DocuSign Envelope ID: D05CD149-D001-40B3-8F10-A913159882BA

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	STP 2024(783)HES		1
STATE	STATE DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
0073	02	082	US 281

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT
PROJECT NO. STP 2024(783)HES
CSJ: 0073-02-082, ETC

BEXAR COUNTY
US 281

LIMITS FROM: IH-410
TO: SAVA ST

NET LENGTH OF ROADWAY = 3,305 FT = 0.626 MI
NET LENGTH OF BRIDGE = 0 FT = 0 MI
NET LENGTH OF PROJECT = 3,305 FT = 0.626 MI

FOR WORK CONSISTING OF: RAISED MEDIANS, MID-BLOCK CROSSINGS WITH OVERHEAD FLASHERS, TRAFFIC SIGNAL, BASE REPAIR, SIGNING, PAVEMENT MARKING, SIDEWALK, AND CURB RAMPS

DESIGN SPEED US 281 = 40 MPH
DESIGN SPEED CROSS STREETS = 30 MPH
AREA OF DISTURBED SOIL = 2.32 ACRES
ADT (2022): 30,989
ADT (2042): 55,780
ACCESSIBILITY STANDARDS = PROWAG
REGISTERED ACCESSIBILITY SPECIALIST INSPECTION REQUIRED
TDLR NO. 2024007496

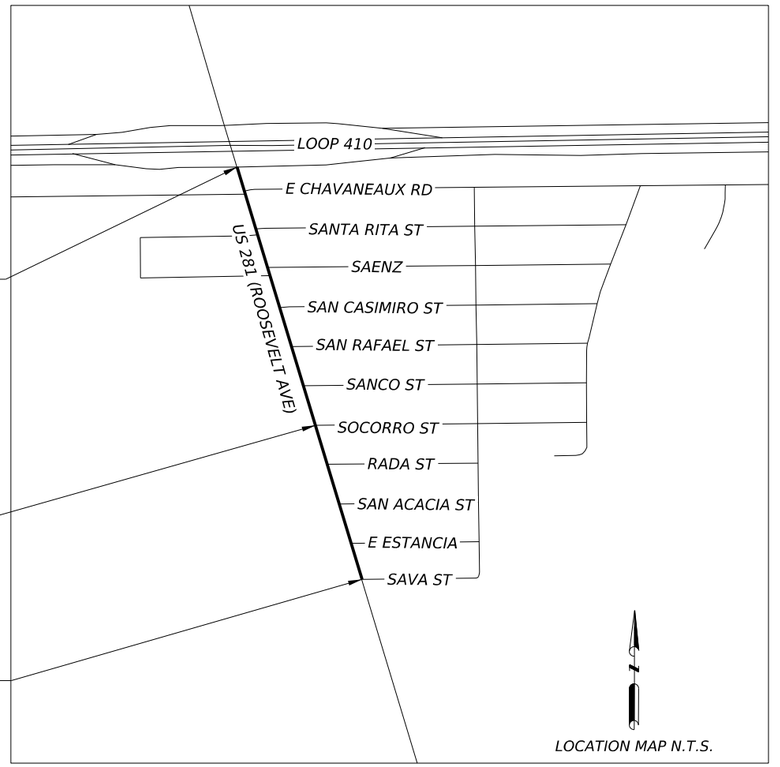
INDEX OF SHEETS

SEE SHEET 2 FOR INDEX OF SHEETS

PLANS PREPARED BY

Kimley»Horn
TX FIRM NO. F-928

10101 REUNION PLACE, SUITE 400,
SAN ANTONIO, TX 78216
TEL: 210-541-9166
FAX: 210-541-8699



LOCATION MAP N.T.S.

EXCEPTIONS: NONE
EQUATIONS: NONE
R.R. CROSSINGS: NONE

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, OCTOBER 23, 2003)

© 2024 by Texas Department of Transportation; all rights reserved.

FINAL PLANS

LETTING DATE: _____

DATE CONTRACTOR BEGAN WORK: _____

DATE WORK WAS ACCEPTED: _____

FINAL CONTRACT COST: $ _____

CONTRACTOR: _____

FINAL PLANS STATEMENT:

THE CONSTRUCTION WORK WAS PERFORMED IN ACCORDANCE WITH THE PLANS.

_____ *P.E.* _____
AREA ENGINEER *DATE*

TEXAS DEPARTMENT OF TRANSPORTATION

SUBMITTED FOR LETTING 1/4/2024
DocuSigned by: Orlando Gallegos, P.E.
TRANSPORTATION ENGINEER SUPERVISOR

RECOMMENDED FOR LETTING 1/5/2024
DocuSigned by: Clayton Kipps, P.E.
DIRECTOR OF TRANSPORTATION PLANNING & DEVELOPMENT

REVIEWED FOR LETTING 1/4/2024
DocuSigned by: J.E.Reyes, P.E.
TRANSPORTATION ENGINEER SUPERVISOR

APPROVED FOR LETTING 1/4/2024
DocuSigned by: Charles Benavides
DISTRICT ENGINEER

PROJ. NO. _____
LETTING DATE _____
COUNTY _____
HWY. NO. _____
DATE ACCEPTED _____

FILE LOCATION AND NAME
T:\Engdata\Standards\Design\TITLESHEET-2014Specs.DGN

LEVELS DISPLAYED
1

I. GENERAL

1				TITLE SHEET
2				INDEX OF SHEETS
3	-	4		PROJECT LAYOUT
5				EXISTING TYPICAL SECTIONS
6	-	6A		PROPOSED TYPICAL SECTIONS
7	-	7H		GENERAL NOTES
8	-	8C		ESTIMATE QUANTITY SUMMARY
9				TRAFFIC CONTROL PLAN SUMMARY
10				REMOVAL SUMMARY
11				ROADWAY SUMMARY
12				TRAFFIC SIGNAL SUMMARY
13				SIGNING, PAVEMENT MARKING, AND DELINEATION SUMMARY
14				SW3P SUMMARY
15	-	22		SUMMARY OF SMALL SIGNS

II. TRAFFIC CONTROL PLAN

23				TRAFFIC CONTROL PLAN NARRATIVE
24	-	25		TRAFFIC CONTROL PLAN TYPICAL SECTIONS
26	-	27		ADVANCED WARNING SIGNS
28				TRAFFIC CONTROL PLAN SIGN LEGEND
29	-	33		TRAFFIC CONTROL PLAN PHASE 1
34	-	37		TRAFFIC CONTROL PLAN PHASE 2
38	-	42		TRAFFIC CONTROL PLAN PHASE 3

TRAFFIC CONTROL STANDARDS

43	-	54	*	BC(1)-21 THRU BC(12)-21
55			*	EDGECON-21
56			*	TCP(1-4)-18
57			*	TCP(2-1)-18
58			*	TCP(2-4)-18
59			*	TCP(2-5)-18
60			*	TCP(3-1)-13
61			*	TCP(3-3)-14
62			*	TCP(3-4)-14
63			*	WZ(BRK)-13
64	-	65	*	WZ(BTS-1)-13 THRU WZ(BTS-2)-13
66			*	WZ(TD)-17
67			*	WZ(UL)-13
68			*	WZ(STPM)-13

III. ROADWAY

69	-	72		SURVEY CONTROL SHEETS
73	-	75		HORIZONTAL DATA
76	-	79		REMOVAL LAYOUT
80	-	82		ROADWAY LAYOUT
83	-	101		DRIVEWAY PLAN AND PROFILE
102				MEDIAN NOSE AND FLEXIBLE PAVEMENT REPAIR DETAIL

ROADWAY STANDARDS

103	-	104	**	MISCELLANEOUS CURB AND SIDEWALK DETAILS
105			**	DRIVEWAY DETAILS
106	-	109	*	PED-18
110	-	113	*	MB(1)-21 THRU MB(4)-21
114				VIA TOLAR SHELTER
115				VIA BENCH PAD

IV. DRAINAGE

116			DRAINAGE CALCULATIONS
117	-	119	SW3P AND INTERNAL DRAINAGE AREA PLAN
120			ARMOR CURB SLOT DETAIL

DRAINAGE STANDARDS

121		**	ARMOR CURB SLOT DETAIL CONCRETE FOUNDATION (MOD)

V. UTILITIES

122	-	124	⚠	UTILITY LAYOUT

VI. SIGNING AND PAVEMENT MARKING

125			SIGN LEGEND
126	-	128	SIGNING AND PAVEMENT MARKING LAYOUT

SIGNING AND PAVEMENT MARKING STANDARDS

129	-	130	*	D&OM(1)-20 THRU D&OM(2)-20
131			*	D&OM(4)-20
132	-	135	*	PM(1)-22 THRU PM(4)-22A
136			**	TCD-05
137			*	SMD(GEN)-08
138	-	140	*	SMD(SLIP-1)-08 THRU SMD(SLIP-3)-08
141	-	142	*	SMD(2-1)-08 THRU SMD(2-2)-08
143	-	145	*	TSR(3)-13 THRU TSR(5)-13

VII. TRAFFIC

146				TRAFFIC SIGNAL GENERAL NOTES
147				CITY OF SAN ANTONIO TRAFFIC SIGNAL GENERAL NOTES
148				SUMMARY OF TRAFFIC SIGNAL QUANTITIES
149				SANTA RITA ST PROPOSED OVERHEAD FLASHERS LAYOUT
150				SANTA RITA ST PROPOSED OVERHEAD FLASHERS DETAILS
151				SANTA RITA ST PROPOSED OVERHEAD FLASHERS ELEVATIONS
152				SAN CASIMIRO ST PROPOSED OVERHEAD FLASHERS LAYOUT
153				SAN CASIMIRO ST PROPOSED OVERHEAD FLASHERS DETAILS
154				SAN CASIMIRO ST PROPOSED OVERHEAD FLASHERS ELEVATIONS
155				SOCORRO ST EXISTING LAYOUT
156				SOCORRO ST PROPOSED TRAFFIC SIGNAL LAYOUT
157	-	158		SOCORRO ST PROPOSED TRAFFIC SIGNAL DETAILS
159				SOCORRO ST PROPOSED TRAFFIC SIGNAL ELEVATIONS
160				E ESTANCIA ST PROPOSED OVERHEAD FLASHERS LAYOUT
161				E ESTANCIA ST PROPOSED OVERHEAD FLASHERS DETAILS 01
162				E ESTANCIA ST PROPOSED OVERHEAD FLASHERS ELEVATIONS

TRAFFIC STANDARDS

163			#	CFA-12
164			#	ED(1)-14
165	-	171	#	ED(3)-14 THRU ED(9)-14
172	-	176	#	LMA(1)-12 THRU LMA(5)-12
177			#	LUM-A-12
178			#	MA-C-12
179			#	MA-C(ILSN)-12
180			#	MA-D-12
181			##	MTS-18 (TXDOT SAT)
182			#	RPDD-RADD-20
183	-	184	#	SMA-80(1)-12 THRU SMA-80(2)-12
185			#	TS-BP-20
186			#	TS-FD-12
187			#	TYPE 332 CABINET (City of San Antonio)
188			#	Battery Backup Detail (City of San Antonio)

VIII. ENVIRONMENTAL

189			EPIC SHEET
190	-	191	STORM WATER POLLUTION PREVENTION PLAN (SW3P)

ENVIRONMENTAL STANDARDS

192			*	EC(1)-16
193	-	195	*	EC(9)-16
196			*	EC(3)-16

⚠ *SEE ROADWAY SHEETS FOR SAWS SURFACE ADJUSTMENTS*

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE, FOR TRAFFIC HAVE BEEN SELECTED BY ME OR UNDER MY SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

#STATE STANDARD
##SAN ANTONIO DISTRICT STANDARD

STATE OF TEXAS · AMY AVERY · 98481 · LICENSED PROFESSIONAL ENGINEER

AMY AVERY, P.E. *98481*

12/21/2023

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE, FOR THE TCP, ROADWAY, DRAINAGE, SIGNING, PAVEMENT MARKINGS, DELINEATIONS, & SW3P HAVE BEEN SELECTED BY ME OR UNDER MY SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

**STATE STANDARD*
***SAN ANTONIO DISTRICT STANDARD*

STATE OF TEXAS · TYLER BARROWS · 147148 · LICENSED PROFESSIONAL ENGINEER

TYLER BARROWS, P.E. *147138*

12/21/2023

DATE: 12/21/2023 3:25:52 PM
FILE: c:\pw\kh1\d0251178\US281_INDEX.dgn

Kimley»Horn F-928

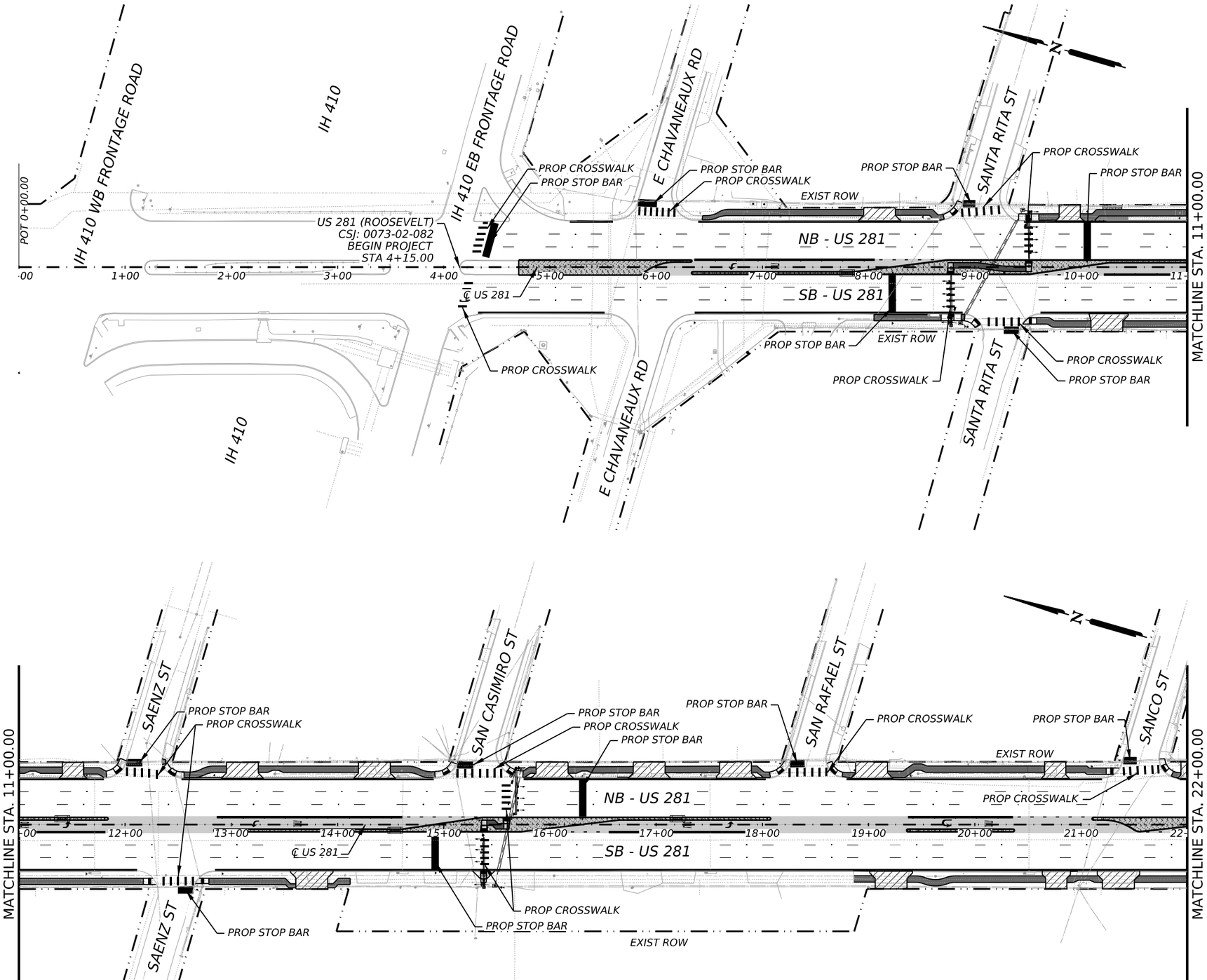
Texas Department of Transportation

US 281

INDEX OF SHEETS

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		2



LEGEND

- EXISTING FEATURES
- FACE OF CURB
- BACK OF CURB
- EXISTING ROW
- CONCRETE SIDEWALK
- BASE REPAIR
- CONCRETE MEDIAN
- CONCRETE DRIVEWAY
- CROSSWALK
- STOP BAR

0' 50' 100'

SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER

1/22/2024

Kimley»Horn F-928

Texas Department of Transportation

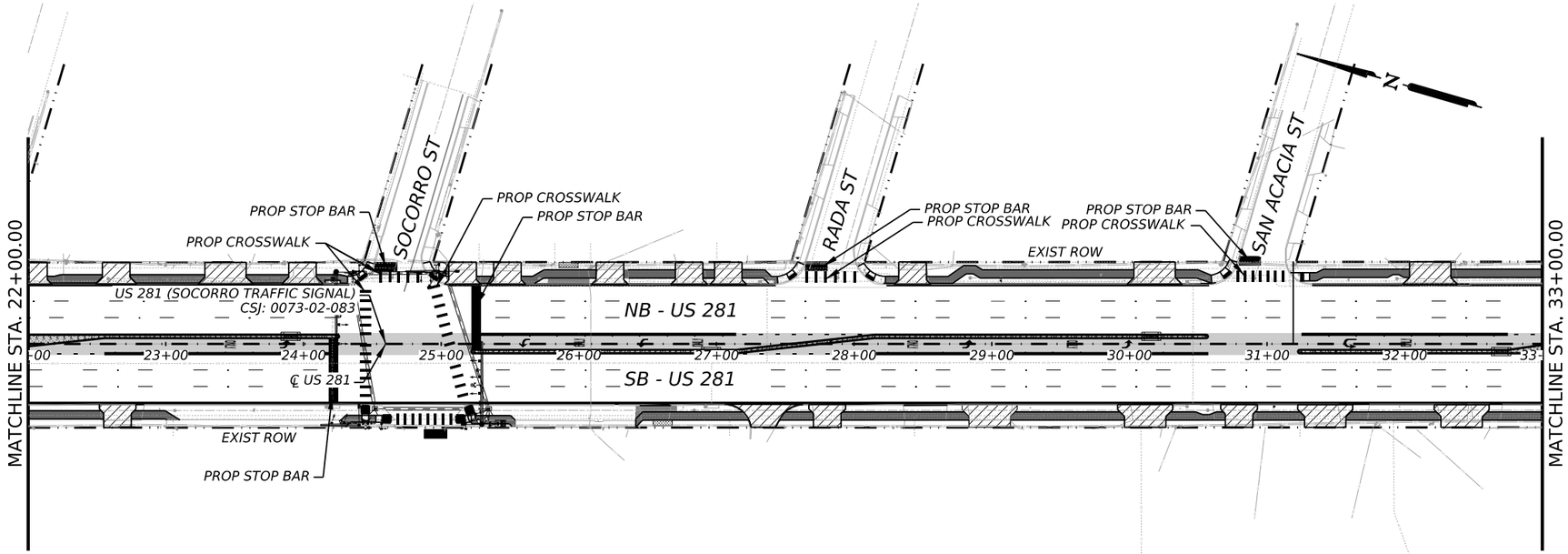
US 281

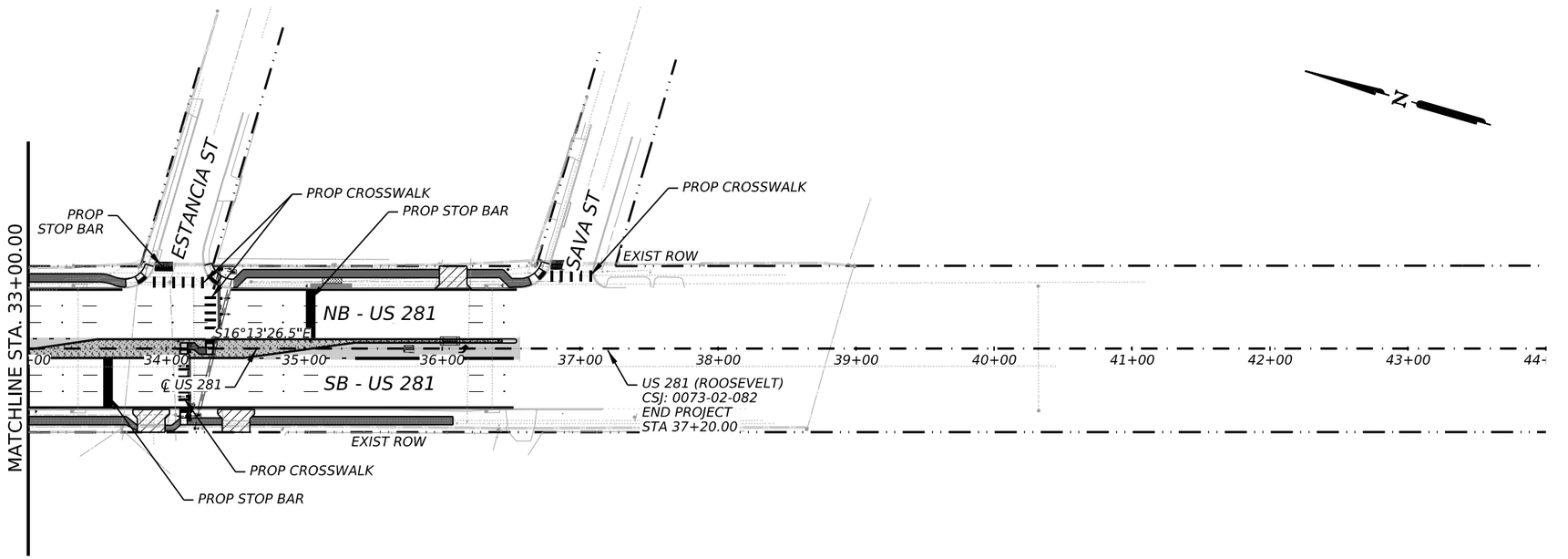
PROJECT LAYOUT

SHEET 1 OF 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	
6	SEE TITLE SHEET	
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY	SHEET NO.
SAT	BEXAR	3

DATE: 1/22/2024 3:33:09 PM
FILE: c:\pw\khl\d0251178\US281_PLAY.dgn





LEGEND

- EXISTING FEATURES
- FACE OF CURB
- BACK OF CURB
- EXISTING ROW
- CONCRETE SIDEWALK
- BASE REPAIR
- CONCRETE MEDIAN
- CONCRETE DRIVEWAY
- CROSSWALK
- STOP BAR

0' 50' 100'

SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER

1/22/2024

Kimley»Horn F-928

Texas Department of Transportation

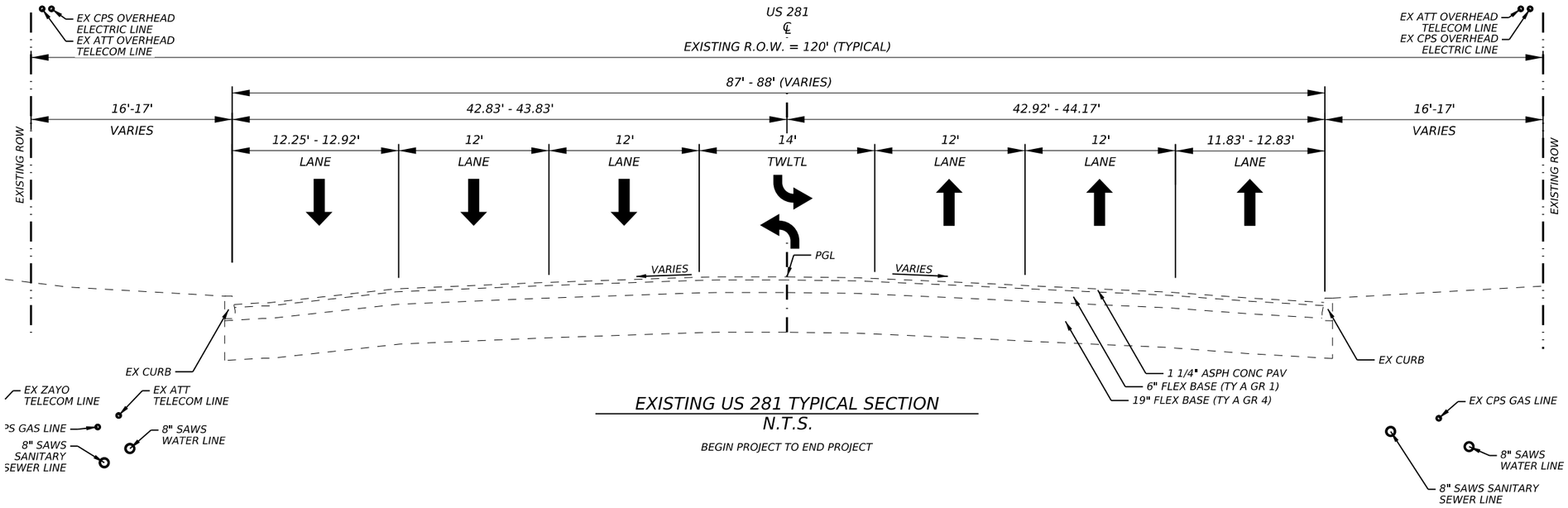
US 281

PROJECT LAYOUT

SHEET 2 OF 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		4

DATE: 1/22/2024 3:33:10 PM
FILE: c:\pw\khl\d0251178\US281_PLAY.dgn



EXISTING US 281 TYPICAL SECTION
N.T.S.

BEGIN PROJECT TO END PROJECT

DATE: 11/21/2023 2:27:28 PM
FILE: c:\pw\kh1\d0251178\US281_EXIST_TYP01.dgn

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED PROFESSIONAL ENGINEER
11/21/2023

Kimley»Horn F-928

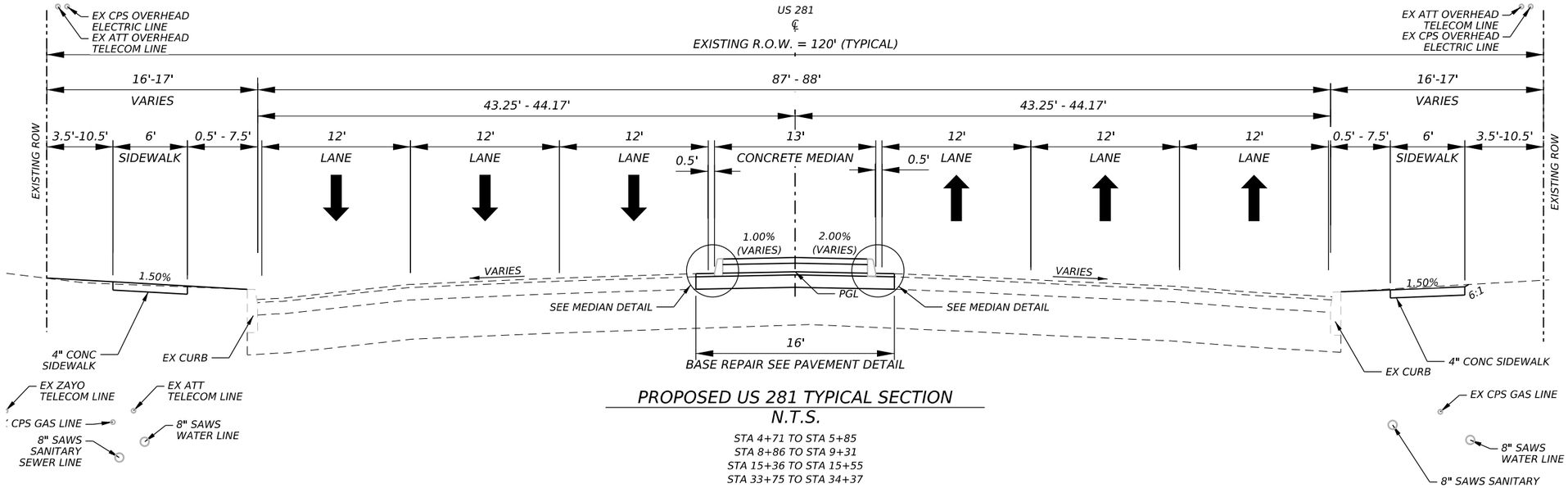
Texas Department of Transportation

US 281

EXISTING TYPICAL SECTION

SHEET 1 OF 1

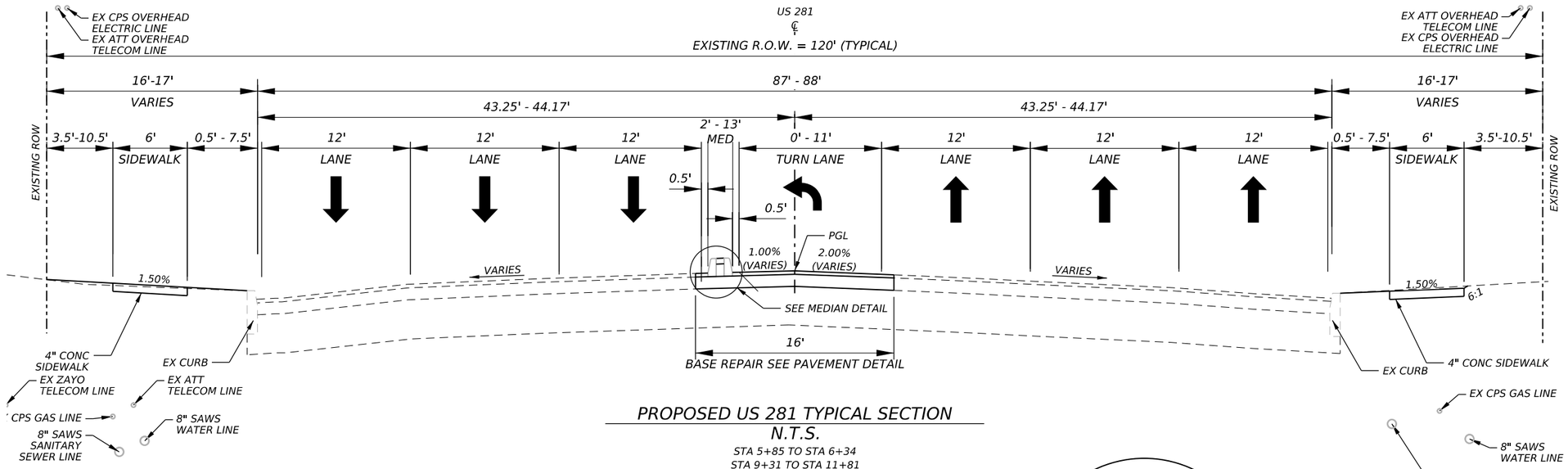
FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	
6	SEE TITLE SHEET	
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY	SHEET NO.
SAT	BEXAR	5



PROPOSED US 281 TYPICAL SECTION

N.T.S.

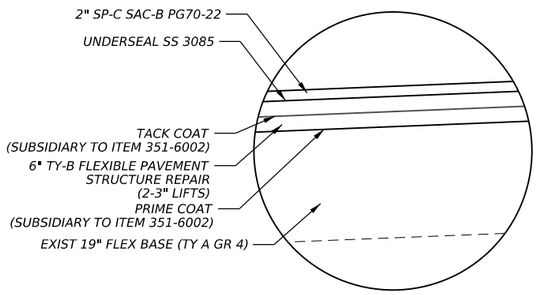
STA 4+71 TO STA 5+85
STA 8+86 TO STA 9+31
STA 15+36 TO STA 15+55
STA 33+75 TO STA 34+37



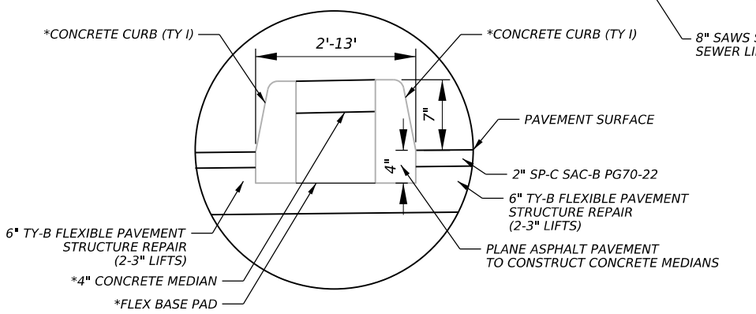
PROPOSED US 281 TYPICAL SECTION

N.T.S.

STA 5+85 TO STA 6+34
STA 9+31 TO STA 11+81
STA 15+55 TO STA 18+05
STA 21+57 TO STA 24+25
STA 27+64 TO STA 30+35
STA 34+37 TO END PROJECT



PAVEMENT DETAIL



*SUBSIDIARY TO CONCRETE MEDIAN BID ITEM 536-6002

MEDIAN DETAIL

NOTES:

1. REFER TO ROADWAY PLANS FOR SIDEWALK, ARMOR CURB SLOT, AND BASE REPAIR LOCATIONS.
2. SEE UTILITY LAYOUT SHEETS FOR UTILITY LOCATIONS.
3. SEE MEDIAN DETAIL FOR CURB TRANSITIONS AND ADDITIONAL INFORMATION.
4. EXISTING DITCH CAPACITY TO BE MAINTAINED. ANY CHANGES TO THE EXISTING DITCHES MUST BE APPROVED BY THE ENGINEER.

DATE: 12/21/2023 11:30:22 AM
FILE: c:\pw\kh1\d0251178\US281_TYP01.dgn

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED PROFESSIONAL ENGINEER
12/21/2023

Kimley»Horn F-928

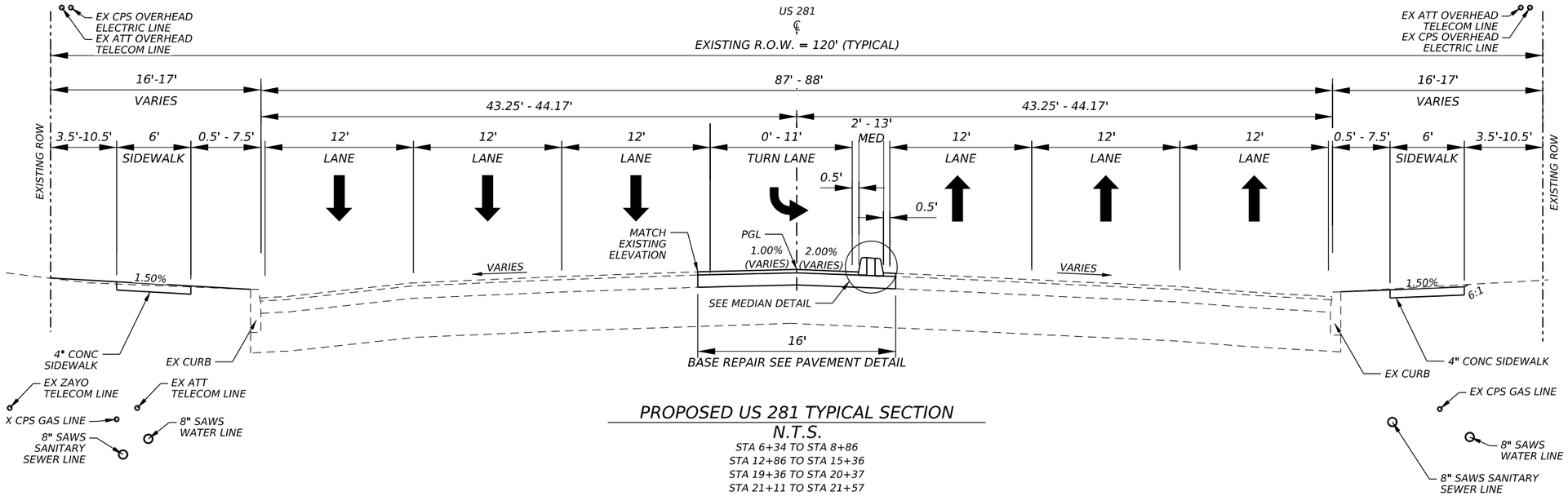
Texas Department of Transportation

US 281

PROPOSED TYPICAL SECTIONS

SHEET 1 OF 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		6



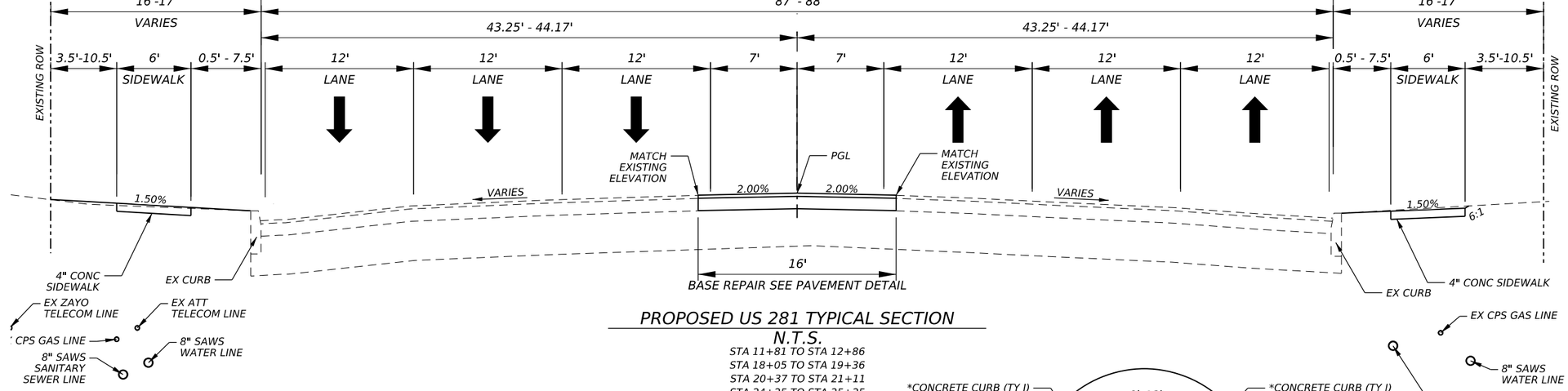
PROPOSED US 281 TYPICAL SECTION

N.T.S.

STA 6+34 TO STA 8+86
STA 12+86 TO STA 15+36
STA 19+36 TO STA 20+37
STA 21+11 TO STA 21+57
STA 25+25 TO STA 27+64
STA 31+25 TO STA 33+75

NOTES:

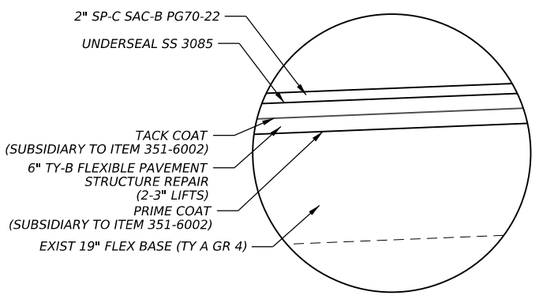
1. REFER TO ROADWAY PLANS FOR SIDEWALK, ARMOR CURB SLOT, AND BASE REPAIR LOCATIONS.
2. SEE UTILITY LAYOUT SHEETS FOR UTILITY LOCATIONS.
3. SEE MEDIAN DETAIL FOR CURB TRANSITIONS AND ADDITIONAL INFORMATION.
4. EXISTING DITCH CAPACITY TO BE MAINTAINED. ANY CHANGES TO THE EXISTING DITCHES MUST BE APPROVED BY THE ENGINEER.



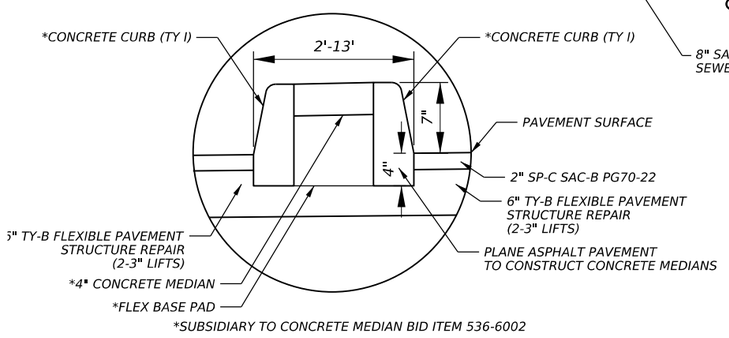
PROPOSED US 281 TYPICAL SECTION

N.T.S.

STA 11+81 TO STA 12+86
STA 18+05 TO STA 19+36
STA 20+37 TO STA 21+11
STA 24+25 TO STA 25+25
STA 30+35 TO STA 31+25



PAVEMENT DETAIL



*SUBSIDIARY TO CONCRETE MEDIAN BID ITEM 536-6002

MEDIAN DETAIL

SEE NOTE 3

DATE: 12/21/2023 11:28:53 AM
FILE: c:\pw\kh1\d0251178\US281_TYP02.dgn

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED PROFESSIONAL ENGINEER
12/21/2023

Kimley»Horn F-928

Texas Department of Transportation

US 281

PROPOSED TYPICAL SECTIONS

SHEET 2 OF 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		6A

**********GENERAL NOTES**********
2014 Specification Book (Revised September 25, 2023)

========== Basis of Estimate ==========

Item	Description	Rate/Area	Quant-Unit
168	Vegetative Watering	15.6 GAL/SY	61 MG

========== Asphalt Concrete Pavement ==========

Type	Location	Depth	Rate/Area	Quant-Tons
SP-C	US 281	2 IN	115 lbs/sy-in	653 TONS
Base Repair	US 281	6 IN	SY	5,665 SY

--General--
The following State, District, Local and/or Utility Standards have been modified: San Antonio District Armor Curb Slot.

Contact the Engineer or the City when construction operations are within 400 feet of a signalized intersection to determine/verify the location of loop detectors, conduit, ground-boxes, etc. Repair or replace any signal equipment damaged by construction operations. The method of repair or replacement shall be pre-approved and inspected. Depending on the type and extent of the damage, the Engineer reserves the right to perform the repair or replacement work and the Contractor will be billed for this work.

City of San Antonio: (210) 207-8642

Any materials removed and not reused and determined to be salvageable shall be stored within the project limits at an approved location or delivered undamaged to the storage yard as directed. Deface traffic signs so that they will not reappear in public as signs.

Any sign panels that are adjusted or removed and replaced, shall be done the same workday unless otherwise approved. This work shall be considered subsidiary to Item 502.

Notify the Engineer at least two weeks prior to a proposed traffic pattern change(s) that will require a revision to traffic signals.

Locate and reference all manholes and valves within the construction area with station and offset or GPS. Each manhole and valve shall be identified by its owner (SAWS, CPS, etc.). No roadwork will begin until this list has been submitted. All valves and manhole covers have to be accessible at all times, therefore; temp. CTB, material stockpiles, etc. cannot be placed over these valves or covers.

Control: 0073-02-082

County: Bexar

Highway: US 281

The Contractor has the option to adjust or construct all manholes and valves to final pavement elevations prior to the final mat of HMA or after final mat of HMA. If between the final elevation adjustment and the final mat of HMA, the manholes and valves are going to be exposed to traffic, place temporary asphalt around the manhole and valve to provide a +/- 50:1 taper. The cost of elevation adjustment and the concrete apron around the manhole and valve will be part of the manhole and valve work. The asphalt tapers are part of the HMA work.

Hurricane Evacuation

Hurricane Season is from June 1 thru November 30. As the closest metropolitan city inland from the Texas Coast, the City of San Antonio is a major shelter destination during mandatory hurricane evacuations. As such, planned work zone lane or road closures may be restricted and/or suspended during mandatory hurricane evacuation operations. The District will coordinate these restrictions at a minimum H-120 from any projected impact to the Texas Coast.

No time charges will be made if the Engineer determines that work on the project was impacted by the hurricane.

The Engineer may order changes in the Traffic Control Plan to accommodate evacuation traffic, and may suspend the work, all or in part, to ensure timely completion of this work. All work to implement changes in the Traffic Control Plan will be paid through existing bid prices or through Item 9.5, Force Account. However, the Department will not entertain any request for delay damages, loss of efficiency that may be attributed to the restriction or suspension of road or lane closures, or to changes in the Traffic Control Plan.

If a sanitary sewer overflow (SSO) occurs:

1. Attempt to eliminate the source of the SSO.
2. Contain sewage from the SSO to the extent possible to prevent contamination of waterways.
3. Call SAWS at (210) 233-2015.

The Contractor should be aware that the “San Antonio Water System” (SAWS) will be consulted by the Engineer in matters concerning the execution of the joint bid Water and/or Sanitary work. This may include reviewing material submittals and testing related to this work, as well as inspection and observation of the actual work. As such, a SAWS employee may be reviewing submittals and test results as well as observing the construction and related operations as they progress.

Submit locate request for SAWS water and sewer to TXDOTlocates@saws.org.

In accordance with the Underground Facility Damage Prevention Act (One Call Bill) the phone number for a utility locator is 811. It is the Contractor's responsibility to plan for utility locators as needed.

Underground utilities owned by the Texas Department of Transportation may be present within the Right-Of-Way. Call or email the TxDOT offices listed below for locates a minimum of 48 hours in advance of excavation. If city or town owned irrigation facilities are present, call the appropriate department of the local city or town a minimum of 48 hours in advance of excavation. The Contractor is liable for all damages incurred to the above-mentioned utilities when working without having the utilities located prior to excavation.

For signal and ITS locates call TransGuide at 210-731-5136 or email sat_its_locates@txdot.gov for ITS locates and signal.request@txdot.gov for signal locates.

Contractor questions on this project are to be addressed to the following individual(s):
Christen Longoria, P.E., Christen.Longoria@txdot.gov
Orlando Gallegos, P.E., Orlando.Gallegos@txdot.gov
Thanya Tarrosa, P.E., Thanya.Tarrosa@txdot.gov

Contractor questions will be accepted through email, phone and in person by the above individuals. Questions may also be submitted via the Letting Pre-Bid Q&A web page. This webpage can be accessed from the Notice to Contractors dashboard located at the following Address:
https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors

All contractor questions will be reviewed by the Engineer. All questions and any corresponding responses that are generated will be posted through the same Letting Pre-Bid Q&A web page.

The Letting Pre-Bid Q&A web page for each project can be accessed by using the dashboard to navigate to the project you are interested in by scrolling or filtering the dashboard using the controls on the left. Hover over the blue hyperlink for the project you want to view the Q&A for and click on the link in the window that pops up.

The Contractor must measure the vertical clearance at each structure after the final surface of the roadway is completed and provide the vertical clearance measurement to the Engineer.

VIA Metropolitan Transit Notes:

The contractor shall not remove or adjust any via assets.

The contractor must notify via dispatch at (210) 362-5020 and/or Robert Terrazas at (210) 419-6905 a minimum of one (1) week before any work that requires the removal of amenities such as

Control: 0073-02-082

County: Bexar

Highway: US 281

bus stop poles, benches, trash cans, shelters and/or any other via amenities within the project limits.

The contractor must notify via dispatch at (210) 362-5020 and/or Robert Terrazas (210) 419-6905 a minimum of one (1) week before any work that requires a detour in one or both directions along a via bus route.

The contractor must notify via dispatch at (210) 362-5020 and/or Robert Terrazas (210) 419-6905 a minimum of one (1) week before any work that requires the temporary closure of a bus stop.

The contractor must notify via dispatch at (210) 362-5020 and/or Robert Terrazas (210) 419-6905 when any temporarily closed bus stop can be reopened.

The contractor will be liable for any damages to via assets not removed by via.

The contractor is required to replace all flatwork removed or damaged in the course of executing the contract unless otherwise noted by via.

The contractor will be responsible for protecting via facilities adjacent to work area.

--Item 5--
Taper ACP placed at curb inlets, traffic inlets and slotted drains.

A horizontal boom or equivalent equipment is required for construction in the vicinity of the CPS Energy electric lines to provide vertical clearance of equipment during construction. Contact CPS Energy Utility Coordination Group sixteen (16) week in anticipation of pole bracing. The estimated duration for pole bracing is 6 to 10 weeks (or longer if temporary construction easements are required) after invoice is paid. For de-energizing or sleeving of the overhead electrical lines depicted on the plans, please contact CPS Energy Utility Coordination Group sixteen (16) week in anticipation of needed de-energization. The estimated duration for de-energizing is approximately 4 to 6 weeks (after invoice is paid) but could vary on system scenario and back feed requirements. De-energizing may not be possible in all instances or may be restricted during specific periods of time due to load demand. Contractor will be reimbursed for the invoice cost for pole bracing and/or de-energizing or sleeving through force account.

Prevention of Migratory Bird Nesting

It is anticipated that migratory birds, a protected group of species, may try to nest on bridges, culverts, vegetation, or gravel substrate, at any time of the year. The preferred nesting season for migratory birds is from February 15 through October 1. When practicable, schedule construction operations outside of the preferred nesting season. Otherwise, nests containing migratory birds

must be avoided and no work will be performed in the nesting areas until the young birds have fledged.

Structures

Bridge and culvert construction operations cannot begin until swallow nesting prevention is implemented, until after October 1 if it's determined that swallow nesting is actively occurring, or until it's determined swallow nests have been abandoned. If the State installed nesting deterrent on the bridges and culverts, maintain the existing nesting deterrent to prevent swallow nesting until October 1 or completion of the bridge and culvert work, whichever occurs earlier. If new nests are built and occupied after the beginning of the work, do not perform work that can interfere with or discourage swallows from returning to their nests. Prevention of swallow nesting can be performed by one of the following methods:

1. By February 15 begin the removal of any existing mud nests and all other mud placed by swallows for the construction of nests on any portion of the bridge and culverts. The Engineer will inspect the bridges and culverts for nest building activity. If swallows begin nest building, scrape, or wash down all nest sites. Perform these activities daily unless the Engineer determines the need to do this work more frequently. Remove nests and mud through October 1 or until bridge and culvert construction operations are completed.

2. By February 15 place a nesting deterrent (which prevents access to the bridge and culvert by swallows) on the entire bridge (except deck and railing) and culverts. This work is subsidiary to the various bid items.

No extension of time or compensation payment will be granted for a delay or suspension of work caused by nesting swallows.

Provide a non-intrusive back-up alarm system on all heavy equipment used in close proximity to residential areas. This item is subsidiary to various bid items.

When a precast or cast-in-place concrete element is included in the plans, a precast concrete alternate may be submitted in accordance with "Standard Operating Procedure for Alternate Precast Proposal Submission" found online at https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/publications/bridge.html#design. Acceptance or denial of an alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor.

Excavation within 5 feet of an existing CPS Energy pole will require pole bracing. Contact CPS Energy utility coordination to request pole bracing (Customer Engineering 210-353-4050). The estimated duration for the pole bracing process is approximately 10 to 15 weeks.

--Item 6--
Show the stockpile lot and/or sub lot numbers on all tickets for all materials.

Steel Wrapped or Asbestos Utility Lines:

Existing steel wrapped natural gas and/or asbestos cement (AC) water lines that will no longer be in service are usually abandoned in place (AIP). However, if any of these lines have to be removed for whatever reason (in the way of other construction, to make tie-ins, etc.), comply with Item 6.

If removal of AC water lines is included in the construction contract, then notify the Engineer of proposed dates of removal of the AC water lines in accordance to Item 6. Excavate to the top of the AC water line to allow a separate contractor hired by the State to remove the AC water line. The excavation for the AC water line removal is subsidiary to the work that created the need for the removal (excavation for structures, roadway, a new line, tie-ins, etc.).

To comply with the latest provisions of Build America, Buy America Act (BABA Act) of the Bipartisan Infrastructure Law, the contractor must submit an original of the TxDOT Construction Material Buy America Certification Form for all items classified as construction materials. This form is not required for materials classified as a manufactured product.
Refer to the Buy America Material Classification Sheet for clarification on material categorization.

The Buy America Material Classification Sheet is located at the below link.
https://www.txdot.gov/business/resources/materials/buy-america-material-classification-sheet.html for clarification on material categorization.

--Item 7--
The project's total disturbed area is 2.32 acres. The disturbed area in all project locations and Contractor project specific locations (PSL's), within 1/4 mile of the project limits, will further establish the authorization requirements for storm water discharges. The department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. Obtain any required authorization from the TCEQ for any PSL's on or off the ROW. When the total area disturbed on the project and PSL's within 1/4 mile of the project exceeds 5 acres, provide a copy of the Contractor NOI for PSL's to the Engineer (to the appropriate MS4 operator when the project is on an off-state system route).

Notify the Engineer of the disturbed acreage within one (1) mile of the project limits. Obtain authorization from the TCEQ for Contractor PSL's for construction support activities on or off ROW.

No significant traffic generators events identified.

--Item 8--
Working days will be computed and charged in accordance with Article 8.3.1.4: Standard work week.

A Special Provision to Item 8 for a delayed authorized date to begin work has been included in the contract. The reason for including the Special Provision is for material processing or contractor mobilization.

Create and maintain a Critical Path Method (CPM) schedule.

The CPM schedule shall be created and maintained using software fully compatible with Primavera Project Planner version P6 Professional R15.2 .

--Item 9--
When approved, provide uniformed, off-duty law enforcement officers with marked vehicles during work that requires a lane closure. The officer in marked vehicles shall be located as approved to monitor or direct traffic during the closure. The method used to direct traffic at signalized intersections shall be as approved. Additional officers and vehicles may be provided when approved or directed.

Complete the daily tracking form provided by the department and submit invoices that agree with the tracking form for payment at the end of each month approved services were provided.

Show proof of certification by the Texas Commission on Law Enforcement Standards.

All law enforcement personnel used in Work Zone Traffic Control shall be trained for performing duties in work zones and are required to take “Safe and Effective Use of Law Enforcement Personnel in Work Zones” (Course #133119) which can be found online at the following site: www.nhi.fhwa.dot.gov

Certificates of completion should be available to all who finish the course. These should be kept by the officers to substantiate completion when reporting to the work site.

Minimums, scheduling fees, etc. will not be paid; TxDOT will consider paying cancellation fees on a case-by-case basis.

--Item 100--
Trim and remove brush and trees within the stations noted in the plans and as needed for construction operations. Unless shown otherwise in the plans or a designated non-mow area, perform trimming or removal for areas to the ROW limits. Trim or remove to provide minimum of 5 ft. of horizontal clearance and 7 ft. of vertical clearance for the following: sidewalks, paths, guard fence, rails, signs, object markers, and structures. Trim to provide a minimum of 12 ft. vertical clearance under all trees.

Control: 0073-02-082

Obtain approval for proposed method of tree and brush trimming and removal. Vertical flailing equipment is not allowed. Treat damaged or cut branches, roots and/or stumps of all oak trees with a commercial tree wound dressing. Disinfect all pruning tools with a solution of 70% alcohol before moving from one tree to another. Unless otherwise approved remove all resulting vegetative debris from the ROW within 24 hours. The Engineer can stop all construction operations if the dressing, cut and removal requirements are not followed.

Removal and disposal of existing abandoned utilities that were unable to be identified before letting required to support this project’s construction shall be performed under the overall Preparing Right of Way. If you are uncertain whether the utility is active, contact the District Utility Section.

--Item 132--
The material used for TY C Embankment shall have a PI of not less than 6 and not greater than 20.

--Item 161--
Approximately 139 CY of existing topsoil may be salvaged and windrowed or stockpiled (as approved) for later use as Compost Manufactured Topsoil (CMT). Place erosion control measures for the stockpile and/or windrow.

--Item 162--
Furnish and place Bermuda grass sod.

--Item 168--
Apply vegetative watering as needed to supplement natural rainfall during the vegetation establishment period. Plan quantity of irrigation water is based on the application of a total of 1.3 gal of water each week for each sq. yd. of area that is sodded or seeded. Establishment time is estimated to be 12 weeks for both sod and permanent seed mixes. Temporary seeding will require less time for establishment. Provide a schedule and coordinate watering cycles and rates per cycle with the Engineer. Obtain approval if the quantity of water to be applied is expected to exceed the plan quantity. Adjust the amount of water applied with each cycle and the number of cycles each wk. according to actual site conditions. Drought or other conditions, as determined by the Engineer, may require the application of supplemental irrigation during hours other than normal working hours.

--Item 465--
Concrete Class B invert shaping is required at all inlets, manholes and junction boxes to insure positive flow. The material and work performed for the placement of the inverts shall be considered subsidiary to this item.

--Item 500--
"Materials on Hand" payments will not be considered in determining percentages for mobilization payments.

--Item 502--
General

In addition to providing a Contractor's Responsible Person and a phone number for emergency contact, have an employee available to respond on the project for emergencies and for taking corrective measures within 2 hours or within a reasonable time frame as specified by the Engineer.

Treat the pavement drop-offs as shown in the TCP.

Avoid placing stockpiles, equipment, and other construction materials within the roadway's horizontal clear zone or at any location that will constitute a hazard and will endanger traffic. If a stockpile is placed within the clear zone, address in accordance with the TMUTCD.

If Nighttime work is required and work is not behind positive barrier then full Class 3 reflective gear is required to be worn by all workers, hard hat halos are required to be worn by the flaggers at flagging stations, TY III barricades are required to be spaced at 500 ft, and a mandatory night work meeting is required.

The Contractor Force Account "Safety Contingency" that has been established for this project is intended to be utilized for work zone enhancements, to improve the effectiveness of the Traffic Control Plan, that could not be foreseen in the project planning and design stage. These enhancements will be mutually agreed upon by the Engineer and the Contractor's Responsible Person based on weekly or more frequent traffic management reviews on the project. The Engineer may choose to use existing bid items if it does not slow the implementation of enhancement.

Mounting and moving the mailbox as needed for the various construction phases is subsidiary to Item 502.

Access to adjoining property must be maintained at all times.

Barricades, Signs, and Traffic Control Devices

When advanced warning flashing arrow panels and/or changeable message sign is specified, have one standby unit in good condition at the job site. Standby time shall be considered subsidiary to the bid item.

After written notification, the time frame is provided on the Form 599 to provide properly maintained signs and barricades before considered in non-compliance with this item.

Moving an existing sign to a temporary location is subsidiary to Item 502. Installations with permanent supports at permanent locations will be paid for under the applicable bid item(s).

Cover permanent signs if not used. This is subsidiary to Item 502.

Lane and Ramp Closures and Detours

Notify the Engineer in writing 10 business days in advance of any temporary or permanent lane, ramp, connector, etc. closures/detours, restrictions to lane widths, alterations to vertical clearances, or modifications to radii. Any other modifications to the roadway that may adversely affect the mobility of oversized/overweight trucks also require 10 business days advance written notice to the Engineer. At least one lane must always remain open.

For closures not listed in the TCP; the lane closures are limited to be between the hours of 9:00 A.M. to 3:00 P.M., and at least one lane must remain open at all times.

At no time shall two consecutive intersecting roadways be closed at one time during construction.

At no time shall two consecutive ramps be closed at one time during construction or overlay operations.

Unless otherwise noted in the plans and/or as directed by the Engineer, daily lane closures shall be limited according to the following restrictions:

No lane closures will be permitted for the following dates and/or special events:
Between December 15 and January 1
Fiesta Week and Sales Tax Holidays (Bexar County Only)
Wednesday before Thanksgiving thru the Sunday after Thanksgiving
Saturday and Sunday before Memorial Day and Labor Day
Saturday or Sunday when July 4 falls on a Friday or Monday
Election days (Bexar County Only)
During major events at the AT&T Center (Spurs home games, Rodeo, concerts, etc.)
Alamodome, and/or Convention Center (Bexar County Only)
Easter April 18-20, 2025

Traffic Signals

There are traffic signals at the intersection of Socorro St and US 281. Always keep the signals in operation except when necessary for specific installation operations, including any modifications to existing signal heads to always maintain clear visibility. Adjustment of any signal head will be subsidiary to Item 502. When it is necessary for a signal to be turned off, or when left-turn lanes are closed, hire off duty police officers to control the traffic until the signals are back in satisfactory condition.

Moving or adjustment of traffic signal heads, VIVDS, and radar detection for the purpose of alignment with the shifting of lanes in conjunction with the traffic control plan will be subsidiary to various bid items.

Coordinate with the appropriate entity (City of San Antonio, City of New Braunfels, etc.) or TxDOT when left-turn lanes are closed and/or for signal timing revisions as necessary.

Hauling

The use of rubber-tired equipment will be required for moving dirt or other materials along or across pavement surfaces. Where the contractor desires to move any equipment not licensed for operation on public highways, on or across pavement, they shall protect the pavement from damage as directed/approved by the Engineer.

Throughout construction operations, the Contractor will be required to conduct their hauling operations in a manner such that vehicles will not haul over previously recompacted subgrade or compacted base material, except in short sections for dumping manipulations.

The Contractor shall keep the roadway clean and free of dirt or other materials during hauling operations. If the Contractor does not maintain a clean roadway, they shall cease all construction operations, when directed by the Engineer, to clean the roadway to the satisfaction of the Engineer.

--Item 506--
An Inspector will perform a regularly scheduled SWP3 inspection every 7 calendar days.

Failure to address items noted on the SW3P inspection report within two report cycles may result in the Department stopping all construction operations, exclusive of time charges, or withholding that month's estimate until the SW3P deficiencies are corrected unless the Engineer determines that the area is too wet to correct SW3P deficiencies.

Failure to correctly maintain daily monitoring reports and submitting to TxDOT on a daily/weekly basis may result in the monthly estimate being withheld.

--Item 529--
Curb inlets and extensions are based on an exposed curb height of 7 inches. The roadway curb height and shape will be transitioned to the inlet's curb with a 40: 1 taper.

--Item 618--
It might be necessary to cut concrete for placement of conduit. Saw cut existing concrete, remove the concrete from the steel reinforcement (bars or fabric) and bend the steel to install the conduit. After the conduit has been placed, bend the steel back to its original position and back-fill the trench with an approved concrete. This work is subsidiary to this Item.

The conduit depth for illumination under the City of San Antonio streets is 36 inches.

--Item 628--
Make all arrangements for electrical service, and compliance with local standards and practices for proper installations.

--Item 644--
The wedge anchor system shown on State Standard Sheet SMD (TWT) is not allowed.

Triangular Slipbase Systems with set screws are not allowed.

--Item 666--
Use TY II markings (vs. an acrylic or epoxy) on asphalt surfaces as the sealer for the TY I markings, unless otherwise approved by the Engineer.

--Item 672--
Place all adhesive material directly from the heated dispenser to the pavement. Do not use portable or non-heated containers. Use adhesive of sufficient thickness so that when the marker is pressed into the adhesive, 1/8" or more adhesive will remain under 100% of the marker. The adhesive should extend not less than 1/2" but not more than 1 1/2" beyond the perimeter of the marker.

--Item 677--
Obtain approval before using the mechanical method for the elimination of existing thermoplastic pavement markings.

--Item 680--
Furnish and install all required materials and equipment necessary for the complete and operating traffic signal installation at the following intersections:
Santa Rita St and US 281, San Casimiro St and US 281, Socorro St and US 281, and E. Estancia St and US 281.

The locations shown on the plans for signal pole foundations, controller foundations, conduit and other items may be adjusted to better fit field conditions as approved.

Furnish and install a new Henke Enterprises or Mobotrex eight-phase NEMA TS2 Type 2 controller and cabinet, meeting the requirements of Departmental Materials Specifications DMS-11170. Provide detector panel toggle switches that additionally permit the user to disconnect the detector. For both ground and pole-mount cabinets, provide cabinet configuration with 16 position load bay.

Deliver TS type 2 controller cabinet and assembly to the TxDOT San Antonio district signal shop for programming and testing two weeks in advance prior to contractor installing equipment in the field. Coordinate drop off and pick up with Mark Perez (210) 218-7430.

Connect all field wiring to the controller assembly into the polyphaser. The Signal Shop representative will assist in determining how the detection cables are to be connected, and will also program the controller for operation, hook up the malfunction management unit (MMU) or conflict monitor, detector units, and other equipment, and turn on the controller. Have a qualified technician on the project site to place the traffic signals in operation.

Once final punch list is complete, contractor is allowed to begin flashing signal operations. Signal shall flash for a minimum of 7 days prior to full operation, unless otherwise approved by the Engineer.

Use LED lamps from the prequalified material producer lists as shown on the Texas Department of Transportation (TxDOT) – Construction Division's (CST) material producer list. Category is "Roadway Illumination and Electrical Supplies." under item 610. No substitutions will be allowed for materials found on this list.

Demonstrate that the field wiring is properly installed. Install the electrical equipment in a neat and workmanlike manner.

Use the following wiring sequence when connecting signal sections to the cabinet:

Conductor No.	Base Color	Tracer Color	Signal Face
1	Black		Yellow Ball
2	White		Neutral
3	Red		Red Ball
4	Green		Green Ball
5	Orange		Yellow Arrow
6	Blue		Green Arrow
7	White	Black	Spare

All existing signal equipment with the exception of the signal controller and related equipment become the property of the Contractor. Deliver the controller and related equipment to the Signal shop, located at 4615 NW Loop 410 (corner of IH 410 and Callaghan Road) in San Antonio, Texas or to the Area Office as directed.

Use qualified personnel to respond to and diagnose all trouble calls during the thirty-day test period. Repair any malfunction to Contractor-supplied signal equipment. Provide to the Engineer a local telephone number, not subject to frequent changes and available on a 24-hour basis, for reporting trouble calls. Response time to reported calls must be less than 2 hours. Make appropriate repairs within 24 hours. Place a logbook in the controller cabinet and keep a record of each trouble call reported. Notify the Engineer of each trouble call. Do not clear the error log in the conflict monitor or MMU during the thirty-day test period without approval.

Integrate the proposed traffic signal(s) into the existing Advanced Traffic Management System (ATMS) as shown on the plans. Centracs ATMS software, which utilizes Econolite controllers, is currently in use in the San Antonio District. Provide controllers on this project that fully communicate with the existing ATMS software.

This project includes the installation of at least one cellular modem at the location(s) specified in the plans. Cellular modem(s) and power supply(s) will be furnished by the department. Provide all materials not supplied by the department necessary for the cellular modem installation. All materials provided by the contractor must be new unless otherwise shown on the plans. Equipment provided by the department shall be stored by the department for pick up at the TxDOT San Antonio TransGuide Office, 3500 NW Loop 410 San Antonio, TX 78229. Prevent damage to all cellular modem components supplied by the department. Replace any component that is damaged or lost during transportation or installation at the contractor's expense. Verify operation of the cellular modem(s) together with operation of its links; demonstrate that data can be transmitted at a satisfactory rate from the field location to the central location. Demonstrate that the cellular modem(s) data packets are being received at the central site via a networked computer. Transportation, installation and incidentals for installation of the cellular modem(s) shall be considered subsidiary to item 680.

Provide a submittal compliance matrix with all traffic signal submittals.

Field verify the depths of the drill shafts to meet the minimum clearances specified in the plans before ordering materials.

Ensure that all TMS (Traffic Management System) equipment furnished and installed is completely compatible with the existing hardware and software located within the TransGuide operations center (i.e. TransGuide central software). The contractor shall contact the traffic management engineer for details on the system network architecture.

Contractor shall be responsible for integrating and testing all new TMS equipment and any existing TMS equipment that is relocated into the existing network management system, subsidiary to the various bid items.

--Item 682--
Pedestrian signals may be by a different manufacturer than the vehicle signal heads.

Cover all signal faces until placed in operation. This work is subsidiary to various bid items.

All mounting attachments shall be constructed of steel pipe and mounted as shown on the plans.

--Item 684--
Provide an extra 10' for each cable terminating in the controller cabinet. All cables must be continuous without splices from terminal point to terminal point. All proposed signal cable must be #12 AWG stranded copper.

--Item 686 & 687--
Provide all signal poles from the same manufacturer. Pedestrian poles may be from a different manufacturer.

--Item 688--
The sealant used for vehicle loop wire must be approved.

The button placement must be coordinated with the concrete pad to access the button according to ADA and TAS. If any mounting modifications are needed (extensions, brackets, etc.) to meet ADA and TAS requirements the adjustment will be subsidiary to Item 688. The concrete pad (if required) will be paid separately.

The pedestrian push button must be wired with a 2/C#14 loop detector cable in lieu of a #12 A.W.G. XHHW wire.

Furnish and install new Polara Enterprises accessible pedestrian signals (APS) push buttons or approved equivalent.

--Item 3076, 3077, 3079, 3080, 3081, & 3082 --

1. Table 10 in Item 3076 and Table 11in Item 3077, Hamburg Wheel Test Requirements tested in accordance with Tex-242-F are changed for PG 64-22 or lower and PG 70-22. Minimum number of passes at 12.55 mm Rut Depth, Tested at 50 degrees C will be 5,000 and 10,000 respectively.

2. Submit a copy of the Tex 233-F production charts on a weekly basis. At the end of the ACP work, provide all originals.

3. Crushing of aggregate for hot mix and immediate use for production of the mix is not allowed. Stockpile the aggregate until enough material is available for five days of production unless prior approval is provided

4. Hold a pre-paving meeting one month prior to the placement of the hot mix. The date and time of pre-paving meeting should be coordinated with the Engineer prior to scheduling.

5. Do not use diesel or solvents as asphalt release agents in production, transportation, or construction. A list of approved asphalt release agents is available from the District Laboratory.

6. No more than one hot mix lot will be open for any specific type of hot mix, unless authorized. After a lot is open and the Contractor gets approval to change plants, the previous lot will be closed, and a new lot will be opened. The numbering for the lots produced at the new plant will start with No. 1. If allowed to switch back to the original or previous plant, the next lot from that plant will resume numbering sequentially from the last lot produced by that plant.

--Item 3084 & 3085 --
The minimum application rates are listed in Table UC/BC. The Engineer may adjust the application rates taking into consideration the existing pavement surface conditions.

Table UC/BC

Material	Minimum Application Rate (gal. per square yard)
TRAIL – Hot Asphalt	0.15
Spray Applied Underseal Membrane	0.20
Seal Coat – Emulsion (CHFRS-2P, CRS-2P)	0.25
Seal Coat – Asphalt (AC-15P, AC-20-5TR, AC-20XP, AC10-2TR)	0.23
Aggregate for Seal Coat Options TY PB GR 4(AC) or TY B GR 4(Emulsion)	1 CY:120 SY

--Item 6185--
1 shadow vehicle with TMA will be required for this project. The TMA's will be measured and paid for by the DAY for each TMA/TA set up and operational on the worksite. The contractor will be responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMA's needed for the project. See TMA and TA Summary sheet in the plans.

County: Bexar

Highway: US 281

--Item 6292--
Radar presence detection device must utilize true-presence detection. Systems using locking algorithms to attempt presence detection will not be accepted. In addition, radar systems will not be allowed to use extensions/delays or place the controller on locking detection to aid in presence detection.

Radar presence detection device must be able to detect up to 10 lanes with a minimum offset of 6’ and have at least 16 zones and channels per unit.

Radar presence detection device must be mounted on the same side of the intersection as the lanes it is set to detect.

Final placement of radar devices must be approved by the engineer.

Furnish and install new Wavetronix SmartSensor Matrix, or approved equivalent, for radar presence detectors and Wavetronix SmartSensor Advance, or approved equivalent, for radar advanced detection devices.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0073-02-082 **DISTRICT** San Antonio **COUNTY** Bexar
HIGHWAY US 281

			CONTROL SECTION JOB		**0073-02-082**		**0073-02-083**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00177471**		**A00177574**			
			COUNTY		**Bexar**		**Bexar**			
			HIGHWAY		**US 281**		**US 281**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL	EST.	FINAL		
	100-6002	PREPARING ROW		STA	33.000				33.000	
	104-6009	REMOVING CONC (RIPRAP)		SY	23.000				23.000	
	104-6011	REMOVING CONC (MEDIANS)		SY	70.000				70.000	
	104-6015	REMOVING CONC (SIDEWALKS)		SY	138.000				138.000	
	104-6017	REMOVING CONC (DRIVEWAYS)		SY	1,275.000				1,275.000	
	104-6021	REMOVING CONC (CURB)		LF	906.000				906.000	
	110-6001	EXCAVATION (ROADWAY)		CY	880.000				880.000	
	132-6005	EMBANKMENT (FINAL)(ORD COMP)(TY C)		CY	20.000				20.000	
	161-6017	COMPOST MANUF TOPSOIL (4")		SY	3,823.000				3,823.000	
	162-6002	BLOCK SODDING		SY	3,823.000				3,823.000	
	168-6001	VEGETATIVE WATERING		MG	61.000				61.000	
	169-6006	SOIL RETENTION BLANKETS (CL 2) (TY F)		SY	3,823.000				3,823.000	
	351-6002	FLEXIBLE PAVEMENT STRUCTURE REPAIR(6")		SY	5,664.000				5,664.000	
	416-6031	DRILL SHAFT (TRF SIG POLE) (30 IN)		LF			22.000		22.000	
	416-6032	DRILL SHAFT (TRF SIG POLE) (36 IN)		LF	78.000				78.000	
	416-6034	DRILL SHAFT (TRF SIG POLE) (48 IN)		LF			44.000		44.000	
	465-6338	INLET (COMPL)(ARMOR CURB SLOT)		EA	18.000				18.000	
	500-6001	MOBILIZATION		LS	0.882		0.118		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING		MO	8.000				8.000	
	506-6021	CONSTRUCTION EXITS (INSTALL) (TY 2)		SY	312.000				312.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)		SY	312.000				312.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)		LF	3,927.000				3,927.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)		LF	3,927.000				3,927.000	
	506-6042	BIODEG EROSN CONT LOGS (INSTL) (18")		LF	400.000				400.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)		LF	400.000				400.000	
	529-6001	CONC CURB (TY I)		LF	326.000				326.000	
	530-6004	DRIVEWAYS (CONC)		SY	1,846.000				1,846.000	
	531-6001	CONC SIDEWALKS (4")		SY	2,283.000				2,283.000	
	531-6003	CONC SIDEWALKS (6")		SY	8.000				8.000	
	531-6004	CURB RAMPS (TY 1)		EA	3.000				3.000	
	531-6005	CURB RAMPS (TY 2)		EA	19.000				19.000	
	531-6010	CURB RAMPS (TY 7)		EA	8.000				8.000	
	531-6016	CURB RAMPS (TY 21)		EA	6.000				6.000	
	536-6002	CONC MEDIAN		SY	1,276.000				1,276.000	
	536-6006	CONC MEDIAN(MONO NOSE)		SY	52.000				52.000	
	560-6005	MAILBOX INSTALL-D (TWG-POST) TY 2		EA	6.000				6.000	
	618-6046	CONDT (PVC) (SCH 80) (2")		LF	100.000		150.000		250.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0073-02-082 **DISTRICT** San Antonio **COUNTY** Bexar
HIGHWAY US 281

			CONTROL SECTION JOB		**0073-02-082**		**0073-02-083**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00177471**		**A00177574**			
			COUNTY		**Bexar**		**Bexar**			
			HIGHWAY		**US 281**		**US 281**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL	EST.	FINAL		
	618-6047	CONDT (PVC) (SCH 80) (2") (BORE)		LF	380.000		365.000		745.000	
	618-6053	CONDT (PVC) (SCH 80) (3")		LF	55.000		95.000		150.000	
	618-6054	CONDT (PVC) (SCH 80) (3") (BORE)		LF	770.000		730.000		1,500.000	
	620-6007	ELEC CONDR (NO.8) BARE		LF	1,250.000		1,350.000		2,600.000	
	620-6009	ELEC CONDR (NO.6) BARE		LF	60.000		40.000		100.000	
	620-6010	ELEC CONDR (NO.6) INSULATED		LF	120.000		55.000		175.000	
	621-6002	TRAY CABLE (3 CONDR) (12 AWG)		LF	655.000		625.000		1,280.000	
	624-6010	GROUND BOX TY D (162922)W/APRON		EA	6.000		4.000		10.000	
	628-6144	ELC SRV TY D 120/240 060(NS)SS(E)PS(U)		EA	3.000		1.000		4.000	
	644-6030	IN SM RD SN SUP&AM TYS80(1)SA(T)		EA	53.000				53.000	
	644-6076	REMOVE SM RD SN SUP&AM		EA	30.000				30.000	
	662-6059	WK ZN PAV MRK REMOV (TRAF BTN) TY Y		LF	5,743.000				5,743.000	
	662-6071	WK ZN PAV MRK REMOV (W)8"(SLD)		LF	1,834.000				1,834.000	
	662-6080	WK ZN PAV MRK REMOV (W)(ARROW)		EA	12.000				12.000	
	662-6089	WK ZN PAV MRK REMOV (W)(UTURN ARROW)		EA	2.000				2.000	
	662-6090	WK ZN PAV MRK REMOV (W)(WORD)		EA	14.000				14.000	
	666-6030	REFL PAV MRK TY I (W)8"(DOT)(100MIL)		LF	195.000				195.000	
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)		LF	1,618.000				1,618.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)		LF	3,534.000				3,534.000	
	666-6054	REFL PAV MRK TY I (W)(ARROW)(100MIL)		EA	10.000				10.000	
	666-6063	REFL PAV MRK TY I(W)(UTURN ARW)(100MIL)		EA	2.000				2.000	
	666-6078	REFL PAV MRK TY I (W)(WORD)(100MIL)		EA	12.000				12.000	
	666-6225	PAVEMENT SEALER 6"		LF	14,119.000				14,119.000	
	666-6226	PAVEMENT SEALER 8"		LF	1,811.000				1,811.000	
	666-6230	PAVEMENT SEALER 24"		LF	3,534.000				3,534.000	
	666-6231	PAVEMENT SEALER (ARROW)		EA	12.000				12.000	
	666-6232	PAVEMENT SEALER (WORD)		EA	12.000				12.000	
	666-6306	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)		LF	3,118.000				3,118.000	
	666-6343	REF PROF PAV MRK TY I(W)6"(SLD)(100MIL)		LF	5,355.000				5,355.000	
	666-6347	REF PROF PAV MRK TY I(Y)6"(SLD)(100MIL)		LF	5,646.000				5,646.000	
	672-6009	REFL PAV MRKR TY II-A-A		EA	570.000				570.000	
	672-6010	REFL PAV MRKR TY II-C-R		EA	238.000				238.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")		LF	2,893.000				2,893.000	
	677-6007	ELIM EXT PAV MRK & MRKS (24")		LF	145.000				145.000	
	677-6009	ELIM EXT PAV MRK & MRKS (DBL ARROW)		EA	2.000				2.000	
	678-6002	PAV SURF PREP FOR MRK (6")		LF	14,119.000				14,119.000	
	678-6008	PAV SURF PREP FOR MRK (24")		LF	3,534.000				3,534.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0073-02-082 **DISTRICT** San Antonio **COUNTY** Bexar
HIGHWAY US 281

			CONTROL SECTION JOB		**0073-02-082**		**0073-02-083**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00177471**		**A00177574**			
			COUNTY		**Bexar**		**Bexar**			
			HIGHWAY		**US 281**		**US 281**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL	EST.	FINAL		
	680-6001	INSTALL HWY TRF SIG (FLASH BEACON)		EA	3.000				3.000	
	680-6003	INSTALL HWY TRF SIG (SYSTEM)		EA			1.000		1.000	
	682-6001	VEH SIG SEC (12")LED(GRN)		EA			10.000		10.000	
	682-6002	VEH SIG SEC (12")LED(GRN ARW)		EA			2.000		2.000	
	682-6003	VEH SIG SEC (12")LED(YEL)		EA	30.000		8.000		38.000	
	682-6004	VEH SIG SEC (12")LED(YEL ARW)		EA			4.000		4.000	
	682-6005	VEH SIG SEC (12")LED(RED)		EA			10.000		10.000	
	682-6006	VEH SIG SEC (12")LED(RED ARW)		EA			2.000		2.000	
	682-6018	PED SIG SEC (LED)(COUNTDOWN)		EA			8.000		8.000	
	682-6021	BACK PLATE (12")(1 SEC)		EA	30.000				30.000	
	682-6049	BACKPLATE W/REFL BRDR(4 SEC)		EA			2.000		2.000	
	682-6060	BACKPLATE W/REFL BRDR(3 SEC)		EA			10.000		10.000	
	684-6035	TRF SIG CBL (TY A)(14 AWG)(9 CONDR)		LF	960.000		1,240.000		2,200.000	
	684-6049	TRF SIG CBL (TY A)(16 AWG)(3 CONDR)		LF			1,100.000		1,100.000	
	686-6027	INS TRF SIG PL AM(S)1 ARM(24')LUM		EA			1.000		1.000	
	686-6031	INS TRF SIG PL AM(S)1 ARM(28')LUM		EA			1.000		1.000	
	686-6045	INS TRF SIG PL AM(S)1 ARM(44')		EA	1.000				1.000	
	686-6047	INS TRF SIG PL AM(S)1 ARM(44')LUM		EA	5.000				5.000	
	686-6063	INS TRF SIG PL AM(S)1 ARM(60')LUM		EA			2.000		2.000	
	687-6001	PED POLE ASSEMBLY		EA			5.000		5.000	
	688-6001	PED DETECT PUSH BUTTON (APS)		EA			8.000		8.000	
	688-6003	PED DETECTOR CONTROLLER UNIT		EA			1.000		1.000	
	690-6024	REMOVAL OF SIGNAL HEAD ASSM		EA	2.000				2.000	
	690-6033	REMOVAL OF TRAFFIC SIGNAL POLE FND		LF	4.000				4.000	
	690-6041	REMOVAL OF CONTROL CABINET(POLE MNT)		EA	2.000				2.000	
	3077-6023	SP MIXES SP-C SAC-B PG70-22		TON	653.000				653.000	
	3085-6001	UNDERSEAL COURSE		GAL	1,134.000				1,134.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN		EA	2.000				2.000	
	6004-6031	ITS COM CBL (ETHERNET)		LF	1,630.000		70.000		1,700.000	
	6058-6001	BBU SYSTEM (EXTERNAL BATT CABINET)		EA			1.000		1.000	
	6185-6002	TMA (STATIONARY)		DAY	266.000				266.000	
	6292-6001	RVDS(PRESENCE DETECTION ONLY)		EA			4.000		4.000	
	6292-6002	RVDS(ADVANCE DETECTION ONLY)		EA			2.000		2.000	
	7194-6018	EXISTING MANHOLE ADJUSTMENTS		EA	2.000				2.000	
	7196-6011	ADJUST VALVE BOX		EA	11.000				11.000	
	7196-6031	NEW METER BOX		EA	2.000				2.000	
	7300-6003	REMOVE & DISPOSE GRAVEL DRIVE		SY	976.000				976.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0073-02-082 **DISTRICT** San Antonio **COUNTY** Bexar
HIGHWAY US 281

			CONTROL SECTION JOB		**0073-02-082**		**0073-02-083**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00177471**		**A00177574**			
			COUNTY		**Bexar**		**Bexar**			
			HIGHWAY		**US 281**		**US 281**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL	EST.	FINAL		
	01	LITTER CONTROL: STATE FORCE ACCOUNT WORK (NON-PARTICIPATING)		LS	1.000				1.000	
		CLEAN EXIST CULVERTS: STATE FORCE ACCOUNT WORK (NON-PARTICIPATING)		LS	1.000				1.000	
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)		LS	1.000				1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)		LS	1.000				1.000	
		LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)		LS	1.000				1.000	
	22	CONTRACTOR FORCE ACCOUNT OR AGREED UNIT PRICE		LS	1.000				1.000	

LOCATION	502 6001	662 6059	662 6071	662 6080	662 6089	662 6090	6001 6002	6185 6002
	BARRICADES, SIGNS AND TRAFFIC HANDLING	WKZN PAV MRK REMOV (TRAF BTN) TY Y	WKZN PAV MRK REMOV (W)8"(SLD)	WKZN PAV MRK REMOV (W)(ARROW)	WKZN PAV MRK REMOV (W)(UTURN ARROW)	WKZN PAV MRK REMOV (W)(WORD)	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)
	MO	LF	LF	EA	EA	EA	EA	DAY
PHASE I	2							64
SHEET 1 OF 5								
SHEET 2 OF 5								
SHEET 3 OF 5								
SHEET 4 OF 5								
SHEET 5 OF 5								
PHASE II	2							56
SHEET 1 OF 4								
SHEET 2 OF 4								
SHEET 3 OF 4								
SHEET 4 OF 4								
PHASE III	4							146
SHEET 1 OF 5		159	466	3		3		
SHEET 2 OF 5		2016	505	3	1	4		
SHEET 3 OF 5		1894	748	5	1	6		
SHEET 4 OF 5		1674	115	1		1		
SHEET 5 OF 5								
PROJECT TOTALS	8	5743	1834	12	2	14	2	266

DATE: 12/22/2023 9:37:14 AM
FILE: c:\pw\kh1\d0251178\US281_QTY_TCP.dgn

Kimley»Horn F-928

Texas Department of Transportation

US 281

TRAFFIC CONTROL PLAN SUMMARY

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		9

LOCATION	104 6009	104 6011	104 6015	104 6017	104 6021	560 6005	644 6076	690 6024	690 6033	690 6041	7300 6003
	REMOVING CONC (RIPRAP)	REMOVING CONC (MEDIANS)	REMOVING CONC (SIDEWALKS)	REMOVING CONC (DRIVEWAYS)	REMOVING CONC (CURB)	MAILBOX INSTALL- D (TWG-POST) TY 2	REMOVE SM RD SN SUP&AM	REMOVAL OF SIGNAL HEAD ASSM	REMOVAL OF TRAFFIC SIGNAL POLE FND	REMOVAL OF CONTROL CABINET(POLE MNT)	REMOVE AND DISPOSE GRAVEL DRIVE
	SY	SY	SY	SY	LF	EA	EA	EA	LF	EA	SY
REMOVAL SHEET 1 OF 4	5	70	45	241	311	3	13	1	2	1	190
REMOVAL SHEET 2 OF 4	18		73	437	293	2	9				379
REMOVAL SHEET 3 OF 4			20	597	302	1	8				407
REMOVAL SHEET 4 OF 4								1	2	1	
PROJECT TOTALS	23	70	138	1275	906	6	30	2	4	2	976

DATE: 12/20/2023 11:02:10 AM
FILE: c:\pw\kh1\d0251178\US281_QTY_REMOV.dgn

Kimley»Horn F-928

Texas Department of Transportation

US 281

REMOVAL SUMMARY

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		10

LOCATION	100 6002	110 6001	132 6005	351 6002	465 6338	529 6001	530 6004	531 6001	531 6003	531 6004	531 6005	531 6010	531 6016	536 6002	536 6006	3077 6023	3085 6001	7194 6018	7196 6011	7196 6031
	PREPARING ROW	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL)(ORD COMP)(TY C)	FLEXIBLE PAVEMENT STRUCTUR E REPAIR(6 ")	INLET (COMPL)(ARMOR CURB SLOT)	CONC CURB (TY I)	DRIVEWAYS (CONC)	CONC SIDEWALK S (4")	CONC SIDEWALK S (6")	CURB RAMPS (TY 1)	CURB RAMPS (TY 2)	CURB RAMPS (TY 7)	CURB RAMPS (TY 21)	CONC MEDIAN	CONC MEDIAN(M ONONOSE)	SP MIXES SP-C SAC-B PG70-22	UNDERSEAL COURSE	EXISTING MANHOLE ADJUSTME NTS	ADJUST VALVE BOX	NEWMETER BOX
	STA	CY	CY	SY	EA	LF	SY	SY	SY	EA	EA	EA	EA	SY	SY	TON	GAL	EA	EA	EA
ROADWAYSHEET 1 OF 3	11	197	5	1830	6	83	352	679	8		6	3	2	507	16	211	366		5	
ROADWAYSHEET 2 OF 3	11	309	1	1956	4	87	715	624		2	7	4	2	354	24	225	392	2	2	2
ROADWAYSHEET 3 OF 3	11	374	14	1878	8	156	779	980		1	6	1	2	415	12	217	376		4	
PROJECT TOTALS	33	880	20	5664	18	326	1846	2283	8	3	19	8	6	1276	52	653	1134	2	11	2

DATE: 12/22/2023 2:14:58 PM
FILE: c:\pw\kh1\d0251178\US281_QTY_RDW.dgn

Kimley»Horn F-928

Texas Department of Transportation

US 281

ROADWAY SUMMARY

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		11

SUMMARY OF TRAFFIC SIGNAL ITEMS

LOCATION	416 6031	416 6032	416 6034	618 6046	618 6047	618 6053	618 6054	620 6007	620 6009	620 6010	621 6002	624 6010	628 6144	680 6001	680 6003	682 6001	682 6002	682 6003	682 6004	682 6005
	DRILL SHAFT (TRF SIG POLE) (30 IN)	DRILL SHAFT (TRF SIG POLE) (36 IN)	DRILL SHAFT (TRF SIG POLE) (48 IN)	CONDT (PVC) (SCH 80) (2")	CONDT (PVC) (SCH 80) (2") (BORE)	CONDT (PVC) (SCH 80) (3")	CONDT (PVC) (SCH 80) (3") (BORE)	ELEC CONDR (NO.8) BARE	ELEC CONDR (NO.6) BARE	ELEC CONDR (NO.6) INSULATE D	TRAY CABLE (3 CONDR) (12 AWG)	GROUND BOX TY D (162922) W/APRON	ELC SRV TY D 120/240 060(NS)S S(E)PS(U)	INSTALL HWYTRF SIG (FLASH BEACON)	INSTALL HWYTRF SIG (SYSTEM)	VEH SIG SEC (12")LED (GRN)	VEH SIG SEC (12")LED (GRN ARW)	VEH SIG SEC (12")LED (YEL)	VEH SIG SEC (12")LED (YEL ARW)	VEH SIG SEC (12")LED (RED)
	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA	EA	EA
Crossing #1		26		35	125	20	250	410	20	40	240	2	1	1				10		
Crossing #2		26		30	120	15	240	370	20	40	165	2	1	1				10		
Socorro	22		44	150	365	95	730	1350	40	55	625	4	1		1	10	2	8	4	10
Crossing #3		26		35	135	20	280	470	20	40	250	2	1	1				10		
PROJECT TOTALS	22	78	44	250	745	150	1500	2600	100	175	1280	10	4	3	1	10	2	38	4	10

SUMMARY OF TRAFFIC SIGNAL ITEMS

LOCATION	682 6006	682 6018	682 6021	682 6049	682 6060	684 6035	684 6049	686 6027	686 6031	686 6045	686 6047	686 6063	687 6001	688 6001	688 6003	6004 6031	6058 6001	6292 6002	6292 6001	CoSA *
	VEH SIG SEC (12")LED (RED ARW)	PED SIG SEC (LED)(COUNTDOWN)	BACK PLATE (12")(1 SEC)	BACKPLATE W/REFL BRDR(4 SEC)	BACKPLATE W/REFL BRDR(3 SEC)	TRF SIG CBL (TY A)(14 AWG)(9 CONDR)	TRF SIG CBL (TY A)(16 AWG)(3 CONDR)	INS TRF SIG PL AM(S)1 ARM(24') LUM	INS TRF SIG PL AM(S)1 ARM(28') LUM	INS TRF SIG PL AM(S)1 ARM(44')	INS TRF SIG PL AM(S)1 ARM(44') LUM	INS TRF SIG PL AM(S)1 ARM(60') LUM	PED POLE ASSEMBLY	PED DETECT PUSH BUTTON (APS)	PED DETECTOR CONTROLLER UNIT	ITS COM CBL (ETHERNET)	BBU SYSTEM (EXTERNAL BATT CABINET)	RVDS(ADVANCE DETECTION ONLY)	RVDS(PRESENCE DETECTION ONLY)	FLIR THERMAL PED DETECTION
	EA	EA	EA	EA	EA	LF	LF	EA	EA	EA	EA	EA	EA	EA	EA	LF	EA	EA	EA	EA
Crossing #1	0	0	10			320					2					460				4
Crossing #2	0	0	10			320				1	1					690				4
Socorro	2	8		2	10	1240	1100	1	1			2	5	8	1	70	1	4	2	
Crossing #3		0	10			320					2					480				4
PROJECT TOTALS	2	8	30	2	10	2200	1100	1	1	1	5	2	5	8	1	1700	1	4	2	12

SUMMARY OF TRAFFIC SIGNAL ITEMS

LOCATION	CoSA *	CoSA *
	TRAFFIC SIGNAL CONTROLLER ASSEMBLY (TYPE 332)	TRAFFIC SIGNAL CABINET FOUNDATION
	EA	EA
Crossing #1		
Crossing #2		
Socorro	1	1
Crossing #3		
PROJECT TOTALS	1	1

DATE: 12/21/2023 11:42:50 AM
FILE: c:\pw\kh1\d0251178\US281_QTY_SIGNAL.dgn

Kimley»Horn F-928

Texas Department of Transportation

US 281

TRAFFIC SIGNAL SUMMARY

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		12

SUMMARY OF PAVEMENT MARKING ITEMS

LOCATION	666 6030	666 6036	666 6048	666 6054	666 6063	666 6078	666 6225	666 6226	666 6230	666 6231	666 6232	666 6306	666 6343	666 6347	672 6009	672 6010	677 6001	677 6007
	REFL PAV MRK TY I (W)8"(DOT)(100MIL)	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	REFL PAV MRK TY I (W)(ARROW)(100MIL)	REFL PAV MRK TY I(W)(UTURN ARW)(100 MIL)	REFL PAV MRK TY I (W)(WORD)(100MIL)	PAVEMENT SEALER 6"	PAVEMENT SEALER 8"	PAVEMENT SEALER 24"	PAVEMENT SEALER (ARROW)	PAVEMENT SEALER (WORD)	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	REF PROF PAV MRK TY I(W)6"(SLD)(100MIL)	REF PROF PAV MRK TY I(Y)6"(SLD)(100MIL)	REFL PAV MRKR TY II-A-A	REFL PAV MRKR TY II-C-R	ELIM EXT PAV MRK & MRKS (4")	ELIM EXT PAV MRK & MRKS (24")
	LF	LF	LF	EA	EA	EA	LF	LF	LF	EA	EA	LF	LF	LF	EA	EA	LF	LF
SPMD SHEET 1 OF 3	39	505	1174	3	0	3	4520	544	1174	3	3	1066	1579	1875	189	79	972	145
SPMD SHEET 2 OF 3	74	491	1547	3	1	4	4698	563	1547	4	4	1000	1904	1794	181	75	986	
SPMD SHEET 3 OF 3	82	622	813	4	1	5	4901	704	813	5	5	1052	1872	1977	200	84	935	
PROJECT TOTALS	195	1618	3534	10	2	12	14119	1811	3534	12	12	3118	5355	5646	570	238	2893	145

SUMMARY OF PAVEMENT MARKING ITEMS

LOCATION	677 6009	678 6002	678 6008
	ELIM EXT PAV MRK & MRKS (DBL ARROW)	PAV SURF PREP FOR MRK (6")	PAV SURF PREP FOR MRK (24")
	EA	LF	LF
SPMD SHEET 1 OF 3	2	4520	1174
SPMD SHEET 2 OF 3		4698	1547
SPMD SHEET 3 OF 3		4901	813
PROJECT TOTALS	2	14119	3534

SUMMARY OF SIGNING ITEMS

LOCATION	644 6030
	IN SM RD SN SUP&AM TYS80(1) SA(P)
	EA
SPMD SHEET 1 OF 3	23
SPMD SHEET 2 OF 3	14
SPMD SHEET 3 OF 3	16
PROJECT TOTALS	53

DATE: 12/22/2023 4:48:58 PM
FILE: c:\pw\kh1\d0251178\US281_QTY_SPMD.dgn

Kimley»Horn F-928

Texas Department of Transportation

US 281

SIGNING, PAVEMENT MARKINGS, AND DELINEATION SUMMARY

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		13

LOCATION	161 6017	162 6002	168 6001	169 6006	506 6021	506 6024	506 6038	506 6039	506 6042	506 6043
	COMPOST MANUF TOPSOIL (4")	BLOCK SODDING	VEGETATIV E WATERING	SOIL RETENTIO N BLANKETS (CL 2) (TY F)	CONSTRUCT ION EXITS (INSTALL) (TY 2)	CONSTRUCT ION EXITS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)
	SY	SY	MG	SY	SY	SY	LF	LF	LF	LF
SW3P SHEET 1 OF 3	1181	1181	19	1181	156	156	1046	1046	120	120
SW3P SHEET 2 OF 3	1079	1079	17	1079			1264	1264	120	120
SW3P SHEET 3 OF 3	1563	1563	25	1563	156	156	1617	1617	160	160
PROJECT TOTALS	3823	3823	61	3823	312	312	3927	3927	400	400

DATE: 12/20/2023 11:03:47 AM
FILE: c:\pw\kh1\d0251178\US281_QTY_SWEP.dgn

Kimley»Horn F-928

Texas Department of Transportation

US 281

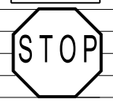
SW3P SUMMARY

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		14

SUMMARY OF SMALL SIGNS

SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
126	19	R6-2R		24x30	X		10BWG	1	SA	P		
126	7	R4-7		24x30	X		10BWG	1	SA	P		
126	1	W11-2		36x36	X		10BWG	1	SA	P		
		W16-9P		24x12	X							
126	3	R1-5bR		36x36	X		10BWG	1	SA	P		
126	2	R1-5bL		36x36	X		10BWG	1	SA	P		
126	4	R3-7		36x36	X		10BWG	1	SA	P		
		D3-1		VARX18	X							
		D3-1		VARX18	X							
126	16	R1-1		36x36	X		10BWG	1	SA	P		

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS SOSS

SHEET 1 OF 8

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0073	02	082	US 281
4-16		DIST	COUNTY		SHEET NO.
8-16		SAT	BEXAR		15

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:

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION PREFABRICATED	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE
							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"		TY N TY S
		D3-1	ROOSEVELT	VARX18	X							
		D3-1	SANTA RITA ST	VARX18	X							
126	16		STOP				10BWG	1	SA	P		
		R1-1		36x36	X							
126	19	R6-2R	ONE WAY	24x30	X		10BWG	1	SA	P		
126	19	R6-2R	ONE WAY	24x30	X		10BWG	1	SA	P		
126	3	R1-5bR	STOP HERE FOR	36x36	X		10BWG	1	SA	P		
126	2	R1-5bL	STOP HERE FOR	36x36	X		10BWG	1	SA	P		
		W12-2	13'-11"	36x36	X							
126	5						10BWG	1	SA	P		
		W12-2Tp	LOW CLEARANCE	24x18	X							
126	7	R4-7		24x30	X		10BWG	1	SA	P		
126	6	R2-1	SPEED LIMIT 45	30x36	X		10BWG	1	SA	P		

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS SOSS

SHEET 2 OF 8

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0073	02	082	US 281
4-16		DIST	COUNTY		SHEET NO.
8-16		SAT	BEXAR		16

TB

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:

SUMMARY OF SMALL SIGNS

SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
126	6	R2-1	SPEED LIMIT 45	30x36	X		10BWG	1	SA	P		
126	8	D3-1 D3-1 R1-1	ROOSEVELT SAENZ ST STOP	VARX18 VARX18 36X36	X X X		10BWG	1	SA	P		
126	8	D3-1 D3-1 R1-1	ROOSEVELT SAENZ ST STOP	VARX18 VARX18 36X36	X X X		10BWG	1	SA	P		
126	1	W11-2 W16-9P	 AHEAD	36x36 24x12	X X		10BWG	1	SA	P		
126	1	W11-2 W16-9P	 AHEAD	36x36 24x12	X X		10BWG	1	SA	P		
126	7	R4-7		24x30	X		10BWG	1	SA	P		
126	3	R1-5bR		36x36	X		10BWG	1	SA	P		

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS SOSS

SHEET 3 OF 8

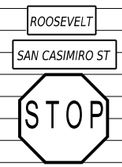
FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0073	02	082	US 281
4-16		DIST	COUNTY		SHEET NO.
8-16		SAT	BEXAR		17

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:

SUMMARY OF SMALL SIGNS

SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
126	2	R1-5bL		36x36	X		10BWG	1	SA	P		
127	9	D3-1 D3-1 R1-1		VARX18 VARX18 36X36	X X X		10BWG	1	SA	P		
127	19	R6-2R		24x30	X		10BWG	1	SA	P		
127	3	R1-5bR		36x36	X		10BWG	1	SA	P		
127	2	R1-5bL		36x36	X		10BWG	1	SA	P		
127	10	M2-1 M1-6T		21x15 24x24	X X		10BWG	1	SA	P		
127	7	R4-7		24x30	X		10BWG	1	SA	P		
127	7	R4-7		24x30	X		10BWG	1	SA	P		

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

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:

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS SOSS

SHEET 4 OF 8

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0073	02	082	US 281
4-16		DIST	COUNTY		SHEET NO.
8-16		SAT	BEXAR		18

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:

SUMMARY OF SMALL SIGNS

SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
		D3-1	ROOSEVELT	VARX18	X							
		D3-1	SAN RAFAEL ST	VARX18	X							
127	11		STOP				10BWG	1	SA	P		
		R1-1		36X36	X							
		W11-2		36x36	X							
127	1		AHEAD				10BWG	1	SA	P		
		W16-9P		24x12	X							
127	17		NORTH 281	EX SIGN TO BE RELOCATED			10BWG	2	SA	P	2 EXT	
127	7	R4-7		24x30	X		10BWG	1	SA	P		
		D3-1	ROOSEVELT	VARX18	X							
		D3-1	SANCO ST	VARX18	X							
127	18		STOP				10BWG	1	SA	P		
		R1-1		36X36	X							
127	19	R6-2R	ONE WAY	24x30	X		10BWG	1	SA	P		
127	7	R4-7		24x30	X		10BWG	1	SA	P		

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS SOSS

SHEET 5 OF 8

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0073	02	082	US 281
4-16		DIST	COUNTY		SHEET NO.
8-16		SAT	BEXAR		19

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION PREFABRICATED	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE
							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"		TY N TY S
		D3-1	ROOSEVELT	VARX18	X							
		D3-1	RADA ST	VARX18	X							
128	13		STOP				10BWG	1	SA	P		
		R1-1		36X36	X							
128	19	R6-2R	ONE WAY	24x30	X		10BWG	1	SA	P		
		W11-2		36x36	X							
128	1						10BWG	1	SA	P		
		W16-9P	AHEAD	24x12	X							
128	7	R4-7		24x30	X		10BWG	1	SA	P		
		D3-1	ROOSEVELT	VARX18	X							
		D3-1	SAN ACACIA ST	VARX18	X							
128	14		STOP				10BWG	1	SA	P		
		R1-1		36X36	X							
128	7	R4-7		24x30	X		10BWG	1	SA	P		
		W11-2		36x36	X							
128	1						10BWG	1	SA	P		
		W16-9P	AHEAD	24x12	X							

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

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:

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS SOSS

SHEET 6 OF 8

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0073	02	082	US 281
4-16		DIST	COUNTY		SHEET NO.
8-16		SAT	BEXAR		20

TB

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:

SUMMARY OF SMALL SIGNS

SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
128	3	R1-5bR		36x36	X		10BWG	1	SA	P		
128	2	R1-5bL		36x36	X		10BWG	1	SA	P		
128	15	D3-1 D3-1 R1-1		VARX18 VARX18 36X36	X X X		10BWG	1	SA	P		
128	19	R6-2R		24x30	X		10BWG	1	SA	P		
128	3	R1-5bR		36x36	X		10BWG	1	SA	P		
128	2	R1-5bL		36x36	X		10BWG	1	SA	P		
128	7	R4-7		24x30	X		10BWG	1	SA	P		

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS SOSS

SHEET 7 OF 8

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
4-16 8-16	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		21

SUMMARY OF SMALL SIGNS

SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
128	1	W11-2		36x36	X		10BWG	1	SA	P		
		W16-9P	AHEAD	24x12	X							
128	12	D3-1	ROOSEVELT	VARX18	X		10BWG	1	SA	P		
		D3-1	SAN ACACIA ST	VARX18	X							
		R1-1	STOP	36X36	X							

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:

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS SOSS

SHEET 8 OF 8

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0073	02	082	US 281
4-16		DIST	COUNTY		SHEET NO.
8-16		SAT	BEXAR		22

18

TRAFFIC CONTROL PLAN SEQUENCE OF WORK

(1) THIS PROJECT WILL BE CONSTRUCTED IN (4) PHASES. BEFORE THE COMMENCEMENT OF EACH PHASE, INSTALL ADVANCE WARNING SIGNS, TEMPORARY SIGNS AND BARRICADES AS SHOWN ON THE PLANS AND/OR AS DIRECTED/APPROVED BY THE ENGINEER. DAILY LANE CLOSURES WILL BE USED IN ACCORDANCE WITH STATE TCP STANDARDS. DROP OFF CONDITIONS OF GREATER THAN 2" MUST HAVE A 3:1 SLOPE AT THE END OF EACH DAY. AS WELL AS THROUGHOUT THE PROJECT WHERE ACCESS TO ADJACENT PROPERTIES IS ALLOWED TO DRIVEWAYS AND SIDE STREETS.
(2) PREPARING ROW / REMOVAL OF EXISTING ITEMS TO BE DONE ONLY IN AREAS WHERE WORK IS OCCURING, AS PER THE PHASES NOTED BELOW.
(3) PLANING, SURFACE TREATMENTS AND OVERLAYS SHALL BE PERFORMED IN THE DIRECTION OF TRAFFIC. BEGIN SURFACE CONSTRUCTION ON HIGH SIDE OF ROAD TO AVOID WATER PONDING ISSUES.
(4) THE CONTRACTOR'S ATTENTION IS DIRECTED TO THE REQUIREMENTS OF ITEM 7, "LEGAL RELATIONS AND RESPONSIBILITIES TO THE PUBLIC"AND ITEM 502, "BARRICADES, SIGNS, AND TRAFFIC HANDLING", OF THE STANADARD SPECIFICATIONS, AND TO THE GENERAL NOTES.
(5) CONTRACTOR IS NOT PERMITTED TO WORK IN AREAS WITH ONGOING UTILITY RELOCATION OR ROW ACQUISITION.
(6) PRIOR TO THE START OF CONSTRUCTION, CONTRACTOR SHALL COORDINATE WITH CPS ON THE OVERHEAD ELECTRIC ADJUSTMENTS REQUESTED BY THE ENGINEER AND TO SUBMIT ELECTRICAL SERVICE REQUESTS REQUIRED FOR THE SIGNALS AND OVERHEAD FLASHERS.
(7) A BRIEF DESCRIPTION OF THESE PHASES ARE AS FOLLOWS:

PHASE 1 (US 281 NORTHBOUND SIDEWALKS, CURB RAMPS, DRIVEWAYS, AND SIGNAL CONDUITS AND FOUNDATIONS)

THE INTENT OF THIS PHASE IS TO CONSTRUCT THE SIDEWALKS, ADA PEDESTRIAN RAMPS, DRIVEWAYS, AND SIGNAL CONDUITS AND FOUNDATIONS ON THE EAST SIDE OF US 281.

(1) INSTALL ADVANCE WARNING SIGNS AND TEMPORARY SIGNS AND BARRICADES AS SHOWN ON THE PLANS AND/OR AS DIRECTED/APPROVED BY THE ENGINEER. DROP OFF CONDITIONS GREATER THAN 2"MUST HAVE A 3:1 SLOPE AT THE END OF EACH DAY. MAINTAIN ACCESS TO ADJACENT PROPERTIES AND INTERSECTING SIDE STREETS AT ALL TIMES DURING CONSTRUCTION. MATERIAL AND LABOR REQUIRED TO MAINTAIN ACCESS WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO ITEM 502.

(2) PREPARE NORTHBOUND ROW.

(3) PLACE TEMPORARY EROSION CONTROL DEVICES AS SHOWN IN PLANS.

(4) CONTRACTOR TO NOTIFY/COORDINATE WITH CPS FOR VALVE SURFACE ADJUSTMENTS DURING CONSTRUCTION. THREE WEEKS ADVANCE NOTICE REQUIRED TO CPS GAS UTILITY COORDINATOR
DEEZY LOVING | 210-353-5165 PRIOR TO ADJUSTMENT.

(5) THE FOLLOWING OPERATIONS SHALL BE PERFORMED WITH DAILY LANE CLOSURES AND LIMITED TO ONLY WHAT CAN BE COMPLETED WITHIN THE WORKDAY. CONSTRUCTION OPERATIONS SHALL OCCUR OUTSIDE THE MORNING PEAK HOURS (7-9 A.M.) AND AFTERNOON PEAK HOURS (3-7 P.M.) WITH THE OUTSIDE LANE REOPENED TO TRAFFIC AT THE CONCLUSION OF EACH WORKDAY. THE LIMITS OF OPERATIONS MUST BE COMPLETED BY TIME SPECIFIED.
A. DURING CONSTRUCTION OPERATIONS, PLACE PLASTIC DRUMS AND SHIFT TRAFFIC ACCORDING TO TCP (1-4a)-18 AND AS SHOWN IN PLANS. AT THE END OF THE WORKDAY, ADJUST PLASTIC DRUMS TO REOPEN OUTSIDE LANE TO TRAFFIC ACCORDING TO TCP (1-1a)-18.
B. CONSTRUCT SIDEWALKS, ADA PEDESTRIAN RAMPS, DRIVEWAYS, AND SIGNAL CONDUITS AND FOUNDATIONS.
C. PLACE TOPSOIL AND SODDING AS SHOWN IN PLANS.

PHASE 2 (US 281 SOUTHBOUND SIDEWALKS, CURB RAMPS, DRIVEWAYS, AND SIGNAL CONDUITS AND FOUNDATIONS)

THE INTENT OF THIS PHASE IS TO CONSTRUCT THE SIDEWALKS, ADA PEDESTRIAN RAMPS, DRIVEWAYS, AND SIGNAL CONDUITS AND FOUNDATIONS ON THE WEST SIDE OF US 281.

(1) INSTALL ADVANCE WARNING SIGNS AND TEMPORARY SIGNS AND BARRICADES AS SHOWN ON THE PLANS AND/OR AS DIRECTED/APPROVED BY THE ENGINEER. DROP OFF CONDITIONS GREATER THAN 2"MUST HAVE A 3:1 SLOPE AT THE END OF EACH DAY. MAINTAIN ACCESS TO ADJACENT PROPERTIES AND INTERSECTING SIDE STREETS AT ALL TIMES DURING CONSTRUCTION. MATERIAL AND LABOR REQUIRED TO MAINTAIN ACCESS WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO ITEM 502.

(2) PREPARE SOUTHBOUND ROW.

(3) PLACE TEMPORARY EROSION CONTROL DEVICES AS SHOWN IN PLANS.

(4) CONTRACTOR TO NOTIFY/COORDINATE WITH CPS FOR VALVE SURFACE ADJUSTMENTS DURING CONSTRUCTION. THREE WEEKS ADVANCE NOTICE REQUIRED TO CPS GAS UTILITY COORDINATOR
DEEZY LOVING | 210-353-5165 PRIOR TO ADJUSTMENT.

(5) THE FOLLOWING OPERATIONS SHALL BE PERFORMED WITH DAILY LANE CLOSURES AND LIMITED TO ONLY WHAT CAN BE COMPLETED WITHIN THE WORKDAY. CONSTRUCTION OPERATIONS SHALL OCCUR OUTSIDE THE MORNING PEAK HOURS (7-9 A.M.) AND AFTERNOON PEAK HOURS (3-7 P.M.) WITH THE OUTSIDE LANE REOPENED TO TRAFFIC AT THE CONCLUSION OF EACH WORKDAY. THE LIMITS OF OPERATIONS MUST BE COMPLETED BY TIME SPECIFIED.
A. DURING CONSTRUCTION OPERATIONS, PLACE PLASTIC DRUMS AND SHIFT TRAFFIC ACCORDING TO TCP (1-4a)-18 AND AS SHOWN IN PLANS. AT THE END OF THE WORKDAY, ADJUST PLASTIC DRUMS TO REOPEN OUTSIDE LANE TO TRAFFIC ACCORDING TO TCP (1-1a)-18.
B. CONSTRUCT SIDEWALKS, ADA PEDESTRIAN RAMPS, DRIVEWAYS, AND SIGNAL CONDUITS AND FOUNDATIONS.
C. PLACE TOPSOIL AND SODDING AS SHOWN IN PLANS.

PHASE 3 (US 281 FLEXIBLE PAVEMENT REPAIR, CONCRETE MEDIANS, MID-BLOCK CROSSINGS, STRIPING, SIGNAL POLE FOUNDATIONS, OVERHEAD FLASHER FOUNDATIONS)

THE INTENT OF THIS PHASE IS TO CONSTRUCT THE FLEXIBLE PAVEMENT REPAIR, CONCRETE MEDIANS, AND MID-BLOCK CROSSINGS IN THE MIDDLE OF US 281.

(1) INSTALL ADVANCE WARNING SIGNS AND TEMPORARY SIGNS AND BARRICADES AS SHOWN ON THE PLANS , TCP DETAIL (2-4), AND/OR AS DIRECTED/APPROVED BY THE ENGINEER. DROP OFF CONDITIONS GREATER THAN 2"MUST HAVE A 3:1 SLOPE AT THE END OF EACH DAY. MAINTAIN ACCESS TO ADJACENT PROPERTIES AND INTERSECTING SIDE STREETS AT ALL TIMES DURING CONSTRUCTION. MATERIAL AND LABOR REQUIRED TO MAINTAIN ACCESS WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO ITEM 502.

(2) MAINTAIN TEMPORARY EROSION CONTROL DEVICES AS SHOWN IN PLANS.

(3) CONTRACTOR TO LIMIT WORK ZONE TO ONE MEDIAN SECTION AT A TIME UNLESS APPROVED BY ENGINEER.

(4) OPERATIONS SHALL OCCUR OUTSIDE OF THE MORNING PEAK HOURS (7-9 A.M.) AND AFTERNOON PEAK HOURS (3-7 P.MM). THE LIMITS OF OPERATION MUST BE COMPLETED BY THE TIME SPECIFIED.

(5) CONSTRUCT FLEXIBLE PAVEMENT REPAIR AS SHOWN IN THE PLANS.

(6) PLACE TEMPORARY PAVEMENT MARKINGS AFTER EACH BASE REPAIR SECTION IS CONSTRUCTED IN ACCORDANCE WITH TCP DETAIL BC(12)-21.

(7) CONSTRUCT CONCRETE MEDIANS, PEDESTRIAN RAMPS, AND MID-BLOCK CROSSINGS AS SHOWN IN THE PLANS.

PHASE 4 (FINAL STRIPING, TRAFFIC SIGNALS, AND OVERHEAD FLASHERS POLES)

THE INTENT OF THIS PHASE IS TO CONSTRUCT THE POLES FOR THE TRAFFIC SIGNALS AND OVERHEAD FLASHERS, AND PLACE THE FINAL STRIPING.

(1) INSTALL ADVANCE WARNING SIGNS AND TEMPORARY SIGNS AND BARRICADES AS SHOWN ON THE PLANS , TCP DETAIL (WZ(BTS)-13 AND/OR AS DIRECTED/APPROVED BY THE ENGINEER. DROP OFF CONDITIONS GREATER THAN 2"MUST HAVE A 3:1 SLOPE AT THE END OF EACH DAY. MAINTAIN ACCESS TO ADJACENT PROPERTIES AND INTERSECTING SIDE STREETS AT ALL TIMES DURING CONSTRUCTION. MATERIAL AND LABOR REQUIRED TO MAINTAIN ACCESS WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO ITEM 502.

(2) MAINTAIN TEMPORARY EROSION CONTROL DEVICES AS SHOWN IN PLANS.

(3) CONTRACTOR SHALL NOTIFY/COORDINATE WITH CPS REGARDING OVERHEAD ELECTRIC ADJUSTMENTS. TWO MONTHS ADVANCED NOTICED REQUIRED TO CPS ELECTRIC UTILITY COORDINATOR
| MIKE DENNING | 210-353-2822, PRIOR TO POLE PLACEMENTS.

(4) OPERATIONS SHALL OCCUR OUTSIDE OF THE MORNING PEAK HOURS (7-9 A.M.) AND AFTERNOON PEAK HOURS (3-7 P.M.). THE LIMITS OF OPERATION MUST BE COMPLETED BY THE TIME SPECIFIED.

STEP 1 - TRAFFIC SIGNAL AND OVERHEAD FLASHER POLES
(1) PLACE PLASTIC DRUMS AND SHIFT TRAFFIC ACCORDING TO TCP (3-4)-13 AND AS SHOWN IN PLANS.

(2) CONSTRUCT TRAFFIC SIGNAL AND OVERHEAD FLASHER POLES; INCLUDE ALL NECESSARY WORK TO COMPLETE ILLUMINATION.

STEP 2 - FINAL STRIPING
(1) SHIFT TRAFFIC LANES USING MOBILE OPERATIONS ACCORDING TO TCP (3-1)-13 AND TCP (3-3)-14.

(2) PERFORM STREET SWEEPING.

(3) PLACE FINAL PAVEMENT MARKINGS AS SHOWN IN PLANS.

(4) TURN ON SIGNALS AND OVERHEAD FLASHERS.

(5) REMOVE ALL EROSION AND PERFORM FINAL CLEANUP.

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
1/05/2024

Kimley»Horn
F-928

Texas Department of Transportation

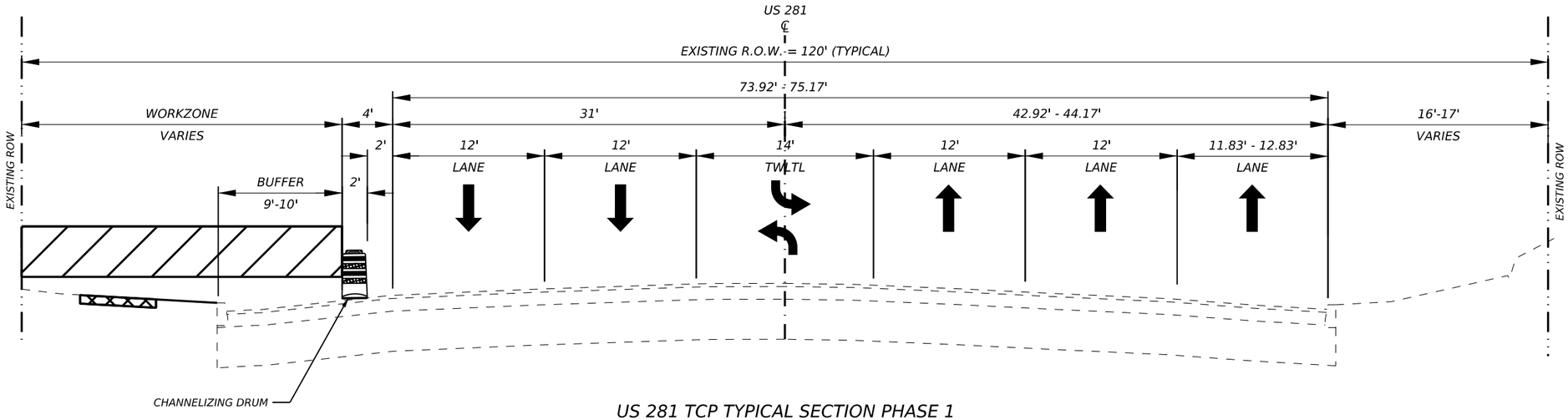
US 281

TCP NARRATIVE

SHEET 1 OF 1

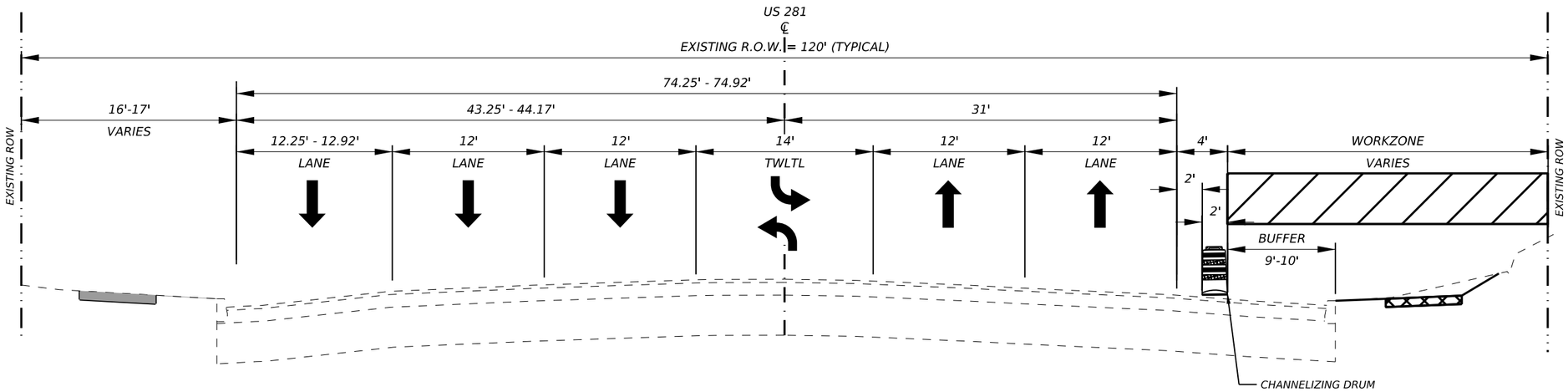
FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		23

DATE: 1/5/2024 12:00:44 PM
FILE: c:\pwlkh1\d0251183\US281_TCP_NARRATIVE.dgn



US 281 TCP TYPICAL SECTION PHASE 1

N.T.S.



US 281 TCP TYPICAL SECTION PHASE 2

N.T.S.

NOTES:

1. ALL PAVEMENT MARKINGS ARE EXISTING UNLESS NOTED OTHERWISE.

2. LANE CLOSURES SHOWN IN PHASE 1, PHASE 2, AND PHASE 4 ARE TEMPORARY LANE CLOSURES ONLY PERMITTED IN NON-PEAK HOURS. CONTRACTOR TO OPEN ALL LANES OF TRAFFIC AT THE END OF THE WORK DAY.

LEGEND

- WORK ZONE THIS PHASE
- CONSTRUCTION THIS PHASE
- PREVIOUS CONSTRUCTION

DATE: 11/21/2023 3:13:45 PM
FILE: c:\pwlkh1\d0251183\US281_TCP_TYP01.dgn

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER

11/21/2023

Kimley»Horn F-928

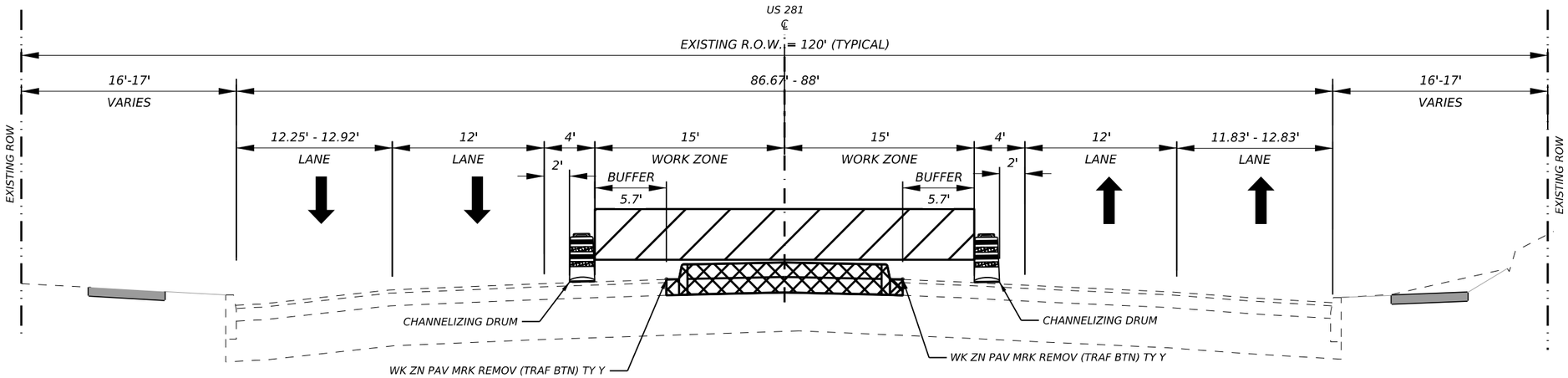
Texas Department of Transportation

US 281

TCP TYPICAL SECTIONS

SHEET 1 OF 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		24



US 281 TCP TYPICAL SECTION PHASE 3

N.T.S.

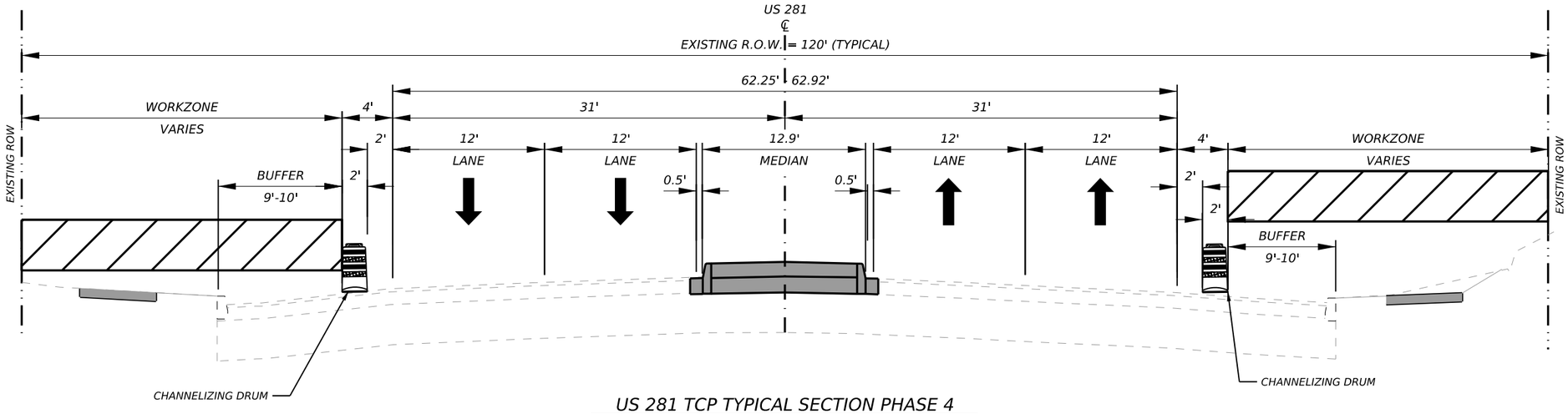
NOTES:

1. ALL PAVEMENT MARKINGS ARE EXISTING UNLESS NOTED OTHERWISE.

2. LANE CLOSURES SHOWN IN PHASE 1, PHASE 2, AND PHASE 4 ARE TEMPORARY LANE CLOSURES ONLY PERMITTED IN NON-PEAK HOURS. CONTRACTOR TO OPEN ALL LANES OF TRAFFIC AT THE END OF THE WORK DAY.

LEGEND

- WORK ZONE THIS PHASE
- CONSTRUCTION THIS PHASE
- PREVIOUS CONSTRUCTION



US 281 TCP TYPICAL SECTION PHASE 4

N.T.S.

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER

11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

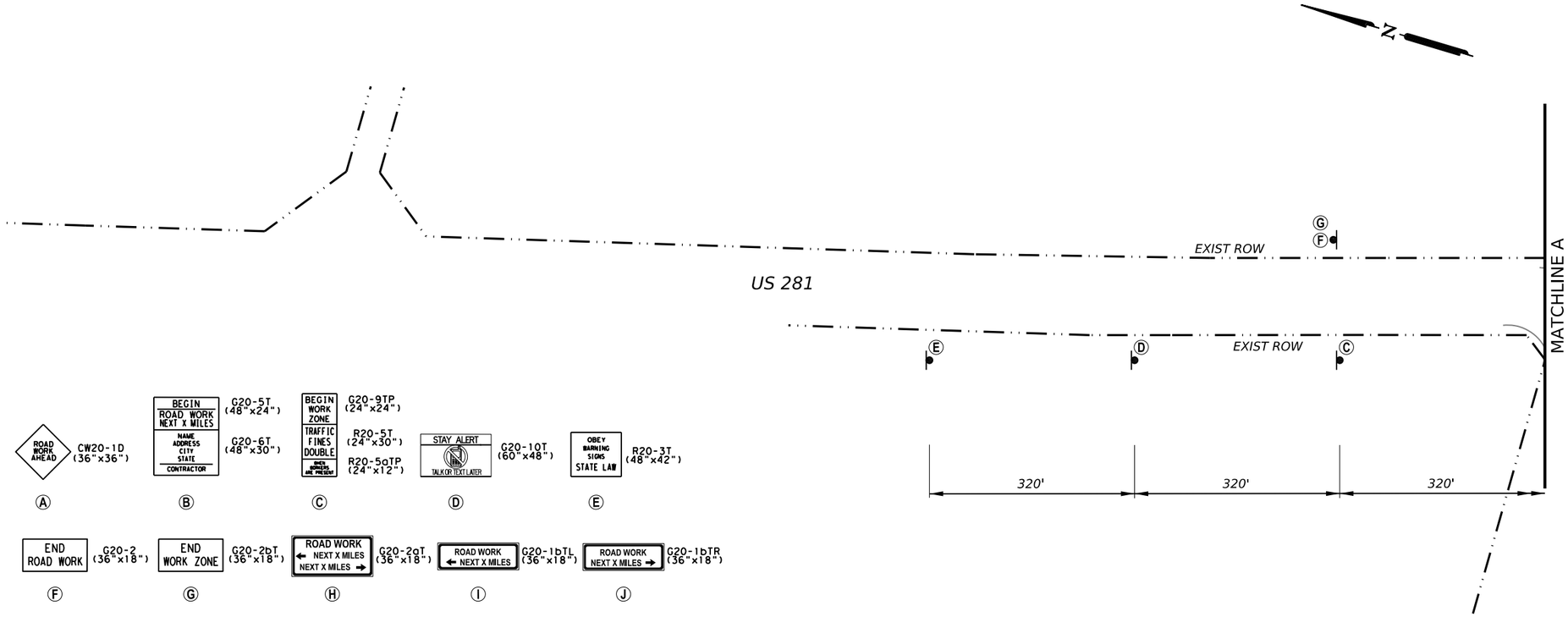
US 281

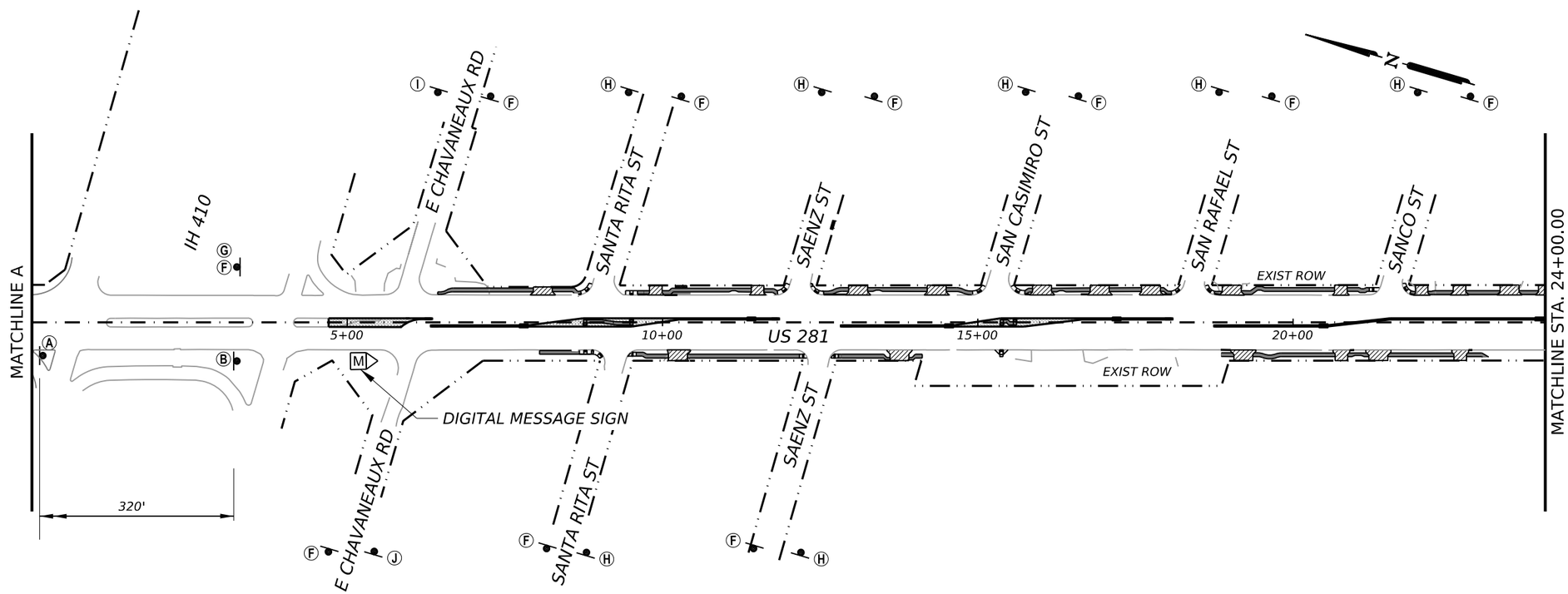
TCP TYPICAL SECTIONS

SHEET 2 OF 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		25

DATE: 11/21/2023 3:14:09 PM
FILE: c:\pwikh1\d0251183\US281_TCP_TYP02.dgn





NOTES:

1. CONSTRUCTION SIGNS SHALL BE INSTALLED PRIOR TO THE START OF WORK OR AS DIRECTED BY THE ENGINEER AND SHALL REMAIN IN PLACE THROUGHOUT THE DURATION OF THE PROJECT.
2. SIGN LOCATIONS ARE APPROXIMATE AND SHOULD BE ADJUSTED BASED ON PHASE OF CONSTRUCTION REQUIREMENTS AND PROVIDE ADEQUATE SIGHT DISTANCE FROM EXISTING SIGNS. SEE TXDOT STANDARD BC(2)-21 FOR SIGN SIZE AND SPACING ("X").
3. SIGN SPACING BASED ON POSTED SPEED OF 45 MPH FOR US 281 AND 30 MPH FOR CROSS STREETS.

0' 100' 200'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

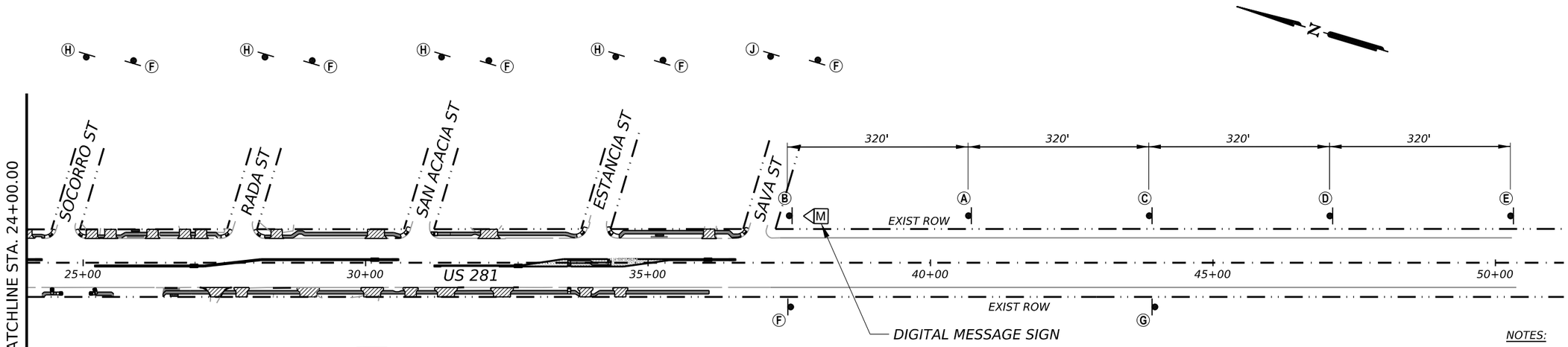
US 281

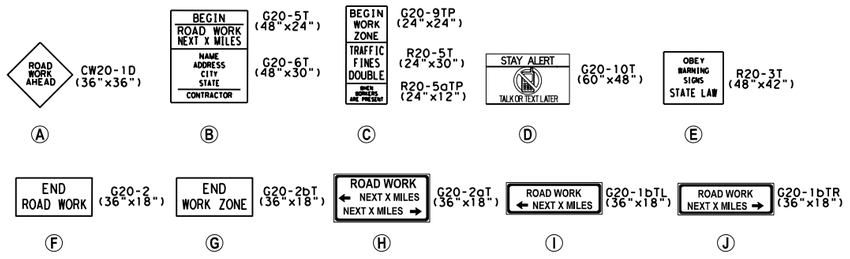
ADVANCED WARNING SIGNS

SHEET 1 OF 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	
6	SEE TITLE SHEET	
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		26

DATE: 11/21/2023 3:15:23 PM
FILE: c:\pw\kh1\d0251183\US281_TCP_ADVWARNSIGNS.dgn





NOTES:

1. *CONSTRUCTION SIGNS SHALL BE INSTALLED PRIOR TO THE START OF WORK OR AS DIRECTED BY THE ENGINEER AND SHALL REMAIN IN PLACE THROUGHOUT THE DURATION OF THE PROJECT.*
2. *SIGN LOCATIONS ARE APPROXIMATE AND SHOULD BE ADJUSTED BASED ON PHASE OF CONSTRUCTION REQUIREMENTS AND PROVIDE ADEQUATE SIGHT DISTANCE FROM EXISTING SIGNS. SEE TXDOT STANDARD BC(2)-21 FOR SIGN SIZE AND SPACING ("X").*
3. *SIGN SPACING BASED ON POSTED SPEED OF 45 MPH FOR US 281 AND 30 MPH FOR CROSS STREETS.*

0' 120' 240'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED PROFESSIONAL ENGINEER
11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

US 281

ADVANCED WARNING SIGNS

SHEET 2 OF 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		27

DATE: 11/21/2023 3:15:24 PM
FILE: c:\pw\kh1\d0251183\US281_TCP_ADVWARNSIGNS.dgn

(A)

CW20-1D
36"X36"

(B)

G20-2
36"x18"

(C)

CW20-5TR
36"X36"

CW16-3aP
24"X12"

(D)

CW20-5TL
36"X36"

CW16-3aP
24"X12"

(E)

R3-7R
36"x36"

(F)

R3-7L
36"x36"

(G)

R3-5R
30"x36"

(H)

R3-5L
30"x36"

(I)

R11-2
48"x30"

(J)

D3-1
30"x12"

(K)

R9-9
24"X12"

DATE: 11/21/2023 3:16:41 PM
FILE: c:\pwikh1\d0251183\US281_TCP_SIGNS_LEG.dgn

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER

11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

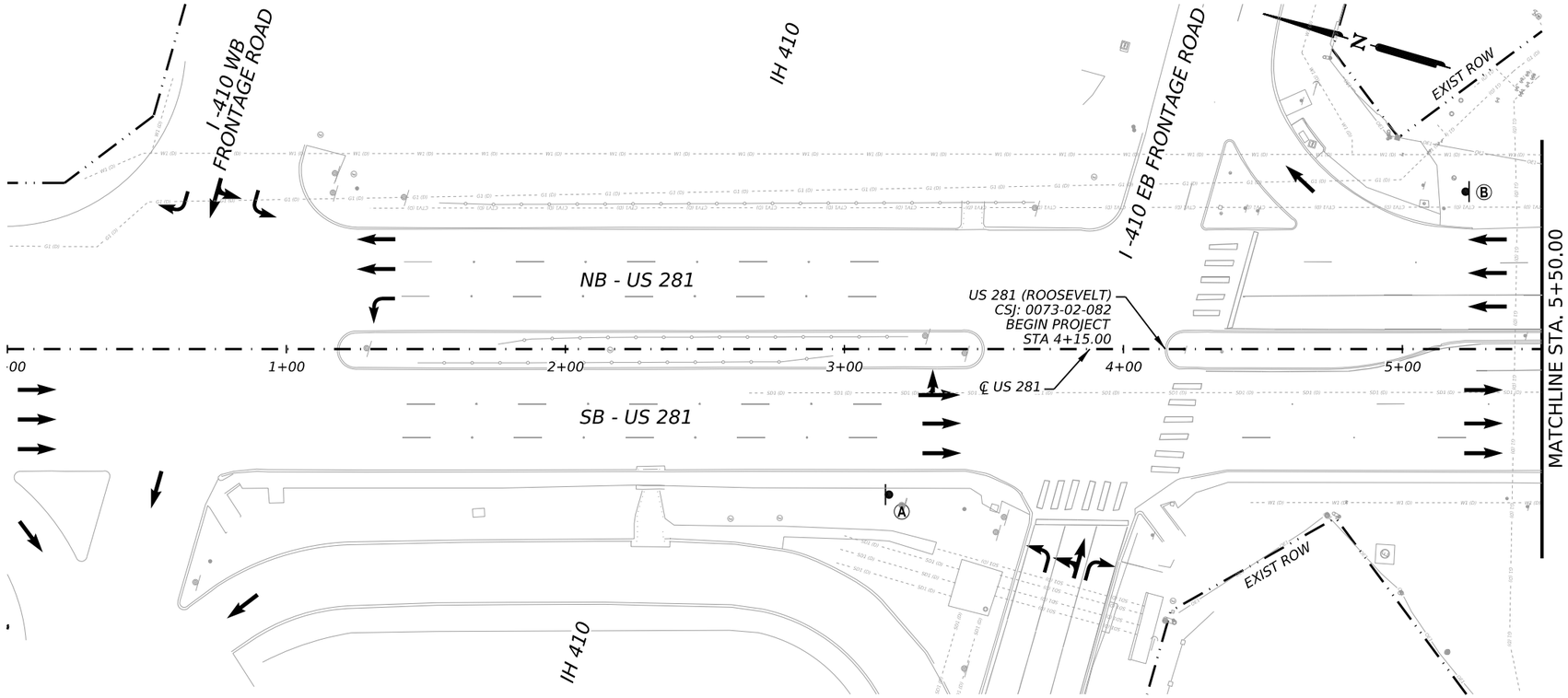
US 281

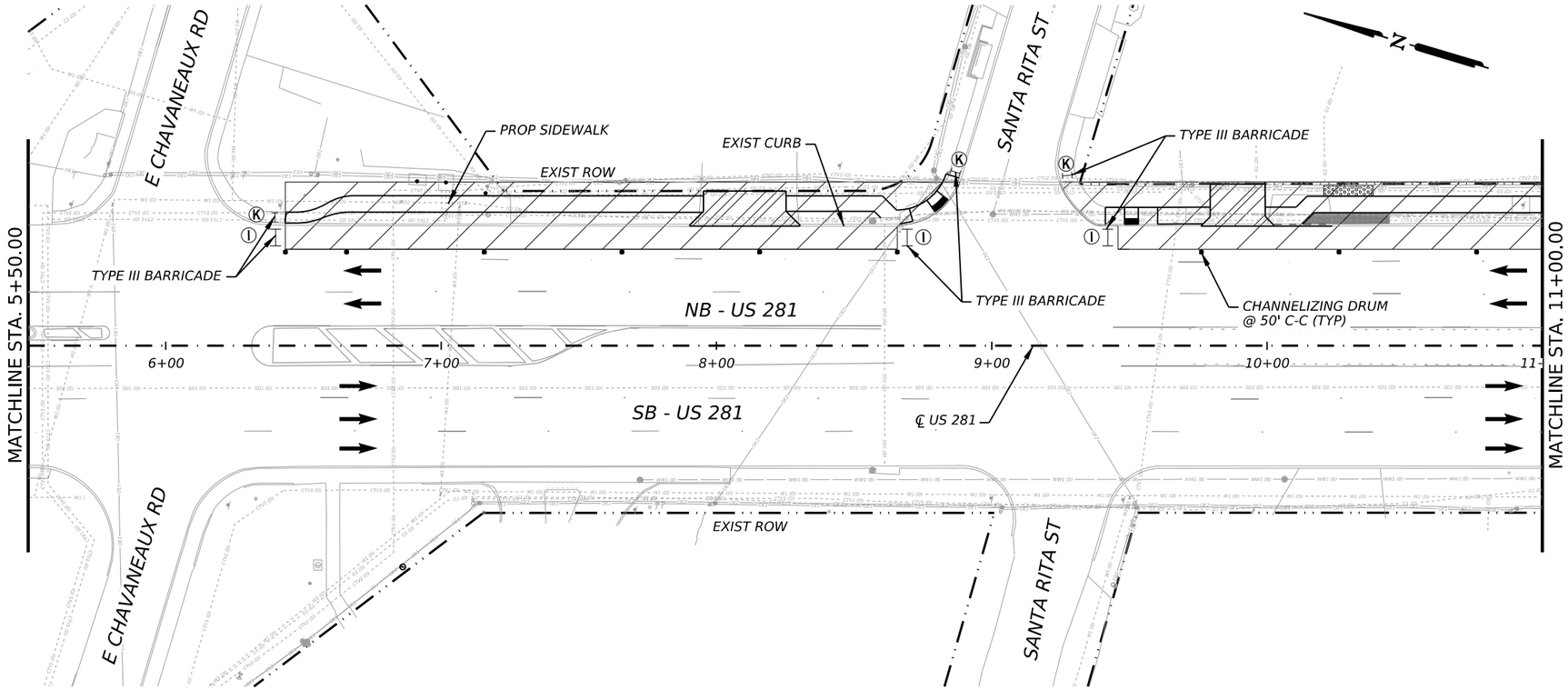
TCP SIGN LEGEND

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		28

QUANTITY SUMMARY				
ITEM		DESCRIPTION	UNIT	QTY
502	6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	2
6185	6002	TMA (STATIONARY)	DAY	64





LEGEND

- DIRECTION OF TRAFFIC FLOW
- WORK ZONE THIS PHASE
- PREVIOUS CONSTRUCTION
- CHANNELIZING DRUMS
- SIGN
- TYPE III BARRICADE
- L WK ZN PAV MRK REMOV (W)8"(SLD)
- M WK ZN PAV MRK REMOV (W)(WORD)
- N WK ZN PAV MRK REMOV (W)(ARROW)
- O WK ZN PAV MRK REMOV (W)(UTURN)
- P

NOTES:

1. CONTRACTOR MAY ONLY CONSTRUCT ONE CROSS STREET AT A TIME. ACCESS TO BE MAINTAINED AT ALL TIMES.
2. FOR ADDITIONAL INFORMATION, SEE TXDOT TCP STANDARD SHEETS.
3. EXISTING PAVEMENT MARKINGS CONFLICTING WITH WORK ZONE PAVEMENT MARKINGS SHALL BE REMOVED AND IS SUBSIDIARY TO ITEM 502.
4. SEE TCP SIGN LEGEND FOR SIGN TYPE AND SIZE.
5. ALL PAVEMENT MARKINGS ARE EXISTING UNLESS SPECIFIED OTHERWISE.

0' 25' 50'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
12/21/2023

Kimley»Horn F-928

Texas Department of Transportation

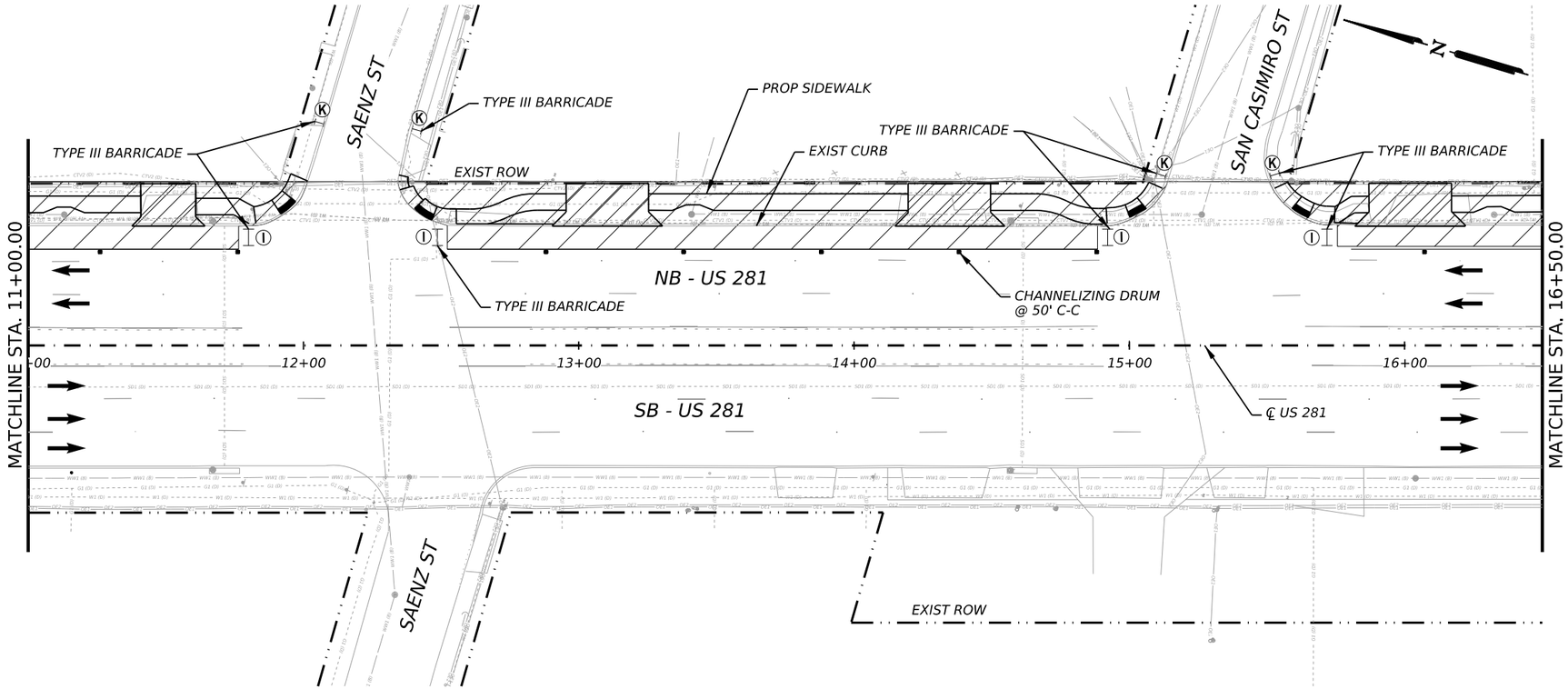
US 281

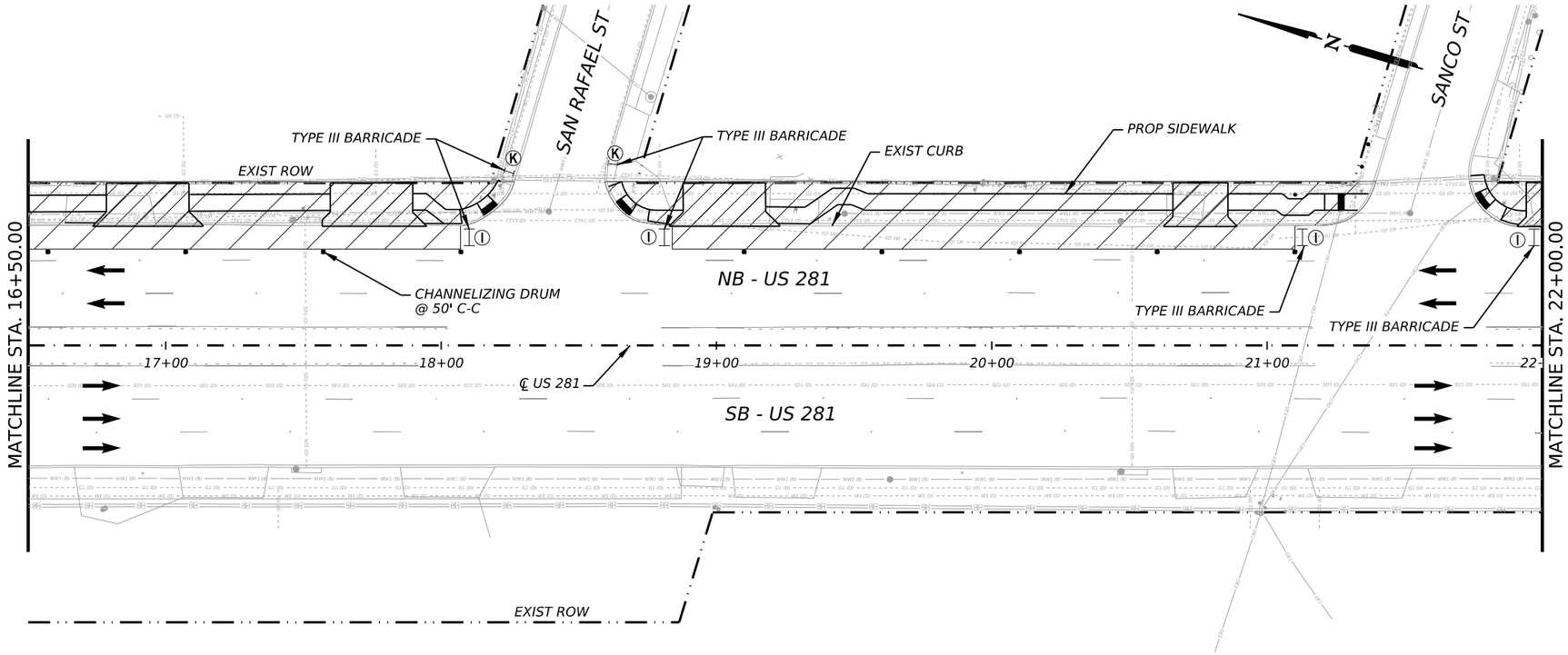
TRAFFIC CONTROL PLAN PHASE 1

SHEET 1 OF 5

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		29

DATE: 12/22/2023 9:43:25 AM
FILE: c:\pw\kh1\d0251183\US281_TCP_LAY_PH1.dgn





LEGEND

- DIRECTION OF TRAFFIC FLOW
- WORK ZONE THIS PHASE
- PREVIOUS CONSTRUCTION
- CHANNELIZING DRUMS
- SIGN
- TYPE III BARRICADE
- L WK ZN PAV MRK REMOV (W)8"(SLD)
- N WK ZN PAV MRK REMOV (W)(WORD)
- O WK ZN PAV MRK REMOV (W)(ARROW)
- P WK ZN PAV MRK REMOV (W)(UTURN)

NOTES:

1. CONTRACTOR MAY ONLY CONSTRUCT ONE CROSS STREET AT A TIME. ACCESS TO BE MAINTAINED AT ALL TIMES.
2. FOR ADDITIONAL INFORMATION, SEE TXDOT TCP STANDARD SHEETS.
3. EXISTING PAVEMENT MARKINGS CONFLICTING WITH WORK ZONE PAVEMENT MARKINGS SHALL BE REMOVED AND IS SUBSIDIARY TO ITEM 502.
4. SEE TCP SIGN LEGEND FOR SIGN TYPE AND SIZE.
5. ALL PAVEMENT MARKINGS ARE EXISTING UNLESS SPECIFIED OTHERWISE.

0' 25' 50'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER

11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

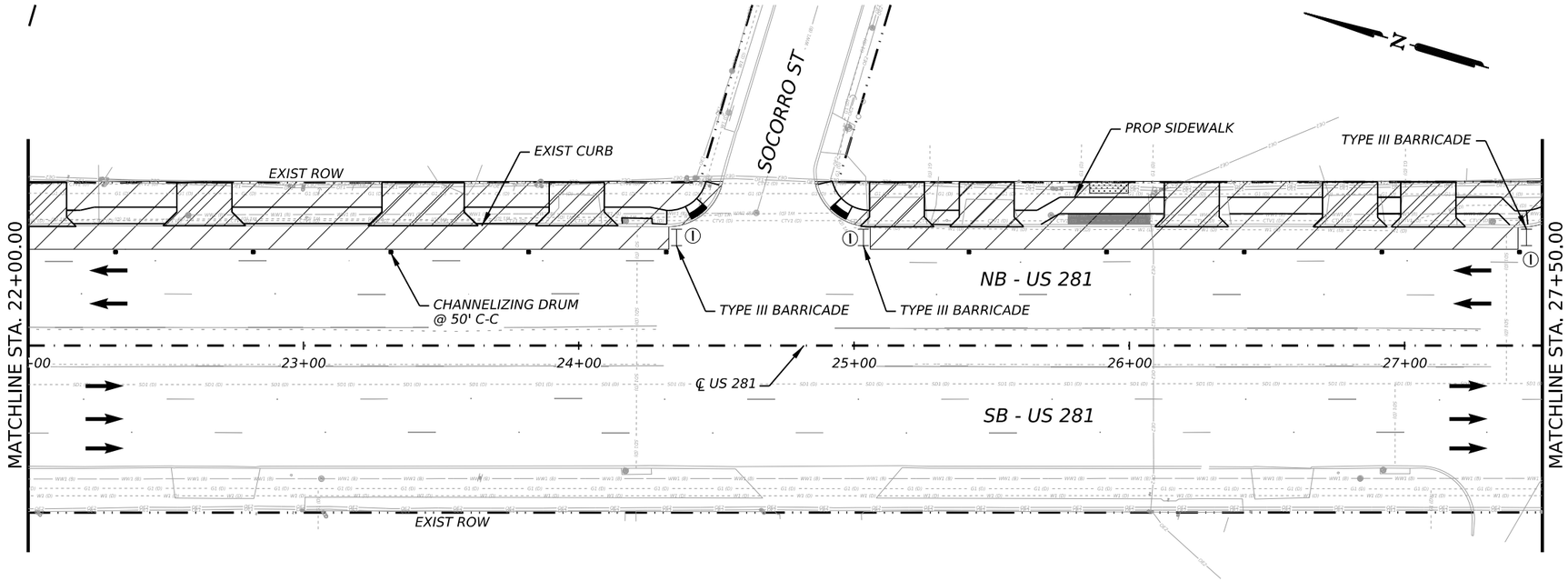
US 281

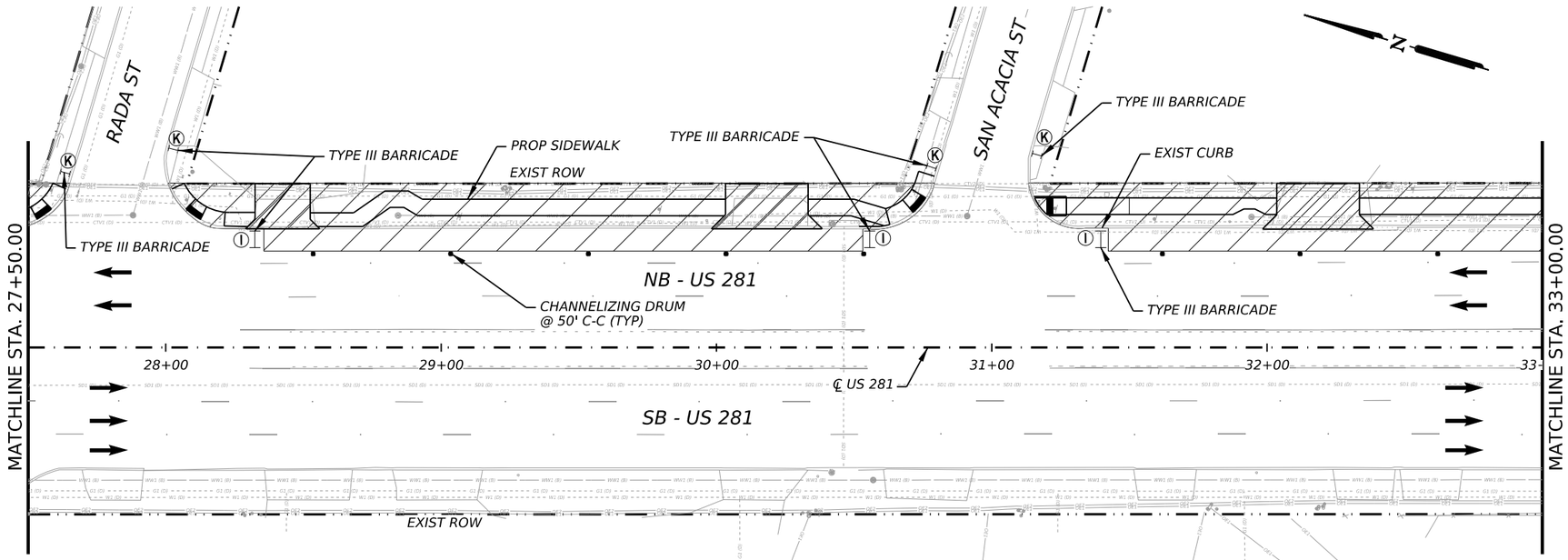
TRAFFIC CONTROL PLAN PHASE 1

SHEET 2 OF 5

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		30

DATE: 11/21/2023 3:17:42 PM
FILE: c:\pw\kh1\d0251183\US281_TCP_LAY_PH1.dgn





LEGEND

- DIRECTION OF TRAFFIC FLOW
- WORK ZONE THIS PHASE
- PREVIOUS CONSTRUCTION
- CHANNELIZING DRUMS
- SIGN
- TYPE III BARRICADE
- L WK ZN PAV MRK REMOV (W)8"(SLD)
- N WK ZN PAV MRK REMOV (W)(WORD)
- O WK ZN PAV MRK REMOV (W)(ARROW)
- P WK ZN PAV MRK REMOV (W)(UTURN)

NOTES:

1. CONTRACTOR MAY ONLY CONSTRUCT ONE CROSS STREET AT A TIME. ACCESS TO BE MAINTAINED AT ALL TIMES.
2. FOR ADDITIONAL INFORMATION, SEE TXDOT TCP STANDARD SHEETS.
3. EXISTING PAVEMENT MARKINGS CONFLICTING WITH WORK ZONE PAVEMENT MARKINGS SHALL BE REMOVED AND IS SUBSIDIARY TO ITEM 502.
4. SEE TCP SIGN LEGEND FOR SIGN TYPE AND SIZE.
5. ALL PAVEMENT MARKINGS ARE EXISTING UNLESS SPECIFIED OTHERWISE.

0' 25' 50'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER

11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

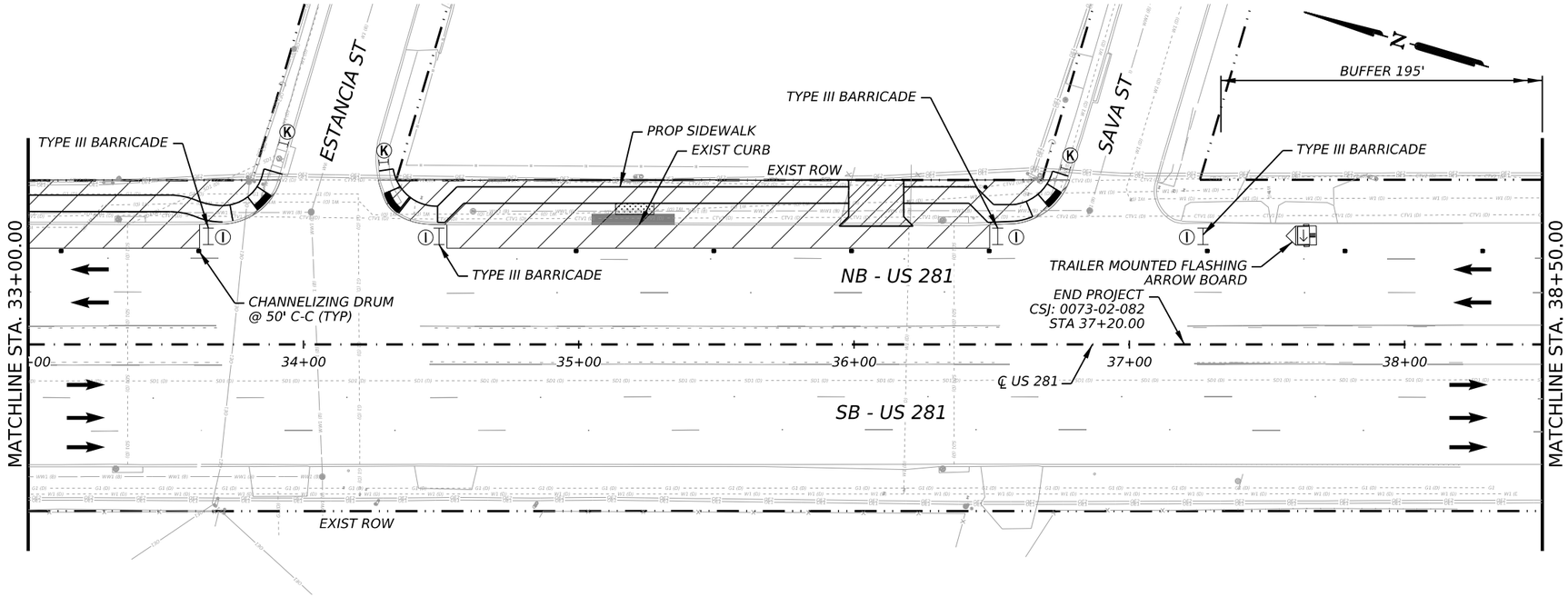
US 281

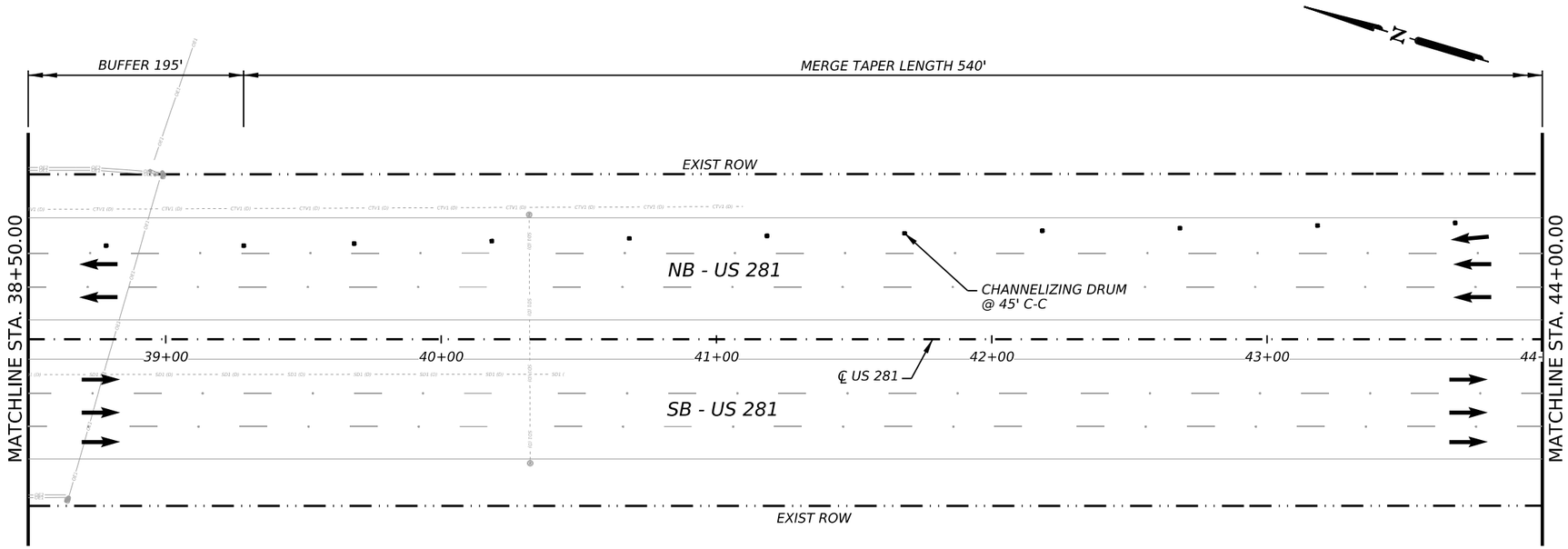
TRAFFIC CONTROL PLAN PHASE 1

SHEET 3 OF 5

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		31

DATE: 11/21/2023 3:17:43 PM
FILE: c:\pw\kn1\d0251183\US281_TCP_LAY_PH1.dgn





LEGEND

- DIRECTION OF TRAFFIC FLOW
- WORK ZONE THIS PHASE
- PREVIOUS CONSTRUCTION
- CHANNELIZING DRUMS
- SIGN
- TYPE III BARRICADE
- L — WK ZN PAV MRK REMOV (W)8"(SLD)
- N — WK ZN PAV MRK REMOV (W)(WORD)
- O — WK ZN PAV MRK REMOV (W)(ARROW)
- P — WK ZN PAV MRK REMOV (W)(UTURN)

NOTES:

1. CONTRACTOR MAY ONLY CONSTRUCT ONE CROSS STREET AT A TIME. ACCESS TO BE MAINTAINED AT ALL TIMES.
2. FOR ADDITIONAL INFORMATION, SEE TXDOT TCP STANDARD SHEETS.
3. EXISTING PAVEMENT MARKINGS CONFLICTING WITH WORK ZONE PAVEMENT MARKINGS SHALL BE REMOVED AND IS SUBSIDIARY TO ITEM 502.
4. SEE TCP SIGN LEGEND FOR SIGN TYPE AND SIZE.
5. ALL PAVEMENT MARKINGS ARE EXISTING UNLESS SPECIFIED OTHERWISE.

