SEE SHEET 2 FOR INDEX OF SHEETS

CONT	SECT	JOB	HIGHWAY
0002	04	035, ETC.	SH 20
DIST		COUNTY	SHEET NO.
ELP		HUDSPETH	1

DESIGN SPEED = 55 MPH
A.D.T. (2021)=275
A.D.T. (2041)=385

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

CSJ: 0002-04-035, ETC.
FEDERAL AID PROJECT NO. STP 2024(607)HES

SH 20
HUDSPETH COUNTY

NET LENGTH OF ROADWAY=	26,982.55 FT. =	5.109 MI.
NET LENGTH OF BRIDGE=	431.00 FT. =	0.080 MI.
NET LENGTH OF PROJECT=	27,413.55 FT. =	5.189 MI.

LIMITS:
CSJ: 0002-04-035 FROM: SH 148 TO: .35 MI E OF FM 192
CSJ: 0002-04-038 FROM: SH 148 TO: .35 MI E OF FM 192

FOR THE CONSTRUCTION OF PAVED SHOULDERS, OVERLAY, RELOCATION AND UPGRADE OF SIGNS, MAILBOXES, PAVEMENT MARKINGS AND RAILING

FINAL PLANS

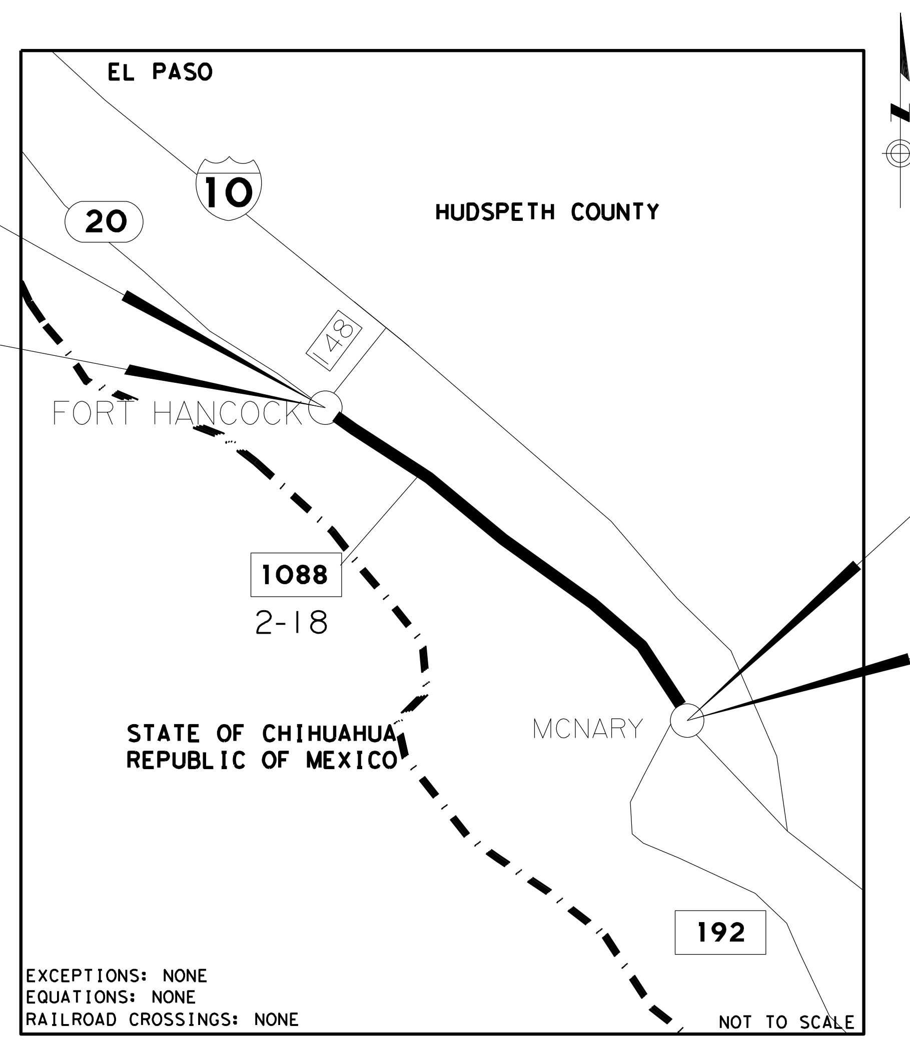
CONTRACTOR: ______
LETTING DATE: ______
TIME CHARGES BEGAN: ______
DATE CONTRACTOR BEGAN WORK: ______
DATE WORK WAS COMPLETED: ______
DATE WORK WAS ACCEPTED: ______
TOTAL DAYS CHARGED: ______
ORIGINAL CONTRACT AMOUNT: $ ______
AMOUNT OF CONTRACT AMENDMENTS: $ ______
FINAL CONTRACT COST: $ ______

______ 20 ______

______
AREA ENGINEER

BEGIN PROJECT
CCSJ: 0002-04-038
STA: 678+48.36
RM: 380+1.008
LATITUDE: 31.2898326
LONGITUDE: -105.8549839

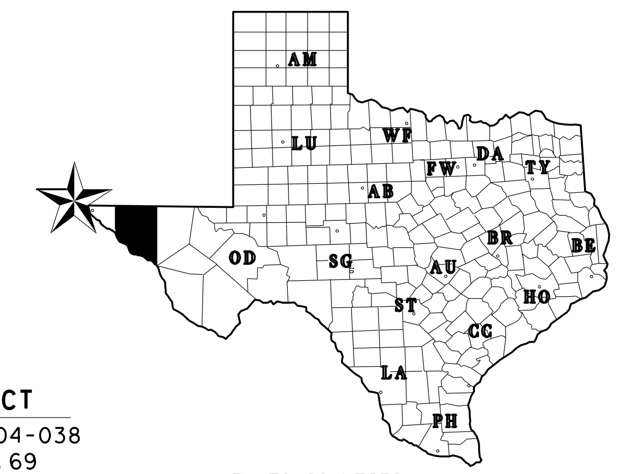
BEGIN PROJECT
CCSJ: 0002-04-035
STA: 678+48.36
RM : 380+1.008
LATITUDE: 31.2898326
LONGITUDE: -105.8549839



TDLR INSPECTION NOT REQUIRED

END PROJECT
CCSJ: 0002-04-038
STA: 936+75.69
RM: 386+0.059
LATITUDE: 31.2410397
LONGITUDE: -105.7914789

END PROJECT
CCSJ: 0002-04-035
STA: 952+46.28
RM : 386+0.059
LATITUDE: 31.2398456
LONGITUDE: -105.7905162



KEY TO COUNTIES

Texas Department of Transportation

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED PROFESSIONAL ENGINEER

[signature] Sheetal Patel, P.E.
11/01/2023

DocuSigned by: RECOMMENDED FOR LETTING:
Eduardo Perales, P.E.
11/2/2023
27...
SAFETY REVIEW COMMITTEE CHAIRMAN

DocuSigned by: RECOMMENDED FOR LETTING:
L. Raul Ortega Jr., P.E.
11/3/2023
0F175...
DISTRICT DIRECTOR OF TRANSPORTATION PLANNING AND DEVELOPMENT

DocuSigned by: APPROVED FOR LETTING:
[signature]
11/3/2023
7A68C5EA0D944...
DISTRICT ENGINEER

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, 2023)

REQUIRED SIGNS SHALL BE IN ACCORDANCE WITH BC (1)-21 THRU BC (12)-21 AND THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".

DATE: 11/1/2023 11:12:59 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Plan Set/1. General/SH20_TitleSheet_

INDEX OF SHEETS

SHEET NO.	DESCRIPTION
	GENERAL
1	TITLE SHEET
2	INDEX OF SHEETS
3-5	TYPICAL SECTIONS
6	TYPICAL SECTIONS DETAIL
7,7A-7I	GENERAL NOTES
8, 8A	ESTIMATE AND QUANTITY SHEETS
9	QUANITITY SUMMARY SHEET
10-11	ENVIRONMENTAL PERMITS ISSUES AND COMMITMENTS EPIC
	TRAFFIC CONTROL PLAN
12-13	TCP TYPICAL SECTIONS
14	TCP NARRATIVE
15	TCP BRIDGE STRUCTURES
16	TREATMENT FOR VARIOUS EDGE CONDITIONS
	TRAFFIC CONTROL PLAN STANDARDS
17-28	*BC(1)-21 THRU BC(12)-21
29-30	*TCP(2-1)-18, TCP(2-2)-18
31	*TCP(2-3)-23
32	*TCP(3-1)-13
33	*TCP(3-3)-14
34	*WZ(BRK)-13
35	*WZ(STPM)-23
36	*WZ(UL)-13
	ROADWAY
37-39	SURVEY CONTROL INDEX SHEET
40	HORIZONTAL & VERTICAL CONTROL SHEET
41	HORIZONTAL ALIGNMENT DATA
42-52	ROADWAY LAYOUT
53	PAVEMENT TRANSITION DETAIL
54	MISCELLANEOUS DETAILS
55-56	BRIDGE RAILING LAYOUT
57-58	TRANSITION RAIL DETAILS
	ROADWAY STANDARDS
59-60	*GF(31) TRTL3-20
61-62	*TYPE T221
63-64	*C-RAIL-R (MOD)
65	*SGT(10S)31-16
66	*SGT(11S)31-18
67	*SGT(12S)31-18
68	*QGELITE(M10)(N)-20
69	*REACT(M)-21
70	*SMTC(N)-16
71	*BED-14
72	*TE(HMAC)-11
73-74	*LPCB-13
	TRAFFIC
75-85	SIGNING & PAVEMENT MARKING
86-87	SUMMARY OF SMALL SIGNS
	PAVEMENT MARKINGS & DELINEATION STANDARDS
88-90	*TSR(3)-13 THRU TSR (5)-13
91	*SMD(GEN)-08
92-94	*SMD(SLIP-1)-08 THRU SMD(SLIP-3)-08
95-98	*PM(1)-22 THRU PM(3)-22 AND PM(5)-22
99-103	*D & OM(1)-20 THRU D & OM(5)-20
104	*D & OM(VIA)-20
105-106	*RS(2)-23 & RS(4)-23
107-110	*MB(1)-21 THRU MB(4)-21
	ENVIRONMENTAL ISSUES
111-112	STORM WATER POLLUTION PREVENTION PLAN (SWP3)
113-123	SWP3 LAYOUT
	ENVIRONMENTAL ISSUES STANDARDS
124	*EC(1)-16

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

*THE STANDARD SHEETS SPECIFICALLY IDENTIFIED HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AND ARE APPLICABLE TO THIS PROJECT.

