AGENDA
City of Lucas City Council Meeting
August 20, 2020
7:00 PM
Video Conference
665 Country Club Road – Lucas, Texas

Notice is hereby given that a meeting of the Lucas City Council will be held on Thursday, August 20, 2020 at 7:00 pm by video conference at Lucas City Hall, 665 Country Club Road, Lucas, Texas 75002-7651 at which time the following agenda will be discussed. As authorized by Section 551.071 of the Texas Government Code, the City Council may convene into closed Executive Session for the purpose of seeking confidential legal advice from the City Attorney on any item on the agenda at any time during the meeting.

On March 16, 2020 Governor Abbott suspended some provisions of the Open Meetings Act in response to the COVID-19 emergency. To comply with Governor Abbott's latest Executive Order and to practice safe distancing, Lucas City Council meetings will not be open to on-site visitors. In the interim, City Council meetings will be available through Zoom Webinar from your computer or smartphone. To join the meeting, go to https://zoom.us/s/95534828374?pwd=ZkJ5cTZkVWNEL3o0WFNCQXBjQ0RvZz09 and enter your name and e-mail address. You may also join by phone: 1-346-248-7799. When prompted, enter the meeting ID: 955 3482 8374 and password: 712285.

If the public desires to speak during a specific agenda item, **they must email shenderson@lucastexas.us by 4:30 pm on the day of the meeting**. The email must contain the person's name, address, phone number, and the agenda item(s) for which comments will be made.

Call to Order

- Roll Call
- Determination of Quorum
- Reminder to turn off or silence cell phones
- Pledge of Allegiance

Citizen Input

1. Citizen Input

Community Interest

Pursuant to Section 5510415 of the Texas Government Code, the City Council may report on the following items: 1)expression of thanks, congratulations or condolences; 2) information about holiday schedules; 3) recognition of individuals; 4) reminders about upcoming City Council events; 5) information about community events; and 6) announcements involving imminent threat to public health and safety.

2. Items of Community Interest

Consent Agenda

All items listed under the consent agenda are considered routine and are recommended to the City Council for a single vote approval. If discussion is desired, an item may be removed from the consent agenda for a separate vote.

3. Consent Agenda:

   A. Approval of the minutes of the July 30, 2020 City Council meeting. **(City Secretary Stacy Henderson)**

   B. Authorize the Mayor to enter into an interlocal agreement between the City of Lucas and Collin County, acting through the Collin County Health Care Services/Collin County Office of Emergency Management allowing the City to become a closed point of dispensing when Strategic National Stockpile assets are released. **(Fire Chief Ted Stephens)**

Public Hearing Agenda

4. Public hearing to consider adopting Ordinance 2020-08-00920 amending the City's Code of Ordinances, Chapter 14 Zoning, Article 14.04 Supplementary Regulations, Division 8. Accessory Buildings, Structures and Uses, Section 14.04.302 Accessory structures, buildings and uses permitted, and Section 14.04.304 General accessory buildings and structures regulations to require storage containers in a residential district to be located a minimum of ten feet behind the main structure, to require storage containers in the commercial business, and light industrial district to be behind the main structure, and to require detached accessory buildings to be a minimum of ten feet behind the main structure unless they are architecturally compatible with the main structure. **(Development Services Director Joe Hilbourn)**

   A. Presentation by Development Services Director Joe Hilbourn
   B. Conduct Public Hearing
   C. Take action regarding the proposed amendments

Regular Agenda

5. Consider an application by Ron Lacock on behalf of Dwarf Willow, LLC for a development agreement for Lucas Country Corner located at 215 Southview, a tract of land being 10.262 acres of land in the James Anderson Survey, Abs A0017, Sheet 1, Tract 8, to give cross access to a self-service gas station and convenience store located at 175 Southview and for the installation of a live screen barrier in lieu of a six to eight foot masonry wall between commercial and residential district in consideration of rezoning. **(Development Services Director Joe Hilbourn)**

6. Consider the approval of 1) Resolution R-2020-08-00503 of the City Council of the City of Lucas, Texas authorizing the approval of an agreement to contribute to right of way funds (fixed price), 2) authorize the Mayor to execute the agreement to contribute to right-of-way funds (fixed price) to the State of Texas through the Texas Department of Transportation for a transportation improvement project located at FM 1378 at FM 3286, and 3) using funds from the 2019 Certificates of Obligation for the City's participation in the right-of-way and utility adjustments for the Bait Shop Intersection (FM 1378/FM 3286) project and appropriate funds to line item 21-8210-491-138 in an amount not to exceed $129,517.60. **(City Engineer Stanton Foerster)**

7. Consider a modification to trail easements within the Stinson Highlands subdivision through the platting process from the rear yard to the front yard. **(Development Services Director Joe Hilbourn)**

8. Consider the Bridge Alternative Report (BAR) of the Stinson Bridge and Roadway Improvements and provide direction to the City Manager. **(City Engineer Stanton Foerster)**

9. Consider the Bridge Alternative Report (BAR) of the Snider Bridge and Roadway Improvements and provide direction to the City Manager. **(City Engineer Stanton Foerster)**

10. Discuss the Fiscal Year 2020-2021 Proposed Budget. **(Finance Director Liz Exum)**

11. Consider the proposed City of Lucas Property Tax Rate for Fiscal Year 2020-2021. **(Finance Director Liz Exum)**

12. Consider how to organize, manage, create, and distribute factual information pertaining to the proposed City of Lucas Broadband Project and provide guidance to the City Manager. **(City Council, Assistant to the City Manager Kent Souriyasak, City Secretary Stacy Henderson, City Manager Joni Clarke)**

Executive Session Agenda

13. An Executive Session is not scheduled for this meeting. **(Mayor Jim Olk)**

    As authorized by Section 551.071 of the Texas Government Code, the City Council may convene into closed Executive Session for the purpose of seeking confidential legal advice from the City Attorney regarding any item on the agenda at any time during the meeting. This meeting is closed to the public as provided in the Texas Government Code.

14. Reconvene from Executive Session and take any action necessary as a result of the Executive Session. **(Mayor Jim Olk)**

15. Adjournment.

Certification

I do hereby certify that the above notice was posted in accordance with the Texas Open Meetings Act on the bulletin board at Lucas City Hall, 665 Country Club Road, Lucas, TX 75002 and on the City's website at www.lucastexas.us on or before 5:00 p.m. on August 14, 2020.

Stacy Henderson, City Secretary

In compliance with the American with Disabilities Act, the City of Lucas will provide for reasonable accommodations for persons attending public meetings at City Hall. Requests for accommodations or interpretive services should be directed to City Secretary Stacy Henderson at 972.912.1211 or by email at shenderson@lucastexas.us at least 48 hours prior to the meeting.

Item No. 01

City of Lucas
City Council Agenda Request
August 20, 2020

Requester: Mayor Jim Olk

Agenda Item Request

Citizen Input

Background Information

NA

Attachments/Supporting Documentation

NA

Budget/Financial Impact

NA

Recommendation

NA

Motion

NA

Item No. 02

City of Lucas
Council Agenda Request
August 20, 2020

Requester: Mayor Jim Olk

Agenda Item Request

2. Items of Community Interest.

Background Information

NA

Attachments/Supporting Documentation

NA

Budget/Financial Impact

NA

Recommendation

NA

Motion

NA

Item No. 03

City of Lucas
Council Agenda Request
August 20, 2020

Requester: City Secretary Stacy Henderson, Fire Chief Ted Stephens

Agenda Item Request

3. Consent Agenda:

   A. Approval of the minutes of the July 30, 2020 City Council meeting.

   B. Authorize the Mayor to enter into an interlocal agreement between the City of Lucas and Collin County, acting through the Collin County Health Care Services/Collin County Office of Emergency Management allowing the City to become a closed point of dispensing when Strategic National Stockpile assets are released.

Background Information

Agenda Item 3B:

This agreement becomes active when Strategic National Stockpile (SNS) assets are released from Department and accepted by the City of Lucas for Closed Point of Dispensing (POD) operations. The agreement authorizes the City of Lucas to conduct mass dispensing operations using a Closed POD model, under the authority of and with consultation from Department.

Attachments/Supporting Documentation

1. Minutes of the July 30, 2020 City Council meeting.
2. Memorandum of Understanding – Closed POD Site Agreement

Budget/Financial Impact

NA

Recommendation

City Staff recommends approval of the Consent Agenda.

Motion

I make a motion to approve the Consent Agenda as presented.

City of Lucas
City Council Meeting/Budget Workshop
July 30, 2020
Video Conference Meeting
6:05 P.M.
City Hall, 665 Country Club Road, Lucas, Texas

MINUTES

Call to Order

City Councilmembers Present:
Mayor Jim Olk
Mayor Pro Tem Kathleen Peele
Councilmember Wayne Millsap
Councilmember Tim Baney
Councilmember Steve Duke
Councilmember Philip Lawrence
Councilmember Debbie Fisher

City Staff Present:
City Manager Joni Clarke
City Secretary Stacy Henderson
City Attorney Joe Gorfida
Assistant to the City Manager Kent Souriyasak
Development Director Joe Hilbourn
City Engineer Stanton Foerster
Finance Director Liz Exum
Fire Chief Ted Stephens
Assistant Fire Chief Lance Gant
EMS Office Aaron Alderdice
Human Resources Generalist Janice Babcock

This meeting was conducted by video conference.

Mayor Olk called the meeting to order at 6:09 p.m. and determined that a quorum was present. Attendees were reminded to silence their cell phones and the Pledge of Allegiance was recited.

Citizen Input

There was no citizen comment at this meeting.

Regular Agenda

1. Consider a bond election to be held on November 3, 2020 or May 1, 2021 for the purpose of submitting a proposition to the voters for the implementation of a broadband fiber project.

Mayor Pro Tem Peele discussed what would occur if a shortfall occurred and the 55 percent uptake rate was not met. Mayor Pro Tem Peele stated that taxpayer funds or extra funds from reserves would be needed to cover the debt. Ms. Peele discussed the construction time of the project, streaming applications were not included, and the number of households needed to be included in the 55 percent uptake rate. Mayor Pro Tem Peele stated that she did not believe there was enough growth in Lucas to support the broadband project.

Councilmember Fisher gave a presentation reviewing pro forma tables, cash flow and salary projections. Negative cash flow was discussed and how to cover costs that could include a tax rate increase should inadequate participation occur. Ms. Fisher expressed her concerns about the take rate, staff time, privacy and data security, and technology changes. Councilmember Fisher suggested other options be explored.

Councilmember Lawrence discussed his concern with the proposed rate of $115 and if residents would want to pay that amount, and the possibility of a tax rate increase should the uptake rate not be met.

Councilmember Millsap discussed grants that could be received, future partnerships, and various scenarios with various uptake rates and monthly rates that could be successful.

The following individuals spoke related to the broadband project:

- Josh Jacobs – in favor of taking to the voters on November 3, 2020
- Tom Redman – more information needed before a decision can be made
- Matt Stroud – in favor of taking to the voters on November 3, 2020
- Jay Keller – Opposed to placing item on the ballot and the City taking part in providing broadband
- Greg Jacobs – Opposed to the City implementing a broadband fiber network, public needs to be informed before decisions were made

This item was for discussion purposes only, no formal action was taken on this item.

2. Consider the Lucas Farmers Market remaining 2020 season, receive a report from the July 25, 2020 market, and provide guidance to the Lucas Farmers Market Committee and City Staff regarding upcoming markets.

City Manager Joni Clarke gave a report on the drive-thru farmers market event held on July 25, 2020. Ms. Clarke stated that logistically traffic flowed well and there was some congestion in the gravel parking lot area, but adequate space was available for vehicles to pass. Ms. Clarke noted that 17 vendors participated and approximately 160 vehicles visited the market. Generally, the participants were pleased with the event. Vendors wore masks and practiced social distancing. Ms. Clarke stated that the Farmers Market Committee would like to request to operate at Stage 2 for the August 8 market and would place more space between each vendor and require masks for the event, and staff was also asking that consideration be given to allow the Mayor authority to make decisions on stage level for future market events.

Mayor Olk noted that currently there have been 29 cases of COVID-19 in Lucas, up from eight just four weeks ago; however only nine cases were active currently.

The City Council discussed using more of the park area to place vendors further apart, wearing masks, and having hand sanitation stations available. Mayor Olk stated that he was comfortable with Stage 2 at this time and will determine if changes need to be made for future events.

Councilmember Fisher asked that vendors be placed ten feet from the sidewalk so that adequate space was available for people to walk as well as pass the booth.

The City Council also discussed the number of staff required to work the event and safety measures for staff.

Mayor Olk and the Council authorized the farmers market to operate at a Stage 2 level for the August 8 market.

Mayor Olk announced that the City Council would be taking a 10-minute break beginning at 8:25 pm and reconvening at 8:35 pm.

3. Discuss the proposed City of Lucas budget for Fiscal Year 20/21.

City Manager Joni Clarke and Finance Director Liz Exum gave a presentation regarding the fiscal year 20/21 budget discussing the following items:

- City of Lucas strategic goals
- Current projects related to West Lucas Road, Southview/East Lucas Road intersection, and the broadband project
- Capital fund projects, Winningkoff Road, reverse curve to Snider; Snider Bridge design and Stinson Road bridge design funded by 2019 Certificates of Obligation
- Current and future water projects
- Mapping projects, enhanced security and water rescue items

Finance Director Liz Exum reviewed the City's existing tax rate of $0.305631, as well as general fund and water fund projected revenues.

The following items were discussed that included:

Unfunded Programs:

- Provide cost of mapping project and potentially fund the project from reserves.
- Provide 5-10-year plan of water rescue with total costs including training.
- Provide total cost and plan for enhanced security at City Hall and trailheads to integrate into a centralized, single system.

Compensation and Benefits:

- City Council to review compensation/market study at mid-year to determine where the City stands.

General Fund – Parks:

- Re-address vendor fees for the Farmers Market at the end of the year.
- Consider holding parade at a future date. Staff will place the parade discussion on a Parks Board meeting agenda to possibly incorporate with another city event.

General Fund – Non-Departmental:

- Discuss negotiating Collin County Sheriff's Office contract and public safety in general at mid-year.

Water Fund – Public Works

- Allocate some of the salary for other staff members from the water fund and free up some funds in the general fund so we consistently have a fund balance in the water fund.

There was no formal action taken on this item, it was for discussion purposes only.

Executive Session Agenda

4. Executive Session

An Executive Session was not held at this meeting.

5. Reconvene from Executive Session and take any action necessary as a result of the Executive Session.

An Executive Session was not held at this meeting.

Adjournment

6. Adjournment.

MOTION: A motion was made by Councilmember Millsap, seconded by Mayor Olk to adjourn the meeting at 9:56 pm. The motion passed unanimously by a 7 to 0 vote.

APPROVED:

Mayor Jim Olk

ATTEST:

Stacy Henderson, City Secretary

STATE OF TEXAS	§	**Closed POD Site Agreement**
	§	
COLLIN COUNTY	§	**With City of Lucas**

MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding ("Agreement") is entered into between City of Lucas ("City") and Collin County ("County"), acting through the Collin County Health Care Services/Collin County Office of Emergency Management ("Department"). This Agreement becomes active when Strategic National Stockpile ("SNS") assets are released from Department and accepted by City for Closed POD operations. This Agreement authorizes City to conduct mass dispensing operations using a Closed POD model, under the authority of and with consultation from Department.

I. Background and Purpose

Under a grant from the Centers for Disease Control and Prevention's Office of Public Health Preparedness and Response ("CDC"), acting through the Texas Department of State Health Services ("DSHS"), the County is required to plan and prepare for a public health emergency in Collin County that may result from natural or man-made causes. The County will need private or closed organizations to serve as Closed Point of Dispensing ("Closed POD") sites in the event of an emergency caused by bioterrorism, pandemic influenza, or a novel or highly fatal infectious agent or biological toxin.

Each Closed POD site reduces the strain on public Point of Dispensing sites ("Open POD"), and allows the Closed POD to serve a smaller subset of County residents during a public health emergency. Increasing the number of these sites will enable the County to provide medical countermeasures to larger numbers of people in a shorter amount of time. The City Closed POD will provide for the dispensing of medical countermeasures to City employees and family

members ("Members"). The County has concluded that City has the facilities and personnel necessary to be a Closed POD site, and this Agreement serves a public service.

II. Public Health Emergency

This Agreement becomes operational if:

a. The applicable County or Department authority declares a public health emergency; and,
b. The Local Health Authority, or designee, declares that large scale distribution of medical countermeasures is necessary as a control measure for an outbreak of one or more communicable diseases and/or other treatment associated with a natural or man-made disaster.

The onset of such a public health emergency ("public health emergency" or "emergency") will be relayed by Department to City in a timely manner.

III. Closed POD Designation

In the event of a public health emergency, City agrees to:

a. provide a Closed POD site location;
b. staff the site; and,
c. dispense the prescribed prophylaxis to its Members using these staff and according to the City dispensing plan.

City agrees to make its facilities and personnel available for mass dispensing to its Members as a Closed POD site according to the provisions in this Agreement. Medical countermeasure assets will come from available supply sources and will be provided at no cost to City and its Members.

IV. Department Obligations

In planning for, during, and after the conclusion of an emergency, Department will be obligated to:

a. Provide site screening to determine participation suitability;

b. Assist City with preparing its site dispensing plan, including but not limited to supply lists, POD layouts, fact sheets, dispensing algorithms, etc.;
c. Arrange for medical countermeasures and/or necessary medical supplies or equipment, if available, to the extent necessary to administer the medical countermeasure. Department will not be obligated to provide a complete POD kit or general dispensing supplies to City. Department will not be obligated to provide transportation of medical countermeasure assets, supplies, or equipment, or security thereof, from Department facilities to City for dispensing;
d. Provide reasonable consultation and assistance, including such consultation and assistance as is needed for City to comply with Closed POD regulations, restrictions, or guidance imposed by DSHS, CDC, County, and other relevant policies;
e. Make reasonable accommodations to provide City information about and/or status updates on a potential, new, or ongoing emergency, including updates and information that would appreciably impact the planning, response efforts, or health and safety of City;
f. Make reasonable accommodations to train, or provide for training of, City staff to operate their dispensing site;
g. Collect any unused medical countermeasures, medical supplies, and/or medical documentation after an emergency has ceased. Transportation for these assets will be provided or arranged for by Department; and,
h. Provide after-action and improvement consultation, as needed or requested.

V. City Obligations

In planning for, during, and after the conclusion of an emergency, City will be obligated to:

a. Serve as a Closed POD location for its employees during an emergency, acting on behalf of Department in such a response;
b. Write a dispensing plan for the specific facility serving as dispensing site;

c. Supply and arrange for all equipment and personnel necessary for staffing, security, dispensing, crowd/traffic control, transportation of assets, and other tasks necessary to dispense prophylaxis to Members;
d. Designate the following individuals and provide biannually updated contact information to Department, including telephone number and email address:
    i. An administrator, who will serve as the primary point of contact to outside entities, including Department;
    ii. A medical staff point of contact, who currently has a medical license in good standing;
    iii. A security point of contact, who will interact with Department and any relevant law enforcement entities in safety and security planning;
    iv. A staff liaison, who will coordinate City staff and training.
e. Provide Department with an estimate of the number of employees that would receive prophylaxis during an emergency, and will provide updates to that estimate as necessary or when requested by Department;
f. Provide the personnel, equipment, transportation, and security personnel to take possession of medical countermeasure assets from Department at the designated pickup site;
g. Designate one or more representatives that will have the authority to sign for receipt of medical countermeasures on behalf of City at the time of pickup from Department;
h. Be responsible for proper disposal of medical waste; and,
i. Be responsible for inventory management.

VI. Term

This Agreement becomes effective when approved by the governing bodies of City and the County and will remain in effect indefinitely. This Agreement may be terminated by either party at any time, with or without cause; however, the terminating party shall provide thirty (30) days written notice to the other party.

VII. Exchange of Information

Information acquired by either City, County or Department on citizens to be served will be mutually accessible to provide an integrated approach to citizen support and to avoid unnecessary duplication of services. This information will be shared only to the extent permitted by regulations requiring confidentiality of participant records. City and Department will cooperate in sharing information on the status and outcome of services provided.

VIII. Evaluation and Review

In order to provide a vehicle for on-going evaluation, review, and discussion of operational issues, both parties agree to communicate on a regular basis to discuss issues related to the implementation of this agreement.

IX. Procedures for Amendments and Termination

This agreement may be amended by mutual consent of both parties. Alternatively, this agreement and any amendments thereof shall remain in effect until terminated by either party upon thirty (30) days written notice to the other party.

X. Fee/Compensation

There shall be no fee or compensation owed by City, County, or Department under this Agreement.

XI. Hold Harmless

Each party agrees to the extent authorized under the Constitution and the laws of the State of Texas to be fully responsible for any and all claims for damages, costs, and expenses to person or persons and property that may arise out of or be occasioned by this Agreement, including but not limited to, its acts of negligence or omission in the performance of responsibilities under this

Agreement. Each party, to the extent allowed by law and without waiving any rights, defenses, or protections provided therein, agrees to be responsible for its own acts of negligence.

Joint Liability. In the event of joint or concurrent negligence of the parties, responsibility, if any, shall be apportioned comparatively in accordance with the laws of the State of Texas without, however, waiving any governmental immunity or defense available to any Party individually under Texas law. City shall be responsible for its sole negligence. County shall be responsible for its sole negligence. The provisions of this section are solely for the benefit of the parties hereto and are not intended to create or grant any rights, contractual or otherwise, to any other person or entity.

Immunity. It is expressly understood and agreed that, in the execution of this Agreement, no Party waives, nor shall be deemed hereby to have waived any immunity or defense that would otherwise be available to it against claims arising in the exercise of governmental powers and functions. By entering into this Agreement, the parties do not create any obligations, express or implied, other than those set forth herein, and this Agreement shall not create any rights in parties not signatories hereto. To the extent authorized under the Constitution and laws of the State of Texas, and without waiving sovereign immunity, each party shall be responsible for any and all claims, demands, suits, actions, damages, and causes for action related to or arising out of or in any way connected with its own actions, and the actions of its personnel rendered or performed pursuant to the terms and conditions of this Agreement. Each party agrees to obtain general liability, public official's liability, if applicable, or maintain a comparable self-insurance program.

XII. Notice

Any notice given by one party to the other in connection with this Agreement shall be in writing and shall be by personal delivery, registered mail or certified mail, or by U.S. Mail, return receipt requested, postage prepared; to:

City Name: City of Lucas

_____

_____

_____

County: Collin County Health Care Services
825 N. McDonald Street, Suite 130
McKinney, Texas 75069

Collin County Administrator
Bill Bilyeu
2300 Bloomdale #4192
McKinney, Texas 75071

Notice shall be deemed to have been received on the date of receipt as shown on the return receipt or other written evidence of receipt.

XI. Authority of Parties

This Agreement is made by and entered into by the duly-authorized officials of each respective entity.

X. Counterparts

This Agreement may be executed in any number of counterparts, each of which shall be deemed an original, and constitute one and the same instrument.

EXECUTED this, the _____ day of _____, 2020.

Collin County, Texas	City of Lucas, Texas
_____	_____
Chris Hill Collin County Judge	NAME 1 TITLE 1
_____	_____
Candy Blair, RN, BSN Public Health Director	NAME 1 TITLE 1
_____	_____
Sadia Siddiqui, MD Collin County Health Authority	NAME 1 TITLE 1
_____	
Dr. Nishat, M.D. Collin County Health Authority	
_____	
Jason Browning Emergency Management Coordinator	

City of Lucas
City Council Agenda Request
August 20, 2020

Item No. 04

Requester: Development Services Director Joe Hilbourn

Agenda Item Request

Public hearing to consider adopting Ordinance 2020-08-00920 amending the City's Code of Ordinances, Chapter 14 Zoning, Article 14.04 Supplementary Regulations, Division 8, Accessory Buildings, Structures and Uses, Section 14.04.302 Accessory structures, buildings and uses permitted, and Section 14.04.304 General accessory buildings and structures regulations to require storage containers in a residential district to be located a minimum of ten feet behind the main structure, to require storage containers in the commercial business, and light industrial district to be behind the main structure, and to require detached accessory buildings to be a minimum of ten feet behind the main structure unless they are architecturally compatible with the main structure.

A. Presentation by Development Services Director Joe Hilbourn
B. Conduct Public Hearing
C. Take action regarding the proposed amendments

Background Information

Due to changes in State law, the City can no longer prohibit building materials that are permitted by the State adopted building code. The question is do we want accessory buildings made from metal in front yards? Storage pods in front yards? Below is the current adopted code with the recommended changes highlighted in yellow.

Section 14.04.302 Accessory structures, buildings and uses permitted

(a) Accessory structures or buildings may be erected, maintained, and used for purposes which are clearly accessory to the principal or main structure, building or use permitted on the premises. Except in the agriculture district accessory buildings shall be built after the main building or structure. (Ordinance 2016-10-00845 adopted 10/20/16)

(b) Accessory structures, buildings and uses shall be so constructed, maintained and utilized so that the use of the building or equipment located does not produce excessive noise, vibration, concussion, dust, dirt, smoke, odors, noxious gases, heat, traffic, glare from artificial illumination or from reflection of natural light and shall be on the premises of the principal or main use, structure, or building except as may be specifically provided herein.

(c) For any accessory structure, a special exception may be required when the total square footage of the main building and any accessory buildings exceeds 50,000 square feet. Special exceptions may be granted by the city council when such property owner can show the following:

(1) Does not contain or support a use inconsistent with the zoning district regulation applicable to the property.

(2) Use of structure does not cause traffic congestion.

(3) Does not support use by any person other than owner or occupant of the main structure; and

(4) That size and mass of the structure is consistent with the surrounding uses.

(d) Except as provided herein, no trailers, containers, commercial boxes or other similar structures shall be used as accessory structures or buildings. Exceptions to this subsection (d) are as follows:

(1) Agriculture uses with five (5) acres or more may use trailers, containers, or commercial boxes for permanent storage located behind the main structure and obscured from public view; or

(2) Industrial and commercial users may use trailers, containers, or commercial boxes for temporary storage located behind the main structure obscured from public view for a period not to exceed ninety (90) days total in any one calendar year. The director of community development may extend the allowable time in thirty (30) day increments up to a maximum of 180 days, provided the property owner provides just cause for the extension.

Section 14.04.304 General accessory buildings and structures regulations

In all residential districts, accessory structures shall comply with the following standards except as may be otherwise specifically provided for in this code:

(1) Types of accessory buildings and structures.

(A) Attached accessory building and structures. Accessory buildings and structures that are physically attached to a main building or located less than ten feet (10') from the main building shall be considered attached accessory buildings and shall meet the requirements set forth for attached accessory buildings. These may include but are not limited to garages, carports, guest/servants quarters, patio covers, outdoor kitchens or living

areas, decks that exceed 30" in height, deck covers, shops, tool houses, pool houses, and other incidental accessory structures.

(B) Detached accessory buildings and structures. Accessory buildings and structures which are physically located ten feet (10') or more from a main building and a minimum of ten feet (10') behind the required front setback line may be considered detached accessory buildings and shall be required to meet the requirements set forth for detached accessory buildings. These may include but are not limited to garages, carports, guest/servants quarters, patio covers, outdoor kitchens or living areas, decks that exceed 30" in height, deck covers, shops, tool houses, pool houses, and other incidental accessory structures.

(2) Design.

(A) Attached accessory buildings and structures shall be designed to be architecturally compatible with the main building and constructed of similar materials as the main building.

(B) Detached accessory buildings shall be constructed of materials designed for construction and have a minimum life expectancy of at least twenty (20) years.

(3) Setbacks.

(A) Accessory buildings.

(i) Front yard setback, a minimum of ten feet behind the rear build line of the main structure unless the building is attached and is designed to be architecturally compatible with the main building and constructed of similar materials as the main building. Then a fifty-foot front yard setback is required.

Attachments/Supporting Documentation

1. Public hearing notice
2. Ordinance 2020-08-00920

Budget/Financial Impact

NA

City of Lucas
City Council Agenda Request
August 20, 2020

Item No. 04

Recommendation

The Planning and Zoning recommendations will be presented at the City Council meeting as this item goes before the Commission on August 13, 2020.

Motion

I make a motion to approve/deny adopting Ordinance 2020-08-00920 amending the City's Code of Ordinances, Chapter 14 Zoning, Article 14.04 Supplementary Regulations, Division 8, Accessory Buildings, Structures and Uses, Section 14.04.302 Accessory structures, buildings and uses permitted, and Section 14.04.304 General accessory buildings and structures regulations to require storage containers in a residential district to be located a minimum of ten feet behind the main structure, to require storage containers in the commercial business, and light industrial district to be behind the main structure, and to require detached accessory buildings to be a minimum of ten feet behind the main structure unless they are architecturally compatible with the main structure.

NOTICE OF PUBLIC HEARING

NOTICE IS HEREBY GIVEN, that the Planning & Zoning Commission of the City of Lucas, Texas (the "City"), will conduct a Public Hearing on Thursday, August 13, 2020 at 7:00 p.m. and City Council will conduct a second Public Hearing on Thursday, August 20, 2020 at 7:00 p.m. at Lucas City Hall, 665 Country Club, Lucas, Texas to consider amending the City's Code of Ordinances, Chapter 14 Zoning, Article 14.04 Supplementary Regulations, Division 8. Accessory Buildings, Structures and Uses, Section 14.04.302 Accessory structures, buildings and uses permitted and Section14.04.304 General accessory buildings and structures regulations. To require storage containers in a residential district to be located a minimum of 10' behind the main structure, to require storage containers in the commercial business, and light industrial district to be behind the main structure, and to require detached accessory buildings to be a minimum of 10' behind the main structure unless they are architecturally compatible with the main structure. More particularly described as follows:.

Section 14.04.302 Accessory structures, buildings and uses permitted

(a)

(d) Except as provided herein, no trailers, containers, commercial boxes or other similar structures shall be used as accessory structures or buildings. Exceptions to this subsection (d) are as follows:

(1) Agriculture uses with five (5) acres or more may use trailers, containers, or commercial boxes for permanent storage located behind the main structure and obscured from public view; or

(2) Industrial and commercial users may use trailers, containers, or commercial boxes for temporary storage located behind the main structure obscured from public view for a period not to exceed ninety (90) days total in any one calendar year. The director of community development may extend the allowable time in thirty (30) day increments up to a maximum of 180 days, provided the property owner provides just cause for the extension.

Section 14.04.304 General accessory buildings and structures regulations

In all residential districts, accessory structures shall comply with the following standards except as may be otherwise specifically provided for in this code:

(3) Setbacks.

(A) Accessory buildings.

(i) Front yard setback, a minimum of ten feet behind the rear build line of the main structure unless the building is attached and is designed to be architecturally compatible with the main building and constructed of similar materials as the main building. Then a fifty-foot front yard setback is required.

Those wishing to speak for or against the above item are invited to attend. If you are unable to attend and have comments you may send them to City of Lucas, Attention: City Secretary, 665 Country Club Road, Lucas, Texas 75002, email shenderson@lucastexas.us and it will be presented at the hearing. If you have any questions about the request, please contact Joe Hilbourn at jhilbourn@lucastexas.us.

ORDINANCE 2020-08-00920
[AMENDING CODE OF ORDINANCES, AMENDING CHAPTER 14 "ZONING", SUBSECTIONS 14.04.302(d)(1) AND 14.04.304(3)(A)(i)]

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF LUCAS, TEXAS, AMENDING THE LUCAS CODE OF ORDINANCES BY AMENDING CHAPTER 14 TITLED "ZONING" BY AMENDING ARTICLE 14.04 TITLED "SUPPLEMENTARY REGULATIONS" BY AMENDING DIVISION 8 TITLED "ACCESSORY BUILDINGS, STRUCTURES AND USES" BY AMENDING SECTION 14.04.302 TITLED "ACCESSORY STRUCTURES, BUILDINGS AND USES PERMITTED" BY AMENDING SUBSECTION (d); BY AMENDING SECTION 14.04.304 TITLED "GENERAL ACCESSORY BUILDINGS AND STRUCTURES REGULATIONS" BY AMENDING SUBSECTION 3 TITLED "SETBACKS" BY AMENDING (A) TITLED "ACCESSORY BUILDINGS" BY AMENDING (i); PROVIDING A CONFLICTS CLAUSE; PROVIDING A REPEALING CLAUSE; PROVIDING A SEVERABILITY CLAUSE; PROVIDING A SAVINGS CLAUSE; PROVIDING A PENALTY OF FINE NOT TO EXCEED THE SUM OF TWO THOUSAND DOLLARS ($2,000.00) FOR EACH OFFENSE AND PROVIDING FOR AN EFFECTIVE DATE.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF LUCAS, TEXAS, THAT:

Section 1. The Code of Ordinances of the City of Lucas, Texas, is hereby amended by amending Chapter 14 titled "Zoning" by amending Article 14.04 titled "Supplementary Regulations" by amending Section 14.04.302 titled "Accessory Structures, Buildings and Uses Permitted" by amending subsection (d) and by amending Section 14.04.304 titled "General Accessory Buildings and Structures Regulations" by amending subsection (3) titled "Setbacks" by amending (A) titled "Accessory Buildings" by amending (i), to read as follows:

"CHAPTER 14

ZONING

ARTICLE 14.04 SUPPLEMENTARY REGULATIONS

DIVISION 8. ACCESSORY BUILDINGS, STRUCTURES AND USES

Sec. 14.04.032 Accessory structures, buildings and uses permitted

Amend Subsection 14.04.032(d), to read as follows:

(d) ~~Accept~~ Except as provided herein, no trailers, containers, commercial boxes or other similar structures shall be used as accessory structures or buildings. Exceptions to this subsection (d) are as follows:

(1) Agriculture uses with five (5) acres or more may use trailers, containers, or commercial boxes for permanent storage located behind the main structure and obscured from public view; or

(2) Industrial and commercial users may use trailers, containers, or commercial boxes for temporary storage located behind the main structure obscured from public view for a period not to exceed ninety (90) days total in any one calendar year. The director of community development may extend the allowable time in thirty (30) day increments up to a maximum of 180 days, provided the property owner provides just cause for the extension.

Sec. 14.04.304 General accessory buildings and structures regulations

Amend Subsection 14.04.304(3)(A)(i), to read as follows:

Amend 14.04.304 (3)(A)(i)

(3) Setbacks.

(A) Accessory buildings.

(i) Front yard setback, a minimum of ten feet behind the rear build line of the main structure unless the building is attached and is designed to be architecturally compatible with the main building and constructed of similar materials as the main building. Then a fifty foot front yard setback is required."

Section 2. To the extent of any irreconcilable conflict with the provisions of this ordinance and other ordinances of the City of Lucas governing the use and development of the Property and which are not expressly amended by this ordinance, the provisions of this ordinance shall be controlling.

Section 3. That all ordinances of the City of Lucas in conflict with the provisions of this Ordinance shall be, and same are hereby, repealed, provided, however, that all other provisions of said Ordinances are not in conflict herewith shall remain in full force and effect.

Section 4. That should any word, sentence, paragraph, subdivision, clause, phrase or section of this Ordinance or of the City of Lucas Code of Ordinances, as amended hereby, be adjudged or held to be voided or unconstitutional, the same shall not affect the validity of the remaining portions of said Ordinances or the City of Lucas Code of Ordinances, as amended hereby, which shall remain in full force and effect.

Section 5. An offense committed before the effective date of the Ordinance is governed by prior law and the provisions of the City of Lucas Code of Ordinances in effect when the offense was committed and the former law is continued in effect for this purpose.

Section 6. That any person, firm or corporation violating any of the provisions or terms of this Ordinance shall be subject to the same penalty as provided for in the Code of Ordinances, as amended, and upon conviction in the municipal court shall be punished by a fine not to exceed the sum of Two Thousand Dollars ($2,000.00) for each offense, and each and every day such violation shall continue shall be deemed to constitute a separate offense.

Section 7. That this Ordinance shall take effect immediately from and after its passage and publication in accordance with the provisions of the Charter of the City of Lucas, and it is accordingly so ordained

DULY PASSED AND APPROVED BY THE CITY COUNCIL OF THE CITY OF LUCAS, COLLIN COUNTY, TEXAS, ON THIS _____ DAY OF _____, 2020.

APPROVED:

_____
Jim Olk, Mayor

APPROVED AS TO FORM:

_____
Joseph J. Gorfida, Jr., City Attorney
(07-23-2020:TM 116896)

ATTEST:

_____
Stacy Henderson, City Secretary

City of Lucas
City Council Agenda Request
August 20, 2020

Item No. 05

Requester: Development Services Director Joe Hilbourn

Agenda Item Request

Consider an application by Ron Lacock on behalf of Dwarf Willow, LLC for a development agreement for Lucas Country Corner located at 215 Southview, a tract of land being 10.262 acres of land in the James Anderson Survey, Abs A0017, Sheet 1, Tract 8, to give cross access to a self-service gas station and convenience store located at 175 Southview and for the installation of a live screen barrier in lieu of a six to eight foot masonry wall between commercial and residential district in consideration of rezoning.

Background Information

This project is located at 215 Southview within the City of Lucas and is currently zoned R-2. The development agreement would grant cross access to a self-service gas station and convenience store located at 175 Southview. For the proposed cross access, the City will consider zoning the property generally in accordance with the approved Comprehensive Plan and allow for a living screen in lieu of a masonry brick wall that is required between residential and commercial districts. This project came before Planning and Zoning Commission in June 2019 requesting commercial zoning and was denied. This project proposes two-story buildings on a lot adjacent to a residential district.

Attachments/Supporting Documentation

1. Development Agreement
2. Location Map
3. Proposed elevations
4. Proposed site plan

Budget/Financial Impact

An amount not to exceed $80,000 from the general fund for cross access.

Recommendation

City Staff recommends approval of the request as presented.

City of Lucas
City Council Agenda Request
August 20, 2020

Item No. 05

Motion

I hereby make a motion to approve/deny the request by Ron Lacock on behalf of Dwarf Willow, LLC for a development agreement for Lucas Country Corner located at 215 Southview, a tract of land being 10.262 acres of land in the James Anderson Survey, Abs A0017, Sheet 1, Tract 8, to give cross access to a self-service gas station and convenience store located at 175 Southview and for the installation of a live screen barrier screen in lieu of a six to eight foot masonry wall between commercial and residential district in consideration of rezoning.

STATE OF TEXAS §
§ **DEVELOPMENT AGREEMENT**
COUNTY OF COLLIN §

This Development Agreement (the "Agreement") is entered into this _____ day of _____, 2020, by and between the City of Lucas, Texas ("City'), whose place of business for purposes of this Agreement is 665 Country Club Road, Lucas, Texas 75002, and Dwarf Willow LLC, a Texas Limited Liability Company, whose place of business for purposes of this Agreement is 906 Santiago Trail, Wylie, Texas (the "Dwarf Willow" or "Owner"). City and Owner are sometimes referred to herein together as the "Parties" and individually as a "Party".

RECITALS:

WHEREAS, Dwarf Willow is the owner of the real property commonly known as Lucas Country Corner which is more particularly depicted and described in the attached Exhibit "A" (the "Property"); and

WHEREAS, the Texas Department of Transportation ("TxDOT") will reconstruct the intersection of Southview Drive and East Lucas Road. which will hinder left turn traffic into 175 Southview Drive; and

WHEREAS, the City Council finds that the fire lane/cross access roads shown on the attached Exhibit "B" (On-Site Improvements") will allow safe and effective access for the flow of traffic from Southview Drive and East Lucas Road to 175 Southview Drive; and

WHEREAS, Owner intends to develop the Property and has agreed to install, cause to have installed, or allow the City to have installed the On-Site Improvements; and

WHEREAS, the City Council has determined that it is in the best interest of the public to provide access to the abutting property;

THEREFORE, and in consideration of ten dollars ($10.00), the mutual covenants and other valuable consideration, the sufficiency and receipt of which are hereby acknowledged, the Parties agree as follows:

Article I
Term

1.1 This Agreement shall commence on the last date of execution hereof ("Effective Date") and shall terminate on the date that is the earlier date of (1) the expiration of fifteen (15) years after City acceptance of the On-Site Improvements; or (2) the date the Owner has fully satisfied all of the terms and conditions herein; or (3) June 18, 2035 ("Expiration Date"); or (4) unless sooner terminated herein.

1.2 This Agreement is contingent upon the Property being zoned as Commercial Business District ("CB") by the City. In the event the Property is not approved for Commercial Business District, this Agreement shall be terminated with no further responsibilities of the Parties.

Article II
Definitions

Unless the context requires otherwise, the following terms shall have the meanings hereinafter set forth:

"Approved Construction Plans" means the plans and specifications for the On-Site Improvements approved by the City Manager, or designee. The Approved Plans shall be in reasonable conformance with the preliminary plans submitted by the Owner and attached as Exhibits "B" and "D", and the approval shall not be unreasonably withheld.

"City Manager" means the City Manager of the City of Lucas, or designee.

"Effective Date" shall mean the last date of execution of this Agreement.

"Event of Bankruptcy or Insolvency" shall mean insolvency, appointment of receiver for any part of Owner's property and such appointment is not terminated within ninety (90) days after such appointment is initially made, any general assignment for the benefit of creditors, or the commencement of any proceeding under any bankruptcy or insolvency laws by or against Owner and such proceeding is not dismissed within ninety (90) days after filing thereof.

"Force Majeure" shall mean any contingency or cause beyond the reasonable control of Owner, as applicable, including, without limitation, acts of God or the public enemy, war riot, civil commotion, insurrection, adverse weather, government or de facto governmental action or inaction (unless caused by negligence or omissions of Owner), fires, explosions or floods, strikes, slowdowns or work stoppages, shortage of materials and labor, or delays by the City.

"On-Site Improvements" shall mean concrete the fire lanes as defined under the City of Lucas Fire Apparatus Access Roads Sections 503.1 to 503.6, from 175 Southview Drive to the proposed northern entrance on East Lucas Road and the proposed western entrance on Southview Drive of the Lucas Country Corner as depicted in Exhibit "B".

Article III
On-Site Improvements

3.1 Access Agreement. Owner agrees to provide an Access Easement for 175 Southview Drive for cross access traffic from East Lucas Road and from Southview Drive Road until a final plat is filed and approved.

3.2 Construction and Cost Participation of On-Site Improvements. The City agrees to participate in the costs of the On-Site Improvements for the cross-access roads, including concrete and striping.

(a) City's Cost. If Owner develops the Property before the City has completed installation of the On-Site Improvements, the City will reimburse the Owner for the actual cost of the construction of the On-Site Improvements. The Owner agrees to competitively bid the installation of the On-Site Improvements to at least three (3) contractors.

(b) Invoices. Owner shall submit invoices to the City in an amount not to exceed Eighty Thousand Dollars ($80,000.00). The City shall pay Owner within thirty (30) days of the receipt of a proper invoice provided there are no errors or discrepancies and that all work noted on the invoice has been completed. Any errors, discrepancies or the invoicing of work not completed may result in a delay in payment.

(c) Owner agrees to design and install the On-Site Improvements in accordance with the applicable standards, ordinances and regulations adopted by the City ("City Standards").

(d) Owner shall submit Approved Construction Plans for the design and construction of the On-Site Improvements to the City for review and approval by the City Administrator. The Approved Construction Plans shall include the estimated cost of design and installation of the On-Site Improvements. The On-Site Improvements shall be constructed in accordance with the Approved Construction Plans.

(e) If Owner does not develop the Property, the City has the right, at its sole cost, to construct the On-Site Improvements in compliance with Exhibit "B" or the most current Construction Plans for Lucas Country Corner which have been approved by the City.

3.3 Masonry Walls. The City agrees to allow current fences and living screens in lieu of masonry walls in the locations described below and depicted in Exhibit "D" (Masonry Wall Exceptions).

Hamlin Tract – Lot 1, Block A, Cook County Country Place Edition, Vol. E Pg 27 MRCCT. Border adjoining Lucas Country Corner shall be 6' Masonry wall per Lucas City Code Section 3.8.045.

Dwarf Willow Residential Tract – Southern Portion as of ABS A0017 James Anderson Survey, Sheet 1, Tract 8 as depicted on Exhibit "D". All fencing and screening requirements waived.

Bierschwale Tract – Lot 2, Block A, Cook County Country Place Edition, Vol. E Pg 27 MRCCT. Current fencing and living screen shall be utilized in lieu of fencing and screening requirements.

Embry Tract – Called 2.985 Acres, John Joseph Lanzillow, Jr., Bessie J Lanzillo &, Regina Embry, Clerk's File Number 20090327000355630, DRCCT. Current fencing and living screen shall be utilized in lieu of fencing and screening requirements.

3.4 Restricted Businesses. Owner agrees that no business that is restricted under Section 14.03.352 of the City of Lucas Ordinances shall be allowed including bars and night clubs, sexually oriented businesses, and vape shops, or any business listed in the attached Exhibit "E".

3.5 Pond. The Owner agrees to keep and maintain a minimum of 24,000 square feet at pool level of the pond depicted in Exhibit "B".

3.6 Lighting. Owner agrees to use directional LED lighting as allowed under the Commercial Business District's requirements to mitigate neighborhood light.

Article IV
Notice

Any notice to be given or to be served upon a Party hereto in connection with this Agreement must be in writing and may be given by hand delivery or by certified or registered mail and shall be deemed to have been given and received two (2) business days after a certified or registered letter containing such notice, properly addressed with postage prepaid, is deposited in the United States mail, and if given otherwise than by certified or registered mail, it shall be deemed to have been given and delivered to and received by the Party (or such Party's agent or representative) to whom it is addressed when actually received by the intended recipient. Such notice shall be given to the Parties hereto at the address set forth below. Any Party hereto may, at any time by giving two (2) days written notice to the other parties, designate any other o which such notice shall be given.

If to City

Joni Clarke, City Manager
City of Lucas
665 Country Club Road
Road Lucas, Texas 75002

With Copy to

Joseph J. Gorfida, Jr.
Nichols, Jackson, Dillard, Hager & Smith, L.L.P.
500 N. Akard
Suite 1800
Dallas, Texas 75201

If to Owner:

Ron Lacock
Dwarf Willow LLC
906 Santiago Trail
Wylie, Texas 75098

Article V
Termination

5.1 This Agreement shall terminate upon any one of the following:

(a) the written agreement of the Parties;
(b) the Expiration Date;
(c) the election by either Party in the event the other Party breaches any of the terms or conditions of this Agreement and such breach is not cured within thirty (30) days after written notice thereof to the breaching party;
(d) the election by the City, if Owner suffers an Event of Bankruptcy or Insolvency;
(e) the election by the City, if any Impositions owed to the City or the State of Texas by Owner shall become delinquent (provided, however the Owner retains the right to timely and properly protest and contest any such Impositions); or
(f) the election by the City, if any subsequent Federal or State legislation or any decision of a court of competent jurisdiction declares or renders this Agreement invalid, illegal or unenforceable.

Article VI
Miscellaneous

6.1 Assignment of Agreement. This Agreement may not be assigned by Owner without the prior written consent of City which consent shall not be unreasonably withheld, conditioned or delayed. This Agreement may not be assigned, in whole or in part, by City.

6.2 Venue. This Agreement shall be construed under and in accordance with the laws of the State of Texas and is specifically performable in Collin County, Texas. Exclusive venue shall be in state district court in Collin County, Texas.

6.3 Savings/Severability. In case any one or more provisions contained in this Agreement shall be for any reason held invalid, illegal, or unenforceable in any respect, such invalidity, illegality, or unenforceability shall not affect any other provision hereof, and it is the intention of the Parties to this Agreement that in lieu of each provision that is found to be illegal, invalid, or unenforceable, a provision be added to this Agreement which is legal, valid, and enforceable and is as similar in terms as possible to the provision found to be illegal, invalid, or unenforceable.

6.4 Authority. Each of the Parties represents and warrants to the other that they have the full power and authority to enter into and fulfill the obligations of this Agreement.

6.5 Entire Agreement. This Agreement contains the entire agreement of the Parties with respect to the matters contained herein and may not be modified or terminated except upon the provisions hereof or by the mutual written agreement of the Parties to this Agreement.

6.6 Consideration. This Agreement is executed by the Parties hereto without coercion or duress and for substantial consideration, the sufficiency of which is forever confessed.

6.7 Counterparts. This Agreement may be executed in a number of identical counterparts, each of which will be deemed an original for all purposes.

6.8 Representations. Each signatory represents this Agreement has been read by the Party for which this Agreement is executed, and that such Party has had an opportunity to confer with its legal counsel.

6.9 Miscellaneous Drafting Provisions. This Agreement shall be deemed drafted equally by all Parties hereto. The language of all parts of this Agreement shall be construed as a whole according to its fair meaning, and any presumption or principle that the language herein is to be construed against any Party shall not apply. Headings in this Agreement are for the convenience of the Parties and are not intended to be used in construing this document.

6.10 Binding Effect. This Agreement will be binding upon and inure to the benefit of the Parties hereto and their respective heirs, executors, administrators, legal representatives, successors, and authorized assigns. This Agreement only inures to the benefit of, and may only be enforced by, the Parties and their respective heirs, executors, administrators, legal representatives, assignees, lender, successors, and City. No other person or entity is a third-party beneficiary of this Agreement.

6.11 No Joint Venture. It is acknowledged and agreed by the Parties that the terms hereof are not intended to and shall not be deemed to create a partnership or joint venture among the Parties, or to cause City to be deemed to be a constituent partner of the Owner.

6.12 Multiple Counterparts and Duplicate Originals. This Agreement may be executed in any number of multiple counterparts and/or duplicate originals, each of which shall be deemed an original and all of which considered together shall be deemed one and the same Agreement.

(signature page to follow)

EXECUTED this _____ day of _____, 2020

City of Lucas, Texas

By: _____
Jim Olk
Mayor

Approved as to form:

By: _____
Joseph J. Gorfida, Jr., City Attorney
(07-30-2020:TM 116932))

STATE OF TEXAS §
§
COUNTY OF COLLIN §

Before me, the undersigned authority, on this _____ day of _____, 2020, personally appeared Jim Olk, Mayor of the City of Lucas, Texas, known to me to be the person whose name is subscribed to the foregoing instrument and acknowledged to me that he executed the same for the purposes and consideration therein expressed.

[Seal]

By:_____
Signature of Notary Public, State of Texas

My Commission Expires:_____

EXECUTED this _____ day of _____, 2020.

Dwarf Willow LLC
a Texas Limited Liability Company

By: _____
Ron Lacock
Dwarf Willow LLC

STATE OF TEXAS §
§
COUNTY OF COLLIN §

Before me, the undersigned authority, on this _____ day of _____, 2020, personally appeared Ron Lacock, Owner of Dwarf Willow LLC, a Texas Limited Liability Company, known to me to be the person whose name is subscribed to the foregoing instrument and acknowledged to me that he executed the same for the purposes and consideration therein expressed.

[Seal]

By:_____
Signature of Notary Public, State of Texas

My Commission Expires:_____

EXHIBIT "A"
Property

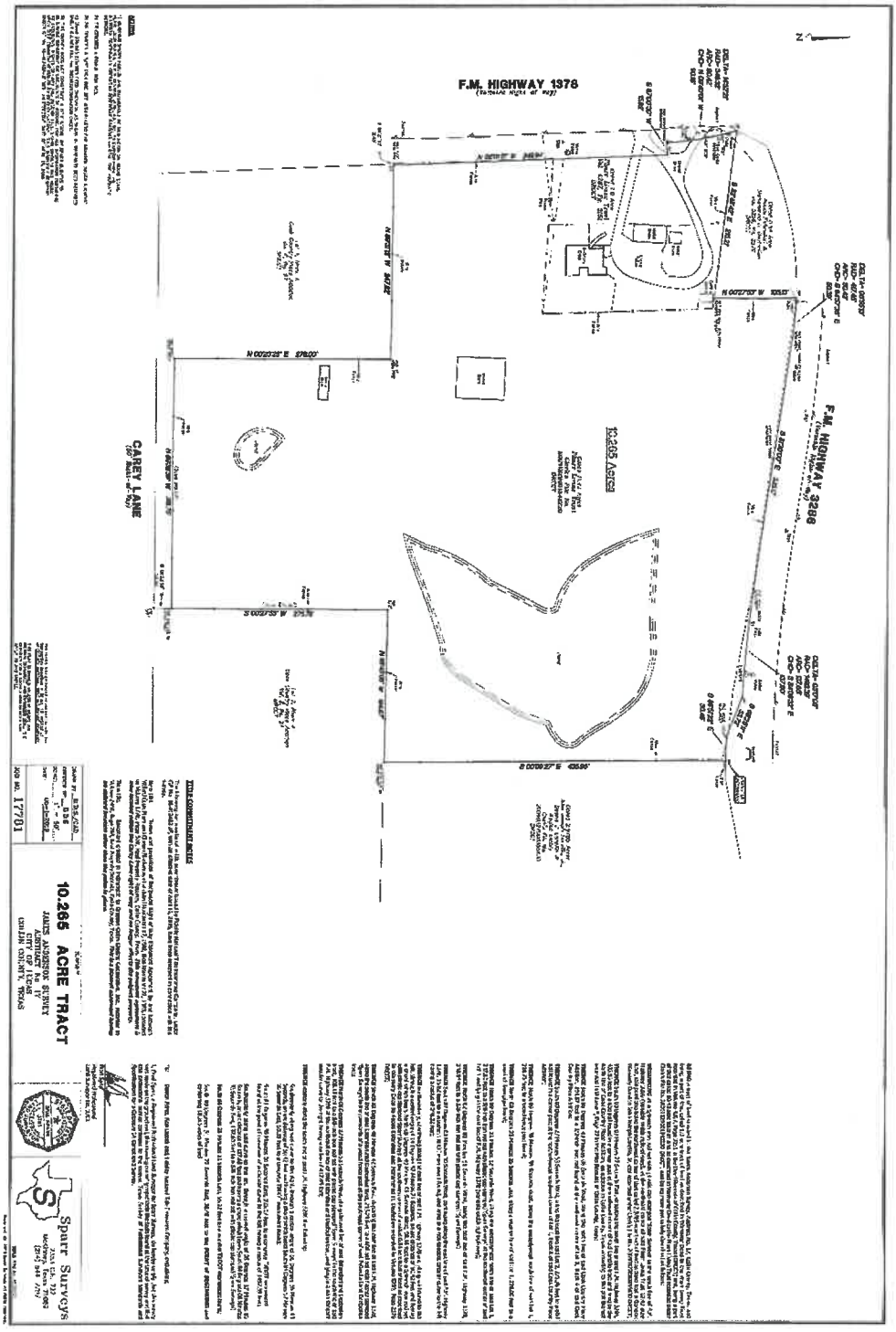


EXHIBIT "B"
On-Site Improvements

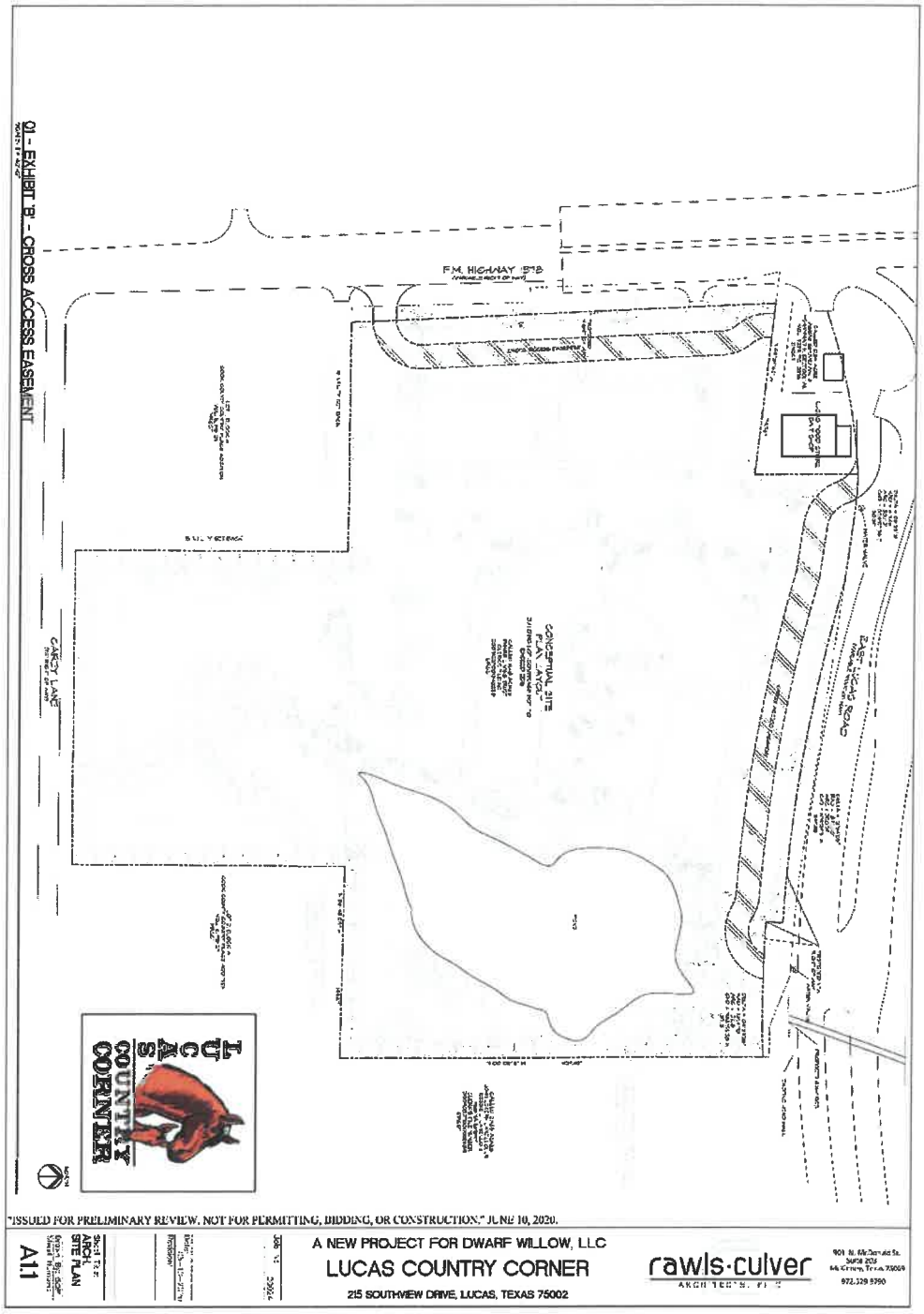


EXHIBIT "C"
Zoning (Depiction and Description)

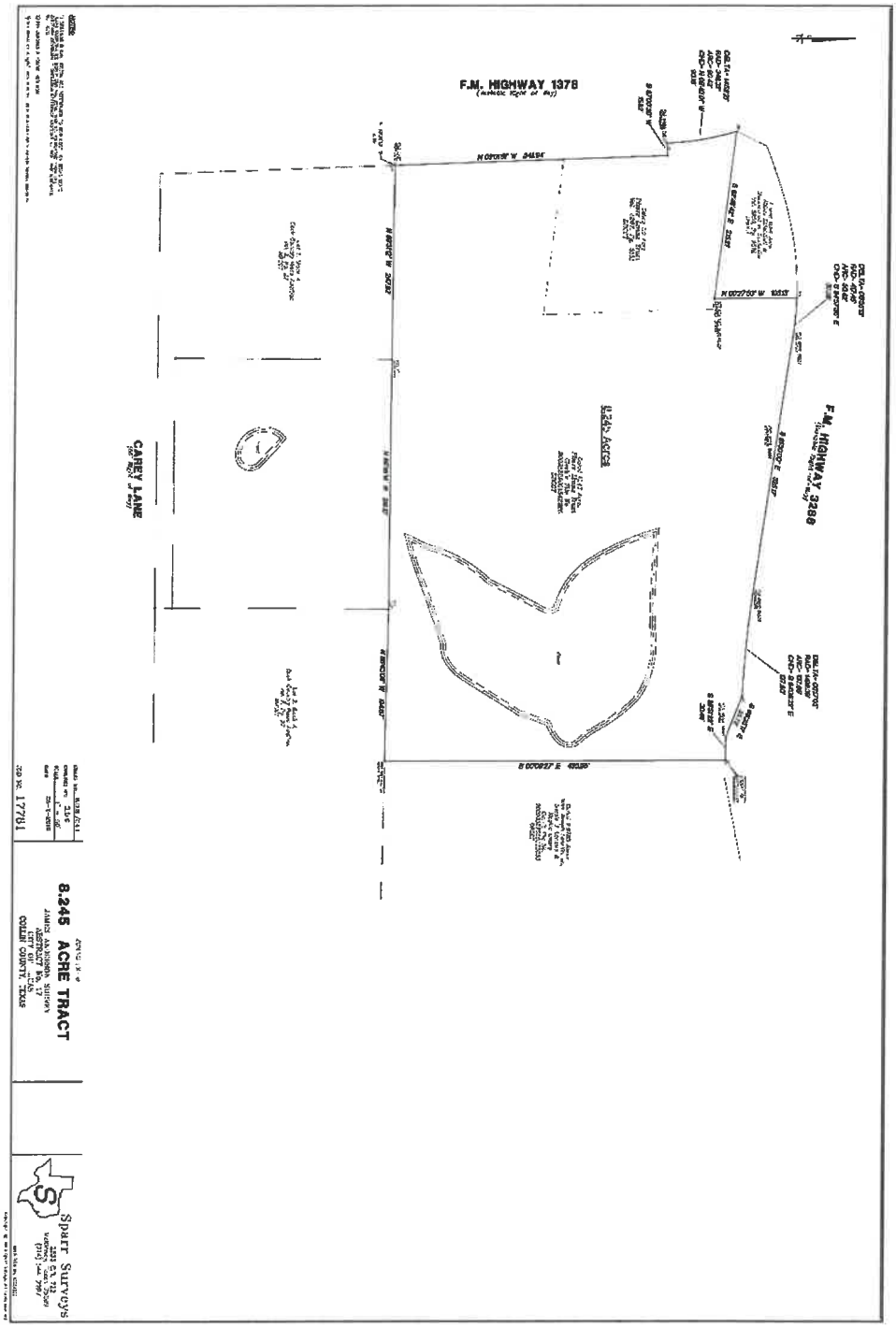


EXHIBIT "C"
Zoning Description

BEING a tract of land situated In the James Anderson Survey, Abstract No. 17, Collin County, Texas, and being a part of that called 1.0 acre tract of land as described in Warranty Deed to the Pharr Living Trust recorded In Volume 4267, Page 3151 in the Deed Records of Collin County, Texas (DRCCT) and, being a part of that called 10.43 acre tract of land as described in Warranty Deed to the Pharr Living Trust recorded under Clerk's File No. 20091229001542220 DRCCT, and being more particularly described as follows:

BEGINNING at a 5/8-inch iron rod set with plastic cap stamped 'Sparr Surveys' in the south line of F.M. Highway 3286 (variable width right-of-way), at the northeast corner of said Pharr Living Trust 10.43 acre tract, said point also being the northwest corner of that called 2.9785 acre tract of land as described in General Warranty Deed to John Joseph Lanzillo, Jr. etal recorded under Clerk's File No. 20090327000355630 DRCCT;

THENCE South 00 Degrees 09 Minutes 27 Seconds East, departing the south line of said F.M. Highway 3286, 435.96 feet to a 60d nail found In a corner post at the southwest corner of said Lanzillo tract and lying in the north line of Cook Country Place Addition, an addition in Collin County, Texas according to the plat thereof recorded in Volume E, Page 27 in the Map Records of Collin County, Texas;

THENCE North 88 Degrees 43 Minutes 08 Seconds West, along the north line of said Cook Country Place Addition, 194.67 feet to a 1/2-inch iron rod found at the northwest corner of Lot 2, Block A of said Cook Country Place Addition;

THENCE North 89 Degrees 36 Minutes 16 Seconds West, 319.10 feet to a one inch iron pipe found at a interior corner of Lot 1 of said Cook Country Place Addition;

THENCE North 89 Degrees 31 Minutes 12 Seconds West, along the westeriymost north line of said Lot 1, 247.82 feet to a 5/8-inch iron rod set with plastic cap stamped 'Spam Surveys' at the northwest corner of said Lot 1 and lying in the east line of F.M. Highway 1378 (variable width right-of-way);

THENCE North 02 Degrees 01 Minutes 51 Seconds West, along the east line of said P.M. Highway 1378, 348.94 feet to a 5/8-inch iron rod set with plastic cap stamped 'Spam Surveys';

THENCE South 87 Degrees 00 Minutes 30 Seconds West, continuing along the east line of said F.M. Highway 1378, 15.82 feet to a wooden TXDOT monument found, and lying in a non-tangent circular curve to the left having a radius of 348.32 feet;

THENCE northwesterly, continuing along the east line of said P.M. Highway 1378 and along said curve to the left, through a central angle of 14 Degrees 52 Minutes 21 Seconds, an arc distance of 90.42 feet and having a chord which bears North 09 Degrees 40 Minutes 01 Seconds West, 90.16 feet to a 5/8-inch iron rod set with plastic cap stamped 'Span' Surveys' at the southwest corner of a called 0.54 acre tract of land as described in Warranty Deed to Abbas Esfandiari and Mohammad H. Dezfoolian recorded in Volume 5259, Page 2576 DRCCT;

THENCE South 82 Degrees48 Minutes 42 Seconds East, departing the east line of said F.M. Highway 1378, along the south line of said Esfandiari and Dezfoolian tract, 215.21 feet to a 60d nail set with flasher stamped 'Sparr Surveys' in the remnants of a wood fence post at the southeast corner of said Esfandiari and Dezfoolian tract;

THENCE North 00 Degrees 27 Minutes 53 Seconds West, along the east line of said Esfandiari and Dezfoolian tract, 105.13 feet to a 518-inch iron rod set with plastic cap stamped 'Spam Surveys' in the south line of said F.M. Highway 3286 at the northeast corner of said Esfandiari and Dezfoolian tract and lying in a non-tangent circular curve to the right having a radius of 417.45 feet;

THENCE easterly along the south line of said P.M. Highway 3286 the following:

Southeasterly along said curve to the right, through a central angle of 06 Degrees 55 Minutes 13 Seconds, an arc distance of 50.42 feet and having a chord which bears South 84 Degrees 57 Minutes 36 Seconds East, 50.39 feet to a concrete TXDOT monument found;

South 81 Degrees 30 Minutes 00 Seconds East, 325.17 feet to a concrete TXDOT monument found at the point of curvature of a circular curve to the left having a radius of 1492.39 feet;

Southeasterly along said curve to the left, through a central angle of 05 Degrees 17 Minutes 05 Seconds, an arc distance of 137.65 feet and having a chord which bears South 84 Degrees 08 Minutes 32 Seconds East, 137.60 feet to a 5/8-Inch iron rod set with plastic cap stamped 'Sparr Surveys';

South 68 Degrees 25 Minutes 11 Seconds East, 55.72 feet to a wooden TXDOT monument found;

South 88 Degrees 51 Minutes 22 Seconds East, 30.48 feet to the **POINT of BEGINNING** and containing 8.245 acres of land.



Brad Spar
Registered Professional
Land Surveyor No. 3701

This description was prepared for zoning purposes and should not be used for conveyance purposes.

EXHIBIT "D"
Masonry Wall Exceptions

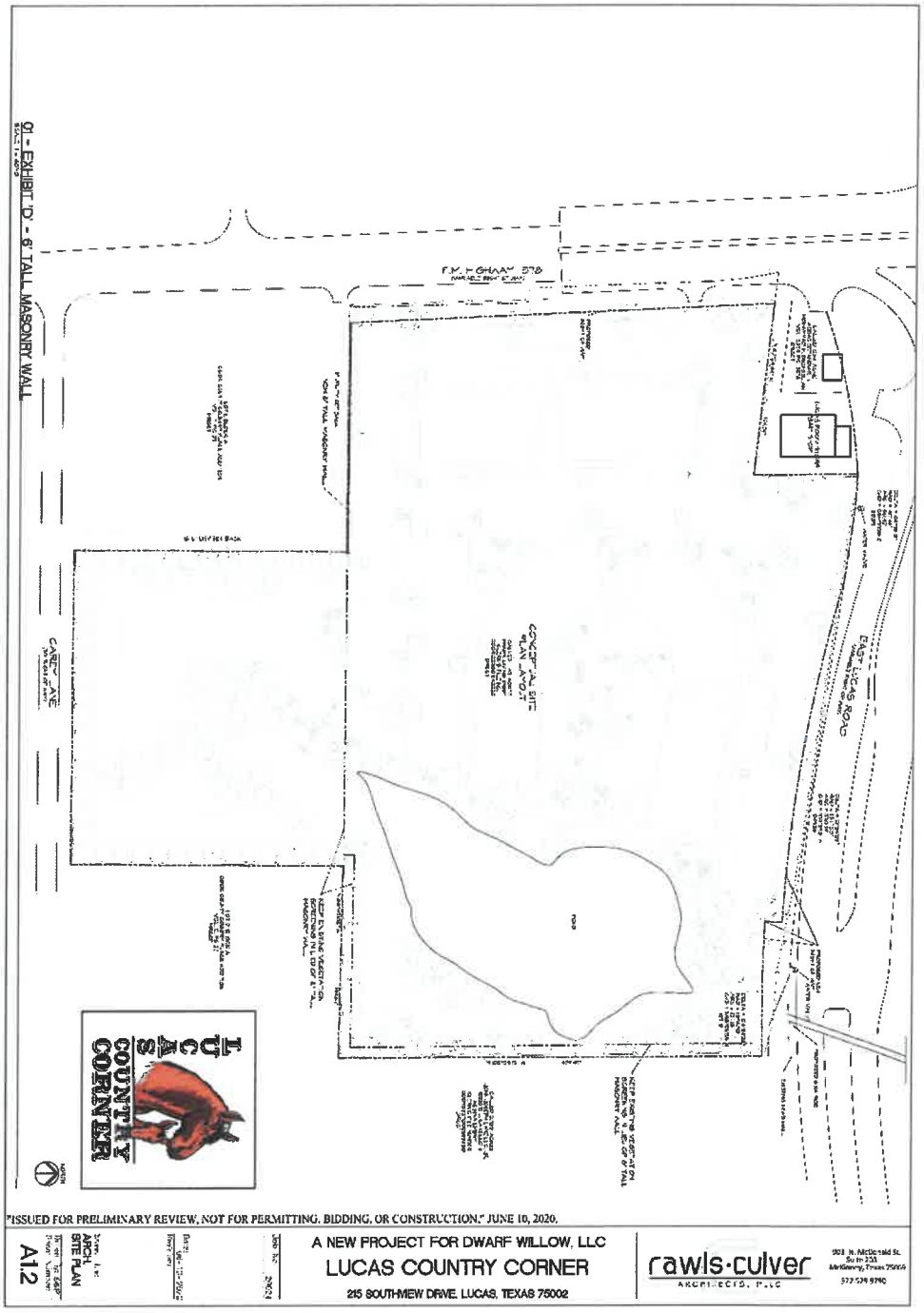


EXHIBIT "E"
Prohibited Businesses

Business Not Allowed:

I. Sexually oriented businesses. - Article 4.02
   1. Adult Arcade
   2. Adult Bookstore or Video Store
   3. Adult Theater
   4. Adult cabaret
   5. Adult Motel
   6. Escort Agencies
   7. Nude model studio
   8. Condom Shops

II. Vape Shops

III. Bars/Night Clubs

Non-Inclusive list of Business Encouraged:

Insurance	**Nail Salon**
Coffee Shop	**Prepared Food Store**
Restaurant	**Specialty Food Stores**
Organic Food Stores	**Donut Shop**
Dry Cleaning	**Financial Store**
Computer/Phone Store	**Pharmacy**
Music Store	**Barber Hair/Salon**
MedicaVDental Office	**Bicycle Shop**
Camera Studio	**Yoga Studio**
Professional Business Offices	**Bakery**
Child Care	**Vet Office**
Tack and Saddle Shop	**Quilt/Fabric Shop**
Bank	**Art Store**
Music Store	**Antique Stores**
Hobby Store	**Game/Magic Stores**
Book Stores	

LOCATION MAP





01 - SCHEMATIC SITE PLAN
SCALE: 1"= 40'-0"



LUCAS COUNTRY CORNER

ColorbyElarnaPark

"ISSUED FOR PRELIMINARY REVIEW, NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION." JUNE 10, 2020.

A NEW PROJECT FOR DWARF WILLOW, LLC

LUCAS COUNTRY CORNER

215 SOUTHVIEW DRIVE, LUCAS, TEXAS 75002

Job No: 20024

Date: 06-10-2020
Revision:

Sheet Title: ARCH. SITE PLAN

Drawn By: SGP
Sheet Number:

A1.1

rawls·culver
ARCHITECTS, PLLC

901 N. McDonald St.
Suite 209
McKinney, Texas 75069
972.529.9790

Item No. 06

City of Lucas
City Council Agenda Request
August 20, 2020

Requester: City Engineer Stanton Foerster

Agenda Item Request

Consider the approval of 1) Resolution R-2020-08-00503 of the City Council of the City of Lucas, Texas authorizing the approval of an agreement to contribute to right of way funds (fixed price), 2) authorize the Mayor to execute the agreement to contribute to right-of-way funds (fixed price) to the State of Texas through the Texas Department of Transportation for a transportation improvement project located at FM 1378 at FM 3286, and 3) using funds from the 2019 Certificates of Obligation for the City's participation in the right-of-way and utility adjustments for the Bait Shop Intersection (FM 1378/FM 3286) project and appropriate funds to line item 21-8210-491-138 in an amount not to exceed $129,517.60.

Background Information

In May 2017, the City entered into an agreement with Collin County for the purchase of 2.194 acres of land (Lucas Corners Tract) on the north side of Lucas Road. The City's cost was $300,000, and the land is being held in Collin County's name.

In July 2020, the City was contacted by members of the TxDOT ROW Division requesting that the City enter into an LPA. The Bait Shop Intersection project will have 11 parcels, and an estimate by TxDOT shows that the City's 10% participation cost (Texas Administrative Code: (43 TAC § Local Governments to contribute to the State funding participation for the cost of acquiring the right of way and relocating or adjusting utilities for the proper improvement of the State Highway System) is $129,517.60.

The City of Lucas has waterlines within the Lucas Road and Southview Drive TxDOT rights-of-way. The City may have to relocate all or some these waterlines at the City's expense depending on the TxDOT's final design of the project.

Attachments/Supporting Documentation

1. Resolution R-2020-08-00503 with TxDOT/Lucas Local Participation Agreement (Fixed Price) as Exhibit A.
2. Local Participation Agreement (Fixed Price)

Budget/Financial Impact

The City budgeted $800,000 for the Bait Shop Intersection in the 2019 Certificates of Obligation. Once TxDOT buys a portion of the 2.194-acre Lucas Corners Tract, which is held in the

City of Lucas
City Council Agenda Request
August 20, 2020

County's name, the proceeds would be divided between Collin County and the City of Lucas. At this time, the specifics of the division of funds has not been determined. As the design of the project continues, the City will need to fund the relocation of any City improvements within the TxDOT rights-of-way: waterlines, traffic signal Opticom equipment, etc.

Recommendation

Staff recommends proceeding as quickly as possible with the TxDOT LPA in an amount not to exceed $129,517.60 to not impede the progress of the Bait Shop Intersection project.

Motion

I make a motion to (approve/not approve) 1) Resolution R-2020-08-00503 of the City Council of the City of Lucas, Texas, approving the agreement to contribute to right-of-way funds to the State of Texas through the Texas Department of Transportation for a transportation improvement project; and providing for an effective date; and 2) using funds from the 2019 Certificates of Obligation for the City's participation in the right-of-way and utility adjustments for the Bait Shop Intersection (FM 1378/FM 3286) project and appropriate funds to line item 21-8210-491-138 in an amount not to exceed $129,517.60.

DocuSign Envelope ID: 68B5C81F-3291-4AFA-86FD-CD718AED85C0

Texas Department of Transportation

125 EAST 11TH STREET, AUSTIN, TEXAS 78701-2483 | 512.463.8588 | WWW.TXDOT.GOV

August 11, 2020

Joni Clarke, City Manager
City of Lucas
c/o Stanton Foerster, P.E.
665 Country Club Road
Lucas, Texas 75002

RE: Collin County
RCSJ-1392-01-049, CCSJ-1392-01-044
FM 1378 at FM 3286

Dear Ms. Clarke,

Enclosed for your execution are three "Agreement to Contribute Right of Way Funds (Fixed Price)" agreements for City of Lucas, and the project stated above.

Please sign and return the following to the address stated below: **three original agreements, Approval Ordinance/Resolution,** and/or **Certified Minutes** and a contribution check. Once final signatures are obtained, the City will have a fully executed agreement returned.

Texas Department of Transportation (TxDOT)
Attention: Tresa Mixon – ROW
4777 US Highway 80 East
Mesquite, Texas 75150-6643

Please understand that TxDOT cannot proceed with ROW acquisition until this process is completed.

If you have any questions, please contact Tresa Mixon at (214) 320-3546.

Sincerely,

DocuSigned by:
CD610F6E0D584EF...

John Hudspeth, P.E.
Director of Transportation, Planning and Development

Attachments
cc: Craig Dearman DS

DocuSign Envelope ID: 68B5C81F-3291-4AFA-86FD-CD718AED85C0

County **Collin**
District Dallas
ROW CSJ **1392-01-049**
CCSJ # **1392-01-044**
Federal Project #: - - -
CFDA Title: Highway Planning & Construction
CFDA # 20.205
Federal Highway Administration
Not Research and Development

STATE OF TEXAS §

COUNTY OF TRAVIS §

AGREEMENT TO CONTRIBUTE RIGHT OF WAY FUNDS (FIXED PRICE)

THIS AGREEMENT is made by and between the State of Texas, acting through the Texas Department of Transportation, (the "**State**"), and the City of Lucas, Texas, acting through its duly authorized officials (the "**Local Government**").

WITNESSETH

WHEREAS, Texas Transportation Code §§ 201.103 and 222.052 establish that the State shall design, construct, and operate a system of highways in cooperation with local governments; and

WHEREAS, Texas Transportation Code, §§ 201.209 authorizes the State and a Local Government to enter into agreements in accordance with Texas Government Code, Chapter 791; and

WHEREAS, the State has deemed it necessary to make certain highway improvements on Highway No.FM 1378 at FM 3286, and this section of highway improvements will necessitate the acquisition of certain right of way and the relocating and adjusting of utilities (the "**Project**"); and

WHEREAS, the Local Government requests that the State assume responsibility for acquisition of all necessary right of way and adjustment of utilities for this highway project; and

WHEREAS, the Local Government desires to enter into a fixed price joint participation agreement pursuant to 43 TAC §15.52 to contribute to the State funding participation as defined in 43 TAC §15.55 for the cost of acquiring the right of way and relocating or adjusting utilities for the proper improvement of the State Highway System;

WHEREAS, the Governing Body of the Local Government has approved entering into this agreement by resolution or ordinance dated _____, 20__, which is attached to and made a part of this agreement as Attachment A. A map showing the Project location appears in Attachment B, which is attached to and made a part of this agreement.

NOW THEREFORE, the State and the Local Government do agree as follows:

County **Collin**
District Dallas
ROW CSJ **1392-01-049**
CCSJ # **1392-01-044**
Federal Project #: - - -
CFDA Title: Highway Planning & Construction
CFDA # 20.205
Federal Highway Administration
Not Research and Development

AGREEMENT

1. **Agreement Period**
   This agreement becomes effective when signed by the last party whose signing makes the agreement fully executed. This agreement shall remain in effect until the Project is completed or unless terminated as provided below.

2. **Termination**
   This agreement shall remain in effect until the Project is completed and accepted by all parties, unless:
   A. The agreement is terminated in writing with the mutual consent of the parties;
   B. The agreement is terminated by one party because of a breach, in which case any cost incurred because of the breach shall be paid by the breaching party; or
   C. The Project is inactive for thirty-six (36) months or longer and no expenditures have been charged against federal funds, in which case the State may in its discretion terminate this agreement.

3. **Local Project Sources and Uses of Funds**
   A. The total estimated cost of the Project is shown in Attachment C, Project Budget Estimate and Payment Schedule, which is attached to and made a part of this agreement. The expected cash contributions from the Federal or State government, the Local Government, or other parties is shown in Attachment C. The Local Government shall pay to the State the amount shown in Attachment C as its required contribution of the total cost of the Project and shall transmit to the State with the return of this agreement, duly executed by the Local Government, a warrant or check for the amount and according to the payment schedule shown in Attachment C.
   B. The Local Government's fixed price contribution set forth in Attachment C is not subject to adjustment unless:
      1. site conditions change;
      2. work requested by the Local Government is ineligible for federal participation; or
      3. the adjustment is mutually agreed on by the State and the Local Government.
   C. If the Local Government will perform any work under this contract for which reimbursement will be provided by or through the State, the Local Government must complete training before federal spending authority is obligated. Training is complete when at least one individual who is working actively and directly on the Project successfully completes and receives a certificate for the course entitled *Local Government Project Procedures Qualification for the Texas Department of Transportation*. The Local Government shall provide the certificate of qualification to the State. The individual who receives the training certificate may be an employee of the Local Government or an employee of a firm that has been contracted by the Local

County **Collin**
District Dallas
ROW CSJ **1392-01-049**
CCSJ # **1392-01-044**
Federal Project #: - - -
CFDA Title: Highway Planning & Construction
CFDA # 20.205
Federal Highway Administration
Not Research and Development

Government to perform oversight of the Project. The State in its discretion may deny reimbursement if the Local Government has not designated a qualified individual to oversee the Project.

D. Whenever funds are paid by the Local Government to the State under this agreement, the Local Government shall remit a warrant or check made payable to the "Texas Department of Transportation Trust Fund." The warrant or check shall be deposited by the State in an escrow account to be managed by the State. Funds in the escrow account may only be applied to this highway project.

E. Notwithstanding that this is a fixed price agreement, the Local Government agrees that in the event any existing, future, or proposed Local Government ordinance, commissioner's court order, rule, policy, or other directive, including, but not limited to, outdoor advertising or storm water drainage facility requirements, is more restrictive than State or federal regulations, or any other locally proposed change, including, but not limited to, plats or re-plats, results in any increased costs to the State, then the Local Government will pay one hundred percent (100%) of all those increased costs, even if the applicable county qualifies as an Economically Disadvantaged County (EDC). The amount of the increased costs associated with the existing, future, or proposed Local Government ordinance, commissioner's court order, rule, policy, or other directive will be determined by the State at its sole discretion.

F. If the Local Government is an EDC and if the State has approved adjustments to the standard financing arrangement, this agreement reflects those adjustments.

G. If the Project has been approved for an "incremental payment" non-standard funding or payment arrangement under 43 TAC §15.52, the budget in Attachment C will clearly state the incremental payment schedule.

4. Real Property in Lieu of Monetary Payment

A. Contributions of real property may be credited to the Local Government's funding obligation for the cost of right of way to be acquired for this project. Credit for all real property, other than property which is already dedicated or in use as a public road, contributed by the Local Government to the State shall be based on the property's fair market value established as of the effective date of this agreement. The fair market value shall not include increases or decreases in value caused by the project and should include the value of the land and improvements being conveyed, excluding any damages to the remainder. The amount of any credit for real property contributed for this project is clearly shown in Attachment C.

B. The Local Government will provide to the State all documentation to support the determined fair market value of the donated property. This documentation shall include an appraisal of the property by a licensed appraiser approved by the State. The cost of appraisal will be the responsibility of the State. The State will review the submitted documentation and make a final determination of value; provided however, the State may perform any additional investigation deemed necessary, including supplemental appraisal work by State employees or employment of fee appraisers.

County **Collin**
District Dallas
ROW CSJ **1392-01-049**
CCSJ # **1392-01-044**
Federal Project #: - - -
CFDA Title: Highway Planning & Construction
CFDA # 20.205
Federal Highway Administration
Not Research and Development

C. Credit shall be given only for property transferred at no cost to the State after the effective date of this agreement and the issuance of spending authority, and only for property which is necessary to complete this project, has title acceptable to the State, and is not contaminated with hazardous materials. Credit shall be in lieu of monetary contributions required to be paid to the State for the Local Government's funding share of the right of way to be acquired for this project. The total credit cannot exceed the Local Government's matching share of the right of way obligation under this agreement, and credits cannot be reimbursed in cash to the Local Government, applied to project phases other than right of way, nor used for other projects.

D. In the event the Local Government's monetary contributions to the State for acquisition of right of way, when added to its real property credits, exceed the Local Government's matching share of the right of way obligation, there will be no refund to the Local Government of any portion of its contributed money.

5. Amendments

Amendments to this agreement due to changes in the character of the work, terms of the agreement, or responsibilities of the parties relating to the Project may be enacted through a mutually agreed upon, written supplemental agreement.

6. Notices

All notices to either party by the other required under this agreement shall be delivered personally or sent by certified or U.S. mail, postage prepaid, to the following addresses:

Local Government:	**State:**
Joni Clarke, City Manager	Director of Right of Way Division
c/o Stanton Foerster, P.E.	Texas Department of Transportation
665 Country Club Road	125 E. 11th Street
Lucas, Texas 75002	Austin, Texas 78701

All notices shall be deemed given on the date delivered or deposited in the mail, unless otherwise provided by this agreement. Either party may change the above address by sending written notice of the change to the other party. Either party may request in writing that notices shall be delivered personally or by certified U.S. mail and that request shall be honored and carried out by the other party.

County **Collin**
District Dallas
ROW CSJ **1392-01-049**
CCSJ # **1392-01-044**
Federal Project #: - - -
CFDA Title: Highway Planning & Construction
CFDA # 20.205
Federal Highway Administration
Not Research and Development

7. Remedies
This agreement shall not be considered as specifying the exclusive remedy for any agreement default, but all remedies existing at law and in equity may be availed of by either party to this agreement and shall be cumulative.

8. Legal Construction
If one or more of the provisions contained in this agreement shall for any reason be held invalid, illegal, or unenforceable in any respect, that invalidity, illegality, or unenforceability shall not affect any other provisions and this agreement shall be construed as if it did not contain the invalid, illegal, or unenforceable provision.

9. Responsibilities of the Parties
The State and the Local Government agree that neither party is an agent, servant, or employee of the other party and each party agrees it is responsible for its individual acts and deeds as well as the acts and deeds of its contractors, employees, representatives, and agents.

10. Compliance with Laws
The parties shall comply with all federal, state, and local laws, statutes, ordinances, rules and regulations, and the orders and decrees of any courts or administrative bodies or tribunals in any manner affecting the performance of this agreement. When required, the Local Government shall furnish the State with satisfactory proof of this compliance.

11. Sole Agreement
This agreement constitutes the sole and only agreement between the parties and supersedes any prior understandings or written or oral agreements respecting the subject matter of this agreement.

12. Ownership of Documents
Upon completion or termination of this agreement, all documents prepared by the State shall remain the property of the State. All data prepared under this agreement shall be made available to the State without restriction or limitation on their further use. All documents produced or approved or otherwise created by the Local Government shall be transmitted to the State in the form of photocopy reproduction on a monthly basis as required by the State. The originals shall remain the property of the Local Government. At the request of the State, the Local Government shall submit any information required by the State in the format directed by the State.

13. Inspection of Books and Records
The Local Government shall maintain all books, papers, accounting records and other documentation relating to costs incurred under this agreement and shall make such materials available to the State and, if federally funded, the Federal Highway

County **Collin**
District Dallas
ROW CSJ **1392-01-049**
CCSJ # **1392-01-044**
Federal Project #: - - -
CFDA Title: Highway Planning & Construction
CFDA # 20.205
Federal Highway Administration
Not Research and Development

Administration (FHWA) or their duly authorized representatives for review and inspection at its office during the contract period and for four (4) years from the date of completion of work defined under this agreement or until any impending litigation, or claims are resolved. Additionally, the State and FHWA and their duly authorized representatives shall have access to all the governmental records that are directly applicable to this agreement for the purpose of making audits, examinations, excerpts, and transcriptions.

14. State Auditor

The state auditor may conduct an audit or investigation of any entity receiving funds from the State directly under this agreement or indirectly through a subcontract under this agreement. Acceptance of funds directly under this agreement or indirectly through a subcontract under this agreement acts as acceptance of the authority of the state auditor, under the direction of the legislative audit committee, to conduct an audit or investigation in connection with those funds. An entity that is the subject of an audit or investigation must provide the state auditor with access to any information the state auditor considers relevant to the investigation or audit.

15. Procurement and Property Management Standards

The parties shall adhere to the procurement standards established in Title 49 CFR §18.36 and with the property management standard established in Title 49 CFR §18.32.

16. Civil Rights Compliance

The parties to this agreement shall comply with the regulations of the U.S. Department of Transportation as they relate to nondiscrimination (49 CFR Part 21 and 23 CFR Part 200), and Executive Order 11246 titled "Equal Employment Opportunity," as amended by Executive Order 11375 and supplemented in the Department of Labor Regulations (41 CFR Part 60).

17. Applicability of Federal Provisions

Articles 18 through 23 only apply if Federal funding is used in the acquisition of right of way or the adjustment of utilities.

18. Office of Management and Budget (OMB) Cost Principles

In order to be reimbursed with federal funds, the parties shall comply with the Cost Principles established in OMB Circular A-87 that specify that all reimbursed costs are allowable, reasonable, and allocable to the Project.

19. Disadvantaged Business Enterprise (DBE) Program Requirements

A. The parties shall comply with the DBE Program requirements established in 49 CFR Part 26.

B. The Local Government shall adopt, in its totality, the State's federally approved DBE program.

County **Collin**
District Dallas
ROW CSJ **1392-01-049**
CCSJ # **1392-01-044**
Federal Project #: - - -
CFDA Title: Highway Planning & Construction
CFDA # 20.205
Federal Highway Administration
Not Research and Development

C. The Local Government shall set an appropriate DBE goal consistent with the State's DBE guidelines and in consideration of the local market, project size, and nature of the goods or services to be acquired. The Local Government shall have final decision-making authority regarding the DBE goal and shall be responsible for documenting its actions.

D. The Local Government shall follow all other parts of the State's DBE program referenced in TxDOT Form 2395, Memorandum of Understanding Regarding the Adoption of the Texas Department of Transportation's Federally -Approved Disadvantaged Business Enterprise by Entity and attachments found at web address http://txdot.gov/business/business_outreach/mou.htm.

E. The Local Government shall not discriminate on the basis of race, color, national origin, or sex in the award and performance of any U.S. Department of Transportation (DOT)-assisted contract or in the administration of its DBE program or the requirements of 49 CFR Part 26. The Local Government shall take all necessary and reasonable steps under 49 CFR Part 26 to ensure non-discrimination in award and administration of DOT-assisted contracts. The State's DBE program, as required by 49 CFR Part 26 and as approved by DOT, is incorporated by reference in this agreement. Implementation of this program is a legal obligation and failure to carry out its terms shall be treated as a violation of this agreement. Upon notification to the Local Government of its failure to carry out its approved program, the State may impose sanctions as provided for under 49 CFR Part 26 and may, in appropriate cases, refer the matter for enforcement under 18 USC 1001 and the Program Fraud Civil Remedies Act of 1986 (31 USC 3801 et seq.).

F. Each contract the Local Government signs with a contractor (and each subcontract the prime contractor signs with a sub-contractor) must include the following assurance: *The contractor, sub-recipient, or sub-contractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this agreement, which may result in the termination of this agreement or such other remedy as the recipient deems appropriate.*

20. Debarment Certification

The parties are prohibited from making any award at any tier to any party that is debarred or suspended or otherwise excluded from or ineligible for participation in Federal Assistance Programs under Executive Order 12549, "Debarment and Suspension." By executing this agreement, the Local Government certifies that it is not currently debarred, suspended, or otherwise excluded from or ineligible for participation in Federal Assistance Programs under Executive Order 12549 and further certifies that it will not do business with any party that is currently debarred, suspended, or otherwise excluded from or ineligible for participation in Federal Assistance Programs under Executive Order 12549. The parties to this contract shall require any party to a subcontract or purchase order awarded under this

County **Collin**
District Dallas
ROW CSJ **1392-01-049**
CCSJ # **1392-01-044**
Federal Project #: - - -
CFDA Title: Highway Planning & Construction
CFDA # 20.205
Federal Highway Administration
Not Research and Development

contract to certify its eligibility to receive federal funds and, when requested by the State, to furnish a copy of the certification.

21. Lobbying Certification

In executing this agreement, each signatory certifies to the best of that signatory's knowledge and belief, that:

A. No federal appropriated funds have been paid or will be paid by or on behalf of the parties to any person for influencing or attempting to influence an officer or employee of any federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any federal contract, the making of any federal grant, the making of any federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any federal contract, grant, loan, or cooperative agreement.

B. If any funds other than federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with federal contracts, grants, loans, or cooperative agreements, the signatory for the Local Government shall complete and submit the Federal Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

C. The parties shall require that the language of this certification shall be included in the award documents for all sub-awards at all tiers (including subcontracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and all sub-recipients shall certify and disclose accordingly. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Title 31 USC §1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each failure.

22. Federal Funding Accountability and Transparency Act Requirements

A. Any recipient of funds under this agreement agrees to comply with the Federal Funding Accountability and Transparency Act (FFATA) and implementing regulations at 2 CFR Part 170, including Appendix A. This agreement is subject to the following award terms: http://www.gpo.gov/fdsys/pkg/FR-2010-09-14/pdf/2010-22705.pdf and http://www.gpo.gov/fdsys/pkg/FR-2010-09-14/pdf/2010-22706.pdf.

B. The Local Government agrees that it shall:

1. Obtain and provide to the State a System for Award Management (SAM) number (Federal Acquisition Regulation, Part 4, Sub-part 4.11) if this award provides more than $25,000 in Federal funding. The SAM number may be obtained by visiting the SAM website whose address is: https://www.sam.gov/portal/public/SAM/

2. Obtain and provide to the State a Data Universal Numbering System (DUNS) number, a unique nine-character number that allows Federal government to track the

County **Collin**
District Dallas
ROW CSJ **1392-01-049**
CCSJ # **1392-01-044**
Federal Project #: - - -
CFDA Title: Highway Planning & Construction
CFDA # 20.205
Federal Highway Administration
Not Research and Development

distribution of federal money. The DUNS may be requested free of charge for all businesses and entities required to do so by visiting the Dun & Bradstreet (D&B) on-line registration website http://fedgov.dnb.com/webform; and

3. Report the total compensation and names of its top five (5) executives to the State if:

i. More than 80% of annual gross revenues are from the Federal government, and those revenues are greater than $25,000,000; and

ii. The compensation information is not already available through reporting to the U.S. Securities and Exchange Commission.

23. Single Audit Report

A. The parties shall comply with the requirements of the Single Audit Act of 1984, P.L. 98-502, ensuring that the single audit report includes the coverage stipulated in OMB Circular A-133.

B. If threshold expenditures of $750,000 or more are met during the Local Government's fiscal year, the Local Government must submit a Single Audit Report and Management Letter (if applicable) to TxDOT's Audit Office, 125 E. 11th Street, Austin, TX 78701 or contact TxDOT's Audit Office at http://txdot.gov/inside-txdot/office/audit/contact.html

C. If expenditures are less than $750,000 during the Local Government's fiscal year, the Local Government must submit a statement to TxDOT's Audit Office as follows: "We did not meet the $750,000 expenditure threshold and therefore, are not required to have a single audit performed for FY _____."