0' 25' 50'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER

11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

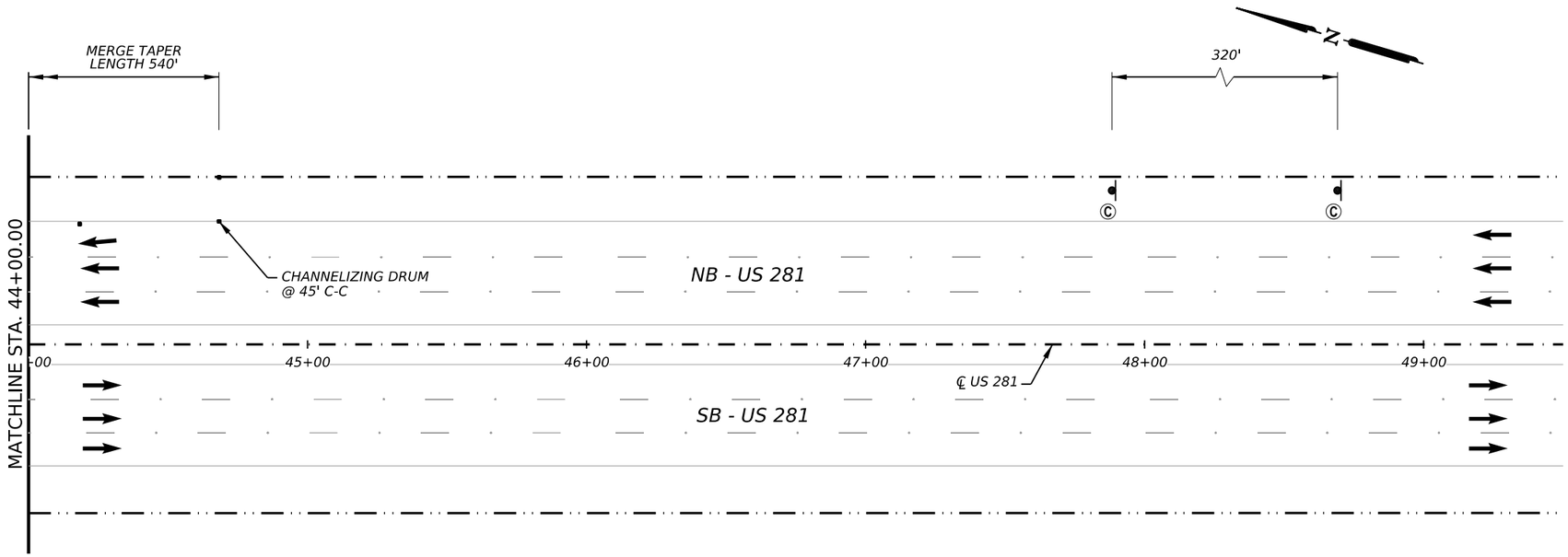
US 281

TRAFFIC CONTROL PLAN PHASE 1

SHEET 4 OF 5

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		32

DATE: 11/21/2023 3:17:43 PM
FILE: c:\pw\kh1\d0251183\US281_TCP_LAY_PH1.dgn



LEGEND

- DIRECTION OF TRAFFIC FLOW
- WORK ZONE THIS PHASE
- PREVIOUS CONSTRUCTION
- CHANNELIZING DRUMS
- SIGN
- TYPE III BARRICADE
- L
- WK ZN PAV MRK REMOV (W)8"(SLD)
- N WK ZN PAV MRK REMOV (W)(WORD)
- O WK ZN PAV MRK REMOV (W)(ARROW)
- P WK ZN PAV MRK REMOV (W)(UTURN)

NOTES:

1. CONTRACTOR MAY ONLY CONSTRUCT ONE CROSS STREET AT A TIME. ACCESS TO BE MAINTAINED AT ALL TIMES.
2. FOR ADDITIONAL INFORMATION, SEE TXDOT TCP STANDARD SHEETS.
3. EXISTING PAVEMENT MARKINGS CONFLICTING WITH WORK ZONE PAVEMENT MARKINGS SHALL BE REMOVED AND IS SUBSIDIARY TO ITEM 502.
4. SEE TCP SIGN LEGEND FOR SIGN TYPE AND SIZE.
5. ALL PAVEMENT MARKINGS ARE EXISTING UNLESS SPECIFIED OTHERWISE.

0' 25' 50'

SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER

11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

US 281

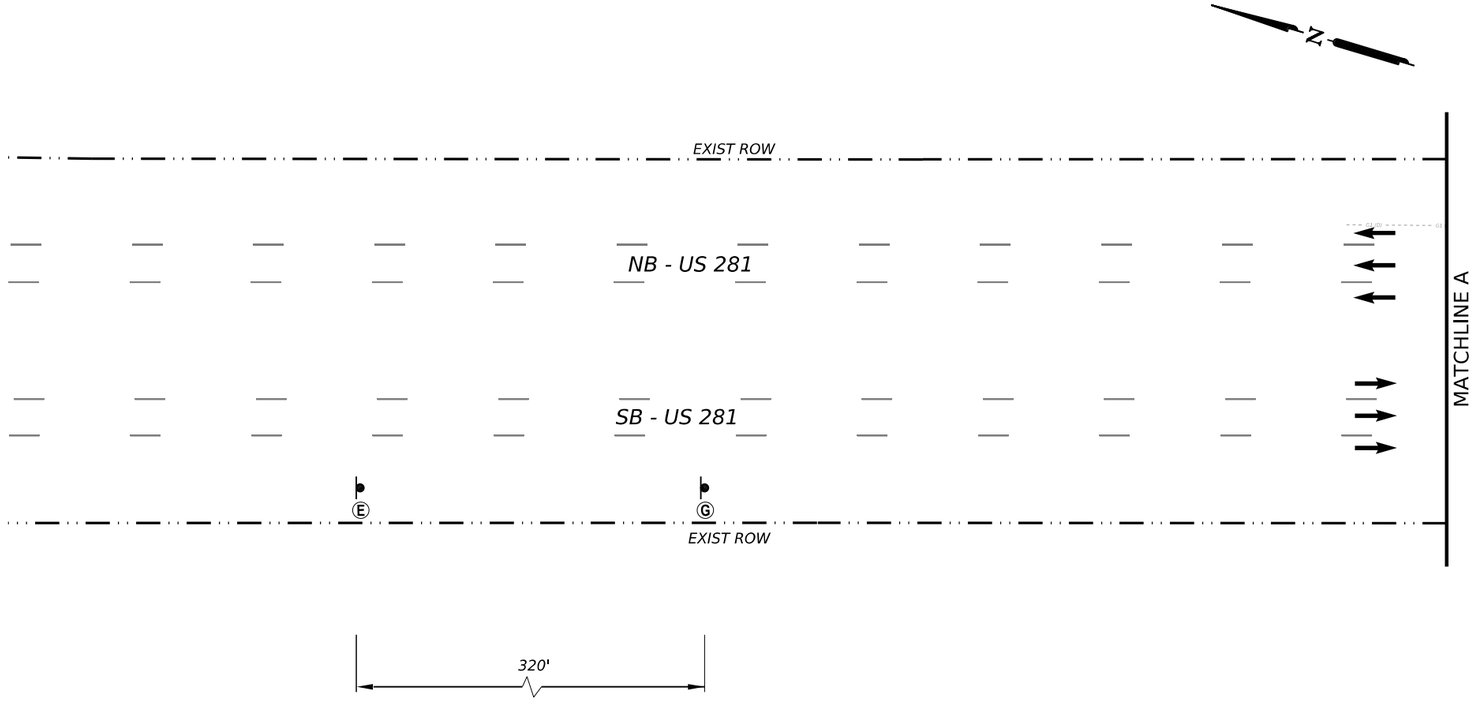
TRAFFIC CONTROL PLAN PHASE 1

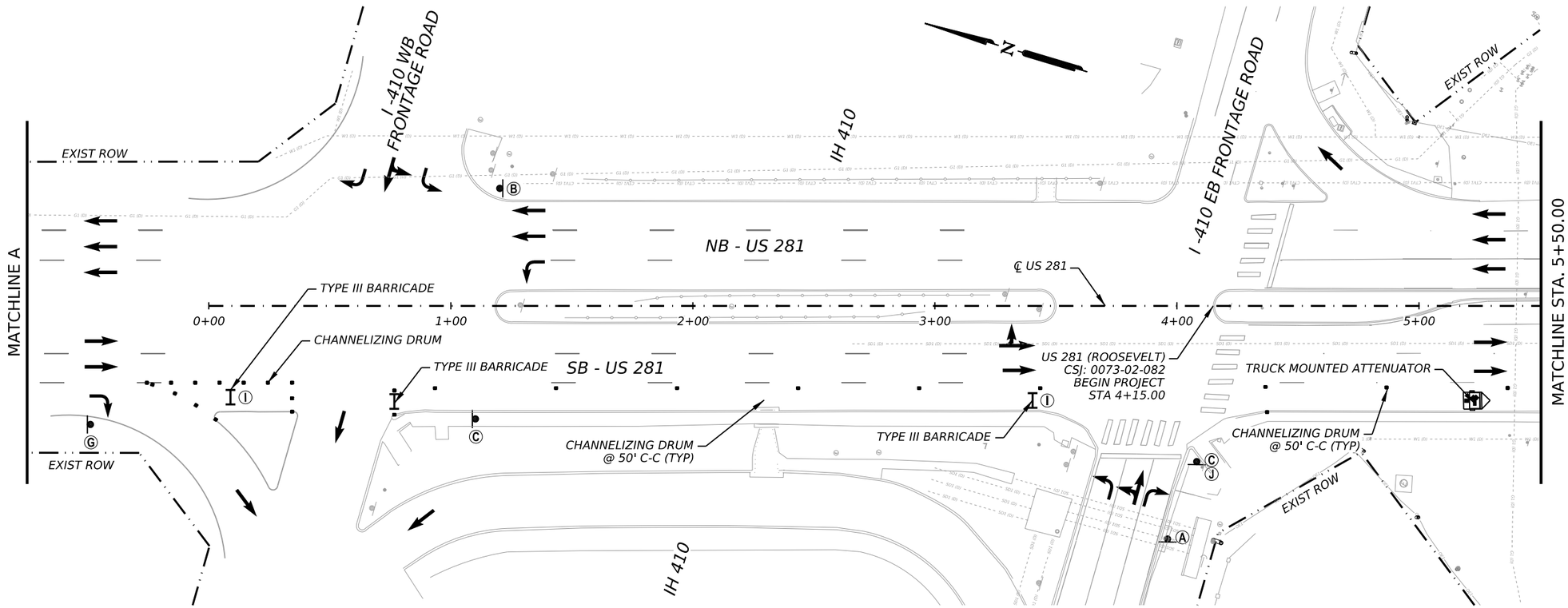
SHEET 5 OF 5

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		33

DATE: 11/21/2023 3:17:44 PM
FILE: c:\pw\kh1\d0251183\US281_TCP_LAY_PH1.dgn

QUANTITY SUMMARY				
ITEM		DESCRIPTION	UNIT	QTY
502	6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	2
6185	6002	TMA (STATIONARY)	DAY	56





LEGEND

- DIRECTION OF TRAFFIC FLOW
- WORK ZONE THIS PHASE
- PREVIOUS CONSTRUCTION
- CHANNELIZING DRUMS
- SIGN
- TYPE III BARRICADE
- L
- M — WK ZN PAV MRK REMOV (W)8"(SLD)
- N — WK ZN PAV MRK REMOV (W)(WORD)
- O — WK ZN PAV MRK REMOV (W)(ARROW)
- P — WK ZN PAV MRK REMOV (W)(UTURN)

NOTES:

1. CONTRACTOR MAY ONLY CONSTRUCT ONE CROSS STREET AT A TIME. ACCESS TO BE MAINTAINED AT ALL TIMES.
2. FOR ADDITIONAL INFORMATION, SEE TXDOT TCP STANDARD SHEETS.
3. EXISTING PAVEMENT MARKINGS CONFLICTING WITH WORK ZONE PAVEMENT MARKINGS SHALL BE REMOVED AND IS SUBSIDIARY TO ITEM 502.
4. SEE TCP SIGN LEGEND FOR SIGN TYPE AND SIZE.
5. ALL PAVEMENT MARKINGS ARE EXISTING UNLESS SPECIFIED OTHERWISE.

0' 25' 50'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
12/21/2023

Kimley»Horn F-928

Texas Department of Transportation

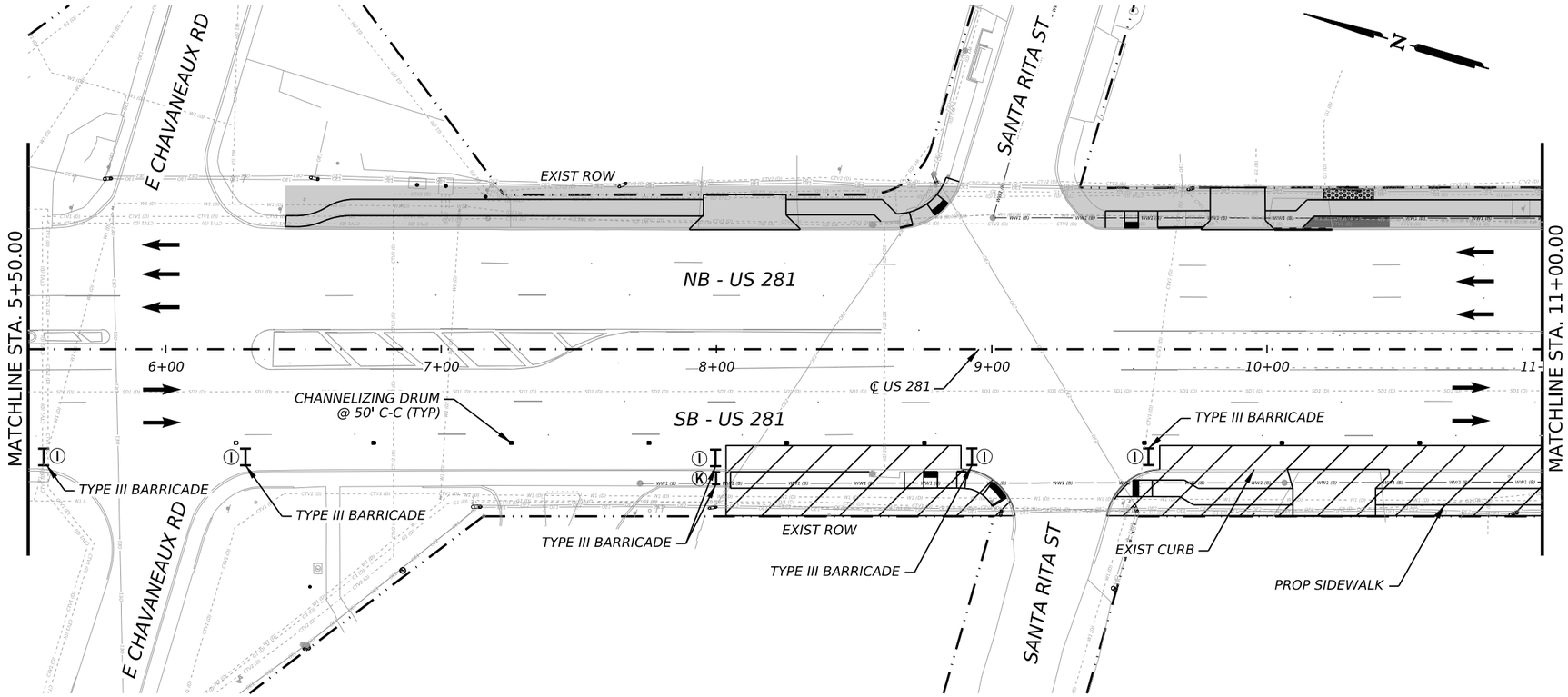
US 281

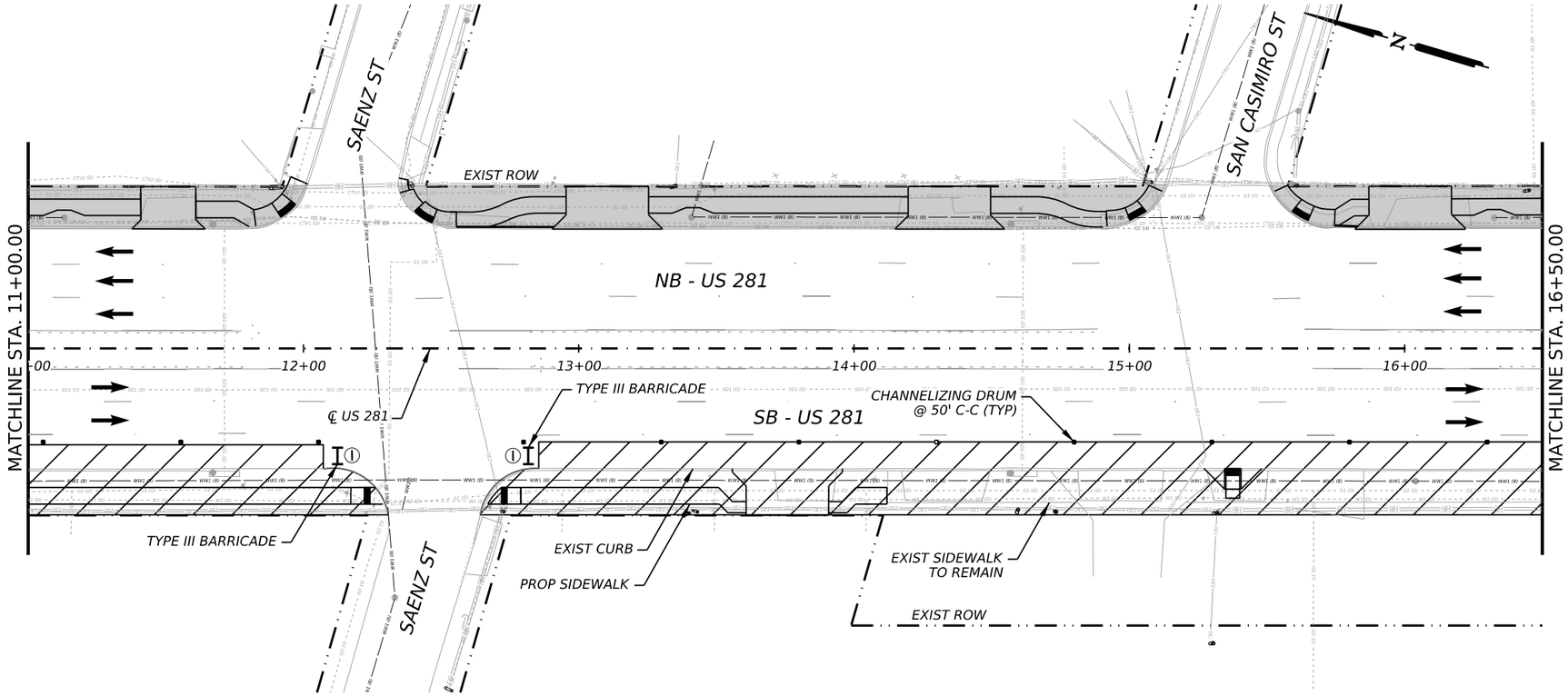
TRAFFIC CONTROL PLAN PHASE 2

SHEET 1 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		34

DATE: 12/22/2023 9:50:54 AM
FILE: c:\pw\kh1\d0251183\US281_TCP_LAY_PH2.dgn





LEGEND

- DIRECTION OF TRAFFIC FLOW
- WORK ZONE THIS PHASE
- PREVIOUS CONSTRUCTION
- CHANNELIZING DRUMS
- SIGN
- TYPE III BARRICADE
- L WK ZN PAV MRK REMOV (W)8"(SLD)
- N WK ZN PAV MRK REMOV (W)(WORD)
- O WK ZN PAV MRK REMOV (W)(ARROW)
- P WK ZN PAV MRK REMOV (W)(UTURN)

NOTES:

1. CONTRACTOR MAY ONLY CONSTRUCT ONE CROSS STREET AT A TIME. ACCESS TO BE MAINTAINED AT ALL TIMES.
2. FOR ADDITIONAL INFORMATION, SEE TXDOT TCP STANDARD SHEETS.
3. EXISTING PAVEMENT MARKINGS CONFLICTING WITH WORK ZONE PAVEMENT MARKINGS SHALL BE REMOVED AND IS SUBSIDIARY TO ITEM 502.
4. SEE TCP SIGN LEGEND FOR SIGN TYPE AND SIZE.
5. ALL PAVEMENT MARKINGS ARE EXISTING UNLESS SPECIFIED OTHERWISE.

0' 25' 50'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER

11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

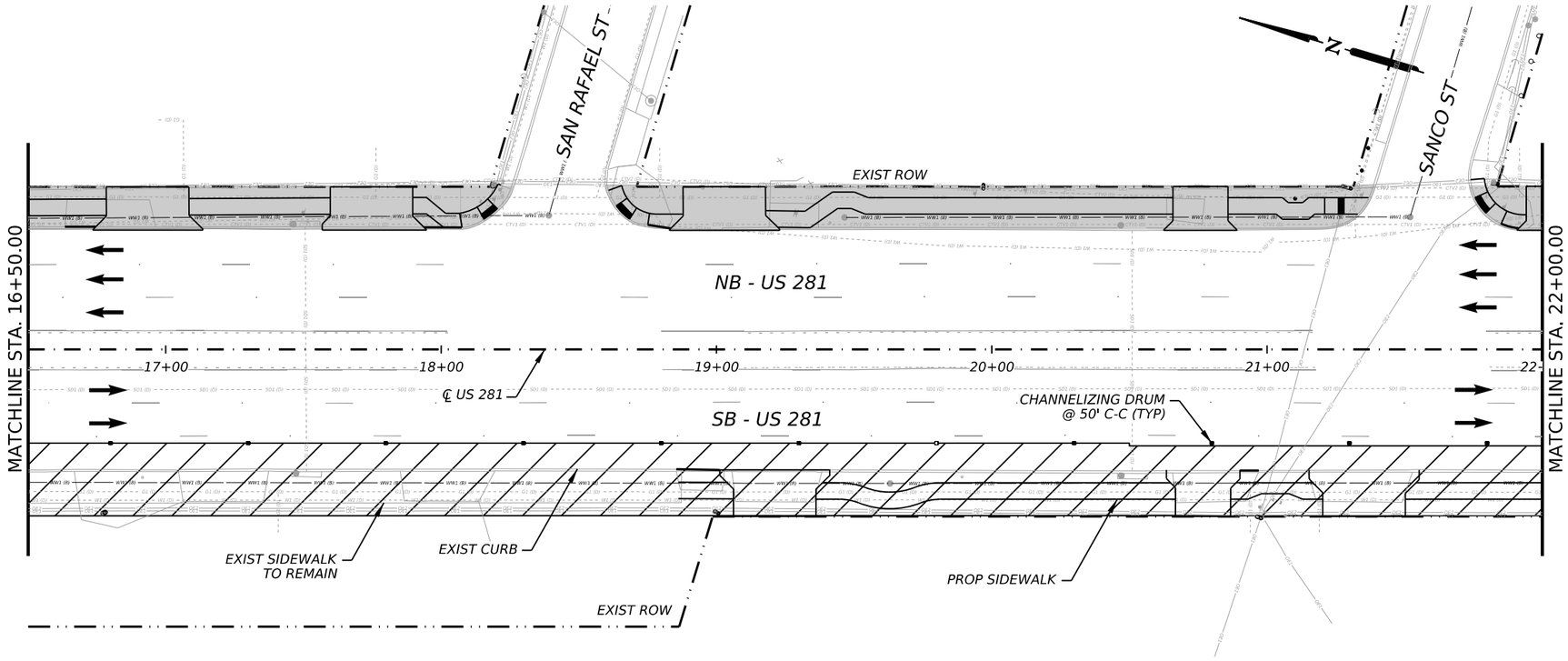
US 281

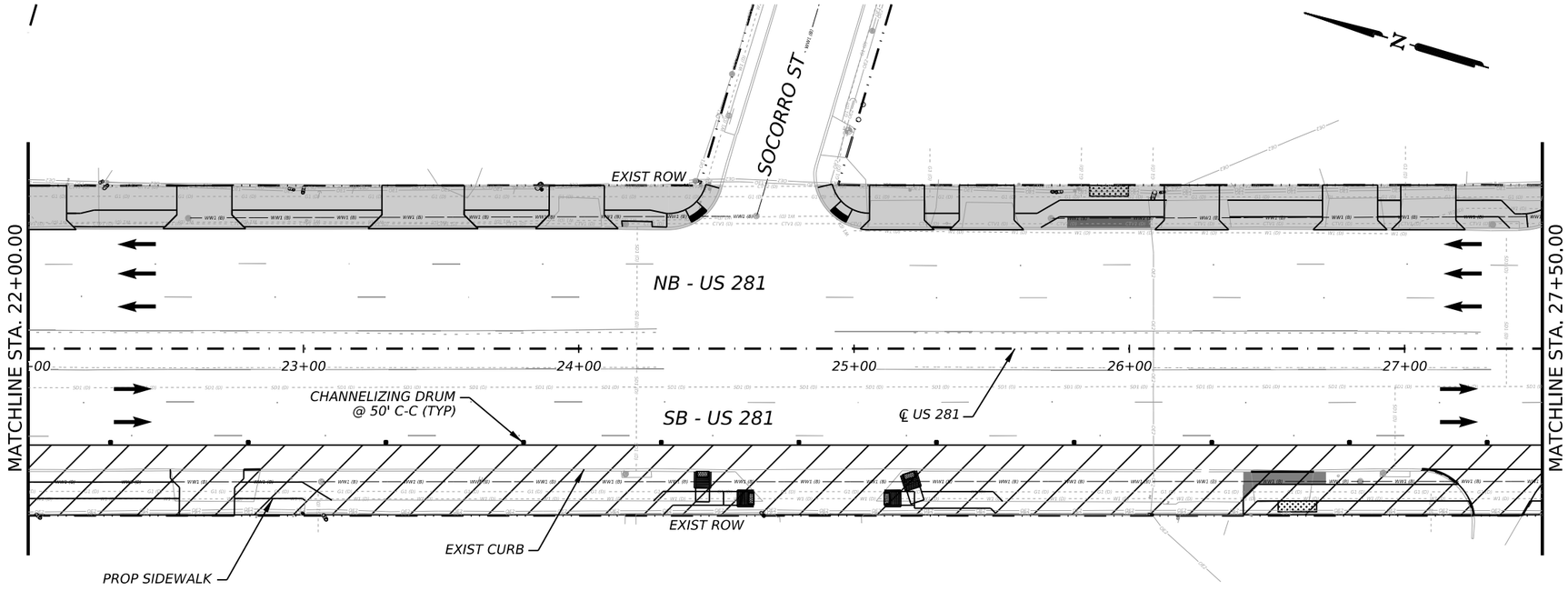
TRAFFIC CONTROL PLAN PHASE 2

SHEET 2 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		35

DATE: 11/21/2023 3:19:09 PM
FILE: c:\pw\kn1d0251183\US281_TCP_LAY_PH2.dgn





LEGEND

- DIRECTION OF TRAFFIC FLOW
- WORK ZONE THIS PHASE
- PREVIOUS CONSTRUCTION
- CHANNELIZING DRUMS
- SIGN
- TYPE III BARRICADE
- L WK ZN PAV MRK REMOV (W)8"(SLD)
- N WK ZN PAV MRK REMOV (W)(WORD)
- O WK ZN PAV MRK REMOV (W)(ARROW)
- P WK ZN PAV MRK REMOV (W)(UTURN)

NOTES:

1. CONTRACTOR MAY ONLY CONSTRUCT ONE CROSS STREET AT A TIME. ACCESS TO BE MAINTAINED AT ALL TIMES.
2. FOR ADDITIONAL INFORMATION, SEE TXDOT TCP STANDARD SHEETS.
3. EXISTING PAVEMENT MARKINGS CONFLICTING WITH WORK ZONE PAVEMENT MARKINGS SHALL BE REMOVED AND IS SUBSIDIARY TO ITEM 502.
4. SEE TCP SIGN LEGEND FOR SIGN TYPE AND SIZE.
5. ALL PAVEMENT MARKINGS ARE EXISTING UNLESS SPECIFIED OTHERWISE.

0' 25' 50'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER

11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

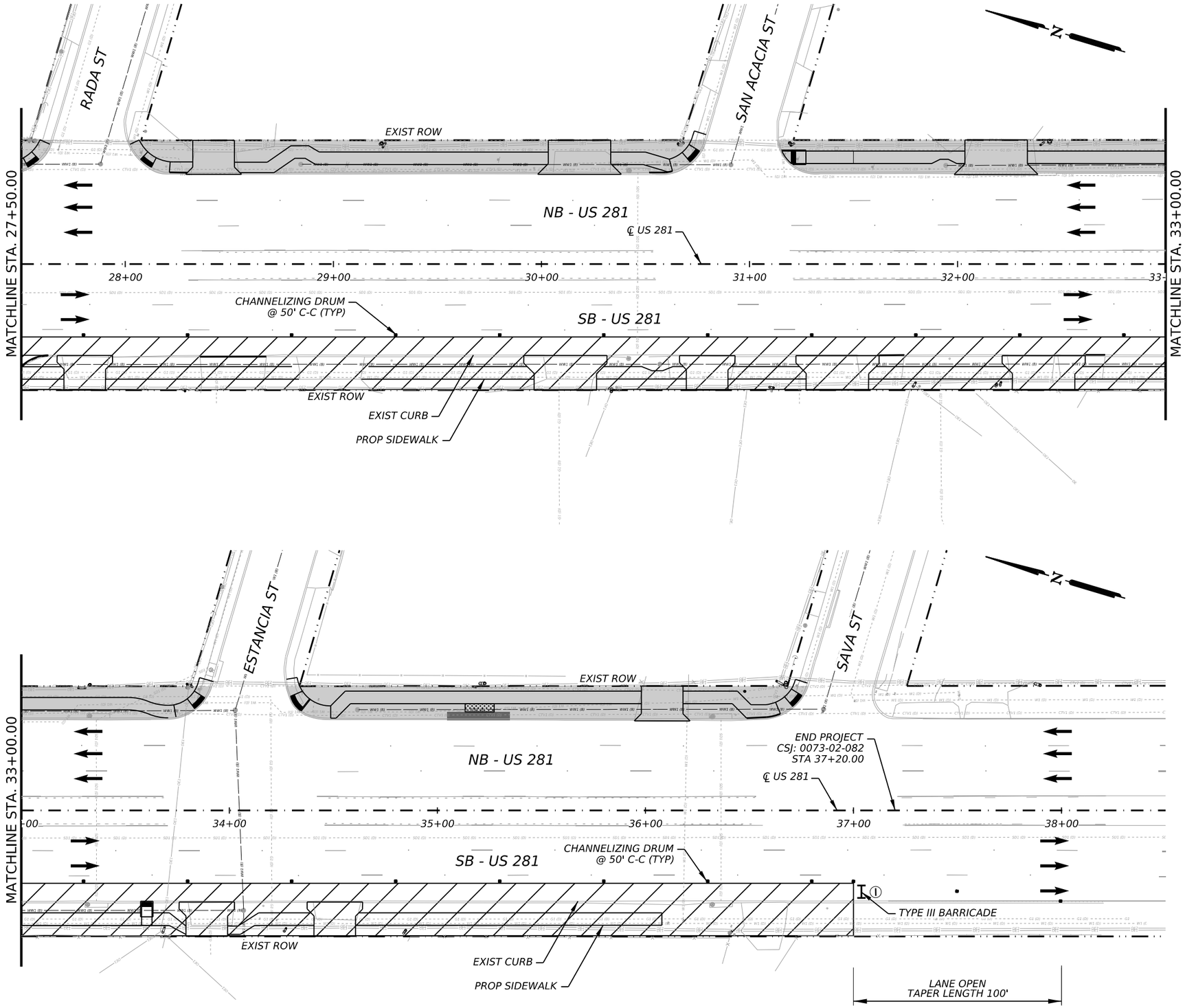
US 281

TRAFFIC CONTROL PLAN PHASE 2

SHEET 3 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		36

DATE: 11/21/2023 3:19:09 PM
FILE: c:\pw\kn1\d0251183\US281_TCP_LAY_PH2.dgn



LEGEND

- DIRECTION OF TRAFFIC FLOW
- WORK ZONE THIS PHASE
- PREVIOUS CONSTRUCTION
- CHANNELIZING DRUMS
- SIGN
- TYPE III BARRICADE
- L — WK ZN PAV MRK REMOV (W)8"(SLD)
- N — WK ZN PAV MRK REMOV (W)(WORD)
- O — WK ZN PAV MRK REMOV (W)(ARROW)
- P — WK ZN PAV MRK REMOV (W)(UTURN)

NOTES:

1. CONTRACTOR MAY ONLY CONSTRUCT ONE CROSS STREET AT A TIME. ACCESS TO BE MAINTAINED AT ALL TIMES.
2. FOR ADDITIONAL INFORMATION, SEE TXDOT TCP STANDARD SHEETS.
3. EXISTING PAVEMENT MARKINGS CONFLICTING WITH WORK ZONE PAVEMENT MARKINGS SHALL BE REMOVED AND IS SUBSIDIARY TO ITEM 502.
4. SEE TCP SIGN LEGEND FOR SIGN TYPE AND SIZE.
5. ALL PAVEMENT MARKINGS ARE EXISTING UNLESS SPECIFIED OTHERWISE.

0' 25' 50'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER

11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

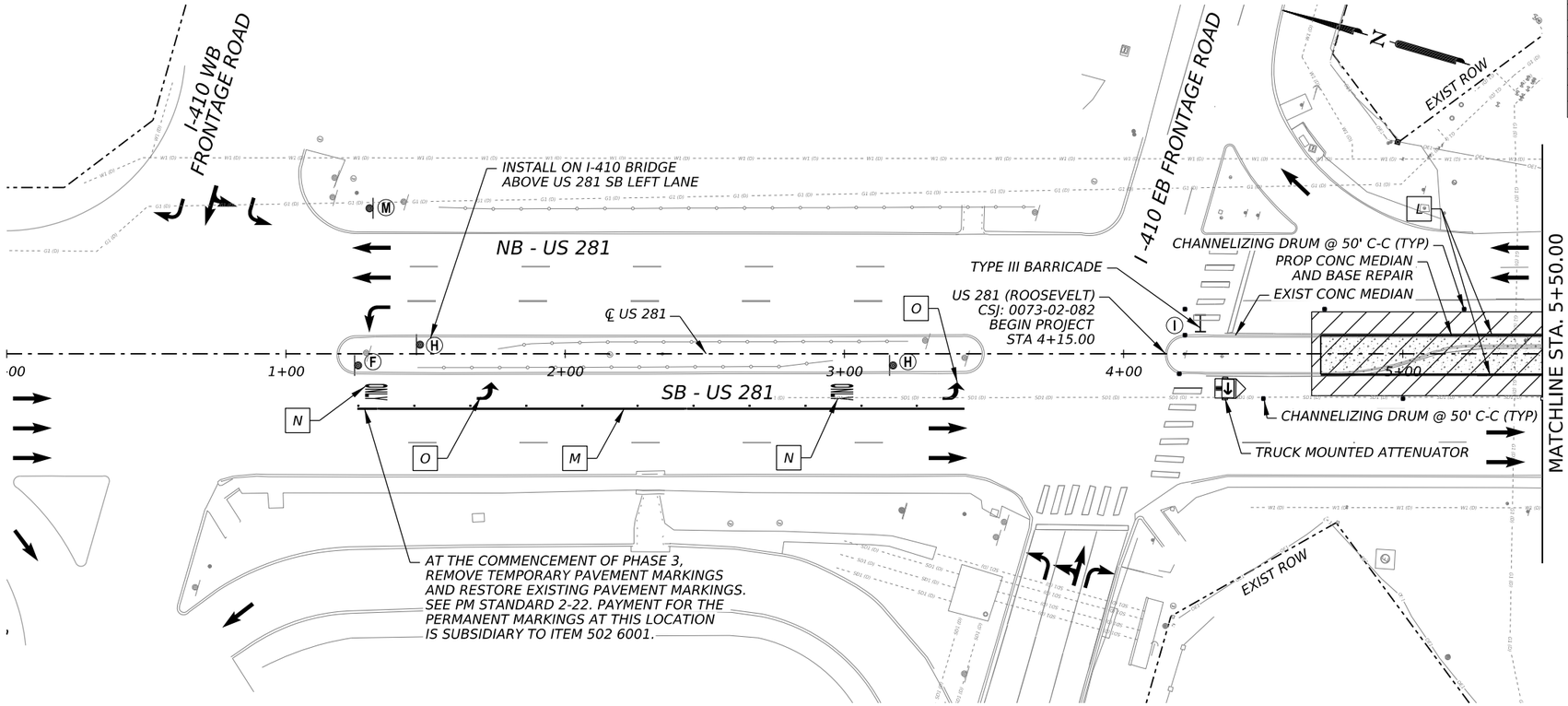
US 281

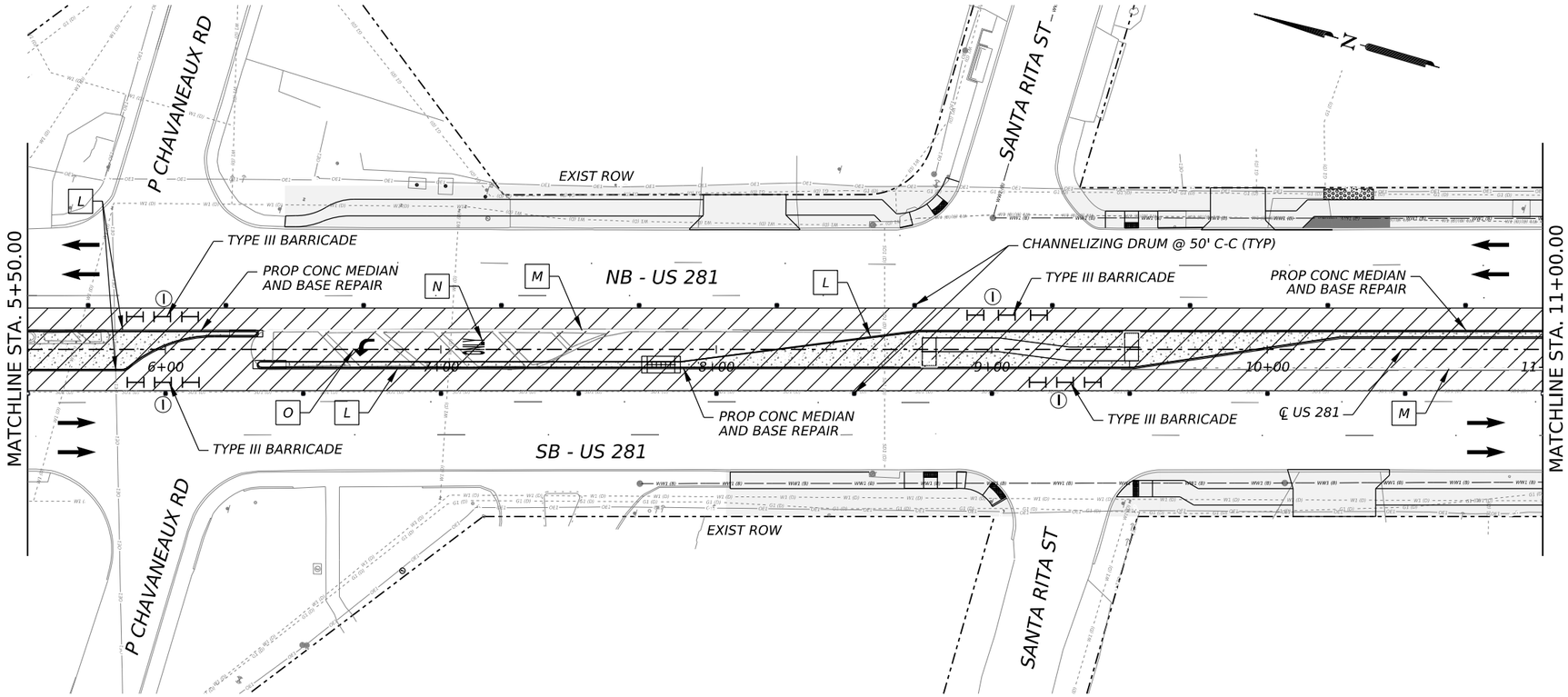
TRAFFIC CONTROL PLAN PHASE 2

SHEET 4 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		37

DATE: 11/21/2023 3:19:10 PM
FILE: c:\pw\kn1\d0251183\US281_TCP_LAY_PH2.dgn





QUANTITY SUMMARY				
ITEM		DESCRIPTION	UNIT	QTY
502	6001	BARRICADES, SIGNS AND TRAFFIC HANDLIN	MO	4
662	6059	WK ZN PAV MRK REMOV (TRAF BTN) TY Y	LF	159
662	6071	WK ZN PAV MRK REMOV (W)8"(SLD)	LF	466
662	6080	WK ZN PAV MRK REMOV (W)(ARROW)	EA	3
662	6090	WK ZN PAV MRK REMOV (W)(WORD)	EA	3
6185	6002	TMA (STATIONARY)	DAY	146

LEGEND

- DIRECTION OF TRAFFIC FLOW
- WORK ZONE THIS PHASE
- PREVIOUS CONSTRUCTION
- CHANNELIZING DRUMS
- SIGN
- TYPE III BARRICADE
- L
- M — WK ZN PAV MRK REMOV (W)8"(SLD)
- N — WK ZN PAV MRK REMOV (W)(WORD)
- O — WK ZN PAV MRK REMOV (W)(ARROW)
- P — WK ZN PAV MRK REMOV (W)(UTURN)

NOTES:

1. CONTRACTOR MAY ONLY CONSTRUCT ONE CROSS STREET AT A TIME. ACCESS TO BE MAINTAINED AT ALL TIMES.
2. FOR ADDITIONAL INFORMATION, SEE TXDOT TCP STANDARD SHEETS.
3. EXISTING PAVEMENT MARKINGS CONFLICTING WITH WORK ZONE PAVEMENT MARKINGS SHALL BE REMOVED AND IS SUBSIDIARY TO ITEM 502.
4. SEE TCP SIGN LEGEND FOR SIGN TYPE AND SIZE.
5. ALL PAVEMENT MARKINGS ARE EXISTING UNLESS SPECIFIED OTHERWISE.

0' 25' 50'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED PROFESSIONAL ENGINEER
12/21/2023

Kimley»Horn F-928

Texas Department of Transportation

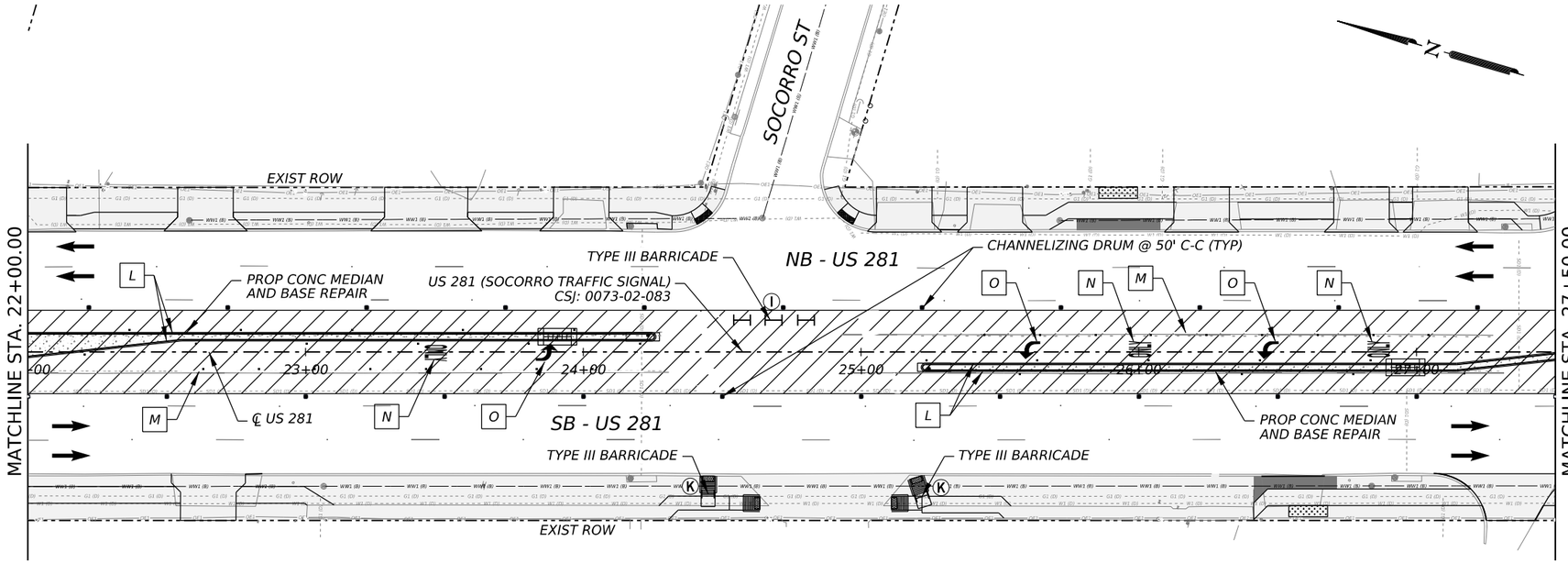
US 281

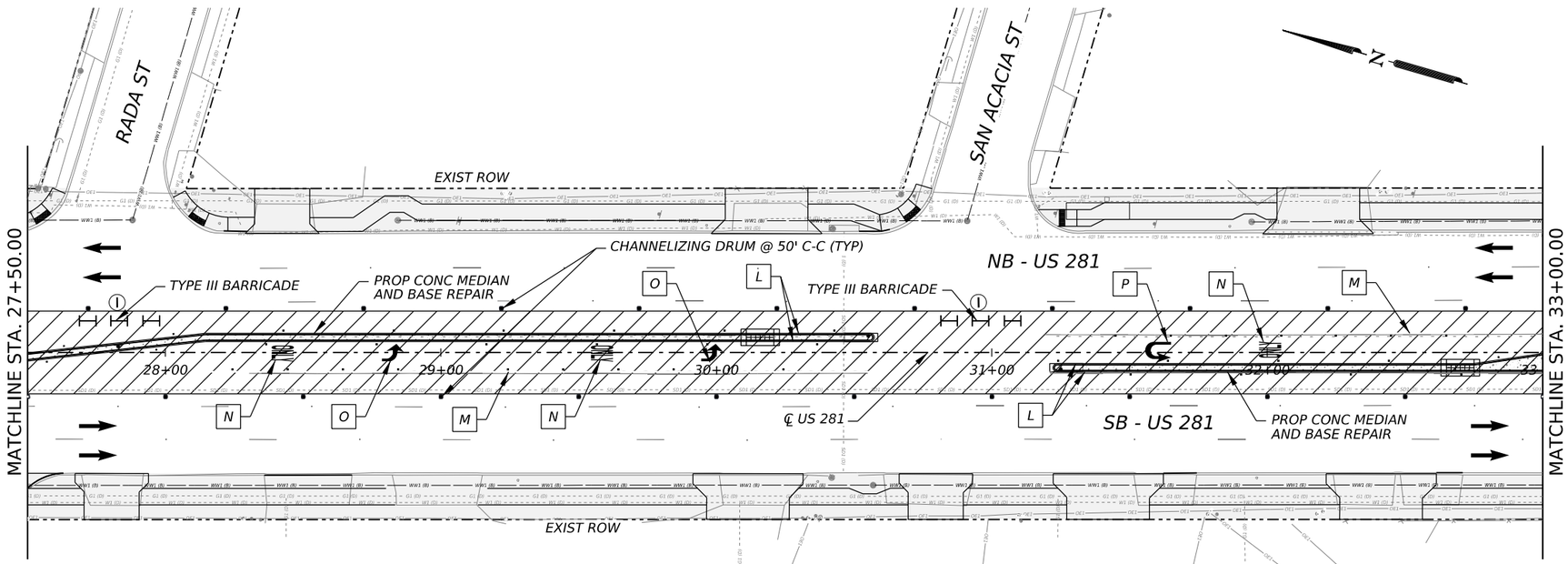
TRAFFIC CONTROL PLAN PHASE 3

SHEET 1 OF 5

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		38

DATE: 12/22/2023 1:55:21 PM
FILE: c:\pw\kh1\d0251183\US281_TCP_LAY_PH3.dgn





QUANTITY SUMMARY				
ITEM		DESCRIPTION	UNIT	QTY
662	6059	WK ZN PAV MRK REMOV (TRAF BTN) TY Y	LF	1894
662	6071	WK ZN PAV MRK REMOV (W)8"(SLD)	LF	748
662	6080	WK ZN PAV MRK REMOV (W)(ARROW)	EA	5
662	6089	WK ZN PAV MRK REMOV (W)(UTURN ARROW	EA	1
662	6090	WK ZN PAV MRK REMOV (W)(WORD)	EA	6

LEGEND

- DIRECTION OF TRAFFIC FLOW
- WORK ZONE THIS PHASE
- PREVIOUS CONSTRUCTION
- CHANNELIZING DRUMS
- SIGN
- TYPE III BARRICADE
- L
- M — WK ZN PAV MRK REMOV (W)8"(SLD)
- N — WK ZN PAV MRK REMOV (W)(WORD)
- O — WK ZN PAV MRK REMOV (W)(ARROW)
- P — WK ZN PAV MRK REMOV (W)(UTURN)

NOTES:

1. CONTRACTOR MAY ONLY CONSTRUCT ONE CROSS STREET AT A TIME. ACCESS TO BE MAINTAINED AT ALL TIMES.
2. FOR ADDITIONAL INFORMATION, SEE TXDOT TCP STANDARD SHEETS.
3. EXISTING PAVEMENT MARKINGS CONFLICTING WITH WORK ZONE PAVEMENT MARKINGS SHALL BE REMOVED AND IS SUBSIDIARY TO ITEM 502.
4. SEE TCP SIGN LEGEND FOR SIGN TYPE AND SIZE.
5. ALL PAVEMENT MARKINGS ARE EXISTING UNLESS SPECIFIED OTHERWISE.

0' 25' 50'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
12/21/2023

Kimley»Horn F-928

Texas Department of Transportation

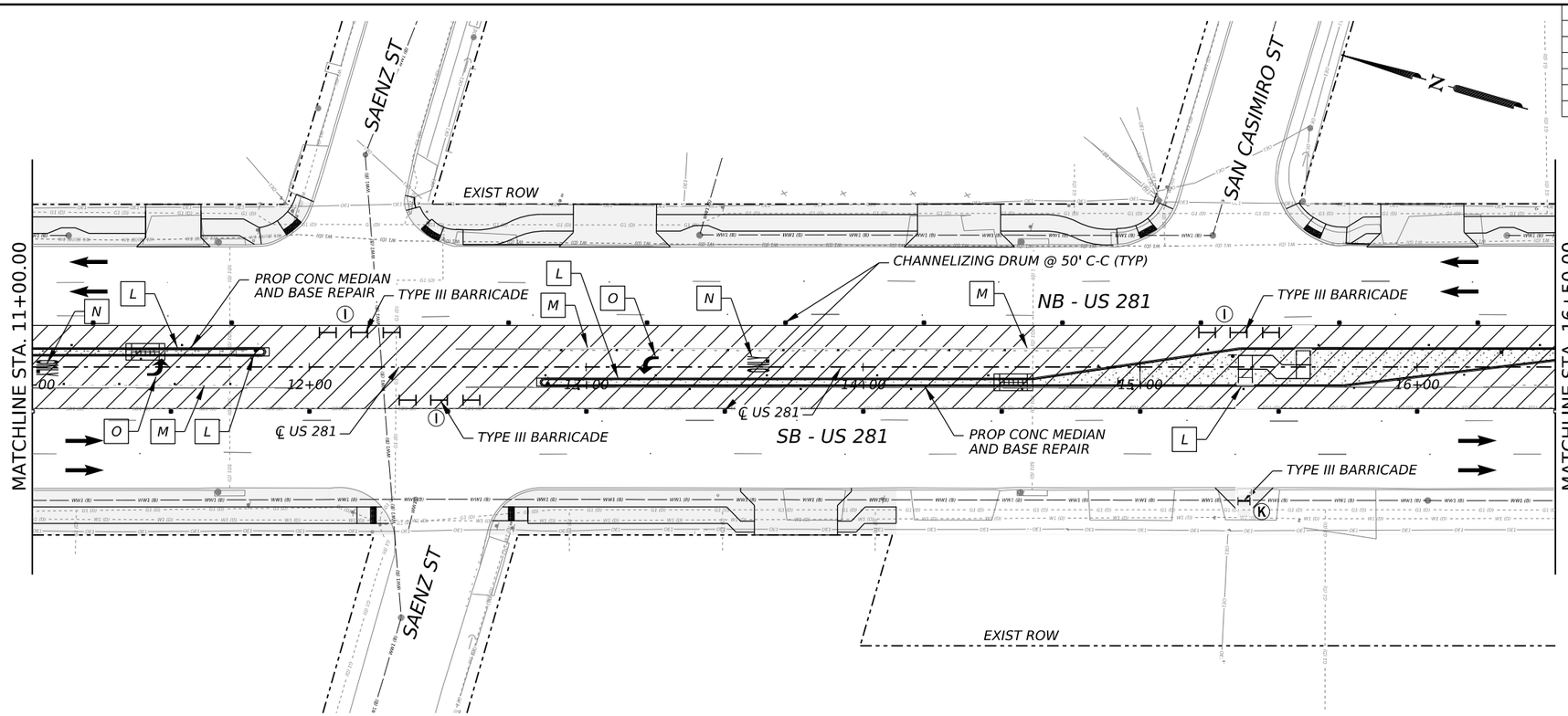
US 281

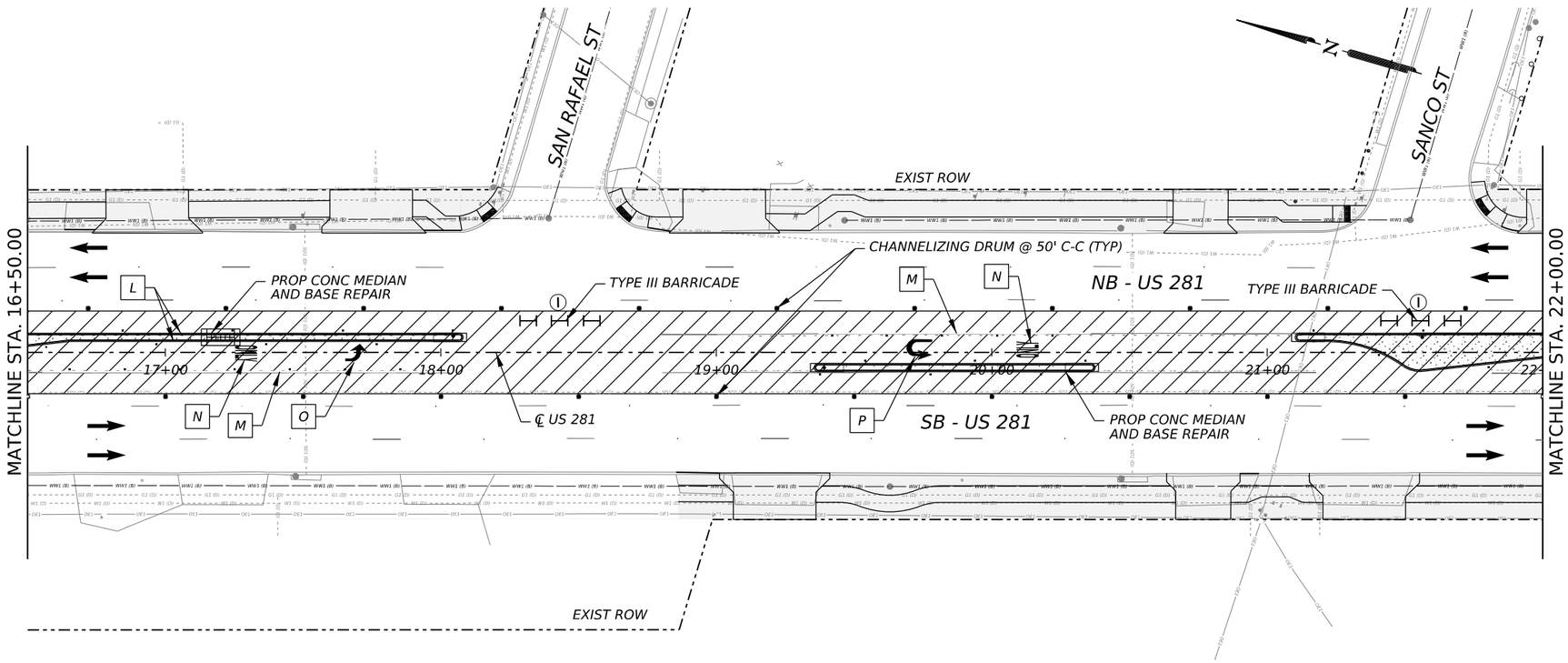
TRAFFIC CONTROL PLAN PHASE 3

SHEET 3 OF 5

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		40

DATE: 12/22/2023 3:41:35 PM
FILE: c:\pw\kh1\d0251183\US281_TCP_LAY_PH3.dgn





QUANTITY SUMMARY				
ITEM		DESCRIPTION	UNIT	QTY
662	6059	WK ZN PAV MRK REMOV (TRAF BTN) TY Y	LF	2016
662	6071	WK ZN PAV MRK REMOV (W)8"(SLD)	LF	505
662	6080	WK ZN PAV MRK REMOV (W)(ARROW)	EA	3
662	6089	WK ZN PAV MRK REMOV (W)(UTURN ARROW	EA	1
662	6090	WK ZN PAV MRK REMOV (W)(WORD)	EA	4

LEGEND

- DIRECTION OF TRAFFIC FLOW
- WORK ZONE THIS PHASE
- PREVIOUS CONSTRUCTION
- CHANNELIZING DRUMS
- SIGN
- TYPE III BARRICADE
- L
- M WK ZN PAV MRK REMOV (W)8"(SLD)
- N WK ZN PAV MRK REMOV (W)(WORD)
- O WK ZN PAV MRK REMOV (W)(ARROW)
- P WK ZN PAV MRK REMOV (W)(UTURN)

NOTES:

1. CONTRACTOR MAY ONLY CONSTRUCT ONE CROSS STREET AT A TIME. ACCESS TO BE MAINTAINED AT ALL TIMES.
2. FOR ADDITIONAL INFORMATION, SEE TXDOT TCP STANDARD SHEETS.
3. EXISTING PAVEMENT MARKINGS CONFLICTING WITH WORK ZONE PAVEMENT MARKINGS SHALL BE REMOVED AND IS SUBSIDIARY TO ITEM 502.
4. SEE TCP SIGN LEGEND FOR SIGN TYPE AND SIZE.
5. ALL PAVEMENT MARKINGS ARE EXISTING UNLESS SPECIFIED OTHERWISE.

0' 25' 50'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
12/21/2023

Kimley»Horn F-928

Texas Department of Transportation

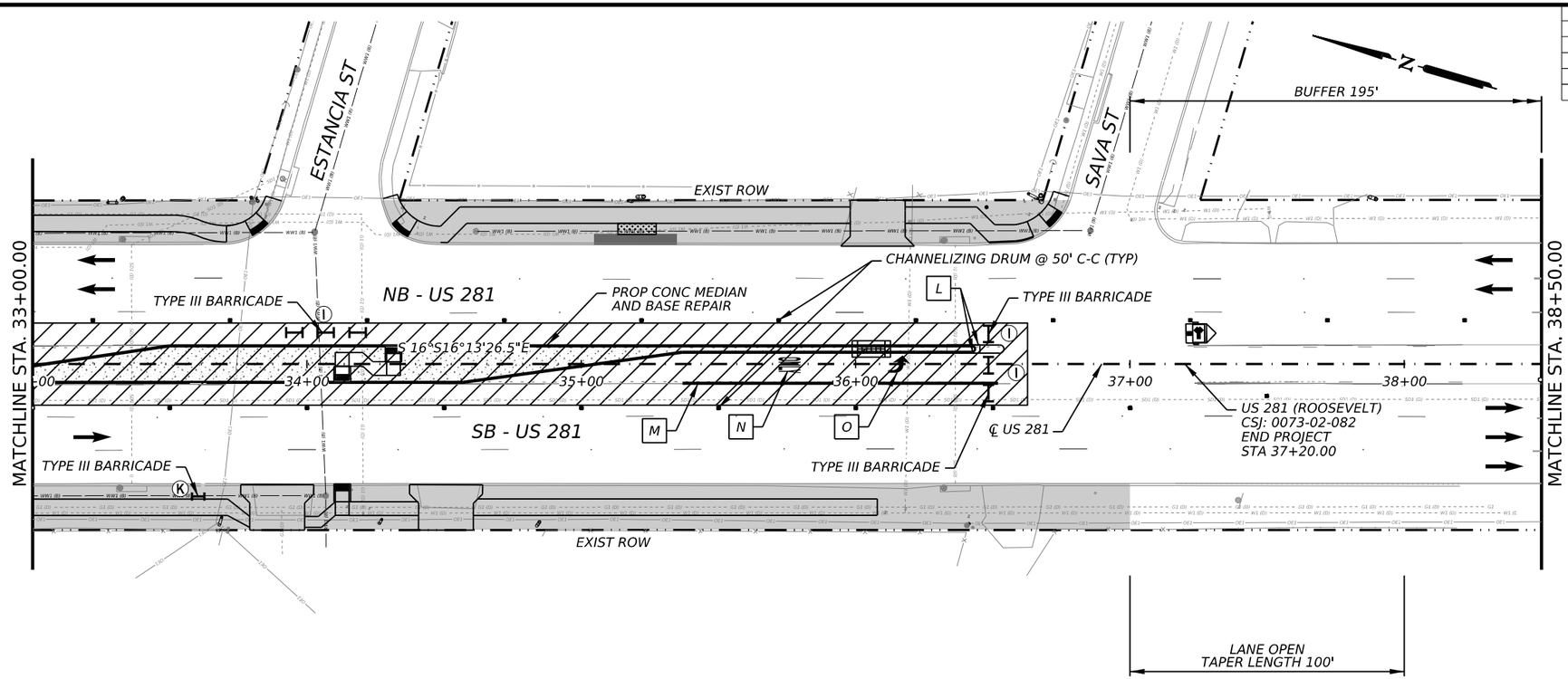
US 281

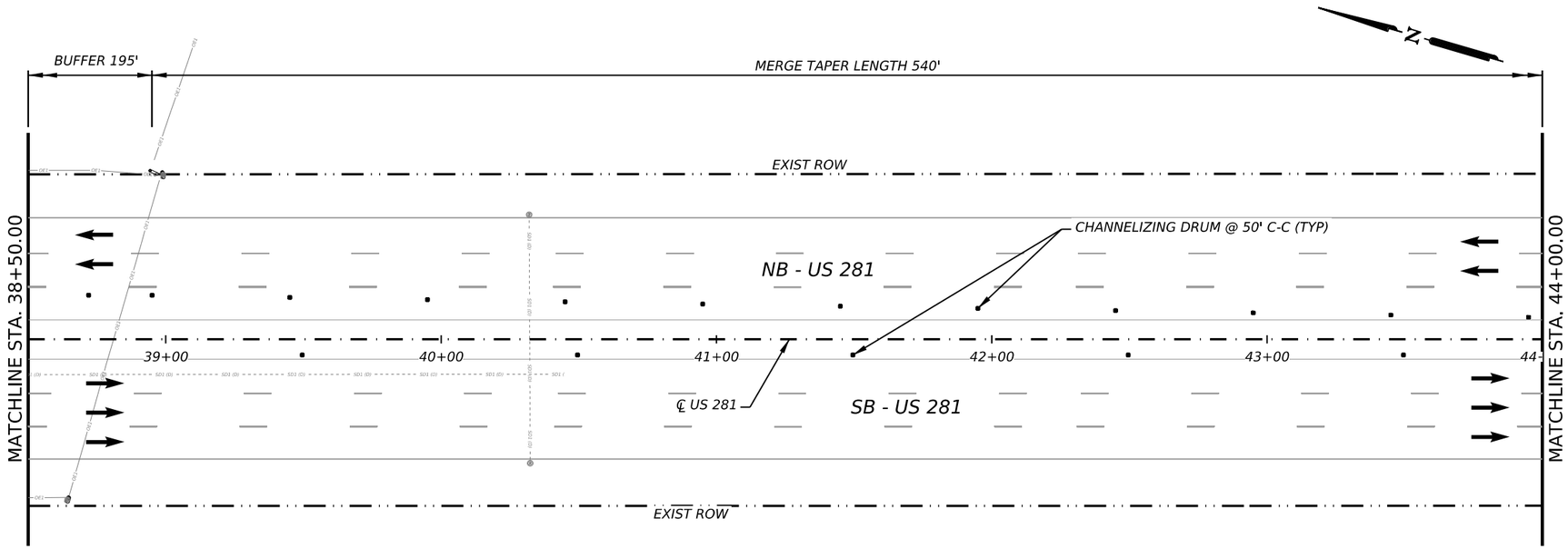
TRAFFIC CONTROL PLAN PHASE 3

SHEET 2 OF 5

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		39

DATE: 12/22/2023 3:41:10 PM
FILE: c:\pw\kh1\d0251183\US281_TCP_LAY_PH3.dgn





QUANTITY SUMMARY				
ITEM		DESCRIPTION	UNIT	QTY
662	6059	WK ZN PAV MRK REMOV (TRAF BTN) TY Y	LF	1674
662	6071	WK ZN PAV MRK REMOV (W)8"(SLD)	LF	115
662	6080	WK ZN PAV MRK REMOV (W)(ARROW)	EA	1
662	6090	WK ZN PAV MRK REMOV (W)(WORD)	EA	1

LEGEND

- DIRECTION OF TRAFFIC FLOW
- WORK ZONE THIS PHASE
- PREVIOUS CONSTRUCTION
- CHANNELIZING DRUMS
- SIGN
- TYPE III BARRICADE
- L — WK ZN PAV MRK REMOV (W)8"(SLD)
- N — WK ZN PAV MRK REMOV (W)(WORD)
- O — WK ZN PAV MRK REMOV (W)(ARROW)
- P — WK ZN PAV MRK REMOV (W)(UTURN)

NOTES:

1. CONTRACTOR MAY ONLY CONSTRUCT ONE CROSS STREET AT A TIME. ACCESS TO BE MAINTAINED AT ALL TIMES.
2. FOR ADDITIONAL INFORMATION, SEE TXDOT TCP STANDARD SHEETS.
3. EXISTING PAVEMENT MARKINGS CONFLICTING WITH WORK ZONE PAVEMENT MARKINGS SHALL BE REMOVED AND IS SUBSIDIARY TO ITEM 502.
4. SEE TCP SIGN LEGEND FOR SIGN TYPE AND SIZE.
5. ALL PAVEMENT MARKINGS ARE EXISTING UNLESS SPECIFIED OTHERWISE.

0' 25' 50'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
12/21/2023

Kimley»Horn F-928

Texas Department of Transportation

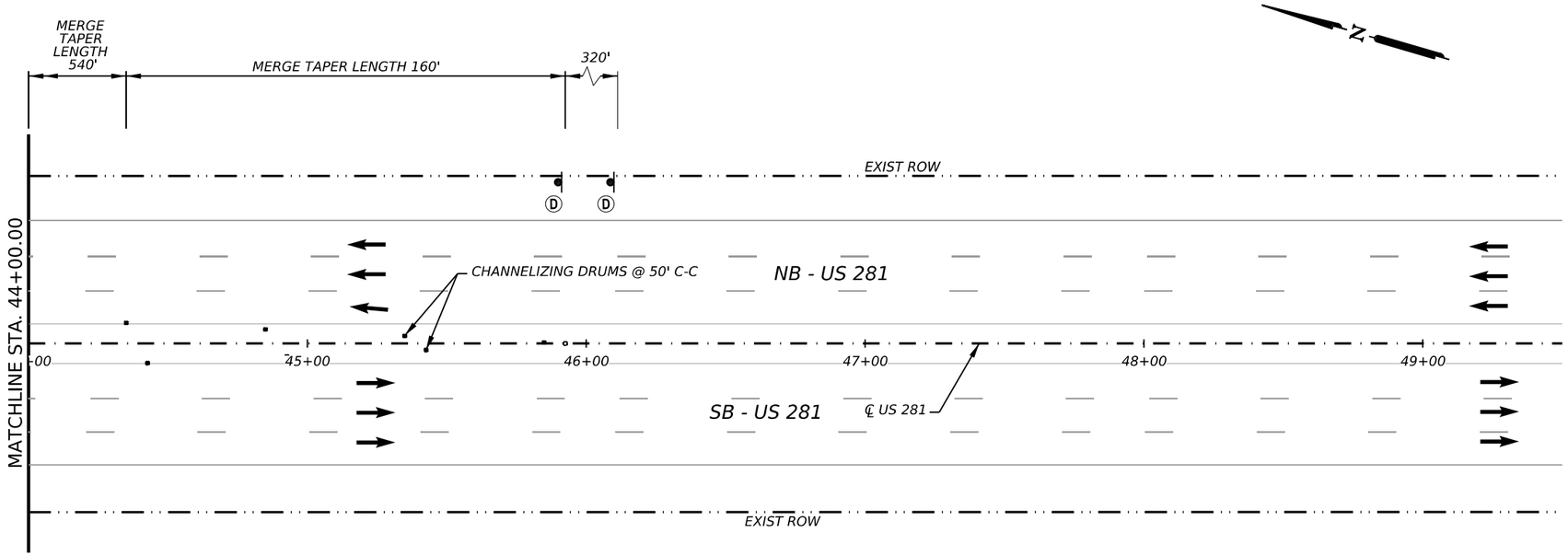
US 281

TRAFFIC CONTROL PLAN PHASE 3

SHEET 4 OF 5

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		41

DATE: 12/21/2023 4:30:41 PM
FILE: c:\pw\kh1\d0251183\US281_TCP_LAY_PH3.dgn



N

LEGEND

- DIRECTION OF TRAFFIC FLOW
- WORK ZONE THIS PHASE
- PREVIOUS CONSTRUCTION
- CHANNELIZING DRUMS
- SIGN
- TYPE III BARRICADE
- L
- WK ZN PAV MRK REMOV (W)8"(SLD)
- N WK ZN PAV MRK REMOV (W)(WORD)
- O WK ZN PAV MRK REMOV (W)(ARROW)
- P WK ZN PAV MRK REMOV (W)(UTURN)

NOTES:

1. CONTRACTOR MAY ONLY CONSTRUCT ONE CROSS STREET AT A TIME. ACCESS TO BE MAINTAINED AT ALL TIMES.
2. FOR ADDITIONAL INFORMATION, SEE TXDOT TCP STANDARD SHEETS.
3. EXISTING PAVEMENT MARKINGS CONFLICTING WITH WORK ZONE PAVEMENT MARKINGS SHALL BE REMOVED AND IS SUBSIDIARY TO ITEM 502.
4. SEE TCP SIGN LEGEND FOR SIGN TYPE AND SIZE.
5. ALL PAVEMENT MARKINGS ARE EXISTING UNLESS SPECIFIED OTHERWISE.

0' 25' 50'

SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER

11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

US 281

TRAFFIC CONTROL PLAN PHASE 3

SHEET 5 OF 5

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	
6	SEE TITLE SHEET	
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		42

DATE: 11/21/2023 3:20:09 PM
FILE: c:\pw\kh1\d02511831US281_TCP_LAY_PH3.dgn

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.

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

1. The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of temporary traffic control devices, construction pavement markings, and typical work zone signs. The information contained in these sheets meet or exceed the requirements shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).

2. The development and design of the Traffic Control Plan (TCP)is the responsibility of the Engineer.

3. The Contractor may propose changes to the TCP that are signed and sealed by a licensed professional engineer for approval. The Engineer may develop, sign and seal Contractor proposed changes.

4. The Contractor is responsible for installing and maintaining the traffic control devices as shown in the plans. The Contractor may not move or change the approximate location of any device without the approval of the Engineer.

5. Geometric design of lane shifts and detours should, when possible, meet the applicable design criteria contained in manuals such as the American Association of State Highway and Transportation Officials (AASHTO), "A Policy on Geometric Design of Highways and Streets," the TxDOT "Roadway Design Manual" or engineering judgment.

6. When projects abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor shall erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign shall be revised to show appropriate work zone distance.

7. The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.

8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.

9. The temporary traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.

10. Where highway construction or maintenance work is being undertaken, other than mobile operations as defined by the Texas Manual on Uniform Traffic Control Devices, CSJ limit signs are required. CSJ limit signs are shown on BC(2). The OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits. For mobile operations, CSJ limit signs are not required.

11. Traffic control devices should be in place only while work is actually in progress or a definite need exists.

12. The Engineer has the final decision on the location of all traffic control devices.

13. Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

WORKER SAFETY NOTES:

1. Workers on foot who are exposed to traffic or to construction equipment within the right-of-way shall wear high-visibility safety apparel meeting the requirements of ISEA "American National Standard for High-Visibility Apparel," or equivalent revisions, and labeled as ANSI 107-2004 standard performance for Class 2 or 3 risk exposure. Class 3 garments should be considered for high traffic volume work areas or night time work.

2. Except in emergency situations, flagger stations shall be illuminated when flagging is used at night.

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

1. Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources.

2. Work zone traffic control devices shall be compliant with the Manual for Assessing safety Hardware (MASH).

THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)
TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD)
TRAFFIC ENGINEERING STANDARD SHEETS

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

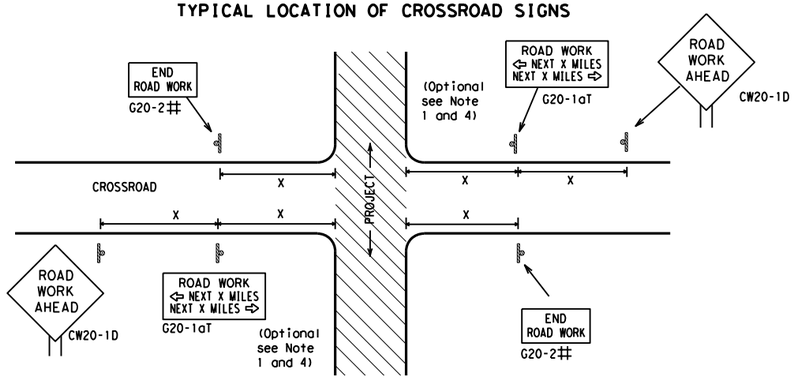
BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	SAT	BEXAR		43
5-10 5-21				

DATE: 11/21/2023
FILE: c:\pw\ken\d0279\16\bc-21.dgn

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.

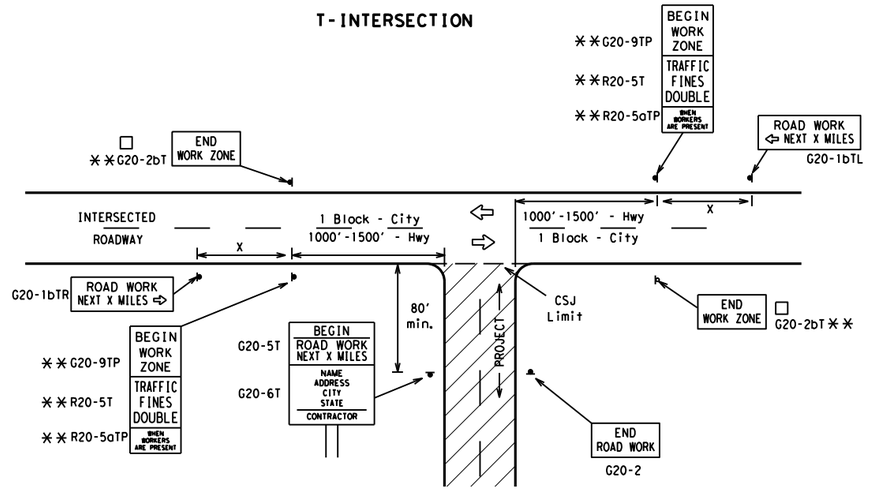
TYPICAL LOCATION OF CROSSROAD SIGNS



May be mounted on back of "ROAD WORK AHEAD"(CW20-1D) sign with approval of Engineer. (See note 2 below)

1. The typical minimum signing on a crossroad approach should be a "ROAD WORK AHEAD" (CW20-1D)sign and a (G20-2) "END ROAD WORK" sign, unless noted otherwise in plans.
2. The Engineer may use the reduced size 36" x 36" ROAD WORK AHEAD (CW20-1D) sign mounted back to back with the reduced size 36" x 18" "END ROAD WORK"(G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume as per TMUTCD Part 5. This information shall be shown in the plans.
3. Based on existing field conditions, the Engineer/Inspector may require additional signs such as FLAGGER AHEAD, LOOSE GRAVEL, or other appropriate signs. When additional signs are required, these signs will be considered part of the minimum requirements. The Engineer/Inspector will determine the proper location and spacing of any sign not shown on the BC sheets, Traffic Control Plan sheets or the Work Zone Standard Sheets.
4. The "ROAD WORK NEXT X MILES"(G20-1aT)sign shall be required at high volume crossroads to advise motorists of the length of construction in either direction from the intersection. The Engineer will determine whether a roadway is considered high volume.
5. Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
6. When work occurs in the intersection area, appropriate traffic control devices, as shown elsewhere in the plans or as determined by the Engineer/Inspector, shall be in place.

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

1. The Engineer will determine the types and location of any additional traffic control devices, such as a flagger and accompanying signs, or other signs, that should be used when work is being performed at or near an intersection.
2. If construction closes the road at a T-intersection, the Contractor shall place the "CONTRACTOR NAME"(G20-6T) sign behind the Type 3 Barricades for the road closure (see BC(10) also). The "ROAD WORK NEXT X MILES" left arrow(G20-1bTL) and "ROAD WORK NEXT X MILES" right arrow (G20-1bTR)" signs shall be replaced by the detour signing called for in the plans.

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING[1,5,6]

SIZE

Sign Number or Series	Conventional Road	Expressway/ Freeway
CW20[4] CW21 CW22 CW23 CW25	48" x 48"	48" x 48"
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"

SPACING

Posted Speed	Sign △ Spacing "X"
MPH	Feet (Apprx.)
30	120
35	160
40	240
45	320
50	400
55	500[2]
60	600[2]
65	700[2]
70	800[2]
75	900[2]
80	1000[2]
*	*[3]

* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

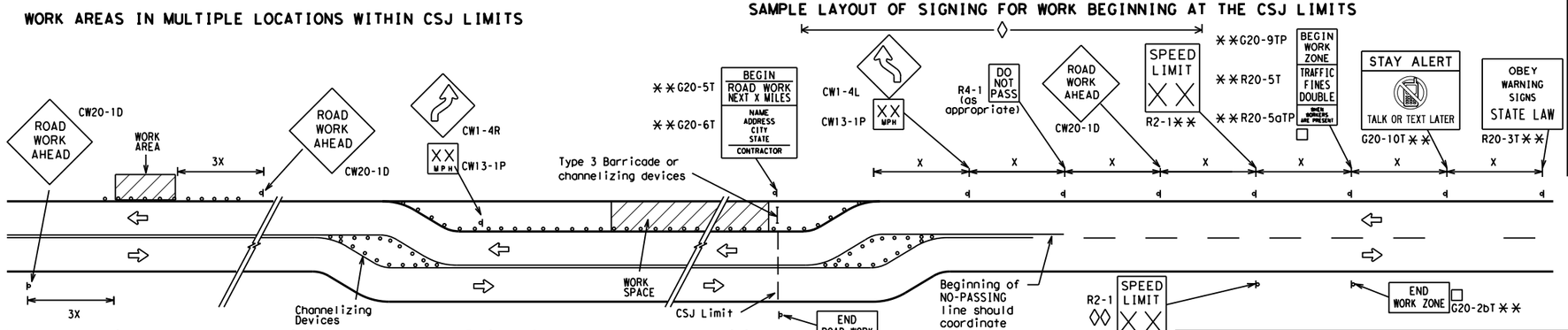
△ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

GENERAL NOTES

1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may be used on low volume crossroads at the discretion of the Engineer as per TMUTCD Part 5. See Note 2 under "Typical Location of Crossroad Signs".
5. Only diamond shaped warning sign sizes are indicated.
6. See sign size listing in "TMUTCD", Sign Appendix or the "Standard Highway Sign Designs for Texas" manual for complete list of available sign design sizes.

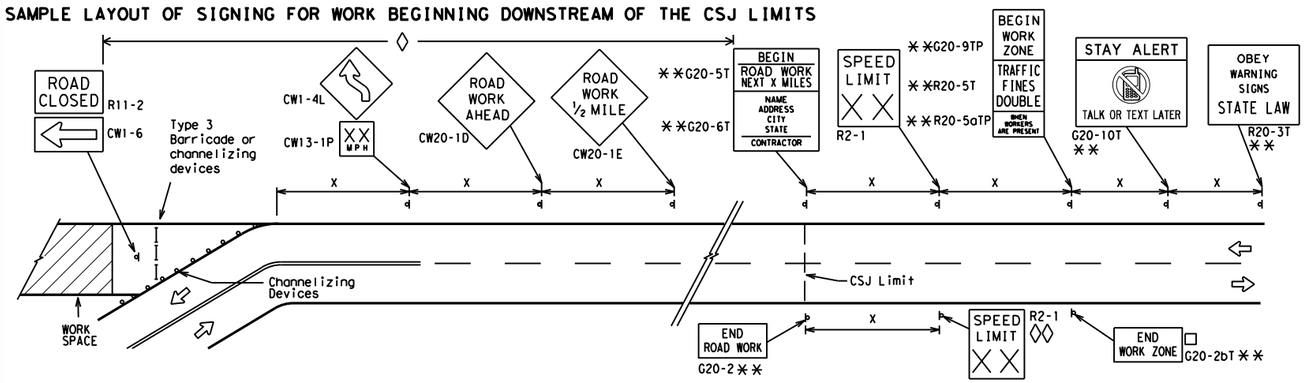
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing of signs and channelizing devices.

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING DOWNSTREAM OF THE CSJ LIMITS



NOTES

The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES"(G20-5T)sign for each specific project. This distance shall replace the "X" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.

□ The "BEGIN WORK ZONE"(G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.

** CSJ limit signing is required for highway construction and maintenance work, with the exception of mobile operations.

◊ Area for placement of "ROAD WORK AHEAD" (CW20-1D)sign and other signs or devices as called for on the Traffic Control Plan.

◊◊ Contractor will install a regulatory speed limit sign at the end of the work zone.

LEGEND

⊢⊣	Type 3 Barricade
○ ○ ○	Channelizing Devices
▬	Sign
X	See Typical Construction Warning Sign Size and Spacing chart or the TMUTCD for sign spacing requirements.

SHEET 2 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SAT	BEXAR		44

DATE: 11/21/2023
FILE: c:\pw\mnl\d0277916\bc-21.dgn

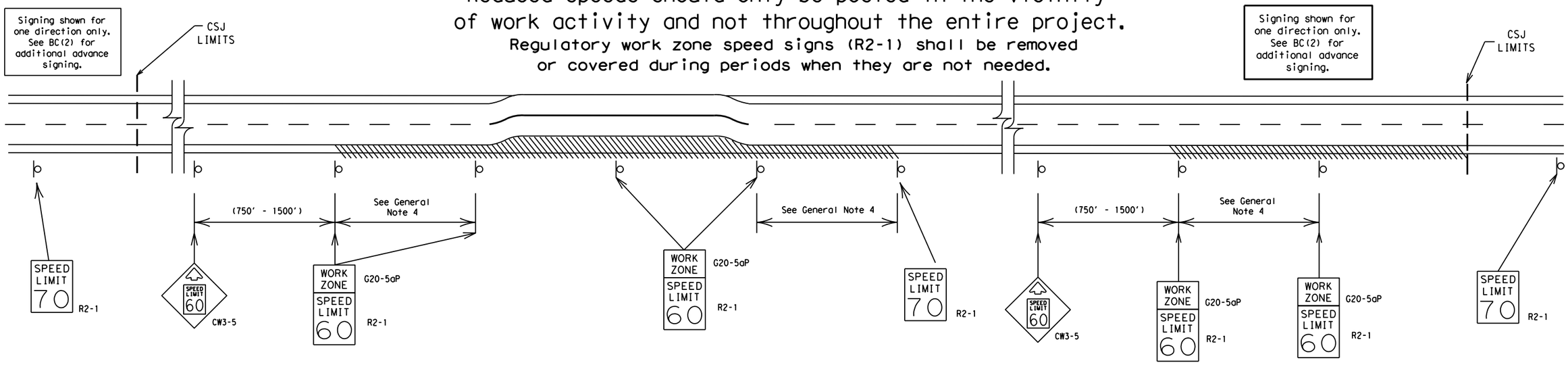
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

Work zone speed limits shall be regulatory, established in accordance with the "Procedures for Establishing Speed Zones," and approved by the Texas Transportation Commission, or by City Ordinance when within Incorporated City Limits.

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project.

Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit should be included on the design of the traffic control plans when restricted geometrics with a lower design speed are present in the work zone and modification of the geometrics to a higher design speed is not feasible.

Long/Intermediate Term Work Zone Speed Limit signs, when approved as described above, should be posted and visible to the motorist when work activity is present. Work activity may also be defined as a change in the roadway that requires a reduced speed for motorists to safely negotiate the work area, including:

a) rough road or damaged pavement surface
b) substantial alteration of roadway geometrics (diversions)
c) construction detours
d) grade
e) width
f) other conditions readily apparent to the driver

As long as any of these conditions exist, the work zone speed limit signs should remain in place.

SHORT TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit may be included on the design of the traffic control plans when workers or equipment are not behind concrete barrier, when work activity is within 10 feet of the traveled way or actually in the traveled way.

Short Term Work Zone Speed Limit signs should be posted and visible to the motorists only when work activity is present. When work activity is not present, signs shall be removed or covered.
(See Removing or Covering on BC(4)).

GENERAL NOTES

1. Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
2. Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
3. Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
4. Frequency of work zone speed limit signs should be:
   40 mph and greater 0.2 to 2 miles
   35 mph and less 0.2 to 1 mile
5. Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
6. Fabrication, erection and maintenance of the"ADVANCE SPEED LIMIT"(CW3-5)sign, "WORK ZONE"(G20-5aP) plaque and the "SPEED LIMIT"(R2-1)signs shall not be paid for directly, but shall be considered subsidiary to Item 502.
7. Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
8. Techniques that may help reduce traffic speeds include but are not limited to:
   A. Law enforcement.
   B. Flagger stationed next to sign.
   C. Portable changeable message sign (PCMS).
   D. Low-power (drone) radar transmitter.
   E. Speed monitor trailers or signs.
9. Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
10. For more specific guidance concerning the type of work, work zone conditions and factors impacting allowable regulatory construction speed zone reduction see TxDOT form #1204 in the TxDOT e-form system.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

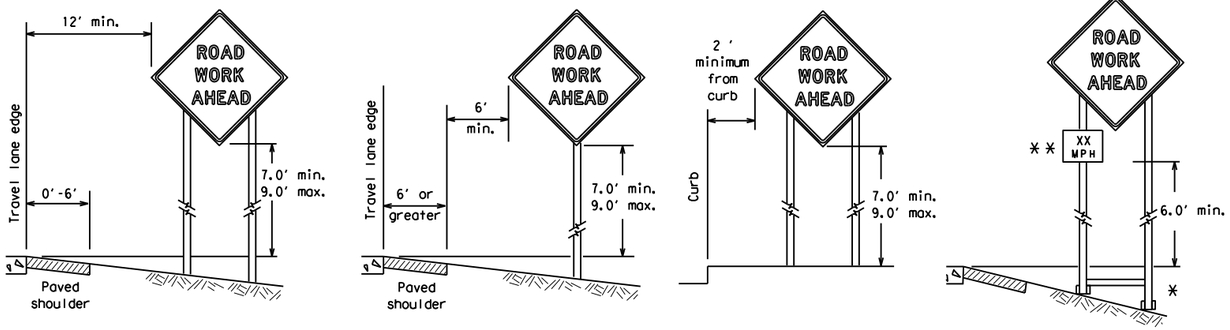
BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SAT	BEXAR		45

DATE: 11/21/2023
FILE: c:\pw\en\d027916\bc-21.dgn

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.

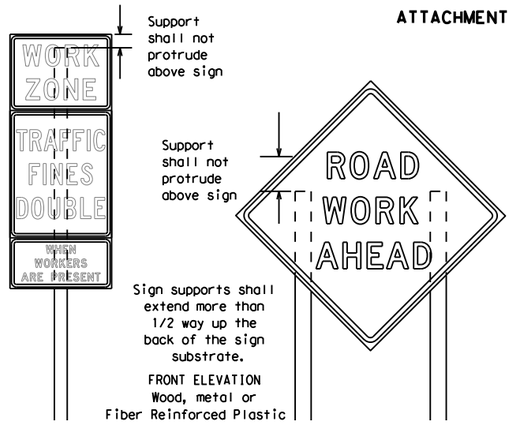
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

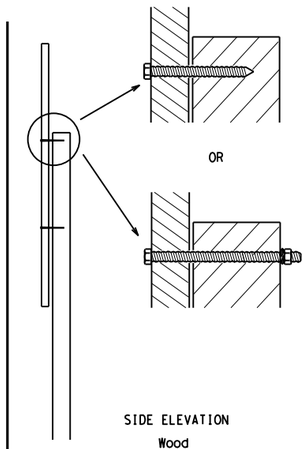


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

** When plaques are placed on dual-leg supports, they should be attached to the upright nearest the travel lane. Supplemental plaques (advisory or distance) should not cover the surface of the parent sign.

ATTACHMENT FOR SIGN SUPPORTS





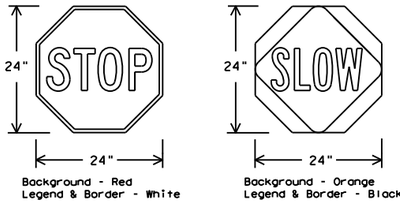
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

Nails shall NOT be allowed. Each sign shall be attached directly to the sign support. Multiple signs shall not be joined or spliced by any means. Wood supports shall not be extended or repaired by splicing or other means.

Splicing embedded perforated square metal tubing in order to extend post height will only be allowed when the splice is made using four bolts, two above and two below the spice point. Splice must be located entirely behind the sign substrate, not near the base of the support. Splice insert lengths should be at least 5 times nominal post size, centered on the splice and of at least the same gauge material.

STOP/SLOW PADDLES

1. STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24".
2. STOP/SLOW paddles shall be retroreflectorized when used at night.
3. STOP/SLOW paddles may be attached to a staff with a minimum length of 6' to the bottom of the sign.
4. Any lights incorporated into the STOP or SLOW paddle faces shall only be as specifically described in Section 6E.03 Hand Signaling Devices in the TMUTCD.



SHEETING REQUIREMENTS (WHEN USED AT NIGHT)		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	ORANGE	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDER	WHITE	TYPE B OR C SHEETING
LEGEND & BORDER	BLACK	ACRYLIC NON-REFLECTIVE FILM

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

1. Permanent signs are used to give notice of traffic laws or regulations, call attention to conditions that are potentially hazardous to traffic operations, show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, specific service (LOGO), or cultural information. Drivers proceeding through a work zone need the same, if not better route guidance as normally installed on a roadway without construction.
2. When permanent regulatory or warning signs conflict with work zone conditions, remove or cover the permanent signs until the permanent sign message matches the roadway condition. For details for covering large guide signs see the TS-CD standard.
3. When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
4. If existing signs are to be relocated on their original supports, they shall be installed on crashworthy bases as shown on the SMD Standard sheets. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards. This work should be paid for under the appropriate pay item for relocating existing signs.
5. If permanent signs are to be removed and relocated using temporary supports, the Contractor shall use crashworthy supports as shown on the BC standard sheets, TLRS standard sheets or the CWZTCD list. The signs shall meet the required mounting heights shown on the BC, or the SMD standard sheets during construction. This work should be paid for under the appropriate pay item for relocating existing signs.
6. Any sign or traffic control device that is struck or damaged by the Contractor or his/her construction equipment shall be replaced as soon as possible by the Contractor to ensure proper guidance for the motorists. This will be subsidiary to Item 502.

GENERAL NOTES FOR WORK ZONE SIGNS

1. Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. All signs shall be installed in accordance with the plans or as directed by the Engineer. Signs shall be used to regulate, warn, and guide the traveling public safely through the work zone.
5. The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish other work zone signs that are shown in the TMUTCD but may have been omitted from the plans. Any variation in the plans shall be documented by written agreement between the Engineer and the Contractor's Responsible Person. All changes must be documented in writing before being implemented. This can include documenting the changes in the Inspector's TxDOT diary and having both the Inspector and Contractor initial and date the agreed upon changes.
6. The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD) for small roadside signs. Supports for temporary large roadside signs shall meet the requirements detailed on the Temporary Large Roadside Signs (TLRS) standard sheets. The Contractor shall install the sign support in accordance with the manufacturer's recommendations. If there is a question regarding installation procedures, the Contractor shall furnish the Engineer a copy of the manufacturer's installation recommendations so the Engineer can verify the correct procedures are being followed.
7. The Contractor is responsible for installing signs on approved supports and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
8. Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1 inch.
9. The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.

DURATION OF WORK (as defined by the "Texas Manual on Uniform Traffic Control Devices" Part 6)

1. The types of sign supports, sign mounting height, the size of signs, and the type of sign substrates can vary based on the type of work being performed. The Engineer is responsible for selecting the appropriate size sign for the type of work being performed. The Contractor is responsible for ensuring the sign support, sign mounting height and substrate meets manufacturer's recommendations in regard to crashworthiness and duration of work requirements.
   a. Long-term stationary - work that occupies a location more than 3 days.
   b. Intermediate-term stationary - work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than one hour.
   c. Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
   d. Short, duration - work that occupies a location up to 1 hour.
   e. Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

SIGN MOUNTING HEIGHT

1. The bottom of Long-term/Intermediate-term signs shall be at least 7 feet, but not more than 9 feet, above the paved surface, except as shown for supplemental plaques mounted below other signs.
2. The bottom of Short-term/Short Duration signs shall be a minimum of 1 foot above the pavement surface but no more than 2 feet above the ground.
3. Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
4. Short-term/Short Duration signs shall be used only during daylight and shall be removed at the end of the workday or raised to appropriate Long-term/Intermediate sign height.
5. Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

SIZE OF SIGNS

1. The Contractor shall furnish the sign sizes shown on BC (2) unless otherwise shown in the plans or as directed by the Engineer.

SIGN SUBSTRATES

1. The Contractor shall ensure the sign substrate is installed in accordance with the manufacturer's recommendations for the type of sign support that is being used. The CWZTCD lists each substrate that can be used on the different types and models of sign supports.
2. "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
3. All wooden individual sign panels fabricated from 2 or more pieces shall have one or more plywood cleat, 1/2" thick by 6" wide, fastened to the back of the sign and extending fully across the sign. The cleat shall be attached to the back of the sign using wood screws that do not penetrate the face of the sign panel. The screws shall be placed on both sides of the splice and spaced at 6" centers. The Engineer may approve other methods of splicing the sign face.

REFLECTIVE SHEETING

1. All signs shall be retroreflective and constructed of sheeting meeting the color and retro-reflectivity requirements of DMS-8300 for rigid signs or DMS-8310 for roll-up signs. The web address for DMS specifications is shown on BC(1).
2. White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
3. Orange sheeting, meeting the requirements of DMS-8300 Type B_{FL} or Type C_{FL}, shall be used for rigid signs with orange backgrounds.

SIGN LETTERS

1. All sign letters and numbers shall be clear, and open rounded type uppercase alphabet letters as approved by the Federal Highway Administration (FHWA) and as published in the "Standard Highway Sign Design for Texas" manual. Signs, letters and numbers shall be of first class workmanship in accordance with Department Standards and Specifications.

REMOVING OR COVERING

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
2. Long-term stationary or intermediate stationary signs installed on square metal tubing may be turned away from traffic 90 degrees when the sign message is not applicable. This technique may not be used for signs installed in the median of divided highways or near any intersections where the sign may be seen from approaching traffic.
3. Signs installed on wooden skids shall not be turned at 90 degree angles to the roadway. These signs should be removed or completely covered when not required.
4. When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night, without damaging the sign sheeting.
5. Burlap shall NOT be used to cover signs.
6. Duct tape or other adhesive material shall NOT be affixed to a sign face.
7. Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

SIGN SUPPORT WEIGHTS

1. Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
4. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
5. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall NOT be used.
6. Rubber ballasts designed for channelizing devices should not be used for ballast on portable sign supports. Sign supports designed and manufactured with rubber bases may be used when shown on the CWZTCD list.
7. Sandbags shall only be placed along or laid over the base supports of the traffic control device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners. Sandbags shall be placed along the length of the skids to weigh down the sign support.
8. Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

FLAGS ON SIGNS

1. Flags may be used to draw attention to warning signs. When used, the flag shall be 16 inches square or larger and shall be orange or fluorescent red-orange in color. Flags shall not be allowed to cover any portion of the sign face.

Texas Department of Transportation | Traffic Safety Division Standard

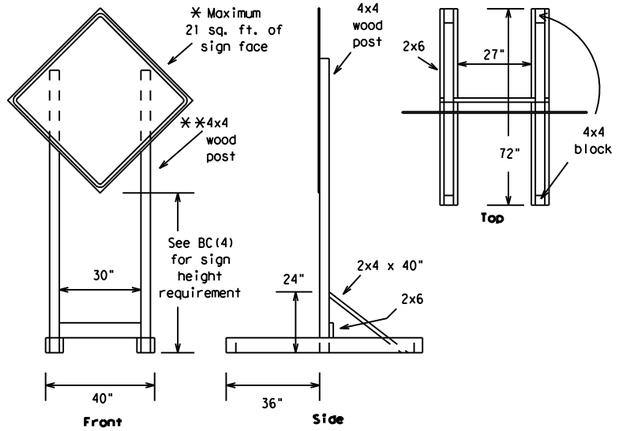
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

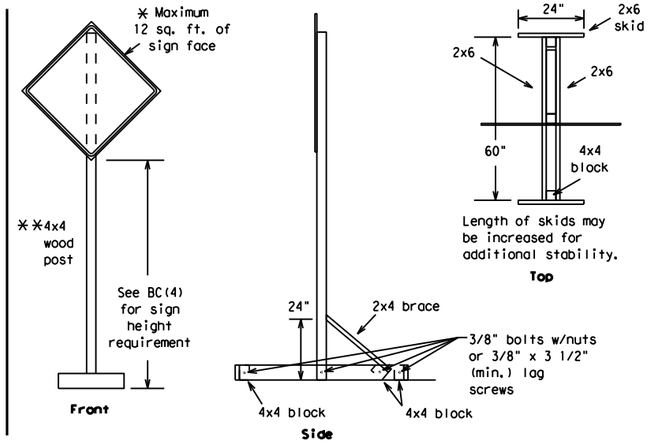
BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SAT	BEXAR		46

DATE: 11/21/2023
FILE: c:\pw\en\d027916\bc-21.dgn

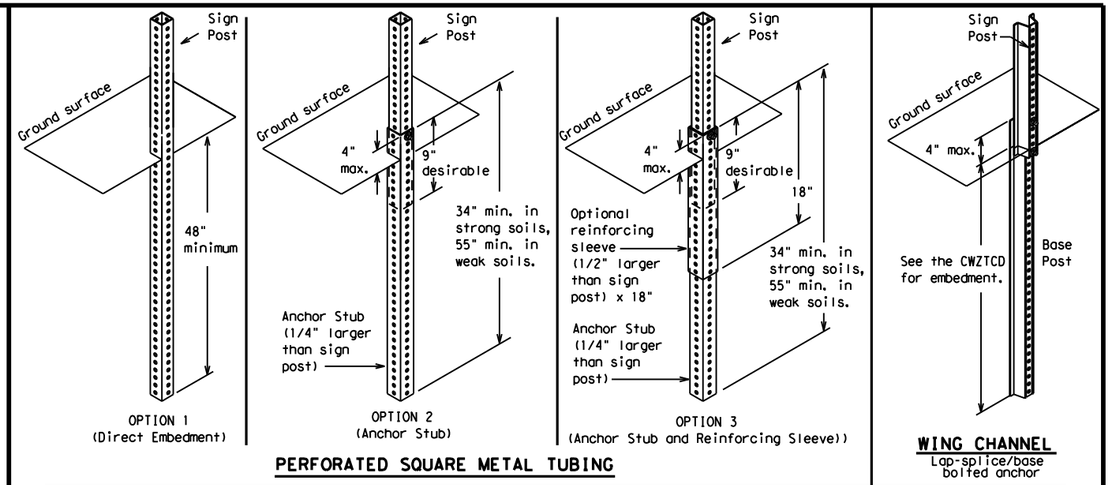
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.





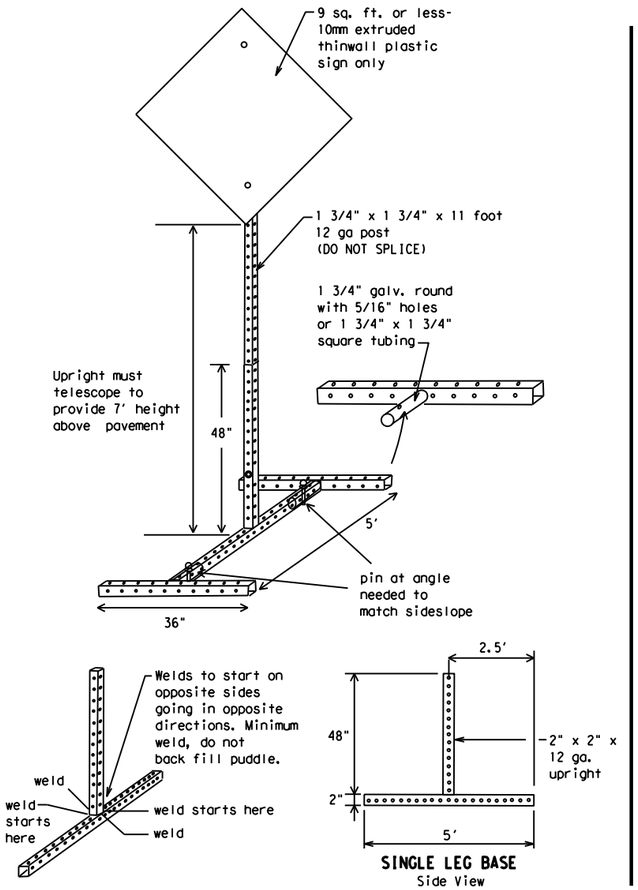
SKID MOUNTED WOOD SIGN SUPPORTS

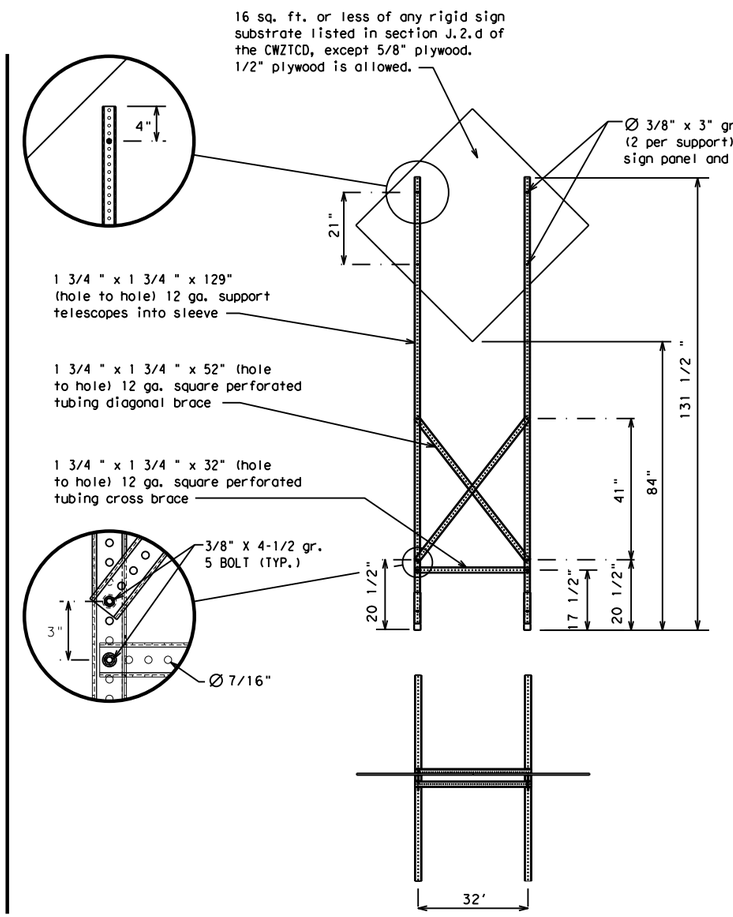
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

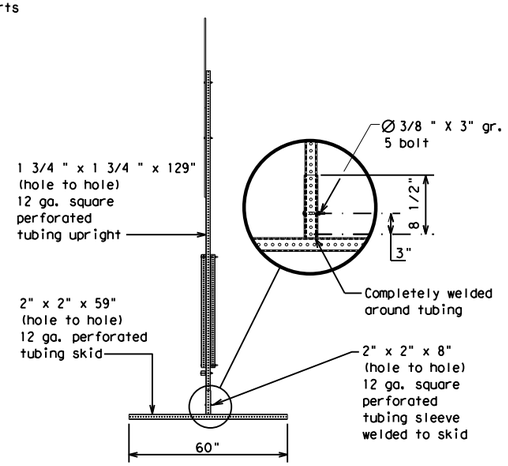


GROUND MOUNTED SIGN SUPPORTS

Refer to the CWZTCD and the manufacturer's installation procedure for each type sign support.
The maximum sign square footage shall adhere to the manufacturer's recommendation.
Two post installations can be used for larger signs.







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

WEDGE ANCHORS

Both steel and plastic Wedge Anchor Systems as shown on the SMD Standard Sheets may be used as temporary sign supports for signs up to 10 square feet of sign face. They may be set in concrete or in sturdy soils if approved by the Engineer. (See web address for "Traffic Engineering Standard Sheets" on BC(1)).

OTHER DESIGNS

MORE DETAILS OF APPROVED LONG/INTERMEDIATE AND SHORT TERM SUPPORTS CAN BE FOUND ON THE CWZTCD LIST. SEE BC(1) FOR WEBSITE LOCATION.

GENERAL NOTES

1. Nails may be used in the assembly of wooden sign supports, but 3/8" bolts with nuts or 3/8" x 3 1/2" lag screws must be used on every joint for final connection.
2. No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
3. When project is completed, all sign supports and foundations shall be removed from the project site. This will be considered subsidiary to Item 502.

* See BC(4) for definition of "Work Duration."

** Wood sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.

☐ See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SAT	BEXAR		47

DATE: 11/21/2023
FILE: c:\pw\en\d0277916\bc-21.dgn

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.

WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

PORTABLE CHANGEABLE MESSAGE SIGNS

1. The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
2. Messages on PCMS should contain no more than 8 words (about four to eight characters per word), not including simple words such as "TO," "FOR," "AT," etc.
3. Messages should consist of a single phase, or two phases that alternate. Three-phase messages are not allowed. Each phase of the message should convey a single thought, and must be understood by itself.
4. Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
5. Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
6. When in use, the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
7. The message term "WEEKEND" should be used only if the work is to start on Saturday morning and end by Sunday evening at midnight. Actual days and hours of work should be displayed on the PCMS if work is to begin on Friday evening and/or continue into Monday morning.
8. The Engineer/Inspector may select one of two options which are available for displaying a two-phase message on a PCMS. Each phase may be displayed for either four seconds each or for three seconds each.
9. Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
10. Do not present redundant information on a two-phase message; i.e., keeping two lines of the message the same and changing the third line.
11. Do not use the word "Danger" in message.
12. Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
13. Do not display messages that scroll horizontally or vertically across the face of the sign.
14. The following table lists abbreviated words and two-word phrases that are acceptable for use on a PCMS. Both words in a phrase must be displayed together. Words or phrases not on this list should not be abbreviated, unless shown in the TMUTCD.
15. PCMS character height should be at least 18 inches for trailer mounted units. They should be visible from at least 1/2 (.5) mile and the text should be legible from at least 600 feet at night and 800 feet in daylight. Truck mounted units must have a character height of 10 inches and must be legible from at least 400 feet.
16. Each line of text should be centered on the message board rather than left or right justified.
17. If disabled, the PCMS should default to an illegible display that will not alarm motorists and will only be used to alert workers that the PCMS has malfunctioned. A pattern such as a series of horizontal solid bars is appropriate.

WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD
Alternate	ALT
Avenue	AVE
Best Route	BEST RTE
Boulevard	BLVD
Bridge	BRDG
Cannot	CANT
Center	CTR
Construction Ahead	CONST AHD
CROSSING	XING
Detour Route	DETOUR RTE
Do Not	DONT
East	E
Eastbound	(route) E
Emergency	EMER
Emergency Vehicle	EMER VEH
Entrance, Enter	ENT
Express Lane	EXP LN
Expressway	EXPWY
XXXX Feet	XXXX FT
Fog Ahead	FOG AHD
Freeway	FRWY, FWY
Freeway Blocked	FWY BLKD
Friday	FRI
Hazardous Driving	HAZ DRIVING
Hazardous Material	HAZMAT
High-Occupancy	HOV
Vehicle Highway	HWY
Hour(s)	HR, HRS
Information	INFO
It Is	ITS
Junction	JCT
Left	LFT
Left Lane	LFT LN
Lane Closed	LN CLOSED
Lower Level	LWR LEVEL
Maintenance	MAINT

WORD OR PHRASE	ABBREVIATION
Major	MAJ
Miles	MI
Miles Per Hour	MPH
Minor	MNR
Monday	MON
Normal	NORM
North	N
Northbound	(route) N
Parking	PKING
Road	RD
Right Lane	RT LN
Saturday	SAT
Service Road	SERV RD
Shoulder	SHLDR
Slippery	SLIP
South	S
Southbound	(route) S
Speed	SPD
Street	ST
Sunday	SUN
Telephone	PHONE
Temporary	TEMP
Thursday	THURS
To Downtown	TO DWNTN
Traffic	TRAF
Travelers	TRVLRS
Tuesday	TUES
Time Minutes	TIME MIN
Upper Level	UPR LEVEL
Vehicles (s)	VEH, VEHS
Warning	WARN
Wednesday	WED
Weight Limit	WT LIMIT
West	W
Westbound	(route) W
Wet Pavement	WET PVMT
Will Not	WONT

Roadway designation * IH-number, US-number, SH-number, FM-number

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

(The Engineer may approve other messages not specifically covered here.)

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

- FREEWAY CLOSED X MILE
- FRONTAGE ROAD CLOSED
- ROAD CLOSED AT SH XXX
- SHOULDER CLOSED XXX FT
- ROAD CLSD AT FM XXXX
- RIGHT LN CLOSED XXX FT
- RIGHT X LANES CLOSED
- RIGHT X LANES OPEN
- CENTER LANE CLOSED
- DAYTIME LANE CLOSURES
- NIGHT LANE CLOSURES
- I-XX SOUTH EXIT CLOSED
- VARIOUS LANES CLOSED
- EXIT XXX CLOSED X MILE
- EXIT CLOSED
- RIGHT LN TO BE CLOSED
- MALL DRIVEWAY CLOSED
- X LANES CLOSED TUE - FRI
- XXXXXXXX BLVD CLOSED

Other Condition List

- ROADWORK XXX FT
- ROAD REPAIRS XXXX FT
- FLAGGER XXXX FT
- LANE NARROWS XXXX FT
- RIGHT LN NARROWS XXXX FT
- TWO-WAY TRAFFIC XX MILE
- MERGING TRAFFIC XXXX FT
- CONST TRAFFIC XXX FT
- LOOSE GRAVEL XXXX FT
- UNEVEN LANES XXXX FT
- DETOUR X MILE
- ROUGH ROAD XXXX FT
- ROADWORK PAST SH XXXX
- ROADWORK NEXT FRI-SUN
- BUMP XXXX FT
- US XXX EXIT X MILES
- TRAFFIC SIGNAL XXXX FT
- LANES SHIFT *

* LANES SHIFT in Phase 1 must be used with STAY IN LANE in Phase 2.

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

- MERGE RIGHT
- FORM X LINES RIGHT
- DETOUR NEXT X EXITS
- USE XXXXX RD EXIT
- USE EXIT XXX
- USE EXIT I-XX NORTH
- STAY ON US XXX SOUTH
- USE I-XX E TO I-XX N
- TRUCKS USE US XXX N
- WATCH FOR TRUCKS
- WATCH FOR TRUCKS
- EXPECT DELAYS
- EXPECT DELAYS
- PREPARE TO STOP
- REDUCE SPEED XXX FT
- END SHOULDER USE
- USE OTHER ROUTES
- WATCH FOR WORKERS
- STAY IN LANE *

Location List

- AT FM XXXX
- BEFORE RAILROAD CROSSING
- NEXT X MILES
- PAST US XXX EXIT
- XXXXXXX TO XXXXXXX
- US XXX TO FM XXXX

Warning List

- SPEED LIMIT XX MPH
- MAXIMUM SPEED XX MPH
- MINIMUM SPEED XX MPH
- ADVISORY SPEED XX MPH
- RIGHT LANE EXIT
- USE CAUTION
- DRIVE SAFELY
- DRIVE WITH CARE

** Advance Notice List

- TUE-FRI XX AM- X PM
- APR XX-XX X PM-X AM
- BEGINS MONDAY
- BEGINS MAY XX
- MAY X-X XX PM - XX AM
- NEXT FRI-SUN
- XX AM TO XX PM
- NEXT TUE AUG XX
- TONIGHT XX PM- XX AM

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

1. Only 1 or 2 phases are to be used on a PCMS.
2. The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
3. A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
4. A Location Phase is necessary only if a distance or location is not included in the first phase selected.
5. If two PCMS are used in sequence, they must be separated by a minimum of 1000 ft. Each PCMS shall be limited to two phases, and should be understandable by themselves.
6. For advance notice, when the current date is within seven days of the actual work date, calendar days should be replaced with days of the week. Advance notification should typically be for no more than one week prior to the work.

WORDING ALTERNATIVES

1. The words RIGHT, LEFT and ALL can be interchanged as appropriate.
2. Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
3. EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
4. Highway names and numbers replaced as appropriate.
5. ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
6. AHEAD may be used instead of distances if necessary.
7. FT and MI, MILE and MILES interchanged as appropriate.
8. AT, BEFORE and PAST interchanged as needed.
9. Distances or AHEAD can be eliminated from the message if a location phase is used.

PCMS SIGNS WITHIN THE R.O.W. SHALL BE BEHIND GUARDRAIL OR CONCRETE BARRIER OR SHALL HAVE A MINIMUM OF FOUR (4) PLASTIC DRUMS PLACED PERPENDICULAR TO TRAFFIC ON THE UPSTREAM SIDE OF THE PCMS, WHEN EXPOSED TO ONE DIRECTION OF TRAFFIC. WHEN EXPOSED TO TWO WAY TRAFFIC, THE FOUR DRUMS SHOULD BE PLACED WITH ONE DRUM AT EACH OF THE FOUR CORNERS OF THE UNIT.

FULL MATRIX PCMS SIGNS

1. When Full Matrix PCMS signs are used, the character height and legibility/visibility requirements shall be maintained as listed in Note 15 under "PORTABLE CHANGEABLE MESSAGE SIGNS" above.
2. When symbol signs, such as the "Flagger Symbol"(CW20-7) are represented graphically on the Full Matrix PCMS sign and, with the approval of the Engineer, it shall maintain the legibility/visibility requirement listed above.
3. When symbol signs are represented graphically on the Full Matrix PCMS, they shall only supplement the use of the static sign represented, and shall not substitute for, or replace that sign.
4. A full matrix PCMS may be used to simulate a flashing arrow board provided it meets the visibility, flash rate and dimming requirements on BC(7), for the same size arrow.

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

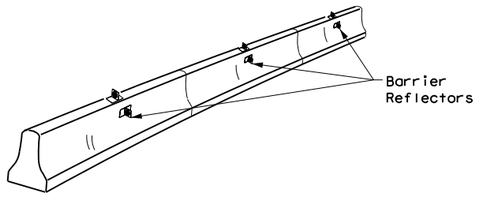
BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SAT	BEXAR		48

DATE: 11/21/2023
FILE: c:\pw\en\cd027916\bc-21.dgn

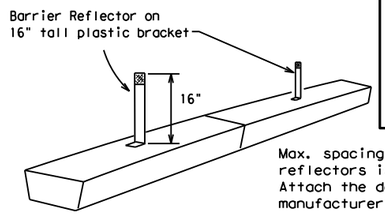
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 512.



CONCRETE TRAFFIC BARRIER (CTB)

3. Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB. An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector. The Barrier Reflector mounted on the side of the CTB shall be located directly below the reflector mounted on top of the barrier, as shown in the detail above.
4. Where CTB separates two-way traffic, three barrier reflectors shall be mounted on each section of CTB. The reflector unit on top shall have two yellow reflective faces (Bi-Directional)while the reflectors on each side of the barrier shall have one yellow reflective face, as shown in the detail above.
5. When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
6. Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
7. Maximum spacing of Barrier Reflectors is forty (40) feet.
8. Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
9. Attachment of Barrier Reflectors to CTB shall be per manufacturer's recommendations.
10. Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer.
11. Single slope barriers shall be delineated as shown on the above detail.

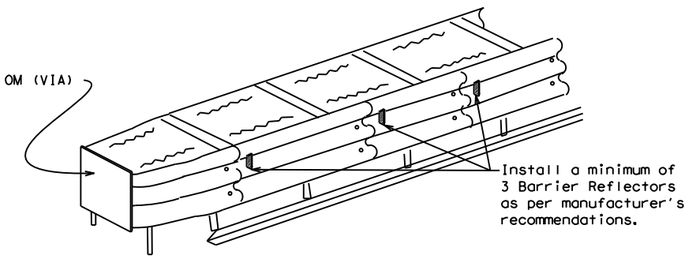


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

LPCB is approved for use in work zone locations, where the posted speed is 45mph, or less. See Roadway Standard Sheet LPCB.

LOW PROFILE CONCRETE BARRIER (LPCB)

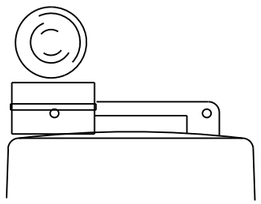


DELINEATION OF END TREATMENTS

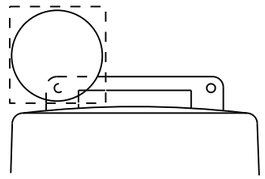
END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet the apppropriate crashworthy standards as defined in the Manual for Assessing Safety Hardware (MASH). Refer to the CWZTCD List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.



Warning reflector may be round or square.Must have a yellow reflective surface area of at least 30 square inches

WARNING LIGHTS

1. Warning lights shall meet the requirements of the TMUTCD.
2. Warning lights shall NOT be installed on barricades.
3. Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "FL". The Type A Warning Lights shall not be used with signs manufactured with Type B_{FL} or C_{FL} Sheeting meeting the requirements of Departmental Material Specification DMS-8300.
4. Type-C and Type D 360 degree Steady Burn Lights are intended to be used in a series for delineation to supplement other traffic control devices. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "SB".
5. The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
6. When required by the Engineer, the Contractor shall furnish a copy of the warning lights certification. The warning light manufacturer will certify the warning lights meet the requirements of the latest ITE Purchase Specifications for Flashing and Steady-Burn Warning Lights.
7. When used to delineate curves, Type-C and Type D Steady Burn Lights should only be placed on the outside of the curve, not the inside.
8. The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

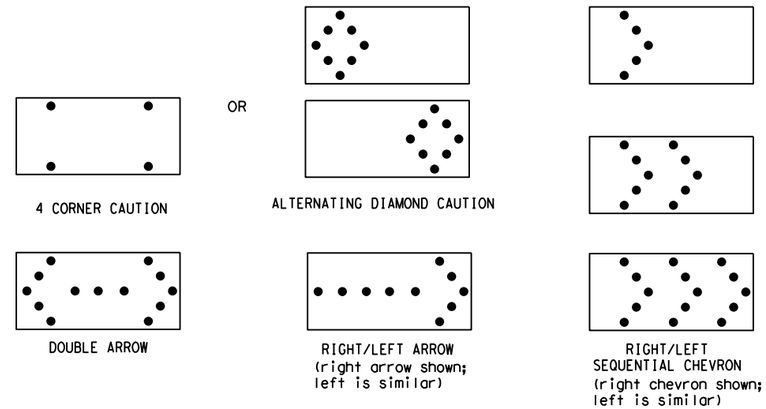
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing devices to form a merging taper may be used for delineation. If used, the successive flashing of the sequential warning lights should occur from the beginning of the taper to the end of the merging taper in order to identify the desired vehicle path. The rate of flashing for each light shall be 65 flashes per minute, plus or minus 10 flashes.
4. Type C and D steady-burn warning lights are intended to be used in a series to delineate the edge of the travel lane on detours, on lane changes, on lane closures, and on other similar conditions.
5. Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
6. Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
7. The maximum spacing for warning lights on drums should be identical to the channelizing device spacing.

WARNING REFLECTORS MOUNTED ON PLASTIC DRUMS AS A SUBSTITUTE FOR TYPE C (STEADY BURN) WARNING LIGHTS

1. A warning reflector or approved substitute may be mounted on a plastic drum as a substitute for a Type C, steady burn warning light at the discretion of the Contractor unless otherwise noted in the plans.
2. The warning reflector shall be yellow in color and shall be manufactured using a sign substrate approved for use with plastic drums listed on the CWZTCD.
3. The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
4. Round reflectors shall be fully reflectorized, including the area where attached to the drum.
5. Square substrates must have a minimum of 30 square inches of reflectorized sheeting. They do not have to be reflectorized where it attaches to the drum.
6. The side of the warning reflector facing approaching traffic shall have sheeting meeting the color and retroreflectivity requirements for DMS 8300-Type B or Type C.
7. When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
8. The warning reflector should be mounted on the side of the handle nearest approaching traffic.
9. The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.

Arrow Boards may be located behind channelizing devices in place for a shoulder taper or merging taper, otherwise they shall be delineated with four (4) channelizing devices placed perpendicular to traffic on the upstream side of traffic.

1. The Flashing Arrow Board should be used for all lane closures on multi-lane roadways, or slow moving maintenance or construction activities on the travel lanes.
2. Flashing Arrow Boards should not be used on two-lane, two-way roadways, detours, diversions or work on shoulders unless the "CAUTION" display (see detail below) is used.
3. The Engineer/Inspector shall choose all appropriate signs, barricades and/or other traffic control devices that should be used in conjunction with the Flashing Arrow Board.
4. The Flashing Arrow Board should be able to display the following symbols:



5. The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
6. The straight line caution display is NOT ALLOWED.
7. The Flashing Arrow Board shall be capable of minimum 50 percent dimming from rated lamp voltage. The flashing rate of the lamps shall not be less than 25 nor more than 40 flashes per minute.
8. Minimum lamp "on time" shall be approximately 50 percent for the flashing arrow and equal intervals of 25 percent for each sequential phase of the flashing chevron.
9. The sequential arrow display is NOT ALLOWED.
10. The flashing arrow display is the TxDOT standard; however, the sequential chevron display may be used during daylight operations.
11. The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
12. A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
13. A full matrix PCMS may be used to simulate a Flashing Arrow Board provided it meets visibility, flash rate and dimming requirements on this sheet for the same size arrow.
14. Minimum mounting height of trailer mounted Arrow Boards should be 7 feet from roadway to bottom of panel.

REQUIREMENTS			
TYPE	MINIMUM SIZE	MINIMUM NUMBER OF PANEL LAMPS	MINIMUM VISIBILITY DISTANCE
B	30 x 60	13	3/4 mile
C	48 x 96	15	1 mile

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

WHEN NOT IN USE, REMOVE THE ARROW BOARD FROM THE RIGHT-OF-WAY OR PLACE THE ARROW BOARD BEHIND CONCRETE TRAFFIC BARRIER OR GUARDRAIL.

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).
2. Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
3. Refer to the CWZTCD for a list of approved TMAs.
4. TMAs are required on freeways unless otherwise noted in the plans.
5. A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
6. The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION ARROW PANEL, REFLECTORS, WARNING LIGHTS & ATTENUATOR

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SAT	BEXAR		49

101

DATE: 11/21/2023
FILE: c:\pw\txdot\d0277916\bc-21.dgn

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.

GENERAL NOTES

1. For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
2. For intermediate term stationary work zones on freeways, drums should be used as the primary channelizing device but may be replaced in tangent sections by vertical panels, or 42" two-piece cones. In tangent sections, one-piece cones may be used with the approval of the Engineer but only if personnel are present on the project at all times to maintain the cones in proper position and location.
3. For short term stationary work zones on freeways, drums are the preferred channelizing device but may be replaced in tapers, transitions and tangent sections by vertical panels, two-piece cones or one-piece cones as approved by the Engineer.
4. Drums and all related items shall comply with the requirements of the current version of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
5. Drums, bases, and related materials shall exhibit good workmanship and shall be free from objectionable marks or defects that would adversely affect their appearance or serviceability.
6. The Contractor shall have a maximum of 24 hours to replace any plastic drums identified for replacement by the Engineer/Inspector. The replacement device must be an approved device.

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

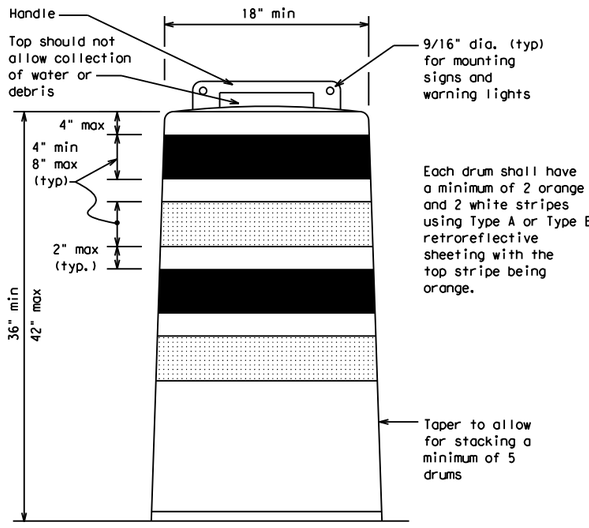
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
3. Plastic drums shall be constructed of lightweight flexible, and deformable materials. The Contractor shall NOT use metal drums or single piece plastic drums as channelization devices or sign supports.
4. Drums shall present a profile that is a minimum of 18 inches in width at the 36 inch height when viewed from any direction. The height of drum unit (body installed on base) shall be a minimum of 36 inches and a maximum of 42 inches.
5. The top of the drum shall have a built-in handle for easy pickup and shall be designed to drain water and not collect debris. The handle shall have a minimum of two widely spaced 9/16 inch diameter holes to allow attachment of a warning light, warning reflector unit or approved compliant sign.
6. The exterior of the drum body shall have a minimum of four alternating orange and white retroreflective circumferential stripes not less than 4 inches nor greater than 8 inches in width. Any non-reflectorized space between any two adjacent stripes shall not exceed 2 inches in width.
7. Bases shall have a maximum width of 36 inches, a maximum height of 4 inches, and a minimum of two footholds of sufficient size to allow base to be held down while separating the drum body from the base.
8. Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
9. Drum body shall have a maximum unballasted weight of 11 lbs.
10. Drum and base shall be marked with manufacturer's name and model number.

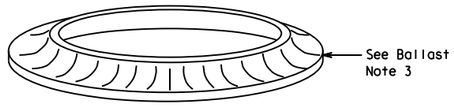
RETROREFLECTIVE SHEETING

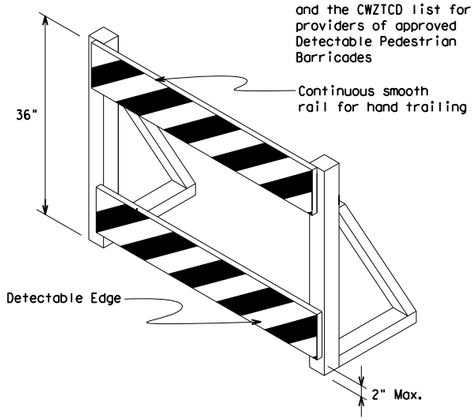
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall be suitable for use on and shall adhere to the drum surface such that, upon vehicular impact, the sheeting shall remain adhered in-place and exhibit no delaminating, cracking, or loss of retroreflectivity other than that loss due to abrasion of the sheeting surface.

BALLAST

1. Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other ballasting devices as approved by the Engineer. Stacking of sandbags will be allowed, however height of sandbags above pavement surface may not exceed 12 inches.
2. Bases with built-in ballast shall weigh between 40 lbs. and 50 lbs. Built-in ballast can be constructed of an integral crumb rubber base or a solid rubber base.
3. Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
4. The ballast shall not be heavy objects, water, or any material that would become hazardous to motorists, pedestrians, or workers when the drum is struck by a vehicle.
5. When used in regions susceptible to freezing, drums shall have drainage holes in the bottoms so that water will not collect and freeze becoming a hazard when struck by a vehicle.
6. Ballast shall not be placed on top of drums.
7. Adhesives may be used to secure base of drums to pavement.



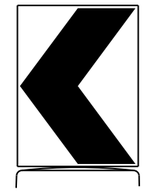




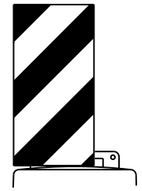
This detail is not intended for fabrication. See note 3 and the CWZTCD list for providers of approved Detectable Pedestrian Barricades

DETECTABLE PEDESTRIAN BARRICADES

1. When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility. Refer to WZ(BTS-2) for Pedestrian Control requirements for Sidewalk Diversions, Sidewalk Detours and Crosswalk Closures.
2. Where pedestrians with visual disabilities normally use the closed sidewalk, a Detectable Pedestrian Barricade shall be placed across the full width of the closed sidewalk instead of a Type 3 Barricade.
3. Detectable pedestrian barricades similar to the one pictured above, longitudinal channelizing devices, some concrete barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian path.
4. Tape, rope, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines (ADAAG)" and should not be used as a control for pedestrian movements.
5. Warning lights shall not be attached to detectable pedestrian barricades.
6. Detectable pedestrian barricades should use 8" nominal barricade rails as shown on BC(10) provided that the top rail provides a smooth continuous rail suitable for hand trailing with no splinters, burrs, or sharp edges.



18" x 24" Sign
(Maximum Sign Dimension)
Chevron CW1-8, Opposing Traffic Lane Divider, Driveway sign D70a, Keep Right R4 series or other signs as approved by Engineer



12" x 24"
Vertical Panel
mount with diagonals sloping down towards travel way

Plywood, Aluminum or Metal sign substrates shall NOT be used on plastic drums

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

1. Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
2. Chevrons and other work zone signs with an orange background shall be manufactured with Type B_{FL} or Type C_{FL} Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.
3. Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A or Type B. Diagonal stripes on Vertical Panels shall slope down toward the intended traveled lane.
4. Other sign messages (text or symbolic) may be used as approved by the Engineer. Sign dimensions shall not exceed 18 inches in width or 24 inches in height, except for the R9 series signs discussed in note 8 below.
5. Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
6. Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
7. Chevrons may be placed on drums on the outside of curves, on merging tapers or on shifting tapers. When used in these locations, they may be placed on every drum or spaced not more than on every third drum. A minimum of three (3) should be used at each location called for in the plans.
8. R9-9, R9-10, R9-11 and R9-11a Sidewalk Closed signs which are 24 inches wide may be mounted on plastic drums, with approval of the Engineer.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

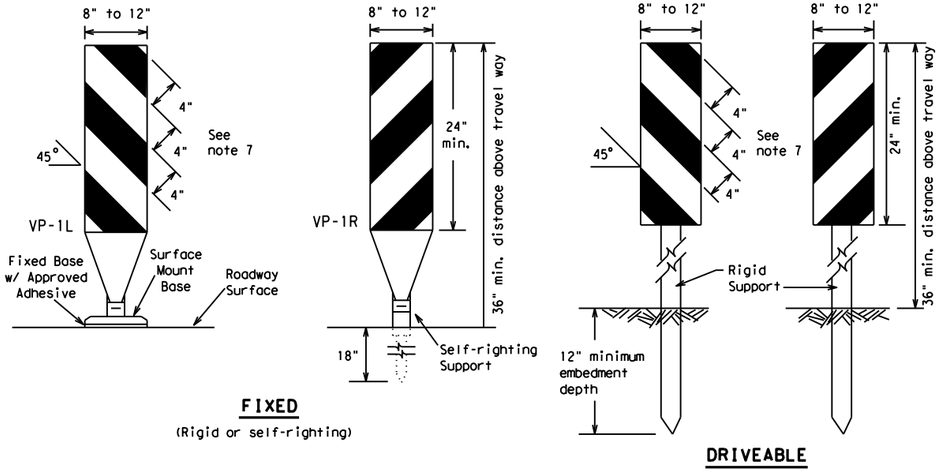
BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	SAT	BEXAR		50
7-13				

102

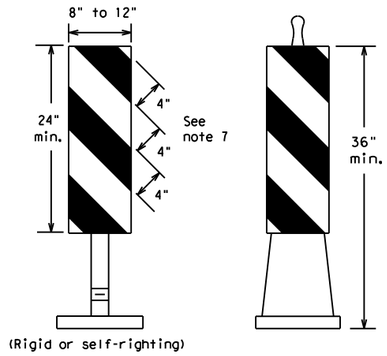
DATE: 11/21/2023
FILE: c:\pw\en\d0277916\bc-21.dgn

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.



FIXED
(Rigid or self-righting)

DRIVEABLE

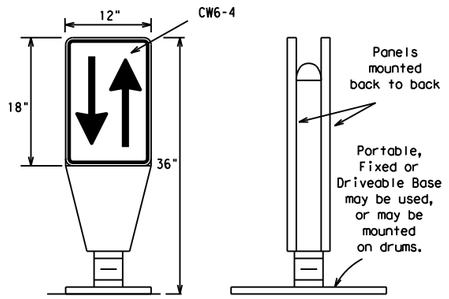


(Rigid or self-righting)

PORTABLE

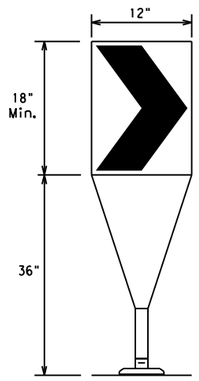
VERTICAL PANELS (VPs)

1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is required. The Engineer/Inspector shall refer to the Roadway Design Manual for additional requirements on the use VP's for drop-offs.
3. VP's should be mounted back to back if used at the edge of cuts adjacent to two-way two lane roadways. Stripes are to be reflective orange and reflective white and should always slope downward toward the travel lane.
4. VP's used on expressways and freeways or other high speed roadways, may have more than 270 square inches of retroreflective area facing traffic.
5. Self-righting supports are available with portable base. See "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
6. Sheeting for the VP's shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
7. Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.



1. Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to two-way operation. OTLD's are used on temporary centerlines. The upward and downward arrows on the sign's face indicate the direction of traffic on either side of the divider. The base is secured to the pavement with an adhesive or rubber weight to minimize movement caused by a vehicle impact or wind gust.
2. The OTLD may be used in combination with 42" cones or VPs.
3. Spacing between the OTLD shall not exceed 500 feet. 42" cones or VPs placed between the OTLD's should not exceed 100 foot spacing.
4. The OTLD shall be orange with a black non-reflective legend. Sheeting for the OTLD shall be retroreflective Type B_{FL} or Type C_{FL} conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



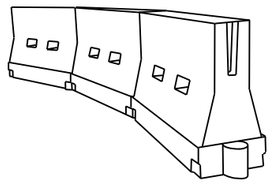
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

1. The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
2. Chevrons are intended to give notice of a sharp change of alignment with the direction of travel and provide additional emphasis and guidance for vehicle operators with regard to changes in horizontal alignment of the roadway.
3. Chevrons, when used, shall be erected on the outside of a sharp curve or turn, or on the far side of an intersection. They shall be in line with and at right angles to approaching traffic. Spacing should be such that the motorist always has three in view, until the change in alignment eliminates its need.
4. To be effective, the chevron should be visible for at least 500 feet.
5. Chevrons shall be orange with a black nonreflective legend. Sheeting for the chevron shall be retroreflective Type B_{FL} or Type C_{FL} conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.
6. For Long Term Stationary use on tapers or transitions on freeways and divided highways, self-righting chevrons may be used to supplement plastic drums but not to replace plastic drums.

CHEVRONS

GENERAL NOTES

1. Work Zone channelizing devices illustrated on this sheet may be installed in close proximity to traffic and are suitable for use on high or low speed roadways. The Engineer/Inspector shall ensure that spacing and placement is uniform and in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
2. Channelizing devices shown on this sheet may have a driveable, fixed or portable base. The requirement for self-righting channelizing devices must be specified in the General Notes or other plan sheets.
3. Channelizing devices on self-righting supports should be used in work zone areas where channelizing devices are frequently impacted by errant vehicles or vehicle related wind gusts making alignment of the channelizing devices difficult to maintain. Locations of these devices shall be detailed elsewhere in the plans. These devices shall conform to the TMUTCD and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
4. The Contractor shall maintain devices in a clean condition and replace damaged, nonreflective, faded, or broken devices and bases as required by the Engineer/Inspector. The Contractor shall be required to maintain proper device spacing and alignment.
5. Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
6. Pavement surfaces shall be prepared in a manner that ensures proper bonding between the adhesives, the fixed mount bases and the pavement surface. Adhesives shall be prepared and applied according to the manufacturer's recommendations.
7. The installation and removal of channelizing devices shall not cause detrimental effects to the final pavement surfaces, including pavement surface discoloration or surface integrity. Driveable bases shall not be permitted on final pavement surfaces. The Engineer/Inspector shall approve all application and removal procedures of fixed bases.



LONGITUDINAL CHANNELIZING DEVICES (LCD)

1. LCDs are crashworthy, lightweight, deformable devices that are highly visible, have good target value and can be connected together. They are not designed to contain or redirect a vehicle on impact.
2. LCDs may be used instead of a line of cones or drums.
3. LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
5. LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
6. LCDs used as barricades placed perpendicular to traffic should have at least one row of reflective sheeting meeting the requirements for barricade rails as shown on BC(10). Place reflective sheeting near the top of the LCD along the full length of the device.

WATER BALLASTED SYSTEMS USED AS BARRIERS

1. Water ballasted systems used as barriers shall not be used solely to channelize road users, but also to protect the work space per the appropriate Manual for Assessing Safety Hardware (MASH) crashworthiness requirements based on roadway speed and barrier application.
2. Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
3. Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
5. When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

If used to channelize pedestrians, longitudinal channelizing devices or water ballasted systems must have a continuous detectable bottom for users of long canes and the top of the unit shall not be less than 32 inches in height.

HOLLOW OR WATER BALLASTED SYSTEMS USED AS LONGITUDINAL CHANNELIZING DEVICES OR BARRIERS

Posted Speed	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'
35		205'	225'	245'	35'	70'
40		265'	295'	320'	40'	80'
45	L = WS	450'	495'	540'	45'	90'
50		500'	550'	600'	50'	100'
55		550'	605'	660'	55'	110'
60		600'	660'	720'	60'	120'
65		650'	715'	780'	65'	130'
70		700'	770'	840'	70'	140'
75		750'	825'	900'	75'	150'
80		800'	880'	960'	80'	160'

** Taper lengths have been rounded off.
L=Length of Taper (FT.) W=Width of Offset (FT.)
S=Posted Speed (MPH)

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SAT	BEXAR		51

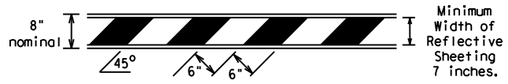
DATE: 11/21/2023
FILE: c:\txdot\1\d027916\bc-21.dgn

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.

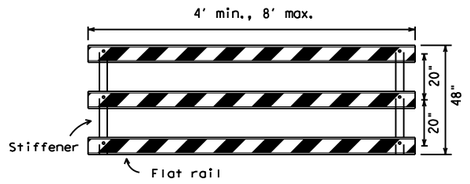
TYPE 3 BARRICADES

1. Refer to the Compliant Work Zone Traffic Control Devices List (CWZTCD) for details of the Type 3 Barricades and a list of all materials used in the construction of Type 3 Barricades.
2. Type 3 Barricades shall be used at each end of construction projects closed to all traffic.
3. Barricades extending across a roadway should have stripes that slope downward in the direction toward which traffic must turn in detouring. When both right and left turns are provided, the chevron striping may slope downward in both directions from the center of the barricade. Where no turns are provided at a closed road, striping should slope downward in both directions toward the center of roadway.
4. Striping of rails, for the right side of the roadway, should slope downward to the left. For the left side of the roadway, striping should slope downward to the right.
5. Identification markings may be shown only on the back of the barricade rails. The maximum height of letters and/or company logos used for identification shall be 1".
6. Barricades shall not be placed parallel to traffic unless an adequate clear zone is provided.
7. Warning lights shall NOT be installed on barricades.
8. Where barricades require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand is recommended. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight. Sand bags shall not be stacked in a manner that covers any portion of a barricade rails reflective sheeting. Rock, concrete, iron, steel or other solid objects will NOT be permitted. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall not be used for sandbags. Sandbags shall only be placed along or upon the base supports of the device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners.
9. Sheeting for barricades shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

Barricades shall NOT be used as a sign support.



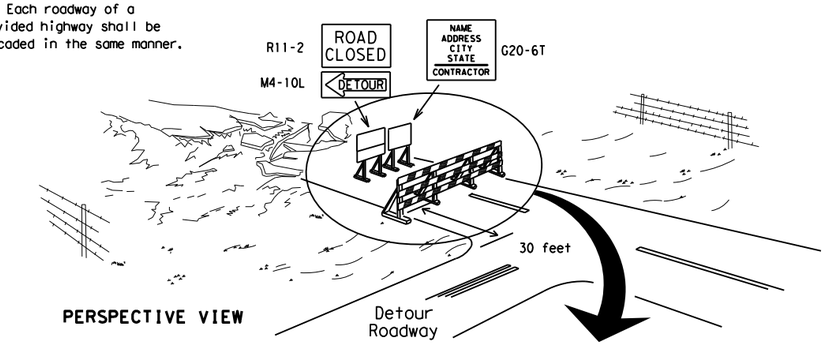
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



Stiffener may be inside or outside of support, but no more than 2 stiffeners shall be allowed on one barricade.

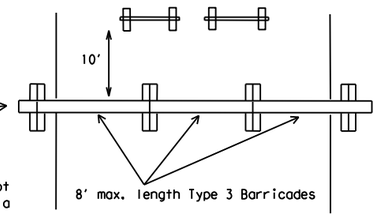
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

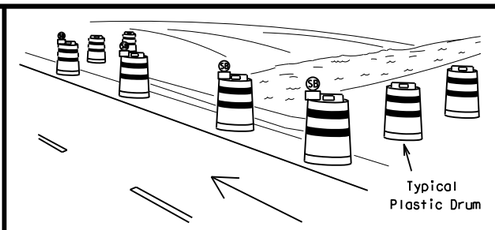
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

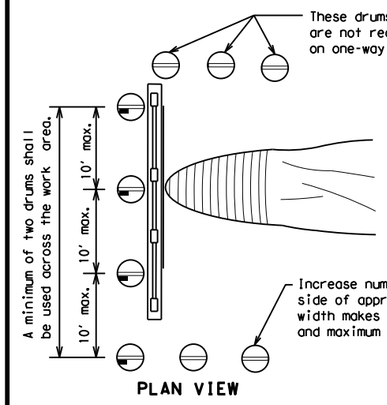
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

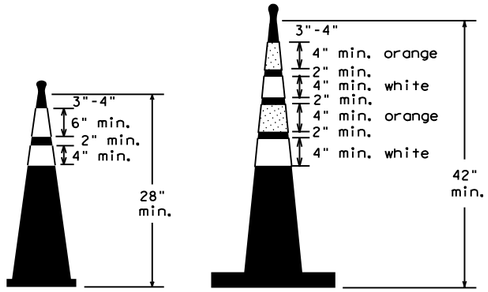
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder width is greater than 12 feet, steady-burn lights may be omitted if drums are used.
5. Drums must extend the length of the culvert widening.



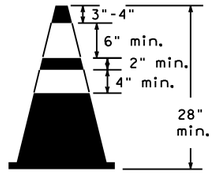
LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

PLAN VIEW

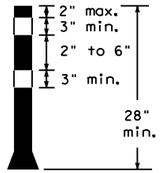
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

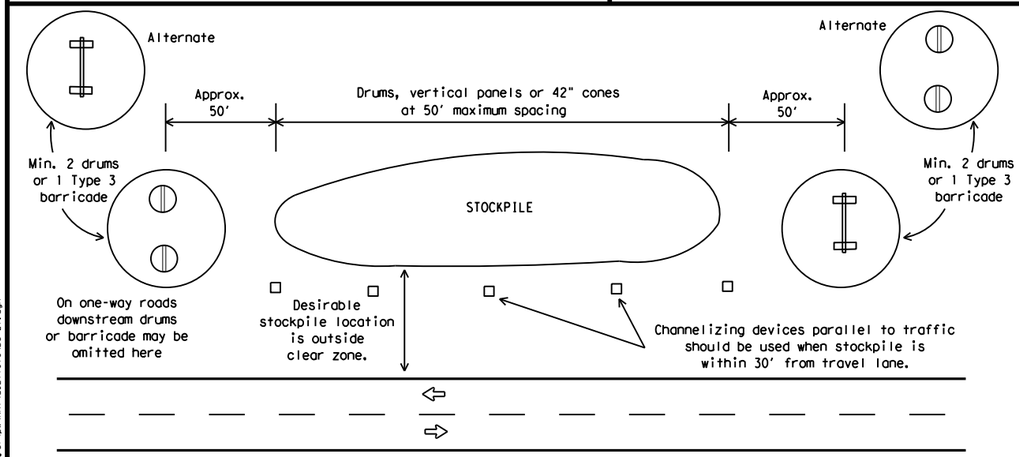


Tubular Marker

28" Cones shall have a minimum weight of 9 1/2 lbs.

42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

1. Traffic cones and tubular markers shall be predominantly orange, and meet the height and weight requirements shown above.
2. One-piece cones have the body and base of the cone molded in one consolidated unit. Two-piece cones have a cone shaped body and a separate rubber base, or ballast, that is added to keep the device upright and in place.
3. Two-piece cones may have a handle or loop extending up to 8" above the minimum height shown, in order to aid in retrieving the device.
4. Cones or tubular markers shall have white or white and orange reflective bands as shown above. The reflective bands shall have a smooth, sealed outer surface and meet the requirements of Departmental Material Specification DMS-8300 Type A or Type B.
5. 28" cones and tubular markers are generally suitable for short duration and short-term stationary work as defined on BC(4). These should not be used for intermediate-term or long-term stationary work unless personnel is on-site to maintain them in their proper upright position.
6. 42" two-piece cones, vertical panels or drums are suitable for all work zone durations.
7. Cones or tubular markers used on each project should be of the same size and shape.



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

SHEET 10 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SAT	BEXAR		52

104

DATE: 11/21/2023
FILE: c:\pw\kmt\d0277916\bc-21.dgn

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.

WORK ZONE PAVEMENT MARKINGS

GENERAL

1. The Contractor shall be responsible for maintaining work zone and existing pavement markings, in accordance with the standard specifications and special provisions, on all roadways open to traffic within the CSJ limits unless otherwise stated in the plans.
2. Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
3. Additional supplemental pavement marking details may be found in the plans or specifications.
4. Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
5. When short term markings are required on the plans, short term markings shall conform with the TMUTCD, the plans and details as shown on the Standard Plan Sheet WZ(STPM).
6. When standard pavement markings are not in place and the roadway is opened to traffic, DO NOT PASS signs shall be erected to mark the beginning of the sections where passing is prohibited and PASS WITH CARE signs at the beginning of sections where passing is permitted.
7. All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

RAISED PAVEMENT MARKERS

1. Raised pavement markers are to be placed according to the patterns on BC(12).
2. All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and Departmental Material Specification DMS-4200 or DMS-4300.

PREFABRICATED PAVEMENT MARKINGS

1. Removable prefabricated pavement markings shall meet the requirements of DMS-8241.
2. Non-removable prefabricated pavement markings (foil back) shall meet the requirements of DMS-8240.

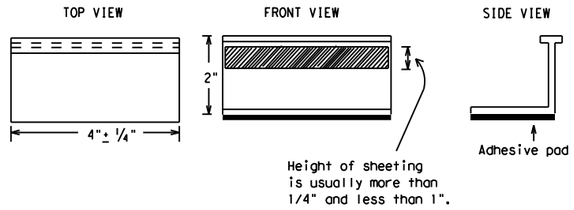
MAINTAINING WORK ZONE PAVEMENT MARKINGS

1. The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
2. Work zone pavement markings shall be inspected in accordance with the frequency and reporting requirements of work zone traffic control device inspections as required by Form 599.
3. The markings should provide a visible reference for a minimum distance of 300 feet during normal daylight hours and 160 feet when illuminated by automobile low-beam headlights at night, unless sight distance is restricted by roadway geometrics.
4. Markings failing to meet this criteria within the first 30 days after placement shall be replaced at the expense of the Contractor as per Specification Item 662.

REMOVAL OF PAVEMENT MARKINGS

1. Pavement markings that are no longer applicable, could create confusion or direct a motorist toward or into the closed portion of the roadway shall be removed or obliterated before the roadway is opened to traffic.
2. The above shall not apply to detours in place for less than three days, where flaggers and/or sufficient channelizing devices are used in lieu of markings to outline the detour route.
3. Pavement markings shall be removed to the fullest extent possible, so as not to leave a discernable marking. This shall be by any method approved by TxDOT Specification Item 677 for "Eliminating Existing Pavement Markings and Markers".
4. The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
5. Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
6. Blast cleaning may be used but will not be required unless specifically shown in the plans.
7. Over-painting of the markings SHALL NOT BE permitted.
8. Removal of raised pavement markers shall be as directed by the Engineer.
9. Removal of existing pavement markings and markers will be paid for directly in accordance with Item 677, "ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS," unless otherwise stated in the plans.
10. Black-out marking tape may be used to cover conflicting existing markings for periods less than two weeks when approved by the Engineer.

Temporary Flexible-Reflective Roadway Marker Tabs



STAPLES OR NAILS SHALL NOT BE USED TO SECURE TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS TO THE PAVEMENT SURFACE

1. Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
2. Tabs detailed on this sheet are to be inspected and accepted by the Engineer or designated representative. Sampling and testing is not normally required, however at the option of the Engineer, either "A" or "B" below may be imposed to assure quality before placement on the roadway.
   A. Select five (5) or more tabs at random from each lot or shipment and submit to the Construction Division, Materials and Pavement Section to determine specification compliance.
   B. Select five (5) tabs and perform the following test. Affix five (5) tabs at 24 inch intervals on an asphaltic pavement in a straight line. Using a medium size passenger vehicle or pickup, run over the markers with the front and rear tires at a speed of 35 to 40 miles per hour, four (4) times in each direction. No more than one (1) out of the five (5) reflective surfaces shall be lost or displaced as a result of this test.
3. Small design variances may be noted between tab manufacturers.
4. See Standard Sheet WZ(STPM) for tab placement on new pavements. See Standard Sheet TCP(7-1) for tab placement on seal coat work.

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

1. Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
2. All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
3. Adhesive for guidemarks shall be bituminous material hot applied or butyl rubber pad for all surfaces, or thermoplastic for concrete surfaces.

Guidemarks shall be designated as:
YELLOW - (two amber reflective surfaces with yellow body).
WHITE - (one silver reflective surface with white body).

DEPARTMENTAL MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
TRAFFIC BUTTONS	DMS-4300
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY REMOVABLE, PREFABRICATED PAVEMENT MARKINGS	DMS-8241
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS	DMS-8242

A list of prequalified reflective raised pavement markers, non-reflective traffic buttons, roadway marker tabs and other pavement markings can be found at the Material Producer List web address shown on BC(1).

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	SAT	BEXAR		53
11-02 8-14				

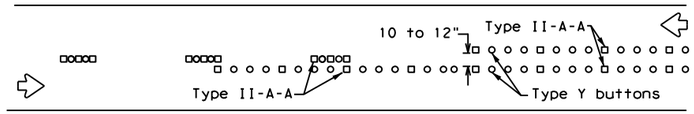
105

DATE: 11/21/2023
FILE: c:\pw\txdot\d0279\d16\bc-21.dgn

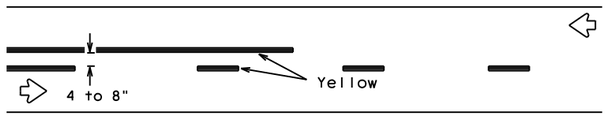
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

PAVEMENT MARKING PATTERNS

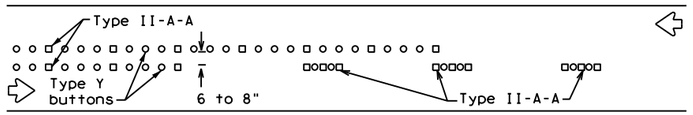
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



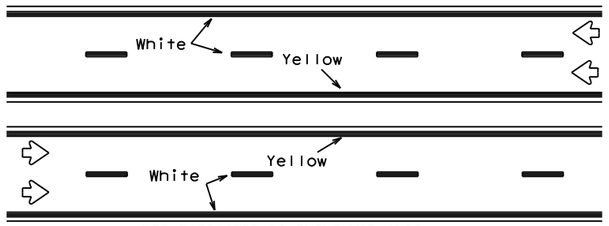
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



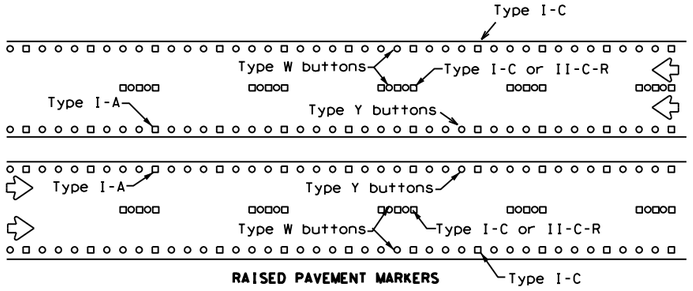
RAISED PAVEMENT MARKERS - PATTERN B

Pattern A is the TXDOT Standard, however Pattern B may be used if approved by the Engineer.
Prefabricated markings may be substituted for reflectorized pavement markings.

CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO-LANE, TWO-WAY HIGHWAYS



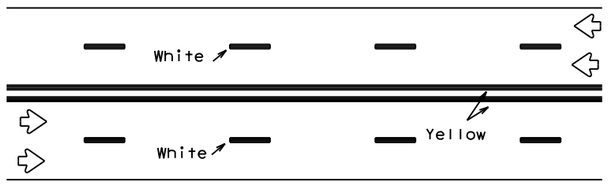
REFLECTORIZED PAVEMENT MARKINGS



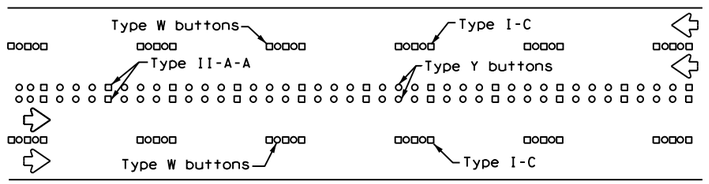
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



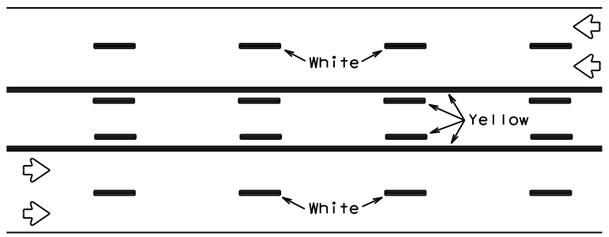
REFLECTORIZED PAVEMENT MARKINGS



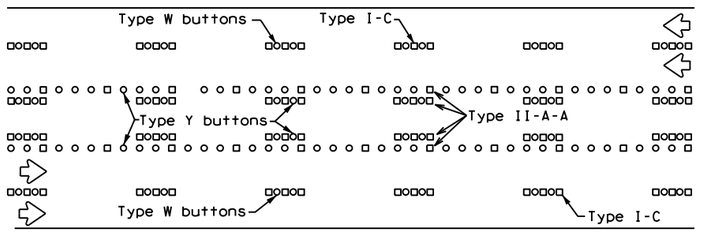
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

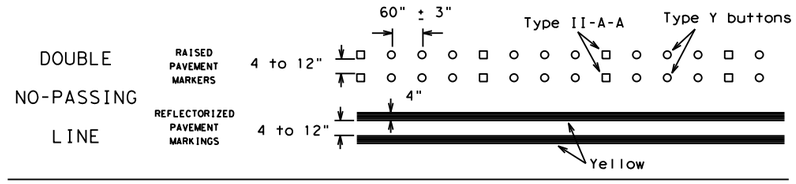
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

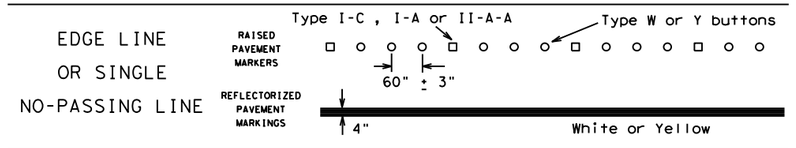
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

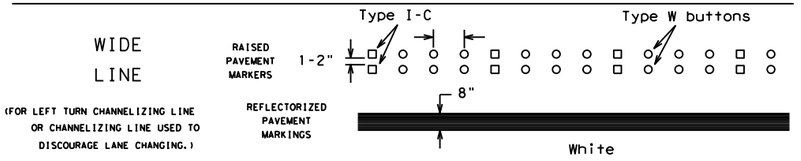


EDGE LINE OR SINGLE NO-PASSING LINE



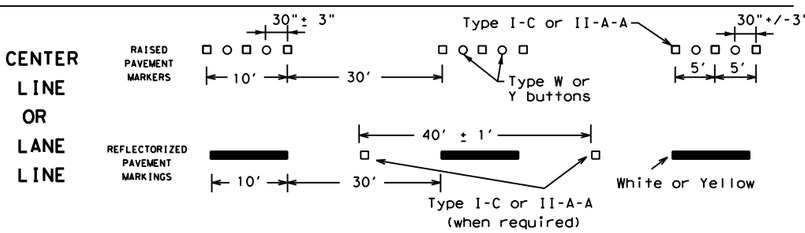
WIDE LINE

(FOR LEFT TURN CHANNELIZING LINE OR CHANNELIZING LINE USED TO DISCOURAGE LANE CHANGING.)

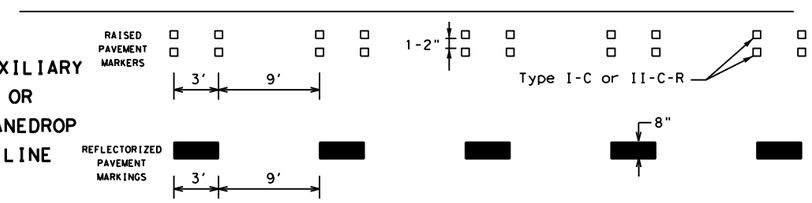


BROKEN LINES

CENTER LINE OR LANE LINE

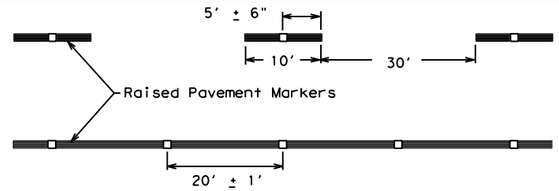


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

If raised pavement markers are used to supplement REMOVABLE markings, the markers shall be applied to the top of the tape at the approximate mid length of tape used for broken lines or at 20 foot spacing for solid lines. This allows an easier removal of raised pavement markers and tape.



Centerline only - not to be used on edge lines

Raised pavement markers used as standard pavement markings shall be from the approved products list and meet the requirements of Item 672 "RAISED PAVEMENT MARKERS."

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21	0073	02	082	US 281
2-98 7-13	DIST	COUNTY		SHEET NO.
11-02 8-14	SAT	BEXAR		54

106

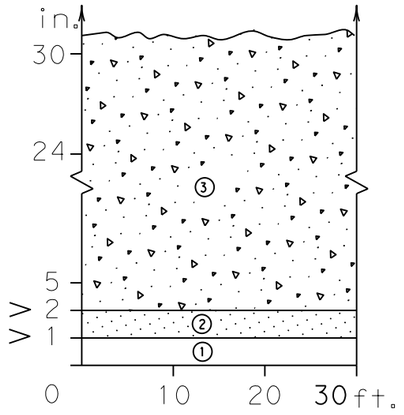
DATE: 11/21/2023
FILE: c:\txdot\001279\16\bc-21.dgn

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.

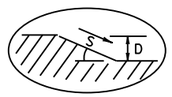
DATE:
FILE:

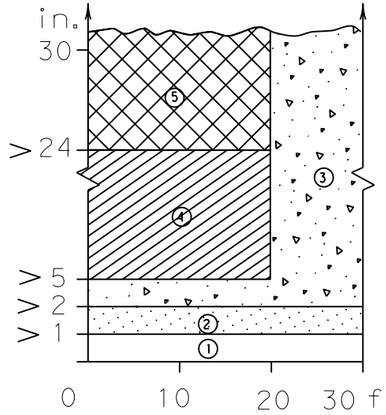
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

Edge Height (D) in Inches versus Lateral Clearance (Y) in Feet

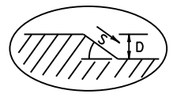


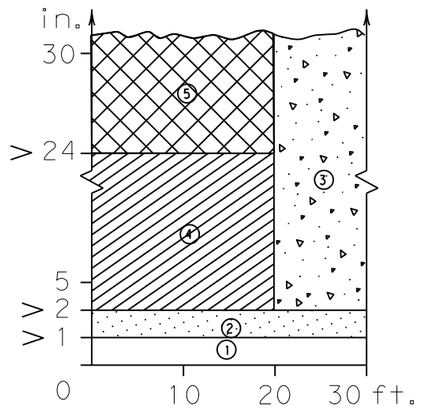
Edge Condition I
S = (3:1) (or flatter)



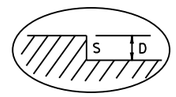


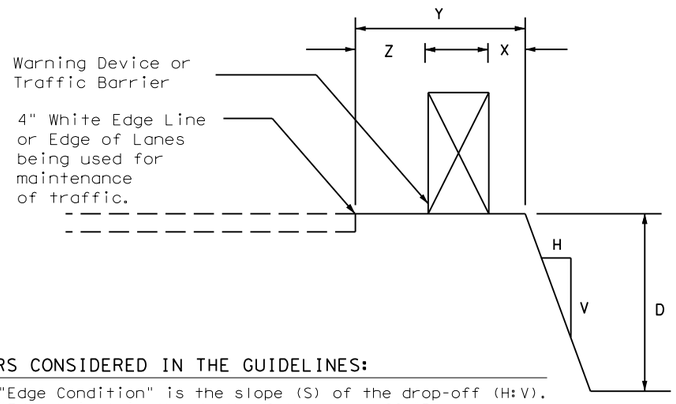
Edge Condition II
S = ((2.99):1) to (1:1)





Edge Condition III
S is steeper than (1:1)





FACTORS CONSIDERED IN THE GUIDELINES:

1. The "Edge Condition" is the slope (S) of the drop-off (H:V). The "Edge Height is the depth of the drop-off "D".

2. Distance "X" is to be the maximum practical under job conditions. Two feet minimum for high speed conditions. Distance "Y" is the lateral clearance from edge of travel lane to edge of dropoff. Distance "Z" does not have a minimum.

3. In addition to the factors considered in the guidelines, each construction zone drop-off situation should be analyzed individually, taking into account other variables, such as: traffic mix, posted speed in the construction zone, horizontal curvature, and the practicality of the treatment options.

4. The conditions for indicating the use of positive or protective barriers are given by Zone-5 and Figure-1. Traffic barriers are primarily applicable for high speed conditions. Urban areas with speeds of 30 mph or less may have a lesser need for signing, delineation, and barriers. Right-angled edges, however, with "D" greater than 2 inches and located within a lateral offset of 6 feet, may indicate a higher level of treatment.

5. If the distance "Y" must be less than 3 feet, the use of a positive barrier may not be feasible. In such a case, consider either: 1) narrowing the lanes to a desired 11 to 12 feet or 10 foot minimum (see CW20-8 sign), or 2) provide an edge slope such as Edge Condition I.

Zone	Treatment Types Guidelines:
①	No treatment
②	CW 8-11 "Uneven Lanes" signs.
③	CW 8-9a Shoulder Drop-Off" or CW 8-11 signs plus vertical panels.
④	CW8-9a or CW 8-11, signs plus drums. Where restricted space precludes the use of drums, use vertical panels. An edge slope to that of the profered Edge Condition I.
⑤	Check indications (Figure-1) for possitive barrier. Where positive barrier is not indicated, the treatment shown above for Zone-4 may be used after consideration of other applicable factors.

Edge Condition Notes:

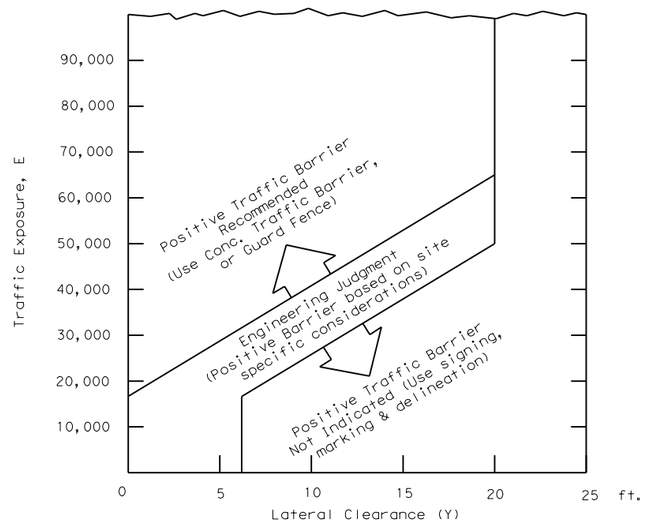
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

2. Edge Condition II: Most vehicles are able to traverse an edge condition with a slope between (2.99 to 1) and (1 to 1) so long as "D" does not exceed 5 inches. Under-carriage drag on most automobiles will occur when "D" exceeds 6 inches. As "D" exeeds 24 inches, the possibility for rollover is greater in most vehicles.

3. Edge Condition III: When slopes are greater than (1 to 1) and where "D" is greater than 2 inches, a more difficult control factor may exist for some vehicles, if not properly treated. For example, where "D" is greater than 2 inches and up to 24 inches different types of vehicles may experience different steering control at different edge heights. Automobiles might experience more steering control differential when "D" is greater than 2 inches and up to 5 inches. Trucks, particularly those with high loads, have more steering control differential when "D" is greater than 5 inches and up to 24 inches. When "D" exceeds 24 inches, the possibility of rollover is greater for most vehicles.

4. Milling or overlay operations that result in Edge Condition III should not be in place without appropriate warning treatments, and these conditions should not be left in place for extended periods of time.

FIGURE-1: CONDITIONS INDICATING USE OF POSITIVE BARRIER FOR ZONE 5 (▨)



1. E = ADT x T
Where ADT is that portion of the average daily traffic volume traveling within 20 feet (generally two adjacent lanes) of the edge dropoff condition; and, T is the duration time in years of the dropoff condition.

2. Figure-1 provides a practical approach to the use of positive barriers for the protection of vehicles from pavement drop-offs. Other factors, such as the presence of heavy machinery, construction workers, or the mix and volume of traffic may make the use of positive barriers appropriate, even when the edge condition alone may not justify the use of a barrier.

3. An approved end treatment should be provided for any positive barrier end located within the clear zone.

These guidelines apply to temporary traffic control areas or work zones where continuous pavement edges or drop-offs exists parallel and adjacent to a lane used by traffic. The edge conditions may be present between shoulders and travel lanes, between adjacent or opposing travel lanes, or at intermediate points across the width of the paved surface. Due to the variability in construction operations, tolerances in the variables may be allowed by the engineer. These guidelines do not apply to short term operations. These guidelines do not constitute a rigid standard or policy; rather, they are guidance to be used in conjunction with engineering judgement. These guidelines may be updated on the Design Division's on-line manuals.

