shaft Foundation
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item No. 360	Concrete Pavement
Item No. 420	Concrete Structures
Item No. 421	Hydraulic Cement Concrete
Item No. 422	Reinforced Concrete Slab
Item No. 423	Retaining Walls
Item No. 440	Reinforcing Steels

ITEM NO. 410S CONCRETE STRUCTURES 9-14-21

410S.1 Description

This item shall govern the construction of all types of structures involving the use of structural concrete, except where the requirements are waived or revised by other governing specifications.

All concrete structures shall be constructed in accordance with the design requirements and details indicated on the drawings, in conformity with the pertinent provisions of the items contracted for, the incidental items referred to and in conformity with the requirements herein.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text and accompanying tables, the inch-pound units are given preference followed by SI units shown within parentheses.

410S.2 Submittals

The submittal requirements of this specification item may include:

Appropriate mix designs for class of concrete for each type of structure or unit;

Appropriate mortar and grout mix designs;

Product name, description, technical information and supplier of any acrylic-polymer latex admixture;

Type, supplier and certified test results for expansion joint materials;

Type of waterstop and confirmation that the product conforms to TxDoT DMS-6160;

Type and manufacturer of proposed evaporation retardant and confirmation that it meets the requirements of test results for TxDoT DMS-4650;

Type and manufacturer of proposed chemical admixtures and confirmation that it meets the requirements of test results for TxDoT DMS-4640;

Type and manufacturer of proposed curing admixtures and confirmation that it meets the requirements of test results for TxDoT DMS-4640;

Type and manufacturer of proposed chemical admixtures and confirmation that it meets the requirements of test results for TxDoT DMS-4640;

Type and manufacturer of proposed epoxy and/or adhesives and confirmation that it meets the requirements of test results for TxDoT DMS-6100;

Reinforcing steel shall conform to Standard Specification Item No. 406S, "Reinforcing Steel";

Contractors formwork plan for placing and consolidating concrete around wall penetrations and at locations designated as having congested reinforcing steel.

410S.3 Materials

A. Concrete

Concrete shall conform to Item No. 403, "Concrete for Structures".

The class of concrete for each type of structure or unit shall be as indicated on the drawings or by pertinent governing specifications.

B. Grout or Mortar

When required or shown on the drawings, mortar and grout consisting of 1 part hydraulic cement and 2 parts sand with sufficient water to provide the desired consistency shall be provided. Mortar shall be provided with a consistency that can be handled easily and spread by a trowel. Grout shall be provided with a consistency that will flow into and completely fill all voids.

C. Latex

When required an acrylic-polymer latex admixture (acrylic resin emulsion in accordance with TxDoT DMS-4640, "Chemical Admixtures for Concrete") suitable for producing polymer-modified concrete or mortar shall be provided. The latex shall not be allowed to freeze.

The following information shall be submitted for latex:

Name and information of company contact personnel,

Product name and polymer description, and

The latex shall meet the following requirements.

Table 1: LATEX ADDITIVE REQUIREMENTS	
Property	Value
Total Solids, minimum, percent	47
PH	9.0 to 11.0
Brookfield viscosity (# 1 spindle @ 10 rpm), mPas, maximum	60
Butadiene Content, percent	30 to 40
Freeze-thaw stability, 2 cycles, maximum	0.1

Specification targets and production tolerances shall also be provided for the following properties.

1. viscosity (including test method and temperature reference),
2. percent solids,
3. pH,
4. specific gravity, and
5. styrene/butadiene ratio.

D. Reinforcing Steel

Reinforcing steel shall conform to Standard Specification Item No. 406S, "Reinforcing Steel".

E. Expansion Joint Material

The expansion joint material shall conform to the requirements of TxDoT DMS-6310, "Joint Materials and Fillers".

1. Preformed Fiber Sheets

Unless otherwise indicated on the drawings preformed bituminous fiber material shall be provided. The preformed fiber material shall conform to the dimensions indicated on the drawings. Preformed fiber sheets shall meet the requirements of ASTM D-1751, "Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types). The requirements related to bitumen content, density and water absorption shall not apply to nonbituminous materials.

2. Joint Sealing Material

Unless otherwise indicated on the drawings a Class 4, 5 or 7 low-modulus silicone sealant shall be provided that conforms to the requirements of TxDoT DMS-6310, "Joint Sealants and Fillers".

3. Timber Boards

Timber boards shall be made from redwood or cypress and must be free from sapwood, knots, clustered bird's eye, checks and splits. When oven dried at 230°F (110°C) to a constant weight (mass), the density of the board shall be between 20 and 35 lbs. Per cubic foot (between 320 and 560 kgs per cubic meter)

4. Asphalt Board

Asphalt Board shall conform to the dimensions indicated on the drawings and shall meet the description, general requirements and distortion testing of ASTM D-994, "Preformed Expansion Joint Filler for Concrete (bituminous Type)".

5. Rebonded Neoprene Filler Sheet

Rebonded neoprene filler shall consist of ground closed cell neoprene particles, rebonded and molded into sheets of uniform thickness of the dimensions indicated on the drawings. These sheets shall meet the requirements of ASTM D-1752, Type I.

The manufacturer shall furnish the Engineer or designated representative with certified test results as to the compliance with the above requirements.

F. Waterstop

Unless otherwise indicated on the drawings, rubber waterstops or Polyvinyl Chloride (PVC) waterstops that conform to TxDoT DMS-6160, "Waterstops, Nylon Reinforced Neoprene Sheet, and Elastomeric Pads" shall be provided.

G. Evaporation Retardants

Evaporation retardants shall conform to the requirements of TxDoT DMS-4650, "Hydraulic Cement Concrete Curing Materials and Evaporation Retardants". The evaporation retardant must be a commercially available monomolecular film compound. The evaporation retardant shall have no adverse effect on the cement hydration process or the concrete and shall reduce surface moisture evaporation from the concrete when performing concrete operations in direct sun, wind, high temperatures, or low relative humidity. The producer of the evaporation retardant shall certify that it meets these specified requirements.

H. Curing Materials

1. Liquid Membrane Forming compounds

Liquid Membrane Forming compounds shall conform to the requirements of TxDoT DMS-4650, "Hydraulic Cement Concrete Curing Materials and Evaporation Retardants". The compound shall be applied to damp concrete as a fine mist through atomizing nozzles at a wet film thickness of 8 to 9 mils (200 to 230 µm). The liquid membrane-forming compound must not react deleteriously with concrete or its components. It must produce a firm, continuous, uniform moisture-impermeable film that is free of pinholes, cracks, or other film defects. It must also exhibit satisfactory adhesion.

The consistency must be such that the compound can be applied satisfactorily by conventional or airless spray at atmospheric and material temperatures above 40°F (5°C) without thinning. When applied at the manufacturer's recommended thickness, not less than 8 mils (200 µm) wet, to vertical surfaces of damp concrete, the compound must not run off or appreciably sag. The liquid membrane-forming compound must not disintegrate, check, peel, or crack during the required curing period. It

must not peel or pick up under traffic, and must disappear from the surface of the cured concrete by gradual disintegration.

2. Cotton Mats

   Cotton mats shall consist of a filling material of cotton "bat" or "bats" [at least 12 oz. Per square yard (400 grams per square meter)] completely covered with unsized cloth [at least 6 oz. Per square yard (200 grams per square meter)] stitched longitudinally with continuous parallel rows of stitching spaced at less than 4 in. (100 mm), or tuft both longitudinally and transversely at intervals less than 3 in. (75 mm).

   The cotton mats shall be free from tears and in good general condition. A flap at least 6 in. (150 mm) wide with two (2) thicknesses of the covering that extends along one side of the mat shall be provided.

3. Polyethylene Sheeting

   The polyethylene sheeting shall be at least 4 mils thick (0.1 mm) and free from visible defects. Clear or opaque white sheeting shall be provided when the ambient temperature during curing exceeds 60°F (15°C) or when applicable to control temperature during mass pours.

4. Burlap-Polyethylene Mats

   The burlap-polyethylene mats shall be made from burlap impregnated on 1 side with a film of opaque white-pigmented polyethylene, free from visible defects. The laminated mats shall have at least 1 layer of an impervious material such as polyethylene, vinyl plastic, or other acceptable material (either as a solid sheet or impregnated into another fabric) and shall be free of visible defects.

I. Chemical Admixtures

Chemical admixtures including water reducing, placticizers and air entrainment shall conform to TxDoT DMS-4640, "Chemical Admixtures for Concrete" Calcium chloride shall not be used. Admixtures shall be included in the prequalified concrete admixtures list maintained by TxDot's Construction Division.

J. City of Austin Survey Monuments

The Public Works Department may furnish permanent survey monuments to be cast in concrete as indicated on the drawings or as directed by the Engineer or designated representative.

K. Epoxy

Unless indicated otherwise on the drawings, epoxy materials shall conform to TxDoT DMS-6100, "Epoxy and Adhesives".

410S.4 General Requirements

Before starting work, the Contractor shall inform the Engineer or designated representative fully of the construction methods the Contractor proposes to use, the adequacy of which shall be subject to the review by the Engineer or designated representative. Drawings for forms and falsework for piers and superstructure spans over 20 feet (6 meters) long, bracing systems for girders when the overhang exceeds 3 ft. 6 in. (1 meter) and for all bridge widening details shall be submitted to the Engineer or designated representative for review, if requested. Similar drawings shall be submitted for other units of the structure, if requested by the Engineer or designated representative. The drawings shall be prepared on standard 22 inch by 36-inch (550mm by 900 mm) sheets and shall show all essential details of the proposed forms, falsework and bracing to permit a structural analysis. Four sets of such drawings will be required.

Concurrence on the part of the Engineer or designated representative in any proposed construction methods, approval of equipment or of form and falsework drawings does not relieve the Contractor of the responsibility for

the safety or correctness of the Contractor's methods, adequacy of equipment or from carrying out the work in full accordance with the contract.

Unless otherwise indicated on the drawings, the requirements in the succeeding paragraphs shall govern the time sequence in which construction operations may be carried on and for the opening of completed structures to traffic:

Superstructure members, forms, falsework or erection equipment shall not be placed on the substructure before the concrete therein has attained a 3000 psi (20.7 MPa) compressive strength.

Storage of materials on completed portions of a structure will not be permitted until all curing requirements for those particular portions have been met.

No forms shall be erected on concrete footings supported by piling or drilled shafts until the concrete therein has attained a minimum compressive strength of 2500 psi (17.2 MPa). Such work may begin on spread footings after the therein has aged at least 2 curing days. Concrete may be placed as soon as the forms and reinforcing steel are approved by the Engineer or designated representative.

The support of tie beam and/or forms by falsework placed on previously placed tie beams is permissible provided such beams have attained 3000 psi (20.7 MPa) compressive strength, curing requirements are completed and the beams are properly supported to eliminate stresses not provided for in the design.

Bridges and direct traffic culverts shall not be opened to construction traffic or to the traveling public until authorized by the Engineer or designated representative in accordance with the following:

Authorization may be given after the last slab concrete has been in place at least 14 days for light construction traffic not to exceed a ¾-ton (0.68 Mg) vehicle. Authorization to place embankments to allow normal construction traffic and when necessary to the traveling public, may be given after the last slab concrete has been in place 30 days or when the minimum compressive strength (fc') has reached the 28 day strength conforming to Item No. 403, "Concrete for Structures" or as indicated on the drawings.

410S.5 Drains

Weep holes and roadway drains shall be installed and constructed as indicated on the drawings.

410S.6 Expansion Joints

Joints and devices shall be used to provide for expansion and contraction of concrete slabs and shall be constructed as indicated on the drawings.

The bearing area under the expansion ends of concrete slabs and slab and girder spans shall be given a steel trowel finish and finished to the exact grades required on the drawings. The material used to separate expansion surfaces shall be as indicated on the drawings and placed so that concrete or mortar cannot be subsequently worked around or under it. The bridging of concrete or mortar around expansion joint material in bearings and expansion joints shall be prevented.

Concrete adjacent to armor joints and finger joints shall be placed carefully to avoid defective anchorage and porous or honeycombed concrete in such areas.

All open joints and joints to be filled with expansion joint material shall be constructed using forms adaptable to loosening or early removal. To avoid expansion or contraction damage to the adjacent concrete, these forms shall be loosened as soon as possible after final concrete set to permit free movement of the span without requiring full form removal.

Preformed fiber joint material or other material indicated shall be used in the vertical joints of the roadway slab, curb, median or sidewalk. The top 1-inch (25 mm) thereof shall be filled with joint sealing material, as specified

herein. The sealer shall be installed in accordance with Standard Specification Item No. 413S, "Cleaning and/or Sealing Joints and Cracks (PC Concrete)" and the manufacturer's recommendations.

Prior to placing the sealing material, the vertical faces of the joint shall be cleaned of all laitance by sandblasting or by mechanical routing. Cracked or spalled edges shall be repaired. The joint shall be blown clean of all foreign material and sealed.

Where preformed fiber joint material is used, it shall be anchored to the concrete on one side of the joint by light wire or nails to prevent the material from falling out.

Finished joints shall conform to the drawing details with the concrete sections completely separated by the specified opening or joint material.

Soon after form removal and where necessary after surface finishing, all projecting concrete shall be removed along exposed edges to secure full effectiveness of the expansion joints.

410S.7 Construction Joints

The joint formed by placing plastic concrete in direct contact with concrete that has attained its initial set shall be deemed a construction joint. The term monolithic placement shall be interpreted to mean that the manner and sequence of concrete placing shall not create construction joints.

Construction joints shall be of the type and at the locations indicated on the drawings. Additional joints will not be permitted without written authorization from the Engineer or designated representative and when authorized, shall have details equivalent to those indicated for joints in similar locations.

Unless otherwise provided, construction joints shall be square and normal to the forms. Bulkheads shall be provided in the forms for all joints, except when horizontal. All vertical construction joints shall be chamfered. All horizontal construction joints shall be routed or grooved.

Construction joints requiring the use of joint sealing material shall be as indicated on the drawings or as directed by the Engineer or designated representative. The material will be indicated on the drawings without reference to joint type.

A concrete placement terminating at a horizontal construction joint shall have the top surface roughened thoroughly as soon as practicable after initial set is attained. The surfaces at bulkheads shall be roughened as soon as the forms are removed.

The hardened concrete surface shall be thoroughly cleaned of all loose material, laitance, dirt or foreign matter and saturated with water so it is moist when placing fresh concrete against it. Remove all free water and moisten the surface before concrete or bonding grout is placed against it. Forms shall be drawn tight against the existing concrete and the joint surface flushed with grout just prior to placing the fresh concrete.

The joint surface shall be coated with bonding mortar, grout, epoxy or other material as indicated on the drawings or other items. A Type V epoxy shall be provided in accordance with TxDoT DMS-6100, "Epoxies and Adhesives" for bonding fresh concrete to hardened concrete. The epoxy shall be placed on a clean dry surface and the fresh concrete shall be placed while the epoxy is still tacky. Bonding mortar or grout shall be placed on a surface that is saturated surface dry and the concrete shall be placed before the bonding mortar or grout dries. Other bonding agents shall be placed in accordance with the manufacturer's recommendations.

410S.8 Foundation and Substructure

Excavation for foundations and substructure shall conform to Standard Specification Item No. 401S, "Structural Excavation and Backfill".

Concrete for foundation seals, unless otherwise indicated on the drawings, shall be Class C Concrete with a coarse aggregate grade of 2, 3, 4 or 5 and placed in accordance with the requirements herein. The top of the completed seal shall not vary from plan grade or the grade established by the Engineer or designated representative.

Where a concrete seal is indicated on the Drawings, the design will be based on the normal water elevation as indicated on the Drawings. If the foundation concrete can be placed in the dry at the time of construction, the seal will not be required. If additional seal is necessary for the conditions existing during the time of construction, its thickness shall be increased as deemed necessary by the Contractor and at the Contractor's expense. If the conditions existing at the time of construction require a seal for placing the foundation concrete in the dry and none is indicated on the Drawings, the Contractor shall place an adequate seal at the Contractor's expense.

The seal shall be allowed to set for at least 36 hours before the caisson or cofferdam is dewatered, after which the top of the seal shall be cleaned of all laitance or other soft material and all high spots exceeding the above limitation shall be cut off and removed.

410S.9 Falsework

The Contractor is totally responsible for all falsework. The Contractor shall design and construct it to safely carry the maximum anticipated loads and to provide the necessary rigidity. Details of falsework construction shall be subject to review by the Engineer or designated representative, but Engineer's review shall in no way relieve the Contractor of responsibility of the adequacy and safety of the falsework design.

All timber used in falsework centering shall be sound, in good condition and free from defects which will impair its strength. When wedges are used to adjust falsework to desired elevations, they shall be used in pairs to insure even bearing.

Sills or grillages shall be large enough to support the superimposed load without settlement and unless founded on solid rock, shale or other hard materials, precautions shall be taken to prevent yielding of the supporting material.

Falsework, which cannot be founded on a satisfactory spread footing, shall be placed on piling driven to a bearing capacity sufficient to support the superimposed load without settlement. The safe bearing capacity of piling shall be determined by test loads or by such other methods that may be required or acceptable to the Engineer or designated representative.

In general, each falsework bent shall be capped transversely by a member of proper size. A short cap section forming a T-head may be substituted to permit the removal of portions of the forms without disturbing the falsework. Caps shall be securely fastened to each pile or column in the bent and set at the proper elevation to produce, in conjunction with the use of approved wedges or jacks, permanent camber indicated on the Drawings, plus a construction camber covering allowance for deformation of the forms and falsework. The use of wedges to compensate for incorrectly cut bearing surfaces will not be permitted. Each falsework bent shall be securely braced to provide the stiffness required with the bracing securely fastened to each pile or column it crosses.

In setting falsework for arches, allowances shall be made for settlement of falsework, deflection of the arch and permanent camber. Provision shall be made by suitable wedges, sand jacks or other acceptable devices for the controlled lowering of falsework when the arch is swung. Falsework may be required to be placed on jacks to provide for settlement correction during concrete placement.

When the falsework is no longer required, it shall be removed. Falsework piling shall be pulled or cut off not less than 2 feet (0.6 meter) below finished ground level. Falsework and piling in a stream, lake or bay shall be completely removed to a point specified by the Engineer or designated representative to prevent any obstruction to the waterway.

410S.10 Forms

Forms for precast prestressed concrete members and for prestressed piling shall be constructed conforming to Item No. 425S, "Prestressed Concrete Structures".

A. General

Except where otherwise indicated on the drawings, forms may be of either timber or metal.

Forms for round columns exposed to view shall be of steel, except that other materials will be allowed with written permission of the Engineer or designated representative.

Forming plans shall be submitted for approval by the Engineer or designated representative. Forms shall be designed for the pressure exerted by a liquid weighing 150 pounds per cubic foot (2.4 Mega grams per cubic meter). The rate of placing the concrete shall be taken into consideration in determining the depth of the equivalent liquid. For job-fabricated forms an additional live load of 50 pounds per square foot (1.675 MPa) shall be allowed on horizontal surfaces. The maximum unit stresses shall not exceed 125 percent of the allowable stresses used by the Engineer or designated representative for the design of structures.

Formwork for wall and/or column pours equal or exceeding 8 feet (2.44 meters) shall be designed in accordance with ACI 347, "Guide to Formwork for Concrete" and sealed by a Registered Civil Engineer Licensed in the State of Texas, who is experienced in formwork design.

Commercially produced structural units used in formwork shall not exceed the manufacturer's maximum allowable working load for moment, shear or end reaction. The maximum working load shall include a live load of 35 pounds per square foot (1.175 MPa) of horizontal form surface and sufficient details and data shall be submitted for use in checking formwork details for approval.

Forms shall be practically mortar-tight, rigidly braced and strong enough to prevent bulging between supports and maintained to the proper line and grade during concrete placement. Forms shall be maintained in a manner that will prevent warping and shrinkage.

Deflections due to cast-in-place slab concrete and railing shown in the dead load deflection diagram shall be taken into account in the setting of slab forms.

All forms and footing areas shall be cleaned of any extraneous matter before placing concrete.

Permission to place concrete will not be given until all of such work is complete to the satisfaction of the Engineer or designated representative.

If, at any stage of the work, the forms show signs of bulging or sagging, the portion of the concrete causing such condition shall be removed immediately, if necessary and the forms shall be reset and securely braced against further movement.

B. Timber Forms

Lumber for forms shall be properly seasoned, of good quality and free from imperfections, which would affect its strength or impair the finished surface of the concrete. The lumber used for facing or sheathing shall be finished on at least 1 side and 2 edges and shall be sized to uniform thickness.

Form or form lumber that will be reused shall be maintained clean and in good condition. Lumber that is split, warped, bulged, or marred or that has defects that will produce inferior forms shall not be used but shall be removed from the work.

Form lining will be required for all formed surfaces, except for the inside of culvert barrels, inlets, manholes and box girders, the bottom of bridge decks between beams or girders, surfaces that are subsequently covered by backfill material or are completely enclosed and any surface formed by a single finished board. Lining will not be required when plywood forms are used.

Form lining shall be of an approved type such as masonite or plywood. Thin membrane sheeting such as polyethylene sheets shall not be used for form lining.

Forms may be constructed of plywood not less than ¾ inch (19 mm) in thickness, with no form lining required. The grain of the face plies on plywood forms shall be placed parallel to the span between the supporting studs or joists.

Plywood used for forming surfaces, which remain exposed, shall be equal to that specified as B-B Plyform Class I or Class II Exterior of the U.S. Department of Commerce Voluntary Product Standard, PS 1.

Studs and joists shall be spaced so that the facing form material remains in true alignment under the imposed loads.

Wales shall be spaced close enough to hold forms securely to the designated lines and scabbed at least 4 feet (1.22 meters) on each side of joints to provide continuity. A row of wales shall be placed near the bottom of each placement.

Facing material shall be placed with parallel and square joints and securely fastened to supporting studs.

Forms for surfaces receiving only an ordinary finish and exposed to view shall be placed with the form panels symmetrical, i.e., long dimensions set in the same direction. Horizontal joints shall be continuous.

Molding specified for chamfer strips or other uses shall be made of materials of a grade that will not split when nailed and which can be maintained to a true line without warping. Wood molding shall be mill cut and dressed on all faces. Unless indicated otherwise on the drawings, forms shall be filleted at all sharp corners and edges with triangular chamfer strips measuring ¾ inch (19 mm) on the sides.

Forms for railings and ornamental work shall be constructed to standards equivalent to first class millwork. All moldings, panel work and bevel strips shall be straight and true with neatly mitered joints designed so the finish work is true, sharp and clean cut. All forms shall be constructed to permit their removal without marring or damaging the concrete. The forms may be given a slight draft to permit ease of removal.

Metal form ties of an approved type or a satisfactory substitute shall be used to hold forms in place and shall be of a type that permits ease of removal of the metal as hereinafter specified.

All metal appliances used inside of forms for alignment purposes shall be removed to a depth of at least ½ inch (13 mm) from the concrete surface. They shall be made so the metal may be removed without undue chipping or spalling and when removed, shall leave a smooth opening in the concrete surface. Burning off of rods, bolts or ties will not be permitted.

Any wire ties used shall be cut back at least ½ inch (13 mm) from the face of the concrete and properly patched.

Devices holding metal ties in place shall be capable of developing the strength of the tie and adjustable to allow for proper alignment.

Metal and wooden spreaders, which are separate from the forms, shall be removed entirely as the concrete is being placed.

Adequate clean-out openings shall be provided for narrow walls and other locations where access to the bottom of the forms is not readily attainable.

Prior to placing concrete, the facing of all forms shall be treated with oil or other bond breaking coating of such composition that it will not discolor or otherwise injuriously affect the concrete surface. Care shall be exercised to prevent coating of the reinforcing steel.

C. Metal Forms

The foregoing requirements for timber forms as regards design, mortar-tightness, filleted corners, beveled projections, bracing, alignment, removal, reuse and wetting shall also apply to metal forms, except that these will not require lining, unless specifically indicated on the drawings.

The thickness of form metal shall be as required to maintain the true shape without warping or bulging. All bolt and rivet heads on the facing sides shall be countersunk. Clamps, pins or other connecting devices shall be designed to hold the forms rigidly together and to allow removal without injury to the concrete. Metal forms, which do not present a smooth surface or line up properly, shall not be used. Metal shall be kept free from rust, grease or other foreign materials.

D. Form Supports for Overhang Slabs

Form supports which transmit a horizontal force to a steel girder or beam or to a prestressed concrete beam will be permitted, but shall not be used unless a structural analysis has been made of the affect on the girder or beam and approval is granted by the Engineer or designated representative.

In normal or skewed spans with standard overhangs not exceeding 3 feet, 1 ½ inches (0.95 meter), beam bracing as shown in the drawings shall be used.

Spans in which the overhang width exceeds 3 feet, 1½ inches (0.95 meter) will require additional support for the outside beams to resist torsion. Details of the Contractor's proposed method of providing additional support shall be included with the slab forming plans submitted to the Engineer or designated representative for review and approval.

Holes in steel members for support of overhang brackets may be punched or drilled full size or may be torch cut to ¼ inch (6 mm) under size and reamed full size. In no case shall the holes be burned full size. The hole shall be left open unless indicated to be filled with a button head bolt. They shall never be filled by welding.

410S.11 Placing Reinforcement

Reinforcement in concrete structures shall be placed carefully and accurately and rigidly supported as provided in Standard Specification Item No. 406S, "Reinforcing Steel". Reinforcing steel supports shall not be welded to I-beams or girders or stirrups of prestressed concrete beams.

410S.12 Placing Concrete

A. General

Concrete shall not be placed when impending weather conditions would impair the quality of the finished work. If conditions of wind, humidity and temperature are such that concrete cannot be placed without the potential for shrinkage cracking, the concrete should be placed in early morning, at night or on a schedule with more favorable weather. When mixing, placing and finishing concrete is scheduled during non-daylight hours; the entire placement site should be illuminated to the satisfaction of the Engineer or designated representative.

If changes in weather conditions require protective measures after work starts, adequate shelter shall be provided to protect the concrete against damage from rainfall or from freezing temperatures as outlined in this Item. Operations during rainfall shall only be continued if approved by the Engineer or designated representative. Aggregate stockpiles shall be covered to the extent necessary to control the moisture conditions in the aggregates.

Slab concrete shall be mixed in a plant located off the structure. Carting or wheeling concrete batches over completed slabs will not be permitted until they have aged at least 4 full curing days or timber planking placed on top of the slab for the carts to traverse along. Carts shall be equipped with pneumatic tires. Curing operations shall not be interrupted for the purpose of wheeling concrete over finished slabs.

Exposed concrete surfaces, while still plastic, shall be stamped with an impression having the Contractor's name, the month and year. The stamp shall be of an approved design.

At least 1 day of curing shall be allowed after the concrete has achieved initial set before placing strain on projecting reinforcement to prevent damage to the concrete.

The storing of reinforcing or structural steel on completed roadway slabs generally shall be avoided and when permitted, shall be limited to quantities and distribution that will not induce excessive stresses.

B. Preparation of Surfaces

All forms, prestressed concrete panels, T-beams and concrete box beams on which concrete will be placed shall be thoroughly wetted before the placement of concrete. Puddles of excess water shall be removed before placing the concrete. The various surfaces shall be in a moist, saturated surface dry condition when concrete is placed on or against them.

The subgrade or foundation shall be moist before placing concrete for bridge approach slabs or other concrete placed on grade. If dry the subgrade shall be lightly sprinkled.

C. Placing Temperature

The minimum temperature of all concrete at the time of placement shall not be less than 50°F (10°C). The maximum temperature of any concrete, unless otherwise indicated on the drawings, shall not exceed 95°F (35°C) when placed. The maximum temperature of cast-in-place concrete in bridge superstructures, diaphragms, parapets, concrete portions of railing, curbs and sidewalks and direct traffic box culverts shall not exceed 85°F (30°C) when placed. Other portions of structures, when indicated on the drawings, shall require the temperature control specified.

For continuous placement of the deck on continuous steel units, the initial set of the concrete shall be retarded sufficiently to insure that it remains plastic in not less than 3 spans immediately preceding the one being placed. For simple spans, retardation shall be required only if necessary to complete finishing operations.

The consistency of the concrete as placed should allow the completion of all finishing operations without the addition of water to the surface. When conditions are such that additional moisture is needed for finishing, the required water shall be applied to the surface by fog spray only and shall be held to a minimum amount. Fog spray for this purpose may be applied with hand operated fogging equipment.

The height of free fall of concrete shall be limited to 5 feet (1.575 meters) to prevent segregation.

D. Transporting Time

The maximum time interval between the addition of cement to the batch and the placing of concrete in the forms shall not exceed the following:

Table 2: Allowable Transportation Times

Air or Concrete Temperature whichever is higher	Maximum Time w/o Retarder	Maximum Time with Retarder	
		*Specific Applications	All others
Non-agitated Concrete			
35°F to 79°F (2°C to 26°C)	45 minutes	45 minutes	45 minutes
Over 80°F (Over 25°C)	30 minutes	45 minutes	45 minutes
Agitated Concrete			
90°F (32°C) or above	45 minutes	75 minutes	105 minutes

75°F to 89°F (24°C to 32°C)	60 minutes	90 minutes	120 minutes
35°F to 74°F (2°C to 23°C)	90 minutes	120 minutes	150 minutes

* Specific applications include Bridge decks, cased drilled shafts and slabs of direct traffic culverts

The use of an approved retarding agent in the concrete will permit the extension of each of the above temperature-time maximums by 30 minutes for bridge decks, top slabs of direct traffic culverts and cased drilled shafts and 1 hour for all other concrete except that the maximum time shall not exceed 45 minutes for non-agitated concrete.

E. Handling and Placing

The Contractor shall give the Engineer or designated representative sufficient advance notice before placing concrete in any unit of the structure to permit the review of forms, reinforcing steel placement and other preparations. Concrete shall not be placed in any unit prior to the completion of formwork and placement of reinforcement therein.

The sequence for placing concrete shall be as indicated on the drawings or as required herein. The placing shall be regulated so the pressures caused by the plastic concrete shall not exceed the loads used in the form design.

The method of handling, placing and consolidation of concrete shall minimize segregation and displacement of the reinforcement and produce a uniformly dense and compact mass. Concrete shall not have a free fall of more than 5 feet (1.5 meters), except in the case of drilled shafts, thin wall sections such as in culverts, or as allowed by other Items. Any hardened concrete spatter ahead of the plastic concrete shall be removed.

Each part of the forms shall be filled by depositing concrete as near its final position as possible. The coarse aggregate shall be worked back from the face and the concrete forced under and around the reinforcement bars without displacing them. Depositing large quantities at one point and running or working it along the forms will not be allowed.

Concrete shall be deposited in the forms in layers of suitable depth but not more than 36 inches (0.9 meter) in thickness, unless otherwise directed by the Engineer or designated representative.

Cold joints in a monolithic placement shall be avoided. The sequence of successive layers or adjacent portions of concrete shall be such that they can be vibrated into a homogeneous mass with the previously placed concrete without a cold joint. Not more than 1 hour (1 ½ hours if a normal dosage of retarding admixture is used) shall elapse between adjacent or successive placements of concrete. Unauthorized construction joints shall be avoided by placing all concrete between the authorized joints in one continuous operation.

An approved retarding agent shall be used to control stress cracks and/or authorized cold joints in mass placements where differential settlement and/or setting time may induce stress cracking, such as on false work, in deep girder stems, etc.

Openings in forms shall be provided, if needed, for the removal of laitance or foreign matter of any kind.

All forms shall be wetted thoroughly before the concrete is placed therein.

F. Consolidation

All concrete shall be carefully consolidated and the mortar flushed to the form surfaces by continuous working with immersion type vibrators. Vibrators which operate by attachment to forms or reinforcement will not be permitted, except on steel forms. At least 1 standby vibrator shall be provided for emergency use

in addition to the ones required for placement. For lightweight concrete, vibrators of the high frequency type, which produce a minimum of 7000 impulses per minute, will be required.

The concrete shall be vibrated immediately after deposition. Prior to the beginning of work, a systematic spacing of the points of vibration shall be established to insure complete consolidation and thorough working of the concrete around the reinforcement, embedded fixtures and into the corners and angles of the forms. Immersion type vibrators shall be inserted vertically, at points 18 to 30 inches (450 to 750 mm) apart and slowly withdrawn. The vibrator may only be inserted in a sloping or horizontal position in shallow slabs. The entire depth of each lift shall be vibrated, allowing the vibrator to penetrate several inches (several cms) into the preceding lift. The vibrator shall not be used to move the concrete to other locations. In addition the vibrator shall not be dragged through the concrete. Concrete along construction joints shall be thoroughly consolidated by operating the vibrator along and close to but not against the joint surface. The vibration shall continue until thorough consolidation and complete embedment of reinforcement and fixtures is produced, but not long enough to cause segregation. Vibration may be supplemented by hand spading or rodding, if necessary, to insure the flushing of mortar to the surface of all forms.

G. Finishing

From the time of initial strike off until final finish is completed and required interim curing is in place, the unformed surfaces of slab concrete in bridge decks and top slab of direct traffic culverts and concrete slabs, shall be kept damp, not wet, to offset the effects of rapid evaporation of mixing water from the concrete due to wind, temperature, low humidity or combinations thereof. Fogging equipment capable of applying water in the form of a fine fog mist, not a spray, will be required. Fogging will be applied at the times and in the manner directed by the Engineer or designated representative.

Fogging equipment may be either water pumped under high pressure or a combination of air and water, either system in combination with a proper atomizing nozzle. The equipment shall be sufficiently portable for use in the direction of any prevailing winds. The equipment shall be adapted for intermittent use to prevent excessive wetting of the surfaces.

Upon completion of the final finish, interim curing will be required for slab concrete in bridge decks and top slabs of direct traffic culverts as follows:

(1) Required water curing shall begin as soon as it can be done without damaging the concrete finish.

(2) Unless otherwise indicated on the Drawings, Type 1-D membrane curing compound that conforms to TxDoT DMS-4650, "Hydraulic Cement Concrete Curing Materials and Evaporation Retardants" shall be applied to the slab surface.

H. Installation of Dowels and Anchor Bolts

Dowels and anchor bolts shall be installed by casting them in place or by grouting with grout, epoxy, or epoxy mortar unless indicated otherwise on the drawings.

Holes for grouting shall be formed or drilled. Holes for anchor bolts shall be drilled to accommodate the bolt embedment required on the drawings. Holes for dowels shall be made at least 12 in. (300 mm) deep unless indicated otherwise on the drawings. When grout or epoxy mortar is specified the diameter of the hole shall be at least twice the dowel or bolt diameter but shall not exceed the dowel or bolt diameter plus 1 ½ in (38 mm). When epoxy is specified the hole diameter should be 1/16 to ¼ in. (1.6 to 6.35 mm) greater than the dowel or bolt diameter.

Holes for anchor bolts in piers, abutments, bents or pedestals may be drilled or formed by the insertion of oiled wooden plugs or metal sleeves in the plastic concrete. Formed holes shall be large enough to permit horizontal adjustments of the bolts. The bolts shall be carefully set in mortar. In lieu of the above, anchor bolts may be set to exact locations when the concrete is placed.

The holes shall be thoroughly cleaned of all loose material, oil, grease or other bond-breaking substance and blow them clean with filtered compressed air. When an epoxy type material is used the holes shall be in a surface dry condition. When hydraulic cement grout is used the holes shall be in a surface moist condition. The void space between the hole and the dowel or bolt shall be completely filled with grouting material. The requirements for cleaning outlined in the product specification for prepackaged systems shall be followed exactly.

The following should be used as a guide in selection of an appropriate grout, mortar, epoxy or epoxy grout.

Table 3: Guide for Selection of Epoxy, Epoxy Mortar, Grout and Epoxy Grout

Material Type	Recommendation
Epoxy, Epoxy Mortar or other prepackaged Mortar	As Approved
Cast-in-place or Grouted system	1 part hydraulic cement, 2 parts sand and sufficient water for desired consistency
Neat Epoxy	Type III epoxy per TxDoT DMS-6100, "Epoxies and Adhesives"
Epoxy Grout	Type III epoxy per TxDoT DMS-6100, "Epoxies and Adhesives"Provide grout, epoxy or epoxy mortar as the binding agent unless otherwise indicated on the drawings

410S.13 Placing Concrete in Cold Weather

A. General

The Contractor is responsible for the protection of concrete placed under any and all weather conditions and is responsible for producing concrete equal in quality to that placed under normal conditions. Permission given by the Engineer or designated representative to allow placement of the concrete during cold weather does not relieve the Contractor of the responsibility for producing concrete equal in quality to that placed under normal conditions. Concrete placed under adverse weather conditions that proves to be unsatisfactory shall be removed and replaced at Contractor' expense.

B. Cast-in-Place Concrete

Concrete may be placed when the ambient temperature is not less than 35°F (2°C) in the shade and rising or above 40°F (4°C). Concrete shall not be placed when the ambient temperature in the shade is below 40°F (4°C) and falling unless approved by the Engineer or designated representative. Concrete shall not be placed in contact with any material coated with frost or having a temperature less than 32°F (0°C).

Aggregates shall be free from ice, frost and frozen lumps. When required, in order to produce the minimum specified concrete temperature; the aggregate and/or the water shall be heated uniformly, in accordance with the following:

The water temperature shall not exceed 180°F(82°C) and/or the aggregate temperature shall not exceed 150°F(66°C). The heating apparatus shall heat the mass of aggregate uniformly. The temperature of the mixture of aggregates and water shall be between 50°F(10°C) and 85°F(29°C) before introduction of the cement.

All concrete shall be effectively protected as follows:

1. The temperature of slab concrete of all unformed surfaces shall be maintained at 50°F(10°C) or above for a period of 72 hours from time of placement and above 40°F(4°C) for an additional 72 hours.

2. The temperature at the surface of all concrete in bents, piers, culvert walls, retaining walls, parapets, wingwalls, bottom of slabs and other similar forms shall be maintained at 40°F(4°C) or above for a period of 72 hours from time of placement.

3. The temperature of all concrete, including the bottom slabs of culverts placed on or in the ground, shall be maintained above 32°F(0°C) for a period of 72 hours from time of placement.

   Protection shall consist of providing additional covering, insulated forms or other means and if necessary, supplementing such covering with artificial heating. Avoid applying heat directly to concrete surfaces. Curing shall be provided during this period until all requirements for curing have been satisfied.

   When impending weather conditions indicate the possibility of the need for such temperature protection, all necessary heating and covering material shall be on hand ready for use before permission is granted to begin placement.

   Sufficient extra test specimens will be made and cured with the placement to ascertain the condition of the concrete as placed prior to form removal and acceptance.

C. Precast Concrete

A fabricating plant for precast products which has adequate protection from cold weather in the form of permanent or portable framework and covering, which protects the concrete when placed the forms and is equipped with approved steam curing facilities may place concrete under any low temperature conditions provided:

1. The framework and covering are placed and heat is provided for the concrete and the forms within 1 hour after the concrete is placed. This shall not be construed to be 1 hour after the last concrete is placed, but that no concrete shall remain unprotected longer than 1 hour.

2. Steam heat shall keep the air surrounding the concrete between 50°F (10°C) and 85°F(29°C) for a minimum of 3 hours prior to beginning the temperature rise, which is required for steam curing.

410S.14 Placing Concrete in Hot Weather

When the temperature of the air is above 85°F (29°C), an approved retarding agent will be required in all exposed concrete, concrete used in superstructures, top slabs of direct traffic culverts and all cased drilled shafts regardless of temperatures. Concrete mix temperatures shall not exceed 90°F (32°C) except for mixes that include high range water reducers where a maximum mix temperature of 100°F (38°C) will be allowed.

If the concrete mix temperature is expected to exceed 90°F (32°C) (or 100°F (38°C) in mixes with high range water reducers) ice may be utilized to lower the concrete mix temperature. Ice may be added to the concrete mix as a portion by weight of the mix water. However the addition of ice shall not exceed 50% of the total mix water weight.

When weather conditions are such that the addition of ice at 50% of the mix water is not sufficient to reduce the concrete mix temperature to an acceptable temperature, concrete work shall not be allowed.

When ice is to be used in hot weather concrete placement, the Contractor shall furnish a mix design (Section 4.4 of Standard Specification Item 360S, "Concrete Pavement" and Section 6 of Standard Specification Item No. 403, "Concrete for Structures") acceptable to the Engineer or designated representative for class of concrete specified on the drawings.

410S.15 Placing Concrete in Water

Concrete shall be deposited in water only when indicated on the drawings or with written permission of the Engineer or designated representative. The forms, cofferdams or caissons shall be sufficiently tight to prevent any water current passing through the space in which the concrete is being deposited. Pumping will not be permitted during the concrete placing nor until it has set for at least 36 hours.

The concrete shall be placed with a tremie, pump or other approved method and shall not be permitted to fall freely through the water nor shall it be disturbed after it has been placed. Its surface shall be kept approximately level during placement.

The tremie shall be supported or the pump operated so that it can be easily moved horizontally to cover all the work area and vertically to control the concrete flow. The lower end of the tremie or pump hose shall be submerged in the concrete at all times.

The placing operations shall be continuous until the work is complete.

For concrete to be placed under water, the concrete mix shall be designed in accordance with Standard Specification Item No. 403, "Concrete For Structures" with a minimum cement content of 650 lb. Per cubic yard (10.4 Mg per cubic meter). An anti-wash admixture may be included in the mix design as necessary to produce a satisfactory finished product.

410S.16 Placing Concrete in Superstructure

A. General

Unless otherwise indicated on the drawings, simple span roadway slabs shall be placed without transverse construction joints by using a mechanical longitudinal screed or a self-propelled transverse finishing machine or a mechanical longitudinal screed. For small placements or unusual conditions such as narrow widening, variable cross-slopes, or transitions, manually operated screeding equipment may be used if approved by the Engineer or designated representative.

B. Transverse Screeding

Unless otherwise indicated on the drawings, slabs on continuous units shall be placed in one continuous operation without transverse construction joints using a longitudinal screed or a self-propelled transverse finishing machine. Rails for transverse finishing machines supported from the beams or girders shall be installed so they may be removed without damage to the slab. Bond between removable supports and the concrete shall be prevented in a manner acceptable to the Engineer or designated representative. Rail support parts, which remain embedded in the slab, shall not project above the upper mat of reinforcing steel. Rail or screed supports attached to I-beams or girders shall be subject to "General Requirements" stated above. Unless indicated otherwise on the drawings, the minimum rate of concrete placement is 30 lineal feet (9.144 lineal meters) of bridge slab per hour. The concrete shall be deposited parallel to the skew of the bridge so that all girders are loaded uniformly along their length. Slab concrete shall be deposited between the exterior beam and the adjacent beam before placing concrete in the overhang portion of the slab. Personnel and equipment shall be furnished that is capable of placing, finishing and curing the slab at an acceptable rate to ensure compliance with this Item. Concrete shall be placed in transverse strips. On profile grades greater than 1.5 %, placement shall be started at the lower end.

C. Longitudinal Screeding

The screed shall be adequately supported on a header or rail system sufficiently stable to withstand the longitudinal or lateral thrust of the equipment. Unless otherwise indicated on the drawings, temporary intermediate headers will be permitted for placements exceeding 50 feet (15.24 meters) in length for the

longitudinal screed, provided the rate of placement is rapid enough to prevent a cold joint and these headers are designed for early removal to permit satisfactory consolidation and finish of the concrete at their locations. The slab concrete shall be deposited between the exterior beam and the adjacent beam before placing concrete in the overhang portion of the slab.

For longitudinal screeding, concrete shall be placed in longitudinal strips starting at a point in the center of the segment adjacent to one side, except as provided herein and the strip completed by placing uniformly in both directions toward the ends except that for spans on a grade of 1.5 percent or more, placing shall start at the lower end. The width of strips shall be such that the concrete therein will remain plastic until the adjacent strip is placed. Where monolithic curb construction is specified, the concrete shall be placed therein in proper sequence to be monolithic with the adjacent longitudinal strips of the slabs.

D. Placements on Continuous Steel Units

Unless otherwise indicated on the drawings, slabs on continuous steel units shall be placed in a single continuous operation without transverse construction joints using a mechanical longitudinal screed or a self-propelled transverse finishing machine. The initial set of the concrete shall be retarded sufficiently to ensure that concrete remains plastic in at least 3 spans immediately preceding the slab being placed. Construction joints shall be used, when required for slab placements on steel beams or girders, as shown on the drawings. When staged placement of a slab is specified in the drawings, it shall be necessary to ensure that the previously placed concrete attains a compressive strength of 3000 psi (20.7 MPa) before placing the next stage concrete. Multiple stages may be placed in a single day if approved by the Engineer or designated representative. When drawings permit staged concrete placement without specifying a particular order of placement, a placing sequence that will not overstress any of the supporting members shall be submitted for the approval of the Engineer or designated representative.

E. Slab and Girder Units

Unless indicated otherwise on the drawings, girders, slab and curbs of slab and girder spans shall be placed monolithically. Concrete girders shall be filled first, and the slab concrete placed within the time limits specified in this Item. If a transverse screed is used, the concrete shall be placed in the stem for a short distance and then the concrete placed in transverse strips. If a longitudinal screed is used, the concrete shall be placed in the outside girder stem first beginning at the low end or side, and then continue the concrete placed in longitudinal strips.

410S.17 Placing Concrete in Concrete Arches

Concrete shall be placed in arch rings so the loading is kept symmetrical on the falsework. The arch rings and ribs shall be placed in one continuous operation unless otherwise indicated on the drawings or permitted by the Engineer or designated representative. The spandrel walls or columns and the beams shall not be placed until the arch is swung. Floor slab, railing, parapet walls, etc., shall not be placed until all spandrels are complete. Slab placement shall be symmetrical about the transverse centerline so the loading of the arch is kept approximately symmetrical.

The placing sequence shall be as indicated on the drawings.

410S.18 Placing Concrete in Box Culverts

In general, construction joints will be permitted only where indicated on the drawings.

Where the top slab and walls are placed monolithically in culverts more than 4 feet (1.22 meters) in clear height, an interval of not less than 1 nor more than 2 hours shall elapse before placing the top slab to allow for settlement and shrinkage in the concrete wall.

The base slab shall be trowel finished accurately at the proper time to provide a smooth uniform surface. Top slabs, which carry traffic, shall be finished as specified for roadway slabs in "Finish of Roadway Slabs", below. Top slabs of fill type culverts shall be given a reasonably smooth float finish.

410S.19 Placing Concrete in Foundations and Substructure

Concrete shall not be placed in footings until the depth and character of the foundation has been inspected by the Engineer or designated representative and permission has been given to proceed.

Placing of concrete footings upon seal courses will be permitted after the caissons or cofferdams are free from water and the seal course cleaned. Any necessary pumping or bailing during the concrete placement shall be done from a suitable sump located outside the forms.

All temporary wales or braces inside cofferdams or caissons shall be constructed or adjusted as the work proceeds to prevent unauthorized construction joints in footings or shafts.

When footings can be placed in a dry excavation without the use of cofferdams or caissons, forms may be omitted if desired by the Contractor and approved by the Engineer or designated representative and the entire excavation filled with concrete to the elevation of the top of footing.

Concrete in columns shall be placed monolithically unless otherwise indicated on the drawings. Columns and caps and/or tie beams supported thereon may be placed in the same operation or separately. To allow for settlement and shrinkage of the column concrete, it shall be placed o the lower level of the cap or tie beam and placement delayed for not less than 1 hour nor more than 2 before proceeding with the cap or tie beam placement.

410S.20 Treatment and Finishing of Horizontal Surfaces Except Bridge Slabs

All unformed upper surfaces shall be struck off to grade and finished. The use of mortar topping for surfaces under this classification will not be permitted.

After the concrete has been struck off, the surface shall be floated with a suitable float. Bridge sidewalks shall be given a wood float or broom finish or may be striped with a brush as specified by the Engineer or designated representative.

The tops of caps and piers between bearing areas shall be sloped slightly from the center toward the edge and the tops of abutments and transition bents sloped from the back wall to the edge, as directed by the Engineer or designated representative, so that water will drain from the surface. The concrete shall be given a smooth trowel finish. Bearing areas for steel units shall be constructed in such a manner to have a full and even bearing upon the concrete. When the concrete is placed below grade, bearing areas may be raised to grade on beds of Portland cement mortar consisting of 1 part cement, 2 parts sand and a minimum amount of water.

Bearing seat buildups or pedestals for concrete units shall be cast integrally with the cap or with a construction joint. The construction joint area under the bearing shall have the surface roughened thoroughly as soon as practical after initial set is obtained. The bearing seat buildups shall be placed using a latex based grout, an epoxy grout, or an approved proprietary bearing mortar, mixed in accordance with the manufacturer's recommendation. Pedestals shall be placed using Class C concrete, reinforced as indicated on the drawings.

The bearing area under the expansion end of concrete slabs and slab and girder spans shall be given a steel-trowel finish to the exact grades required on the drawings. Bearing areas under elastomeric bearing pads or nonreinforced bearing seat buildups shall be given a textured wood float finish. The bearing area shall not vary from a level plane more than 1/16in. (1.6 mm) in all directions.

410S.21 Finish of Bridge Slabs

In all roadway slab-finishing operations, camber for specified vertical curvature and transverse slopes shall be provided.

For concrete flat slab and concrete slab and girder spans cast in place on falsework, an additional amount of camber shall be provided to offset the initial and final deflections of the span indicated in the drawings. For concrete slab and girder spans using pan forms, a camber of approximately 3/8 in. for 30 ft. (9.5 mm for 9.14 meter) spans and ½ in. for 40 ft. (12.7 mm for 12.19 meter) spans shall be provided to offset initial and final deflections unless otherwise directed by the Engineer or designated representative. When dead load deflection requirements for concrete flat slab and concrete slab and girder spans not using pan forms is not indicated on the drawings, the additional amount of camber shall be ⅛ inch per 10 foot (3.2 mm per 3 meter) of span length but not to exceed ½ inch (12.7 mm).

Bridge slabs supported on prestressed concrete beams, steel beams or girders shall receive no additional camber, except that for slabs without vertical curvature, the longitudinal camber shall be approximately ¼ inch (6.35 mm).

Work bridges or other suitable facilities shall be provided from which to perform all finishing operations and to provide access, if necessary, for the Engineer or designated representative to check measurements for slab thickness and reinforcement cover.

As soon as the concrete has been placed and vibrated in a section of sufficient width to permit working, the surface shall be struck off, leveled and screeded, carrying a slight excess of concrete ahead of the screed to insure filling of all low spots. The screed shall be designed rigid enough to hold true to shape and shall have sufficient adjustments to provide for the required camber. A vibrating screed shall be used in all slabs more than 20 feet (6.1 meters) in width. A vibrating screed may be used if heavy enough to prevent undue distortion. The screeds shall be provided with a metal edge.

Longitudinal screeds shall be moved across the concrete with a saw like motion while their ends rest on headers or templates set true to the roadway grade or on the adjacent finished slab. The transverse screeds shall be moved longitudinally approximately 1/5 of the drum length for each complete out-and-back pass of the carriage.

The surface of the concrete shall be screeded a sufficient number of times and at such intervals to produce a uniform surface, true to grade and free of voids. If necessary, the screeded surface shall be worked to a smooth finish with a long handled wood or metal float of the proper size or hand floated from bridges over the slab. Floating may not be necessary if the pan float attached to a transverse screed produces an acceptable finish. Overworking the concrete surface and overuse of finish water shall be avoided.

The Contractor shall perform in the presence of the Engineer or designated representative sufficient checks with a long handled 16-foot (5 meter) straightedge on the plastic concrete to insure that the final surface will be within the specified tolerances. The check shall be made with the straightedge parallel to the centerline. Each pass thereof shall lap half of the preceding pass. All high spots shall be removed and all depressions over 1/16 inch (1.6 mm) in depth shall be filled with fresh concrete and floated. The checking and floating shall be continued until the surface is true to grade and free of depressions, high spots, voids or rough spots.

Screed-rail support holes shall be filled with concrete and finished to match the top of the slab.

The concrete surface shall be finished to a uniform texture using a carpet drag, burlap drag or broom finish. The surface shall be finished to a smooth sandy texture without blemishes, marks or scratches deeper than 1/16 inch (1.6 mm). The surface texturing shall be applied using a work bridge or platform immediately after completing the straightedge checks. The carpet or burlap drag shall be drug longitudinally along the concrete surface, adjusting the surface contact area or pressure to provide a satisfactory coarsely textured surface. A broom finish may be performed using a fine bristle broom transversely.

The concrete surface shall be coated immediately after the carpet or burlay drag, or broom finish with a single application of evaporation retardant at a rate recommended by the manufacturer. The time between the texturing at any location and subsequent application of evaporation retardant shall not exceed 10 minutes. The evaporation retardant may be applied using the same workbridge used for surface texturing. The concrete surface shall not be worked once the evaporation retardant has been applied.

Interim and final curing shall be applied in accordance with Section P410S.23, "Curing Concrete".

The Contractor is responsible for the ride quality of the finished bridge slab. The Engineer or designated representative will use a 10-ft. (3.05 meter) straightedge to verify ride quality [⅛ in. or less in 10 ft (3.2 mm or less in 3.05 meters)] and to determine locations where corrections are needed. If the Engineer or designated representative determines that the ride quality is unacceptable, then the Contractor shall submit to the Engineer or designated representative for approval a plan to produce a ride of acceptable quality. All corrections for ride-quality shall be made before saw-cutting grooves.

At the option of the Contractor or when indicated on the drawings, the hardened concrete surface of bridge slabs, bridge approach slabs and direct-traffic culverts shall be given its final texture by saw grooving to meet the above requirements after completion of the required curing period. Grooves shall be cut perpendicular to the structure centerline. The grooves shall be cut continuously across the slab to within 18 in. (450 mm) of the barrier rail, curb or median divider. At skewed metal expansion joints in bridge slabs, groove cutting shall be adjusted by using narrow-width cutting heads so that all grooves end within 6 in. (150 mm) of the joint, measured perpendicular to the centerline of the metal joint. There should not be any ungrooved surface wider than 6 in. (150 mm) adjacent to either side of the joint. The minimum distance to the first groove, measured perpendicular to the edge of the concrete joint or from the junction between the concrete and the metal leg of the joint shall be 1 in. (25 mm), Grooves shall be continuously cut across construction joints or other joints in the concrete that are less than ½ in. (13 mm) wide. The same procedure described above shall be used where barrier rails, curbs or median dividers are not parallel to the structure centerline in order to maintain the 18-in. (450-mm) maximum dimension from the end of the grooves to the gutter line. The grooves shall be cut continuously across formed concrete joints.

When the plans require that a concrete overlay be placed on the slab (new construction) or on prestressed concrete box beams or other precast elements, a carpet drag, burlap drag or broom finish shall be given to all concrete surfaces to be overlaid. Saw grooving is not necessary in this case. An average texture depth for the finish of approximately 0.035 in. (0.9 mm) shall be provided with no individual test falling below 0.020 in. (0.5 mm), unless otherwise indicated on the drawings, when tested in accordance with TxDoT's Tex-436-A, "Measurement of Texture Depth by the Sand Patch Method". If the texture depth falls below what is specified, the finishing procedure shall be revised to produce the desired texture.

When the drawings require an asphalt seal with or without overlay on the slab (new construction), on prestressed concrete box beams or on other precast elements, all concrete surfaces to be covered shall be given a lightly textured broom or carpet drag finish, similar to a sidewalk finish having an average texture depth of approximately 0.025 inch (0.635 mm), when tested in accordance with TxDoT's Tex-436-A, ".

410S.22 Placing Survey Monuments

The Contractor shall obtain City Survey Monuments, for a fee of 10 dollars, from the Department of Public Works, Construction Inspection Division. Monuments shall be embedded in freshly poured concrete at locations indicated on the drawings and accessible to survey equipment at the completion of the project. The monuments shall be installed flush with the adjacent concrete.

410S.23 Curing Concrete

The Contractor shall inform the Engineer or designated representative fully of the methods and procedures proposed for curing, shall provide the proper equipment and material in adequate amounts and shall have the

proposed method, equipment and material approved by the Engineer or designated representative prior to placing concrete.

Inadequate curing and/or facilities therefore shall be cause for the Engineer or designated representative to notify the Contractor, in writing, that the work is unsatisfactory and the concrete will have to be removed and replaced.

All concrete shall be cured for a period of 4 curing days except as noted herein. A curing day is a calendar day when the temperature, taken in the shade away from artificial heat is above 50°F (10°C) for at least 19 hours or on colder days if the temperature of all surfaces of the concrete is maintained above 40°F (4°C) for the entire 24 hours. The required curing shall begin when all concrete has attained its initial set. TxDoT's Tex-440-A, "Initial Time-of-Set of Fresh Concrete" may be used to establish when the concrete has attained its initial set.

Table 4: Exceptions to 4-Day Curing

Description	Type of Cement	Required Curing Days
Upper Surfaces of Bridge Slabs, Top Slabs of Direct Traffic Culverts and Concrete Overlays	I or II	8
	II or I/II	10
	All types with supplementary cementing materials	10
Concrete Piling buildups		6

For upper surfaces of bridge slabs, bridge support slabs, median and sidewalk slabs and culvert top slabs constructed using Class S Concrete (Standard Specification Item No. 403, "Concrete for Structures") interim curing using a Type 1-D curing compound shall be applied as soon as possible after application of the evaporation retardant and after the water sheen has disappeared, but no more than 45 minutes after application of the evaporation retardant. Membrane interim curing shall be applied using a work bridge or other approved apparatus to ensure a uniform application. Final curing with water cure in accordance with this section shall start as soon as possible without damaging the surface finish. Water curing shall be maintained for the duration noted in the table above. Polyethylene sheeting, burlap-polyethylene blankets, laminated mats or insulating curing mats shall be placed in direct contact with the slab when the ambient temperature is expected to drop below 40°F (4°C) during the first 72 hours of the curing period. The curing materials will be weighed down with dry mats to maintain direct contact with the concrete and to provide insulation against cold weather. Supplemental heating or insulation may be required in cold and wet weather if the insulating cotton mats become wet or if the concrete temperature drops below the specified curing temperature. Application of heat directly to concrete surfaces shall be avoided.

For the top surface of any concrete unit upon which concrete is to be placed and bonded at a later date (i.e. stub walls, risers, etc.), only water-cure in accordance with this Section shall be used.

All other concrete shall be cured as specified in pertinent Items.

The following methods are permitted for curing concrete subject to the restrictions of this Item .

A. Form Curing

When forms are left in intimate contact with the concrete, other curing methods will not be required except for exposed surfaces and for cold weather protection.

When forms are striped before the 4-day minimum curing time has elapsed, curing shall continue by an approved method.

B. Water Curing

All exposed surfaces of the concrete shall be kept wet continuously for the required curing time. The water used for curing shall meet the requirements for concrete mixing water as indicated in Item No. 403,

"Concrete for Structures". Seawater will not be permitted. Water, which stains or leaves an unsightly residue, shall not be used.

1. Wet Mats

   Wet cotton mats placed in direct contact with the slab shall be maintained for the required curing time. If needed damp burlap blankets made from 9-ounce (255 gm) stock may be placed on the damp concrete surface for temporary protection prior to the application of the cotton mats, which may be placed dry and wetted down after placement.

   The mats shall be weighted down adequately to provide continuous contact with all concrete surfaces where possible. The surfaces of the concrete shall be kept wet for the required curing time. Surfaces, which cannot be cured by contact, shall be enclosed with mats, anchored positively to the forms or to the ground, so that outside air cannot enter the enclosure. Sufficient moisture shall be provided inside the enclosure to keep all surfaces of the concrete wet.

2. Water Spray

   This method shall consist of overlapping sprays or sprinklers that keep all unformed surfaces continuously wet.

3. Ponding

   This method requires the covering of the surfaces with a minimum of 2 inches (50 mm) of clean granular material, kept wet at all times or a minimum of 1 inch (25 mm) depth of water. Satisfactory provisions shall be made to provide a dam to retain the water or saturated granular material.

C. Membrane Curing

Unless otherwise indicated on the drawings, either Type 1-D or Type 2 membrane curing compound may be used where permitted except that Type 1-D (Resin Base Only) will be permitted for slab concrete in bridge decks and top slabs of direct traffic culverts and all other surfaces that require a higher grade of surface finish. For substructure concrete, only one Type of curing compound will be permitted on any one structure.

TABLE 5

	REQUIRED		**PERMITTED**	
STRUCTURE UNIT DESCRIPTION	**Water for Complete Curing**	**Membrane for Interim Curing**	**Water for Complete Curing**	**Membrane for Complete Curing**
1. Upper surfaces of Bridge Roadway, Median and Side walk Slabs, Top Slabs of Direct Traffic, and Culverts.	X	X (resin base)		
2.Top Surface of any Concrete Unit upon which Concrete is to be placed and bonded at a later interval (Stub Walls, Risers, etc.). Other Super-structure Concrete (curbs, wing- walls, Parapet Walls, etc.).	X		*X	*X
3. Top Surface of Precast and/or Pre-stressed Piling.	X	X		
4. All Substructure Concrete Culverts. Box Sewers, Inlets, Manholes, Retaining Walls, Riprap.			*X	*X

* Polyethylene Sheeting, Burlap-Polyethylene Mats or Laminated Mats in close intimate contact with the concrete surfaces, will be considered equivalent to water or membrane curing for items under 4.

The membrane curing shall be applied just after free moisture has disappeared in a single, uniform coating at the rate of coverage recommended by the manufacturer and as approved by the Engineer or designated representative, but not less than 1 gallon per 180 square feet (1 liter per 4.4 square meters) of area. Tests for acceptance shall be at this specified rate.

Membrane curing shall not be applied to dry surfaces, but shall be applied just after free moisture has disappeared. Formed surfaces and surfaces which have given a first rub shall be dampened and shall be moist at the time of application of the membrane.

When membrane is used for complete curing, the film shall remain unbroken for the minimum curing period specified. Membrane, which is damaged, shall be corrected immediately by reapplication of membrane. Polyethylene sheeting, burlap-polyethylene mats or laminated mats in close intimate contact with the concrete surfaces, will be considered equivalent to membrane curing. Unless otherwise indicated on the drawing, the choice of membrane type shall be at the option of the Contractor, except that the Engineer or designated representative may require the same curing method for like portions of a single structure.

410S.24 Removal of Forms and Falsework

Unless otherwise indicated on the drawing, forms for vertical surfaces may be removed when the concrete has aged 12 hours after initial set, provided it can be done without damage to the concrete. Forms for mass concrete placements shall be maintained in place for 4-days following concrete placement. Mass placements are defined as concrete placements with a least dimension greater than equal to 5 ft. (1.575 meters), or those designated as such on the drawings.

Forms for inside curb faces may be removed in approximately 3 hours provided it can be done without damage to the curb.

Unless indicated otherwise on the drawings weight supporting forms and falsework spanning more than 1 ft. (300 mm) for structures, bridge components and culvert slabs shall remain in place until the concrete has attained a minimum compressive strength of 2500 psi (17.25 MPa). Forms for other structural components may be removed as specified by the Engineer or designated representative.

Inside forms (walls and top slabs) for inlets, box culverts and sewers may be removed after the concrete has attained a minimum compressive strength of 1800 psi (12.4 MPa), provided an overhead support system, approved by the Engineer or designated representative, is used to transfer the weight (mass) of the top slab to the walls of the box culvert or sewer before the support provided by the forms is removed.

If all test cylinders made for the purpose of form removal have been broken without attaining the required strength, forms shall remain in place for a total of 14 curing days.

The above provisions relative to form removal shall apply only to forms or parts thereof which are constructed to permit removal without disturbing forms or falsework required to be left in place for a longer period on other portions of the structure.

Remove all metal appliances used inside forms for alignment shall be removed to a depth of at least ½ in. (13 mm) from the concrete surface. The appliances shall be manufactured to allow the removal without undue chipping or spalling of the concrete, and so that it leaves a smooth opening in the concrete surface when removed. Rods, bolts and ties shall not be burned-off.

Backfilling against walls of Type I or Type II cement shall not take place for a minimum of 7 days. Backfilling against walls of Type III cement shall not take place until the cylinder compressive strength has reached 3000 psi (20.7 MPa) or the wall has cured for 5 days.

All forms and falsework shall be removed unless indicated otherwise on the drawings.

410S.25 Defective Work

Any defective work discovered after the forms have been removed shall be repaired as soon as possible in accordance with "Finishing Exposed Surfaces", below.

If the surface of the concrete is bulged, uneven or shows excess honeycombing or form marks, which in the opinion of the Engineer or designated representative, cannot be repaired satisfactorily, the entire section shall be removed and replaced at the expense of the Contractor.

410S.26 Finishing Exposed Surfaces

A. Ordinary Surface Finish

An Ordinary Surface Finish shall be applied to all concrete surfaces either as a final finish or preparatory to a higher grade or class of finish. Higher grades and classes of finish shall conform to Item No. 411S, "Surface Finishes for Concrete". Where neither a grade or class of finish is specified, an Ordinary Surface Finish only, will be required.

Ordinary Surface Finish shall be provided as follows:

1. After formal removal, all porous, honeycombed areas and spalled areas shall be corrected by chipping away all loose or broken material to sound concrete.
2. Featheredges shall be eliminated by saw-cutting and chipping spalled areas to a depth at least ½ in. (13 mm) deep perpendicular to the surface. Shallow cavities shall be repaired using a latex adhesive grout, cement mortar or epoxy grout approved by the Engineer or designated representative. If judged repairable by the Engineer or designated representative, large defective areas shall be corrected using concrete or other material approved by the Engineer or designated representative.
3. Holes and spalls caused by removal of form ties, etc., shall be cleaned and filled with latex adhesive grout, cement mortar or epoxy grout approved by the Engineer or designated representative. Only the holes shall be filled. The patch shall not be blended with the surrounding concrete. On surfaces to receive a rub finish in accordance with Standard Specification Item No. 411S, "Surface Finishes for Concrete" the exposed parts of metal chairs shall be chipped out to a depth of ½ inch (13 mm) and the surface repaired.
4. All fins, runs, drips or mortar that will be exposed shall be removed from surfaces. Form marks and chamfer edges shall be smoothed by grinding and/or dry rubbing.
5. Grease, oil, dirt, curing compound, etc., shall be removed from surfaces requiring a higher grade of finish. Discolorations resulting from spillage or splashing of asphalt, paint or other similar material shall be removed.
6. Repairs shall be dense, well bonded and properly cured and when made on surfaces, which remain exposed and do not require a higher finish, shall be finished to blend with the surrounding concrete.

Unless otherwise indicated on the drawings Ordinary Surface Finish shall be the final finish for the following exposed surfaces:

1. inside and top of inlets,
2. inside and top of manholes,
3. inside of sewer appurtenances,

4. inside of culvert barrels,
5. bottom of bridge decks between beams or girders,
6. vertical and bottom surfaces of interior concrete beams or girders.

B. Rubbed Finish

In general, the following areas shall require a rubbed finish and shall receive a first and second rubbing:

1. The top, exterior and roadway facia of curbs and parapet walls.
2. All concrete surfaces of railing.
3. The exterior vertical facia of slab spans, rigid frames, arches and box girders.
4. The outside and bottom surfaces of facia beams or girders (except precast concrete beams).
5. The underside of overhanging slabs to the point of juncture of the supporting beams.
6. All vertical surfaces of piers, columns, bent caps, abutments, wing walls and retaining walls which are exposed to view after all backfill and embankments is placed.
7. Exposed formed surfaces of inlet and outlet structures on culverts, transition structures, headwalls and inlets.
8. Such other surfaces specified elsewhere to receive a rubbed finish and such additional surfaces required by the Engineer or designated representative to receive a rubbed finish.

After removal of forms and as soon as the mortar used in pointing has set sufficiently, surfaces to be rubbed shall be wet with a brush and given a first surface rubbing with a medium coarse carborundum stone. This rubbing shall be done before the concrete has cured more than 48 hours.

The second rubbing shall present a cleaned uniform appearance free from drip marks and discoloration. It shall be given with a No. 30 carborundum stone or an abrasive of equal quality.

If the Contractor elects to use epoxy paint in lieu of the second rubbings the Contractor may do so upon approval of the Engineer or designated representative.

C. Special Surface Finishes

Striated, exposed aggregate and other special surface finishes shall conform to Standard Specification Item No. 411S, "Surface Finishes for Concrete" and/or with the requirements indicated on the drawings.

410S.27 Repair of Existing Structures

Assessment, repair and rehabilitation of structural concrete in existing structures shall be in accordance with current version of ACI 562 Code Requirements for Assessment, Repair, and Rehabilitation of Existing Concrete Structures.

Source: Rule No. R161-21.17, 9-14-2021.

410S.28 Measurement and Payment

No direct measurement or payment will be made for the work to be done or the equipment to be furnished under this item, but shall be included in the unit price bid for the item of construction in which this item is used.

Source: Rule No. R161-21.17, 9-14-2021.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Standard Specification Item 410S, "Concrete Structures"	
City of Austin Standard Specification Items	
Designation	Description
Item No. 360S	Concrete Pavement
Item No. 401S	Structural Excavation and Backfill
Item No. 403	Concrete for Structures
Item No. 406S	Reinforcing Steel
Item No. 411S	Surface Finishes for Concrete
Item No. 413S	Cleaning and/or Sealing Joints and Cracks (PC Concrete)
Item No. 425S	Prestressed Concrete Structures
U.S. Department of Commerce Voluntary Product Standard, PS 1 American Concrete Institute	
Designation	Description
ACI 347	Guide to Formwork for Concrete
American Society for Testing and Materials (ASTM)	
Designation	Description
ASTM D-994	Preformed Expansion Joint Filler for Concrete (bituminous Type)
ASTM D-1751	Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D-1752	Prefprmed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
Texas Department of Transportation: Departmental Material Specifications	
Designation	Description
DMS-4640	Chemical Admixtures for Concrete
DMS-4650	Hydraulic Cement Concrete Curing Materials and Evaporation Retardants"
DMS-6100	Epoxy and Adhesives
DMS-6160	Waterstops, Nylon Reinforced Neoprene Sheet, and Elastomeric Pads
DMS-6310	Joint Materials and Fillers
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
Tex-436-A	Measurement of Texture Depth by the Sand Patch Method
Tex-440-A	Initial Time-of-Set of Fresh Concrete

RELATED CROSS REFERENCE MATERIALS	
Standard Specification Item 410S, "Concrete Structures"	
American Society for Testing and Materials, ASTM	
Designation	Description
A 36/A 36M	Carbon Structural Steel
A 82	Steel Wire, Plain, for Concrete Reinforcement
A 185	Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
A 496	Steel Wire, Deformed, for Concrete Reinforcement

A 497	Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement
A 615/A 615M	Deformed and Plain Billet-steel Bars for Concrete Reinforcement
A 675/A 675M	Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties
A 706/A 706M	Low- Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
A 775/A 775M	Epoxy-Coated Reinforcing Steel Bars
A 884/A 884M	Epoxy-Coated Steel Wire and Welded Wire Fabric For Reinforcement
A 934/A 934M	Epoxy-Coated Prefabricated Reinforcing Steel Bars
A 996/A 996M	Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement
D3963/D3963M	Fabrication and Jobsite Handling of Epoxy-coated Reinforcing Steel Bars
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
Tex-739-I	Sampling and Testing Epoxy Coated Reinforcing Steel
City of Austin Standard (Details)	
Designation	Description
Standard 406S-1	Reinforced Steel Tolerances
Texas Department of Transportation: Departmental Material Specifications	
Designation	Description
DMS 8130	Epoxy Powder Coating for Reinforcing Steel
City of Austin Standard Specification Items	
Designation	Description
Item No. 404S	Pneumatically Placed Concrete
Item No. 407S	Fibrous Concrete
Item No. 414S	Concrete Retaining Walls
Item No. 420S	Drilled Shaft Foundations
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item No. 360	Concrete Pavement
Item No. 420	Concrete Structures
Item No. 421	Hydraulic Cement Concrete
Item No. 422	Reinforced Concrete Slab
Item No. 423	Retaining Walls
Item No. 440	Reinforcing Steels

ITEM NO. 425S PRESTRESSED CONCRETE STRUCTURES 9-26-12

425S.1 Description

This item shall govern the construction and erection of precast, prestressed concrete members, as indicated on the Drawings, with approved shop and/or working drawings and in conformance with these specifications.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text and accompanying tables, the inch-pound units are given preference followed by SI units shown within parentheses.

425S.2 Submittals

The submittal requirements of this specification item include:

A. Proposed sequence of erection by structure and span of unit with approximate scheduling.

B. Shop Drawings for precast, prestressed members. Additional Drawings are required if work will be completed at more than one plant.

C. Certification that casting beds and facilities are in conformance with this specification.

D. Proposed curing procedures.

425S.3 General

Prior to the beginning of casting, the Contractor shall provide the Engineer or designated representative ample notice as to the location of the casting site and the date on which the work will begin. The Contractor shall furnish an inspection laboratory at the casing site for use by the City's testing personnel.

The Contractor shall submit to the Engineer or designated representative a proposed sequence of erection by structure and span or unit number with the approximate date that the members are to be erected. Shop Drawings shall be submitted following this proposed sequence.

Shop Drawings for precast prestressed members shall be submitted for approval in accordance with these specifications and shall consist of the following:

Erection Plan - 7 Copies
Index Sheet - 6 Copies
Bearing Sheet - 6 Copies
Fabrication Sheet - 6 Copies

When fabrication is to be conducted at more than one casting plant, two additional sets of Shop Drawings will be required for each additional casting location. Index sheets shall reflect the plant locations where each member is to be fabricated.

After completion of fabrication, a corrected set of final record drawings shall be submitted by the Contractor for inclusion in the final contract plans.

Submission of the above Shop Drawings shall be to the City of Austin, Project Manager of Construction.

A Casting Schedule shall be prepared on a form, approved by the Engineer or designated representative, and submitted to the Engineer or designated representative, prior to stressing.

The design of casting beds and facilities for pretensioned construction indicated in the drawings, shall be designed and sealed by a Licensed Professional Engineer registered in the State of Texas. The Contractor (Fabricator) shall furnish a certificate bearing his signature or that of a responsible Office of the Company, that the bed, facilities and hardware have been constructed in accordance with the above Drawings and specifications. The Contractor (Fabricator) shall specify the maximum loading for which the bed is to be used. Prior to approval for that loading, the facilities shall be proof-loaded to a minimum 10 percent overload for 8 hours. Additional proof loads shall be performed every 12 months at a 10 percent overload for 4 hours, if deemed necessary by the Engineer or designated representative. Minor changes in facilities will not require proofloading but will require submission of the details of changes accompanied with design calculations.

425S.4 Materials

Materials required for use under this item shall conform to the following:

Concrete for Structures	Item No. 403
Reinforcing Steel (Non Prestressed)	Item No. 406S
Prestressing	TxDOT Item 426
Elastomeric Materials	Item No. 438S

425S.5 Construction Methods

Prestressing shall be in accordance with the most current version of TxDOT Item 426, "Prestressing".

Reinforcing steel shall be fabricated and placed conforming to Item No. 406S, "Reinforcing Steel" and as indicated.

The construction of forms and the placing, curing and finishing of concrete shall be in accordance with the provisions contained herein and requirements of the plans.

(1) Forms

All side and bottom forms for precast prestressed concrete construction shall be constructed of steel unless otherwise noted on the Drawing. End headers and inside forms may be of other materials as approved on the Shop Drawings.

Forms shall be of sufficient thickness with adequate external bracing. Holding devices in forms will not be permitted if such would remain in the finished prestressed member. Joints shall be maintained reasonably mortar tight.

The grade and alignment of forms shall be checked each time they are set and shall be maintained during the casting of concrete.

Metal forms shall be reasonably free from rust, grease or other foreign material. All forms shall be cleaned thoroughly prior to each casting operation.

The soffit for casting members shall be constructed and maintained to provide not more than ¼ inch (6 mm) variation in any 50 foot (15 m) length of the bed from the theoretical plane of the bottom of the member.

Forms for internal voids in the members shall be anchored securely to prevent movement or misalignment during the placing of concrete. For forming internal voids with a mandrel, special attention shall be given to maintaining the correct position and alignment of the mandrel throughout the casting operation.

The facing of all forms shall be treated with form oil or other bond breaking coating prior to placing of concrete. The oil or other materials used for this purpose shall be of a consistency and composition to facilitate form removal. Materials, which appreciably stain or react with the concrete, will not be permitted.

All forms shall be constructed to facilitate removal without damage to the concrete. At the Contractor's option, forms for piling may be constructed with a ⅛ inch (3 mm) draft to permit ease of removal.

(2) Placing Concrete

All concrete shall be placed during daylight hours unless the fabrication plant or site is provided with an approved lighting system.

The method of concrete placement shall avoid segregation of the aggregate or displacement of the reinforcing steel, prestressing steel or conduit. Concrete shall be deposited as near as possible in its final position in the forms. Depositing large quantities of concrete at one location in the forms and running or working it along the forms will not be permitted.

Special attention shall be directed toward working the coarse aggregate back from the face of the concrete and to forcing the concrete under and around the reinforcing steel, prestressing steel or conduit.

Placement of concrete in large members shall be subject to approval of the Engineer or designated representative. Concrete may be placed in beams and girders in one lift or in multiple continuous horizontal layers. In the latter case the thickness of the first layer shall be slightly above the juncture of the bottom flange and web. Not more than one hour shall elapse between the placing of the successive layers. Vibration of subsequent layers of concrete shall extend into the previously placed layers. When casting concrete piling or concrete slab units, the concrete shall be placed in one continuous horizontal layer.

Concrete shall not be placed at outdoor casting beds during inclement weather or when weather conditions may result in rainfall or low temperature during the casting operation, which might impair the quality of the finished member. In case rainfall should occur after placing operations are underway, the Contractor shall provide adequate covering to protect exposed concrete. The completion of a member being cast will be permitted, provided adequate provisions are made to prevent damage to the concrete.

(a) Placing Concrete in Cold Weather

When members are produced in a fabricating plant, which has adequate provisions to protect the concrete when placed, and which has approved elevated temperature curing facilities, concrete may be placed under any low temperature conditions provided:

1. The temperature of the concrete is not less than 50°F (10°C) nor more than 85°F (29°C), when placed in the forms.
2. The framework and covering are in place and heat is provided for the concrete and forms within one hour after the concrete is placed. This shall not be constructed to be one hour after the last concrete is placed but that no concrete shall remain unprotected and unheated for longer than one hour.
3. The air surrounding the concrete shall be kept between 50°F (10°C) and 85°F (29°C) for a minimum of three hours prior to beginning the temperature rise which is required for elevated temperature curing. The temperature of the concrete shall not be less than 50°F (10°C) at any time after all materials are added and mixing commences.

For central fabricating plants or job site casting operations which do not provide facilities necessary to accomplish the above provisions, concrete may be placed when the atmospheric temperature is 35°F (2°C) or greater. The temperature of the concrete at the time of placement shall not be less than 50°F (10°C) or more than 85°F (29°C). The concrete shall not be placed in contact with any material having a temperature less than 32°F (0°C) or any material coated with frost.

Aggregates shall be free from ice, frost and frozen lumps. When required, to produce the minimum temperature specified above, the aggregate and/or the water shall be heated uniformly in accordance with the following:

Water shall be heated to a temperature not to exceed 180°F (82°C). The equipment furnished shall be capable of heating the aggregate uniformly to eliminate overheated areas in the stockpile, which might cause flash set of the cement. The temperature of the mixture of the aggregates and water shall be between 50°F (10°C) and 85°F (29°C) before introduction of the cement.

Protection shall be provided to maintain the temperature of the concrete at all surfaces above 50°F (10°C) for the required total curing time as specified in this Item.

Protection shall consist of providing additional covering and, if necessary, supplementing such covering with artificial heating. When weather conditions indicate the possibility of the need for such temperature protection, all necessary heating equipment and covering material shall be on hand ready for use before permission is granted by the Engineer or designated representative to begin placement of concrete.

(b) Placing Concrete in Hot Weather

When concrete is to be placed during hot weather, it shall be placed without the addition of more water to the concrete than required by the design (slump and consistency) and it shall be finished properly without adding water to the surface. Control of the initial set of concrete and lengthening the time for finishing operations, under adverse wind, humidity and hot weather conditions, may be accomplished with the use of an approved retarder conforming to Item No. 403, "Concrete for Structures".

The maximum time interval between the addition of mixing water and/or cement to the batch and the placing of concrete in the forms shall not exceed the following:

Air or Concrete Temperature (Whichever is Higher)	**Maximum Time (Addition of Water or Cement to placing in Forms)**
Non-agitated Concrete	
Over 80°F (27°C)	15 Minutes
50°F to 79°F(10°C to 26°C)	30 Minutes
Agitated Concrete	
90°F (32°C) to Above	45 Minutes
75°F to 80°F(24°C to 27°C)	60 Minutes
80°F to 90°F(27°C to 32°C)	
50°F to 74°F(10°C to 23°C)	90 Minutes

The use of an approved retarder in the concrete will permit the extension of each of the above temperature time maximum by 30 minutes, except that for non-agitated concrete, the maximum time shall not exceed 30 minutes.

Under conditions of extreme temperature, wind or humidity, when the specified temperature-time maximums are excessive, the Engineer or designated representative may require the use of an approved retarder or may suspend concrete placing operations, if quality concrete is not being placed.

Minimum required concrete strengths during different phases of construction, shall be shown on approved shop drawings.

For Class H Concrete, the control of the concrete shall be by compressive tests of cylinders. An adequate number of cylinders will be made for each pertinent strength test required. Tests for determining "Release Strength" and/or "Handling Strength" of members, will be the average of the breaking strength of two cylinders.

All test specimens, beams or cylinders representing tests for removal of forms and/or falsework and for "Release Strength" shall be cured under the same conditions, be subjected to the same curing materials and to the same weather conditions as the concrete represented.

"Design Strength" cylinders for acceptance of members shall be cured with the member which the cylinders represent until release of stress or until partial tensioning strength is obtained. These cylinders shall then be cured for the remainder of the test period in accordance with TxDOT Test Method Tex-704-I.

(3) Vibration of Concrete

All concrete shall be compacted and the mortar flushed to the surface of the forms by continuous working with approved high frequency mechanical vibrators, operating at a minimum of 7,000 impulses per minute. Use of external vibrators in conjunction with internal vibrators will be permitted when the forms are of steel.

At least one stand-by vibrator shall be provided for emergency use to avoid delays.

The vibrators shall be inserted systematically into the concrete immediately after deposit, thoroughly consolidating and working the concrete around the reinforcement and into the corners and angles of the forms until it has been reduced to a plastic mass. When the concrete is placed in more than one layer, the vibrator shall be operated so that it will penetrate the previously placed layer of concrete. The vibration shall be of sufficient duration to accomplish thorough compaction and complete embedment of the reinforcing steel and prestressed tendons, but not so excessive as to result in segregation. Vibration shall be supplemented by hand spading, if necessary, to insure the flushing of mortar to the surface of all forms.

(4) Finishing of Concrete

Top surface of prestressed members against which cast-in-place concrete will be placed later shall be screeded or rough floated to bring grout to the surface and cover all aggregate. At the approximate time of initial set the surface shall be roughened by brushing, brooming or other approved methods. Sound concrete shall not be removed or aggregate loosened. Fresh concrete shall be removed from exposed reinforced steel.

The top surfaces of beams, upon which panels are to be placed, shall be finished smooth from the reinforcing bar out to the outside edges. The center portion of these beams shall be roughened.

Top surfaces of members, which will be the riding surface in the finished structure, shall be finished conforming to Item No. 360, "Concrete Pavement". Roadway surfaces, which are to be given an additional wearing course, shall be screeded and given a wood float finish.

Erection holes (lifting eyes, form anchors, etc.) in exterior beams shall be filled with mortar and made flush with the surrounding surface. Holes in interior beams need not be filled unless steel is exposed. Erection of fabrication holes in the bottom of all beams shall be filled with nonstain, nonshrink mortar and made flush with the surrounding surface.

Form marks in excess of that permitted in Item No. 425S, "Prestressed Concrete Beams" and all fins and rough edges along chamfer lines shall be removed in an acceptable manner.

Unless otherwise indicated, strands shall be removed flush with the end of the member or recessed approximately 3/8 inch (9.5 mm). In either case, the ends of the strands and a minimum of 1 inch (25 mm) around each strand shall be cleaned and coated with approximately 10 mils (0.25 mm) of an acceptable commercial grade epoxy or epoxy grout.

After slab placement, the outside and bottom surfaces of exterior beams or members shall be given the grade of surface finish specified for the structure. Other members shall be given the grade or class of finish required by the plans.

(5) Curing of Concrete

Careful attention shall be given to the proper curing of concrete. The Contractor shall inform the Engineer or designated representative regarding the methods and procedures proposed for curing; shall provide the proper equipment and necessary materials; and shall have approval of the Engineer or designated representative of such methods, equipment and materials prior to placing concrete.

Inadequate curing facilities or lack of attention to the proper curing of concrete shall be cause for the Engineer or designated representative to stop all construction until approved curing is provided. Inadequate curing may be cause for rejection of the member.

Side forms may be removed at the discretion of the Contractor at any time after the concrete has reached sufficient strength to prevent physical damage to the member. Weight supporting forms shall remain in place until the concrete has reached the "Handling Strength" shown on the Drawings. Removal of the forms shall be done in such a manner that curing is not interrupted on any member by more than 30 minutes.

Curing shall be commenced prior to the formation of surface shrinkage cracks but in no case delayed longer than one hour after the concrete has been placed in the forms.

An approved water or membrane cure (when permitted) shall be used as an interim measure prior to elevated temperature or other methods of curing.

Concrete shall be cured continuously except as provided for form removal, until the concrete strength as indicated by compressive test of cylinders cured with the members, has reached the "Release Strength" or "Handling Strength" designated on the plans or shop drawings. Riding surfaces of members shall be cured an additional four curing days. Concrete piling shall be steam or water cured for an additional three curing days. Other members shall be covered to prevent rapid drying for a period of 72 hours after release of stress or after reaching handling strength. All members shall be protected from freezing during the above period.

A period not to exceed four hours will be permitted for removal to a storage area prior to resuming the balance of curing and protection required.

A curing day is defined as a calendar day, when the temperature, taken in the shade away from artificial heat, is above 50°F (10°C) for at least 19 hours, or for colder days if satisfactory provisions are made to maintain the temperature at all surfaces of the concrete above 50°F (10°C) for the entire 24 hours.

All concrete shall be steam or water cured except that membrane curing may be used as interim curing on the top surface of concrete piling. Only Type 1 member curing compound will be permitted for interim curing.

(a) Water Curing

All exposed surfaces of the concrete shall be kept wet continuously for the required curing time. The water used for curing shall meet the requirements for concrete mixing water as specified in Item No. 403, "Concrete for Structures". Sea water will not be permitted. Water, which stains or leaves an unsightly residue, shall not be used.

Water curing will be permitted as follows:

1. Wet Mat Method

For water curing by the wet mat method, cotton mats, polyethylene sheeting or polyethylene burlap blankets may be used.

The mats, sheets or blankets shall not be placed in contact with the prestressed concrete member until such time that damage will not occur to the surfaces.

The mats, sheets or blankets shall be adequately anchored and weighted to provide continuous contact with all concrete surfaces. Any concrete surfaces, which cannot be cured by contact, shall be enclosed by mats, adequately anchored, so that outside air cannot enter the enclosure.

Sufficient moisture shall be provided inside to keep all of the surfaces of the concrete wet for the required curing time.

2. Water Spray Method

For water curing by the water spray method, overlapping sprays or sprinklers shall be used so that all concrete surfaces are kept wet continuously.

(b) Elevated Temperature Curing

Curing by elevated temperatures will be permitted as follows:

1. Steam Curing

(Steam curing is defined as use of steam above 85°F (29°C) for curing.) When steam curing of concrete is provided, the temperature inside the curing jacket at the surface of the concrete shall not exceed 165°F (74°C) for more than one hour during the entire steam curing period. Concrete exposed to temperature exceeding 180°F (82°C) will not be acceptable.

Sufficient moisture shall be provided inside the curing jacket so that all surfaces of the concrete are wet.

An unobstructed air space of not less than 6 inches (150 mm) shall be provided between all surfaces of the concrete and the curing jacket. Steam outlets shall be positioned so that live steam is not applied directly on the concrete, reinforcing steel or tendons.

The location of steam lines, location of control points for discharge of steam into the curing jacket and the number and type of openings for steam distribution within the curing jacket shall be arranged so that temperature variation between any points in the enclosure shall not exceed 20°F (-7°C).

Steam curing shall not commence until the concrete has been in place a minimum of three hours.

During the application of steam, the temperature inside the curing jacket shall be raised uniformly at a rate not to exceed 40°F (4°C) per hour.

Temperature decrease at the end of the curing operation shall not exceed the same rate.

When elevated temperature curing is used, members shall remain protected until the differential between the temperature inside the curing jacket and the outside air is not more than 25°F (-4°C).

2. Alternate Methods

Other methods of elevated temperature curing shall be permitted by the Engineer provided temperature maximums, rate of temperature variation, humidity control, etc., are in accordance with the requirements for steam curing. Permission shall be obtained from the Engineer or designated representative, in writing, for use of any alternate method.

425S.6 Handling, Hauling and Erection

The Contractor (Fabricator) shall be responsible for proper handling, monitoring, hauling and erection of all members so that they may be placed in the structure without damage.

Unless approved on erection and/or Shop Drawings, prestressed members shall be maintained in an upright position at all times and shall be picked up and supported near the ends of the member in such a way to prevent torsion. Members may be lifted with the lifting devices on the reviewed Shop Drawings or by other methods approved by the Engineer or designated representative or as indicated on the Drawings.

No member shall be removed from the casting yard until all requirements for tensioning (when pertinent), curing and strength requirements have been attained.

All concrete beams or girders, placed over a traveled roadway or railroad, shall be securely tied and/or braced to prevent over-turning until diaphragms capable of providing lateral stability are permanently in place. When railroads or roadway traffic must be maintained beneath girders or beams already placed, traffic shall be protected against falling objects during the erection of diaphragms and other structural members, during the placing of cast-in-place concrete and during the erection and dismantling of forms thereof. The protection shall consist of safety nets (1 inch (25 mm) mesh maximum) or a flooring with openings not larger than 1 inch (25 mm).

425S.7 Defects and Breakage

Failure of individual wires in a 7 wire strand or wires in a parallel wire tendon is acceptable provided the total area of wire failure is not more than 2 percent of the total cross-sectional area of tendons in any member. Failure of entire strand will be subject to structural review.

Fine hair cracks or checks on the surface of the member which, as determined by the Engineer or designated representative or, do not extend to the plane of the nearest reinforcement will not be cause for rejection unless they are numerous and extensive. Diagonal cracks, which indicate damage from torsion, will be subject to a structural review prior to acceptance. Vertical or horizontal cracks, which are 1/16 inch (1.6 mm) or less in width and which tend to close upon transfer of stress to the concrete, are acceptable. Cracks in excess of this are subject to review prior to acceptance.

Cracks, which extend into the plane of the reinforcing steel and/or prestressed tendons but are acceptable otherwise, shall be repaired by sealing with a latex-base adhesive, grout or with epoxy.

Small damaged or honeycombed areas which are purely surface in nature (not over 1 inch (25 mm) deep) may be repaired. Damage or honeycomb in excess of this will be tentatively rejected, but will be subject to structural review.

425S.8 Tolerances

Reinforcing steel shall not project above the top of the member more than ½ inch (12.7 mm) or less than ¾ inch (19 mm) from plan dimension. In the plan of the steel parallel to the nearest surface of concrete, bars shall not vary from plan placement by more than ¼ inch (6.4 mm) or 1/12 (2.1 mm) of the spacing between bars, whichever is greater. In the plane of the steel perpendicular to the nearest surface of concrete, bars shall not vary from plan placement by more than ¼ inch(6.4 mm).