D. For each year the project remains open for federal funding expenditures, the Local Government will be responsible for filing a report or statement as described above. The required annual filing shall extend throughout the life of the agreement, unless otherwise amended or the project has been formally closed out and no charges have been incurred within the current fiscal year.

24. Signatory Warranty

Each signatory warrants that the signatory has necessary authority to execute this agreement on behalf of the entity represented.

DocuSign Envelope ID: 68B5C81F-3291-4AFA-86FD-CD718AED85C0

County **Collin**
District Dallas
ROW CSJ **1392-01-049**
CCSJ # **1392-01-044**
Federal Project #: - - -
CFDA Title: Highway Planning & Construction
CFDA # 20.205
Federal Highway Administration
Not Research and Development

THIS AGREEMENT IS EXECUTED by the State and the Local Government in duplicate.

THE LOCAL GOVERNMENT

_____
Signature

_____
Typed or Printed Name

_____
Title

_____
Date

THE STATE OF TEXAS

_____
Rose Wheeler
Contracts & Finance Director
Right of Way Division
Texas Department of Transportation

_____
Date

DocuSign Envelope ID: 68B5C81F-3291-4AFA-86FD-CD718AED85C0

County **Collin**
District Dallas
ROW CSJ **1392-01-049**
CCSJ # **1392-01-044**
Federal Project #: - - -
CFDA Title: Highway Planning & Construction
CFDA # 20.205
Federal Highway Administration
Not Research and Development

ATTACHMENT A
RESOLUTION OR ORDINANCE

RESOLUTION NO. R-2020-08-00503

[Approving Agreement to Contribute to Right-of-Way Funds (Fixed Price)]

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF LUCAS, TEXAS, APPROVING THE AGREEMENT TO CONTRIBUTE TO RIGHT-OF-WAY FUNDS TO THE STATE OF TEXAS THROUGH THE TEXAS DEPARTMENT OF TRANSPORTATION FOR A TRANSPORTATION IMPROVEMENT PROJECT; AND PROVIDING FOR AN EFFECTIVE DATE.

WHEREAS, the Texas Transportation Code, Sections 201.103 and 222.052, establishes that the State shall design, construct, and operate a system of highways in cooperation with local governments; and

WHEREAS, the Texas Transportation Code, Section 201.209, authorizes the State and a Local Government to enter into agreements in accordance with Texas Government Code, Chapter 791; and

WHEREAS, the State has deemed it necessary to make certain highway improvements on Highway No. FM 1378 at FM 3286, and this section of highway improvements will necessitate the acquisition of certain right-of-way and the relocating and adjusting of utilities (the "Project"); and

WHEREAS, the Local Government requests that the State assume responsibility for acquisition of all necessary right-of-way and adjustments of utilities for this highway project; and

WHEREAS, the Local Government desires to enter into a fixed price joint participation agreement pursuant to 43 TAC §15.52 to contribute to the State funding participation as defined in 43 TAC §15.55 for the cost of acquiring the right of way and relocating or adjusting utilities for the proper improvement of the State Highway System; and

WHEREAS, the City Council of the City of Lucas, Texas, desires to enter into an Agreement To Contribute Right of Way Funds for a Transportation Improvement Project (the "Agreement") between the Texas Department of Transportation and the City for the Project;

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF LUCAS, TEXAS, THAT:

SECTION 1. The Mayor is hereby authorized to execute the Agreement to Contribute Right of Way Funds (Fixed Price), for certain highway improvements on FM 1378 at FM 3286 with the Texas Department of Transportation.

SECTION 2. This Resolution shall take effect immediately upon its passage.

DULY PASSED by the City Council of the City of Lucas, Texas, on the 20th day of August, 2020.

APPROVED:

Jim Olk, Mayor

ATTEST:

Stacy Henderson, City Secretary

APPROVED AS TO FORM:

Joseph J. Gorfida, Jr., City Attorney

DocuSign Envelope ID: 68B5C81F-3291-4AFA-86FD-CD718AED85C0

County **Collin**
District Dallas
ROW CSJ **1392-01-049**
CCSJ # **1392-01-044**
Federal Project #: - - -
CFDA Title: Highway Planning & Construction
CFDA # 20.205
Federal Highway Administration
Not Research and Development

ATTACHMENT B
LOCATION MAP SHOWING PROJECT



DocuSign Envelope ID: 68B5C81F-3291-4AFA-86FD-CD718AED85C0

County **Collin**
District Dallas
ROW CSJ **1392-01-049**
CCSJ # **1392-01-044**
Federal Project #: - - -
CFDA Title: Highway Planning & Construction
CFDA # 20.205
Federal Highway Administration
Not Research and Development

ATTACHMENT C
PROJECT BUDGET ESTIMATE AND PAYMENT SCHEDULE

Texas Department of Transportation

County	Collin
District	Dallas District
ROW CSJ #	1392-01-049
CCSJ #	1392-01-044

Federal Project #	
CFDA Title: Highway Planning and Construction	
FHWA CFDA # 20.205	
Federal Highway Administration	
Not Research and Development	

Standard Agreement to Contribute
State Performs Work
Attachment C

Description	Total Estimated Cost	Participation				Total % (should be 100%)
		State		Local		
		%	Cost	%	Cost	
Right of Way Acquisition	$1,255,280.00	90.0%	$1,129,752.00	10.0%	$125,528.00	100.0%
Reimbursable Utility Adjustments	$39,896.00	90.0%	$35,906.40	10.0%	$3,989.60	100.0%
Joint Bid - Reimbursable Utility Adjustments						0.0%
TOTAL	$1,295,176.00		$1,165,658.40		$129,517.60	

Fixed Amount
Except as otherwise provided in the Agreement, the fixed amount of Local Government participation will be that amount provided above.

City of Lucas
City Council Agenda Request
August 20, 2020

Item No. 07

Requester: Development Services Director Joe Hilbourn

Agenda Item Request

Consider a modification to trail easements within the Stinson Highlands subdivision through the platting process from the rear yard to the front yard.

Background Information

Recently 925 Inverness and 1001 Inverness applied for permits to install fencing. While waiting for review, the fence companies installed the fences. The fence permits were denied because they blocked a trails access easement. The City has acquired easements for trails through Stinson Highlands. Staff is proposing a modification moving the trails easement on lots 4 through 7, block A from the rear yard to the front yard.

The property at 1015 Inverness, south of 925 Inverness, also installed a fence across a trails access easement, the fence at 1015 Inverness was installed prior to the City requiring fence permits.

Before requiring homeowners to remove fences, staff wants to verify that the trails easements are still necessary, and if they are, could alter the alignment and have the trails easements go in front of the properties from open space lot 8, Block A to lot 4, block A. South of lot 4, block A the trail was always designed to be in the right of way for a prescribed distance. See attached detail taken from the approved plat.

Attachments/Supporting Documentation

1. Proposed trail easement location/plat
2. Location map

Budget/Financial Impact

NA

Recommendation

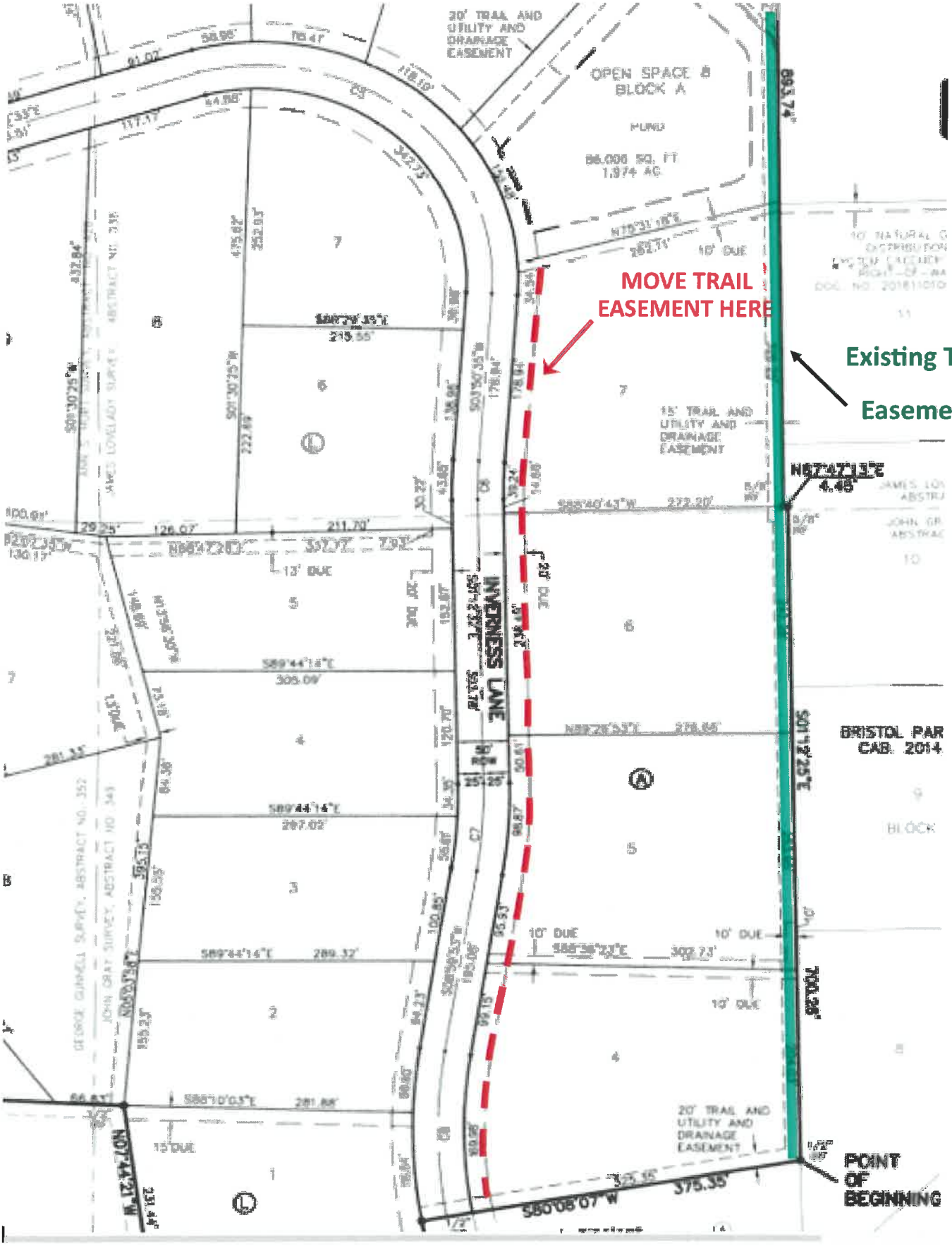
Staff recommends approving the alteration to move the trails easements on lots 4 through 7, Block A of Stinson Highlands from the rear yard to the front yard.

City of Lucas
City Council Agenda Request
August 20, 2020

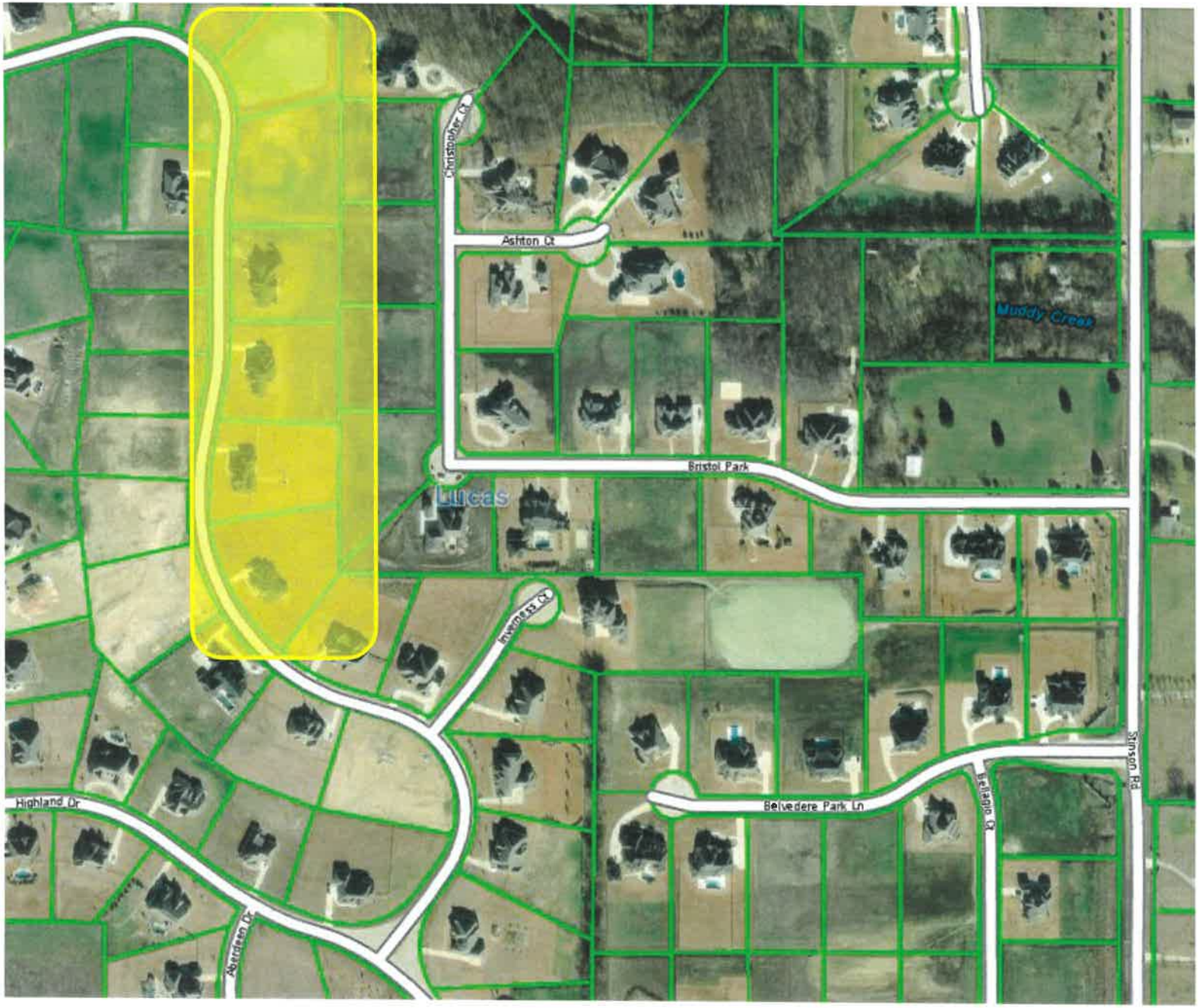
Item No. 07

Motion

I make a motion to approve/deny proposed modifications to the trails master plan moving the trails access easements on lots 4 through 7, block A of Stinson Highlands from the rear yard to the front yard.


MOVE TRAIL
EASEMENT HERE
Existing Trail
Easement
OPEN SPACE 8
BLOCK A
POND
20' TRAIL AND
UTILITY AND
DRAINAGE
EASEMENT
15' TRAIL AND
UTILITY AND
DRAINAGE
EASEMENT
INVERNESS LANE
BRISTOL PAR
CAB. 2014
POINT
OF
BEGINNING
S80°08'07"W
375.35'
N87°47'13"E
4.48'
S01°12'25"E
700.28'
N07°44'21"W
S88°10'03"E
281.88'
S89°44'14"E
289.32'
S89°44'14"E
297.02'
S89°44'14"E
305.09'
S88°40'43"W
272.20'
N89°28'53"E
278.66'
S88°36'23"E
302.73'
10' DUE
13' DUE
15' DUE
20' DUE
30' DUE
50' ROW
25'-25'
893.74'

TRAIL EASEMENT LOCATION MAP



Item No. 08

City of Lucas
City Council Agenda Request
August 20, 2020

Requester: City Engineer Stanton Foerster

Agenda Item Request

Consider the Bridge Alternative Report (BAR) of the Stinson Bridge and Roadway Improvements and provide direction to the City Manager.

Background Information

In December 2019, the City engaged the professional services of Lakes Engineering, Inc. to start designs of the Stinson Road bridge crossing at Muddy Creek and the associated roadway from Bristol Park to Bentwater Drive. Lakes has completed about 10% of the design, but Lakes is requesting direction from the City regarding bridge materials and location relative to the existing bridge before proceeding any further with the design. The major elements discussed in the BAR as follows:

A. Which alignment is best: maintain the same horizontal location or shift it to the east?

B. What are the impacts to the rights-of-way based on the two alignments?

C. What are the impacts to the easements based on the two alignments?

D. How are the nine driveways within the project impacted? What special consideration is needed for the two driveways closest to the bridge?

E. What materials should be used for the bridge structure and how do the materials impact the height of the bridge above Muddy Creek?

F. How do the two alignments impact bridge constructability and impede traffic flow during construction?

G. How do the two alignments impact the cost of the bridge construction?

Attachments/Supporting Documentation

Bridge Alternative Report for Stinson Bridge and Roadway Improvements from Bristol Park to Bentwater Drive prepared by Lakes Engineering, Inc. for the City of Lucas and dated July 2020.

Item No. 08

City of Lucas
City Council Agenda Request
August 20, 2020

Budget/Financial Impact

The BAR provides several various cost alternatives. The impacts of the budget cannot be determined without direction from the City Council. This construction project is not funded.

Recommendation

The City Engineer does not concur with the Lakes recommendations and adds the following clarifications to the major elements:

A. Proceed with Horizontal Alignment 1. Keep the bridge and roadway in its exiting location.
B. Avoid right-of-way acquisition.
C. Proceed with access easements where rights-of-way are needed.
D. Develop consensus with the property owner regarding maintenance of access for the two driveways closest to the bridge.
E. Proceed with a single-span bridge design with four-7DS23 Beams, which will raise the existing roadway 3.64 feet at the bridge.
F. Close the project to all through traffic during the construction of the bridge and roadway.
G. Proceed with Horizontal Alignment 1. Keep the bridge and roadway in its exiting location despite the cost being 15% higher than Horizontal Alignment 2.

Lakes Engineering's recommendations are as follows:

The **proposed bridge** typical section provides one (1) 12'-0" traveling lanes in each direction and a 2'-0" wide shoulder on each side with a 0.02 ft/ft crown, and a bridge railing type T411. The **proposed roadway** typical section provides one concrete paved (1) 12'-0" traveling lanes in each direction and an unpaved 2'- 0" wide shoulder on each side with a cross-slope of 0.02 ft/ft and 0.06 ft/ft, respectively.

Given the information here in presented, it is recommended that Stinson Road Culvert be replace with an 80'-0" single-span bridge on Horizontal Alignment 2 with a 4.31 ft vertical profile raise, utilizing Option 2: six (6) TxDOT Prestressed Concrete Box Beams (5B28) with a minimum 5" thick cast-in-place reinforced concrete deck, supported on twelve (12) 18"x18" driven concrete piles foundation or six (6) 30" diameter drilled shafts with a cast-in-place reinforced concrete abutment foundation. Retaining walls are recommended on the northeast and southeast of the bridge. It is also recommended that construction be completed by implementing a Complete Closure and Detour with southbound remaining open to local traffic only.

Horizontal Alignment 2 has a higher estimated cost by only 15%, see Appendix A for the Alternatives Cost Comparison. The increase is due to right-of-way acquisition and increased span length. A significant key advantage of the Horizontal Alignment 2 is that it offers added safety to the traveling to the public and residents along Stinson Road by encouraging reduced

City of Lucas
City Council Agenda Request
August 20, 2020

speed. It also makes phased construction feasible if the City should desire. Many advantages are realized by Horizontal Alignment 2 for a fractional increase in cost. Therefore, the recommended proposed alignment is Horizontal Alignment 2.

If Horizontal Alignment 2 is not feasible due to right-of-way acquisitions, then it is recommended that Stinson Road Culvert be replaced with a 60'-0" single-span bridge on Horizontal Alignment 1 with a 3.64 ft vertical profile raise, utilizing Option 1: four (4) TxDOT Prestressed Concrete Decked Slab Beams (7DS23) with a minimum 2" thick concrete or asphalt overlay, which supports on ten (10) 18"x18" driven concrete piles foundation or six (6) 30" diameter drilled shafts with a cast-in-place reinforced concrete abutment foundation. Retaining walls are recommended on all four corners of the bridge.

The Complete Closure with Detour Option is recommended as this would allow for a shorter construction duration, resulting in overall construction savings.

Motion

I make a motion to (direct/not direct) the City Manager to proceed with design of the Stinson Road bridge and roadway in accordance with the following:

I. Option 1 - Keep the bridge and roadway in its current location
OR
Option 2 – Shift the roadway and bridge to the east.

II. Proceed with fee simple right-of-way acquisition
OR
proceed with obtaining easements in-leu-of fee simple right-of-way.

III. Proceed with a single span bridge using the following typical section:

Option 1/Option 2
Figure 10/NA – TxDOT Prestressed Concrete Decked Slab Beams (7SB23)
OR
Figure 11/15 – TxDOT Prestressed Concrete Box Beams
OR
Figure 12/16 – TxDOT Prestressed Concrete XBeams
OR
Figure 13/17 – TxDOT Prestressed Concrete I-Girders
OR
Figure 14/18 – Steel Rolled Beams

IV. Close the project to all through traffic during the construction of the bridge and roadway.

BRIDGE ALTERNATIVE REPORT

Stinson Bridge and Roadway Improvements from Bristol Park to Bentwater Drive

City of Lucas

Prepared for:
City of Lucas

Prepared by:

Lakes Engineering, Inc.

LAKES ENGINEERING | BCC

A BCC Engineering Company

July 2020

TABLE OF CONTENTS

SECTION PAGE

1. EXECUTIVE SUMMARY 2

2. INTRODUCTION 4

2.1. Project Background 4

2.2. Project Objective 6

3. GEOMETRIC DESIGN 7

3.1. Geometric Criteria 7

3.2. Horizontal and Vertical Alignment 8

3.3. Right-of-Way 10

3.4. Easement 10

3.5. Access Impact 10

4. STRUCTURAL DESIGN CRITERIA 11

4.1. Specifications 11

4.2. Bridge Loading 11

4.3. Environmental Classification 12

4.4. Materials 12

4.5. Permit 13

4.6. Aesthetics 13

4.7. Utilities 13

5. BRIDGE ALTERNATIVES 14

5.1. Span Arrangement Alternatives 14

5.2. Bridge Skew 17

5.3. Typical Section 17

5.4. Superstructure Alternatives 18

5.5. Substructure / Foundation Alternatives 29

5.6. Retaining Walls 29

5.7. Bridge Drainage 29

5.8. Bridge Lighting 29

5.9. Construction Sequencing 30

6. ALTERNATIVE COST COMPARISON 31

APPENDICES

APPENDIX A: Alternatives Cost Comparison

APPENDIX B: Existing Culvert Inspection Report (Lakes Engineering, Inc. F-15243)

APPENDIX C: References

1. EXECUTIVE SUMMARY

Lakes Engineering, Inc. has prepared this Bridge Alternative Report (BAR) for the proposed Stinson Bridge and Roadway Improvements from Bristol Park to Bentwater Drive The intent of this report is to give the City of Lucas a comprehensive analysis of the different options and costs to replace Stinson Road crossing over Muddy Creek. It provides our recommendations of the best alternative that will deliver, to the City of Lucas residents, the most value, best economy, and least impact to the public for these improvements.

Stinson Road Culvert over Muddy Creek is located approximately 1 mile north of Parker Rd. This crossing is currently in a floodplain and below the flood elevation. Muddy Creek has historically frequently overtopped Stinson Road Culvert, which is comprised of a double-barrel steel pipe each with a 78-inch diameter opening. The aging culvert opening is not adequate for larger storm events, gets clogged with debris easily, and has caused closure of the road many times. This is a problem that the City must monitor after heavy rains and causes recurring maintenance. Flooding and overtopping of Stinson Road is a safety hazard for the residents and road users of the vicinity area. Replacing the culvert with a bridge that is above the flood elevation will provide adequate opening, which will resolve the clogging and overtopping issues and may lower the water surface elevations locally. Replacing the existing crossing with a new culvert and roadway above the flood elevation does not solve the clogging issue and could potentially raise the water surface elevations upstream if clogging occurred. For these reasons, a culvert replacement option was not evaluated. We have evaluated many bridge constructions types and materials in the development of this report, provide a comparison and recommend solutions.

This report identifies the project in terms of needs, purpose, and recommended solution. It also provides design criteria and parameters, description of bridge superstructure options, and evaluates the alternatives according to the following:

A. Horizontal/Vertical Alignments
B. Right-of-Way/Easement
C. Access Impact
D. Bridge Superstructure Options
E. Method of Construction
F. Cost

The major elements discussed above are summarized below:

A. Two (2) Horizontal Alignments are presented.
   - ***Horizontal Alignment 1***, Stinson Road Bridge over Muddy Creek will match existing horizontal alignment.
   - ***Horizontal Alignment 2***, Stinson Road Bridge over Muddy Creek will be shifted to the east of the existing Stinson Road alignment introducing curves before and after the bridge.

   Horizontal Alignment 2 is recommended due to benefits in method of construction, it may reduce speeding, and less impact to driveways.
B. Both Horizontal Alignments require right-of-way acquisition as most of the road is on prescriptive right-of-way.
   - Horizontal Alignment 1 will require a total of 47,518 square feet right-of-way acquisition from 8 parcels along Stinson Road.

- Horizontal Alignment 2 will require total of 55,240 square feet right-of-way acquisition from 7 parcels along Stinson Road.

C. Both Horizontal Alignments will need easement acquisition along the east side for future utilities or any relocation needed.
   - Horizontal Alignment 1 will require total of 25,645 square feet easement acquisition from 9 parcels along Stinson Road.
   - Horizontal Alignment 2 will require total of 28,440 square feet easement acquisition from 9 parcels along Stinson Road.

D. There is a total of nine (9) driveways within the project limits on Stinson Road that may be impacted. Two driveways nearest the crossing will be significantly impacted due to the necessary raise of existing elevation should Horizontal Alignment 1 be employed, and work on private property would be required. Horizontal Alignment 2 will have less impact to driveways.

E. Seven (7) bridge superstructure alternatives are presented for each alignment. We have found option 2 to be the most cost-effective superstructure option considered for the most beneficial alignment, Horizontal Alignment 2. Option 2 offers an overall cost-savings, construction schedule advantages, and the lowest vertical profile raise compared to the other options. Therefore, option 2 with Horizontal Alignment 2 is the most feasible and is the recommended bridge superstructure alternative. This recommended bridge has the following characteristics:
   - 80ft single-span bridge with 0-degree skew,
   - Six (6) TxDOT Prestressed Concrete Box Beams (5B28)
   - 5in thick cast-in-place reinforced concrete deck.
   - Aesthetics similar to the Blondy Jhune bridges.
   - Vertical alignment associated with option 2/alignment 2 will raise the bridge 5 feet from the existing top of pavement and will have retaining walls northeast and southeast of the bridge.

F. The construction for Horizontal Alignment 1, which matches the existing alignment, would require complete road closure. For Horizontal Alignment 2, due to the offset to the east from the existing road, provides an opportunity for traffic access with at least one lane open for a majority of the project duration. Both alignments will provide a detour option for drivers to use Lewis Lane as an alternate route.

G. The recommended bridge superstructure alternative, option 2, is the most economical option for Horizontal Alignment 2.

2. INTRODUCTION

This Bridge Alternatives Report (BAR) is developed to define the parameters which affect the selection of the superstructure and substructure for the proposed bridge and provide alternatives. Issues addressed herein include geometric constraints, horizontal and vertical clearance requirements, utility conflicts, drainage issues, evaluation of span arrangements, evaluation of different superstructure and substructure alternatives, aesthetics, traffic control and construction sequencing and construction cost.

It is not the intent for this BAR to define the precise geometry of all structural elements, but rather to provide information in sufficient detail to fairly assess the relative impacts of the various alternatives and establish basic parameters needed to proceed to the final design phase.

2.1. Project Background

Stinson Road crosses Muddy Creek approximately 1 mile north of Parker Road and approximately 3 miles west of Lavon Lake within the City of Lucas located in Collin County, Texas. The existing culvert is comprised of a double-barrel steel pipe each with a 78-inch diameter opening and approximately 29.6 feet long with 3 feet of fill and an asphalt roadway on top. It is estimated that the culvert was constructed around 1980 with a timber headwall and was later reconstructed to a concrete headwall with the two-barrel steel pipe remaining in place. The culvert does not appear to have ever been rehabilitated since the reconstruction. The culvert has a roadway width of approximately 21 feet and carries two lanes of traffic with no shoulder width on either side.

Based on an inspection report performed by Lakes Engineering on June 26, 2019 (refer to Appendix B), the current condition of the culvert is structurally deficient and functionally obsolete with a sufficiency rating of 63 (rated by NBIS procedure). It is important to note that structurally deficient does not carry the meaning of structurally unsafe, at the time of this report. The field inspection found the following deficiencies:

- Marginal and substantial longitudinal cracking on the top of the asphalt roadway
- Asphalt pavement edge failure in all four corners
- Spalls and cracks on various locations on the headwalls and wingwalls
- Evidence of flooding
- Headwall 2 (downstream) is out of plumb
- 1-foot scour at outfall and exposed encased utility at headwall 2 (downstream) under culvert 2
- Scour/erosion at outlet of headwall 2 (downstream) above culvert 2 and loss of backfill
- Undermining of headwall 1 (upstream)
- Substandard railing type, height, openings and crashworthiness

The waterway opening appears to be inadequate. It is reported that Muddy Creek overtops Stinson Road multiple times a year, causing traffic delays and disruptions. A gate with a "ROAD FLOODED" sign is posted on each approach of the culvert that is closed by the City of Lucas when overtopping occurs.

Existing condition photos are shown below.



Approach- Looking North



Approach - Looking South



Downstream Headwall



Upstream Headwall



Downstream – During A Storm Event



Upstream – During A Storm Event

2.2. Project Objective

The intent of this project is to address the existing and future operational and safety conditions of Stinson Road culvert over Muddy Creek. Because the age and current condition, the project proposes to replace the culvert with a new structure that is sufficiently durable and resilient to environmental effects and flooding. The structure must be sustainable, minimize maintenance requirements and provide a safe and rideable corridor for the traveling public.

The project will involve the construction of a new bridge to carry Stinson Road over Muddy Creek located in the City of Lucas, Collin County, Texas. See **Figure 1 – Project Location Map.**



Figure 1 – Project Location Map

3. GEOMETRIC DESIGN

3.1. Geometric Criteria

Stinson Road is a low-speed, local road. It is classified as a low-speed, major collector and is under the jurisdiction of the City of Lucas. Stinson Road has a posted speed limit of 40 mph. Stinson road narrows at the culvert over Muddy Creek and has an advisory speed of 15 mph.

Roadway Design Parameters

- Functional Classification: Rural/Major Collector
- Design Speed: 45 mph
- Minimum Travel Lane Width: 11 ft

Design Specifications

- American Association of State Highway and Transportation Officials (AASHTO) A Policy on Geometric Design of Highways and Streets "The Green Book" (2018), 7th Edition with latest Interim Revisions
- Texas Manual on Uniform Traffic Control Devices (October 2014)
- TxDOT Roadway Design Manual (April 2018)
- TxDOT Hydraulic Design Manual (September 2019)
- TxDOT Environmental Handbook (November 2019)
- TxDOT Bridge Project Development Manual (March 2018)

Horizontal Clearance (waterway)

In accordance with the TxDOT Bridge Project Development Manual, Chapter 3, Section 1, bridges over water shall have substructure supports located within the horizontal clearance requirements as follows:

- A maximum of 2:1 embankment slope in a direction normal to the abutment cap.
- Side slopes should be normal to the roadway and no steeper than 3:1.
- Use stone riprap (preferred) or concrete riprap under the bridge and wrap around the abutment.

Embankment slope and stone riprap will be considered for the proposed bridge evaluation.

Vertical Clearance

According to Federal Emergency Management Agency (FEMA), the Base Flood Elevation (BFE), which is the current flood elevation, is at EL. 568.73. Based on TxDOT Hydraulic Design Manual a minimum 2'-0" freeboard, additional clearance above the flood elevation, is required. In order to prevent Stinson Road from future flooding, providing a minimum 2'-0" above the BFE should be provided. The minimum Low Member Elevation (bottom of the bearing pad) shall equal or exceed the BFE EL. 570.73. However, by replacing the culvert with a bridge, the current flood elevation is expected to be lower. An in-depth Hydrology and Hydraulic study shall be performed in the design process.

The intent of the design is to provide the minimum vertical clearance. This is proposed to be achieved by a combination of minimization of the proposed structure depth and raising the vertical profile.

3.2. Horizontal and Vertical Alignment

Horizontal Alignment

The existing horizontal alignment of Stinson Road, within the limits of the culvert over the Muddy Creek is on a tangent segment. Two alternatives are presented for the proposed alignment.

Horizontal Alignment 1:

Proposed alternative horizontal alignment 1, Stinson Road Bridge over Muddy Creek will match existing horizontal alignment.

Horizontal Alignment 1 is shown in **Figure 2 – Horizontal Alignment 1** below.

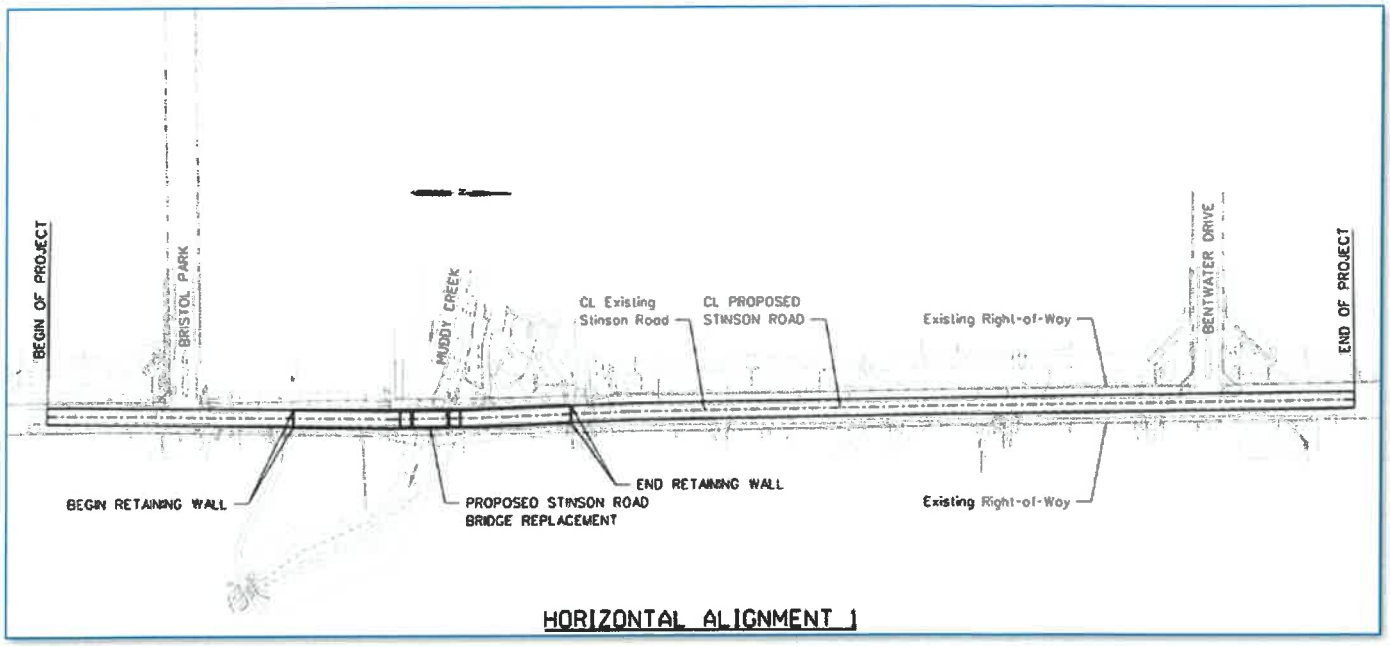


Figure 2 - Horizontal Alignment 1

Horizontal Alignment 2:

Proposed horizontal alignment 2, Stinson Road bridge over Muddy Creek will be shifted to the east of the existing Stinson Road alignment introducing curves before and after the bridge.

Horizontal Alignment 2 is shown in **Figure 3 – Horizontal Alignment 2** below.

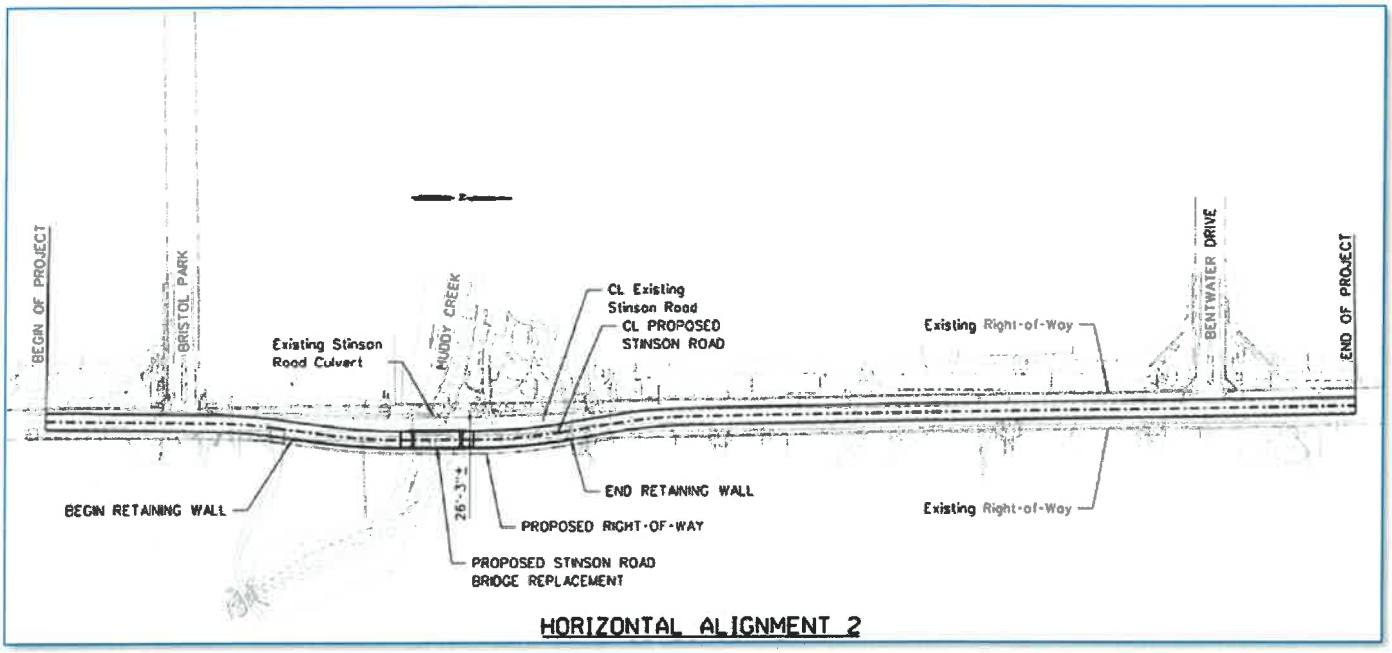


Figure 3 - Horizontal Alignment 2

Recommendation

The advantages of Horizontal Alignment 2 over Horizontal Alignment 1 are listed below.

- Allows construction in phases and at least one lane open to traffic
- Curvature may help reduce speeding along Stinson Road
- Less impact to driveways
- Minimize costs by reducing the length of retaining walls

The disadvantages of Horizontal Alignment 2 over Horizontal Alignment 1 are listed below.

- Requires Right-of-Way acquisition from 3 parcels on the east side of Stinson Road
- Longer bridge span
- Limited shallow superstructure types
- 11.5" higher profile due to deeper superstructure section
- Higher cost compared to Decked Slab Beams recommended for Horizontal Alignment 1

Horizontal Alignment 2 requires right-of-way acquisition and increased span length. A significant key advantage of the Horizontal Alignment 2 is that it offers added safety to the traveling to the public and

residents along Stinson Road by encouraging reduced speed. Many advantages are realized by Horizontal Alignment 2 as presented above. The recommended proposed alignment is Horizontal Alignment 2.

Vertical Alignment/Profile

Muddy Creek has historically frequently overtopped Stinson Road. Raising the top of the road to be above the designated flood elevation is recommended. It is also recommended that the low member elevation should be a minimum of 2'-0" above the current flood elevations. Several bridge superstructure alternatives (see section 5.4) were evaluated with the intent to minimize raising the vertical profile, which reduce the limits of the project, impact to property driveway access, and additional roadway embankment.

3.3. Right-of-Way

The City of Lucas has established a 50 feet prescriptive right-of-way being 25 feet offset each side of the existing centerline of the road. There are one (1) parcel on the west and five (5) parcels on the east of Stinson Road that have a 25 feet prescriptive right-of-way from the centerline of Stinson Road within the project limits. There are six (6) parcels that have a 30 feet permanent right-of-way and one (1) parcel that have a 20 feet permanent right-of-way on the west of Stinson Road from the centerline of Stinson Road within the project limits. Also, there are three (3) parcels that have a 30 feet permanent right-of-way on the east of Stinson Road from the centerline of Stinson Road within the project limits. Both Horizontal Alignment 1 and 2 will require right-of-way acquisition from a total of eight (8) and nine (9) parcels, respectively, see Appendix A for reference. Therefore, the proposed right-of-way acquisition will be a 25 feet offset from the centerline of Stinson Road each side. The proposed improvements will be within the acquired right-of-way.

3.4. Easement

The City of Lucas has established a 20 feet water/utility easement offset from the existing right-of-way on both sides of Stinson Road. There are eight (8) parcels on the west and two (2) parcels on the east of Stinson Road that have a 20 feet water/utility easement from the right-of-way of Stinson Road within the project limits. There are two (2) parcels on the east of Stinson Road that have a 10 feet water/utility easement from the right-of-way of Stinson Road within the project limits. Also, there is one (1) parcel on the west of Stinson Road that does not have a water/utility easement. Both Horizontal Alignment 1 and 2 will require easement acquisition from a total of nine (9) parcels, see Appendix A for reference. Therefore, the proposed easement acquisition matches the typical 20 feet offset.

3.5. Access Impact

There is a total of nine (9) driveways within the project limits on Stinson Road that may be impacted. For Horizontal Alignment 1, two driveways will be significantly impacted due to the proposed profile raise. The driveway just south of the proposed bridge and west of Stinson Road where there is an existing concrete culvert that was recently constructed will need approximately 50 feet in length from the edge of the pavement to tie into the existing ground. And the driveway just north of the bridge and west of Stinson Road will need approximately 40 feet in length from the edge of the pavement to tie into the existing ground. Both driveways will require work to be perform on the owners' properties. However, Horizontal Alignment 2 will be less of an impact to the driveways compared with Horizontal Alignment 1. Access must be provided for all property owners during the duration of construction. Temporary driveways may be required.

4. STRUCTURAL DESIGN CRITERIA

4.1. Specifications

The design of the structural elements of this project shall be in full compliance with AASHTO and TxDOT Bridge Design Manual - LRFD. The structure shall be designed in accordance with the TxDOT standard practices and procedures. The design shall comply with the latest edition of the following design specifications:

General Specifications:

- Texas Department of Transportation (TxDOT) Standard Specifications for Construction and Maintenance of Highways, Streets and Bridge, 2014

Design Standards and Specifications:

- American Association of State Highway and Transportation Officials (AASHTO) LRFD Bridge Design Specifications (2017), 8th Edition with latest Interim Revisions
- TxDOT Bridge Project Development Manual (March 2018)
- TxDOT Bridge Design Manual - LRFD (July 2018)
- TxDOT Bridge Railing Manual (September 2019)
- TxDOT Bridge Standard Drawings

Design Methodology

All structural components shall be designed in accordance with Load and Resistance Factor (LRFD) design methodology. The design life for bridge structures is 75 years per AASHTO LRFD and TxDOT design criteria.

4.2. Bridge Loading

The following design loads were utilized in the evaluation of the superstructure and substructure alternatives:

Dead Loads:

Unit weights in accordance with the TxDOT Standards and the AASHTO LRFD Bridge Design Specifications were utilized.

Concrete, Structural ..... 150 pcf
Asphalt Concrete Pavement Overlay ..... 150 pcf (Applicable to prestressed slab unit alternative)
Future Wearing Surface ..... 25 psf

Soil, Compacted ..... 120 pcf

Vertical-Faced Concrete Parapet ..... 270 plf (TxDOT Traffic Railing Type T411)

Bridge Deck Sacrificial Thickness ..... ½ in. (½" sacrificial deck thickness for grinding and grooving was accounted for as dead load but was not utilized for bridge deck section properties).

Live Loads
Vehicular Loading: HL-93

Wind Loads
Wind loads will be calculated in accordance with AASHTO LRFD Bridge Design Specifications.

Vessel Collision
Not applicable.

Seismic Criteria
According to TxDOT Bridge Design Manual, bridges and structure in Texas do not require analysis for seismic loading due to the low seismic hazard as shown in AASHTO Article 3.10.2. TxDOT Bridge Standards and conventional bridge configurations have been evaluated for seismic effects and do not require further analysis.

4.3. Environmental Classification

Non-Severe: De-icing agents are not frequently used and contact with salt-water spray is not possible.

4.4. Materials

The following material properties shall be utilized in the design of the structures:

Concrete
Concrete shall be specified in accordance with TxDOT Standard Specifications.

Class	Minimum 28-day Compressive Strength (psi)	Location
Superstructure		
C (HPC if needed)	3,600	Traffic Railings
S (HPC if needed)	4,000	Decks and Approach Slabs,
H (HPC if needed)	5,500	Prestressed Deck Slab Units
Substructure		
C	3,600	Abutments, Bent and Wingwalls
C (Drilled Shaft)	3,600	Drilled Shafts
C (Driven Pile)	3,600	Driven Piles

Reinforcing Steel
Reinforcement shall be ASTM A615, Grade 60 deformed carbon-steel bar. All superstructure reinforcement shall be epoxy coated or galvanized.

Prestressing Steel

Prestressing strands shall conform to ASTM A416, Grade 270, low-relaxation strands. Stress-relieved strands will not be used.

4.5. Permit

The following regulatory and permitting agencies may have interest and/or jurisdiction requiring permits to perform the proposed bridge replacement:

- City of Lucas
- Texas Commission on Environmental Quality (TCEQ)
- United States Environmental Protection Agency (EPA)
- Federal Emergency Management Agency (FEMA)

4.6. Aesthetics

The proposed bridge will not have any non-standard aesthetic requirements. As reference, the bridge aesthetics will be similar to the Blondy Jhune bridges.

4.7. Utilities

Based on field surveying performed by Surveying and Mapping, LLC (SAM) in March 2020, existing overhead and underground utilities were noted at various locations. Further investigation will need to be conducted as the project progresses to identify the exact facility locations. The following companies operate within the project limits:

- City of Lucas Public Utilities – 12" water line located along the west side of Stinson Road and 8" sanitary sewer force main located along the east side of Stinson Road.
- North Texas Municipal Water District (NTMWD) Water – 42" water line located along the west side of Stinson Road.
- Oncor Electric – Aerial facilities on the west and east side of Stinson Road.
- CoServ Gas – 8" gas main near the beginning of project limit at Bristol Park.
- Frontier Fiber – Underground facilities located along the west and east side of Stinson Road.

There are five (5) Utility Agency Owners (UAO) with facilities within the project limits and additional utility coordination will be performed in preliminary and final design phases. The table below lists utility agency owners, utility contact data, and potential for required relocations.

Existing Utilities					
	Utility Agency Owner	Facilities	Contact Person	Phone	Relocation Potential
1	City of Lucas	Water	Jeremy Bogle	469-628-8586	Y
2	North Texas Municipal Water District (NTMWD)	Water	Ray Sikes	469-626-4569	N
3	Oncor	Electric	Chris Dulaney	972-569-1294	Y
4	CoServ	Gas	Shawn Mead	214-458-7851	N
5	Frontier	Fiber	David Lemons	972-578-3212	Y

Bridge Mounted Utilities
The existing culvert structure does not carry any utilities. No utilities are proposed for attachment to the bridge. It is recommended that conduit be placed in each bridge railing for future use of utility passthrough.

Overhead Utilities
Shared-use utility poles run longitudinally near the west and east fascia of the bridge, carrying likely electrical, and telephone/cable.

Construction activities will need to address temporary support or relocation of these utilities.

5. BRIDGE ALTERNATIVES

5.1. Span Arrangement Alternatives

An approximate minimum overall bridge length of 60'-0" for Horizontal Alignment 1 and 80'-0" for Horizontal Alignment 2 are required to span over Muddy Creek. This would locate the begin and end bridge outside of the Muddy Creek limits and would provide a 2H:1V slope embankment at each abutment. The proposed abutments would be placed approximately at the edge of Muddy Creek top embankment to minimize future scour potential. The proposed bridge replacement structure must comply with the vertical clearance requirement discussed in Section 3 above.

Single-Span Bridge Option
A single-span bridge option is considered for the culvert structure replacement to maximize the bridge opening for optimum hydraulics. This option is less likely to minimize vertical profile raise; however, it offers the most cost-effective option by minimizing substructure costs. As such, this option appears to be the most feasible.

The proposed Plan for Horizontal Alignment 1 is shown in **Figure 4 – Plan View** below.

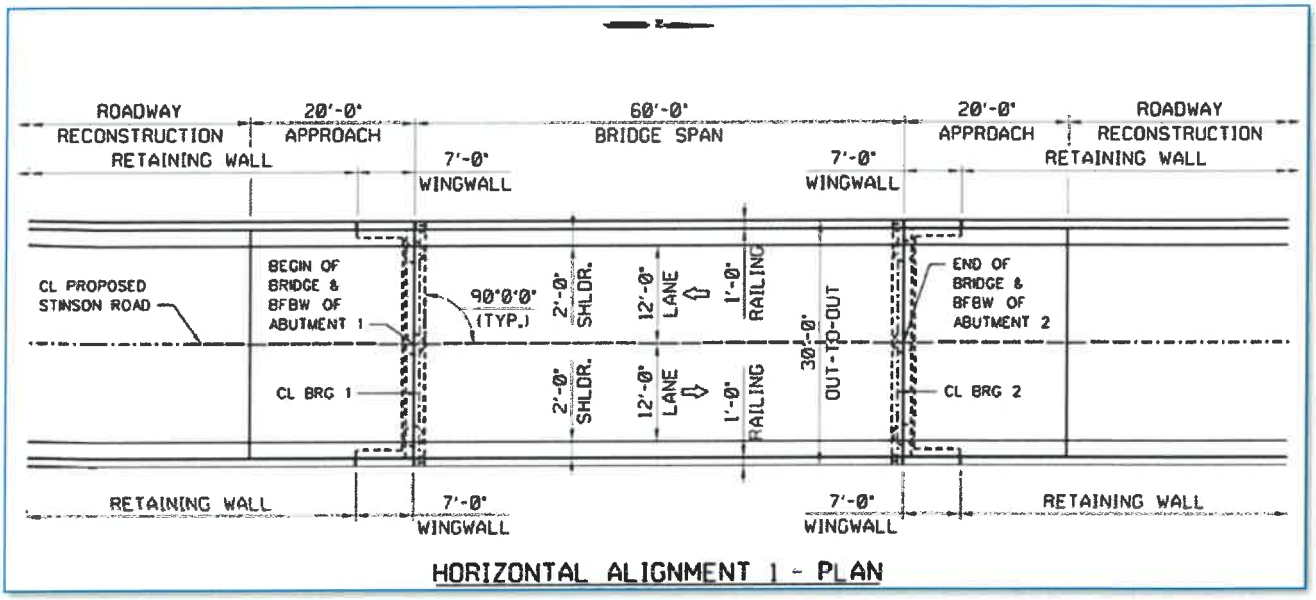


Figure 4 - Bridge Plan (Alignment 1)

The proposed Elevation for Horizontal Alignment 1 is shown in **Figure 5 – Elevation View** below.

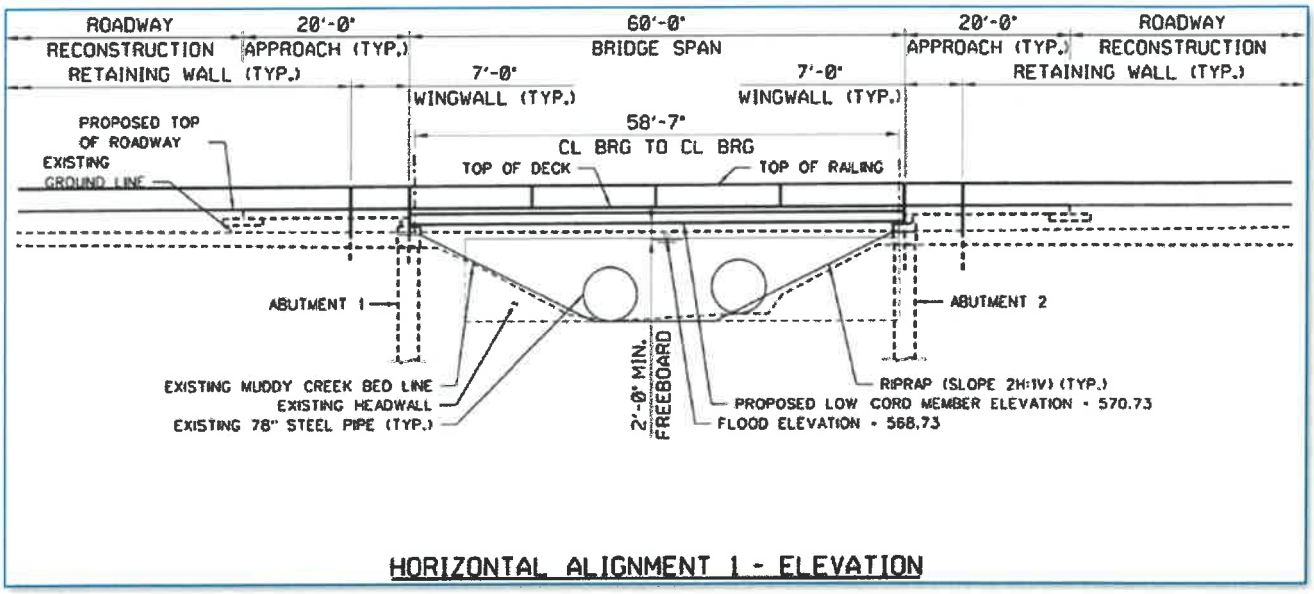


Figure 5 - Bridge Elevation (Alignment 1)

The proposed Plan for Horizontal Alignment 2 is shown in **Figure 6 – Plan View** below.

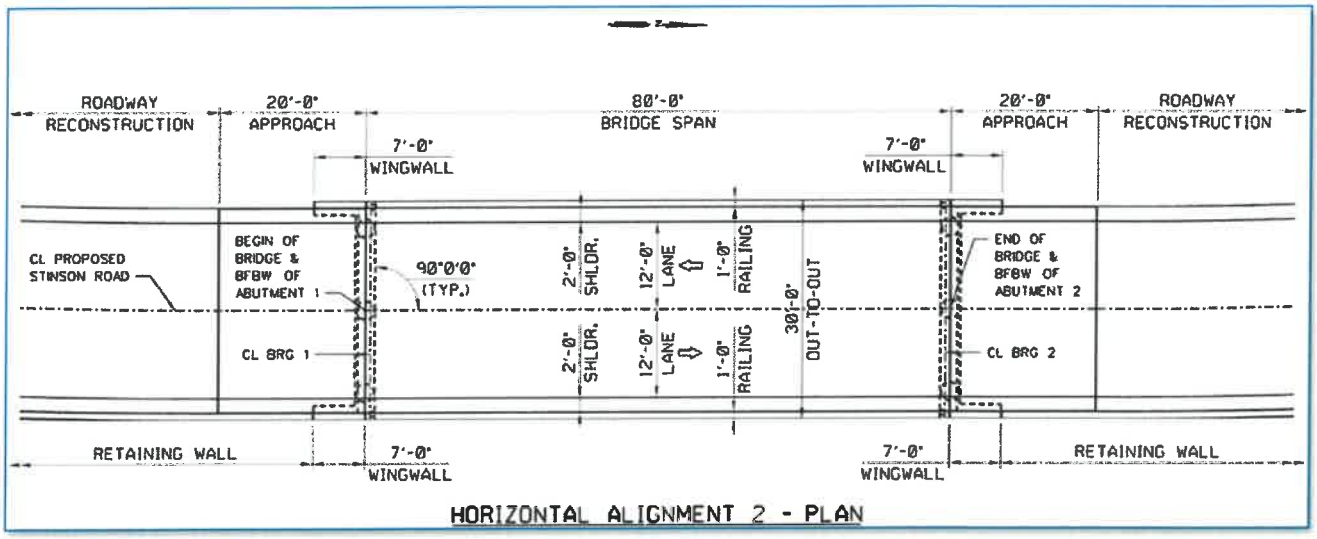


Figure 6 - Bridge Plan (Alignment 2)

The proposed Elevation for Horizontal Alignment 2 is shown in **Figure 7 – Elevation View** below.

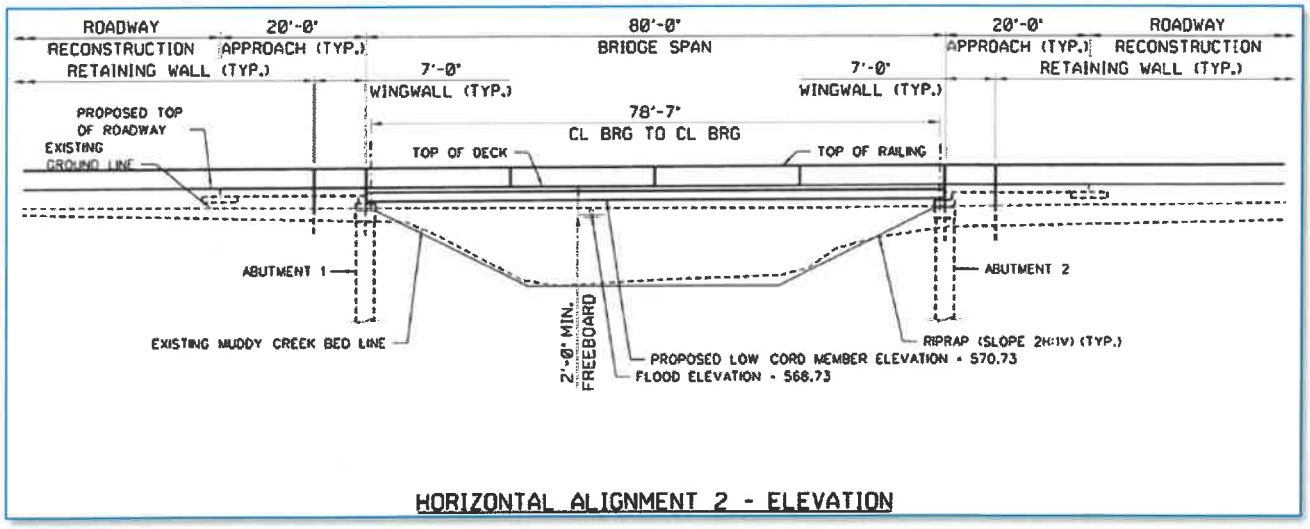


Figure 7 - Bridge Elevation (Alignment 2)

Two-Span Bridge Option

A two-span bridge is another option to minimize vertical profile raise; however, this option is less feasible as it would locate an intermediate bent in the middle of the Muddy Creek's, which would require additional

future maintenance, introduces high scour potential, and impedes the hydraulic opening. Having an intermediate bent increases the overall construction cost above a similar length single-span bridge in this particular situation and is not considered economical. As such, a two-span bridge was not further evaluated.

Three-Span Bridge Option

A three-span bridge is another option to minimize vertical profile raise; however, this option is not feasible as it would locate two intermediate bents near the edge of the Muddy Creek's embankments, which increase the negative impacts mentioned above in the two-span option. As such, a three-span bridge was not further evaluated.

Recommendation

A single-span bridge configuration is recommended for the replacement structure.

5.2. Bridge Skew

Muddy Creek is perpendicular to Stinson Road; therefore, the bridge will have a 0-degree skew.

5.3. Typical Section

The existing roadway approach typical sections have two (2) approximately 11 ft paved asphalt travel lanes and no shoulders on either side. The roadway narrows over the Muddy Creek culvert crossing. The existing typical section of Stinson Road at the Muddy Creek culvert has two (2) approximately 10'-6" asphalt paved travel lanes, various unpaved shoulders on either side and a substandard black iron fence railing with a flood gate attached.

The existing typical section of Stinson Road at Muddy Creek is shown in **Figure 8 – Existing Typical Section** below.

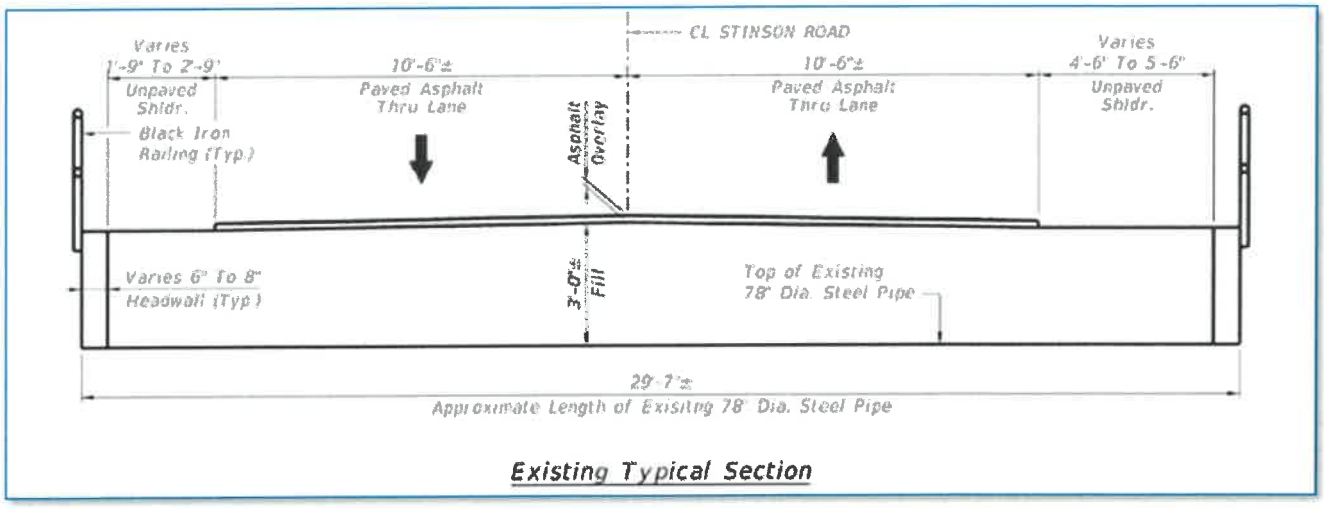


Figure 8 - Stinson Rd Typical Section at Muddy Creek

Stinson Road was recently reconstructed south of this project's limits. To provide a consistent corridor, it is recommended to match the roadway typical section for Stinson Road Bridge over Muddy Creek. The proposed roadway typical section provides two (2) 12'-0" travel lanes and a 2'-0" unpaved shoulder in each direction. Travel lanes and shoulders provide a cross-slope of 0.02 ft/ft and 0.06 ft/ft, respectively. The proposed bridge typical section provides two (2) 12'-0" travel lanes and a 2'-0" shoulder in each direction. Travel lanes and shoulders provide a constant cross-slope of 0.02 ft/ft. Based on TxDOT Bridge Railing Manual (September 2019), 45 mph or less is considered as low speed and a bridge railing that is a minimum Test Level 2 (TL-2) is required. There are three (3) types of bridge railings that have a minimum TL-2 rating, such as T631LS, T411, and C411. There are no sidewalks present on Stinson Road, therefore, type C411 is not suitable. Type T631LS is a w-beam supported on steel posts and needs to be replaced after an impact. Type T411 is a continuous concrete railing that has 6" wide windows spaced every 18", center to center, with a nominal 2'-8" height and 1'-0' width. The recommended bridge railing is type T411. Type T411 is less likely to require replacement after impact and offers better aesthetics, Texas Classic, over type T631LS. The proposed bridge typical section will have an out-to-out bridge width of 30'-0".

The proposed bridge typical section is shown in **Figure 9 – Proposed Bridge Typical Section** below.

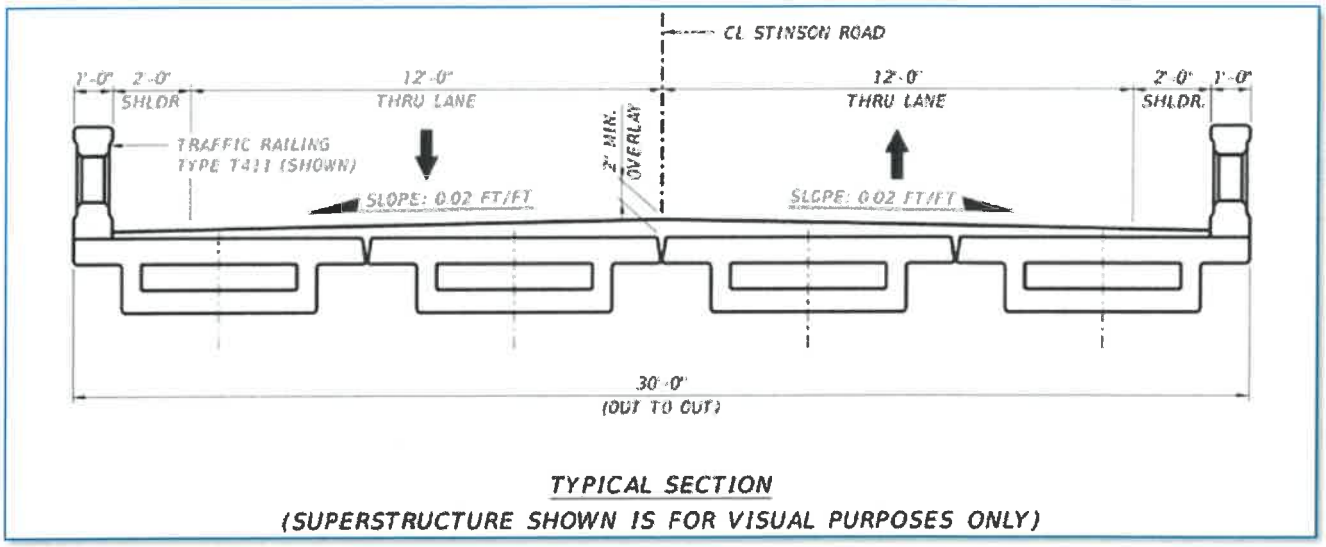


Figure 9 - Proposed Bridge Typical Section

5.4. Superstructure Alternatives

The superstructure alternatives have been selected to satisfy the minimum horizontal and vertical clearance, hydraulic requirements, and constructability. Different superstructure alternatives were considered and elevated based on two Horizontal Alignments as discussed in section 3.2 above

Horizontal Alignment 1:
Seven superstructure alternatives were considered and evaluated for Stinson Road Bridge over Muddy Creek. The overall bridge length is 60'-0" for Horizontal Alignment 1. TxDOT Prestressed Concrete Slab Beam was evaluated and eliminated due to capacity limitations for Horizontal Alignment 1. A steel through-

truss superstructure was considered to minimize superstructure depth. The advantages to a through-truss superstructure are generally realized in long spans where prestressed concrete does not perform well or the members become very large. Since the span is relatively short, the structure depth for a through-truss is not less than other alternatives considered. Therefore, the steel through-truss was eliminated. The remaining five superstructure alternatives are described below, options 1 through 5.

Each superstructure alternative presented below for Horizontal Alignment 1 is presented with the recommended typical section as discussed in Section 4.1 above.

Option 1: TxDOT Prestressed Concrete Decked Slab Beams (7DS23)

This superstructure alternative consists of replacing the existing culvert structure with a single-span bridge utilizing four (4) TxDOT Prestressed Concrete Decked Slab Beams (7DS23) with a minimum of 2" thick concrete or asphalt overlay. The proposed superstructure depth is 25 inches. This shallow superstructure depth in conjunction with a modified vertical profile results in the lowest vertical profile raise over Muddy Creek and places the bottom of the bridge bearings elevation to be above the 100-year flood storm. Option 1 proposes a 3.64' vertical profile raise and is the most cost-effective superstructure alternative.

Option 1 is considered the most economical and offers the lowest vertical profile raise compared to the other options. Therefore, this option appears the most feasible.

The proposed TxDOT Prestressed Concrete Decked Slab Beams (7DS23) typical section is shown in **Figure 10 – TxDOT Prestressed Concrete Decked Slab Beams (7SB23) Typical Section** below.

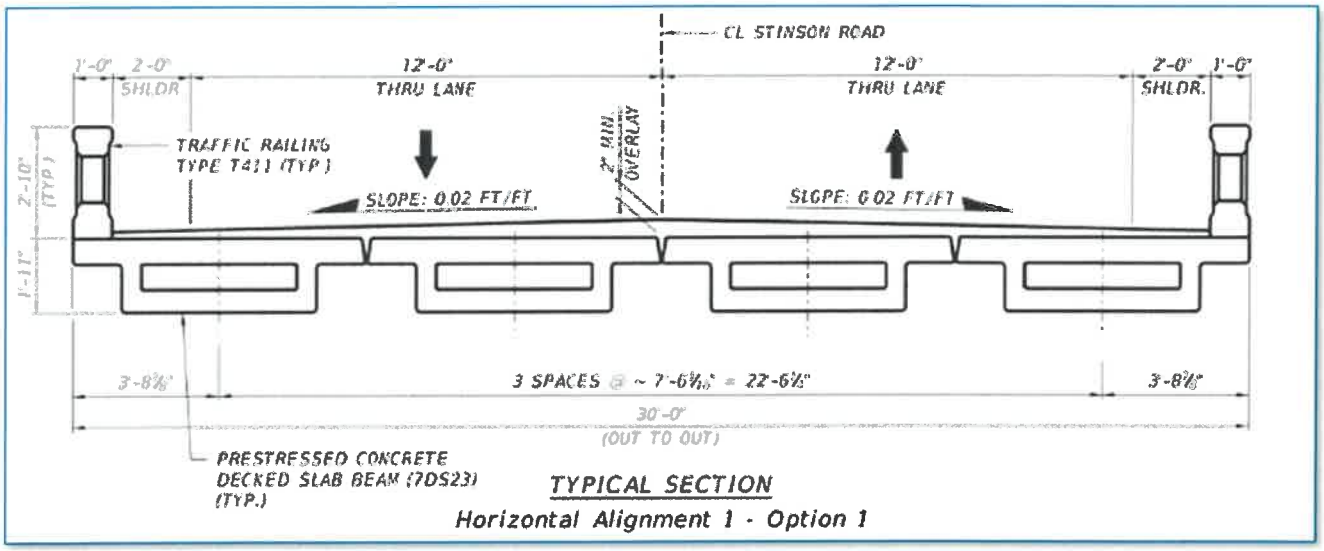


Figure 10 - TxDOT Prestressed Concrete Decked Slab Beams (7SB23) Typical Section

Option 2: TxDOT Prestressed Concrete Box Beams (5B20)

This superstructure alternative consists of replacing the existing culvert structure with a single-span bridge utilizing six (6) TxDOT Prestressed Concrete Box Beams (5B20) with a minimum of 5" thick Cast-in-Place (CIP) reinforced concrete deck. The proposed superstructure depth is 25". This shallow superstructure depth in conjunction with a modified vertical profile results in matching option 1 with the lowest vertical profile raise over Muddy Creek and places the bottom of the bridge bearing elevation to be above the 100-year flood storm. Option 2 proposes a 3.64' vertical profile raise and is the second most cost-effective superstructure alternative.

Although there is no reduction in the vertical profile raise compared to Option 1, utilizing six (6) TxDOT Prestressed Concrete Box Beams (5B20) with a 5" thick reinforced concrete deck increases the construction cost by 12%, see Appendix A for reference, compared to Option 1. Option 2 is not considered the most economical and does not offer any cost-saving or a lower vertical profile raise compared to Option 1. Therefore, this option was not further evaluated.

The proposed TxDOT Prestressed Concrete Box Beams (5B20) typical section is shown in **Figure 11 – TxDOT Prestressed Concrete Box Beams (5B20) Typical Section** below.

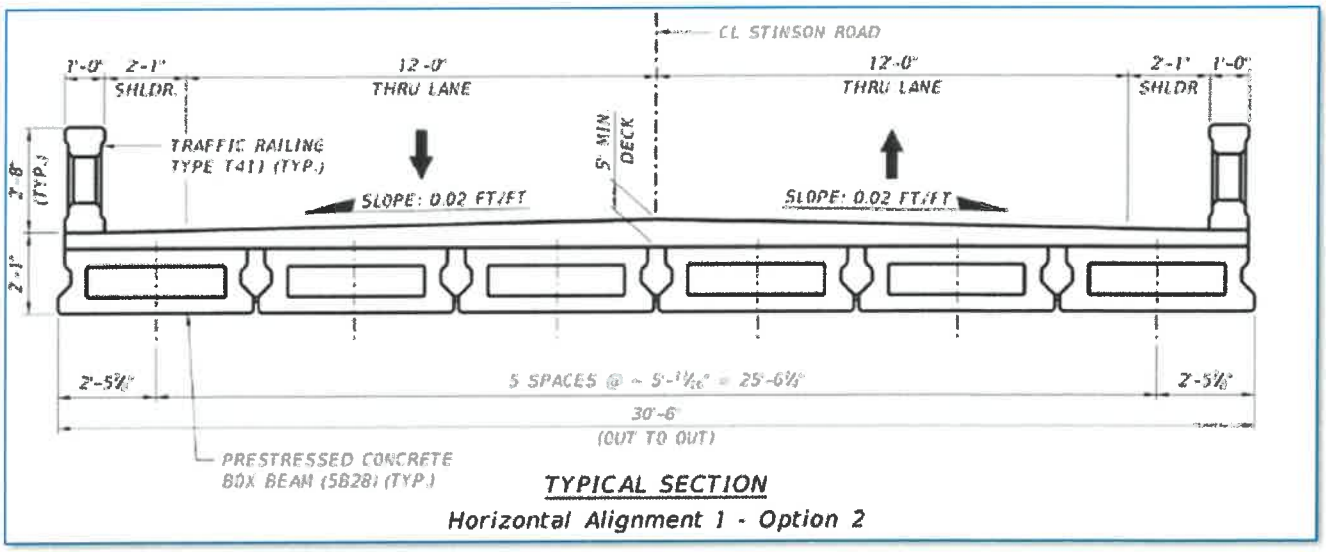


Figure 11 - TxDOT Prestressed Concrete Box Beams (5B20) Typical Section

Option 3: TxDOT Prestressed Concrete XBeams (5XB20)

This superstructure alternative consists of replacing the existing culvert structure with a single-span bridge utilizing four (4) TxDOT Prestressed Concrete XBeams (5XB20) with an 8" thick Cast-in-Place (CIP) reinforced concrete deck. The proposed superstructure depth is 30". This shallow superstructure depth in conjunction with a modified vertical profile results in the second lowest vertical profile raise over Muddy Creek and places the bottom of the bridge bearing elevation to be above the 100-year flood storm. Option 3 proposes a 4.06' vertical profile raise and is the fourth most cost-effective superstructure alternative.

There is a 5" increase in the vertical profile raise compared to Option 1. Also, utilizing four (4) TxDOT Prestressed Concrete XBeams (5XB20) with an 8" thick reinforced concrete deck increases the construction cost by 25%, see Appendix A for reference, compared to Option 1. Option 3 is not considered the most economical and does not offer any cost-saving or a lower vertical profile raise compared to Option 1. Therefore, this option was not further evaluated.

The proposed TxDOT Prestressed Concrete XBeams (5XB20) typical section is shown in **Figure 12 – TxDOT Prestressed Concrete XBeams (5XB20) Typical Section** below.

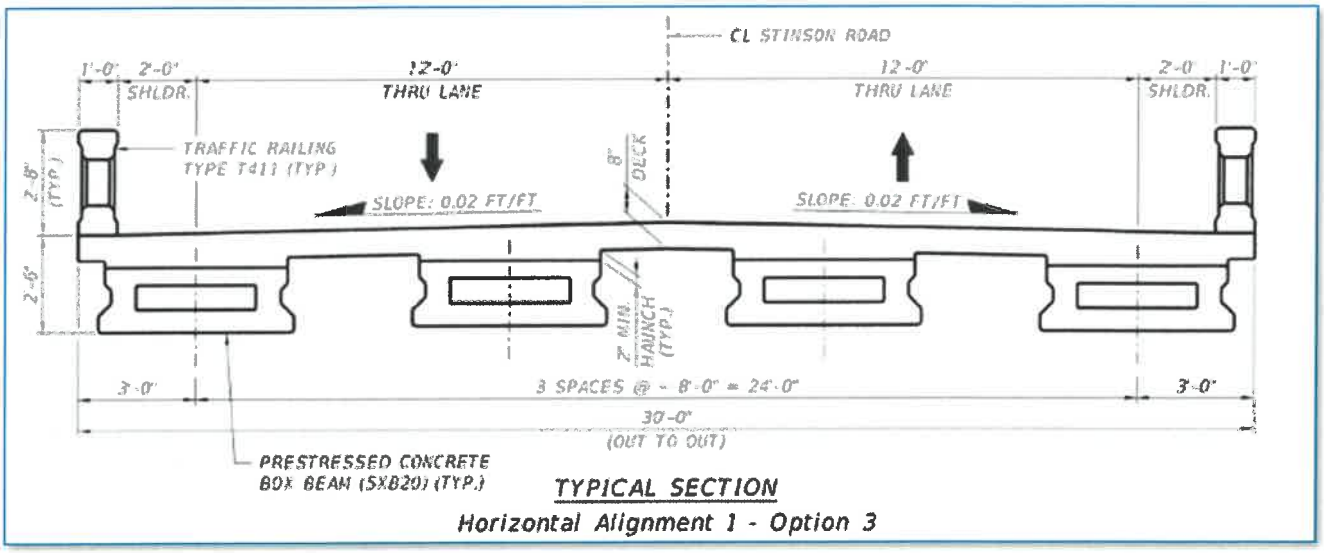


Figure 12 - TxDOT Prestressed Concrete XBeams (5XB20) Typical Section

Option 4: TxDOT Prestressed Concrete I-Girders (TX28)

This superstructure alternative consists of replacing the existing culvert structure with a single-span bridge utilizing four (4) TxDOT Prestressed Concrete I-Girders (TX28) with an 8.5" thick Cast-in-Place (CIP) reinforced concrete deck. The proposed superstructure depth is 38.5". This superstructure depth in conjunction with a modified vertical profile results in the highest vertical profile raise over Muddy Creek and places the bottom of the bridge bearing elevation to be above the 100-year flood storm. Option 4 proposes a 4.77' vertical profile raise and is the third most cost-effective superstructure alternative.

There is a 13.5" increase in the vertical profile raise compared to Option 1. Also, utilizing four (4) TxDOT Prestressed Concrete I-Girders (TX28) with an 8.5" thick reinforced concrete deck increases the construction cost by 15%, see Appendix A for reference, compared to Option 1. Option 4 is not considered the most economical and does not offer any cost-saving or a lower vertical profile raise compared to Option 1. Therefore, this option was not further evaluated.

The proposed TxDOT Prestressed Concrete I-Girders (TX28) typical shown in **Figure 13 – TxDOT Prestressed Concrete I-Girders (TX28) Typical Section** below.

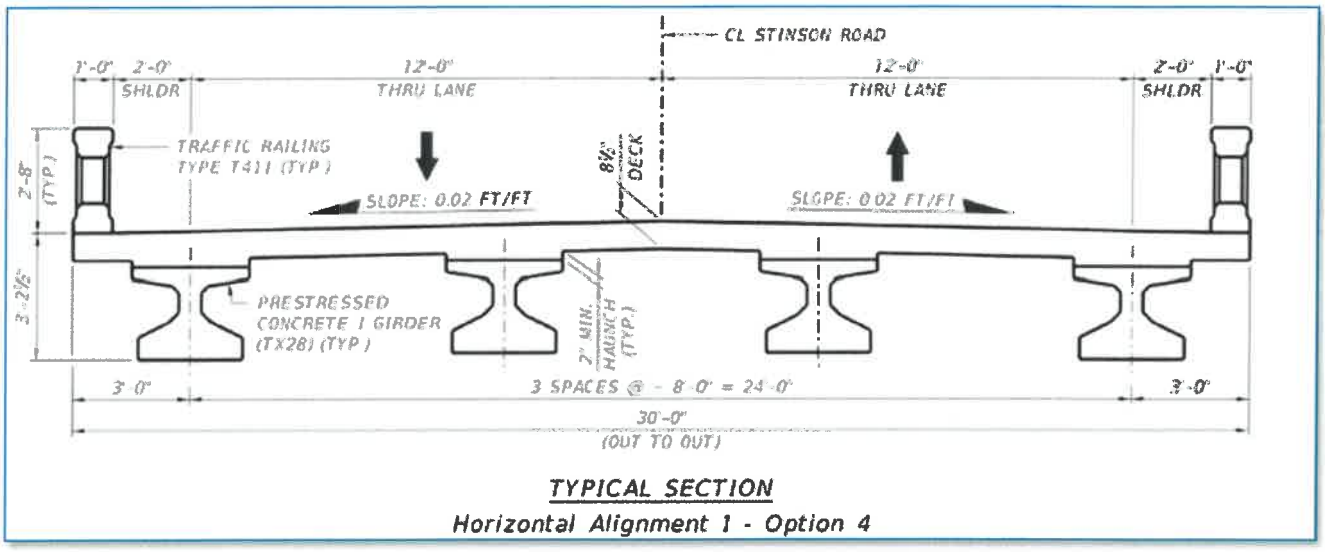


Figure 13 - TxDOT Prestressed Concrete I-Girders (TX28) Typical Section

Option 5: Steel Rolled Beams (W21X166)

This superstructure alternative consists of replacing the existing culvert structure with a single-span bridge utilizing four (4) Steel Rolled Beams (W21X166) with an 8.5" thick Cast-in-Place (CIP) reinforced concrete deck. The proposed superstructure depth is 33". This superstructure depth in conjunction with a modified vertical profile results in the third lowest vertical profile raise over Muddy Creek and places the bottom of the bridge bearing elevation to be above the 100-year flood storm. Option 5 proposes a 4.31' vertical profile raise and is the least cost-effective superstructure alternative.

There is an 8" increase in the vertical profile raise compared to Option 1. Also, utilizing four (4) Steel Rolled Beams (W21X166) with an 8.5" thick reinforced concrete deck increases the construction cost by 145%, see Appendix A for reference, compared to Option 1. The steel beams increase maintenance requirements as well. Option 5 is not considered the most economical and does not offer any cost-saving or a lower vertical profile raise compared to Option 1. Therefore, this option was not further evaluated.

The proposed Steel Rolled Beams (W21X166) typical section is shown in **Figure 14 – Steel Rolled Beams (W21X166) Typical Section** below.

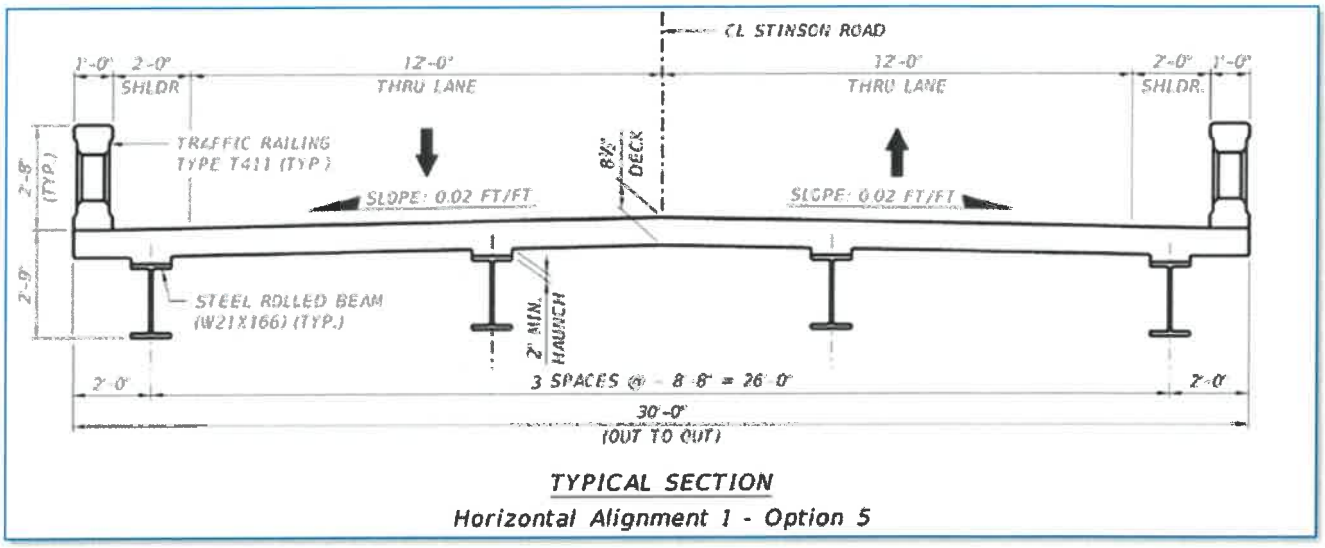


Figure 14 - Steel Rolled Beams (W21X166) Typical Section

Recommendation for Horizontal Alignment 1

Of the five options discussed above for Horizontal Alignment 1, Option 1 is recommended: a single-span bridge utilizing four (4) TxDOT Prestressed Concrete Decked Slab Beams (7DS23) with a 2" thick concrete or asphalt overlay. Option 1 is the most cost-effective superstructure alternative. This option provides the shallowest superstructure depth, minimizing the vertical profile raise, and provides the most overall cost savings.

Horizontal Alignment 2:

Four of the five superstructure alternatives considered for Horizontal Alignment 1 were considered and evaluated for Horizontal Alignment 2 of Stinson Road Bridge over Muddy Creek. The overall bridge length is 80'-0" for Horizontal Alignment 2. Option 1 considered the TxDOT Prestressed Concrete Decked Slab beam was evaluated and eliminated due to capacity limitations for Horizontal Alignment 2.

Each superstructure alternative for Horizontal Alignment 2 presented below is presented with the recommended typical section as discussed in Section 5.1 above.

Option 1: TxDOT Prestressed Concrete Decked Slab Beams (7DS23)

This superstructure alternative consists of replacing the existing culvert structure with a single-span bridge utilizing four (4) TxDOT Prestressed Concrete Decked Slab Beams (7DS23) with a minimum of 2" thick concrete or asphalt overlay. However, TxDOT Prestressed Concrete Decked Slab Beams (7DS23) can only span up to 60'-0", Option 1 was not further evaluated.

Option 2: TxDOT Prestressed Concrete Box Beams (5B28)

This superstructure alternative consists of replacing the existing culvert structure with a single-span bridge utilizing six (6) TxDOT Prestressed Concrete Box Beams (5B28) with a minimum of 5" thick Cast-in-Place (CIP) reinforced concrete deck. The proposed superstructure depth is 25". This shallow superstructure depth in conjunction with a modified vertical profile results in the lowest vertical profile raise over Muddy Creek and places the bottom of the bridge bearing elevation to be above the 100-year flood storm. Option 2 proposes a 4.31' vertical profile raise and is the second most cost-effective superstructure alternative.

Option 2 is the most cost-effective superstructure option considered for Alignment 2. This option offers overall cost-saving and the lowest vertical profile raise compared to the other options. Therefore, this option is the most feasible.

The proposed TxDOT Prestressed Concrete Box Beams (5B28) typical section is shown in **Figure 15 – TxDOT Prestressed Concrete Box Beams (5B28) Typical Section** below.

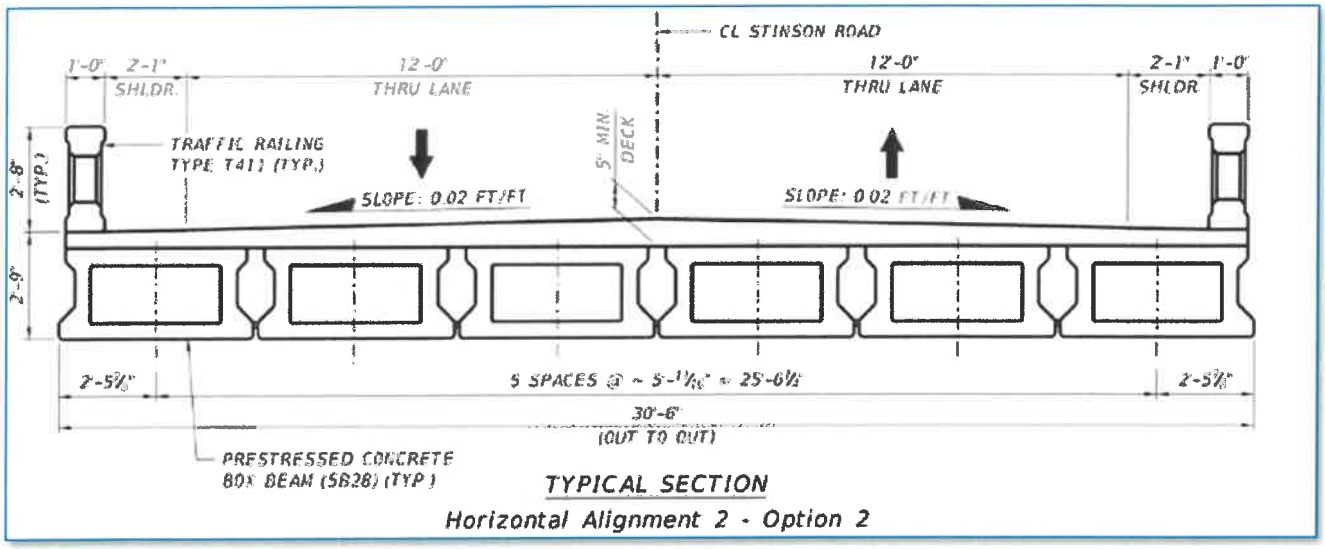


Figure 15 - TxDOT Prestressed Concrete Box Beams (5B28) Typical Section

Option 3: TxDOT Prestressed Concrete XBeams (5XB28)

This superstructure alternative consists of replacing the existing culvert structure with a single-span bridge utilizing four (4) TxDOT Prestressed Concrete XBeams (5XB28) with an 8" thick Cast-in-Place (CIP) reinforced concrete deck. The proposed superstructure depth is 30". This shallow superstructure depth in conjunction with a modified vertical profile results in the second lowest vertical profile raise over Muddy Creek and places the bottom of the bridge bearing elevation to be above the 100-year flood storm. Option 3 proposes a 4.73' vertical profile raise and is the third most cost-effective superstructure alternative.

There is a 5" increase in the vertical profile raise compared to Option 2. Also, utilizing four (4) TxDOT Prestressed Concrete XBeams (5XB28) with an 8" thick reinforced concrete deck increases the construction cost by 10%, see Appendix A for reference, compared to Option 2. Option 3 is not considered the most economical and does not offer any cost-saving or a lower vertical profile raise compared to Option 2. Therefore, this option was not further evaluated.

The proposed TxDOT Prestressed Concrete XBeams (5XB28) typical section is shown in **Figure 16 – TxDOT Prestressed Concrete XBeams (5XB28) Typical Section** below.

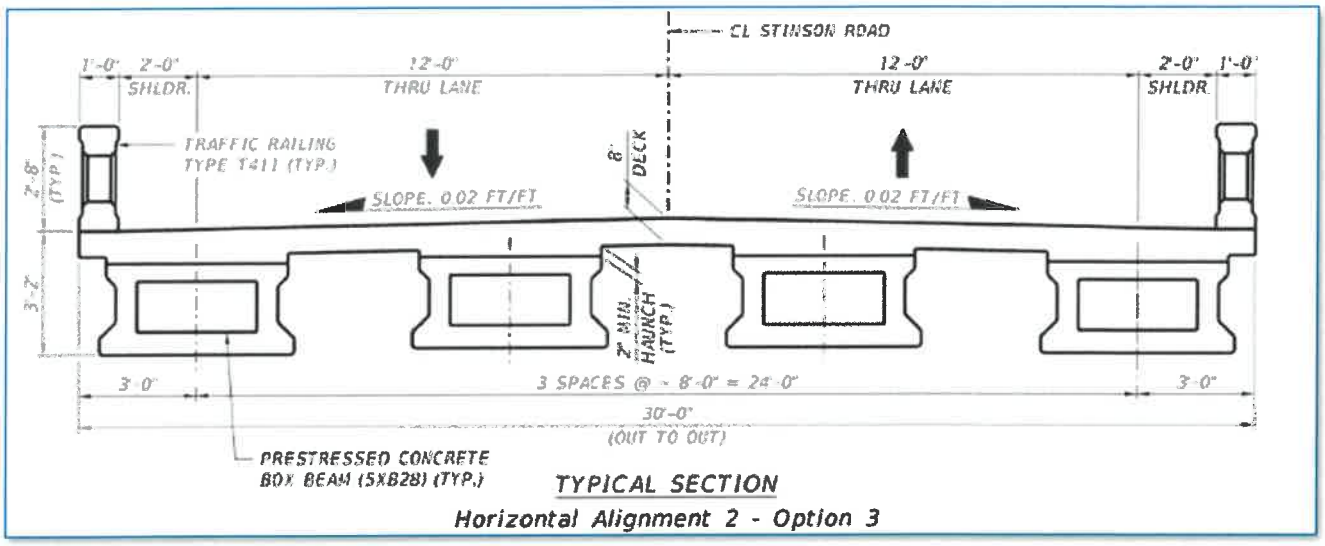


Figure 16 - TxDOT Prestressed Concrete XBeams (5XB28) Typical Section

Option 4: TxDOT Prestressed Concrete I-Girders (TX34)

This superstructure alternative consists of replacing the existing culvert structure with a single-span bridge utilizing four (4) TxDOT Prestressed Concrete I-Girders (TX34) with an 8.5" thick Cast-in-Place (CIP) reinforced concrete deck. The proposed superstructure depth is 38.5". This superstructure depth in conjunction with a modified vertical profile results in the highest vertical profile raise over Muddy Creek and places the bottom of the bridge bearing elevation to be above the 100-year flood storm. Option 4 proposes a 5.27' vertical profile raise and is the most cost-effective superstructure alternative.

There is a 13.5" increase in the vertical profile raise compared to Option 2. Utilizing four (4) TxDOT Prestressed Concrete I-Girders (TX34) with an 8.5" thick reinforced concrete deck decreases the construction cost by -12%, see Appendix A for reference, compared to Option 2. Option 4 is the most cost-effective superstructure alternative, but this option does not offer any overall cost-saving from the higher vertical profile raise compared to Option 2. Therefore, this option was not further evaluated.

The proposed TxDOT Prestressed Concrete I-Girders (TX34) typical shown in **Figure 17 – TxDOT Prestressed Concrete I-Girders (TX34) Typical Section** below.