Engineer's Seal

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER

11/21/2023

Date _____

Texas Department of Transportation

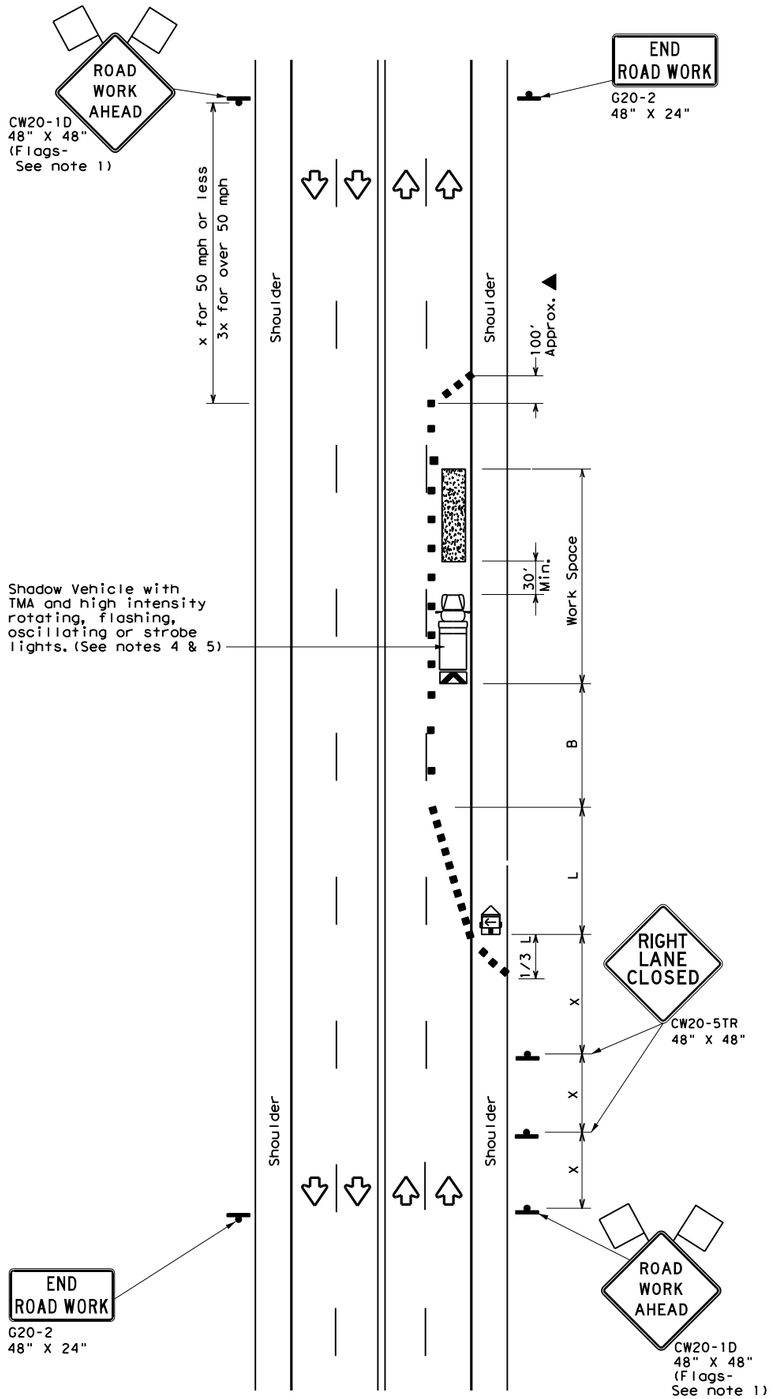
Traffic Safety Division Standard

TREATMENT FOR VARIOUS EDGE CONDITIONS

FILE: edgecon.dgn	DN:	CK:	DW:	CK:
© TxDOT August 2000	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
03-01 08-01 9-21	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		55

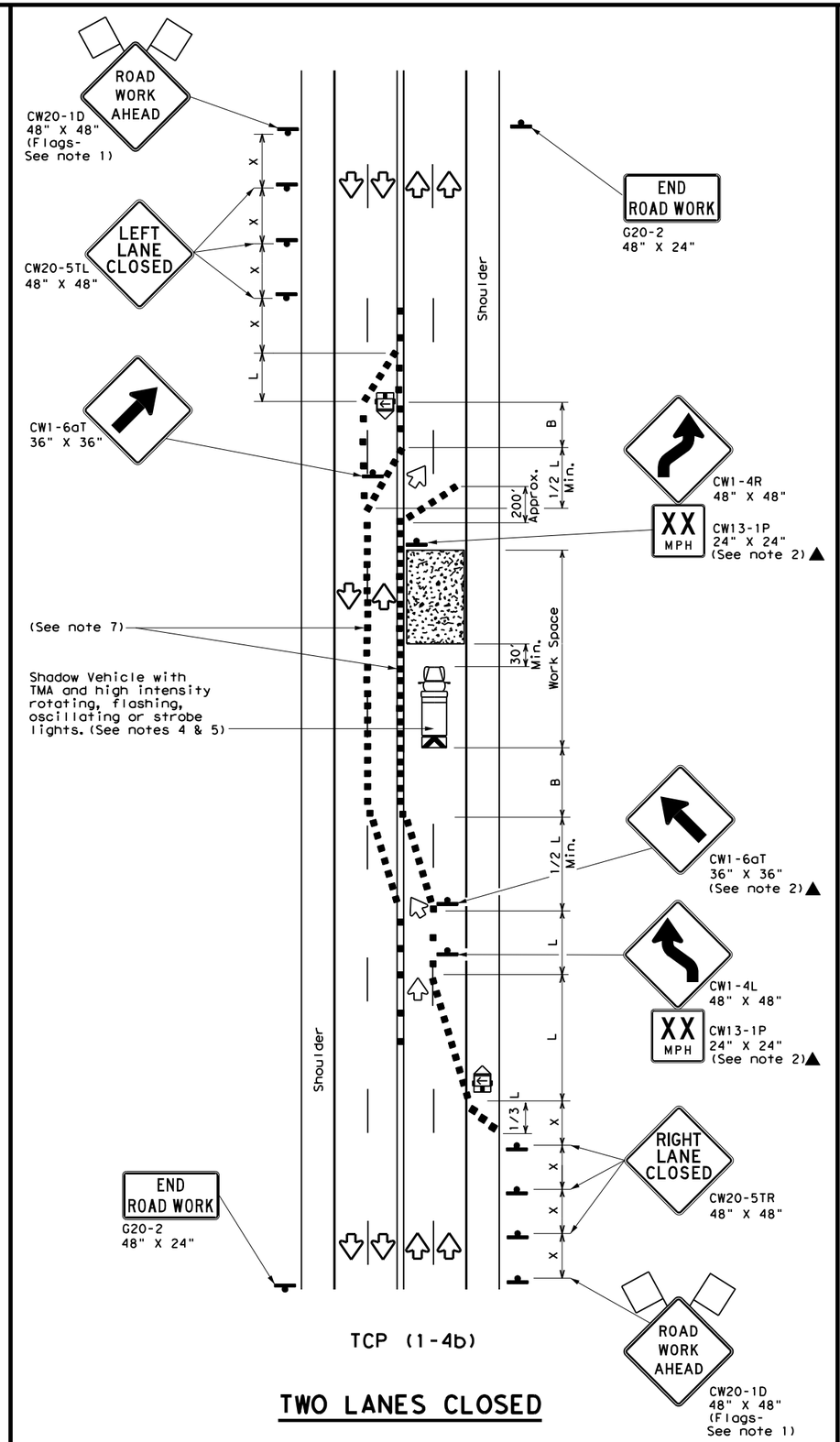
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:



TCP (1-4a)

ONE LANE CLOSED



TCP (1-4b)

TWO LANES CLOSED

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only
** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓		

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW20-1D "ROAD WORK AHEAD" sign may be repeated if the visibility of the work zone is less than 1500 feet.
4. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-4a)

6. If this TCP is used for a left lane closure , CW20-5TL "LEFT LANE CLOSED" signs shall be used and channelizing devices shall be placed on the centerline where needed to protect the work space from opposing traffic with the arrow panel placed in the closed lane near the end of the merging taper.

TCP (1-4b)

7. Where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2S where S is the speed in mph. This tighter device spacing is intended for the areas of conflicting markings, not the entire work zone.

Texas Department of Transportation

Traffic Operations Division Standard

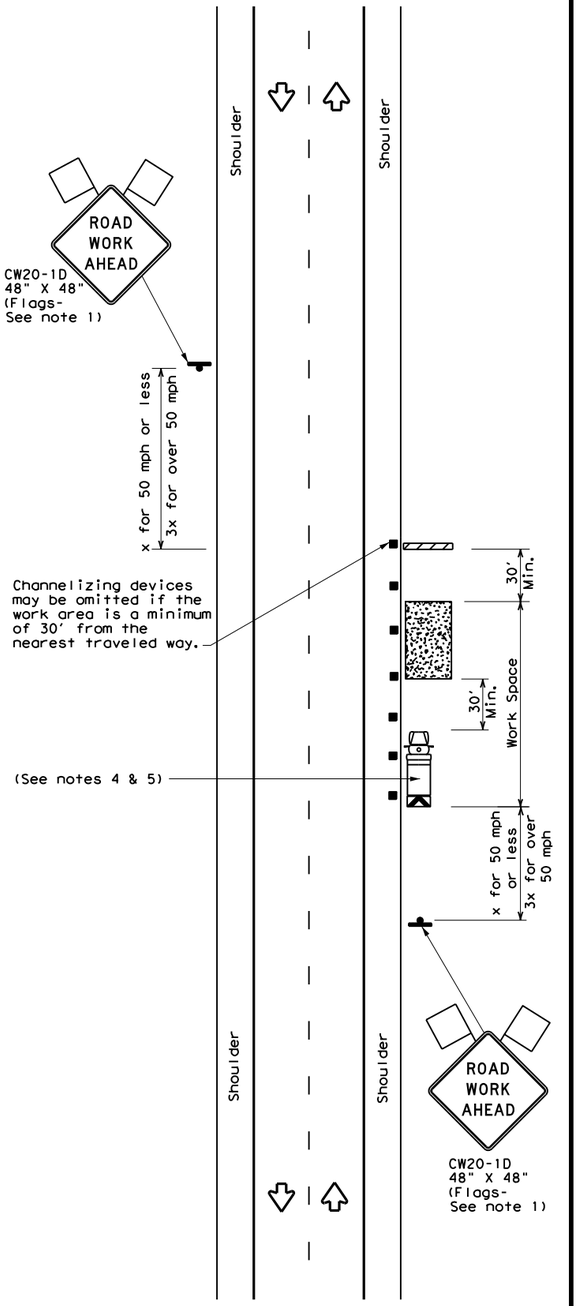
TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(1-4)-18

FILE: tcp1-4-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	SAT	BEXAR		56
1-97 2-18				

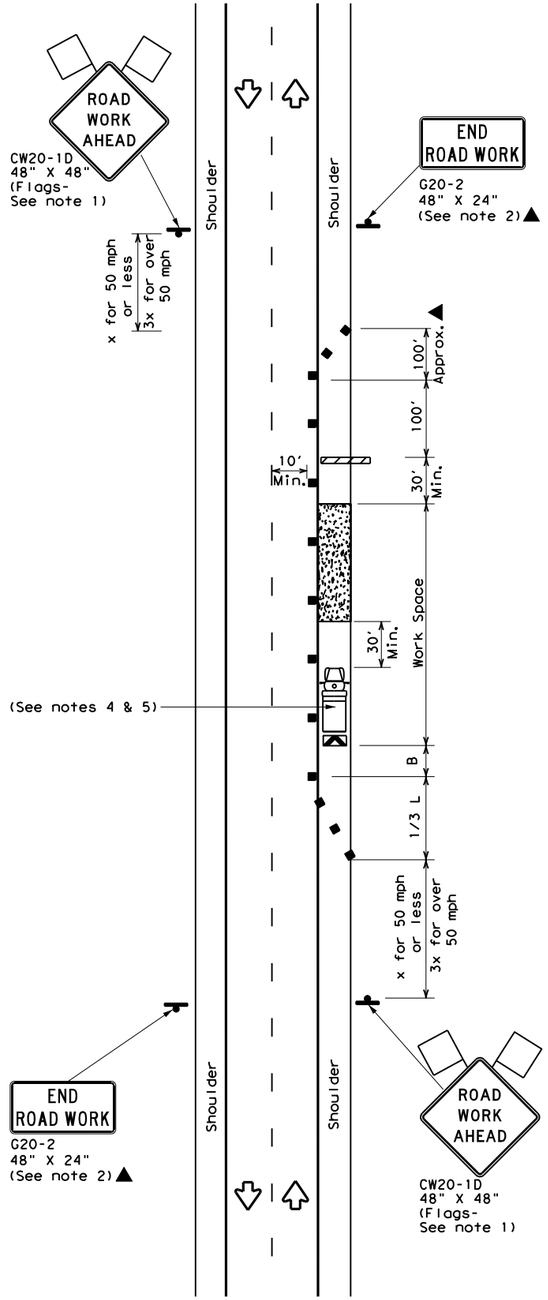
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:



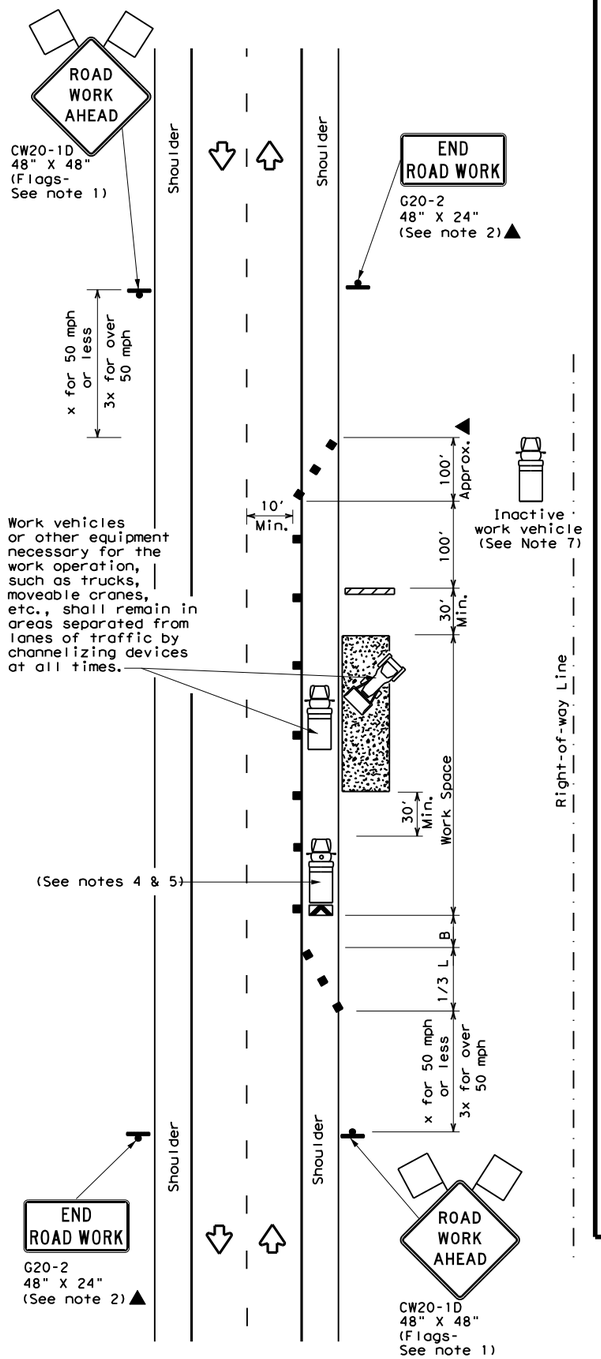
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only

** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓	✓	✓

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated in the plans, or for routine maintenance work, when approved by the Engineer.
3. Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
4. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
6. See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
7. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
8. CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation

Traffic Operations Division Standard

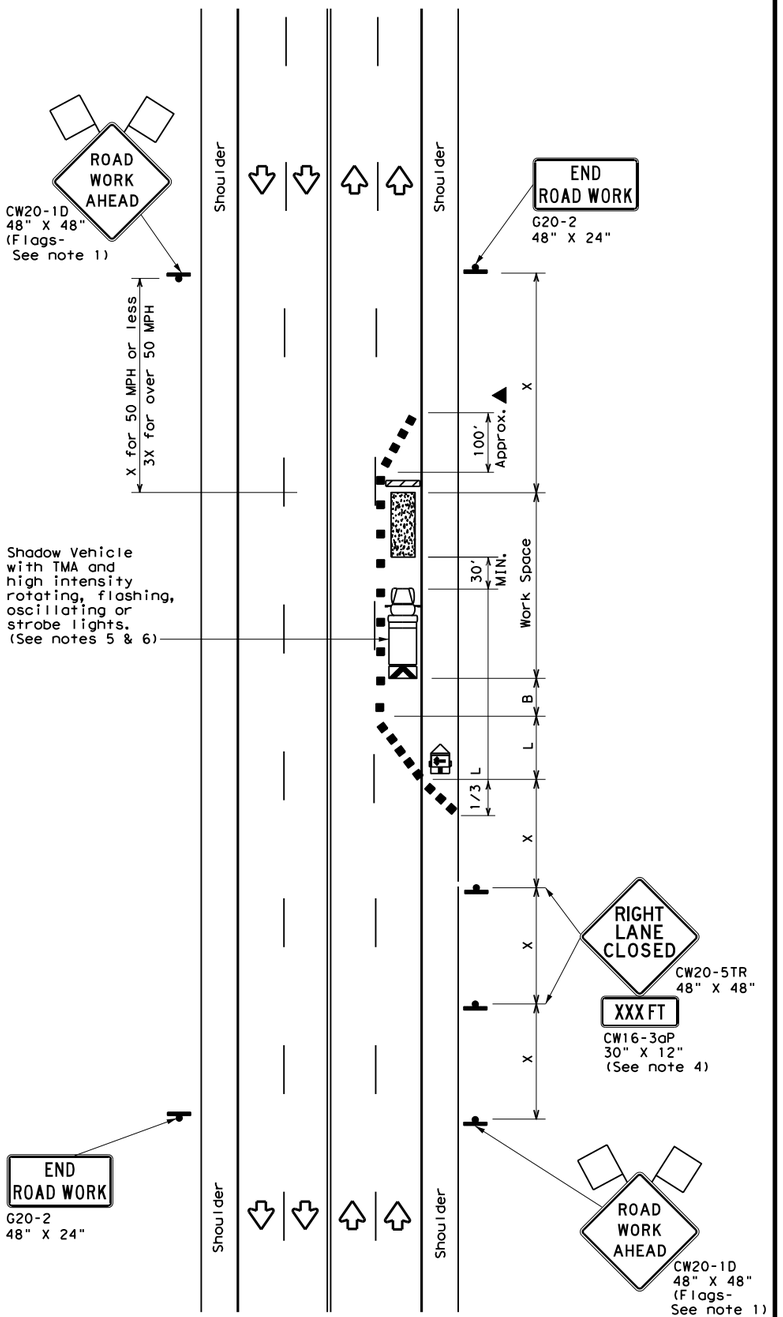
TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	SAT	BEXAR		57
1-97 2-18				

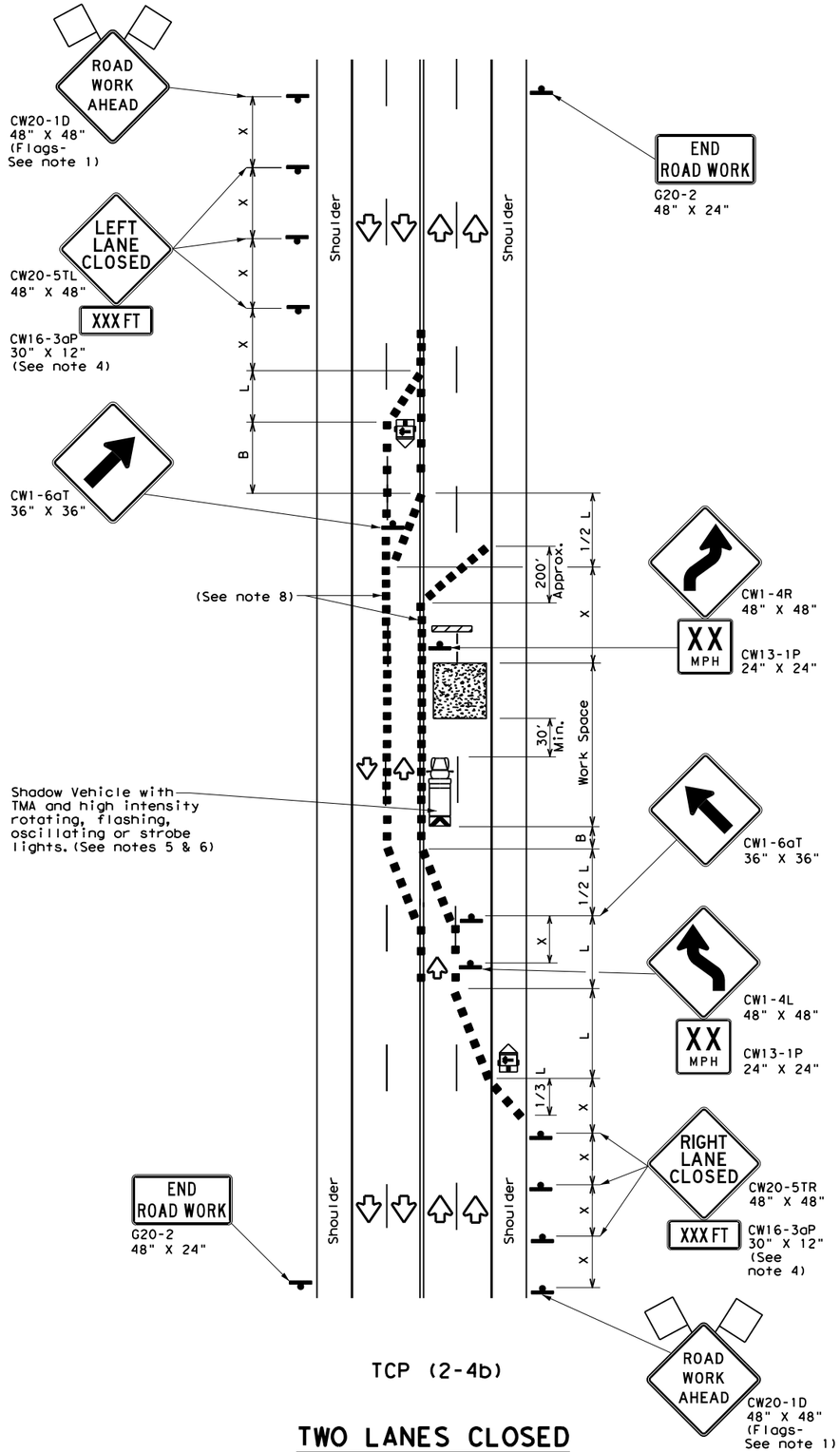
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:



TCP (2-4a)

ONE LANE CLOSED



TCP (2-4b)

TWO LANES CLOSED

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only

** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
		✓	✓	

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The downstream taper is optional. When used, it should be 100 feet minimum length per lane.
4. For short term applications, when post mounted signs are not used, the distance legend may be shown on the sign face rather than on a CW16-3aP supplemental plaque.
5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
6. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-4a)

7. If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED"signs shall be used and channelizing devices shall be placed on the centerline to protect the work space from opposing traffic with the arrow board placed in the closed lane near the end of the merging taper.

TCP (2-4b)

8. For shorter durations where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2(S) where S is the speed in mph. This tighter devices spacing is intended for the area of conflicting markings, not the entire work zone.

Texas Department of Transportation

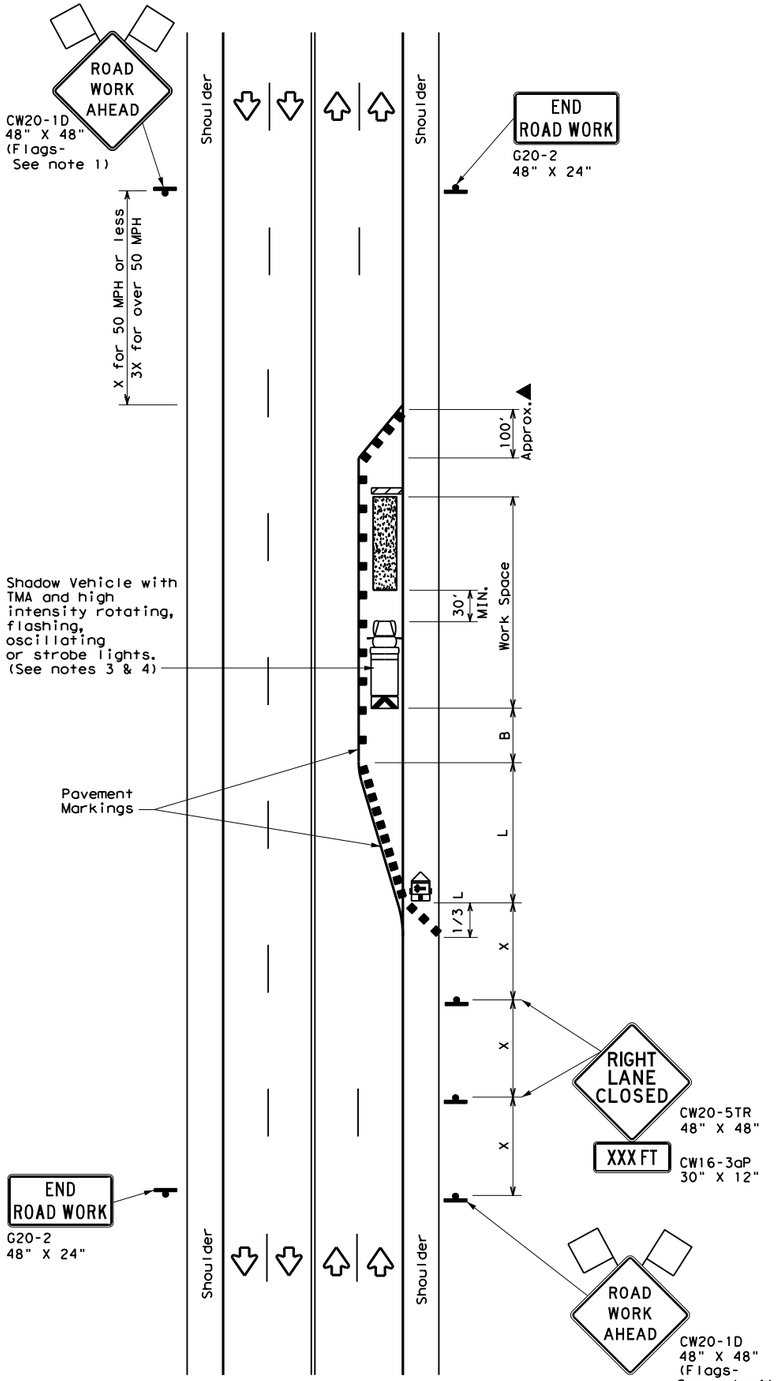
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(2-4)-18

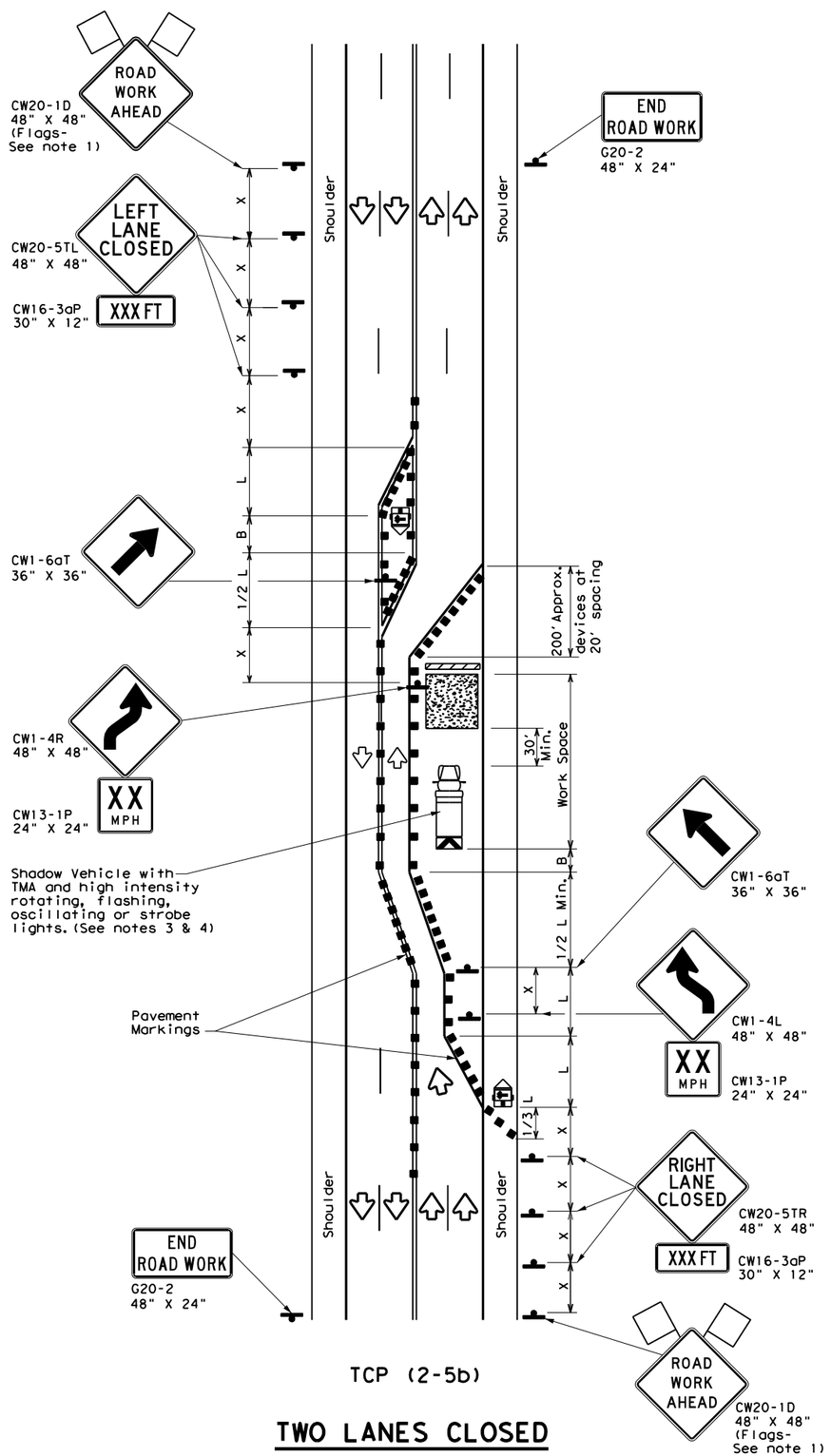
FILE: tcp2-4-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0073	02	082	US 281
1-97 2-12	DIST	COUNTY		SHEET NO.
4-98 2-18	SAT	BEXAR		58

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.



TCP (2-5a)

ONE LANE CLOSED



TCP (2-5b)

TWO LANES CLOSED

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only

** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
			✓	✓

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew eposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substitutued for the Shadow Vehicle and TMA.
4. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.
5. The downstream taper is optional. When used, it should be 100 feet approximately per lane, with channelizing devices spaced at 20 feet.

TCP (2-5a)

6. If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED" signs shall be used and channelizing devices shall be placed on the centerline to protect the work space from opposing traffic, with the arrow board placed in the closed lane near the end of the merging taper.

TCP (2-5b)

7. Conflicting pavement markings shall be removed for long-term projects.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LONG TERM LANE CLOSURES MULTILANE CONVENTIONAL RDS.

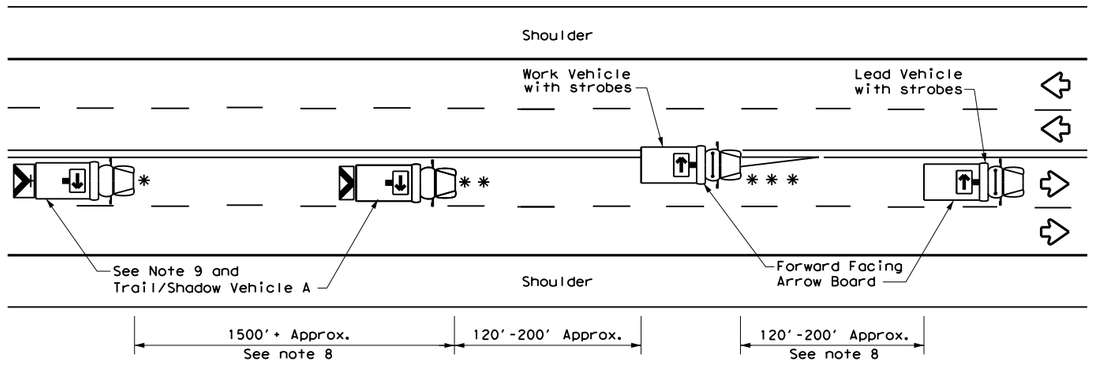
TCP(2-5)-18

FILE: tcp2-5-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 2-12	007	302	082	US 281
1-97 3-03	DIST	COUNTY		SHEET NO.
4-98 2-18	SAT	BEXAR		59

DATE:
FILE:

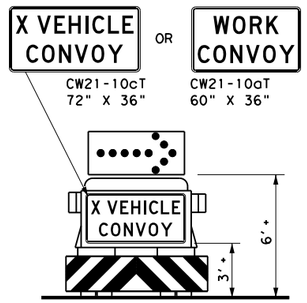
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:



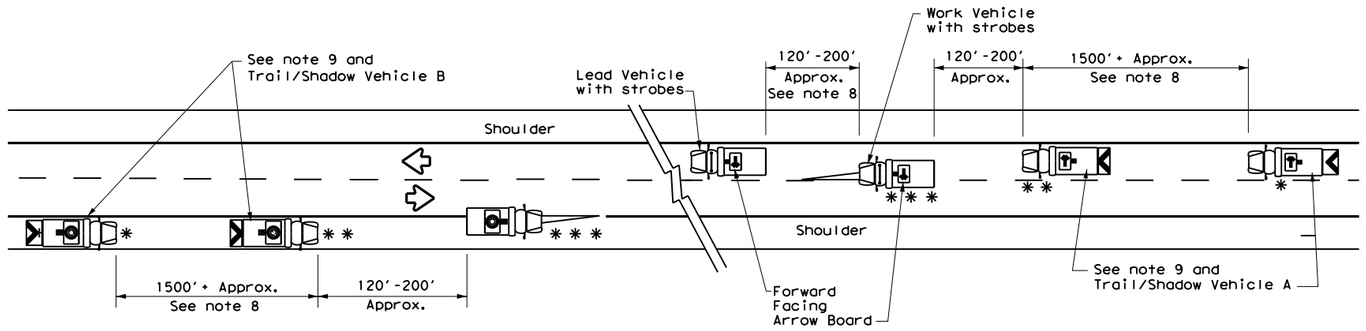
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

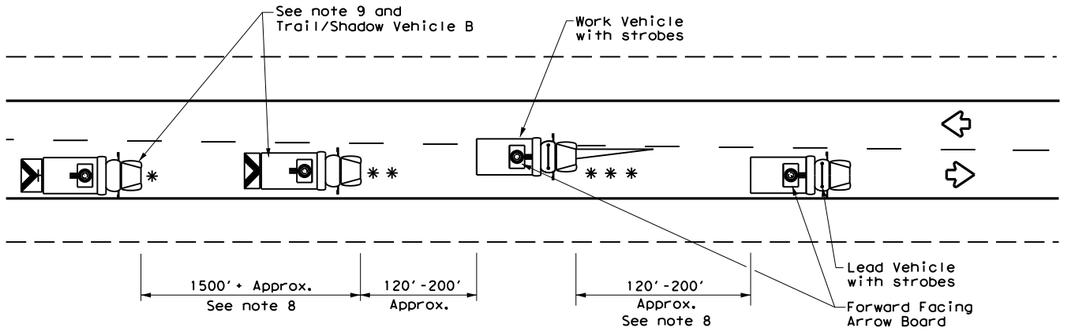


WORK ON SHOULDER

WORK ON TRAVEL LANE

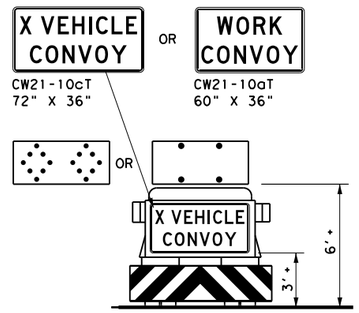
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

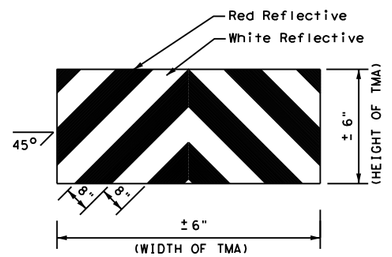
with Flashing Arrow Board in CAUTION display

LEGEND			
*	Trail Vehicle	ARROW BOARD DISPLAY	
* *	Shadow Vehicle		
* * *	Work Vehicle		RIGHT Directional
	Heavy Work Vehicle		LEFT Directional
	Truck Mounted Attenuator (TMA)		Double Arrow
	Traffic Flow		CAUTION (Alternating Diamond or 4 Corner Flash)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
✓				

GENERAL NOTES

1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used the WORK vehicle must be equipped with an arrow board. The Engineer will determine if the LEAD VEHICLE and/or TRAIL VEHICLE are required based on prevailing roadway conditions, traffic volume, and sight distance restrictions.
2. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
3. The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE and TRAIL VEHICLE are required.
4. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION DMS 8300, Type A.
5. Flashing arrow boards shall be Type B or Type C as per the Barricade and Construction (BC) standards. The board shall be controlled from inside the vehicle.
6. Each vehicle shall have two-way radio communication capability.
7. When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
8. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE and vehicle spacing between WORK VEHICLE and LEAD VEHICLE may vary according to terrain, work activity and other factors.
9. "X VEHICLE CONVOY" (CW21-10cT) or "WORK CONVOY" (CW21-10aT) signs shall be used on TRAIL VEHICLES and SHADOW VEHICLES as shown. As an option 48" X 48" diamond shaped "WORK CONVOY"(CW21-10T) or "X VEHICLE CONVOY" (CW21-10bT) signs may be used where adequate mounting space exists. When used, the X VEHICLE CONVOY sign shall have the number of the convoy vehicles displayed on the sign in the number designation "X" location. The "X VEHICLE CONVOY" sign shall not be used on the SHADOW VEHICLE if a TRAIL VEHICLE is used.
10. On two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a "DO NOT PASS" (R4-1) sign should be placed on the back of the rearmost protection vehicle.



STRIPING FOR TMA

Texas Department of Transportation

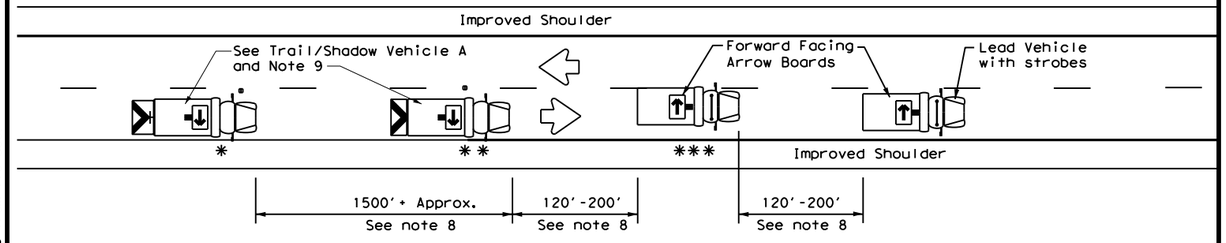
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

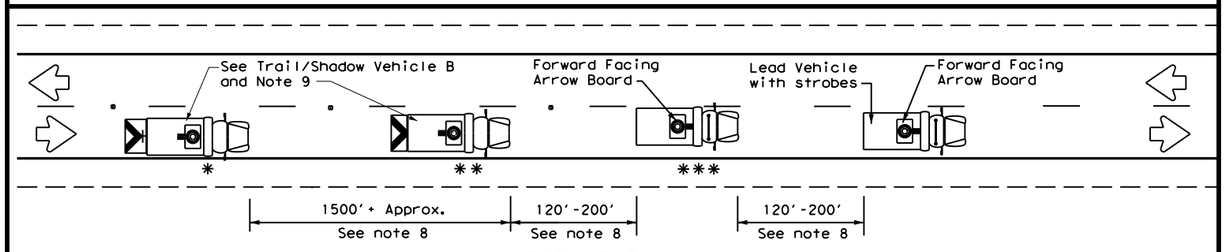
FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	0073	02	082	US 281
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		60

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.



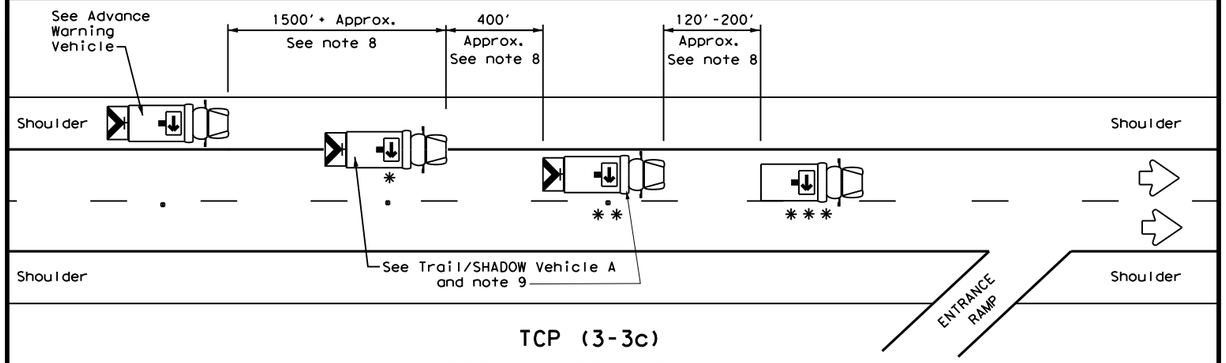
TCP (3-3a)

TWO LANE HIGHWAY WITH PAVED SHOULDERS
(WORK ON TRAVEL LANE)



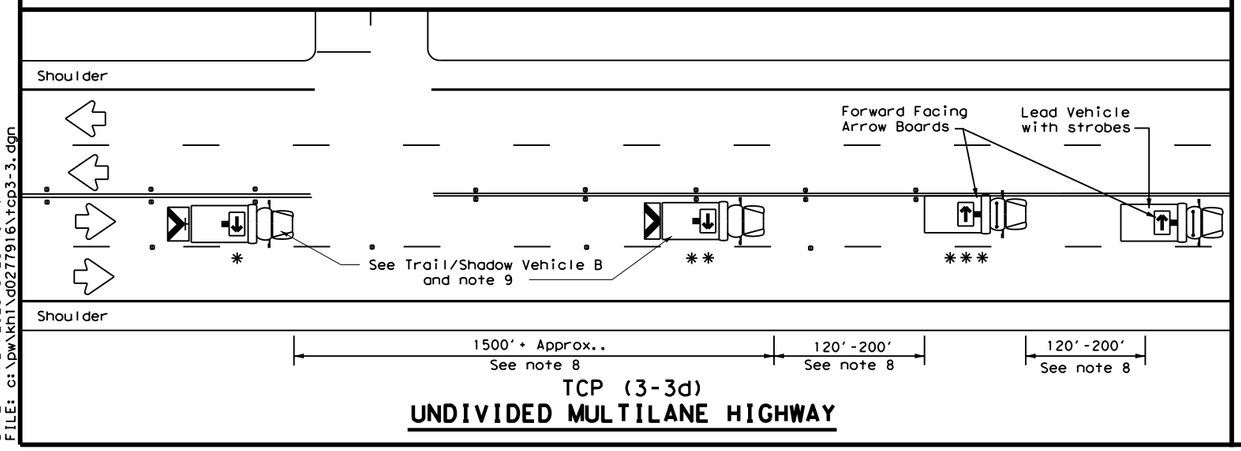
TCP (3-3b)

TWO LANE HIGHWAY WITHOUT PAVED SHOULDERS
(WORK ON TRAVEL LANE)



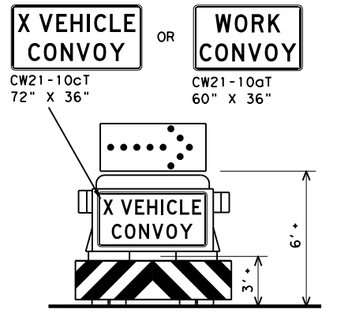
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



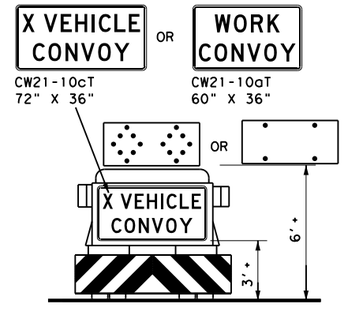
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



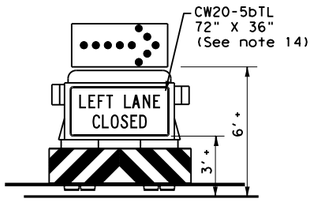
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

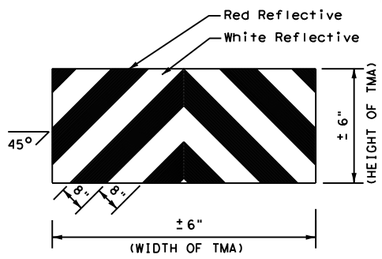


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

LEGEND			
*	Trail Vehicle	ARROW BOARD DISPLAY	
**	Shadow Vehicle		
***	Work Vehicle		RIGHT Directional
	Heavy Work Vehicle		LEFT Directional
	Truck Mounted Attenuator (TMA)		Double Arrow
	Traffic Flow		CAUTION (Alternating Diamond or 4 Corner Flash)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
✓				

GENERAL NOTES

1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used on two way roads the WORK vehicle must have an arrow board. For divided roadways, the arrow board on the WORK vehicle is optional based on the type of work being performed. The Engineer will determine if the LEAD vehicle and/or TRAIL vehicle are required based on prevailing roadway conditions, traffic volume, and sight distance restrictions.
2. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating, or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
3. The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE, ADVANCE WARNING and TRAIL VEHICLE are required.
4. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION DMS 8300, Type A.
5. Flashing arrow boards shall be Type B or Type C as per the Barricade and Construction (BC) standards. The board shall be controlled from inside the vehicle.
6. Each vehicle shall have two-way radio communication capability.
7. When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
8. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE and vehicle spacing between WORK VEHICLE and LEAD VEHICLE may vary according to terrain, work activity and other factors.
9. X VEHICLE CONVOY (CW21-10cT) or WORK CONVOY (CW21-10aT) signs shall be used on TRAIL VEHICLES and SHADOW VEHICLES as shown. As an option 48" x 48" diamond shaped WORK CONVOY (CW21-10T) or X VEHICLE CONVOY (CW21-10bT) signs may be used where adequate mounting space exists. When used, the X VEHICLE CONVOY sign shall have the number of the convoy vehicles displayed on the sign in the number designation "X" location. The X VEHICLE CONVOY sign shall not be used on the SHADOW VEHICLE if a TRAIL VEHICLE is used.
10. For divided highways with two or three lanes in one direction, the appropriate LEFT LANE CLOSED (CW20-5bTL), RIGHT LANE CLOSED (CW20-5bTR), or CENTER LANE CLOSED (CW20-5dT) sign should be used on the Advance Warning Vehicle. As an option, a portable changeable message sign (PCMS) or truck mounted changeable message sign (TMCMS) with a minimum character height of 12", and displaying the same legend may be substituted for these signs. An appropriate directional arrow display, simulating the size and legibility of the flashing arrow board may be used in the second phase of the PCMS/TMCMS message. When this is done, the arrow board will not be required on the Advance Warning Vehicle.
11. A double arrow shall not be displayed on the arrow board on the Advance Warning Vehicle.
12. For divided highways with three or four lanes in each direction, use TCP(3-2).
13. Standard diamond shape versions of the CW20-5 series signs may be used as an option if the rectangular signs shown are not available.
14. The Advance Warning Vehicle may straddle the edgeline when Shoulder width makes it necessary.
15. On two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a DO NOT PASS (R4-1) sign should be placed on the back of the rearmost protection vehicle.

Texas Department of Transportation

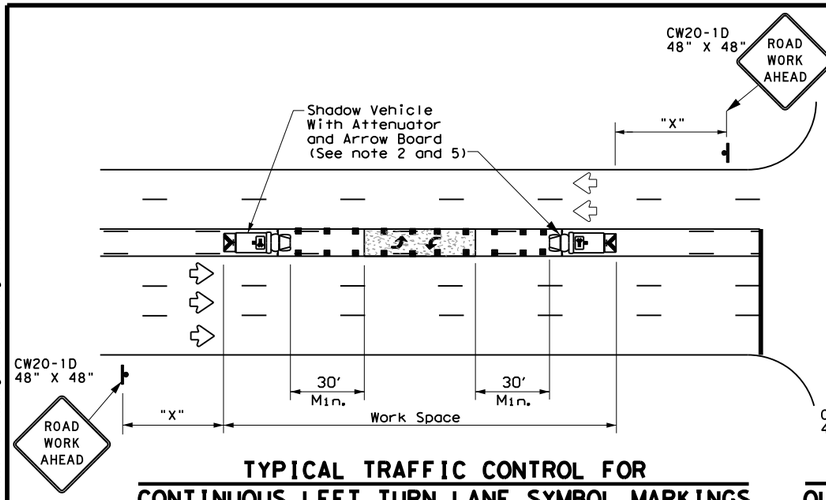
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
MOBILE OPERATIONS
RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL
TCP(3-3)-14

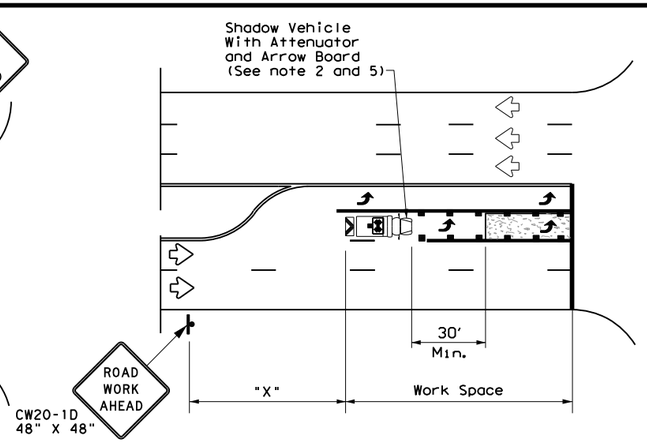
FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	SAT	BEXAR		61
1-97 7-14				

DATE: 11/21/2023 3:23:40 PM
FILE: c:\pw\kh1\d0279916\tcp3-3.dgn

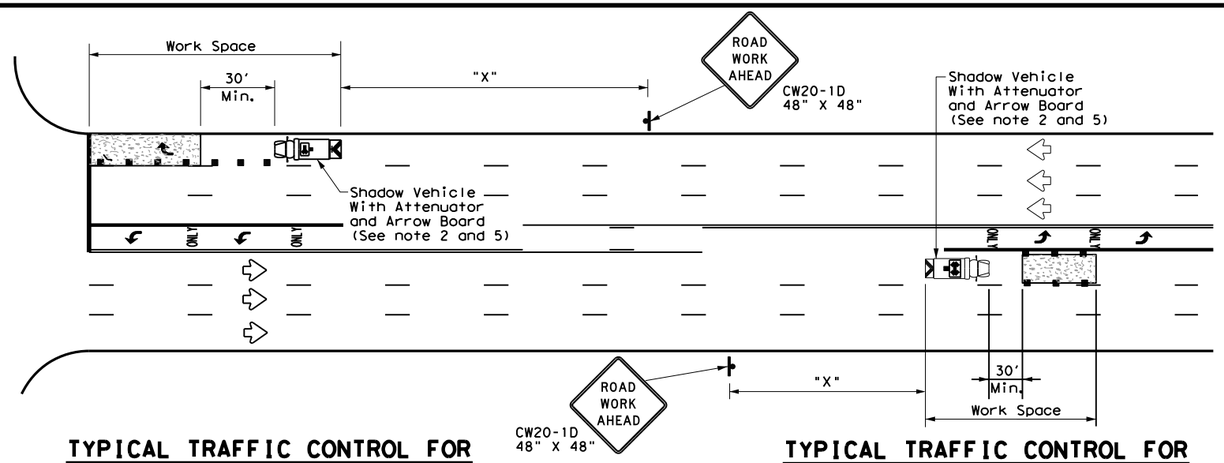
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



TYPICAL TRAFFIC CONTROL FOR CONTINUOUS LEFT TURN LANE SYMBOL MARKINGS

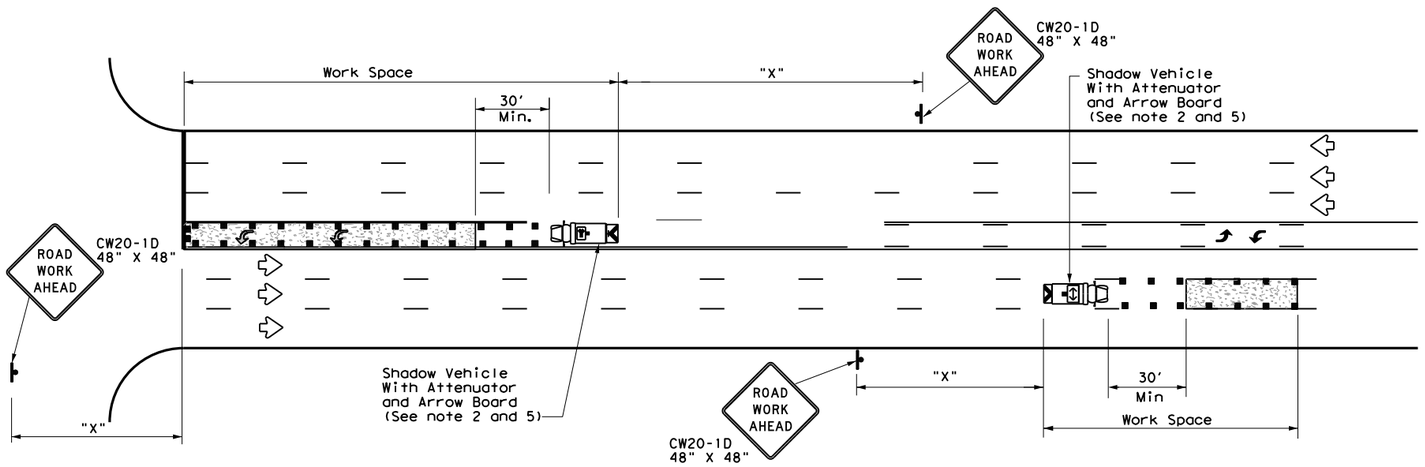


TYPICAL TRAFFIC CONTROL FOR OUTSIDE DUAL LEFT TURN LANE SYMBOL MARKINGS



TYPICAL TRAFFIC CONTROL FOR OUTSIDE LANE MARKINGS

TYPICAL TRAFFIC CONTROL FOR INSIDE LANE MARKINGS



TYPICAL TRAFFIC CONTROL FOR LEFT TURN LANE MARKINGS

TYPICAL TRAFFIC CONTROL FOR CENTER LANE MARKINGS

LEGEND			
*	Trail Vehicle	ARROW BOARD DISPLAY	
**	Shadow Vehicle		
***	Work Vehicle		RIGHT Directional
	Heavy Work Vehicle		LEFT Directional
	Truck Mounted Attenuator (TMA)		Double Arrow
	Traffic Flow		Channelizing Devices

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

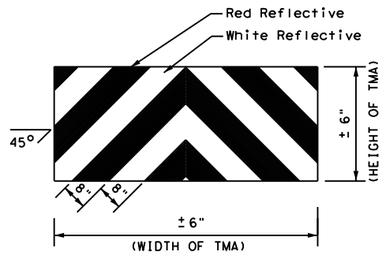
* Conventional Roads Only

** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
✓				

GENERAL NOTES

1. This traffic control plan is for use on conventional roads posted at 45 mph or less and is intended for mobile operations that move continuously or intermittently (stopping up to approximately 15 minutes) such as short-line striping and in-lane rumble strips. When activities are anticipated to take longer amounts of time or traffic conditions warrant, a short duration or short-term stationary traffic control plan should be used.
2. A Truck Mounted Attenuator shall be used on Shadow Vehicle. Striping on the back panel of all truck mounted attenuators shall be 8" red and white reflective sheeting placed in an inverted "V" design. Reflective sheeting shall meet or exceed the reflectivity and color requirements of departmental material specification DMS-8300, Type A.
3. All traffic control devices shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD), latest edition.
4. The use of yellow rotating beacons or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the drivers side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
5. Flashing arrow board shall be used on Shadow Vehicle. Flashing arrow board shall be Type B or Type C as per BC Standards. The arrow board operation shall be controlled from inside the truck.



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

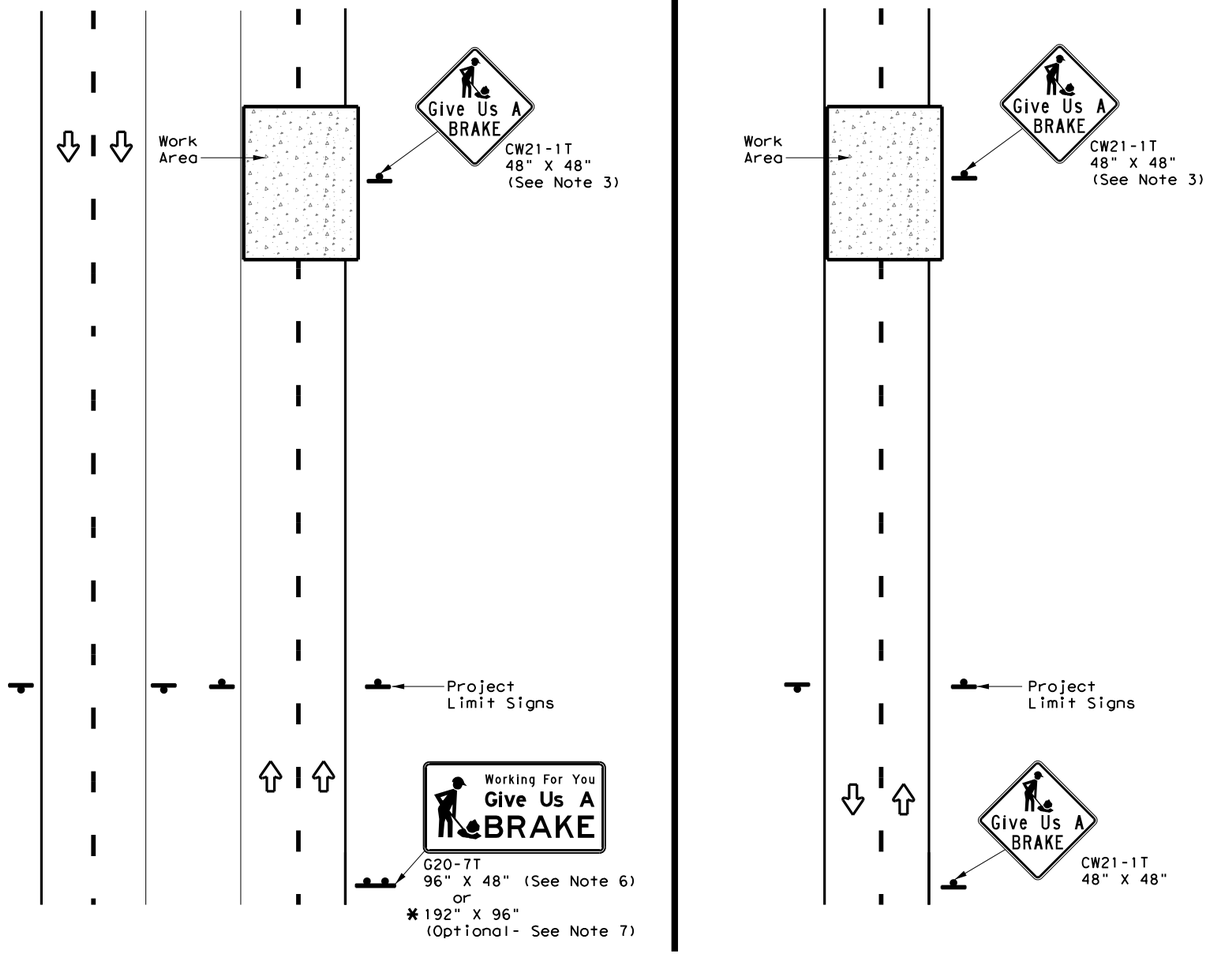
TRAFFIC CONTROL PLAN MOBILE OPERATIONS FOR ISOLATED WORK AREAS UNDIVIDED HIGHWAYS

TCP(3-4)-13

FILE: tcp3-4.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT July, 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		62

DATE: 11/21/2023 3:24:02 PM
FILE: c:\pw\kn1\d0277916\tcp3-4.dgn

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.



DIVIDED HIGHWAY

UNDIVIDED HIGHWAY

SIGNS ARE SHOWN FOR ONE DIRECTION OF TRAVEL

* When the optional larger WORKING FOR YOU GIVE US A BRAKE (G20-7T) 192" x 96" sign is required, the locations shall be noted elsewhere in the plans.

SUMMARY OF LARGE SIGNS

BACKGROUND COLOR	SIGN DESIGNATION	SIGN	SIGN DIMENSIONS	REFLECTIVE SHEETING	SQ FT	GALVANIZED STRUCTURAL STEEL			DRILLED SHAFT 24" DIA. (LF)
						Size	(LF) ①	(LF) ②	
Orange	G20-7T	Working For You Give Us A BRAKE	96" X 48"	Type B_{FL} or C_{FL}	32	▲	▲	▲	▲
Orange	G20-7T	Working For You Give Us A BRAKE	192" X 96"	Type B_{FL} or C_{FL}	128	W8x18	16	17	12

▲ See Note 6 Below

LEGEND	
	Sign
	Large Sign
	Traffic Flow

DEPARTMENTAL MATERIAL SPECIFICATIONS	
PLYWOOD SIGN BLANKS	DMS-7100
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B_{FL} OR TYPE C_{FL}
BLACK	LEGEND & BORDERS	NON-REFLECTIVE ACRYLIC FILM

GENERAL NOTES

1. See BC and SMD sheets for additional sign support details.
2. Sign locations shall be approved by the Engineer.
3. For projects more than two miles in length, Give Us a BRAKE signs should be repeated halfway through the project. The Give Us a Brake (CW21-1T) may be used for this purpose.
4. Work zone speed limits are sometimes used in conjunction with GIVE US A BRAKE signing. See BC(3) for location and spacing of construction speed zone signing when required.
5. Give Us a Brake (CW21-1T) signs and supports shall be considered subsidiary to Item 502, "Barricades, Signs and Traffic Handling."
6. The 96" X 48" Working For You Give Us A BRAKE (G20-7T) may use a 1/2" or 5/8" plywood substrate or 0.125" aluminum sheeting substrate and may be supported by two 4" x 6" wood posts with drilled holes for breakaway as per BC(5) and will be subsidiary to Item 502.
7. The Working For You Give Us A BRAKE (G20-7T) 192" X 96" sign shall be paid for under the following specification items:
   Item 636 - Aluminum Signs
   Item 647 - Large Roadside Sign Supports and Assemblies.
   Item 416 - Drilled Shaft Foundations
8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE "GIVE US A BRAKE" SIGNS

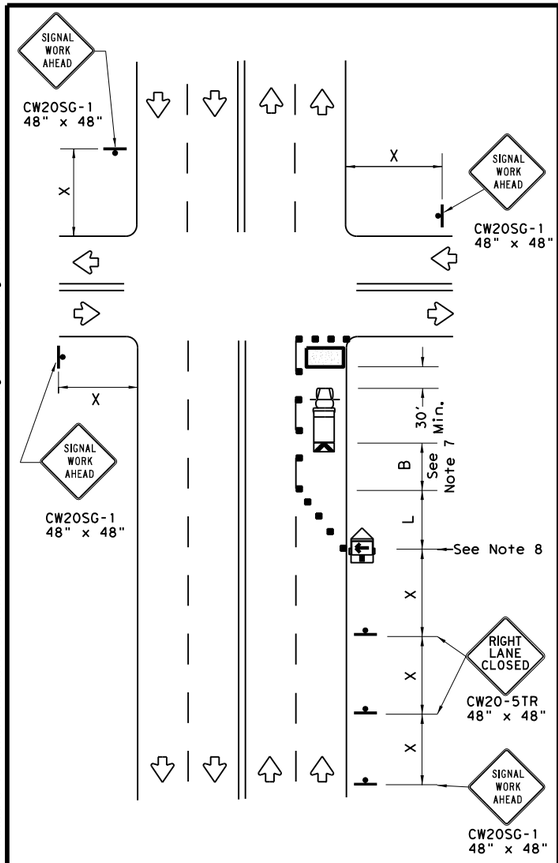
WZ(BRK)-13

FILE: wzbrk-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
6-96 5-98 7-13	DIST	COUNTY		SHEET NO.
8-96 3-03	SAT	BEXAR		63

DATE: 11/21/2023
FILE: c:\pw\txdot\d027916\wzbrk-13.dgn

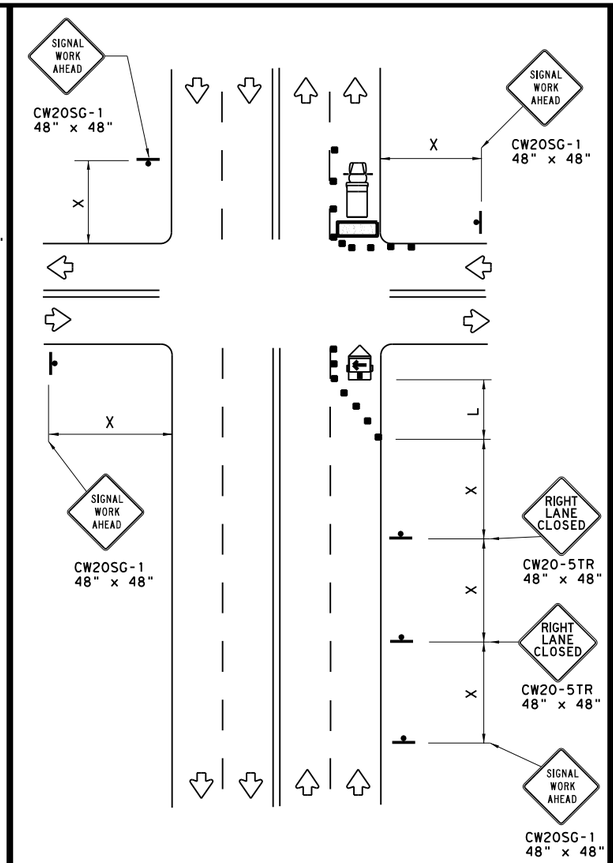
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:



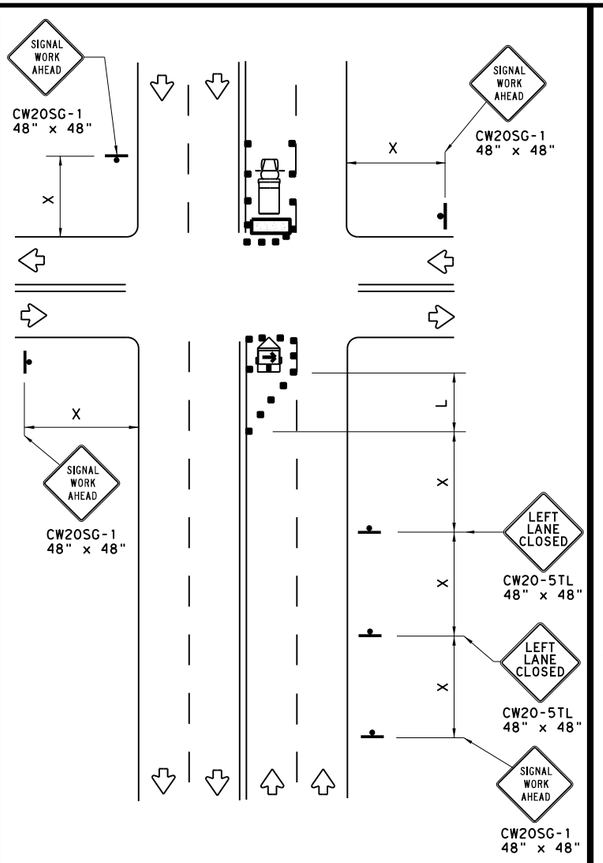
NEAR SIDE LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY



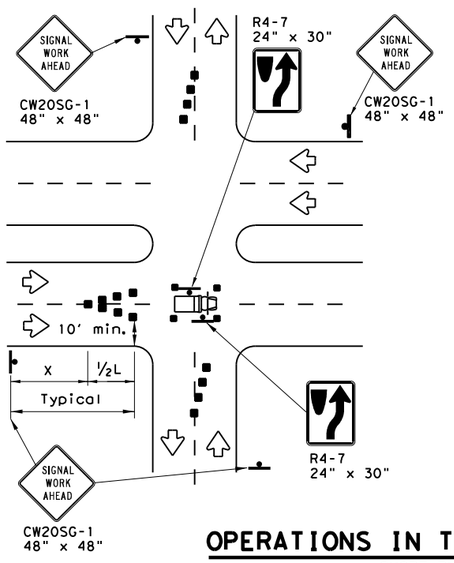
FAR SIDE RIGHT LANE CLOSURE

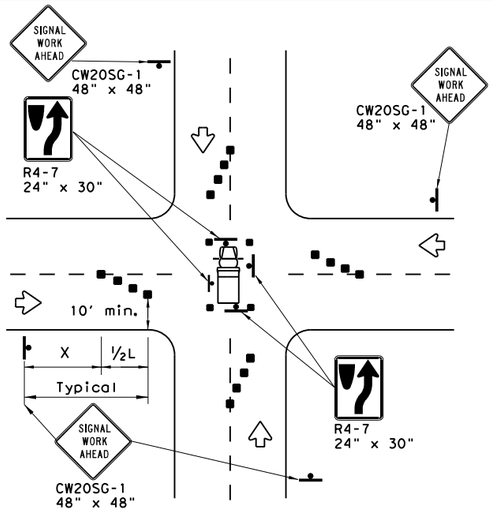
SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE LEFT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY





OPERATIONS IN THE INTERSECTION

SHORT DURATION

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L = WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only

** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

WORKERS IN BUCKET TRUCKS SHALL NOT WORK ABOVE OPEN LANES OF TRAFFIC.

GENERAL NOTES

1. The minimum size channelizing device is the 28" cone. 42" Two-piece cones, drums, vertical panels or barricades will be required when the device must be left unattended at night.
2. Obstructions or hazards at the work area shall be clearly marked and delineated at all times.
3. Flaggers and Flagger Symbol (CW20-7) signs may be required according to field conditions.
4. Vehicles parked in roadway shall be equipped with at least two high intensity rotating, flashing, oscillating or strobe type lights.
5. High level warning devices (flag trees) may be used at corners of the vehicle.
6. When work operations are performed on existing signals, the signals may be placed in flashing red mode when approved by the engineer. If existing signals do not have power, All-Way Stop (R1-1 and R1-3P) signs may be implemented when approved by the engineer.
7. For Short-Term Stationary work the buffer space "B" from the above table should be used if field conditions permit. For Short Duration (less than 1 hour) any buffer space provided will enhance the safety of the setup.
8. The arrow board at this location may be omitted for Short Duration work if the work vehicle has an arrow board in operation. As an option, the arrow board may be placed at the end of the taper in the closed lane if space is not available at the beginning of the taper.
9. Signs and devices for the NEAR SIDE LANE CLOSURE may be altered for a left lane closure by using a LEFT LANE CLOSED (CW20-5TL) and adding channelizing devices on the centerline to protect the work space from opposing traffic.

Texas Department of Transportation

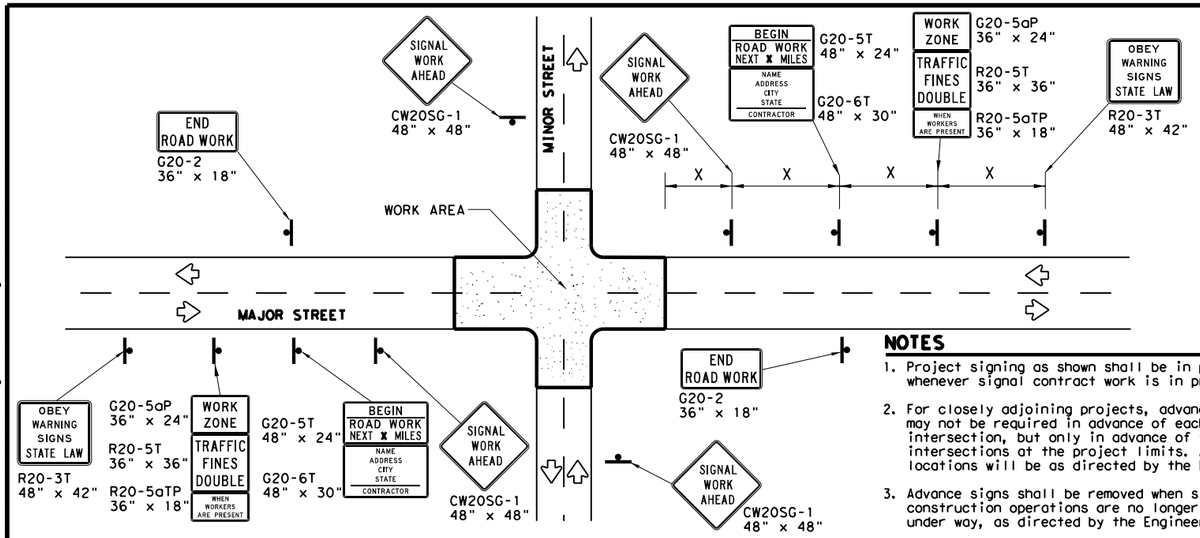
Traffic Operations Division Standard

TRAFFIC SIGNAL WORK TYPICAL DETAILS

WZ(BTS-1)-13

FILE: wzbts-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	007	302	082	US 281
2-98 10-99 7-13	DIST	COUNTY		SHEET NO.
4-98 3-03	SAT	BEXAR		64

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.



TYPICAL ADVANCE SIGNAL PROJECT SIGNING

FOR LONG TERM and INTERMEDIATE-TERM STATIONARY WORK OPERATIONS

NOTES

1. Project signing as shown shall be in place whenever signal contract work is in progress.
2. For closely adjoining projects, advance signing may not be required in advance of each intersection, but only in advance of the intersections at the project limits. Actual locations will be as directed by the Engineer.
3. Advance signs shall be removed when signal construction operations are no longer under way, as directed by the Engineer.
4. Warning sign spacing shown is typical for both directions.
5. See the Table on sheet 1 of 2 for Typical warning sign spacing.

GENERAL NOTES FOR WORK ZONE SIGNS

1. Signs shall be installed and maintained in a straight and plumb condition.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. Nails shall NOT be used to attach signs to any support.
5. All signs shall be installed in accordance with the plans or as directed by the Engineer.
6. The Contractor shall furnish the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD).
7. The Contractor shall furnish sign supports and substrates listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD), installed as per the manufacturer's recommendations.
8. Temporary signs that have damaged or cracked substrates and/or damaged or marred reflective sheeting shall be replaced as directed by the Engineer.
9. Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1".
10. Damaged wood posts shall be replaced. Splicing wood posts will not be allowed.

DURATION OF WORK

1. Work zone durations are defined in Part 6, Section 6G.02 of the Texas Manual on Uniform Traffic Control Devices (TMUTCD).

SIGN MOUNTING HEIGHT

1. Sign height of Long-term/Intermediate-term warning signs shall be as shown on Figure 6F-1 of the TMUTCD.
2. Sign height of Short-term/Short Duration warning signs shall be as shown on Figure 6F-2 of the TMUTCD.
3. Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

REMOVING OR COVERING

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered, unless otherwise approved by the Engineer.
2. When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night without damaging the sign sheeting. Burlap, or heavy materials such as plywood or aluminum shall not be used to cover signs.
3. Duct tape or other adhesive material shall NOT be affixed to a sign face.
4. Signs and anchor stubs shall be removed and holes back filled upon completion of the work.

REFLECTIVE SHEETING

1. All signs shall be retroreflective and constructed of sheeting meeting the requirements of the DMS and color usage table shown on this sheet.

SIGN SUPPORT WEIGHTS

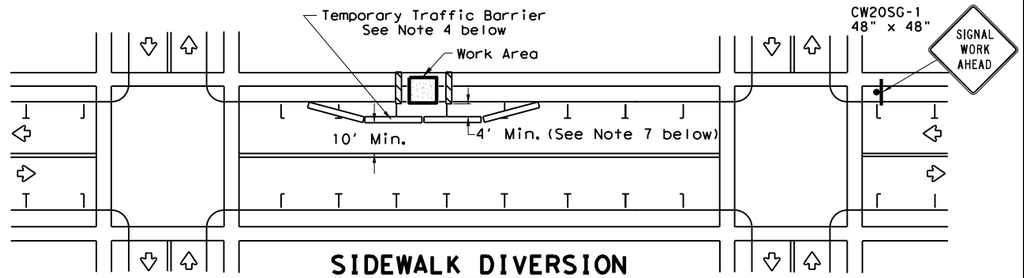
1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support weights.
4. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
5. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber, such as tire inner tubes, shall not be used.
6. Rubber ballasts designed for channelizing devices should not be used for ballast on portable sign supports. Sign supports designed and manufactured with rubber bases may be used when shown on the CWZTCD list.
7. Sandbags shall only be placed along or laid over the base supports of the traffic control device and shall not be suspended above ground level or hung with rope, wire, chains or other fastners. Sandbags shall be placed along the length of the skids to weigh down the sign support.
8. Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

LEGEND	
	Sign
	Channelizing Devices
	Type 3 Barricade

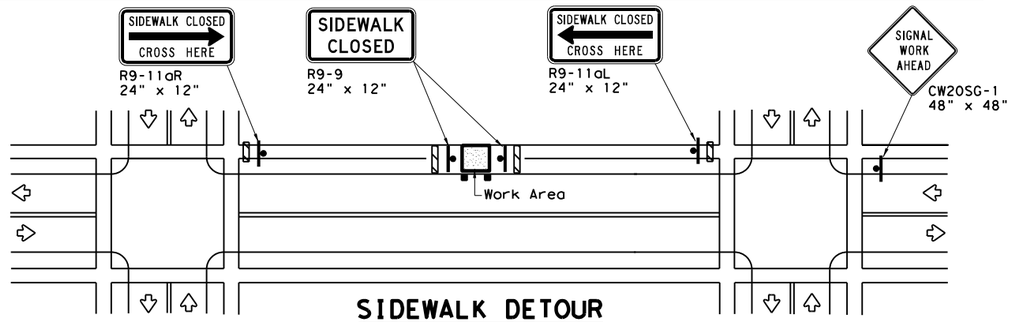
DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
FLEXIBLE ROLL-UP REFLECTIVE SIGNS	DMS-8310

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B_{FL} OR TYPE C_{FL} SHEETING
WHITE	BACKGROUND	TYPE A SHEETING
BLACK	LEGEND & BORDERS	ACRYLIC NON-REFLECTIVE SHEETING

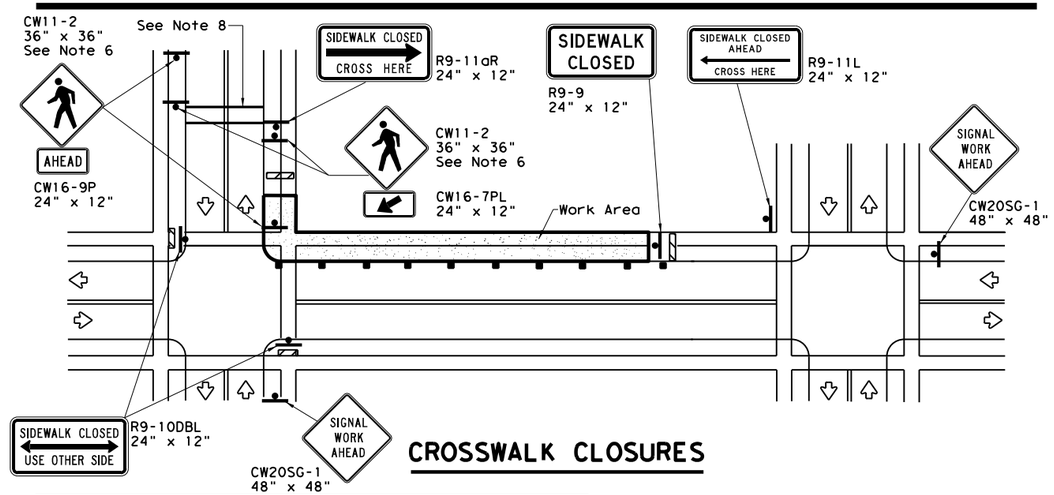
Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:
http://www.txdot.gov/txdot_library/publications/construction.htm



SIDEWALK DIVERSION



SIDEWALK DETOUR



CROSSWALK CLOSURES

PEDESTRIAN CONTROL

1. Holes, trenches or other hazards shall be adequately protected by covering, delineating or surrounding the hazard with orange plastic pedestrian fencing or longitudinal channelizing devices, or as directed by the Engineer.
2. "CROSSWALK CLOSURES" as detailed above will require the Engineer's approval prior to installation.
3. R9 series signs shown may be placed on supports detailed on the BC standards or CWZTCD list, or when fabricated from approved lightweight plastic substrates, they may be mounted on top of a plastic drum at or near the location shown.
4. For speeds less than 45 mph longitudinal channelizing devices may be used instead of traffic barriers when approved by the Engineer. Attenuation of blunt ends and installation of water filled devices shall be as per BC(9) and manufacturer's recommendations.
5. Location of devices are for general guidance. Actual device spacing and location must be field adjusted to meet actual conditions.
6. Where pedestrians with visual disabilities normally use the closed sidewalk Detectable Pedestrian Barricades should be used instead of the Type 3 Barricades shown.
7. The width of existing sidewalk should be maintained if practical.
8. Pavement markings for mid-block crosswalks shall be paid for under the appropriate bid items.
9. When crosswalks or other pedestrian facilities are closed or relocated, temporary facilities shall be detectable and shall include accessibility features consistent with the features present in the existing pedestrian facility.

Texas Department of Transportation

Traffic Operations Division Standard

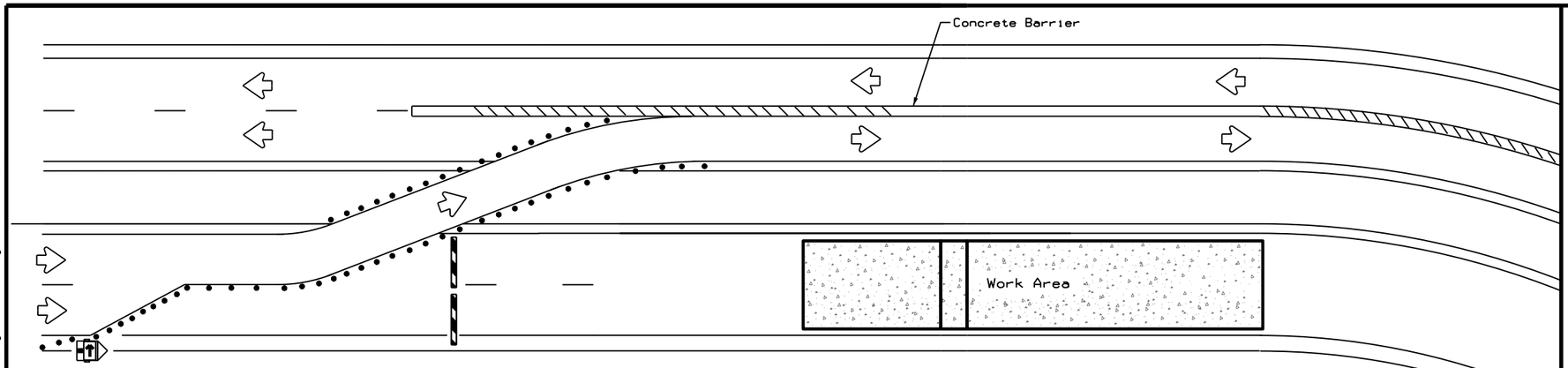
TRAFFIC SIGNAL WORK BARRICADES AND SIGNS

WZ(BTS-2)-13

FILE: wzbts-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0076	02	082	US 281
2-98 10-99 7-13	DIST	COUNTY		SHEET NO.
4-98 3-03	SAT	BEXAR		65

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.



NOTES:

1. Length of Safety Glare screen will be specified elsewhere in the plans.
2. The cumulative nominal length of the modular safety glare screen units shall equal the length of the individual sections of temporary concrete traffic barrier on which they are installed so the joint between barrier sections will not be spanned by any one safety glare screen unit.
3. Screen Panel/blades will be designed such that reflective sheeting conforming with Departmental Material Specification DMS-8300, Sign Face Materials, Type B or C Yellow, minimum size of 2 inches by 12 inches can be attached to the edge of the panel/blade. The sheeting shall be attached to one glare screen panel/blade per section of concrete barrier not to exceed a spacing of 30 feet. Barrier reflectors are not necessary when panel/blades are installed with reflective sheeting as described.
4. Payment for these devices will be under statewide Special Specification "Modular Glare Screens for Headlight Barrier."
5. This detail is only intended to show types of locations where Glare Screens would be appropriate. Required signing and other devices shall be as shown elsewhere in the plans.

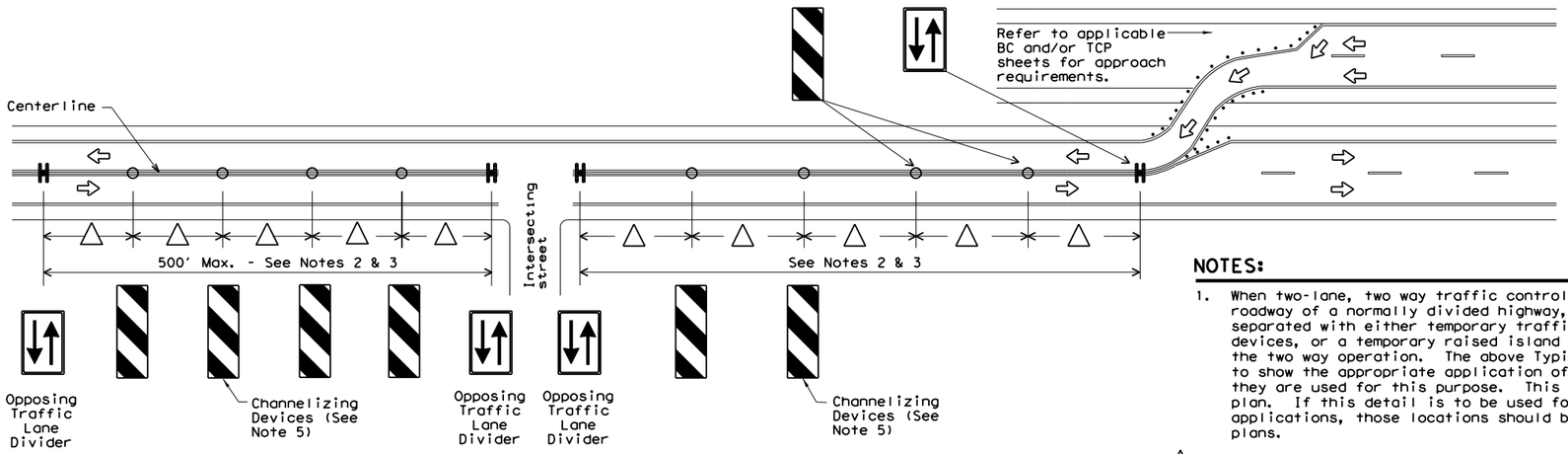
BARRIER DELINEATION WITH MODULAR GLARE SCREENS

LEGEND	
	Type 3 Barricade
• • •	Channelizing Devices
	Trailer Mounted Flashing Arrow Board
	Sign
\\\\	Safety glare screen

DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
DELINEATORS AND OBJECT MARKERS	DMS-8600
MODULAR GLARE SCREENS FOR HEADLIGHT BARRIER	DMS-8610

Only pre-qualified products shall be used. A copy of the Compliant Work Zone Traffic Control Devices List" CWZTCD)describes pre-qualified products and their sources and may be found at the following web address:

http://www.txdot.gov/business/resources/producer-list.html



VERTICAL PANELS & OPPOSING TRAFFIC LANE DIVIDERS (OTLD)
SEPARATING TWO-WAY TRAFFIC ON NORMALLY DIVIDED HIGHWAYS

NOTES:

1. When two-lane, two way traffic control must be maintained on one roadway of a normally divided highway, opposing traffic shall be separated with either temporary traffic barriers, channelizing devices, or a temporary raised island throughout the length of the two way operation. The above Typical Application is intended to show the appropriate application of channelizing devices when they are used for this purpose. This is not a traffic control plan. If this detail is to be used for other types of roads or applications, those locations should be stated elsewhere in the plans.

△2. Space devices according to the Tangent Spacing shown on the Device Spacing table on BC(9) but not exceeding 100'.

3. Every fifth device should be an OTLD except when spaced closer to accommodate an intersection. An OTLD should be the first device on each side of intersecting streets or roads.
4. Locations where surface mount bases with adhesives or self-righting devices will be required in order to maintain them in their proper position should be noted elsewhere in the plans.
5. Channelizing devices are to be vertical panels, 42" cones or tubular markers that are at least 36" tall. Tubular markers used to separate traffic should have a rubber base weighing at least 30 pounds. Tubular markers that are 42" tall or more shall have four bands of reflective material as detailed for 42" cones on BC(10). Tubular markers less than 42" but at least 36" tall shall have three bands of 3" wide white reflective material spaced 2" apart. Reflective material shall meet DMS-8300, Type A.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN TYPICAL DETAILS

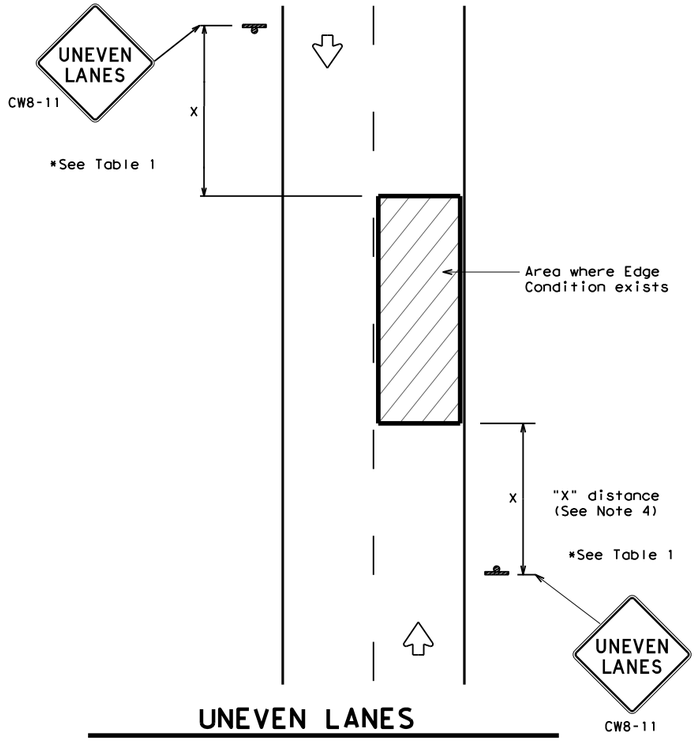
WZ(TD)-17

FILE: wztd-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-98 2-17 3-03 7-13	0073	02	082	US 281
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		66

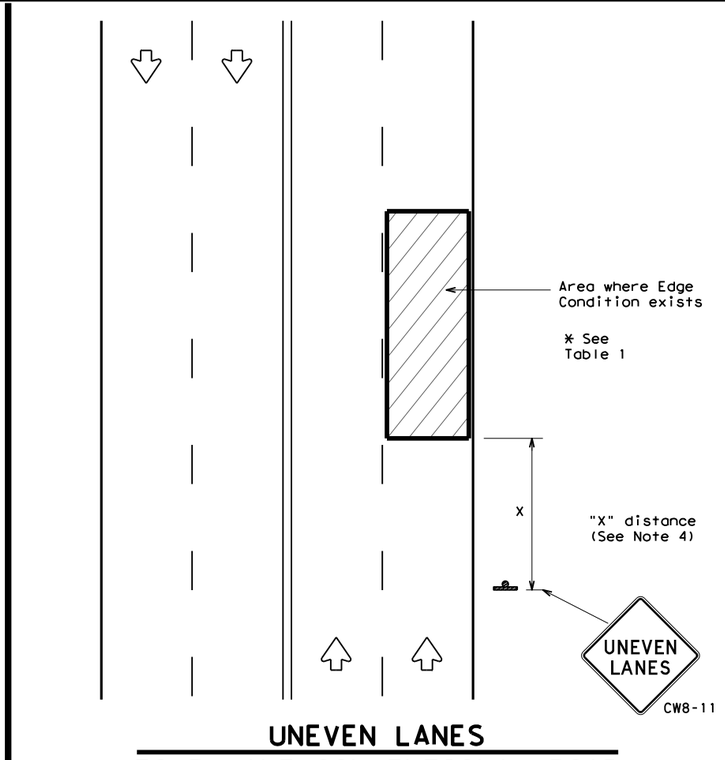
110

DATE:
FILE:

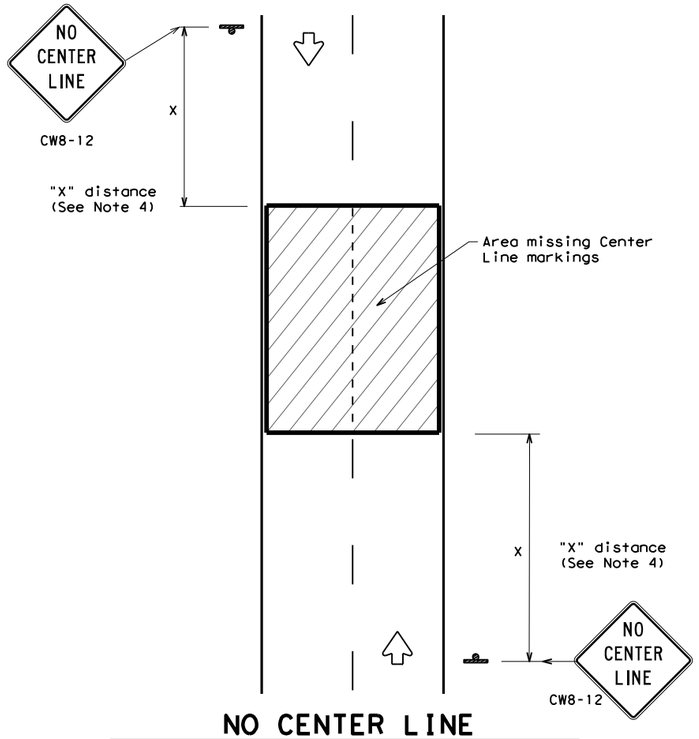
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



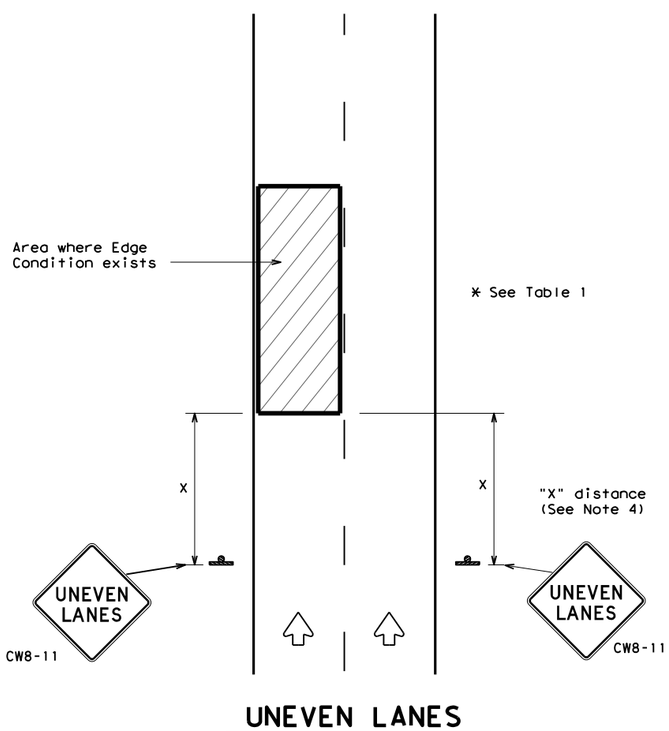
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

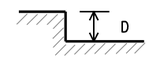
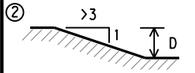
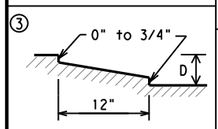
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B_{FL} OR TYPE C_{FL} SHEETING
BLACK	LEGEND & BORDERS	ACRYLIC NON-REFLECTIVE SHEETING

GENERAL NOTES

1. If spalling or holes occur, ROUGH ROAD (CW8-8) signs should be placed in advance of the condition and be repeated every two miles where the condition persists.
2. UNEVEN LANES (CW8-11) signs shall be installed in advance of the condition and repeated every mile. Signs installed along the uneven lane condition may be supplemented with the NEXT XX MILES (CW7-3aP) plaque or Advisory Speed (CW13-1P) plaque.
3. NO CENTER LINE (CW8-12) signs and temporary pavement markings as per the WZ(STPM) standard shall be installed if yellow centerlines separating two way traffic are obscured or obliterated. Repeat NO CENTER LINE signs every two miles where the center line markings are not in place. The signs and markings shall remain in place until permanent pavement markings are installed.
4. Signs shall be spaced at the distances recommended as per BC standards.
5. Additional signs may be required as directed by the Engineer. Signs shall remain in place until final surface is applied. Signs shall be considered subsidiary to Item 502 "BARRICADES, SIGNS AND TRAFFIC HANDLING."
6. Signs shall be fabricated and mounted on supports as shown on the BC standards and/or listed on the "Compliant Work Zone Traffic Control Devices" list.
7. Short term markings shall not be used to simulate edge lines.
8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition.

TABLE 1

Edge Condition	Edge Height (D)	* Warning Devices
① 	Less than or equal to: 1¼" (maximum-planing) 1½" (typical-overlay)	Sign: CW8-11
	Distance "D" may be a maximum of 1 1/4 " for planing operations and 2" for overlay operations if uneven lanes with edge condition 1 are open to traffic after work operations cease.	
② 	Less than or equal to 3"	Sign: CW8-11
③  Notched Wedge Joint	Distance "D" may be a maximum of 3" if uneven lanes with edge condition 2 or 3 are open to traffic after work operations cease. Uneven lanes should not be open to traffic when "D" is greater than 3".	

TRAFFIC CONTROL DURING PLANING, OVERLAY AND LEVELING OPERATIONS ARE SHOWN ELSEWHERE IN THE PLANS.

MINIMUM WARNING SIGN SIZE	
Conventional roads	36" x 36"
Freeways/expressways, divided roadways	48" x 48"

Texas Department of Transportation

Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

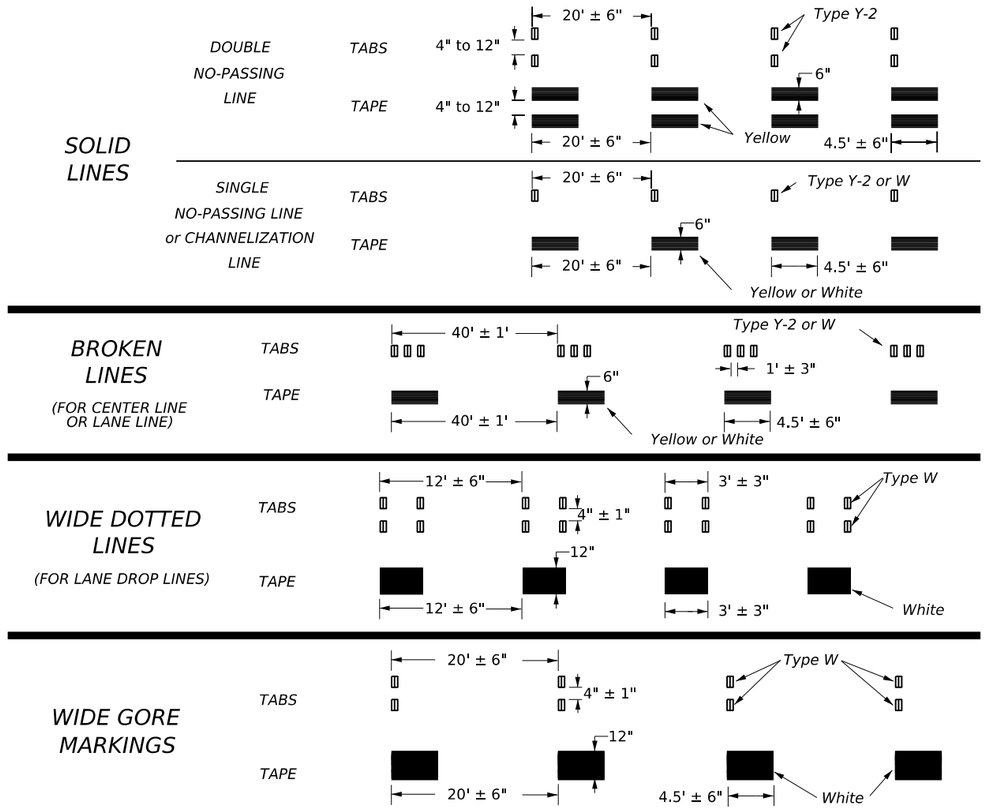
WZ(UL)-13

FILE:	wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	April 1992	CONT	SECT	JOB	HIGHWAY
	REVISIONS	0073	02	082	US 281
8-95 2-98 7-13		DIST	COUNTY		SHEET NO.
1-97 3-03		SAT	BEXAR		67

DATE: 11/21/2023
FILE: c:\pw\ken\d0279\16\wzul-13.dgn

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.

WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



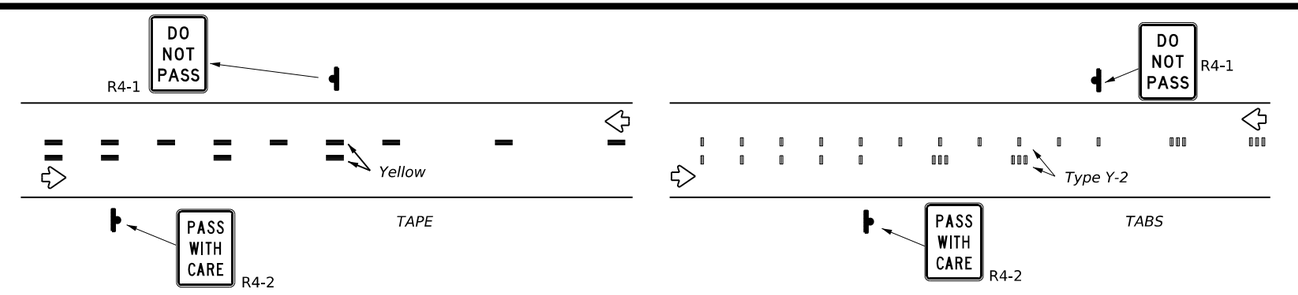
NOTES:

1. Short term pavement markings may be prefabricated markings (stick down tape) or temporary flexible reflective roadway marker tabs unless otherwise specified elsewhere in plans.
2. Short term pavement markings shall NOT be used to simulate edge lines.
3. Dimensions indicated on this sheet are typical and approximate. Variations in size and height may occur between markers or devices made by manufacturers, by as much as 1/4 inch, unless otherwise noted.
4. Temporary flexible-reflective roadway marker tabs will require normal maintenance replacement when used on roadways with an ADT per lane of up to 7500 vehicles with no more than 10% truck mix. When roadways exceed these values, additional maintenance replacement of devices should be planned.
5. No segment of roadway open to traffic shall remain without permanent pavement markings for a period greater than 14 calendar days. The Contractor will be responsible for maintaining short term pavement markings until permanent pavement markings are in place. When the Contractor is responsible for placement of permanent pavement markings, no segment of roadway shall remain without permanent pavement markings for a period greater than 14 calendar days unless weather conditions prohibit placement. Permanent pavement markings shall be placed as soon as weather permits.
6. For two lane, two-way roadways, DO NOT PASS signs shall be erected to mark the beginning of sections where passing is prohibited and PASS WITH CARE signs shall be erected to mark the beginning of sections where passing is permitted. Signs shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and may be used to indicate the limits of no-passing zones for up to 14 calendar days. Permanent pavement markings should then be placed.
7. For low volume two lane, two-way roadways of 4000 ADT or less, no-passing lines may be omitted when approved by the Engineer. DO NOT PASS and PASS WITH CARE signs shall be erected (see note 6).
8. For exit gores where a lane is being dropped place wide gore markings or retroreflective channelizing devices to guide motorist through the exit. If channelizing devices are to be used it should be noted elsewhere in the plans. One piece cones are not allowed for this purpose.

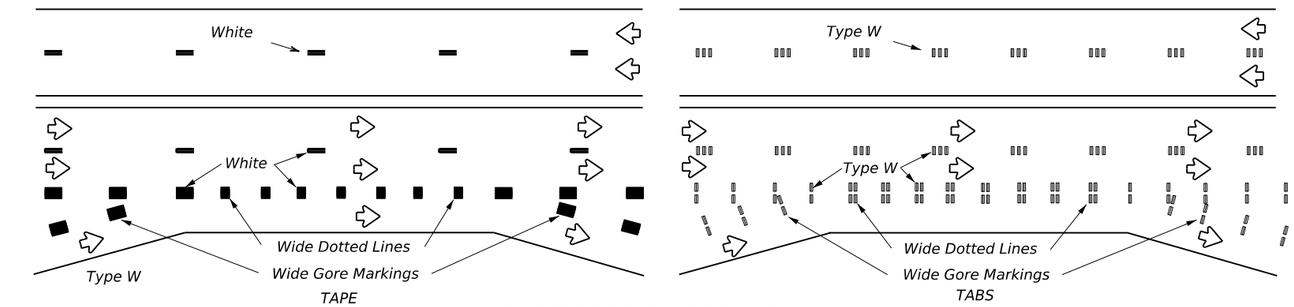
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

1. Temporary flexible-reflective roadway marker tabs detailed on this sheet will be designated Type Y-2 (two amber reflective surfaces with yellow body); Type Y (one amber reflective surface with yellow body); and Type W (one white or silver reflective surface with white body). Additional details may be found on BC(11).
2. Tabs shall meet requirements of Departmental Material Specification DMS-8242.
3. When dry, tabs shall be visible for a minimum distance of 200 feet during normal daylight hours and when illuminated by automobile low-beam head light at night, unless sight distance is restricted by roadway geometrics.
4. No two consecutive tabs nor four tabs per 1000 feet of line shall be missing or fail to meet the visual performance requirements of Note 3.

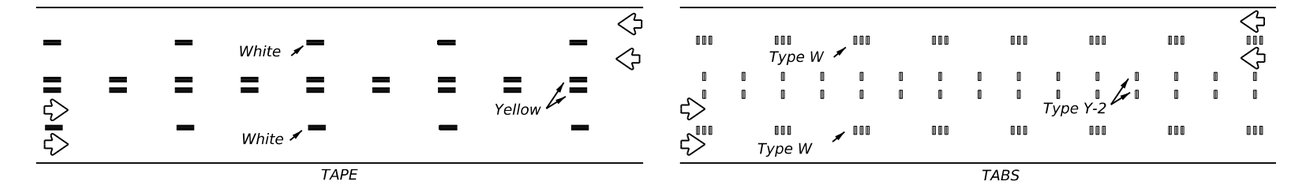
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



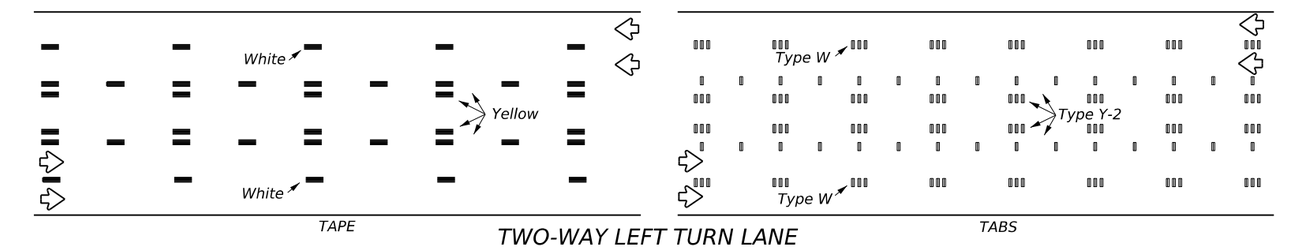
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



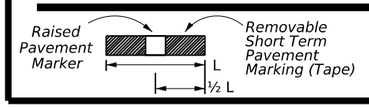
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



If raised pavement markers are used to supplement REMOVABLE short term markings, the markers shall be applied to the top of the tape at the approximate mid length of the tape. This allows an easier removal of raised markers and tape.

PREFABRICATED PAVEMENT MARKINGS

1. Temporary Removable Prefabricated Pavement Markings shall meet the requirements of DMS-8241.
2. Non-removable Prefabricated Pavement Markings shall meet the requirements of either DMS-8240 "Permanent Prefabricated Pavement Markings" or DMS-8243 "Temporary Costruction-Grade Prefabricated Pavement Markings."

RAISED PAVEMENT MARKERS

1. All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and DMS-4200.

DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS) & MATERIAL PRODUCER LISTS (MPL)

1. DMSs referenced above can be found along with embedded links to their respective MPLs at the following website:

http://www.txdot.gov/business/contractors_consultants/material_specifications/default.htm

Texas Department of Transportation

Traffic Safety Division Standard

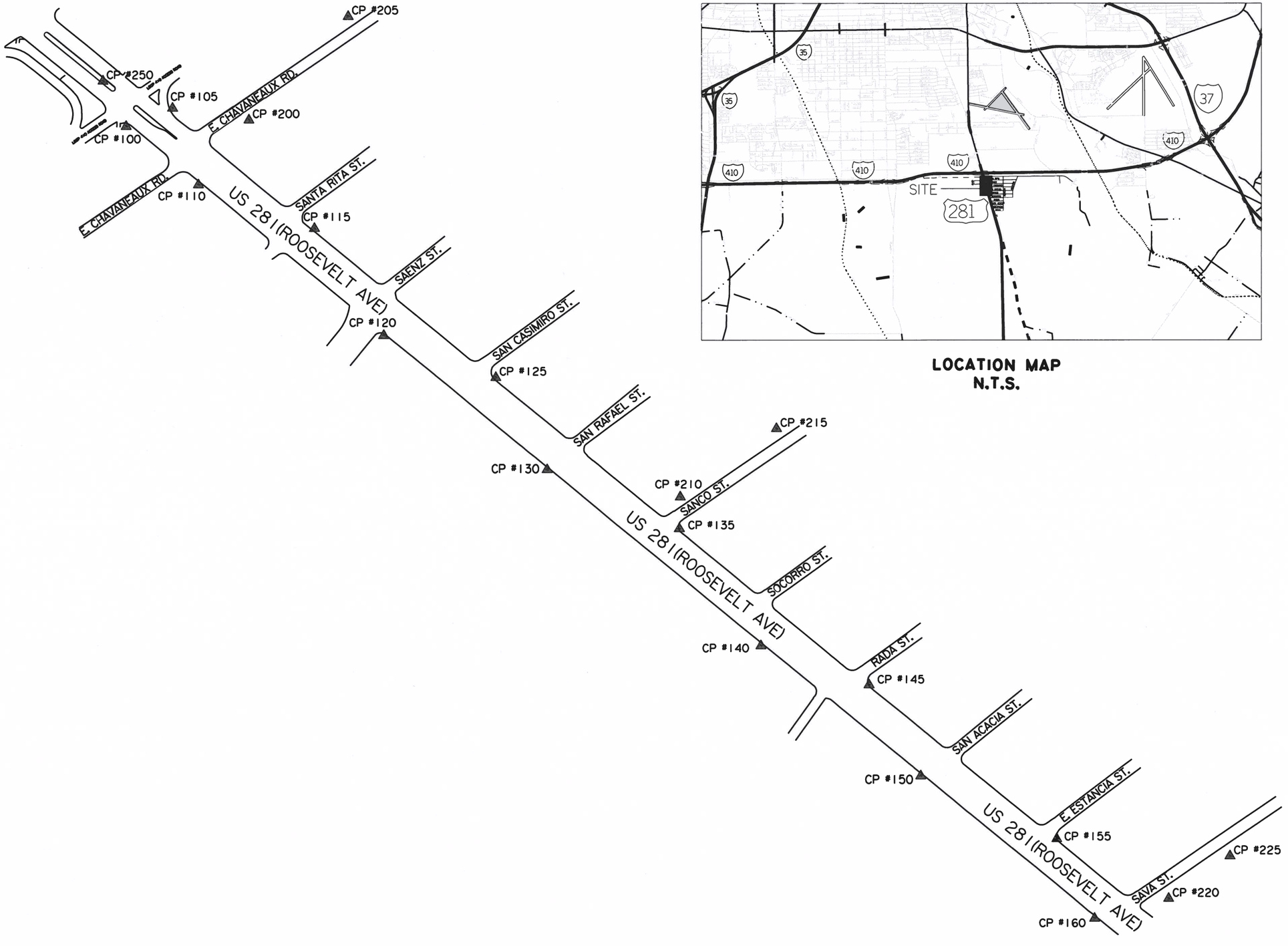
WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-23

FILE: wzstpm-23.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
4-92 7-13 1-97 2-23 3-03	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		68

111

DATE: 11/21/2023 3:25:54 PM
FILE: c:\pwkh1\d0277916\wz(stpm)-23.dgn



LOCATION MAP
N.T.S.

NOTE:

1. HORIZONTAL AND VERTICAL VALUES WERE ESTABLISHED FROM THE TxDOT VRS SYSTEM FROM GPS METHODS CONFORMING TO THE "TxDOT GPS USERS MANUAL" BY VRS. TxDOT PRIMARY CONTROL POINTS ZO1152119 AND VISTA WERE TIED.

2. HORIZONTAL CONTROL IS BASED ON TEXAS THE STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NORTH AMERICAN DATUM NAD 83 (2011).

3. VERTICAL DATUM SHOWN HEREON IS NAVD 88.

4. DISTANCES AND COORDINATES ARE IN US SURVEY FEET DISPLAYED IN SURFACE VALUES WITH A SURFACE ADJUSTMENT FACTOR OF 1.00016.

STATE OF TEXAS
MICHAEL J. SHELTON
4893
REGISTERED
PROFESSIONAL LAND SURVEYOR

I HEREBY CERTIFY THAT THIS CONTROL MAP WAS PREPARED UNDER MY SUPERVISION.

N

N.T.S.

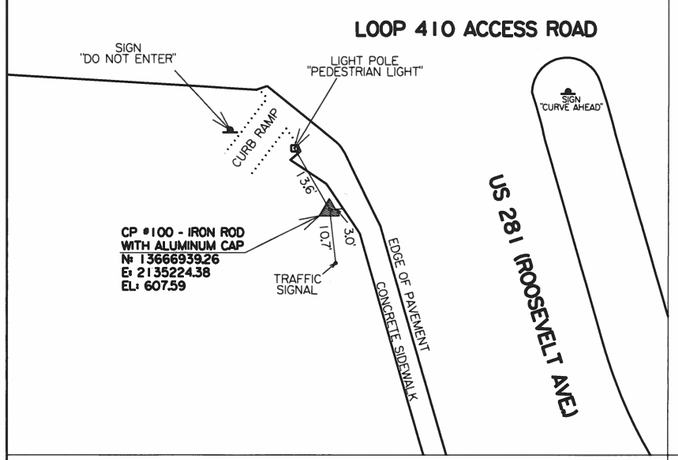
SURVEYED JANUARY 2022

Texas Department of Transportation
© 2023 TxDOT

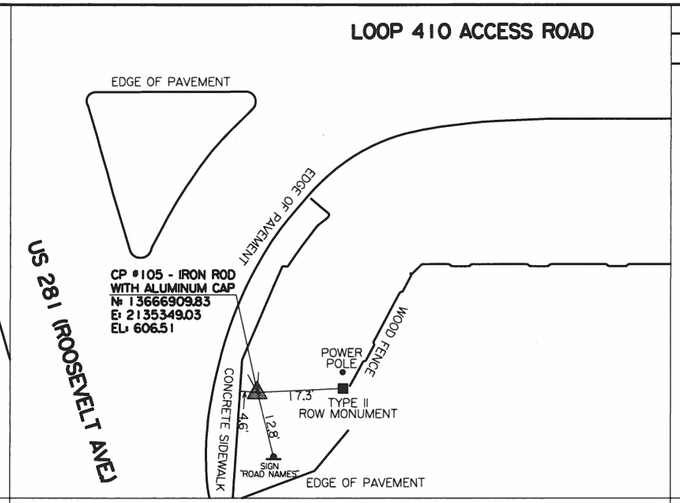
US 281 @ LOOP 410-SAVA ST. HORIZONTAL & VERTICAL CONTROL

SHEET 1 OF 4

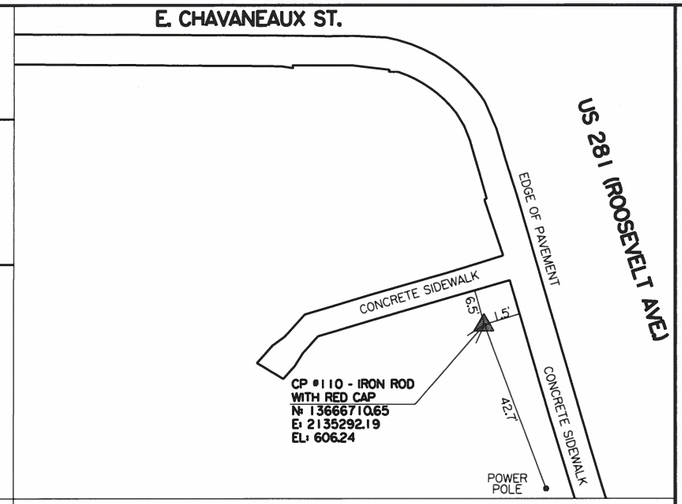
FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6			69
STATE	DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
0073	02	082	US 281



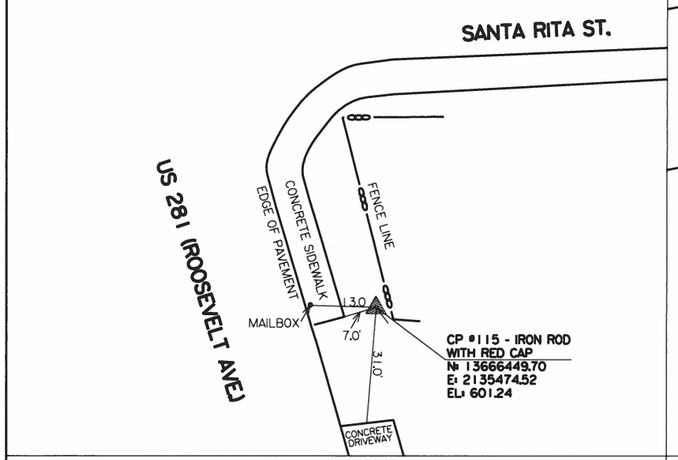
CONTROL POINT #100 IS A 1/2" IRON ROD SET WITH AN ALUMINUM CAP ON THE WEST SIDE OF US 281 AT THE INTERSECTION OF THE EAST BOUND ACCESS RD. OF LOOP 410



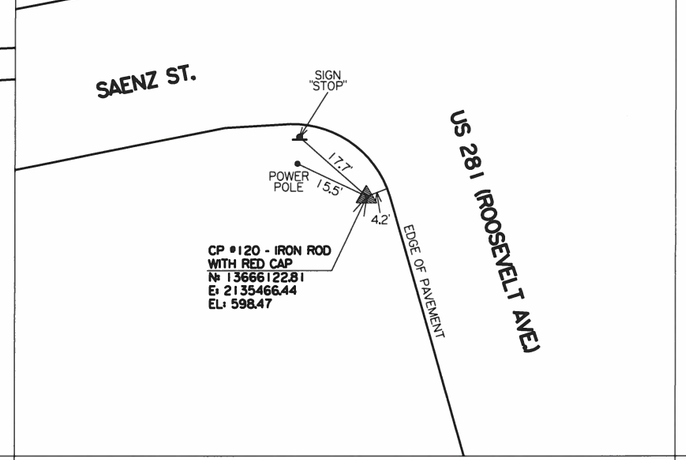
CONTROL POINT #105 IS 5/8" IRON ROD SET WITH AN ALUMINUM CAP ON THE EAST SIDE OF US 281 AT THE INTERSECTION OF THE EAST BOUND ACCESS RD OF LOOP 410.



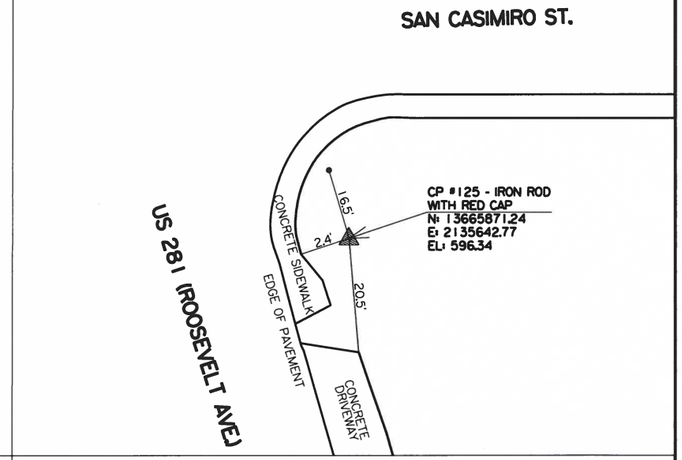
CONTROL POINT #110 IS A 1/2" IRON ROD SET WITH A RED PLASTIC CAP ON THE WEST SIDE OF US 281 APPROXIMATLEY 77 FROM THE E CHAVANEUX RD. INTERSECTION



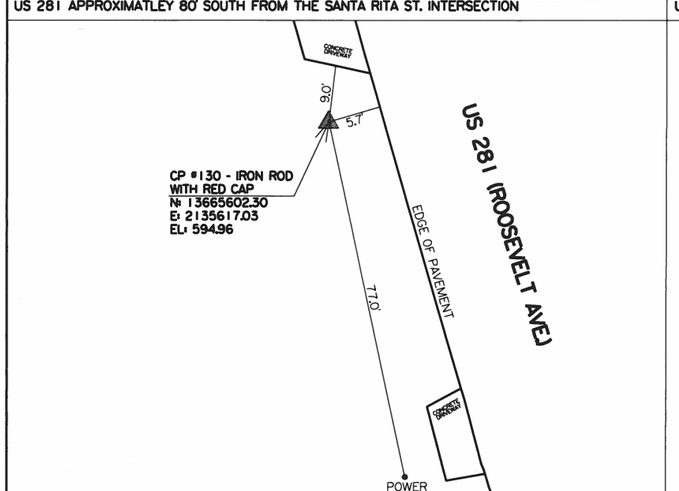
CONTROL POINT #115 IS A 1/2" IRON ROD SET WITH A RED PLASTIC CAP ON THE EAST SIDE OF US 281 APPROXIMATLEY 80' SOUTH FROM THE SANTA RITA ST. INTERSECTION



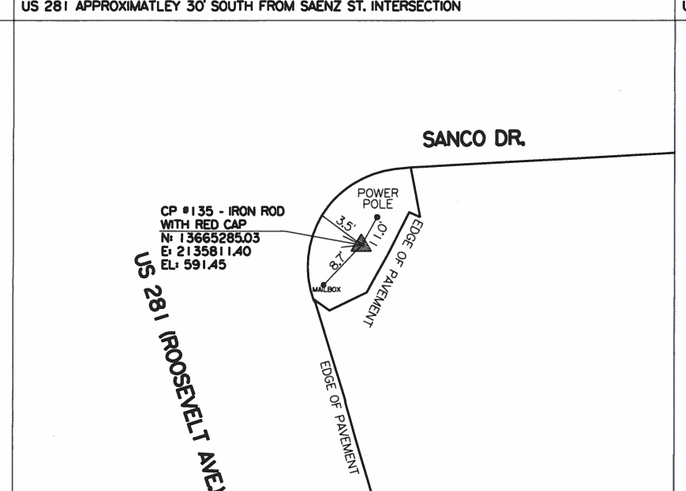
CONTROL POINT #120 IS A 1/2" IRON ROD SET WITH A RED PLASTIC CAP ON THE WEST SIDE OF US 281 APPROXIMATLEY 30' SOUTH FROM SAENZ ST. INTERSECTION



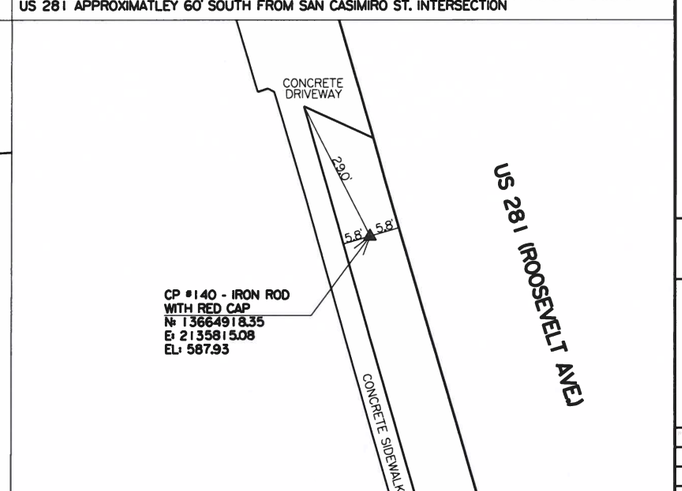
CONTROL POINT #125 IS A 1/2" IRON ROD SET WITH A RED PLASTIC CAP ON THE EAST SIDE OF US 281 APPROXIMATLEY 60' SOUTH FROM SAN CASIMIRO ST. INTERSECTION



CONTROL POINT #130 IS A 1/2" IRON ROD SET WITH A RED PLASTIC CAP ON THE WEST SIDE OF US 281 APPROXIMATLEY 330' SOUTH FROM THE SAN CASIMIRO. INTERSECTION



CONTROL POINT #135 IS A 1/2" IRON ROD SET WITH A RED PLASTIC CAP ON THE EAST SIDE OF US 281 APPROXIMATLEY 35' SOUTH FROM THE SANCO ST. INTERSECTION



CONTROL POINT #140 IS A 1/2" IRON ROD SET WITH A RED PLASTIC CAP ON THE WEST SIDE OF US 281 APPROXIMATLEY 100' SOUTH FROM THE SOCORRO ST. INTERSECTION

NOTE:

1. HORIZONTAL AND VERTICAL VALUES WERE ESTABLISHED FROM THE TxDOT VRS SYSTEM FROM GPS METHODS CONFORMING TO THE "TxDOT GPS USERS MANUAL" BY VRS. TxDOT PRIMARY CONTROL POINTS ZO152119 AND VISTA WERE TIED.
2. HORIZONTAL CONTROL IS BASED ON TEXAS THE STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NORTH AMERICAN DATUM NAD 83 (2011).
3. VERTICAL DATUM SHOWN HEREON IS NAVD 88.
4. DISTANCES AND COORDINATES ARE IN US SURVEY FEET DISPLAYED IN SURFACE VALUES WITH A SURFACE ADJUSTMENT FACTOR OF 1.00016.

STATE OF TEXAS
LJS LTC
1683
REGISTERED
PROFESSIONAL LAND SURVEYOR

I HEREBY CERTIFY THAT THIS CONTROL MAP WAS PREPARED UNDER MY SUPERVISION.

N

N.T.S.

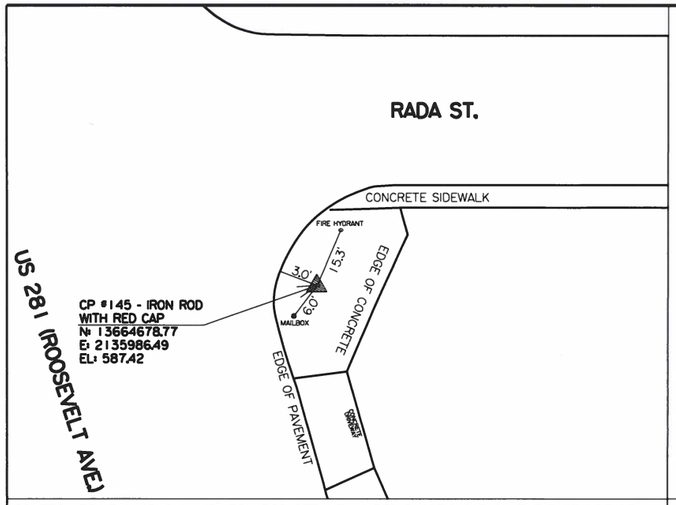
SURVEYED JANUARY, 2022

Texas Department of Transportation
© 2023 TxDOT

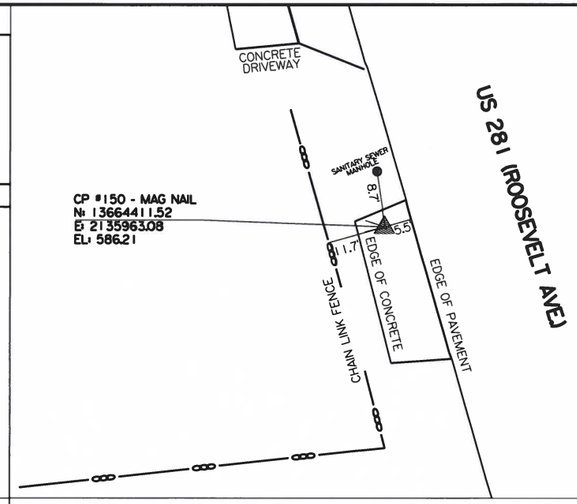
US 281 @ LOOP 410-SAVA ST. HORIZONTAL & VERTICAL CONTROL

SHEET 2 OF 4

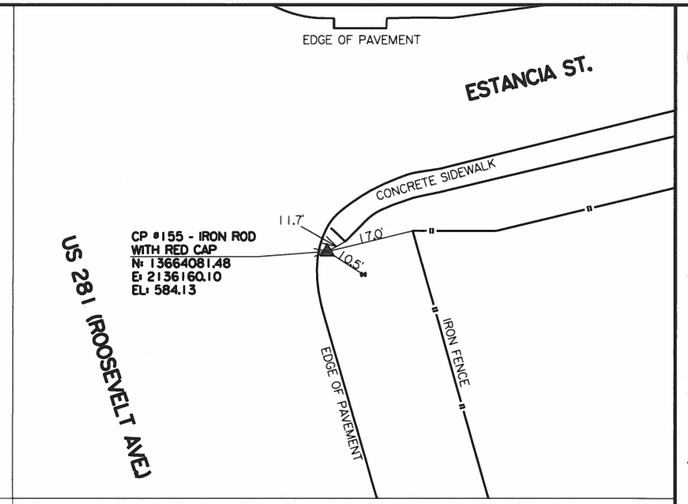
FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6			70
STATE	DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
0073	02	082	US 281



CONTROL POINT #145 IS A 1/2" IRON ROD SET WITH A RED PLASTIC CAP ON THE EAST SIDE OF US 281 APPROXIMATLEY 45' SOUTH FROM THE RADA ST. INTERSECTION



CONTROL POINT #150 IS A MAG NAIL WITH WASHER ON THE EAST SIDE OF US 281 APPROXIMATLEY 325' SOUTH FROM THE RADA ST. INTERSECTION



CONTROL POINT #155 IS A 1/2" IRON ROD SET WITH A RED PLASTIC CAP ON THE EAST SIDE OF US 281 APPROXIMATLEY 40' SOUTH FROM THE E ESTANCIA ST. INTERSECTION

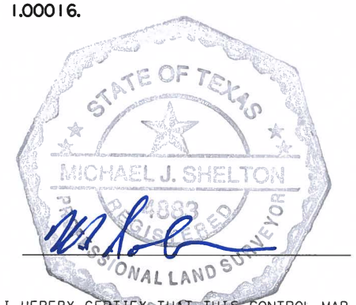
NOTE:

1. HORIZONTAL AND VERTICAL VALUES WERE ESTABLISHED FROM THE TxDOT VRS SYSTEM FROM GPS METHODS CONFORMING TO THE "TxDOT GPS USERS MANUAL" BY VRS. TxDOT PRIMARY CONTROL POINTS ZO1521 19 AND VISTA WERE TIED.

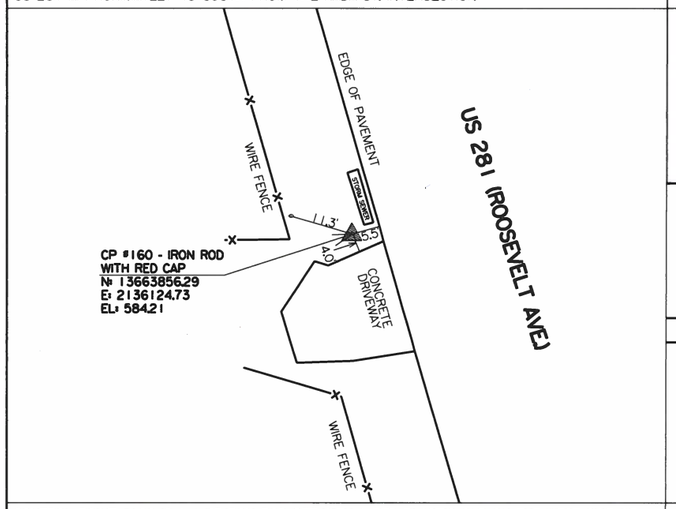
2. HORIZONTAL CONTROL IS BASED ON TEXAS THE STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NORTH AMERICAN DATUM NAD 83 (2011).

3. VERTICAL DATUM SHOWN HEREON IS NAVD 88.

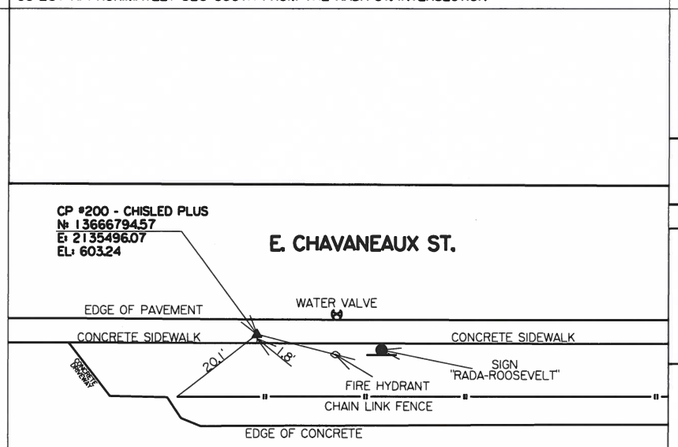
4. DISTANCES AND COORDINATES ARE IN US SURVEY FEET DISPLAYED IN SURFACE VALUES WITH A SURFACE ADJUSTMENT FACTOR OF 1.00016.



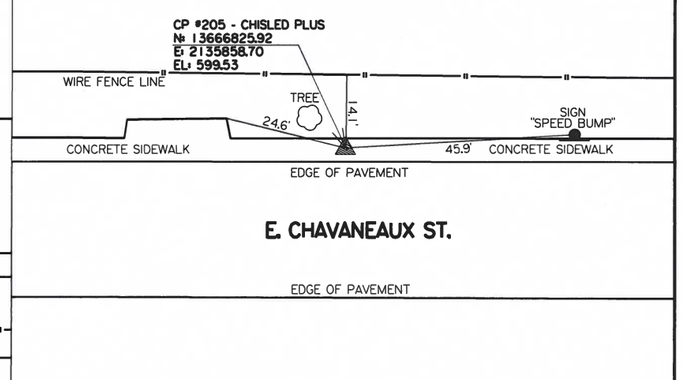
I HEREBY CERTIFY THAT THIS CONTROL MAP WAS PREPARED UNDER MY SUPERVISION.



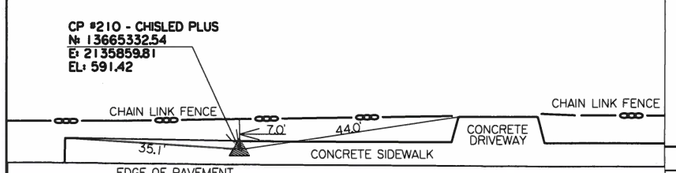
CONTROL POINT #160 IS A 1/2" IRON ROD SET WITH A RED PLASTIC CAP ON THE WEST SIDE OF US 281 APPROXIMATLEY 280' SOUTH FROM THE E ESTANCIA ST. INTERSECTION



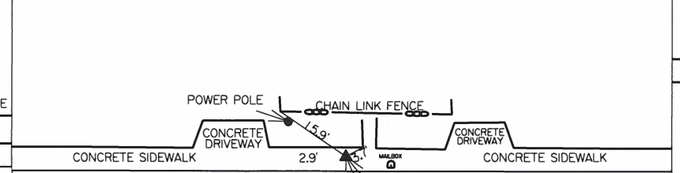
CONTROL POINT #200 IS A CHISLED PLUS SET ON THE SOUTH SIDE OF E CHAVANEAUX RD. APPROXIMATLEY 140' EAST OF THE ROOSEVELT AVE. INTERSECTION



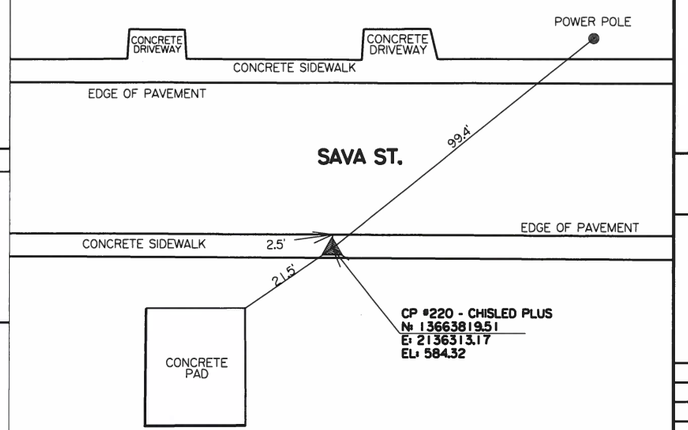
CONTROL POINT #205 IS A CHISLED PLUS SET ON THE SOUTH SIDE OF E CHAVANEAUX RD. APPROXIMATLEY 500' EAST OF THE ROOSEVELT AVE. INTERSECTION



CONTROL POINT #210 IS A CHISLED PLUS SET ON THE NORTH SIDE OF SANCO ST. APPROXIMATLEY 75 EAST FROM THE ROOSEVELT AVE. INTERSECTION



CONTROL POINT #215 IS A CHISLED PLUS SET ON THE NORTH SIDE OF SANCO ST. APPROXIMATLEY 380' EAST FROM THE ROOSEVELT AVE. INTERSECTION



CONTROL POINT #220 IS A CHISLED PLUS SET ON THE SOUTH SIDE OF SAVA ST. APPROXIMATLEY 105' EAST FROM THE ROOSEVELT AVE. INTERSECTION

N

N.T.S.

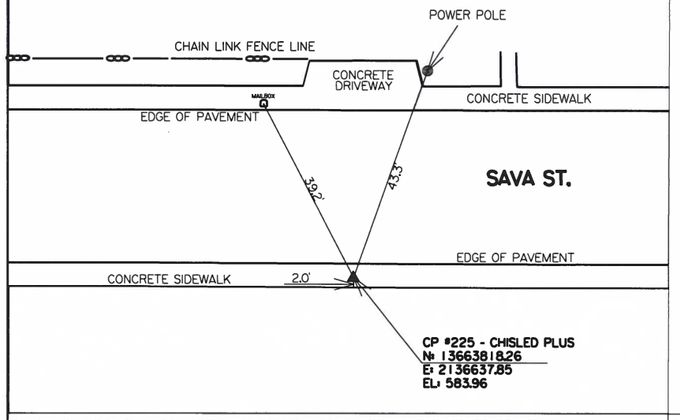
SURVEYED JANUARY, 2022

Texas Department of Transportation
© 2023 TxDOT

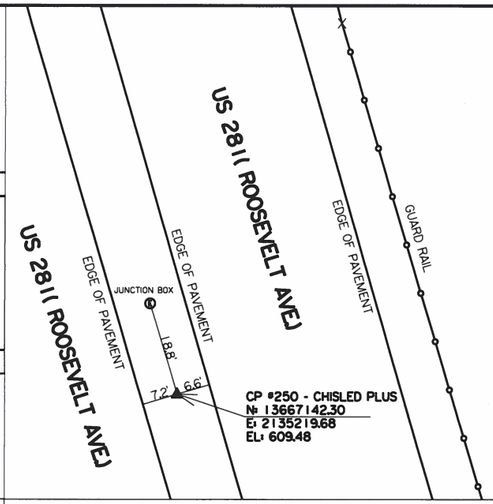
US 281 @ LOOP 410-SAVA ST. HORIZONTAL & VERTICAL CONTROL

SHEET 3 OF 4

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6			71
STATE	DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
0073	02	082	US 281



CONTROL POINT #225 IS A CHISLED PLUS SET IN THE SOUTH SIDE OF SAVAST ST. APPROXIMATLEY 425' EAST FROM THE ROOSEVELT AVE. INTERSECTION



CONTROL POINT #250 IS A CHISLED PLUS SET IN THE MEDIAN OF US 281 APPROXIMATLEY 150' NORTH FROM THE LOOP 410 ACCESS ROAD INTERSECTION

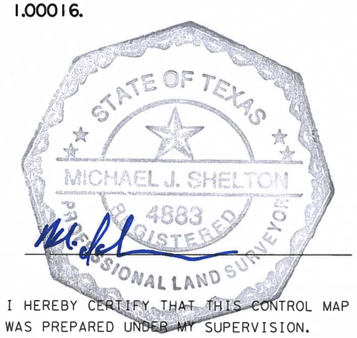
NOTE:

1. HORIZONTAL AND VERTICAL VALUES WERE ESTABLISHED FROM THE TxDOT VRS SYSTEM FROM GPS METHODS CONFORMING TO THE "TxDOT GPS USERS MANUAL." BY VRS. TxDOT PRIMARY CONTROL POINTS Z01521 19 AND VISTA WERE TIED.

2. HORIZONTAL CONTROL IS BASED ON TEXAS THE STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NORTH AMERICAN DATUM NAD 83 (2011).

3. VERTICAL DATUM SHOWN HEREON IS NAVD 88.

4. DISTANCES AND COORDINATES ARE IN US SURVEY FEET DISPLAYED IN SURFACE VALUES WITH A SURFACE ADJUSTMENT FACTOR OF 1.00016.



I HEREBY CERTIFY THAT THIS CONTROL MAP WAS PREPARED UNDER MY SUPERVISION.

N

N.T.S.

SURVEYED JANUARY, 2022

Texas Department of Transportation
© 2023 TxDOT

US 281 @ LOOP 410-SAVA ST. HORIZONTAL & VERTICAL CONTROL

SHEET 4 OF 4

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6			72
STATE	DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
0073	02	082	US 281

℄ DRIVEWAY 1

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13666584.149	2135361.289
POT ( )	11+00	13666617.677	2135476.510
Tangential Direction:	N73.776°E		
Tangential Length:	120		

℄ DRIVEWAY 2

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13666412.237	2135411.312
POT ( )	11+00	13666445.787	2135526.527
Tangential Direction:	N73.764°E		
Tangential Length:	120		

℄ DRIVEWAY 3

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13666257.161	2135456.437
POT ( )	11+00	13666290.711	2135571.651
Tangential Direction:	N73.764°E		
Tangential Length:	120		

℄ DRIVEWAY 4

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13666389.818	2135459.495
POT ( )	11+00	13666356.267	2135344.28
Tangential Direction:	S73.764°W		
Tangential Length:	120		

℄ DRIVEWAY 5

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13666103.969	2135501.012
POT ( )	11+00	13666137.52	2135616.227
Tangential Direction:	N73.764°E		
Tangential Length:	120		

℄ DRIVEWAY 6

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13665984.675	2135535.725
POT ( )	11+00	13666018.226	2135650.939
Tangential Direction:	N73.764°E		
Tangential Length:	120		

℄ DRIVEWAY 7

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13666052.358	2135557.689
POT ( )	11+00	13666018.807	2135442.475
Tangential Direction:	S73.764°W		
Tangential Length:	120		

℄ DRIVEWAY 8

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13665824.03	2135582.47
POT ( )	11+00	13665857.581	2135697.684
Tangential Direction:	N73.764°E		
Tangential Length:	120		

℄ DRIVEWAY 9

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13665736.224	2135608.020
POT ( )	11+00	13665769.774	2135723.234
Tangential Direction:	N73.764°E		
Tangential Length:	120		

℄ DRIVEWAY 10

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13665658.133	2135630.743
POT ( )	11+00	13665691.684	2135745.957
Tangential Direction:	N73.764°E		
Tangential Length:	120		

℄ DRIVEWAY 11

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13665535.114	2135666.539
POT ( )	11+00	13665568.665	2135781.753
Tangential Direction:	N73.764°E		
Tangential Length:	120		

℄ DRIVEWAY 12

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13665528.697	2135710.065
POT ( )	11+00	13665495.170	2135594.844
Tangential Direction:	S73.764°W		
Tangential Length:	120		

℄ DRIVEWAY 13

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13665369.036	2135714.865
POT ( )	11+00	13665402.587	2135830.079
Tangential Direction:	N73.764°E		
Tangential Length:	120		

℄ DRIVEWAY 14

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13665379.355	2135753.468
POT ( )	11+00	13665345.819	2135638.302
Tangential Direction:	S73.764°W		
Tangential Length:	120		

℄ DRIVEWAY 15

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13665323.219	2135769.856
POT ( )	11+00	13665289.668	2135654.641
Tangential Direction:	S73.764°W		
Tangential Length:	120		

℄ DRIVEWAY 16

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13665245.894	2135750.697
POT ( )	11+00	13665279.444	2135865.911
Tangential Direction:	N73.764°E		
Tangential Length:	120		

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER

11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

US 281

HORIZONTAL ALIGNMENT DATA

SHEET 1 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		73

DATE: 11/21/2023 3:29:21 PM
FILE: c:\pw\kh1\d0251184\US281_HORIZONTAL_DATA1.dgn

℄ DRIVEWAY 17

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13665188.348	2135767.442
POT ( )	11+00	13665221.899	2135882.656
Tangential Direction:	N73.764°E		
Tangential Length:	120		

℄ DRIVEWAY 18

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13665112.037	2135789.647
POT ( )	11+00	13665145.587	2135904.861
Tangential Direction:	N73.764°E		
Tangential Length:	120		

℄ DRIVEWAY 19

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13665058.439	2135805.243
POT ( )	11+00	13665092.009	2135920.451
Tangential Direction:	N73.755°E		
Tangential Length:	120		

℄ DRIVEWAY 20

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13665198.642	2135806.105
POT ( )	11+00	13665165.091	2135690.891
Tangential Direction:	S73.764°W		
Tangential Length:	120		

℄ DRIVEWAY 21

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13664946.747	2135837.743
POT ( )	11+00	13664980.317	2135952.952
Tangential Direction:	N73.755°E		
Tangential Length:	120		

℄ DRIVEWAY 22

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13664915.468	2135846.845
POT ( )	11+00	13664949.018	2135962.059
Tangential Direction:	N73.764°E		
Tangential Length:	120		

℄ DRIVEWAY 23

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13664843.945	2135867.657
POT ( )	11+00	13664877.496	2135982.871
Tangential Direction:	N73.764°E		
Tangential Length:	120		

℄ DRIVEWAY 24

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13664788.714	2135883.728
POT ( )	11+00	13664822.265	2135998.942
Tangential Direction:	N73.764°E		
Tangential Length:	120		

℄ DRIVEWAY 25

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13664761.438	2135891.665
POT ( )	11+00	13664794.989	2136006.879
Tangential Direction:	N73.764°E		
Tangential Length:	120		

℄ DRIVEWAY 26

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13664750.011	2135936.649
POT ( )	11+00	13664716.344	2135821.468
Tangential Direction:	S73.706°W		
Tangential Length:	120		

℄ DRIVEWAY 27

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13664703.728	2135950.116
POT ( )	11+00	13664670.061	2135834.936
Tangential Direction:	S73.706°W		
Tangential Length:	120		

℄ DRIVEWAY 28

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13664590.332	2135983.113
POT ( )	11+00	13664556.804	2135867.891
Tangential Direction:	S73.764°W		
Tangential Length:	120		

℄ DRIVEWAY 29

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13664632.93	2135929.058
POT ( )	11+00	13664666.48	2136044.273
Tangential Direction:	N73.764°E		
Tangential Length:	120		

℄ DRIVEWAY 30

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13664464.083	2135978.19
POT ( )	11+00	13664497.634	2136093.404
Tangential Direction:	N73.764°E		
Tangential Length:	120		

℄ DRIVEWAY 31

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13664481.847	2136014.68
POT ( )	11+00	13664448.296	2135899.465
Tangential Direction:	S73.764°W		
Tangential Length:	120		

℄ DRIVEWAY 32

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13664416.395	2136033.725
POT ( )	11+00	13664382.844	2135918.511
Tangential Direction:	S73.764°W		
Tangential Length:	120		

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER

11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

US 281

HORIZONTAL ALIGNMENT DATA

SHEET 2 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		74

DATE: 11/21/2023 3:29:41 PM
FILE: c:\pw\kh1\d0251184\US281_HORIZONTAL_DATA02.dgn

℄ DRIVEWAY 33

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13664356.334	2136051.202
POT ( )	11+00	13664322.783	2135935.987
Tangential Direction:	S73.764°W		
Tangential Length:	120		

℄ DRIVEWAY 34

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13664271.776	2136034.147
POT ( )	11+00	13664305.327	2136149.362
Tangential Direction:	N73.764°E		
Tangential Length:	120		

℄ DRIVEWAY 35

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13664261.278	2136078.861
POT ( )	11+00	13664227.728	2135963.647
Tangential Direction:	S73.764°W		
Tangential Length:	120		

℄ DRIVEWAY 36

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13664119.243	2136120.191
POT ( )	11+00	13664085.692	2136004.976
Tangential Direction:	S73.764°W		
Tangential Length:	120		

℄ DRIVEWAY 37

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13664060.162	2136137.382
POT ( )	11+00	13664026.612	2136022.168
Tangential Direction:	S73.764°W		
Tangential Length:	120		

℄ DRIVEWAY 38

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	9+80	13663897.834	2136142.958
POT ( )	11+00	13663931.385	2136258.172
Tangential Direction:	N73.764°E		
Tangential Length:	120		

℄ US 281

	STATION	NORTHING	EASTING
Element: Linear			
POT ( )	0+00	13667367.783	2135154.095
POT ( )	69+39.76	13660704.392	2137093.021
Tangential Direction:	S16.224°E		
Tangential Length:	6939.76		

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER

11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

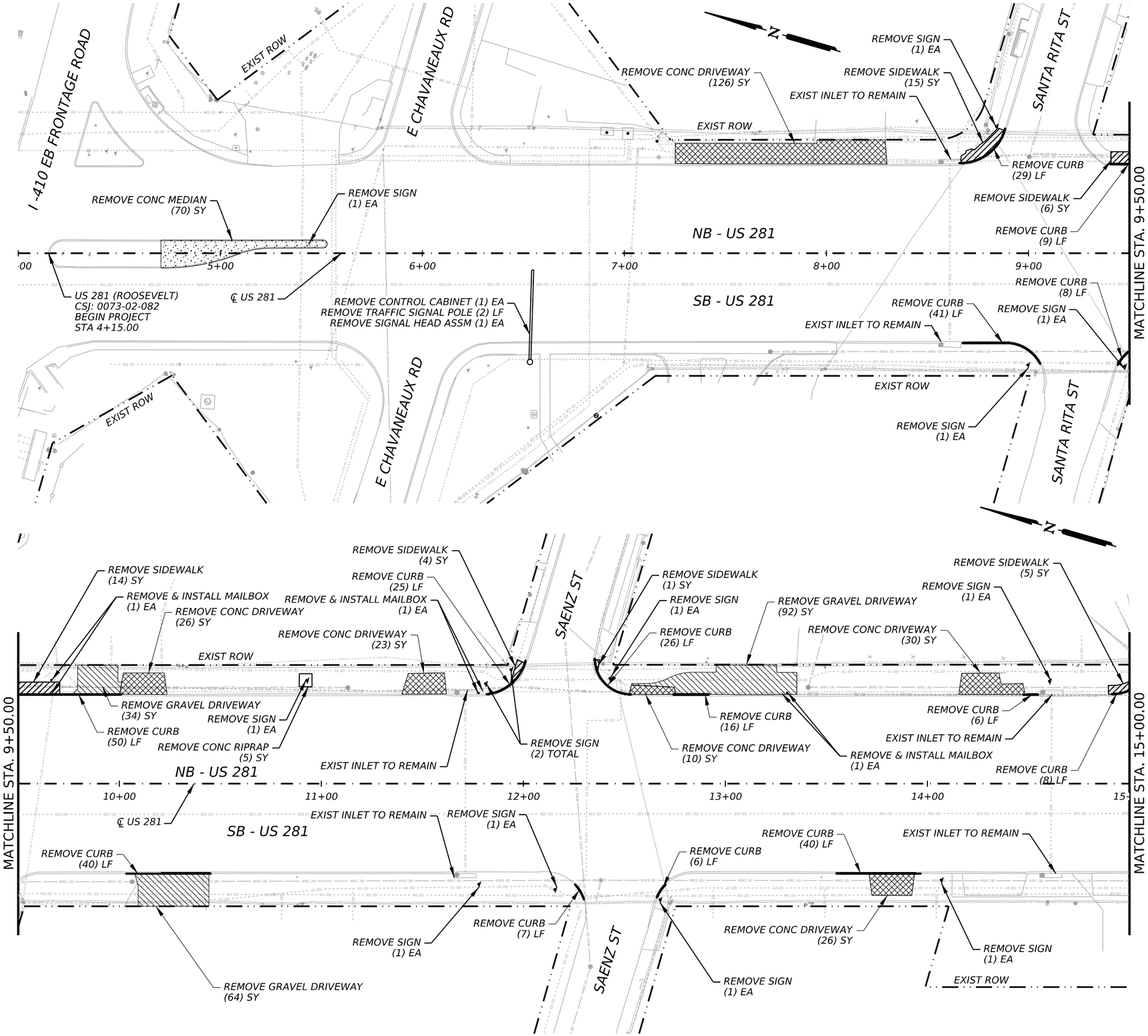
US 281

HORIZONTAL ALIGNMENT DATA

SHEET 3 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		75

DATE: 11/21/2023 3:30:04 PM
FILE: c:\pw\kh1\d0251184\US281_HORIZONTAL_DATA03.dgn



QUANTITY SUMMARY				
ITEM		DESCRIPTION	UNIT	QTY
104	6009	REMOVING CONC (RIPRAP)	SY	5
104	6011	REMOVING CONC (MEDIANS)	SY	70
104	6015	REMOVING CONC (SIDEWALKS)	SY	45
104	6017	REMOVING CONC (DRIVEWAYS)	SY	241
104	6021	REMOVING CONC (CURB)	LF	311
560	6005	MAILBOX INSTALL-D (TWG-POST) TY 2	EA	3
644	6076	REMOVE SM RD SN SUP&AM	EA	13
690	6024	REMOVAL OF SIGNAL HEAD ASSM	EA	1
690	6033	REMOVAL OF TRAFFIC SIGNAL POLE FND	LF	2
690	6041	REMOVAL OF CONTROL CABINET(POLE MNT)	EA	1
7300	6003	REMOVE AND DISPOSE GRAVEL DRIVE	SY	190

NOTES:

1. ALL SIGNS TO REMAIN UNLESS NOTED OTHERWISE.
2. REMOVAL OF MAILBOXES IS SUBSIDIARY TO ITEM 560 "MAILBOX INSTALL."

LEGEND

- EXISTING FEATURES
- EXISTING ROW
- CONCRETE RIPRAP REMOVAL
- SIDEWALK REMOVAL
- CONC DRIVEWAY REMOVAL
- GRAVEL DRIVEWAY REMOVAL

0' 25' 50'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
12/21/2023

Kimley»Horn F-928

Texas Department of Transportation

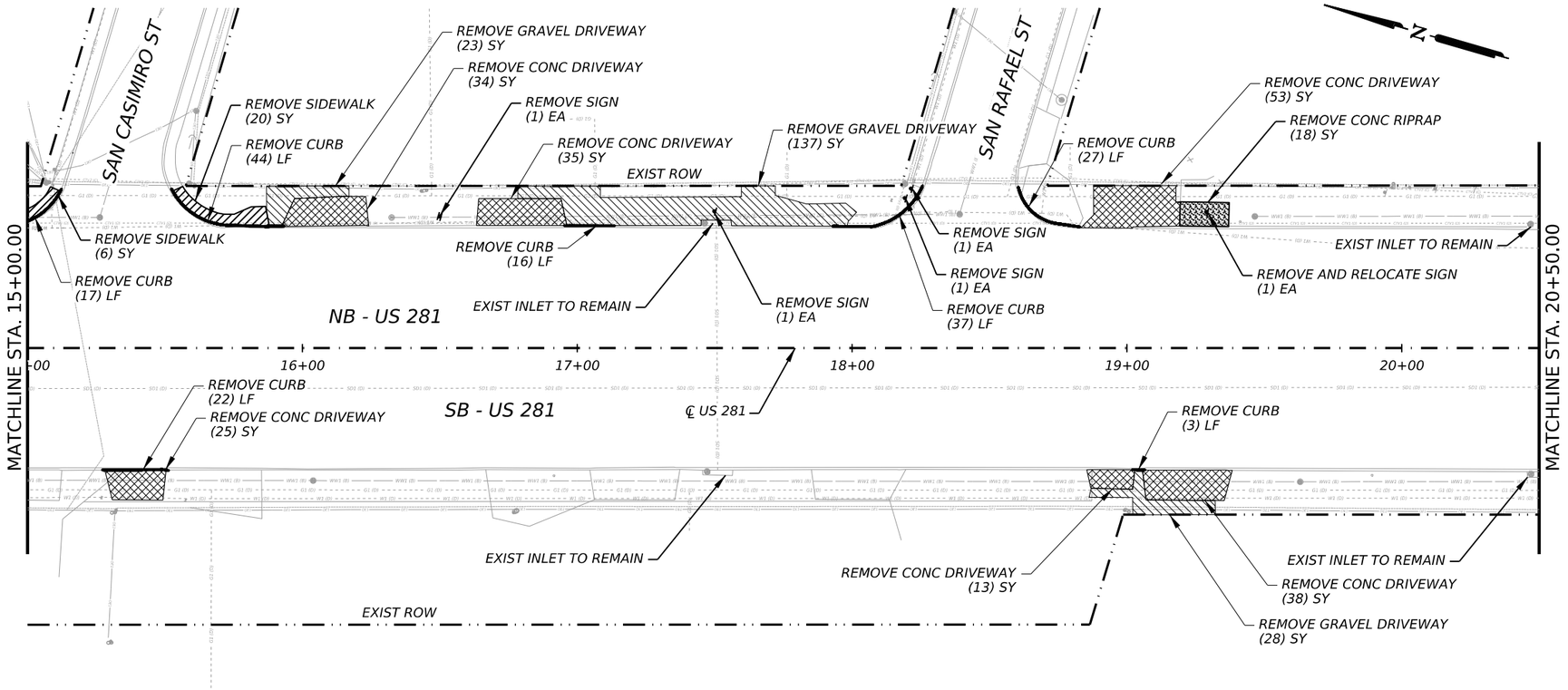
US 281

REMOVAL LAYOUT

SHEET 1 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		76

DATE: 12/21/2023 4:37:41 PM
FILE: c:\pw\kh1\d0251184\US281_SHEET_REMOVAL.dgn



QUANTITY SUMMARY				
ITEM		DESCRIPTION	UNIT	QTY
104	6009	REMOVING CONC (RIPRAP)	SY	18
104	6015	REMOVING CONC (SIDEWALKS)	SY	73
104	6017	REMOVING CONC (DRIVEWAYS)	SY	437
104	6021	REMOVING CONC (CURB)	LF	293
560	6005	MAILBOX INSTALL-D (TWG-POST) TY 2	EA	2
644	6076	REMOVE SM RD SN SUP&AM	EA	9
7300	6003	REMOVE AND DISPOSE GRAVEL DRIVE	SY	379

NOTES:

1. ALL SIGNS TO REMAIN UNLESS NOTED OTHERWISE.
2. REMOVAL OF MAILBOXES IS SUBSIDIARY TO ITEM 560 "MAILBOX INSTALL."

LEGEND

- EXISTING FEATURES
- EXISTING ROW
- CONCRETE RIPRAP REMOVAL
- SIDEWALK REMOVAL
- CONC DRIVEWAY REMOVAL
- GRAVEL DRIVEWAY REMOVAL

0' 25' 50'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
12/21/2023

Kimley»Horn F-928

Texas Department of Transportation

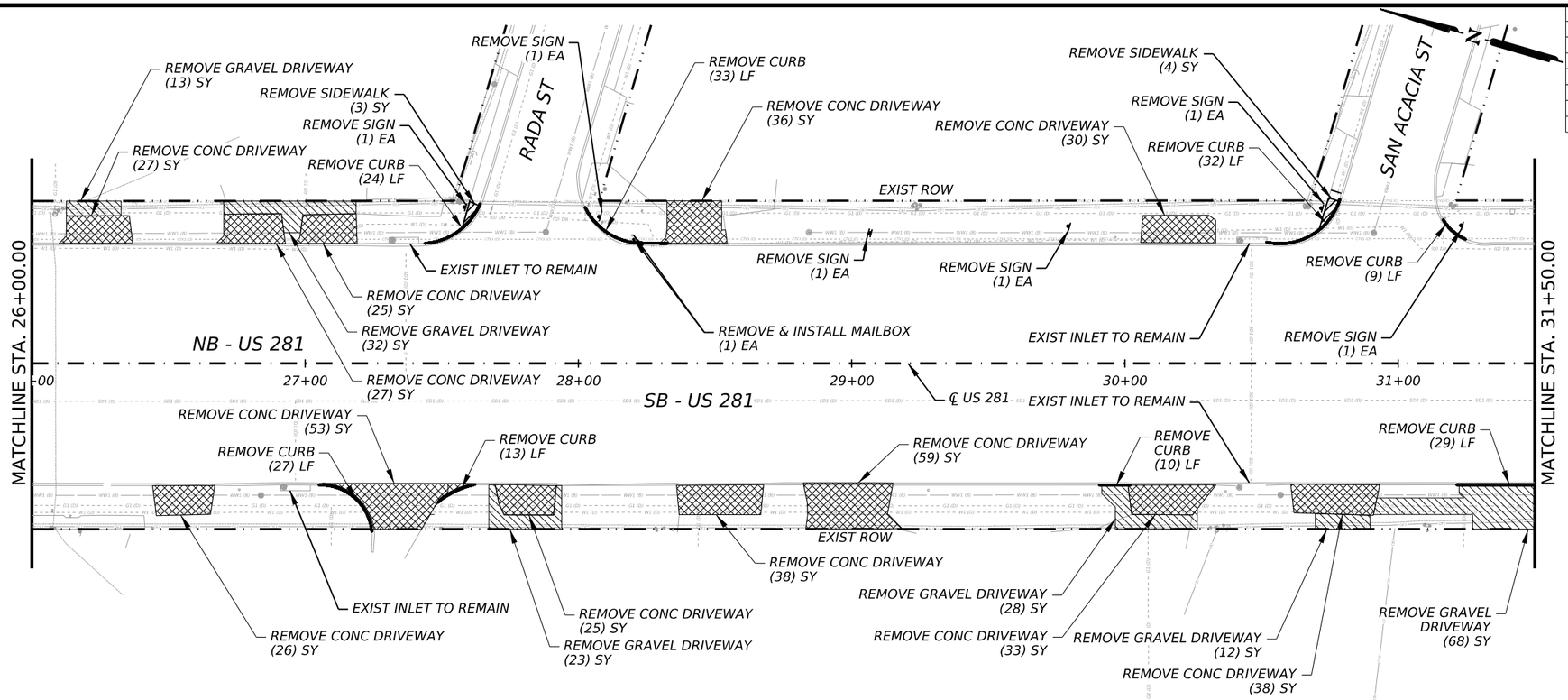
US 281

REMOVAL LAYOUT

SHEET 2 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		77

DATE: 12/21/2023 4:37:45 PM
FILE: c:\pw\kh1\d0251184\US281_SHEET_REMOVAL.dgn



QUANTITY SUMMARY				
ITEM		DESCRIPTION	UNIT	QTY
104	6015	REMOVING CONC (SIDEWALKS)	SY	20
104	6017	REMOVING CONC (DRIVEWAYS)	SY	597
104	6021	REMOVING CONC (CURB)	LF	302
560	6005	MAILBOX INSTALL-D (TWG-POST) TY 2	EA	1
644	6076	REMOVE SM RD SN SUP&AM	EA	8
7300	6003	REMOVE AND DISPOSE GRAVEL DRIVE	SY	407

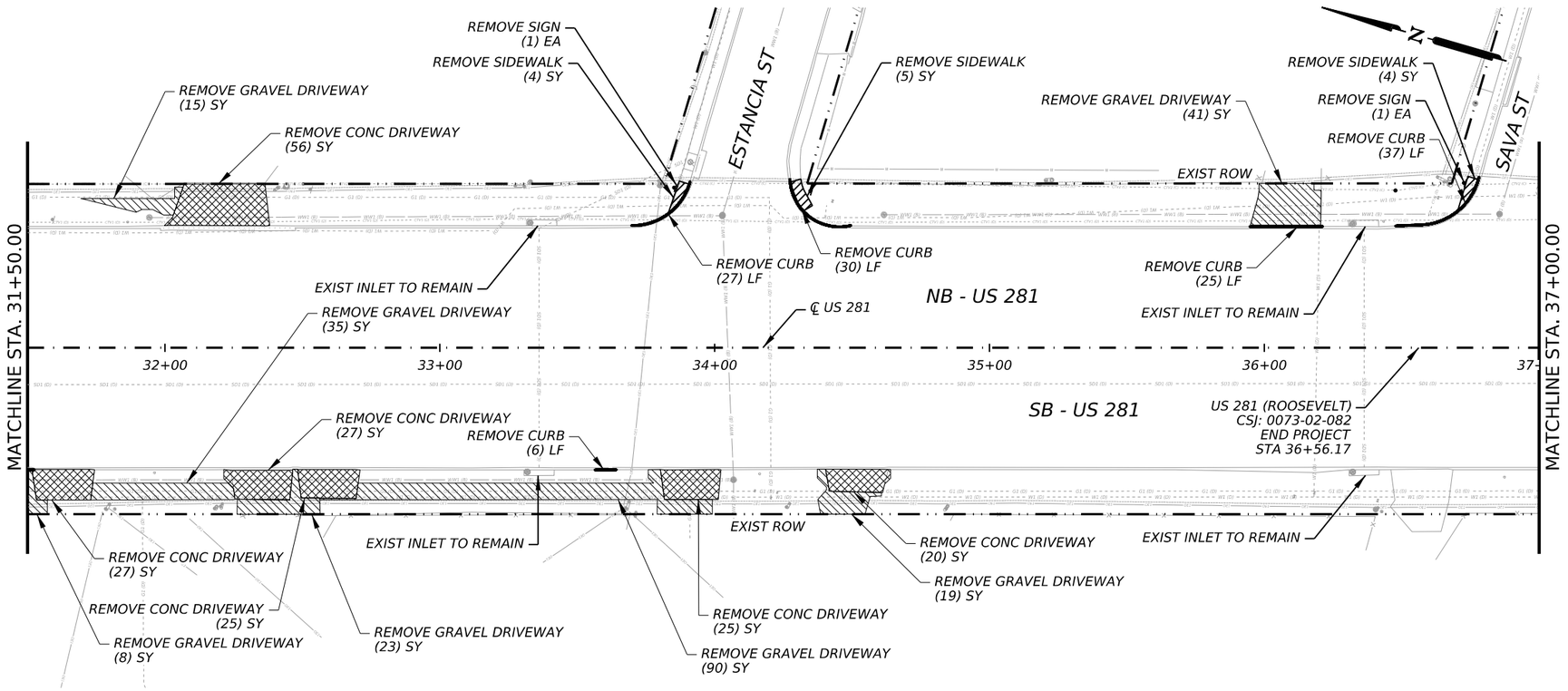
NOTES:

1. ALL SIGNS TO REMAIN UNLESS NOTED OTHERWISE.
2. REMOVAL OF MAILBOXES IS SUBSIDIARY TO ITEM 560 "MAILBOX INSTALL."

LEGEND

- EXISTING FEATURES
- EXISTING ROW
- CONCRETE RIPRAP REMOVAL
- SIDEWALK REMOVAL
- CONC DRIVEWAY REMOVAL
- GRAVEL DRIVEWAY REMOVAL

0' 25' 50'
SCALE



STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER

12/21/2023

Kimley»Horn F-928

Texas Department of Transportation

US 281

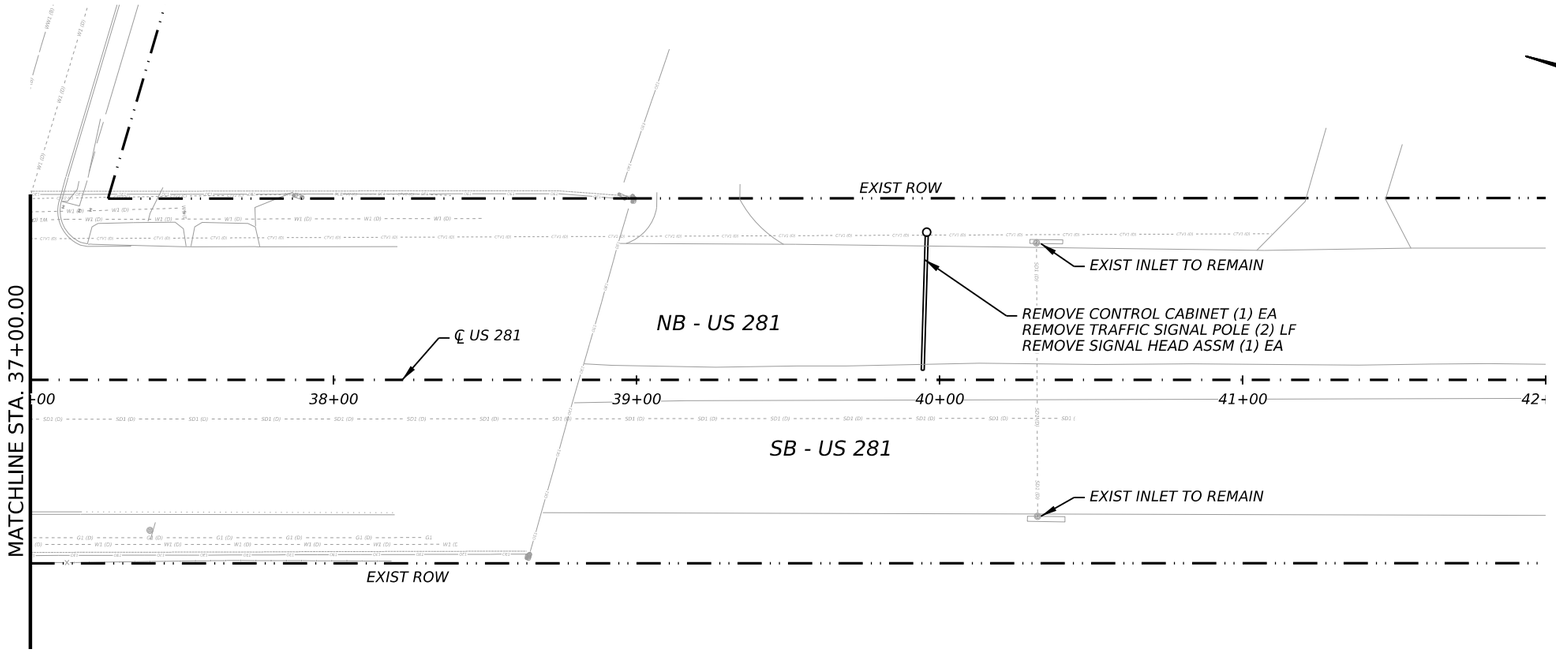
REMOVAL LAYOUT

SHEET 3 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		78

DATE: 12/21/2023 4:37:49 PM
FILE: c:\pw\kh1\d0251184\US281_SHEET_REMOVAL.dgn

QUANTITY SUMMARY				
ITEM		DESCRIPTION	UNIT	QTY
690	6024	REMOVAL OF SIGNAL HEAD ASSM	EA	1
690	6033	REMOVAL OF TRAFFIC SIGNAL POLE FND	LF	2
690	6041	REMOVAL OF CONTROL CABINET(POLE MNT)	EA	1



N

NOTES:

1. ALL SIGNS TO REMAIN UNLESS NOTED OTHERWISE.
2. REMOVAL OF MAILBOXES IS SUBSIDIARY TO ITEM 560 "MAILBOX INSTALL."

LEGEND

- EXISTING FEATURES
- EXISTING ROW
- CONCRETE RIPRAP REMOVAL
- SIDEWALK REMOVAL
- CONC DRIVEWAY REMOVAL
- GRAVEL DRIVEWAY REMOVAL

0' 25' 50'

SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER

12/21/2023

Kimley»Horn F-928

Texas Department of Transportation

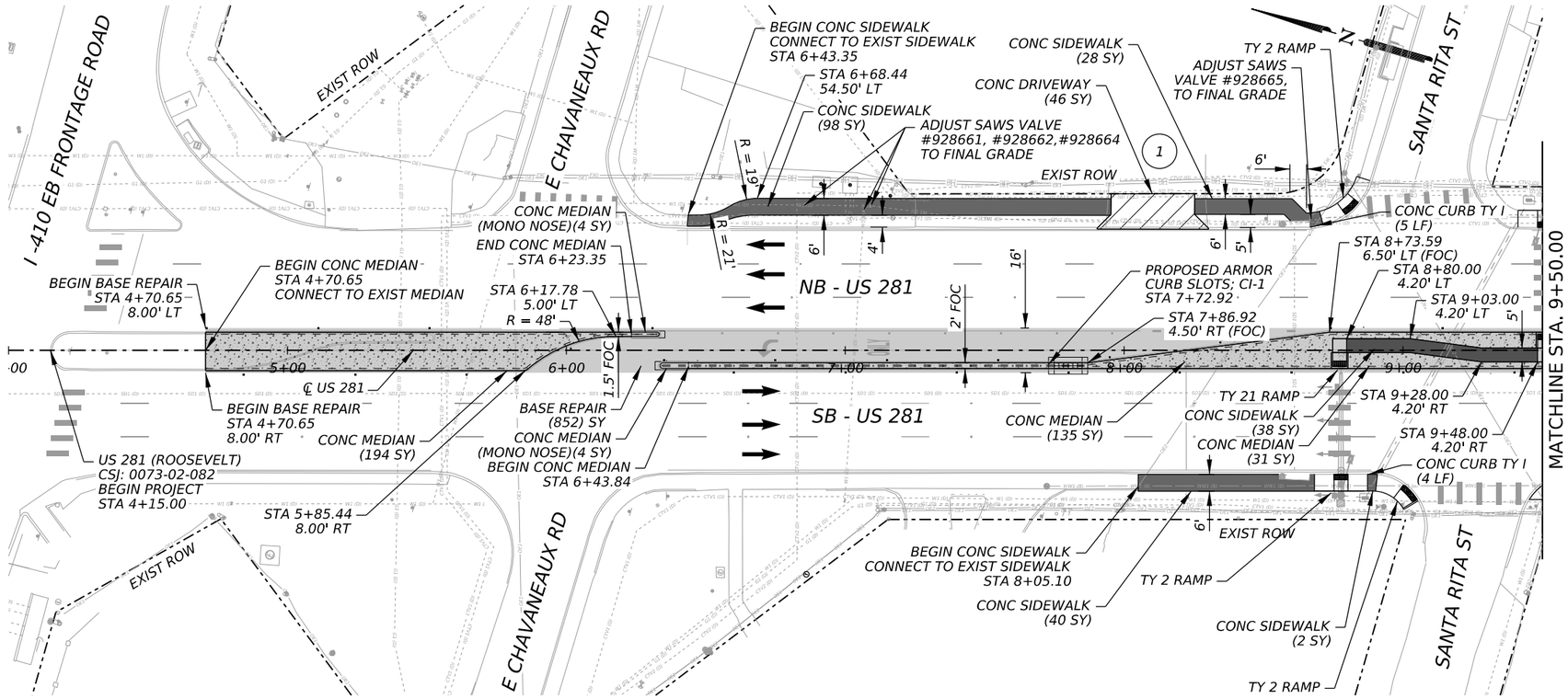
US 281

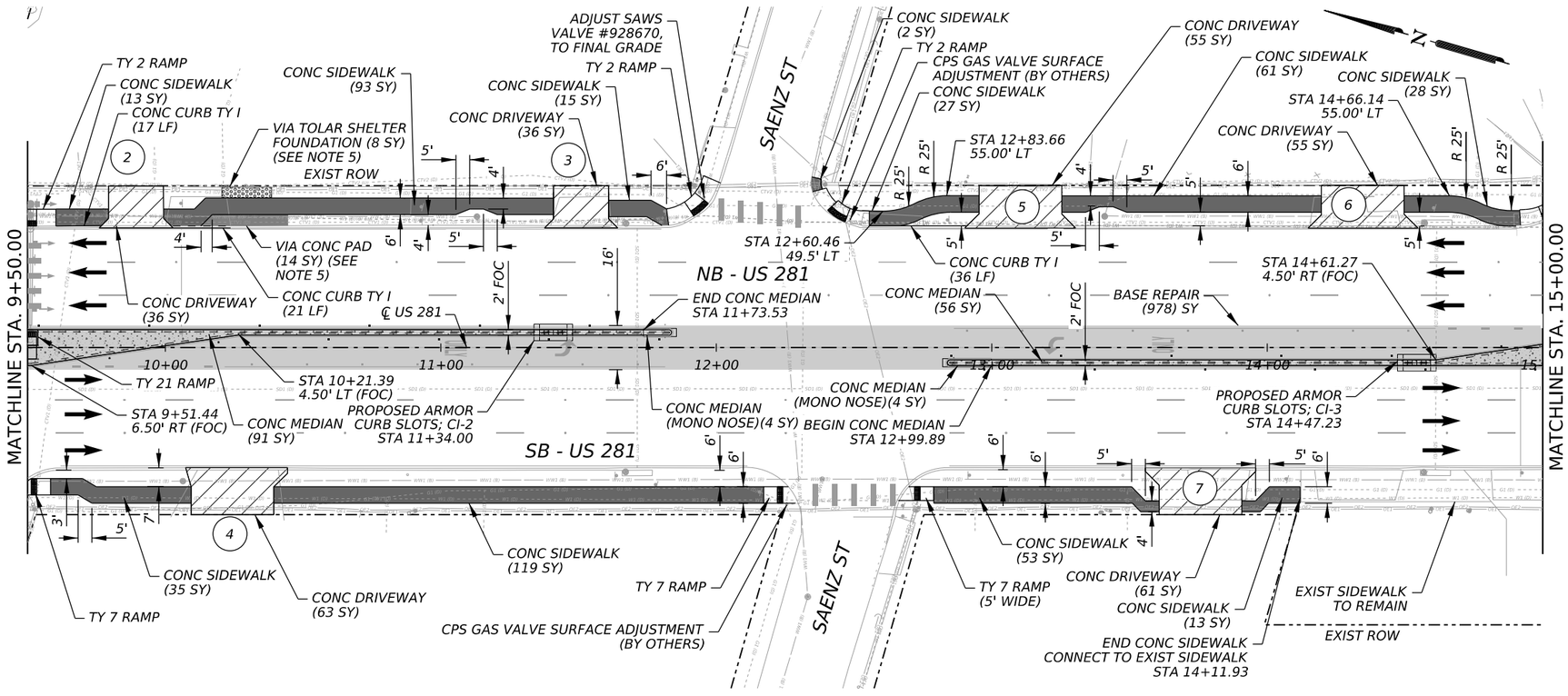
REMOVAL LAYOUT

SHEET 4 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		79

DATE: 12/21/2023 4:37:53 PM
FILE: c:\pw\kh1\d0251184\US281_SHEET_REMOVAL.dgn





QUANTITY SUMMARY				
ITEM		DESCRIPTION	UNIT	QTY
100	6002	PREPARING ROW	STA	11
110	6001	EXCAVATION (ROADWAY)	CY	197
132	6005	EMBANKMENT (FINAL)(ORD COMP)(TY C)	CY	5
351	6002	FLEXIBLE PAVEMENT STRUCTURE REPAIR(6")	SY	1830
465	6338	INLET (COMPL)(ARMOR CURB SLOT)	EA	6
529	6001	CONC CURB (TY I)	LF	83
530	6004	DRIVEWAYS (CONC)	SY	352
531	6001	CONC SIDEWALKS (4")	SY	679
531	6003	CONC SIDEWALKS (6")	SY	8
531	6005	CURB RAMPS (TY 2)	EA	6
531	6010	CURB RAMPS (TY 7)	EA	3
531	6016	CURB RAMPS (TY 21)	EA	2
536	6002	CONC MEDIAN	SY	507
536	6006	CONC MEDIAN(MONO NOSE)	SY	16
3077	6023	SP MIXES SP-C SAC-B PG70-22	TON	211
3085	6001	UNDERSEAL COURSE	GAL	366
7196	6011	ADJUST VALVE BOX	EA	5

LEGEND

- (X) DRIVEWAY NUMBER
- TRAFFIC DIRECTION
- BACK OF CURB
- EXISTING ROW
- CONCRETE SIDEWALK
- BASE REPAIR
- CONCRETE MEDIAN
- CONCRETE DRIVEWAY

NOTES:

1. MONOLITHIC MEDIAN NOSE, PAVEMENT, AND CURB IS SUBSIDIARY TO ITEM 536-6002 CONC MEDIAN. SEE MEDIAN DETAIL FOR ADDITIONAL INFORMATION.
2. LONGITUDINAL SIDEWALK SLOPES SHALL NOT EXCEED 5% EXCEPT IN CASES WHERE THE ADJACENT ROADWAY SLOPE EXCEEDS 5%. IF ROADWAY SLOPE EXCEEDS 5%, LONGITUDINAL SLOPE OF THE SIDEWALK MAY MATCH THAT OF THE ROADWAY.
3. DIMENSIONS, STATIONS, AND OFFSETS ARE GIVEN AT BACK OF CURB UNLESS OTHERWISE NOTED.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING AND LOCATING ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION. CONTRACTOR WILL BE SOLELY RESPONSIBLE FOR ANY DAMAGE CAUSED BY THE CONSTRUCTION OPERATIONS TO EXISTING UTILITIES.
5. CONSTRUCTION OF STANDARD VIA BENCH PAD AND VIA CONCRETE PAD QUANTITIES ARE INCLUDED IN ITEM 531 6001 CONCRETE SIDEWALKS (4"). VIA TOLAR SHELTER FOUNDATION QUANTITIESARE INCLUDED IN ITEM 531 6003 CONCRETE SIDEWALKS (6"). ADDITIONAL MATERIALS AND LABOR NEEDED TO MEET VIA STANDARD DETAILS IS SUBSIDIARY TO ITEM 531 6001 AND ITEM 531 6003. SEE VIA TOLAR SHELTER AND VIA BENCH DETAILS FOR MORE INFORMATION.

