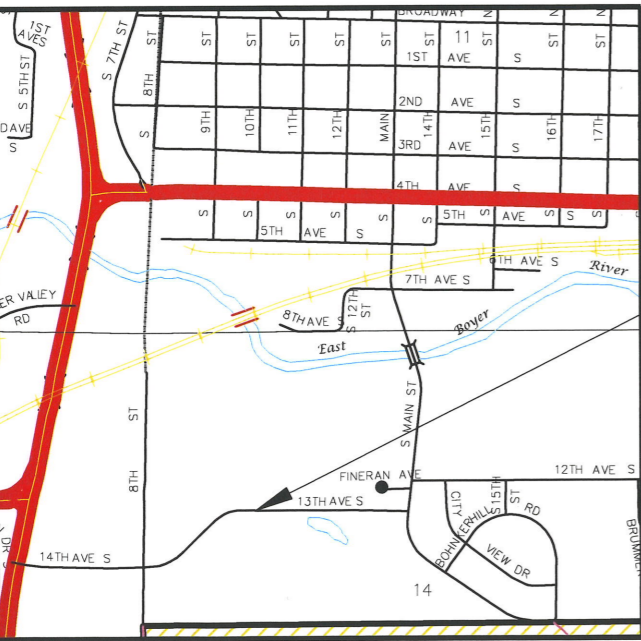


CITY OF DENISON

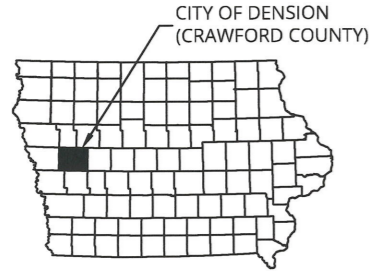
**2024 CITY OF DENISON
13TH AVENUE SOUTH STORM SEWER REPLACEMENT
PROJECT No.: E24042**

**QUOTE DATE:
May 2, 2024**



APPROXIMATE PROJECT LOCATION

VICINITY MAP (NOT TO SCALE)



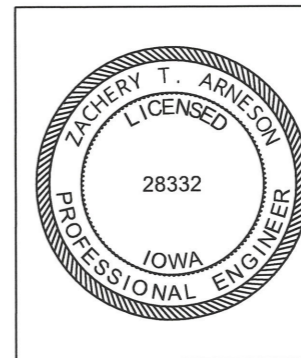
CITY OF DENISON (CRAWFORD COUNTY)

Unless otherwise specified, the Iowa Statewide Urban Design and Specifications (SUDAS) for Public Improvements, 2024 edition, followed by the Iowa Department of Transportation Standard Specifications for Highway and Bridge Construction, Series 2023, and applicable general supplemental specifications and special provisions shall apply to construction on this project. In case of conflicting requirements, the more stringent shall apply.

PLANS OF IMPROVEMENTS FOR
CITY OF DENISON
BEI PROJECT No.: E24042

2024 13TH AVENUE SOUTH STORM SEWER REPLACEMENT
APPROXIMATELY 1000' WEST OF THE INTERSECTION OF 13TH AVENUE
SOUTH AND SOUTH MAIN STREET
DENISON, IOWA

INDEX OF SHEETS	
NO.	DESCRIPTION
A.01	TITLE SHEET
A.02	LEGEND, GENERAL CONSTRUCTION NOTES, UTILITY CONTACT INFORMATION
B.01	TYPICAL CROSS SECTIONS AND DETAILS
C.01	ESTIMATE OF PROJECT QUANTITIES AND ESTIMATE REFERENCE INFORMATION
CR.01	REMOVAL SHEETS
D.01	PLAN SHEET
U.01-U.07	DETAILS



I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

Zachery T. Arneson 04/19/24 (date)
ZACHERY T. ARNESON, P.E.
LICENSE NUMBER 28332

My license renewal date is December 31, 2024

Pages or sheets covered by this seal: All

Beck Engineering, Inc.				
110 E Indian Street Cherokee, IA 51012 (712) 225-9025	2480 Berkshire Parkway Suite B Clive, IA 50325 (515) 330-1538	806 Hartford PL SE Orange City, IA 51041 (712) 737-9225	301 10th Street Suite A Sheldon, IA 51201 (712) 631-4014	3301 Zenith Avenue PO Box 238 Spirit Lake, IA 51360 (712) 336-3596

Drawn	04-18-24 By ZTA	Checked by	BJG
Revised		Project No.	E24042
Sheet	A.01		

2024 City of Denison
13th Avenue South Storm Sewer Replacement
Title Sheet



Beck Engineering, Inc.	
Cherokee, Iowa	Clive, Iowa
Orange City, Iowa	Sheldon, Iowa
Spirit Lake, Iowa	

Client:
City of Denison
111 N Main St.
Denison, IA 51442

LEGEND

● FOUND BOUNDARY MONUMENT AS NOTED	✕ FG 1305.00 PROPOSED FINISH GRADE
---1400--- BUILDING SETBACK LIMITS	✕ ME 1305.00 MATCH EXISTING GRADE
---1401--- EXISTING MAJOR CONTOUR	✕ TOC 1305.00 PROPOSED TOP OF CURB GRADE
---1400--- EXISTING MINOR CONTOUR	(UAC) UNDISTURBED AFTER CONSTRUCTION
---1400--- PROPOSED CONTOUR	— GAS — EXISTING GAS LINE
⬡ EXISTING CURB STOP	— E — EXISTING UNDERGROUND ELECTRIC LINE
⬢ PROPOSED CURB STOP	— OH — EXISTING OVERHEAD UTILITY LINE
⊗ EXISTING GATE VALVE	— CLN — EXISTING CENTURY LINK NETWORK LINE
⊗ PROPOSED GATE VALVE	— FO — EXISTING FIBER OPTIC LINE
⊗ EXISTING FIRE HYDRANT	— COM — EXISTING COMMUNICATION LINE
⊗ PROPOSED FIRE HYDRANT	— SAN — EXISTING SANITARY SEWER LINE
⊗ EXISTING IOWA HYDRANT	— SAN — PROPOSED SANITARY SEWER LINE
⊗ EXISTING CISTERN	— ST — EXISTING STORM SEWER LINE
⊗ EXISTING WATER METER PIT	— ST — PROPOSED STORM SEWER LINE
⊗ EXISTING SANITARY SEWER CLEANOUT	— W — EXISTING WATER MAIN
⊗ EXISTING SANITARY SEWER MANHOLE	— W — PROPOSED WATER MAIN
⊗ PROPOSED SANITARY SEWER MANHOLE	— ROW — RIGHT OF WAY LINE
⊗ EXISTING STORM SEWER MANHOLE	— SF — PROPOSED SILT FENCE
⊗ PROPOSED STORM SEWER MANHOLE	— SC — PROPOSED FLOATING SILT CURTAIN
⊗ COMMUNICATION PEDESTAL	— SL — PROPOSED SEDIMENT LOG
⊗ COMMUNICATION VAULT	— FS — PROPOSED FILTER SOCK
⊗ ELECTRIC PEDESTAL	— W — EXISTING CHAIN LINK FENCE
⊗ ELECTRIC VAULT	— W — EXISTING WOOD FENCE
⊗ ELECTRIC METER	⊗ EXISTING WOOD DECK
⊗ GAS METER	⊗ EXISTING PAVERS
⊗ GAS GATE VALVE	⊗ PROPOSED PAVERS
⊗ UTILITY PEDESTAL	⊗ PROPOSED RIP-RAP
⊗ UTILITY MANHOLE	⊗ EXISTING DETECTABLE WARNING
⊗ AIR CONDITIONER	⊗ PROPOSED DETECTABLE WARNING
⊗ SPRINKLER CONTROL VALVE	⊗ PROPOSED SOD
⊗ EXISTING MAILBOX	⊗ EXISTING GRAVEL
⊗ EXISTING STREET LIGHT	⊗ PROPOSED GRAVEL
⊗ EXISTING LIGHT POLE	⊗ EXISTING PCC PAVEMENT
⊗ EXISTING GUY WIRE	⊗ PROPOSED FULL DEPTH PCC PATCH
⊗ EXISTING UTILITY POLE	⊗ PROPOSED 5" PCC SIDEWALK
⊗ EXISTING TRAFFIC LIGHT	⊗ EXISTING ASPHALT PAVEMENT
⊗ 911 (ADDRESS) SIGN	⊗ PROPOSED ASPHALT PAVEMENT
⊗ STREET OR INFORMATIONAL SIGN	
⊗ DECIDUOUS TREE (DIA. GIVEN)	
⊗ CONIFEROUS TREE (DIA. GIVEN)	
⊗ STUMP	
⊗ BUSH	
⊗ BRUSH	
⊗ PROPOSED RETAINING WALL	
⊗ EXISTING BUILDING FOOTPRINT	
⊗ PROPOSED BUILDING FOOTPRINT	

DISTRICT	CONTACT NAME	CONTACT PHONE	CONTACT EMAIL
DENISON MUNICIPAL UTILITIES	JUSTIN GIBBONS	712-263-3046	jgibbons@dmuonline.com
FRONTIER COMMUNICATIONS	URANAN THAO	515-573-1268	frontierlocatemapsia@ftr.com
IOWA COMMUNICATIONS NETWORK	DAVE AUGSPURGER	515-725-4604	icnoutsideplantiowaonecall@iowa.gov
MONARC TECHNOLOGIES	MIKE LUDWIG	712-673-2311	mludwig@westianet.com
BLACK HILLS ENERGY COUNCIL BLUFFS	CHRIS DEWEY	712-580-6028	chris.dewey@blackhillscorp.com
MEDIACOM CABLE	TIM ADREON	515-451-8404	tadreon@mediacomcc.com

WHERE PUBLIC UTILITY LINES AND FIXTURES ARE SHOWN AS EXISTING ON THE PLANS OR ENCOUNTERED WITHIN THE CONSTRUCTION AREA, IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE OWNER OF THOSE UTILITIES PRIOR TO BEGINNING ANY CONSTRUCTION ACTIVITIES. THE CONTRACTOR SHALL PROVIDE ACCESS TO THOSE UTILITIES THAT REQUIRE SERVICE. UNDERGROUND UTILITIES AND STRUCTURES ARE SHOWN FROM LOCATES, SURVEYS AND RECORDS, AND SHALL BE CONSIDERED APPROXIMATE ONLY. IT IS POSSIBLE THAT OTHERS MAY EXIST OF WHICH THE LOCATION IS NOT KNOWN. THE CONTRACTOR WILL BE RESPONSIBLE FOR DETERMINING THE EXISTENCE AND EXACT LOCATION OF ALL UTILITIES AND STRUCTURES AND TO AVOID DAMAGE THERETO. NO CLAIMS FOR ADDITIONAL COMPENSATION WILL BE ALLOWED TO THE CONTRACTOR FOR INTERFERENCE OR DELAY CAUSED BY UTILITY COORDINATION OR RELOCATION WORK.

THE CONTRACTOR SHALL CONTACT THE IOWA ONE-CALL SERVICE (1-800-292-8989) AT LEAST 48 HOURS PRIOR TO COMMENCING ANY WORK ON THE CONSTRUCTION SITE.

GENERAL CONSTRUCTION NOTES:

- HEAVY TRUCK TRAFFIC ON THE EXISTING ADJACENT PAVEMENTS SHALL BE KEPT TO THE MINIMUM NECESSARY FOR THE REQUIRED CONSTRUCTION OPERATIONS. ALL BASE AND EXISTING PAVEMENT REPAIRS NECESSARY DUE TO HAULING DURING CONSTRUCTION ACTIVITIES SHALL BE COMPLETED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER. LIGHTER HAUL LOADS MAY BE REQUIRED TO PROTECT THE EXISTING SURFACES AND SHALL BE INCLUDED IN THE BID. NO COMPENSATION WILL BE MADE FOR ADDITIONAL HAULING ACTIVITIES OR PLACEMENT MACHINES/OPERATIONS THAT MAY BE REQUIRED TO PROTECT THE EXISTING SURFACES AND BASE MATERIALS.
- LOCATION OF UTILITIES IS APPROXIMATE. CONTRACTOR SHALL CONTACT IOWA ONE-CALL (1-800-292-8989) AT LEAST 48 HOURS PRIOR TO COMMENCING WORK ON THE PROJECT TO VERIFY LOCATION OF UTILITIES.
- NO CLAIMS FOR ADDITIONAL COMPENSATION WILL BE ALLOWED TO THE CONTRACTOR FOR INTERFERENCE OR DELAY CAUSED BY UTILITY COORDINATION OR RELOCATION WORK.
- ALL EXISTING UTILITY POLES, STREET LIGHTS, PEDESTALS AND TRANSFORMERS, EXCEPT THOSE NOTED IN THE PLANS, SHALL REMAIN UNDISTURBED AND FUNCTIONAL DURING CONSTRUCTION.
- ALL WORK SHALL TAKE PLACE WITHIN THE CURRENT ADJACENT PUBLIC ROAD RIGHT-OF-WAY, EASEMENT AREAS OR PROJECT BOUNDARY AS SHOWN IN THE PLAN SHEETS. NO PAYMENT WILL BE MADE FOR REPLACEMENT OR REPAIR TO ITEMS THAT ARE DAMAGED OUTSIDE OF THIS AREA OR WITHIN SAID WORK ZONE THAT ARE NOT NOTED IN THE PLANS.
- THE CONTRACTOR WILL BE REQUIRED TO PROVIDE CONSTRUCTION ACCESS TO THE SITE. THIS SHALL INCLUDE REMOVING, SALVAGING AND REPLACING ANY REQUIRED ITEMS NECESSARY TO ACCOMMODATE CONSTRUCTION TRAFFIC.
- ACCESS TO THE ADJACENT PROPERTIES SHALL BE MAINTAINED TO THE FULL EXTENT POSSIBLE AT ALL TIMES DURING CONSTRUCTION. THIS SHALL REQUIRE KEEPING THE ADJACENT ROADWAYS AND AREAS CLEAN AND FREE OF EQUIPMENT AND DEBRIS.
- THE PROJECT AREA WILL BE CONTROLLED THROUGH TRAFFIC CONTROL DURING CONSTRUCTION. THE ADJACENT ROADWAYS SHALL REMAIN OPEN TO TRAFFIC DURING CONSTRUCTION.
- IF THE PROJECT IS OPEN TO PROPERTIES ALONG THE PROJECT SITE, THE CONTRACTOR SHALL CONSTRUCT AND MAINTAIN TEMPORARY DRIVEWAY RAMPS AND ACCESSES DURING CONSTRUCTION. RAMPS CAN BE CONSTRUCTED OF MODIFIED SUBBASE TO BE USED FOR LATER GRADING OPERATIONS. NO SEPARATE PAYMENT WILL BE MADE FOR THIS TEMPORARY ACCESS TO LOCAL RESIDENTS.
- THE CONTRACTOR WILL BE REQUIRED TO MAINTAIN SANITARY SEWER AND WATER SERVICES TO ALL ADJACENT PROPERTIES TO THE FULL EXTENT POSSIBLE. A WRITTEN NOTICE SHALL BE PROVIDED TO THE CITY AND ANY INDIVIDUAL PROPERTY OWNERS INFORMING OF AN EXPECTED SERVICE INTERRUPTION. THIS NOTICE SHALL BE GIVEN AT LEAST 24 HOURS PRIOR TO SERVICE INTERRUPTION.
- ALL STRUCTURES AND FIXTURES, INCLUDING, BUT NOT LIMITED TO, MANHOLE COVERS AND STORM SEWER INTAKES, SHALL BE CLEAN AND FREE OF ALL DEBRIS AFTER CONSTRUCTION ACTIVITIES.
- THE CONTRACTOR SHALL APPLY NECESSARY MOISTURE TO THE CONSTRUCTION AREA TO PREVENT THE SPREAD OF DUST. SEE SECTION 1107.07 OF THE IOWA DOT STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGE CONSTRUCTION.
- ALL VEGETATION SHALL BE SCARIFIED PRIOR TO GRADING OF THE PROJECT. EXCEPT FOR BACKFILLING, NO VEGETATION SHALL BE PLACED UNDER, OR WITHIN 2 FEET OF ANY PAVING.
- ALL FILL MATERIAL SHALL BE COMPACTED TO 95% OF THE STANDARD PROCTOR DENSITY UNLESS STATED OTHERWISE.
- THE CONTRACTOR SHALL NOT DISTURB DESIRABLE GRASS AREAS AND DESIRABLE TREES OUTSIDE OF THE CONSTRUCTION LIMITS AS SHOWN IN THE CONSTRUCTION DOCUMENTS. THE CONTRACTOR SHALL PROTECT ALL GRASS AREAS, TREES, BUSHES AND LANDSCAPING WITHIN THE WORK ZONE UNLESS NOTED OTHERWISE IN THE PLANS. DAMAGE TO SUCH ITEMS WILL BE AT THE CONTRACTOR'S EXPENSE.
- CONTRACTOR SHALL PROTECT EXISTING TREES AND SUCH THAT ARE NOT NOTED TO BE CLEARED/GRUBBED.
- THE CONTRACTOR WILL NOT BE PERMITTED TO PARK OR SERVICE VEHICLES AND EQUIPMENT OR USE UNDISTURBED AREAS FOR STORAGE OF MATERIALS. STORAGE, PARKING, AND SERVICE AREAS WILL BE SUBJECT TO APPROVAL OF THE ENGINEER.
- ALL TOPSOIL IN THE DISTURBED AREAS SHALL BE FREE OF ROCK AND DEBRIS AND SHALL BE SUITABLE FOR THE ESTABLISHMENT OF VEGETATION, SOD AND SEEDING OPERATIONS, SUBJECT TO APPROVAL OF THE ENGINEER.
- ANY WASTE MATERIALS THAT ARE GENERATED SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED FROM THE PROJECT SITE. NO ADDITIONAL PAYMENT WILL BE MADE FOR THIS REMOVAL.
- INSTALLATION OF THE EROSION CONTROL DEVICES MAY REQUIRE MULTIPLE MOBILIZATIONS. THESE ITEMS MUST BE INSTALLED AS SPECIFIED AND NO ADDITIONAL PAYMENT WILL BE MADE FOR MULTIPLE MOBILIZATIONS.
- OWNER WILL PROVIDE CONSTRUCTION SURVEY AND QUALITY CONTROL TESTING.