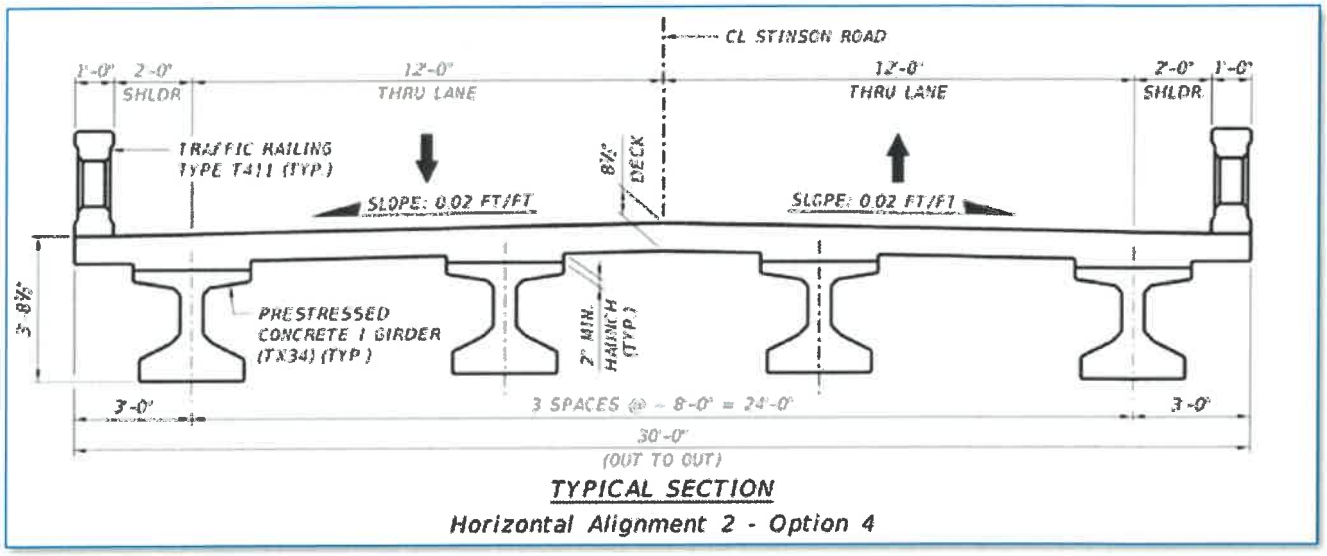


Figure 17 - TxDOT Prestressed Concrete I-Girders (TX34) Typical Section

Option 5: Steel Rolled Beams (W27X235)

This superstructure alternative consists of replacing the existing culvert structure with a single-span bridge utilizing four (4) Steel Rolled Beams (W27X235) with an 8.5" thick Cast-in-Place (CIP) reinforced concrete deck. The proposed superstructure depth is 33". This superstructure depth in conjunction with a modified vertical profile results in the third lowest vertical profile raise over Muddy Creek and places the bottom of the bridge bearing elevation to be above the 100-year flood storm. Option 5 proposes a 4.82' vertical profile raise and is the least cost-effective superstructure alternative.

There is an 8" increase in the vertical profile raise compared to Option 2. Also, utilizing four (4) Steel Rolled Beams (W27X235) with an 8.5" thick reinforced concrete deck increases the construction cost by 172%, see Appendix A for reference, compared to Option 2. Option 5 is not considered the most economical and does not offer any cost-saving or a lower vertical profile raise compared to Option 2. Therefore, this option was not further evaluated.

The proposed Steel Rolled Beams (W27X235) typical section is shown in **Figure 18 – Steel Rolled Beams (W27X235) Typical Section** below.

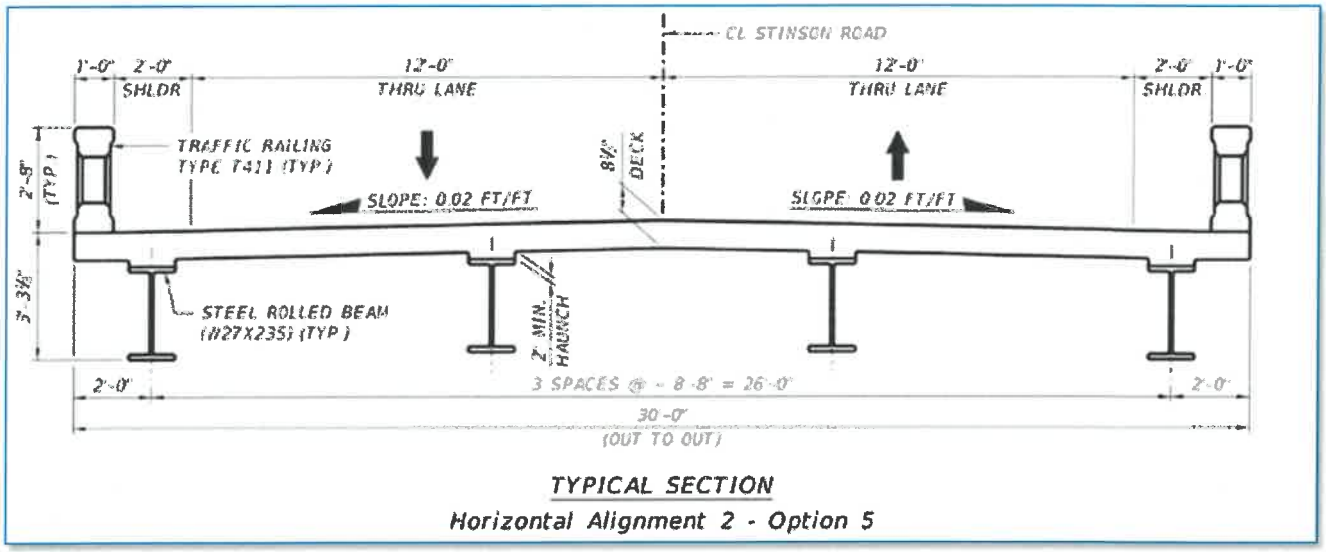


Figure 18 - Steel Rolled Beams (W27X235) Typical Section

Recommendation for Horizontal Alignment 2

Of the five options discussed above for Horizontal Alignment 2, Option 2 is recommended: a single-span bridge utilizing six (6) TxDOT Prestressed Concrete Box Beams (5B28) with 5" thick reinforced concrete deck. Option 2 is the most feasible superstructure alternative. This option provides the shallowest superstructure depth, minimizing the vertical profile raise, and provides the most overall cost savings.

5.5. Substructure / Foundation Alternatives

A full geotechnical evaluation of the bridge site will be investigated during the final design phase to determine the suitability and capacity needed for the proposed bridge replacement. TxDOT standards for prestressed concrete decked slab beams and box beams allow two foundation alternatives with a cast-in-place concrete abutment cap. A specialty design may also be considered should the geotechnical evaluation recommend a non-standard substructure.

Driven Concrete Piles

TxDOT Standard allows for five (5) 18"x18" driven concrete piles per an abutment for prestressed concrete decked slab beams and six (6) 18"x18" driven concrete piles per an abutment for prestressed concrete box beams. An in-depth foundation design will be performed to verify the capacity in the final design phase.

Drilled Shafts

TxDOT Standard allows for three (3) 30" diameter drilled shafts per an abutment for prestressed concrete decked slab beams and box beams. An in-depth foundation design will be performed to verify the capacity in the final design phase.

Recommendation

No recommendation is provided at this time for the substructure foundation alternatives.

5.6. Retaining Walls

Retaining walls will be used on this project to minimize the encroachment of the roadway embankment and to contain the typical section footprint within the limits of the existing right-of-way. Two types of walls are considered feasible, conventional Cast-In-Place (CIP) walls and proprietary walls. The required wall area is determined by superstructure type as well as the foundation soil conditions to determine what type of wall will be best suited for this application. An in-depth retaining wall evaluation will be performed in the final design phase.

5.7. Bridge Drainage

Bridge drainage will be evaluated in preliminary and final design phases.

5.8. Bridge Lighting

There is no street light system existing along Stinson Road, and there are no light poles on the existing culvert. Therefore, no lighting will be proposed for the bridge.

5.9. Construction Sequencing

Safety to motorists and pedestrians is the highest priority for the Traffic Control Plan and the plan must minimize disruption to traffic flow during the construction of these improvements. To achieve these goals several keys issues will be addressed in the development of the selected alternative:

- Maintain access to the residential community during all phases of construction.
- Communicate with all project stakeholders, including local HOAs.
- Avoid or minimize utility facility relocations.
- Minimize impacts to traffic during the construction phase.

The following two construction options have been evaluated:

Phased Construction Option

To maintain traffic along Stinson Road, phased construction was considered and evaluated. At the culvert, Stinson Road has a paved roadway width of approximately 21'. There are unpaved shoulder widths of approximately 1'-9" on the southbound and 4'-6" on the northbound. Also, the existing railing is substandard and should not be used as a safe bridge railing during construction. Therefore, a pre-stage to pave the shoulder and to install an appropriate traffic railing will be needed. TxDOT requires a 1'-0" offset from the barriers and a minimum 10'-0" lane. Given the required widths and width of temporary barriers, providing two lanes of traffic will be impossible, however leaving only one southbound lane open was considered. This option was utilized for the Stinson Road reconstruction immediately south of this project. Initial investigations find staged construction will require either widening the bridge significantly or shifting the horizontal alignment. Widening the bridge to accommodate a phased construction would significantly increase the cost without realizing the added benefit of shifting the alignment as discussed in section 2.2. If Horizontal Alignment 2 is ultimately chosen, then the additional cost of phased construction will be much smaller since the bridge will be offset from the existing roadway. The additional costs would be noticed in traffic control items and schedule.

Complete Closure with Detour Option

Replacement of the Stinson Road Culvert of Muddy Creek can be completed in a shorter duration and with a reduced construction cost (when compared to the phased option) by implementing complete closure from Bristol Park to Bentwater Drive during construction and implementing a Detour. An initial detour plan will utilize East Parker Road or West Lucas Road for west to east detours and Lewis Lane or Southview Drive for south to north detours. A minimum of one (1) driveway access would be required for each property within the closure, which may require temporary driveways and temporary construction easements through adjacent properties. An in-depth detour route and access plan will be evaluated in preliminary design.

Recommendation

The Complete Closure with Detour Option is recommended as this would allow for a shorter construction duration, resulting in overall construction savings.

6. ALTERNATIVE COST COMPARISON

Horizontal Alignment 1

A comparison of the estimated % difference in cost based on selective variable components of each alternatives to Option 1 of Horizontal Alignment 1 has been prepared for the bridge, roadway options, and retaining wall evaluated (refer to Appendix A - Alternatives Cost Comparison for more details).

The table below summarizes the bridge alternatives by percentage differences of cost for each alternative compared with Option 1 based only on superstructure types.

Bridge Alternatives	% Difference Compared to Option 1
Option 1: Single-Span with four-7DS23 Beams	
Option 2: Single-Span with six-5B20 Beams	5% increase
Option 3: Single-Span with four-5XB20 Beams	4% increase
Option 4: Single-Span with four-TX28 Beams	29% increase
Option 5: Single-Span with four-W21x166 Beams	102% increase

Based on a bridge superstructure cost estimated comparison, Option 1 is the most economical.

The table below summarizes the associated roadway profile raise of each bridge alternatives by percentage differences of cost compared with Option 1 based only on roadway fill. Profile raise is measured from the top of the existing pavement at the culvert to the top of the proposed concrete bridge deck at the center of the proposed bridge span. The top of the existing pavement at the culvert and at the center of the proposed bridge span is estimated to be at EL. 569.70.

Roadway Profile Raise	% Difference Compared to Option 1
Option 1: 3.64 feet Profile Raise	
Option 2: 3.64 feet Profile Raise	0% increase
Option 3: 4.06 feet Profile Raise	14% increase
Option 4: 4.77 feet Profile Raise	45% increase
Option 5: 4.31 feet Profile Raise	24% increase

Based on the roadway profile raise cost estimated comparison, Option 1 and Option 2 are the most economical.

The table below summarizes the associated retaining wall area of each bridge alternatives and roadway profile raise by percentage differences of cost compared with Option 1 based only on estimated exposed retaining wall area.

Retaining Wall Area	% Difference Compared to Option 1
Option 1: 1336 SF	
Option 2: 1336 SF	0% increase
Option 3: 1576 SF	18% increase
Option 4: 2118 SF	59% increase
Option 5: 1754 SF	31% increase

Based on retaining wall cost estimated comparison, Option 1 and Option 2 are the most economical. The table below summarizes the overall alternatives by percentage differences of cost for each alternative compared with Option 1.

Overall Alternatives	% Difference Compared to Option 1
Option 1: Single-Span with four-7DS23 Beams	
Option 2: Single-Span with six-5B20 Beams	2% increase
Option 3: Single-Span with four-5XB20 Beams	8% increase
Option 4: Single-Span with four-TX28 Beams	31% increase
Option 5: Single-Span with four-W21x166 Beams	46% increase

This comparison provides a summary of the overall cost for each option. Based on the above overall alternative cost estimated comparison, Option 1 is the most economical and provides an overall cost-saving.

Horizontal Alignment 2

A comparison of the estimated % difference in cost based on selective variable components of each alternatives to Option 2 of Horizontal Alignment 2 has been prepared for the bridge, roadway options, and retaining wall evaluated (refer to Appendix A for more details).

The table below summarizes the bridge alternatives by percentage differences of cost for each alternative compared with Option 2 based only on superstructure types.

Bridge Alternatives	% Difference Compared to Option 2
Option 2: Single-Span with six-5B28 Beams	
Option 3: Single-Span with four-5XB28 Beams	14% increase
Option 4: Single-Span with four-TX34 Beams	7% decrease
Option 5: Single-Span with four-W27x235 Beams	176% increase

Based on a bridge superstructure cost estimated comparison, Option 4 is the most economical. However, Option 4 roadway profile raise and retaining wall costs do not offset the cost enough from Option 2 roadway profile and retaining wall cost. Option 2 would be a more suitable alternative in this case.

The table below summarizes the associated roadway profile raise of each bridge alternatives by percentage differences of cost compared with Option 1 based only on roadway fill. Profile raise is measured from the top of the existing pavement at the culvert to the top of the proposed concrete bridge deck at the center of the proposed bridge span. The top of the existing pavement at the culvert and at the center of the proposed bridge span is estimated to be at EL. 569.70.

Roadway Profile Raise	% Difference Compared to Option 2
Option 2: 4.31 feet Profile Raise	
Option 3: 4.75 feet Profile Raise	8% increase
Option 4: 5.27 feet Profile Raise	21% increase
Option 5: 4.82 feet Profile Raise	10% increase

Based on the roadway profile raise cost estimated comparison, Option 2 is the most economical.
The table below summarizes the associated retaining wall area of each bridge alternatives and roadway profile raise by percentage differences of cost compared with Option 2, based only on estimated exposed retaining wall area.

Retaining Wall Area	% Difference Compared to Option 2
Option 2: 1345 SF	
Option 3: 1469 SF	9% increase
Option 4: 1684 SF	25% increase
Option 5: 1500 SF	12% increase

Based on retaining wall cost estimated comparison, Option 2 is the most economical.

The table below summarizes the overall alternatives by percentage differences of cost for each alternative compared with Option 2.

Overall Alternatives	% Difference Compared to Option 2
Option 2: Single-Span with six-5B28 Beams	
Option 3: Single-Span with four-5XB28 Beams	8% increase
Option 4: Single-Span with four-TX34 Beams	6% increase
Option 5: Single-Span with four-W27x235 Beams	68% increase

This comparison provides a summary of the overall cost for each option. Based on the above overall alternative cost estimated comparison, Option 2 is the most economical and provides an overall cost-saving.

Horizontal Alignment 1 vs Horizontal Alignment 2

The table below summarizes the overall horizontal alignment alternatives by percentage differences of cost for each alternative compared with Horizontal Alignment 2.

Overall Horizontal Alignment Alternatives	% Difference Compared to Horizontal Alignment 2
Horizontal Alignment 1 **Option 1: Single-Span with four-7DS23 Beams**	15% decrease
Horizontal Alignment 2 **Option 2: Single-Span with six-5B28 Beams**	

This comparison provides a summary of the overall cost for each horizontal alignment alternative. Based on the above overall horizontal alignment alternative cost estimated comparison, Horizontal Alignment 1 is the most economical. However, the advantages Horizontal Alignment 2 offers are worth the fraction increase.

Recommendation

The proposed bridge typical section provides one (1) 12'-0" traveling lanes in each direction and a 2'-0" wide shoulder on each side with a 0.02 ft/ft crown, and a bridge railing type T411. The proposed roadway typical section provides one concrete paved (1) 12'-0" traveling lanes in each direction and an unpaved 2'-0" wide shoulder on each side with a cross-slope of 0.02 ft/ft and 0.06 ft/ft, respectively.

Given the information here in presented, it is recommended that Stinson Road Culvert be replace with an 80'-0" single-span bridge on Horizontal Alignment 2 with a 4.31 ft vertical profile raise, utilizing Option 2: six (6) TxDOT Prestressed Concrete Box Beams (5B28) with a minimum 5" thick cast-in-place reinforced concrete deck, supported on twelve (12) 18"x18" driven concrete piles foundation or six (6) 30" diameter drilled shafts with a cast-in-place reinforced concrete abutment foundation. Retaining walls are recommended on the northeast and southeast of the bridge. It is also recommended that construction be completed by implementing a Complete Closure and Detour with southbound remaining open to local traffic only.

Horizontal Alignment 2 has a higher estimated cost by only 15%, see Appendix A for the Alternatives Cost Comparison. The increase is due to right-of-way acquisition and increased span length. A significant key advantage of the Horizontal Alignment 2 is that it offers added safety to the traveling to the public and residents along Stinson Road by encouraging reduced speed. It also makes phased construction feasible if the City should desire. Many advantages are realized by Horizontal Alignment 2 for a fractional increase in cost. Therefore, the recommended proposed alignment is Horizontal Alignment 2.

If Horizontal Alignment 2 is not feasible due to right-of-way acquisitions, then it is recommended that Stinson Road Culvert be replace with a 60'-0" single-span bridge on Horizontal Alignment 1 with a 3.64 ft vertical profile raise, utilizing Option 1: four (4) TxDOT Prestressed Concrete Decked Slab Beams (7DS23) with a minimum 2" thick concrete or asphalt overlay, which supports on ten (10) 18"x18" driven concrete piles foundation or six (6) 30" diameter drilled shafts with a cast-in-place reinforced concrete abutment foundation. Retaining walls are recommended on all four corners of the bridge.

APPENDIX A:
Alternative Cost Comparison Estimate / Calculations

Horizontal Alignment 1 - Alternative Cost Comparison

Stinson Bridge Roadway Improvements from Bristol Park to Bentwater Drive

City of Lucas

Horizontal Alignment 1					
Bridge Superstructure	**Option 1**	**Option 2**	**Option 3**	**Option 4**	**Option 5**
Beam Type	**7DS23**	**5B20**	**5XB20**	**TX28**	**W21X166**
BEAMS					
beam length	59.83 lf	59.83 lf	59.83 lf	59.83 lf	59.83 lf
no. beam	4	6	4	4	4
beam unit weight (steel option only)					166 lb/lf
total beam length	239.33 lf	359.00 lf	239.33 lf	239.33 lf	39729.33 lb
unit cost ($/lf)	*$430.00*	*$235.00*	*$270.00*	*$400.00*	*$5.00 /lb*
total cost	$102,913.33	$84,365.00	$64,620.00	$95,733.33	$198,646.67
DECK					
deck/overlay width	30.00 lf	30.17 lf	30.00 lf	30.00 lf	30.00 lf
deck/overlay length	59.83 lf	59.83 lf	59.83 lf	59.83 lf	59.83 lf
deck thickness		5.0 in	8.0 in	8.5 in	8.5 in
total deck volume	199.44 sy	27.85 cy	44.32 cy	47.09 cy	47.09 cy
unit cost ($/cy)	*$125.00 / sy*	*$1,550.00*	*$1,550.00*	*$1,550.00*	*$1,550.00*
total cost	$24,930.56	$43,174.49	$68,697.53	$72,991.13	$72,991.13
BEARING PADS					
total no. bearing pads	8 ea	12 ea	8 ea	8 ea	8 ea
unit cost ($/each)	*$1,700.00*	*$1,700.00*	*$1,700.00*	*$1,700.00*	*$1,700.00*
total cost	$13,600.00	$20,400.00	$13,600.00	$13,600.00	$13,600.00
Overall bridge alternative cost *	**$141,443.89**	**$147,939.49**	**$146,917.53**	**$182,324.46**	**$285,237.79**
% difference Compared to Option 1	**0%**	**5%**	**4%**	**29%**	**102%**

Roadway Profile Fill	**Option 1**	**Option 2**	**Option 3**	**Option 4**	**Option 5**
roadway profile fill area (elevation view)	925 sf	925 sf	1050 sf	1341 sf	1145 sf
roadway profile fill width	28 ft	28 ft	28 ft	28 ft	28 ft
roadway profile fill volume	959.26 cy	959.26 cy	1088.89 cy	1390.67 cy	1187.41 cy
unit cost ($/cy)	*$25.00*	*$25.00*	*$25.00*	*$25.00*	*$25.00*
total cost	$23,981.48	$23,981.48	$27,222.22	$34,766.67	$29,685.19
Overall roadway alternative cost *	**$23,981.48**	**$23,981.48**	**$27,222.22**	**$34,766.67**	**$29,685.19**
% difference Compared to Option 1	**0%**	**0%**	**14%**	**45%**	**24%**

Retaining Wall	**Option 1**	**Option 2**	**Option 3**	**Option 4**	**Option 5**
retaining wall area	668 sf	668 sf	788 sf	1059 sf	877 sf
no. retaining walls	2	2	2	2	2
total retaining wall area	1336 sf	1336 sf	1576 sf	2118 sf	1754 sf
unit cost ($/sf)	*$95.00*	*$95.00*	*$95.00*	*$95.00*	*$95.00*
total cost	$126,920.00	$126,920.00	$149,720.00	$201,210.00	$166,630.00
Overall retaining wall cost *	**$126,920.00**	**$126,920.00**	**$149,720.00**	**$201,210.00**	**$166,630.00**
% difference Compared to Option 1	**0%**	**0%**	**18%**	**59%**	**31%**

Right-Of-Way Cost	**Option 1**	**Option 2**	**Option 3**	**Option 4**	**Option 5**
Total Property Area	47518 sf	47518 sf	47518 sf	47518 sf	47518 sf
unit cost ($/sf)	*$2.30*	*$2.30*	*$2.30*	*$2.30*	*$2.30*
total cost	$109,086.32	$109,086.32	$109,086.32	$109,086.32	$109,086.32
Overall additional right-of-way cost *	**$109,086.32**	**$109,086.32**	**$109,086.32**	**$109,086.32**	**$109,086.32**

Easement Cost	**Option 1**	**Option 2**	**Option 3**	**Option 4**	**Option 5**
Total Property Area	25645 sf	25645 sf	25645 sf	25645 sf	25645 sf
unit cost ($/sf)	*$0.23*	*$0.23*	*$0.23*	*$0.23*	*$0.23*
total cost	$5,887.28	$5,887.28	$5,887.28	$5,887.28	$5,887.28
Overall additional easement cost *	**$5,887.28**	**$5,887.28**	**$5,887.28**	**$5,887.28**	**$5,887.28**

	Horizontal Alignment 1				
	Option 1	Option 2	Option 3	Option 4	Option 5
OVERALL ALTERNATIVE COST **	**$407,318.97**	**$413,814.57**	**$438,833.35**	**$533,274.73**	**$596,526.58**
% difference Compared to Option 1	**0%**	**2%**	**8%**	**31%**	**46%**
	Recommendation				

* Does not reflect all components, and only selective variable components were used for aiding alternative selection.

** Overall Alternative Cost does not reflect fully estimated construction cost, and is only used for aiding alternative selection.

LAKES ENGINEERING BCC

A BCC Engineering Company

Date: June 3, 2020

Horizontal Alignment 2 - Alternative Cost Comparison

Stinson Bridge Roadway Improvements from Bristol Park to Bentwater Drive

City of Lucas

Horizontal Alignment 2

Bridge Superstructure	Option 1	Option 2	Option 3	Option 4	Option 5
Beam Type	7DS23	5B28	5XB28	TX34	W27X235
BEAMS					
beam length	N/A	79.83 lf	79.83 lf	79.83 lf	79.83 lf
no. beam		6	4	4	4
beam unit weight (steel option only)					235 lb/lf
total beam length		479.00 lf	319.33 lf	319.33 lf	75043.33 lb
unit cost ($/lf)		*$205.00*	*$300.00*	*$165.00*	*$5.00 /lb*
total cost	N/A	$98,195.00	$95,800.00	$52,690.00	$375,216.67
DECK					
deck/overlay width	N/A	30.17 lf	30.00 lf	30.00 lf	30.00 lf
deck/overlay length		79.83 lf	79.83 lf	79.83 lf	79.83 lf
deck thickness		5.0 in	8.0 in	8.5 in	8.5 in
total deck volume		37.17 cy	59.14 cy	62.83 cy	62.83 cy
unit cost ($/cy)		*$1,550.00*	*$1,550.00*	*$1,550.00*	*$1,550.00*
total cost	N/A	$57,606.07	$91,660.49	$97,389.27	$97,389.27
BEARING PADS					
total no. bearing pads	N/A	12 ea	8 ea	8 ea	8 ea
unit cost ($/each)		*$1,700.00*	*$1,700.00*	*$1,700.00*	*$1,700.00*
total cost	N/A	$20,400.00	$13,600.00	$13,600.00	$13,600.00
Overall bridge alternative cost *	N/A	**$176,201.07**	**$201,060.49**	**$163,679.27**	**$486,205.94**
% difference Compared to Option 4		**0%**	**14%**	**-7%**	**176%**

Roadway Profile Fill	Option 1	Option 2	Option 3	Option 4	Option 5
roadway profile fill area (elevation view)	N/A	1713 sf	1844 sf	2070 sf	1876 sf
roadway profile fill width		28 ft	28 ft	28 ft	28 ft
roadway profile fill volume		1776.44 cy	1912.30 cy	2146.67 cy	1945.48 cy
unit cost ($/cy)		*$25.00*	*$25.00*	*$25.00*	*$25.00*
total cost	N/A	$44,411.11	$47,807.41	$53,666.67	$48,637.04
Overall roadway alternative cost *	N/A	**$44,411.11**	**$47,807.41**	**$53,666.67**	**$48,637.04**
% difference Compared to Option 4		**0%**	**8%**	**21%**	**10%**

Retaining Wall	Option 1	Option 2	Option 3	Option 4	Option 5
retaining wall area	N/A	1345 sf	1469 sf	1684 sf	1500 sf
no. retaining walls		1	1	1	1
total retaining wall area		1345 sf	1469 sf	1684 sf	1500 sf
unit cost ($/sf)		*$95.00*	*$95.00*	*$95.00*	*$95.00*
total cost	N/A	$127,775.00	$139,555.00	$159,980.00	$142,500.00
Overall retaining wall cost *	N/A	**$127,775.00**	**$139,555.00**	**$159,980.00**	**$142,500.00**
% difference Compared to Option 4		**0%**	**9%**	**25%**	**12%**

Right-Of-Way Cost	Option 1	Option 2	Option 3	Option 4	Option 5
Total Property Area		55240 sf	55240 sf	55240 sf	55240 sf
unit cost ($/sf)		*$2.30*	*$2.30*	*$2.30*	*$2.30*
total cost	N/A	$126,813.59	$126,813.59	$126,813.59	$126,813.59
Overall additional right-of-way cost *	N/A	**$126,813.59**	**$126,813.59**	**$126,813.59**	**$126,813.59**

Easement Cost	Option 1	Option 2	Option 3	Option 4	Option 5
Total Property Area		28440 sf	28440 sf	28440 sf	28440 sf
unit cost ($/sf)		*$0.23*	*$0.23*	*$0.23*	*$0.23*
total cost	N/A	$6,528.93	$6,528.93	$6,528.93	$6,528.93
Overall additional easement cost *	N/A	**$6,528.93**	**$6,528.93**	**$6,528.93**	**$6,528.93**

	Horizontal Alignment 2				
	Option 1	Option 2	Option 3	Option 4	Option 5
OVERALL ALTERNATIVE COST **	N/A	**$481,729.70**	**$521,765.42**	**$510,668.46**	**$810,685.49**
% difference Compared to Option 4		**0%**	**8%**	**6%**	**68%**
		Recommendation			

* Does not reflect all components, and only selective variable components were used for aiding alternative selection.

** Overall Alternative Cost does not reflect fully estimated construction cost, and is only used for aiding alternative selection.

LAKES ENGINEERING BCC

A BCC Engineering Company

Date: June 3, 2020

Horizontal Alignment 1 VS Horizontal Alignment 2
Alternative Cost Comparison
Stinson Bridge Roadway Improvements from Bristol Park to Bentwater Drive
City of Lucas

	Horizontal Alignment 1	Horizontal Alignment 2
Bridge Superstructure	**Option 1**	**Option 2**
Beam Type	**7DS23**	**5B28**
BEAMS		
beam length	59.83 lf	79.83 lf
no. beam	4	6
beam unit weight (steel option only)		
total beam length	239.33 lf	479.00 lf
unit cost ($/lf)	*$430.00*	*$205.00*
total cost	$102,913.33	$98,195.00
DECK		
deck/overlay width	30.00 lf	30.17 lf
deck/overlay length	59.83 lf	79.83 lf
deck thickness		5.0 in
total deck volume	199.44 sy	37.17 cy
unit cost ($/cy)	*$125.00 / sy*	*$1,550.00*
total cost	$24,930.56	$57,606.07
BEARING PADS		
total no. bearing pads	8 ea	12 ea
unit cost ($/each)	*$1,700.00*	*$1,700.00*
total cost	$13,600.00	$20,400.00
Overall bridge alternative cost *	**$141,443.89**	**$176,201.07**
% difference Compared to Horizontal Alignment 2 - Option 2	**-20%**	**0%**
Roadway Profile Fill	**Option 1**	**Option 2**
roadway profile fill area (elevation view)	925 sf	1713 sf
roadway profile fill width	28 ft	28 ft
roadway profile fill volume	959.26 cy	1776.44 cy
unit cost ($/cy)	*$25.00*	*$25.00*
total cost	$23,981.48	$44,411.11
Overall roadway alternative cost *	**$23,981.48**	**$44,411.11**
% difference Compared to Horizontal Alignment 2 - Option 2	**-46%**	**0%**
Retaining Wall	**Option 1**	**Option 2**
retaining wall area	668 sf	1345 sf
no. retaining walls	2 sf	1 sf
total retaining wall area	1336 sf	1345 sf
unit cost ($/sf)	*$95.00*	*$95.00*
total cost	$126,920.00	$127,775.00
Overall retaining wall cost *	**$126,920.00**	**$127,775.00**
% difference Compared to Horizontal Alignment 2 - Option 2	**-1%**	**0%**
Right-Of-Way Cost	**Option 1**	**Option 2**
Total Property Area	47518 sf	55240 sf
unit cost ($/sf)	*$2.30*	*$2.30*
total cost	$109,086.32	$126,813.59
Overall additional right-of-way cost *	**$109,086.32**	**$126,813.59**
% difference Compared to Horizontal Alignment 2 - Option 2	**-14%**	**0%**
Easement Cost	**Option 1**	**Option 2**
Total Property Area	25645 sf	28440 sf
unit cost ($/sf)	*$0.23*	*$0.23*
total cost	$5,887.28	$6,528.93
Overall additional easement cost *	**$5,887.28**	**$6,528.93**
% difference Compared to Horizontal Alignment 2 - Option 2	**-10%**	**0%**

	Horizontal Alignment 1 Option 1	Horizontal Alignment 2 Option 2
OVERALL ALTERNATIVE COST **	**$407,318.97**	**$481,729.70**
% difference Compared to Horizontal Alignment 2 - Option 2	**-15%**	**0%**
		Recommendation

* Does not reflect all components, and only selective variable components were used for aiding alternative selection.

** Overall Alternative Cost does not reflect fully estimated construction cost, and is only used for aiding alternative selection.

LAKES ENGINEERING BCC
A BCC Engineering Company

Date: June 3, 2020

Average Low Bid Unit Prices Based on **Apr-2020**

Link

ITEM CODE	ITEM DESCRIPTION	ITEM UNIT	STATEWIDE 3M COUNT	STATEWIDE 3M QUANTITY	STATEWIDE 3M AVG	STATEWIDE 12M COUNT	STATEWIDE 12M QUANTITY	STATEWIDE 12M AVG	USE
01326001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	3	984.00	$21.80	24	52,683.00	$16.08	$25.00
04206014	CL C CONC (ABUT)(HPC)	CY	4	489.37	$1,852.55	19	2,384.67	$1,540.16	$1,550.00
04236008	RETAINING WALL (CAST - IN - PLACE)	SF	2	723.00	$51.67	16	40,607.00	$94.99	$95.00
04256016	PRESTR CONC DECK SLAB BEAM (6DS23)	LF				1	220.00	$330.00	$430.00
04256002	PRESTR CONC BOX BEAM (5B20)	LF	1	69.50	$233.47	14	6,872.70	$187.57	$235.00
04256004	PRESTR CONC BOX BEAM (5B28)	LF				2	2,086.32	$201.79	$205.00
04256020	PRESTR CONC BOX BEAM (5XB20)	LF				1	387.00	$265.00	$270.00
04256062	PRESTR CONC BOX BM(5XB28)(MOD1)	LF				1	796.24	$270.00	$300.00
04256024	PRESTR CONC BOX BEAM (5XB34)	LF				1	1,074.00	$371.50	$375.00
04256035	PRESTR CONC GIRDER (TX28)	LF	5	12,676.99	$435.44	35	69,698.12	$195.30	$400.00
04256036	PRESTR CONC GIRDER (TX34)	LF	2	793.90	$162.24	19	38,538.46	$139.98	$165.00
04346024	ELASTOMERIC BEARING (E5)	EA	1	8.00	$1,650.00	3	15.00	$1,474.01	$1,700.00
04396002	CONCRETE OVERLAY (2 IN)	SY	1	14,051.00	$102.00	3	19,666.50	$99.18	$125.00
04426004	STR STEEL (ROLLED BEAM)	LB				1	54,042.00	$10.00	$5.00

Notes:

Item "EMBANKMENT (FINAL)(ORD COMP)(TY A)" was used as "fill" for Roadway profile raise, similar to recently reconstructed project south of project limits.

Item "CL C CONC (ABUT)(HPC)" was used as "deck" - Class S, similar to a nearby project on Blondy Jhune.

Item "PRESTR CONC DECK SLAB BEAM (6DS23)" was from Nov-2019 average low bid unit prices and was used as "7DS23" with a mark up.

Item "PRESTR CONC BOX BEAM (5B20)" average low bid unit prices was from Feb and Mar 2020 with a mark up.

Item "PRESTR CONC BOX BM(5XB28)(MOD1") was used as "5XB28" with a mark up.

Item "ELASTOMERIC BEARING (E5)" was "assumed" use for superstructure types.

Item "CONCRETE OVERLAY (2 IN)" was used as "overlay" for deck slab beams.

Horizontal Alighment 1 - ROW Take

Property I.D.	Property Address	Owner(s)	Estimated Land Value /SF	Estimated ROW Take	ROW Take Cost
1	805 Bristol Pk	Christopher & Heather Blair	$2.30 / SF	213 SF	$488.98
2	Stinson Rd	Lee G. & Betty A. Bauer	$2.30 / SF	7,635 SF	$17,527.55
3	1190 Stinson Rd	Jennie Ball	$2.30 / SF	823 SF	$1,889.35
4	1180 Stinson Rd	Francisco & Angel Lopez	$2.30 / SF	0 SF	$0.00
5	901 Parchman Pl	Manoj & Beena Pappen	$2.30 / SF	0 SF	$0.00
6	891 Parchman Pl	Laer Trams Co., LLC	$2.30 / SF	0 SF	$0.00
7	871 Parchman Pl	Laer Trams Co., LLC	$2.30 / SF	0 SF	$0.00
8	851 Parchman Pl	Brad J. & Marybeth G. Wilkerson	$2.30 / SF	0 SF	$0.00
9	821 Parchman Pl	Our Country Homes, INC.	$2.30 / SF	0 SF	$0.00
10	800 Bentwater Dr	Our Country Homes, INC.	$2.30 / SF	0 SF	$0.00
11	1015 Stinson Rd	HDT Homes, LLC	$2.30 / SF	0 SF	$0.00
12	1045 Stinson Rd	Shawn N. & Laura K. Warren	$2.30 / SF	0 SF	$0.00
13	1095 Stinson Rd	Joe S. & Peggy S. Athey	$2.30 / SF	0 SF	$0.00
14	1111 Stinson Rd	James & Ann Ellis	$2.30 / SF	7,940 SF	$18,227.73
15	1155 Stinson Rd	Venita Ellis	$2.30 / SF	8,236 SF	$18,907.25
16	1177 Stinson Rd	Roger A. & Janis H. Steven	$2.30 / SF	10,187 SF	$23,386.13
17	1325 Stinson Rd	Richard G. & Renee M. Phillips	$2.30 / SF	9,865 SF	$22,646.92
18	1415 Stinson Rd	Stinson 1415, LLC	$2.30 / SF	2,619 SF	$6,012.40
				47,518 SF	
				Total Cost	**$109,086.32**

Note:
Right-of-way acquistion area was estimated based on commonly used prescriptive 25 ft right-of-way offset from the centerline. Cost of land in Lucas was provided by City of Lucas to be $100,000.00 per an acre or $2.30 per a square foot.

LAKES ENGINEERING BCC
A BCC Engineering Company

Date: June 3, 2020

Horizontal Alighment 1 - Easement Take

Property I.D.	Property Address	Owner(s)	Estimated Land Value /SF	Estimated ESMT Take	ESMT Take Cost
1	805 Bristol Pk	Christopher & Heather Blair	$0.23 / SF	304 SF	$69.79
2	Stinson Rd	Lee G. & Betty A. Bauer	$0.23 / SF	0 SF	$0.00
3	1190 Stinson Rd	Jennie Ball	$0.23 / SF	0 SF	$0.00
4	1180 Stinson Rd	Francisco & Angel Lopez	$0.23 / SF	0 SF	$0.00
5	901 Parchman Pl	Manoj & Beena Pappen	$0.23 / SF	0 SF	$0.00
6	891 Parchman Pl	Laer Trams Co., LLC	$0.23 / SF	0 SF	$0.00
7	871 Parchman Pl	Laer Trams Co., LLC	$0.23 / SF	0 SF	$0.00
8	851 Parchman Pl	Brad J. & Marybeth G. Wilkerson	$0.23 / SF	0 SF	$0.00
9	821 Parchman Pl	Our Country Homes, INC.	$0.23 / SF	0 SF	$0.00
10	800 Bentwater Dr	Our Country Homes, INC.	$0.23 / SF	0 SF	$0.00
11	1015 Stinson Rd	HDT Homes, LLC	$0.23 / SF	1,123 SF	$257.81
12	1045 Stinson Rd	Shawn N. & Laura K. Warren	$0.23 / SF	1,000 SF	$229.57
13	1095 Stinson Rd	Joe S. & Peggy S. Athey	$0.23 / SF	2,362 SF	$542.24
14	1111 Stinson Rd	James & Ann Ellis	$0.23 / SF	6,378 SF	$1,464.19
15	1155 Stinson Rd	Venita Ellis	$0.23 / SF	6,560 SF	$1,505.97
16	1177 Stinson Rd	Roger A. & Janis H. Steven	$0.23 / SF	7,504 SF	$1,722.68
17	1325 Stinson Rd	Richard G. & Renee M. Phillips	$0.23 / SF	305 SF	$70.02
18	1415 Stinson Rd	Stinson 1415, LLC	$0.23 / SF	109 SF	$25.02
				25,645 SF	
				Total Cost	**$5,887.28**

Note:
Easement acquistion area was estimated based on matching existing 20 ft water/utility easement in vecinity properties.
Cost of Easement in Lucas was provided by City of Lucas to be $10,000.00 per an acre = or $0.23 per a square foot.

LAKES ENGINEERING bcc
A BCC Engineering Company

Date: June 3, 2020

Horizontal Alighment 2 - ROW Take

Property I.D.	Property Address	Owner(s)	Estimated Land Value /SF	Estimated ROW Take	ROW Take Cost
1	805 Bristol Pk	Christopher & Heather Blair	$2.30 / SF	213 SF	$488.98
2	Stinson Rd	Lee G. & Betty A. Bauer	$2.30 / SF	3,631 SF	$8,335.63
3	1190 Stinson Rd	Jennie Ball	$2.30 / SF	0 SF	$0.00
4	1180 Stinson Rd	Francisco & Angel Lopez	$2.30 / SF	0 SF	$0.00
5	901 Parchman Pl	Manoj & Beena Pappen	$2.30 / SF	0 SF	$0.00
6	891 Parchman Pl	Laer Trams Co., LLC	$2.30 / SF	0 SF	$0.00
7	871 Parchman Pl	Laer Trams Co., LLC	$2.30 / SF	0 SF	$0.00
8	851 Parchman Pl	Brad J. & Marybeth G. Wilkerson	$2.30 / SF	0 SF	$0.00
9	821 Parchman Pl	Our Country Homes, INC.	$2.30 / SF	0 SF	$0.00
10	800 Bentwater Dr	Our Country Homes, INC.	$2.30 / SF	0 SF	$0.00
11	1015 Stinson Rd	HDT Homes, LLC	$2.30 / SF	0 SF	$0.00
12	1045 Stinson Rd	Shawn N. & Laura K. Warren	$2.30 / SF	0 SF	$0.00
13	1095 Stinson Rd	Joe S. & Peggy S. Athey	$2.30 / SF	0 SF	$0.00
14	1111 Stinson Rd	James & Ann Ellis	$2.30 / SF	7,940 SF	$18,227.73
15	1155 Stinson Rd	Venita Ellis	$2.30 / SF	8,739 SF	$20,061.98
16	1177 Stinson Rd	Roger A. & Janis H. Steven	$2.30 / SF	19,315 SF	$44,341.14
17	1325 Stinson Rd	Richard G. & Renee M. Phillips	$2.30 / SF	12,783 SF	$29,345.73
18	1415 Stinson Rd	Stinson 1415, LLC	$2.30 / SF	2,619 SF	$6,012.40
				55,240 SF	
				Total Cost	**$126,813.59**

Note:
Right-of-way acquistion area was estimated based on commonly used prescriptive 25 ft right-of-way offset from the centerline. Cost of land in Lucas was provided by City of Lucas to be $100,000.00 per an acre or $2.30 per a square foot.

LAKES ENGINEERING bcc
A BCC Engineering Company

Date: June 3, 2020

Horizontal Alighment 2 - Easement Take

Property I.D.	Property Address	Owner(s)	Estimated Land Value /SF	Estimated ESMT Take	ESMT Take Cost
1	805 Bristol Pk	Christopher & Heather Blair	$0.23 / SF	304 SF	$69.79
2	Stinson Rd	Lee G. & Betty A. Bauer	$0.23 / SF	0 SF	$0.00
3	1190 Stinson Rd	Jennie Ball	$0.23 / SF	0 SF	$0.00
4	1180 Stinson Rd	Francisco & Angel Lopez	$0.23 / SF	0 SF	$0.00
5	901 Parchman Pl	Manoj & Beena Pappen	$0.23 / SF	0 SF	$0.00
6	891 Parchman Pl	Laer Trams Co., LLC	$0.23 / SF	0 SF	$0.00
7	871 Parchman Pl	Laer Trams Co., LLC	$0.23 / SF	0 SF	$0.00
8	851 Parchman Pl	Brad J. & Marybeth G. Wilkerson	$0.23 / SF	0 SF	$0.00
9	821 Parchman Pl	Our Country Homes, INC.	$0.23 / SF	0 SF	$0.00
10	800 Bentwater Dr	Our Country Homes, INC.	$0.23 / SF	0 SF	$0.00
11	1015 Stinson Rd	HDT Homes, LLC	$0.23 / SF	1,123 SF	$257.81
12	1045 Stinson Rd	Shawn N. & Laura K. Warren	$0.23 / SF	1,000 SF	$229.57
13	1095 Stinson Rd	Joe S. & Peggy S. Athey	$0.23 / SF	2,362 SF	$542.24
14	1111 Stinson Rd	James & Ann Ellis	$0.23 / SF	6,378 SF	$1,464.19
15	1155 Stinson Rd	Venita Ellis	$0.23 / SF	6,581 SF	$1,510.79
16	1177 Stinson Rd	Roger A. & Janis H. Steven	$0.23 / SF	7,512 SF	$1,724.52
17	1325 Stinson Rd	Richard G. & Renee M. Phillips	$0.23 / SF	3,071 SF	$705.00
18	1415 Stinson Rd	Stinson 1415, LLC	$0.23 / SF	109 SF	$25.02
				28,440 SF	
				Total Cost	**$6,528.93**

Note:
Easement acquistion area was estimated based on matching existing 20 ft water/utility easement in vecinity properties.
Cost of Easement in Lucas was provided by City of Lucas to be $10,000.00 per an acre = or $0.23 per a square foot.

LAKES ENGINEERING bcc
A BCC Engineering Company

Date: June 3, 2020

APPENDIX B:
Existing Culvert Inspection Report (Lakes Engineering, Inc. F-15243)

BRIDGE SUMMARY SHEET

City: Lucas County: Collin Name: _____ Structure #: _____ Route: Stinson Road

Description: Double Barrel Pipe Culvert

Feature Crossed: Muddy Creek Inspector's Signature: _____ Date: 6/26/19

Company Name and Company Number: Lakes Engineering, Inc. F-15243

Selected Component Description and Rating:

	Inspection Rating (1085)	Inventory Rating H	Inventory Rating HS	Operating Rating H	Operating Rating HS
Double Barrel Steel Pipe Culvert	5				

Comments and/or Upgrade Recommendations (if applicable):

Loss of backfill at culvert pipe 2 should be investigated and repairs scheduled.

Structurally deficient. Functionally obsolete

Sufficiency Rating = 63

Load Posting Limits for Present Condition (if applicable):

Inventory

_____ lbs Gross

_____ lbs Tandem Axle

_____ lbs Axle or Tandem

_____ Sign Code

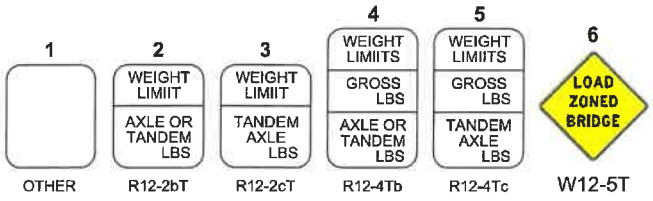
Operating

_____ lbs Gross

_____ lbs Tandem Axle

_____ lbs Axle or Tandem

_____ Sign Code



Posting Recommendation: _____

Previous Load Posting Recommendations:

_____	R12-2bT	X None
_____	R12-2cT	_____ lbs Gross
_____	R12-4Tb	_____ lbs Tandem Axle
_____	R12-4Tc	_____ lbs Axle or Tandem

Observed Load Posting at Bridge:

_____	R12-2bT	X None
_____	R12-2cT	_____ lbs Gross
_____	R12-4Tb	_____ lbs Tandem Axle
_____	R12-4Tc	_____ lbs Axle or Tandem
_____	Other (desc):	_____

Material Needed

_____ - R12-2bT

_____ - R12-2cT

_____ - R12-4Tb

_____ - R12-4Tc

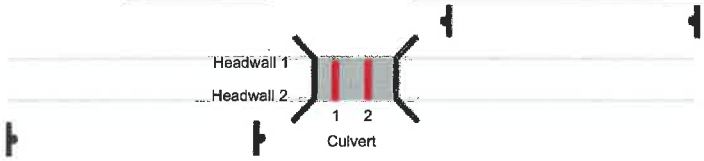
_____ - W12-5

_____ - Posts

_____ - Hardware Sets

_____ - Decals





	Advanced Warning (optional)		Bridge Approach	Bridge Approach	Advanced Warning (optional)	
Sign Code						
Condition Code						
Maintenance Need						

A. Visible & Legible
B. Obscured by Vegetation
C. Sign Needs Cleaning
D. Improper Position
E. Damaged Beyond Repair
F. Sign Down
G. Sign Missing
H. Sign & Post Missing
J. Clear Vegetation
K. Clean Sign
L. Reposition Sign
M. Reposition Sign & Post
N. None
P. Replace Sign
S. Replace Sign & Post

DO NOT DISCLOSE - INFORMATION CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT AND 23 USC SECTION 409, SAFETY SENSITIVE INFORMATION

BRIDGE INSPECTION RECORD

City: Lucas County: Collin Name: _____ Structure #: _____ Route: Stinson Road

Description: Double Barrel Steel Pipe Culvert

Feature Crossed: Muddy Creek Inspector's Signature: _____ Date: 6/26/2019

Company Name and Company Number: Lakes Engineering, Inc. F-15243 Inspector: Christopher Meszler, P.E.

Ratings Defined:

0 = Failed condition - bridge closed and beyond repair
1 = Failing condition - bridge closed but repairable
2 = Critical condition - bridge should be closed until repaired
3 = Serious condition - deterioration seriously affects structural capacity
4 = Poor condition - deterioration significantly affects structural capacity
5 = Fair condition - minor deterioration of structural elements (extensive)
6 = Satisfactory condition - minor deterioration of structural elements (limited)
7 = Good condition - some minor problems
8 = Very good condition - no problems noted
9 = Excellent condition
- = Not applicable

STATE OF TEXAS
CHRISTOPHER P. MESZLER
112052
LICENSED
PROFESSIONAL ENGINEER
08-01-2019

Enter a rating for each element of each component. Component ratings should equal the lowest rating of any element of the component, except for Deck. The Deck component is independent of its' associated element ratings. Fully supportive comments are to be made hereon or on attachments for all ratings of 7 or below.

General Comment:

Sufficiency Rating = 63
Structurally deficient: waterway adequacy rating (2). Functionally obsolete: waterway adequacy (2) & deck Geometry (3)

DECK (Item 58)

Minimum	Description	Rating	Comments
1	Deck - Rating	N	Elements are referred to and numbered: south (begin) to north (end) and west to east.
6	Wearing Surface	6	
6	Joints, Expansion, Open	-	
6	Joints, Expansion, Sealed	-	Photo 4: Lt lane, marginal longitudinal cracking (Typ.)
6	Joints, Other	-	
6	Drainage System	-	Photo 5: Rt lane, substantial longitudinal cracking (Typ.)
6	Curbs, Sidewalks & Parapets	-	
6	Median Barrier	-	Photo 6: Asphalt pavement edge failure all 4 corners (Typ.)
6	Railings	-	
7	Railing Protective Coating	-	Photo 7: Substantial failure northwest pavement edge (12")
7	Delineation (curve Markers)	-	
	Other	-	See additional comments.

SUPERSTRUCTURE (Item 59)

Minimum	Description	Rating	Comments
0	Main Members - Steel		
0	Main Members - Concrete		
0	Main Members - Timber		
0	Main Members - Connections		
1	Floor System Members		
1	Floor System Connections		
5	Secondary Members		
5	Secondary Members Connections		
6	Expansion Bearings		
6	Fixed Bearings		
6	Steel Protective Coating		
	Other		
	Component Rating	N	

DO NOT DISCLOSE - INFORMATION CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT AND 23 USC SECTION 409, SAFETY SENSITIVE INFORMATION

BRIDGE INSPECTION RECORD

City: Lucas County: Collin Name: _____ Structure #: _____ Route: Stinson Road

SUBSTRUCTURE (Item 60)

Minimum	Description	Rating	Comments
0	Abutment Caps		
0	Above Ground		
0	Below Ground or Foundation		
0	Backwalls and Wingwalls		
0	Intermediate Supports		
	Caps - Concrete		
	Caps - Steel		
	Caps - Timber		
	Above Ground - Concrete		
	Above Ground - Steel		
	Above Ground - Timber		
	Above Ground - Masonry		
	Below Ground or Foundation		
5	Collision Protection System		
6	Steel Protective Coating		
	Component Rating	N	

CHANNEL (Item 61)

Minimum	Description	Rating	Comments
0	Channel Banks	6	
0	Channel Bed	6	
5	Rip Rap, Toe Walls and Aprons	N	
5	Dikes	N	
5	Jetties	N	
	Other		
	Component Rating	6	

CULVERTS (Item 62)

Minimum	Description	Rating	Comments
0	Top Slabs	-	Photo 9: Thickness along Headwall 1 Varies (6-8")
0	Bottom Slab or Footing	7	
0	Abutments & Intermediate Supports	-	Photo 10: 10" x 4" x 1" Spall Midspan Headwall 1
5	Headwalls and Wingwalls	6	
	Other	5	Photo 11: 0.025" crack midspan headwall 1, full depth. crack continues approx. 7.5' down headwall
	Component Rating	5	
			See additional comments.

DO NOT DISCLOSE - INFORMATION CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT AND 23 USC SECTION 409, SAFETY SENSITIVE INFORMATION

BRIDGE INSPECTION RECORD

City: Lucas County: Collin Name: _____ Structure #: _____ Route: Stinson Road

APPROACHES

Minimum	Description	Rating	Comments
0	Embankments	6	Photo 29: 6' drop off within 1' of EOP (currently under construction)
4	Embankment Retaining Walls	N	
5	Slope Protection	N	
5	Roadway	5	
6	Relief Joints	N	
6	Drainage	N	
6	Guardfence	N	
7	Delineation	N	
7	Sight Distance	8	
	Other		
	Component Rating	5	

MISCELLANEOUS

Minimum	Description	Rating	Comments
7	Signs		
7	Illumination		
7	Warning Devices		
7	Utility Lines		
	Other - Gates	8	

TRAFFIC SAFETY (Item 36)

	Description	Rating	Comments
	Bridge Railing (036.1)	0	Guardrail and Bridge railing not present
	Transitions (036.2)	0	
	Approach Guardrail (036.3)	0	
	Approach Guardrail Ends (036.4)	0	

APPRAISAL RATINGS

	Description	Rating	Comments
	Waterway Adequacy (071)	2	Frequent overtopping with significant traffic delays (major collector)
	Approach Roadway Alignment (072)	8	

DO NOT DISCLOSE - INFORMATION CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT AND 23 USC SECTION 409, SAFETY SENSITIVE INFORMATION

BRIDGE INSPECTION RECORD
ADDITIONAL COMMENTS

City: Lucas County: Collin Name: Stinson Rd Bridge Structure #: _____ Route: Stinson Road

Description: Double Barrel Steel Pipe Culvert

Feature Crossed: Muddy Creek Inspector's Signature: _____ Date: 6/26/2019

Company Name and Company Number: Lakes Engineering, Inc. F-15243 Inspector: Christopher Meszler, P.E.

DECK (Item 58)

Photo Num.	Comments
16	Railing connection at headwall 2 in good condition
29	6' drop off 1' off the road (currently under construction)

CULVERTS (Item 62)

Photo Num.	Comments
12	Honey combing of culvert 1 at headwall 1 (Typ.)
13	16" x 5" x 1.5" spall and 36" x 0.05" crack near culvert 1
14	Spall and 6' x .030" crack north of culvert 2, headwall 1
15	Headwall 2 out of plumb
17	Crack and 8" x 5" x 2.5" Spall at headwall 2, top, midspan
18	Evidence of flooding at headwall 2
19	3" x 0.50" crack at first railing support connection to headwall 2
21	Spall at headwall 2, culvert 1 (Likely resulting from construction)
22	5' horizontal crack at headwall 2, culvert 1
23	19" x 1/8" crack at wingwall 1
24	Approximately 1 ft of scour at outfall and exposed incased utility
25	Scour/erosion at outlet headwall above pipe. Loss of backfill
26	Culvert 1 pipe good condition
27	Moderate corrosion and sediment buildup inside culvert 2
28	Undermining of headwall 1 at midspan

DO NOT DISCLOSE - INFORMATION CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT
AND 23 USC SECTION 409, SAFETY SENSITIVE INFORMATION

BRIDGE INSPECTION RECORD
Photos

City: Lucas County: Collin Name: Stinson Road Bridge Structure #: 004 Route: Stinson Road

01: Elevation – West View



DO NOT DISCLOSE – INFORMATION CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT AND 23 USC SECTION 409, SAFETY SENSITIVE INFORMATION

BRIDGE INSPECTION RECORD
Photos

City: Lucas County: Collin Name: Stinson Road Bridge Structure #: 004 Route: Stinson Road

02: Approach – Southbound



DO NOT DISCLOSE – INFORMATION CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT AND 23 USC SECTION 409, SAFETY SENSITIVE INFORMATION

BRIDGE INSPECTION RECORD
Photos

City: Lucas County: Collin Name: Stinson Road Bridge Structure #: 004 Route: Stinson Road

03: Approach – Northbound



DO NOT DISCLOSE – INFORMATION CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT AND 23 USC SECTION 409, SAFETY SENSITIVE INFORMATION

BRIDGE INSPECTION RECORD
Photos

City: Lucas County: Collin Name: Stinson Road Bridge Structure #: 004 Route: Stinson Road

04: Top of Deck – North View



Left lane with Marginal longitudinal cracking (Typ.).

05: Top of Deck – North View



Right Lane substantial longitudinal cracking.

06: Top of Deck – Southwest Corner Pavement failure



Asphalt Pavement edge failure in all four corners (Typ.)

07: Top of Deck – Northwest Corner Pavement failure



Substantial pavement failure (12")

DO NOT DISCLOSE – INFORMATION CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT AND 23 USC SECTION 409, SAFETY SENSITIVE INFORMATION

BRIDGE INSPECTION RECORD
Photos

City: Lucas County: Collin Name: Stinson Road Bridge Structure #: 004 Route: Stinson Road

08: Headwall 1 – North View



Typical - no deficiencies noted.

9: Headwall 1 – Top View



Headwall thickness varies from 6" to 8"

10: Headwall 1 – Top View



10" x 4" x 1" Spall midspan

11: Headwall 1



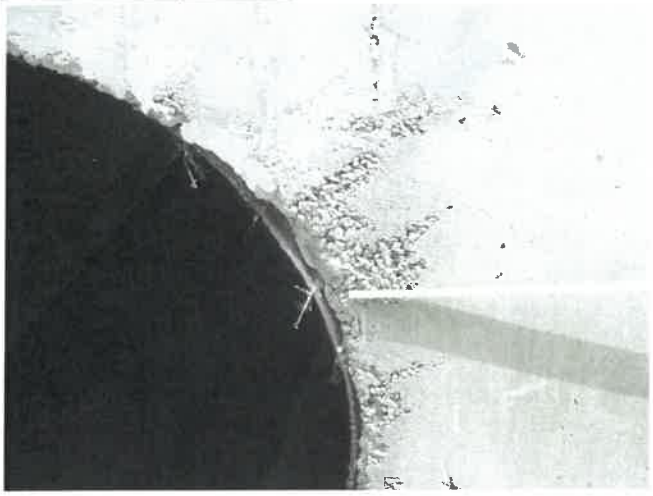
0.025" crack midspan headwall 1, full depth. crack continues approx. 7.5' down headwall

DO NOT DISCLOSE – INFORMATION CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT AND 23 USC SECTION 409, SAFETY SENSITIVE INFORMATION

BRIDGE INSPECTION RECORD
Photos

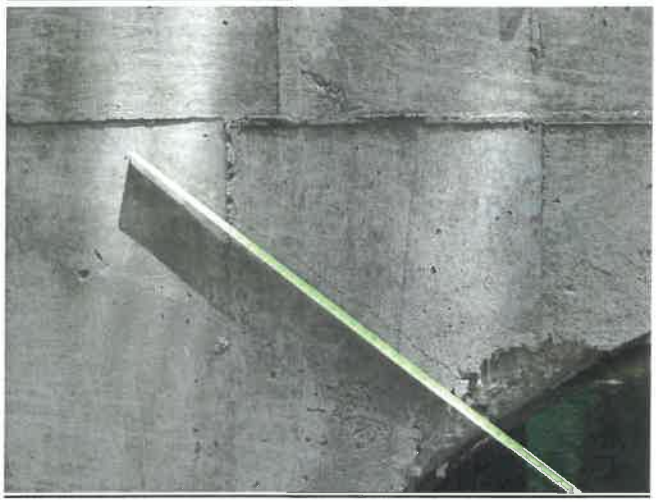
City: Lucas County: Collin Name: Stinson Road Bridge Structure #: 004 Route: Stinson Road

12: Headwall 1, Culvert 1



Honeycombing (typ.)

13: Headwall 1, Culvert 1



16" x 5" x 1.5" spall and 36" x 0.05" crack near culvert 1

14: Headwall 1, Culvert 2



Spall and 6' x .030" crack north of culvert 2, headwall 1

15: Headwall 2 – North View



Headwall 2 out of plumb

DO NOT DISCLOSE – INFORMATION CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT AND 23 USC SECTION 409, SAFETY SENSITIVE INFORMATION

BRIDGE INSPECTION RECORD
Photos

City: Lucas County: Collin Name: Stinson Road Bridge Structure #: 004 Route: Stinson Road

16: Railing Connection – Headwall 2



Railing/gate connection in good condition

17: Headwall 2 – Midspan



Crack and 8" x 5" x 2.5" spall at headwall 2, top, midspan

18: Headwall 2 – Midspan



Evidence of flooding

19: Headwall 2



3" x .05" crack at first railing support connection to headwall 2

DO NOT DISCLOSE – INFORMATION CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT AND 23 USC SECTION 409, SAFETY SENSITIVE INFORMATION

BRIDGE INSPECTION RECORD
Photos

City: Lucas County: Collin Name: Stinson Road Bridge Structure #: 004 Route: Stinson Road

20: Headwall 2, Culvert 1



21: Headwall 2, Culvert 1



Spall at headwall 2, culvert 1 (Likely resulting from construction)

22: Headwall 2, Culvert 1



5' Horizontal crack near culvert 1

23: Wingwall 1 – Southwest Corner



19" x 1/8" crack at wingwall 1

DO NOT DISCLOSE – INFORMATION CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT AND 23 USC SECTION 409, SAFETY SENSITIVE INFORMATION

BRIDGE INSPECTION RECORD
Photos

City: Lucas County: Collin Name: Stinson Road Bridge Structure #: 004 Route: Stinson Road

24: Headwall 2, Culvert 2 - Encased Utility & Waterway



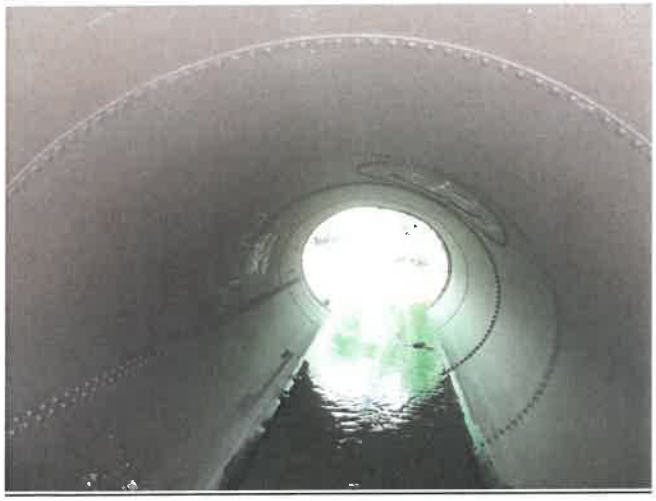
Approximately 1 ft scour at outfall and exposed encased utility

25: Headwall 2, Culvert 2



Scour/erosion at outlet headwall above pipe. Loss of backfill

26: Inside of Culvert 1, East View



Typical – no deficiencies noted

27: Inside of Culvert 2, East View



Moderate corrosion and sediment build up along bottom

DO NOT DISCLOSE – INFORMATION CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT AND 23 USC SECTION 409, SAFETY SENSITIVE INFORMATION

BRIDGE INSPECTION RECORD
Photos

City: Lucas County: Collin Name: Stinson Road Bridge Structure #: 004 Route: Stinson Road

28: Channel – West Side



Undermining of headwall 1 at midspan

29: Southwest Corner Pavement Dropoff

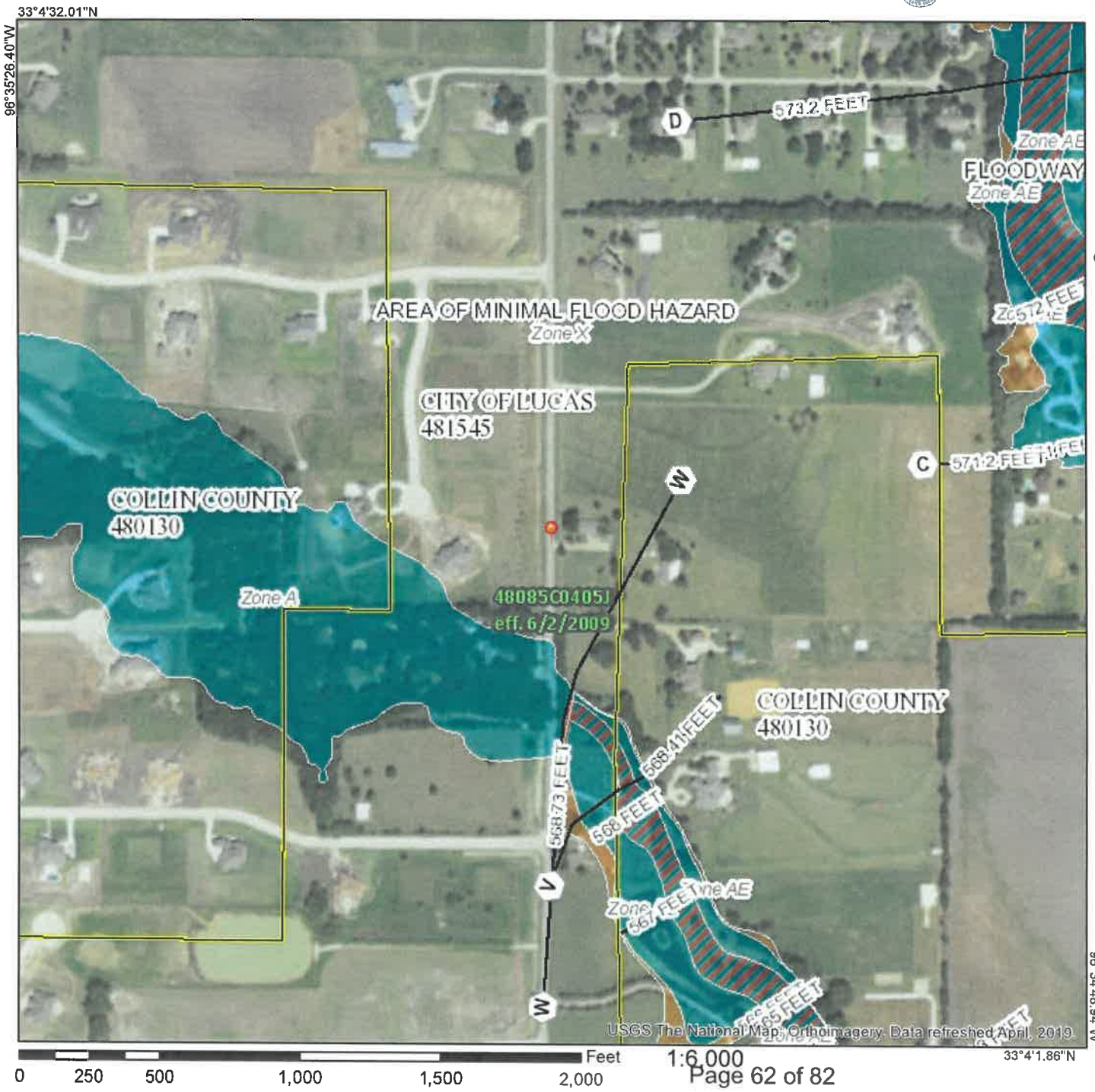


6' drop off 1' off the road (currently under construction)

DO NOT DISCLOSE – INFORMATION CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT AND 23 USC SECTION 409, SAFETY SENSITIVE INFORMATION

APPENDIX C:
References

National Flood Hazard Layer FIRMette



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 12/31/2019 at 10:39:36 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

DESIGNED BEAMS (STRAIGHT STRANDS)

STRUCTURE	SPAN LENGTH (ft)	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS: NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRETH fpu (ksi)	"e" @ CL (in)	"e" END (in)	TOT NO. DEB	DEBONDED STRANDS PER ROW: DIST FROM BOTTOM (in)	NO. OF STRANDS TOTAL	NO. OF STRANDS DE-BONDED	NUMBER OF STRANDS DEBONDED TO (ft from end) 3	6	9	12	15	CONCRETE: RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)
24' ROADWAY SB12 BEAM	25	ALL	5SB12		8	0.6	270	3.50	3.50	0	2.50	8	0	0	0	0	0	0	4.000	5.000
	30	ALL	5SB12		10	0.6	270	3.50	3.50	0	2.50	10	0	0	0	0	0	0	4.000	5.000
	35	ALL	5SB12		14	0.6	270	3.50	3.50	0	2.50	14	0	0	0	0	0	0	4.000	5.000
	40	ALL	5SB12		18	0.6	270	3.50	3.50	0	2.50	18	0	0	0	0	0	0	4.000	5.000
24' ROADWAY SB15 BEAM	25	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.50	8	0	0	0	0	0	0	4.000	5.000
	30	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.50	8	0	0	0	0	0	0	4.000	5.000
	35	ALL	5SB15		10	0.6	270	5.00	5.00	0	2.50	10	0	0	0	0	0	0	4.000	5.000
	40	ALL	5SB15		14	0.6	270	5.00	5.00	0	2.50	14	0	0	0	0	0	0	4.000	5.000
	45	ALL	5SB15		18	0.6	270	5.00	5.00	2	2.50	18	2	2	0	0	0	0	4.000	5.000
	50	ALL	5SB15		24	0.6	270	5.00	5.00	8	2.50	24	8	4	4	0	0	0	4.000	5.000
28' ROADWAY SB12 BEAM	25	ALL	5SB12		8	0.6	270	3.50	3.50	0	2.50	8	0	0	0	0	0	0	4.000	5.000
	30	ALL	5SB12		10	0.6	270	3.50	3.50	0	2.50	10	0	0	0	0	0	0	4.000	5.000
	35	ALL	5SB12		12	0.6	270	3.50	3.50	0	2.50	12	0	0	0	0	0	0	4.000	5.000
	40	ALL	5SB12		18	0.6	270	3.50	3.50	0	2.50	18	0	0	0	0	0	0	4.000	5.000
28' ROADWAY SB15 BEAM	25	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.50	8	0	0	0	0	0	0	4.000	5.000
	30	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.50	8	0	0	0	0	0	0	4.000	5.000
	35	ALL	5SB15		10	0.6	270	5.00	5.00	0	2.50	10	0	0	0	0	0	0	4.000	5.000
	40	ALL	5SB15		14	0.6	270	5.00	5.00	0	2.50	14	0	0	0	0	0	0	4.000	5.000
	45	ALL	5SB15		18	0.6	270	5.00	5.00	2	2.50	18	2	2	0	0	0	0	4.000	5.000
	50	ALL	5SB15		22	0.6	270	5.00	5.00	6	2.50	22	6	4	2	0	0	0	4.000	5.000
30' ROADWAY SB12 BEAM	25	ALL	4SB12		6	0.6	270	3.50	3.50	0	2.50	6	0	0	0	0	0	0	4.000	5.000
	30	ALL	4SB12		8	0.6	270	3.50	3.50	0	2.50	8	0	0	0	0	0	0	4.000	5.000
	35	ALL	4SB12		10	0.6	270	3.50	3.50	0	2.50	10	0	0	0	0	0	0	4.000	5.000
	40	ALL	4SB12		14	0.6	270	3.50	3.50	0	2.50	14	0	0	0	0	0	0	4.000	5.000
30' ROADWAY SB15 BEAM	25	ALL	4SB15		6	0.6	270	5.00	5.00	0	2.50	6	0	0	0	0	0	0	4.000	5.000
	30	ALL	4SB15		6	0.6	270	5.00	5.00	0	2.50	6	0	0	0	0	0	0	4.000	5.000
	35	ALL	4SB15		8	0.6	270	5.00	5.00	0	2.50	8	0	0	0	0	0	0	4.000	5.000
	40	ALL	4SB15		12	0.6	270	5.00	5.00	0	2.50	12	0	0	0	0	0	0	4.000	5.000
	45	ALL	4SB15		14	0.6	270	5.00	5.00	2	2.50	14	2	2	0	0	0	0	4.000	5.000
	50	ALL	4SB15		18	0.6	270	5.00	5.00	4	2.50	18	4	2	2	0	0	0	4.000	5.000

OPTIONAL DESIGN

STRUCTURE	DESIGN LOAD COMP STRESS (TOP f) (SERVICE I) fcd (ksi)	DESIGN LOAD TENSILE STRESS (BOTT ft) (SERVICE III) fctb (ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) Mr (k-ft)	LIVE LOAD DISTRIBUTION FACTOR (2) Moment	Shear
24' ROADWAY SB12 BEAM	0.914	-1.217	448	0.450	0.450
	1.292	-1.685	530	0.450	0.450
	1.730	-2.219	675	0.450	0.450
	2.218	-2.796	820	0.440	0.440
24' ROADWAY SB15 BEAM	0.725	-0.897	551	0.450	0.450
	1.020	-1.244	574	0.450	0.450
	1.361	-1.640	708	0.450	0.450
	1.739	-2.068	864	0.440	0.440
	2.179	-2.574	1054	0.440	0.440
	2.680	-3.153	1276	0.440	0.440
28' ROADWAY SB12 BEAM	0.903	-1.184	444	0.430	0.430
	1.276	-1.639	508	0.430	0.430
	1.708	-2.159	647	0.430	0.430
	2.200	-2.744	799	0.430	0.430
28' ROADWAY SB15 BEAM	0.716	-0.874	529	0.430	0.430
	1.007	-1.212	570	0.430	0.430
	1.343	-1.598	680	0.430	0.430
	1.725	-2.032	842	0.430	0.430
	2.149	-2.508	1013	0.420	0.420
	2.643	-3.073	1227	0.420	0.420
30' ROADWAY SB12 BEAM	0.904	-1.187	341	0.340	0.340
	1.277	-1.646	407	0.340	0.340
	1.711	-2.169	518	0.340	0.340
	2.205	-2.758	640	0.340	0.340
30' ROADWAY SB15 BEAM	0.723	-0.888	431	0.350	0.350
	1.017	-1.231	438	0.350	0.350
	1.346	-1.605	545	0.340	0.340
	1.729	-2.043	675	0.340	0.340
	2.166	-2.542	823	0.340	0.340
	2.665	-3.115	998	0.340	0.340

(1) Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

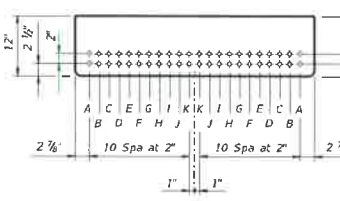
(2) Portion of full HL93.

DESIGN NOTES:

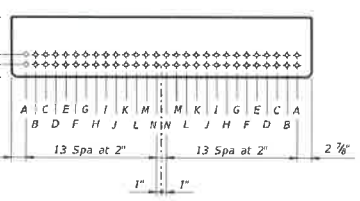
Designed according to AASHTO LRFD Bridge Design Specifications.
Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

FABRICATION NOTES:

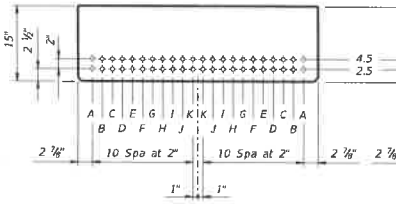
Provide Class H concrete.
Provide Grade 60 reinforcing steel.
Use low relaxation strands, each pretensioned to 75 percent of fpu.
Full-length debonded strands are not permitted in positions "A" and "B".
Strand debonding must comply with Item 424.4.2.2.2.4.
When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.
Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5". Place strands within a row as follows:
1) Locate a strand in each "A" position.
2) Place strand symmetrically about vertical centerline of beam.
3) Space strands as equally as possible across the entire width.
Do not debond strands in position "A". Distribute debonded strands symmetrically about the vertical centerline. Increase debonded lengths working outward, with debonding staggered in each row.



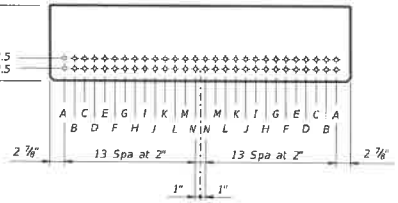
TxDOT 4SB12 SLAB BEAM



TxDOT 5SB12 SLAB BEAM



TxDOT 4SB15 SLAB BEAM



TxDOT 5SB15 SLAB BEAM

HL93 LOADING

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM STD DESIGNS

(TY SB12 OR SB15)

24', 28' & 30' ROADWAY

PSBSD

FILE: psbsts08-17.dgn	DN: SRW	CK: BMP	DW: SFS	CK: SDB
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS				
	DIST	COUNTY		SHEET NO.

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

STRUCTURE	DESIGNED BEAMS (STRAIGHT STRANDS)																			OPTIONAL DESIGN				
	PRESTRESSING STRANDS									DEBONDED STRAND PATTERN PER ROW								CONCRETE		DESIGN LOAD COMP STRESS (TOP 6) (SERVICE I)	DESIGN LOAD TENSILE STRESS (BOTT 6) (SERVICE III)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I)	LIVE LOAD DISTRIBUTION FACTOR ②	
	SPAN LENGTH	BEAM NO.	BEAM TYPE	Hyld-Stg STRAND PATTERN	TOTAL NO.	SIZE	STRGTH	"e" @	"e" END	TOT NO. DEB	DIST FROM BOTTOM	NO.OF STRANDS		NUMBER OF STRANDS DEBONDED TO (ft from end)						RELEASE STRGTH ①	MINIMUM 28 DAY COMP STRGTH					
												TOTAL	DE-BONDED	3	6	9	12	15							
	(ft)					(in)	fpu (ksi)	(in)	(in)		(in)									f'ci (ksi)	f'c (ksi)	fc(ksi)	fc(ksi)	(ft-kips)	Moment	Shear
28' ROADWAY 7DS20 BEAM	30	ALL	7DS20		10	0.6	270	8.73	8.73	0	2.50	10	0	0	0	0	0	0	4.000	5.000	1.128	-1.251	797	0.710	0.710
	35	ALL	7DS20		14	0.6	270	8.73	8.73	0	2.50	14	0	0	0	0	0	0	4.000	5.000	1.429	-1.594	1001	0.700	0.700
	40	ALL	7DS20		16	0.6	270	8.73	8.73	0	2.50	16	0	0	0	0	0	0	4.000	5.000	1.753	-1.968	1218	0.690	0.690
	45	ALL	7DS20		20	0.6	270	8.73	8.73	2	2.50	20	2	2	0	0	0	0	4.000	5.000	2.120	-2.392	1464	0.680	0.680
	50	ALL	7DS20		26	0.6	270	8.73	8.73	6	2.50	26	6	2	4	0	0	0	4.000	5.000	2.568	-2.905	1768	0.680	0.680
28' ROADWAY 7DS23 BEAM	30	ALL	7DS23		10	0.6	270	10.53	10.53	0	2.50	10	0	0	0	0	0	0	4.000	5.000	0.870	-0.986	900	0.710	0.710
	35	ALL	7DS23		12	0.6	270	10.53	10.53	0	2.50	12	0	0	0	0	0	0	4.000	5.000	1.102	-1.257	1007	0.700	0.700
	40	ALL	7DS23		14	0.6	270	10.53	10.53	0	2.50	14	0	0	0	0	0	0	4.000	5.000	1.353	-1.553	1227	0.690	0.690
	45	ALL	7DS23		16	0.6	270	10.53	10.53	0	2.50	16	0	0	0	0	0	0	4.000	5.000	1.638	-1.889	1475	0.680	0.680
	50	ALL	7DS23		20	0.6	270	10.53	10.53	0	2.50	20	0	0	0	0	0	0	4.000	5.000	1.984	-2.294	1782	0.680	0.680
	55	ALL	7DS23		24	0.6	270	10.53	10.53	2	2.50	24	2	2	0	0	0	0	4.000	5.000	2.334	-2.706	2086	0.670	0.670
	60	ALL	7DS23		30	0.6	270	10.40	10.37	6	2.50	28	6	2	2	2	0	0	4.000	5.000	2.722	-3.165	2425	0.670	0.670

DESIGN NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

Beam designs are applicable for 2" ACP overlay and 0 through 30 degree skews.

FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel bars.

Use low relaxation strands, each pretensioned to 75 percent of fpu.

When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.

Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard stand pattern is indicated. Fill row "2.5", then row "4.5". Place strands within a row as follows:

1) Locate a strand in each "1" position.
2) Place strand symmetrically about vertical centerline of box.
3) Space strands as equally as possible across the entire width.

Strand debonding must comply with Item 424.4.2.2.2.4.

Do not debond strands in position "1". Distribute debonded strands equally about the vertical centerline. Decrease debonded lengths working inward, with debonding staggered in each row.

Full-length debonded strands are not permitted in positions "1" through "3".

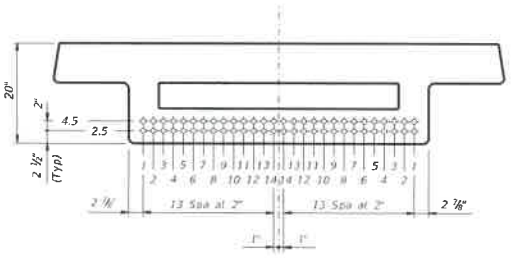
① Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

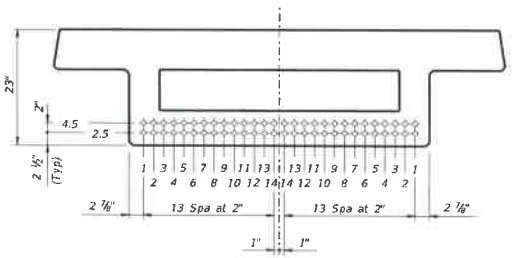
Optional designs must likewise conform.

② Portion of full HL93.



TxDOT 7DS20 DECKED SLAB BEAM

(Showing interior beam, exterior beam similar.)



TxDOT 7DS23 DECKED SLAB BEAM

(Showing interior beam, exterior beam similar.)

HL93 LOADING

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE DECKED SLAB BEAM STANDARD DESIGNS

28' ROADWAY

DSBSD-28

FILE:	dsbsd15.dgn	DN: GPT	CK: BAP	DW: SFS	CK: SDB
©TxDOT	September 2010	PPMT		MD	HIGHWAY
REVISIONS					
04-11: f'ci and LLDF. 01-14: #3bar, 0.6" strand pattern.					SHEET NO.

DISCLAIMER:
The use of this standard is governed by the Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

STANDARD SBBS-B20-28	DESIGNED BEAMS (STRAIGHT STRANDS)																			OPTIONAL DESIGN				
	PRESTRESSING STRANDS									DEBONDED STRAND PATTERN PER ROW								CONCRETE		DESIGN LOAD COMP STRESS (TOP ⓛ) (SERVICE I)	DESIGN LOAD TENSILE STRESS (BOTT ⓛ) (SERVICE III)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I)	LIVE LOAD DISTRIBUTION FACTOR ②	
	SPAN LENGTH	BEAM NO.	BEAM TYPE	NON-STD STRAND PATTERN	TOTAL NO.	SIZE	STRGTH	"c" ℄	"e" END	TOT NO. DEB	DIST FROM BOTTOM	NO.OF STRANDS		NUMBER OF STRANDS DEBONDED TO (ℓℓ from end)						RELEASE STRGTH ①	MINIMUM 28 DAY COMP STRGTH					
	(ft)					(in)	fpu (ksi)	(in)	(in)		(in)	TOTAL	DE-BONDED	3	6	9	12	15		f'ci (ksi)	f'c (ksi)	fct(ksi)	fcb(ksi)	(ft-kip)	Moment	Shear
	30	ALL	5B20		8	0.6	270	7.38	7.38	0	2.50	8	0	0	0	0	0	0		4.000	5.000	0.654	-0.828	715	0.454	0.691
	35	ALL	5B20		8	0.6	270	7.38	7.38	0	2.50	8	0	0	0	0	0	0		4.000	5.000	0.861	-1.069	796	0.440	0.680
28' Roadway	40	ALL	5B20		10	0.6	270	7.38	7.38	0	2.50	10	0	0	0	0	0	0		4.000	5.000	1.092	-1.335	890	0.427	0.671
5" Slab	45	ALL	5B20		10	0.6	270	7.38	7.38	0	2.50	10	0	0	0	0	0	0		4.000	5.000	1.356	-1.638	980	0.417	0.663
	50	ALL	5B20		14	0.6	270	7.38	7.38	0	2.50	14	0	0	0	0	0	0		4.000	5.000	1.658	-1.988	1172	0.408	0.655
	55	ALL	5B20		16	0.6	270	7.38	7.38	0	2.50	16	0	0	0	0	0	0		4.000	5.000	1.985	-2.364	1374	0.400	0.649
	60	ALL	5B20		20	0.6	270	7.38	7.38	2	2.50	20	2	2	0	0	0	0		4.000	5.000	2.339	-2.766	1587	0.393	0.643
	65	ALL	5B20		24	0.6	270	7.38	7.38	6	2.50	24	6	2	2	0	2	0		4.000	5.000	2.720	-3.197	1811	0.387	0.638

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

DESIGN NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

Beam designs are applicable for 5" concrete slabs without overlay and 0 degree skew.

FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel bars.

Use low relaxation strands, each pretensioned to 75 percent of fpu.

When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.

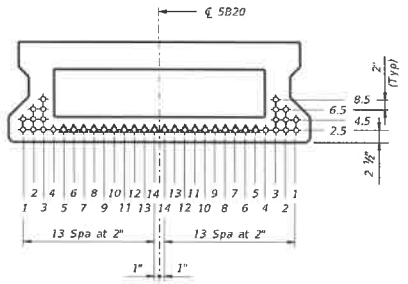
Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard stand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc. Place strands within a row as follows:

1) Locate a strand in each "1" position.
2) Place strand symmetrically about vertical centerline of box.
3) Space strands as equally as possible across the entire width.

Strand debonding must comply with Item 424.4.2.2.2.4.

Do not debond strands in position "1". Distribute debonded strands equally about the vertical centerline. Decrease debonded lengths working inward, with debonding staggered in each row.

Full-length debonded strands are only permitted in positions marked Δ.



TxDOT 5B20 BOX BEAM

① Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

② Portion of full HL93.

HL93 LOADING

Texas Department of Transportation — Bridge Division Standard

PRESTR CONC BOX BEAM STANDARD DESIGNS

TYPE B20 28' RDWY (WITH SLAB)

BBSDS-B20-28

FILE: bbstds25.dgn	DN: SAW	CK: BRP	DW: SFS	CK: SDB
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS				
04-13: Tbl and LEDF. 07-06: Notes, 0.6" strand lengths	DIST			SHEET NO.

STANDARD SBBS-B28-28	DESIGNED BEAMS (STRAIGHT STRANDS)																		OPTIONAL DESIGN				
	SPAN LENGTH (ft)	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS: NUM-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"a" ℄ (in)	"a" END (in)	TOT NO. DEB	DEBONDED STRAND PATTERN PER ROW: DIST FROM BOTTOM (in)	NO.OF STRANDS: TOTAL	DE-BONDED	NUMBER OF STRANDS DEBONDED TO (ft from end): 3	6	9	12	15	CONCRETE: RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE 1) f'c(ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE 1(i)) f'ct(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH 1) (ft-kips)	LIVE LOAD DISTRIBUTION FACTOR (2): Moment	Shear
	30	ALL	5B28		8	0.6	270	11.24	11.24	0	2.50	8	0	0	0	0	0	0	4.000	5.000	0.457	-0.544	757	0.461	0.700
	35	ALL	5B28		8	0.6	270	11.24	11.24	0	2.50	8	0	0	0	0	0	0	4.000	5.000	0.599	-0.704	950	0.447	0.689
28' Roadway	40	ALL	5B28		10	0.6	270	11.24	11.24	0	2.50	10	0	0	0	0	0	0	4.000	5.000	0.759	-0.880	1157	0.434	0.679
5" Slab	45	ALL	5B28		10	0.6	270	11.24	11.24	0	2.50	10	0	0	0	0	0	0	4.000	5.000	0.942	-1.081	1342	0.424	0.671
	50	ALL	5B28		12	0.6	270	11.24	11.24	0	2.50	12	0	0	0	0	0	0	4.000	5.000	1.150	-1.313	1477	0.415	0.664
	55	ALL	5B28		12	0.6	270	11.24	11.24	0	2.50	12	0	0	0	0	0	0	4.000	5.000	1.377	-1.562	1477	0.407	0.657
	60	ALL	5B28		14	0.6	270	11.24	11.24	0	2.50	14	0	0	0	0	0	0	4.000	5.000	1.620	-1.828	1707	0.399	0.651
	65	ALL	5B28		16	0.6	270	11.24	11.24	0	2.50	16	0	0	0	0	0	0	4.000	5.000	1.883	-2.113	1952	0.393	0.646
	70	ALL	5B28		18	0.6	270	11.24	11.24	0	2.50	18	0	0	0	0	0	0	4.000	5.000	2.163	-2.416	2208	0.387	0.641
	75	ALL	5B28		22	0.6	270	11.24	11.24	2	2.50	22	2	2	0	0	0	0	4.000	5.000	2.461	-2.738	2477	0.382	0.636
	80	ALL	5B28		26	0.6	270	11.24	11.24	4	2.50	26	4	0	2	0	2	0	4.000	5.000	2.778	-3.078	2758	0.377	0.632

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

DESIGN NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

Beam designs are applicable for 5" concrete slabs without overlay and 0 degree skew.

FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel bars.

Use low relaxation strands, each pretensioned to 75 percent of fpu.

When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.

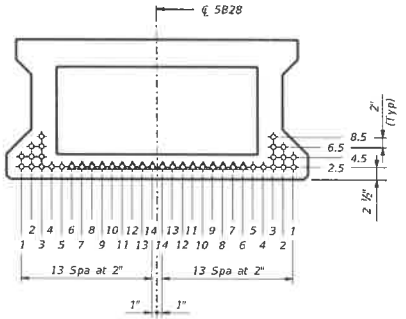
Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard stand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc. Place strands within a row as follows:

1) Locate a strand in each "1" position.
2) Place strand symmetrically about vertical centerline of box.
3) Space strands as equally as possible across the entire width.

Strand debonding must comply with Item 424.4.2.2.2.4.

Do not debond strands in position "1". Distribute debonded strands equally about the vertical centerline. Decrease debonded lengths working inward, with debonding staggered in each row.

Full-length debonded strands are only permitted in positions marked Δ.



TxDOT 5B28 BOX BEAM

(1) Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

(2) Portion of full HL93.

HL93 LOADING

Texas Department of Transportation — Bridge Division Standard

PRESTR CONC BOX BEAM STANDARD DESIGNS

TYPE B28 28' RDWY (WITH SLAB)

BBSDS-B28-28

FILE: bbsds27.dgn	DN: SRW	CK: BHP	DW: SFS	CK: SDB
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS				
04-13: Fu and LLDF 01-24: Notes, 0.6" strand & slabs	DIST	COUNTY		SHEET NO.