0' 25' 50'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
12/21/2023

Kimley»Horn F-928

Texas Department of Transportation

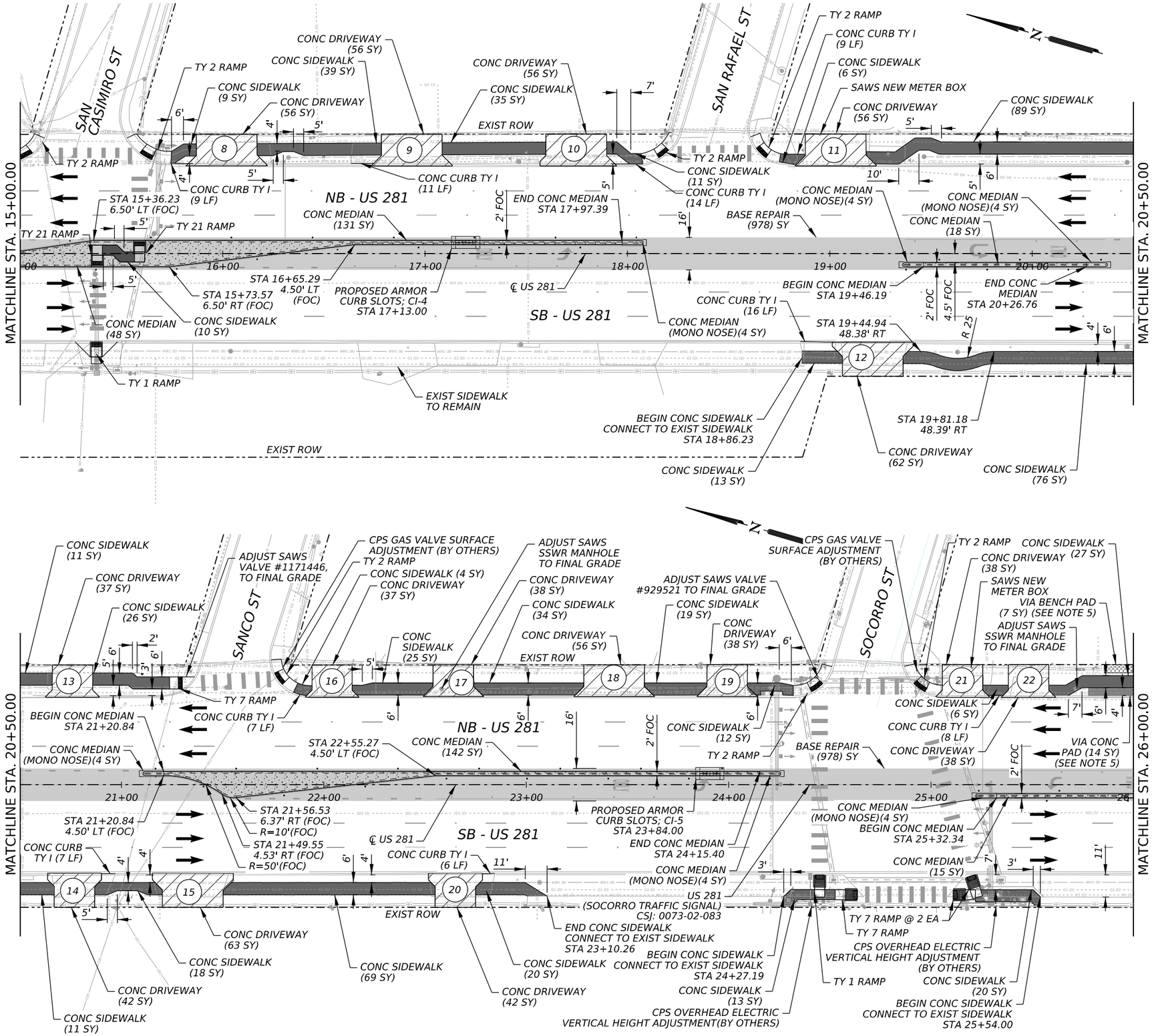
US 281

ROADWAY LAYOUT

SHEET 1 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		80

DATE: 12/21/2023 3:55:55 PM
FILE: c:\pw\kh1\d0251184\US281_ROADWAY_PP.dgn



QUANTITY SUMMARY

ITEM		DESCRIPTION	UNIT	QTY
100	6002	PREPARING ROW	STA	11
110	6001	EXCAVATION (ROADWAY)	CY	309
132	6005	EMBANKMENT (FINAL)(ORD COMP)(TY C)	CY	1
351	6002	FLEXIBLE PAVEMENT STRUCTURE REPAIR(6"	SY	1956
465	6338	INLET (COMPL)(ARMOR CURB SLOT)	EA	4
529	6001	CONC CURB (TY I)	LF	87
530	6004	DRIVEWAYS (CONC)	SY	715
531	6001	CONC SIDEWALKS (4")	SY	624
531	6004	CURB RAMPS (TY 1)	EA	2
531	6005	CURB RAMPS (TY 2)	EA	7
531	6010	CURB RAMPS (TY 7)	EA	4
531	6016	CURB RAMPS (TY 21)	EA	2
536	6002	CONC MEDIAN	SY	354
536	6006	CONC MEDIAN(MONO NOSE)	SY	24
3077	6023	SP MIXES SP-C SAC-B PG70-22	TON	225
3085	6001	UNDERSEAL COURSE	GAL	392
7194	6018	EXISTING MANHOLE ADJUSTMENTS	EA	2
7196	6011	ADJUST VALVE BOX	EA	2
7196	6031	NEW METER BOX	EA	2

LEGEND

- (X) DRIVEWAY NUMBER
- TRAFFIC DIRECTION
- BACK OF CURB
- EXISTING ROW
- CONCRETE SIDEWALK
- BASE REPAIR
- CONCRETE MEDIAN
- CONCRETE DRIVEWAY

NOTES:

1. MONOLITHIC MEDIAN NOSE, PAVEMENT, AND CURB IS SUBSIDIARY TO ITEM 536-6002 CONC MEDIAN. SEE MEDIAN DETAIL FOR ADDITIONAL INFORMATION.
2. LONGITUDINAL SIDEWALK SLOPES SHALL NOT EXCEED 5% EXCEPT IN CASES WHERE THE ADJACENT ROADWAY SLOPE EXCEEDS 5%. IF ROADWAY SLOPE EXCEEDS 5%, LONGITUDINAL SLOPE OF THE SIDEWALK MAY MATCH THAT OF THE ROADWAY.
3. DIMENSIONS, STATIONS, AND OFFSETS ARE GIVEN AT BACK OF CURB UNLESS OTHERWISE NOTED.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING AND LOCATING ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION. CONTRACTOR WILL BE SOLELY RESPONSIBLE FOR ANY DAMAGE CAUSED BY THE CONSTRUCTION OPERATIONS TO EXISTING UTILITIES.
5. CONSTRUCTION OF STANDARD VIA BENCH PAD AND VIA CONCRETE PAD QUANTITIES ARE INCLUDED IN ITEM 531 6001 CONCRETE SIDEWALKS (4"). VIA TOLAR SHELTER FOUNDATION QUANTITIESARE INCLUDED IN ITEM 531 6003 CONCRETE SIDEWALKS (6"). ADDITIONAL MATERIALS AND LABOR NEEDED TO MEET VIA STANDARD DETAILS IS SUBSIDIARY TO ITEM 531 6001 AND ITEM 531 6003. SEE VIA TOLAR SHELTER AND VIA BENCH DETAILS FOR MORE INFORMATION.

0' 25' 50'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
12/21/2023

Kimley»Horn F-928

Texas Department of Transportation

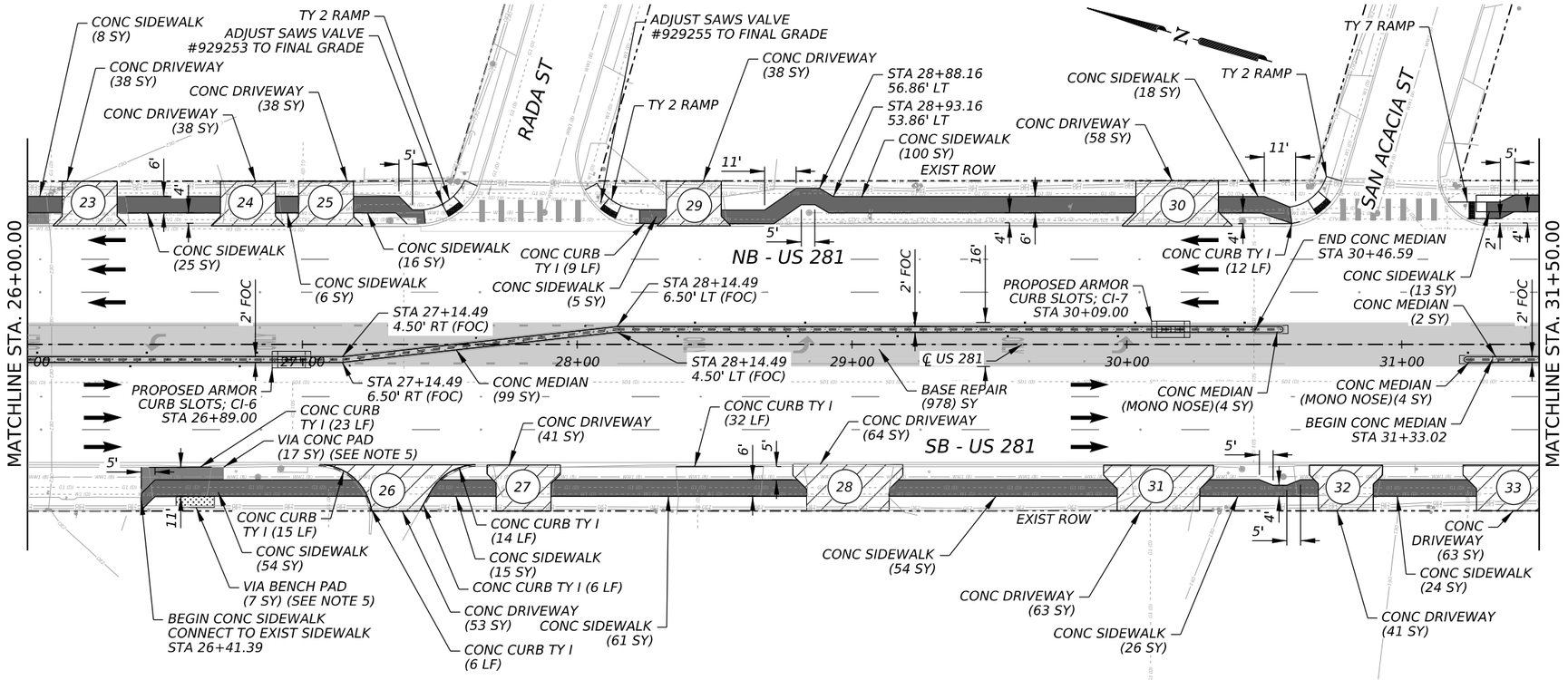
US 281

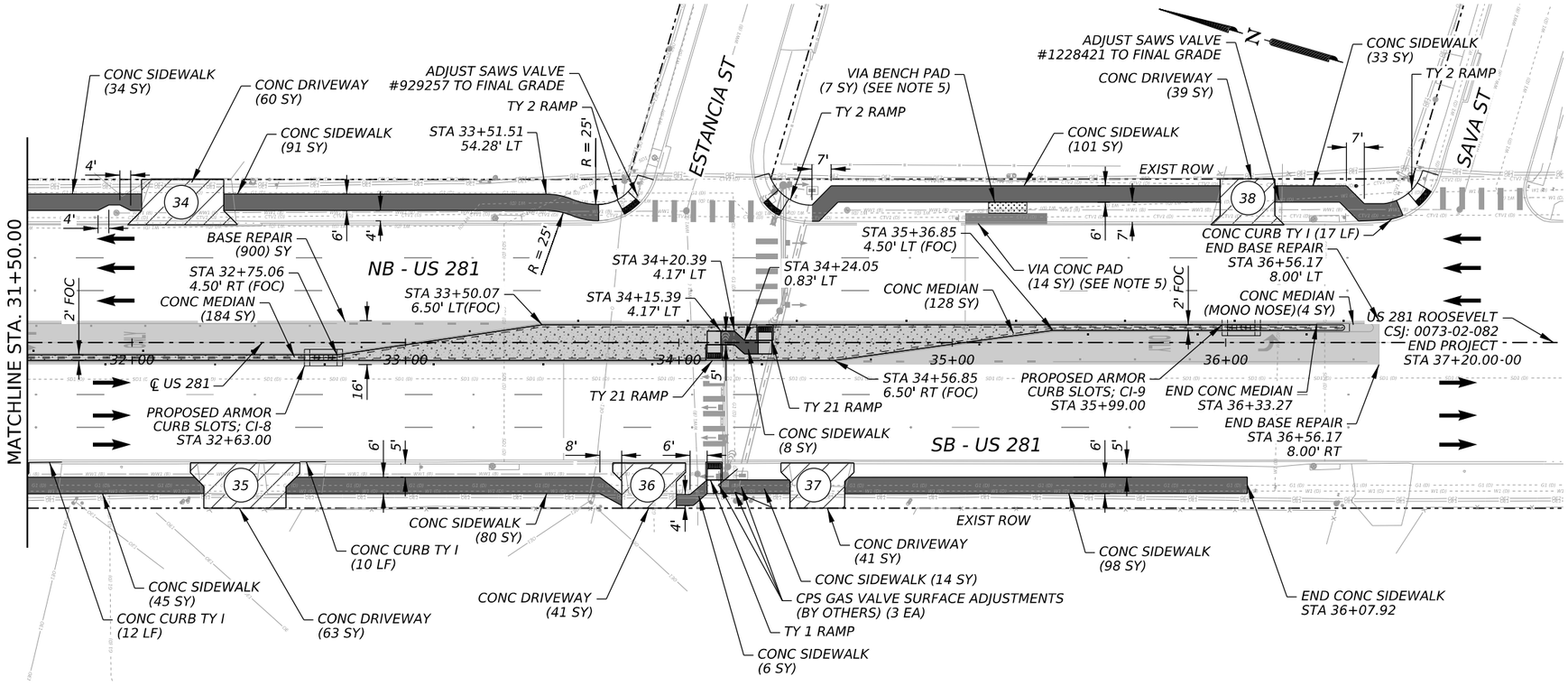
ROADWAY LAYOUT

SHEET 2 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		81

DATE: 12/21/2023 3:56:11 PM
FILE: c:\pw\kh1\d0251184\US281_ROADWAY_PP.dgn





QUANTITY SUMMARY				
ITEM		DESCRIPTION	UNIT	QTY
100	6002	PREPARING ROW	STA	11
110	6001	EXCAVATION (ROADWAY)	CY	374
132	6005	EMBANKMENT (FINAL)(ORD COMP)(TY C)	CY	14
351	6002	FLEXIBLE PAVEMENT STRUCTURE REPAIR(6"	SY	1878
465	6338	INLET (COMPL)(ARMOR CURB SLOT)	EA	8
529	6001	CONC CURB (TY I)	LF	156
530	6004	DRIVEWAYS (CONC)	SY	779
531	6001	CONC SIDEWALKS (4")	SY	980
531	6004	CURB RAMPS (TY 1)	EA	1
531	6005	CURB RAMPS (TY 2)	EA	6
531	6010	CURB RAMPS (TY 7)	EA	1
531	6016	CURB RAMPS (TY 21)	EA	2
536	6002	CONC MEDIAN	SY	415
536	6006	CONC MEDIAN(MONO NOSE)	SY	12
3077	6023	SP MIXES SP-C SAC-B PG70-22	TON	217
3085	6001	UNDERSEAL COURSE	GAL	376
7196	6011	ADJUST VALVE BOX	EA	4

LEGEND

- (X) DRIVEWAY NUMBER
- TRAFFIC DIRECTION
- BACK OF CURB
- EXISTING ROW
- CONCRETE SIDEWALK
- BASE REPAIR
- CONCRETE MEDIAN
- CONCRETE DRIVEWAY

NOTES:

1. MONOLITHIC MEDIAN NOSE, PAVEMENT, AND CURB IS SUBSIDIARY TO ITEM 536-6002 CONC MEDIAN. SEE MEDIAN DETAIL FOR ADDITIONAL INFORMATION.
2. LONGITUDINAL SIDEWALK SLOPES SHALL NOT EXCEED 5% EXCEPT IN CASES WHERE THE ADJACENT ROADWAY SLOPE EXCEEDS 5%. IF ROADWAY SLOPE EXCEEDS 5%, LONGITUDINAL SLOPE OF THE SIDEWALK MAY MATCH THAT OF THE ROADWAY.
3. DIMENSIONS, STATIONS, AND OFFSETS ARE GIVEN AT BACK OF CURB UNLESS OTHERWISE NOTED.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING AND LOCATING ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION. CONTRACTOR WILL BE SOLELY RESPONSIBLE FOR ANY DAMAGE CAUSED BY THE CONSTRUCTION OPERATIONS TO EXISTING UTILITIES.
5. CONSTRUCTION OF STANDARD VIA BENCH PAD AND VIA CONCRETE PAD QUANTITIES ARE INCLUDED IN ITEM 531 6001 CONCRETE SIDEWALKS (4"). VIA TOLAR SHELTER FOUNDATION QUANTITIESARE INCLUDED IN ITEM 531 6003 CONCRETE SIDEWALKS (6"). ADDITIONAL MATERIALS AND LABOR NEEDED TO MEET VIA STANDARD DETAILS IS SUBSIDIARY TO ITEM 531 6001 AND ITEM 531 6003. SEE VIA TOLAR SHELTER AND VIA BENCH DETAILS FOR MORE INFORMATION.

0' 25' 50'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED PROFESSIONAL ENGINEER
12/21/2023

Kimley»Horn F-928

Texas Department of Transportation

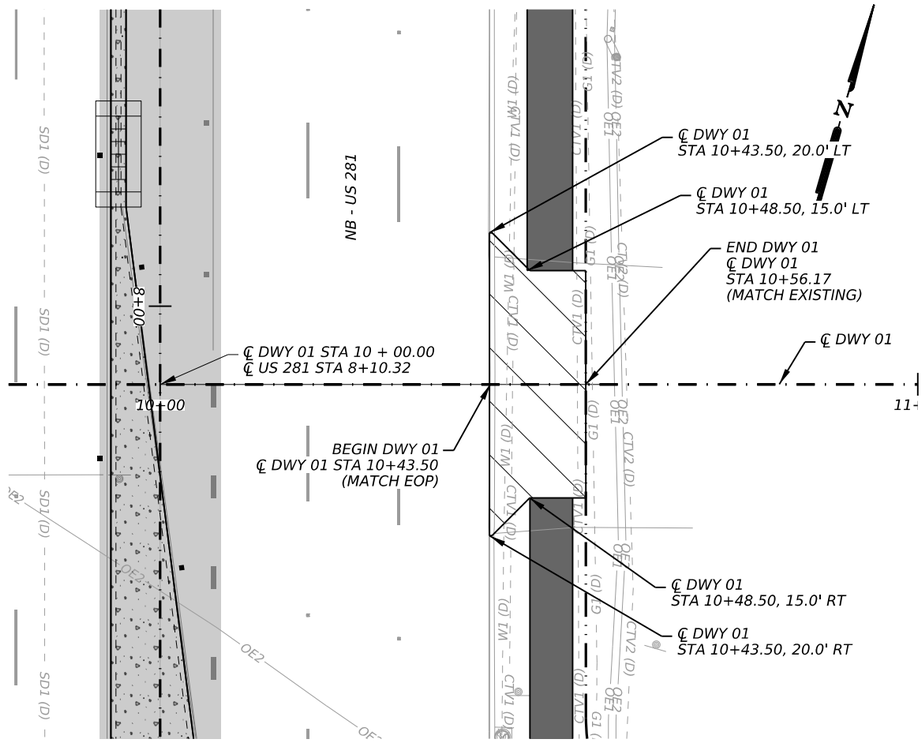
US 281

ROADWAY LAYOUT

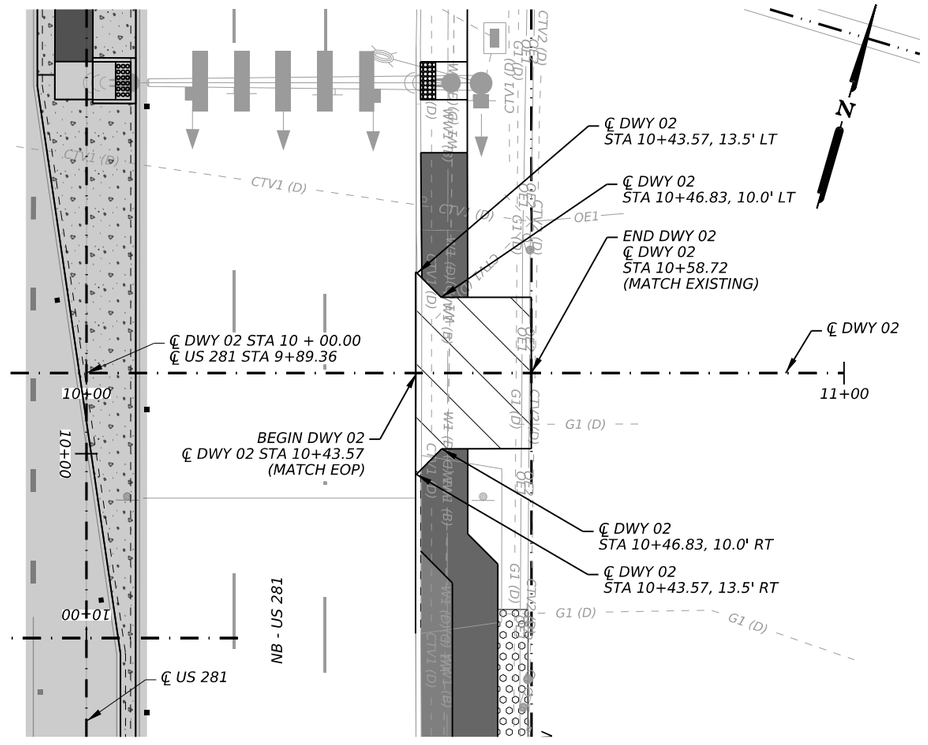
SHEET 3 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		82

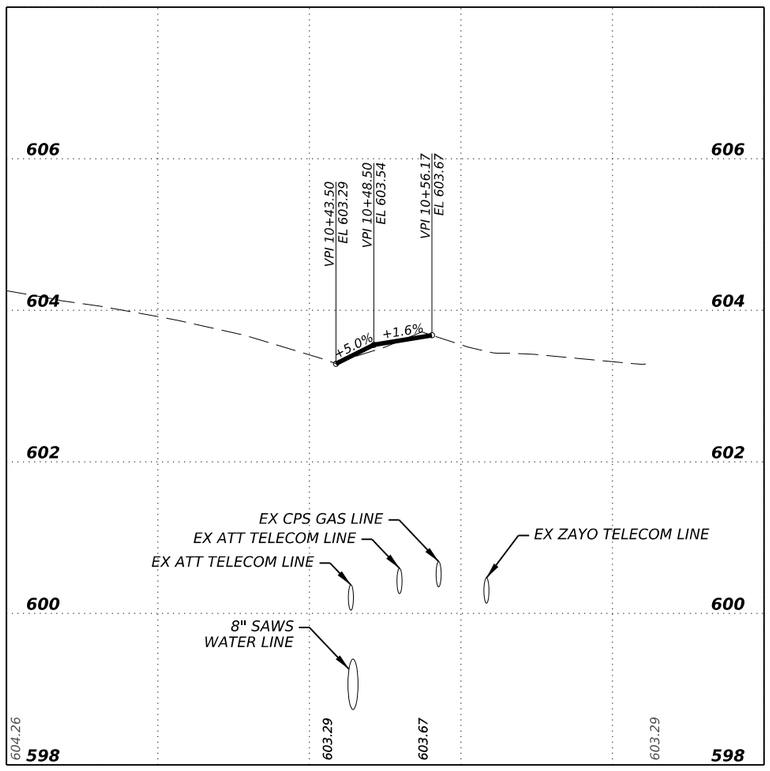
DATE: 12/21/2023 3:56:33 PM
FILE: c:\pw\kh1\d0251184\US281_ROADWAY_PP.dgn



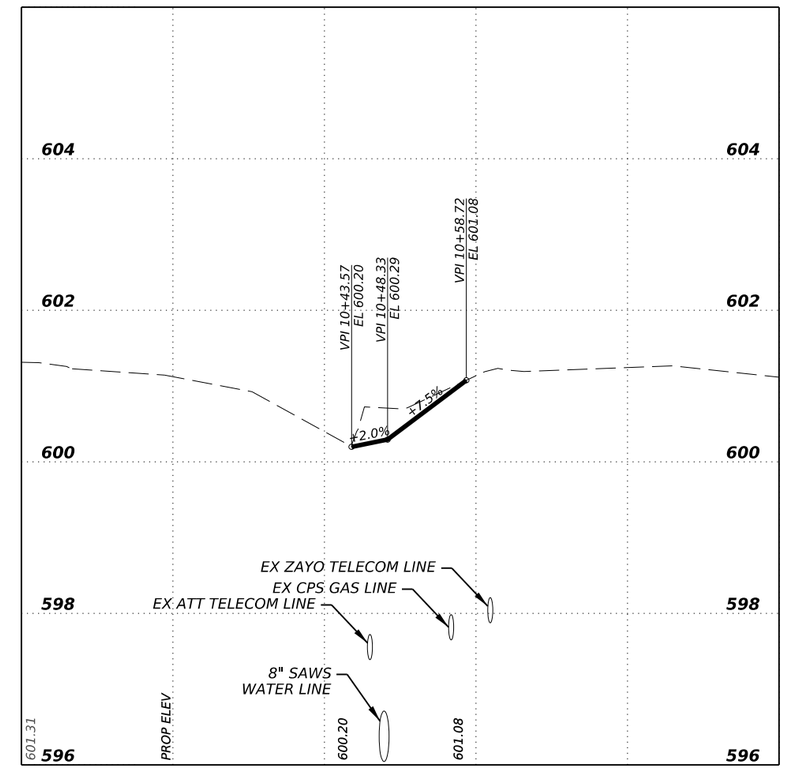
DRIVEWAY 01



DRIVEWAY 02



DRIVEWAY 01



DRIVEWAY 02

LEGEND

- BACK OF CURB
- EXISTING ROW
- PROPOSED TCE
- CONCRETE SIDEWALK
- BASE REPAIR
- CONCRETE MEDIAN
- CONCRETE DRIVEWAY

NOTES:

1. CONTRACTOR SHALL VERIFY EXISTING FIELD CONDITIONS FOR ALL TIE IN ELEVATIONS AND ADJUST AS NEEDED.
2. SEE HORIZONTAL DATA SHEET FOR DRIVEWAY ALIGNMENT INFORMATION.

HORIZ. 0' 10' 20'
VERT. 0' 1' 2'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

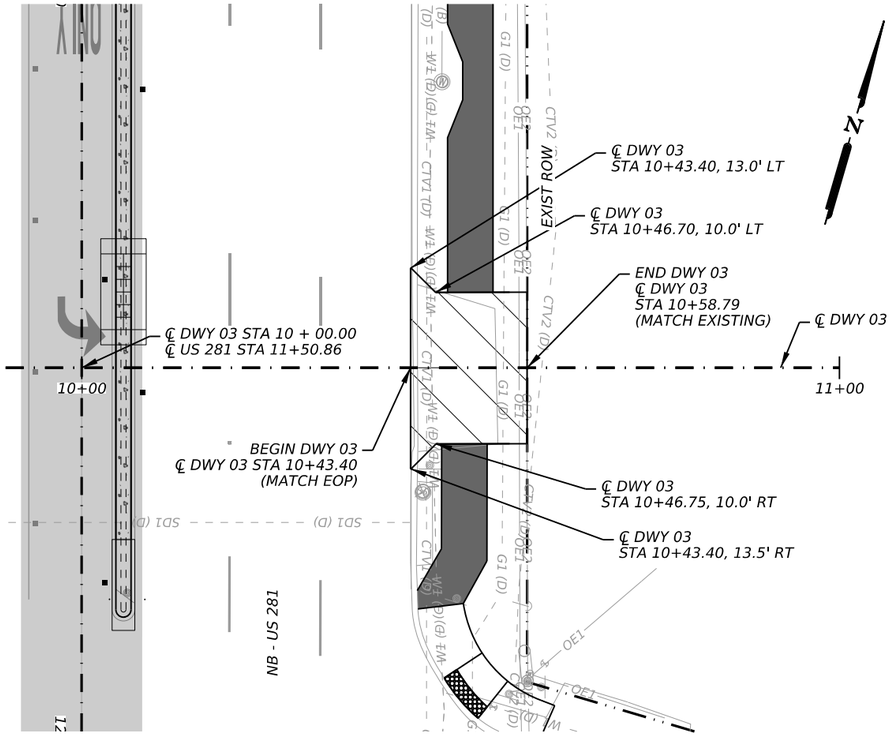
US 281

DRIVEWAY PLAN & PROFILE

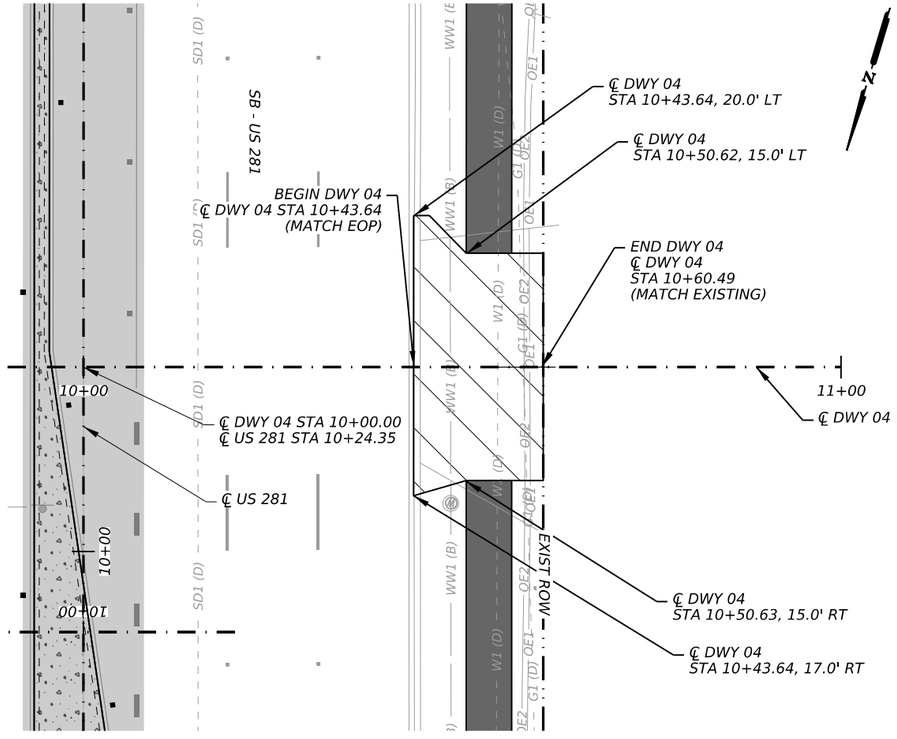
SHEET 1 OF 19

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		83

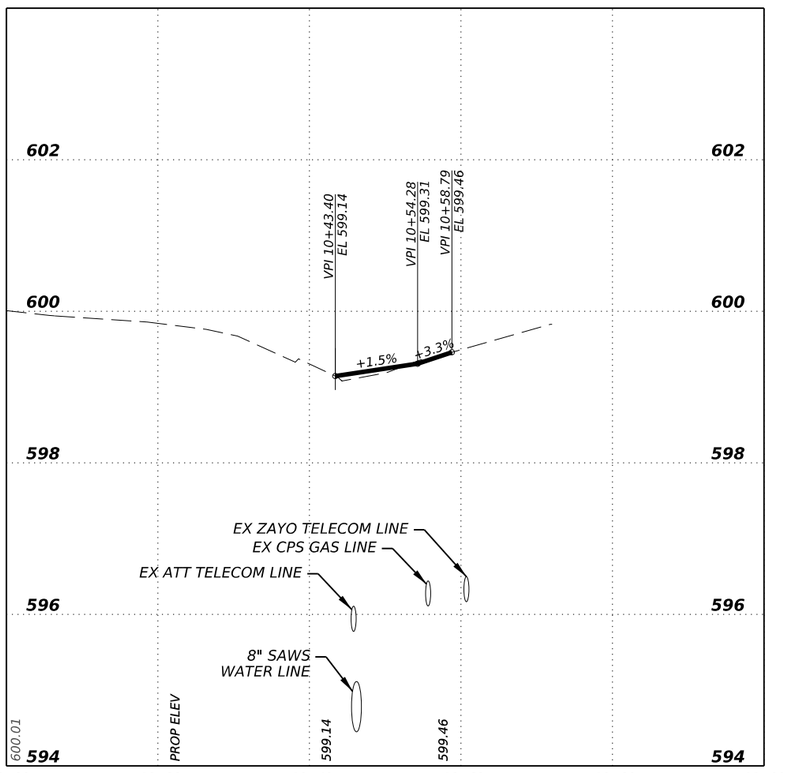
DATE: 11/21/2023 3:34:04 PM
FILE: c:\pw\kh1\d0251184\US281_DRIVEWAY_PP2.dgn

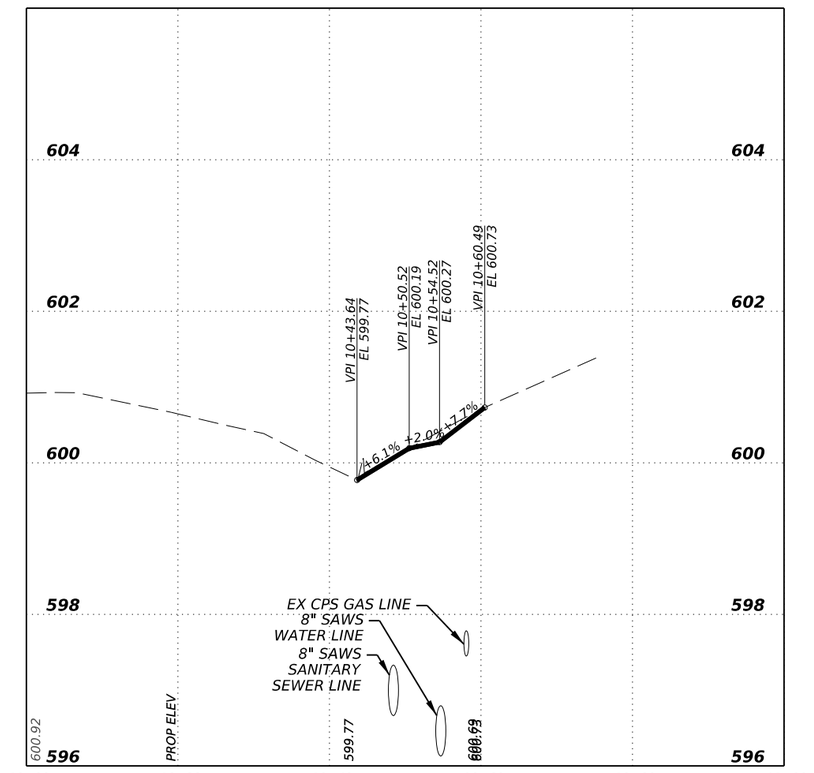


DRIVEWAY 03



DRIVEWAY 04





LEGEND

- BACK OF CURB
- EXISTING ROW
- PROPOSED TCE
- CONCRETE SIDEWALK
- BASE REPAIR
- CONCRETE MEDIAN
- CONCRETE DRIVEWAY

NOTES:

1. CONTRACTOR SHALL VERIFY EXISTING FIELD CONDITIONS FOR ALL TIE IN ELEVATIONS AND ADJUST AS NEEDED.

2. SEE HORIZONTAL DATA SHEET FOR DRIVEWAY ALIGNMENT INFORMATION.

HORIZ. 0' 10' 20'
VERT. 0' 1' 2'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

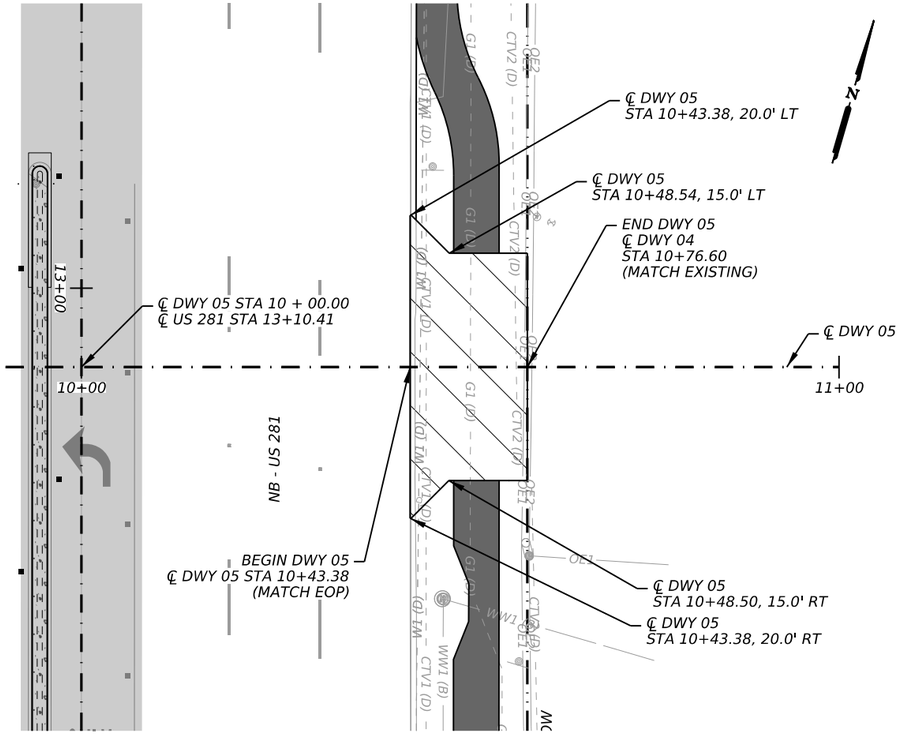
US 281

DRIVEWAY PLAN & PROFILE

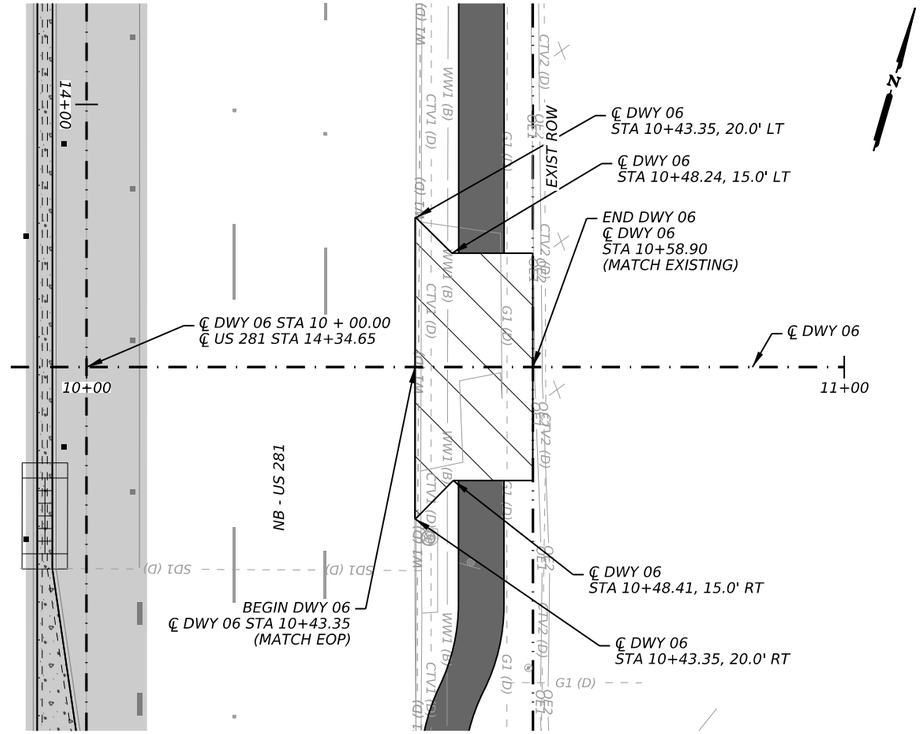
SHEET 2 OF 19

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		84

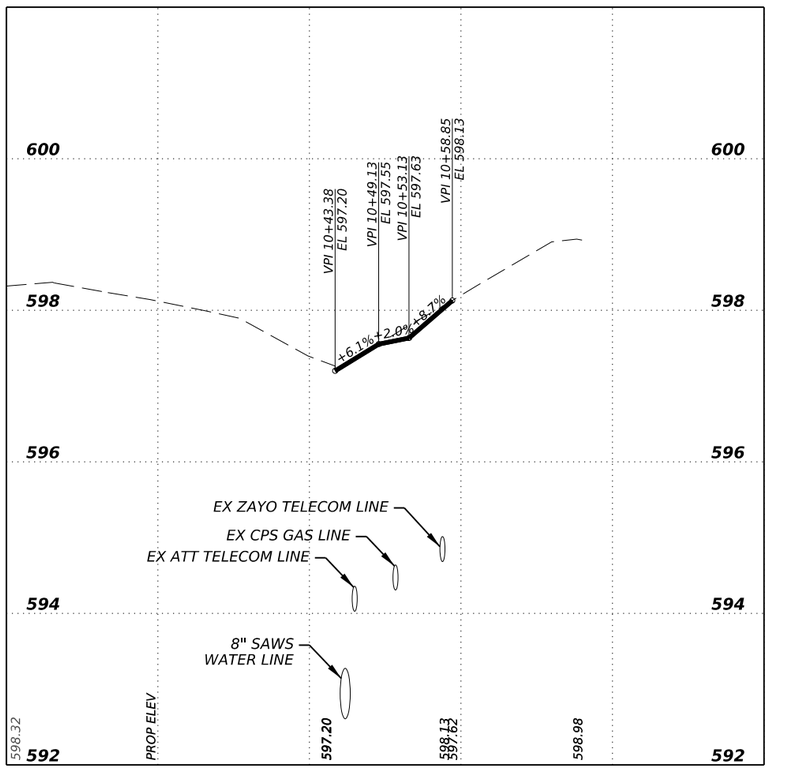
DATE: 11/21/2023 3:34:05 PM
FILE: c:\pw\kh1\d0251184\US281_DRIVEWAY_PP2.dgn



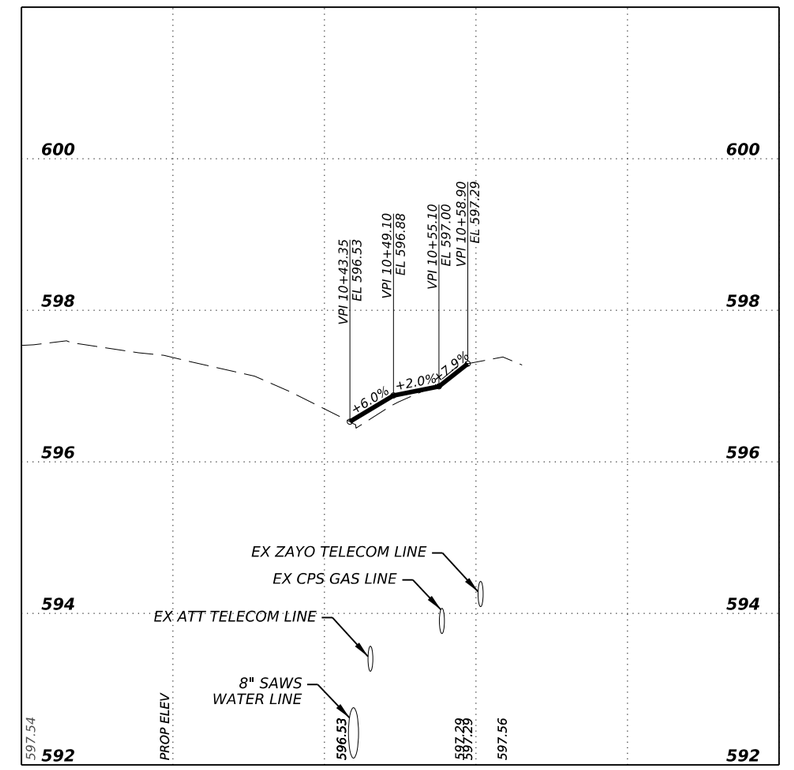
DRIVEWAY 05



DRIVEWAY 06



DRIVEWAY 05



DRIVEWAY 06

LEGEND

- BACK OF CURB
- EXISTING ROW
- PROPOSED TCE
- CONCRETE SIDEWALK
- BASE REPAIR
- CONCRETE MEDIAN
- CONCRETE DRIVEWAY

NOTES:

1. CONTRACTOR SHALL VERIFY EXISTING FIELD CONDITIONS FOR ALL TIE IN ELEVATIONS AND ADJUST AS NEEDED.
2. SEE HORIZONTAL DATA SHEET FOR DRIVEWAY ALIGNMENT INFORMATION.

HORIZ. 0' 10' 20'
VERT. 0' 1' 2'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

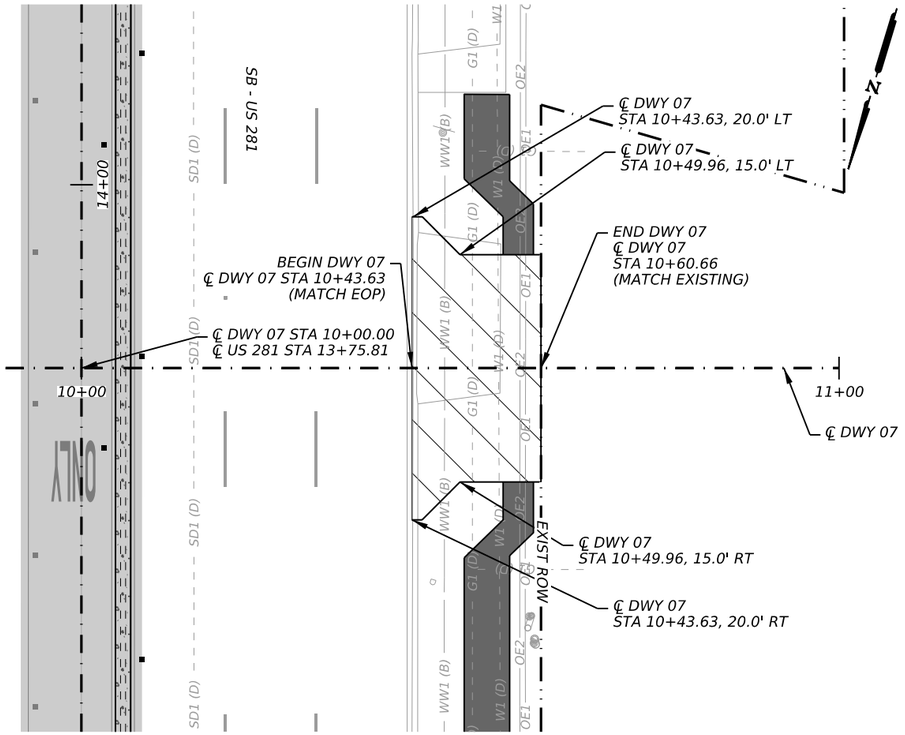
US 281

DRIVEWAY PLAN & PROFILE

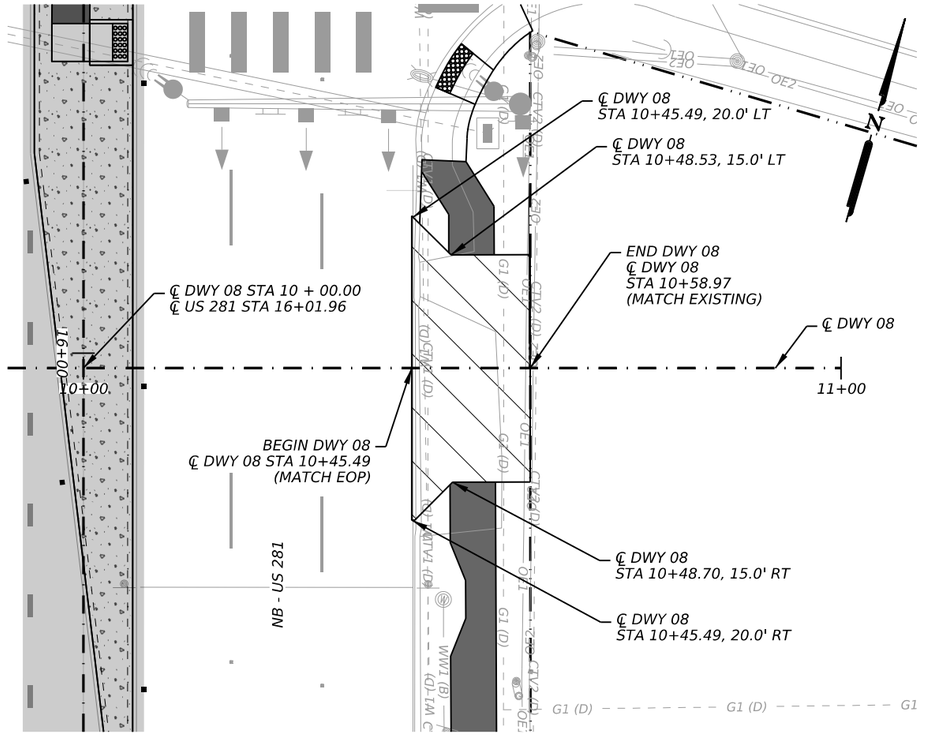
SHEET 3 OF 19

FED.RD. DIV NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		85

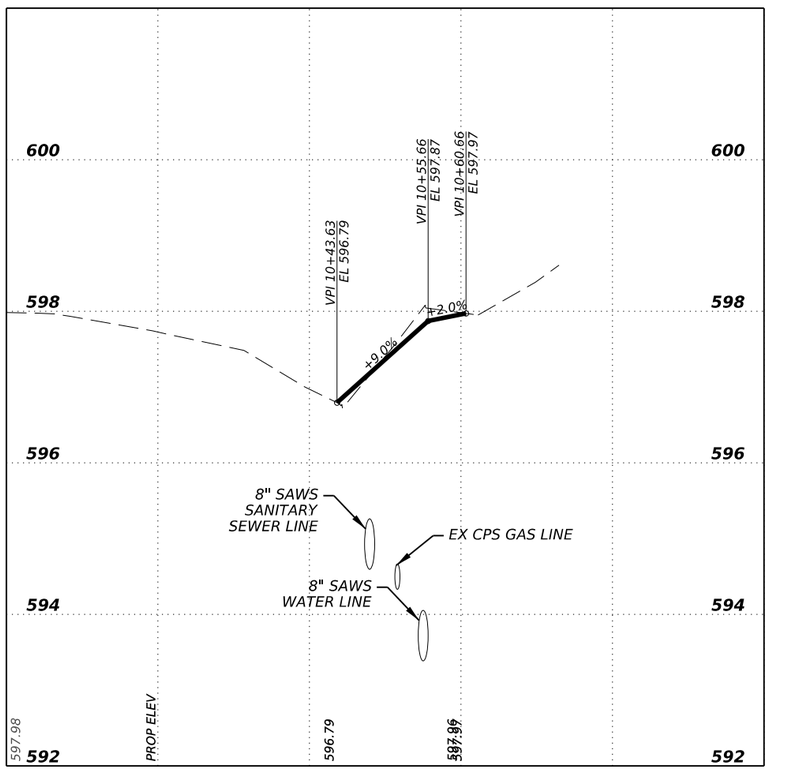
DATE: 11/21/2023 3:34:05 PM
FILE: c:\pw\kh1\d0251184\US281_DRIVEWAY_PP2.dgn



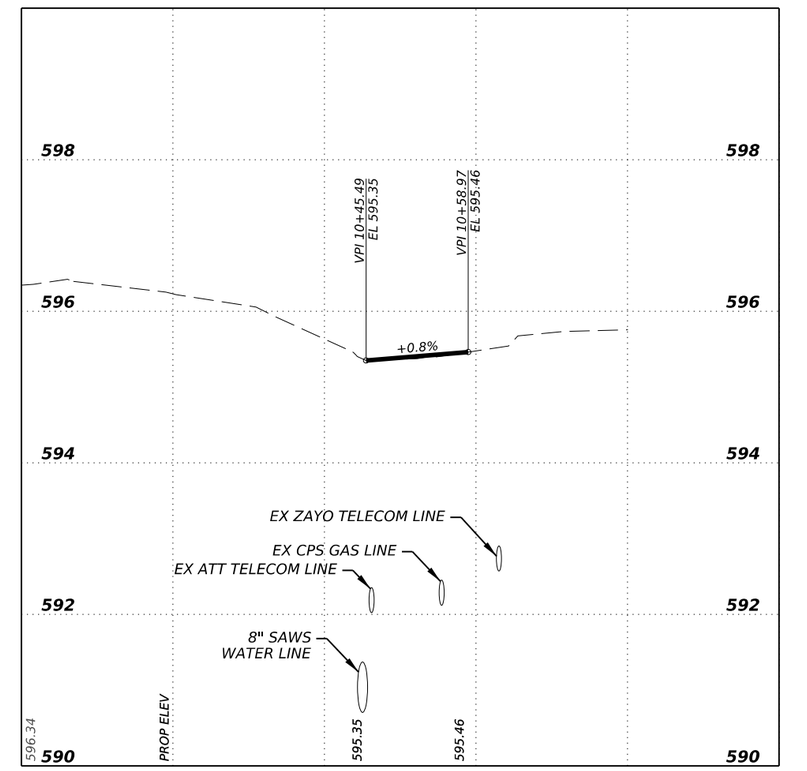
DRIVEWAY 07



DRIVEWAY 08



DRIVEWAY 07



DRIVEWAY 08

LEGEND

- BACK OF CURB
- EXISTING ROW
- PROPOSED TCE
- CONCRETE SIDEWALK
- BASE REPAIR
- CONCRETE MEDIAN
- CONCRETE DRIVEWAY

NOTES:

1. CONTRACTOR SHALL VERIFY EXISTING FIELD CONDITIONS FOR ALL TIE IN ELEVATIONS AND ADJUST AS NEEDED.
2. SEE HORIZONTAL DATA SHEET FOR DRIVEWAY ALIGNMENT INFORMATION.

HORIZ. 0' 10' 20'
VERT. 0' 1' 2'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

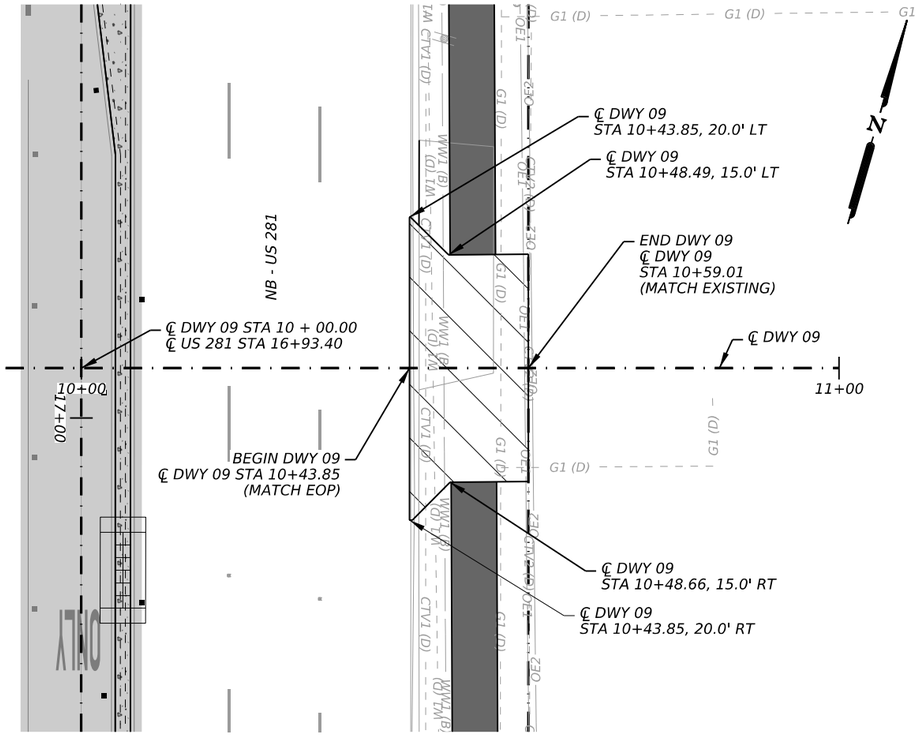
US 281

DRIVEWAY PLAN & PROFILE

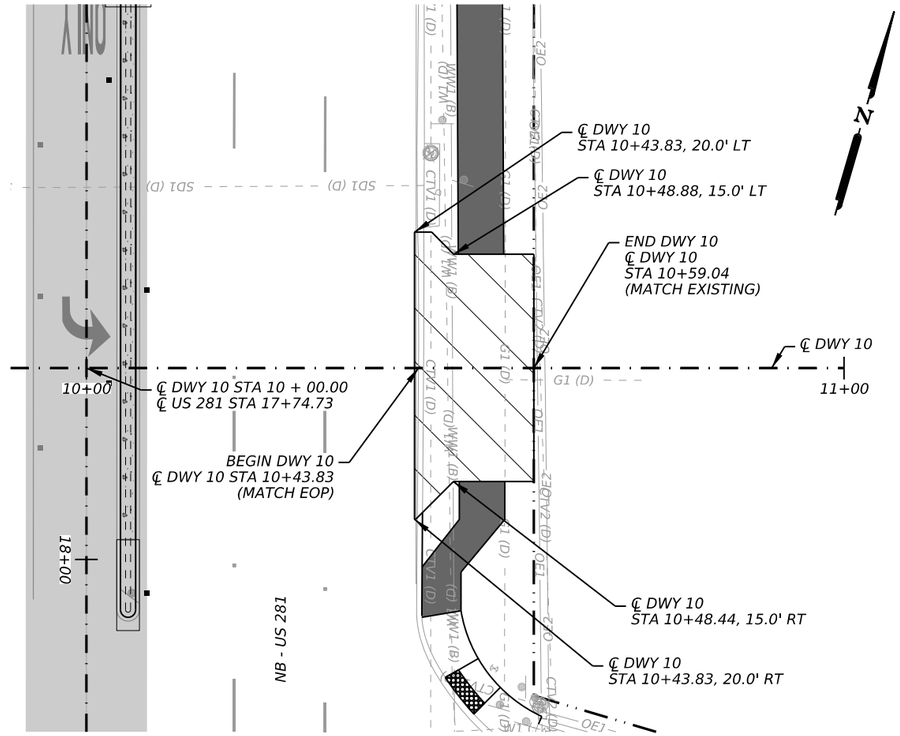
SHEET 4 OF 19

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		86

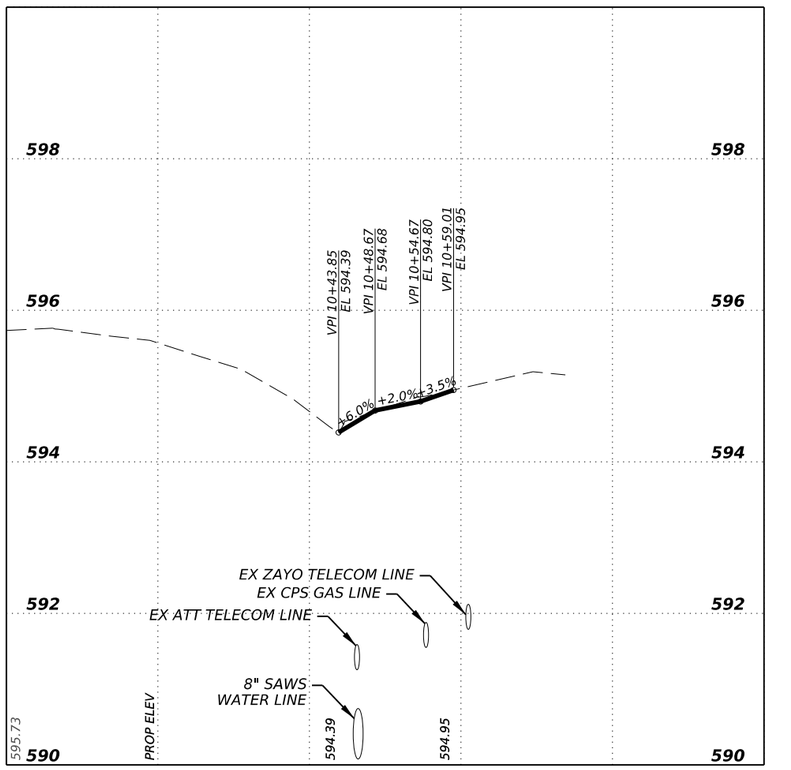
DATE: 11/21/2023 3:34:06 PM
FILE: c:\pw\kh1\d0251184\US281_DRIVEWAY_PP2.dgn



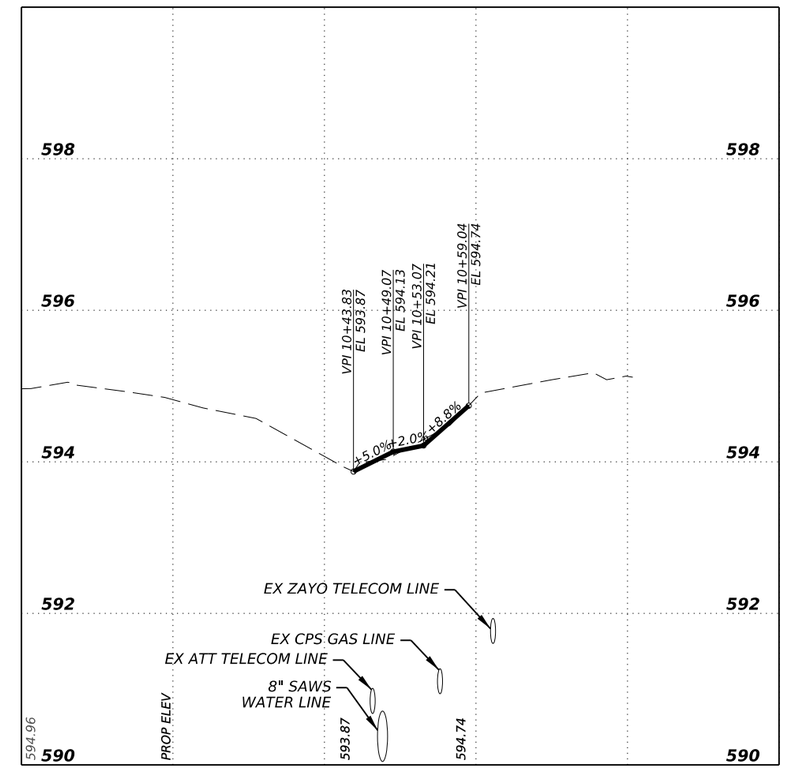
DRIVEWAY 09



DRIVEWAY 10



DRIVEWAY 09



DRIVEWAY 10

LEGEND

- BACK OF CURB
- EXISTING ROW
- PROPOSED TCE
- CONCRETE SIDEWALK
- BASE REPAIR
- CONCRETE MEDIAN
- CONCRETE DRIVEWAY

NOTES:

1. CONTRACTOR SHALL VERIFY EXISTING FIELD CONDITIONS FOR ALL TIE IN ELEVATIONS AND ADJUST AS NEEDED.
2. SEE HORIZONTAL DATA SHEET FOR DRIVEWAY ALIGNMENT INFORMATION.

HORIZ. 0' 10' 20'
VERT. 0' 1' 2'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

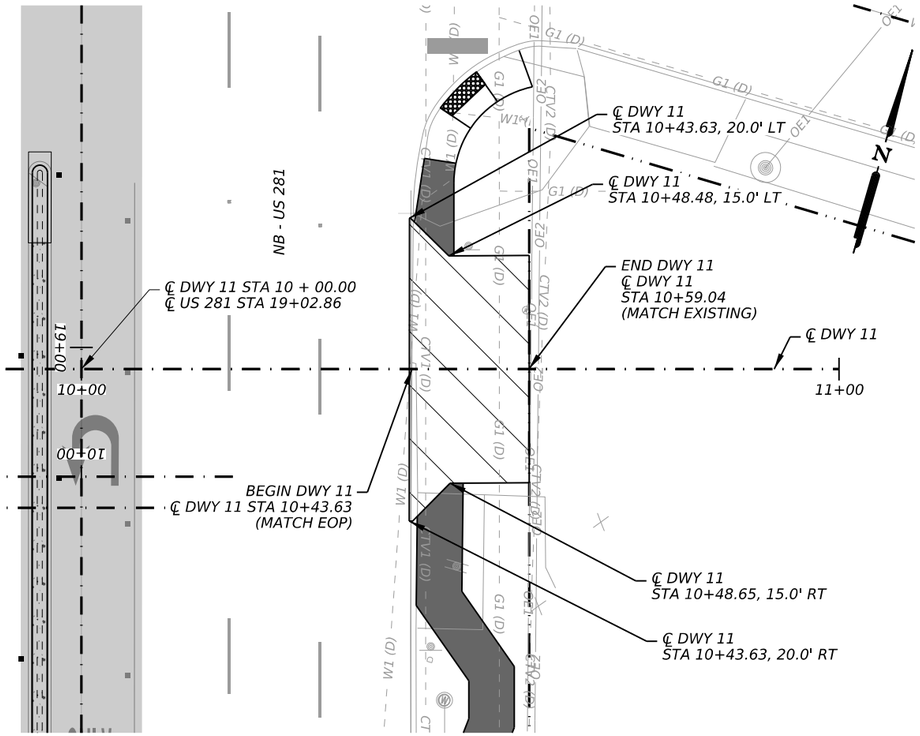
US 281

DRIVEWAY PLAN & PROFILE

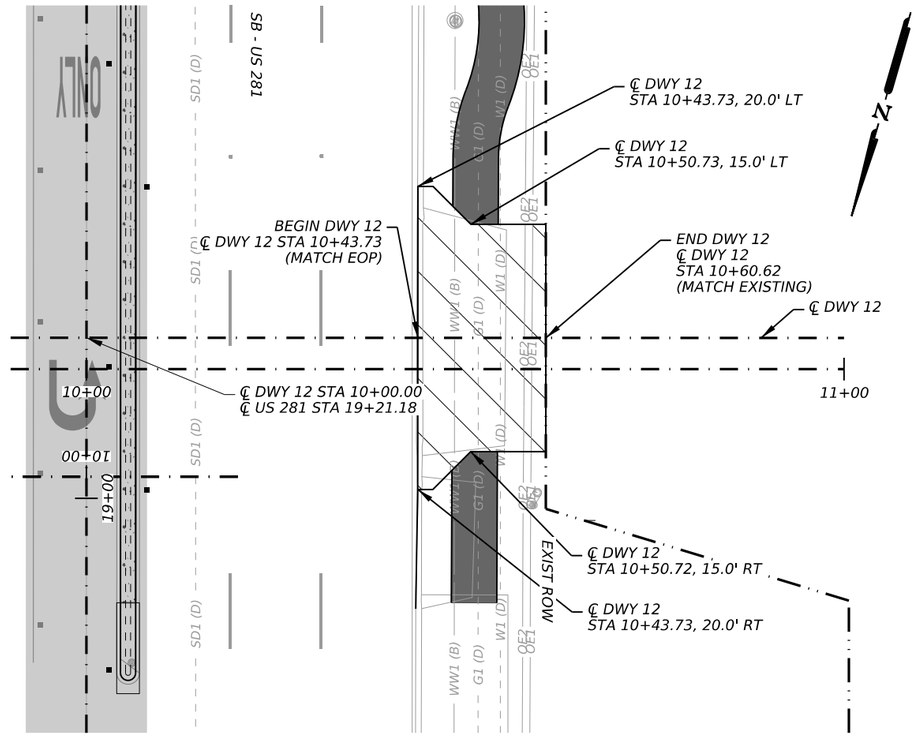
SHEET 5 OF 19

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		87

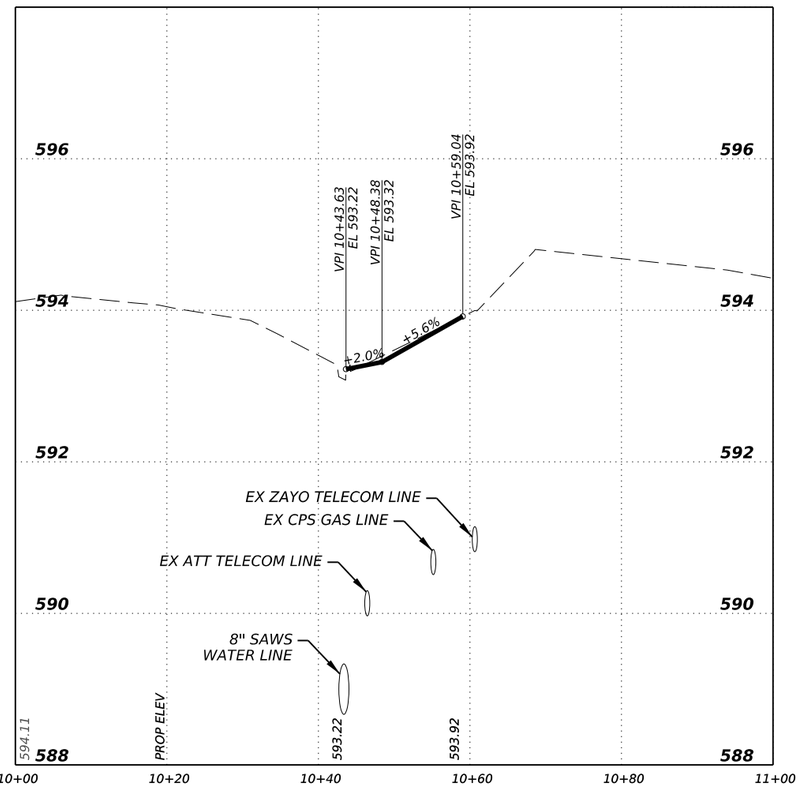
DATE: 11/21/2023 3:34:06 PM
FILE: c:\pw\kh1\d0251184\US281_DRIVEWAY_PP2.dgn



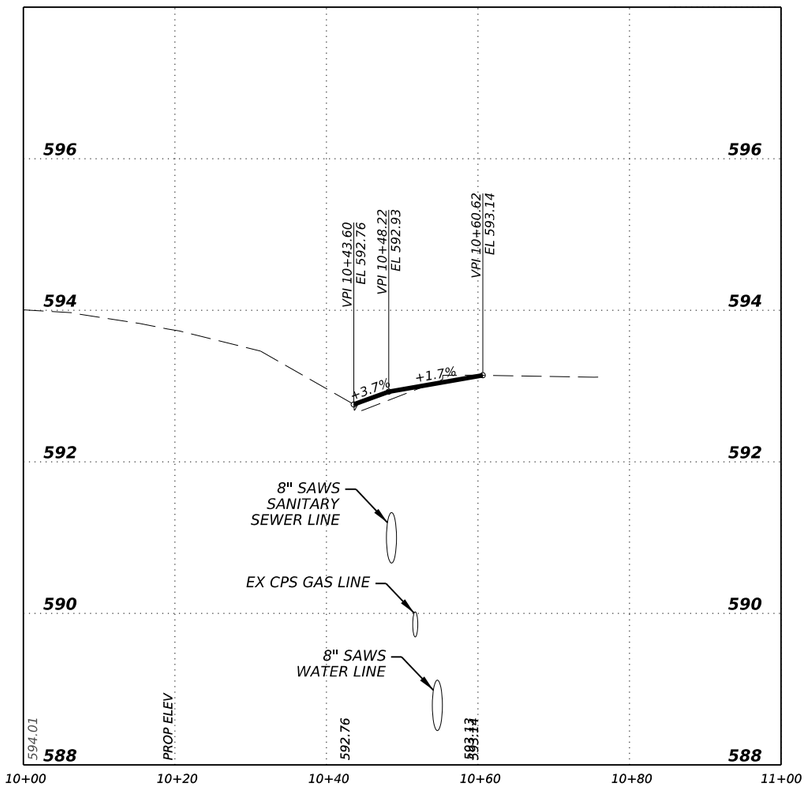
DRIVEWAY 11



DRIVEWAY 12



DRIVEWAY 11



DRIVEWAY 12

LEGEND

- BACK OF CURB
- EXISTING ROW
- PROPOSED TCE
- CONCRETE SIDEWALK
- BASE REPAIR
- CONCRETE MEDIAN
- CONCRETE DRIVEWAY

NOTES:

1. CONTRACTOR SHALL VERIFY EXISTING FIELD CONDITIONS FOR ALL TIE IN ELEVATIONS AND ADJUST AS NEEDED.

2. SEE HORIZONTAL DATA SHEET FOR DRIVEWAY ALIGNMENT INFORMATION.

HORIZ. 0' 10' 20'
VERT. 0' 1' 2'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

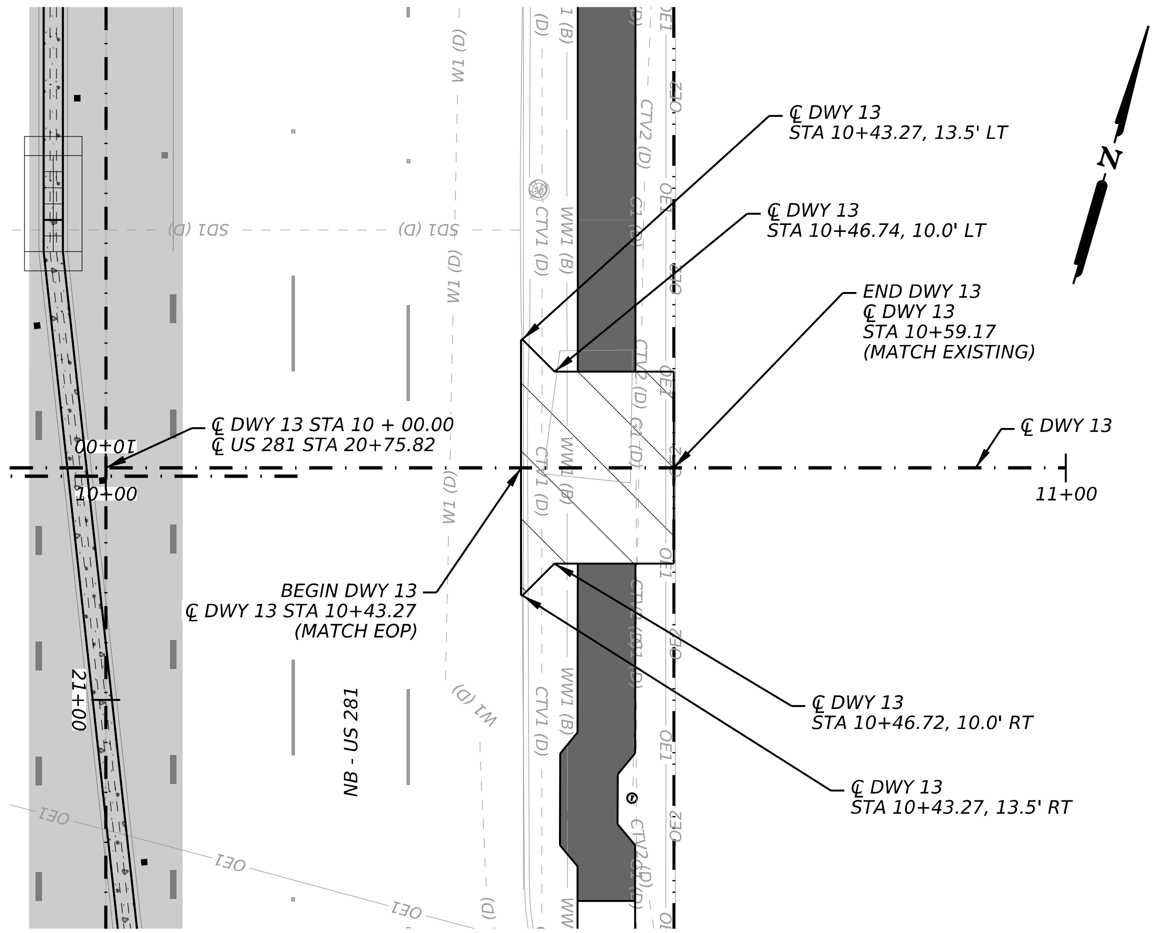
US 281

DRIVEWAY PLAN & PROFILE

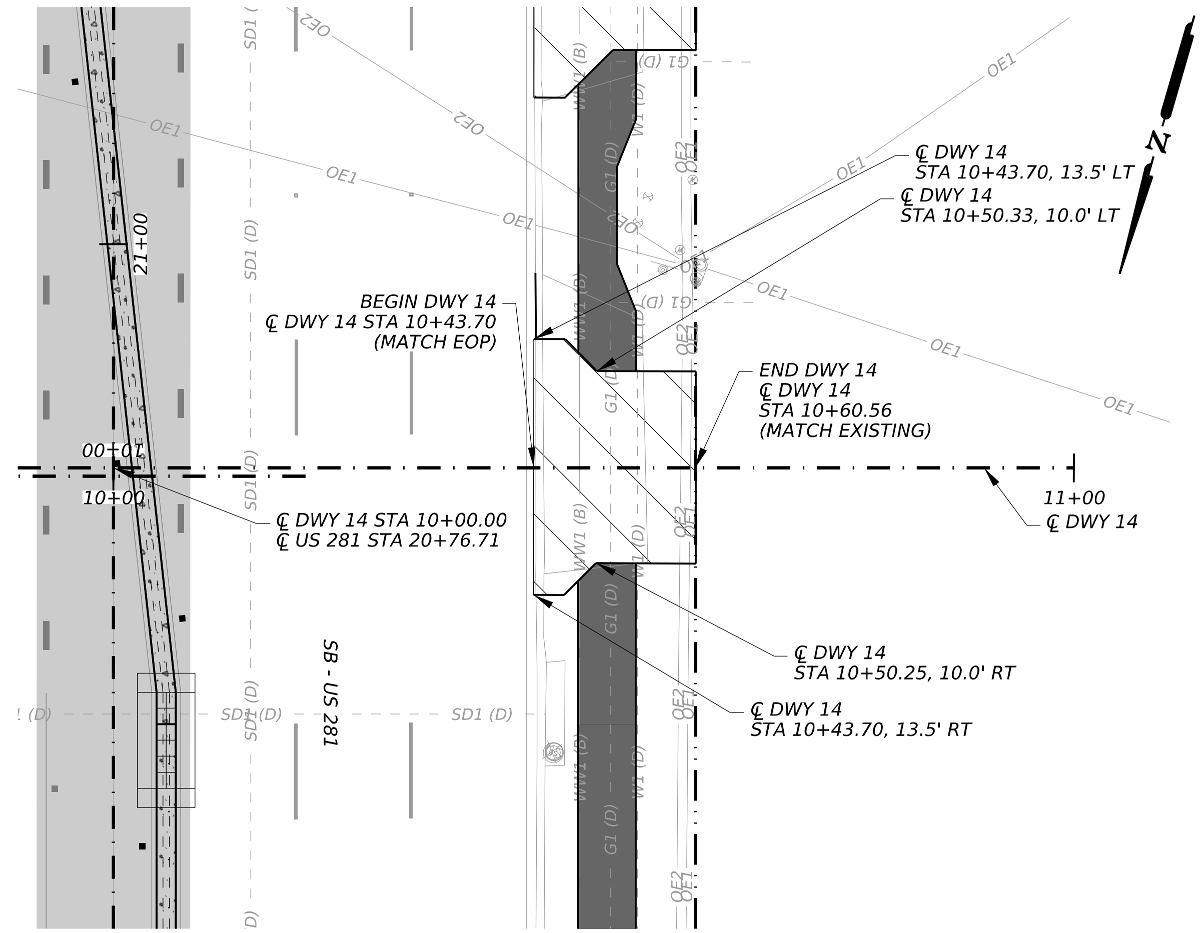
SHEET 6 OF 19

FED.RD. DIV NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		88

DATE: 11/21/2023 3:34:07 PM
FILE: c:\pw\kh1\d0251184\US281_DRIVEWAY_PP2.dgn



DRIVEWAY 13



DRIVEWAY 14

LEGEND

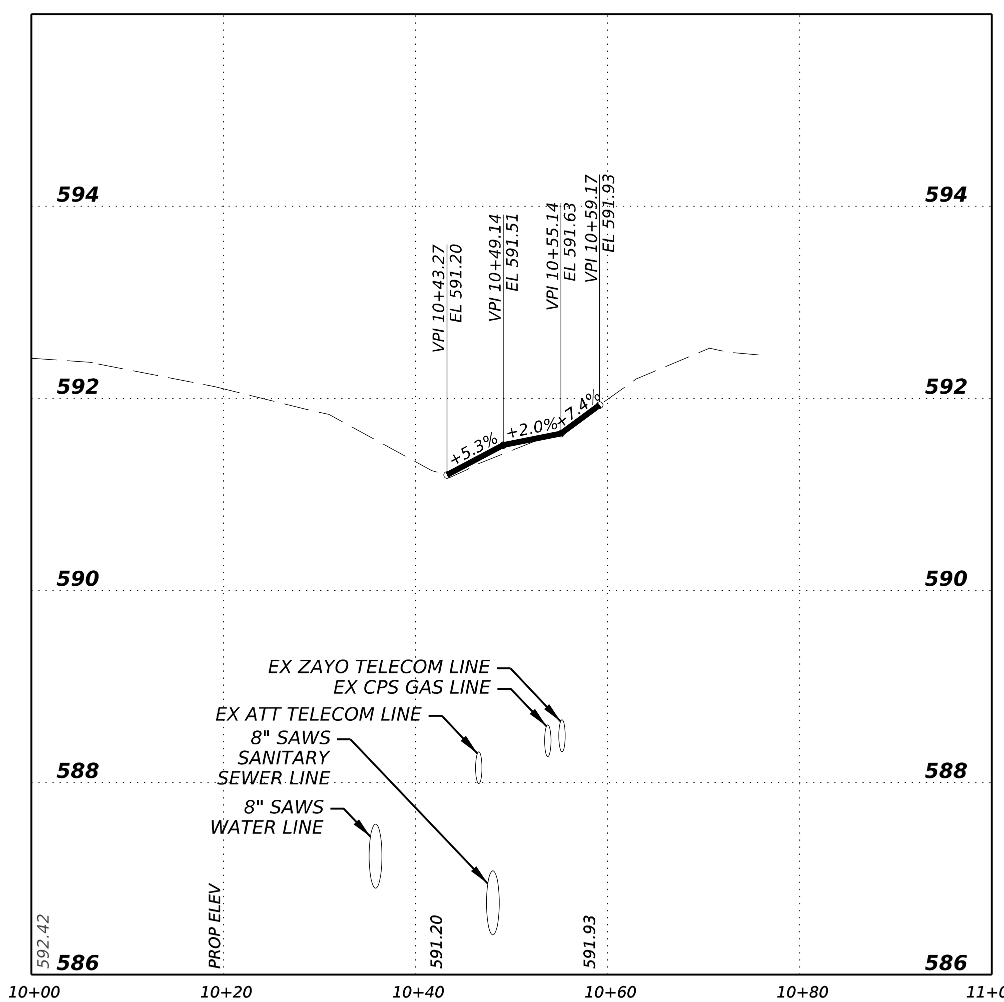
- BACK OF CURB
- EXISTING ROW
- PROPOSED TCE
- CONCRETE SIDEWALK
- BASE REPAIR
- CONCRETE MEDIAN
- CONCRETE DRIVEWAY

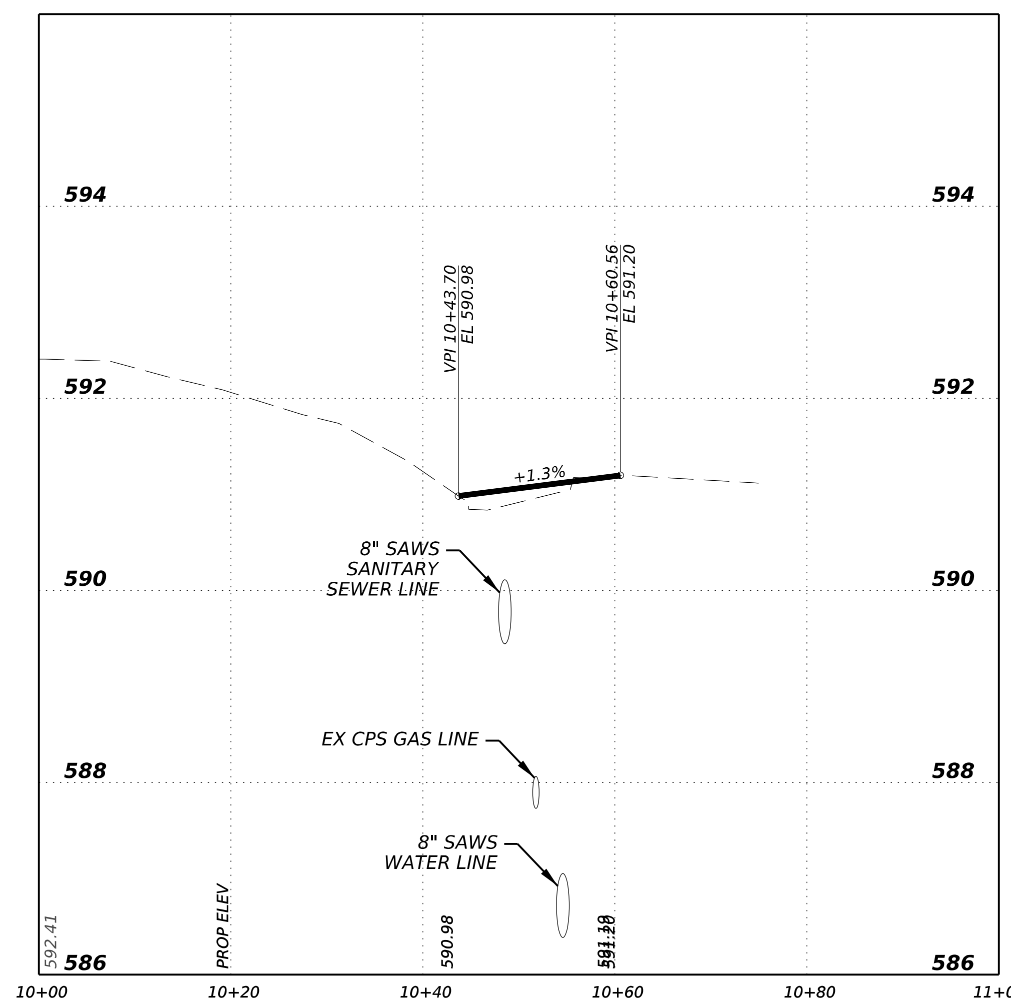
NOTES:

1. CONTRACTOR SHALL VERIFY EXISTING FIELD CONDITIONS FOR ALL TIE IN ELEVATIONS AND ADJUST AS NEEDED.

2. SEE HORIZONTAL DATA SHEET FOR DRIVEWAY ALIGNMENT INFORMATION.

HORIZ. 0' 10' 20'
VERT. 0' 1' 2'
SCALE





STATE OF TEXAS
TYLER BARROWS
147138
LICENSED PROFESSIONAL ENGINEER

11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

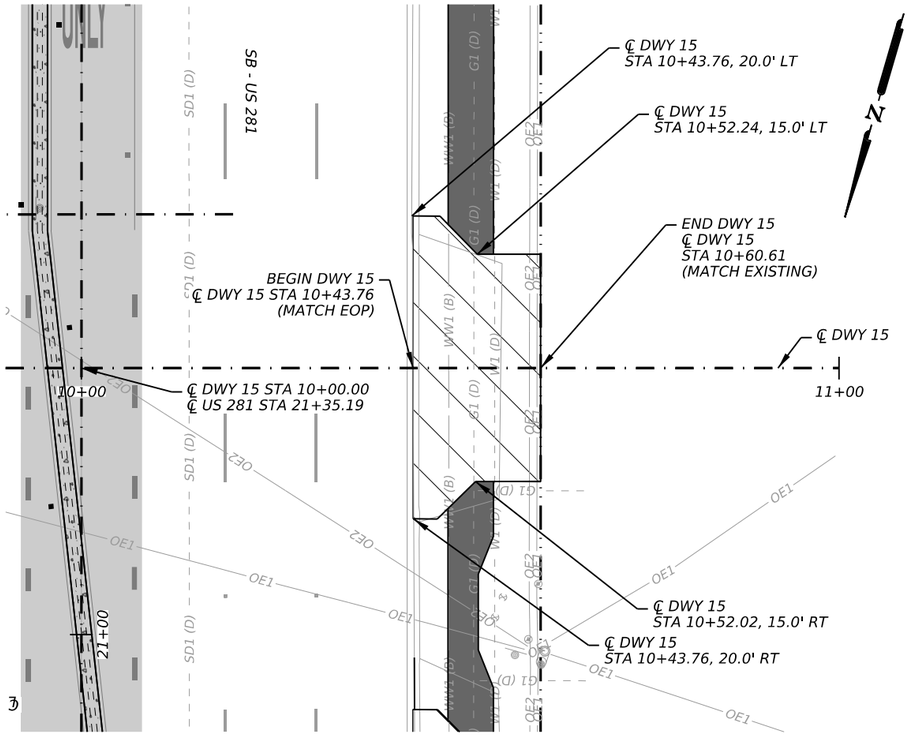
US 281

DRIVEWAY PLAN & PROFILE

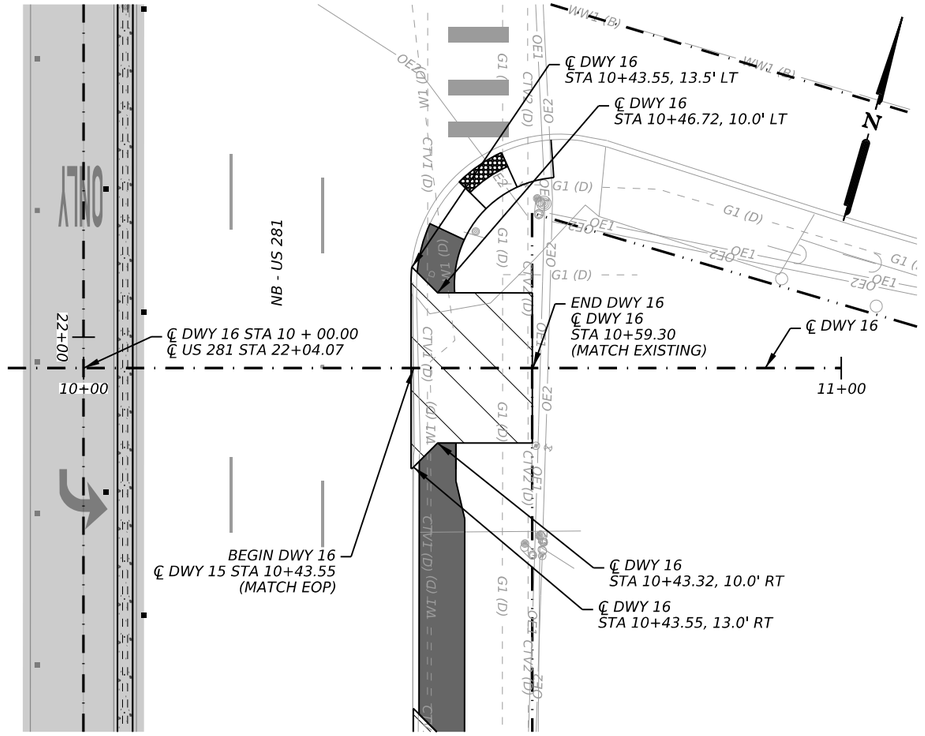
SHEET 7 OF 19

FED RD. DIV NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		89

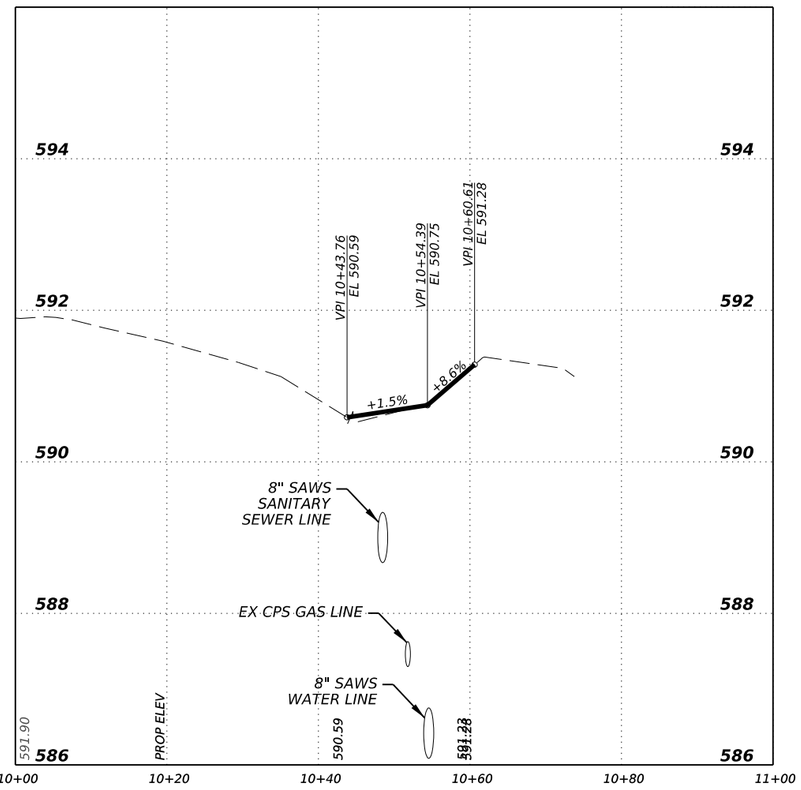
DATE: 11/21/2023 3:34:08 PM
FILE: c:\pwkh1d0251184\US281 DRIVEWAY PP2.dgn

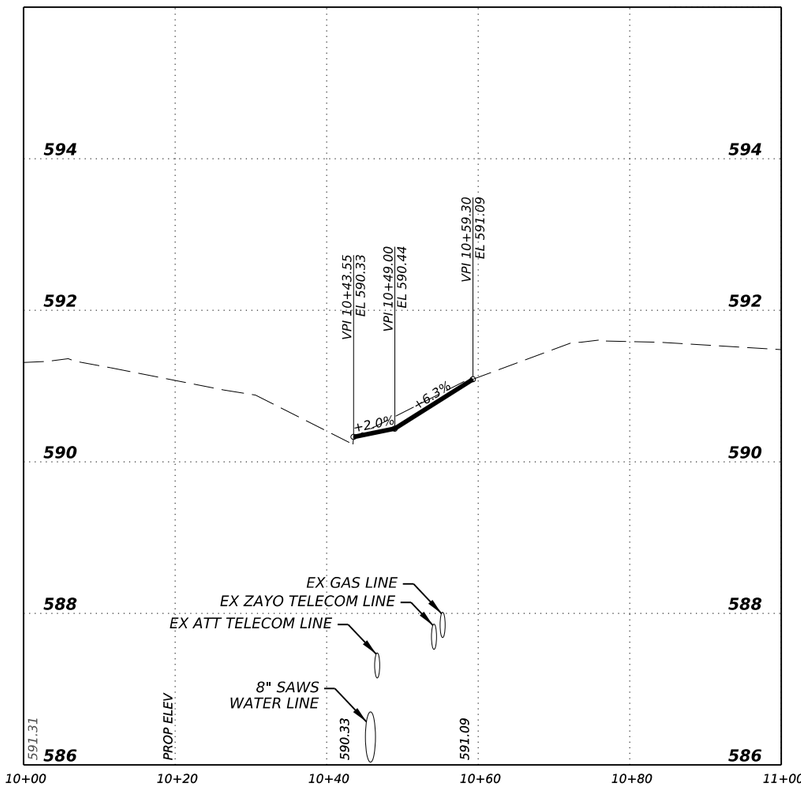


DRIVEWAY 15



DRIVEWAY 16





LEGEND

- BACK OF CURB
- EXISTING ROW
- PROPOSED TCE
- CONCRETE SIDEWALK
- BASE REPAIR
- CONCRETE MEDIAN
- CONCRETE DRIVEWAY

NOTES:

1. CONTRACTOR SHALL VERIFY EXISTING FIELD CONDITIONS FOR ALL TIE IN ELEVATIONS AND ADJUST AS NEEDED.
2. SEE HORIZONTAL DATA SHEET FOR DRIVEWAY ALIGNMENT INFORMATION.

HORIZ. 0' 10' 20'
VERT. 0' 1' 2'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

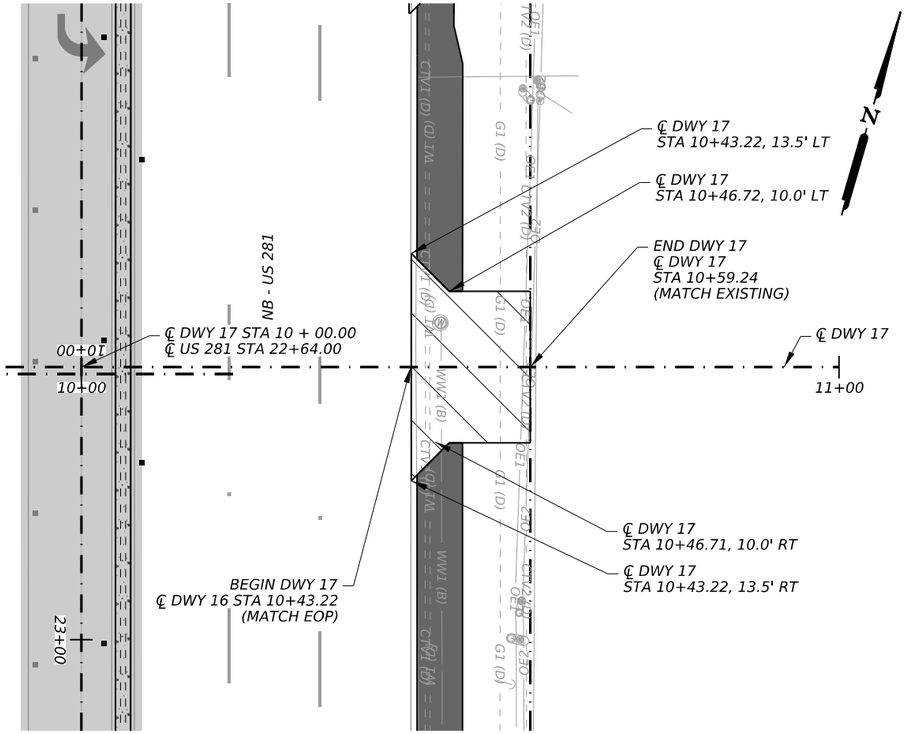
US 281

DRIVEWAY PLAN & PROFILE

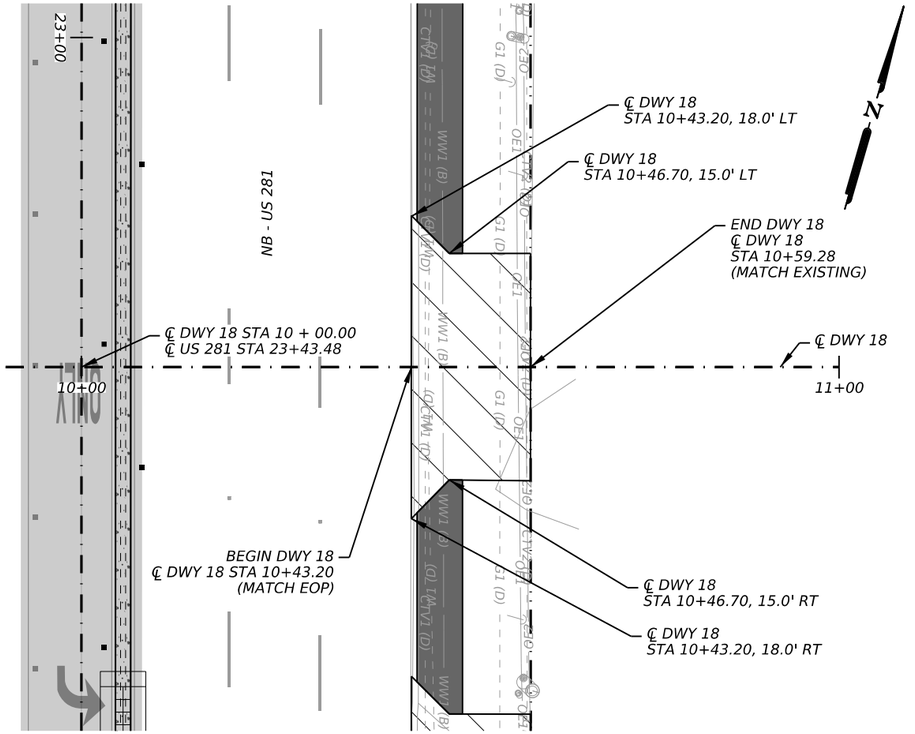
SHEET 8 OF 19

FED.RD. DIV NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		90

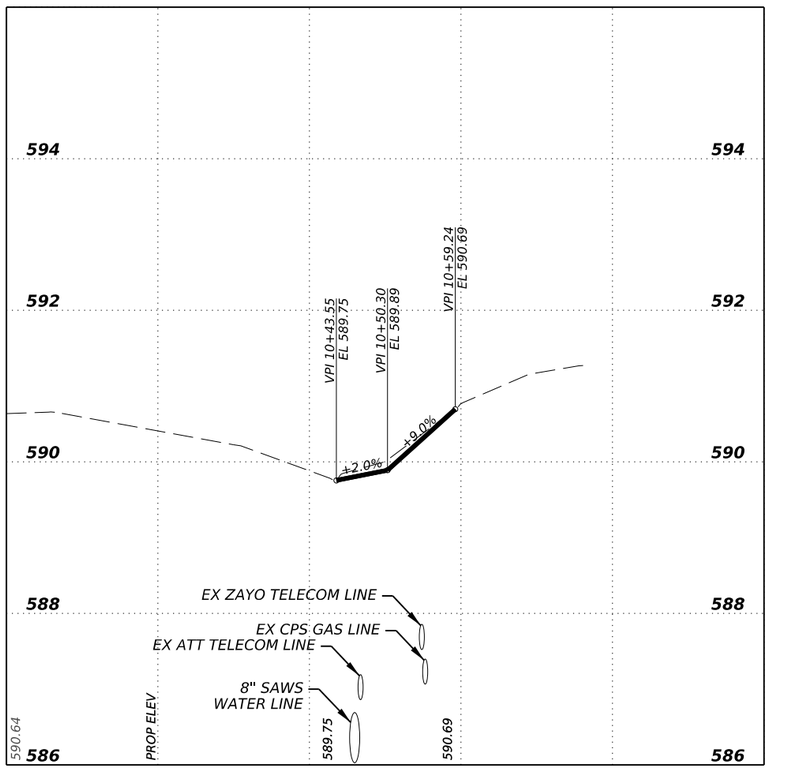
DATE: 11/21/2023 3:34:08 PM
FILE: c:\pw\kh1\d0251184\US281_DRIVEWAY_PP2.dgn

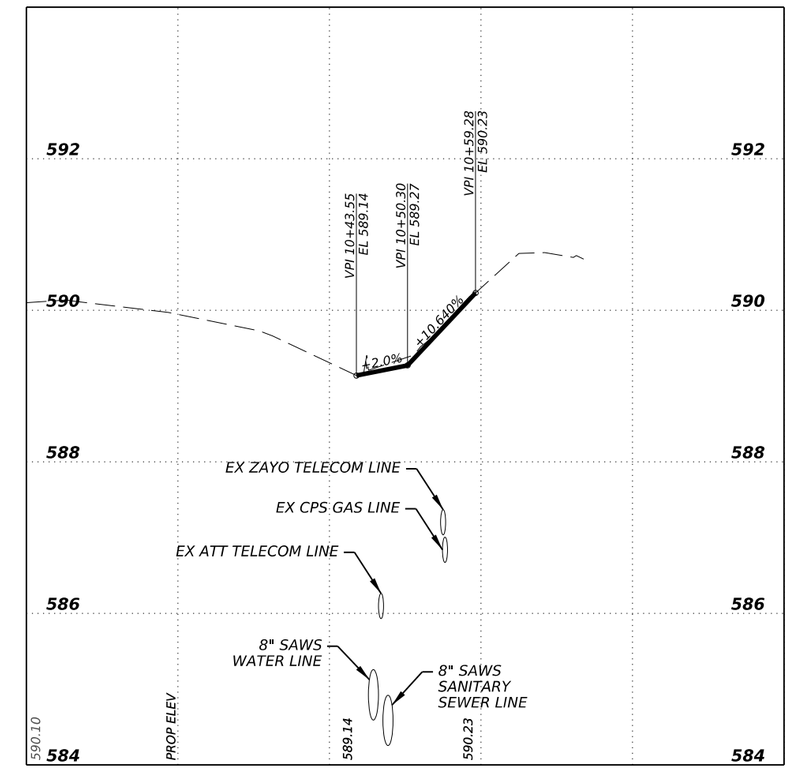


DRIVEWAY 17



DRIVEWAY 18





DRIVEWAY 18

LEGEND

- BACK OF CURB
- EXISTING ROW
- PROPOSED TCE
- CONCRETE SIDEWALK
- BASE REPAIR
- CONCRETE MEDIAN
- CONCRETE DRIVEWAY

NOTES:

1. CONTRACTOR SHALL VERIFY EXISTING FIELD CONDITIONS FOR ALL TIE IN ELEVATIONS AND ADJUST AS NEEDED.

2. SEE HORIZONTAL DATA SHEET FOR DRIVEWAY ALIGNMENT INFORMATION.

HORIZ. 0' 10' 20'
VERT. 0' 1' 2'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

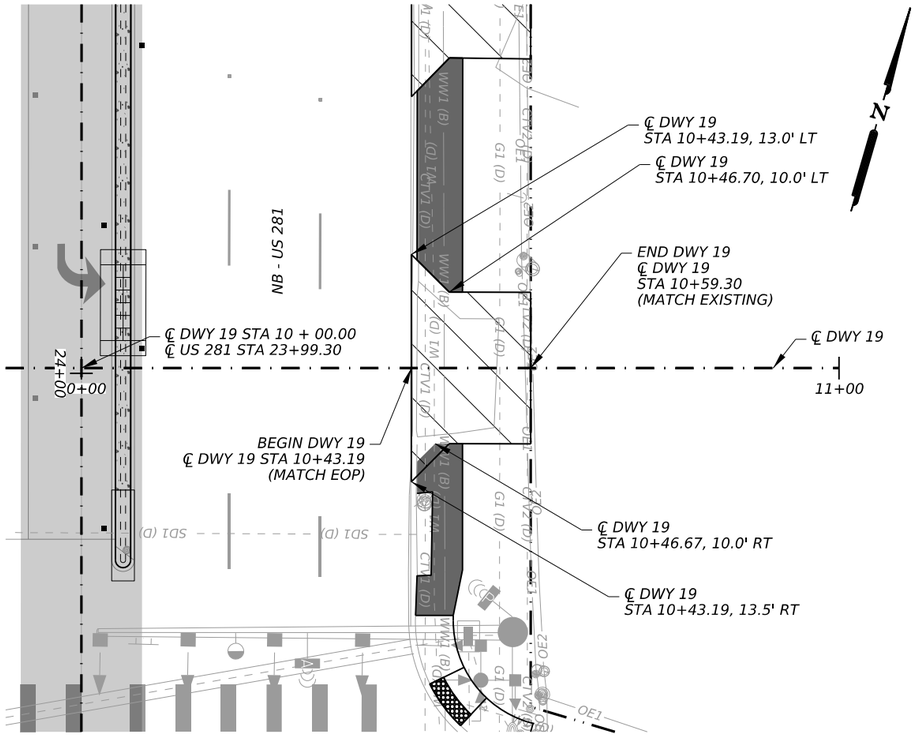
US 281

DRIVEWAY PLAN & PROFILE

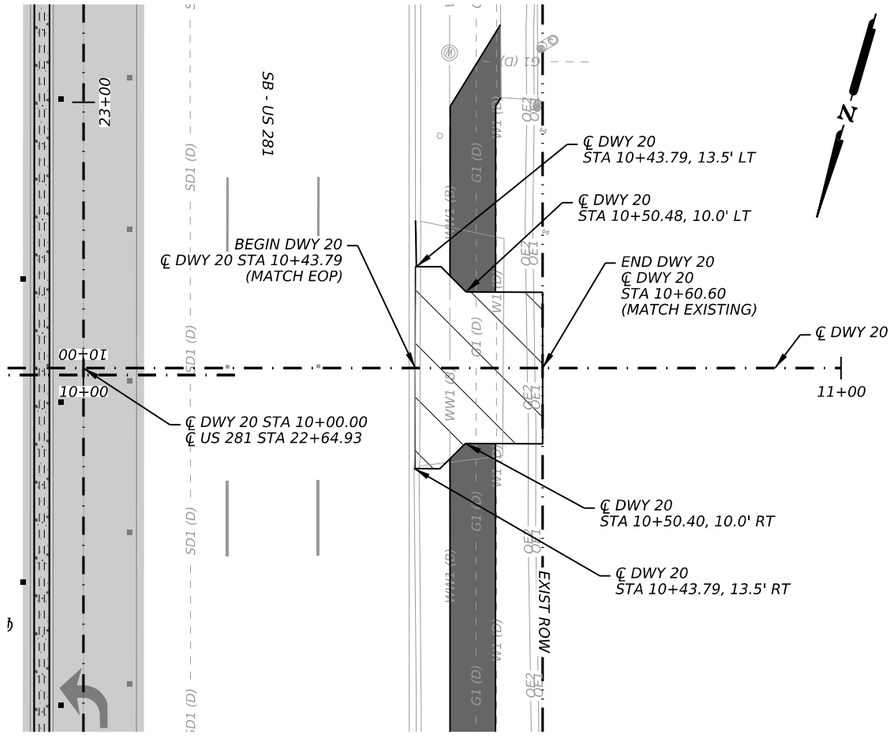
SHEET 9 OF 19

FED.RD. DIV NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		91

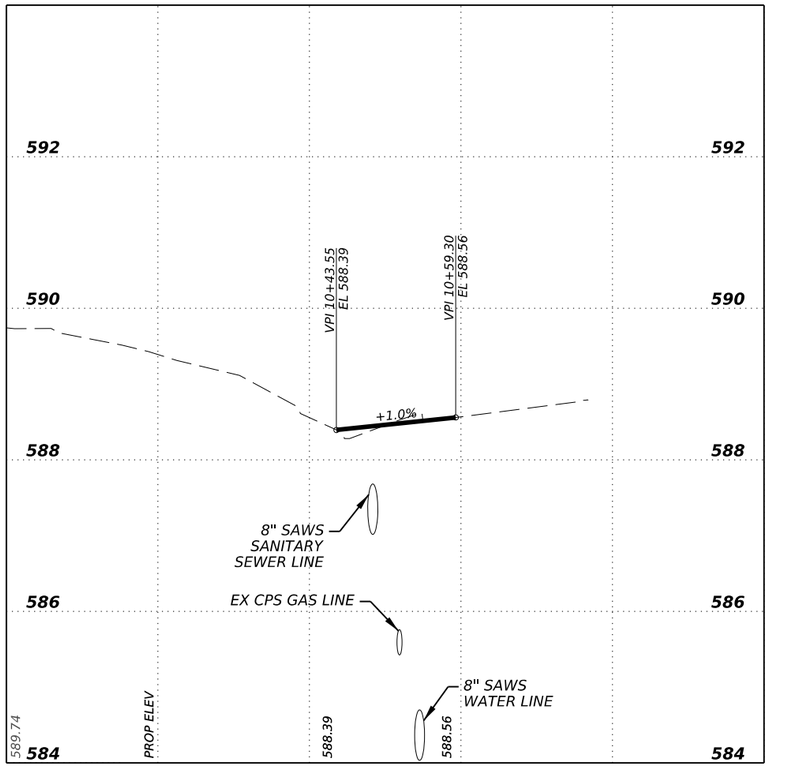
DATE: 11/21/2023 3:34:09 PM
FILE: c:\pw\kh1\d0251184\US281_DRIVEWAY_PP2.dgn

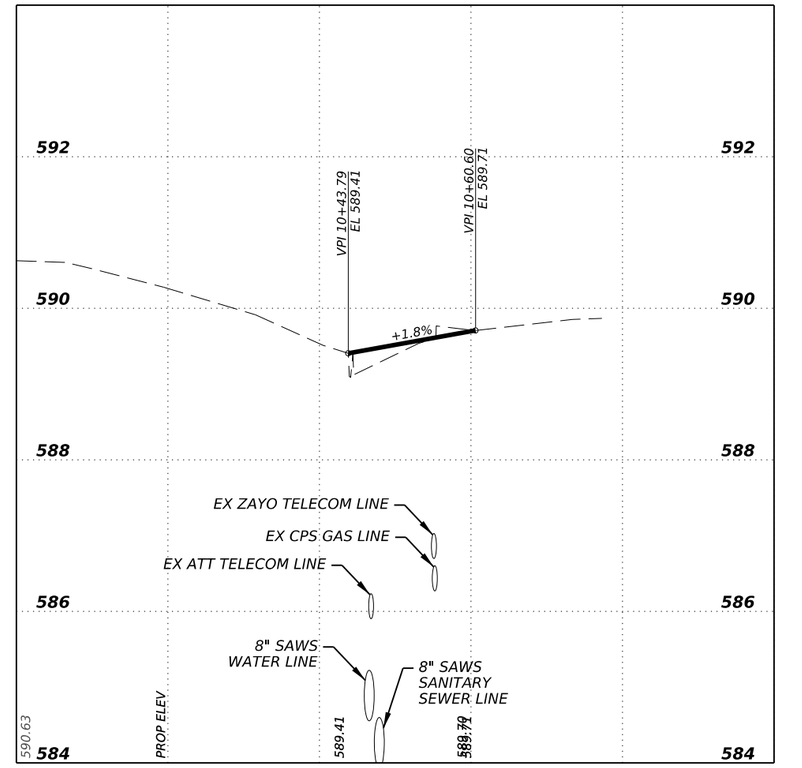


DRIVEWAY 19



DRIVEWAY 20





LEGEND

- BACK OF CURB
- EXISTING ROW
- PROPOSED TCE
- CONCRETE SIDEWALK
- BASE REPAIR
- CONCRETE MEDIAN
- CONCRETE DRIVEWAY

NOTES:

1. CONTRACTOR SHALL VERIFY EXISTING FIELD CONDITIONS FOR ALL TIE IN ELEVATIONS AND ADJUST AS NEEDED.
2. SEE HORIZONTAL DATA SHEET FOR DRIVEWAY ALIGNMENT INFORMATION.

HORIZ. 0' 10' 20'
VERT. 0' 1' 2'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

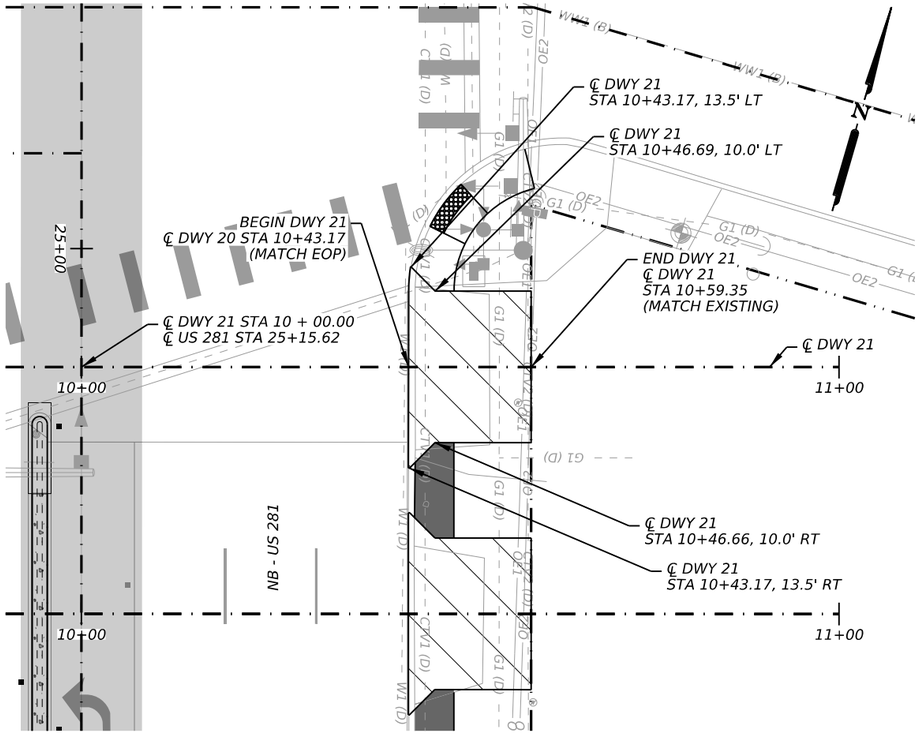
US 281

DRIVEWAY PLAN & PROFILE

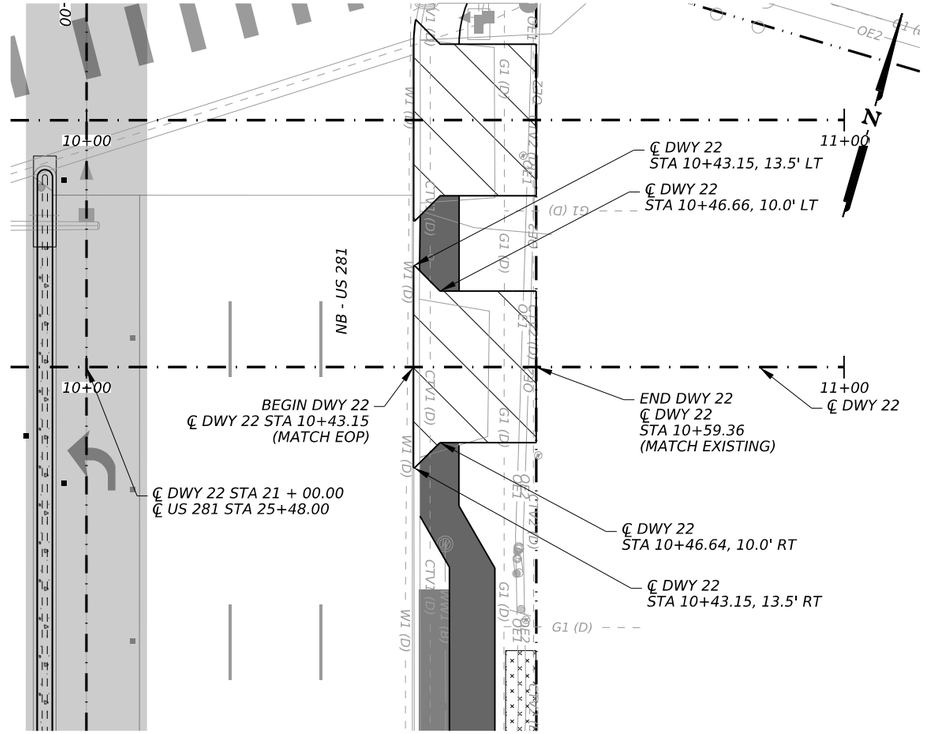
SHEET 10 OF 19

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		92

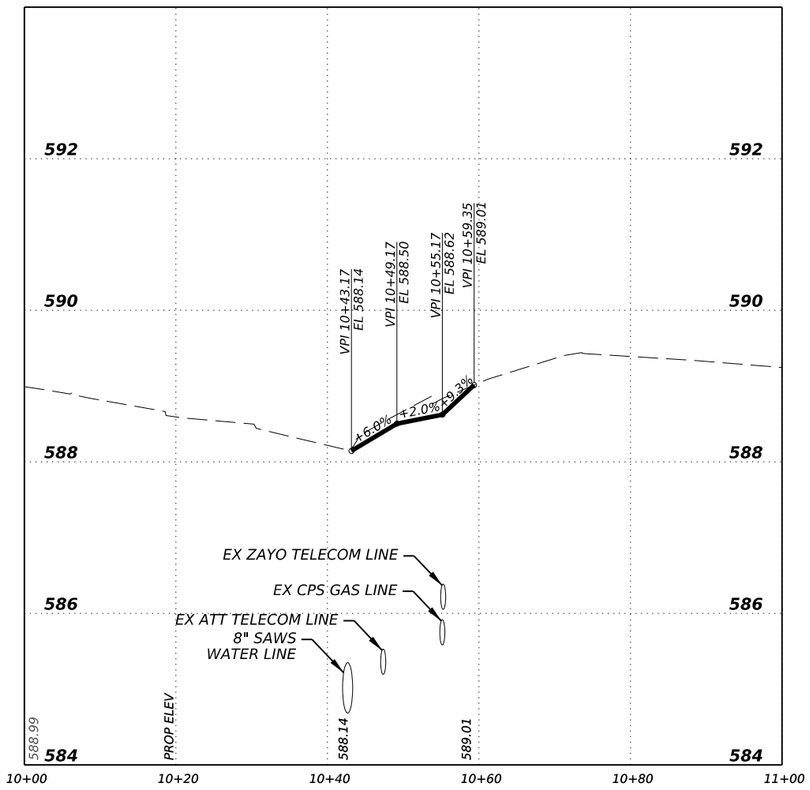
DATE: 11/21/2023 3:34:09 PM
FILE: c:\pw\kh1\d0251184\US281_DRIVEWAY_PP2.dgn

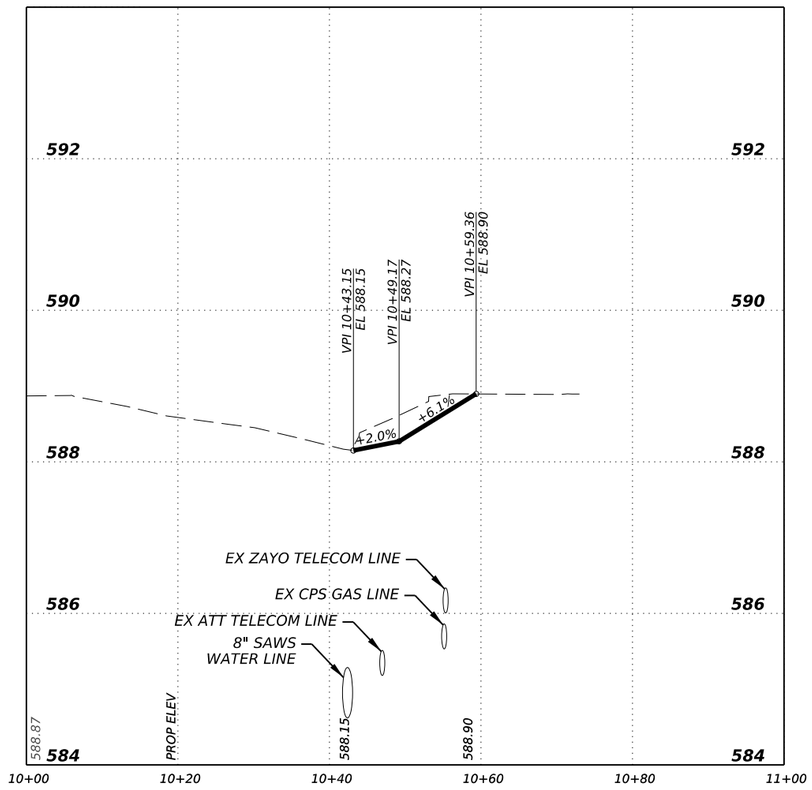


DRIVEWAY 21



DRIVEWAY 22





LEGEND

- BACK OF CURB
- EXISTING ROW
- PROPOSED TCE
- CONCRETE SIDEWALK
- BASE REPAIR
- CONCRETE MEDIAN
- CONCRETE DRIVEWAY

NOTES:

1. CONTRACTOR SHALL VERIFY EXISTING FIELD CONDITIONS FOR ALL TIE IN ELEVATIONS AND ADJUST AS NEEDED.

2. SEE HORIZONTAL DATA SHEET FOR DRIVEWAY ALIGNMENT INFORMATION.

HORIZ. 0' 10' 20'
VERT. 0' 1' 2'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

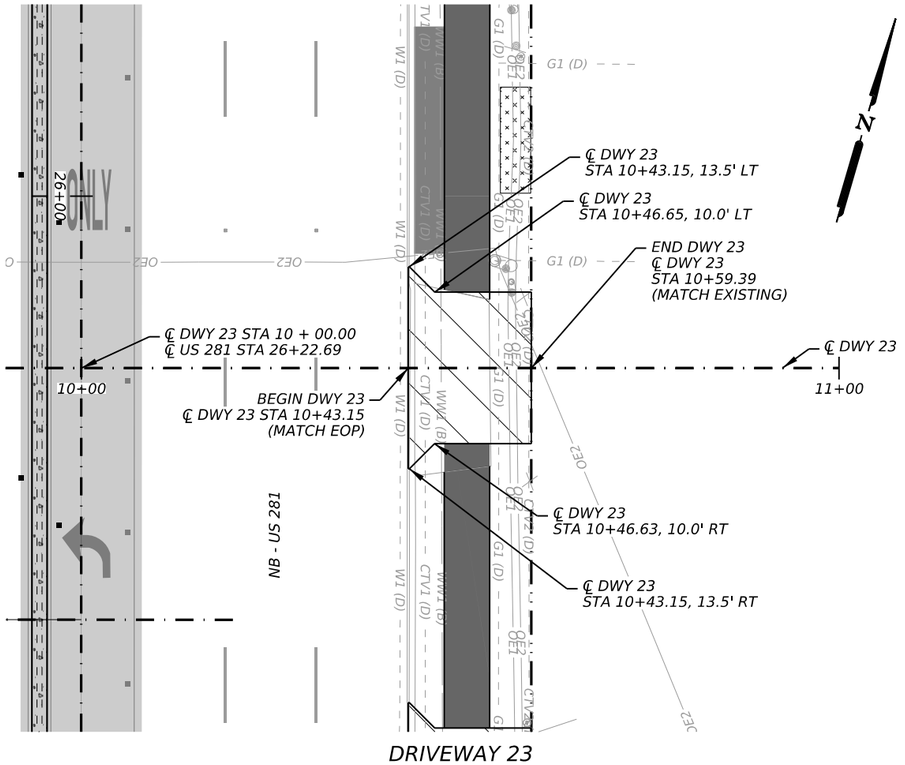
US 281

DRIVEWAY PLAN & PROFILE

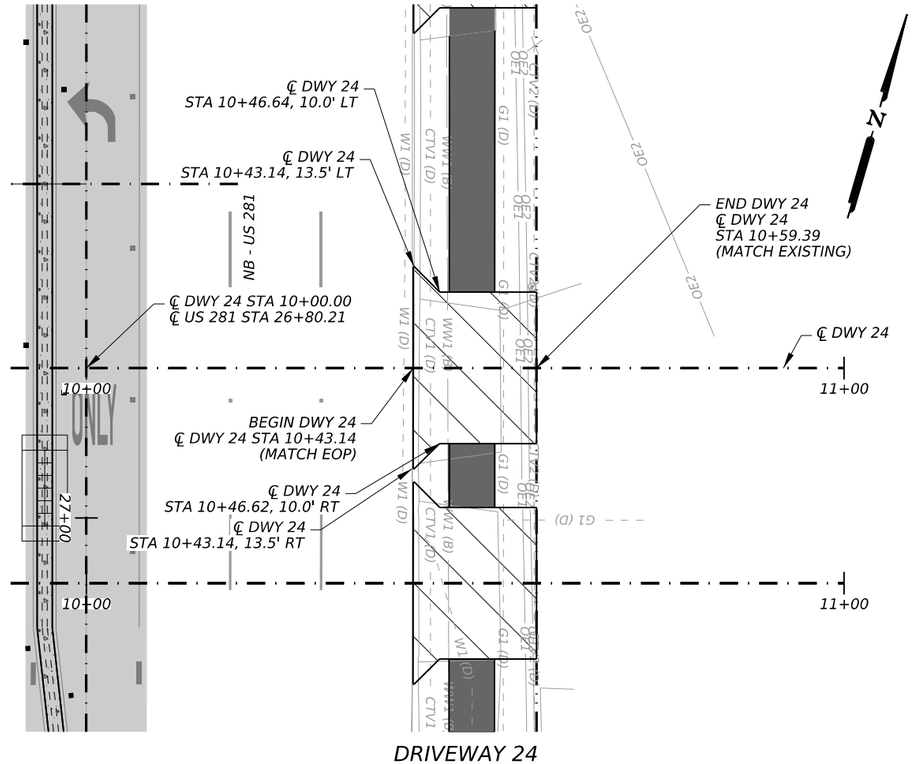
SHEET 11 OF 19

FED.RD. DIV NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		93

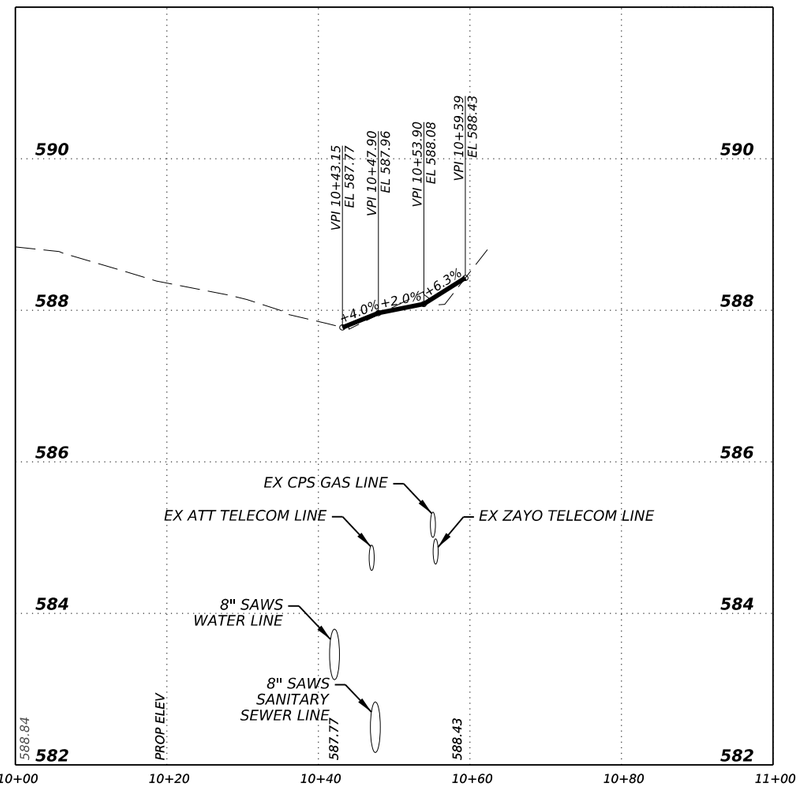
DATE: 11/21/2023 3:34:10 PM
FILE: c:\pw\kh1\d0251184\US281_DRIVEWAY_PP2.dgn



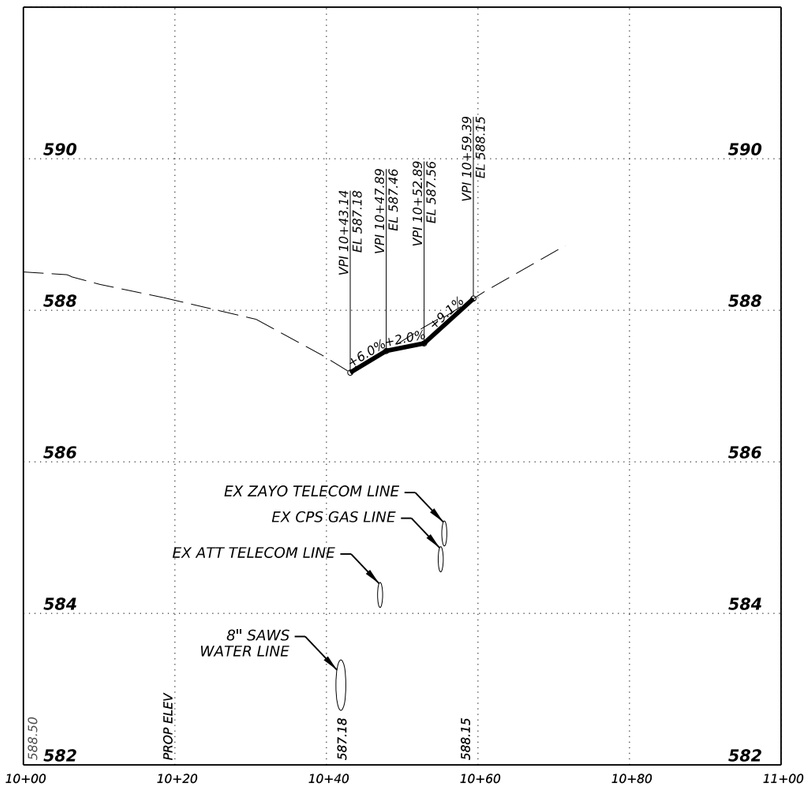
DRIVEWAY 23



DRIVEWAY 24



DRIVEWAY 23



DRIVEWAY 24

LEGEND

- BACK OF CURB
- EXISTING ROW
- PROPOSED TCE
- CONCRETE SIDEWALK
- BASE REPAIR
- CONCRETE MEDIAN
- CONCRETE DRIVEWAY

NOTES:

1. CONTRACTOR SHALL VERIFY EXISTING FIELD CONDITIONS FOR ALL TIE IN ELEVATIONS AND ADJUST AS NEEDED.
2. SEE HORIZONTAL DATA SHEET FOR DRIVEWAY ALIGNMENT INFORMATION.

HORIZ. 0' 10' 20'
VERT. 0' 1' 2'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

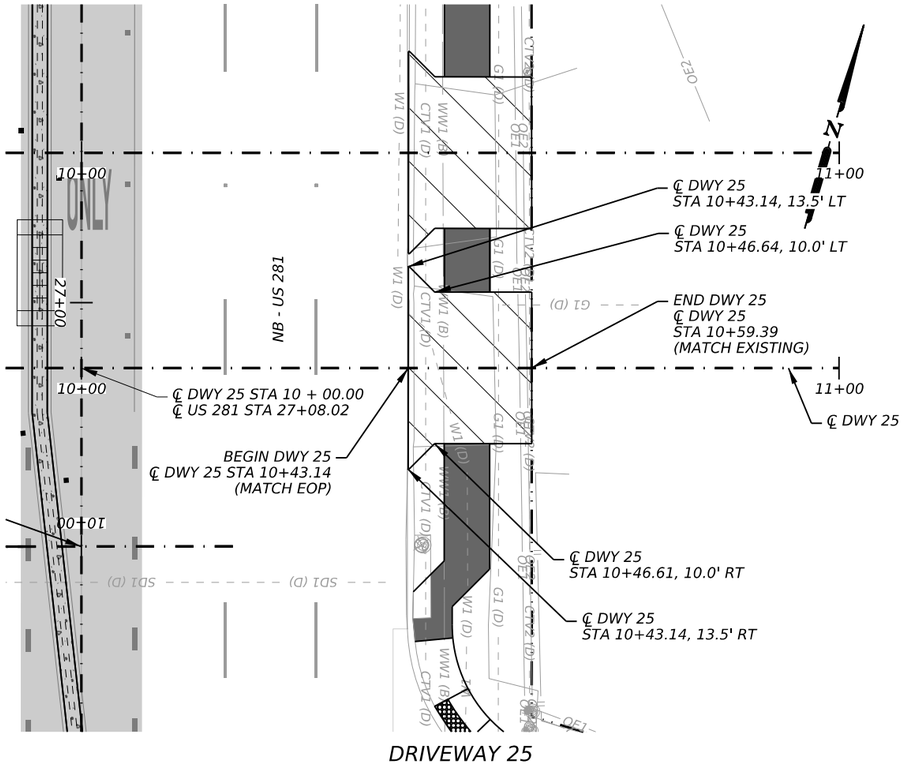
US 281

DRIVEWAY PLAN & PROFILE

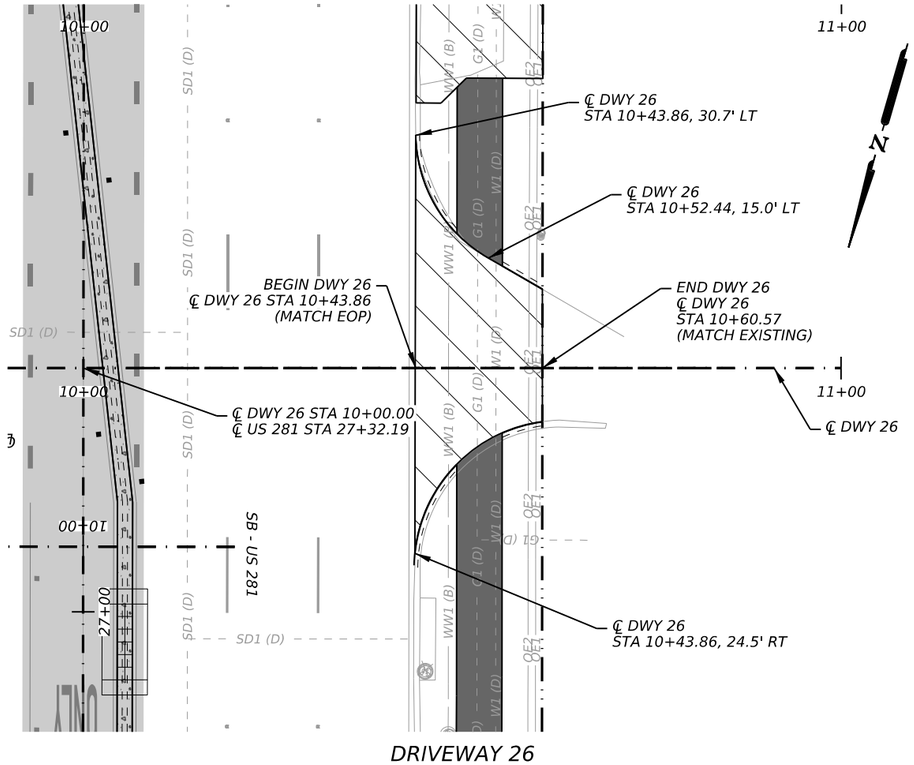
SHEET 12 OF 19

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		94

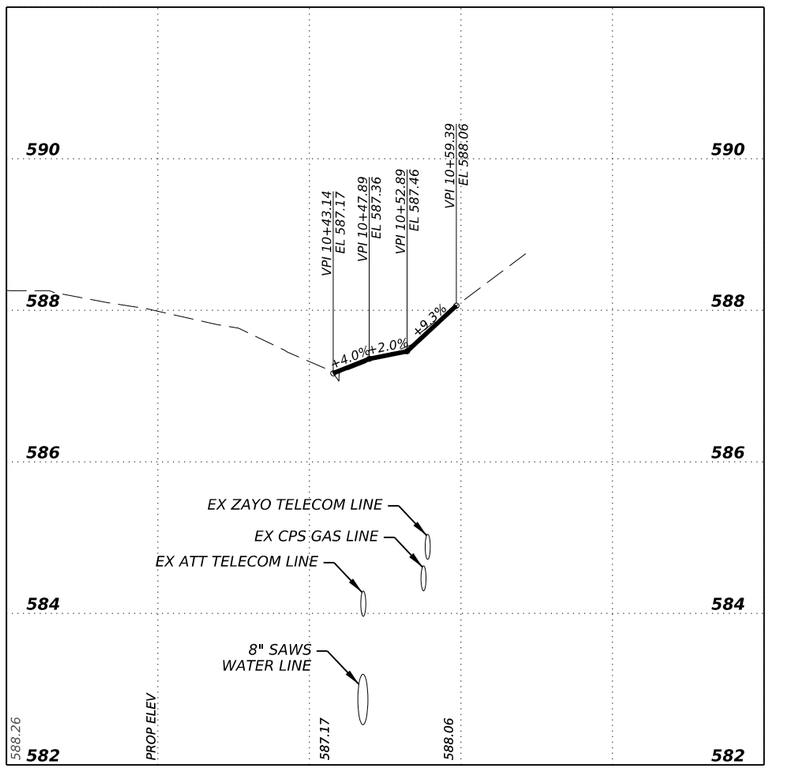
DATE: 11/21/2023 3:34:11 PM
FILE: c:\pw\kh1\d0251184\US281 DRIVEWAY PP2.dgn

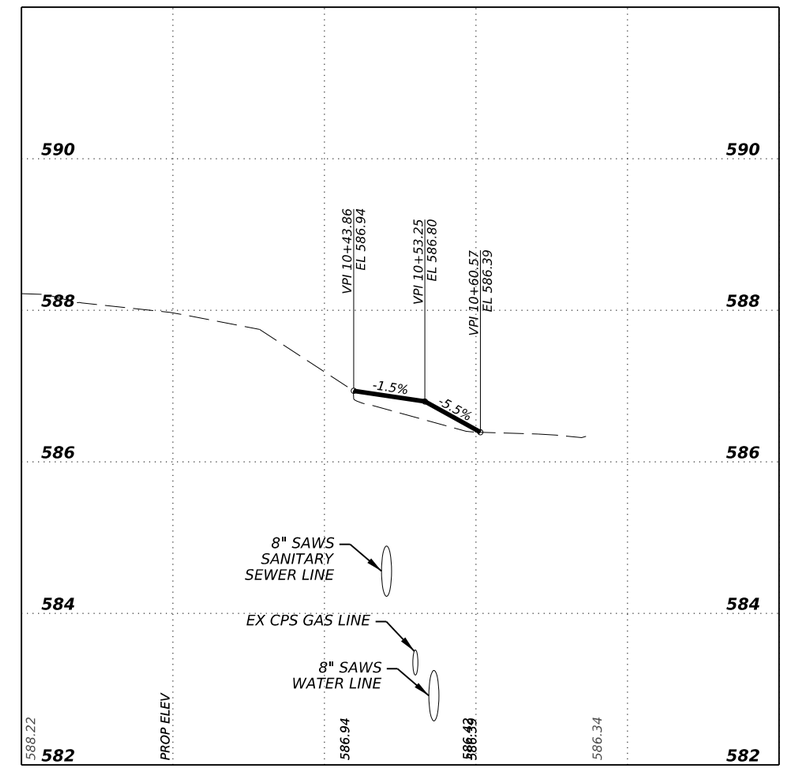


DRIVEWAY 25



DRIVEWAY 26





LEGEND

- BACK OF CURB
- EXISTING ROW
- PROPOSED TCE
- CONCRETE SIDEWALK
- BASE REPAIR
- CONCRETE MEDIAN
- CONCRETE DRIVEWAY

NOTES:

1. CONTRACTOR SHALL VERIFY EXISTING FIELD CONDITIONS FOR ALL TIE IN ELEVATIONS AND ADJUST AS NEEDED.
2. SEE HORIZONTAL DATA SHEET FOR DRIVEWAY ALIGNMENT INFORMATION.

HORIZ. 0' 10' 20'
VERT. 0' 1' 2'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

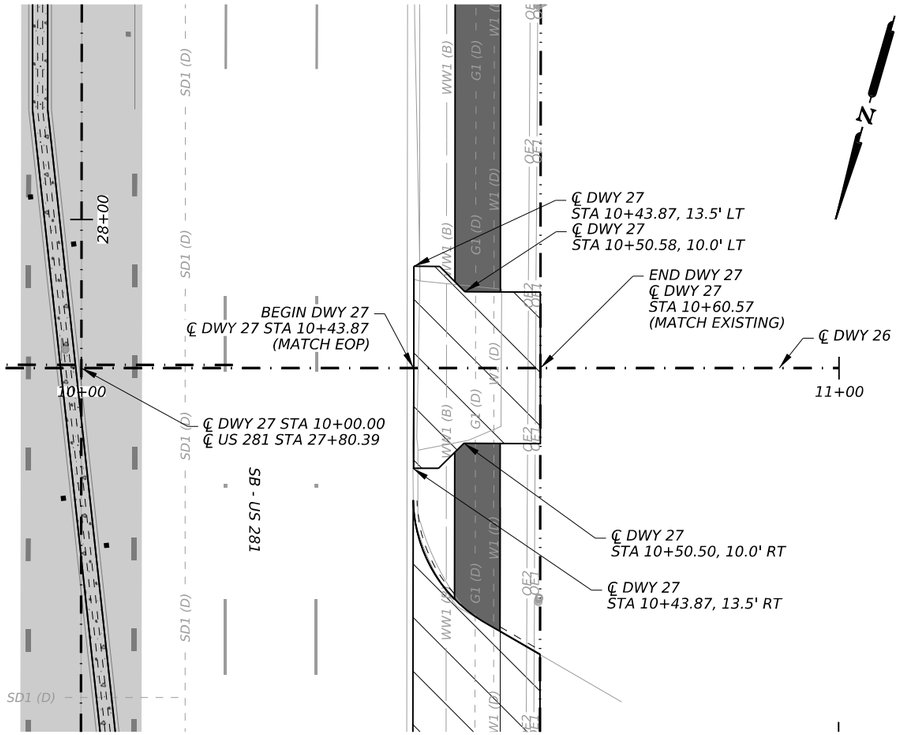
US 281

DRIVEWAY PLAN & PROFILE

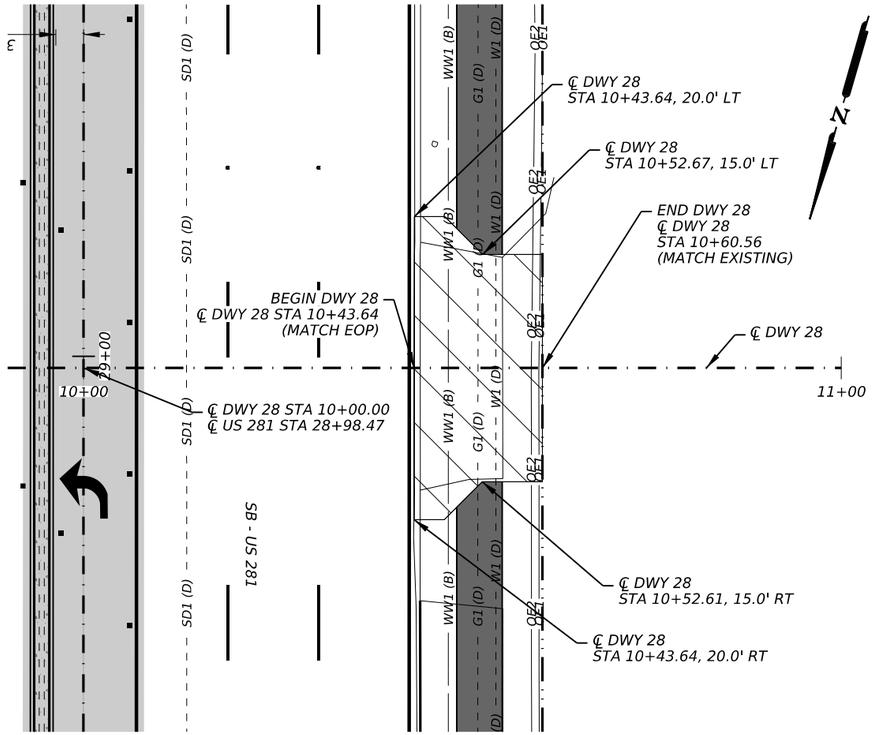
SHEET 13 OF 19

FED.RD. DIV NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		95

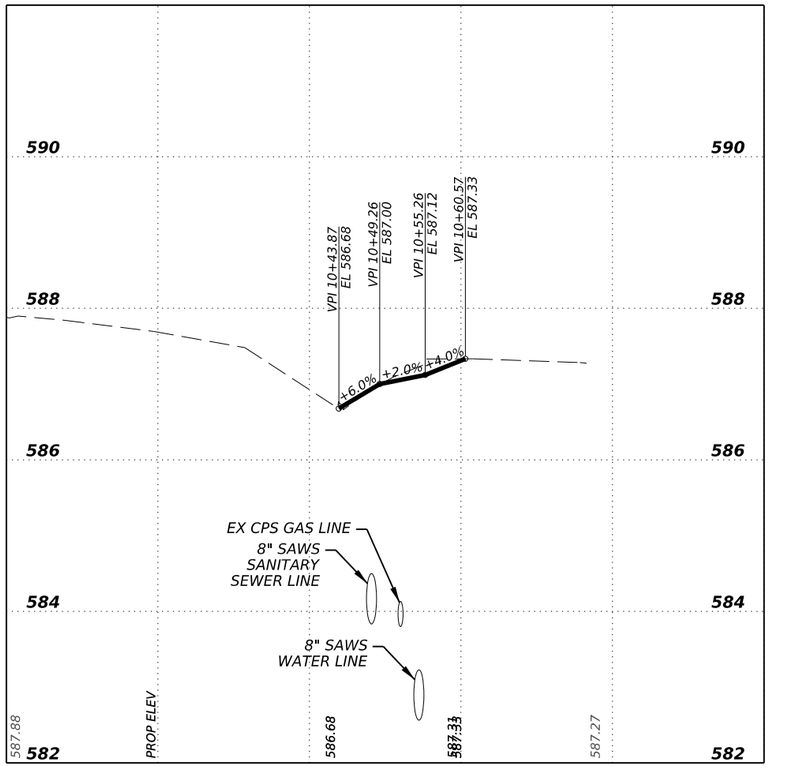
DATE: 11/21/2023 3:34:11 PM
FILE: c:\pw\kh1\d0251184\US281_DRIVEWAY_PP2.dgn



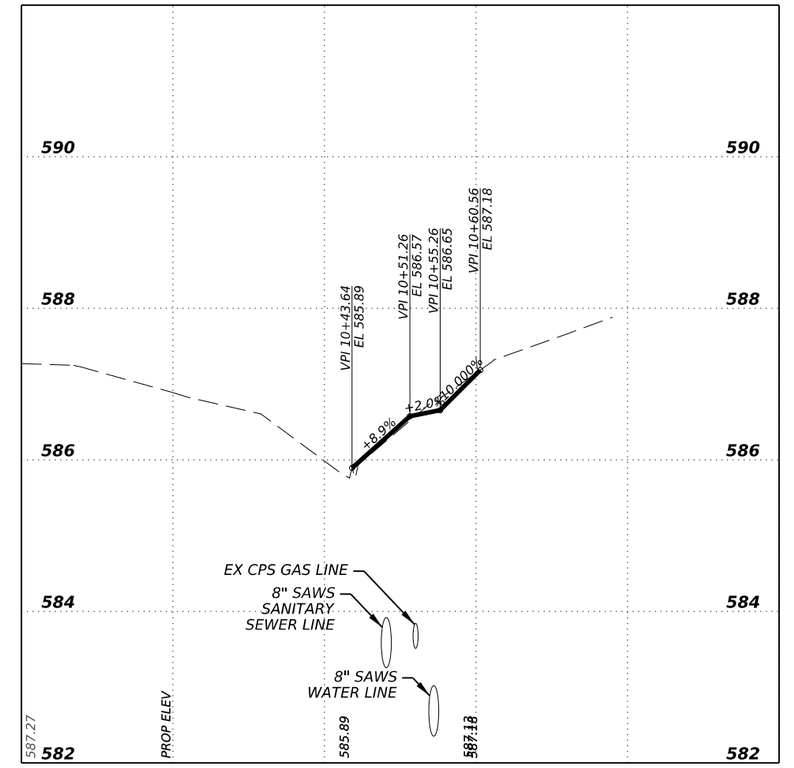
DRIVEWAY 27



DRIVEWAY 28



DRIVEWAY 27



DRIVEWAY 28

LEGEND

- BACK OF CURB
- EXISTING ROW
- PROPOSED TCE
- CONCRETE SIDEWALK
- BASE REPAIR
- CONCRETE MEDIAN
- CONCRETE DRIVEWAY

NOTES:

1. CONTRACTOR SHALL VERIFY EXISTING FIELD CONDITIONS FOR ALL TIE IN ELEVATIONS AND ADJUST AS NEEDED.
2. SEE HORIZONTAL DATA SHEET FOR DRIVEWAY ALIGNMENT INFORMATION.