Client:
City of Denison
111 N Main St.
Denison, IA 51442

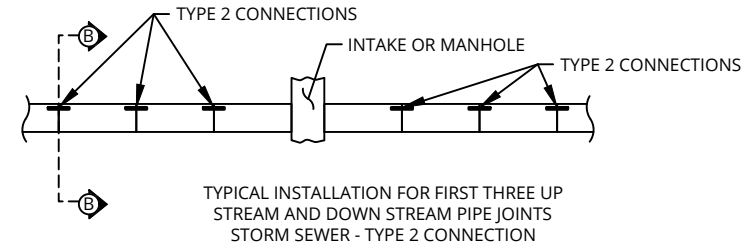
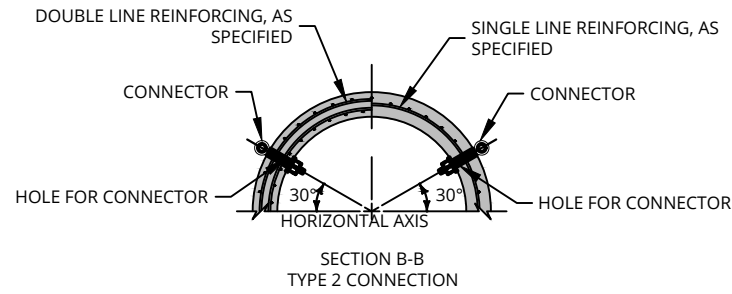
Beck Engineering, Inc.
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Spirit Lake, Iowa



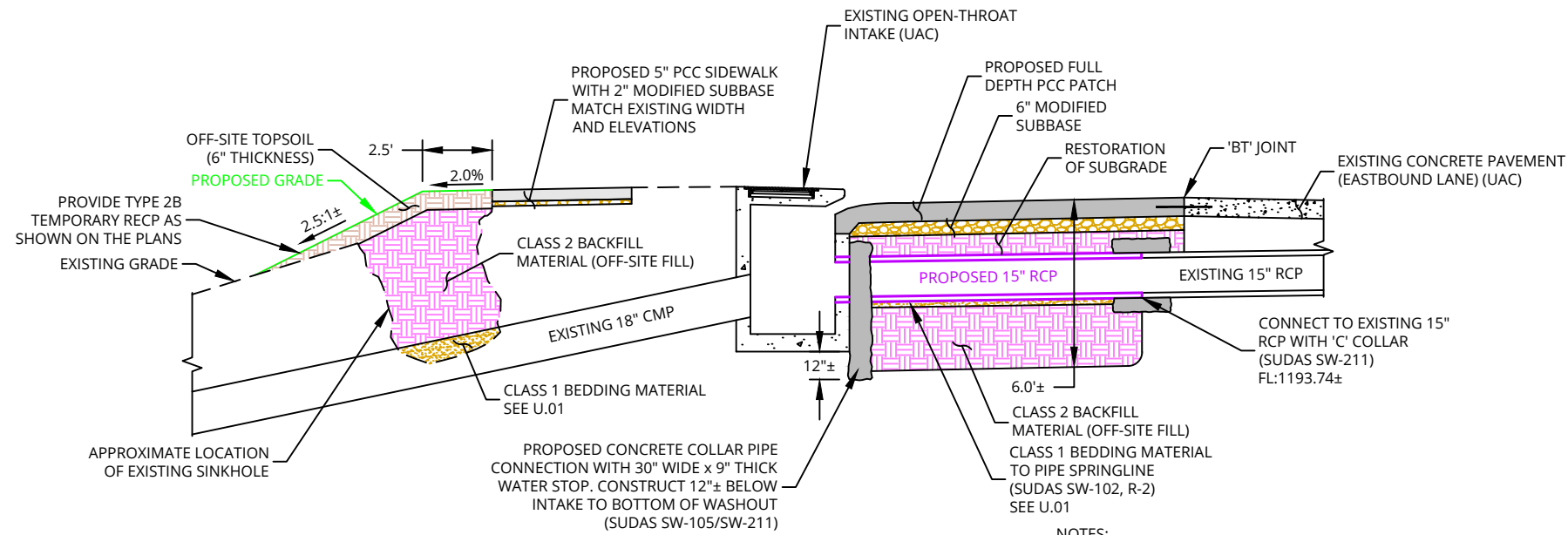
2024 City of Denison
13th Avenue South Storm Sewer Replacement
Legend, General Construction Notes,
Utility Contact Information

Checked by B/JG
Project No. E24042

Drawn 04-18-24 By ZTA
Revised
Sheet A.02

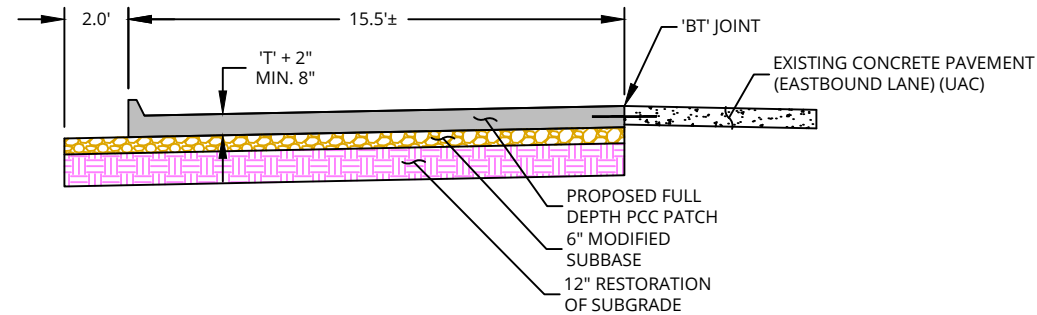


A
B.01 TIED PIPE JOINTS FOR RCP STORM SEWER
(NOT TO SCALE)



B
B.01 PROPOSED IMPROVEMENTS CROSS SECTION
(NOT TO SCALE)

- NOTES:
- EXPANSION JOINTS WILL BE REQUIRED AS SHOWN OR AS DIRECTED WHEN ABUTTING CERTAIN EXISTING PAVEMENTS OR BUILDING FOUNDATIONS.
 - TYPICAL 12' JOINT SPACING IS MAX SPACING FOR THE LONGITUDINAL JOINTS. TRANSVERSE JOINTS SHALL BE SPACED AT 15' MAX SPACING OR AS SHOWN IN THE PLAN SHEETS. IRREGULAR SPACING SHALL BE AS SHOWN OR AS DIRECTED. INTEGRAL TRANSVERSE JOINTS SHALL BE A 'CD' JOINT AND END OF PAVING TRANSVERSE JOINTS SHALL BE A 'RT' JOINT. DEPENDING ON THE SEQUENCE OR LOCATION, LONGITUDINAL JOINTS SHALL BE A 'C', 'L-1' OR A 'BT-1' OR 'KT-1' JOINT. MATCH EXISTING TRANSVERSE AND LONGITUDINAL JOINTING LAYOUTS.
 - THICKNESS SHALL BE EXISTING 'T' + 2" WITH 6" MINIMUM THICKNESS.
 - PROPOSED CONCRETE PATCHING SHALL MATCH ADJACENT SURFACES.
 - RESTORED SUBGRADE SHALL BE COMPACTED TO A MINIMUM 95% OF THE STANDARD PROCTOR DENSITY.



C
B.01 TYPICAL PCC PATCH
(NOT TO SCALE)

Drawn	04-18-24 By ZTA	Checked by	BJG
Revised		Project No.	E24042
Sheet B.01			

2024 City of Denison
13th Avenue South Storm Sewer Replacement
Typical Cross Sections and Details



Beck Engineering, Inc.	
Cherokee, Iowa	Clive, Iowa
Orange City, Iowa	Sheldon, Iowa
	Spirit Lake, Iowa

Client:
City of Denison
111 N Main St.
Denison, IA 51442

ESTIMATED PROJECT QUANTITIES - BASE BID				
ITEM NO.	ITEM CODE	ITEM DESCRIPTION	UNIT	QUANTITY
1	2010-D-1	TOPSOIL, ON-SITE	CY	25
2	2010-D-3	TOPSOIL, OFF-SITE	CY	10
3	2010-E	EXCAVATION, CLASS 10, BORROW	CY	80
4	2010-J	SUBBASE, MODIFIED, 2"	SY	17
5	2010-J	SUBBASE, MODIFIED, 6"	SY	114
6	4020-A-1	STORM SEWER, TRENCHED, RCP, 15"	LF	11
7	4020-D	REMOVAL OF STORM SEWER, RCP, 15"	LF	11
8	4020-999-A	SPECIAL 'C' COLLAR	EA	2
9	7030-A	REMOVAL OF SIDEWALK	SY	17
10	7030-E	SIDEWALK, PCC, 5"	SY	17
11	7040-A	FULL DEPTH PATCHES	SY	101
12	7040-H	PAVEMENT REMOVAL	SY	101
13	9010-A	CONVENTIONAL SEEDING, SEEDING, FERTILIZING, AND HYDRO-MULCHING	AC	0.03
14	9040-N-1	SILT FENCE OR SILT FENCE DITCH CHECK	LF	92
15	9040-N-2	SILT FENCE OR SILT FENCE DITCH CHECK, REMOVAL OF SEDIMENT	LF	92
16	9040-N-3	SILT FENCE OR SILT FENCE DITCH CHECK, REMOVAL OF DEVICE	LF	92
17	11,020-A	MOBILIZATION	LS	1
18	11,050-A	CONCRETE WASHOUT	LS	1

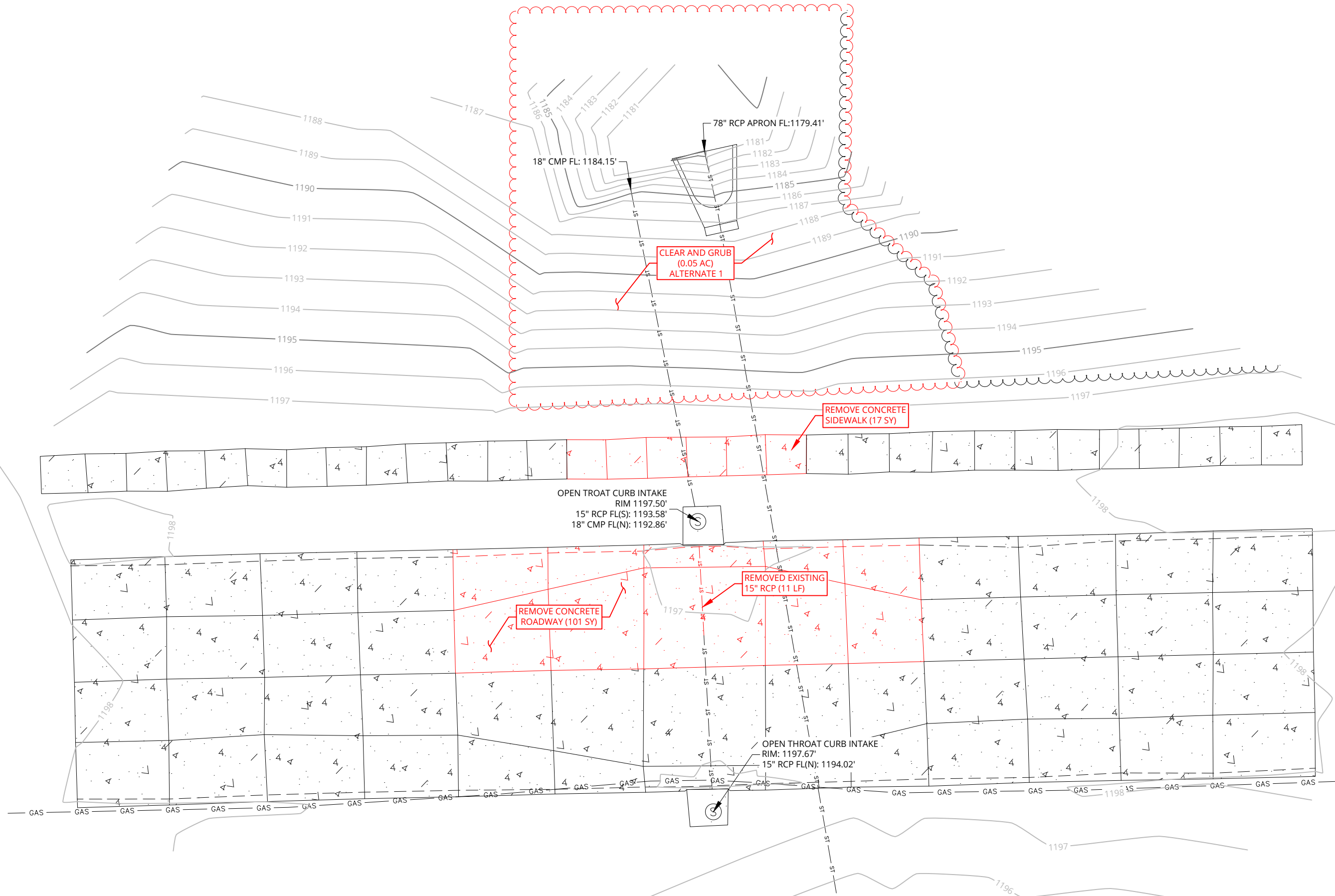
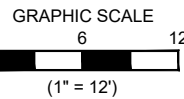
ESTIMATE REFERENCE INFORMATION - BASE BID				
ITEM NO.	ITEM CODE	ITEM DESCRIPTION	UNIT	QUANTITY
1	2010-D-1	TOPSOIL, ON-SITE Bid item is for stripping, salvaging, spreading and shaping on-site topsoil in accordance with Section 2010 of the SUDAS Standard Specifications. Quantity is based on grass areas inside the right-of-way and construction limits that will be disturbed with a 6" uniform thickness. Bid item shall include scarifying all vegetation prior to grading.		
2	2010-D-3	TOPSOIL, OFF-SITE Bid item is for furnishing, spreading and shaping off-site topsoil in accordance with Section 2010 of the SUDAS Standard Specifications. Material shall be topsoil free of rock and debris and subject to engineer approval prior to placement. Quantity is based on grass areas inside the right-of-way and sinkhole that are disturbed and require furnished topsoil with a 6" uniform thickness. Bid item shall include scarifying all vegetation prior to grading.		
3	2010-E	EXCAVATION, CLASS 10, BORROW Bid item includes 80 c.y. of off-site fill material. Fill quantity is based on a 30% compaction factor. All fill material shall be compacted to a minimum 95% of the Standard Proctor Density. All imported fill shall be suitable clay material approved by the engineer prior to placement.		
4-5	2010-J	SUBBASE, MODIFIED, 2", 6" Modified subbase will be required under all portions of the proposed roadway pavement and sidewalks. Roadway quantity is based on material being placed as shown in the typical sections and shall be a minimum of 6" thickness. Sidewalk quantity is based on material being placed the full width of the driveway and sidewalk pavement or as shown in the typical sections and shall be a minimum of 2" thickness. Material shall conform to Section 4123 of the Iowa DOT Standard Specifications for Highway and Bridge Construction.		
6	4020-A-1	STORM SEWER, TRENCHED, RCP, 15" Bid item shall include all equipment, labor and material, including all necessary bends and connections, watertight rope gaskets per ASTM C443 and fabric for joints, required for complete installation. All Reinforced Concrete Pipe shall be 2000D. Bid item shall include all excavation, bedding and backfill material. All RCP pipe bedding shall be Class R-2 as shown in Figure 3010.102 (SW-102) of the SUDAS Standard Specifications. Bedding material shall conform to Class 1 Material (crushed stone) of Section 3010-2.02.A of the SUDAS Standard Specifications. Bid item includes bedding material for existing CMP located at the sinkhole location. Bid item shall include topsoil separation where applicable. All excavation, with topsoil separation, salvage and spread, as well as all backfill shall be included in this bid item. Salvaged topsoil shall be spread on the top 6" of all excavated areas that are not under the proposed pavement and shall be free of rock and debris and shall be suitable for the establishment of vegetation. All backfill material shall be compacted to a minimum 95% of the Standard Proctor Density. Bid item shall include the installation and removal of all temporary tie-ins that may be required. All pipe joints shall include ASTM C443 gaskets and be fabric wrapped. The first three up stream and down stream RCP pipe joints shall be tied with Type 2 connections as per Iowa DOT Standard Road Plan DR-121.		
7	4020-D	REMOVAL OF STORM SEWER, RCP, 15" Bid item shall include the complete removal of the existing storm sewer system as shown on the plan sheets. Material shall become the property of the contractor and shall be removed from the project site. Bid item shall include all backfill material. All backfill material shall be compacted to a minimum 95% of the Standard Proctor Density.		
8	4020-999-A	SPECIAL 'C' COLLAR Bid item shall include all trench excavation, pipe, bends, bedding and backfill material, engineering fabric, wire mesh, concrete, couplers, connections, equipment, and labor required for the complete installation. Bedding and backfill material shall be in accordance with the Storm Sewer, Trench bid item. Payment will be per each item of special connection 'C' collar installed. Bid item includes connection to existing open-throat intake and poured water stop at connection as shown in the plans.		
9	7030-A	REMOVAL OF SIDEWALK Bid item shall include all saw cutting and complete removal of the existing sidewalk as shown in the plan sheets or as directed. No separate payment for the material hauling or disposal will be made. Material is to become the property of the contractor and shall be removed from the project site and disposed of in a timely and legal fashion. The contractor shall exercise care when removing the sidewalks to ensure that adjacent surfaces are not damaged. Damaged portions shall be re-sawed, removed and replaced at the discretion of the engineer at no additional cost to the owner.		
10	7030-E	SIDEWALK, PCC, 5" Concrete shall be Iowa DOT C-4 Mix. Coarse aggregate shall be Class 3 Ledge Rock (Limestone or Quartzite). Refer to Sections 7010 and 7030 of the SUDAS Standard Specifications and Sections 2301 and 2511 of the Iowa DOT Standard Specifications for Highway and Bridge Construction. Bid item shall include 'C' joints sawed at a spacing equal to the width, but not to exceed 10' maximum. Connections to existing sidewalk and end of pouring sequence joints shall be 'RT' joints. Bid item shall include epoxy coated reinforcing steel, pavement cure and joint sealant material where required. Contractor shall construct the sidewalks in strict compliance with ADA requirements and Chapter 12 of the SUDAS Design Manual-General Sidewalk Requirements.		