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

DESIGNED BEAMS (STRAIGHT STRANDS)

STRUCTURE	SPAN LENGTH (ft)	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS: RUN-STR STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" @ (in)	"e" END (in)	TOT NO. DEB	DEBONDED STRAND PATTERN PER ROW: DIST FROM BOTTOM (in)	NO.OF STRANDS: TOTAL	DE-BONDED	NUMBER OF STRANDS DEBONDED TO (ft from end): 3	6	9	12	15	CONCRETE: RELEASE STRGTH (1) f'ci (ksi)	28 DAY COMP STRGTH f'c (ksi)
TYPE 5XB20 X-BEAMS 32' Roadway 8" Slab	40	ALL	5XB20		12	0.6	270	7.03	7.03	0	2.50	12	0	0	0	0	0	0	4.000	5.000
	45	ALL	5XB20		14	0.6	270	7.03	7.03	0	2.50	14	0	0	0	0	0	0	4.000	5.000
	50	ALL	5XB20		20	0.6	270	7.03	7.03	0	2.50	20	0	0	0	0	0	0	4.000	5.000
	55	ALL	5XB20		24	0.6	270	7.03	7.03	4	2.50	24	4	2	2	0	0	0	4.000	5.000
	60	ALL	5XB20		30	0.6	270	6.90	6.87	6	2.50	28	6	2	2	2	0	0	4.400	5.000
	65	ALL	5XB20		36	0.6	270	6.59	6.46	8	2.50	28	8	2	2	2	2	0	4.900	5.200
TYPE 5XB28 X-BEAMS 32' Roadway 8" Slab	40	ALL	5XB28		12	0.6	270	10.63	10.63	0	2.50	12	0	0	0	0	0	0	4.000	5.000
	45	ALL	5XB28		12	0.6	270	10.63	10.63	0	2.50	12	0	0	0	0	0	0	4.000	5.000
	50	ALL	5XB28		12	0.6	270	10.63	10.63	0	2.50	12	0	0	0	0	0	0	4.000	5.000
	55	ALL	5XB28		14	0.6	270	10.63	10.63	0	2.50	14	0	0	0	0	0	0	4.000	5.000
	60	ALL	5XB28		18	0.6	270	10.63	10.63	0	2.50	18	0	0	0	0	0	0	4.000	5.000
	65	ALL	5XB28		22	0.6	270	10.63	10.63	0	2.50	22	0	0	0	0	0	0	4.000	5.000
	70	ALL	5XB28		26	0.6	270	10.63	10.63	2	2.50	26	2	2	0	0	0	0	4.000	5.000
	75	ALL	5XB28		32	0.6	270	10.38	10.32	6	2.50	26	6	0	2	2	2	0	4.000	5.000
	80	ALL	5XB28		36	0.6	270	10.19	10.10	6	2.50	28	6	2	2	0	2	0	4.600	5.000
TYPE 5XB34 X-BEAMS 32' Roadway 8" Slab	40	ALL	5XB34		10	0.6	270	13.11	13.11	0	2.50	10	0	0	0	0	0	0	4.000	5.000
	45	ALL	5XB34		12	0.6	270	13.11	13.11	0	2.50	12	0	0	0	0	0	0	4.000	5.000
	50	ALL	5XB34		14	0.6	270	13.11	13.11	0	2.50	14	0	0	0	0	0	0	4.000	5.000
	55	ALL	5XB34		14	0.6	270	13.11	13.11	0	2.50	14	0	0	0	0	0	0	4.000	5.000
	60	ALL	5XB34		16	0.6	270	13.11	13.11	0	2.50	16	0	0	0	0	0	0	4.000	5.000
	65	ALL	5XB34		18	0.6	270	13.11	13.11	0	2.50	18	0	0	0	0	0	0	4.000	5.000
	70	ALL	5XB34		22	0.6	270	13.11	13.11	0	2.50	22	0	0	0	0	0	0	4.000	5.000
	75	ALL	5XB34		24	0.6	270	13.11	13.11	0	2.50	24	0	0	0	0	0	0	4.000	5.000
	80	ALL	5XB34		28	0.6	270	13.11	13.11	4	2.50	28	4	2	2	0	0	0	4.000	5.000
	85	ALL	5XB34		34	0.6	270	12.75	12.65	8	2.50	28	8	4	2	2	0	0	4.000	5.000
	90	ALL	5XB34		40	0.6	270	12.51	12.31	10	2.50	28	10	2	2	2	2	2	4.200	5.000
	95	ALL	5XB34		44	0.6	270	12.38	12.17	10	2.50	28	10	2	2	2	2	2	4.600	5.200
TYPE 5XB40 X-BEAMS 32' Roadway 8" Slab	40	ALL	5XB40		10	0.6	270	15.70	15.70	0	2.50	10	0	0	0	0	0	0	4.000	5.000
	45	ALL	5XB40		12	0.6	270	15.70	15.70	0	2.50	12	0	0	0	0	0	0	4.000	5.000
	50	ALL	5XB40		14	0.6	270	15.70	15.70	0	2.50	14	0	0	0	0	0	0	4.000	5.000
	55	ALL	5XB40		14	0.6	270	15.70	15.70	0	2.50	14	0	0	0	0	0	0	4.000	5.000
	60	ALL	5XB40		14	0.6	270	15.70	15.70	0	2.50	14	0	0	0	0	0	0	4.000	5.000
	65	ALL	5XB40		16	0.6	270	15.70	15.70	0	2.50	16	0	0	0	0	0	0	4.000	5.000
	70	ALL	5XB40		18	0.6	270	15.70	15.70	0	2.50	18	0	0	0	0	0	0	4.000	5.000
	75	ALL	5XB40		20	0.6	270	15.70	15.70	0	2.50	20	0	0	0	0	0	0	4.000	5.000
	80	ALL	5XB40		24	0.6	270	15.70	15.70	2	2.50	24	2	2	0	0	0	0	4.000	5.000
	85	ALL	5XB40		28	0.6	270	15.70	15.70	4	2.50	28	4	2	2	0	0	0	4.000	5.000
	90	ALL	5XB40		32	0.6	270	15.45	15.40	6	2.50	28	6	2	4	0	0	0	4.000	5.000
	95	ALL	5XB40		36	0.6	270	15.26	15.09	10	2.50	28	10	4	6	0	0	0	4.000	5.000
	100	ALL	5XB40		42	0.6	270	15.04	14.77	12	2.50	28	12	2	4	2	2	2	4.000	5.000
	105	ALL	5XB40		48	0.6	270	14.87	14.58	16	2.50	28	14	2	6	2	0	4	4.500	5.100
											4.50	20	2	2	0	0	0	0		

OPTIONAL DESIGN

STRUCTURE	SPAN LENGTH (ft)	BEAM NO.	BEAM TYPE	DESIGN LOAD COMP STRESS (TOP fc) (SERVICE I) fct(ksi)	DESIGN LOAD TENSILE STRESS (BOTT fc) (SERVICE III) fct(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (ft-Kips)	LIVE LOAD DISTRIBUTION FACTOR (2) Moment	LIVE LOAD DISTRIBUTION FACTOR (2) Shear
TYPE 5XB20 X-BEAMS 32' Roadway 8" Slab	40	ALL	5XB20	1.231	-1.621	1255	0.688	0.903
	45	ALL	5XB20	1.557	-1.997	1498	0.667	0.897
	50	ALL	5XB20	1.926	-2.432	1787	0.649	0.891
	55	ALL	5XB20	2.333	-2.901	2090	0.633	0.887
	60	ALL	5XB20	2.777	-3.406	2407	0.619	0.883
	65	ALL	5XB20	3.259	-3.946	2739	0.606	0.879
TYPE 5XB28 X-BEAMS 32' Roadway 8" Slab	40	ALL	5XB28	0.800	-1.023	1748	0.719	0.948
	45	ALL	5XB28	1.006	-1.255	1793	0.697	0.942
	50	ALL	5XB28	1.240	-1.523	1870	0.678	0.937
	55	ALL	5XB28	1.497	-1.812	2187	0.661	0.933
	60	ALL	5XB28	1.777	-2.124	2521	0.647	0.929
	65	ALL	5XB28	2.079	-2.454	2867	0.633	0.926
	70	ALL	5XB28	2.404	-2.807	3231	0.621	0.923
	75	ALL	5XB28	2.753	-3.182	3614	0.611	0.921
	80	ALL	5XB28	3.124	-3.578	4011	0.601	0.919
TYPE 5XB34 X-BEAMS 32' Roadway 8" Slab	40	ALL	5XB34	0.657	-0.777	1818	0.736	0.976
	45	ALL	5XB34	0.824	-0.953	2172	0.714	0.971
	50	ALL	5XB34	1.014	-1.158	2467	0.695	0.966
	55	ALL	5XB34	1.222	-1.378	2432	0.678	0.962
	60	ALL	5XB34	1.449	-1.614	2632	0.663	0.958
	65	ALL	5XB34	1.693	-1.866	2997	0.649	0.956
	70	ALL	5XB34	1.955	-2.134	3381	0.637	0.953
	75	ALL	5XB34	2.236	-2.419	3781	0.626	0.951
	80	ALL	5XB34	2.535	-2.718	4197	0.615	0.949
	85	ALL	5XB34	2.853	-3.036	4634	0.606	0.947
	90	ALL	5XB34	3.188	-3.369	5086	0.597	0.946
	95	ALL	5XB34	3.542	-3.719	5558	0.589	0.945
TYPE 5XB40 X-BEAMS 32' Roadway 8" Slab	40	ALL	5XB40	0.560	-0.629	1886	0.752	1.001
	45	ALL	5XB40	0.701	-0.772	2255	0.729	0.996
	50	ALL	5XB40	0.861	-0.938	2694	0.709	0.991
	55	ALL	5XB40	1.037	-1.117	3007	0.692	0.988
	60	ALL	5XB40	1.227	-1.308	2947	0.676	0.984
	65	ALL	5XB40	1.433	-1.513	3137	0.662	0.982
	70	ALL	5XB40	1.654	-1.731	3521	0.650	0.980
	75	ALL	5XB40	1.890	-1.962	3939	0.638	0.978
	80	ALL	5XB40	2.142	-2.207	4378	0.628	0.976
	85	ALL	5XB40	2.408	-2.464	4834	0.618	0.975
	90	ALL	5XB40	2.690	-2.735	5310	0.609	0.974
	95	ALL	5XB40	2.988	-3.020	5806	0.601	0.973
	100	ALL	5XB40	3.300	-3.318	6319	0.593	0.972
	105	ALL	5XB40	3.628	-3.630	6854	0.586	0.971

DESIGN NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.
Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.
Beam designs are applicable for 8" concrete slabs without overlay and 0 through 30 degree skews.

FABRICATION NOTES:

Provide Class H concrete.
Provide Grade 60 reinforcing steel bars.
Use low relaxation strands, each pretensioned to 75 percent of fpu.
When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.
Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard stand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc. Place strands within a row as follows:
1) Locate a strand in each "1" position.
2) Place strand symmetrically about vertical centerline of box.
3) Space strands as equally as possible across the entire width.
Strand debonding must comply with Item 424.4.2.2.2.4.
Do not debond strands in position "1". Distribute debonded strands equally about the vertical centerline. Decrease debonded lengths working inward, with debonding staggered in each row.
Full-length debonded strands are only permitted in positions marked △.

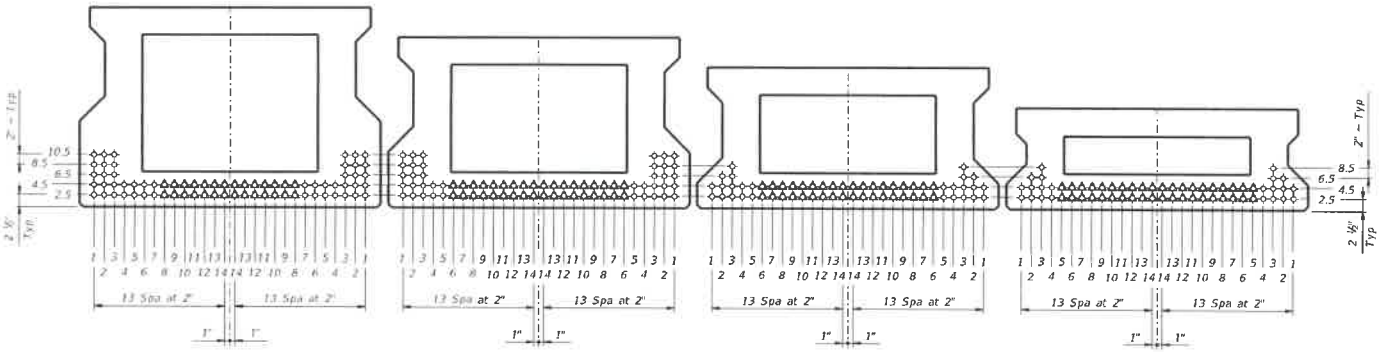
(1) Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

(2) Portion of full HL93.



TxDOT 5XB40 BEAMS | TxDOT 5XB34 BEAMS | TxDOT 5XB28 BEAMS | TxDOT 5XB20 BEAMS

HL93 LOADING

Texas Department of Transportation | Bridge Division Standard

PRESTRESSED CONCRETE X-BEAM STANDARD DESIGNS 32' ROADWAY

XBSD-32

FILE: xbsds40.dgn	DN: SRW	CK: BMP	DW: SFS	CK: SDB
©TxDOT June 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS				
01-16: Notes, 0.6" strand options.	DIST	COUNTY		SHEET NO.

STRUCTURE	DESIGNED GIRDERS								DEPRESSED STRAND PATTERN		CONCRETE		OPTIONAL DESIGN				
	SPAN NO.	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS					NO.	TO END (in)	RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP E) (SERVICE I) fcn(ksi)	DESIGN LOAD TENSILE STRESS (BOTT E) (SERVICE III) fcn(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR (2)	
				NUMBER STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" @ (in)	"e" END (in)								Moment	Shear
Type Tx28 Girders 28' Roadway 8.5" Slab	40	ALL	Tx28		12	0.6	270	10.48	10.48			4.700	5.000	1.152	-1.588	1581	0.760	0.960
	45	ALL	Tx28		12	0.6	270	10.48	10.48			4.800	5.800	1.458	-1.949	1578	0.740	0.970
	50	ALL	Tx28		14	0.6	270	10.48	9.62	2	8.5	4.000	5.200	1.787	-2.340	1855	0.710	0.970
	55	ALL	Tx28		18	0.6	270	10.04	7.81	4	14.5	4.000	6.000	2.167	-2.793	2180	0.700	0.980
	60	ALL	Tx28		22	0.6	270	9.75	6.48	4	22.5	4.400	6.500	2.557	-3.243	2487	0.680	0.980
	65	ALL	Tx28		24	0.6	270	9.65	7.65	4	16.5	5.200	6.600	2.999	-3.736	2808	0.660	0.980
	70	ALL	Tx28		28	0.6	270	9.48	6.91	4	22.5	5.700	7.400	3.448	-4.249	3154	0.650	0.990
Type Tx34 Girders 28' Roadway 8.5" Slab	40	ALL	Tx34		12	0.6	270	13.01	13.01			4.000	5.000	0.884	-1.199	1806	0.790	0.940
	45	ALL	Tx34		12	0.6	270	13.01	13.01			4.000	5.000	1.113	-1.460	1921	0.760	0.950
	50	ALL	Tx34		14	0.6	270	13.01	13.01			5.100	6.000	1.375	-1.769	2187	0.740	0.950
	55	ALL	Tx34		14	0.6	270	13.01	13.01			5.000	6.000	1.662	-2.098	2224	0.720	0.960
	60	ALL	Tx34		16	0.6	270	12.76	11.76	4	8.5	4.000	5.000	1.957	-2.432	2537	0.700	0.960
	65	ALL	Tx34		20	0.6	270	12.41	9.61	4	18.5	4.000	5.500	2.285	-2.804	2886	0.690	0.960
	70	ALL	Tx34		22	0.6	270	12.28	8.65	4	24.5	4.200	5.800	2.636	-3.195	3247	0.680	0.970
	75	ALL	Tx34		26	0.6	270	12.09	8.40	4	28.5	4.800	6.100	3.004	-3.588	3587	0.660	0.970
	80	ALL	Tx34		30	0.6	270	11.81	7.81	6	26.5	5.300	6.500	3.398	-4.016	3966	0.650	0.970
	85	ALL	Tx34		34	0.6	270	11.48	7.25	6	30.5	5.800	7.100	3.830	-4.476	4364	0.640	0.980
Type Tx40 Girders 28' Roadway 8.5" Slab	40	ALL	Tx40		10	0.6	270	15.60	15.60			4.000	5.000	0.735	-0.976	1872	0.820	0.930
	45	ALL	Tx40		12	0.6	270	15.60	15.60			4.000	5.000	0.917	-1.181	2207	0.790	0.930
	50	ALL	Tx40		14	0.6	270	15.60	15.60			4.500	5.500	1.130	-1.430	2590	0.770	0.940
	55	ALL	Tx40		14	0.6	270	15.60	15.60			4.300	5.300	1.364	-1.695	2518	0.750	0.940
	60	ALL	Tx40		16	0.6	270	15.35	14.35	4	8.5	4.000	5.000	1.604	-1.964	2637	0.730	0.950
	65	ALL	Tx40		16	0.6	270	15.35	14.35	4	8.5	4.000	5.000	1.876	-2.258	2970	0.710	0.950
	70	ALL	Tx40		18	0.6	270	15.16	14.27	4	8.5	4.000	5.000	2.170	-2.579	3347	0.700	0.950
	75	ALL	Tx40		22	0.6	270	14.87	11.24	4	24.5	4.000	5.300	2.461	-2.887	3694	0.680	0.950
	80	ALL	Tx40		24	0.6	270	14.77	10.77	4	28.5	4.300	5.500	2.793	-3.239	4093	0.670	0.960
	85	ALL	Tx40		28	0.6	270	14.60	10.03	4	36.5	4.800	5.700	3.120	-3.588	4489	0.660	0.960
	90	ALL	Tx40		32	0.6	270	14.23	8.98	6	34.5	5.200	5.800	3.489	-3.972	4911	0.650	0.960
	95	ALL	Tx40		36	0.6	270	13.93	8.93	6	36.5	5.800	6.500	3.863	-4.359	5336	0.640	0.970
Type Tx46 Girders 28' Roadway 8.5" Slab	40	ALL	Tx46		10	0.6	270	17.60	17.60			4.000	5.000	0.646	-0.778	1949	0.850	0.920
	45	ALL	Tx46		12	0.6	270	17.60	17.60			4.000	5.000	0.809	-0.947	2308	0.820	0.920
	50	ALL	Tx46		12	0.6	270	17.60	17.60			4.000	5.000	0.994	-1.141	2728	0.790	0.920
	55	ALL	Tx46		14	0.6	270	17.60	17.60			4.000	5.000	1.190	-1.346	3018	0.770	0.930
	60	ALL	Tx46		14	0.6	270	17.60	17.60			4.500	5.500	1.412	-1.577	3048	0.760	0.930
	65	ALL	Tx46		16	0.6	270	17.35	16.35	4	8.5	4.000	5.000	1.649	-1.814	3161	0.740	0.930
	70	ALL	Tx46		16	0.6	270	17.35	16.85	4	6.5	4.000	5.000	1.903	-2.063	3487	0.720	0.940
	75	ALL	Tx46		18	0.6	270	17.16	15.83	4	10.5	4.000	5.000	2.162	-2.322	3884	0.710	0.940
	80	ALL	Tx46		22	0.6	270	16.88	15.06	4	14.5	4.000	5.000	2.452	-2.607	4306	0.700	0.940
	85	ALL	Tx46		24	0.6	270	16.77	14.10	4	20.5	4.000	5.000	2.738	-2.889	4726	0.690	0.940
	90	ALL	Tx46		28	0.6	270	16.60	11.46	4	40.5	4.200	5.200	3.061	-3.199	5174	0.680	0.950
	95	ALL	Tx46		32	0.6	270	16.23	9.85	6	40.5	4.500	5.400	3.387	-3.512	5624	0.670	0.950
	100	ALL	Tx46		36	0.6	270	15.94	10.27	6	40.5	5.100	5.800	3.728	-3.837	6086	0.660	0.950
	105	ALL	Tx46		40	0.6	270	15.70	10.30	6	42.5	5.600	6.400	4.099	-4.186	6571	0.650	0.950

NON-STANDARD STRAND PATTERNS

PATTERN	STRAND ARRANGEMENT AT ℄ OF GIRDER

(1) Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

(2) Portion of full HL93.

DESIGN NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Optional designs for girders 120 feet or longer must have a calculated residual camber equal to or greater than that of the designed girder.

Prestress losses for the designed girders have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel bars.

Use low relaxation strands, each pretensioned to 75 percent of fpu.

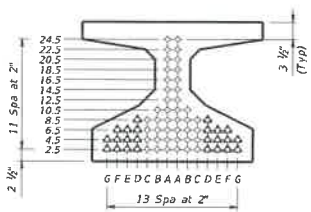
Strand debonding must comply with Item 424.4.2.2.2.4. Full-length debonded strands are only permitted in positions marked △. Double wrap full-length debonded strands in outer most position of each row.

When shown on this sheet, the Fabricator has the option of furnishing either the designed girder or an approved optional design. All optional design submittals must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.

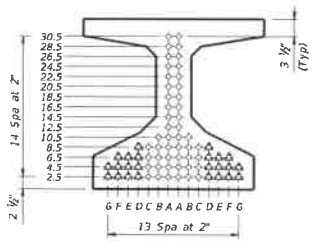
Seal cracks in girder ends exceeding 0.005" in width as directed by the Engineer. The fabricator is permitted to decrease the spacing of Bars R and S by providing additional bars to help limit crack width provided the decreased spacing results in no less than 1" clear between bars. The fabricator must take an approved corrective action if cracks greater than 0.005" form on a repetitive basis.

DEPRESSED STRAND DESIGNS:

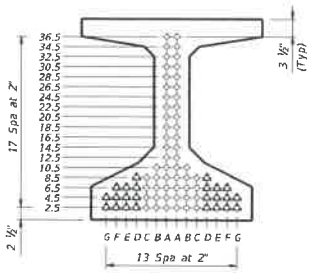
Locate strands for the designed girder as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc., beginning each row in the "A" position and working outward until the required number of strands is reached. All strands in the "A" position must be depressed, maintaining the 2" spacing so that, at the girder ends, the upper two strands are in the position shown in the table.



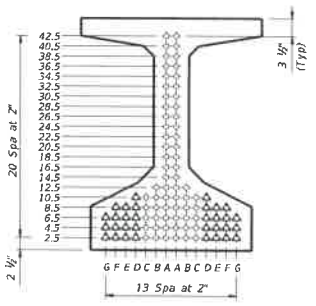
TYPE Tx28



TYPE Tx34



TYPE Tx40



TYPE Tx46

HL93 LOADING

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER STANDARD DESIGNS

28' ROADWAY

IGSD-28

FILE: ig02std-19.dgn	DN: EFC	CK: ALF	DW: EFC	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-1st Redesigned girders.				
	DIST	COUNTY		SHEET NO.

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

STRUCTURE	DESIGNED GIRDERS								DEPRESSED STRAND PATTERN		CONCRETE		OPTIONAL DESIGN				
	SPAN NO.	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS					NO.	TO END (in)	RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP E) (SERVICE I) fct(ksi)	DESIGN LOAD TENSILE STRESS (BOTT E) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR (2)	
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)								Moment	Shear
Type Tx54 Girders 28' Roadway 8.5" Slab	40	ALL	Tx54		10	0.6	270	21.01	21.01			4.000	5.000	0.536	-0.634	2015	0.880	0.910
	45	ALL	Tx54		12	0.6	270	21.01	21.01			4.000	5.000	0.670	-0.771	2387	0.850	0.910
	50	ALL	Tx54		12	0.6	270	21.01	21.01			4.000	5.000	0.822	-0.929	2824	0.820	0.910
	55	ALL	Tx54		14	0.6	270	21.01	21.01			4.000	5.000	0.983	-1.096	3285	0.800	0.920
	60	ALL	Tx54		14	0.6	270	21.01	21.01			4.000	5.000	1.163	-1.277	3619	0.780	0.920
	65	ALL	Tx54		16	0.6	270	20.76	20.26	4	6.5	4.000	5.000	1.356	-1.468	3862	0.760	0.920
	70	ALL	Tx54		16	0.6	270	20.76	20.26	4	6.5	4.000	5.000	1.567	-1.677	3811	0.750	0.920
	75	ALL	Tx54		18	0.6	270	20.56	19.67	4	8.5	4.000	5.000	1.782	-1.884	4043	0.730	0.930
	80	ALL	Tx54		18	0.6	270	20.56	19.67	4	8.5	4.000	5.000	2.026	-2.119	4448	0.720	0.930
	85	ALL	Tx54		20	0.6	270	20.41	18.81	4	12.5	4.000	5.000	2.263	-2.349	4883	0.710	0.930
	90	ALL	Tx54		22	0.6	270	20.28	18.46	4	14.5	4.000	5.000	2.528	-2.601	5348	0.700	0.930
	95	ALL	Tx54		26	0.6	270	20.08	16.39	4	28.5	4.000	5.000	2.786	-2.848	5805	0.690	0.930
	100	ALL	Tx54		30	0.6	270	19.81	12.21	6	44.5	4.000	5.000	3.077	-3.120	6296	0.680	0.940
	105	ALL	Tx54		32	0.6	270	19.63	12.51	6	44.5	4.300	5.000	3.381	-3.403	6800	0.670	0.940
	110	ALL	Tx54		36	0.6	270	19.34	12.01	6	50.5	4.700	5.400	3.686	-3.686	7303	0.660	0.940
	115	ALL	Tx54		40	0.6	270	19.11	12.51	6	50.5	5.300	6.100	4.016	-3.989	7832	0.650	0.940
	120	ALL	Tx54		44	0.6	270	18.83	11.55	8	48.5	5.600	6.500	4.352	-4.308	8420	0.650	0.940
	125	ALL	Tx54		48	0.6	270	18.42	10.09	10	50.5	5.800	7.200	4.709	-4.633	8977	0.640	0.940
Type Tx62 Girders 28' Roadway 8.5" Slab	60	ALL	Tx62		14	0.6	270	25.78	25.78			4.000	5.000	0.916	-1.069	3911	0.800	0.910
	65	ALL	Tx62		14	0.6	270	25.78	25.78			4.000	5.000	1.069	-1.235	4248	0.790	0.910
	70	ALL	Tx62		16	0.6	270	25.53	25.53			4.000	5.000	1.231	-1.403	4544	0.770	0.910
	75	ALL	Tx62		16	0.6	270	25.53	25.53			4.000	5.000	1.395	-1.579	4502	0.760	0.920
	80	ALL	Tx62		18	0.6	270	25.33	25.33			4.000	5.000	1.576	-1.763	4785	0.740	0.920
	85	ALL	Tx62		18	0.6	270	25.33	25.33			4.000	5.000	1.771	-1.964	5084	0.730	0.920
	90	ALL	Tx62		18	0.6	270	25.33	25.33			4.000	5.000	1.976	-2.174	5571	0.720	0.920
	95	ALL	Tx62		22	0.6	270	25.05	23.96	4	10.5	4.000	5.000	2.192	-2.393	6073	0.710	0.920
	100	ALL	Tx62		24	0.6	270	24.94	23.28	4	14.5	4.000	5.000	2.400	-2.605	6563	0.700	0.920
	105	ALL	Tx62		28	0.6	270	24.78	20.21	4	36.5	4.000	5.000	2.636	-2.841	7092	0.690	0.930
	110	ALL	Tx62		30	0.6	270	24.58	17.78	6	40.5	4.000	5.000	2.858	-3.067	7602	0.680	0.930
	115	ALL	Tx62		34	0.6	270	24.25	15.42	6	56.5	4.200	5.000	3.113	-3.319	8156	0.670	0.930
	120	ALL	Tx62		36	0.6	270	24.11	17.11	6	48.5	4.700	5.500	3.378	-3.579	8725	0.660	0.930
	125	ALL	Tx62		40	0.6	270	23.88	16.68	6	54.5	5.100	6.000	3.629	-3.839	9330	0.660	0.930
	130	ALL	Tx62		44	0.6	270	23.60	14.87	8	56.5	5.300	6.200	3.913	-4.116	9926	0.650	0.930
	135	ALL	Tx62		48	0.6	270	23.28	14.94	8	58.5	5.800	6.700	4.206	-4.402	10535	0.640	0.940

NON-STANDARD STRAND PATTERNS

PATTERN	STRAND ARRANGEMENT AT ℄ OF GIRDER
*	2.5(14),4.5(14),6.5(14),8.5(4),10.5(2)

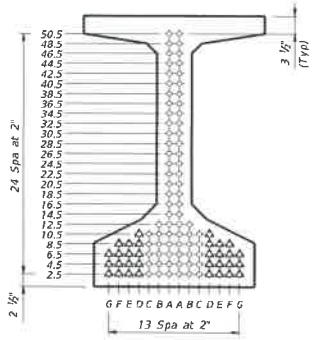
(1) Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

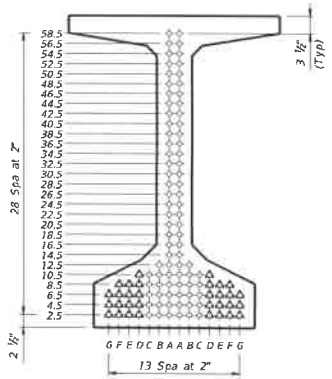
Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

(2) Portion of full HL93.



TYPE Tx54



TYPE Tx62

HL93 LOADING

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER STANDARD DESIGNS

28' ROADWAY

IGSD-28

FILE: ig02stds-19.dgn	DN: EFC	CK: JJF	DW: EFC
©TxDOT August 2017		JOB	HIGHWAY
REVISIONS 10-19: Redesigned girders.	DIST	COUNTY	SHEET NO.

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

TABLE OF REQUIRED BEAM SIZES, DESIGN DATA AND STEEL QUANTITIES

SPAN (ft)	ROLLED BEAM				OPTIONAL PLATE GIRDER						Diaphragm Spaces	Stud Spacing	Elastomeric Bearing	Estimated Quantities Structural Steel (lbs)	
		Dimension	Deflection "A" (feet)		Plate Sizes (inches)			Dimension	Deflection "A" (feet)						
	Beam Member	"Y" (in)	Slab DL	Total DL	Top Flange	Bott Flange	Web	"Y" (in)	Slab DL	Total DL	"N" (ea)	"X" (in)	Type	Rolled Beam	PL Girder (1)
30	W18 x 130	29.25	0.017	0.021	1 x 12	1 1/4 x 12	1/2 x 17	29.25	0.018	0.022	2	8	SB - 1	18,200	17,200
	W21 x 132	31.83	0.013	0.017	7/8 x 12	1 1/4 x 12	1/2 x 19.5	31.62	0.014	0.017	2	8	SB - 1	19,440	18,110
	W24 x 117	34.26	0.012	0.015	3/4 x 12	1 x 12	1/2 x 22.5	34.25	0.013	0.016	2	9	SB - 1	17,660	16,920
	W27 x 146	37.38	0.008	0.010	3/4 x 14	1 x 14	1/2 x 25.5	37.25	0.009	0.011	2	9	SB - 2	21,190	19,120
	W30 x 173	40.44	0.005	0.007	1 x 15	1 1/4 x 15	1/2 x 28.5	40.75	0.005	0.007	2	9	SB - 3	24,490	23,620
	W33 x 118	42.86	0.007	0.009	3/4 x 12	3/4 x 12	1/2 x 31.5	43.00	0.007	0.009	2	10.5	SB - 1	18,490	18,290
	W36 x 135	45.55	0.006	0.007	3/4 x 12	7/8 x 12	1/2 x 34	45.62	0.006	0.007	2	10.5	SB - 1	20,530	19,450
	W40 x 149	48.20	0.005	0.006	3/4 x 12	1 x 12	1/2 x 36.5	48.25	0.005	0.006	2	10.5	SB - 1	22,320	20,700
35	W18 x 130	29.25	0.032	0.039	1 x 12	1 1/4 x 12	1/2 x 17	29.25	0.033	0.040	2	8	SB - 1	20,850	19,670
	W21 x 132	31.83	0.025	0.031	7/8 x 12	1 1/4 x 12	1/2 x 19.5	31.62	0.026	0.032	2	8	SB - 1	22,140	20,560
	W24 x 117	34.26	0.022	0.027	3/4 x 12	1 x 12	1/2 x 22.5	34.25	0.024	0.029	2	9	SB - 1	20,040	19,160
	W27 x 146	37.38	0.014	0.018	3/4 x 14	1 x 14	1/2 x 25.5	37.25	0.016	0.020	2	9	SB - 2	24,160	21,690
	W30 x 173	40.44	0.010	0.013	1 x 15	1 1/4 x 15	1/2 x 28.5	40.75	0.010	0.013	2	9	SB - 3	28,000	26,930
	W33 x 118	42.86	0.014	0.017	3/4 x 12	3/4 x 12	1/2 x 31.5	43.00	0.013	0.016	2	10.5	SB - 1	20,890	20,640
	W36 x 135	45.55	0.010	0.013	3/4 x 12	7/8 x 12	1/2 x 34	45.62	0.011	0.013	2	10.5	SB - 1	23,280	21,980
	W40 x 149	48.20	0.008	0.011	3/4 x 12	1 x 12	1/2 x 36.5	48.25	0.009	0.011	2	10.5	SB - 1	25,350	23,410
40	W18 x 130	29.25	0.054	0.067	1 x 12	1 1/4 x 12	1/2 x 17	29.25	0.055	0.068	3	8	SB - 1	24,080	22,720
	W21 x 132	31.83	0.042	0.052	7/8 x 12	1 1/4 x 12	1/2 x 19.5	31.62	0.044	0.054	2	8	SB - 1	24,840	23,020
	W24 x 117	34.26	0.038	0.047	3/4 x 12	1 x 12	1/2 x 22.5	34.25	0.041	0.050	2	9	SB - 1	22,430	21,390
	W27 x 146	37.38	0.024	0.031	3/4 x 14	1 x 14	1/2 x 25.5	37.25	0.028	0.035	2	9	SB - 2	27,130	24,270
	W30 x 173	40.44	0.017	0.022	1 x 15	1 1/4 x 15	1/2 x 28.5	40.75	0.017	0.022	2	9	SB - 3	31,510	30,240
	W33 x 118	42.86	0.023	0.028	3/4 x 12	3/4 x 12	1/2 x 31.5	43.00	0.023	0.028	2	10.5	SB - 1	23,300	22,980
	W36 x 135	45.55	0.018	0.022	3/4 x 12	7/8 x 12	1/2 x 34	45.62	0.018	0.023	2	10.5	SB - 1	26,030	24,510
	W40 x 149	48.20	0.014	0.018	3/4 x 12	1 x 12	1/2 x 36.5	48.25	0.015	0.019	2	10.5	SB - 1	28,370	26,130
45	W18 x 130	29.25	0.087	0.108	1 x 12	1 1/4 x 12	1/2 x 17	29.25	0.089	0.109	3	8	SB - 1	26,740	25,190
	W21 x 132	31.83	0.067	0.084	7/8 x 12	1 1/4 x 12	1/2 x 19.5	31.62	0.070	0.086	2	8	SB - 1	27,540	25,470
	W24 x 117	34.26	0.061	0.075	3/4 x 12	1 x 12	1/2 x 22.5	34.25	0.065	0.079	2	9	SB - 1	24,830	23,650
	W27 x 146	37.38	0.039	0.050	3/4 x 14	1 x 14	1/2 x 25.5	37.25	0.045	0.056	2	9	SB - 2	30,110	26,860
	W30 x 173	40.44	0.027	0.035	1 x 15	1 1/4 x 15	1/2 x 28.5	40.75	0.027	0.035	2	9	SB - 3	35,020	33,560
	W33 x 118	42.86	0.037	0.046	3/4 x 12	3/4 x 12	1/2 x 31.5	43.00	0.036	0.045	2	10.5	SB - 1	25,700	25,310
	W36 x 135	45.55	0.028	0.036	3/4 x 12	7/8 x 12	1/2 x 34	45.62	0.029	0.037	2	10.5	SB - 1	28,760	27,030
	W40 x 149	48.20	0.023	0.029	3/4 x 12	1 x 12	1/2 x 36.5	48.25	0.024	0.030	2	10.5	SB - 1	31,390	28,830
50	W18 x 130	29.25	0.132	0.164	1 x 12	1 1/4 x 12	1/2 x 17	29.25	0.135	0.166	3	8	SB - 1	29,400	27,660
	W21 x 132	31.83	0.102	0.128	7/8 x 12	1 1/4 x 12	1/2 x 19.5	31.62	0.107	0.131	2	8	SB - 1	30,230	27,930
	W24 x 117	34.26	0.093	0.114	3/4 x 12	1 x 12	1/2 x 22.5	34.25	0.099	0.121	2	9	SB - 1	27,220	25,880
	W27 x 146	37.38	0.059	0.076	3/4 x 14	1 x 14	1/2 x 25.5	37.25	0.068	0.085	2	9	SB - 2	33,070	29,440
	W30 x 173	40.44	0.041	0.054	1 x 15	1 1/4 x 15	1/2 x 28.5	40.75	0.040	0.053	2	9	SB - 3	38,530	36,870
	W33 x 118	42.86	0.056	0.069	3/4 x 12	3/4 x 12	1/2 x 31.5	43.00	0.055	0.068	2	10.5	SB - 1	28,100	27,650
	W36 x 135	45.55	0.043	0.054	3/4 x 12	7/8 x 12	1/2 x 34	45.62	0.045	0.056	2	10.5	SB - 1	31,510	29,560
	W40 x 149	48.20	0.035	0.044	3/4 x 12	1 x 12	1/2 x 36.5	48.25	0.036	0.045	2	10.5	SB - 1	34,420	31,550
55	W21 x 132	31.83	0.149	0.187	7/8 x 12	1 1/4 x 12	1/2 x 19.5	31.62	0.156	0.192	3	8	SB - 2	33,900	31,350
	W24 x 117	34.26	0.136	0.167	3/4 x 12	1 x 12	1/2 x 22.5	34.25	0.146	0.177	3	9	SB - 2	30,580	29,100
	W27 x 146	37.38	0.087	0.111	3/4 x 14	1 x 14	1/2 x 25.5	37.25	0.100	0.124	3	9	SB - 2	36,970	32,950
	W30 x 173	40.44	0.060	0.079	1 x 15	1 1/4 x 15	1/2 x 28.5	40.75	0.059	0.077	3	9	SB - 3	42,980	41,120
	W33 x 118	42.86	0.082	0.102	3/4 x 12	3/4 x 12	1/2 x 31.5	43.00	0.081	0.100	3	10.5	SB - 2	31,740	31,210
	W36 x 135	45.55	0.063	0.080	3/4 x 12	7/8 x 12	1/2 x 34	45.62	0.065	0.081	3	10.5	SB - 2	35,490	33,320
	W40 x 149	48.20	0.051	0.065	3/4 x 12	1 x 12	1/2 x 36.5	48.25	0.053	0.066	3	10.5	SB - 2	38,720	35,540
60	W21 x 166	32.48	0.161	0.209	1 x 12	1 5/8 x 12	1/2 x 19.75	32.38	0.187	0.235	3	8	SB - 2	44,710	38,800
	W24 x 131	34.48	0.171	0.214	7/8 x 12	1 1/8 x 12	1/2 x 22.5	34.50	0.183	0.225	3	9	SB - 2	36,310	33,750
	W27 x 146	37.38	0.123	0.157	3/4 x 14	1 x 14	1/2 x 25.5	37.25	0.141	0.176	3	9	SB - 2	39,930	35,530
	W30 x 173	40.44	0.085	0.112	1 x 15	1 1/4 x 15	1/2 x 28.5	40.75	0.084	0.109	3	9	SB - 3	46,480	44,430
	W33 x 118	42.86	0.117	0.144	3/4 x 12	3/4 x 12	1/2 x 31.5	43.00	0.115	0.142	3	10.5	SB - 2	34,140	33,560
	W36 x 135	45.55	0.089	0.113	3/4 x 12	7/8 x 12	1/2 x 34	45.62	0.093	0.115	3	10.5	SB - 2	38,240	35,850
	W40 x 149	48.20	0.072	0.092	3/4 x 12	1 x 12	1/2 x 36.5	48.25	0.076	0.093	3	10.5	SB - 2	41,750	38,250

(1) For Contractor's information only. Structural Steel pay weight shall be based on Rolled Beams.

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

See Steel Beam Span sheets for beam spacing, diaphragm locations, fabrication notes and references to values "A", "N", "X" & "Y".

See standard SBEB for bearing details.

Indicated beam/girder designs are applicable for spans with 0, 15 and 30 degree skews.

See Bridge Layout for beam type. Change in beam type within a bridge, for example W18 to W24, is not supported by this standard.

The standard beam designs shown on these sheets are applicable for use only with the Steel Beam Spans shown on Standards SSB-28, SSB-28-15 and SSB-28-30.

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

STEEL BEAM STANDARD DESIGNS

28' ROADWAY

SBSD-28

FILE: sbsd28.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY		SHEET NO.

TABLE OF REQUIRED BEAM SIZES, DESIGN DATA AND STEEL QUANTITIES

SPAN (ft)	ROLLED BEAM				OPTIONAL PLATE GIRDER						Diaphragm Spaces	Stud Spacing	Elastomeric Bearing	Estimated Quantities Structural Steel (lbs)	
	Beam Member	Dimension "Y" (in)	Deflection "A" (feet) Slab DL	Deflection "A" (feet) Total DL	Plate Sizes (inches) Top Flange	Plate Sizes (inches) Bott Flange	Plate Sizes (inches) Web	Dimension "Y" (in)	Deflection "A" (feet) Slab DL	Deflection "A" (feet) Total DL	"N" (ea)	"X" (in)	Type	Rolled Beam	PL Girder (1)
65	W24 x 162	35.00	0.185	0.239	1 1/4 x 12	1 1/2 x 12	1/2 x 22.5	35.25	0.196	0.248	3	9	SB - 2	47,010	44,160
	W27 x 146	37.38	0.170	0.216	3/4 x 14	1 x 14	1/2 x 25.5	37.25	0.195	0.242	3	9	SB - 2	42,910	38,120
	W30 x 173	40.44	0.117	0.154	1 x 15	1 1/4 x 15	1/2 x 28.5	40.75	0.116	0.150	3	9	SB - 3	50,000	47,760
	W33 x 130	43.09	0.142	0.178	3/4 x 12	3/4 x 12	1/2 x 31.5	43.00	0.141	0.176	3	10.5	SB - 2	39,640	35,960
	W36 x 135	45.55	0.123	0.155	3/4 x 12	7/8 x 12	1/2 x 34	45.62	0.128	0.159	3	10.5	SB - 2	40,980	38,370
	W40 x 149	48.20	0.099	0.127	3/4 x 12	1 x 12	1/2 x 36.5	48.25	0.104	0.129	3	10.5	SB - 2	44,760	40,960
70	W24 x 207	35.71	0.189	0.257	1 1/2 x 12	1 7/8 x 12	1/2 x 22.5	35.88	0.203	0.267	3	9	SB - 2	62,830	54,300
	W27 x 178	37.81	0.185	0.244	3/4 x 14	1 3/8 x 14	1/2 x 25.5	37.62	0.229	0.289	3	9	SB - 2	54,800	45,690
	W30 x 173	40.44	0.158	0.207	1 x 15	1 1/4 x 15	1/2 x 28.5	40.75	0.155	0.202	3	9	SB - 3	53,510	51,070
	W33 x 141	43.30	0.173	0.220	3/4 x 12	1 1/8 x 12	1/2 x 31.5	43.38	0.182	0.227	3	9	SB - 2	45,440	42,570
	W36 x 135	45.55	0.166	0.209	3/4 x 12	7/8 x 12	1/2 x 34	45.62	0.172	0.214	3	10.5	SB - 2	43,720	40,900
	W40 x 149	48.20	0.133	0.170	3/4 x 12	1 x 12	1/2 x 36.5	48.25	0.140	0.173	3	10.5	SB - 2	47,790	43,670
75	W27 x 217	38.43	0.193	0.265	1 1/4 x 14	1 3/4 x 14	1/2 x 25.5	38.50	0.209	0.277	3	9	SB - 2	70,050	61,050
	W30 x 191	40.68	0.213	0.286	1 x 15	1 3/8 x 15	1/2 x 28.5	40.88	0.198	0.259	3	9	SB - 3	62,390	56,290
	W33 x 169	43.82	0.184	0.241	1 x 12	1 1/4 x 12	1/2 x 31.5	43.75	0.203	0.259	3	10.5	SB - 2	56,580	49,710
	W36 x 160	46.01	0.176	0.228	7/8 x 12	1 1/4 x 12	1/2 x 34	46.12	0.183	0.233	3	10.5	SB - 2	53,940	49,520
	W40 x 149	48.20	0.175	0.224	3/4 x 12	1 x 12	1/2 x 36.5	48.25	0.184	0.228	3	10.5	SB - 2	50,820	46,390
80	W27 x 235	38.66	0.231	0.322	1 1/4 x 14	1 3/4 x 14	1/2 x 25.75	38.75	0.266	0.354	4	9	SB - 3	81,170	65,980
	W30 x 191	40.68	0.243	0.326	1 x 15	1 3/8 x 15	1/2 x 28.5	40.88	0.256	0.335	4	9	SB - 3	67,190	60,680
	W33 x 201	43.68	0.194	0.263	3/4 x 16	1 1/4 x 16	1/2 x 31.5	43.50	0.237	0.306	4	10.5	SB - 3	71,440	59,470
	W36 x 170	46.17	0.212	0.278	7/8 x 12	1 1/4 x 12	1/2 x 34	46.12	0.238	0.303	4	10.5	SB - 3	61,610	53,690
	W40 x 167	48.59	0.192	0.251	7/8 x 12	1 1/4 x 12	1/2 x 36.5	48.62	0.205	0.262	4	12	SB - 3	60,790	55,190
85	W30 x 235	41.30	0.244	0.341	1 x 15	1 3/4 x 15	1/2 x 28.5	41.25	0.294	0.390	4	10.5	SB - 3	85,870	70,480
	W33 x 221	43.93	0.223	0.308	1 1/4 x 16	1 3/8 x 16	1/2 x 31.5	44.12	0.226	0.306	4	10.5	SB - 3	82,270	74,260
	W36 x 194	46.49	0.236	0.317	1 1/8 x 12	1 1/2 x 12	1/2 x 34	46.62	0.250	0.327	4	10.5	SB - 3	73,170	63,530
	W40 x 183	48.98	0.214	0.285	1 x 12	1 3/8 x 12	1/2 x 36.5	48.88	0.237	0.307	4	12	SB - 3	69,580	61,650
90	W30 x 261	41.61	0.274	0.394	1 1/4 x 15	1 7/8 x 15	1/2 x 28.5	41.62	0.319	0.434	4	10.5	SB - 3	99,940	81,150
	W33 x 241	44.18	0.253	0.357	1 1/8 x 16	1 5/8 x 16	1/2 x 31.5	44.25	0.278	0.377	4	10.5	SB - 3	93,910	80,670
	W36 x 231	46.49	0.268	0.374	1 1/8 x 16	1 1/2 x 16	1/2 x 33.5	46.12	0.256	0.346	4	10.5	SB - 3	90,360	79,520
	W40 x 199	48.67	0.241	0.327	7/8 x 16	1 1/4 x 16	1/2 x 36.5	48.62	0.261	0.344	4	12	SB - 3	79,020	71,760
95	W33 x 291	44.84	0.253	0.374	1 1/2 x 16	2 x 16	1/2 x 31.5	45.00	0.270	0.382	4	12	SB - 3	117,630	100,150
	W36 x 231	46.49	0.299	0.417	1 1/8 x 16	1 1/2 x 16	1/2 x 33.5	46.12	0.317	0.429	4	12	SB - 3	94,950	83,480
	W40 x 215	48.98	0.268	0.370	1 x 16	1 3/8 x 16	1/2 x 36.5	48.88	0.292	0.392	4	12	SB - 3	89,110	80,510
100	W36 x 247	46.67	0.343	0.486	1 1/8 x 16	1 5/8 x 16	1/2 x 33.5	46.25	0.377	0.512	4	12	SB - 3	105,980	90,220
	W40 x 249	49.38	0.283	0.403	1 1/8 x 16	1 5/8 x 16	1/2 x 36.5	49.25	0.316	0.432	4	12	SB - 3	107,000	92,500
105	W36 x 282	47.11	0.356	0.521	1 3/8 x 16	1 7/8 x 16	1/2 x 33.5	46.75	0.388	0.542	5	12	SB - 4	126,780	106,940
	W40 x 277	49.69	0.338	0.494	1 1/4 x 16	1 7/8 x 16	1/2 x 36.5	49.62	0.343	0.479	5	12	SB - 4	124,950	106,520
110	W40 x 277	49.69	0.371	0.542	1 1/4 x 16	1 7/8 x 16	1/2 x 36.5	49.62	0.413	0.577	5	12	SB - 4	130,540	111,210
115	W40 x 297	49.84	0.419	0.624	1 3/8 x 16	2 x 16	1/2 x 36.5	49.88	0.460	0.649	5	12	SB - 4	145,290	122,120
120	W40 x 324	50.20	0.451	0.687	1 5/8 x 16	2 1/8 x 16	1/2 x 36.5	50.25	0.486	0.701	5	12	SB - 4	164,190	136,840

(1) For Contractor's information only. Structural Steel pay weight shall be based on Rolled Beams.

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

STEEL BEAM STANDARD DESIGNS

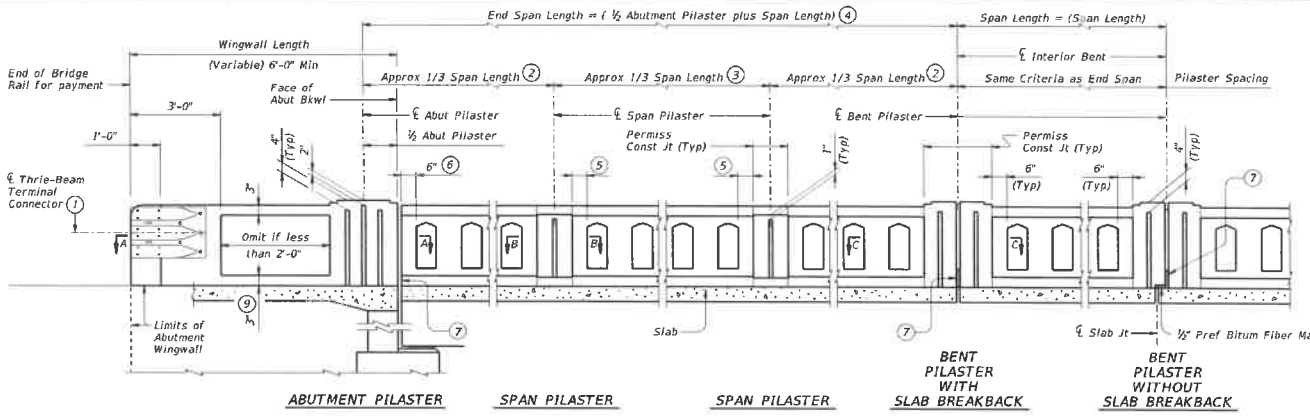
28' ROADWAY

SBSD-28

FILE: sbsloel5.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2004	CONT	JOB	HIGHWAY	
REVISIONS	DIST	COUNTY		SHEET NO.

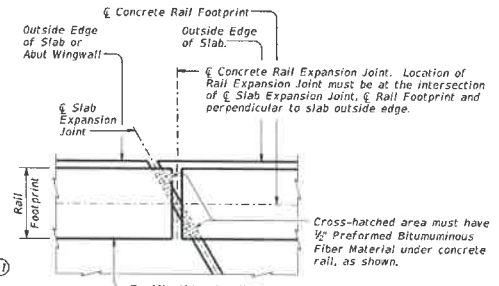
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or incorrect results or damages resulting from its use.

DATE:
FILE:



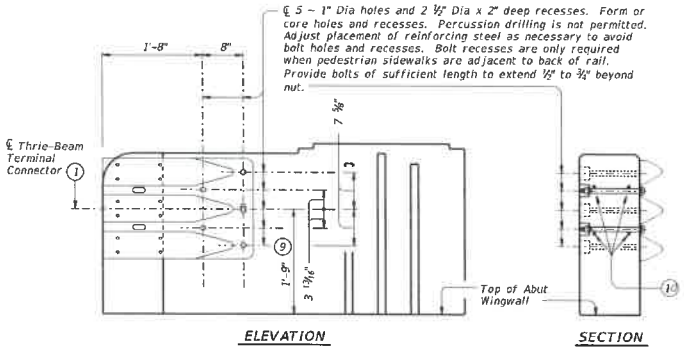
ROADWAY ELEVATION OF RAIL

1. Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge unless otherwise shown in the plans.
2. Number of windows in exterior bays are equal.
3. Number of windows in interior bay(s) are not less than the amount in exterior bays (Note 2).
4. Space Span Pilasters at 1/3 span length (Approx) when spans are 100 ft and less, as shown. Space Span Pilasters at 1/5 span length (Approx) for spans greater than 100 ft.
5. Dimension is the same for all posts adjacent to Span Pilasters in a span. Dimension may vary from span to span. Min = 3", Max = 7 ½".
6. Min = 6", Max = 1'-3".
7. Provide rail joints at ends of all spans the same width as Slab joint opening, except that Rail Joints over construction joints must be ½" Min to ¾" Max in width. Joints must be open if slab joint opening is not sealed. Joints over construction joints and over sealed deck joints must be plugged. Forming material used in joints may be left in place if it is light in color and compressible, such as the following materials: polystyrene, molded cork granules, sponge rubber sheet, etc. If forming material is not left in place, plug the bottom 6" with slab joint sealing compound to prevent drainage and staining.
8. Place Preformed Bituminous Fiber Material between slab and rail when rail extends over expansion joint. Shift Bars U as necessary.
9. Increase 2" for structures with overlay.
10. Place 4 additional Bars WH(#5) 3'-8" in length inside Bars S(#5) and centered 2'-0" from end of rail when Terminal Connections are required. Field bend as needed.
11. Shift U Bars from region below ½" Preformed Bituminous Fiber Material at joints.



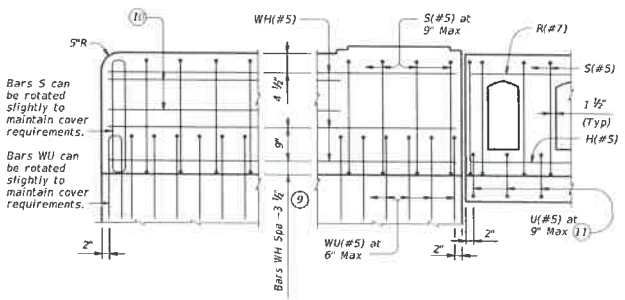
PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

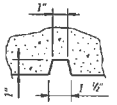


TERMINAL CONNECTION DETAILS

(Showing parapet with Pilaster on 6'-0" Wingwall)

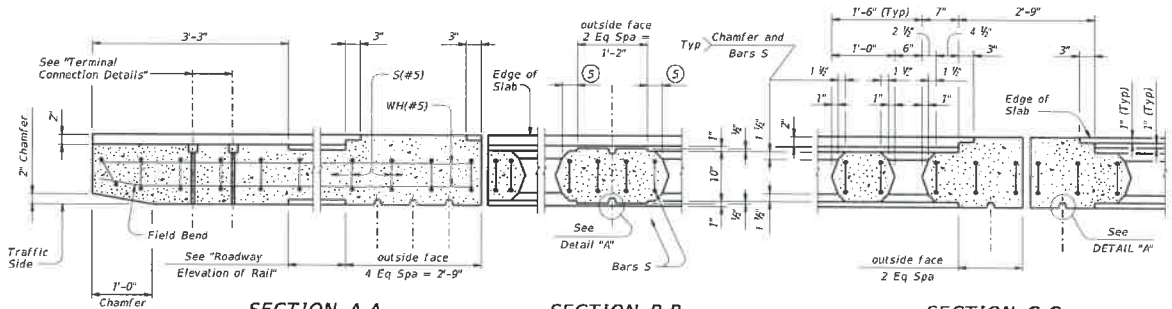


ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT



DETAIL "A"

10. Place 4 additional Bars WH(#5) 3'-8" in length inside Bars S(#5) and centered 2'-0" from end of rail when Terminal Connections are required. Field bend as needed.
11. Shift U Bars from region below ½" Preformed Bituminous Fiber Material at joints.



SECTION A-A

SECTION B-B

SECTION C-C

The use of this railing is restricted to speeds of 45 mph or less.

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

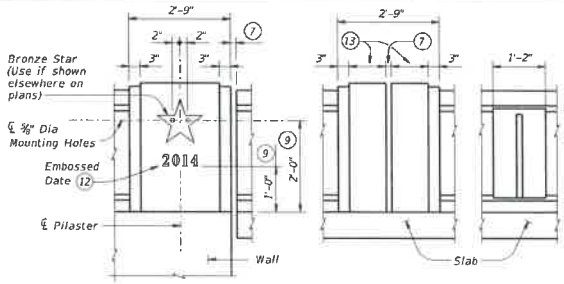
TRAFFIC RAIL TEXAS CLASSIC

TYPE T411

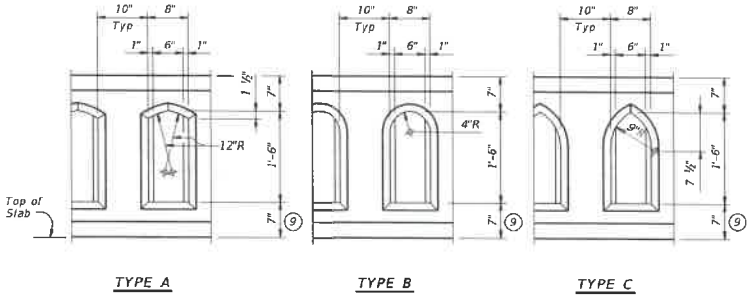
FILE:	t1std008-19.dgn	DW: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS					
		DIST	COUNTY		SHEET NO.

DISCLAIMER:
The use of this standard is governed by the Texas Engineering Practice Act. No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:



EXTERIOR PILASTER ELEVATIONS



WINDOW TYPES

(7) Provide rail joints at ends of all spans the same width as Slab joint opening, except that Rail Joints over construction joints must be ½" Min to ¾" Max in width. Joints must be open if slab joint opening is not sealed. Joints over construction joints and over sealed deck joints must be plugged. Forming material used in joints may be left in place if it is light in color and compressible, such as the following materials: polystyrene, molded cork granules, sponge rubber sheet, etc. If forming material is not left in place, plug the bottom 6" with slab joint sealing compound to prevent drainage and staining.

(9) Increase 2" for structures with overlay.

(12) Construction year (use if shown elsewhere on plans) 3" High "Plantin Bold" Typeface with ½" recess. Placed at one Abutment only or as directed by the Engineer.

(13) Dimensions must be the same on each side of joint.

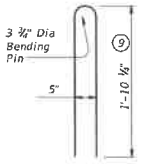
(14) Reduce by 2" or field bend over Preformed Bituminous Fiber Material to gain cover.

(15) 5 ½" when vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls or retaining walls on traffic side of wall.

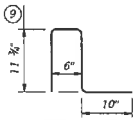
(16) As an aid in supporting reinforcement, additional longitudinal bars may be used in the slab with the approval of the Engineer. Such bars must be furnished at the Contractor's expense.

(17) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

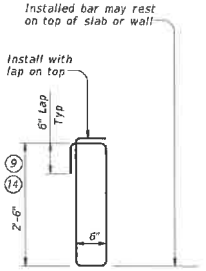
(18) Bronze Star dimensions of the final product can be slightly smaller due to shrinkage after casting.



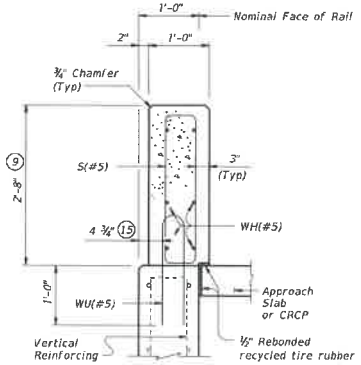
BARS WU (#5)



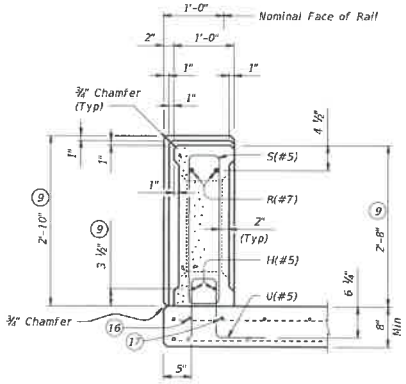
BARS U (#5)



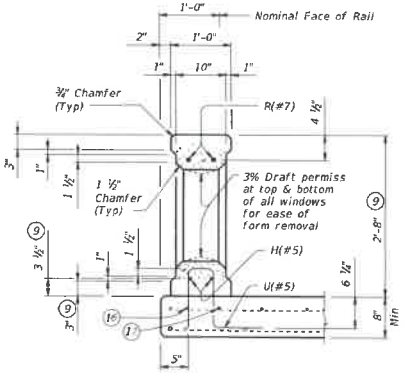
BARS S (#5)



ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS

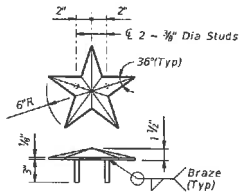


SECTION THRU POST ON BRIDGE SLAB
(Showing Pilaster)



SECTION THRU WINDOW ON BRIDGE SLAB

SECTIONS THRU RAIL



BRONZE STAR DETAIL (18)

Two known manufacturers are:

1. Kassnas Castings
   Austin, Texas

2. Southwell Company
   San Antonio, Texas

CONSTRUCTION NOTES:

Attach Bronze Star with a Type III Class C, D, E, or F epoxy adhesive. Clamp star until epoxy achieves set. Remove any visible epoxy "squeeze out" from under star.

Face of rail and pilasters, parapet must be plumb unless otherwise approved.

Apply a one rub finish to all railing surfaces unless otherwise shown elsewhere on the plans.

MATERIAL NOTES:

Provide Class "S" concrete for railing. Provide Class "S" (HPC) concrete if shown elsewhere in the plans.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.

Bronze Star must be cast of architectural bronze having the following composition: Copper 85 %, Tin 5 %, Lead 5 %, Zinc 5 %.

Provide bar laps, where required, as follows:

Uncoated or galvanized – #5 = 2'-0"
Uncoated or galvanized – #7 = 2'-11"
Epoxy coated – #5 = 3'-0"
Epoxy coated – #7 = 4'-4"

GENERAL NOTES:

This rail has been evaluated and approved to be of equal strength to railing with like geometry, which have been crash tested to meet NASH TL-2 criteria. This rail can be used for speeds of 45 mph and less when a TL-2 or TL-3 rated guard fence transition is used. This rail is only approved for low speed use, speeds of 45 mph and less.

Do not use this railing on bridges with expansion joints providing more than 5" movement.

Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

Shop drawings will not be required for this rail.

See Bridge Layout or other plan sheets for the following: dimensions with the number of span pilasters, dimensions with the number of windows, window type, inclusion of bronze stars, inclusion of construction year with abutment identity.

Submit erection drawings showing span number, span pilaster locations, number of windows between pilasters and spacing to first window (see Note 6) to the Engineer for approval.

Average weight of railing with no overlay increase and no pilasters is 270 plf.

Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.

Texas Department of Transportation

Bridge Division Standard

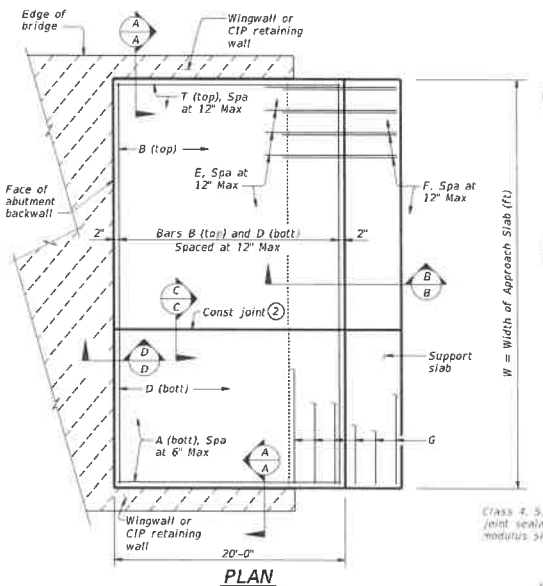
TRAFFIC RAIL TEXAS CLASSIC

TYPE T411

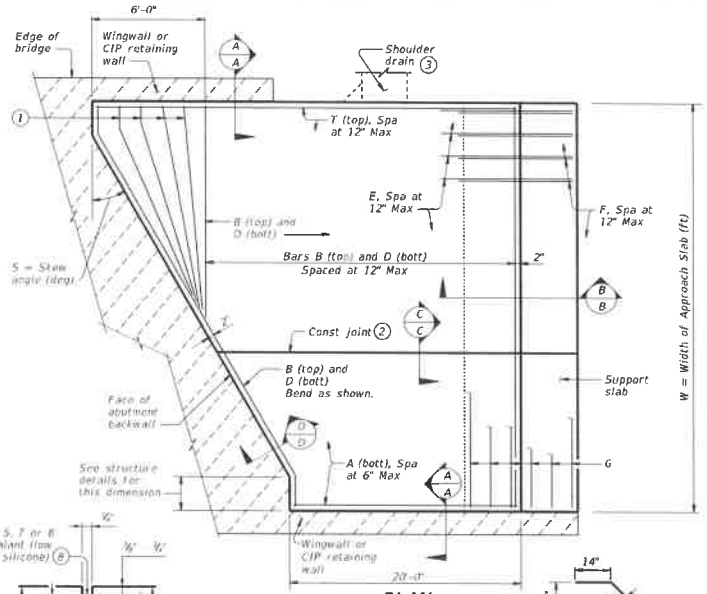
FILE: rlstd008-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 2019				
REVISIONS				

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

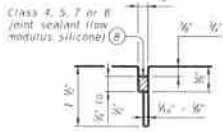
DATE:
FILE:



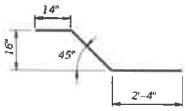
PLAN
(Showing non-skewed approach slab.)



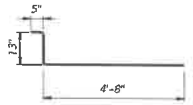
PLAN
(Showing skewed approach slab.)



LONGITUDINAL SAW CUT JOINT DETAIL



BARS E (#5)



BARS F (#5)

BAR TABLE	
BAR	SIZE
A	#8
B	#5
D	#5
E	#5
F	#5
G	#5
T	#5

APPROXIMATE QUANTITIES (4)

Reinf steel weight = 8.5 Lbs/SF of Approach Slab
= 18.4 Lbs/LF of Support Slab

Vol of Appr Slab Conc (CY) = 1.057W - 0.008W x T + 0.02W² Tan S
(Includes Support Slab)

W = Width of Approach Slab (ft)

T = Conc Pavement Thickness (in)

S = Skew Angle (deg)

(1) Flare Bars B and D in this region (1'-6" Max Spa, 3" Min Spa). Minimum flared bar length = 2'-6". Bend bars as necessary.

(2) Provide longitudinal construction joints that align with longitudinal construction joints in the bridge slab with bridges built in stages. Other longitudinal construction joints must receive approval of the Engineer.

(3) See details elsewhere in plans for shoulder drain location and details.

(4) For Contractor's information only. Quantities shown are for one approach slab only.

(5) On portion of support slab that supports the concrete pavement, adjust top surface elevation, if required, to accommodate concrete pavement thickness. Smooth trowel finish. Oil top of support slab with 60 grade oil and apply heavy coat of powdered graphite. Press down one layer of 30# roofing felt.

(6) Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.

(7) See details elsewhere in plans for required cross-slope.

(8) Place in accordance with Item 438.

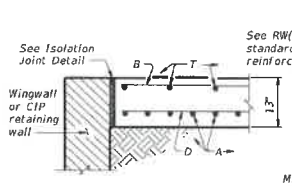
(9) Provide backer rod that is 25% larger than joint opening and compatible with the sealant.

(10) If bridge rail is present at the wingwall or CIP retaining wall, place ½" rebonded recycled tire rubber between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.

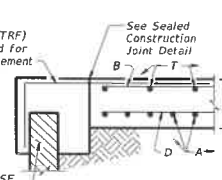
GENERAL NOTES:

Construct approach slab in accordance with Item 422.
Provide Class "S" concrete with a minimum compressive strength of 4,000 psi.
Provide Grade 60 reinforcing steel.
Provide longitudinal joints as shown on the Longitudinal Saw Cut Joint Detail at lane lines and shoulders when width between longitudinal construction joints or edges of approach slab exceeds 16 feet. Saw cut joints within 24 hours of concrete placement to a depth of 1 ½" and seal in accordance with Item 438. Alternately, provide a controlled joint consisting of 1 ½" vinyl or plastic joint former (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)
Provide rebonded recycled tire rubber joint filler that meets the requirements of DMS-6310, "Joint Sealants and Fillers."
Construct the subgrade or subbase away from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.
Compact and finish the subgrade or foundation for the approach slab to the typical cross-section and to the lines and grades shown on the plans.
Cure for 4 days using water or membrane curing per Item 422.
All details shown herein are subsidiary to bridge approach slab.

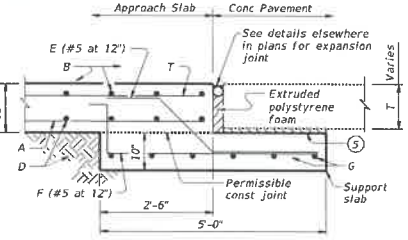
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



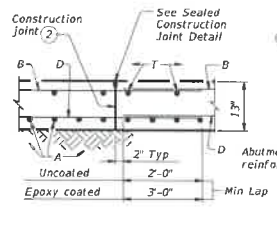
SHOWING WINGWALL OR CIP RETAINING WALL



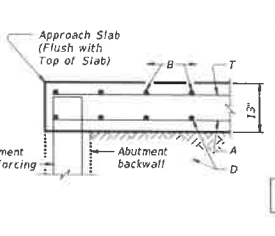
SHOWING MSE WALL



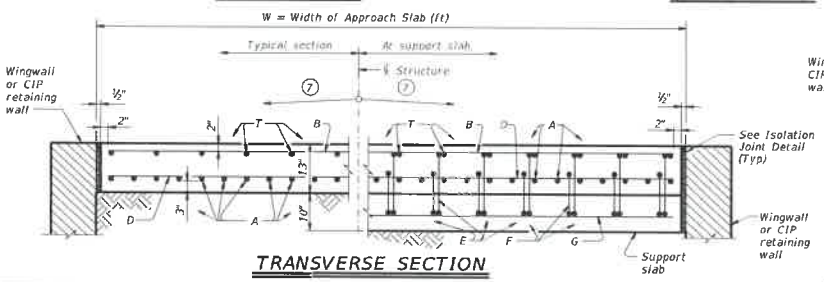
SECTION B-B



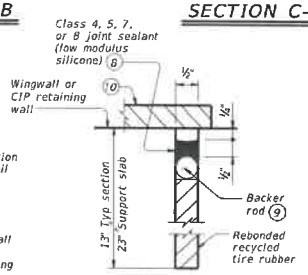
SECTION C-C (6)



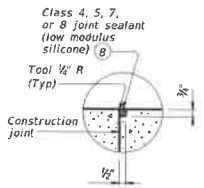
SECTION D-D



TRANSVERSE SECTION



ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOINT DETAIL

Texas Department of Transportation

Bridge Division Standard

BRIDGE APPROACH SLAB

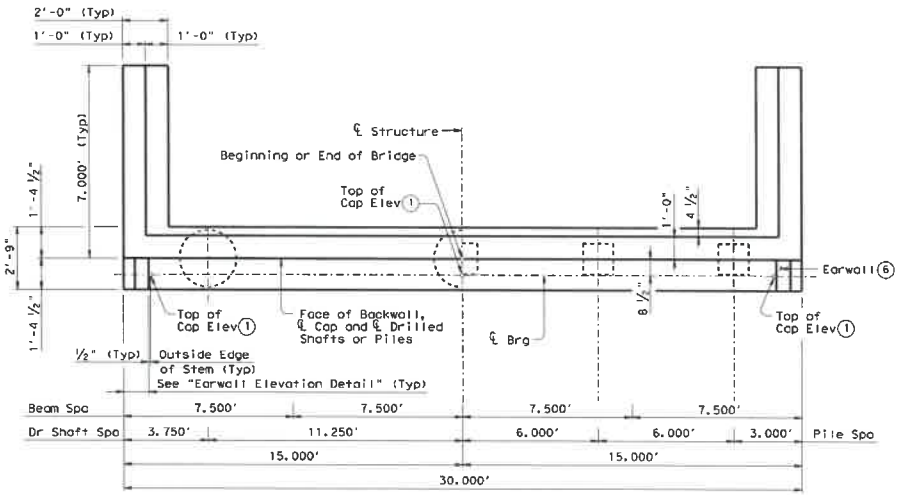
CONCRETE PAVEMENT

BAS-C

FILE: bascste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS				
02-20: Added ½" dowel rod ring joint	DIST	COUNTY		SHEET NO.

DISCLAIMER:
The use of this standard is governed by the Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

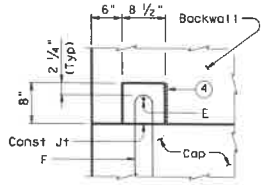
DATE:
FILE:



SHOWING DRILLED SHAFTS

PLAN

SHOWING PILES



EARWALL ELEVATION DETAIL (6)

(Slope top of earwall away from beams)

TABLE OF FOUNDATION LOADS		
Span Length	Drilled Shaft Load	Pile Load
Ft	Tons/DS	Tons/Pile
30	46	27
35	50	30
40	54	33
45	58	35
50	62	37
55	65	39
60	69	41

(1) Top of cap elevations are based on section depths shown on span details.

(2) 1'-8" for 7DS20 beams, 1'-11" for 7DS23 beams.

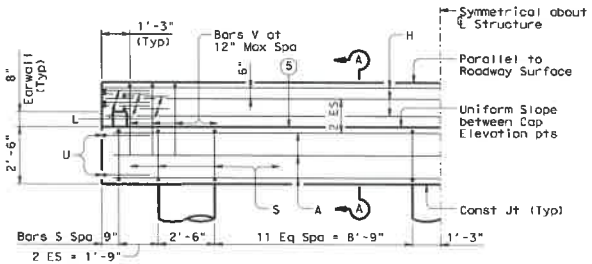
(3) With Pile foundations, replace Bar A, located at bottom centerline of cap with 4 ~ #11 x 4'-8" bars placed between piles. Deduct 55 Lbs from reinforcing steel total.

(4) ½" Preformed Bituminous Fiber material between beam stem and earwall. Bond to beam with an approved adhesive. Inside face of earwall to be cast with face of beam stem.

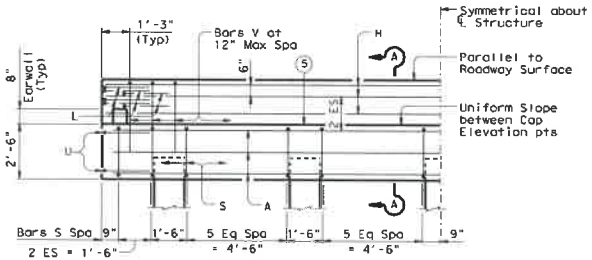
(5) Surface finish for the top of cap must be a wood float finish. The surface must be level in the direction of the centerline of beams. Bearing surface must be clean and free of all loose material before placing bearing pads.

(6) Do not cast earwalls until beams are erected in their final position.

(7) Top of backwall elevation is equal to top of beam elevation.

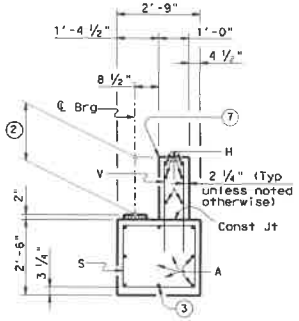


HALF ELEVATION ~ DRILLED SHAFT ABUTMENT



HALF ELEVATION ~ PILE ABUTMENT

(Showing 16" Piles ~ for Piles larger than 16", adjust Bars S spacing as required to avoid Piling)



SECTION A-A

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.
Concrete strength f'c = 3,600 psi.
All reinforcing must be Grade 60.
Designed for normal embankment header slope of 3:1 or 2:1.
See Bridge Layout for beam type and foundation type, size and length.
See standard FD for all foundation details and notes.
See applicable rail details for rail anchorage cast in wingwalls.
See standard CRR for riprap attachment details, if applicable.
These abutment details may only be used with the following standards:
SDSB-28

HL93 LOADING

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

ABUTMENTS

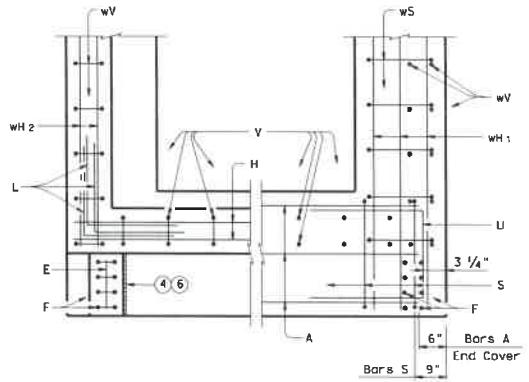
PRESTRESSED CONCRETE DECKED SLAB BEAMS 28' ROADWAY

ADSB-28

FILE:	dsbste16.dgn	DN: JMH	CK: AM	DW: JTR	CK: JMH
©TxDOT	September 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS					
		DIST	COUNTY		SHEET NO.

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:



BACKWALL CAP

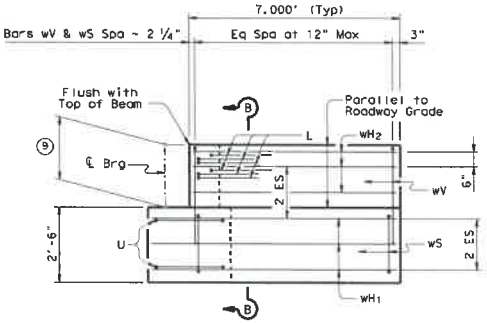
CORNER DETAILS

TABLE OF ESTIMATED QUANTITIES (TYPE 7DS20 BEAMS) ⑧

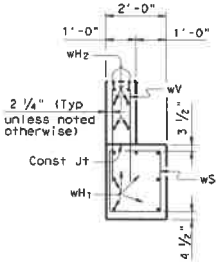
Bar	No.	Size	Length	Weight
A ③	8	#11	29'- 0"	1,233
E	2	# 5	1'- 1"	2
F	8	# 4	3'-10"	20
H	6	# 6	29'- 8"	267
L	12	# 6	4'- 0"	72
S	30	# 4	9'- 8"	194
U	4	# 6	7'- 3"	44
V	29	# 5	6'-11"	209
wH1	14	# 6	8'- 0"	168
wH2	12	# 6	6'- 8"	120
wS	16	# 4	7'- 9"	83
wV	16	# 5	6'-11"	115
Reinforcing Steel			Lb	2,527
Class "C" Concrete			CY	12.6

TABLE OF ESTIMATED QUANTITIES (TYPE 7DS23 BEAMS) ⑧

Bar	No.	Size	Length	Weight
A ③	8	#11	29'- 0"	1,233
E	2	# 5	1'- 1"	2
F	8	# 4	3'-10"	20
H	6	# 6	29'- 8"	267
L	12	# 6	4'- 0"	72
S	30	# 4	9'- 8"	194
U	4	# 6	7'- 3"	44
V	29	# 5	6'-11"	209
wH1	14	# 6	8'- 0"	168
wH2	12	# 6	6'- 8"	120
wS	16	# 4	7'- 9"	83
wV	16	# 5	6'-11"	115
Reinforcing Steel			Lb	2,527
Class "C" Concrete			CY	13.0



WINGWALL ELEVATION
(Earwall omitted for clarity)



SECTION B-B

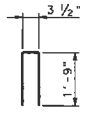
③ With Pile foundations, replace Bar A, located at bottom centerline of cap with 4 - #11 x 4'-8" bars placed between piles. Deduct 55 Lbs from reinforcing steel total.

④ ½" Preformed Bituminous Fiber material between beam stem and earwall. Bond to beam with an approved adhesive. Inside face of earwall to be cast with face of beam stem.

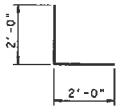
⑥ Do not cast earwalls until beams are erected in their final position.

⑧ Quantities shown are for one Abutment only.

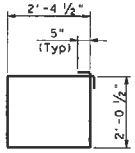
⑨ 1'-10" for 7DS20 beams, 2'-1" for 7DS23 beams.



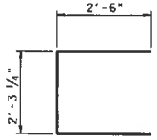
BARS F



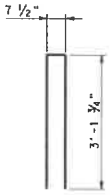
BARS L



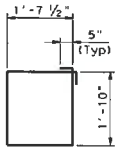
BARS S



BARS U



BARS V & wV



BARS wS

HL93 LOADING SHEET 2 OF 2

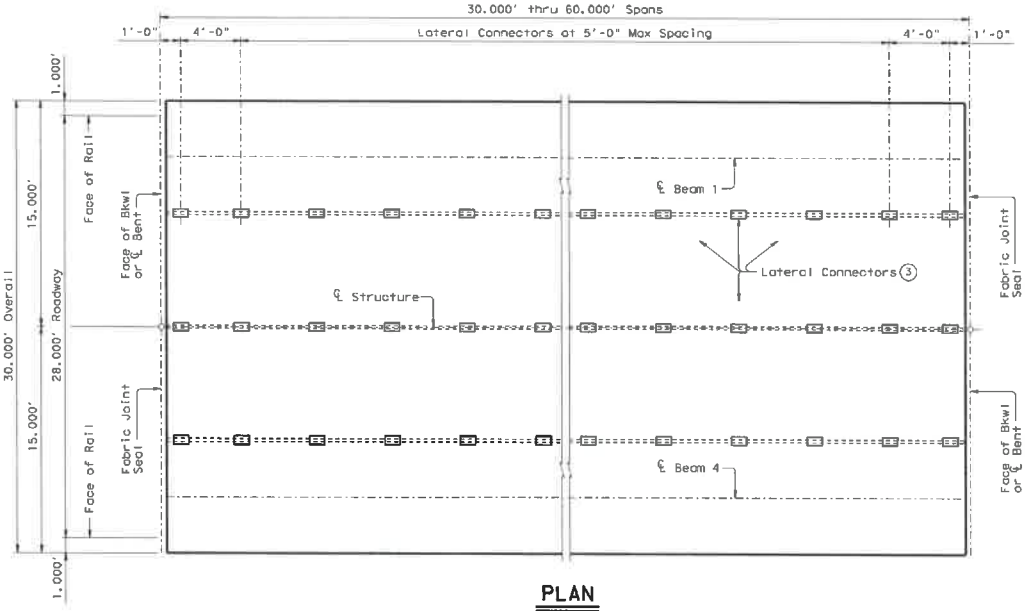
Texas Department of Transportation — Bridge Division Standard

ABUTMENTS
PRESTRESSED CONCRETE DECKED SLAB BEAMS 28' ROADWAY
ADSB-28

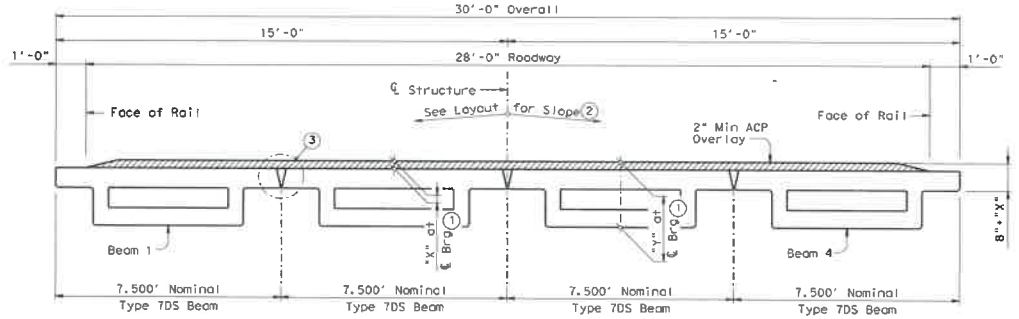
FILE: adsb1e16.dgn	DW: JMH	CK: AN	DW: JTR	CK: JMH
©TxDOT September 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY		SHEET NO.

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:



PLAN

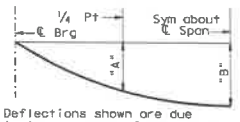


TYPICAL TRANSVERSE SECTION

(1) Based on theoretical beam camber, dead load deflections of two-course surface treatment and 2" ACP Overlay, and a constant grade.

(2) This Standard does not provide for changes in roadway cross-slopes within the structure.

(3) See Lateral Connector Details.



Deflections shown are due to two-course surface treatment and 2" ACP overlay only, (E_c = 5 x 10^3 ksi). Calculated deflections shown are theoretical and actual dimension may be less. Adjust deflections based on field observation.

DEAD LOAD DEFLECTION DIAGRAM

TABLE OF VARIABLE VALUES

SPAN LENGTH	BEAM TYPE	DEAD LOAD DEFLECTIONS		SECTION DEPTHS (1)	
		"A"	"B"	"X" AT ℄ BRG	"Y" AT ℄ BRG
Ft		Ft	Ft	In	Ft/In
30	7DS20	0.001	0.001	2 1/2"	1'-10 1/2"
35	7DS20	0.001	0.002	2 3/4"	1'-10 3/4"
40	7DS20	0.002	0.003	3"	1'-11"
45	7DS20	0.004	0.005	3 1/2"	1'-11 1/2"
50	7DS20	0.006	0.008	4"	2'-0"
30	7DS23	0.001	0.001	2 1/2"	2'-1 1/2"
35	7DS23	0.001	0.001	2 1/2"	2'-1 1/2"
40	7DS23	0.002	0.002	2 3/4"	2'-1 3/4"
45	7DS23	0.002	0.003	3"	2'-2"
50	7DS23	0.004	0.005	3 1/4"	2'-2 1/4"
55	7DS23	0.006	0.008	3 3/4"	2'-2 3/4"
60	7DS23	0.008	0.011	4 1/2"	2'-3 1/2"

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

Lateral Connector Rods (LCR) must be Grade 36 or 50.

See railing details and standard DSBRA for rail anchorage.

This standard does not support the use of transition bents.

It is recommended, with crown cross-slope, to erect beams adjacent to crown point first. For structures without a crown point, it is recommended to erect beams on the high side of cross-slope first and progress to the low side.

Payment for the following is considered subsidiary to the other bid items: packaged non-metallic, non-shrink cementitious grout; corrosion inhibiting bonding agent; fabric underseal; work performed; materials furnished; and curing time.

Payment for Fabric Joint Seal is considered subsidiary to other bid items.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE DECKED SLAB BEAM SPANS (TYPE 7DS20 OR 7DS23)

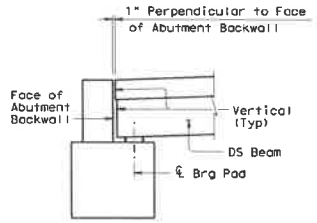
28' ROADWAY

SDSB-28

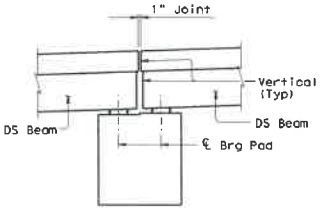
FILE:	dsbste22.dgn	DN: JMH	CK: AH	DW: JTR	CK: JMH
©TxDOT	September 2010				
REVISIONS					

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:



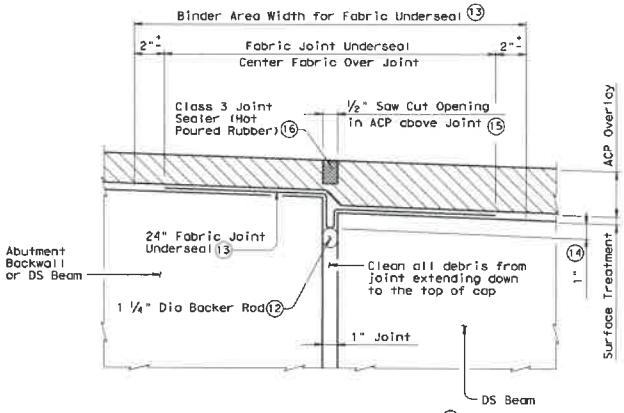
AT ABUTMENT



AT INTERIOR BENT

STANDARD BEAM END ELEVATIONS

(ACP Overlay not shown for clarity.)



FABRIC JOINT SEAL (11)

(Showing Expansion Joint with ACP Overlay.)

(4) Fabricator must adjust beam lengths for beam slopes as required.

(5) Seat and center 1" diameter smooth Lateral Connector Rod (LCR) in the bottom of the flange connection "Vee" prior to welding to minimize grout leakage. Caulk where necessary between connectors.

(6) Coat steel surfaces in contact with grout with a 3-component, water-based, epoxy-modified cement bonding agent including a corrosion inhibitor (BASF Emaco P24, Euclid Corr-Bond, Sika Armatec 110 EpoCem or approved equal). Submit material data sheet to Engineer for approval, prior to use. Apply in accordance with manufacturer's specifications and not prior to 12 hours before grout placement.

(7) Fill shear keys with packaged non-metallic, non-shrink cementitious grout that is certified by the manufacturer to meet the requirements of ASTM C 1107, free of chlorides, and capable of a compressive strength of 4,000 psi after 3 days of curing at anticipated temperatures. Surface preparation, mixing and consistency of grout, placing, and curing grout must follow the manufacturer's recommendations. Curing compounds are not allowed. Cure 3 days, minimum, prior to placing surface treatment and overlay. Approximate grout quantity for three beam joints = 0.33 CF of grout per foot of span length.

(8) Use forming material between Lateral Connectors. Maintain a uniform grout depth along length of beams.

(9) Lateral Connector Rods are to be considered subsidiary to other pertinent bid items.

(10) After the specified cure times for the grout is reached, apply fabric underseal to the limits shown. Use fabric underseal meeting the requirements of Item 356, "Fabric Underseal".

(11) Provide joint for roadway width and/or between toe of rails on the superstructure.

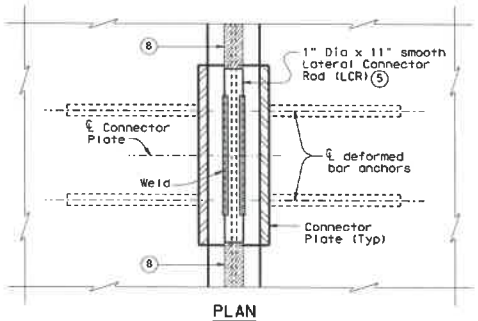
(12) Place backer rod in joint opening prior to placing binder. Backer rods must be suitable for contact with hot asphalt.

(13) Use fabric underseal meeting the requirements of Item 356, "Fabric Underseal." When using the self-adhesive type fabric underseal, pressure roll fabric underseal to improve adhesion. Apply binder to fabric joint underseal as required by the manufacturer's installation instructions.

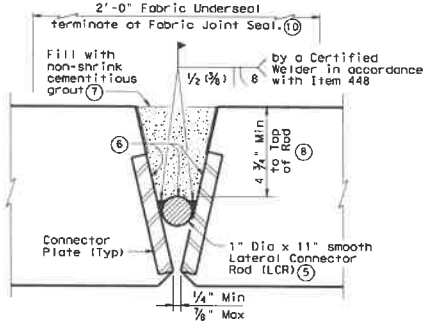
(14) Tuck fabric 1" into joint opening. Mark location of centerline of joint on curb or barrier as approved.

(15) After the asphaltic concrete pavement operations are complete, saw cut through the asphalt at centerline of joint. Make multiple saw cuts to create a ½" minimum joint opening. Depth of saw cut will be ½" less than total ACP Overlay over joint. Do not damage the underseal.

(16) Seal the joint opening with a Class 3, "Hot Poured Rubber" in accordance with DMS-6310, "Joint Sealants and Fillers." Seal flush with the top of the asphaltic concrete pavement.



PLAN



SECTION

(deformed bar anchors not shown for clarity)

LATERAL CONNECTOR DETAILS (9)

Do not apply load to beams while welding lateral connector rods.
No vehicles are allowed on the span until shear key grout has cured 72 hours.

TABLE OF ESTIMATED QUANTITIES

SPAN LENGTH	BEAM TYPE	PRESTRESSED CONCRETE DECKED SLAB BEAMS (4)		
		ABUTMENT TO INTERIOR BENT	INT BENT TO INT BENT	ABUTMENT TO ABUTMENT
Ft		LF	LF	LF
30	7DS20	119.50	119.67	119.33
35	7DS20	139.50	139.67	139.33
40	7DS20	159.50	159.67	159.33
45	7DS20	179.50	179.67	179.33
50	7DS20	199.50	199.67	199.33
30	7DS23	119.50	119.67	119.33
35	7DS23	139.50	139.67	139.33
40	7DS23	159.50	159.67	159.33
45	7DS23	179.50	179.67	179.33
50	7DS23	199.50	199.67	199.33
55	7DS23	219.50	219.67	219.33
60	7DS23	239.50	239.67	239.33

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE DECKED SLAB BEAM SPANS (TYPE 7DS20 OR 7DS23)

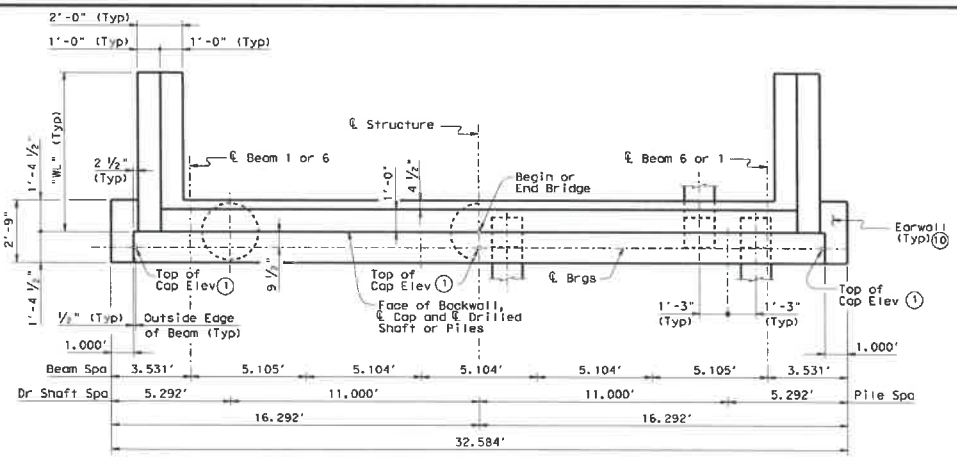
28' ROADWAY

SDSB-28

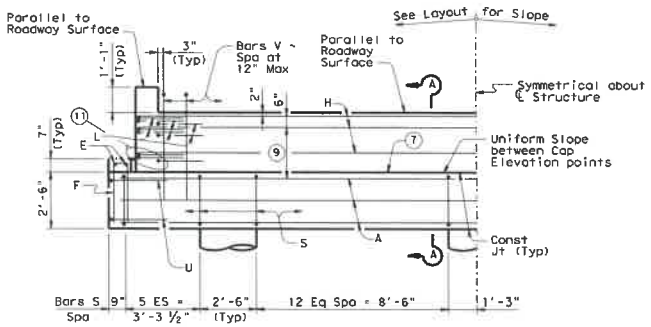
FILE: dsbste22.dgn	DN: JNH	CK: AN	DW: JTR	CK: JNH
©TxDOT September 2010				
REVISIONS				

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

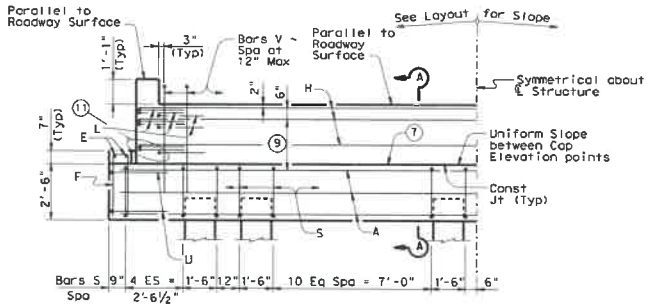
DATE:
FILE:



SHOWING DRILLED SHAFTS **PLAN** SHOWING BATTERED PILES

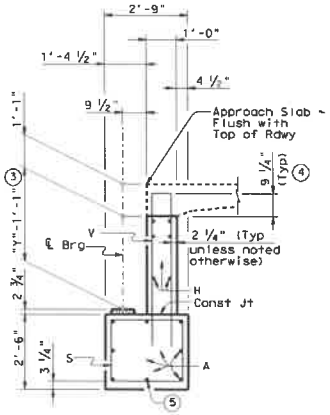


HALF ELEVATION ~ DRILLED SHAFT ABUTMENT



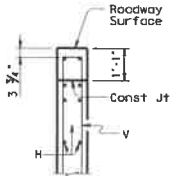
HALF ELEVATION ~ PILE ABUTMENT

(Showing 16" Piles ~ for Piles larger than 16", adjust Bars S spacing as required to avoid Piling)



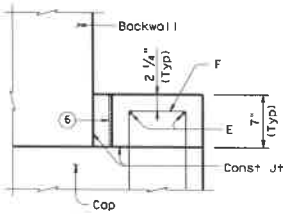
SECTION A-A

(Showing Approach Slab) (2)



BACKWALL DETAIL

(Without Approach Slab) (2)



EARWALL ELEVATION DETAIL (10)

(Slope top of earwall away from beams)

TABLE OF WINGWALL LENGTHS "WL"

Beam Type	"WL"
B20	8.000'
B28	10.000'
B34	11.000'

TABLE OF FOUNDATION LOADS (8)

Span Length	Drilled Shaft Load	Battered Pile Load
Ft	Tons/DS	Tons/Pile
30	53	41
35	58	44
40	63	46
45	68	49
50	72	51
55	77	54
60	81	56
65	86	58
70	90	60
75	94	63
80	99	65
85	103	67
90	107	69
95	112	71
100	116	74

(1) Top of Cap Elevations are based on section depths shown on Span Details.

(2) See Bridge Layout for Joint type and to determine if Approach Slab is present.

(3) See Span details for "Y" value.

(4) Increase as required to maintain 3 ¾" from Finished Grade.

(5) With pile foundations, replace Bar A, located at bottom centerline of cap with 2 ~ #11 x 7'-0" bars placed between pile groups. Deduct 93 Lbs from reinforcing steel total.

(6) ½" Preformed Bituminous Fiber material between beam and earwall. Bond to beam with an approved adhesive. Inside face of earwall to be cast with vertical side of beam.

(7) Surface finish for the top of Cap will be a textured wood float finish. The surface must be level in the direction of the centerline of Beams.

(8) Foundation loads are based on B34 beams.

(9) Use 2 Eq Spa for B28 and B34 beams. Use 1 space for B20 beams.

(10) Do not cast earwalls until beams are erected in their final position.

(11) This set of Bars L only required for B28 and B34 beams.