HORIZ. 0' 10' 20'
VERT. 0' 1' 2'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

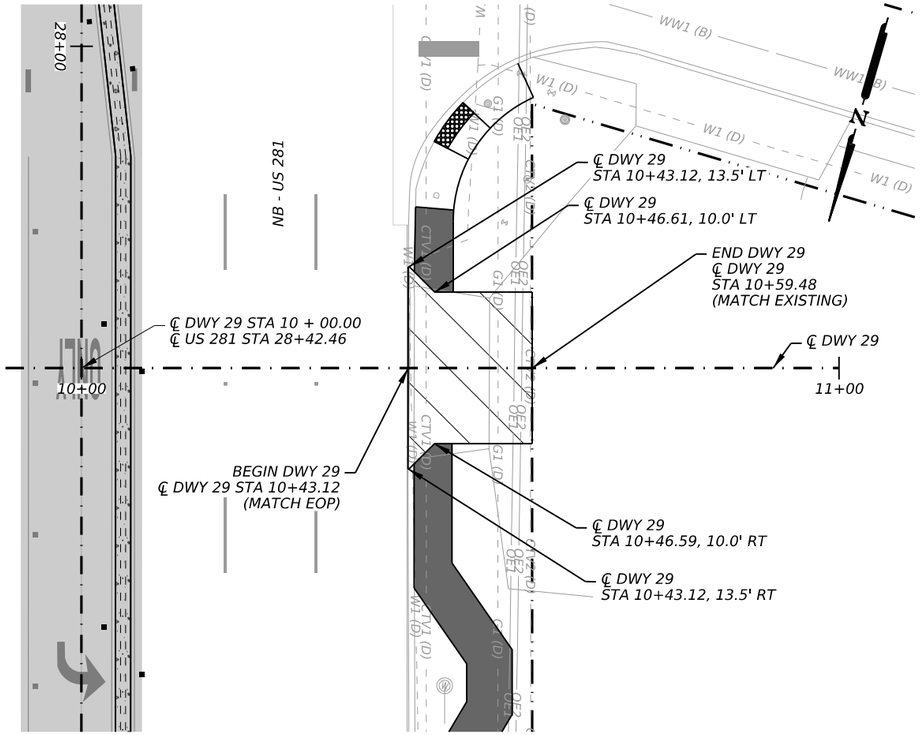
US 281

DRIVEWAY PLAN & PROFILE

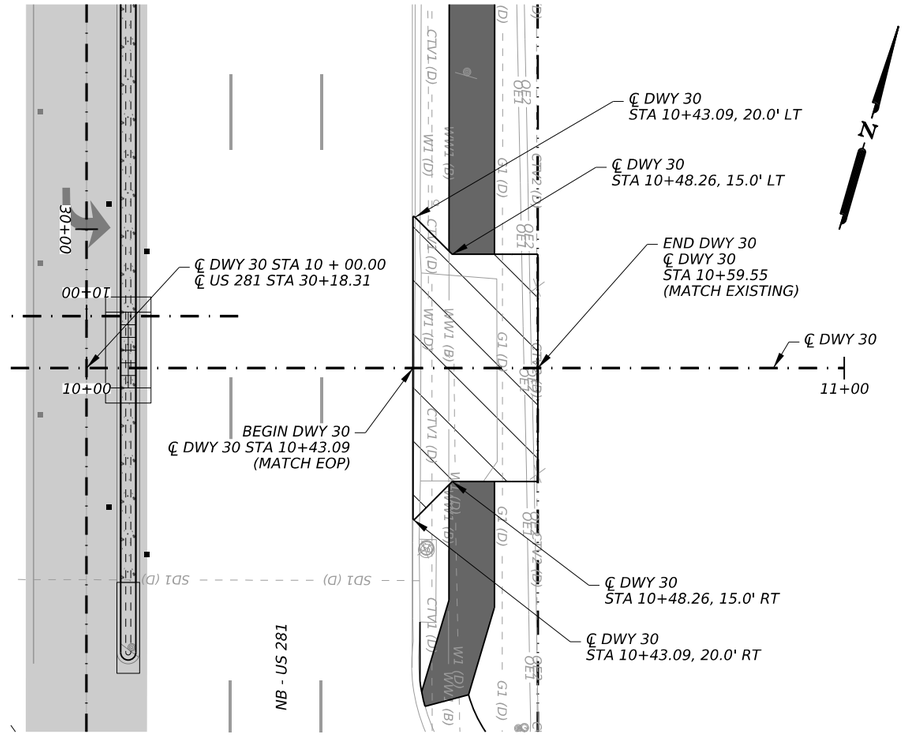
SHEET 14 OF 19

FED.RD. DIV NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		96

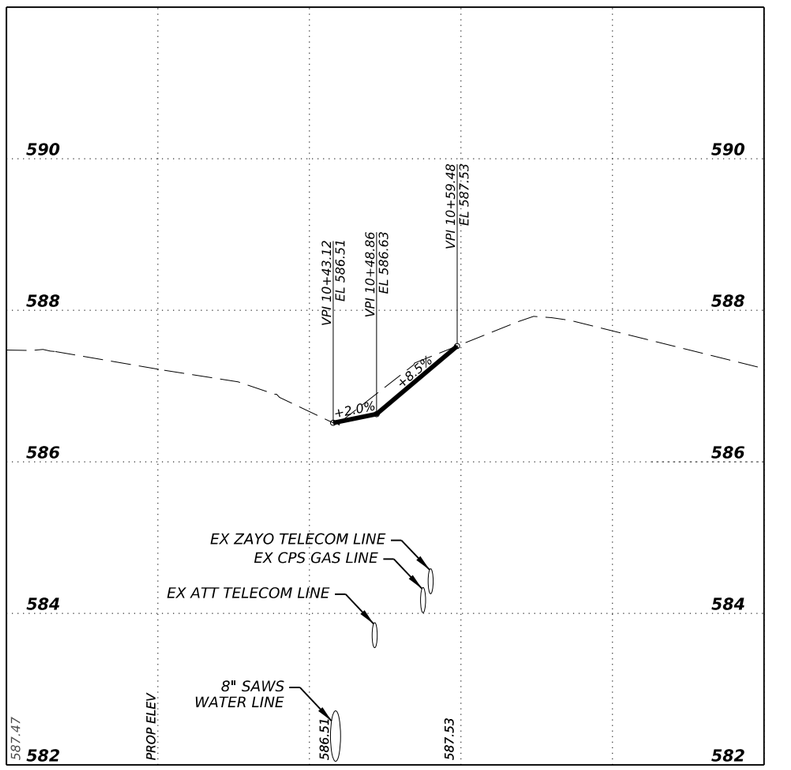
DATE: 11/21/2023 3:34:12 PM
FILE: c:\pw\kh1\d0251184\US281_DRIVEWAY_PP2.dgn

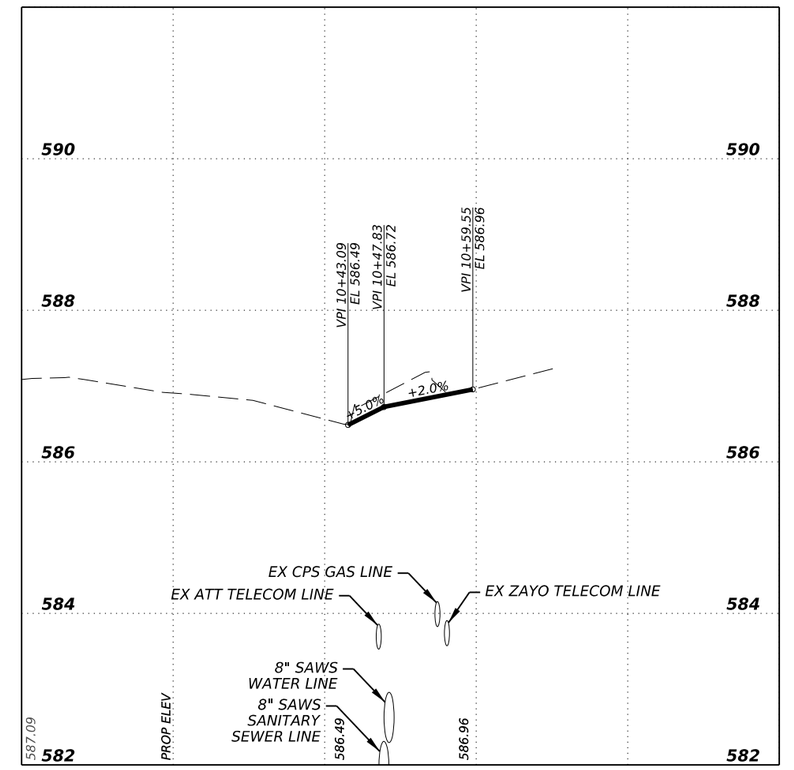


DRIVEWAY 29



DRIVEWAY 30





LEGEND

- BACK OF CURB
- EXISTING ROW
- PROPOSED TCE
- CONCRETE SIDEWALK
- BASE REPAIR
- CONCRETE MEDIAN
- CONCRETE DRIVEWAY

NOTES:

1. CONTRACTOR SHALL VERIFY EXISTING FIELD CONDITIONS FOR ALL TIE IN ELEVATIONS AND ADJUST AS NEEDED.
2. SEE HORIZONTAL DATA SHEET FOR DRIVEWAY ALIGNMENT INFORMATION.

HORIZ. 0' 10' 20'
VERT. 0' 1' 2'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

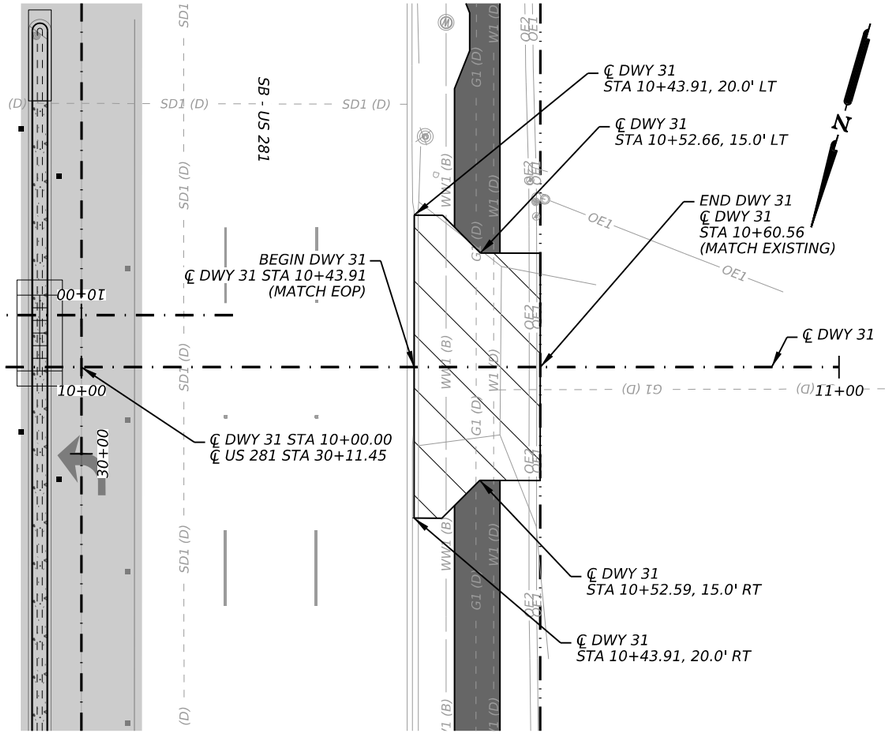
US 281

DRIVEWAY PLAN & PROFILE

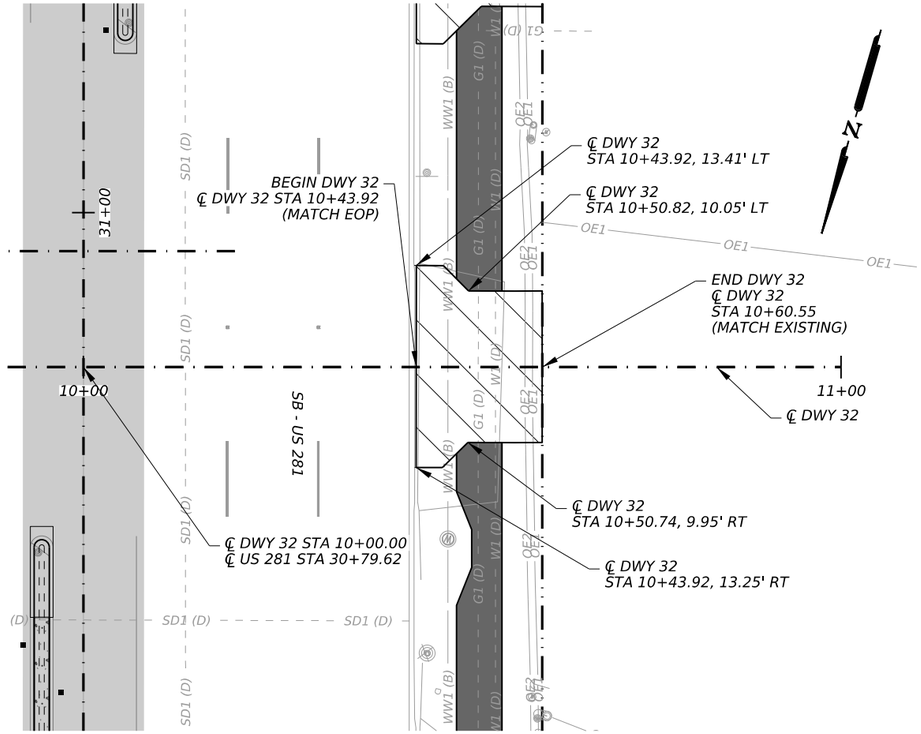
SHEET 15 OF 19

FED.RD. DIV NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		97

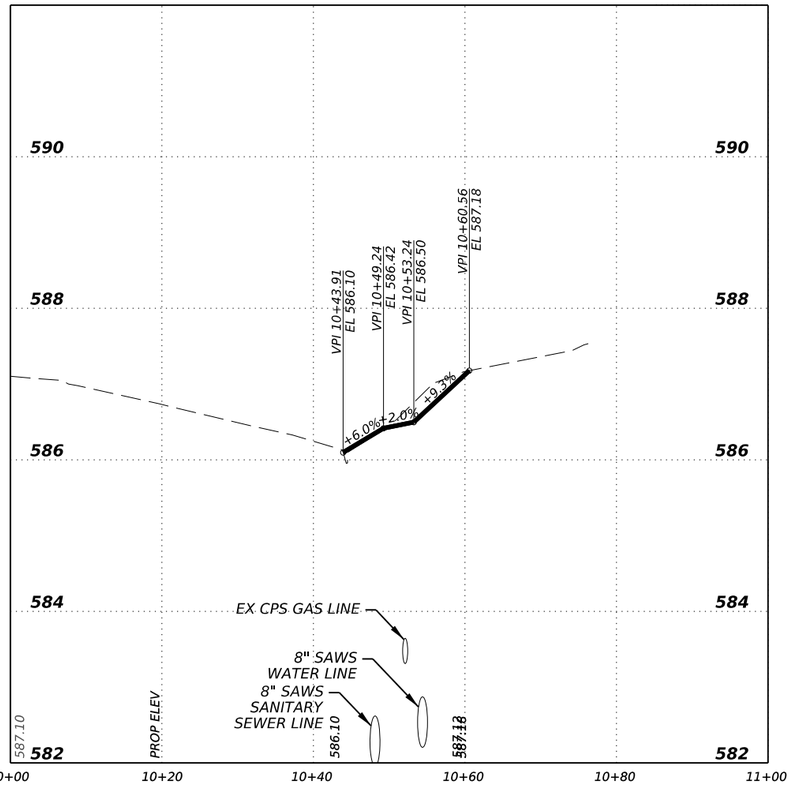
DATE: 11/21/2023 3:34:13 PM
FILE: c:\pw\kh1\d0251184\US281_DRIVEWAY_PP2.dgn



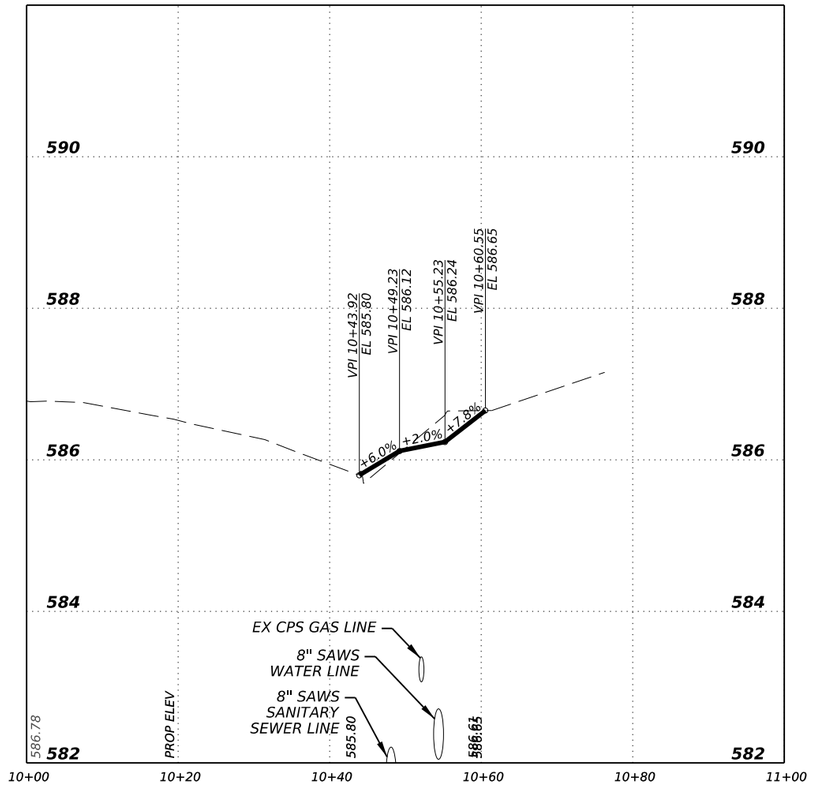
DRIVEWAY 31



DRIVEWAY 32



DRIVEWAY 31



DRIVEWAY 32

LEGEND

- BACK OF CURB
- EXISTING ROW
- PROPOSED TCE
- CONCRETE SIDEWALK
- BASE REPAIR
- CONCRETE MEDIAN
- CONCRETE DRIVEWAY

NOTES:

1. CONTRACTOR SHALL VERIFY EXISTING FIELD CONDITIONS FOR ALL TIE IN ELEVATIONS AND ADJUST AS NEEDED.
2. SEE HORIZONTAL DATA SHEET FOR DRIVEWAY ALIGNMENT INFORMATION.

HORIZ. 0' 10' 20'
VERT. 0' 1' 2'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

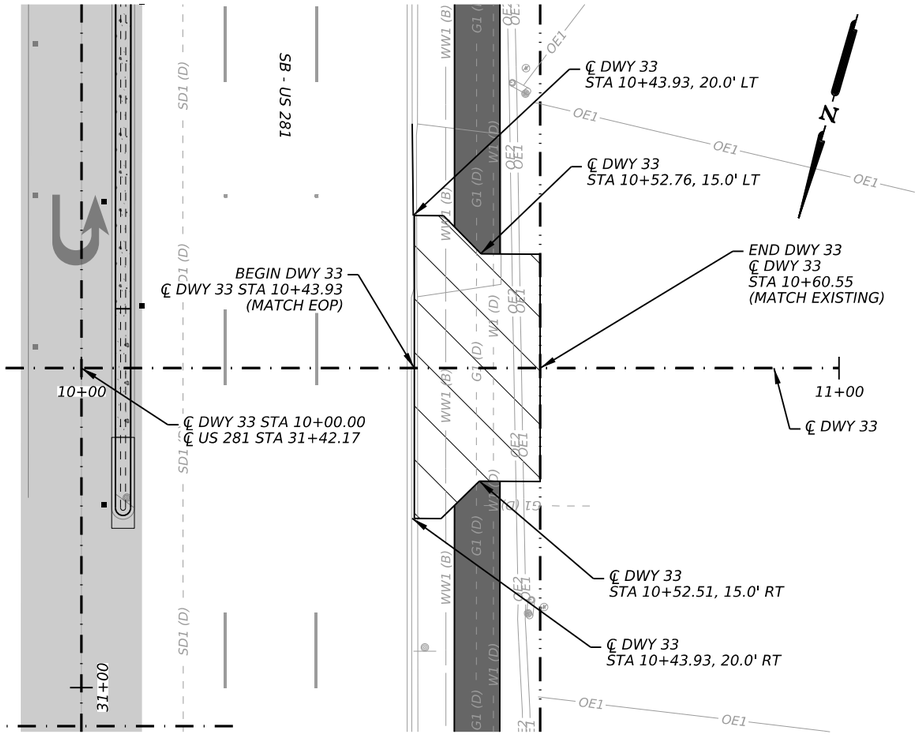
US 281

DRIVEWAY PLAN & PROFILE

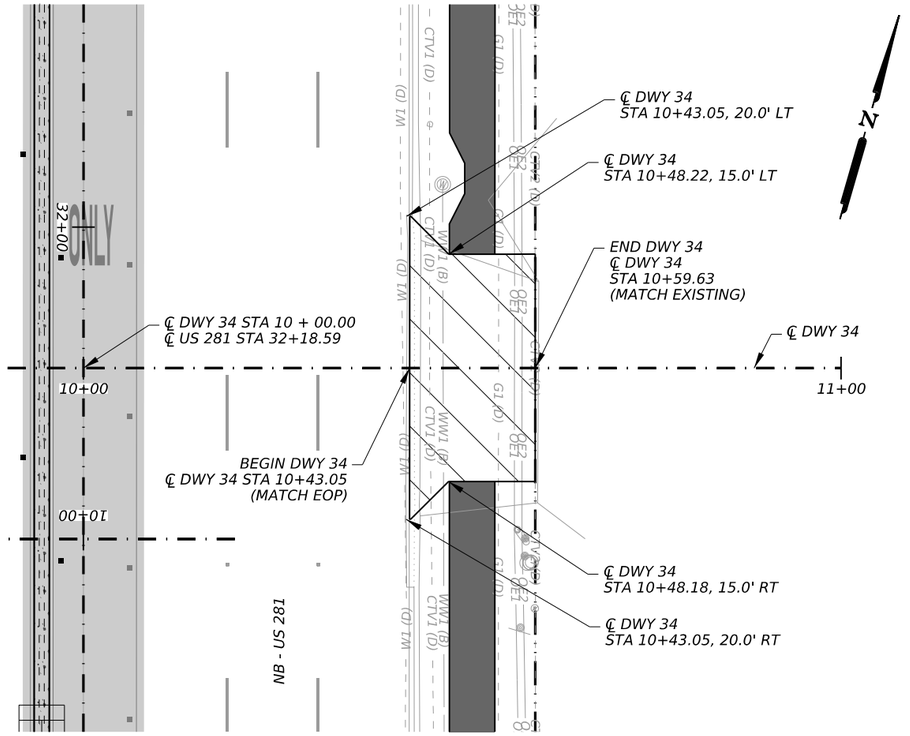
SHEET 16 OF 19

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		98

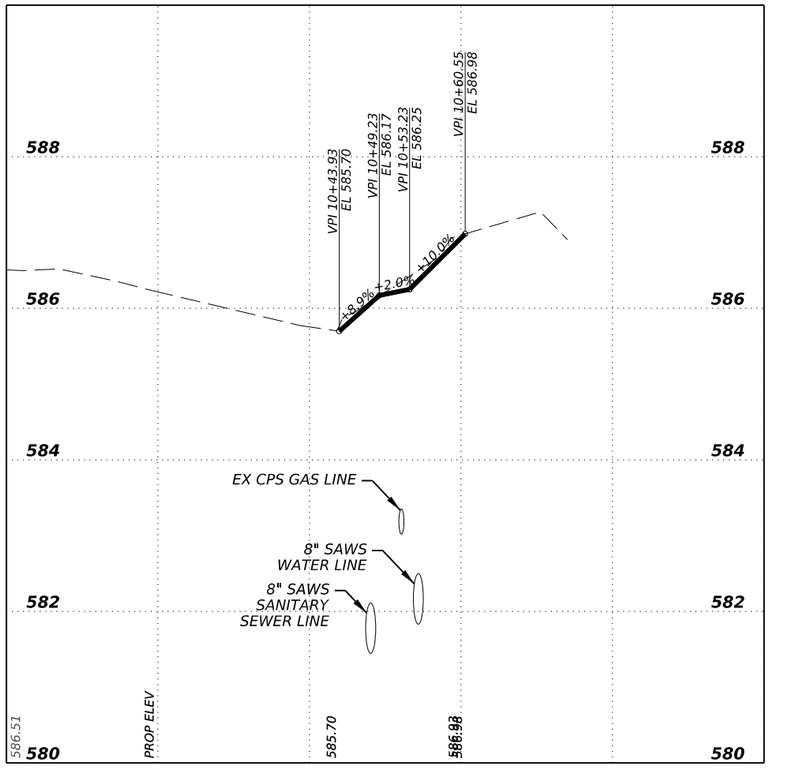
DATE: 11/21/2023 3:34:13 PM
FILE: c:\pw\kh1\d0251184\US281_DRIVEWAY_PP2.dgn

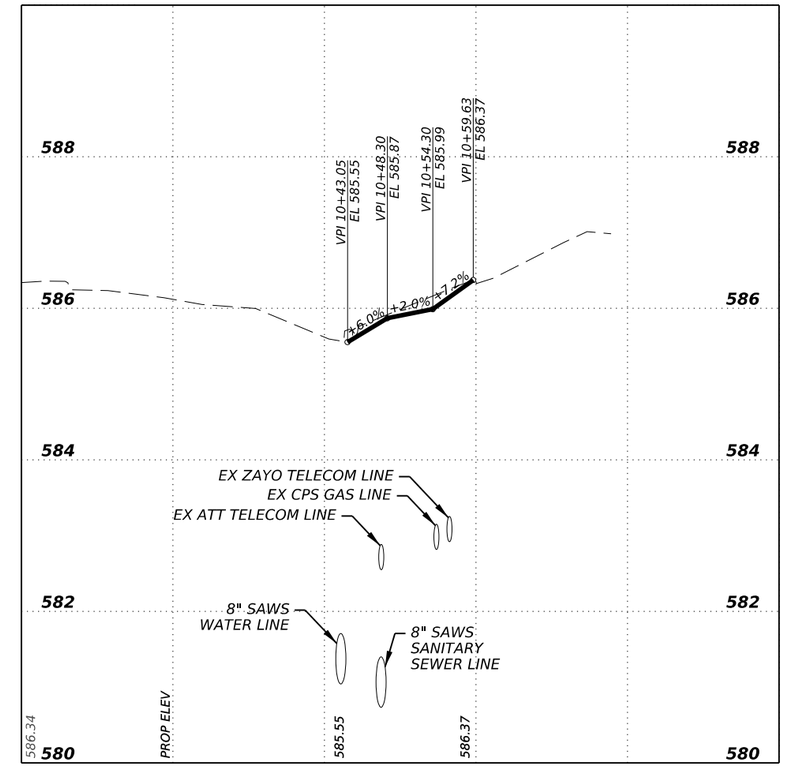


DRIVEWAY 33



DRIVEWAY 34





LEGEND

- BACK OF CURB
- EXISTING ROW
- PROPOSED TCE
- CONCRETE SIDEWALK
- BASE REPAIR
- CONCRETE MEDIAN
- CONCRETE DRIVEWAY

NOTES:

1. CONTRACTOR SHALL VERIFY EXISTING FIELD CONDITIONS FOR ALL TIE IN ELEVATIONS AND ADJUST AS NEEDED.

2. SEE HORIZONTAL DATA SHEET FOR DRIVEWAY ALIGNMENT INFORMATION.

HORIZ. 0' 10' 20'
VERT. 0' 1' 2'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

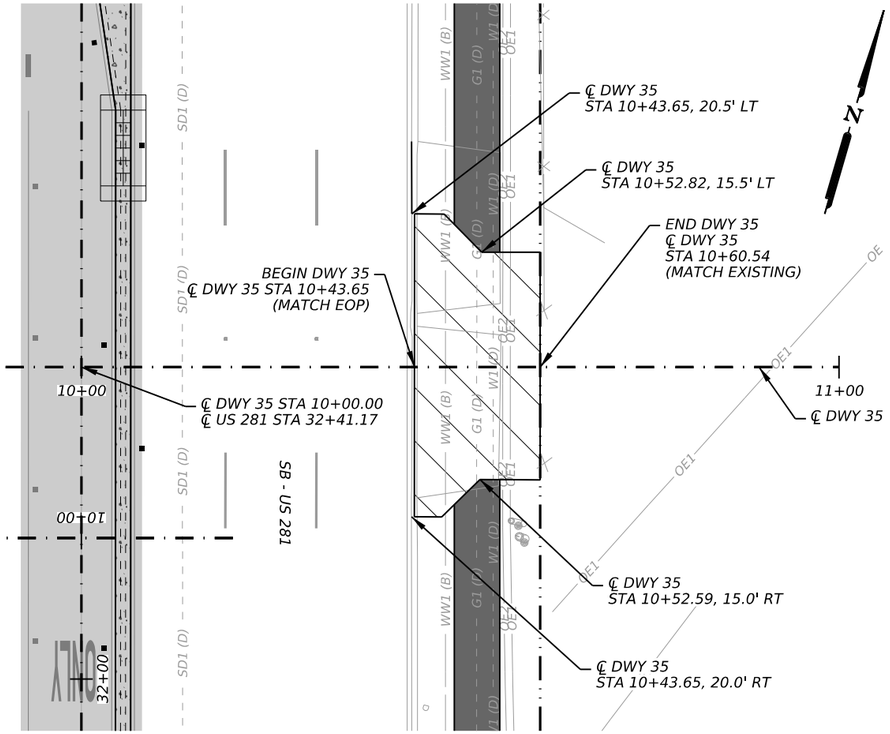
US 281

DRIVEWAY PLAN & PROFILE

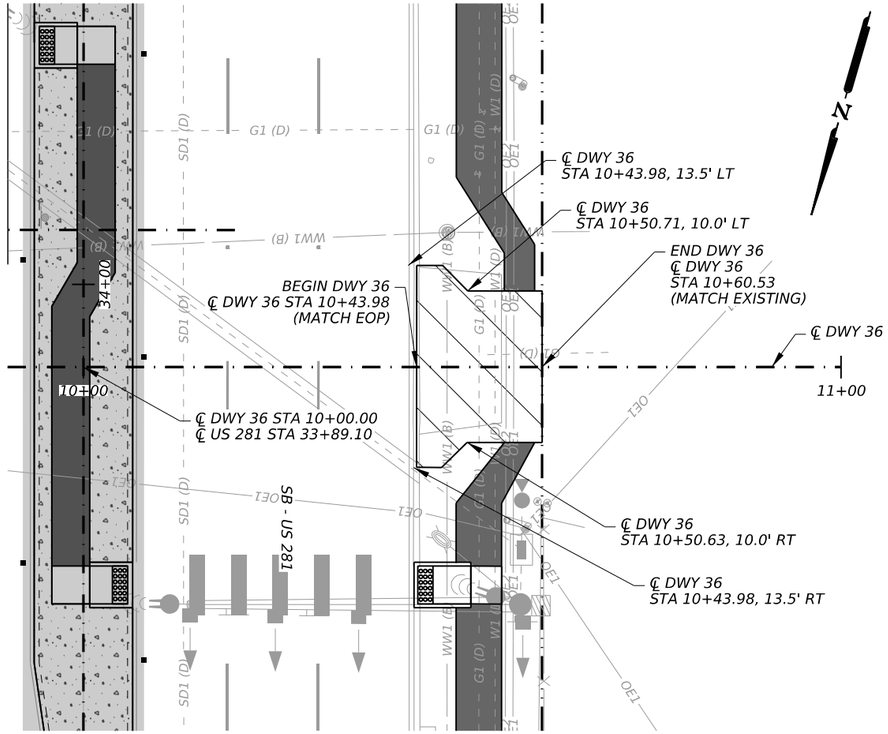
SHEET 17 OF 19

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		99

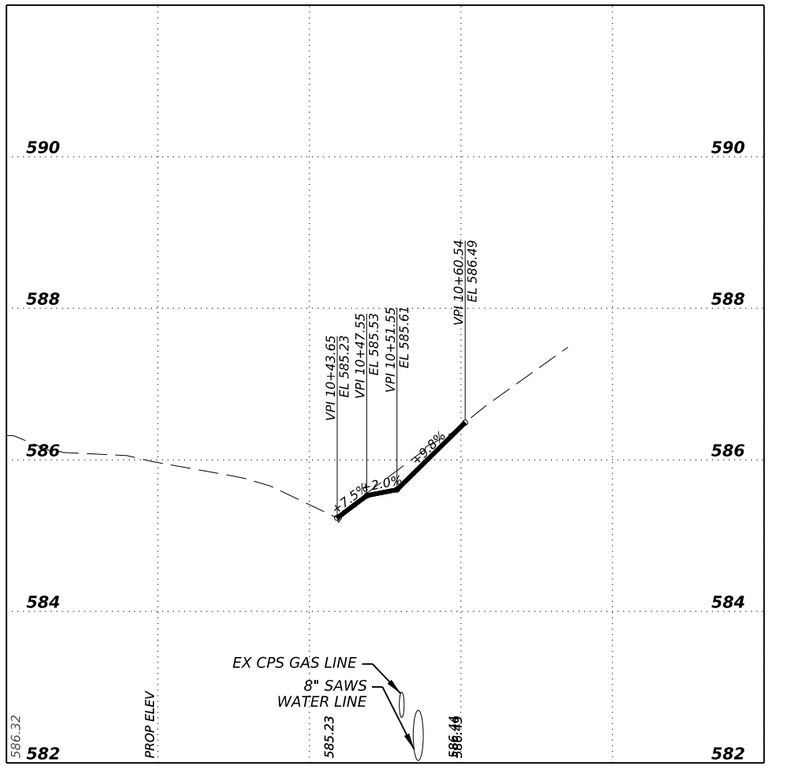
DATE: 11/21/2023 3:34:14 PM
FILE: c:\pw\kh1\d0251184\US281_DRIVEWAY_PP2.dgn



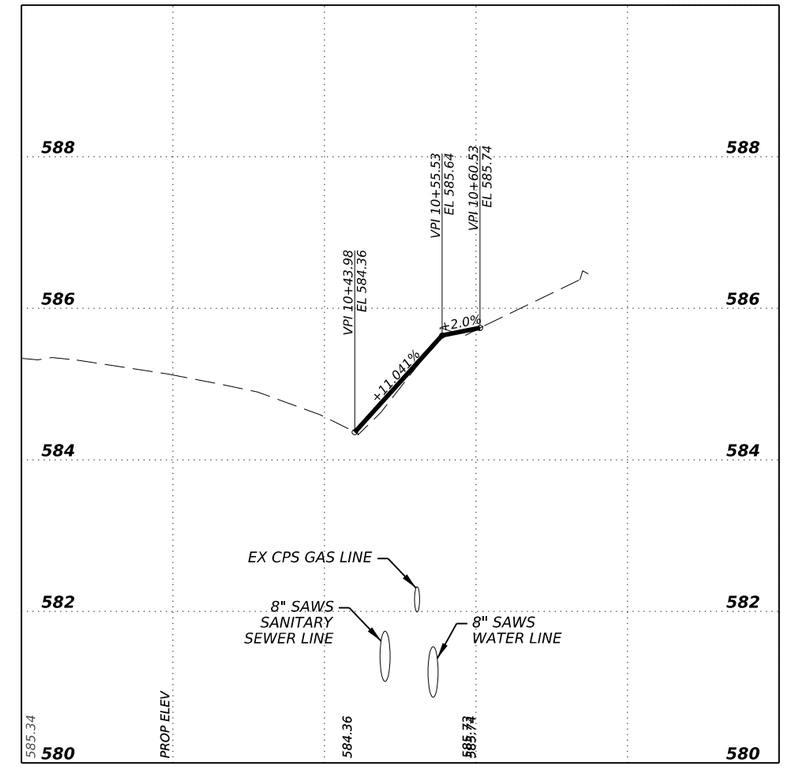
DRIVEWAY 35



DRIVEWAY 36



DRIVEWAY 35



DRIVEWAY 36

LEGEND

- BACK OF CURB
- EXISTING ROW
- PROPOSED TCE
- CONCRETE SIDEWALK
- BASE REPAIR
- CONCRETE MEDIAN
- CONCRETE DRIVEWAY

NOTES:

1. CONTRACTOR SHALL VERIFY EXISTING FIELD CONDITIONS FOR ALL TIE IN ELEVATIONS AND ADJUST AS NEEDED.
2. SEE HORIZONTAL DATA SHEET FOR DRIVEWAY ALIGNMENT INFORMATION.

HORIZ. 0' 10' 20'
VERT. 0' 1' 2'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

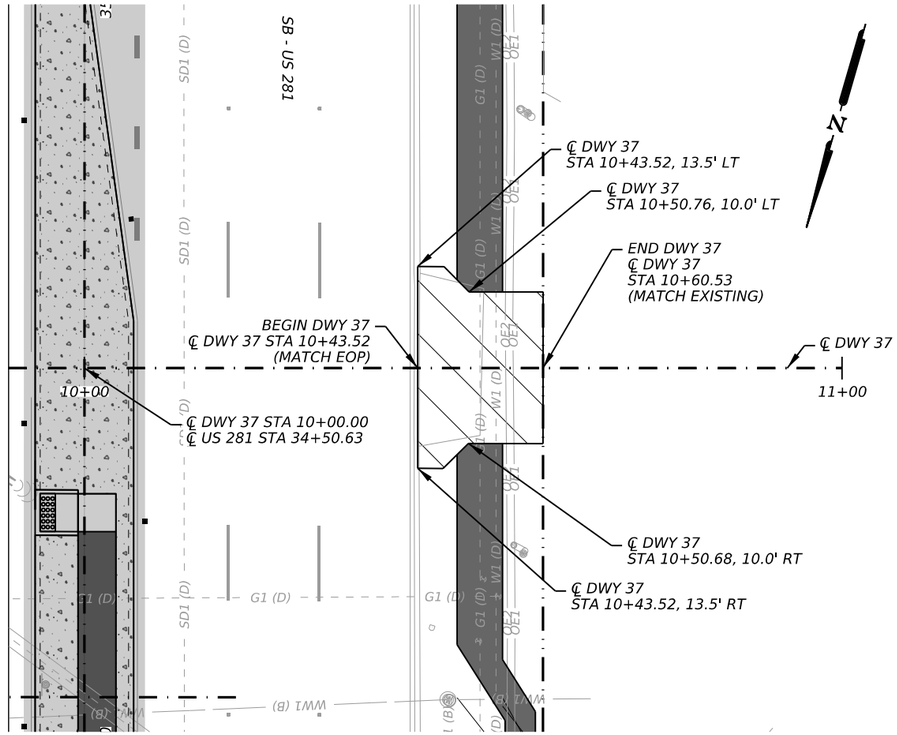
US 281

DRIVEWAY PLAN & PROFILE

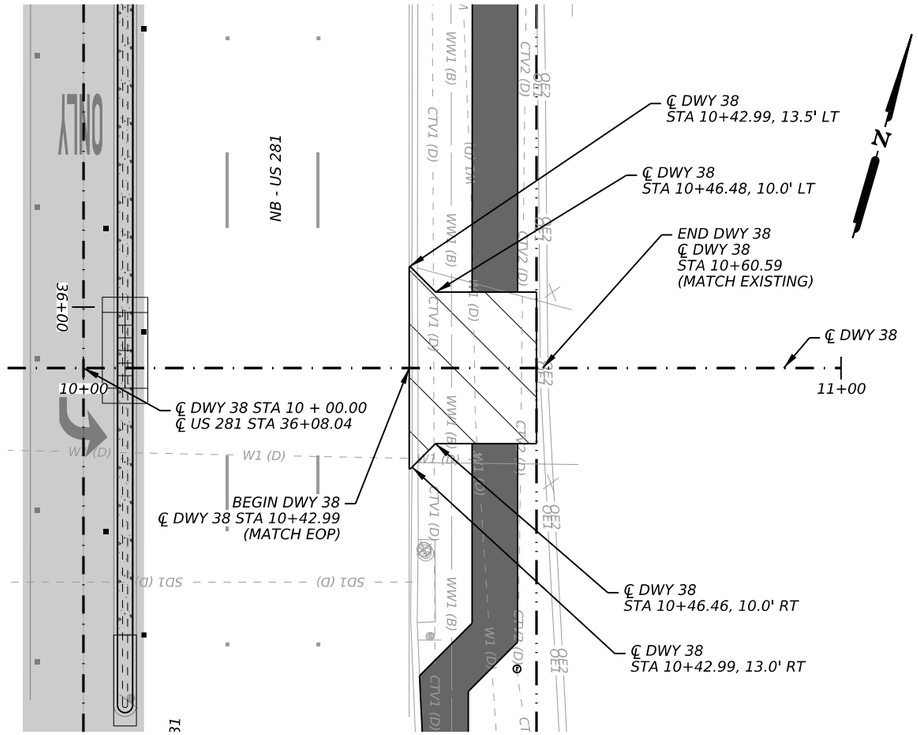
SHEET 18 OF 19

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		100

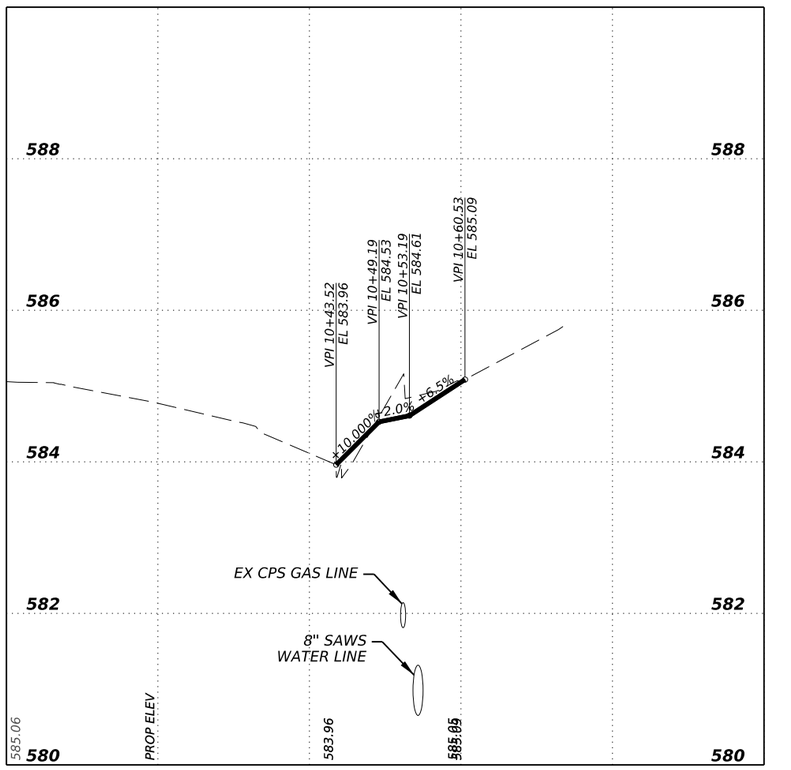
DATE: 11/21/2023 3:34:15 PM
FILE: c:\pw\kh1\d0251184\US281_DRIVEWAY_PP2.dgn



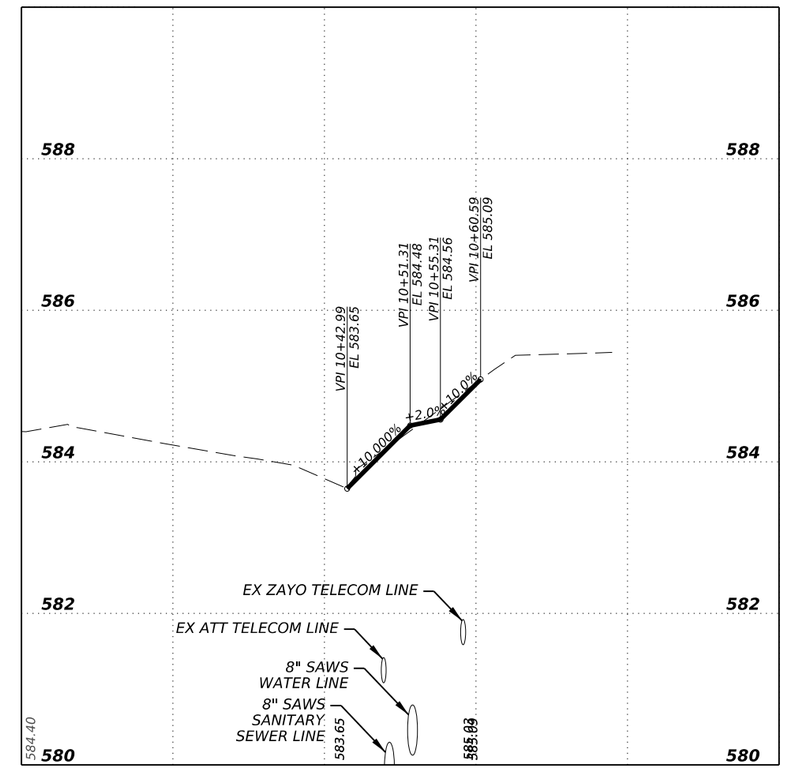
DRIVEWAY 37



DRIVEWAY 38



DRIVEWAY 37



DRIVEWAY 38

LEGEND

- BACK OF CURB
- EXISTING ROW
- PROPOSED TCE
- CONCRETE SIDEWALK
- BASE REPAIR
- CONCRETE MEDIAN
- CONCRETE DRIVEWAY

NOTES:

1. CONTRACTOR SHALL VERIFY EXISTING FIELD CONDITIONS FOR ALL TIE IN ELEVATIONS AND ADJUST AS NEEDED.
2. SEE HORIZONTAL DATA SHEET FOR DRIVEWAY ALIGNMENT INFORMATION.

HORIZ. 0' 10' 20'
VERT. 0' 1' 2'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

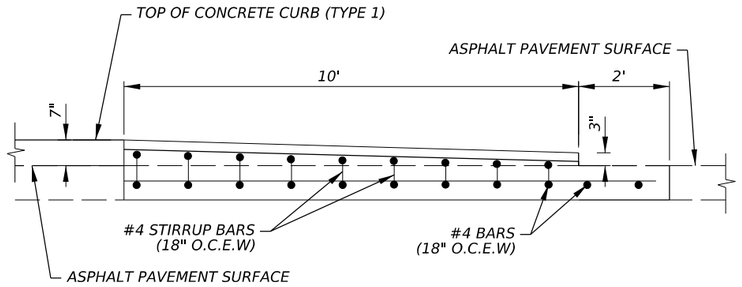
US 281

DRIVEWAY PLAN & PROFILE

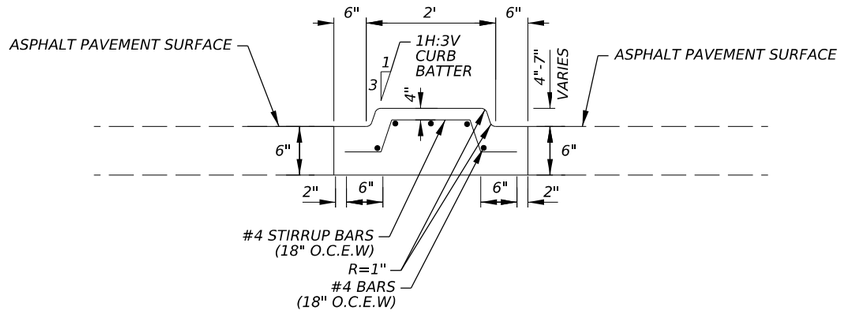
SHEET 19 OF 19

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		101

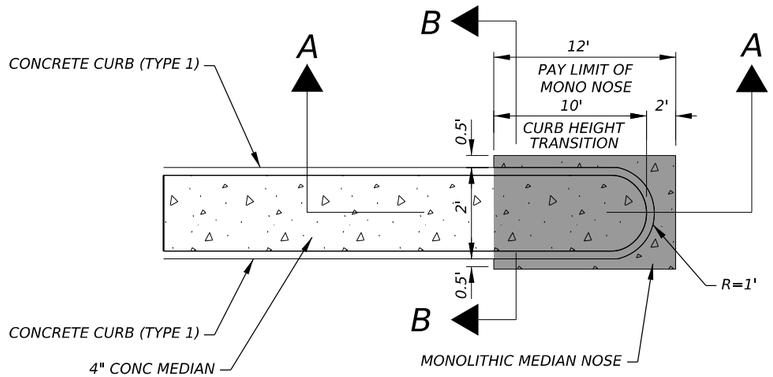
DATE: 11/21/2023 3:34:15 PM
FILE: c:\pw\kh1\d0251184\US281_DRIVEWAY_PP2.dgn



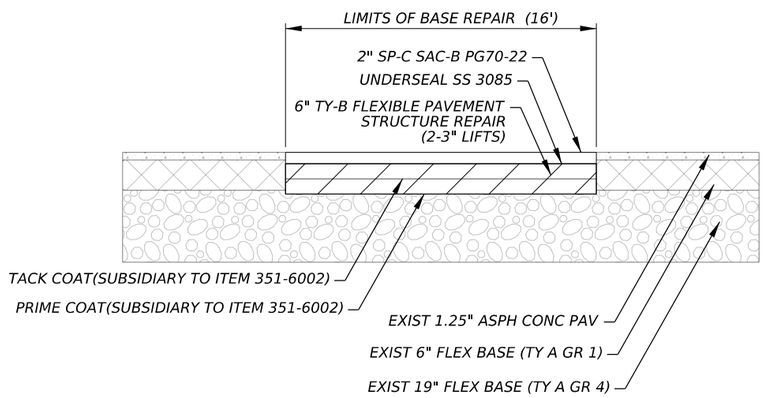
SECTION A-A



SECTION B-B



MONOLITHIC MEDIAN NOSE



FLEXIBLE PAVEMENT REPAIR

12/21/2023

Kimley»Horn F-928

© 2023

Texas Department of Transportation

US 281

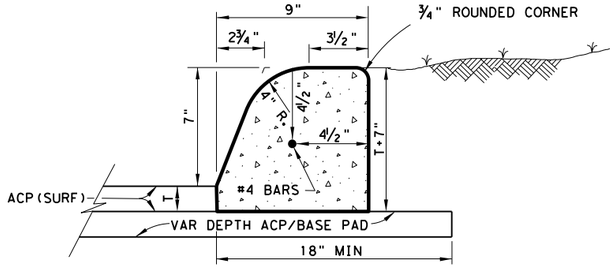
MEDIAN NOSE AND FLEXIBLE PAVEMENT REPAIR DETAILS

SHEET 1 OF 1

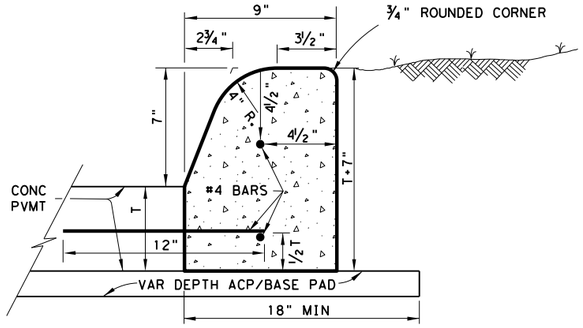
FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	US 281

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAT	BEXAR	102
CONT.	SECT.	JOB	
0073	02	082	

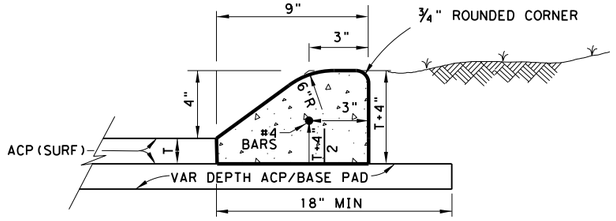
FILENAME: c:\pw\kh1\d0277925\MEDIAN DETAIL.dgn
PLOTTED: 12/21/2023 11:20:25 AM



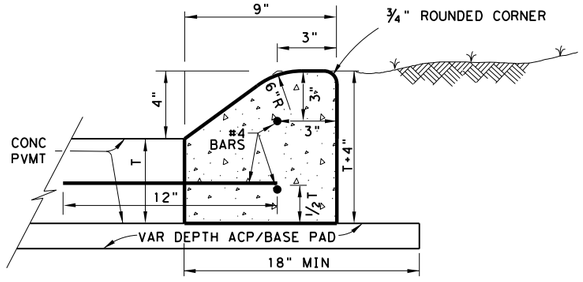
CONCRETE CURB (TYPE 1)
W/ ACP



CONCRETE CURB (TYPE 1)
W/ CONC PAVEMENT



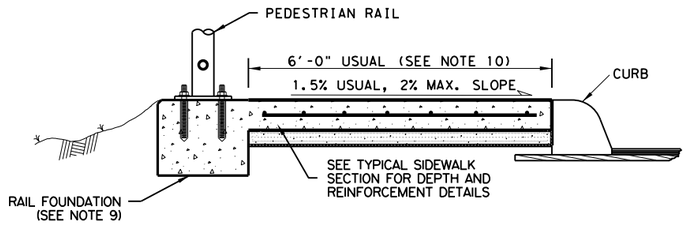
CONCRETE CURB (TYPE 2)
W/ ACP



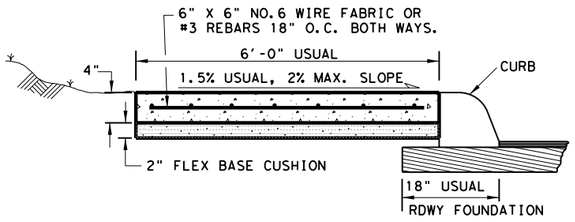
CONCRETE CURB (TYPE 2)
W/ CONC PAVEMENT

GENERAL NOTES:

1. CONCRETE CURB TYPE 1 AND 2 SHOWN SHALL MEET THE MINIMUM SPECIFICATION REQUIREMENTS OF CLASS "A" CONCRETE PER ITEM 529 AND 421.
2. ALL REINFORCING STEEL SHALL BE GRADE 60
3. WHERE CONCRETE CURB IS PLACED ON EXISTING CONCRETE PAVEMENT, THE PAVEMENT SHALL BE DRILLED AND THE REINFORCING BARS GROUTED IN PLACE.
4. EXPANSION AND CONTRACTION JOINTS SHALL BE CONSTRUCTED TO MATCH PAVEMENT JOINTS IN ALL CURBS AND CURB AND GUTTER ADJACENT TO JOINTED CONCRETE PAVEMENT. WHERE PLACEMENT OF CURB OR CURB AND GUTTER IS NOT ADJACENT TO CONCRETE PAVEMENT, EXPANSION JOINTS SHALL BE PROVIDED AT STRUCTURES, CURB RETURNS AT STREETS, AND AT LOCATIONS DIRECTED BY THE ENGINEER.
5. VERTICAL AND HORIZONTAL DOWEL BARS AND TRANSVERSE REINFORCING BARS SHALL BE PLACED AT 4 FEET C-C, UNLESS OTHERWISE SHOWN.
6. ONE-HALF INCH EXPANSION JOINT MATERIAL SHALL BE PROVIDED WHERE CURB OR CURB AND GUTTER IS ADJACENT TO SIDEWALK OR RIPRAP. THIS IS SUBSIDIARY TO THE CURB, ITEM 529.
7. LAYDOWN CURB AT DRIVEWAYS WILL BE PAID AS SUBSIDIARY TO ITEM 530.
8. FOR SIDEWALK DETAILS AT DRIVEWAYS, SEE SAN ANTONIO DISTRICT STANDARD "DRIVEWAY DETAILS".
9. SEE PEDESTRIAN HANDRAIL DETAILS STANDARD "PRD" FOR MORE INFORMATION. CONCRETE RAIL FOUNDATION TO BE POURED WITH THE SIDEWALK BUT PAYMENT IS SUBSIDIARY TO ITEM 450 "RAILING".
10. CLEAR SIDEWALK WIDTH EXCLUDING THE PEDESTRIAN RAIL FOUNDATION SHALL BE 6' UNLESS OTHERWISE SPECIFIED IN THE PLANS

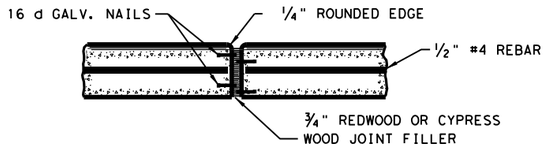


TYPICAL SIDEWALK SECTION WITH PEDESTRIAN RAIL



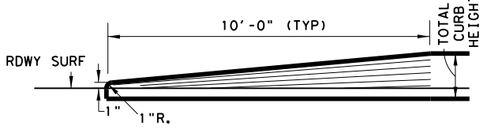
TYPICAL SIDEWALK SECTION

GROOVED JOINTS IN THE SIDE WALK SHALL BE AT A MAX. SPACING OF 10 FT. AND SHALL HAVE 3/4" EXPANSION JOINTS AT A MAX. SPACING OF 60' AND TO COINSIDE WITH THE CURB EXP. JOINTS.



TYPICAL CURB EXPANSION JOINT DETAIL

EXPANSION JOINTS TO BE PLACED AT BEGINNING AND END OF CURVES, DRIVEWAYS WHEELCHAIR RAMPS, INLETS, ILLUMINATION/ SIGNAL FOUNDATIONS AND OTHER FIXED OBJECTS.



TRANSITION FOR CONCRETE CURB ENDS

SEE CURB DETAIL FOR REINFORCEMENT

© 2020

Texas Department of Transportation
San Antonio District

MISCELLANEOUS CURB AND SIDEWALK DETAILS

San Antonio District Standard
Sheet (1 of 2)

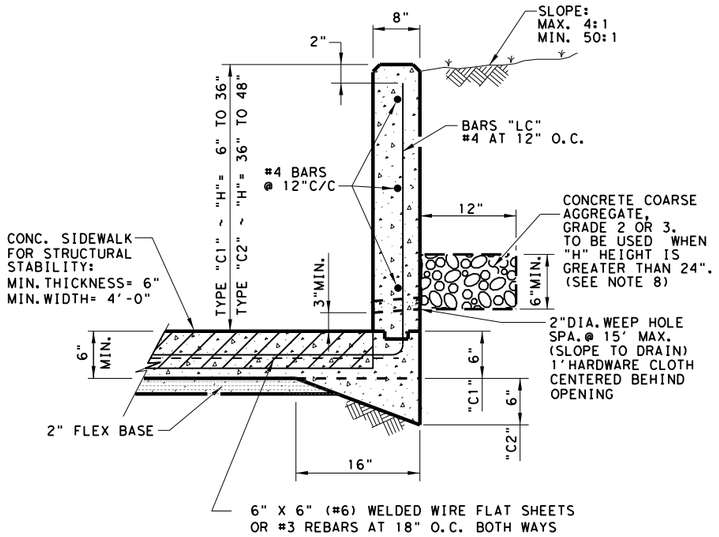
T:\Engdata\Standards\MiscCurbdetails.dgn
ORIGINAL DRAWING DATE:
REVISIONS
09-01-08
10-10-17 sidewalk width equals 6' usual
07-22-20 9" curb + curb w/ conc pvmt det.

PREPARED BY AND FOR USE OF TxDoT.

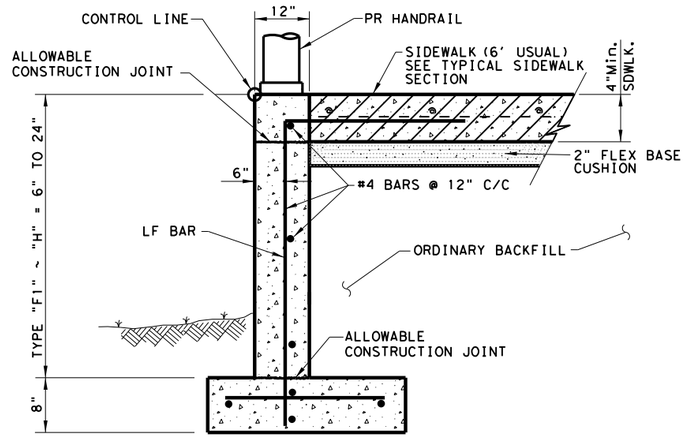
STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT #	SHEET
SAT	6		103

COUNTY	CONTROL	SECTION	JOB	HIGHWAY
BEXAR		02	082	US 281

11/21/2023 3:35:54 PM
c:\pw\kh1\d0277925\miscurbdetails.dgn



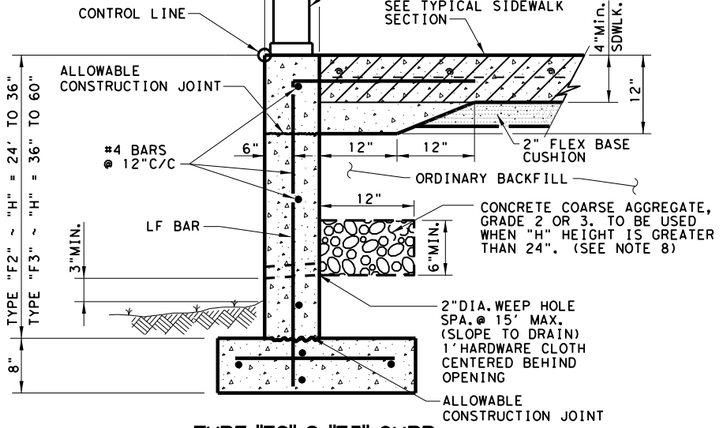
TYPE "C1" & "C2" CURB



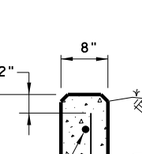
TYPE "F1" CURB

GENERAL NOTES:

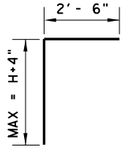
1. CONCRETE FOR CURB TYPE F AND C SHOWN SHALL MEET THE MINIMUM SPECIFICATION REQUIREMENTS OF CLASS "C" CONCRETE PER ITEM 421
2. ALL REINFORCING STEEL SHALL BE GRADE 60
3. EXPANSION AND CONTRACTION JOINTS SHALL BE CONSTRUCTED TO MATCH PAVEMENT JOINITS IN ALL CURBS AND CURB AND GUTTER ADJACENT TO JOINTED CONCRETE PAVEMENT. WHERE PLACEMENT OF CURB OR CURB AND GUTTER IS NOT ADJACENT TO CONCRETE PAVEMENT, EXPANSION JOINTS SHALL BE PROVIDED AT STRUCTURES, CURB RETURNS AT STREETS, AND AT LOCATIONS DIRECTED BY THE ENGINEER.
4. VERTICAL AND HORIZONTAL DOWEL BARS AND TRANSVERSE REINFORCING BARS SHALL BE PLACED AT 4 FEET C-C, UNLESS OTHERWISE SHOWN.
5. UNTIL THE SIDEWALK IS COMPLETE, LATERAL SUPPORT FOR THE "F" CURBS WILL BE REQUIRED.
6. IF AGGREGATE IS REQUIRED PER THE DETAIL, IT IS PAID AS SUBSIDIARY TO THE CURB, ITEM 529.



TYPE "F2" & "F3" CURB

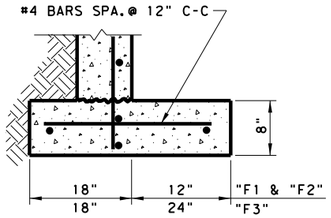


BAR "LC"



BAR "LF"

DESIGN SOIL PARAMETERS:
Soil Unit Wt.= 120 pcf
Phi = 30 Degrees
Cohesion = 50 psf
Min. PI = 15
Max. PI = 30
SURCHARGE:
TYPE F CURB q = 2' Adjacent to sidewalk
Max. slope behind TYPE C Curb = 4:1
Min. Factor of Safety against sliding is 1.5.
Designed in accordance with current AASHTO Standards and Interim Specifications.



FOOTING DETAIL

CLASS C CONCRETE PAID UNDER ITEM 531, SIDEWALK. (NOTE. ADDITIONAL CONCRETE TO MEET THE THICKENED SECTIONS REQUIRED BY THESE DETAILS IS SUBSIDIARY TO ITEM 531, CURB.)

© 2020

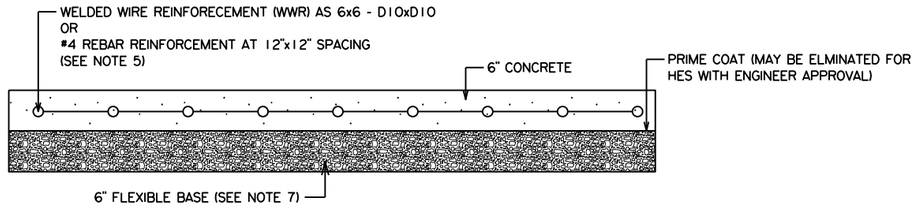
Texas Department of Transportation
San Antonio District

MISCELLANEOUS CURB AND SIDEWALK DETAILS

San Antonio District Standard
Sheet (2 of 2)

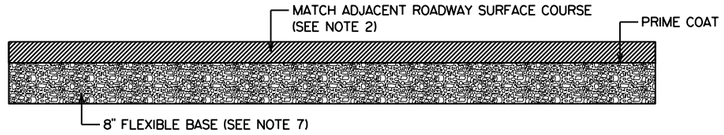
T:Engdata/Standards/MiscCurbdetails.dgn	PREPARED BY AND FOR USE OF TxDoT.				
ORIGINAL DRAWING DATE:	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT #		SHEET
REVISIONS	SAT	6			104
09-01-08	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
10-10-17 sidewalk width equals 6' usual	BEXAR			02	082	US 281
07-22-20 9" curb + curb w/ conc pvmt det.						
- -						

11/21/2023 3:35:54 PM
c:\pw\khl\d0277925\miscurbdetails.dgn



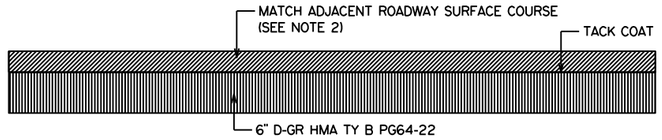
TYPICAL CONCRETE DRIVEWAY

• NOTE: STEEL SHALL BE CENTERED VERTICALLY IN CONCRETE.
PAID AS 'DRIVEWAYS CONC (HES)' OR 'DRIVEWAYS (CONC)'



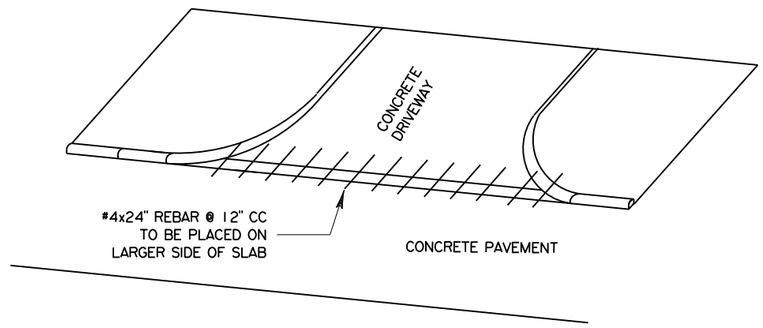
TYPICAL ROADWAY DRIVEWAY (TYPE 1)

PAID AS DRIVEWAYS ACP (TYPE 1)

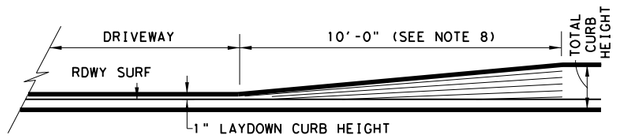


TYPICAL ROADWAY DRIVEWAY (TYPE 2)

PAID AS DRIVEWAYS ACP (TYPE 2)



TIE BAR PLACEMENT WITH CRCP



LAYDOWN CURB AT DRIVEWAYS DETAIL

NOTES:

1. USE CLASS A CONCRETE UNLESS OTHERWISE NOTED.
2. DENSE GRADED HMA MAY BE USED WHEN APPROVED BY THE ENGINEER IF THE ROADWAY SURFACE COURSE IS A PERFORMANCE MIX.
3. REFER TO PLAN SHEETS FOR GEOMETRIC DESIGN DETAILS.
4. FOR CONCRETE DRIVEWAYS, PROVIDE EXPANSION JOINT 20 FT C-C FOR WIDTH OR LENGTH OVER 25 FT.
5. FIBER REINFORCEMNT IS NOT ALLOWED.
6. MACHINE LAID HMA IS REQUIRED UNLESS OTHERWISE APPROVED BY THE ENGINEER.
7. FURNISH BASE MEETING THE REQUIREMENTS FOR ANY TYPE OF GRADE IN ACCORDANCE WITH ITEM 247. FLEXIBLE BASE COMPRESSIVE STRENGTHS ARE WAIVED. BASE IS SUBSIDIARY TO THE ITEM.
8. WHERE SIDEWALK IS PRESENT, SLOPE AND LENGTH OF CURB TRANSITION SHOULD MATCH THE SIDEWALK AND MEET ADA REQUIREMENTS.
9. IF ROOTS ARE ENCOUNTERED VERIFY WITH THE ENGINEER PRIOR TO ACCOMODATING OR REMOVING 2 IN. DIAMETER OR LARGER ROOTS. ROOT REMOVAL MUST BE IN ACCORDANCE WITH ITEM 752.4.2. ROOTS MAY REMAIN IN THE BASE. FOR IMPROVEMENTS WITHIN 6 IN. OF A ROOT, THE CONCRETE THICKNESS MAY BE REDUCED BY 1 IN. AND THE BASE INCREASED BY 1 IN. TO MINIMIZE THE IMPACT TO THE ROOTS. ADJUST BASE AND SURFACE PROFILE TO PROVIDE A 1 IN. BASE CUSHION AROUND THE ROOTS. THE SURFACE PROFILE MAY BE ADJUSTED TO THE EXTENT ALLOWED BY ADA. THIS WORK IS SUBSIDIARY.

© 2020

Texas Department of Transportation
San Antonio District

DRIVEWAY DETAILS

San Antonio District Standard
Sheet (1 of 1)

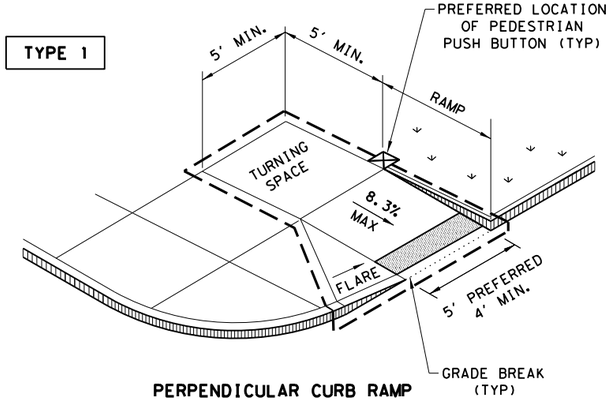
I:\engdata\Standards\Drivewaydetails.dgn	PREPARED BY AND FOR USE OF TxDoT.					
ORIGINAL DRAWING DATE: 8/1/2020	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT #			SHEET
REVISIONS	SAT	6				105
	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
	BEXAR		0073	02	082	US 281

11/21/2023 3:36:17 PM
c:\pw\khl\d0277925\sat_drivewaydetails.dgn

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.

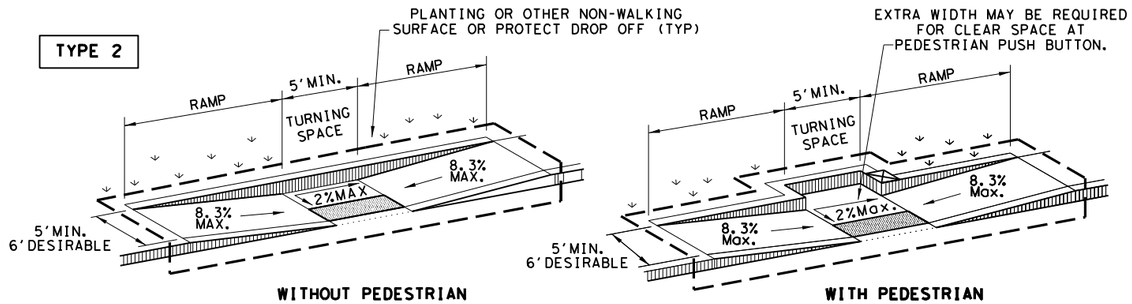
DATE:
FILE:

TYPE 1



PERPENDICULAR CURB RAMP

TYPE 2

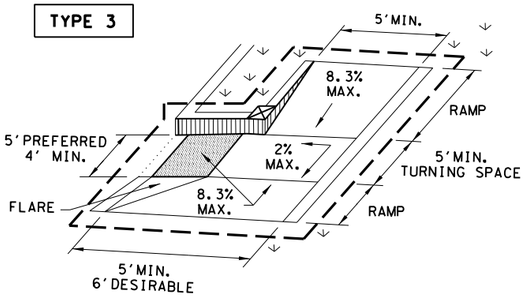


WITHOUT PEDESTRIAN PUSH BUTTON

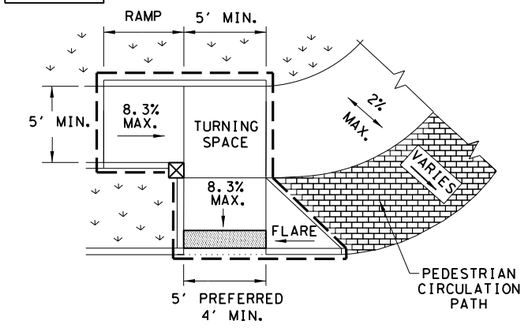
WITH PEDESTRIAN PUSH BUTTON

PARALLEL CURB RAMP

TYPE 3

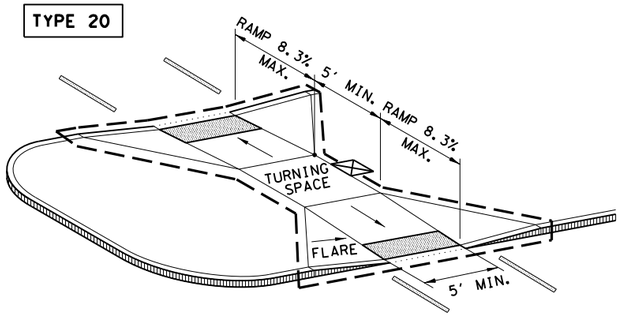


TYPE 6



COMBINATION CURB RAMPS

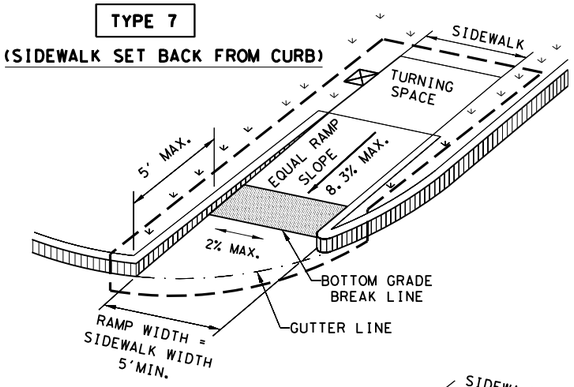
TYPE 20



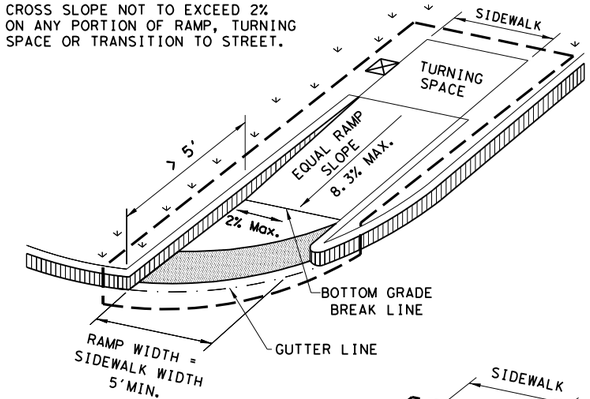
CURB RAMPS AT MEDIAN ISLANDS

TYPE 7

(SIDEWALK SET BACK FROM CURB)

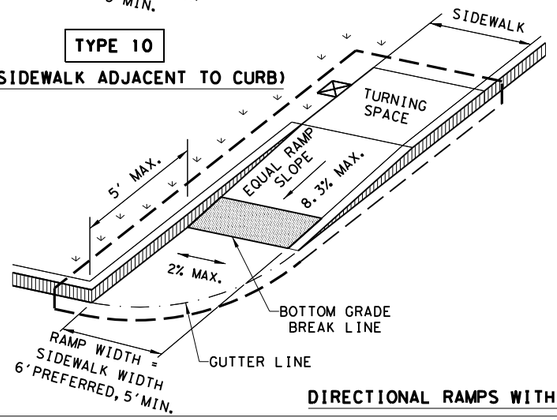


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.

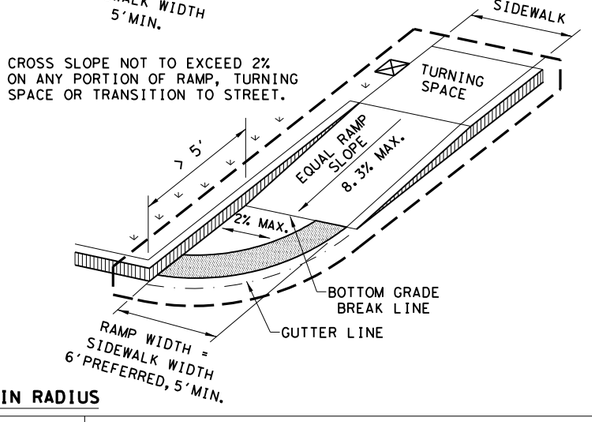


TYPE 10

(SIDEWALK ADJACENT TO CURB)

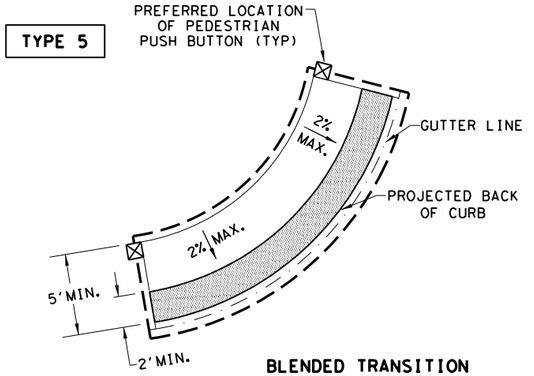


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



DIRECTIONAL RAMPS WITHIN RADIUS

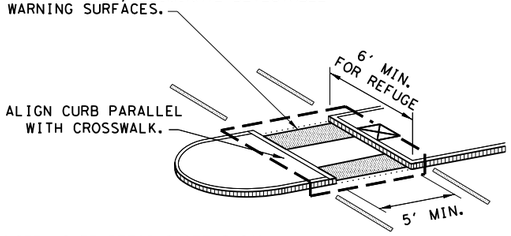
TYPE 5



BLENDED TRANSITION
(FLUSH LANDING)

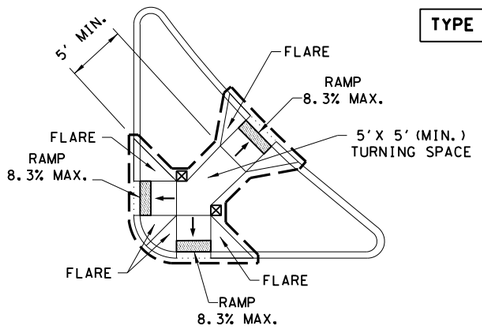
TYPE 21

INSTALL DETECTABLE WARNING SURFACE AT EACH END OF THE CUT-THROUGH RAMP WITH A MINIMUM 2' USUAL SIDEWALK SURFACE BETWEEN. IF MEDIAN IS LESS THAN 6' WIDE, ELIMINATE DETECTABLE WARNING SURFACES.



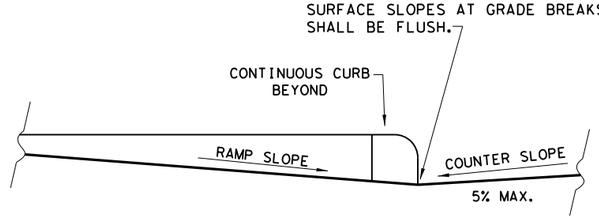
NOTE: CURB DETAILS ARE SHOWN ELSEWHERE IN THE PLANS.

TYPE 22



COMBINATION ISLAND RAMPS

BOTTOM GRADE BREAK OF CURB RAMP WILL NORMALLY BE AT GUTTER LINE. SURFACE SLOPES AT GRADE BREAKS SHALL BE FLUSH.



TYPICAL SECTION OF PERPENDICULAR CURB RAMP AT CONNECTION TO ROADWAY

NOTES / LEGEND:

SEE GENERAL NOTES ON SHEET 2 OF 4 FOR MORE INFORMATION.

DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.

DETECTABLE WARNING SURFACE

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON IF APPLICABLE.

GUTTER LINE

GRADE BREAK .....

RAMP LIMITS OF PAYMENT

SHEET 1 OF 4

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		106

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:

GENERAL NOTES

CURB RAMPS

1. Install a curb ramp or blended transition at each pedestrian street crossing.
2. All slopes shown are maximum allowable. Cross slopes of 1.5% and lesser running should be used. Adjust curb ramp length or grade of approach sidewalks as directed.
3. Maximum allowable cross slope on sidewalk and curb ramp surfaces is 2%.
4. The minimum sidewalk width is 5'. Where the sidewalk is adjacent to the back of curb, a 6' sidewalk width is desirable. Where a 5' sidewalk cannot be provided due to site constraints, sidewalk width may be reduced to 4' for short distances. 5'x 5' passing areas at intervals not to exceed 200' are required.
5. Turning Spaces shall be 5'x 5' minimum. Cross slope shall be maximum 2%.
6. Clear space at the bottom of curb ramps shall be a minimum of 4'x 4' wholly contained within the crosswalk and wholly outside the parallel vehicular travel path.
7. Provide flared sides where the pedestrian circulation path crosses the curb ramp. Flared sides shall be sloped at 10% maximum, measured parallel to the curb. Returned curbs may be used only where pedestrians would not normally walk across the ramp, either because the adjacent surface is planted, substantially obstructed, or otherwise protected.
8. Additional information on curb ramp location, design, light reflective value and texture may be found in the latest draft of the Proposed Guidelines for Pedestrian Facilities in the Public Right of Way (PROWAG) as published by the U.S. Architectural and Transportation Barriers Compliance Board (Access Board).
9. To serve as a pedestrian refuge area, the median should be a minimum of 6' wide, measured from back of curbs. Medians should be designed to provide accessible passage over or through them.
10. Small channelization islands, which do not provide a minimum 5'x 5' landing at the top of curb ramps, shall be cut through level with the surface of the street.
11. Crosswalk dimensions, crosswalk markings and stop bar locations shall be as shown elsewhere in the plans. At intersections where crosswalk markings are not required, curb ramps shall align with theoretical crosswalks unless otherwise directed.
12. Provide curb ramps to connect the pedestrian access route at each pedestrian street crossing. Handrails are not required on curb ramps.
13. Curb ramps and landings shall be constructed and paid for in accordance with Item 531 "Sidewalks".
14. Place concrete at a minimum depth of 5" for ramps, flares and landings, unless otherwise directed.
15. Furnish and install No. 3 reinforcing steel bars at 18" o.c. both ways, unless otherwise directed.
16. Provide a smooth transition where the curb ramps connect to the street.
17. Curbs shown on sheet 1 within the limits of payment are considered part of the curb ramp for payment, whether it is concrete curb, gutter, or combined curb and gutter.
18. Existing features that comply with applicalble standards may remain in place unless otherwise shown on the plans.

DETECTABLE WARNING MATERIAL

19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material adjacent to uncolored concrete, unless specified elsewhere in the plans.
20. Detectable Warning Materials must meet TxDOT Departmental Materials Specification DMS 4350 and be listed on the Material Producer List. Install products in accordance with manufacturer's specifications.
21. Detectable warning surfaces must be firm, stable and slip resistant.
22. Detectable warning surfaces shall be a minimum of 24 inches in depth in the direction of pedestrian travel, and extend the full width of the curb ramp or landing where the pedestrian access route enters the street.
23. Detectable warning surfaces shall be located so that the edge nearest the curb line is at the back of curb and neither end of that edge is greater than 5 feet from the back of curb. Detectable warning surfaces may be curved along the corner radius.
24. Shaded areas on Sheet 1 of 4 indicate the approximate location for the detectable warning surface for each curb ramp type.

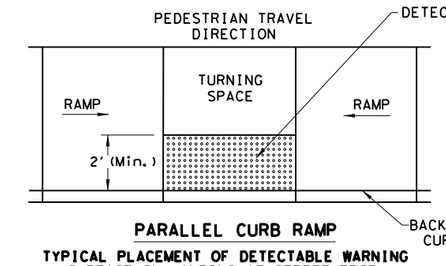
DETECTABLE WARNING PAVERS (IF USED)

25. Furnish detectable warning paver units meeting all requirements of ASTM C-936, C-33. Lay in a two by two unit basket weave pattern or as directed.
26. Lay full-size units first followed by closure units consisting of at least 25 percent (25%) of a full unit. Cut detectable warning paver units using a power saw.

SIDEWALKS

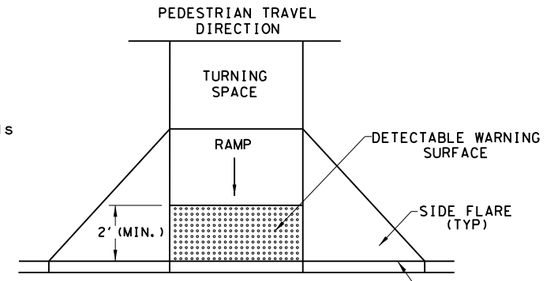
27. Provide clear ground space at operable parts, including pedestrian push buttons. Operable parts shall be placed within unobstructed reach range specified in PROWAG section R406.
28. Place traffic signal or illumination poles, ground boxes, controller boxes, signs, drainage facilities and other items so as not to obstruct the pedestrian access route or clear ground space.
29. Street grades and cross slopes shall be as shown elsewhere in the plans.
30. Changes in level greater than 1/4 inch are not permitted.
31. The least possible grade should be used to maximize accessibility. The running slope of sidewalks and crosswalks within the public right of way may follow the grade of the parallel roadway. Where a continuous grade greater than five percent (5%) must be provided, handrails may be desirable to improve accessibility. Handrails may also be needed to protect pedestrians from potentially hazardous conditions. If provided, handrails shall comply with PROWAG R409.
32. Handrail extensions shall not protrude into the usable landing area or into intersecting pedestrian routes.
33. Driveways and turnouts shall be constructed and paid for in accordance with Item "Intersections, Driveways and Turnouts". Sidewalks shall be constructed and paid for in accordance with Item, "Sidewalks".
34. Sidewalk details are shown elsewhere in the plans.

DETECTABLE WARNING SURFACE DETAILS



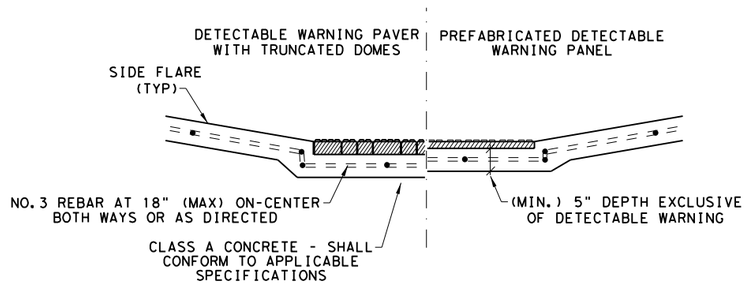
PARALLEL CURB RAMP

TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON LANDING AT STREET EDGE.



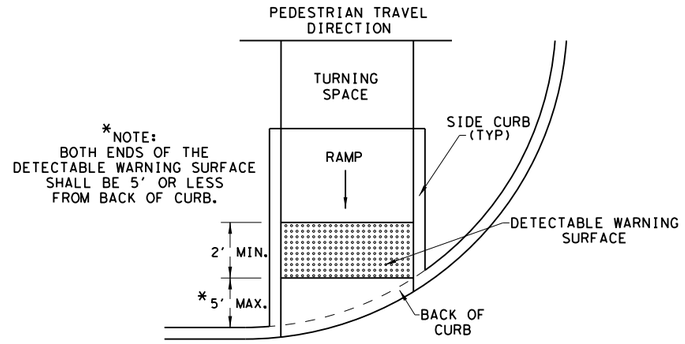
PERPENDICULAR CURB RAMP

TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.



SECTION VIEW DETAIL

CURB RAMP AT DETECTIBLE WARNINGS



DIRECTIONAL CURB RAMP

TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

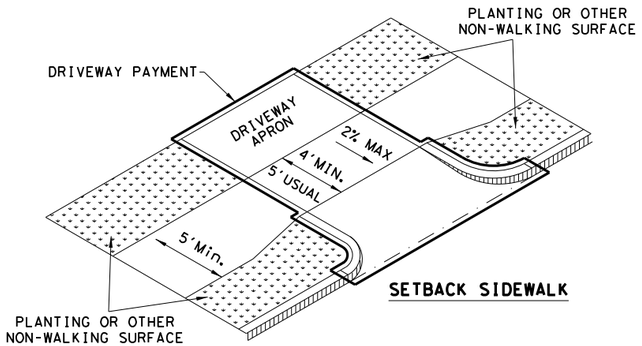
PED-18

FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY
REVISIONS	0073	02	082		US 281
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY			SHEET NO.
	SAT	BEXAR			107

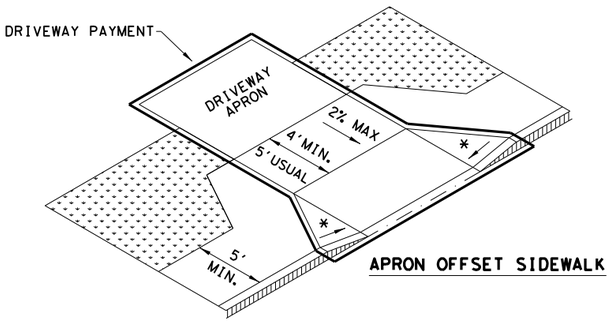
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

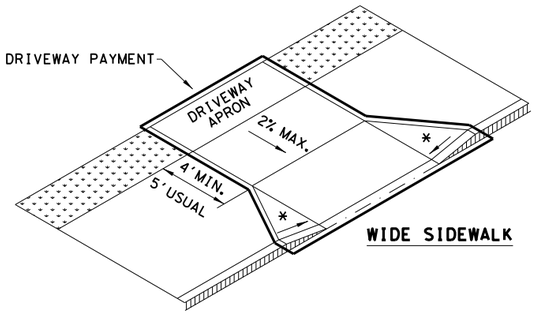
SIDEWALK TREATMENT AT DRIVEWAYS



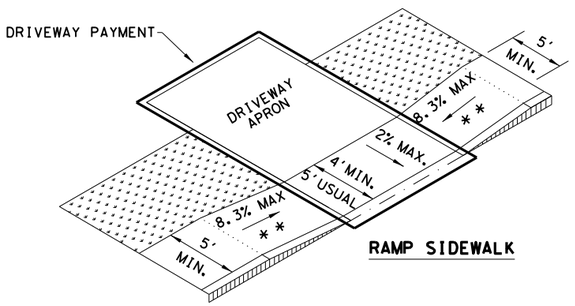
SETBACK SIDEWALK



APRON OFFSET SIDEWALK



WIDE SIDEWALK

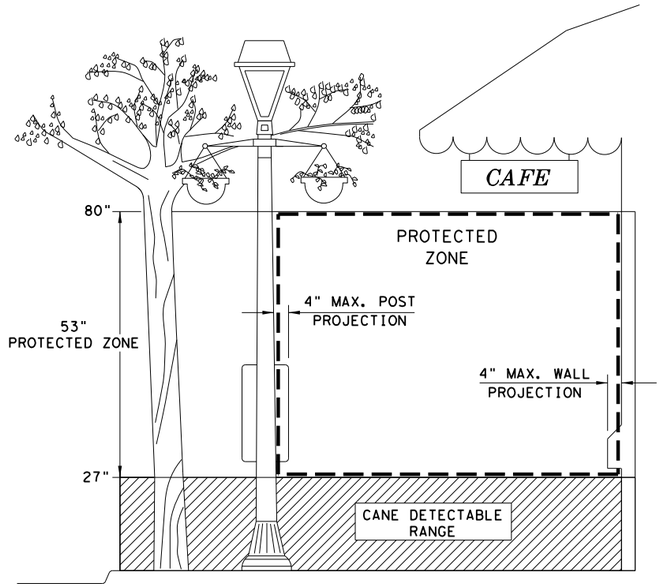


RAMP SIDEWALK

NOTES:

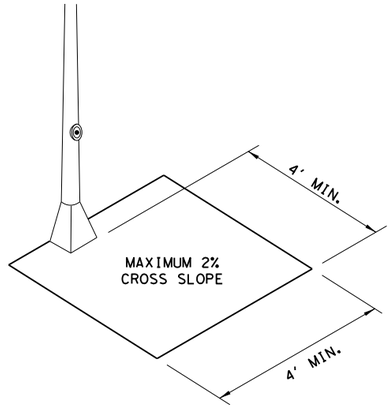
* WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.

* * IF CURB HEIGHT IS GREATER THAN 6 INCHES, USE GRADE LESS THAN OR EQUAL TO 5%. HANDRAIL AND DETECTABLE WARNING ARE NOT REQUIRED.

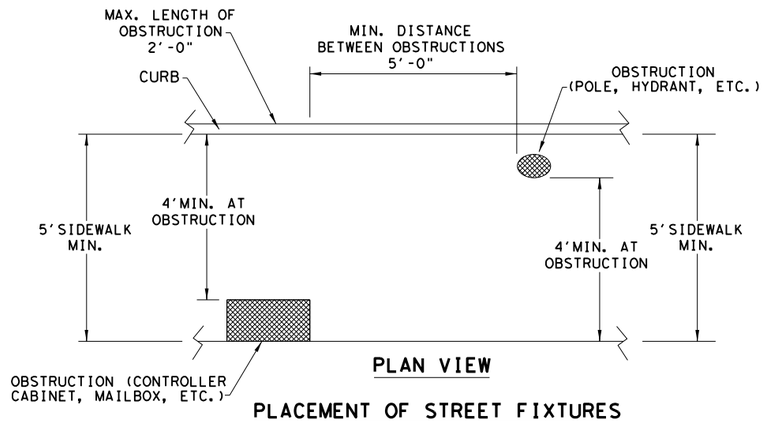


PROTECTED ZONE

NOTE: IN PEDESTRIAN CIRCULATION AREA, MAXIMUM 4" PROJECTION FOR POST OR WALL MOUNTED OBJECTS BETWEEN 27" AND 80" ABOVE THE SURFACE.



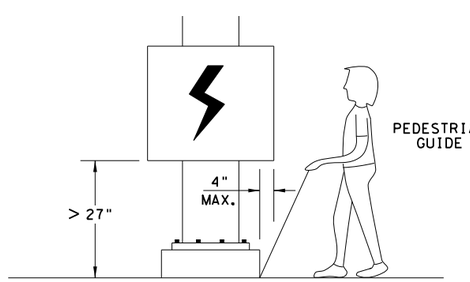
CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



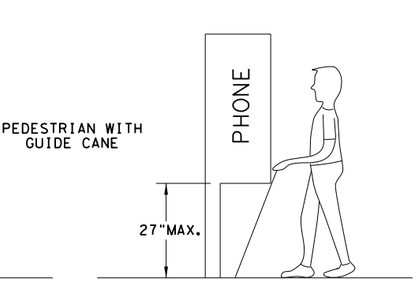
PLAN VIEW

PLACEMENT OF STREET FIXTURES

NOTE: ITEMS NOT INTENDED FOR PUBLIC USE. MINIMUM 4' X 4' CLEAR GROUND SPACE REQUIRED AT PUBLIC USE FIXTURES.



WHEN AN OBSTRUCTION OF A HEIGHT GREATER THAN 27" FROM THE SURFACE WOULD CREATE A PROTRUSION OF MORE THAN 4" INTO THE PEDESTRIAN CIRCULATION AREA, CONSTRUCT ADDITIONAL CURB OR FOUNDATION AT THE BOTTOM TO PROVIDE A MAXIMUM 4" OVERHANG.



PROTRUDING OBJECTS OF A HEIGHT ≤ 27" ARE DETECTABLE BY CANE AND DO NOT REQUIRE ADDITIONAL TREATMENT.

DETECTION BARRIER FOR VERTICAL CLEARANCE < 80"

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

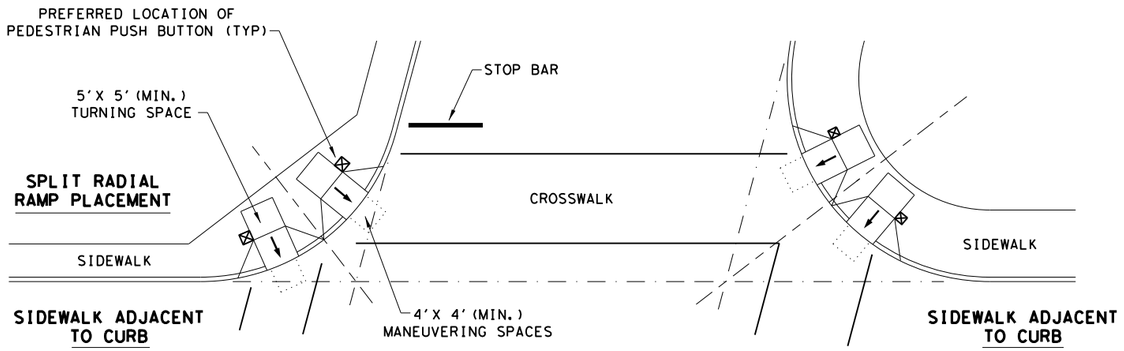
FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG	
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0073	02	082	US 281	
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY		SHEET NO.	
	SAT	BEXAR		108	

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.

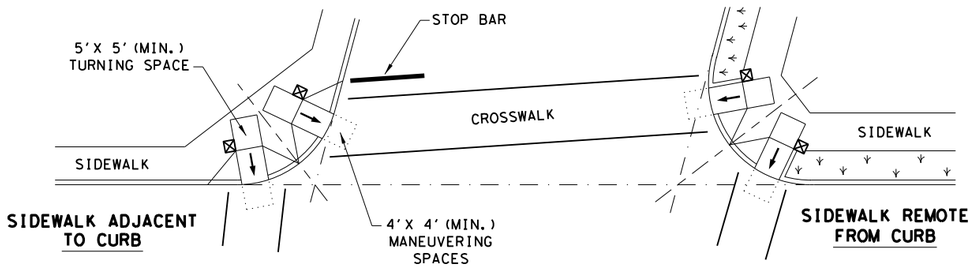
DATE:
FILE:

TYPICAL CROSSING LAYOUTS

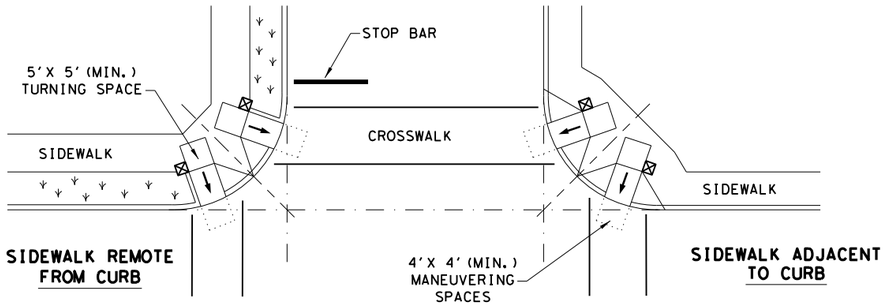
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



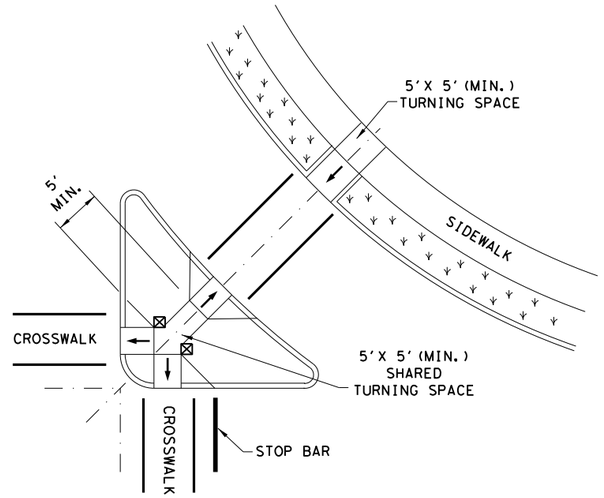
SKEWED INTERSECTION WITH "LARGE" RADIUS



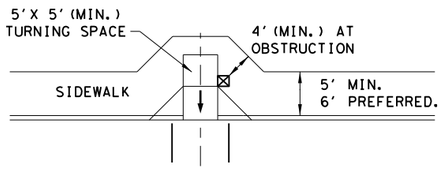
SKEWED INTERSECTION WITH "SMALL" RADIUS

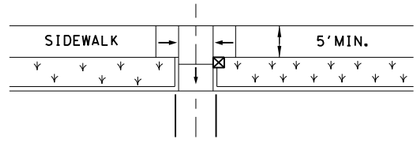


NORMAL INTERSECTION WITH "SMALL" RADIUS



AT INTERSECTION
W/FREE RIGHT TURN & ISLAND





MID-BLOCK PLACEMENT
PERPENDICULAR RAMPS

LEGEND:

SHOWS DOWNWARD SLOPE. →

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON (IF APPLICABLE). ⊠

DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

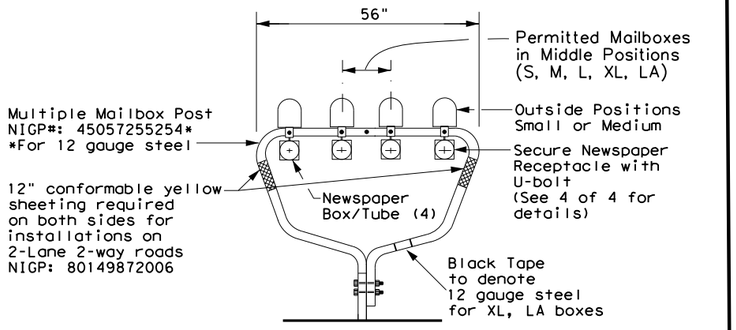
PED-18

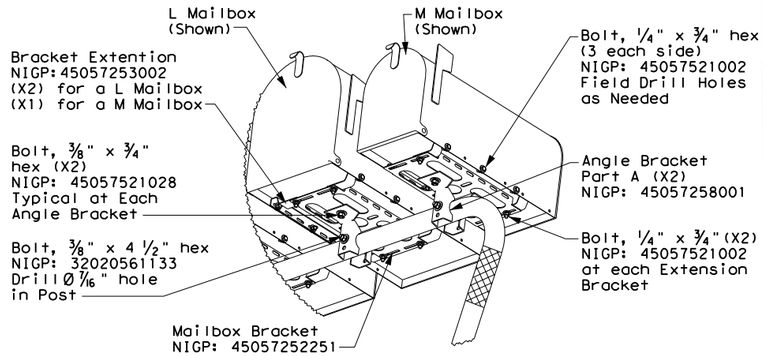
FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY
REVISIONS	0073	02	082		US 281
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY			SHEET NO.
	SAT	BEXAR			109

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.

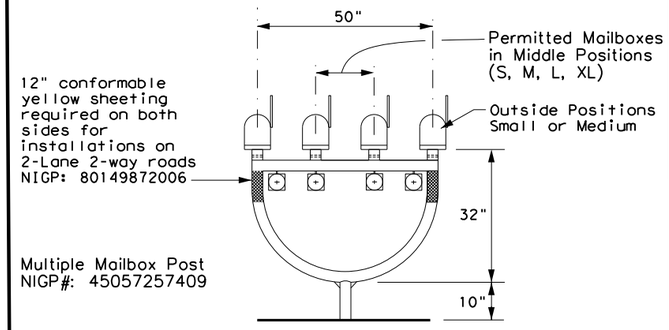
DATE:
FILE:

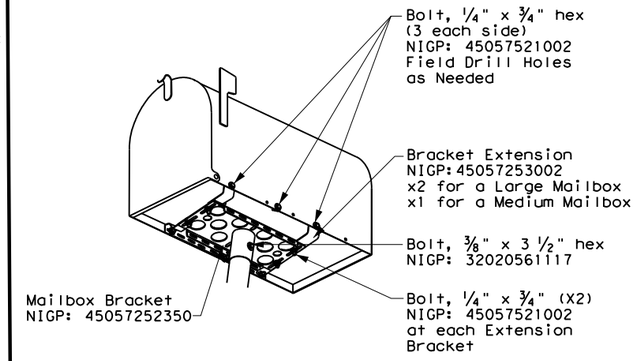
TYPE 1 - MULTIPLE





TYPE 4 - MULTIPLE





MAILBOX SIZES

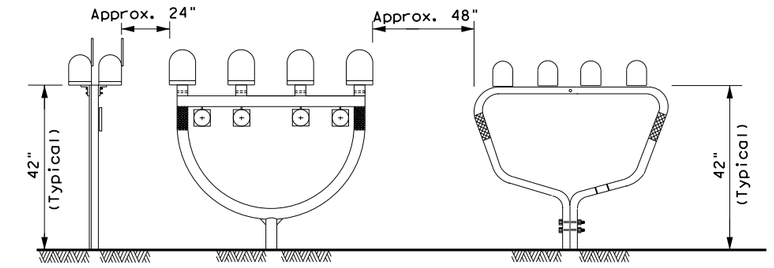
MAILBOX SIZE	TYPICAL DIMENSIONS			MAX **
	LENGTH	WIDTH	HEIGHT	WEIGHT
SMALL	19 1/2"	6"	7"	6 LBS
MEDIUM	22 1/2" *	8" *	11 1/2" *	8 LBS
LARGE	23 1/2"	11 1/2"	13 1/2"	11 LBS
EXTRA LARGE	18"	14"	12"	13 LBS
LOCKABLE	18"	11 1/2"	15"	23 LBS

* See Note 1.
** Excluding Molded Plastic on 4 X 4 Post

GENERAL NOTES:

1. Dimensions shown (length, width, and height) are typical, not maximums. However, anytime a medium size mailbox is mounted on a single/double mount or on the outside position on a multi mount, the dimensions shown are maximums.
2. Mailboxes shall be made of light weight sheet metal or light weight plastic. Heavy steel, cast iron or decorative mailboxes shall not be used on the state highway system.

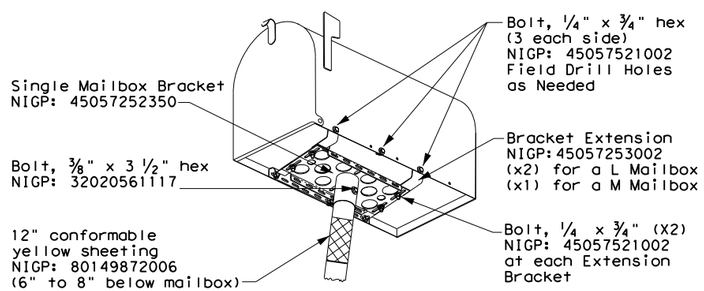
TYPICAL INSTALLATION MEASUREMENTS

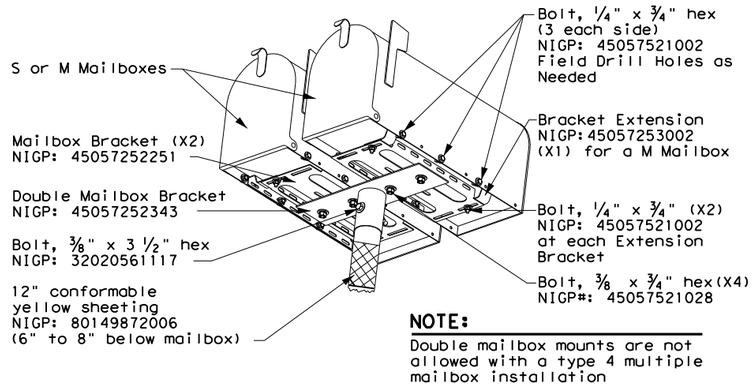


NOTE:

Mailbox installations in sidewalk areas shall be in accordance with the latest TxDOT Design Standard sheets PED-Pedestrian Facilities Curb Ramps.

TYPE 2 and 4 - SINGLE/DOUBLE

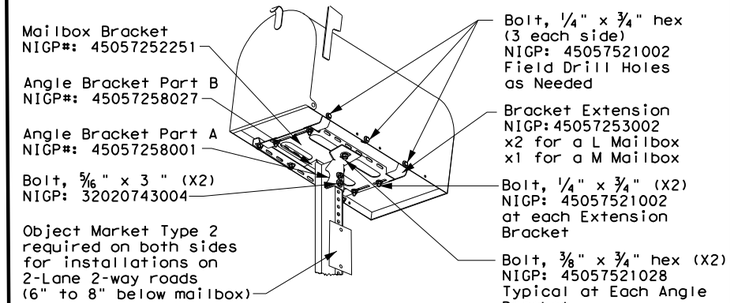


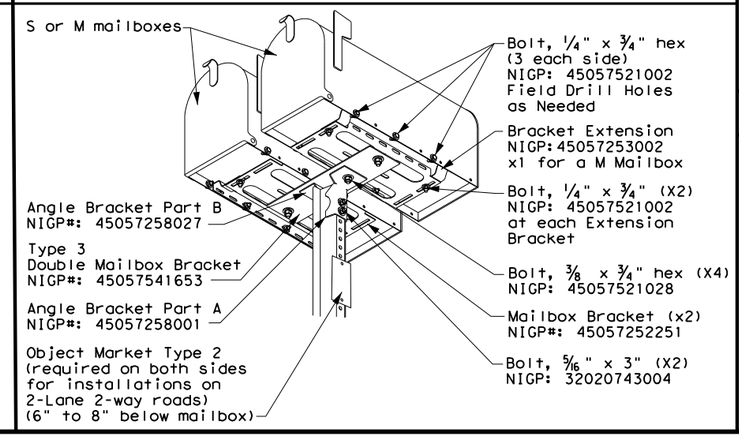


NOTE:

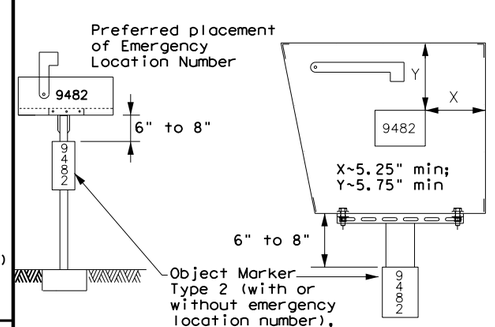
Double mailbox mounts are not allowed with a type 4 multiple mailbox installation

TYPE 3 - SINGLE/DOUBLE





PLACEMENT OF EMERGENCY LOCATION NUMBER

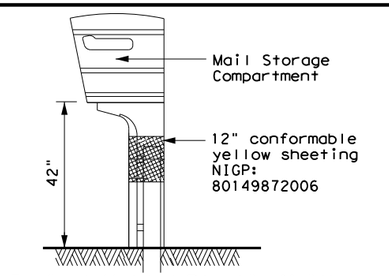


NOTES:

1. Location numbers are provided by homeowner. Minimum size 1" height.
2. Location number is typically placed on the mailbox in a contrasting color.
3. Black numbers may be placed on the Type 2 object marker if the numbers cannot be placed on the mailbox.
4. Alternatively, a green or blue plate with white numbers attached may be mounted below the object marker. Other contrasting color configuration, as approved, may be used.
5. See 3 of 4 for Foundation details.
6. See 4 of 4 for Hardware details.

SHEET 1 OF 4

TYPE 5



Typical Molded Plastic Mailbox

Texas Department of Transportation

Maintenance Division Standard

MAILBOX MOUNTING AND ASSEMBLY

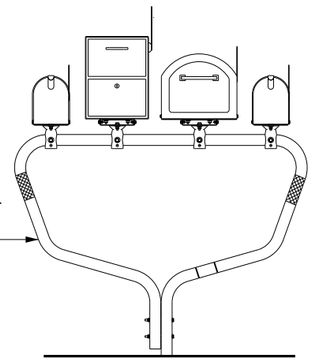
MB(1)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0073	02	082	US 281
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		110

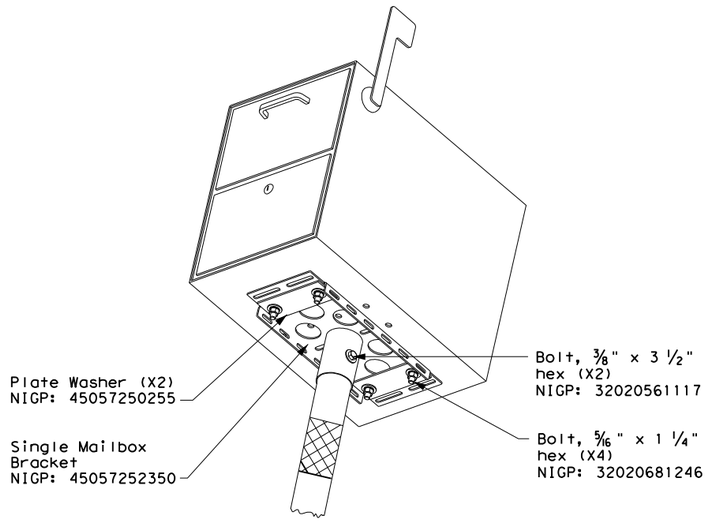
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

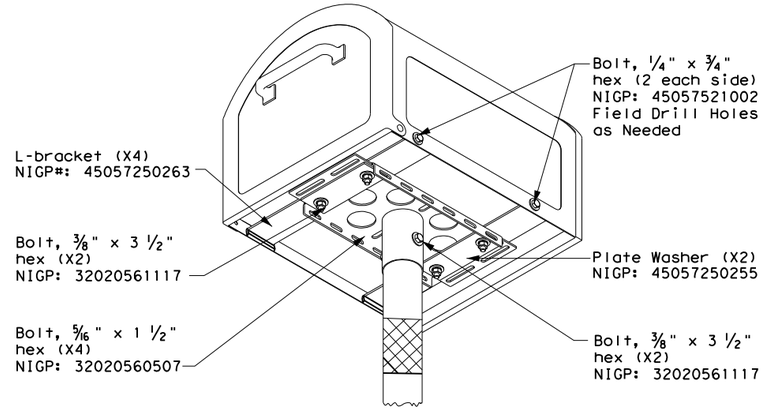
TYPE 1- MULTI LOCKABLE AND XL MAILBOX



TYPE 2/4 - SINGLE LOCKABLE MAILBOX

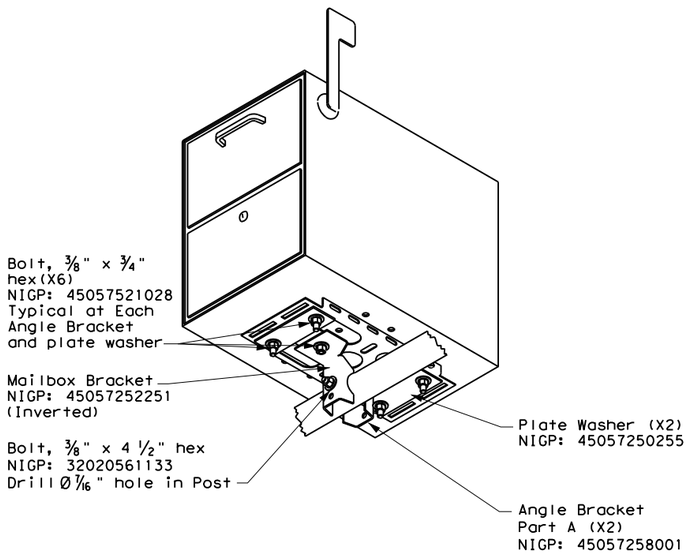


TYPE 2/4 - SINGLE XL MAILBOX

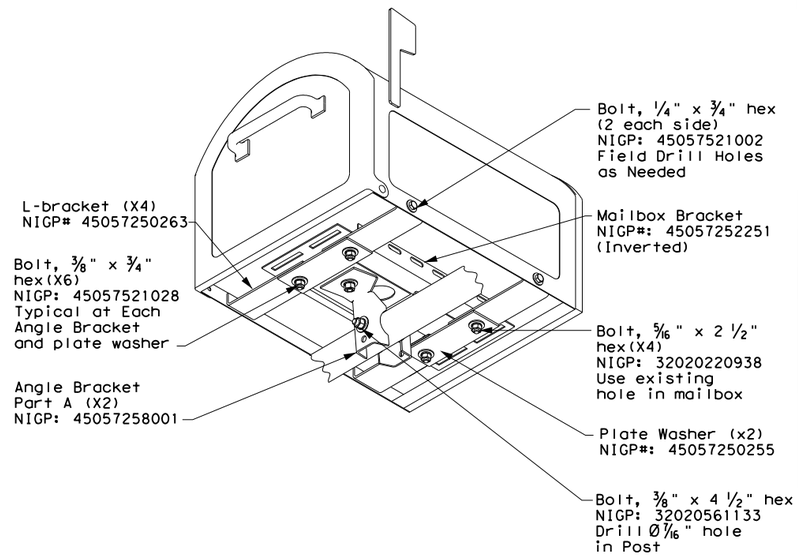


NOTE:
Follow same configuration when mounting an XL mailbox on a Type 4 multi post.

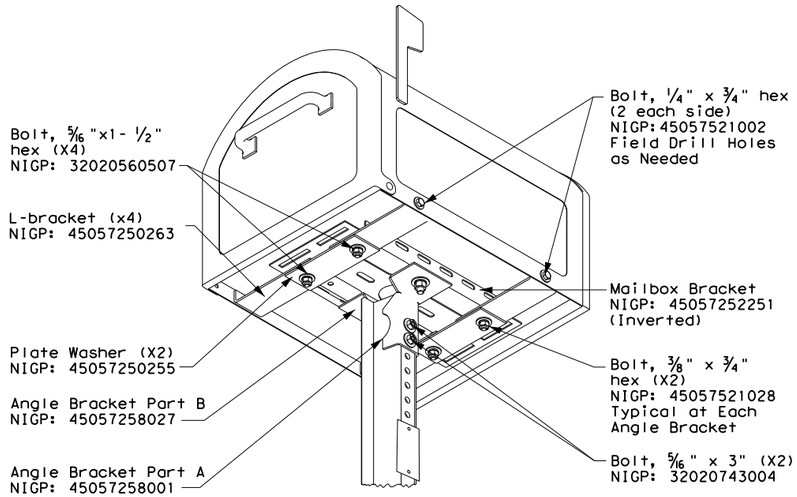
TYPE 1 MULTI – LOCKABLE ARCHITECTURAL (LA)



TYPE 1 MULTI – XL MAILBOX



TYPE 3 - XL MAILBOX MOUNTING



Texas Department of Transportation

Maintenance Division Standard

XL AND LOCKABLE ARCHITECTURAL MAILBOX ASSEMBLY

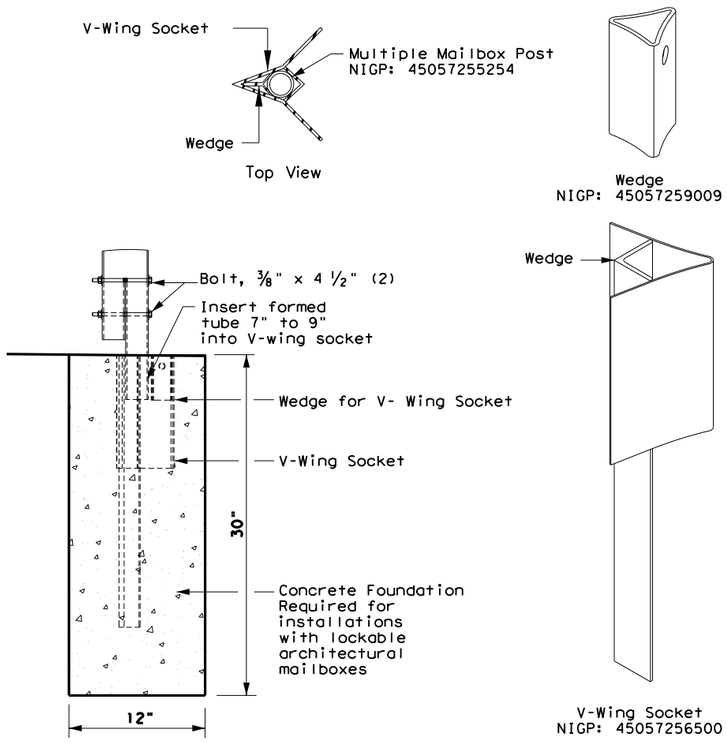
MB(2)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0073	02	082	US 281
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		111

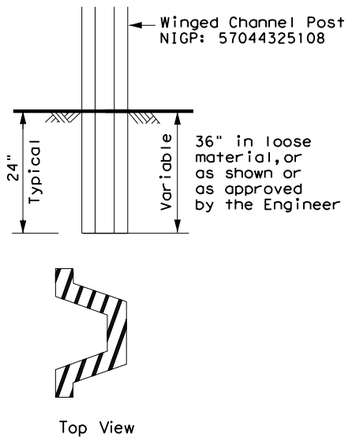
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

TYPE 1 - SUPPORT/FOUNDATION

Thin Wall Tube w/ V-LOC Anchorage



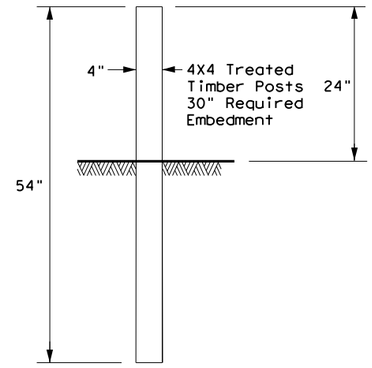
TYPE 3 - SUPPORT/FOUNDATION



NOTES:

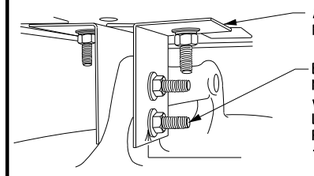
1. Attach Object Marker (OM) facing direction of traffic.
2. OM will also be required on opposite side if installed on a 2-Lane, 2-Way roadway.

TYPE 5 - SUPPORT/FOUNDATION



Molded Plastic Mailboxes shall be installed on 4"x4" treated timber posts only. The use of steel pipe or structural tubing in place of timber post is prohibited.

TYPE 6 - TEMPORARY MAILBOX SUPPORT



Plastic Drum NIGP: 55093383655
Rubber Collar NIGP: 55093387102

NOTES:

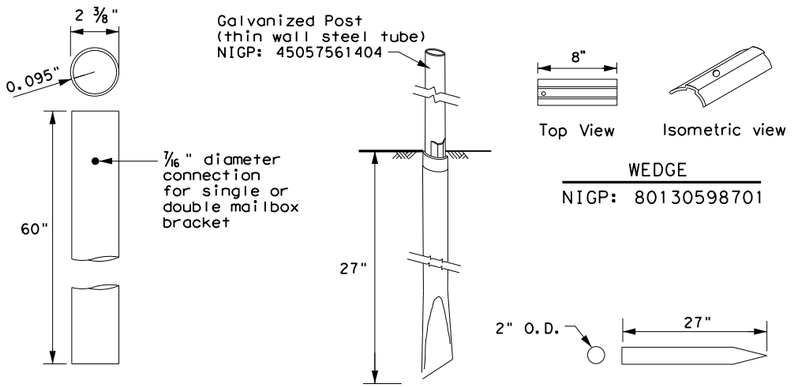
1. Place on approved plastic drum as shown in the Compliant Work Zone Traffic Control Devices (CWZTCD).
2. Existing attachment hardware shall be used unless damaged. Damaged hardware shall be replaced.

GENERAL NOTES:

1. Erect post plumb or vertical.
2. When galvanized part is required galvanize in accordance with Item 445.
3. Use a concrete footing as shown or when directed. Concrete footing will be required when soils do not hold the support/foundations in a stable condition, only on Type 1, Type 2, and Type 4

TYPE 2 - SUPPORT/FOUNDATION

Thin Wall Steel Tube w/Wedge Anchor System

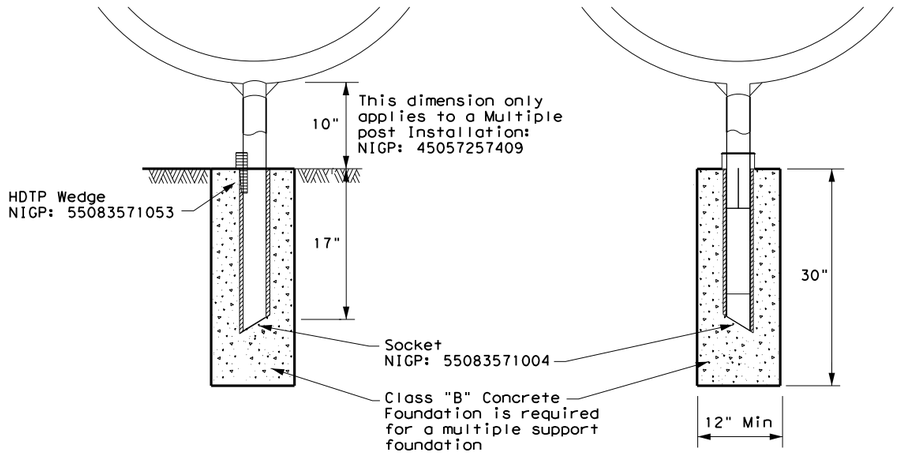


MAILBOX POST

WEDGE ANCHOR
NIGP: 80130238407

TYPE 4 - SUPPORT/FOUNDATION

Whitecoated steel post NIGP: 45057561107
Multiple post NIGP: 45057257409
Recycled Rubber post (RR) NIGP: 45057561057



SHEET 3 OF 4

Texas Department of Transportation

Maintenance Division Standard

MAILBOX SUPPORT AND FOUNDATION

MB(3)-21

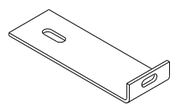
FILE: MB-21.dgn	DN:	CK:	DW:	CK:
© TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0073	02	082	US 281
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		112

DATE:
FILE:

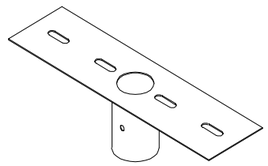
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

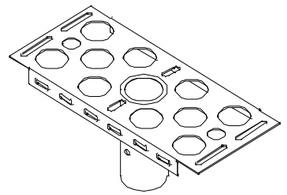
TYPE	TYPE 1	TYPE 2	TYPE 3	TYPE 4			TYPE 5	TYPE 6
Configuration	Multiple	Single or Double	Single or Double	Single	Double	Multiple	Single	Single
Mailbox Size NIGP #	Outside Position: S or M Inside Position: S, M, L, XL, or LA	Single: S, M, L, XL, or LA Double: SS, SM, MM	Single: S, M, L, or XL Double: SS, SM, MM	S, M, L, XL, or LA	SS, SM, or MM	Outside Position: S or M Inside Position: S, M, L, or XL	Molded Plastic	S, or M
Mailbox Post NIGP #	45057255254 (Galvanized Multiple)	45057561404 (Thin Walled Gavanize)	57044325108 (Wing Channel Post)	45057561107 (Thin walled white powder coated) 45057561057 (Recycled Rubber Post: S or M only)	45057561107 (Thin Walled White Powder Coated)	45057257409 (White Powder Coated Multiple)	4x4 Timber	Construction Barrel
Post and Mailbox Hardware NIGP #	45057259009 (Wedge) 45057256500 (V-Wing Socket) 45057253002 (Bracket Extension) 45057252251 (Mailbox Bracket) 45057258001 (Part A Angle Bracket x2) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	80130598701 (Wedge) 80130238407 (Wedge Anchor) 45057253002 (Bracket Extension) 45057252343 (Double MB Bracket) 45057252350 (S. Mailbox Bracket) 45057252251 (Mailbox Bracket) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket forXL x4)	45057541653 (Type 3 Double Mailbox Bracket) 45057252251 (Mailbox Bracket) 45057253002 (Bracket Extension) 45057258001 (Part A Angle Bracket) 45057258027 (Part B Angle Bracket) 45057250255 (Plate Washer for XL x2) 45057250263 (L-Bracket for XL x4)	55083571053 (Wedge) 55083571004 (Socket) 45057252350 (Single Mailbox Bracket) 45057253002 (Bracket Extension) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	55083571053 (Wedge) 55083571004 (Socket) 45057253002 (Bracket Extension) 45057252343 (Double Mount Bracket) 45057252251 (Mailbox Bracket x2)	55083571053 (Wedge) 55083571004 (Socket) 45057253002 (Bracket Extension) 45057252350 (Single Mount Bracket) 45057250255 (Plate Washer for XL x2) 45057250263 (L-Bracket for XL x4)	None	45057251055 Angle Bracket (x2)
Foundation Used	Class B Concrete (Required for LA Mailboxes)	Class B Concrete (Required for LA Mailboxes)	None	Class B Concrete (not used with recycled rubber post, required for LA Mailboxes)	Class B Concrete (not required)	Class B Concrete	None	None



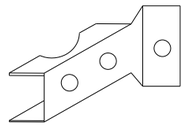
NIGP: 45057250263
L-Bracket x4 for
XL sized mailboxes



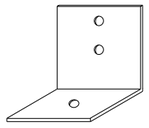
NIGP: 45057252343
Double Mailbox Bracket
For Type 2 and Type 4
double mount



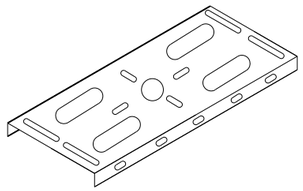
NIGP: 45057252350
Single Mailbox Bracket
For Type 2 single and for
Type 4 single and multi mount



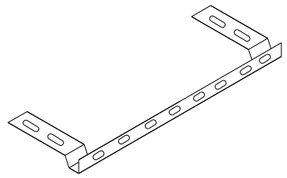
NIGP: 45057258001
Part "A" Angle Bracket
For Type 1 multi (2 per mailbox)
and Type 3 single and double



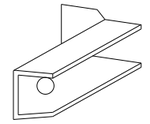
NIGP: 45057251055
Type 6 Angle Bracket
(2 per mailbox)



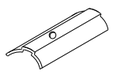
NIGP: 45057252251
Mailbox Bracket
For Type 1 multi and
any double mount (use 2)



NIGP: 45057253002
Bracket Extension
Use 1 for a medium Mailbox
Use 2 for a Large Mailbox



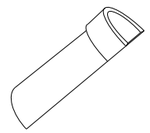
NIGP: 45057258027
Part "B" Angle Bracket
For Type 3 single
and double



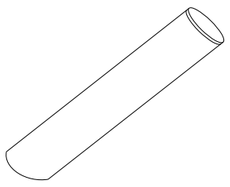
NIGP: 80130598701
Wedge for Type 2

NIGP: 45057250255
Plate Washer for Architecural
and XL Mailboxes

NIGP: 45057541653
Type 3 double mailbox bracket

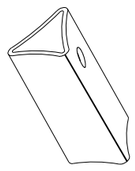


NIGP: 55083571053
Type 4 Mailbox Wedge

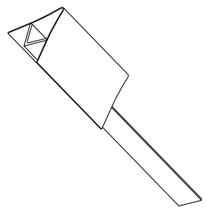


NIGP: 55083571004
Type 4 Mailbox Socket

NIGP: 80130238407
Type 2 Wedge Anchor



NIGP: 45057259009
Wedge for Type 1 V-wing Socket



NIGP: 45057256500
V-wing Socket for
Type 1 Foundation

NIGP #	OBJECT MARKERS AND CONFORMABLE SHEETING
55008311759	Type 2 OM 4"x4" (3 Needed) for Type 3 Wing Channel Post
55008312906	Type 2 OM 6"x12" (1 needed) for Type 3 Wing Channel Post
80149872006	12" Conformable Reflective Yellow Sheeting for Flexible Posts

NOTES:

1. Type 2 object marker in accordance with Traffic Engineering Standard Delineators & Object Markers.
2. A light weight receptacle for newspaper delivery can be attached to mailbox posts if the receptacle does not touch the mailbox, present a hazard to traffic or delivery of the mail, extend beyond the front of the mailbox, or display advertising, except the publication title.

BID CODES FOR CONTRACTS

MB-(X) ASSM TY (XXX) (X)

Type of Mailbox
- S = Single
- D = Double
- M = Multiple
- MP = Molded Plastic

Type of Post
- WC = Winged Channel Post
- RR = Recycled Rubber
- TWW = Thin Walled White Tubing
- TWG = Thin Walled Galvanized Tubing
- TIM = Timber

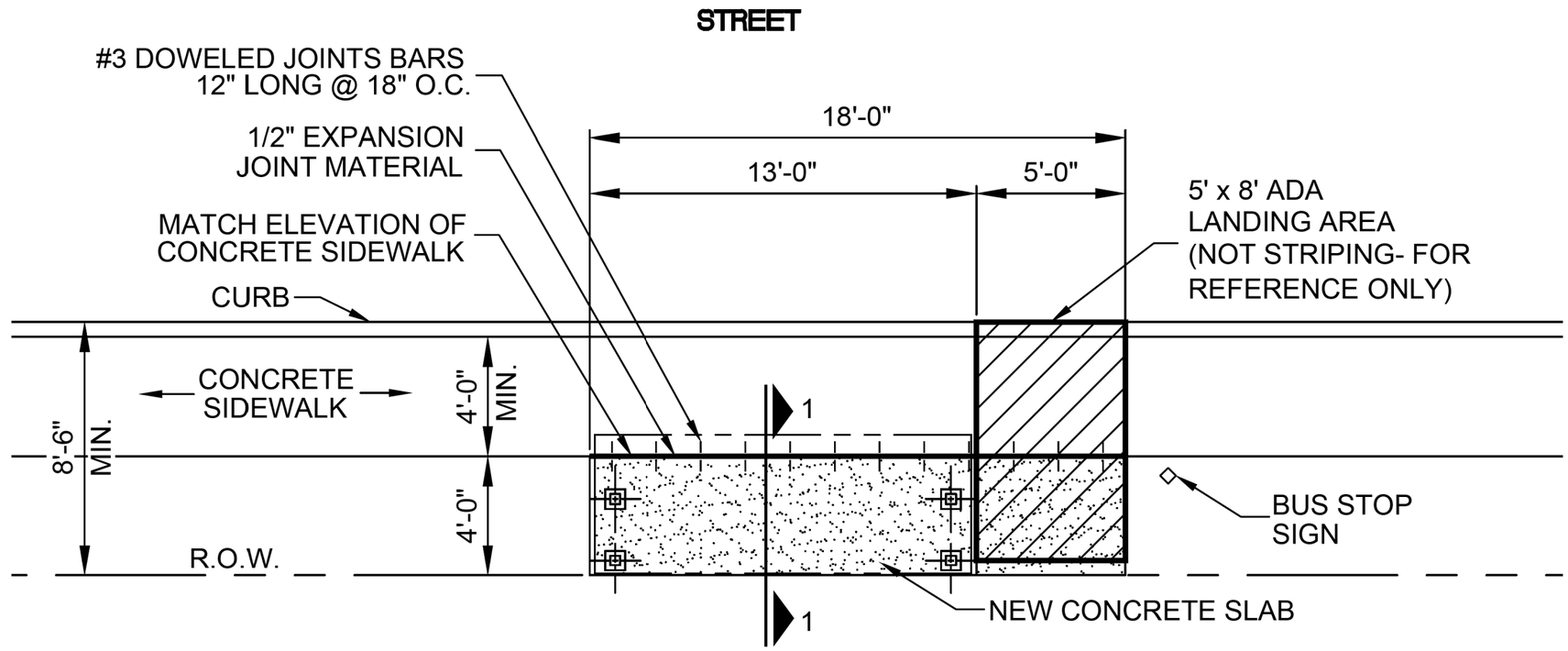
Type of Foundation
- Ty 1 = V-Loc
- Ty 2 = Wedge Anchor Steel System
- Ty 3 = Winged Channel post
- Ty 4 = Wedge Anchor Plastic System
- Ty 5 = 4 X 4 Post

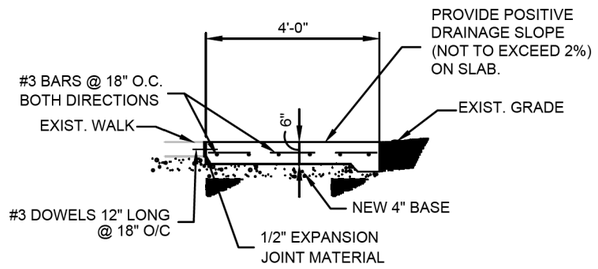
Texas Department of Transportation — Maintenance Division Standard

NIGP PARTS LIST AND COMPATIBILITY

MB(4)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0073	02	082	US 281
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		113





1 **DETAIL**
SCALE: 1/4" = 1'-0"

VIA METROPOLITAN TRANSIT
P.O. BOX 12489, 800 WEST MYRTLE
SAN ANTONIO, TEXAS 78212

TOLAR SHELTER STANDARD DESIGN

DATE: JUNE 27, 2019
DRAWN BY: NC
SCALE: 3/16"=1'-0"
SHEET: 1 OF 1

Kimley»Horn F-928

Texas Department of Transportation

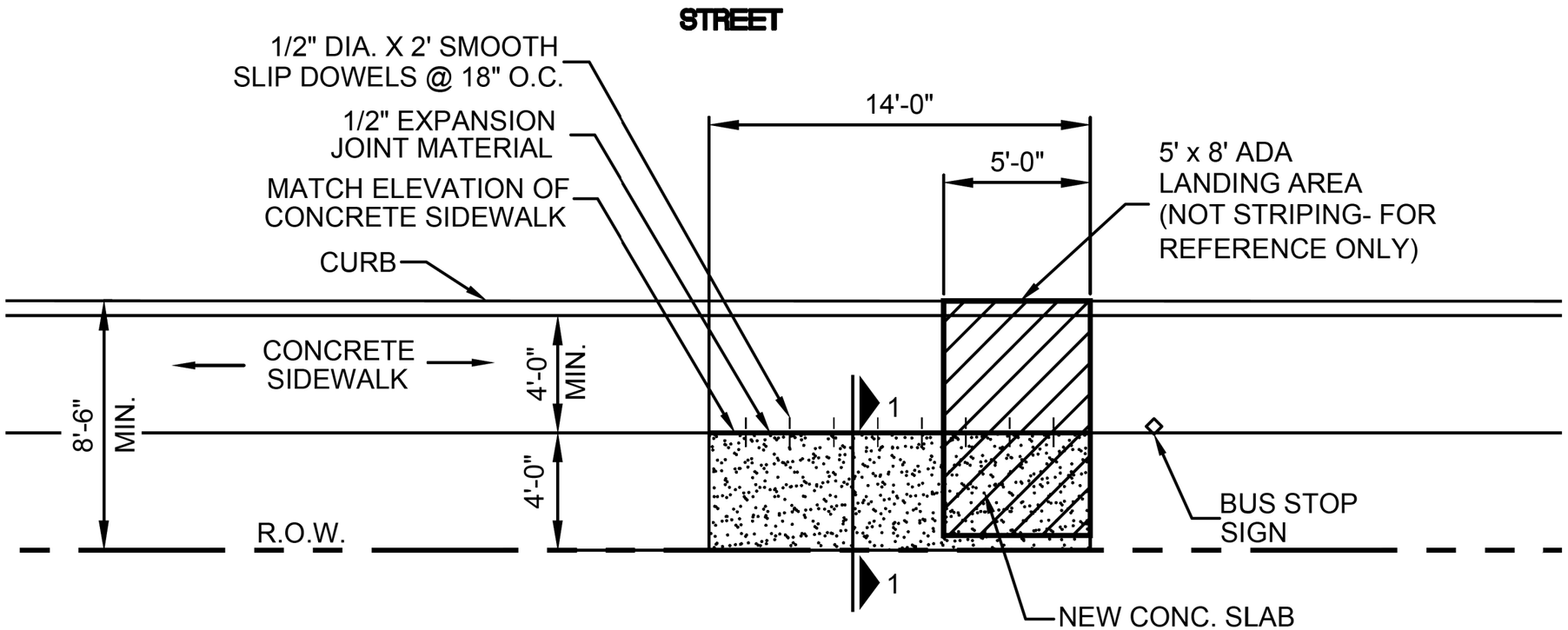
US 281

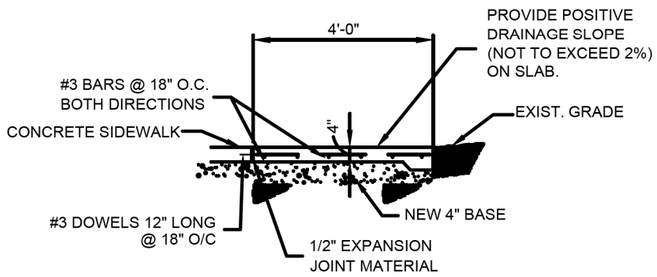
VIA TOLAR SHELTER

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		114

DATE: 11/21/2023 3:37:32 PM
FILE: c:\pw\kh1\d0277925\VIA TOLAR FOUNDATION.dgn





1 **DETAIL**
SCALE: 1/4" = 1'-0"

VIA METROPOLITAN TRANSIT
P.O. BOX 12489, 800 WEST MYRTLE
SAN ANTONIO, TEXAS 78212

BENCH PAD STANDARD DESIGN

DATE:	DEC 12, 2018
DRAWN BY:	NC
SCALE:	3/16"=1'-0"
SHEET:	1 OF 1

Kimley»Horn F-928

Texas Department of Transportation

US 281

VIA BENCH PAD

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		115

DATE: 11/21/2023 3:37:38 PM
FILE: c:\pw\kh1\d0277925\VIA_TOLAR_FOUNDATION.dgn

HYDRAULIC CALCULATIONS

RATIONAL FLOWS, Q (cfs)					
DRAINAGE AREA ID	AREA	C	Tc	INTENSITY I = 5 YR	DISCHARGE Q = 5 YR
	(ACRES)		(MIN)	(IN / HR)	(CFS)
DA-1	0.020	0.95	10	6.14	0.114
DA-2	0.016	0.95	10	6.14	0.092
DA-3	0.022	0.95	10	6.14	0.129
DA-4	0.009	0.95	10	6.14	0.054
DA-5	0.019	0.95	10	6.14	0.111
DA-6	0.021	0.95	10	6.14	0.120
DA-7	0.026	0.95	10	6.14	0.153
DA-8	0.017	0.95	10	6.14	0.101
DA-9	0.011	0.95	10	6.14	0.062

ARMOR CURB SLOT CALCULATIONS

Drainage Area	ID	Type	Manning's n	Q [cfs]	CROSS SLOPE %	LONG SLOPE %	Gutter Width [ft]	Gutter Depression [ft]	Allow. Ponding Width [ft]	Ponding Width T [ft]	Length Required L_T [ft]	Length Available, L_T [ft]	Capacity (cfs)
DA-1	CI - 1	On-Grade Armor Curb Slot	0.013	0.11	1.050%	0.720%	2	0.000	11.000	4.689	11.437	10	0.100
DA-2	CI - 2	On-Grade Armor Curb Slot	0.013	0.09	2.080%	0.720%	2	0.000	11.000	2.819	6.925	10	0.132
DA-3	CI - 3	On-Grade Armor Curb Slot	0.013	0.13	2.600%	0.720%	2	0.000	11.000	2.783	6.979	10	0.184
DA-4	CI - 4	On-Grade Armor Curb Slot	0.013	0.05	0.940%	0.720%	2	0.000	11.000	3.801	8.939	10	0.061
DA-5	CI - 5	On-Grade Armor Curb Slot	0.013	0.11	2.570%	0.720%	2	0.000	11.000	2.655	6.615	10	0.168
DA-6	CI - 6	On-Grade Armor Curb Slot	0.013	0.12	0.790%	0.720%	2	0.000	11.000	5.716	13.875	10	0.087
DA-7	CI - 7	On-Grade Armor Curb Slot	0.013	0.15	0.860%	0.720%	2	0.000	11.000	5.937	14.602	10	0.105
DA-8	CI - 8	On-Grade Armor Curb Slot	0.013	0.10	2.750%	0.720%	2	0.000	11.000	2.457	6.106	10	0.166
DA-9	CI - 9	On-Grade Armor Curb Slot	0.013	0.06	2.020%	0.720%	2	0.000	11.000	2.479	5.978	10	0.104

NOTES:

1. *STORM DRAIN INLET BASED ON 5-YEAR DESIGN STORM EVENT CAPACITY.*
2. *TXDOT HYDRAULIC DESIGN MANUAL (HDM) SEPTEMBER 2019, WAS USED TO DETERMINE THE HYDROLOGIC DATA.*
3. *SEE SW3P LAYOUT SHEETS FOR DRAINAGE AREA SIZE AND LOCATION.*
4. *CLEAN ALL EXISTING CURB INLETS WITHIN THE PROJECT LIMITS. WORK SHALL BE PAID FOR IN ACCORDANCE WITH FORCE ACCOUNT 01-0117.*
5. *PROJECT PROPOSES NO IMPACTS TO EXISTING DITCH CAPACITY. ANY CHANGES TO THE EXISTING DITCHES MUST BE APPROVED BY THE ENGINEER.*

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER

12/21/2023

Kimley»Horn F-928

Texas Department of Transportation

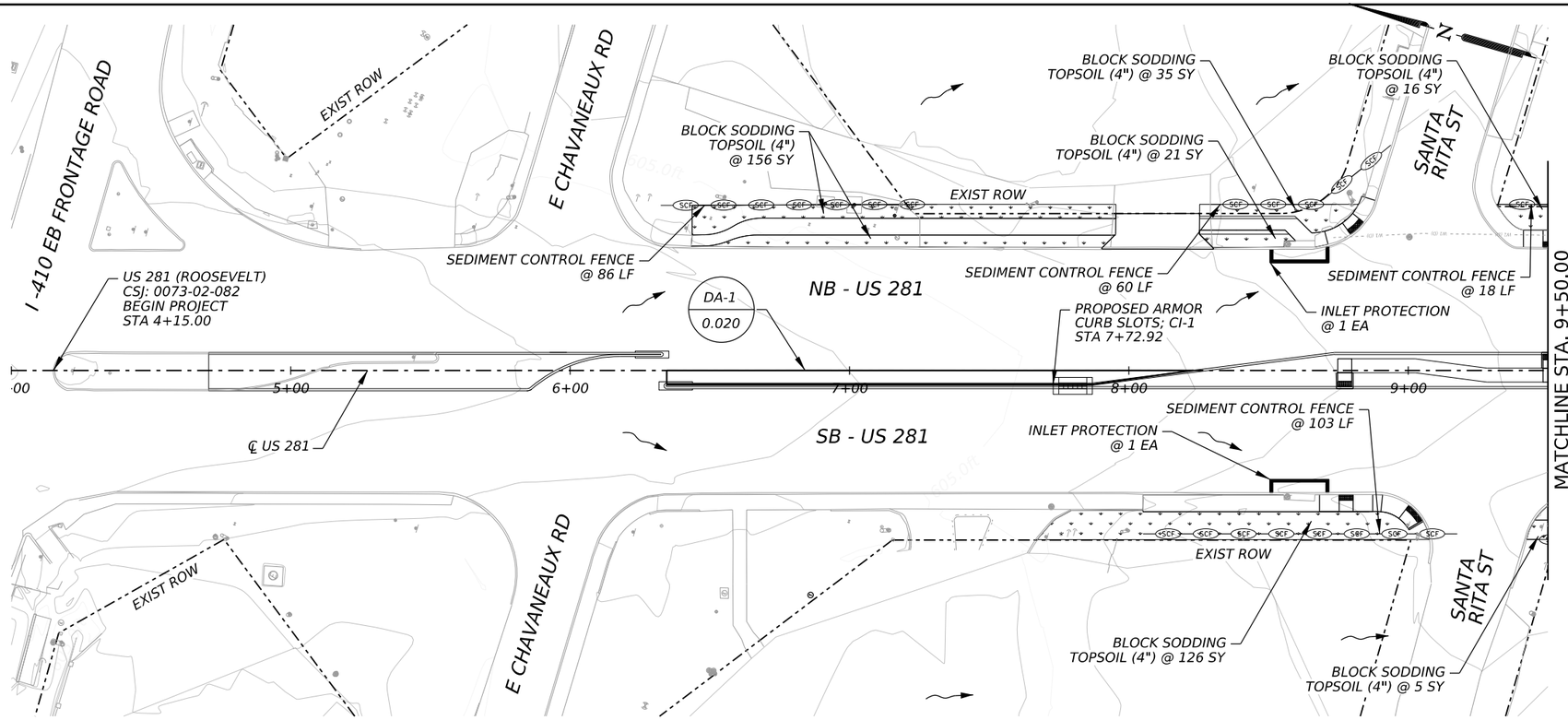
US 281

DRAINAGE CALCULATIONS

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		116

DATE: 12/22/2023 10:11:56 AM
FILE: c:\pw\khj1\d0251186\US281_DRG_CALC.dgn



QUANTITY SUMMARY				
ITEM		DESCRIPTION	UNIT	QTY
161	6017	COMPOST MANUF TOPSOIL (4")	SY	1181
162	6002	BLOCK SODDING	SY	1181
168	6001	VEGETATIVE WATERING	MG	19
169	6006	SOIL RETENTION BLANKETS (CL 2) (TY F)	SY	1181
506	6021	CONSTRUCTION EXITS (INSTALL) (TY 2)	SY	156
506	6024	CONSTRUCTION EXITS (REMOVE)	SY	156
506	6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	1046
506	6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	1046
506	6042	BIODEG EROSN CONT LOGS (INSTL) (18")	LF	120
506	6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	120

NOTES:

1. *INSTALLED MEASURES SHALL REMAIN IN PLACE AND BE MAINTAINED THROUGHOUT DURATION OF PROJECT OR AS DIRECTED BY ENGINEER.*
2. *SW3P MEASURES SHOWN ARE MINIMUM REQUREMENTS BASED UPON PROJECT DESIGN. INSTALLATION OF SW3P MEASURES WILL BE SHOWN AND MODIFIED TO ACCOMODATE ACTUAL FIELD CONDITIONS.*
3. *CONSTRUCTION EXITS TO BE LOCATED IN THE FIELD AND APPROVED BY THE ENGINEER. THE SIZE OF THE CONSTRICTION EXIT WILL BE 78 SY (50' X 14'). REFER TO STANDARD EC(3) -16 FOR DETAILS.*
4. *SILT FENCE IS TO BE PLACED 1' INSIDE OF THE EXISTING ROW UNLESS STATED OTHERWISE.*
5. *INLET PRODECTION SHOWN FOR CLARITY. SEE EROSION CONTROL LOG DETAIL FOR PLACEMENT AT INLETS.*

LEGEND

- *1-FT CONTOURS*
- *EXISTING ROW*
- *BLOCK SODDING/TOPSOIL (4")*
- *TEMP SEDIMENT CONTROL FENCE*
- *FLOW ARROWS*
- *INLET PROTECTION*
- *DA-X / X.XXX — DRAINAGE AREA ID / AREA IN ACRES*

0' 25' 50'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED PROFESSIONAL ENGINEER
12/21/2023

Kimley»Horn F-928

Texas Department of Transportation

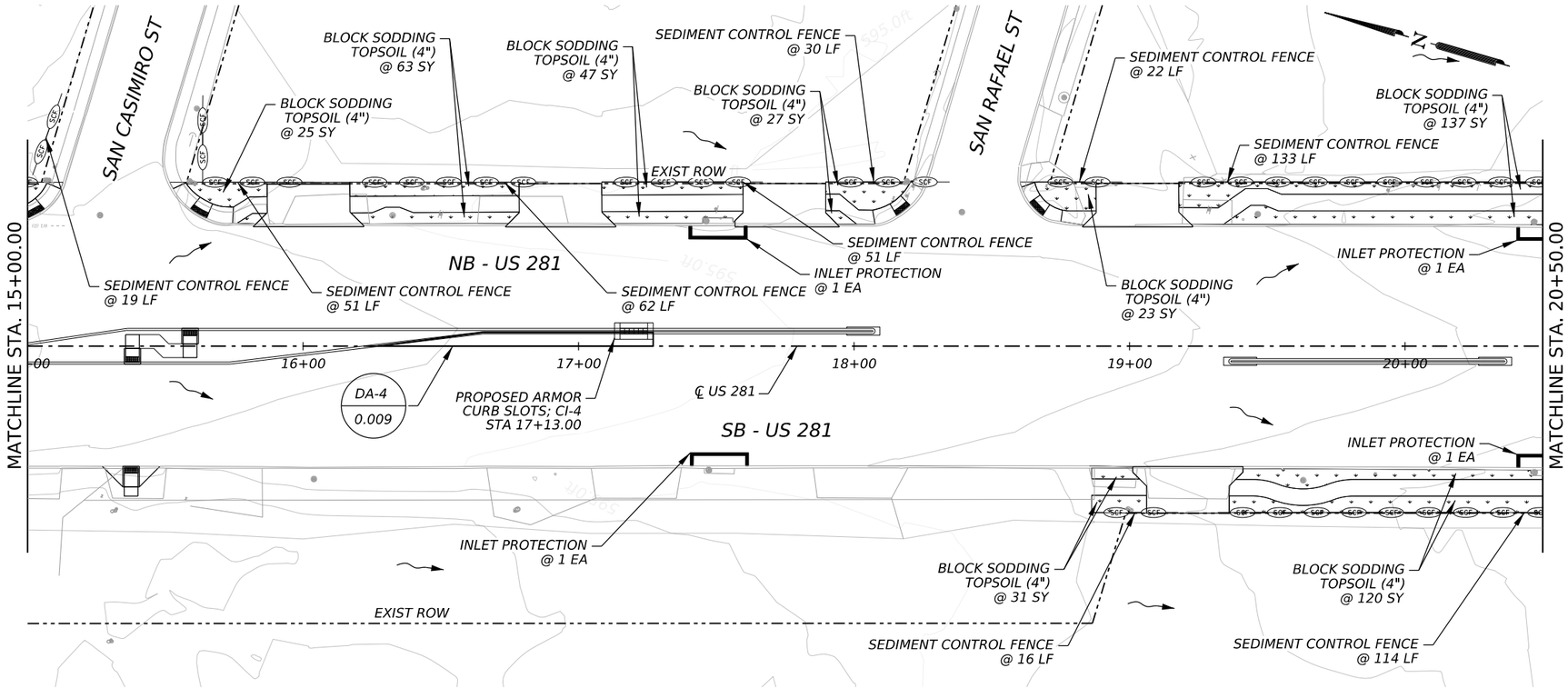
US 281

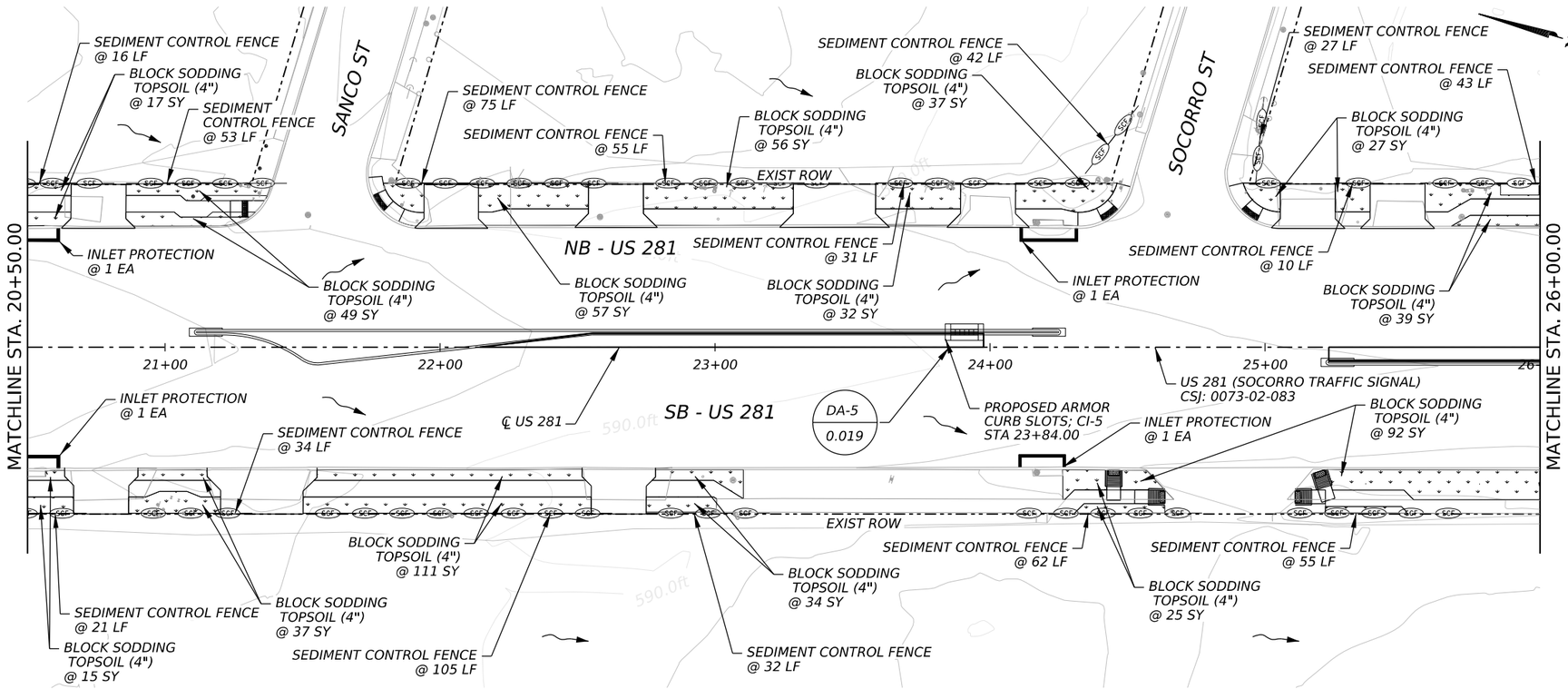
SW3P AND INTERNAL DRAINAGE AREA PLAN

SHEET 1 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		117

DATE: 12/22/2023 1:49:12 PM
FILE: c:\pw\kh1\d0251190\US281_SW3P.dgn





QUANTITY SUMMARY				
ITEM		DESCRIPTION	UNIT	QTY
161	6017	COMPOST MANUF TOPSOIL (4")	SY	1079
162	6002	BLOCK SODDING	SY	1079
168	6001	VEGETATIVE WATERING	MG	17
169	6006	SOIL RETENTION BLANKETS (CL 2) (TY F)	SY	1079
506	6021	CONSTRUCTION EXITS (INSTALL) (TY 2)	SY	0
506	6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	1264
506	6042	BIODEG EROSN CONT LOGS (INSTL) (18")	LF	120
506	6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	120

NOTES:

1. *INSTALLED MEASURES SHALL REMAIN IN PLACE AND BE MAINTAINED THROUGHOUT DURATION OF PROJECT OR AS DIRECTED BY ENGINEER.*
2. *SW3P MEASURES SHOWN ARE MINIMUM REQUREMENTS BASED UPON PROJECT DESIGN. INSTALLATION OF SW3P MEASURES WILL BE SHOWN AND MODIFIED TO ACCOMODATE ACTUAL FIELD CONDITIONS.*
3. *CONSTRUCTION EXITS TO BE LOCATED IN THE FIELD AND APPROVED BY THE ENGINEER. THE SIZE OF THE CONSTRICTION EXIT WILL BE 78 SY (50' X 14'). REFER TO STANDARD EC(3) -16 FOR DETAILS.*
4. *SILT FENCE IS TO BE PLACED 1' INSIDE OF THE EXISTING ROW UNLESS STATED OTHERWISE.*
5. *INLET PRODECTION SHOWN FOR CLARITY. SEE EROSION CONTROL LOG DETAIL FOR PLACEMENT AT INLETS.*

LEGEND

- *1-FT CONTOURS*
- *EXISTING ROW*
- *BLOCK SODDING/TOPSOIL (4")*
- *TEMP SEDIMENT CONTROL FENCE*
- *FLOW ARROWS*
- *INLET PROTECTION*
- *DA-X / X.XXX — DRAINAGE AREA ID / AREA IN ACRES*

0' 25' 50'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED PROFESSIONAL ENGINEER
12/21/2023

Kimley»Horn F-928

Texas Department of Transportation

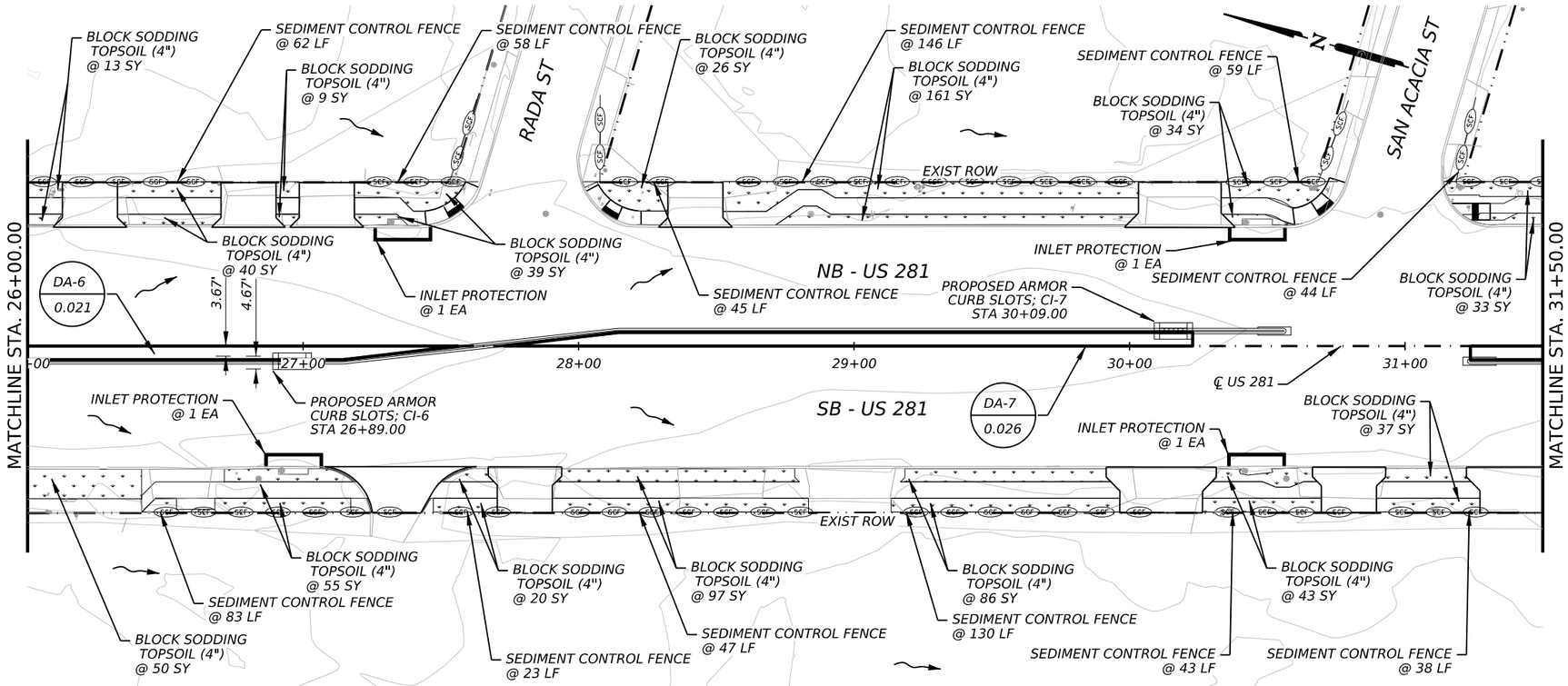
US 281

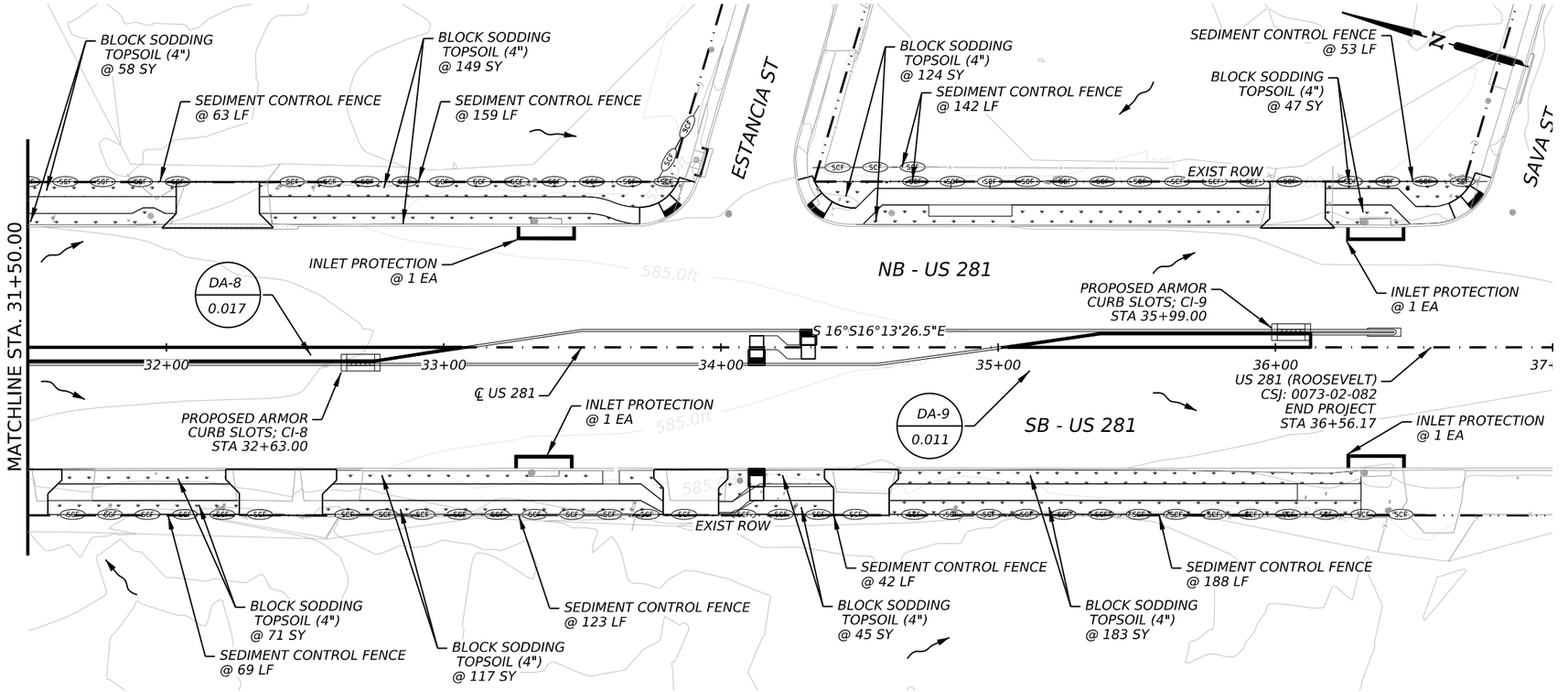
SW3P AND INTERNAL DRAINAGE AREA PLAN

SHEET 2 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		118

DATE: 12/22/2023 12:38:18 AM
FILE: c:\pw\kh1\d0251190\US281_SW3P.dgn





QUANTITY SUMMARY				
ITEM		DESCRIPTION	UNIT	QTY
161	6017	COMPOST MANUF TOPSOIL (4")	SY	1537
162	6002	BLOCK SODDING	SY	1537
168	6001	VEGETATIVE WATERING	MG	24
169	6006	SOIL RETENTION BLANKETS (CL 2) (TY F)	SY	1537
506	6021	CONSTRUCTION EXITS (INSTALL) (TY 2)	SY	156
506	6024	CONSTRUCTION EXITS (REMOVE)	SY	156
506	6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	1617
506	6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	1617
506	6042	BIODEG EROSN CONT LOGS (INSTL) (18")	LF	160
506	6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	160

NOTES:

1. *INSTALLED MEASURES SHALL REMAIN IN PLACE AND BE MAINTAINED THROUGHOUT DURATION OF PROJECT OR AS DIRECTED BY ENGINEER.*
2. *SW3P MEASURES SHOWN ARE MINIMUM REQUREMENTS BASED UPON PROJECT DESIGN. INSTALLATION OF SW3P MEASURES WILL BE SHOWN AND MODIFIED TO ACCOMODATE ACTUAL FIELD CONDITIONS.*
3. *CONSTRUCTION EXITS TO BE LOCATED IN THE FIELD AND APPROVED BY THE ENGINEER. THE SIZE OF THE CONSTRICTION EXIT WILL BE 78 SY (50' X 14'). REFER TO STANDARD EC(3) -16 FOR DETAILS.*
4. *SILT FENCE IS TO BE PLACED 1' INSIDE OF THE EXISTING ROW UNLESS STATED OTHERWISE.*
5. *INLET PRODECTION SHOWN FOR CLARITY. SEE EROSION CONTROL LOG DETAIL FOR PLACEMENT AT INLETS.*

LEGEND

- *1-FT CONTOURS*
- *EXISTING ROW*
- *BLOCK SODDING/TOPSOIL (4")*
- SCF — *TEMP SEDIMENT CONTROL FENCE*
- *FLOW ARROWS*
- *INLET PROTECTION*
- DA-X / X.XXX — *DRAINAGE AREA ID / AREA IN ACRES*

0' 25' 50'

SCALE

TYLER BARROWS 147138 LICENSED PROFESSIONAL ENGINEER
12/21/2023

Kimley»Horn F-928

Texas Department of Transportation

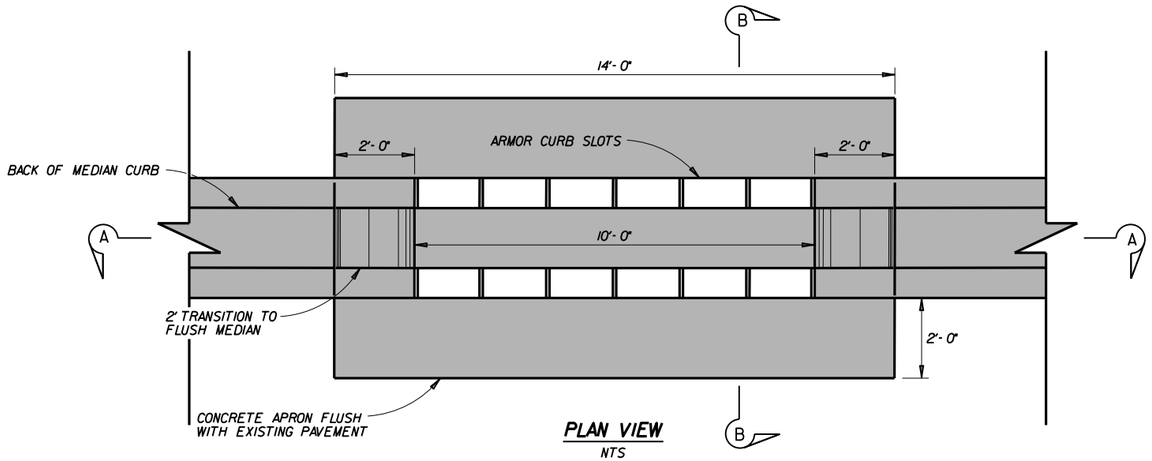
US 281

SW3P AND INTERNAL DRAINAGE AREA PLAN

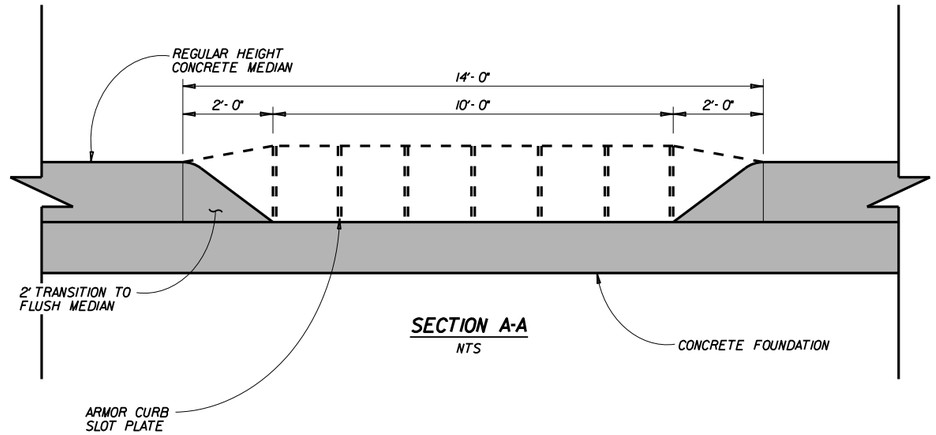
SHEET 3 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		119

DATE: 12/21/2023 4:42:37 PM
FILE: c:\pw\kh1\d0251190\US281_SW3P.dgn



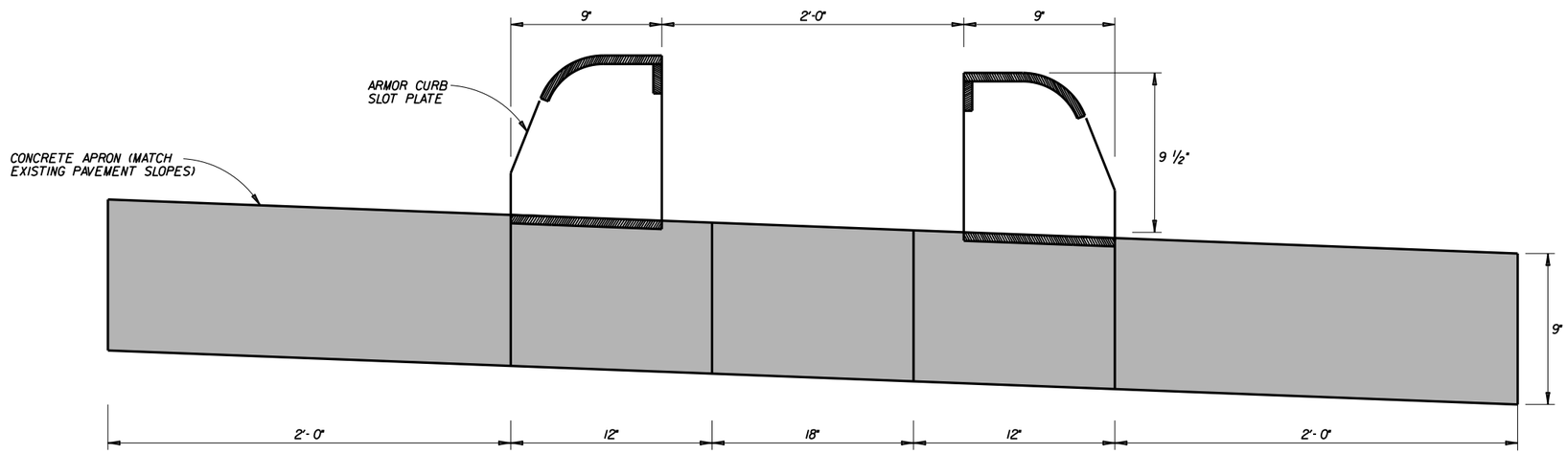
PLAN VIEW
NTS



SECTION A-A
NTS

NOTES

1. REFERENCE THE MODIFIED ARMOR CURB SLOT DETAIL FOR ADDITIONAL DETAILS AND DIMENSIONS.
2. DIMENSIONS GIVEN ON THIS SHEET SHALL NOT SUPERCEDE THOSE SHOWN ON THE MODIFIED ARMOR CURB SLOT DETAIL UNLESS APPROVED BY THE ENGINEER.