11	7040-A	FULL DEPTH PATCHES Concrete shall be Iowa DOT C-4 Mix. Coarse aggregate shall be Class 3 Ledge Rock (Limestone or Quartzite). Bid item shall include integral curb and gutter where applicable. Refer to Section 7010 and 7040 of the SUDAS Standard Specifications and Sections 2301 and 2529 of the Iowa DOT Standard Specifications for Highway and Bridge Construction. Thickness shall be existing 'T' + 2", minimum 8". Contractor shall utilize a jointing system as specified in the SUDAS Standard Specifications. Contractor shall utilize a sealed 'E' joint when abutting buildings, structures and other certain pavements. All reinforcing steel shall be epoxy coated. Bid item shall include all saw cuts, dowels, reinforcing steel, cure and joint sealant material required for pavement. Jointing system shall match existing joints or as shown or directed. A mix design shall be submitted to the engineer prior to construction. Bid item shall include all saw cutting, excavation, compaction of disturbed subgrade, and full depth patch.		
12	7040-H	PAVEMENT REMOVAL Bid item shall include all saw cutting required for complete removal of the existing pavement. No separate payment for the material hauling or disposal will be made. Material is to become the property of the contractor and shall be disposed of in a timely and legal fashion. The contractor shall exercise care when removing the existing pavement to ensure that adjacent surfaces are not damaged. Damaged portions shall be re-sawed, removed and replaced at the discretion of the engineer at no additional cost to the owner.		
13	9010-A	CONVENTIONAL SEEDING, SEEDING, FERTILIZING, AND HYDRO-MULCHING Bid item includes areas that are disturbed during construction. Seed areas with Type 1 Seed Mixture as specified in Section 9010-2.02 of the SUDAS Standard Specifications. Seed and fertilizer shall be placed conventionally with hydro-mulch applied. If seed does not establish to a minimum of 70% coverage within the first growing season, the contractor shall re-seed the project area until 70% coverage is achieved at no additional expense to the owner.		
14	9040-N-1	SILT FENCE OR SILT FENCE DITCH CHECK Contractor shall install silt fence at locations indicated in the plan sheets or as directed by the engineer. Installation shall take place prior to construction activities whenever possible. Installation may require multiple mobilizations to the project site. No additional payment will be made for multiple mobilizations.		
15	9040-N-2	SILT FENCE OR SILT FENCE DITCH CHECK, REMOVAL OF SEDIMENT Bid item shall include removal of sediment once the silt has reached a height of 50% of the height of the silt fence for the duration of the project. This shall not include dirt that is placed along the silt fence as part of the grading or excavation operations.		
16	9040-N-3	SILT FENCE OR SILT FENCE DITCH CHECK, REMOVAL OF DEVICE Bid item shall include the complete removal of the device once vegetation has been established to a minimum coverage of 70% along the entire project site.		
17	11,020-A	MOBILIZATION Refer to Section 11,020 of the SUDAS Standard Specifications. Shall include preparatory work and operations of all items under the contract.		
18	11,050-A	CONCRETE WASHOUT Bid item shall include all labor and materials required for the installation of a concrete washout. Concrete washout shall conform to Section 11,050 of the SUDAS Standard Specifications.		

ESTIMATED PROJECT QUANTITIES - ALTERNATE 1				
ITEM NO.	ITEM CODE	ITEM DESCRIPTION	UNIT	QUANTITY
1	2010-B	CLEARING AND GRUBBING	AC	0.05
2	9010-A	CONVENTIONAL SEEDING, SEEDING, FERTILIZING, AND HYDRO-MULCHING	AC	0.05
3	9040-E-0	TEMPORARY RECP, TYPE 2B	SY	175
4	9040-J-0	RIP RAP, CLASS 'E'	TON	105
5	11,020-A	MOBILIZATION	LS	1

ESTIMATE REFERENCE INFORMATION - ALTERNATE 1				
ITEM NO.	ITEM CODE	ITEM DESCRIPTION	UNIT	QUANTITY
1	2010-B	CLEARING AND GRUBBING Bid item shall include all combined clearing and grubbing for complete tree and stump removal as shown in the plan sheets and as specified in Section 2010 of the SUDAS Standard Specifications. Trees, stumps and bushes that are to be removed shall be marked by the engineer prior to removal. Material shall become the property of the contractor and shall be promptly and properly removed from the project site.		
2	9010-A	CONVENTIONAL SEEDING, SEEDING, FERTILIZING, AND HYDRO-MULCHING Bid item includes areas that are disturbed during construction. Seed areas with Type 1 Seed Mixture as specified in Section 9010-2.02 of the SUDAS Standard Specifications. Seed and fertilizer shall be placed conventionally with hydro-mulch applied. If seed does not establish to a minimum of 70% coverage within the first growing season, the contractor shall re-seed the project area until 70% coverage is achieved at no additional expense to the owner.		
3	9040-E-0	TEMPORARY RECP, 2B Bid item includes all equipment, labor and materials to furnish and place Temporary Erosion Control Products as shown in the plans. RECP shall be a type 2B Netless Rolled Erosion Control Blanket. Refer to Section 9040 of the SUDAS Standard Specifications.		
4	9040-J-0	RIP RAP, CLASS 'E' Material shall meet the requirements of Section 4130 of the Iowa DOT Standard Specifications for Highway and Bridge Construction. Bid item shall include material and labor to place stone.		
5	11,020-A	MOBILIZATION Refer to Section 11,020 of the SUDAS Standard Specifications. Shall include preparatory work and operations of all items under the contract.		

Client:	City of Denison 111 N Main St. Denison, IA 51442		
	Beck Engineering, Inc.	Cherokee, Iowa	Clive, Iowa
Beck Engineering, Inc.	Orange City, Iowa	Sheldon, Iowa	Spirit Lake, Iowa
	 Beck Engineering, Inc. Civil Engineering Land Surveying Landscape Architecture		
2024 City of Denison 13th Avenue South Storm Sewer Replacement Estimate of Project Quantities and Estimate Reference Information			
Drawn	04-18-24 By ZTA	Checked by	BJG
Revised		Project No.	E24042
Sheet	C.01		



Plot Date: 4/19/2024 Last Saved By: zameson File Name: E24042 - CR Sheets

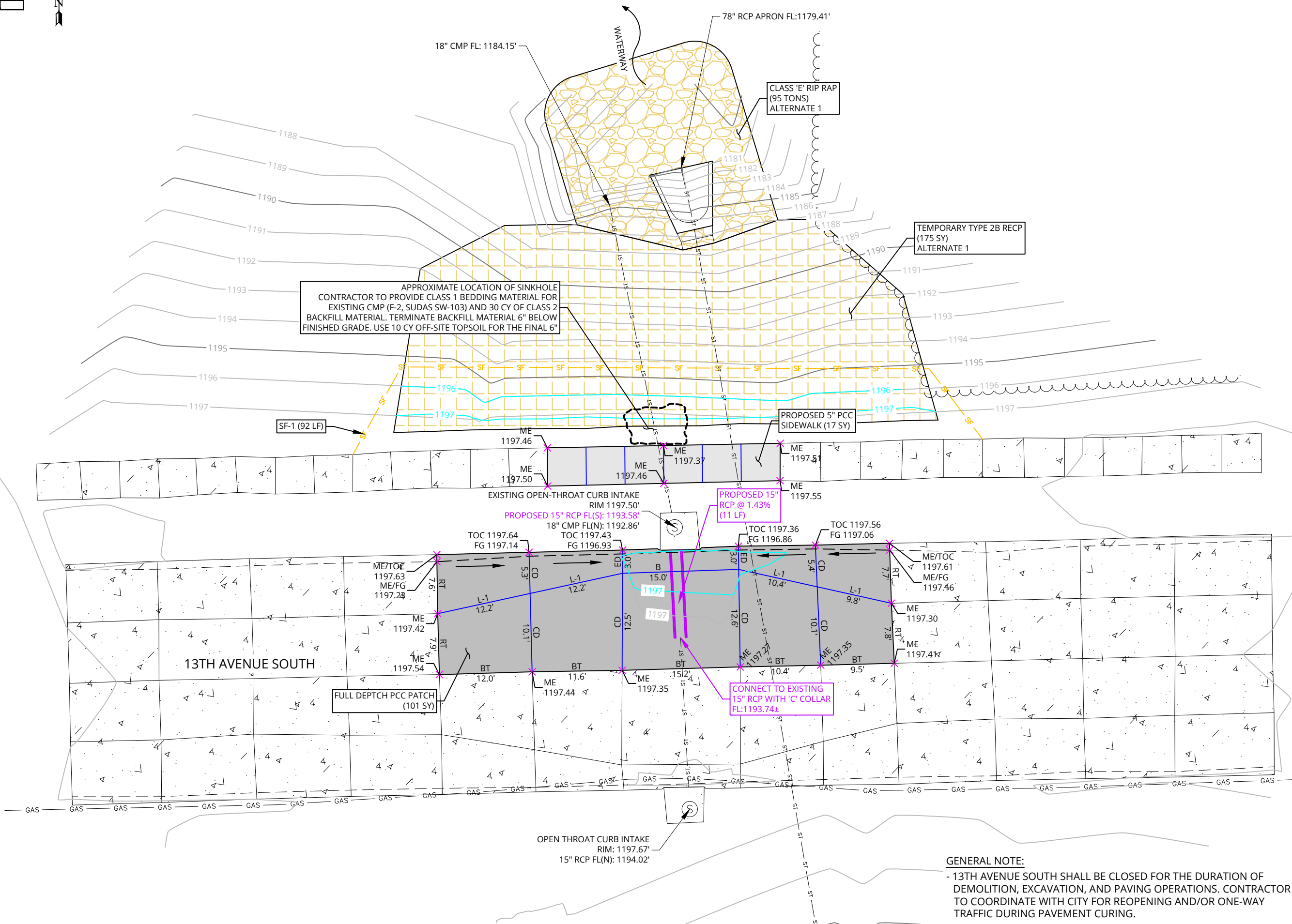
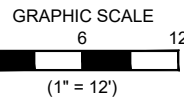
Drawn	04-18-24 By ZTA	Checked by	BJG
Revised		Project No.	E24042
Sheet CR.01			

2024 City of Denison
13th Avenue South Storm Sewer Replacement
Removal Sheet



Beck Engineering, Inc.	
Cherokee, Iowa	Clive, Iowa
Orange City, Iowa	Sheldon, Iowa
Spirit Lake, Iowa	

Client:
City of Denison
111 N Main St.
Denison, IA 51442



APPROXIMATE LOCATION OF SINKHOLE
 CONTRACTOR TO PROVIDE CLASS 1 BEDDING MATERIAL FOR
 EXISTING CMP (F-2, SUDAS SW-103) AND 30 CY OF CLASS 2
 BACKFILL MATERIAL. TERMINATE BACKFILL MATERIAL 6" BELOW
 FINISHED GRADE. USE 10 CY OFF-SITE TOPSOIL FOR THE FINAL 6"

CLASS 'E' RIP RAP
 (95 TONS)
 ALTERNATE 1

TEMPORARY TYPE 2B RECP
 (175 SY)
 ALTERNATE 1

PROPOSED 5" PCC
 SIDEWALK (17 SY)

PROPOSED 15" RCP @ 1.43%
 (11 LF)

CONNECT TO EXISTING
 15" RCP WITH 'C' COLLAR
 FL:1193.74±

FULL DEPTCH PCC PATCH
 (101 SY)

OPEN THROAT CURB INTAKE
 RIM: 1197.67'
 15" RCP FL(N): 1194.02'

GENERAL NOTE:
 - 13TH AVENUE SOUTH SHALL BE CLOSED FOR THE DURATION OF
 DEMOLITION, EXCAVATION, AND PAVING OPERATIONS. CONTRACTOR
 TO COORDINATE WITH CITY FOR REOPENING AND/OR ONE-WAY
 TRAFFIC DURING PAVEMENT CURING.

Plot Date: 4/19/2024 Last Saved By: zameson File Name: E24042 - D Sheets

Drawn	04-18-24 By ZTA	Checked by	BJG
Revised		Project No.	E24042
Sheet D.01			

2024 City of Denison
 13th Avenue South Storm Sewer Replacement
 Plan Sheet



Beck Engineering, Inc.	Clive, Iowa
Cherokee, Iowa	Sheldon, Iowa
Orange City, Iowa	Spirit Lake, Iowa

Client:
 City of Denison
 111 N Main St.
 Denison, IA 51442

Refer to the contract documents for specific material and placement requirements.

- ① Required only when specified in the contract documents or when directed by the Engineer.

Key

- OD = Outside diameter of pipe
- D = Inside diameter of pipe
- TW = Trench width at top of pipe
- d = Depth of bedding material below pipe

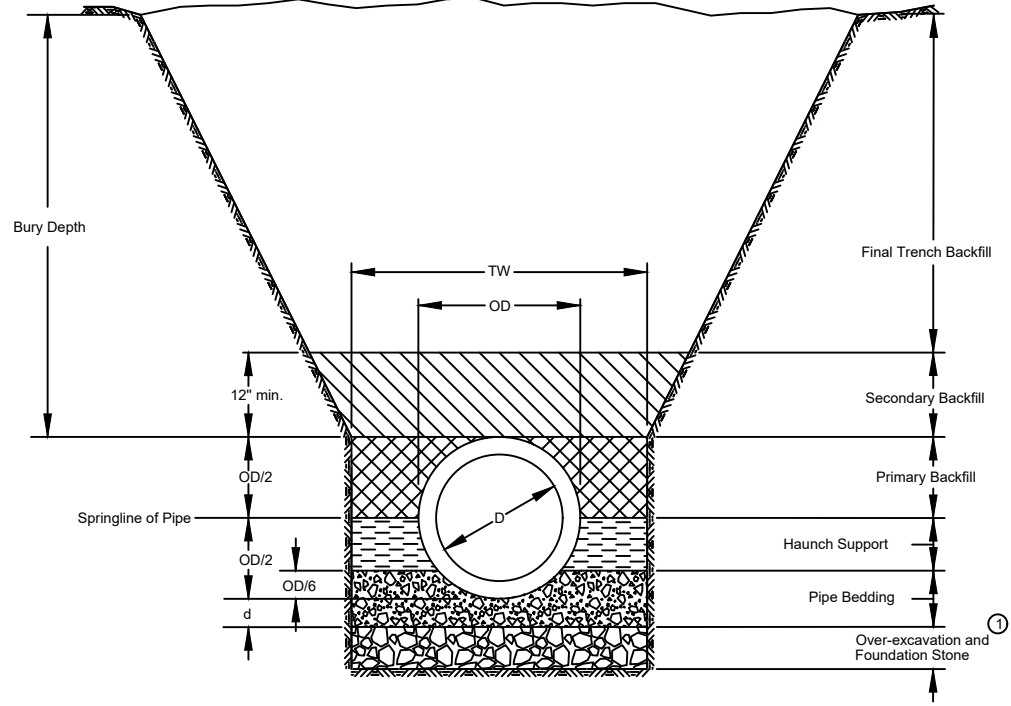
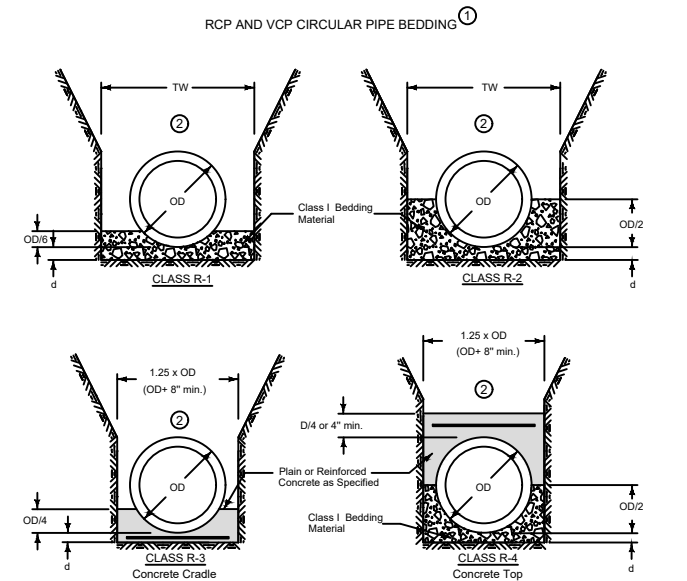


FIGURE 3010.101 STANDARD ROAD PLAN SW-101 SHEET 1 of 1

REVISIONS: Replaced Iowa DOT and SUDAS logos.

SUDAS DIRECTOR DESIGN METHODS ENGINEER

TRENCH BEDDING AND BACKFILL ZONES



DO NOT USE ON PRIMARY ROADWAYS

Refer to sheet 2 for bury depth restrictions.

- ① Use Bedding Class R-1 or R-2 unless specified otherwise.
- ② Place remainder of bedding and backfill materials as specified in the contract documents.