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.
Concrete strength f'c = 3,600 psi.
All reinforcing must be Grade 60.
Designed for normal embankment header slope of 3:1 or 2:1.
See Bridge Layout for beam type and foundation type, size and length.
See standard FD for all foundation details and notes.
See applicable rail details for rail anchorage cast in wingwalls.
See standard CRR for riprap attachment details, if applicable.
These abutment details may be used only with the following standards:
SBBS-B20-28 or SBBO-B20-28
SBBS-B28-28 or SBBO-B28-28
SBBS-B34-28 or SBBO-B34-28

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation — Bridge Division Standard

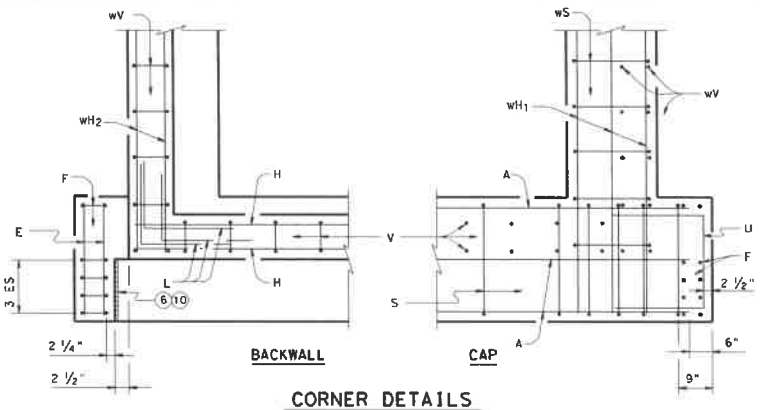
ABUTMENTS
PRESTR CONC BOX BEAMS
28' RDWY

ABB-28

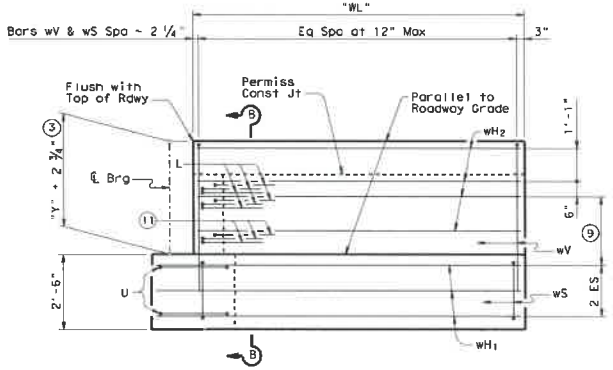
FILE: bbside31.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY		SHEET NO.

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

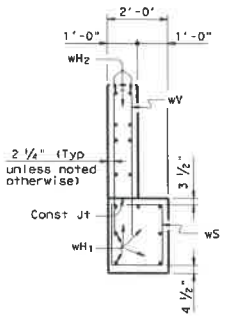
DATE:
FILE:



CORNER DETAILS



WINGWALL ELEVATION
(Earwall omitted for clarity)



SECTION B-B

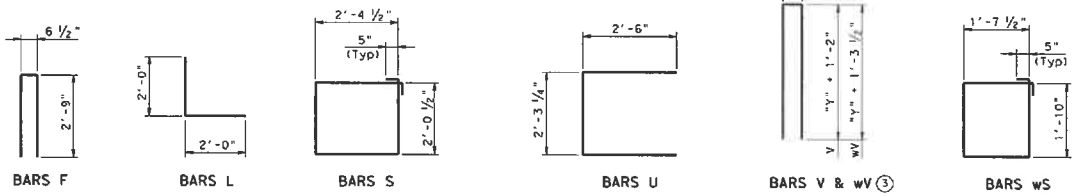


TABLE OF ESTIMATED QUANTITIES (TYPE B20 BEAMS) 12

BAR	NO.	SIZE	LENGTH	WEIGHT
A 5	8	#11	31'- 7"	1,342
E	4	# 5	2'- 5"	10
F	10	# 5	6'- 1"	63
H	4	# 6	29'-10"	179
L	12	# 6	4'- 0"	72
S	38	# 4	9'- 8"	245
U	4	# 6	7'- 6"	227
V	29	# 5	7'- 6"	227
wH1	14	# 6	9'- 0"	189
wH2	12	# 6	7'- 8"	138
wS	18	# 4	7'- 9"	93
wV	18	# 5	7'- 9"	145
Reinforcing Steel			Lb	2,747
Class "C" Concrete (w/Slab)			CY	13.8
Class "C" Concrete (w/ACP)			CY	13.5

TABLE OF ESTIMATED QUANTITIES (TYPE B28 BEAMS) 12

BAR	NO.	SIZE	LENGTH	WEIGHT
A 5	8	#11	31'- 7"	1,342
E	4	# 5	2'- 5"	10
F	10	# 5	6'- 1"	63
H	6	# 6	29'-10"	269
L	18	# 6	4'- 0"	108
S	38	# 4	9'- 8"	245
U	4	# 6	7'- 3"	44
V	29	# 5	8'-10"	267
wH1	14	# 6	11'- 0"	231
wH2	16	# 6	9'- 8"	232
wS	22	# 4	7'- 9"	114
wV	22	# 5	9'- 1"	208
Reinforcing Steel			Lb	3,133
Class "C" Concrete (w/Slab)			CY	16.1
Class "C" Concrete (w/ACP)			CY	15.7

TABLE OF ESTIMATED QUANTITIES (TYPE B34 BEAMS) 12

BAR	NO.	SIZE	LENGTH	WEIGHT
A 5	8	#11	31'- 7"	1,342
E	4	# 5	2'- 5"	10
F	10	# 5	6'- 1"	63
H	6	# 6	29'-10"	269
L	18	# 6	4'- 0"	108
S	38	# 4	9'- 8"	245
U	4	# 6	7'- 3"	44
V	29	# 5	9'- 9"	295
wH1	14	# 6	12'- 0"	252
wH2	16	# 6	10'- 8"	256
wS	24	# 4	7'- 9"	124
wV	24	# 5	10'- 0"	250
Reinforcing Steel			Lb	3,258
Class "C" Concrete (w/Slab)			CY	17.6
Class "C" Concrete (w/ACP)			CY	17.2

3 See Span details for "Y" value.

5 With pile foundations, replace Bar A, located at bottom centerline of cap, with 2 ~ #11 x 7'-0" bars placed between pile groups. Deduct 93 Lbs from reinforcing steel total.

6 ½" Preformed Bituminous Fiber material between beam and earwall. Bond to beam with an approved adhesive. Inside face of earwall to be cast with vertical side of beam.

9 Use 2 Eq Spa for B28 and B34 beams and 1 space for B20 beams.

10 Do not cast earwalls until beams are erected in their final position.

11 This set of Bars L only required for B28 and B34 beams.

12 Quantities shown are for one Abutment only (with Approach Slab). With no Approach Slab, add 1.1 CY Class "C" concrete and 90 Lb reinforcing steel for 2 additional Bars H.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

ABUTMENTS

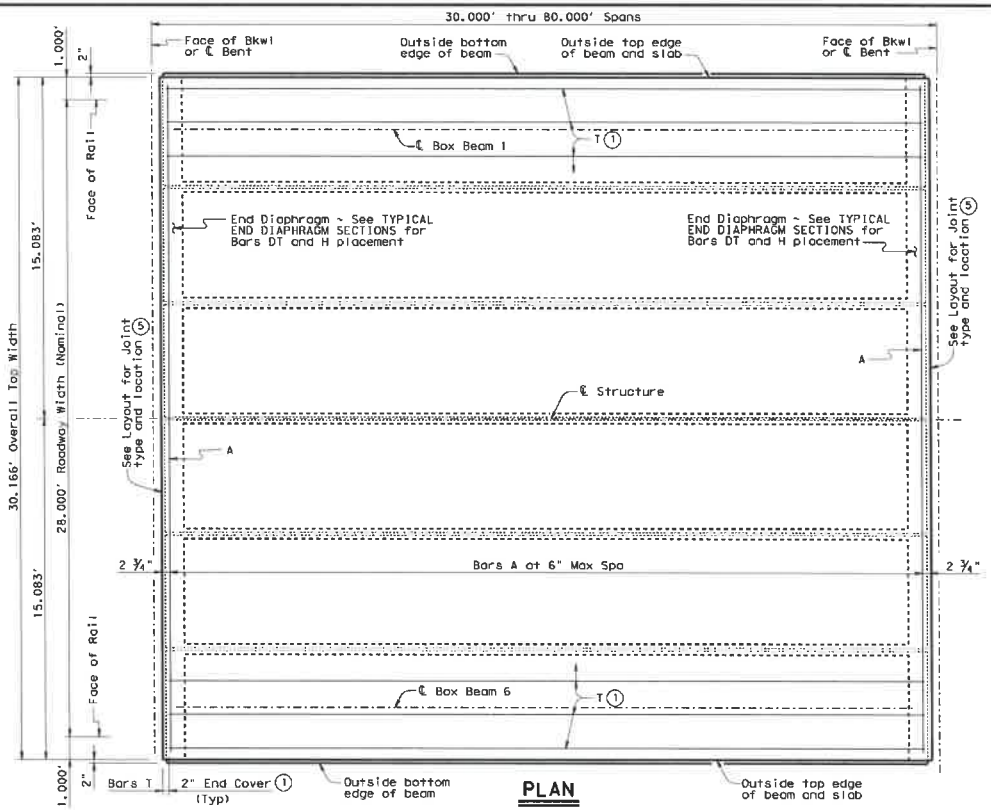
PRESTR CONC BOX BEAMS 28' RDWY

ABB-28

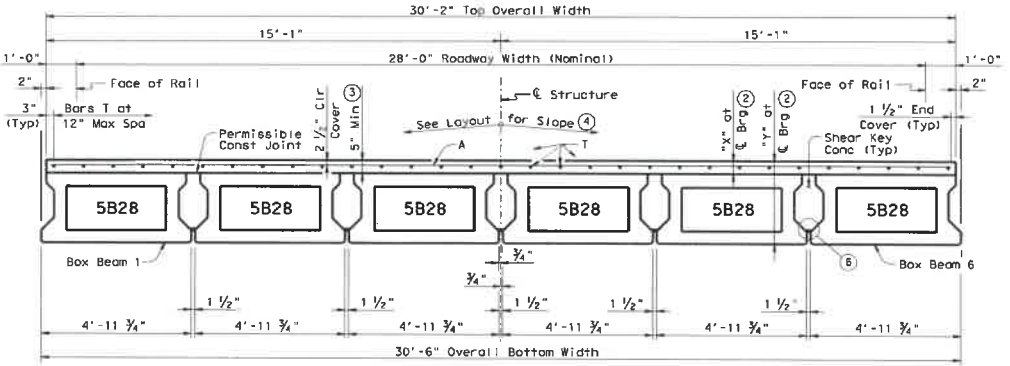
FILE: bbstde31.dgn	DN: TxDOT	CK:	DW: TxDOT	CK: TxDOT
©TxDOT December, 2008	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY		SHEET NO.

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

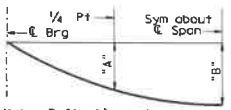
DATE:
FILE:



PLAN



TYPICAL TRANSVERSE SECTION



Note: Deflections shown are due to shear key and concrete slab only, ($E_c = 5 \times 10^3$ ksi). Calculated deflections shown are theoretical and actual dimension may be less. Deflections may be adjusted based on field observation.

DEAD LOAD DEFLECTION DIAGRAM

BAR TABLE	
BAR	SIZE
A	#4
DT	#4
H	#5
T	#4

TABLE OF DEFLECTIONS AND SECTION DEPTHS

SPAN LENGTH (FT)	BEAM NO.	POINT	DEAD LOAD DEFLECTIONS (FT) SHEAR KEY	SLAB	TOTAL	SECTION DEPTHS "X" AT ℄ BRG (2)	"Y" AT ℄ BRG (2)
30	ALL	"A"	0.000	0.001	0.001	5"	2'-9"
		"B"	0.000	0.001	0.001		
35	ALL	"A"	0.001	0.001	0.002	5 1/4"	2'-9 1/4"
		"B"	0.001	0.002	0.003		
40	ALL	"A"	0.001	0.003	0.004	5 1/4"	2'-9 1/4"
		"B"	0.002	0.003	0.005		
45	ALL	"A"	0.002	0.003	0.005	5 1/4"	2'-9 1/4"
		"B"	0.003	0.005	0.008		
50	ALL	"A"	0.003	0.006	0.009	5 1/4"	2'-9 1/4"
		"B"	0.004	0.008	0.012		
55	ALL	"A"	0.004	0.008	0.012	5 1/2"	2'-9 1/2"
		"B"	0.006	0.012	0.018		
60	ALL	"A"	0.006	0.012	0.018	5 1/2"	2'-9 1/2"
		"B"	0.010	0.016	0.026		
65	ALL	"A"	0.009	0.016	0.025	5 3/4"	2'-9 3/4"
		"B"	0.012	0.023	0.035		
70	ALL	"A"	0.013	0.021	0.034	6"	2'-10"
		"B"	0.018	0.030	0.048		
75	ALL	"A"	0.017	0.028	0.045	6 1/2"	2'-10 1/2"
		"B"	0.024	0.040	0.064		
80	ALL	"A"	0.022	0.037	0.059	7"	2'-11"
		"B"	0.031	0.052	0.083		

(1) If multi-span units (with slab continuous over interior Bents) are indicated on the Bridge Layout, Bars T must be continuous through joint. See Continuous Slab Detail.

(2) Based on theoretical beam camber, dead load deflections of 5" Cast-in-place slab, shear key dead load and a constant grade. The contractor must adjust these values for any vertical curve.

(3) Slab thickness at midspan of Beams may not exceed 7 inches.

(4) This standard does not provide for changes in roadway cross slopes within the structure.

(5) If using Type A expansion joints, the maximum distance between joints is 100 feet.

(6) Form bottom of shear keys with foam backer rod or other material acceptable to the Engineer.

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.
Provide Class S concrete (f'_c = 4,000 psi) for slab and shear key. Provide Class S (HPC) concrete if shown elsewhere in the plans.
All reinforcing must be Grade 60.
Two-span or three-span units, with the slab continuous over interior Bents, may be formed with the details on this standard. Unit Length cannot exceed 3.5 times length of the shortest end span.
Bar laps, where required, will be as follows:
Uncoated ~ #4 = 1'-5"
Epoxy coated ~ #4 = 2'-1"
It is recommended, with crown cross-slope, to erect beams adjacent to crown point first. For structures without a crown point, it is recommended to erect beams on the high side of cross-slope first and progress to the low side.
This sheet does not support the use of Transition Bents.
See railing details and standard BBRAS for rail anchorage.

HL93 LOADING

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE BOX BEAM SPANS

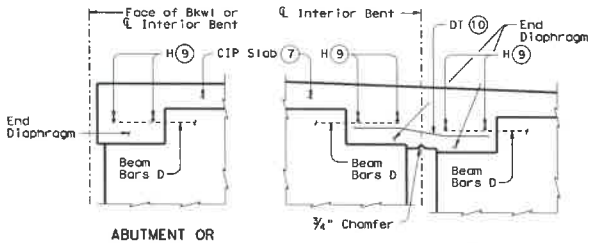
TYPE B28 28' RDWY
(WITH SLAB)

SBBS-B28-28

FILE: bbstds35.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006			MB	HIGHWAY
REVISIONS				
03-12: Cover. 10-13: Table of Est Quantities, Notes.			COUNTY	SHEET NO.

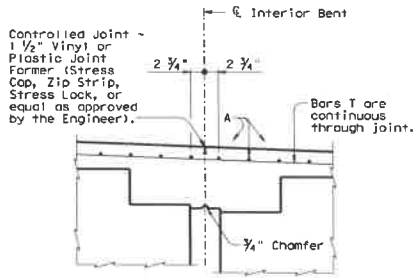
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:



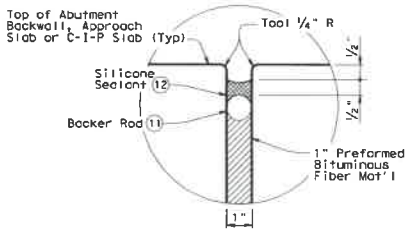
TYPICAL END DIAPHRAGM SECTIONS

(along centerline of Box Beam)



CONTINUOUS SLAB DETAIL

(Diaphragm reinforcing not shown for clarity)



TYPE A JOINT DETAIL (5)

TABLE OF ESTIMATED QUANTITIES

SPAN LENGTH	SHEAR KEY	REINF CONC SLAB (BOX BEAM)	PRESTR CONCRETE BOX BEAMS (TY SB28) (13)	TOTAL REINF STEEL (14)
FT	CY	SF	LF	Lb
30	7.9	905	177.00	1,810
35	9.3	1,056	207.00	2,112
40	10.6	1,207	237.00	2,414
45	12.0	1,357	267.00	2,714
50	13.3	1,508	297.00	3,016
55	14.7	1,659	327.00	3,318
60	16.0	1,810	357.00	3,620
65	17.4	1,961	387.00	3,922
70	18.7	2,112	417.00	4,224
75	20.0	2,262	447.00	4,524
80	21.4	2,413	477.00	4,826

(5) If using Type A expansion joints, the maximum distance between joints is 100 ft.

(7) Slab reinforcing omitted for clarity.

(8) See Bridge Layout for Joint type.

(9) Provide 1 ½" end cover to Bars H. After all beams have been placed, weld one Bar H to two Bars D at each end of all beams.

(10) Lap Bars DT 9" Min with each Beam Bar D at Interior Bents without Expansion Joints. Bars DT shown bent for clarity only.

(11) Backer rod must be 25% larger than joint opening and must be compatible with the sealant.

(12) Use Class 7 silicone sealant. Prepare joint and seal in accordance with Item 438 "Cleaning and Sealing Joints".

(13) Fabricator must adjust beam lengths for beam slopes as required.

(14) Reinforcing steel weight is based on an approximate factor of 2.0 lbs per square foot of slab.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE BOX BEAM SPANS

TYPE B28 28' RDWY

(WITH SLAB)

SBBS-B28-28

FILE: bbsids35.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006			MB	HIGHWAY
REVISIONS				
01-12: Cover, Table of Est Quantities, Notes.	DIST			SHEET NO.

Item No. 09

City of Lucas
City Council Agenda Request
August 20, 2020

Requester: City Engineer Stanton Foerster

Agenda Item Request

Consider the Bridge Alternative Report (BAR) of the Snider Bridge and Roadway Improvements and provide direction to the City Manager.

Background Information

In December 2019, the City engaged the professional services of Lakes Engineering, Inc. to start designs of the Snider Lane bridge crossing at White Rock Creek and the associated roadway from Winningkoff Road to Shady Lane. Lakes has completed about 20% of the design, but Lakes is requesting direction from the City regarding bridge materials and location relative to the existing bridge before proceeding any further with the design. The major elements discussed in the BAR as follows:

A. Should the bridge be shifted south to remove the curve in the roadway or remain in the same locations?

B. What rights-of-way are available and how does this impact U.S. Army Corps of Engineers' Lavon Lake property/easements?

C. What type of connections will be provided to the AT&T fiber hub structure and to the Trinity Trail?

D. Should the Snider Lane/Shady Lane intersection be raised to reduce the possibility of flooding?

E. What materials should be used for the bridge structure and how do the materials impact the height of the bridge above White Rock Creek?

F. Should the area be closed to all traffic or partial closed during the construction?

Attachments/Supporting Documentation

Bridge Alternative Report for Snider Bridge and Roadway Improvements from Susan Circle to Shady Lane prepared by Lakes Engineering, Inc. for the City of Lucas and dated July 2020.

Item No. 09

City of Lucas
City Council Agenda Request
August 20, 2020

Budget/Financial Impact

The BAR provides several various cost alternatives. The impacts of the budget cannot be determined without direction from the City Council. This construction project is not funded.

Recommendation

The City Engineer concurs with the Lakes recommendations and adds the following clarifications to the major elements:

A. Shift the bridge and some of the roadway to a new location south within the existing right-of-way.
B. Acquire any needed easements.
C. Maintain connections to the AT&T fiber hub structure and to the Trinity Trail. Provide a location on the north side of the road for AT&T maintenance vehicles to park. Extend the Trinity Trail to the west along the southern right-of-way line of Snider Lane towards Winningkoff Road.
D. Raise the Snider Lane/Shady Lane intersection.
E. Construct a signal-span bridge with four-TX46 Beams (Option 3). At minimum, the bridge should be 30 feet wide like the Blondy Jhune bridges.
F. Close Snider Lane between Natha Court and Shady Lane to all traffic during the construction of the bridge.

Lakes Engineering's recommendations are as follows:

The **proposed bridge** typical section provides one (1) 12'-0" traveling lanes in each direction and a 4'-0" wide shoulder on each side with a 0.02 ft/ft crown, and a bridge railing type T411. The **proposed roadway** typical section provides one (1) paved 12'-0" traveling lanes in each direction and a 4'-0" wide shoulder on each side with a cross-slope of 0.02 ft/ft. Given the information herein presented, it is recommended that Snider Lane Culvert be replaced with a 100'-0" single-span bridge on the proposed Horizontal Alignment with a 12.34 ft vertical profile raise, utilizing Option 3: four (4) TxDOT Prestressed Concrete I-Girders (TX46) with an 8.5" thick cast-in-place reinforced concrete deck and 4" thick prestressed concrete deck panels, supported on twelve (12) 18"x18" driven concrete piles foundation or eight (8) 36" diameter drilled shafts with a cast-in-place reinforced concrete abutment foundation. Retaining walls are recommended on all four corners of the bridge. It is recommended that construction be completed by implementing a complete roadway closure and detour. Shady Lane at Snider Lane intersection will be impacted due to the proposed vertical alignment raise. The recommended vertical alignment will raise the intersection of approximately 5 feet from the existing top of pavement to the proposed top of pavement. Retaining walls are recommended to limit right of

City of Lucas
City Council Agenda Request
August 20, 2020

way acquisition. An in-depth retaining wall and intersection sight distance evaluation will be performed in the final design phase.

Motion

I make a motion to (direct/not direct) the City Manager to proceed with design of the Snider Lane bridge and roadway in accordance with the Lakes Engineering recommendations as outlined in the Bridge Alternative Report dated July 2020.

BRIDGE ALTERNATIVE REPORT

Snider Bridge and Roadway Improvements from Susan Circle to Shady Lane

City of Lucas

Prepared for:
City of Lucas

Prepared by:

Lakes Engineering, Inc.

LAKES ENGINEERING bcc
A BCC Engineering Company

July 2020

TABLE OF CONTENTS

SECTION PAGE

1. EXECUTIVE SUMMARY 3
2. INTRODUCTION 5
2.1. Project Background 5
2.2. Project Objective 8
3. GEOMETRIC DESIGN 9
3.1. Geometric Criteria 9
3.2. Horizontal and Vertical Alignment 10
3.3. Right-of-Way 11
3.4. Easement 11
3.5. Access Impact 11
3.6. Intersection Impact 11
4. STRUCTURAL DESIGN CRITERIA 11
4.1. Specifications 11
4.2. Bridge Loading 12
4.3. Environmental Classification 13
4.4. Materials 13
4.5. Permit 13
4.6. Aesthetics 14
4.7. Utilities 14
5. BRIDGE ALTERNATIVES 15
5.1. Span Arrangement Alternatives 15
5.2. Bridge Skew 16
5.3. Typical Section 17
5.4. Superstructure Alternatives 20
5.5. Substructure / Foundation Alternatives 25
5.6. Retaining Walls 25
5.7. Bridge Drainage 25
5.8. Bridge Lighting 25
5.9. Construction Sequencing 26
6. ALTERNATIVE COST COMPARISON 26

APPENDICES

APPENDIX A: Alternatives Cost Comparison

APPENDIX B: Existing Culvert Inspection Report

APPENDIX C: References

EXHIBITS

EXHIBIT A: Existing Right-Of-Way & Easement Plan

1. EXECUTIVE SUMMARY

Lakes Engineering, Inc. has prepared this Bridge Alternative Report (BAR) for the proposed Snider Bridge and Roadway Improvements from Susan Circle to Shady Lane. The intent of this report is to give the City of Lucas a comprehensive analysis of the different options and costs to replace Snider Road crossing over White Rock Creek. It provides our recommendations of the best alternative that will deliver, to the City of Lucas residents, the most value, best economy, and least impact to the public for these improvements. Snider Lane Culvert over White Rock Creek is located approximately 0.3 miles east of Winningkoff Road. Snider Lane crosses the creek with triple 8-ft by 8-ft concrete box culverts within the floodplain and the roadway is below the flood elevation. White Rock Creek has historically overtopped Snider Lane frequently from the culvert crossing to Shady Lane. The aging culvert opening is not adequate for larger storm events, gets clogged easily with large debris, and has caused closure of the roadway many times. The debris build up contributes to the flooding requires the City to provide regular recurring maintenance. Flooding and overtopping of Snider Lane is a safety hazard for the residents and road users of the vicinity area. Replacing the culvert with a bridge above the flood elevation will provide an adequate opening, which will resolve the clogging and overtopping issues and may lower the water surface elevation locally. Replacing the existing crossing with a new culvert does not solve the clogging issue and would need to be sized much larger than any available precast culvert available to raise the roadway above the flood elevation. A new culvert would need to be cast in place, cost similar to a bridge, and not provide the sustainability of a bridge structure. For these reasons, a culvert replacement option was not evaluated. We have evaluated many bridge types and materials, provide a comparison, and recommend solutions, within this report.

This report identifies the project in terms of needs, purpose, and recommended solution. This report also provides design criteria and parameters, description of bridge superstructure options, and evaluates the alternatives according to the following:

A. Horizontal/Vertical Alignments
B. Right-of-Way/Easement
C. Access Impact
D. Intersection Impact
E. Bridge Superstructure Options
F. Method of Construction

The major elements discussed above are summarized below:

A. The proposed Horizontal Alignment of, Snider Lane bridge over White Rock Creek will be shifted slightly to the south of the existing Snider Lane alignment smoothing the curves and to provide better visibility.
B. Most of the right-of-way within the project limits has been dedicated. However, there is a parcel at the south side of the bridge crossing owned by the United States Army Corps of Engineers that will require a temporary construction easement permit to build the proposed improvements.

   Snider Lane has existing 20ft utility easements on both sides of the roadway from Winningkoff Road to White Rock Creek.

C. There is one (1) utility service driveway and one (1) equestrian trail access within the project limits on Snider Lane that will be impacted. It is recommended that both the utility driveway and trail access be relocated near Natha Court. An in-depth evaluation for the utility driveway and trail

access locations will be performed in the final design phase. Access must be provided for all property owners during the duration of construction.

D. The intersection of Snider Lane and Shady Lane will be impacted by the recommended vertical alignment. The recommended vertical alignment will raise the intersection of Snider Lane and Shady Lane approximately 5 feet from the existing top of pavement to the proposed top of pavement with retaining walls along both sides of Snider Lane and Shady Lane. This intersection will be evaluated in detail during the Preliminary or Final Design.

E. Seven (7) bridge superstructure alternatives are presented, and option 3 is the most cost-effective superstructure option considered. Option 3 offers overall cost-savings, despite having the largest vertical profile raise compared to the other options. Therefore, option 3 is the most feasible and is the recommended bridge superstructure alternative. This recommended alternative has the following characteristics:
    - 100ft single-span bridge with 30-degree skew
    - Four (4) TxDOT Prestressed Concrete I-Girders (TX46)
    - 8.5in thick cast-in-place reinforced concrete deck and 4in thick prestressed concrete deck panels
    - Aesthetics similar to the Blondy Jhune bridges
    - The recommended vertical alignment associated with option 3 will raise the pavement elevation at the crossing approximately 12 feet from the existing top of pavement and will have retaining walls at all four corners of the bridge.

F. The recommended method of construction is complete roadway closure and detour. The intersection of Shady Lane may be constructed in phases to avoid a complete closure.

2. INTRODUCTION

This Bridge Alternatives Report (BAR) is developed to define the parameters which affect the selection of the superstructure and substructure for the proposed bridge and provide alternatives with a recommendation. Issues addressed herein include geometric constraints, horizontal and vertical clearance requirements, utility conflicts, drainage issues, evaluation of span arrangements, evaluation of superstructure and substructure alternatives, aesthetics, traffic control, construction sequencing and construction cost.

It is not the intent for this BAR to define the precise geometry of all structural elements, but rather to provide information in sufficient detail to fairly assess the relative impacts of the various alternatives and establish basic parameters needed to proceed to the final design phase.

2.1. Project Background

Snider Lane crosses White Rock Creek approximately 0.6 miles east Winningkoff Road and approximately 1 mile west of Lavon Lake within the City of Lucas, located in Collin County, Texas. The existing culvert crossing is comprised of three concrete boxes with 8 feet by 8 feet openings and is approximately 31 feet long with the roadway directly on top of the boxes. It is estimated that the culvert was constructed around 1990 and does not appear to have been rehabilitated since construction other than slope protection addition. The crossing has a roadway width of approximately 29 feet and carries one lane of traffic in each direction with no shoulder width on either side.

Based on an inspection report performed by Lakes Engineering on July 11, 2019 (refer to Appendix B), the current condition of the culvert is functionally obsolete with a sufficiency rating of 93 (rated by NBIS procedure). It is important to note that functionally obsolete does not carry the meaning of functionally unsafe, at the time of this report. The field inspection found the following deficiencies:

1. Various diagonal cracks on approach slab 1 and 2
2. 6" settlement of approach slab 1 at the southwest corner
3. 2.5 settlement of approach slab 2 at the southeast corner
4. Lateral crack across the full width of the roadway on deck span 1
5. Light scaring on deck span 2
6. Concrete riprap settled 9" at abutment 4 southeast corner
7. Toe exposed, chipping and undermining of riprap at abutment 4 southeast corner
8. Exposed bottom slab toe with 18" scour and undermining at south channel south outfall
9. Exposed bottom slab toe with 5" scour at north channel northeast corner
10. Moderate bank erosion at north and south channels
11. 75% delaminated on southwest face of abutment 1
12. 7" x 24" x 3" spall at second railing post on span 1 south headwall
13. 15" x 3" spall at both railing post on span 2 south headwall
14. Full width hairline crack at the beginning of span 3 north headwall
15. Scaring and gouging from debris at northwest corner of abutment 1
16. Scaring and gouging from debris at northeast corner of abutment 4
17. 0.010" full height crack with efflorescence on abutment 1
18. 0.020" full diagonal crack on abutment 4
19. 0.025" full height crack on wall 2 and wall 3

20. Various spalls on north side of wall 3
21. Slope protection appears to have settle 8" southwest corner of abutment 1
22. No slope protection at northwest corner of abutment 1 and northeast corner of abutment 4

The waterway opening appears to be inadequate. It is reported that White Rock Creek overtops Snider Lane multiple times a year, causing traffic delays and disruptions. A gate with a "ROAD FLOODED" sign is posted on each approach of the culvert that is closed by the City of Lucas when overtopping occurs.

Snider Lane culvert over White Rock Creek has a weight limit of 10 tons with signage located near Shady lane.

Existing condition photos are shown below.



Approach- Looking East



Approach - Looking West



Upstream Headwall



Downstream Headwall



Upstream – During A Storm Event



Downstream – During A Storm Event



At Shady Lane – During A Storm Event



At Snider Lane Culvert – During A Storm Event

2.2. Project Objective

The intent of this project is to address the existing and future operational and safety conditions of Snider Lane over White Rock Creek. Because the age and current condition, the project proposes to replace the culvert with a new structure that is sufficiently durable and resilient to environmental effects, and flooding. The structure must be sustainable, minimize maintenance requirements and provide a safe and rideable corridor for the traveling public.

The project will involve the construction of a new bridge to carry Snider Lane over White Rock Creek located in the City of Lucas, Collin County, Texas. See **Figure 1 – Project Location Map.**



Figure 2 – Project Location Map

3. GEOMETRIC DESIGN

3.1. Geometric Criteria

Snider Lane is a low-speed, local road. It is classified as a low-speed, minor collector and is under the jurisdiction of the City of Lucas. Snider Lane has a posted speed limit of 35 mph. Snider Lane widens at the culvert over White Rock Creek.

Roadway Design Parameters

- Functional Classification: Rural/Minor Collector
- Design Speed: 35 mph
- Minimum Travel Lane Width: 12 ft.

Design Specifications

- American Association of State Highway and Transportation Officials (AASHTO) A Policy on Geometric Design of Highways and Streets "The Green Book" (2018), 7th Edition with latest Interim Revisions
- Texas Manual on Uniform Traffic Control Devices (October 2014)
- TxDOT Roadway Design Manual (April 2018)
- TxDOT Hydraulic Design Manual (September 2019)
- TxDOT Environmental Handbook (November 2019)
- TxDOT Bridge Project Development Manual (March 2018)

Horizontal Clearance

In accordance with the TxDOT Bridge Project Development Manual, Chapter 3, Section 1, bridges over water shall have substructure supports located within the horizontal clearance requirements as follows:

- A maximum of 2:1 embankment slope in a direction normal to the abutment cap.
- Side slopes should be normal to the roadway and no steeper than 3:1.
- Use stone riprap (preferred) or concrete riprap under the bridge and wrap around the abutment.

Embankment slope and stone riprap will be considered for the proposed bridge evaluation.

Vertical Clearance

According to Federal Emergency Management Agency (FEMA), the Base Flood Elevation (BFE), which is the current flood elevation, is at EL. 515.00. Based on TxDOT Hydraulic Design Manual a minimum 2'-0" freeboard, additional clearance above the flood elevation, is required. In order to prevent Snider Lane from future flooding, providing a minimum 2'-0" above the BFE should be provided. The minimum Low Member Elevation (bottom of the bearing pad) shall be equal or exceed an elevation of 517.00. However, by replacing the culvert with a bridge, the current flood elevation may be lower. An in-depth Hydrology and Hydraulic study shall be performed in Preliminary or Final Design.

The intent of the design is to provide the minimum vertical clearance. This is proposed to be achieved by a combination of minimization of the proposed structure depth and raising the vertical profile.

3.2. Horizontal and Vertical Alignment

Horizontal Alignment

The existing horizontal alignment of Snider Lane, within the limits of the culvert over the White Rock Creek, is on a tangent segment separated by two curves that do not meet current design standards. Only one alternative is presented for the proposed alignment.

Proposed Horizontal Alignment, Snider Lane bridge over White Rock Creek will be shifted slightly to the south of the existing Snider Lane alignment in order to correct the substandard curves. Additionally, this alignment will improve sight distance and visibility at Shady Lane.

Proposed Horizontal Alignment is shown in **Figure 2 – Proposed Horizontal Alignment** below.

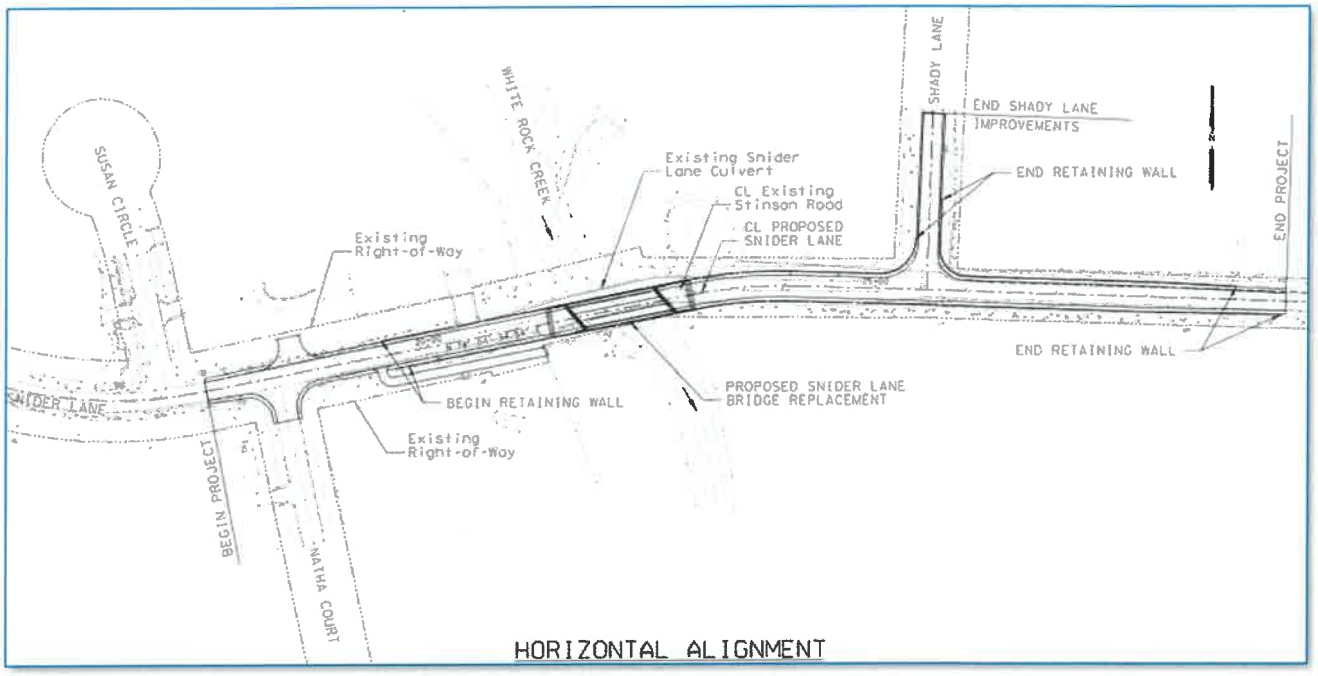


Figure 2 – Proposed Horizontal Alignment

Vertical Alignment/Profile

White Rock has historically frequently overtopped Snider Lane. Raising the top of the roadway to be above the designated flood elevation is recommended throughout the corridor. It is also recommended that the low member elevation of the bridge be a minimum of 2'-0" above the current 100-year flood elevation. Several bridge superstructure alternatives (see section 5.4) were evaluated with the intent to minimize raising the vertical profile, which reduce the limits of the project, impact to property driveway access, and additional roadway embankment.

3.3. Right-of-Way

The City of Lucas has established a 50 feet prescriptive right-of-way being 25 feet offset each side of the existing centerline of the roads. There is a 90 feet dedicated right-of-way along Snider Lane from Winningkoff Road to the west end of the proposed bridge. At White Rock Creek crossing there is one (1) parcel north of Snider Lane that has a 50 feet dedicated right-of-way from the centerline and one (1) parcel on the south of Snider Lane that have a prescriptive right-of-way from the centerline of Snider Lane. East of the proposed bridge, there is one (1) parcel on the north of Snider Lane that has a 35 feet dedicated right-of-way from the centerline of Snider Lane. The proposed Horizontal Alignment at the bridge will require a temporary construction easement from one (1) parcel. Therefore, to build the bridge improvements a permit is required from the United States Army Corps of Engineers property to obtain a total of 44,365 square feet of temporary construction easement. See Exhibit A for reference.

3.4. Easement

The City of Lucas has 20 feet of water/utility easement offset from the existing right-of-way on both sides of Snider Lane from Winningkoff Road to White Rock Creek crossing. There are two (2) parcels on the north of Snider Lane and west of Shady Lane that do not have a water/utility easement on record. Also, there is (1) parcel on the north of Snider Lane and East of Shady Lane that does not have a water/utility easement on record. We recommend the acquisition of a 20-ft utility/drainage easement from the above three (3) parcels along Snider Lane. This project will require the relocation of several franchise utilities and those could be accommodated within the proposed easement area, separated from the roadway improvements.

3.5. Access Impact

There is one (1) utility service driveway and one (1) equestrian trail access within the project limits on Snider Lane that will be impacted. It is recommended both the utility driveway and trail access be relocated near Natha Court. An in-depth evaluation for the utility driveway and trail access locations will be performed in the final design phase. Access must be provided for all property owners during the duration of construction. Temporary driveways may be required.

3.6. Intersection Impact

Shady Lane at Snider Lane intersection will be impacted due to the proposed vertical alignment raise. The recommended vertical alignment will raise the intersection of approximately 5 feet from the existing top of pavement to the proposed top of pavement. Retaining walls are recommended to limit right of way acquisition. An in-depth retaining wall and intersection sight distance evaluation will be performed in the final design phase.

4. STRUCTURAL DESIGN CRITERIA

4.1. Specifications

The design of the structural elements of this project shall be in full compliance with AASHTO and TxDOT Bridge Design Manual - LRFD. The structure shall be designed in accordance with the TxDOT standard practices and procedures. The design shall comply with the latest edition of the following design specifications:

General Specifications:

- Texas Department of Transportation (TxDOT) Standard Specifications for Construction and Maintenance of Highways, Streets and Bridge, 2014

Design Standards and Specifications:

- American Association of State Highway and Transportation Officials (AASHTO) LRFD Bridge Design Specifications (2017), 8th Edition with latest Interim Revisions
- TxDOT Bridge Project Development Manual (March 2018)
- TxDOT Bridge Design Manual - LRFD (July 2018)
- TxDOT Bridge Railing Manual (September 2019)
- TxDOT Bridge Standard Details Drawings

Design Methodology

All structural components shall be designed in accordance with Load and Resistance Factor (LRFD) design methodology. The design life for bridge structures is 75 years per AASHTO LRFD and TxDOT design criteria.

4.2. Bridge Loading

The following design loads were utilized in the evaluation of the superstructure and substructure alternatives:

Dead Loads:

Unit weights in accordance with the TxDOT Standards and the AASHTO LRFD Bridge Design Specifications were utilized.

Concrete, Structural	150 pcf	
Asphalt Concrete Pavement Overlay	150 pcf	(Applicable to prestressed slab unit alternative)
Future Wearing Surface	25 psf	
Soil, Compacted	120 pcf	
Vertical-Faced Concrete Parapet	270 plf	(TxDOT Traffic Railing Type T411)
Bridge Deck Sacrificial Thickness	½ in.	(½" sacrificial deck thickness for grinding and grooving was accounted for as dead load but was not utilized for bridge deck section properties).

Live Loads

Vehicular Loading: HL-93

Wind Loads

Wind loads will be calculated in accordance with AASHTO LRFD Bridge Design Specifications.

Vessel Collision

Not applicable.

Seismic Criteria
According to TxDOT Bridge Design Manual, bridges and structure in Texas do not require analysis for seismic loading due to the low seismic hazard as shown in AASHTO Article 3.10.2. TxDOT Bridge Standards and conventional bridge configurations have been evaluated for seismic effects and do not require further analysis.

4.3. Environmental Classification

Non-Severe: De-icing agents are not frequently used and contact with salt-water spray is not possible.

4.4. Materials

The following material properties shall be utilized in the design of the structures:

Concrete
Concrete shall be specified in accordance with TxDOT Standard Specifications.

Class	Minimum 28-day Compressive Strength (psi)	Location
Superstructure		
C (HPC if needed)	3,600	Traffic Railings
S (HPC if needed)	4,000	Decks and Approach Slabs,
H (HPC if needed)	5,500	Prestressed Deck Slab Units
Substructure		
C	3,600	Abutments, Bent and Wingwalls
C (Drilled Shaft)	3,600	Drilled Shafts
C (Driven Pile)	3,600	Driven Piles

Reinforcing Steel
Reinforcement shall be ASTM A615, Grade 60 deformed carbon-steel bar. All superstructure reinforcement shall be epoxy coated or galvanized.

Prestressing Steel
Prestressing strands shall conform to ASTM A416, Grade 270, low-relaxation strands. Stress-relieved strands will not be used.

4.5. Permit

The following regulatory and permitting agencies may have interest and/or jurisdiction requiring permits to perform the proposed bridge replacement:

- City of Lucas
- Texas Commission on Environmental Quality (TCEQ)
- United States Environmental Protection Agency (EPA)
- Federal Emergency Management Agency (FEMA)
- United State Army Corp of Engineers (USACE)

4.6. Aesthetics

The proposed bridge will not have any non-standard aesthetic requirements. However, the bridge aesthetics may be similar to the Blondy Jhune bridges.

4.7. Utilities

Based on field surveying performed by Surveying and Mapping, LLC (SAM) in April 2020, existing overhead and underground utilities were noted at various locations. Further investigation will need to be conducted as the project progresses to identify the exact facility locations. The following companies operate within the project limits:

- City of Lucas Public Utilities – 8" water line located along the south side of Snider Lane and 3" water lines tapped at Susan Circle, Natha Court and Shady Lane.
- Grayson Collin Electric – Underground facilities on the south side of Snider lane.
- AT&T Fiber - Underground facilities located along the south side of Snider lane
- AT&T Telephone - Underground facilities located along the North side of Snider lane
- Frontier Telephone – Underground facilities located along the south side of Snider lane.
- Suddenlink CATV – Underground facilities along the east side of Susan Circle and west side of Natha Court.

There are five (5) Utility Agency Owners (UAO) with facilities within the project limits and additional utility coordination will be performed in preliminary and final design phases. The table below lists utility agency owners, utility contact data, and potential for required relocations.

Existing Utilities					
	Utility Agency Owner	Facilities	Contact Person	Phone/Email	Relocation Potential
1	City of Lucas	Water	Jeremy Bogle	469-628-8586	Y
2	Grayson Collin	Electric	Michael Lauer	mlauer@gcec.net	Y
3	AT&T	Fiber	Joanie Baker	972-649-8759	Y
4	AT&T	Telephone	Joanie Baker	972-649-8759	Y
5	Frontier	Telephone	David Lemons	972-578-3212	Y
6	Suddenlink	CATV	N/A	N/A	N

Bridge Mounted Utilities

The existing culvert structure does not carry any utilities. No utilities are proposed for attachment to the bridge. It is recommended that conduit be placed in each bridge railing for future use of utility passthrough.

Overhead Utilities

Shared-use utility poles run longitudinally near the west and east fascia of the proposed bridge, carrying electrical, and telephone/cable. These electric/telephone overhead utilities will need to be adjusted to meet the vertical clearance requirements. This will need to be discussed with the Franchise Utility owners and they will adjust or relocate according to their standards.

Construction activities will need to address temporary support or relocation of these utilities.

5. BRIDGE ALTERNATIVES

5.1. Span Arrangement Alternatives

An approximate minimum overall bridge length of 100'-0" is required to span over White Rock Creek. This would locate the begin and end bridge outside of the existing banks of White Rock Creek and would provide a 2H:1V slope embankment at each abutment. The proposed abutments would be placed approximately at the edge of White Rock Creek top of bank to minimize future scour potential. The proposed bridge replacement structure must comply with the vertical clearance requirement discussed in Section 3 above.

Single-Span Bridge Option

A single-span bridge option is considered for the culvert structure replacement to maximize the bridge opening for optimum hydraulics. This option is less likely to minimize vertical profile raise; however, it offers the most cost-effective option by minimizing substructure costs. As such, this option appears to be the most feasible.

The proposed Plan for Horizontal Alignment 1 is shown in **Figure 3 – Plan View** below.

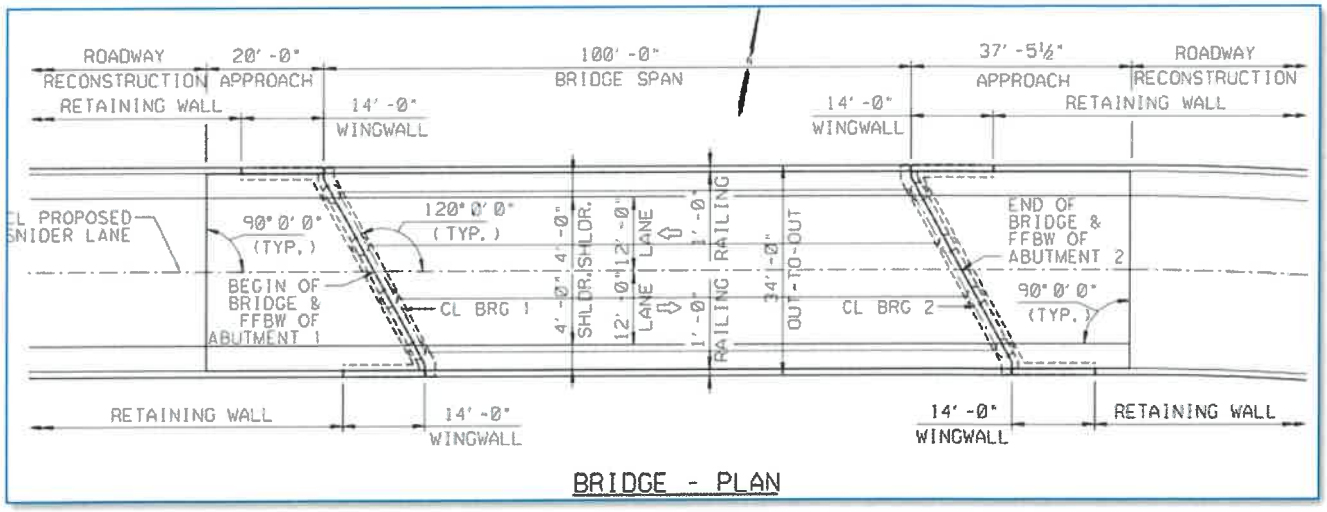


Figure 3 - Bridge Plan

The proposed Elevation for Horizontal Alignment 1 is shown in **Figure 4 – Elevation View** below.

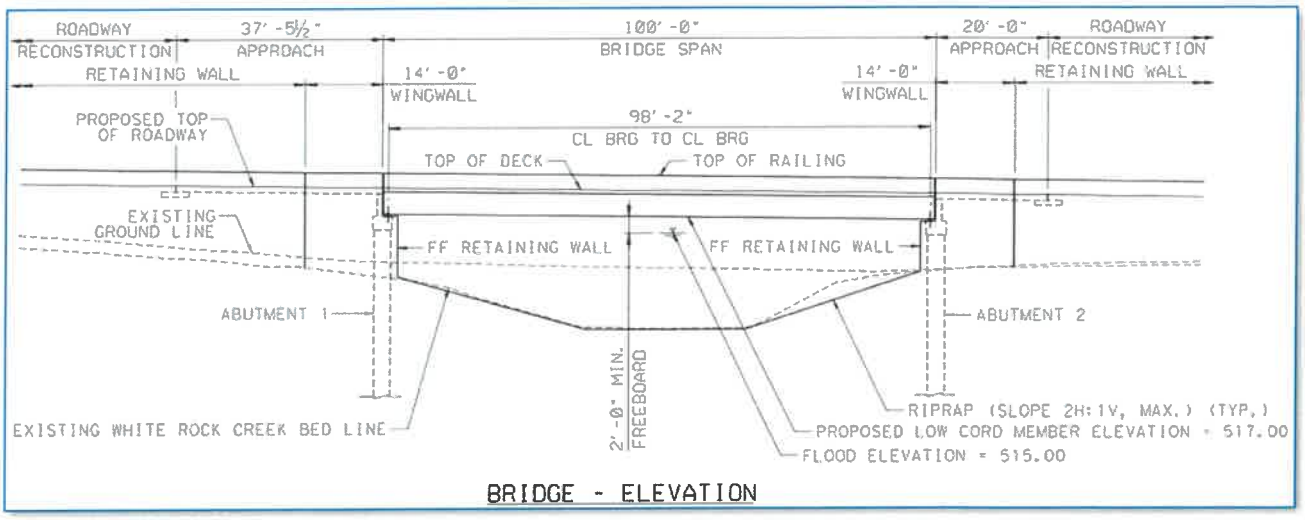


Figure 4 - Bridge Elevation

Two-Span Bridge Option

A two-span bridge is another option to minimize vertical profile raise; however, this option is less feasible as it would locate an intermediate bent in the middle of the White Rock Creek's, which would require additional future maintenance, introduces high scour potential, and impedes the hydraulic opening. Having an intermediate bent increases the overall construction cost above a similar length single-span bridge in this particular situation and is not considered economical. As such, a two-span bridge was not further evaluated.

Three-Span Bridge Option

A three-span bridge is another option to minimize vertical profile raise; however, this option is not feasible as it would locate two intermediate bents near the edge of the White Rock Creek's embankments, which increase the negative impacts mentioned above in the two-span option. As such, a three-span bridge was not further evaluated.

Recommendation

A single-span bridge configuration is recommended for the replacement structure.

5.2. Bridge Skew

White Rock Creek is on an approximate 30-degree skew to Snider Lane; therefore, the bridge abutments will have a 30-degree skew.

5.3. Typical Section

The existing roadway approach typical sections have two (2) approximately 10 feet paved asphalt travel lanes and no shoulders on either side. The roadway widens over the White Rock Creek culvert crossing. The existing typical section of Snider Lane at the White Rock Creek culvert has two (2) approximately 14'-6" concrete paved travel lanes, no shoulders on either side, and a substandard guard rail. Flood gates are located before and after the culvert.

The existing typical section of Snider Lane over White Rock Creek is shown in **Figure 5 – Existing Typical Section** below.

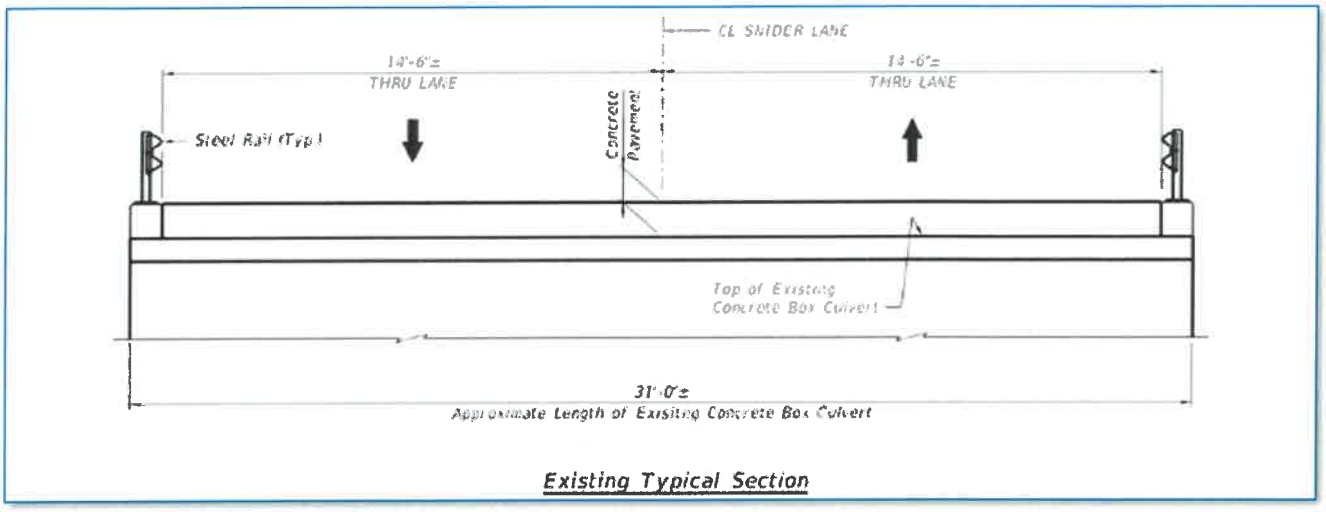


Figure 5 – Snider Lane Typical Section at White Rock Creek

Proposed Typical Section 1:

Based on TxDOT Statewide Planning Map, Snider Lane has an annual average daily traffic (AADT) count of 211 in 2018 and an estimated AADT count of 342 in 2038. Based on the TxDOT Roadway Design Manual (April 2018), the proposed Snider Lane's typical section is to follow a Rural Two-Way Highway design. The proposed roadway typical section provides two (2) 12'-0" travel lanes and a 4'-0" unpaved shoulder in each direction. Travel lanes and shoulders provide a cross-slope of 0.02 ft/ft and 0.06 ft/ft, respectively. The proposed bridge typical section provides two (2) 12'-0" travel lanes and a 4'-0" shoulder in each direction. Travel lanes and shoulders provide a constant cross-slope of 0.02 ft/ft. Based on TxDOT Bridge Railing Manual (September 2019), 45 mph or less is considered as low speed, and a bridge railing that is a minimum Test Level 2 (TL-2) is required. There are three (3) types of bridge railings that have a minimum TL-2 rating, such as T631LS, T411, and C411. There are no sidewalks present on Snider Lane, therefore, type C411 is not suitable. Type T631LS is a w-beam supported on steel posts and needs to be replaced after an impact. Type T411 is a continuous concrete railing that has 6" wide windows spaced every 18", center to center, with a nominal 2'-8" height and 1'-0' width. The recommended bridge railing is type T411. Type T411 is less likely to require replacement after impact and offers better aesthetics, Texas Classic, over type T631LS. The proposed bridge typical section will have an out-to-out bridge width of 34'-0".

The proposed bridge typical section is shown in **Figure 6 – Proposed Bridge Typical Section 1** below.

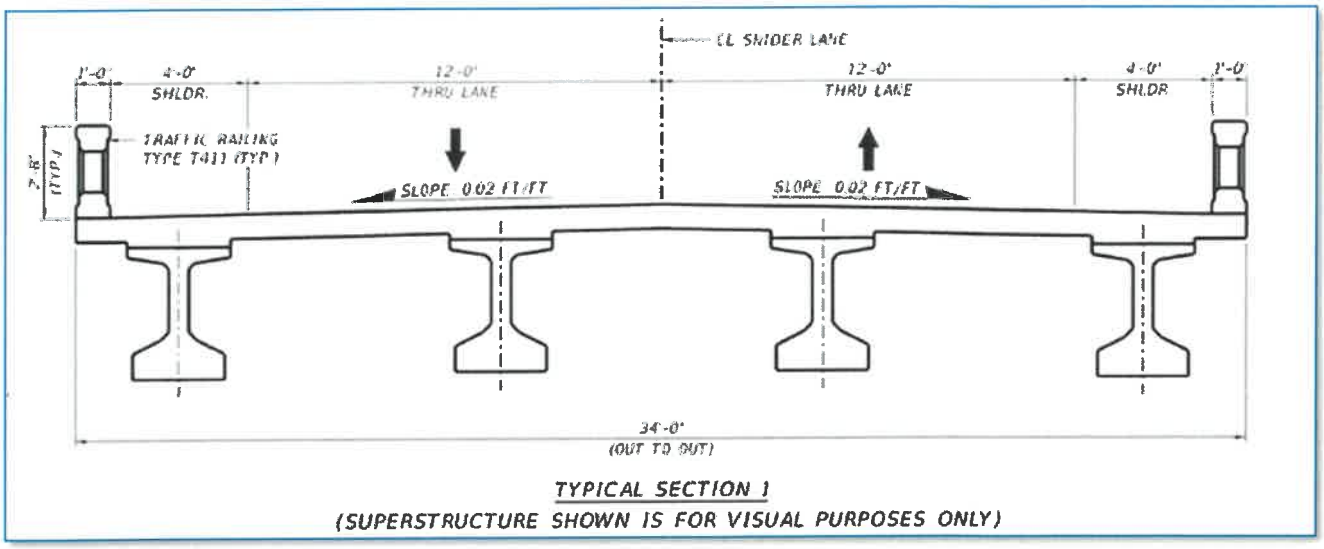


Figure 6 - Proposed Bridge Typical Section 1

Proposed Typical Section 2:

The City of Lucas has requested an ADT design of 20,000 be considered for Snider Lane to accommodate potential future traffic increases. Based on the TxDOT Roadway Design Manual (April 2018), the proposed Snider Lane's typical section is to follow a Rural Two-Way Highway design. The proposed roadway typical section provides two (2) 12'-0" travel lanes and an 8'-0" unpaved shoulder in each direction. Travel lanes and shoulders provide a cross-slope of 0.02 ft/ft and 0.06 ft/ft, respectively. The proposed bridge typical section provides two (2) 12'-0" travel lanes and an 8'-0" shoulder in each direction. Travel lanes and shoulders provide a constant cross-slope of 0.02 ft/ft. Based on TxDOT Bridge Railing Manual (September 2019), 45 mph or less is considered as low speed, and a bridge railing that is a minimum Test Level 2 (TL-2) is required. There are three (3) types of bridge railings that have a minimum TL-2 rating, such as T631LS, T411, and C411. There are no sidewalks present on Snider Lane, therefore, type C411 is not suitable. Type T631LS is a w-beam supported on steel posts and needs to be replaced after an impact. Type T411 is a continuous concrete railing that has 6" wide windows spaced every 18", center to center, with a nominal 2'-8" height and 1'-0' width. The recommended bridge railing is type T411. Type T411 is less likely to require replacement after impact and offers better aesthetics, Texas Classic, over type T631LS. The proposed bridge typical section will have an out-to-out bridge width of 42'-0".

The proposed bridge typical section is shown in **Figure 7 – Proposed Bridge Typical Section 2** below.

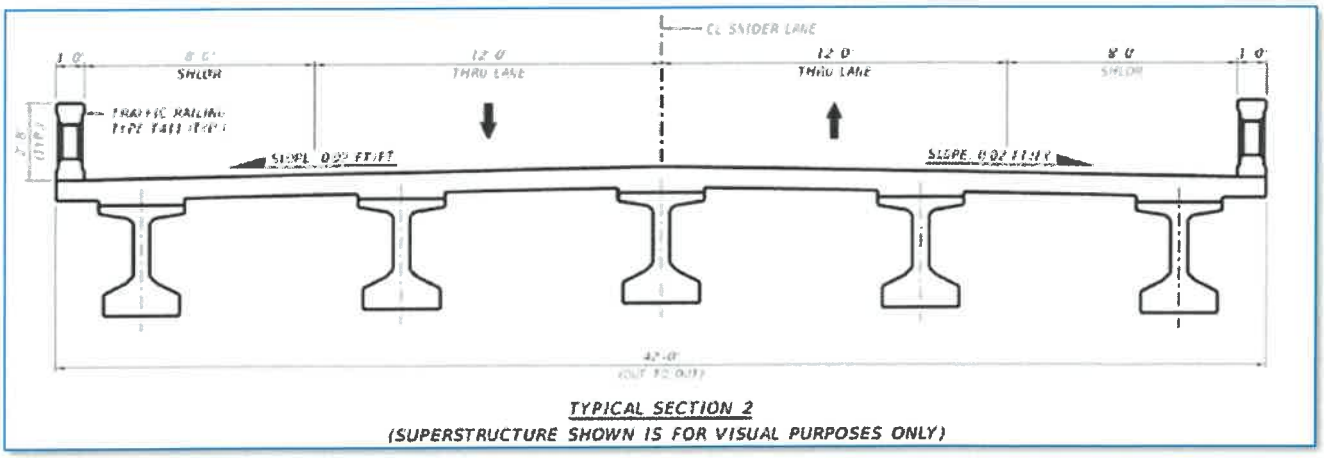


Figure 7 - Proposed Bridge Typical Section 2

Recommendation

The advantages of Bridge Typical Section 1 over Bridge Typical Section 2 are listed below.

- Lower overall construction cost
- Does not require Right-of-Way or easement acquisition from USACE on the south side of Snider Lane
- Less impact to driveways, turnouts and intersections

The disadvantages of Bridge Typical Section 1 over Bridge Typical Section 2 are listed below.

- Does not allows construction in phases or at least one lane open to traffic
- Less shoulder width
- Does not meet design standards for 20,000 ADT (Average Daily Traffic)

Proposed Bridge Typical Section 2 would require right-of-way acquisition and increased overall construction cost. A significant key disadvantage of Bridge Typical Section 1 over Bridge Typical Section 2 is that it does not meet the design standards for an ADT of 20,000. According to TxDOT Roadway Design Manual for a collector two-lane rural highway with an ADT more than 2,000 it is recommended to have a minimum of 8 feet shoulder. Snider Lane serves a small community with property size of 1 acre or more. It is not expected that this area will be developed with high density lots as most properties along Snider Lane are developed. Because of the large increase in bridge width required to meet design criteria for an ADT of 20,000, the cost increase for the Bridge Typical Section 2 is large. Bridge Typical Section 1 is functional and meets the needs of the community and the wider bridge typical section does not appear to provide a significant advantage to offset the overall cost increase; therefore, Bridge Typical Section 1 is recommended.

5.4. Superstructure Alternatives

The superstructure alternatives have been selected to satisfy the minimum horizontal and vertical clearance, hydraulic requirements, and constructability. Many superstructure alternatives were considered and evaluated based on the recommended Horizontal Alignment as discussed in section 3.2 above.

Seven superstructure alternatives were considered and evaluated for Snider Lane Bridge over White Rock Creek. The overall bridge length is 100'-0". TxDOT Prestressed Concrete Slab Beam and Decked Slab Beams were evaluated and eliminated due to capacity limitations at this span length. A steel through-truss superstructure was considered to minimize superstructure depth. The advantages to a through-truss superstructure are generally realized in long spans where prestressed concrete does not perform well or the members become very large. Since the span is relatively short, the structure depth for a through-truss is not less than other alternatives considered. Further, the structure depth is not a limiting factor since the roadway must be raised significantly to remain above the 100-year flood elevation. Therefore, the steel through-truss was eliminated. The remaining four superstructure alternatives are described below, options 1 through 4.

Each superstructure alternative presented below considers the recommended proposed Bridge Typical Section 1 as discussed in Section 5.3 above.

Option 1: TxDOT Prestressed Concrete Box Beams (5B34 &4B34)

This superstructure alternative consists of replacing the existing culvert structure with a single-span bridge utilizing six (6) TxDOT Prestressed Concrete Box Beams (5B34) and one (1) TxDOT Prestressed Concrete Box Beam (4B34) with a minimum of 5" thick Cast-in-Place (CIP) reinforced concrete deck. The proposed superstructure depth is 39". This shallow superstructure depth in conjunction with a modified vertical profile results in the lowest vertical profile raise over White Rock Creek and places the bottom of the bridge bearing elevation to be above the 100-year flood storm. Option 1 proposes a 10.88' vertical profile raise and is the second most cost-effective superstructure alternative. Refer to Appendix A for the options cost comparison.

The proposed TxDOT Prestressed Concrete Box Beams (5B34 & 4B34) typical section is shown in **Figure 8 – TxDOT Prestressed Concrete Box Beams (5B34 & 4B34) Typical Section** below.

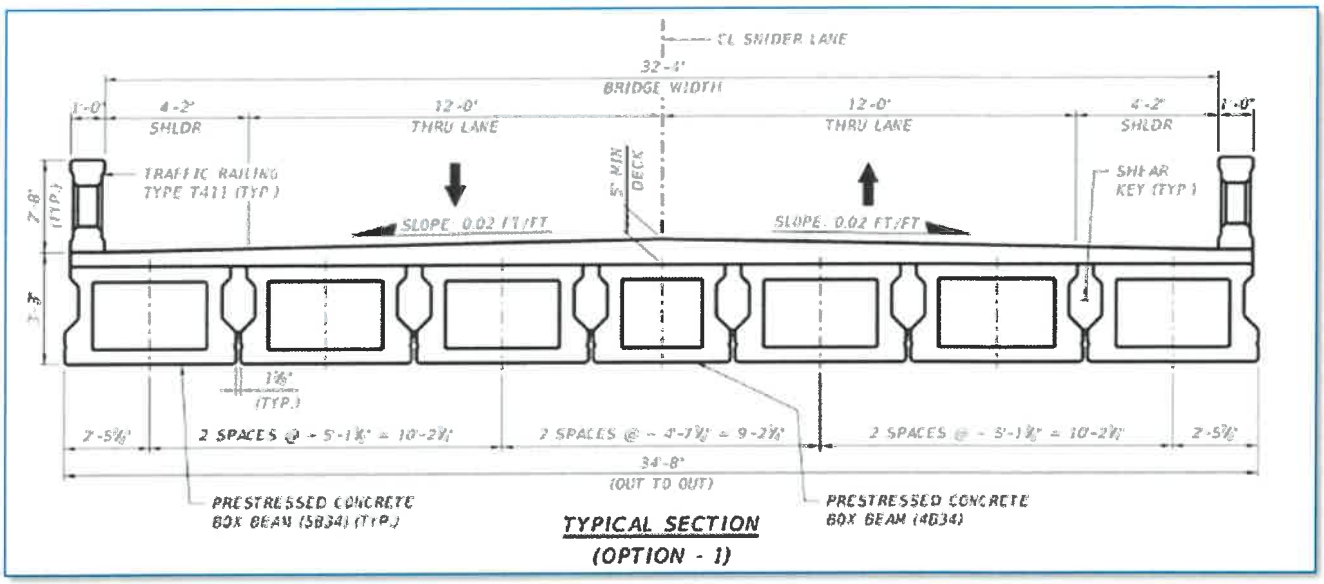


Figure 8 - TxDOT Prestressed Concrete Box Beams (5B34 & 4B34) Typical Section

Option 2: TxDOT Prestressed Concrete XBeams (5XB40)

This superstructure alternative consists of replacing the existing culvert structure with a single-span bridge utilizing four (4) TxDOT Prestressed Concrete XBeams (5XB40) with an 8" thick Cast-in-Place (CIP) reinforced concrete deck. The proposed superstructure depth is 50". This shallow superstructure depth in conjunction with a modified vertical profile results in the second lowest vertical profile raise over White Rock Creek and places the bottom of the bridge bearing elevation to be above the 100-year flood storm. Option 2 proposes an 11.80' vertical profile raise and is the third most cost-effective superstructure alternative. Refer to Appendix A for the options cost comparison.

The proposed TxDOT Prestressed Concrete XBeams (5XB40) typical section is shown in **Figure 9 – TxDOT Prestressed Concrete XBeams (5XB40) Typical Section** below.

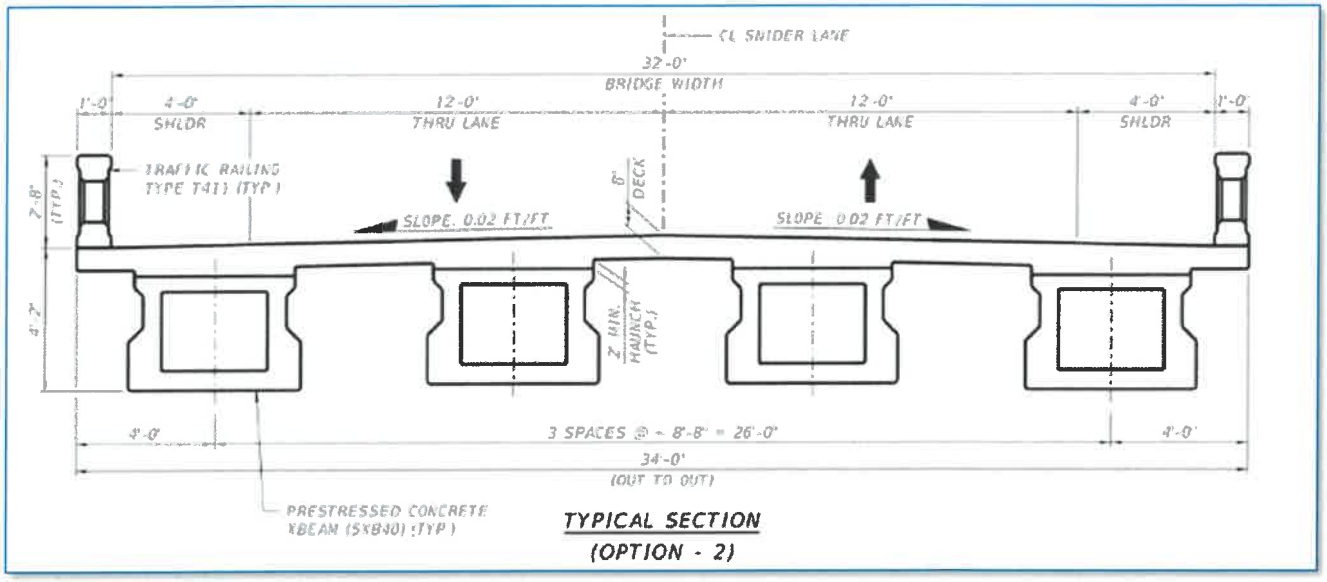


Figure 9 - TxDOT Prestressed Concrete XBeams (5XB40) Typical Section

Option 3: TxDOT Prestressed Concrete I-Girders (TX46)

This superstructure alternative consists of replacing the existing culvert structure with a single-span bridge utilizing four (4) TxDOT Prestressed Concrete I-Girders (TX46) with an 8.5" thick Cast-in-Place (CIP) reinforced concrete deck and 4" thick prestressed concrete deck panels. The proposed superstructure depth is 56.5". This superstructure depth in conjunction with a modified vertical profile results in the highest vertical profile raise over White Rock Creek and places the bottom of the bridge bearing elevation to be above the 100-year flood storm. Option 3 proposes a 12.34' vertical profile raise and is the most cost-effective superstructure alternative. Refer to Appendix A for the options cost comparison.

The proposed TxDOT Prestressed Concrete I-Girders (TX46) typical shown in **Figure 10 – TxDOT Prestressed Concrete I-Girders (TX46) Typical Section** below.

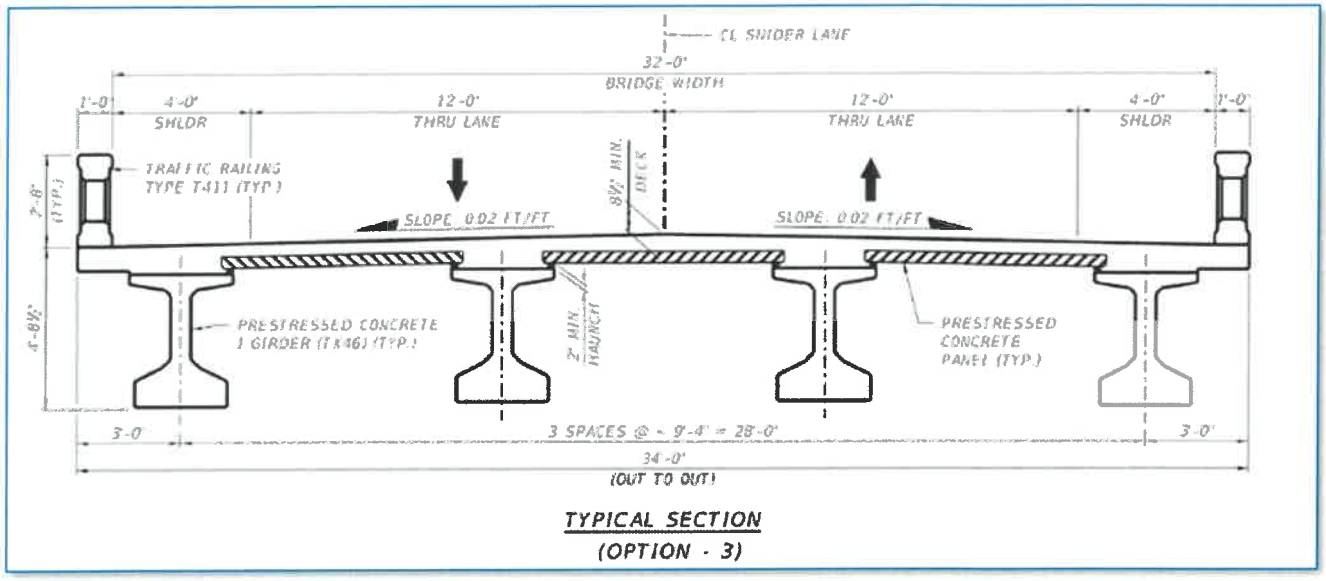


Figure 10 - TxDOT Prestressed Concrete I-Girders (TX46) Typical Section

Option 4A: Steel Plate Girders (40"X1/2" Web) or Option 4B: Steel Rolled Beams (W40X211)

This superstructure alternative consists of replacing the existing culvert structure with a single-span bridge utilizing five (5) Steel Plate Girders (40"X1/2" Web) or five (5) Steel Rolled Beams (W40X211), both with an 8.5" thick Cast-in-Place (CIP) reinforced concrete deck. The proposed superstructure depth is 53" for plate girders and 50" for rolled beams. These superstructure depths in conjunction with a modified vertical profile result in the third lowest vertical profile raise for plate girders and second lowest vertical profile raise for rolled beams over White Rock Creek and place the bottom of the bridge bearing elevation to be above the 100-year flood storm. Option 4A & 4B propose a 12.03' vertical profile raise for plate girders and 11.79' vertical profile raise for rolled beams and are both the least cost-effective superstructure alternatives. Refer to Appendix A for the options cost comparison.

The proposed Steel Plate Girders (40"X1/2" Web) or Steel Rolled Beams (W40X211) typical section is shown in **Figure 11 – Steel Plate Girders (40"X1/2" Web) or Steel Rolled Beams (W40X211) Typical Section** below.

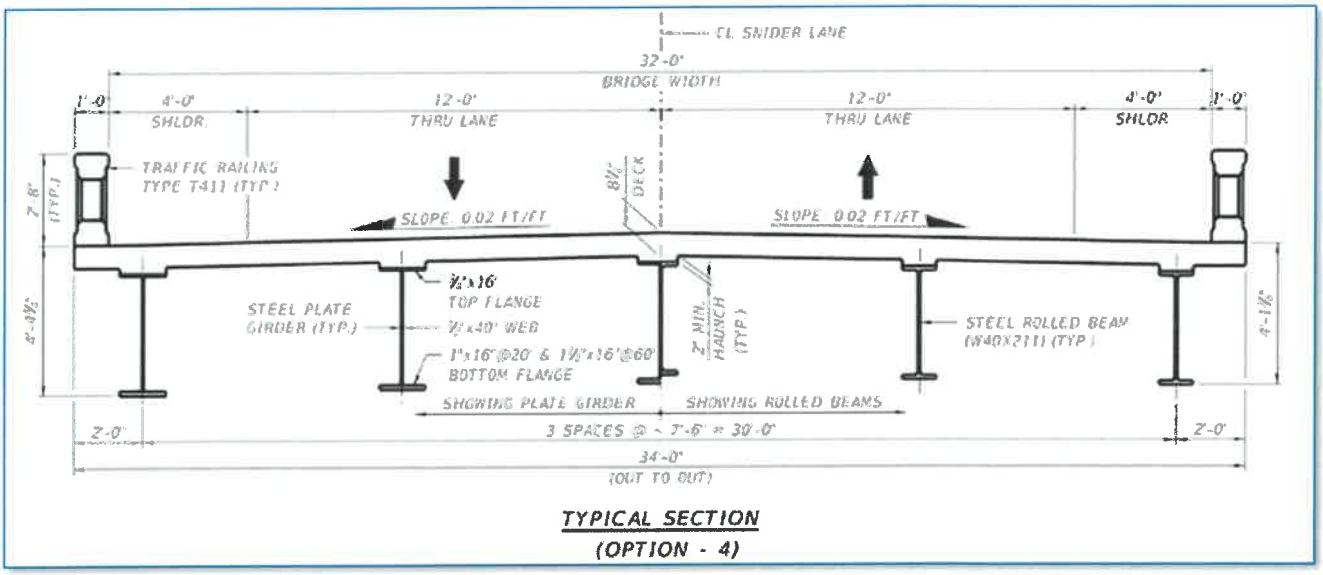


Figure 11 - Steel Plate Girders (40"X1/2" Web) or Steel Rolled Beams (W40X211) Typical Section

Recommendation

Of the four options discussed above for the proposed Horizontal Alignment, Option 3 is recommended: a single-span bridge utilizing four (4) TxDOT Prestressed Concrete I-Girders (TX46) with 8.5" thick reinforced concrete deck. Option 3 does not provide the shallowest superstructure depth, nor does it minimize the vertical profile raise, but this option is the most feasible superstructure in terms of overall cost savings.

5.5. Substructure / Foundation Alternatives

A full geotechnical evaluation of the bridge site will be investigated during the final design phase to determine the suitability and capacity needed for the proposed bridge replacement. TxDOT standard for prestressed concrete I-girders allows two foundation alternatives with a cast-in-place concrete abutment cap. A specialty design may also be considered should the geotechnical evaluation recommend a non-standard substructure.

Driven Concrete Piles

TxDOT Standard allows for six (6) 18"x18" driven concrete piles per an abutment for prestressed concrete I-girders. An in-depth foundation design will be performed to verify the capacity in the final design phase.

Drilled Shafts

TxDOT Standard allows for four (4) 30" diameter drilled shafts per an abutment for prestressed concrete I-girders. An in-depth foundation design will be performed to verify the capacity in the final design phase.

Recommendation

No recommendation is provided at this time for the substructure foundation alternatives.

5.6. Retaining Walls

Retaining walls will be used on this project to minimize the encroachment of the roadway embankment and to contain the typical section footprint within the limits of the existing right-of-way. Two types of walls are considered feasible, conventional Cast-In-Place (CIP) walls and Mechanically Stabilized Earth (MSE) retaining walls. The required wall area is determined by superstructure type as well as the foundation soil conditions to determine what type of wall will be best suited for this application. An in-depth retaining wall evaluation will be performed in the final design phase.

5.7. Bridge Drainage

Bridge drainage will be evaluated in preliminary and final design phases.

5.8. Bridge Lighting

There is no streetlight system existing along Snider Lane, and there are no light poles on the existing culvert. Therefore, no lighting will be proposed for the bridge.

5.9. Construction Sequencing

Safety to motorists and pedestrians is the highest priority for the Traffic Control Plan and the plan must minimize disruption to traffic flow during the construction of these improvements. To achieve these goals several keys issues will be addressed in the development of the selected alternative:

- Maintain access to the residential community during all phases of construction.
- Communicate with all project stakeholders, including local HOAs.
- Avoid or minimize utility facility relocations.
- Minimize impacts to traffic during the construction phase.

The following two construction options have been evaluated:

Phased Construction Option

To maintain traffic along Snider Lane, phased construction was considered and evaluated. At the culvert, Snider Lane has a paved roadway width of approximately 21 ft. TxDOT requires a 1'-0" offset from the temporary barriers and a minimum 12'-0" lane. Given the required widths and width of temporary barriers, providing two lanes of traffic will be impossible, however, leaving only one westbound or eastbound lane open was considered. Also, temporary shoring will be needed due to the significant profile raise, which increases the project limit even farther due to lane shifting requirements. Initial investigations find staged construction will require either widening the bridge or shifting the horizontal alignment. Either widening the bridge or shifting the horizontal alignment will require right-of-way or easement acquisition from USACE property. Widening the bridge or shifting the horizontal alignment to accommodate a phased construction would significantly increase the cost due to temporary shoring, traffic control items and schedule.

Complete Closure with Detour Option

Replacement of the Snider Lane Culvert of White Rock Creek can be completed in a shorter duration and with a reduced construction cost (when compared to the phased option) by implementing complete closure from Susan Circle to Shady Lane during construction and implementing a Detour. An initial detour plan will utilize East Lucas Road for west to east detours and Winningkoff Road for south to north detours. Shady Lane can be used for west to east detours only during the construction of the bridge and a portion of the roadway improvement up to Shady Lane. However, due to a change of profile at the intersection of Snider Lane and Shady Lane, Shady Lane will be closed for the construction of the remaining roadway improvement and access maintained from the north. An in-depth detour route and access plan will be evaluated in preliminary design.

Recommendation

The Complete Closure with Detour Option is recommended as this would allow for a shorter construction duration, resulting in overall construction savings.

6. ALTERNATIVE COST COMPARISON

A comparison of the estimated difference in cost of each alternative to Option 3 has been prepared. The comparison is based on certain major components of cost, such as the bridge, roadway, and retaining walls evaluated (refer to Appendix A - Alternatives Cost Comparison for more details).

The table below summarizes the bridge alternatives by percentage differences of cost for each alternative compared with Option 3 based only on superstructure types.

Bridge Alternatives	% Difference Compared to Option 3
Option 1: Single-Span with six-5B34 & one-4B34 Beams	38% increase
Option 2: Single-Span with four-5XB40 Beams	58% increase
Option 3: Single-Span with four-TX46 Beams	
Option 4A: Single-Span with five-Plate Girder Beams	66% increase
Option 4B: Single-Span with five-W40x211 Beams	222% increase

Based on a bridge superstructure cost estimated comparison, Option 3 is the most economical.

The table below summarizes the associated roadway profile raise of each bridge alternatives by percentage differences of cost compared with Option 3 based only on roadway fill. Profile raise is measured from the top of the existing pavement at the culvert to the top of the proposed concrete bridge deck at the beginning of the proposed bridge span. The top of the existing pavement at the culvert and at the beginning of the proposed bridge span is estimated to be at EL. 509.94.

Roadway Profile Raise	% Difference Compared to Option 3
Option 1: 10.88 feet Profile Raise	3% decrease
Option 2: 11.80 feet Profile Raise	3% decrease
Option 3: 12.34 feet Profile Raise	
Option 4A: 12.03 feet Profile Raise	2% decrease
Option 4B: 11.79 feet Profile Raise	3% decrease

Based on the roadway profile raise cost estimated comparison, Option 1 is the most economical. However, Option 3 bridge superstructure cost offsets the cost enough from Option 1 roadway profile cost. Option 3 would be a more suitable alternative in this case.

The table below summarizes the associated retaining wall area of each bridge alternatives and roadway profile raise by percentage differences of cost compared with Option 3 based only on estimated exposed retaining wall area.

Retaining Wall Area	% Difference Compared to Option 3
Option 1: 8709 SF	10% decrease
Option 2: 9292 SF	4% decrease
Option 3: 9637 SF	
Option 4A: 9438 SF	2% decrease
Option 4B: 9292 SF	4% decrease

Based on retaining wall cost estimated comparison, Option 1 is the most economical. However, Option 3 bridge superstructure cost offsets the cost enough from Option 1 retaining wall cost. Option 3 would be a more suitable alternative in this case.

The table below summarizes the overall alternatives by percentage differences of cost for each alternative compared with Option 3.

Overall Alternatives	% Difference Compared to Option 3
Option 1: Single-Span with six-5B34 & one-4B34 Beams	3% increase
Option 2: Single-Span with four-5XB40 Beams	12% increase
Option 3: Single-Span with four-TX46 Beams	
Option 4A: Single-Span with five-Plate Girder Beams	15% increase
Option 4B: Single-Span with five-W40x211 Beams	52% increase

This comparison provides a summary of the overall cost for each option. Based on the above overall alternative cost estimated comparison, Option 3 is the most economical and provides an overall cost-savings.

Recommendation

The proposed bridge typical section provides one (1) 12'-0" traveling lanes in each direction and a 4'-0" wide shoulder on each side with a 0.02 ft/ft crown, and a bridge railing type T411. The proposed roadway typical section provides one (1) paved 12'-0" traveling lanes in each direction and a 4'-0" wide shoulder on each side with a cross-slope of 0.02 ft/ft.

Given the information herein presented, it is recommended that Snider Lane Culvert be replaced with a 100'-0" single-span bridge on the proposed Horizontal Alignment with a 12.34 ft vertical profile raise, utilizing Option 3: four (4) TxDOT Prestressed Concrete I-Girders (TX46) with an 8.5" thick cast-in-place reinforced concrete deck and 4" thick prestressed concrete deck panels, supported on twelve (12) 18"x18" driven concrete piles foundation or eight (8) 36" diameter drilled shafts with a cast-in-place reinforced concrete abutment foundation. Retaining walls are recommended on all four corners of the bridge. It is recommended that construction be completed by implementing a complete roadway closure and detour.

APPENDIX A:
Alternative Cost Comparison Estimate / Calculations

Bridge Typical Section 1 - Alternative Cost Comparison

Snider Bridge Roadway Improvements from Susan Circle to Shady Lane

City of Lucas

Bridge Typical Section 1

Bridge Superstructure	Option 1	Option 2	Option 3	Option 4A	Option 4B
Beam Type	5B34/4B34	5XB40	TX46	Plate Girder	W40X211
BEAMS					
beam length	99.67 lf	99.67 lf	99.67 lf	99.67 lf	99.67 lf
no. beam	7	4	4	5	5
beam unit weight (steel option only)				196 lb/lf	211 lb/lf
total beam length	697.67 lf	398.67 lf	398.67 lf	97673.33 lb	105148.33 lb
unit cost ($/lf)	*$265.00*	*$475.00*	*$150.00*	*$2.00 /lb*	*$5.00 /lb*
total cost	$184,881.67	$189,366.67	$59,800.00	$195,346.67	$525,741.67
DECK					
deck/overlay width	34.67 lf	34.00 lf	34.00 lf	34.00 lf	34.00 lf
deck/overlay length	99.67 lf	99.67 lf	99.67 lf	99.67 lf	99.67 lf
deck thickness	5.0 in	8.0 in	8.5 in	8.5 in	8.5 in
total deck volume	53.32 cy	83.67 cy	88.90 cy	88.90 cy	88.90 cy
unit cost ($/cy)	*$1,550.00*	*$1,550.00*	*$1,550.00*	*$1,550.00*	*$1,550.00*
total cost	$82,645.40	$129,689.71	$137,795.32	$137,795.32	$137,795.32
BEARING PADS					
total no. bearing pads	14 ea	8 ea	8 ea	10 ea	10 ea
unit cost ($/each)	*$1,700.00*	*$1,700.00*	*$1,700.00*	*$1,700.00*	*$1,700.00*
total cost	$23,800.00	$13,600.00	$13,600.00	$17,000.00	$17,000.00
Overall bridge alternative cost *	**$291,327.07**	**$332,656.38**	**$211,195.32**	**$350,141.95**	**$680,536.99**
% difference Compared to Option 3	**38%**	**58%**	**0%**	**66%**	**222%**

Roadway Profile Fill	Option 1	Option 2	Option 3	Option 4A	Option 4B
roadway profile fill area (elevation view)	4860 sf	5171 sf	5355 sf	5249 sf	5171 sf
roadway profile fill width	34.33 ft	32 ft	32 ft	32 ft	32 ft
roadway profile fill volume	6180.25 cy	6128.55 cy	6346.19 cy	6220.63 cy	6128.55 cy
unit cost ($/cy)	*$25.00*	*$25.00*	*$25.00*	*$25.00*	*$25.00*
total cost	$154,506.36	$153,213.80	$158,654.81	$155,515.77	$153,213.80
Overall roadway alternative cost *	**$154,506.36**	**$153,213.80**	**$158,654.81**	**$155,515.77**	**$153,213.80**
% difference Compared to Option 3	**-3%**	**-3%**	**0%**	**-2%**	**-3%**

Retaining Wall	Option 1	Option 2	Option 3	Option 4A	Option 4B
retaining wall area	4354 sf	4646 sf	4818 sf	4719 sf	4646 sf
no. retaining walls	2	2	2	2	2
total retaining wall area	8709 sf	9292 sf	9637 sf	9438 sf	9292 sf
unit cost ($/sf)	*$50.00*	*$50.00*	*$50.00*	*$50.00*	*$50.00*
total cost	$435,440.00	$464,599.43	$481,830.00	$471,889.29	$464,599.43
Overall retaining wall cost *	**$435,440.00**	**$464,599.43**	**$481,830.00**	**$471,889.29**	**$464,599.43**
% difference Compared to Option 3	**-10%**	**-4%**	**0%**	**-2%**	**-4%**

	Bridge Typical Section 1				
	Option 1	Option 2	Option 3	Option 4A	Option 4B
OVERALL ALTERNATIVE COST **	**$881,273.43**	**$950,469.61**	**$851,680.13**	**$977,547.04**	**$1,298,350.21**
% difference Compared to Option 3	**3%**	**12%**	**0%**	**15%**	**52%**
			Recommendation		

* Does not reflect all components, and only selective variable components were used for aiding alternative selection.

** Overall Alternative Cost does not reflect fully estimated construction cost, and is only used for aiding alternative selection.

LAKES ENGINEERING BCC

A BCC Engineering Company

Date: July 10, 2020

Bridge Typical Section 2 - Alternative Cost Comparison

Snider Bridge Roadway Improvements from Susan Circle to Shady Lane

City of Lucas

Bridge Typical Section 2

Bridge Superstructure	Option 1	Option 2	Option 3	Option 4A	Option 4B
Beam Type	5B34/4B34	5XB40	TX46	Plate Girder	W44X262
BEAMS					
beam length	99.67 lf	99.67 lf	99.67 lf	99.67 lf	99.67 lf
no. beam	9	5	5	5	5
beam unit weight (steel option only)				245 lb/lf	262 lb/lf
total beam length	897.00 lf	498.33 lf	498.33 lf	122091.67 lb	130563.33 lb
unit cost ($/lf)	*$265.00*	*$475.00*	*$150.00*	*$2.00 /lb*	*$5.00 /lb*
total cost	$237,705.00	$236,708.33	$74,750.00	$244,183.33	$652,816.67
DECK					
deck/overlay width	42.89 lf	42.00 lf	42.00 lf	42.00 lf	42.00 lf
deck/overlay length	99.67 lf	99.67 lf	99.67 lf	99.67 lf	99.67 lf
deck thickness	5.0 in	8.0 in	8.5 in	8.5 in	8.5 in
total deck volume	65.96 cy	103.36 cy	109.82 cy	109.82 cy	109.82 cy
unit cost ($/cy)	*$1,550.00*	*$1,550.00*	*$1,550.00*	*$1,550.00*	*$1,550.00*
total cost	$102,238.92	$160,204.94	$170,217.75	$170,217.75	$170,217.75
BEARING PADS					
total no. bearing pads	18 ea	10 ea	10 ea	10 ea	10 ea
unit cost ($/each)	*$1,700.00*	*$1,700.00*	*$1,700.00*	*$1,700.00*	*$1,700.00*
total cost	$30,600.00	$17,000.00	$17,000.00	$17,000.00	$17,000.00
Overall bridge alternative cost *	**$370,543.92**	**$413,913.27**	**$261,967.75**	**$431,401.08**	**$840,034.41**
% difference Compared to Option 3	**41%**	**58%**	**0%**	**65%**	**221%**

Roadway Profile Fill	Option 1	Option 2	Option 3	Option 4A	Option 4B
roadway profile fill area (elevation view)	4860 sf	5171 sf	5355 sf	5249 sf	5171 sf
roadway profile fill width	42.56 ft	40 ft	40 ft	40 ft	40 ft
roadway profile fill volume	7661.57 cy	7660.69 cy	7932.74 cy	7775.79 cy	7660.69 cy
unit cost ($/cy)	*$25.00*	*$25.00*	*$25.00*	*$25.00*	*$25.00*
total cost	$191,539.13	$191,517.25	$198,318.52	$194,394.71	$191,517.25
Overall roadway alternative cost *	**$191,539.13**	**$191,517.25**	**$198,318.52**	**$194,394.71**	**$191,517.25**
% difference Compared to Option 3	**-3%**	**-3%**	**0%**	**-2%**	**-3%**

Retaining Wall	Option 1	Option 2	Option 3	Option 4A	Option 4B
retaining wall area	4354 sf	4646 sf	4818 sf	4719 sf	4646 sf
no. retaining walls	2	2	2	2	2
total retaining wall area	8709 sf	9292 sf	9637 sf	9438 sf	9292 sf
unit cost ($/sf)	*$50.00*	*$50.00*	*$50.00*	*$50.00*	*$50.00*
total cost	$435,440.00	$464,599.43	$481,830.00	$471,889.29	$464,599.43
Overall retaining wall cost *	**$435,440.00**	**$464,599.43**	**$481,830.00**	**$471,889.29**	**$464,599.43**
% difference Compared to Option 3	**-10%**	**-4%**	**0%**	**-2%**	**-4%**

	Bridge Typical Section 2				
	Option 1	Option 2	Option 3	Option 4A	Option 4B
OVERALL ALTERNATIVE COST **	**$997,523.05**	**$1,070,029.95**	**$942,116.27**	**$1,097,685.07**	**$1,496,151.09**
% difference Compared to Option 3	**6%**	**14%**	**0%**	**17%**	**59%**
			Recommendation		

* Does not reflect all components, and only selective variable components were used for aiding alternative selection.

** Overall Alternative Cost does not reflect fully estimated construction cost, and is only used for aiding alternative selection.