SECTION B-B
NTS

DATE: 11/21/2023 5:01:53 PM
FILE: c:\pwikh1\d0277925\US281_ARMR_DTL.dgn

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED PROFESSIONAL ENGINEER
11/21/2023

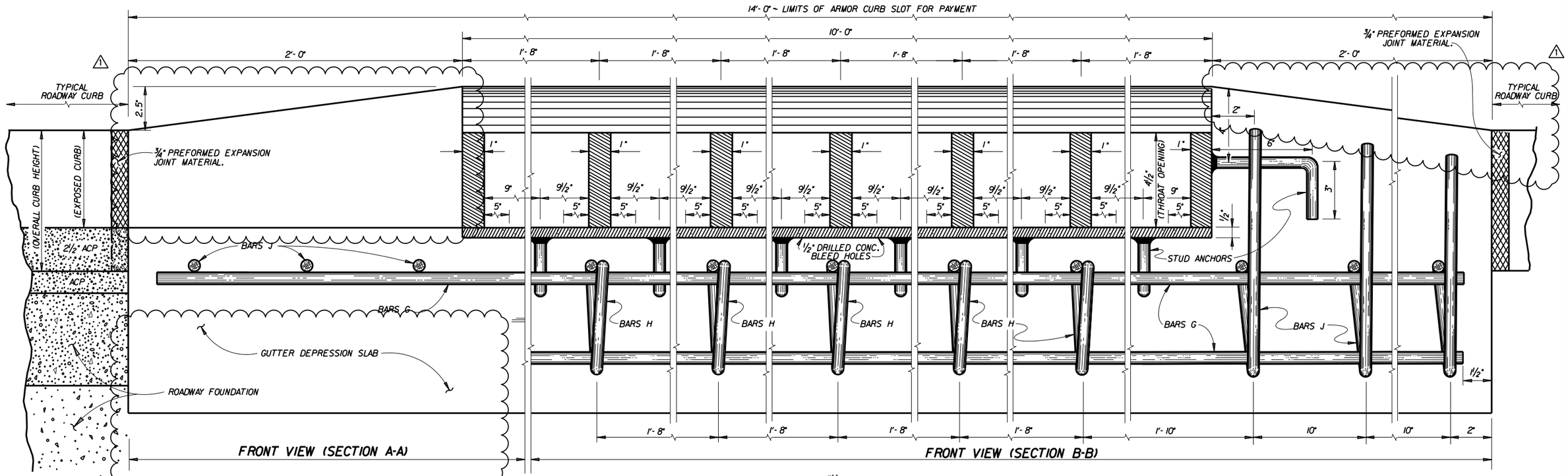
Kimley»Horn F-928

Texas Department of Transportation

US 281

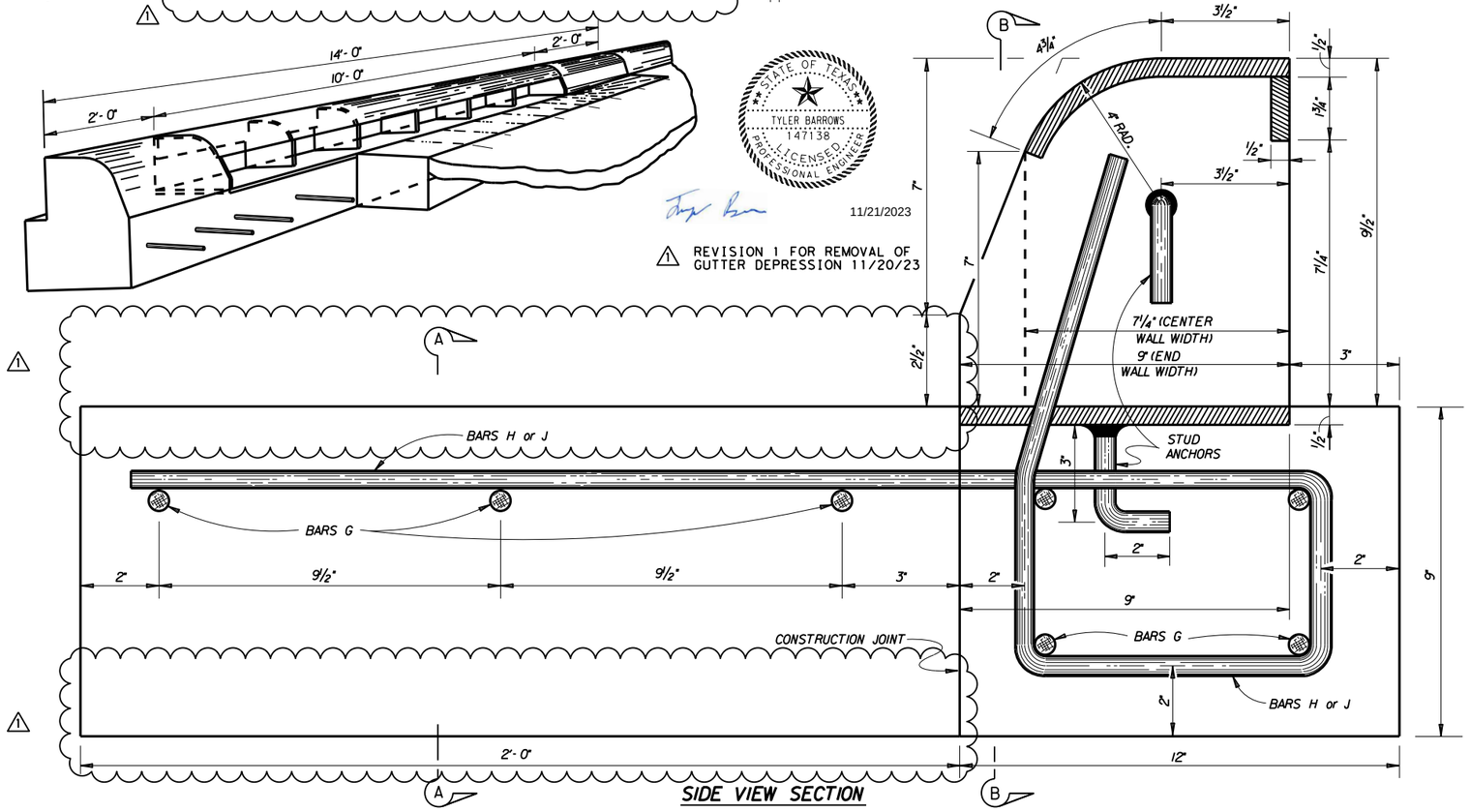
ARMOR CURB SLOT DETAIL

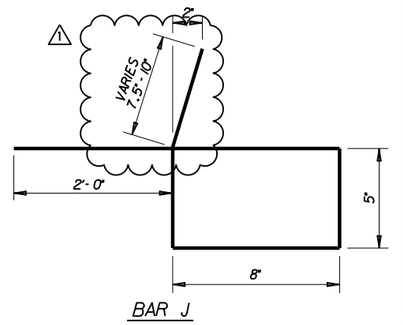
FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		120

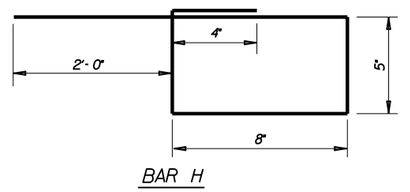


STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
11/21/2023

⚠1 REVISION 1 FOR REMOVAL OF GUTTER DEPRESSION 11/20/23







ESTIMATED QUANTITIES
FOR REINFORCING STEEL

BAR	NO.	SIZE	SPAC.	LENGTH	WEIGHT
G	7	#4	SHOWN	13'-9"	64
H	5	#4	1'-8"	4'-6"	15
J	6	#4	8"	5'-0" (TYP)	19.625
TOTAL WEIGHT *				LBS.	98.625
CONCRETE FOR FOUNDATION *				C.Y.	0.47
CONCRETE FOR GUTTER DEPRESSION *				C.Y.	0.78

⚠1

STRUCTURAL STEEL FOR ARMOR CURB SLOT

STUD ANCHORS (1/2"DIA.)	LBS.	3.5
STEEL PLATE	LBS.	451
TOTAL WEIGHT *	LBS.	454.5

* FOR CONTRACTORS INFO ONLY.

GENERAL NOTES:

ALL CONCRETE SHALL BE CL."A".

ALL DIMENSIONS RELATING TO REINFORCING STEEL ARE TO CENTER OF BARS.

ALL SIDES OF ARMOR CURB SLOT AND STUD ANCHORS SHALL BE 1/4" FILLET WELDS.

ALL EXPOSED STRUCTURAL STEEL (ARMOR) SHALL BE GALVANIZED.

ALL EXPOSED EDGES ON ARMOR CURB SHALL RECEIVE A 1/8" BEVEL.

THE SHAPE OF THE TYPICAL ROADWAY CURB SHALL TRANSITION TO THE ARMOR CURB AS APPROVED BY THE ENGINEER.

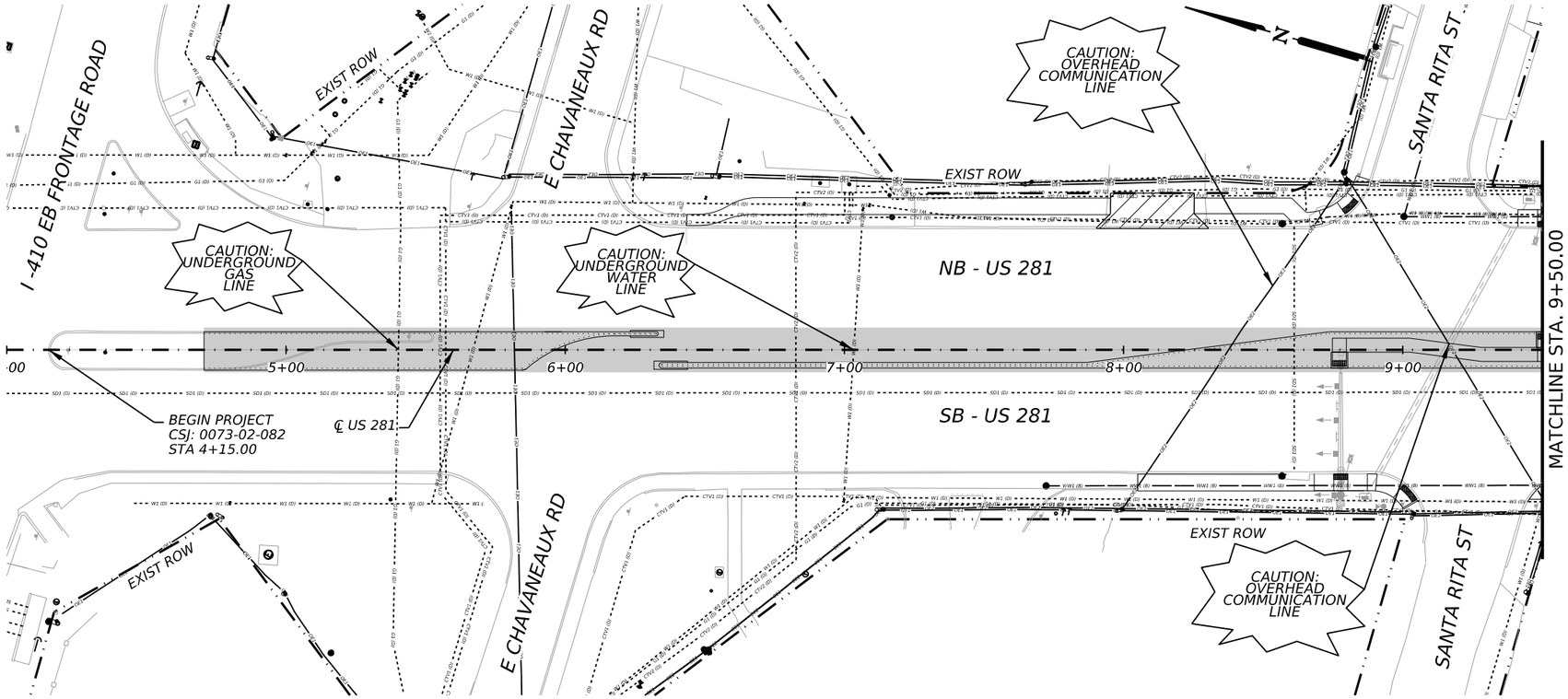
© 1998 Texas Department of Transportation

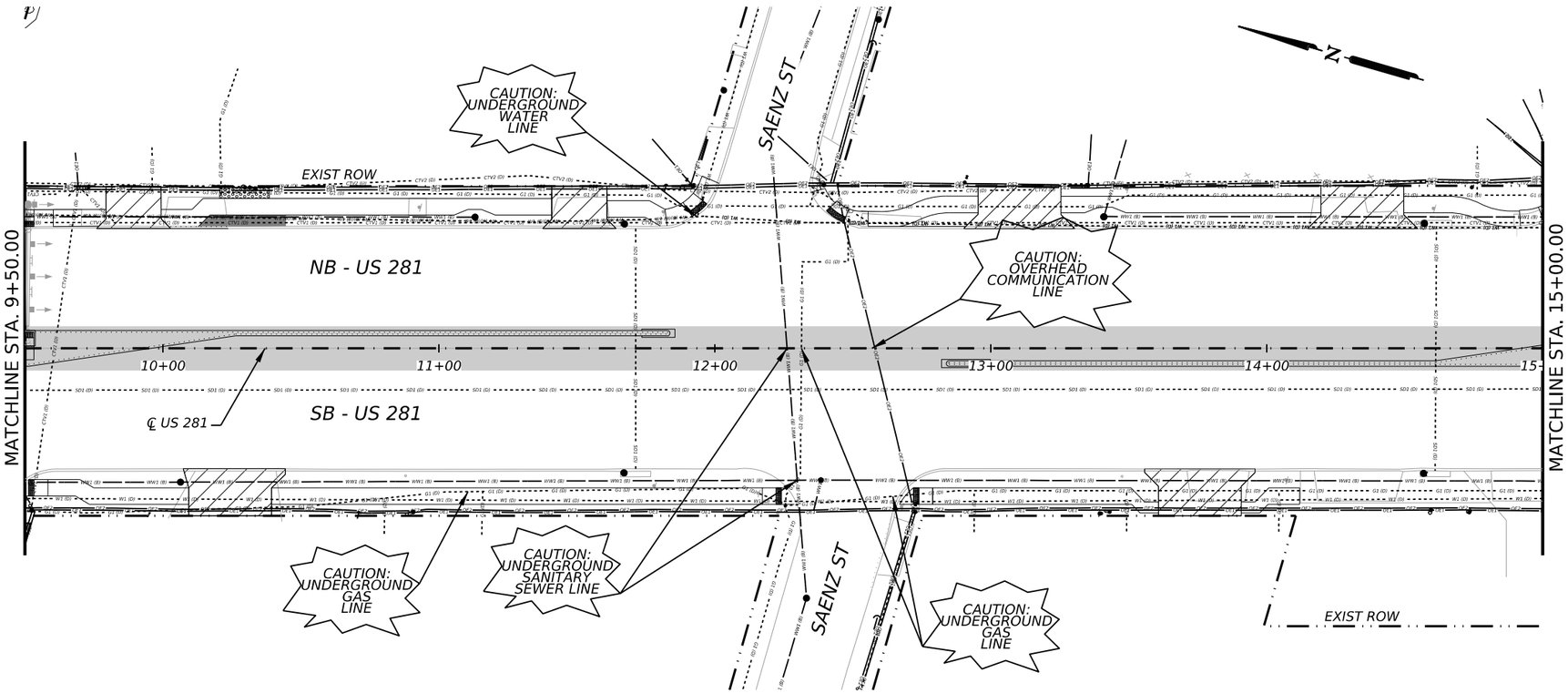
ARMOR CURB SLOT
WITH CONCRETE FOUNDATION
SAN ANTONIO DISTRICT STANDARDS

10/95
REV. 07/01

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			121
STATE	STATE DISTRICT	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
0073	02	082	US 281

STRUCTURE DESIGN
/BRIDGE/STDS/ARMORCURB.DGN





LEGEND

- EXISTING FEATURES
- EXISTING ROW
- W1 — SAWS (WATER)
- WW1 — SAWS(SEWER)
- CTV1 — ATT UNDERGROUND TELEPHONE
- CTV2 — ZAYO UNDERGROUND TELEPHONE
- G1 — CPS GAS
- SD1 — STORM LINE
- OE1 — CPS OVERHEAD ELECTRIC
- OE2 — ATT OVERHEAD TELEPHONE

NOTES:

1. LOCATIONS OF EXISTING UTILITIES SHOWN ARE APPROXIMATE. CONTRACTOR TO FIELD VERIFY PRIOR TO CONSTRUCTION.
2. ALL UTILITIES SHOWN ARE FROM QUALITY LEVELS "C" & "D" INVESTIGATIONS.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING AND LOCATING ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION. CONTRACTOR SHALL PROTECT EXISTING UTILITIES DURING CONSTRUCTION. THE CONTRACTOR WILL BE SOLEY RESPONSIBLE FOR ANY DAMAGE CAUSED BY THE CONSTRUCTION OPERATIONS TO EXISTING UTILITIES.

0' 25' 50'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER

11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

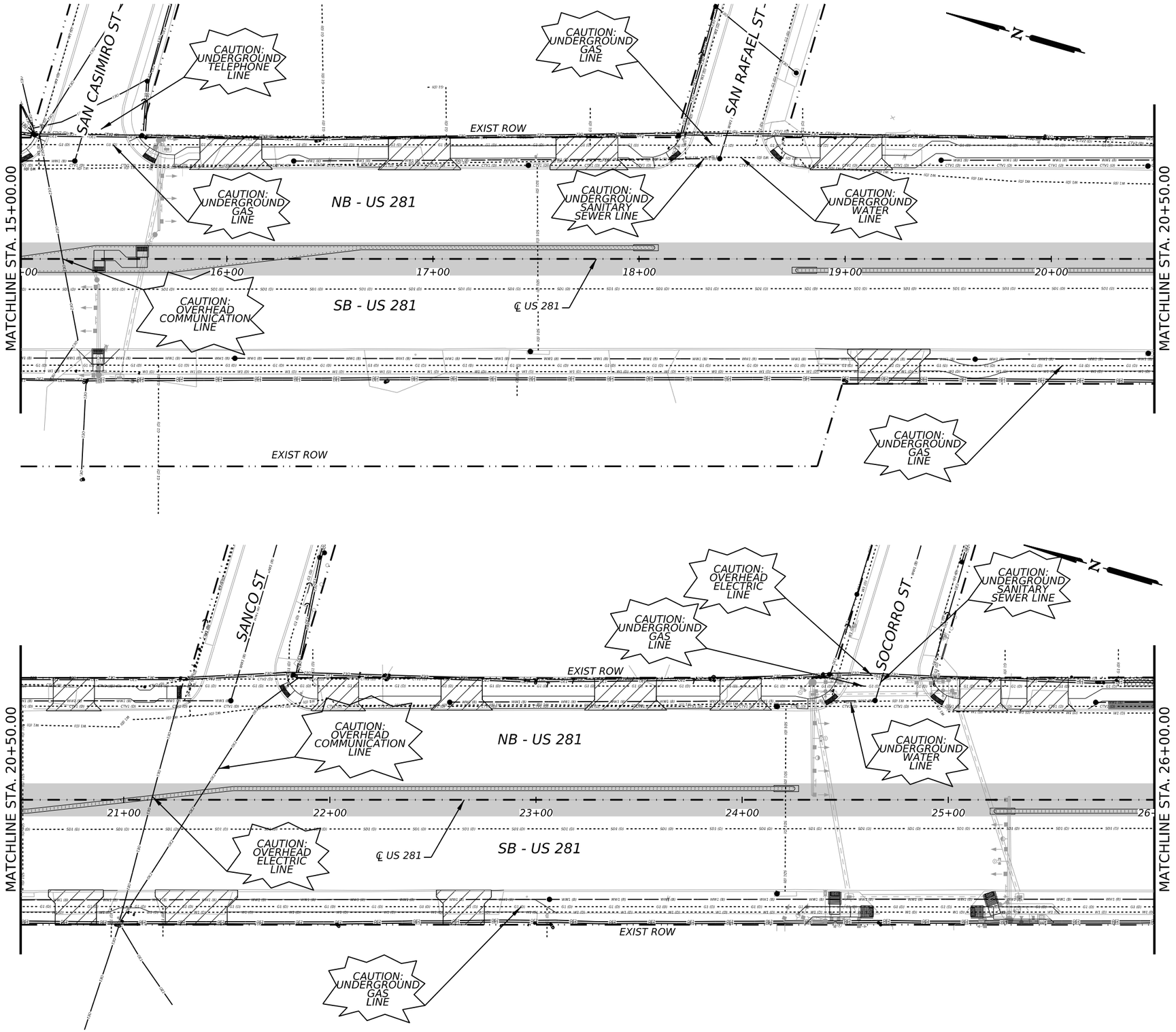
US 281

UTILITY LAYOUT

SHEET 1 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		122

DATE: 11/21/2023 3:49:22 PM
FILE: c:\pw\kh1\d0251187\US281_ROADWAY UTILITY.dgn



LEGEND

- EXISTING FEATURES
- EXISTING ROW
- W1 — SAWS (WATER)
- WW1 — SAWS(SEWER)
- CTV1 — ATT UNDERGROUND TELEPHONE
- CTV2 — ZAYO UNDERGROUND TELEPHONE
- G1 — CPS GAS
- SD1 — STORM LINE
- OE1 — CPS OVERHEAD ELECTRIC
- OE2 — ATT OVERHEAD TELEPHONE

NOTES:

1. LOCATIONS OF EXISTING UTILITIES SHOWN ARE APPROXIMATE. CONTRACTOR TO FIELD VERIFY PRIOR TO CONSTRUCTION.
2. ALL UTILITIES SHOWN ARE FROM QUALITY LEVELS "C" & "D" INVESTIGATIONS.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING AND LOCATING ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION. CONTRACTOR SHALL PROTECT EXISTING UTILITIES DURING CONSTRUCTION. THE CONTRACTOR WILL BE SOLEY RESPONSIBLE FOR ANY DAMAGE CAUSED BY THE CONSTRUCTION OPERATIONS TO EXISTING UTILITIES.

0' 25' 50'

SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER

11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

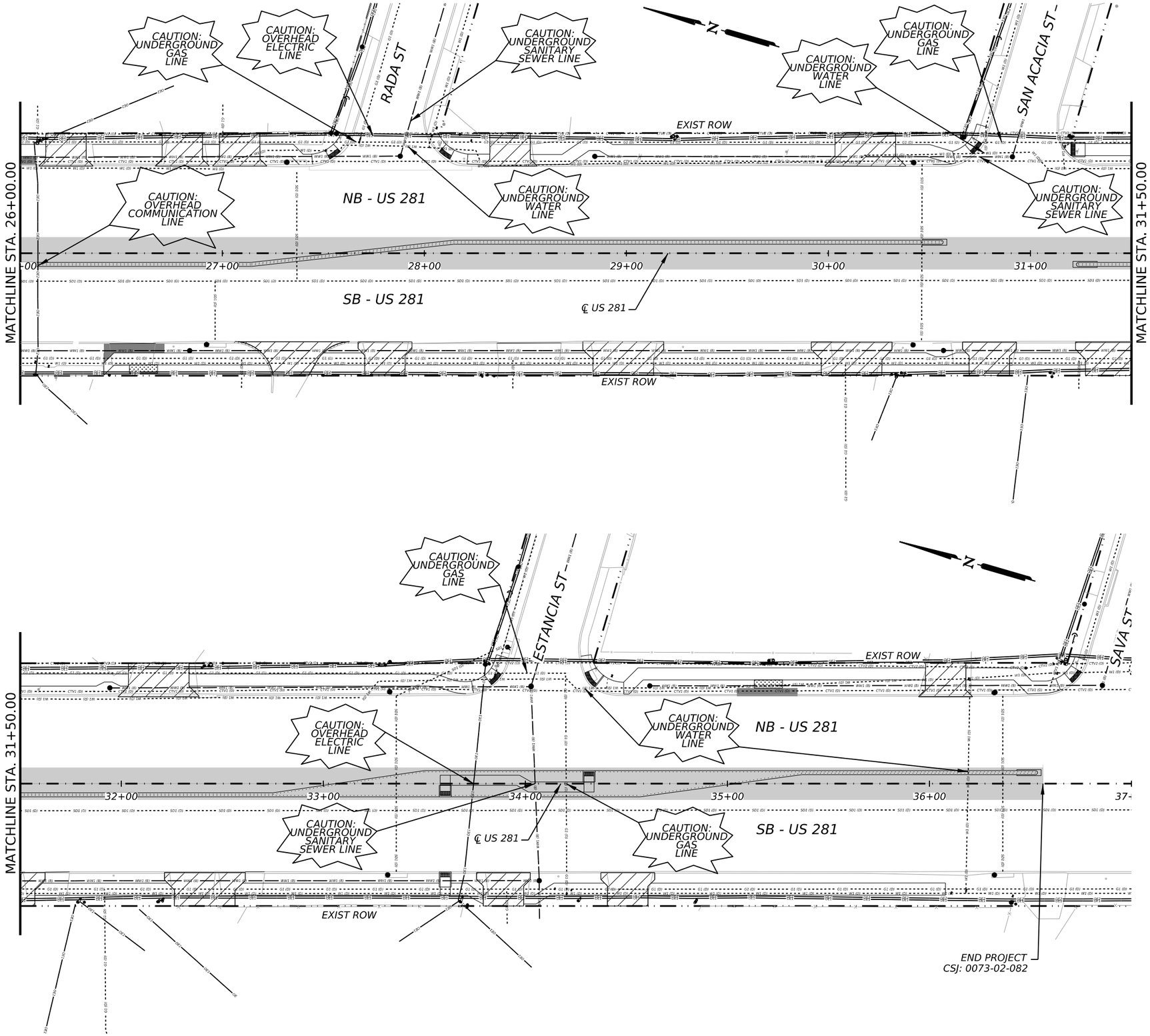
US 281

UTILITY LAYOUT

SHEET 2 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		123

DATE: 11/21/2023 3:49:23 PM
FILE: c:\pw\kh1\d0251187\US281_ROADWAY UTILITY.dgn



LEGEND

- EXISTING FEATURES
- EXISTING ROW
- SAWS (WATER)
- SAWS(SEWER)
- ATT UNDERGROUND TELEPHONE
- ZAYO UNDERGROUND TELEPHONE
- CPS GAS
- STORM LINE
- CPS OVERHEAD ELECTRIC
- ATT OVERHEAD TELEPHONE

NOTES:

1. LOCATIONS OF EXISTING UTILITIES SHOWN ARE APPROXIMATE. CONTRACTOR TO FIELD VERIFY PRIOR TO CONSTRUCTION.
2. ALL UTILITIES SHOWN ARE FROM QUALITY LEVELS "C" & "D" INVESTIGATIONS.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING AND LOCATING ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION. CONTRACTOR SHALL PROTECT EXISTING UTILITIES DURING CONSTRUCTION. THE CONTRACTOR WILL BE SOLEY RESPONSIBLE FOR ANY DAMAGE CAUSED BY THE CONSTRUCTION OPERATIONS TO EXISTING UTILITIES.

0' 25' 50'

SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER

11/21/2023

Kimley»Horn F-928

Texas Department of Transportation

US 281

UTILITY LAYOUT

SHEET 3 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		124

DATE: 11/21/2023 3:49:24 PM
FILE: c:\pw\kh1\d0251187\US281_ROADWAY UTILITY.dgn

1 

W11-2
W16-9P

2 

R1-5bL

3 

R1-5bR

4 

R3-7

5 

W12-2
W12-2Tp

6 

R2-1

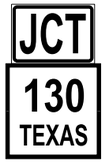
7 
R4-7

8 

D3-1
D3-1
R1-1

9 

D3-1
D3-1
R1-1

10 

M2-1
M1-6T

11 

D3-1
D3-1
R1-1

12 

D3-1
D3-1
R1-1

13 

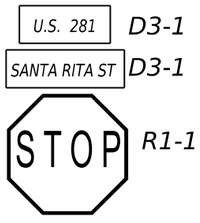
D3-1
D3-1
R1-1

14 

D3-1
D3-1
R1-1

15 

D3-1
D3-1
R1-1

16 

D3-1
D3-1
R1-1

17 

D13-3a

18 

D3-1
D3-1
R1-1

19 

R6-2R

NOTES:

1. SEE SUMMARY OF SMALL SIGNS FOR SIGN DIMENSIONS

TYLER BARROWS
147138
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
11/21/2023

Kimley»Horn
F-928

© 2023

Texas Department of Transportation

US 281

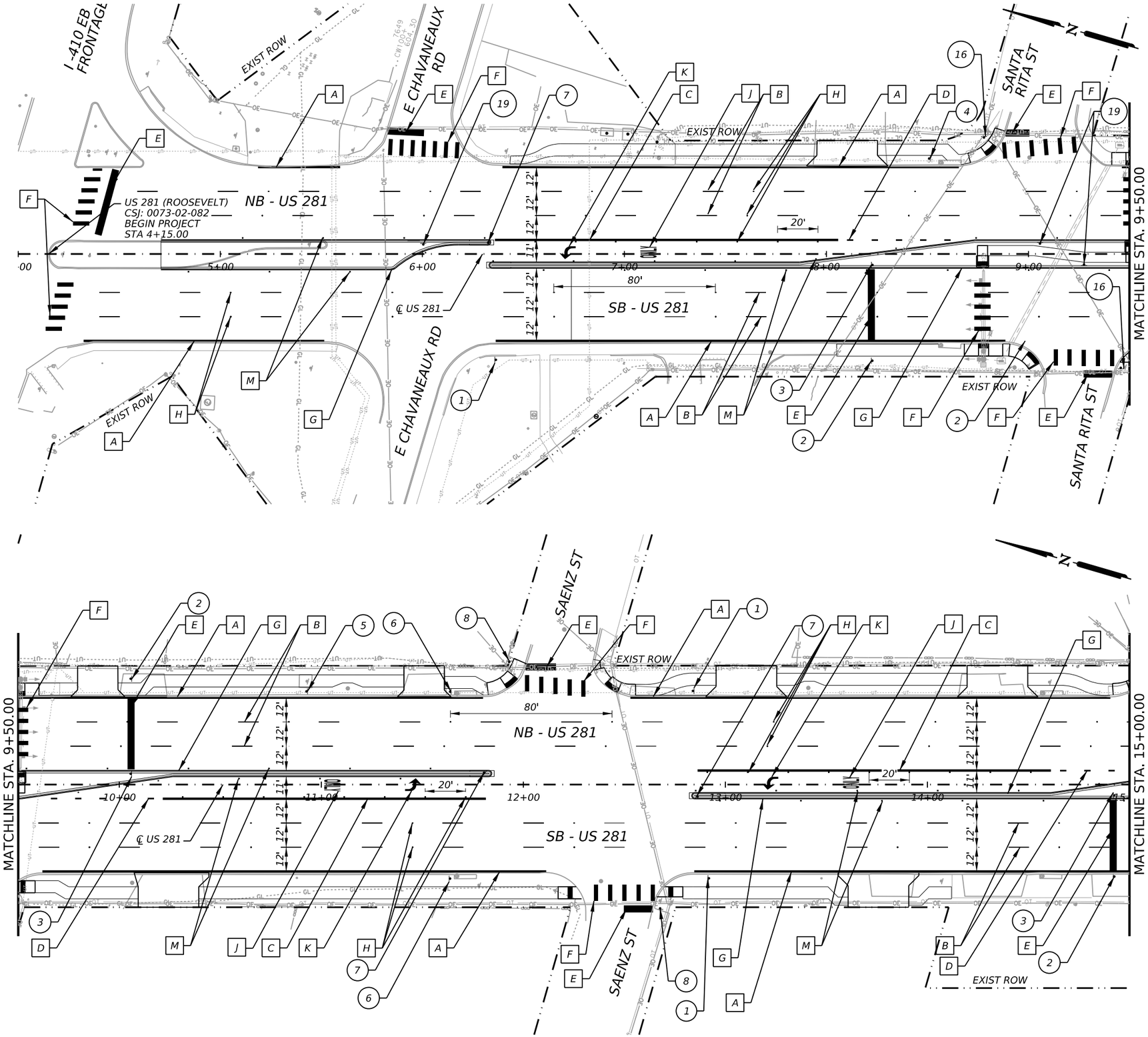
SIGN LEGEND

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	US 281

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAT	BEXAR	125
CONT.	SECT.	JOB	
0073	02	082	

FILENAME: c:\pw\kh1\d0251189\US281_SPMD_LEGEND.dgn
PLOTTED: 11/21/2023 3:46:12 PM



QUANTITY SUMMARY				
ITEM		DESCRIPTION	UNIT	QTY
666	6030	REFL PAV MRK TY I (W)8"(DOT)(100MIL)	LF	39
666	6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	505
666	6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	1174
666	6054	REFL PAV MRK TY I (W)(ARROW)(100MIL)	EA	3
666	6078	REFL PAV MRK TY I (W)(WORD)(100MIL)	EA	3
666	6225	PAVEMENT SEALER 6"	LF	4520
666	6226	PAVEMENT SEALER 8"	LF	544
666	6230	PAVEMENT SEALER 24"	LF	1174
666	6231	PAVEMENT SEALER (ARROW)	EA	3
666	6232	PAVEMENT SEALER (WORD)	EA	3
666	6306	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	LF	1066
666	6343	REF PROF PAV MRK TY I(W)6"(SLD)(100MIL)	LF	1579
666	6347	REF PROF PAV MRK TY I(Y)6"(SLD)(100MIL)	LF	1875
672	6009	REFL PAV MRKR TY II-A-A	EA	189
672	6010	REFL PAV MRKR TY II-C-R	EA	79
677	6001	ELIM EXT PAV MRK & MRKS (4")	LF	972
677	6007	ELIM EXT PAV MRK & MRKS (24")	LF	145
677	6009	ELIM EXT PAV MRK & MRKS (DBL ARROW)	EA	2
678	6002	PAV SURF PREP FOR MRK (6")	LF	4520
678	6008	PAV SURF PREP FOR MRK (24")	LF	1174

LEGEND

- EXISTING FEATURES
- EDGE OF PAVEMENT
- EXISTING ROW
- EXISTING SIGN
- PROPOSED SIGN STRUCTURE
- (#) PROPOSED SIGN
- [#] PROPOSED PAVEMENT MARKINGS

A	REFL PAV MRK TY I (W) 6" (SLD)
B	REFL PAV MRK TY I (W) 6" (BRK)
C	REFL PAV MRK TY I (W) 8" (SLD)
D	REFL PAV MRK TY I (W) 8" (DOT)
E	REFL PAV MRK TY I (W) 24" (SLD)
F	REFL PAV MRK TY I (W) 24" (CROSSWALK)
G	REFL PAV MRK TY I (Y) 6" (SLD)
H	REFL PAV MRKR TY II-C-R
J	PREFAB PAV MRK TY C (W) (WORD)
K	PREFAB PAV MRK TY C (W) (ARROW)
L	PREFAB PAV MRK TY C (W) (UTURN)
M	REFL PAV MRKR TY II A-A

NOTES:
1. REMOVE ALL PAVEMENT MARKINGS FROM STA 4+00 TO STA 36+50.
2. REFER TO SUMMARY OF SMALL SIGNS FOR SIGN DIMENSIONS.
3. REFER TO SIGN LEGEND FOR SIGN TYPES.

0' 25' 50'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED PROFESSIONAL ENGINEER
12/21/2023

Kimley»Horn F-928

Texas Department of Transportation

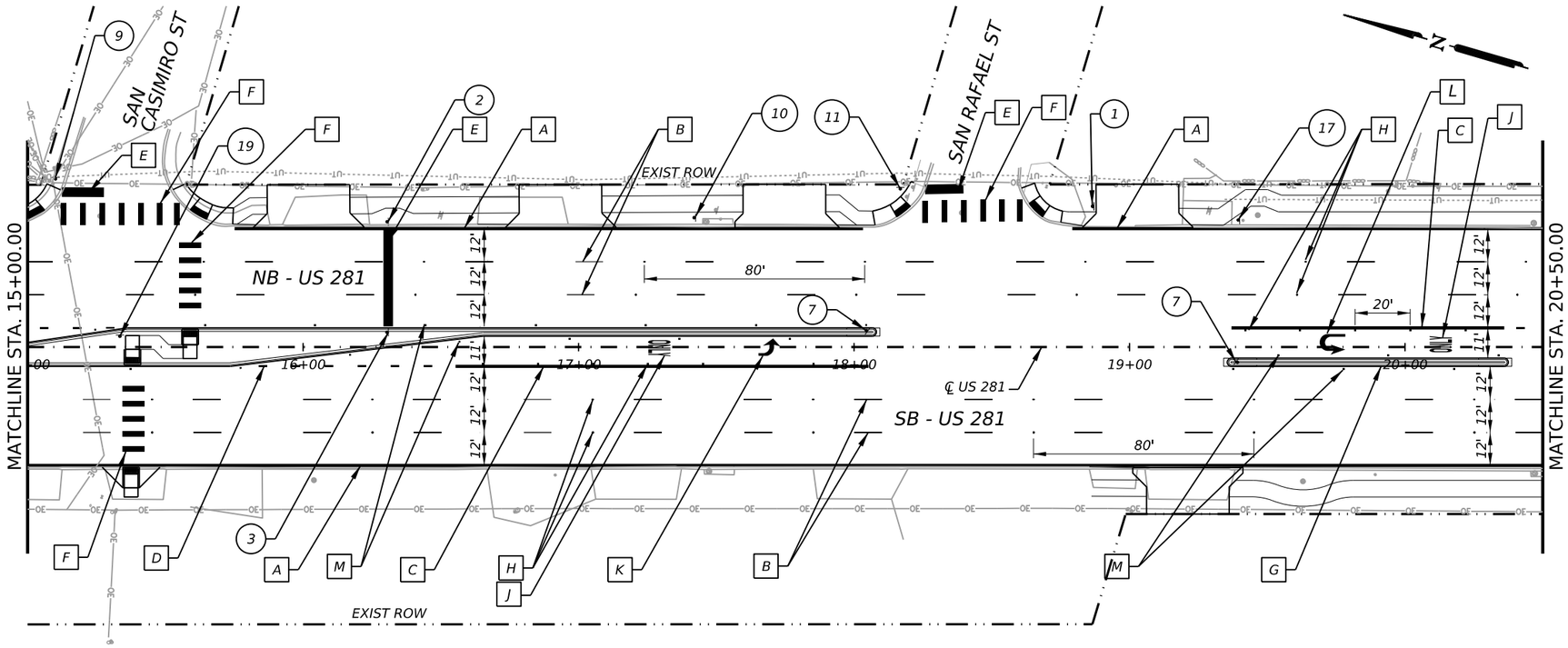
US 281

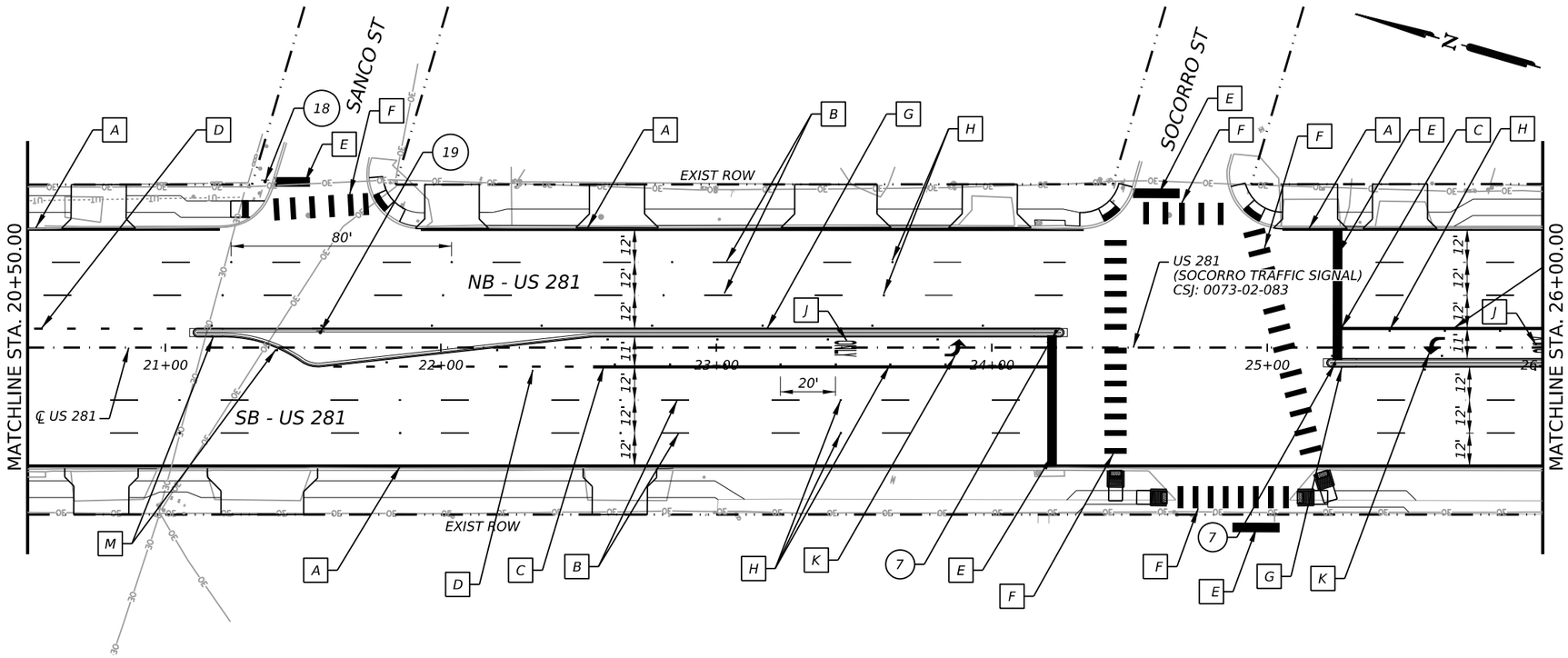
SIGNING AND PAVEMENT MARKING LAYOUT

SHEET 1 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		126

DATE: 12/23/2023 9:45:51 AM
FILE: c:\pw\khi1d025118g\US281_ROADWAY_SPMD1.dgn





QUANTITY SUMMARY				
ITEM		DESCRIPTION	UNIT	QTY
666	6030	REFL PAV MRK TY I (W)8"(DOT)(100MIL)	LF	74
666	6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	491
666	6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	1547
666	6054	REFL PAV MRK TY I (W)(ARROW)(100MIL)	EA	3
666	6063	REFL PAV MRK TY I(W)(UTURN ARW)(100MIL)	EA	1
666	6078	REFL PAV MRK TY I (W)(WORD)(100MIL)	EA	4
666	6225	PAVEMENT SEALER 6"	LF	4698
666	6226	PAVEMENT SEALER 8"	LF	563
666	6230	PAVEMENT SEALER 24"	LF	1547
666	6231	PAVEMENT SEALER (ARROW)	EA	4
666	6232	PAVEMENT SEALER (WORD)	EA	4
666	6306	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	LF	1000
666	6343	REF PROF PAV MRK TY I(W)6"(SLD)(100MIL)	LF	1904
666	6347	REF PROF PAV MRK TY I(Y)6"(SLD)(100MIL)	LF	1794
672	6009	REFL PAV MRKR TY II-A-A	EA	181
672	6010	REFL PAV MRKR TY II-C-R	EA	75
677	6001	ELIM EXT PAV MRK & MRKS (4")	LF	986
678	6002	PAV SURF PREP FOR MRK (6")	LF	4698
678	6008	PAV SURF PREP FOR MRK (24")	LF	1547

LEGEND

- EXISTING FEATURES
- EDGE OF PAVEMENT
- EXISTING ROW
- EXISTING SIGN
- PROPOSED SIGN STRUCTURE
- (#) PROPOSED SIGN
- [#] PROPOSED PAVEMENT MARKINGS

A	REFL PAV MRK TY I (W) 6" (SLD)
B	REFL PAV MRK TY I (W) 6" (BRK)
C	REFL PAV MRK TY I (W) 8" (SLD)
D	REFL PAV MRK TY I (W) 8" (DOT)
E	REFL PAV MRK TY I (W) 24" (SLD)
F	REFL PAV MRK TY I (W) 24" (CROSSWALK)
G	REFL PAV MRK TY I (Y) 6" (SLD)
H	REFL PAV MRKR TY II-C-R
J	PREFAB PAV MRK TY C (W) (WORD)
K	PREFAB PAV MRK TY C (W) (ARROW)
L	PREFAB PAV MRK TY C (W) (UTURN)
M	REFL PAV MRKR TY II A-A

NOTES:
1. REMOVE ALL PAVEMENT MARKINGS FROM STA 4+00 TO STA 36+50.
2. REFER TO SUMMARY OF SMALL SIGNS FOR SIGN DIMENSIONS.
3. REFER TO SIGN LEGEND FOR SIGN TYPES.

0' 25' 50'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
12/21/2023

Kimley»Horn F-928

Texas Department of Transportation

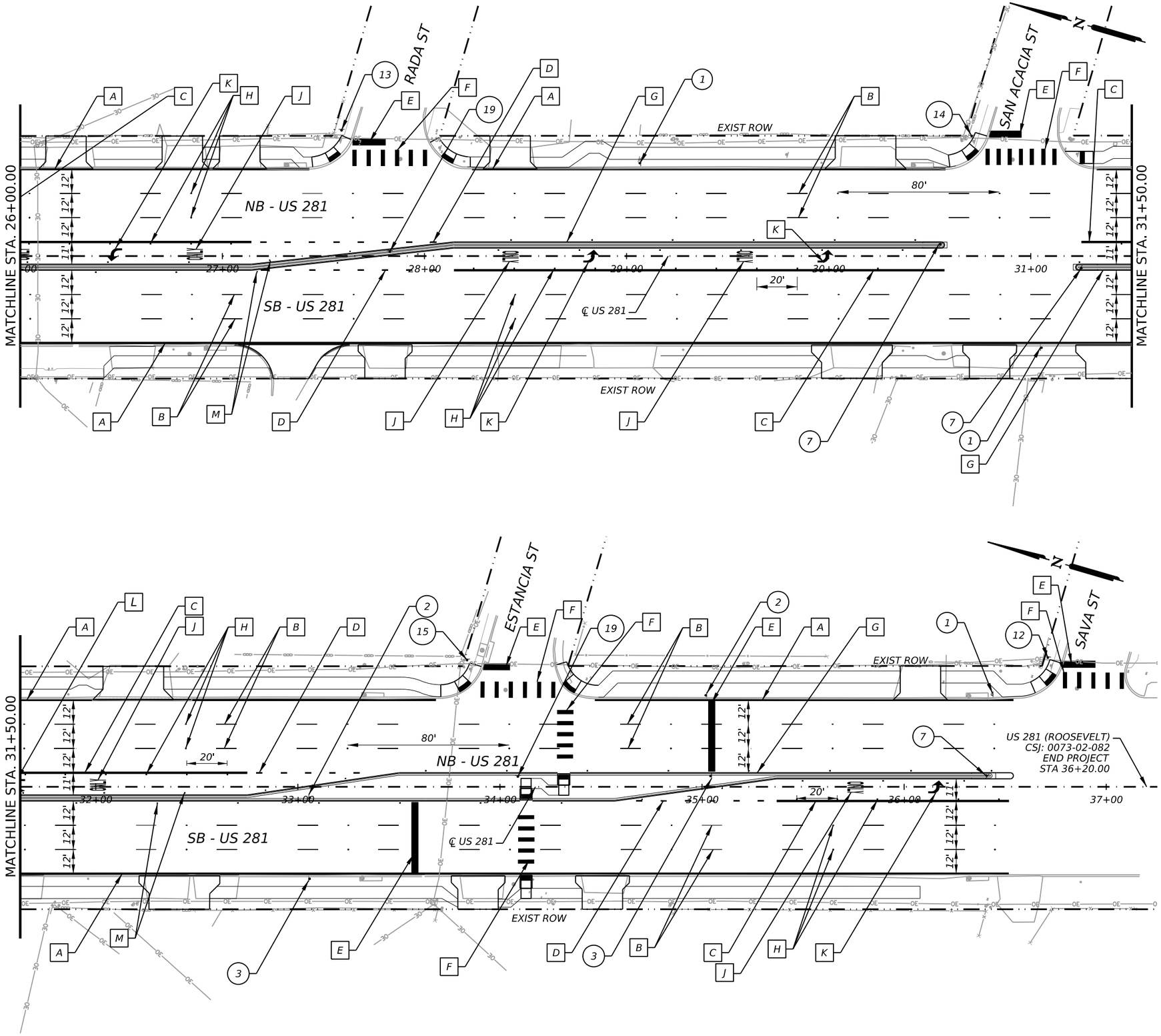
US 281

SIGNING AND PAVEMENT MARKING LAYOUT

SHEET 2 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		127

DATE: 12/23/2023 9:45:52 AM
FILE: c:\pw\kh1\d0251189\US281_ROADWAY_SPMD1.dgn



QUANTITY SUMMARY				
ITEM		DESCRIPTION	UNIT	QTY
666	6030	REFL PAV MRK TY I (W)8"(DOT)(100MIL)	LF	82
666	6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	622
666	6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	813
666	6054	REFL PAV MRK TY I (W)(ARROW)(100MIL)	EA	4
666	6063	REFL PAV MRK TY I(W)(UTURN ARW)(100MIL)	EA	1
666	6078	REFL PAV MRK TY I (W)(WORD)(100MIL)	EA	5
666	6225	PAVEMENT SEALER 6"	LF	4901
666	6226	PAVEMENT SEALER 8"	LF	704
666	6230	PAVEMENT SEALER 24"	LF	813
666	6231	PAVEMENT SEALER (ARROW)	EA	5
666	6232	PAVEMENT SEALER (WORD)	EA	5
666	6306	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	LF	1052
666	6343	REF PROF PAV MRK TY I(W)6"(SLD)(100MIL)	LF	1872
666	6347	REF PROF PAV MRK TY I(Y)6"(SLD)(100MIL)	LF	1977
672	6009	REFL PAV MRKR TY II-A-A	EA	200
672	6010	REFL PAV MRKR TY II-C-R	EA	84
677	6001	ELIM EXT PAV MRK & MRKS (4")	LF	935
678	6002	PAV SURF PREP FOR MRK (6")	LF	4901
678	6008	PAV SURF PREP FOR MRK (24")	LF	813

LEGEND

- EXISTING FEATURES
- EDGE OF PAVEMENT
- EXISTING ROW
- EXISTING SIGN
- PROPOSED SIGN STRUCTURE
- (#) PROPOSED SIGN
- [#] PROPOSED PAVEMENT MARKINGS

A	REFL PAV MRK TY I (W) 6" (SLD)
B	REFL PAV MRK TY I (W) 6" (BRK)
C	REFL PAV MRK TY I (W) 8" (SLD)
D	REFL PAV MRK TY I (W) 8" (DOT)
E	REFL PAV MRK TY I (W) 24" (SLD)
F	REFL PAV MRK TY I (W) 24" (CROSSWALK)
G	REFL PAV MRK TY I (Y) 6" (SLD)
H	REFL PAV MRKR TY II-C-R
J	PREFAB PAV MRK TY C (W) (WORD)
K	PREFAB PAV MRK TY C (W) (ARROW)
L	PREFAB PAV MRK TY C (W) (UTURN)
M	REFL PAV MRKR TY II A-A

NOTES:
1. REMOVE ALL PAVEMENT MARKINGS FROM STA 4+00 TO STA 36+50.
2. REFER TO SUMMARY OF SMALL SIGNS FOR SIGN DIMENSIONS.
3. REFER TO SIGN LEGEND FOR SIGN TYPES.

0' 25' 50'
SCALE

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER
12/21/2023

Kimley»Horn F-928

Texas Department of Transportation

US 281

SIGNING AND PAVEMENT MARKING LAYOUT

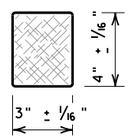
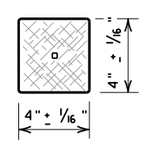
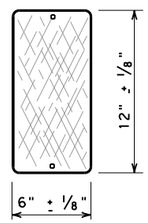
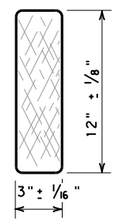
SHEET 3 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		128

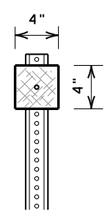
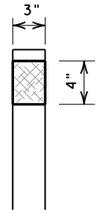
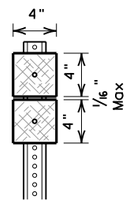
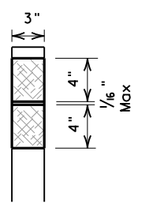
DATE: 12/23/2023 9:45:53 AM
FILE: c:\pw\kh1\d0251189\US281_ROADWAY_SPMD1.dgn

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.

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

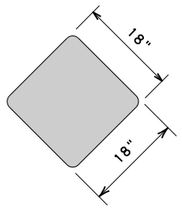
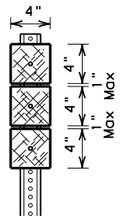
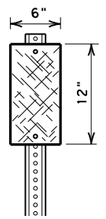
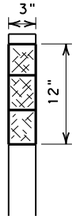
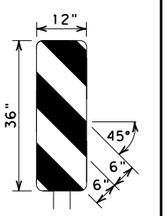
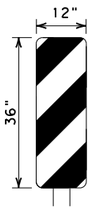
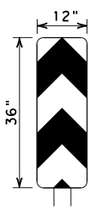
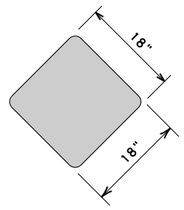
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

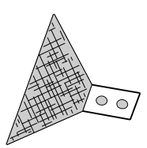
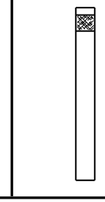
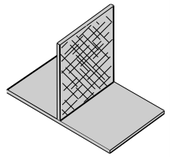
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

DEPARTMENTAL MATERIAL SPECIFICATIONS

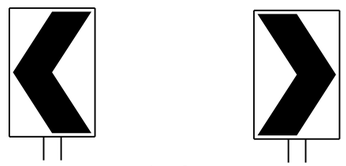
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		

CHEVRONS

DEVICE

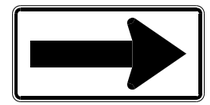


SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

NOTE
1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

ONE DIRECTION LARGE ARROW

DEVICE



SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	SAT	BEXAR		129

20A

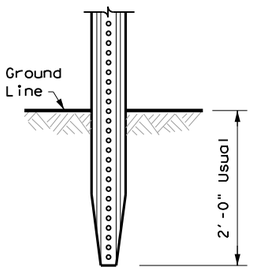
DATE: 11/21/2023
FILE: e:\pw\en\d0278495\dom1-20.dgn

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.

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

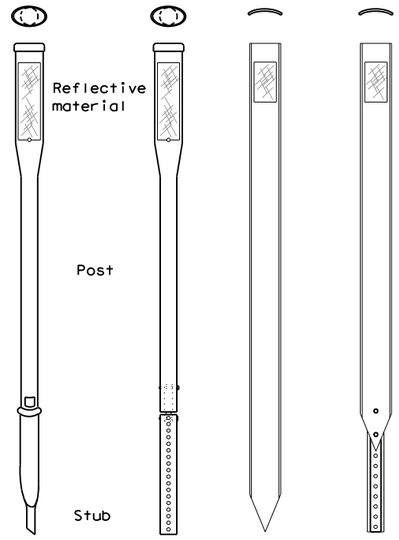


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

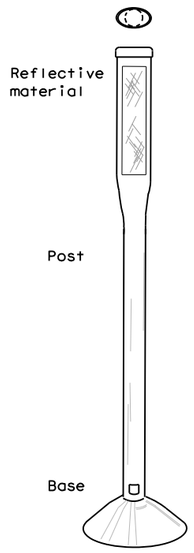
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



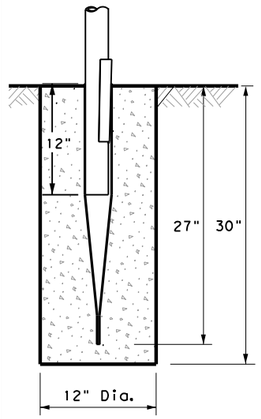
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

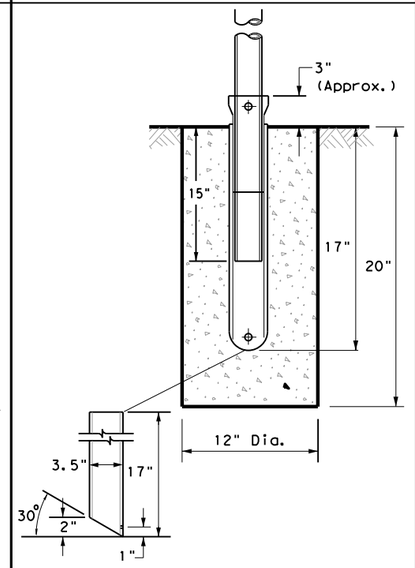
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

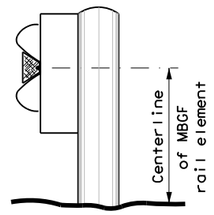
NOTE

1. Install per manufacturer's recommendations.

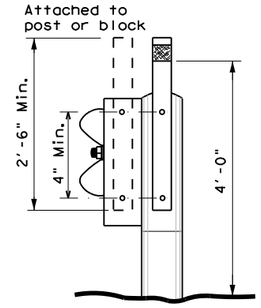
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

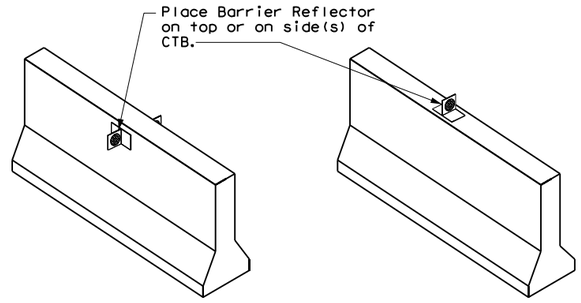
GF1



GF2



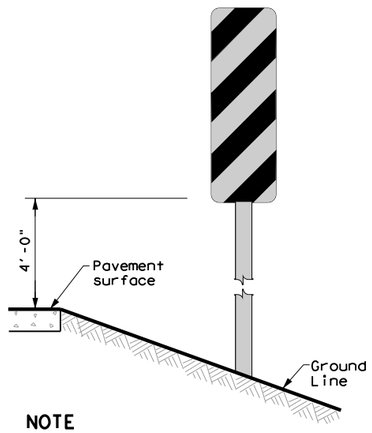
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

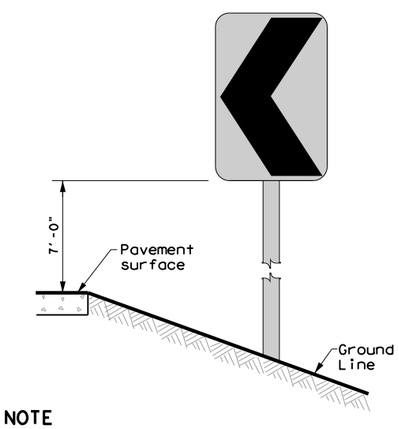
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

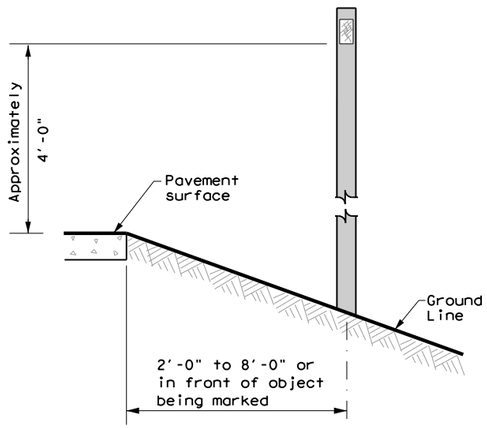
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

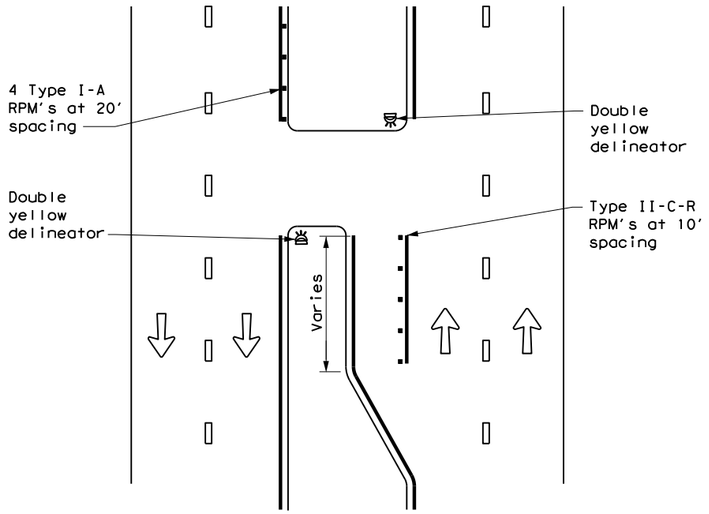
FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	SAT	BEXAR		130

20B

DATE: 11/21/2023
FILE: c:\pw\txdot\d0278495\dom2-20.dgn

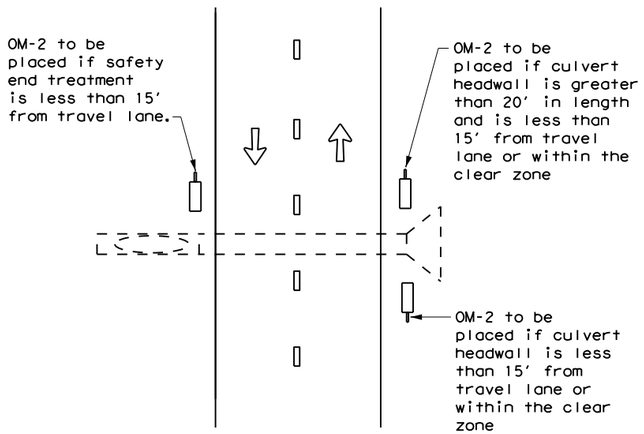
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

CROSSOVERS



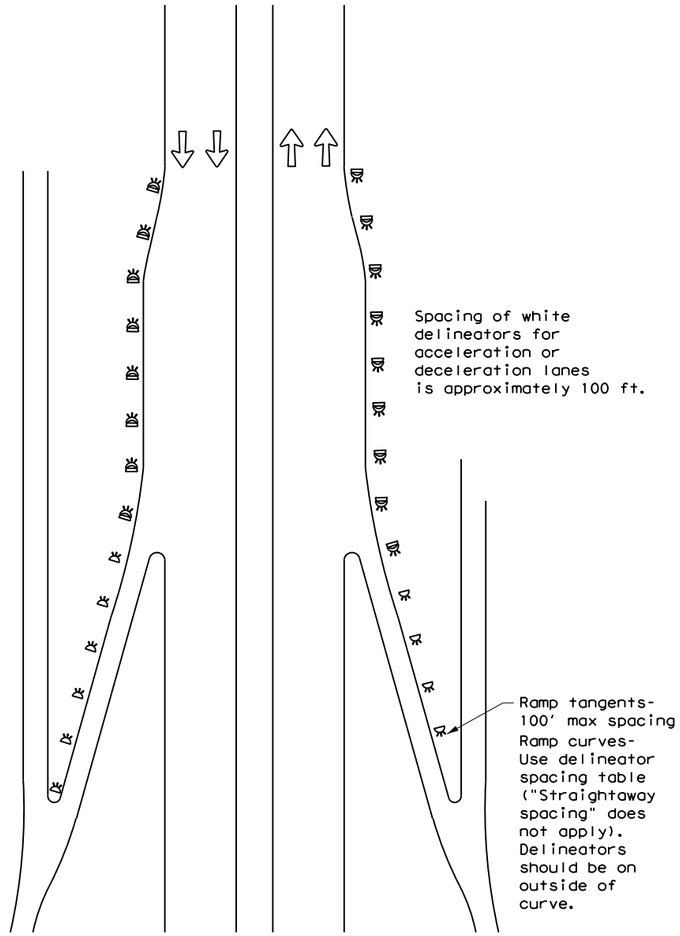
DETAIL 1

FOR CULVERTS WITHOUT MBGF



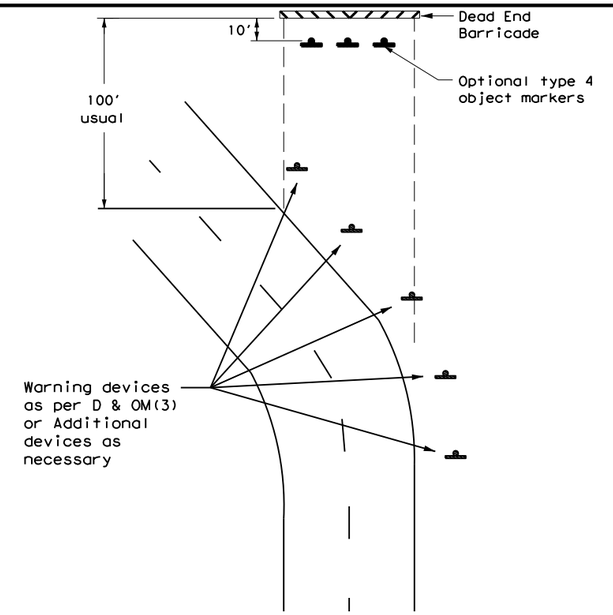
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



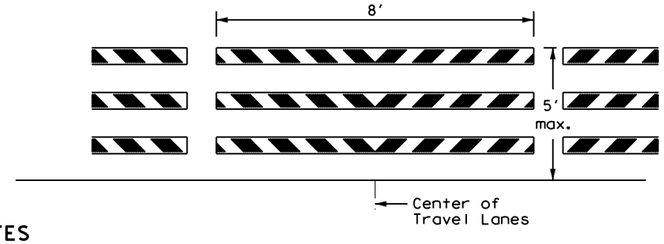
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

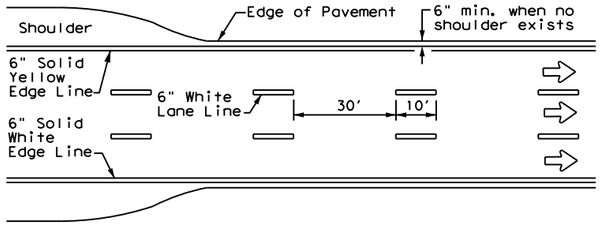
D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
3-15	DIST	COUNTY		SHEET NO.
7-20	SDS	BEXAR		131

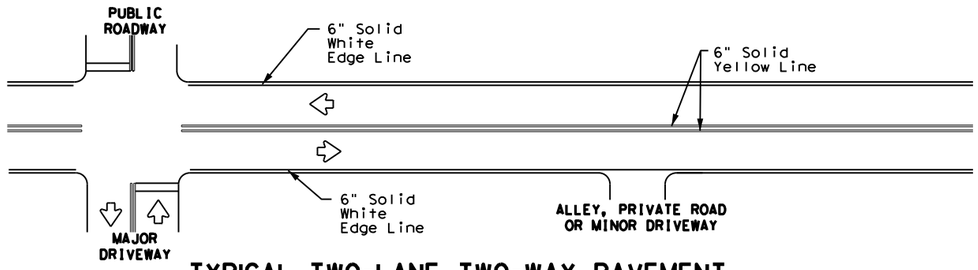
20D

DATE: 11/21/2023
FILE: c:\pw\en\d0278495\dom4-20.dgn

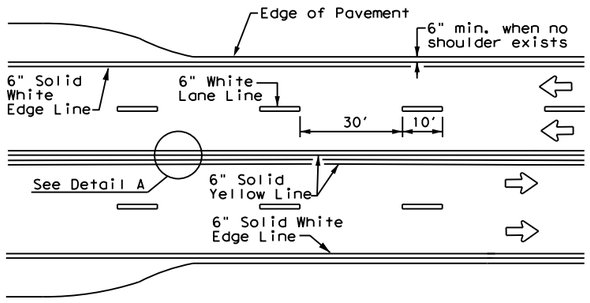
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

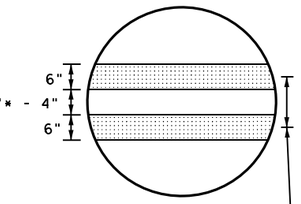


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

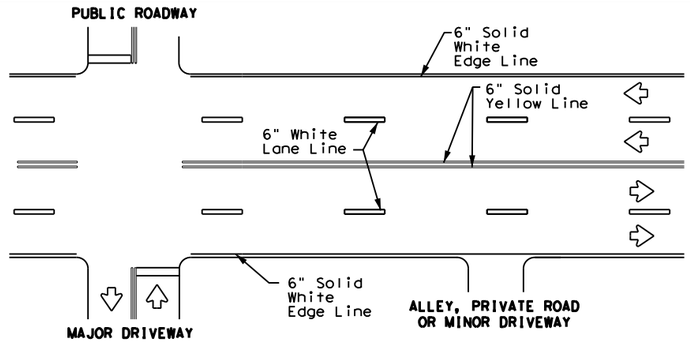




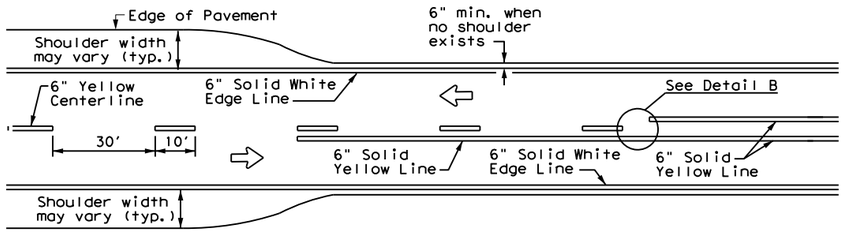
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

* 2" minimum for restripe projects when approved by the Engineer.

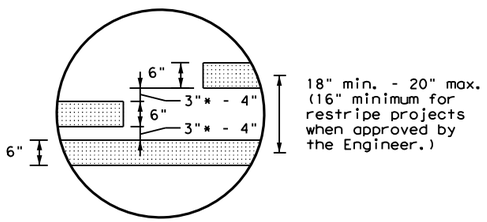
** 8" minimum for restripe projects when approved by the Engineer.



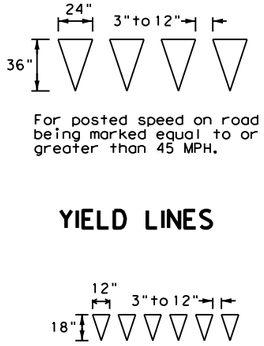
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

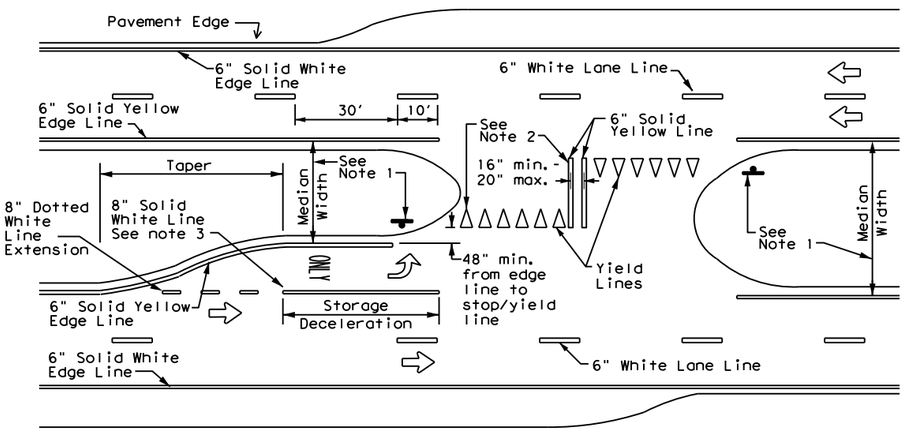


TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



* 2" minimum for restripe projects when approved by the Engineer.





FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

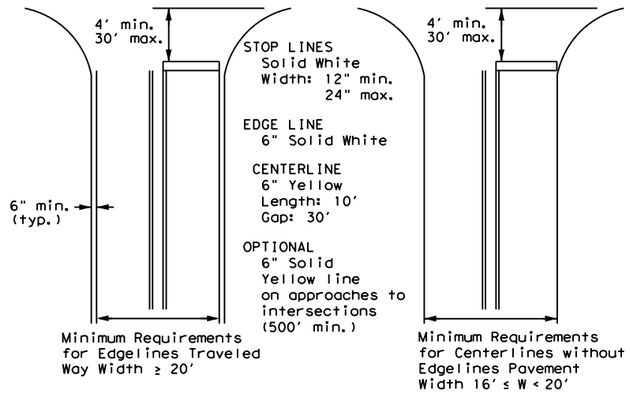
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

GENERAL NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

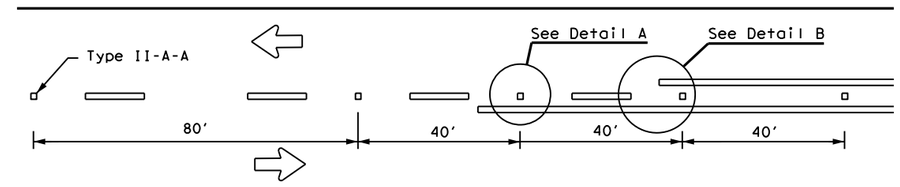
PM(1)-22

FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 11-78 8-00 6-20	0073	02	082	US 281
8-95 3-03 12-22	DIST	COUNTY		SHEET NO.
5-00 2-12	SAT	BEXAR		132

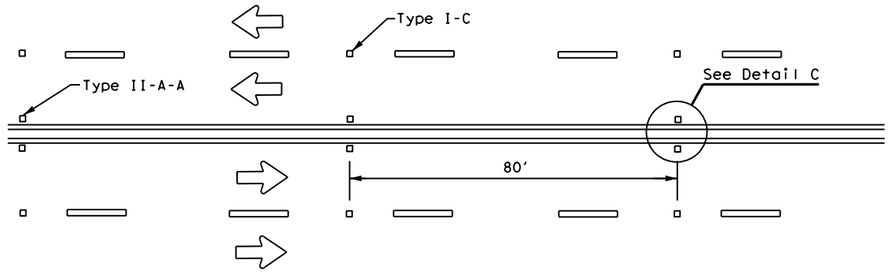
22A

DATE: 11/21/2023
FILE: c:\pw\khi\d0278495\pm1-22.dgn

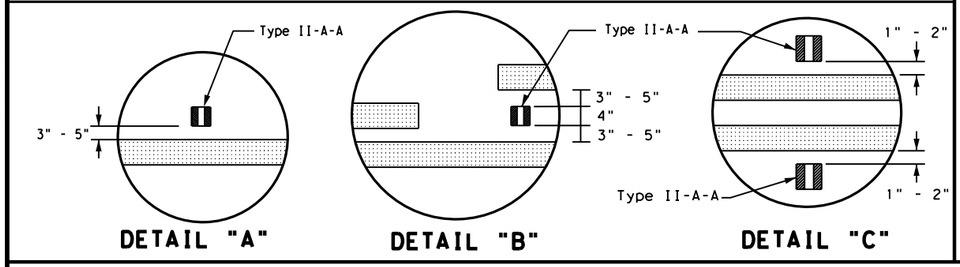
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

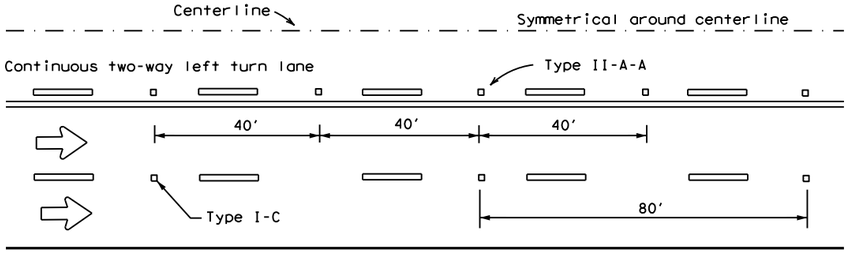


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

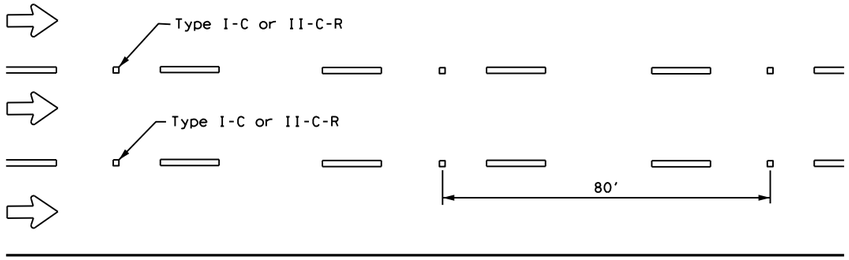


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS





CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



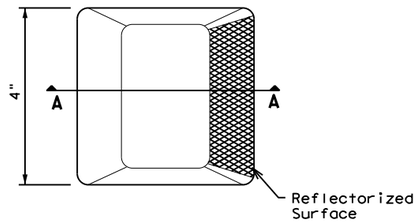
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

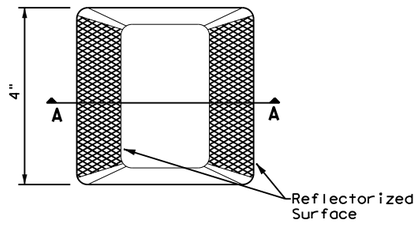
See Note 3.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

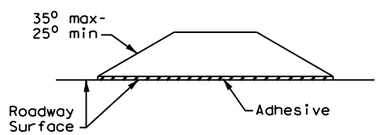
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

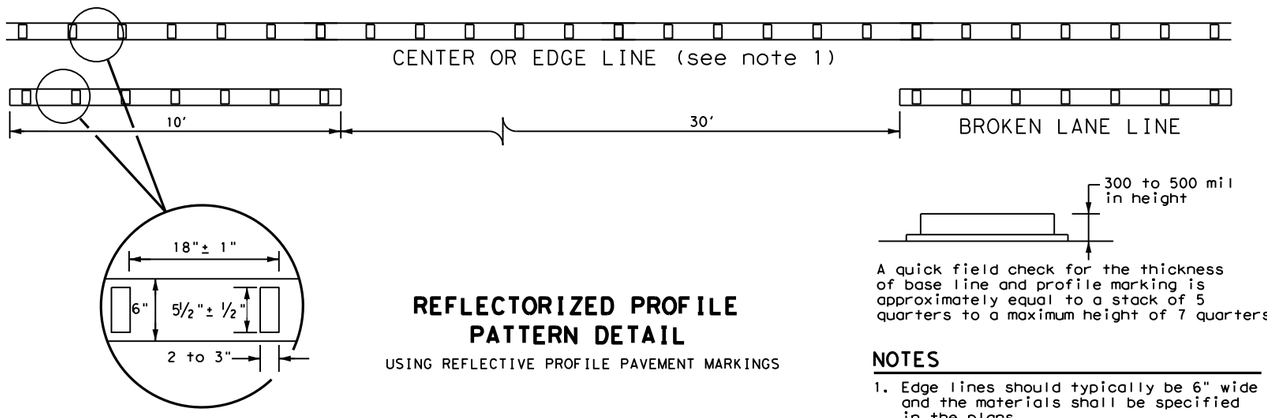


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



6" EDGE LINE, 6" CENTERLINE OR 6" LANE LINE

REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTES

1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-22

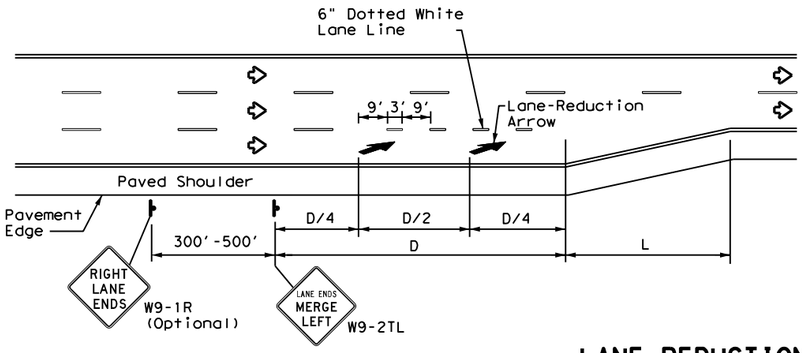
FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-77 8-00 6-20 4-92 2-10 12-22 5-00 2-12	0073	02	082	US 281
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		133

22B

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: 11/21/2023
FILE: c:\pw\en\d0278985\pm2-22.dgn

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.



LANE REDUCTION

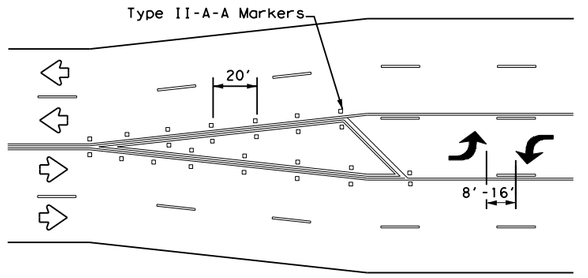
NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional RIGHT LANE ENDS (W9-1R) sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.

ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	

GENERAL NOTES

1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer. See Chapter 3 of the Roadway Design Manual for additional information on turning lanes or storage lengths.

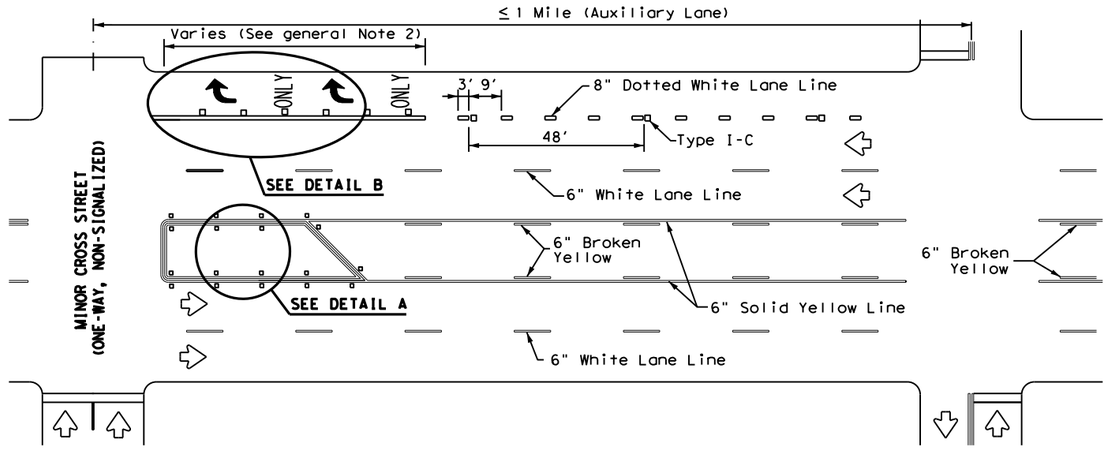


A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

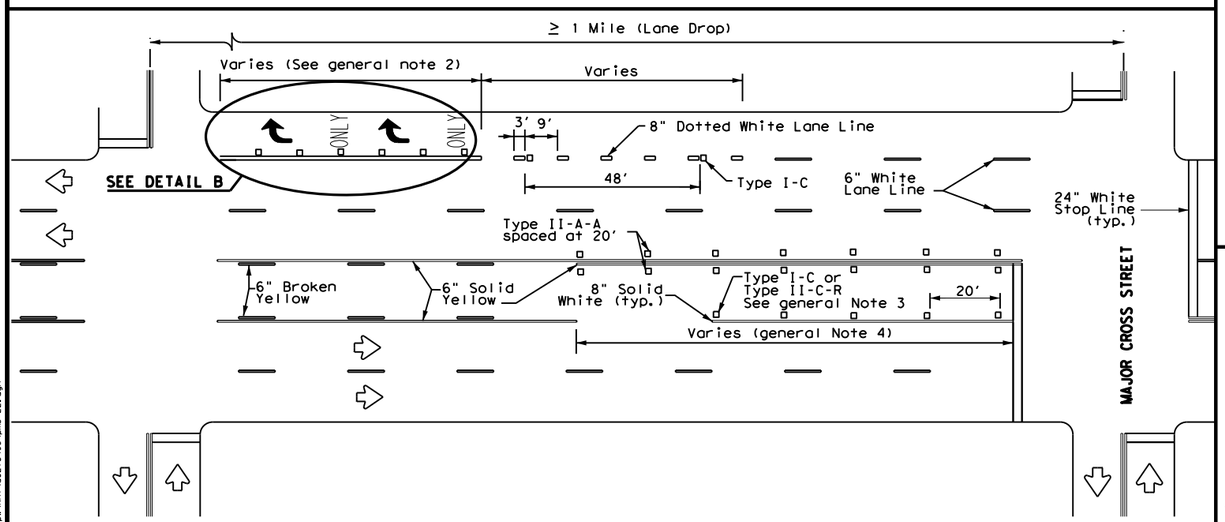
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

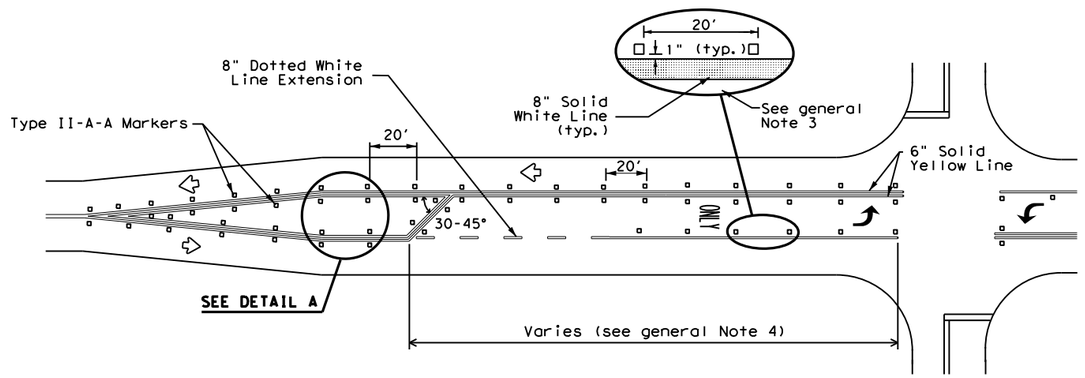
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



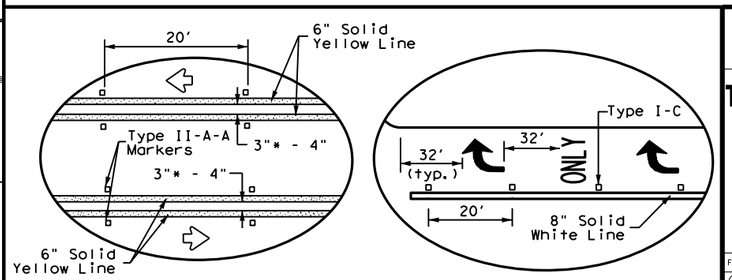
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS



* 2" minimum allowed for restripe projects when approved by the Engineer.

Texas Department of Transportation

Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS

PM(3)-22

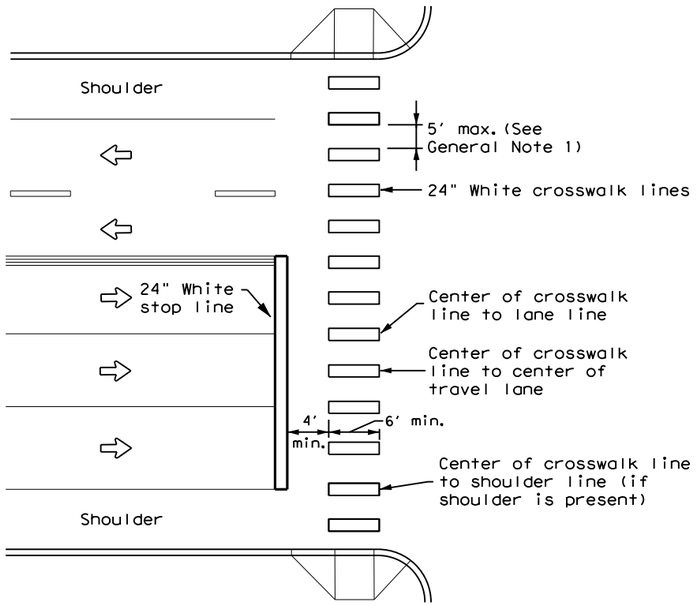
FILE: pm3-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-98 3-03 6-20 5-00 2-10 12-22 8-00 2-12	0073	02	082	US 281
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		134

22C

DATE: 11/21/2023
FILE: c:\pw\wm\d0278495\pm3-22.dgn

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:



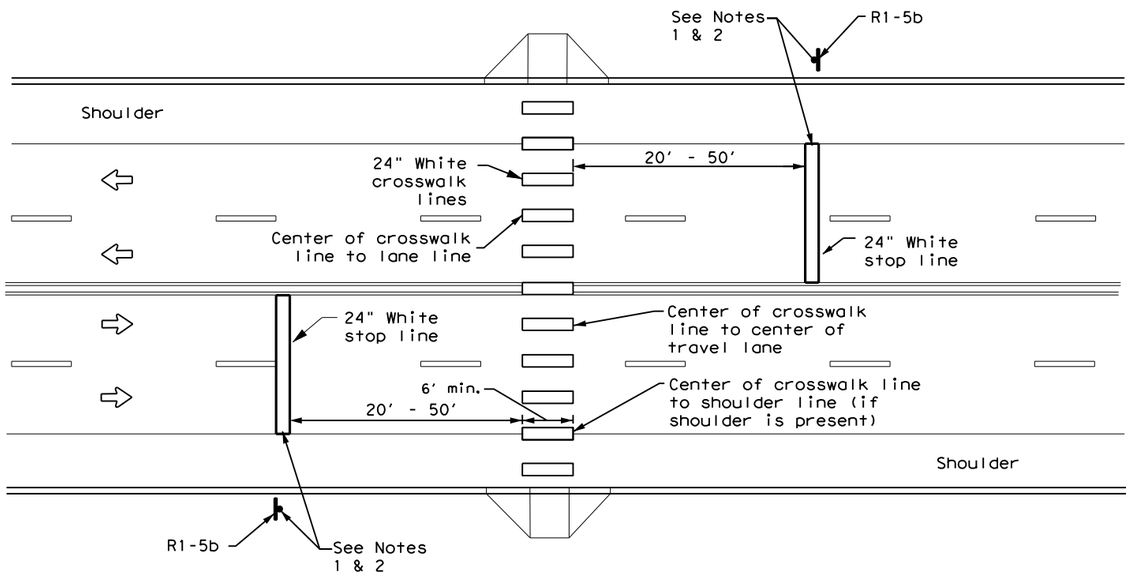
HIGH-VISIBILITY LONGITUDINAL CROSSWALK AT CONTROLLED APPROACH

GENERAL NOTES

1. Longitudinal crosswalk lines should not be placed in the wheel path of vehicles. Center the crosswalk lines on travel lanes, lane lines, and shoulder lines (if present).
2. A minimum 6" clear distance shall be provided to the curb face. If the last crosswalk line falls into this distance it must be omitted.
3. For divided roadways, adjustments in spacing of the crosswalk lines should be made in the median so that the crosswalk lines are maintained in their proper location across the travel portion of the roadway.
4. At skewed crosswalks, the crosswalk lines are to remain parallel to the lane lines.
5. Each crosswalk shall be a minimum of 6' wide.
6. The High-Visibility Longitudinal Crosswalk is the preferred crosswalk pattern on State Highways. Other crosswalk patterns as shown in the "Texas Manual on Uniform Traffic Control Devices" may be used. All crosswalk designs and dimension shall comply with the "Texas Manual on Uniform Traffic Control Devices."
7. Final placement of Stop Bar and Crosswalk shall be approved by the Engineer in the field.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



UNSIGNALIZED MIDBLOCK HIGH-VISIBILITY LONGITUDINAL CROSSWALK

NOTES:

1. Use stop bars with Stop Here For Pedestrians (R1-5b) signs at unsignalized midblock cross walks.
2. Use stop bars with STOP HERE ON RED (R10-6 or R10-6a) signs at mid block crosswalks controlled by traffic signals or pedestrian hybrid beacons.

Texas Department of Transportation

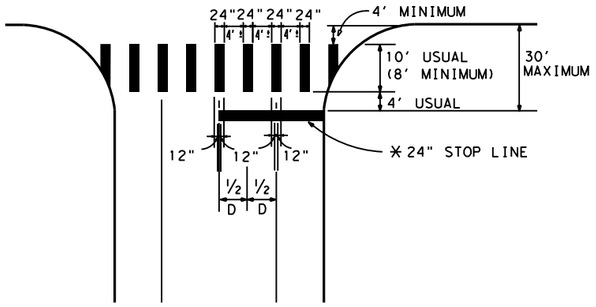
Traffic Safety Division Standard

CROSSWALK PAVEMENT MARKINGS

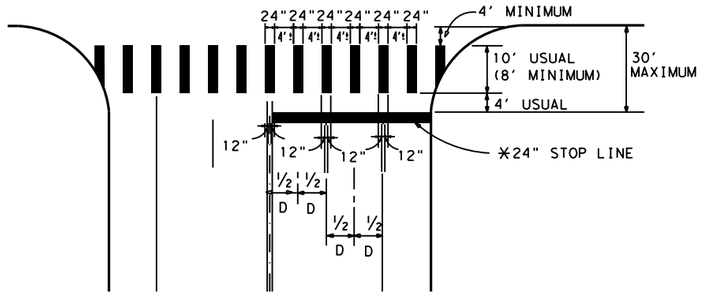
PM(4)-22A

FILE: pm4-22a.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
6-20	DIST	COUNTY		SHEET NO.
6-22	SAT	BEXAR		135
12-22				

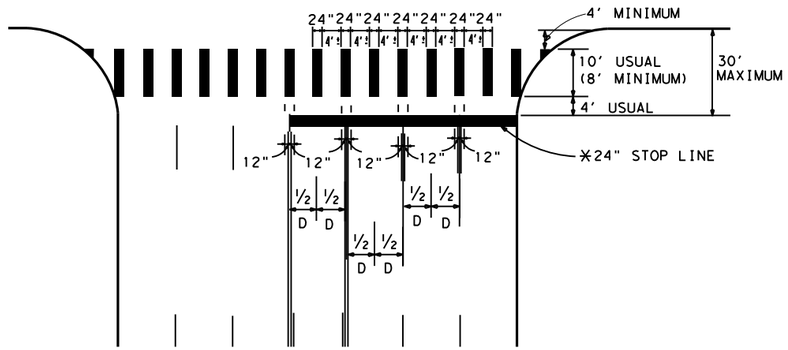
22D



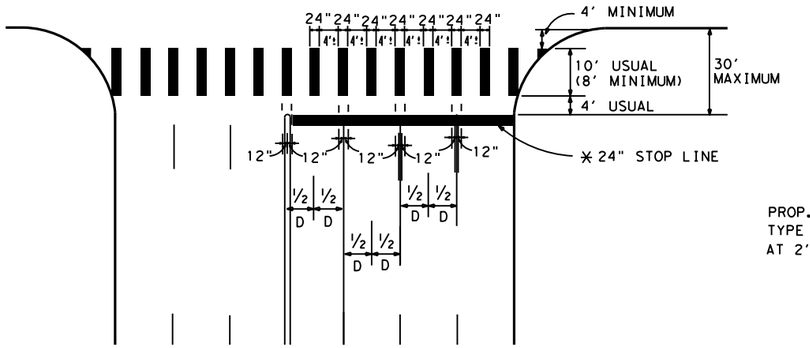
TWO LANES WITH SHOULDERS



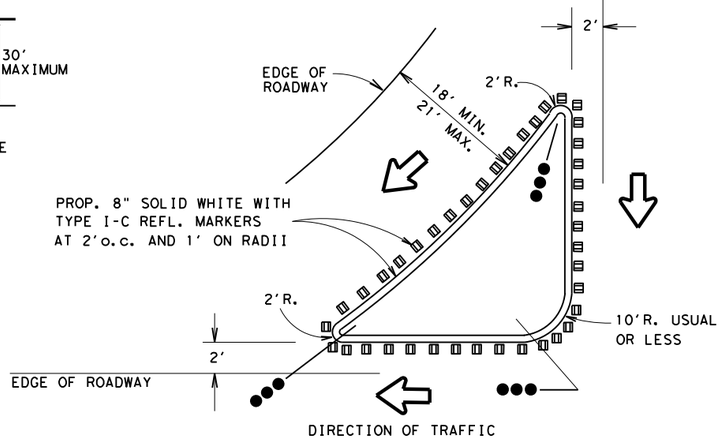
FOUR LANES WITH SHOULDERS



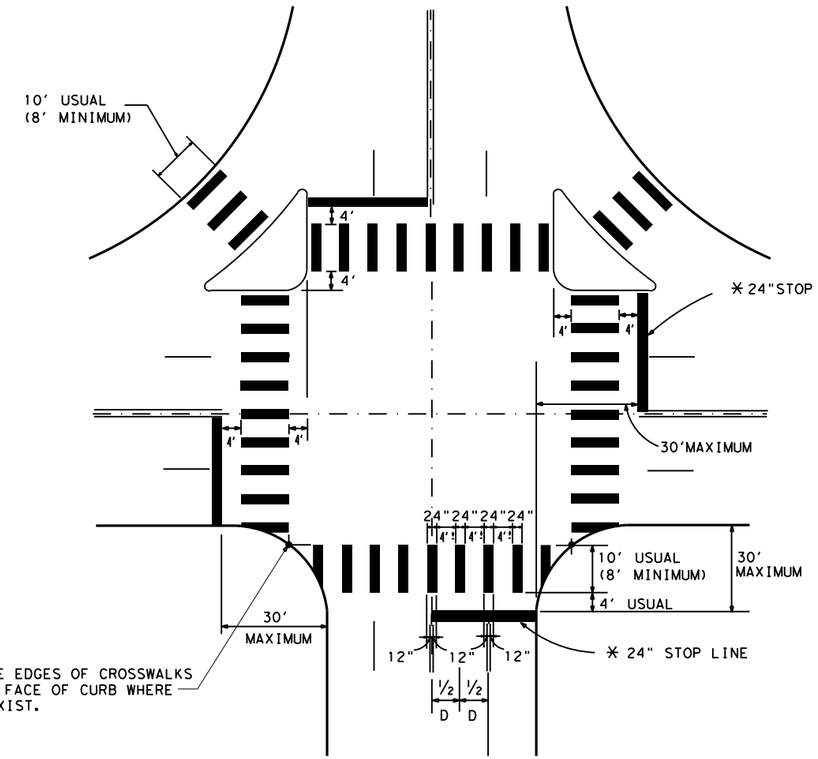
MULTI - LANES



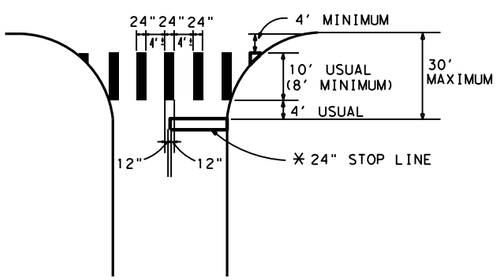
MULTI - LANE WITH MEDIAN



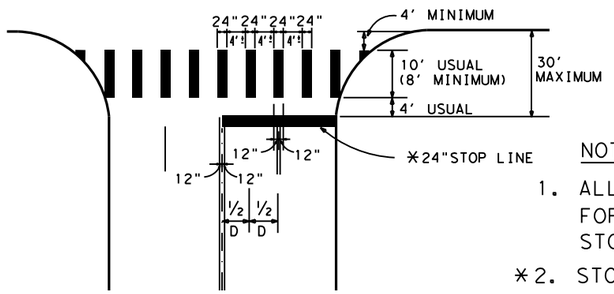
TYPICAL RIGHT TURN ISLAND
WITH DELINEATION



INTERSECTION WITH RIGHT - TURN ISLANDS



TWO LANES



FOUR LANES

NOTES:

1. ALL LONGITUDINAL LINES FORMING CROSSWALK AND STOP LINES SHALL BE WHITE
2. * STOP LINES AS REQUIRED ON DETAILED PAVEMENT MARKING PLANS.
3. "D" IS EQUAL TO ONE HALF THE DISTANCE.

LEVELS DISPLAYED ACC:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	
49	50	51	52	53	54	55	56	57	58	59	60	61	62	63		

San Antonio District Standard

TYPICAL CROSSWALK DETAILS

TCD-05

© 2006 Texas Department of Transportation

REVISIONS	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
DEC 1999	6	SEE TITLE SHEET		136
AUG 2005	STATE	DIST.	COUNTY	
	TEXAS	SAT	BEXAR	
	CONT.	SECT.	JOB	HIGHWAY NO.
	0073	02	082	US 281

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.

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

SM RD SGN ASSM TY XXXXX(X)XX(X-XXXX)

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

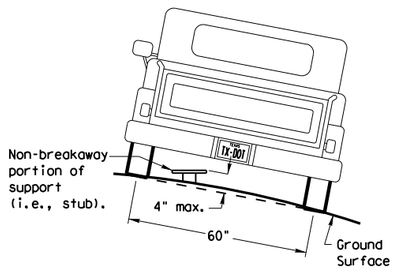
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1) to (SLIP-3))

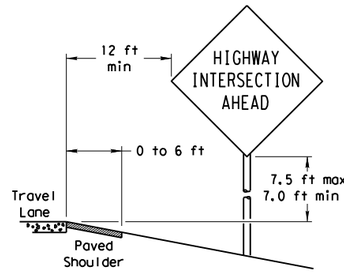
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

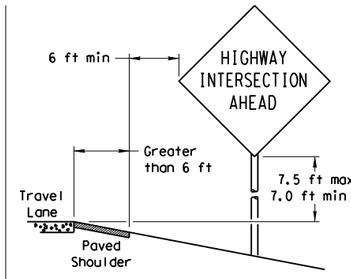
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

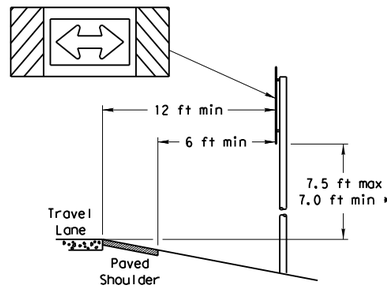
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



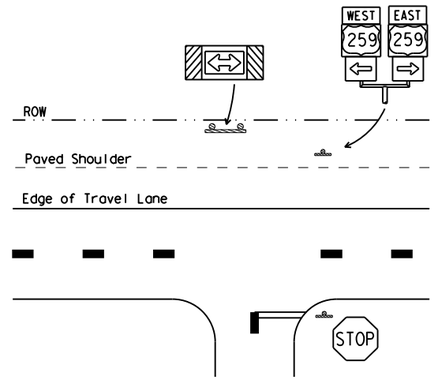
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

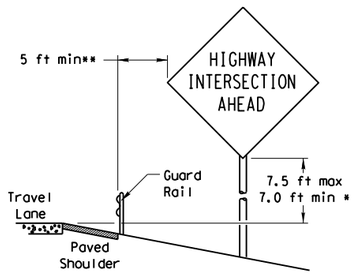
T-INTERSECTION



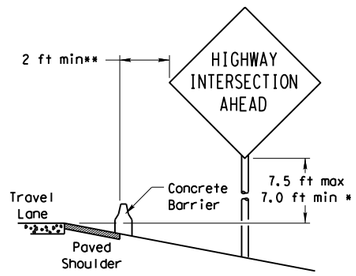
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



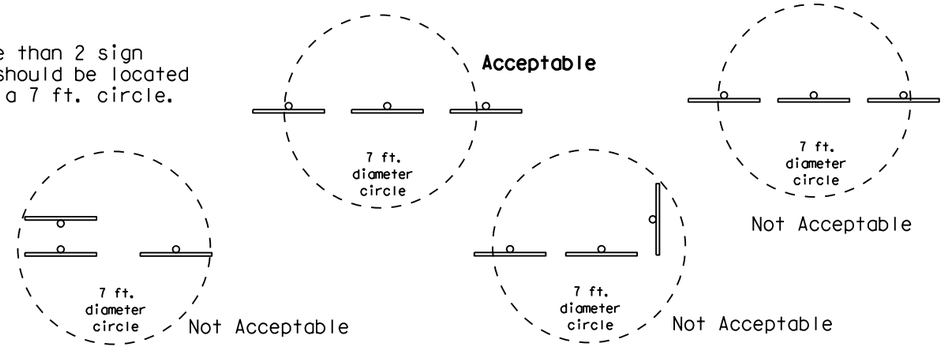
BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

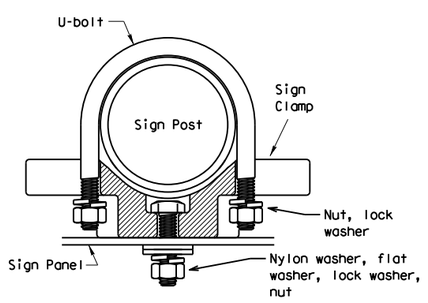
**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

No more than 2 sign posts should be located within a 7 ft. circle.



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

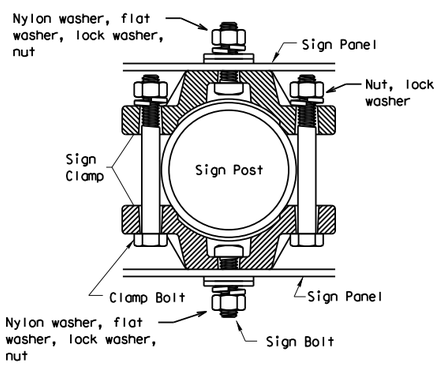


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

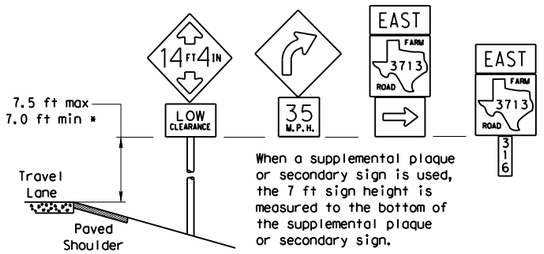
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



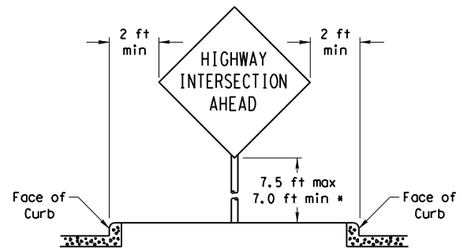
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



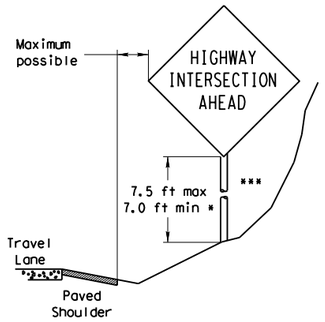
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

The website address is:
http://www.txdot.gov/publications/traffic.htm

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

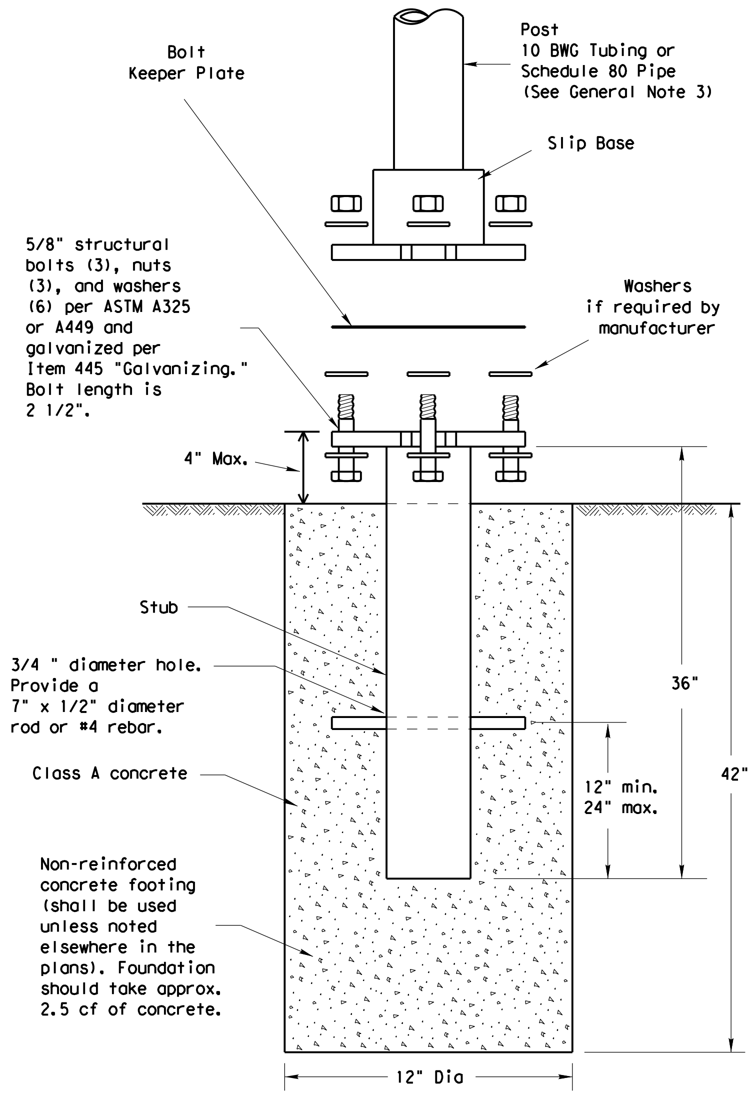
©TxDOT July 2002

9-08 REVISIONS

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		137

DATE: 11/21/2023
FILE: c:\pw\txdot\d0278495\smdgen (1).dgn

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



SM RD SGN ASSM TY XXXXX(X)SA(X-XXXX)

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems.
http://www.txdot.gov/business/producer_list.htm
The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is:
   http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

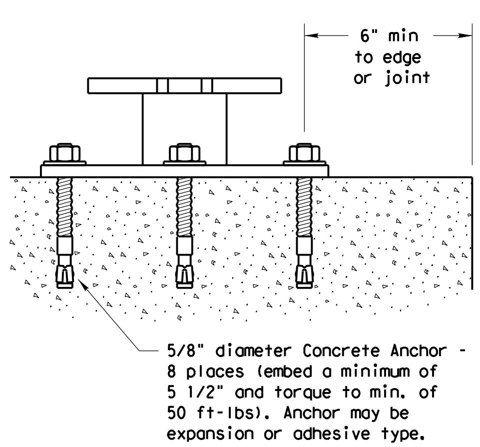
Foundation

1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support

1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



SM RD SGN ASSM TY XXXXX(X)SB(X-XXXX)

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

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: 11/21/2023
FILE: c:\pw\kh1\d0278495\smds1.dgn

Texas Department of Transportation
Traffic Operations Division

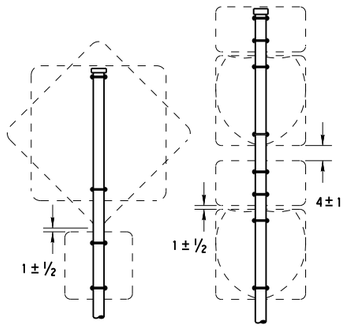
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

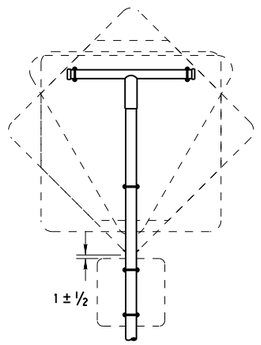
©TxDOT July 2002

DN: TXDOT		CK: TXDOT	DW: TXDOT		CK: TXDOT	
REVISIONS	CONT	SECT	JOB		HIGHWAY	
9-08	0073	02	082		US 281	
	DIST		COUNTY			SHEET NO.
	SAT		BEXAR			138

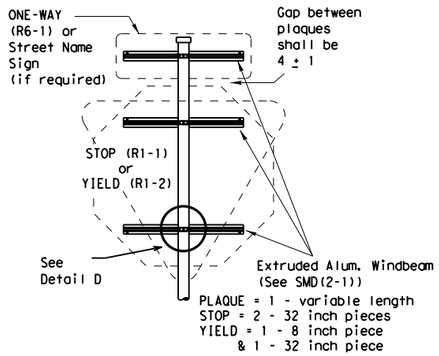
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



SM RD SGN ASSM TY XXXXX(1)XX(P)

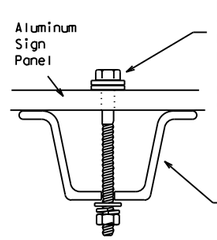


SM RD SGN ASSM TY XXXXX(1)XX(T)



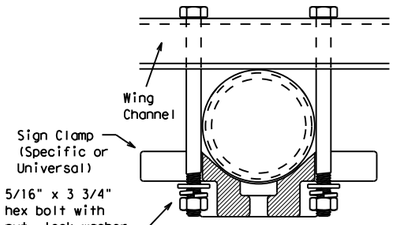
PLAQUE = 1 - variable length
STOP = 2 - 32 inch pieces
YIELD = 1 - 8 inch piece
& 1 - 32 inch piece

SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



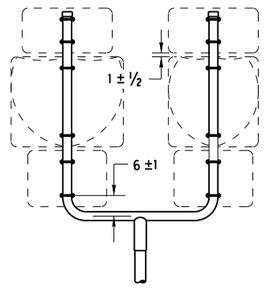
Top View

Detail A

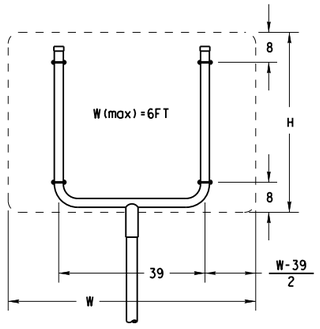


Top View

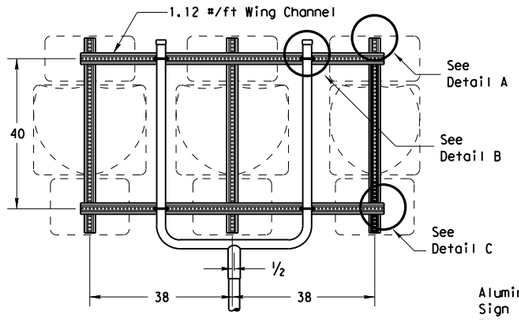
Detail B



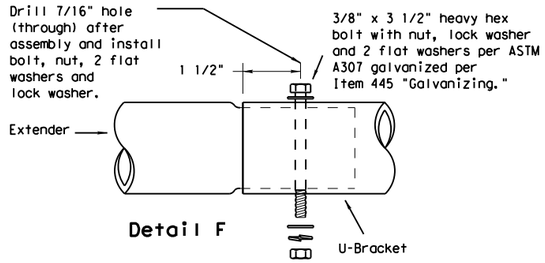
SM RD SGN ASSM TY XXXXX(1)XX(U)



SM RD SGN ASSM TY XXXXX(1)XX(U)

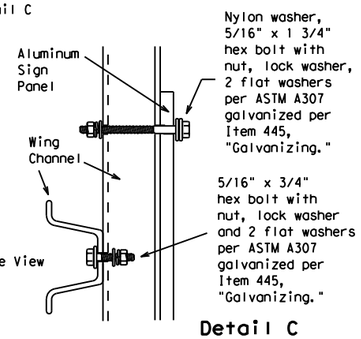


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

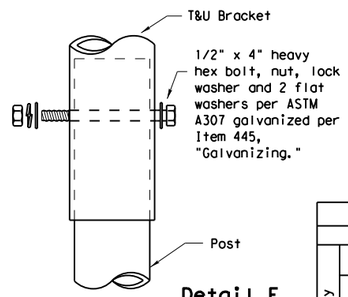


Detail F

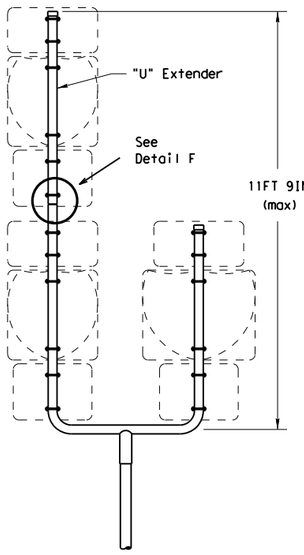
Splices shall only be allowed behind the sign substrate.



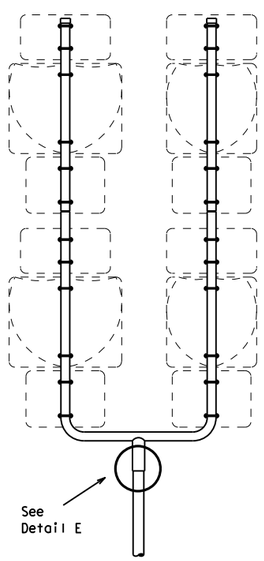
Detail C



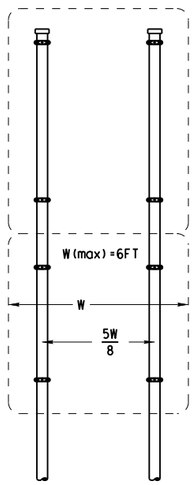
Detail E



SM RD SGN ASSM TY S80(1)XX(U-1EXT)

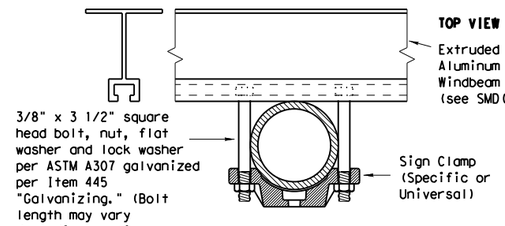


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

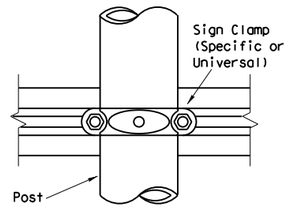


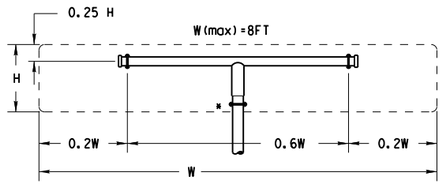
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

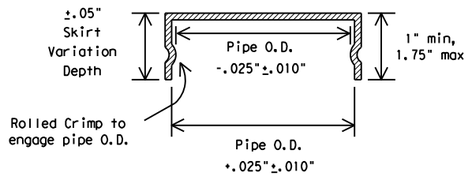




All dimensions are in english unless detailed otherwise.

SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

©TxDOT July 2002

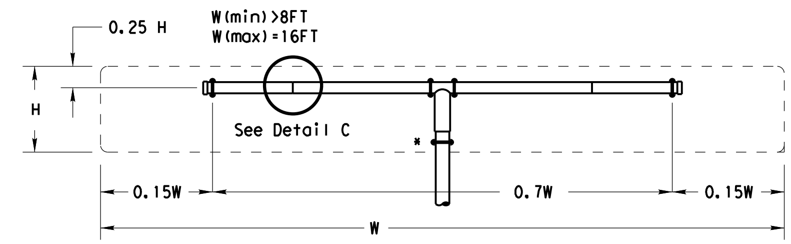
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		139

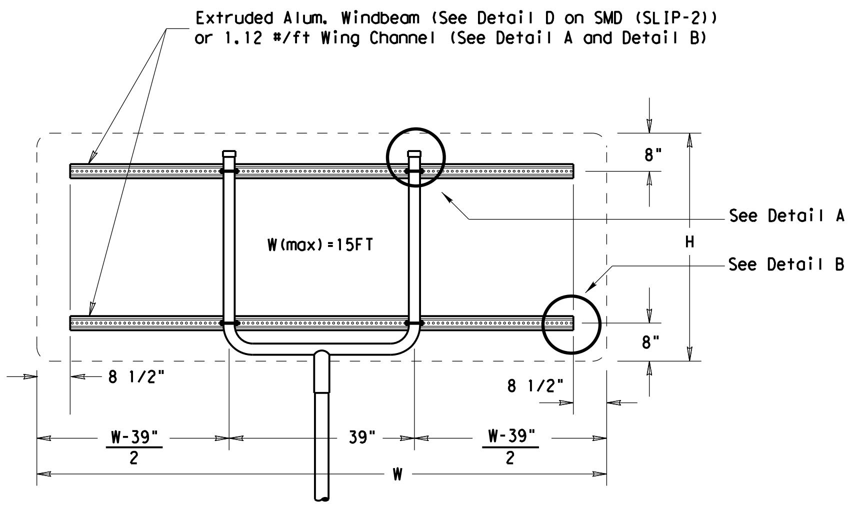
9-08 REVISIONS

DATE: 11/21/2023
FILE: c:\pw\mnl\d0278495\smd2.dgn

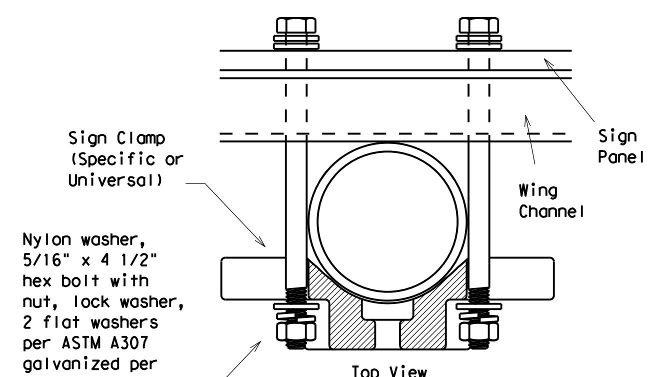
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



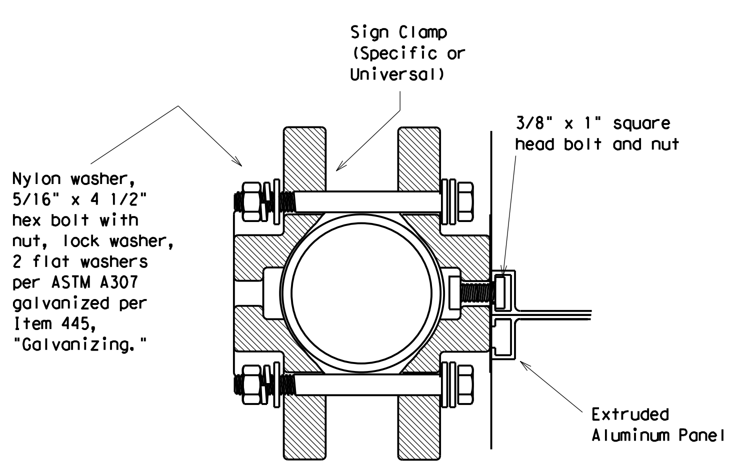
SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



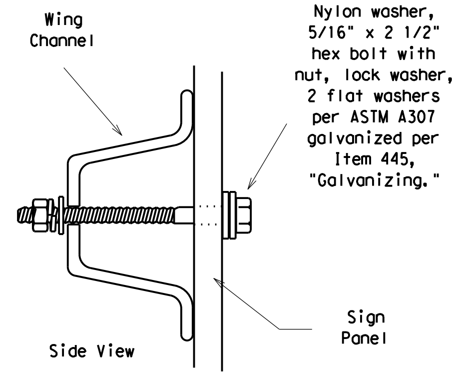
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



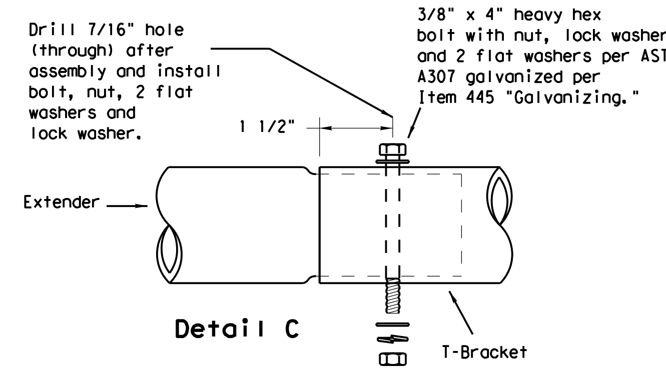
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

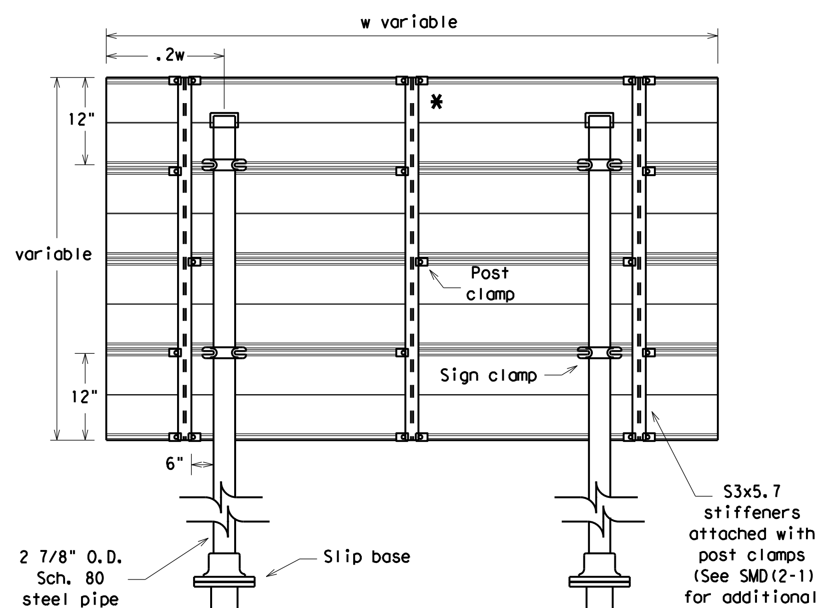


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

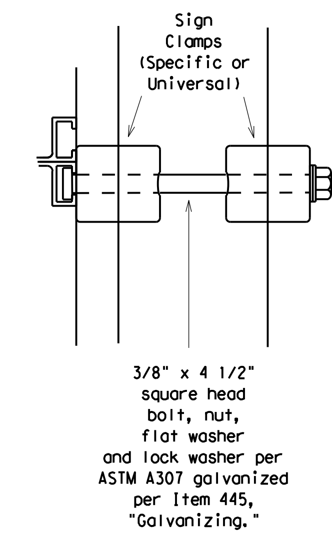


Typical Sign Mount

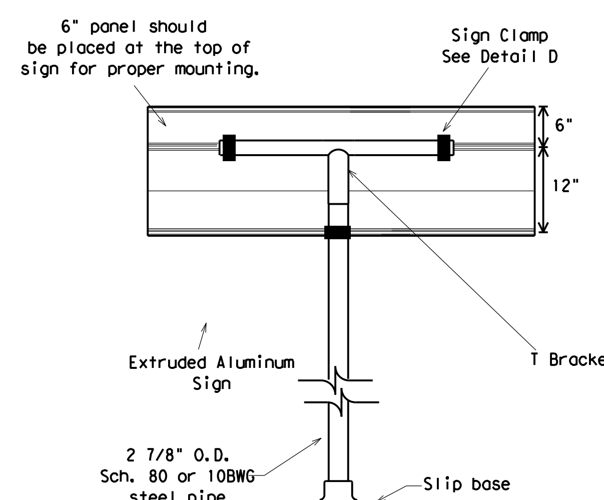
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

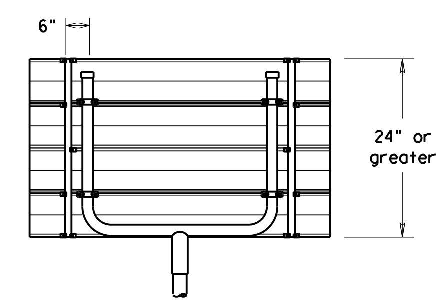
See Detail E
for clamp installation



Detail E



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Sign blanks shall be the sizes and shapes shown on the plans.
11. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

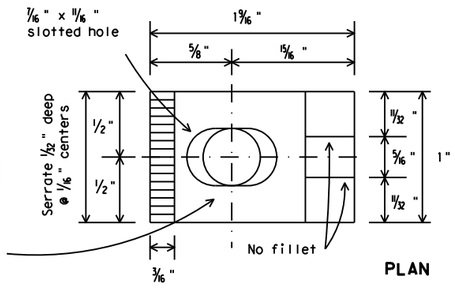
SMD(SLIP-3)-08

©TxDOT July 2002	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT	
REVISIONS	CONT	SECT	JOB	HIGHWAY	
9-08	0073	02	082	US 281	
	DIST		COUNTY	SHEET NO.	
	SAT		BEXAR	140	

26D

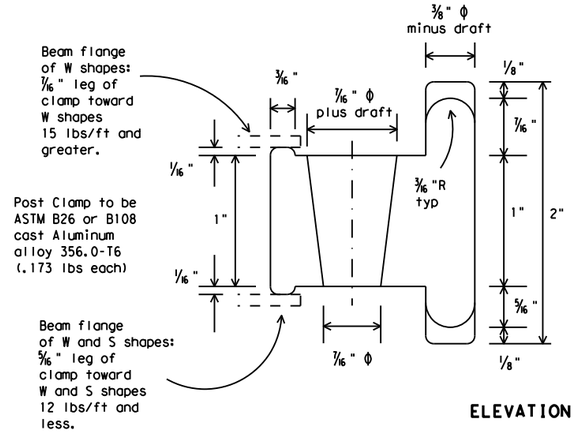
DATE: 11/21/2023
FILE: c:\pw\kh1\d0278495\smds3.dgn

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.



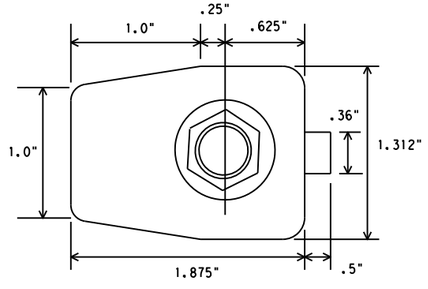
NOTE: centerline of hole for 3/8" diameter squarehead bolt x 2 1/4" long with a flat washer and self-locking nut, or lock washer and hex. nut. Bolt head dimensions shall be in accordance with ANSI B 18.2.1 as referred to in the AISC Manual of steel construction. Bolt assembly shall be galvanized.

PLAN

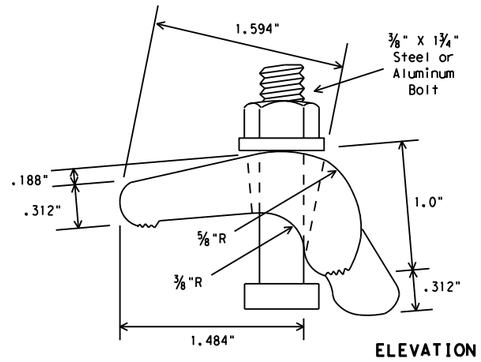


ELEVATION

POST CLAMP DETAIL

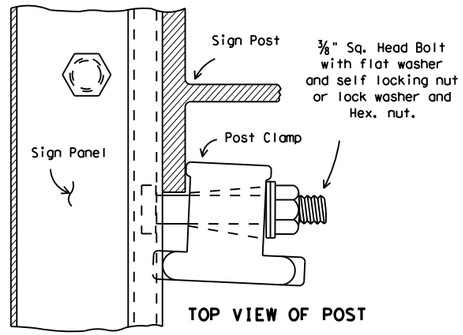


PLAN

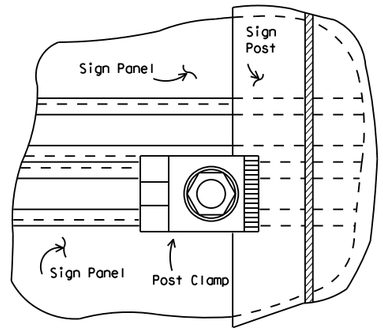


ELEVATION

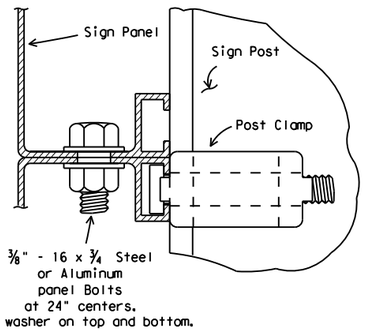
ALTERNATE POST CLAMP DETAIL



TOP VIEW OF POST

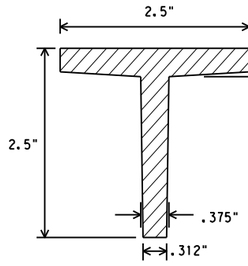


TOP VIEW OF CLAMP



SIDE VIEW OF PANELS

CONNECTION DETAILS

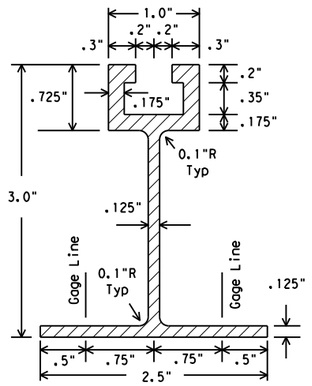


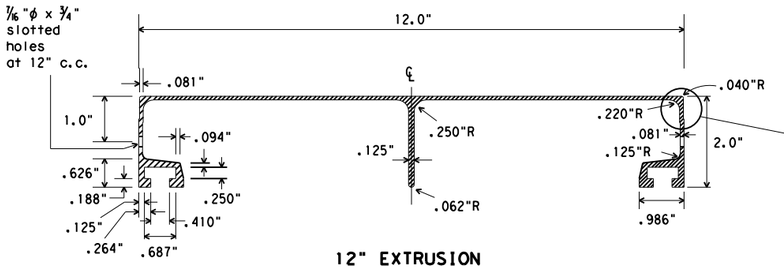
1.912 lbs/ft

ALUMINUM T SECTION OR APPROVED ALTERNATIVE

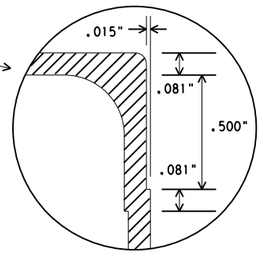
WINDBEAM CROSS SECTION

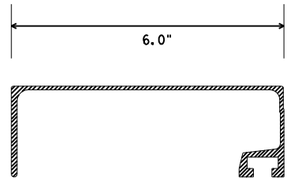
Windbeam to be extruded aluminum (1.175 lbs/ft) or approved alternative



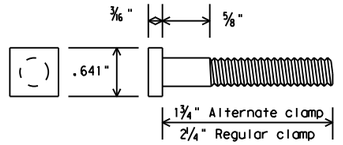


12" EXTRUSION





6" EXTRUSION



POST CLAMP BOLT DETAIL

ALUMINUM SIGN PANEL EXTRUSION DETAILS

DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN HARDWARE	DMS-7120

GENERAL NOTES:

1. Design conforms with AASHTO Specifications for the design and construction of structural supports for highway signs.
2. Materials and fabrication shall conform to the requirements of the Department material specifications.
3. Structural steel shall be "low-alloy steel" for non-bridge structures per Item 442, "Metal For Structures."
4. For fiberglass substrate connection details, see manufacturer's recommendations.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS- EXTRUDED ALUMINUM SIGN PANELS & HARDWARE

SMD(2-1)-08

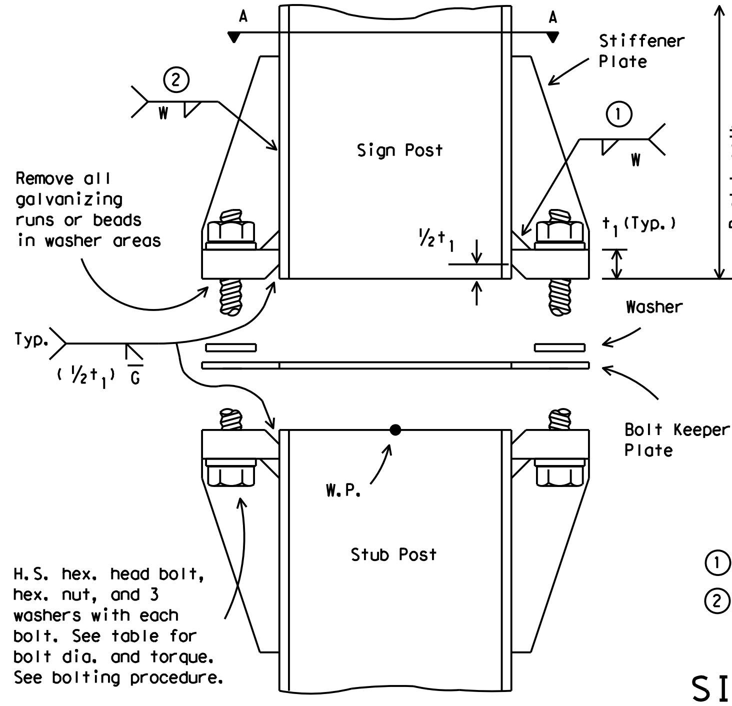
© TxDOT 2001

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

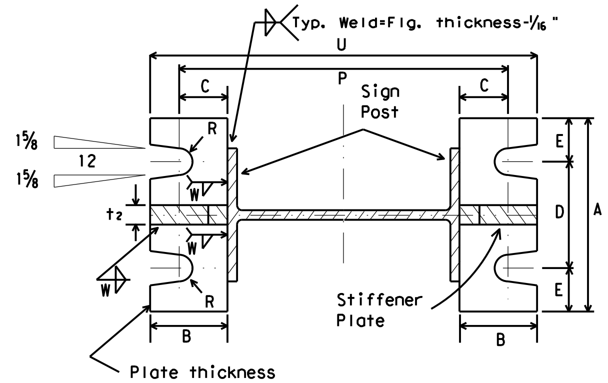
REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0073	02	082	US 281
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		141

DATE: 11/21/2023
FILE: c:\pw\mnl\d0278495\smd21-08.dgn

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.



ELEVATION



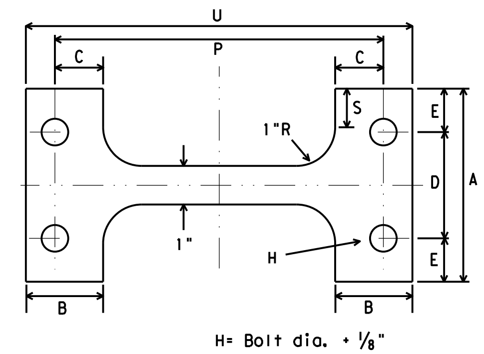
SECTION A-A

① Back up weld to be made before installing stiffener plate

② Weld W may be continued across clips to seal joint

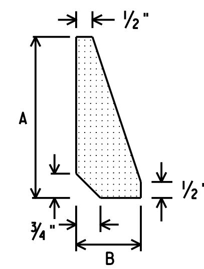
SIGN POST AND STUB POST

(For W Shapes)



BOLT KEEPER PLATE

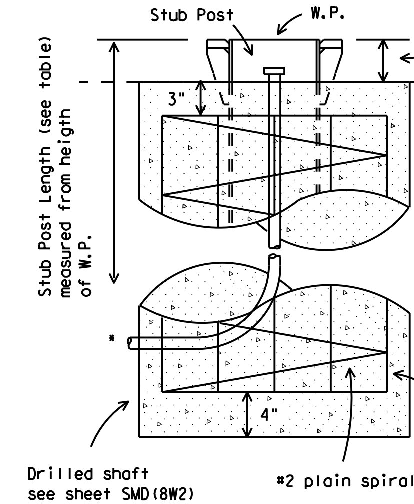
30 Ga galv. sheet steel



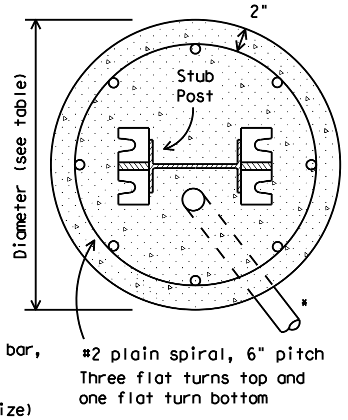
STIFFENER PLATE DETAIL

Steel Plate (thickness = t_2)

(See table for dimensions)



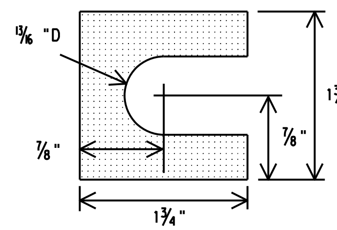
ELEVATION



PLAN

FOUNDATION DETAIL

*Note: For signs with electrical apparatus, see ED(10) for conduit required in founation.



SHIM DETAIL

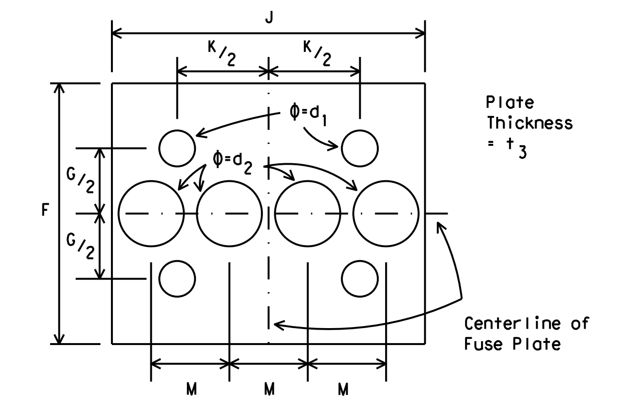
Furnish two .012"± thick and two .032"± thick shims per post. Shims shall be fabricated from brass shim stock or strip conforming to ASTM B36.

BOLTING PROCEDURE FOR ASSEMBLY OF BASE CONNECTION:

1. Assemble sign post, BOLT KEEPER PLATE and stub post with bolts and three flat washers per bolt as shown.
2. Shim as required to plumb post.
3. Tighten all bolts the maximum possible with a 12 to 15 inch wrench to clean bolt threads and to bed washers and shims.
4. Loosen each bolt in sequence and retighten bolts in a systematic order to the prescribed torque. Do not overtighten.
5. To prevent nut loosening, burr threads of bolt at junction with nut using a center punch.

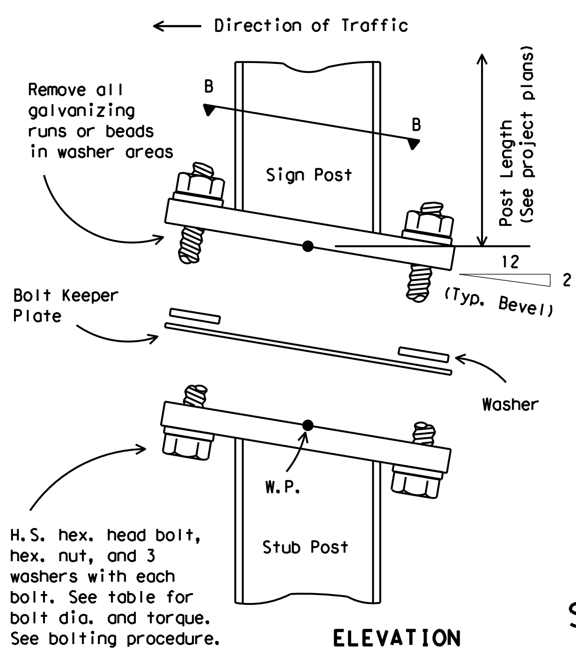
Dimensions / Post Size	Base Connection Data Table: Bolt Size & Torque	A	B	C	D	E	t_1	t_2	W	R	Perforated Fuse Plate Data Table: F	G	J	K	M	d_1	d_2	t_3	Bolt Dia.	Wt. (ea.) (lbs.)	Bolt length	Bolt Keeper Data: P	S	U	Foundation Data: Stub length	Stub projection	Dr. Shaft diameter	Bar V Size
W6x9	⅝"ϕ x 2¾" 440-450 inch pounds 36-38 foot pounds	5"	2"	1¼"	2¾"	1⅛"	¾"	½"	¼"	11/32"	4¼"	2"	4"	2¼"	1"	9/16"	¾"	¼"	½"	1.01	1½"	8⅜"	1"	9⅞"	2'-0"	3"	24"	#5
W6x12																						8½"		10"	2'-0"	3"		#5
W6x15											5"	2½"	6"	3½"	1½"	11/16"	1¼"	⅜"	⅝"	2.51	2¼"	8½"		10"	2'-6"	3"		#6
W8x18											5"	2½"	5¼"	2¾"	1¼"	11/16"	1 1/16"	⅜"	⅝"	2.26	2¼"	10⅝"		12⅛"	2'-6"	3"		#7
W8x21	¾"ϕ x 3½" 740-750 inch pounds 62-63 foot pounds	6"	2¼"	1⅜"	3½"	1¼"	1"	¾"	5/16"	13/32"	5½"	2½"	5¼"	2¾"	1¼"	13/16"	1"	½"	¾"	3.35	2¼"	11"	1½"	12¾"	3'-0"	2½"		#8
W10x22											6"	3"	5¾"	2¾"	1⅜"	13/16"	1⅛"	½"	¾"	4.03	2¼"	12⅞"		14⅝"	3'-0"	2½"		#9
W10x26																						13⅛"		14⅞"	3'-0"	2½"		#10
W12x26											6"	3"	6½"	3½"	1⅝"	13/16"	1 5/16"	½"	¾"	4.47	2¼"	15"		16¾"	3'-0"	2½"		#11
S3x5.7	½"ϕ x 2½" 440-450 inch pounds 36-38 foot pounds	See Detail Below									3¾"	1½"	2⅝"	1½"	⅝"	9/16"	⅜"	¼"	½"	0.60	1½"	See Detail Below			3'-3½"	3½"	12"	Non-reinforced ③
S4x7.7																												

③ Foundation design shall be Type G Mount, see SMD (TY G).

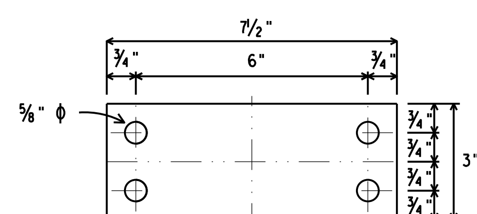


PERFORATED FUSE PLATE DETAIL

Use H.S. hex head bolts, hex head nut and bevel or flat washer (where req'd) under nut. All holes shall be drilled, sub-punched and reamed. All plate cuts shall preferably be saw cuts. However, flame cutting will be permitted provided all edges are ground. Metal projecting beyond the plane of the plate face will not be permitted. Steel fuse plates shall conform to the requirements of ASTM A36. ASTM A572 Grade 50 or ASTM A588 may be substituted for A36 at the option of the fabricator. Mill test reports shall be submitted for Fuse Plates. Steel used shall have an ultimate tensile strength not to exceed 80 KSI. For alternative Fuse Plate contact Traffic Operations Division.

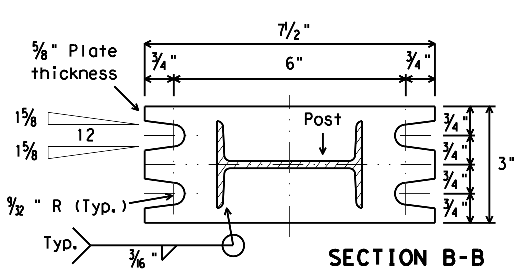


ELEVATION



BOLT KEEPER PLATE

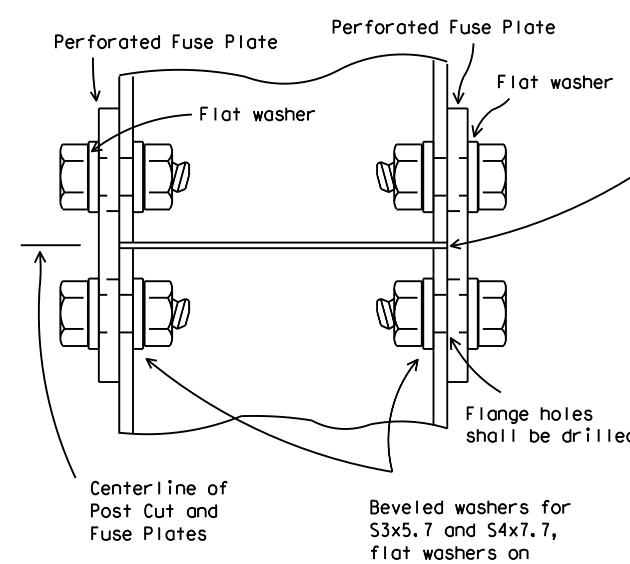
30 Ga galv. sheet steel



SECTION B-B

SIGN POST AND STUB POST

(For S4x7.7 and S3x5.7)



DETAIL "A"

Parts shall be saw cut either before galvanizing and the galvanized cut cleaned of zinc build-up, or saw cut after galvanizing and the cut surface repaired per Item 445, "Galvanizing."

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS-LARGE ROADSIDE SIGNS FOUNDATION & STUB

SMD(2-2)-08

©TxDOT August 1995	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS	CONT	SECT	JOB	HIGHWAY
4-98 9-08	0073	02	082	US 281
	DIST		COUNTY	SHEET NO.
	SAT		BEXAR	142

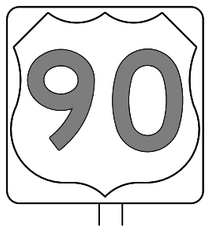
DATE: 11/21/2023
FILE: c:\pw\knl\d0278495\smd22-08.dgn

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:

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

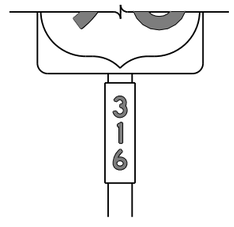
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(3)-13

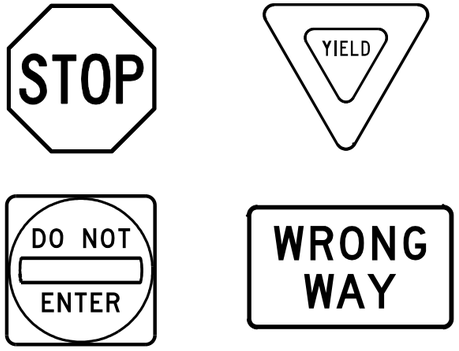
FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	SAT	BEXAR		143

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: 11/21/2023
FILE: c:\pw\int\d0278495\tsr4-13.dgn

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

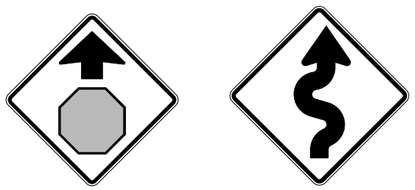
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

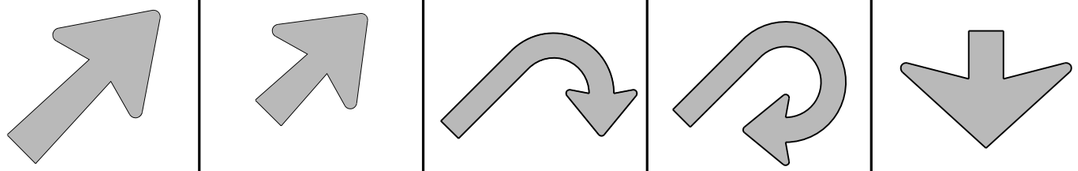
TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	SAT	BEXAR		144

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.

ARROW DETAILS

for Large Ground-Mounted and Overhead Guide Signs



TYPE	LETTER SIZE	USE
A-1	10.67" U/L and 10" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 20" U/L	
B-1	10.67" U/L and 10" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 20" U/L	

CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

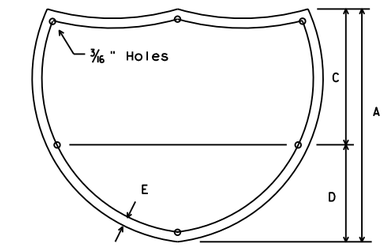
NOTE

Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

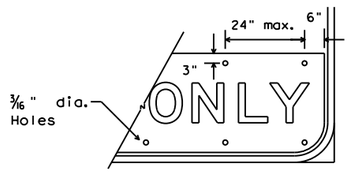
http://www.txdot.gov/

SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)

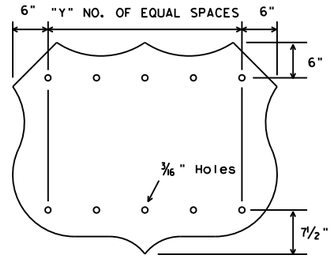


INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1 1/2
48	28	20	1 3/4

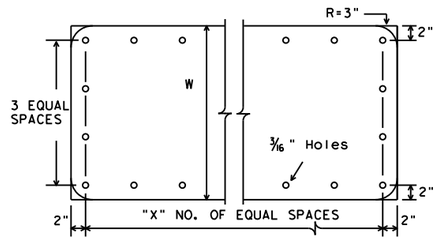


EXIT ONLY PANEL



U.S. ROUTE MARKERS

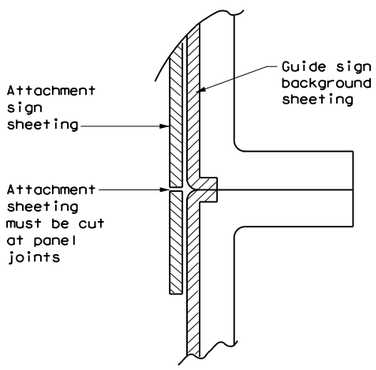
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



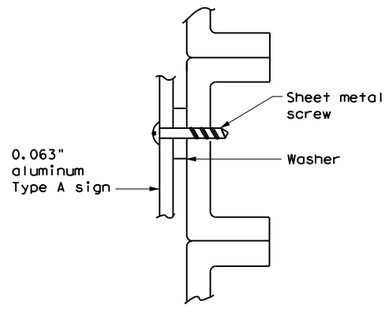
STATE ROUTE MARKERS

No. of Digits	W	X
4	24	4
4	36	5
4	48	6
3	24	3
3	36	4
3	48	5

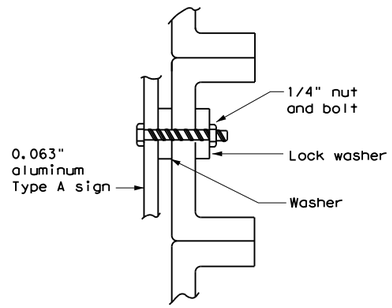
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



DIRECT APPLIED ATTACHMENT



SCREW ATTACHMENT



NUT/BOLT ATTACHMENT

NOTE:

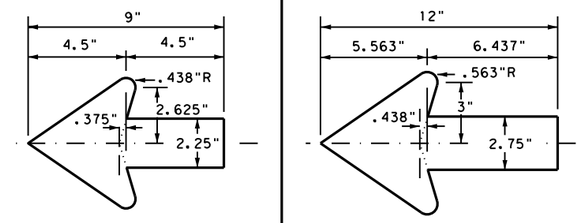
1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".

NOTE:

Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.

Standard arrow to be used with 8 inch letters.

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(5)-13

FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	SAT	BEXAR		145

DATE: 11/21/2023
FILE: c:\pw\ent\d0278495\tsr5-13.dgn

TRAFFIC SIGNAL NOTES

1. SIGNAL HEADS SHALL HAVE A MINIMUM OF 18.5 FEET CLEARANCE ABOVE ROADWAY SURFACE.
2. FURNISH VEHICLE AND PEDESTRIAN SIGNALS WITH LIGHT EMITTING DIODE (LED) SIGNAL LAMP UNITS.
3. FURNISH MOUNTING HARDWARE REQUIRED FOR ATTACHING VEHICLE SIGNAL HEADS TO THE TOP AND BOTTOM SWAY CABLES.
4. USE TYPE C HIGH SPECIFIC IINTENSITY GRADE SHEETING FOR SIGNS MOUNTED UNDER OR ADJACENT TO THE SIGNAL HEADS.
5. FURNISH AND INSTALL FULL-ACTUATED CONTROLLER WITH INTERNAL TIME BASE COORDINATION UNIT IN A BASE MOUNTED CABINET.
6. ASSUME OWNERSHIP OF THE REMOVED EXISTING SIGNS.
7. PLACE PAVEMENT MARKINGS AS SHOWN ON THE PLANS OR AS DIRECTED.
8. FUNISH AND INSTALL URETHANE FOAM TO ENCLOSE THE ENDS OF ALL CONDUITES CONTAINING SIGNAL CABLES AND ELECTRICAL CONDUCTORS.
9. CAP SPARE CONDUITS INSTALLED IN POLE FOUNDATIONS AND GROUND BOXES USING APPROVED CAPING DEVICES.
10. DO NOT PLACE SIGNAL HEADS OVER THE ROADWAY UNTIL ALL NECESSARY MATERIALS ARE ON HAND AS APPROVED.
11. INSTALL TOW SET SCREWS ON ALL VEHICLE SIGNAL HEAD MOUNTING HARDWARE FITTINGS.
12. INSTALL A 5/8-IN. (MINIMUM) EYE BOLT FOR THE POINT OF ATTACHMENT BELOW THE SERVICE ENTRANCE WEATHERHEAD FOR THE SERVICE DROP TO STEEL OR WOOD POLE.
13. PROVIDE 250 WATT LIGHT EMITTING DIODE (LED) LAMP LUMINAIRES OPERATING AT 240 VOLTS.
14. WRAP SIGNAL HEADS WITH DARK PLASTIC OR SUITABLE MATERIAL TO CONCEAL THE SIGNAL FACES FROM THE TIME OF INSTALLATION UNTIL PLACING INTO OPERATION.
15. GROUND STEEL MAST ARM POLE ASSEMBLIES IN ACCORDANCE WITH THE REQUIREMENTS SHOWN ON THE LATEST TRAFFIC SIGNAL POLE FOUNDATION STANDARD. USE THE GROUNDING LUG ON THE POLE TO GROUND THE POLE TO THE GROUND CONDUCTORS FROM THE CONDUITS.
16. VERIFY THE CORRECT MAST ARM POLE LENGTHS FOR EACH SIGNALIZED INTERSECTION PRIOR TO ORDERING THE EQUIPMENT.
17. INSTALL A CLOSE NIPPLE WITH LOCK NUT AND BRUSHING (SIZE AS REQUIRED) WHERE THE CABLE ENTERS THE UPPER PORTION OF THE SIGNAL POLE.
18. REFER TO TXDOT'S WEBSITE FOR PREQUALIFIED PRODUCTS LIST REGARDING RADAR DETECTION UNITS, VEHICLE LED TRAFFIC SIGNAL LAMP UNIT, SYMBOLIC PEDESTRIAN SIGNAL HEAD, SYMBOLIC PEDESTRIAN SIGNAL LAMP, CONDUIT, CONDUCTORS, GROUND BOXES, AND ELECTRICAL SERVICE. CHECK WEBSITE PERIODICALLY FOR CURRENT UPDATES.
19. THE LOCATION OF THE DETECTION ZONE IS APPROXIMATE. THE EXACT LOCATION WILL BE DETERMINED BY THE ENGINEER AND/OR DEPARTMENTS TRAFFIC OPERATIONS SECTION.
20. REMOVE THE EXISTING PAVEMENT MARKINGS AS DIRECTED. REMOVE THE PAVEMENT MARKINGS TO THE EXTENT THAT THEY ARE EITHER COMPLETELY REMOVED OR OBLITERATED TO THE SATISFACTION OF THE ENGINEER.
21. RIGHT OF WAY, EASEMENTS, OR OTHER MATTERS OF RECORD MAY EXIST WHERE NONE ARE SHOWN.
22. THE EXISTING PAVEMENT MARKINGS, UTILITIES, AND OTHER APPURTENANCES ARE SHOWN FOR REFERENCE ONLY. CONTRACTOR TO VERIFY LOCATION OF ADJACENT UNDERGROUND UTILITIES PRIOR TO DIGGING AND PROTECT THEM DURING CONSTRUCTION.
23. THE CONTRACTOR SHALL CONNECT ALL FIELD WIRING TO THE CONTROLLER.
24. TRAY CABLE AND ILSN CABLE SHALL BE RUN IN 2-IN. CONDUIT SEPARATE FROM THE SIGNAL CABLE AS SHOWN ON THE ASSOCIATED TRAFFIC SIGNAL DETAILS SHEET CONDUIT AND CABLING TABLE.
25. THE PRESENCE DETECTOR PROCESSOR SYSTEM PROVIDED SHALL CONSIST OF UNITS THAT INSERT DIRECTLY INTO THE CONTROLLER INPUT FILE.
26. MINIMUM CLEARANCE OF 10' RADIUS FROM THE NEUTRAL AND 10' RADIUS FROM PRIMARY SHALL BE MAINTAINED BETWEEN PROPOSED TRAFFIC SIGNAL EQUIPMENT. INCLUDING EXISTING OVERHEAD ELECTRICAL LINES.
27. IT IS THE INTENTION OF THESE PLANS TO PROVIDE A FULLY OPERATIONAL TRAFFIC SIGNAL. ANY ITEMS REQUIRED, BUT OMITTED, ARE THE RESPONSIBILITY OF THE CONTRACTOR AND WILL BE SUBSIDIARY TO THE PROPER BID ITEM.
28. IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE ALL UTILITIES (PUBLIC AND PRIVATE) PRIOR TO COMMENCING WORK. THE CONTRACTOR IS FULLY RESONSIBLE FOR ANY DAMAGES CAUSED BY HIS FAILURE TO LOCATE, PRESERVE, AND PROTECT THESE UTILITIES, WHETHER UNDERGROUND, ABOVE GROUND, OR OVERHEAD.
29. CONTRACTOR SHALL EXERCISE CAUTION WHEN EXCAVATING IN THE VICINITY OF UNDERGROUND UTILITIES.
30. CONTRACTOR WILL NOTIFY THE STATE'S UTILITIES LOCATOR AT 800-344-8377 WITH 48 HOURS ADVANCE NOTICE PRIOR TO ANY EXCAVATION, BORING, TRENCHING, OR PUSHING PIPING IN THE AREA.
31. ALL CONSTRUCTION SIGNS AND BARRICADES WILL CONFORM TO THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES AND BE CONSISTENT WITH TXDOT TCP STANDARDS.
32. EXACT LOCATION OF TRAFFIC SIGNAL POLES, GROUND BOXES,AND ELECTRICAL SERVICE WILL BE DETERMINED IN THE FIELD SUBJECT TO FINAL APPROVAL BY TXDOT INSPECTOR. IT IS THE CONTRACTOR'S RESONSIBILITY TO VERIFY THE EXACT LOCATIONS FROM INSPECTING ENGINEER, PRIOR TO CONSTRUCTION.
33. ALL CONDUITS IN NATURAL GROUND WILL BE TRENCHED AND BURIED. THE CONTRACTOR WILL BACKFILL, COMPACT, AND RESTORE TRENCH AREA TO ORIGINAL CONDITIONS AND MATCH EXISTING SURFACE CONDITIONS TO THE DENSITY OF THE ADJACENT AREA.
34. ALL CONDUITS UNDER ROADWAYS AND PAVED SHOULDERS WILL BE BORED.
35. ALL PVC CONDUIT WILL BE SCHEDULE 80.
36. ALL POLES AND GROUND BOXES WILL BE GROUNDED.
37. ALL DRILL SHAFT LOCATIONS ARE APPROXIMATE AND WILL BE FIELD VERIFIED PRIOR TO CONSTRUCTION. ANY ADJUSTMENTS WILL BE APPROVED BY THE INSPECTING ENGINEER.
38. CONTRACTOR WILL RESTORE THE CONSTRUCTION AREA TO ORIGINAL CONDITIONS PRIOR TO FINAL INSPECTION.
39. ANY EXISTING PAVEMENT, CURBS, SIDEWALKS, AND DRIVEWAYS DAMAGED OR REMOVED DURING CONSTRUCTION WILL BE REPLACED TO TXDOT STANDARDS.
40. SIGNAL HEADS WILL BE LED AND HAVE RED, YELLOW, GREEN, RED ARROW, YELLOW ARROW, GREEN ARROW, WHERE SPECIFIED INDICATORS WITH 12-IN. LENS. ALL SIGNAL HEADS WILL HAVE BLACK BACKPLATES.
41. FURNISH MATERIALS NECESSARY TO INSTALL ACCESSIBLE PEDESTRIAN SIGNAL UNITS AND SIGNS AS SHOWN IN THE PLANS.
42. PEDESTRIAN PUSH BUTTONS WILL CONFORM TO CURRENT ADA STANDARDS AND WILL BE ACCESSIBLE PEDESTRIAN SIGNAL (APS) UNITS CONFORMING TO ITEM 688. EACH APS PUSH BUTTON WILL HAVE THE FOLLOING FEATURES:
    I) PUSH BUTTON LOCATOR TONE
    II) A TACTILE ARROW
    III) A SPEECH WALK MESSAGE INDICATION, AND
    IV) A SPEECH PUSH BUTTON INFORMATION MESSAGE.
43. THE APS UNIT WILL BE PROGRAMMED BY A MANUFACTURERS REPRESENTATIVE IN ACCORDANCE WITH SPECIFICATIONS AND THE TMUTCD.
44. CABINET ASSEMBLY SHALL BE EQUIPPED WITH A MANUAL CONTROL SWITCH AND INTERNAL ADVANCE BUTTON IN THE POLICE PANEL FOR MANUAL CONTROL OF SIGNAL.
45. TXDOT HAS THE AUTHORITY TO STOP CONSTRUCTION OF TRAFFIC SIGNAL, IF THE STATE INSPECTIONS ARE NOT BEING FOLLOWED.
46. FURNISH SYMBOL TYPE PEDESTRIAN COUNTDOWN SIGNALS. INSTALL USING MOUNTING HEIGHT IN ACORDANCE WITH THE LATEST TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
47. FURNISH MATERIALS NECESSARY TO INSTALL ACCESSIBLE PEDESTRIAN SIGNAL UNITS AND SIGNS AS SHOWN IN PLANS. INSTALL AT 3 FT. 6 IN. TO 4 FT. 0 IN. ABOVE THE SIDEWALK OR CONCRETE WALKWAY.
48. INSTALL A CONCRETE WALKWAY FROM THE END OF THE CURB RAMP OR EDGE OF PAVEMENT TO THE TRAFFIC SIGNAL POLE FOUNDATION TO PROVIDE ACCESS TO PEDESTRIAN PUSH BUTTON(S). PERFORM THIS WORK IN ACCORDANCE WITH ITEM 531, "SIDEWALKS".
49. REPAIR OR REPLACE PAVEMENT DAMAGED BY THE CONTRACTOR'S FORCES DURING CONSTRUCTION AT NO COST TO THE DEPARTMENT.
50. CONTACT AND COORDINATE WITH THE OWNER OF ANY OPTICOM EQUIPMENT PRIOR TO CONSTRUCTION. THE OWNER IS TO REMOVE OPTICOM EQUIPMENT. ONCE THE CONSTRUCTION IS COMPLETED IT'S THE OWNER RESPONSIBILITY TO REINSTALL OPTICOM COMPONENTS.