Key

- OD = Outside diameter of pipe
- OS = Outside span of pipe
- TW = Trench width at top of pipe:
Min. = OD+18 inches
Max. = 1.25xOD+12 inches OR
54 inches (whichever is greater)
- d = Depth of bedding material below pipe:
OD/8 or OS/8, OR 4 inches
(whichever is greater)

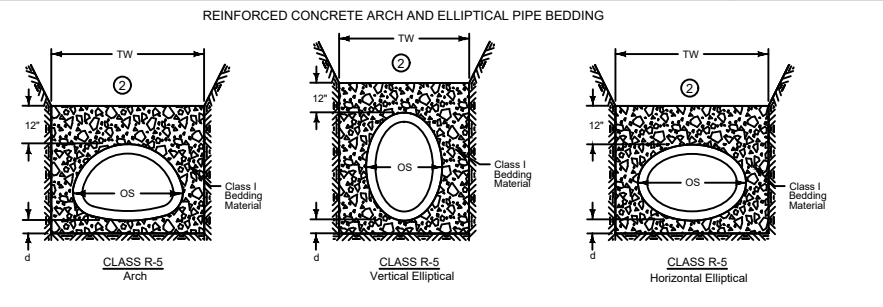


FIGURE 3010.102 STANDARD ROAD PLAN SW-102 SHEET 1 of 2

REVISIONS: Added note DO NOT USE ON PRIMARY ROADWAYS.

SUDAS DIRECTOR DESIGN METHODS ENGINEER

RIGID GRAVITY PIPE TRENCH BEDDING

ALLOWABLE BURY DEPTH

Pipe Diameter (in)	Class R-1 Bedding	Class R-2 Bedding	Class R-3 & R-4 Bedding		
			No Steel	As=0.4%	As=1.0%
12	7'	10'	15'	19'	27'
15	8'	10'	16'	19'	27'
18	8'	11'	16'	20'	40'
21	8'	11'	18'	26'	40'
24	8'	12'	23'	36'	40'
27	10'	15'	30'	40'	40'
30	11'	15'	29'	40'	40'
33	11'	15'	28'	40'	40'
36	11'	15'	27'	40'	40'
42	11'	15'	26'	38'	40'
48	11'	15'	26'	36'	40'
54	11'	15'	25'	34'	40'
60	11'	15'	25'	33'	40'
66	11'	15'	24'	32'	40'
72	11'	15'	24'	32'	40'

As = Area of Steel Reinforcing

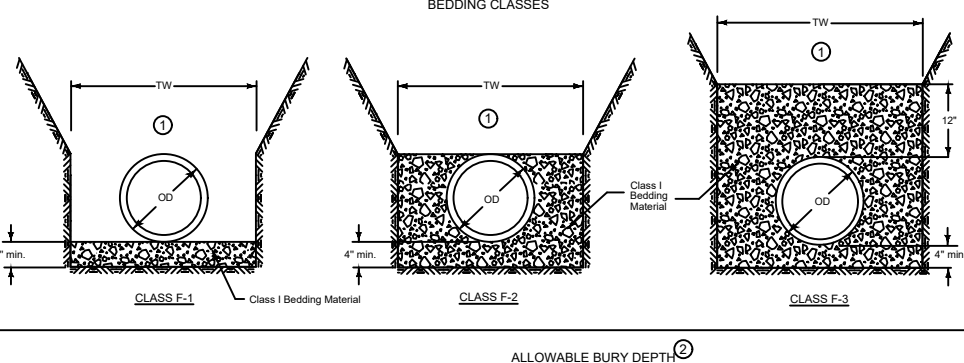
EXTRA STRENGTH VCP

Pipe Dia. (in)	Bedding Class				
	R-1	R-2	R-3 & R-4		
			No Steel	As=0.4%	As=1.0%
6	25'	30'	30'	30'	30'
8	20'	26'	30'	30'	30'
10	18'	23'	30'	30'	30'
12	16'	20'	30'	30'	30'
15	15'	19'	28'	30'	30'
18	14'	18'	30'	30'	30'
21	15'	22'	30'	30'	30'
24	18'	28'	30'	30'	30'
27	20'	30'	30'	30'	30'
30	19'	29'	30'	30'	30'
33	20'	30'	30'	30'	30'
36	20'	30'	30'	30'	30'
39	19'	29'	30'	30'	30'
42	18'	26'	30'	30'	30'

As = Area of Steel Reinforcing

FIGURE 3010.102 SHEET 1 OF 2

FIGURE 3010.103 SHEET 1 OF 1



DO NOT USE ON PRIMARY ROADWAYS

- ① Place remainder of bedding and backfill materials as specified in the contract documents.
- ② Minimum depth of bury 12 inches or as specified by the manufacturer.

ALLOWABLE BEDDING CLASSES

PIPE MATERIAL	STORM SEWER	SANITARY SEWER
Ductile Iron	F-1, F-2, F-3	F-1, F-2, F-3
HDPE	F-2, F-3	Not allowed
Polypropylene	F-2, F-3	F-3
PVC	F-2, F-3	F-3

- Key**
- OD = Outside diameter of pipe
 - TW = Trench width at top of pipe:
Min. = OD+18 inches OR 1.25xOD+12 inches
(whichever is greater)

ALLOWABLE BURY DEPTH

Pipe Diameter (in)	ASTM D 3034				ASTM F 679	ASTM F 949	ASTM F 1803	ASTM D 2680
	Solid Wall		Corrug Exterior					
	SDR 23.5	SDR 26	SDR 35	SDR 35				
8	30'	28'	24'	24'	24'	24'	32'	
10	30'	28'	24'	24'	24'	24'	32'	
12	30'	28'	24'	24'	24'	24'	32'	
15	30'	28'	24'	24'	24'	24'	32'	
18	---	---	---	24'	24'	24'	---	
21	---	---	---	24'	24'	24'	---	
24	---	---	---	24'	24'	24'	---	
27	---	---	---	24'	24'	24'	---	
30	---	---	---	24'	24'	24'	---	
33	---	---	---	24'	24'	24'	---	
36	---	---	---	24'	24'	24'	---	
42	---	---	---	24'	24'	24'	---	
48	---	---	---	24'	24'	24'	---	
54	---	---	---	24'	24'	24'	---	
60	---	---	---	24'	24'	24'	---	

Pipe Diameter (in)	Class F-1 Bedding	Class F-2 Bedding	Class F-3 Bedding
6	40'	40'	40'
8	40'	40'	40'
10	40'	40'	40'
12	37'	40'	40'
14	31'	40'	40'
16	28'	37'	40'
18	25'	34'	40'
20	23'	32'	40'
24	20'	29'	38'
30	18'	23'	31'
36	18'	22'	30'
42	17'	21'	29'
48	16'	19'	27'
54	16'	19'	27'

Pipe Diameter (in)	AASHTO M 294	Pipe Diameter (in)	ASTM F 2764
15	9'	15	25'
18	9'	18	22'
24	9'	24	20'
30	9'	30	22'
36	9'	36	21'
42	8'	42	22'
48	8'	48	23'
54	8'	54	21'
60	8'	60	21'

FIGURE 3010.103 STANDARD ROAD PLAN SW-102 SHEET 2 of 2

REVISIONS: Added note DO NOT USE ON PRIMARY ROADWAYS.

SUDAS DIRECTOR DESIGN METHODS ENGINEER

RIGID GRAVITY PIPE TRENCH BEDDING

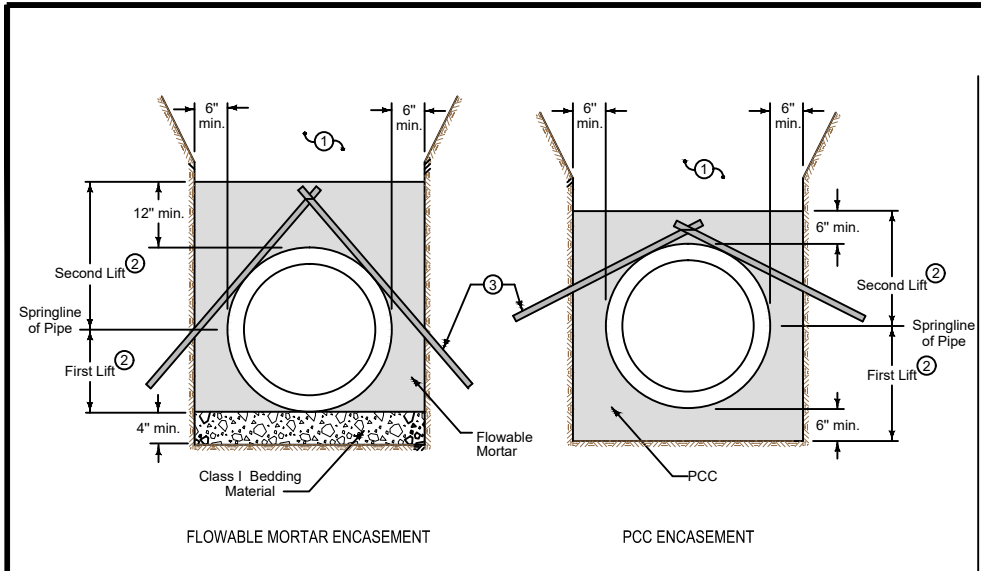
File Name: E24042 - U Sheets
Last Saved By: zameson
FIGURE 3010.102 SHEET 2 OF 2
Plot Date: 4/19/2024

Client: Beck Engineering, Inc. City of Denison, Iowa
Cherokee, Iowa Clive, Iowa
Orange City, Iowa Sheldon, Iowa
Spirit Lake, Iowa

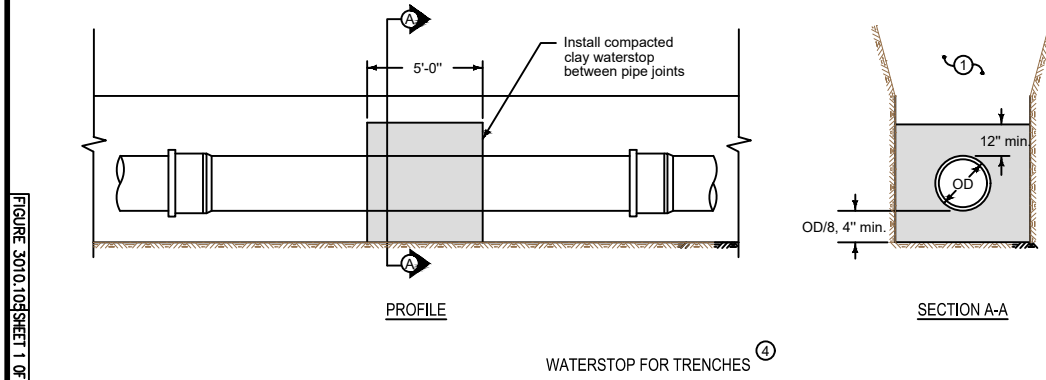
2024 City of Denison
13th Avenue South Storm Sewer Replacement
Details

Checked by: BJC
Project No.: E24042

Drawn: 04-18-24 By ZTA
Revised: JTA
Sheet U.01

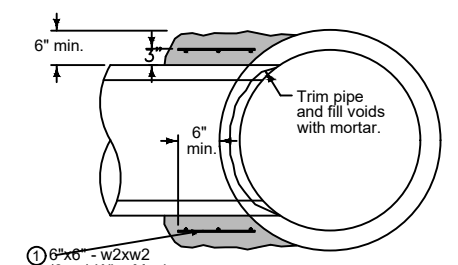


- Place remainder of bedding and backfill material as specified in the contract documents.
- Place encasement material in two lifts, or as required to prevent pipe flotation. Allow previous lift to reach initial set prior to placing subsequent lifts.
- Restrain pipe as necessary to prevent flotation.
- When specified in the contract documents, install waterstops at a nominal spacing of 800 feet or at locations as specified by the Engineer.

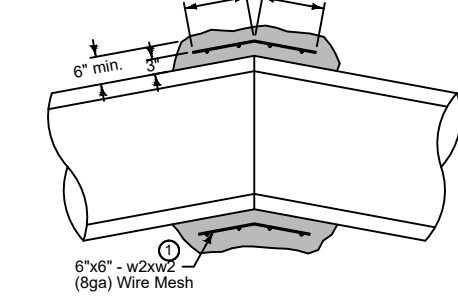


SUDAS	REVISION	2	04-17-18
FIGURE 3010.105	STANDARD ROAD PLAN	SW-105	
REVISIONS: Replaced Iowa DOT and SUDAS logos.		SHEET 1 of 1	
SUDAS DIRECTOR	DESIGN METHODS ENGINEER		
MISCELLANEOUS PIPE BEDDING			

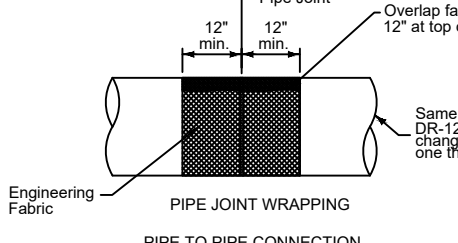
FIGURE 3010.105 SHEET 1 OF 1



TYPE PC-1 CONCRETE COLLAR CONNECTION

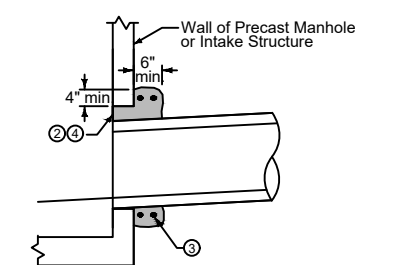


TYPE PC-2 CONCRETE COLLAR CONNECTION

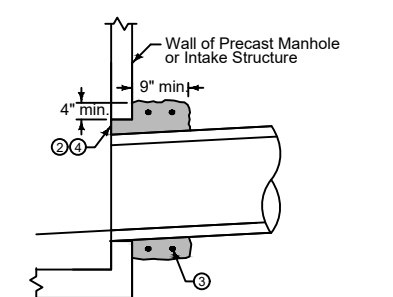


PIPE TO PIPE CONNECTION

- Lap ends of wire mesh a minimum of 6 inches.
- Concrete collar is required when annular space between the outside of the pipe and the wall of the structure is 2 inches or greater.
- Provide two #4 hoop bars in concrete collar. Lap bars a minimum of 6 inches.
- Trowel concrete flush with inside wall of structure.



CONCRETE COLLAR FOR PIPES 12" AND SMALLER



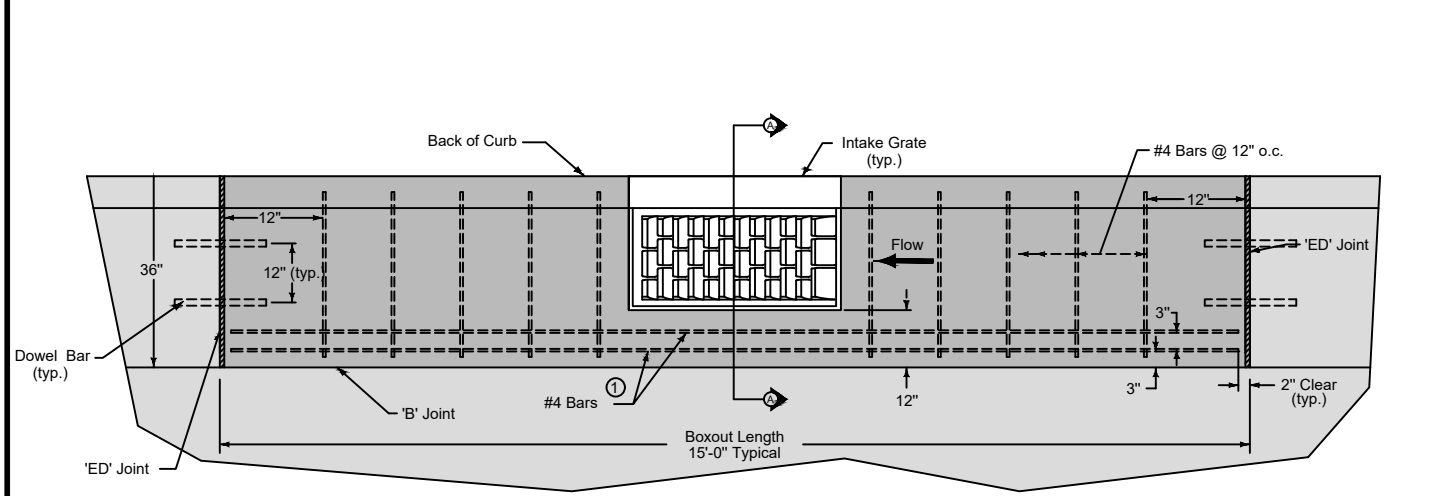
CONCRETE COLLAR FOR PIPES GREATER THAN 12" PIPE TO STRUCTURE CONNECTION

SUDAS	REVISION	2	04-17-18
FIGURE 4020.211	STANDARD ROAD PLAN	SW-211	
REVISIONS: Removed 'Invert' callout on Pipe to Structure View. Restored and replaced old Iowa DOT and SUDAS logos with new logos.		SHEET 1 of 1	
SUDAS DIRECTOR	DESIGN METHODS ENGINEER		
STORM SEWER PIPE CONNECTIONS			

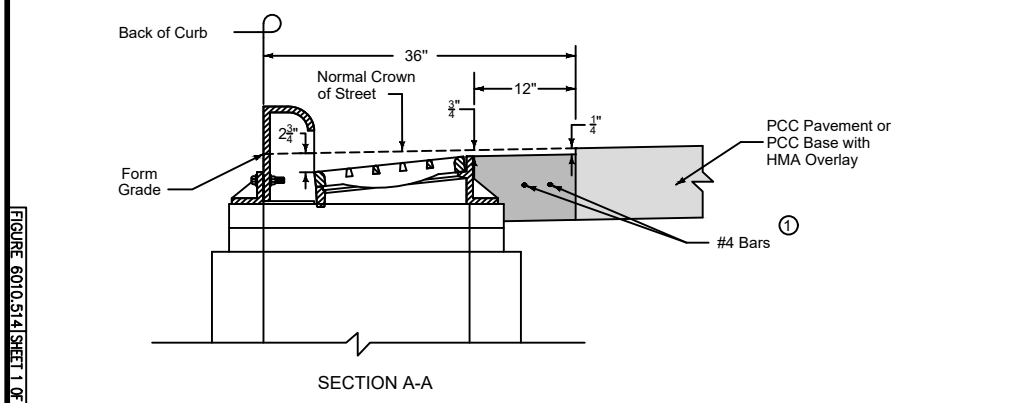
Client:
City of Denison
111 N Main St.
Denison, IA 51442

Beck Engineering, Inc.
Cherokee, Iowa
Orange City, Iowa
Spirit Lake, Iowa

BEI
Civil Engineering
Land Surveying
Landscape Architecture



BOXOUT IN PCC PAVEMENT AND PCC BASE WITH HMA OVERLAY



SECTION A-A

Transverse joint spacing on new concrete pavement is controlled by the intake boxout. Adjust adjacent joint spacing as required to accommodate boxouts.