Allowable tolerance from the dimensions and configuration shown on the approved shop drawings shall be as follows:

	Beams (inches)	**Boxes (inches)**
Length	+¾ (+19 mm)	+½ (+12.7 mm)
Width	+¾ - ¼ +19 mm -6.4 mm)	+¼ (+6.4 mm)
Depth	+½ -¼ +12.7 mm -6.4 mm)	+ ¼ (+6.4 mm)
Top Slab or Flange	+¾ -¼ (+19 mm -6.4 mm)	+½ (+12.7 mm)
Thickness Bottom Slab or Flange	+½ -¼ (+12.7 mm -6.4 mm)	+ ½ - ⅛ (+12.7 mm -3.2 mm)

Web	+¾ -¼ (+19 mm -6.4 mm)	+⅜ (+9.5 mm)
Horizontal Alignment-Upon release of stress	+⅛ per 10' of length (+3.2 mm per 3 m) of length	±¼ (±6.4 mm)
Deviation of Ends from Horizontal	±¼ (±12.7 mm)	±¼ (±6.4 mm)
Designated Skew or Bevel Vertical	±⅛ per 1' of depth (±3.2 mm per 300 mm) of depth	±¼ (±6.4 mm)
Bearing to Vertical Axis	+⅛ (+3.2 mm)	
Surfaces Deviation from Plane	+ 1/16 (+1.6 mm)	+ ⅛ (+3.2 mm)
Anchor Hole From End of Member	+¾ -¼ (+19 mm -6.4 mm)	+¼ (+6.4 mm)
Location Longitudinal Spacing	+¾ (+19 mm)	+½ (+12.7 mm)
Transverse Location	+¼ (+6.4 mm)	+¼ (+6.4 mm)
Diaphragm or Lateral Tie Holes	+½ (+12.7 mm)	+½ (+12.7 mm)
Longitudinal Position of Void		±1 (+12.7 mm)
Position of Strands	+¼ (+6.4 mm)	+¼ (+6.4 mm)
Position of Hold-Down Points	+6 (+150 mm)	+6 (+150 mm)
Position of Handling Devices	+6 (+150 mm)	+6 (+150 mm)

Where sections of forms are to be joined, an offset of ;frax;1;16 inch (1.6 mm) for flat surfaces and ⅛ inch (3.2 mm) for corners and bends will be permitted. Offsets between adjacent and header sections shall not exceed ¼ inch (6.4 mm).

Variations greater than specified above shall be corrected to within these tolerances or be subject to structural review. Horizontal alignment (sweep) beams and girders only, which may increase at a later time over that shown in the table, will be acceptable if the member can be hauled, erected and aligned to within the above tolerance without being damaged.

Tolerances for concrete piling shall not exceed ⅛ inch (3.2 mm) per 10 feet (3 m) for the maximum sweep (curvature along the axis of the pile).

Tolerances for post-tensioned segmental members shall conform to Item No. 403, "Concrete for Structures".

The head of the pile shall not be out of square by more than ⅛ inch (3.2 mm).

Small, damaged or honeycombed areas which are purely surface in nature (not over 1 inch (25 mm) deep) may be repaired. Damage or honeycomb in excess of this will be tentatively rejected, but will be subject to structural review.

When piling are cast with internal voids, the position of the void shall be within ±½ inch (±12.7 mm).

Piling cracked in the process of fabrication, handling, hauling or driving will be subject to the following provisions:

Piling which have one or more cracks transverse to the main reinforcement or strand which are 1/16 inch (1.6 mm) or greater in width shall be rejected if the crack(s) occur in a portion which will be below ground or water level after driving. If the crack(s) herein described will be located above ground or water level when driving is completed, the piling may be used provided it is cut back to the crack and rebuilt to grade. No additional payment will be made for this build-up.

Piling which have one or more cracks as described above, that are less than 1/16 inch (1.6 mm) in width may be used if the crack(s) is sealed with a Type VII epoxy, conforming to Item No. 867S, "Epoxy Adhesive".

The cracks shall be grooved a minimum of ¼ inch (6.4 mm) in width and depth and the epoxy shall be applied in the groove and extend over an area not less than 1 inch (25 mm) on each side of the crack. The area to which the epoxy is to be applied shall be clean and dry. If during driving, cracks develop in the portion, which will be below ground, driving operations shall be stopped and the required epoxy material applied before driving continues.

Piling with one or more cracks parallel or diagonal to the main reinforcing steel or strand which extend to the plane of reinforcement as determined by the Engineer or designated representative, will be cause for rejection. If these piling are found to be acceptable, proper repair shall be made, conforming to the above requirements.

Fine hair cracks or surface checks, which do not extend to the plane of the nearest reinforcing steel, as determined by the Engineer, will not generally require repair and will not be cause for rejection.

425S.9 Measurement

Precast, prestressed concrete beams or girders of the type specified, cast and stressed as required by the Drawings, will be measured by the lineal foot, as established on reviewed shop drawings. Other precast, prestressed concrete members of the size and type specified, cast and stressed as required by the Drawings will be measured by the linear foot or each as indicated.

Precast, prestressed concrete spans of the size and type specified, cast and stressed as required by the plans will be measured as each prestressed span is complete in place.

Cast-in-place structures (or structures where the Contractor has the option of casting-in-place) will be measured in accordance with the provisions of TxDOT Item 426, "Prestressing".

425S.10 Payment

Precast, prestressed concrete beams or girders will be paid for at the unit price bid per linear foot for "Prestressed Concrete Beams" of the type specified.

The above price shall be full compensation for constructing the members, furnishing and tensioning prestressing steel; conduit, when required; furnishing and placing reinforcing steel, bearing plates and bearing pads; all bars, anchorage plates and appurtenances which become an integral part of the structure; for grouting of holes; for any necessary repair and for any special treatment of end anchorages and shoes as indicated and for furnishing all materials, tools, equipment, labor and incidentals necessary to fabricate, transport and erect the members in the structure as indicated.

Payment will be made under:

Pay Item No. 425S:	Prestressed Concrete Beams, Type, Size ___	Per Lineal Foot.
Pay Item No. 425SA:	Prestressed Concrete Beams, Type, Size ___	Per Each.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Specification Item No. 425S, "Prestressed Concrete Structures"	
City of Austin Standard Specifications	
Designation	Description
Item No. 360	Concrete Pavement
Item No. 403	Concrete for Structures
Item No. 406S	Reinforcing Steel
Item No. 425S	Prestressed Concrete Structures
Item No. 438S	Elastomeric Materials
Item No. 867S	Epoxy Adhesive
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
Tex-426-A	Estimating Concrete Strength by the Maturity Method
Tex-704.1	Making, Curing and testing Compression Test Specimens for Precast Concrete

ITEM NO. 430S P.C. CONCRETE CURB AND GUTTER 11-15-11

430S.1 Description

This item shall govern Portland Cement (p.c.) concrete curb, p.c. concrete curb and gutter with reinforcing steel or p.c. concrete laydown curb as required, that is constructed in accordance with this specification on an approved subgrade and base in conformity with Standard Detail Series 430S and the lines, grades, section indicated on the Drawings or as established by the Engineer or designated representative.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text, the inch-pound units are given preference followed by SI units shown within parentheses.

430S.2 Submittals

The submittal requirements of this specification item include:

A. Class A p.c. concrete mix design,

B. Type of Installation (i.e. P.C. Concrete Curb and Gutter or P.C. Concrete Curb or P.C. Concrete Laydown Curb) and construction details (i.e. base, reinforcing steel, joints, curing membrane),

C. Identification of the type, source, mixture, Pure Live Seed (PLS) and rate of application of the seeding.

430S.3 Materials

A. Concrete

The Portland cement (p.c.) concrete shall conform to Class A Concrete, Section 403S.7 (Table 4) of Standard Specification Item No. 403S, "Concrete for Structures" or Sections 360S.4 and 360S.6 of Standard Specification Item No. 360S, "Concrete Pavement" when curb and gutter is to be constructed integral with the pavement.

B. Reinforcing Steel

Reinforcing steel shall conform to Standard Specification Item No. 406S, "Reinforcing Steel."

C. Expansion Joint Materials

Expansion joint materials shall conform to Standard Specification Item No. 408S, "Expansion Joint Materials."

D. Membrane Curing Compound

Membrane curing compound shall conform to Standard Specification Item No. 409S, "Membrane Curing."

E. Flexible Base

Aggregate shall conform to Standard Specification Item No. 210S, "Flexible Base".

430S.4 Construction Methods

A. Subgrade and Base Preparation

Subgrade for curb and gutter shall be excavated and prepared to depth and width requirements indicated on the Drawings, including a minimum of 12 inches (300 mm) behind the curb, unless a greater width is indicated on the Drawings. The subgrade shall be shaped to the line, grades, cross section and dimensions

indicated on the Drawings. A minimum of 4 inches (100 mm) of flexible base shall be spread, wetted and thoroughly compacted under curb and gutter as specified in Standard Specification Item No. 210S, "Flexible Base". If dry, the base shall be sprinkled lightly with water before p.c. concrete is deposited thereon.

B. C & G Forms

Forms shall be of metal, well-seasoned wood or other approved material. The length of the forms shall be a minimum of 10 feet (3 meters). Flexible or curved forms shall be used for curves of 100-foot (30 meter) radius or less. Wood forms for straight sections shall be not less than 2 inches (50 mm) in thickness. Forms shall be a section, that is satisfactory to the Engineer or designated representative, of the depth required and clean, straight, free from warp and, if required, oiled with a light form oil. All forms shall be securely staked to line and grade and maintained in a true position during the placement of p.c. concrete.

C. Reinforcing Steel

The reinforcing steel, if required, shall be placed as shown on the typical section of the Drawings. Care shall be exercised to keep all steel in its proper location during p.c. concrete placement.

D. Joints

Joints shall be of the type and spacing shown on the Drawings. Expansion joint material, ¾ inch (19 mm) in thickness, shall be provided at intervals not to exceed 40 feet (12 meters) and shall extend the full width and depth of the p.c. concrete. Weakened plane joints shall be made ¾ inch (19 mm) deep at 10-foot (3 meters) intervals. All joint headers shall be braced perpendicular and at right angles to the curb.

Two round smooth dowel bars, ½ inch (12.5 mm) in diameter and 24 inches (600 mm) in length, shall be installed at each expansion joint. Sixteen inches (400 mm) of one end of each dowel shall be thoroughly coated with hot oil, asphalt or red lead, so that it will not bond to the concrete. The dowels shall be installed with a dowel sleeve on the coated end as indicated on the Drawings or equivalent method as directed by the Engineer or designated representative.

E. P.C. Concrete Placement and Form Removal

Concrete shall be placed in the forms and properly consolidated. Within 1 hour after p.c. concrete placement, a thin coating, that is no more than ½ inch (12.5 mm) nor less than ¼ inch (6.25 mm) thick of finish mortar, composed of 1 part Portland Cement to 2 parts fine aggregate, shall be worked into the exposed faces of the curb and gutter by means of a "mule". After the p.c. concrete has become sufficiently set, the exposed edges shall be rounded by the use of an edging tool to the radii indicated on Standard Detail 430S-1. The entire exposed surface of the curb and gutter shall be floated to a uniform smooth surface, and then finished with a camel hairbrush to a gritty texture. The forms shall remain in place a minimum of 24 hours unless approved otherwise by the Engineer or designated representative.

After removal of the forms, any minor honeycombed surfaces shall be plastered with a mortar mix as described above. Excessively honeycombed curb and gutter, as determined by the Engineer or designated representative, shall be completely removed and replaced when directed.

F. Curing

Immediately after finishing the curb, concrete shall be protected by a membrane curing conforming to Standard Specification Item No. 409S, "Membrane Curing."

After a minimum of 3 days curing and before placement of the final lift of the base course, the curb shall be backfilled to the full height of the p.c. concrete, tamped and sloped as directed by the Engineer or designated representative. The upper 4 inches (100-mm) of backfill shall be of clean topsoil that conforms to Standard Specification Item No. 130S, "Borrow" and is free of stones and debris.

G. Seeding in Turf Areas

When turf is to be established, preparation of the seedbed shall conform to Item No. 604S, "Seeding for Erosion Control".

430S.5 Measurement

Accepted work as prescribed by this item will be measured by the lineal foot (lineal meter: 1 lineal meter equals 3.281 lineal feet) of p.c. concrete curb and gutter, p.c. concrete curb and/or p.c. concrete laydown curb, complete in place.

430S.6 Payment

The work performed as prescribed by this item will be paid for at the unit bid price per lineal foot for "P.C. Concrete Curb and Gutter" or P.C. Concrete Curb. The price shall include full compensation for all work as set forth and described under payment Method A and/or B.

A. Method A (Pay Item No. 430S-A)

This payment method shall include all the work performed for "P.C. Concrete Curb and Gutter" complete, at the unit bid price. The unit bid price shall include full compensation for excavation, preparation of the subgrade, furnishing and placing all concrete and base material, reinforcing steel, dowels, expansion joint material, curing material, backfill and for all other materials, manipulations, labor, tools, equipment and incidentals necessary to complete the work.

B. Method B (Pay Item No. 430S-B)

This payment method includes all the work performed for "P.C. Concrete Curb and Gutter", complete, at the unit bid price. The unit bid price shall include full compensation for fine grading, furnishing and placing concrete and reinforcing steel, dowels, expansion joint material, curing material, backfill and for all other materials, manipulations, labor, tools, equipment and incidentals necessary to complete the work.

C. Method C (Pay Item No. 430S-C)

This payment method includes all the work performed for " P.C. Concrete Curb" complete, at the unit bid price. The unit bid price shall include full compensation for excavation, furnishing and placing all concrete and base material, reinforcing steel, dowels, expansion joint material, curing material, backfill and for all other materials, manipulations, labor, tools, equipment and incidentals necessary to complete the work.

D. Method D (Pay Item No. 430S-D)

This payment method includes all the work performed for "P.C. Concrete Curb" complete, at the unit bid price. The unit bid price shall include full compensation for fine grading, furnishing and placing concrete and reinforcing steel, dowels, expansion joint material, curing material, backfill and for other materials, manipulations, labor, tools, equipment and incidentals necessary to complete the work.

E. Method E (Pay Item No. 430S-E)

This payment method shall include all the work performed for "P.C. Concrete Laydown Curb" complete, at the unit bid price. The unit bid price shall include full compensation for excavation, preparation of the subgrade, furnishing and placing all concrete and base material, reinforcing steel, dowels, expansion joint material, curing material, backfill and for all other materials, manipulations, labor, tools, equipment and incidentals necessary to complete the work.

F. Method F (Pay Item No. 430S-F)

This payment method includes all the work performed for "P.C. Concrete Laydown Curb" complete, at the unit bid price. The unit bid price shall include full compensation for fine grading, furnishing and placing

concrete and reinforcing steel, dowels, expansion joint material, curing material, backfill and for other materials, manipulations, labor, tools, equipment and incidentals necessary to complete the work.

Payment will be made under one of the following:

Pay Item No. 430S-A:	P.C. Concrete Curb and Gutter (Excavation)	Per Lineal Foot.
Pay Item No. 430S-B:	P.C. Concrete Curb and Gutter (Fine Grading)	Per Lineal Foot.
Pay Item No. 430S-C:	P.C. Concrete Curb (Excavation)	Per Lineal Foot.
Pay Item No. 430S-D:	P.C. Concrete Curb (Fine Grading)	Per Lineal Foot.
Pay Item No. 430S-D:	P.C. Concrete Curb (Fine Grading)	Per Lineal Foot.
Pay Item No. 430S-E:	P.C. Concrete Laydown Curb (Excavation)	Per Lineal Foot.
Pay Item No. 430S-F:	P.C. Concrete Laydown Curb (Fine Grading)	Per Lineal Foot.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Specification Item No. 430S, "P.C. Concrete Curb and Gutter"	
City of Austin Standard Specifications	
Designation	Description
Item No 130S	Borrow
Item No 210S	Flexible Base
Item No. 360	Concrete Pavement"
Section 360.4 of Item 360	Proportioning of Concrete
Section 360.6 of Item 360	Concrete Mixing and Placing
Item No. 403S	Concrete for Structures
Section 403S.7 of Item No. 403S	(Table 4)
Item No. 406S	Reinforcing Steel
Item No. 408S	Expansion Joint Materials
Item No. 409S	Membrane Curing
Item No. 604S	Seeding for Erosion Control
City of Austin Standard Details	
Designation	Description
430S-1	Curb and Gutter Section
430S-3	Curb Expansion Joint Dowel Detail
430S-4	Concrete Backfill Under Curb & Gutter
430S-5	Reinforcing Bar Detail at Existing Curb and Gutter

RELATED CROSS REFERENCE MATERIALS	
Specification Item No. 430S, "P.C. Concrete Curb and Gutter"	
City of Austin Standard Specifications	
Designation	Description
Item No. 301S	Asphalts, Oils and Emulsions
Item No. 302S	Aggregates for Surface Treatments
Item No. 340S	Hot Mix Asphaltic Concrete Pavement

Item No. 431S	Machine Laid PCC Curb and Gutters
Item No. 433S	P.C. Concrete Driveways
Item No. 434S	P.C. Concrete Medians and Islands
Item No. 436S	P.C. Concrete Valley Gutters
Item No. 606S	Fertilizer

ITEM NO. 432S PORTLAND CEMENT CONCRETE SIDEWALKS 1-4-10

432S.1 Description

This item shall govern the construction of Portland cement concrete sidewalks (Standard Detail No. 432S-1), as herein specified, on an approved subgrade and in conformance with the lines, grades and details indicated on the Drawings or as established by the Engineer or designated representative.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text inch-pound units are given preference followed by SI units shown within parentheses.

432S.2 Submittals

The submittal requirements of this specification item include:

A. Class A portland cement (p.c.) concrete mix design,

B. Type of Installation (i.e. Type I, Type II, etc.) and construction details (i.e. cushion layer, base, reinforcing steel, joints, curing membrane),

C. Identification of the type, source, mixture, Pure Live Seed (PLS) and rate of application of the seeding,

D. Number, manufacturer, model, construction, finish and installation details of streetscape appurtenances of bicycle racks, benches, chairs, trash receptacles, streetlights, tree wells and above grade tree planters [for sidewalks, 12 feet (3.66 meters) or wider].

432S.3 Materials

A. Portland Cement Concrete

Portland cement concrete shall be Class A conforming to Specification Item No. 403S, "Concrete for Structures" or Specification Item No. 407S, "Fibrous Concrete."

B. Reinforcement

Reinforcement shall conform to Specification Item No. 406S, "Reinforcing Steel" or Specification Item No. 407S, "Fibrous Concrete."

C. Expansion Joint Materials

Expansion joint materials shall conform to Specification Item No. 408S, "Expansion Joint Materials."

D. Membrane Curing Compound

Membrane curing compound shall conform to Specification Item No. 409S, "Membrane Curing."

432S.4 Construction Methods

The subgrade shall be excavated in accordance with Specification Item No. 111S, "Excavation," prepared in accordance with Specification Item No. 201S, "Subgrade Preparation," shaped to the lines, grades and cross section as indicated on the Drawings or as directed by the Engineer or designated representative and thoroughly compacted in accordance with Specification Item No. 201S. A granular cushion of a minimum thickness of 2 inches (50 mm) but maximum thickness of 5 inches (125 mm), composed of crusher screenings, gravel and sand, crushed

rock or coarse sand, shall be spread, wetted thoroughly, tamped and leveled. The granular cushion shall be moist at the time the Portland cement concrete is placed.

If the subgrade is undercut by more than 4 inches (100 mm) or the elevation of the natural ground is more than 4 inches (100 mm) below "top of subgrade," then a necessary backfill/embankment layer of an approved material shall be placed and compacted with a mechanical tamper. Hand tamping will not be permitted.

Where the subgrade is rock or gravel, 70% of which is rock; the 2-inch (50 mm) cushion need not be used. The Engineer or designated representative will determine if the subgrade meets the above requirements.

Sidewalk forms shall be constructed of metal or well-seasoned wood not less than 2 inches (50 mm) in thickness, with a section satisfactory to the Engineer or designated representative. The forms shall be clean, straight, and free from warp with a depth equal to the thickness of the finished work. All forms shall be securely staked to line and grade and maintained in a true position during the deposition of Portland cement concrete. Before p.c. concrete is placed, the forms shall be thoroughly oiled with a light form oil.

Expansion joint material ¾ inch (19 mm) thick, shall be provided where the new construction abuts an existing structure, sidewalk or driveway. Similar expansion material shall be placed around all obstructions protruding through the sidewalk. The expansion joint material shall be placed vertically and shall extend the full depth of the p.c. concrete. Maximum spacing of expansion joints shall be 40 feet (12 meters) as indicated on the Drawings or as directed by the Engineer or designated representative. Weakened plane joints shall be spaced at 5 feet (1.5 meters) on center. Normal dimensions of the weakened plane joints shall be ¼ inch wide and ¾ inch deep (6 mm wide and 19 mm deep). All joints shall be constructed perpendicular (90 degrees) to the centerline of walk and shall match any previously placed concrete joints. For sidewalks with widths exceeding 6 feet (1.83 meters) longitudinal weakened-plane tooled joints shall be provided as indicated on the Drawings or as directed by the Engineer or designated representative.

Reinforcement for sidewalks shall consist either of polypropylene fibrillated fibers or 6" × 6" × W1.4 × W1.4 (150mm × 150mm × MW9 × MW9) welded wire fabric or one layer #3 (10M) reinforcing bars, placed no more than 18 inches (450 mm) on center both directions. All reinforcement shall be accurately placed at slab mid-depth, equidistant from the top and bottom of the p.c. concrete and held firmly in place by means of bar supports of adequate strength and number that will prevent displacement and keep the steel at its proper position during the placement of the p.c. concrete. In no instance shall the steel be placed directly on the subgrade or sand cushion layer.

Prior to placement of the concrete, the reinforcement installation shall be inspected by the Engineer or designated representative to ensure conformance with the drawings, specifications and this item. In addition, care shall be exercised to keep all steel in its proper position during placement of the p.c. concrete. If during placement of the concrete, the reinforcement is observed to loose bar support, float upward or move in any direction, the placement shall be stopped until corrective action is taken.

Splices in wire fabric shall overlap sufficiently to allow two pairs of transverse wires to be tied together and no splice of less than 6 inches (150 mm) will be permitted. Splices in the #3 (10M) bars shall have a minimum lap of 12 inches (300 mm).

Where driveways cross sidewalks, additional reinforcing shall be placed in the sidewalk as indicated on the Drawings.

Portland cement concrete sidewalk ramps shall be formed to produce a finished surface with detectable warnings (Standard Detail 432S-2A) in accordance with the requirements of the American Disabilities Act and Texas Accessibility Standards (TAS), including Sections 4.29.2 and A4.29.2. The p.c. concrete sidewalk ramps shall be constructed in accordance with appropriate City of Austin Standard Details (Standard Details 432S-3, 432S-3A through 432S-3H, 432S-5, 432S-5A, 432S-5B, etc.).

Detectable warning for the ramps shall consist of raised truncated domes with a diameter of nominal 0.9 inch (23 mm), a height of nominal 0.2 inch (5 mm) and center-to-center spacing of nominal 2.35 inches (60 mm) and shall

contrast visually with adjoining surfaces, either light on dark or dark-on-light. The material used to provide contrast shall be an integral part of the walking surface.

When indicated on the Drawings or as directed by the Engineer or designated representative, the construction of the sidewalk ramp shall include the installation of interlocking concrete paving units (Standard Specification Item No. 480S, "Concrete Paving Units"). The concrete paving units shall be constructed in accordance with Standard Specification Item No. 485S, "Concrete Paving Units for Sidewalk Ramps" and appropriate City of Austin Standard Details (Standard Details 432S-2A, 432S-3, 432S-3A through 432S-3H, 432S-5, 432S-5A and 432S-5B).

At the proper time after finishing, the surface shall be protected by a membrane, compound curing agent or by wetted cotton or burlap mats, conforming to Item No. 409S, "Membrane Curing." The sides of the p.c. concrete shall be cured in the forms. If the forms are removed during the curing process, the curing shall be continued by the placement of fill against the exposed concrete edges or by other procedures conforming to Item No. 410S, "Concrete Structures." The top 4 inches (100 mm) of fill shall be clean topsoil conforming to Item No. 604S, "Seeding for Erosion Control."

Existing sidewalk that is scheduled for removal and replacement shall be removed and the underlying material shaped to the lines, grades and cross section as indicated in the drawings or as directed by the Engineer or designated representative. The removal and/or relocation of obstructions, including but not limited to signs, trash cans and benches on concrete pads, abandoned manholes, sprinkler control valves and landscaping, shall be performed, as indicated on the drawings, in a manner acceptable to the Engineer or designated representative. Removal and/or relocation of obstructions will be considered incidental work to this item and will not be paid for directly.

Existing PVC pipe drains in and behind curb shall be removed and replaced as required in new sidewalk and/or curb and gutter. In areas of proposed sidewalk construction, where curb and gutter is to remain in place, existing PVC pipe shall be cut far enough behind the back of curb to allow sufficient room for joint fittings to connect to new or salvaged PVC pipe.

The Contractor shall be responsible for removing and replacing mailboxes that are located in the construction area, while assuring that mail delivery will not be interrupted as a result of the construction activities. Mailboxes shall not be laid on the ground.

All necessary excavation, filling and grading of the slopes adjacent to the completed concrete sidewalks will be considered incidental work pertaining to this item and will not be paid for directly. The adjacent excavation and grading of the slopes shall be done in a manner acceptable to the Engineer or designated representative.

432S.5 Streetscape Furniture Installation Requirements

A. General

Bicycle racks, benches and chairs, trash receptacles, tree wells and above grade tree wells and planters shall only be installed in sidewalks that are 12 feet (3.66 meters) or wider. When installation is indicated on the Drawings or directed by the Engineer or designated representative, these items shall be permanently installed as indicated in Standard Details 710S-4 and 710S-5; 432S-9B; 432S-7C, 432S-7F; and 432S-8B. Above grade tree wells shall be installed in conformance with Standard Detail 432S-7E, while above grade tree planters shall be installed in conformance with Standard Detail Nos. 432S-7D and 432S-7G.

B. Location Requirements

1. Benches.

Benches shall be placed either perpendicular to the curb with the center of the bench on line with trees and light poles and facing toward the building entry, or parallel to the building and within 6” (150 mm) of the building wall, facing out to the street.

Bench siting shall be in conformance with Standard Detail No. 432S-9C in 12’ (3.6 M) or wider sidewalks and Standard Detail No. 432S-9D in sidewalks of width between 12’ (3.6 M) and 18’ (5.4 M).

2. Bike Racks.

   Bike racks are to be placed perpendicular to the curb with the centerline of the rack on line with trees and light poles.

   Bike rack siting shall be in conformance with Standard Detail No. 710S-6A in 12’ (3.6 M) or wider sidewalks and Standard Detail No. 710S-6B in sidewalks of width between 12’ (3.6 M) and 18’ (5.4 M).

3. Trash Receptacles.

   Trash receptacles shall either be placed along the curb, with the center line of the receptacle on line with the trees and light poles, or shall be located at the building entry in alignment with the structural bay system of the building. If located at the entry there shall be no more than 1 foot (300 mm) clearance between the receptacle and the building wall.

   Trash receptacle siting adjacent to curb ramps within an intersection shall be in conformance with Standard Detail No. 432S-8C in 12’ (3.6 M) or wider sidewalks.

432S.6 Pedestrian Railing

When a pedestrian railing installation is required along sidewalks for pedestrian protection as indicated on the Drawings or directed by the Engineer or designated representative, this type of pedestrian railing shall be permanently installed in conformance with one of the following designated Standard Details: 707S-1, 707S-2, 707S-3 or 707S-4.

When a pedestrian railing installation is required along portions of sidewalks identified as 'ramps' for ADA accessibility purposes as indicated on the Drawings or directed by the Engineer or designated representative, this type of pedestrian railing shall be permanently installed in conformance with one of the following designated Standard Details: 707S-2, 707S-3 or 707S-4.

432S.7 Measurement

Accepted work performed as prescribed by this item will be measured by the square foot (square meter: 1 square meter is equal to 10.764 square feet) of surface area of "Concrete Sidewalk."

Accepted work performed as prescribed by "Sidewalk Ramps" will be measured per each for the type of ramp indicated on the Drawings.

Accepted work performed as prescribed by "Streetscape Appurtenances" will be measured per each for the type of appurtenance indicated on the drawings.

Accepted work performed as prescribed by "Pedestrian Railing" will be measured per lineal foot of the type of railing indicated on the Drawings.

432S.8 Payment

The work performed as prescribed by this item for concrete sidewalk will be paid for at the unit bid price per square foot for "Concrete Sidewalk" and/or "Sidewalks Reconstruction"; per each for "Concrete Sidewalk Ramps" and "Streetscape Appurtenances" or per lineal foot for "Pedestrian Railing".

The unit bid price for new sidewalk shall include full compensation for excavating and/or removal and/or relocating obstructions, vegetating adjacent areas disturbed by sidewalk construction, preparing the subgrade; for furnishing and placing all materials including cushion material, all reinforcement, bar supports, joints, expansion

joint materials, and for any other materials, manipulations, labor, tools, equipment, finishing, curing and incidentals necessary to complete the work.

The unit bid price for sidewalk reconstruction shall include full compensation for excavating and/or removal of existing sidewalk and other obstructions, relocating obstructions, replacing PVC drain pipe, re-vegetating adjacent areas disturbed by sidewalk construction, preparing the subgrade; for furnishing and placing all materials including cushion material, all reinforcement, bar supports, joints, expansion joint materials, and for any other materials, manipulations, labor, tools, equipment, finishing, curing and incidentals necessary to complete the work.

The unit bid price for ramps shall include full compensation for preparing the subgrade when not included as a separate item; for furnishing and placing all materials, manipulation, labor, tools, equipment and incidentals necessary to complete the work. All necessary excavation, filling and grading of the slopes adjacent to the completed concrete paver units will be included in the unit price bid for the item of construction in which this item is used, unless included as a separate pay item in the Contract bid form.

The unit bid price for streetscape appurtenances shall include full compensation for the individual item (i.e. bench, chair, bicycle rack, trash receptacle, street light or above grade tree planter), as well as the removal of existing sidewalk, preparation of footings, furnishing and placing all materials, manipulation and finishing, labor, tools, equipment and incidentals necessary to complete the work.

The unit bid price for pedestrian railing shall include full compensation for the complete installation of the specific pedestrian railing including but not limited to preparation of footings or curb, furnishing and placing all materials, manipulation and finishing, labor, tools, equipment and incidentals necessary to complete the work.

Payment will be made under one of the following:

New Sidewalks		
Pay Item 432S-4:	New P.C. Concrete Sidewalks, 4 Inch thickness	Per Square Foot.
Pay Item 432S-5:	New P.C. Concrete Sidewalks, 5 Inch thickness	Per Square Foot.
Pay Item 432S-6:	New P.C. Concrete Sidewalks, 6 Inch thickness	Per Square Foot.
Pay Item 432S-7:	New P.C. Concrete Sidewalks, 7 Inch thickness	Per Square Foot.
Sidewalks Reconstruction		
Pay Item 432SR-4:	Reconstruct Concrete Sidewalks to 4 Inch thickness, including removal of existing sidewalk	Per Square Foot.
Pay Item 432SR-5:	Reconstruct Concrete Sidewalks to 5 Inch thickness, including removal of existing sidewalk	Per Square Foot.
Pay Item 432SR-6:	Reconstruct Concrete Sidewalks to 6 Inch thickness, including removal of existing sidewalk	Per Square Foot.
Pay Item 432SR-7:	Reconstruct Concrete Sidewalks to 7 Inch thickness, including removal of existing sidewalk	Per Square Foot.
Ramps		
Pay Item 432S-RP-1:	P.C. Sidewalk Curb Ramp with Pavers (Type I)	Per Each.
Pay Item 432S-RP-1A:	P.C. Sidewalk Curb Ramp with Pavers (Type IA)	Per Each.
Pay Item 432S-RP-1B:	P.C. Sidewalk Curb Ramp with Pavers (Type IB)	Per Each.
Streetscape Appurtenances		
Pay Item 432S-SAC-1:	Streetscape Bench (___ inches in length)	Per Each.
Pay Item 432S-SAC-2:	Streetscape Chair	Per Each.

Pay Item 432S-SAC-3:	Streetscape Bicycle Rack	Per Each.
Pay Item 432S-SAC-4:	Streetscape Trash Receptacle	Per Each.
Pay Item 432S-SAC-5:	Streetscape Street Light	Per Each.
Pay Item 432S-SAC-7C:	Streetscape Tree Well for Concrete Sidewalks	Per Each.
Pay Item 432S-SAC-7D:	Streetscape Above Grade Tree Planters	Per Each.
Pay Item 432S-SAC-7E:	Streetscape Tree Well with Seat	Per Each.
Pay Item 432S-SAC-7F:	Streetscape Tree Well without Grate	Per Each.
Pay Item 432S-SAC-7G:	Streetscape Above Grade Galvanized Steel Tree Planters	Per Each.
Pesdestrian Railing		
Pay Item 432S-PRC-1:	Pedestrian Railing (Standard 707S-1)	Per LF.
Pay Item 432S-PRC-2:	Pedestrian ADA Railing - Option 1 (Standard 707S-2)	Per LF.
Pay Item 432S-PRC-3:	Pedestrian ADA Railing - Option 2 (Standard 707S-3)	Per LF.
Pay Item 432S-PRC-4:	Pedestrian ADA Railing - Option 3 (Standard 707S-4)	Per LF.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Specification 432S, "Portland Cement Concrete Sidewalks"	
City of Austin Standard Specifications	
Designation	Description
Item No. 111S	Excavation
Item No. 201S	Subgrade Preparation
Item No. 403S	Concrete for Structures
Item No. 406S	Reinforcing Steel
Item No. 407S	Fibrous Concrete
Item No. 408S	Expansion Joint Materials
Item No. 409S	Membrane Curing
Item No. 410S	Concrete Structures
Item No. 480S	Concrete Paving Unit
Item No. 485S	Concrete Paving Units for Sidewalk Ramps
Item No. 604S	Seeding for Erosion Control
City of Austin Standard Details	
Designation	Description
432S-1	Sidewalk
432S-2A	Detectable Warning-Paver
432S-3	Type I Curb Ramps-Full Intersection
432S-3A	Type I Curb Ramps-T Intersection
432S-3B	Type IA/IB Curb Ramps-Full Intersection
432S-3C	Type IA/IB Curb Ramps-T Intersection
432S-3D	Combined Curb Ramps-Full Intersection
432S-3E	Combined Curb Ramps-T Intersection
432S-3F	Combined Sidewalk Curb Ramp with Pavers
432S-3G	Combined Sidewalk Curb Ramp with Pavers within Limited ROW

432S-3H	Type I Curb Ramps within PC/PT of Curb and Gutter
432S-5	Type I Sidewalk Curb Ramp
432S-5A	Type IA Sidewalk Curb Ramp
432S-7C	Tree Well for New Trees Planted Within Concrete Sidewalk 3.6 M (12') or Greater
432S-7D	Above Grade Tree Planters
432S-7E	Above Grade Tree Well with Bench
432S-7F	Tree Well Without Grate
432S-7G	Above Grade Galvanized Steel Tree Planters
432S-8B	Trash Receptacle Installation in Concrete Sidewalk
432A-8C	Furnishing Location in 12' (3.6 M) or greater Trash Receptacle Siting
432S-9B	Bench/Chair Installation in Sidewalks
432S-9C	Furnishing Location in 12' (3.6 M) or greater Sidewalks-Bench Siting
432S-9D	Furnishing Location in Greater than 12' (3.6 M) or Less than 18' (5.4 M) Sidewalks-Bench Siting
707S-1	Pedestrian Railing
707S-2	Pedestrian ADA Railing - Option 1
707S-3	Pedestrian ADA Railing - Option 2
707S-4	Pedestrian ADA Railing - Option 3
710S-4	Bicycle Rack Installation in Concrete Sidewalks (Alternate 1)
710S-5	Bicycle Rack Installation in Concrete Sidewalks (Alternate 2)
710S-6A	Furnishing Location in 12' (3.6 M) or greater Sidewalks-Bicycle Rack Siting
710S-6B	Furnishing Location in Greater than 12' (3.6 M) or Less than 18' (5.4 M) Sidewalks-Bicycle Rack Siting
American Disabilities Act, Federal Register; Volume 56, No. 144; July 26, 1991 ADA Accessibility Guidelines For Building And Facilities	
Designation	Description
Section 4.29	Detectable Warnings on Walking Surfaces
Section A4.29.2	Detectable Warnings on Walking Surfaces
Architectural Barriers; Texas Civil Statutes, Article 9102; June 14, 1995 Texas Accessibility Standards (TAS)	
Designation	Description
Section 4.29	Detectable Warnings on Walking Surfaces
Section A4.29.2	Detectable Warnings on Walking Surfaces

RELATED CROSS REFERENCE MATERIALS	
Specification 432S, "Portland Cement Concrete Sidewalks"	
City of Austin Standard Contract Documents	
Designation	Description
00700	General Conditions
01500	Temporary Facilities
01550	Public Safety and Convenience
City of Austin Utilities Criteria Manual	
Designation	Description

Section 5.2.3	Utility Adjustments For Roadway Construction Projects
City of Austin Standard Specifications	
Designation	Description
Item No. 102S	Clearing and Grubbing
Item No. 104S	Removing Portland Cement Concrete
Item No. 110S	Street Excavation
Item No. 132S	Embankment
Item No. 203S	Lime Treatment for Materials In Place
Item No. 204S	Portland Cement Treatment for Materials In Place
Item No. 230S	Rolling (Flat Wheel)
Item No. 232S	Rolling (Pneumatic Tire)
Item No. 234S	Rolling (Tamping)
Item No. 236S	Rolling (Proof)
Item No. 360S	Concrete Pavement
Item No. 402S	Controlled Low Strength Material
Item No. 404S	Pneumatically Placed Concrete
Item No. 405S	Concrete Admixtures
Item No. 411S	Surface Finishes for Concrete
Item No. 436S	P.C. Concrete Valley Gutters
Item No. 602S	Sodding for Erosion Control
Item No. 610S	Preservation of Trees and Other Vegetation
Item No. 642S	Silt Fence
City of Austin Standard Details	
Designation	Description
432S-8A	Trash Receptacle Installation in Concrete Paver Sidewalk
432S-9A	Bench Installation in Concrete Paver Sidewalk
432S-10	Mailbox Placement Detail
433S-1	Type I Driveway (1 & 2 Family Residential Use Only)
433S-1A	Flared Type I Driveway (1 & 2 Family Residential Use Only)
433S-2	Type II Driveway
433S-3	Temporary Driveway
436S-2	Concrete Valley Gutter
470S-1	Curb Cut for Ramp or Driveway (Optional)
710S-3	Bicycle Rack Installation in Concrete Paver Sidewalks (Alternate 1)
1000-8(A)	Typical ROW and Front Lot Utility Assignments
1000-8(B)	Typical Single Service Utility Assignment Details (TV,W,WW)
1000S-10	Local Street Sections
1000S-11	Residential and Neighborhood Collector Street Sections
1000S-12	Primary Collector Street Sections
1000S-13	Minor Arterial Street Sections
1000S-14	Major Arterial Street Sections
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description

Item No. 100	Preparing Right of Way
Item No. 110	Excavation
Item No. 112	Subgrade Widening
Item No. 132	Embankment
Item No. 164	Seeding for Erosion Control
Item No. 204	Sprinkling
Item No. 210	Rolling (Flat Wheel)
Item No. 211	Rolling (Tamping)
Item No. 213	Rolling (Pneumatic Tire)
American Disabilities Act, Federal Register; Volume 56, No. 144; July 26, 1991 ADA Accessibility Guidelines For Building And Facilities	
Designation	Description
Section 4.3	Accessible Route
Section 4.3.6	Surface Texture
Section 4.3.7 & 4.7.2	Slope
Section 4.3.8 & 4.5.2	Changes in Levels
Section 4.7	Curb Ramps
Section 4.8	Ramps
Architectural Barriers; Texas Civil Statutes, Article 9102; June 14, 1995 Texas Accessibility Standards (TAS)	
Designation	Description
Section 4.3	Accessible Route
Section 4.3.6	Surface Texture
Section 4.3.7 & 4.7.2	Slope
Section 4.3.8 & 4.5.2	Changes in Levels
Section 4.7	Curb Ramps
Section 4.8	Ramps

ITEM NO. 433S P.C. CONCRETE DRIVEWAYS 12-9-08

433S.1 Description

This item shall govern construction of Portland Cement (p.c.) concrete driveways, as herein specified, on an approved subgrade, in conformity with the lines, grades and cross section indicated on the Drawings, identified in Standard Detail Series 433S, or as established by the Engineer or designated representative.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text, the inch-pound units are given preference followed by SI units shown within parentheses.

433S.2 Submittals

The submittal requirements of this specification item include:

A. Class A and/or Item 360S p.c. concrete mix design,

B. Type of Installation (i.e. Type I, Flared Type I, Type II, etc.) and construction details (i.e. cushion layer, base, reinforcing steel, joints, curing membrane),

C. Identification of the type, source, mixture, Pure Live Seed (PLS) and rate of application of the seeding.

433S.3 Materials

A. Concrete

The Portland Cement Concrete for a Type I driveway (Standards 433S-1 and 433S—A) shall conform to Class A, Section 403S.7 (Table 4) of Standard Specification Item No. 403S, "Concrete for Structures." The Portland Cement Concrete for a Type II driveway (Standard 433S-2) shall conform to a normal concrete mix design for concrete pavement, Section 360S.5(A) of Standard Specification Item No. 360S, "Concrete Pavement".

B. Reinforcing Steel

Reinforcing steel and welded wire fabric shall conform to Standard Specification Item No. 406S, "Reinforcing Steel".

C. Expansion Joint Materials

Expansion joint materials shall conform to Standard Specification Item No. 408S, "Expansion Joint Materials."

D. Membrane Curing Compound

Membrane curing compound shall conform to Standard Specification Item No. 409S, "Membrane Curing."

E. Cushion Layer

The Cushion layer shall consist of crusher screenings, gravel or coarse sand.

433S.4 Construction Methods

All forms and forming, placement of reinforcement, placement of concrete, form removal, finishing and curing shall conform to Standard Specification Item No. 410S, "Concrete Structures".

A. Subgrade Preparation

The subgrade shall be excavated, prepared and shaped to the lines, grades and cross sections indicated on the Drawings or as directed by the Engineer or designated representative. The subgrade shall be thoroughly compacted in accordance with Standard Specification Item No. 201S, "Subgrade Preparation". A 2-inch (50-mm) minimum compacted thickness cushion shall be spread, wetted thoroughly, tamped and leveled. The cushion shall be moist at the time the p.c. concrete is placed.

If the subgrade is undercut or natural ground is located below the top of subgrade, the necessary backfill material shall conform with Standard Specification Item 130S, "Borrow" and shall be compacted with a mechanical tamper. Hand tamping will not be permitted.

Where the subgrade material consists of gravel or includes 70 percent of rock, the 2-inch (50-mm) cushion layer may not be required. The Engineer or designated representative will determine if the subgrade meets the above requirements.

B. Forms

Forms shall be of metal, well-seasoned wood or other approved material of a section satisfactory to the Engineer or designated representative. Wood forms shall not be less than 2 inches (50 mm) nominal thickness for straight runs and 1-inch (25-mm) nominal thickness for curved runs. Forms shall be a section satisfactory to the Engineer or designated representative and clean, straight, free from warp and of a depth equal to the thickness of the finished work.

All forms shall be securely staked to line and grade and maintained in a true position during the placement of p.c. concrete.

C. Joints

Joints shall be of the type and spacing shown on the Drawings. Expansion joint material, ¾ inch (19 mm) thick, shall be provided where the new construction abuts the existing sidewalks or driveways or as directed by the Engineer or designated representative. The expansion joint material shall be placed vertically and shall extend the full depth of the p.c. concrete. Similar expansion material shall be placed around all obstructions protruding through the driveway. Weakened plane joints shall be located on 10-foot (3-meter) centers or as directed by the Engineer or designated representative. Normal dimensions of the weakened plane groove joints shall be ¼-inch (6.25-mm) wide and ¾-inch (19 mm) deep.

D. Reinforcement

Reinforcement for Type I driveways shall consist of 1 layer of 6 x 6 by W 1.4 x W 1.4 (150 x 150 by MW9 x MW9) wire fabric or No. 3 (10 M) bars placed not more than 18 inches (450 mm) on center, both directions. Reinforcement for Type II driveways shall consist of 1 layer of No. 4 (13 M) bars placed no more than 18 inches (450 mm) on center, both directions.

All reinforcements shall be accurately placed equidistant from the top and bottom of the p.c. concrete slab and held firmly in place by means of bar supports of adequate strength and number that will prevent displacement and keep the steel at its proper position. In no instance shall the steel be placed directly on the subgrade or sand cushion layer.

Prior to placement of the concrete, the reinforcement installation shall be inspected by the Engineer or designated representative to ensure conformance with the drawings, specifications and this item. In addition, care shall be exercised to keep all steel in its proper position during the placement of p.c. concrete. If during placement of the concrete, the reinforcement is observed to lose bar support, float upward or move in any direction, the placement shall be stopped until corrective action is taken.

Splices in wire fabric shall overlap sufficiently to allow two pairs of transverse wires to be tied together and no splice of less than 6 inches (150 mm) will be permitted. Splices in the No. 3 (10 M) and No. 4 (13 M) bars shall have a minimum lap of 12 inches (300 mm).

E. P.C. Concrete Placement and Finishing

The p.c. concrete shall be placed in the forms and spaced, tamped and thoroughly compacted until it entirely covers the surface and has a monolithic finish. The top surface shall be floated and troweled to a uniform smooth surface, then finished with a broom or wood float to a gritty texture unless otherwise indicated on the Drawings. The outer edges and joints shall be rounded with approved tools to a ¼-inch (6.3 mm) radius. Care shall be exercised to prevent loss of dummy joints or rounded edges when applying the broom finish.

F. Curing

At the proper time after finishing, the surface shall be protected by a membrane compound curing agent in conformance with Standard Specification Item No. 409S, "Membrane Curing" or by wetting cotton or burlap mats. Either method shall be subject to approval by the Engineer or designated representative.

Traffic shall be barricaded from using the driveway for a minimum of 4 days after initial placing and may be opened to traffic only with approval of the Engineer or designated representative.

G. Incidental Work

All necessary excavation, filling and grading of the slopes, adjacent to the completed pcc driveways, will be considered incidental work pertaining to this item and will not be paid for directly.

The adjacent excavation and grading of the slopes shall be done with topsoil conforming to Standard Specification Item No. 130S, "Borrow". When turf is to be established, the preparation of the seedbed shall conform to Standard Specification Item No. 604S, "Seeding for Erosion Control", in a manner acceptable to the Engineer or designated representative.

433S.5 Measurement

Accepted work performed as prescribed by this item will be measured by the square foot (square meters: 1 square meter equals 10.764 square feet) of surface area of the specific type of p.c. concrete driveway.

433S.6 Payment

The work performed as prescribed by this item will be paid for at the unit bid price per square foot for "Concrete Driveways." The unit bid price shall include full compensation for preparation of the subgrade; furnishing and placing all materials, including cushion layer, all reinforcing steel, bar supports and expansion joint materials; and any other materials, manipulations, labor, tools, equipment and incidentals necessary to complete the work.

Payment will be made under:

Pay Item No. 433S-A:	Type I P.C. Concrete Driveway	Per Square Foot.
Pay Item No. 433S-B:	Flared Type I P.C. Concrete Driveway	Per Square Foot.
Pay Item No. 433S-C:	Type II P.C. Concrete Driveway	Per Square Foot.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Specification Item No. 433S, "P.C. Concrete Driveways"	
City of Austin Standard Specifications	
Designation	Description
Item No. 130S	Borrow
Item No. 201S	Subgrade Preparation

Item No. 360	Concrete Pavement
Item No. 403S	Concrete for Structures
Section 403S.7; Item 403S	Table 4: Classes of Concrete
Item No. 406S	Reinforcing Steel
Item No. 408S	Expansion Joint Materials
Item No. 409S	Membrane Curing
Item No. 410S	Concrete Structures
Item No. 604S	Seeding for Erosion Control
City of Austin Standard Details	
Designation	Description
No. 433S-1	Type I Driveway (1 & 2 Family Residential Use Only)
No. 433S-1A	Flared Type I Driveway (1 & 2 Family Residential Use Only)
No. 433S-2	Type II Driveway

RELATED CROSS REFERENCE MATERIALS	
Specification Item No. 433S, "P.C. Concrete Driveways"	
City of Austin Standard Specifications	
Designation	Description
Item No. 430S	P.C. Concrete Curb and Gutter
Item No. 431S	Machine Laid PCC Curb and Gutter
Item No. 432S	Concrete Sidewalks
Item No. 434S	P.C. Concrete Medians and Islands
Item No. 436S	P.C. Concrete Valley Gutters
Item No. 470S	Curb Cuts for Sidewalk Ramps and Driveways
Item No. 606S	Fertilizer

ITEM NO. 434S P.C. CONCRETE MEDIANS AND ISLANDS 11-13-07

434S.1 Description

This item shall govern construction of Portland cement concrete traffic islands and medians in accordance with these specifications and in conformity to the lines, grades, sections and details indicated on the Drawings or as established by the Engineer or designated representative.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text, the inch-pound units are given preference followed by SI units shown within parentheses.

434S.2 Submittals

The submittal requirements of this specification item include:

A. Class A p.c. concrete mix design,

B. Type of Installation (i.e. Median or Island) and construction details (i.e. cushion layer, base, reinforcing steel, joints, curing membrane).

434S.3 Materials

A. Portland Cement (p.c.) Concrete

The p.c. concrete shall conform to Class A Concrete, Section 403.7 (Table 4) of Standard Specification Item No. 403, "Concrete for Structures".

B. Reinforcing Steel

Reinforcing steel and welded wire fabric shall conform to Standard Specification Item No. 406S, "Reinforcing Steel".

C. Expansion Joint Materials

Preformed expansion joint materials shall conform to Standard Specification Item No. 408S, "Expansion Joint Materials".

D. Membrane Curing Compound

Membrane curing compound shall conform to Standard Specification Item No. 409S, "Membrane Curing".

E. Admixtures

Admixtures shall conform to Standard Specification Item No. 405S, "Concrete Admixtures".

F. Aggregate Cushion

Cushion layer shall consist of crusher screening, gravel, sand, crushed stone or "Flexible Base" materials (Standard Specification Item No. 210S) approved by the Engineer or designated representative.

434S.4 Construction Methods

All forms and forming, placement of reinforcement, placement of concrete, form removal, finishing and curing shall conform to Standard Specification Item No. 410S, "Concrete Structures".

A. PCC Mix Design

The p.c. concrete shall conform to an approved design mix for a Class A p.c. concrete on file with the City or proposed Class A mix designs with the necessary test data may be submitted for approval by the Engineer or designated representative.

High range water reducing admixtures conforming to Standard Specification Item No. 360, "Concrete Pavements" may be used when approved by the Engineer or designated representative.

B. Subgrade and Base Preparation

The subgrade shall be excavated, prepared and shaped to the lines, grades and cross section indicated on the Drawings or as directed by the Engineer or designated representative, and shall be thoroughly compacted conforming to Standard Specification Item No. 201S, "Subgrade Preparation". A cushion layer, 2 inches (50 mm) minimum thickness, shall be spread, wetted thoroughly, tamped and leveled. The cushion shall be moist at the time the p.c. concrete is placed.

C. Forms

Forms shall be of metal, well-seasoned wood or other approved material. The length of the forms shall be a minimum of 10 feet (3 meters). Flexible or curved forms shall be used for curves of 100-foot (30-meter) radius or less. Wood forms for straight sections shall be not less than 2 inches (50 mm) in thickness. Forms shall be a section, that is satisfactory to the Engineer or designated representative, and shall be clean, free from warp, and of a depth equal to the finished work. All forms shall be securely staked to line and grade and maintained in a true position during the placement of the p.c. concrete and, if required, forms shall be thoroughly oiled with a light form oil prior to p.c. concrete placement. If the adjacent existing asphalt pavement is damaged during construction, it shall be restored to its original condition.

D. Reinforcement

Reinforcement shall conform to the details indicated on the Drawings or the directions of the Engineer or designated representative. All reinforcement shall be accurately placed at slab mid-depth, equidistant from the top and bottom of the p.c. concrete, and held firmly in place by means of bar supports of adequate strength and number that will prevent displacement and keep the reinforcement in its proper position during the placement of the p.c. concrete. In no instance shall the steel be placed directly on the subgrade or sand cushion layer.

Prior to placement of the concrete, the reinforcement installation shall be inspected by the Engineer or designated representative to ensure conformance with the drawings, specifications and this item. In addition, care shall be exercised to keep all steel in its proper position during placement of the p.c. concrete. If during placement of the concrete, the reinforcement is observed to loose bar support, float upward or move in any direction, the placement shall be stopped until corrective action is taken.

E. Joints

Joints shall be of the type and spacing shown on the Drawings. Expansion joint material, ¾ inch (19 mm) in thickness, shall be placed as indicated on the Drawings with a maximum spacing of 40 feet (12 meters) or as directed by the Engineer or designated representative. Expansion joints shall be placed on the same alignment when adjacent to a Portland Cement concrete pavement. Weakened plane joints shall be made ¾ inch (19 mm) deep and equally spaced, normally at 5 foot (1.5 meters) on centers or as directed by the Engineer or designated representative. Expansion joints shall be required between the curb and median p.c. concrete.

F. P.C. Concrete Placement and Finishing

The p.c. concrete shall be placed in the forms to the depth indicated on the Drawings, and properly consolidated and until mortar entirely covers the surface and forms a monolithic finish. If a vibrator is used,

care shall be taken not to leave it in one location long enough to induce segregation. The top surface shall be floated and troweled to a uniform smooth surface, then finished with a camel hairbrush or wood float to a gritty texture. The outer edges shall be rounded with approved tools to the radii indicated on the Drawings.

When the ambient air temperature is above 85°F (30°C), an approved retarding agent will be required in all p.c. concrete. The maximum temperature of all p.c. concrete placed shall not exceed 95°F (35°C), unless High Range Water Reducer Admixtures are used.

G. Curing

Immediately after finishing the p.c. concrete median or island, the pcc surface shall be protected by a membrane-compound curing agent conforming with Standard Specification Item No. 409S, "Membrane Curing". The curing procedures shall be acceptable to the Engineer or designated representative.

434S.5 Measurement

Accepted work as prescribed by this item will be measured by the square foot (square meter: 1 square meter equals 10.764 square feet) of surface area of p.c concrete medians and/or p.c. concrete island, complete in place.

434S.6 Payment

The work performed as prescribed by this item will be paid for at the unit bid price per square foot for "P.C. Concrete Medians and Islands." The unit bid price shall include full compensation for preparation of the subgrade; finishing and placing all materials, including all reinforcing steel, welded wire fabric; bar supports and any other materials, manipulation, labor, tools, equipment and incidentals necessary to complete the work.

Payment will be made under:

Pay Item No. 434S:	___ Inch P.C. Concrete Medians and Islands	Per Square Foot.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Specification Item No. 434S, "P.C. Concrete Medians and Islands"	
City of Austin Standard Specifications	
Designation	Description
Item No. 201S	Subgrade Preparation
Item No. 210S	Flexible Base
Item No. 403	Concrete for Structures
Section 403.7: Item No. 403	Table 4: Classes of Concrete
Item No. 405S	Concrete Admixtures
Item No. 406S	Reinforcing Steel
Item No. 408S	Expansion Joint Materials
Item No. 409S	Membrane Curing
Item No. 410S	Concrete Structures

RELATED CROSS REFERENCE MATERIALS
Specification Item No. 434S, "P.C. Concrete Medians and Islands"

City of Austin Standard Specifications	
Designation	Description
Item No. 360	Concrete Pavement
Item No. 430S	P.C. Concrete Curb and Gutter
Item No. 431S	Machine Laid PCC Curb and Gutter
Item No. 432S	P.C. Concrete Sidewalks
Item No. 433S	P. C. Concrete Driveways
Item No. 434S	P.C. Concrete Medians and Islands
Item No. 436S	P.C. Concrete Valley Gutters
Item No. 470S	Curb Cuts for Sidewalk Ramps and Driveways

ITEM NO. 480S CONCRETE PAVER UNITS FOR SIDEWALKS AND STREETSCAPE REQUIREMENTS 4-4-12

480S.1 Description

This item shall govern furnishing and installing interlocking concrete paver units, manufactured for the construction of sidewalks, constructed as herein specified on an approved base or subgrade in conformity to the lines, grades and details indicated on the Drawings, Standard Detail or as established by the Engineer or designated representative.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text, the inch-pound units are given preference followed by SI units shown within parentheses.

480S.2 Submittals

The submittal requirements of this specification item may include:

A. Samples for initial selection from manufacturer color charts showing the full range of colors, textures and patterns for each type of paver unit indicated on the Drawings,

B. Shop drawings indicating locations of color changes, pattern orientation and cross-section details,

C. Product data including sieve analysis of sand bedding material and compaction test results on subgrade, subbase and base courses,

D. Manufacturer Certification that the Interlocking Paver Units meet or exceed all the requirements of ASTM C-936 and this specification item.

E. Number, manufacturer, model, construction, finish and installation details of streetscape appurtenances of bicycle racks, benches, chairs, trash receptacles and above grade tree planters [for sidewalks, 12 feet (3.66 meters) or wider].

480S.3 Materials

A. Base Course

Base Course shall be constructed of either a fibrous reinforced concrete (Standard Specification Item No. 407S, "Fibrous Concrete"), Class J Portland cement concrete (Standard Specification Item No. 403, "Concrete For Structures") or a cement treated material (Standard Specification Item No. 204S, "Portland Cement Treatment for Materials In Place").

B. Concrete Paver Units

Paver units shall be modular concrete pavers conforming to ASTM Designation: C-936 "Solid Concrete Interlocking Paving Units" and the requirements specified in this Item. The paver units shall be made using normal weight aggregates conforming to ASTM C-33.

C. Pigments

Pigments used in concrete paver units shall be synthetic iron oxide and shall be alkali-resistant, light fast, water insoluble, chemically inert and weather resistant.

D. Bedding Sand

Bedding sand shall conform to the requirements of a concrete sand Grade No. 1 as indicated in Table 2, Standard Specification Item No. 403, "Concrete for Structures" with the exception of the Fineness Modulus and aggregate gradation requirements.

The aggregate gradation shall be in compliance with the following gradation:

Sieve Designation/Size		
U.S.	S.I.	% Passing By Weight (Mass)
⅜"	9.5 mm	100
No. 4	4.75 mm	85—100
No. 100	150 µm	10—30

The bedding sand shall be free from frozen material or injurious amounts of deleterious soluble salts, vegetable matter or other contaminants likely to cause efflorescence or contribute to reduced skid resistance and shall contain no more than 0.5 percent by weight (mass) of clay lumps.

The bedding sand shall be of uniform moisture content from 3 to 7 percent when spread and shall be protected against rain when stockpiled on site prior to spreading.

E. Grout Mix

When required in conjunction with a bedding layer for the concrete paver units or with paver closure units, the grout mix shall be composed of one part Portland cement, one part masonry cement (or ¼ part hydrated lime), parts of concrete sand equal to 2½ to 3 times the sum of the volumes of the cement and lime used, and sufficient water to make the mixture plastic

480S.4 Physical Requirements

The general shape of the concrete paver units shall be similar to that indicated on the Drawings. The concrete paver units shall be of the color and laid in the pattern as specified on the Drawings or as approved in writing by the Engineer or designated representative.

All units shall be sound and free of defects that would interfere with the appearance or proper placement of the unit or impair the strength or longevity of the final structure. Any units, which are structurally damaged during the work, shall be immediately removed and replaced.

480S.5 Construction Method

A. Preparation Of Subgrade, Subbase And Base Layers

The subgrade, subbase or base course shall be shaped to the lines, grades and cross sections as indicated on the Drawings or as directed by the Engineer or designated representative and shall be thoroughly compacted. Any unsuitable material encountered in the subgrade shall be removed and replaced by a suitable material and compacted to a uniform grade. When subgrade stabilization has been specified, the subgrade shall be prepared accordingly.

If the subgrade is undercut by more than 4 inches (100 mm) or the natural ground is below "top of subgrade" by more than 4 inches (100 mm), the necessary backfill shall be made with an approved material and compacted with a mechanical tamper. Hand tamping will not be permitted.

B. Bedding Sand Installation

An uncompacted sand bed base shall be screeded over the compacted base to a minimum thickness of 1 inch (100 mm) but no more than 1 ½ inches (38 mm). This assumes that after placement and vibration of the

paving units the thickness of the compacted sand bed will be approximately ½ inch (12.5 mm) lower. Bedding sand shall not be used for leveling the base course.

The spread sand shall be carefully maintained in a loose condition and protected against precompaction both prior to and following screeding. Any precompacted sand or screeded sand left overnight shall be loosened before other units are placed. Sand shall be lightly screeded in a loose condition to the predetermined depth, slightly ahead of placement of the paving units. Under no circumstances shall the sand be screeded more than ½ hour in advance of the placement of paving units.

Screeded sand must be fully protected against accidental precompaction including compaction by rain or dew. Any screeded sand, which is precompacted prior to placement of units, shall be removed and brought back to profile in a loose condition.

C. Paver Unit Installation

Concrete paver units shall be placed on the uncompacted screeded sand bed and/or grout bedding in the laying pattern indicated on the Drawings. Concrete paver units shall be bedded in a 1" (25 mm) thick mortar bed or a 1" (25 mm) sand layer placed on top of a 3" (75-mm) minimum Class A Fibrous Concrete pad (see Standard Specification Item 407S, "Fibrous Concrete") or on top of 4" (100-mm) thick layer of Class J Portland Cement Concrete (Standard Specification Item No. 403, "Concrete For Structures") or cement treated material (see Standard Specification Item No. 204S, "Portland Cement Treatment for Materials In Place").

The Contractor shall exercise particular care to maintain the specified laying pattern throughout the job. Paver units shall be placed to achieve gaps nominally ⅛ inch (3.2 mm) wide between adjacent units to insure that all joints are correctly aligned.

The first row shall abut an edge restraint with a gap of ⅛ inch (3.2 mm) and shall be laid at a suitable angle to the edge restraint to achieve the required visual orientation of paver units in the completed pavement.

The first two rows of concrete paver units adjacent to edge restraints, building walls, openings in the sidewalk layout for meter boxes (see Standard Detail 480S-1), meter vaults (see Standard Detail 480S-2), valve access pipe (see Standard Detail 480S-3), light/traffic poles and light fixtures (see Standard Detail 480S-4), curb and gutter (see Standard Detail 480S-5) external stairs (see Standard Detail 480S-6) and any other projections in the sidewalk shall be set in a 1inch (25 mm) thick grout layer. As an alternative to grouting the first two layers of concrete paver units, a Portland cement concrete (Class A, "Concrete for Structures") band, that is a minimum of 6inch (150 mm) wide and 4inch (25 mm) deep with a # 3 (10M) rebar, may be constructed adjacent to edge restraints, building walls, projections through the sidewalk and other conditions indicated in details 480S-1 through 480S-6.

In each row, all full units shall be placed first. Closure units shall be cut and fitted subsequently. In no case shall a closure unit consist of less than 25 percent of a full unit. Areas with closure units less than 25 percent of a full unit shall be filled solid with mortar. Units may be cut using a mechanical or hydraulic cutter or by power sawing. A grout mix shall be used to fill larger edge spaces.

Any foot or wheelbarrow traffic during the construction shall use boards overlaying paver units to prevent disturbance of units prior to mechanical compaction. No other traffic shall be allowed on the pavement at this stage of construction.

D. Paver Unit Compaction

After placement of the paver units on the uncompacted screeded sand layer, consolidation of the sand bedding and the design levels and profiles of the paver units shall be obtained by not less than two and preferably three passes of a suitable flat plate compactor. Any grouted concrete paver units that are damaged or displaced during the compaction process shall be replaced and regrouted.

The compactor shall be a high frequency, low-amplitude mechanical flat plate vibrator with a plate area sufficient to cover a minimum of 12 paver units. The compactor shall be capable of producing 3,500 to 5,000

pounds (15.5 to 22.2 kiloNewton) centrifugal compaction force. The flat plate compactor shall be equivalent to Model P-22 manufactured by Koehring, Master Division of Dayton, Ohio.

Compaction shall proceed as closely as possible following placement and shall be completed prior to the acceptance of any construction traffic.

Compaction shall not be attempted, however, within 3 feet (.9 meter) of the laying face of the paver units. Compaction shall continue until lipping has been eliminated between adjoining units. Joints shall be filled and compacted again as herein described.

All work extending to within 3 feet (.9 meter) of the laying face must be left fully compacted at the completion of each day's placement. Compaction of the remaining surface will be completed after sufficient units are laid in place.

As soon as practical after compaction and in any case prior to the termination of work on that day and acceptance of construction traffic, the bedding sand for joint-filling shall be spread over the pavement and allowed to dry. When dry, the filling sand shall be swept to fill the joints. At least one pass of the plate vibrator will be used to achieve compaction of the joint filling sand.

As soon as possible after filling the joints, light construction traffic should be encouraged to use the pavement to assist in the development of the paver unit lockup. Such traffic should traverse the greatest possible area of the pavement. After traffic has been allowed on the street, joints shall be refilled with dry sand periodically until no additional sand will be accepted in the joints.

E. Installation of Streetscape Appurtenances

Bicycle racks, benches, chairs or trash receptacles shall only be installed in sidewalks that are 12 feet (3.66 meters) or wider. When installation is indicated on the Drawings or directed by the Engineer or designated representative, these items shall be permanently installed as indicated in Standard Details 710S-3, 710S-5, 432S-9A or 432S-8A. Streetlights shall be installed in sidewalks in accordance with Standard Detail 850S-1. Above grade tree planters shall be installed in conformance with Standard Detail No. 432S-7D.

480S.6 Streetscape Location Requirements

A. Benches

Benches shall be placed either perpendicular to the curb with the center of the bench on line with trees and light poles and facing toward the building entry, or parallel to the building and within 6" (150 mm) of the building wall, facing out to the street.

Bench siting shall be in conformance with Standard Detail No. 432S-9C in 12' (3.6 m) or wider sidewalks and Standard Detail No. 432S-9D in sidewalks of width between 12' (3.6 m) and 18' (5.4 m).

B. Bike Racks

Bike racks are to be placed perpendicular to the curb with the centerline of the rack on line with trees and light poles.

Bike rack siting shall be in conformance with Standard Detail No. 710S-6A in 12' (3.6 m) or wider sidewalks and Standard Detail No. 710S-6B in sidewalks of width between 12' (3.6 m) and 18' (5.4 m).

C. Trash Receptacles

Trash receptacles shall either be placed along the curb, with the center line of the receptacle on line with the trees and light poles, or shall be located at the building entry in alignment with the structural bay system of the building. If located at the entry there shall be no more than 1 foot (300 mm) clearance between the receptacle and the building wall.

Trash receptacle siting adjacent to curb ramps within an intersection shall be in conformance with Standard Detail No. 432S-8C in 12' (3.6 m) or wider sidewalks

480S.7 Streetscape Furniture Installation Requirements

Bicycle racks, benches, chairs or trash receptacles shall only be installed in sidewalks that are 12 feet (3.66 meters) or wider. When installation is indicated on the Drawings or directed by the Engineer or designated representative, these items shall be permanently installed as indicated in Standard Detail Nos. 710S-3, 432S-9A and 432S-8A.

Above grade tree wells shall be installed in conformance with Standard Detail 432S-7E, while above grade tree planters shall be installed in conformance with Standard Detail Nos. 432S-7D and 432S-7G.

480S.8 Pedestrian Railing

When a pedestrian railing installation is required along sidewalks for pedestrian protection as indicated on the Drawings or directed by the Engineer or designated representative, this type of pedestrian railing shall be permanently installed in conformance with one of the following designated Standard Details: 707S-1, 707S-2, 707S-3 or 707S-4.

When a pedestrian railing installation is required along portions of sidewalks identified as 'ramps' for ADA accessibility purposes as indicated on the Drawings or directed by the Engineer or designated representative, this type of pedestrian railing shall be permanently installed in conformance with one of the following designated Standard Details: 707S-2, 707S-3 or 707S-4

480S.9 Measurement

Accepted work performed as prescribed by this item will be measured by the square foot (square meter: 1 square meter equals 10.76 square feet) of surface area of "Concrete Paver Units".

Accepted work performed as prescribed by "Sidewalk Ramps" will be measured per each for the type of ramp indicated on the Drawings.

Accepted work performed as prescribed by "Pedestrian Railing" will be measured per lineal foot of the type of railing indicated on the Drawings.

Accepted work performed as prescribed by "Streetscape Appurtenances" will be measured per each for the type of appurtenance indicated on the Drawings.

480S.10 Payment

The work performed as prescribed by this item and measured as provided under section 480S.9, "Measurement", for "Paver Sidewalk" and/or "Sidewalks Reconstruction" will be paid for at the unit bid price per square foot; per each for Curb Ramps with Pavers and "Streetscape Appurtenances" or per lineal foot for "Pedestrian Railing".

The unit bid price for new sidewalk shall include full compensation for excavating and/or removal and/or relocating obstructions, vegetating adjacent areas disturbed by sidewalk construction, preparing the subgrade; for furnishing and placing all materials including cushion material, all reinforcement, joints, expansion joint materials, and for any other materials, manipulations, labor, tools, equipment, finishing, curing and incidentals necessary to complete the work.

The unit bid price for sidewalk reconstruction shall include full compensation for excavating and/or removal of existing sidewalk and other obstructions, relocating obstructions, replacing PVC drain pipe, re-vegetating adjacent areas disturbed by sidewalk construction, preparing the subgrade; for furnishing and placing all materials including

cushion material, all reinforcement, joints, expansion joint materials, and for any other materials, manipulations, labor, tools, equipment, finishing, curing and incidentals necessary to complete the work.

The unit bid price for ramps shall include full compensation for preparing the subgrade when not included as a separate item; for furnishing and placing all materials, manipulation, labor, tools, equipment and incidentals necessary to complete the work. All necessary excavation, filling and grading of the slopes adjacent to the completed concrete paver units shall be included in the unit price bid for this specification item, unless included as a separate pay item in the Contract bid form.

The unit bid price for streetscape appurtenances shall include full compensation for the individual item (i.e. bench, chair, bicycle rack, trash receptacle, street light or above grade tree planter), as well as the removal of existing paver sidewalk, preparation of footings, furnishing and placing all materials, manipulation and finishing, labor, tools, equipment and incidentals necessary to complete the work.

The unit bid price for pedestrian railing shall include full compensation for the complete installation of the specific pedestrian railing including but not limited to preparation of footings or curb, furnishing and placing all materials, manipulation and finishing, labor, tools, equipment and incidentals necessary to complete the work.

Payment will be made under:

New Sidewalk		
Pay Item No. 480S-NS:	Concrete Paver Units for Sidewalks, mm	Per Square Foot.
Sidewalk Reconstruction		
Pay Item 480S-RS:	Reconstruct Concrete Paver Sidewalk, including removal of existing sidewalk	Per Square Foot.
Ramps		
Pay Item 480S-RP-1:	Curb Ramp with Pavers (Type I)	Per Each.
Pay Item 480S-RP-1A:	Curb Ramp with Pavers (Type IA)	Per Each.
Pay Item 480S-RP-1B:	Curb Ramp with Pavers (Type IB)	Per Each.
Streetscape Appurtenances		
Pay Item 480S-SAP-1:	Streetscape Bench (____ inches in length)	Per Each.
Pay Item 480S-SAP-2:	Streetscape Chair	Per Each.
Pay Item 480S-SAP-3:	Streetscape Bicycle Rack	Per Each.
Pay Item 480S-SAP-4:	Streetscape Trash Receptacle	Per Each.
Pay Item 480S-SAP-5:	Streetscape Street Light	Per Each.
Pay Item 480S-SAP-7A:	Streetscape Tree Well for Clay Soils	Per Each.
Pay Item 480S-SAP-7B:	Streetscape Tree Well for Granular Soils	Per Each.
Pay Item 480S-SAP-7D:	Streetscape Above Grade Tree Planters with Bench	Per Each.
Pay Item 480S-SAP-7E:	Streetscape Above Grade Tree Well with Seat	Per Each.
Pay Item 480S-SAP-7F:	Streetscape Tree Well without Grate	Per Each.
Pay Item 480S-SAP-7G:	Streetscape Above Grade Galvanized Steel Tree Planters	Per Each.
Pedestrian Railing		
Pay Item 480S-PRP-1:	Pedestrian Railing (Standard 707S-1)	Per LF.
Pay Item 480S-PRP-2:	Pedestrian ADA Railing - Option 1 (Standard 707S-2)	Per LF.
Pay Item 480S-PRP-3:	Pedestrian ADA Railing - Option 2 (Standard 707S-3)	Per LF.

Pay Item 480S-PRP-4:	Pedestrian ADA Railing - Option 3 (Standard 707S-4)	Per LF.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Specification Item 480S, "Concrete Paver Units for Sidewalks and Streetscape Requirements"	
City of Austin Standard Specifications	
Designation	Description
Item No. 204S	Portland Cement Treatment for Materials In Place
Item No. 403	Concrete for Structures
Item No. 407S	Fibrous Concrete
City of Austin Standard Details	
Designation	Description
432S-7D	Above Grade Tree Planters
432S-7E	Above Grade Tree Well with Bench
432S-7G	Above Grade Galvanized Steel Tree Planters
432S-8A	Trash Receptacle Installation in Concrete Paver Sidewalk
432S-8C	Furnishing Location in 12' (3.6 m) or Greater Trash Receptacle Siting
432S-9A	Bench Chair Installation in Concrete Paver Sidewalks
432S-9C	Furnishing Location in 12' (3.6 m) or Greater Sidewalks - Bench Siting
432S-9D	Furnishing Location in Greater than 12' (3.6 m) or Less than 18' (5.4 m) Sidewalks - Bench Siting
480S-1	Sidewalk Paver Installation-Hatch Opening for Meter Box
480S-2	Sidewalk Paver Installation - Water Meter Vault
480S-3	Sidewalk Paver Installation - Alternate Customer Cut-Off
480S-4	Sidewalk Paver Installation - Light Pole/Fixture & Traffic Signal Pole
480S-5	Sidewalk Paver Installation - Pavers Along Back of Curb
480S-6	Sidewalk Paver Installation - Exterior Stairs and Steps
707S-1	Pedestrian Railing
707S-2	Pedestrian ADA Railing - Option 1
707S-3	Pedestrian ADA Railing - Option 2
707S-4	Pedestrian ADA Railing - Option 3
710S-3	Bicycle Rack Installation in Concrete Paver Sidewalk (Alternate 1)
710S-6A	Furnishing Location in 12' (3.6 m) or Greater Sidewalks - Bicycle Rack Siting
710S-6B	Furnishing Location in Greater than 12' (3.6 m) or Less than 18' (5.4 m) Sidewalks- Bicycle Rack Siting
American Disabilities Act, Federal Register; Volume 56, No. 144; July 26, 1991 ADA Accessibility Guidelines For Building And Facilities	
Designation	Description
Section 4.29	Detectable Warnings on Walking Surfaces
Section A4.29.2	Detectable Warnings on Walking Surfaces
Architectural Barriers; Texas Civil Statutes, Article 9102; June 14, 1995 Texas Accessibility Standards (TAS)	
Designation	Description

Section 4.29	Detectable Warnings on Walking Surfaces
Section A4.29.2	Detectable Warnings on Walking Surfaces
American Society for Testing and Materials, ASTM	
Designation	Description
ASTM C-33	Specification for Concrete Aggregates
ASTM C-936	Specifications for Solid Concrete Interlocking Paving Units

RELATED CROSS REFERENCE MATERIALS	
Specification Item 480S, "Concrete Paver Units for Sidewalks and Streetscape Requirements"	
City of Austin Standard Contract Documents	
Designation	Description
00700	General Conditions
01500	Temporary Facilities
01550	Public Safety and Convenience
City of Austin Utilities Criteria Manual	
Designation	Description
Section 5.2.3	Utility Adjustments For Roadway Construction Projects
City of Austin Standard Specifications	
Designation	Description
Item No. 102S	Clearing and Grubbing
Item No. 104S	Removing Portland Cement Concrete
Item No. 110S	Street Excavation
Item No. 111S	Excavation
Item No. 132S	Embankment
Item No. 201S	Subgrade Preparation
Item No. 203S	Lime Treatment for Materials In Place
Item No. 480S	Concrete Paving Unit
Item No. 485S	Concrete Paving Units For Sidewalk Ramps
Item No. 604S	Seeding for Erosion Control
City of Austin Standard Details	
Designation	Description
432S-2A	Detectable Warning-Paver
432S-3	Type 1 Curb Ramps-Full Intersection
432S-3A	Type 1 Curb Ramps- T Intersection
432S-3B	Type 1A/1B Curb Ramps-Full Intersection
432S-3C	Type 1A/1B Curb Ramps- T Intersection
432S-3D	Combined Curb Ramps-Full Intersection
432S-3E	Combined Curb Ramps- T Intersection
432S-3F	Combined Sidewalk Curb Ramp with Pavers
432S-3G	Combined Sidewalk Curb Ramp with Pavers within Limited ROW
432S-3H	Type 1 Curb Ramps within PC/PT of Curb and Gutter

432S-5	Type 1 Sidewalk Curb Ramp
432S-5A	Type 1A Sidewalk Curb Ramp
432S-7C	Tree Well for New Trees Planted Within Concrete Sidewalk 3.6 m (12′) or Greater
432S-7F	Tree Well Without Grate

ITEM NO. 503 FRAMES, GRATES, RINGS AND COVERS 11-07-22

503.1 Description

This item shall govern furnishing and installation of frames, grates, rings and covers for inlets, manholes and other structures indicated on the Drawings.

Source: Rule No. R161-22.13, 11-7-2022.

503.2 Submittals

The submittal requirements of this specification item include manufacturer, model number, description, painting requirements and characteristics of frames, grates, rings, covers, height adjustment insert and nuts and bolts required for completion of the work.

Source: Rule No. R161-22.13, 11-7-2022.

503.3 Materials

The Contractor shall submit descriptive information and evidence that the materials the Contractor proposes for incorporation in the Work are of the kind and quality that satisfy the requirements in the Contract Documents. Austin Water (AW) shall be included in all submittal reviews. The AW Standard Products Lists (SPLs) are considered a part of the Specifications for the Work. The Contractor shall use products from the SPLs for all water and wastewater construction unless alternative products are shown on the Drawings; called for in the specifications; or specified in the Bidding Requirements, Contract Forms and Conditions of the Contract.

The products included in the SPLs current at the time of plan approval shall govern unless a specific product or products on the lists have subsequently been removed from those SPLs because of quality or performance issues. Products and materials that are not covered by the SPLs shall meet the requirements in the contract documents.

Submittals for the products and materials covered by this specification shall include manufacturer catalog sheets, technical data sheets, shop drawings, product or material test results, requirements listed below, and any other information needed to adequately describe the product or material. For products covered by SPLs, the submittal shall include a copy of the applicable SPL with the proposed product identified. An SPL by itself is not considered an adequate submittal.

A. Welded. Steel Welded steel grates and frames shall conform to the number; size, dimensions and details indicated on the Drawings and shall be welded into an assembly in accordance with those details. Steel shall conform to the requirements of ASTM A 36/A 36M, "Specification for Structural Steel".

B. Castings. Castings, whether Carbon-Steel, Gray Cast Iron or Ductile Iron shall conform to the shape and dimensions indicated on the Drawings and shall be clean substantial castings, free from sand or blowholes or other defects. Surfaces of the castings shall be free from burnt on sand and shall be reasonably smooth. Runners, risers, fins and other cast on pieces shall be removed from the castings and such areas ground smooth.

   Bearing surfaces between manhole rings and covers or grates and frames shall be cast or machined with such precision that uniform bearing shall be provided throughout the perimeter area of contact. Pairs of machined castings shall be matchmarked to facilitate subsequent identification at installation with the exception of water and wastewater manhole and valve castings. These manhole and valve castings shall be

fabricated with such draft, tolerances, bolt hole spacing, etc., that all rings and covers of a particular type or class are interchangeable and match-marking will not be required.

Steel castings shall conform to ASTM A 27/27M, "Specifications for Steel Castings, Carbon, for General Application". Grade 70-36 shall be furnished unless otherwise specified on the Drawings.

Cast iron castings shall conform to ASTM A 48, "Specification for Gray Iron Castings", Class 30.

Ductile Iron castings shall conform to ASTM A 536, "Specification for Ductile Iron Castings". Grade 60-40-18 shall be used unless otherwise indicated on the Drawings.

C. Manhole Cover Riser Rings. Height-adjustment inserts for wastewater manhole rings, which are used for raising standard manhole covers, shall be those models listed in AW SPL WW-146G.

D. Nuts and Bolts. Nuts and bolts shall be hex head ⅝ inch × 2.5 inch #11 National Coarse Thread, Type 316 stainless steel. For bolted manhole covers, a thin film of an approved "Anti-freeze" compound, approved by the Engineer or designated representative, shall be applied to all bolts.

E. Mortar. Unless otherwise specified or approved by the Engineer or designated representative, the mortar for bedding castings shall consist of one (1) part Portland cement and three (3) parts sand and sufficient water to provide the desired consistency. The gradation of the fine aggregate shall meet the requirements for Grade No. 1, City of Austin (COA) Standard Specification Item No. 403.

Source: Rule No. R161-22.13, 11-7-2022.

503.4 Construction Methods

Frames, grates, rings and covers shall be constructed of the specified materials in accordance with the details indicated on the Drawings or in the COA Standard Details. The frames, grates, rings and covers shall be placed carefully to the lines or grades indicated on the Drawings or as directed by the Engineer or designated representative.

All welding shall conform to the requirements of the ANSI/AWS Structural Welding Code D1.1. Welded frames, grates, rings and covers shall be given 1 coat of a commercial grade red lead oil paint and 2 coats of commercial grade aluminum paint. All coats shall be a minimum of 1.5 mils, dry.

Painting of gray iron castings will not be required, except when used in conjunction with structural steel shapes.

Source: Rule No. R161-22.13, 11-7-2022.

503.5 Measurement and Payment

Frames, grates, rings and covers will not be measured and payment for furnishing all materials, tools, equipment, labor and incidentals to complete the Work will be included in the Bid Items which constitute the complete structures.

Source: Rule No. R161-22.13, 11-7-2022.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Standard Specification Item Number 503, "Frames, Grates, Rings and Covers"	
COA Standard Specifications	
Designation	Description

Item No. 403S	Concrete for Structures
AW SPLs	
Designation	Description
WW-146G	Manhole Grade Rings, Plastic
American Society for Testing Materials (ASTM)	
Designation	Description
A36/A36M	Specification for Structural Steel
A27/A27M	Specification for Steel Castings, Carbon, for General Application
A48	Specification for Gray Iron Castings
A536	Specification for Ductile Iron Castings
ANSI/AWS	
Designation	Description
Code D 1.1	Structural Welding Code

RELATED CROSS REFERENCE MATERIALS	
Standard Specification Item Number 503, "Frames, Grates, Rings and Covers"	
COA Standard Specifications	
Designation	Description
Item No. 504S	Adjusting Structures
Item No. 510	Pipe
COA Standard Details	
Designation	Description
No. 503S-1	457mm (18”) Cover and Frame
No. 503S-2S	Storm Sewer Manhole Ring and 610 mm (24”) Cover
No. 503S-3S	Bolted Storm Sewer Manhole Ring and 610 mm (24”) Cover
No. 503S-4S	Storm Sewer Manhole Ring and 813 mm (32”) Cover
No. 503S-5S	Bolted Storm Sewer Manhole Ring and 813 mm (32”) Cover
No. 506S-2	Major Manhole Adjustment
No. 506S -11	Storm Sewer Manhole Details
TxDOT Specifications	
Designation	Description
Item 421	Portland Cement Concrete

Source: Rule No. R161-22.13, 11-7-2022.

ITEM NO. 505S CONCRETE ENCASEMENT AND ENCASEMENT PIPE 2-24-10

505S.1 Description

This item shall govern the furnishing of materials and the methods of constructing a Portland cement concrete encasement or encasement pipe in a trench.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text and accompanying tables, the inch-pound units are given preference followed by SI units shown within parentheses.

505S.2 Submittals

The submittal requirements of this specification item include:

A. Type, of pipe, construction methods and sequence,

B. Aggregate types, gradations and physical characteristics for the Portland cement concrete mix,

C. Proposed proportioning of materials for the mortar mix.

505S.3 Materials

A. Portland Cement Concrete

The Portland cement concrete shall conform to Class D Concrete, Item No. 403, "Concrete for Structures."

B. Pipe

Portland Cement concrete pipe shall conform to ASTM C-76, Class III or better.

Corrugated Metal Pipe (CMP) shall conform to Section 510. 2 (8)(o) of the City of Austin Standard Specification Item No. 510, "Pipe."

Steel Pipe shall conform to ASTM A134 with a minimum thickness of 3/8 inch (9.5 mm) for pipe with a diameter of 16 inches (400 mm) and greater.

C. Grout

Grout shall consist of not less than 6 sacks Portland cement per cubic yard (335 kilograms Portland cement per cubic meter) and clean washed sand mixed with water. The grout shall have a consistency such that the grout will flow into and completely fill all voids. If allowed by the Engineer or designated representative, an air entraining admixture may be added to facilitate placement.

505S.4 Construction Methods

When indicated on the Drawings or acceptable to an Engineer or designated representative, a concrete encasement shall be placed to protect the pipe. Pipe or bedding shall not be placed where:

(a) the top of the pipe would have less than 30 inches (750 mm) of cover from finish grade,

(b) the ground water invades the trench, or

(c) the trench bottom is of unstable material.

If either of these conditions is encountered, the Engineer or designated representative shall be notified and may direct the Contractor to:

(a) encase the pipe with concrete,

(b) change pipe material, or

(c) use a higher strength class of pipe.

Concrete encasement shall extend from 6 inches (150 mm) below to 6 inches (150 mm) above the outer projections of the pipe over the entire width of the trench in accordance with the City of Austin Standard Detail 501S-1, "Encasement Detail w/ Casing Spacers."

The ends of the encasement pipe shall be bulkheaded (Standard Specification Item No. 507S) with concrete blocks, bricks or stones, dry-stacked without mortar, sufficient to prevent the intrusion of trench backfill material into the encasement, but fitted loosely enough to facilitate the escape of water from the encasement should carrier pipe leakage or failure occur.

505S.5 Measurement

Concrete encasement will be measured by the lineal foot (meter: 1 meter equals 3.281 feet), for size of pipe being encased, complete in place. The measurement will be made between ends of the encasement, along the central axis as installed.

Encasement pipe installed by open cut will be measured by size of encasement installed, complete in place. The measurement will be made between the ends of the pipe, along the central axis as installed

505S.6 Payment

Work performed and materials furnished as prescribed by this item will be included in a unit price bid item from Standard Specification Item No. 510, "Pipe" unless included as a separate pay item in the contract. When included for payment, it shall be measured as provided under "Measurement" and will be paid at the unit bid price per lineal foot for "Concrete Encasement" or "Encasement Pipe" of the size indicated on the Drawings. The unit bid price shall include full compensation for furnishing all materials, pipe for all preparation, hauling, installation and for all labor, tools, equipment and incidentals necessary to complete the work, including bench excavation and disposal of surplus material.

Payment, when included as a contract Pay Item, will be made under one of the following:

Pay Item No. 505S-A:	Concrete Encasement for ___ Dia. Pipe	Per Lineal Foot.
Pay Item No. 505S-B:	Encasement Pipe ___ Dia., Type ___,	Per Lineal Foot.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Standard Specification Item No. 505S, "Encasement and Encasement Pipe"	
City of Austin Standard Specification Items	
Designation	Description
Item 403	Concrete For Structures
Item 507S	Bulkheads
Item 510	Pipe
Section 510.2(8)(o)	Corrugated Metal Pipe (CMP)

City of Austin Standard Details	
Designation	Description
Detail 501S-1	Encasement Detail w/ Casing Spacers
American Society for Testing and Materials (ASTM)	
Designation	Description
A-134	Specification for Pipe, Steel, Electric-Fusion (Arc)-Welded (Sizes NPS 16 and Over)
C-76/C-76M	Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe

RELATED CROSS REFERENCE MATERIALS	
Standard Specification Item No. 505S, "Encasement and Encasement Pipe"	
TxDOT Specifications	
Designation	Description
Item 421	Portland Cement Concrete
Section 421.9	Quality of Concrete
Section 421.2(8)	Mortar and Grout
City of Austin Standard Specification Items	
Designation	Description
Item No. 501S	Jacking or Boring Pipe
Item No. 506	Manholes
Section 510.2(8)(c)	Concrete pipe
Section 510.2(8)(m)	Steel Pipe
Item No. 593S	Concrete Retards

ITEM NO. 506 MANHOLES 2-22-21

506.1 Description

This item governs construction of pre-cast and cast-in-place wastewater manholes, storm water manholes, storm water junction boxes and cast-in-place wastewater junction boxes, complete in place, including excavation, installation, backfilling and surface restoration; required items including rings, covers, coatings, and appurtenances; and incidental work such as pumping and drainage necessary to complete the work. Contractor-performed acceptance testing is required for wastewater manholes.

Source: Rule No. R161-21.08, 2-22-2021.

506.2 Qualifications

Applicators of coatings to the interior surfaces of wastewater manholes, as specified in 506.4.R and 506.5.J, shall be listed on Austin Water (AW) Standard Products List (SPL) WW-511. Individual(s) setting up and operating equipment to core through the walls of existing manholes or junction boxes shall have experience in coring similar size holes through the walls of similar size and type structures on at least ten projects (or 15 manholes) in AW's jurisdiction.

Source: Rule No. R161-21.08, 2-22-2021.

506.3 Project Submittals

A. Products and Materials

The Contractor shall submit descriptive information and evidence that the materials the Contractor proposes for incorporation in the Work are of the kind and quality that satisfy the requirements in the Contract Documents. AW shall be included in all submittal review. The AW SPLs are considered a part of the Specifications for the Work. The Contractor shall use products from the SPLs for all water and wastewater construction unless alternative products are shown on the Drawings; called for in the specifications; or specified in the Bidding Requirements, Contract Forms and Conditions of the Contract.

The products included in the SPLs current at the time of plan approval shall govern; unless a specific product or products on the lists have subsequently been removed from those SPLs because of quality or performance issues. Products and materials that are not covered by SPLs shall meet the requirements in the contract documents.

Submittals for the products and materials covered by this specification shall include manufacturer catalog sheets, technical data sheets, shop drawings, product or material test results, requirements listed below, and any other information needed to adequately describe the product or material. For products covered by SPLs, the submittal shall include a copy of the applicable SPL with the proposed product identified. An SPL by itself is not considered an adequate submittal.

The submittal requirements of this specification item include:

1. For pre-cast manholes and junction boxes: shop drawings for each structure showing, at a minimum, the Project and Contractor's name: manufacturer's name and plant location; applicable specifications; list of materials (such as adjusting rings, boots, gaskets, and pre-cast sections) by type and quantity; elevation view showing diameter or size, ring and cover size and elevation, ring type (bolted or unbolted, flared top or flared bottom) wall thickness, elevations of transitions from large diameter

sections to smaller diameter sections, base width and thickness, total depth, size of openings, reinforcement, and length of each pre-cast section; structure identification number and station location; pipe line identification; pipe material and size; pipe flowline elevations; plan view showing azimuthal orientation (based on 360 degrees clockwise) of the pipes relative to the outflow pipe; technical data sheets covering pipe-to-manhole or pipe-to-junction box connectors, and gaskets.

2. For cast-in-place manholes and junction boxes: formwork drawings sealed by a registered Professional Engineer licensed in the State of Texas with documented experience in formwork design for wall pours that exceed 4 feet in height and slabs that are not ground supported.