Sheetal Patel, P.E. — NAME

11/01/2023 — DATE

Texas Department of Transportation

SH 20
GENERAL

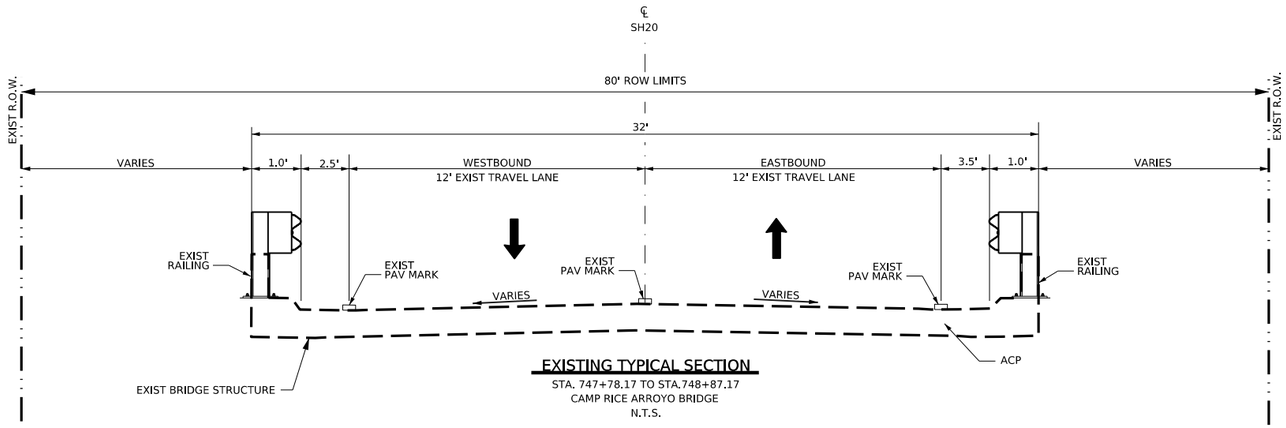
INDEX OF SHEETS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		2

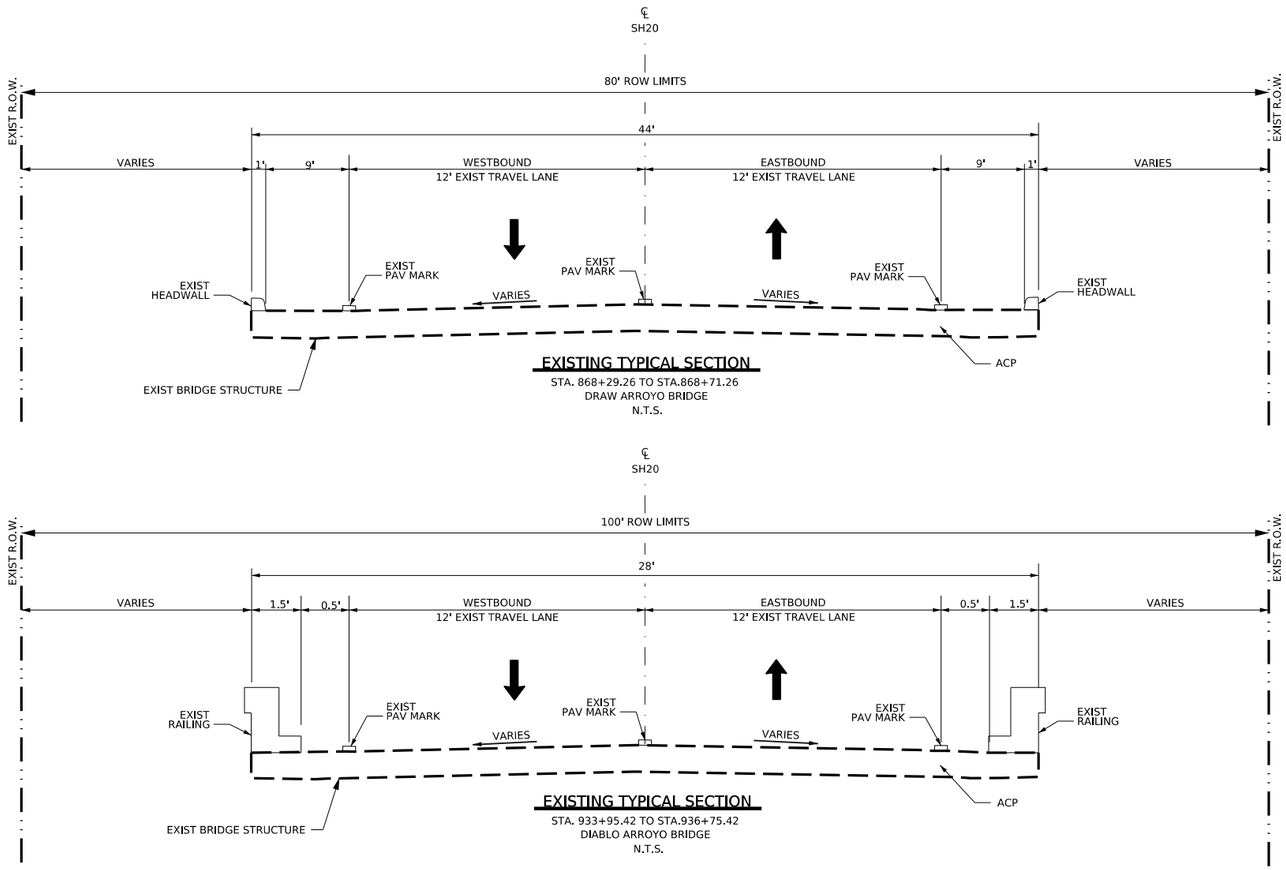
DW: CE: DW: CE:

DATE: 11/1/2023 11:13:41 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/000204035/4 - Design/Plan Set/1. General/SH20 INDEX



EXISTING TYPICAL SECTION

STA. 747+78.17 TO STA.748+87.17
CAMP RICE ARROYO BRIDGE
N.T.S.



EXISTING TYPICAL SECTION

STA. 868+29.26 TO STA.868+71.26
DRAW ARROYO BRIDGE
N.T.S.

EXISTING TYPICAL SECTION

STA. 933+95.42 TO STA.936+75.42
DIABLO ARROYO BRIDGE
N.T.S.

NOTES:

1. TYPICAL SECTIONS ARE FOR GENERAL INFORMATION ONLY AND SHALL NOT BE USED FOR QUANTITY CALCULATIONS.

LEGEND

TRAFFIC FLOW

EXIST PAVEMENT MARKING

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

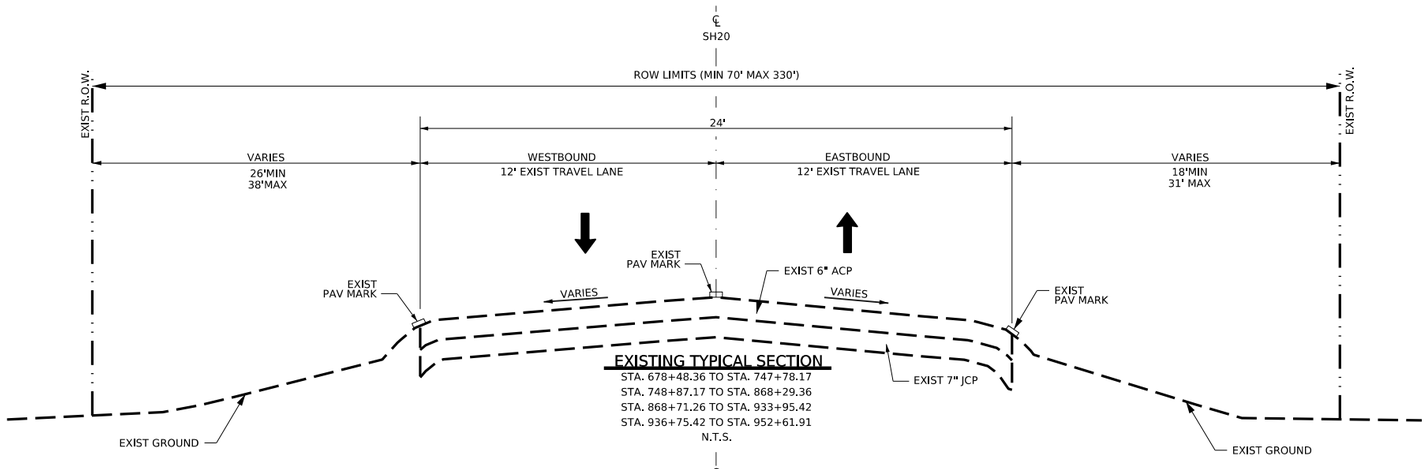
SH 20
GENERAL

TYPICAL SECTIONS

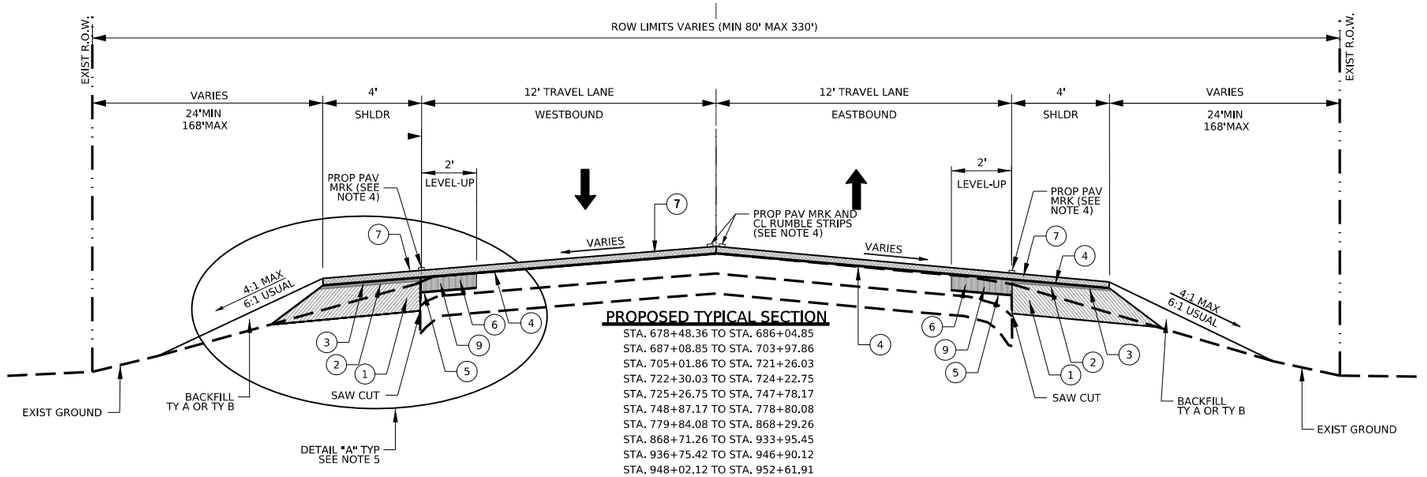
SHEET 1 OF 3

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		3

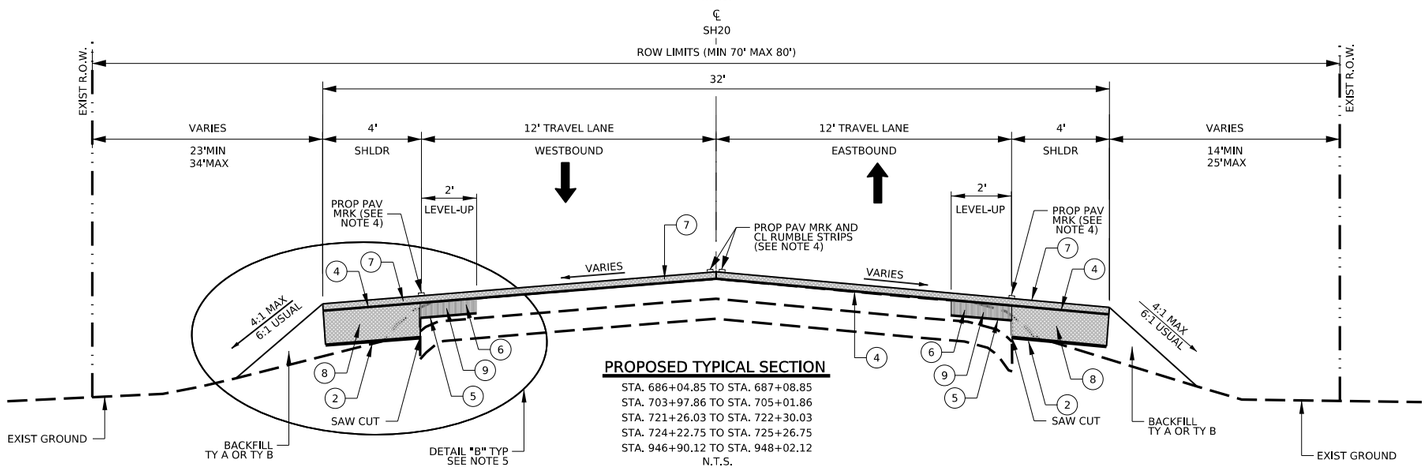
DATE: 11/1/2023 11:15:03 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040354 - Design/Plan Set/1 General/SH20_TYPICAL SECTIONS_EXISTING-PROPOSED



EXISTING TYPICAL SECTION
STA. 678+48.36 TO STA. 747+78.17
STA. 748+87.17 TO STA. 868+29.36
STA. 868+71.26 TO STA. 933+95.42
STA. 936+75.42 TO STA. 952+61.91
N.T.S.



PROPOSED TYPICAL SECTION
STA. 678+48.36 TO STA. 686+04.85
STA. 687+08.85 TO STA. 703+97.86
STA. 705+01.86 TO STA. 721+26.03
STA. 722+30.03 TO STA. 724+22.75
STA. 725+26.75 TO STA. 747+78.17
STA. 748+87.17 TO STA. 778+80.08
STA. 779+84.08 TO STA. 868+29.26
STA. 868+71.26 TO STA. 933+95.45
STA. 936+75.42 TO STA. 946+90.12
STA. 948+02.12 TO STA. 952+61.91
N.T.S.



PROPOSED TYPICAL SECTION
STA. 686+04.85 TO STA. 687+08.85
STA. 703+97.86 TO STA. 705+01.86
STA. 721+26.03 TO STA. 722+30.03
STA. 724+22.75 TO STA. 725+26.75
STA. 946+90.12 TO STA. 948+02.12
N.T.S.

NOTES:

1. TYPICAL SECTIONS ARE FOR GENERAL INFORMATION ONLY AND SHALL NOT BE USED FOR QUANTITY CALCULATIONS.
2. CONTRACTOR SHALL MATCH EXISTING ROADWAY CROSS SLOPE UNLESS OTHERWISE DIRECTED.
3. EXISTING EDGE OF PAVEMENT REQUIRES A NEAT SAW-CUT EDGE AT THE PROPOSED WIDENING. CONTRACTOR SHALL PERFORM NEAT SAW-CUTS AT EXISITNG PAVEMENT EDGES AS DIRECTED. THIS SHALL BE SUBSIDIARY TO THE VARIOUS BID ITEMS.
4. FOR PROPOSED PAVEMENT MARKINGS REFER TO SIGNING & PAVEMENT MARKINGS SHEETS.
5. REFER TO TYPICAL SECTION DETAIL SHEET FOR DETAIL INFORMATION.

LEGEND

- TRAFFIC FLOW
- PROPOSED PAVEMENT MARKINGS
- (1) 8" FLEXBASE (TY A)(GR1-2)
- (2) PRIME COAT (SS-1H)
- (3) SEAL COAT
- (4) UNDERSEAL COURSE
- (5) TACK COAT
- (6) 1.5" SP MIXES SP-D SAC-A PG70-22 (LEVEL-UP)
- (7) 1.5" SP MIXES SP-D SAC-A PG70-22
- (8) 6" SP MIXES SP-D SAC-A PG70-22
- (9) MILL 0" TO 1.5"

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

SH 20
GENERAL

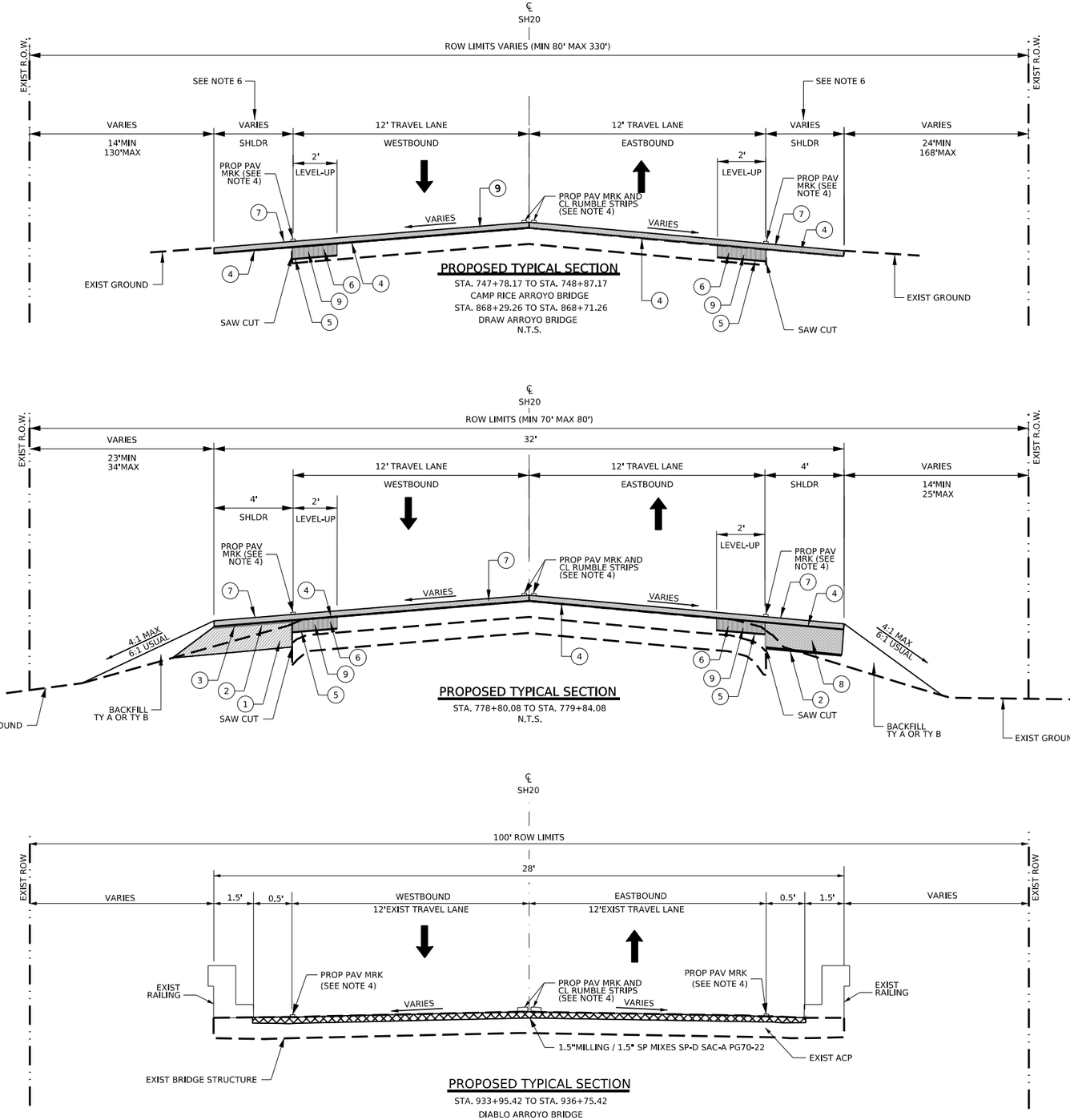
TYPICAL SECTIONS

SHEET 2 OF 3

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		4

DATE: 11/1/2023 11:15:36 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040354 - Design/Plan Set/1. General/SH20 TYPICAL SECTIONS EXISTING-PROPOSED

CK DW CK DW



NOTES:

1. TYPICAL SECTIONS ARE FOR GENERAL INFORMATION ONLY AND SHALL NOT BE USED FOR QUANTITY CALCULATIONS.
2. CONTRACTOR SHALL MATCH EXISTING ROADWAY CROSS SLOPE UNLESS OTHERWISE DIRECTED.
3. EXISTING EDGE OF PAVEMENT REQUIRES A NEAT SAW-CUT EDGE AT THE PROPOSED WIDENING. CONTRACTOR SHALL PERFORM NEAT SAW-CUTS AT EXISITNG PAVEMENT EDGES AS DIRECTED. THIS SHALL BE SUBSIDIARY TO THE VARIOUS BID ITEMS.
4. FOR PROPOSED PAVEMENT MARKINGS REFER TO SIGNING & PAVEMENT MARKINGS SHEETS.
5. REFER TO TYPICAL SECTION DETAIL SHEET FOR DETAIL INFORMATION.
6. REFER TO ROADWAY LAYOUT SHEETS AND MISCELLANEOUS DETAIL SHEETS FOR DETAIL INFORMATION.