For retrofit intakes, match existing concrete pavement joints. Stop any transverse pavement joints that do not conform to the minimum spacing requirements at the edge of the boxout.

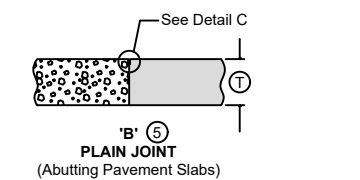
- Center bars vertically within slab.

SUDAS	REVISION	1	04-17-18
FIGURE 6010.514	STANDARD ROAD PLAN	SW-514	
REVISIONS: Added dimension to back of grate. Updated line work and Iowa DOT and SUDAS logos.		SHEET 1 of 3	
<i>Paul D. Wilson</i>	<i>Brian Smith</i>		
BOXOUT FOR GRATE INTAKES			

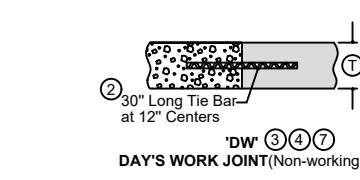
FIGURE 6010.514 SHEET 1 OF 3

FIGURE 4020.211 SHEET 1 OF 1

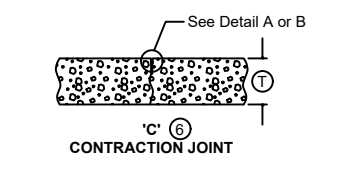
FIGURE 7010.101 SHEET 1 OF 8



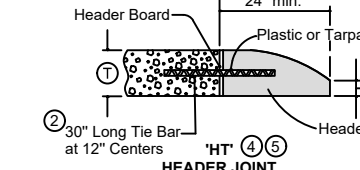
'B' PLAIN JOINT (Abutting Pavement Slabs)



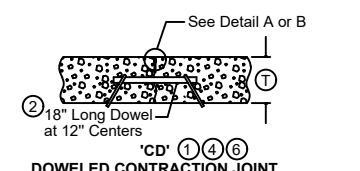
'DW' DAY'S WORK JOINT (Non-working)



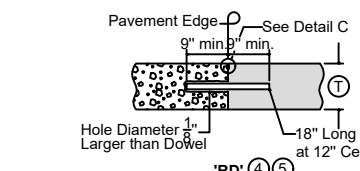
'C' CONTRACTION JOINT



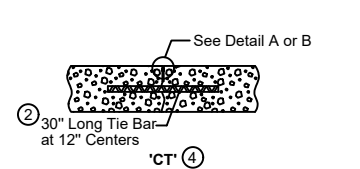
'HT' HEADER JOINT (End Rigid Pavement)



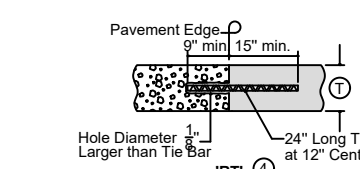
'CD' DOWELED CONTRACTION JOINT



'RD' ABUTTING PAVEMENT JOINT

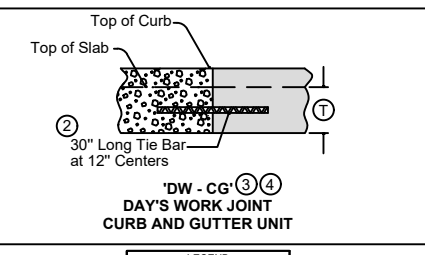


'CT' TIED CONTRACTION JOINT



'RT' ABUTTING PAVEMENT JOINT RIGID TIE

- See dowel assemblies for fabrication details.
- See Bar Size Table for Contraction Joints on Sheet 2.
- Locate 'DW' joint at a mid-panel location between future 'C' or 'CD' joints. Place no closer than 5 feet to a 'C' or 'CD' joint.
- Place bars within the limits shown under dowel assemblies.
- Edge with 1/8 inch tool for length of joint. For HT joint, remove header block and board when second slab is placed.
- Unless specified otherwise, use 'CD' transverse contraction joints in mainline pavement when ϕ is greater or equal to 8 inches. Use 'C' joints when ϕ is less than 8 inches.
- 'RT' joint may be used in lieu of 'DW' joint at the end of the days work. Remove any pavement damaged due to the drilling at no additional cost to the Contracting Authority.



'DW - CG' DAY'S WORK JOINT CURB AND GUTTER UNIT

LEGEND	
	Existing Pavement
	Proposed Pavement
SUDAS	REVISION
FIGURE 7010.101	STANDARD ROAD PLAN
PV-101	
REVISIONS: Modified Circle Note 12.	
SUDAS DIRECTOR	DESIGN METHODS ENGINEER
JOINTS	

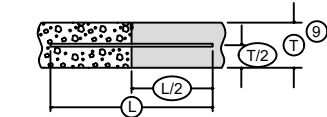
2024 City of Denison
13th Avenue South Storm Sewer Replacement
Details

Checked by
BJG
Project No.
E24042

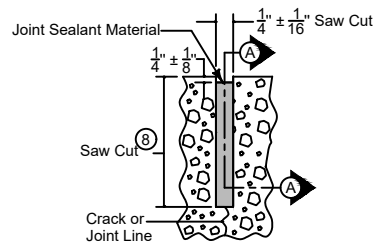
Drawn
04-18-24 By ZTA
Revised
Sheet U.02

File Name: E24042 - U Sheets
Last Saved By: zameson
Plot Date: 4/19/2024

FIGURE 7010.101 SHEET 2 OF 8



BAR PLACEMENT
(Applies to all joints unless otherwise detailed.)

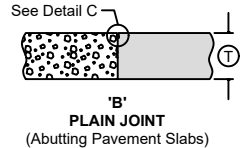


DETAIL A
(Saw cut formed by conventional concrete sawing equipment.)

- ⑧ Saw 'CD' joint to a depth of $T/3 \pm 1/4"$; saw 'C' joint to a depth of $T/4 \pm 1/4"$.
- ⑨ When tying into old pavement, T represents the depth of sound PCC.

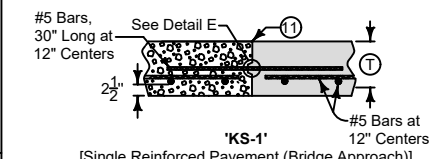
T	Solid Dowel Diameter	Tubular Dowel Diameter	Tie Bar Size
< 8"	$\frac{3}{4}$ "	$\frac{7}{8}$ "	#6
$\geq 8"$ but < 10"	$1\frac{1}{4}$ "	$1\frac{3}{8}$ "	#10
$\geq 10"$	$1\frac{1}{2}$ "	$1\frac{5}{8}$ "	#11

Tubular Dowel Bars will not be allowed for RD joints.



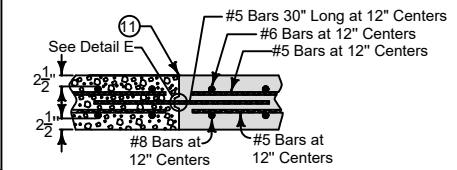
'B' PLAIN JOINT
(Abutting Pavement Slabs)

T	Joint	Bars	Bar Length and Spacing
< 8"	'BT-1'	#5	36" Long at 30" Centers
$\geq 8"$	'BT-2'	#5	36" Long at 30" Centers



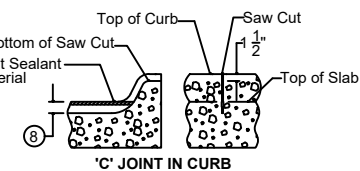
'KS-1'
[Single Reinforced Pavement (Bridge Approach)]

- ⑩ Bar supports may be necessary for fixed form paving to ensure the bar remains in a horizontal position in the plastic concrete.
- ⑪ Sawing or sealing of joint not required.
- ⑫ The following joints are interchangeable, subject to the pouring sequence:
'BT-1', 'L-1', and 'KT-1'
'KT-2' and 'L-2'
'KT-3' and 'L-3'

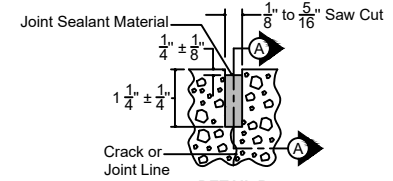


'KS-2'
[Double Reinforced Pavement (Bridge Approach)]

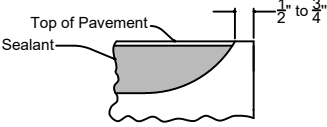
T	Joint	Bars	Bar Length and Spacing
< 8"	'L-1'	#4	36" Long at 30" Centers
$\geq 8"$	'L-2'	#5	36" Long at 30" Centers
$\geq 8"$	'L-3'	#5	36" Long at 15" Centers



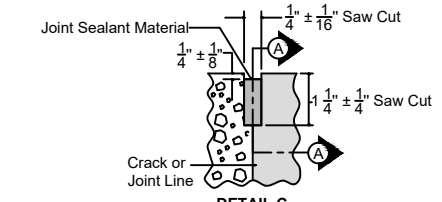
'C' JOINT IN CURB
(Match 'CT', 'CD', or 'C' joint in pavement.)



DETAIL B
(Saw cut formed by approved early concrete sawing equipment.)



SECTION A-A
(Detail at Edge of Pavement)



DETAIL C

TRANSVERSE CONTRACTION

	Existing Pavement
	Proposed Pavement

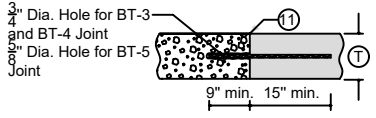
FIGURE 7010.101 STANDARDROADPLAN PV-101 SHEET 2 OF 8

REVISIONS: Modified Circle Note 32

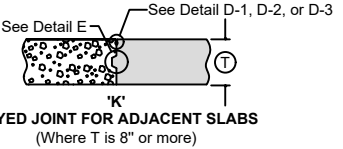
SUDAS DIRECTOR DESIGN METHOD/ENGINEER

JOINTS

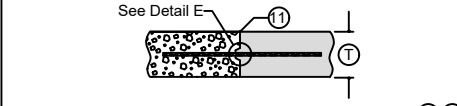
FIGURE 7010.101 SHEET 3 OF 8



T	Joint	Bars	Bar Length and Spacing
< 8"	'BT-5'	#4	24" Long at 30" Centers
$\geq 8"$	'BT-3'	#5	24" Long at 30" Centers
$\geq 8"$	'BT-4'	#5	24" Long at 15" Centers



'K' KEYED JOINT FOR ADJACENT SLABS
(Where T is 8" or more)



T	Joint	Bars	Bar Length and Spacing
< 8"	'KT-1'	#4	30" Long at 30" Centers
$\geq 8"$	'KT-2'	#5	30" Long at 30" Centers
$\geq 8"$	'KT-3'	#5	30" Long at 15" Centers

LONGITUDINAL CONTRACTION

	Existing Pavement
	Proposed Pavement

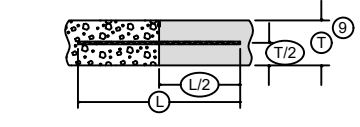
FIGURE 7010.101 STANDARDROADPLAN PV-101 SHEET 3 OF 8

REVISIONS: Modified Circle Note 32

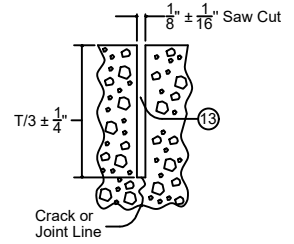
SUDAS DIRECTOR DESIGN METHOD/ENGINEER

JOINTS

Plot Date: 4/19/2024 Last Saved By: zameson FIGURE 7010.101 SHEET 4 OF 8

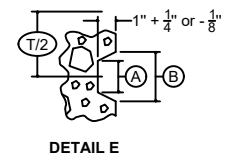


TIE BAR PLACEMENT
(Applies to all joints unless otherwise detailed.)



DETAIL D-1
(Required when specified in the contract documents.)

- ⑨ When tying into old pavement, T represents the depth of sound PCC.
- ⑬ Sealant or cleaning not required.



DETAIL E

Keyway Type	Pavement Thickness	T	A	B
Standard	8" or greater	$1\frac{3}{4}$ "	$2\frac{3}{4}$ "	
Narrow	Less than 8"	1"	2"	

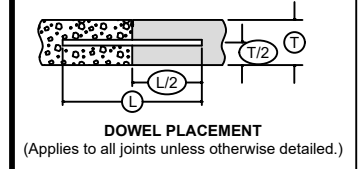
	Existing Pavement
	Proposed Pavement

FIGURE 7010.101 STANDARDROADPLAN PV-101 SHEET 4 OF 8

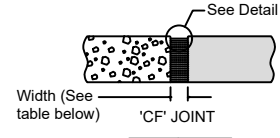
REVISIONS: Modified Circle Note 32

SUDAS DIRECTOR DESIGN METHOD/ENGINEER

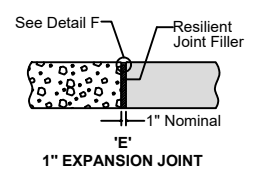
JOINTS



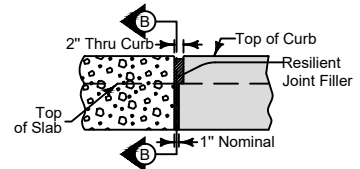
DOWEL PLACEMENT
(Applies to all joints unless otherwise detailed.)



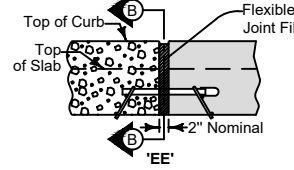
TYPE	WIDTH
CF-1	2"
CF-2	$2\frac{1}{2}$ "
CF-3	3"
CF-4	$3\frac{1}{2}$ "



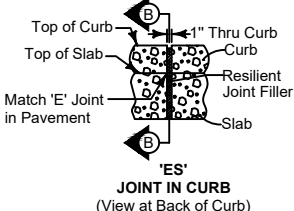
'E' 1" EXPANSION JOINT



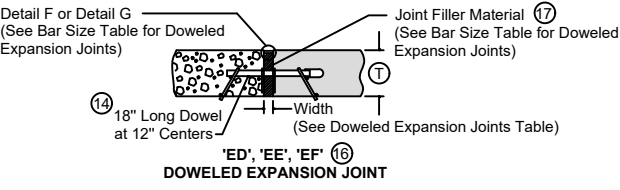
'E' JOINT IN CURB
(View at Back of Curb)



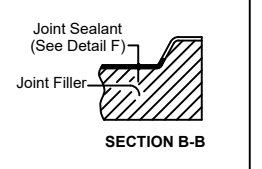
'EE' JOINT IN CURB
(View at Back of Curb)



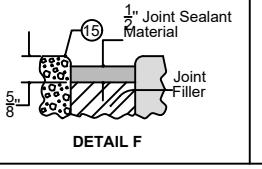
'ES' JOINT IN CURB
(View at Back of Curb)



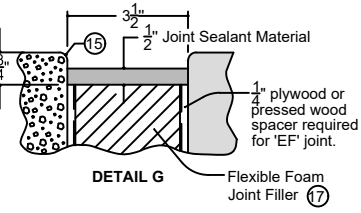
'ED', 'EE', 'EF' ⑬ DOWELED EXPANSION JOINT



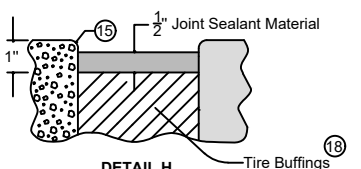
SECTION B-B



DETAIL F



DETAIL G



DETAIL H

- ⑭ See Bar Size Table for Doweled Expansion Joints.
- ⑮ Edge with 1/4 inch tool for length of joint indicated if formed; edging not required when cut with diamond blade saw.
- ⑯ See Dowel Assemblies for fabrication details and placement limits. Coat the free end of dowel bar to prevent bond with pavement. At intake locations, dowel bars may be cast-in-place.
- ⑰ Predrill or preform holes in joint material for appropriate dowel size.
- ⑱ Compact tire buffings by spading with a square-nose shovel.

TYPE	WIDTH	FILLER MATERIAL (⑰)
ED	1"	Resilient (Detail F)
EE	2"	Flexible Foam (Detail F)
EF	$3\frac{1}{2}$ "	Flexible Foam (Detail G)

T	< 8"	$\geq 8"$ but < 10"	$\geq 10"$
Dowel Diameter	$\frac{3}{4}$ "	$1\frac{1}{4}$ "	$1\frac{1}{2}$ "

Tubular Dowel Bars will not be allowed for expansion joints.

	Existing Pavement
	Proposed Pavement

FIGURE 7010.101 STANDARDROADPLAN PV-101 SHEET 5 OF 8

REVISIONS: Modified Circle Note 32

SUDAS DIRECTOR DESIGN METHOD/ENGINEER

JOINTS

LONGITUDINAL CONTRACTION

FIGURE 7010.101 SHEET 5 OF 8

Client:
City of Denison
111 N Main St.
Denison, IA 51442

Beck Engineering, Inc.
Cherokee, Iowa
Orange City, Iowa
Sheldon, Iowa
Spirit Lake, Iowa

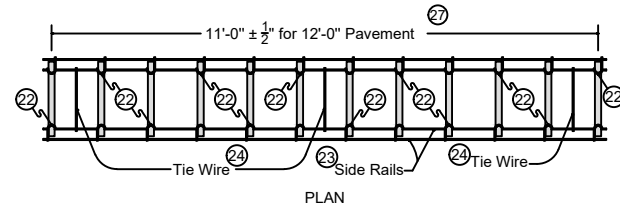
Beck Engineering, Inc.
BET
Civil Engineering Land Surveying
Landscape Architecture

2024 City of Denison
13th Avenue South Storm Sewer Replacement
Details

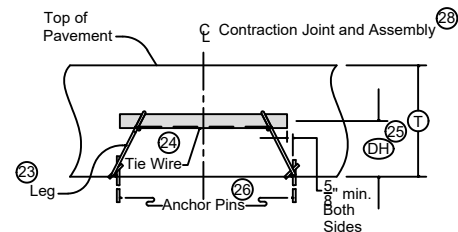
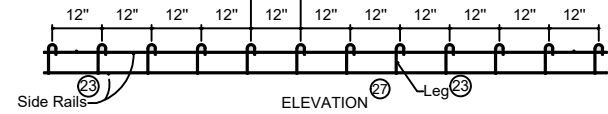
Checked by
BJG
Project No.
E24042

Drawn
Revised
Sheet U.03

CONTRACTION JOINTS



Spaces between dowel bars are nominal dimensions with a 1/4" allowable tolerance.