3. For hydraulic cement concrete; mix components and proportions, material sources, materials test results.

4. For mortar: mix components and proportions, material sources, materials test results.

5. For non-shrink grout: technical data sheet indicating ASTM type and containing instructions on surface preparation, mixing, placing, and curing procedures.

6. For wastewater manhole coatings and linings: technical data sheets that include instructions on surface preparation, mixing, placing, and curing procedures; technical data sheets for coating thickness measuring equipment and for holiday detection test equipment.

7. For connections to existing manholes or junction boxes: details showing the size, location, and method of removal of the wall section, including any temporary supports attached to the manhole or junction box wall; details showing the location of existing joints, other connecting pipes, and other features that penetrate or attach to the wall; and technical data sheets covering the pipe-to-manhole or pipe-to-junction box connectors.

B. Acceptance Test Records

Submittal of acceptance test records is required for wastewater manholes and shall include as a minimum the following items:

Name of the manhole manufacturer.

Interior surface coating type and application method.

Model and manufacturer of vacuum tester.

Date tested/date re-tested.

Indication of whether test passed or failed and statement of corrective action taken if test failed.

Test Method Used.

Location/station of manhole.

Type of base: Precast/cast-in-place.

Type of repairs made to the joints.

The test records shall also be included as part of the Project records turned in with the acceptance package.

C. Installation

The Contractor shall submit evidence that the individual(s) setting up the equipment and coring through the walls of manholes and junction boxes are experienced with the equipment and procedures and have successfully cored through the same types of materials using the same types of equipment.

Source: Rule No. R161-21.08, 2-22-2021.

506.4 Materials

A. Concrete

All cast-in-place concrete shall conform to City of Austin (COA) Standard Specification Item No. 403S, "Concrete for Structures." Cast in place concrete shall be Class A or as specified on the Drawings. Concrete used in precast concrete manhole base sections, riser sections and appurtenances shall conform to the requirements of Texas Department of Transportation Item 421, Hydraulic Cement Concrete. Concrete for backfill of over-excavated areas shall be COA Class A, or Class J (COA Standard Specification Item 403S, Concrete For Structures) or Controlled Low Strength Material (COA Standard Specification Item 402S) as indicated on the Drawings.

B. Mortar

Mortar shall be composed of one part Portland cement, one part masonry cement (or ¼ part hydrated lime), and sand equal to 2½ to 3 times the sum of the volumes of the cements and lime used. The sand shall meet the requirements for "Fine Aggregate" as given in Standard Specification Item No. 403S "Concrete For Structures." Mortar shall not be used for any purpose on the inside of wastewater manholes.

C. Grout

Grout shall be the non-shrink type conforming to ASTM C 1107, Packaged, Dry, Hydraulic Cement Grout (Nonshrink), Grade C. Grout shall be used as packaged, with the mixed ingredients requiring only the addition of water.

D. Reinforcement

The reinforcing steel shall conform to the requirements of Standard Specification Item No. 406S, "Reinforcing Steel." Secondary, non-structural steel in cast-in-place stormwater manholes may be replaced by collated fibrillated polypropylene fibers, if approved by the Engineer or designated representative.

E. Brick

The brick for ring adjustment courses and for stormwater manholes shall be of first quality, sound, hard burned, perfectly shaped brick conforming to the requirements of ASTM C 62, Grade SW, or concrete brick meeting the requirements of ASTM C 55, Grade N-1. Use of brick to construct any part of wastewater manholes is prohibited.

F. Rings and Covers

Rings and covers shall conform to the requirements of COA Standard Specification Item No. 503, "Frames, Grates, Rings and Covers."

1. Replacement Rings and Covers, 24-inch Diameter Lids

   This ring and cover shall be used for the replacement of broken rings and covers, minor manhole adjustment, or as otherwise directed by the Engineer or designated representative.

2. Rings and Covers, 32-inch Diameter Lids

   This ring and cover shall be used for all new manhole construction, except as otherwise directed by the Engineer or designated representative.

G. Bulkheads

Bulkheads shall meet the requirements of COA Standard Specification Item No. 507 "Bulkheads."

H. Precast Base Sections, Riser Sections, Flat-top Slabs and Cones

Precast concrete base sections, riser sections, flat-top slabs, and cones shall conform to the requirements of ASTM C 478. The width of the invert shall be specifically sized for the connecting pipes. Inverts shall be "U" shaped channels. The channel depth at the point where a pipe connects to the manhole wall, for pipes 24 inches in diameter and smaller, shall be a minimum of three-fourths of the diameter of the pipe, with the top of the channel being a smooth transition between the inlet and outlet pipe connection points. For manholes connecting to pipes larger than 24 inches in diameter, the channel depth at the point where a pipe connects to the manhole wall shall be at least equal to the full pipe diameter. Changes in flow direction in the inverts of manholes shall be made by constructing smooth, long-radius sweeps to minimize splashing, turbulence, and eddies. The manhole invert grade shall 1) be a continuation of the inlet and outlet pipe grades carried through to the centerline of the manhole, or 2) have a minimum slope of 2.5 percent between the inlet and outlet pipe inverts, or 3) have a minimum difference of 0.10 feet between the inlet and outlet pipe inverts, whichever provides the maximum difference in invert elevation between the inlet and outlet pipes, 4) have a straight section of invert that is 4 to 6 inches in length to transition between the curved portion of the invert channel and the connecting pipes in order to accommodate the mandrel apparatus for up to 15-inch dimeter pipes. In all cases, the bottom(s) of the channel(s) shall provide a smooth transition between the inlet and outlet pipes. Where wastewater lines enter a manhole above the flowline of the outlet, the invert shall be filleted to prevent splashing and solids deposition.

Joints for wastewater base sections, riser sections, and cones shall conform to the requirements of ASTM C 443. Additionally, joint dimensions for 48-inch inside diameter wastewater manhole sections and cones shall comply with the "Wedge Seal Offset Joint Detail, Precast Manhole Section", located in SPL WW-146. Joint dimensions for wastewater manhole sections and cones larger than 48-inch inside diameter shall comply with COA Standard No. 506S-12, "O-Ring Joint Detail Precast Manhole Section" or "Wedge Seal Offset Joint Detail, Precast Manhole Section", located in SPL WW-146. Precast bases for 48-inch inside diameter manholes shall have preformed inverts. Inserts acceptable to the Engineer or designated representative shall be embedded in the concrete wall of the manhole sections to facilitate handling; however, through-wall holes for lifting will not be permitted.

I. Precast Junction Boxes

Precast junction boxes shall conform to the requirements of ASTM C913 and shall be allowed only where indicated on the Drawings or acceptable to the Engineer or designated representative.

J. Pipe-to-Manhole and Pipe-to-Junction-Box Connectors

Resilient connectors, ring waterstops, and seals at connections of wastewater pipes to pre-cast and cast-in-place manholes and junction boxes shall be watertight, flexible, resilient and non-corrosive, conforming to ASTM C 923. Metallic mechanical devices for securing the connectors, ring waterstops, and seals in place shall be Type 304 stainless steel.

K. Precast Flat-Slab Transition/Junction Box Lids

Precast slab transitions and lids shall be designed to safely resist pressures resulting from loads which might result from any combination of forces imposed by an HS-20 loading as defined by the American Association of State Highway and Transportation Officials (AASHTO). The joints of precast slab transitions and of lids for wastewater applications shall conform to the requirements of ASTM C443.

L. Precast-Prefabricated Tee Manholes

Tee manholes shall be allowed only where indicated on the Drawings or as directed by the Engineer or designated representative. The main pipe section shall conform to the requirements of COA Standard Specification Item No. 510, "Pipe." The vertical manhole portion (tee) above the main pipe shall conform to the requirements of the precast components.

The manhole tee shall have a minimum inside diameter of 48 inches and shall rise vertically centered or tangent to the main pipe, as indicated on the Drawings or as directed by the Engineer or designated

representative. An access hole less than 48 inches in diameter shall be cut into the main pipe to allow a ledge for support of access ladders. Unless otherwise specified on the Drawings, the main pipe portion of the tee manhole shall be included in the unit price bid for the unit tee manhole price.

M. Precast Grade Rings

Rings shall be reinforced Class A concrete

1. Precast Grade Rings, 24½ inches Inside Diameter

This adjustment ring shall be used only for adjusting existing manholes with 24-inch diameter lids and for Wastewater Access Device. Inside to outside diameter dimension of ring shall be 6 inches with a thickness of 3 to 6 inches.

2. Precast Grade Rings, 35 inches Inside Diameter

This adjustment ring shall be used for all new manhole construction with 32-inch diameter lids. Inside to outside diameter dimension of ring shall be 6 inches with a thickness of 2 to 6 inches.

N. High Density Polyethylene Grade Rings

Plastic grade (adjusting) rings shall be injection molded from high density polyethylene identified according to ASTM D4976. Reprocessable and recyclable ethylene plastic materials are allowed. Manufacturers of HDPE adjusting rings shall be listed on SPL WW-146G.

O. Controlled Low Strength Material

Controlled low strength material (CLSM) shall meet Standard Specification Item 402S, Controlled Low Strength Material.

P. Cement Stabilized Sand

Cement stabilized sand for bedding or backfilling shall contain 2 bags of Portland cement per cubic yard. The sand shall meet the requirements for "Fine Aggregate" in Standard Specification Item 403S, "Concrete for Structures."

Q. Waterproofing Joint Materials

O-rings and wedge seals for the joints of all wastewater manholes, and for stormwater manholes when indicated on the Drawings, shall conform to the requirements of ASTM C443. Cold applied preformed plastic gaskets for stormwater manholes shall be as specified in City of Austin Standard Specification Item No. 510, "Pipe." Plastic seals wrapped around manholes at joints, and hydrophillic waterstops installed in joints, shall be listed on SPL WW-146A. PVC waterstops installed in joints and waterproofing compounds applied to the exterior surfaces of manholes and junction boxes shall be as specified in the Contract Documents.

R. Interior Surface Coatings for Wastewater Manholes

Interior surface coatings for wastewater manholes shall be either: as specified on the Drawings, as designated in writing by the Engineer or designated representative, or as included on SPL WW-511, which lists acceptable products, uses and applicators.

S. Structural Lining Systems for Wastewater Manholes

Structural lining systems for wastewater manholes shall be either: as specified on the Drawings, as designated in writing by the Engineer or designated representative, or as included on SPL WW-511A.

Source: Rule No. R161-21.08, 2-22-2021.

506.5 Construction

A. General

Pipe ends within the base section or junction box walls shall not be relied upon to support overlying manhole dead and live load weights. All wastewater branch connections to new or existing mains shall be made at manholes, with the branch pipe crown installed at an elevation no lower than the elevation of the effluent pipe crown. Changes in flow direction in the inverts shall be made by constructing smooth, long-radius sweeps to minimize splashing, turbulence, and eddies. Where wastewater lines enter the manhole up to 24 inches above the flowline of the outlet, the invert shall be sloped upward in a U-shaped channel three-fourths of the diameter of the incoming pipe to receive the flow, thus preventing splashing or solids deposition. A drop pipe shall be provided for a wastewater pipe entering a manhole whenever the invert cannot be constructed to prevent splashing and solids deposition. Construction of extensions to existing systems shall require placement of bulkheads at locations indicated or directed by the Engineer or designated representative.

Unless otherwise indicated on the Drawings, stormwater manholes shall have eccentric cones and wastewater manholes shall have concentric cones, except on manholes over large mains where an eccentric cone shall be situated to provide access to an invert ledge. Eccentric cones may be used where conflicts with other utilities dictate. Flat-slab tops may be used only where clearance problems are encountered or where specified on the Drawings. Cast-in-place wastewater junction boxes shall be allowed only where indicated on the Drawings or where accepted by the Engineer or designated representative.

B. Foundation Support

Manholes shall be founded at the established elevations on uniformly stable subgrade. Unstable subgrade shall be over-excavated a minimum of 12 inches and replaced with a material acceptable to the Engineer or designated representative. Precast base units shall be founded and leveled on a 6-inch thick layer of coarse aggregate bedding. A pipe section with a prefabricated tee manhole and half the length of the adjoining pipe sections on each side shall be founded on a minimum 6-inch thick layer of unreinforced Class A concrete (COA Standard Specification Item No. 403S, "Concrete For Structures"). The cast-in-place concrete cradle shall be placed against undisturbed trench walls up to the pipe's springline.

C. Cast-in-Place Concrete

Structural concrete work shall conform to Standard Specification Item No. 410S, "Concrete Structures." Forms shall be used for all slabs that are not ground supported and for all vertical surfaces above the foundation level. Formwork shall be designed according to American Concrete Institute ACI 347, Guide to Formwork for Concrete. Outside forms on vertical surfaces may be omitted where concrete can be cast against the surrounding earthen material that can be trimmed to a smooth vertical face.

D. Manhole Bases

Pre-cast bases shall conform to requirements in 506.4.H.

Cast-in-place bases shall have a minimum thickness of 12 inches at the invert flowline. The widths of all manhole inverts shall be specifically sized for the connecting pipes. Inverts shall be "U" shaped channels. The channel depth at the point where a pipe connects to the manhole wall, for pipes 24 inches in diameter and smaller, shall be a minimum of three-fourths of the pipe diameter, with the top of the channel being a smooth transition between the inlet and outlet pipe connection points. For manholes connecting to pipes greater than 24 inches in diameter, the channel depth at the point where a pipe connects to the manhole wall shall be equal to the full pipe diameter. The manhole invert grade shall 1) be a continuation of the inlet and outlet pipe grades carried through to the centerline of the manhole, or 2) have a minimum slope of 2.5 percent between the inlet and outlet pipe inverts, or 3) have a minimum difference of 0.10 feet between the

inlet and outlet pipe inverts, whichever provides the maximum difference in invert elevation between the inlet and outlet pipes, 4) have a straight section of invert that is 4 to 6 inches in length to transition between the curved portion of the invert channel and the connecting pipes in order to accommodate the mandrel apparatus for up to 15-inch dimeter pipes. In all cases, the bottom(s) of the channel(s) shall provide a smooth transition between the inlet and outlet pipes. Changes in flow direction in the inverts of manholes shall be made by constructing smooth, large-radius sweeps to prevent splashing, turbulence, and eddies. The lowermost riser section may be set in the Portland cement concrete, while still plastic, after which the base shall be cured a minimum of 24 hours prior to proceeding with construction of the manhole up to 12 feet in depth. The base shall be cured an additional 24 hours prior to continuing construction above the 12-foot level.

Wastewater manholes having cast-in-place bases may be constructed over existing wastewater pipes and the top half of the pipe removed to facilitate invert construction, except where the existing pipe is PVC, in which case, the entire pipe shall be removed from inside the manhole. The manhole floor shall rise outwardly from the springline elevation of the pipe, approximately one inch for each 12 inches of run (8 percent slope). The floors of stormwater manholes, also, shall rise outwardly from the springline elevation of the pipe, approximately one inch for each 12 inches of run (8 percent slope).

Wastewater manholes with lines larger than 18 inches shall require pre-cast bases; manholes constructed over in-service mains however, may be built on cast-in-place bases if the flow cannot be interrupted.

E. Pipe Connections to New Manholes and Junctions Boxes

Wastewater pipe connections to new manholes and junction boxes shall be made using flexible, resilient, and non-corrosive watertight boot connectors or ring waterstops acceptable to the Engineer and conforming to the requirements of ASTM C-923. Any voids in the annular space between the pipe and boot connector or ring waterstop and the inside of the manhole wall shall be filled with non-shrink grout to prevent solids collection. New precast manholes and manholes with cast-in-place bases shall have holes for pipe penetrations in the manhole wall separated by a minimum of 7 inches, designed by the manhole manufacturer and as measured from the inside diameter of the cored or formed holes on the inside wall of the manhole to ensure the structural integrity of the manhole wall.

F. Pipe Connections to Existing Manholes and Junction Boxes

Wastewater pipe connections to existing manholes and junction boxes shall be made by removing the wall section by coring; installing flexible, resilient, and non-corrosive boot connectors or ring waterstops acceptable to the Engineer and conforming to the requirements of ASTM C-923; filling any voids in the annular space between the pipe and boot connector or ring waterstop and the inside of the manhole or junction box wall with non-shrink grout; rebuilding the invert to conform to Section 506.5.D; rehabilitating the interior walls with structural lining material listed on SPL WW-511A, and coating the interior of the manhole with material listed on SPL WW-511. Connections to existing manholes and junction boxes shall be made at locations that allow the removal limits of the wall section to be no closer than 12 inches to the inside diameter of the nearest existing connecting pipe. Equipment used to remove the wall section shall be operated in a manner that does not damage the adjacent interior coating, substrate, or wall. This includes installation of anchors or other supports that are attached to the manhole or junction box wall for temporary support of the removal equipment.

G. Waterproofing

PVC waterstops, hydrophillic waterstops, joint wrapping, and waterproofing compounds shall be installed as specified. Material wrapped around manholes at joints shall be listed on SPL WW-146A regardless of whether installation of the material is required by the Contract for waterproofing or is volunteered by the Contractor for ensuring acceptance of the manhole joints.

H. Backfilling

Backfilling of manholes shall conform to the density requirements of COA Standard Specification Item No. 510, "Pipe." Manhole construction in roadways may be staged to facilitate pavement base construction. Manholes constructed to interim elevations to facilitate interim construction shall be covered with steel plates that conform to the requirements of COA Standard 804S-4, sheets 5, 6 and 7, Steel Plating. Steel plates on wastewater manholes shall be set in mortar to minimize inflow of storm water runoff. Manholes shall be completed to finish elevation prior to placement of the roadway's finish surface except on pavement reconstruction projects, where castings may be adjusted after paving is completed. The excavation for completion of manhole construction shall be backfilled in accordance with COA Standards for Trench Repair.

I. Height Adjustment of Manholes

1. General

All adjustments shall be completed prior to the placement of the final roadway surface except on pavement reconstruction projects, where castings may be adjusted after paving is completed.

Brick shall not be used in making height adjustments to wastewater manholes. Mortar shall not be used for any purpose on the inside of wastewater manholes.

Manhole components to be reused shall be carefully removed and the contact areas shall be cleaned of all mortar, concrete, grease and sealing compounds. Any items broken in the process of removal and cleaning shall be replaced in kind by the Contractor at its expense.

If the adjustment involves lowering the top of a manhole, a sufficient depth of pre-cast concrete rings or brick courses shall be removed to permit reconstruction. Existing mortar shall be cleaned from the top surface remaining in place and from all brick or concrete rings to be reused and the manhole rebuilt to the required elevation. The manhole ring and cover shall then be installed with the top surface conforming to the proposed grade.

If the adjustment involves raising the elevation of the top of the manhole in accordance with "Minor Manhole Height Adjustment," the top of brick or concrete ring shall be cleaned and built up vertically to the new elevation, using new or salvaged concrete rings or bricks and the ring and cover installed with the top surface conforming to the proposed grade.

After rings and covers are set to grade, the inside and outside of the precast concrete grade rings shall be wiped with non-shrink grout to form a durable surface and water-tight joints. The grouted surface shall be smooth and even with the manhole cone section. Grout shall not be placed when the atmospheric temperature is at or below 40°F. If a sudden drop in temperature below 40°F occurs or temperatures below 40°F are predicted, the grouted surfaces shall be protected against freezing for at least 24 hours.

2. Minor Manhole Height Adjustment (New and Existing Manholes)

Minor manhole height adjustments shall be performed as indicated on COA Standard 506S-4, "Minor Manhole Height Adjustment", and shall consist of adding precast reinforced concrete rings to adjust new and existing manholes to final grade. Brick shall not be used in making height adjustments to wastewater manholes.

If the adjustment involves raising the elevation of the top of the manhole, the top of brick or concrete ring shall be cleaned and built up vertically to the new elevation, using new or salvaged concrete rings or bricks and the ring and cover installed with the top surface conforming to the proposed grade.

For new manhole construction, the maximum allowable throat or chimney height, including the depth of the ring casting, shall be limited to 21 inches of vertical face on the interior surface. For adjustments of existing manholes that fall within the limits of overlay and street reconstruction projects, the maximum vertical allowable height, including the depth of the ring casting, shall be limited to 27 inches of vertical face on the interior surface. All other existing manholes shall have a maximum allowable

throat or chimney height adjustment, including the depth of the ring casting, of 12 inches of vertical face on the interior surface. Any adjustment that will exceed these requirements shall be accomplished as indicated on COA Standard 506S-2, "Major Manhole Height Adjustment" and as described below. Manholes not located in paved areas shall have bolted covers. Manholes located within paved areas (street right-of-way only) shall be standard non-bolted unless otherwise noted on the drawings.

3. Major Manhole Height Adjustment (Existing Manholes Only)

   Any adjustment that exceeds the requirements of Minor Manhole Adjustments, shall be accomplished as indicated on COA Standard 506S-2, "Major Manhole Height Adjustment," and shall consist of any combination of removing and replacing the concrete rings, and/or the manhole cone section, and/or the straight riser section of the manhole in order to bring the manhole to final grade. Major manhole adjustments shall apply only to existing manholes. Manholes not located in paved areas shall have bolted covers. Manholes located within paved areas (street right-of-way only) shall be standard non-bolted unless otherwise noted on the drawings.

J. Interior Coatings of Wastewater Manholes and Junction Boxes

The interior surfaces of all Portland cement concrete wastewater manholes and junction boxes shall be coated with products specified either on the Drawings, designated in writing by the Engineer or representative, or listed on SPL WW-511. Product selection shall conform to usage described in that SPL. Surface preparation shall follow the product manufacturer's recommended procedures contained in technical data sheets unless otherwise specified in the contract documents. The Contractor shall measure the coating thickness according to ASTM D 6132, Nondestructive Measurement of Dry Film Thickness of Applied Organic Coatings Over Concrete Using an Ultrasonic Gage. Thickness measures shall be made at locations designated by the Engineer or designated representative. All thickness measurements shall be witnessed by the Engineer or designated representative.

The contractor shall test for discontinuities (holidays) in each new layer of interior organic coating applied to wastewater manholes and junction boxes. The test methods and equipment shall confirm to ASTM D4787, Continuity Verification of Liquid or Sheet Linings Applied to Concrete Substrate. Each new layer of applied coating shall be tested to detect pinholes, voids, cracks, thin spots, and foreign inclusions. All discontinuity testing shall be performed using high-voltage, pulse-type equipment and witnessed by the Engineer or designated representative. The test voltage shall depend on the coating thickness according to the tabulated values in ASTM D4787. Test voltages for common coating thicknesses are as follow:

Coating or Lining Thickness, Mils	Test Voltage
20	2700
40	5500
80	11500
120	16500

K. Structural Linings of Existing Wastewater Manholes

The interior surfaces of existing wastewater manholes and junction boxes at locations shown in the Drawings or as designated by the Engineer shall be strengthened by application of structural lining systems either as specified on the Drawings, directed in writing by the Engineer or designated representative, or listed on SPL WW-511A. Selection of products for coating the interior of existing manholes shall be based on the condition of the manholes. Surface preparation shall follow the product manufacturer's recommended procedures contained in technical data sheets unless otherwise specified in the contract documents.

L. Abandonment of Existing Manholes

Manholes designated on the Drawings for abandonment, shall be removed to a level not less than four feet below grade. Two-foot long sections of the inlet and outlet pipes shall be cut and removed on the outside of the manhole, the ends of the remaining pipe and the pipe sections penetrating the manhole wall shall be securely plugged, and the structure filled with material in accordance with COA Standard 506S-15 or as directed by the Engineer or designated representative.

Source: Rule No. R161-21.08, 2-22-2021.

506.6 Acceptance Testing of Wastewater Manholes

Manholes shall be tested separately and independently of the wastewater lines.

A. Test by the Vacuum Method

A vacuum test shall be performed by the Contractor prior to backfilling those manholes that fall within the right-of-way that require detouring of vehicular traffic. A second vacuum test will not be required after backfilling and compaction is complete unless there is evidence that the manhole has been damaged or disturbed subsequent to the initial vacuum test.

For manhole installations which do not require detouring of vehicular traffic, the vacuum method is recommended and may be used by the Contractor prior to backfilling the manhole to insure proper installation so that defects may be located and repaired; however, a vacuum test shall be performed after backfilling, and compaction are complete. Testing after backfill and compaction are complete will be the basis for acceptance of the manhole.

1. Equipment

    a) The manhole vacuum tester shall be a device approved for use by the Engineer or designated representative.

    b) Pipe sealing plugs shall have a load resisting capacity equal to or greater than that required for the size of the connected pipe to be sealed.

    c) Gauges shall be calibrated and read in inches of mercury (inches Hg or in Hg) or pounds per square inch gauge (psig) or both.

2. Procedures applicable to new 48-inch diameter manholes

    a) Manhole section interiors shall be carefully inspected; units found to have through-wall lift holes, or any penetration of the interior surface by inserts provided to facilitate handling, will not be accepted. Coating shall be applied after the testing unless coating is applied before installation or unless it is applied at the factory. All lift holes and exterior joints shall be plugged with an acceptable non-shrink grout. No grout shall be placed in horizontal joints. Tests shall be performed before grouting the invert or around pipe penetrations and before coating the interior surfaces of the manhole or junction box.

    b) After cleaning the interior surfaces of the manhole, the Contractor shall place and inflate pneumatic plugs in all of the connecting pipes to isolate the manhole; sealing pressure within the plugs shall be as recommended by the plug manufacturer. Plugs and the ends of pipes connected by flexible boots shall be blocked to prevent their movement during the vacuum test.

    c) The vacuum test head shall be placed on the top of the cone section or, inside of the top of the manhole cone section, and the compression seal band inflated to the pressure recommended by its manufacturer. The vacuum pump shall be connected to the outlet port with the valve open. When a vacuum of 10 inches of mercury (-10" Hg) (-5 psig) has been attained, the valve shall be closed and the time noted. Tampering with the test equipment will not be allowed.

d) The manhole shall have passed the test if the vacuum does not drop below 9 inches of mercury (-9" Hg) (-4.5 psig) within 3 minutes of the time the valve was closed. The actual vacuum shall be recorded at the end of the 3 minutes during which the valve was closed.

e) When the standard vacuum test cannot be performed because of design or material constraints (examples: T-Type manholes, T-Lock Liners, or other reasons acceptable to the Engineer or designated representative), testing of individual joints shall be performed as directed by the Engineer or designated representative.

B. Test by the Exfiltration Method

At the discretion of the Engineer or designated representative, the Contractor may substitute the Exfiltration Method of testing for the Vacuum test described in Section 506.6.A. above. This method may only be used when ground water is not present. If ground water is present a Vacuum Test shall be used unless otherwise directed by the Engineer or designated representative. All backfilling and compaction shall be completed prior to the commencement of testing.

The procedures for the test shall include the following:

1. Manhole section interiors shall be carefully inspected; units found to have through-wall lift holes, or any penetration of the interior surface by inserts provided to facilitate handling, will not be accepted. Coating shall be applied after the testing unless coating is applied before field assembly, or at the factory. All lift holes and exterior joints shall be plugged with an acceptable non-shrink grout. No grout shall be placed in horizontal joints. Tests shall be performed before grouting the invert or around pipe penetrations and before coating the interior surfaces of the manhole or junction box.

2. After cleaning the interior surface of the manhole, the Contractor shall place and inflate pneumatic plugs in all of the connecting pipes to isolate the manhole; sealing pressure within the plugs shall be as recommended by the plug manufacturer.

3. Concrete manholes shall be filled with water or otherwise thoroughly wetted for a period of 24 hours prior to testing.

4. At the start of the test, the manhole shall be filled to the top with water. The test time shall be 1 hour. The Construction Inspector must be present for observation during the entire time of the test. Permissible loss of water in the 1-hour test time is 0.025 gallons per diameter foot, per foot of manhole depth. For a 4-foot diameter manhole, this quantity converts to a maximum permissible drop in the water level (from the top of the manhole cone) of 0.1 inches per foot of manhole depth or 1.0 inch for a 10-foot deep manhole.

C. Failure to Pass the Test - Records of Tests

If the manhole fails to pass the initial test method as described in (A) Test by the Vacuum Method and, if allowed, (B) Test by the Exfiltration Method, or if visible groundwater leakage into the manhole is observed, the Contractor shall locate the leak, if necessary by disassembly of the manhole. The Contractor shall check the gaskets and replace them if necessary. The Contractor may re-lubricate the joints and re-assemble the manhole, or the Contractor may install an acceptable exterior joint sealing product (see AW Standard Products List Item SPL WW-146A) on all joints and then retest the manhole. If any manhole fails the vacuum and/or exfiltration test twice, the Contractor shall consider replacing that manhole. If the Contractor chooses to attempt to repair that manhole, the manhole must be retested until it passes. In no case shall cold applied preformed plastic gaskets be used for repair. Records of all manhole testing shall be made available to the Engineer or designated representative at the close of each working day, or as otherwise directed by the Engineer or designated representative. Any damaged or visually defective products, or any products out of acceptable tolerance shall be removed from the site.

D. Inspection

The Engineer or designated representative shall make a visual inspection of each manhole after it has passed the testing requirements and is considered to be in its final condition. The inspection shall determine the completeness of the manhole; any defects shall be corrected to the satisfaction of Engineer or designated representative.

Source: Rule No. R161-21.08, 2-22-2021.

506.7 Measurement

A "Junction Box" and "Box Manholes" will be measured by each structure of the indicated size regardless of depth.

A "Standard Pre-cast Manhole with Pre-cast Base", "Standard Pre-cast Manhole with Cast-in-Place (CIP) Base", "Special Manhole", "Drop Manhole with Pre-cast Base", "Drop Manhole with Cast-in-Place (CIP) Base", "Centered Tee Manhole", or "Tangent Tee Manhole" will be measured by each structure of the indicated size for the first 8 feet of depth.

An "Extra Depth Manhole" will be measured by linear vertical foot of Standard Pre-cast Manhole with Pre-cast Base, Standard Pre-cast Manhole with CIP Base, Drop Manhole with Pre-cast Base, Drop Manhole with CIP Base, Special Manhole, Centered Tee Manhole, or Tangent Tee Manhole of the indicated size in excess of eight feet of depth. Manhole depth will be measured from the invert flow line to the finished surface elevation.

"Minor Manhole Height Adjustment" and "Major Manhole Height Adjustment" will be measured by each unit for the indicated size. Only existing manholes will be measured for minor or major manhole height adjustment.

"Connection to Existing Manhole or Junction Box" will be measured per each for the indicated type of structure and location.

"Structural Lining" will be measured by the linear vertical foot for the indicated structure.

New manholes constructed to interim elevations to facilitate stage construction shall be measured as one unit regardless of the number of interim elevations constructed. All labor, materials and other expenses necessary for the stage construction shall be included in the unit price bid for the completed unit. Cost of abandonment of existing manholes shall be included in the unit price bid for the completed unit, unless Pay Item No. 506 AB is indicated on the Drawings and identified in Standard Contract Bid Form 00300U.

Source: Rule No. R161-21.08, 2-22-2021.

506.8 Payment

Payment for completed junction boxes and manholes of the type indicated on the Drawings shall be made at the appropriate unit bid price. The unit bid price shall include all labor, equipment, materials, (including but not limited to frames and grates, rings and covers, adjusting rings, cone sections, riser sections, gaskets, drop piping and fittings, bases, pipe-to-manhole connectors, concrete, reinforcing steel, non-shrink grout, mortar, joint wrap where specified, and, for wastewater manholes, interior coatings), time and incidentals necessary to complete the work.

Payment for a "Junction Box" and "Box Manhole" will be made at the unit price bid for the indicated size, complete in place.

Payment for the first 8 feet of a "Standard Pre-cast Manhole with Pre-cast Base", "Standard Pre-cast Manhole with Cast-in-Place (CIP) Base", "Special Manhole", "Drop Manhole with Pre-cast Base", "Drop Manhole with Cast-in-Place (CIP) Base", "Centered Tee Manhole", or "Tangent Tee Manhole" will be made at the unit price bid for the indicated type and size, complete in place.

Payment for that portion of a Standard Pre-cast Manhole with Pre-cast Base, Standard Pre-cast Manhole with CIP Base, Drop Manhole with Pre-cast Base, Drop Manhole with CIP Base, Special Manhole, Centered Tee Manhole, or

Tangent Tee Manhole in excess of 8 feet in depth will be made at the unit price bid for "Extra Depth Manhole" of the indicated type and size, complete in place.

Payment for "Minor Manhole Height Adjustment" and "Major Manhole Height Adjustment" will be made at the unit bid price, complete in place.

Payment for "Structural Lining" will be made at the unit price per linear vertical foot, which will include surface preparation, environmental adjustments, lining application, and curing, as required.

Payment for "Connection to Existing Manhole or Junction Box" shall be made at the unit price per connection and will include removing the wall section by coring or alternative method approved by the Engineer or designated representative, rehabilitating the interior walls, rebuilding the invert, and preparing and coating the interior surfaces of the structure.

When indicated in the Drawings, abandonment of existing manholes shall be made at the unit price for abandonment.

The intended use of each item shall be designated by a two-letter code (Wastewater = WW; Stormwater = SW) in the spaces provided after the pay item number:

Pay Item No. 506 M___:	Standard Pre-cast Manhole w/Pre-cast Base, ___ Dia.	Per Each.
Pay Item No. 506 M1___:	Standard Pre-Cast Manhole w/CIP Base, ___ Dia.	Per Each.
Pay Item No. 506 S___:	Special Manhole, ___ Dia.	Per Each.
Pay Item No. 506 D___:	Drop Manhole w/Pre-cast Base, ___ Dia.	Per Each.
Pay Item No. 506 D1___:	Drop Manhole w/CIP Base, ___ Dia.	Per Each.
Pay Item No. 506 C___:	Centered Tee Manhole, ___ Dia. × ___ Dia.	Per Each.
Pay Item No. 506 T___:	Tangent Tee Manhole, ___ Dia. × ___ Dia.	Per Each.
Pay Item No. 506 J___:	Junction Box, ___ Ft. × ___ Ft.	Per Each.
Pay Item No. 506 B___:	Box Manhole ___ Ft. × ___ Ft.	Per Each.
Pay Item No. 506 2___:	Major Manhole Height Adjustment, ___ Dia.	Per Each.
Pay Item No. 506 4___:	Minor Manhole Height Adjustment, ___ Dia.	Per Each.
Pay Item No. 506 AB___:	Abandonment of existing Manholes:	Per Each.
Pay Item No. 506 EDM___	Extra Depth of Manhole, ___ Dia.	Per Linear Vert. Foot.
Pay Item No. 506 SL___:	Structural Lining of ___:	Per Linear Vert. Foot.
Pay Item No. 506 CN___:	Connection to Existing ___:	Per Each.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Standard Specification Item No. 506, "Manholes"	
COA Standard Specifications Items	
Designation	Description
Item 402S	Controlled Low Strength Material
Item 403S	Concrete For Structures
Item 406S	Reinforcing Steel
Item 410S	Concrete Structures
Item 503	Frames, Grates, Rings and Covers
Item 504	Adjusting Structures
Item 507	Bulkheads
Item 510	Pipe
Texas Department of Transportation Standard Specifications For Construction and Maintenance of Highways, Streets and Bridges	
Designation	Description
Item 421	Hydraulic Cement Concrete
COA Utilities Criteria Manual	
Designation	Description
Section 2.8.0	Abandonment of Facilities
Subsection 2.9.4.D	Manholes
AW Standard Products Lists	
Designation	Description
SPL WW-146	Concrete Manhole Sections
SPL WW-146A	Manhole Seals
SPL WW-146G	Manhole Grade Rings, Plastic
SPL WW-511	Organic Lining for Wastewater Manholes
SPL WW-511A	Structural Lining for Wastewater Manholes
COA Standard Details	
Designation	Description
506S-2	Major Manhole Height Adjustment
506S-4	Minor Manhole Height Adjustment
506S-15	Abandoned Manhole
506S-12	O-Ring Joint Detail, Precast Manhole Section
506S-15	Abandoned Manhole
804S-4, 5, 6 and 7 of 9	Steel Plating
COA Standard Contract	
Designation	Description
00300U	Bid Form (Unit Prices)
American Society for Testing and Materials (ASTM)	
Designation	Description

ASTM C 55	Specification for Concrete Building Brick
Designation	Description
ASTM C 62	Specification for Building Brick Solid Masonry Units Made from Clay of Shale
ASTM C478/C478M	Standard Specification for Precast Concrete Manhole
ASTM C443/C443M	Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
ASTM C923/C923M	Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures Pipes
ASTM C1107	Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM D4787	Continuity Verification of Liquid or Sheet Lining Applied to Concrete Substrate
ASTM D4976	Specification for Polyethylene Plastics Molding and Extrusion Materials
ASTM D6132	Test Method for Nondestructive Measurement of Dry Film Thickness of Applied Organic Coating Over Concrete Using an Ultrasonic Gage
American Concrete Institute	
Designation	Description
Item 347	Guide to Formwork for Concrete

RELATED CROSS REFERENCE MATERIALS	
Standard Specification Item No. 506, "Manholes"	
AW Standard Products Lists	
SPL WW-219	32 Inch Manhole Cover Casting Sets
COA Utilities Criteria Manual	
Designation	Description
Section 2	Water, Reclaimed Water and Wastewater Criteria
COA Standards	
Designation	Description
1100S-1	Casting Adjustments
503S-4S	Storm Sewer Manhole Ring and 32” Cover
503S-5S	Bolted Storm Sewer Manhole Ring and 32” Cover
506S-1	Manhole Invert Plan
506S-5	Typical Box Manhole 30” and Larger Pipe
506S-7	Precast Manhole with Drop Inlet on Cast in Place Foundation
506S-8	Precast Manhole with Drop Inlet on Precast Base
506S-9	Precast Manhole on Cast-In-Place Foundation
506S-10	Wastewater Manhole on Precast Base
506S-11	Storm Sewer Manhole Details
American Association of State Highway and Transportation Officials (AASHTO)	
Designation	Description
M306	Standard Specifications for Drainage Structure Castings

Source: Rule No. R161-21.08, 2-22-2021.

ITEM NO. 508S MISCELLANEOUS STRUCTURES AND APPURTENANCES 2-24-10

508S.1 Description

This item governs the construction of miscellaneous structures and appurtenances, complete in place or to the stage detailed and/or indicated in the Drawings, using the materials specified herein, including the excavation, installation, backfilling, placement of the concrete and when required, the furnishing and installation of frames, grates, rings, covers, safety end treatment and any concrete curb and gutter indicated on the Drawings.

This specification is applicable for projects or work involving either SI or inch-pound units. Within the text, the inch-pound units are given preference followed by SI units shown within parentheses

508S.2 Submittals

The submittal requirements of this specification item include:

A. Type of structure and appurtenances (inlets, headwalls, frames, grates, energy dissipators, etc.), construction methods and sequence (precast, cast in place), materials (bolts, nuts, plates, angles, etc.)

B. Aggregate types, gradations and physical characteristics for the Portland cement concrete mix.

C. Proposed proportioning of materials for the mortar mix.

D. Analysis and thickness calculations for temporary steel covers.

508S.3 Types

The various types of structures and appurtenances such as inlets, headwalls, energy dissipators, etc., are designated on the Drawings by letter or by number for the particular design of structure to be constructed in accordance with the details indicated on the Drawings. Unless otherwise indicated on the Drawings, the Contractor may have the option of furnishing cast in place or precast structures.

508S.4 Materials

A. Portland Cement Concrete

The Portland cement concrete shall conform to Item No. 403S, "Concrete For Structures", with the following classes:

Cast in Place Concrete Class A

Precast Concrete Class C

B. Mortar

Mortar shall be composed of 1 part Portland cement and 2 parts clean, sharp mortar sand suitably graded for the purpose by conforming in other respects to the provisions of Standard Specification Item No. 403S, "Concrete for Structures" for fine aggregate. Hydrated lime or lime putty may be added to the mix, but in no case shall it exceed 10 percent by weight (mass) of the total dry mix.

C. Reinforcement and Steel

Reinforcing Steel shall conform to Standard Specification Item No. 406S,"Reinforcing Steel".

Structural Steel shall conform to Standard Specification Item No. 720S, "Metal for Structures".

D. Frames, Grates, Rings and Covers

Frames, grates, rings and covers shall conform to City of Austin Standard Specification Item No. 503S, "Frames, Grates, Rings and Covers".

E. Safety End Treatment for Structures

The safety end treatment for structures shall conform to TxDOT Specification Item No. 467, "Safety End Treatment".

1. Bolts and Nuts. All bolts, nuts and associated hardware shall meet the specifications of ASTM A 307.
2. Plates and Angles. All plates and similar angles and brackets shall meet the specifications of ASTM A 36.
3. Pipe Runners. Pipe Runners shall conform to the requirements of ASTM A53, Grade B.
4. Galvanizing. All hardware including nuts, bolts and plates listed above shall be galvanized conforming to ASTM A 123 or A 153.

F. Miscellaneous Items

Cast iron for supports, steps and inlet units shall conform to the shape and dimensions indicated on the Drawings. The casting shall be clean and perfect, free from sand or blowholes or other defects. Cast iron castings shall meet the requirements of ASTM A 48, Class 30. Steel for temporary covers when used with stage construction shall be adequate for the loads imposed.

508S.5 Construction Methods

All concrete work shall be performed in accordance with Standard Specification Item No.410S, "Concrete Structures". Forms will be required for all cast-in-place concrete walls, except where the nature of the surrounding material is such that it can be trimmed to a smooth vertical face (the outside form for concrete bases). Where cast in place concrete is used in wall construction of storm sewers, the steps shall be cast into the wall when the concrete is placed.

The construction inlets shall be completed, as soon as is practicable after installation is complete of the sewer lines in the inlet. All sewer line shall be cut neatly at the inside face of the walls of the inlet and pointed up with mortar.

Bases for cast in place inlets may be placed prior to or at the Contractor's option after the sewer is constructed.

Bases for box sewers shall be cast as an integral part of the sewer. The manholes may be constructed prior to backfilling or if the Contractor so elects, the manhole opening may be covered temporarily with a steel plate to facilitate the compaction of backfill for the sewer as a whole. Thereafter, required excavation for the inlet shall be made and the inlet constructed and backfilled.

The inverts passing out or through an inlet shall be shaped and grouted across the floor of the inlet as indicated on the Drawings. This shaping may be accomplished by adding shaping mortar or concrete after the base is cast or by placing the required additional material with the base.

All miscellaneous structures shall be completed in accordance with the details indicated on the Drawings. Backfilling to original ground elevation shall be in accordance with the provisions of the appropriate items and as directed by the Engineer or designated representative.

Energy dissipators and headwalls shall be constructed in accordance with City of Austin Standard Detail 508S-13.

508S.6 Measurement

All miscellaneous structures and safety end treatments satisfactorily completed as indicated on the Drawings will be measured as completed units per each.

Concrete removal, excavation and backfill, riprap, pipe, headwalls, wing walls, collars and apron slabs will not be measured under this item but will be included in the unit price bid for the item of construction in which this item is used.

Frames, grates, rings, covers, safety end treatment and any concrete curb and gutter indicated will not be measured and paid for but shall be included in the unit price bid of one of the pay items identified in the contract bid form.

508S.7 Payment

A. Inlets

Payment for Inlets of the type indicated in place in accordance with these specifications and measured as prescribed above will be made at the unit bid price for each Inlet, of the type specified.

B. Energy Dissipators and Headwalls

Payment for special complete structures will be made at the unit price bid per each.

C. Safety End Treatment

Payment for Safety End Treatment, complete in place, will be made at the unit bid price for each unit of the type indicated on the Drawings.

Payment will be made under one of the following:

Pay Item No. 508S-E:	Energy Dissipators, _____ In. Dia.	Per Each.
Pay Item No. 508S-H:	Headwalls, Type _____, ___ In. Dia. Pipe	Per Each.
Pay Item No. 508S-IG:	Inlet, Grated	Per Each.
Pay Item No. 508S-SET	Safety End Treatment, Type _____ Size ___	Per Each.
Pay Item No. 508S-I5R:	Inlet, Recessed	Per Each.
Pay Item No. 508S-I10R:	Inlet, Recessed	Per Each.
Pay Item No. 508S-I15R:	Inlet, Recessed	Per Each.
Pay Item No. 508S-I20R:	Inlet, Recessed	Per Each.
Pay Item No. 508S-I5S:	Inlet, Standard	Per Each.
Pay Item No. 508S-I10S:	Inlet, Standard	Per Each.
Pay Item No. 508S-I15S:	Inlet, Standard	Per Each.
Pay Item No. 508S-I20S:	Inlet, Standard	Per Each.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Standard Specification Item No. 508S, "Miscellaneous Structures and Appurtenances"	
City of Austin Standard Specification Items	
Designation	Description
Item No. 403S	Concrete For Structures

Item No. 406	Reinforcing Steel
Item No. 410	Concrete Structures
Item No. 720	Structural Steel
Item No. 503S	Frames, Grates, Rings and Covers
TxDOT Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges	
Designation	Description
Item 467	Safety End Treatment
American Society for Testing and Materials (ASTM)	
Designation	Description
ASTM A36/36M	Specification for Structural Steel
ASTM A48	Specification for Gray Iron Castings
ASTM A53	Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless
ASTM A123	Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153	Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A307	Specifications for Carbon Steel Externally Threaded Standard Fasteners
ASTM C913	Specifications for Precast Concrete Water and Wastewater Structures

RELATED CROSS REFERENCE MATERIALS	
Standard Specification Item No. 508S, "Miscellaneous Structures and Appurtenances"	
City of Austin Drainage Criteria Manual	
Designation	Description
Section 6.6.0	Energy Dissipators
City of Austin Standard Specification Items	
Designation	Description
Item No. 501S	Jacking or Boring Pipe
Item No. 504S	Adjusting Structures
Item No. 506	Manholes
Item No. 507S	Bulkheads
Item No. 510	Pipe
City of Austin Standard Details	
Designation	Description
508S-13	Standard Headwall and Energy Dissipators
510S-1	Concrete Trench Cap
TxDOT Specifications	
Designation	Description
Item 420	Concrete Structures
Item 421	Portland Cement Concrete
Section 421.2(5)	Fine Aggregate
Item 424	Precast Concrete Structures (Fabrication)

Item 440	Reinforcing Steel
Item 466	Headwalls and Wingwalls
Item 467	Safety End Treatment
Item 471	Frames, Grates, Rings and Covers
Item 529	Concrete Curb, Gutter and Combined Curb and Gutter

ITEM NO. 509S EXCAVATION SAFETY SYSTEMS 9-26-12

509S.1 Description

This item shall govern the designing, furnishing, installing, maintaining and removing or abandoning of temporary Excavation Safety Systems consisting of trench shields, aluminum hydraulic shoring, timber shoring, trench jacks, tied-back or braced sheeting, tied-back slurry walls, soil nailing, rock bolting, tied-back or braced soldier piles and lagging, and other systems for protecting workers in excavations. This item shall also govern the designing and constructing of sloping and benching systems for protecting workers in excavations.

At a minimum, the Excavation Safety Systems shall conform to United States Department of Labor Rules 29 CFR, Occupational Safety and Health Administration, Part 1926 Safety and Health Regulations for Construction, Subpart P, Excavation (hereinafter called OSHA).

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text, the inch-pound units are given preference followed by SI units shown within parentheses.

509S.2 Definitions

COMPETENT PERSON shall mean one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them. The ***COMPETENT PERSON*** shall be capable of interpreting the manufacturer's data sheets and interpreting and implementing the Excavation Safety System Plan.

An ***EXCAVATION*** shall mean any cut, cavity, trench, or depression in an earth surface, formed by earth removed by the Contractor. The Contractor shall provide an Excavation Safety System for all excavations except when 1) the excavation is in stable rock as determined by the Texas-licensed Professional Engineer who prepared the Contractor's Excavation Safety System Plan or 2) the excavation is less than 5 feet (1.52 m) in depth and examination of the ground by the Contractor's competent person provides no indication of a potential cave-in.

TRENCH (TRENCH EXCAVATION) shall mean any narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth shall be greater than the width, but the trench (measured at the bottom) shall not be wider than 15 feet (4.56 m). Excavation Safety Systems for such trenches shall be defined as Trench Excavation Safety Protective Systems.

If the Contractor installs or constructs forms or other structures in an excavation such that the dimension measured from the forms or structures to the sides of the excavation is reduced to 15 feet (4.6 m) or less (measured at the bottom of the excavation), those excavations shall also be defined as a ***TRENCH*** if workers must enter it. Excavation Safety Systems for such ***TRENCHES*** shall also be defined as ***TRENCH EXCAVATION SAFETY PROTECTIVE SYSTEMS***.

509S.3 Excavation Safety System Plan Submittal

A. The Notice to Proceed with construction may be issued by the Owner before the Contractor has submitted the necessary Excavation Safety Plan(s); however, excavation shall not proceed until the Owner has received the Contractor's Excavation Safety Plan(s) for the Project.

B. Prior to Starting Excavation

Prior to starting any Excavation, the Contractor shall submit to the Owner:

1. A certificate indicating that the Contractor's Competent Person(s) has completed training in an excavation safety program based on OSHA regulations within the past 5 years.

2. Manufacturer's tabulated data or other tabulated data for Excavation Safety Systems consisting of pre-engineered protective systems such as trench shields, aluminum hydraulic shoring, timber shoring, pneumatic shoring, or trench jacks, or benching or sloping or other protective systems that are not designed specifically for the Project.

Manufacturer's tabulated data shall meet the requirements in OSHA and shall describe the specific equipment to be used on the Project. Tabulated data must bear the seal of the licensed professional engineer who approved the data. Manufacturer's tabulated data shall be an attachment to the Contractor's Excavation Safety System Plan described below.

509S.4 Excavation Safety System Plan Review

The Contractor shall prepare an Excavation Safety System Plan (hereafter called the "Plan") specifically for the Project. The Contractor shall retain a Texas-licensed Professional Engineer to prepare the Plan. On City-funded projects, the Contractor must follow qualifications-based procedures to procure the required Professional Engineering services, according to Chapter 2254 of the Texas Government Code.

The Contractor shall be responsible for obtaining geotechnical information necessary for design of the Excavation Safety System. If geotechnical information for design of the Project has been acquired by the Owner or designated representative, it shall be provided to the Contractor for information purposes subject to the provisions of City of Austin Standard Contract Section 00220, "Geotechnical Data."

A. The Plan for Excavation Safety Systems consisting of pre-engineered protective systems such as trench shields, aluminum hydraulic shoring, timber shoring, pneumatic shoring, or trench jacks, or benching or sloping or other protective systems that are not designed specifically for the Project shall include:

   1. Detailed Drawings of the Excavation Safety System(s) that will provide worker protection conforming to OSHA. The Drawings shall note the required load carrying capacity, dimensions, materials, and other physical properties or characteristics in sufficient detail to describe thoroughly and completely the Excavation Safety System(s).

   2. Drawings, notes, or tables clearly detailing the specific areas of the Project in which each Excavation Safety System shall be used, the permissible size of the excavation, the length of time that the excavation shall remain open, the means of egress from the excavation, the location of material storage sites in relation to the excavation, the methods for placing/compacting bedding/backfill within the safety of the system, any excavation safety equipment restrictions and subsequent removal of the system.

   3. Recommendations and limitations for using the Excavation Safety Systems.

   4. A Certificate of Insurance of the Excavation Safety System Engineer's Professional Liability Insurance coverage. For City-funded projects, coverage meeting the requirements of Standard Contact Documents Section 00810 shall be provided. For privately funded projects the coverage shall be at least $1,000,000.

B. The Plan for Excavation Safety Systems consisting of tied-back or braced sheeting, tied-back or braced soldier piles and lagging, slurry walls, soil nailing, rock bolting or other protective systems that are designed specifically for the Project shall include:

   1. Detailed Drawings of the Excavation Safety System(s) that will provide worker protection conforming to OSHA. The Drawings shall note the design assumptions, design criteria, factors of safety, applicable

codes, dimensions, components, types of materials, and other physical properties or characteristics in sufficient detail to describe thoroughly and completely the Excavation Safety System(s).

2. Detailed technical specifications for the Excavation Safety System addressing the properties of the materials, construction means and methods, quality control and quality assurance testing, performance monitoring, and monitoring of adjacent features, as appropriate.
3. Drawings that clearly detail the specific areas of the Project in which each type of system shall be used and showing the Special Shoring in plan and elevation (vertical profile) views.
4. Drawings, notes or tables clearly detailing the length of time that the excavation shall remain open, the means of egress from the excavation, the location of material storage sites in relation to the excavation, the methods for placing/compacting bedding/backfill within the safety of the system, any excavation safety equipment restrictions and subsequent removal or abandonment of the system or parts thereof.
5. Recommendations and limitations for using the Excavation Safety Systems.
6. A Certificate of Insurance of the Excavation Safety System Engineer's Professional Liability Insurance coverage. For City-funded projects, coverage meeting the requirements of Standard Contract Documents Section 00810 shall be provided. For privately funded projects the coverage shall be at least $1,000,000.

509S.5 Excavation Safety System Submittal Review

Review of the Excavation Safety System submittal conducted by the Owner or designated representative shall only relate to conformance with the requirements herein. The Owner's failure to note exceptions to the submittal shall not relieve the Contractor of any or all responsibility or liability for the adequacy of the Excavation Safety System. The Contractor shall remain solely and completely responsible for all Excavation Safety Systems and for the associated means, methods, procedures, and materials.

509S.6 Contractor's Responsibility

The Contractor shall be responsible for implementing the Excavation Safety System Plan and for confirming that the Excavation Safety System(s) used on the Project meets the requirements of the Plan.

The Contractor's Competent Person(s) shall be on the Project whenever workers are in an excavation meeting the definitions of a Trench given in 509S.2.

509S.7 Construction Methods

The Contractor's Competent Person(s) shall maintain a copy of appropriate OSHA regulations on-site and shall implement OSHA excavation safety regulations at the work site. The Contractor shall perform all excavation in a safe manner and shall maintain the Excavation Safety Systems to prevent death or injury to personnel or damage to structures, utilities or property in or near excavation.

If evidence of possible cave-ins or earthen slides is apparent or an installed Excavation Safety System is damaged, the Contractor shall immediately cease work in the excavation, evacuate personnel from any potentially hazardous areas and notify the Owner. Personnel shall not be allowed to re-enter the excavation until necessary repairs or replacements are completed and are inspected and approved by the Contractor's Competent Person(s). Repair and replacement of damaged Excavation Safety System shall be at the Contractor's sole expense.

509S.8 Changed Conditions

When changed conditions require modifications to the Excavation Safety System, the Contractor shall provide to the Owner or designated representative a new design or an alternate Excavation Safety System Plan that is proposed by the Contractor's Excavation Safety System Engineer to address the changed conditions. Copies of the new design or alternate system shall be provided to the Owner or designated representative in accordance with the requirements of section 509S.3, "Excavation Safety System Plan Submittals." A copy of the most current Excavation Safety System Plan shall be maintained on site and made available to inspection and enforcement officials at all times.

Any changes to the Excavation Safety System Plan that are initiated by the Contractor for operational efficiency or as a result of changed conditions, that could be reasonably anticipated, will not be cause for contract time extension or cost adjustment. When changes to the Excavation Safety System Plan are necessitated by severe and uncharacteristic natural conditions or other conditions not reasonably within the control of the Contractor, the Contractor may make a written request to the Owner for a Change Order to address the anticipated work. The Contractor shall notify the Owner in writing within 24 hours of the occurrence of changed conditions that the Contractor anticipates the submittal of a claim for additional compensation. Under "Changed Conditions" the work deemed immediately necessary by the Contractor to protect the safety of workers and public, equipment or materials may only be accomplished until the Owner or designated representative has a reasonable opportunity to investigate the Contractor's written request for a Change Order and respond in writing to the request.

509S.9 Measurement

Trench Excavation Safety Protective Systems will only be measured and paid for those trenches that workers would reasonably be expected to enter.

Trench Excavation Safety Protective Systems for Trenches excavated to a final width (measured at the bottom of the excavation) not exceeding 15 feet (4.56 m) shall be measured by the linear foot (meter: 1 meter equals 3.281 feet) through manholes, bore pits, receiving pits, and other appurtenances along the centerline of the trench. This method of measurement shall apply to any and all protective systems, including but not limited to tieback or braced sheeting, tieback or braced soldier piles and lagging, slurry walls, soil nails, rock bolts, shoring, trench boxes, and sloping or benching as used to provide a Trench Excavation Safety Protective System in accordance with the Excavation Safety System Plan.

Trench Excavation Safety Protective Systems for Trenches created by installation or construction of forms or other structures in an excavation whose width is greater than 15 feet (4.56 m) such that the dimension measured from the forms or structures to the sides of the excavation is reduced to 15 feet (4.56 m) or less (measured at the bottom of the excavation) shall be measured by the linear foot along the centerline of the Trench. Where forms or structures create multiple Trenches in one excavation, each Trench shall be measured separately. This method of measurement shall apply to any and all protective systems, including but not limited to tieback or braced sheeting, tieback or braced soldier piles and lagging, slurry walls, soil nails, rock bolts, shoring, trench boxes, and sloping or benching as used to provide a Trench Excavation Safety Protective System in accordance with the Excavation Safety System Plan.

509S.10 Payment

Payment for Trench Excavation Safety Protective Systems, measured as prescribed above, will be made at unit bid price per centerline linear foot of Trench. The unit bid price shall include full compensation for designing, furnishing, installing the system; for dewatering, and for maintaining, replacing, repairing and removing the Trench Excavation Safety Protective System and for sloping, special clearing, and excavation necessary to safely implement the Excavation Safety System Plan. No payment will be made for Trench Excavation Safety Protective

Systems made necessary by the Contractor's selection of an optional design or sequence of work that creates the need for the Trench Excavation Safety Protective System

Payment will be made under the following:

Pay Item No. 509S-1:	Trench Excavation Safety Protective Systems (all depths)	Per Linear Foot.

END

SPECIFIC CROSS REFERENCE MATERIALS	
Standard Specification Item No. 509S, "Excavation Safety Systems"	
City of Austin Standard Contract Documents	
Designation	Description
Section 00020	Invitation for Bids
Section 00220	Geotechnical Data
Section 00650	Certificate of Insurance
Section 00700, Article 6.11	Safety and Protection
Section 810	Supplemental General Conditions
29 CFR, Occupational Safety and Health Administration, Part 1926 Safety and Health Regulations for Construction, Subpart P, Excavation	
Texas Health and Safety Code Title 9 Chapter 756 Subchapter C	
Texas Government Code Chapter 2254	

RELATED CROSS REFERENCE MATERIALS	
Standard Specification Item No. 509S, "Excavation Safety Systems"	
Texas Department of Transportation: Standard Specifications For Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item 104	Removing Concrete
Item 110	Excavation
Item 402	Trench Excavation Protection
City of Austin Standard Specification Items	
Designation	Description
Item No. 101S	Preparing Right-of-way
Item No. 102S	Clearing and Grubbing
Item No. 110S	Street Excavation
Item No. 111S	Excavation
Item No. 130S	Borrow
Item No. 132S	Embankment
Item No. 201S	Subgrade Preparation
Item No. 402S	Controlled Low Strength Material
Item No. 501S	Jacking or Boring Pipe

Item No. 503S	Frames, Grates, Rings and Covers
Item No. 504S	Adjusting Structures
Item No. 505S	Concrete Encasement and Encasement Pipe
Item No. 506	Manholes
Item No. 507S	Bulkheads
Item No. 510	Pipe
Item No. 511S	Water Valves
Item No. 593S	Concrete Retards
Item No. 594S	Gabions and Revet Mattresses

ITEM NO. 510 PIPE 06-02-25

510.1 Description

This item governs the furnishing and installing all pipe and/or materials for constructing pipe mains, sewers, laterals, stubs, inlet leads, service connections, culverts, temporary service lines and temporary diversion lines, including all applicable Work such as excavating, bedding, jointing, backfilling materials, tests, concrete trench cap, concrete cap and encasement, etc., prescribed under this item in accordance with the provisions of the Edwards Aquifer Protection Ordinance, when applicable, and City of Austin (COA) Utility Criteria Manual, Section 5, "Working in Public Rights-of-Way." The pipe shall be of the sizes, types, class and dimensions indicated or as designated by the Engineer/Architect (E/A) and shall include all joints or connections to new or existing mains, pipes, sewers, manholes, inlets, structures, etc., as may be required to complete the Work in accordance with specifications and published standard practices of the trade associations for the material specified and to the lines and grades indicated. This item shall include any pumping, bailing, and drainage when indicated or applicable.

Refer to ITEM NO. 513 (POLYETHYLENE (HDPE) PIPE AND FITTINGS AWWA C906, 4-INCH AND LARGER) for Material and Construction Methods for projects with HDPE pipe.

Unless otherwise provided, this item shall consist of the removal and disposition of trees, stumps and other obstructions, old structures or portions thereof such as house foundations, old sewers, masonry or concrete walls, the plugging of the ends of abandoned piped utilities cut and left in place and the restoration of existing utilities damaged in the process of excavation, cutting and restoration of pavement and base courses, the furnishing and placing of select bedding, backfilling and cement or lime stabilized backfill, the hauling and disposition of surplus materials, bridging of trenches and other provisions for maintenance of traffic or access as indicated.

Source: Rule No. R161-22.13, 11-7-2022; Rule No. R161-25.08, 6-2-25.

510.2 Materials

The Contractor shall submit descriptive information and evidence that the materials the Contractor proposes for incorporation in the Work are of the kind and quality that satisfy the requirements in the Contract Documents. Austin Water (AW) shall be included in all submittal reviews. The AW Standard Products Lists (SPLs) are considered a part of the Specifications for the Work. The Contractor shall use products from the SPLs for all water and wastewater construction unless alternative products are shown on the Drawings; called for in the specifications; or specified in the Bidding Requirements, Contract Forms and Conditions of the Contract.

The products included in the SPLs current at the time of plan approval shall govern unless a specific product or products on the lists have subsequently been removed from those SPLs because of quality or performance issues. Products and materials that are not covered by the SPLs shall meet the requirements in the contract documents.

Submittals for the products and materials covered by this specification shall include manufacturer catalog sheets, technical data sheets, shop drawings, product or material test results, requirements listed below, and any other information needed to adequately describe the product or material. For products covered by SPLs, the submittal shall include a copy of the applicable SPL with the proposed product identified. An SPL by itself is not considered an adequate submittal.

(1) Concrete

Concrete shall conform to Item No. 403S, "Concrete for Structures".

(2) Coarse Aggregate

Coarse aggregate shall conform to Item No. 403S, "Concrete for Structures" or one of the following:

(a) Pipe Bedding Stone

Pipe bedding stone shall be clean gravel, crushed gravel or crushed limestone, free of mud, clay, vegetation or other debris, conforming to ASTM C 33 for stone quality. Size gradation shall conform to ASTM C-33 No. 57 or No. 67 or the following Table:

SIEVE SIZE	% RETAINED BY WEIGHT
1½"	0
1"	0—10
½"	40—85
#4	90—100
#8	95—100

(b) Foundation Rock

Foundation rock shall be well graded coarse aggregate ranging in size from 2 to 8 inches.

(c) Flexible Base

Flexible base shall conform to Item No. 210S, "Flexible Base".

(3) Fine Aggregate

(a) Concrete and Mortar Sand

Fine aggregate shall conform to Item No. 403S, "Concrete for Structures".

(b) Bedding Sand

Sand for use as pipe bedding shall be clean, granular and homogeneous material composed mainly of mineral matter, free of mud, silt, clay lumps or clods, vegetation or debris. The material removed by decantation TxDOT Test Method Tex-406-A, plus the weight of any clay lumps, shall not exceed 4.5 percent by weight.

The resistivity shall not be less than 3,000 ohms-cm as determined by TxDOT Test Method Tex-129-E. Size gradation of sand for bedding shall be as follows:

GRADATION TABLE	
SIEVE SIZE	% RETAINED BY WEIGHT
¼"	0
#60	75—100
#100	95—100

(c) Stone Screenings

Stone screenings shall be free of mud, clay, vegetation or other debris, and shall conform to the following Table:

SIEVE SIZE	% PASSING
⅜"	100
No. 4	95 to 100
No. 8	80 to 100
No. 16	50 to 85

No. 30	25 to 60
No. 50	10 to 30
No. 100	2 to 10

All screenings shall be the result of a rock crushing operation.

(4) Controlled Low Strength Material

Controlled Low Strength Material (CLSM) shall conform to Item 402S, "Controlled Low Strength Material.

(5) Pea Gravel

Pea gravel bedding shall be clean washed material, hard and insoluble in water, free of mud, clay, silt, vegetation or other debris. Stone quality shall meet ASTM C 33. Size gradation shall be as follows:

SIEVE SIZE	% RETAINED BY WEIGHT
¾″	0
½″	0—25
¼″	90—100

(6) Select Backfill or Borrow

This material shall consist of borrow or suitable material excavated from the trench. It shall be free of stones or rocks over 8 inches and shall have a plasticity index of less than 20. The moisture content at the time of compaction shall be within 2 percent of optimum as determined by TxDOT Test Method Tex-114-E. Sandy loam borrow will not be allowed unless shown on the Drawings or authorized by the E/A.

All suitable materials from excavation operations not required for backfilling the trench may be placed in embankments, if applicable. All unsuitable materials that cannot be made suitable shall be considered surplus excavated materials as described in 510.3(13). The Contractor may, if approved by the engineer, modify unsuitable materials to make them suitable for use. Modification may include drying, removal or crushing of over-size material, and lime or cement treatment.

(7) Cement Stabilized Backfill

When indicated or directed by the E/A, all backfill shall be with cement-stabilized backfill rather than the usual materials. Unless otherwise indicated, cement stabilized backfill material shall consist of a mixture of the dry constituents described for Class J Concrete. The cement and aggregates shall be thoroughly dry mixed with no water added to the mixture except as may be directed by the E/A.

(8) Pipe

General

Fire line leads and fire hydrant leads shall be ductile iron. Domestic water services shall not be supplied from fire service leads, unless the domestic and fire connections are on separately valved branches with an approved backflow prevention device in the fire service branch. All wastewater force mains shall be constructed of ductile iron pipe Pressure Class 250 minimum for pipe greater than 12-inch size and Pressure Class 350 for pipe 12-inch size and smaller. Wastewater pipe shall be in accordance with AW SPL WW-534 and shall have a corrosion resistant interior lining acceptable to the Owner.

All water pipe within utility easements on private property shall be Ductile Iron Pipe, Pressure Class 350 minimum for pipe 12-inch size and smaller and Pressure Class 250 minimum for pipe greater than

12-inch size wrapped as indicated. For sizes over 24 inches, Concrete Pressure Pipe, steel cylinder type, conforming to the requirements of AWWA C-301 will be acceptable.

There may be no service connections to Concrete Pressure Pipe installed in utility easements on private property. Approved service clamps or saddles shall be used when tapping ductile iron pipe 12 inch size and smaller. All service tubing (¾ inch thru 2 inches) installed in utility easements on private property shall be 150 psi annealed seamless Type K copper tubing with no sweat or soldered joints.

All reclaimed water mains shall be constructed of ductile iron pipe, Pressure Class 350 minimum for pipe 12-inch size and smaller and pressure class 250 for pipe greater than 12-inch size. For mains 12-inch size and smaller, PVC pipe, conforming to the requirements of AWWA C-900, DR 14 shall be acceptable. Reclaimed water pipe shall be manufactured purple, painted purple, or wrapped in purple polyethylene film wrap.

Manufacturers of concrete pipe and pipe larger than 24-inch diameter shall have a quality control program consisting of one or more of the following: 1) a quality management system certified by the American National Standards Institute (ANSI) or National Sanitation Foundation (NSF) to comply with ISO 9001:2000, 2) a quality management system certified by the QCast Program following the requirements of the ACPA Plant Certification Manual, 3) a quality management system certified by the National Precast Concrete Association 4) a quality control program approved by the OWNER prior to submittal of bids for the PROJECT, or 5) an independent, third party quality control testing and inspection firm for testing and inspecting pipe produced for the PROJECT and approved by the OWNER prior to submittal of bids for the PROJECT. All such quality control programs shall be paid for by the manufacturer. It is the intent of this requirement that the manufacturer will document all appropriate tests and inspections with sampling and inspection criteria, frequency of testing and inspection, date of testing and inspection and date on which every piece was manufactured. Required testing and inspection, including that by an independent, third party, shall be performed full-time during production of pipe for the PROJECT. When requested by the OWNER, the manufacturer will provide copies of test data and results and inspection reports with the shipment of pipe for the PROJECT. Test data and results and inspection reports shall be traceable to specific pipe lots or pieces. Owner approval of the manufacturer's quality control program will expire after three years, at which time the manufacturer must present a current quality control program for approval in order to retain listing on the applicable SPL. Owner approval of the Concrete Pipe manufacturer's quality control program will expire after three years, at which time the manufacturer must present a current quality control program for approval.

The quality of materials, the process of manufacture and the finished pipe shall be subject to inspection and approval by the E/A at the pipe manufacturing plant and at the project site prior to and during installation. Plant inspections shall be conducted at the discretion of the City Representative. Only manufacturers having a quality control program of the type described above will be considered as approved providers of concrete pipe and pipe products as listed in the SPL.

All water distribution pipe and fittings shall be listed in the Fire Protection Equipment Directory published by the Underwriter's Laboratories, Inc., or shall be Factory Mutual approved for fire service. All water pipe and related products shall be registered by the National Sanitation Foundation as having been certified to meet NSF/ANSI Standard 61.

(a) Reserved

(b) Iron Pipe

Iron pipe shall be ductile iron pipe meeting all requirements of standards as follows:

-For push-on and mechanical joint pipe: AWWA C-151

-For flanged pipe: AWWA C-115

Barrels shall have a nominal thickness required by Table 1 of AWWA C-115, which thickness corresponds to Special Class 53 in sizes through 54 inch, and Class 350 in 60 and 64-inch sizes. Flanges shall be ductile iron (gray iron is not acceptable); they shall be as shown in ANSI/AWWA C115/A21.15 and shall conform to dimensions shown in Table 2 and Figure 1 of AWWA C115. These flanges are the same in all respects as flanges shown in ANSI/AWWA C110/A21.10 for fittings and are standard for all flanges used with pipe, valve, and equipment units in the COA water distribution and wastewater force main systems. Flanges shall be fabricated and attached to the pipe barrels by U.S. fabricators using flanges and pipe barrels of U.S. manufacture. If fabrication is to be by other than the pipe barrel manufacturer, a complete product submittal and approval by the AW will be required. Additionally, such fabricator shall furnish certification that each fabricated joint has been satisfactorily tested hydrostatically at a minimum pressure of 300 psi.

-Linings and Coating:

Interior surfaces of all iron potable or reclaimed water pipe shall be cement-mortar lined as required by AWWA C104. Interior surfaces of all iron wastewater line and force main pipe shall be coated with a non-corrosive lining material as indicated on AW SPL WW-534. Pipe exteriors shall be coated as required by the applicable pipe specification. The type and brand of interior lining shall be clearly marked on the outside of the pipe and fittings. Except as authorized by the E/A, only one type and brand of pipe lining shall be used on a given project.

Except as described above for flanged pipe (Thickness Class 53) and where not otherwise indicated, ductile iron pipe shall be minimum Class 250 as defined by ANSI/AWWA C150/A21.50-current; all ductile iron pipe and flanges shall meet the following minimum physical requirements:

Grade 60-42-10:

-Minimum tensile strength: 60,000 psi (414 mPa).

-Minimum yield strength: 42,000 psi (290 mPa).

-Minimum elongation: 10 percent.

The flanges for AWWA C115 pipe may be also be made from:

Grade 70-50-05:

-Minimum tensile strength: 70,000 psi (483 mPa).

-Minimum yield strength: 50,000 psi (345 mPa).

-Minimum elongation: 5 percent.

1. Ductile Iron Fittings:

Fittings shall be push-on, flanged or mechanical joint as indicated or approved and shall meet all requirements of standards as follows:

-Sizes 4 inch through 24 inch: AWWA C-110 or AWWA C-153

-Sizes larger than 24 inch: AWWA C-110.

-Lining and Coating:

Interior surfaces or all iron potable/reclaimed water pipe fittings shall be lined with cement- mortar and seal coated as required by AWWA C104. Interior surfaces of all iron wastewater and force main fittings shall be coated with a non-corrosive lining

material acceptable to Owner. Fitting exteriors shall be coated as required by the applicable pipe specification.

2. Joint Materials

   Gaskets for mechanical joints shall conform to ANSI/AWWA A21.11/C-111.

   Joining of slip joint iron pipe shall, without exception, be accomplished with the natural or synthetic rubber gaskets of the manufacturer of that particular pipe being used. A joint lubricant shall be used and applicable recommendations of the manufacturer shall be followed.

   Gaskets for flanged joints shall be continuous full face gaskets, of ⅛ inch minimum thickness of natural or synthetic rubber, cloth-reinforced rubber or neoprene material, of deformed cross section design and shall meet all applicable requirements of ANSI/AWWA A21.11/C-111 for gaskets. They shall be manufactured by, or satisfy all recommendations of, the manufacturer of the pipe/fittings being used and be fabricated for use with Class 125 ANSI B16.1 flanges.

   Tee-head bolts, nuts and washers for mechanical joints shall be high strength, low alloy, corrosion resistant steel stock equal to "COR-TEN A" having UNC Class 2 rolled threads or alloyed ductile iron conforming to ASTM A 536; either shall be fabricated in accordance with ANSI/AWWA A21.11/C-111.

   Hex head bolts and nuts shall satisfy the chemical and mechanical requirements of ASTM A449 SAE Grade 5 plain, and shall be fabricated in accordance with ASTM B 18.2 with UNC Class 2 rolled threads.

   Either Tee-Head or Hex-Head bolts, nuts and washers as required, shall be protected with bonded fluoro-polymer corrosion resistant coating where specifically required by the E/A.

   All threaded fasteners shall be marked with a readily visible symbol cast, forged or stamped on each nut and bolt, which will identify the fastener material and grade. The producer and the supplier shall provide adequate literature to facilitate such identification; painted markings are not acceptable.

3. Polyethylene Film Wrap

   All metallic pipe, fittings and accessories shall be wrapped in polyethylene encasement per SPL WW-27D, with all edges overlapped and taped securely with duct tape to provide a continuous wrap to prevent contact between the piping and the surrounding backfill. Repair all punctures of the polyethylene, including those caused in the placement of bedding aggregates, with duct tape to restore the continuous protective wrap before backfilling. Polyethylene film wrap for reclaimed water pipe shall be purple.

4. Marking

   Each pipe joint and fitting shall be marked as required by the applicable AWWA specification. This includes in all cases: Manufacturer's identification, Country where cast, year of casting, and "DUCTILE" or "DI". Barrels of flanged pipe shall show thickness class; others shall show pressure class. The flanges of pipe sections shall be stamped with the fabricators identification; fittings shall show pressure rating, the nominal diameter of openings and the number of degrees for bends. Painted markings are not acceptable.

5. Warning Tape

   Warning tape for identifying restrained joint pipe and fittings shall be yellow and shall have black lettering at least 2inches high that reads "Restrained Joint/Junta de Restriccion" at

intervals not exceeding 24 inches. The warning tape shall be polypropylene having a minimum thickness of 2 mils, a minimum width of 3 inches, and adhesive backing on the side opposite the lettering.

(c) Concrete

1. General

Pipe shall conform to ASTM C 76 for Circular Pipe. Concrete pipe smaller than 12 inches in diameter shall conform to ASTM C 14, Extra Strength. All pipe shall be machine made or cast by a process which will provide uniform placement of the concrete in the form and compaction by mechanical devices, which will assure a dense concrete. Concrete shall be mixed in a central batch plant or other approved batching facility from which the quality and uniformity of the concrete can be assured. Transit mixed concrete shall not be acceptable for use in precast pipe. The pipe shall be Class III or the class indicated. Storm sewer pipe shall be of the tongue and groove or 0-ring joint design. Wastewater pipe shall be of the 0-ring joint design; it shall be acceptably lined for corrosion protection.

2. Marking

Each joint of pipe shall be marked with the pipe class, the date of manufacture, the manufacturer's name or trade mark, diameter of pipe and orientation, if required.

Pipe marking shall be waterproof and conform to ASTM C 76.

3. Minimum Age for Shipment

Pipe shall be considered ready for shipment when it conforms to the tests specified in ASTM C 76.

4. Joint Materials

When installing storm sewers (or storm drains), the Contractor shall have the option of using joints with preformed flexible joint sealants or with rubber gaskets. Preformed flexible joint sealants for storm drain joints shall comply with ASTM C990, and rubber gaskets for storm drain joints shall comply with ASTM C 1619. Mortar shall not be used to seal pre-fabricated joints. Pipe manufacturer shall be responsible for submitting to the Owner a detailed design of the joint upon request. The pipe manufacturer shall be responsible for submitting to the Owner a complete list of joint sizes showing the minimum size of material to be used with each size joint, along with complete instructions on recommended installation procedures. Quality control testing at the manufacturing plant shall be in accordance with TxDOT Departmental Materials Specifications (DMS) 7310, "Reinforced Concrete Pipe And Machine-Made Precast Concrete Box Culvert Fabrication And Plant Qualification". The pipe manufacturer shall be verified as compliant with TxDOT DMS 7310 at time of pipe delivery to the jobsite.

a. Mortar

Mortar for joints shall meet the requirements set forth below in "Mortar".

b. Cold Applied Preformed Plastic Gaskets

Cold Applied Plastic Gaskets shall be suitable for sealing joints of tongue and groove concrete pipe. The gasket sealing the joint shall be produced from blends of refined hydrocarbon resins and plasticizing compounds reinforced with inert mineral filler and shall contain no solvents, irritating fumes or obnoxious odors. The gasket joint sealer shall not depend on oxidizing, evaporating or chemical action for its adhesive or cohesive strength and shall be supplied in extruded rope form of suitable cross

section. The size of the plastic gasket joint sealer shall be in accordance with the manufacturer's recommendations and sufficient to obtain squeeze-out around the joint. The gasket joint sealer shall be protected by a suitable removable wrapper that may be removed longitudinally without disturbing the joint sealer to facilitate application.

The chemical composition of the gasket joint sealing compound as shipped shall meet the following requirements:

Composition (% by weight)	Test Method	Typical Analysis
Bitumen (petroleum plastic content)	ASTM D 4	50-70
Ash-inert Mineral Water	Tex-526-C	30-50
Volatile Matter (at 325 F)	Tex-506-C	2.0 Maximum

The gasket joint sealing compound when immersed for 30 days at ambient room temperature separately in 5 percent solution of caustic potash, a mixture of 5 percent hydrochloric acid, a 5 percent solution of sulfuric acid and a saturated H2S solution shall show no visible deterioration.

The physical properties of the gasket joint sealing compound as shipped shall meet the following requirements:

Property	Test Method	Typical Analysis	
		Minimum	Maximum
Specific Gravity at 77 F	ASTM D 71	1.20	1.35
Ductility at 77F (cm) Minimum	Tex-503-C	5.0	
Softening point	Tex-505-C	275 F	
Penetration:			
32 F (300 g) 60 sec	Tex-502-C	75	
77 F (150 g) 5 sec	Tex-502-C	50	120
115 F (150 g) 5 sec	Tex-502-C		150
Flashpoint C.O.C. F	Tex-504-C	600 F	
Fire Point C.O.C. F	Tex-504-C	625 F	

When constructing wastewater lines, the Contractor shall use 0-ring gasket joints conforming to ASTM C 443. Just before making a joint, the ends of the pipe shall be clean, dry, free of blisters or foreign matter and shall be wire brushed. For O-ring joints, the gasket and the inside surface of the bell shall be lubricated with a light film of soft vegetable soap compound to facilitate assembly of the joint. The rubber O-ring gasket shall be stretched uniformly in the joint. Wedge seal type ("Forsheda" pre-lubricated) gaskets may be used if joint details submitted are approved; installation of such gaskets shall be in strict accordance with the manufacturer's recommendations, and shall be the sole element depended upon to make the joint flexible and watertight.

In wastewater lines no horizontal or vertical angles in the alignment of pipes shall be permitted unless indicated. The spigot shall be centered in the bell, the pipe pushed uniformly home and brought into true alignment. Bedding material shall be placed and tamped against pipe to secure the joint.

5. Bends

When horizontal or vertical angles in the alignment of storm sewers are indicated, the bend or angle shall be constructed by cutting on a bias one or both pipes as may be required for the alignment indicated. The pipe cut shall be sufficiently long to allow exposing the reinforcement, which shall be bent, welded and incorporated into the pipe bend and reinforced concrete collar to maintain the structural integrity. The collar shall be 6 inches minimum, reinforced with #4 bars on a 1 foot center both directions. Builder's hardware cloth may be used on the outside of the joint to aid in holding cementing materials in place. Plywood, fiberboard or other materials placed on the inside of the pipe as formwork shall be removed as soon as the joint materials have obtained initial set, after which the inside surface of the pipe joint shall be finished smooth and true to the line and grade established. The Contractor may use prefabricated bends meeting the specification requirements in lieu of field fabricated bends. All bends shall be watertight, have a smooth flow line and be equal or greater in strength to the adjacent pipe.

Horizontal or vertical changes in alignment in wastewater lines shall be accomplished by use of manholes. With the E/A's approval, horizontal changes in alignment may be made by the "Joint Deflection" method. Joint deflection is limited by regulations of the Texas Commission on Environmental Quality (TCEQ) to 80 percent of the maximum recommended by the manufacturer; such deflection may not exceed 5 degrees at any joint. Changes in alignment using pipe flexure shall not be allowed.

6. Sulfide and Corrosion Control

All concrete pipe used for wastewater installations shall be protected from sulfide and corrosion damage by using limestone aggregate.

(d) Concrete Steel Cylinder (CSC) Pipe

1. General Requirements

The Contractor shall submit to the E/A for approval along with other required data a tabulated layout schedule with reference to the stationing and grade lines to be used.

The manufacturer shall furnish all fittings and special pieces required for closures, bends, branches, manholes, air valves, blow offs and connections to main line valves and other fittings as indicated.

Each pipe length, fitting and special joint shall have plainly marked on the bell end of the pipe, the head condition for which it is designed. In addition, marking shall be required to indicate the location of each pipe length or special joint in the line and such markings will be referenced to the layout schedules and drawings and submitted for approval.

Concrete steel cylinder fittings shall be tested as required by the applicable AWWA Standards.

2. Design and Inspection

Where not otherwise indicated, concrete steel cylinder pipe shall be Class 150, designed to withstand a vacuum of not less than 28 feet of water. Valve reducers, tees and outlets from a pipe run shall be designed and fabricated so that all stresses are carried by the steel forming the fitting or outlet.

Concrete steel cylinder pipe shall meet one of the following specifications:

AWWA C-301 - Any size.

AWWA C-303 - 24-inch maximum size.

All pipe flanges shall conform to AWWA C-207, requirements for standard steel flanges of pressure classes corresponding to the pipe class.

Pipe to be installed in a tunnel or encasement shall be manufactured with 1 inch thick by 24-inch wide skid bands of mechanically impacted mortar in addition to the normal coating.

All concrete steel cylinder fittings shall be constructed of steel plate of adequate strength to withstand both internal pressure and external loading. Rod reinforcing shall not be used to figure the required steel area. The fittings shall have a concrete lining and 1 inch minimum coating of cement mortar, except that centrifugally spun lining need not be reinforced.

Minimum lining thickness shall be ½ inch for 16-inch pipe and ¾ inch for sizes larger than 16-inch pipe. Where it is impractical to place such concrete protection on interior surfaces of small outlets, 2 coats of "Bitumastic Tank Solution" shall be applied.

No fitting shall be made by cutting of standard pipe, except that outlets of less than 75 percent of the pipe diameter may be placed in a standard pipe. Beveled spigots may be placed on standard pipe.

3. Joint Materials

Joints shall be of the rubber gasket type conforming to the applicable standards. The inside and outside recesses between the bell and spigot shall be completely filled with Cement Grout in accordance with the pipe manufacturer's recommendations. Grout materials for jointing such pipe, unless otherwise indicated, shall be as described herein.

(e) Polyethylene (HDPE) Pressure Pipe and Fittings, 4-inch and Larger

Refer to ITEM NO. 513 - Polyethylene (HDPE) Pipe and Fittings, AWWA C906, 4-inch and Larger. HDPE Pipe and Fittings manufacturers shall be listed on SPL WW-706, WW-706A, WW-706B, or WW-706C.

(f) Polyethylene (HDPE) Service Tubing

HDPE tubing shall conform to material requirements specified in AWWA C901 and meet the requirements of ASTM D2737. HDPE tubing shall be copper tubing size (CTS) outside diameter and minimum Pressure Class 250 (DR 9). Tubing manufacturers shall be listed on SPL WW-65, WW-65A, or WW-65C.

(g) Copper Service Tubing

All copper service tubing shall be annealed seamless Type K water tube meeting ASTM B88 and rated at 150 psi working pressure. The tubing shall be homogenous throughout and free from cracks, holes, crimping, foreign inclusions or other defects. It shall be uniform in density and other physical properties. Copper tubing for reclaimed water shall be wrapped in purple polyethylene film wrap. Pipe manufacturers shall be listed on SPL WW-613.

(h) Service Connection Fittings

All fittings used in customer service connection - tapping mains, connecting meters, etc. - must be currently listed on the applicable AW (SPL WW-68), or called for in the COA Standards (520 - series).

(i) Brass Goods

All brass valves, couplings, bends, connections, nipples and miscellaneous brass pipe fittings and accessories used in meter connections, service lines, air release piping assemblies, and wherever needed in the water distribution system, shall conform to the COA Standards, AW SPL, and AWWA C-800, except as herein modified or supplemented.

Unless otherwise noted, the goods described herein shall be fabricated of standard Red Brass (Waterworks Brass) meeting ASTM B62 or B584, alloy 83600, consisting of 85 percent copper and 5 percent each of tin, lead and zinc.

Exposed threads shall be covered with plastic caps or sheeting to protect the threads.

Brass goods of each type and class shall be compatible with other fittings in common usage for similar purposes. Where not otherwise indicated, all such materials shall meet the following requirements:

Inlet threads of corporation valves shall be AWWA iron pipe (IP) thread (male); outlets of service saddles shall be tapped with AWWA IP thread (female). AWWA IP threads shall conform to ANSI/ASME B1.20.1 as required by AWWA C800 for "General Purpose (Inch) Pipe Threads". For ¾" and 1" sizes only, corporation valve inlet threads, and the internal threads of saddles may be the AWWA taper thread conforming to AWWA C800 Figure 1 and Table 6. External threads of corporation valve inlet must be compatible with internal threads of the service saddle.

Connections of all new tubing, and of tubing repairs wherever possible, shall be by compression fittings. Compression connections shall be designed to provide a seal and to retain the tubing, without slippage, at a working water pressure of 150 psig.

Flanges shall conform to ANSI B16.1, Class 125, as to dimensions, drillings, etc. Copper tubing, when used, shall be Type K tubing having dimensions and weights given in Table A.1 of AWWA C800.

Brass pipe shall conform to the weights and dimensions for Extra Strong pipe given in Table A.2 of AWWA C800.

All fittings shall be suitable for use at hydrostatic working pressures up to 150 psig (hydrostatic testing of installed systems is at 200 psig).

(j) Inductive Tracer Detection Tape

Inductive Tracer Detection Tape shall be placed directly above the centerline of all non-metallic water, reclaimed water, and wastewater pipe (PVC and HDPE) a minimum of 12 inches and no deeper than 36 inches below subgrade or, in areas outside the limits of pavement, a minimum of 18 inches and no deeper than 36 inches below finished grade. The tracer tape shall be encased in a protective, inert, plastic jacket and color coded according to American Public Works Association Uniform Color Code. Except for minimum depth of cover, the tracer tape shall be placed according to manufacturer's recommendations. Manufacturers must be listed on SPL WW-597.

(k) Polyvinyl Chloride Potable/Reclaimed Water Pipe

1. General

All polyvinyl chloride (PVC) potable/reclaimed water pipe shall be of the rigid (UNPLASTICIZED) type and must bear the National Sanitation Foundation seal of approval for potable water pipe. Each joint of pipe shall consist of single continuous extrusion; bells or other components attached by solvent welding are not acceptable. Pipe shall be pressure rated at 200 psi (SDR-14).

Pipe shall have push-on, rubber gasket joints of the bell and spigot type with thickened integral bells with rubber gasket joints. The wall thickness of each pipe bell and joint

coupling must be greater than the standard pipe barrel thickness. Clearance must be provided in every gasket joint for both lateral pipe deflection and for linear expansion and contraction. Concrete support cradles or blocking shall be required for support of all fire hydrants, valves and AWWA C110 fittings; such support shall be provided for AWWA C153 fittings when required by the E/A.

Pipe with a whitened exterior (fading of color) that was manufactured more than two (2) years before the proposed installation date shall be rejected.

2. Applicable Specifications

Except as modified or supplemented herein, PVC pipe shall meet the following standards:

AWWA C-900, or SDR 14 for PVC Pressure Pipe, in 4, 6, 8 and 12 inch nominal sizes, having Cast Iron Pipe size outside diameters.

Fittings used with PVC Pressure pipe shall be AWWA C-110 or AWWA C-153 compact ductile iron fittings.

All pipe 4 inches and larger must be approved Underwriter's Laboratories for use in buried water supply and fire protection systems.

3. Material Requirements

All pipe and fittings shall be made from clean, virgin, NSF certified, Class 12454 PVC. Clean reworked materials generated from the manufacturers own production may be used within the current limits of the referenced AWWA C-900.

4. Marking

PVC for reclaimed piping shall be purple or wrapped in purple polyethylene film wrap.

Permanent marking on each joint of pipe shall include the following at intervals of not more than 5 feet:

Nominal pipe size and OD base (e.g., 4 CIPS).

Type of plastic material (e.g., PVC 12454).

Standard Dimension Ratio and the pressure rating in psi for water at 73 F (e.g., SDR 18, 150 psi).

AWWA designation with which the pipe complies (e.g., AWWA C-900).

Manufacturer's name or code and the National Sanitation Foundation (NSF) mark.

(l) Polyvinyl Chloride (PVC) Pipe (Nonpressure) and Fittings

1. General

PVC sewer and wastewater pipe and fittings 6 through 15 inch diameter shall conform to ASTM D 3034. Pipe shall have minimum cell classification of 12364 or 12454. Fittings shall have cell classification of 12454 or 13343. Pipe stiffness shall be at least 115 psi as determined by ASTM D 2412. Pipe manufacturers shall be on SPL WW-227, and fitting manufacturers shall be on SPL WW-227B.

PVC sewer and wastewater pipe and fittings 18 through 27 inch diameter shall conform to ASTM F 679. Pipe shall have minimum cell classification of 12364 or 12454. Pipe stiffness shall be at least 72 psi as determined by ASTM D 2412. Pipe manufacturers shall be on SPL WW-227A, and fitting manufacturers shall be on SPL WW-227B.

Pipe with a whitened exterior (fading of color) that was manufactured more than two (2) years before the proposed installation date shall be rejected.

2. Joints

PVC pipe and fitting shall have elastomeric gasket joints conforming to ASTM D 3212. Gaskets shall conform to ASTM F 477.

3. Pipe Markings

Pipe meeting ASTM D 3034 shall have permanent marking on the pipe that includes the following at intervals of not more than 5 feet:

Manufacturer's name and/or trademark and code.

Nominal pipe size.

PVC cell classification per ASTM D 1784.

The legend "SDR-_ _ PVC Sewer Pipe" (SDR 26, 23.5. or less is required)

The designation "ASTM D 3034"

Pipe meeting ASTM F 679 shall have permanent marking that includes the following at intervals of not more than 5 feet:

Manufacturer's name or trademark and code

Nominal pipe size

PVC cell classification per ASTM D 1784

Pipe stiffness designation "PS _ _ PVC Sewer Pipe" (PS of at least 72 is required

The designation "ASTM F 679"

4. Fitting Markings

Fittings meeting ASTM D 3034 shall have permanent marking that includes the following:

Manufacturer's name or trademark

Nominal size

The material designation "PVC"

The designation, "ASTM F 679"

Fittings meeting ASTM F 679 shall have permanent marking that includes the following:

Manufacturer's name or trademark and code

Nominal size

The material designation "PVC"

The designation "ASTM F 679"

(m) Steel Pipe

1. Standard Weight

ASTM A 53, Schedule 40.