LEGEND

- TRAFFIC FLOW
- PROPOSED PAVEMENT MARKINGS
- (1) 8" FLEXBASE (TY A)(GR1-2)
- (2) PRIME COAT (SS-1H)
- (3) SEAL COAT
- (4) UNDERSEAL COURSE
- (5) TACK COAT
- (6) 1.5" SP MIXES SP-D SAC-A PG70-22 (LEVEL-UP)
- (7) 1.5" SP MIXES SP-D SAC-A PG70-22
- (8) 6" SP MIXES SP-D SAC-A PG70-22
- (9) MILL 0" TO 1.5"

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

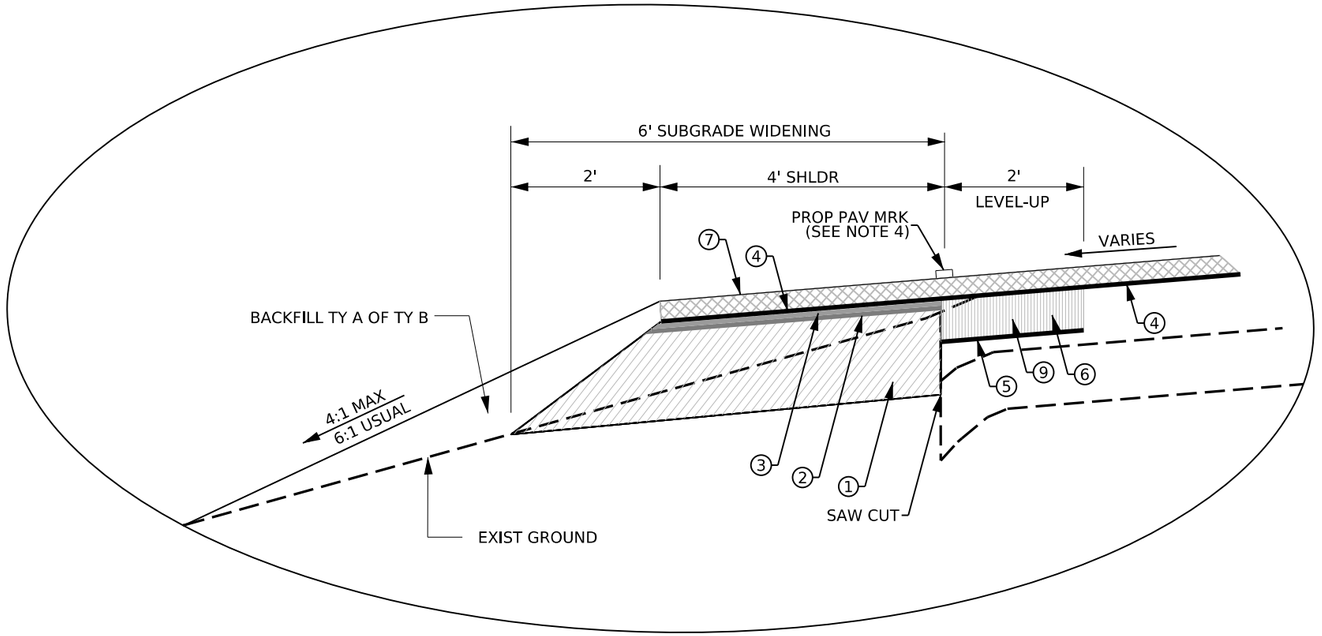
SH 20
GENERAL

TYPICAL SECTIONS

SHEET 3 OF 3

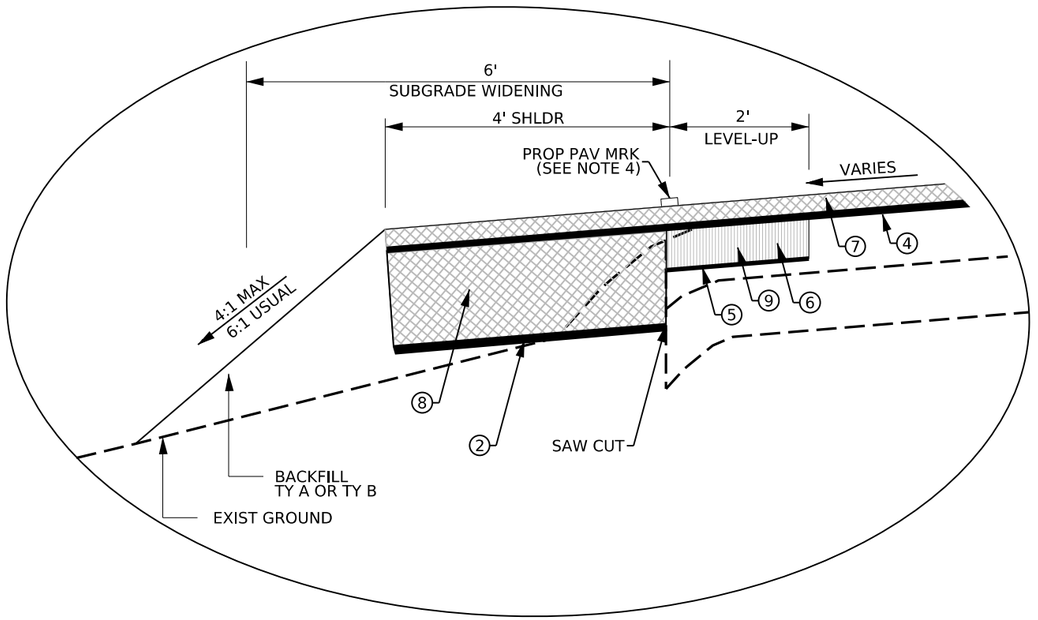
CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		5

DATE: 11/1/2023 11:15:59 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Plan Set/1. General/SH20 TYPICAL SECTIONS EXISTING-PROPOSED



DETAIL "A"

N.T.S.



DETAIL "B"

NOTES:

1. EXISTING EDGE OF PAVEMENT REQUIRES A NEAT SAW-CUT EDGE AT THE PROPOSED WIDENING. CONTRACTOR SHALL PERFORM NEAT SAW-CUTS AT EXISITNG PAVEMENT EDGES AS DIRECTED. THIS SHALL BE SUBSIDIARY TO THE VARIOUS BID ITEMS.
2. FOR PROPOSED PAVEMENT MARKINGS REFER TO SIGNING & PAVEMENT MARKINGS SHEETS.
3. REFER TO TYPICAL SECTION DETAIL SHEET AND MISCELLANEOUS DETAIL SHEET FOR DETAIL INFORMATION.

LEGEND

- TRAFFIC FLOW
- PROPOSED PAVEMENT MARKINGS
- (1) 8" FLEXBASE (TY A)(GR1-2)
- (2) PRIME COAT (SS-1H)
- (3) SEAL COAT
- (4) UNDERSEAL COURSE
- (5) TACK COAT
- (6) 1.5" SP MIXES SP-D SAC-A PG70-22 (LEVEL-UP)
- (7) 1.5" SP MIXES SP-D SAC-A PG70-22
- (8) 6" SP MIXES SP-D SAC-A PG70-22
- (9) MILL 0" TO 1.5"

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

SH 20
GENERAL

TYPICAL SECTION DETAILS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		6

DATE: 11/1/2023 11:16:21 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Plan Set/1. General/SH20_TYPICAL SECTIONS_EXISTING-PROPOSED

********** General Notes **********

2014 Specification Book

Specification Data

Tests to be in accordance with the Department's Standard Test Methods.

Table 1

Basis of Estimate

Item	Description	Rate
247	FL BS (CMP IN PLC)(TY A GR 1-2)(8")	140 lbs./cf
310	Prime Coat (SS-1H)	0.20 gal./sq.yd.
316	AGGR (TY-PB GR-4 SAC-B) ASPH (MULTI OPTION) ASPH (AC-20-5TR)(Warm Weather) ASPH (AC12-5TR)(Cool Weather)	110 SY/CY. 0.35 gal./sq. yd.
3077	SP MIXES SP-D SAC-A PG70-22	1.0 in. = 110 lbs./sq.yd. 1.5 in. = 165 lb./sq.yd. 6.0 in. = 660 lb./sq.yd.
3077	TACK COAT	0.15 gal/sq.yd.
3085	UNDERSEAL COURSE	See GN Item 3085 for Application Rates

1. **Deviation from the rates shown will require approval.**
2. **Tack Coat to be applied to each layer as directed by the Engineer. Rate shown is based on the desired residual application of 0.10 gal./sq.yd.**

General Requirements

Maintain the entire project area in a neat and orderly manner throughout the duration of the work. Remove all construction litter and undesirable vegetation within the right of way inside the project limits. This work will be subsidiary to the various bid items.

General Project Description – The project consists of bridge rail at three locations, newly constructed paved shoulders on both east and westbound directions and an overlay for the full width on SH 20 corridor in the Hudspeth County. Project limits are from SH 148 to 0.35 miles east of FM 192.

Traffic

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

CONTROL: 0002-04-035 SHEET 7

COUNTY: HUDSPETH

HIGHWAY: SH 20

replacement shall be pre-approved and inspected. This work shall be completed at the Contractor's expense.

Inform the Engineer and the respective utility companies, when it becomes apparent that the utility lines will interfere with the work in progress.

Contractor questions on this project are to be addressed to the following individual(s):

East Area Office:

Rene Romero	**Aldo Madrid, P.E.**	**Monica Ruiz, P.E.**
East El Paso Area Engineer	**Director of Construction**	**District Construction Engineer**
Rene.Romero@txdot.gov	Aldo.Madrid@txdot.gov	Monica.Ruiz@txdot.gov

Questions may 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.

Traffic

Contact the Department's El Paso District Signal Shop at txdotelplocates@txdot.gov to request all Department utility line locates within the project limits. The Signal Shop will locate one time only. Record locates for the purpose of refreshing and maintaining all markings throughout the duration of the project.

Contact City of El Paso Streets and Maintenance Department at linespots@elpasotexas.gov and pavementcut@elpasotexas.gov to request all City of El Paso utility line locates within project limits. The City will locate one time only. Record locates for refreshing and maintaining all markings throughout the duration of the project.

Item 4 – Scope of Work

Schedule and perform all work to ensure proper drainage during the course of construction or maintenance operations. All labor, tools, equipment, and supervision required, to ensure drainage, removal, and handling of water shall be considered incidental work.

Item 5 – Control of Work

The Department will furnish horizontal and vertical reference points. Contractor must verify horizontal and vertical reference points with conventional survey methods before proceeding with construction activities. Verification must be submitted for review and approval to the Department's R.P.L.S. prior to start of construction. Any discrepancies not reported will be at no additional cost to the Department.

Plan datum for this project is NAD 83 for horizontal and NAVD 88 for elevation based.

Electronic earthwork cross sections are available upon request at the Area Engineer's office.

Keep traveled surfaces used in hauling operations clear and free of dirt or other material.

Existing pavement, utilities, structures, etc. damaged as a result of construction operations will be repaired at no additional cost to the Department.

Protect from damage and destruction all areas of the right of way, which are not included in the actual limits of the proposed construction areas. Exercise care to prevent damage to trees, vegetation, irrigation system and other natural features. Protect trees, shrubs, and other landscape features from abuse, marring, or damage within the actual construction and/or fenced protection areas designated for preservation.

Restore any area disturbed or damaged to a condition "as good as" or "better than" prior to start of construction operation. This work will be at the Contractor's expense.

Item 6 – Control of Materials

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.

Item 7 – Legal Relations and Responsibilities

Comply with all requirements of the Environmental Permits Issues and Commitments (EPIC) Sheet.
Do not discharge any liquid pollutant from vehicles onto the roadside. Immediately clean spills

and dispose in compliance with local, state, and federal regulations to the satisfaction of the Engineer at no additional cost to the Department.
Occupational Safety & Health Administration (OSHA) regulations prohibit operations that bring people or equipment within 10 ft. of an energized electrical line. Where workers and/or equipment may be close to an energized electrical line, notify the electrical power company and make all necessary adjustments to ensure the safety of workers near the energized line.

No significant traffic generator events identified.

Law Enforcement Personnel

Submit charge summary and invoices using the Department forms.