LONGITUDINAL SECTION

DOWEL ASSEMBLIES 19, 20, 21

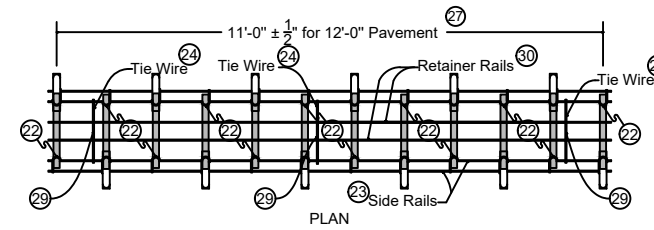
T	DH 25	Diameter (Solid)	Diameter (Tubular)
7" to 7 1/2"	3 1/2"	3/4"	7/8"
8" to 9 1/2"	4 1/4"	1 1/4"	1 3/8"
10" to 11 1/2"	5 1/4"	1 1/2"	1 5/8"
12" to 13"	6 1/4"	1 1/2"	1 5/8"

Tubular Dowel Bars will not be allowed for RD joints.

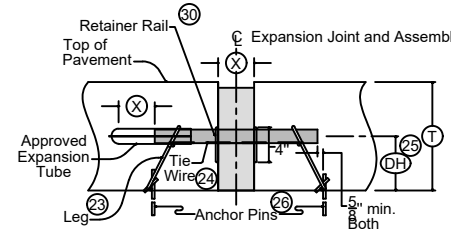
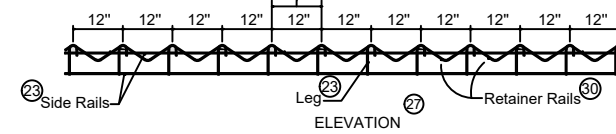
- 19 Use 18 inch long dowel bars with a tolerance of ± 1/8 inch. Ensure the centerlines of individual dowels are parallel to the other dowels in the assembly within ± 1/8 inch.
- 20 Use wires with a minimum tensile strength of 50 ksi.
- 21 Details apply to both transverse contraction and expansion joints.
- 22 Weld alternately throughout.
- 23 0.306 inch diameter wire. Wire sizes shown are the minimum required.
- 24 Maximum 0.177 inch diameter wire, welded or friction fit to upper side rail, both sides.
- 25 Measured from the centerline of dowel bar to bottom of lower side rail + 1/4 inch.
- 26 Per lane width, install a minimum of 8 anchor pins evenly spaced (4 per side), to prevent movement of assembly during construction. Anchor assemblies placed on pavement or PCC base with devices approved by the Engineer.
- 27 If dowel basket assemblies are required for curbed pavements, the assembly length is based on the jointing layout. See PV-101, sheet 8.
- 28 Ensure dowel basket assembly centerline is within 2 inches of the intended joint location longitudinally and has no more than 1/4 inch horizontal skew from end of basket to end of basket.

FIGURE 7010.101	STANDARD ROAD PLAN	REVISION 11 04-19-22
PV-101		SHEET 6 of 8
JOINTS		

EXPANSION JOINTS



Spaces between dowel bars are nominal dimensions with a 1/4" allowable tolerance.



Joint Type	X	Minimum Tube Length
"ED"	1"	6"
"EE"	2"	7"
"EF"	3 1/2"	9"

T	DH 25	Diameter
7" to 7 1/2"	3 1/2"	3/4"
8" to 9 1/2"	4 1/4"	1 1/4"
10" to 11 1/2"	5 1/4"	1 1/2"
12" to 13"	6 1/4"	1 1/2"

Tubular Dowel Bars will not be allowed for expansion joints.

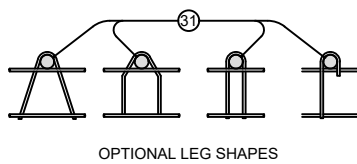
DOWEL ASSEMBLIES 19, 20, 21

- 19 Use 18 inch long dowel bars with a tolerance of ± 1/8 inch. Ensure the centerlines of individual dowels are parallel to the other dowels in the assembly within ± 1/8 inch.
- 20 Use wires with a minimum tensile strength of 50 ksi.
- 21 Details apply to both transverse contraction and expansion joints.
- 22 Weld alternately throughout.
- 23 0.306 inch diameter wire. Wire sizes shown are the minimum required.
- 24 Maximum 0.177 inch diameter wire, welded or friction fit to upper side rail, both sides.
- 25 Measured from the centerline of dowel bar to bottom of lower side rail + 1/4 inch.
- 26 Per lane width, install a minimum of 8 anchor pins evenly spaced (4 per side), to prevent movement of assembly during construction. Anchor assemblies placed on pavement or PCC base with devices approved by the Engineer.
- 27 If dowel basket assemblies are required for curbed pavements, the assembly length is based on the jointing layout. See PV-101, sheet 8.
- 28 Ensure dowel basket assembly centerline is within 2 inches of the intended joint location longitudinally and has no more than 1/4 inch horizontal skew from end of basket to end of basket.
- 29 Clip and remove center portion of tie during field assembly.
- 30 1/4 inch diameter wire.

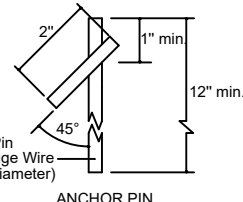
FIGURE 7010.101	STANDARD ROAD PLAN	REVISION 11 04-19-22
PV-101		SHEET 7 of 8
JOINTS		

File Name: E24042 - U Sheets
 Plot Date: 4/19/2024
 Last Saved By: zameson
 FIGURE 7010.101 SHEET 6 OF 8
 FIGURE 7010.101 SHEET 7 OF 8
 FIGURE 7010.101 SHEET 8 OF 8
 FIGURE 7010.102 SHEET 1 OF 2

Client:
 City of Denison
 111 N Main St.
 Denison, IA 51442
 Beck Engineering, Inc.
 Cherokee, Iowa
 Orange City, Iowa
 Sheldon, Iowa
 Spirit Lake, Iowa
 Beck Engineering, Inc.
 Civil Engineering Land Surveying
 Landscape Architecture

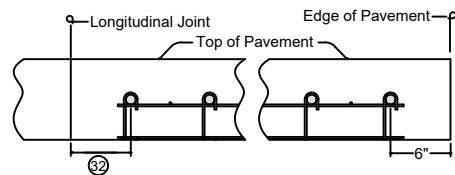


OPTIONAL LEG SHAPES

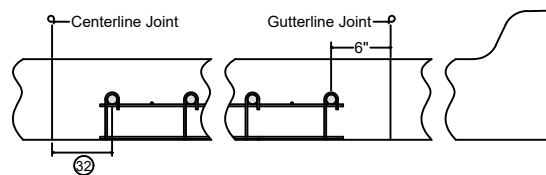


ANCHOR PIN

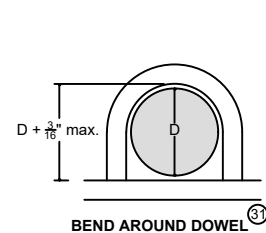
- 19 Use 18 inch long dowel bars with a tolerance of ± 1/8 inch. Ensure the centerlines of individual dowels are parallel to the other dowels in the assembly within ± 1/8 inch.
- 20 Use wires with a minimum tensile strength of 50 ksi.
- 21 Details apply to both transverse contraction and expansion joints.
- 31 Diameter of bend around dowel is dowel diameter + 1/8 to 3/16 inches.
- 32 For uniform lane widths: 3 to 6 inches. For taper and variable width pavements: 3 to 12 inches.



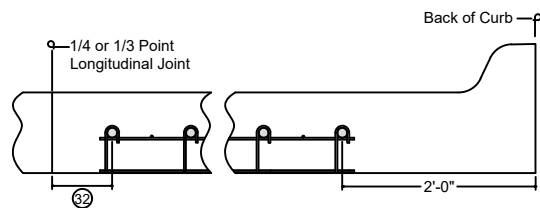
PLACEMENT LIMITS (Rural Section)



PLACEMENT LIMITS (Curb and Gutter - Gutterline Jointing)



BEND AROUND DOWEL 31



PLACEMENT LIMITS (Curb and Gutter - 1/4 or 1/3 Point Jointing)

DOWEL ASSEMBLIES 19, 20, 21

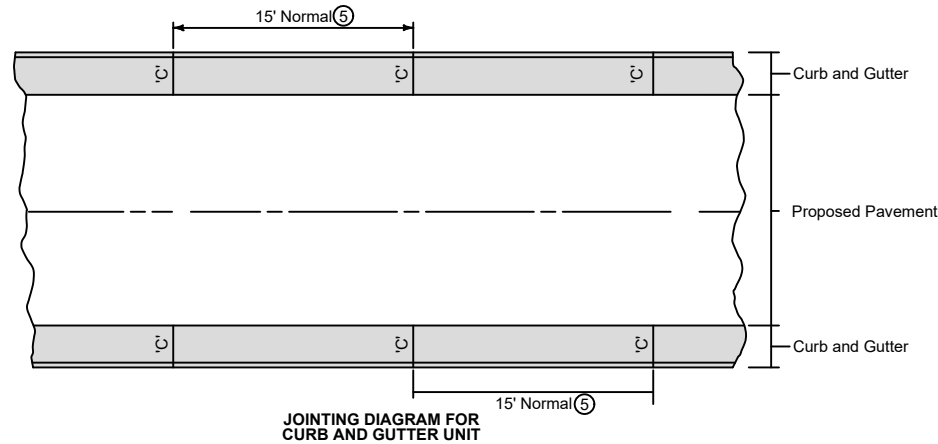
FIGURE 7010.101	STANDARD ROAD PLAN	REVISION 11 04-19-22
PV-101		SHEET 8 of 8
JOINTS		

FIGURE 7010.102 SHEET 1 OF 2

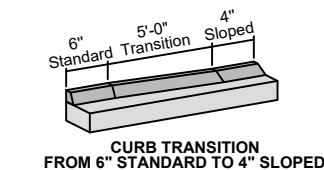
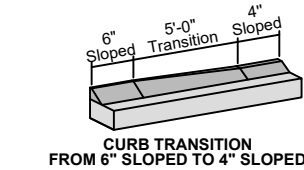
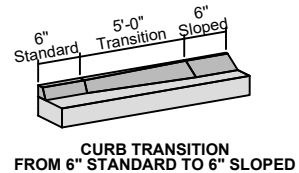
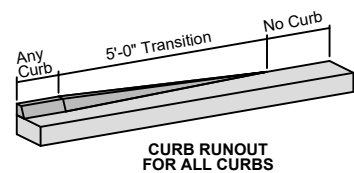
- For joint details, see PV-101.
- 1 6 inch Standard Curb, 6 inch Sloped Curb, or 4 inch Sloped Curb as specified.
 - 2 1/2 inch if Proposed Pavement is HMA. No elevation difference if Proposed Pavement is PCC.
 - 3 'BT', 'KT', or 'L' joint if Proposed Pavement is PCC. 'B' joint if Proposed Pavement is HMA.
 - 4 0 to 2 inches for residential entrances. 1 1/2 to 3 inches for industrial or commercial entrances.

FIGURE 7010.102	STANDARD ROAD PLAN	REVISION 5 04-21-20
PV-102		SHEET 1 of 2
PCC CURB DETAILS		

Checked by: BJC
 Project No: E24042
 Drawn: 04-18-24 By ZTA
 Revised:
 Sheet U.04
 2024 City of Denison
 13th Avenue South Storm Sewer Replacement
 Details



5 If proposed pavement is PCC, match joint spacing for proposed pavement. Place 'E' joints in curb and gutter section where expansion joints are to be placed in proposed pavement.



REVISION	DATE
5	04-21-20

FIGURE 7010.102 STANDARD ROAD PLAN PV-102

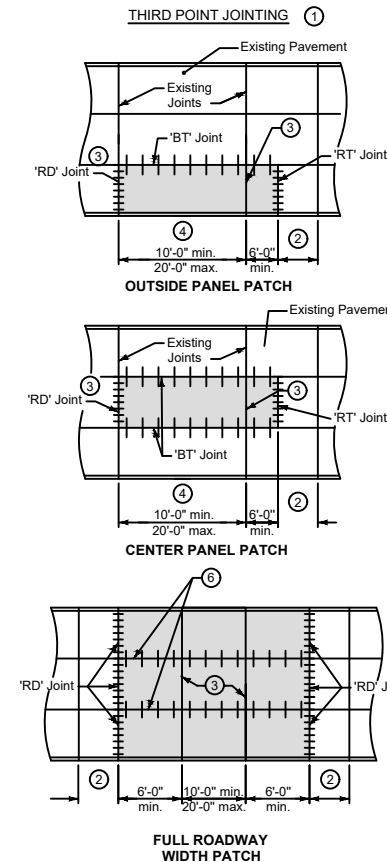
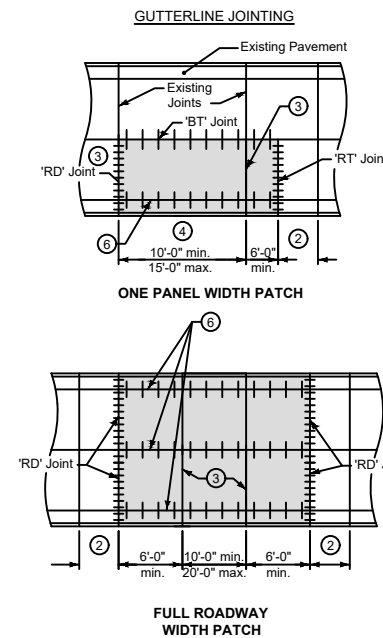
SHEET 2 of 2

REVISIONS: Split DRIVEWAY DROP CURB detail into two details. Added new circle note

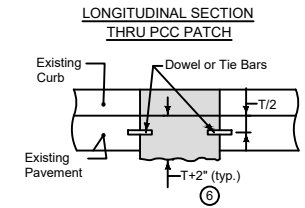
SUDAS DIRECTOR DESIGN METHODS ENGINEER

PCC CURB DETAILS

FIGURE 7040.102 SHEET 1 OF 1



- Patches on roadways with quarter point jointing will be similar to third point jointing details.
- Minimum distance between existing joint and patch is 6 feet. If distance is less than 6 feet, extend patch to existing joint.
- Match existing joint type and locations. If specified, replace existing 'C' joints with 'CD' joints.
- If existing joint spacing is greater than 20 feet, add a 'CT' joint at mid-panel.
- If subgrade or subbase material is required below patch, bring material to a level 2 inches below bottom of existing pavement.
- BT, KT, or L joint depending on pavement thickness and pouring sequence



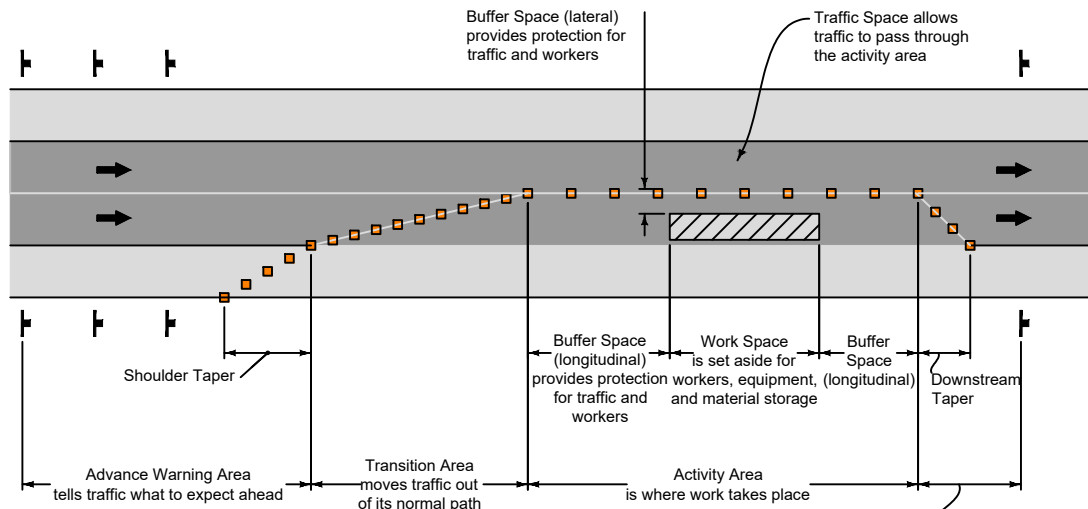
REVISION	DATE
5	2022 Edition

SUDAS Standard Specifications 7040.102

SHEET 1 of 1

FULL DEPTH PATCHES GREATER THAN 15' LONG

FIGURE 8030.101 SHEET 1 OF 1



It may be necessary to combine two or more examples to adequately address the traffic control needed.

Utilize vehicle warning lights (amber, high-intensity rotating, flashing, oscillating, or strobe light) on all shadow and work vehicles.

Vehicle hazard lights may be used to supplement warning lights. Do not use hazard lights alone.

Flags may be used to call attention to the advanced warning signs.

If a closure extends overnight, utilize channelizing devices with retroreflective sheeting.

Speed limit refers to the legally established and signed speed limit.

If an arrow board is used on 2-lane roads, operate only in the caution mode.