2. Extra Heavy Weight

Seamless ASTM A 53, Schedule 80.

3. Encasement Pipe

    a. For direct-bury installations, pipe shall conform to ASTM A134 with minimum thickness of ⅜ inch (9.5 mm).

    b. For jacked installations, pipe shall conform to requirements on drawings.

4. Fittings

    Nipples and fittings extra strong Federal Specification WW-N 351 or WW-P 521.

5. Coatings

    Black or galvanized as indicated.

(n) Welded Steel Pipe and Fittings for Water-Pipe

1. General Reference Standards Specification.

    Specifications of the American Water Works Association (AWWA) listed below shall apply to this Section.

    C-200 Steel Water Pipe 6 inches and larger.

    C-205 Cement-Mortar Protective Lining and Coating for Steel Water Pipe, 4 inches and larger, Shop Applied.

    C-206 Field Welding of Steel Water Pipe.

    C-207 Steel Pipe Flanges for Waterworks Services, Sizes 4 inches through 144 inches.

    C-208 Dimensions for Steel Water Pipe Fittings.

    C-602 Cement-Mortar Lining of Water Pipelines, 4 inches and larger in Place.

2. Submittals

    Furnish Shop Drawings, product data, design calculations and test reports as described below:

    a. Certified copies of mill tests confirming the type of materials used in steel plates, mill pipe flanges and bolts and nuts to show compliance with the requirements of the applicable standards.

    b. Complete and dimensional working drawings of all pipe layouts. Shop Drawings shall include the grade of material, size, wall thickness of the pipe and fittings, type and location of fittings and the type and limits of the lining and coating systems of the pipe and fittings.

    c. Product data to show compliance of all couplings, supports, fittings, coatings and related items.

3. Job Conditions

    a. The internal design pressure of all steel pipe and fittings shall be as indicated.

    b. The interior of all steel pipe for potable water, 4 inches and larger, shall be cement-mortar lined.

4. Manufacturing

    a. Description

Pipe shall comply with AWWA C-200.

(1) Circumferential deflection of all pipe in-place shall not exceed 2.0 percent of pipe diameter.

(2) Diameter

Nominal pipe diameter shall be the inside diameter of lining or pipe barrel, unless otherwise designated in Job Conditions.

b. Wall Thickness

(1) Steel pipe wall thickness shall be designed for the internal and external loads specified in this section. The cylinder thickness needed to resist internal pressure shall be based on an allowable stress in the steel equal to ½ the minimum yield stress of the material used.

5. Fittings

a. Welded

Fabricated steel fittings shall be of the same material as pipe and shall comply with AWWA C-208.

6. Flanges

a. Flanges shall comply with the requirements of AWWA C-207, Class D or Class E. The class shall be based on operating conditions and mating flanges of valves and equipment.

b. Gaskets shall be cloth-inserted rubber, ⅛ inch thick.

c. Flanges shall be flat faced with a serrated finish.

7. Pipe Joints

a. Lap Joints for Field Welding

(1) Lap joints for field welding shall conform to AWWA C-206. This item applies only to pipes 72 inches in diameter and larger.

(2) The bell ends shall be formed by pressing on a hydraulic expander or a plug die. After forming, the minimum radius of curvature of the bell end at any point shall not be less than 15 times the thickness of the steel shell. Bell ends shall be formed in a manner to avoid impairment of the physical properties of the steel shell. Joints shall permit a lap at least 1½ inches when assembled. The longitudinal or spiral weld on the inside of the bell end and the outside of the spigot end on each section of pipe shall be ground flush with the plate surface. The inside edge of the bell and the outside edge of the spigot shall be scarfed or lightly ground to remove the sharp edges or burrs.

b. Bell and Spigot Joints with O-Ring Gasket

(1) Bell and spigot joints with rubber gasket shall conform to AWWA C-200.

(2) The bell and spigot ends shall be so designed that when the joint is assembled, it will be self-centered and the gasket will be confined to an annular space in such manner that movement of the pipe or hydrostatic pressure cannot displace it. Compression of the gasket when the joint is

completed shall not be dependent upon water pressure in the pipe and shall be adequate to ensure a watertight seal when subjected to the specified conditions of service. Bell and spigot ends shall be welded on preformed shapes. The bell and spigot ends shall conform to the reviewed Shop Drawings.

8. Interior and Exterior Protective Surface Coatings

    a. Exterior Surface to be mortar coated shall conform to AWWA C-205 for shop application and AWWA C-602 for field application. Pipe materials shall be the product of an organization, which has had not less than 5 years successful experience manufacturing pipe materials, and the design and manufacture of the pipe, including all materials, shall be the product of one company.

    b. All surfaces except as noted in c and d below shall receive shop application of mortar lining and coating.

    c. Field Welded Joints. After installation, clean, line and coat unlined or uncoated ends adjacent to welded field joints, including the weld proper, as specified for pipe adjacent to the weld. Potable water only shall be used in the preparation of any cement, mortar, or grout lining.

    d. Machined Surfaces. Shop coat machined surfaces with a rust preventative compound. After jointing surfaces, remaining exposed surfaces shall be coated per a. and b. above.

(o) Corrugated Metal Pipe

1. General

Pipe shall be corrugated continuous lock or welded seam helically corrugated pipe. Corrugated metal pipe may be galvanized steel, aluminized steel or aluminum conforming to the following:

Galvanized Steel: AASHTO M 218

Aluminized Steel: AASHTO M 274

Aluminum: AASHTO M 197

Where reference is made herein to gage of metal, the reference is to U.S. Standard Gage for uncoated sheets. Tables in AASHTO M 218 and AASHTO M 274 list thickness for coated sheets in inches. The Tables in AASHTO M 197 list thickness in inches for clad aluminum sheets.

Sampling and testing of metal sheets and coils used for corrugated metal pipe shall be in accordance with TXDOT Test Method Tex-708-I.

Damaged spelter coating shall be repaired by thoroughly wire brushing the damaged area and removing all loose, cracked or weld-burned spelter coating. The cleaned area shall be painted with a zinc dust-zinc oxide paint conforming to Federal Specifications TT-P 641b. Damaged pipe shall be rejected and removed from the project.

Damaged aluminized coating shall be repaired in accordance with the manufacturer's recommendations.

The following information shall be clearly marked on each section of pipe:

Thickness and corrugations.

Trade Mark of the manufacturer.

Specification compliance.

2. Fabrication.

a. Steel Pipe.

Galvanized or aluminized steel pipe shall be full circle or arch pipe conforming to AASHTO M 36, Type I or Type II as indicated.

It may be fabricated with circumferential corrugations; lap joint construction with riveted or spot welded seams or it may be fabricated with helical corrugations with continuous helical lock seam or ultra high frequency resistance butt-welded seams.

b. Aluminum Pipe

Pipe shall conform to AASHTO M 196, Type I, circular pipe or Type II, pipe arch as indicated. It may be fabricated with circumferential corrugations; lap joint construction with riveted or spot welded seams or it may be fabricated with helical corrugations with a continuous helical lock seam.

Portions of aluminum pipe that are to be in contact with high chloride concrete or metal other than aluminum, shall be insulated from these materials by a coating of bituminous material. The coating applied to the pipe or pipe arch to provide insulation between the aluminum and other material shall extend a minimum distance of 1 foot beyond the area of contact.

3. Selection of Gages

The pipe diameter, permissible corrugations and required gauges for circular pipe shall be as indicated on the drawings.

For pipe arch, the span, rise, gage, corrugation size and coating thickness shall be as shown on the drawings. A tolerance of plus or minus 1 inch or 2 percent of equivalent circular diameter, whichever is greater, will be permissible in span and rise, with all dimensions measured from the inside crests of the corrugations.

4. Joint Material

Except as otherwise indicated, coupling bands and other hardware for galvanized or aluminized steel pipe shall conform to AASHTO M 36 for steel pipe and AASHTO M 196 for aluminum pipe. Field joints for each type of corrugated metal pipe shall maintain pipe alignment during construction and prevent infiltration of soil material during the life of the installation.

Coupling bands shall be not more than 3 nominal sheet thickness lighter than the thickness of the pipe to be connected and in no case lighter than 0.052 inch for steel or 0.048 inch for aluminum.

Coupling bands shall be made of the same base metal and coating (metallic or otherwise) as the pipe.

Coupling bands shall lap equally on each of the pipes being connected to form a tightly closed joint after installation.

Pipes furnished with circumferential corrugations shall be field jointed with corrugated locking bands. This includes pipe with helical corrugations, which has reformed circumferential corrugations on the ends. The locking bands shall securely fit into at least

one full circumferential corrugation on each of the pipe ends being coupled. The minimum width of the corrugated locking bands shall be as shown below for the corrugation which corresponds to the end circumferential corrugations on the pipes being joined:

10½ inches wide for 2⅔ inches × ½-inch corrugations.

12 inches wide for 3 inches × 1 inch or 5 inches × 1-inch corrugations.

Helical pipe without circumferential end corrugations will be permitted only when it is necessary to join a new pipe to an existing pipe, which was installed with no circumferential end corrugations. In this event pipe furnished with helical corrugations at the ends shall be field jointed with either helically corrugated bands or with bands with projections or dimples. The minimum width of helically corrugated bands shall conform to the following:

12 inches wide for pipe diameters up to and including 72 inches.

14 inches wide for 1 inch deep helical end corrugations.

Bands with projections shall have circumferential rows of projections with one projection for each corrugation. The width of bands with projections shall be not less than the following:

12 inches wide for pipe diameters up to and including 72 inches.

The bands shall have 2 circumferential rows of projections.

16¼ inches wide for pipe diameters of 78 inches and greater.

The bands shall have 4 circumferential rows of projections.

Unless otherwise indicated, all bolts for coupling bands shall be ½-inch diameter. Bands 12 inches wide or less shall have a minimum of 2 bolts and bands greater than 12 inches wide shall have a minimum of 3 bolts.

Galvanized bolts may be hot dip galvanized conforming to AASHTO M 232, mechanically galvanized to provide the same requirements as AASHTO M 232 or electro-galvanized per ASTM A 164 Type RS.

5. Additional Coatings or Linings

a. Bituminous Coated

Bituminous Coated pipe or pipe arch shall be as indicated both as to base metal and fabrication and in addition shall be coated inside and out with a bituminous coating which shall meet the performance requirements set forth herein. The bituminous coating shall be 99.5 percent soluble in carbon bisulphide. The pipe shall be uniformly coated inside and out to a minimum thickness of 0.05 inch, measured on the crests of the corrugations.

The bituminous coating shall adhere to the metal tenaciously, shall not chip off in handling and shall protect the pipe from deterioration as evidenced by samples prepared from the coating material successfully meeting the Shock Test and Flow Test in accordance with Test Method Tex-522-C.

b. Paved Invert

Where a Paved Invert is indicated, the pipe or pipe arch, in addition to the fully coated treatment described above, shall receive additional bituminous material of the same specification as above, applied to the bottom quarter of the circumference

to form a smooth pavement with a minimum thickness of ⅛ inch above the crests of the corrugations.

c. Cement Lined

(1) General

Except as modified herein, pipe shall conform to AASHTO M 36 for lock seam or welded helically corrugated steel pipe. Pipe shall be of full circle and shall be fabricated with two annular corrugations for purposes of joining pipes together with band couplers. Lock seams shall develop the seam strength as required in Table 3 of AASHTO M 36. Concrete lining shall conform to the following:

Composition

Concrete for the lining shall be composed of cement, fine aggregate and water that are well mixed and of such consistency as to produce a dense, homogeneous, non-segregated lining.

Cement

Portland Cement shall conform to AASHTO M 85.

Aggregate

Aggregates shall conform to AASHTO M 6 except that the requirements for gradation and uniformity of gradation shall not apply.

Mixture

The aggregates shall be sized, graded, proportioned and thoroughly mixed with such proportions of cement and water as will produce a homogenous concrete mixture of such quality that the pipe will conform to the design requirements indicated. In no case, however, shall the proportions of Portland Cement, blended cement or Portland Cement plus pozzolanic admixture be less than 470 lb/cu. yd. of concrete.

Thickness

The lining shall have a minimum thickness of ⅛ inch above the crest of the corrugations.

Lining Procedures

The lining shall be plant applied by a machine traveling through a stationary pipe. The rate of travel of the machine and the rate of concrete placement shall be mechanically regulated so as to produce a homogenous nonsegregated lining throughout.

Surface Finish

The lining machine shall also mechanically trowel the concrete lining as the unit moves through the pipe.

Certification

Furnish manufacturer's standard certification of compliance upon request of the purchaser.

Joints

Pipe shall be joined together with coupling bands made from steel sheets to an indicated thickness of 0.064 inch (12 ga.). Coupling bands shall be formed with two corrugations that are spaced to provide seating in the third corrugation of each pipe end without creating more than ½ inch ± annular space between pipe ends when joined together.

Bands shall be drawn together by two ½ inch galvanized bolts through the use of a bar and strap suitably welded to the band.

When O-ring gaskets are indicated they shall be placed in the first corrugation of each pipe and shall be compressed by tightening the coupling band. Rubber O-ring gaskets shall conform to Section 5.9, ASTM C 361.

(2) Causes for Rejection

Pipe shall be subject to rejection on account of failure to conform to any of the indications. Individual sections of pipe may be rejected because of any of the following:

Damaged ends, where such damage would prevent making satisfactory joint.

Defects that indicate poor quality of work and could not be easily repaired in the field.

Severe dents or bends in the metal itself.

If concrete lining is broken out, pipe may be rejected or at the discretion of the E/A, repaired in the field in accordance with the manufacturer's recommendation.

Hairline cracks or contraction cracks in the concrete lining are to be expected and does not constitute cause for rejection.

d. Fiber Bonded

Where fiber bonded pipe is indicated, the pipe or pipe arch shall be formed from sheets whose base metal shall be as indicated. In addition, the sheets shall have been coated with a layer of fibers, applied in sheet form by pressing them into a molten metallic bonding. If a paved invert is indicated it shall be in accordance with the procedure outlined above. The test for spelter coating above is waived for fiber bonded pipe.

6. Slotted Drain Storm Sewers

The pipes for the slotted drain and slotted drain outfall shall be helically corrugated, lock seam or welded seam pipe. Materials and fabrication shall be in accordance with the above. The metal thickness shall be a minimum 16 gage.

The chimney assemblies shall be constructed of 3/16inch welded plate or machine formed 14 gage galvanized steel sheets. The height of the chimney required shall be as indicated. Metal for the welded plate slot shall meet the requirements of ASTM A 36 and the completed plate slot shall be galvanized after fabrication in accordance with ASTM A 123.

Weld areas and the heat affected zones where the slot is welded to the corrugated pipe shall be thoroughly cleaned and painted with a good quality asphalt base aluminum paint.

7. Mortar

Mortar shall be composed of 1 part Type I Portland Cement and 2 parts clean, sharp mortar sand suitably graded for the purpose and conforming in other respects to the provisions for fine aggregate of Item No. 403, "Concrete for Structures". Hydrated lime or lime putty may be added to the mix, but in no case shall it exceed 10 percent by weight of the total dry mix.

(9) Geotextile Filter Fabric for Pipe Bedding Material

Geotextile filter fabric for pipe bedding material shall be Hanes Geo Components - TerraTex NO4.5 (AOS US Standard Sieve 70) geotextile fabric or approved equal.

Source: Rule No. R161-22.13, 11-7-2022; Rule No. R161-25.08, 6-2-25.

510.3 Construction Methods

(1) General

Prior to commencing this Work, all erosion control and tree protection measures required shall be in place and all utilities located and protected as set forth in "General Conditions". Clearing the site shall conform to Item No. 102S, "Clearing and Grubbing". Maintenance of environmental quality protection shall comply with all requirements of "General Conditions" and Item No. 601S, "Salvaging and Placing Topsoil".

The Contractor shall Work such that a reasonable minimum of disturbance to existing utilities will result. Particular care shall be exercised to avoid the cutting or breakage of all existing utilities. If at any time the Contractor's operations damage the utilities in place, the Contractor shall immediately notify the owner of the utility to make the necessary repairs. When active wastewater sewer lines are cut in the trenching operations, temporary flumes shall be provided across the trench while open and the lines shall be restored when the backfilling has progressed to the original bedding lines of the sewer so cut.

The Contractor shall inform utility owners sufficiently in advance of the Contractor's operations to enable such utility owners to reroute, provide temporary detours or to make other adjustments to utility lines in order that the Contractor may Work with a minimum of delay and expense. The Contractor shall cooperate with all utility owners concerned in effecting any utility adjustments necessary and shall not hold the City liable for any expense due to delay or additional Work because of conflicts arising from existing utilities.

The Contractor shall do all trenching in accordance with the provisions and the directions of the E/A as to the amount of trench left unfilled at any time. All excavation and backfilling shall be accomplished as indicated and in compliance with State Statutes.

Where excavation for a pipe line is required in an existing City street, an excavation permit is required and control of traffic shall be as indicated in accordance with the Texas Manual on Uniform Traffic Control Devices.

Wherever existing utility branch connections, sewers, drains, conduits, ducts, pipes or structures present obstructions to the grade and alignment of the pipe, they shall be permanently supported, removed, relocated or reconstructed by the Contractor through cooperation with the owner of the utility, structure or obstruction involved. In those instances where their relocation or reconstruction is impractical, a deviation from line and grade will be ordered by the E/A and the change shall be made in the manner directed.

Adequate temporary support, protection and maintenance of all underground and surface utility structures, drains, sewers and other obstructions encountered in the progress of the Work shall be furnished by, and at the expense of, the Contractor and as approved by the E/A.

Where traffic must cross open trenches, the Contractor shall provide suitable bridges in conformance with Standard 804S-4. Adequate provisions shall be made for the flow of sewers; drains and watercourses encountered during construction and any structures, which may have been disturbed, shall be satisfactorily restored upon completion of Work.

When rainfall or runoff is occurring or is forecast by the U.S. Weather Service, the Contractor shall not perform or attempt any excavation or other earth moving Work in or near the flood plain of any stream or watercourse or on slopes subject to erosion or runoff, unless given specific approval by the E/A. When such conditions delay the Work, an extension of time for working day contracts will be allowed in accordance with "General Conditions".

(2) Water Line/New Wastewater Line Separation

Separation between water, reclaimed water, and wastewater lines shall be provided as shown in the Drawings.

Crossings of water, reclaimed water, and wastewater lines shall conform to details in the Drawings.

Wastewater manholes within 9 feet of water and reclaimed water lines shall be made watertight according to details in the Drawings.

(3) Utility and Storm Sewer Crossings

When the Contractor installs a pipe that crosses under a utility or storm sewer structure and the top of the pipe is within 18 inches of the bottom of the structure, the pipe shall be backfilled as shown in the Drawings. When the Contractor installs a pipe that crosses under a utility or storm sewer structure that is not shown in the Drawings, the pipe shall be backfilled as directed by the Engineer. Payment for backfilling pipe at utility or storm sewer structures not shown in the Drawings shall be by Change Order.

(4) Trench Excavation

Excavation in a paved street shall be preceded by saw cutting completely through any asphaltic cement concrete or Portland cement concrete surface, base, or subbase to the underlying subgrade. This requirement shall not apply to excavations made with trenching machines that use a rotating continuous belt or chain for cutting and removing of material.

Underground piped utilities shall be constructed in an open cut in accordance with Federal regulations, applicable State Statutes conforming to Item No. 509S, "Excavation Safety Systems" and with a trench width and depth described below. When pipe is to be constructed in fill above the natural ground, Contractor shall construct embankment to an elevation not less than one foot above the top of the pipe, after which trench is excavated. Required vertical sides shall be sheeted and braced as indicated to maintain the sides of the required vertical excavation throughout the construction period. Adequacy of the design of sheeting and bracing shall be the responsibility of the Contractor's design professional. The Contractor shall be responsible for installation as indicated. After the pipe has been laid and the backfill placed and compacted to 12 inches above the top of the pipe, any sheeting, shoring and bracing required may be removed with special care to ensure that the pipe is not disturbed. As each piece of sheeting is removed, the space left by its removal must be thoroughly filled and compacted with suitable material and provisions made to prevent the sides of the trench from caving until the backfill has been completed. Any sheeting left in place will not be paid for and shall be included in the unit price bid for pipe.

(5) Trench Width

Trenches for water, reclaimed, and wastewater lines shall have a clear width on each side beyond the outside surfaces of the pipe bell or coupling of not less than 6 inches nor more than 12 inches.

Trenches for Storm Sewers up to 42 inches shall have a width of 1 foot on each side beyond the outside surfaces of the pipe. Pipes more than 42 inches shall have a trench width not to exceed 18 inches on each side beyond the outside surfaces of the pipe.

If the trench width within the pipe zone exceeds this maximum, the entire pipe zone shall be refilled with approved backfill material, thoroughly compacted to a minimum of 95 percent of maximum density as determined by TxDOT Test Method Tex-114-E and then re-excavated to the proper grade and dimensions. Excavation along curves and bends shall be so oriented that the trench and pipe are approximately centered on the centerline of the curve, using short lengths of pipe and/or bend fittings if necessary.

For all utilities to be constructed in fill above natural ground, the embankment shall first be constructed to an elevation not less than 1 foot above the top of the utility after which excavation for the utility shall be made.

(6) Trench Depth and Depth of Cover

All pipe and in-line appurtenances shall be laid to the grades indicated. The depth of cover shall be measured from the established finish grade, natural ground surface, subgrade for staged construction, street or other permanent surface to the top or uppermost projection of the pipe.

(a) Where not otherwise indicated, all potable/reclaimed water piping shall be laid to the following minimum depths:

1. Minimum depth of cover over the uppermost projection of pipe shall be at least 48 inches below proposed ground elevation.

2. Unless approved by the E/A, installation of potable/reclaimed water piping in proposed new streets will not be permitted until paving and drainage plans have been approved and the roadway traffic areas excavated to the specified or standard paving subgrade, with all parkways and sidewalk areas graded according to any applicable provisions of the drainage plans or sloped upward from the curb line to the right-of-way line at a minimum slope of ¼ inch per foot. Piping and appurtenances installed in such proposed streets shall be laid with at least 36 inches of cover below the actual subgrade.

(b) Where not otherwise indicated, all wastewater piping shall be laid to the following minimum depths:

1. Wastewater piping installed in natural ground in easements or other undeveloped areas, which are not within existing or planned streets, roads or other traffic areas shall be laid with at least 42 inches of cover.

2. Wastewater piping installed in proposed streets, existing streets, roads or other traffic areas shall be laid with at least 66 inches of cover.

(7) Classification of Excavation

Excavation will not be considered or paid for as a separate item of Work, so excavated material will not be classified as to type or measured as to quantity. Full payment for all excavation required for the construction shall be included in the various unit or lump sum Contract prices for the various items of Work installed, complete in place. No extra compensation, special treatment or other consideration will be allowed due to rock, pavement, caving, sheeting and bracing, falling or rising water, working under and in the proximity of trees or any other handicaps to excavation.

(8) Dewatering Excavation

Underground piped utilities shall not be constructed or the pipe laid in the presence of water. All water shall be removed from the excavation prior to the pipe placing operation to ensure a dry firm granular bed on which to place the underground piped utilities and shall be maintained in such unwatered condition until all concrete and mortar is set. Removal of water may be accomplished by bailing, pumping or by a well-point installation as conditions warrant.

In the event that the excavation cannot be dewatered to the point where the pipe bedding is free of mud, a seal shall be used in the bottom of the excavation. Such seal shall consist of Class B concrete, conforming to Item No. 403, "Concrete for Structures", with a minimum depth of 3 inches.

(9) Trench Conditions

Before attempting to lay pipe, all water, slush, debris, loose material, etc., encountered in the trench must be pumped or bailed out and the trench must be kept clean and dry while the pipe is laid and backfilled. Where needed, sump pits shall be dug adjoining the trench and pumped as necessary to keep the excavation dewatered.

Backfilling shall closely follow pipe laying so that no pipe is left exposed and unattended after initial assembly. All open ends, outlets or other openings in the pipe shall be protected from damage and shall be properly plugged and blocked watertight to prevent the entrance of trench water, dirt, etc. The interior of the pipeline shall at all times be kept clean, dry and unobstructed.

Where the soil encountered at established footing grade is a quicksand, saturated or unstable material, the following procedure shall be used unless other methods are indicated:

All unstable soils shall be removed to a depth of a minimum 2 feet below bottom of piped utility or as required to stabilize the trench foundation. Such excavation shall be carried out for the entire trench width.

All unstable soil so removed shall be replaced with a concrete seal, foundation rock or coarse aggregate materials placed across the entire trench width in uniform layers not to exceed 6 inches, loose measure and compacted by mechanical tamping or other means which shall provide a stable foundation for the utility.

Forms, sheathing and bracing, pumping, additional excavation and backfill required in unstable trench conditions shall be included in the unit price bid for pipe.

(10) Blasting

All blasting shall conform to the provisions of the "General Conditions" and/or "Public Safety and Convenience".

(11) Removing Old Structures

When out of service masonry structures or foundations are encountered in the excavation, such obstructions shall be removed for the full width of the trench and to a depth of 1 foot below the bottom of the trench. When abandoned inlets or manholes are encountered and no plan provision is made for adjustment or connection to the new sewers, such manholes and inlets within the construction limits shall be removed completely to a depth 1 foot below the bottom of the trench. In each instance, the bottom of the trench shall be restored to grade by backfilling and compacting by the methods provided above. Where the trench cuts through storm or wastewater sewers which are known to be abandoned, these sewers shall be cut flush with the sides of the trench and blocked with a concrete plug in a manner satisfactory to the E/A. When old structures are encountered, which are not visible from the existing surface and are still in service, they shall be protected and adjusted as required to the finished grade.

(12) Lines and Grades

Grades, lines and levels shall conform to the General Conditions and/or "Grades, Lines and Levels". Any damage to the above by the Contractor shall be re-established at the Contractor's expense. The Contractor shall furnish copies of all field notes and "cut sheets" to the City.

The location of the lines and grades indicated may be changed only by direction of the E/A. It is understood that the Contractor will be paid for Work actually performed on the basis of the unit Contract prices and that the Contractor shall make no claim for damages or loss of anticipated profits due to the change of location or grade.

All necessary electronic devices for controlling the Work shall be furnished by, and at the expense of, the Contactor. The Contractor shall furnish good working condition suitable devices for use in achieving lines and grades and the necessary plummets and graduated poles.

The Contractor shall submit to the E/A at least 6 copies of any layout Drawings from the pipe manufacturer for review and approval. The Contractor shall submit the layout Drawings at least 30 days in advance of any actual construction of the project. The E/A will forward all comments of the review to the Contractor for revision. Revisions shall be made and forwarded to the E/A for his acceptance. Prior to commencement of the Project, reviewed layout Drawings will be sent to the Contractor marked for construction.

Should the Contractor's procedures not produce a finished pipe placed to grade and alignment, the pipe shall be removed and relayed and the Contractors procedures modified to the satisfaction of the E/A. No additional compensation shall be paid for the removal and relaying of pipe required above.

(13) Surplus Excavated Materials

Excess material or material which cannot be made suitable for use in embankments will be declared surplus by the E/A and shall become the property of the Contractor to dispose of off site at a permitted fill site, without liability to the City or any individual. Such surplus material shall be removed from the Work site promptly following the completion of the portion of the utility involved.

(14) Pipe Bedding Envelope

Pipe shall be installed in a continuous bedding envelope of the type shown on the drawings or as described herein. The envelope shall extend the full trench width, to a depth of at least 6 inches (150 mm) below the pipe and to a depth of the springline of rigid concrete pipe or 1 inch above the top of pipe for flexible corrugated metal pipe of storm water pipe and at least 12 inches (300 mm) above water, reclaimed, and wastewater pipe.

(a) Standard Bedding Materials

USE/PIPE MATERIAL	Cement Stabilized Backfill	Natural or Mf'd Sand	Pea Gravel	PIPE BEDDING STONE			
				Uncrushed Gravel	Crushed Gravel	Crushed Stone	Stone Screenings
WATER and RECLAIMED WATER							
Welded Steel	X					X	
Service Tubing ¾" to 2½"		X	X				X
WATER and RECLAIMED WATER (Ductile Iron)							
Up to 15 Inch ID		X	X	X			X
Larger Than 15 Inch ID			X	X			
WATER and RECLAIMED WATER (PVC only) and WASTEWATER							
Up to 15 Inch ID		X	X	X	X	X	X
Larger Than 15 Inch ID			X	X	X	X	
STORMWATER							

Concrete		X	X	X	X	X	X
Metal		X	X	X			X

(b) General requirements and limitations governing bedding selection.

(1) Crushed gravel or crushed stone shall not be used with polyethylene tubing or polyethylene film wrap.

(2) Uncrushed gravel may be used with polyethylene film wrap in trenches up to 6 feet deep and in deeper trenches where ample trench width, a tremmie, or conditions will allow controlled placement of the gravel without damaging the polyethylene wrap.

(3) Bedding shall be placed in lifts not exceeding 8 inches loose thickness and compacted thoroughly to provide uniform support for the pipe barrel and to fill all voids around the pipe.

(4) Pea Gravel or bedding stone shall be used in blasted trenches.

(c) Requirements to prevent particle migration.

Bedding material shall be compatible with the materials in the trench bottom, walls and backfill so that particle migration from, into or through the bedding is minimized. The E/A may require one or more of the following measures to minimize particle migration: use of impervious cut-off collars; selected bedding materials, such as pea gravel or bedding stone mixed with sand; filter fabric envelopment of the bedding; cement stabilized backfill; or other approved materials or methods. Measures to minimize particle migration will be shown on the Drawings or designated by the E/A, and, unless provisions for payment are provided in the contract documents, the cost of these measures shall be agreed by change order. The following limitations shall apply.

(1) Sand, alone, shall not be used in watercourses, in trenches where groundwater is present, or in trenches with grades greater than 5 percent.

(2) Pea gravel or bedding stone, alone, shall not be used in the street right-of-way within 5 feet of subgrade elevation in trenches that are 3 feet or wider.

(3) Each gravel or bedding stone, alone, shall not be used where the trench bottom, sides, or backfill is composed of non-cementitious, silty or sandy soils having plasticity indices less than 20, as determined by the E/A.

(4) Sand, alone, shall not be used for installation of concrete storm water pipe unless the bedding envelope is wrapped with a geotextile membrane and the joints of the stormdrain conduit are wrapped to prevent the migration of fines into the bedding envelope and into the stormdrain conduit.

(5) For concrete storm water pipe, if pea gravel, uncrushed gravel, crushed gravel, crushed stone, or combination thereof is used for pipe bedding material, a geotextile filter fabric shall be placed around the perimeter of the joint.

(15) Laying Pipe

No pipe shall be installed in the trench until excavation has been completed, the bottom of the trench graded and the trench completed as indicated.

Laying of corrugated metal pipes on the prepared foundation shall be started at the outlet end with the separate sections firmly joined together, with outside laps of circumferential joints pointing upstream and with longitudinal laps on the sides. Any metal in joints, which are not protected by galvanizing, shall be coated with suitable asphaltum paint. Proper facilities shall be provided for hoisting and

lowering the sections of pipe into the trench without damaging the pipe or disturbing the prepared foundation and the sides of the trench. Any pipe which is not in alignment or which shows any undue settlement after laying or damage, shall be taken up and re-laid without extra compensation.

Multiple installations of corrugated pipe or arches shall be laid with the centerlines of individual barrels parallel. When not otherwise indicated, clear distances of 2 feet between outer surfaces of adjacent pipes shall be maintained.

No debris shall remain in the drainways or drainage structures.

All recommendations of the manufacturer shall be carefully observed during handling and installation of each material. Unless otherwise indicated, all materials shall be delivered to the project by the manufacturer or agent and unloaded as directed by the Contractor. Each piece shall be placed facing the proper direction near to where it will be installed.

The interior of all pipe, fittings and other accessories shall be kept free from dirt and foreign matter at all times and stored in a manner that will protect them from damage. Stockpiled materials shall be stacked so as to minimize entrance of foreign matter.

The interior of all pipeline components shall be clean, dry and unobstructed when installed.

Piping materials shall not be skidded or rolled against other pipe, etc. and under no circumstances shall pipe, fittings or other accessories be dropped or jolted.

During handling and placement, materials shall be carefully observed and inspected and any damaged, defective or unsound materials shall be marked, rejected and removed from the job site. Minor damage shall be marked and repaired in a manner satisfactory to the E/A. Joints, which have been placed, but not joined, backfilled, etc., shall be protected in a manner satisfactory to the E/A.

(16) Assembling of Pipe

Angular spacing of all joints shall meet the manufacturer's recommendations for the pipe and accessories being used. Side outlets shall be rotated so that the operating stems of valves shall be vertical when the valves are installed. Pressure pipe shall be laid with bell ends facing the direction of pipe installation. Pipe end bells shall be placed upgrade for all wastewater lines.

Orientation marks, when applicable, shall be in their proper position before pipe is seated.

Before joining any pipe, all foreign matter, lumps, blisters, excess coal tar coating, oil or grease shall be removed from the ends of each pipe and the pipe ends shall then be wire brushed and wiped clean and dry. Pipe ends shall be kept clean until joints are made.

Every precaution shall be taken to prevent foreign material from entering the pipe during installation. No debris, tools, clothing or other materials shall be placed in the pipe.

(17) Joints

(a) Mortar (Storm Drain joints only)

Pipe ends shall be clean, free of asphalt or other contaminants, which will inhibit the bond of the mortar to the pipe. The pipe ends shall be moistened immediately prior to placing the mortar in the joint.

(b) Cold Applied Preformed Plastic Gaskets (Storm Drain joints only)

The pipe ends shall be clean and the joint material applied to the dry pipe. In cold weather, the joint material shall be heated to facilitate the seal of the joint.

(c) O-Ring and Push-on Joints

Just before making a joint the ends of the pipe shall be clean, dry, free of any foreign matter, lump blisters, excessive coal tar coating and grease or oil and shall be wire brushed. The gasket and the inside surface of the bell shall be lubricated with a light film of soft vegetable soap compound (Flax Soap) to facilitate telescoping the joints. The rubber gasket if not factory installed shall be stretched uniformly as it is placed in the spigot groove to ensure a uniform volume of rubber around the circumference of the groove. The spigot shall be centered in the bell and the pipe pushed home uniformly to avoid twisting or otherwise displacing or damaging the rubber gasket. Bedding material shall be placed and tamped against pipe to secure the joint. Care should be taken to prevent dirt or foreign matter from entering the joint space.

Joint Gasket Inspection: After each pipe section is joined, inspect joint gasket to ensure that no displacement of gasket has occurred by use of a feeler gauge approximately ½ inch wide and 0.015-inch thick, or by other gasket inspection procedures approved or recommended by pipe manufacturer that ensures a watertight installation prior to backfilling. If gasket displacement has occurred, remove pipe section and remake joint as for new pipe. Remove old gasket and replace with new gasket before remaking joint.

(d) Bolted Joints

All flanged, mechanical or other bolted joints shall be joined with nuts and bolts and be coated as indicated above in Iron Pipe.

(e) Storm Drain Joints

Storm drain joints sealed with preformed flexible joint sealants shall be provided and installed in compliance with ASTM C990. Storm drain joints sealed with rubber gaskets shall comply with ASTM C443 Install joint sealants in accordance with the pipe and joint sealant manufacturers' recommendations. Place the joint sealer so that no dirt or other deleterious materials come in contact with the joint sealing material. Pull or push home the pipe with enough force to properly seal the joint with the final joint opening (gap) on the inside of the installed pipe being less than or equal to the pipe manufacturer's recommended dimensions. Protrusion of joint material greater than ⅛" into the interior of the pipe will not be accepted. Excess joint material will be removed to within ⅛''of pipe surface. Observe joint sealant manufacturer's recommendations for installation temperature of the joint sealant. Apply joint sealant to pipe joint immediately before placing pipe in trench, and then connect pipe to previously laid pipe.

If inspection (video or other means) reveal C-990 joints that show signs of backfill infiltration, or where joints or conduits exhibit excessive joint gap or are otherwise defective, then the contractor has the following options:

1. Conduits less than 36-inches in any dimension: pour a concrete collar around the joint or wrap joint with a wrap meeting requirements of ASTM C-877 or approved equal.
2. Conduits greater than or equal to 36-inches in all dimensions: repair joints using joint repair techniques recommended by the manufacturer to achieve a completed system that meets all Contract requirements.

(18) Pressure Pipe Laying

(a) Grout for Concrete Steel Cylinder Pipe (CSC) and Welded Steel Pipe

Aggregate, cement, etc., shall be as indicated in "Mortar" herein. Potable water shall be used in the preparation of any cement, mortar, or grout lining.

Grout shall be poured into the recess between the bell and spigot on the outside of the pipe and contained by a joint wrapper ("diaper") recommended by the pipe manufacturer. The wrapper shall have a minimum width of 7 inches for 30 inch and smaller and 9 inches for larger pipe,

secured to the pipe by "Band Iron" steel straps. The grout shall be poured in one continuous operation in such manner that after shrinkage and curing the joint recess shall be completely filled.

Mortar for the inside recess shall be of the consistency of plaster. The inside recess between the bell and spigot shall be filled with mortar after the pipe joint on either side of the recess has been backfilled and well tamped with no less than one pipe joint installed ahead of the pipe forming the recess. The mortar shall completely fill the recess and shall be trowelled and packed into place and finished off smooth with the inside of the pipe.

The Contractor shall inspect the joint after the mortar has set and make repairs of any pockets, cracks or other defects caused by shrinkage to the satisfaction of the E/A. The inside surface shall be cleared of any mortar droppings, cement, water, slurry, etc., before they have become set and shall be cleared of any other foreign matter. The inside surface of the pipe shall be left clean and smooth.

Pipe shall be handled at all times with wide non abrasive slings, belts or other equipment designed to prevent damage to the coating and all such equipment shall be kept in such repair that its continued use is not injurious to the coating. The use of tongs, bare pinch-bars, chain slings, rope slings without canvas covers, canvas or composition belt slings with protruding rivets, pipe hooks without proper padding or any other handling equipment, which the E/A deems to be injurious to the coating, shall not be permitted. The spacing of pipe supports required to handle the pipe shall be adequate to prevent cracking or damage to the cement mortar lining.

(19) Placing Pipe in Tunnels

Piping installed as a carrier pipe in a tunnel, encasement pipe, etc., shall have uniform alignment, grade, bearing and conform to the reviewed Shop Drawings. All necessary casing spacers, bedding material, grout cradle or paving, bracing, blocking, etc., as stipulated by the Contract or as may be required to provide and maintain the required pipe alignment and grade, shall be provided by the Contractor at no cost except as provided by the Bid Items. This shall include casing spacers acceptable to the Owner attached to the carrier pipe in accordance with the manufacturer's recommendations. The insertion pushing forces shall not exceed the pipe manufacturer's recommendation. Such carrier piping shall have flexible bolted or gasketed push-on joints or Concrete Steel Cylinder pipe installed as follows:

(a) 21 Inch Pipe and Smaller

Prior to placing the pipe in the tunnel, the inside joint recess at the bell shall be buttered with cement mortar.

After the joint is engaged, the excess mortar shall be smoothed by pulling a tight fitting swab through the joint. Cement mortar protection shall then be placed in the normal manner to the exterior of the joint and allowed to harden sufficiently to avoid dislodgment during installation. If time is of the essence, a quick setting compound may be used.

(b) 24 Inch Pipe and Larger

Each length of pipe shall be pushed into the tunnel as single units. A flexible mastic sealer shall be applied to the exterior of the joint prior to joint engagement. The surfaces receiving the mastic sealer shall be cleaned and primed in accordance with the manufacturer's recommendation. Sufficient quantities of the mastic sealer shall be applied to assure complete protection of all steel in the joint area. The interior of the joint shall be filled with cement mortar in the normal manner after the pipe is in its final position within the tunnel.

(20) Temporary Pipe Plugs, Caps, Bulkheads and Trench Caps

Temporary plugs, caps or plywood bulkheads shall be installed to close all openings of the pipe and fittings when pipeline construction is not in progress.

All temporary end plugs or caps shall be secured to the pipe as provided under Item No. 507, "Bulkheads".

Trench caps shall be reinforced Class D concrete as indicated.

(21) Corrosion Control

(a) Protective Covering

Unless otherwise indicated, all flanges, nuts, bolts, threaded outlets and all other iron or steel components buried and in contact with earth or backfill shall be wrapped with 8-mil (minimum) polyethylene film meeting ANSI/AWWA C-105 to provide a continuous wrap.

(22) Pipe Anchorage, Support and Protection

Pressure pipeline tees, plugs, caps and bends exceeding 22½ degrees; other bends as directed shall be securely anchored by suitable methods as defined in the construction documents. Unless otherwise indicated, on 24 inch or larger piping, all bends greater than 11¼ degrees shall be anchored as described herein.

Storm sewers on steep grades shall be lugged as indicated.

(a) Concrete Thrust Blocking

Concrete for use as reaction or thrust blocking shall be Class B conforming to Item No. 403, "Concrete for Structures".

Concrete blocking shall be placed between solid ground and the fitting to be anchored. The area of bearing on the pipe and on the ground shall be as indicated or directed by the E/A. The blocking shall, unless otherwise indicated, be so placed that the pipe, fittings and joints will be accessible for repair.

The trench shall be excavated at least 6 inches outside the outermost projections of the pipe or appurtenance and the trench walls shaped or undercut according to the detail Drawings or as required to provide adequate space and bearing area for the concrete.

The pipe and fittings shall be adequately weighted and laterally braced to prevent floating, shifting or straining of the pipeline while the concrete is being placed and taking initial set. The Contractor shall be solely responsible for the sufficiency of such restraints.

(b) Metal Thrust Restraint

Fabricated thrust restraint systems such as those described below may be approved for use instead of concrete blocking. To obtain approval, the project Drawings must include sufficient drawings, notes, schedules, etc., to assure that the proposed restraints as installed will be adequate to prevent undesirable movement of the piping components. Such restraint systems may only be used where and as specifically detailed and scheduled on approved Project Drawings.

1. Thrust Harness

A metal thrust harness of tie rods, pipe clamps or lugs, turnbuckles, etc., may be approved. All carbon steel components of such systems, including nuts and washers, shall be hot-dip galvanized; all other members shall be cast ductile iron. After installation, the entire assembly shall be wrapped with 8-mil polyethylene film, overlapped and taped in place with duct tape to form a continuous protective wrap.

2. Restrained Joints

Piping or fitting systems utilizing integral mechanically restrained joints may be approved. All components of such systems shall be standard manufactured products fabricated from cast ductile iron, hot-dip galvanized steel, brass or other corrosion resistant materials and the entire assembly shall be protected with a continuous film wrap as described for 1. above. Manufacturers of pipe with restrained joints integral to the pipe shall be listed on SPL WW-27F. All pipe and fitting systems with restrained joints shall be identified by applying an adhesive-backed warning tape to the top of the pipe and for the full length of the pipe, regardless of the type of pipe. For plastic pipes the warning tape shall be applied directly to the top of the pipe. For metal pipes and fittings the warning tape shall be applied to the top of the polyethylene film wrap. The warning tape shall conform to 510.2(8)(b)5.

Location, configuration and description of such products shall be specifically detailed on the Drawings. (Add-on attachments such as retainer glands, all-thread rods, etc., are not acceptable.)

(c) Concrete Encasement, Cradles, Caps and Seals

When trench foundation is excessively wet or unstable or installation of water or wastewater pipe will result in less than 30 inches of cover, Contractor shall notify E/A. E/A may require Contractor to install a concrete seal, cradle, cap, encasement or other appropriate action.

All concrete cap, etc., shall be continuous and begin and end within 6 inches of pipe joints. Concrete cap, cradle and encasement shall conform to COA Standard 510S-1, "Concrete Trench Cap". The pipe shall be well secured to prevent shifting or flotation while the concrete is being placed.

(d) Anchorage Bulkheads

Concrete bulkheads keyed into the undisturbed earth shall be placed as indicated to support and anchor the pipe and/or backfill against end thrust, slippage on slopes, etc. Concrete material and placement shall be Class A, Item No. 403, "Concrete for Structures".

(e) Trench Caps, Concrete Rip-Rap and Shaped Retards

Where called for by the Contract or as directed by the E/A, concrete trench caps, concrete rip-rap and/or shaped retards shall be placed as detailed by the Drawings as protection against erosion. Concrete material and placement shall be Class B, Item No. 403, "Concrete for Structures".

(23) Wastewater Connections

(a) Connections to Mains 12 Inches and Smaller

All branch connections of new main lines shall be made by use of manholes.

Service stubs shall be installed as indicated. Minimum grade shall be 1 percent downward to main and minimum cover shall be 4½ feet at the curb. Standard plugs shall be installed in the dead end before backfilling.

Where a service connection to a main 12 inches or smaller is indicated, a wye, tee or double wye shall be installed.

Where a service connection to a main 15 inches or larger is indicated, a field tap may be made with the pipes installed crown to crown. The tap should be made conforming to the pipe manufacturer's recommendations with the E/A's approval.

Where not otherwise indicated, (wastewater) service connections shall be installed so that the outlet is at an angle of not more than 45 degrees above horizontal at the main line.

(b) Connections to the Existing System

Unless otherwise specified by the E/A, all connections made to existing mains shall be made at manholes with the crown of the inlet pipe installed at the same elevation as the crown of the existing pipe. Service stubs installed on the existing system shall be installed by use of tapping saddles unless otherwise approved by the E/A. Extreme care shall be exercised to prevent material from depositing in the existing pipe as the taps are being made.

When connections to existing mains are made, a temporary plug approved by the E/A must be installed downstream in the manhole to prevent water and debris from entering the existing system before Final Completion. These plugs shall be removed after the castings are adjusted to finish grade or prior to Final Completion.

(c) Connecting Existing Services to New Mains

Where wastewater services currently exist and are being replaced from the main to the property line, those services shall be physically located at the property line prior to installing any new mains into which the services will be connected. Where wastewater services currently exist but are not being replaced to the property line, those services shall be physically located at the point of connection between the new and existing pipes prior to installing any new mains into which the services will be connected.

(24) Potable or Reclaimed Water System Connections

All necessary connections of new piping or accessories to the existing potable or reclaimed water system shall be made by, and at the expense of, the Contractor. To minimize any inconvenience from outages, the Contractor shall schedule all such connections in advance and such schedule must be approved by the E/A before beginning any Work. When cutting existing water mains, the contractor shall ensure the existing pipe shall not be cut within 3 feet of an existing pipe joint. If a pipe joint exists within 3 feet, then adjacent pipe joint shall be removed and new pipe and approved sleeve installed in its place.

(a) Shutoffs

The City will make all shutoffs on existing potable or reclaimed water mains. The Contractor shall be required to notify the Owner's Representative in writing a least twenty five (25) Calendar Days prior to the anticipated date for a wet-connection. The Owner's Representative is defined as the City Inspector. The Owner's Representative will notify any affected utility customers at least 48 hours prior to the shutoff. AW will make the shutoff after ensuring that all appropriate measures have been taken to protect the potable or reclaimed water system, customers and employees.

The City will operate all valves to fill existing mains. Where a newly constructed main has not been placed in service and has only one connection to the potable or reclaimed system, the Contractor may operate one valve to fill the main after approval has been obtained from AW. The operation of the valve is to be conducted under the immediate supervision of the Owner's Representative.

Water for the Work shall be metered and furnished by the Contractor in accordance with Section 01500 of the Standard Contract Documents.

(b) Wet Connections to Existing Potable or Reclaimed Water System

A wet connection is required when connecting a new main to an existing main by cutting in a new MJ ductile iron tee, fitting or gate valve.

The Contractor shall make all wet connections called for by the Contract or required to complete the Work. Two connections to an existing line performed during the same shutout, at the same time and at a distance less than 50 linear feet apart, will be considered one wet connection. Two connections to an existing line performed during the same shutout, at the same time and at a distance equal to, or greater than 50 linear feet will be considered two wet connections. A wet connection shall include draining and cutting into existing piping and connecting a new pipeline or other extension into the existing pressure piping, forming an addition to the potable or reclaimed water transmission and distribution network.

The Contract price for wet connections shall be full payment for all necessary shutoffs, excavation, removing plugs and fittings, pumping water to drain the lines, cutting in new fittings, blocking and anchoring piping, bedding and backfilling, placing the lines and service and all site cleanup.

No water containing detectable amounts of chlorine may be drained, released or discharged until specific planning and appropriate preparations to handle, dilute and dispose of such chlorinated water are approved in advance by the City and the disposal operations will be witnessed by an authorized representative from the City.

(c) Pressure Taps to Existing Potable or Reclaimed Water System

The Contractor shall make all pressure taps called for by the Contract Documents or required to complete the Work. A pressure tap shall consist of connecting new piping to the existing potable or reclaimed water system by drilling into the existing pipe while it is carrying water under normal pressure without taking the existing piping out of service.

Unless otherwise provided by the Contract, the Contractor shall, at the Contractor's expense, perform all necessary excavation, furnish and install the tapping sleeve, valve and accessories, provide the tapping machine, drill the tap and shall block, anchor and backfill the piping, valve and all accessories, place the new piping in service and perform all site cleanup. When the City makes the tap, City forces are not obligated or expected to perform any Work except to provide tapping machine and drill the actual hole. If City crews are to make the tap, fiscal arrangements must be made in advance at the Taps Office, Waller Creek Center, 625 East 10th Street.

If a private Contractor makes the tap, an AW Inspector must be present. "Size on size" taps will not be permitted, unless made by use of an approved full bodied mechanical joint tapping sleeve. Concrete blocking shall be placed behind and under all tap sleeves 24 hours prior to making the pressure tap.

Pressure taps shall be performed by Austin Water approved Contractors and requires the use of approved SPL listed tapping sleeves.

(d) Service Connections

Service connection taps into PVC or AC pipe or into CI or DI pipe 12 inches or smaller shall be made using either a service clamp or saddle or a tapping sleeve as recommended by the pipe manufacturer and as approved by the E/A. Direct tapping of these pipes will not be permitted.

All potable or reclaimed water service connections shall be installed so that the outlet is at an angle of not more than 45 degrees above horizontal at the main line.

Precautions should be taken to ensure that the tapping saddle or sleeve is placed on the pipe straight to prevent any binding or deformation of the PVC pipe. The mounting chain or U-bolt strap must be tight.

Tapping shall be performed with a sharp shell type cutter so designed that it will smoothly penetrate heavy walled PVC DR14 and 200 psi AC and will retain and extract the coupon from the pipe.

(25) Backfilling

(a) General

Special emphasis is placed upon the need to obtain uniform density throughout the backfill material. The maximum lift of backfill shall be determined by the compaction equipment selected and in no case shall it exceed 18 inches, loose measurement.

No heavy equipment, which might damage pipe, will be allowed over the pipe until sufficient cover has been placed and compacted. All internal pipe bracing installed or recommended by the manufacturer shall be kept in place until the pipe bedding and trench backfill have been completed over the braced pipe section. Testing of the completed backfill in streets and under and around structures shall meet the specified density requirements. Initial testing shall not be at Contractor's expense and shall conform to the "General Conditions."

(b) General Corrugated Metal Pipe

After the corrugated metal pipe structure has been completely assembled on the proper line and grade and headwalls constructed where indicated; selected material free from rocks over 8 inches in size from excavation or borrow, as approved by the E/A, shall be placed along both sides of the completed structures equally, in uniform layers not exceeding 6 inches in depth (loose measurement), sprinkled if required and thoroughly compacted between adjacent structures and between the structures and the sides of the trench.

Backfill material shall be compacted to the same density requirements as indicated for the adjoining sections of embankment in accordance with the governing specifications thereof. Above the ¾ point of the structure, the fill shall be placed uniformly on each side of the pipe in layers not to exceed 12 inches, loose measure.

Prior to adding each new layer of loose backfill material, until a minimum of 12 inches of cover is obtained over the crown of the pipe, an inspection will be made of the inside periphery of the corrugated metal structure to determine if any floating, local or unequal deformation has occurred as a result of improper construction methods.

(c) Backfill Materials

The Engineer or designated representative may approve any of the following well graded materials as backfill:

1. Select trench material.
2. Sand.
3. Crushed rock cuttings.
4. Rock cuttings.
5. Foundation Rock.
6. Blasted material with fines and rock.
7. Cement stabilized material.
8. Borrow.

Within the 100-year flood plain, sand will not be permitted for backfilling. The Engineer or designated representative will approve the topsoil for areas to be seeded or sodded.

(d) Backfill in Street Right-of-Way

Placement of backfill under existing or future pavement structures and within 2 feet of any structures shall be compacted to the specified density using any method, type and size of equipment, which will produce the specified compaction without damaging the pipe or bedding. Placement of backfill greater than 2 feet beyond structures in right-of-way shall conform to (g) below. Inductive Tracer Detection Tape shall be placed directly above the centerline of all non-metallic water, reclaimed water, and wastewater pipe (PVC and HDPE) per 510.2(8)(j).

The thickness of lifts, prior to compaction, shall depend upon the type of sprinkling and compacting equipment used and the test results thereby obtained. Prior to and in conjunction with the compaction operation, each lift shall be brought to the moisture content necessary to obtain the specified density and shall be placed in a uniform thickness to ensure uniform compaction over the entire lift. Testing for density shall be in accordance with Test Method Tex-114-E and Test Method Tex-115-E.

It is highly desirable that the backfill lifts be placed in a flat (or level) configuration; however when approved by the Engineer or designated representative, the backfill lifts may be placed at gradients (percent of vertical rise or fall to horizontal run) that do not exceed 30%.

The proposed gradient for each lift or series of lifts shall be established based on the capabilities of the equipment proposed to attain the required compaction.

Each lift of backfill must provide the density as specified herein. Swelling soils (soils with a minimum Liquid Limit of 50, more than 50% passing a #200 sieve and a plasticity index greater than 22) shall be sprinkled as required to provide not less than optimum moisture nor more than 2 percent over optimum moisture content and compacted to the extent necessary to provide not less than 95 percent nor more than 102 percent of the density as determined in accordance with Test Method Tex-114-E. Non-swelling soils shall be sprinkled as specified and compacted to the extent necessary to provide not less than 95 percent of the density as determined in accordance with Test Method Tex-114-E.

After each lift of backfill is complete, tests may be made by the Engineer or designated representative. If the material fails to meet the density indicated, the course shall be reworked as necessary to obtain the indicated compaction and the compaction method shall be altered on subsequent Work to obtain indicated density.

At any time, the Engineer or designated representative may order proof rolling to test the uniformity of compaction of the backfill lifts. All irregularities, depressions, weak or soft spots that develop shall be corrected immediately by the Contractor.

If the backfill, due to any reason, loses the specified stability, density or finish before the pavement structure is placed, it shall be recompacted and refinished at the sole expense of the Contractor. Excessive loss of moisture in the subgrade shall be prevented by sprinkling, sealing or covering with a subsequent backfill layer or granular material. Excessive loss of moisture shall be construed to exist when the subgrade soil moisture content is more than 4 percent below the optimum of compaction ratio density. Backfill shall be placed from the top of the bedding material to the existing grade, base course, subgrade or as specified. The remainder of the street backfill shall either be Flexible Base, Concrete or Hot Mix Asphalt Concrete as specified on the drawings or replacement "in kind" to the surface of the materials originally removed for placement of the pipe.

(e) Backfill in County Street or State Highway Right-of-Way

All Work within the right-of-way shall meet the requirements of (d) above, as a minimum and shall meet the requirements of the permit issued by the County when their requirements are more stringent. Prior to the start of construction, the Contractor shall be responsible for contacting the appropriate TxDOT office or County Commissioner's Precinct Office and following the operating procedures in effect for utility cut permits and pavement repair under their jurisdiction. Approval for all completed Work in the State or County right-of-way shall be obtained from the appropriate Official prior to final payment by the Owner.

(f) Backfill in Railroad Right-of-Way

All Work within the railroad right-of-way shall meet the requirements of (d) above, as a minimum and shall meet the requirements of the permit issued by the Railroad Owner when their requirements are more stringent. Approval for all completed Work in the railroad right-of-way shall be obtained from the Railroad prior to Final Completion.

(g) Backfill in Easements

Where not otherwise indicated, Contractor may select whatever methods and procedures may be necessary to restore entire Work area to a safe, useful and geologically stable condition with a minimum density of 85 percent or a density superior to that prior to construction.

In and near flood plain of all streams and watercourses, under or adjacent to utilities, structures, etc. all backfill shall be compacted to a density of not less than 95 percent conforming to TxDOT Test Method Tex-114-E, unless otherwise directed by E/A.

All soil areas disturbed by construction shall be covered with top soil and seeded conforming to Item No. 604, "Seeding for Erosion Control". All turf, drainways and drainage structures shall be constructed or replaced to their original condition or better. No debris shall remain in the drainways or drainage structures.

Inductive Tracer Detection Tape shall be placed directly above the centerline of all non-metallic water, reclaimed water, and wastewater pipe (PVC and HDPE) per 510.2(8)(j).

(h) Temporary Trench Repair/Surfacing

If details of temporary trench repair/surfacing are not provided in the contract documents, the Contractor shall submit for approval of the E/A (1) a plan for temporary trench repair for areas that will be open to traffic but will be excavated later for full depth repair, and (2) a proposed method for covering trenches to maintain access to properties. The temporary surfacing shall afford a smooth riding surface and shall be maintained by the Contractor the entire time the temporary surface is in place.

(i) Permanent Trench Repair

The Contractor shall install permanent trench repairs conforming to details in the drawings.

(26) Quality Testing for Installed Pipe

(a) Wastewater Pipe Acceptance Testing

After wastewater pipe has been backfilled, the Contractor shall perform infiltration tests, exfiltration tests, or low pressure air tests as determined by the E/A. In addition, the Contractor shall perform deflection tests and shall assist OWNER'S personnel, as directed, in performing pipeline settlement tests. The Contractor shall be responsible for making appropriate repairs to those elements that do not pass any of these tests.

(b) Exfiltration Test

Water for the Work shall be metered and furnished by the Contractor in accordance with Section 01500 of the Standard Contract Documents.

Exfiltration testing shall be performed by the Contractor when determined by the E/A to be the appropriate test method. Exfiltration testing shall conform to requirements of the Texas Commission on Environmental Quality given in the Texas Administrative Code Title 30 Part 1 Chapter 317 Rule §317.2.

(c) Infiltration Test

Infiltration testing shall be performed by the Contractor when determined by the E/A to be the appropriate test method. Infiltration testing shall conform to requirements of the Texas Commission on Environmental Quality given in the Texas Administrative Code Title 30 Part 1 Chapter 317 Rule §317.2.

(d) Pipeline Settlement Test

During the infiltration test or after the exfiltration test, the pipe will be TV inspected for possible settlement. When air testing has been used, water shall be flowed into the pipe to permit meaningful observations. Any pipe settlement which causes excessive ponding of water in the pipe shall be cause for rejection. Excessive ponding shall be defined as a golf ball (1⅝" dia.) submerged at any point along the line.

(e) Low Pressure Air Test of Gravity Flow Wastewater Lines

(1) General

Wastewater lines up to 33-inch diameter shall be air tested between manholes. Wastewater lines 36-inch in diameter and larger shall be either air tested between manholes or at pipe joints. Backfilling to grade shall be completed before the test and all laterals and stubs shall be capped or plugged by the Contractor so as not to allow air losses, which could cause an erroneous, test result. Manholes shall be plugged so they are isolated from the pipe and cannot be included in the test.

All plugs used to close the sewer for the air test shall be capable of resisting the internal pressures and must be securely braced. Place all air testing equipment above ground and allow no one to enter a manhole or trench where a plugged sewer is under pressure. Release all pressure before the plugs are removed. The testing equipment used must include a pressure relief device designed to relieve pressure in the sewer under test at 10 psi or less and must allow continuous monitoring of the test pressures in order to avoid excessive pressure. Use care to avoid the flooding of the air inlet by infiltrated ground water. (Inject the air at the upper plug if possible.) Use only qualified personnel to conduct the test.

(2) Ground Water

Since the presence of ground water will affect the test results, test holes shall be dug to the pipe zone at intervals of not more than 100 feet and the average height of ground water above the pipe (if any) shall be determined before starting the test.

(3) Test Procedure

The E/A may, at any time, require a calibration check of the instrumentation used. Use a pressure gauge having minimum divisions of 0.10 psi and an accuracy of 0.0625 psi. (One ounce per square inch.) All air used shall pass through a single control panel. Clean the sewer to be tested and remove all debris where indicated. Wet the sewer prior to testing.

The average back pressure of any groundwater shall be determined (0.433 psi) for each foot of average water depth (if any) above the sewer.

Add air slowly to the section of sewer being tested until the internal air pressure is raised to 3.5 psig greater than the average back pressure of any ground water that may submerge the pipe. After the internal test pressure is reached, allow at least 2 minutes for the air temperature to stabilize, adding only the amount of air required to maintain pressure. After the temperature stabilization period, disconnect the air supply. Determine and record the time in seconds that is required for the internal air pressure to drop from 3.5 psig to 2.5 psig greater than the average backpressure of any ground water that may submerge the pipe.

For pipe less than 36-inch diameter, compare the time recorded with the time computed using the following equation:

$T = (0.0850 \times D \times K) \div Q$, where:

T = time for pressure to drop 1.0 pounds per square inch gauge in seconds;

K = $0.000419 \times D \times L$, but not less than 1.0;

D = nominal inside diameter, in inches, as marked on the pipe;

L = length of line of same pipe size in feet; and

Q = rate of loss, 0.0015 cubic feet per minute per square foot of internal surface area (ft3/min/ft sq) shall be used.

Because a K value of less than 1.0 shall not be used, there are minimum test times for each pipe diameter as shown in the following table:

Table For Low Pressure Air Testing of Pipe

Pipe Diameter (inches)	Minimum Time (seconds)	Minimum Time Applies to All Pipes Shorter than (feet)	Time for Longer Pipes (seconds)
8	454	298	1.520 × L
10 (See Note 1)	567	239	2.374 × L
12	680	199	3.419 × L
15	850	159	5.342 × L
18	1020	133	7.693 × L
21	1190	114	10.471 × L
24	1360	100	13.676 × L
30	1700	80	21.369 × L

Note 1. 10-inch diameter pipe to be used only by AW maintenance personnel.

Note 2. The test parameter for pipes larger than 30-inch diameter shall be shown on the construction plans.

Any drop in pressure, from 3.5 psig to 2.5 psig (adjusted for groundwater level), in a time less than that required by the above equation or table shall be cause for rejection. When the line tested includes more than one size pipe, the minimum time shall be that given for the largest size pipe included.

When joint testing, the minimum time allowable for the pressure to drop from 3.5 pounds per square inch to 2.5 pounds per square inch gauge during a joint test, regardless of pipe size, shall be twenty (20) seconds. A drop in pressure from 3.5 psig to 2.5 psig (adjusted for groundwater level) in less than twenty seconds shall be cause for rejection.

Manholes must be tested separately and independently. All manholes must be hydrostatically tested with a maximum loss allowance of 0.025 gallon per foot diameter per foot of head per hour.

When lines are air tested, manholes are to be tested separately by exfiltration or vacuum method (see Standard Specification Item No. 506S, "Manholes").

(f) Deflection Test

Deflection tests shall be performed by the Contractor on all flexible and semi-rigid wastewater pipes. The tests shall be conducted after the final backfill has been in place at least 30 days. Testing for in-place deflection shall be with a pipe mandrel at 95% of the inside diameter of the pipe. A second test of flexible and semi-rigid wastewater pipes 18 inch size and larger, also with a pipe mandrel sized at 95% of the inside diameter of the pipe, shall be conducted by the Contractor 30 days before the warranty expires on the Contractor's Work.

Contractor shall submit proposed pipe mandrels to the E/A or the E/A's designated representative for concurrence prior to testing the line.

Test(s) must be performed without mechanical pulling devices and must be witnessed by the E/A or the E/A's designated representative.

Any deficiencies noted shall be corrected by the Contractor and the test(s) shall be redone.

(g) Inspection of Installed Storm Drain Conduits

(1) General

All storm drain conduits (pipe and box culvert) shall be inspected for conformance to the requirements of this specification. Smart Housing, low/moderate income housing, and projects that are 100-percent privately funded are exempt from the cost of the initial video inspection. All deficiencies revealed by inspection shall be corrected. Video re-inspection meeting the requirements of this specification shall be provided at the Contractor's expense to show that deficiencies have been corrected satisfactorily. Further, the contractor shall provide video in complete segments (manhole to manhole) versus specific deficiency locations.

Projects that are not exempt from the cost of the initial video inspection are also subject to the following constraints:

- All inspectors utilized by the Contractor for video inspection shall be NASSCO-PACP certified for a minimum of 3 years.
- The Contractor will be required to inspect, assess, and record the condition of the storm drain pipe using National Association of Sewer Service Companies (NASSCOs) Pipeline Assessment Certification Program (PACP) coding standards.

(2) Video Inspection of Installed Storm Drain Conduits

Contractor shall provide all labor, equipment, material and supplies and perform all operations required to conduct internal closed-circuit television and video recording of all storm drain conduits. Video recording of each storm drain conduit section shall be conducted after the trench has been backfilled and prior to placement of permanent

pavement repairs or permanent pavement reconstruction. The video recording shall be provided to the Owner for review. Contractor shall not place permanent pavement repairs or permanent pavement reconstruction over the storm drain conduit until Owner has reviewed the video and agrees that there are no defects in the storm drain conduit installation shown in the video submitted by the Contractor or shown in any video acquired by the Owner through other means. Placement of permanent pavement repair or permanent pavement reconstruction over the installed storm drain conduit before the Owner acknowledges no defects shall be at the Contractor's risk. Any defects revealed by the video inspection shall be corrected at the Contractor's expense and a new video submitted to the Owner for review prior to acceptance of the conduit.

All video work shall be conducted under the direct full-time supervision of a NASSCO-PACP certified operator.

The conduit inspection camera shall have the capability of panning plus/minus 275 degrees and rotating 360 degrees. The television camera shall be specifically designed and constructed for such use. The camera shall be operative in 100% humidity conditions. Camera shall have an accurate footage counter that displays on the monitor the exact distance of the camera (to the nearest tenth of a foot) from the centerline of the starting manhole or access point. Camera shall have height adjustment so that the camera lens is always centered within plus/minus 10% of the center axis of the conduit being videoed. Camera shall provide a minimum of 460 lines of horizontal resolution and 400 lines of vertical resolution. Camera shall be equipped with a remote iris to control the illumination range for an acceptable picture. Geometrical distortion of the image shall not exceed one percent (1%). The video image produced by each camera shall be calibrated using a Marconi Resolution Chart No. 1 or equivalent.

Lighting for the camera shall be sufficient to allow a clear picture of the entire periphery of the conduit without loss of contrast, flare out of picture or shadowing. A reflector in front of the camera may be required to enhance lighting in dark or large sized conduit. The video camera shall be capable of showing on the digital display the Owner's name, Project name, Contractor name, date, line size and material, conduit identification, and ongoing footage counter. The camera, television monitor, and other components of the video system shall be capable of producing a picture quality satisfactory to the satisfaction of the Owner. The recording of the internal condition of the storm drain conduit shall be clear, accurate, focused and in color. If the recording fails to meet these requirements, the, equipment shall be removed and replaced with equipment that is suitable. No payment will be made for an unsatisfactory recording.

If during video inspection, water is encountered inside the conduit, the conduit shall be dewatered by the Contractor. The storm drain section must be dry. Video recording conducted while the camera is floating is not acceptable unless approved by the Owner.

If during video inspection, debris is encountered that prohibits a proper inspection of the conduit, the Contractor shall remove the debris before proceeding.

All video shall be documented using a data logger and reporting system that are PACP compliant and which use codes as established by the National Association of Sewer Service Companies (NASSCO)s - Pipeline Assessment and Certification Program (PACP).

Computer printed location records shall be kept by the Contractor and shall clearly show the location and orientation of all points of significance such as joints, conduit connections, connections at manholes and inlets, and defects. Copy of all records shall be supplied to

the Owner. Noted defects shall be documented as color digital files and color hard copy print-outs. Photo logs shall accompany each photo submitted.

The video recording shall supply a visual and audio record of the storm drain conduits that may be replayed. Video recordings shall include an audio track recorded by the video technician during the actual video work describing the parameters of the storm drain conduit being videoed (i.e. location, depth, diameter, pipe material), as well as describing connections, defects and unusual conditions observed during the video work. Video recording playback shall be at the same speed that it was recorded. Slow motion or stop-motion playback features may be supplied at the option of the Contractor. Once videoed, the recordings shall be labeled and become the property of the Owner. The Contractor shall have all video and necessary playback equipment readily accessible for review by the Owner while the project is under construction.

Post-installation video shall not be completed until all work is completed on a section of storm drain conduit. Post-installation video work shall be completed by the Contractor in the presence of the Owner. The post-installation video work shall be completed to confirm that the storm drain conduits are free of defects. Provide a color video showing the completed work. Prepare and submit video logs providing location of storm drain conduit along with location of any defects. Manhole and inlet work shall be complete prior to post-installation video work.

For post-installation video, exercise the full capabilities of the camera equipment to document the completion and conformance of the storm drain installation work with the Contract Documents. Provide a full 360-degree view of conduit, all joints, and all connections. The camera shall be moved through the storm drain conduit in either direction at a moderate rate, stopping and slowly panning when necessary to permit proper documentation of the conduit condition at each pipe connection, joint, and defect. In no case shall the camera be pulled at a speed greater than 30 feet per minute. Manual winches, power winches, TV cable, and powered rewinds or other devices that do not obstruct the camera view or interfere with proper documentation of the storm drain conditions shall be used to move the camera through the storm drain conduit. When manually operated winches are used to pull the camera through the conduit, telephones or other suitable means of communication shall be set up between the two access points of the conduit being videoed to insure good communication between members of the video crew.

Distance measurements shall be provided to an accuracy of one tenth of a foot.

Video shall be continuous for each storm drain conduit segment. Do not show a single segment on more than one recording, unless specifically allowed by the Owner.

Contractor shall submit to Owner the following:

A. National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) certification of operators who will be performing video work.

B. Recordings of storm drain conduits (concrete storm water pipe or box culvert) shall be provided to Owner in the form of a Compact Disc (CD), Digital Video Disc (DVD), or uploaded to an online file storage location.

    a. The color recordings shall include a digital color key map in a format acceptable to the Owner with each segment of storm drain conduit labeled with the appropriate inspection ID on the map.

b. The file folder for each segment of the storm drain conduit shall have a unique name based on the Owner's approved inspection naming convention and shall contain the following:

i. Video files.

ii. Video inspection logs with information coded in accordance with the PACP.

iii. Photo logs.

iv. A report summarizing the results of the video inspection.

v. A proposed method of repair for any defects discovered.

(3) Time commitments from City for projects that are exempt from the cost of the initial video inspection

Projects that are exempt from the cost of the initial video inspection are afforded the following time commitments from the City.

A. Initial inspection - contractor must inform the COA construction inspector assigned to the project in writing that all stormdrain infrastructure for the project has been completed according to the permit and is ready for inspection. The inspector will then notify the Watershed Protection Department (WPD) in writing that the all of the stormdrain infrastructure for the project has been completed and is ready for inspection. The WPD is allowed 15-days to complete inspection from written notification by the inspector. The outcome of this item does not impact the one-year warranty requirements.

B. Video re-inspection by the contractor for deficient installed stormdrain infrastructure. The contractor must submit the video inspection data as defined in this specification to the COA construction inspector assigned to the project along with a written letter of transmittal certified by a professional engineer stating that all identified stormdrain infrastructure installation deficiencies for the project have been corrected. The inspector will then notify the Watershed Protection Department (WPD) in writing and convey the video inspection data to the WPD. The WPD is allowed 15-days to complete review of the data from the date of delivery by the inspector.

(27) Pressure Pipe Hydrostatic Testing

After the pipe has been installed and backfilled and all service laterals, fire hydrants and other appurtenances installed and connected, a pressure test, followed by a leakage test, will be conducted by the City. The City will furnish the pump and gauges for the tests. The Contractor shall be present and shall furnish all necessary assistance for conducting the tests. The specified test pressures will be based on the elevation of the lowest point of the line or section under test. Before applying the specified test pressure, all air shall be expelled from the pipe. Permanent Combination Air Valves (CAVs) shall be located at all high points in accordance with Item 511.

All drain hydrant and fire hydrant leads, with the main 6-inch gate valve open, the hydrant valve seats closed and no nozzle caps removed, shall be included in the test.

(a) Pressure Test

The entire project or each valved section shall be tested, at a constant pressure of 200 psi for a sufficient period (approximately 10 minutes) to discover defective materials or substandard work. The Contractor assumes all risks associated with testing against valves. Repairs shall be

made by the Contractor to correct any defective materials or substandard work. The Contractor shall pre-test new lines before requesting pressure tests by City Forces. The Contractor shall have new lines pressurized to a minimum of 100 psi, on the date of testing, prior to arrival of City Forces.

(b) Leakage Test

A leakage test will follow the pressure test and will be conducted on the entire project or each valved section. The Contractor assumes all risks associated with testing against valves. The leakage test shall be conducted at 150 psi for at least 2 hours. The test pressure shall not vary by more than ±5 psi for the duration of the test.

(1) Allowable Leakage (For gasketed pipe only)

Leakage shall be defined as the quantity of water that must be supplied into any test section of pipe to maintain the specified leakage test pressure after the air in the pipeline has been expelled and the pipe has been filled with water.

No pipe installation will be accepted if leakage exceeds the amount given by the following formula:

Allowable leakage (gal/hr) = [L × D] ÷ 10,875

Where: L = length of pipe tested, in feet
D= nominal pipe diameter, in inches, as marked on the pipe

There is no allowable leakage for seamless, heat fused pipe. Segments of seamless pipe shall be excluded from allowable leakage calculations.

(2) Location and Correction of Leakage

If such testing discloses leakage in excess of this specified allowable, the Contractor, at the Contractor's expense, shall locate and correct all defects in the pipeline until the leakage is within the indicated allowance. Leakage disclosed at more than one gasketed pipe joint in any tested section will be considered indicative of improper installation and joint gasket inspection procedures by the Contractor for the entire tested section. That entire section of pipe shall be relayed at the Contractor's expense, employing installation procedures approved by the pipe manufacturer.

All visible leakage in pipe shall also be corrected by Contractor at the Contractor's expense.

(28) Service Charges for Testing

Initial testing performed by City forces for the Contractor will be at the City's expense. Retesting, by City forces, of Contractor's work that fails initial testing will be at the Contractor's expense. The City's charge for retests will be a base fee plus an hourly rate published in the current AW Fee Schedule. On City-funded projects, the charges incurred by the City for retesting will be deducted from funds due the Contractor. On non-City-funded projects, the charges incurred by the City for retesting will be billed to the Contractor. The City will withhold acceptance of the Contractor's work until the Contractor has paid the City for the retesting costs.

(29) Disinfection of Potable Water Lines

Prior to performing any disinfection of potable water lines, the Contractor shall submit a Disinfection Plan (Plan) and obtain approval in accordance with COA specification 01300, Submittals. The Plan shall comply with AWWA C651 (Disinfecting Water Mains) and AWWA C655 (Field Dechlorination), latest editions, and shall be developed using one of the following templates, unless otherwise approved by the Engineer and/or AW: Disinfection Plan for Tablet/Granule Method, or Disinfection Plan for

Continuous-Feed Method. Templates for these two methods are located at http://www.austintexas.gov/department/construction-standards. The Contractor shall decide which disinfection method to use for a given project. All High Density Polyethylene (HDPE) pipe shall only be disinfected by the continuous feed method. Tablet/Granule Method is not allowed. The liquid disinfection chemical solution should be limited to less than 12% active chlorine. The time-duration of the disinfection should not exceed 24 hours. The Slug Method and Spray Method are also acceptable if better suited for disinfection. The initial plan shall be submitted for review a minimum of 60 calendar days prior to when the water main is scheduled to be placed into service, or at the preconstruction conference if the project requires that the waterline be placed in service in less than 60 days, as indicated in the Contractor's Construction Schedule. If any appurtenances are required for injection, sampling, or flushing purposes that are not shown in the original plan/profile sheets, then the Contractor shall include the appurtenances in the project Record Drawings. The Contractor shall disinfect potable water lines only in accordance with an approved Plan.

(a) Preventing Contamination

The Contractor shall protect all piping materials from contamination during storage, handling and installation. Prior to disinfection, the pipeline interior shall be clean, dry and unobstructed. All openings in the pipeline shall be closed with watertight plugs when pipe laying is stopped at the close of the day's work.

(b) Cleaning

Prior to disinfection the Contractor shall clean the pipeline to remove foreign matter. For pipelines 16” in diameter or smaller, cleaning shall consist of flushing the pipeline. For pipelines greater than 16” in diameter, cleaning shall be performed by operating hydrants and blow-offs located at low points in the pipeline, or by mechanical means (sweeping or pigging. Water for the Work shall be metered and furnished by the Contractor in accordance with Section 01500 of the Standard Contract Documents.

(c) Procedure and Dosage

For pipelines 16" or smaller in diameter, the Contractor may use either the AWWA C-651 "Tablet/Granular Method" or the "Continuous Feed Method" for disinfecting the pipeline. The Contractor, at its expense, will supply the test gauges and the Sodium Hypochlorite conforming to ANSI/AWWA B300, which contains approximately 5 percent to fifteen percent available chlorine, and will submit for approval a written plan for the disinfection process. Calcium Hypochlorite conforming to ANSI/AWWA B300, which contains approximately 65 percent available chlorine by weight, may be used in granular form or in 5 g tablets for 16” diameter or smaller lines, if it is included as part of the written plan of disinfection that is approved by the COA. The Contractor, at its expense, shall provide all other equipment, supplies and the necessary labor to perform the disinfection under the general supervision of the City.

One connection to the existing system will be allowed with a valve arranged to prevent the strong disinfecting dosage from flowing back into the existing water supply piping. The valve shall be kept closed and locked in a valve box with the lid painted red. No other connection shall be made until the disinfection of the new line is complete and the water samples have met the established criteria. The valve shall remain closed at all times except when filling or flushing the line and must be staffed during these operations. As an option, backflow prevention in the form of a reduced pressure backflow assembly may be provided if the valve is left unattended. The new pipeline shall be filled completely with disinfecting solution by feeding the concentrated chlorine and approved water from the existing system uniformly into the new piping in such proportions that every part of the line has a minimum concentration of 25 mg/liter available chlorine.

The disinfecting solution shall be retained in the piping for at least 16 hours and all valves, hydrants, services, stubs, etc. shall be operated so as to disinfect all their parts. After this retention period, the water shall contain no less than 10 mg/liter chlorine throughout the treated section of the pipeline.

For pipelines larger than 16" in diameter, the Contractor may use the AWWA C-651 "Slug Method" for disinfecting the pipeline. Chlorine shall be fed at a constant rate and at a sufficient concentration at one end of the pipeline to develop a slug of chlorinated water having not less than 100 mg/liter of free chlorine. The Contractor shall move the slug through the main so that all interior surfaces are exposed to the slug for at least three (3) hours. The chlorine concentration in the slug shall be measured as it moves through the pipeline. If the chlorine concentration drops below 50 mg/liter, the Contractor shall stop the slug and feed additional chlorine to the head of the slug to restore the chlorine concentration to at least 100 mg/liter before proceeding. As the slug flows past fittings and valves, related valves and hydrants shall be operated so as to disinfect appurtenances and pipe branches.

Unless otherwise indicated, all quantities specified herein refer to measurements required by the testing procedures included in the current edition of AWWA C-651. The chlorine concentration at each step in the disinfection procedure shall be verified by chlorine residual determinations.

(d) Final Flushing

The heavily chlorinated water shall then be carefully flushed from the potable water line by a dechlorination process until the chlorine concentration is no higher than the residual generally prevailing in the existing distribution system. This is necessary to ensure that there is no injury or damage to the public, the water system or the environment. The plans and preparations of the Contractor must be approved by the City before flushing of the line may begin. The Contractor will supply the Dechlorination chemical conforming to ANSI/AWWA C655. Additionally the flushing must be witnessed by an authorized representative of the City.

Approval for discharge of the diluted chlorine water or heavily chlorinated water into the wastewater system must be obtained from AW. The line flushing operations shall be regulated by the Contractor so as not to overload the wastewater system or cause damage to the odor feed systems at the lift stations. The City shall designate its own representative to oversee the work.

Daily notice of line discharging must be reported to the AW Dispatch office.

(e) Bacteriological Testing

After disinfection and final flushing, samples shall be collected per one of the two options. Option A: Before approving a main for release, take an initial set of samples and then resample again after a minimum of 16 hours. Both sets of samples must pass for the main to be approved for release. Option B: Before approving a main for release, let it sit for a minimum of 16 hours without any water use. Then collect two sets of samples a minimum of 15 minutes apart while the sampling taps are left running. Both sets of samples must pass for the main to be approved for release. The two (2) sets of water samples from the line will be tested for bacteriological quality by the City and must be found free of coliform organisms before the pipeline may be placed in service. Each set shall consist of one (1) sample that is drawn from the end of the main, at least one from each branch greater than one pipe length, and additional samples that are collected at intervals of not more than 1,200 feet along the pipeline. All stubs shall be tested before connections are made to existing systems.

The Contractor, at its expense, shall install sufficient sampling taps at proper locations along the pipeline. Each sampling tap shall consist of a standard corporation cock installed in the line and

extended with a copper tubing gooseneck assembly. After samples have been collected, the gooseneck assembly may be removed and retained for future use.

Samples for bacteriological analysis will only be collected from suitable sampling taps in sterile bottles treated with sodium thiosulfate. Samples shall not be drawn from hoses or unregulated sources. The City, at its expense, will furnish the sterile sample bottles and may, at its discretion, collect the test samples with City personnel.

If the initial disinfection fails to produce acceptable sample test results, the disinfection procedure shall be repeated at the Contractor's expense. Before the piping may be placed in service, two (2) consecutive sets of acceptable test results must be obtained.

An acceptable test sample is one in which: (1) the chlorine level is similar to the level of the existing distribution system; (2) there is no free chlorine and (3) total coliform organisms are absent. An invalid sample is one, which has excessive free chlorine, silt or non-coliform growth as defined in the current issue of the AWWA C-651. If unacceptable sample results are obtained for any pipe, the Contractor may, with the concurrence of the Inspector, for one time only flush the lines and then collect a second series of test samples for testing by the City. After this flushing sequence is completed, any pipe with one or more failed samples must be disinfected again in accordance with the approved disinfection procedure followed by appropriate sampling and testing of the water.

The COA Water Quality Laboratory will notify the assigned COA Inspector in writing of all test results. The Inspector will subsequently notify the Contractor of all test results. The Water Quality Laboratory will not release test results directly to the Contractor.

(30) Cleanup and Restoration

It shall be the Contractor's responsibility to keep the construction site neat, clean and orderly at all times. Cleanup shall be vigorous and continuous to minimize traffic hazards or obstructions along the streets and to driveways. Trenching, backfill, pavement repair (as necessary), and cleanup shall be coordinated as directed by the City. The E/A will regulate the amount of open ditch and may halt additional trenching if cleanup is not adequate to allow for orderly traffic flow and access.

Materials at the site shall be stored in a neat and orderly manner so as not to obstruct pedestrian or vehicular traffic. All damaged material shall be removed from the construction site immediately and disposed of in a proper manner. All surplus excavated materials shall become the property of the Contractor for disposal at the Contractor's expense. After trenching, the Contractor shall immediately remove all excavated materials unsuitable for or in excess of, backfill requirements. Immediately following the pipe laying Work as it progresses, the Contractor shall backfill, grade and compact all excavations as provided elsewhere. The backfill placed at that time shall meet all compaction test requirements. The Contractor shall immediately clean up and remove all unused soil, waste and debris and restore all surfaces and improvements to a condition equal or superior to that before construction began and to an appearance which complements the surroundings. The Contractor shall grade and dress the top 6 inches of earth surfaces with soil or other material similar and equal to the surrounding, fill and smooth any visible tracks or ruts, replace and re-establish all damaged or disturbed turf or other vegetation and otherwise make every effort to encourage the return of the entire surface and all improvements to a pleasant appearance and useful condition appropriate and complementary to the surroundings and equal or similar to that before construction began.

Placement of the final lift of permanent pavement, if a pavement is required, shall begin immediately after all testing of each segment of piping is satisfactorily completed.

(31) AW Walk-Through

As part of the acceptance of Water or Reclaimed Water pressure pipe, an AW Walk Through will be performed after an initial inspection by the Owner's Representative to identify any deficient items. As part of the AW Walk-Through, AW will confirm the installation of inductive tracer detection tape for projects that contain PVC or HDPE. If deficient items are present during the AW Walk-Through and the project fails acceptance, a re-inspection fee will apply and must be paid before a re-inspection is scheduled to confirm correction of deficient items. See AW Fee Schedule for the current Distribution Walk-Through Re-inspection Fee.

(32) 2-inch Jumper Hose

During connections to the water distribution system, the Contractor may be required to install a temporary jumper hose between the unpressurized water segment and an adjacent pressurized water segment for the purpose of maintaining water service to customers who can't operate without water service during the connection. The jumper shall include an approved backflow preventer and be of adequate size and pressure rating to maintain service to the customer. It shall be polyethylene tubing meeting the requirements of COA SPL WW-65. The jumper hose and other components in the temporary service shall be disinfected, and bacteriological samples will be taken and pass before the temporary service is provided to the customer. Contractor shall provide adequate protection for the jumper hose in vehicular traffic areas at all times during use.

Source: Rule No. R161-17.05, 5-31-2017; Rule No. R161-17.19, 11-28-2017; Rule No. R161-18.23, 12-8-2018; Rule No. R161-22.11, 8-8-2022; Rule No. R161-22.13, 11-7-2022; Rule No. R161-23.25, 11-6-2023; Rule No. R161-24.03, 5-8-2024; Rule No. R161-25.08, 6-2-25.

510.4 Measurement

Pipe will be measured by the linear foot for the various types, sizes and classes. Parallel lines will be measured individually.

Where a line ties into an existing system, the length of the new line will be measured from the visible end of the existing system at the completed joint. Unless otherwise indicated, the length of water, reclaimed, and wastewater lines will be measured along pipe horizontal centerline stationing through fittings, valves, manholes, and other appurtenances.

Ductile iron fittings, whether standard mechanical joint or integral factory restrained joint type, will be measured by the ton and paid for in accordance with the schedule in Standard Products List WW-27C. Bolts, glands and gaskets will not be measured for payment. Steel cylinder concrete pipe fittings and welded steel pipe fittings will not be measured separately and are included in the unit price for the respective pipe bid items.

Factory restrained joint pipe meeting the requirements of Standard Products List WW-27F will be measured by the linear foot. The estimated quantity on the bid form is only for restrained joint pipe having integral mechanically restrained joints.

Connecting a new water, wastewater, or reclaimed water service to an existing, comparable type of private service will be measured by each connection. Service pipe from the main to the service connection will be measured by the linear foot.

The Contractor shall be responsible for removing and treating ground water flowing into a trench up to a baseline flow rate of 350 gpm of sustained flow for each mainline open trench (no more that 300 linear feet open trench per work zone segment is allowed at one time). This baseline flow rate is not a prediction of ground water conditions to be expected on the Project. Rather, it establishes contract terms regarding the quantity of ground water for which the contractor is responsible without extra or separate compensation. The flow rate must exceed

350 gpm continuously for at least 4 consecutive hours to be considered sustained flow. It is expected that trench dewatering for this baseline rate may be accomplished with a single 3-inch trash-type pump per open trench; however, measured flow rate, not pump size, type or characteristics shall be used to determine if the baseline rate has been exceeded. Flow rate shall be determined by measurements made at the discharge point of the water treatment facilities. Surface storm water flowing into a trench shall be the Contractor's responsibility to remove and treat without compensation, regardless of inflow rate or volume.

Adjustment of elevations during construction resulting in changes in flow line elevations of plus or minus two feet or less will not be considered for credit or additional compensation and no measurement for payment will be made.

Stormwater pipe will be measured along the slope of the pipe. Where drainage pipe ties into inlets, headwalls, catch basins, manholes, junction boxes or other structures that length of pipe tying into the structure wall will be included for measurement but no other portion of the structure length or width will be so included.

Excavation and backfill, when included as pipe installation will not be measured as such but shall be included in the unit price bid for constructing pipe and measured as pipe complete in place including excavation and backfill.

When pay items are provided for the other components of the system, measurement will be made as addressed hereunder.

Video inspection of newly installed box culverts and storm drain pipe will be measured per linear foot of pipe videoed.

Jumper hose will be measured per linear foot of hose installed, including all depths, excavation and backfill, complete, and in place.

Source: Rule No. R161-17.05, 5-31-2017.

510.5 Payment

Payment for pipe, measured as prescribed above, will be made at the unit price bid per linear foot for the various sizes of pipe, of the materials and type indicated, unless unstable material is encountered or trench excavation and backfill is bid as a separate item.

The concrete seal, foundation rock or coarse aggregate when used as directed in unstable material will be paid for at the unit price bid per cubic yard, which shall be full payment for all excavation and removal of unsuitable material and furnishing, placing and compacting the foundation rock, coarse aggregate or other approved material all complete in place.

Excavation and backfill, when included as a separate pay item, will be paid for by Pay Item No. 510-C or 510-D.

No separate payment will be made for dewatering a trench with ground water inflow of less than the baseline rate of 350 gpm of sustained flow as described above. Dewatering of those trenches shall be included in the contract unit price of the Pipe pay item. Payment for dewatering a trench with ground water inflow exceeding 350 gpm of sustained flow shall be agreed by change order. Dewatering of bore pits shall be included in the contract unit price for Bore Entry Pit or Exit Pit regardless of inflow rate or volume unless specified otherwise in the bid item for Bore Entry Pit or Exit Pit.

(1) Pipe

Payment for pipe, measured as prescribed above, will be made at the unit price bid per linear foot complete-in-place as designed and represented in the Drawings and other Contract documents. Restrained joint pipe meeting the requirements of Standard Products List WW-27F will be paid for separately at the unit price bid per linear foot. Unless otherwise provided herein, as separate pay item(s), the bid price per linear foot of pipe shall include the following:

a. clearing

b. constructing any necessary embankment

c. excavation

d. disposal of surplus or unusable excavated material

e. furnishing, hauling and placing pipe

f. field constructed joints, collars, temporary plugs, caps or bulkheads

g. all necessary lugs, rods or braces

h. pipe coatings and protection

i. connections to existing systems or structures, concrete blocking and thrust blocks and restrained joints

j. preparing, shaping, pumping for dewatering, and shoring of trenches

k. bedding materials

l. backfill materials

m. hauling, placing and preparing bedding materials

n. particle migration measures

o. hauling, moving, placing and compacting backfill materials

p. temporary and permanent pavement repairs and maintenance

q. temporary removal and replacement of pavement, curb, drainage structures, driveways, sidewalks and any other improvements damaged or removed during construction

r. cleanup

s. vertical stack on deep wastewater services

t. all other incidentals necessary to complete the pipe installation as indicated.

u. pipe joint restraint devices, where specified or allowed, meeting Standard Products List WW-27A or WW-27G.

No separate payment will be made for thrust restraint measures.

Steel cylinder concrete pipe fittings and welded steel pipe fittings will not be paid for separately. These will be included in the unit price bid for the bid item Pipe.

(2) Concrete Cradles and Seals

When called for in the Bid, concrete cradles and seals will be paid for at the unit Contract price bid per linear foot for the size of pipe specified, complete in place.