Patrol vehicles must be clearly marked to correspond with the officer's agency and equipped with appropriate lights to identify them as law enforcement. For patrol vehicles not owned by a law enforcement agency, markings will be retroreflective and legible from 100 ft. from both sides and the rear of the vehicle. Lights will be high intensity and visible from all angles.

No payment will be made for law enforcement personnel needed for moving equipment or payment for drive time to/from the event site.

Item 8 – Prosecution and Progress

Working days will be calculated in accordance with Section 8.3.1., "**Standard** Workweek."

Create and maintain a bar chart schedule.

Submit baseline schedule and obtain approval prior to beginning construction. The monthly progress payment will be held if the monthly update is not submitted.

Item 9 – Measurement and Payment

Monthly progress payments will be made for items of work completed by the 27th day of each month. Any work completed after the 27th will be included for payment in the subsequent monthly progress payment.

Submit Material on Hand (MOH) payment requests at least **two (2)** working days before the end of the month for payment consideration on that month's estimate.

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” WEB-BASED (Course #133119) which can be found online at the following site: **https://www.nhi.fhwa.dot.gov/**

Certificates of completion should be available to all who finish the course. These should be kept by the officers in order 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 – Preparing Right of Way

Remove any and all remaining items not listed and paid for by other items of the contract. This item shall cover all items requiring removal with the right of way as directed by the Engineer not governed otherwise by individual removal pay items elsewhere in the plans.

Item 112 – Subgrade Widening

Scarify and compact top 6 in. of existing roadway over proposed width as shown in the plan typical sections prior to placing base material under this item. All work items required to saw cut the existing pavement, driveways, etc., as shown in the plans, or as directed, will be considered subsidiary to this Item.

To eliminate all drop-off conditions, construct tapers as shown in the plans or as directed.

Item 134 – Backfilling Pavement Edges

Backfill pavement edges immediately after the surface course has begun unless determined otherwise by the Engineer.

Backfill edges to allow no more than a 1:3 slope from pavement edge to existing ground.

Reclaimed asphalt pavement (RAP) may be used to backfill pavement edges. If insufficient RAP is available, then substitute Flexible Base of a type and grade acceptable by the Engineer to backfill pavement edges at no additional cost to the Department.

If Contractor elects to use RAP material for backfill pavement edges, the RAP material must pass a 2” sieve. All material not passing sieve will be removed and disposed of properly. This shall be considered subsidiary to Item 134.

Apply emulsified asphalt at a 50/50 solution of water to emulsion over the disturbed area with backfill material. The application rate shall achieve a final emulsion rate of 0.15 gal/SY residual asphalt.

Item 247 – Flexible Base

A 20-ton vibratory pad foot roller will be required for compaction of lifts 10 inches or greater, unless otherwise directed by the Engineer.

When requested, stake with blue tops at 100-foot intervals, the lines, and grade shown in the plans. (For Item 247.4)

Item 310 – Prime Coat

Cure prime coat for at least 48 hr. prior to beginning hot-mix asphalt placement operations, unless otherwise directed.

When multi option is allowed, provide AE-P, SS-1H, CSS-1H or other material approved by the Engineer.

Contractor to provide a test sample of prime coat to the engineer prior to production. Material must be tested and approved by the engineer prior to application.

Place seal coat or pavement course as shown on the plans within 14 calendar days of initial prime coat application. Otherwise, reapply prime coat as directed by the Engineer. Reapplication of the prime coat will be at the Contractor’s expense.

Item 316 – Seal Coat

Before applying the seal coat, protect all bridge armor and expansion joints, manhole and valve covers with paper or other suitable materials as directed by the Engineer.

Protect all existing bridges, curbs, and other exposed concrete surfaces within the limits of the project from asphalt materials by any method that is approved. Remove any excessive asphalt materials deposited on these surfaces at the Contractor’s expense. During the application of the surface treatment, if existing conditions warrant, the lane widths, transitions, and intersection areas may be varied as directed.

The Engineer will approve asphalt and aggregate rates prior to application.

Prepare the roadway surface prior to placing asphalt to the satisfaction of the Engineer. Some areas may require more extensive cleaning than other areas. This work will not be paid for directly, but will be subsidiary to pertinent items.
Do not apply asphalt cement from September 16th to April 30th unless authorized in writing.

Surface treat existing intersections, curb widenings, and widened dipped sections plus any additional areas encountered during construction to conform to the existing surface. The limits are the right-of-way line or as directed.

Use AC-10 or PG 64-22 asphalt for pre-coating aggregate. The stripping characteristics of pre-coated aggregate must not exceed 10% when tested in accordance with Tex-530-C. Add asphalt antistripping agent (Liquid) only to the asphalt pre-coating the aggregate.

Item 351 – Flexible Pavement Structure Repair

Provide six (6) inches of SP-D SAC A PG70-22 for all repairs. SP-D SAC A PG70-22 will not be measured but will be subsidiary to Item 351, “Flexible Pavement Structure Repair “Perform repairs on locations shown in plans, as per plan quantities or as directed by the Engineer.

Repair pavement edges to the line and grade of the original pavement. Sides of the repair area shall be made square by saw cutting or other approved methods. Any loose and foreign material shall be removed. Repair area to be clean and dry prior to application of prime coat. SS-1H to be applied as prime coat at 0.15 gal/sy to repaired area surfaces, unless otherwise directed. Waste material to be removed and disposed of as directed or approved.

Tack coat to be applied all surfaces that will be in contact with the subsequent HMA placement at 0.15 GAL/SY unless otherwise directed.

Use of a motor grader will not be permitted unless otherwise directed by the Engineer.

Proof rolling or other approved compacting method as directed by the Engineer shall be required in the event that Flex Base or Subgrade is exposed. Payment is subsidiary to this item.

Item 354 – Planing and Texturing Pavement

When a bridge deck is planed and textured, remove excess material. Do not broom to the sides of the bridge, under guardrail, etc. Cover or protect all sealed expansion joints, rails on bridge, and all railroad tracks encountered as approved by the engineer. Clean all these features if they weren’t properly protected. This work is subsidiary work to applicable bid items. Refer to Item 438, “Cleaning and Sealing Joints”, for procedures and methods.

Construct a taper with an asphaltic mixture at all uneven transverse joints left by planning operation. Transitions shall be at 10 feet for every 1 inch. Asphaltic material will be subsidiary to this item of work.

Item 416 – Drilled Shaft Foundations

Construct drilled shaft at all abutments as per the approved method.

Stake all foundations and locations prior to commencement of drilling operations for verification to ensure no conflicts with utility lines. Approval by Engineer will be required for all non-bridge foundations.

Cover drilled shafts with plywood and delineate with pedestrian fence, to the satisfaction of the Engineer, when no work is being performed and after working hours. This work shall be considered subsidiary to this item.

Remove spoils, daily, out of the drainage areas or as directed.

Item 420 – Concrete Substructures

Cover and protect all bridge elements. Clean all features if they weren’t properly protected. Refer to Item 438, “Cleaning and Sealing Joints,” for procedures and methods.

Item 502 – Barricades, Signs, and Traffic Handling

Prior to beginning construction, the Engineer will approve the routing of traffic and sequence of work.

Additional signs and barricades, placed as directed, will be considered subsidiary to this Item. In accordance with Section 7.2.6.1, designate, in writing, a Contractor Responsible Person (CRP)

and a CRP alternate to take full responsibility for the set-up, maintenance, and necessary corrective measures of the traffic control plan. The CRP or CRP alternate must be present at site and implement the initial set up of every traffic control phase/stage, at each location, and/or each call out, for the entire duration of the project.

At the written request of the Engineer, immediately remove the CRP or CRP alternate from the project if, in the opinion of the Engineer, is not competent, not present at initial TCP set-ups, or does not perform in a proper, skillful, or safe manner. These individuals shall not be reinstated without written consent of the Engineer.

CRP and CRP alternate must be trained using Department approved training. Provide a copy of the certificate of completion to the Engineer for project records. Refer to Table 2 for Department approved Training.

Table 2
Contractor Responsible Person and Alternate

Provider	Course Number	Course Title	Duration	Notes
American Traffic Safety Services Association	TCS	Traffic Control Supervisor	2 days	
National Highway Institute	133112 133113	Design and Operation of Work Zone Traffic Control Work Zone Traffic Control for Maintenance Operations	1 day 1 day	Both courses are required to meet minimum required training.
Texas Engineering Extension Services	133112A	Design and Operation of Work Zone Traffic Control	3 days	
University of Texas Arlington Division for Enterprise Development	WKZ421	Traffic Control Supervisor	16 hours	Contact UTA for training needs.

All contractor workers involved with the traffic control implementation and maintenance must participate and complete a Department approved training course. Provide a copy of the certificate of completion to the Engineer for project records. Refer to Table 3 for Department approved training.

Table 3
Other Work Zone Personnel

Provider	Course Number	Course Title	Duration	Notes
American Traffic Safety Services Association	TCT	Traffic Control Technician	1 day	
Texas Engineering Extension Services	HWS002	Work Zone Traffic Control	16 hours	Identical to HWS-410. Counts for 3 year CRP requirement.
National Highway Institute	133116	Maintenance of Traffic for Technicians	5 hours	Web based
National Highway Institute	134109-I	Maintenance Training Series: Basics of Work Zone Traffic Control	1 hour	Free, Web based
University of Texas at Arlington, Division for Enterprise Development	WKZ100	Work Zone Safety: Temporary Traffic Control	4 hours	Note name change. Free, Web based
TxDOT/AGC Joint Development	N/A	Safe Workers Awareness Highway Construction Work Zone Hazards	16 minutes 18 minutes	Videos available through AGC of Texas offices. English & Spanish
AGC America	N/A	Highway Work Zone Safety Training	1 day	
Texas Engineering Extension Service	HWS400	Temporary Traffic Control Worker	4 hours	Contact TEEX, if interested in course
TxDOT/AGC Joint Development	N/A	Work Zone Fundamentals	10 minutes	Videos available through ACT of Texas offices. English & Spanish

Contractor may choose to train workers involved with the traffic control implementation and maintenance with a contractor developed training in lieu of Department approved training. Contractor developed training must be equivalent to the Department approved training shown in Table 2. Provide the Engineer a copy of the course curriculum for pre-approval, prior to conducting

the contractor developed training. Provide the Engineer a copy of the log of attendees after training completion for project records.

Existing regulatory signs, route marker auxiliaries, guide signs, and warning signs that must be removed due to widening shall be relocated temporarily and erected on approved supports at locations shown in the plans, or as directed. This work will not be paid for directly, but considered subsidiary to this Item.

Notify the Department officials when major traffic changes are to be made, such as detours. Coordinate with the Department on all traffic changes. Advance notification for the following week's work must be made by 5 P.M. on Wednesdays.

If Law Enforcement Personnel is required by the Engineer, coordinate with local law enforcement as directed or agreed. Complete the weekly tracking form provided by the Department and submit invoices with 5% allowance for Law Enforcement payments by Contractor that agree with the tracking form for payment at the end of each month where approved services were provided.

Provide access to intersecting side roads and driveways at all times, unless otherwise directed.