LAKES ENGINEERING bcc
A BCC Engineering Company

Date: July 10, 2020

Bridge Typical Section 1 VS Bridge Typical Section 2
Alternative Cost Comparison
Snider Bridge Roadway Improvements from Susan Circle to Shady Lane
City of Lucas

	Bridge Typical Section 1	Bridge Typical Section 2
Bridge Superstructure	**Option 3**	**Option 3**
Beam Type	TX46	TX46
BEAMS		
beam length	99.67 lf	99.67 lf
no. beam	4	5
beam unit weight (steel option only)		
total beam length	398.67 lf	498.33 lf
unit cost ($/lf)	*$150.00*	*$150.00*
total cost	$59,800.00	$74,750.00
DECK		
deck/overlay width	34.00 lf	42.00 lf
deck/overlay length	99.67 lf	99.67 lf
deck thickness	8.5 in	8.5 in
total deck volume	88.90 sy	109.82 cy
unit cost ($/cy)	*$1,550.00 / sy*	*$1,550.00*
total cost	$137,795.32	$170,217.75
BEARING PADS		
total no. bearing pads	8 ea	10 ea
unit cost ($/each)	*$1,700.00*	*$1,700.00*
total cost	$13,600.00	$17,000.00
Overall bridge alternative cost *	**$211,195.32**	**$261,967.75**
% difference Compared to Horizontal Alignment 2 - Option 2	**0%**	**24%**
Roadway Profile Fill	**Option 3**	**Option 3**
roadway profile fill area (elevation view)	5355 sf	5355 sf
roadway profile fill width	32 ft	40 ft
roadway profile fill volume	6346.19 cy	7932.74 cy
unit cost ($/cy)	*$25.00*	*$25.00*
total cost	$158,654.81	$198,318.52
Overall roadway alternative cost *	**$158,654.81**	**$198,318.52**
% difference Compared to Horizontal Alignment 2 - Option 2	**0%**	**25%**
Retaining Wall	**Option 3**	**Option 3**
retaining wall area	4818 sf	4818 sf
no. retaining walls	2	2
total retaining wall area	9637 sf	9637 sf
unit cost ($/sf)	*$50.00*	*$50.00*
total cost	$481,830.00	$481,830.00
Overall retaining wall cost *	**$481,830.00**	**$481,830.00**
% difference Compared to Horizontal Alignment 2 - Option 2	**0%**	**0%**

	Bridge Typical Section 1 Option 3	Bridge Typical Section 2 Option 3
OVERALL ALTERNATIVE COST **	**$851,680.13**	**$942,116.27**
% difference Compared to Horizontal Alignment 2 - Option 2	**0%**	**11%**
	Recommendation	

* Does not reflect all components, and only selective variable components were used for aiding alternative selection.
** Overall Alternative Cost does not reflect fully estimated construction cost, and is only used for aiding alternative selection.

LAKES ENGINEERING BCC
A BCC Engineering Company

Date: July 10, 2020

Average Low Bid Unit Prices Based on **Apr-2020**

Link

ITEM CODE	ITEM DESCRIPTION	ITEM UNIT	STATEWIDE 3M COUNT	STATEWIDE 3M QUANTITY	STATEWIDE 3M AVG	STATEWIDE 12M COUNT	STATEWIDE 12M QUANTITY	STATEWIDE 12M AVG	USE
01326001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	3	984.00	$21.80	24	52,683.00	$16.08	$25.00
04206014	CL C CONC (ABUT)(HPC)	CY	4	489.37	$1,852.55	19	2,384.67	$1,540.16	$1,550.00
04236001	RETAINING WALL (MSE)	SF	2	50,652.00	$65.56	30	1,481,765.79	$49.61	$50.00
04236008	RETAINING WALL (CAST - IN - PLACE)	SF	2	723.00	$51.67	16	40,607.00	$94.99	$95.00
04256005	PRESTR CONC BOX BEAM (4B34)	LF	2	656.00	$250.37	5	17,193.50	$195.13	$265.00
04256006	PRESTR CONC BOX BEAM (5B34)	LF	2	328.00	$250.37	5	18,850.00	$192.55	$265.00
04256024	PRESTR CONC BOX BEAM (5XB34)	LF				1	1,074.00	$371.50	$475.00
04256038	PRESTR CONC GIRDER (TX46)	LF	1	8,145.00	$150.00	23	167,490.40	$124.46	$150.00
04346024	ELASTOMERIC BEARING (E5)	EA	1	8.00	$1,650.00	3	15.00	$1,474.01	$1,700.00
04426001	STR STEEL (PLATE GIRDER)	LB	2	3,241,667.00	$1.57	9	19,872,961.00	$1.57	$2.00
04426004	STR STEEL (ROLLED BEAM)	LB				1	54,042.00	$10.00	$5.00

Notes:

Item "EMBANKMENT (FINAL)(ORD COMP)(TY A)" was used as "fill" for Roadway profile raise, similar to recently reconstructed project south of project limits.

Item "CL C CONC (ABUT)(HPC)" was used as "deck" - Class S, similar to a nearby project on Blondy Jhune.

Item "PRESTR CONC BOX BEAM (5XB34)" was used as "5XB40" with a mark up.

Item "ELASTOMERIC BEARING (E5)" was "assumed" use for superstructure types.

APPENDIX B:
Existing Culvert Inspection Report

BRIDGE SUMMARY SHEET

City: Lucas County: Collin Name: _____ Structure #: _____ Route: Snider Lane

Description: 3-Barrel Concrete Box Culvert

Feature Crossed: White Rock Creek Inspector's Signature: _____ Date: 7/11/19

Company Name and Company Number: Lakes Engineering, Inc. F-15243

Selected Component Description and Rating:

	Inspection Rating (1085)	Inventory Rating H	Inventory Rating HS	Operating Rating H	Operating Rating HS
Concrete Multiple Box Culvert	6	-	20.0	-	27.0

Comments and/or Upgrade Recommendations (if applicable):

Backfill and protect undermined areas up and downstream.

MBGF (no blockouts) and terminals (turndowns) at approaches do not meet current standards.

Functionally obsolete. Sufficiency Rating = 93

Load Posting Limits for Present Condition (if applicable):

Inventory

_____ lbs Gross

_____ lbs Tandem Axle

_____ lbs Axle or Tandem

_____ Sign Code

Operating

_____ lbs Gross

_____ lbs Tandem Axle

_____ lbs Axle or Tandem

_____ Sign Code

1	2	3	4	5	6
	WEIGHT LIMIIT: AXLE OR TANDEM LBS	WEIGHT LIMIIT: TANDEM AXLE LBS	WEIGHT LIMIITS: GROSS LBS / AXLE OR TANDEM LBS	WEIGHT LIMIITS: GROSS LBS / TANDEM AXLE LBS	LOAD ZONED BRIDGE
OTHER	R12-2bT	R12-2cT	R12-4Tb	R12-4Tc	W12-5T

Posting Recommendation: _____

Previous Load Posting Recommendations:

_____	R12-2bT	X None
_____	R12-2cT	_____ lbs Gross
_____	R12-4Tb	_____ lbs Tandem Axle
_____	R12-4Tc	_____ lbs Axle or Tandem

Observed Load Posting at Bridge:

_____	R12-2bT	X None
_____	R12-2cT	_____ lbs Gross
_____	R12-4Tb	_____ lbs Tandem Axle
_____	R12-4Tc	_____ lbs Axle or Tandem
_____	Other (desc):	_____

Material Needed

_____ - R12-2bT

_____ - R12-2cT

_____ - R12-4Tb

_____ - R12-4Tc

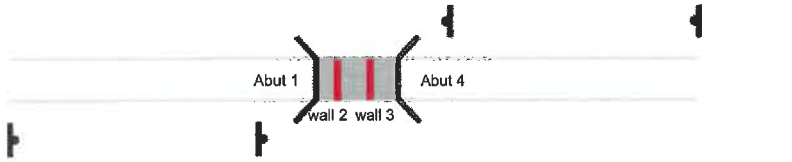
_____ - W12-5

_____ - Posts

_____ - Hardware Sets

_____ - Decals





	Advanced Warning (optional)		Bridge Approach	Bridge Approach	Advanced Warning (optional)	
Sign Code						
Condition Code						
Maintenance Need						

A. Visible & Legible
B. Obscured by Vegetation
C. Sign Needs Cleaning
D. Improper Position
E. Damaged Beyond Repair
F. Sign Down
G. Sign Missing
H. Sign & Post Missing
J. Clear Vegetation
K. Clean Sign
L. Reposition Sign
M. Reposition Sign & Post
N. None
P. Replace Sign
S. Replace Sign & Post

DO NOT DISCLOSE - INFORMATION CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT AND 23 USC SECTION 409, SAFETY SENSITIVE INFORMATION

BRIDGE INSPECTION RECORD

City: Lucas County: Collin Name: Snider Lane Bridge Structure #: _____ Route: Snider Lane

Description: 3-Barrel Concrete Box Culvert

Feature Crossed: White Rock Creek Inspector's Signature: _____ Date: 7/11/2019

Company Name and Company Number: Lakes Engineering, Inc. F-15243 Inspector: Christopher Meszler, P.E.

Ratings Defined:

0 = Failed condition - bridge closed and beyond repair
1 = Failing condition - bridge closed but repairable
2 = Critical condition - bridge should be closed until repaired
3 = Serious condition - deterioration seriously affects structural capacity
4 = Poor condition - deterioration significantly affects structural capacity
5 = Fair condition - minor deterioration of structural elements (extensive)
6 = Satisfactory condition - minor deterioration of structural elements (limited)
7 = Good condition - some minor problems
8 = Very good condition - no problems noted
9 = Excellent condition
- = Not applicable

Enter a rating for each element of each component. Component ratings should equal the lowest rating of any element of the component, except for Deck. The Deck component is independent of its' associated element ratings. Fully supportive comments are to be made hereon or on attachments for all ratings of 7 or below.

General Comment:

Elements are numbered and measured west to east and south to north. Functionally obsolete due to waterway adequacy rating (3)

DECK (Item 58)

Minimum	Description	Rating	Comments
1	Deck - Rating	N	Previously Noted:
6	Wearing Surface	7	Moderate impact damage to north railing: two posts are
6	Joints, Expansion, Open	-	missing & flex beam is dented. - REPAIRED (Guardrail
6	Joints, Expansion, Sealed	-	beam still dented)
6	Joints, Other	7	
6	Drainage System	-	Photo 2: Approach slab 1 southwest corner partially asphalt
6	Curbs, Sidewalks & Parapets	-	overlaid
6	Median Barrier	-	
6	Railings	6	Photo 4: Diagonal crack at southwest portion of approach
7	Railing Protective Coating	-	slab 1
7	Delineation (curve Markers)	-	
	Other		See additional comments

SUPERSTRUCTURE (Item 59)

Minimum	Description	Rating	Comments
0	Main Members - Steel		
0	Main Members - Concrete		
0	Main Members - Timber		
0	Main Members - Connections		
1	Floor System Members		
1	Floor System Connections		
5	Secondary Members		
5	Secondary Members Connections		
6	Expansion Bearings		
6	Fixed Bearings		
6	Steel Protective Coating		
	Other		
	Component Rating	N	

DO NOT DISCLOSE - INFORMATION CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT
AND 23 USC SECTION 409, SAFETY SENSITIVE INFORMATION

BRIDGE INSPECTION RECORD

City: Lucas County: Collin Name: Snider Lane Bridge Structure #: _____ Route: Snider Lane

SUBSTRUCTURE (Item 60)

Minimum	Description	Rating	Comments
0	Abutment Caps		
0	Above Ground		
0	Below Ground or Foundation		
0	Backwalls and Wingwalls		
0	Intermediate Supports		
	Caps - Concrete		
	Caps - Steel		
	Caps - Timber		
	Above Ground - Concrete		
	Above Ground - Steel		
	Above Ground - Timber		
	Above Ground - Masonry		
	Below Ground or Foundation		
5	Collision Protection System		
6	Steel Protective Coating		
	Component Rating		

CHANNEL (Item 61)

Minimum	Description	Rating	Comments
0	Channel Banks		Previously Noted: (1) Minor bank erosion with exposed tree roots - NO CHG. (2) Moderate scour & channel degradations have exposed up to 3.5' of bottom slab toewall at upstream end & 3' of apron slab toewall (with slight undermining) at downstream end. Moderate amount of drift caught on culvert entrance - INCR. See additional comments
0	Channel Bed		
5	Rip Rap, Toe Walls and Aprons		
5	Dikes		
5	Jetties		
	Other		
	Component Rating		

CULVERTS (Item 62)

Minimum	Description	Rating	Comments
0	Top Slabs	7	Previously Noted: (1) Minor spalls on north end of interior walls - NO CHG. (2) Minor spalls on north headwall at post locations. Minor Vertical cracks with efflor. in headwalls - NO CHG. Photo 16: Abutment 1 75% delaminated on southwest face See additional comments
0	Bottom Slab or Footing	7	
0	Abutments & Intermediate Supports	6	
5	Headwalls and Wingwalls	6	
	Other		
	Component Rating	6	

DO NOT DISCLOSE - INFORMATION CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT AND 23 USC SECTION 409, SAFETY SENSITIVE INFORMATION

BRIDGE INSPECTION RECORD

City: Lucas County: Collin Name: Snider Lane Bridge Structure #: _____ Route: Snider Lane

APPROACHES (Item 65)

Minimum	Description	Rating	Comments
0	Embankments	6	Previously Noted:
4	Embankment Retaining Walls	-	(2) Asphalt surface is worn & cracked at approaches - NO CHG.
5	Slope Protection	5	
5	Roadway	6	(3) Minor impact damage to approach guardfence - DECR. (Repaired)
6	Relief Joints	-	
6	Drainage	-	
6	Guardfence	6	Northwest corner embankment moderate erosion
7	Delineation	-	
7	Sight Distance	7	See additional comments
	Other		
	Component Rating	5	

MISCELLANEOUS

Minimum	Description	Rating	Comments
7	Signs		
7	Illumination		
7	Warning Devices		
7	Utility Lines		
	Other		

TRAFFIC SAFETY (Item 36)

Description		Rating	Comments
	Bridge Railing (036.1)	0	Previously Noted:
	Transitions (036.2)	0	(1) No blockouts. No Turndowns - NO CHG.
	Approach Guardrail (036.3)	1	
	Approach Guardrail Ends (036.4)	0	General condition: substandard guardrail end treatments (both approaches)

APPRAISAL RATINGS

Description		Rating	Comments
	Waterway Adequacy (071)	3	Evidence of flooding outside of bridge limits
	Approach Roadway Alignment (072)	5	Frequent overtopping with significant traffic delays. Minor collector

DO NOT DISCLOSE - INFORMATION CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT AND 23 USC SECTION 409, SAFETY SENSITIVE INFORMATION

BRIDGE INSPECTION RECORD
ADDITIONAL COMMENTS

City: Lucas County: Collin Name: Snider Lane Bridge Structure #: _____ Route: Snider Lane

Description: 3-Barrel Concrete Box Culvert

Feature Crossed: White Rock Creek Inspector's Signature: _____ Date: 7/11/2019

Company Name and Company Number: Lakes Engineering, Inc. F-15243 Inspector: Christopher Meszler, P.E.

DECK (Item 58)

Photo Num.	Comments
5	6" settlement of approach slab 1 in southwest corner
-	Hairline longitudinal & lateral cracks northwest portion of approach 1
6	Approach slab 2 southeast corner 1/8" diagonal crack
7	Approach slab 2 2-1/2" settlement south east corner
8	Span 1 lateral crack along deck full width of roadway; light scaring (likely from heavy equipment)
9	Span 2 south side light scaring (likely from heavy equipment)
-	27" guardrail height (substandard)
-	Loose nuts on 10% of railing post anchors

CHANNEL (Item 61)

Photo Num.	Comments
10	Abutment 4 southeast corner concrete riprap settled 9"
11	Abutment 4 southeast corner moderate erosion and toe exposed; chipping & undermining of concrete riprap
12	Exposed bottom slab toe with 18" scour and undermining at south outfall
13	5" scour at bottom slab toe, northeast corner
14-15	Moderate bank erosion upstream and downstream

CULVERTS (Item 62)

Photo Num.	Comments
17	Span 1 south headwall 2" x 13" x 1" spall at second railing post
-	South headwall 6" x 2" x 1" spall at post 3
18	Span 2 7" x 24" x 3" spall at the second railing post of south headwall
19	Span 2 15" X 3" spall at both railing posts southside (Typ.)
20	Span 3 full width hairline crack north headwall
21	Scaring and gouging from debris at northwest corner of abutment 1 (Typ.)
22	Abutment 1 0.010" crack full height at 10' with efflorescence
23	Wall 2 0.025" crack full height and depth through wall at 15'
-	Wall 2 0.016" crack full height and depth through wall at 21'
-	Wall 2 0.016" crack full height and depth through wall at 27'; associated 6' x .025" horizontal cracking at top of wall with efflorescence
24	Wall 3 0.025" crack full height and depth through wall at 12'
25	Wall 3 20" x 7" x 1" spall north side (varies) (likely from debris impact)
-	Wall 3 0.020" crack full height and depth through wall at 18'
-	Wall 3 0.016" crack full height and depth through wall at 24'
26	Abutment 4 0.020" full diagonal crack center of bridge
-	Abutment 4 0.016' crack full height at 28'

Approach

Photo Num.	Comments
27	Abutment 1 Slope protection at southside (southwest corner) settled 8"
28	No slope protection at abutment 1 (northwest corner); 1/8" full height crack and spall
29	No slope protection at abutment 4 (northeast corner); Gouging from debris noted (Typ.)

DO NOT DISCLOSE - INFORMATION CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT
AND 23 USC SECTION 409, SAFETY SENSITIVE INFORMATION

01: Elevation – North View



DO NOT DISCLOSE – INFORMATION CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT
AND 23 USC SECTION 409, SAFETY SENSITIVE INFORMATION

02: Approach – Eastbound



DO NOT DISCLOSE – INFORMATION CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT
AND 23 USC SECTION 409, SAFETY SENSITIVE INFORMATION

03: Approach – Westbound



DO NOT DISCLOSE – INFORMATION CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT
AND 23 USC SECTION 409, SAFETY SENSITIVE INFORMATION

04: Approach Slab 1 – Eastbound



Diagonal crack at southwest portion of approach

05: Approach Slab 1 – Southwest Corner



6" settlement of approach slab in southwest corner

06: Approach Slab 2 – Southeast Corner



1/8" diagonal crack

07: Approach Slab 2 – Southeast Corner



2-1/2" settlement of approach slab 2

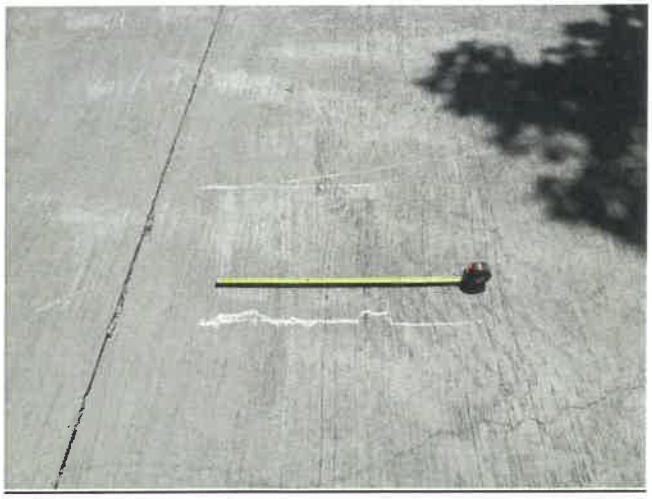
DO NOT DISCLOSE – INFORMATION CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT AND 23 USC SECTION 409, SAFETY SENSITIVE INFORMATION

08: Deck – Span 1



Lateral crack full width of roadway

09: Deck – South Side Span 2



Light scaring (likely from heavy equipment)

10: Abutment 4 – Southeast corner



Concrete riprap settled 9"

11: Abutment 4 – Southeast corner



Toe exposed; chipping and undermining of riprap

DO NOT DISCLOSE – INFORMATION CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT AND 23 USC SECTION 409, SAFETY SENSITIVE INFORMATION

12: Bottom Slab Toe – South Channel



Exposed bottom slab toe with 18" scour and undermining at south outfall

13: Bottom Slab Toe – North Channel



5" scour at bottom slab toe, northeast corner

14: North Channel – Looking North



Moderate bank erosion looking upstream

15: South Channel – Looking South



Moderate bank erosion looking downstream

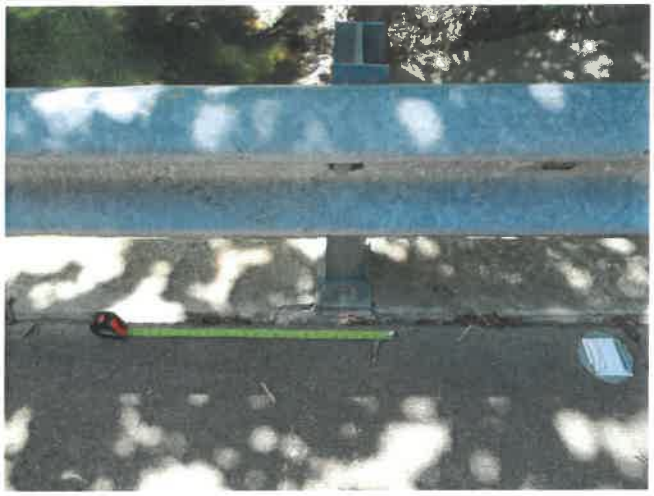
DO NOT DISCLOSE – INFORMATION CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT AND 23 USC SECTION 409, SAFETY SENSITIVE INFORMATION

16: Abutment 1 – Southwest



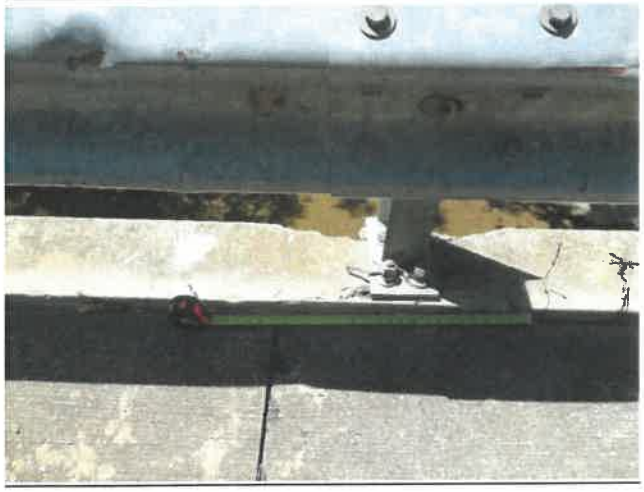
75% delaminated on southwest face abutment 1

17: Span 1 – South Headwall



2" x 13" x 1" spall at second railing post of span 1

18: Span 2 – South Headwall



7" x 24" x 3" spall at the second post of span 2

19: Span 2 – South Headwall



15" X 3" spall at both posts on span 2 (Typ.)

20: Span 3 – North Headwall



Full width hairline crack at the beginning of span 3

21: Abutment 1



Scaring and gouging from debris at northwest corner (Typ.)

22: Abutment 1



0.010" crack full height at 10' with efflorescence

23: Wall 2



0.025" crack full height and depth through wall at 15'

24: Wall 3



0.025" crack full height and depth through wall at 12'

25: Wall 3 – North Side



20" x 7" x 1" spall (varies) (likely from debris impact)

26: Abutment 4



0.020" full diagonal crack center of bridge

27: Abutment 1 – Southwest



Slope protection appears to have settled 8" at southwest corner

DO NOT DISCLOSE – INFORMATION CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT AND 23 USC SECTION 409, SAFETY SENSITIVE INFORMATION

28: Abutment 1 – Northwest corner



No slope protection; 1/8" full height crack and spall; moderate bank erosion

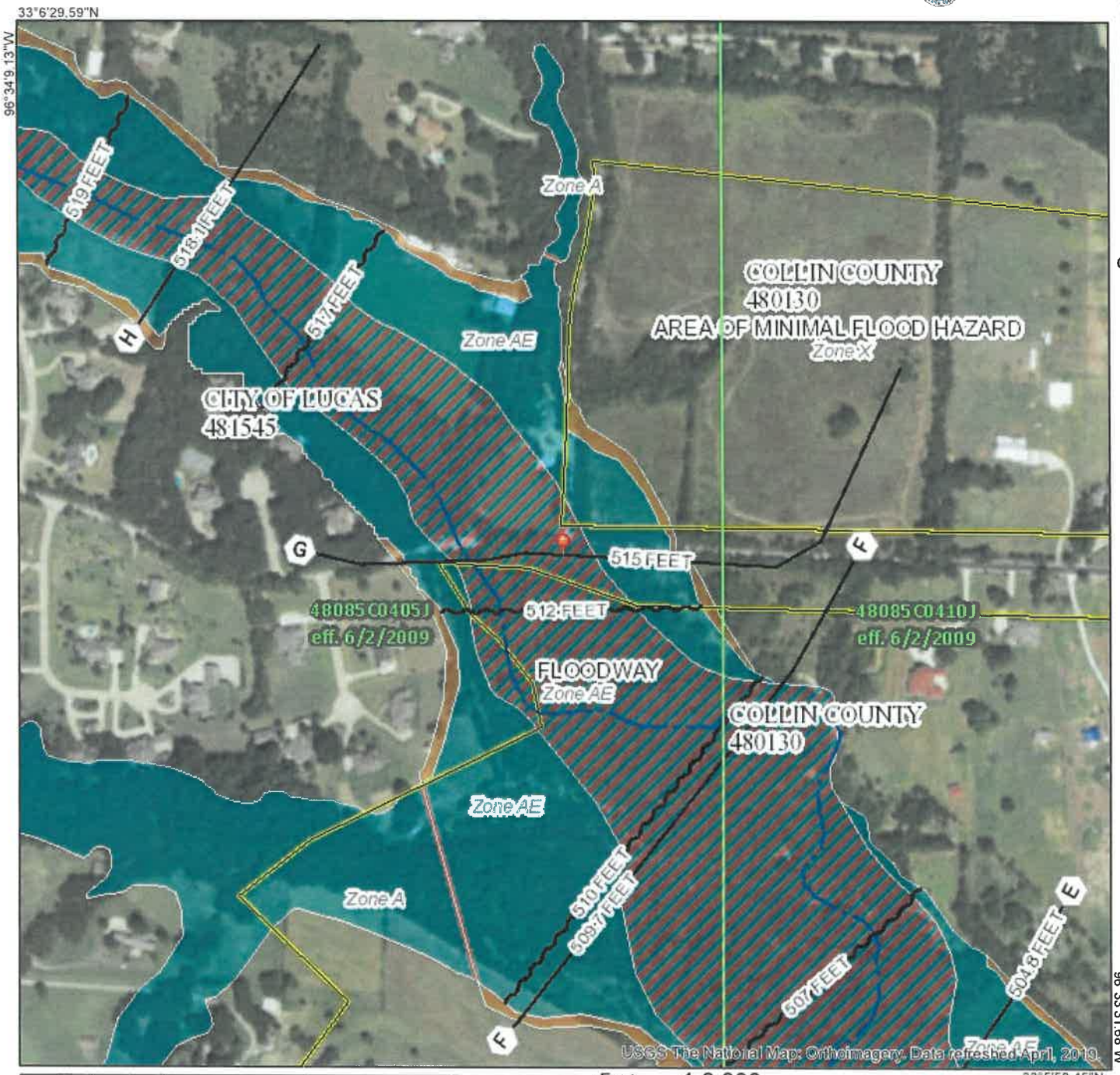
29: Abutment 4 – Northeast corner



No slope protection; scoring and gouging from debris (Typ.)

APPENDIX C:
References

National Flood Hazard Layer FIRMette



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN — Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 — Cross Sections with 1% Annual Chance
- 17.5 — Water Surface Elevation
- Coastal Transect
- 513 — Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 1/20/2020 at 10:41:29 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

STRUCTURE	DESIGNED BEAMS (STRAIGHT STRANDS)																				OPTIONAL DESIGN				
	SPAN NO.	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS							DEBONDED STRAND PATTERN PER ROW								CONCRETE		DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I)	LIVE LOAD DISTRIBUTION FACTOR ②	
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)	TOT NO. DEB	DIST FROM BOTTOM (in)	NO. OF STRANDS TOTAL	NO. OF STRANDS DE-BONDED	NUMBER OF STRANDS DEBONDED TO (ft from end) 3	6	9	12	15	RELEASE STRGTH ① f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	fct(ksi)	fct(ksi)	(ft-kips)	Moment	Shear

① Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

② Portion of full HL93.

③ Bottom corner chamfer required for 4B40 and 5B40 boxes when beam lengths are greater than 100 ft.

DESIGN NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

Prestress losses for the designed beams have been calculated for a relative humidity of percent. Optional designs must likewise conform.

FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel bars.

Use low relaxation strands, each pretensioned to 75 percent of fpu.

When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.

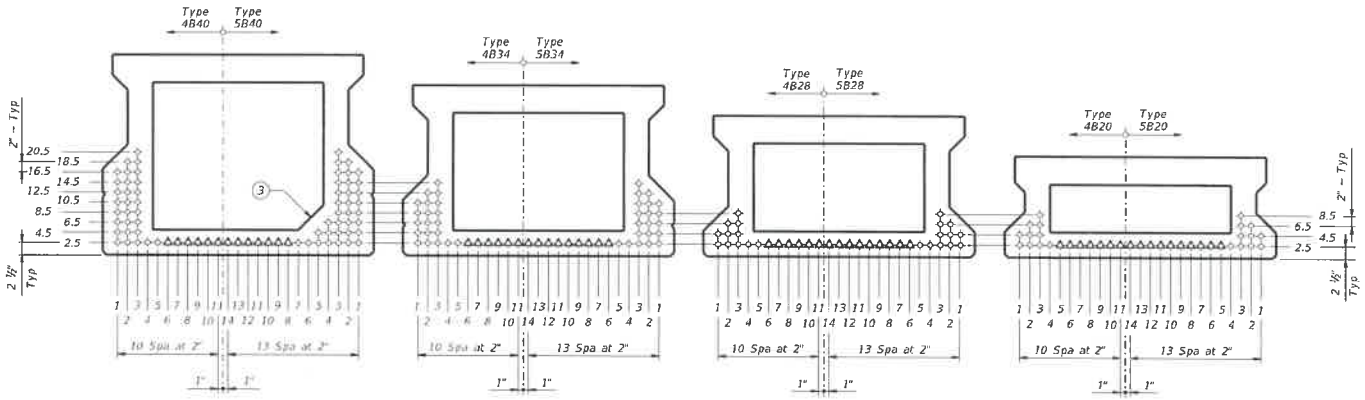
Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard stand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc. Place strands within a row as follows:

1) Locate a strand in each "1" position.
2) Place strand symmetrically about vertical centerline of box.
3) Space strands as equally as possible across the entire width.

Strand debonding must comply with Item 424.4.2.2.2.4.

Do not debond strands in position "1". Distribute debonded strands equally about the vertical centerline. Decrease debonded lengths working inward, with debonding staggered in each row.

Full-length debonded strands are only permitted in positions marked △.



TxDOT B40 BOX BEAMS

TxDOT B34 BOX BEAMS

TxDOT B28 BOX BEAMS

TxDOT B20 BOX BEAMS

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE BOX BEAM DESIGNS (NON-STANDARD SPANS)

BBND

FILE: bbstds07.dgn	DN: TxDOT	CK: TxDOT	DW: SFS	CK: SDB
©TxDOT December 2006		JMB		HIGHWAY
REVISIONS				
04-11: Fix and LLDF 01-19: NMDS.	DIST			SHEET NO.

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

STRUCTURE	SPAN LENGTH (ft)	BEAM NO.	BEAM TYPE	DESIGNED BEAMS (STRAIGHT STRANDS) — PRESTRESSING STRANDS: NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" @ (in)	"e" END (in)	TOT NO. DEB	DEBONDED STRAND PATTERN PER ROW: DIST FROM BOTTOM (in)	NO. OF STRANDS: TOTAL	DE-BONDED	NUMBER OF STRANDS DEBONDED TO (ft from end): 3	6	9	12	15	CONCRETE: RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	OPTIONAL DESIGN: DESIGN LOAD COMP STRESS (TOP fl) (SERVICE I) fct(ksi)	DESIGN LOAD TENSILE STRESS (BOTT fl) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (ft-kips)	LIVE LOAD DISTRIBUTION FACTOR (2): Moment	Shear
TYPE 5XB20 X-BEAMS 32' Roadway 8" Slab	40	ALL	5XB20		12	0.6	270	7.03	7.03	0	2.50	12	0	0	0	0	0	0	4.000	5.000	1.231	-1.621	1255	0.688	0.903
	45	ALL	5XB20		14	0.6	270	7.03	7.03	0	2.50	14	0	0	0	0	0	0	4.000	5.000	1.557	-1.997	1498	0.667	0.897
	50	ALL	5XB20		20	0.6	270	7.03	7.03	0	2.50	20	0	0	0	0	0	0	4.000	5.000	1.926	-2.432	1787	0.649	0.891
	55	ALL	5XB20		24	0.6	270	7.03	7.03	4	2.50	24	4	2	2	0	0	0	4.000	5.000	2.333	-2.901	2090	0.633	0.887
	60	ALL	5XB20		30	0.6	270	6.90	6.87	6	2.50	28	6	2	2	2	0	0	4.400	5.000	2.777	-3.406	2407	0.619	0.883
	65	ALL	5XB20		36	0.6	270	6.59	6.46	8	2.50	28	8	2	2	2	2	0	4.900	5.200	3.259	-3.946	2739	0.606	0.879
TYPE 5XB28 X-BEAMS 32' Roadway 8" Slab	40	ALL	5XB28		12	0.6	270	10.63	10.63	0	2.50	12	0	0	0	0	0	0	4.000	5.000	0.800	-1.023	1748	0.719	0.948
	45	ALL	5XB28		12	0.6	270	10.63	10.63	0	2.50	12	0	0	0	0	0	0	4.000	5.000	1.006	-1.255	1793	0.697	0.942
	50	ALL	5XB28		12	0.6	270	10.63	10.63	0	2.50	12	0	0	0	0	0	0	4.000	5.000	1.240	-1.523	1870	0.678	0.937
	55	ALL	5XB28		14	0.6	270	10.63	10.63	0	2.50	14	0	0	0	0	0	0	4.000	5.000	1.497	-1.812	2187	0.661	0.933
	60	ALL	5XB28		18	0.6	270	10.63	10.63	0	2.50	18	0	0	0	0	0	0	4.000	5.000	1.777	-2.124	2521	0.647	0.929
	65	ALL	5XB28		22	0.6	270	10.63	10.63	0	2.50	22	0	0	0	0	0	0	4.000	5.000	2.079	-2.454	2867	0.633	0.926
	70	ALL	5XB28		26	0.6	270	10.63	10.63	2	2.50	26	2	2	0	0	0	0	4.000	5.000	2.404	-2.807	3231	0.621	0.923
	75	ALL	5XB28		32	0.6	270	10.38	10.32	6	2.50	26	6	0	2	2	2	0	4.000	5.000	2.753	-3.182	3614	0.611	0.921
	80	ALL	5XB28		36	0.6	270	10.19	10.10	6	2.50	28	6	2	2	0	2	0	4.600	5.000	3.124	-3.578	4011	0.601	0.919
TYPE 5XB34 X-BEAMS 32' Roadway 8" Slab	40	ALL	5XB34		10	0.6	270	13.11	13.11	0	2.50	10	0	0	0	0	0	0	4.000	5.000	0.657	-0.777	1818	0.736	0.976
	45	ALL	5XB34		12	0.6	270	13.11	13.11	0	2.50	12	0	0	0	0	0	0	4.000	5.000	0.824	-0.953	2172	0.714	0.971
	50	ALL	5XB34		14	0.6	270	13.11	13.11	0	2.50	14	0	0	0	0	0	0	4.000	5.000	1.014	-1.158	2487	0.695	0.966
	55	ALL	5XB34		14	0.6	270	13.11	13.11	0	2.50	14	0	0	0	0	0	0	4.000	5.000	1.222	-1.378	2432	0.678	0.962
	60	ALL	5XB34		16	0.6	270	13.11	13.11	0	2.50	16	0	0	0	0	0	0	4.000	5.000	1.449	-1.614	2632	0.663	0.958
	65	ALL	5XB34		18	0.6	270	13.11	13.11	0	2.50	18	0	0	0	0	0	0	4.000	5.000	1.693	-1.866	2997	0.649	0.956
	70	ALL	5XB34		22	0.6	270	13.11	13.11	0	2.50	22	0	0	0	0	0	0	4.000	5.000	1.955	-2.134	3381	0.637	0.953
	75	ALL	5XB34		24	0.6	270	13.11	13.11	0	2.50	24	0	0	0	0	0	0	4.000	5.000	2.236	-2.419	3781	0.626	0.951
	80	ALL	5XB34		28	0.6	270	13.11	13.11	4	2.50	28	4	2	2	0	0	0	4.000	5.000	2.535	-2.718	4197	0.615	0.949
	85	ALL	5XB34		34	0.6	270	12.75	12.65	8	2.50	28	8	4	2	2	0	0	4.000	5.000	2.853	-3.036	4634	0.606	0.947
	90	ALL	5XB34		40	0.6	270	12.51	12.31	10	2.50	28	10	2	2	2	2	0	4.200	5.000	3.188	-3.369	5086	0.597	0.946
	95	ALL	5XB34		44	0.6	270	12.38	12.17	10	2.50	28	10	2	2	2	2	2	4.600	5.200	3.542	-3.719	5558	0.589	0.945
TYPE 5XB40 X-BEAMS 32' Roadway 8" Slab	40	ALL	5XB40		10	0.6	270	15.70	15.70	0	2.50	10	0	0	0	0	0	0	4.000	5.000	0.560	-0.629	1886	0.752	1.001
	45	ALL	5XB40		12	0.6	270	15.70	15.70	0	2.50	12	0	0	0	0	0	0	4.000	5.000	0.701	-0.772	2255	0.729	0.996
	50	ALL	5XB40		14	0.6	270	15.70	15.70	0	2.50	14	0	0	0	0	0	0	4.000	5.000	0.861	-0.938	2694	0.709	0.991
	55	ALL	5XB40		14	0.6	270	15.70	15.70	0	2.50	14	0	0	0	0	0	0	4.000	5.000	1.037	-1.117	3007	0.692	0.988
	60	ALL	5XB40		14	0.6	270	15.70	15.70	0	2.50	14	0	0	0	0	0	0	4.000	5.000	1.227	-1.308	2947	0.676	0.984
	65	ALL	5XB40		16	0.6	270	15.70	15.70	0	2.50	16	0	0	0	0	0	0	4.000	5.000	1.433	-1.513	3137	0.662	0.982
	70	ALL	5XB40		18	0.6	270	15.70	15.70	0	2.50	18	0	0	0	0	0	0	4.000	5.000	1.654	-1.731	3521	0.650	0.980
	75	ALL	5XB40		20	0.6	270	15.70	15.70	0	2.50	20	0	0	0	0	0	0	4.000	5.000	1.890	-1.962	3939	0.638	0.978
	80	ALL	5XB40		24	0.6	270	15.70	15.70	2	2.50	24	2	2	0	0	0	0	4.000	5.000	2.142	-2.207	4378	0.628	0.976
	85	ALL	5XB40		28	0.6	270	15.70	15.70	4	2.50	28	4	2	2	0	0	0	4.000	5.000	2.408	-2.464	4834	0.618	0.975
	90	ALL	5XB40		32	0.6	270	15.45	15.40	6	2.50	28	6	2	4	0	0	0	4.000	5.000	2.690	-2.735	5310	0.609	0.974
	95	ALL	5XB40		36	0.6	270	15.26	15.09	10	2.50	28	10	4	6	0	0	0	4.000	5.000	2.988	-3.020	5806	0.601	0.973
	100	ALL	5XB40		42	0.6	270	15.04	14.77	12	2.50	28	12	2	4	2	2	2	4.000	5.000	3.300	-3.318	6319	0.593	0.972
	105	ALL	5XB40		48	0.6	270	14.87	14.58	16	2.50	28	14	2	6	2	0	4	4.500	5.100	3.628	-3.630	6854	0.586	0.971
											4.50	20	2	2	0	0	0	0							

DESIGN NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

Beam designs are applicable for 8" concrete slabs without overlay and 0 through 30 degree skews.

FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel bars.

Use low relaxation strands, each pretensioned to 75 percent of fpu.

When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.

Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard stand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc. Place strands within a row as follows:

1) Locate a strand in each "1" position.
2) Place strand symmetrically about vertical centerline of box.
3) Space strands as equally as possible across the entire width.

Strand debonding must comply with Item 424.4.2.2.2.4.

Do not debond strands in position "1". Distribute debonded strands equally about the vertical centerline. Decrease debonded lengths working inward, with debonding staggered in each row.

Full-length debonded strands are only permitted in positions marked △.

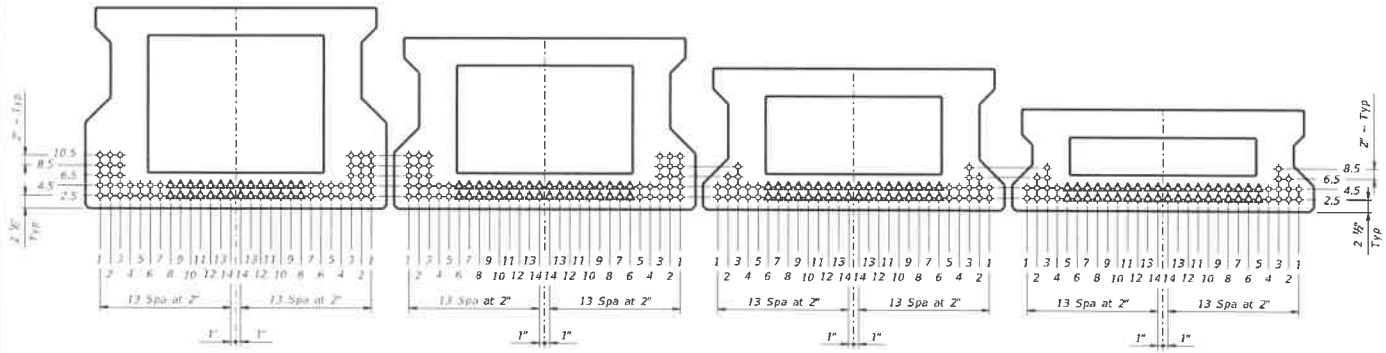
(1) Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

(2) Portion of full HL93.



TxDOT 5XB40 BEAMS | TxDOT 5XB34 BEAMS | TxDOT 5XB28 BEAMS | TxDOT 5XB20 BEAMS

HL93 LOADING

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE X-BEAM STANDARD DESIGNS
32' ROADWAY

XBSD-32

FILE: xbsds40.dgn	DN: SRW	CK: BMP	DW: SPS	CK: SDB
©TxDOT June 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS				
01-16: Notes, 0.6" strands removed.	DIST	COUNTY		SHEET NO.

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

STRUCTURE	DESIGNED GIRDERS								DEPRESSED STRAND PATTERN		CONCRETE		OPTIONAL DESIGN				
	SPAN NO	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS					NO.	TO END (in)	RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fcd(si)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcd(si)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR (2)	
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)								Flexure	Shear
Type Tx28 Girders 32' Roadway 8.5" Slab	40	ALL	Tx28		14	0.6	270	10.48	9.34	2	10.5	4.000	5.000	1.189	-1.700	1731	0.850	1.070
	45	ALL	Tx28		14	0.6	270	10.48	9.34	2	10.5	4.000	5.400	1.507	-2.077	1717	0.820	1.080
	50	ALL	Tx28		16	0.6	270	10.23	9.23	4	8.5	4.000	5.800	1.853	-2.508	2040	0.800	1.080
	55	ALL	Tx28		18	0.6	270	10.04	8.26	4	12.5	4.100	6.400	2.247	-2.980	2377	0.780	1.090
	60	ALL	Tx28		22	0.6	270	9.75	7.57	4	16.5	4.800	6.900	2.655	-3.462	2715	0.760	1.090
	65	ALL	Tx28		26	0.6	270	9.56	7.71	4	16.5	5.600	7.300	3.104	-3.978	3064	0.740	1.100
Type Tx34 Girders 32' Roadway 8.5" Slab	40	ALL	Tx34		12	0.6	270	13.01	13.01			4.000	5.000	0.934	-1.303	1975	0.880	1.050
	45	ALL	Tx34		14	0.6	270	13.01	12.15	2	8.5	4.000	5.000	1.180	-1.588	2124	0.850	1.060
	50	ALL	Tx34		16	0.6	270	12.76	11.76	4	8.5	4.000	5.000	1.437	-1.907	2248	0.830	1.060
	55	ALL	Tx34		16	0.6	270	12.76	11.76	4	8.5	4.000	5.000	1.739	-2.263	2449	0.810	1.060
	60	ALL	Tx34		18	0.6	270	12.57	11.23	4	10.5	4.000	5.500	2.068	-2.640	2806	0.790	1.070
	65	ALL	Tx34		22	0.6	270	12.28	7.92	4	28.5	4.000	6.000	2.424	-3.039	3173	0.770	1.070
	70	ALL	Tx34		26	0.6	270	12.09	8.09	4	30.5	4.700	6.500	2.807	-3.458	3548	0.750	1.080
	75	ALL	Tx34		30	0.6	270	11.81	7.41	6	28.5	5.200	6.700	3.195	-3.894	3951	0.740	1.080
	80	ALL	Tx34		34	0.6	270	11.48	7.25	6	30.5	5.800	7.000	3.633	-4.373	4378	0.730	1.080
Type Tx40 Girders 32' Roadway 8.5" Slab	40	ALL	Tx40		12	0.6	270	15.60	15.60			4.000	5.000	0.768	-1.053	2052	0.910	1.030
	45	ALL	Tx40		14	0.6	270	15.60	15.60			4.700	5.000	0.967	-1.282	2430	0.880	1.040
	50	ALL	Tx40		14	0.6	270	15.60	15.60			4.500	5.000	1.195	-1.554	2558	0.860	1.040
	55	ALL	Tx40		16	0.6	270	15.35	14.35	4	8.5	4.000	5.000	1.442	-1.834	2685	0.830	1.050
	60	ALL	Tx40		18	0.6	270	15.16	13.82	4	10.5	4.000	5.000	1.687	-2.118	2875	0.810	1.050
	65	ALL	Tx40		18	0.6	270	15.16	13.82	4	10.5	4.000	5.000	1.978	-2.447	3277	0.800	1.060
	70	ALL	Tx40		20	0.6	270	15.00	13.40	4	12.5	4.000	5.200	2.288	-2.783	3666	0.780	1.060
	75	ALL	Tx40		24	0.6	270	14.77	9.77	4	34.5	4.100	5.700	2.619	-3.135	4064	0.760	1.060
	80	ALL	Tx40		28	0.6	270	14.60	10.60	4	32.5	4.900	6.000	2.964	-3.509	4498	0.750	1.070
	85	ALL	Tx40		32	0.6	270	14.23	8.60	6	36.5	5.100	6.200	3.328	-3.900	4944	0.740	1.070
	90	ALL	Tx40		36	0.6	270	13.93	9.27	6	34.5	5.900	6.600	3.695	-4.294	5394	0.730	1.070
Type Tx46 Girders 32' Roadway 8.5" Slab	40	ALL	Tx46		12	0.6	270	17.60	17.60			4.000	5.000	0.678	-0.844	2150	0.950	1.020
	45	ALL	Tx46		14	0.6	270	17.60	17.60			4.500	5.000	0.846	-1.024	2543	0.920	1.020
	50	ALL	Tx46		14	0.6	270	17.60	17.60			4.500	5.000	1.041	-1.235	3012	0.890	1.030
	55	ALL	Tx46		16	0.6	270	17.35	16.35	4	8.5	4.000	5.000	1.257	-1.465	3277	0.870	1.030
	60	ALL	Tx46		16	0.6	270	17.35	16.35	4	8.5	4.000	5.000	1.489	-1.701	3221	0.840	1.040
	65	ALL	Tx46		18	0.6	270	17.16	15.83	4	10.5	4.000	5.000	1.732	-1.957	3424	0.830	1.040
	70	ALL	Tx46		18	0.6	270	17.16	15.83	4	10.5	4.000	5.000	2.001	-2.227	3834	0.810	1.040
	75	ALL	Tx46		20	0.6	270	17.00	15.40	4	12.5	4.000	5.000	2.289	-2.510	4254	0.790	1.040
	80	ALL	Tx46		24	0.6	270	16.77	14.10	4	20.5	4.000	5.100	2.579	-2.804	4703	0.780	1.050
	85	ALL	Tx46		28	0.6	270	16.60	11.46	4	40.5	4.200	5.500	2.905	-3.125	5181	0.770	1.050
	90	ALL	Tx46		32	0.6	270	16.23	9.48	6	42.5	4.400	5.700	3.234	-3.438	5624	0.750	1.050
	95	ALL	Tx46		34	0.6	270	16.07	11.13	6	34.5	5.000	5.900	3.582	-3.777	6117	0.740	1.060
	100	ALL	Tx46		38	0.6	270	15.81	11.39	6	34.5	5.600	6.600	3.961	-4.139	6635	0.730	1.060

NON-STANDARD STRAND PATTERNS

PATTERN	STRAND ARRANGEMENT AT ℄ OF GIRDER

(1) Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

(2) Portion of full HL93.

DESIGN NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Optional designs for girders 120 feet or longer must have a calculated residual camber equal to or greater than that of the designed girder.

Prestress losses for the designed girders have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel bars.

Use low relaxation strands, each pretensioned to 75 percent of fpu.

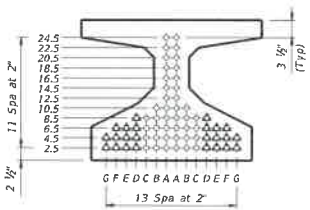
Strand debonding must comply with Item 424.4.2.2.2.4. Full-length debonded strands are only permitted in positions marked Δ. Double wrap full-length debonded strands in outer most position of each row.

When shown on this sheet, the Fabricator has the option of furnishing either the designed girder or an approved optional design. All optional design submittals must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.

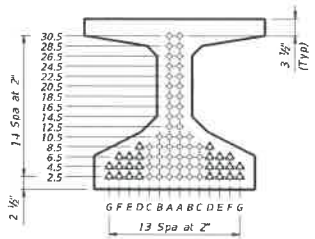
Seal cracks in girder ends exceeding 0.005" in width as directed by the Engineer. The fabricator is permitted to decrease the spacing of Bars R and S by providing additional bars to help limit crack width provided the decreased spacing results in no less than 1" clear between bars. The fabricator must take an approved corrective action if cracks greater than 0.005" form on a repetitive basis.

DEPRESSED STRAND DESIGNS:

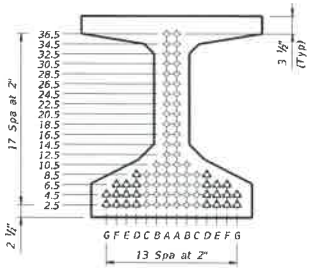
Locate strands for the designed girder as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc., beginning each row in the "A" position and working outward until the required number of strands is reached. All strands in the "A" position must be depressed, maintaining the 2" spacing so that, at the girder ends, the upper two strands are in the position shown in the table.



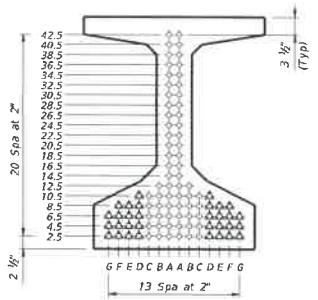
TYPE Tx28



TYPE Tx34



TYPE Tx40



TYPE Tx46

HL93 LOADING

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER STANDARD DESIGNS

32' ROADWAY

IGSD-32

FILE: ig06stds-19.dgn	DN: EFC	CK: AJF	DK: EFC	CK: TAR
©TxDOT August 2017	CONT		MB	HIGHWAY
REVISIONS 10-19: Reassigned girders	DIST	COUNTY		SHEET NO.

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

STRUCTURE	DESIGNED GIRDERS									DEPRESSED STRAND PATTERN		CONCRETE		OPTIONAL DESIGN				
	SPAN NO.	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS						NO.	TO END (in)	RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct(ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR (2)	
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)								Flexure	Shear
Type Tx54 Girders 32' Roadway 8.5" Slab	40	ALL	Tx54		12	0.6	270	21.01	21.01			4.000	5.000	0.561	-0.686	2216	0.980	1.010
	45	ALL	Tx54		12	0.6	270	21.01	21.01			4.000	5.000	0.703	-0.835	2629	0.950	1.010
	50	ALL	Tx54		14	0.6	270	21.01	21.01			4.000	5.000	0.858	-1.003	3108	0.920	1.020
	55	ALL	Tx54		16	0.6	270	20.76	20.26	4	6.5	4.000	5.000	1.035	-1.189	3629	0.900	1.020
	60	ALL	Tx54		16	0.6	270	20.76	20.26	4	6.5	4.000	5.000	1.224	-1.381	3931	0.870	1.020
	65	ALL	Tx54		18	0.6	270	20.56	19.23	4	10.5	4.000	5.000	1.430	-1.588	4159	0.850	1.020
	70	ALL	Tx54		18	0.6	270	20.56	19.23	4	10.5	4.000	5.000	1.653	-1.815	4103	0.840	1.030
	75	ALL	Tx54		20	0.6	270	20.41	18.81	4	12.5	4.000	5.000	1.877	-2.035	4399	0.820	1.030
	80	ALL	Tx54		20	0.6	270	20.41	18.81	4	12.5	4.000	5.000	2.129	-2.284	4880	0.810	1.030
	85	ALL	Tx54		22	0.6	270	20.28	18.46	4	14.5	4.000	5.000	2.392	-2.534	5339	0.790	1.040
	90	ALL	Tx54		26	0.6	270	20.08	16.39	4	28.5	4.000	5.000	2.665	-2.800	5839	0.780	1.040
	95	ALL	Tx54		28	0.6	270	20.01	14.29	4	44.5	4.000	5.000	2.951	-3.075	6353	0.770	1.040
	100	ALL	Tx54		32	0.6	270	19.63	12.51	6	44.5	4.300	5.200	3.262	-3.370	6892	0.760	1.040
	105	ALL	Tx54		36	0.6	270	19.34	12.01	6	50.5	4.700	5.400	3.574	-3.667	7434	0.750	1.040
	110	ALL	Tx54		40	0.6	270	19.11	12.51	6	50.5	5.300	6.100	3.899	-3.973	7988	0.740	1.050
	115	ALL	Tx54		44	0.6	270	18.83	11.55	8	48.5	5.600	6.400	4.252	-4.301	8569	0.730	1.050
	120	ALL	Tx54	*	48	0.6	270	18.42	10.09	10	50.5	5.800	7.700	4.619	-4.640	9165	0.720	1.050
Type Tx62 Girders 32' Roadway 8.5" Slab	60	ALL	Tx62		16	0.6	270	25.53	25.53			4.000	5.000	0.961	-1.157	4309	0.900	1.010
	65	ALL	Tx62		16	0.6	270	25.53	25.53			4.000	5.000	1.121	-1.331	4614	0.880	1.010
	70	ALL	Tx62		18	0.6	270	25.33	25.33			4.000	5.000	1.292	-1.514	4894	0.860	1.020
	75	ALL	Tx62		18	0.6	270	25.33	25.33			4.000	5.000	1.475	-1.705	4844	0.840	1.020
	80	ALL	Tx62		20	0.6	270	25.18	24.38	4	8.5	4.000	5.000	1.659	-1.903	5116	0.830	1.020
	85	ALL	Tx62		20	0.6	270	25.18	24.38	4	8.5	4.000	5.000	1.866	-2.120	5578	0.820	1.020
	90	ALL	Tx62		20	0.6	270	25.18	24.38	4	8.5	4.500	5.500	2.080	-2.338	6072	0.800	1.030
	95	ALL	Tx62		24	0.6	270	24.94	22.94	4	16.5	4.000	5.000	2.310	-2.574	6621	0.790	1.030
	100	ALL	Tx62		26	0.6	270	24.85	22.39	4	20.5	4.000	5.000	2.531	-2.805	7159	0.780	1.030
	105	ALL	Tx62		30	0.6	270	24.58	14.18	6	58.5	4.800	5.800	2.771	-3.050	7723	0.770	1.030
	110	ALL	Tx62		34	0.6	270	24.25	15.42	6	56.5	4.200	5.000	3.020	-3.304	8301	0.760	1.030
	115	ALL	Tx62		36	0.6	270	24.11	17.44	6	46.5	4.700	5.600	3.291	-3.576	8909	0.750	1.030
	120	ALL	Tx62		40	0.6	270	23.88	16.68	6	54.5	5.100	6.000	3.545	-3.835	9493	0.740	1.040
	125	ALL	Tx62		44	0.6	270	23.60	14.87	8	56.5	5.300	6.100	3.836	-4.124	10128	0.730	1.040
	130	ALL	Tx62		46	0.6	270	23.28	15.26	8	56.5	5.800	6.700	4.144	-4.438	10849	0.720	1.040

NON-STANDARD STRAND PATTERNS

PATTERN	STRAND ARRANGEMENT AT ℄ OF GIRDER
*	2.5(14),4.5(14),6.5(14),8.5(4),10.5(2)

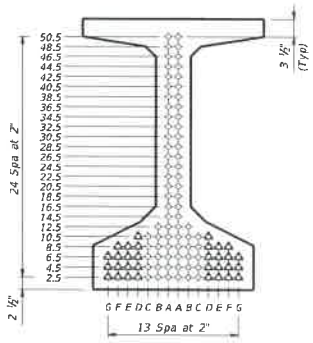
(1) Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

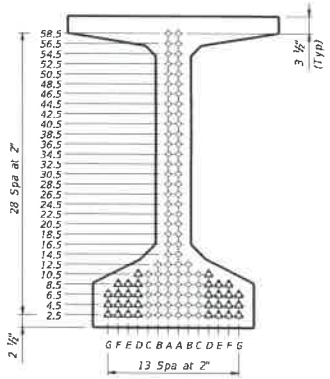
Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

(2) Portion of full HL93.



TYPE Tx54



TYPE Tx62

HL93 LOADING

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER STANDARD DESIGNS

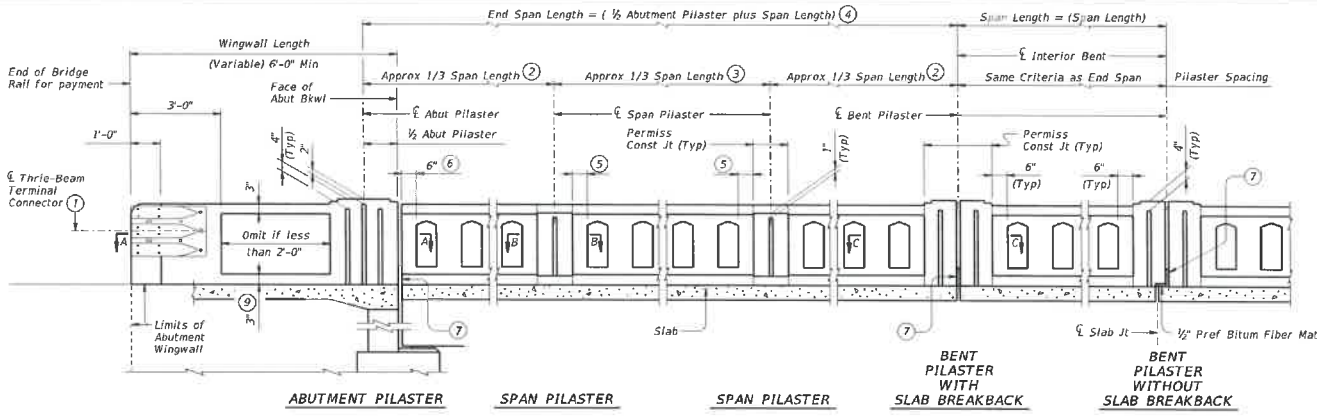
32' ROADWAY

IGSD-32

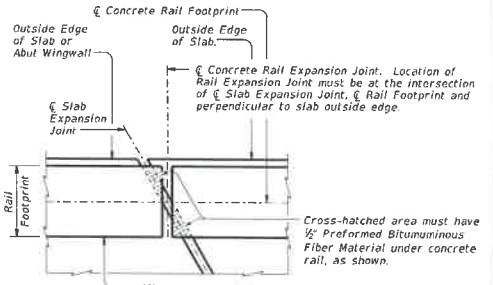
FILE: tg06stds-19.dgn	DW: EFC	CK: AJF	DW: EFC	CK: TAR
©TxDOT August 2017	CONT	SECT	MB	HIGHWAY
REVISIONS 10-Jul Redesigned girders.				SHEET NO.

DISCLAIMER:
The use of this standard is governed by the Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:



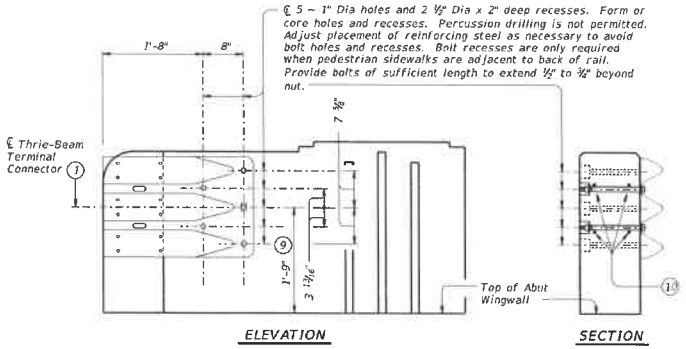
ROADWAY ELEVATION OF RAIL



PLAN OF RAIL AT EXPANSION JOINTS

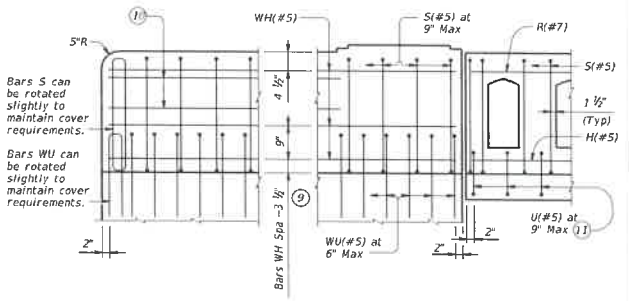
Example showing Slab Expansion Joints without breakbacks.

1. Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge unless otherwise shown in the plans.
2. Number of windows in exterior bays are equal.
3. Number of windows in interior bay(s) are not less than the amount in exterior bays (Note 2).
4. Space Span Pilasters at 1/3 span length (Approx) when spans are 100 ft and less, as shown. Space Span Pilasters at 1/5 span length (Approx) for spans greater than 100 ft.
5. Dimension is the same for all posts adjacent to Span Pilasters in a span. Dimension may vary from span to span, Min = 3", Max = 7 ½".
6. Min = 6", Max = 1'-3".
7. Provide rail joints at ends of all spans the same width as Slab joint opening, except that Rail Joints over construction joints must be ¼" Min to ¾" Max in width. Joints must be open if slab joint opening is not sealed. Joints over construction joints and over sealed deck joints must be plugged. Forming material used in joints may be left in place if it is light in color and compressible, such as the following materials: polystyrene, molded cork granules, sponge rubber sheet, etc. If forming material is not left in place, plug the bottom 6" with slab joint sealing compound to prevent drainage and staining.
8. Place Preformed Bituminous Fiber Material between slab and rail when rail extends over expansion joint. Shift Bars U as necessary.
9. Increase 2" for structures with overlay.
10. Place 4 additional Bars WH(#5) 3'-8" in length inside Bars S(#5) and centered 2'-0" from end of rail when Terminal Connections are required. Field bend as needed.
11. Shift U Bars from region below ½" Preformed Bituminous Fiber Material at joints.



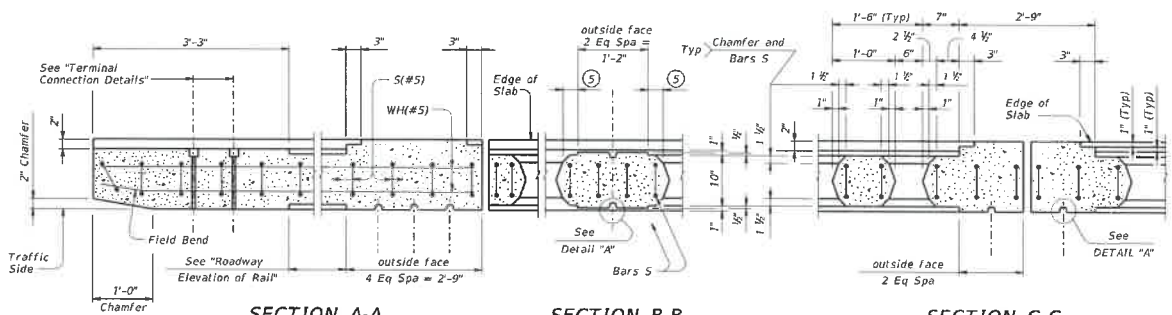
TERMINAL CONNECTION DETAILS

(Showing parapet with Pilaster on 6'-0" Wingwall)



ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

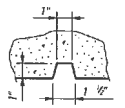
The use of this railing is restricted to speeds of 45 mph or less.



SECTION A-A

SECTION B-B

SECTION C-C



DETAIL "A"

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL TEXAS CLASSIC

TYPE T411

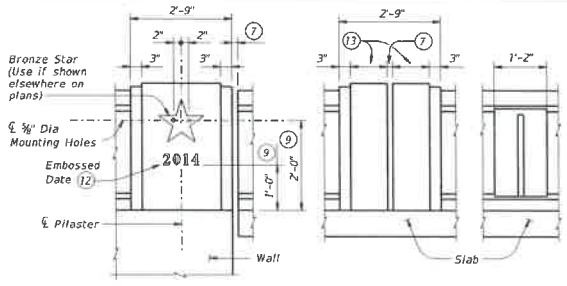
FILE:	rtst008-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS					
		DIST	COUNTY		SHEET NO.

DISCLAIMER:
The use of this standard is governed by the Texas Engineering Practice Act. No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

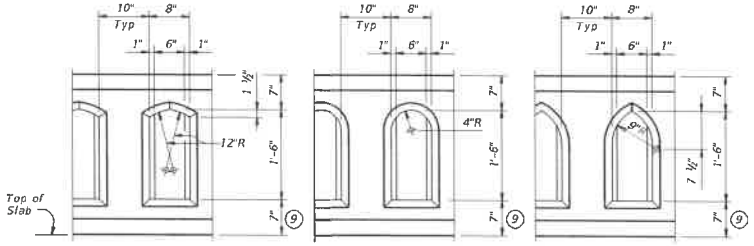
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:



ABUTMENT BENT SPAN

EXTERIOR PILASTER ELEVATIONS



TYPE A TYPE B TYPE C

WINDOW TYPES

(7) Provide rail joints at ends of all spans the same width as Slab joint opening, except that Rail Joints over construction joints must be ½" Min to ¾" Max in Width. Joints must be open if slab joint opening is not sealed. Joints over construction joints and over sealed deck joints must be plugged. Forming material used in joints may be left in place if it is light in color and compressible, such as the following materials: polystyrene, molded cork granules, sponge rubber sheet, etc. If forming material is not left in place, plug the bottom 6" with slab joint sealing compound to prevent drainage and staining.

(9) Increase 2" for structures with overlay.

(12) Construction year (use if shown elsewhere on plans) 3" High "Plantin Bold" Typeface with ¼" recess. Placed at one Abutment only or as directed by the Engineer.

(13) Dimensions must be the same on each side of joint.

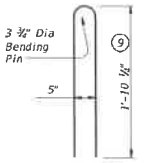
(14) Reduce by 2" or field bend over Preformed Bituminous Fiber Material to gain cover.

(15) 5 ½" when vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls or retaining walls on traffic side of wall.

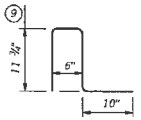
(16) As an aid in supporting reinforcement, additional longitudinal bars may be used in the slab with the approval of the Engineer. Such bars must be furnished at the Contractor's expense.

(17) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

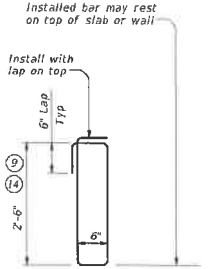
(18) Bronze Star dimensions of the final product can be slightly smaller due to shrinkage after casting.



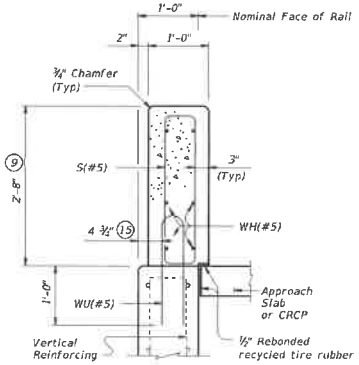
BARS WU (#5)



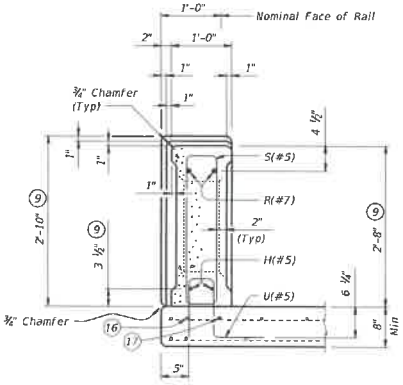
BARS U (#5)



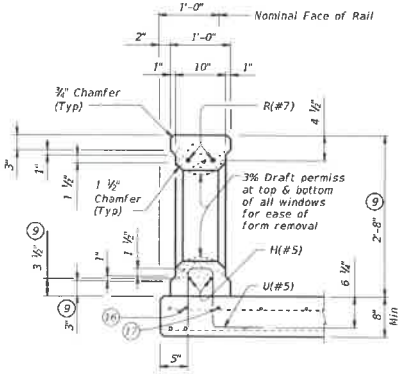
BARS S (#5)



ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS

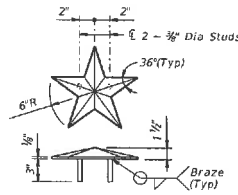


SECTION THRU POST ON BRIDGE SLAB
(Showing Pilaster)



SECTION THRU WINDOW ON BRIDGE SLAB

SECTIONS THRU RAIL



BRONZE STAR DETAIL (18)

Two known manufacturers are:

1. Kassons Castings
   Austin, Texas

2. Southwell Company
   San Antonio, Texas

CONSTRUCTION NOTES:

Attach Bronze Star with a Type III Class C, D, E, or F epoxy adhesive. Clamp star until epoxy achieves set. Remove any visible epoxy "squeeze out" from under star.

Face of rail and pilasters, parapet must be plumb unless otherwise approved.

Apply a one rub finish to all railing surfaces unless otherwise shown elsewhere on the plans.

MATERIAL NOTES:

Provide Class "S" concrete for railing. Provide Class "S" (HPC) concrete if shown elsewhere in the plans.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.

Bronze Star must be cast of architectural bronze having the following composition: Copper 85 %, Tin 5 %, Lead 5 %, Zinc 5 %.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #5 = 2'-0"
Uncoated or galvanized ~ #7 = 2'-11"
Epoxy coated ~ #5 = 3'-0"
Epoxy coated ~ #7 = 4'-4"

GENERAL NOTES:

This rail has been evaluated and approved to be of equal strength to railing with like geometry, which have been crash tested to meet MASH TL-2 criteria. This rail can be used for speeds of 45 mph and less when a TL-2 or TL-3 rated guard fence transition is used. This rail is only approved for low speed use, speeds of 45 mph and less.

Do not use this railing on bridges with expansion joints providing more than 5" movement.

Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

Shop drawings will not be required for this rail.

See Bridge Layout or other plan sheets for the following: dimensions with the number of span pilasters, dimensions with the number of windows, window type, inclusion of bronze stars, inclusion of construction year with abutment identity.

Submit erection drawings showing span number, span pilaster locations, number of windows between pilasters and spacing to first window (see Note 6) to the Engineer for approval.

Average weight of railing with no overlay increase and no pilasters is 270 plf.

Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.

Texas Department of Transportation — Bridge Division Standard

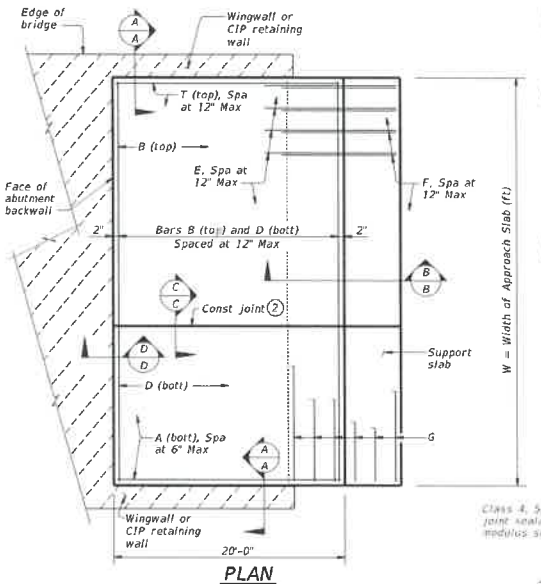
TRAFFIC RAIL TEXAS CLASSIC

TYPE T411

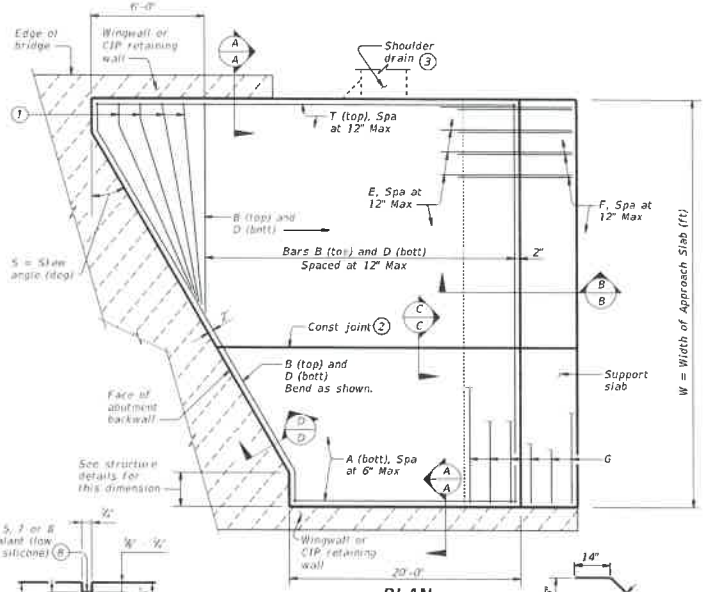
FILE: rlstd008-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 2019				HIGHWAY
REVISIONS				SHEET NO.

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

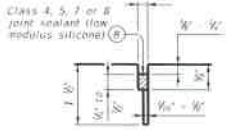
DATE:
FILE:



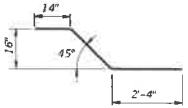
PLAN
(Showing non-skewed approach slab.)



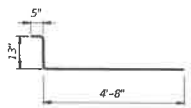
PLAN
(Showing skewed approach slab.)



LONGITUDINAL SAW CUT JOINT DETAIL



BARS E (#5)



BARS F (#5)

BAR TABLE	
BAR	SIZE
A	#8
B	#5
D	#5
E	#5
F	#5
G	#5
T	#5

APPROXIMATE QUANTITIES (4)

Reinf steel weight = 8.5 Lbs/SF of Approach Slab
= 18.4 Lbs/LF of Support Slab

Vol of Appr Slab Conc (CY) = 1.057W - 0.008W x T + 0.02W² Tan S
(Includes Support Slab)

W = Width of Approach Slab (ft)

T = Conc Pavement Thickness (in)

S = Skew Angle (deg)

(1) Flare Bars B and D in this region (1'-6" Max Spa, 3" Min Spa). Minimum flared bar length = 2'-6". Bend bars as necessary.

(2) Provide longitudinal construction joints that align with longitudinal construction joints in the bridge slab with bridges built in stages. Other longitudinal construction joints must receive approval of the Engineer.

(3) See details elsewhere in plans for shoulder drain location and details.

(4) For Contractor's information only. Quantities shown are for one approach slab only.

(5) On portion of support slab that supports the concrete pavement, adjust top surface elevation, if required, to accommodate concrete pavement thickness. Smooth trowel finish. Oil top of support slab with 60 grade oil and apply heavy coat of powdered graphite. Press down one layer of 30# roofing felt.

(6) Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.

(7) See details elsewhere in plans for required cross-slope.

(8) Place in accordance with Item 438.

(9) Provide backer rod that is 25% larger than joint opening and compatible with the sealant.

(10) If bridge rail is present at the wingwall or CIP retaining wall, place ½" rebonded recycled tire rubber between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.

GENERAL NOTES:

Construct approach slab in accordance with Item 422.

Provide Class "S" concrete with a minimum compressive strength of 4,000 psi.

Provide Grade 60 reinforcing steel.

Provide longitudinal joints as shown on the Longitudinal Saw Cut Joint Detail at lane lines and shoulders when width between longitudinal construction joints or edges of approach slab exceeds 16 feet. Saw cut joints within 24 hours of concrete placement to a depth of 1 ½" and seal in accordance with Item 438. Alternately, provide a controlled joint consisting of 1 ½" vinyl or plastic joint former (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

Provide rebonded recycled tire rubber joint filler that meets the requirements of DMS-6310, "Joint Sealants and Fillers."

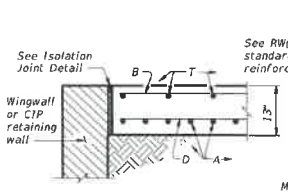
Construct the subgrade or subbase away from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.

Compact and finish the subgrade or foundation for the approach slab to the typical cross-section and to the lines and grades shown on the plans.

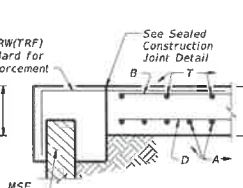
Cure for 4 days using water or membrane curing per Item 422.

All details shown herein are subsidiary to bridge approach slab.

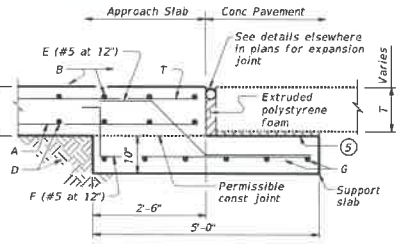
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.

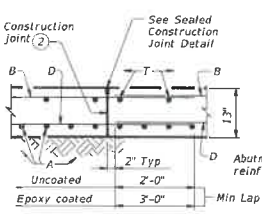


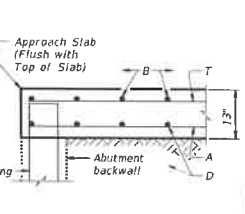
SHOWING WINGWALL OR CIP RETAINING WALL



SHOWING MSE WALL





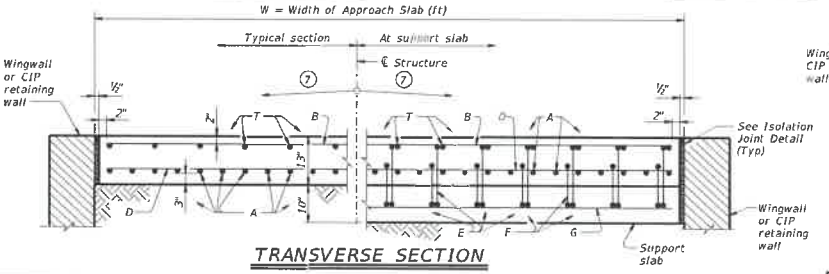


SECTION A-A

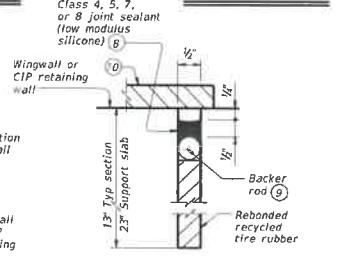
SECTION B-B

SECTION C-C (6)

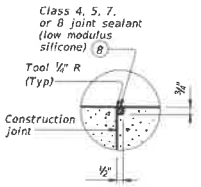
SECTION D-D



TRANSVERSE SECTION



ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOINT DETAIL

Texas Department of Transportation

Bridge Division Standard

BRIDGE APPROACH SLAB

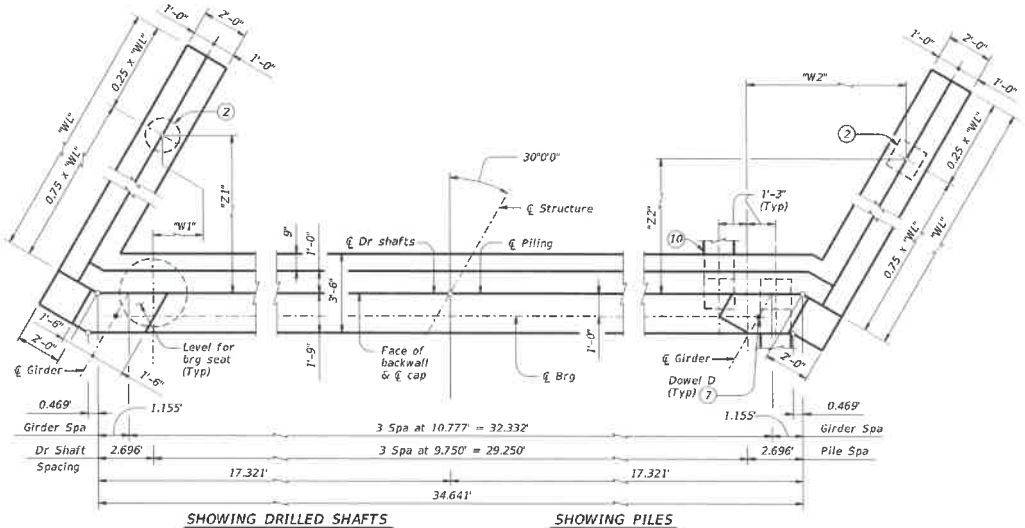
CONCRETE PAVEMENT

BAS-C

FILE:	bascste1-20.dgn	DN: TxDOT	CK: TxDOT	CK: TxDOT
©TxDOT	April 2019	DW:	SECT	HIGHWAY
REVISIONS				
02-20 Added "Slope of Wingwall"		DIST		SHEET NO.

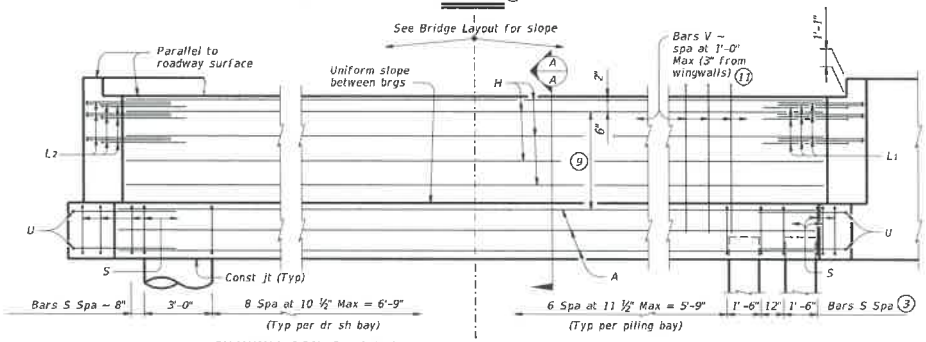
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:



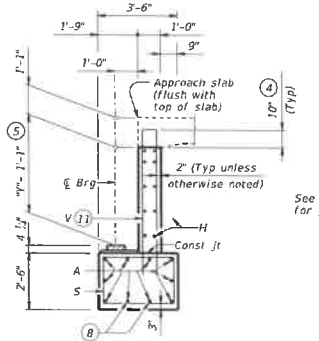
SHOWING DRILLED SHAFTS — SHOWING PILES

PLAN (1)



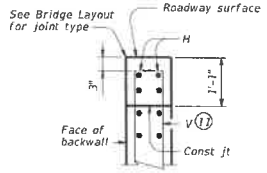
SHOWING DRILLED SHAFTS — SHOWING PILES

ELEVATION



SECTION A-A

(With approach slab) (6)



BACKWALL DETAIL

(Without approach slab) (6)

TABLE OF FOUNDATION LOADS

Span Length	All Girder Types	
Ft	Tons/Shaft	Tons/Pile
40	54	51
45	58	53
50	61	54
55	64	56
60	68	58
65	71	59
70	74	61
75	77	63
80	80	64
85	84	66
90	87	68
95	90	69
100	93	71
105	96	72
110	99	74
115	102	76
120	105	77

(1) See Table A for variable dimensions based on header slope and girder type.

(2) See Table A to determine if wingwall foundations are required.

(3) For piling larger than 16" adjust Bars S spacing as required to avoid piling.

(4) Increase as required to maintain 3" from finished grade.

(5) See Span details for "Y" value.

(6) See Bridge Layout to determine if approach slab is present.

(7) Omit Dowels D at end of multi-span unit. Adjust reinforcing steel total accordingly.

(8) With pile foundations, move Bars A shown to clear piles.

(9) Spacing based on girder type:
Tx28 ~ 3 spaces at 1'-0" Max
Tx34 ~ 3 spaces at 1'-0" Max
Tx40 ~ 4 spaces at 1'-0" Max
Tx46 ~ 4 spaces at 1'-0" Max
Tx54 ~ 5 spaces at 1'-0" Max

(10) See Detail A on FD standard.

(11) Field bend as needed to clear piles.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

See Bridge Layout for header slope and foundation type, size and length.

See Common Foundation Details (FD) standard sheet for all foundation details and notes.

See Concrete Riprap (CRR) standard sheet or Stone Riprap (SRR) standard sheet for riprap attachment details, if applicable.

See applicable rail details for rail anchorage in wingwalls.

Details are drawn showing right forward skew. See Bridge Layout for actual skew directions.

These abutment details may be used with standard SIG-32-30 only.

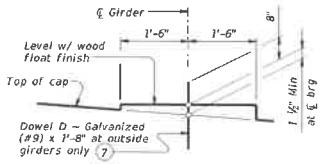
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.

MATERIAL NOTES:

Provide Class C concrete (f'_c = 3,600 psi).
Provide Class C (HPC) concrete if shown elsewhere in the plans.
Provide Grade 60 reinforcing steel.
Galvanize dowel bars D.

TABLE A

Header Slope	Girder Type	Wingwall Type	Wingwall Lgth "W1"	"W1"	"Z1"	"W2"	"Z2"
2:1	Tx28	Cantilevered	10.000'	Not Applicable			
	Tx34	Cantilevered	11.000'				
	Tx40	Cantilevered	12.000'				
	Tx46	Founded	14.000'	1.688'	9.593'	8.812'	8.593'
	Tx54	Founded	15.000'	2.063'	10.243'	9.187'	9.243'
3:1	Tx28	Founded	14.000'	1.688'	9.593'	8.812'	8.593'
	Tx34	Founded	16.000'	2.438'	10.892'	9.562'	9.892'
	Tx40	Founded	18.000'	3.188'	12.191'	10.312'	11.191'
	Tx46	Founded	20.000'	3.938'	13.490'	11.062'	12.490'
	Tx54	Founded	22.000'	4.688'	14.789'	11.812'	13.789'



BEARING SEAT DETAIL

(Bearing surface must be clean and free of all loose material before placing bearing pad.)

HL93 LOADING — SHEET 1 OF 3

Texas Department of Transportation — Bridge Division Standard

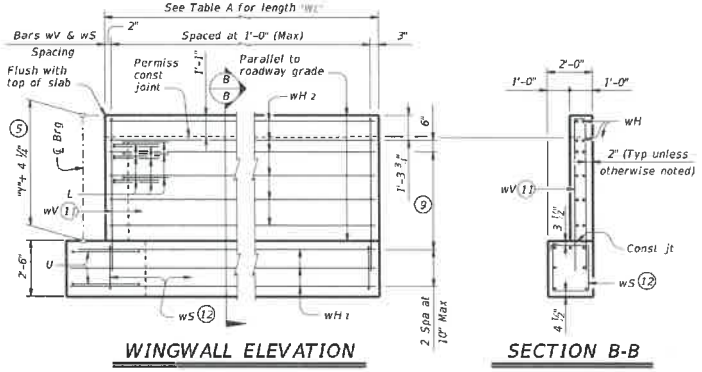
ABUTMENTS
TYPE TX28 THRU TX54
PRESTR CONC I-GIRDERS
32' ROADWAY 30° SKEW

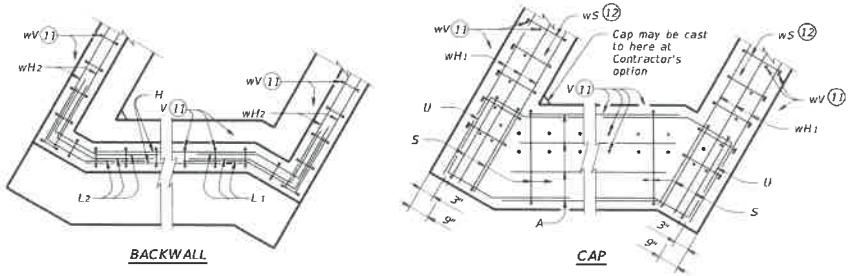
AIG-32-30

FILE:	aig43sts-17.dgn	DW: TAR	CK: KCM	DW: JTR	CK: TAR
©TxDOT	August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS		DIST	COUNTY		SHEET NO.

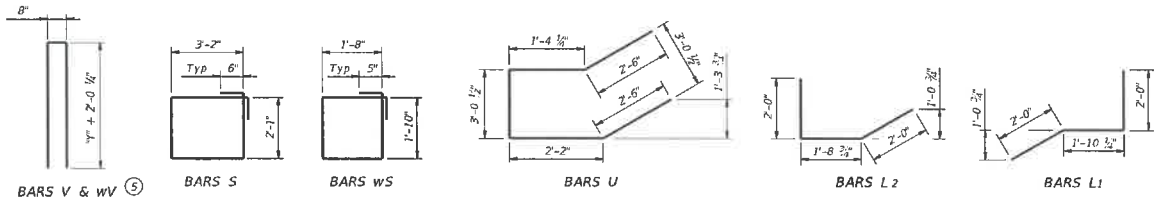
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:





CORNER DETAILS



(5) See Span details for "Y" value.

(9) Spacing based on girder type:
Tx28 – 3 spaces at 1'-0" Max
Tx34 – 3 spaces at 1'-0" Max
Tx40 – 4 spaces at 1'-0" Max
Tx46 – 4 spaces at 1'-0" Max
Tx54 – 5 spaces at 1'-0" Max

(11) Field bend as needed to clear piles.

(12) Adjust as required to avoid piling.

HL93 LOADING

SHEET 2 OF 3

Texas Department of Transportation

Bridge Division Standard

ABUTMENTS
TYPE TX28 THRU TX54
PRESTR CONC I-GIRDERS
32' ROADWAY 30° SKEW

AIG-32-30

FILE: aig43sls-17.dgn	DW: TAR	CK: KCH	DW: JTR	CK: TAR	
©TxDOT August 2017	STATE	SECT	JOB	HIGHWAY	
REVISIONS	DIST	COUNTY		SHEET NO.	

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

TABLES OF ESTIMATED QUANTITIES WITH 2:1 HEADER SLOPE (13)

TYPE Tx28 Girders

Bar	No.	Size	Length	Weight
A	10	#11	34'-8"	1,842
D (7)	2	#9	1'-8"	11
H	8	#6	34'-8"	417
L1	9	#6	5'-11"	80
L2	9	#6	5'-9"	78
S	35	#5	11'-6"	420
U	4	#6	11'-7"	70
V	38	#5	11'-4"	449
wH1	14	#6	11'-5"	240
wH2	20	#6	9'-8"	290
wS	22	#4	7'-10"	115
wV	22	#5	11'-4"	260
Reinforcing Steel		Lb		4,272
Class "C" Concrete		CY		21.8

TYPE Tx34 Girders

Bar	No.	Size	Length	Weight
A	10	#11	34'-8"	1,842
D (7)	2	#9	1'-8"	11
H	8	#6	34'-8"	417
L1	9	#6	5'-11"	80
L2	9	#6	5'-9"	78
S	35	#5	11'-6"	420
U	4	#6	11'-7"	70
V	38	#5	12'-4"	489
wH1	14	#6	12'-5"	261
wH2	20	#6	10'-8"	320
wS	24	#4	7'-10"	126
wV	24	#5	12'-4"	309
Reinforcing Steel		Lb		4,423
Class "C" Concrete		CY		23.5

TYPE Tx40 Girders

Bar	No.	Size	Length	Weight
A	10	#11	34'-8"	1,842
D (7)	2	#9	1'-8"	11
H	10	#6	34'-8"	521
L1	9	#6	5'-11"	80
L2	9	#6	5'-9"	78
S	35	#5	11'-6"	420
U	4	#6	11'-7"	70
V	38	#5	13'-4"	528
wH1	14	#6	13'-5"	282
wH2	24	#6	11'-8"	421
wS	26	#4	7'-10"	136
wV	26	#5	13'-4"	362
Reinforcing Steel		Lb		4,751
Class "C" Concrete		CY		25.3

TYPE Tx46 Girders

Bar	No.	Size	Length	Weight
A	10	#11	34'-8"	1,842
D (7)	2	#9	1'-8"	11
H	10	#6	34'-8"	521
L1	9	#6	5'-11"	80
L2	9	#6	5'-9"	78
S	35	#5	11'-6"	420
U	4	#6	11'-7"	70
V	38	#5	14'-4"	568
wH1	14	#6	15'-5"	324
wH2	24	#6	13'-8"	493
wS	30	#4	7'-10"	157
wV	30	#5	14'-4"	446
Reinforcing Steel		Lb		5,012
Class "C" Concrete		CY		27.9

TYPE Tx54 Girders

Bar	No.	Size	Length	Weight
A	10	#11	34'-8"	1,842
D (7)	2	#9	1'-8"	11
H	12	#6	34'-8"	625
L1	9	#6	5'-11"	80
L2	9	#6	5'-9"	78
S	35	#5	11'-6"	420
U	4	#6	11'-7"	70
V	38	#5	15'-8"	621
wH1	14	#6	16'-5"	345
wH2	28	#6	14'-8"	617
wS	32	#4	7'-10"	167
wV	32	#5	15'-8"	523
Reinforcing Steel		Lb		5,399
Class "C" Concrete		CY		30.3

TABLES OF ESTIMATED QUANTITIES WITH 3:1 HEADER SLOPE (13)

TYPE Tx28 Girders

Bar	No.	Size	Length	Weight
A	10	#11	34'-8"	1,842
D (7)	2	#9	1'-8"	11
H	8	#6	34'-8"	417
L1	9	#6	5'-11"	80
L2	9	#6	5'-9"	78
S	35	#5	11'-6"	420
U	4	#6	11'-7"	70
V	38	#5	11'-4"	449
wH1	14	#6	15'-5"	324
wH2	20	#6	13'-8"	411
wS	30	#4	7'-10"	157
wV	30	#5	11'-4"	355
Reinforcing Steel		Lb		4,614
Class "C" Concrete		CY		24.4

TYPE Tx34 Girders

Bar	No.	Size	Length	Weight
A	10	#11	34'-8"	1,842
D (7)	2	#9	1'-8"	11
H	8	#6	34'-8"	417
L1	9	#6	5'-11"	80
L2	9	#6	5'-9"	78
S	35	#5	11'-6"	420
U	4	#6	11'-7"	70
V	38	#5	12'-4"	489
wH1	14	#6	17'-5"	366
wH2	20	#6	15'-8"	471
wS	34	#4	7'-10"	178
wV	34	#5	12'-4"	437
Reinforcing Steel		Lb		4,859
Class "C" Concrete		CY		26.9

TYPE Tx40 Girders

Bar	No.	Size	Length	Weight
A	10	#11	34'-8"	1,842
D (7)	2	#9	1'-8"	11
H	10	#6	34'-8"	521
L1	9	#6	5'-11"	80
L2	9	#6	5'-9"	78
S	35	#5	11'-6"	420
U	4	#6	11'-7"	70
V	38	#5	13'-4"	528
wH1	14	#6	19'-5"	408
wH2	24	#6	17'-8"	637
wS	38	#4	7'-10"	199
wV	38	#5	13'-4"	528
Reinforcing Steel		Lb		5,322
Class "C" Concrete		CY		29.6

TYPE Tx46 Girders

Bar	No.	Size	Length	Weight
A	10	#11	34'-8"	1,842
D (7)	2	#9	1'-8"	11
H	10	#6	34'-8"	521
L1	9	#6	5'-11"	80
L2	9	#6	5'-9"	78
S	35	#5	11'-6"	420
U	4	#6	11'-7"	70
V	38	#5	14'-4"	568
wH1	14	#6	21'-5"	450
wH2	24	#6	19'-8"	709
wS	42	#4	7'-10"	220
wV	42	#5	14'-4"	628
Reinforcing Steel		Lb		5,597
Class "C" Concrete		CY		32.5

TYPE Tx54 Girders

Bar	No.	Size	Length	Weight
A	10	#11	34'-8"	1,842
D (7)	2	#9	1'-8"	11
H	12	#6	34'-8"	625
L1	9	#6	5'-11"	80
L2	9	#6	5'-9"	78
S	35	#5	11'-6"	420
U	4	#6	11'-7"	70
V	38	#5	15'-8"	621
wH1	14	#6	23'-5"	492
wH2	28	#6	21'-8"	911
wS	46	#4	7'-10"	241
wV	46	#5	15'-8"	752
Reinforcing Steel		Lb		6,143
Class "C" Concrete		CY		35.9

(7) Omit Dowels D at end of multi-span unit. Adjust reinforcing steel total accordingly.