(3) Concrete Retards

When called for in the Bid, Concrete retards will be paid under Item No. 593S, "Concrete Retards."

(4) Boring or Jacking.

When called for in the Bid, boring or jacking will be paid under Item 501S, "Jacking or Boring Pipe".

(5) Wet Connections to Potable or Reclaimed Water Mains

When called for in the bid, wet connections will be paid at the unit price bid per each, complete in place, according to the size of the main that is in service and shall be full compensation for all Work required to make the connection and place the pipe in service. (See subsection 510.3 'Construction Methods' part (24) (b) 'Wet Connections to Existing Water System').

(6) Fittings

Ductile iron fittings, furnished in accordance with these specifications, will be paid for at the unit price bid per ton, complete in place, according to the schedule of weights in Standard Products List WW-27C. Bolts, glands, and gaskets will not be paid for separately and shall be included in the contract unit price for fittings.

(7) Concrete Trench Cap and Encasement

Where the distance between the top of the concrete encasement and the top of the trench cap is less than 36 inches, the concrete cap and encasement shall be poured as one unit and paid for under this bid item at the Contract price bid per linear foot. When the distance above is greater than 36 inches or when the trench cap is placed separately, the trench cap shall be paid for as a separate item, per linear foot, complete in place.

(8) Cement-Stabilized Backfill

Cement-stabilized backfill will be paid for at the unit price bid per linear foot and shall be full payment to the Contractor for furnishing and installing the required material, mixed, placed and cured complete in place.

(9) Concrete Encasement

When called for in the Bid, Concrete Pipe Encasement will be paid under Item No. 505S, "Encasement and Encasement Pipe".

(10) Pressure Taps

Pressure taps will be paid for at the unit price bid, complete in place, according to the size tap made and the size main tapped and shall be full payment for furnishing all necessary materials, including tapping sleeve and valve, making the tap, testing and placing the connection in service.

(11) Excavation Safety Systems

When called for in Bid, Trench Safety Systems shall conform to Item No. 509S, "Excavation Safety Systems."

(12) Connecting a New Water, Wastewater, or Reclaimed Water Service to an existing, comparable type of private service will be paid for at the unit price bid, complete in place, according to the size of new service and size of existing private service, and shall be full payment for furnishing and installing all necessary materials, such as cleanouts, pipe, couplings, and fittings, and including excavation and backfill. Service pipe from the main to the service connection will be measured and paid by the horizontal linear foot.

(13) Video Inspection

Video Inspection of Newly Installed Box Culverts and Storm Drain Pipe will be paid for at the unit price bid per linear foot and shall be full payment for all labor, equipment, and materials required for video inspection per this specification, including all submittals of CD/DVD as required.

(14) Jumper Hose

Jumper Hose will be paid at the unit bid price, complete and in place, including installation and removal of all materials necessary to provide a fully functional jumper hose. This item shall also include adequate protection for the jumper hose within vehicular traffic areas.

Source: Rule No. R161-17.05, 5-31-2017; Rule No. R161-22.13, 11-7-2022.

Payment, when included as a Contract pay item, will be made under one of the following:

Pay Item No. 510-AR___Dia.:	Pipe, ___ Dia. ___ Type (all depths), including Excavation and Backfill	Per Linear Foot.
Pay Item No. 510-ARRJ___Dia.:	Factory Restrained Joint Pipe, ___ Dia., Class ___ Ductile Iron, (all depths) including Excavation and Backfill	Per Linear Foot.
Pay Item No. 510-BR___×___Dia.:	Connecting New ___ Service to Existing Private Service (___ Dia. New Service to ___ Dia. Private Service)	Per Each.
Pay Item No. 510-CR:	Pipe Excavation, ___ Ft. Width	Per Linear Foot.
Pay Item No. 510-DR:	Pipe Trench Backfill, ___ Ft. Width	Per Linear Foot.
Pay Item No. 510-ER:	Concrete Seal or Cradle, ___ Dia. Pipe	Per Linear Foot.
Pay Item No. 510-FR:	Concrete Trench Cap, ___ Ft. Width	Per Linear Foot.
Pay Item No. 510-GR:	Concrete Cap and Encasement, ___ Dia. Pipe	Per Linear Foot.
Pay Item No. 510-HR:	Cement Stabilized Backfill, ___ Dia. Pipe	Per Linear Foot.
Pay Item No. 510-IR: ___ × ___ Dia.:	Pressure Taps, ___ Dia. × ___ Dia.	Per Each.
Pay Item No. 510-JR: ___ × ___ Dia.:	Wet Connections, ___ Dia. × ___ Dia.	Per Each.
Pay Item No. 510-KR:	Ductile Iron Fittings	Per Ton.
Pay Item No. 510-ASD___Dia.:	Pipe, ___ Dia. (all depths), including excavation and backfill	Per Linear Foot.
Pay Item No. 510-CSD:	Pipe Excavation, ___ Ft. Width	Per Linear Foot.
Pay Item No. 510-DSD:	Pipe Trench Backfill, ___ Ft. Width	Per Linear Foot.
Pay Item No. 510-ESD:	Concrete Seal or Cradle, ___ Dia. Pipe	Per Linear Foot.
Pay Item No. 510-FSD:	Concrete Trench Cap, ___ Ft. Width	Per Linear Foot.
Pay Item No. 510-GSD:	Concrete Cap and Encasement, ___ Dia. Pipe	Per Linear Foot.
Pay Item No. 510-HSD:	Cement Stabilized Backfill, ___ Dia. Pipe	Per Linear Foot.
Pay Item No. 510-AW___ Dia.:	Pipe, ___ Dia. ___ Type (all depths), including excavation and backfill	Per Linear Foot
Pay Item No. 510-AWRJ___ Dia.:	Factory Restrained Joint Pipe, ___ Dia., Class Ductile Iron, (all depths) including Excavation and Backfill	Per Linear Foot.
Pay Item No. 510-BW___ × ___ Dia.:	Connecting New ___ Service to Existing Private Service (___ Dia. New Service to ___ Dia. Private Service)	Per Each.
Pay Item No. 510-CW:	Pipe Excavation, ___ Ft. Width	Per Linear Foot.
Pay Item No. 510-DW:	Pipe Trench Backfill, ___ Ft. Width	Per Linear Foot.
Pay Item No. 510-EW:	Concrete Seal or Cradle, ___ Dia. Pipe	Per Linear Foot.
Pay Item No. 510-FW:	Concrete Trench Cap, ___ Ft. Width	Per Linear Foot.
Pay Item No. 510-GW:	Concrete Cap and Encasement, ___ Dia. Pipe	Per Linear Foot.
Pay Item No. 510-HW:	Cement Stabilized Backfill, ___ Dia. Pipe	Per Linear Foot.

Pay Item No. 510-IW:___ × ___ Dia.:	Pressure Taps, ___ Dia. × ___ Dia.	Per Each.
Pay Item No. 510-JW: ___ × ___ Dia.:	Wet Connections, ___ Dia. × ___ Dia.	Per Each.
Pay Item No. 510-KW:	Ductile Iron Fittings	Per Ton.
Pay Item No. 510-AWW: ___ Dia.:	Pipe, ___ Dia. ___ Type (all depths), including Excavation and Backfill	Per Linear Foot.
Pay Item No. 510-AWWRJ___ Dia.:	Factory Restrained Joint Pipe, ___ Dia., Class ductile Iron, (all depths) including Excavation and Backfill	Per Linear Foot.
Pay Item No. 510-BWW___ × ___ Dia.:	Connecting New ___ Service to Existing Private Service (___ Dia. New Service to ___ Dia. Private Service)	Per Each.
Pay Item No. 510-CWW:	Pipe Excavation, ___ Ft. Width	Per Linear Foot.
Pay Item No. 510-DWW:	Pipe Trench Backfill, ___ Ft. Width	Per Linear Foot.
Pay Item No. 510-EWW:	Concrete Seal or Cradle, ___ Dia. Pipe	Per Linear Foot.
Pay Item No. 510-FWW:	Concrete Trench Cap, ___ Ft. Width	Per Linear Foot.
Pay Item No. 510-GWW:	Concrete Cap and Encasement, ___ Dia. Pipe	Per Linear Foot.
Pay Item No. 510-HWW:	Cement Stabilized Backfill, ___ Dia. Pipe	Per Linear Foot.
Pay Item No. 510-KWW:	Ductile Iron Fittings	Per Ton.
Pay Item No. 510-VIDEO	Video Inspection of Newly Installed Box Culverts and Storm Drain Pipe	Per Linear Foot.
Pay Item No. 510-JH	2-inch Jumper Hose	Per Linear Foot.

An "R" after the pay item indicates the use for reclaimed water.

An "SD" after the pay item indicates the use for storm drain.

A "W" after the pay item indicates the use for water.

A "WW" after the pay item indicates the use for wastewater.

Source: Rule No. R161-17.05, 5-31-2017.

End

Applicable References:

Standard Specifications Manual: Item Nos. Ref: 102S, 210S, 402S, 403, 501S, 505S, 506, 507S, 509S, 593S, 601S, 604S

Standards Manual: Standard 510S-1, (520 - series).

Design Criteria Manuals: Utilities Criteria Manual, Section 5.

ITEM NO. 511 WATER VALVES 3-10-25

511.1 Description

This item shall govern the valves furnished and installed as indicated on the Drawings. Unless otherwise indicated on the Drawings, all valves 4 inches and larger shall be AWWA-type valves of suitable design and fully equipped for service buried in the earth, without need for further modification and shall be wrapped with 8-mil polyethylene film with all edges and laps securely taped to provide a continuous wrap. For reclaimed water piping, the polyethylene film shall be purple. Where not indicated, the Contractor may use valves with any type end-joint allowed for fittings of the pipe class being used. Unless otherwise indicated on the Drawings, all valve stems shall be adjusted to situate the operating nut not more than 24 inches below the proposed ground or paving surface of the finished project. Laydown valves shall not be used unless called out on the Drawings. Standard details shall not be used as an indicator of available options.

Source: Rules No. R161-22.04, 2-14-2022; Rule No. R161-22.13, 11-7-2022.

511.2 Submittals

The Contractor shall submit descriptive information and evidence that the materials the Contractor proposes for incorporation in the Work are of the kind and quality that satisfy the requirements in the Contract Documents. Austin Water (AW) shall be included in all submittal reviews. The AW Standard Products Lists (SPLs) are considered a part of the Specifications for the Work. The Contractor shall use products from the SPLs for all water and wastewater construction unless alternative products are shown on the Drawings; called for in the specifications; or specified in the Bidding Requirements, Contract Forms and Conditions of the Contract.

The products included in the SPLs current at the time of plan approval shall govern unless a specific product or products on the lists have subsequently been removed from those SPLs because of quality or performance issues. Products and materials that are not covered by the SPLs shall meet the requirements in the contract documents.

Submittals for the products and materials covered by this specification shall include manufacturer catalog sheets, technical data sheets, shop drawings, product or material test results, requirements listed below, and any other information needed to adequately describe the product or material. For products covered by SPLs, the submittal shall include a copy of the applicable SPL with the proposed product identified. An SPL by itself is not considered an adequate submittal.

A. Samples, Inspection and Testing Requirements

All tests and inspections called for by the applicable standards shall be performed by the manufacturer. Upon request, results of these tests shall be made available to the purchaser.

B. Other Requirements

Each submittal shall be accompanied by:

1. Complete data covering:
    a. the operator, including type and size, model number, etc.,
    b. the name and address of the manufacturer's nearest service facility,
    c. the number of turns to fully open or close the valve.
2. Detailed instructions for calibrating the limit stops for open and closed positions.

3. Any other information, that may be necessary to operate and maintain the operator.

4. Complete dimensional data and installation instructions for the valve assembly as it is to be installed, including the operator.

5. Complete replacement parts lists and drawings, identifying every part for both the valve and operator.

Source: Rules No. R161-22.04, 2-14-2022; Rule No. R161-22.13, 11-7-2022.

511.3 Materials

A. Iron-Body Gate Valves

Reduced-wall, resilient-seated gate valves for potable or reclaimed service, including tapping valves, shall conform to AWWA C515 and SPL WW-700.

B. Plug Valves for Wastewater

Resilient-Seated Eccentric Plug Valves shall conform to AWWA C517 and SPL WW-703.

C. Ball Valves

Ball valves shall be brass, bronze, stainless steel or PVC as indicated on the Drawings or Details or as approved by the Engineer or designated representative.

D. Combination Air Valves

Combination Air Valves (CAVs) shall conform to AWWA C512 and SPL WW-462 for wastewater service and WW-462A for portable and reclaimed service.

E. Fire Hydrants

Fire Hydrants shall conform to AWWA C502 and SPL WW-3. All fire hydrants shall be Dry Barrel, Traffic Model (break-away), Post Type having Compression Type Main Valves with 5¼ inch opening, closing with line pressure.

1. Applicable Specifications

AWWA C502 current: "AWWA Standard for Dry-Barrel Fire Hydrants."

NFPA 1963: "National (American) Standard Fire Hose Coupling Screw Thread" and City of Austin 4-inch Fire Hose Connection Standard.

ANSI A-21.11 current: "American National Standard for Rubber Gasket Joints for Cast Iron and Ductile Iron Pressure Pipe and Fittings."

2. Functional Requirements

Design Working Pressure shall be 200 psi and a test pressure of 400 psi.

Inlet shall be side connection hub end for mechanical joint (ANSI A-21.11-current). Shoe shall be rigidly designed to prevent breakage.

Lower Barrel shall be rigid to assure above ground break at traffic feature. Bury length of hydrant shall be 4 feet minimum, 5 feet maximum (hydrant lead pipe may be elbowed up from main using restrained joints; flanged joints in lead pipes are not allowed). Flange type connections between hydrant shoe, barrel sections and bonnet shall have minimum of six corrosion resistant bolts.

Hydrant Main Valve shall be 5¼ inch I.D. Valve stem design shall meet requirements of AWWA C502, with Operating Nut turning clockwise to close. Operating Nut shall be pentagonal, 1½ inch point to flat at base, and 1 7/16inches at top and 1-inch minimum height. Seat ring shall be bronze (bronze to

bronze threading) and shall be removable with lightweight stem wrench. Valve mechanisms shall be flushed with each operation of valve; there shall be a minimum of two drain ports.

Traffic Feature shall have replaceable breakaway ferrous metal stem coupling held to stem by readily removable type 302 or 304 stainless steel fastenings. Breakaway flange or frangible lugs shall be designed to assure aboveground break. Breakaway or frangible bolts will not be acceptable.

Outlet Nozzles shall be located approximately 18 inches above ground. Each hydrant shall have two 2½ inch nozzles 180 degrees apart with National (American) Standard Fire Hose Coupling Screw Thread NFPA 1963 and one 4-inch pumper nozzle with City of Austin (COA) standard thread-six threads per inch "Higbee" cut, 4.859-inch O.D., 4.6425-inch root diameter. Nozzles shall be threaded or cam-locked, O-ring sealed, and shall have type 302 or 304 stainless steel locking devices. Nozzle caps (without chains) and cap gaskets shall be furnished on the hydrant. The cap nut shall have the same configuration as the operating nut.

Hydrants shall be Dry-Top Construction, factory lubricated oil or grease with the lubricant plug readily accessible. The system shall be described for City approval.

A blue Type II-B-B reflectorized pavement marker, conforming to Standard Specification Item No. 863S, shall be placed 2 to 3 feet offset from the centerline of paved streets, on the side of and in line with, all newly installed fire hydrants.

Hydrant shall have double O-ring seals in a bronze stem sheath housing to assure separation of lubricant from water and shall have a weather cap or seal, or both, as approved by the Owner, to provide complete weather protection.

3. Material Requirements

All below ground bolts shall be corrosion resistant. The hydrant valve shall be Neoprene, 90 durometer minimum. The seat ring, drain ring, operating nut and nozzles shall be bronze, AWWA C502 current, containing not over 16 percent zinc. Break-away stem coupling shall be of ferrous material; its retaining pins, bolts, nuts, etc. of type 302 or 304 stainless steel.

Coatings shall be durable and applied to clean surfaces. Exterior surfaces above ground shall receive a coating of the type and color specified in the applicable version of AW SPL WW-3. The coating shall be applied according to coating manufacturer's specifications. Other exposed ferrous metal shall receive asphalt-based varnish, or approved equal, applied according to the coating manufacturer's specifications.

F. Pressure/Flow Control Valves

All control valves to regulate pressure, flow, etc., in City lines shall be models listed in the AW SPL WW-319 and shall conform to AWWA C530.

G. Drain Valves

Drain valve materials and installation shall conform to COA Standard 511-AW-03.

H. Valve Stem Extensions:

Valve stem extensions shall consist of a single piece of the required length with a socket on one end and a nut on the other.

Source: Rules No. R161-22.04, 2-14-2022; Rule No. R161-22.13, 11-7-2022; Rule No. R161-23.14, 8-10-2023; Rule No. R161-23.25, 11-6-2023; Rule No. R161-25.03, 3-10-2025.

511.4 Construction Methods

A. Setting Valves, Drains and Air Valves

Unless otherwise indicated, main line valves, drain valves and piping, combination air valve and pressure/flow control valve assemblies, and other miscellaneous accessories shall be set and jointed in the manner described for cleaning, laying, and jointing pipe.

Unless otherwise indicated, valves shall be set at the locations shown on the Drawings and such that their location does not conflict with other appurtenances such as curb ramps. Valves shall be installed so that the tops of operating stems will be at the proper elevation required for the piping at the location indicated above. Valve boxes and valve stem casings shall be firmly supported and maintained, centered and aligned plumb over the valve or operating stem, with the top of the box or casing installed flush with the finished ground or pavement in existing streets, and installed with the top of the box or casing approximately 6 inches below the standard street subgrade in streets which are excavated for paving construction or where such excavation is scheduled or elsewhere as directed by the Engineer or designated representative.

Drainage branches or air blowoffs shall not be connected to any sanitary sewer or submerged in any stream or be installed in any other manner that will permit back siphonage into the distribution system (see COA "Standard Series 500"). Every drain line and every air release line shall have a full-sized independent gate valve flanged directly to the main. Flap-valves, shear gates, etc., will not be accepted.

B. Setting Fire Hydrants

Fire hydrants shall be located in a manner to provide accessibility and in such a manner that the possibility of damage from vehicles or conflict with pedestrian travel will be minimized. Unless otherwise directed, the setting of any hydrant shall conform to the following:

Hydrants between curb and sidewalk on public streets, shall be installed as shown on Standard 511- AW-02 with outermost point of large nozzle cap 6 inches to 18 inches behind back of curb. Where walk abuts curb, and in other public areas or in commercial areas, dimension from gutter face of curb to outermost part of any nozzle cap shall be not less than 3 feet, nor more than 6 feet, except that no part of a hydrant or its nozzle caps shall be within 6 inches of any sidewalk or pedestrian ramp. Any fire hydrant placed near a street corner shall be no less than 20 feet from the curb line point of tangency. Fire hydrants shall not be installed within 9 feet vertically or horizontally of any sanitary sewer line regardless of construction.

All hydrants shall stand plumb; those near curbs shall have the 4-inch nozzle facing the curb and perpendicular to it. The hydrant bury mark shall be located at ground or other finish grade; nozzles of all new hydrants shall be approximately 18 inches above grade. Lower barrel length shall not exceed 5 feet. Barrel extensions are not permitted unless approved by the Engineer or designated representative. Each hydrant shall be connected to the main by 6-inch ductile iron pipe; a 6-inch gate valve shall be installed in the line for individual shutoff of each new hydrant.

Below each hydrant, a drainage pit 2 feet in diameter and 2 feet deep shall be excavated and filled with compacted coarse gravel or broken stone mixed with coarse sand under and around the bowl of the hydrant, except where thrust blocking is located COA Specification Item 510 and Standard 510-6 and to a level 6 inches above the hydrant drain opening.

The hydrant drainage pit shall not be connected to a sanitary sewer. The drain gravel shall be covered with filter fabric to prevent blockage of voids in the gravel by migration of backfill material. The bowl of each hydrant shall be well braced against unexcavated earth at the end of the trench with concrete thrust blocking (taking care not to obstruct the hydrant drain holes), or the hydrant shall be tied to the pipe with approved metal harness rods and clamps. The fire line shall be provided with joint restraint from the main line to the fire hydrant. Hydrants shall be thoroughly cleaned of dirt or foreign matter before setting.

Fire hydrants on mains under construction shall be securely wrapped with a poly wrap bag or envelope taped into place. When the mains are accepted and placed in service the bag shall be removed.

C. Pressure Taps: Refer to Section 510.3 (24) of Standard Specification Item Number 510, "Pipe."

D. Plugging Dead Ends

Standard plugs shall be inserted into the bells of all dead ends of pipes, tees or crosses and spigot ends shall be capped. All end plugs or caps shall be secured to the pipe conforming to Section 510.3 (22) of Standard Specification Item Number 510, "Pipe."

E. Protective Covering

Unless otherwise indicated, all flanges, nuts, bolts, threaded outlets and all other steel component shall be coal tar coated and shall be wrapped with standard minimum 8-mil low density polyethylene film or a minimum 4-mil cross laminated high-density polyethylene meeting ANSI/AWWA Specification C105 current, with all edges and laps taped securely to provide a continuous and watertight wrap. Repair all punctures of the polyethylene, including those caused in the placement of bedding aggregates, with duct tape to restore the continuous protective wrap before backfilling. For reclaimed water piping, the polyethylene shall be purple.

F. Valve Box, Casing and Cover

Stems of all buried valves shall be protected by valve box assemblies. Valve box castings shall conform to ASTM A 48, Class 30B. Testing shall be verified by the manufacturer at the time of shipment. Each casting shall have cast upon it a distinct mark identifying the manufacturer and the country of origin. Valve boxes and covers for potable water shall be round. Valve boxes and covers for reclaimed water piping shall be square and shall have "Reclaimed Water" indicated on the lid.

G. Drain Valve Installations

Refer to Standard 511-AW-03.

H. Combination Air Valve (CAV) Assemblies

Refer to Standard 511-AW-04A, for potable and reclaimed waterline CAV assemblies and Standard 511-AW-04B, for force main CAV assemblies.

I. Pressure/Flow Control Valves

Refer to Standard Specification Item No. 512, "Pre-Cast Water Utility Vaults", and Standard 512-AW-01.

J. Connections to Existing System

Refer to Standard Specification Item No. 510, "Pipe" for connections to the existing system.

K. Shutoffs

Refer to Standard Specification Item No. 510, "Pipe" for shutoffs.

Source: Rules No. R161-22.04, 2-14-2022; Rule No. R161-22.13, 11-7-2022; Rule No. R161-23.14, 8-10-2023; Rule No. R161-25.03, 3-10-2025.

511.5 Measurement

All types of valves will be measured per each. Fire hydrants and drain valve assemblies will be measured per each. Fire Hydrant barrel extensions will be measured per vertical foot. Pressure/Flow control valve assemblies will be measured in accordance with Standard Specification Item 512, "Pre-Cast Water Utility Vaults." Combination air

valve assemblies will be measured per each. Reflectorized pavement markers for identifying the location of newly installed fire hydrants will be measured per each, as per Standard Specification Item No. 863S.7.

Bury depths exceeding 5.5 feet are defined as Additional Bury Depths. Additional bury depths will only be measured if indicated on the Drawings and identified in the Standard Contract Bid Form 00300U; otherwise, the unit bid price for each completed unit includes all depths.

Source: Rules No. R161-22.04, 2-14-2022; Rule No. R161-22.13, 11-7-2022; Rule No. R161-23.14, 8-10-2023.

511.6 Payment

Payment shall include full compensation, in accordance with the pay item established in the bid, for excavation, furnishing, hauling and placing valves, drain valve assemblies, fire hydrants and barrel extensions including anchorage and all incidental materials and work; preparing, shaping, dewatering, bedding, placing and compacting backfill materials and for all other incidentals necessary to complete the installation, as indicated in the Drawings, complete in place.

Payment for iron fittings and for wet connections is covered in Section 510.6 of Standard Specification Item 510, "Pipe."

Payment for excavation safety systems is covered in Section 509S.10 of Standard Specification Item 509S, "Excavation Safety Systems."

A. Valves: Valves will be paid for at the unit bid price for the size and type valve installed, including valve stem casing and cover, excavation and backfill, setting, adjusting to grade, anchoring in place, and other appurtenances necessary for proper operation.

B. Fire Hydrants: Fire Hydrants installation shall be paid for at the unit bid price, which includes all necessary labor and materials to set, adjust to grade and anchor the hydrant body, barrel extensions, concrete block, gravel drain and other appurtenances necessary for proper operation; but shall not include pipe and valve between the main line and fire hydrant base.

C. Pressure or Flow Control Valve Assemblies: Pressure control and flow control valve assemblies will be paid for in accordance with Standard Specification Item 512, "Pre-Cast Water Utility Vaults."

D. Drain Valve Assemblies: Drain valve installation shall be paid for at the unit bid price, which includes all necessary labor and materials to set, adjust to grade and anchor the bends, vertical piping, blind flange, joint restraint devices, concrete blocking, concrete pad the drain valve, setting, adjusting to grade, anchoring in place, and other appurtenances necessary for proper operation; but shall not include pipe and valve between the main line and drain valve buried bend.

E. Combination Air Valve (CAV) Assemblies: CAV assemblies will be paid for at the unit bid price and will include all pipe, valves, fittings, vault and cover, and other appurtenances necessary for proper operation for Type I or Type II installation.

F. Additional Bury Depth: Additional bury depth will be paid for at the unit bid price, which will include all work necessary to install units with bury depths exceeding 5.5 feet.

G. Fire Hydrant Barrel Extensions: Hydrant barrel extensions will be paid for at the unit bid price which will include necessary hardware and rod extensions.

H. Reflectorized Pavement Markers: Pavement markers will be paid for at the unit bid price, which will include necessary surface preparation and adhesive, as per Standard Specification Item No. 863S.8.

Payment, when included as a contract pay item, will be made under one of the following:

Pay Item No. 511-A:	Valves, _____ Type, ___ Diameter	Per Each.

Pay Item No. 511-B:	Fire Hydrants (See Standard No. 511-AW-02)	Per Each.
Pay Item No. 511-D:	Drain Valve Assemblies (See Standard No. 511-AW-03)	Per Each.
Pay Item No. 511-E-WL-T1:	Combination Air Valve (CAV) Assembly, Diameter. (See Standard No. 511-AW-04A, "Type I")	Per Each.
Pay Item No. 511-E-WL-T2:	Combination Air Valve (CAV) Assembly, Diameter. (See Standard No. 511-AW-04A, "Type II")	Per Each.
Pay Item No. 511-E-FM-T1:	Combination Air Valve (CAV) Assembly, Diameter. (See Standard No. 511-AW-04B, "Type I")	Per Each.
Pay Item No. 511-E-FM-T2:	Combination Air Valve (CAV) Assembly, Diameter. (See Standard No. 511-AW-04B, "Type II")	Per Each.
Pay Item No. 511-F:	Additional Bury Depth	Per Vertical Foot.
Pay Item No. 511-G:	Fire Hydrant Barrel Extensions	Per Vertical foot.

Source: R161-22.04, 2-14-2022; Rule No. R161-22.13, 11-7-2022; Rule No. R161-23.14, 8-10-2023; Rule No. R161-25.03, 3-10-2025.

SPECIFIC CROSS REFERENCE MATERIALS	
Standard Specification Item No. 511, "Water Valves"	
COA Standard Specification Items	
Designation	Description
Item 510	Pipe
Item 510.3 (22)	Pipe Anchorage, Support and Protection
Item 510.3 (24)	Water System Connections
COA Standard Details	
Designation	Description
511-AW-04	Air Release and Air/Vacuum Valve
511-AW-03	Drain Valve
511-AW-02	Fire Hydrant
AW SPLs	
Designation	Description
SPL WW-462	Combination Air Valves for Wastewater
SPL WW-462A	Combination Air Valves for Potable and Reclaimed Water
SPL WW-700	Resilient-Seated Gate Valves, AWWA C515
SPL WW-703	Resilient-Seated Eccentric Plug Valves for Wastewater, AWWA C517
ANSI/AWWA Standards	
Designation	Description
A-21.11	American National Standard for Rubber Gasket Joints for Cast Iron and Ductile Iron Pressure Pipe and Fittings
C105	American National Standard for Polyethylene Encasement for Ductile-Iron Pipe
C500	Metal-Seated Gate Valves for Water Supply Service
C502	Dry-Barrel Fire Hydrants
C504	Rubber-Seated Butterfly Valves

C512	Air-Release, Air/Vacuum, and Combination Air Valves for Water and Wastewater Service
C515	Reduced-Wall, Resilient-Seated Gate Valves For Water Supply Service-515
C517	Resilient-Seated Cast-Iron Eccentric Plug Valves
ASTM Standards	
Designation	Description
ASTM A48/A48M	Specification for Gray Iron Castings
ASTM A 536	Specification for Ductile Iron Castings
National Fire Protection Association (NFPA)	
1963 National (American) Standard Fire Hose Coupling Screw Thread	

RELATED CROSS REFERENCE MATERIALS	
Specification 511, "Water Valves"	
COA Standard Specification Items	
Designation	Description
Item No. 501	Jacking or Boring Pipe
Item No. 503	Frames, Grates, Rings and Covers
Item No. 505	Concrete Encasement and Encasement Pipe
Item No. 506	Manholes
Item No. 507	Bulkheads
Item No. 508	Miscellaneous Structures and Appurtenances
Item No. 509	Trench Safety Systems

END

Source: Rule No. R161-22.13, 11-7-2022; Rule No. R161-23.14, 8-10-2023; Rule No. R161-25.03, 3-10-2025.

ITEM NO. 559S CONCRETE BOX CULVERTS 10-3-13

559S.1 Description

This item governs the materials used and the constructing, furnishing and placing of concrete box culverts (boxes) on a prepared grade at the location shown on the Drawings and in accordance with Standard Detail 559S-1, "Fabrication Tolerances for Precast Box Culverts". Unless indicated otherwise on the Drawings, the Contractor shall have the option of furnishing cast-in-place, precast (formed) or precast (machine made) concrete box culverts.

When cast-in-place box culverts are used, they shall conform to the details indicated on the Drawings and Standard Detail 559S-1, "Fabrication Tolerances for Precast Box Culverts" along with the requirements for Standard Specification Item No. 403S, "Concrete for Structures" and Standard Specification Item No. 410, "Concrete Structures".

The manufacturing of precast box culverts shall conform to the requirements of the current version of ASTM C1577. When precast box culverts are used under traffic, the design loads shall consist of the impact load, dead load and live load [AASHTO LRFD Bridge Construction Design Specifications - greater of: Truck Axle load (32Kf {identical to HS-20load axial load of 32Kf}) or Tandem Axle load (2 at 25Kf each)].

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text and accompanying tables, the inch-pound units are given preference followed by SI units shown within parentheses.

559S.2 Submittals

The submittal requirements of this specification item include for both cast-in-place and precast boxes:

A. The foundation plan and drilling/excavation details;

B. Class C and S Portland cement concrete mix design for cast-in-place boxes;

C. Anchor bolt plan and details;

D. Reinforcing Steel details and placement drawings;

E. Casting plan and details (if required);

F. Certification of compliance with HL93 Liveload design standards;

G. Bedding Material;

H. Joint design;

I. List of joint sizes showing the minimum size of sealant material to be used with each size joint, along with complete instructions on recommended installation procedures;

J. Test results of the hydrostatic performance testing of the joints, if requested by the City;

K. Box Culvert manufacturer's recommended final joint opening (gap) dimension on the inside of the installed box;

L. Certification from the QCast Program, which provides a third party certification auditing firm to certify that the manufacturing plant is producing boxes based on the requirements of the National Precast Concrete Association;

M. Inspection procedures to be used by the manufacturer for quality control and assurance for materials; and

N. 5000 psi (34.475 mPa) Concrete mix design for machine made boxes.

559S.3 Quality Control

Manufacturers of concrete boxes shall have a quality management system certified by the QCast Program following the requirements of the American Concrete Pipe Association (ACPA) Plant Certification Manual. Manufacturers of concrete boxes, inlets and storm water manholes shall have a quality control program consisting of one or more of the following: 1) a quality management system certified by the QCast Program following the requirements of the ACPA Plant Certification Manual, 2) a quality management system certified by the National Precast Concrete Association. 3) a quality control program approved by the OWNER prior to submittal of bids for the PROJECT, or 4) an independent, third party quality control testing and inspection firm for testing and inspecting box culverts produced for the PROJECT and approved by the OWNER prior to submittal of bids for the PROJECT.

All such quality control programs shall be paid for by the manufacturer. It is the intent of this requirement that the manufacturer will document all appropriate tests and inspections with sampling and inspection criteria, frequency of testing and inspection, date of testing and inspection and date on which every piece was manufactured. Required testing and inspection, including that by an independent, third party, shall be performed full-time during production of box culverts for the PROJECT. When requested by the OWNER, the manufacturer will provide copies of test data and results and inspection reports with the shipment of box culverts for the PROJECT. Test data and results and inspection reports shall be traceable to specific box culverts lots or pieces. Owner approval of the manufacturer's quality control program will expire after three years, at which time the manufacturer must present a current quality control program for approval.

The quality of materials and, the process of manufacturing and furnishing box culverts shall be subject to inspection and approval by the E/A at the box culvert manufacturing plant and at the project site prior to and during installation. Plant inspections shall be conducted at the discretion of the City Representative. Only manufacturers having a quality control program of the type described above will be considered as approved providers of concrete box culverts and storm water manholes.

559S.4 Materials

A. Concrete

Class C Concrete shall be used for cast-in-place and precast (formed) box culverts conforming to the requirements of Standard Specification Item No. 403S, "Concrete Structures" and Standard Specification Item No. 410S, "Concrete for Structures", except that Class S Portland cement Concrete will be required for the top slab of direct traffic boxes.

Portland cement concrete for precast (machine made) boxes shall conform to the current version of ASTM C 1577 and shall have a minimum 28-day compressive strength of 5,000 psi (34.475 mPa).

B. Reinforcement

Reinforcing steel for cast-in place and precast (formed) box culverts shall conform to Standard Specification Item No. 406S, "Reinforcing Steel".

Reinforcing steel for machine made boxes shall in accordance with ASTM C1577

C. Jointing Material

Unless otherwise shown on the drawings, when installing box culverts, the Contractor shall have the option of making joints with preformed flexible joint sealants or with rubber gaskets. Preformed flexible joint sealants for box culvert joints shall comply with ASTM C990, and rubber gaskets for box culvert joints shall comply with ASTM C1677. Mortar shall not be used to seal pre-fabricated joints. Box culvert joint shall be designed to prevent the flow of solids through the joint.

D. Membrane Curing

Materials for membrane curing for cast-in-place and precast (formed) box culverts shall conform to Standard Specification Item No. 409S, "Membrane Curing". Materials for membrane curing for machine made boxes shall be in accordance with ASTM C1577.

E. Admixtures

Admixtures for all box culverts shall conform to Standard Specification Item No. 405S, "Concrete Admixtures". Air entraining admixtures shall be added to the mixture to produce concrete with not less than 4, nor more than 7 percent, air content by volume.

F. Granular Backfill

Materials for Granular Backfill shall conform to Standard Specification Item No. 210S, "Flexible Base".

G. Foundation Rock

Bedding material shall be 1-inch (25 mm) to 3-inch (75mm) diameter clean gravel or crushed gravel or crushed rock in conformance with Standard Specification Item No. 510 "Pipe."

H. Geotextile Filter Fabric for Bedding Material

Geotextile filter fabric for bedding material shall be Webtec, Terra Tex NO 4 (AOS US Standard Sieve 70) geotextile fabric or approved equal.

559S.5 Fabrication

The fabrication of machine-made precast boxes shall comply with ASTM C1577.

Forms for precast (machine made) boxes shall be made of steel. Forms for precast (formed) boxes may be either wood or steel. Forms shall be mortar-tight and of sufficient strength to prevent bulging or misalignment of adjacent boxes. They shall be constructed to permit their removal without damage to the concrete. Offsets at form joints shall not exceed ⅛ inch (3.2-mm). Forms shall be clean and free of extraneous matter when Portland cement concrete is placed.

Positive means of supporting steel cages in place throughout forming and Portland cement concrete placement will be required and subject to the approval of the Engineer or designated representative. Welding of reinforcing steel will be permitted only where shown on the Drawings. Welding shall be done by a qualified welder.

Precast (machine made) boxes shall be cast by a process, which will provide for uniform placement of the Portland cement concrete in the forms and compaction by mechanical devices, that will assure dense concrete. Portland cement concrete shall be mixed in a central batch plant or other approved batching facility from which the quality and uniformity of the Portland cement concrete can be assured. Transit-mixed concrete will not be acceptable for use in precast (machine made) boxes.

Curing of precast boxes made in a commercial plant shall be by any one or by a combination of the following methods, which are compatible with the joint materials selected or as directed by the Engineer or designated representative.

A. Steam Curing

Boxes will be placed in a curing chamber, free from outside drafts and cured in a moist atmosphere maintained by the injection of steam for such time and temperature as necessary for proper curing. The curing chamber shall be constructed to allow full circulation of steam around the entire box. Steam outlets shall be positioned so that live steam is not applied directly to the Portland cement concrete.

B. Water Curing

Boxes may be water cured by covering with water saturated cotton mats, polyethylene sheeting or polyethylene burlap blankets, by a system of perforated pipe or mechanical sprinklers, by porous hose or by

other methods that will keep the boxes moist during the curing period. Water for curing shall conform to Standard Specification Item No. 403S, "Concrete for Structures".

C. Membrane Curing

Type 1 membrane curing compound may be used for interim curing or for complete curing. All surfaces shall be kept moist prior to the application of the curing compound and shall be damp when the compound is applied.

When used for interim curing, the curing compound shall be applied to the outside surface of the box upon removal of forms. It shall also be applied to the inside surface or a suitable covering may be placed over the box opening to protect the inside of the box against rapid drying.

When used for complete curing, curing compound shall be applied to the inside surface of the box when interim curing is applied or when handling strength has been attained, but not later than 24 hours after casting.

Curing shall not be delayed longer than 1 hour after the Portland cement concrete has been placed in the forms or more than ½ hour after removal of forms, unless interim curing is applied.

Precast boxes made in a commercial plant shall be continuously cured for a period of 3 days after reaching handling strength or until the design strength has been attained. Curing may be interrupted for no more than 30 minutes for form removal and no more than 4 hours for removal to a storage area and resumption of curing. All precast boxes shall be protected from freezing during the curing period.

A curing day is a calendar day when the air temperature, taken in the shade away from artificial heat, is above 50°F (10°C) for at least 19 hours or for colder days if satisfactory provisions are made to maintain the temperature at all surfaces of the concrete above 50°F (10°C) for the entire 24 hours.

Test cylinders shall be cured at the same time and in the same manner as the boxes.

Not more than 4 lifting holes may be provided in each box to facilitate handling. They may be cast-in, cut into the fresh Portland cement concrete after form removal or drilled and shall not be more than 2 inches (50-mm) in diameter or 2 inches (50-mm) square. Cutting or displacement of reinforcement will not be permitted. Spalled areas around the holes shall be repaired. Concrete boxes shall be given an ordinary finish conforming to Standard Specification Item No. 410S, "Concrete Structures".

Precast boxes of either type, made in a plant, shall bear the following marking:

The name or trademark of the manufacturer;

The date of manufacture;

The box size and height of fill.

When fitting holes are not provided, one end of each box section shall be clearly marked on the inside and outside walls to indicate the top and/or bottom as it will be installed.

Marking shall be indented into the box or may be painted thereon with waterproof paint.

D. Grout and Bentonite Slurry Injection Holes

Box culvert sections installed by trenchless tunneling and jacking method shall have drilled or fabricated grout injection holes and bentonite slurry injection holes as required by Standard Technical Specification Item No. 501S Jacking or Boring Pipe and its special provision. Injection holes shall be 1½ inch (38 mm) minimum diameter with plugs cast into the box culvert at the time of manufacture.

559S.6 Testing

Precast box culverts made in a commercial plant shall be tested and accepted in accordance with ASTM C1577.

Testing of cast-in-place and precast (formed) box culverts shall conform to Standard Specification Item No. 403S, "Concrete for Structures".

559S.7 Fabricating Tolerances

Tolerances for precast boxes of either type shall conform to the following:

A. The inside vertical and horizontal dimensions shall not vary from plan requirements more than + ½ inch (12.5-mm).

B. The horizontal or vertical plane at each end shall not vary from being perpendicular to the top and bottom by more than ½ inch (12.5-mm) when measured diagonally between opposite interior corners of the end section.

C. The sides of a section at each end shall not vary from being perpendicular to the top and bottom by more than ½ inch (12.5-mm) when measured diagonally between opposite interior corners of the end section.

D. The thickness of walls and slabs shall not be less than that required by the Drawings, except that an occasional deficiency not greater than ¼ inch (6.3-mm), will be acceptable. If proper jointing is not affected, thick nesses in excess of Drawing requirements are acceptable.

E. The straightness of the tongue and groove at the mating surface shall not vary by more than ¼ inch (6.3-mm).

Deviations from the above tolerances will be acceptable if the box sections can be fitted at the plant or job site and it is determined that an acceptable joint can be made. For this condition, an acceptable joint is:

When 2 box sections are fitted together on a flat surface in proper alignment and in the position they will be installed, the longitudinal opening at any point shall not exceed 1 inch (50-mm). Box sections accepted in this manner shall be match-marked for installation.

559S.8 Defects and Repair

Fine cracks or checks on the surface of the member which do not extend to the plane of the nearest reinforcement will not be cause for rejection unless they are numerous and extensive. Cracks, which extend into the plane of the reinforcing steel, but are acceptable otherwise, shall be repaired in an approved manner.

Small damaged or honeycombed areas, which are purely surface in nature, may be repaired. Excessive damage, honeycomb or cracking will be subject to structural review. Repairs shall be sound, properly finished and cured in conformance with the pertinent specifications.

When fine cracks or hairchecks on the surface indicate poor curing practices, further production of precast boxes shall be discontinued until corrections are made and proper curing provided.

559S.9 Storage and Shipment

Precast boxes shall be stored on level blocking in a manner acceptable to the Engineer or designated representative. No load shall be placed upon them until design strength is reached and curing completed. Shipment of boxes may be made when the design strength and curing requirements have been met.

559S.10 Construction Methods

Excavation and backfill shall conform to Standard Specification Item No. 401S, "Structural Excavation and Backfill" and Standard Specification Item No. 510, "Pipe", except where tunneling or jacking methods are required or indicated on the Drawings.

Precast concrete boxes shall be bedded on a foundation of firm stable material accurately shaped to conform to their base. When indicated on the Drawings, special bedding materials shall be provided.

The envelope shall extend the full trench width from a depth of 6” (150 mm) and shall rise to at least 12” (300 mm) above the box. Geotextile filter fabric shall be placed within the bedding envelope approximately 8” (200 mm) above the top of the box and covered with a minimum of 4” (100 mm) of bedding material to protect fabric during placement of compaction and backfill. Damaged fabric should be removed and replaced or overlapped at least 12” (300 mm).

Joints sealed with preformed flexible joint sealants shall comply with ASTM C990. Joints sealed with rubber gaskets shall comply with ASTM C1677. Install joint sealants in accordance with the box culvert and joint sealant manufacturers' recommendations. Place the joint sealer so that no dirt or other deleterious materials come in contact with the joint sealing material. Pull or push home the box culvert with enough force to properly seal the joint. Remove any joint material pushed out into the interior of the box culvert to be flush and smooth with the inside surface of the box culvert. Protrusion of joint material greater than ⅛" (3.13 mm) into the interior of the box culvert shall be grounds for rejection of the box as installed. Observe joint sealant manufacturer's recommendations for installation temperature of the joint sealant. Apply joint sealant to box culvert joint immediately before placing box culvert section in trench, and then connect box culvert section to previously laid box culvert section.

Contractor shall provide video recording of installed box culverts, in accordance with the video recording work requirements of Standard Specification Item No. 510.

If video inspections reveals joints where soil infiltration is evident, or where joints or conduits are otherwise defective, then the contractor shall remove and replace all affected conduit or repair joints using joint repair techniques recommended by the manufacturer to achieve a completed system that meets all Contract requirements.

When precast boxes are used to form multiple barrel structures, they shall be placed in conformance with the details indicated on the Drawings. Materials to be used between barrels shall be as indicated on the Drawings.

Connections of precast boxes to cast-in-place boxes or to any required headwalls, wingwalls, riprap or other structures shall conform to the details indicated on the Drawings.

Lifting holes shall be filled with mortar or concrete and cured to the satisfaction of the Engineer or designated representative.

559S.11 Measurement

A. Cast in Place Box Culverts

The quantities of Portland cement concrete of the various classifications. which will constitute the completed and accepted "Box Culverts" in place will be measured by the cubic yard (cubic meter: 1 cubic meter equals 1.308 cubic yards), based on the dimensions indicated on the Drawings.

B. Precast

Concrete box culverts of each size and type shall be measured by the lineal foot (lineal meter: 1 lineal meter equals 3.28 lineal feet). The measurement will be made between the ends of the box along the central axis.

For concrete boxes used in multiple barrel structures, the measured length will be the sum of the lengths of all barrels measured as described above.

559S.12 Payment

"Concrete Box Culverts" shall be full compensation for constructing, furnishing and transporting boxes; excavation; disposal of surplus or unusable excavated material; providing, hauling, placing, preparing and shaping bedding material and leveling courses; concrete, reinforcing steel; jointing of boxes; connections to existing systems or structures; connections to new systems or structures; preparing, shaping, pumping for dewatering up to 360 gpm; particle migration measures including geotextile filter fabric; hauling, moving, placing and compacting backfill materials; installation and maintenance of temporary pavement repairs; temporary removal and replacement of pavement, curb, drainage structures, driveways, sidewalks, and any other improvements damaged or removed during construction;; and all other items of material, labor, equipment, tools and incidentals necessary to complete this work in accordance with the Drawings and specifications.

Video recording shall be paid for under Standard Specification 510:

Payment will be made under one of the following:

Item No. 559S:	Precast Concrete Box Culverts, ___ Ft. × ___ Ft.	Per Lineal Foot.
Item No. 559S-A:	Cast in Place Concrete Box Culverts	Per Cubic Yard.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Standard Specification Item No. 559S, "Concrete Box Culverts"	
City of Austin Standard Details	
Designation	Description
Detail No. 559S-1	Fabrication Tolerances for Precast Box Culverts
City of Austin Standard Specifications	
Designation	Description
Item No. 210S	Flexible Base
Item No. 403S	Concrete for Structures
Item No. 405S	Concrete Admixtures
Item No. 406S	Reinforcing Steel
Item No. 409S	Membrane Curing
Item No. 410S	Concrete Structures
Item No. 509S	Trench Safety Systems
Item No. 510	Pipe
American Society for Testing and Materials,	
ASTM Designation	Description
C 1577	Standard Specification for Precast reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers Designed According to AASHTO LRFD
Texas Department of Transportation, Manual of Testing Procedures	
Test Method	Description

Tex 704-1	Making, Curing, and Testing Compression Test Specimens in Precast Concrete

RELATED CROSS REFERENCE MATERIALS	
Standard Specification Item No. 559S, "Concrete Box Culverts"	
Texas Department of Transportation: Standard Specifications for Construction, Maintenance Of Highways, Streets and Bridges	
Designation	Description
Item No. 420	Concrete Structures
Item No. 421	Portland Cement Concrete
Item No. 440	Reinforcing Steel

ITEM NO. 601S SALVAGING AND PLACING TOPSOIL 11-14-16

601S.1 Description

This item shall govern the removal, storage and placement of approved on-site naturally occurring topsoil and topsoil mix (see 601S.3.A) to the depths and area shown on the Drawings or as directed by the Engineer or Landscape Architect.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text and accompanying tables, the inch-pound units are given preference followed by SI units shown within parentheses.

Source: Rule No. R161-16.21, 11-14-16.

601S.2 Submittals

A. Submittals required before construction:

1. Soil test results and soil classification necessary for approval of material as suitable topsoil. Soil test results should include, at minimum, texture; percentage organic matter (OM); salinity (soil salt) level; pH; and amounts of phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), nitrate-nitrogen (NO_3-N), and sulfate-sulfur (SO_4-S).
2. For topsoil mixes containing compost, the soil test for shall also include moisture content, C:N ratio and Solvita compost maturity index.
3. A sample (1-gallon) of proposed topsoil or topsoil mix shall be submitted to the Owner or their representative 30 calendar days before installation and be approved before installation. Sample should be labeled including type of material, specification number; name, address, and telephone number of manufacturer or supplier; and address of the location of the source or material stockpile.

B. Submittals/Inspection required during construction:

1. Delivery tickets indicating type/product name, source and quantities of imported topsoil mix or compost (for mixing with salvaged soil).
2. Deliveries of soil to a job site shall be inspected by the project Engineer or Landscape Architect or Owner's construction inspector before placement to verify product compliance with specification.

Source: Rule No. R161-16.21, 11-14-16.

601S.3 Materials

A. **Topsoil Mix**

1. Topsoil mix shall be composed of 4 parts of soil mixed with 1 part compost, by volume. The soil shall be locally available native soil that meets the following specifications:
   a) Shall be free of trash, weeds, deleterious materials, rocks and debris.
   b) 100% shall pass through a ⅜-inch (9.5 mm) screen.

c) Soil to be a black or dark brown loamy material that meets the requirements of the table below in accordance with the USDA textural triangle. Soil known locally as "red death" is not an allowable soil. Textural composition shall meet the following criteria:

Textural Class	Minimum	Maximum
Clay	5%	50%
Silt	10%	50%
Sand	15%	67%

d) Organic matter percentage shall be at least 5.0% after the addition of compost.

e) Salinity shall be below 6.00 mmhos/cm.

f) An owner/project designer(s) may propose use of onsite salvaged topsoil which does not meet the soil texture class required above by providing a soil analysis and a written statement from a qualified professional in soils, landscape architecture, or agronomy indicating the onsite topsoil will provide an equivalent growth media and specifying what, if any, soil amendments are required.

2. The compost shall be locally available and shall meet the following specifications:

a) Shall be well decomposed, stable to very stable, weed-free plant-based material source derived from yard trimmings or City approved alternate source. The Carbon/Nitrogen (C/N) ratio shall be less than 25:1 and trace metals test results should "pass".

b) Shall be blended and ground leaf, wood and other plant-based material, composted for a minimum of nine (9) months and at temperatures sufficient to break down all woody fibers, seeds and leaf structures, free of toxic material at levels that are harmful to plants or humans. Source material shall be yard waste trimmings blended with other plants or other materials designed to produce compost high in fungal material. Non-vegetal source materials may be acceptable upon approval by the Owner. The compost will possess no objectionable odors and shall not resemble the raw material from which it was derived.

c) Compost shall be commercially prepared compost and meet US Compost Council STA/TMECC criteria or as modified in this section for "Compost as a Landscape Backfill Mix Component".

http://compostingcouncil.org/admin/wp-content/plugins/wp-pdfupload/pdf/191/LandscapeArch_Specs.pdf

d) Compost shall comply with the following parameters:

PARAMETERS[1]	**REPORTED AS (UNITS OF MEASURE)**	**GENERAL RANGE**
pH	pH units	6.0 - 8.5
Salinity (electric conductivity)	dS/m (mmhos/cm)	Maximum 10
Moisture Content	%, net weight basis	30 - 60%
Organic Matter Content	%, dry weight basis	30 - 65%
Particle Size	% passing a selected mesh size, dry weight basis	98% pass through ¾ inch screen
Stability Carbon Dioxide Evolution Rate	mg CO2-C per g OM per day	<8
Solvita Compost Maturity Test	Solvita units	>6
Physical Contaminants (inerts)	%, dry weight basis	<1%

Chemical Contaminants[2]	mg/kg (ppm)	Meet or exceed US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3 levels
Biological Contaminants Select pathogens Fecal coliform bacteria or Salmonella[3]	MPN per gram per dry weight MPN per 4 grams per dry weight	Meet or exceed US EPA Class A standard, 40 CFR § 503.32(a) levels

[1] Recommended test methodologies are provided in Test Methods for the Examination of Composting and Compost (TMECC, The US Composting Council).

[2] US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3 levels = Arsenic 41 ppm, Cadmium 39 ppm, Copper 1,500 ppm, Lead 300 ppm, Mercury 17 ppm, Molybdenum 75 ppm, Nickel 420 ppm, Selenium 100 ppm, Zinc 2,800 ppm.

[3] US EPA Class A standard, 40 CFR § 503.32(a) levels = Salmonella <3 MPN/4grams of total solids or Fecal Coliform <1,000 MPN/gram of total solids.

e) Compost and other soil amendments shall be worked into the existing on-site topsoil with a disc or tiller to create a well-blended material.

2. All disturbed areas to be revegetated are required to provide a minimum of six (6) inches of topsoil. The topsoil shall be able to support the growth of planting (Standard Specification Item No. 608S), Seeding for Erosion Control (Standard Specification Item No. 604S), sodding (Standard Specification Item No. 602S) and Native Seeding and Planting for Restoration (Standard Specification Item No. 609S).

B. **Water.** Water shall be furnished by the Contractor and shall be clean and free from seed source, pesticide, fertilizer, industrial wastes and other objectionable matter.

Source: Rule No. R161-16.21, 11-14-16.

601S.4 Sources

The salvaged topsoil may be obtained from the right-of-way at sites of proposed excavation or embankment when shown on the Drawings or identified by the Engineer or Landscape Architect. The approximate quantity of acceptable topsoil to be salvaged from the project will be shown on the Drawings. The topsoil or topsoil mix may also be obtained from approved sources, which are located outside the right-of-way and have been secured by the Contractor.

Source: Rule No. R161-16.21, 11-14-16.

601S.5 Construction Methods

Tree protection fencing will be maintained at all times to protect all trees in the limits of construction. Where removal of trees is indicated on the Drawings, they shall be marked as directed by the Engineer, Landscape Architect, or certified arborist.

Construction equipment shall not be operated nor construction materials stockpiled within the critical root zone of trees. Tree protection fencing shall remain in place per tree protection plan. Topsoil materials shall not be placed within the critical root zones of trees until tree wells are constructed that conform to Item No. 610S, "Preservation of Trees and Other Vegetation " and Standard Details 591S-1 and 610S-6. The source and stockpile areas shall be kept drained, insofar as practicable, during the period of topsoil removal.

The existing topsoil shall be removed from the area indicated on the Drawings, stockpiled in designated area on the site plan, windrow along the right-of-way or other designated area outside the 100-year floodplain (as defined in the Drainage Criteria Manual and Land Development Code) or spread over an area that is ready for topsoil application in accordance with the Drawings or as directed by the Engineer or Landscape Architect.

Trash, wood, brush, stumps, rocks over 1½ inches (37.5 mm) in size and other objectionable material encountered shall be removed and disposed of as directed by the Engineer or Landscape Architect prior to beginning of work required by this item. Grass and other herbaceous plant materials may remain. Large clumps shall be broken up.

Where the proposed planting area is compacted more than 85% proctor or 225 p.s.i., the existing soil should be tilled to a minimum depth of six inches before installation of the salvaged topsoil or topsoil mix. In the critical root zone of trees reference 661S.

The topsoil should not be placed if the ground is muddy, saturated, or frozen.

The topsoil should not be placed if the ground is extremely dry. Wet soil enough to prevent dust from leaving the site.

After the grading has been completed to the required alignment, grades and cross-sections and prior to the spreading of the salvaged topsoil, any clay or tight soil surfaces shall be scarified by plowing furrows approximately 4 inches (100 mm) deep along horizontal slope lines at 2 foot (600 mm) vertical intervals. The spreading of the salvaged topsoil or topsoil mix shall be undertaken as soon as the grading has been completed. The topsoil shall be spread so as to form a cover of uniform thickness indicated. After the topsoil has been placed and shaped, it shall be sprinkled with water and rolled to provide a suitable seed bed.

Source: Rule No. R161-16.21, 11-14-16.

601S.6 Measurement and Payment

Salvaging, removal and/or placing topsoil materials will not be measured for payment, but shall be included in the unit price bid for the item of construction in which these activities are used.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Specification 601S, "Salvaging and Placing Topsoil"	
City of Austin Standard Specification Items	
Designation	Description
Item No. 602S	Sodding for Erosion Control
Item No. 604S	Seeding for Erosion Control
Item No. 608S	Planting
Item No. 609S	Native Seeding and Planting For Restoration
Item No. 610S	Preservation of Trees and Other Vegetation
City of Austin Standard Details	
Designation	Description
591S-1	Dry Stack Rock Wall
610S-6	Typical Tree Well Applications

RELATED CROSS REFERENCE MATERIALS
Specification 601S, "Salvaging and Placing Topsoil"

City of Austin Standard Specification Items	
Designation	Description
Item No. 102S	Clearing and Grubbing
Item No. 104S	Removing Concrete
Item No. 110S	Street Excavation
Item No. 111S	Excavation
Item No. 120S	Channel Excavation
Item No. 132S	Embankment
Item No. 606S	Fertilizer
City of Austin Standard Details	
Designation	Description
610S-1	Tree Protection Fence Locations
610S-2	Tree Protection Fence, Type B Chainlink
610S-3	Tree Protection Fence, Type B Wood
610S-4	Tree Protection Fence, Modified Type A
610S-5	Tree Protection Fence, Modified Type B
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item No. 100	Preparing Right-of-way
Item No. 110	Excavation
Item No. 160	Furnishing and Placing Topsoil
Item No. 164	Seeding for Erosion Control
Item No. 204	Sprinkling
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
Tex-103-E	Determination of Moisture Content of Soil Materials
Tex-104-E	Determination of Liquid Limit of Soils
Tex-105-E	Determination of Plastic Limit of Soils
Tex-106-E	Method of Calculating the Plasticity Index of Soils

ITEM NO. 602S SODDING FOR EROSION CONTROL 6-16-08

602S.1 Description

This item shall govern planting of Bermuda grass; St. Augustine or other acceptable grass sod at locations indicated on the Drawings or as directed by the Engineer or designated representative in accordance with this Standard Specification Item.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text and accompanying tables, the inch-pound units are given preference followed by SI units shown within parentheses.

602S.2 Submittals

The submittal requirements for this specification item shall include the identification of the type and source of sodding, the type of mulch, type of tacking agent and type and rate of application of fertilizer.

602S.3 Materials

A. Block and Mulch Sod

The sod shall consist of live, growing Bermuda Grass, St. Augustine grass, when shown on the Drawings, or other acceptable grass sod indicated on the Drawings secured from sources that are approved by the Engineer or designated representative. Bermuda Grass sod, St. Augustine sod or other grass sod as shown on the Drawings shall have a healthy, virile root system of dense, thickly matted roots throughout the soil of the sod for a minimum thickness of 1 inch (25 millimeters). The thickness measure does not include grass. The sod shall be cut in rectangular pieces with its shortest side not less than 12 inches (300 mm). The Contractor shall not use sod from areas where the grass is thinned out nor where the grass roots have been dried out by exposure to the air and sun to such an extent as to damage its ability to grow when transplanted.

The sod shall be substantially free from noxious weeds, Johnson grass or other grasses and shall not contain any matter deleterious to its growth or which might affect its subsistence or hardiness when transplanted. Unless the area has been closely pastured, it shall be closely mowed and raked to remove all weeds and long standing stems. Sources from which sod is to be secured shall be approved by the Engineer or designated representative.

Care shall be taken at all times to retain the native soil of the roots of the sod during the process of excavating, hauling and planting. Sod material shall be kept moist from the time it is dug until it is planted. The sod existing at the source shall be watered to the extent required by the Engineer or designated representative prior to excavating.

B. Fertilizer

Fertilizer and the rate of application shall conform to the requirements of Standard Specification Item No. 606S, "Fertilizer".

C. Mulch

Straw mulch shall be oat, wheat or rice straw. Hay mulch may be substituted for straw mulch and shall be Prairie Grass, Bermuda grass or other hay approved by the Engineer or designated representative. The hay or straw mulch shall be free of Johnson grass or other noxious weeds and foreign materials. It shall be kept in a dry condition and shall not be molded or rotted.

D. Water

Water shall be furnished by the Contractor and shall be clean and free of industrial wastes and other substances harmful to the growth of sod or to the area irrigated.

E. Tacking Agents

Tacking agents for straw or hay mulch shall be as shown on the Drawings.

602S.4 Planting Season

All planting shall be done between April and November except as specifically authorized in writing by the Engineer or designated representative.

602S.5 Construction Methods

A. General

After the designated areas have been completed to the lines, grade and cross sections indicated on the Drawings, the surface shall be worked to a depth of not less than 4 inches (100 mm) with a disc, tiller or other equipment approved by the Engineer or designated representative. Fertilizer nutrients shall be applied and tilled. Areas that become crusted shall be reworked to an acceptable condition before sodding. Sodding of the type specified shall conform to the requirements of this Specification Item. The Contractor shall give continuous care to the sodded area until the sod is accepted.

B. Placement

The sod shall be placed on the prepared surface with the edges in close contact and alternate courses staggered. In ditches the sod shall be placed with the longer dimension perpendicular to the flow of water in the ditch. On slopes, starting at the bottom of the slope, the sod shall be placed with the longer dimension parallel to the contours of the ground. The exposed edges of sod shall be buried flush with the adjacent soil. On slopes exceeding 3:1 or where the sod may be displaced, the sod shall be pegged with not less than 4 stakes or ground staples per square yard (square meter) with at least 1 stake or ground staple for each piece of sod.

Pegs shall be of wood lath or similar material, pointed and driven with the flat side against the slope, 6 inches (150 mm) into the ground, leaving approximately ½ inch (12.5 mm) of the top above the ground. Ground staples shall not be less than 13 inches (330 mm) in length and shall be constructed of No. 11 gage (3 mm) wire that is bent to form a "U" approximately 1 inch (25 mm) in width.

C. Watering

Immediately after the area is sodded, it shall be watered with a minimum of 5 gallons of water per square yard (22.5 liters per square meter) and at 10 day intervals as needed and as directed by the Engineer or designated representative. Subsequent to the initial application water shall be applied at a minimum rate of 3 gallons per square yard (13.5 liters per square meter), as required on the Drawings or as directed by the Engineer or designated representative until final acceptance by the City or until the grass uniformly reaches a height of 2 ½ inches (62.5 mm).

Availability of water from the Austin Water Utility will be limited as stated under the Water Conservation Standard, City of Austin Land Development Code Chapter 6-2, Article II, "Water Use Management Plan Established".

The use of potable water will be restricted as stated in city of Austin Land Development code Sections 6-4-73, 6-4-54, 6-4-63, 6-4-64, 6-4-65, 6-4-81, 6-4-92, 15-9-37(D) and 15-9-101(B).

D. Finishing

Where applicable, the shoulders, slopes and ditches shall be smoothed after planting has been completed and shaped to conform to the desired cross sections shown on the Drawings. Any excess soil from planting operations shall be spread uniformly over adjacent areas or disposed of as directed by the Engineer or designated representative so that the completed surfaces will present a neat appearance. All sodded areas shall be rolled after the initial watering application, when sufficiently dry.

602S.6 Block Sodding

At locations indicated on the Drawings or where directed by the Engineer or designated representative, sod blocks shall be carefully placed on the prepared areas. The fertilizer shall then be applied in accordance with the applicable provisions of Item No. 606S, "Fertilizer" and thoroughly watered. When sufficiently dry, the sodded area shall be rolled or tamped to form a thoroughly compacted, solid mat. Any voids left in the block sodding shall be filled with additional sod and tamped. Surfaces of block sod which, in the opinion of the Engineer or designated representative may slide due to the height and slope of the surface or nature of the soil, shall be pegged with wooden pegs driven through the sod blocks into firm earth sufficiently close to hold the block sod firmly in place. Edges along curbs and drives, walkways, etc., shall be carefully trimmed and maintained until the sodding is accepted.

602S.7 Mulch Sodding

The sod source shall be disked in 2 directions cutting the sod thoroughly to a depth of not less than 4 inches (100 mm). Sod material shall be excavated to a depth of not more than 2 inches (50 mm) below the existing root system, being careful to avoid having soil containing no grass roots. The disked sod may be windrowed or otherwise handled in a manner satisfactory to the Engineer or designated representative. The material shall be rejected if not kept in a moist condition.

Prior to placement of mulch sod, the cut slopes shall be scarified by plowing furrows 4 inches (100 mm) to 6 inches (150 mm) deep along horizontal slope lines at 2 foot (600 mm) vertical intervals. Excavated material from the furrows shall not protrude more than 3 inches (75 mm) above the original surface of the cut. Fertilizer shall be distributed uniformly over the area in accordance with the applicable provisions of Item No. 606S, "Fertilizer". The sod shall then be deposited upon the prepared area and spread uniformly to the thickness indicated on the Drawings.

Any section that is not true to lines and cross sections shall be remedied by the addition of sod material or by reshaping the material to meet the requirements of "Finishing" [Section 602S.5 (4)]. After the sod material has been spread and shaped, it shall be thoroughly wetted and compacted with a corrugated roller of the "Cultipacker" type. All rolling of slope areas shall be on the contour.

602S.8 Measurement

Work and acceptable material for "Sodding for Erosion Control" will be measured by the square yard (square meter: 1 square meter is equal to 1.196 square yards) complete in place with a minimum of 95 percent growth with a 2 ½ inch (62.5 mm) stand of grass.

602S.9 Payment

The work performed and materials furnished and measured as provided under "Measurement" will be paid for at the unit bid price for Bermuda Block Sodding", "St. Augustine Block Sodding", "Bermuda Mulch Sodding" or "Other Approved Grass Sodding". The prices shall each represent full compensation for completion of the work including all water applications, rolling, pegging and fertilizer as indicated on the Drawings.

Payment will be made under one of the following:

Pay Item No. 602S-A:	Bermuda Block Sodding	Per Square Yard.
Pay Item No. 602S-B:	St. Augustine Block Sodding	Per Square Yard.
Pay Item No. 602S-C:	Bermuda Mulch Sodding	Per Square Yard.
Pay Item No. 602S-D:	Grass Sodding	Per Square Yard.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Specification 602S, "Sodding for Erosion Control"	
City of Austin Land Development Code	
Designation	Description
Chapter 4-2, Art. II	Emergency and Peak Day Water Use Management
City of Austin Standard Specification Items	
Designation	Description
Item No. 606S	Fertilizer
City of Austin Land Development Code	
Designation	Description
Section 6-4-52	Water Use Management Plan Established
Section 6-4-53	Applicability
Section 6-4-54	Compliance Required
Section 6-4-63	Permanent Water Use Restrictions
Section 6-4-64	Water Conservation Stage One Regulations
Section 6-4-65	Water Conservation Stage Two Regulations
Section 6-4-81	Variance
Section 6-4-92	Penalty
Section 15-9-37(D)	Customer's Responsibilities
Section 15-9-101(B)	Basis for Termination of Service

RELATED CROSS REFERENCE MATERIALS	
Specification 602S, "Sodding for Erosion Control"	
City of Austin Standard Specification Items	
Designation	Description
Item No. 110S	Street Excavation
Item No. 111S	Excavation
Item No. 120S	Channel Excavation
Item No. 132S	Embankment
Item No. 601S	Salvaging and Placing Topsoil
Item No. 604S	Seeding for Erosion Control
Item No. 608S	Planting
Item No. 610S	Preservation of Trees and Other Vegetation

Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item No. 100	Preparing Right-of-way
Item No. 110	Excavation
Item No. 160	Furnishing and Placing Topsoil
Item No. 162	Sodding for Erosion Control
Item No. 164	Seeding for Erosion Control
Item No. 166	Fertilizer
Item No. 168	Vegetative Watering
Item No. 204	Sprinkling

ITEM NO. 610 PRESERVATION OF TREES AND OTHER VEGETATION 04-14-25

610.1 Description and Definitions

This item shall govern the proper care, protection and treatment of trees and other vegetation in the vicinity of the permitted development activity (as defined in Land Development Code 25-1-21(27)). All work shall be performed in accordance with the City approved drawings and specifications (e.g. Standard Series 600) or as approved by the City Arborist (as defined below). Tree pruning and/or treatments shall be performed under the direct supervision of a qualified arborist (as defined below) or as allowed by the City Arborist.

Definitions

City Arborist - City official designated by the Director of the Development Services Department (Land Development Code 25-8-603) or as designated by the City Arborist.

Oak wilt - a tree disease caused by a fungus "Bretziella fagacearum" that infects the vascular system of Oak "genus Quercus" trees and prevents water transport through the trunk and canopy of the tree. This usually fatal tree disease can be spread by certain insects that come into contact with tree wounds or by interconnected tree roots. February through June is a high risk period due to the stage of the fungus and insect activity. See section 610.4(H) for additional requirements for preventing Oak wilt infection.

Qualified Arborist - an individual engaged in the profession of arboriculture or closely related field who, through experience, education, and related training, possesses the competence to provide for, or supervise, the management of trees and other woody plants (as defined in the most current version of ANSI A300 (Part 1)-2001, section 4.1).

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text and accompanying tables, the inch-pound units are given preference followed by SI units shown within parentheses.

Source: Rule No. R161-25.05, 4-14-25.

610.2 Submittals

The following is a list of the minimum submittal requirements for this specification item shall include:

A. Identification of the location, type of protective fencing (i.e. A, B or C), materials of construction and installation details;

B. Qualified Arborist credentials (i.e. proof of certification from the International Society of Arboriculture, licenses, resume and/or references);

C. Type, location and construction details for proposed tree wells;

D. Location, type, materials of construction and installation details for permeable paving;

E. Proposed nutrient mix specifications and when required by the City Arborist, soil and/or foliar analysis for fertilizer applications.

Source: Rule No. R161-25.05, 4-14-25.

610.3 Materials

A. Protective Fencing and Signage

Protective fencing is designated as the materials used to protect the root zones of trees as illustrated in City of Austin Standard Detail 610-1. Three basic types of protective fencing materials are allowed by the City of Austin. Type A and Type B are typical applications and shall be installed where damage potential to a tree root system is high, while Type C shall be installed where damage potential is minimal. The specific type of protective fencing for the work shall be as indicated on the drawings. Type C fence materials shall be subject to approval by the City Arborist. Type C fencing shall be replaced by Type A or Type B fencing as directed by the City Arborist if it fails to perform the necessary function.

1. Type A Chain Link fence (Typical Application-high potential damage)

   Type A protective fencing shall be installed in accordance with City of Austin Standard Details 610-2 and 610-4 and shall consist of a minimum five-foot high chain link fencing with tubular steel support poles or "T" posts.

2. Type B Wood Fence (Typical Application-high potential damage)

   Type B protective fencing shall be installed in accordance with City of Austin Standard Details 610-3 and 610-5 and shall consist of any vertical planking attached to 2x4-inch horizontal stringers which are supported by 2x4-inch intermediate vertical supports and a 4x4-inch at every fourth vertical support.

3. Type C Other Materials (Limited Application-minimal potential damage)

   The following materials may be permitted as alternates for limited or temporary applications (3 days or less) where tree damage potential is minimal (as determined by the City Arborist):

   (a) High visibility plastic construction fencing.

   The fabric shall be 4 feet in width and made of high density polyethylene resin, extruded and stretched to provide a highly visible international orange, non-fading fence. The fabric shall remain flexible from -60°F to 200°F and shall be inert to most chemicals and acid. The fabric pattern may vary from diamond to circular with a minimum unit weight of 0.4 lbs./Ft.

   The fabric shall have a 4 foot width minimum tensile yield strength (Horizontal) of 2000 psi, ultimate tensile strength of 2680 psi (Horizontal) and a maximum opening no greater than 2 inches.

   (b) Other approved equivalent restraining material.

   The fencing materials, identified in (a) and (b) above, shall be supported bysteel pipe, tee posts, U posts or 2" × 4" timber posts that are a minimum of 5½ feet in height and spaced no more than 8 feet on centers. The fabric shall be secured to post by bands or wire ties.

4. Signage

   A laminated sign, no smaller than 8.5 X 11 inches, shall be posted on each tree protective device, and at least every 100 linear feet on protective fencing, identifying the following information: Tree & Root Protection Zone, Per City of Austin code (Chapter 25-8, Subchapter B, Article 1) this protective device is to remain in place for the entirety of the development project and illegal removal is subject to fines and work suspensions. Additional information can be obtained at the City Arborist (512) 974-1876) web site (http://www.ci.austin.tx.us/trees). Zona de Protección del Árbol y las Raíces: el dispositivo protector debe quedarse en el lugar para la totalidad del proyecto de la construcción. Para información adicional, contacta la Arborista Municipal (512) 974-1876 http://www.ci.austin.tx.us/trees/trees_spanish.htm.

B. Trunk Protection (Limited Application)

When indicated on the drawings or directed by the City Arborist tree trunk protection shall be provided in accordance with City of Austin Standard Details 610-4 and 610-5. Tree trunk protection shall consist of any 2

x 4-inch or 2 x 6-inch planking or plastic strapping and shall be attached in a manner that does not damage the tree.

C. Tree Dressing

Wound treatments should not be used to cover wounds or pruning cuts, except when recommended for disease (see section 610.4(H)), insect, mistletoe, or sprout control (from ANSI A300 (Part 1)-2001, section 5.4.1).

D. Tree Wells for Raised Grades

When existing grades are raised by more than 4 inches, the tree root system shall be protected by the installation of tree wells in accordance with City of Austin Standard Detail 610-6. Native stone or non-toxic timber shall be used for the separator wall of the well and PVC conforming to ASTM D-2729, SDR-35 shall be used for the aeration systems in fill areas.

E. Permeable Paving (Environmental Criteria Manual Section 3.5.A.1)

Permeable segmented pavers in conjunction with PVC pipe aeration system or concrete on gravel base with cored holes shall be used to protect existing tree root zones when indicated on the drawings or directed by the City Arborist.

F. Fertilizer

Humate/nutrient solutions with mycorrhizae components or soil injection at recommended rates are to be used when appropriate. Construction which will be completed in less than 90 days may use materials at half the recommended rates. Alternative organic fertilizer materials are acceptable when approved by the City Arborist.

Source: Rule No. R161-25.05, 4-14-25.

610.4 Construction Methods

A. Protective Fencing

All trees and shrubs in the proximity of the construction site shall be carefully checked for damage prior to initiation of the permitted development activity.

All individual or groups of trees, shrubs, and natural areas shown to be protected on the drawings or identified to be protected by the City Arborist, shall be protected during construction with temporary fencing as indicated on the drawings or as directed by the City Arborist.

Protective fences (section 610.4.A) shall be installed prior to the start of any site preparation work (clearing, grubbing, or grading), and shall be maintained in functioning condition throughout all phases of the construction project.

Protective fence locations in close proximity to intersecting streets or drives shall adhere to the sight distance (Section 1.3.1.C.6) and desirable sight triangle (Figure 1-6 criteria found in the City of Austin Transportation Criteria Manual).

1. Protective fences shall be constructed at the locations (typically the outer limits of the critical root zone) and with materials indicated on the drawings to prevent the following (Environment Criteria Manual, Appendix P-2, Note 6):

    (a) Soil compaction in the root zone area resulting from vehicular traffic or storage of equipment or materials.

(b) Critical root zone disturbances due to grade changes [greater than 4” cut or fill] or trenching not reviewed and authorized by the City Arborist.

(c) Damage to exposed roots, trunks or limbs by mechanical equipment.

(d) Other activities detrimental to trees such as chemical storage, concrete truck cleaning, and fires.

2. Exceptions to the installation of protective fences at the tree drip lines may be permitted in the following cases:

(a) Where there is to be an approved grade change, impermeable paving surface, tree well, or other such site development, the fence shall be erected no more than 2 feet beyond the area of disturbance unless approved by the City Arborist;

(b) When permeable paving is to be installed within a tree's critical root zone, the fence shall be erected at the outer limits of the permeable paving area (prior to any site grading so that this enclosed area is graded separately to minimize root damage);

(c) When trees are located close to a proposed building or other construction activity (Environment Criteria Manual, Appendix P-2, Note 6.c), the fence shall be erected up to 10 feet to allow work space between the fence and the structure. Apply organic mulch to a depth of 8 inches in the unprotected root zone area;

(d) When there are street-side pedestrian walkways, fences shall be constructed in a manner that does not obstruct safe passage;

(e) When there are severe space constraints due to tract size or other special requirements, the Contractor shall contact the City Arborist to discuss alternatives.

When any of the exceptions listed above will result in a fence being located closer than five (5) feet to a tree trunk, the Contractor shall also protect the trunk with strapped-on planking to a height of 8 feet (or to the limits of lower branching) in addition to the fencing requirement (City of Austin Standard Details 610-4 and 610-5).

B. Pruning and Repair of Damage

Tree pruning, to provide clearance for the work and/or to remove hazards, shall be performed under the direct supervision of a qualified arborist and shall follow standards identified in ANSI A300 (Part 1), "Pruning". A minimum clearance height of eight (8) feet above the street level must be provided and maintained for all existing trees if adjacent to a sidewalk. However, if the limbs of trees overhang the curb line or edge of travel lane of any street, a minimum clearance height of fourteen (14) feet is required (Transportation Criteria manual section 6.2.3,A, 4, "Clearance Height"). Pruning shall provide the minimum clearance needed to perform the work or remove a hazard unless otherwise directed by the City Arborist to comply with transportation criteria or to mitigate for damage.

If tree damage compromises a tree's structural integrity then the area shall be adequately secured until a qualified arborist makes an assessment of the tree and corrective actions are completed with approval from the City Arborist. Damage to oak trees shall be treated immediately, with consideration for site safety, to reduce the risk of Oak Wilt infection (See 610.4.H, "Oak Wilt Prevention"). Tree root wounds shall be treated to remove loose, damaged tissue from in and around the wound or if necessary the root shall be cut cleanly and covered with topsoil, or other material approved by the City Arborist, to prevent drying of root tissue and to create a favorable environment for root sprouting. Trunk wounds shall also be treated to remove loose, damaged tissue around the wound. Tree canopy repairs shall be performed in accordance with the most current version of ANSI A300 (Part 1), "Pruning", to prevent further damage to the tree and to promote recovery of the tree to sound condition. The ANSI standard describes proper pruning methods for limb removal and for making finish pruning cuts.

Trees damaged or removed without prior approval or where minimum design criteria is exceeded due to failure to maintain approved tree protection shall be mitigated (Environmental Criteria Manual section 3.5.4, "Mitigation Measures") in accordance with Land Development Code Chapter 25-8, Subchapter B, Article 1.

All trees damaged during construction shall receive an application of fertilizer within the drip line conforming to Standard Specification Item No. 606S, "Fertilizer" at the rate of 4 pounds per caliper inch.

C. Cutting and Filling Around Trees

When the depth of an excavation or embankment exceeds 4 inches within the critical root zone of any tree with a trunk diameter greater than 8 inches, the City Arborist may require a tree well to be constructed per the City of Austin approved specifications and details (Section 610.3.D and City of Austin Standard Detail 610-6).

D. Paving Around Trees

Where new paving within the ½ critical root zone of any tree greater than a 8 inches diameter is approved, a permeable pavement and aeration system may be required by the City Arborist per the City of Austin Standard Detail (Section 610.3.E, Environmental Criteria Manual Section 3.5.3.A.1 and Figure 3-8) must be installed as indicated on the Drawings, except for street construction.

E. Tree Removal

Tree removal shall comply with Land Development Code Chapter 25-8, Subchapter B, Article 1. An approved permit, or an approved site plan is required for removal of trees 8" and larger (see Environmental Criteria manual section 3.3.2.A.2 and figure 3-1 for measurement standards) with additional requirements for City Parkland properties and for Hill Country Roadway Corridor sites. Trees 19 inches in diameter and greater are defined as protected trees and require specific review from the City Arborist to approve a permit or site plan for removal. In addition heritage trees require a more extensive evaluation by the City Arborist and may require rulings from boards and commissions.

All trees to be removed shall be performed in a manner that does not damage the canopies, trunks or root systems of remaining trees and that protects all existing facilities, improvements and vegetation. Removal of oak trees shall follow the Oak Wilt Prevention procedures per the City of Austin Standards (Section 610.4,(H)). All tree material shall be removed from the site unless authorized by the City Arborist or if it will be used as wood chips or mulch.

When a tree or shrub is scheduled for removal, it shall be cut to a maximum depth of 12 inches below the surrounding grade (the tree(s) should be removed at grade, and with hand saws, in situations where other tree root systems are present which are to be preserved). When applicable, after tree removal, soil shall be placed in the hole to a depth matching the existing grade.

All damage resulting from tree removal or pruning shall be repaired at the Contractor's own expense and shall follow guidelines in this specification.

F. Final Cleanup

All temporary tree and shrub preservation and protection measures shall be removed when the construction has been completed and any mulch applications shall be removed or reduced to no more than 3 inches depth.

G. Root Zone Aeration and Fertilization

As a component of an effective remedial tree care program per Environmental Criteria Manual section 3.5.4, preserved trees within the limits of construction may require soil aeration and supplemental nutrients. Soil and/or foliar analysis should be used to determine the need for supplemental nutrients. The City Arborist may require these analyses as part of a comprehensive tree care plan. Soil pH shall be considered when determining the fertilization composition as soil pH influences the tree's ability to uptake nutrients from the

soil. If analyses indicate the need for supplemental nutrients, then humate/nutrient solutions with mycorrhizae components are highly recommended. In addition, soil analysis may be needed to determine if organic material or beneficial microorganisms are needed to improve soil health. Materials and methods are to be approved by the City Arborist (512-974-1876) prior to application. The owner or general contractor shall select a fertilization contractor and ensure coordination with the City Arborist.

Pre-construction treatment should be applied in the appropriate season; ideally the season preceding the proposed construction. Minimally, areas to be treated include the entire critical root zone of trees as depicted on the City approved plans. Treatment should include, but not limited to, fertilization, soil treatment, mulching, and proper pruning.

Post-construction treatment should occur during final revegetation or as determined by a qualified arborist after construction. Construction activities often result in a reduction in soil macro and micro pores and an increase in soil bulk density. To ameliorate the degraded soil conditions, aeration via water and/or air injected into the soil is needed or by other methods as approved by the City Arborist. The proposed nutrient mix specifications and soil and/or foliar analysis results need to be provided to and approved by the City Arborist prior to application (Fax # 512-974-3010). Construction which will be completed in less than 90 days may use materials at ½ recommended rates. Alternative organic fertilizer materials are acceptable when approved by the City Arborist. Within 7 days after fertilization is performed, the contractor shall provide documentation of the work performed to the City Arborist, Planning and Development Review Department, P.O. Box 1088, Austin, TX 78767. This note should be referenced as item #1 in the Sequence of Construction.

H. Oak Wilt Prevention Policy

1. Purpose and Scope

   The purpose of this Oak Wilt Prevention Policy is to identify measures that city staff and city-hired contractors and their sub-contractors, who perform the services of removing or trimming trees, will take to prevent the spread of oak wilt.

2. Definitions

   Oak Wilt Disease: A tree disease caused by the fungus, Bretziella fagacearum. The fungus infects the vascular system of a tree. The vascular system contains vessels which transport moisture throughout the tree. The vessels of an infected tree effectively become blocked by the infection of the fungus, and cannot transport adequate moisture to sustain a healthy or living tree. In most cases, the end result is tree mortality.

3. Prevention Policy

   (a) Prior to beginning field work, all city staff associated with projects involving potential contact with oak trees shall be made aware of the city's official Oak Wilt Policy by receiving and reading a written copy of this policy. Staff receiving a written copy of the policy shall include, but not limited to, project managers, equipment operators responsible for removing or trimming trees, or operators using heavy equipment which could cause wounding of susceptible oaks in the use of the equipment. In addition, individual city departments will provide a written copy of the Oak Wilt Policy to contractors participating in city projects in areas where oak trees are present before initiating field work.

   (b) When possible, city staff and contractors should avoid trimming, pruning, or wounding Live Oaks, White oaks and Red Oaks (Spanish, Shumard, Texas Red, and Blackjack oaks) from February through June.

   (c) At all times and irrespective of limb size, all cuts and wounds to oak trees shall be dressed immediately using a non-phytotoxic tree wound dressing. Stump cuts and damaged roots (both above and below ground) shall also be dressed.

(d) Disinfection of pruning tools, saws, and related equipment is mandatory during the trimming or pruning of oak trees. Disinfection of tree removal and trimming equipment shall occur before work begins in a project area, between work in individual oak trees, and again prior to leaving a project area. Acceptable disinfectants include either aerosol disinfectant or a 10 percent bleach-water solution.

*NOTE: Although this policy would require the disinfection of pruning equipment before and between oak trees as a precaution, research does not substantiate disinfection as a means of preventing the transmission of the oak wilt disease.

4. Disposal Policy

(a) Chipping or shredding the wood from infected trees to use as mulch is an acceptable means of recycling the wood. Chipping or shredding allows the wood to dry out quickly, thereby killing the fungus.

(b) Burning diseased wood is an acceptable means of disposal. Burning diseased logs will kill the fungus, and the fungus will not spread with the smoke.

(c) Logs from diseased Red Oaks, that are not chipped, shredded, or burned shall be disposed of at a landfill.

(d) Firewood from diseased Red Oak trees shall not be stored near healthy trees where fungal spores or insects that carry the spores have the potential to spread the fungus to healthy trees. It is recommended to store oak firewood under a sheet of clear plastic, tightly sealing the edges of plastic with soil or bricks. Doing so will prevent any spore carrying beetles from escaping and will solarize and heat the stored firewood to speed the drying process. It is also recommended to use clear plastic, as black plastic will reveal any escape holes to the beetles.

(e) In situations where diseased Red Oak trees are identified and are not accessible for chipping, shredding, or removal, the trunk of the diseased tree should be girdled, and the stem treated with an appropriate herbicide to deaden the tree and hasten the desiccation and drying of the wood below the minimum moisture content that could support the development of fungal spores.

Source: Rule No. R161-25.05, 4-14-25.

610.5 Measurement

Tree and shrub pruning, drains, fertilization, removal of existing trees, etc. will generally not be measured for payment unless included as a contract pay item. Tree wells and protective fencing for tree protection will be measured by the units, complete in place, conforming to the Drawings and applicable City of Austin Standard Details.

Removal of existing trees, when included as a contract pay item, will be measured per each tree.

Source: Rule No. R161-25.05, 4-14-25.

610.6 Payment

The work and materials prescribed herein with the exception of the Protective Fencing and Tree Well (Tree Protection) will not be paid for directly but shall be included in the unit price bid for the item of construction in which this activity is used, unless a payment item is included as a contract pay item.

Except when specified as a contract pay item, payment for removal of existing trees will be paid for in accordance with Item No. 101S, "Preparing Right-of-Way" or Item No. 102S, "Clearing and Grubbing."

When included as a contract pay item, payment will be made under:

Pay Item 610-A:	Protective Fencing Type A Chain Link fence (Typical Application-high damage potential)	Per Lineal Foot
Pay Item 610-B:	Protective Fencing Type B Wood Fence (Typical Application-high damage potential)	Per Lineal Foot
Pay Item 610-C:	Protective Fencing Type C Other Materials (Limited Application-minimal damage potential)	Per Lineal Foot
Pay Item 610-D:	Tree Well (Tree Protection)	Per Each
Pay Item 610-E:	Tree Trunk Protection (Wood Planking)	Per Each
Pay Item 610-R:	Removal of Existing Trees, 8—18 inches in diameter	Per Each
Pay Item 610-RP:	Removal of Existing Trees, 19—23 inches in diameter	Per Each
Pay Item 610-RH:	Removal of Existing Trees, 24 inches or greater in diameter	Per Each

Source: Rule No. R161-18.24, 12-7-2018; Rule No. R161-25.05, 4-14-25.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Specification Item 610, "Preservation of Trees and Other Vegetation"	
City of Austin Standard Specification Items	
Designation	Description
Item No. 101S	Preparing Right-of-Way
Item No. 102S	Clearing and Grubbing
Item No. 606S	Fertilizer
City of Austin Standard Details	
Designation	Description
Item No. 610-1	Tree Protection Fence Locations
Item No. 610-2	Tree Protection Fence, Type A, Chainlink
Item No. 610-3	Tree Protection Fence, Type B, Wood
Item No. 610-4	Tree Protection Fence, Modified Type A, Chainlink
Item No. 610-5	Tree Protection Fence, Modified Type B, Wood
Item No. 610-6	Tree Protection, Tree Wells
City of Austin Transportation Criteria Manual	
Designation	Description
Section 1.3.1.C.6	Sight Distance
Section 6.2.3.A.4	Clearance Height
Figure 1-6	Desirable Sight Triangle
City of Austin Environmental Criteria Manual	
Designation	Description
Appendix P-2, Note 6	Exceptions to Installing Fences
Appendix P-2, Note 6c	Trees close to proposed buildings - - -
Appendix P-6	Remedial Tree Care Notes
Section 3.3.2.A.2	Diameter of trees - - -
Section 3.5.0	Design Criteria
Section 3.5.3.A.1	Permeable Paving
Figure 3-8	Example of Minimum Design Criteria Applied to Permeable Parking
City of Austin Land Development Code	
Designation	Description
Section 25-8-603	Tree Protection Administration
Section 25-8-623	Inspection by City Arborist
ASTM, American Society for Testing and Materials	
Designation	Description
D-2729	Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings

RELATED CROSS REFERENCE MATERIALS	
Specification 610, "Preservation of Trees and Other Vegetation"	
City of Austin Standard Specification Items	
Designation	Description
Item No. 101S	Preparing Right-of-way
Item No. 102S	Clearing and Grubbing
Item No. 111S	Excavation
Item No. 120S	Channel Excavation
Item No. 132S	Embankment
Item No. 608S	Planting
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item No. 100	Preparing Right-of-way
Item No. 110	Excavation
Item No. 132	Embankment
Item No. 158	Specialized Excavation Work
Item No. 160	Furnishing and Placing Topsoil
Item No. 166	Fertilizer
Item No. 168	Vegetative Watering

Source: Rule No. R161-25.05, 4-14-25.

ITEM NO. 628S SEDIMENT CONTAINMENT DIKES 12-31-13

628S.1 Description

This item shall govern the provision and placement of temporary filtration dikes along or across such areas as indicated on the Drawings. This method shall be used during construction only and its purpose shall be to temporarily control erosion by intercepting and retaining sediment.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text, the inch-pound units are given preference followed by SI units shown within parentheses.

628S.2 Submittals

The submittal requirements for this specification item shall include:

A. Locations and Types of containment dikes (hay Bales or Triangular Sediment Filter Dike).

B. Seeding

1. Identification of the type, source, mixture, pure live seed (PLS) and rate of application of the seeding.
2. Type of mulch.
3. Type of tacking agent.
4. Type and rate of application of fertilizer.

628S.3 Materials

A. Hay Bales

"Hay Bales" shall be free of Johnson Grass or other nocuous weeds. The bales shall consist of either hay or straw in good condition and be securely tied with wire. Stakes for anchoring bales shall be #4 (10M) reinforcing bars, ½ inch (12.5 mm) steel pickets or 2 x 2 inch (50 x 50 mm) wooden stakes. Hay bales shall be limited to drainage areas less than 2,500 square feet (0.02 hectares).

B. Filter Dike

"Filter Dike" shall be prefabricated from 6x6-D2.9xD2.9 (150x150-MW19xMW19) WWF and 4.5 oz. (127 grams) non-woven polyester filter fabric securely fastened to WWF with galvanized shoat rings or j-clips. A 12-inch (300-mm) skirt shall be a continuous extension of the filter fabric on the upstream face.

The filter fabric shall extend beyond the dike joints to provide a 3-inch (75-mm) overlap. Ends of dike not lapped with filter fabric shall be plugged with filter fabric.

628S.4 Construction Methods

The Contractor may select the material for the dikes, unless otherwise indicated, conforming to the details on the Drawings and Standard Detail Numbers 628S and 628S-1.