FILENAME: c:\pw\kh1\d0251189\US281_SIG_NOTES.dgn.dgn
PLOTTED: 12/21/2023 2:01:15 PM

STATE OF TEXAS
AMY ELIZABETH AVERY
98481
LICENSED
PROFESSIONAL ENGINEER
12/21/2023
Amy E Avery

Kimley»Horn
F-928

© 2023

Texas Department of Transportation

US 281

TRAFFIC SIGNAL

GENERAL NOTES

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	US 281

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAT	BEXAR	146
CONT.	SECT.	JOB	
0073	02	082	

CoSA TRAFFIC SIGNAL NOTES

1. PRIOR TO CONSTRUCTION THE CITY SHALL APPROVE ALL LOCATIONS FOR TRAFFIC SIGNAL POLES, CONTROLLER FOUNDATION, AND ELECTRICAL SERVICE PEDESTALS. CONTRACTOR SHALL STAKE LOCATIONS BEFORE CONTACTING GOVERNING AGENCY FOR APPROVAL.

2. GROUND BOX COVERS SHALL BE POLYMER CONCRETE WITH "TRAFFIC SIGNAL" LEGIBLY IMPRINTED IN 1 INCH LETTERS (MINIMUM HEIGHT).

3. MATERIALS & EQUIPMENT DEEMED SALVAGEABLE BY THE CITY INSPECTOR SHALL BE DELIVERED BY THE CONTRACTOR TO THE CITY OF SAN ANTONIO TRAFFIC OPERATIONS. THE CONTRACTOR SHALL CONTACT THE CITY SERVICES AND SUPPLY SUPERINTENDENT, AT (210)-27-8462 SEVEN (7) DAY PRIOR TO THE DELIVERY OF THE SALVAGED MATERIAL IN ACCORDANCE WITH FEDERAL, STATE, AND LOCAL REGULATION.

4. FINAL ADJUSTMENT OF TRAFFIC SIGNAL HEADS (VEHICLE OR PEDESTRIAN), AS REQUIRED BY THE ENGINEER, SHALL BE DONE BY THE CONTRACTOR AND SHALL BE SUBSIDIARY TO FURNISHING AND INSTALLING TRAFFIC SIGNAL HEADS OR SECTIONS.

5. ALL VEHICLE AND PEDESTRIAN SIGNAL FACES SHALL BE COVERED SO THAT THE INDICATIONS CANNOT BE SEEN FROM THE TIME OF INSTALLATION UNTIL PLACED IN OPERATION.

6. EXISTING TRAFFIC SIGNAL SHALL REMAIN IN OPERATION UNTIL NEW SIGNAL IS READY.

7. WHEN NECESSARY TO TURN OFF AN EXISTING SIGNAL, CONTRACTOR SHALL PROVIDE AN OFF-DUTY UNIFORMED POLICE OFFICER TO CONTROL TRAFFIC UNTIL THE TRAFFIC SIGNAL IS BACK IN SATISFACTORY OPERATION.

8. THE CONTRACTOR SHALL CONTACT THE CITY TRAFFIC ENGINEER AT (210) 207-8462 AND THE CITY INSPECTOR AT (210) 207-3954 A MINIMUM OF FOURTEEN (14) DAYS PRIOR TO THE TRAFFIC SIGNAL TURN-ON.

9. THE LENGTH OF TIME FOR ANY TRAFFIC SIGNAL DEACTIVATION AND REACTIVATION FOR THIS PROJECT WILL BE MINIMIZED. DEACTIVATION CAN ONLY OCCUR DURING OFF-PEAK TIME PERIOD TO MINIMIZE TRAFFIC DISRUPTIONS. OFF-DUTY POLICE OFFICERS ARE REQUIRED IF TRAFFIC SINGAL DEACTIVATION REQUIRES MORE THAN 20 MINUTES (NO SEPARATE PAY ITEM).

10. CONTRACTOR TO REMOVE ALL EXISTING ELECTRIAL SERVICES, PEDESTAL POLES, MAST ARM ASSEMBLIES, LUMINAIRES, SIGNAL HEADS, CONTROLLERS, CABLES, AND OTHER ACCESSORIES. REMOVE IN A MANNER SO THAT DAMAGE DOES NOT OCCUR. REMOVE AND SALVAGE ALL ITEMS SHOWN ON THE PLANSOR AS DIRECTED BY THE INSPECTOR.

11. CONTRACTOR TO REMOVE ABANDONED GROUND BOXES AND ALL EXISTING CABLES REGARDLESS OF TYPE OR NUMBER FROM EXISTING CONDUIT. REMOVE EXISTING CONDUIT 24" BELOW GRADE AS IT TURNS UP INTO THE GROUND BOX AND BACKFILL THE HOLE WITH MATERIAL EQUAL IN COMPOSITION AND DENSITY TO THE SURROUNDING AREA.

12. CONTRACTOR TO REMOVE ABANDONED CONCRETE FOUNDATIONS TO A POINT 24" BELOW FINAL GRADE. BACKFILL HOLE WITH MATERIAL EQUAL IN COMPOSITION AND DENSITY TO THE SURROUNDING AREA. REPLACE SURFACING MATERIAL WITH SIMILAR MATERIAL TO AN EQUIVALENT CONDITION.

13. CONTRACTOR SHALL ACCEPT OWNERSHIP OF UNSALVAGEABLE MATERIALS AND DISPOSE OF IN ACCORDANCE WITH FEDERAL, STATE, AND LOCAL REGULATIONS.

14. ALL DIMENSIONS ARE SHOWN IN FEET UNLESS SPECIFIED OTHERWISE (ALL EXISTING FEATURES ARE SHOWN IN SCREENED BLACK I.E. FADED).

15. ALL TRAFFIC SIGNAL EQUIPMENT, INCLUDING SPAN WIRE INSTALLED SHALL MAINTAIN A MINIMUM CLEARANCE OF 10' RADIUS FROM NEUTRAL AND 15' RADIUS FROM PRIMARY OR SECONDARY OVERHEAD ELECTRIC LINES. CONTRACTOR SHALL CONSIDER ALTERNATIVE FOUNDATION PLACEMENT METHODS IN AREAS WHERE EXISTING OVERHEAD ELECTRIC LINES PROHIBIT THE USE OF CONVENTIONAL DRILL TRUCK.

16. CONTRACTOR TO POTHOLE SIGNAL POLE LOCATIONS NEAR UNDERGROUND UTILITIES PRIOR TO INSTALLING POLE FOUNDATION.

17. BATTERY BACK UP SYSTEM (BBS) COMPLETE SHALL BE ABOVE GROUND AND INSTALLED PER TxDOT SPECIFICATION ITEM 6058.

18. LOCATION OF TRAFFIC SIGNAL, POLES, CONTROLLER ASSEMBLIES, AND ELECTRICAL SERVICE SHALL BE VERIFIED AN APPROVED BY COSA PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL SUPPLY AND INSTALL THE ADDRESS IN PERMANENT NUMBERS AND LETTERS TO THE STREET SIDE OF THE SERVICE ENCLOSEURE. SAID ADDRESS SHALL ALSO BE RECORDED AND GIVEN TO THE CITY OF SAN ANTONIO INSPECTOR FOR THE CITY'S RECORDS.

19. ALL ILSN SIGNS SHALL BE INSTALLED ON THE ILSN MAST ARM AS DIRECTED BY THE ENGINEER.

20. AN ADDITIONAL 2" SCHEDULE 80 PVC SHALL BE INSTALLED AT EACH POLE FOUNDATION STUBBED OUT 2" FROM THE FACE OF THE FOUNDATION. STUB OUTS SHALL BE APPROPRIATELY CAPPED BELOW GRADE FOR FUTURE USE.

21. SIDEWALK SHALL BE EXTENDED UP TO THE MAST ARM POLES, AS NEEDED, TO PROVIDE PEDESTRIAN ACCESS TO THE PEDESTRIAN PUSH BUTTONS.

22. UTILITIES SHOWN ARE APPROXIMATE. CONTRACTOR SHALL CALL FOR LOCATES PRIOR TO COMMENCING EXCAVATION. ALL UTILITY LOCATION SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR.

23. NEATLY CAP/COIL ALL WIRES AND CABLES IN GROUND BOX OR AT TERMINATION.

24. SIGNAL OPERATION WILL BE MONITORED AFTER CONSTRUCTION AND MODIFIED AS NECESSARY.

25. ALL SIGNAL HEADS SHALL HAVE BACK PLATES.

26. CONTRACTOR SHALL CONTACT THE CITY TRAFFIC ENGINEER AT (210) 207-8462 A MINIMUM OF SEVEN (7) DAYS PRIOR TO THE BEGINNING OF CONSTRUCTION.

27. CONTRACTOR SHALL FURNISH AND DELIVER CONTROLLER AND CABINET ASSEMBLY TO THE CITY OF SAN ANTONIO SIGNAL SHOP FOR PROGRAMMING FOUR (4) WEEKS IN ADVANCE OF THE EQUIPMENT INSTALLATION IN THE FIELD.

28. CONTRACTOR SHALL NOT INSTALL ANY TRAFFIC SIGNAL EQUIPMENT OR SIGNS PERTINENT TO UNFINISHED ROADWAY BEING OPENED TO VEHICULAR TRAFFIC.

29. ACTUAL POWER SOURCE LOCATION UNIDENTIFIED AT THE TIME OF PLAN PREPARATION. CONDUIT QUANTITY INCLUDES ALLOWANCE FOR 150 LF OG 3 INCH CONDUIT.

FILENAME: c:\pw\khi\d0251189\US281_SIG_NOTES_CoSA.dgn.dgn
PLOTTED: 12/21/2023 2:01:39 PM

STATE OF TEXAS
AMY ELIZABETH AVERY
98481
LICENSED PROFESSIONAL ENGINEER
12/21/2023
Amy E Avery

Kimley»Horn
F-928

© 2023

Texas Department of Transportation

US 281

CoSA TRAFFIC SIGNAL

GENERAL NOTES

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	US 281

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAT	BEXAR	147
CONT.	SECT.	JOB	
0073	02	082	

TRAFFIC SIGNAL QUANTITIES

ITEM #	DESC CODE	DESCRIPTION	UNIT	US 281 (ROOSEVELT) AT SANTA RITA ST	US 281 (ROOSEVELT) AT SAN CASIMIRO ST	US 281 (ROOSEVELT) AT SOCORRO ST	US 281 (ROOSEVELT) AT E ESTANCIA ST	TOTAL
0416	6031	DRILL SHAFT (TRF SIG POLE) (30 IN)	LF			22		22
0416	6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	26	26		26	78
0416	6034	DRILL SHAFT (TRF SIG POLE) (48 IN)	LF			44		44
0618	6046	CONDT (PVC) (SCH 80) (2")	LF	35	30	150	35	250
0618	6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	125	120	365	135	745
0618	6053	CONDT (PVC) (SCH 80) (3")	LF	20	15	95	20	150
0618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	250	240	730	280	1500
0620	6007	ELEC CONDR (NO.8) BARE	LF	410	370	1350	470	2600
0620	6009	ELEC CONDR (NO.6) BARE	LF	20	20	40	20	100
0620	6010	ELEC CONDR (NO.6) INSULATED	LF	40	40	55	40	175
0621	6002	TRAY CABLE (3 CONDR) (12 AWG)	LF	240	165	625	250	1280
0624	6010	GROUND BOX TY D (162922)W/APRON	EA	2	2	4	2	10
0628	6144	ELC SRV TY D 120/240 060(NS)SS(E)PS(U)	EA	1	1	1	1	4
0680	6001	INSTALL HWY TRF SIG (FLASH BEACON)	EA	1	1		1	3
0680	*	THERMAL DETECTION DEVICE (INSTALL ONLY)	EA	4	4		4	12
0680	6003	INSTALL HWY TRF SIG (SYSTEM)	EA			1		1
0680	*	CONTROLLER FULLY ACTUATED W/CABINET TYPE 332	EA			1		1
0680	*	TYPE 332 TRAFFIC SIGNAL CONTROLLER CONCRETE FOUNDATION	EA			1		1
0680	*	ROD, 5/8" X 10' COPPER-CLAD GROUND (CONTROLLER ONLY)	EA			1		1
0680	*	DETECTOR UNIT (DUAL CHANNEL)	EA			1		1
0680	*	MAST ARM 8' LUMINAIRE W/LED (250W EQ)	EA			4		4
0680	*	MAST ARM DAMPERS	EA			2		2
0680	*	SIGN, R10-17T, "LEFT TURN YIELD ON FLASHING YELLOW ARROW"	EA			2		2
0680	*	SIGN, R10-12, "LEFT TURN YIELD ON GREEN"	EA			2		2
0680	*	STREET NAME (ROOSEVELT)	EA			2		2
0680	*	STREET NAME (SOCORRO)	EA			2		2
0680	*	PTZ CAMERA	EA			1		1
0680	*	5G LTE CELLULAR MODEM WITH ANTENNA AND POWER SUPPLY	EA			1		1
0680	*	DMS SIGN - INSTALLED 2 WEEKS BEFORE SIGNAL TURN ON	EA			1		1
0682	6001	VEH SIG SEC (12")LED(GRN)	EA			10		10
0682	6002	VEH SIG SEC (12")LED(GRN ARW)	EA			2		2
0682	6003	VEH SIG SEC (12")LED(YEL)	EA	10	10	8	10	38
0682	6004	VEH SIG SEC (12")LED(YEL ARW)	EA			4		4
0682	6005	VEH SIG SEC (12")LED(RED)	EA			10		10
0682	6006	VEH SIG SEC (12")LED(RED ARW)	EA			2		2
0682	6018	PED SIG SEC (LED)(COUNTDOWN)	EA			8		8
0682	6021	BACK PLATE W/REFL BRDR (12")(1 SEC)	EA	10	10		10	30
0682	6049	BACKPLATE W/REFL BRDR(4 SEC)	EA			2		2
0682	6060	BACKPLATE W/REFL BRDR(3 SEC)	EA			10		10
0684	6035	TRF SIG CBL (TY A)(14 AWG)(9 CONDR)	LF	320	320	1240	320	2200
0684	6049	TRF SIG CBL (TY A)(16 AWG)(3 CONDR)	LF			1100		1100
0686	6027	INS TRF SIG PL AM(S)1 ARM(24')LUM	EA			1		1
0686	6031	INS TRF SIG PL AM(S)1 ARM(28')LUM	EA			1		1
0686	6046	INS TRF SIG PL AM(S)1 ARM(44')	EA		1			1
0686	6047	INS TRF SIG PL AM(S)1 ARM(44')LUM	EA	2	1		2	5
0686	6063	INS TRF SIG PL AM(S)1 ARM(60')LUM	EA			2		2
0687	6001	PED POLE ASSEMBLY	EA			5		5
0688	6001	PED DETECT PUSH BUTTON (APS)	EA			8		8
0688	6003	PED DETECTOR CONTROLLER UNIT	EA			1		1
6004	6031	ITS COM CBL (ETHERNET)	LF	460	690	70		1700
6058	6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA			1		1
6292	6001	RVDS(PRESENCE DETECTION ONLY)	EA			4		4
6292	6002	RVDS(ADVANCE DETECTION ONLY)	EA			2		2
6292	*	RVDS POWER/COMM CABLE	LF		940			940
6292	*	RVDS PROCESSOR SYSTEM(4 CHANNEL)	EA	2				2

* ITEM WILL NOT BE PAID FOR DIRECTLY, BUT SHALL BE CONSIDERED SUBSIDIARY TO ITEM ABOVE.

FILENAME: c:\pw\kh1\vd025118\9\US281_TRAF_QTY_SUM.dgn.dgn
PLOTTED: 1/3/2024 6:25:35 PM

STATE OF TEXAS
AMY ELIZABETH AVERY
98481
LICENSED PROFESSIONAL ENGINEER
1/3/2024

Kimley»Horn F-928

© 2023

Texas Department of Transportation

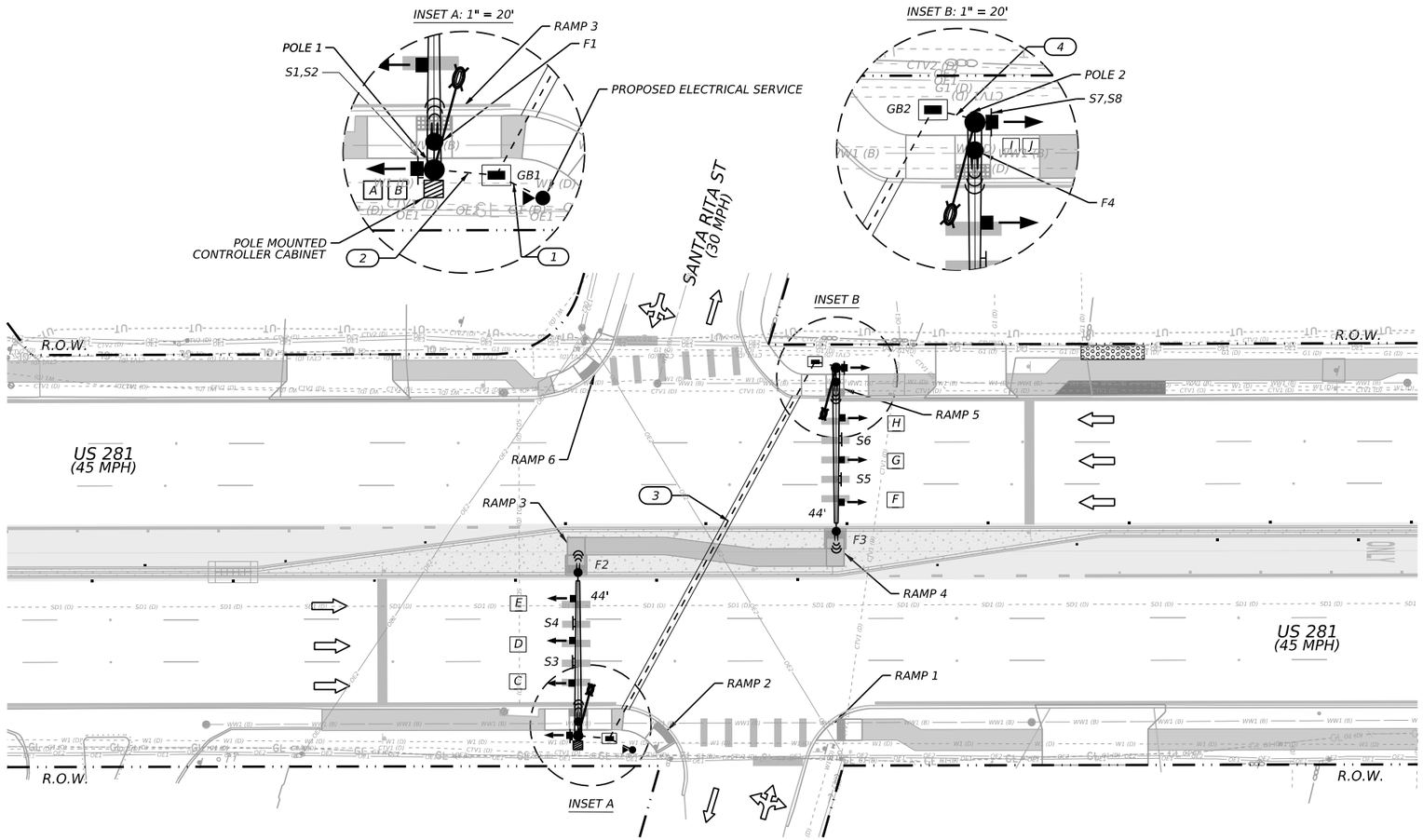
US 281

SUMMARY OF TRAFFIC SIGNAL QUANTITIES

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	US 281

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAT	BEXAR	148
CONT.	SECT.	JOB	
0073	02	082	



LEGEND

- SIGNAL POLE W/ MAST ARM
- LUMINAIRE
- VERTICAL SIGNAL HEAD
- OVERHEAD SIGN
- FLIR TRAFIONF PEDESTRIAN DETECTION SENSOR
- TYPE D GROUND BOX W/APRON
- CONDUIT (TRENCH)
- CONDUIT (BORE)
- SERVICE METER AND DISCONNECT
- GROUND MOUNTED CONTROLLER CABINET
- POLE MOUNTED CONTROLLER CABINET
- EQUIPMENT DESIGNATION
- DIRECTION OF TRAFFIC
- RIGHT OF WAY (R.O.W.)

N

0′ 20′ 40′
SCALE: 1"=40′

NOTES:

1. THE CONTRACTOR SHALL VERIFY AND DETERMINE THE EXACT LOCATION OF UTILITIES PRIOR TO CONSTRUCTION.
2. THE CONTRACTOR SHALL CALL UTITILITY LOCATOR SERVICE AT LEAST 48 HOURS PRIOR TO COMMENCING WORK TEXAS "ONE-CALL" SYTEM: 1-800-345-4545.
3. THE CONTRACTOR IS FULLY RESPONSIBLE FOR ANY DAMAGES CAUSED BY THE FAILURE TO LOCATE AND PRESERVE THE UNDERGROUND FACILITIES.
4. LOCATION OF SIGNAL POLES, CABINET, AND ELECTRICAL SERVICE SHALL BE VERIFIED AND APPROVED BY TXDOT PRIOR TO CONSTRUCTION.
5. CONTRACTOR SHALL CONNECT FIELD WIRING TO CONTROLLER
6. SIGNAL HEADS SHALL HAVE A MINIMUM OF 18.5 FEET CLEARANCE ABOVE ROADWAY SURFACE.
7. TRAY CABLE SHALL BE RUN IN 2" CONDUIT SEPARATE FROM THE SIGNAL CABLE.
8. LUMINAIRES ARE SHOWN FOR CLARITY PURPOSES ONLY; ORIENT THEM AS DIRECTED BY THE TRAFFIC ENGINEER. CONTRACTOR TO ENSURE MINIMUM 10 FEET CLEARANCE FROM TRAFFIC SIGNAL EQUIPMENT TO OHE NEUTRAL WIRE.
9. CONTRACTOR SHALL POTHOLE ALL SIGNAL POLE FOUNDATION LOCATIONS NEAR UNDERGROUND UTILITIES PRIOR TO INSTALLING POLE FOUNDATIONS.
10. CONTRACTOR SHALL FURNISH AND DELIVER POLE MOUNTED CONTROLLER CABINET AND ASSEMBLY TO COSA SIGNAL SHOP FOR PROGRAMMING AND TESTING TWO WEEKS IN ADVANCE PRIOR TO CONTRACTOR INSTALLING EQUIPMENT IN THE FIELD.
11. CONTRACTOR SHALL CONTACT COSA TRAFFIC ENGINEER A MINIMUM OF SEVEN (7) DAYS PRIOR TO BEGINNING OF CONSTRUCTION.
12. CONTRACTOR SHALL CONTACT COSA TRAFFIC ENGINEER A MINIMUM OF FOURTEEN (14) DAYS PRIOR TO THE OVERHEAD FLASHER TURN-ON.

PROPOSED FLASHER SIGNS

W11-2
(36X36)

W16-7PL
(24"X12")

S1, S8

S2, S3, S4
S5, S6, S7

PROPOSED LED TRAFFIC SIGNAL HEADS

1-SECTION
12" SIGNAL HEAD

A B C D E
F G H I J

STATE OF TEXAS
AMY ELIZABETH AVERY
98481
LICENSED
PROFESSIONAL ENGINEER
12/21/2023

Kimley»Horn F-928

© 2023

Texas Department of Transportation

US 281

SANTA RITA ST

PROPOSED OVERHEAD
FLASHERS LAYOUT

SHEET 1 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	US 281

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAT	BEXAR	149
CONT.	SECT.	JOB	
0073	02	082	

FILENAME: c:\pw\khi\d0251189\US281-ST-RITA_FLSHR_PR_01.dgn
PLOTTED: 12/21/2023 2:02:30 PM

CONDUCTOR AND CONDUIT SCHEDULE								
CONDUIT/ SPAN RUN NUMBER		1	2		3		4	
NUMBER OF CONDUITS		1	1	1	1	2	1	1
CONDUIT SIZE IN INCHES		2.0	2.0	3.0	2.0	3.0	2.0	3.0
CONDUIT/ SPAN LENGTH (LF)		10	10	10	125	125	10	10
RUN TYPE		T	T	T	B	B	T	T
CABLE	CIRCUIT	NUMBER OF CONDUCTORS						
#6 XHHN	120 POWER HOT & COMMON	2	2					
BARE BOND GROUND	BARE #6 (INS)	1	1					
	BARE #8			1	1	2	1	1
9-CONDUCTOR #14 CABLE (FLASHERS)	POLE 1							
	POLE 2			1		1		1
3-CONDUCTOR #12 TRAY CABLE (LUM)	POLE 1	1	1					
	POLE 2	1			1		1	
CAT 5E ETHERNET CABLE (FLIR)	POLE 1							
	POLE 2			2		2		2

FLIR SMART SENSOR DETECTION DETAILS		
DETECTOR	RAMP	MOUNTING LOCATION
F1	RAMP 2	POLE 1 POLE
F2	RAMP 3	POLE 1 MA
F3	RAMP 4	POLE 2 MA

TRAFFIC POLE SCHEDULE		
POLE	POLE 1	POLE 2
FOUNDATION	36-A @ 13'	36-A @ 13'
MOUNTING HEIGHT	MA - 19', LUM - 35'	MA - 19', LUM - 35'
ATTACHMENTS	44' MA	44' MA
	POLE MOUNTED CABINET	
	TRAFFIC SIGNAL HEADS A, B, C, D, E	TRAFFIC SIGNAL HEADS F, G, H, I, J
	250W LED LUMINAIRE	250W LED LUMINAIRE
	2X FLIR DETECTORS	2X FLIR DETECTORS
	S1, S2, S4, S5	S5, S6, S7, S8

INSIDE POLES	9C	CAT 5E	#12 3/C TRAY
	(FT)	(FT)	(FT)
POLE 1	40	40	35
POLE 2	20	40	35
TOTALS	60	80	70

INSIDE ARMS	9C	CAT 5E	#12 3/C TRAY
	(FT)	(FT)	(FT)
POLE 1	45	45	0
POLE 2	45	45	0
TOTALS	90	90	0

ELECTRICAL SERVICE DATA												
ELEC. SERVICE ID	PLAN SHEET NUMBER	ELECTRICAL SERVICE DESCRIPTION	SERVICE CONDUIT SIZE	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN CKT.BRK. POLE/AMPS	TWO-POLE CONTRACTOR AMPS	PANE I BD/LOADCENTER AMP RATING	BRANCH CIRCUIT ID	BRANCH CKT. BRK. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
A	149	ELC SRV TY D 120/240 060(NS)SS(E)PS(U)	2"	3/#6	N/A	2P/60	N/A	100	Flashers	1P/40	30	4.1
									Pole Mounted Luminaires	2P/15	2	

FILENAME: c:\pw\khl\d0251189\US281-ST-RITA_FLSHR_DET_01.dgn
PLOTTED: 12/21/2023 2:02:55 PM

STATE OF TEXAS
AMY ELIZABETH AVERY
98481
LICENSED PROFESSIONAL ENGINEER
12/21/2023

Kimley»Horn F-928

© 2023

Texas Department of Transportation

US 281

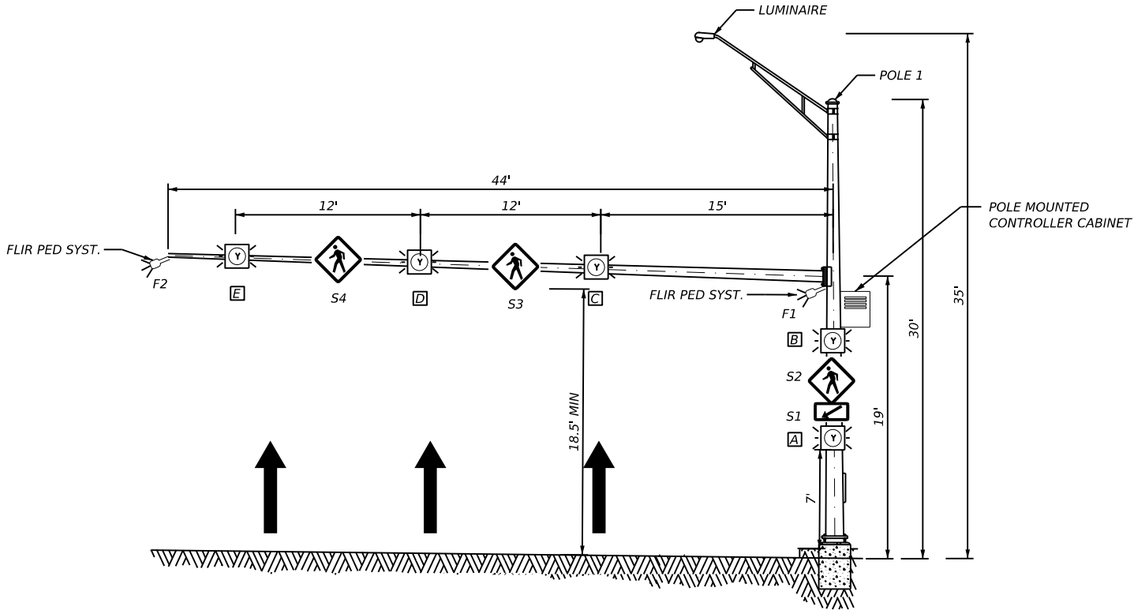
SANTA RITA ST

PROPOSED OVERHEAD FLASHERS DETAILS

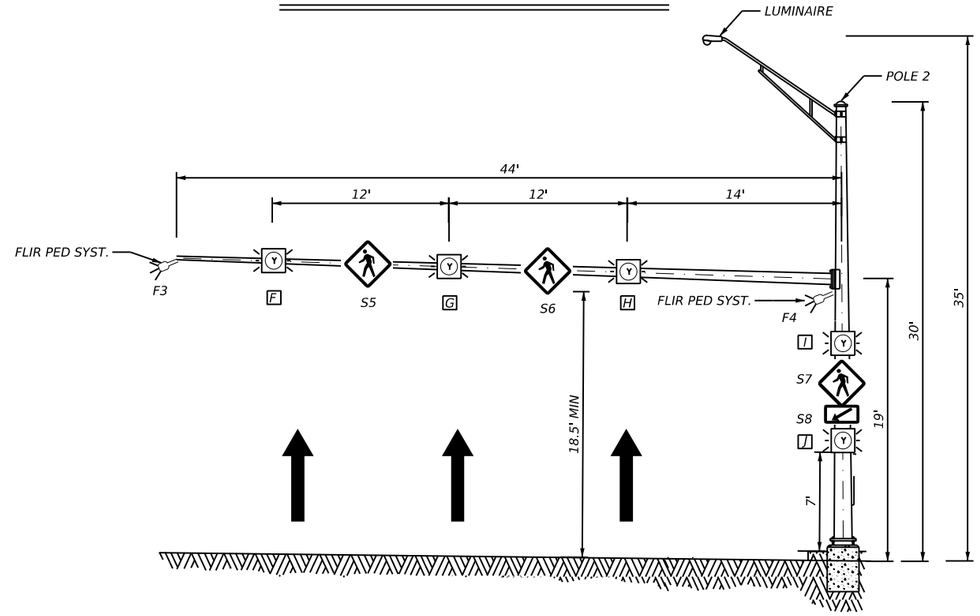
SHEET 2 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	US 281

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAT	BEXAR	150
CONT.	SECT.	JOB	
0073	02	082	



LOOKING SOUTH ON US 281 (ROOSEVELT)



LOOKING NORTH ON US 281 (ROOSEVELT)

NOTE:

1. CONTRACTOR TO INSTALL FLASHING BEACONS ON MAST ARM OVER CENTER OF EACH RESPECTIVE LANE.

FILENAME: c:\pw\kn1\d0251189\US281-ST-RITA_FLSHR_ELEV_01.dgn
PLOTTED: 12/21/2023 5:50:12 PM

STATE OF TEXAS
AMY ELIZABETH AVERY
98481
LICENSED PROFESSIONAL ENGINEER
12/21/2023

Kimley»Horn F-928

© 2023

Texas Department of Transportation

US 281

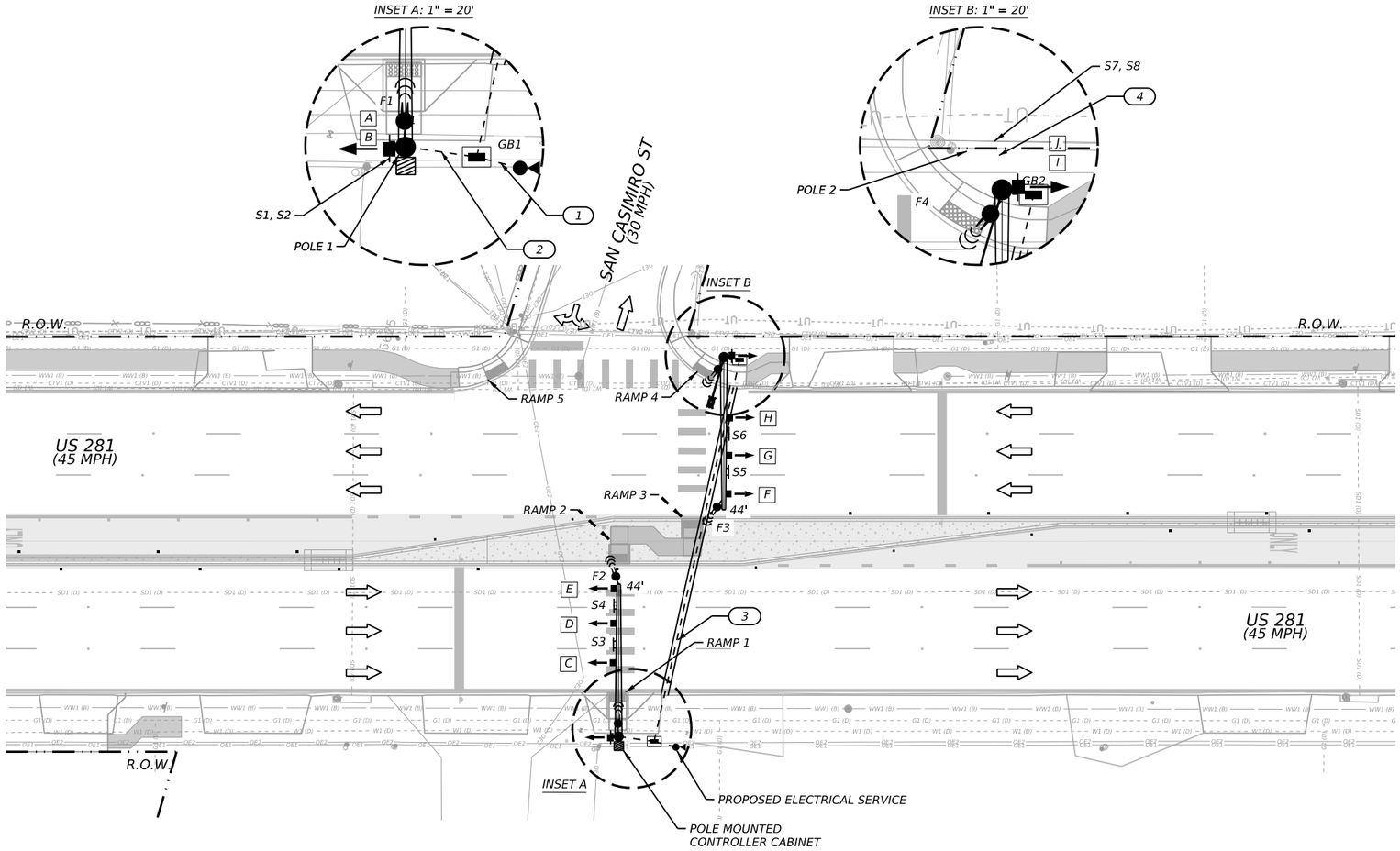
SANTA RITA ST

PROPOSED OVERHEAD
FLASHERS ELEVATIONS

SHEET 3 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	US 281

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAT	BEXAR	151
CONT.	SECT.	JOB	
0073	02	082	



LEGEND

- SIGNAL POLE W/ MAST ARM
- LUMINAIRE
- VERTICAL SIGNAL HEAD
- OVERHEAD SIGN
- FLIR TRAFIONF PEDESTRIAN DETECTION SENSOR
- TYPE D GROUND BOX W/APRON
- CONDUIT (TRENCH)
- CONDUIT (BORE)
- SERVICE METER AND DISCONNECT
- GROUND MOUNTED CONTROLLER CABINET
- POLE MOUNTED CONTROLLER CABINET
- EQUIPMENT DESIGNATION
- DIRECTION OF TRAFFIC
- RIGHT OF WAY (R.O.W.)

N

0' 20' 40'
SCALE: 1"=40'

NOTES:

1. THE CONTRACTOR SHALL VERIFY AND DETERMINE THE EXACT LOCATION OF UTILITIES PRIOR TO CONSTRUCTION.
2. THE CONTRACTOR SHALL CALL UTITILITY LOCATOR SERVICE AT LEAST 48 HOURS PRIOR TO COMMENCING WORK TEXAS "ONE-CALL" SYTEM: 1-800-345-4545.
3. THE CONTRACTOR IS FULLY RESPONSIBLE FOR ANY DAMAGES CAUSED BY THE FAILURE TO LOCATE AND PRESERVE THE UNDERGROUND FACILITIES.
4. LOCATION OF SIGNAL POLES, CABINET, AND ELECTRICAL SERVICE SHALL BE VERIFIED AND APPROVED BY TXDOT PRIOR TO CONSTRUCTION.
5. CONTRACTOR SHALL CONNECT FIELD WIRING TO CONTROLLER
6. SIGNAL HEADS SHALL HAVE A MINIMUM OF 18.5 FEET CLEARANCE ABOVE ROADWAY SURFACE.
7. TRAY CABLE SHALL BE RUN IN 2" CONDUIT SEPARATE FROM THE SIGNAL CABLE.
8. LUMINAIRES ARE SHOWN FOR CLARITY PURPOSES ONLY; ORIENT THEM AS DIRECTED BY THE TRAFFIC ENGINEER. CONTRACTOR TO ENSURE 10 FEET MINIMUM CLEARANCE FROM TRAFFIC SIGNAL EQUIPMENT TO OHE NEUTRAL WIRE.
9. CONTRACTOR SHALL POTHOLE ALL SIGNAL POLE FOUNDATION LOCATIONS NEAR UNDERGROUND UTILITIES PRIOR TO INSTALLING POLE FOUNDATIONS.
10. CONTRACTOR SHALL FURNISH AND DELIVER POLE MOUNTED CONTROLLER CABINET AND ASSEMBLY TO COSA SIGNAL SHOP FOR PROGRAMMING AND TESTING TWO WEEKS IN ADVANCE PRIOR TO CONTRACTOR INSTALLING EQUIPMENT IN THE FIELD.
11. CONTRACTOR SHALL CONTACT COSA TRAFFIC ENGINEER A MINIMUM OF SEVEN (7) DAYS PRIOR TO BEGINNING OF CONSTRUCTION.
12. CONTRACTOR SHALL CONTACT COSA TRAFFIC ENGINEER A MINIMUM OF FOURTEEN (14) DAYS PRIOR TO THE OVERHEAD FLASHER TURN-ON.

PROPOSED FLASHER SIGNS

W11-2
(36X36)

W16-7PL
(24"X12")

S1, S8

S2, S3, S4
S5, S6, S7

PROPOSED LED TRAFFIC SIGNAL HEADS

1-SECTION
12" SIGNAL HEAD

Y

A B C D E
F G H I J

STATE OF TEXAS
AMY ELIZABETH AVERY
98481
LICENSED PROFESSIONAL ENGINEER
1/3/2024
Amy E Avery

Kimley»Horn F-928

© 2023

Texas Department of Transportation

US 281

SAN CASIMIRO ST

PROPOSED OVERHEAD
FLASHERS LAYOUT

SHEET 1 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	US 281

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAT	BEXAR	152
CONT.	SECT.	JOB	
0073	02	082	

FILENAME: c:\pw\kh1\d0251189\US281_CSMRO_FLSHR_PR_02.dgn
PLOTTED: 12/21/2023 2:03:41 PM

CONDUCTOR AND CONDUIT SCHEDULE								
CONDUIT/ SPAN RUN NUMBER		1	2		3		4	
NUMBER OF CONDUITS		1	1	1	1	2	1	1
CONDUIT SIZE IN INCHES		2.0	2.0	3.0	2.0	3.0	2.0	3.0
CONDUIT/ SPAN LENGTH (LF)		10	10	10	115	115	5	5
RUN TYPE		T	T	T	B	B	T	T
CABLE	CIRCUIT	NUMBER OF CONDUCTORS						
#6 XHHN	120 POWER HOT & COMMON	2	2					
BARE BOND GROUND	BARE #6 (INS)	1	1					
	BARE #8			1	1	2	1	1
9-CONDUCTOR #14 CABLE (FLASHERS)	POLE 1							
	POLE 2			1		1		1
3-CONDUCTOR #12 TRAY CABLE (LUM)	POLE 1							
	POLE 2	1			1		1	
CAT 5E ETHERNET CABLE (FLIR)	POLE 1							
	POLE 2			2		2		2

FLIR SMART SENSOR DETECTION DETAILS		
DETECTOR	RAMP	MOUNTING LOCATION
F1	RAMP 1	POLE 1 POLE
F2	RAMP 2	POLE 1 MA
F3	RAMP 3	POLE 2 MA
F4	RAMP 4	POLE 2 POLE

TRAFFIC POLE SCHEDULE		
POLE	POLE 1	POLE 2
FOUNDATION	36-A @ 13'	36-A @ 13'
MOUNTING HEIGHT	MA - 19'	MA - 19', LUM - 35'
ATTACHMENTS	44' MA	44' MA
	POLE MOUNTED CABINET	
	TRAFFIC SIGNAL HEADS A, B, C, D, E	TRAFFIC SIGNAL HEADS F, G, H, I, J
		250W LED LUMINAIRE
	2X FLIR DETECTORS	2X FLIR DETECTORS
	S1, S2, S4, S5	S5, S6, S7, S8

INSIDE POLES	9C	CAT 5E	#12 3/C TRAY
	(FT)	(FT)	(FT)
POLE 1	40	40	
POLE 2	20	40	35
TOTALS	60	80	35

INSIDE ARMS	9C	CAT 5E	#12 3/C TRAY
	(FT)	(FT)	(FT)
POLE 1	45	45	0
POLE 2	45	45	0
TOTALS	90	90	0

ELECTRICAL SERVICE DATA												
ELEC. SERVICE ID	PLAN SHEET NUMBER	ELECTRICAL SERVICE DESCRIPTION	SERVICE CONDUIT SIZE	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN CKT.BRK. POLE/AMPS	TWO-POLE CONTRACTOR AMPS	PANE I BD/LOADCENTER AMP RATING	BRANCH CIRCUIT ID	BRANCH CKT. BRK. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
B	152	ELC SRV TY D 120/240 060(NS)SS(E)PS(U)	2"	3/#6	N/A	2P/60	N/A	100	Flashers	1P/40	30	4.1
									Pole Mounted Luminaires	2P/15	2	

FILENAME: c:\pw\khl\d0251189\US281_CSMRO_FLSHR_DET_02.dgn
PLOTTED: 12/21/2023 2:04:04 PM

STATE OF TEXAS
AMY ELIZABETH AVERY
98481
LICENSED PROFESSIONAL ENGINEER
12/21/2023
Amy E Avery

Kimley»Horn F-928

© 2023

Texas Department of Transportation

US 281

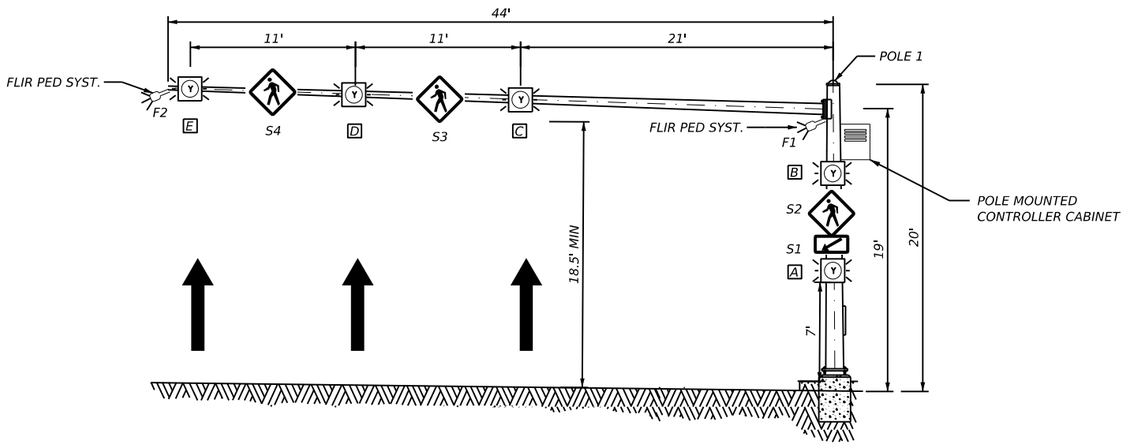
SAN CASIMIRO ST

PROPOSED OVERHEAD FLASHERS DETAILS

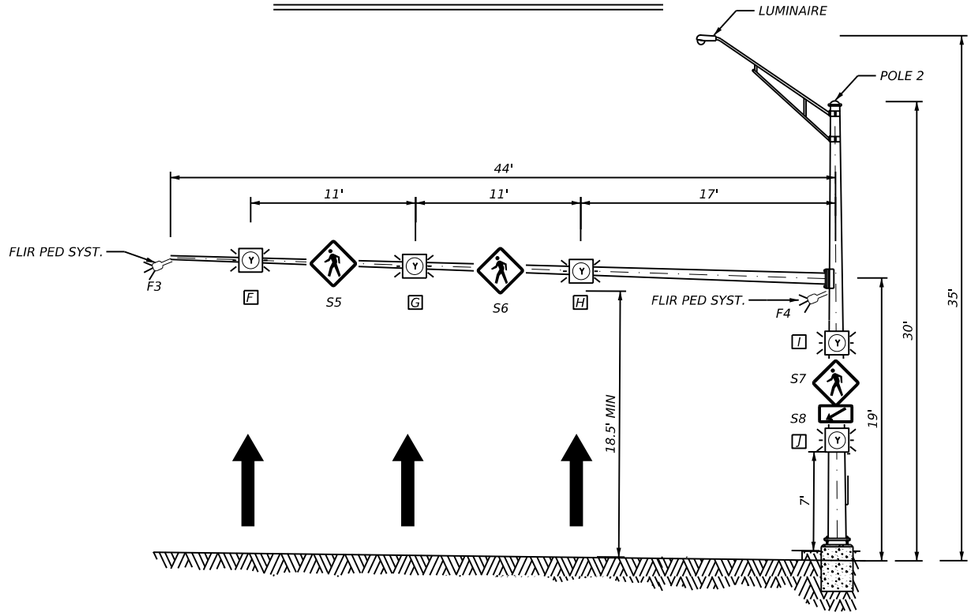
SHEET 2 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	US 281

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAT	BEXAR	153
CONT.	SECT.	JOB	
0073	02	082	



LOOKING SOUTH ON US 281 (ROOSEVELT)



LOOKING NORTH ON US 281 (ROOSEVELT)

NOTE:

1. CONTRACTOR TO INSTALL FLASHING BEACONS ON MAST ARM OVER CENTER OF EACH RESPECTIVE LANE.

FILENAME= c:\pw\khi\d0251189\US281_CSMRO_FLSHR_ELEV_02.dgn
PLOTTED= 12/21/2023 5:50:40 PM

STATE OF TEXAS
AMY ELIZABETH AVERY
98481
LICENSED PROFESSIONAL ENGINEER
12/21/2023

Kimley»Horn F-928

© 2023
Texas Department of Transportation

US 281

SAN CASIMIRO ST

PROPOSED OVERHEAD
FLASHERS ELEVATIONS

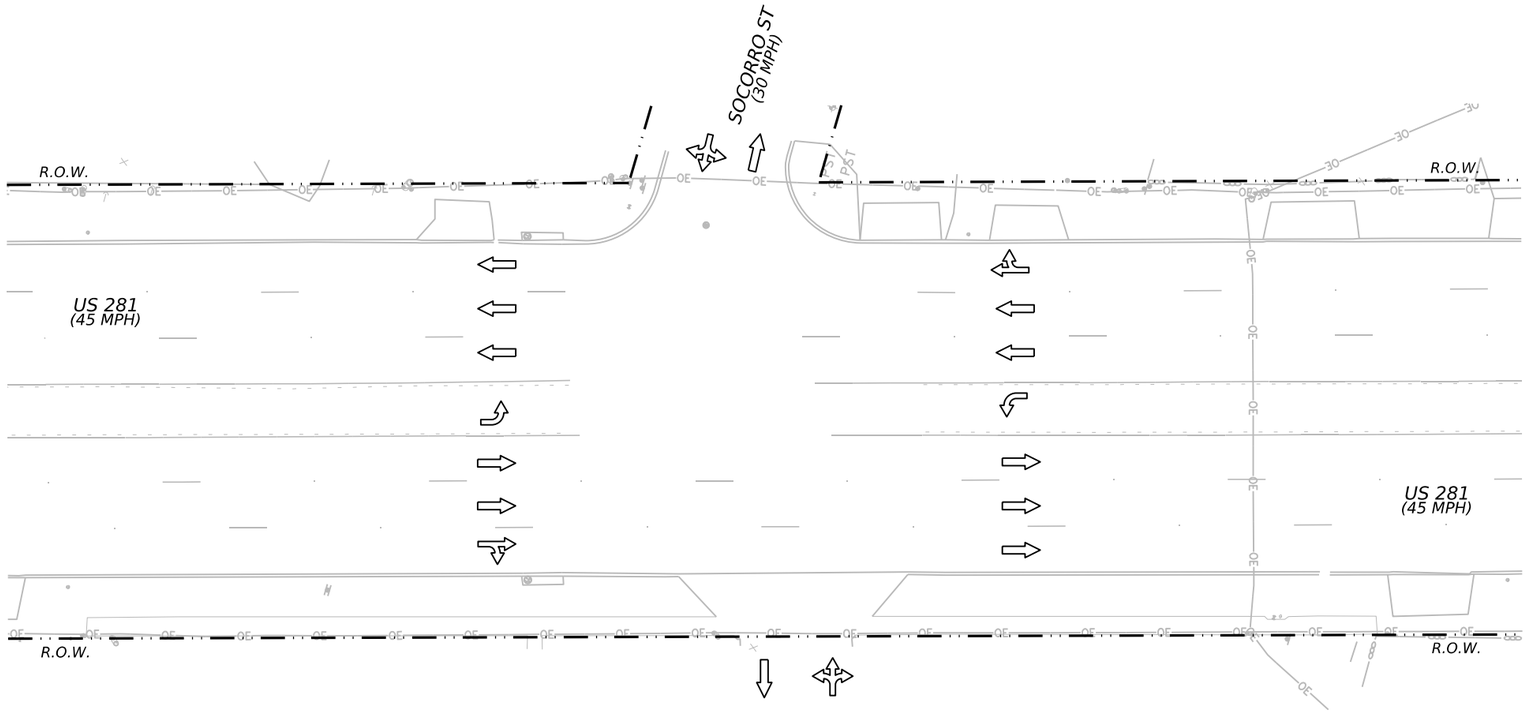
SHEET 3 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	US 281

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAT	BEXAR	154
CONT.	SECT.	JOB	
0073	02	082	

LEGEND

- EXISTING GROUND MOUNTED SIGN
- OVERHEAD ELECTRIC
- DIRECTION OF TRAFFIC
- RIGHT-OF-WAY (R.O.W.)



N

0' 20' 40'

STATE OF TEXAS
AMY ELIZABETH AVERY
98481
LICENSED PROFESSIONAL ENGINEER
12/21/2023

Kimley»Horn F-928

© 2023

Texas Department of Transportation

US 281

SOCORRO ST

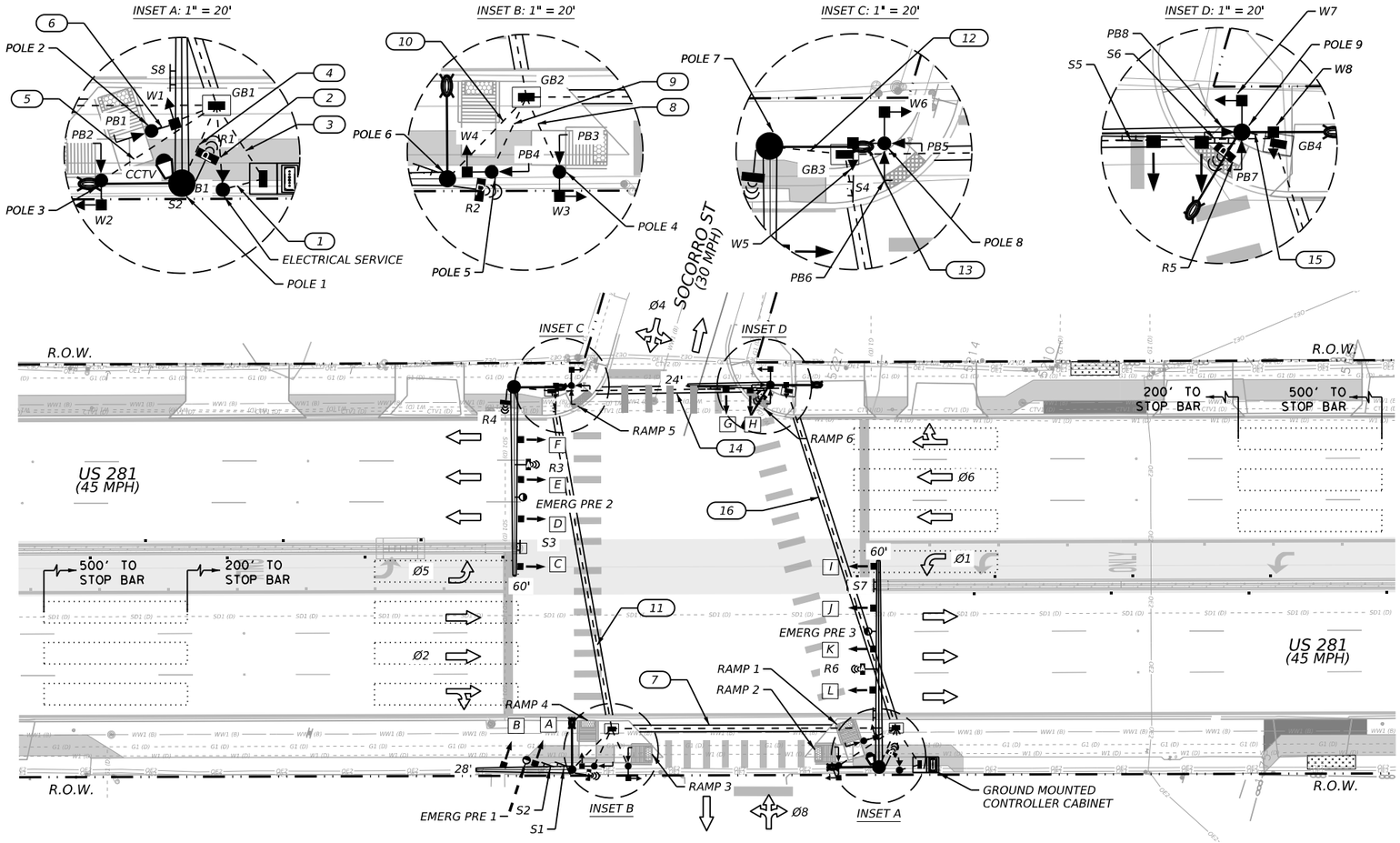
EXISTING TRAFFIC
SIGNAL LAYOUT

SHEET 1 OF 5

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	US 281

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAT	BEXAR	155
CONT.	SECT.	JOB	
0073	02	082	

FILENAME: c:\pw\khi\d0251189\US281_SCRO_SIG_EX_01.dgn
PLOTTED: 12/21/2023 2:04:53 PM



LEGEND

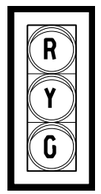
- SIGNAL POLE W/ MAST ARM
- LUMINAIRE
- VERTICAL SIGNAL HEAD
- OVERHEAD SIGN
- PEDESTRIAN POLE W/ SIGNAL HEAD
- PEDESTRIAN PUSH BUTTON
- RADAR PRESENCE DETECTION DEVICE (RPDD)
- RADAR ADVANCE DETECTION DEVICE (RADD)
- PROPOSED EMERGENCY PREEMPTION
- TYPE D GROUND BOX W/APRON
- CONDUIT (TRENCH)
- CONDUIT (BORE)
- SERVICE METER AND DISCONNECT
- GROUND MOUNTED CONTROLLER CABINET
- A — TRAFFIC SIGNAL HEAD DESIGNATION
- DETECTION ZONE
- DIRECTION OF TRAFFIC
- RIGHT OF WAY (R.O.W.)

NOTES:

1. THE CONTRACTOR SHALL VERIFY AND DETERMINE THE EXACT LOCATION OF UTILITIES PRIOR TO CONSTRUCTION.
2. THE CONTRACTOR SHALL CALL UTITILITY LOCATOR SERVICE AT LEAST 48 HOURS PRIOR TO COMMENCING WORK TEXAS "ONE-CALL" SYTEM: 1-800-345-4545.
3. THE CONTRACTOR IS FULLY RESPONSIBLE FOR ANY DAMAGES CAUSED BY THE FAILURE TO LOCATE AND PRESERVE THE UNDERGROUND FACILITIES.
4. LOCATION OF SIGNAL POLES, CABINET, AND ELECTRICAL SERVICE SHALL BE VERIFIED AND APPROVED BY COSA PRIOR TO CONSTRUCTION.
5. CONTRACTOR SHALL CONNECT FIELD WIRING TO CONTROLLER
6. SIGNAL HEADS SHALL HAVE A MINIMUM OF 18.5 FEET CLEARANCE ABOVE ROADWAY SURFACE.
7. TRAY CABLE SHALL BE RUN IN 2" CONDUIT SEPARATE FROM THE SIGNAL CABLE.
8. LUMINAIRES ARE SHOWN FOR CLARITY PURPOSES ONLY; ORIENT THEM AS DIRECTED BY THE TRAFFIC ENGINEER. CONTRACTOR TO ENSURE MINIMUM 10 FEET CLEARANCE FROM SIGNAL EQUIPMENT TO OHE NEUTRAL WIRE.
9. CONTRACTOR SHALL POTHOLE ALL SIGNAL POLE FOUNDATION LOCATIONS NEAR UNDERGROUND UTILITIES PRIOR TO INSTALLING POLE FOUNDATIONS.
10. CONTRACTOR SHALL REMOVE EXISTING STOP SIGNS WHEN TRAFFIC BECOMES OPERATIONAL. REMOVAL SHALL BE SUBSIDIARY TO ITEM 680.
11. CONTRACTOR SHALL FURNISH AND DELIVER TS 2 TYPE 2 CONTROLLER CABINET AND ASSEMBLY TO COSA SIGNAL SHOP FOR PROGRAMMING AND TESTING TWO WEEKS IN ADVANCE PRIOR TO CONTRACTOR INSTALLING EQUIPMENT IN THE FIELD.
12. CONTRACTOR SHALL CONTACT COSA TRAFFIC ENGINEER A MINIMUM OF SEVEN (7) DAYS PRIOR TO BEGINNING OF CONSTRUCTION.
13. CONTRACTOR SHALL CONTACT COSA TRAFFIC ENGINEER A MINIMUM OF FOURTEEN (14) DAYS PRIOR TO THE TRAFFIC SIGNAL TURN-ON.

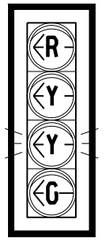
PROPOSED LED TRAFFIC SIGNAL HEADS

3-SECTION VERTICAL
12" SIGNAL HEAD



A B D E F
G H J K L

4-SECTION VERTICAL
12" SIGNAL HEAD (FYA)



C I

COUNTDOWN PEDESTRIAN
SIGNAL HEAD

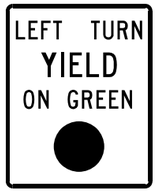
W1, W2, W3, W4,
W5, W6, W7, W8

PROPOSED TRAFFIC SIGNAL SIGNS

R10-17T
36" X 42"

S3, S7

R10-17T
36" X 42"



S2, S5

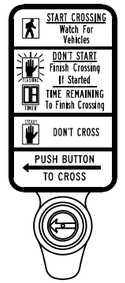
D3-1(B)
S6

D3-1(B)
S1

D3-1(B)
S4

S3-1(B)
S8

R10-3eL
9" X 15"



PB1, PB3,
PB5, PB7

R10-3eR
9" X 15"

PB2, PB4,
PB6, PB8

STATE OF TEXAS
AMY ELIZABETH AVERY
98481
LICENSED PROFESSIONAL ENGINEER
12/21/2023
Amy E Avery

Kimley»Horn F-928

© 2023 Texas Department of Transportation

US 281

SOCORRO ST

PROPOSED TRAFFIC
SIGNAL LAYOUT

SHEET 2 OF 5

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	US 281

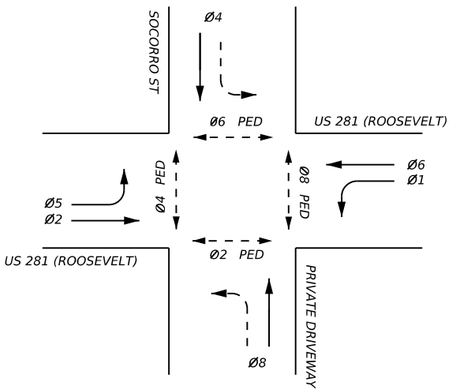
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAT	BEXAR	156
CONT.	SECT.	JOB	
0073	02	082	

FILENAME: c:\pw\khn\d0251189\US281_SCRO_SIG_PR_01.dgn
PLOTTED: 12/21/2023 2:05:19 PM

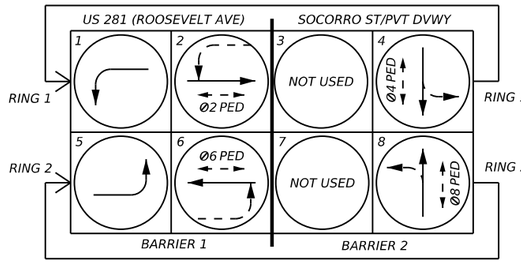
CONDUCTOR AND CONDUIT SCHEDULE

CONDUIT/ SPAN RUN NUMBER		1	2	3	4		5	6	7		8	9	10		11		12		13	14		15		16	
NUMBER OF CONDUITS		1	1	3	1	1	1	1	1	2	1	1	1	1	1	2	1	1	1	1	2	1	1	1	2
CONDUIT SIZE IN INCHES		2.0	2.0	3.0	2.0	3.0	2.0	2.0	2.0	3.0	2.0	2.0	2.0	3.0	2.0	3.0	2.0	3.0	2.0	2.0	3.0	2.0	3.0	2.0	3.0
CONDUIT/ SPAN LENGTH (LF)		10	15	15	15	15	20	10	85	85	15	15	20	20	105	105	5	5	10	70	70	10	10	105	105
RUN TYPE		T	T	T	T	T	T	T	B	B	T	T	T	T	B	B	T	T	T	B	B	T	T	B	B
CABLE	CIRCUIT	NUMBER OF CONDUCTORS																							
#6 XHHN	120 POWER HOT & COMMON	2	2																						
BARE BOND GROUND	BARE #6	1	1																						
	BARE #8			3	1	1	1	1	1	2	1	1	1	1	1	2	1	1	1	1	2	1	1	1	2
9-CONDUCTOR #14 CABLE (SIGNAL)	POLE 1 - PHASES 2 & 5			2		2																			
	POLE 6 - PHASE 4			1						1				1											
	POLE 7 - PHASES 1 & 6			2														2			2				2
	POLE 9 - PHASE 8			1																			1		1
9-CONDUCTOR #14 CABLE (PED SIGNAL)	POLE 2 - PHASE 8			1				1																	
	POLE 3 - PHASE 2			1			1																		
	POLE 4 - PHASE 2			1						1	1														
	POLE 5 - PHASE 4			1						1		1													
	POLE 8 - PHASES 4 & 6			2															2		2				2
	POLE 9 - PHASES 6 & 8			2																			2		2
3-CONDUCTOR #16 CABLE (PED PUSH BUTTONS-APS)	POLE 2 - PHASE 8			1				1																	
	POLE 3 - PHASE 2			1			1																		
	POLE 4 - PHASE 2			1						1	1														
	POLE 5 - PHASE 4			1						1		1													
	POLE 8 - PHASES 4 & 6			2															2		2				2
	POLE 9 - PHASES 6 & 8			2																			2		2
3-CONDUCTOR #12 TRAY CABLE (LUM)	POLE 1		1		1																				
	POLE 6		1						1				1												
	POLE 7		1														1			1				1	
	POLE 9		1																			1		1	
EMERGENCY PREEMPTION CABLE	POLE 1			1		1																			
	POLE 6			1						1				1											
	POLE 7			1														1			1				1
CAT 5E ETHERNET CABLE	POLE 1			1		1																			

ORIENTATION DIAGRAM



PHASING DIAGRAM



INSIDE POLES	#14 9/C SIG	#14 9/C PED HEAD	#16 3/C PED BUTTON	6/C RPDD & RADD	#12 3/C TRAY	EMERG PRE	CAT 5 ETHERNET
	(FT)	(FT)	(FT)	(FT)	(FT)	(FT)	(FT)
POLE 1	40	-	-	40	35	20	35
POLE 2	-	10	10	-	-	-	-
POLE 3	-	10	10	-	-	-	-
POLE 4	-	10	10	-	-	-	-
POLE 5	-	10	10	-	-	-	-
POLE 6	20	-	-	20	35	20	-
POLE 7	40	-	-	40	35	20	-
POLE 8	-	20	20	-	-	-	-
POLE 9	20	20	20	20	35	-	-
TOTAL	120	80	80	120	140	60	35

INSIDE ARMS	#14 9/C SIG	#14 9/C PED HEAD	#16 3/C PED BUTTON	6/C RPDD & RADD	#12 3/C TRAY	EMERG PRE	CAT 5 ETHERNET
	(FT)	(FT)	(FT)	(FT)	(FT)	(FT)	(FT)
POLE 1	120	-	-	60	-	60	-
POLE 2	-	-	-	-	-	-	-
POLE 3	-	-	-	-	-	-	-
POLE 4	-	-	-	-	-	-	-
POLE 5	-	-	-	-	-	-	-
POLE 6	28	-	-	-	-	28	-
POLE 7	120	-	-	60	-	60	-
POLE 8	-	-	-	-	-	-	-
POLE 9	24	-	-	-	-	-	-
TOTAL	292	0	0	120	0	148	0

STATE OF TEXAS
AMY ELIZABETH AVERY
98481
LICENSED PROFESSIONAL ENGINEER
12/21/2023

Kimley»Horn F-928

© 2023

Texas Department of Transportation

US 281

SOCORRO ST

PROPOSED TRAFFIC SIGNAL DETAILS

SHEET 3 OF 5

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	US 281

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAT	BEXAR	157
CONT.	SECT.	JOB	
0073	02	082	

FILENAME: c:\pw\khn1\d0251189\US281_SCRO_SIG_DET_01.dgn
PLOTTED: 12/21/2023 2:05:45 PM

APS MESSAGE INFORMATION			
APS UNIT NO.	ACKNOWLEDGEMENT DEFAULT WAIT	EXTENDED PRESS MESSAGE "WAIT TO CROSS (STREET NAME) AT (CROSS STREET NAME)"	WALK PRESS MESSAGE "(STREET NAME) WALK SIGN IS ON TO CROSS; CROSS (STREET NAME)"
W1	YES	ROOSEVELT @ SOCORRO	AUSTRALIAN TONE
W2	YES	SOCORRO @ ROOSEVELT	AUSTRALIAN TONE
W3	YES	SOCORRO @ ROOSEVELT	AUSTRALIAN TONE
W4	YES	ROOSEVELT @ SOCORRO	AUSTRALIAN TONE
W5	YES	ROOSEVELT @ SOCORRO	ROOSEVELT
W6	YES	SOCORRO @ ROOSEVELT	SOCORRO
W7	YES	SOCORRO @ ROOSEVELT	SOCORRO

RADAR DETECTION ZONE DETAILS			
DETECTOR	APPROACH	TYPE	MOUNTING LOCATION
R1	NB (PHASES 1 & 6)	PRESENCE	POLE 1
R2	EB (PHASE 8)	PRESENCE	POLE 2
R3	NB (PHASES 1 & 6)	ADVANCE	POLE 7 MA
R4	SB (PHASES 2 & 5)	PRESENCE	POLE 7
R5	WB (PHASE 4)	PRESENCE	POLE 9
R6	SB (PHASES 2 & 5)	ADVANCE	POLE 1 MA

TRAFFIC POLE SCHEDULE					
POLE	POLE 1	POLE 2	POLE 3	POLE 4	POLE 5
FOUNDATION	42-A @ 22'	24-A @ 6'	24-A @ 6'	24-A @ 6'	24-A @ 6'
MOUNTING HEIGHT	MA 19' | LUM 35'	10'	10'	10'	10'
ATTACHMENTS	60' MA	-	-	-	-
	TRAFFIC SIGNAL HEADS I, J, K, L	1X PED PUSH BUTTON (PB2)	1X PED PUSH BUTTON (PB1)	1X PED PUSH BUTTON (PB3)	1X PED PUSH BUTTON (PB4)
	EMERG PRE 3	1X PED SIGNAL HEAD (W2)	1X PED SIGNAL HEAD (W1)	1X PED SIGNAL HEAD (W3)	1X PED SIGNAL HEAD (W4)
	RPDD (R1) | RADD (R6)				
	250W LUMINAIRE				
	1X CCTV				
	S7, S8				

TRAFFIC POLE SCHEDULE				
POLE	POLE 6	POLE 7	POLE 8	POLE 9
FOUNDATION	30-A @ 11'	42-A @ 22'	24-A @ 6'	30-A @ 11'
MOUNTING HEIGHT	MA 19' | LUM 35'	MA 19' | LUM 35'	10'	MA 19' | LUM 35'
ATTACHMENTS	20' MA	60' MA		24' MA
	TRAFFIC SIGNAL HEADS A, B	TRAFFIC SIGNAL HEADS C, D, E, F	2X PED PUSH BUTTON (PB5, PB6)	TRAFFIC SIGNAL HEADS G, H
	EMERG PRE 1	EMERG PRE 2	2X PED SIGNAL HEAD (W5, W6)	RPDD (R5)
	RPDD (R2)	RADD (R3) | RPDD (R4)		250W LUMINAIRE
	250W LUMINAIRE	250W LUMINAIRE		S5, S6
				2X PED PUSH BUTTON (PB7, PB8)
	S1, S2	S3, S4		2X PED SIGNAL HEAD (W7, W8)

ELECTRICAL SERVICE DATA											
ELEC. SERVICE ID	PLAN SHEET NUMBER	ELECTRICAL SERVICE DESCRIPTION	SERVICE CONDUIT SIZE	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN CKT.BRK. POLE/AMPS	TWO-POLE CONTRACTOR AMPS	PANEL BD/LOADCENTER AMP RATING	BRANCH CIRCUIT ID	BRANCH CKT. BRK. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
C	156	ELC SRV TY D 120/240 060(NS)SS(E)PS(U)	2"	3 / #6	N/A	2P / 60	N/A	100	Traffic Signal	1P / 50	40	5.5
									Pole Mounted Luminaires	2P / 15	3	

FILENAME: c:\pw\khl\d0251189\US281_SCRO_SIG_DET_02.dgn
PLOTTED: 12/22/2023 7:52:06 AM

STATE OF TEXAS
AMY ELIZABETH AVERY
98481
LICENSED PROFESSIONAL ENGINEER
12/22/2023

Kimley»Horn F-928

© 2023

Texas Department of Transportation

US 281

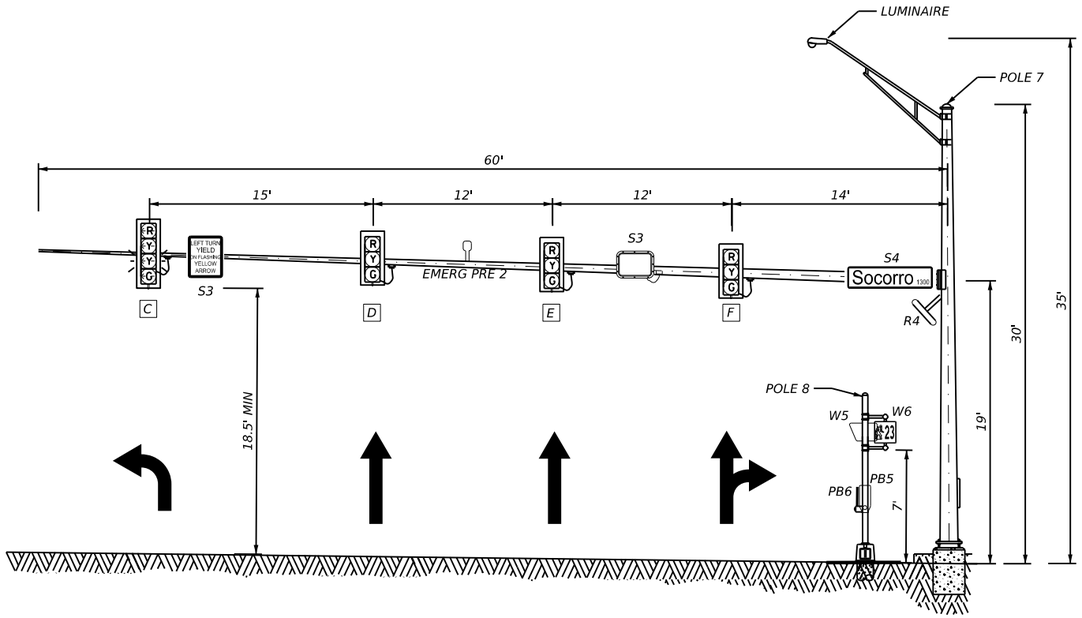
SOCORRO ST

PROPOSED TRAFFIC SIGNAL DETAILS

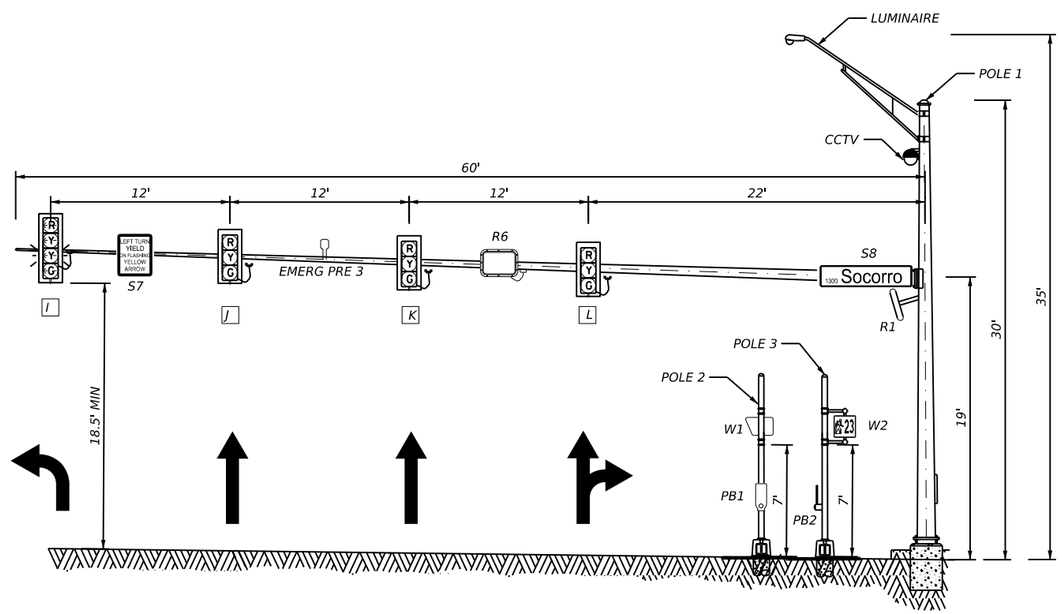
SHEET 4 OF 5

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		US 281

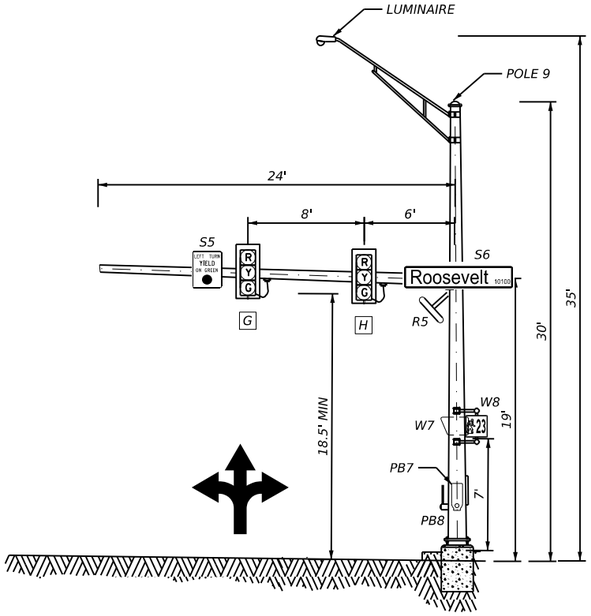
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAT	BEXAR	158
CONT.	SECT.	JOB	
0073	02	082	



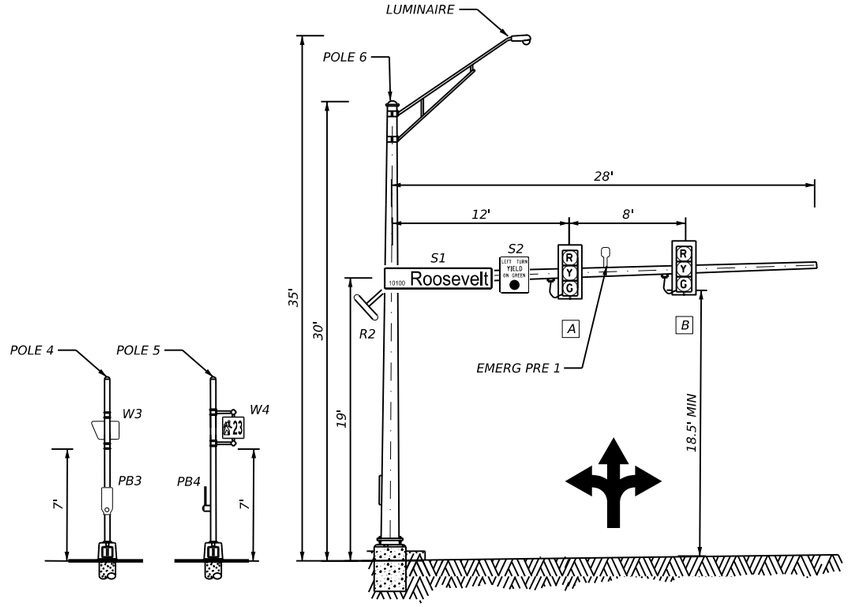
LOOKING NORTH ON ROOSEVELT AVE



LOOKING SOUTH ON ROOSEVELT AVE



LOOKING EAST ON DVWY



LOOKING WEST ON SOCORRO ST

STATE OF TEXAS
AMY ELIZABETH AVERY
98481
LICENSED PROFESSIONAL ENGINEER
12/21/2023
Amy E Avery

Kimley»Horn F-928

© 2023

Texas Department of Transportation

US 281

SOCORRO ST

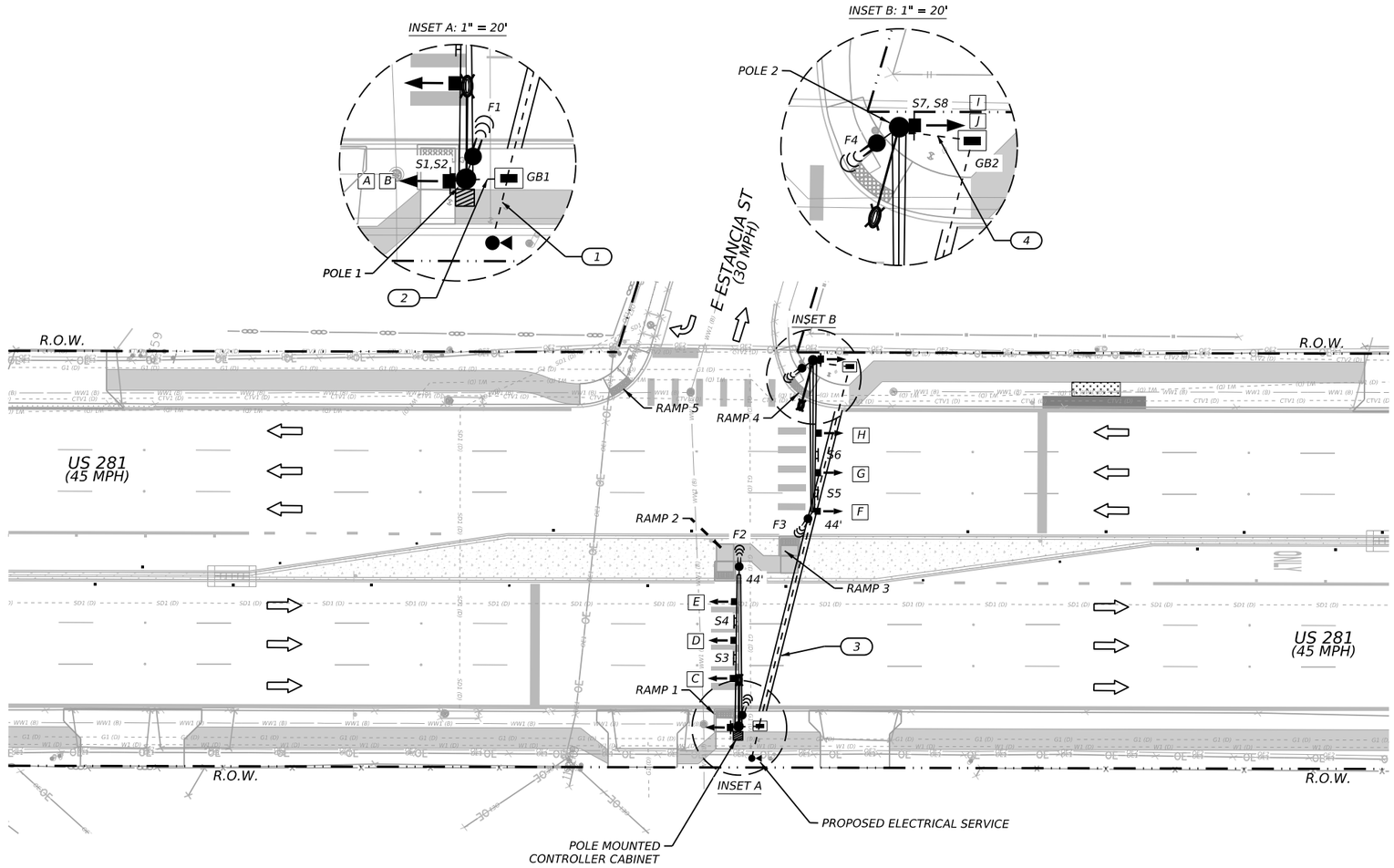
PROPOSED TRAFFIC SIGNAL ELEVATIONS

SHEET 5 OF 5

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	US 281

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAT	BEXAR	159
CONT.	SECT.	JOB	
0073	02	082	

FILENAME: c:\pw\khi\d0251189\US281_SCRO_SIG_ELEV_01.dgn
PLOTTED: 12/21/2023 5:51:07 PM



LEGEND

- SIGNAL POLE W/ MAST ARM
- LUMINAIRE
- VERTICAL SIGNAL HEAD
- OVERHEAD SIGN
- FLIR TRAFIONF PEDESTRIAN DETECTION SENSOR
- TYPE D GROUND BOX W/APRON
- CONDUIT (TRENCH)
- CONDUIT (BORE)
- SERVICE METER AND DISCONNECT
- GROUND MOUNTED CONTROLLER CABINET
- POLE MOUNTED CONTROLLER CABINET
- EQUIPMENT DESIGNATION
- DIRECTION OF TRAFFIC
- RIGHT OF WAY (R.O.W.)

N

0' 20' 40'
SCALE: 1"=40'

NOTES:

1. THE CONTRACTOR SHALL VERIFY AND DETERMINE THE EXACT LOCATION OF UTILITIES PRIOR TO CONSTRUCTION.
2. THE CONTRACTOR SHALL CALL UTITILITY LOCATOR SERVICE AT LEAST 48 HOURS PRIOR TO COMMENCING WORK TEXAS "ONE-CALL" SYTEM: 1-800-345-4545.
3. THE CONTRACTOR IS FULLY RESPONSIBLE FOR ANY DAMAGES CAUSED BY THE FAILURE TO LOCATE AND PRESERVE THE UNDERGROUND FACILITIES.
4. LOCATION OF SIGNAL POLES, CABINET, AND ELECTRICAL SERVICE SHALL BE VERIFIED AND APPROVED BY TXDOT PRIOR TO CONSTRUCTION.
5. CONTRACTOR SHALL CONNECT FIELD WIRING TO CONTROLLER
6. SIGNAL HEADS SHALL HAVE A MINIMUM OF 18.5 FEET CLEARANCE ABOVE ROADWAY SURFACE.
7. TRAY CABLE SHALL BE RUN IN 2" CONDUIT SEPARATE FROM THE SIGNAL CABLE.
8. LUMINAIRES ARE SHOWN FOR CLARITY PURPOSES ONLY; ORIENT THEM AS DIRECTED BY THE TRAFFIC ENGINEER. CONTRACTOR TO ENSURE MINIMUM 10 FEET CLEARANCE FROM TRAFFIC SIGNAL EQUIPMENT TO OHE NEUTRAL WIRE.
9. CONTRACTOR SHALL POTHOLE ALL SIGNAL POLE FOUNDATION LOCATIONS NEAR UNDERGROUND UTILITIES PRIOR TO INSTALLING POLE FOUNDATIONS.
10. CONTRACTOR SHALL FURNISH AND DELIVER POLE MOUNTED CONTROLLER CABINET AND ASSEMBLY TO COSA SIGNAL SHOP FOR PROGRAMMING AND TESTING TWO WEEKS IN ADVANCE PRIOR TO CONTRACTOR INSTALLING EQUIPMENT IN THE FIELD.
11. CONTRACTOR SHALL CONTACT COSA TRAFFIC ENGINEER A MINIMUM OF SEVEN (7) DAYS PRIOR TO BEGINNING OF CONSTRUCTION.
12. CONTRACTOR SHALL CONTACT COSA TRAFFIC ENGINEER A MINIMUM OF FOURTEEN (14) DAYS PRIOR TO THE OVERHEAD FLASHER TURN-ON.

PROPOSED FLASHER SIGNS

W11-2
(36X36)

W16-7PL
(24"X12")

S1, S8

S2, S3, S4
S5, S6, S7

PROPOSED LED TRAFFIC SIGNAL HEADS

1-SECTION
12" SIGNAL HEAD

A B C D E
F G H I J

STATE OF TEXAS
AMY ELIZABETH AVERY
98481
LICENSED
PROFESSIONAL ENGINEER
12/21/2023

Kimley»Horn F-928

© 2023

Texas Department of Transportation

US 281

EAST ESTANCIA ST

PROPOSED OVERHEAD
FLASHERS LAYOUT

SHEET 1 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		US 281
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAT	BEXAR	160
CONT.	SECT.	JOB	
0073	02	082	

FILENAME: c:\pw\kh1\d0251189\US281_ESTNC_FLSHR_PR_03.dgn
PLOTTED: 12/21/2023 2:06:54 PM

CONDUCTOR AND CONDUIT SCHEDULE								
CONDUIT/ SPAN RUN NUMBER		1	2		3		4	
NUMBER OF CONDUITS		1	1	1	1	2	1	1
CONDUIT SIZE IN INCHES		2.0	2.0	3.0	2.0	3.0	2.0	3.0
CONDUIT/ SPAN LENGTH (LF)		10	10	10	120	120	10	10
RUN TYPE		T	T	T	B	B	T	T
CABLE	CIRCUIT	NUMBER OF CONDUCTORS						
#6 XHHN	120 POWER HOT & COMMON	2	2					
BARE BOND GROUND	BARE #6 (INS)	1	1					
	BARE #8			1	1	2	1	1
9-CONDUCTOR #14 CABLE (FLASHERS)	POLE 1							
	POLE 2			1		1		1
3-CONDUCTOR #12 TRAY CABLE (LUM)	POLE 1	1	1					
	POLE 2	1			1		1	
CAT 5E ETHERNET CABLE (FLIR)	POLE 1							
	POLE 2			2		2		2

FLIR SMART SENSOR DETECTION DETAILS		
DETECTOR	RAMP	MOUNTING LOCATION
F1	RAMP 1	POLE 1 POLE
F2	RAMP 2	POLE 1 MA
F3	RAMP 3	POLE 2 MA
F4	RAMP 4	POLE 2 POLE

TRAFFIC POLE SCHEDULE		
POLE	POLE 1	POLE 2
FOUNDATION	36-A @ 13'	36-A @ 13'
MOUNTING HEIGHT	MA - 19', LUM - 35'	MA - 19', LUM - 35'
ATTACHMENTS	44' MA	44' MA
	POLE MOUNTED CABINET	
	TRAFFIC SIGNAL HEADS A, B, C, D, E	TRAFFIC SIGNAL HEADS F, G, H, I, J
	250W LED LUMINAIRE	250W LED LUMINAIRE
	2X FLIR DETECTORS	2X FLIR DETECTORS
	S1, S2, S4, S5	S5, S6, S7, S8

INSIDE POLES	9C	CAT 5E	#12 3/C TRAY
	(FT)	(FT)	(FT)
POLE 1	40	40	35
POLE 2	20	40	35
TOTALS	60	80	70

INSIDE ARMS	9C	CAT 5E	#12 3/C TRAY
	(FT)	(FT)	(FT)
POLE 1	45	45	0
POLE 2	45	45	0
TOTALS	90	90	0

ELECTRICAL SERVICE DATA												
ELEC. SERVICE ID	PLAN SHEET NUMBER	ELECTRICAL SERVICE DESCRIPTION	SERVICE CONDUIT SIZE	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN CKT.BRK. POLE/AMPS	TWO-POLE CONTRACTOR AMPS	PANE I BD/LOADCENTER AMP RATING	BRANCH CIRCUIT ID	BRANCH CKT. BRK. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
D	160	ELC SRV TY D 120/240 060(NS)SS(E)PS(U)	2"	3/#6	N/A	2P/60	N/A	100	Flashers	1P/40	30	4.1
									Pole Mounted Luminaires	2P/15	2	

FILENAME: c:\pw\khi\d0251189\US281_ESTNC_FLSHR_DET_03.dgn
PLOTTED: 12/21/2023 2:07:17 PM

STATE OF TEXAS
AMY ELIZABETH AVERY
98481
LICENSED PROFESSIONAL ENGINEER
12/21/2023

Kimley»Horn F-928

© 2023

Texas Department of Transportation

US 281

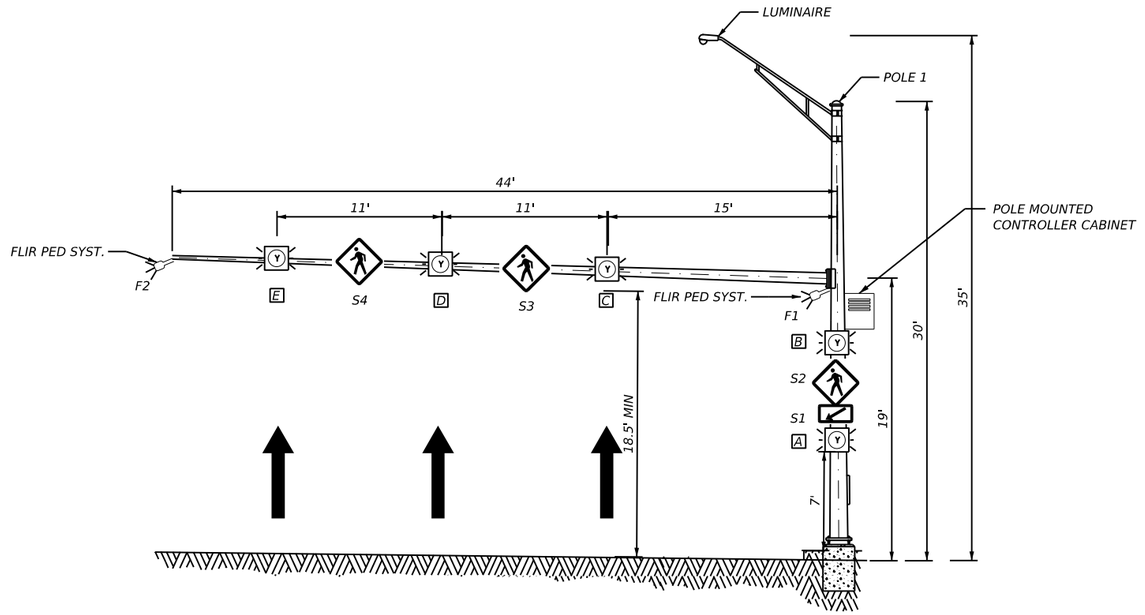
EAST ESTANCIA ST

PROPOSED OVERHEAD FLASHERS DETAILS

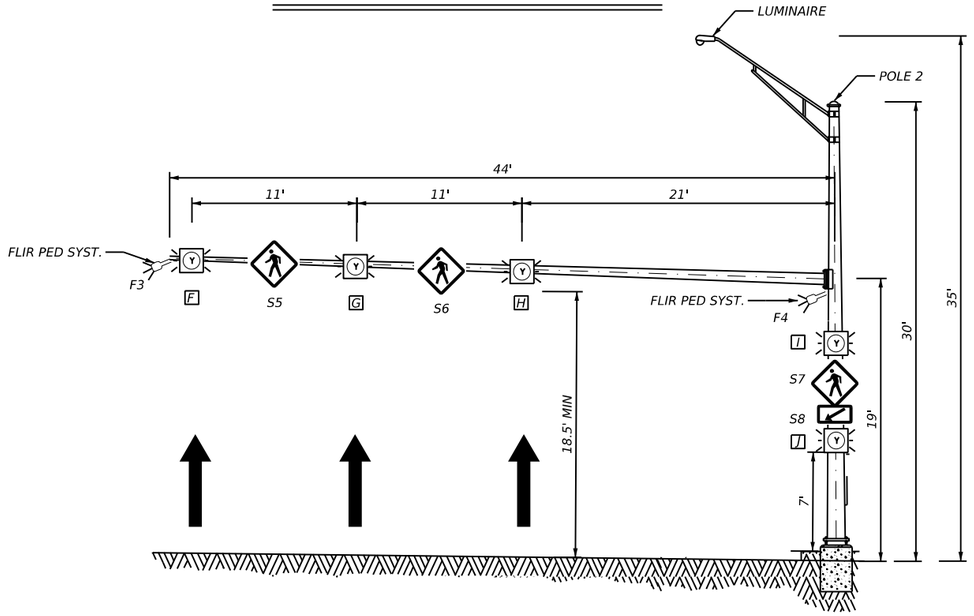
SHEET 2 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	US 281

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAT	BEXAR	161
CONT.	SECT.	JOB	
0073	02	082	



LOOKING SOUTH ON US 281 (ROOSEVELT)



LOOKING NORTH ON US 281 (ROOSEVELT)

NOTE:

1. CONTRACTOR TO INSTALL FLASHING BEACONS ON MAST ARM OVER CENTER OF EACH RESPECTIVE LANE.

FILENAME: c:\pw\khn1\d0251189\US281_ESTNC_FLSHR_ELEV_03.dgn
PLOTTED: 12/21/2023 5:51:32 PM

STATE OF TEXAS
AMY ELIZABETH AVERY
98481
LICENSED PROFESSIONAL ENGINEER
12/21/2023

Kimley»Horn F-928

© 2023

Texas Department of Transportation

US 281

EAST ESTANCIA ST

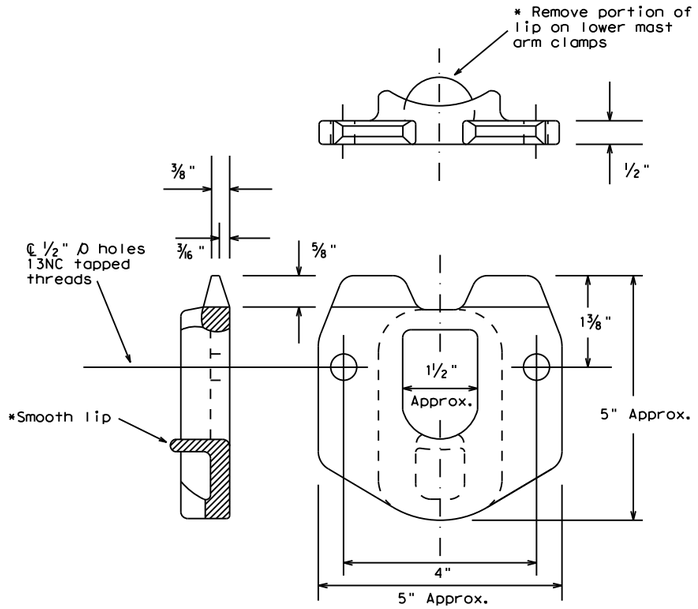
PROPOSED OVERHEAD
FLASHERS ELEVATIONS

SHEET 3 OF 3

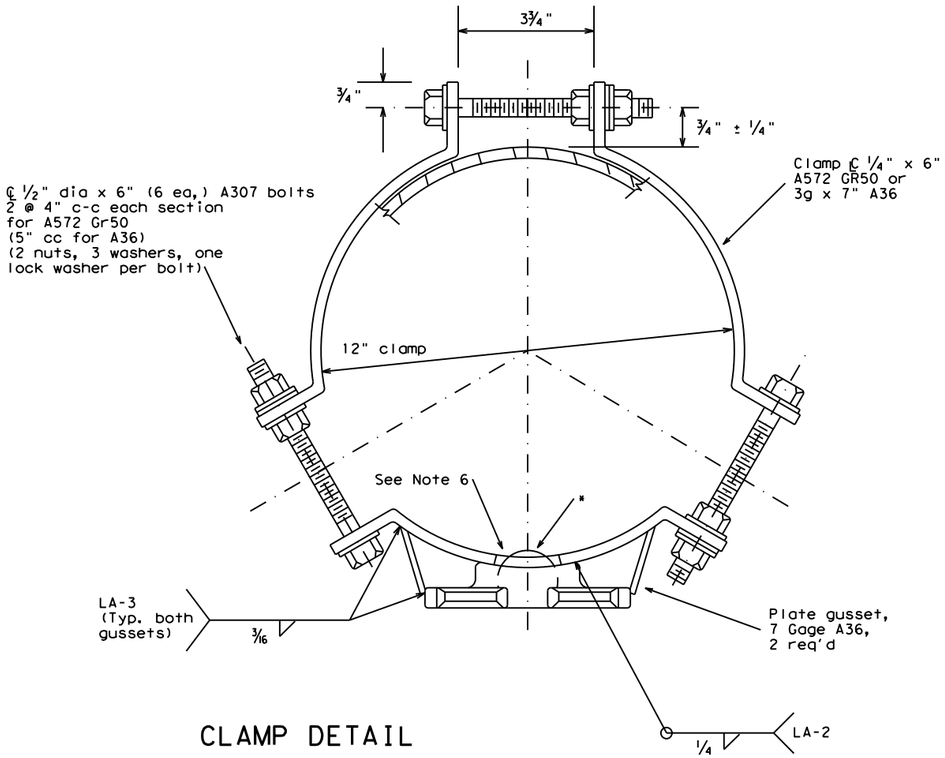
FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	US 281

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAT	BEXAR	162
CONT.	SECT.	JOB	
0073	02	082	

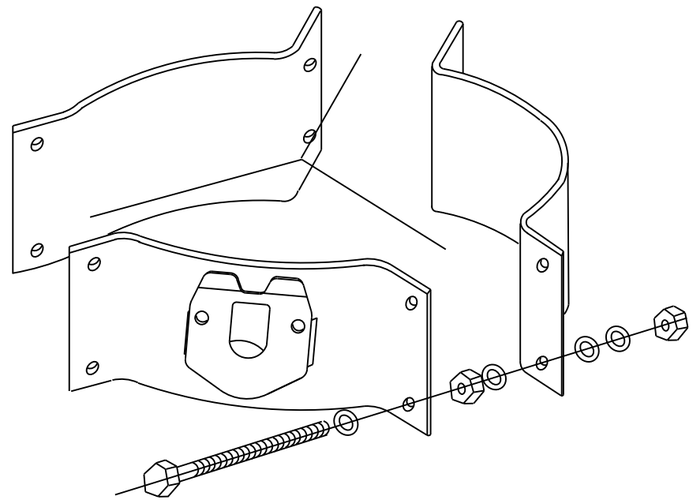
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



POLE SIMPLEX DETAILS



CLAMP DETAIL



PROJECTION

OTHER MATERIALS:

1. Pole simplex shall be ASTM A27 GR65-35 or A148 GR80-50 or A576 GR1021. ASTM A576 must be suitable for forging and also meet minimum tensile of 65ksi, minimum yield of 35ksi, and a minimum elongation of 22 percent in 2 inches.
2. Welded tabs and backplates shall be ASTM A-36 steel or better.
3. Nylon insert locknuts shall conform to ASTM A563.

GENERAL NOTES:

1. Materials and fabrication shall be in accordance with Standard Sheet "MA-C" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absence of specified fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.
2. All parts shall be galvanized after fabrication in accordance with Item 445, "Galvanizing". The throat of the Simplex shall be made free of all rough or sharp edges resulting from the galvanizing process.
3. Each simplex fitting shall be supplied with 2 ASTM A325 bolts, ½ in. X 1½ in. and 2 lock washers. The bolts and lock washers shall be secured to the clamp with the other hardware items. The Fabricator shall ship clamp assembly together in a single package, including all bolts, nuts, and washers required for the clamp and simplex fitting.
4. Design conforms to 1994 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals" and interim revisions thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor. Clamps are designed to support a 60 lb. luminaire having an effective projected area (actual area times drag coefficient) of 1.6 sq.ft.,12 ft. maximum arm length.
5. Each assembly shall consist of one upper piece simplex fitting having a smooth lip and one lower piece simplex fitting with the lip removed.
6. Approximately 2 in. diameter hole in upper mast arm clamp.

For 8.9 - 12 inch diameter Signal Poles
(Two req'd for each mast arm)

Texas Department of Transportation
Traffic Operations Division

CLAMP ON FITTING ASSEMBLY FOR LUMINAIRE MAST ARM

CFA-12

© TxDOT	DN: KAB	CK: RES	DW: FDN	CK: CAL
REVISIONS	CONT	SECT	JOB	HIGHWAY
11-99	0073	02	082	US 281
1-12	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		163

DATE: 11/21/2023 3:31:02 PM
FILE: c:\pw\kn1\d0275822\CFA-12.dgn

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.

PLOTTED: 11/21/2023 3:31:28 PM $$$SCALE$$$ BY:
FILENAME: c:\pw\kh1\d0275822\ED(1)-14.dgn

GENERAL NOTES FOR ALL ELECTRICAL WORK

1. The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.

2. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Where reference is made to NEMA listed devices, International Electrotechnical Commission (IEC) listed devices will not be considered an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection. Replace or reinstall rejected material or equipment at no additional cost to the Department.

3. Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is ½ in. or less in diameter.

4. Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: voltmeter, ammeter, megohm meter (1000 volt DC), ground resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated within the last year. Provide calibration certification to the Engineer upon request. Operate test equipment during inspection as requested by the Engineer.

5. Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits; metal poles; luminaires; and metal enclosures are bonded to the equipment grounding conductor. Provide stranded bare copper or green insulated grounding conductors. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.

6. When required by the Engineer, notify the Department in writing of materials from the Material Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL on TxDOT's website under "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

CONDUIT

A. MATERIALS

1. Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification (DMS) 11030 "Conduit" and Item 618 "Conduit" of TxDOT's "Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges," latest edition. Provide conduits listed under Item 618 on the MPL under "Roadway Illumination and Electrical Supplies." Provide conduit types according to the descriptive code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for on galvanized steel rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for on polyvinyl chloride (PVC) systems.

2. Provide galvanized steel RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.

3. Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with no more than four conduits per box. When a mixture of conductor sizes is present, count the conductors as if all are of the larger size. For situations not applicable to the table, size junction boxes in accordance with NEC.

AWG	3 CONDUCTORS	5 CONDUCTORS	7 CONDUCTORS
#1	10" x 10" x 4"	12" x 12" x 4"	16" x 16" x 4"
#2	8" x 8" x 4"	10" x 10" x 4"	12" x 12" x 4"
#4	8" x 8" x 4"	10" x 10" x 4"	10" x 10" x 4"
#6	8" x 8" x 4"	8" x 8" x 4"	10" x 10" x 4"
#8	8" x 8" x 4"	8" x 8" x 4"	8" x 8" x 4"

4. Junction boxes with an internal volume of less than 100 cu. in. and supported by entering raceways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.

5. Provide hot dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only 10 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.

6. Do not use intermediate metal conduit (IMC) or electrical metallic tubing (EMT) unless specifically required by the plan sheets. When EMT is called for, provide junction boxes made from galvanized steel sheeting, listed and approved for outdoor use, unless otherwise noted on the plans. Size all galvanized steel junction boxes in accordance with the NEC. Provide junction boxes for IMC conduit systems that meet the same requirements for junction boxes used with RMC systems.

7. Provide PVC junction boxes intended for outdoor use on PVC conduit systems, unless otherwise noted on the plans.

8. Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the PVC conduit system. When galvanized steel RMC elbows are specifically called for in the plans and any portion of the RMC elbow is buried less than 18 in., ground the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.

9. When required, provide High-Density Polyethylene (HDPE) conduit with factory installed internal conductors according to Item 622 "Duct Cable." At the Contractor's request and with approval by the Engineer, substitute HDPE conduit with no conductors for bored schedule 40 or schedule 80 PVC conduit bid under Item 618. Ensure bored HDPE substituted for PVC is schedule 40 and of the same size PVC called for in the plans. Ensure the substituted HDPE meets the requirements of Item 622, except that the conduit is supplied without factory-installed conductors. Make the transition of the HDPE conduit to PVC (or RMC elbow when required) at the bore pit. Provide conduit of the size and schedule as shown on the plans. Do not extend substituted conduit into ground boxes or foundations. Provide PVC or galvanized steel RMC elbows as called for at all ground boxes and foundations.

10. Use two-hole straps when supporting 2 in. and larger conduits. On electrical service poles, properly sized stainless steel or hot dipped galvanized one-hole standoff straps are allowed on the service riser conduit.

B. CONSTRUCTION METHODS

1. Provide and install expansion joint conduit fittings on all structure-mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint conduit fittings. Repair or replace expansion joint fittings that do not allow for movement at no additional cost to the Department. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFMC or LFNC as a substitute for the required expansion conduit fittings.

2. Space all conduit supports at maximum intervals of 5 ft. Install conduit spacers when attaching metal conduit to surface of concrete structures. See "Conduit Mounting Options" on ED(2). Install conduit support within 3 ft. of all enclosures and conduit terminations.

3. Do not attach conduit supports directly to pre-stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.

4. Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or after the base or surfacing operation has begun. Backfill and compact the bore pits below the conduit per Item 476 "Jacking, Boring, or Tunneling Pipe or Box" prior to installing conduit or duct cable to prevent bending of the connections.

5. When placing conduit in the sub-grade of new roadways, backfill all trenches with excavated material unless otherwise noted on the plans. When placing conduit in the sub-base of new roadways, backfill all trenches with cement-stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Shoring."

6. Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.

7. During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.

8. Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on water tight sealing hubs are not required.

9. Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.

10. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a casing under roadways for duct cable is not required, if the duct extends the full length through the casing.

11. At all electrical services, install a 6 AWG solid copper grounding electrode conductor.

12. Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box detail on sheet ED(4).

13. Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.

14. File smooth the cut ends of all mounting strut and conduit. Before installing, paint the field cut ends of all mounting strut and RMC (threaded or non-threaded) with zinc rich paint (94% or more zinc content) to alleviate overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUITS & NOTES

ED(1)-14

FILE:	ed1-14.dgn	DN:	CK:	DW:	CK:
© TxDOT	October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS		0073	02	082	US 281
		DIST	COUNTY		SHEET NO.
		SAT	BEXAR		164

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.

ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

1. Provide Type XHHW insulated conductors in accordance with Departmental Material Specification (DMS)11040 "Conductors" and Item 620 "Electrical Conductors." Provide conductors as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 620. Color code insulated conductors in conformance with the NEC. Identify grounded (neutral) conductors with white insulation. Identify grounding conductors (ground wires) with green insulation or bare conductors. Identify ungrounded (hot) conductors with any color insulation except green, white, or gray. Keep color scheme consistent throughout the wiring system. Identify conductors 6 American Wire Gauge (AWG) and smaller by continuous color jacket. Identify electrical conductors 4 AWG and larger by continuous color jacket or by colored tape. When identifying conductors with colored tape, mark at least 6 in. of the conductor's insulation with half laps of tape.
2. Provide a solid copper 6 AWG grounding electrode conductor to bond the electrical service equipment to the concrete encased grounding electrode or the ground rod at the service location. Connect the grounding electrode conductor to the ground rod with a UL listed connector in accordance with DMS 11040. Connect the grounding electrode conductor to the concrete encased grounding electrode as shown in the plans.
3. Where two or more circuits are present in one conduit or enclosure, permanently identify the conductors of each branch circuit by attaching a non-metallic tag around both circuit conductors at each accessible location. Provide tags with two straps, large enough to indicate circuit number, letter, or other identification as shown in the plans. Print circuit identification on the tag with a permanent marker.
4. Use listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors for splicing as specified in DMS 11040. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Provide UL listed gel-filled insulating splice covers. Splicing materials, insulating materials, breakaway disconnects, splice covers, and fuse holders are subsidiary to various bid items.

B. CONSTRUCTION METHODS

1. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the conduit system. After installing conductors in conduit, perform conductor pull test. If a conductor cannot be freely pulled, make any needed alterations or repairs at no additional cost to the department. Perform insulation resistance tests in accordance with Item 620. Coordinate with the Engineer to witness the tests.
2. Leave 2 ft. minimum, 3 ft. maximum length for each conductor up to the splice in ground boxes. Leave 3 ft. minimum, 4 ft. maximum length of conductor in ground boxes when pulled through with no splice. Leave 1 ft. minimum, 1.5 ft. maximum length of conductor at enclosures, weatherheads and pole bases.
3. Make splices only in junction boxes, ground boxes, pole bases, or electrical enclosures and use only listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or gel-filled insulating splice covers to provide a watertight splice. Overlap conductor insulation with heat shrink tubing a minimum of 2 in. past both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, increase the diameter of the conductor insulation using hot melt adhesive tape to provide a watertight seal between the individual conductors and the heat shrink tubing. Ensure the tape extends past the heat shrink tubing. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Heat shrink tubing that appears to have been burned, or overheated, is considered defective and must be replaced.
4. Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.
5. Wire nuts with factory applied waterproof sealant may be used for 8 AWG or smaller conductors in above ground junction boxes, but not in pole bases or ground boxes. Install wire nuts in an upright position to prevent the accumulation of water.
6. Support conductors in illumination poles with a J-hook at the top of the pole.
7. When terminating conductors, remove the insulation and jacketing material without nicking the individual strands of the conductor. Conductors with nicked individual conductor strands or removed strands will be considered damaged.
8. Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.
9. Do not repair damaged conductors with duct tape, electrical tape, or wire nuts. Use only approved splicing methods.
10. Do not terminate more than one conductor under a single connector, unless the connector is rated for multiple conductors. Do not exceed the pressure connector's listing for maximum number and size of conductors allowed.
11. Install breakaway connectors on conductors bid under Item 620 whenever those conductors pass through a breakaway support device. Follow manufacturer's instructions when terminating conductors to breakaway connectors. Properly torque threaded connections. Proper terminations are critical to the safe operation of breakaway devices. Trim waterproofing boots on breakaway connectors to fit snugly around the conductor to ensure waterproof connection. Only one conductor may enter a single opening in a boot. Provide waterproof boots with the correct number of openings. Leave unused openings factory sealed. Use prequalified breakaway connectors as shown on the MPL.
12. Provide and install a separate stranded equipment grounding conductor (EGC) in all conduits that contain circuit wiring of 50 volts or more. Unless shown elsewhere, size the EGC to be the same size as the largest current carrying conductor contained in the conduit. Ensure all EGCs are bonded together at every accessible location. For traffic signal installations, provide a minimum size 8 AWG EGC. The EGC is paid for under Item 620.

C. TEMPORARY WIRING

1. Install temporary conductors and electrical equipment in accordance with the NEC article "Temporary Installations" and Department standard sheets.
2. Provide a ground fault circuit interrupter (GFCI) for power outlets for portable electrical equipment, power tools, ice machines, ice storage bins and refrigerators located outdoors at grade. GFCI may be any one of the following: molded cord and plug set, receptacle, or circuit breaker type.
3. Use listed wire nuts with factory applied sealant for temporary wiring where approved.
4. Enclose conductor splices within a listed enclosure or ground box, or ensure the splices are more than 10 ft. above grade vertically and more than 5 ft. horizontally from any metal structure. Where installing temporary conductors in areas subject to vehicle traffic or mobile construction equipment, ensure the vertical clearance to ground is at least 18 ft. when measured at the lowest point. Ground messenger wires that support power conductors in conformance with the NEC.
5. Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

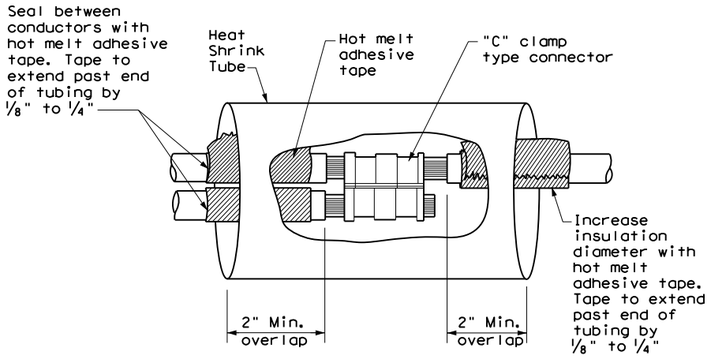
GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in specific locations including electrical service, see individual plan sheets.

B. CONSTRUCTION METHODS

1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, ensure that the upper end is between 2 to 4 in. below finished grade.
2. Do not place ground rods in the same drilled hole as a timber pole.
3. Install ground rods so the imprinted part number is at the upper end of the rod.
4. Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.
6. Unless otherwise called for in the plans, protect grounding electrode conductors with non-metallic conduit. When protecting grounding electrode conductors with metal conduit, provide and install a grounding type bushing and properly sized bonding jumper on each end of the metal conduit.
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



SPLICE OPTION 1
Compression Type

SPLICE OPTION 2
Split Bolt Type

SPLICE OPTION 3
Listed Screw Type

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUCTORS

ED(3)-14

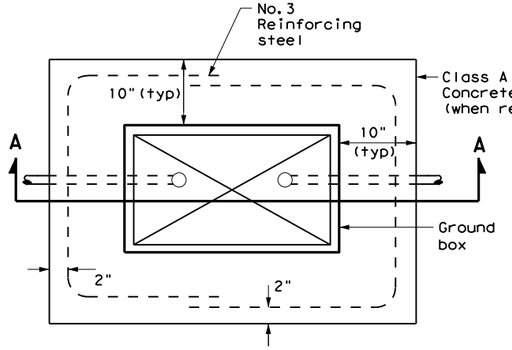
FILE:	ed3-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS		0073	02	082	US 281
		DIST	COUNTY		SHEET NO.
		SAT	BEXAR		165

71C

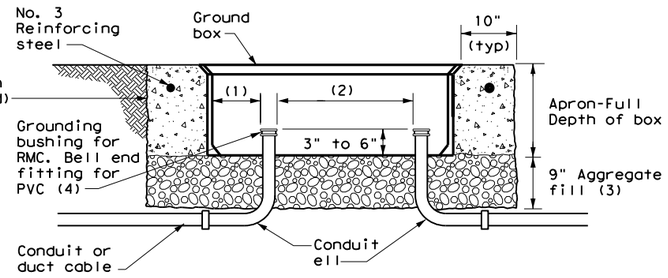
PLOTTED: 11/21/2023 3:31:53 PM $$$SCALE$$$ BY:
FILENAME: c:\pw\khl\d0275822\ED(3)-14.dgn

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.

PLOTTED: 11/21/2023 3:32:17 PM $$$SCALE$$$ BY:
FILENAME: c:\pwkh1\d0275822\ED(4)-14.dgn



PLAN VIEW



SECTION A - A

APRON FOR GROUND BOX

(1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.

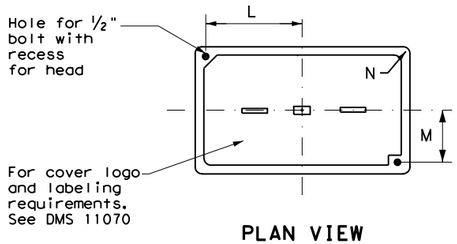
(2) Maintain sufficient space between conduits to allow for proper installation of bushings.

(3) Place aggregate under the box, not in the box. Aggregate should not encroach on the interior volume of the box.

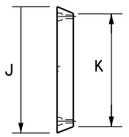
(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

GROUND BOX DIMENSIONS	
TYPE	OUTSIDE DIMENSIONS (INCHES) (Width x Length X Depth)
A	12 X 23 X 11
B	12 X 23 X 22
C	16 X 29 X 11
D	16 X 29 X 22
E	12 X 23 X 17

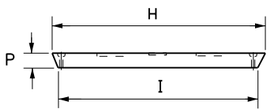
GROUND BOX COVER DIMENSIONS								
TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2



PLAN VIEW



END



SIDE

GROUND BOX COVER

GROUND BOXES

A. MATERIALS

1. Provide polymer concrete ground boxes measuring 16x30x24 in. (WxLxD) or smaller in accordance with Departmental Material Specification (DMS) 11070 "Ground Boxes" and Item 624 "Ground Boxes."

2. Provide Type A, B, C, D, and E ground boxes as shown in the plans, and as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 624.

3. Ensure ground box cover is correctly labeled in accordance with DMS 11070.

4. Provide larger ground boxes in accordance with Item 624 and as shown in the plans.

B. CONSTRUCTION METHODS

1. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure aggregate bed is in place and at least 9 inches deep, prior to setting the ground box. Install ground box on top of aggregate.

2. Cast ground box aprons in place. Reinforcing steel may be field bent. Ensure the depth of concrete for the apron extends from finished grade to the top of the aggregate bed under the box. Ground box aprons, including concrete and reinforcing steel, are subsidiary to ground boxes when called for by descriptive code.

3. Keep bolt holes in the box clear of dirt. Bolt covers down when not working in ground boxes.

4. Install all conduits and ells in a neat and workmanlike manner. Uniformly space conduits so grounding bushings and bell end fittings can easily be installed.

5. Temporarily seal all conduits in the ground box until conductors are installed.

6. Permanently seal conduits immediately after the completion of conductor installation and pull tests. Permanently seal the ends of all conduits with duct seal, expandable foam, or other method as approved. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a sealant.

7. When a ground rod is present in a ground box, bond all equipment grounding conductors together and to the ground rod with listed connectors.

8. When a type B or D ground box is stacked to meet volume requirements, it is allowable to cut an appropriately sized hole for conduit entry in the side wall at least 18 inches below grade.

9. If an existing ground box in the contract has a metal cover, bond the cover to the equipment grounding conductor with a 3 ft. long stranded bonding jumper the same size as the grounding conductor. The bonding jumper is subsidiary to various bid items. Verify existing ground boxes with metal covers are shown on the plans, with notes fully describing the work required.

10. If other ground boxes with metal covers are within the project limits but are not part of the contract, the Engineer may direct the Contractor to bond the metal covers, identifying the specific boxes in writing. This work will be paid for separately.

11. Bond metal ground box covers to the grounding conductor with a tank ground type lug.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS
GROUND BOXES

ED(4)-14

FILE: ed4-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		166

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.

PLOTTED: 11/21/2023 3:32:43 PM $$$SCALE$$$ BY:
FILENAME: c:\pw\kh1\d0275822\ED(5)-14.dgn

ELECTRICAL SERVICES NOTES

1. Provide new materials. Ensure installation and materials comply with the applicable provisions of the National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards. Ensure material is Underwriters Laboratories (UL) listed. Provide and install electrical service conduits, conductors, disconnects, contactors, circuit breaker panels, and branch circuit breakers as shown on the Electrical Service Data chart in the plans. Faulty fabrication or poor workmanship in material, equipment, or installation is justification for rejection. Where manufacturers provide warranties and guarantees as a customary trade practice, furnish these to the State.

2. Provide electrical services in accordance with Electrical Details standard sheets, Departmental Material Specification (DMS) 11080 "Electrical Services,"DMS 11081 "Electrical Services-Type A," DMS 11082 "Electrical Services-Type C," DMS 11083 "Electrical Services-Type D," DMS 11084 "Electrical Services-Type T," DMS 11085 "Electrical Services-Pedestal (PS)", and Item 628 "Electrical Services" of the Standard Specifications. Provide electrical service types A, C, and D, as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 628. Provide other service types as detailed on the plans.

3. Provide all work, materials, services, and any incidentals needed to install a complete electrical service as specified in the plans.

4. Coordinate with the Engineer and the utility provider for metering and compliance with utility requirements. Primary line extensions, connection charges, meter charges, and other charges by the utility company to provide power to the location are paid for in accordance with Item 628. Get approval for the costs associated with these charges prior to engaging the utility company to do the work. Consult with the utility provider to determine costs and requirements, and coordinate the work as approved.

5. The enclosure manufacturer will provide Master Lock Type 2 with brass tumblers keyed #2195 for all custom electrical enclosures. Installing Contractor is to provide Master Lock #2195 Type 2 with brass tumblers for "off the shelf" enclosures. Master Lock #2195 keys and locks become property of the State. Unless otherwise approved, do not energize electrical service equipment until locks are installed.

6. Enclosures with external disconnects that de-energize all equipment inside the enclosure do not need a dead front trim. Protect incoming line terminations from incidental contact as required by the NEC.

7. When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used.

8. Provide wiring and electrical components rated for 75°C. Provide red, black, and white colored XHHW service entrance conductors of minimum size 6 American Wire Gauge (AWG). Identify size 6 AWG conductors by continuous color jacket. Identify electrical conductors sized 4 AWG and larger by continuous color jacket or by colored tape. Mark at least 6 inches of the conductor's insulation with half laps of colored tape, when identifying conductors. Ensure each service entrance conductor exits through a separately bushed non-metallic opening in the weatherhead. The lengths of the conductors outside the weatherhead are to be 12 inches minimum, 18 inches maximum, or as required by utility.

9. All electrical service conduit and conductors attached to the electrical service including the riser or the elbow below ground are subsidiary to the electrical service. For an underground utility feed, all service conduit and conductors after the elbow, including service conduit and conductors for the utility pole riser when furnished by the Contractor, will be paid for separately.

10. Provide rigid metal conduit (RMC) for all conduits on service, except for the ½ in. PVC conduit containing the electrical service grounding electrode conductor. Size the service entrance conduit as shown in the plans. Ensure conduit for branch circuit entry to enclosure is the same size as that shown on the layout sheets for branch circuit conduit. Extend all rigid metal conduits a minimum of 6 inches underground and then couple to the type and schedule of the conduit shown on the layout for that particular branch circuit. Install a grounding bushing on the RMC where it terminates in the service enclosure.

11. Use of liquidtight flexible metal conduit (LFMC) is allowed between the meter and service enclosure when they are mounted 90 to 180 degrees to each other. Size the LFMC the same size as service entrance conduit. LFMC must not exceed 3 feet in length. Strap LFMC within 1 foot of each end. LFMC less than 12 inches in length need not be strapped. Each end of LFMC must have a grounding bushing or be terminated with a grounding fitting. The LFMC must contain a grounded (neutral) conductor. Ensure any bend in LFMC never exceeds 180 degrees. A pull test is required on all installed conductors, with at least six inches of free conductor movement demonstrated to the satisfaction of the Engineer.

12. Ensure all mounting hardware and installation details of services conform to utility company specifications.

13. For all electrical service enclosures listed under Item 628 on the MPL, the UL 508 enclosure manufacturers will prepare and submit a schematic drawing unique to each service. Before shipment to the job site, place the applicable laminated schematic drawings and the laminated plan sheet showing the electrical service data chart used to build the enclosure in the enclosure's data pocket. The installing contractor will copy and laminate the actual project plan sheets detailing all equipment and branch circuits supplied by that service. The laminated plan sheets are to be placed in the service enclosure's document pocket. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in. before laminating. If the installation differs from the plan sheets, the installing contractor is to redline plan sheets before laminating.

14. When providing an "Off The Shelf" Type D or Type T service, provide laminated plan sheets detailing equipment and branch circuits supplied by that service. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in before laminating. Deliver these drawings before completion of the work to the Engineer, instead of placing in enclosure that has no door pocket.

15. Do not install conduit in the back wall of a service enclosure where it would penetrate the equipment mounting panel inside the enclosure. Provide grounding bushings on all metal conduits, and terminate bonding jumpers to grounding bus. Grounding bushings are not required when the end of the metal conduit is fitted with a conduit sealing hub or threaded boss, such as a meter base hub.

SERVICE ASSEMBLY ENCLOSURE

1. Provide threaded hub for all conduit entries into the top of enclosure.

2. Type galvanized steel (GS) enclosures may be used for Type C panelboards and for Type D and T services that do not use an enclosure mounted photocell or lighting contactor. Provide GS enclosures in accordance with DMS 11080, 11082, 11083, and 11084.

3. Provide aluminum (AL) and stainless steel (SS) enclosures for Types A, C, and D in accordance with DMS 11080, 11081, 11082, 11083, and 11084. Do not paint stainless steel.

4. Provide pedestal service (PS) enclosures in accordance with ED(9) and DMS 11080 and 11085. Do not provide GS pedestal services. If GS is shown in the PS descriptive code, provide an AL enclosure.

MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

1. Field drill flange-mounted remote operator handle if needed, to ensure handle is lockable in both the "On" and "Off" positions.

2. When the utility company provides a transformer larger than 50 KVA, verify that the available fault current is less than the circuit breaker's ampere interrupting capacity (AIC) rating and provide documentation from the electric utility provider to the Engineer.

PHOTOELECTRIC CONTROL

1. Provide photocell as listed on the MPL. Move, adjust, or shield the photocell from stray or ambient night time light to ensure proper operation. Mount photocell facing north when practical. Mount top of pole photocells as shown on Top Mounted Photocell Detail.

* ELECTRICAL SERVICE DATA

Elec. Service ID	Plan Sheet Number	Electrical Service Description	Service Conduit **Size	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amps	Two-Pole Contractor Amps	Panelbd/ Loadcenter Amp Rating	Branch Circuit ID	Branch Ckt. Bkr. Pole/Amps	Branch Circuit Amps	KVA Load
SB 183	289	ELC SRV TY A 240/480 100(SS)AL(E)SF(U)	2"	3/#2	100	2P/100	100	N/A	Lighting NB	2P/40	26	28.1
									Lighting SB	2P/40	25	
									Underpass	1P/20	15	
NB Access	30	ELC SRV TY D 120/240 060(NS)SS(E)TS(O)	1 ¼"	3/#6	N/A	2P/60		100	Sig. Controller	1P/30	23	5.3
							30		Luminaires	2P/20	9	
									CCTV	1P/20	3	
2nd & Main	58	ELC SRV TY T 120/240 000(NS)GS(N)SP(O)	1 ¼"	3/#6	N/A	N/A	N/A	70	Flashing Beacon 1	1P/20	4	1.0
									Flashing Beacon 2	1P/20	4	

* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.

** Verify service conduit size with utility. Size may change due to utility meter requirements. Ensure conduit size meets the National ELectrical Code.

EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE

ELEC SERV TY X XXX/XXX XXX (XX) XX (X) XX (X)

Schematic Type

Service Voltage V / V

Disconnect Amp Rating
000 indicates main lug only/
Typically Type T

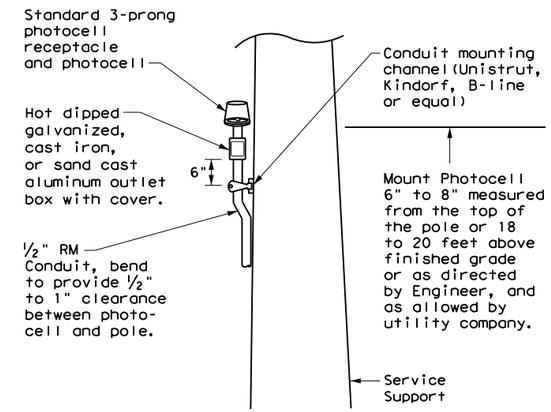
(SS)= Safety Switch Ahead of Meter-Check with Utility
(NS)= No safety Switch Ahead of Meter-Check with Utility

Enclosure Type
GS= Galvanized steel("off the shelf")
SS= Stainless steel(Custom Enclosure)See MPL
AL= Aluminum (Custom Enclosure)See MPL

Photocell Mounting Location
(E)= Inside Service/Enclosure Mounted
(T)= Top of pole
(L)= Luminaire mounted
(N)= None/No Photocell or Lighting Contactor Required

Service Support Type
GC= Granite concrete
OC= Other concrete
TP= Timber pole
SP= Steel pole
SF= Steel frame
OT= Pole by others or paid for separately
EX= Existing pole
TS= Service on traffic signal pole
PS= Pedestal Service

O= Overhead Service Feed from Utility
U= Underground Service Feed from Utility



TOP MOUNTED PHOTOCELL

Install conduit strap maximum 3 feet from box. 5 foot maximum spacing between straps supporting conduit.

Texas Department of Transportation

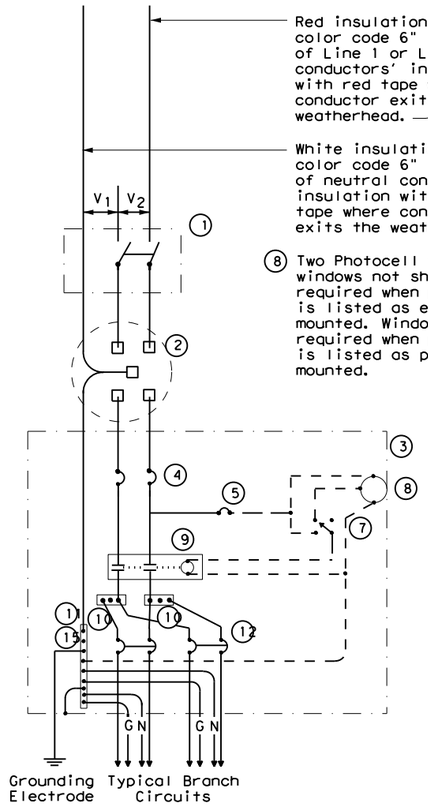
Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE NOTES & DATA

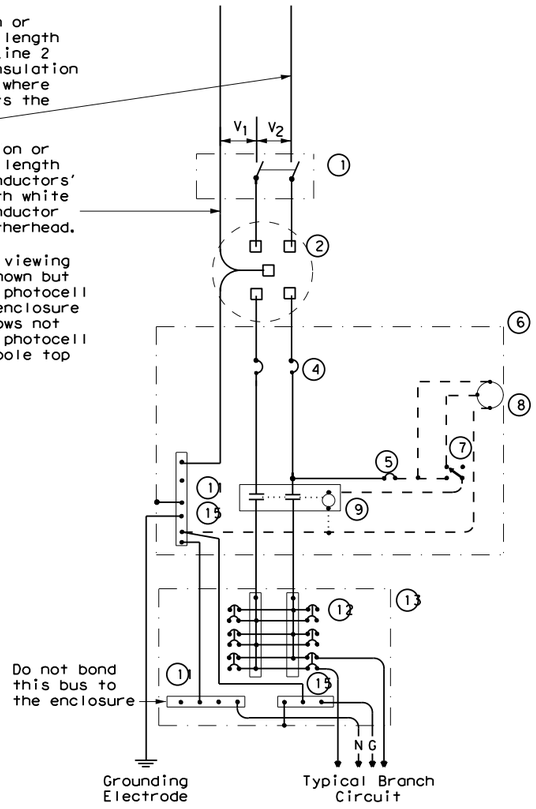
ED(5)-14

FILE: ed5-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		167

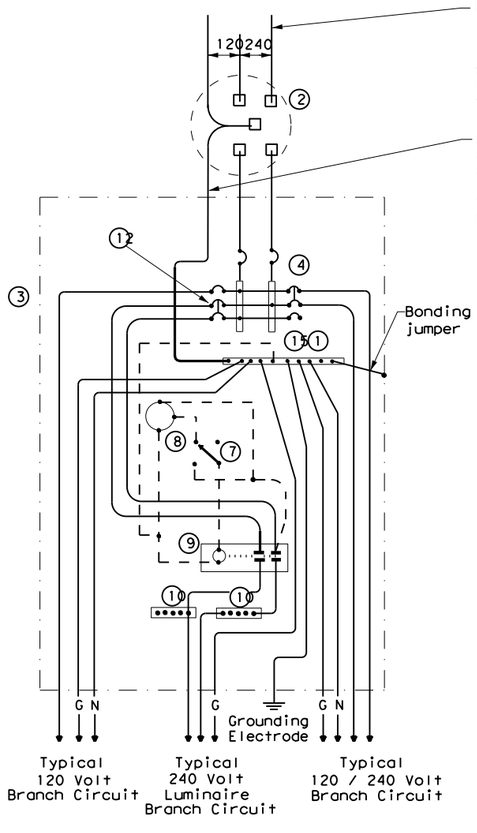
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



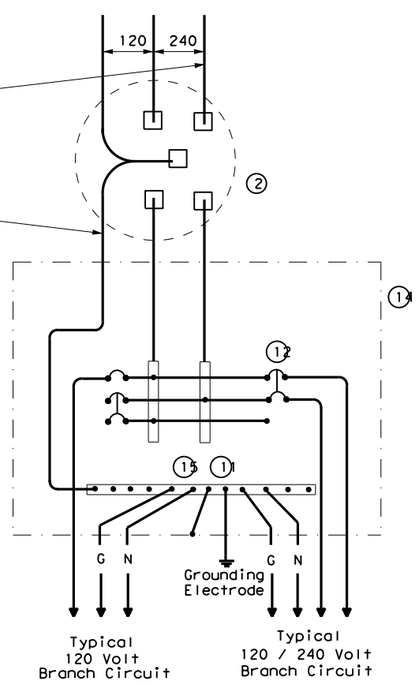
SCHEMATIC TYPE A
THREE WIRE



SCHEMATIC TYPE C
THREE WIRE



SCHEMATIC TYPE D - CUSTOM
120/240 VOLTS - THREE WIRE



SCHEMATIC TYPE T
120/240 VOLTS - THREE WIRE

Galvanized steel-"Buy Off The Shelf" only. When required install photocell top of the pole or on luminaire only, no lighting contractor will be installed.

WIRING LEGEND	
———	Power Wiring
- - - -	Control Wiring
—N—	Neutral Conductor
—G—	Equipment grounding conductor-always required

SCHEMATIC LEGEND	
1	Safety Switch (when required)
2	Meter (when required-verify with electric utility provider)
3	Service Assembly Enclosure
4	Main Disconnect Breaker (See Electrical Service Data)
5	Circuit Breaker, 15 Amp (Control Circuit)
6	Auxiliary Enclosure
7	Control Station ("H-O-A" Switch)
8	Photo Electric Control (enclosure-mounted shown)
9	Lighting Contactor
10	Power Distribution Terminal Blocks
11	Neutral Bus
12	Branch Circuit Breaker (See Electrical Service Data)
13	Separate Circuit Breaker Panelboard
14	Load Center
15	Ground Bus

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES

ED(6)-14

FILE: ed6-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		168

71F

PLOTTED: 11/21/2023 3:33:09 PM $$$SCALE$$$ BY:
FILENAME: c:\pwYkh1\d0275822\ED(6)-14.dgn

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: 11/21/2023
FILE: c:\pw\kni\d0275822\ED(7)-14.dgn

SUPPORT TYPE STEEL POLE (SP) AND STEEL FRAME (SF)

1. Provide steel pole and steel frame supports as per TxDOT Departmental Material Specification (DMS)11080 "Electrical Services." Mount all equipment and conduit on 12 gauge galvanized steel or stainless steel channel strut, 1 ½ in. or 1 ⅝ in. wide by 1 in. up to 3 ¾ in. deep Unistrut, Kindorf, B-line or equal. Bolt or weld all channel and hardware to vertical members as approved. Do not stack channel. File smooth and paint field cut ends of all channel with zinc-rich paint before installing.

2. Provide poles for overhead service with an eyebolt or similar fitting for attachment of the service drop to the pole in conformance with the electric utility provider's specifications.

3. Provide and install galvanized ¾ in. x 18 in. x 4 in. (dia. x length x hook length) anchor bolts for underground service supports. Provide and install galvanized ¾ in. x 56 in. x 4 in. anchor bolts for overhead service supports. Ensure anchor bolts have 3 in of thread, with 3 ¼ in. to 3 ½ in. of the exposed anchor bolt projecting above finished foundation. Provide and install leveling nuts for all anchor bolts.

4. Bond one of the anchor bolts to the rebar cage with 6 AWG bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete. See Inset B.

5. Furnish and install rigid metallic ells in all steel pole and steel frame foundations for all conduits entering the service from underground.

6. Use class C concrete for foundations. Ensure reinforcing steel is Grade 60 with 3" of unobstructed concrete cover.

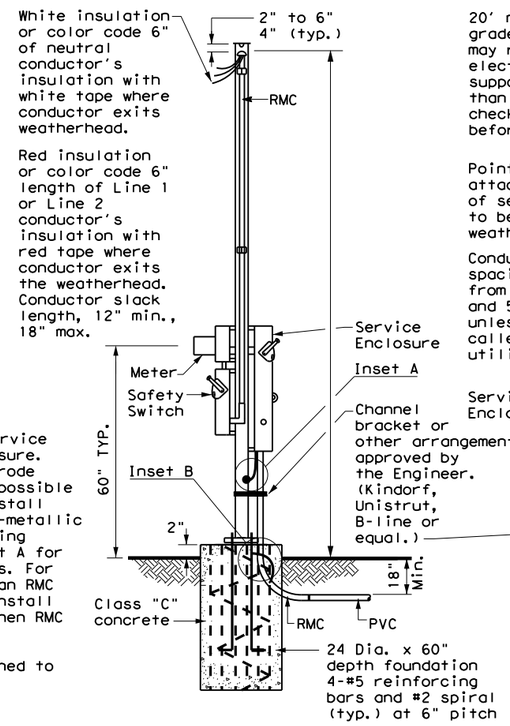
7. Drill and tap steel poles and frames for ½ in. X 13 UNC tank ground fitting. For steel pole service supports, provide and install tank ground fitting 4 in. to 6 in. below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode conductor. Ensure electrical service grounding electrode conductor is as short and straight as possible from the enclosure to the tank ground fitting. For steel frame service supports, provide and install tank ground fitting on steel frame post. Install service grounding electrode conductor in a non-metallic conduit or tubing from the enclosure to the steel frame post. Connect electrical service grounding electrode conductor to the tank ground fitting. See steel frame and steel pole details and Inset A for more information. Size service entrance conduit and branch circuit conduit as shown in the plans. For underground conduit runs from the electrical service, extend RMC from the service enclosure to an RMC elbow, and then connect the schedule type and size of conduit shown in the plans. Provide and install grounding bushings where RMC terminates in the enclosure. Grounding bushings are not required when RMC is fitted into a sealing hub or threaded boss.

8. If Steel pole or frame is painted, bond each separate painted piece with a bonding jumper attached to a tapped hole.

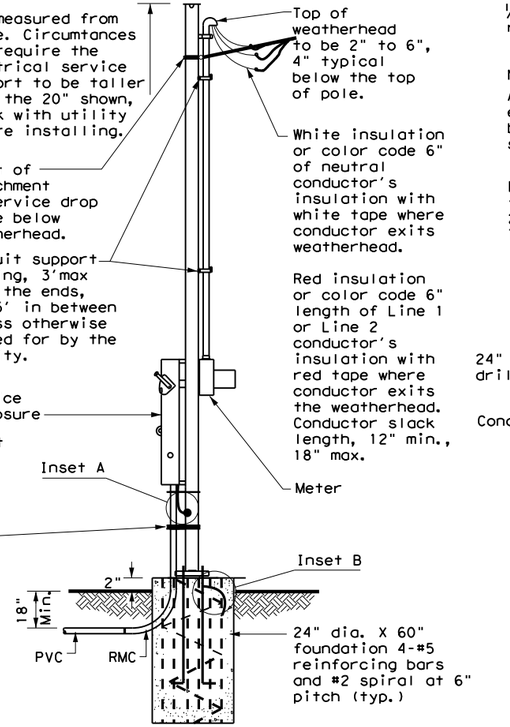
9. Provide ¼" - 20 machine screws for bonding. Do not use sheet metal screws. Remove all non-conductive material at contact points. Terminate bonding jumpers with listed devices. Install minimum size 6 AWG stranded copper bonding jumpers. Make up all threaded bonding connections wrench tight.

10. Avoid contact of the service drop and service entrance conductors with the metal pole to prevent abrasion of the insulated conductors.

11. Shop drawings are not required for service support structure unless specifically stated elsewhere or directed by the Engineer.

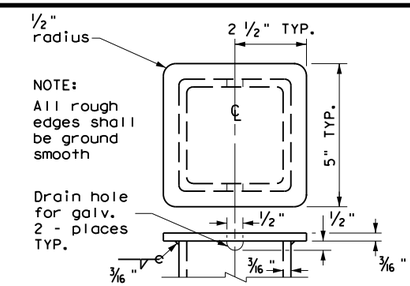


WITH SAFETY SWITCH

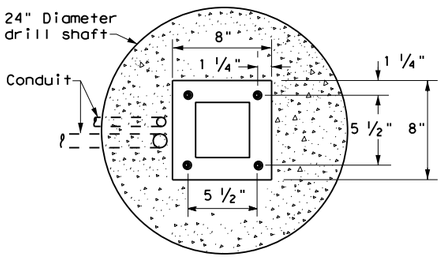


WITHOUT SAFETY SWITCH

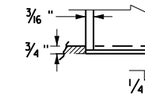
SERVICE SUPPORT TYPE SP (O) - OVERHEAD SERVICE



POLE TOP PLATE

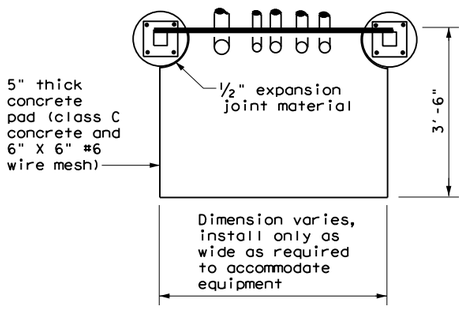


BASE PLATE DETAIL



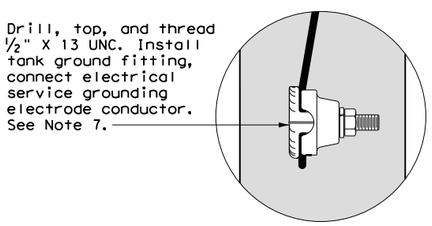
BOTTOM OF POLE

SERVICE SUPPORT TYPE SF & SP



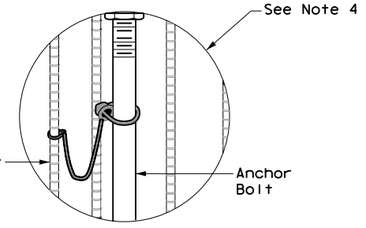
TOP VIEW

SERVICE SUPPORT TY SF (O) & SF (U)

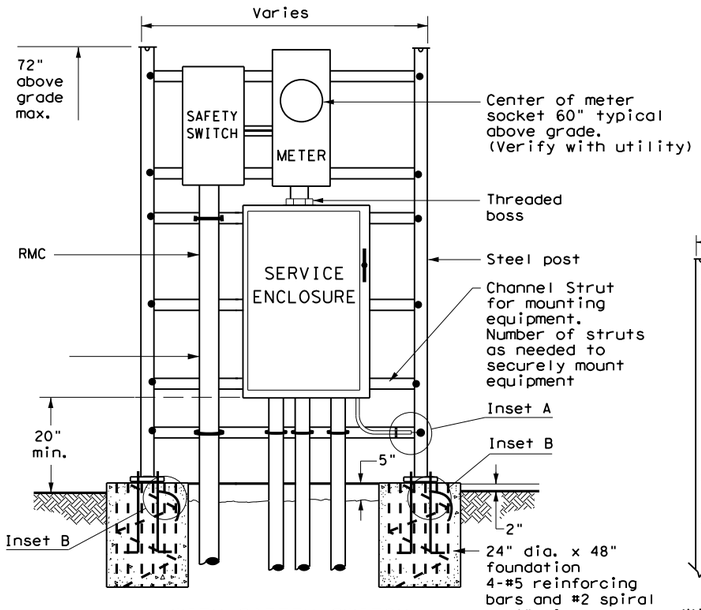


FRONT VIEW

INSET A

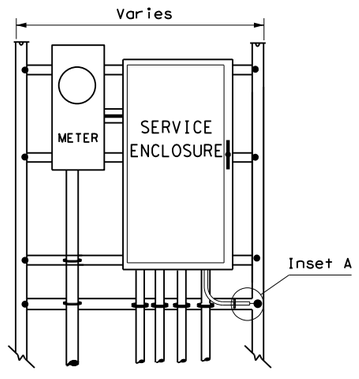


INSET B



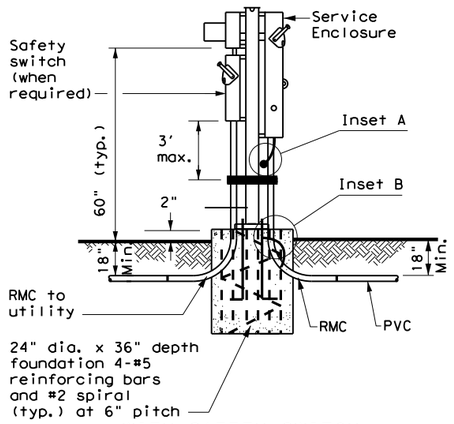
WITH SAFETY SWITCH

FRONT VIEW

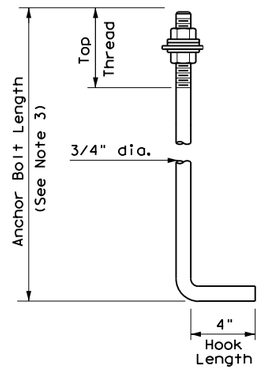


WITHOUT SAFETY SWITCH

SERVICE SUPPORT TYPE SF(U) - UNDERGROUND SERVICE



WITH SAFETY SWITCH



HOOKED ANCHOR DETAIL

SERVICE SUPPORT TYPE SP(U) - UNDERGROUND SERVICE

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE SUPPORT TYPES SF & SP

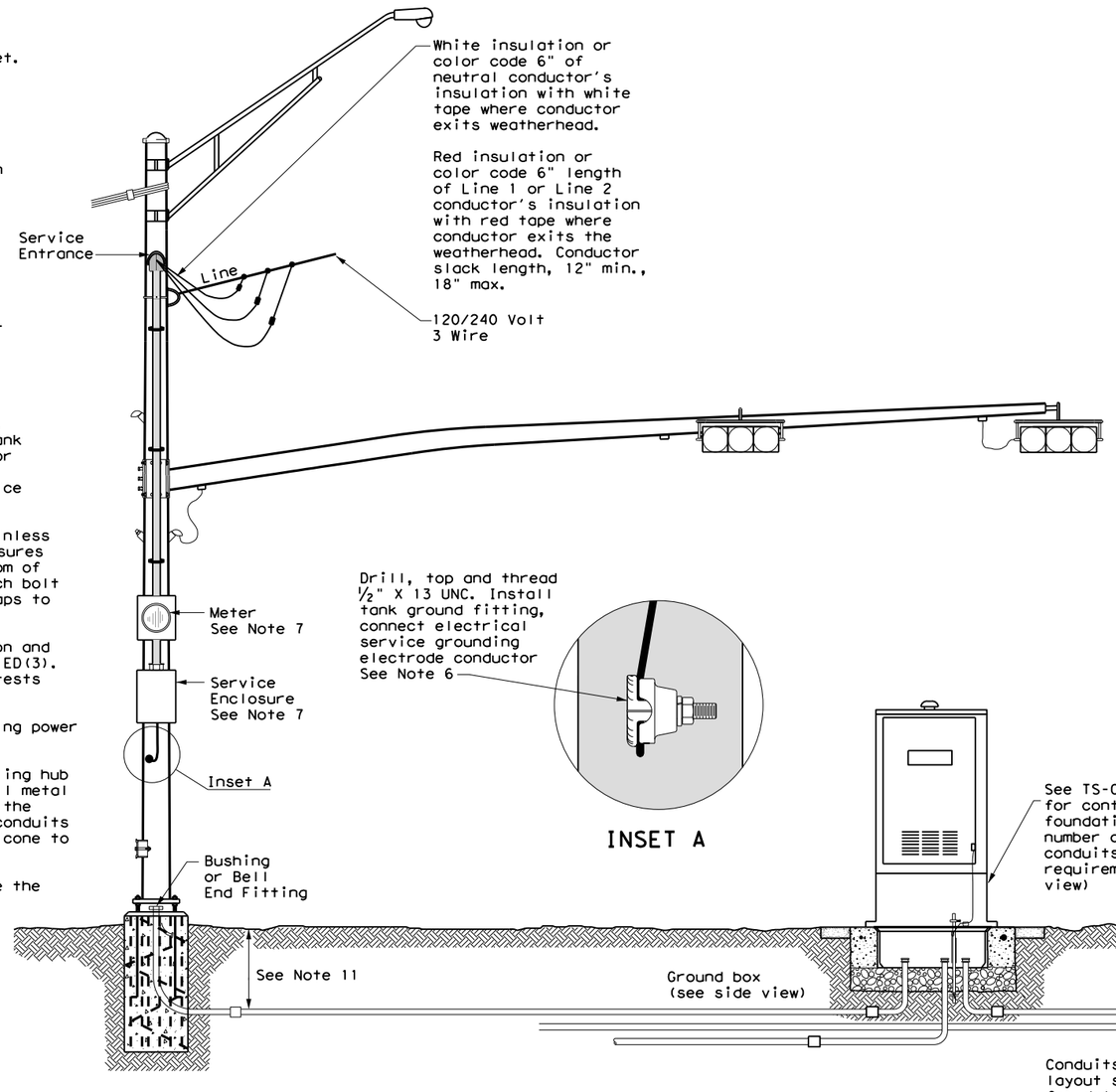
ED(7)-14

FILE: ed7-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		169

71G

TRAFFIC SIGNAL NOTES

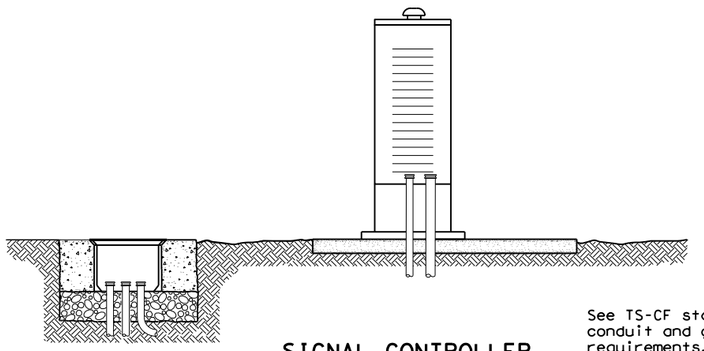
1. Do not pass luminaire conductors through the signal controller cabinet.
2. Include an equipment grounding conductor in all conduits throughout the electrical system. Bond all exposed metal parts to the grounding conductor.
3. Provide roadway luminaires, when required, in accordance with the material and construction sections of Item 610, "Roadway Illumination Assemblies," except for performance testing of luminaires. Test installed roadway luminaires for proper operation as a part of the associated traffic signal system test.
4. If internally illuminated street name signs are approved for use, ground the fixture to the pole with a 12 AWG green XHHW conductor.
5. Bond anchor bolts to rebar cage in two locations using #3 bars or 6 AWG stranded copper conductors. Use listed mechanical connectors rated for embedment in concrete. See TXDOT standard TS-FD for further details.
6. Drill and tap signal poles for ½ in. X 13 UNC tank ground fitting. Provide and install tank ground fitting 4 in. to 6 in. directly below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode conductor. Connect the electrical service grounding electrode conductor to the tank ground fitting. Ensure electrical service grounding electrode conductor is as short and straight as possible from the enclosure to the tank ground fitting. See Inset A detail for further information. Size service entrance conduit and branch circuit conduit as shown in the plans.
7. Mount electrical service enclosure and meter to signal pole with stainless steel bands. Ensure bands are a minimum width of ¾ in. Secure enclosures to bands using two-bolt brackets. Install brackets near top and bottom of each enclosure. Install properly sized stainless steel washers on each bolt in the enclosure. Band or drill and tap properly sized stand-off straps to signal pole for attaching conduit.
8. Conduct pull tests and insulation resistance tests on all illumination and power conductors as required in Item 620 "Electrical Conductors" and ED(3). To prevent electronics damage, do not conduct insulation resistance tests on traffic signal cables after termination.
9. Lock all enclosures and bolt down all ground box covers before applying power to the signal installation.
10. Terminate conduits entering the top of enclosures with a conduit-sealing hub or threaded boss such as meter hub. Install a grounding bushing on all metal conduits not connected to conduit-sealing hub or threaded boss. Bond the grounding bushing to the ground bus with a bonding jumper. Seal all conduits entering enclosures with duct seal or expanding foam. Do not use silicone to seal conduit ends.
11. For all conduits, ensure the burial depth is a minimum of 18". Ensure the minimum burial depth for conduit placed under a roadway is 24".



SIGNAL POLE WITH SERVICE

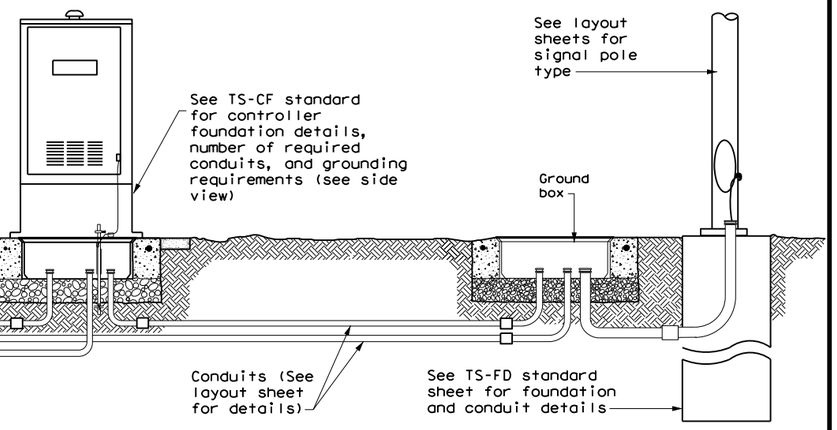
Type T electrical service mounted on signal pole shown as an example. See electrical details, layout sheets, and electrical service data chart for additional details.

INSET A



SIGNAL CONTROLLER SIDE VIEW

See TS-CF standard for conduit and grounding requirements. See layout sheets for ground box locations and any additional conduits that are required.



SIGNAL CONTROLLER FRONT VIEW

SIGNAL POLE

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS TYPICAL TRAFFIC SIGNAL SYSTEM DETAILS

ED(8)-14

FILE: ed8-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		170

71H

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.

PLOTTED: 11/21/2023 3:33:57 PM $$$SCALE$$$ BY:
FILENAME: c:\pw\kh1\d0275822\ED(8)-14.dgn

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:

PEDESTAL SERVICE NOTES

1. Manufacture pedestal electrical services in accordance with Departmental Material Specifications (DMS)11080 "Electrical Services", 11085 "Electrical Services-Pedestal (PS)" and Item 628 "Electrical Services. "Provide pedestal electrical services as listed on the Material Producers list (MPL) on the Department's web site under "Roadway Illumination and Electrical Supplies," Item 628. Ensure all mounting hardware and installation details of services meet utility company specifications. Contact the local utility company for approval of pedestal details prior to installing the electrical pedestal service. Submit any changes required by the utility company prior to manufacturing the pedestal enclosure.

2. When a meter socket is required, provide a socket with a minimum 100 amp rating that complies with local utility requirements.

3. Provide Class A or C concrete for pedestal service foundations in accordance with Item 420, "Concrete Substructures," except that concrete will not be paid for directly but is considered subsidiary to Item 628.

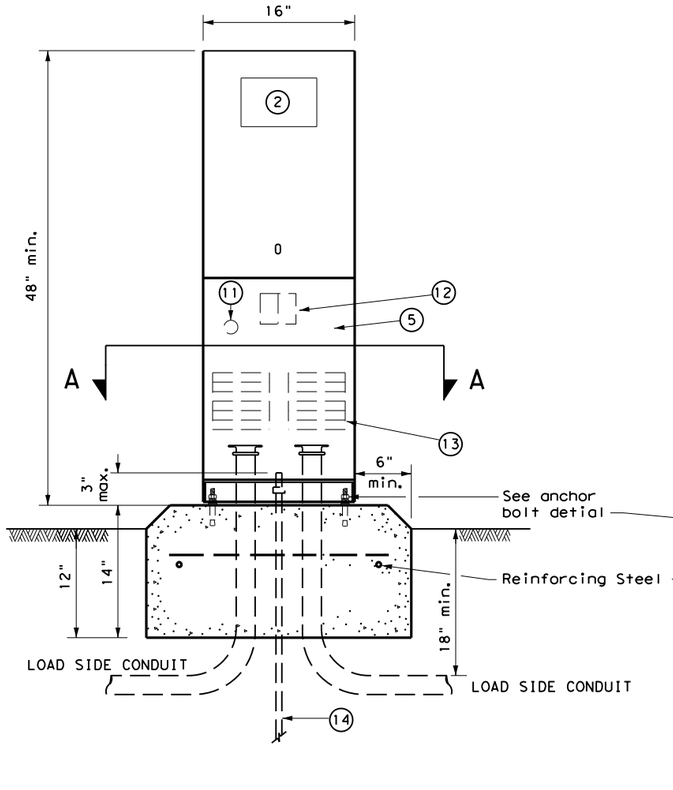
4. Provide #4 reinforcing steel for foundations in accordance with Item 440, "Reinforcement for Concrete."

5. Install ½ in. X 2 ⅛ in. minimum length concrete single expansion type anchors for mounting pedestal enclosure to foundation. Anchor location to match mounting holes in each corner of enclosure. Secure each of the four corners of the pedestal enclosure to the anchors in the foundation with a ½ in. galvanized or stainless steel machine thread bolt, a properly sized locknut and a flat washer.

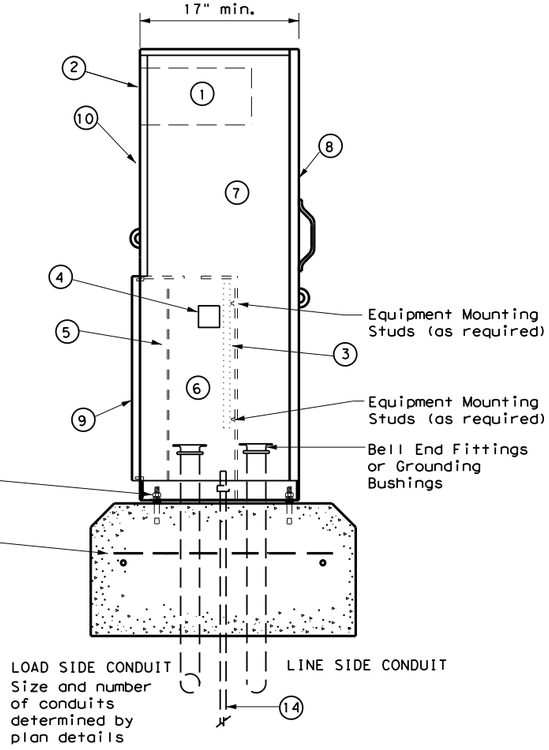
6. Finish top of concrete foundation in a neat and workmanlike manner. If leveling washers are used, ensure no more than ⅛ in. gap at any corner. Do not exceed a maximum dip or rise in the foundation of ⅛ in. per foot. When properly installed, ensure the top of the service enclosure is level front to back and side to side within ¼ in. Repair rocking or movement of the service enclosure at no additional cost to the department.

7. Do not use liquidtight flexible metal conduit (LFMC) on pedestal type services.

8. Ensure all elbows in the foundation are sized as per utility provider's conduit requirements for underground conduit and feeders. PVC extensions may be installed provided the ends of the rigid metal conduits are more than 2 in. below the top of the concrete foundation. Where extension conduits are metal, grounding bushings must be installed with a bonding jumper properly terminated.

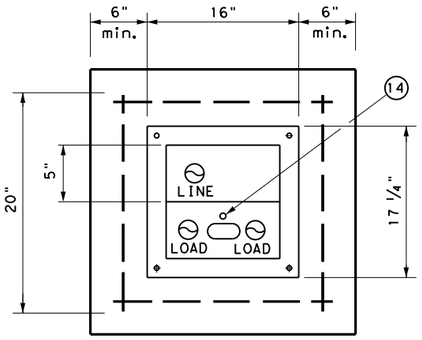


FRONT VIEW

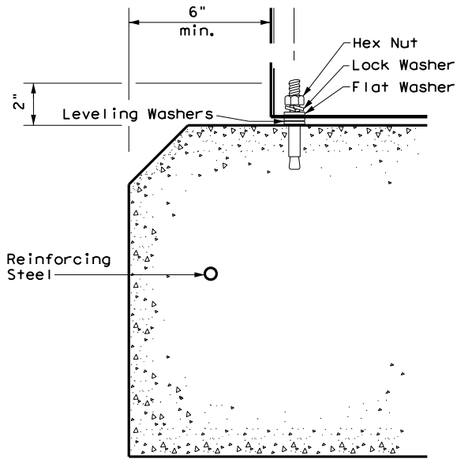


SIDE VIEW

TYPE C shown, TYPE A similar except that TYPE A shall have individual circuit breakers (CB) mounted on an equipment mounting panel. CB Handles shall protrude through hinged deadfront trim.



SECTION A-A



ANCHOR BOLT DETAIL

LEGEND	
1	Meter Socket, (when required)
2	Meter Socket Window, (when required)
3	Equipment Mounting Panel
4	Photo Electric Control Window, (When required)
5	Hinged Deadfront Trim
6	Load Side Conduit Trim
7	Line Side Conduit Area
8	Utility Access Door, with handle
9	Pedestal Door
10	Hinged Meter Access
11	Control Station (H-O-A Switch)
12	Main Disconnect
13	Branch Circuit Breakers
14	Copper Clad Ground Rod - 5/8" X 10'

Texas Department of Transportation

Traffic Operations Division Standard

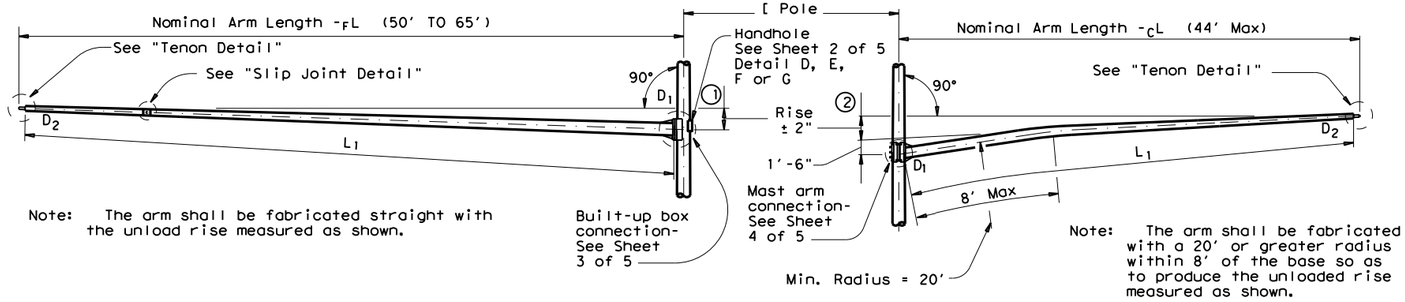
ELECTRICAL DETAILS
ELECTRICAL SERVICE SUPPORT
PEDESTAL SERVICE TYPE PS

ED(9)-14

FILE: ed9-14.dgn		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT		
©TxDOT October 2014		CONT	SECT	JOB	HIGHWAY		
REVISIONS		BEXAR	02	082	US 281		
		DIST	COUNTY		SHEET NO.		
		SAT	BEXAR		171		

71J

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.



Note: The arm shall be fabricated straight with the unload rise measured as shown.