Any approved change to the sequence of work or TCP, must be signed and sealed by a Contractor's Licensed Professional Engineer assuming full responsibility for any additional barricade signs and devices needed.

Use striping operations to channelize traffic into the newly completed roadway, as directed. Maintain shoulders and median areas in a condition capable of serving as emergency paths, as approved. This work will be subsidiary to this Item.

Use portable changeable message signs (PCMS) to alert public of construction two weeks prior to construction.

Use flaggers when directed. Provide two-way radio communication for all flaggers.

Place and maintain sufficient additional warning signs, beacons, delineators, and barricades to warn and guide the public of all hazards through the construction zone at all times, and as directed.

Use flashing arrow boards on all tapers for each lane closure.

Some signs, barricades, and channelization devices may not be shown at the precise or measured position. Place the barricades, devices, or signs, with approval, in positions to meet field conditions.

Fill any holes left by barricade or sign supports and restore the area to its original condition.

Use Type A flashing warning lights or delineators to mark open excavation, footings, foundations, or other obstructions near lanes that may be open to traffic, as directed.

For additional information pertaining to channelization, signing, spacing details, and flagging procedures required to regulate, warn, and guide traffic through project, refer to the "Barricade and Construction Standards," BC(1)-21 and to the current *Texas Manual on Uniform Traffic Control Devices(TMUTCD)*.

Remove or cover signs that do not apply to current conditions at the end of each day's work.

Repair and/or replace all signs damaged by the public or due to weather events.

Safety Contingency

The contractor Force Account "Safety Contingency" that has been established for this project is intended to be utilized for work zone enhancement, to improve the effectiveness of the TCP 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.

Item 506 – Temporary Erosion, Sedimentation, and Environmental Controls

Place Best Method Practices (BMP's) in locations as designated in the plans or as directed to meet field conditions.

Place a weatherproof bulletin board containing the Texas Commission on Environmental Quality (TCEQ) required information on the project at a site as directed. Post the following documents:

1. TCEQ "TPDES Storm Water Program" Construction Site Notice; Primary Construction Site Notices from both Contractor and Department, completed and signed.
2. TCEQ "Primary Notice of Intents," from both Contractor and Department; and
3. TCEQ "TPDES Permit."

Place rain gauge(s) at locations as designated.

The total disturbed area for this project is **5.03** acres. Establish the authorization requirements for Storm Water Discharges for soil disturbed area in this project, all project locations in the Contract, and Contractor Project Specific Locations (PSLs), within one mile of the project limits. Both the Department and the Contractor shall obtain an authorization to discharge storm water from TCEQ for the construction activities shown on the plans. Obtain required authorization from the TCEQ for any Contractor PSLs for construction support activities on or off right of way. When the total area disturbed for all projects in the Contract and PSLs within one mile of the project

limits exceeds five acres, provide a copy of the Contractor Notice of Intent (NOI) PSLs on the right of way to the Engineer (to the appropriate Municipal Separate Storm Sewer System (MS4) Operator when on an Off-system State route).

Best Method Practices (BMP's) may be adjusted to meet field conditions, or as directed. Engineer will verify all locations prior to placement of BMPs. Within the project limits, keep all inlets functional as long as possible to accept storm water as part of the Storm Water Pollution Prevention Plan (SWP3), as directed.

The sedimentation fences will be paid at the time of their initial placement. Any required replacement will be paid by Force Account.

Grading operations will be limited to the catch point of the proposed cross-section.

Preserve any vegetation outside these limits.

Item 512 – Portable Traffic Barrier

Portable Concrete Traffic Barrier (PCTB) shall be furnished by the Contractor. Contractor furnished PCTB with a Joint Connection (Type R) will not be allowed for use. The PCTB will remain property of the Department upon termination for its need. Provide necessary joint connections, as needed, or as directed, subsidiary to this item. Connections will become property of the Department.

Coordinate with the Engineer two (2) weeks in advance to schedule return of the PCTB. Upon completion of its use, disassemble, deliver, and neatly stack PCTB at the designated Department stockpile location, or as directed. The work performed will not be measured or paid for directly but will be subsidiary to pertinent bid items.

Designated Source Stockpile Location Return:

IH-10/Acala (MM 68)

Latitude/Longitude: 31.344271, -105.89158

Contractor will not be allowed to mix match between the two types of barriers unless approved by the Engineer.

Any increase in temporary barrier quantities that occur due to Contractor changes in the sequence of work, or the traffic control plan will not be paid.

Item 540 – Metal Beam Guard Fence

Provide composite block-outs for all Metal Beam Guard Fence (MBGF) posts.

Install guardrails in the direction of traffic flow.

Stake the locations for approval prior to beginning the installation of the proposed MBGF.

Remove all delineators and object markers associated with the MBGF. This work will be subsidiary to the various bid items.

Verify MBGF post lengths and heights prior to ordering materials.

Place GF2 Barrier reflectors, as per Delineator and Object Marker Standard sheet D&OM (1-5)-20 on the metal beam rail element or as directed. This work will not be paid for directly but will be considered subsidiary to pertinent items.

At the end of each work day, protect all untreated, incomplete, MBGF/Rail blunt ends exposed to traffic flow during construction until the permanent end treatment is in place. All work and incidentals are considered subsidiary to this Item.

MBGF not used will become the property of the Contractor.

Item 544 –Guardrail End Treatments

Provide certifications from the approved manufacturer's online training for all personnel installing end treatments prior to beginning work.

Item 545 –Crash Cushion Attenuators

Furnish crash cushion attenuators at the locations shown on the plans and on the Crash Cushion Summary Sheet (CCSS) for temporary work zone and permanent applications. Crash Cushion Attenuators shall meet the plan requirements and be on the Department's *Compliant Work Zone Traffic Control Devices* List.

Item 560 – Mailbox Assemblies

Relocate existing mailboxes shown on the plans and paid under this Item. All final installations require new materials in their final locations. Payment is for the each, complete, in-place new assembly. Assemblies may include multiple boxes mounted on a single pole/post. All other manipulations or costs will be subsidiary to this Item.

Item 585 – Ride Quality for Pavement Surfaces

In accordance with Tex-1001-S, operate the inertial profiler on existing pavement and deliver test results within 24 hours of testing. Provide all profile measurements in electronic data files. The Engineer will determine areas of localized roughness using the individual profile from each wheel path. Item 354-6134, "Plane Asph Conc (0" to ½" Micro)" will be used to correct the bumps identified by the Engineer. The work performed for testing, certification and recertification, and traffic control for all testing will not be paid for directly but will be subsidiary to pertinent items.

Reprofile the corrected area and provide results that show the corrective action was successful. If the corrective action is not successful, the Engineer may require continued corrective action.

Ride Quality for Final Riding Surface of Travel Lanes

Use Surface Test Type B to govern ride quality for finished riding surfaces of travel lanes. Notify the District Laboratory 48 hours prior to conducting Surface Test Type B. Properly mark all starting/ending points, and leave-out sections prior to testing. Deliver test results within 24 hours of testing. Provide all profile measurements in electronic data to ELP-LAB@txdot.gov using the format specified in Tex-1001-S.

"Payment Adjustment, Schedule 2" will be used for the travel lanes.

An IRI > 95 will require corrective action.

Use diamond grinding or equivalent to correct areas of localized roughness. For flexible pavements, use CSS-1H emulsion to fog seal the corrected areas.

Milling will not be allowed as a corrective action for excessive deviations in the surface layer of hot mix.

Item 644 – Small Roadside Sign Assemblies

Stake all sign locations and receive approval prior to sign placement.

The 2-1/2 inch, Schedule 10 post will meet the following requirements:

- 0.120 in. nominal wall thickness
- Seamless or electric-resistance welded steel tubing or pipe
- Steel will be HSLAS Grade 55 per ASTM A1011 or ASTM A1008

Other steel may be used, if it meets the following:

- 55,000 psi minimum yield strength
- 70,000 psi minimum tensile strength
- 20% minimum elongation in 2 in.
- Wall thickness (uncoated) to be within the range of 0.108 in. to 0.132 in. galvanization per ASTM A123 or ASTM A653 G90

For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metalizing with zinc wire per ASTM B833.

Verify all post lengths to ensure the proper sign height. Remove and replace any sign installed incorrectly. This work will be done at no expense to the Department.

Provide Texas Universal Triangular Slip Base Bolt clamp type for all signs as shown on SMD (Slip-1)-08.

As directed, some regulatory and guide signs will be relocated before construction begins. Mark and locate each reference marker perpendicular to the road and along the right of way, or as directed, prior to removal. Re-erect reference markers at their original location upon completion of construction.

All signs removed will remain property of the Department.

Item 658 – Delineator and Object Marker Assemblies

Verify all locations with the Engineer prior to installation.

Removal and proper disposal of all existing delineators, object markers, and any non-standard hardware assemblies are not paid directly, but will be considered subsidiary to pertinent items for payment.

Item 662 – Work Zone Pavement Markings

In those areas where existing pavement markings are to be covered or removed, field locate and record the existing pavement markings by survey or other approved method by the Engineer as directed. Place final striping on these locations.

Remove and properly dispose of tabs upon completion of the final striping. This work is considered subsidiary to various bid items.

Item 666 –Retroreflectorized Pavement Markings

Use a pilot line for final striping and remove pilot line after all striping is complete. Removal will be in accordance with the methods specified in Item 677, "Eliminating Existing Pavement Markings and Markers," and will be subsidiary to this Item.

Air blasting is required as pavement surface preparation.

In those areas where existing pavement markings are to be covered or removed, field locate and record the existing pavement markings by survey or other approved method by the Engineer as directed. Place final striping on these locations.

Item 672 – Raised Pavement Markers

Use a pilot line for final pavement markers and remove pilot line after all striping is complete. Remove pilot line in accordance with the methods specified in Item 677, “Eliminating Existing Pavement Markings and Markers,” and will be subsidiary to this Item.

Air blasting is required for pavement surface preparation.

Do not place raised pavement markers when the pavement surface temperature is below 60°F.

Completely remove all existing raised pavement markers from pavement where raised pavement markers are proposed as shown in the plans. This will include all RPMs in the surrounding area of the proposed RPM. Removal of raised pavement markers is subsidiary to various bid items

Raised pavement marking spacing must be in compliance with the requirements as shown on the plans.

Item 3077 – Superpave Mixtures

Use Surface Aggregate Classification “A” material for all surface mixes.

In place of typical tack materials shown in Table 18 under Item 300, use a tracking resistant asphalt interlayer (TRAIL) material as a tack coat. TRAIL shall only be required prior to the final riding surface layer of HMA. Approved TRAIL products are found on TxDOT’s Material Producer List under Asphalt Interlayer (Tracking Resistant) at:
https://www.txdot.gov/business/resources/materials.html

Hydrated Lime shall be added as an additive as per Item 301 “Asphalt Antistripping Agents” between the rates of 1% minimum and 2.0% maximum by weight. If the Hamburg Wheel Test cannot be met within these limits, Liquid Antistripping agents as approved by the Engineer may be used in conjunction with lime.

Supply Warm-Mix Asphalt (WMA) under this Item.