Bales shall be placed with ends tightly abutting the adjacent bales. Each bale shall be embedded in the soil a minimum of 4 inches (100 mm) and a maximum of 6 inches (150 mm). Bales shall be securely anchored in place by a minimum of 2 stakes per bale. The first stake in each bale shall be angled toward the previously placed bale to force the bales together. Stakes shall be embedded in the soil a minimum of 1 ½ feet (0.45 meters). Bales that are

not able to be imbedded and are placed on impervious cover should be placed level with the concrete and have all bales butted end to end with no voids or gaps between them. Bales shall be bound by either wire or nylon string. Bales shall be replaced every 2 months or more often during wet periods.

For filter dikes the filters shall be placed with ends tightly abutting the adjacent filter. Each filter and skirt shall be securely anchored in place using 6 inch (150 mm) staples at a maximum spacing of 12 inches (300 mm) on center. Anchoring on impervious areas shall be accomplished with sand/gravel bags placed at 18 inches (450 mm) on center or with a nominal 1 inch by 4 inch (25 mm by 100 mm) board nailed at 18 inches (450 mm) on center.

Silt accumulation behind hay bales and triangular sediment filter dikes shall be removed at a maximum depth of 6 inches (150 mm) or when, in the opinion of the Engineer or designated representative, the structure ceases to function as intended.

All dikes shall be inspected by the Contractor at least monthly and after each rainfall. Dikes shall be repaired or replaced when necessary or as directed by the Engineer or designated representative.

After completion of construction or when directed by the Engineer or designated representative the dike shall be removed and the site re-graded to the final grades. Any depression shall be filled and any accumulations of silt shall be spread or removed to a permitted disposal area. After removal of the dike the area shall be graded and seeded conforming to Item No. 604S, "Seeding for Erosion Control".

628S.5 Measurement

The work performed and the materials furnished as prescribed by this item will be measured by the lineal foot (lineal meter: 1 lineal meter equals 3.281 lineal feet) of "Sediment Containment Dikes", complete in place.

628S.6 Payment

The work performed and materials furnished and measured as provided under "Measurement" will be paid for at the unit bid price per lineal foot of "Sediment Containment Dikes" indicated on the Drawings. The Unit bid price shall include full compensation for: (a) furnishing, hauling and placing all materials including all labor, tools, equipment and incidentals needed to complete the work, (b) the repair and/or replacement of materials, (c) the removal and disposal of all silt and debris and (d) the removal of all dikes, silt and debris after completion of construction or when directed by the Engineer or designated representative.

When indicated on the Drawings, payment for sediment containment will be made under:

Pay Item No. 628S-A:	Sediment Containment Dikes with hay bales	Per Lineal Foot.
Pay Item No. 628S-B:	Sediment Containment Dikes with filter fabric	Per Lineal Foot.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Specification 628S, "Sediment Containment Dike"	
City of Austin Standard Details	
Designation	Description
Number 628S	Triangular Sediment Filter Dike
Number 628S-1	Hay Bale Dike
City of Austin Standard Specifications	
Designation	Description

Item No. 604S	Seeding for Erosion Control
City of Austin Standard Contract	
Section	Description
00300U	Bid Form (Unit Prices)

RELATED CROSS REFERENCE MATERIALS	
Specification 628S, "Sediment Containment Dike"	
City of Austin Standard Specifications	
Designation	Description
Item No. 101S	Preparing Right-of-way
Item No. 102S	Clearing and Grubbing
Item No. 111S	Excavation
Item No. 120S	Channel Excavation
Item No. 401S	Structural Excavation and Backfill
Item No. 406S	Reinforcing Steel
Item No. 602S	Sodding for Erosion Control
Item No. 605S	Soil Retention Blanket
Item No. 606S	Fertilizer
Item No. 608S	Planting
Item No. 610S	Preservation of Trees and Other Vegetation
Item No. 620S	Filter Fabric
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item No. 100	Preparing Right-of-way
Item No. 110	Excavation
Item No. 132	Embankment
Item No. 158	Specialized Excavation Work
Item No. 166	Fertilizer
Item No. 168	Vegetative Watering
Item No. 169	Soil Retention Blanket
Item No. 204	Sprinkling

ITEM NO. 639S ROCK BERM 8-18-10

639S.1 Description

This item shall govern the construction of a temporary berm of open graded rock that is installed at the toe of a slope on the perimeter of a developing area. Rock berms are appropriate for use as flow diverters, energy dissipators, grade control, and level spreaders to release the water in sheet flow (Environmental Criteria Manual Section 1.4.5.E). This item shall also govern the removal of the "Rock Berm" and re-vegetation of the area.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text, the inch-pound units are given preference followed by SI units shown within parentheses.

639S.2 Submittals

The submittal requirements for this specification item shall include:

A. Function (flow diversion, grade control, energy dissipator, level spreader, or other) and dimensions of the rock berm

B. Source, type and gradation of rock

C. Re-vegetation program, including:

1. Identification of the type, source, mixture, Pure Live Seed (PLS) and rate of application of the seeding.
2. Type of mulch.
3. Type of tacking agent.
4. Type and rate of application of fertilizer.

639S.3 Design Criteria

A detailed design is not required for the installation of a rock berm; however, the following criteria shall be observed:

Drainage area	-	less than 5 acres (2 hectares).
Height	-	18 inches (450 mm) minimum height, measured vertically from the top of the existing ground at the upslope toe to the top of the berm.
Top width	-	2 feet (0.6 meter) minimum.
Side slopes	-	2:1 or flatter.
Grade	-	Berms will be built along a contour as near possible to a 0 percent grade.

639S.4 Materials

Surplus rock excavated from utility trenches or from other excavations may be used in construction of these berms. In general, the rocks shall be sound with a minimum of 3 inches (75 mm) in smallest dimension and shall weigh between 10 and 30 pounds (4.5 to 13.6 kilograms) each. Seeding for re-vegetation shall conform to Item No. 604S, "Seeding for Erosion Control".

Use only open-graded rock of the size indicated on Standard Detail No. 639S-1, with most of the fines removed.

639S.5 Construction Methods

All trees, brush, stumps and objectionable material shall be removed and disposed in a manner that will not interfere with the construction of the berm.

A trench shall be excavated to a minimum depth of 4 inches (100 mm) below existing grade for placement of the rock as indicated on Standard Detail No. 639S-1 and the Drawings. The rocks shall be placed in interlocking layers with close joints starting at the base. Open joints shall be filled with rock-spalled materials as required to stabilize the berm.

The area upstream from the rock berm shall be maintained in a condition, which will allow sediment to be removed following the runoff from a rainfall event. After each rainfall event with an accumulation of 1 inch (25 mm) or more, an inspection of the rock berm will be made by the Contractor and the stone shall be replaced, when the structure ceases to function as intended because of sediment accumulation among the rocks, washout, construction traffic damage, etc.

If the sediment reaches a depth equal to ⅓ the height of the berm or 6 inches (150 mm), whichever is less, the Contractor will remove the accumulated sediment and dispose of it at an approved disposal site in a manner that will not contribute to additional sedimentation. The berm will be reshaped as needed during construction.

When the site is completely stabilized, the berm will be removed and disposed of in a manner approved by the Engineer or designated representative.

The area will be re-vegetated as required by Item No. 604S, "Seeding for Erosion Control".

639S.6 Measurement

Acceptable work performed and prescribed in this item will be measured by the linear foot (lineal meter: 1 lineal meter equals 3.281 lineal feet) along the centerline of top of berm.

639S.7 Payment

The work performed and material furnished and measured as provided under "Measurement" to construct this item will be paid for at the unit bid price per linear foot of rock berm barrier as indicated on the Drawings. The Unit Bid Price shall include full compensation for: (a) furnishing, hauling and placing all materials including all labor, tools, equipment and incidentals needed to complete the work, (b) maintaining the berm, (c) removing sediment accumulations, (d) rock replacement, (e) removing and disposing of all materials when the berm is no longer required and (f) re-vegetating the site upon removal of the berm.

Payment will be made under:

Pay Item No. 639S:	Rock Berm	Per Lineal Foot.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Specification 639S, "Rock Berm"	
City of Austin Environmental Criteria Manual	
Designation	Description
Section 1.4.2.E	Rock Berm

City of Austin Standard Details	
Designation	Description
Number 639S-1	Rock Berm
City of Austin Standard Specifications	
Designation	Description
Item No. 604S	Seeding for Erosion Control

RELATED CROSS REFERENCE MATERIALS	
Specification 639S, "Rock Berm"	
City of Austin Environmental Criteria Manual	
Designation	Description
Table 1-1.3	Recommended Design Values For Functional Controls
Table 1-2	Maximum Water Depth At The Barrier
City of Austin Standard Specifications	
Designation	Description
Item No. 101S	Preparing Right-of-way
Item No. 102S	Clearing and Grubbing
Item No. 111S	Excavation
Item No. 120S	Channel Excavation
Item No. 401S	Structural Excavation and Backfill
Item No. 602S	Sodding for Erosion Control
Item No. 605S	Soil Retention Blanket
Item No. 606S	Fertilizer
Item No. 608S	Planting
Item No. 610	Preservation of Trees and Other Vegetation
Item No. 620S	Filter Fabric
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item No. 100	Preparing Right-of-way
Item No. 110	Excavation
Item No. 132	Embankment
Item No. 158	Specialized Excavation Work
Item No. 166	Fertilizer
Item No. 168	Vegetative Watering
Item No. 169	Soil Retention Blanket
Item No. 204	Sprinkling

ITEM NO. 641S STABILIZED CONSTRUCTION ENTRANCE 3-25-21

641S.1 Description

This item governs the construction of a stabilized pad of crushed stone located at any point where traffic will be entering or leaving a construction site to or from a public right-of-way, street, alley, sidewalk or parking area. The removal of the stabilized pad of crushed stone shall also be included in the item. The purpose of a stabilized construction entrance is to reduce or eliminate the tracking or deposition of sediment onto public right-of-way (Environmental Criteria Manual Section 1.4.2.N.4).

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text, the inch-pound units are given preference followed by SI units shown within parentheses.

641S.2 Submittals

The submittal requirements for this specification item shall include:

A. Source, type and gradation of rock.

B. Drainage technique (i.e. drainage swale or entrance grading) proposed to prevent runoff from exiting the construction site.

641S.3 Materials

Aggregate for construction shall conform to the following gradation:

Table 1: Aggregate Gradation Chart (TEX 401-A, % Retained per sieve)		
US 8 inch (SI 200 mm)	US 5 inch (SI 125 mm)	US 2 inch (SI 50 mm)
0	90-100	100

641S.4 Construction Methods

All trees, brush, stumps, obstructions and other objectionable material shall be removed and disposed of in a manner that will not interfere with the excavation and construction of the entrance as indicated on the Drawings or as presented in Standard Details No. 641S-1. The entrance shall not drain onto the public right-of-way or shall not allow surface water runoff to exit the construction site.

When necessary, vehicle wheels shall be cleaned to remove sediment prior to entrance onto public right-of-way. When vehicle washing is required, it shall be done on an area stabilized with crushed stone, which drains into an approved sediment trap or sediment basin. All sediment shall be prevented from entering any storm drain, ditch or watercourse through use of sand bags, gravel, boards, silt fence (Standard Specification Item No 642S) or other methods approved by the Engineer or designated representative.

The entrance shall be maintained in a condition that will prevent tracking or disposition of sediment onto public right-of-way. This restriction may require periodic top dressing with additional stone as conditions demand, as well as the repair and/or cleanout of any measures used to trap sediment. All sediment that is spilled, dropped, washed or tracked onto public right-of-way must be removed immediately.

641S.5 Measurement

Acceptable work performed as prescribed in this item will be measured by unit of each stabilized construction entrance installed.

641S.6 Payment

The work performed and materials furnished and measured as provided under "Measurement" will be paid for at the unit bid price per each "Stabilized Construction Entrance." The price shall include full compensation for furnishing, hauling and placing all materials, labor, tools, equipment and incidentals necessary to complete the work including inspecting, repairing, replacing and relocating existing fencing, removal of silt and removal and disposal of all materials at the completion of construction. The price shall include full compensation for furnishing, installing, maintaining, moving, and removing any traffic control devices required by the installation of a stabilized construction entrance.

Payment, when included as a contract pay item, will be made under:

Pay Item No. 641S:	Stabilized Construction Entrance	Per Each.

Source: Rule No. R161-21.01, 3-25-2021.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Specification 641S, "Stabilized Construction Entrance (SCE)"	
City of Austin Environmental Criteria Manual	
Designation	Description
Section 1.4.2.N.4	Stabilized Construction Entrance "Design Criteria"
City of Austin Standard Details	
Designation	Description
Number 641S-1	Stabilized Construction Entrance
City of Austin Standard Specifications	
Designation	Description
Item No. 642S	Silt Fence (SF)

RELATED CROSS REFERENCE MATERIALS	
Specification 641S, "Stabilized Construction Entrance (SCE)"	
City of Austin Environmental Criteria Manual	
Designation	Description
Section 1.4.2.J	Sandbag Berm
Figure 1-11	Sand Bag Berm
Section 1.4.2.G	Silt Fence
City of Austin Standard Specifications	

Designation	Description
Item No. 101S	Preparing Right-of-way
Item No. 102S	Clearing and Grubbing
Item No. 111S	Excavation
Item No. 120S	Channel Excavation
Item No. 401S	Structural Excavation and Backfill
Item No. 610S	Preservation of Trees and Other Vegetation
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item No. 100	Preparing Right-of-way
Item No. 110	Excavation
Item No. 132	Embankment
Item No. 158	Specialized Excavation Work
Item No. 168	Vegetative Watering

ITEM NO. 648S MULCH SOCK 3-1-22

648S.1 Description

A mulch sock consists of material encased in a tube of mesh. It is used to intercept, settle, and filter sheet flow and pond runoff. Mulch socks provide an environmentally sensitive and cost-effective alternative to sediment fences.

648S.2 Submittals

The submittal requirements for this specification item shall include the following:

A. **Mulch Material.**

1. A small sample of mulch material proposed to be used on the site will be provided to the engineer.
2. Provide a designated project stockpile of mulch for sampling and testing at the producer's site.
3. A copy of the lab analysis, performed by an STA-certified lab, verifying that the mulch material meets the requirements of Table 1.

Table 1

Item	Requirement	Reference Specification
Particle Size	3” minus screening process	Equivalent to TXDOT item 161, Compost, Section 1.6.2.B, Wood Chip requirements
pH	5.5 - 8.5	TMECC 04. 11-A, "1.5 Slurry pH"
Organic Matter Content	≥25%, dry weight basis	TMECC 05.07-A, "Loss-On-Ignition Organic Matter Method"

B. **Tube Material.**

The CONTRACTOR shall submit a sample of the material that the CONTRACTOR proposes to use on the project. A sample of the material should be accompanied by material data sheet identifying composition, ability of the material to biodegrade, and size of openings in tube at a minimum.

648S.3 Materials

A. Mulching material can be manufactured on or off the project site and may consist of:

1. Shredded bark
2. Stump grindings
3. Composted bark

B. The mulch shall have the following composition:

1. Wood chips shall be produced from a 3-inch minus screening process (equivalent to TxDOT item 161, Compost, Section 1.6.2.B Wood Chip Requirements).
2. Large portions of silts, clays, or fine sands are not acceptable.
3. The pH of the mulch shall be between 5.5 and 8.5.

4. The organic matter content shall be greater than or equal to 25% on a dry weight basis.

C. Mulch material must be free of refuse, physical contaminants, and material toxic to plant growth. It is not acceptable for the mulch material to contain ground construction debris, biosolids, manure, or recyclable material.

D. Prior to placement, a representative sample of the mulching material must be tested and certified by the project engineer or his/her designee and accepted by the city inspector.

E. The sock material mesh opening shall be equal to or less than ⅜ inch (10 mm) and the material tensile strength shall be equal to or greater than 202 psi (14.2 kg/cm^2).

Source: Rule No. R161-14.29, 12-30-2014.

648S.4 Installation

A. Use 12 or 18 inch diameter mulch socks for all sediment control applications. This diameter of mulch sock material has proven to be the most consistent for all sediment control applications (TxDOT, April 2006).

B. Install mulch socks per Figure 1.4.5.F in the City of Austin Environmental Criteria Manual.

C. Mulch socks should be used at the base of slopes no steeper than 2:1 and should not exceed the maximum spacing criteria provided in the following table.

Slope	Max. Slope Length Between 18 in. Dia. Sock (ft)	Max. Drainage Area (sf) per 100 ft of Sock
100:1 - 50:1	100	10,000
50:1 - 30:1	75	7,500
30:1 - 25:1	65	6,500
25:1 - 20:1	50	4,800
20:1 - 10:1	25	2,600
10:1 - 5:1	15	1,300
5:1 - 2:1	10	1,000

Slope	Max. Slope Length Between 12 in. Dia. Sock (ft)	Max. Drainage Area (sf) per 100 ft of Sock
100:1 - 50:1	100	6,000
50:1 - 30:1	40	4,000
30:1 - 25:1	30	3,000
25:1 - 20:1	25	2,600
20:1 - 10:1	15	1,300
10:1 - 5:1	10	1,000
5:1 - 2:1	5	500

D. Place mulch socks at a 5 feet or greater distance away from the toe of the slopes to maximize space available for sediment deposition.

E. When placed on level contours, sheet flow of water should be perpendicular to the mulch sock at impact and unconcentrated.

F. Install mulch socks using rebar (#5 minimum with safety caps) a minimum of 48 inches in length placed on 2-foot centers. In order to prevent the movement or floating of the mulch sock during rain events or

construction operations, install steel posts on alternating sides of the sock. Drive the posts into the ground to a minimum depth of 24 inches, leaving less than 12 inches of post above the exposed mulch sock.

G. In order to prevent water flowing around the ends of the mulch socks, point the ends of the socks up slope.

H. In order to prevent water from flowing between the gaps at adjacent ends of mulch socks, overlap the ends of adjacent mulch socks a minimum of 12 inches. Never stack mulch socks on top of one another.

I. Mulch Socks should be placed using "smiles" and "j-hooks". See ECM Section 1.4.5 G (Silt Fence).

J. For steeper slopes, an additional mulch sock can be constructed on the top of the slope and within the slope area as determined by specific field conditions. Multiple mulch socks are recommended on steeper slopes.

K. Do not use mulch socks in areas of concentrated flow as they are intended to control sheet flow only.

648S.5 Inspection and Maintenance

A. Inspect mulch socks after installation for gaps under the mulch socks and for gaps between the joints of adjacent ends of mulch socks. Contractor shall repair gaps such that no water flows under or around sock.

B. Inspect every seven days and within 24 hours of a rainfall event of 0.5 inches or greater. Replace and repair mulch socks as necessary.

C. Sediment retained by the mulch socks shall be removed when it has reached one third of the exposed height of the mulch socks.

D. Mulch socks can be vegetated or un-vegetated. Vegetated mulch socks can be left in place. The vegetation will grow in the slope, further anchoring the sock.

648S.6 Measurement

Installed mulch sock shall be measured along the center line of the installed mulch sock ignoring any overlaps.

Source: Rule No. R161-22.01, 3-1-2022.

648S.7 Payment

The work performed and the materials furnished as prescribed by this item shall be paid for by the linear foot of mulch sock installed.

Payment will be made under:

Pay Item No. 648S:	Mulch Sock	Per Lineal Foot.

Source: Rule No. R161-22.01, 3-1-2022.

END

SPECIFIC CROSS REFERENCE MATERIALS	
Specification Item No. 648S, "Mulch Sock"	
City of Austin Environmental Criteria Manual	
Designation	Description
1.4.5.F	Mulch Sock

1.4.5.G	Silt Fence
City of Austin Standard Details	
Designation	Description
648S-1	Mulch Sock

ITEM NO. 700S MOBILIZATION 9-26-12

700S.1 Description

This item shall govern the mobilization of personnel, equipment and materials at the work site for other contract items that will be performed by the Contractor. Mobilization shall include, but not be limited to the movement of equipment, personnel, material, supplies, etc. to the Work site; the installation of temporary facilities (when not paid for separately) and the establishment of office and other necessary facilities prior to the initiation of the Work. The cost of the Payment Bond and Performance Bond on the Work that is delayed due to circumstances beyond Contractor's control, a closed construction season or for the convenience of the City of Austin will be considered part of the mobilization item under this Contract.

700S.2 Measurement.

Measurement of the Specification Item, "Mobilization", as specified herein as "Total Mobilization Payment", will be by the "Lump Sum", as the Work progresses.

700S.3 Payment.

The adjusted contract amount as used below is defined as the original contract amount less the lump sum bid for Mobilization and any payments for materials or equipment not yet incorporated in the Work. The Contractor shall submit a lump sum amount for Payment Item No. 700S-TM, "Total Mobilization Payment".

"Initial Mobilization Payout" as used below is defined as:

1. 8% of the original contract amount for projects with an original contract amount of $ 0.5 million or less; or
2. 4% of the original contract amount for projects with an original contract amount greater than $ 0.5 million.

In those instances where the "Initial Mobilization Payout", as defined above, exceeds the "Total Mobilization Payment" lump sum bid item (i.e. Payment Item No. 700S-TM), the "Total Mobilization Payment" shall be used as the "Initial Mobilization Payout". In no instance shall the "Initial Mobilization Payout" exceed the "Total Mobilization Payment" bid item.

Partial payments of the "Initial Mobilization Payout" shall be as follows:

A. Upon presentation of a paid invoice for the Payment Bond, Performance Bond and/or required insurance, the Contractor will be paid that cost from the amount bid for "Total Mobilization Payment".

B. The Mobilization of tunnel boring machines, batch plants or other similar facilities, along with supporting materials and equipment, to the work site or to the vicinity of the Work site will be considered as partial Mobilization under this contract. The Contractor shall provide a certified statement of the Contractor's expenditure for the Mobilization and setup of the facility and supporting equipment. Upon approval by the Engineer or designated representative, the certified expenditure will be paid from the amount bid for the Specification Item, "Total Mobilization Payment". In no case shall the combined amount for all of these facilities be more than 10 percent of the Mobilization "Total Mobilization Payment" lump sum bid or one (1) percent of the total contract amount, whichever is less.

C. When one (1) percent of the adjusted contract amount is earned, 50 percent of the "Initial Mobilization Payout will be paid. Previous payments under this item will be deducted from this amount.

D. When five (5) percent of the adjusted contract amount is earned, seventy-five (75) of the "Initial Mobilization Payout will be paid. Previous payments under this item will be deducted from this amount.

E. When ten (10) percent of the adjusted contract amount is earned, one hundred (100) percent of the "Initial Mobilization Payout will be paid. Previous payments under this item will be deducted from this amount.

F. Payment for the remainder of Pay Item No. 700S-TM, "Total Mobilization Payment" will be made upon receipt of the final pay estimate.

Payment will be made under:

Pay Item No. 700S-TM:	"Total Mobilization Payment"	Lump Sum

End

RELATED CROSS REFERENCE MATERIALS	
Specification 700S, "MOBILIZATION"	
City of Austin Standard Contract Documents	
Designation	Description
00020	Invitation for Bids
00100	Instructions To Bidders
00300	Bid Form
00425	Insurance Cost Form
00500	Agreement
00610	Performance Bond
00620	Bid Bond
00650	Certificate of Insurance
00700	General Conditions
00810	Supplemental General Conditions
00820	Modifications to Bidding Requirements & Contract Forms
01010	Summary of Work
01300	Submittals
01500	Temporary Facilities
01550	Public Safety and Convenience
01700	Contract Closeout
01710	Final Cleaning

ITEM NO. 702S REMOVAL AND RELOCATION OF EXISTING FENCES 5-20-02

702S.1 Description

This item shall govern the removal and relocation of existing fence, gates and hardware to a new alignment at the location in conformance to the typical details indicated on the Drawings or as directed by the Engineer or designated representative.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text inch-pound units are given preference followed by SI units shown within parentheses.

702S.2 Removal of Existing Materials

The existing boards, fabric, posts, wire, rails, braces, hardware, gates and miscellaneous items shall be carefully removed, bundled, rolled and stockpiled as indicated on the Drawings for installation at the new fence assignment. The removal and handling shall be such that the fence materials may be reused in the relocated fence.

A. Removal of Fabric and Wire

Fabric and wire of all types shall be carefully untied or disassembled from the posts and other appurtenances and shall be rolled in bundles of a size that will allow handling with ordinary equipment.

B. Removal of Posts

Posts shall be carefully removed from the ground and the concrete footing removed. The concrete shall be disposed of off site. Post holes shall be filled with suitable embankment material and thoroughly compacted.

C. Removal of Boards

Boards of all types shall be carefully disassembled from the rails and other appurtenances to facilitate removal in panels. Excess material removed shall be disposed of as indicated below.

D. Storage of Materials

Storage of all salvageable materials, that will be reinstalled at a new location, shall be stored on-site or at such other locations as the Contractor may elect, subject to approval by the Engineer or designated representative. Security and maintenance of the salvageable materials shall be the responsibility of the Contractor.

E. Excess Materials

Materials, that are damaged, unsuitable for reinstallation or unnecessary for completion of the scope of the fence work in the new alignment shall be considered as excess but shall be offered to the Owner before removal from the site by the Contractor.

702S.3 New Materials

New materials that are required to complete the fence at the location indicated on the Drawings shall be of equal quality to the existing materials. Used materials from other projects or from the Contractor's own used material stocks will not be allowed. The new materials to be furnished will be those necessary to replace items from the existing fence which were damaged during removal operations or which for other reasons cannot be reused.

702S.4 Construction Methods

The removed fence shall be installed at the new assignment in accordance with the typical details indicated on the Drawings and shall comply with Standard Specification Item No. 701S, "Fencing" and the best practice for fence construction of the specified type.

702S.5 Measurement

Fences of the height and type to be relocated will be measured by the lineal foot (lineal meter: 1lineal foot equals 0.31 meters) of fence in its new location measured at the bottom of the fence along the centerline of the fence from center to center of terminal posts, excluding gates.

702S.6 Payment

The work performed and material furnished as prescribed by this item measured under "Measurement" will be paid for at the unit bid price for "Removing and Relocating Fences" of the size and type specified to be relocated. The unit bid price shall include full compensation for removing, salvaging, storing and handling all existing fence materials; furnishing new posts, boards, rails, braces, tie wires, connection clips, fabric, rails, brace rods and any other fence component items that were damaged during removal and necessitating new material being furnished to complete the project; digging post holes and grouting in rock where required; furnishing concrete for post footings; and for all manipulations, labor, tools, equipment and incidentals necessary to complete the work including excavation, backfilling and disposal of surplus materials.

Gates as provided under "Measurement" will be paid for at the unit bid price for Removal and Relocation of Existing Pedestrian or Vehicular Gates of the type and size specified to be relocated. The unit bid price shall include full compensation for removing the gate from the existing locations, handling, storing and hauling all gate materials, furnishing any new materials necessary for installing at new locations; providing new center anchorage blocks, latches and catch blocks and for manipulations, labor, tools, equipment and incidentals necessary to complete the gate relocation.

Payment will be made under one of the following:

Pay Item No. 702S-A:	Removing and Relocating Existing ___ Ft. Chain Link Fence	Per Lineal Foot.
Pay Item No. 702S-B:	Removing and Relocating Existing ___ Ft. × ___ Ft. Chain Link Pedestrian Gate	Per Each.
Pay Item No. 702S-C:	Removing and Relocating Existing ___ Ft. × ___ Ft. Chain Link Vehicular Gate	Per Each.
Pay Item No. 702S-D:	Removing and Relocating Existing ___ Ft. Wooden Fence	Per Lineal Foot.
Pay Item No. 702S-E:	Removing and Relocating Existing ___ Ft. × ___ Ft. Wooden Pedestrian Gate	Per Each.
Pay Item No. 702S-F:	Removing and Relocating Existing ___ Ft. × ___ Ft. Wooden Vehicular Gate	Per Each.
Pay Item No. 702S-G:	Removing and Relocating Existing ___ Ft. Wire Fence	Per Lineal Foot.
Pay Item No. 702S-H:	Removing & Relocating Existing ___ Ft. × ___ Ft. Metal Gate	Per Each.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Specification 702S, "Removal and Relocation of Existing Fences"	
City of Austin Standard Specifications	
Designation	Description
Item No. 701S	Fencing

RELATED CROSS REFERENCE MATERIALS	
Specification 702S, "Removal and Relocation of Existing Fences"	
City of Austin Standard Specifications	
Designation	Description
Item No. 403S	Concrete for Structures
Texas Department of Transportation: Standard Specifications For Construction of Highways, Streets and Bridges	
Designation	Description
Item No. 445	Galvanizing
American Society For Testing And Materials (ASTM)	
Designation	Description
A 53/A 53M	Specification For Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
A 116	Specification For Zinc-Coated (Galvanized) Steel Woven Wire Fence Fabric
A 121	Specification For Zinc-Coated (Galvanized) Steel Barbed Wire
A 153/A 153M	Specification For Zinc-Coated (Hot-Dip) on Iron and Steel Hardware
A 239	Practice for Locating the Thinnest Spot in a Zinc (Galvanized) Coating on Iron and Steel Articles
A 392	Specification For Zinc-Coated Steel Chain-Link Fence Fabric
A 491	Specification For Aluminum-Coated Steel Chain-Link Fence Fabric
A 585	Specification For Aluminum-Coated Steel Barbed Wire
B 117	Practice for Operating Salt Spray (Fog) Apparatus

ITEM NO. 720S METAL FOR STRUCTURES 9-26-12

720S.1 Description

This item shall govern all structural and miscellaneous steel, anchor bolts, and miscellaneous metals used in structures. Reinforcing steel (Item 406S) and other structural materials are not included.

This specification is optional and is applicable for projects or work involving either inch-pound or SI units. Within the text inch-pound units are given preference followed by SI units shown within parentheses.

720S.2 Submittals

The submittal requirements of this specification item include:

A. Certification or mill test reports indicating that all materials supplied are in accordance with this specification.

B. Any material proposed for use and not designated herein, including type and trade name for any material not generically specified by the American Society for Testing and Materials (ASTM). Submittal shall include material specification and technical data as required to show that the proposed material meets the intent of those specified herein.

C. When SI unit bolts are proposed for use on a project, submit sizing of bolt(s) and the U.S. Customary Unit (USCU) bolt size(s) the SI unit bolt(s) will be substituted for. Note: although this specification includes ASTM standards for both USCU and SI, there is no conversion between these standards; each contains a different set of bolts with different physical size characteristics. When SI unit bolts are used, appropriately sized SI unit nuts and washers shall also be provided.

720S.3 Structural Steel for Main Members

Unless otherwise indicated, structural steel for main members shall conform to the longitudinal Charpy V-notch (CVN) requirements in accordance with Table A. Sampling and testing shall be in accordance with ASTM A673 (A673M).

A. Structural Steel

When indicated as Structural Steel, the material shall conform to ASTM A 36 (A36M), with a minimum specified yield strength of 36 ksi (250 MPa).

B. High Strength Structural Steel (HS)

When indicated as Structural Steel-HS, the material shall have a minimum required yield strength of 50 ksi (345 MPa), conforming to one of the following ASTM specifications:

1. ASTM A 572 (A572M).
2. ASTM A 588 (A588M).
3. ASTM A709 (A709M).
4. ASTM A992 (A992M).

C. Extra High Strength Structural Steel (XHS)

When indicated as Structural Steel-XHS, the material shall have a minimum specified yield strength of 90 ksi (620 MPa), conforming to one of the following ASTM specifications:

1. ASTM A 514 (A514M). Structural shapes and seamless tubing, meeting the requirements of A514 (A514M) will be permitted with a maximum tensile strength of 140 ksi (965 MPa) for structural shapes and 145 ksi (1,000 MPa) for seamless tubing.
2. ASTM A 517 (A517M).

ASTM A514 (A514M) and ASTM A517 (A517M) steels are considered weldable.

TABLE A

Min. Spec. Yield Strength, Fy [ksi (MPa)]	Thickness, t [in. (mm)]	Welded	Mech. Fastened	Min. CVN Toughness [ft. lb. @ °F (J @ °C)]
Fy ≤ 40 (275)	t ≤ 4 (100)	X	X	15 @ 70 (20 @ 21)
40 (275)< Fy ≤ 65 (450)	t ≤ 2 (50) 2 (50) < t ≤ 4 (100) >2 (50) < t ≤ 4 (100)	X X	X X	15 @ 70 (20 @ 21) 15 @ 70 (20 @ 21) 20 @ 70 (27 @ 21)
65 (450)< Fy ≤ 90 (620) (Refer to note 3 below)	t ≤ 2.5 (65) 2.5 (65) < t ≤ 4 (100) 2.5 (65) < t ≤ 4 (100)	X X	X X	20 @ 50 (27 @ 10) 20 @ 50 (27 @ 10) 25 @ 50 (34 @ 10)

Notes for Table A:

1. For Fy ≤ 50 ksi (345 MPa), use the (H) frequency of testing in accordance with ASTM A673 (A673M).
2. For Fy > 50 ksi (345 MPa), use the (P) frequency of testing in accordance with ASTM A673 (A673M).
3. If the yield strength of the material exceeds 90 ksi (585 MPa), the testing temperature shall be reduced 15°F (8.3°C) per 10 ksi (69 MPa) increment, or portion thereof.

720S.4 Miscellaneous Steel

A. High Strength Bolts

High strength bolts shall conform to ASTM A325, A325M, A490, or A490M, unless otherwise indicated. For submittal requirements of SI unit bolts, refer to 720S.3 C. Nuts for high strength bolts shall conform to ASTM A563 or A563M and washers shall conform to ASTM F436 or F436M.

B. Unless otherwise indicated, structural steel for secondary members such as shoes, diaphragms, stiffeners, bearing stiffeners, lateral bracing, diagonals, armor joints, and finger joints shall conform to one of the following:

1. ASTM A36 (A36M), with a minimum specified yield strength of 36 ksi (250 MPa).
2. ASTM A500, with a minimum specified yield strength of 46 ksi (315 MPa).

Structural steels used for secondary or nonstress-carrying members will not be subject to impact requirements.

All steels greater than 0.5 inch (13 mm) in thickness used for structural supports for highway signs, luminaries, and traffic signals shall conform to the longitudinal Charpy V-notch requirements of Table A.

C. Stud shear connectors, slab anchors, and anchors on armor and finger joints shall conform to ASTM A108, Grades 1015, 1018, or 1020, either semi- or fully-killed, with a minimum specified yield strength of 50 ksi (345 MPa).

D. Piling

Steel piling shall conform to one of the following:

1. ASTM A36 (A36M), with a minimum specified yield strength of 36 ksi (250 MPa).
2. ASTM A252, greater than or equal to 10 gauge, with a minimum specified yield strength of 35 ksi (240 MPa).
3. ASTM A328 (A328M), with a minimum specified yield strength of 39 ksi (270 MPa).
4. ASTM A1011 (A1011M), with a minimum specified yield strength of 33 ksi (230 MPa).

E. Deck Plates

Material for deck plates shall be corrosive-resistant structural steel conforming to ASTM A242 (A242M). The material must be of weldable quality and shall contain alloying elements that furnish corrosion resistance at least twice that of copper bearing structural steel. The type and trade name shall be submitted for review.

F. Rail Posts

Material for rail posts shall conform to ASTM A36 (A36M), with a minimum specified yield strength of 36 ksi (250 MPa).

G. Forgings

Steel forgings from which pins, rollers, trunnions, or other forged parts are to be fabricated shall conform to ASTM A668 (A668M), class C, D, F, or G, with a minimum specified yield strength of 33 ksi (230 MPa). As an alternate for pins four (4) inches in diameter or less, ASTM A108, grades 1016-1030, with a minimum specified yield strength of 36 ksi (250 MPa) may be used.

H. Castings

Steel castings shall conform to ASTM A27 (A27M), Grade 70-36, with a minimum specified yield strength of 36 ksi (250 MPa).

I. Anchor Bolts

Anchor bolts shall conform to one of the following:

1. Plain and threaded bars used for anchorage purposes, ASTM A36 (A36M).
2. Headed bolts and nuts, ASTM A307, Grade A.
3. High strength anchor bolts, ASTM A193 (A193M). Nuts for high strength anchor bolts shall conform to ASTM A194 (A194M).

Anchor bolts shall not be galvanized unless otherwise indicated. When galvanized, anchor bolts and nuts shall be tapped or chased after galvanizing.

When heat treated material is specified or required, the test report for certification shall include the necessary certification relative to the heat treating process.

J. Steel Pipe

Steel pipe shall conform to Item No. 510, "Pipe".

K. Tubing

Steel tubing shall conform to one of the following:

1. ASTM A500, Grade B.
2. API Standard 5L, Grade X52, except as noted herein, may be used if produced by a mill recognized as authorized to produce pipe with the API monogram and listed as such in the standard API specifications. Hydrostatic tests will not be required.

In lieu of the mill test report, a certificate from the manufacturer will be required for each lot or shipment certifying that the tubing meets the requirements stated above.

L. Pipe Rail

Pipe rail shall be construed to include special extruded and bent shapes and shall be of the section indicated. Pipe may be rolled or extruded to the shape indicated or may be cold pressed from a round pipe or flat plate.

If cold pressed, the design of the press and dies shall result in a pipe of uniform section and free from die marks. After the pipe has been formed to the required section, it shall be cut to the lengths required. The end cuts and notches shall be made at such angles with the axis of the pipe as required to produce vertical end faces and plumb posts when indicated. Cutting and notching of pipe shall be done with a saw or machine guided torch or other means that will insure a neat and uniform finish.

M. Deep Beam Rail

Deep beam rail shall conform to AASHTO M180, 10 or 12 gage (exclusive of protective coating). The terminal connector shall be of the same material, not less than 10 gage. Unless otherwise indicated, the rail element shall be galvanized.

720S.5 Miscellaneous Metals

A. Iron

All iron castings shall be true to pattern in form and dimensions, free from pouring faults, sponginess, cracks, blow holes, and other defects in positions affecting their strength and value for the service intended. Castings shall conform to the following ASTM designations:

1. Malleable iron, ASTM A47 (A47M), grade 35018.
2. Gray iron, ASTM A48 (A48M), class 30 or 35.
3. Ductile iron, ASTM A536, grade 60-40-18 or 65-45-12.

B. Lead

Sheet lead shall conform to ASTM B29, refined lead or pig.

C. Copper

Copper strip or sheet shall conform to the following:

1. ASTM B100, alloy 510 or 511.
2. ASTM B152 (B152M).

D. Aluminum

Unless otherwise indicated, aluminum materials shall conform to the following:

1. Castings, ASTM B108, alloy A444-T4.
2. Extrusions, ASTM B221, alloy 6061-T6.

3. Sheet and plate, ASTM B209, alloy 2024-T3. If welding is required, alloy 6061-T6 can be substituted, but must be heat treated after fabrication and welding.

4. Deep beam rail, ASTM B209, alloy 2024-T3. The minimum thickness of the rail element shall be 0.156 inch (nominal) unless otherwise indicated.

E. Bronze

Bronze bearing and expansion plates shall conform to ASTM B22, alloy 911.

720S.6 Fabrication, Erection and Painting

Fabrication, erection and painting of metal for structures shall conform to the following:

A. Item No. 721S, "Steel Structures".

B. Item No. 722S, "Paint and Painting". Aluminum or galvanized steel members shall not require painting.

C. Item No. 723, "Structural Welding".

720S.7 Galvanizing

Galvanizing, where indicated, shall conform to the following:

A. Fabricated items, rolled, pressed or forged steel shapes, plates, pipes, tubular items, and bars, ASTM A123 (A123M).

B. Steel or iron castings, ASTM A153 (A153M).

C. Bolts, nuts, screws, washers, and other miscellaneous hardware, ASTM A153 (A153M), Class C or D or ASTM B695, Class 50.

The measurements of thickness and weight of galvanized coating shall be in accordance with TxDOT test method Tex-728-I.

720S.8 Measurement

Measurement shall be in accordance with the following:

A. Weights of supplied metal for structures shall be determined in accordance with Table B:

TABLE B	
Material	**Weight [lb./cu. ft. (kg/cu. m)]**
Steel	490 (7,849)
Iron, cast	450 (7,208)
Iron, wrought	485 (7,769)
Lead	710 (11,373)
Copper	556 (8,906)
Aluminum	165 (2,643)
Bronze	509 (8,153)

B. Weights of bolts, nuts, and washers shall be in accordance with the American Institute of Steel Construction's "Steel Construction Manual".

C. The quantity of metal for structures furnished and placed will be based on the weight of metal in the fabricated structure. The weight of erection bolts, paint or weld metal shall be excluded.

D. The weights of secondary metals in steel or concrete structures (such as castings, bearing plates, anchor bolts, drains, deck plates, armor joints, and finger joints) for which no separate measurement is specified, shall be in accordance with this specification.

E. The weights of rolled shapes and plates shall be computed on the basis of their normal weights and dimensions.

F. The weights of castings will be computed from the dimensions indicated.

G. Deductions will be made for all cuts, copes, perforations, and all holes except bolt holes.

Splices will be measured as follows:

A. No additional weight will be allowed for weld metal in a welded splice.

B. Where a bolted splice is permitted as an alternate for a welded splice, measurement will be made on the basis of a welded splice.

C. Where a bolted splice is required, the weight of splice material, bolt heads, washers and nuts, with no deduction for holes, will be measured.

A change in design may be required and approved by the Engineer or designated representative, due to unforeseen conditions or other reason, which either increases or decreases the quantity of metal in the completed structure; the increase or decrease in weight will be measured in accordance with this specification and shall be included as a change from the original quantity computed. No adjustment will be made for a change which has not been approved by the Engineer or designated representative and which either increases or decreases the quantity of metal in the completed structure. These changes are subject to approval by the Engineer or designated representative nonetheless to assure that the completed structure is in accordance with the original design intent.

720S.9 Payment

Structural steel for main members will be paid for at the unit price bid per pound for "Structural Steel", "Structural Steel-HS", "Structural Steel-XHS", or such other classification(s) of metal indicated.

Shipping invoice or acceptance slip weights will not be used as basis for payment.

Payment will be made based on the quantity indicated, except as may be modified by the following:

A. Either party to the contract may request an adjustment of the quantities indicated (by each separate bid item), if the weights calculated in accordance with this specification vary from those indicated by more than the following:

   1. Over 500 tons - 0.5 percent.

   2. 50 tons through 500 tons - 1 percent.

   3. Less than 50 tons - 1.5 percent.

   When adjustment is required, the Contractor shall furnish the Engineer or designated representative three sets of shop bills showing the calculated weights of all parts of the structure. The weights shall be computed from the approved shop drawings, except as noted above. When this quantity is certified correct by the Engineer or designated representative, it will become the revised plan quantity. Quantities revised in this manner will not be subject to the provisions of the "General Conditions".

B. When quantities are revised by a change in design, the plan quantity will be increased or decreased by the amount involved in the design change. Quantities revised in this manner will be subject to the provisions of the "General Conditions".

The unit bid price(s) shall include full compensation for furnishing all materials and for all fabrication, shopwork, transportation, erection, paint, painting, galvanizing, and for furnishing all equipment, tools, labor, and incidentals necessary to complete the work.

Payment, when included as a contract pay item, will be made under:

Pay Item No. 720S-A:	Structural Steel	Per Pound.
Pay Item No. 720S-B:	Structural Steel-HS	Per Pound.
Pay Item No. 720S-C:	Structural Steel-XHS	Per Pound.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Specification Item 720S, "Metal for Structures"	
City of Austin Standard Specification Items	
Designation	Description
Item 510	Pipe
Item 721S	Steel Structures
Item 722S	Paint and Painting
Item 723	Structural Welding
American Association of State Highway and Transportation Officials (AASHTO)	
Designation	Description
M180	Standard Specification for Corrugated Sheet Steel Beams for Highway Guardrail
American Petroleum Institute (API)	
Designation	Description
5L	Line Pipe
American Society for Testing and Materials (ASTM)	
Designation	Description
A27/A27M	Standard Specification for Steel Castings, Carbon, for General Application
A36/A36M	Standard Specification for Carbon Structural Steel
A47/A47M	Standard Specification for Ferritic Malleable Iron Castings
A48/A48M	Standard Specification for Gray Iron Castings
A108	Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
A123/A123M	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
A153/A153M	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
A193/A193M	Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature or High Pressure Service and Other Special Purpose Applications
A194/A194M	Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both
A242/A242M	Standard Specification for High-Strength Low-Alloy Structural Steel

A252	Standard Specification for Welded and Seamless Steel Pipe Piles
A307	Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
A325	Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
A325M	Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength [Metric]
A328/A328M	Standard Specification for Steel Sheet Piling
A370	Standard Test Methods and Definitions for Mechanical Testing of Steel Products
A490	Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength
A490M	Standard Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints [Metric]
A500	Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
A514/A514M	Standard Specification for High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding
A517/A517M	Standard Specification for Pressure Vessel Plates, Alloy Steel, High-Strength, Quenched and Tempered
A536	Standard Specification for Ductile Iron Castings
A563	Standard Specification for Carbon and Alloy Steel Nuts
A563M	Standard Specification for Carbon and Alloy Steel Nuts [Metric)
A572/A572M	Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
A588/A588M	Standard Specification for High-Strength Low-Alloy Structural Steel with 50 ksi [345 MPa] Minimum Yield Point to 4-in. [100-mm] Thick
A668/A668M	Standard Specification for Steel Forgings, Carbon and Alloy, for General Industrial Use
A673/A673M	Standard Specification for Sampling Procedure for Impact Testing of Structural Steel
A709/A709M	Standard Specification for Structural Steel for Bridges
A992/A992M	Standard Specification for Structural Steel Shapes
A1011/A1011M	Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
B22	Standard Specification for Bronze Castings for Bridges and Turntables
B29	Standard Specification for Refined Lead
B100	Standard Specification for Wrought Copper-Alloy Bearing and Expansion Plates and Sheets for Bridge and Other Structural Use
B152/B152M	Standard Specification for Copper Sheet, Strip, Plate, and Rolled Bar
B108	Standard Specification for Aluminum-Alloy Permanent Mold Castings
B209/B209M	Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
B221/B221M	Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
B695	Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel
F436	Standard Specification for Hardened Steel Washers
F436M	Standard Specification for Hardened Steel Washers [Metric]

TxDOT Specifications	
Designation	Description
Tex-728-I	Measurements of Dry Film Coating Thickness on Steel

RELATED CROSS REFERENCE MATERIALS	
Specification Item 720S, "Metal for Structures"	
City of Austin Standard Specification Items	
Designation	Description
Item 406S	Reinforcing Steel
American Society for Testing and Materials (ASTM)	
Designation	Description
A370	Standard Test Methods and Definitions for Mechanical Testing of Steel Products

ITEM NO. 721S STEEL STRUCTURES 9-26-12

721S.1 Description

This item shall govern the furnishing, fabricating, erecting and painting steel and other metals for structures or portions of structures. The materials related to this specification are specified in Item 720S, "Metal for Structures" unless otherwise noted. Reinforcing steel (Item 406S) and other structural materials are not included.

This specification is optional and is applicable for projects or work involving either inch-pound or SI units. Within the text inch-pound units are given preference followed by SI units shown within parentheses.

721S.2 Submittals

The submittal requirements of this specification item include:

A. Shop Drawings

1. The Contractor shall prepare and submit seven (7) copies of detailed shop drawings (or as required by the Contract Documents) for each detail of the Contract Drawings requiring the use of materials specified herein or in Item No. 720S, "Metal for Structures".
2. Shop drawings shall include complete details and schedules for fabrication and assembly, as well as camber and erection diagrams for all structures, bridges, plate girders, and other structural members as indicated on the drawings. The equipment, sequence of erection, location and type(s) of falsework (including calculations), location of splices, and proposed method of support to determine any overstress caused by the erection procedure shall also be included.
3. The drawings shall be prepared on sheets 22 x 36 inches (A1 sheet size or 559 x 914 mm) or larger. Each sheet shall include the following:
    a. Project name and location
    b. Name of structure or detail. For details, include structure name or location of detail within the project.
    c. Fabricator name and person responsible for preparation of drawing.
    d. Contractor name.
    e. Sheet numbering.
4. Preparation and submission of shop drawings may be on 11 × 17 inch sheets (A3 sheet size or 279 × 432 mm) or full size drawings may be reduced to half scale size if they are completely clear and legible.
5. Field Verification
    a. The Contractor shall be responsible for field verification of design information and shall inform the Fabricator of any discrepancies with the Contract Documents.
    b. When discrepancies are more than minor dimensional changes, the Contractor shall resolve with the Architect/Engineer.
    c. Any changes from the Contract Documents due to field verification of information shall be clearly noted on the shop drawings.

6. All shop drawings shall be checked by the Fabricator before submitting them to the City of Austin. The Contractor shall also be responsible for reviewing the shop drawings prior to submittal to assure correctness and completeness and to coordinate ship fit and field connections. Resolution of problems and corrections to drawings, if necessary, shall be done prior to submittal.

7. Changes in section(s), as allowed per this specification (P721S.4 C), shall be clearly noted on the shop drawings.

8. Color coding for any grade of steel to be used on the project and not listed in ASTM A6 (A6M).

B. Painting shall conform to Item No. 722S, "Paint and Painting". Submit any proposed shop primers or paints that are not otherwise specified.

C. Connections

1. When structural members are to be fabricated by welding, a welding procedure shall be submitted. A welding procedure shall include the standard AWS symbol, size, length, type of weld, and any other pertinent information. Upon approval, the welding procedure will be assigned a Welding Procedure Number and the Shop Drawings shall include this number adjacent to the appropriate welding symbol.

2. When structural members with calculated stress are to fabricated by bolting, a fabrication procedure shall be submitted. A fabrication procedure shall include a list of equipment to be used, sequence of assembly, sequence and detail of connections made, special processes such as planing, facing, etc., detail of heat treating procedures, when applicable and any other information concerning fabrication, as may be required by the Engineer/Architect.

3. Submit seven (7) copies of connection procedures along with the shop drawings.

4. Provide calculations for all standard connections, sealed by a Licensed Professional Engineer registered in the state of Texas.

D. Production Data

1. Submit product data for all items in accordance with this specification and those materials specified in Item No. 720S, "Metal for Structures". Include certification, mill test reports, or other data as required. Mill test reports will not be required for miscellaneous hardware.

2. Quality Control

a. The Contractor shall provide, if requested, facilities in the shop and as many helpers as needed, for the Inspector to properly inspect the materials and work quality. The Inspector shall be allowed free access to the necessary parts of the work.

b. The Inspector will have the authority to reject any material or work which does not meet the requirement of this specification. In case of dispute, the Contractor may appeal to the Engineer or designated representative, whose decision will be final.

c. The acceptance of any material or finished members by the inspector will not prohibit subsequent rejection if found defective. Rejected material shall be replaced promptly, or made good by the Contractor to the satisfaction of the Engineer or designated representative.

3. As materials are shipped, the Fabricator shall furnish the Engineer or designated representativewith four (4) copies of the shipping invoice. The Fabricator's shipping invoice shall include:

a. Member piece mark identification.

b. Number of pieces shipped.

c. Total calculated or scale weight for each shipment per bid item.

4. Final payment for structural steel will not be made until shipping invoices indicating total weight of material used have been received and checked by the Engineer or designated representative. Shipping weights will not be used as measurement for payment.

E. Notice of Beginning Fabrication Work

1. The Contractor shall give the Engineer or designated representative seven (7) days notice prior to the beginning of fabrication work in the shop.

2. No work shall be performed in the shop before the Engineer or designated representative has authorized fabrication. Any purchases of material prior to authorization shall be at the Contractor's risk.

F. Material Safety Data Sheets (MSDS)

Submit MSDS for materials as required and keep on the project job site.

G. Welder Certifications

Provide certification that welders working on the project have satisfactorily passed qualification tests in accordance with AWS D1.1 (D1.1M). If recertification is required, retesting will be at the Contractor's expense.

H. Repair Procedures

Submit repair procedures in accordance with the requirements herein.

721S.3 Delivery, Storage, and Handling

A. Delivery

1. Deliver materials to the site at such intervals as required so as to ensure uninterrupted progress of work.

2. Anchor bolts, anchorages, and other embedded items shall be delivered to the site in ample time so as not to delay related work. Also, provide setting drawings, templates, and directions for installation as required to properly install these items.

B. Storage and Handling

1. Store materials so as to permit easy access for inspection and identification. Do not store materials in a manner that might cause distortion or damage to materials or support.

2. Keep materials off the ground using pallets, platforms or other supports.

3. Protect materials from corrosion and deterioration.

4. If bolts and nuts become dry or rusty, clean and lubricate them before use.

C. Repair or replace damaged materials, structures, or portions of structures as directed.

D. The handling of material, fabrication, blocking of partially completed members, and movement of completed members shall be done in such a manner that the safety of workers and inspection personnel will not be impaired at any time.

E. The storage, handling, and cleaning of corrosion resistant ("weathering") steel shall be in accordance with ASTM A242 (A242M), ASTM A588 (A588M), or the requirements of the proprietary manufacturer as applicable.

721S.4 Quality of Work

A. Fabrication and Assembly

1. Fabrication shall be in accordance with either AISC 325 or 360.

2. Fabricate and assemble structural assemblies in the shop when possible. When shop fabrication is not practical, provide markings as required to facilitate assembly.

3. Fabricate in such a manner so as to limit storage and handling and not to hinder construction progress.

B. Fabrication tolerances for rolled shapes, plate girders, plates, bars, wide flange sections, and miscellaneous steel shall be in accordance with ASTM A 6 (A6M) or AWS D1.5 (D1.5M).

C. Rolled fabricated sections of slightly different dimensions and weight than the standard sections shown will be acceptable, provided they have equal or greater Moment of Inertia and Section Modulus than the sections(s) detailed. Changes in section(s) shall be clearly noted on the shop drawings.

D. Maximum deviation from flatness for webs of wide flange sections shall be the same as for built-up girders.

E. Shoes shall be fabricated with a tolerance not greater than the following:

1. The top bolster shall have the center 75 percent of the long dimension true to 1/32inch (0.8 mm), with the remainder true to 1/16inch (1.6 mm) and shall be true to 1/32inch (0.8 mm) across its entire width in the short dimension.

2. For a pin and rocker type expansion shoe, the axis of rotation shall coincide with the central axis of the pin.

3. When the shoe is completely assembled and the top bolster is moved horizontally simulating the movement of the shoe in the finished structure, no point in the plane of the top bolster shall change elevation by more than 1/16inch (1.6 mm) for the full possible travel of the rocker both ways from the neutral position nor shall the top bolster change inclination with respect to the horizontal by more than 1 degree during this same travel.

F. I-beams and girders shall be fabricated with a tolerance not greater than the following:

1. The plane of the bearing area of beams and girders shall be perpendicular to the vertical axis of the beam within 1/16inch (1.6 mm).

2. Correction of bearing areas of shoes, beams and girders to the above tolerances shall be with heat and/or external pressure. Grinding or milling will be permitted if reduction of required thickness of member is not reduced by more than 1/16inch (1.6 mm).

3. Rolled material must be straight before being laid off or worked.

4. If straightening is necessary, it shall be done by procedures submitted to and approved by the Engineer or designated representative. Sharp kinks and bends will be cause for rejection of the material unless corrected to the satisfaction of the Engineer or designated representative.

721S.5 Execution

A. Finishing

1. Finishing details of materials specified herein and Item No. 720S, unless noted otherwise, shall be in accordance with AISC 325, Steel Construction Manual, and AISC 360, Specification for Structural Steel Buildings.

2. Surface finishes shall be in accordance with ASME B46.1 and as indicated in Table A:

TABLE A	
Condition	Roughness Value [micro inches (micrometers)]
Member ends not subject to calculated stress	2000 (50.8)
Cut surfaces 4 inches (100 mm) to 8 inches (200 mm) thick	1500 (38.1)
Cut surfaces up to 4 inches (100 mm) thick	1000 (25.4)
Milled ends of compression members, stiffeners, and fillers	500 (12.7)
Top surfaces of steel slabs, base plates, column cap plates, and pedestal cap plates	250 (6.4)
Surfaces of bearing plates intended for sliding contact, pins, and pin holes	125 (3.2)

3. Sheared edges of plates greater than 5/8 inch (15.9 mm) thickness and carrying calculated stress shall be planed to a depth of ¼ inch (6.4 mm).

4. Re-entrant cuts shall be filleted to a minimum radius of ¾ inch (19.1 mm), except for the corners of welding access cope holes adjacent to a flange.

5. Oxygen cutting shall be in accordance with AWS D1.1 and D1.5. Hand cutting shall be done only where approved by the Engineer or designated representative.

6. Edges of all main members, which are sheared or oxygen cut, and all other exposed edges to be painted shall be rounded or chamfered to an approximate 1/16inch (1.6 mm) dimension by grinding.

7. Unless otherwise indicated, steel plates for main members shall be cut and fabricated so that the primary direction of rolling is parallel to the direction of the main tensile and/or compressive stresses.

8. In all oxygen cutting, the flame shall be adjusted and manipulated to avoid cutting inside the prescribed lines. Roughness exceeding the values of Table A and occasional notches or gouges not more than 3/16 inch (4.8 mm) deep on otherwise satisfactory surfaces shall be removed by machining or grinding. Cut edges shall be left free of slag. Correction of defects shall be faired to the oxygen cut edges with a slope not exceeding 1 in 10.

9. Air carbon-arc or oxygen gouging, oxygen cutting, chipping or grinding may be used for joint preparation or the removal of defective work or material. Oxygen gouging shall not be used on ASTM A 514 (A514M), A517 (A517M), A242 (A242M), and A588 (A588M) corrosion resistant ("weathering") steels.

10. The top and bottom surfaces of steel slabs, base plates and cap plates of columns and pedestals shall be planed or else the steel slabs and base plates hot-straightened. Parts of members in contact with plates shall be faced to fit.

11. In planning the surfaces of expansion bearings, the cut of the tool shall be in the direction of expansion.

12. Stiffeners shall provide an even bearing against flanges. Tight-fit, when indicated, shall have at least 1 point bearing on the flange surface and the remainder with a maximum clearance of 1/16inch (1.6 mm) at any point. Where stiffeners are to be welded to the flange, the opening prior to shall not exceed 3/16 inch (4.8 mm) with the fillet weld size increased by the amount of the opening.

13. Structural members which are indicated on the Contract Documents to be annealed or normalized shall have finish machining, boring, and straightening done subsequent to heat treatment. Normalizing and annealing shall be as defined by ASTM A941. The temperatures during the heating and cooling process

shall be maintained uniformly throughout the furnace so that the temperature a any two points on the member will not differ by more than 100°F (38°C) at any one time.

14. Special requirements for ASTM A 514 (A514M) and A517 (A517M) shall be as follows:

    a. Annealing and normalizing is not allowed.

    b. Stress relieve only with the approval of the Engineer or designated representative.

    c. Allowance for springback should be about three (3) times that of carbon steel.

    d. For break press forming, the lower die span should be at least sixteen (16) times the plate thickness.

    e. If steel plates to be bent are heated to a temperature greater than 1125°F (605°C), they must be requenched and tempered in accordance with the producing mill's practice.

    f. The holding temperature for stress relieving shall not exceed 1100°F (595°C), except that 950°F (510°C) shall be maximum for welds and six (6) inches (150 mm) surrounding welds.

15. Short radii on steel plates shall be hot bent at a temperature not greater than 1200°F (650°C).

16. When indicated, bridge shoes, pedestals or other parts which are built up by welding sections of plate together shall be stress relieved in accordance with approved procedures.

B. Repair of Defects

1. Correction of cutting defects and of occasional notches or gouges less than 7/16 inch (11.1 mm) deep for material up to 4 inches (100 mm) thick and less than 5/8 inch (15.9 mm)for material over 4 inches (100 mm) thick may be made on steel with yield strengths up through 65 ksi (450 Mpa) by welding.

2. Discontinuities or defects in plate edges which form the faces of groove welds shall be removed to a depth of 5/8 inch (15.9 mm) and repaired by welding. Laminations opening to these edges shall be removed. Weld repairs shall be made by suitably preparing the defect, welding in accordance with AWS D1.1 (D1.1M), and grinding the completed weld smooth and flush with the adjacent surfaces.

3. Occasional notches, gouges or defects in oxygen cut edges of ASTM A514 (A514M) and ASTM A517 (A517M) steel may be repaired by welding, when approved by the Engineer or designated representative under the following conditions:

    a. Cutting defects not more than 3/16 inch (4.8 mm) deep in plate edges which will form the faces of a groove weld joint and which will subsequently be completely fused with the weld may be repaired by welding. Discontinuities or defects to these edges shall be removed to a depth of ¼ inch (6.4 mm) below the surface by grinding or chipping and the gouge repaired by welding. Laminations opening to these edges shall be removed.

    b. Cutting defects not more than 3/16 inch (4.8 mm) deep in plate edges which will form a fillet-welded corner joint shall be repaired by welding only on the part of the edge which will become the faying surface for the joint and the fusion zone of the fillet weld. The part of the defect outside the toe of the completed fillet weld shall be removed by machining or grinding and faired to the oxygen cut surface with a slope not exceeding 1 in 10. If the actual net cross-sectional area which would remain after removal of the discontinuity is 98 percent or greater than the area of the plate based on nominal dimensions, weld repairs shall be made as specified above using E-11018-M electrodes and grinding the completed weld smooth and flush with the adjacent surface to produce a proper finish.

4. Straightening Bent Material

a. The straightening of plates, angles, miscellaneous shapes, and built up members, when approved by the Engineer or designated representative be done by methods that will not produce fracture or other damage. A detailed procedure for straightening bent materials shall be submitted to the Engineer or designated representative for approval.

b. Straightening of individual pieces shall be done prior to assembly into a built-up member.

c. The temperature for heat straightening of steel members shall not exceed 1200°F (650°C).

d. Heat straightening or correction of errors in camber of ASTM A514 (A514M) and A517 (A517M) steel members shall be done only under rigidly controlled procedures, each application subject to the approval of the Engineer or designated representative. The temperature shall not exceed 1100°F (595°C) nor shall the temperature exceed 950°F (510°C) at the weld metal or within 6 inches (150 mm) thereof.

e. The temperature of the steel shall be controlled by approved temperature indicating devices, such as crayons, liquids or bimetal thermometers.

f. Heat shall not be applied directly on weld metal.

g. Following straightening, the metal shall be carefully inspected for evidence of fracture.

5. Pins, Pinholes, and Rockers

a. Pinholes shall be bored true to the specified diameter, smooth and straight, at right angles with the axis of the member and parallel with each other, unless otherwise indicated. Pins and pinholes shall be finished to an ASME B46.1 value of 125.

b. The diameter of the pinhole shall not exceed that of the pin by more than 1/50 inch (0.5 mm) for pins 5 inches (127 mm) or less in diameter or 1/32 inch (0.8 mm) for larger pins.

c. Rockers shall be finished to an ASME B36.1 value of 250.

6. The limits of acceptability and repair of surface imperfections for all steels shall be in accordance with ASTM a6 (A6M).

7. Discontinuities

a. Roughness exceeding an ASME B46.1 value of 2000 in oxygen cut surfaces and occasional notches or gouges not more than 3/16 inch (4.8 mm) deep on otherwise satisfactory surfaces, shall be removed by machining or grinding to a slope not exceeding 1 in 10.

b. In the repair and determination of limits of internal discontinuities visually observed on rolled, sheared or oxygen cut edges and caused by entrapped slag or refractory, deoxidation products, gas pocket or blow holes, the metal removed shall be the minimum necessary to remove the defect or to determine that the permissible limit is not exceeded. All repairs made by welding shall be approved by the Engineer and shall conform to the applicable provisions of AWS D1.1 (D1.1M).

c. The limits of acceptability and the repair of visually observed edge discontinuities in plates 4 inches (100 mm) or less in thickness shall be in accordance with Table B where the length of defect is the visible long dimension on the plate edge and the depth is the distance the defect extends into the plate from the edge.

Table B

Description of Discontinuity	**Repair Required**
Any discontinuity 1 inch (25 mm) in length or less	None - need not be explored.

Any discontinuity over 1 inch (25 mm) in length and ⅛ inch (3.2 mm) maximum depth.	None - depth should be explored.
Any discontinuity over 1 inch (25 mm) in length with depth over ⅛ inch (3.2 mm) but not greater than ¼ inch (6.4 mm).	Remove - need not weld.
Any discontinuity over 1 inch (25 mm) in length with depth over ¼ inch (6.4 mm)but not greater than 1 inch (25 mm).	Completely remove and weld. Aggregate length of welding not over 20 percent of plate edge length being repaired.
Any discontinuity over 1 inch (25 mm) in length with depth greater than 1 inch (25 mm).	Subject to approval by the Engineer. Gouge out to 1 inch (25 mm) and block off by welding. Aggregate length of welding not over 20 percent of plate edge length being repaired unless approved by the Engineer.

d. Removal of metal by gouging shall be done in a manner assuring adequate width and slope for welding.

e. Multiple discontinuities should be considered continuous when located in the same plane within 5 percent of the plate thickness and separated by a distance less than the length of the smaller of two adjacent continuities.

C. Heat Curving

The Contractor shall submit a list of steel members proposed for heat curving and a detailed procedure for this work to be completed. Heat curving shall not proceed prior to written approval by the Engineer or designated representative.

D. Color Coding

1. For each steel approved for use on the project, a distinct color code shall be required. The color code shall be as specified in ASTM A6 (A6M). White shall be required for A 36 steel.

2. The color code used for any steels not specified by ASTM A6 (A6M) must be submitted to and approved by the Engineer or designated representative.

3. The appropriate color(s) shall be placed on the material upon entry into the shop and shall be carried on all pieces to final fabrication. Loss of color code marking on any piece and with no other positive identification shall require testing thereof prior to its use to re-establish positive identity of the material to the satisfaction of the Engineer or designated representative.

E. Shop Painting

Preparation of surfaces and shop painting shall conform to Item No. 722S, "Paint and Painting."

F. Marking and Shipping

1. All structural members shall be marked in accordance with the erection diagram.

2. The markings shall be over the painted surface. In no case shall shop paint be left off in order to preserve original markings on steel to be painted.

3. Members weighing more than 3 tons (2.7 MT) shall have the weight marked thereon.

4. The loading, transporting, unloading and storing of material shall be conducted so it will be kept clean and free from injury.

5. Bolts of each length and diameter and loose nuts or washers of each size, shall be packed separately and shipped in boxes, crates, kegs or barrels. A list and description of the contents shall be plainly marked on the outside of each package.

721S.6 Bolted Members

A. Detailing

Detailing of bolted connections, where not indicated on the drawings or specified herein, shall conform to the latest edition of AISC 325, Steel Construction.

B. Bolts

Bolts shall be in accordance with Item No. 720S, "Metal for Structures".

C. Bolt Holes

1. All holes for bolts shall be either punched or drilled. Material forming parts of a member composed of not more than five (5) thicknesses of metal may be punched 1/16inch (1.6 mm) larger than the nominal diameter of the bolts, if the thickness of the metal is not greater than ¾ inch for carbon steel, 5/8 inch (16.9 mm) for HS or ½ inch (12.7 mm) for XHS steel. For more than five (5) thicknesses or when any of the main material is thicker than shown herein, all the holes shall be subpunched or subdrilled 3/16 inch (4.8 mm) smaller and after assembling, reamed 1/16inch (1.6 mm) larger or drilled from the solid to 1/16inch (1.6 mm) larger than the nominal diameter of the bolts.
2. For punched holes, the diameter of the die shall not exceed that of the punch by more than 1/16inch (1.6 mm). If any holes must be enlarged to admit the bolts, they shall be reamed. Holes shall be clean cut without torn or ragged edges. Poor matching of holes will be cause for rejection.
3. Reamed, punched and drilled holes shall be cylindrical, perpendicular to the member and 1/16inch (1.6 mm) larger than the nominal diameter of the bolts. Reamers and drills shall be guided by mechanical means. Only holes which are not accessible to mechanically guided equipment shall be done by hand. Reaming and drilling shall be done with twist drills, except that for poorly aligned holes tapered reamers shall be used in conjunction with a template so placed and held so as to force the reaming to the best center of holes for that group. Connecting parts shall be assembled and held securely during reaming or drilling operations and match-marked before disassembling.

D. Preparation of Holes for Field Bolting

1. Holes in all field splices of main truss members, box girders, continuous I-beams and plate girders shall be subpunched and reamed while assembled or drilled full size with all parts assembled, taking into account their relative position in the finished structure due to grade, camber, and curvature. The assembly, including camber, alignment, accuracy of holes, and milled joints shall be approved by the Engineer before reaming or drilling full size is started.
2. All holes for floor beams and stringer end connections shall be subpunched and reamed to a steel template of not less than 1 inch (25 mm) thickness or reamed while assembled.
3. Holes for secondary members such as diaphragms, laterals, sway bracing, etc. may be punched full size unless subpunching or subdrilling.

E. Accuracy of Holes

1. Accuracy of all holes punched full size, subpunched, or subdrilled shall be such that a cylindrical pin ⅛ inch (3.2 mm) smaller in diameter than the nominal size of the punched hole may be entered perpendicular to the face of the member, without drifting, in at least 75 percent of the adjoining holes in the same plane after assembling and prior to any reaming. Pieces not meeting this requirement will

be rejected. Any hole which will not pass a pin 3/16 inch (4.8 mm) smaller in diameter than the nominal size of the punched hole will be cause for rejection.

2. After reaming or drilling, 85 percent of the holes in any adjoining group shall show no offset greater than 1/32 inch (0.8 mm) between adjacent thickness of metal.

3. Layout of shop work shall be done so that gage lines for bolts shall not vary from plan dimensions more than 1/16inch (1.6 mm). Full size holes in any adjoining group or line shall not vary more than the following:

   a. At least 8 percent of the holes shall be within 1/16inch (1.6 mm) of plan gage.

   b. Not more than 10 percent of the holes may vary as much as ⅛ inch (3.2 mm) from plan gage.

   c. Holes varying more than ⅛ inch (3.2 mm) from plan gage will not be accepted.

F. Shop Assembly

1. Each truss or box girder section shall be assembled in its relative position in the shop before reaming is started. Match-marks shall be stamped in the metal at all field connections, conforming to erection diagrams, at the time reaming is done.

2. Surfaces of metal to be in contact shall be cleaned before assembling.

3. Disassembling after reaming will be required to remove shavings, burrs, etc.

4. When bolting is required, shop or field, faying surfaces of all joints including splice plates, shall be cleaned in accordance with AISC 325, Steel Construction Manual, and AISC 360, Specification for Structural Steel Buildings.

5. The members shall be free from twists, bends and other deformations. In no case shall tack welding be used in assembly for bolting without prior approval of the Engineer or designated representative..

6. If necessary, the bolt holes shall be spear-reamed for the admission of bolts preparatory to the shop bolting of full-sized punched material. The spear reamer used for this purpose shall be not more than 1/16inch (1.6 mm) larger than the nominal diameter of the bolts.

7. Parts not completely bolted in the shop shall be secured by temporary bolts, where practicable, to prevent damage in shipment and handling.

8. The drifting done during assembling shall be only that required to bring the parts into position and not sufficient to enlarge the holes or distort the metal. If any holes must be enlarged to admit bolts, they shall be reamed.

G. Preparation and Fit of Members

1. When indicated, abutting joints shall be milled and brought to an even bearing. Where joints are not milled, the openings shall not exceed ¼ inch (6.4 mm).

2. Floor beams and girders with end connection angles shall be built to exact length back to back of connection angles. If end connections are faced, the finished thickness of the angles shall be not less than that indicated.

721S.7 Welded Members

A. General

1. All welding operations, processes, equipment, materials, qualifications of welders, quality of work, nondestructive testing, and inspection shall conform to Item No. 723S, "Structural Welding", AWS D1.1 (D1.1M), AWS D1.5 (D1.5M), and the Shop Drawings.

2. Unless otherwise indicated, nondestructive testing (magnetic particle and radiographic) required in the shop will be done by, and at the expense of, the Contractor. This will include furnishing all materials, equipment, tools, labor and incidentals necessary to perform the required testing.

3. All magnetic particle inspection and all radiographic inspection shall be done in the presence of and at the locations selected by the Engineer or designated representative. The Engineer or designated representative shall examine and interpret all tests made.

4. Magnetic particle inspection shall conform to ASTM E 709 and the following unless otherwise indicated:

    a. For built-up members, 100 percent of the web to flange and bearing stiffener fillet welds on not less than 1 fabricated piece for each 15 pieces or fraction thereof when the maximum flange thickness is less than 2 ½ inches (63.5 mm).

    b. For built-up members, 100 percent of the web to flange and bearing stiffener fillet welds on not less than 1 fabricated piece for each 10 pieces or fraction thereof when the maximum flange thickness is 2 ½ inches (63.5 mm) or greater.

    c. Welds requiring repairs shall be retested by magnetic particle inspection after the repairs are made.

    d. No magnetic particle inspection will be required for rolled sections.

5. Radiographic inspection shall conform to ASTM E94, AWS B1.10, and the following unless indicated otherwise on the Drawings:

    a. For shop welds of material 65 ksi (450 Mpa) yield strength and less, radiographic inspection will be made as follows:

        1. The full flange width of 35 percent of all flange splices where the plate thickness at the weld is 2 inches (50 mm) or less.

        2. The full flange width of 50 percent of all flange splices where the plate thickness at the weld is greater than 2 inches (50 mm).

        3. 1/5 the depth of the web of 50 percent of the web splices on each structure.

        4. If unacceptable work is found, additional radiographs will be made on sections welded by the same equipment and/or operator just prior to and just after the section containing the defect.

    b. For shop welds of material greater than 65 ksi (450 Mpa) yield strength, radiographic inspection shall be made on all groove welds. These welds shall be inspected not less than 48 hours after they are completed.

    c. Welds requiring repairs shall be retested by radiography after repairs are made. All radiographic inspection and necessary repairs shall be done prior to assembly.

    d. When radiographic inspection of particular welds is required by the plans, this shall be in addition to the radiographic inspection required herein.

B. Surface Preparation for Welding

1. Surfaces to be welded shall be smooth, uniform and free from fins, tears and other defects which would adversely affect the quality of the weld. Surfaces to be welded shall be free from loose scale, slag, rust, grease, or other material. Mill scale that withstands vigorous wire brushing or a light film of drying oil or rust inhibitive coating may remain. Finish of bevels of groove welds shall be milled or ground. Oxygen cut bevels without grinding will not be allowed.

2. When a zinc-rich paint is specified, surfaces within 4 inches (100 mm) of a groove weld joining main stress carrying members and within 2 inches (50 mm) of fillet welds joining diaphragms or lateral bracing to stiffeners or gusset plates shall be sandblast cleaned and coated with linseed oil. After welding is completed, the areas shall be sandblast cleaned and painted as required for the specified paint system.

3. For other paint systems, surfaces within 2 inches (50 mm) of any weld joining main stress carrying members shall be free from any paint or other material that would prevent proper welding.

4. Sheared plates for webs of built-up members shall be wide enough to allow for trimming of edges where built-in camber is required. Plates with rolled edges used for webs shall be trimmed by oxygen cutting.

5. The faying surfaces of the web and flange plates and the adjacent surfaces that are to be fillet welded shall be cleaned by grinding prior to assembly and welding of web to flange.

C. Assembly of Parts

1. Parts to be joined by fillet welds shall be brought into as close contact as possible, with a maximum separation of 3/16 inch (4.8 mm). If the separation is 1/16inch (1.6 mm) or greater, the leg of the fillet weld shall be increased by an equivalent amount. The separation between faying surfaces of lap joints and of butt joints landing on a backing strip shall not exceed 1/16inch (1.6 mm). The fit of joints not sealed by welds throughout their length shall be close enough to exclude water after painting. Where irregularities in rolled shapes or plates after straightening prevents this, the procedure necessary to bring them within the above limits shall be approved by the Engineer or designated representative. The use of fillers is prohibited, except as indicated or as approved by the Engineer.

2. Members to be welded shall be brought into correct alignment and held in position by clamping, welding, or tacking until the joint has been welded.

3. Adequate clamps must be provided to prevent cupping or warping of the parts when welding them to the web. The clamping devices must be designed to not interfere with the operation or guiding of automatic welding equipment.

4. Temporary stiffeners used for jigs and/or warpage control shall not be tack welded to the flange material. Tacking to the web is permissible if the welds are at least d/6 distance away from the flange, where "d" is the web depth. The tack weld shall be removed by grinding flush with the parent metal prior to acceptance.

5. Suitable allowance shall be made for shrinkage. The joint shall never be restrained on both sides when welding.

6. Abutting parts to be joined by groove welds shall be aligned carefully. All shop groove welds in flange plates shall be ground smooth and flush with the base metal on all surfaces. This shall apply both to parts of equal thickness and parts of unequal thickness.

7. The surfaces shall be ground so that the radii at the points of transition will be 4 inches (100 mm) minimum.

8. When groove welds are used to join materials of different thickness or width, there shall be a smooth transition between offset surfaces with a slope of not greater than 1 in 4 in thickness transition and to the proper radii in the case of width transition.

9. Groove welds in web plates need not be ground unless indicated.

10. Grinding shall be done in the direction of stress and in a manner that keeps the metal below the blue brittle range of 350°F (177°C).

11. Intermediate stiffeners within 12 inches (300 mm) of a splice point shall be shipped tack welded in place. Final welding shall be done in the field.

D. Surface Preparation and Shop Assembly for Field Welds

1. Ends of beams and girders shall be prepared in accordance with the requirements herein or as indicated. The centerline of the land of opposing web and flange bevels shall not deviate from each other by more than 1/16inch (1.6 mm).

2. For Shop Assembly, members should be brought into abutting contact in accordance with the shop drawings. Root faces shall not vary in excess of 1/16inch (1.6 mm) from contact. Corrections by additional cutting and/or grinding shall be made to bring the splice within this tolerance. Finish of bevels for groove welds shall be milled or ground. Oxygen cut bevels without grinding will not be allowed.

3. Ends of beams or girders to be welded shall be prepared in the shop taking into account their relative positions in the finished structure due to grade, camber, and curvature. Each splice shall be completely shop assembled, checked and match-marked while assembled.

721S.8 Field Erection

A. General

1. Field erection shall be in accordance with the approved shop drawings. Such approval shall not relieve the Contractor of responsibility for the safety or adequacy of methods or equipment, or from carrying out the work in full as indicated. No work shall be done without the approval of the Engineer or designated representative.

2. Field erection plans for beam units will not be required unless indicated.

3. Spot welding for the purpose of eliminating field erection bolts or for holding steel parts together while bolting will not be permitted.

4. The Contractor shall provide falsework and all tools, machinery, and appliances (including drift pins and fit-up bolts) necessary for the expeditious handling of field erection work. Drift pins sufficient to fill at least ¼ of the field holes for main connections shall be provided.

5. When railroad or roadway traffic must be maintained beneath girders or beams already placed, traffic shall be protected against falling objects during the erection of diaphragms and other structural members, during the placing of cast-in-place concrete, and during the erection and dismantling of forms thereof. The protection shall consist of safety nets of 1 inch (25 mm) mesh maximum or a flooring with openings not larger than 1 inch (25 mm).

B. Storing, Handling, and Assembling Materials

1. All material shall be handled in a manner that prevents damage.

2. Stored material shall be placed on skids above the ground and kept clean and properly drained. Girders and beams shall be placed upright and shored. Long members, such as columns, shall be supported on skids placed closely enough to prevent excessive deflection.

3. The parts shall be match-marked and assembled accurately as indicated on the approved erection drawings.

4. Hammering which will injure or distort the members is not allowed.

5. All bearing and faying surfaces of structural steel in bolted connections shall be cleaned before the connection members are assembled. When ASTM A588 (A588M) steel is used these, surfaces shall

receive a Class B blast cleaning conforming to Item No. 722S, "Paint and Painting", prior to assembly of the connection members. The areas of the outside ply under washers, nuts, or bolt heads shall be cleaned prior to installation of the bolts.

6. Unless erected by the cantilever method, truss spans shall be erected on blocking located so as to provide proper camber. The blocking shall be left in place until the tension chord splices are fully connected and all other truss connections pinned and bolted. Main connections shall have ½ of the holes filled with bolts and erection pins (½ bolts and ½ pins) before swinging the span. Splices and connections carrying traffic during erection shall have ¾ of the holes so filled.

7. Fit-up bolts shall be of the same nominal diameter as the connection bolts. Erection pins shall be 1/32 inch (1 mm) larger diameter.

8. There shall be no temporary welds for transportation, erection, or other purposes on main members, except at approved locations more than 1/6 the depth of the web from the flanges of beams and girders, unless otherwise approved by the Engineer or designated representative.

C. Falsework

1. Falsework shall be properly designed for the loads to be supported and shall be substantially constructed and properly maintained. The Contractor shall prepare and submit to the Engineer falsework plans, including calculations.

2. The falsework plans shall include all details of members, connections, equipment, etc., so that a structural check can be made of them.

3. Approval of the falsework plans does not relieve the Contractor of responsibility/liability for the falsework during field erection.

D. Welding and Nondestructive Testing

Welding and nondestructive testing shall conform to Item No. 723S, "Structural Welding".

E. Ancillary Items

All ancillary items such as castings, bearing plates, etc. shall be in accordance with the drawings or as specified elsewhere.

F. Errors in Shop Work

1. Any errors in shop work which prevent the proper assembling and fit-up of parats by the moderate use of drift pins or a moderate amount of reaming and slight chipping or cutting shall be reported immediately to the Engineer or designated representative, along with the proposed method(s) of correction.

2. Corrections of minor misfits and a reasonable amount of reaming will be considered a legitimate part of the work.

3. Corrections shall be made in the presence of the Engineer or designated representative, unless otherwise directed. Such work is to be done at the entire expense of the Contractor.

721S.9 Paint and Painting

Unless otherwise indicated, painting shall conform to Item No. 722S, "Paint and Painting".

721S.10 Measurement and Payment

No direct compensation will be made for "Steel Structures". Measurement and payment for quantities of metals, concrete, reinforcement, railing, ancillary items, and other bid items which constitute the completed and accepted structure(s) shall conform to pertinent specifications.

End

Ref: 204S, TxDoT 447, 720, 722, 723, TxDoT Bulletin C-5, ASTM E 44, ASTM A 6, AS TM A 514/A 517, AS TM A 588

SPECIFIC CROSS REFERENCE MATERIALS	
Specification Item 721S, "Steel Structures"	
City of Austin Standard Specification Items	
Designation	Description
Item 406S	Reinforcing Steel
Item 720S	Metal for Structure
Item 722S	Paint and Painting
Item 723	Structural Welding
American Institute of Steel Construction (AISC)	
Designation	Description
325	Steel Construction Manual
360	Specification for Structural Steel Buildings
American Society for Testing and Materials (ASTM)	
Designation	Description
A6/A6M	Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
A242/A242M	Standard Specification for High-Strength Low-Alloy Structural Steel
A588/A588M	Standard Specification for High-Strength Low-Alloy Structural Steel with 50 ksi [345 Mpa] Minimum Yield Point to 4-in. [100-mm] Thick
A941	Terminology Relating to Steel, Stainless Steel, Related Alloys, and Ferroalloys
E94	Standard Guide for Radiographic Examination
E709	Standard Guide for Magnetic Particle Examination
American Society of Mechanical Engineers (ASME)	
Designation	Description
B46.1	Surface Texture (Surface Roughness, Waviness & Lay)
American Welding Society (AWS)	
Designation	Description
B1.10	Guide for Nondestructive Inspection of Welds
D1.1/D1.1M	Structural Welding Code - Steel
D1.5/D1.5M	Bridge Welding Code

RELATED CROSS REFERENCE MATERIALS
Specification Item 721S, "Steel Structures"

City of Austin Standard Specification Items	
Designation	Description
Item 406S	Reinforcing Steel
TxDOT Specifications	
Designation	Description
Item 441	Steel Structures
Item 442	Metal for Structures
Item 447	Structural Bolting
Item 448	Structural Field Welding

ITEM NO. 723 STRUCTURAL WELDING 9-26-12

723.1 Description

This item shall consist of field welding of structural steel and reinforcing steel.

Provisions are made herein for the welding of the types of steel listed in Table 2, using the manual shielded metal-arc process, semiautomatic (manual) gas metal-arc welding and flux cored arc welding processes. Other welding processes may be permitted with the specific approval of the Engineer and with qualification of the welding procedure.

Shop fabrication and welding shall conform to Item No. 721, "Steel Structures" and TXDOT Bulletin C-5.

723.2 General

All welds including tack welds to be incorporated shall be made by a certified welder. Tack welds shall be cleaned and fused thoroughly with the final weld. Defective, cracked or broken tack welds shall be removed.

Certification for welders shall conform to TXDOT Bulletin C-6. Miscellaneous welds may be made by a welder qualified conforming to "Welder Qualification", below.

Welds shall be as indicated. The location or size shall not be changed without approval of the Engineer.

The welder shall identify groove welds made by the welder with paint or indelible ink.

Welding will not be allowed when air temperature is lower than 20°F, surfaces are wet or exposed to rain, snow or wind or when operators are exposed to inclement conditions that will hamper their performance.

Moisture present at the point of welding shall be driven off conforming with Table 3, before welding commences. Wind breaks shall be required for the protection of all welding operations.

There shall be no temporary welds for transportation, erection or other purposes on main members, except at locations more than 1/6 the depth of the web from the flanges of beams and girders as indicated or as approved by the Engineer.

ASTM A 514/517 steels shall maintain all groove welds in main members and in flanges of beams and girders subject to tensile stress or reversals of stress shall be finished smooth and flush on all surfaces, including edges, by grinding in the direction of applied stress leaving the surface free from depressions. Chipping may be used provided it is followed by such grinding. Parts joined by groove welds connecting plates of unequal thickness or width shall have a smooth transition between offset surfaces at a slope not greater than 1 in 4 with the surface of either part. The surfaces shall be ground so that the radii at the points of transition shall be 4 inches minimum.

All groove welds, except when produced with the aid of backing, shall have the root of the initial weld gouged, chipped or other-wise removed to sound metal before welding is started from the second side, except that back gouging will not be required when welding steel piling or armor joints with E 6010 electrodes. The back side shall be thoroughly cleaned before placing backup pass.

When backing for welds is left in place to become a part of the structure, it shall be a single length insofar as possible. Where more than a single length is needed, they shall be joined by full penetration butt welds. The surfaces of this butt weld shall be ground flush as necessary to obtain proper fit-up in the weld joint.

Before welding over previously deposited metal, all slag shall be removed and the weld and adjacent base metal shall be cleaned. This requirement shall apply equally to successive layers, successive beads and the crater area.

Arc strikes outside the area of permanent weld must be avoided on all steels. Where they do occur, resulting cracks and blemishes shall be ground out to a smooth contour and checked to insure soundness.

Stringer bead technique shall be used where possible for groove welds on all types of steel. Weaving will not be permitted for ASTM A 514/517 steel except in vertical welding, where a weave not exceeding 2 electrode diameters is permissible for manual shielded metal-arc process.

In all welding processes the progression for all passes in vertical welding shall be upward using a back step sequence.

Groove welds shall begin and terminate at the ends of a joint on extension bars. Edge preparation and thickness of extension bars shall be the same as that of the member being welded and shall extend a minimum of ¾ inch beyond the joint. Extension bars shall be removed with a cutting torch or arc-air gouging upon completion of the weld and the flange edges shall be ground smooth.

Any defects exposed by the grinding shall be cleaned, filled with weld metal and reground to a uniform finish. All grinding shall be parallel to the flange. Excess grinding of the parent metal shall be avoided.

723.3 Materials

Electrodes for manual shielded metal arc welding shall conform to the requirements of the latest edition of "Specification for Mild Steel Covered Arc-Welding Electrodes", AWS A5.1 or to the requirements of the latest edition of "Specifications for Low Alloy Steel Covered Arc-Welding Electrodes", ASW A5.5.

All electrodes and combination of electrode shielding for gas metal-arc welding for producing weld metal with a minimum specified yield point not exceeding 60,000 psi shall conform to the requirements in the latest edition, "Specification for Mild Steel Electrodes for Gas Metal-Arc Welding", AWS A5.18, AWS A5.28 or "Specification for Mild Steel Electrodes for Flux Cored Arc Welding", AWS A5.20, applicable for the classifications producing weld metal having a minimum impact strength of 20 ft/lb, Charpy V-notch, at a temperature of 0 F or below.

For weld metal with a minimum specified yield strength exceeding 60,000 psi, the Contractor shall demonstrate that each electrode and flux or combination of electrode and shielding medium proposed for use will produce low alloy weld metal having the mechanical properties listed in Table 1 in the as welded condition.

The mechanical properties shall be determined from a multiple pass weld made in accordance with the test requirements of the latest edition of AWS A5.18, AWS A5.20 or AWS A5.28 as applicable.

Table 1
Required Mechanical Properties for GMAW and FCAW Electrodes

GMAW Grade	FCAW Grade	Tensile Strength psi - Minimum	Yield Strength psi - Minimum	Elongation, % in 2 inches Minimum	Strength ft-lb at 0 F -Minimum
ER80S	E80T	80,000	65,000	18	20
ER90S	E90T	90,000	78,000	17	20
ER100S	E100T	100,000	90,000	16	20
ER110S	E110T	110,000	98,000	15	20

The mechanical property tests for Grades ER100S, E100T and E110T shall be made using ASTM A 514/517 base metal.

All electrodes used on City projects shall be approved by the Engineer. Tests shall be made on electrodes of the same class, size and brand which were manufactured by the same process and with the same materials as the electrodes to be furnished. Tests must be made and approval renewed every 12 months.

For sizes of electrodes not requiring tests by AWS Specifications, test reports shall be furnished for electrodes of the nearest size and of the same classification. The request for approval shall include the manufacturer's certification that the process and material requirements were the same for manufacturing the tested electrodes and those to be furnished and new test reports, shall be submitted if any changes are made in process or materials during the effective period.

Class of electrodes required will be shown in Table 2. Electrodes shall be used with the type of current, the polarity and in the positions permitted by AWS A5.1 and A5.5 for manual shielded metal-arc welding. AWS A5.18 or A5.20 and A5.28 Specifications shall govern for gas metal-arc welding and flux cored arc welding.

Table 2
Classifications of Electrodes Permitted

Type of Steel	**Main Members Groove & Fillet Welds**			**Secondary Members Groove & Fillet Welds**	
Steel Piling,	E6010	E60T-8	E60XX	E60T-8	ER70S-2
A 53 Pipe,	E6011	E70S-1B	E70XX	E7XT-1	ER70S-3
A 500,	E7016	ER70S-2	E702-1B	E7XT-5	ER70S-6
A 501,	E7018	ER70S-3	E70S-2	E7XT-6	ER70S-7
Armor Joints		ER70S-6	E70S-3	E7XT-8	
		ER70S-7	E70S-6		
			E70U-1		
A 36,	E7016	ER70S-2	E7016	ER70S-2	
A 441,	E7018	ER70S-3	E7018	ER70S-3	
A 572 Grade 50	E7XT-1	ER70S-6	E7XT-1	ER70S-6	
A 588,	E7XT-5	ER70S-7	E7XT-5	ER70S-7	
A 242 Deck Plates	E7XT-6		E7Xt-6		
API Pipe	E7XT-8		E7XT-8		
A 514/A 517	E10018M	ER1102	E11018M	ER110S	
2½ inches thick or less	E110T		E110T		
A 514/A 517	E10018M	ER100S	E10018M	ER100S	
Over 2 ½ inches thick	E100T		E100T		
A 588, A 242	E8018, C-3		E8018, C-3		
A 618 Weathering Steel	E80T(3)	ER80S(3)	E80T(3) ER80S(3)		
Reinforcing Steel	E7016	E7018			
A 572 Grades 60 and 65 for Light Towers	E8016				
E8018	E80T				
ER80S					

(1) Use of the same type electrode with the next higher mechanical properties, conforming to AWS A5.1 or A5.5, than those listed will be permitted.

(2) In joints involving base metals of different yield points or strengths, low hydrogen electrodes applicable to the lower strength base metal may be used.