Adjust the position of warning signs and channelizing devices for available sight distance.

Do not install temporary traffic control devices until work is ready to begin, and remove or cover all signs and devices promptly when they are not needed.

The END WORK (G20-2) signs shown on all figures are optional.

Speed Limit (mph)	Taper (ft)	Buffer (ft)	Work Space (ft)
20	20	40	40
25	25	50	50
30	30	60	60
35	35	70	70
40	40	80	80
45	45	90	90
50	50	100	100
55	55	110	110

Speed Limit (mph)	A
20-25	100
30-40	250
45-50	350
55	500

Speed Limit (mph)	Taper Length (L) (ft)	Number of Devices
20	80	5
25	125	6
30	180	7
35	245	8
40	320	9
45	540	13
50	600	13
55	660	13

*Values shown are for a 12 foot shift. Table does not apply to one-lane, two-way (flagger) tapers

REVISION	DATE
New	10-17-17

FIGURE 8030.102 SHEET 1 OF 1

SUDAS

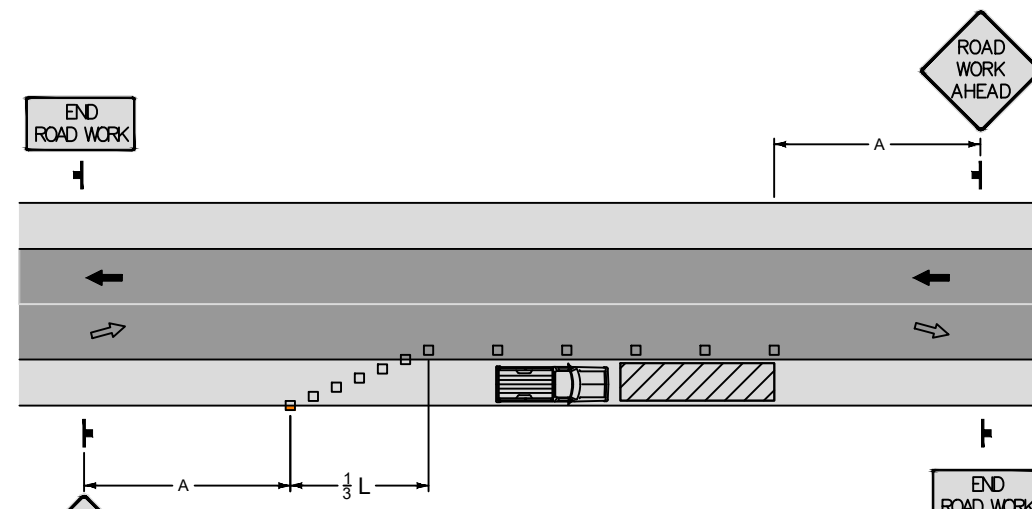
8030.101

SHEET 1 of 1

SUDAS Standard Specifications

TEMPORARY TRAFFIC CONTROL GENERAL INFORMATION

FIGURE 8030.102 SHEET 1 OF 1



Use only on minor, low speed (< 40 mph) streets. Provide a lane closure for higher speed traffic conditions.

Maintain a minimum lane width of 10 feet as measured to the near face of channelizing devices. For short-term use on low speed, low volume roads without wider heavy commercial vehicles, a minimum lane width of 9 feet may be used.

Where the opposite shoulder is suitable for carrying vehicular traffic, lanes may be shifted by using closely spaced channelizing devices provided the resulting lane widths are at least 10 feet wide.

Additional advanced warning may be appropriate, such as a ROAD NARROWS sign.

For short-term work, the taper and channelizing devices may be omitted if a shadow vehicle with activated vehicle warning lights is used.

Refer to Figure 8030.101 for symbol key and sign spacing.

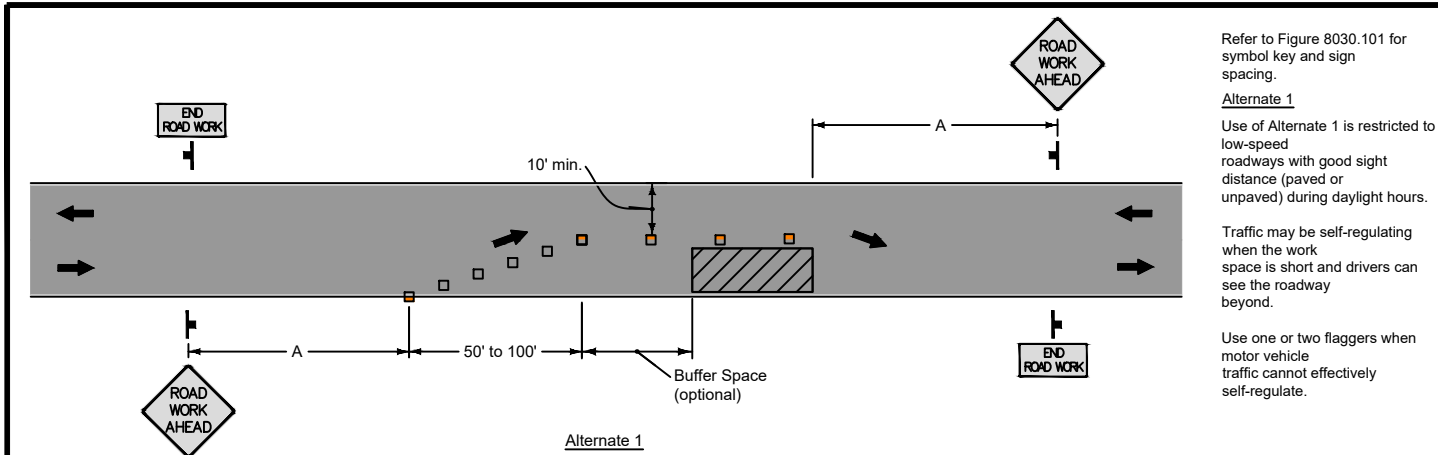
REVISION	DATE
New	10-17-17

SUDAS Standard Specifications 8030.102

SHEET 1 of 1

WORK OFF OF PAVEMENT WITH MINOR ENCROACHMENT ONTO TRAVELED WAY

Plot Date: 4/19/2024 Last Saved By: zameson File Name: E24042 - U Sheets



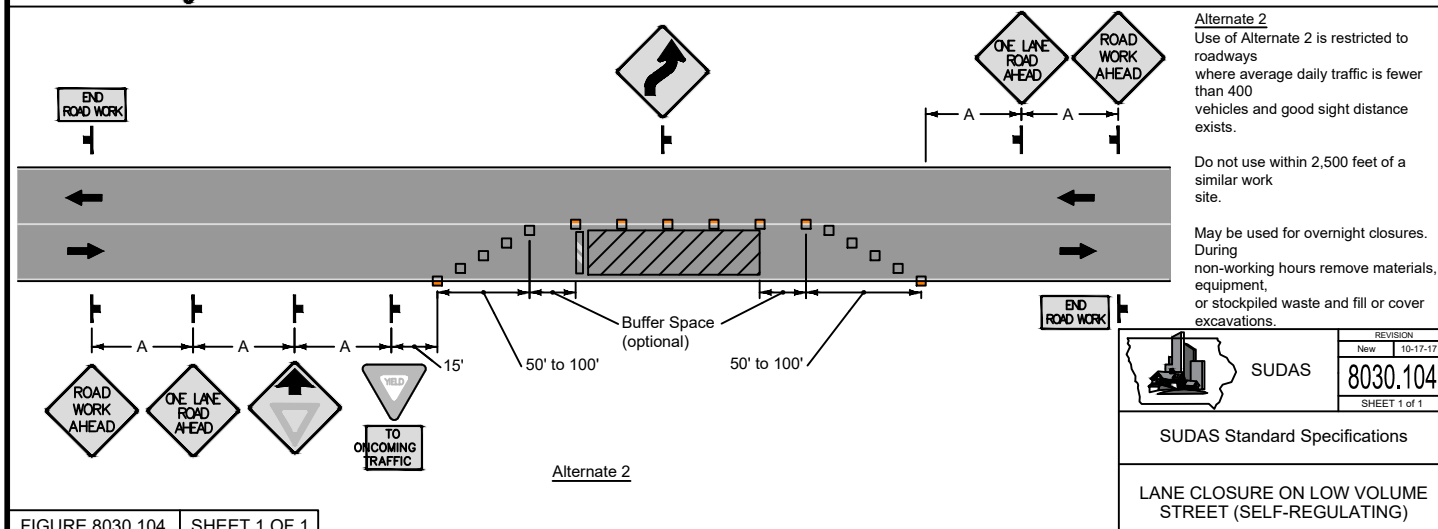
Refer to Figure 8030.101 for symbol key and sign spacing.

Alternate 1

Use of Alternate 1 is restricted to low-speed roadways with good sight distance (paved or unpaved) during daylight hours.

Traffic may be self-regulating when the work space is short and drivers can see the roadway beyond.

Use one or two flaggers when motor vehicle traffic cannot effectively self-regulate.



Alternate 2

Use of Alternate 2 is restricted to roadways where average daily traffic is fewer than 400 vehicles and good sight distance exists.

Do not use within 2,500 feet of a similar work site.

May be used for overnight closures. During non-working hours remove materials, equipment, or stockpiled waste and fill or cover excavations.

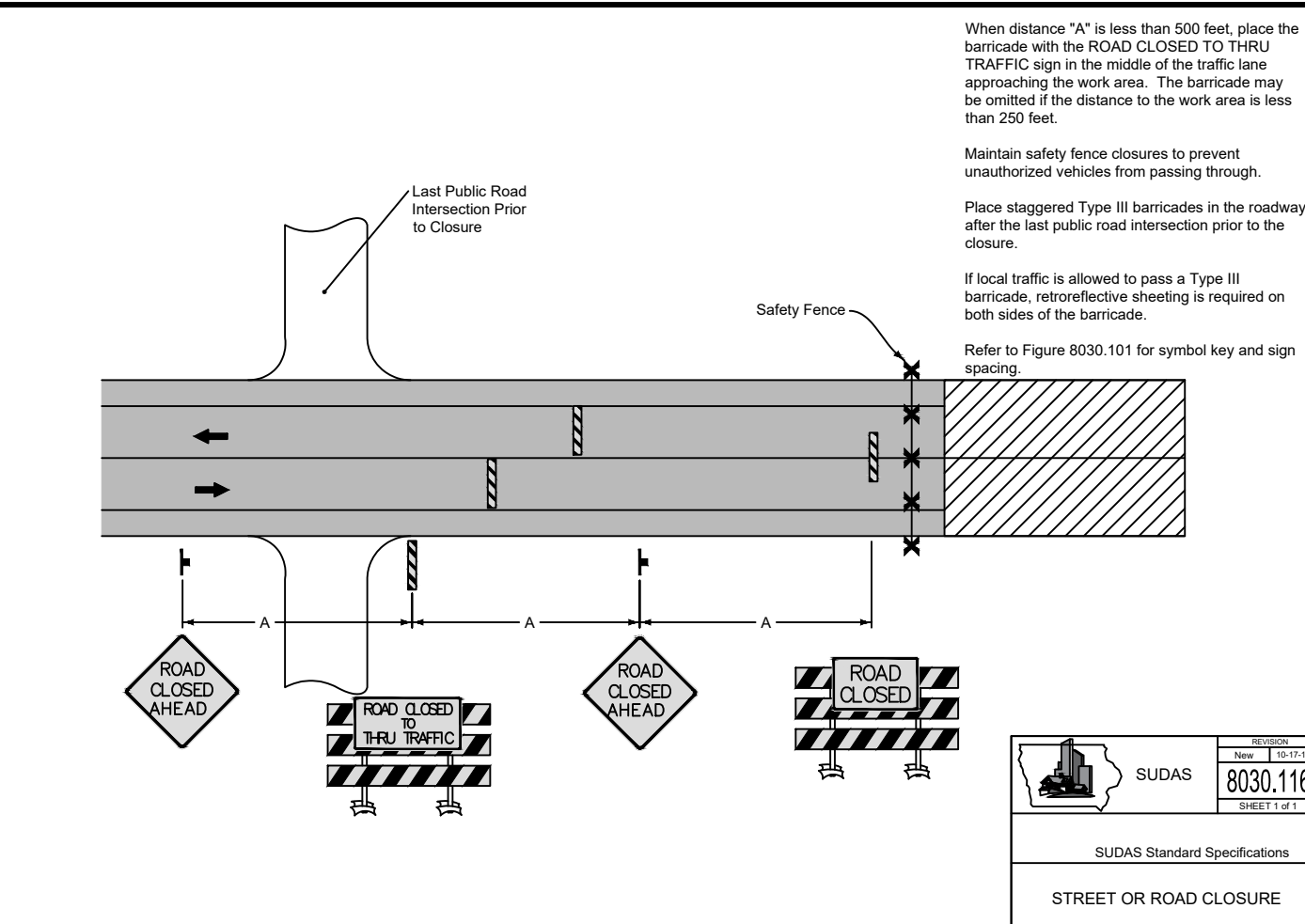
SUDAS	REVISION
	New 10-17-17
8030.104	
SHEET 1 of 1	

SUDAS Standard Specifications

LANE CLOSURE ON LOW VOLUME STREET (SELF-REGULATING)

FIGURE 8030.104 SHEET 1 OF 1

FIGURE 8030.116 SHEET 1 OF 1



When distance "A" is less than 500 feet, place the barricade with the ROAD CLOSED TO THRU TRAFFIC sign in the middle of the traffic lane approaching the work area. The barricade may be omitted if the distance to the work area is less than 250 feet.

Maintain safety fence closures to prevent unauthorized vehicles from passing through.

Place staggered Type III barricades in the roadway after the last public road intersection prior to the closure.

If local traffic is allowed to pass a Type III barricade, retroreflective sheeting is required on both sides of the barricade.

Refer to Figure 8030.101 for symbol key and sign spacing.

SUDAS	REVISION
	New 10-17-17
8030.116	
SHEET 1 of 1	

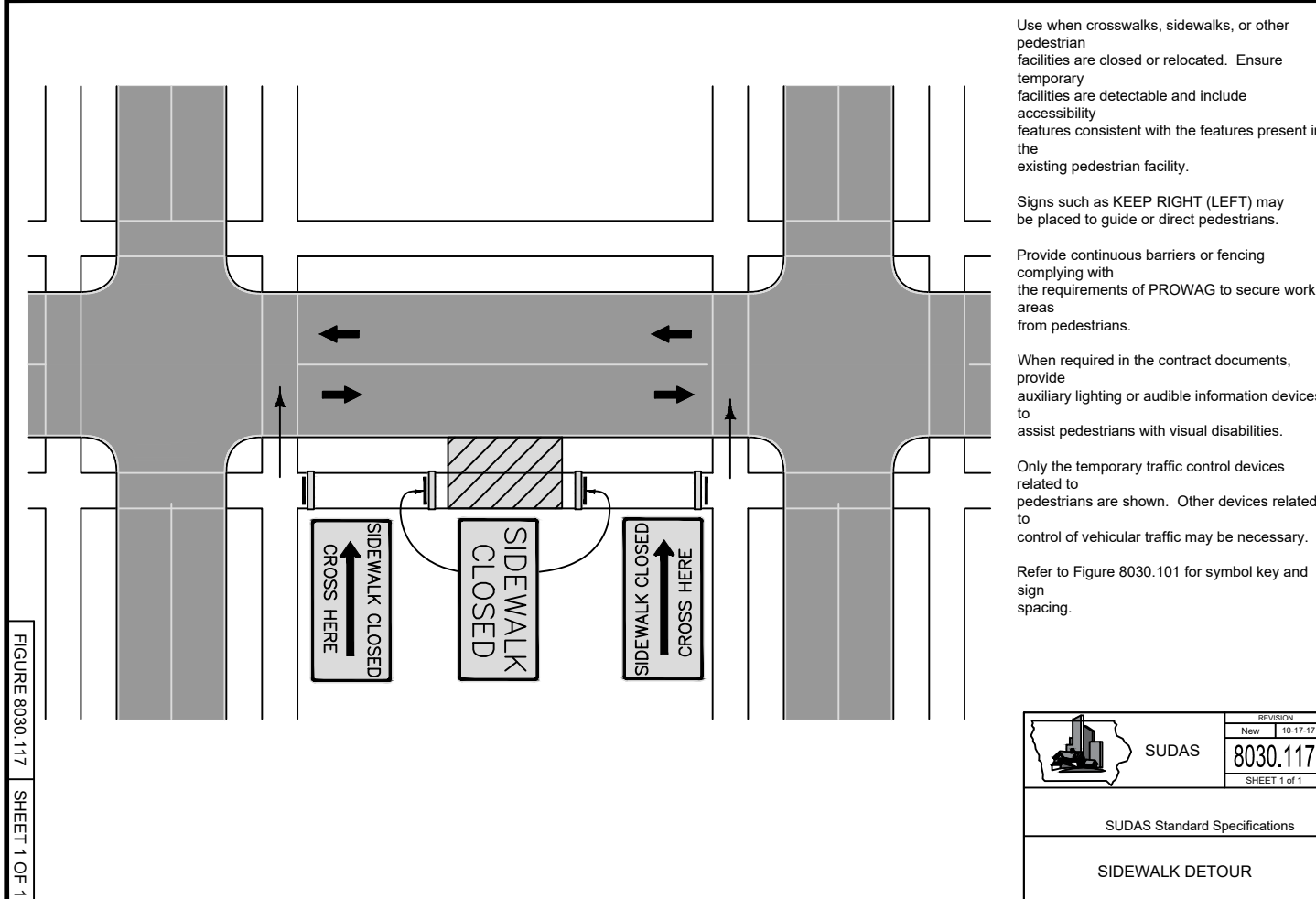
SUDAS Standard Specifications

STREET OR ROAD CLOSURE

Client: City of Denison, 111 N Main St., Denison, IA 51442

Beck Engineering, Inc. Cherokee, Iowa Clive, Iowa Orange City, Iowa Sheldon, Iowa Spirit Lake, Iowa

Beck Engineering, Inc. Civil Engineering, Land Surveying, Landscape Architecture



Use when crosswalks, sidewalks, or other pedestrian facilities are closed or relocated. Ensure temporary facilities are detectable and include accessibility features consistent with the features present in the existing pedestrian facility.