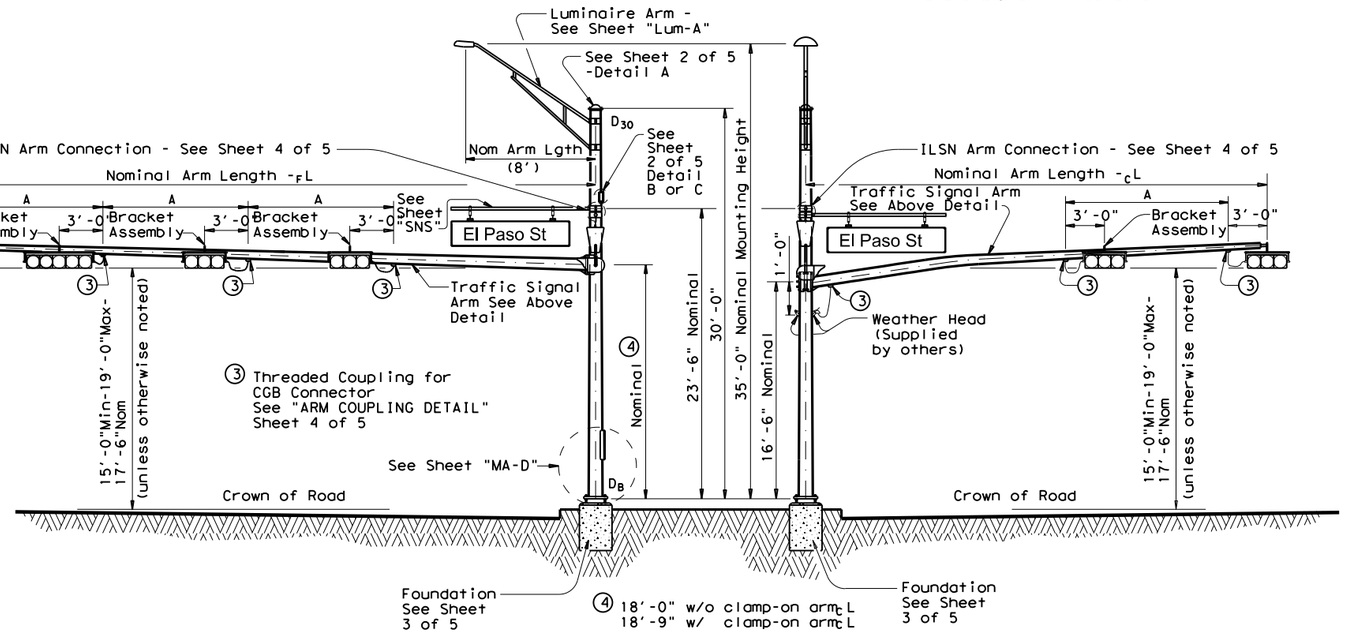
Note: The arm shall be fabricated with a 20' or greater radius within 8' of the base so as to produce the unloaded rise measured as shown.

FIXED MOUNT TRAFFIC SIGNAL ARM

① See Sheet 3 of 5 for Arm Rise

CLAMP-ON TRAFFIC SIGNAL ARM (IF REQUIRED)

② See Sheet 4 of 5 for Arm Rise and Clamp-on Arm Details

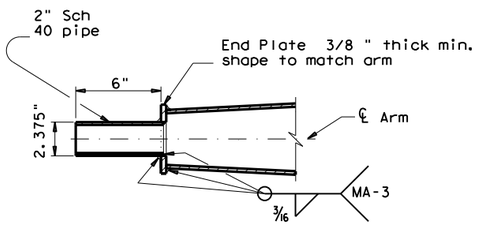


ELEVATION
(Showing fixed mount arm)

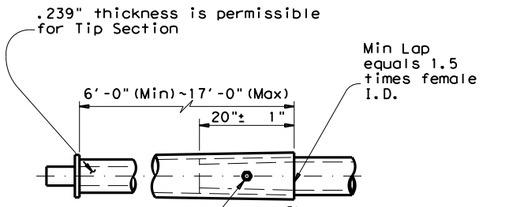
STRUCTURE ASSEMBLY

ELEVATION
(Showing clamp-on arm)

TABLE OF DIMENSIONS "A"										
Arm Length	24'	28'	32'	36'	40'	44'	50'	55'	60'	65'
Arm Type II	10'	11'	12'	13'						
Arm Type III			10'	11'	12'	12'				
Arm Type IV							12'	12'	12'	12'



TENON DETAIL



Note: A slip joint is permissible for arms 50' and greater in length. The slip joint shall be made in the shop, but may be match marked and shipped disassembled.

4 - ¾" Dia holes and 1- ⅝" Dia galv A307 bolt. Tack weld nut to thread projection after making joint. Repair damaged galvanizing in accordance with Item 445, "Galvanizing".

SLIP JOINT DETAIL (FIXED MOUNT ARM)

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed can be either 100 mph or 80 mph plus a 1.3 gust factor. If clamp-on traffic signal is required, designs are based on an arm included angle of 90 degrees or more. Angles of less than approximately 75 degrees will require a special design.

Poles are designed to support one 8'-0" luminaire arm, two 9'-0" internally lighted street name (ILSN) signs and two traffic signal arms with limited length combinations.

Each arm with its related attachment is shown below

Arm	Equivalent D⑤	WL EPA⑤⑥
8' Luminaire Arm	Luminaire 60 lbs	1.6 sq ft
9' ILSN Arm	Sign 85 lbs	11.5 sq ft
50' to 65' Fixed Mount Arm	Signal Loads 310 lbs	52 sq ft
Up to 44' Clamp-on Arm	Signal Loads 180 lbs	32.4 sq ft

⑤ Equivalent dead load plus horizontal wind load applied at the end of arm except ILSN arm, which applied 4.5' from the centerline of the pole.

⑥ Effective projected area (actual area times drag coefficient) for the application of horizontal wind load.

Except as noted in Sheet 1 thru 5 of 5, other details not covered shall refer to Standard Sheet "MA-D" for pole details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details.

Fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Material, fabrication tolerances, and shipping practices shall also meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

Unless otherwise noted, all parts shall be galvanized in accordance with Item 445, "Galvanizing" after fabrication.

Deviations from the details and dimensions shown herein require submission of shop drawings in accordance with the Item 441, "Steel Structures". Alternate designs are not acceptable.

Installation of damping plate for the long mast arm is not recommended.

Provision of the bracket assembly used to support the traffic signal heads shall be under the direction of the Engineer for approval.

Design also conforms to NCHRP Report 412 for fatigue resistance except that there are no stiffeners at the base plate. TxDOT is conducting tests to determine if stiffeners at the base plate will or will not result in optimal performance; depending upon the results of the tests, poles may need a retrofit to ensure optimal fatigue performance.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)
LMA(1)-12

Sheet 1 of 5

© TxDOT July 2000

DN: JSY	CK: ARC	DW: TGG	CK: JSY

REVISIONS
4-20-01
1-12

CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281

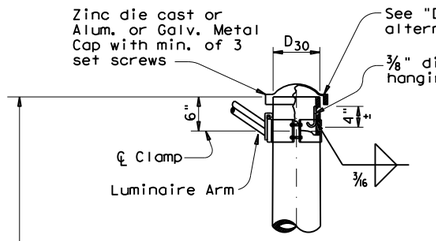
DIST	COUNTY	SHEET NO.
SAT	BEXAR	172

131A

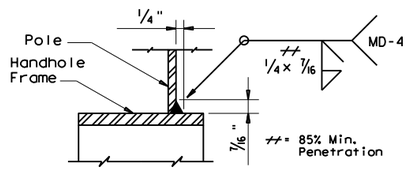
PLOTTED: 11/21/2023 3:34:47 PM
FILENAME: c:\pw\kh1\d0275822\LMA (1)-12.dgn
BY:

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.

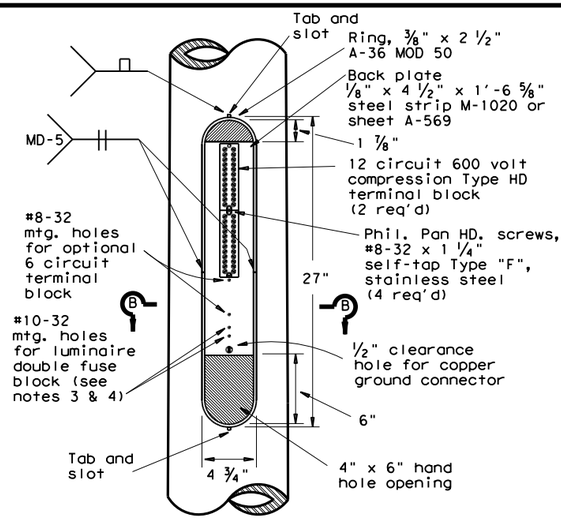
PLOTTED: 11/21/2023 3:35:12 PM BY:
FILENAME: c:\pw\kh1\d0275822\LMA (2)-12.dgn



DETAIL A
(for pole with luminaire)



DETAIL H

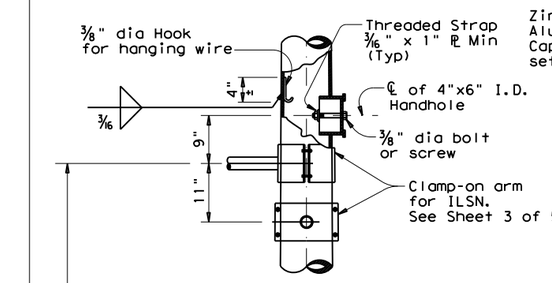


ACCESS COMPARTMENT

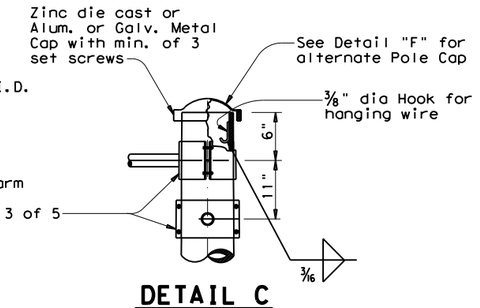
MATERIALS	
Round Shafts or Polygonal Shafts (7)	ASTM A595 Gr.A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 (8)
Plates (7)	ASTM A36, A588, or A572 Gr.50
Connection Bolts	ASTM A325, or A449 except where noted
Pin Bolts	ASTM A325
Pipe (7)	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50, A1011 HSLAS-F Gr.50
Misc. Hardware	Galvanized steel or stainless steel or as noted

(7) ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F, or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.

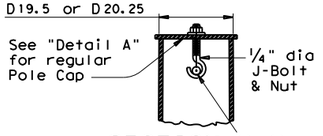
(8) ASTM A1011 SS Gr.50 shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.



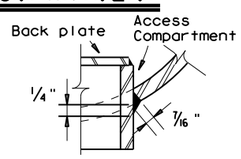
DETAIL B
(If ILSN applied)



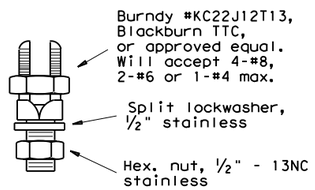
DETAIL C



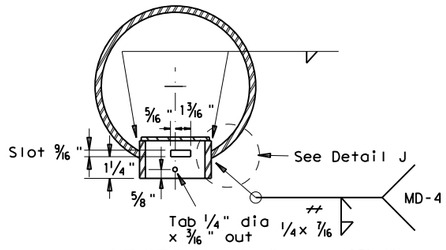
SECTION Y-Y



DETAIL J

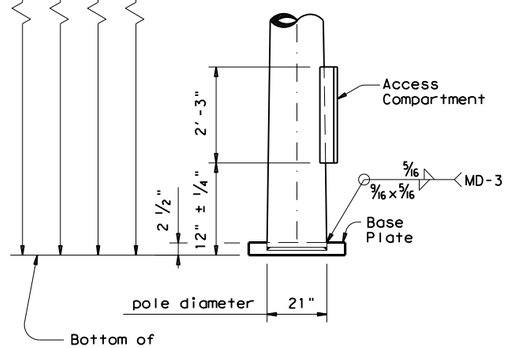


COPPER GROUND CONNECTOR

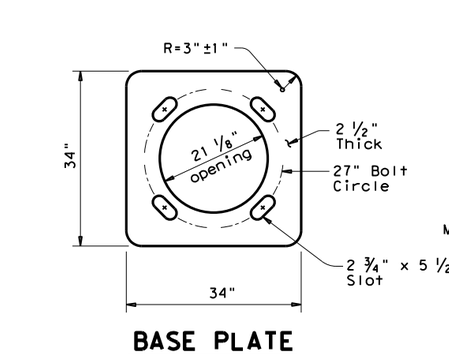


SECTION B-B
= 85% Min. Penetration

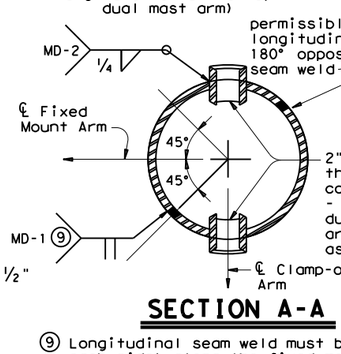
Opening for access compartment shall be no more than 1/16 inch wider than the access compartment itself.



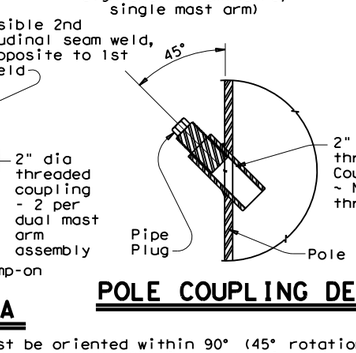
DETAIL D
(for 30' pole with luminaire and ILSN sign)



DETAIL E
(for 24' pole with ILSN sign and no luminaire, single or dual mast arm)



DETAIL F
(for 20.25' pole with no ILSN sign and no luminaire, dual mast arm)



DETAIL G
(for 19.5' pole with no ILSN sign and no luminaire, single mast arm)

POLE ELEVATION

BASE PLATE

SECTION A-A

POLE COUPLING DETAIL

(9) Longitudinal seam weld must be oriented within 90° (45° rotation each side) along the fixed mount arm. 60% min penetration required, 100% penetration within 6" of circumferential base weld.

ACCESS COMPARTMENT NOTES:

1. The cover shall be one piece formed from ABS plastic, shall be a pearl gray color, and shall be suitable for exposure to harsh sunlight and extreme weather. Cover shall latch with two screw latches and shall fit tightly to the enclosure ring to create a rainproof seal. Latch screws shall be 1/4-20 stainless flat socket head screws with tamper proof feature.
2. The pole manufacturer shall provide with each pole a separate kit consisting of: one cover with two latching assemblies, two terminal strips (Marathon #985GP12CU or approved equal), four #8-32 x 1 1/4" self tapping type "F" stainless steel pan head screws, and one ground connector (Blackburn TTC, Burndy KC22J12T13, or Ilsco SSS-5). The traffic signal contractor shall install the kit items in the field.
3. The screw hole spacing on the enclosure back plate shall be for two Marathon #985GP12 terminal strips, one Marathon #985GP06CU terminal strip, and one Bussmann #BM6032B fuse block.
4. Install one Bussmann #BM6032B, Littelfuse #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

Sheet 2 of 5

LMA(2)-12

©TxDOT July 2000

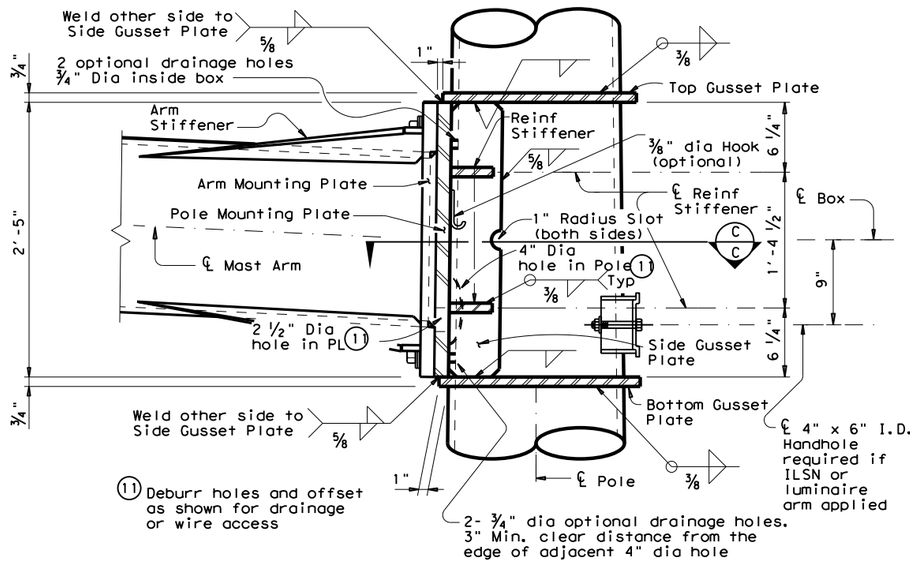
DN: JSY	CK: ARC	DW: TGG	CK: JSY

REVISIONS
4-20-01
1-12

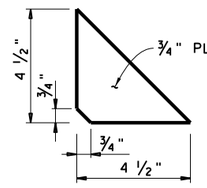
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		173

131B

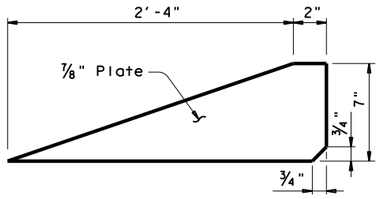
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



BUILT-UP BOX CONNECTION

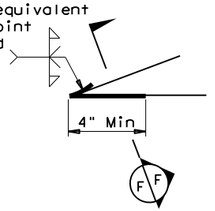


REINFORCING STIFFENER



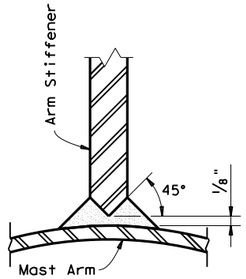
ARM STIFFENER
(Cut to match arm inclination and taper)

Provide Detail shown in SECTION F-F or equivalent 100% complete joint penetration weld from both sides.



Only 4" length at tip of Arm Stiffener requires a complete joint penetration weld. Smooth weld radius to connect Stiffener. Only a fillet weld is required for the remaining weld length.

DETAIL "K"



SECTION F-F

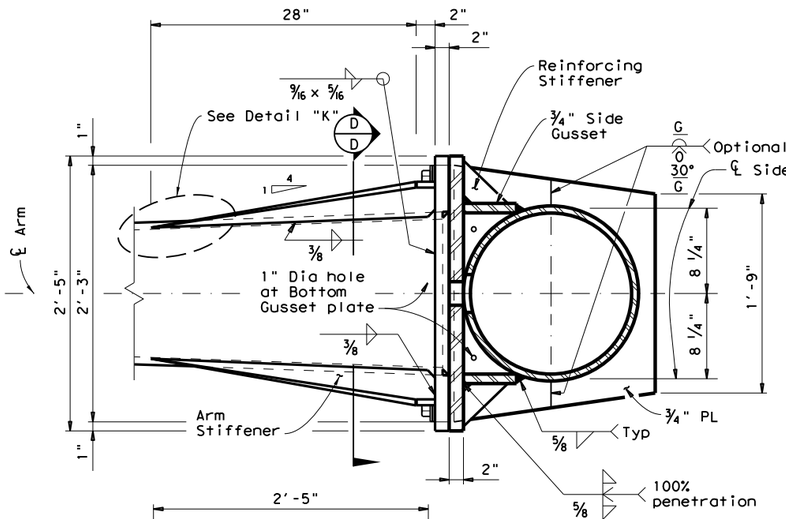
Fixed Mount Arm L_F	ROUND POLES(13)					Foundation Type
	D_B	$D_{19.5}$ or $D_{20.25}$	D_{24}	D_{30}	(12) thk	
ft.	in.	in.	in.	in.	in.	
50', 55' 60', 65'	21.0	18.2	17.6	16.8	.3125	48-A

Fixed Mount Arm L_F	ROUND ARMS(13)				
	L_1	D_1	D_2	(12) thk	Rise
ft.	ft.	in.	in.	in.	
50	49	18.5	11.7	.3125	3'- 3"
55	54	18.5	11.0	.3125	3'- 7"
60	59	18.5	10.3	.3125	3'-11"
65	64	18.5	9.6	.3125	4'- 4"

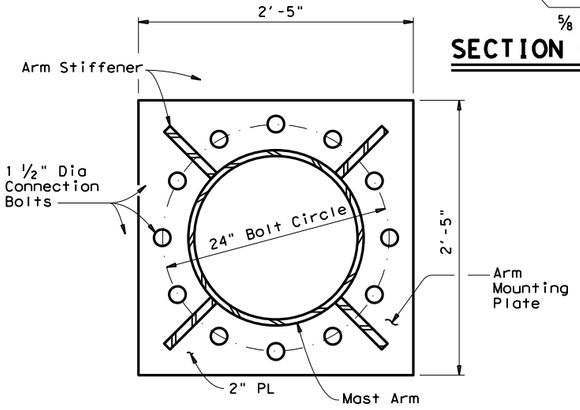
D_B = Pole Base O.D.
$D_{19.5}$ = Pole Top O.D. with no Luminaire and no ILSN (single mast arm)
$D_{20.25}$ = Pole Top O.D. with no Luminaire and no ILSN (dual mast arm)
D_{24} = Pole Top O.D. with ILSN w/out Luminaire
D_{30} = Pole Top O.D. with Luminaire
D_1 = Arm Base O.D.
D_2 = Arm End O.D.
L_1 = Shaft Length
L_F = Fixed Arm Length

(12) Thickness shown is minimum, thicker materials may be used.

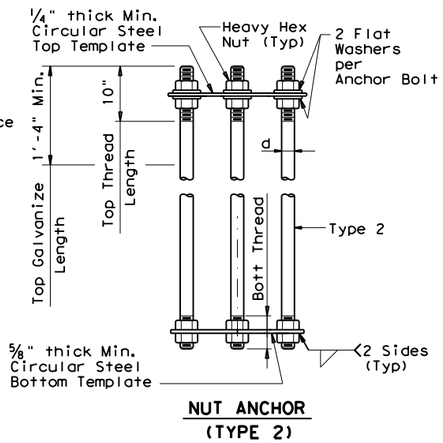
(13) Shaft profile 16-sided or 18-sided is considered to be equivalent to round section.



SECTION C-C

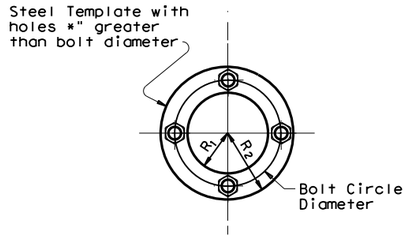


SECTION D-D



NUT ANCHOR
(TYPE 2)

ANCHOR BOLT ASSEMBLY



TEMPLATE DETAIL

ANCHOR BOLT & TEMPLATE SIZE						
Bolt Dia in.	Length ‡	Top Thread	Bottom Thread	Bolt Circle	R_2	R_1
2 1/2"	5'-2"	10"	6 1/2"	27"	16"	11"

‡ Min dimension given, longer bolts are acceptable.

FOUNDATION DESIGN TABLE													
FDN TYPE	DRILLED SHAFT DIA	REINFORCING STEEL		DRILLED SHAFT LENGTH-ft (16), (17), 18			ANCHOR BOLT DESIGN (14)				FOUNDATION DESIGN LOAD (15)		TYPICAL APPLICATION
		VERT BARS	SPIRAL & PITCH	TEXAS CONE PENETROMETER N blows/ft			ANCHOR BOLT DIA	Fy (ksi)	BOLT CIR DIA	ANCHOR TYPE	MOMENT K-ft	SHEAR Kips	
				10	15	40							
48-A	48"	20 #9	#4 at 6"	21.9	19.5	14.7	2 1/2"	55	27"	2	490	10	50' to 65' Mast arm assembly.

SEE SHEET "TS-FD" FOR ADDITIONAL DETAILS.

(14) Anchor bolt design develops the foundation capacity given under Foundation Design Loads.

(15) Foundation Design Loads are the allowable moments and shears at the base of the structure.

(16) Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.

(17) If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.

(18) Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

GENERAL NOTES:

Built-up Box Connection: For the welded arm-to-pole connection as a build-up box configuration illustrated here is an example only, fabricators are required to submit a shop drawing of box connection for approval. The drawing shall specify the details of each box element, welds of arm-to-pole connection, arm-to-plate socket connection, and arm rise creation. Specify the proper location of drain holes along the pole. 2 1/2" dia hole in the pole mounting plate and 4" dia hole in the pole need to be aligned for wiring access or drainage. Arm stiffeners cut to match arm inclination and taper shall also be included.

The deviation from flat for either arm or pole mounting plate shall not exceed 1/32 in., which is measured along the center of mounting plate to a radial distance of 13.5 in. The deformed-from-flat connection between arm and pole mounting plates shall not be allowed if the center of both mounting plates cannot contact directly.

Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

Sheet 3 of 5 — LMA(3)-12

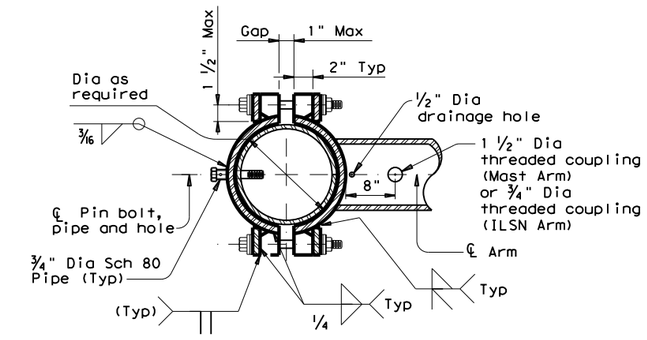
©TxDOT July 2000

REVISIONS	DN: JSY	CK: ARC	DW: TGG	CK: JSY
4-20-01 1-12	CONT	SECT	JOB	HIGHWAY
	0073	02	082	US 281
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		174

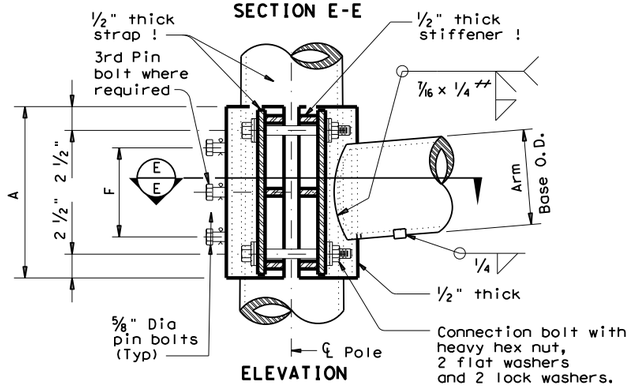
131C

PLOTTED: 11/21/2023 3:35:40 PM
FILENAME: c:\pw\khl\d0275822\LMA (3)-12.dgn
BY:

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.



SECTION E-E



ELEVATION
(Mast Arm or ILSN Arm to pole)

= 85% Min. Penetration

CLAMP-ON CONNECTION

80 MPH WIND

Clamp-on Arm L C	ROUND ARMS					POLYGONAL ARMS				
	L_1	D_1	D_2	thk(12)	Rise	L_1	D_1	D_2	thk(12)	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	6.5	3.8	.179	1'-9"	19.1	7.0	3.5	.179	1'-8"
24	23.1	7.5	4.3	.179	1'-10"	23.1	7.5	3.5	.179	1'-9"
28	27.1	8.0	4.2	.179	1'-11"	27.1	8.0	3.5	.179	1'-10"
32	31.0	9.0	4.7	.179	2'-1"	31.0	9.0	3.5	.179	2'-0"
36	35.0	9.5	4.6	.179	2'-4"	35.0	10.0	3.5	.179	2'-1"
40	39.0	9.5	4.1	.239	2'-8"	39.0	9.5	3.5	.239	2'-3"
44	43.0	10.0	4.1	.239	2'-11"	43.0	10.0	3.5	.239	2'-6"

100 MPH WIND

Clamp-on Arm L C	ROUND ARMS					POLYGONAL ARMS				
	L_1	D_1	D_2	thk(12)	Rise	L_1	D_1	D_2	thk(12)	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	8.0	5.3	.179	1'-8"	19.1	8.0	3.5	.179	1'-7"
24	23.1	9.0	5.8	.179	1'-9"	23.1	9.0	3.5	.179	1'-8"
28	27.1	9.5	5.7	.179	1'-10"	27.1	10.0	3.5	.179	1'-9"
32	31.0	9.5	5.2	.239	1'-11"	31.0	9.5	3.5	.239	1'-10"
36	35.0	10.0	5.1	.239	2'-0"	35.0	10.0	3.5	.239	1'-11"
40	39.0	10.5	5.1	.239	2'-3"	39.0	11.0	3.5	.239	2'-1"
44	43.0	11.0	5.1	.239	2'-8"	43.0	11.5	4.0	.239	2'-3"

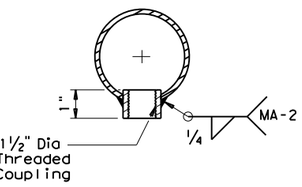
D_1 = Arm Base O.D.
D_2 = Arm End O.D.
L_1 = Shaft Length
Lc = Clamp-on Arm Length

(12) Thickness shown is minimum, thicker materials may be used.

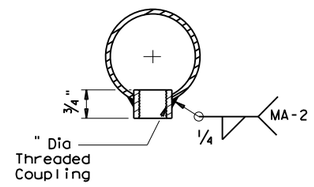
CLAMP-ON ARM CONNECTION

ILSN Arm Size		A	F	4 Conn. Bolts	5/8" Dia. Pin Bolts
Sch 40 pipe Dia	Thick			Dia	No.
in.	in.	in.	in.	in.	ea
3	.216	10	4		2

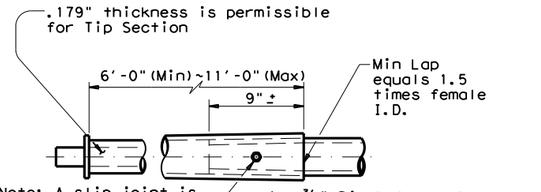
Mast Arm Size		A	F	4 Conn. Bolts	5/8" Dia. Pin Bolts
Base Dia	Thick			Dia	No.
in.	in.	in.	in.	in.	ea
6.5	.179	12	6	1	2
7.5	.179	14	8	1	2
8.0	.179	14	8	1	2
9.0	.179	16	10	1	2
9.5	.179	18	12	1 ¼	3
9.5	.239	18	12	1 ¼	3
10.0	.239	18	12	1 ¼	3
10.5	.239	18	12	1 ¼	3
11.0	.239	18	12	1 ¼	3
11.5	.239	18	12	1 ¼	3



ARM COUPLING DETAIL



ILSN ARM COUPLING DETAIL

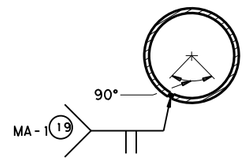


Note: A slip joint is permissible for arms 40' and greater in length. The slip joint shall be made in the shop, but may be match marked and shipped disassembled.

SLIP JOINT DETAIL (CLAMP-ON ARM)

Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 ½" Dia Threaded Coupling.

BRACKET ASSEMBLY



ARM WELD DETAIL

(19) Longitudinal Seam Weld must be oriented within the lower 90° of the signal arm.
60% Min penetration
100% penetration within 6" of circumferential base welds.

GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies or ILSN arm support. For a clamp-on mast arm, a maximum 1 ½" wide vertical slotted hole may be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1". For an ILSN arm, a 1 ½" diameter hole shall be cut in the front clamp plate for wire access. A matched hole shall be field drilled through the pole to provide wire access after arm is oriented. Deburr both holes.

Where duplicate parts occur on a detail, welds shown for part shall apply to all similar parts on the detail.

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces. Pin bolts shall be ASTM A325 with threads excluded from the shear plane. Pin bolt and ¾" diameter pipe shall have 3/16" diameter holes for a 1/8" diameter galvanized cotter pin. Back clamp plate shall be furnished with a ¾" diameter hole for each pin bolt. An 11/16" diameter hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

Sheet 4 of 5 — LMA(4)-12

© TxDOT November 2000

DN: JK	CK: GRB	DW: FDN	CK: CAL

REVISIONS
4-20-01 1-12

CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		175

131D

PLOTTED: 11/21/2023 3:36:07 PM BY:
FILENAME: c:\pw\kh1\d0275822\LMA (4)-12.dgn

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.

Shipping Parts List

Ship each pole with the following attached: enlarged hand hole, pole cap, fixed arm connection bolts and washers, and any additional hardware listed in the table.

Nominal Arm Length	30' Poles with Luminaire: See note above plus: one (or two if ILSN attached) small hand hole, clamp-on simplex		24' Poles with ILSN: See note above plus one small hand hole		19.50' (Single Mast Arm) 20.25' (Dual Mast Arm) Poles with no Luminaire and no ILSN: See note above	
Single Mast Arm						
Lf ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
50	50L		50S		50	
55	55L		55S		55	
60	60L	2	60S		60	
65	65L		65S		65	
Dual Mast Arm						
Lf ft. / Lc ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
50 / 20	5020L		5020S		5020	
24	5024L		5024S		5024	
28	5028L		5028S		5028	
32	5032L		5032S		5032	
36	5036L		5036S		5036	
40	5040L		5040S		5040	
44	5044L		5044S		5044	
55 / 20	5520L		5520S		5520	
24	5524L		5524S		5524	
28	5528L		5528S		5528	
32	5532L		5532S		5532	
36	5536L		5536S		5536	
40	5540L		5540S		5540	
44	5544L		5544S		5544	
60 / 20	6020L		6020S		6020	
24	6024L		6024S		6024	
28	6028L		6028S		6028	
32	6032L		6032S		6032	
36	6036L		6036S		6036	
40	6040L		6040S		6040	
44	6044L		6044S		6044	
65 / 20	6520L		6520S		6520	
24	6524L		6524S		6524	
28	6528L		6528S		6528	
32	6532L		6532S		6532	
36	6536L		6536S		6536	
40	6540L		6540S		6540	
44	6544L		6544S		6544	

Shipping Parts List

Traffic Signal Arms (Fixed Mount) (1 per pole)
Ship each arm with listed equipment attached

Nominal Arm Length	Type IV Arm (4 Signals) 3 Bracket Assembly and 4 CGB Connectors	
ft.	Designation	Quantity
50	50IV	
55	55IV	
60	60IV	2
65	65IV	

Luminaire Arms (1 per 30' pole)

Nominal Arm Length	Quantity
8' Arm	2

ILSN Arm (Max. 2 per pole) Ship with clamps, bolts and washers

Nominal Arm Length	Quantity
7' Arm	
9' Arm	

Traffic Signal Arms (80 MPH Clamp-On Mount) (1 per pole) Ship each arm with listed equipment attached

Nominal Arm Length	Type I Arm (1 Signal) 2 CGB connector and 1 clamp w/bolts and washers		Type II Arm (2 Signals) 1 Bracket Assembly and 3 CGB connectors, and 1 clamp w/bolts and washers		Type III Arm (3 Signals) 2 Bracket Assembly and 4 CGB connectors, and 1 clamp w/bolts and washers	
ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-80					
24	24I-80		24II-80			
28	28I-80		28II-80			
32			32II-80		32III-80	
36			36II-80		36III-80	
40					40III-80	
44					44III-100	

Traffic Signal Arms (100 MPH Clamp-On Mount) (1 per pole) Ship each arm with listed equipment attached

Nominal Arm	Type I Arm (1 Signal) 2 CGB connector and 1 clamp w/bolts and washers		Type II Arm (2 Signals) 1 Bracket Assembly and 3 CGB connectors, and 1 clamp		Type III Arm (3 Signals) 2 Bracket Assembly and 4 CGB connectors, and 1 clamp	
ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-100					
24	24I-100		24II-100			
28	28I-100		28II-100			
32			32II-100		32III-100	
36			36II-100		36III-100	
40					40III-100	
44					44III-100	

Anchor Bolt Assemblies (1 per pole)

Anchor Bolt Diameter	Anchor Bolt Length	QUANTITY
2 1/2 "	5' - 3"	2

Each bolt assembly consists of the following: Top and bottom templates, 4 anchor bolts, 8 nuts, 8 flat washers and 4 nut anchor devices (type 2) per Standard Drawing "TS-FD". Templates may be removed for shipment.

Foundation Summary Table **

Location Ident.	Avg. N Blow/ft.	No. Each	Drill Shaft *** Length (feet)
			48-A
US 281 AT SOCORRO ST			
POLE 1	10	1	22
POLE 7	10	1	22
Total Drill Shaft Length			44

** Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.

*** Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

Abbreviations
Lf= Fixed Arm Length
Lc= Clamp-on Arm Length (44' Max.)

STATE OF TEXAS
AMY ELIZABETH AVERY
98481
LICENSED PROFESSIONAL ENGINEER
12/21/2023

Amy E Avery

Texas Department of Transportation
Traffic Operations Division

LONG MAST ARM ASSEMBLY PARTS LIST

LMA(5)-12

Sheet 5 of 5

© TxDOT November 2000

DN: JK	CK: GRB	DW: FDN	CK: CAL

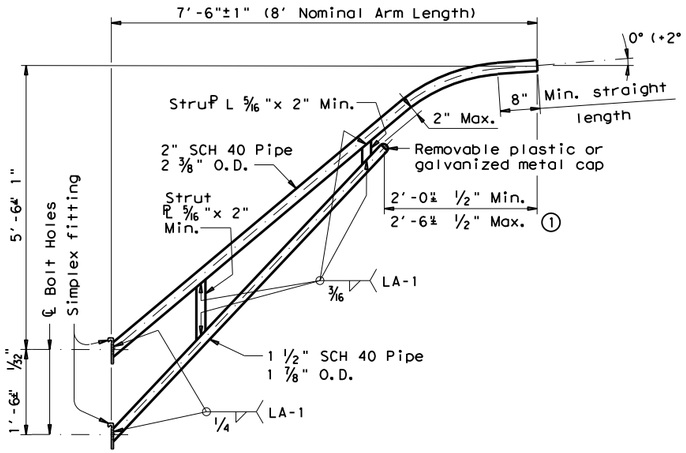
REVISIONS
4-20-01 1-12

CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		176

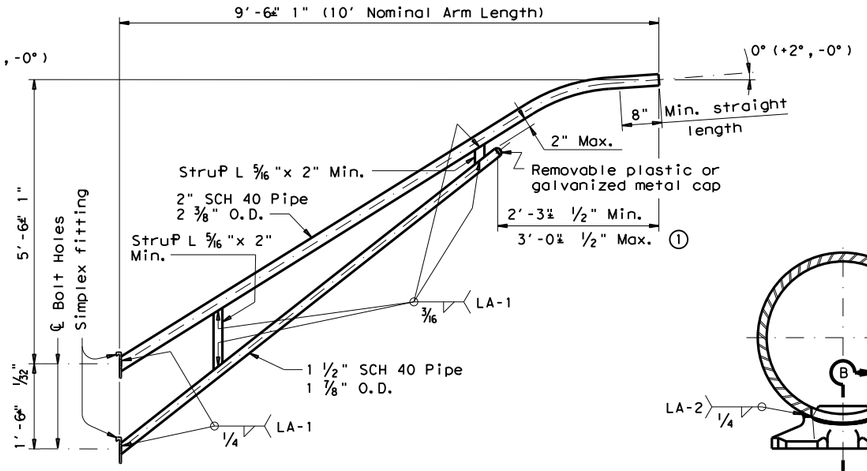
131E

DATE: 12/21/2023 2:08:00 PM
FILE: c:\pw\krh\d0275822\LMA (5)-12.dgn

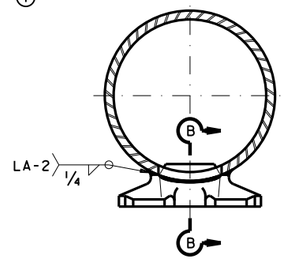
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



8-FOOT LUMINAIRE ARM



10-FOOT LUMINAIRE ARM



DIRECT ATTACHMENT DETAIL

MATERIALS	
Pole or Arm Simplex	ASTM A27 Gr.65-35 or A148 Gr.80-50, A576 Gr.10(2)1 3 , or A36 (Arm only)
Arm Pipes	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50(2)4 , or A1011 HSLAS-F (3)Gr.50 4
Arm Strut Plates (2)	ASTM A36, A572 Gr.50(2)4 , or A588
Misc.	ASTM designations as noted

(1) Dimensional limits are given to show acceptable variation in design. All of a Fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.

(2) Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.

(3) A576 must be suitable for forging and also meet minimum tensile strength of 65 ksi, minimum yield of 35 ksi, and elongation in 2 inches of 22 percent.

(4) ASTM A572, A1008 HSLAS-F, and A1011 HSLAS-F may have higher yield strengths but shall not have less elongation than the grade indicated.

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Revisions thereto. Design Wind Speed equals 90 mph plus a 1.3 gust factor. Arms are designed to support a 60 lb. luminaire having an effective projected area (actual area times drag coefficient) of 1.6 sq. ft.

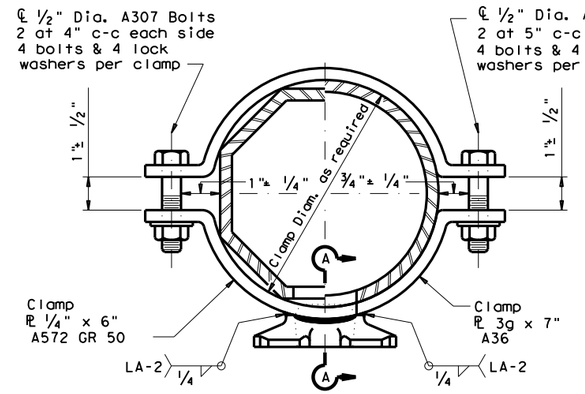
Materials and fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absense of specified Fabricaton tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.

Unless otherwise noted, all parts shall be galvanized after fabrication in accordance with Item 445, "Galvanizing".

Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.

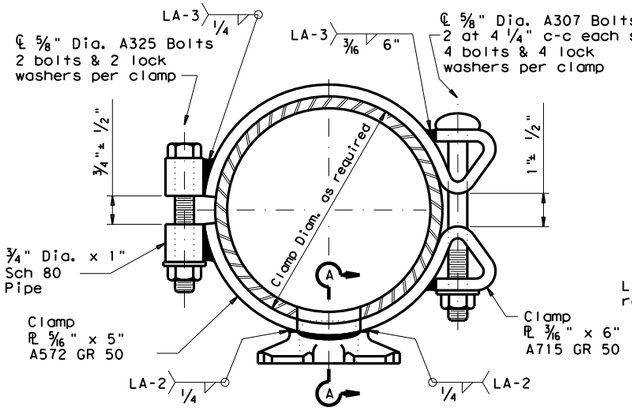
Each pole simplex fitting shall be supplied with 2 ASTM A325 bolts and 2 lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans. When clamp attachment is specified, the Fabricator shall ship the clamp assembly securely attached to the pole at the location shown on the plans.

If clamp assemblies are ordered without poles, the Fabricator shall ship one upper and one lower clamp assembly together in a single package, including all nuts and washers required for the clamps and simplex fittings.



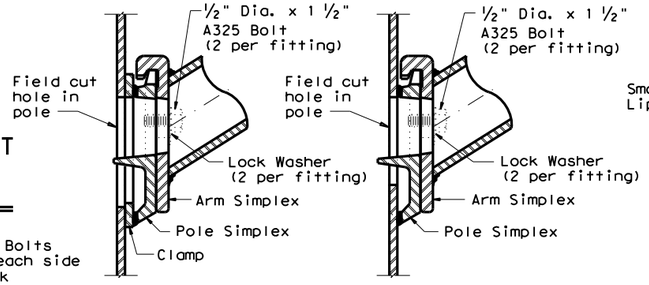
CLAMP ATTACHMENT DETAIL NO. 1 (HALF SECTION)

CLAMP ATTACHMENT DETAIL NO. 2 (HALF SECTION)



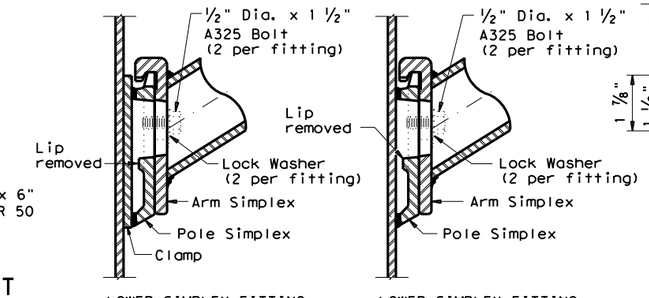
CLAMP ATTACHMENT DETAIL NO. 3 (HALF SECTION)

CLAMP ATTACHMENT DETAIL NO. 4 (HALF SECTION)



UPPER SIMPLEX FITTING

UPPER SIMPLEX FITTING

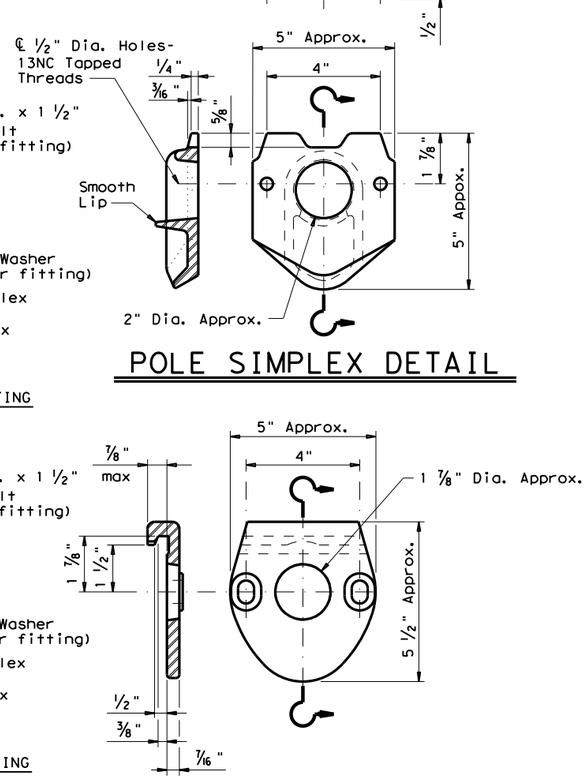


LOWER SIMPLEX FITTING

LOWER SIMPLEX FITTING

SECTON A-A

SECTON B-B



POLE SIMPLEX DETAIL

ARM SIMPLEX DETAIL

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY DRAWINGS FOR LUMINAIRE SUPPORT STRUCTURES

ARM DETAILS

LUM-A-12

© TxDOT August 1995

DN: LEH	CK: JSY	DW: LTT	CK: TEB

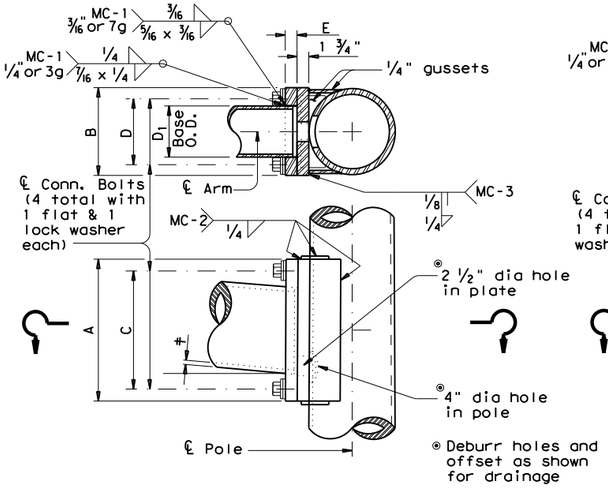
REVISIONS
5-96
1-99
1-12

CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		177

DATE: 11/21/2023 3:37:01 PM
FILE: c:\pw\kn1\d0275822\LUM-A-12.DGN

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.

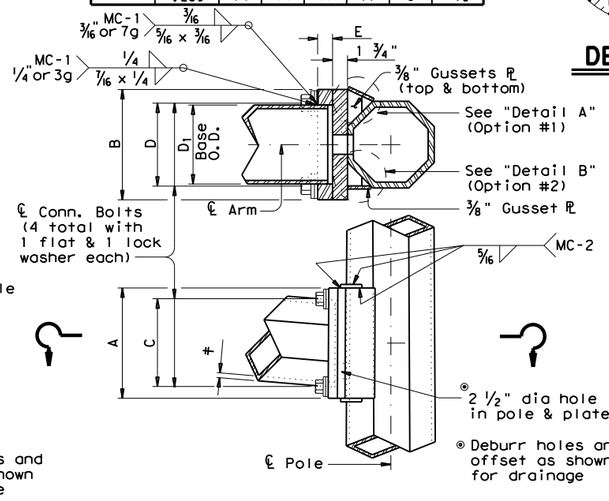
ARM SIZE D_1	ARM SIZE ǂ	A	B	C	D	E	CONN BOLT DIA
in.	in.	in.	in.	in.	in.	in.	in.
6.5	.179	12	9	9	6	1 ¾	1
7.5	.179	13	9	10	6	1 ¾	1
8.0	.179	14	10	11	7	2	1 ¼
9.0	.179	16	11	13	8	2	1 ¼
9.5	.179	17	12	14	9	2	1 ¼
9.5	.239	18	12	15	9	2	1 ¼
10.0	.239	18	12	15	9	2	1 ¼
10.5	.239	18	13	15	10	3	1 ½
11.0	.239	18	13	15	10	3	1 ½



FIXED MOUNT DETAIL 1

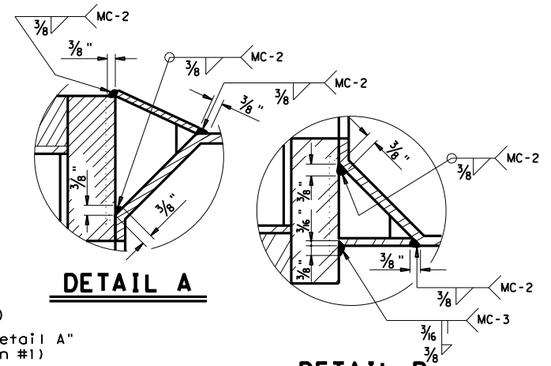
ARM SIZE D_1	ARM SIZE ǂ	A	F	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
in.	in.	in.	in.	ea.	in.	ea.	in.
6.5	.179	12	6	4	1	2	5/8
7.5	.179	14	8	4	1	2	5/8
8.0	.179	14	8	4	1	2	5/8
9.0	.179	16	10	4	1	2	5/8
9.5	.179	18	12	4	1 1/4	3	5/8
9.5	.239	18	12	4	1 1/4	3	5/8
10.0	.239	18	12	4	1 1/4	3	5/8

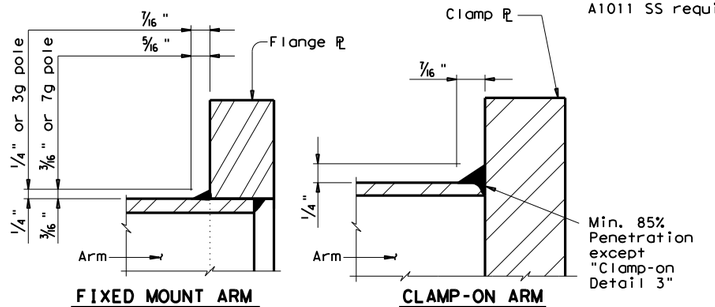
ARM SIZE D_1	ARM SIZE ǂ	A	B	C	D	E	CONN BOLT DIA
in.	in.	in.	in.	in.	in.	in.	in.
7.0	.179	11	11	8	8	1 ¾	1 ¼
7.5	.179	11	11	8	8	1 ¾	1 ¼
8.0	.179	11	11	8	8	2	1 ¼
9.0	.179	13	13	10	10	2	1 ¼
10.0	.179	13	13	10	10	2	1 ¼
9.5	.239	13	13	10	10	2	1 ¼
10.0	.239	14	14	11	11	2	1 ½
11.0	.239	14	14	11	11	3	1 ½
11.5	.239	14	14	11	11	3	1 ½



FIXED MOUNT DETAIL 2

ARM SIZE D_1	ARM SIZE ǂ	A	F	T	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
in.	in.	in.	in.	in.	ea.	in.	ea.	in.
7.0	.179	12	6	¾	4	¾	2	5/8
7.5	.179	14	8	¾	4	¾	2	5/8
8.0	.179	14	8	¾	4	¾	2	5/8
9.0	.179	16	10	⅞	4	1	2	5/8
10.0	.179	18	10	⅞	4	1	2	5/8
9.5	.239	18	10	1	6	1	3	5/8
10.0	.239	18	10	1	6	1	3	5/8





ARM BASE WELD DETAILS

ARM SIZE D_1	ARM SIZE ǂ	A	F	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
in.	in.	in.	in.	ea.	in.	ea.	in.
6.5	.179	12	6	4	1	2	5/8
7.5	.179	14	8	4	1	2	5/8
8.0	.179	14	8	4	1	2	5/8
9.0	.179	16	10	4	1	2	5/8
9.5	.179	18	12	6	1	3	5/8
9.5	.239	18	12	6	1	3	5/8
10.0	.239	18	12	6	1	3	5/8

MATERIALS	
Round Shafts or Polygonal Shafts ①	ASTM A595 Gr.A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 ②
Plates ①	ASTM A36, A588, or A572 Gr.50
Connection Bolts	ASTM A325 or A449, except where noted
Pin Bolts	ASTM A325
Pipe ①	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50, A1011 HSLAS-F Gr.50
Misc. Hardware	Galvanized steel or stainless steel or as noted

① ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.

② ASTM A1011 SS Gr.50 material shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.

GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies. A Maximum 1 ½" wide vertical slotted hole shall be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1"

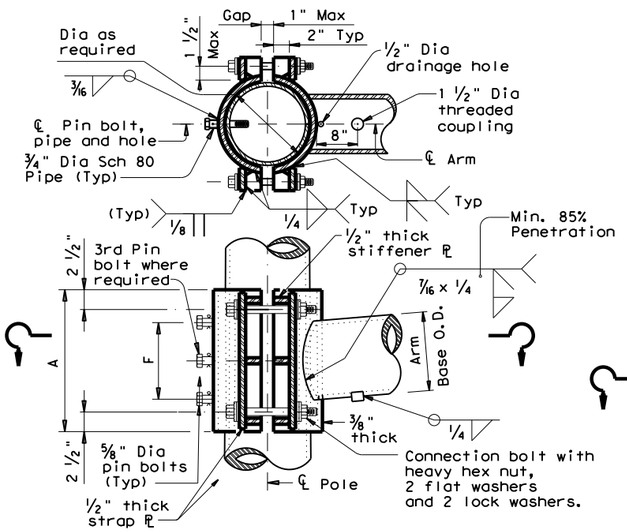
Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

Where duplicate parts occur on a detail, welds shown for one part shall apply to all similar parts on the detail.

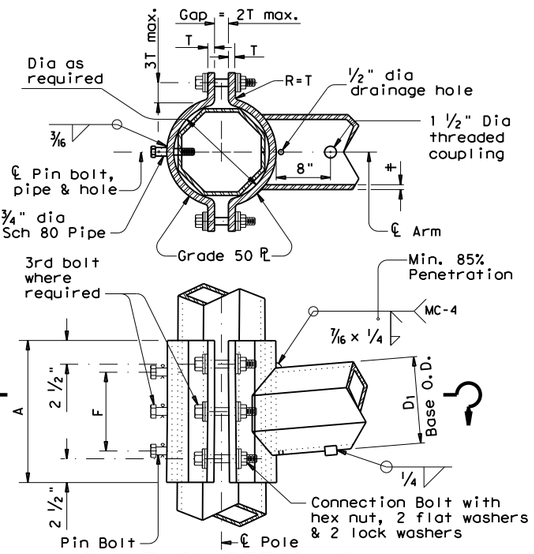
Pin bolts are required to prevent rotation of clamp-on arms under design wind forces.

NOTE:

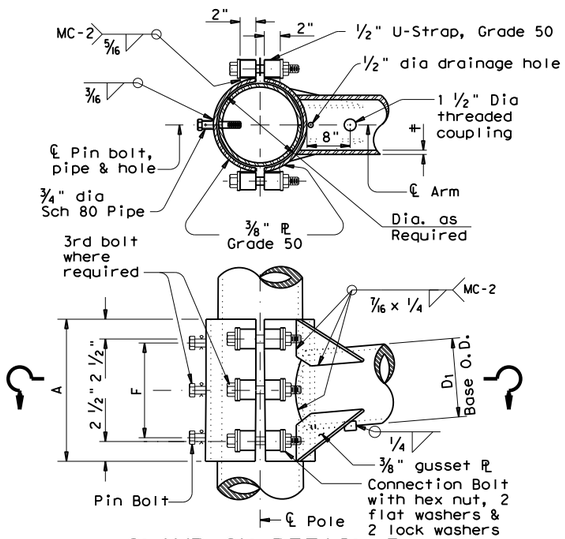
Pin bolts shall be A325 with threads excluded from the shear plane. Pin bolt and ¾" dia pipe shall have 9/16" dia holes for a ⅛" dia galvanized cotter pin. Back clamp plate shall be furnished with a ¾" dia hole for each pin bolt. An 11/16" dia hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.



CLAMP-ON DETAIL 1



CLAMP-ON DETAIL 2



CLAMP-ON DETAIL 3

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY FOR TRAFFIC SIGNAL SUPPORT STRUCTURES

MAST ARM CONNECTIONS

MA-C-12

© TxDOT August 1995

DN: MS	CK: JSY	DW: MMF	CK: JSY

REVISIONS: 5-96, 5-09, 1-12

CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		178

126A

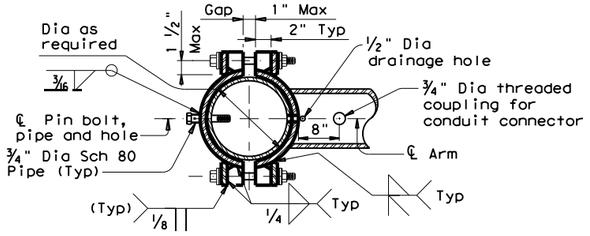
DATE: 11/21/2023 3:37:30 PM
FILE: c:\pw\kni\d0275822\MA-C-12.DGN

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.

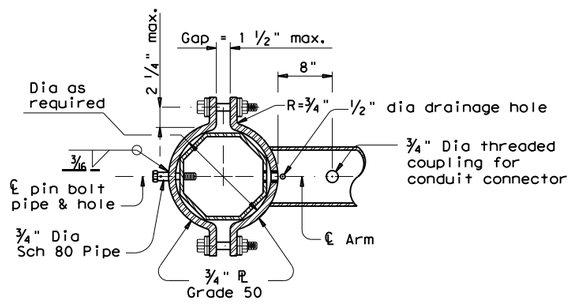
DATE:
FILE:

TABLE OF DIMENSIONS
for ILSN Support Arm Clamp-on Details 1, 2 and 3

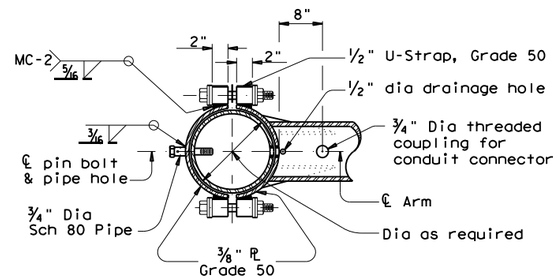
ILSN ARM SIZE	A	F	CONN. BOLTS		PIN BOLTS	
			No.	Dia	No.	Dia
	in.	in.	ea.	in.	ea.	in.
3 in. dia Schedule 40 Pipe	10	4	4	¾	2	⅝



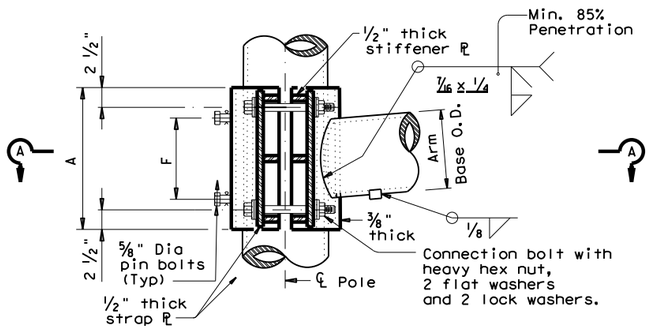
SECTION A-A



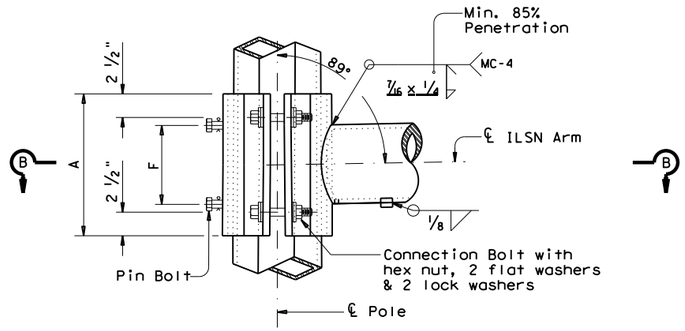
SECTION B-B



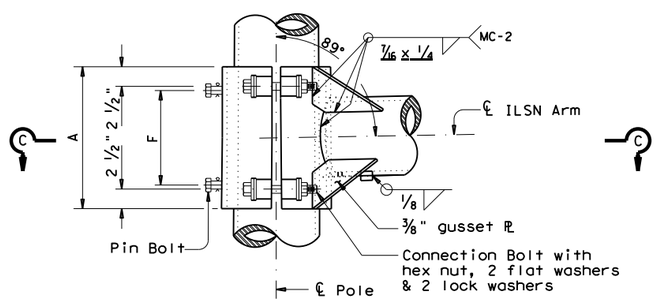
SECTION C-C



ILSN CLAMP-ON DETAIL 1



ILSN CLAMP-ON DETAIL 2



ILSN CLAMP-ON DETAIL 3

GENERAL NOTES:

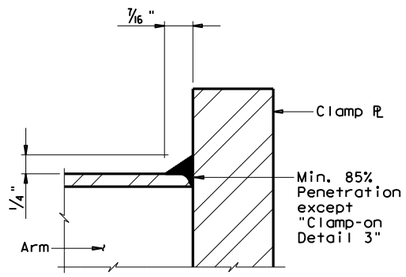
Clamp-on details shall be used for ILSN support arm assemblies. A 1 ½" inch diameter hole shall be cut in the front clamp plate for wiring access. A matched hole shall be field drilled through the pole to provide wire access after arm is oriented. Deburr both holes.

Where duplicate parts occur on a detail, welds shown for one part shall apply to all similar parts on the details.

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces.

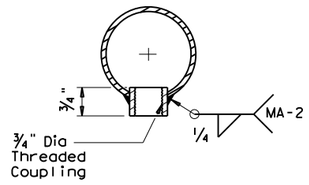
NOTE:

Pin bolts shall be A325 with threads excluded from the shear plane. Pin bolt and ¾" dia pipe shall have 7/16" dia holes for a ⅛" dia galvanized cotter pin. Back clamp plate shall be furnished with a ¾" dia hole for each pin bolt. An 11/16" dia hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.



CLAMP-ON ARM

ARM BASE WELD DETAILS



ILSN ARM COUPLING DETAIL

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY FOR TRAFFIC SIGNAL SUPPORT STRUCTURES

MAST-ARM CONNECTIONS

MA-C(ILSN)-12

© TxDOT August 1995

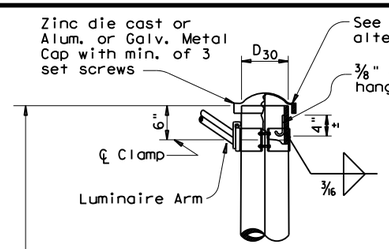
DN: MS	CK: JSY	DW: MMF	CK: JSY

REVISIONS
5-96
1-12

CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		179

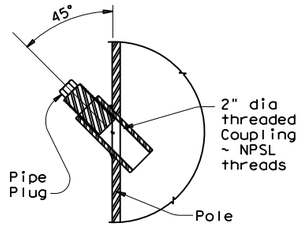
126B

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.

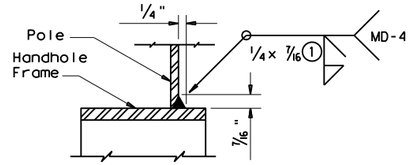


DETAIL A

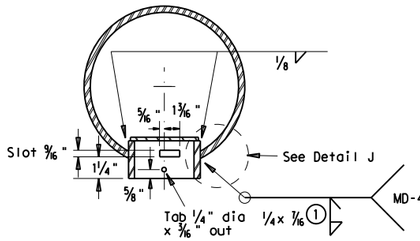
(for pole with luminaire)



POLE COUPLING DETAIL

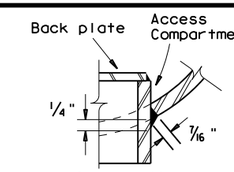


DETAIL G

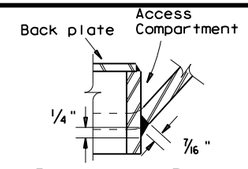


SECTION X-X

Opening for access compartment shall be no more than 1/16 inch wider than the access compartment itself.

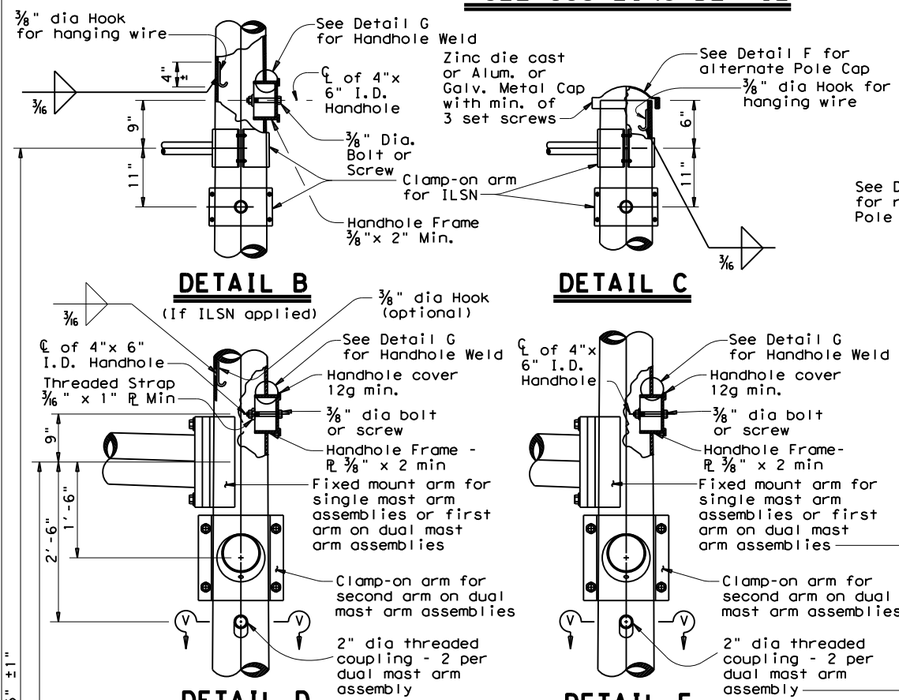


Round Pole



Polygonal Pole

DETAIL J



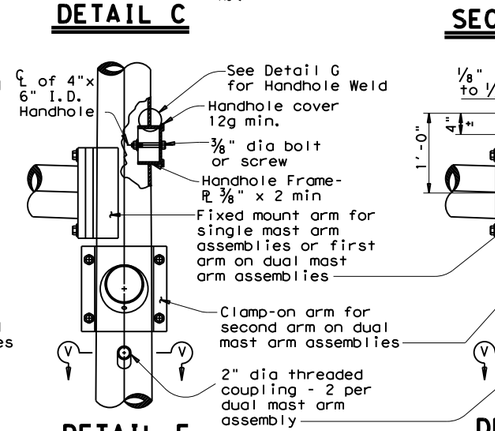
DETAIL B

(If ILSN applied)

DETAIL C

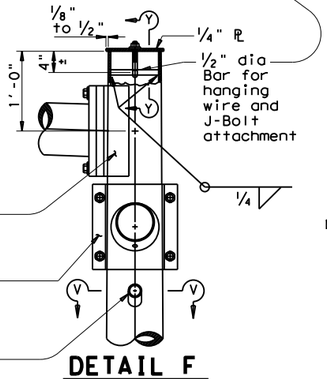
DETAIL D

(for 30' pole with luminaire and ILSN sign)



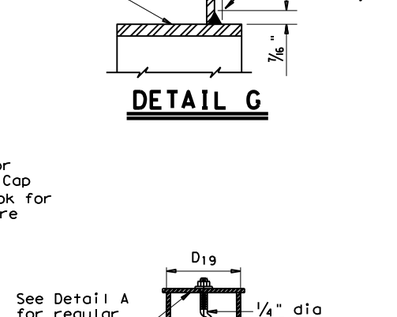
DETAIL E

(for 24' pole with ILSN sign and no luminaire)

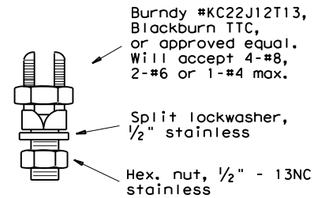


DETAIL F

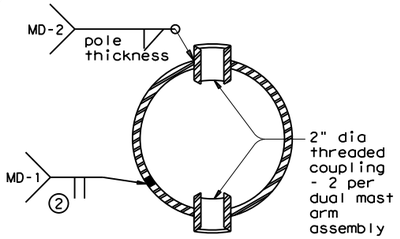
(for 19' pole with no ILSN sign and no luminaire)



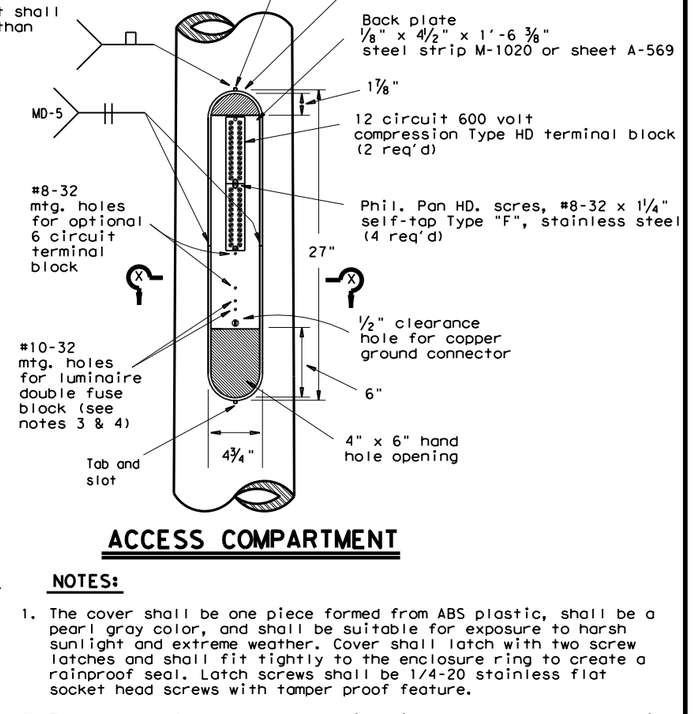
SECTION Y-Y



COPPER GROUND CONNECTOR



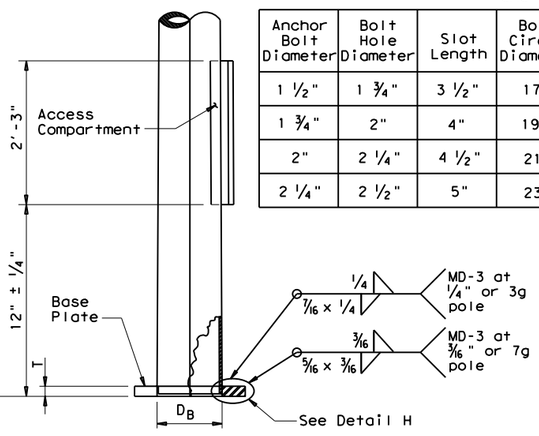
SECTION V-V



ACCESS COMPARTMENT

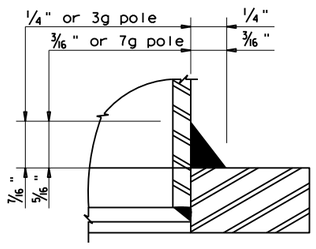
NOTES:

1. The cover shall be one piece formed from ABS plastic, shall be a pearl gray color, and shall be suitable for exposure to harsh sunlight and extreme weather. Cover shall latch with two screw latches and shall fit tightly to the enclosure ring to create a rainproof seal. Latch screws shall be 1/4-20 stainless flat socket head screws with tamper proof feature.
2. The pole manufacturer shall provide with each pole a separate kit consisting of: one cover with two latching assemblies, two terminal strips (Marathon #985GP12CU or approved equal), four #8-32 x 1 1/4" self tapping type "F" stainless steel pan head screws, and one ground connector (Blackburn TTC, Burndy KC22J12T13, or Ilsco SSS-5). The traffic signal contractor shall install the kit items in the field.
3. The screw hole spacing on the enclosure back plate shall be for two Marathon #985GP12 terminal strips, one Marathon #985GP06CU terminal strip, and one Bussmann #BM6032B fuse block.
4. Install one Bussmann #BM6032B, Littelfuse #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.

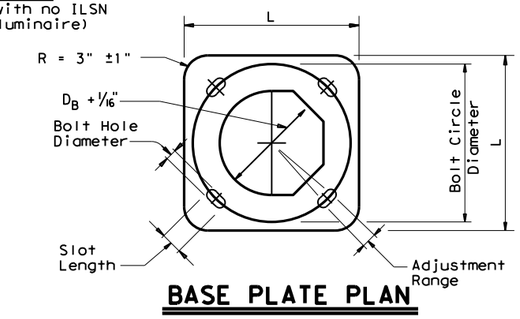


POLE ELEVATION

Anchor Bolt Diameter	Bolt Hole Diameter	Slot Length	Bolt Circle Diameter	Base PL Dim. L x T	Adjust. Range
1 1/2"	1 3/4"	3 1/2"	17"	18" x 1 1/2"	13.4°
1 3/4"	2"	4"	19"	20" x 1 3/4"	13.5°
2"	2 1/4"	4 1/2"	21"	22" x 2"	13.6°
2 1/4"	2 1/2"	5"	23"	24" x 2 1/4"	13.7°



DETAIL H



BASE PLATE PLAN

(1) 85% Min. penetration

(2) 60% Min. penetration 100% pemetration within 6" of circumferential base welds.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES MAST ARM POLE DETAILS

MA-D-12

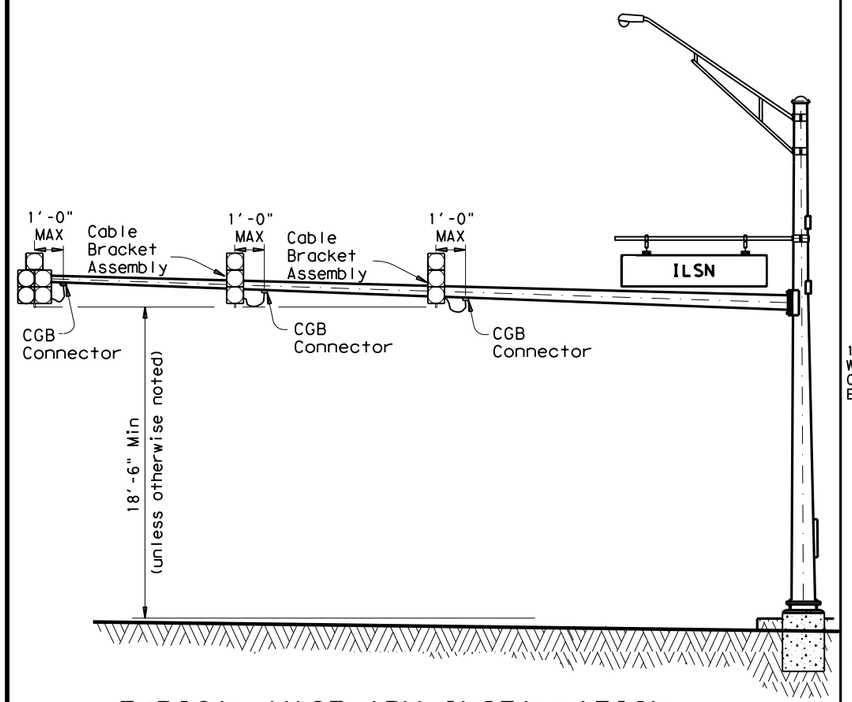
© TxDOT August 1995

DN: MS	CK: JSY	DW: FDN	CK: CAL

REVISIONS
8-99
1-12

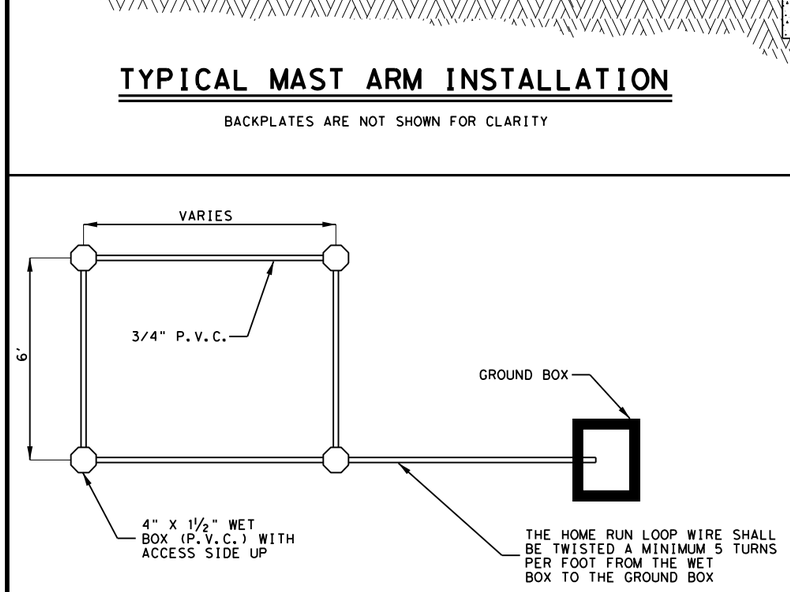
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		180

DATE: 11/21/2023 3:38:21 PM
FILE: c:\pw\kni\d0275822\MA-D-12.DGN



TYPICAL MAST ARM INSTALLATION

BACKPLATES ARE NOT SHOWN FOR CLARITY



NOTES:

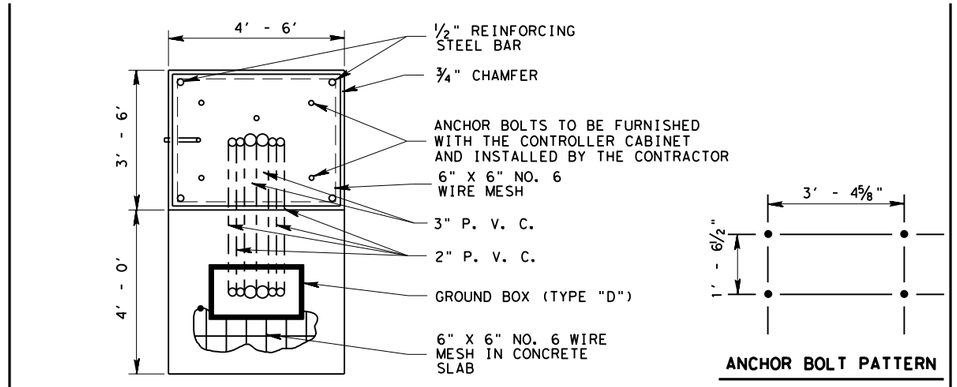
SHALL INSTALL CONDUIT ENCASED LOOPS AT THE LOCATIONS SHOWN ON THE PLANS USING 3/4 " DIAMETER PVC SCHEDULE 40 OR AT NO ADDITIONAL COST 1" DIAMETER PVC SCHEDULE 80.

LOOP LOCATIONS MAY BE STAGGERED SLIGHTLY (6") TO ACCOMMODATE HOME RUN PLACEMENT.

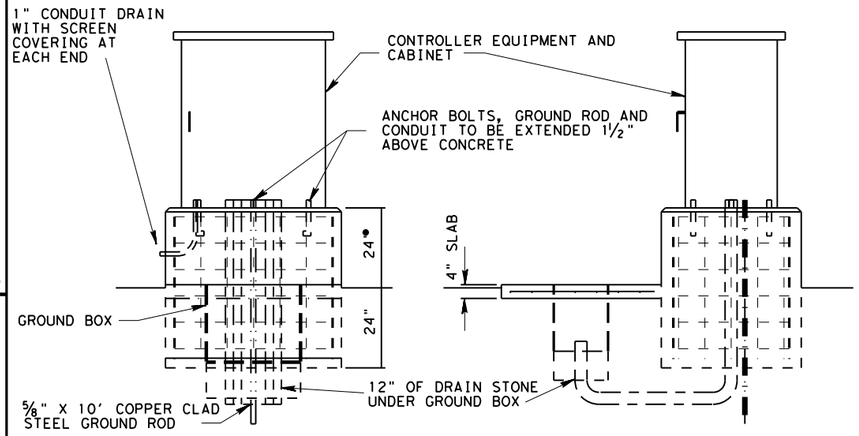
INDIVIDUAL HOME RUN CONDUITS SHALL BE EXTENDED TO THE GROUND BOX SHOWN ON THE PLANS FOR EACH LOOP INSTALLED.

THE NUMBER OF LOOP WIRE TURNS SHALL BE AS SHOWN ON THE TYPICAL LOOP DETECTOR DETAILS.

CONDUIT ENCASED LOOPS



ANCHOR BOLT PATTERN



CONTROLLER MOUNT NOTES :

ALL WIRING TERMINATING IN THE CONTROLLER SHALL BE LABELED IN A MANNER THAT CAN BE IDENTIFIED WHEN THE CONTROLLER IS INSTALLED THE CONTRACTOR SHALL CONNECT THE FIELD WIRING TO THE CONTROLLER

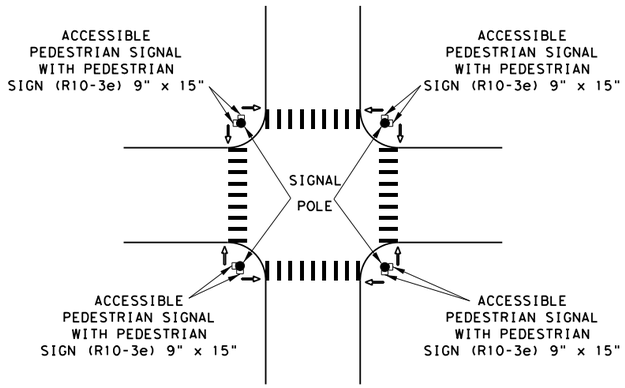
ONE 2" PVC SHALL REMAIN EMPTY FOR FUTURE USE

CONCRETE SHALL BE TESTED AS MISCELLANEOUS CONCRETE

ALL MATERIALS SHOWN AND LABOR TO INSTALL THE CONTROLLER FOUNDATION SHALL BE CONSIDERED SUBSIDIARY TO PERTINENT ITEMS

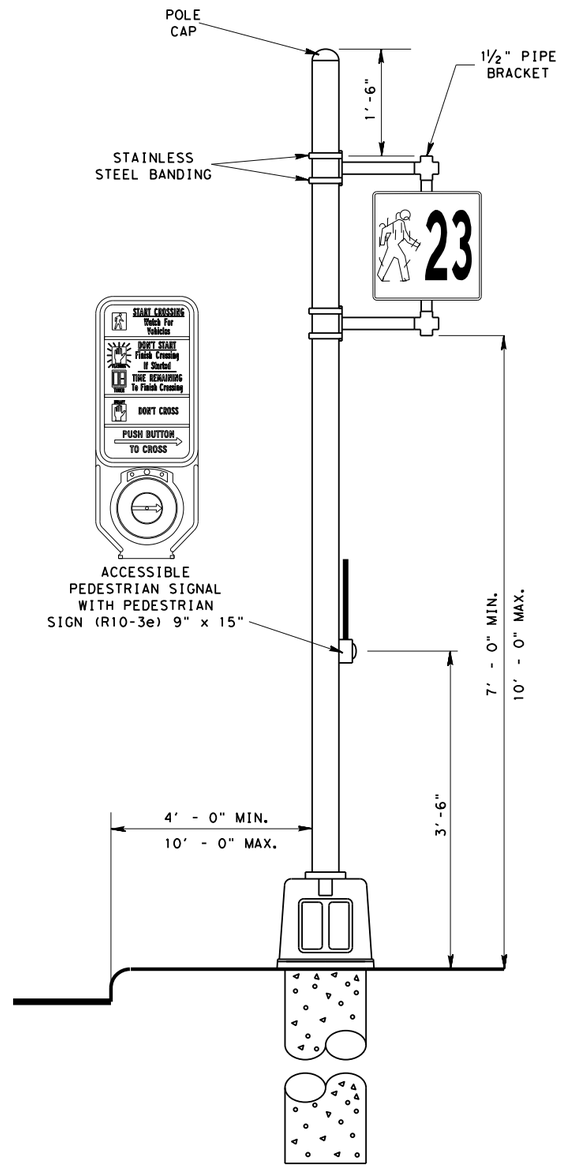
CONTROLLER FOUNDATION SHALL BE AS SHOWN ON THE PLANS, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

TYPICAL CONTROLLER MOUNT DETAILS



TYPICAL PED PUSH BUTTON LOCATION

THE ENGINEER SHALL VERIFY ALL PEDESTRIAN SIGNAL AND PEDESTRIAN PUSH BUTTON LOCATIONS PRIOR TO INSTALLATION.



TYPICAL PEDESTAL POLE ASSEMBLY

Texas Department of Transportation
© 2018

San Antonio District Standard

MISCELLANEOUS TRAFFIC SIGNAL DETAILS

SCALE: NS

MTS-18

REVISIONS	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
FEB 2006	6			181
OCT 2007	STATE	DIST.	COUNTY	
MAR 2017	TEXAS	SAT	BEXAR	
MAY 2018	CONT.	SECT.	JOB	HIGHWAY NO.
	0073	02	082	US 281

LEVELS DISPLAYED
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
ACC:
11:38:42 PM
11/28/2023
c:\pw\krh1\d0275822\MTS-18 (TXDOT SAT).dgn

MOUNTING LOCATIONS

PRESENCE (RPDD)

① PREFERRED PLACEMENT FOR MAST ARMS, STRAIN POLES AND TIMBER POLES. ON MAST ARM POLES, MOUNT BELOW CONNECTION OF MAST ARM TO A MINIMUM OF 15 FT., MOUNT AS HIGH AS POSSIBLE TO A MAXIMUM OF 30 FT ON STRAIN AND TIMBER POLES.

② PREFERRED PLACEMENT FOR MAST ARMS. MOUNT ON AND BELOW MAST ARM ON NEAR SIDE OF ARM.

③ ALTERNATE PLACEMENT LOCATION. MOUNT AS HIGH AS POSSIBLE TO A MAXIMUM OF 30 FT TO PREVENT OCCLUSION OF THE LEFT TURN LANES. THIS PLACEMENT TO BE USED ONLY IF RPDD CANNOT BE MOUNTED IN THE PREFERRED PLACEMENT LOCATIONS.

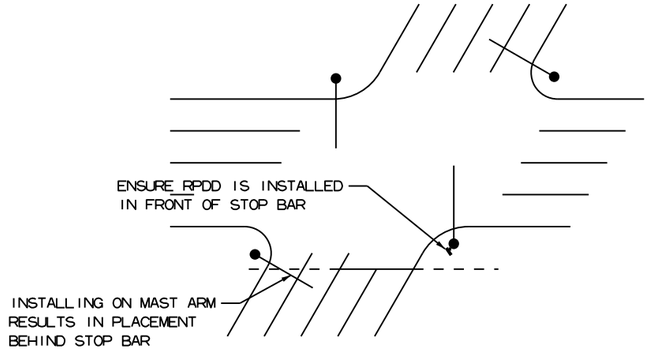
ADVANCE (RADD)

Ⓐ PREFERRED PLACEMENT FOR MAST ARMS. ALIGN RADD WITH CENTER OF TRAVEL LANES.

Ⓑ ALTERNATE PLACEMENT FOR MAST ARMS. MOUNT ON BACK SIDE OF OPPOSING MAST ARM.

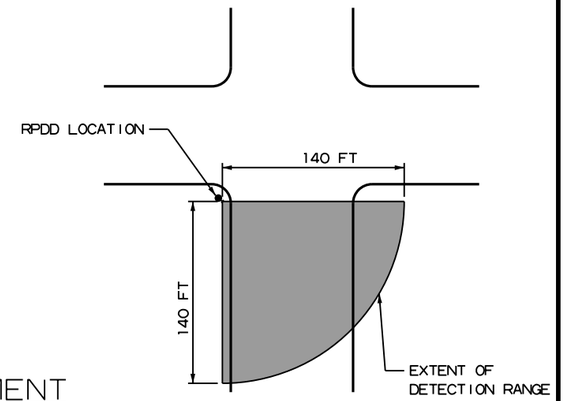
Ⓒ STRAIN OR TIMBER POLE PLACEMENT. MOUNT ON NEAR SIDE POLE.

Ⓓ ALTERNATE STRAIN OR TIMBER POLE PLACEMENT. MOUNT LUMINAIRE ARM ON NEAR SIDE POLE WITH A MAXIMUM 40 FT MOUNTING HEIGHT.



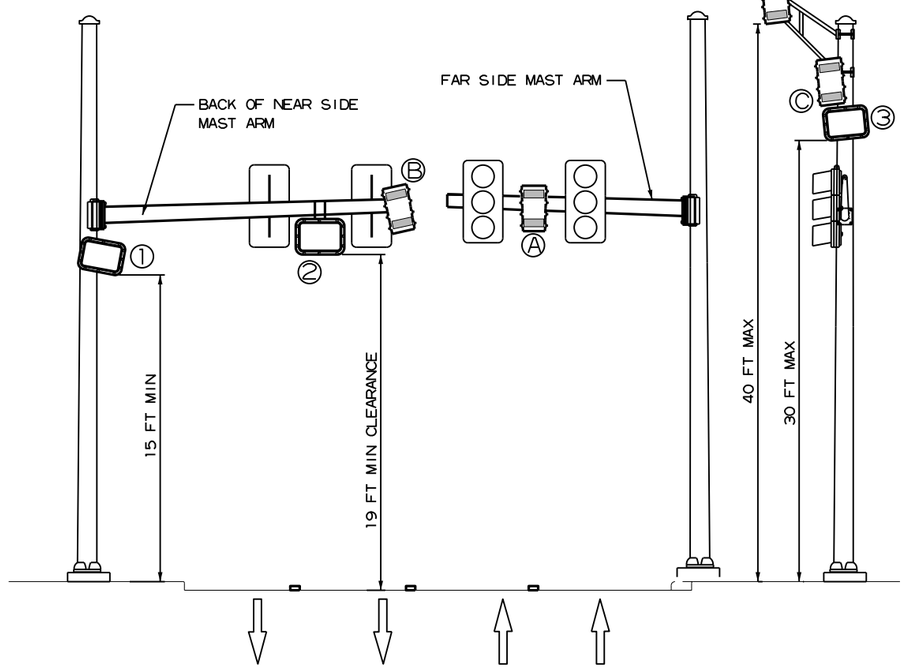
SKEWED INTERSECTION RPDD PLACEMENT

NTS



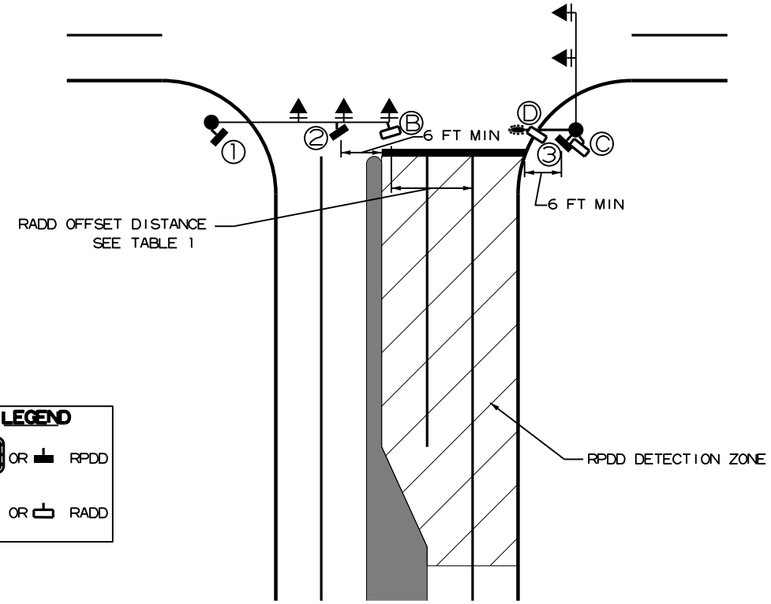
TYPICAL RPDD DETECTION RANGE

NTS



ELEVATION VIEW

NTS



PLAN VIEW

NTS

LEGEND

OR RPDD

OR RADD

NOTES:

1) A MINIMUM 6 FT HORIZONTAL OFFSET MUST BE MAINTAINED BETWEEN THE RPDD AND THE DETECTION ZONE

2) THE RPDD SHALL BE MOUNTED SUCH THAT AT LEAST 20 FT ALONG THE FARTHEST LANE TO BE MONITORED IS WITHIN THE FIELD OF VIEW OF THE RPDD

3) AIM RPDD AT THE CENTER OF THE LANES TO BE MONITORED, APPROXIMATELY 50 FT FROM THE RPDD UNIT

4) MOUNT RPDD SO THAT ITS FIELD OF VIEW IS NOT OCCLUDED BY POLES, SIGNS, OR OTHER STRUCTURES

5) RADD MOUNTING HEIGHT SHALL NOT BE LESS THAN 17 FT OR GREATER THAN 40 FT. RADD MOUNTING LOCATION SHALL HAVE A MAXIMUM 50 FT LATERAL OFFSET FROM CENTER OF TRAVEL LANES TO BE MONITORED

3:39:23 PM
11/21/2023
c:\pw\km1\d0275822\rpdd_radd-20.dgn

LEVELS DISPLAYED
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63

ACC:

Texas Department of Transportation
© 2020

San Antonio District Standard

RADAR PRESENCE DETECTOR (RPDD)
RADAR ADVANCED DETECTION DEVICE (RADD)
PLACEMENT

SCALE: NS

RPDD-RADD-20

REVISIONS	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
MAR 2020	6			182
	STATE	DIST.	COUNTY	
	TEXAS	SAT	BEXAR	
	CONT.	SECT.	JOB	HIGHWAY NO.
	0073	02	082	US 281

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.

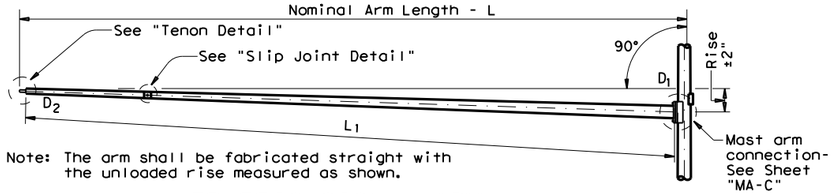
Arm Length	ROUND POLES					POLYGONAL POLES					Foundation Type
	D_B	D_{19}	D_{24}	D_{30}	① thk	D_B	D_{19}	D_{24}	D_{30}	① thk	
ft.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	
20	10.5	7.8	7.1	6.3	.179	11.5	8.5	7.7	6.8	.179	30-A
24	11.0	8.3	7.6	6.8	.179	12.0	9.0	8.2	7.3	.179	30-A
28	11.5	8.8	8.1	7.3	.179	12.5	9.5	8.7	7.8	.179	30-A
32	12.5	9.8	9.1	8.3	.179	12.0	9.0	8.2	7.3	.239	30-A
36	12.0	9.3	8.6	7.8	.239	12.5	9.5	8.7	7.8	.239	36-A
40	12.0	9.3	8.6	7.8	.239	13.5	10.5	9.7	8.8	.239	36-A
44	12.5	9.8	9.1	8.3	.239	14.0	11.0	10.2	9.3	.239	36-A
48	13.0	10.3	9.6	8.8	.239	15.0	12.0	11.2	10.3	.239	36-A

Arm Length	ROUND ARMS					POLYGONAL ARMS				
	L_1	D_1	D_2	① thk	Rise	L_1	D_1	② D_2	① thk	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	6.5	3.8	.179	1'-9"	19.1	7.0	3.5	.179	1'-8"
24	23.1	7.5	4.3	.179	1'-10"	23.1	7.5	3.5	.179	1'-9"
28	27.1	8.0	4.2	.179	1'-11"	27.1	8.0	3.5	.179	1'-10"
32	31.0	9.0	4.7	.179	2'-1"	31.0	9.0	3.5	.179	2'-0"
36	35.0	9.5	4.6	.179	2'-4"	35.0	10.0	3.5	.179	2'-1"
40	39.0	9.5	4.1	.239	2'-8"	39.0	9.5	3.5	.239	2'-3"
44	43.0	10.0	4.1	.239	2'-11"	43.0	10.0	3.5	.239	2'-6"
48	47.0	10.5	4.1	.239	3'-4"	47.0	11.0	3.5	.239	2'-9"

D_B = Pole Base O.D.
D_{19} = Pole Top O.D. with no Luminaire and no ILSN
D_{24} = Pole Top O.D. with ILSN w/out Luminaire
D_{30} = Pole Top O.D. with Luminaire
D_1 = Arm Base O.D.
D_2 = Arm End O.D.
L_1 = Shaft Length
L = Nominal Arm Length

① Thickness shown are minimums, thicker materials may be used.

② D_2 may be increased by up to 1" for polygonal arms.



Note: The arm shall be fabricated straight with the unloaded rise measured as shown.

TRAFFIC SIGNAL ARM

(Fixed Mount)

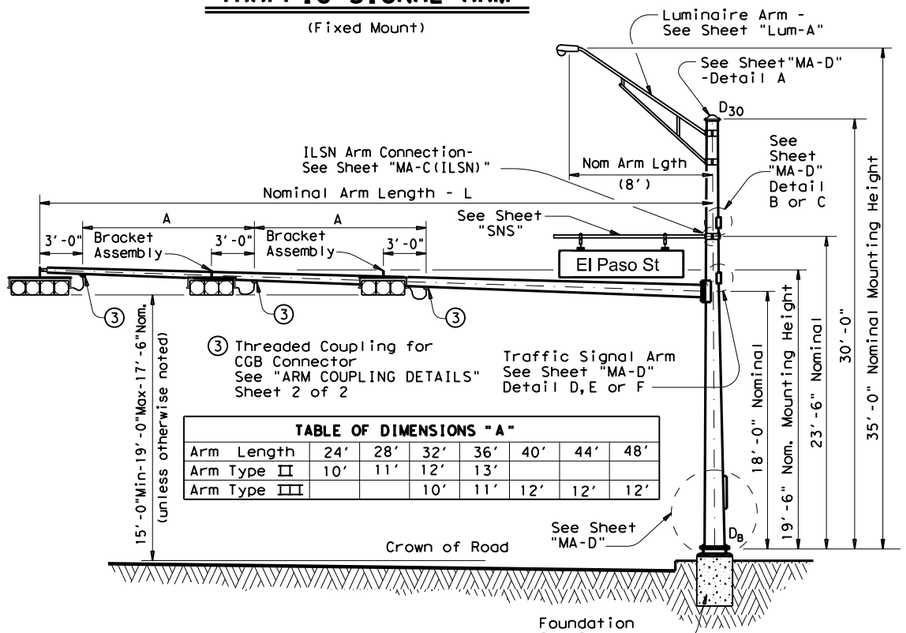


TABLE OF DIMENSIONS "A"

Arm Length	24'	28'	32'	36'	40'	44'	48'
Arm Type II	10'	11'	12'	13'			
Arm Type III			10'	11'	12'	12'	12'

STRUCTURE ASSEMBLY

SHIPPING PARTS LIST

Ship each pole with the following attached: enlarged hand hole, pole cap, fixed-arm connection bolts and washers and any additional hardware listed in the table.

Nominal Arm Length	30' Poles With Luminaire		24' Poles With ILSN		19' Poles With No Luminaire and No ILSN	
	Above hardware plus: One (or two if ILSN attached) small hand hole, clamp-on simplex		Above hardware plus one small hand hole		See note above	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20L-80		20S-80		20-80	
24	24L-80	1	24S-80		24-80	
28	28L-80	1	28S-80		28-80	
32	32L-80		32S-80		32-80	
36	36L-80		36S-80		36-80	
40	40L-80		40S-80		40-80	
44	44L-80	6	44S-80		44-80	
48	48L-80		48S-80		48-80	

Traffic Signal Arms (1 per Pole) Ship each arm with the listed equipment attached

Nominal Arm Length	Type I Arm (1 Signal)		Type II Arm (2 Signals)		Type III Arm (3 Signals)	
	1 CGB connector		1 Bracket Assembly and 2 CGB Connectors		2 Bracket Assemblies and 3 CGB Connectors	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-80					
24	24I-80		24II-80	1		
28	28I-80		28II-80	1		
32			32II-80		32III-80	
36			36II-80		36III-80	
40					40III-80	
44					44III-80	6
48					48III-80	

Luminaire Arms (1 per 30' pole)

Nominal Arm Length	Quantity
8' Arm	8

ILSN Arm (Max. 2 per pole) Ship with clamps, bolts and washers

Nominal Arm Length	Quantity
7' Arm	
9' Arm	

Anchor Bolt Assemblies (1 per pole)

Anchor Bolt Diameter	Anchor Bolt Length	Quantity
1 ½"	3'-4"	2
1 ¾"	3'-10"	6

Each anchor bolt assembly consists of the following: Top and Bottom templates, 4 anchor bolts, 8 nuts, 8 flat washers, and 4 nut anchor devices (Type 2) per Standard Drawing "TS-FD".

Templates may be removed for shipment.

SHEET 1 OF 2

STATE OF TEXAS
AMY ELIZABETH AVERY
98481
LICENSED PROFESSIONAL ENGINEER
12/21/2023
Amy E Avery

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY

(80 MPH WIND ZONE)

SMA-80(1)-12

© TxDOT August 1995

DN: MS	CK: JSY	DW: MWF	CK: JSY

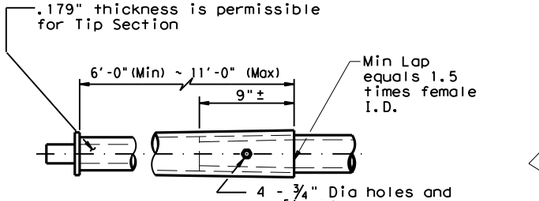
REVISIONS
5-96
11-99
1-12

CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		183

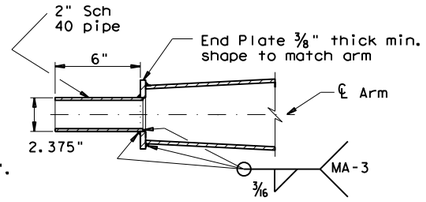
122A

DATE: 12/21/2023 10:00:29 AM
FILE: c:\pw\kni\d0275822\SMA-80 (1)-12.dgn

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.



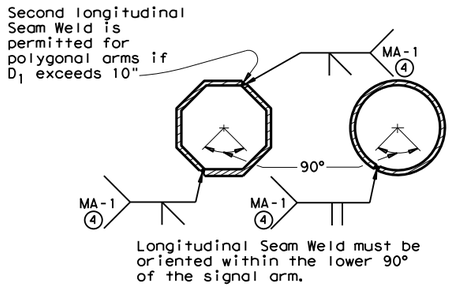
SLIP JOINT DETAIL



TENON DETAIL

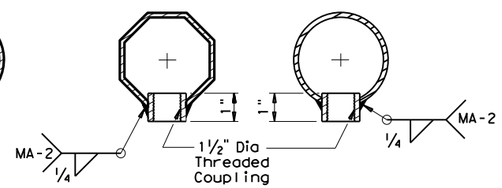
Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 ½" Dia Threaded Coupling.

BRACKET ASSEMBLY



ARM WELD DETAIL

④ 60% Min. penetration 100% pemetration within 6" of circumferential base welds.



ARM COUPLING DETAILS

VIBRATION WARNING

Mast Arms of SMA and DMA structures and clamp-on Arms of LMA structures of approximately 40 ft or longer are subject to harmonic vertical vibrations in light wind conditions due to the aeroelastic characteristics of a few of the myriads of possible combinations of the following: signal numbers, weights and positions; existence/solidity of backplates; presence of additional attachments to the arm, such as signs and cameras; arm-wind orientation; and arm-pole stiffness.

Such vibrations may cause fatigue damage to the structure and may lead to galloping in moderate wind conditions which may further damage the structure and alarm the public. Tests have indicated that when wind is blowing toward the back side of signal heads having un-vented backplates attached the probability of unacceptable harmonic vibration and/or galloping is rather high.

If backplates are not required for improved visibility they should not be applied to the signal heads or, if they must be applied, they should be vented as a first and inexpensive measure to mitigate vibrations.

The traffic signal mast arms shall be visually inspected in 5 to 20 mph wind conditions after installation of signal heads and any attachments, including any required backpates. If vertical movements with a total excursion (maximum upward excursion to maximum downward excursion) of more than approximately 8" are observed at the arm tip, a damping plate shall be fitted to the arm. See "Damping Plate Mounting Details" on standard sheet, MA-DPD-10.

This visual inspection shall be repeated after each modification of the structure that could affect its aeroelastic response. Excessive vibrations shall not be allowed to continue for more than two days.

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor.

Poles are designed to support one 8'-0" luminaire arm, one 9'-0" internally lighted street name sign and one traffic signal arm with a length as tabulated. The specified luminaire load applied at the end of the luminaire arm equals 60 lbs vertical dead load plus the horizontal wind load on an effective projected area of 1.6 sq ft. The specified internally lighted street name sign load applied 4.5 ft from the centerline of the pole equals 85 lbs vertical dead load plus horizontal wind load on an effective projected area of 11.5 sq ft. The specified signal load applied at the end of the traffic signal arm equals 180 lbs vertical dead load plus the horizontal wind load on an effective projected area of 32.4 sq ft (actual area times drag coefficient).

See Standard Sheet "MA-D" for pole details, "MA-C" for traffic signal arm connection details, "MA-C (ILSN)" for internally lighted street name sign arm connection details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details. See "MA-C" for material specifications.

Fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

Unless otherwise noted, all parts shall be galvanized in accordance with Item 445, "Galvanizing", after fabrication.

Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
SINGLE MAST ARM ASSEMBLY
(80 MPH WIND ZONE)
SMA-80(2)-12

© TxDOT August 1995

DN: MS	CK: JSY	DW: MMF	CK: JSY

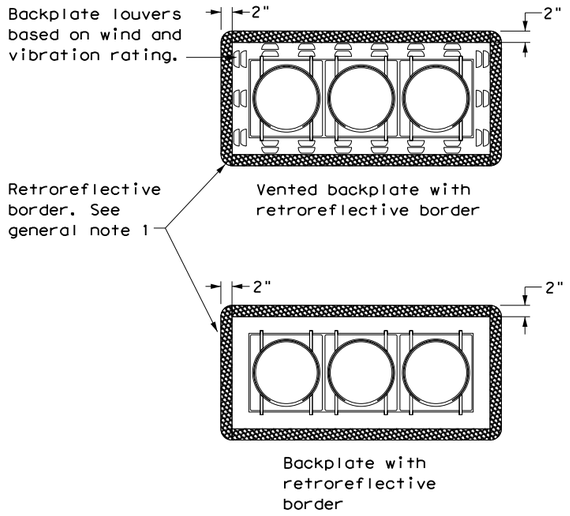
REVISIONS
5-96
1-12

CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		184

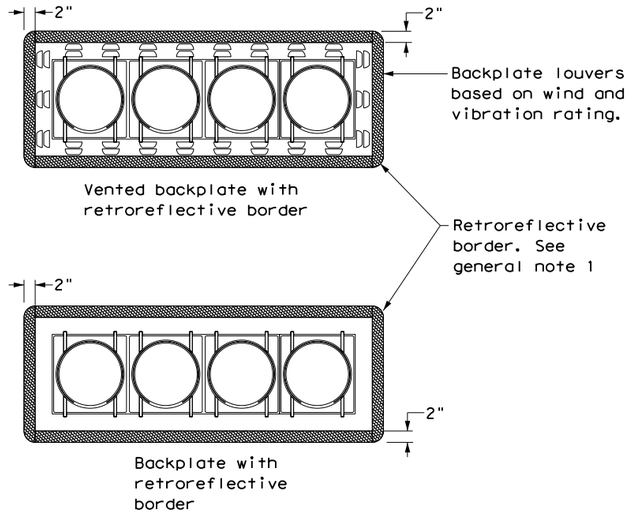
122B

DATE: 11/21/2023 3:40:08 PM
FILE: c:\pw\kh1\d0275822\SMA-80 (2)-12.dgn

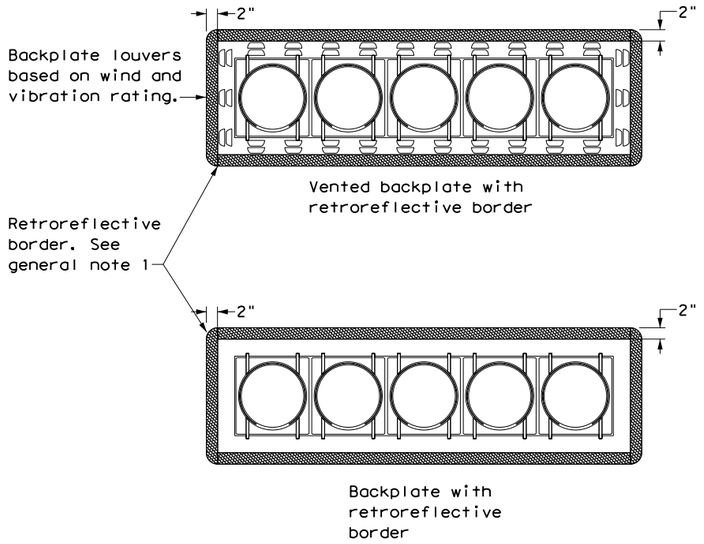
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



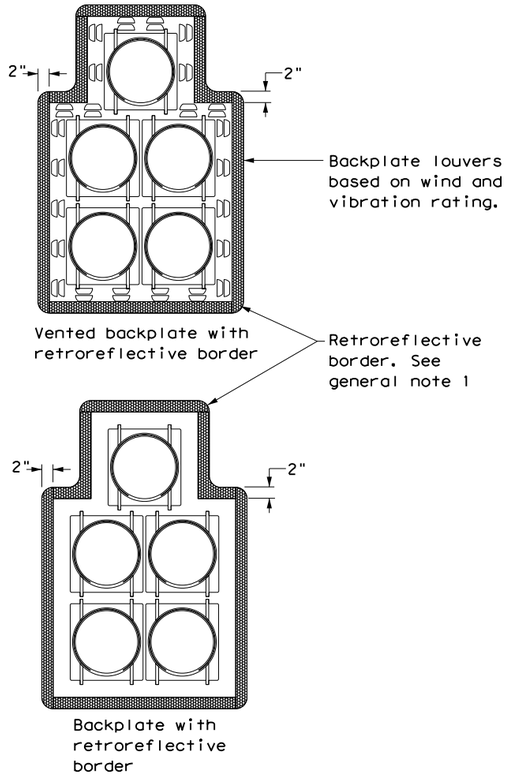
THREE-SECTION HEAD
HORIZONTAL OR VERTICAL



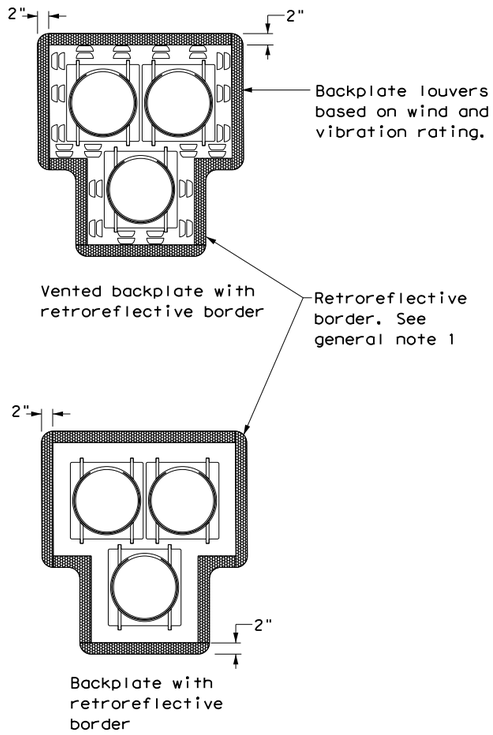
FOUR-SECTION HEAD
HORIZONTAL OR VERTICAL



FIVE-SECTION HEAD
HORIZONTAL OR VERTICAL



FIVE-SECTION HEAD
CLUSTER



PEDESTRIAN HYBRID
BEACON

GENERAL NOTES:

1. Backplates are optional for traffic signals and pedestrian hybrid beacons. When backplates are used, a 2-inch wide fluorescent yellow AASHTO Type B_{FL} or C_{FL} retroreflective border conforming to TxDOT DMS-8300 is required. Place on all approaches when used.
2. Signal head and backplate compatability must be verified by the contractor prior to installation.
3. When using backplates on signal heads, venting is preferred to reduce cyclic vibration stress.
4. When a vented backplate is used, the retroreflective border must not be placed over the louvers.
5. This standard sheet applies to all signal heads with backplates, including but not limited to:
   - Pole mounted
   - Overhead mounted
   - Span wire mounted
   - Mast arm mounted
   - Vertical signal heads
   - Horizontal signal heads
   - Clustered signal heads
   - Pedestrian hybrid beacons

Texas Department of Transportation

Traffic Safety Division Standard

TRAFFIC SIGNAL HEAD WITH BACKPLATE
TS-BP-20

FILE: ts-bp-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT June 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0073	02	082	US 281
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		185

DATE: 11/21/2023 3:40:29 PM
FILE: c:\pw\kni\d0275822\TS-BP-20.dgn

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.

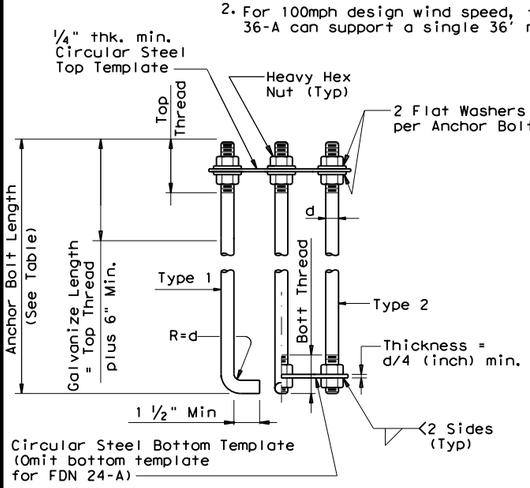
FOUNDATION DESIGN TABLE

FDN TYPE	DRILLED SHAFT DIA	REINFORCING STEEL		EMBEDDED DRILLED SHAFT LENGTH-ft (4), (5), (6)			ANCHOR BOLT DESIGN (1)				FOUNDATION DESIGN LOAD (2)		TYPICAL APPLICATION
		VERT BARS	SPIRAL & PITCH	TEXAS CONE PENETROMETER N blows/ft			ANCHOR BOLT DIA	Fy (ksi)	BOLT CIR DIA	ANCHOR TYPE	MOMENT K-ft	SHEAR Kips	
				10	15	40							
24-A	24"	4-# 5	#2 at 12"	5.7	5.3	4.5	¾"	36	12 ¾"	1	10	1	Pedestal pole, pedestal mounted controller.
30-A	30"	8-# 9	#3 at 6"	11.3	10.3	8.0	1 ½"	55	17"	2	87	3	Mast arm assembly. (see Selection Table)
36-A	36"	10#	9#3 at 6"	13.2	12.0	9.4	1 ¾"	55	19"	2	131	5	Mast arm assembly. (see Selection Table) 30' strain pole with or without luminaire.
36-B	36"	12-#	9#3 at 6"	15.2	13.6	10.4	2"	55	21"	2	190	7	Mast arm assembly. (see Selection Table) Strain pole taller than 30' & strain pole with mast arm
42-A	42"	14-#	9#3 at 6"	17.4	15.6	11.9	2 ¼"	55	23"	2	271	9	Mast arm assembly. (see Selection Table)

FOUNDATION SELECTION TABLE FOR STANDARD MAST ARM PLUS ILSN SUPPORT ASSEMBLIES (ft)

		FDN 30-A	FDN 36-A	FDN 36-B	FDN 42-A
80 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH	32'	48'		
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS	24' X 24'			
		28' X 28'			
		32' X 28'	32' X 32'		
			36' X 36'		
			40' X 36'		
			44' X 28'	44' X 36'	
100 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH		36'	44'	
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS		24' X 24'		
			28' X 28'		
			32' X 24'	32' X 32'	
				36' X 36'	
				40' X24'	40' X 36'
					44' X 36'

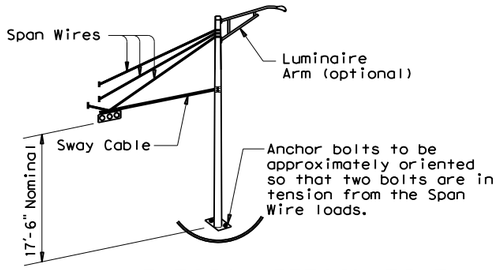
EXAMPLE:
1. For 80mph design wind speed, foundation 30-A can support up to a 32' arm with another arm up to 28'
2. For 100mph design wind speed, foundation 36-A can support a single 36' mast arm.



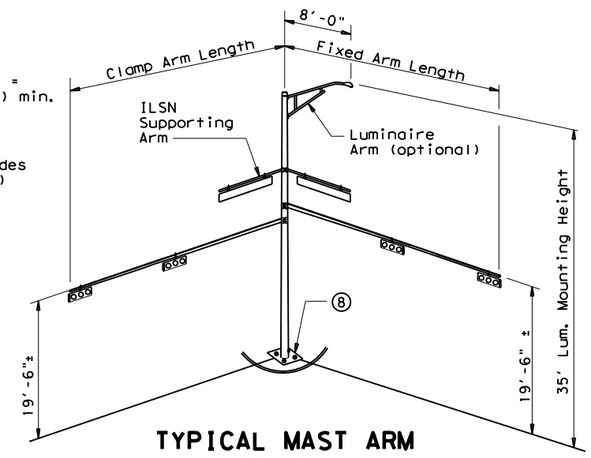
HOOKED ANCHOR (TYPE 1) NUT ANCHOR (TYPE 2)

ANCHOR BOLT ASSEMBLY

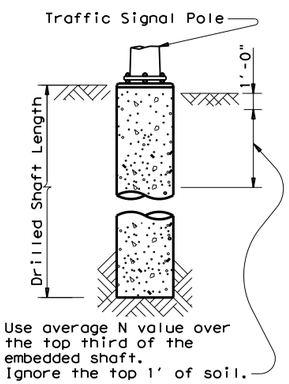
⑧ Orient anchor bolts orthogonal with the fixed arm direction to ensure that two bolts are in tension under dead load.



TYPICAL STRAIN POLE ASSEMBLY



TYPICAL MAST ARM ASSEMBLY



NOTES:

(1) Anchor bolt design develops the foundation capacity given under Foundation Design Loads.

(2) Foundation Design Loads are the allowable moments and shears at the base of the structure.

(3) Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.

(4) Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.

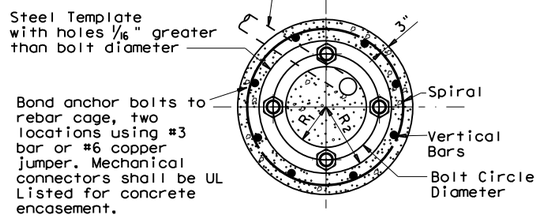
(5) If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.

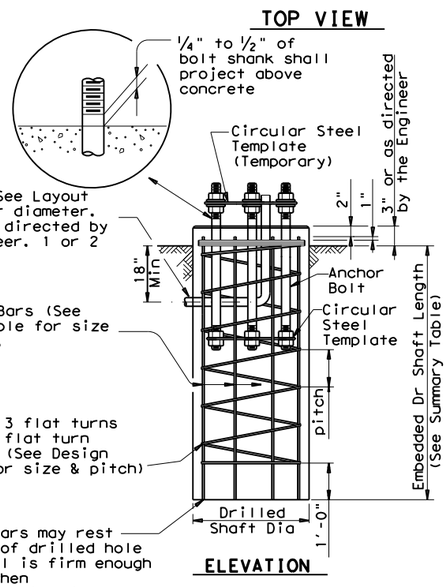
(6) Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

ANCHOR BOLT & TEMPLATE SIZES

BOLT DIA IN.	(7) BOLT LENGTH	TOP THREAD	BOTTOM THREAD	BOLT CIRCLE	R2	R1
¾"	1'-6"	3"	—	12 ¾"	7 ⅛"	5 ⅝"
1 ½"	3'-4"	6"	4"	17"	10"	7"
1 ¾"	3'-10"	7"	4 ½"	19"	11 ¼"	7 ¾"
2"	4'-3"	8"	5"	21"	12 ½"	8 ½"
2 ¼"	4'-9"	9"	5 ½"	23"	13 ¾"	9 ¼"

(7) Min dimensions given, longer bolts are acceptable.





FOUNDATION DETAILS

FOUNDATION SUMMARY TABLE (3)

LOCATION IDENTIFICATION	AVG. N BLOW /ft.	FDN TYPE	NO. EA	DRILLED SHAFT LENGTH (6) (FEET) 24-A	30-A	36-A	36-B	42-A
US 281 AT SANTA RITA ST - PROPOSED OVERHEAD FLASHERS								
POLE 1	*10*	*36-A*	*1*			*13*		
POLE 2	*10*	*36-A*	*1*			*13*		
US 281 AT SAN CASIMIRO ST - PROPOSED OVERHEAD FLASHERS								
POLE 1	*10*	*36-A*	*1*			*13*		
POLE 2	*10*	*36-A*	*1*			*13*		
US 281 AT SOCORRO ST - PROPOSED TRAFFIC SIGNALS								
POLE 2	*10*	*24-A*	*1*	*6*				
POLE 3	*10*	*24-A*	*1*	*6*				
POLE 4	*10*	*24-A*	*1*	*6*				
POLE 5	*10*	*24-A*	*1*	*6*				
POLE 6	*10*	*30-A*	*1*		*11*			
POLE 8	*10*	*24-A*	*1*	*6*				
POLE 9	*10*	*30-A*	*1*		*11*			
US 281 AT E ESTANCIA ST - PROPOSED OVERHEAD FLASHERS								
POLE 1	*10*	*36-A*	*1*			*13*		
POLE 2	*10*	*36-A*	*1*			*13*		
TOTAL DRILLED SHAFT LENGTH				*30*	*22*	*78*		

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals and interim revisions thereto.

Reinforcing steel shall conform to Item 440, "Reinforcing Steel".

Concrete shall be Class "C".

Threads for anchor bolts and nuts shall be rolled or cut threads of 8UN series up to 2" in diameter or UNC series for all sizes. Bolts and nuts shall have Class 2A and 2B fit tolerances. Galvanized nuts shall be tapped after galvanizing.

Anchor bolts that are larger than 1" in diameter shall conform to "alloy steel" or "medium-strength mild steel" per Item 449, "Anchor Bolts". Anchor bolts that are 1" in diameter or less shall conform to ASTM A36. Galvanize a minimum of the top end thread length plus 6" for all anchor bolts unless otherwise noted. Exposed washers and exposed nuts shall be galvanized. All galvanizing shall be in accordance with Item 445, "Galvanizing".

Templates and embedded nuts need not be galvanized. Lubricate and tighten anchor bolts when erecting the structure in accordance with Item 449, "Anchor Bolts".

STATE OF TEXAS
AMY ELIZABETH AVERY
98481
LICENSED PROFESSIONAL ENGINEER
12/21/2023

Amy E Avery

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL POLE FOUNDATION

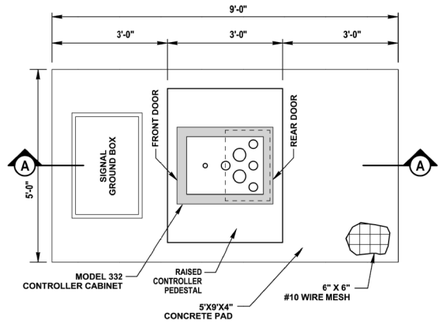
TS-FD-12

© TxDOT August 1995

REVISIONS
5-96
11-98
1-12

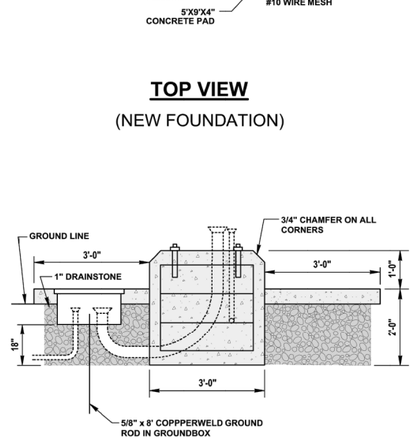
DN: MS	CK: JSY	DW: MAO/MMF	CK: JSY/TEB
CONT	SECT	JOB	HIGHWAY
0073	02	082	US 281
DIST	COUNTY		SHEET NO.
SAT	BEXAR		186

DATE: 12/21/2023 10:01:41 AM
FILE: c:\pw\kni\d0275822\TS-FD-12.dgn

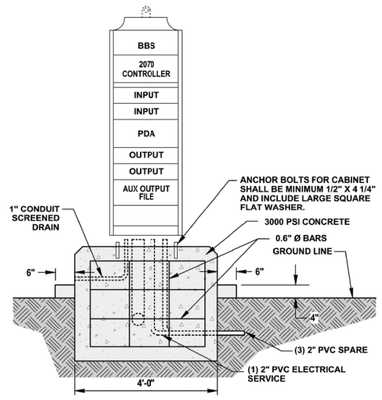


TOP VIEW

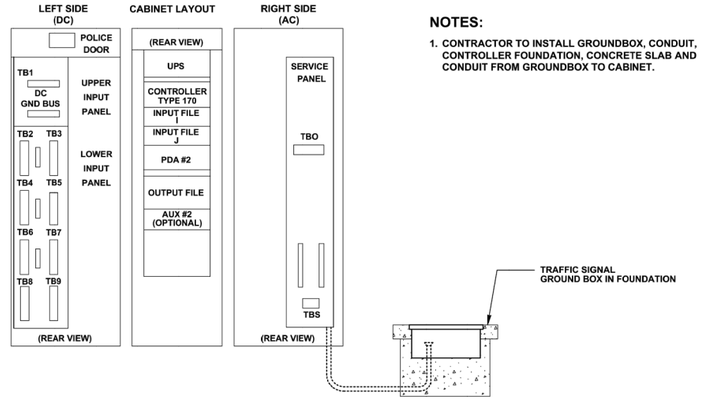
(NEW FOUNDATION)



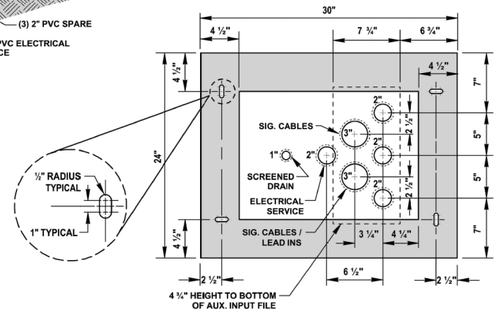
SECTION A-A



REAR VIEW



REAR VIEW SCHEMATIC



BASE PLATE TEMPLATE

NOTES:

1. CONTRACTOR TO INSTALL GROUNDBOX, CONDUIT, CONTROLLER FOUNDATION, CONCRETE SLAB AND CONDUIT FROM GROUNDBOX TO CABINET.

CITY OF SAN ANTONIO
TRANSPORTATION & CAPITAL IMPROVEMENTS
Transportation Planning Division

TRAFFIC SIGNAL STANDARD

TYPE 332 CABINET FOUNDATION

TS-CAB-17

FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
			25
STATE	DISTRICT	COUNTY	TOTAL SHTS.
TEXAS	SAT	BEXAR	
CONTROL	SECTION	JOB	HIGHWAY NO.

STATE OF TEXAS
AMY ELIZABETH AVERY
98481
LICENSED PROFESSIONAL ENGINEER
12/21/2023
Amy E Avery

Kimley»Horn
F-928

© 2023
Texas Department of Transportation

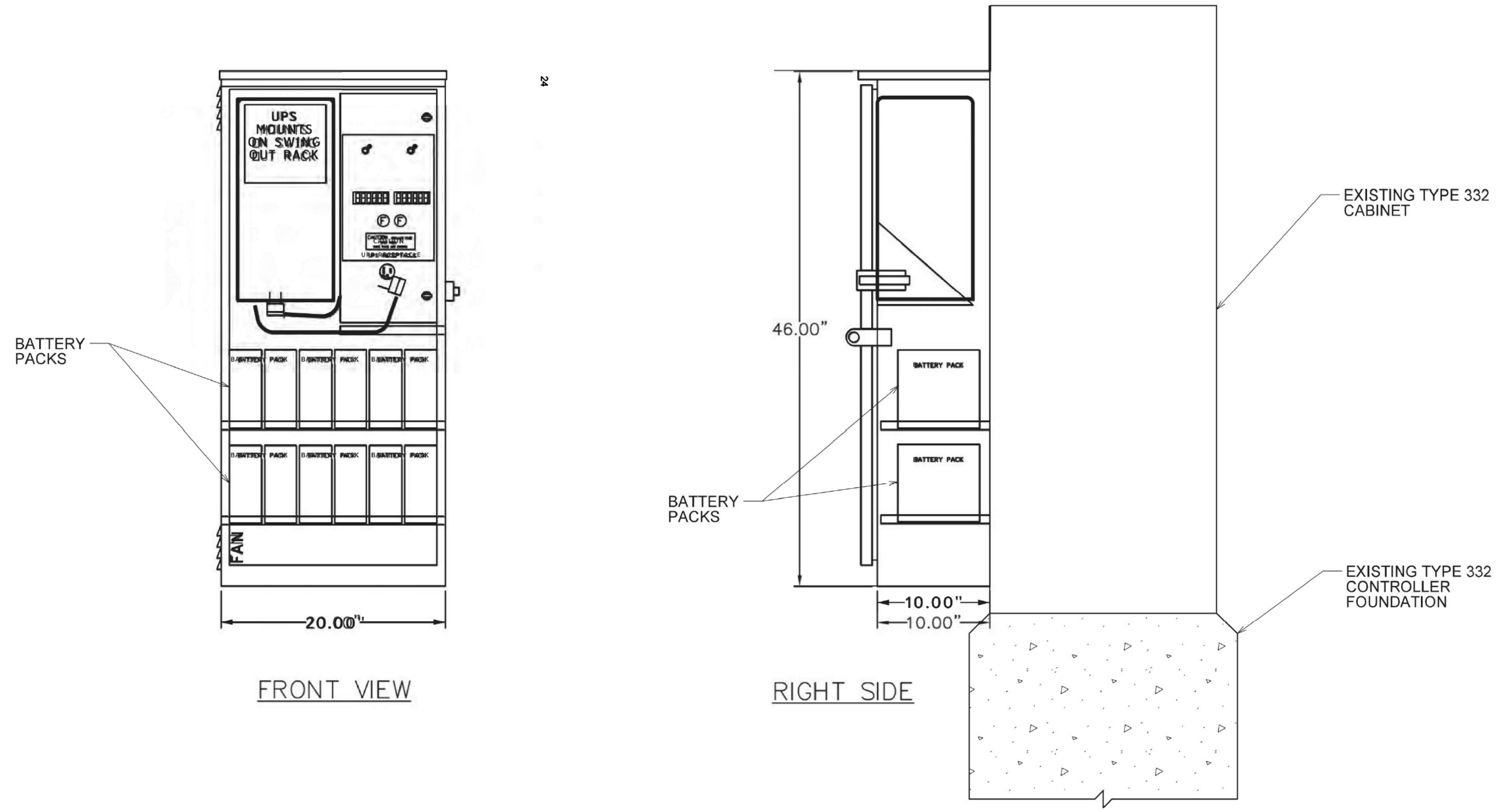
TS-CAB-17

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	US 281

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAT	BEXAR	187
CONT.	SECT.	JOB	
0073	02	082	

FILENAME: c:\pw\kh1\d0275822\TYPE 332 CABINET (City of San Antonio).dgn.dgn
PLOTTED: 12/21/2023 2:09:10 PM



NOTE: THIS DETAIL IS TO BE USED FOR RETROFIT OF EXISTING SIGNALS ONLY.

NTS

REV NO	DATE	DESCRIPTION	BY

GKW ENGINEERING
3463 MAGIC DR., SUITE 250
SAN ANTONIO, TEXAS 78229
210-582-5870 FAX 210-582-5872
WWW.GKW-INC.COM FIRM No. TX - 4532

CITY OF SAN ANTONIO
DEPARTMENT OF TRANSPORTATION & CAPITAL IMPROVEMENTS
BANDERA ROAD AT MAINLAND DRIVE IMPROVEMENTS
BATTERY BACKUP DETAIL

SHEET NO.: 1 OF 1
PROJECT NO.: | DATE: 1/27/2015
DRWN. BY: MAL | DSGN. BY: MAL | CHKD. BY: AFG | SHEET: 26
FILE NAME: Bandera-Mainland-Battery Backup.dgn

STATE OF TEXAS
AMY ELIZABETH AVERY
98481
LICENSED PROFESSIONAL ENGINEER
12/21/2023
Amy E Avery

Kimley»Horn F-928

© 2023 Texas Department of Transportation

BATTERY BACKUP DETAIL

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		US 281
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAT	BEXAR	188
CONT.	SECT.	JOB	
0073	02	082	

FILENAME: c:\pw\kh1\d0275822\Battery Backup Detail (City of San Antonio).dgn
PLOTTED: 12/21/2023 2:09:39 PM

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.

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

Texas Pollutant Discharge Elimination System (TPDES) TXR 150000: Stormwater Discharge Permit or Construction General Permit (CGP) required for projects with 1 or more acres distrubed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

☐ No Action Required ☒ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000.
2. Comply with the Storm Water Pollution Prevention Plan (SW3P) and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and Texas Commission on Environmental Quality (TCEQ), Environmental Protection Agency (EPA) or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, Contractor shall submit Notice of Intent (NOI) to TCEQ and the Engineer.
5. NOI required: ☐Yes ☒No

Note: If amount of soil disturbance changes, permit requirements may change.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

US Army Corps of Engineers (USACE) Permit required for filling, dredging, excavating or other work in any potential USACE jurisdictional water, such as, rivers, creeks, streams, or wetlands.

The Contractor shall adhere to all of the terms and conditions associated with the following permit(s):

☒ No Permit Required

☐ Nationwide Permit (NWP) 14 - Pre-construction Notice (PCN) not Required

☐ Nationwide Permit 14 - PCN Required

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices (BMPs) planned to control erosion, sedimentation and post-project total suspended solids (TSS).

1.

2.

3.

4.

401 Best Management Practices: (Not applicable if no USACE permit)

Erosion	Sedimentation	Post-Construction TSS
☐ Temporary Vegetation	☐ Silt Fence	☐ Vegetative Filter Strips
☐ Blankets/Matting	☐ Rock Berm	☐ Retention/Irrigation Systems
☐ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☐ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Mulch Filter Berm and Socks
☐ Mulch Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☐ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☐ Sedimentation Chambers
		☐ Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical. Contractor must adhere to Construction Specification Requirements Specs 162,164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

☐ No Action Required ☒ Required Action

Action No.

1. MIGRATORY BIRD NESTS: Schedule construction activities as needed to meet the following requirements:

   A. Do not remove or destroy any active migratory bird nests (nests containing eggs and/or flightless birds) at any time of year. If there are any active nests, they shall not be removed until the nests become inactive.

   B. On/in structures, if there are any active nests, they shall not be removed until all nests become inactive. After inactive nests are removed and/or before nest activity begins, deterrent materials may be applied to the structures to prevent future nest building.

2. See Item 5 in General Notes.

3.

4.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediated area, and contact the Engineer immediately.

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the follwing are detected:

* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

Hazardous Materials or Contamination Issues Specific to this Project:

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

Does the project involve the demolition of a span bridge?

☐ Yes ☒ No (No further action required)

If "Yes", a pre- demolition notification must be submitted to the Texas Department of State Health Services. The contractor shall contact TxDOT's Project Engineer 25 calendar days prior to the demolition of the bridges(s) on the project to assist with the notification.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER

1/22/2024

Texas Department of Transportation
San Antonio District Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic_2015-10-09_SAT.dgn	DN: TxDOT	CK: TxDOT	DW: BW	CK: GAG			
©TxDOT OCTOBER 2015	CONT	SECT	JOB	HIGHWAY			
REVISIONS	0073	02	082	US 281			
	DIST	COUNTY		SHEET NO.			
	SAT	BEXAR		189			

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with the TPDES Construction General Permit TXR150000 (CGP). The Texas Department of Transportation (TxDOT) ensures that project specifications include adequate best management practices (BMPs) for this project.

For all projects with any soil disturbing activities, TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office. If no field office is available, then this SWP3 shall be kept in the appropriate TxDOT Area Office.

This SWP3 is consistent with requirements specified in applicable stormwater plans and the projects environmental permits, issues, and commitments (EPICs). A copy of the CGP is included in Attachment 2.12 of the SWP3 binder.

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0073-02-082

1.2 PROJECT LIMITS:

From: E CHAVANEAUX RD

To: SAVA ST

1.3 PROJECT COORDINATES:

BEGIN: (Lat) 29°19' 15.20"N ,(Long) -98°28'39.08"W

END: (Lat) 29°18' 45.98"N ,(Long) -98°28'29.50"W

1.4 TOTAL PROJECT AREA (Acres): 8.93

1.5 TOTAL AREA TO BE DISTURBED (Acres): 2.32

1.6 NATURE OF CONSTRUCTION ACTIVITY:
BASE REPAIR, SIDEWALK, CURB RAMPS, CONCRETE MEDIANS, TRAFFIC SIGNAL, AND MID-BLOCK CROSSINGS

1.7 MAJOR SOIL TYPES:

Soil Type	Description
PREDOMINATELY SAND	46.5% FLORESVILLE 13.8% DUVAL 12.0% MIGUEL FINE SANDS

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):
PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

☐ PSLs determined during preconstruction meeting
☐ PSLs determined during construction
☐ No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:
(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.5.)

☒ Mobilization
☒ Install sediment and erosion controls
☒ Blade existing topsoil into windrows, prep ROW, clear and grub
☒ Remove existing pavement
☒ Grading operations, excavation, and embankment
☐ Excavate and prepare subgrade for proposed pavement widening
☐ Remove existing culverts, safety end treatments (SETs)
☐ Remove existing metal beam guard fence (MBGF), bridge rail
☐ Install proposed pavement per plans
☐ Install culverts, culvert extensions, SETs
☐ Install mow strip, MBGF, bridge rail
☐ Place flex base
☒ Rework slopes, grade ditches
☒ Blade windrowed material back across slopes
☒ Revegetation of unpaved areas
☒ Achieve site stabilization and remove sediment and erosion control measures
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

☒ Sediment laden stormwater from stormwater conveyance over disturbed area
☒ Fuels, oils, and lubricants from construction vehicles, equipment, and storage
☒ Solvents, paints, adhesives, etc. from various construction activities
☒ Transported soils from offsite vehicle tracking
☒ Construction debris and waste from various construction activities
☒ Contaminated water from excavation or dewatering pump-out water
☒ Sanitary waste from onsite restroom facilities
☒ Trash from various construction activities/receptacles
☐ Long-term stockpiles of material and waste
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.11 RECEIVING WATERS:
Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
MEDINA RIVER	*MEDINA RIVER (1903); IMPAIRED FOR NITRATE & PHOSPHOROUS

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

X Development of plans and specifications
X Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
X Post Construction Site Notice
X Submit NOI/CSN to local MS4
X Perform SWP3 inspections
X Maintain SWP3 records and update to reflect daily operations
X Complete and submit Notice of Termination to TCEQ
X Maintain SWP3 records for 3 years
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

X Day To Day Operational Control
X Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
X Post Construction Site Notice
X Submit NOI/CSN to local MS4
X Maintain schedule of major construction activities
X Install, maintain and modify BMPs
X Complete and submit Notice of Termination to TCEQ
X Maintain SWP3 records for 3 years
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:

MS4 Entity

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER

1/05/2024

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

© 2022

Sheet 1 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		190
STATE	STATE DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
0073	02	082	US 281

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- ☒ ☐ Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- ☒ ☐ Soil Retention Blankets
- ☐ ☐ Geotextiles
- ☐ ☒ Mulching/ Hydromulching
- ☐ ☐ Soil Surface Treatments
- ☒ ☐ Temporary Seeding
- ☐ ☒ Permanent Planting, Sodding or Seeding
- ☐ ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Vertical Tracking
- ☐ ☐ Interceptor Swale
- ☐ ☐ Riprap
- ☐ ☐ Diversion Dike
- ☐ ☐ Temporary Pipe Slope Drain
- ☐ ☐ Embankment for Erosion Control
- ☐ ☐ Paved Flumes
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- ☐ ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Dewatering Controls
- ☒ ☐ Inlet Protection
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- ☒ ☐ Sediment Control Fence
- ☒ ☐ Stabilized Construction Exit
- ☐ ☐ Floating Turbidity Barrier
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Vegetated Filter Strips
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

T / P

- ☐ ☐ Sediment Trap
  - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
  - ☐ 3,600 cubic feet of storage per acre drained
- ☐ ☐ Sedimentation Basin
  - ☐ Not required (<10 acres disturbed)
  - ☐ Required (>10 acres) and implemented.
    - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
    - ☐ 3,600 cubic feet of storage per acre drained
  - ☐ Required (>10 acres), but not feasible due to:
    - ☐ Available area/Site geometry
    - ☐ Site slope/Drainage patterns
    - ☐ Site soils/Geotechnical factors
    - ☐ Public safety
    - ☐ Other: _____

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- ☒ Excess dirt/mud on road removed daily
- ☐ Haul roads dampened for dust control
- ☒ Loaded haul trucks to be covered with tarpaulin
- ☒ Stabilized construction exit
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- ☐ Chemical Management
- ☒ Concrete and Materials Waste Management
- ☒ Debris and Trash Management
- ☒ Dust Control
- ☐ Sanitary Facilities
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- ☒ Fire hydrant flushings
- ☒ Irrigation drainage
- ☒ Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- ☒ Potable water sources
- ☒ Springs
- ☒ Uncontaminated groundwater
- ☒ Water used to wash vehicles or control dust
- ☒ Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3 .

2.9 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

STATE OF TEXAS
TYLER BARROWS
147138
LICENSED
PROFESSIONAL ENGINEER

1/05/2024

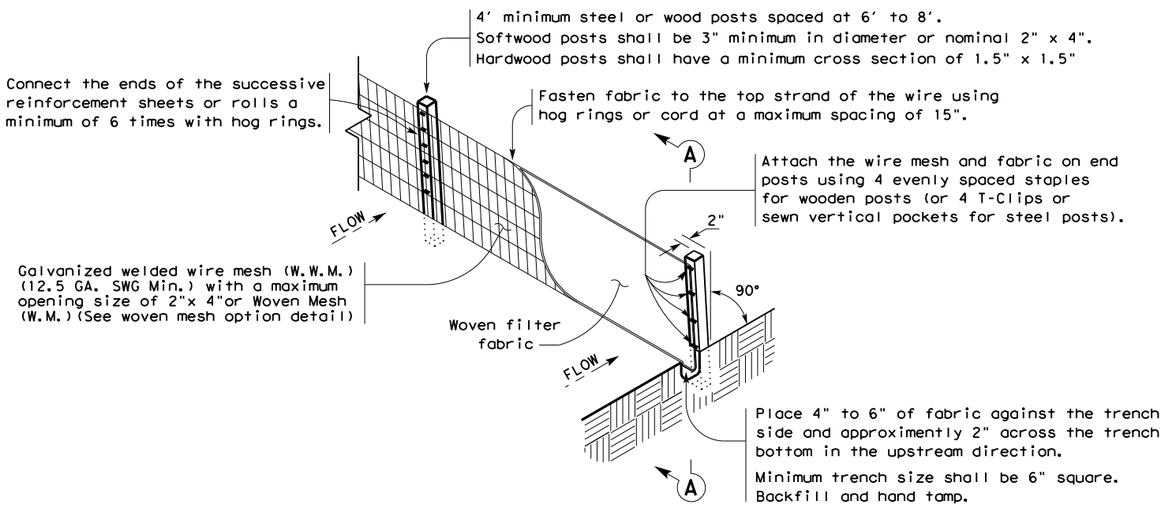
STORMWATER POLLUTION PREVENTION PLAN (SWP3)

© 2022

Texas Department of Transportation

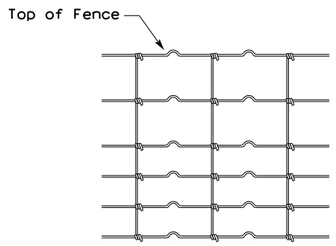
FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		191
STATE	STATE DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
0073	02	082	US 281

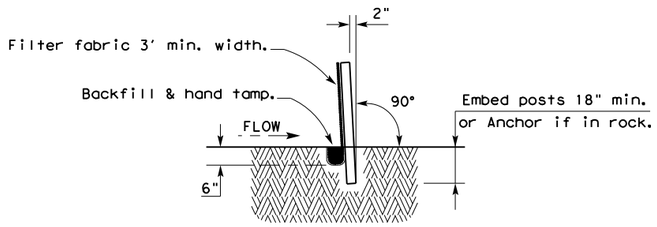
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

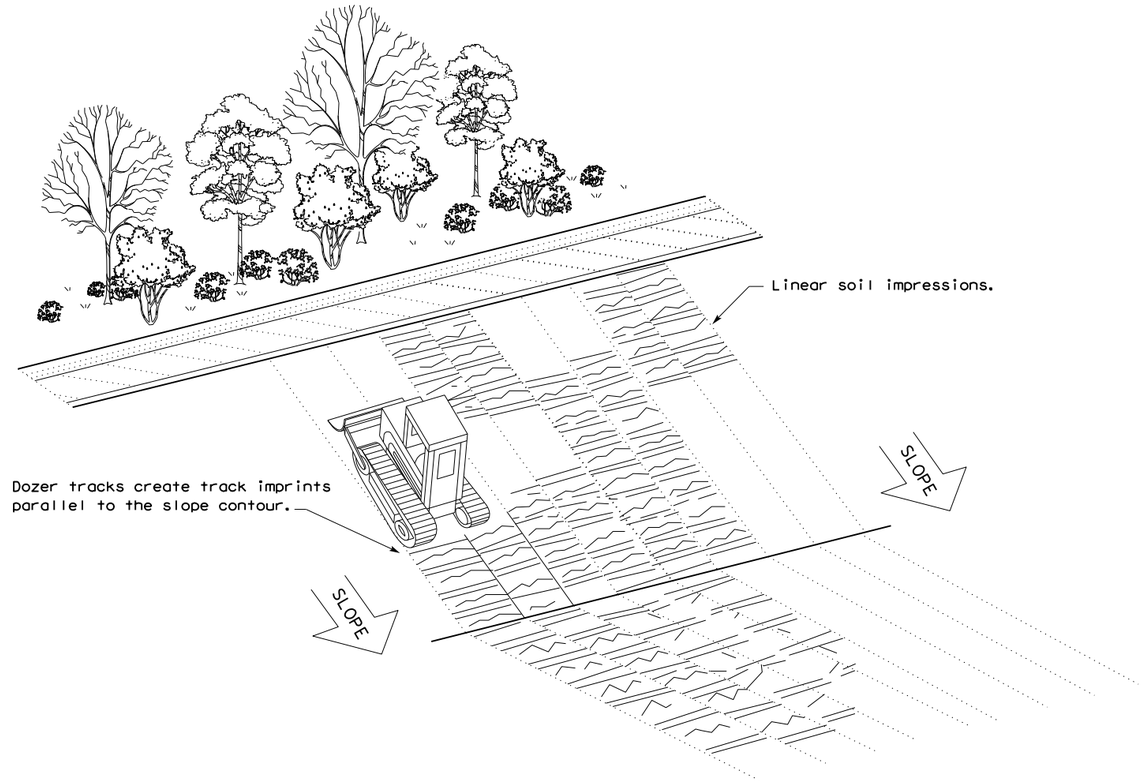
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

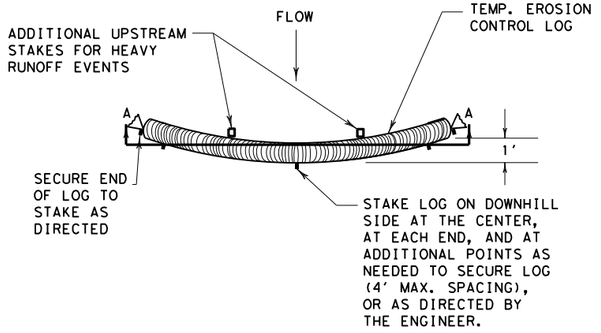
FENCE & VERTICAL TRACKING

EC(1)-16

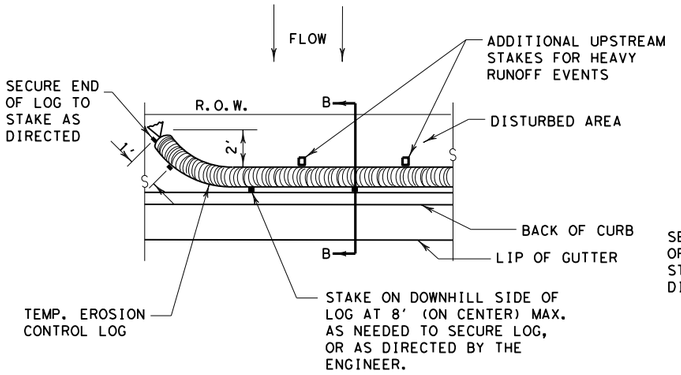
FILE: ec116	DN: TxDOT		CK: KM		DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0073	02	082		US 281	
	DIST		COUNTY			SHEET NO.
	SAT		BEXAR			192

DATE: 11/21/2023
FILE: c:\pw\vm1\d027791\Tvec116.dgn

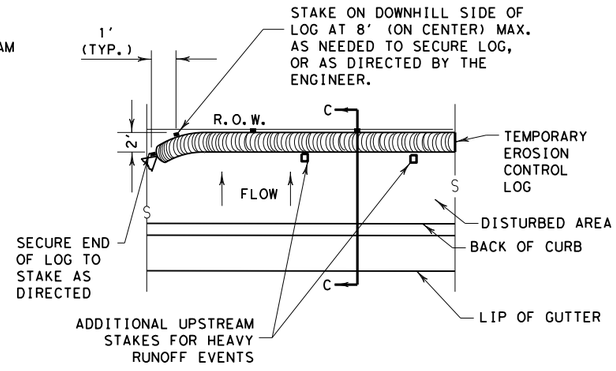
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



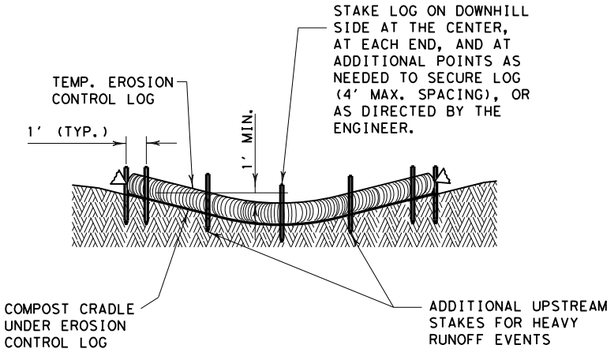
PLAN VIEW



PLAN VIEW



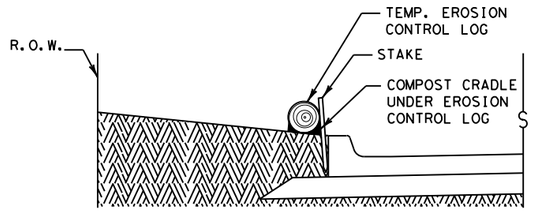
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

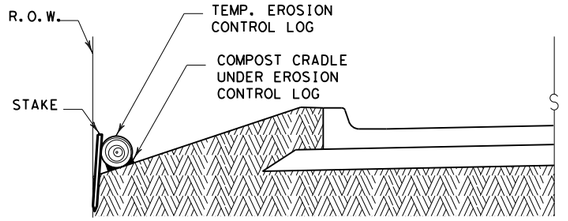
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

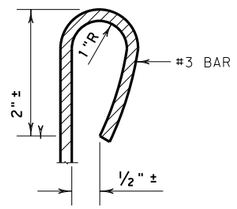
CL-ROW

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.

LEGEND

- CL-D — EROSION CONTROL LOG DAM
- CL-BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW — EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI — EROSION CONTROL LOG AT DROP INLET
- CL-CI — EROSION CONTROL LOG AT CURB INLET
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET



REBAR STAKE DETAIL

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

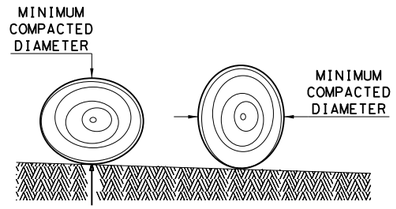
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

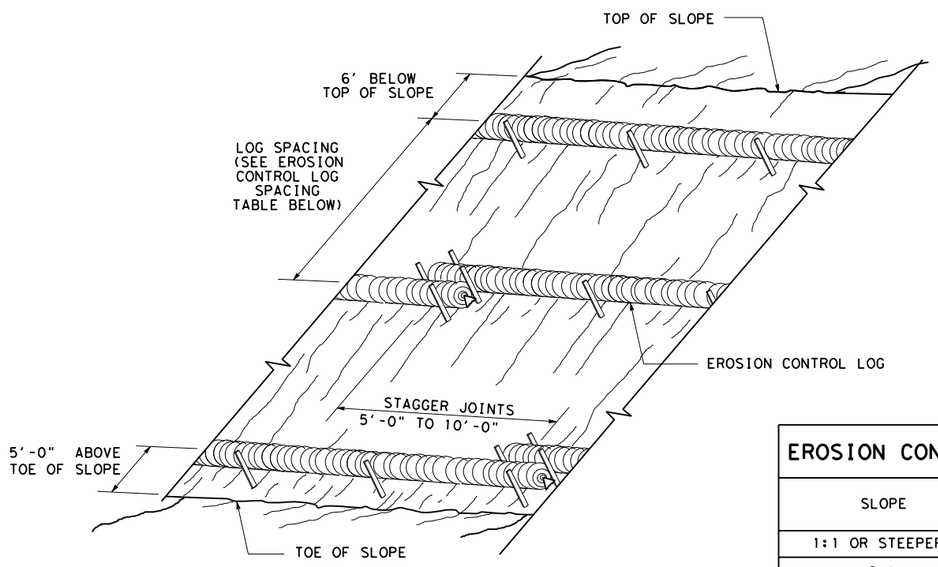
EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT		CK: KM		DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0073	02	082		US 281		
	DIST	COUNTY					SHEET NO.
	SAT	BEXAR					193

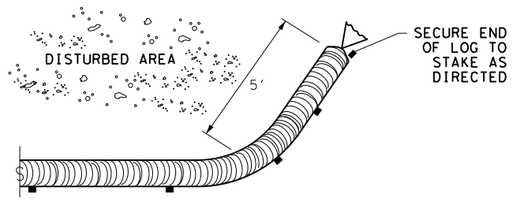
DATE: 11/21/2023
FILE: c:\pw\MH1\d0277917\ec916.dgn

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.



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

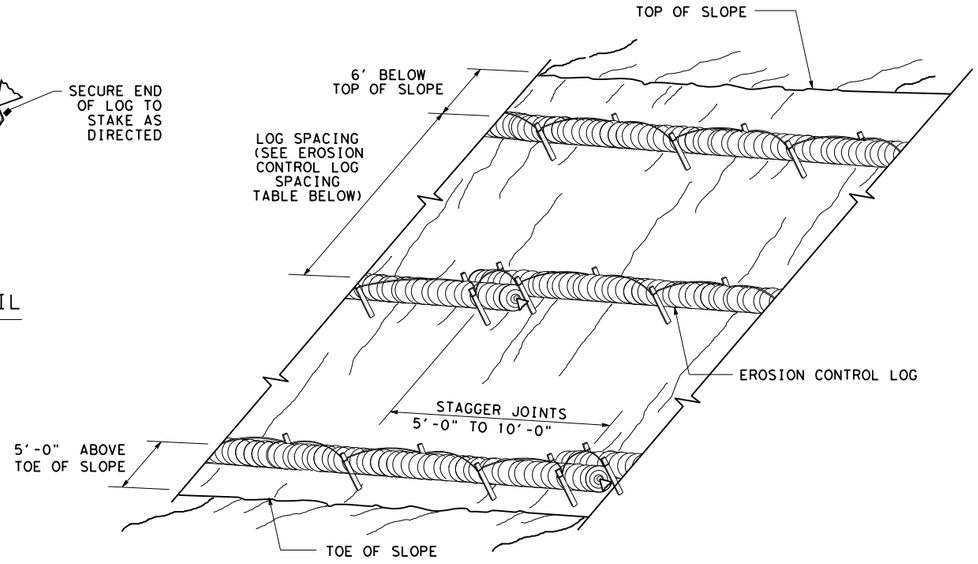
CL-SST



END SECTION RAP DETAIL

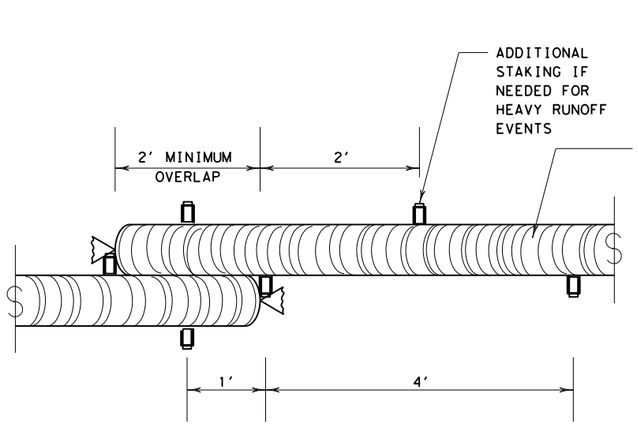
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

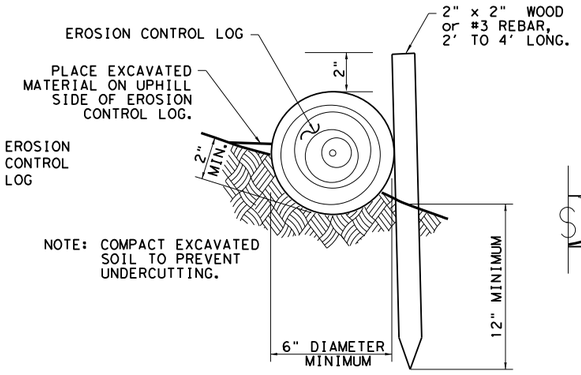
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

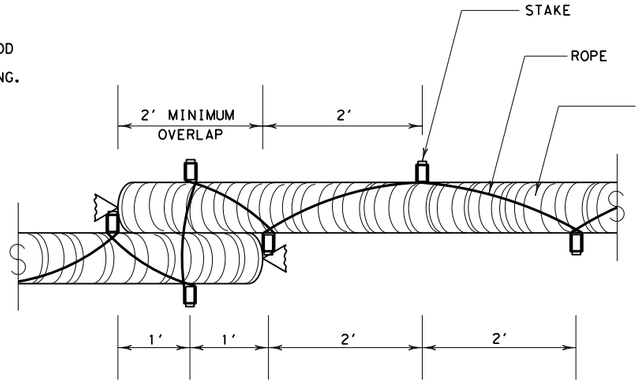


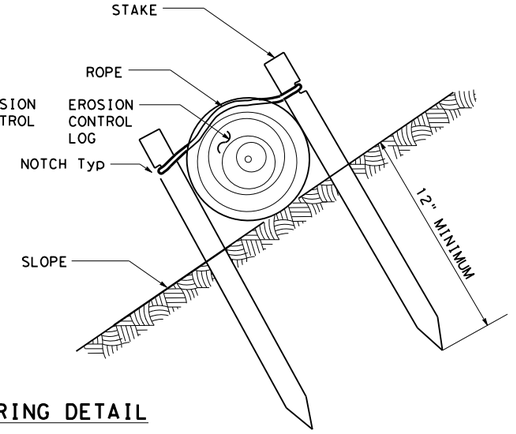


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

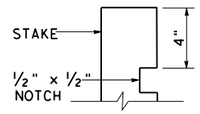
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

Texas Department of Transportation

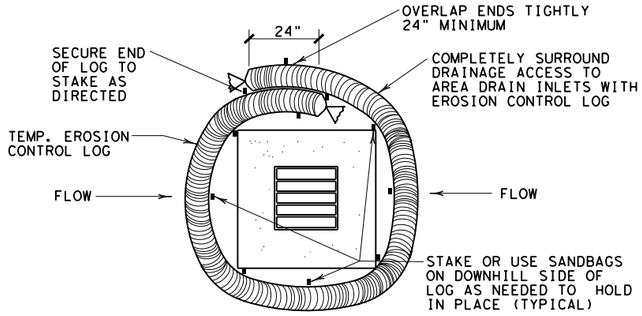
Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16

FILE: ec116	DN: TxDOT		CK: KM		DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0073	02	082		US 281	
	DIST	COUNTY			SHEET NO.	
	SAT	BEXAR			194	

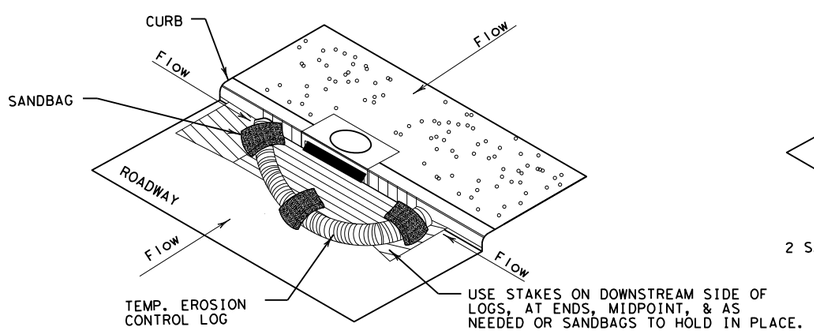
DATE: 11/21/2023
FILE: c:\tpw\kh1\d0277917\ec916.dgn

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.



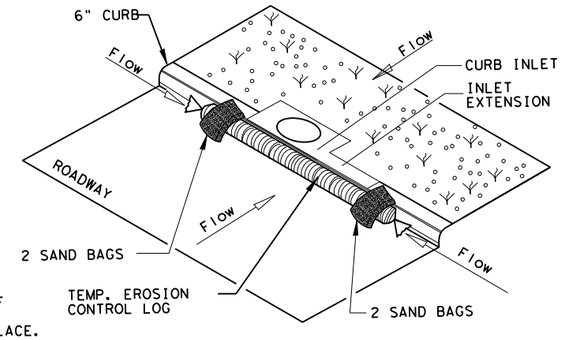
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

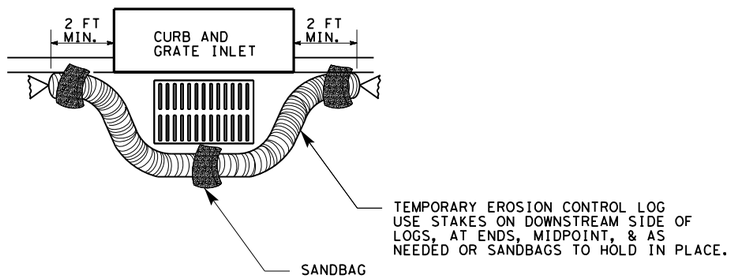
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

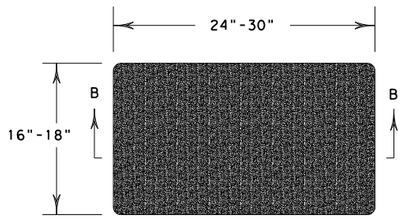
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

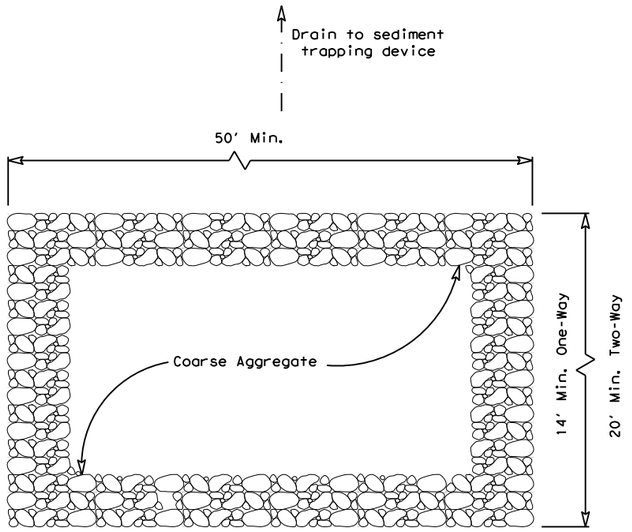
EROSION CONTROL LOG

EC(9)-16

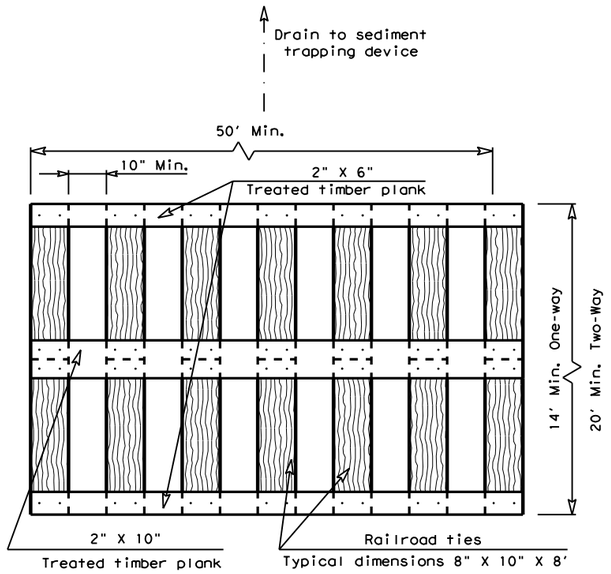
FILE: ec916	DN: TxDOT		CK: KM	DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0073	02	082		US 281	
	DIST	COUNTY			SHEET NO.	
	SAT	BEXAR			195	

DATE: 11/21/2023
FILE: c:\pw\kh1\d0273917\ec916.dgn

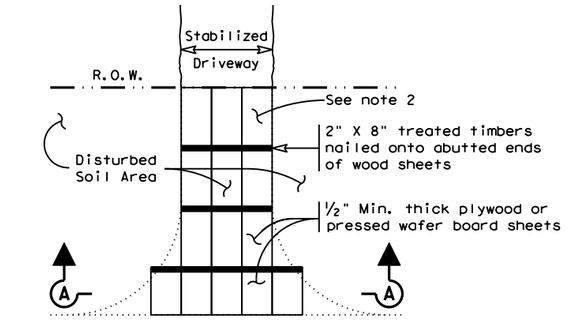
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



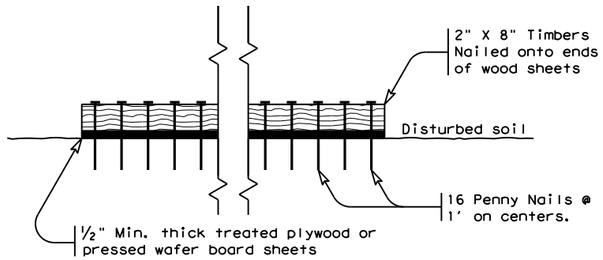
PLAN VIEW



PLAN VIEW



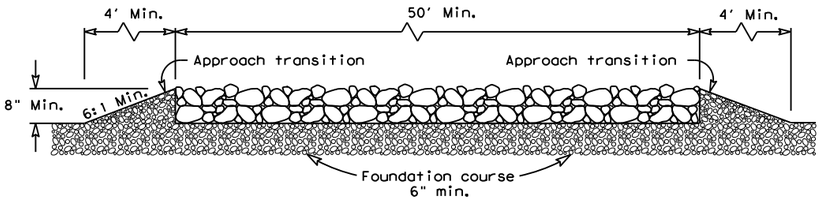
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

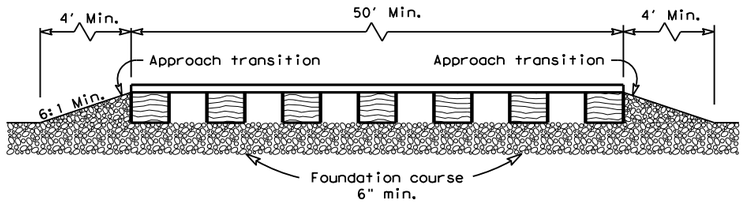
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-16

FILE: ec316	DN: TxDOT		CK: KM	DW: VP	DN/CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY
REVISIONS	0073	02	082		US 281
	DIST	COUNTY			SHEET NO.
	SAT	BEXAR			196

DATE: 11/21/2023
FILE: c:\projects\1d027791\ec316 (1).dgn