(3) Deposited weld metal for weathering steel shall have the following chemical composition: C, maximum percent, 0.12; Minimum percent, 0.51/1.30; P, maximum percent, 0.03; S, maximum percent, 0.04; Si, percent 0.35/0.80; Cu, percent, 0.30/0.75; Ni, percent, 0.40/0.80; Cr, percent, 0.45/0.70.

Before use, all electrodes with low hydrogen coverings conforming to AWS A5.1 shall be dried for not less than 2 hours between 450 F and 500 F and electrodes with low hydrogen coverings conforming to AWS 5.5 for not less than 1 hour at a temperature between 700 F and 800 F. Immediately after drying, electrodes shall be stored in ovens held at a temperature of at least 250 F. E70 electrodes not used within 4 hours, E80 within 2 hours, E90 within 1 hour, E100 and E110 within 30 minutes after removal from the storage oven shall be redried before use. Electrodes with flux which has been wet, cracked or otherwise damaged, shall not be used. When ASTM A 514/517 steel is used for welding, electrodes shall be dried at least 1 hour at temperatures between 700 F and 800 F before being used. Electrodes may be redried only once.

Suitable facilities for drying and storage of electrodes shall be furnished at the job site, along with thermometers for checking and controlling the oven temperature.

In humid atmospheres, the times allowed for use without redrying may be reduced.

When a gas or gas mixture is used for gas metal-arc or flux cored arc welding, it shall be of a welding grade having a dew point of -40 F or lower. The gas manufacturer shall furnish certification to the Engineer that the gas or gas mixture is suitable for the intended application and will meet the dew point requirements.

Welding wire coils removed from the original package shall be protected or stored to keep their characteristics or welding proper-ties intact. Rusty coils or portions of coils that are rusty shall not be used.

Any deviation from the above electrode designation shall be approved by the Engineer.

723.4 Construction Methods

For any welding process, the parts to be joined by fillet welds shall be brought into as close as possible and shall not be separated more than 3/16 inch. If the separation is 1/16inch or greater, the leg of the fillet weld shall be increased by the amount of the separation. The separation between faying surfaces of lap joints and of butt joints landing on backing strips shall not exceed 1/16inch.

Splices of beams and girders joined by groove welds shall be carefully aligned with the center of gravity of both members coinciding or each flange vertically offset equally. Beams and girders with offset webs shall be fit with the webs aligned and the flanges offset laterally.

When flanges are offset or abutting parts differ a thickness or width by more than ⅛ inch, the joint shall be made with the slope of the weld metal to each surface, with a transition not exceeding 1 in 4.

Suitable allowance shall be made for shrinkage and the joint shall never be restrained on both sides in any welding process.

All butt splices shall be made before welding of diaframs or sway bracing in a particular section of a unit. Diaframs and sway bracing may be welded in a unit behind the splice welding to provide stability except where such welding interferes with butt splice adjustments such as at a drop-in segment of a continuous unit. All splices shall be made before welding of beams or girders to shoes.

For manual shielded metal-arc welding, the fit-up procedure listed below shall be used for manual shielded metal-arc welding of groove welds for butt joints:

Members shall be spaced to provide a 3/16 inch root opening at the nearest point. When at other parts of the joint the spacing provides up to and including a 7/16 inch opening correction may be made by buildup not exceeding ⅛

inch on each bevel nose. Openings exceeding 7/16 inch shall require rebeveling of the joint to bring it within the maximum buildup limits prescribed above. Build must be allowed to cool before proceeding with the welding.

All members shall be brought into correct alignment and held in position by acceptable clamps while being welded.

Deviations from the above fit-up procedure shall be approved by the Engineer.

723.5 Procedure

Shrinkage and distortion shall be controlled through the use of an approved procedure. Passes shall be made symmetrically and shall alternate between both sides of the joint.

For manual shielded metal-arc welding, beam and girder splices shall be made as indicated. Welds shall be alternated from side to side to prevent heat buildups on 1 flange edge. The passes must be arranged between the top and bottom flange to maintain balance and symmetry.

The sequence used in welding of splices in all I-beams shall be to first place 4 tacks (1½ to 2 inches) in the web.

For I-beam or for built-up girders, place passes 1, 2 and 3 in the top flange, followed by passes 4, 5 and 6 in the bottom flange.

Gouge out and replace passes 1 and 4, which always are placed in the over position before welding on the web. Next, place passes 7 and 8 in the web after aligning girder webs with short tacks at approximately 8 inches on centers.

Alignment clamps may be removed when sufficient weld has been placed to hold the members together and welding is completed using the sequence indicated.

When welding the root passes of beam and girder splices, E7010 electrodes may be used, provided the work is preheated con-forming to Table 3. After the root passes are backed up, the E7010 electrode pass shall be completely removed by arc-air gouging and replaced using low hydrogen electrode.

When this procedure is used, it shall be a continuous operation and back gouging and rewelding shall be completed on each splice before starting on another one. The use of E7010 electrodes will not be permitted for welding ASTM A 514/A 517 steel.

For haunch girder splices adjacent to the haunch section, the welding, once started, shall be continuous until a minimum of 50 percent of the welding in both flanges is completed.

Deviation from the above sequence of weld passes shall be approved by the Engineer.

Procedures for all gas metal-arc and flux cored arc welding shall be submitted to the Engineer for approval and shall be qualified prior to any field welding.

All gas metal-arc and flux cored arc welding procedures shall be qualified conforming to Sections 5 and 7 of TXDOT Bulletin C-5. For each joint to be used in construction, the joint details, electrode classification or grade, electrode diameter, voltage, amperage, travel speed, order and relative position of passes, number and thickness of layers, gas flow, dew point of gas, back gouging, method of cleaning and other pertinent information shall be clearly presented in the Procedure Specification. Fillet welds shall conform to details indicated.

Procedures for welding on ASTM A 514/A 517 steel shall be qualified conforming to TXDOT Bulletin C-5 and approved by the Engineer prior to starting work. Variables to be reported shall include welding process, plate thickness, grade of steel, weld position, joint details, type and size of electrode, number and location of passes, welding sequence, back gouging, current and voltage per pass, welding speed, heat, input and maximum interpass temperature. The heat input and maximum interpass temperature shall not exceed the recommendations of the Steel Producer.

The classification and size of electrode, arc length, voltage and amperage shall be suitable for the thickness of the material, type of groove, welding positions and other circumstances attending the work.

(1) **Manual Shielded Metal-Arc Welding Process**

(a) The maximum size of electrode shall be as follows provided the welder has been certified for its use by the City:

1. 5/16 inch for all welds made in the flat position except root passes.
2. ¼ inch for horizontal fillet welds.
3. ¼ inch for root passes of fillet welds made in the flat position and of groove welds made in the flat position with backing and with a root opening of ¼ inch or more.
4. 5/32 inch for welds made with EXX14 and low hydrogen electrodes in the vertical and overhead positions.
5. 3/16 inch for root passes of groove welds and for all other welds not included under 1, 2, 3 and 4 above.

(b) The root pass size shall be large enough to prevent cracking. The maximum thickness of layers subsequent to the root pass in fillet welds and of all layers in groove welds shall be:

1. ¼ inch for root passes of groove welds.
2. ⅛ inch for subsequent layers of welds made in the flat position.
3. 3/16 inch for subsequent layers of welds made in the vertical, overhead and horizontal positions.

(c) The maximum size fillet weld which may be made in one pass shall be:

1. 3/8 inch in the flat position.
2. 5/16 inch in horizontal or overhead positions.
3. ½ inch in the vertical position.

(2) **Manual (Semiautomatic) Gas Metal-Arc Welding and Flux Cored Arc Welding Process**

(a) The maximum size electrode used shall be as follows:

1. 5/32 inch for the flat and horizontal positions.
2. 3/32 inch for the vertical position.
3. 5/64 inch for the overhead positions.

(b) The thickness of weld layers, except root and surface layers shall not exceed ¼ inch. When the root opening of a groove weld is ½ inch or greater, a multiple pass split-layer technique shall be used. The split-layer technique shall be used. The split-layer technique shall be used in making all multiple pass welds when the width of the layer exceeds 5/8 inch for gas metal-arc welding or ¾ inch for flux cored arc welding.

(c) The welding current, arc voltage, gas flow, mode of metal transfer and speed of travel shall be such that each pass will have complete fusion with adjacent base metal and weld metal and there will be no overlap, excessive porosity or undercutting.

(d) Gas metal-arc welding or flux cored arc welding with external gas shielding shall not be done in a draft or wind. An approved shelter of a material and shape capable of reducing the wind velocity in the vicinity of the welding to a maximum of 5 miles per hour shall be furnished by the Contractor

(e) The maximum size of a fillet weld made in 1 pass shall be:

1. ½ inch for the flat and vertical position.
2. 3/8 inch for the horizontal position.
3. 5/16 inch for the overhead position.

(3) **Preheat**

Preheat ahead of welding both groove and fillet welds (including tack welding) will be required as shown in Table 3.

Preheat and interpass temperatures must be sufficient to prevent crack formation. The preheat temperatures shown in Table 3 are minimums and higher preheats may be necessary in highly restrained welds.

When the base metal is below the required temperature, it shall be preheated so the parts being welded are not less than the specified temperature within 3 inches of the point of welding.

For all groove welds, reheat temperature shall be measured on the side opposite to which the heat is applied at points about 3 inches away from the joint.

Preheating equipment shall be adequate to maintain the entire joint at or above the specified temperature. When possible, a joint shall be completely welded before it is allowed to cool below the specified temperature but shall always be welded sufficiently to prevent cracking before cooling is permitted.

Usually preheat and interpass temperatures shall not exceed 400 F for thickness up to 1 ½ inches and 450 F for greater thickness. These temperatures shall never be exceeded on ASTM A514/517 steels.

The welder shall have and use approved equipment for checking preheat and interpass temperatures at all times while welding is in progress.

Table 3
Minimum Preheat and Interpass Temperature for Manual Shielded Metal-Arc Welding, Flux Cored Arc Welding or Gas Metal-Arc Welding

	Manual or Semiautomatic Gas Metal-Arc Welding, Flux Cored Arc Welding or Manual Shielded Metal-Arc Welding with Low Hydrogen Electrodes	
Thickness of Thickest Part at Point of Welding	**ASTM A 36; A 242; A 441 A 572 Grades 42, 45 and 50; A 588**	**ASTM A 514/517**
To ¾ inch, incl.	50 F	50 F
Over ¾ inch to 1 ½ inches, incl.	70 F	125 F
Over 1 ½ inches to 2 ½ inches, incl.	150 F	175 F
Over 2 ½ inches	225 F	225 F

1. These temperatures are the minimum required for the thinner material shown for each increment and higher preheat on a step basis will be required for the thicker material within each increment. Preheat and interpass temperatures must be sufficient to prevent crack formation and welding shall be carried continuously to completion or to a point that will assure freedom from cracking before the joint is allowed to cool below the minimum specified preheat and interpass temperature. Temperature above those shown may be required for highly restrained welds.
2. When E7010 electrodes are permitted for tacking or temporary root pass, the material shall be pre-heated according to the following:

Thickness of Thickest Part	**Preheat for Tacking or Temporary Root Pass**

½ inch and less	150 F
9/16 inch through ¾ inch	200 F
13/16 inch through 1½ inches	300 F
Over 1½ inches	400 F

3. When joining steels of different strengths or thickness with groove welds, the preheat and interpass temperatures for the higher strength steel and the average plate thickness shall be used. For fillet welds, the preheat shall be used for the higher strength steel and the thickest plate being welded.
4. When the base metal temperature is below 32 F, preheat to at least 70 F and maintain this minimum temperature during welding.
5. Heat input when welding A 514/517 steel shall not exceed the steel producer's recommendations.
6. When moisture is present on the base metal it shall be preheated to 200 F before welding is started.

723.6 Quality of Welds

Weld metal shall be sound throughout.

There shall be no cracks in any weld or weld pass.

There shall be complete fusion between the weld metal and the base metal and between successive passes throughout the joint.

Welds shall be free from overlap and the base metal free from undercut more than 1/100 inch deep when its direction is transverse to the primary stress in the part that is undercut. Undercut shall not be more than 1/32 inch deep when its direction is parallel to the primary stress in the part that is undercut.

All craters shall be filled to the full cross section of the welds.

All welds on ASTM A 514/517 steel shall be visually examined for longitudinal or transverse cracks not less than 48 hours after completion of welding.

723.7 Corrections

When the weld quality is unsatisfactory, the following corrective measures will be required by the Engineer whose specific approval shall be obtained for making each correction.

When requirements prescribe the removal of part of the weld or a portion of the base metal, removal shall be by oxygen gouging or arc-air gouging.

Oxygen gouging shall not be used on ASTM A 514/517 steel or for A 588 weathering steel.

Backgouging of splices in beams and girders or cutouts of defective welds shall be done by arc-air gouging by a welder qualified to make beam and girder splices.

Where corrections require the deposition of additional weld metal, the sides of the area to be welded shall have sufficient slope to permit depositing new metal.

Defective or unsound welds shall be corrected either by removing and replacing the entire weld or as follows:

1. Excessive convexity. Reduce to size by grinding off the excess weld metal.
2. Shrinkage cracks. Cracks in base metal, craters and excessive porosity. Remove defective portions of base and weld metal down to sound metal and replace with additional sound weld metal.

3. Undercutting, undersize and excessive concavity. Clean and deposit additional weld metal.
4. Overlapping and incomplete fusion. Remove and replace the defective portion of weld.
5. Slag inclusions. Remove the parts of the weld containing slag and replace with sound weld metal.
6. Removal of adjacent base metal during welding. Clean and form full size by depositing additional weld metal.

Where corrections require the deposition of additional weld metal, the electrode used shall be smaller than that used for making the original weld. Surfaces shall be cleaned thoroughly before rewelding.

A cracked weld shall be removed throughout its length, unless the extent of the crack can be ascertained to be limited, in which case the weld metal shall be removed 2 inches beyond each end of the crack and repairs made.

Where work performed after the making of a deficient weld has made the weld inaccessible or has caused new conditions making the correction of the deficiency dangerous or ineffectual, the original conditions shall be restored by removal of welds or members or both, before making the necessary corrections or else the deficiency shall be compensated by additional work ac-cording to a revised design approved by the Engineer.

Improperly fitted and misaligned parts shall be cut apart and rewelded.

Members distorted by the heat of welding shall be straightened by mechanical means or by the carefully supervised application of a limited amount of localized heat. Heated areas shall not exceed 1200 F as measured by Tempil-sticks or other approved methods for steel up to 65,000 psi yield strength. Parts to be heat straightened shall be substantially free of stress from external forces, except when mechanical means are used in conjunction with the application of heat.

Heat straightening of A 514/517 steel shall be done only under rigidly controlled procedures, subject to the approval of the Engineer. In no case shall the maximum temperature of the steel exceed 1100 F. Sharp kinks and bends shall be cause for rejection of the material.

723.8 Radiographic Inspection

Radiographic testing required in the field shall be done at the expense of the Contractor by an approved laboratory as defined by "General Conditions" having prior approval of the Engineer. The testing shall include furnishing all materials, equipment, tools, labor and incidentals necessary to perform the required testing. The Owner may require further tests as necessary conforming to "General Conditions" and may perform additional testing including other types.

Radiographic equipment, procedures, resulting radiographs, identification marks, penetrameters, examination, reports and weld surface preparation shall conform to TXDOT Bulletin C-5. The Engineer will examine and interpret the resulting radiographs.

Radiography shall be done within the time interval specified by the Engineer. Field welds on ASTM A 514/517 steel shall not be radiographed until a minimum of 48 hours after completion of the weld.

When so indicated, welded butt splices shall be radiographed. Radiographic testing shall be as indicated in "Radiographic Inspection", above. Weld quality shall be as follows:

There shall be no cracks and the sum of the greatest dimension of porosity and fusion type defects shall not exceed 1/10 of the nominal bar diameter in inches. The Engineer will examine and interpret the resulting radiographs, which shall become the property of the Owner and remain with the Engineer.

For field welds of splices in material with a specified yield strength of less than 65,000 psi, radiographic inspection will be made of the full flange width of 25 percent of all flange splices and of ⅓ the depth of the web of 25 percent of all web splices on each structure (17 inches minimum length). If unacceptable work is found, an additional radiograph (penalty shot) shall be made on a section welded by the same operator just prior to and just following

the section containing the defect. Welds requiring repairs shall be retested by radiography after repairs are made. Necessary repairs shall be made prior to any further work being done.

For field welds of splices in material with a specified yield strength greater than 65,000 psi, radiographic inspection shall be made on all flange and web splices. Welds requiring repairs shall be retested by radiography a minimum of 48 hours after repairs are made.

All radiography (penalty shots and retakes) required because of unacceptable welding shall be performed at the expense of the Contractor.

When radiographic inspection of particular welds is indicated, this shall be in addition to the radiographic inspection required herein.

All resulting radiographs shall become the property of the Owner and remain with the Engineer.

All groove welds designed to carry primary stresses shall be subject to radiographic inspection. When subjected to such inspections, the presence of any of the following defects in excess of the limits indicated will result in rejection of the defective weld until corrected.

1. Sections of welds shown to have any cracking, regardless of length or location, incomplete fusion, overlapping or inadequate penetration shall be judged unacceptable.
2. Inclusions less than 1/16inch in greatest dimension including slag, porosity and other deleterious material, shall be permitted if well dispersed so that the sum of the greatest dimensions of the inclusions in any linear inch of welded joint shall not exceed 3/8 inch.
3. Inclusions 1/16inch or larger in greatest dimension shall be permitted provided such defects do not exceed the limits indicated or described above.
4. There shall be no inclusion greater than 1/16inch within 1 inch of the edge of part or member at the joint or point of restraint.

723.9 Reinforcing Steel

Provisions are made herein for the welding of reinforcing steel by the manual shielded metal-arc process. Other processes may be permitted with the specific approval of the Engineer or may be specified on the plans. When the Cadwell process is permitted, a "C" series splice shall be used with grade 40 reinforcing steel and a "T" series splice shall be used with grade 60 reinforcing steel, unless otherwise indicated.

(1) **Base Metal**

Reinforcing steel to be welded shall be new billet steel conforming to ASTM A 615 and to the following chemical composition:

Maximum Carbon	0.40 Percent
Maximum Manganese	1.30 Percent

Mill test reports will be required conforming to Item No. 406, "Reinforcing Steel".

(2) Filler Metal

Low hydrogen electrodes as specified in Table 1 shall be required for all welding of reinforcing steel. Drying of electrodes shall be as specified in "Materials", above.

723.10 Preheat and Interpass Temperature

Minimum preheat and interpass temperatures shall be as shown in Table 4.

Table 4 Preheat and Interpass Temperature for Reinforcing Steel		
Carbon Range	**No. 7 & Smaller**	**No. 8 & Larger**
Up to and including 0.30	None	100
0.31 to 0.35 inclusive	None	150
0.36 to 0.40 inclusive	100	250
Unknown	250	400

For widening projects, use carbon content and bar size of new steel to determine preheat required.

723.11 Joint Types

For all bars No. 8 and larger, butt splices will be required. For No. 7 bars and smaller, lap splices will be required.

Fillet welds in lap splices shall be a minimum of 4 inches in length and shall be welded on each side of the lap joint. For bars No. 5 and smaller, welding from one side of the lap will be permitted by the Engineer, when it is impractical to weld from both sides of the joint, but in this case the weld shall be a minimum of 6 inches in length.

Lap welds shall conform to Table 5.

Where possible, all butt splices shall be made in the flat position. All welds for butt splices, except horizontal welds on vertical bars shall be as indicated. The backup strip will be required when access to the splice is from the top only. When bars may be rotated or access to the splice is available from two sides the double bevel splice may be made and this type weld requires gouging out the root pass similar to a flange splice on structural steel. The root pass may be made using E7010 electrodes for all double beveled splices and the root pass shall be completely removed prior to welding the opposite side. The steel shall be preheated to 400 F if E7010 electrodes are used. Horizontal splices, on vertical bars, shall be as indicated.

Table 5					
Bar Size	**a**	**b Maximum**	**t Minimum**	**c Maximum**	**Electrode Size**
No. 4	.04 inch	⅛ inch	⅛ inch	1/16inch	⅛ inch
No. 5	.05 inch	⅛ inch	3/16 inch	1/16inch	5/32 inch
No. 6	.06 inch	⅛ inch		1/16inch	5/32 inch
No. 7	.07 inch	3/16 inch	5/16 inch	1/16inch	5/32 inch

723.12 Widening Projects

In general, the new reinforcing steel shall be either lap or butt spliced directly to the bar to be extended. When the reinforcement in the old portion of a structure is found to be of the wrong spacing, dowel bars long enough to develop the welded lap or butt splice and also develop the bar in bond, conforming to Item No. 406, "Reinforcing Steel", shall be welded to the old steel and the new reinforcement placed at the correct spacing without welding to the old steel. No measurement or payment will be made for the dowels but will be included in the unit price bid for other items in the contract.

Both old and new reinforcement shall be cleaned thoroughly prior to the preparation of the joint.

723.13 Welder Qualification

All welders shall be certified before working on any material which is to be incorporated into a City project, except for miscellaneous welds as defined below. Each welder must have certification papers conforming to TXDOT

Bulletin C-6, showing the type of work the welder is certified to perform. The welder will only be permitted to do work covered by such papers.

Miscellaneous welds of the following types may be made by a welder who is certified for structural or reinforcing steel or a qualified welder:

Armor joints and their supports, Screed Rail and Form Hanger Supports where permitted on Steel units, Reinforcing Steel to R-Bars for lateral stability between Prestressed Beams, Spirals or Bands to reinforcing Bars in Drilled Shaft cages, permanent Metal Deck forms, additional steel added in railing when slip form construction is used and other similar miscellaneous members that have no load carrying capacity in the completed structure.

A qualified welder is an experienced welder who is capable of making welds of sound quality, but does not have certification papers. Prior to welding operations, the Engineer or a representative of the Engineer shall check the welder's ability by a job site Miscellaneous Weld Qualification Test. The Contractor shall furnish all of the material and equipment necessary for the test.

The miscellaneous Weld Qualification Test shall consist of the following:

The welder shall make a single pass fillet weld in the vertical position ¼ inch maximum size approximately 2 inches long on ½ inch plate using 5/32 inch low hydrogen electrodes in the position indicated. The welder shall stop and start again within the 2 inch length of fillet weld.

The specimen shall be visually examined and the fillet weld shall present a reasonably uniform appearance free of cracks, overlap and undercut. There shall be no porosity visible on the surface of the weld.

The specimen shall be ruptured as indicated by the application of a force or by striking with a hammer.

The fractured surface of the weld shall show complete penetration into the root of the joint and shall exhibit no incomplete fusion to the base metal nor any inclusion or porosity larger than 3/32 inch in its greatest dimension.

If a welder fails to meet the requirements of this test, a retest may be allowed under the following conditions:

An immediate retest may be made consisting of 2 test welds, as described above and both test specimens shall meet all of the requirements specified.

A retest may be made after 30 days, provided there is evidence that the welder has had further training or practice. In this case the test shall be a single specimen.

Qualification by the test herein specified for miscellaneous welding shall be effective immediately upon satisfactory completion thereof and shall remain in effect for the duration of the project.

Before welding on ASTM A 514/517 steel, a welder must present evidence, satisfactory to the Engineer, of at least 3 months satisfactory experience welding this type of steel over 1 inch thick. In lieu of such experience, a welder, previously qualified for welding with low-hydrogen electrodes or has used the proposed welding process, shall have completed a training course in welding ASTM A 514/517 steel prior to taking the welder qualification test.

Tests for certification of welders for manual shielded metal-arc welding shall conform to TXDOT Bulletin C-6. Tests shall be given by an approved laboratory. For field welding, certification by an approved laboratory will be accepted for a period of 1 month from the time of certification. During this period, the welder will be permitted to work on City projects provided the welder's work is satisfactory. If the welder's work is satisfactory during this period, the City will issue certification papers which will permit the welder to work on City projects, as long as the welder continues to do satisfactory work.

A welder must have passed the Basic Qualification Test for Structural Welding in the vertical (3G) and overhead position (4G) conforming to TXDOT Bulletin C-6 prior to welding on any load carrying members. Also, the welder must demonstrate to a City welding inspector a thorough knowledge of, and ability to consistently implement, the required welding procedures and make welds of sound quality and good appearance. Quality of the welds will be checked by radiography.

To work on field splices of beams and girders, a welder must be certified for and be capable of making groove welds in both the vertical and overhead position when using the manual shielded metal-arc process.

For manual (semiautomatic) gas metal-arc welding or flux cored arc welding, welder qualification tests for certification shall qualify conforming to TXDOT Bulletin C-5 and tested conforming to TXDOT Bulletin C-6 as follows:

1. Basic Test Certification for groove welds for unlimited thickness material will also qualify a welder for any equal or lower strength steel or for fillet welding in the position in which the welder is certified, using the same electrode and combination of shielding used for the test.
2. Welders shall be certified in the vertical and overhead position to work on field splices of beams or girders.
3. Tests for certification shall be given by an approved laboratory. Certification papers for gas metal-arc welding or flux cored arc welding issued by an approved laboratory will be handled in a manner similar to that used for the manual shielded metal-arc process.
4. Welders shall be qualified for each process to be used. Qualification for flux cored arc welding will not qualify a welder for gas metal-arc welding or vice versa.
5. Qualification for welding with any grade electrode will automatically qualify a welder for the use of lower grades of electrodes using the same process, i.e., qualification with Grade ER80S/E80S electrode will qualify for Grade ER70S, but not vice versa.

The certification papers issued by the City are the property of the City and may be canceled at any time.

Radiographic inspection shall be made of all qualification test plates of groove welds for the "Basic Qualification Test". If this inspection indicates any lack of fusion, incomplete penetration and defects 1/16inch or larger in greatest dimension or if the sum of the greatest dimensions of defects less than 1/16of an inch in greatest dimension exceeds 3/8 inch in any linear inch of weld, the weld shall be considered as failing the soundness test. This radiographic inspection shall apply only to that portion of the welds between the discard strips of the specimens as indicated in Figures 13 and 14 of Appendix B of TXDOT Bulletin C-6. The specimen plates shall be wide enough to provide a minimum of 6 inches of effective weld length for radiographic testing. Mechanical testing shall conform to TXDOT Bulletin C-6.

723.14 Measurement and Payment

Compensation will not be allowed under this item for the work prescribed but shall be included in the unit price item of construction in which the item is used.

End

Ref: 406, 721

ITEM NO. 802S PROJECT SIGNS 9-14-21

802S.1 Description

This item shall govern furnishing, fabricating, erecting, maintaining and removing Project Signs on Capital Improvement Projects (C.I.P.), Bond Program Projects and for project identification at other construction sites, when required on the Drawings. The C.I.P. signs shall be constructed in accordance with Standards 802S-1, 802S-1A, 802S-2, 802S-2A, 802S-2B and 804S-5 or as indicated on the Drawings.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text, the inch-pound units are given preference followed by SI units shown within parentheses.

802S.2 Materials

A. Sign Face

Sign face shall be manufactured on standard exterior waterproof plywood sheets or other suitable material approved by the Engineer or designated representative. Unless indicated otherwise on the Standard Details or Drawings, the thickness of the plywood sheet shall be a minimum of ¾ inches (19 mm).

B. Posts

Lumber posts, of the size indicated on the Standard Details or on the Drawings, shall be pressure treated with pentachlorophenol.

C. Paint

Exterior oil base paint, colors as indicated on the Standard Details or on the Drawings.

D. Decals for Capital Improvement Projects and Bond Program Projects

City seal shall be in color using the 4 color process. Electronic images, in EPS format, are available from the Public Works Website (www.ci.austin.tx.us/publicworks/techspecs.htm) for downloading.

802S.3 Installation

The signs shall be erected at each major entrance to the project for maximum public identification and exposure. At locations where construction is confined to a specific area, the installed sign size shall be 4 foot x 8 foot (1.2 meter x 2.4 meter). At locations where C.I.P. roadway construction is in progress, such as a street paving or construction of a sidewalk, the sign shall be 2 foot x 3 foot (0.2 meter x 0.8 meter). Signs for Bond Program Projects shall be 3 x 4 foot (0.9 x 1.2 meters).

The signs shall be posted on portable wood frames or stanchions and will be located in the proximity of the work area as construction progresses. All lumber shall be painted with two coats of paint as indicated herein, on the Standard Details or in the Drawings.

In special cases the size of the sign may be changed to meet special requirements, but general proportions shall be maintained.

It shall be the responsibility of the contractor to maintain and relocate signs, if necessary during the progression of the project. Care shall be exercised to assure that placement of the signs does not interfere with or cause sight obstruction to vehicular and pedestrian traffic.

For projects located on a street with curb and gutter, signs shall be installed no closer than 2 feet (0.6 meter) from the face of curb on the street.

For projects located on a street without curb and gutter, signs shall be installed no closer than 6 feet (1.8 meters) from the edge of street pavement.

The contractor may install, at the Contractor's own expense, company signs to identify the contractor, architectural firm, etc. Signs are to be securely attached to the posts at locations indicated on the drawings and shall not be larger than 18 x 36 inches (0.45 x 0.90 meter).

802S.4 Measurement

In the CIP contract and/or Bond Program, signs shall be measured by either lump sum or per each.

802S.5 Payment

The work performed and the materials furnished as prescribed by this item shall be paid for by lump sum or per each price bid only. The "lump sum" bid or "per each" price bid shall include full compensation for all work performed and all materials furnished in constructing, transporting, temporarily storing and relocating as required, and maintaining and removing the signs as specified on the Drawings and as directed by the Engineer or designated representative.

Payment will be made under one of the following:

Pay Item No. 802S-AC.I.P.:	C.I.P.Project Signs	Lump Sum.
Pay Item No. 802S-BC.I.P.:	C.I.P. Project Sign	Per Each.
Pay Item No. 802S-ABOND:	Bond Project Signs	Lump Sum.
Pay Item No. 802S-BBOND:	Bond Project Sign	Per Each.

Source: Rule No. R161-21.17, 9-14-2021.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Specification Item No. 802S, "Project Signs"	
City of Austin Standard Details	
Designation	Description
Item No. 802S-1	2.4 m × 1.2 m (8′ × 4′) C.I.P. Building Project Sign
Item No. 802S-1A	2.4 m × 1.2 m (8′ × 4′) Bond Program Building Project Sign
Item No. 802S-2	600 mm × 900 mm (24″ × 36″) C.I.P. Movable Sign Type II
Item No. 802S-2A	600 mm × 900 mm (24″ × 36″) Joint C.I.P. Movable Sign Type II
Item No. 802S-2B	900 mm × 1.2 m (36″ × 48″) Bond Program Project Movable Sign Type II
Item No. 804S-5	Typical CMTA/C.I.P. Sign Locations

ITEM NO. 803S BARRICADES, SIGNS AND TRAFFIC HANDLING 11-15-11

803S.1 Description

This item shall govern for providing, installing, moving, replacing, maintaining, cleaning and removing upon completion of the work, all temporary or permanent street closure barricades, signs, cones, lights or other devices required to handle the traffic in conformance with the current edition of the Texas Manual of Uniform Traffic Control Devices for Street and Highways and as indicated on the Drawings or directed by the Engineer or designated representative.

Constructing a detour, if required, shall conform to Standard Specification Item No. 801S, "Constructing a Detour." Capital Improvement Project Signs shall conform to Standard Specification Item No. 802S, "Project Signs."

This item shall also include the installation of all required safety fencing as described in the latest adopted version of Standard Detail 804S-4.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text, the inch-pound units are given preference followed by SI units shown within parentheses.

803S.2 Submittals

The submittal requirements of this specification item include:

A. Type of Barricade and proposed materials and Construction of the barricade,

B. Test results for Retro-Reflective sheeting.

803S.3 Materials

All barricades, signs, cones, lights and other types of devices to handle traffic, as indicated on the Drawings or directed by the Engineer or designated representative, shall conform to details shown on the Drawings or those indicated in the Texas Manual on Uniform Traffic Control Devices (TMUTCD).

803S.4 Construction Methods

Prior to commencement of construction, suitable "Barricades, Signs and Traffic Handling" devices shall be installed to protect the workers and the public.

The Contractor shall be responsible for the installation of all markers, signs and barricades in accordance with the Drawings and in conformance with the Texas Manual on Uniform Traffic Control Devices (TMUTCD) and/or as indicated on the Drawings or directed by the Engineer or designated representative. If, in the opinion of the Engineer or designated representative, additional markers, signs or barricades are needed in the interest of safety, the Contractor will install such as are required or as directed by the Engineer or designated representative. All changes and/or revisions to the detour/traffic control plan shall be approved by the Engineer or designated representative.

Lumber shall be painted with two coats of paint as indicated on the Drawings.

803S.5 Maintenance

It shall be the Contractor's responsibility to maintain, clean, move and replace if necessary, barricades, signs and traffic handling devices during the time required for construction of the project. Permanent barricades shall be constructed as required after the completion of the street by drilling holes to place the posts and concrete foundations. Foundation concrete shall be cured before the rails are attached. When no longer needed, all temporary Barricades, Signs and Traffic Handling Devices shall be removed and the area restored to its original condition or as directed by the Engineer or designated representative.

803S.6 Measurement

The work performed and material furnished as prescribed by this item, City of Austin Standard Details, details included on the Drawings or indicated in the TMUTCD shall be measured as follows:

A. Pavement Markings.

All pavement marking required for proper installation of the designated Traffic Control Plans and Details, as well as required removal of existing pavement marking, shall be measured and paid for under Standard Specification Item No. 870S, "Work Zone Pavement Markings" and Standard Specification Item No. 874S, "Eliminating Existing Pavement Markings".

B. Barricades, Signs and Traffic Handling.

All work performed and material furnished as prescribed by this item, City of Austin Standard Details, details shown on the Drawings or indicated in the TMUTCD, that are not included in the above paragraph, shall be measured by the number of calendar days, working days or months of actual service.

Traffic control for the project will be measured and paid for once per contract defined time period, i.e. either per Calendar Day, Working day or Month at the contract rate, regardless of the number of set-ups, locations or streets under construction.

C. Safety Fencing

Safety fencing will be measured by the lineal foot.

803S.7 Payment

The work performed and materials furnished as prescribed by this item, measured as provided under section "803S.6 Measurement" shall be paid for at the contract unit price for barricades, signs and traffic handling. This unit price shall include full compensation for furnishing, placement and removal of all materials and for all labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

Pay Item No. 803S-CD:	Barricades, Signs, and Traffic Handling	Per Calendar Day.
Pay Item No. 803S-WD:	Barricades, Signs, and Traffic Handling	Per Working Day.
Pay Item No. 803S-MO:	Barricades, Signs, and Traffic Handling	Per Month.
Pay Item No. 803S-SF:	Safety Fence	Per Lineal Foot.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification Item No. 803S, "Barricades, Signs and Traffic Handling"

City of Austin Standard Specifications	
Designation	Description
Item No. 801S	Constructing a Detour
Item No. 802S	Project Signs
Item No. 870S	Work Zone Pavement Markings
Item No. 874S	Eliminating Existing Pavement Markings and Markers
Texas Technical Documents:	
Designation	Description
(TMUTCD)	Texas Manual on Uniform Traffic Control Devices

RELATED CROSS REFERENCE MATERIALS	
Specification Item No. 803S, "Barricades, Signs and Traffic Handling"	
City of Austin Standard Specifications	
Designation	Description
Item No. 403S	Concrete for Structures
Item No. 860S	Pavement Marking Paint (Reflectorized)
Item No. 863S	Reflectorized Pavement Markers
Item No. 864S	Abbreviated Pavement Markings
Item No. 867S	Epoxy Adhesive
Item No. 871S	Reflectorized Pavement Markings
Item No. 875S	Pavement Surface Preparation For Markings
City of Austin Standard Details	
Designation	Description
803S-1	Street-End Barricades
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item No. 502	Barricades, Signs and Traffic Handling
Item No. 508	Constructing Detours
Item No. 510	One-Way Traffic Control
Item No. 512	Portable Concrete Traffic Barrier
Item No. 514	Permanent Concrete Traffic Barrier
Item No. 662	Work Zone Pavement Markings
Item No. 666	Reflectorized Pavement Markings
Item No. 667	Prefabricated Pavement Markings
Item No. 672	Raised Pavement Markers
Item No. 677	Eliminating Existing Pavement Markings and Markers
Item No. 678	Pavement Surface Preparation For Markings
Texas Department of Transportation: Departmental Materials Specifications	
Designation	Description
DMS 7110	Aluminum Sign Blanks

DMS 8310	Flexible Roll-up Reflective Signs
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
Tex-839-B	Determining Color in Reflective Materials
Tex-842-B	Method for Measuring Retroreflectivity
American Society for Testing and Materials (ASTM)	
Designation	Description
A-307	Specification for Carbon Steel Externally Threaded Standard Fasteners
A-320	Specification for Alloys-Steel Bolting Materials for Low-Temperature Service
A-513	Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing
B-108/B108M	Specification for Aluminum-Alloy Permanent Mold Castings
B-183	Practice for Preparation of Low-Carbon Steel for Electroplating
B-221/B-221M	Specification for Aluminum-Alloy Extended Bars, Rods, Wire, Shapes, and Tubes
D-523	Test Method for Specular Gloss
D-822	Recommended Practice for Operating Light- and Water-Exposure Apparatus (Carbon-Arc Type) for Testing Paint, Varnish, Lacquer, and Related Products
D-828	Test Method for Tensile Breaking Strength of Paper and Paperboard
G-23	Recommended Practice for Operating Light- and Water-Exposure Apparatus (Carbon-Arc Type) for Exposure of Nonmetallic Materials

ITEM NO. 824S TRAFFIC SIGNS 2-24-10

824S.1 Description

This item shall govern furnishing and placement of Traffic Signs including excavation, posts, hardware and signs.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text, the inch-pound units are given preference followed by SI units shown within parentheses.

824S.2 Submittals

The submittal requirements of this specification item include:

A. Identification of the types of materials proposed for traffic sign, i.e. faces, posts, clamps, etc.,

B. Results of any State or Federal tests (reflectance, diffuse day color, specific intensity brightness, Weather-O-meter, etc.) performed on their products,

824S.3 Materials

The following ASTM Standards and documents, of the issue in effect on the date of Invitation for Bid, form a part of this specification to the extent herein.

A. ASTM B 209 Specification for Aluminum and Aluminum Alloy Sheet and Plate

B. ASTM D 523 Standard Method for Test for Specular Gloss

C. ASTM D 4956 Standard Specification for Retroreflective Sheeting for Traffic Control

D. ASTM E 284 Standard Definition of Terms Relating to Appearance of Materials

E. ASTM E 308 Computing the Colors of Objects by Using the CIE System

F. ASTM E 810 Standard Test Method for Coefficient of Retroreflection of Retroreflective Sheeting

G. ASTM E 1164 Standard Practice for Obtaining Spectrophotometric Data for Object-Color Evaluation

H. CIE Publication Number 39-2, Recommendation for Surface Colors for Visual Signaling

I. FP-92 Standard Specifications for Construction of Roads and Bridges on Federal Highway Project

J. Substrate. This shall be aluminum alloy 5052-H38 or 6061-T-6 and otherwise in conformance with ASTM B-209.

   1. Metal working. The aluminum shall be free of burrs and pits on both sides, including edges and holes, and shall be made ready for applications of the sheeting.

      The aluminum shall be new and corrosion-free with holes drilled or punched, corners rounded to the radii shown in the standard detail sheet, and all edges smoothed prior to application of sheeting.

   2. Size. The dimensions of substrate applications for regulatory, warning, and guide signs shall be as specified by the Engineer and as shown on the plans.

K. Background, Legends, Symbols, and Colors. These shall be in accordance with the Standard Highway Sign Designs (SHSD) for Texas and with the Texas Manual of Uniform Traffic Control Devices (TMUTCD).

1. Retroreflective Materials. Retroreflective materials shall comply with Texas Department of Transportation Departmental Materials Specification 8300, Sign Face Materials. The materials requirements for Reflective Sheeting must meet all the requirements of ASTM D 4956.

    a. Retroreflective Sheeting. Type III (High Intensity Prismatic): The materials as listed in these specifications shall comply with Texas Department of Transportation Departmental Materials Specification 8300, Sign Face Materials. The materials requirements for Reflective Sheeting must meet all the requirements of ASTM D 4956. Colors shall be as specified in specifications for Standard Highway Sign Colors (FHWA, HTO-21).

    b. Retroreflective Sheeting. Type IX (Fluorescent yellow green): The materials shall comply with ASTM 4956. Designed to provide higher nighttime sign brightness in the legibility distance and brightness at high entrance angles. The minimum fluorescence luminance factor (YF) for new sheeting shall be 35%.

2. Electronically Cuttable Film. Electronically cuttable film shall consist of flexible, transparent, durable acrylic colored films coated with a transparent pressure sensitive adhesive protected by a clear removable liner. These films are designed to be applied to retroreflective materials for the creation of traffic control signs and devices by either cutting by knife over roll (sprocket fed or friction fed) and flat bed electronic cutting machines. The films shall be available in standard traffic colors, be dimensionally stable, and be designed to optimally cut, weed, lift, and transfer. Use of electronic cuttable films will not require the release of any volatile organic compounds.

    When electronic cuttable film is applied to retroreflective sheeting, the resulting color of the composite sheeting will conform to Texas Department of Transportation Departmental Materials Specification 8300, Sign Face Materials. The materials requirements for Reflective Sheeting must meet all the requirements of ASTM D 4956.

    Only signage utilizing electronically cuttable film will be allowed. Silk screened sign faces will not be accepted.

    a. Color Test. Conformance to color requirements shall be determined by instrumental method in accordance with ASTM E 1164 on sheeting applied to aluminum test panels. The values shall be determined on a HunterLab Labscan 6000 0/45 Spectrocolorimeter with option CMR 559 [or approved equal 0/45 (45/0) instrument with circumferential viewing (illumination)].

        Computations shall be done in accordance with ASTM E 308 for the 2° observer.

    b. Coefficient of Retroreflection R^. When electronic cuttable film is applied to retroreflective sheeting, the composite will conform to the percentage retained of the minimum coefficient of retroreflection specified by the using agency and the manufacturer for the retroreflective sheeting when the retroreflective sheeting is screen processed. The coefficient of retroreflection shall be determined in accordance with ASTM E 810. Coefficients of retroreflection R^ shall be specified in units of candelas as per foot candle per square foot (candelas per lux per square meter). The observation angles shall be 0.2 and 0.5 degrees unless otherwise specified. The entrance angles shall be -4 and 30 degrees unless otherwise specified. The electronic cuttable film shall have and 85° specular gloss of not less than 50 when tested in accordance with ASTM D 523.

    c. Processing and Cuttability. The electronic cuttable film shall permit cutting, weeding, masking with transfer tape, lifting, and application to retroreflective sheeting when used in accordance with manufacturer's recommendations at temperatures between 65° and 95° F and relative humidifies between 30% and 70%. The film shall lay flat with minimal edge curl and be dimensionally stable.

d. Adhesive Liner. The protective liner attached to the adhesive shall be removable by peeling without soaking in water or other solutions, without breaking, tearing, or removing any adhesive from the electronic cuttable film. The liner shall have a controlled release from the adhesive coated film sufficient to allow cutting without the film popping off from the liner while still allowing the liner to easily be peeled from the film.

e. Film. Film with punched edges for use on sprocket fed knife over roll cutters shall be edge scored and weeded to remove film in the punched area as a means of eliminating adhesive build up on the sprockets.

f. Resistance to Accelerated Outdoor Weathering. When electronic cuttable film is applied to retroreflective sheeting, the surface of the film shall be weather resistant and show no appreciable cracking, blistering, crazing, or dimensional change after 2 years unprotected outdoor exposure, facing the equator and inclined 45° from the vertical. Following weather exposure, panels shall be washed in a 5% HCl solution for 45 seconds, rinsed thoroughly with clean water, blotted dry with a soft cloth and brought to equilibrium at standard conditions.

After cleaning, the coefficient of retroreflection shall not be less than the value specified by the using agency for the retroreflective sheeting when the retroreflective sheeting is screen processed. Show no appreciable evidence of cracking, scaling, pitting, blistering, edge lifting or curling or more than 1/32 inch shrinkage or expansion. Show good color fastness or better when tested. The electronic cuttable film shall not be removable from the retroreflective sheeting without damage.

3. Application Methods. The method of application of sheeting, letters, numbers, and symbols shall be precisely as prescribed in writing by the manufacturer.

a. Legend Spacing and Layout. Spacing and layout for all traffic control signs shall conform to the Texas SHSD.

L. Sign Posts. Steel post shall conform to the standard specification for hot rolled carbon sheet steel, structural quality, ASTM designation A570, Grade 50. Average minimum yield strength after cold forming is 60,000 psi. The cross section of the post shall be square tube formed steel, carefully rolled to size and shall be welded directly in the comer by high frequency resistance welding or equivalent process and externally scarified to agree with corner radii. Sign posts shall be hot dipped galvanized conforming to ASTM A653, G90.

1. Sizes. Perforated sign posts, anchors and sleeves shall be of the following size:

Size	USS Gauge	Weight
1¾″ × 1¾″	14	1.71
2″ × 2″	12	2.42

On square tubing, holes shall be on centerline of each side in true alignment and opposite each other directly and diagonally. The length of each post shall have a permissible length tolerance of ± ¼".

The finished posts shall be straight and have a smooth, uniform finish. It shall be possible to telescope all consecutive sizes of square tubes freely and for not less than ten feet of their length without the necessity of matching any particular face to any other face. All holes and ends shall be free from burrs and ends shall be cut square.

a. Tolerance on Outside Sizes

Nominal Outside Dimension Outside Tolerances at Corners

1¾″ × 1¾″	±0.008″
2″ × 2″	±0.008″

Note: Measurement from outside dimensions shall be made at least 2 inches from the end of the tube.

Permissible variation in wall thickness is +0.011", -0.005".

Convexity and concavity shall be measured in the center of the flat sides, tolerance in ±0.010", determined at the corner.

b. Squareness of Sides and Twist Permissible in 3" Length.

Nominal Outside Dimension	Squareness Tolerance	Twist
1¾" × 1¾" ±0.010"	0.062"	
2" × 2"	±0.012"	0.062"

Permissible variation in straightness is 1/16of an inch in 3 feet. The standard outside corner radius shall be 5/32 of an inch ±1/64 inch.

2. Installation. The square end of the post shall not be modified or pointed.

a. Mount Base. When sign post installation is required over building basements, bridges and cavities, a galvanized cast iron surface mount coupler shall be used. The square post surface mount base must be a NCHRP 350-Compliant breakaway system for use with 1 ¾ - inch square post.

b. Hardware. All ground mounted signs shall be attached to posts using ⅜" aluminum drive rivets. Stainless steel banding material, brackets and clips will be used for signs installed on light standards or mast arms.

c. Construction.

1. Concrete specifications: Insert a 2" square × 30" 12 gauge into concrete with 1-2 inches exposed above ground. Make sure the anchor assembly is level. Attach the sign to the 1 ¾" square 14 gauge post (length varies with installation) at a minimum height of seven feet using drive rivets and nylon washers. Insert the post 6-8 inches into the anchor assembly. Bolt the signpost to the anchor assembly using a corner bolt and flange nut.

2. Soil specifications: Drive a 2" square × 30" 12 gauge omni-directional anchor sleeve into soil with 1-2 inches exposed above ground. Make sure the anchor assembly is level. Attach the sign to the 1 ¾" square x 14 gauge post (length varies with installation) at a minimum height of seven feet using drive rivets and nylon washers. Insert the post 6-8 inches into the anchor assembly. Bolt the signpost to the anchor assembly using a corner bolt and flange nut.

M. Maker's Mark Decals. Each sign shall be permanently marked on the lower right corner of the back side with the month and year of installation, and name of manufacturer.

Table 1
Minimum Coefficient of Retroreflectivity
[0.2° observation angle and -4° entrance angle]

Type III Sheeting: 10 Year Life Span	
Sheeting Color	**Candelas per Foot-Candle per Sq. Ft.**
White	250
Yellow	170

Green	45
Red	45
Blue	20
Brown	12

Table 2
Minimum Coefficient of Retroreflectivity
[0.2° observation angle and -4° entrance angle]

Type IX Sheeting: 7 Year Life Span	
Sheeting Color	**Candelas per Foot-Candle per Sq. Ft.**
Fluorescent Yellow Green	300

824S.4 Equipment

Provide machinery, tools, and equipment necessary for proper execution of the work.

824S.5 Construction

Construction shall be high quality with no visible defects in the finished product. Fabrication shall be in accordance with these specifications. Street name signs shall always be supplied and installed at each project intersection whether signs previously existed at the location or not.

A. Unsignalized Intersection. At unsignalized intersections, ground-mounted street name signs of 9 inch height with 6 inch letters and 3 inch suffix and block numbers are required. Lettering on street name signs must be in upper/lower case letters.

B. Signalized Intersection.

1. Ground Mounted Street Signs

   If a signalized intersection has either mast arms or span- wire on which overhead street name signs can be attached, no ground mounted streets name signs are required at that intersection.

2. Overhead Street Signs

   Signs shall be strapped to the mast arm or span wire. Attachments to mast arms shall be by means of a ¾ inch stainless steel strap and a stainless steel flared strap bracket.

   a. Letter Heights

      Overhead street name signs shall be 18 inches high. Street name signs must be 8 inch (or larger) upper/lower case letters. The suffix and block numbers shall be at least 4 ½ inches high.

C. Existing Signs.

The removal of existing signs shall be coordinated with the Austin Transportation Department to assure required signage is in place during all construction phases. When existing signs are to be removed, they will be removed from their post by hand and delivered to the Traffic Sign Shop (974 - 4055).

D. No Parking Signs

No Parking signs with horizontal dimensions wider than 15" shall not be used unless specifically authorized in advance by the City. For 24 hour parking restriction see the attached detail for the typical No Parking sign.

824S.6 Measurement

Traffic signs shall be measured as each complete sign constructed and placed as indicated on the Drawings.

824S.7 Payment

The work performed and materials furnished as prescribed by this item will be paid for at the unit bid price for "Traffic Signs" per each complete in place. The unit bid price shall include full compensation for furnishing all materials, completing the excavation, placing p.c. concrete and reinforcing steel, setting posts in p.c. concrete and for all labor, tools, equipment and incidentals necessary to complete the work.

Payment will be made under:

Pay Item No. 824S:	Traffic Signs	Per Each.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Specification Item No. 824S, "Traffic Signs"	
City of Austin Standard Specifications	
Designation	Description
Item No. 401S	Structural Excavation and Backfill
Item No. 403S	Concrete for Structures
Item No. 406S	Reinforcing Steel
Item No. 410S	Concrete Structures
Item No. 411	Surface Finishes for Concrete
Item No. 722	Paint and Painting
Texas Department of Transportation: Manual of Testing Procedures:	
Designation	Description
Tex-839-B	Determining Color in Reflective Materials
Tex-842-B	Method for Measuring Retroreflectivity
Texas Department of Transportation: Departmental Materials Specifications	
Designation	Description
DMS-8300	Flat Surface Reflective Sheeting
American Society for Testing and Materials (ASTM):	
Designation	Description
A-36/A-36M	Specification for Structural Steel
A-307	Specification for Carbon Steel Externally Threaded Standard Fasteners
A-320	Specification for Alloys-Steel Bolting Materials For Low-Temperature Service
A-513	Specification for Electric Resistance-Welded Carbon and Alloy Steel Mechanical Tubing
B-26	Specification for Aluminum-Alloy Sand Castings
B-108/B-108M	Specification for Aluminum-Alloy Permanent Mold Castings
B-221/B-221M	Specification for Aluminum-Alloy Extended Bars, Rods, Wire, Shapes, and Tubes

D-523	Test Method for Specular Gloss
D 822	Recommended Practice for Operating Light- and Water-Exposure Apparatus (Carbon-Arc Type) for Testing Paint, Varnish, Lacquer, and Related Products
D 828	Test Method for Tensile Breaking Strength of Paper and Paperboard
E 97	45-degree, 0-degree Directional Reflectance Factor of Opaque Specimens by Broad-Band Filter Reflectometry
G 23	Recommended Practice for Operating Light- and Water-Exposure Apparatus (Carbon-Arc Type) for Exposure of Nonmetallic Materials
Other Specifications	
Federal Specification A-G-90	
Federal Test Method 8801	
Federal Specification O-G-93 (stick only)	
Federal Specification TT-P-64lb.	

RELATED CROSS REFERENCE MATERIALS	
Specification Item No. 824S, "Traffic Signs	
Texas Department of Transportation Technical Documents:	
Designation	Description
(TMUTCD)	Texas Manual on Uniform Traffic Control Devices
City of Austin Standard Details	
Designation	Description
824S-1	Standard Street-End Markers
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item No. 445	Galvanizing
Item No. 636	Aluminum Signs (Type A)
Item No. 637	Aluminum Signs (Type G)
Item No. 642	Aluminum Signs (Type O)
Item No. 646	Small Roadside Sign Supports
Item No. 647	Large Roadside Sign Supports
Item No. 656	Foundations for Signs, Traffic Signals and Roadway Illumination Assemblies
Texas Department of Transportation: Departmental Materials Specifications	
Designation	Description
DMS-7110	Aluminum Sign Blanks
DMS-7120	Sign Hardware
DMS-8310	Flexible Roll-up Reflective Signs
DMS-8320	Vinyl, Non-reflective Decal Sheeting

ITEM NO. 829S DESIGNATED BICYCLE LANE MARKINGS 8-20-03

829S.1 Description

This item shall govern the markings for Designated Bicycle Lanes of the colors, types and sizes required in Standard Detail No. 829S-1, "Bicycle Lane Markings" and/or indicated on the Drawings. Designated Bicycle Lanes shall be for the exclusive use of bicycle traffic.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text and accompanying tables, inch-pound units are given preference followed by SI units shown within parentheses.

829S.2 Submittals

The submittal requirements of this specification item include:

A. Identification of the types of marking materials (i.e. thermoplastic or paint type) materials proposed for each type of lane marking (i.e. lane striping, words and symbols).

B. Guidemark layout and installation plan.

829S.3 Materials

The bicycle lane markings (i.e. lane striping, words and symbols) shall conform to the requirements of Standard Specification Item No. 871S, "Reflectorized Pavement Markings".

829S.4 Installation

A. General

Designated Bicycle Lanes shall be delineated with appropriate lane markings and symbols to alert the automobile/truck driver of the possibility of the presence of bicyclists. Preferential Lane markings and symbols shall be installed in conformance with this specification item, as indicated on the Drawings and/or directed by the Engineer or designated representative. Signs shall be installed in conformance with Standard Specification Item No. 827S, "Designated Bicycle Lane Signing".

Under inclement weather conditions the placement of pavement markings as shown on the Drawings shall be delayed until the time that weather conditions allow the application of pavement lane markings, symbols and words.

B. Lane striping

The lateral extent (or width) of a Designated Bicycle Lane shall be defined by solid white edge striping with a minimum width of 4 inches (100 mm) that separates the bicycle lane from the adjacent traffic lane. With the exception of potential conflict areas, the edge striping shall be continuous throughout the length of the Designated Bicycle Lane. The edge striping may be broken in a 1 to 3 segment-to-gap ratio, with a nominal 3-foot (0.9 meter) segment and a 9-foot (2.7 meters) in potential conflict areas including marked or unmarked pedestrian crosswalks, congested intersections and shared vehicular turning lanes at intersections. The striping shall be installed in conformance with Standard Specification Item No. 871S, "Reflectorized Pavement Markings", as identified in the Drawings or as directed by the Engineer or designated representative.

C. Symbols

Marking of a Designated Bicycle Lane shall include the installation of Preferential Lane (directional arrow) and Bicycle Rider Symbols, as indicated on Standard Detail 829S-1, "Bicycle Lane Markings". A combination of Preferential Lane and Bicycle Rider symbols shall be installed after each street intersection with the bicycle lane and at a maximum distance of 1000 feet (305 meters) along the bicycle lane. The Preferential Lane Symbols shall be spaced a maximum distance of 250 feet (75 meters) apart. The striping shall be installed in conformance with Standard Specification Item No. 871S, "Reflectorized Pavement Markings", as identified in the Drawings or as directed by the Engineer or designated representative.

829S.5 Maintenance of Markings

The Contractor shall be responsible for maintaining all bicycle lane markings for 30-calendar days after installation. Lane markings, that fail to meet the requirements of this specification for 30 calendar days from the date of installation, shall be removed and replaced by the Contractor at the Contractor's expense. The 30-calendar day maintenance requirement will be required for replaced markings from the time the original markings were installed.

829S.6 Construction Methods

A. Placement and Maintenance

When required by the Engineer, the Contractor and the Engineer shall review the sequence of Work to be followed and the estimated progress schedule.

The Contractor shall exercise due diligence in the selection of materials and placement of bicycle lane markings. The Contractor at its own expense shall maintain lane markings to the satisfaction of the Engineer or designated representative in accordance with this Specification Item.

Markings may be placed on streets either free of traffic or open to traffic. On streets already open to traffic, the markings shall be placed under traffic conditions that exist with a minimum of interference to the operation of the facility. Traffic control shall be as shown on the Drawings or as approved in writing by the Engineer or designated representative. All markings placed under open-traffic conditions shall be protected from traffic damage and disfigurement.

Guidemarks to mark the lateral location of pavement markings shall be in proper alignment with the final location of future standard markings as shown on the Drawings or as directed by the Engineer or designated representative. The Contractor shall establish the pavement marking guide and the Engineer or designated representative will verify the location of the guides. Any guidemarks, which are not in alignment with standard markings, shall be removed by the Contractor at its own expense.

Markings shall essentially have a uniform cross-section. The density and quality of markings shall be uniform throughout their thickness. The applied markings shall have no more than five percent, by area, of holes or voids and shall be free of blisters.

Unless otherwise shown on the Drawings, pavement markings may be applied by any method that will yield markings meeting the requirements of the Specification Item.

Unless approved otherwise in writing by the Engineer or designated representative, all Portland cement concrete pavement surfaces shall have standard markings in place prior to opening to traffic.

All asphaltic surfaces, which are scheduled for opening to traffic, shall be marked with guidemarks immediately following placement and final rolling of any course. Guidemarks shall consist of a single temporary flexible-reflective street marker tab or a single temporary construction raised reflective pavement marker at 40-foot (12-meter) spacings.

The standard lane markings shall be installed in accordance with the Texas Manual on Uniform Traffic Control Devices for Streets and Highways (Texas MUTCD) and as shown on the Drawings.

Surfaces to receive surface treatments (Specification Item 320S) shall be marked in accordance with the Drawings. Unless otherwise shown on the Drawings, the standard pavement markings shall be placed in accordance with Texas MUTCD, no sooner than three days nor later than two weeks after the placement of the surface treatment.

B. Marking Removal

Any bicycle lane markings placed by the Contractor that conflict with any succeeding lane markings shall be removed by the Contractor at its own expense in accordance with Standard Specification Item No. 874S, "Eliminating Existing Pavement Markings and Markers", except for measurement and payment.

829S.7 Measurement

This Standard Specification Item will be measured by material type (i.e. Type I or Type II) in lineal foot (lineal meter: 1 lineal meter is equal to 3.281 lineal feet) of standard lane marking (striping), by each symbol and by each letter of word markings, or by any other unit as shown on the Drawings. Where double stripes are placed, each stripe will be measured separately.

829S.8 Payment

The work performed and materials furnished in accordance with this Standard Specification Item and measured as provided under "Measurement" will be paid for at the Unit bid price for "Reflectorized Bicycle Lane Pavement Markings" of the various types, shapes, sizes, widths and thickness (Type I markings only) specified. The unit bid prices shall include full compensation for furnishing all materials, labor, tools, equipment and incidentals necessary to place, maintain and remove, when required, the markings, except as described below.

Removal of existing markings will be paid for under Specification Item No. 874S, "Eliminating Existing Pavement Markings and Markers".

Payment will be made under one or more of the following:

Pay Item 829S-A:	Type I Bicycle Lane Markings, __inches in width, white in color	per lineal foot
Pay Item 829S-B:	Type I Bicycle Lane Preferential (directional arrow) Symbols, white in color	per each
Pay Item 829S-C:	Type I Bicycle Lane (Bike Rider) Symbol, white in color	per each
Pay Item 829S-D:	Type I Bicycle Lane Letters, white in color	per each
Pay Item 829S-E:	Type II Bicycle Lane Markings, __ inches in width, white in color	per lineal foot
Pay Item 829S-F:	Type II Bicycle Lane Preferential (directional arrow) Symbols, white in color	per each
Pay Item 829S-G:	Type II Bicycle Lane (Bike Rider) Symbol, white in color	per each
Pay Item 829S-H:	Type II Bicycle Lane Letters, white in color	per each

END

SPECIFIC CROSS REFERENCE MATERIALS	
Specification Item 829S, "Designated Bicycle Lane Markings"	

City of Austin Standard Details	
Designation	Description
Detail No. 829S-1	Bicycle Lane Markings
City of Austin Standard Specifications	
Designation	Description
Item No. 320S	Two Course Surface Treatment
Item No. 827S	Designated Bicycle Lane Signing
Item No. 860S	Pavement Marking Paint (Reflectorized)
Item No. 871S	Reflectorized Pavement Markings
Item No. 874S	Eliminating Existing Pavement Markings and Markers
Texas State Technical Documents	
Designation	Description
(Texas MUTCD)	Texas Manual on Uniform Traffic Control Devices

RELATED CROSS REFERENCE MATERIALS	
Specification Item 829S, "Designated Bicycle Lane Markings"	
City of Austin Contract Documents	
Designation	Description
Section 00300U	Bid Form (Unit Price)
City of Austin Standard Specification Items	
Designation	Description
Item No. 315S	Milling Asphaltic Concrete Paving
Item No. 340S	Hot Mix Asphaltic Concrete Pavement
Item No. 341S	Paving Fabric
Item No. 350S	Heating, Scarifying and Repaving
Item No. 360	Concrete Pavement
Item No. 801S	Construction Detours
Item No. 803S	Barricades, Signs and Traffic Handling
Item No. 824S	Traffic Signs
Item No. 863S	Reflectorized Pavement Markers
Item No. 864S	Abbreviated Pavement Markings
Item No. 867S	Epoxy Adhesive
Item No. 872S	Prefabricated Pavement Markings
Item No. 875S	Pavement Surface Preparation for Markings
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges	
Designation	Description
Item No. 351	Repairing Existing Flexible Pavement Structure
Item No. 354	Planning and/or Texturing Pavement
Item No. 358	Asphaltic Concrete Surface Rehabilitation
Item No. 360	Concrete Pavement

Item No. 427	Surface Finishes for Concrete
Item No. 666	Reflectorized Pavement Markings
Item No. 667	Prefabricated Pavement Markings
Item No. 677	Eliminating Existing Pavement Markings and Markers
Item No. 678	Pavement Surface Preparation for Markings
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
Tex-729-I	Sampling of Traffic Markers
Tex-732-I	Sampling of Prefabricated Pavement Marking Materials
Tex-828-B	Determining Functional Characteristics of Pavement Markings
Tex-829-B	Method for Measuring Pavement Temperature
Tex-854-B	Evaluation of Thermoplastic Striping for Uniformity and Thickness
Texas Department of Transportation: Departmental Materials Specification	
Designation	Description
DMS-4100	Jiggle Bar Tile
DMS-4200	Pavement Markers (Reflectorized)
DMS-4300	Traffic Buttons
DMS-4210	Pavement Markers
DMS-6130	Bituminous Adhesive
DMS-8200	Pavement Paint
DMS-8220	Thermoplastic marking material
DMS-8240	Prefabricated Marking Materials
DMS-8300	Flat Surface Reflective Sheeting
YPT-10 &/or WPT-10	Pavement Paint

ITEM NO. 863S REFLECTORIZED PAVEMENT MARKERS 9-26-12

863S.1 Description

This item governs reflectorized pavement markers to be used to delineate traffic lanes or fire hydrants.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text, the inch-pound units are given preference followed by SI units shown within parentheses.

863S.2 Submittals

The submittal requirements of this specification item include:

A. List of specific application(s) [i.e. type: (reflectorized Type I-A, I-C or II-A-A, II-B-B or II-C-R)] and applicable epoxy system and adhesive types [867S.5].

B. Specific manufacturer with test results and technical specifications for proposed pavement markers.

C. Manufacturer's recommendations for surface preparation, cleaning, placement temperatures and installation instructions.

D. Adhesive components and mixing recommendations.

863S.3 Materials

All materials shall meet the requirements as specified below and indicated on City of Austin Standard Detail 863S-1, "Pavement Markers (Reflectorized - Type I & II)". The pavement markers shall comply with TxDoT Departmental Materials Specifications DMS-4210.

A. Design and Shape

The outer surface of the marker shall be smooth and all corners and edges exposed to traffic must be rounded. The base of the marker shall have a width of 4.0 inches + ½ inch (100 mm + 13 mm) and shall have a minimum area exposed to traffic of 12.5 square inches (8000 square mm). The maximum height shall be ¾ inch (19 mm). The maximum slope of the reflector face or faces shall be not more than 30 degrees from the horizontal.

The bottom surface of the markers shall be of a design for adhesion with epoxy adhesives to comply with TxDoT Test Method Tex-611-J.

The marker shall be designed to show no change in shape or color when subjected to the requirements of TxDoT Test Method Tex-846-B, at a temperature of 140°F (60°C) with the marker in a vertical position.

B. Optical

1. Definitions

(a) Horizontal entrance angle is defined as being in a plane parallel to the base of the road marker, between a line in the direction of the incident light and a line that is perpendicular to the leading edge of the reflective surface.

(b) Divergence angle shall mean the angle at the reflector between observer's line of sight and the direction of the light incident on the marker.

(c) Specific intensity shall mean candle power of the returned light at the chosen divergence and entrance angles for each footcandle of incident light per reflective face. TxDoT Test Method Tex-842-B will be used to determine specific intensity.

2. Performance

For the pavement markers the specific intensity of the reflecting surface at a 15-degree divergence angle shall be not less than the following when the incident light is parallel to the base of the marker.

Horizontal Entrance Angle, Degrees	Specific Intensity	
	Crystal	Amber
0	3.0	2.0
20	1.5	1.0

The specific intensity of the marker shall not be less than 80 percent of the above minimum values after being subjected to heat test of TxDoT Test Method Tex-846-B.

C. Pavement Marker Types

Pavement markers shall be of the following types:

1. Type I-A shall contain an approach face that reflects amber light. The body, other than the reflective face, shall be yellow.
2. Type I-C shall contain an approach face that reflects white light. The body, other than the reflective face, shall be white, silver white or light gray.
3. Type II-A-A, shall contain two reflective faces (approach and trailing), each of which shall reflect amber light. The body, other than the reflective faces, shall be yellow.
4. Type II-B-B shall contain two reflective faces (approach and trailing) with glass covered pneumatic reflective faces, each of which shall reflect blue light. The body, other than the reflective faces, shall be blue.
5. Type II-C-R shall contain two reflective faces (approach and trailing), one of which reflects white light and one of which reflects red light. The body, other than the reflective faces, shall be either white, silver white or light gray or one-half white, silver white or light gray on the side that reflects white light and one-half red on the side that reflects red light.

The reflective faces of the Type II markers shall be located so that the direction from one face shall be directly opposite the direction of reflections of the other face.

863S.4 Sampling

Sampling will be conducted in accordance with TxDoT Test Method Tex-729-I.

863S.5 Testing

The Contractor shall certify that the markers meet the requirements defined in the specification and meet or exceed the applicable tests required. All testing will be in accordance with the TxDoT manual of Testing Procedures. Applicable tests shall include the following:

Tex-611-J: Adhesion Requirements

Tex-842-B: Light Retroreflectivity

Tex-846-B: Heat Resistance

Blue markers' color will conform to Fire Department requirements.

863S.6 Construction Methods

The Contractor shall use a crew experienced in the work of installing reflectorized pavement markers and in the necessary traffic control for such operations on the roadway surface and shall supply all the equipment, personnel, traffic control and materials necessary for the placement of the pavement markings as indicated on the Drawings or as directed by the Engineer or designated representative. All work shall conform to the current edition of the Texas Manual of Uniform Traffic Control Devices (TMUTCD), The City of Austin Transportation Criteria Manual and Standard Detail 863S-1.

All reflectorized pavement markers shall be from the same manufacturer. Surfaces to which markers are to be attached by an adhesive shall be prepared by any method approved by the Engineer or designated representative to ensure that the surface is free of dirt, curing compound, grease, oil, moisture, loose or unsound pavement markings and any other material which would adversely affect the adhesive bond. Unless indicated otherwise on the Drawings, surface preparation for installation of raised reflectorized pavement markers will not be paid for directly, but shall be included in the unit price bid for this specification item.

Guides to mark the lateral location of pavement markings shall be established as indicated on the Drawings or as directed by the Engineer or designated representative. The Contractor will establish the pavement marking guides and the Engineer or designated representative will verify the location of the guides prior to final installation.

The pavement markers shall be placed in proper alignment with the Guides. The deviation rate in alignment shall not exceed 1 inch per 200 feet (25 millimeters per 60 meters) of roadway. The maximum deviation shall not exceed 2 inches (50 millimeters) nor shall any deviation be abrupt.

Markers placed which are not in alignment indicated on the Drawings shall be removed by the Contractor at the Contractor's expense. Removal shall be in accordance with Specification Item 874S except for measurement and payment. Guides placed on the roadway for alignment purposes shall not establish a permanent marking on the roadway.

The Reflectorized Pavement Markers shall be applied using an approved epoxy adhesive (City of Austin Standard Specification Item 867S) to the lines and spacings as indicated on the Drawings or as directed by the Engineer or designated representative. The adhesive shall be applied in sufficient quantity to ensure that 100 percent of the bonding area of the pavement markers shall be in contact with the adhesive. The adhesive shall be applied in accordance with the manufacturer's recommendations.

Pavement markers shall be placed immediately after the adhesive is applied and shall be firmly bonded to the pavement. Adhesive or any other material that impairs functional reflectivity will not be acceptable.

When deemed necessary by the Engineer or designated representative, the Contractor, at the Contractor's expense, shall place any additional pilot markings required to facilitate the placement of the permanent markings in the alignment specified. Any and all additional markings placed on the roadway for alignment purposes shall be temporary in nature and shall not establish a permanent marking on the roadway. Materials used for pilot markings and equipment used to place such markings shall be approved by the Engineer or designated representative.

863S.7 Measurement

Reflectorized Pavement Marker will be measured as per each, complete in place.

863S.8 Payment

Payment will be made at the unit bid price per each. The price shall include full compensation for all work performed and all materials furnished in constructing, transporting and placing the markers.

Payment will be made under:

Pay Item No. 863S-1:	Reflectorized Pavement Markers (Type I-A)	Per Each.
Pay Item No. 863S-2:	Reflectorized Pavement Markers (Type I-C)	Per Each.
Pay Item No. 863S-3:	Reflectorized Pavement Markers (Type II-A-A)	Per Each.
Pay Item No. 863S-4:	Reflectorized Pavement Markers (Type II-B-B)	Per Each.
Pay Item No. 863S-5:	Reflectorized Pavement Markers (Type II-C-R)	Per Each.

End

Specification Item 863S " Reflectorized Pavement Markers"		
Texas Department of Transportation: Manual of Testing Procedures		
Designation	Description	
Tex 611-J	Adhesion Test For Traffic Buttons, Markers, and Jiggle Bars	
Tex-729-I	Sampling of Traffic Markers	
Tex-842-B	Method for Measuring Retroreflectivity	
Tex-846-B	Method of Testing The Heat Resistance of Reflector Units	
Texas Department of Transportation: Departmental Materials Specifications		
Designation	Description	
DMS-4210	Pavement Markers (All Weather Reflectorized	
City of Austin Standard Details		
Designation	Description	
863S-1	Pavement Buttons (Reflectorized-Type I & Type II)	
City of Austin Standard Specifications		
Designation	Description	
Item No. 867S	Epoxy Adhesive	
Item No. 874S	Eliminating Existing Pavement Markings and Markers	
Item No. 875S	Pavement Surface Preparation For Markings	
City of Austin Transportation Criteria Manual		
Designation	Description	
Section 8	Traffic Control	
State of Texas Manual on Uniform Traffic Control Devices for Streets and Highways		
Designation	Description	
Part III	Markings	

Part VI	Traffic Controls for Street and Highway Construction, Maintenance, Utility and Incident Management Operations	
Part VI, Article D	Markings	
Part VI, Article F	Control of Traffic Through Work Areas	

RELATED CROSS REFERENCE MATERIALS	
Specification Item 863S " Reflectorized Pavement Markers"	
City of Austin Standard Specifications	
Designation	Description
Item No. 865S	Non-Reflectorized Traffic Buttons
Item No. 870S	Work Zone Pavement Markings
Item No. 871S	Reflectorized Pavement Markings
Item No. 873S	Raised Pavement Markers
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item No. 666	Reflectorized Pavement Markings
Item No. 672	Raised Pavement Markers
Item No. 677	Eliminating Existing Pavement Markings and Markers
Item No. 678	Pavement Surface Preparation For Markings

ITEM NO. 864S ABBREVIATED PAVEMENT MARKINGS 6-21-07

864S.1 Description

This item shall govern the placement, maintenance and removal of temporary abbreviated markings, which are to be placed on all roadways, that are open to traffic and that do not have standard markings in place.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text and accompanying tables, the inch-pound units are given preference followed by SI units shown within parentheses.

864S.2 Submittals

The submittal requirements of this specification item include:

A. Specific applications and color of traffic markings.

B. Specific manufacturer with test results and technical specifications.

C. Manufacturer's recommendations for surface preparation, cleaning, placement temperatures and installation instructions.

864S.3 Materials

The pavement-marking material shall consist of an adhesive-backed reflective tape, which can be applied to the pavement. Markings shall be of good appearance, have straight, unbroken edges and have a color that complies with all federal regulations.

A. Color

The markings, as well as retroreflected light from the markings, shall be white or yellow as indicated on the Drawings or provided in writing by the Engineer or designated representative.

B. Visibility

The pavement markings (during daylight hours) shall be distinctively visible for a minimum of 300 feet (90 meters) unless sight distance is restricted by geometric roadway features.

The pavement markings (when illuminated by automobile lowbeam headlights at night) shall be distinctively visible for a minimum of 160 feet (48 meters) unless sight distance is restricted by geometric roadway features.

The day and night visibility requirements, which are specified above, shall be met when viewed from an automobile traveling on the roadway.

864S.4 Construction Methods

The Contractor shall use a crew experienced in the work of installing pavement markings and in the necessary traffic control for such operations on the roadway surface and shall supply all the equipment, personnel, traffic control and materials necessary for the placement of the pavement markings as indicated on the Drawings or as directed by the Engineer or designated representative. All work shall conform to the current edition of the Texas Manual of Uniform Traffic Control Devices (MUTCD), The City of Austin Transportation Criteria Manual and Standard Details 804S-3 series.

Abbreviated markings, which meet all specification requirements, shall be in place on all roadways on which traffic is allowed and where suitable standard pavement marking is not in place. The transverse location of the line(s) formed by the markings shall be as indicated on the Drawings or determined by the Engineer or designated representative.

Unless otherwise indicated, the abbreviated makings shall be placed as follows:

Condition	Spacing	Length of Stripe
Straight	20 feet (6 meters) approximately	24 inch (600 mm)
Curve greater than 2 degrees	20 feet (6 meters) maximum	24 inch (600 mm)
Curve less than or equal 2 degrees	10 feet (3 meters)	24 inch (600 mm)

Pavement markings shall be a minimum of 3 7/8 inches (100 millimeters) wide. Lengths and spacings will be in accordance with these specifications.

The spacing of stripes may be modified by the Engineer or designated representative. However, the maximum spacing specified above shall not be exceeded in any case.

The Contractor will be responsible for maintaining the abbreviated pavement markings until standard pavement markings are in place.

Abbreviated pavement markings shall be removed after all permanent markings have been placed.

864S.5 Performance

Installed abbreviated pavement markings shall meet all requirements of this specification for a minimum of seven (7) days after installation of the abbreviated markings is complete. Pavement markings that fail to meet all requirements of this specification shall be removed and shall be replaced at the sole expense to the Contractor with pavement markings that meet the requirements of this specification.

864S.6 Measurement and Payment

Abbreviated pavement markings will not be measured for payment but shall be included in the unit price bid for the item of construction for which abbreviated pavement markings are indicated on the drawings.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Specification Item 864S "Abbreviated Pavement Markings"	
City of Austin Transportation Criteria Manual	
Designation	Description
Section 8	Traffic Control
State of Texas Manual on Uniform Traffic Control Devices for Streets and Highways	
Designation	Description
Part III	Markings
Part VI	Traffic Controls for Street and Highway Construction, Maintenance, Utility and Incident Management Operations
Part VI, Article D	Markings
Part VI, Article F	Control of Traffic Through Work Areas

RELATED CROSS REFERENCE MATERIALS	
Specification Item 864S "Abbreviated Pavement Markings"	
City of Austin Standard Specifications	
Designation	Description
Item No. 867S	Epoxy Adhesive
Item No. 870S	Work Zone Pavement Markings
Item No. 872S	Prefabricated Pavement Markings
Item No. 874S	Eliminating Existing Pavement Markings and Markers
Item No. 875S	Pavement Surface Preparation For Markings
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item No. 662	Work Zone Pavement Markings
Item No. 667	Prefabricated Pavement Markings
Item No. 677	Eliminating Existing Pavement Markings and Markers
Item No. 678	Pavement Surface Preparation For Markings

ITEM NO. 870S WORK ZONE PAVEMENT MARKINGS 11-21-05

870S.1 Description

This item shall govern the placement and maintenance of work zone pavement markings of the colors, types and sizes indicated on the Drawings.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text and accompanying tables, inch-pound units are given preference followed by SI units shown within parentheses.

870S.2 General

Work zone pavement markings shall consist of guide marks, short-term markings and/or standard pavement markings. Existing markings are considered to be any standard pavement markings in place at the time of commencement of the Work. All streets, which are to be opened to traffic, shall be marked with short-term markings or standard markings, as shown on the Drawings, at the end of each day of operation.

When inclement weather prohibits the application of short-term markings or standard markings indicated on the Drawings, guide marks may be considered as temporary short-term markings for asphaltic surfaces, upon approval by the Engineer. The placement of pavement markings as shown on the Drawings may be delayed until the time that weather conditions allow the application of pavement markings.

870S.3 Materials

All non-removable markings shall be thermoplastic, unless otherwise indicated on the Drawings. Thermoplastic markings shall have a thickness of 90 mils (2.3 millimeters) unless indicated otherwise on the Drawings. All non-removable work zone markings shall conform to the requirements of Specification Item 871S, "Reflectorized Pavement Markings", except for Section 871C.5, 'Performance Period for Type I Markings', Section 871C.6, 'Measurement' and Section 871C.7, 'Payment'.

Thermoplastic or paint and beads applications shall not be used for removable markings.

Unless otherwise shown on the Drawings or indicated in the Contract Documents:

> The Contractor shall have the option to use raised pavement markers to simulate standard markers in accordance with the Drawings. Longitudinal lines wider than four (4) inches {100 millimeters} may be simulated by the side-by-side placement of markers to increase the apparent line width in multiples of four (4) inches {100 millimeters}.

Removable work zone pavement markings on final pavement surfaces shall be removable tape conforming to TxDOT Departmental Materials Specification DMS-8241.

When raised reflective pavement markers are required on the Drawings to supplement the removable pavement markings, a marker shall be applied to the top of the tape at the approximate mid-length of tape used for broken lines and at approximate 20 foot (6 meter) spacing for solid lines.

Raised pavement markers will not be allowed for words, symbols, shapes and diagonal or transverse lines.

The paint shall be water-based and shall conform to Standard Specification Item 860S, "Pavement Marking Paint".

The beads shall conform to Standard Specification Item 860S, "Pavement Marking Paint".

The thermoplastic type materials shall conform to TxDOT Departmental Materials Specification Item DMS-8220, "Thermoplastic Pavement Markings".

870S.4 Performance Requirements

The markings in construction areas shall remain in proper alignment and shall be distinctly visible when dry from a minimum distance of 300 feet (90 meters) in daylight hours and distinctly visible from a minimum distance of 120 feet (36 meters) at night, when illuminated by automobile low-beam headlights. The visibility distances will be determined when viewed from an automobile traveling on the street.

The daytime color and the nighttime reflected color of the markings shall be distinctly white or yellow as shown on the Drawings. The markings shall exhibit uniform retroflective characteristics.

870S.5 Construction Methods

A. Placement and Maintenance.

The Contractor shall exercise due diligence in the selection of materials and placement of work zone pavement markings. The Contractor at its own expense shall maintain work zone pavement markings to the satisfaction of the Engineer or designated representative in accordance with this Specification Item.

Unless approved otherwise in writing by the Engineer or designated representative, all Portland cement concrete surfaces shall have standard markings in place prior to opening to traffic.

All asphaltic surfaces, which are scheduled for opening to traffic, shall be marked with guide marks immediately following placement and final rolling of any course. Guide marks shall consist of a single temporary flexible-reflective street marker tab or a single temporary construction raised reflective pavement marker at 40-foot (12-meter) spacing.

Guide marks shall be placed in proper alignment with the final location of future standard markings. Any guide marks, which are not in alignment with standard markings, shall be removed by the Contractor at its own expense.

The standard pavement markings shall be installed in accordance with the Texas Manual on Uniform Traffic Control Devices for Streets and Highways (TMUTCD) and as shown on the Drawings.

Surfaces to receive surface treatments (Standard Specification Item 320S) shall be marked in accordance with the Drawings. Unless otherwise shown on the Drawings, the standard pavement markings shall be placed in accordance with TMUTCD, no sooner than three (3) days nor later than two (2) weeks after the placement of the surface treatment.

Short-term markings required by the Drawings shall conform to the TMUTCD and details shown on the Drawings. Unless otherwise shown on the Drawings, short-term markings shall be removed immediately prior to placement of the final pavement markings.

B. Marking Removal.

Any work zone pavement markings placed by the Contractor that conflict with any succeeding work zone markings shall be removed by the Contractor at its own expense in accordance with Specification Item 874S, "Eliminating Existing Pavement Markings and Markers", except for measurement and payment.

Removable marking materials shall leave minimal evidence of the existence of the marking upon removal.

C. Maintenance of Markings

The Contractor shall be responsible for maintaining all work zone pavement markings in accordance with this specification item, at its own expense, to the satisfaction of the Engineer or designated representative.

870S.6 Measurement

This Standard Specification Item will be measured by the lineal foot (lineal meter: 1 lineal meter is equal to 3.281 lineal feet) of standard marking or short-term marking, by each guide mark, by each word, shape or symbol, by each temporary flexible-reflective street marker tab on surface treatments or by any other unit as shown on the Drawings. Raised pavement markers used to simulate a stripe will be measured by the lineal foot (lineal meter) of simulated stripe or each raised pavement marker as shown on the Drawings. Where double stripes are placed, each stripe will be measured separately.

Payment for revised quantities will be paid for at the unit price bid for that bid item.

870S.7 Payment

The work performed and materials furnished in accordance with this Standard Specification Item and measured as provided under "Measurement" will be paid for at the Unit bid price for "Work Zone Pavement Markings (Removable)", "Work Zone Pavement Markings (Non-removable)", "Work Zone Pavement Markings (Short-Term)" and "Work Zone Pavement Markings (Guide mark)" of the width, color and type shown on the Drawings. This price shall include full compensation for furnishing all materials, labor, tools, equipment and incidentals necessary to place, maintain and remove, when required, the markings, except as described below.

Removal of existing markings will be paid for under Specification Item 874S, "Eliminating Existing Pavement Markings and Markers".

Final work zone pavement markings (paint and beads) which will be used within 30 calendar days after application as a sealer for Type I pavement markings will not be paid for under this Specification Item, but will be paid for under Specification Item 871S, "Reflectorized Pavement Markings".

Payment will be made under one or more of the following:

Pay Item 870S-A:	Work Zone Pavement Markings (Removable), ___ inches in width, _____ in color	per lineal foot.
Pay Item 870S-B:	Work Zone Pavement Markings (Non-removable), ___ inches in width, _____ in color	per lineal foot.
Pay Item 870S-C:	Work Zone Pavement Markings (Short Term), ___ inches in width, _____ in color	per lineal foot.
Pay Item 870S-D:	Work Zone Pavement Markings (Guide mark), ___ inches in width, _____ in color	per lineal foot.
Pay Item 870S-E:	Work Zone Pavement Marking (Removable), Words	per each.
Pay Item 870S-F:	Work Zone Pavement Marking (Removable), Symbols	per each.
Pay Item 870S-G:	Work Zone Pavement Marking (Non-removable), Words	per each.
Pay Item 870S-H:	Work Zone Pavement Marking (Non-removable), Symbols	per each.

END

SPECIFIC CROSS REFERENCE MATERIALS	
Specification 870S, "Work Zone Pavement Markings	
City of Austin Contract Documents	
Designation	Description

Section 00300U	Bid Form (Unit Price)
City of Austin Standard Specifications	
Designation	Description
Item No. 320S	Two Course Surface Treatment
Item No. 860S	Pavement Marking Paint (Reflectorized)
Item No. 871S	Reflectorized Pavement Markings
Item No. 874S	Eliminating Existing Pavement Markings and Markers

RELATED CROSS REFERENCE MATERIALS	
Specification 870S, "Work Zone Pavement Markings	
City of Austin Standard Specifications	
Designation	Description
Item No. 302S	Aggregates for Surface Treatments
Item No. 310S	Emulsified Asphalt Treatment
Item No. 311S	Emulsified Asphalt Repaving
Item No. 312S	Seal Coat
Item No. 313S	Cleaning and/or Sealing Joints and Cracks (Asphaltic Concrete)
Item No. 315S	Milling Asphaltic Concrete Paving
Item No. 340	Hot Mix Asphaltic Concrete Pavement
Item No. 341S	Paving Fabric
Item No. 350S	Heating, Scarifying and Repaving
Item No. 360	Concrete Pavement
Item No. 413S	Cleaning and/or Sealing Joints and Cracks (Portland Cement Concrete)
Item No. 801S	Construction Detours
Item No. 803S	Barricades, Signs and Traffic Handling
Item No. 863S	Reflectorized Pavement Markers
Item No. 864S	Abbreviated Pavement Markings
Item No. 865S	Non-Reflectorized Traffic Buttons
Item No. 866S	Jiggle Bar Tile
Item No. 867S	Epoxy Adhesive
Item No. 872S	Prefabricated Pavement Markings
Item No. 873S	Raised Pavement Markers
Item No. 875S	Pavement Surface Preparation For Markings
City of Austin Standard Details	
Designation	Description
863S-1	Pavement Buttons (Reflectorized-Type I & Type II)
865S-1	Traffic Buttons (Non-Reflectorized)
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item No. 302	Aggregates for Surface Treatments
Item No. 314	Emulsified Asphalt Treatment

Item No. 315	Emulsified Asphalt Seal
Item No. 316	Surface Treatments
Item No. 334	Hot Mix-Cold Laid Asphaltic Concrete Pavement
Item No. 340	Hot Mix Asphaltic Concrete Pavement
Item No. 342	Plant Mix Seal
Item No. 351	Repairing Existing Flexible Pavement Structure
Item No. 354	Planing and/or Texturing Pavement
Item No. 358	Asphaltic Concrete Surface Rehabilitation
Item No. 360	Concrete Pavement
Item No. 421	Hydraulic Cement Concrete
Item No. 427	Surface Finishes for Concrete
Item No. 428	Concrete Surface Treatment
Item No. 662	Work Zone Pavement Markings
Item No. 666	Reflectorized Pavement Markings
Item No. 667	Prefabricated Pavement Markings
Item No. 672	Raised Pavement Markers
Item No. 677	Eliminating Existing Pavement Markings and Markers
Item No. 678	Pavement Surface Preparation For Markings
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
Tex-729-I	Sampling of Traffic Markers
Tex-732-I	Sampling of Prefabricated Pavement Marking Materials
Tex-828-B	Determining Functional Characteristics of Pavement Markings
Tex-829-B	Method For Measuring Pavement Temperature
Tex-854-B	Evaluation Of Thermoplastic Striping For Uniformity And Thickness
Texas Department of Transportation: Departmental Materials Specifications	
Designation	Description
DMS-4100	Jiggle Bar Tile
DMS-4200	Pavement Markers (Reflectorized)
DMS-4300	Traffic Buttons
DMS-4210	Pavement Markers
DMS-6130	Bituminous Adhesive
DMS-8200	Pavement Paint
DMS-8220	Thermoplastic marking material
DMS-8240	Prefabricated Marking Materials
DMS-8241	Removable Tape
DMS-8290	Pavement Paint
YPT-10 and/or WPT-10	Pavement Paint

ITEM NO. 871S REFLECTORIZED PAVEMENT MARKINGS 6-21-07

871S.1 Description

This item shall govern furnishing and placement of reflectorized pavement markings of the colors, types, shapes, sizes, widths and thickness indicated on the Drawings.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text and accompanying tables, the inch-pound units are given preference followed by SI units shown within parentheses.

871S.2 Materials

A. Type I Marking Material.

Type I markings are thermoplastic type materials that require heating to elevated temperatures for application. Type I marking materials shall conform to TxDOT Departmental Materials Specification Item DMS-8220, "Thermoplastic Pavement Markings". Each container of Type I Marking Material shall be clearly marked to indicate the color, weight (mass), type of material, manufacturer's name and lot/batch number.

B. Type II Marking Material.

Type II markings are paint- type materials that are applied at ambient temperature or slightly elevated temperatures. Type II marking materials shall conform to Specification Item No. 860S, "Pavement Marking Paint".

C. Source of Supply.

All Type I marking materials shall be purchased on the open market. All glass traffic beads shall be purchased on the open market.

871S.3 Equipment Requirements

The equipment used to place pavement markings shall:

A. be maintained in satisfactory operating condition;

B. be considered in satisfactory operating condition if it has an average placement rate of 5,000 lineal feet (1,525 lineal meters) per hour of acceptable four (4) inch (100 millimeters) solid or broken lines over any five (5) consecutive working days;

C. meet or exceed the material handling at elevated temperature requirements of the National Fire Underwriters and the Texas Railroad Commission;

D. be capable of placing a minimum of 40,000 lineal feet (12,190 lineal meters) of 4 inch (100 millimeters) solid or broken markings per day;

E. have production capabilities similar to four-inch (100 millimeters) marking equipment and shall be capable of placing linear markings up to 8 inches (200 millimeters) in width in a single pass when used for placing markings in widths other than 4 inches (100 millimeters);

F. have production capabilities considered satisfactory by the Engineer or designated representative, when used to place markings other than solid or broken lines;

G. be capable of placing a centerline and no-passing barrier-line configuration consisting of one broken line with two solid lines at the same time to the alignment and spacing shown on the Drawings;

H. be capable of placing broken and/or continuous white line from both sides;

I. be capable of placing lines with clean edges and of uniform cross-section. All lines shall have a tolerance of plus or minus ⅛ inch per 4-inch width (3 mm per 100-mm width);

J. have an automatic cut-off device with manual operating capabilities to provide clean, reasonably square marking ends to the satisfaction of the Engineer, and to provide a method of applying broken line in an approximate stripe-to-gap ratio of 10 to 30. The length of the stripe shall not be less than 10 feet (3.05 meters) or more than 10.5 feet (3.2 meters). The total length of any stripe-gap cycle shall not be less than 39.5 feet (12 meters) or more than 40.5 feet (12.3 meters);

K. provide continuous mixing and agitation of the pavement marking material. The use of pans, aprons or similar appliances, which the die overruns, will not be permitted for longitudinal striping applications;

L. apply beads by an automatic bead dispenser attached to the pavement marking equipment in such a manner that the beads re-dispensed uniformly and almost instantly upon the marking as the marking is being applied to the road surface. The bead dispenser shall have an automatic cut-off control, synchronized with the cut-off of the pavement marking equipment.