Signs such as KEEP RIGHT (LEFT) may be placed to guide or direct pedestrians.

Provide continuous barriers or fencing complying with the requirements of PROWAG to secure work areas from pedestrians.

When required in the contract documents, provide auxiliary lighting or audible information devices to assist pedestrians with visual disabilities.

Only the temporary traffic control devices related to pedestrians are shown. Other devices related to control of vehicular traffic may be necessary.

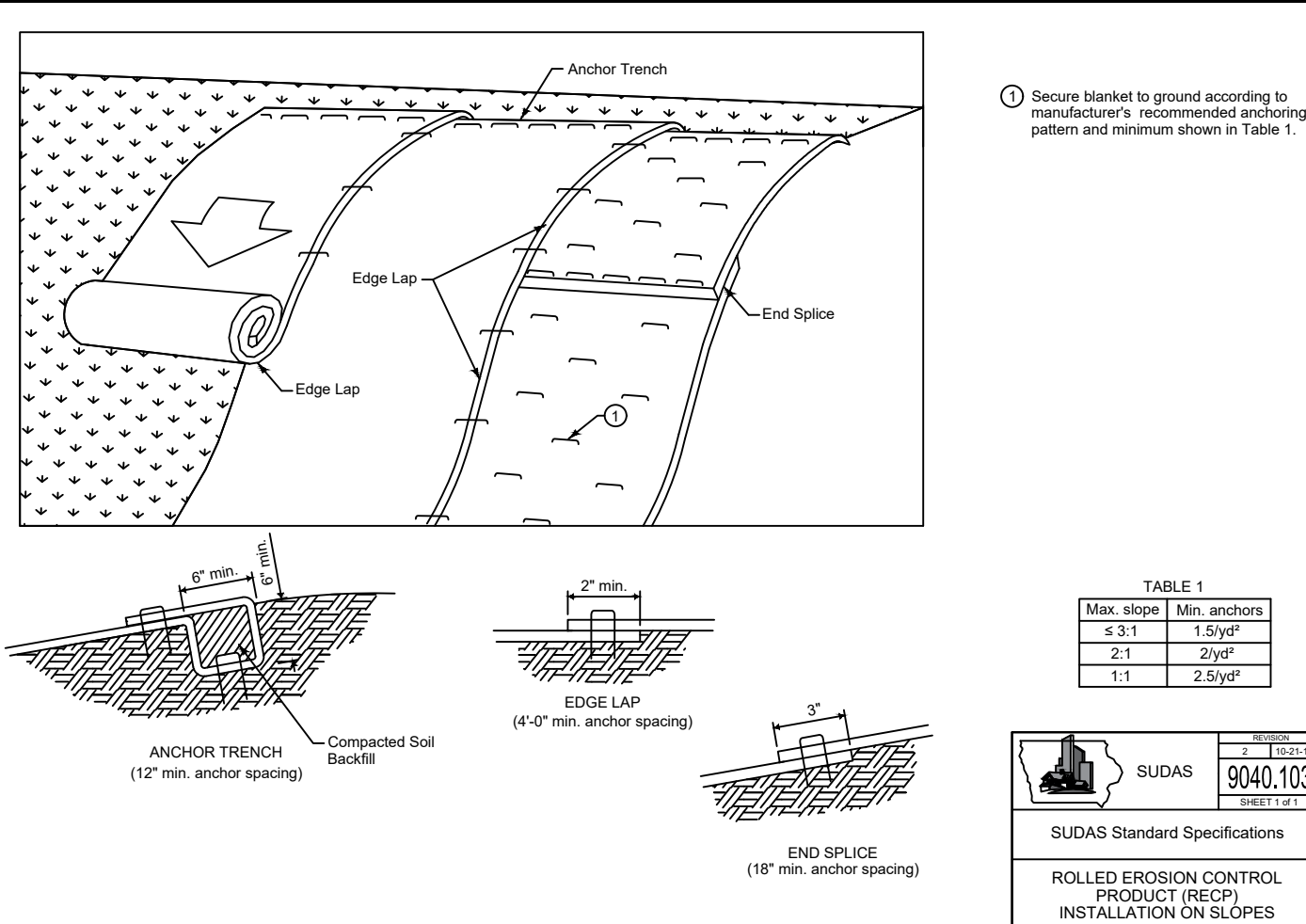
Refer to Figure 8030.101 for symbol key and sign spacing.

SUDAS	REVISION
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8030.117	
SHEET 1 of 1	

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SIDEWALK DETOUR

FIGURE 8040.103 SHEET 1 OF 1



① Secure blanket to ground according to manufacturer's recommended anchoring pattern and minimum shown in Table 1.

TABLE 1

Max. slope	Min. anchors
≤ 3:1	1.5/yd ²
2:1	2/yd ²
1:1	2.5/yd ²

SUDAS	REVISION
	2 10-21-14
9040.103	
SHEET 1 of 1	

SUDAS Standard Specifications

ROLLED EROSION CONTROL PRODUCT (RECP) INSTALLATION ON SLOPES

2024 City of Denison 13th Avenue South Storm Sewer Replacement Details

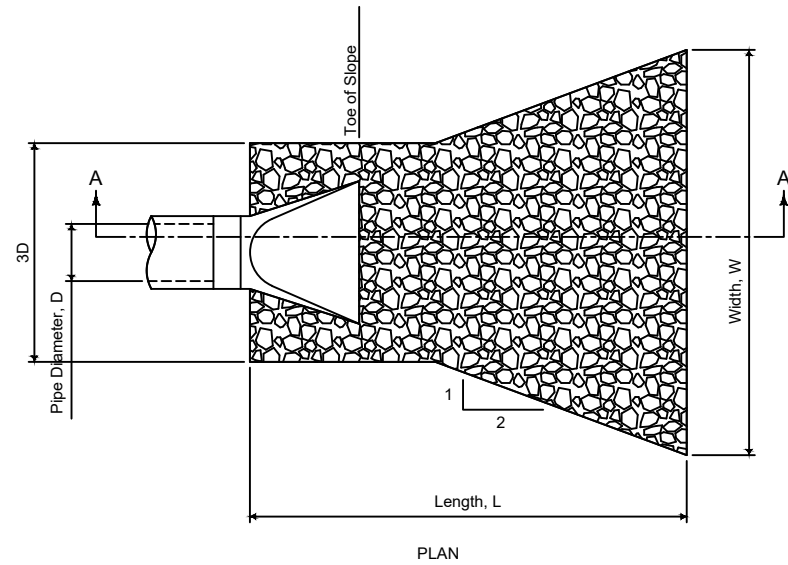
Checked by: BJB

Project No.: E24042

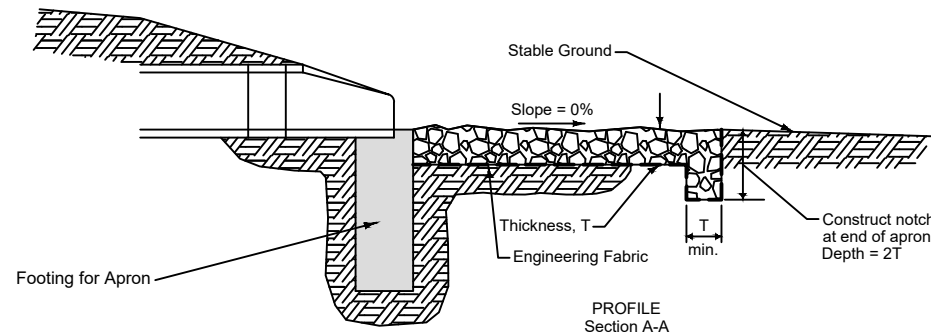
Drawn: 04-18-24 By ZTA

Revised:

Sheet U.06



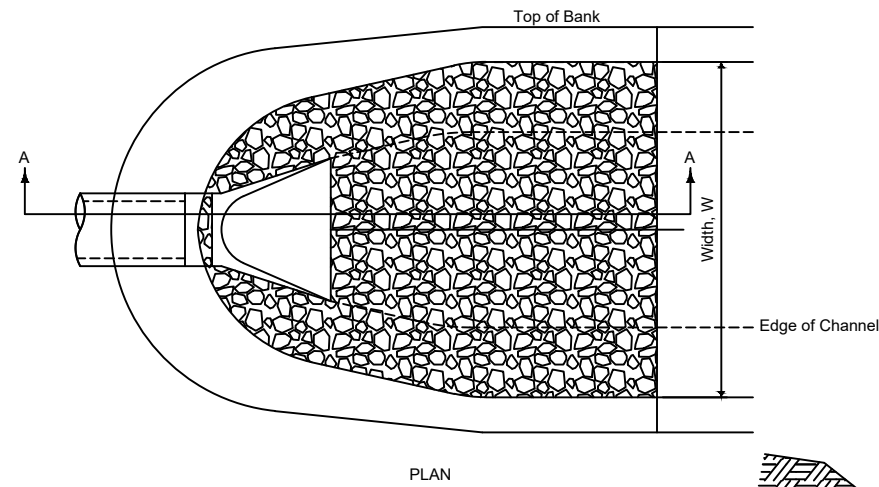
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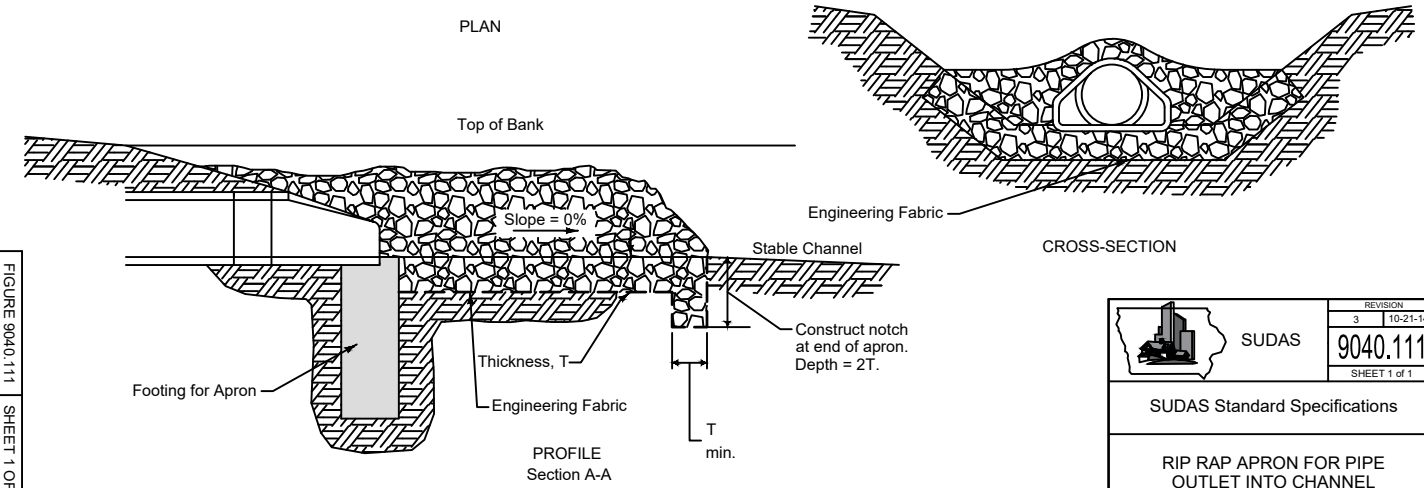
PROFILE Section A-A

	REVISION	3	10-21-14
	SUDAS	9040.110	
	SHEET 1 of 1		
SUDAS Standard Specifications			
RIP RAP FOR PIPE OUTLET ONTO FLAT GROUND			

FIGURE 9040.110 SHEET 1 OF 1



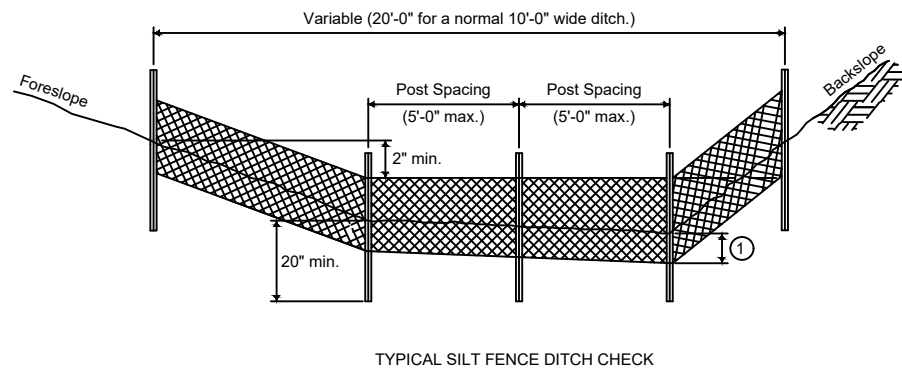
PLAN



PROFILE Section A-A

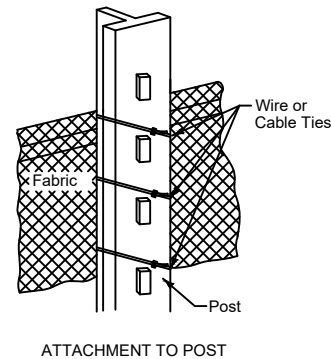
	REVISION	3	10-21-14
	SUDAS	9040.111	
	SHEET 1 of 1		
SUDAS Standard Specifications			
RIP RAP APRON FOR PIPE OUTLET INTO CHANNEL			

FIGURE 9040.111 SHEET 1 OF 1



TYPICAL SILT FENCE DITCH CHECK

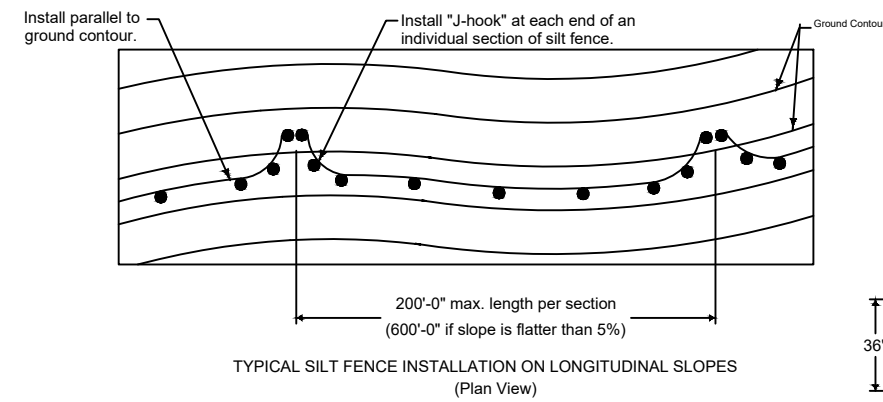
- ① Insert 12 inches of fabric a minimum of 6 inches deep (fabric may be folded below the ground line).



ATTACHMENT TO POST

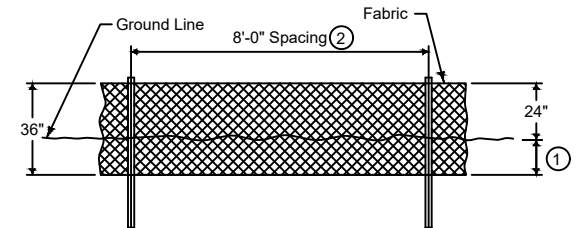
	REVISION	2	10-21-14
	SUDAS	9040.119	
	SHEET 1 of 2		
SUDAS Standard Specifications			
SILT FENCE			

FIGURE 9040.119 SHEET 2 OF 2

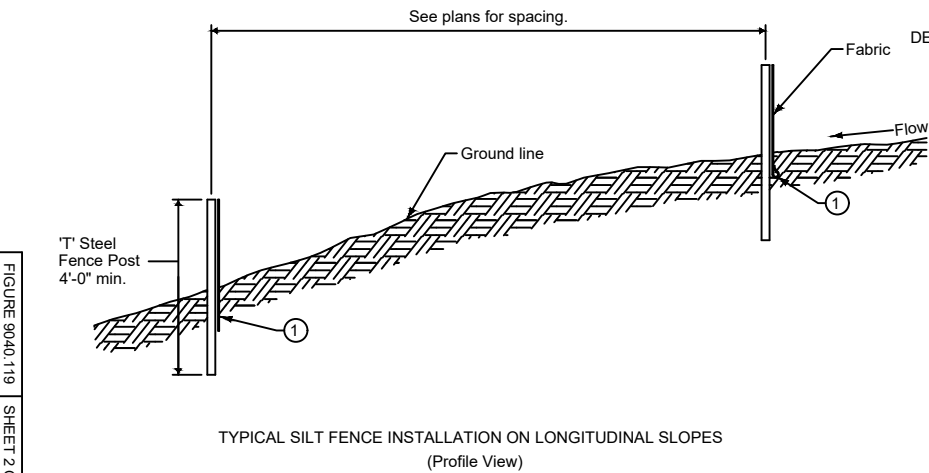


TYPICAL SILT FENCE INSTALLATION ON LONGITUDINAL SLOPES (Plan View)

- ① Insert 12 inches of fabric a minimum of 6 inches deep (fabric may be folded below the ground line).
- ② Reduce post spacing to 5'-0" at water concentration areas, or as required to adequately support fence.



DETAILS OF SILT FENCE ON LONGITUDINAL SLOPES



TYPICAL SILT FENCE INSTALLATION ON LONGITUDINAL SLOPES (Profile View)

	REVISION	2	10-21-14
	SUDAS	9040.119	
	SHEET 2 of 2		
SUDAS Standard Specifications			
SILT FENCE			

FIGURE 9040.119 SHEET 2 OF 2

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FIGURE 9040.110 SHEET 1 OF 1

FIGURE 9040.119 SHEET 1 OF 2

2024 City of Denison
13th Avenue South Storm Sewer Replacement
Details

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Revised BJC
Checked by Project No. E24042
Sheet U.07

Client:
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