When Reclaimed Asphalt Pavement (RAP) is used in the production of hot-mix asphaltic concrete, use fractionated RAP. Do not exceed 10.0% of Fractionated RAP on surface mixtures.

Use of Recycled Asphalt Shingles (RAS) is not allowed for any mixtures.

Substitute PG Binders (grade dumping) will not be allowed for any mixtures.

Obtain the current version of the templates at http://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/forms/site-manager.html Submit electronically to the Engineer.

Design the mixture at 50 gyrations (Ndesign).

Do not cover with asphaltic material, any existing survey monuments, manholes, or valve covers, etc. Adjustments will be done in coordination with the respective utility owners.

Place a string line or other suitable marking to ensure smooth, neat lines, or as directed. Provide smooth transitions to existing driveways and intersections.

Place longitudinal joints approximately 6 in. from the stripe, or as directed by the Engineer. Avoid placing joint under the wheel path. Avoid placing longitudinal joints on the outside travel lane on multi-lane roadway.

Operate the spreading and finishing machine at a uniform forward speed consistent with the plant production rate, hauling capability, and roller train capacity to result in a continuous operation. The speed will be slow enough, so that stopping between trucks is not ordinarily required. If the Engineer determines non-uniform delivery of material is affecting the HMA placement, the

Engineer may require the paving operations to cease until acceptable methods are employed to minimize starting and stopping of the paver.

Item 3085 – Underseal Course

Prepare the roadway surface prior to placing Underseal Course to the satisfaction of the Engineer. Some areas may require more extensive cleaning than other areas. This work will not *be paid for directly but will be subsidiary to pertinent items.*

Use Spray Applied Underseal Membrane or seal coat as underseal course prior to the placement of SP MIX (SP-D SAC-A) along entire width of roadway.

The minimum application rates are listed in Table 4. The engineer may adjust the application rate taking in consideration the existing pavement surface conditions.

Table 4

Material	Minimum Application Rate	Conversion Factor
AGGR (TY-PB GR-4 SAC-B)	110 SY/CY	
SEAL COAT ASPHALT: (AC-20-5TR) (Warm Weather), (AC12-5TR) (Cool Weather)	0.25 GAL/SY	0.8 (see note 1)
OR		
Spray Applied Underseal Membrane	0.20 GAL/SY	1.0 (see note 2)

For estimating purposes, the Underseal Course is applied at a rate of 0.20 Gal/SY.

1. Aggregate is considered subsidiary to the asphalt. For estimating purposes 0.8 Gallons of Seal Coat Asphalt is equivalent to 1.0 Gallons of Underseal Course. Refer to Item 316 for more information on this option.

2. For estimating purposes 1.0 Gallon of Spray Applied Underseal Membrane is equivalent to 1.0 Gallon of Underseal Course. Refer to Special Specification SS3002 for information and specifications.

Example: If Seal Coat Option Is Selected for Use.

A conversation rate of 0.8 will be applied to every one gallon of oil that is used.

If the NET gallons determined after strapping the tank is 1,000 gallons, then the 1,000 gallons will be multiplied by the 0.8 Conversion Rate shown in the table above.

Example: 1,000-GAL x 0.8 CR = 800 gallons for payment.

Quantity based price adjustment factors are not applicable to compensate for over or under runs resulting from the method chosen.

Item 6001 – Portable Changeable Message Sign

Provide messages as directed.

Provide two Portable Changeable Message Signs (PCMS) as advanced notification for two weeks prior to beginning project and throughout duration of project as directed.

Item 6185 – Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)

All TMA Operators must participate in a TMA workshop to be conducted by the El Paso District Safety Office, on the proper use of TMAs, prior to working on Department Right of Way (ROW). A certificate of completion will be issued to TMA Operators that successfully complete the TMA workshop. The certificate of completion must be carried by TMA Operators at all times while working on Department right of way.

Acquire the TCP and TMA Operator's certificates of completion prior to the authorization to begin work. No time suspension will be granted, and no traffic control work will be allowed without certificates of completion.

Up to 2 shadow vehicles with TMA will be required for this type of work. 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 TMAs needed for the project.

The supporting vehicle for the TMA shall have a minimum gross (i.e., ballasted) vehicular weight of 19,000 pounds.

Basis of Estimate for Stationary TMAs				
		TMA(Stationary)		
Phase	Standard	Required	Additional	TOTAL
1 Step A	TCP (2-2)-18	1	0	1
1 Step B	TCP (2-2)-18	1	0	1
2 Step A	TCP (2-2)-18	1	0	1
2 Step B	TCP (2-2)-18	1	0	1

Basis of Estimate or Mobile TMAs			
	TMA(Mobile)		
Standard	Required	Additional	TOTAL
TCP (3-1)-13	2	0	2

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0002-04-035 **DISTRICT** El Paso **COUNTY** Hudspeth
HIGHWAY SH 20

			CONTROL SECTION JOB		**0002-04-035**		**0002-04-038**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00177497**		**A00190741**			
			COUNTY		**Hudspeth**		**Hudspeth**			
			HIGHWAY		**SH 20**		**SH 20**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL	EST.	FINAL		
	100-6002	PREPARING ROW		STA	274.100				274.100	
	112-6003	SUBGRADE WIDENING (DENS CONT)		SY	36,555.000				36,555.000	
	134-6004	BACKFILL (TY A OR B)		STA	275.000				275.000	
	150-6002	BLADING		HR	100.000				100.000	
	216-6001	PROOF ROLLING		HR	11.000				11.000	
	247-6230	FL BS (CMP IN PLACE)(TY A GR 1-2)(8")		SY	29,333.000				29,333.000	
	260-6002	LIME (HYDRATED LIME (SLURRY))		TON	10.000				10.000	
	260-6079	LIME TRT (SUBGRADE)(6")		SY	1,280.000				1,280.000	
	310-6014	PRIME COAT (SS-1H)		GAL	4,785.000				4,785.000	
	316-6001	ASPH (MULTI OPTION)		GAL	8,199.000				8,199.000	
	316-6224	AGGR(TY-PB GR-4 SAC-B)		CY	213.000				213.000	
	351-6002	FLEXIBLE PAVEMENT STRUCTURE REPAIR(6")		SY	178.000				178.000	
	354-6016	PLAN & TEXT CONC PAV(0" TO 1-1/2")		SY	16,533.000				16,533.000	
	354-6134	PLANE ASPH CONC PAV (0" TO 1/2" MICRO)		SY	1,500.000				1,500.000	
	416-6001	DRILL SHAFT (18 IN)		LF	48.000				48.000	
	420-6066	CL C CONC (RAIL FOUNDATION)		CY	32.800				32.800	
	450-6055	RAIL (TY T221) (MOD)		LF	68.000				68.000	
	451-6005	RETROFIT RAIL (TY T221)		LF	124.000		221.000		345.000	
	500-6001	MOBILIZATION		LS	1.000				1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING		MO	8.000				8.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)		LF	8,660.000				8,660.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)		LF	8,660.000				8,660.000	
	512-6009	PORT CTB (FUR & INST)(LOW PROF)(TY 1)		LF	680.000				680.000	
	512-6010	PORT CTB (FUR & INST)(LOW PROF)(TY 2)		LF	80.000				80.000	
	512-6033	PORT CTB (MOVE)(LOW PROF)(TY 1)		LF	680.000				680.000	
	512-6034	PORT CTB (MOVE)(LOW PROF)(TY 2)		LF	80.000				80.000	
	512-6045	PORT CTB (STKPL)(LOW PROF)(TY 1)		LF	680.000				680.000	
	512-6046	PORT CTB (STKPL)(LOW PROF)(TY 2)		LF	80.000				80.000	
	533-6004	RUMBLE STRIPS (CENTERLINE) ASPHALT		LF	27,464.000				27,464.000	
	540-6002	MTL W-BEAM GD FEN (STEEL POST)		LF	400.000		125.000		525.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)		EA	8.000		2.000		10.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE		LF	150.000		50.000		200.000	
	542-6002	REMOVE TERMINAL ANCHOR SECTION		EA	2.000		2.000		4.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)		EA	8.000		2.000		10.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)		EA	2.000		2.000		4.000	
	545-6007	CRASH CUSH ATTEN (INSTL)(L)(N)(TL3)		EA			2.000		2.000	
	560-6025	RELOCATE EXISTING MAILBOX		EA	12.000				12.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0002-04-035 **DISTRICT** El Paso **COUNTY** Hudspeth
HIGHWAY SH 20

			CONTROL SECTION JOB		**0002-04-035**		**0002-04-038**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00177497**		**A00190741**			
			COUNTY		**Hudspeth**		**Hudspeth**			
			HIGHWAY		**SH 20**		**SH 20**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL	EST.	FINAL		
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)		EA	4.000				4.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)		EA	10.000				10.000	
	644-6030	IN SM RD SN SUP&AM TYS80(1)SA(T)		EA	1.000				1.000	
	644-6067	IN SM RD SN SUP&AM (INST SIGN ONLY)		EA	2.000				2.000	
	644-6068	RELOCATE SM RD SN SUP&AM TY 10BWG		EA	43.000				43.000	
	644-6076	REMOVE SM RD SN SUP&AM		EA	18.000				18.000	
	658-6047	INSTL OM ASSM (OM-2Y)(WC)GND		EA	9.000				9.000	
	658-6060	REMOVE DELIN & OBJECT MARKER ASSMS		EA	13.000				13.000	
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2		EA	2,740.000				2,740.000	
	666-6285	REF PROF PAV MRK TY I(W)6"(SLD)(090MIL)		LF	54,315.000				54,315.000	
	666-6317	RE PM W/RET REQ TY I (Y)6"(BRK)(090MIL)		LF	6,770.000				6,770.000	
	666-6320	RE PM W/RET REQ TY I (Y)6"(SLD)(090MIL)		LF	3,360.000				3,360.000	
	672-6009	REFL PAV MRKR TY II-A-A		EA	383.000				383.000	
	677-6028	ELIM EXT PV MRK & MRKS (RUMBLE STRIP)		LF	54,828.000				54,828.000	
	3077-6052	SP MIXES SP-D SAC-A PG70-22		TON	8,189.000				8,189.000	
	3077-6054	SP MIXES SP-D SAC-A PG70-22 (LEVEL-UP)		TON	1,004.000				1,004.000	
	3077-6075	TACK COAT		GAL	1,984.000				1,984.000	
	3085-6001	UNDERSEAL COURSE		GAL	19,436.000				19,436.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN		DAY	140.000				140.000	
	6185-6002	TMA (STATIONARY)		DAY	130.000				130.000	
	6185-6005	TMA (MOBILE OPERATION)		DAY	20.000				20.000	
	18	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	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)		LS	1.000				1.000	