(13) Quantities shown are for one abutment only (with approach slab). With no approach slab, add 1.5 CY Class "C" concrete and 208 lbs reinforcing steel for 4 additional Bars H.

HL93 LOADING

SHEET 3 OF 3

Texas Department of Transportation

Bridge Division Standard

ABUTMENTS

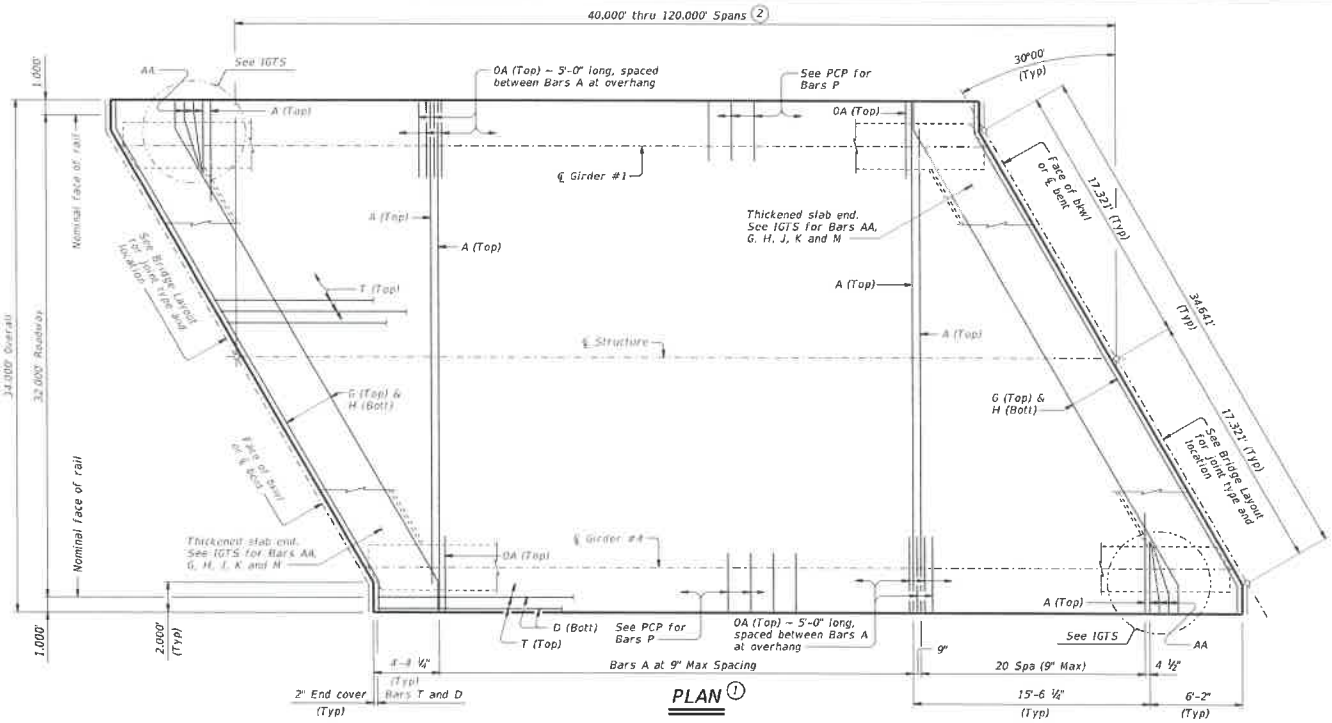
TYPE TX28 THRU TX54

PRESTR CONC I-GIRDERS

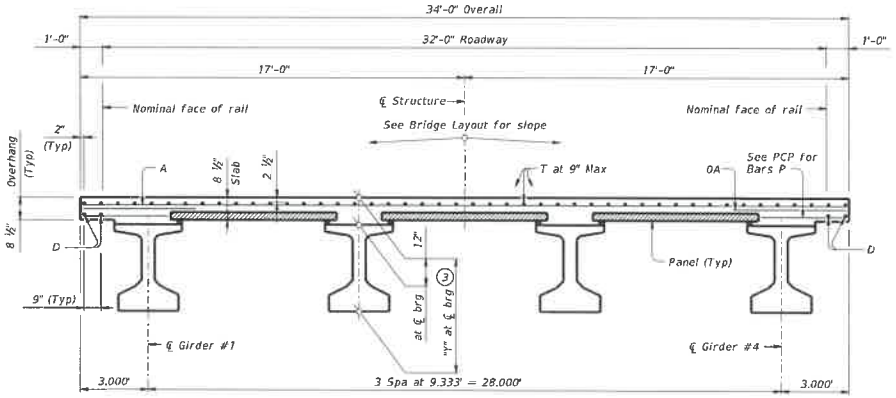
32' ROADWAY 30° SKEW

AIG-32-30

FILE: aig43sts-17.dgn	DW: TAR	CK: KCM	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY		SHEET NO.



PLAN (1)



TYPICAL TRANSVERSE SECTION

(Showing girder type Tx46)

BAR TABLE

BAR	SIZE
A	#4
AA	#5
D	#4
G	#4
H	#4
J	#4
K	#4
M	#4
OA	#5
P	#4
T	#4

(1) If multi-span units (with slab continuous over interior bents) are indicated on the Bridge Layout, see standard IGCS for adjustment to slab reinforcement and quantities.

(2) Span lengths for prestressed concrete I-Girder type:
Type Tx28 for spans lengths 40.000' thru 65.000'.
Type Tx34 for spans lengths 40.000' thru 80.000'.
Type Tx40 for spans lengths 40.000' thru 90.000'.
Type Tx46 for spans lengths 40.000' thru 100.000'.
Type Tx54 for spans lengths 40.000' thru 120.000'.

(3) "Y" value shown is based on theoretical girder camber, dead load deflection from an 8 ½" concrete slab, a constant roadway grade, and using precast panels (PCP). The Contractor will adjust this value as necessary for any roadway vertical curve and/or if the precast overhang panel (PCP(O)) option is used.

TABLE OF SECTION DEPTHS

GIRDER TYPE	"Y" AT ℄ BRG (3)
	Ft/In
Tx28	3'-4"
Tx34	3'-10"
Tx40	4'-4"
Tx46	4'-10"
Tx54	5'-6"

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER SPANS (TYPE Tx28 THRU Tx54)

32' ROADWAY 30° SKEW

SIG-32-30

FILE: sig43sls-19.dgn DN: JMH CK: ASB DN: JTR CK: TAR

©TxDOT August 2017 REVISIONS

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

TABLE OF DEAD LOAD DEFLECTIONS

TYPE Tx28 GIRDERS

SPAN LENGTH	"A"	"B"
Ft	Ft	Ft
40	0.011	0.015
45	0.017	0.024
50	0.026	0.037
55	0.040	0.056
60	0.057	0.080
65	0.079	0.111

TYPE Tx34 GIRDERS

SPAN LENGTH	"A"	"B"
Ft	Ft	Ft
40	0.006	0.009
45	0.010	0.014
50	0.016	0.022
55	0.024	0.033
60	0.034	0.048
65	0.047	0.066
70	0.064	0.090
75	0.085	0.120
80	0.111	0.156

TYPE Tx40 GIRDERS

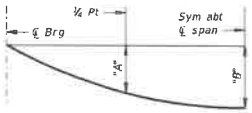
SPAN LENGTH	"A"	"B"
Ft	Ft	Ft
40	0.004	0.006
45	0.006	0.009
50	0.011	0.015
55	0.016	0.022
60	0.022	0.031
65	0.031	0.043
70	0.042	0.059
75	0.056	0.078
80	0.073	0.102
85	0.093	0.131
90	0.118	0.165

TYPE Tx46 GIRDERS

SPAN LENGTH	"A"	"B"
Ft	Ft	Ft
40	0.003	0.004
45	0.004	0.006
50	0.007	0.010
55	0.011	0.015
60	0.015	0.021
65	0.021	0.030
70	0.028	0.040
75	0.038	0.053
80	0.049	0.069
85	0.063	0.089
90	0.080	0.113
95	0.100	0.140
100	0.123	0.173

TYPE Tx54 GIRDERS

SPAN LENGTH	"A"	"B"
Ft	Ft	Ft
40	0.002	0.003
45	0.003	0.004
50	0.005	0.007
55	0.007	0.010
60	0.010	0.014
65	0.014	0.020
70	0.019	0.027
75	0.025	0.035
80	0.033	0.046
85	0.042	0.059
90	0.053	0.074
95	0.066	0.093
100	0.081	0.114
105	0.100	0.140
110	0.120	0.169
115	0.144	0.202
120	0.172	0.241



DEAD LOAD DEFLECTION DIAGRAM

Calculated deflections shown are due to the concrete slab on interior girders only (Ec = 5000 ksi). Adjust values as required for exterior girders and if optional slab forming is used. These values may require field verification.

TABLE OF ESTIMATED QUANTITIES

SPAN LENGTH	REINF CONCRETE SLAB	Prestressed Concrete Girders: ABUT TO INT BT (4)	Prestressed Concrete Girders: INT BT TO INT BT (4)	Prestressed Concrete Girders: ABUT TO ABUT (4)	TOTAL REINF STEEL (5)
Ft	SF	LF	LF	LF	Lb
40	1,360	157.85	158.00	157.69	3,128
45	1,530	177.85	178.00	177.69	3,519
50	1,700	197.85	198.00	197.69	3,910
55	1,870	217.85	218.00	217.69	4,301
60	2,040	237.85	238.00	237.69	4,692
65	2,210	257.85	258.00	257.69	5,083
70	2,380	277.85	278.00	277.69	5,474
75	2,550	297.85	298.00	297.69	5,865
80	2,720	317.85	318.00	317.69	6,256
85	2,890	337.85	338.00	337.69	6,647
90	3,060	357.85	358.00	357.69	7,038
95	3,230	377.85	378.00	377.69	7,429
100	3,400	397.85	398.00	397.69	7,820
105	3,570	417.85	418.00	417.69	8,211
110	3,740	437.85	438.00	437.69	8,602
115	3,910	457.85	458.00	457.69	8,993
120	4,080	477.85	478.00	477.69	9,384

(4) Fabricator will adjust lengths for girder slopes as required.

(5) Reinforcing steel weight is calculated using an approximate factor of 2.3 lbs/SF.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Multi-span units, with slab continuous over interior bents, may be formed with the details shown on this sheet and standard IGCS.

See IGTS standard for Thickened Slab End details and quantity adjustments.

See PCP and PCP-FAB for panel details not shown.

See PCP(O) and PCP(O)-FAB for precast overhang panel details if this option is used.

See IGMS standard for miscellaneous details.

See applicable rail details for rail anchorage in slab.

See PMDF standard for details and quantity adjustments if this option is used.

This standard is drawn showing right forward skew. See Bridge Layout for actual skew direction.

This standard does not support the use of transition bents.

Cover dimensions are clear dimensions, unless noted otherwise.

MATERIAL NOTES:

Provide Class S concrete (f'_c = 4,000 psi).

Provide Class S (HPC) concrete if shown elsewhere in the plans.

Provide Grade 60 reinforcing steel.

Provide bar laps, where required, as follows:

Uncoated – #4 = 1'-7"

Epoxy coated – #4 = 2'-5"

Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars A, AA, D, DA, P or T unless noted otherwise.

HL93 LOADING

SHEET 2 OF 2

Texas Department of Transportation | Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER SPANS (TYPE Tx28 THRU Tx54)

32' ROADWAY 30° SKEW

SIG-32-30

FILE: sig43s1s-19.dgn	DN: JHH	CK: ASB	DW: JTR	CK: TAR
©TxDOT August 2017				
REVISIONS				
10-19: Increased "A" and "B" values	DIST			SHEET NO.

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

EXHIBIT A:
Existing Right-Of-Way & Easement Plan

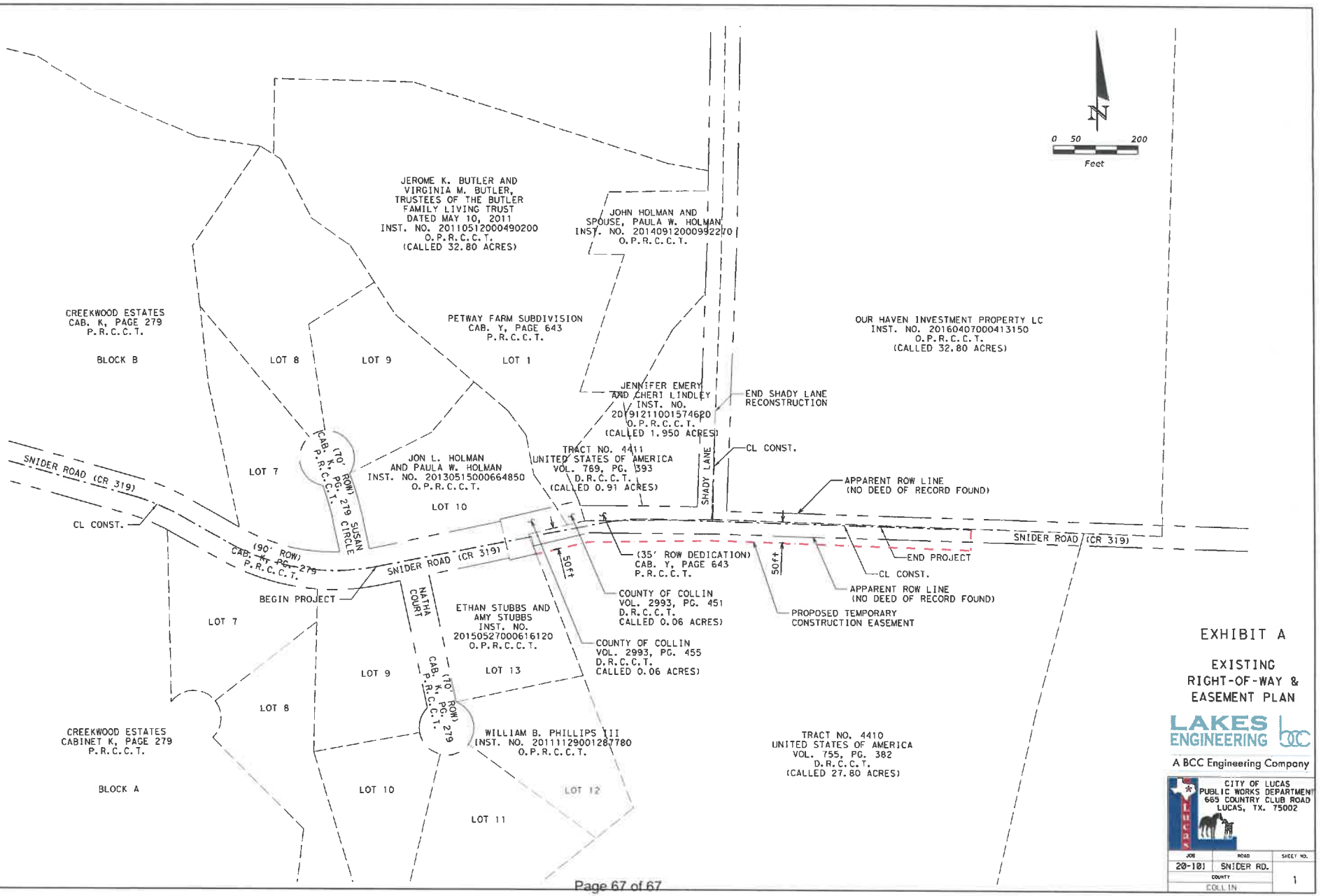


EXHIBIT A

EXISTING RIGHT-OF-WAY & EASEMENT PLAN

LAKES ENGINEERING

A BCC Engineering Company

CITY OF LUCAS
PUBLIC WORKS DEPARTMENT
665 COUNTRY CLUB ROAD
LUCAS, TX. 75002

JOB	ROAD	SHEET NO.
20-101	SNIDER RD.	1
COUNTY	COLLIN	

DATE: 7/30/2020 3:43:33 PM
FILE: T:\20-101 Snider Bridge and Road Improvements\4 - Design\Plan Set\10. Miscellaneous\Snider_Ex_ROW.dgn

Item No. 10

City of Lucas
Council Agenda Request
August 20, 2020

Requester: Finance Director Liz Exum

Agenda Item Request

Discuss the Fiscal Year 2020-2021 Proposed Budget.

Background Information

The draft budget presented at the July 30, 2020 workshop was prepared using projected information on assessed valuation and an estimated tax rate. The City has received the certified estimated tax roll from the Collin County Appraisal District's Office and the calculated No-New-Revenue tax rate of $.300790 and Voter-Approval rate of $.299795 from the Collin County Tax Assessor-Collector. Staff has incorporated the Voter-approval tax rate of $.**299795** into the new draft budget document for fiscal year 2020-2021. The revised projection for the fiscal year 2020-2021 shows excess revenue over expenditures in the amount of $555,525. Excess revenue over expenditures is due to a streamlined budget and does not include funding for compensation, training (except for mandatory requirements), or capital outlay. This budget was prepared ultra conservative to help maintain our strong financial position should we experience a financial downturn due to the recession and potential impact of COVID-19. If trends are favorable and the bulk of our revenue has been collected, staff will propose mid-year adjustments for the City Council's consideration.

On March 5, 2020, City Council authorized participation in the customer city coalition and expenditures up to $50,000 for the Public Utility Commission (PUC) rate case against North Texas Municipal Water District. Remaining dollars from the $50,000 allocation will be included as part of the re-allocated funding for capital projects. This re-allocation occurs after the completion of the fiscal year audit (once final balances are recorded, and re-allocation amounts can be determined).

Attachments/Supporting Documentation

1. Detailed Proposed Budget for FY 2020-2021.

Budget/Financial Impact

The financial impact for the proposed budget is varied and is outlined in detail to be reviewed and discussed.

Recommendation

City of Lucas
Council Agenda Request
August 20, 2020

Item No. 10

Recommendation

No action is required. Public hearing is scheduled for September 3. The scheduled date to adopt the ordinance approving the budget for FY 2020-2021 is September 3, following the public hearing.

Motion

There is no motion with this item, it is for discussion purposes only.

City of Lucas, Texas
Proposed Operating Budget for
Fiscal Year 2020-2021

This budget will raise more revenue from property taxes than last year's budget by an amount of $66,231 which is a 1.74 percent increase from last year's budget. The property tax revenue to be raised from new property added to the tax roll this year is $106,361.

The members of the governing body voted on the budget as follows:

FOR:

AGAINST:

PRESENT and not voting:

ABSENT:

Property Tax Rate Comparison

	2020-2021	2019-2020
Proposed property tax rate:	$0.299795/100	$0.303216/100
No-new-revenue tax rate:	$0.300790/100	$0.297373/100
No-new revenue maintenance & operations tax rate:	$0.184393/100	$0.198440/100
Voter-approval tax rate:	$0.299795/100	$0.333016/100
Debt rate:	$0.108949/100	$0.118701/100

Total debt obligation for City of Lucas secured by property taxes: $1,570,850

CITY OF LUCAS

Proposed Budget
Fiscal Year 2020-2021



City Councilmembers

Mayor Jim Olk
Mayor Pro Tem Kathleen Peele
Councilmember Wayne Millsap
Councilmember Tim Baney
Councilmember Steve Duke
Councilmember Phil Lawrence
Councilmember Debbie Fisher

City Manager Joni Clarke
Finance Director Liz Exum

TABLE OF CONTENTS

OVERVIEW

Organizational Chart	Page	1

FINANCIAL SUMMARY

Total Funds Budget Overview	Pages	2-3
General Fund Balance Summary	Page	4
Water Fund Balance Summary	Page	5
Capital Fund Summary	Page	6
Impact/Development Fee Summary	Page	7
Tax Revenue Comparisons	Page	8

OPERATING BUDGET

GENERAL FUND:

General Fund Revenue Summary Chart	Page	9
General Fund Departmental Expenditures Chart	Page	10
Revenue	Pages	11-12
City Council	Page	13
City Secretary	Page	14
Administration/Finance	Page	15
Public Works - Engineering	Page	16
Public Works - Operations	Page	17
Parks	Page	18
Development Services	Page	19
Fire Department	Page	20-21
Non-Departmental	Page	22

CAPITAL FUND:

Capital Improvements Revenue Summary	Page	23
Capital Improvements - Water and General Fund	Page	24

WATER FUND:

Water Fund Revenue Summary Chart	Page	25
Water Fund Expenditures Summary Chart	Page	26
Revenue	Page	27
Water	Page	28-29
Water - Engineering	Page	30
Water Debt Service	Page	31

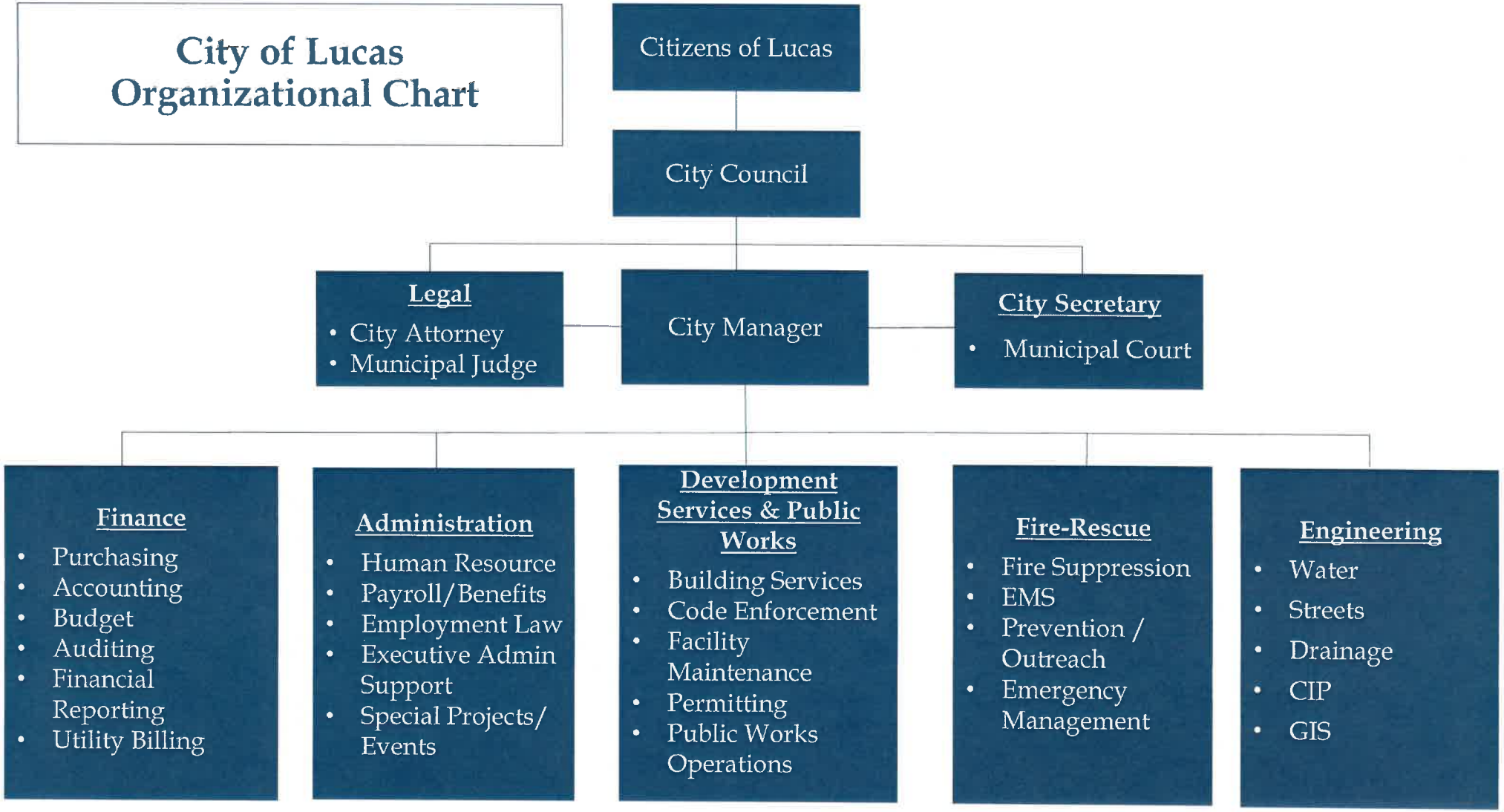
DEBT SERVICE FUND:

Debt Service Summary	Page	32

TECHNOLOGY FUND:

Technology Summary	Page	33

City of Lucas
Organizational Chart



	2018-2019 FISCAL YEAR ACTUAL	2019-2020 ORIGINAL BUDGET	2019-2020 AMENDED BUDGET	2020-2021 FISCAL YEAR BUDGET
REVENUE SUMMARY				
GENERAL FUND				
PROPERTY TAXES	2,639,576	2,538,275	2,545,475	2,654,263
OTHER TAXES	1,574,466	1,506,000	1,599,460	1,592,460
FINES & FORFEITURES	1,414	1,430	1,742	1,430
LICENSES & PERMITS	487,162	576,620	581,160	518,620
FIRE DEPARTMENT REVENUE	886,832	905,044	939,954	937,805
FEES & SERVICE CHARGES	30,925	54,450	107,333	43,850
MISCELLANEOUS REVENUES	733,048	584,739	982,826	468,296
GF RESERVE FUNDING (USE OF)	-	100,000	-	-
TOTAL GENERAL FUND REVENUE	**6,353,423**	**6,266,558**	**6,757,950**	**6,216,724**
WATER UTILITIES FUND				
FEES & SERVICE CHARGES	4,361,007	4,743,563	4,782,563	4,970,154
RESERVE FUNDING (USE OF)			-	-
MISCELLANEOUS REVENUES	271,847	160,400	125,400	46,400
TOTAL WATER UTILITIES FUND REVENUE	**4,632,854**	**4,903,963**	**4,907,963**	**5,016,554**
DEBT SERVICE FUND				
PROPERTY TAXES/RESERVE FUNDING	1,359,010	1,533,603	1,516,503	1,570,850
TOTAL DEBT SERVICE FUND REVENUE	**1,359,010**	**1,533,603**	**1,516,503**	**1,570,850**
TECHNOLOGY FUND				
TRANSFERS		-	56,625	-
TOTAL TECHNOLOGY FUND REVENUE	**-**	**-**	**56,625**	**-**
COMBINED REVENUE OPERATIONS	**12,345,287**	**12,704,124**	**13,239,041**	**12,804,128**
EXPENDITURES				
GENERAL FUND				
CITY COUNCIL	31,954	24,140	37,120	21,140
CITY SEC	142,335	168,900	161,776	165,137
ADMIN/FINANCE	562,723	612,889	634,133	626,744
DEVELOPMENT SERVICES	413,860	485,603	433,002	443,626
PUBLIC WORKS - ENGINEERING	1,165,288	1,004,705	1,171,700	991,534
PUBLIC WORKS	245,925	664,940	587,589	349,380
PARKS	168,397	226,925	208,561	213,110
FIRE	2,584,869	2,276,365	2,322,844	2,293,092
NON-DEPARTMENTAL	703,293	704,966	991,024	557,436
TOTAL GENERAL FUND EXPENDITURES	**6,018,644**	**6,169,433**	**6,547,749**	**5,661,199**
WATER UTILITIES FUND				
WATER UTILITIES	3,610,996	3,851,321	3,939,154	3,900,343
WATER - ENGINEERING	120,887	162,621	165,547	152,416
TOTAL WATER FUND EXPENDITURES	**3,731,883**	**4,013,942**	**4,104,701**	**4,052,759**
DEBT SERVICE				
WATER UTILITIES	670,904	733,819	733,819	730,246
GENERAL FUND	1,172,388	1,500,398	1,500,398	1,570,850
TOTAL DEBT SERVICE	**1,843,292**	**2,234,217**	**2,234,217**	**2,301,096**
TECHNOLOGY FUND				
TECHNOLOGY FUND EXPENDITURES		-	56,625	-
	-	-	-	-
TOTAL TECHNOLOGY FUND EXPENDITURES	**-**	**-**	**56,625**	**-**
TOTAL EXPENDITURES OPERATING	**11,593,819**	**12,417,592**	**12,943,292**	**12,015,054**
NET REVENUE LESS EXPENDITURES - OPERATING	**751,468**	**286,532**	**295,749**	**789,074**

	2018-2019 FISCAL YEAR ACTUAL	2019-2020 ORIGINAL BUDGET	2019-2020 AMENDED BUDGET	2020-2021 FISCAL YEAR BUDGET
SUMMARY BY FUND				
GENERAL FUND				
REVENUE	6,353,423	6,266,558	6,757,950	6,216,724
EXPENDITURES	6,018,644	6,169,433	6,547,749	5,661,199
NET REVENUE LESS EXPENDITURES	334,779	97,125	210,201	555,525
WATER UTILITIES FUND				
REVENUE	4,632,854	4,903,963	4,907,963	5,016,554
RESERVE FUNDING			-	
EXPENDITURES	3,731,883	4,013,942	4,104,701	4,052,759
DEBT SERVICE	670,904	733,819	733,819	730,246
NET REVENUE LESS EXPENDITURES	230,067	156,202	69,442	233,549
DEBT SERVICE FUND-GENERAL				
REVENUE	1,359,010	1,533,603	1,516,503	1,570,850
EXPENDITURES	1,172,388	1,500,398	1,500,398	1,570,850
NET REVENUE LESS EXPENDITURES	186,622	33,205	16,105	-
TECHNOLOGY FUND				
REVENUE/TRANSFERS		-	56,625	-
EXPENDITURES		-	56,625	-
NET REVENUE LESS EXPENDITURES	-	-	-	-
NET REVENUE LESS EXPENDITURES - OPERATING	751,468	286,532	295,749	789,074

FUND SUMMARIES - GOVERNMENTAL FUNDS

COMBINED SUMMARY OF REVENUES AND EXPENDITURES AND CHANGES IN FUND BALANCE

	GENERAL	DEBT SERVICE	CAPITAL IMPROVEMENTS	BROCKDALE ROAD IMPROV	DEVELOPERS IMPACT FEES (LOGAN FORD/5 OAKS)	IMPACT FEES	TOTAL GOVERNMENTAL
BEGINNING FUND BALANCE	**7,602,525**	**1,177,437**	**6,031,538**	**342,127**	**52,800**	**483,681**	**15,690,108**
PROPERTY TAXES	2,654,263	1,415,383					4,069,646
OTHER TAXES	1,592,460						1,592,460
FINES & FORFEITURES	1,430						1,430
LICENSES & PERMITS	518,620						518,620
FIRE DEPARTMENT REVENUE	937,805						937,805
FEES & SERVICE CHARGES	43,850						43,850
MISCELLANEOUS REVENUES	468,296		60,000	60,000			588,296
IMPACT FEE REVENUE (11-4500)						300,000	300,000
TRANSFER IN IMPACT FEES			-				-
TOTAL REVENUES	**6,216,724**	**1,415,383**	**60,000**	**60,000**		**300,000**	**8,052,107**
EXPENDITURES							
CITY COUNCIL	21,140						21,140
CITY SEC	165,137						165,137
ADMIN/FINANCE	626,744						626,744
DEVELOPMENT SERVICES	443,626						443,626
PUBLIC WORKS	349,380						349,380
PUBLIC WORKS - ENGINEERING	991,534						991,534
PARKS	213,110						213,110
FIRE	2,293,092						2,293,092
NON-DEPARTMENTAL	557,436						557,436
DEBT SERVICE PRINCIPAL		1,020,000					1,020,000
DEBT SERVICE INTEREST/BOND EXP		550,850					550,850
BROCKDALE ROAD MAINT.						-	-
CAPITAL ROADWAY PROJECTS			4,184,820			-	4,184,820
TOTAL EXPENDITURES	**5,661,199**	**1,570,850**	**4,184,820**	-		-	**11,416,869**
NET CHANGE IN FUND BALANCE	**555,525**	**(155,467)**	**(4,124,820)**	**60,000**		**300,000**	**(3,364,762)**
ENDING FUND BALANCE	**8,158,050**	**1,021,970**	**1,906,718**	**402,127**	**52,800**	**783,681**	**12,325,346**
MINUS RESTRICTIONS AND TRANSFERS							
IMPACT FEES						(783,681)	(783,681)
BROCKDALE ROAD IMPROVEMENTS				(402,127)			(402,127)
RESTRICTED FOR CAPITAL - GENERAL FUND (FY 20-21)NEW	(50,000)						(50,000)
DEBT SERVICE PAYMENTS		(1,021,970)					(1,021,970)
3RD PARTY (DEVELOPER) IMPACT FEES RESTRICTED (LOGAN FORD/5 OAKS)					(52,800)		(52,800)
CAPITAL IMPROVEMENT PROJECTS			(1,906,718)				(1,906,718)
UNASSIGNED FUND BALANCE	8,108,050	-	-	-	-	-	8,108,050
TOTAL AMOUNT OF RESERVES PRIOR TO GASB 54 REQUIREMENT	**8,108,050**	-	-	-	-	-	**8,108,050**
AMOUNT IN DAYS OPERATING COST	516						516
AMOUNT IN MONTHS OPERATING COST	17						17
RESERVES FOR GASB 54 FUND BALANCE POLICY (50% OF CURRENT YR EXPENDITURES IN GENERAL FUND)	(2,830,600)						(2,830,600)
TOTAL RESERVES AFTER GASB 54 REQUIREMENTS	**5,277,451**						**5,277,451**
AMOUNT IN DAYS OPERATING COST	**336**						**336**
AMOUNT IN MONTHS OPERATING COST	**11**						**11**

FUND SUMMARIES - PROPRIETARY

COMBINED SUMMARY OF REVENUES AND EXPENDITURES AND CHANGES IN FUND BALANCE

	WATER	CAPITAL IMPROVEMENTS	IMPACT /DEVELOP FEES	TOTAL PROPRIETARY
BEGINNING BALANCE RESTRICTED/UNRESTRICTED	**6,726,901**	**1,468,370**	-	**8,195,271**
WATER REVENUE	4,283,924			4,283,924
WASTE WATER REVENUE	51,230			51,230
TRASH REVENUE	635,000			635,000
MISCELLANEOUS REVENUES	46,400			46,400
REFUND NTMWD CAPITAL				-
DEVELOPERS FEES - SEWER	-			-
IMPACT FEES			200,000	200,000
TRANSFER IN IMPACT FEES		200,000		200,000
TRANSFER IN FUND BALANCE - WATER				-
TOTAL REVENUES	**5,016,554**	**200,000**	**200,000**	**5,416,554**
EXPENDITURES				
WATER	3,282,343			3,282,343
TRASH	564,000			564,000
WASTEWATER	54,000			54,000
DEBT SERVICE PRINCIPAL	515,000			515,000
DEBT SERVICE INTEREST/BOND EXP	215,246			215,246
WATER - ENGINEERING	152,416			152,416
TRANSFER OUT TO FUND WATER PROJECT		-		-
TRANSFER OUT TO FUND WATER PROJECT			200,000	200,000
CAPITAL PROJECTS WF				-
				-
TOTAL EXPENDITURES	**4,783,005**	**-**	**200,000**	**4,983,005**
NET CHANGE IN BALANCE	**233,549**	**200,000**	**-**	**433,549**
ENDING BALANCE	**6,960,450**	**1,668,370**	-	**8,628,820**
MINUS RESTRICTED FOR:				
DEBT SERVICE PAYMENTS	(515,000)			(515,000)
CUSTOMER DEPOSITS	(261,295)			(261,295)
CAPITAL IMPROVEMENTS - PROJECTS		(1,668,370)		(1,668,370)
TRSF TO CAPITAL FROM RESERVES				-
UNASSIGNED FUND BALANCE	6,184,155	-	-	6,184,155
TOTAL AMOUNT OF RESERVES PRIOR TO GASB 54 REQUIREMENT	**6,184,155**	-	-	**6,184,155**
AMOUNT IN DAYS OPERATING COST	522			522
AMOUNT IN MONTHS OPERATING COST	17			17
RESERVES FOR GASB 54 FUND BALANCE POLICY (50% OF CURRENT YR EXPENDITURES IN GENERAL FUND)	(2,134,002)			(2,134,002)
TOTAL RESERVES AFTER GASB 54 REQUIREMENTS	**4,050,153**	-	-	**4,050,153**
AMOUNT IN DAYS OPERATING COST	**342**			**342**
AMOUNT IN MONTHS OPERATING COST	**11**			**11**

CAPITAL FUND SUMMARY	2020-2021 FISCAL YEAR BUDGET
CAPITAL WATER PROJECTS:	
TOTAL WF PROJECTS FY 20/21	**0**
PROJECT FUNDING - WATER:	
TOTAL WATER PROJECT FUNDING	**0**
CAPITAL ROADWAY AND GF PROJECTS:	
WEST LUCAS ROAD PROJECT (21-8210-491-136)	4,184,820
TOTAL GF PROJECTS FY 20/21	**4,184,820**
PROJECT FUNDING - GENERAL FUND:	
2019 CERTIFICATES OF OBLIGATION INTEREST	(60,000)
2019 CERTIFICATES OF OBLIGATION	(4,124,820)
TOTAL GENERAL FUND PROJECT FUNDING	**(4,184,820)**
TOTAL CAPITAL PROJECTS FY 20/21	**4,184,820**

Impact/Development Fee Summary	2018-2019 ACTUAL	2019-2020 AMENDED BUDGET	2020-2021 FISCAL YEAR BUDGET
GENERAL FUND:			
Beginning Balance General Fund (Restricted)	1,817,459	2,071,164	878,608
Revenue			
Roadway Impact Fees(11-4500)	212,881	300,000	300,000
Roadway Fees Brockdale(11-4989) Improv	81,400	60,000	60,000
Contrib. Roadway Maint. Brockdale(11-4990)	100,000	-	-
Total Revenues	394,281	360,000	360,000
Expenditures			
Capital Projects Roadways		1,548,806	-
Brockdale Road Rehabilitation	38,795		-
Brockdale Road Maint.	101,781	3,750	-
Total Expenditures	140,576	1,552,556	-
Total General Fund Restricted Impact Fees & 3rd Party	**2,071,164**	**878,608**	**1,238,608**
Restricted for Developers Logan Ford/Five Oaks	52,800	52,800	52,800
Restricted for Brockdale Road Maint.	8,079	4,329	4,329
Restricted for Brockdale Capital Improvements	277,799	337,798	397,798
Total 3rd Party Restricted	338,678	394,927	454,927
General Fund Ending Bal Impact Fees (Restricted for Roads)	1,732,486	483,681	783,681
Total General Fund Restricted Impact Fees & 3rd Party	**2,071,164**	**878,608**	**1,238,608**
WATER FUND:			
Beginning Balance - Water Fund	(5,691,859)	(5,691,860)	(5,441,860)
Revenue			
Water Impact Fees	188,869	250,000	200,000
Development Fees -Sewer		-	
Total Revenues	188,869	250,000	200,000
Expenditures			
Capital Projects - Water	-		
Capital Projects- Sewer			-
Total Expenditures	-	-	-
Revenues less Expenditures	188,869	250,000	200,000
Water Fund Ending Balance to apply toward impact fees	(5,502,990)	(5,441,860)	(5,241,860)

CITY OF LUCAS PROPERTY TAX RATES

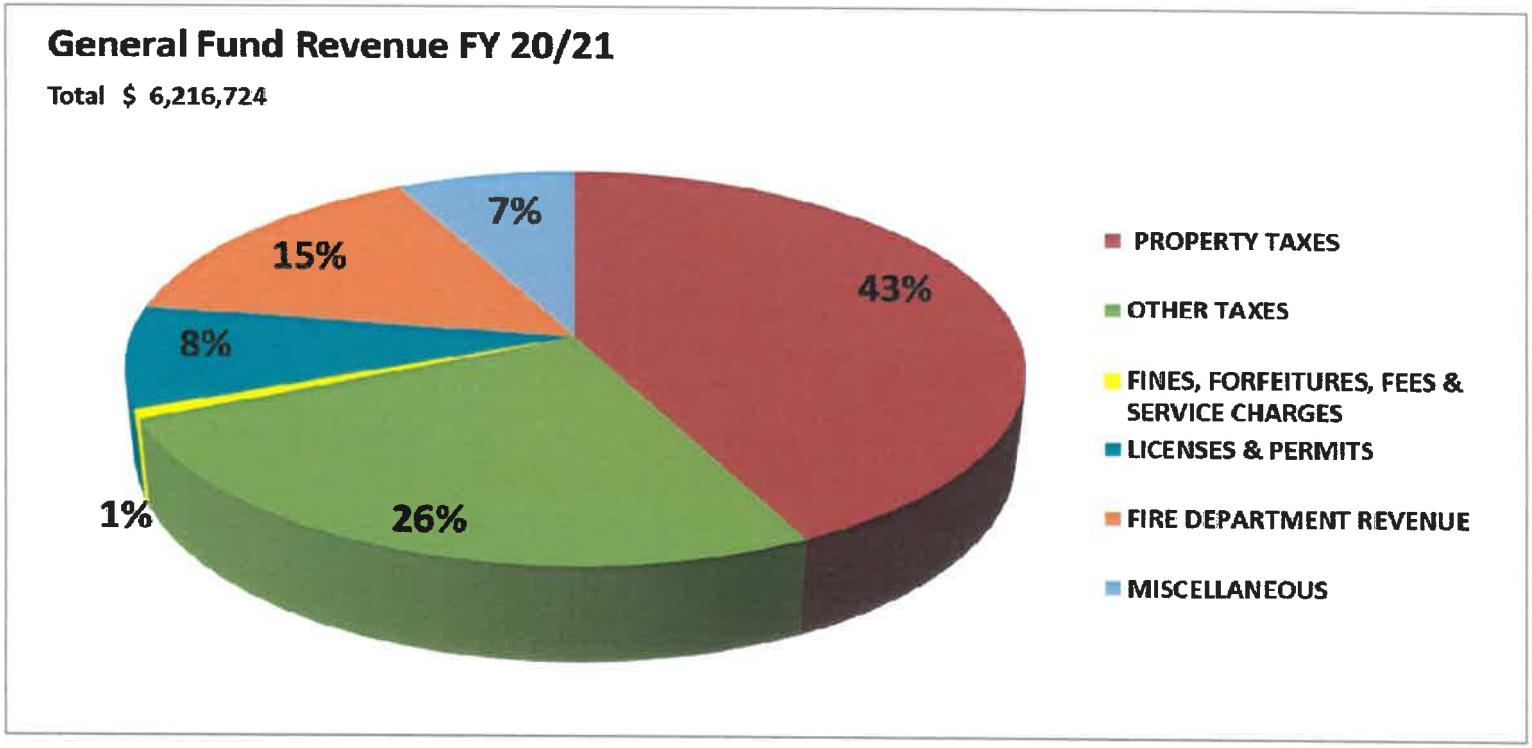
Property tax is by far the largest source of revenue in the City of Lucas General Fund. Property tax is collected by Collin County and distributed to the City. The City's property tax is budgeted at a rate of .299795 for 2020. This tax rate is the "Voter-approval" Rate - below is a table depicting the recent history of the City of Lucas property tax rate.

Tax Year	O&M	I&S	Total
2006	0.248146	0.126854	0.375000
2007	0.244260	0.130740	0.375000
2008	0.250509	0.123668	0.374177
2009	0.252040	0.122137	0.374177
2010	0.247231	0.126946	0.374177
2011	0.257723	0.116454	0.374177
2012	0.261218	0.112959	0.374177
2013	0.254005	0.101611	0.355616
2014	0.233068	0.087593	0.320661
2015	0.215514	0.105147	0.320661
2016	0.230371	0.087577	0.317948
2017	0.198695	0.119253	0.317948
2018	0.202346	0.100870	0.303216
2019	0.184515	0.118701	0.303216
2020	0.190846	0.108949	0.299795

As you can see in the chart below, the property tax rate for the City of Lucas is very favorable in comparison to other cities within the area.

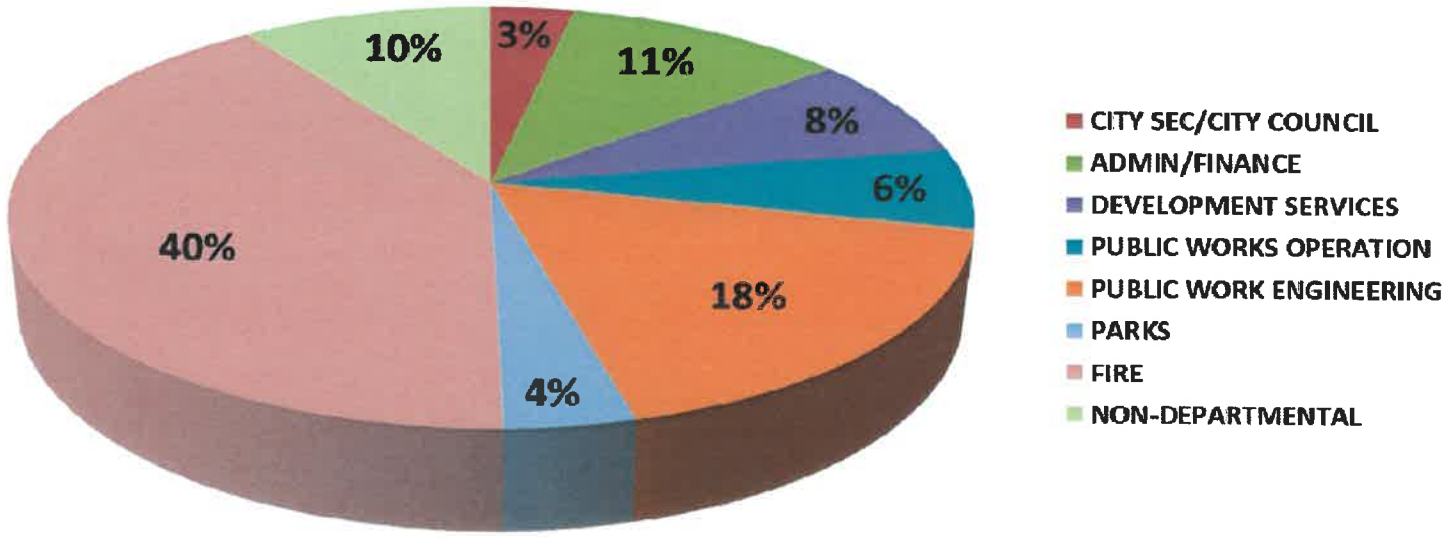
Fiscal Year 2019 Tax Rates

City	O&M	I&S	Total
Farmersville	0.414033	0.335967	0.750000
Sachse	0.525793	0.194207	0.720000
Wylie	0.516225	0.172229	0.688454
Princeton	0.394076	0.282223	0.676299
Celina	0.453683	0.191317	0.645000
Melissa	0.460931	0.148610	0.609541
Anna	0.451540	0.139748	0.591288
Prosper	0.367500	0.152500	0.520000
Murphy	0.315104	0.179896	0.495000
Allen	0.387038	0.101962	0.489000
Parker	0.317791	0.048193	0.365984
Fairview	0.230180	0.116976	0.347156
Lucas	0.184515	0.118701	0.303216


General Fund Revenue FY 20/21
Total $ 6,216,724
7%
15%
43%
8%
1%
26%
PROPERTY TAXES
OTHER TAXES
FINES, FORFEITURES, FEES & SERVICE CHARGES
LICENSES & PERMITS
FIRE DEPARTMENT REVENUE
MISCELLANEOUS

General Fund Expenditures by Department FY 20/21

Total $ 5,661,199



11 -GENERAL FUND REVENUE		2018-2019 FISCAL YEAR ACTUAL	2019-2020 ORIGINAL BUDGET	2019-2020 AMENDED BUDGET	2020-2021 FISCAL YEAR BUDGET	DESCRIPTION
4011	PROPERTY TAXES	2,580,665	2,510,275	2,534,275	2,644,263	M&O rate .190846
4012	PROPERTY TAXES-DEL.	32,247	16,000	1,200		Collection down
4015	PROPERTY TAXES-P&I	26,663	12,000	10,000	10,000	
TOTAL PROPERTY TAXES		**2,639,576**	**2,538,275**	**2,545,475**	**2,654,263**	
OTHER TAXES						
4101	SALES TAX	773,110	730,000	780,000	780,000	
4101-100	SALES TAX STREETS	387,716	370,800	417,000	417,000	
4102	FRANCHISE-ELECTRICAL	327,931	330,000	330,000	330,000	
4103	FRANCHISE-TELEPHONE	6,386		4,260	4,260	
4104	FRANCHISE-CABLE	43,422	42,000	35,000	28,000	Legislative change SB 1152
4105	FRANCHISE-GAS	32,595	30,000	30,000	30,000	
4106	FRANCHISE-CABLE PEG	3,306	3,200	3,200	3,200	
TOTAL OTHER TAXES		**1,574,466**	**1,506,000**	**1,599,460**	**1,592,460**	
FINES & FORFEITURES						
4202	COURT TECHNOLOGY FUND	16	20	20	20	
4203	COURT SECURITY FUND	12	15	15	15	
4204	COURT COST-CITY	20	20	20	20	
4205	FINES	1,158	1,160	1,472	1,160	
4206	COURT COST-STATE	160	160	160	160	
4208	STATE JURY FEE	16	20	20	20	
4212	JUDICIAL FEES-STATE	22	25	25	25	
4213	JUDICIAL FEES-CITY	2	2	2	2	
4218	INDIGENT DEFENSE FEE	8	8	8	8	
TOTAL FINES & FORFEITURES		**1,414**	**1,430**	**1,742**	**1,430**	
LICENSES & PERMITS						
4301	GEN CONTRACTOR REG.	18,765	20,000	20,000	20,000	
4361	ZONING REQUEST	450	1,200	1,200	1,200	
4362	SPECIFIC USE PERMITS	1,800	1,350	1,350	1,350	
4363	VARIANCE REQUEST	-	450	450	450	
4365	BLDG PERMITS-RESIDENTIAL	269,367	360,000	360,000	320,000	
4367	BLDG PERMITS-ACC.	24,558	20,000	20,000	20,000	
4368	BLDG PERMITS-REMODEL	6,380	7,200	7,200	7,200	
4369	BLDG PERMITS-COMM.	30,601	30,000	30,000	20,000	
4371	ELECTRICAL PERMITS	2,630	2,200	2,370	2,200	
4372	PLUMBING PERMITS	4,740	4,000	4,200	4,000	
4373	HEATING & A/C PERMITS	3,060	1,200	1,980	1,200	
4374	FENCE PERMITS	6,600	6,000	6,000	6,000	
4375	SWIMMING POOL PERMITS	19,675	22,000	22,000	22,000	
4376	WEIGHT LIMIT PERMITS	51,100	48,000	48,000	40,000	
4377	ROOF PERMITS	5,100	1,000	2,400	1,000	
4378	SPRINKLER SYST PERMITS	7,920	6,500	6,500	6,500	
4379	DRIVEWAY PERMIT	1,300	1,000	1,390	1,000	
4380	SIGN PERMIT	1,000	2,000	2,000	2,000	
4382	STORM WATER MGMT PERMIT	3,100	4,900	4,900	4,900	
4384	SOLICITATION PERMIT	-	120	120	120	
4390	PLANNED DEVELOPMENT	500		1,600		
4395	HEALTH SERVICE PERMITS	4,500	6,300	6,300	6,300	
4398	MISC LICENSES & PERMITS	755	1,200	1,200	1,200	
4611	FIRE SPRINKLER PERMIT	23,261	30,000	30,000	30,000	
TOTAL LICENSES & PERMITS		**487,162**	**576,620**	**581,160**	**518,620**	
FIRE DEPARTMENT REVENUE						
4612	COUNTY FIRE DISTRICT	32,022	20,000	8,710	-	
4613	SEIS LAGOS INTER-LOCAL	363,841	406,144	406,144	442,705	Adjusted preliminary calc for actual
4614	AMBULANCE SERVICES	101,140	100,000	100,000	70,000	
4615	LISD EMS SERVICE	7,040	8,100	8,100	8,100	

11 -GENERAL FUND REVENUE		2018-2019 FISCAL YEAR ACTUAL	2019-2020 ORIGINAL BUDGET	2019-2020 AMENDED BUDGET	2020-2021 FISCAL YEAR BUDGET	DESCRIPTION
4999	FIRE DISTRICT TRANSFER IN	382,789	370,800	417,000	417,000	
TOTAL FIRE DEPARTMENT REVENUE		**886,832**	**905,044**	**939,954**	**937,805**	
FEES & SERVICE CHARGES						
4424	PLAT & REPLAT FEES	5,604	15,000	15,000	15,000	
4425	RE-INSPECTION FEES	4,650	5,000	5,000	3,400	
4426	FEES-BUILDING PROJECTS	1,200	7,200	7,200	7,200	
4427	PUBLIC IMPRV/3% INSPEC	19,071	27,000	79,883	18,000	
4497	PUBLIC INFO. REQUESTS			-		
4498	MISC. FEES & CHARGES	400	250	250	250	
TOTAL FEES & SERVICE CHARGES		**30,925**	**54,450**	**107,333**	**43,850**	
MISCELLANEOUS REVENUE						
4911	INTEREST INCOME	160,320	130,000	95,000	50,000	Lower interest rate trend
4914	INSURANCE CLAIM REIMB	65,052	-	1,964		
4915	CHILD SAFETY INCOME	7,427	6,900	6,900	6,900	
4916	CREDIT CARD REVENUE	14,937	11,500	12,823	16,000	
4918	PERMIT FEE BEER & WINE	60		-		
4931	RENTAL INCOME	83,082	79,800	85,800	85,800	
4980	PARK DEDICATION FEES	20,000	80,000	121,000	30,000	Adj to actual
4981	FACILITY RENTAL	1,274		-		
4984	CARES ACT FUNDING			361,356		Funding from County for COVID-19 exp
4985	GRANT REVENUES	24,310	12,505	27,505	12,500	FD Training Grants
4986	DONATIONS	4,600		-		
4990	BROCKDALE RD MAINT	100,000	-	-		
4991	STREET ASSESSMENTS	1,300		-		
4992	SALE OF ASSETS	8,418	3,000	3,000		
4995	REIMBURSEMENTS	-		-		
4997	MISCELLANEOUS	3,880	5,539	8,091		
4998	PILOT TRANSFER IN	238,388	255,495	259,387	267,096	
TOTAL MISCELLANEOUS REVENUE		**733,048**	**584,739**	**982,826**	**468,296**	
4996	GF RESERVE FUNDING (USE OF)	-	100,000	-	0	
*****TOTAL REVENUES*****		**6,353,423**	**6,266,558**	**6,757,950**	**6,216,724**	

11 -GENERAL FUND *CITY COUNCIL* DEPARTMENTAL EXPENDITURES	2018-2019 FISCAL YEAR ACTUAL	2019-2020 ORIGINAL BUDGET	2019-2020 AMENDED BUDGET	2020-2021 FISCAL YEAR BUDGET	DESCRIPTION
PERSONNEL SERVICES					
6100-112 WORKERS' COMPENSATION	60	70	70	70	
6100-127 MEDICARE	131	220	220	220	
6100-127 UNEMPLOYMENT	-				
6100-468 CITY COUNCIL FEES	9,000	9,000	9,000	9,000	
TOTAL PERSONNEL SERVICES	**9,191**	**9,290**	**9,290**	**9,290**	
MATERIALS & SUPPLIES					
6100-201 OFFICE SUPPLIES	2,410	-		-	
6100-204 FOOD/BEVERAGE	1,135	1,500	1,500	1,500	
6100-205 LOGO/UNIFORM	447				
6100-210 COMPUTER SUPPLIES	-	350	350	350	
6100-222 AUDIO/VISUAL	-	3,000	15,980	1,000	Replacement/repair
TOTAL MATERIALS & SUPPLIES	**3,992**	**4,850**	**17,830**	**2,850**	
PURCHASED SERVICES:					
6100-307 TRAINING & TRAVEL	3,045	3,500	3,500	3,500	$500 per council member
6100-309 PROFESSIONAL SERVICES	1,200	-	-		
TOTAL PURCHASED SERVICES	**4,245**	**3,500**	**3,500**	**3,500**	
GENERAL & ADMINISTRATIVE SERVICES					
6100-441 APPRECIATION/AWARDS	3,443	6,000	6,000	5,000	See Detail Listing/Board Apprec
TOTAL GENERAL & ADMIN SERVICES	**3,443**	**6,000**	**6,000**	**5,000**	
NON-CAPITAL EXPENSE					
6100-451 SOFTWARE, BOOKS, & CDS	144	500	500	500	See Detail Listing
6100-452 HARDWARE & TELECOM	769	-			
6100-411 FURNITURE & EQUIPMENT	10,170	-			
TOTAL NON-CAPITAL EXPENSE	**11,083**	**500**	**500**	**500**	
TOTAL CITY COUNCIL	**31,954**	**24,140**	**37,120**	**21,140**	

11 -GENERAL FUND *CITY SECRETARY* DEPARTMENTAL EXPENDITURES		2018-2019 FISCAL YEAR ACTUAL	2019-2020 ORIGINAL BUDGET	2019-2020 AMENDED BUDGET	2020-2021 FISCAL YEAR BUDGET	DESCRIPTION
PERSONNEL SERVICES						
6110-101	SALARIES - EXEMPT	77,875	77,964	80,315	80,315	
6110-103	SALARIES - TEMPORARY	-	-	-	-	
6110-112	WORKERS' COMPENSATION	260	275	275	275	
6110-113	LONGEVITY PAY	184	235	235	280	
6110-122	TMRS	10,300	9,993	10,299	10,318	Increase from 12.63% to 12.79%
6110-123	GROUP INSURANCE	9,719	9,996	9,996	10,320	
6110-127	MEDICARE	1,137	1,135	1,169	1,169	
6110-129	LT DISABILITY	329	410	410	241	Decrease from $.0425 to $.023 per $100
6110-133	TELEPHONE ALLOWANCE	480	480	480	480	
TOTAL PERSONNEL SERVICES		**100,284**	**100,488**	**103,179**	**103,398**	
MATERIALS & SUPPLIES						
6110-201	OFFICE SUPPLIES	892	1,100	1,100	1,100	
6110-204	FOOD/BEVERAGE	74	100	100	100	
6110-210	COMPUTER SUPPLIES	-	50	50	50	
6110-238	PRINTING & COPYING	10,699	12,800	12,800	12,800	Newsletter
6110-239	RECORDS MANAGEMENT	937	4,500	4,500	4,500	See Detail Listing
TOTAL MATERIALS & SUPPLIES		**12,602**	**18,550**	**18,550**	**18,550**	
PURCHASED SERVICES						
6110-305	SOFTWARE SUPPORT & MAINT.	11,069	11,414	11,414	7,194	See Detail Listing
6110-306	ADVERTISING/PUBLIC NOTICES	8,037	14,300	11,445	14,300	
6110-307	TRAINING & TRAVEL	300	4,163	4,163	1,710	See Travel & Training Plan
6110-309	PROFESSIONAL SERVICES	1,018	5,500	5,500	5,500	Qtrly Codification - Franklin
6110-349	FILING FEES	465	2,200	2,200	2,200	
TOTAL PURCHASED SERVICES		**20,889**	**37,577**	**34,722**	**30,904**	
GENERAL & ADMINISTRATIVE SERVICES						
6110-443	DUES/LICENSES	175	185	185	185	See Detail Listing
6110-445	ELECTIONS	8,385	11,000	875	11,000	Two elections/Nov 3rd/May 1st
6110-451	SOFTWARE, BOOKS & CD'S	-	1,100	1,100	1,100	See Detail Listing
TOTAL GENERAL & ADMIN SERVICES		**8,560**	**12,285**	**2,160**	**12,285**	
NON-CAPITAL EXPENSE						
6110-411	FURNITURE & FIXTURES					
6110-452	HARDWARE TELECOM	-		3,165		Council Computer for Court
TOTAL NON-CAPITAL EXPENSE		-	-	3,165	-	
TOTAL CITY SECRETARY		**142,335**	**168,900**	**161,776**	**165,137**	

11 -GENERAL FUND *ADMINISTRATION & FINANCE* DEPARTMENTAL EXPENDITURES		2018-2019 FISCAL YEAR ACTUAL	2019-2020 ORIGINAL BUDGET	2019-2020 AMENDED BUDGET	2020-2021 FISCAL YEAR BUDGET	DESCRIPTION
PERSONNEL SERVICES						
6200-101	SALARIES - EXEMPT	256,574	244,500	260,858	260,858	
6200-102	SALARIES - NON-EXEMPT	82,450	85,435	88,014	88,020	
6200-111	OVERTIME	540	1,900	1,900	1,900	
6200-112	WORKERS' COMP	1,123	1,125	1,125	1,125	
6200-113	LONGEVITY PAY	1,292	1,485	1,485	1,500	
6200-122	TMRS	45,234	43,000	45,462	46,000	Increase from 12.63% to 12.79%
6200-123	GROUP INSURANCE	50,199	49,980	51,456	52,800	Includes $1404 for Teladoc
6200-127	MEDICARE	4,931	4,820	5,095	5,100	
6200-129	LT DISABILITY	1,361	1,443	1,443	915	Decrease from $.0425 to $.023 per $100
6200-133	TELEPHONE ALLOWANCE	1,380	1,380	1,380	1,380	
6200-141	CAR ALLOWANCE	2,400	2,400	2,400	2,400	
TOTAL PERSONNEL SERVICES		**447,484**	**437,468**	**460,618**	**461,998**	
MATERIALS & SUPPLIES						
6200-201	OFFICE SUPPLIES	5,170	6,000	6,000	6,000	
6200-202	POSTAGE	1,500	1,700	1,700	1,700	Split between water and general funds
6200-203	SUBSCRIPTIONS	304	450	450	450	
6200-204	FOOD/BEVERAGE	2,193	2,200	2,200	2,200	
6200-205	LOGO/UNIFORM ALLOWANCE	370	800	800	800	$100 per person
6200-210	COMPUTER SUPPLIES	80	350	350	350	
TOTAL MATERIALS & SUPPLIES		**9,617**	**11,500**	**11,500**	**11,500**	
PURCHASED SERVICES:						
6200-302	AUDITING & ACCOUNTING	9,705	12,500	12,500	12,500	
6200-305	SOFTWARE SUPPORT/MAINT	14,054	17,250	17,250	18,200	Incode Maintenance
6200-307	TRAINING & TRAVEL	9,353	17,595	11,265	9,960	See Travel & Training Plan
6200-309	PROFESSIONAL SERVICES	3,621	19,016	17,540	3,000	$3K Debt Disclosure SAMCO
6200-313	MAINTENANCE AGREEMENTS	5,356	5,400	5,400	5,496	Konica Copier/Split with water fund
6200-318	TAX COLLECTION	2,282	2,600	2,600	3,000	Increased costs County
6200-319	CENTRAL APPRAISAL FEE	25,187	30,000	30,000	36,000	Increased costs CAD
6200-321	STATE COMPTROLLER (COURT FEES)	140	300	300	300	
6200-322	CONTRACTS	5,500	7,600	7,600	7,600	$3.6K Retainer/$3K Judge/$1K Hrly
6200-323	CELL PHONE	1,225	1,300	1,300	1,300	
6200-324	INMATE BOARDING	94	750	750	750	
6200-325	LIABILITY INSURANCE	15,625	30,000	30,000	30,000	
TOTAL PURCHASED SERVICES		**92,142**	**144,311**	**136,505**	**128,106**	
GENERAL & ADMINISTRATIVE SERVICES						
6200-441	APPRECIATION/AWARDS	3,757	4,400	4,400	4,400	See Detail Listing
6200-442	TML MEMBERSHIP DUES	1,774	2,000	2,000	2,000	TML annual dues
6200-443	DUES/LICENSES	3,415	4,410	4,410	4,540	See Detail Listing
6200-444	EMPLOYMENT SCREENING	662	2,200	2,200	2,200	CareNow Physicals/Drug Screening
6200-445	CHILD SAFETY EXPENSE	-	500	500		
6200-497	CREDIT CARD FEES	3,872	6,100	12,000	12,000	Increase in activity
TOTAL GENERAL & ADMIN SERVICES		**13,480**	**19,610**	**25,510**	**25,140**	
NON-CAPITAL EXPENSE						
6200-411	FURNITURE & FIXTURES	-	-	-	-	
6200-451	SOFTWARE					
TOTAL NON-CAPITAL EXPENSE		-	-	-	-	
TOTAL ADMINISTRATION		**562,723**	**612,889**	**634,133**	**626,744**	

11 -GENERAL FUND *PUBLIC WORKS - ENGINEERING* DEPARTMENTAL EXPENDITURES		2018-2019 FISCAL YEAR ACTUAL	2019-2020 ORIGINAL BUDGET	2019-2020 AMENDED BUDGET	2020-2021 FISCAL YEAR BUDGET	DESCRIPTION
PERSONNEL SERVICES						
6209-101	SALARIES - EXEMPT	85,150	85,259	87,816	87,816	
6209-103	SALARIES - TEMPORARY	-	10,000	16,720	14,820	
6209-112	WORKERS' COMPENSATION	280	290	290	290	
6209-113	LONGEVITY	186	235	235	290	
6209-122	TMRS	11,192	11,000	11,332	11,400	Increase from 12.63% to 12.79%
6209-123	GROUP INSURANCE	9,783	9,972	9,972	10,320	
6209-127	MEDICARE	1,163	1,390	1,427	1,490	
6209-129	LT DISABILITY	365	446	446	265	Decrease from $.0425 to $.023 per $100
TOTAL PERSONNEL SERVICES		**108,119**	**118,592**	**128,238**	**126,691**	
MATERIALS & SUPPLIES						
6209-201	OFFICE SUPPLIES	141	250	250	250	
6209-204	FOOD/BEVERAGE	-	1,000	1,000	1,000	Ribbon cuttings
6209-208	MINOR APPARATUS	287	500	500	500	
6209-209	PROTECTIVE CLOTHING/UNIFOF	440	1,915	1,915	1,070	See Detail Listing
6209-210	COMPUTER SUPPLIES	328	500	500	500	
TOTAL MATERIALS & SUPPLIES		**1,196**	**4,165**	**4,165**	**3,320**	
MAINTENANCE & REPAIR						
6209-232	VEHICLE MAINTENANCE	5,117	3,000	3,000	4,950	See Detail Listing/Annual maint New Truck outfitting
TOTAL MAINTENANCE & REPAIR		**5,117**	**3,000**	**3,000**	**4,950**	
PURCHASED SERVICES						
6209-307	TRAVEL/TRAINING	2,628	3,913	3,913	1,538	See Travel & Training Plan
6209-313	MAINTENANCE AGREEMENTS		1,500	1,500	1,500	Maint. for Plotter/Scanner
6209-309	PROFESSIONAL SERVICES	74,992	87,500	143,788	82,500	See Detail Listing
6209-323	CELL PHONE	838	1,200	1,200	1,200	
6209-333	UTILITIES - WATER	3,236				
6209-334	STREET LIGHTING	1,618	5,000	5,000	5,000	
TOTAL PURCHASED SERVICES		**83,312**	**99,113**	**155,401**	**91,738**	
GENERAL & ADMINISTRATIVE SERVICES						
6209-443	DUES/LICENSES	100	325	325	325	Institute of Traffic Engineers
TOTAL GENERAL & ADMIN SERVICES		**100**	**325**	**325**	**325**	
NON-CAPITAL EXPENSE						
6209-411	FURNITURE & FIXTURES	360	500	500	500	
6209-416	IMPLEMENTS & APPARATUS	470	500	500	500	
6209-451	SOFTWARE	3,310	3,510	3,510	3,510	See Comprehensive IT Schedule
6209-452	HARDWARE	2,777				
TOTAL NON-CAPITAL EXPENSE		**6,917**	**4,510**	**4,510**	**4,510**	
CAPITAL OUTLAY						
8209-301	IMPROVEMENTS ROADS	945,148	750,000	811,061	750,000	Includes Pavement and Culvert Maint.
8209-420	EQUIPMENT	-	-	-		
8209-421	VEHICLES	-	-	40,000		
8209-433	SIGNS & MARKINGS	15,379	25,000	25,000	10,000	Regulatory Signage
8209-452	HARDWARE & TELECOM	-	-	-		
TOTAL CAPITAL OUTLAY		**960,527**	**775,000**	**876,061**	**760,000**	
TOTAL PUBLIC WORKS - ENGINEERING		**1,165,288**	**1,004,705**	**1,171,700**	**991,534**	

11 -GENERAL FUND *PUBLIC WORKS - OPERATIONS* DEPARTMENTAL EXPENDITURES	2018-2019 FISCAL YEAR ACTUAL	2019-2020 ORIGINAL BUDGET	2019-2020 AMENDED BUDGET	2020-2021 FISCAL YEAR BUDGET	DESCRIPTION
PERSONNEL SERVICES					
6210-102 SALARIES - NON-EXEMPT	73,195	112,715	96,289	112,486	
6210-104 SALARIES - NON-EXEMPT PT		18,720	24,352	18,720	
6210-111 OVERTIME	474	4,500	1,000	4,500	
6210-112 WORKERS' COMPENSATION	1,544	5,175	5,175	5,175	
6210-113 LONGEVITY	532	718	718	815	
6210-122 TMRS	9,681	17,500	17,787	17,900	Increase from 12.63% to 12.79%
6210-123 GROUP INSURANCE	17,536	29,988	29,988	30,660	
6210-127 MEDICARE	1,070	1,980	2,012	2,012	
6210-129 LT DISABILITY	306	590	590	337	Decrease from $.0425 to $.023 per $100
TOTAL PERSONNEL SERVICES	**104,338**	**191,886**	**177,911**	**192,605**	
MATERIALS & SUPPLIES					
6210-201 OFFICE SUPPLIES	480	550	550	550	
6210-204 FOOD/BEVERAGE	145	800	800	800	
6210-206 FUEL & LUBRICANTS	5,350	11,000	11,000	11,000	
6210-208 MINOR APPARATUS	4,411	5,000	1,000	5,000	
6210-209 PROTECTIVE CLOTHING/UNIFORMS	5,483	9,560	9,560	9,560	See Detail Listing
6210-210 COMPUTER SUPPLIES	168	250	250	250	
6210-211 MEDICAL SUPPLIES	-	250	250	250	
6210-214 CLEANING SUPPLIES	40	1,000	1,000	1,000	
6210-223 SAND/DIRT	522	1,500	1,500	1,500	
6210-224 ASPHALT/BASE/CONC/CULVERT	41,880	22,000	22,000	32,000	Street Maint. Program
TOTAL MATERIALS & SUPPLIES	**58,479**	**51,910**	**47,910**	**61,910**	
MAINTENANCE & REPAIR					
6210-231 FACILITY MAINTENANCE	13,025	11,500	11,500	7,500	See Detail Listing
6210-232 VEHICLE MAINTENANCE	9,264	10,800	10,800	4,200	See Detail Listing
6210-233 EQUIPMENT MAINTENANCE	7,995	9,050	9,050	9,450	See Detail Listing
6210-234 WASTE DISPOSAL	2,523	4,000	4,000	4,000	
6210-298 MAINTENANCE & PARTS - MISC	2,468	3,000	3,000	3,000	
TOTAL MAINTENANCE & REPAIR	**35,275**	**38,350**	**38,350**	**28,150**	
PURCHASED SERVICES					
6210-307 TRAVEL/TRAINING	1,403	3,599	599	1,015	See Travel & Training Plan
6210-309 PROFESSIONAL SERVICES	2,400	5,000	3,000	5,000	Surveying Easements
6210-323 CELL PHONE	989	3,500	3,500	3,500	
6210-331 UTILITIES, ELECTRIC	5,055	6,000	6,000	6,000	
6210-346 EQUIPMENT RENTAL	1,804	4,000	2,000	4,000	
TOTAL PURCHASED SERVICES	**11,651**	**22,099**	**15,099**	**19,515**	
GENERAL & ADMINISTRATIVE SERVICES					
6210-443 DUES/LICENSES	40	400	400	200	See Detail Listing
TOTAL GENERAL & ADMIN SERVICES	**40**	**400**	**400**	**200**	
NON-CAPITAL EXPENSE					
6210-411 FURNITURE & FIXTURES	-		-		
6210-416 IMPLEMENTS & APPARATUS	5,275	-	-	-	
6210-433 SIGNS & MARKINGS	8,578	12,000	10,000	12,000	
TOTAL NON-CAPITAL EXPENSE	**13,853**	**12,000**	**10,000**	**12,000**	
CAPITAL OUTLAY					
8210-420 EQUIPMENT	22,289	284,595	189,219	35,000	See Detail Listing Raptor Boom Mower replacement
8210-421 VEHICLES	-	63,700	108,700		
TOTAL CAPITAL OUTLAY	**22,289**	**348,295**	**297,919**	**35,000**	
TOTAL PUBLIC WORKS	**245,925**	**664,940**	**587,589**	**349,380**	

11 -GENERAL FUND *PARKS DEPARTMENT* DEPARTMENTAL EXPENDITURES	2018-2019 FISCAL YEAR ACTUAL	2019-2020 ORIGINAL BUDGET	2019-2020 AMENDED BUDGET	2020-2021 FISCAL YEAR BUDGET	DESCRIPTION
PERSONNEL SERVICES					
6211-103 SALARIES - NON-EXMPT TEMP	29,714	20,160	29,940	20,160	3 seasonal positions
6211-112 WORKERS COMP	1,023	600	600	600	
6211-127 MEDICARE	431	300	300	300	
TOTAL PERSONNEL SERVICES	**31,168**	**21,060**	**30,840**	**21,060**	
MAINTENANCE & REPAIR					
6211-231 FACILITIES MAINTENANCE				4,500	Previously budgeted in Pworks
6211-233 EQUIPMENT MAINTENANCE	3,285	4,500	6,500	4,500	Landscaping Equipment
TOTAL MAINTENANCE & REPAIR	**3,285**	**4,500**	**6,500**	**9,000**	
PURCHASED SERVICES					
6211-322 CONTRACTS	54,140	57,500	57,500	57,500	$35K Mowing/$22.5K Weed/Feed
6211-331 UTILITIES, ELECTRIC	2,291	2,000	2,000	2,000	
6211-333 UTILITIES, WATER	4,555	10,000	10,000	10,000	
TOTAL PURCHASED SERVICES	**60,986**	**69,500**	**69,500**	**69,500**	
SPECIAL EVENTS					
6211-444 FOUNDERS DAY	20,474	30,000	28	30,000	
6211-445 SERVICE TREE PROGRAM	921	3,200	3,200	4,000	Includes $1K for replacement trees
6211-446 KEEP LUCAS BEAUTIFUL	3,234	4,550	1,550	4,550	See Detail Listing
6211-447 COUNTRY CHRISTMAS	4,564	10,000	10,000	10,000	
6211-448 PARK EVENTS	1,909	11,000	8,000	15,000	See Detail Listing
TOTAL SPECIAL EVENTS	**31,102**	**58,750**	**22,778**	**63,550**	
NON-CAPITAL OUTLAY					
6211-417 PARK IMPROVEMENTS	22,192	50,000	54,100	50,000	$10K Beautification/$40K Trails
6211-418 PARK IMPROVEMENTS- USACE	149			-	
TOTAL NON- CAPITAL OUTLAY	**22,341**	**50,000**	**54,100**	**50,000**	
CAPITAL OUTLAY					
8211-417 PARK IMPROVEMENTS	19,515	23,115	24,843		
TOTAL CAPITAL OUTLAY	**19,515**	**23,115**	**24,843**	**-**	
TOTAL PARKS	**168,397**	**226,925**	**208,561**	**213,110**	

11 -GENERAL FUND *DEVELOPMENT SERVICES* DEPARTMENTAL EXPENDITURES		2018-2019 FISCAL YEAR ACTUAL	2019-2020 ORIGINAL BUDGET	2019-2020 AMENDED BUDGET	2020-2021 FISCAL YEAR BUDGET	DESCRIPTION
PERSONNEL SERVICES						
6212-101	SALARIES - EXEMPT	47,502	47,741	49,173	49,173	
6212-102	SALARIES - NON-EXEMPT	208,572	214,469	183,972	221,000	
6212-111	OVERTIME	7,637	11,200	11,200	11,200	
6212-112	WORKERS' COMPENSATION	1,205	2,200	2,200	2,200	
6212-113	LONGEVITY PAY	1,202	1,420	1,420	1,420	
6212-122	TMRS	34,646	35,500	34,368	36,500	Increase from 12.63% to 12.79%
6212-123	GROUP INSURANCE	42,849	44,982	38,482	46,440	
6212-127	MEDICARE	3,659	3,965	4,061	4,101	
6212-129	LT DISABILITY	1,089	1,350	1,350	810	Decrease from $.0425 to $.023 per $100
6212-131	UNEMPLOYMENT					
TOTAL PERSONNEL SERVICES		**348,361**	**362,827**	**326,226**	**372,844**	
MATERIALS & SUPPLIES						
6212-201	OFFICE SUPPLIES	4,642	5,500	5,500	5,500	
6212-203	SUBSCRIPTIONS	64	350	350	350	
6212-204	FOOD/BEVERAGE	78	500	500	500	
6212-205	LOGO/UNIFORM ALLOWANCE	1,999	2,400	2,400	2,400	
6212-206	FUEL & LUBRICANTS	3,706	5,200	5,200	5,200	
6212-210	COMPUTER SUPPLIES	76	250	250	250	
TOTAL MATERIALS & SUPPLIES		**10,565**	**14,200**	**14,200**	**14,200**	
MAINTENANCE & REPAIR						
6212-232	VEHICLE MAINTENANCE	17,362	6,900	4,900	9,100	See Detail Listing
TOTAL MAINTENANCE & REPAIR		**17,362**	**6,900**	**4,900**	**9,100**	
PURCHASED SERVICES:						
6212-305	SOFTWARE SUPPORT/MAINT.	6,334	1,900	1,900	12,574	See Comprehensive IT Schedule Energov $10,579/Incode $1,995
6212-307	TRAINING & TRAVEL	7,656	12,197	6,197	5,959	See Travel & Training Plan
6212-309	PROFESSIONAL SERVICES	4,050	14,600	7,600	12,600	See Detail Listing
6212-313	MAINTENANCE AGREEMENTS	-	100	100	100	
6212-323	CELL PHONE	2,210	3,200	3,200	3,200	
TOTAL PURCHASED SERVICES		**20,250**	**31,997**	**18,997**	**34,433**	
GENERAL & ADMINISTRATIVE SERVICES						
6212-443	DUES/LICENSES	1,512	3,029	3,029	2,949	See Detail Listing
6212-450	COMPUTER HARDWARE	2,438	5,150	5,150		
6212-451	SOFTWARE, BOOKS & CD'S	1,795	1,600	1,600	1,600	See Comprehensive IT Schedule
6212-452	STORM WATER MGMT EXPENSE	5,603	8,500	7,500	8,500	Includes $6K supplies/eqp for two cleanup events/$2.5K Education exp
TOTAL GENERAL & ADMINISTRATION SERVICES		**11,348**	**18,279**	**17,279**	**13,049**	
CAPITAL OUTLAY						
8212-420	EQUIPMENT	5,974				
8212-451	COMPUTER SOFTWARE		51,400	51,400		
8212-452	COMPUTERS					
8212-421	VEHICLES	-				
TOTAL CAPITAL OUTLAY		**5,974**	**51,400**	**51,400**	**-**	
TOTAL DEVELOPMENT SERVICES		**413,860**	**485,603**	**433,002**	**443,626**	

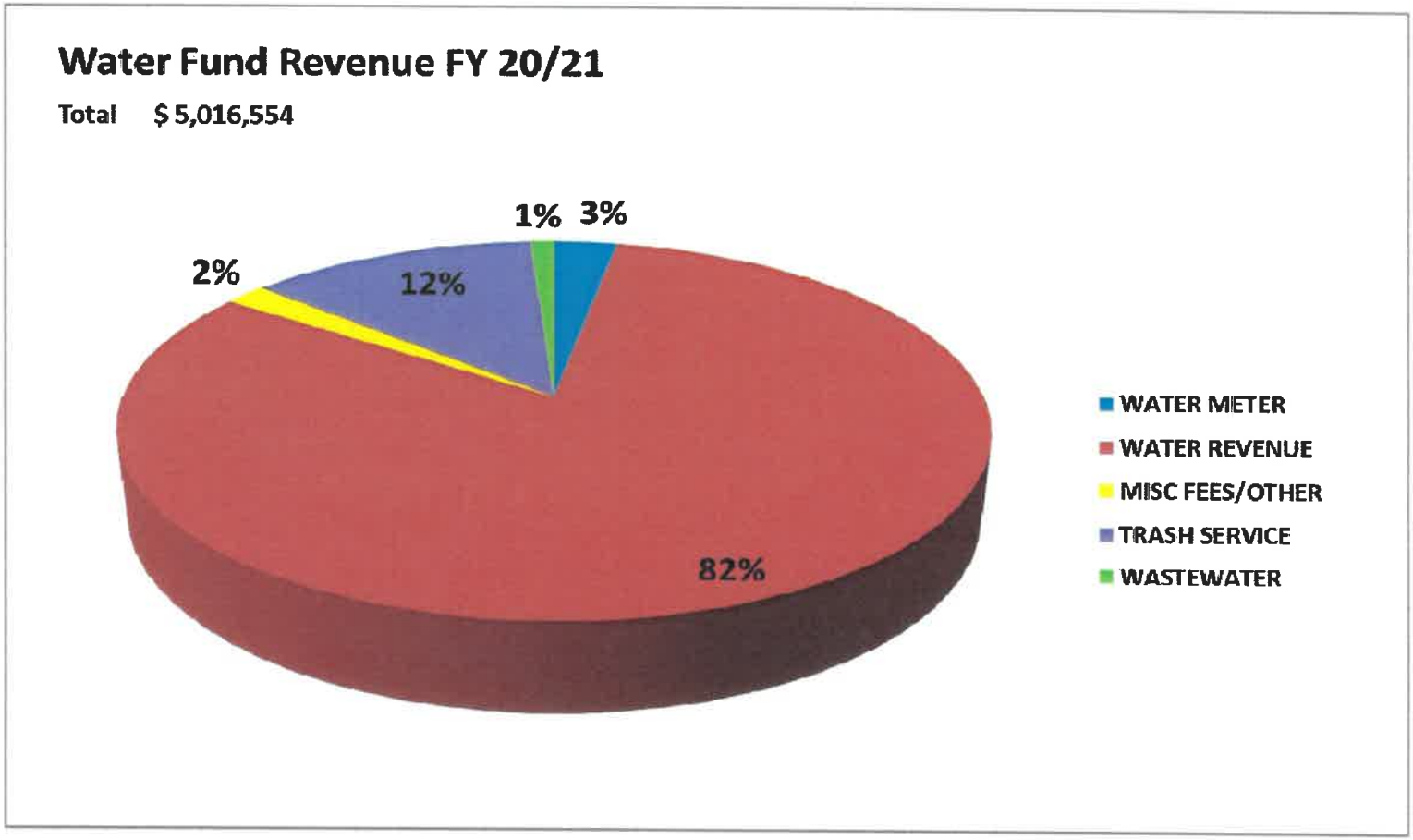
11 -GENERAL FUND *FIRE DEPARTMENT* DEPARTMENTAL EXPENDITURES		2018-2019 FISCAL YEAR ACTUAL	2019-2020 ORIGINAL BUDGET	2019-2020 AMENDED BUDGET	2020-2021 FISCAL YEAR BUDGET	DESCRIPTION
PERSONNEL SERVICES						
6300-101	SALARIES - EXEMPT	206,734	253,101	260,713	260,713	
6300-102	SALARIES - NON EXEMPT FF/EMS	754,472	753,534	772,604	772,604	
6300-103	SAL - NON EXEMPT TEMP	-	3,600	-	9,620	See Detail Listing
6300-106	CERTIFICATION FEES	4,830	12,360	8,360	12,000	See Detail Listing
6300-111	SALARIES - OVERTIME	128,784	123,716	141,816	124,971	See Detail Listing
6300-112	WORKERS' COMPENSATION	22,153	49,500	49,500	49,500	
6300-113	LONGEVITY PAY	2,240	2,500	2,500	2,500	
6300-122	TMRS	143,341	147,000	152,822	153,000	Increase from 12.63% to 12.79%
6300-123	GROUP INSURANCE	151,401	159,936	159,936	165,120	
6300-127	MEDICARE	16,720	16,660	17,310	17,310	
6300-128	OTHER RETIREMENT	23,001	51,120	51,120	85,500	See Detail Listing
6300-129	LT DISABILITY	4,065	5,290	5,290	3,100	Decrease from $.0425 to $.023 per $100
6300-133	TELEPHONE ALLOWANCE	250	600	600	600	Aaron Alderdice phone allowance
TOTAL PERSONNEL SERVICES		**1,457,991**	**1,578,917**	**1,622,571**	**1,656,538**	
MATERIALS & SUPPLIES						
6300-201	OFFICE SUPPLIES	2,383	2,250	1,800	2,100	
6300-202	POSTAGE	243	400	400	375	
6300-203	SUBSCRIPTIONS	85	140	140	55	See Detail Listing
6300-204	FOOD/BEVERAGE	4,480	6,550	5,550	6,050	
6300-205	LOGO/UNIFORM ALLOWANCE	21,207	22,350	22,350	18,850	See Detail Listing
6300-206	FUEL & LUBRICANTS	18,456	19,000	19,000	18,600	See Detail Listing
6300-207	FUEL - PROPANE/(natural gas)	1,460	1,800	1,800	1,700	
6300-208	MINOR APPARATUS	7,102	7,950	7,950	8,175	See Detail Listing
6300-209	PROTECTIVE CLOTHING	32,802	29,520	29,520	23,020	See Detail Listing
6300-210	COMPUTER SUPPLIES	1,206	1,300	1,300	1,200	See Detail Listing
6300-211	MEDICAL & SURGICAL SUPPL	26,793	28,000	28,000	29,313	See Detail Listing
6300-214	SUPPLIES - FD	3,970	4,000	4,000	4,220	See Detail Listing
6300-215	DISPOSABLE MATERIALS	5,531	6,050	6,050	6,650	See Detail Listing
6300-227	PREVENTION ACTIVITIES	5,694	6,600	4,875	5,650	See Detail Listing
TOTAL MATERIALS & SUPPLIES		**131,412**	**135,910**	**132,735**	**125,958**	
MAINTENANCE & REPAIR						
6300-231	FACILITY MAINTENANCE	11,331	13,900	14,700	13,900	See Detail Listing
6300-232	VEHICLE MAINTENANCE	38,220	27,049	32,829	27,369	See Detail Listing
6300-233	EQUIPMENT MAINT	5,430	12,550	12,550	12,600	See Detail Listing
TOTAL MAINTENANCE & REPAIR		**54,981**	**53,499**	**60,079**	**53,869**	
PURCHASED SERVICES						
6300-302	FIRE DEPT RUN REIMBURS.	66,768	77,820	69,820	72,300	See Detail Listing
6300-302.1	LISD GAME COVERAGE	6,901	6,210	6,210	6,210	See Detail Listing
6300-303	TELEPHONE	2,793	3,700	3,700	3,700	
6300-304	INTERNET	7,239	6,600	6,600	6,600	
6300-307	TRAINING & TRAVEL	24,442	37,578	30,872	28,778	See Detail Listing
6300-309	PROFESSIONAL SERVICES	80,655	116,709	112,435	120,562	See Detail Listing and Comprehensive IT Schedule - $13,876
6300-310	SCBA	14,425	25,490	25,490	26,590	See Detail Listing
6300-312	PARAMEDIC SCHOOL	2,300	1,000	-	1,000	Jesse Allen Paramedic School
6300-313	MAINTENANCE AGREEMENTS	12,353	16,300	16,300	16,795	See Detail Listing and Comprehensive IT Schedule - $12,950
6300-316	911 DISPATCH	79,000	79,000	79,000	79,939	Wylie Dispatch
6300-323	CELL PHONE	7,841	9,090	9,090	9,090	See Detail Listing
6300-325	LIABILITY INSURANCE	20,000	20,000	20,000	20,000	
6300-331	UTILITIES, ELECTRIC	26,612	27,000	27,000	27,000	
6300-333	UTILITIES, WATER	3,511	4,000	4,000	4,750	
6300-337	PAGER SERVICE	654	700	700	700	Active 911 notification of emergencies
6300-346	EQUIPMENT RENTAL	396	450	450	450	See Detail Listing
6300-349	EMS/EQP NOTE PAY INT	1,717	-	-		
6300-350	EMS EQUIP FINAN PRINC	60,928	-	-		
TOTAL PURCHASED SERVICES		**418,535**	**431,647**	**411,667**	**424,464**	
GENERAL & ADMINISTRATIVE SERVICES						
6300-441	APPRECIATION/AWARDS	3,808	4,200	3,800	4,000	See Detail Listing
6300-443	DUES/LICENSES	5,680	7,003	6,703	5,899	See Detail Listing
6300-445	CHILD SAFETY					
6300-447	EMERGENCY MANAGEMENT SERV	16,319	13,439	13,439	8,239	See Detail Listing
6300-448	REHAB TRAINING & EQUIPMENT	1,968	2,000	1,500	1,500	See Detail Listing
6300-451	SOFTWARE, BOOKS & CD'S	2,300	4,700	4,700	3,300	See Detail Listing and Comprehensive IT Schedule - $1,600
TOTAL GENERAL & ADMINISTRATIVE SERVICES		**30,075**	**31,342**	**30,142**	**22,938**	

11 -GENERAL FUND *FIRE DEPARTMENT* DEPARTMENTAL EXPENDITURES	2018-2019 FISCAL YEAR ACTUAL	2019-2020 ORIGINAL BUDGET	2019-2020 AMENDED BUDGET	2020-2021 FISCAL YEAR BUDGET	DESCRIPTION
NON-CAPITALIZED EXPENSE					
6300-411 FURNITURE & FIXTURES		-	-		
6300-420 EQUIPMENT	8,146	-		8,475	PPE for water rescue training
6300-452 HARDWARE & TELECOM	17,207	20,050	20,050	850	Radio Maintenance
TOTAL NON-CAPITALIZED EXPENSE	**25,353**	**20,050**	**20,050**	**9,325**	
CAPITAL OUTLAY					
8300-200 BUILDING IMPROVEMENTS	71,250	25,000	45,600		
8300-411 FURNITURE & FIXTURES	-	-	-		
8300-416 IMPLEMENTS & APPARATUS	-	-	-	-	
8300-420 EQUIPMENT	77,553	-			
8300-421 VEHICLES	317,719	-			
8300-452 HARDWARE & TELECOM	-	-	-	-	
TOTAL CAPITAL OUTLAY	**466,522**	**25,000**	**45,600**	**-**	
TOTAL FIRE	**2,584,869**	**2,276,365**	**2,322,844**	**2,293,092**	

11 -GENERAL FUND *GENERAL ADMINISTRATION - NON-DEPA* DEPARTMENTAL EXPENDITURES	2018-2019 FISCAL YEAR ACTUAL	2019-2020 ORIGINAL BUDGET	2019-2020 AMENDED BUDGET	2020-2021 FISCAL YEAR BUDGET	DESCRIPTION
PERSONNEL SERVICES					
6999-109 TMRS - COLA					
6999-110 PERFORMANCE/INCENTIVE PA	35,653	65,925	4,855	-	
6999-130 LT DISABILITY					
TOTAL PERSONNEL SERVICES	**35,653**	**65,925**	**4,855**	**-**	
MAINT & SUPPLIES					
6999-214 CLEANING SUPPLIES	1,597	1,500	1,500	1,500	
6999-231 FACILITY MAINT	49,814	30,400	28,672	26,800	
TOTAL MAINT & SUPPLIES	**51,411**	**31,900**	**30,172**	**28,300**	
PURCHASED SERVICES					
6999-303 TELEPHONE	10,006	11,500	11,500	11,500	
6999-305 IT SUPPORT/MAINT	72,292	72,292	72,292	72,292	See Comprehensive IT Schedule
6999-306 SOFTWARE MAINTENANCE	16,569	17,484	17,484	17,484	See Comprehensive IT Schedule
6999-308 CLEANING & PEST CONTROL	16,597	18,300	18,300	18,300	
6999-309 PROFESSIONAL SERVICES	2,808	4,320	4,320	4,660	See Comprehensive IT Schedule
6999-310 LEGAL SERVICES	128,225	150,000	100,000	100,000	
6999-326 LAW ENFORCEMENT	285,073	250,000	250,000	250,000	
6999-323 STREAKER RESTORATION	-	-	37,500		
6999-331 ELECTRICITY	8,288	8,400	8,400	8,400	
6999-333 WATER	529	600	600	600	
6999-336 ANIMAL CONTROL	34,000	35,000	35,000	35,000	
TOTAL PURCHASED SERVICES	**574,387**	**567,896**	**555,396**	**518,236**	
NON-CAPITAL EXPENSE					
6999-411 FURNITURE	-	-	-		
6999-451 SOFTWARE	12,734	12,800	12,800	5,900	See Comprehensive IT Schedule
6999-452 HARDWARE, TELECOM	11,285	26,445	26,445	5,000	See Comprehensive IT Schedule
TOTAL NON-CAPITALIZED EXPENSE	**24,019**	**39,245**	**39,245**	**10,900**	
COVID 19 EXPENSE					
8999-200 BUILDING IMPROVEMENTS	17,823	-	-	-	
8999-420 EQUIPMENT		-	-		
8999-421 VEHICLE		-	-		
8999-452 HARDWARE, TELECOM	-	-	-		
TRANSFER					
6999-499 COVID-19 EXPENDITURES	-	-	361,356		COVID-19 Expenses offset with CARES Act funding from County
TOTAL COVID-19 EXPENSE	**17,823**	**-**	**361,356**	**-**	
TOTAL NON-DEPARTMENTAL	**703,293**	**704,966**	**991,024**	**557,436**	
OTHER FINANCING SOURCES(USES)					
6999-998 TRANSFER OUT TO CAPITAL FUND			1,743,290		FY 19-20 Restricted Proj Mgmt & Cap
6999-999 TRANSFER OUT TO TECHNOLOGY FUND			56,625		
TOTAL FINANCING SOURCES(USES)			1,799,915		