871S.4 Construction Methods

A. General.

When required by the Engineer, the Contractor and the Engineer shall review the sequence of Work to be followed and the estimated progress schedule.

Markings may be placed on streets either free of traffic or open to traffic. On streets already open to traffic, the markings shall be placed under traffic conditions that exist with a minimum of interference to the operation of the facility. Traffic control shall be as shown on the Drawings or as approved in writing by the Engineer or designated representative. All markings placed under open-traffic conditions shall be protected from traffic damage and disfigurement. On streets open to traffic with 3 lanes of travel in one direction, all markings shall be placed from the outside lanes only, unless otherwise approved in writing by the Engineer or designated representative.

Guides to mark the lateral location of pavement markings shall be established as shown on the Drawings or as directed by the Engineer or designated representative. The Contractor shall establish the pavement marking guide and the Engineer or designated representative will verify the location of the guides.

Markings shall be placed in proper alignment with the guides. The deviation rate in alignment shall not exceed 1 inch per 200 feet (25 mm per 60 meters) of street. The maximum deviation shall not exceed 2 inches (50 millimeters) nor shall any deviation be abrupt.

Markings shall essentially have a uniform cross-section. The density and quality of markings shall be uniform throughout their thickness. The applied markings shall have no more than five (5) percent, by area, of holes or voids and shall be free of blisters.

Markings, in place on the street, shall be reflectorized both internally and externally. Glass beads shall be applied to the materials at a uniform rate sufficient to achieve uniform and distinctive retroflective characteristics when observed in accordance with TxDOT Test Method Tex-828-B.

Contractor personnel shall be sufficiently skilled in the Work of installing pavement markings.

Markings placed that are not in alignment or sequence, as shown on the drawings or as stated in the Standard Specification Item, shall be removed by the Contractor at its own expense. Removal shall be in

accordance with Specification Item 874S, "Eliminating Existing Pavement Markings and Markers", except for measurement and payment. Guides placed on the street for alignment purposes shall not establish a permanent marking on the street.

Unless indicated otherwise on the Drawings, pavement markings shall not be placed sooner than 3 calendar days after the placement of a new hot mix asphaltic concrete surface course or surface treatment.

Unless otherwise shown on the Drawings, pavement markings may be applied by any method that will yield markings meeting the requirements of the Specification Item.

B. Surface Preparation.

New Portland cement concrete surfaces shall be cleaned in accordance with Specification Item 875S, "Pavement Surface Preparation for Markings" to remove curing membrane, dirt, grease, loose and/or flaking existing construction markings and other forms of contamination.

Older Portland cement concrete surfaces and asphaltic surfaces that exhibit loose and/or flaking existing markings shall be cleaned in accordance with Specification Item 875S, "Pavement Surface Preparation for Markings" to remove all loose and flaking markings.

Pavement to which material is to be applied shall be completely dry. Pavements shall be considered dry if, on a sunny day after observation for 15 minutes, no condensation occurs in the underside of a 1 foot (300 mm) square piece of clear plastic that has been placed on the pavement and weighted on the edges.

C. Application of Type I Markings.

New Portland cement concrete surfaces shall be further prepared for Type I markings, after cleaning, by placing a Type II marking as a sealer in accordance with the Specification Item. When placing Type I markings in new locations on asphaltic surfaces 3 years old or older or any Portland cement concrete surfaces, a Type II marking shall be used as a sealer. Unless otherwise shown on the Drawings, existing Portland cement concrete and asphaltic surfaces to be restriped will not require Type II markings as a sealer; existing markings may be used as a sealer in lieu of Type II markings. Type II markings shall be placed a minimum of 2 and a maximum of 30 calendar days in advance of placing Type I markings. Type II markings which become dirty due to inclement weather or street conditions shall be cleaned by washing, brushing, compressed air or other means approved by the Engineer, prior to application of Type I markings. If washing is used, the surface of Type II markings shall become thoroughly dry before placing Type I markings. Color, location and configuration of Type II markings shall be the same as that of Type I markings.

Type I pavement marking material shall be applied within temperature limits recommended by the material manufacturer. Application of Type I pavement markings shall be done only on clean, dry pavement having a surface temperature above 500F (100C). Pavement temperature shall be measured in accordance with TxDOT Test Method Tex-829-B.

When Type I pavement marking application is by spray, and operations cease for 5 minutes or more, the spray head shall be flushed by spraying pavement marking material into a pan or similar container until the pavement marking material being sprayed is at the proper temperature for application.

Unless otherwise directed by the Engineer in writing, Type I pavement-marking materials shall not be placed on streets between September 30 and March 1, subject to temperature and moisture limitations specified herein.

Unless otherwise shown on the Drawings, the minimum thickness of Type I marking shall be 0.060 inches (60 mil) (1.5 millimeters) for edgeline markings and 0.090 inches (90 mil) (2.3 millimeters) for stop-bars, legends, symbols, gore and center-line/no-passing barrier-line markings, when measured in accordance with TxDOT Test Method Tex-854-B. The maximum thickness of all Type I markings shall be 0.180 inches (180 mil) (4.6 millimeters).

The thickness of Type I markings at the time of placement will be measured above the plane formed by the pavement surface. The Contractor will supply an approved device to measure the thickness of the applied markings. The markings shall be of uniform thickness throughout their lengths and widths.

D. Application of Type II Markings.

The application of Type II marking materials shall be done only on surfaces with a minimum surface temperature of 500F (100C).

The application rate for Type II marking material shall be between 15 and 20 gallons per mile (35 to 47 liters per kilometer) of solid 4 inch (100 millimeter) line and between 30 and 40 gallons per mile (70 to 95 liters per kilometer) of solid 8 inch (200 millimeter) line. For new surface treatment projects the application rate shall be between 25 and 30 gallons per mile (60 to 70 liters per kilometer) of solid four (4) inch line (one hundred (100) millimeters) and between 40 and 50 gallons per mile (95 to 120 liters per kilometer) of solid 8 inch (200 millimeters) line.

Pavement markings for new surface treatment projects shall be applied in two applications, each approximately one-half the application rate. The first application shall not contain glass beads. The interval between the first and second application shall be a minimum of 1 hour.

When there is impending inclement weather and the Contractor chooses to apply water-based traffic paint and the markings, that are subsequently damaged by rain, sleet, hail, etc., the Contractor is responsible for all costs associated with the replacement markings. The Contractor will be paid, when the work is acceptable.

871S.5 Performance Period for Type I Markings

Type I pavement markings shall meet all the requirements of this technical specification for a minimum of 15 calendar days after installation. Pavement markings that fail to meet all requirements of this specification shall be removed and replaced by the Contractor at its own expense. The Contractor shall replace all pavement markings failing the requirements of this technical specification within 30 calendar days following notification by the Engineer or designated representative of such failing. All replacement markings shall also meet all requirements of this technical specification for a minimum of 15 calendar days after installation.

871S.6 Measurement

This Specification Item will be measured by the lineal foot (lineal meter), by each of the various words, shapes or symbols, or by any other unit as shown on the Drawings.

Where double stripes are placed, each stripe will be measured separately.

Type II pavement markings requiring 2 applications on new surface treatments (Specification Item No. 320S) will be measured as 1 marking.

Type II pavement marking materials, when used as a sealer for Type I markings will be measured as Type II markings.

Final work zone pavement markings (paint and beads), which will be used as a sealer for Type I pavement markings, will not be measured for payment.

871S.7 Payment

The work performed and materials furnished in accordance with this Standard Specification Item and measured as provided under "Measurement" will be paid for at the Unit bid price for "Reflectorized Pavement Markings" of the various types, colors, shapes, sizes, widths and thickness (Type I markings only) specified. This price shall include

full compensation for furnishing all materials; for application of pavement markings; and for all other labor, tools, equipment and incidentals necessary to complete the Work, except as described below.

Surface Preparation, when indicated on the Drawings, will be paid for under Specification Item 875S, "Pavement Surface Preparation for Markings."

Final work zone pavement markings (paint and beads), which will be used as a sealer for Type I pavement markings, shall be included in the unit price bid for the item of construction for which final work zone pavement markings are used.

When replacement Type II markings are required due to damage to the original markings from rain, sleet, hail, etc., and the original markings were placed at the Direction of the Engineer, the Contractor will be paid for the actual quantity of original and replacement markings at the unit bid price for the bid item.

Payment will be made under one or more of the following:

Original placement of Reflectorized Pavement Markings:

Pay Item 871S-A:	Reflectorized Type I Thermoplastic Pavement Markings ___ inches in width, ___ mils in thickness _____ in color	per lineal foot.
Pay Item 871S-B:	Reflectorized Type I Thermoplastic Pavement Markings ___ inches in width, ___ mils in thickness _____ in color	Words per each.
Pay Item 871S-C:	Reflectorized Type I Thermoplastic Pavement Markings ___ inches in width, ___ mils in thickness _____ in color	Shapes per each.
Pay Item 871S-D:	Reflectorized Type I Thermoplastic Pavement Markings ___ inches in width, ___ mils in thickness _____ in color	Symbols per each.
Pay Item 871S-E:	Reflectorized Type II Paint Pavement Markings ___ inches in width, _____ in color	per lineal foot.
Pay Item 871S-F:	Reflectorized Type II Paint Pavement Markings ___ inches in width, _____ in color	Words per each.
Pay Item 871S-G:	Reflectorized Type II Paint Pavement Markings ___ inches in width, _____ in color	Shapes per each.
Pay Item 871S-H:	Reflectorized II Paint Pavement Markings ___ inches in width, _____ in color	Symbols per each.
Replacement of Reflectorized Pavement Markings:		
Pay Item 871S-AR:	Replace Reflectorized Type I Thermoplastic Pavement Markings ___ inches in width, ___ mils in thickness _____ in color	per lineal foot.
Pay Item 871S-BR:	Replace Reflectorized Type I Thermoplastic Pavement Markings ___ inches in width, ___ mils in thickness _____ in color	Words per each.
Pay Item 871S-CR:	Replace Reflectorized Type I Thermoplastic Pavement Markings ___ inches in width, ___ mils in thickness _____ in color	Shapes per each.
Pay Item 871S-DR:	Replace Reflectorized Type I Thermoplastic Pavement Markings ___ inches in width, ___ mils in thickness _____ in color	Symbols per each.

Pay Item 871S-ER:	Replace Reflectorized Type II Paint Pavement Markings ___ inches in width, _____ in color	per lineal foot.
Pay Item 871S-FR:	Replace Reflectorized Type II Paint Pavement Markings ___ inches in width, _____ in color	Words per each.
Pay Item 871S-GR:	Replace Reflectorized Type II Paint Pavement Markings ___ inches in width, _____ in color	Shapes per each.
Pay Item 871S-HR:	Replace Reflectorized Type II Paint Pavement Markings ___ inches in width, _____ in color	Symbols per each.

END

SPECIFIC CROSS REFERENCE MATERIALS	
Specification Item No. 871S, "Reflectorized Pavement Markings"	
City of Austin Contract Documents	
Designation	Description
Section 00300U	Bid Form (Unit Price)
City of Austin Standard Specifications	
Designation	Description
Item No. 320S	Two Course Surface Treatment
Item No. 860S	Pavement Marking Paint (Reflectorized)
Item No. 874S	Eliminating Existing Pavement Markings and Markers
Item No. 875S	Pavement Surface Preparation For Markings
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
Tex-828-B	Determining Functional Characteristics of Pavement Markings
Tex-829-B	Method For Measuring Pavement Temperature
Tex-854-B	Evaluation Of Thermoplastic Striping For Uniformity And Thickness

RELATED CROSS REFERENCE MATERIALS	
Specification Item No. 871S, "Reflectorized Pavement Markings"	
City of Austin Standard Specifications	
Designation	Description
Item No. 301S	Asphalts, Oils and Emulsions
Item No. 302S	Aggregates for Surface Treatments
Item No. 310S	Emulsified Asphalt Treatment
Item No. 311S	Emulsified Asphalt Repaving
Item No. 312S	Seal Coat
Item No. 313S	Rubber Asphalt Joint and Crack Sealant
Item No. 315S	Milling Asphaltic Concrete Paving
Item No. 340S	Hot Mix Asphaltic Concrete Pavement
Item No. 341S	Paving Fabric
Item No. 350S	Heating, Scarifying and Repaving

Item No. 360	Concrete Pavement
Item No. 801S	Construction Detours
Item No. 803S	Barricades, Signs and Traffic Handling
Item No. 863S	Reflectorized Pavement Markers
Item No. 864S	Abbreviated Pavement Markings
Item No. 865S	Nonreflectorized Traffic Buttons
Item No. 866S	Jiggle Bar Tile
Item No. 867S	Epoxy Adhesive
Item No. 870S	Work Zone Pavement Markings
Item No. 872S	Prefabricated Pavement Markings
Item No. 873S	Raised Pavement Markers
Item No. 863S-1	Pavement Buttons (Reflectorized-Type I & Type II)
Item No. 865S-1	Traffic Buttons (Non-Reflectorized)
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item No. 302	Aggregates for Surface Treatments
Item No. 314	Emulsified Asphalt Treatment
Item No. 315	Emulsified Asphalt Seal
Item No. 316	Surface Treatments
Item No. 334	Hot Mix-Cold Laid Asphaltic Concrete Pavement
Item No. 340	Hot Mix Asphaltic Concrete Pavement
Item No. 342	Plant Mix Seal
Item No. 351	Repairing Existing Flexible Pavement Structure
Item No. 354	Planing and/or Texturing Pavement
Item No. 358	Asphaltic Concrete Surface Rehabilitation
Item No. 360	Concrete Pavement
Item No. 421	Hydraulic Cement Concrete
Item No. 427	Surface Finishes for Concrete
Item No. 428	Concrete Surface Treatment
Item No. 662	Work Zone Pavement Markings
Item No. 666	Reflectorized Pavement Markings
Item No. 667	Prefabricated Pavement Markings
Item No. 672	Raised Pavement Markers
Item No. 677	Eliminating Existing Pavement Markings and Markers
Item No. 678	Pavement Surface Preparation For Markings
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
Tex 729-I	Sampling of Traffic Markers
Texas Department of Transportation: Departmental Materials Specifications	
Designation	Description
DMS-4100	Jiggle Bar Tile
DMS-4200	Pavement Markers (Reflectorized)
DMS-4300	Traffic Buttons

DMS-4210	Pavement Markers
DMS-6130	Bituminous Adhesive
DMS-8200	Pavement Paint
DMS-8220	Thermoplastic marking material
DMS-8240	Prefabricated Marking Materials
DMS-8241	Removable Tape
DMS-8290	Pavement Paint
YPT-10 and/or WPT-10	Pavement Paint

ITEM NO. 874S ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS 4-3-09

874S.1 Description

This item shall govern the elimination of existing pavement markings of various types and sizes, and pavement markers as shown on the Drawings or as directed, in writing, by the Engineer or designated representative.

874S.2 Materials

All surface treatment material application rates shall be as directed by the Engineer or designated representative. Unless otherwise shown on the Drawings, surface treatment materials shall conform to the requirements of Specification Item No. 301S, "Asphalts, Oils and Emulsions," and Specification Item No. 302S, "Aggregates for Surface Treatment." Testing of surface treatment materials may be waived by the Engineer or designated representative. Asphalt and aggregate types and grades shall be as shown on the Drawings or as approved by the Engineer or designated representative.

874S.3 Construction Methods

Elimination of existing pavement markings and markers shall be accomplished by one or more of the following methods as approved by the Engineer or designated representative.

A. Markings on Asphaltic Surfaces.

1. Placement of a surface treatment a minimum of 2 feet (600 mm) wide to cover the existing marking.
2. Placement of a surface treatment, thin overlay or microsurfacing a minimum of 1 lane in width in areas where directional changes of traffic are involved or other areas as directed by the Engineer or designated representative. Construction methods for surface treatments shall conform to Specification Item No. 320S, "Two Course Surface Treatment."

B. Markings on Concrete Surfaces.

Removal by an approved burning method.

C. Markings on Asphaltic or Concrete Surfaces.

Removal by water, water-sand blasting techniques or any other method(s) proven satisfactory to the Engineer.

D. Markers on Asphaltic or Concrete Surfaces.

Removal by any mechanical method to remove marker and adhesive.

Existing pavement markings and markers on both concrete and asphaltic surfaces shall be removed in such a manner that color and/or texture contrast of the pavement surface will be held to a minimum.

Removal of pavement markings on concrete surfaces by blast cleaning shall be accomplished in accordance with Specification Item No. 875S, "Pavement Surface Preparation for Markings," except for measurement and payment. Blast cleaning shall be performed in such a manner that damage to the Portland cement concrete surface is held to a minimum.

When thermoplastic pavement markings or prefabricated pavement markings are encountered, the application of heat may be used to remove the bulk of the marking material prior to blast cleaning. When heat is used, care shall be taken to prevent spalling of Portland cement concrete surfaces.

A burner may be used for complete removal of pavement markings. Broom removal or light blast cleaning may be used for removal of minor residue.

Damage to asphaltic surfaces, such as spalling, shelling, etc., that is greater than ¼ inch (6 mm) in depth and is caused by the removal of pavement markers shall be repaired by the application of a 2 foot (600 mm) wide surface treatment for longitudinal markers with no directional change or a minimum of 1 lane width surface treatment in areas where directional changes of traffic are involved.

Grinding is not an acceptable method of marker or marking removal. However, equipment utilizing special milling flails is considered acceptable in the removal of markings and markers on asphalt and Portland cement concrete surfaces.

874S.4 Measurement

This Specification Item will be measured by the square yard (square meter: 1 square meter is equal to 1.196 square yards) of surface treatment, thin overlay or microsurfacing (full lane width) placed; by each word, symbol or shape eliminated; by the lineal foot (lineal meter: 1 lineal meter is equal to 3.281 lineal feet) of markings eliminated; or by any other unit as shown on the Drawings.

Payment for revised quantities will be paid for at the unit price bid for that bid item.

The elimination of pavement markers required in conjunction with the elimination of longitudinal markings will not be measured for payment.

874S.5 Payment

The work performed and materials furnished in accordance with this Specification Item and measured as provided under "Measurement" will be paid for at the unit bid price for "Eliminating Existing Pavement Markings and Markers" of the various types specified. This price shall include full compensation for blast cleaning, mechanical cleaning and/or other cleaning methods; for all materials, tools, equipment and incidentals necessary to complete the Work, except as specified below.

Elimination of pavement markers when pavement markers are to be removed in conjunction with the elimination of longitudinal markings shall be included in the unit price bid for the item of construction indicated on the drawings.

Payment will be made under one or more of the following:

Pay Item 874S-A:	Eliminating Existing Pavement Markings: ___ inches in width,	Per Lineal Foot.
Pay Item 874S-B:	Eliminating Existing Work Zone Pavement Markings: ___ inches in width,	Per Lineal Foot.
Pay Item 874S-C:	Eliminating Existing Reflectorized Thermoplastic Pavement Markings: ___ inches in width	Words Per Each.
Pay Item 874S-D:	Eliminating Existing Reflectorized Thermoplastic Pavement Markings: ___ inches in width	Shapes Per Each.
Pay Item 874S-E:	Eliminating Existing Reflectorized Thermoplastic Pavement Markings: ___inches in width	Symbols. Per Each.
Pay Item 874S-F:	Eliminating Existing Raised Pavement Markings, _____ Type,	Per Each.

END

SPECIFIC CROSS REFERENCE MATERIALS	
Specification Item No. 874S, "Eliminating Existing Pavement Markings And Markers"	
City of Austin Contract Documents	
Designation	Description
Section 00300U	Bid Form (Unit Prices)
City of Austin Standard Specifications	
Designation	Description
Item No. 301S	Asphalts, Oils and Emulsions
Item No. 302S	Aggregates for Surface Treatments
Item No. 320S	Two Course Surface Treatment
Item No. 875S	Pavement Surface Preparation For Markings

RELATED CROSS REFERENCE MATERIALS	
Specification Item No. 874S, "Eliminating Existing Pavement Markings And Markers"	
City of Austin Standard Specifications	
Designation	Description
Item No. 310S	Emulsified Asphalt Treatment
Item No. 311S	Emulsified Asphalt Repaving
Item No. 312S	Seal Coat
Item No. 313S	Cleaning and/or Sealing Joints and Cracks (Asphaltic Concrete)
Item No. 315S	Milling Asphaltic Concrete Paving
Item No. 340	Hot Mix Asphaltic Concrete Pavement
Item No. 341S	Paving Fabric
Item No. 350S	Heating, Scarifying and Repaving
Item No. 360	Concrete Pavement
Item No. 413S	Cleaning and/or Sealing Joints and Cracks (Portland Cement Concrete)
Item No. 801S	Construction Detours
Item No. 803S	Barricades, Signs and Traffic Handling
Item No. 860S	Pavement Marking Paint (Reflectorized)
Item No. 863S	Reflectorized Pavement Markers
Item No. 864S	Abbreviated Pavement Markings
Item No. 865S	Non-Reflectorized Traffic Buttons
Item No. 866S	Jiggle Bar Tile
Item No. 867S	Epoxy Adhesive
Item No. 870S	Work Zone Pavement Markings
Item No. 871S	Reflectorized Pavement Markers
Item No. 872S	Prefabricated Pavement Markings
Item No. 873S	Raised Pavement Markings
City of Austin Standard Details	

Designation	Description
863S-1	Pavement Buttons (Reflectorized-Type I & Type II)
865S-1	Traffic Buttons (Non-Reflectorized)
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item No. 302	Aggregates for Surface Treatments
Item No. 314	Emulsified Asphalt Treatment
Item No. 315	Emulsified Asphalt Seal
Item No. 316	Surface Treatments
Item No. 334	Hot Mix-Cold Laid Asphaltic Concrete Pavement
Item No. 340	Hot Mix Asphaltic Concrete Pavement
Item No. 342	Plant Mix Seal
Item No. 351	Repairing Existing Flexible Pavement Structure
Item No. 354	Planing and/or Texturing Pavement
Item No. 358	Asphaltic Concrete Surface Rehabilitation
Item No. 360	Concrete Pavement
Item No. 421	Hydraulic Cement Concrete
Item No. 427	Surface Finishes for Concrete
Item No. 428	Concrete Surface Treatment
Item No. 662	Work Zone Pavement Markings
Item No. 666	Reflectorized Pavement Markings
Item No. 667	Prefabricated Pavement Markings
Item No. 672	Raised Pavement Markers
Item No. 677	Eliminating Existing Pavement Markings and Markers
Item No. 678	Pavement Surface Preparation For Markings
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
Tex 729-I	Sampling of Traffic Markers
Tex-828-B	Determining Functional Characteristics of Pavement Markings
Tex-829-B	Method For Measuring Pavement Temperature
Tex-854-B	Evaluation Of Thermoplastic Striping For Uniformity And Thickness
Texas Department of Transportation: Departmental Materials Specification	
Designation	Description
DMS-4100	Jiggle Bar Tile
DMS-4200	Pavement Markers (Reflectorized)
DMS-4300	Traffic Buttons
DMS-4210	Pavement Markers
DMS-6130	Bituminous Adhesive
DMS-8200	Pavement Paint
DMS-8220	Thermoplastic marking material
DMS-8240	Prefabricated Marking Materials
DMS-8241	Removable Tape
DMS-8290	Pavement Paint

YPT-10 and/or WPT	Pavement Paint

SPECIAL PROVISIONS TO CITY STANDARD TECHNICAL SPECIFICATIONS

SPECIAL PROVISION To

Standard Specification Item No. 402
Controlled Low Strength Material

For this project Item 402, Controlled Low Strength Material, of the City of Austin Standard Technical Specifications dated 9/13/22 is hereby amended with respect to the clauses cited below. No other clauses or requirements of this Section of the City of Austin Standard Specifications are waived or changed.

402.9 Measurement and Payment

Revise Paragraph 1 as follows:

The work and materials presented herein will only be paid for in areas specified in the drawings. For work included under Pay Item SP402-2 reference Details 1 and 2 on Sheet 94. For work included under Pay Item SP402-3 reference Storm Drain Line I from Station 12+34.33 to Station 12+79.75 on Sheet 43. All other use of Controlled Low Strength Material (CLSM) shall be included in the unit price bid for the item of construction in which this item is used.

Add the following pay item:

Pay Item No. SP402-1: CLSM-Structural Backfill for CI-69,CI-70,CI-72, SI-02 and Concrete Retaining Walls Per Cubic Yard

Pay Item No. SP402-2: CLSM-Pipe Crossings Per Cubic Yard

Pay Item No. SP402-3: CLSM-Full Trench Backfill Per Cubic Yard

End

SP432S
Special Provision to COA Standard Specification Item No. 432S
PORTLAND CEMENT CONCRETE SIDEWALKS 1-4-10

For this project, Item 432S, "Portland Cement Concrete Sidewalks" of the City of Austin Standard Technical Specifications dated 01/04/10 is hereby amended with respect to the clauses cited below and no other clauses or requirements of this section of the City of Austin Technical Specifications are waived or changed.

432.1 Description

Amend by adding the following:

Bicycle Facility Pavement: Concrete pavement designated on the Drawings as a concrete cycle track.

Terra Cotta Colored Concrete: Integrally colored concrete used exclusively for bicycle facility pavement.

432.3 Materials

Amend by adding the following:

E. Terra Cotta Colored Concrete for Bicycle Facility Pavement

Where shown on the Drawings, bicycle facility pavement shall consist of integrally colored terra cotta concrete.

The terra cotta color treatment is intended solely for bicycle facility pavement and bicycle conflict areas identified on the Drawings.

Unless otherwise shown on the Drawings, terra cotta colored concrete shall not be used for any other concrete structures.

The Contractor shall submit manufacturer product data and color samples for approval prior to placement.

432S.2 – Submittals

Add the following submittal requirement of this specification item to include:

E. Concrete integral color for bikeway pavement in Terra Cotta Dark (Prism integral colors or equivalent).

432S.3 Materials

Revise Paragraph 1 as follows:

A. Portland Cement Concrete

Portland cement concrete shall be Class A conforming to Specification Item No. 403, "Concrete for Structures" or Specification Item No. 407S, "Fibrous Concrete." Include concrete integral color Terra Cotta Dark (Prism integral colors or equivalent).

432S.6 Payment

Add the following item:

Pay Item No. 432S-5-BIKE:	New P.C. Concrete Off-Street Bike Facility, 5 in Thickness (Color Integrated)	Per Square Foot.

End

SP433S
Special Provision to COA Standard Specification Item No. 433S
P.C. Concrete Driveways

For this project, Item 433S, “P.C. Concrete Driveways” of the City of Austin Standard Technical Specifications dated 12/09/08 is hereby amended with respect to the clauses cited below and no other clauses or requirements of this section of the City of Austin Technical Specifications are waived or changed.

433S.3 Materials

Revise Paragraph 1 as follows:

A. Concrete

The Portland Cement Concrete for a Type I driveway (Standards 433S-1 and 433S—A) shall conform to Class A, Section 403S.7 (Table 4) of Standard Specification Item No. 403S, "Concrete for Structures." The Portland Cement Concrete for a Type II driveway (Standard 433S-2) shall conform to a high early strength concrete mix design for concrete pavement, Section 360S.5(A) of Standard Specification Item No. 360S, "Concrete Pavement".

433S.6 Payment

Add the following item:

Pay Item No. 433S-CH:	Type II P.C. Concrete Driveway (High Early Strength)	Per Square Foot.

End

SP434S
Special Provision to COA Standard Specification Item No. 434S
P.C. CONCRETE MEDIANS AND ISLANDS 11-13-07

For this project, Item 434S, "P.C. Concrete Medians and Islands" of the City of Austin Standard Technical Specifications dated 11/13/07 is hereby amended with respect to the clauses cited below and no other clauses or requirements of this section of the City of Austin Technical Specifications are waived or changed.

432.1 Description

Amend by adding the following:

Mid-Block Island: Concrete median islands designated on the Drawings as a proposed pedestrian crossing island.

Decorative Stamped Concrete: Concrete that is imprinted, textured, and colored using approved stamping pattern methods.

432.3 Materials

Amend by adding the following:

G. Stamped Pattern

Where shown on the Drawings, pedestrian crossing island shall consist of stone cobble stamped pattern at 0.5" – 1" impression depth.

The stamped concrete pattern treatment is intended solely for pedestrian crossing islands as identified on the Drawings.

Unless otherwise shown on the Drawings, stamped concrete pattern treatment shall not be used for any other concrete structures.

The Contractor shall submit manufacturer product data and pattern treatment samples for approval prior to placement.

432S.2 – Submittals

Add the following submittal requirement of this specification item to include:

C. Concrete "Cut Stone Cobble" stamp pattern and impression depth.

432S.6 Payment

Add the following item:

Pay Item No. 434S-A:	DECORATIVE STAMPED CONCRETE MEDIANS AND ISLAND SURFACE	Per Square Foot.

End

Special Provision to
Standard Specification Item No. 506
Manholes

For this Project, Item No. 506 “Manholes”, of the City of Austin Standard Technical Specifications dated 02/22/21 is hereby amended with respect to the clauses cited below. No other clauses or requirements of this section of the City of Austin Standard Technical Specifications are waived or changed.

506.8 Payment

Add the following sentence after the first paragraph:

Payment for placement of concrete trench fill around manholes, when called for on the plans, shall be subsidiary to the installation of the manhole.

End

SPECIAL PROVISION TO
Standard Specification Item No. 510
Pipe

For this Project, Item No. 510 "Pipe", of the City of Austin Standard Technical Specifications dated 6/2/25 is hereby amended with respect to the clauses cited below. No other clauses or requirements of this section of the City of Austin Standard Technical Specifications are waived or changed.

510.2 Materials

510.2(8)(j), Materials, Pipe, Inductive Tracer Detection Tape: DELETE and REPLACE with the following:

(j) Tracer Detection Tape

Tracer Detection Tape shall be placed directly above the centerline of all potable water, reclaimed water, and wastewater pipe a minimum of 12 inches and no deeper than 36 inches below finished grade or, in areas outside the limits of pavement, a minimum of 18 inches and no deeper than 36 inches below finished grade in accordance with manufacturer's instructions. Under no circumstances shall tracer tape be placed closer than 12 inches to the top of the pipe. Manufacturers must be listed on SPL WW-597.

Add the following after the 12th section:

(10) Cellular Grout Backfill

The Contractor shall verify that the material is pumpable and that the Minimum Strength (PSI) of the material shall be 100-300 PSI @28 days. The material must be Aerix Industries Aerlite Low-Density Cellular Concrete product or approved equal.

510.3 Construction Methods

510.3(24)(a), Construction Methods, Potable or Reclaimed Water System Connections, Shutoffs: ADD the following as paragraph two:

If a shutout is required for a connection to or relocation of an existing water transmission main (typically 24-inch and larger in diameter for potable water), these shutouts will generally only be allowed from October 1 to March 31. Shutout of these waterlines will require prior approval via the AW Concurrence process prior to shutting off water. COA inspector shall contact AWValveExercising@austintexas.gov six or more weeks before desired schedule for the subject shutout. No shutout will proceed until the contractor is fully prepared to perform work related to the shutout, i.e., all required material, equipment, and labor are on site.

510.3(25)(d), Construction Methods, Backfilling, Backfill in Street Right-of-Way: DELETE and REPLACE first paragraph of section with the following:

Placement of backfill under existing or future pavement structures and within 2 feet of any structures shall be compacted to the specified density using any method, type and size of equipment, which will produce the specified compaction without damaging the pipe or bedding. Placement of backfill greater than 2 feet beyond structures in right-of-way shall conform to (g) below. Tracer Detection Tape shall be placed directly above the centerline of all potable water, reclaimed water, and wastewater pipe per 510.2(8)(j).

510.3(25)(g), Construction Methods, Backfilling, Backfill in Easements: DELETE and REPLACE last sentence of section with the following:

> Tracer Detection Tape shall be placed directly above the centerline of all potable water, reclaimed water, and wastewater pipe per 510.2(8)(j).

510.3(31), Construction Methods, AW Walk-Through: DELETE and REPLACE section with the following:

(31) AW Walk-Through

> As part of the acceptance of Water or Reclaimed Water pressure pipe, an AW Walk-Through will be performed after an initial inspection by the Owner's Representative to identify any deficient items. As part of the AW Walk-Through, AW will confirm the installation of tracer detection tape for projects that contain potable water, reclaimed water, or wastewater pipe. If deficient items are present during the AW Walk-Through and the project fails acceptance, a re-inspection fee will apply and must be paid before a re-inspection is scheduled to confirm correction of deficient items. See AW Fee Schedule for the current Distribution Walk-Through Re-inspection Fee.

Add the following after the 32nd section:

(33) Cellular Grout Backfill

> Ensure that cellular grout material's air entrainment does not collapse as it is pumped into the abandoned utility pipes.

510.5 Payment

Add the following after the first paragraph:

The labor, tools, equipment and incidentals necessary to complete the work of installing and removing temporary water bypass lines and appurtenances shall be subsidiary to the installation of the main water pipelines.

The labor, tool, equipment, and incidentals necessary to complete the work of filling existing abandoned storm drain lines with cellular grout per the Demolition Plan will be made at the unit bid price per linear foot.

The labor, tool, equipment, and incidentals necessary to complete the work of removing existing abandoned utility and storm drain lines per the Demolition Plan will be made at the unit bid price per linear foot.

Add the following pay items:

Pay Item SP510-CGB: Cellular Grout Backfill Per Linear Foot

Pay Item SP510-REM: Existing Utility and Storm Drain Pipe Removal Per Linear Foot

End

SPECIAL PROVISION To
Standard Specification Item No. 628S
Sediment Containment Dikes

For this project, Item 628S, Sediment Containment Dikes, of the City of Austin Standard Technical Specifications is hereby amended with respect to the clauses cited below. No other clauses or requirements of this section of the City of Austin Technical Specifications are waived or changed.

628S.1 Description

Add the following to the first paragraph:

Filter dike to follow active construction. Removing and re-setting filter dike is considered subsidiary to barricades and traffic handling.

628S.4 Construction Methods

Add the following after the first paragraph:

Install triangular sediment filter dike across full width of traffic closure and downstream of construction, perpendicular to curb and placed to effectively catch and contain sediment laden runoff from the excavated area. Filter dike is to follow active construction.

End

SPECIAL PROVISION TO
Standard Specification Item No. 702S
Removal and Relocation of Existing Fences

For this Project, Item No. 510 “Removal and Relocation of Existing Fences”, of the City of Austin Standard Technical Specifications dated 5/20/02 is hereby amended with respect to the clauses cited below. No other clauses or requirements of this section of the City of Austin Standard Technical Specifications are waived or changed.

702S.1 Description

Replace the first paragraph with the following:

This item shall govern the removal and replacement of existing fence, gates and hardware to the same alignment as existing conditions and in like kind design as indicated on the Drawings or as directed by the Engineer or designated representative.

702S.4 Construction Methods

Replace the first paragraph with the following:

The removed fence shall be installed at the same alignment as existing conditions and in like kind design as indicated on the Drawings and shall comply with Standard Specification Item No. 701S, "Fencing" and the best practice for fence construction of the specified type.

510.5 Payment

Add the following pay item:

Pay Item SP702S-I: Removing and Replacing Existing 4 FT. Wire Fence Per LF

End

SP870S
Special Provision to COA Standard Specification Item No. 870S
Work Zone Pavement Markings

For this project, Item 870S, “Work Zone Pavement Markings” of the City of Austin Standard Technical Specifications is hereby amended with respect to the clauses cited below and no other clauses or requirements of this section of the City of Austin Technical Specifications are waived or changed.

870S.5 Construction Methods

Add the following subsection after subsection C:

D. Covering of Existing Markings

The Contractor shall be responsible for covering all existing pavement markings with black work zone pavement markings when other work zone pavement markings will provide conflicting guidance from the existing markings.

End

SP871S
Special Provision to COA Standard Specification Item No. 871S
Reflectorized Pavement Markings

For this project, Item 871S, “Reflectorized Pavement Markings” of the City of Austin Standard Technical Specifications is hereby amended with respect to the clauses cited below and no other clauses or requirements of this section of the City of Austin Technical Specifications are waived or changed.

871S.1 Description

Amend by adding the following:

Dotted Pavement Marking. A dotted pavement marking shall consist of a longitudinal line, as specified in the Drawings, formed by a series of marking segments separated by gaps. Unless otherwise shown in the Drawings, each segment shall be 2 feet in length with a 4-foot gap between segments.

Broken Pavement Marking. A broken pavement marking shall consist of a longitudinal line, as specified in the Drawings, formed by a series of marking segments separated by gaps. Unless otherwise shown in the Drawings, each segment shall be 10 feet in length with a 30-foot gap between segments.

871S.2 Materials

Amend by adding the following:

D. Green Pavement Markings

As shown on the Drawings, provide reflectorized Type I pavement marking paint in GREEN color. Paint shall comply with Item 860S, “Pavement Marking Paint”, and be specifically manufactured for pavement marking applications.

Contractor shall submit the manufacturer's product data, color specifications, and certification that the material complies with Item 860S requirements.

The green color shall be a standard traffic marking green intended for bicycle facilities and conflict zone pavement markings and shall be uniform in color and appearance after installation.

871S.7 Payment

Add the following pay items:

Pay Item 871S-A-4WD:	Reflectorized Type I Thermoplastic Pavement Markings 4 inches in width, 90 mils in thickness WHITE in color (DOTTED)	per lineal foot.

Pay Item 871S-A-4YB:	Reflectorized Type I Thermoplastic Pavement Markings 4 inches in width, 90 mils in thickness YELLOW in color (BROKEN)	per lineal foot.
Pay Item 871S-A-4YS:	Reflectorized Type I Thermoplastic Pavement Markings 4 inches in width, 90 mils in thickness YELLOW in color (SOLID)	per lineal foot.
Pay Item 871A-24WS	Reflectorized Type I Thermoplastic Pavement Markings, 24 inches in width, 90 mils in thickness, WHITE in color (Solid)	per lineal foot.
Pay Item 871S-C-36G:	Reflectorized Type I Thermoplastic Pavement Markings 36 inches in width, 90 mils in thickness GREEN in color (SHAPE)	Shapes per each
Pay Item 871S-D-36W:	Reflectorized Type I Thermoplastic Pavement Markings 36 inches in width, 90 mils in thickness WHITE in color (SYMBOL)	Symbol per each

End

SPECIAL SPECIFICATIONS

SPECIAL SPECIFICATION
PRIVATE LATERAL RELOCATION

SS01025.1 Definitions

This item shall govern the following:

Collection Line means a wastewater line installed to transport wastewater to a treatment facility located within a public right-of-way or easement.

CONTRACTOR means an individual, firm, corporation, or other business entity with whom the OWNER has entered into the Contract (as defined in Section 700).

Improvements means any structure on Customer's Premises to which a Private Lateral will be connected.

OWNER means the City of Austin, Texas, a municipal corporation, home rule city and political subdivision organized and existing under the laws of the State of Texas, acting through the City Manager or his/her designee, officers, agents, or employees to administer design and construction of the Project (as defined in Section 700).

Premises means Customer's property on which a Private Lateral will be relocated.

Private Lateral means a wastewater line installed on private property that connects the Improvements on the Premises to the OWNER's Collection Line.

SS01025.2 References

A. 2021 Uniform Plumbing Code with City of Austin Amendments

B. City of Austin Code Website:

https://www.austintexas.gov/department/building-technical-codes

C. City of Austin Standard Details Website:

https://library.municode.com/TX/Austin/codes/standards_manual

D. City of Austin Standard Specification "510 Pipe"

SS01025.3 Description

This item shall govern the following:

A. All coordination as described in Section SS1025.4.

B. Locating the existing Private Lateral and cleanouts on the premises between the improvement and the property line and obtaining all necessary elevation information from this line to develop a new wastewater Private Lateral design.

C. Designing, permitting, furnishing, installing and testing a new wastewater Private Lateral on private property with all necessary fittings and cleanouts between the existing improvements and the new Private Lateral cleanout at the property line of the premises. The plumber must

be licensed by the State of Texas and registered with the City of Austin. All work on private property must meet the City of Austin Plumbing Code.

D. Notifying the property owner of the proposed wastewater Private Lateral design and obtaining the property owner's concurrence at least five (5) working days prior to submitting the design to the City of Austin for approval.

E. Obtaining approval for the new wastewater Private Lateral design from an authorized City of Austin Building/Plumbing Inspector.

F. Disconnecting all improvements from the existing Private Lateral and immediately reconnecting these improvements to the new Private Lateral and collection system.

G. Proper abandonment of the existing Private Lateral after the new Private Lateral is in service. Abandonment shall be considered to be, at a minimum, flushing, cutting and plugging of the existing lateral, per City of Austin standards, up to and including the building cleanout.

H. All required submittals as described in Section SS1025.5.

SS01025.4 Coordination

The CONTRACTOR shall be responsible for the following:

A. Coordinating all permit and inspection requirements between the plumber(s) and the City of Austin Building/Plumbing Inspection Division and the Austin Water.

B. Coordinating all work between the CONTRACTOR, subcontractors performing wastewater improvements for this project within City of Austin Right-of-Way or Easement Areas and the licensed plumber(s) performing wastewater Private Lateral relocation work on private property.

C. Coordinating all work between the plumber(s) and property owner(s) and providing the property owner with appropriate notice and information about the Private Lateral work. CONTRACTOR shall provide written notice to each property owner at least 30 working days prior to work affecting the Private Lateral. CONTRACTOR shall submit to the property owner a proposed design for each residence connected under the Contract. EACH SKETCH SHALL BE SUBMITTED TO THE OWNER FIVE (5) WORKING DAYS PRIOR TO PERMITTING THE DESIGN AND BEGINNING CONSTRUCTION ON THE PREMISES.

D. Coordinating all work between the plumber(s), OWNER's Construction Inspector and OWNER's Building/Plumbing Inspector. All work performed on private property must be done in the presence of the OWNER's Construction Inspector or OWNER's Building/Plumbing Inspector.

SS01025.5 Submittals

The CONTRACTOR shall be responsible for the following submittals in accordance with Section 1300:

A. Plumber(s) License and Registration:

1. Ten (10) copies each of both the plumber's license from the State of Texas and registration with the City of Austin. The license and registration must be current, active and in good standing. This is required for each plumber.

B. Photographs and Videotape:

1. Two (2) copies of all photographs and videotapes required under Section SS1025.6 will be submitted to the OWNER's REPRESENTATIVE in accordance with the submittal process.

C. Private Lateral Plumbing Design:

1. Ten (10) copies of the letter notifying the property owner of the proposed Private Lateral plumbing design shall be submitted to the OWNER's REPRESENTATIVE in accordance with the submittal process prior to beginning any construction on the premises.

2. Ten (10) copies of all plumbing design approved and permitted by the City of Austin shall be submitted to the OWNER's REPRESENTATIVE in accordance with the submittal process prior to beginning any construction on the premises.

D. Building/Plumbing Permit:

1. Ten (10) copies of all building/plumbing permits from the City of Austin shall be submitted to the OWNER's REPRESENTATIVE in accordance with the submittal process prior to beginning any construction on the premises.

E. Property Owner Notification:

1. Ten (10) copies of all notification letters sent to the property owner as required in Section SS1025.4.

F. As-built with Certification Letter:

1. Ten (10) copies of all as-builts with certification letters for all approved Private Lateral plumbing work shall be submitted to the OWNER's REPRESENTATIVE in accordance with the submittal process prior to application for payment for any construction on any private premises. The certification letter must state that all work was performed by a licensed plumber, meets City of Austin Plumbing Code and was inspected and approved by a City of Austin Building/Plumbing Inspector. The Inspection Approval Letter shall be attached. The certification letter must be certified by the licensed plumber. PAYMENT FOR A COMPLETELY CONNECTED RESIDENCE SHALL NOT BE MADE UNTIL AN AS-BUILT SKETCH WITH CERTIFICATION LETTER FOR THAT RESIDENCE HAS BEEN SUBMITTED. Such sketches may be red-lines of the permitted Private Lateral Plumbing Design. The as-built sketches shall, at a minimum, identify all installed lengths of pipe, cleanout locations, points of intersections (PIs), fittings, adapters, concrete supports, distances from permanent structures such as house slabs, pools, sheds, etc. and any other information that may assist the home owner in identifying the Private Lateral location at a later date. The CONTRACTOR shall review each as-built sketch with the OWNER's Construction Inspector and OWNER's Building/Plumbing Inspector prior to submitting to the OWNER's REPRESENTATIVE. Upon acceptance, the OWNER's Construction Inspector shall provide each property owner with a copy of the as-built with certification letter.

SS01025.6 Photographs and Videotape

A. Prior to initiating any construction at a residence, CONTRACTOR shall document pre-construction conditions of each residence by use of a digital camera. A minimum of five digital exposures of each residence shall be taken, or otherwise an adequate number, to fully document all landscaping, residential features and existing conditions along the entire connection alignment of each residence that may be affected during construction. Two (2) copies of all such documentation shall be provided in electronic format, in accordance with

Section 01380 (Construction Photographs), to the OWNER's REPRESENTATIVE prior to initiating any construction at a residence.

B. A video of each property showing the proposed Private Lateral alignment shall be taken prior to beginning any construction on private property. Two (2) copies of the all such documentation shall be provided to the OWNER's REPRESENTATIVE prior to initiating any construction at a residence. An additional video shall be taken along the same route following completion of the fieldwork, but prior to final acceptance of project. Both the initial and final videos shall show details of all objects within and in close proximity of the construction work area, with particular attention to landscaping, trees, plants, shrubs, sidewalks, pavement and other surface features. Videos shall also be taken of all staging and storage areas used on the premises. Two (2) copies of the all such documentation shall be provided to the OWNER's REPRESENTATIVE prior to final acceptance of project.

SS01025.7 CONTRACTOR Responsibilities

A. All building/plumbing permits as described in Section 00810 of the Contract Documents.

B. The CONTRACTOR shall perform all work within public rights-of-way and easement areas. The CONTRACTOR shall be responsible for the collection lines and Private Lateral between the collection line and the property line, including all fittings and the cleanout at the property line.

C. The CONTRACTOR shall have a licensed plumber design and perform all work on private property between the new cleanout at the property line and the improvements on the premises. This work shall include supplying and installing all necessary fittings, bends, adapters and concrete supports. The plumber must be licensed by the State of Texas and registered with the OWNER.

D. All work on private property must meet the current City of Austin Plumbing Code.

E. All work shall be inspected and approved by the OWNER's Wastewater Plumbing/Building Inspector. A new Private Lateral shall not be used until this Plumbing/Building Inspector grants approval in writing. The CONTRACTOR shall coordinate all required inspections.

F. No Private Lateral shall be relocated or connected to a new collection line until the OWNER's Construction Inspector has approved the new collection line for use.

G. No segment of an existing collection line shall be abandoned until after all Private Laterals connected to this segment of the existing collection line are relocated and connected into the new collection line, all relocated Private laterals have been approved by the OWNER's Plumbing/Building Inspector, and all relocated Private laterals are fully active on the new collection line. CONTRACTOR shall verify that the existing line to be abandoned is also not in use from upstream of the segment by verifying that no flows exist at the manholes of this segment. "No flow" verification must be supervised by the OWNER's Construction Inspector and shall be performed during dry weather. Dry weather is defined as no measurable rainfall occurring in past 24 hours.

SS01025.8 Private Lateral Requirements

A. Plumber shall tie into existing plumbing with a new cleanout at a point not more than four feet outside the building improvement footprint. The building cleanout shall be at a four-inch (4") two-way tee (minimum). For larger Private laterals, the building cleanout shall not be smaller than the Private lateral size.

B. All Work under this Contract must comply with the City of Austin Plumbing Code as referenced in Section SS1025SS.2, all applicable rules, codes and regulations of the Texas Commission on Environmental Quality (TCEQ) for wastewater service connections and all applicable rules, codes and regulations of the Texas Department of Health and the Travis County Health Department for septic tank cleanings and closures. Formal certifications letters that line installations, Private Lateral connections and Private lateral abandonment were completed in compliance with the City of Austin Plumbing Code and all applicable rules, codes and regulations, shall be submitted for each residence so connected under the Contract as required in Section SS1025.5(F)

C. Each new private lateral must pass the Low-Pressure Air Test of Plastic Gravity Flow Wastewater Lines, as described in COA Standard Specification 510.3.26 (e).

D. Restoration shall be an on-going process during construction operations and shall immediately follow completion of construction for each residence.

SS01025.9 Maintaining Wastewater Service to Residents

A. CONTRACTOR shall ensure that no improvement is without wastewater service at any time except for the minimum time required to make the formal reconnection from the existing Private lateral to the new Private lateral. During the reconnection of the existing Private lateral to the new Private lateral, the CONTRACTOR shall specifically coordinate with the property owner and tenant(s), and OWNER's Construction Inspector to minimize any inconveniences to the resident(s) and, to the full extent possible, limit the length of time the residence is out of wastewater service to no more than two to three hours. Upon completion of the connection, the CONTRACTOR shall immediately notify the property owner and resident(s) that wastewater service has been restored.

SS01025.10 Right of Entry Agreement

The OWNER will be responsible for obtaining a Right of Entry Agreement from each property owner. The Right of Entry Agreement authorizes the CONTRACTOR to relocate the Private Lateral on the premises. A copy of the Right of Entry documents will be provided to the CONTRACTOR.

SS01025.11 Measurement and Payment

Private Lateral Relocations are identified as either Type A or Type B relocation. Type A relocations have existing clean-outs and outfalls located on the back side of the property that are being re-routed to the adjacent street/front of home. Type B relocations are located at the adjacent street but are being relocated from the existing location. Private Lateral Relocation Type A and Type B, when so called for in the design or specifications, will be paid for at the unit bid price, per EACH address; for the size, type and class specified in the 1997 Uniform Building Code, as adopted and amended by ordinance for the City of Austin, complete and in place.

Private Lateral Relocation Type A Addresses are as follows:

- NONE

Private Lateral Relocation Type B Addresses are as follows:

- 3201 MERRIE LYNN AVE •

The bid price shall include excavation, pavement and sidewalk removal, dewatering, pipe, fittings, cleanouts, encasement pipe, bedding material, traffic control, disposal of surplus material, laying of pipe, backfilling, compaction of backfill, pressure testing, abandonment of existing Private lateral, pavement and sidewalk replacement, landscape restoration, tree restoration, fence replacement, or other existing condition impacted restored to existing, cleanup, and one year warranty.

For private lateral relocations requiring cutting through asphalt pavement, CONTRACTOR shall seal coat the asphalt pavement upon completion of work. For private lateral relocations requiring cutting into concrete pavement, CONTRACTOR shall remove and replace damaged panels. CONTRACTOR shall utilize materials complying with the Specifications listed within the Contract Documents. All costs for cutting, removing and replacing of pavement, including seal coat and reinforcement bars, shall be included in the bid price.

PAYMENT FOR A COMPLETELY CONNECTED RESIDENCE SHALL NOT BE MADE UNTIL AN AS-BUILT SKETCH WITH CERTIFICATION LETTER FOR THAT RESIDENCE HAS BEEN SUBMITTED AS DESCRIBED IN SECTION SS1025.5(F). FINAL PAYMENT SHALL NOT BE MADE UNTIL THE CONTRACTOR SUBMITTING PROOF THAT ALL PERMITS FOR THE PRIVATE LATERAL RELOCATION WORKS HAVE BEEN CLOSED.

Payment will be made under the following bid items for Private Lateral relocation, Type A or Type B complete in place per each address.

Pay Item No. SS01025-A: Private Lateral Relocation – Type A. **Per EA**

Pay Item No. SS01025-B: Private Lateral Relocation – Type B. **Per EA**

End

SS1540.1 Description

A. This special specification governs by-pass pumping for the flow of wastewater around the section or sections of pipe designated for rehabilitation including active services.

B. The work covered by this speciation consists of furnishing all labor, supervision, tools, equipment, appliances, and materials to perform all operations in connection with pumping of wastewater and wet weather flows around pipe section(s). The purpose of by-pass pumping is to prevent wastewater overflows and provide reliable sewer service at all times. The Contractor shall maintain sewage flow in the construction area in order to prevent back-up and/or overflow into upstream pipe segments and laterals, adjacent ditches, storm sewers, and waterways.

SS1540.2 Definitions

A. By-pass pumping is the installation and operation of bulkheads, plugs, hoses, piping, and pumps to maintain wastewater flow and prevent backup and overflow.

B. By-pass pumping provides continuous wastewater service to the users while maintenance or construction operations are in progress by diverting flow when necessary around the construction location and pumping it to a downstream manhole.

SS1540.3 Contractor's Responsibility

A. It is the sole responsibility of the CONTRACTOR to locate and identify all existing sewer lines and services and to provide any and all labor, material, equipment, techniques and methods to bypass pump as necessary for his construction methods and to monitor the effectiveness of this installed system and its effect on adjacent facilities.

B. Operate, maintain and modify the system(s) as required to conform to this specification. Upon completion of the Construction, CONTRACTOR shall remove the system(s).

C. Assume sole responsibility for bypass pumping systems and for all loss or damage resulting from partial or complete failure of protective measures and any spills or resultant damage caused by his operation.

SS1540.4 Materials

A. The pump and by-pass pumping lines shall be of adequate capacity and size to handle peak wet weather flows as shown on the drawings. All piping, joints, and accessories shall be designed to withstand at least twice the maximum system pressure, or a minimum of 50 psi, whichever is greater.

B. Internal and or external by-pass pumping operations shall use 100% leak proof pipe such as PVC (Yelomine) or HDPE. Pipe shall be restrained as necessary to prevent joint separation.

C. Pumps shall be self-priming or submersible electric, in good working order, with a working pressure gauge on the discharge. A back-up pump of the same capacity as the primary pump shall be maintained on site at all times to be used in the event that the primary pump fails. No wastewater shall be allowed to drain or stand in earthen sump pits.

D. Pumping between the hours 9:00 p.m. to 8:00 a.m. shall use sound attenuated pumps as the primary pumps. The back-up pump does not have to be sound attenuated and may be used as the primary pump between the hours of 8:00 a.m. and 9:00 p.m. Sound attenuated pumps shall reduce noise generated by the equipment to a maximum of 70 dBA when measured 30 feet from the pump.

E. Any wastewater back-ups and/or overflows as the result of inadequate equipment are the responsibility of the Contractor.

F. The Contractor shall be required to have all materials, equipment, and labor necessary to complete the pipe rehabilitation work on the job site prior to isolating the wastewater manhole or line segment and beginning by-pass pumping operations.

SS1540.5 Submittals

A. Submittals: Comply with Item 01300 “Submittals.”

B. The normal practice will be to setup by-pass pumping at the beginning of each work day and pump around to allow for the day’s wastewater construction activities. However, continuous by-pass pumping for longer than one day may be necessary, depending on the Contractor’s means and methods. With normal practice, the preferred suction point will be at a manhole upstream of the relay section. In some cases, the suction location may be the existing pipe in the trench. Discharge of bypass must be into a manhole (discharge into a cleanout is not acceptable). At the end of the work day, the new and existing pipe will be reconnected to allow gravity flow until the next work day. Access to driveways must be coordinated with residences / businesses and maintained during by-pass pumping.

C. The Contractor shall provide a written description and plan/sketch for implementation and sequencing of by-pass pumping for review and approval of the Owner prior to installation of the by-pass system. The plan shall include sufficient detail to show the location, number and size of pumps, the number, location, size and type of hoses and/or rigid piping, and the location of the downstream discharge. Show any special features where pipes or hoses cross roadways, such as temporary trenches, support bridges, etc. A plan for each line segment(s) around which flows are being by-passed is required. The plan shall include but not be limited to details of the following:

(a) Project information including the project name, location, and permit number (from plan cover sheet).

(b) Contact information for general contractor/submitting entity shall include the company name, contact person (24hrs/day), phone number(s), and fax number.

(c) Staging areas for pumps including a schematic showing the arrangement and layout of the pumping and bypassing facilities at various stages in the work.

(d) Sewer plugging method and types of plugs.

(e) Calculations for selection of bypass pump and pipe size(s) based on wastewater flows.

(f) Length, size, material, location and method of installation of suction piping.

(g) Length, size, material, location, method of installation and location of discharge piping.

(h) Pump manufacturer model and pump curve.

(i) Calculations of static lift, friction losses, and flow velocity, (pump curves showing pump operating range shall be submitted).

(j) Downstream discharge plan.

(k) Method of protecting discharge manholes or structures from erosion, damage, and unauthorized entry.

(l) Method of noise control for each pump and expected decibel levels.

(m) Any temporary pipe supports and anchoring, if required.

SS1540.6 Construction Methods

A. Maintain sewage flow to prevent backup of sewage in the collection system with the goal of preventing an overflow onto streets, yards and unpaved areas or into buildings, adjacent ditches,

storm sewers, and waterways. Do not divert sewage outside of the sanitary sewer system. The Contractor shall take all necessary steps to prevent flooding of public or private property. Maintaining flow inside the existing pipe during rehabilitation operations is preferred.

B. Any time the by-pass pump(s) are operating, an experienced operator shall be on site to monitor the operation: adjust pump speed, valves, etc.; maintain and make minor repairs to the system; and report problems.

C. Where work requires by-passing beyond working hours, the Contractor shall operate by-pass pumping and man the system for twenty-four (24) hours per day.

D. Contractor shall ensure that no damage will be caused to private property as a result of by-pass pumping operations. Access to adjacent properties shall be maintained at all times including driveways. Ramps, steel plates, or other methods shall be employed by the Contractor to facilitate traffic over surface piping and hose. High traffic commercial properties may require alternate methods to maintain access.

E. Contractor shall complete the Work as quickly as possible and satisfactorily pass all tests, inspections, and repair all deficiencies prior to discontinuing by-pass pumping operations and returning flow to the sewer manhole or line segment.

F. During by-pass pumping, do not allow sewage to be leaked, dumped, or spilled in or onto any area outside of the existing sanitary sewer system.

G. In the event of accidental spill or overflow, immediately stop the discharge and take action to clean up and disinfect the spill. Promptly notify the Owner so that required reporting can be made to the Texas Commission on Environmental Quality (TCEQ) by the Owner.

H. In the event of accidental spill or overflow, the Contractor is responsible for any damages that may have occurred to public or private property including cleaning, disinfection, and other corrections to the satisfaction of the E/A at no cost to the Owner.

I. Contractor shall not intentionally damage, alter, or remove portions of the existing sewer system structures for the purpose of installing a by-pass pumping system without specific approval from the E/A or Inspector. If a structure is damaged, it shall be reconstructed or replaced to the satisfaction of the E/A at no additional cost to the Owner.

J. The Contractor shall be responsible for any and all damage that results directly or indirectly from the interference of storm water runoff to by-passing equipment, piping, and/or appurtenances.

K. When by-pass pumping operations are complete, piping shall be drained into the sanitary sewer prior to disassembly, and all pumps and lines shall be flushed with clean water until all discharge is clear.

SS1540.7 Scheduling

A. The Contractor shall report any by-pass pumping activities not included in the submitted plan to the Engineer prior to proceeding with these activities.

B. The Contractor shall cease by-pass pumping operations when directed by the Engineer.

C. The Contractor shall perform leakage and pressure tests of the bypass pumping discharge piping using clean water prior to actual operation. The Engineer will be given a 24 hour notice prior to testing.

SS1540.8 Measurement

A. Unless included as a separate pay item in the contract documents, no separate payment will be made for installation, operation and maintenance of by-pass pumping system for wastewater lines 6”, 8”, 10” and 12”. This also applied to any lateral service work. The costs for by-pass pumping are considered as subsidiary to the installation or replacement of wastewater line relay, spot repair and lateral service work as indicated in the related contract specifications.

B. When included as a contract pay item, measurement for by-pass pumping shall be on per calendar day basis. Bypass pumping set-up and operation for 15” and larger wastewater line will be a contract pay item. The Contractor will not be paid for bypass pumping when pumps are not in operation.

SS1540.9 Payment

A. The work performed and materials furnished as prescribed by this item and measured as provided under "Measurement" will be paid at the unit prices bid, when included as a contract pay item. Unit prices shall be full compensation for furnishing all labor, equipment, time, materials and incidentals necessary to complete the work.

END

SS4150
Special Specification Item No. SS4150
Contaminated Soil and Water

PART 1 GENERAL

1.01 SCOPE

A. This specification covers the excavation, handling, loading, temporary storage, transportation and disposal of contaminated soils and water encountered during the installation of the planned storm drain, utilities, and roadway improvements located along Manor Road, Alexander Avenue, Curtis Avenue, Larry Lane, Merrie Lynn Avenue, and Randolph Road. An environmental assessment (included as an attachment to this specification) of the area indicated that contaminated soils and groundwater may be present at depths less than the proposed depth of the excavation. Based on this assessment, if the CONTRACTOR encounters, during excavation and/or earth moving for the work, soil or groundwater that is contaminated, discolored, has a noticeable odor or is otherwise out of the ordinary, the CONTRACTOR shall immediately notify the OWNER and follow the procedures set forth in this Section.

1.02 REGULATORY REQUIREMENTS

A. Work covered under this specification shall be performed in accordance with all applicable local, state, and federal regulations, statues, codes, rules, ordinances and policies. In the event of a conflict, the more stringent standards shall apply. Applicable regulations and laws include, but are not limited to:

- *Code of Federal Regulations, Title 29, Part 1910.120 Hazardous Waste Operations and Emergency Response* (29 CFR § 1910.120). U.S. Government Printing Office, Washington, DC.
- RG-022 – Texas Natural Resource Conservation Commission. *Classifying and Coding of Industrial and Hazardous Waste*. Austin, TX.
- SW-846 - U.S. Environmental Protection Agency. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Vol. I*. Washington, DC.
- *Texas Administrative Code, Title 30, Chapter 335* (30 TAC § 335). Office of the Secretary of State, Austin, TX.
- *Texas Administrative Code, Title 30, Chapter 350* (37 TAC § 350). Office of the Secretary of State, Austin, TX.
- *Texas Administrative Code, Title 37, Chapter 16* (37 TAC § 16). Office of the Secretary of State, Austin, TX.
- *Austin City Code, Volume 1, Title IV § 4-1-82*
- *Austin City Code, Volume 1, Title XVIII § 18-2-003*

1.03 HEALTH AND SAFETY

A. The CONTRACTOR shall be responsible for developing, implementing, and maintaining a health and safety program for their personnel including subcontractors. Prior to commencement of work, the CONTRACTOR shall submit a site-specific Health and Safety Plan (HASP) to the OWNER for review. *The HASP shall be prepared and signed by a certified safety professional (CSP) or a certified industrial hygienist (CIH).* The resume of the CSP or CIH shall be submitted as an attachment to the HASP and shall document their qualifications and applicable experience. In addition to the health and safety requirements as described in the sewer construction specifications, the HASP shall address exposure of workers to contaminated soil and groundwater, temporary storage, transportation and disposal of contaminated materials. The HASP shall be prepared in accordance with the requirements of 29 CFR 1910.120 and shall contain, at minimum, the following sections:

- Project Description
- Site Description
- Summary of Field Activities
- Listing of Field Staff including Project Manager, On-site Manager, and Health and Safety Officer
- Emergency Contact Information
- Site Control Measures
- Identification of Environmental Hazards
- Protective Equipment
- Exposure Limits for Chemicals of Concern
- Monitoring Requirements and Action Levels
- Decontamination Procedures
- Disposal Procedures
- Employee Training Records
- *Resume of CSP or CIH*

1.04 RECORD KEEPING

A. When performing work within the scope of this specification, the CONTRACTOR shall be responsible for maintaining a Project record on-site that includes:

1. A copy of the CONTRACTOR's HASP;
2. A daily sign in sheet including the signatures of all personnel, regardless of affiliation, who enter the site acknowledging that they;
    i. Have read and understood the CONTRACTOR'S Site Specific HASP;
    ii. Meet the training requirements described in the CONTRACTOR HASP; and
    iii. Have been made aware of potential site hazards including environmental hazards.
3. A copy of all waste manifests or load tickets generated during the transport of contaminated soils or water in accordance with Section 3.07 of this Specification.

4. A copy of all waste manifests or scale tickets generated during the disposal of contaminated soils or water in accordance with Section 3.08 of this Specification.

PART 2 PRODUCTS

2.01 PLASTIC SHEETING

A. The CONTRACTOR shall use plastic sheeting at least 6 mil thick for lining of all trucks, transport vehicles, soil stockpiles, and roll-off boxes.

B. Plastic sheeting shall be used and or applied in a manner to prevent migration of soils and contaminants from soils. Soil stockpiles must be placed on, and covered by, plastic sheeting. Under no circumstances will leakage of fluids from soil stockpiles, roll-off boxes or transport trucks be allowed.

PART 3 EXECUTION

3.01 EXCAVATION

A. During excavation of soils as required by the work, the CONTRACTOR shall place all excavated soils into soil stockpiles or lined roll-off containers in the designated staging area. For areas beyond the originally identified location, the CONTRACTOR shall notify the OWNER if soil or groundwater is encountered that is contaminated, discolored, has a noticeable odor or is otherwise out of the ordinary. This notification shall be made immediately upon encountering contaminated soil and groundwater beyond the limits initially identified.

B. If the excavation fills with water such that the CONTRACTOR cannot perform construction activities in accordance with the construction specifications, the OWNER shall determine, if the water is potentially contaminated in accordance with Section 3.03 of this specification. The CONTRACTOR shall collect water that is found to be potentially contaminated in a clean temporary storage tank.

3.02 MONITORING

A. During excavation activities, the CONTRACTOR shall be responsible for monitoring the excavation for potentially hazardous vapor concentrations and preventing exposure of workers to contaminated media in accordance with their health and safety plan.

B. If contaminated soils or groundwater, (soil or groundwater that is discolored, has a noticeable odor or is otherwise out of the ordinary) are encountered in areas beyond the originally identified location, CONTRACTOR shall immediately notify the OWNER or OWNER'S REPRESENTATIVE, who will screen excavated soils. The CONTRACTOR shall abide by the directions of the OWNER'S REPRESENTATIVE and shall provide the OWNER'S REPRESENTATIVE the opportunity to screen soils in accordance with the following procedure:

1. The OWNER'S REPRESENTATIVE will screen excavated soil with a photoionization detector (PID). If OWNER or OWNER's REPRESENTATIVE determines that readings are above pre-determined action levels, the CONTRACTOR shall stage soils in soil stockpiles or roll-offs separate from other fill materials.
2. If the OWNER'S REPRESENTATIVE determines that soils are contaminated by visual inspection or odor, the CONTRACTOR shall

stage soils in soil stockpiles or roll-offs separate from the other fill materials.

3.03 COLLECTION OF SAMPLES

A. The OWNER or OWNER'S REPRESENTATIVE will collect soil samples from stockpiled soil that is suspected to be contaminated, confirmation samples from clean soil stockpiles, and samples of potentially contaminated groundwater based on the procedures defined in Section 3.02 of this specification. The OWNER shall pay for any testing undertaken for soil that is suspected of contamination due to existing conditions. The OWNER or OWNER'S REPRESENTATIVE will perform waste characterization (testing) of the soil and water, and the CONTRACTOR shall abide by the waste characterization decisions of the OWNER. Depending on the type of contamination discovered, testing duration may be up to three (3) weeks. Testing may need to be conducted on an ongoing basis as additional contaminated soil is discovered. Soils that are thought to be contaminated must remain in the staging area and protected from rainfall and contact by the CONTRACTOR until the OWNER determines how the soil is to be disposed in accordance with Section 3.07 of this Specification.

3.04 TEMPORARY STORAGE

A. Soils that are determined by the OWNER or OWNER'S REPRESENTATIVE to be potentially contaminated by shall be staged in soil stockpiles or roll-off containers separately from soils that are to be used as fill. Soil stockpiles shall be placed on, and covered by, plastic sheeting. Roll-off containers shall be covered to prevent accumulation of water in the container. The roll-off containers shall be located so that they do not block surface drainage pathways, or prevent access to storm sewer inlets or manholes. The CONTRACTOR must ensure that roll-off containers and soil stockpiles are completely sealed and covered. The CONTRACTOR will be responsible for replacing or repairing any roll-off box found to be leaking or in poor condition.

B. Water that is determined by the OWNER or OWNER'S REPRESENTATIVE to be contaminated shall be collected as required to allow work. Such water shall be collected and temporarily stored in clean, sealed tank(s) by CONTRACTOR. The CONTRACTOR shall place tank(s) such that they do not block surface drainage pathways, storm sewer inlets or manholes. The CONTRACTOR shall be responsible for repairing or replacing any tanks that are found to be leaking or in poor condition.

C. During storage, contaminated soil and groundwater containers shall be placed within designated or approved areas. The limits of these areas shall be indicated via barricades, flagging, and/or fencing and access to storage areas shall be restricted.

3.05 CLASSIFICATION OF SOILS AND WATER

A. The OWNER or OWNER's REPRESENTATIVE will determine the waste classification of soils and groundwater for the purpose of proper disposal.

B. Confirmation samples collected from clean soil must have Total Petroleum Hydrocarbon (TPH) concentrations, as measured by Method TX 1005, less than 60

mg/kg per Texas Risk Reduction Program Tier 1 Protective Concentration Levels. Soils with TPH concentrations greater than 60 mg/kg but less than 1500 mg/kg are classified as Class 2 industrial non-hazardous waste and must be disposed in accordance with Section 3.07 at a permitted Class 2 industrial waste landfill.

C. Soils with TPH concentration greater than or equal to 1500 mg/kg are classified as Class I industrial non-hazardous wastes and must be disposed at a permitted Class I landfill.

D. Groundwater with TPH concentrations less than 0.73 mg/L is unregulated and can be disposed of by the contractor in accordance with city stormwater disposal regulations. Groundwater with TPH concentrations greater than 0.73 mg/L but less than 1500 mg/l TPH concentration is classified as Class 2 industrial, non-hazardous waste. Groundwater with TPH concentration greater than or equal to 1500 mg/l must be classified as Class I industrial non-hazardous waste.

3.06 TRANSPORTATION

A. The CONTRACTOR shall perform transport operations in a manner that precludes the spread of contamination. The CONTRACTOR shall remediate waste spillage in transport in accordance with applicable requirements of 30 TAC 335.93, 330.34, and other applicable Federal, State, and local regulations at no additional cost to the OWNER.

Open waste transport vehicles shall be covered by the CONTRACTOR prior to leaving the project site. Covers shall be constructed from water-resistant material with sufficient strength to withstand wind loads during transit. Covers shall effectively prevent release of dust from the transport vehicle. Covers shall have tie-downs or other restraint mechanisms necessary to securely fasten them to the transport vehicle.

Waste transport vehicles shall not leave the project site until the OWNER or OWNER'S REPRESENTATIVE signs the waste manifest as generator of the waste. The CONTRACTOR shall not sign any waste manifest or shipping papers as generator. Payment will not be made for any waste shipment that leaves the site without signatory approval of OWNER or OWNER's REPRESENTATIVE.

The CONTRACTOR shall line all trucks transporting potentially contaminated or known contaminated soils with plastic liner as described in Section 2.01 of this specification. The liner shall be secured in such a manner as to prevent the leaking of liquid materials from the truck bed. The CONTRACTOR shall be responsible for ensuring that trucks leaving the site are NOT leaking liquid materials, and shall be responsible for sealing or re-lining any trucks that are leaking liquids. The CONTRACTOR shall also be responsible for clean-up of any releases.

B. The CONTRACTOR shall retain a copy of all waste manifests and load tickets for each waste shipment prior to off-site transportation, for record purposes. The CONTRACTOR shall submit a copy of all waste manifests and load tickets to the OWNER within THREE (3) business days of transport. The CONTRACTOR shall notify the OWNER whenever a waste shipment does not arrive at the approved disposal site in a timely manner.

The CONTRACTOR will inspect vehicles before they enter or exit the Project site to verify compliance with decontamination criteria provided in Part A of this Section. The CONTRACTOR shall be responsible to remedy deficiencies identified by OWNER or OWNER REPRESENTATIVES.

C. All transport vehicles shall be properly licensed, labeled and placarded in a manner consistent with TCEQ and DOT regulations for material being transported.

3.07 DISPOSAL

A. The CONTRACTOR shall submit contact information for off-site hazardous and non-hazardous waste transfer, storage, processing, and disposal facilities prior to the commencement of work to the OWNER for approval. The OWNER or appointed representative must review and approve of all off-site disposal facilities prior to commencement of work. In the event that the CONTRACTOR does not receive approval from the OWNER or the appointed representatives for the selected off-site disposal facility prior to starting work, the CONTRACTOR will be responsible for all costs incurred in identifying an alternative off-site disposal facility and the cost of staging any contaminated material until a facility acceptable to the OWNER is identified.

B. The CONTRACTOR shall retain a copy of all waste manifests, certificates of disposal, and load or weight tickets from disposal facility on-site for the duration of the project and submit copies of the waste manifests, certificates of disposal, and load or weight tickets with the corresponding Application for Progress Payment.

3.08 DECONTAMINATION

A. The CONTRACTOR shall be responsible for preventing the spread of contaminated material beyond the excavation and temporary storage areas. To accomplish this, the CONTRACTOR shall include, as part of the health and safety plan, written procedures for decontamination of personnel and equipment, including transport vehicles that come in contact with potentially contaminated material.

B. The CONTRACTOR shall establish exclusion and contamination reduction zones around the excavation when potentially contaminated soils and/or water are encountered. The exclusion zone is the zone around the excavation and the temporary storage piles and/or tanks. All personnel and equipment entering or exiting the exclusion zone must do so through the contamination reduction zone. The contamination reduction zone includes all of the equipment and materials necessary to clean workers and equipment, and to collect all decontamination materials and water for proper disposal.

C. The CONTRACTOR shall be responsible for all fines, penalties, or citations resulting from non-conformance with these specifications.

PART 4 MEASUREMENT AND PAYMENT

4.01 Work Includes

A. Provide all labor, equipment, and materials to excavate, handle, load, place in temporary storage, transport, and dispose of contaminated soils and groundwater in accordance with this specification.

4.02 Measurement

A. Soils- Measurement of soils will be based on tons of waste received and disposed at the approved off-site facility as weighed on a certified scale at the disposal facility. Submittal of certificates of disposal and weight tickets will be required for all nonhazardous solid wastes prior to the OWNER's recommendation for payment. Submittal of final waste manifests will be required for Class I industrial nonhazardous solid wastes prior to the OWNER's recommendation of payment. Soils transported and disposed of off-site shall contain no free liquids.

B. Water - Measurement of bulk liquid nonhazardous wastes will be based on gallons of wastewater received and disposed at the approved facility/location as measured at the disposal facility/location by a means accepted by the OWNER. Measurement of nonhazardous liquid wastes in drums, barrels or other containers will be based on the number of waste containers received and disposed at the off-site facility. Submittal of certificates of disposal and load tickets will be required for all nonhazardous liquid wastes prior to the OWNER's recommendation of payment. Submittal of final waste manifests will be required for Class I industrial nonhazardous wastes prior to the OWNER's recommendation of payment.

4.03 Payment – Payment for soil and water disposal under this section shall be all inclusive of all costs associated with disposal of this material, including but not limited to fees, temporary storage, loading and unloading storage containers, decontamination of equipment if required, and any and all other costs associated with disposal of this material.

Payment, when included as a Contract pay item, will be made under one of the following:

Pay Item No. SS4150-CLIS: CL I Contaminated Soil	Per Ton
Pay Item No. SS4150-CLIIS: CL II Contaminated Soil	Per Ton
Pay Item No. SS4150-CLIL: CL I Contaminated Liquid	Per Gallon
Pay Item No. SS4150-CLIIL: CL II Contaminated Liquid	Per Gallon

SS6001
Special Specification Item No. 6001
Portable Changeable Message Sign

1.00 General

Furnish, operate, and maintain portable trailer mounted changeable message sign (PCMS) units.

2.00 Materials

Furnish new or used material in accordance with the requirements of this Item and the details shown on the plans. Provide a self-contained PCMS unit with the following:

- Sign controller
- Changeable Message Sign
- Trailer
- Power source

Paint the exterior surfaces of the power supply housing, supports, trailer, and sign with Federal Orange No. 22246 or Federal Yellow No. 13538 of Federal Standard 595C, except paint the sign face assembly flat black.

2.1. Sign Controller. Provide a controller with permanent storage of a minimum of 75 pre-programmed messages. Provide an external input device for random programming and storage of a minimum of 75 additional messages. Provide a controller capable of displaying up to 3 messages sequentially. Provide a controller with adjustable display rates. Enclose sign controller equipment in a lockable enclosure.

2.2. Changeable Message Sign. Provide a sign capable of being elevated to at least 7 ft. above the roadway surface from the bottom of the sign. Provide a sign capable of being rotated 360° and secured against movement in any position.
Provide a sign with 3 separate lines of text and 8 characters per line minimum. Provide a minimum 18 in. character height. Provide a 5 × 7 character pixel matrix. Provide a message legibility distance of 600 ft. for nighttime conditions and 800 ft. for normal daylight conditions. Provide for manual and automatic dimming light sources.

The following are descriptions for 3 screen types of PCMS:

- Character Modular Matrix. This screen type comprises of character blocks.
- Continuous Line Matrix. This screen type uses proportionally spaced fonts for each line of text.
- Full Matrix. This screen type uses proportionally spaced fonts, varies the height of characters, and displays simple graphics on the entire sign.

2.3. Trailer. Provide a 2 wheel trailer with square top fenders, 4 leveling jacks, and trailer lights. Do not exceed an overall trailer width of 96 in. Shock mount the electronics and sign assembly.

2.4. Power Source. Provide a diesel generator, solar powered power source, or both. Provide a backup power source as necessary.

2.5. Cellular Telephone. When shown on the plans, provide a cellular telephone connection to communicate with the PCMS unit remotely.

3.00 Execution

Place or relocate PCMS units as shown on the plans or as directed. The plans will show the number of PCMS units needed, for how many days, and for which construction phases.

Maintain the PCMS units in good working condition. Repair damaged or malfunctioning PCMS units as soon as possible. PCMS units will remain the property of the Contractor.

4.00 Measurement and Payment

This Item will be measured by each PCMS or by the day used. All PCMS units must be set up on a work area and operational before a calendar day can be considered measurable. When measurement by the day is specified, a day will be measured for each PCMS set up and operational on the worksite.

Payment will be made under:

Pay Item No. SS6001: Portable Changeable Message Sign Per Calendar Day

End

SPECIAL SPECIFICATION

JUNCTION BOXES, MANHOLES, AND INLETS

SS000465.1 Description

Construct junction boxes, manholes, and inlets, complete in place or to the stage detailed, including furnishing and installing frames, grates, rings, and covers.

SS000465.2 Materials

Furnish materials in accordance with the following:

- Item 403S, “Concrete for Structures”
- Item 406S, “Reinforcing Steel”
- Item 410S, “Concrete Structures”
- Item 503, “Frames, Grates, Rings, and Covers”

Cast-in-place junction boxes, manholes, inlets, risers, and appurtenances are acceptable unless otherwise shown on the plans. Alternate designs for cast-in-place items must be acceptable to the Engineer and must conform to functional dimensions and design loading. Alternate designs must be designed and sealed by a licensed professional engineer.

SS000465.3 Construction

Construct all types of junction boxes, manholes, and inlets either complete or in two stages, described as Stage I and Stage II.

Construct the Stage I portion of junction boxes, manholes, and inlets as shown on the plans or as specified in this Item. Furnish and install a temporary cover as approved.

Furnish and install the storm drain pipe and a temporary plug for the exposed end of the storm drain pipe from the storm drain to a point below the top of curb indicated on the plans for Stage I construction of cast iron or steel inlet units.

Construct Stage II after the pavement structure is substantially complete, unless otherwise approved.

Construct the remaining wall height and top of junction box, manhole, or inlet for Stage II, and furnish and install any frames, grates, rings and covers, curb beams, or collecting basins required.

Construct cast-in-place junction boxes, manholes, and inlets in accordance with Item 420. Forms are required for all concrete walls. Outside wall forms for cast-in-place concrete may be omitted with approval if the surrounding material can be trimmed to a smooth vertical face.

A. Precast Junction Boxes, Manholes, and Inlets: Construct formed and machine-made precast junction boxes, manholes, and inlets as shown on the plans, except as otherwise specified in this Item.

B. Marking. Clearly mark each precast junction box, manhole, and inlet unit with the following information:

1. name or trademark of fabricator and plant location,
2. product designation,
3. ASTM designation (if applicable),
4. date of manufacture,
5. designated fabricator's approval stamp for each approved unit, and
6. designation "SR" for product meeting sulfate-resistant concrete plan requirements (when applicable).

C. Defects and Repair. Repair precast junction boxes, inlets, and manholes, if necessary. Precast junction boxes, inlets, and manholes may be rejected for any of the conditions stated in this Annex.

D. Storage and Shipment. Store precast units on a level surface. Do not ship units until design strength requirements have been met.

E. Excavation, Shaping, Bedding, and Backfill. Excavate, shape, bed, and backfill in accordance with Item 401S, "Structural Excavation and Backfill." Immediate backfilling is permitted for all junction box, manhole, and inlet structures where joints consist of rubber boots, rubber gaskets, or bulk or preformed joint sealant. Take precautions in placing and compacting the backfill to avoid any movement of junction boxes, manholes, and inlets. Remove and replace junction boxes, manholes, and inlets damaged by the Contractor at no expense to the Department.

F. Junction Boxes, Manholes, and Inlets for Precast Concrete Pipe Storm Drains. Construct junction boxes, manholes, and inlets for precast concrete pipe storm drains before completion of storm drain lines into or through the junction box, manhole, or inlet. Neatly cut all storm drains at the inside face of the walls of the junction box, manhole, or inlet.

G. Junction Boxes, Manholes, and Inlets for Box Storm Drains. Place bases or risers of junction boxes, manholes, and inlets for box storm drains before or in conjunction with placement of the storm drain. Backfill the junction box, manhole, or inlet and storm drain as a whole.

H. Inverts. Shape and route floor inverts passing out or through the junction box, manhole, or inlet as shown on the plans. Shape by adding and shaping mortar or concrete after the base is placed or by placing the required additional material with the base.

I. Finishing Complete Junction Boxes, Manholes, and Inlets. Complete junction boxes, manholes, and inlets as shown on the plans. Backfill to original ground elevation in accordance with Item 401S.

J. Finishing Stage I Construction. Complete Stage I construction by constructing the walls to the elevations shown on the plans and backfilling to required elevations in accordance with Item 401S.

K. Stage II Construction. Construct subgrade and base course or concrete pavement over Stage I junction box, manhole, or inlet unless otherwise approved. Excavate to expose the top of Stage I construction and complete the junction box, manhole, or inlet as shown on the plans and in accordance with these specifications, including backfill and cleaning of all debris from the bottom of the junction box, manhole, or inlet.

L. Inlet Units. Install cast iron or steel inlet units in conjunction with the construction of concrete curb and gutter. Set the inlet units securely in position before placing concrete for curb and gutter. Form openings for the inlets and recesses in curb and gutter as shown on the plans. Place and thoroughly consolidate concrete for curb and gutter adjacent to inlets and around the inlet castings and formed openings and recesses without displacing the inlet units.

SS000465.6 Measurement

All junction boxes, manholes, and inlets satisfactorily completed as shown on the plans and in conformance with specifications will be measured by each junction box, manhole, or inlet complete, or by each junction box, manhole, or inlet completed to the stage of construction required by the plans.

SS000465.7 Payment

The work performed and materials furnished in accordance with this Item and measured as provided under “Measurement” will be paid for as follows.

A. Complete Junction Boxes. Payment for junction boxes will be made at the unit price bid for “Junction Box (Complete)” of the type specified.

Pay Item No. SS000465-A: 4ft x 4ft Junction Box **Per EA**

Pay Item No. SS000465-B: 5ft x 5ft Junction Box **Per EA**

Pay Item No. SS000465-C: 6ft x 5ft Junction Box **Per EA**

Pay Item No. SS000465-D: 6ft x 6ft Junction Box **Per EA**

END

These prices are full compensation for concrete, reinforcing steel, mortar, frames, grates, rings and covers, excavation, and backfill, and for all other materials, tools, equipment, labor, and incidentals.

SPECIAL SPECIFICATION

PORTABLE TRAFFIC BARRIER

SS000512.1 Description

Furnish, install, move, and remove portable traffic barrier.

SS000512.2 Materials

Furnished by the Contractor.

A. Concrete. Furnish barrier of the class of concrete shown on the plans and using materials that meet the pertinent requirements of the following Items.

- Item 403S, “Concrete for Structures”
- Item 406S, “Reinforcing Steel”
- Item 410S, “Concrete Structures”
- Item 425S, “Prestressed Concrete Structures”
- Item 720S, “Metal for Structures”

B. Steel. Barrier sections will be furnished when shown on the plans.

C. Concrete and Steel. When barrier is to be furnished and retained by the Contractor, products from non-approved sources or previously used products may be provided if the Contractor submits written certification that the barrier sections and materials substantially conform to the requirements of this Item. The Engineer may approve the use of the product if:

- the barrier sections substantially meet typical cross-section dimension requirements,
- there is no evidence of structural damage such as major spalls or cracks,
- the general condition of both the barrier sections and their connectors is acceptable,
- the barrier is new,
- the barrier is being reused, and
- the applicable crash test criteria in accordance with Item 803S, “Barricades, Signs, and Traffic Handling,” are met.

D. Connection Hardware. When shown on the plans, provide connection hardware for Department-furnished barrier sections. Provide the type of connection hardware shown on the plans. Connection hardware is defined as being sufficient hardware for

one complete connection between two traffic barrier sections, including the required bolts, nuts, washers, structural steel shapes, and dowels. Connection hardware will be retained by the Department unless otherwise shown on the plans.

SS000512.3 Construction

Produce precast barrier to the tolerances shown in Table 1 unless otherwise shown on the plans.

Table 1

Precast Barrier Tolerances

Dimension	Tolerance
Length	+/- 1 in.
Insert placement	+/- 1/2 in.
Horizontal alignment	+/- 1/8 in. per 10ft of length
Deviation of Ends	
Horizontal skew	+/- 1/4 in.
Vertical batter	+/- 1/8 in. per 10ft of depth

Install the barrier sections as shown on the plans or as directed. For concrete barrier, the areas that require pinning will be shown on the plans. For steel barrier, the acceptable deflection distance will be shown on the plans.

After use, stockpile barrier sections and connection hardware that will be retained by the Department at the location shown on the plans or as otherwise directed. Obtain assembly and installation information for the portable steel traffic barrier from the manufacturer and provide the Engineer with an installation and repair manual specific to the portable steel traffic barrier.

Repair or replace all traffic barrier or connecting hardware damaged by the Contractor's operations at the Contractor's expense.

Repair or replace any pavement damaged in the process of installing, moving, or removing barrier sections at the Contractor's expense.

SS000512.6 Measurement

This Item will be measured by the foot based on the nominal lengths of the barrier sections.

When shown on the plans, connection hardware will be measured by each complete connection between two traffic barrier sections for Department-furnished barrier.

When pinning of concrete barrier is shown on the plans, pinning of the barrier will be measured by each pin.

SS000512.7 Payment

The work performed and materials furnished in accordance with this Item and measured as provided under “Measurement” will be paid for at the unit price bid as follows.

- For concrete barrier only, bid for “Portable Traffic Barrier” of the work category (Furnish and Install, Designated Source, Move, Stockpile, Remove, or Connection Hardware), shape (e.g., Single Slope, F-Shape, or Low Profile) and Type (e.g., 1, 2, or 3) of barrier sections specified. This price includes equipment, labor, tools, and incidentals.

- For concrete and steel barrier, bid for “Portable Traffic Barrier” of the work category (Furnish and Install, Designated Source, Move, Stockpile, or Remove), shape (e.g., Single Slope, F-Shape, or Low Profile) and Type (e.g., 1, 2, or 3) of barrier sections specified, or “Steel.” This price includes equipment, labor, tools, and incidentals.

A. Furnish and Install. This price is full compensation for furnishing and installing barrier sections and connection hardware.

B. Move. This price is full compensation for moving barrier section installations on the project from one location to another (including disassembly and reassembly costs), moving barrier sections from an installation on the project to a temporary storage area (including disassembly costs), or moving barrier sections from a temporary storage area to an installation site on the project (including assembly costs).

C. Remove. This price is full compensation for removing barrier and connection hardware from the project that are retained by the Contractor. This price is also full compensation for removing barrier sections and connective hardware from the project and delivering to the Department stockpile area shown on the plans or as directed.

Pay Item No. SS000512-7009: Portable, Concrete Traffic Barrier - Furnish and Install, Low Profile, Type 1 **Per EA**

Pay Item No. SS000512-7010: Portable, Concrete Traffic Barrier - Furnish and Install, Low Profile, Type 2 **Per EA**

Pay Item No. SS000512-7033: Portable, Concrete Traffic Barrier - Move, Low Profile, Type 1 **Per EA**

Pay Item No. SS000512-7034: Portable, Concrete Traffic Barrier - Move, Low Profile, Type 2 **Per EA**

Pay Item No. SS000512-7057: Portable, Concrete Traffic Barrier - Remove, Low Profile, Type 1 **Per EA**

Pay Item No. SS000512-7058: Portable, Concrete Traffic Barrier - Remove, Low Profile, Type 2 **Per EA**

END

SPECIAL SPECIFICATION

DELINEATOR AND OBJECT MARKER ASSEMBLIES

SS000658.1 Description

- Installation. Install delineator or object marker assembly.
- Removal. Remove delineator or object marker assembly.
- Replacement. Remove existing delineator or object marker assembly and replace with new delineator or object marker assembly.

SS000658.2 Materials

Furnish only new materials as shown on the plans unless otherwise directed.

Materials and assemblies must be approved of by OWNER prior to installation.

Galvanize material.

SS000658.3 Construction

A. Installation. Locate delineators, object markers, and barrier reflectors as shown on the plans or as directed and install in conformance with the manufacturer's recommendations.

Install winged channel post and flexible delineator posts to allow the reflector units and reflectorized panels to be installed at the specified height and orientation. Align post as shown or as directed.

Install delineators such that the height from the finished pavement surface to the top of the post is 28 inches.

Drive post plumb using a driving cap to prevent visible cross-section dimension distortion. Drill or drive a pilot hole when post cannot be driven without visibly distorting the cross-section dimension. Backfill pilot holes thoroughly by tamping in 6-in. lifts to grade.

Repair damaged galvanizing. Install reflector units on wing channel posts after the posts have been erected.

B. Removal. Remove post assemblies without damaging materials, and salvage when indicated on the plans. Remove post to a minimum of 6 in. below finished grade. Stockpile salvaged materials at the location shown on the plans or as directed. Accept ownership of unsalvageable materials and dispose of them in conformance with federal, state, and local requirements.

C. Replacement. Remove existing delineator or object marker assembly in "Removal,"

and replace with new delineator or object marker assembly “Installation.”

SS000658.6 Measurement

Installation will be measured by each delineator or object marker assembly installed, removed, or replaced.

SS000658.7 Payment

The work performed and materials furnished in accordance with this Item and measured as provided under “Measurement” will be paid for at the unit price bid for “Install Delineator Assemblies,” “Install Object Marker Assemblies,” “Install High Speed/High Impact Assemblies,” “Replace Delineator Assemblies,” or “Replace Object Marker Assemblies” of the types and colors specified, and for “Remove Delineator or Object Marker Assemblies.”

A. Installation. This price is full compensation for furnishing and fabricating when required; installing and mounting the delineator or object marker assemblies, including posts, adhesive or pads for surface mount assemblies, back plates, reflector units, fastening plates, brackets, bolts, nuts, and washers; and materials, equipment, labor, tools, and incidentals.

Pay Item No. SS000658-7047: Install Delineator Assembly (Double White Reflectors), Size 1, White Flexible Post, Surface Mount **Per EA**

Pay Item No. SS000658-7050: Install Delineator Assembly (Double Yellow Reflectors), Size 1, Yellow Flexible Post, Surface Mount **Per EA**

Pay Item No. SS000658-7051: Install Delineator Assembly (Zilca Zebra Separator) **Per EA**

END