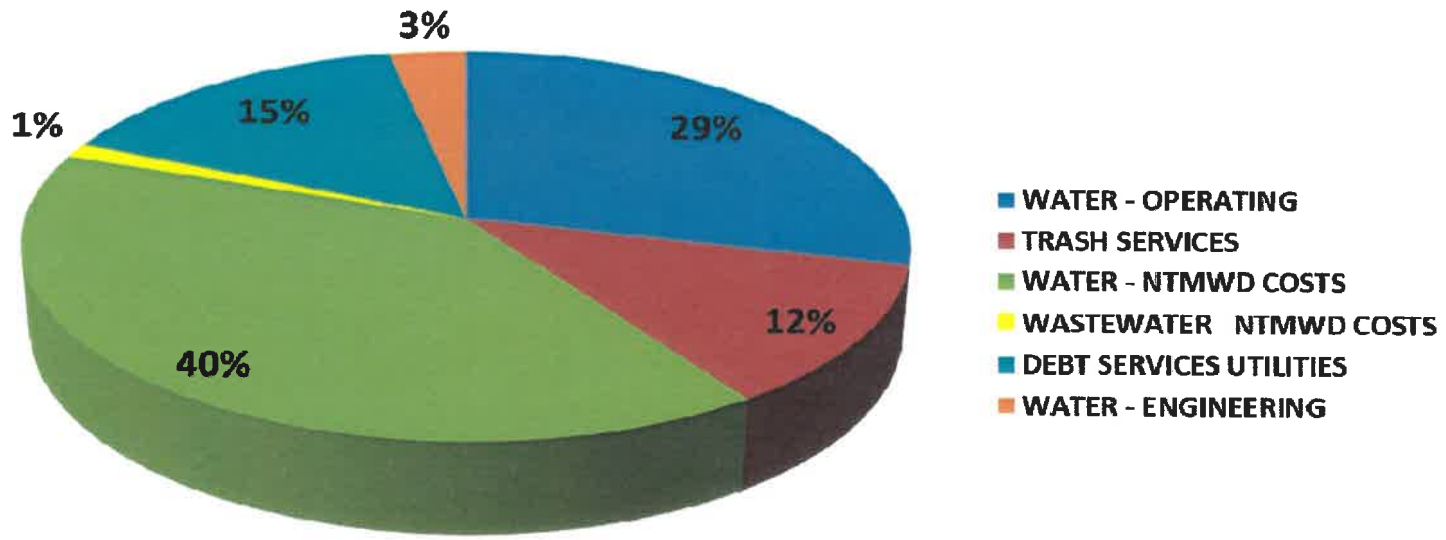
21 - CAPITAL IMPROVEMENTS REVENUES	2018-2019 FISCAL YEAR ACTUAL	2019-2020 ORIGINAL BUDGET	2019-2020 AMENDED BUDGET	2020-2021 FISCAL YEAR BUDGET	DESCRIPTION
FEES & SERVICE CHARGES					
4404 INTERGOV/3RD PARTY REV	-	-	-	-	
TOTAL FEES & SERVICE CHARGES	**-**	**-**	**-**	**-**	
MISCELLANEOUS REVENUE					
4911 INTEREST INCOME	122,712	120,000	87,000	60,000	Adjust for trend
4914 INSURANCE PROCEEDS	-	-	-		
TOTAL MISCELLANEOUS REV	**122,712**	**120,000**	**87,000**	**60,000**	
*****TOTAL OPERATING REVENUE*****	**122,712**	**120,000**	**87,000**	**60,000**	
OTHER FINANCIAL SOURCES (USES)					
4800 BOND PROCEEDS	7,215,000	-			
4810 BOND ISSUE PREMIUM	488,693				
4996 TRANSFER IN FROM GF RESTRICTED RESERVES			1,743,290		Restic Reserves for Cap Proj/Proj Mgmt.
TOTAL OTHER FIN. SOURCES (USES)	**7,703,693**	**-**	**1,743,290**	**-**	

21 - CAPITAL IMPROVEMENTS *PUBLIC WORKS* DEPARTMENTAL EXPENDITURES		2018-2019 FISCAL YEAR ACTUAL	2019-2020 ORIGINAL BUDGET	2019-2020 AMENDED BUDGET	2020-2021 FISCAL YEAR BUDGET	DESCRIPTION
CAPITAL OUTLAY						
7900-298	BOND ISSUE COSTS	-	-	-		
8210-490-104	WATER METER REPLACEMENT	127,093	-	-		
8210-490-120	PARKER R 12" WATER LINE PHASE ONE	26,831	-	-		
8210-490-124	PROJ MGMT 125 -ELEV WATER TWR		34,973	69,946		
8210-490-125	ELEVATED WATER TOWER	-	-	1,147,091		
8210-490-127	SCADA SYSTEM PROJECT			100,000		
8210-490-128	NORTH PUMP STATION PROJECT			1,603,029		
8210-491-123	WINNINGKOFF ROAD REVERSE CURVE	11,721	-	-		
8210-491-124	STINSON RD W LUCAS INTERSECTION	78,763	-	-		
8210-491-126	COUNTRY CLUB RD/ESTATES PKWY INTERSECTION	1,443	-	293,254		
8210-491-127	WINNINGKOFF RD(REVERSE C TO SNIDER LN)	31,935	-	1,771,837		
8210-491-128	STINSON RD (PARKER RD TO BRISTOL PARK)	1,552,006	-	1,158,761		
8210-491-129	BLONDY JHUNE RD (WEST BRIDGE TO WINNINGK)	2,094,960	-	592,840		
8210-491-130	PARKER RD-CIMARRON TRAIL TURN LANE	116,301	-	-		
8210-491-131	PROJ MGMT 127 - WINNINGKOFF RD	139,503	139,890	139,890		
8210-491-132	PROJ MGMT 128 - STINSON RD	131,712	104,918	70,333		
8210-491-133	PROJ MGMT 129 - BLONDY JHUNE RD		139,890	148,068		
8210-491-134	STISON RD / MUDDY CREEK BRIDGE	-	-	802,115		
8210-491-135	SNIDER LANE/WHITE ROCK ROCK CREEK BRIDGE	-		754,185		
8210-491-136	WEST LUCAS RD PROJECT				4,184,820	
8210-491-500	BROCKDALE RD REHABILITATION	2,188	-	34,070		
TOTAL CAPITAL OUTLAY		**4,314,456**	**419,671**	**8,685,419**	**4,184,820**	
TOTAL PUBLIC WORKS		**4,314,456**	**419,671**	**8,685,419**	**4,184,820**	


Water Fund Revenue FY 20/21
Total $ 5,016,554
1%
3%
2%
12%
82%
WATER METER
WATER REVENUE
MISC FEES/OTHER
TRASH SERVICE
WASTEWATER

Water Fund Expenditures FY 20/21

Total $ 4,783,005



51 - WATER UTILITIES FUND REVENUES		2018-2019 FISCAL YEAR ACTUAL	2019-2020 ORIGINAL BUDGET	2019-2020 AMENDED BUDGET	2020-2021 FISCAL YEAR BUDGET	DESCRIPTION
FEES & SERVICE CHARGES						
4461	WATER REVENUE	3,559,687	3,909,333	3,909,333	4,099,624	
4462	WATER TAPS & BORES	-				
4463	PENALTY & INTEREST	33,775	35,000	35,000	35,000	
4467	WATER METER	107,200	140,000	140,000	140,000	
4468	WATER METER REPAIRS	4,800	9,000	9,000	9,000	
4469	WASTEWATER FEES	57,615	51,230	51,230	51,230	
4470	REREAD/CHARTING	25	100	100	100	
4478	TRASH SERVICE	594,825	596,000	635,000	635,000	
4497	FH METER RENTAL INC	3,080	2,900	2,900	200	
4498	MISC. FEE AND CHARGES		-	-		
4499	WATER LINES/FEES DEVEL	-	-	-		
TOTAL FEES & SERVICE CHARGES		**4,361,007**	**4,743,563**	**4,782,563**	**4,970,154**	
MISCELLANEOUS REVENUE						
4911	INTEREST INCOME	205,199	150,000	115,000	36,000	
4912	RETURN CHECK CHARGE	225	400	400	400	
4913	NTMWD REFUND	66,210	10,000	10,000	10,000	
4914	INSURANCE CLAIM REIMB	-	-	-		-
4915	MISC REV -SALES TAX DISC	213				
4992	SALE OF ASSETS	-	-	-		-
4996	WF RESERVE FUNDING (USE OF)	-	-	-		
TOTAL MISCELLANEOUS REVENUE		**271,847**	**160,400**	**125,400**	**46,400**	
TOTAL OPERATING REVENUE		**6,115,840**	**4,903,963**	**4,907,963**	**5,016,554**	

51 - WATER FUND- Public Works DEPARTMENTAL EXPENDITURES		2018-2019 FISCAL YEAR ACTUAL	2019-2020 ORIGINAL BUDGET	2019-2020 AMENDED BUDGET	2020-2021 FISCAL YEAR BUDGET	DESCRIPTION
PERSONNEL SERVICES						
6400-101	SALARIES - EXEMPT	171,825	173,516	182,501	182,501	
6400-102	SALARIES - NON-EXEMPT	250,193	250,495	258,000	258,000	
6400-106	CERTIFICATION FEES	3,705	6,300	6,300	6,300	
6400-110	PERFORMANCE/INCENTIVE PAY	1,500	17,630	2,698		
6400-111	OVERTIME	30,011	51,726	51,726	51,726	
6400-112	WORKERS' COMPENSATION	9,440	10,700	10,700	10,700	
6400-113	LONGEVITY PAY	1,978	2,500	2,500	2,800	
6400-122	TMRS	60,427	62,500	64,644	65,000	Increase from 12.63% to 12.79%
6400-123	GROUP INSURANCE	74,046	74,970	74,970	77,400	
6400-127	MEDICARE	6,376	6,995	7,234	7,300	
6400-129	LT DISABILITY	1,716	2,157	2,157	1,321	Decrease from $.0425 to $.023 per $100
6400-141	CAR ALLOWANCE	2,400	2,400	2,400	2,400	
TOTAL PERSONNEL SERVICES		**613,617**	**661,889**	**665,830**	**665,448**	
MATERIALS & SUPPLIES						
6400-201	OFFICE SUPPLIES	722	800	800	800	
6400-202	POSTAGE	528	2,000	2,000	2,000	
6400-204	FOOD/BEVERAGE	98	800	800	800	
6400-206	FUEL & LUBRICANTS	14,059	14,000	14,000	15,500	
6400-208	MINOR APPARATUS	-	1,500	1,500	1,500	Small tools
6400-209	PROTEC CLOTHING/UNIFORMS	5,793	8,775	8,775	8,775	See Detail Listing
6400-210	COMPUTER SUPPLIES	-	300	300	300	
6400-211	MEDICAL SUPPLIES	-	250	250	250	
6400-212	CHEMICALS	5,330	6,000	6,000	6,000	Water Testing Materials
6400-222	OTHER SUPPLIES		1,500	-	-	
6400-223	SAND/DIRT	-	1,000	1,000	1,000	
6400-224	ASPHALT/FLEXBASE/CONCRETE	-	3,000	3,000	4,500	
TOTAL MATERIALS & SUPPLIES		**26,530**	**39,925**	**38,425**	**41,425**	
MAINTENANCE & REPAIR						
6400-230	REPAIRS & MAINT. - EQUIP.	1,852	2,500	2,500	2,500	
6400-231	FACILITY MAINTENANCE	1,289	3,000	3,000	3,000	
6400-232	VEHICLE/EQP MAINT.	7,293	5,850	5,850	6,450	See Detail Listing
6400-233	REPAIR & MAINT WTR FACILITIES	140,875	163,000	154,320	163,000	See Detail Listing
TOTAL MAINTENANCE & REPAIR		**151,309**	**174,350**	**165,670**	**174,950**	
PURCHASED SERVICES:						
6400-237	TRASH SERVICES	517,911	528,000	558,000	564,000	Barnes
6400-302	AUDITING & ACCOUNTING	8,955	12,500	12,500	12,500	
6400-303	TELEPHONE	5,935	7,200	7,200	7,200	
6400-304	UB PROCESSING	24,527	25,000	25,000	26,000	
6400-305	SOFTWARE SUPPORT/MAINT	22,482	26,500	26,500	28,000	$14K Online Bill Pay/$14K Incode Annual Maint.
6400-306	METER SOFTWARE/HARDWARE MAINT			5,430	6,180	Neptune software and hardware maintenance
6400-307	TRAINING & TRAVEL	2,410	10,735	2,735	7,097	See Travel & Training Plan
6400-309	PROFESSIONAL SERVICES	11,067	24,000	22,000	24,000	See Detail Listing
6400-310	LEGAL SERVICES	-	-	50,000	-	
6400-313	MAINTENANCE AGREEMENTS	5,356	5,400	5,400	6,000	
6400-315	WATER - NTMWD	1,866,912	1,910,914	1,910,914	1,910,914	No price change
6400-316	WASTEWATER NTMWD	26,451	53,980	53,980	54,000	
6400-323	CELL PHONE	3,855	5,000	5,000	6,000	
6400-325	LIABILITY INSURANCE	16,637	20,200	20,200	20,200	
6400-331	ELECTRICITY	62,680	75,000	75,000	75,000	
6400-333	UTILITIES, WATER	-	400	400	-	
6400-346	EQUIPMENT RENTAL	-	4,000	1,000	4,000	
TOTAL PURCHASED SERVICES		**2,575,178**	**2,708,829**	**2,781,259**	**2,751,091**	
GENERAL & ADMIN SERVICES/TRANSFERS						
6400-443	DUES/LICENSES	-	333	333	333	Three water license renewals
6400-999	PILOT TRANSFER OUT	238,388	255,495	259,387	267,096	
TOTAL GENERAL & ADMIN SERVICES/TRANSF		**238,388**	**255,828**	**259,720**	**267,429**	
NON-CAPITAL EXPENSE						

51 - WATER FUND- Public Works DEPARTMENTAL EXPENDITURES	2018-2019 FISCAL YEAR ACTUAL	2019-2020 ORIGINAL BUDGET	2019-2020 AMENDED BUDGET	2020-2021 FISCAL YEAR BUDGET	DESCRIPTION
6400-411 FURNITURE	-	-	-	-	
6400-416 IMPLEMENTS & APPARATUS					
6400-420 EQUIPMENT - WATER	5,974				
6400-452 COMPUTER HARDWARE	-	10,500	13,750		
TOTAL NON-CAPITAL EXPENSE	**5,974**	**10,500**	**13,750**	-	-
CAPITAL OUTLAY					
8400-420 EQUIPMENT - WATER	-	-	14,500	-	
8400-452 HARDWARE	-	-	-		
TOTAL CAPITAL OUTLAY	**-**	**-**	**14,500**	**-**	
TOTAL WATER UTILITIES	**3,610,996**	**3,851,321**	**3,939,154**	**3,900,343**	

51 - WATER FUND- Engineering DEPARTMENTAL EXPENDITURES		2018-2019 FISCAL YEAR ACTUAL	2019-2020 ORIGINAL BUDGET	2019-2020 AMENDED BUDGET	2020-2021 FISCAL YEAR BUDGET	DESCRIPTION
PERSONNEL SERVICES						
6409-101	SALARIES - EXEMPT	85,150	85,259	87,816	87,816	
6409-112	WORKERS' COMPENSATION	280	290	290	290	
6409-113	LONGEVITY PAY	186	235	235	290	
6409-122	TMRS	11,191	11,000	11,332	11,400	Increase from 12.63% to 12.79%
6409-123	GROUP INSURANCE	9,719	9,972	9,972	10,320	
6409-127	MEDICARE	1,163	1,654	1,691	1,300	
6409-129	LT DISABILITY	360	446	446	265	Decrease from $.0425 to $.023 per $100
TOTAL PERSONNEL SERVICES		**108,049**	**108,856**	**111,782**	**111,681**	
MATERIALS & SUPPLIES						
6409-201	OFFICE SUPPLIES	148	1,500	1,500	1,000	$500 Plotter Ink/Paper/$500 Other
6409-204	FOOD/BEVERAGE	36	500	500	250	
6409-208	MINOR APPARATUS	-	500	500	500	
6409-209	PROTEC CLOTHING/UNIFORMS	985	1,350	1,350	1,020	See Detail Listing
6409-210	COMPUTER SUPPLIES	40	500	500	500	
TOTAL MATERIALS & SUPPLIES		**1,209**	**4,350**	**4,350**	**3,270**	
MAINTENANCE & REPAIR						
6409-232	VEHICLE MAINTENANCE	-	2,000	2,000	2,000	See Detail Listing - Expedition
TOTAL MAINTENANCE & REPAIR		**-**	**2,000**	**2,000**	**2,000**	
PURCHASED SERVICES:						
6409-305	SOFTWARE SUPPORT & MAINT	495	550	550	550	See Comprehensive IT Schedule
6409-307	TRAINING & TRAVEL	198	240	240	240	Texas Society of Professional Engieers
6409-309	PROFESSIONAL SERVICES	10,266	35,800	35,800	32,800	See Detail Listing
6409-323	CELL PHONE	618	1,200	1,200	1,200	
TOTAL PURCHASED SERVICES		**11,577**	**37,790**	**37,790**	**34,790**	
GENERAL & ADMIN SERVICES/TRANSFERS						
6409-443	DUES/LICENSES	40	1,125	1,125	675	See Detail Listing
TOTAL GENERAL & ADMIN SERVICES/TRANSF		**40**	**1,125**	**1,125**	**675**	
NON-CAPITAL EXPENSE						
6409-411	FURNITURE	-	500	500	-	
6409-416	IMPLEMENTS & APPARATUS	12	5,000	5,000	-	
6409-452	HARDWARE & TELECOM	-	3,000	3,000	-	
TOTAL NON-CAPITAL EXPENSE		**12**	**8,500**	**8,500**	**-**	-
CAPITAL OUTLAY						
8409-452	HARDWARE & TELECOMM					
TOTAL CAPITAL OUTLAY		-	-	-	-	
TOTAL WATER UTILITIES		**120,887**	**162,621**	**165,547**	**152,416**	

51 - WATER FUND- Debt Service DEPARTMENTAL EXPENDITURES	2018-2019 FISCAL YEAR ACTUAL	2019-2020 ORIGINAL BUDGET	2019-2020 AMENDED BUDGET	2020-2021 FISCAL YEAR BUDGET	DESCRIPTION
DEBT SERVICE					
7900-214 2007 CERT OF OBLIG-PRINCIPAL	120,000	120,000	120,000	125,000	
7900-215 2007 CERT OF OBLIG-INTEREST	44,837	39,738	39,738	34,531	
7900-216 2007 GO REFUNDING- PRINCIPAL	105,000	110,000	110,000	105,000	
7900-217 2007 GO REFUNDING- INTEREST	14,006	9,964	9,964	5,922	
7900-218 2011 CERT OF OBLIG-PRINCIPAL	100,000	105,000	105,000	115,000	
7900-219 2011 CERT OF OBLIG-INTEREST	61,025	57,950	57,950	54,650	
7900-222 2017 CERT OF OBLIG-PRINCIPAL	110,000	115,000	115,000	120,000	
7900-223 2017 CERT OF OBLIG-INTEREST	82,650	79,275	79,275	75,750	
7900-224 2019 CERT OF OBLIG-PRINCIPAL		50,000	50,000	50,000	
7900-225 2019 CERT OF OBLIG-INTEREST		46,293	46,293	43,793	
7900-298 BOND ISSUE COSTS	33,386	600	600	600	
TOTAL DEBT SERVICE	**670,904**	**733,819**	**733,819**	**730,246**	
TOTAL DEBT SERVICE	670,904	733,819	733,819	730,246	

59 - DEBT SERVICES FUND **DEPARTMENTAL EXPENDITURES**	**2018-2019 FISCAL YEAR ACTUAL**	**2019-2020 ORIGINAL BUDGET**	**2019-2020 AMENDED BUDGET**	**2020-2021 FISCAL YEAR BUDGET**	**DESCRIPTION**
REVENUES					
PROPERTY TAXES					
4011 PROPERTY TAXES	1,286,482	1,499,103	1,499,103	1,406,783	
4012 PROPERTY TAXES-DELINQUENT	15,644	5,500	400		Collect down due to pandemic
4015 PROPERTY TAXES-P&I	12,536	5,000	5,000	5,000	
4911 INTEREST INCOME	44,348	24,000	12,000	3,600	Lower interest rate trend
TOTAL PROPERTY TAXES	**1,359,010**	**1,533,603**	**1,516,503**	**1,415,383**	
4996 RESERVE FUNDING (USE OF)				**155,467**	
TOTAL REVENUES	**1,359,010**	**1,533,603**	**1,516,503**	**1,570,850**	
EXPENDITURES					
DEBT SERVICE					
7900-214 2007 CERT OF OBLIG-PRINCIPAL	90,000	90,000	90,000	90,000	
7900-215 2007 CERT OF OBLIG-INTEREST	34,638	30,813	30,813	26,988	
7900-216 2007 GO REFUNDING- PRINCIPAL	215,000	225,000	225,000	235,000	
7900-217 2007 GO REFUNDING- INTEREST	30,550	22,278	22,278	13,630	
7900-218 2011 CERT OF OBLIG-PRINCIPAL	155,000	160,000	160,000	165,000	
7900-219 2011 CERT OF OBLIG-INTEREST	94,425	89,700	89,700	84,825	
7900-220 2015 CERT OF OBLIG-PRINCIPAL	115,000	120,000	120,000	120,000	
7900-221 2015 CERT OF OBLIG-INTEREST	46,450	43,500	43,500	39,900	
7900-222 2017 CERT OF OBLIG-PRINCIPAL	225,000	230,000	230,000	235,000	
7900-223 2017 CERT OF OBLIG-INTEREST	165,525	158,700	158,700	151,725	
7900-224 2019 CERT OF OBLIG-PRINCIPAL		90,000	90,000	175,000	
7900-225 2019 CERT OF OBLIG-INTEREST		239,408	239,408	232,783	
7900-298 BOND SALE EXPENSES	800	1,000	1,000	1,000	
TOTAL DEBT SERVICE	**1,172,388**	**1,500,398**	**1,500,398**	**1,570,850**	

12 - TECHNOLOGY FUND DEPARTMENTAL EXPENDITURES	2018-2019 FISCAL YEAR ACTUAL	2019-2020 ORIGINAL BUDGET	2019-2020 AMENDED BUDGET	2020-2021 FISCAL YEAR BUDGET	DESCRIPTION
REVENUES					
TRANSFERS FROM GENERAL FUND					
4996 TRANSFER FROM GF RESERVES	-		56,625		CC APPROVED 2-20-20
TOTAL REVENUE/TRANSFERS	**-**	**-**	**56,625**	**-**	
TOTAL REVENUE/TRANSFERS	**-**	**-**	56,625	**-**	
EXPENDITURES					
PURCHASED SERVICES					
6800-309 PROFESSIONAL SERVICES	-		56,625		FEASIBLITY STUDY CC APPROVED 2-20-20
TOTAL TECHNOLOGY FUND EXPENSES	**-**	**-**	**56,625**	**-**	

Item No. 11

City of Lucas
Council Agenda Request
August 20, 2020

Requester: Finance Director Liz Exum

Agenda Item Request

Consider the proposed City of Lucas Property Tax Rate for Fiscal Year 2020-2021:

Background Information

The Finance Department has received the No-New-Revenue, Voter-Approval, and De Minimis tax rate calculations for the 2020-2021 year from the Collin County Tax Assessor. Property tax options have been reviewed by staff and are being presented to the City Council for vote on a proposed tax rate for Fiscal Year 2020-2021. The property tax rate options for FY 2020-2021 are as follows:

1. No-New-Revenue tax rate - $.300790 ($.191841 M&O and $.108949 Debt).
2. Voter-Approval tax rate $.299795 ($.190846 M&O and $.108949 Debt).
3. De Minimis tax rate - $.332064 ($.223115 M&O and $.108949 Debt).

The City of Lucas history of property tax rates are as follows:

Fiscal Year	M&O	I&S	Total
FY 2019-2020	.184515	.118701	.303216
FY 2018-2019	.202346	.100870	.303216
FY 2017-2018	.198695	.119253	.317948
FY 2016-2017	.230371	.087577	.317948
FY 2015-2016	.215514	.105147	.320661
FY 2014-2015	.233068	.087593	.320661
FY 2013-2014	.254005	.101611	.355616
FY 2012-2013	.261218	.112959	.374177
FY 2011-2012	.257723	.116454	.374177
FY 2010-2011	.247231	.126946	.374177
FY 2009-2010	.252040	.122137	.374177

Attachments/Supporting Documentation

1. Property tax options worksheet for FY 2020-2021.
2. No-New-Revenue, Voter-Approval, De Minimis tax rate calculation from Collin County Tax Assessor-Collector.

Budget/Financial Impact

The financial impact to the budget is detailed in the property tax option worksheet.

Item No. 11

City of Lucas
Council Agenda Request
August 20, 2020

Recommendation

The three property tax options and the associated tax levy are calculated in the property tax option spreadsheet for City Council consideration. The No-New-Revenue rate is the total tax rate needed to raise the same amount of property tax revenue for the City of Lucas from the same properties in both the 2019 tax year and the 2020 tax year. The Voter-Approval tax rate is the highest rate that the City of Lucas may adopt without holding an election to seek voter approval of the rate. The Deminimis tax rate is the new calculation used to give smaller taxing units (with a population of less than 30,000) some flexibility to adopt a tax rate that generates $500,000 more in property tax revenue than the previous year. In order to not trigger an election or petition to hold a tax approval election, the lower of the No-New-Revenue or Voter-Approval rate would need to be adopted. The proposed rate is the rate that will be advertised for public hearing notice. One public hearing has been scheduled for September 3, 2020. The scheduled date to adopt the tax rate is also September 3, 2020 following the public hearing. The rate adopted can be lower than the proposed rate but cannot exceed it.

Motion

There must be a record vote accepting the proposed tax rate for FY 2020-2021.

I make a motion to **approve/deny** Option #_____, a proposed tax rate of _____ percent, which is the _____ rate for the 2020 tax year.

Taxing Units Other Than School Districts or Water Districts
2020 Tax Rate Calculation Worksheet

Date: 07/31/2020 03:37 PM

2020 City of Lucas	972-727-8999
Taxing Unit Name	Phone (area code and number
665 Country Club Road, Lucas, TX, 75002	https://lucastexas.us
Taxing Unit Address, City, State, ZIP Code	Taxing Unit's Website Address

GENERAL INFORMATION: Tax Code Section 26.04(c) requires an officer or employee designated by the governing body to calculate the no-new-revenue (NNR) tax rate and voter-approval tax rate for the taxing unit. These tax rates are expressed in dollars per $100 of taxable value calculated. The calculation process starts after the chief appraiser delivers to the taxing unit the certified appraisal roll and the estimated values of properties under protest. The designated officer or employee shall certify that the officer or employee has accurately calculated the tax rates and used values shown for the certified appraisal roll or certified estimate. The officer or employee submits the rates to the governing body by Aug. 7 or as soon thereafter as practicable.

School districts do not use this form, but instead use Comptroller For 50-859 *Tax Rate Calculation Worksheet for School Districts*.

Water districts as defined under Water Code Section 49.001(1) should use Comptroller Form 50-858 Water District Rollback Tax Rate Worksheet. All other taxing units should use Comptroller Form 50-856 Tax Rate Calculation, Taxing Units Other Than School Districts.

The Comptroller's office provides this worksheet to assist taxing units in determining tax rates. The information provided in this worksheet is offered as technical assistance and not legal advice. Taxing units should consult legal counsel for interpretations of law regarding tax rate preparation and adoption.

STEP 1: No-New-Revenue Tax Rate

The NNR tax rate enables the public to evaluate the relationship between taxes for the prior year and for the current year based on a tax rate that would produce the same amount of taxes (no new taxes) if applied to the same properties that are taxed in both year.

The NNR tax rate for a county is the sum of the NNR tax rates calculated for each type of tax the county levies.

While uncommon, it is possible for a taxing unit to provide an exemption for only maintenance and operation taxes. In this case, the taxing unit will need to calculate the NNR tax rate separately for the maintenance and operations tax and the debt tax, then add the two components together.

Line	No-New-Revenue Rate Activity		Amount/Rate
1.	**2019 total taxable value.** Enter the amount of 2019 taxable value on the 2019 tax roll today. Include any adjustments since last year's certification; exclude Tax Code Section 25.25(d) one-fourth and one-third over-appraisal corrections from these adjustments. Exclude any property value subject to an appeal under Chapter 42 as of July 25 (will add undisputed value in Line 6). This total includes the taxable value of homesteads with tax ceilings (will deduct in Line 2) and the captured value for tax increment financing (will deduct taxes in Line 17).		$1,410,335,474
2.	**2019 tax ceilings.** Counties, cities and junior college districts. Enter 2019 total taxable value of homesteads with tax ceilings. These include the homesteads of homeowners age 65 or older or disabled. Other taxing units enter 0. If your taxing unit adopted the tax ceiling provision in 2019 or a prior year for homeowners age 65 or older or disabled, use this step		$171,157,555
3.	**Preliminary 2019 adjusted taxable value.** Subtract Line 2 from Line 1.		$1,239,177,919
4.	**2019 total adopted tax rate**		$.303216
5.	**2019 taxable value lost because court appeals of ARB decisions reduced 2019 appraised value:**		
	A. **Original 2019 ARB values:**	$0	
	B. **2019 values resulting from final court decisions:**	$0	
	C. **2019 value loss.** Subtract B from A.[3]		$0
6.	**2019 taxable value subject to appear under Chapter 42, as of July 25.**		
	A. 2019 ARB certified value		

Line	No-New-Revenue Rate Activity		Amount/Rate
		22,234,897	
	B. 2019 disputed value:	8,038,643	
	C. 2019 undisputed value Subtract B from A		14,196,254
7.	**2019 Chapter 42-related adjusted values.** Add Line 5 and 6		14,196,254
8.	**2019 taxable value, adjusted for court-ordered reductions.** Add Line 3 and Line 7		$1,253,374,173
9.	**2019 taxable value of property in territory the taxing unit deannexed after Jan. 1, 2019.** Enter the 2019 value of property in deannexed territory.[4]		$0
10.	**2019 taxable value lost because property first qualified for an exemption in 2020.** If the taxing unit increased an original exemption, use the difference between the original exempted amount and the increased exempted amount. Do not include value lost due to freeport, goods-in-transit, temporary disaster exemptions. Note that lowering the amount or percentage of an existing exemption in 2020 does not create a new exemption or reduce taxable value.		
	A. Absolute exemptions. Use 2019 market value:	$2,113,035	
	B. Partial exemptions. 2020 exemption amount or 2020 percentage exemption times 2019 value:	$6,998,417	
	C. Value loss. Add A and B.⁶		$9,111,452
11.	**2019 taxable value lost because property first qualified for agricultural appraisal (1-d or 1-d-1),timber appraisal, recreational/scenic appraisal or public access airport special appraisal in 2020.** Use only properties that qualified in 2020 for the first time; do not use properties that qualified in 2019.		
	A. Use 2019 market value:	$0	
	B. 2020 productivity or special appraised value:	$0	
	C. Value loss. Subtract B from A.		$0
12.	**Total adjustments for lost value.** Add Lines 9, 10C and 11C.		$9,111,452
13.	**Adjusted 2019 taxable value.** Subtract Line 12 from Line 8		$1,244,262,721
14.	**Adjusted 2019 taxes.** Multiply Line 4 by Line 13 and divide by $100		$3,772,803
15.	**Taxes refunded for years preceding tax year 2019.** Enter the amount of taxes refunded by the district for tax years preceding tax year 2019. Types of refunds include court decisions, Tax Code Section 25.25(b) and (c) corrections and Tax Code Section 31.11 payment errors. Do not include refunds for tax year 2019. This line applies only to tax years preceding tax year 2019. [8]		$4,384
16.	**Taxes in tax increment financing (TIF) for tax year 2019** Enter the amount of taxes paid into the tax increment fund for a reinvestment zone as agreed by the taxing unit. If the taxing unit has no 2020 captured appraised value in Line 18D, enter 0.⁹		$0
17.	**Adjusted 2019 levy with refunds and TIF adjustment.** Add Lines 14, and 15, subtract Line 16.¹⁰		$3,777,187
18.	**Total 2020 taxable value on the 2020 certified appraisal roll today.** This value includes only certified values or certified estimate of values and includes the total taxable value of homesteads with tax ceilings (will deduct in Line 20). These homesteads include homeowners age 65 or older or disabled. ¹¹		
	A.Certified values	$1,182,690,177	
	B. Counties Include railroad rolling stock values certified by the Comptroller's office	$0	
	C. Pollution control and energy storage system exemption Deduct the value of property exempted for the current tax year for the first time as pollution control or energy storage system property	$0	
	D. Tax increment financing Deduct the 2020 captured appraised value of property taxable by a taxing unit in a tax increment financing zone for which the 2020 taxes will be deposited into the tax increment fund. Do not include any new property value that will be included in Line 23 below.[12]	$0	

Line	No-New-Revenue Rate Activity		Amount/Rate
	E. Total 2020 value Add A and B, then subtract C and D		$1,182,690,177
19.	**Total value of properties under protest or not included on certified appraisal roll. [13]**		
	A. 2020 taxable value of properties under protest The chief appraiser certifies a list of properties still under ARB protest. The list shows the appraisal district' s value and the taxpayer's claimed value, if any, or an estimate of the value if the taxpayer wins. For each of the properties under protest, use the lowest of these values. Enter the total value under protest [14]	$297,309,823	
	B. 2020 value of properties not under protest or included on certified appraisal roll. The chief appraiser gives taxing units a list of those taxable properties that the chief appraiser knows about but are not included in the appraisal roll certification. These properties also are not on the list of properties that are still under protest. On this list of properties, the chief appraiser includes the market value, appraised value and exemptions for the preceding year and a reasonable estimate of the market value, appraised value and exemptions for the current year. Use the lower market, appraised or taxable value (as appropriate). Enter the total value of property not on the certified roll.[15]	$0	
	C. Total value under protest or not certified. Add A and B.		$297,309,823
20.	**2020 tax ceilings.** Counties, cities and junior colleges enter 2020 total taxable value of homesteads with tax ceilings. These include the homesteads of homeowners age 65 or older or disabled. Other taxing units enter 0. If your taxing unit adopted the tax ceiling provision in 2019 or a prior year for homeowners age 65 or older or disabled, use this step.		$188,768,934
21.	**2020 total taxable value.** Add Lines 18E and 19C. Subtract Line 20C.		$1,291,231,066
22.	**Total 2020 taxable value of properties in territory annexed after Jan. 1, 2019.** Include both real and personal property. Enter the 2020 value of property in territory annexed. [18]		$0
23.	**Total 2020 taxable value of new improvements and new personal property located in new improvements.** New means the item was not on the appraisal roll in 2019. An improvement is a building, structure, fixture or fence erected on or affixed to land. New additions to existing improvements may be included if the appraised value can be determined. New personal property in a new improvement must have been brought into the taxing unit after Jan. 1, 2019 and be located in a new improvement. New improvements **do** include property on which a tax abatement agreement has expired for 2020. [19]		$35,477,926
24.	**Total adjustments to the 2020 taxable value.** Add Lines 22 and 23.		$35,477,926
25.	**Adjusted 2020 taxable value.** Subtract Line 24 from Line 21.		$1,255,753,140
26.	**2020 NNR tax rate.** Divide Line 17 by Line 25 and multiply by $100.		$.300790 /$100
27.	**COUNTIES ONLY.** Add together the NNR tax rates for each type of tax the county levies. The total is the 2020 county NNR tax rate		

[1]Tex. Tax Code Section

[2]Tex. Tax Code Section

[3]Tex. Tax Code Section

[4]Tex. Tax Code Section

[5]Tex. Tax Code Section

[6]Tex. Tax Code Section

[7]Tex. Tax Code Section

[8]Tex. Tax Code Section

[9]Tex. Tax Code Section

[10]Tex. Tax Code Section

[11]Tex. Tax Code Section

[12]Tex. Tax Code Section

[13]Tex. Tax Code Section

[14]Tex. Tax Code Section

[15]Tex. Tax Code Section

[16]Tex. Tax Code Section

[17]Tex. Tax Code Section

[18]Tex. Tax Code Section

[19]Tex. Tax Code Section

[20]Tex. Tax Code Section

[21]Tex. Tax Code Section

STEP 2: Voter-Approval Tax Rate

The voter-approval tax rate is the highest tax rate that a taxing unit may adopt without holding an election to seek voter approval of the rate. The voter-approval tax rate is split into two separate rates:

1. **Maintenance and Operations (M&O) Tax Rate:** The M&O portion is the tax rate that is needed to raise the same amount of taxes that the taxing unit levied in the prior year plus the applicable percentage allowed by law. This rate accounts for such things as salaries, utilities and day-to-day operations.

2. **Debt Rate:** The debt rate includes the debt service necessary to pay the taxing unit s debt payments in the coming year. This rate accounts for principal and interest on bonds and other debt secured by property tax revenue.

The voter-approval tax rate for a county is the sum of the voter-approval tax rates calculated for each type of tax the county levies. In most cases the voter-approval tax rate exceeds the no-new-revenue tax rate, but occasionally decreases in a taxing unit s debt service will cause the NNR tax rate to be higher than the voter-approval tax rate.

Line	Voter Approval Tax Rate Activity		Amount/Rate
28.	**2019 M&O tax rate.** Enter the 2019 M&O tax rate.		$.184515
29.	**2019 taxable value, adjusted for actual and potential court-ordered adjustments.** Enter the amount in Line 8 of the No-New-Revenue Tax Rate Worksheet.		1,253,374,173
30.	**Total 2019 M&O levy.** Multiply Line 28 by Line 29 and divide by $100		2,312,663
31.	**Adjusted 2019 levy for calculating NNR M&O rate.** Add Line 31E to Line 30.		2,315,522
	A. 2019 sales tax specifically to reduce property taxes. For cities, counties and hospital districts, enter the amount of additional sales tax collected and spent on M&O expenses in 2019, if any. Other taxing units, enter 0. Counties must exclude any amount that was spent for economic development grants from the amount of sales tax spent	0	
	B. M&O taxes refunded for years preceding tax year 2019. Enter the amount of M&O taxes refunded in the preceding year for taxes before that year. Types of refunds include court decisions, Tax Code Section 25.25(b) and (c) corrections and Tax Code Section 31.11 payment errors. Do not include refunds for tax year 2019. This line applies only to tax years preceding tax year 2019	2,859	
	C. 2019 taxes in TIF: Enter the amount of taxes paid into the tax increment fund for a reinvestment zone as agreed by the taxing unit. If the taxing unit has no 2020 captured appraised value in Line 18D, enter 0	0	
	D. 2019 transferred function: If discontinuing all of a department, function or activity and transferring it to another taxing unit by written contract, enter the amount spent by the taxing unit discontinuing the function in the 12 months preceding the month of this calculation. If the taxing unit did not operate this function for this 12-month period, use the amount spent in the last full fiscal year in which the taxing unit operated the function. The taxing unit discontinuing the function will subtract this amount in E below. The taxing unit receiving the function will add this amount in E below. Other taxing units enter 0.	0	
	E. 2019 M&O levy adjustments. Add A and B, then subtract C. For taxing unit with D, subtract if discontinuing function and add if receiving function		2,859
32.	**Adjusted 2020 taxable value.** Enter the amount in Line 25 of the No-New-Revenue Tax Rate Worksheet.		1,255,753,140
33.	**2020 NNR M&O rate (unadjusted)** Divide Line 31 by Line 32 and multiply by $100.		0.184393
34.	**Rate adjustment for state criminal justice mandate.** Enter the rate calculated in C. If not applicable, enter 0.		0.000000
	A. 2020 state criminal justice mandate. Enter the amount spent by a county in the previous 12 months providing for the maintenance and operation cost of keeping inmates in county-paid facilities after they have been sentenced. Do not include any state reimbursement received by the county for the same purpose.	0	
	B. 2019 state criminal justice mandate Enter the amount spent by a county in the 12 months prior to the previous 12 months providing for the maintenance and operation cost of keeping inmates in county-paid facilities after they have been sentenced. Do not include any state reimbursement received by the county for the same purpose. Enter zero if this is the first time the mandate applies	0	

Line	Voter Approval Tax Rate Activity		Amount/Rate
	C. Subtract B from A and divide by Line 32 and multiply by $100	0.000000	
35.	**Rate adjustment for indigent health care expenditures** Enter the rate calculated in C. If not applicable, enter 0		0.000000
	A. 2020 indigent health care expenditures Enter the amount paid by a taxing unit providing for the maintenance and operation cost of providing indigent health care for the period beginning on July 1, 2019 and ending on June 30, 2020, less any state assistance received for the same purpose	0	
	B. 2019 indigent health care expenditures Enter the amount paid by a taxing unit providing for the maintenance and operation cost of providing indigent health care for the period beginning on July 1, 2018 and ending on June 30, 2019, less any state assistance received for the same purpose	0	
	C. Subtract B from A and divide by Line 32 and multiply by $100	0.000000	
36.	**Rate adjustment for county indigent defense compensation** Enter the lessor of C and D. If not applicable, enter 0		0.000000
	A. 2020 indigent defense compensation expenditures Enter the amount paid by a county to provide appointed counsel for indigent individuals for the period beginning on July 1, 2019 and ending on June 30, 2020, less any state grants received by the county for the same purpose	0	
	B. 2019 indigent defense compensation expenditures Enter the amount paid by a county to provide appointed counsel for indigent individuals for the period beginning on July 1, 2018 and ending on June 30, 2019, less any state grants received by the county for the same purpose	0	
	C. Subtract B from A and divide by Line 32 and multiply by $100	0.000000	
	D. Multiply B by 0.05 and divide by Line 32 and multiply by $100	0.000000	
37.	**Rate adjustment for county hospital expenditures.** Enter the lessor of C and D, if applicable. If not applicable, enter 0.		0
	A. 2020 eligible county hospital expenditures Enter the amount paid by the county or municipality to maintain and operate an eligible county hospital for the period beginning on July 1, 2019 and ending on June 30, 2020	0	
	B. 2019 eligible county hospital expenditures Enter the amount paid by the county or municipality to maintain and operate an eligible county hospital for the period beginning on July 1, 2018 and ending on June 30, 2019	0	
	C. Subtract B from A and divide by Line 32 and multiply by $100	0.000000	
	D. Multiply B by 0.08 and divide by Line 32 and multiply by $100	0.000000	
38.	**Adjusted 2020 NNR M&O rate.** Add Lines 33, 34, 35, 36, and 37		0.184393
39.	**2020 voter-approval M&O rate.** Enter the rate as calculated by the appropriate scenario below. **Special Taxing Unit** If the taxing unit qualifies as a special taxing unit, multiply Line 38 by 1.08 **-or-** **Other Taxing Unit** If the taxing unit does not qualify as a special taxing unit, multiply Line 38 by 1.035. **-or-** **Taxing unit affected by disaster declaration** If the taxing unit is located in an area declared as disater area, the governing body may direct the person calculating the voter-approval rate to calculate in the manner provided for a special taxing unit. The taxing unit shall continue to calculate the voter-approval rate in this manner until the earlier of 1) the second year in which total taxable value on the certified appraisal roll exceeds the total taxable value of the tax year in which the disaster occurred, and 2) the third tax year after the tax year in which the disaster occurred. If the taxing unit qualifies under this scenario, multiply Line 38 by 1.08. [27]		0.190846
40.	**Total 2020 debt to be paid with property taxes and additional sales tax revenue.** Debt means the interest and principal that will be paid on debts that: **(1)** are paid by property taxes, **(2)** are secured by property taxes, **(3)** are scheduled for payment over a period longer than one year, and **(4)** are not classified in the taxing unit's budget as M&O expenses.		

Line	Voter Approval Tax Rate Activity		Amount/Rate
	A. Debt also includes contractual payments to other taxing units that have incurred debts on behalf of this taxing unit, if those debts meet the four conditions above. Include only amounts that will be paid from property tax revenue. Do not include appraisal district budget payments. Enter debt amount	1,570,851	
	B. Subtract **unencumbered fund amount** used to reduce total debt.	0	
	C. Subtract **certified amount spent from sales tax to reduce debt**(enter zero if none)	0	
	D. Subtract **amount paid** from other resource	0	
	E. Adjusted debt Subtract B, C and D from A		1,570,851
41.	**Certified 2019 excess debt collections** Enter the amount certified by the collector.		145,497
42.	**Adjusted 2020 debt** Subtract Line 41 from Line 40E		1,425,354
43.	**2020 anticipated collection rate.** . If the anticipated collection rate in A is lower than actual collection rates in B, C and D, enter the lowest collection rate from B, C and D. If the anticipated rate in A is higher than at least one of the rates in the prior three years, enter the rate from A. Note that the rate can be greater than 100%		101.32
	A. Enter the 2020 anticipated collection rate certified by the collector	101.32	
	B. Enter the 2019 actual collection rate	101.32	
	C. Enter the 2018 actual collection rate	103.79	
	D. Enter the 2017 actual collection rate	101.83	
44.	**2020 debt adjusted for collections.** Divide Line 42 by Line 43.		1,406,784
45.	**2020 total taxable value.** Enter the amount on Line 21 of the No-New-Revenue Tax Rate Worksheet.		1,291,231,066
46.	**2020 debt rate** Divide Line 44 by Line 45 and multiply by $100.		0.108949
47.	**2020 voter-approval tax rate**		0.299795
48.	**COUNTIES ONLY**		
STEP 3 NNR Tax Rate and Voter-Approval Tax Rate Adjustments for Additional Sales tAx to Reduce Property Taxes			

Cities, counties and hospital districts may levy a sales tax specifically to reduce property taxes. Local voters by election must approve imposing or abolishing the additional sales tax. If approved, the taxing unit must reduce its NNR and voter-approval tax rates to offset the expected sales tax revenue.

This section should only be completed by a county, city or hospital district that is required to adjust its NNR tax rate and/or voter-approval tax rate because it adopted the additional sales tax.

Line	Additional Sales and Use Tax Worksheet	Amount/Rate
49.	**Taxable sales.** For taxing units that adopted the sales tax in November 2019 or May 2020, enter the Comptroller's estimate of taxable sales for the previous four quarters. Estimates of taxable sales may be obtained through the Comptroller's Allocation Historical Summary webpage. Taxing units that adopted the sales tax before November 2019, skip this line.	0
50.	**Estimated sales tax revenue.** Counties exclude any amount that is or will be spent for economic development grants from the amount of estimated sales tax revenue. **Taxing units that adopted the sales tax in November 2019 or in May 2020.** Multiply the amount on Line 49 by the sales tax rate (.01, .005 or .0025, as applicable) and multiply the result by .95[3] **-or-** **Taxing units that adopted the sales tax before November 2019.** Enter the sales tax revenue for the previous four quarters. Do not multiply by .95.	0
51.	**2020 total taxable value.** Enter the amount from Line 21 of the *No-New-Revenue Tax Rate Worksheet.*.	1,291,231,066
52.	**Sales tax adjustment rate.** Divide Line 50 by Line 51 and multiply by $100.	0.000000
53.	**2020 NNR tax rate, unadjusted for sales tax.[35]** Enter the rate from Line 26 or 27, as applicable, on the *No-New-Revenue Tax Rate Worksheet.*	$.300790
54.	**2020 NNR tax rate, adjusted for sales tax.** Subtract Line 52 from Line 55.	$.300790
55.	**2020 voter-approval tax rate, unadjusted for sales tax.**[36] Enter the rate from	0.299795

Line	Additional Sales and Use Tax Worksheet	Amount/Rate
	Line 47 or Line 48 as applicable, of the *Voter-Approval Tax Rate Worksheet*	
56.	**2020 voter-approval tax rate, adjusted for sales tax. Subtract Line 52 from Line 55.**	0.299795

[37]Tex. Tax Code Section **[38]Tex. Tax Code Section**

STEP 4: Additional Rollback Protection for Pollution Control

A taxing unit may raise its rate for M&O funds used to pay for a facility, device or method for the control of air, water or land pollution. This includes any land, structure, building, installation, excavation, machinery, equipment or device that is used, constructed, acquired or installed wholly or partly to meet or exceed pollution control requirements. The taxing unit s expenses are those necessary to meet the requirements of a permit issued by the Texas Commission on Environmental Quality (TCEQ). The taxing unit must provide the tax assessor with a copy of the TCEQ letter of determination that states the portion of the cost of the installation for pollution control.

This section should only by completed by a taxing unit that uses M&O funds to pay for a facility, device or method for the control of air, water or land pollution.

Line	Activity	Amount/Rate
57.	**Certified expenses from the Texas Commission on Environmental Quality (TCEQ).[6]** Enter the amount certified in the determination letter from TCEQ. The taxing unit shall provide its tax assessor collector with a copy of the letter.[7]	$0
58.	**2020 total taxable value.** Enter the amount from Line 21 of the *No-New-Revenue Tax Rate Worksheet*	$1,291,231,066
59.	**Additional rate for pollution control.** Divide Line 57 by Line 58 and multiply by $100.	0.000000
60.	**2020 voter-approval tax rate, adjusted for pollution control.** Add Line 59 to one of the following lines (as applicable): Line 47, Line 48 (counties) or Line 56 (taxing units with the additional sales tax).	0.299795

[37]Tex. Tax Code Section **[38]Tex. Tax Code Section**

STEP 5: Voter-Voter-Approval Tax Rate Adjustment for Unused Increment Rate

The unused increment rate is the rate equal to the difference between the adopted tax rate and voter-approval tax rate before the unused increment rate for the prior three years.[39] In a year where a special taxing unit adopts a rate above the voter-approval tax rate by applying any portion of the unused increment rate, the unused increment rate for that year would be zero. Consult with legal counsel to ensure appropriate calculation of the unused increment rate.

For each tax year before 2020, the difference between the adopted tax rate and voter-approval rate is considered zero, therefore the unused increment rate for 2020 is zero.[40]

This section should only be completed by a taxing unit that is a municipality of less than 30,000 or a taxing unit that does not meet the definition of a special taxing unit. [41]

Line	Activity	Amount/Rate
61.	**2019 unused increment rate.** Subtract the 2019 actual tax rate and the 2019 unused increment rate from the 2019 voter-approval tax rate. If the number is less than zero, enter zero. If the year is prior to 2020, enter zero.	0.000000
62.	**2018 unused increment rate.** Subtract the 2018 actual tax rate and the 2018 unused increment rate from the 2028 voter-approval tax rate. If the number is less than zero, enter zero. If the year is prior to 2020, enter zero.	0.000000
63.	**2017 unused increment rate.** Subtract the 2017 actual tax rate and the 2017 unused increment rate from the 2017 voter-approval tax rate. If the number is less than zero, enter zero. If the year is prior to 2020, enter zero.	0.000000
64.	**2020 unused increment rate.** Add Lines 61, 62 and 63.	0.000000
65.	**2020 voter-approval tax rate, adjusted for unused increment rate.** Add Line 64 to one of the following lines (as applicable): Line 47, Line 48 (counties), Line 56 (taxing units with the additional sales tax) or Line 60 (taxing units with pollution control).	0.000000

STEP 6: De Minimis Rate

The de minimis rate is the rate equal to the sum of the no=new-revenue maintenance and operations rate, the rate that will raise $500,000, and the current debt rate for a taxing unit.[42]

This section should only be completed by a taxing unit that is a municipality of less than 30,000 or a taxing unit that does not meet the definition of a special taxing unit. [41]

Line	Activity	Amount/Rate
66.	**Adjusted 2020 NNR M&O tax rate.** Enter the rate from Line 38 of the *Voter-Approval Tax Rate Worksheet*	0.184393
67.	**2020 total taxable value** Enter the amount on Line 21 of the *No-New-Revenue Tax Rate Worksheet*	1,291,231,066
68.	**Rate necessary to impose $500,000 in taxes.** Divide $500,000 by Line 67 and multiply by $100.	0.038722
69.	**2020 debt rate** Enter the rate from Line 46 of the *Voter- Approval Tax Rate Worksheet*	0.108949
70.	**De minimis rate** Add Lines 66, 68 and 69.	0.332064

STEP 7: Total Tax Rate

Indicate the applicable total tax rates as calculated above.

No-new-revenue tax rate	0.300790
Voter-Approval Tax Rate	0.299795
De minimis rate	0.332064

STEP 8: Taxing Unit Representative Name and Signature

print here Karen Thier
Printed Name of Taxing Unit Representative

sign here Karen Thier
Taxing Unit Representative

7/31/2020
Date

City of Lucas
Property Tax Rate Options
2020-2021 Based on July 24th Certified Estimate from Collin CAD

	Adjusted Tax Value	Total Tax Rate	Tax Rate Operating	Tax Rate Debt Serv	Total Potential Tax Revenue	Tax Operating	Tax Debt Serv	Tax Levy Incl Freeze	Total Tax Levy
2007 Adjusted Tax Value	$ 422,216,071	0.375000	0.244260	0.130740	$ 1,583,310	$ 1,031,305	552,005		$ 1,583,310
2008 Adjusted Tax Value	$ 471,411,284	0.374177	0.250509	0.123668	$ 1,763,913	$ 1,180,928	582,985		$ 1,763,913
2009 Adjusted Tax Value	$ 494,414,564	0.374177	0.252040	0.122137	$ 1,849,986	$ 1,246,122	603,863	$ 127,907	$ 1,977,893
2010 Adjusted Tax Value	$ 506,955,477	0.374177	0.247231	0.126946	$ 1,896,911	$ 1,253,347	643,564	$ 66,500	$ 1,963,411
2011 Adjusted Tax Value	$ 517,875,574	0.374177	0.257723	0.116454	$ 1,937,771	$ 1,334,680	603,089	$ 50,000	$ 1,987,769
2012 Adjusted Tax Value	$ 536,714,544	0.374177	0.261218	0.112959	$ 2,008,262	$ 1,401,995	606,272	$ 86,000	$ 2,094,268
2013 Adjusted Tax Value	$ 602,991,584	0.355617	0.254006	0.101611	$ 2,144,333	$ 1,531,629	612,710	$ 145,000	$ 2,289,339
2014 Adjusted Tax Value	$ 695,041,710	0.320661	0.233068	0.087593	$ 2,228,730	$ 1,619,920	608,811	$ 154,000	$ 2,382,730
2015 Adjusted Tax Value	$ 786,263,436	0.320661	0.215514	0.105147	$ 2,521,239	$ 1,694,508	826,739	$ 163,000	$ 2,684,247
2016 Adjusted Tax Value	$ 894,009,068	0.317948	0.230371	0.087577	$ 2,842,486	$ 2,059,538	782,948	$ 180,000	$ 3,022,486
2017 Adjusted Tax Value	$ 1,003,893,835	0.317948	0.198695	0.119253	$ 3,191,860	$ 1,994,687	1,197,172	$ 180,000	$ 3,371,859
2018 Adjusted Tax Value	$ 1,162,269,768	0.303216	0.202346	0.100870	$ 3,524,188	$ 2,351,806	1,172,382	$ 180,000	$ 3,704,188
2019 Adjusted Tax Value	$ 1,262,918,750	0.303216	0.184515	0.118701	$ 3,829,372	$ 2,330,275	1,499,097	$ 180,000	$ 4,009,372
2020 Adjusted Tax Value (Voter-approval)	$ 1,291,231,066	0.299795	0.190846	0.108949	$ 3,871,046	$ 2,464,263	1,406,783	$ 180,000	$ 4,051,046
Property Tax Revenue 2020-2021									
1. No-new-revenue Rate (effective)	$ 1,291,231,066	0.300790	0.191841	0.108949	$ 3,883,894	$ 2,477,111	1,406,783	$ 180,000	$ 4,063,894
2. Voter-approval Rate (rollback)	$ 1,291,231,066	0.299795	0.190846	0.108949	$ 3,871,046	$ 2,464,263	1,406,783	$ 180,000	$ 4,051,046
3. De minimis rate	$ 1,291,231,066	0.332064	0.223115	0.108949	$ 4,287,714	$ 2,880,930	1,406,783	$ 180,000	$ 4,467,714

Additional Dollars compared to prior year (2019 tax year) :

No-New-Revenue Rate (1)		**Voter Approval Rate (2)**		**Using De minimis Rate (3)**	
New Value	106,714	New Value	106,361	New Value	117,809
Annexations	-	Annexations	-	Annexations	-
Subtotal	106,714	Subtotal	106,361	Subtotal	117,809
Existing Values	$ (52,192)	Existing Values	$ (64,687)	Existing Values	$ 340,533
	54,522		41,674		458,342
Debt	(92,314)	Debt	(92,314)	Debt	(92,314)
M&O	146,836	M&O	133,988	M&O	550,656
Total	54,522	Total	41,674	Total	458,342

Item No. 12

City of Lucas
Council Agenda Request
August 20, 2020

Requester: City Council
Assistant to the City Manager Kent Souriyasak
City Secretary Stacy Henderson
City Manager Joni Clarke

Agenda Item Request

Consider how to organize, manage, create, and distribute factual information pertaining to the proposed Lucas Broadband Project and provide guidance to the City Manager.

Background Information

City staff is in the process of creating a webpage to publish all factual information regarding the proposed Lucas Broadband Project. The attached is an image of a proposed webpage that has been created for City Council consideration with specific links. There is a lot of content currently on the fiber project under the News section on the homepage. Once City Council has had an opportunity to provide guidance on how to organize the information, staff will start migrating any of that information over to these new pages.

Staff is recommending the City use the "Report A Issue" function via the City's website as a mechanism for citizens to ask questions. Citizens will have an online form they can use to submit their question(s) regarding the project that will include their name, address, etc. Citizens will be encouraged to be succinct in formulating their question(s).

The following steps represent the proposed procedures for responding to citizen inquiries:

1. All incoming questions will be sent via the City's website to Assistant to the City Manager Kent Souriyasak, City Secretary Stacy Henderson, and City Manager Joni Clarke.
2. Staff will have three working days to formulate a proposed answer and work with representatives that have specific expertise (i.e. the City Attorney for legal advice, Magellan Advisors on technical questions, SAMCO on financial matters) to facilitate answering the question.
3. The question and proposed answer will then undergo an internal review process.
4. The goal is to have a response to the requestor within five business days (depending on the number of questions received) and posted on the City's website.
5. Staff further recommends that this be the only avenue to ask questions and receive feedback to ensure proper management of the data.

Magellan Advisors created a Broadband Primer Frequently Asked Questions dated July 29, 2020 and staff captured questions and answers generated from City Council review of the Magellan Broadband Feasibility Study. Staff is seeking City Council direction on this whether any of this information should be posted to the Q & A section of the Lucas Broadband Project website page.

City of Lucas
Council Agenda Request
August 20, 2020

Staff is also seeking direction on ways to communicate information to the public that can include:

- Virtual Town Hall
- Postcards mailed to households
- Utility Billing inserts
- Lucas Leader articles
- Drive through information booth
- Q & A

Project Background and Milestones

Due to concerns raised by citizens about the lack of adequate and reliable internet service, the City Council appointed Lucas residents to form the Technology Committee which serves as an ad hoc committee in all matters relating to technology-related services of the City. The Technology Committee provided recommendations to the City Council and City Manager on issues of community-wide interests relating to information technology and internet services.

The City moved forward with acquiring the services of Magellan Advisors to conduct a broadband feasibility study which includes a conceptual network design and financial model. The purpose of the study is to determine if it is feasible for the City to implement and operate a sustainable broadband network to provide internet service to Lucas residents within city limits.

The following is a timeline of the City's efforts in researching internet solutions to date:

September - October 2018: The City released the Technology & Communication Survey to the community to obtain feedback regarding internet service and city communication efforts in Lucas.

November 2018: 400 household responses were collected from the Technology and Communication Survey and results were presented to City Council.

January 2019: City Council appointed members of the Technology Committee. Technology Committee held their first meeting and determined items to research and collect information regarding internet service.

February - April 2019: Technology Committee explored opportunities to steer interest from current Internet Service Providers (ISPs) to expand and/or improve internet service. The overall response from ISPs indicated there are no business plans to expand existing networks or rebuild infrastructure due to low return on investment, low density housing, and large residential lots.

May - August 2019: The City developed the Internet Speed Test where 514 households reported internet speeds, service providers, and infrastructure. Internet speed data was used to geographically map internet speeds throughout Lucas.

August - September 2019: Technology Committee researched municipal broadband networks

City of Lucas
Council Agenda Request
August 20, 2020

and traveled alongside city staff to Mont Belvieu, Texas, to meet with the City of Mont Belvieu and discuss MB Link, the first municipally owned and operated broadband network in the State.

October 2019: City Council approved the Technology Committee's recommendation to acquire the services of a broadband consultant to conduct a broadband feasibility study.

November 2019: City staff and Technology Committee developed key content in the Request for Proposal to acquire the services of a broadband consultant to conduct a broadband feasibility study which includes a conceptual network design and financial model.

December 2019: The Request for Proposal was finalized and published to garner interest from broadband developers and consultants to conduct the broadband feasibility study.

January - February 2020: The City received seven proposals in response to the Request for Proposal and the Technology Committee reviewed, scored, and ranked each proposal based on a set of evaluation factors. The City Council approved the Technology Committee's recommendation to acquire the services of Magellan Advisors to conduct the broadband feasibility study.

March 2020: A formal contract was executed between the City and Magellan Advisors to conduct the broadband feasibility study.

April 2020: Magellan Advisors collected data and necessary information from the City to develop the conceptual network design and estimate costs.

May 27, 2020: Magellan Advisors held a broadband project meeting with City Council and Technology Committee to review the preliminary conceptual network design and estimated construction costs.

June 4, 2020: City Council meeting with discussions regarding broadband project timelines, milestones, funding, and the potential bond election.

June 17, 2020: Magellan Advisors held a broadband project meeting with City Council to review the preliminary financial model.

June 18, 2020: City Council meeting to discuss the preliminary financial model, recommendations, funding strategies, and information from the City's Financial Advisor.

June 29, 2020: Magellan Advisors held a broadband project meeting with City Council to review the adjusted financial model.

June 30, 2020: Magellan Advisors held a broadband project meeting with Technology Committee to provide an update on the overall project.

July 2, 2020: City Council meeting with final recommendations regarding the adjusted financial model.

City of Lucas
Council Agenda Request
August 20, 2020

July 16, 2020: City Council meeting with overview of the broadband feasibility draft study provided by Magellan Advisors.

July 27, 2020: Magellan Advisors held a broadband project meeting with City Council to review the finalized broadband feasibility study.

July 28, 2020: Magellan Advisors submits completed broadband feasibility study to the City.

July 30, 2020: Budget Workshop/Special City Council meeting with discussions regarding the broadband project, feasibility study, and potential bond election date.

August 6, 2020: City Council meeting approving Ordinance 2020-08-00919 calling a Bond Election to seek voter approval of the issuance of not more than $19,190,000 of general obligation bonds to create a fiber optic broadband utility system.

Attachments/Supporting Documentation

1. Image of webpage for information pertaining to proposed Lucas Broadband Project
2. Magellan Advisors Broadband Primer Frequently Asked Questions dated July 29, 2020
3. Proposed Questions and Answers generated from City Council review of Magellan Broadband Feasibility Study
4. Email from City Attorney Joe Gorfida dated Friday, August 7, 2020 regarding Section 255.003 of the Election Code making it unlawful to use public funds to promote a proposition.

Budget/Financial Impact

N/A

Recommendation

Provide staff with guidance on content management for the proposed Lucas Broadband Project.

Motion

I make a motion to approve/deny directing the City Manager to....

General Information
- Background Information
- Project Timeline
- Survey Information

Q & A

Feasibility Study

Financial

Technical Aspects of the Project

Legal Questions
- Bond Information
- Unlawful Use of Public Funds for Political Advertising

Technology Committee Agendas/Minutes

City Council Broadband Agendas/Minutes

Lucas Broadband Project

Executive Summary content here

City of Lucas Broadband Design and Financial Plan
Broadband Primer Frequently Asked Questions

Broadband Primer FAQ

Q: *Why is broadband so important for communities?*

A: Access to broadband Internet service has become an essential gateway to equal opportunities for education, healthcare, business, jobs, security, civic and social engagement, and prosperity and quality of life. More and more organizations are pushing services, information, products and support to online applications, which have become integrated into the daily lives of those with broadband Internet service while those without it are increasingly left behind without the online tools and applications needed to participate or compete in a digital society. The number and types of these applications continue to grow at an ever-increasing rate, but to realize the benefits of these applications, access to affordable and reliable broadband Internet infrastructure is required.

The 2019 COVID pandemic has demonstrated that broadband is a necessity in today's world. People need broadband to work from home, engage in virtual education, and stay in place. Internet applications are using more and more broadband capacity every day as more information, education and entertainment content is enabled online. Citizens of Lucas should have access to everything the Internet has to offer, without being restricted by their local broadband services. It will support citizens' needs to run their local businesses or work from home, ensure their children have the best opportunities to learn through technology and access the wealth of information and entertainment options that the Internet provides.

Q: Is high-speed broadband available in Lucas?

A: In October 2018, the City conducted a Technology and Communications Survey aimed at learning about broadband availability and opinion of City communications. The study found that the residents north of Lucas Rd were generally dissatisfied with their Internet and those south of Lucas Rd were generally satisfied. In the summer of 2019, the City conducted a speed test survey to determine speeds residents receive in Lucas. The average upload/download speed was 41/23 Mbps, compared to the Dallas average of 116/20 Mbps, demonstrating that Lucas is lagging compared to its regional metro area.

Q: *What is broadband infrastructure?*

A: Broadband infrastructure provides high speed access for homes and businesses to the Internet via multiple types of technologies including fiber optics, wireless, cable, DSL and satellite. According to the FCC, in order to be considered a broadband service, Internet access must be provided at a minimum of 25 Mbps download and 3 Mbps upload speeds (25/3 Mbps).

Q: *How much bandwidth do we need?*

A: The amount of bandwidth we need grows every year. The largest growth has been for video – traditional pay TV, "over the top" or Internet-based video, and video communications. This trend is expected to continue at least for the foreseeable future. Video requires not only extra bandwidth but also extra reliability. Additionally, Internet-based video applications continue to push more and more bandwidth, such as Hulu and Netflix. Business applications have become more bandwidth-intensive and also need good reliability to function correctly.

Q: *What about other kinds of data?*

A: Bandwidth requirements for many kinds of data are exploding. For example, new digital cameras can create larger and larger images; 30 megabytes is not uncommon. In health care, the medical images produced by equipment such as CT scanners are a hundred times larger than camera images. In the last few years, many industries have entered the era of "Big Data" applications that collect and analyze data on massive scales. Today's Big Data applications range from consumer pricing models to online marketing to DNA sequencing to particle physics to control of electrical grids. Big Data doesn't work without broadband services that maintain high bandwidth and reliability.

Q: *Can't copper carry high bandwidth?*

A: Copper and copper coax, which includes broadband systems such as DSL and cable, is a distance sensitive technology. The longer a signal travels on copper, the more the bandwidth degrades causing less reliability and lower overall bandwidth. Fiber optic is unique in that it can carry high-bandwidth signals over enormous distances. Fiber uses laser light to carry these signals. Under some circumstances, a signal can travel 40 miles (60 kilometers) without degrading. Fiber is also better able to support symmetrical bandwidth. Symmetrical bandwidth provides the same speed in both directions, whereas copper-based broadband speeds are usually asymmetrical with download and upload speeds being different, such as 6 Mbps down and 2 Mbps up. In addition, copper-based networks are inherently shared systems. Each user on the network shares bandwidth with all other users on the network. The more users on the system, the less bandwidth available to each user. In these cases, users do not receive expected bandwidth for their use. If a few users consume the majority of the bandwidth, other users may see a significant impact to connection.

Q: What about wireless? I hear it can provide high-speed broadband.

A: Wireless networks, including fixed wireless and mobile cellular systems can provide high-speed broadband service, however, wireless service – like copper technology – is both distance sensitive and usually shares bandwidth with all other users on the wireless network. Wireless systems can be configured to provide guaranteed bandwidth in some instances and these systems have been used in areas where fiber-optic cable is infeasible from a cost/benefit standpoint; however, the bandwidth potential of these systems is far less than fiber-optic cable. Additionally, most mobile and carrier providers include data caps and additional fees in their data service packages. Plans with data caps generally do not support real-time video or streaming video applications very well, and will lead to increased costs and fees for the end user.

Q: *What exactly makes fiber "futureproof"?*

A: The equipment used to send light signals over glass fiber keeps getting better. So equipping an existing fiber network with new electronics and with lasers that pulse light faster, or lasers that use different wavelengths of light, can vastly increase available bandwidth without changing the fiber itself. New electronics are very cheap compared with the original cost of installing the fiber. Therefore, once fiber has been deployed, network operators can keep increasing bandwidth as needed incrementally.

Q: *How long has fiber technology been in use?*

A: Fiber-optic technology is the foundation of the world's telecommunications networks. It has been used for more than 30 years to carry communications traffic from city to city and from country to country. Almost every country has some fiber-optic, delivering services reliably and inexpensively. The first time fiber delivered a signal directly to an American home (in Hunter's Creek, FL.) was more than 20 years ago.

Q: *Isn't DSL and cable good enough?*
A: It's not good enough to make your community competitive in attracting or supporting a tech-savvy company or home-based businesses. Today's cable modems and DSL lines may suffice for consumers to send emails, to download songs or share family photos. However, healthcare, education and commerce are increasing requiring more and more bandwidth. Almost 100 communities have deployed fiber broadband networks and more are on the way as communities realize that these types of networks are critical to economic development and competitiveness.

Q: *Why aren't providers upgrading to fiber-optic broadband in my community?*
A: The primary issue is density. For many rural and smaller communities, low household density, long distances between premises, and fewer businesses does not warrant investment in upgraded broadband infrastructure by many Internet service providers. Due to the City of Lucas' lower density their cost per premise to construct a fiber broadband network is approximately twice the cost of other municipalities of similar population making it difficult for current providers to get their desired return on investment.

Project-Specific FAQ

Q: Why is the City looking at providing services that the private sector offers?
A: Two reasons, 1) the City believes it is important to be a connected city with high-speed Internet available to all residents. A connected city provides opportunities for all and maintains the city's competitiveness attracting talented citizens and businesses into our community, and it can provide digital equity to all residents of Lucas.. 2) In conversations with the incumbents, they have provided no clear timeline of when they would provide this service to our community. Some have stated that only greenfield, new development will get fiber-optic infrastructure. As a result, in order to future-proof the City of Lucas, and provide next generation high-speed broadband to the community the City is looking into providing this service using a potential Broadband Utility model.

Q: Will the City offer video as part of the broadband package?
A: Video is not part of the services being offered. However, the City is still evaluating all of its options. Many communities are choosing not to offer video services, due to the movement of "cutting the cord" and over-the-top ("OTT") services such as Netflix, Hulu, Disney +, and the multitude of other streaming services available to consumers. The City of Lucas should focus its efforts on delivering a high-speed, high-quality experience to its users, allowing the extensive content market to serve the video content needs of the City's customers.

Q: What are the implications to the Lucas Broadband Network in terms of the cost of the project and bond?
A: The estimated bonding amount based on overall project costs is $19,180,368 plus an additional $4,730,000 in interfund loans from the City. Expenses funded from the debt include: engineering and design, network construction, network electronics, bond issuance fees, capitalized interest, facilities and equipment and working capital. The estimated debt requirements with a conservative interest rate of 3.25% will be in the range of $20-30 million depending on the final architecture and subscriber adoption. Specific details regarding the borrowing summary can be found on page 78 of the Design and Financial Model.

The largest cost component of the capital requirement will be the network construction, currently estimated at more than $11.3 million. Details are on page 61 of the Broadband Design and Financial Model. The model calls for additional staffing for this project as outlined on page 54 of the Broadband Design and Financial Model.

Q: *When will service be available?*
A: Once design engineering and construction begins on the network, construction is expected to be done in two phases to allow subscriber connections as soon as possible. First subscribers are expected to be able to receive service within 24 months. Build out of the entire city is scheduled to take two years. Should the City decide to move forward, given a 2021 start date, initial services could begin to roll out in early to mid 2022.

Q: If the City offers broadband services what kind of privacy policy can be expected?
A: As a current Utility provider, the City takes privacy very seriously and this commitment would be practiced with broadband. Private, or personal information, includes names, addresses, phone number, emails as well as browsing and Internet history and usage, email and phone records, and other generated electronic data.

The City will not collect any of this information beyond what is required to provide service.

Q: Will the City track or sell my information?
A: The City has no need, desire, or intent to collect or sell resident information including browser history. Ensuring customer privacy is a City priority and is critical to maintaining customer confidence.

Q: Net Neutrality is becoming a big deal nationwide. What is the City's position on Net Neutrality?
A: Net Neutrality is the principle where services are not blocked, slowed down, sped up, or otherwise manipulated based on who is accessing the Internet or from where. The City of Lucas is committed to the principles of Net Neutrality. The City's Broadband Design and Financial Model does not call for any restrictions on access including uploads, downloads, delivery methods or providers (email, Skype, Netflix, etc.)

Q: How will the City provide Internet security?
A: Developing security strategies that can protect all parts of a complicated network is one of the most important tasks related to network design. The City will work with third parties and vendors to achieve a reliable and secure network. The design philosophy is to block everything and then allow access as warranted. The system will be monitored to ensure proper operation and to verify the functioning of security features. This includes monitoring access, insuring all security patches are applied, verifying required services are configured securely and no passwords are left set to the factory defaults. All failed login attempts and ACL violations will be alerted. The City's security priorities will also focus on physical security of network equipment (which is likely the biggest risk point.)

Questions & Answers
Lucas Broadband Project

Financial Model

1. **Q:** What is the definition for the term breakeven regarding the financial model?

   A: Breakeven, in terms of the model, basically means what is the minimum uptake percentage and rate combination that can support a sustainable enterprise. Positive free cash flow would be one metric. In addition, debt payoff, and debt payoff using excess free cash flow can be determined as key break-even factors. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

2. **Q:** What is the method and justification for recommending a 55% uptake?

   A: The 55% is the required take rate given the model – it's the breakeven model. We may be able to reduce the take rates and rates a bit, as contingency requirements are resolved, etc., but at this point 55% is the take rate required to minimize City contributions or loan funds. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

3. **Q:** How can we determine the best position of where the City could fund a feasible amount from reserves while also balancing the best rate for customers?

   A: All dollars contributed to the project will buy down the rates for customers. We need to understand what the City is willing to "put in", or loan. We've provided varied analysis on City funding requirements – we need to understand the "sweet spot" from City leadership at this point. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

4. **Q:** What are options for providing other bandwidth options for residential service?

   A: Having lower rate tiers will reduce revenue impacting pro forma. For example, adding a 250x250Mb tier at $75.95 with 30% of subscribers taking service, thus reducing the 1G number of subscribers, impacts pro forma in that positive annual cash flow is not achieved until year 20 versus current pro forma at year 6. Also, Mont Belvieu only has the 1G tier and has achieved an uptake of around 70%. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

5. **Q:** What is the basis for the amount in the operating reserve fund? How does this work into the cash flow?

   A: Fund is adjusted in order to keep at least two months of current year's operating expenses in reserve. Cash flow is impacted by amount placed into reserve. Less in reserve equates to more in cash balance and vice versa. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

6. **Q:** How does new funding fit into the Borrowing Summary?

   A: New funding in Pro Forma is directly pulled from the year-to-year totals in the Total to Be Financed section in Borrowing Summary tab. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

7. **Q:** What is the source for Working Capital?

   A: Working capital can be a line-of-credit or a loan. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

8. **Q:** What is the additional working capital? How does this fit into the calculations?

   A: Monies added to Pro Forma to try and ensure an End-of-Year positive cash flow. Any amount added to Working Capital is assumed to be a loan with a 15 year term. Pro Forma reduces End-of-Year Cash by amount of Working Capital principal and Interest in the following years. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

9. **Q:** The model indicates that there is cash available earlier that could be used to pay off the reserve loan. Can we assume a minimum cash reserve with the excess going to pay back the reserve loan?

   A: The City can use its free cash from the Broadband Operation to payoff any series of debt it so chooses. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

10. **Q:** How many years and which years into the project will the City have to cover any shortfalls via an interfund loan (including interest) or another resource?

    A: Response is based on model (dated June 26, 2020) with Lucas purchasing materials; 55% residential uptake; $115.95 1GB rate. Model contains 1.8M in interfund loans spanning three years.
    - $550K year 3
    - $900K year 4
    - $400K year 5

    (Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)

11. **Q:** Terminology in the Cash Flow section of model is confusing, "End of Year Cash Flow Final" – is this end of year cash or the cash flow?

    A: Pro forma shows two End of Year cash totals. (1) Running cash balance from year to year PRIOR to any working capital or City contributions applied; (2) Running cash balance from year to year including any City contributions and working capital principal and associated interest. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

12. **Q:** Cost of Service, Line 28, Network & Headend Maintenance – Assumption?

    A: Annual Op-Ex costs based on 8% of equipment costs. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

13. **Q:** Cost of Service, Line 45, Direct Internet Access and Line 49, 10GB Ethernet Transport – What is this? How determined? Why is there no escalation in the cost?

A: Costs based on discussions between Magellan network expert and vendors for the above services dependent on amount of bandwidth expected. Costs for these services historically remain the same or go down at each new contract. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

14. **Q:** What is the geography of the 2 zones?

A: Zones are based on number of subscribers and not physical zones. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

15. **Q:** Assumes 55% - do we have metrics we can use in addition to Mont Belvieu?

A: Mont Belvieu TX – 70% within 24 months
Waverly IA – 50% within 18 months
Newport TN – 40% within 24 months
Hudson OH – 40% within 24 months
Indianola IA – 40% within 24 months
(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)

Internet Service Costs

16. **Q:** Is sales tax included in the internet subscription and installment fees?

A: From Texas Comptroller website: Internet access service enables users to connect to the Internet in order to access content, information, electronic mail or other services offered online. Beginning July 1, 2020, Texas will no longer impose sales tax on separately stated internet access charges due to the Internet Tax Freedom Act (ITFA) of 2016. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

17. **Q:** How was the $115.95 rate determined?

A: The $115.95 rate was determined to be the minimum rate needed, at a 55% uptake, to support costs. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

18. **Q:** What are the actual services that come with managed services?

A: Managed services are generally focused on greater support levels, for instance, connecting devices to the WiFi network.... With Managed services, Tech Support has visibility all the way down to devices, and can make network adjustments on the fly, over the phone to support the customer. This is something far beyond typical support, services are up/down. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

19. **Q:** How are costs determined for installment fees for homes that are located at a greater distance from the road where fiber will pass; and what is the general calculation to determine these costs?

A: Various vendors have different pricing policies, but our pricing is based on a national drop vendor who uses a max of 200' as part of the standard drop charge. Over that distance, the charge is usually around $0.50 - $0.60 per foot for direct bury and up to $1.00 per foot for conduit bury (cost of conduit is additional). Also, there are extra charges for out-of-the-ordinary drops such as having to bore under driveways or lawn features. These instances are ICB (individual case basis). The drop budget in the model covers about a 200' buried drop. Anything over this can cost upwards of $0.50 per foot additional. Boring under driveways, landscape features, ponds, etc., can drive the cost up more – these are all one off costs. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

20. **Q:** What is the minimum feet requirement from the road where installment fees will increase?

A: Max of 200' as part of the standard drop charge. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

Market Analysis

21. **Q:** Does the internet subscription rate remain the same over 30 years and should we expect increases?

A: Historically, rates have not gone up for Internet service. And we don't model rate increases unless its absolutely necessary. Most providers are looking to maintain current rates by adding functionality for the same price point or as was discussed, providers are adding in "white glove" type services to augment revenue. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

22. **Q:** How volatile is the market for internet?

A: Pricing generally remains consistent, unless you're in a highly competitive area. Lucas will likely see rates drop further as Lucas finalizes its decision to move forward or not – this is something the competitors will likely try to drive. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

Project Construction

23. **Q:** What is the cost per foot for constructing fiber underground and aerial?

A: UG (not including design): $20.77
OH (not including design): $10.00
(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)

24. **Q:** How many months is the design/engineering period?

A: 8 months
(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)

25. **Q:** How many months is the construction period?

A: Planned at 24 months. Maybe a bit less, but 24 months is safe. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

26. **Q:** Can service be available within 12 months after construction commences?

A: Yes, we would plan for services to activate and first customers getting service within 12 months of construction start. This may be able to be accelerated a bit, but 12 months is safe planning timeframe. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

27. **Q:** How are building needs identified for a data center, workspace, and equipment storage?

A: The minimum space for a data room needed would be approximately a 20x40 ft space with needed environmental systems (racks and cages; clean power; battery backup; fire suppression; A/C; security). Storage space for data room is minimal about the size of a large closet. Office space is dependent on number of offices desired. Usually data room has one office or desk for workspace when in the data center. Additional offices are usually located close to data room. Depending on number of offices and size, 1000 sq ft should be sufficient. You can expect the cage and data center equipment space to be around 200 sq ft or less. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

28. **Q:** What are services that would need to be outsourced during construction?

A: During the construction phase (year 1 and year 2), all construction would be outsourced to a qualified fiber underground construction contractor. Additional services include project management, construction management, oversight, and inspections, which Magellan could fulfill as part of its turnkey deployment services. During the first year of construction, the data center needs to be stood up and equipment installed and configured. This is usually done by outside vendors. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

Broadband Operations

29. **Q:** How were competitive salaries determined for recommended staff positions to operate the network?

A: Magellan did salary research from Glassdoor and Payscale for Dallas metro area.
(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)

30. **Q:** Where are the costs for computers and other necessary equipment are included?

A: These costs are covered in the systems and tools capital budgets. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

31. **Q:** Were there recommendations to the Cities of Mont Belvieu, Dayton, and other cities on how to cover indirect costs such as staffing?

A: Working capital loans and interfund loans/contributions to cover first three – five years of OpEx including salaries. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

32. **Q:** Is home equipment, such as routers, based on standardized consumer-grade equipment? The City of Mont Belvieu has shared that their network utilizes standardized equipment that is provided by the City to reduce issues.

A: Concur. We always suggest that a standard home equipment be installed by the City for easier support. Also, the managed service is predicated on using the Calix home equipment we suggested. If customers insist on using their own equipment, usually the provider lets it be known that they cannot supply support. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

33. **Q:** Are there costs for adapting to a new telephone system?

A: Basically, yes. The fiber network gives you the infrastructure to utilize cloud-based VoIP system which would entail costs to install and use. This would need to be looked at as a separate item. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

34. **Q:** Due to the complexity of this type of project, and it's scope that having a director with strong project management is key? Or would they advise hiring a project manager to oversee such?

A: Having a Telecom Manager that understands all aspects of this project are key, including project management. When a client does not have the expertise, or the person they hire doesn't, Magellan fulfills this role, both in project management, and construction management/inspections. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

Additional Considerations

35. **Q:** What are options to explore possible public-private partnerships to implement a broadband network?

A: Partnerships can take many different forms. In a potential partnership, assuming the City would fund the infrastructure buildout, and would be required to cover debt service, and other relative expenses, it is questionable whether a private partner could provide a better service at a lessor cost. The partner would have to charge fees for its services, associated operational expenses, overhead, and profit requirements, which would likely require higher rates than is already proposed. Magellan does not see a partnership opportunity unless the City were willing to fund the infrastructure outright or would be willing to make key investments into the partners buildout costs. **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

36. **Q:** What are options to having a third party manage this broadband system for the City?

A: We believe it would be very difficult to outsource the entire operation without raising the rates…. Debt service on the infrastructure build/deployment drives rates higher already. Add in private sector profit requirements, and rates would likely have to increase from where they are proposed today… **(Reference: Courtney Violette and Scott Moehnke, Magellan Advisors)**

Clarification from the City of Mont Belvieu

37. **Q:** How did Mont Belvieu go about hiring the Manager / Director and staff for their broadband project? Did they go to a head hunter agency? Did they use an employment agency? Did they rely on their in house HR?

A: For the Engineer/Director, we utilized Magellan to provide us job boards to post the position on. We developed a recruitment brochure in-house to go along with the Job Description and posting. Magellan assisted Nathan and I with screening the applicants and performing the initial interviews to determine their technical ability. After that, Nathan [City Manager Nathan Watkins] and I brought them in and interviewed them to determine their fit within our organization, work character, ethics, etc. Once we hired the Engineer/Director [Broadband/IT Director Dwight Thomas] he was able to work with HR to post the positions on the appropriate job boards for the different positions and screened the applicants. Dwight and I would then interview them together and of course, he handled the technical ability. Initially we utilized our Utility Billing clerks to handle sign-ups and we trained them internally to assist with basic CSR responsibilities. The Engineer/Director interviewed and trained the CSR as we built that team. **(Reference: Assistant City Manager Scott Swigert, City of Mont Belvieu)**

38. **Q:** What was the biggest challenge Mont Belvieu faced in getting the system up and running?

A: For Nathan and I it was hiring the Engineer/Director. Recruiting an individual to leave the private sector to join the City for less pay was a challenge. We had to sale the benefits of working for a city and being a part of something much bigger than what they were currently doing. Once we hired Dwight, he was able to monitor the construction, the contractors, etc. and was able to lead the hiring and training of the team. However recruiting from the private sector to public remains a challenge, primarily because of the salary range. For Dwight the biggest challenge was dealing with the Pipeline crossing that we had do around town to get the infrastructure underground. **(Reference: Assistant City Manager Scott Swigert, City of Mont Belvieu)**

39. **Q:** What would Mont Belvieu do differently?

A: We should have hired the Engineer/Director sooner, should have developed the back office processes and procedures earlier and should have made sure there were clean breaks, separation points for contractors including our consultant. **(Reference: Assistant City Manager Scott Swigert, City of Mont Belvieu)**

40. **Q:** What is the best advice Mont Belvieu would give the City of Lucas?

A: Get your Engineer on Board as quickly as you can so that they can help develop, implement and oversee the project and hiring and training of personnel. You know your citizens needs better than anyone else, make sure you design and develop to best meet their needs and expectations, and do not rely soley on the consultants, they do not know your citizens. **(Reference: Assistant City Manager Scott Swigert, City of Mont Belvieu)**

41. **Q:** Has Mont Belvieu done any citizen satisfactory surveys now that they are 5 years in? Results?

A: We have only been live for 2 yrs. We have not done a citizen survey at this point but are planning to with the next fiscal year. We have done customer surveys quarterly, resulting in positive feedback. Our network promoter score, people willing to promote our services, has exceeded 90%. **(Reference: Assistant City Manager Scott Swigert, City of Mont Belvieu)**

42. **Q:** If no survey what has been the #1 complaint of the citizens?

A: Wireless coverage within the homes. We have a large number of homes over 3,000sqft with expanded exterior areas with which they want covered. We have implemented a new managed services program that the city will provide a device that will extend your coverage area for an additional monthly fee of a minimal $10/month. **(Reference: Assistant City Manager Scott Swigert, City of Mont Belvieu)**

43. **Q:** Did their "take rate" track close to the initial projections?

A: Our take rate has been and continues to be well ahead of our projections. We were projected to be at 400 by the end of the first year, however we had over 700 preregistered before we connected to the first house. With our growth we are projected to achieve 65% for residential after 3 yrs and then maintain the 65% thereafter. We achieve 65% after just 1 ½ year and have been able to maintain that ever since. We also started servicing businesses in January 2019, which has continued to grow and were not part of our initial take rate or business plan. **(Reference: Assistant City Manager Scott Swigert, City of Mont Belvieu)**

Feasibility Study

44. **Q:** Have other cities that created an Internet Utility had the same home density as Lucas or were they high density communities?

A: Many cities that have done this have done so in areas more rural than Lucas, however in some cases those deployments are funded through state and federal grants targeting rural underserved/unserved areas that meet certain economic indicators. In other cases, the rural electric coop, or rural telephone provider would make the investment.

As is outlined below, the cost per passing in Lucas is far greater than every other projection summarized.

	OSP Costs	Passings	Per Passing Cost
Waterloo, IA	44,885,691	29639	1,514.41
Mont Belvieu, TX	5,557,125	2468	2,251.67
Dayton, TX	8,651,413	3062	2,825.41
Lucas, TX	10,609,284	2508	4,230.18

(Reference: Courtney Violette, Gillian Violette, and Scott Moehnke, Magellan Advisors)

45. **Q:** What was the average internet city speed prior to the utility launch for the different cities that you prepared reports for?

A: Most work we're doing today, including planning for the entire Navajo Nation, have typical internet speeds in the 1.5 Mbps to 100 Mbps range. This would include our work in Dayton, as well as work in Waterloo IA, Hillsboro OR, Boulder CO, etc. In each of these markets gigabit over cable is available very sparsely, and a significant amount of slower speed DSL is still in place. There were no fiber services available market wide prior to the City's consideration to deploy, and still aren't today. **(Reference: Courtney Violette, Gillian Violette, and Scott Moehnke, Magellan Advisors)**

46. **Q:** Have any other studies that went forward and you consider a success produced a required monthly rate of $115 or higher?

A: Although the $115 rate for a 1 Gbps service can be considered a high rate, the financial requirements dictate that rate along with a 55% residential uptake is needed. It is the highest 1 Gbps rate this project team has determined on any project previously, but we are only recommending it because sustainability requires it.

However, the final rate could be less. If the capital expenses can be reduced, through new grant or outside investment, the reduction could be used to reduce borrowings and possibly allowing lower rates than the current modeled rates. **(Reference: Courtney Violette, Gillian Violette, and Scott Moehnke, Magellan Advisors)**

47. **Q:** Is your objective of this study to see if this is a wise financial decision or to produce a proposed rate to make this possible?

A: This study aims to present what rates and customer uptakes would be needed to create a sustainable broadband utility based on projected CapEx, OpEx, debt service, etc. It is up to the individual city, its leaders and the voters to decide whether the decision to go forward is in the community's best interest or not. If the City of Lucas feels that broadband investments are required, and it is ready to make those investments where others will not, then this study aims to inform City leadership of the decisions they'll need to make. City leadership, including the Finance Director, and their advisors can help the City determine whether this concept is a wise financial decision or not, as compared to the long list of other City priorities we're sure you have to contend with.

As for the rate to make this possible reference, based on the current SOW of our engagement, the data we've compiled to date, and what we can project, we believe at a $115 rate and 55% uptake the City can build and deploy a profitable, financially sustainable utility. **(Reference: Courtney Violette, Gillian Violette, and Scott Moehnke, Magellan Advisors)**

48. **Q:** How do you define "feasible" as you use it? What parameters are you using when you employ the word feasible in your report?

A: The deployment of a broadband utility to every home and business in Lucas appears to be feasible, as modeled, if 55% of the users took service. Feasible is defined as executing the deployment of a FTTH in a financially sustainable way – over the long- term. If the City believes the voters want it, and the voters agree, then it must be clear that the utility must hit 55% to be successful.

Magellan has modeled and recommended take rates from 35-50% in recent years, Magellan believes you can get to the 55% target and beyond, if the public supports the project. You also have the ability to look toward other recent projects previously documented, including Waverly, Indianola, Cedar Falls, Mont Belvieu, Newport and others, community based services can be successful and a much better option than is available in Lucas today. **(Reference: Courtney Violette, Gillian Violette, and Scott Moehnke, Magellan Advisors)**

49. **Q:** How many of your client cities have you told it was not feasible? Percent please.

A: As detailed above, we strive to show our clients what parameters are needed to create a sustainable entity. Each client has a different environment to contend with, including public expectations, therefore it is up to them to determine if the rates/uptakes, etc. that are documented in this Study are valid and acceptable for their community. We have several times during meetings stated that the $115 rate is considerably higher than other clients, but Lucas is a unique city with a much higher cost/passing and higher income per capita. We find that 10-25% of our customers find that there are not feasible solutions. However, some choose to build backbone networks connecting city facilities and community anchors, and in some cases they build full fiber-to-the-home networks. City and community needs and networks are not one-size fit all. **(Reference: Courtney Violette, Gillian Violette, and Scott Moehnke, Magellan Advisors)**

To clarify what role a Councilmember can play in campaigning for or against a Bond Passage, the Election Code states the following:

Section 255.003 of the Election Code makes it unlawful to use public funds to promote a proposition. The communication that is made using city resources can be factual but cannot advocate for or against. The law does not prohibit a council member from speaking for or against when they are not acting in capacity as a council member. (For example; not using city resources, on city property, advocating before, during or after a meeting.) Employees can also advocate for or against on their own time.

Sec. 255.003. UNLAWFUL USE OF PUBLIC FUNDS FOR POLITICAL ADVERTISING. (a) An officer or employee of a political subdivision may not knowingly spend or authorize the spending of public funds for political advertising.

(b) Subsection (a) does not apply to a communication that factually describes the purposes of a measure if the communication does not advocate passage or defeat of the measure.

(b-1) An officer or employee of a political subdivision may not spend or authorize the spending of public funds for a communication describing a measure if the communication contains information that:

(1) the officer or employee knows is false; and

(2) is sufficiently substantial and important as to be reasonably likely to influence a voter to vote for or against the measure.

(c) A person who violates Subsection (a) or (b-1) commits an offense. An offense under this section is a Class A misdemeanor.

(d) It is an affirmative defense to prosecution for an offense under this section or the imposition of a civil penalty for conduct under this section that an officer or employee of a political subdivision reasonably relied on a court order or an interpretation of this section in a written opinion issued by:

(1) a court of record;

(2) the attorney general; or

(3) the commission.

(e) On written request of the governing body of a political subdivision that has ordered an election on a measure, the commission shall prepare an advance written advisory opinion as to whether a particular communication relating to the measure does or does not comply with this section.

(f) Subsections (d) and (e) do not apply to a port authority or navigation district.

Item No. 13

City of Lucas
City Council Agenda Request
August 20, 2020

Requester: Mayor Jim Olk

Agenda Item Request

Executive Session:

An Executive Session is not scheduled for this meeting.

As authorized by Section 551.071 of the Texas Government Code, the City Council may convene into closed Executive Session for the purpose of seeking confidential legal advice from the City Attorney regarding any item on the agenda at any time during the meeting. This meeting is closed to the public as provided in the Texas Government Code.

Background Information

NA

Attachments/Supporting Documentation

NA

Budget/Financial Impact

NA

Recommendation

NA

Motion

NA

City of Lucas
City Council Agenda Request
August 20, 2020

Item No. 14

Requester: Mayor Jim Olk

Agenda Item Request

Reconvene from Executive Session and take any action necessary as a result of the Executive Session.

Background Information

NA

Attachments/Supporting Documentation

NA

Budget/Financial Impact

NA

Recommendation

NA

Motion

NA