SUMMARY OF ROADWAY ITEMS

LOCATION	100 6002	112 6003	134 6004	150 6002	216 6001	260 6002	260 6079	247 6230	310 6014	316 6001	316 6224	351 6002	354 6016	354 6134	416 6001	420 6066	450 6055	451 6005	540 6002	540 6006	542 6001	542 6002	544 6001	544 6003	3077 6052	3077 6054	3077 6075	3085 6001
	PREPARING ROW	SUBGRADE WIDENING (DENS CONT)	BACKFILL (TY A OR B)	BLADING	PROOF ROLLING	LIME (HYDRATED LIME (SLURRY))	LIMETRT (SUBGRADE)(6")	FL BS (CMP IN PLACE)(TY A GR 1-2)(8")	PRIME COAT (SS-1H)	ASPH (MULTI OPTION)	AGGR(TY-PB GR-4 SAC-B)	FLEXIBLE PAVEMENT STRUCTURE REPAIR (6")	PLAN & TEXT CONC PAV (0" TO 1-1/2")	PLANE ASPH CONC PAV (0" TO 1/2" MICRO)	DRILL SHAFT (18 IN)	CL C CONC (RAIL FOUNDATION)	RAIL (TY T221) (MOD)	RETROFIT RAIL (TY T221)	MTL W-BEAM GD FEN (STEEL POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	REMOVE METAL BEAM GUARD FENCE	REMOVE TERMINAL ANCHOR SECTION	GUARDRAIL END TREATMENT (INSTALL)	GUARDRAIL END TREATMENT (REMOVE)	SP MIXES SP-D SAC-A PG70-22	SP MIXES SP-D SAC-A PG70-22 (LEVEL-UP)	TACK COAT	UNDERSEAL COURSE
	STA	SY	STA	HR	HR	TON	SY	SY	GAL	GAL	CY	SY	SY	SY	LF	CY	LF	LF	LF	EA	LF	EA	EA	EA	TON	TON	GAL	GAL
CSJ: 0002-04-035																												
SHEET 1	23.5	3136	24	0	1	0	0	2553	427	715	19	0	1245		0	0	0	0	0	0	0	0	0	0	735	88	188	1708
SHEET 2	26	3467	26	0	1	0	0	2542	462	712	18	0	1156		0	0	0	0	0	0	0	0	0	0	854	95	257	1849
SHEET 3	26	3467	26	0	1	0	0	2889	462	809	21	0	2447		0	0	0	0	0	0	0	0	0	0	763	95	173	1849
SHEET 4	26	3467	26	0	1	0	0	2831	462	793	21	0	1156		0	0	0	0	0	0	0	0	0	0	778	95	187	1849
SHEET 5	26	3467	26	0	1	0	0	2889	462	809	21	0	1156		0	0	0	0	0	0	0	0	0	0	763	95	173	1849
SHEET 6	26	3467	26	0	1	0	0	2889	462	809	21	0	1156	SEE NOTE 1	0	0	0	0	0	0	0	0	0	0	763	95	173	1849
SHEET 7	26	3467	26	0	1	0	0	2889	462	809	21	0	1156		0	0	0	0	0	0	0	0	0	0	763	95	173	1849
SHEET 8	26	3467	26	0	1	0	0	2889	462	809	21	0	2250		0	0	0	124	100	4	0	0	4	0	763	95	173	1849
SHEET 9	26	3467	26	0	1	0	0	2889	462	809	21	0	1156		0	0	0	0	0	0	0	0	0	0	763	95	173	1849
SHEET 10	26	3467	26	0	1	0	0	2554	404	708	18	0	2232		24	16.4	34	0	150	2	75	1	2	1	739	95	173	1791
SHEET 11	16.6	2216	17	0	1	0	0	1519	258	417	11	178	1423		24	16.4	34		150	2	75	1	2	1	505	61	141	1145
PROJECT TOTALS	274.1	36555	275	100	11.0	10.0	1280.0	29333	4785	8199	213	178	16533	1,500	48	32.80	68	124	400	8	150	2	8	2	8189	1004	1984	19436

SUMMARY OF SIGNING AND PAVEMENT MARKING ITEMS

LOCATION	533 6004	560 6025	644 6001	644 6004	644 6030	644 6067	644 6068	644 6076	658 6047	658 6060	666 6285	666 6317	666 6320	672 6009	677 6028
	RUMBLE STRIPS (CENTERLINE) ASPHALT	RELOCATE EXISTING MAIL BOX	IN SMRD SN SUP&AM TY10BWG(1)SA(P)	IN SMRD SN SUP&AM TY10BWG(1)SA(T)	IN SMRD SN SUP&AM TYS80(1)SA(T)	IN SMRD SN SUP&AM (INST SIGN ONLY)	RELOCATE SM RD SN SUP&AMTY 10BWG	REMOVE SM RD SN SUP&AM	INSTL OM ASSM (OM-2Y)(WC)GND	REMOVE DELIN & OBJECT MARKER ASSMS	REF PROF PAV MRK TY I(W)6"(SLD)(090MIL)	REPM W/RET REQ TY I (Y)6"(BRK)(090MIL)	REPM W/RET REQ TY I (Y)6"(SLD)(090MIL)	REFL PAV MRKR TY II-A-A	ELIM EXT PV MRK & MRKS (RUMBLE STRIP)
	LF	EA	EA	EA	EA	EA	EA	EA	EA	EA	LF	LF	LF	EA	LF
CSJ: 0002-04-035															
SHEET 1	2402	1	2	1	0	1	10	3	0	0	4625	600	0	30	4704
SHEET 2	2600	2	0	2	0	1	11	3	3	3	5050	650	1000	45	5200
SHEET 3	2600	3	0	1	0	0	5	2	0	4	5135	650	0	33	5200
SHEET 4	2600	3	2	2	0	0	1	5	4	4	5135	650	0	33	5200
SHEET 5	2600	0	0	0	0	0	0	0	0	0	5200	650	0	33	5200
SHEET 6	2600	0	0	0	0	0	0	0	2	2	5200	650	0	33	5200
SHEET 7	2600	0	0	0	0	0	1	0	0	0	5200	650	0	32	5200
SHEET 8	2600	0	0	0	0	0	1	0	0	0	5200	550	2060	53	5200
SHEET 9	2600	1	0	1	0	0	2	1	0	0	5200	650	300	37	5200
SHEET 10	2600	2	0	1	0	0	5	1	0	0	5200	650	0	33	5200
SHEET 11	1662	0	0	2	1	0	7	3	0	0	3170	420	0	21	3324
PROJECT TOTALS	27464	12	4	10	1	2	43	18	9	13	54315	6770	3360	383	54828

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS

LOCATION	500 6001	502 6001	506 6038	506 6039	512 6009	512 6010	512 6033	512 6034	512 6045	512 6046	662 6111	6001 6001	6185 6002	6185 6005
	MOBILIZATION	BARRICADES, SIGNS AND TRAFFIC HANDLING	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	PORT CTB (FUR & INST)(LOW PROF)(TY 1)	PORT CTB (FUR & INST)(LOW PROF)(TY 2)	PORT CTB (MOVE)(LOW PROF)(TY 1)	PORT CTB (MOVE)(LOW PROF)(TY 2)	PORT CTB (STKPL)(LOW PROF)(TY 1)	PORT CTB (STKPL)(LOW PROF)(TY 2)	WK ZN PAV MRK SHTTERM (TAB)TY Y-2	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
	LS	MO	LF	LF	LF	LF	LF	LF	LF	LF	EA	DAY	DAY	DAY
SHEET 1			666	666										
SHEET 2			432	432										
SHEET 3			1131	1131										
SHEET 4			956	956										
SHEET 5			507	507										
SHEET 6			656	656										
SHEET 7			1162	1162										
SHEET 8			954	954										
SHEET 9			702	702										
SHEET 10			1254	1254										
SHEET 11			240	240										
CSJ 0002-04-035	1	8	8660	8660	680	80	680	80	680	80	2740	140	130	20
PROJECT TOTALS	1	8	8660	8660	680	80	680	80	680	80	2740	140	130	20

SUMMARY OF BRIDGE ITEMS

LOCATION	451 6005	540 6002	540 6006	542 6001	542 6002	544 6001	544 6003	545 6007
	RETROFIT RAIL (TY T221)	MTL W-BEAM GD FEN (STEEL POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	REMOVE METAL BEAM GUARD FENCE	REMOVE TERMINAL ANCHOR SECTION	GUARDRAIL END TREATMENT (INSTALL)	GUARDRAIL END TREATMENT (REMOVE)	CRASH CUSH ATTEN (INSTL)(L)(N) (TL3)
	LF	LF	EA	LF	EA	EA	EA	EA
CSJ: 0002-04-038	221	125	2	50	2	2	2	2
PROJECT TOTALS	221	125	2	50	2	2	2	2

NOTE:

1.PLANNING TO CORRECT LOCALIZED ROUGHNESS (BUMPS) IDENTIFIED BY THE ENGINEER. QUANTITY MAY NARY AS DIRECTED BY THE ENGINEER.

Texas Department of Transportation

SH 20
GENERAL

QUANTITY SUMMARY SHEET

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		9

DATE: 11/29/2023 8:17:10 AM
FILE: pw://txdot.projectwiseonline.com:TxDOT5/Documents/24 - ELP/Design Projects/0002040354 - Design/Plan Set/1. General/SH20 SUMMARY SHEETS .dgn

CK:
DW:
CK:
DW:

DATE: 11/1/2023
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/000204035/4 - Design/Plan Set/13. Standards/ENVIRONMENTAL ISSUES STANDARDS/ENV_EPIC

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1.

2.

☐ 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 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 TCEQ, EPA or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

☒ No Permit Required

☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)

☐ 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 planned to control erosion, sedimentation and post-project TSS.

1.

2.

3.

4.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

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 Logs	☐ 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	☐ 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. Minimize the amount of vegetation cleared. Removal of native vegetation, particularly mature native trees and shrubs should be avoided. Impacted vegetation should be replaced with in-kind on-site replacement/restoration of native vegetation.
2. The use of any non-native vegetation in landscaping and revegetation is discouraged. Locally adapted native species should be used.
3. The use of seed mix that contains seeds from only regional ecotype native species is recommended.

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 Birds:

In the event that migratory birds are encountered onsite during project construction, every effort would be made to avoid protected birds, active nests, eggs, and/or young.

A. If active migratory bird nests are discovered on a project site, the contractor would immediately stop work within 50 feet of the nest(s) or bird(s) and notify the TxDOT El Paso District's Environmental Coordinator. TxDOT would determine how long the nest(s) would need to be avoided, or if a permit to remove or relocate the nest is an option.

B. Avoid disturbing, destroying, or removing active bird nest, including ground nesting birds, during the nesting season. Avoid the removal of unoccupied, inactive nest, as practicable. Prevent the establishment of active nest during the nesting seasons on TxDOT owned and Operated facilities and structures proposed for replacement or repair. Do not collect, capture, relocate, or transport birds, eggs, young, or active nest without a permit.

In addition to complying with the Migratory Bird Treaty Act (MBTA) and Chapter 64 of the Parks and Wildlife Code (PWC) regarding nongame bird protections, perform the following BMP:

A. Avoid vegetation clearing activities during the general bird nesting season, March through August, to minimize adverse impacts to birds.

B. Prior to construction, perform daytime surveys for nests including under bridges and in culverts to determine if they are active before removal. Nests that are active should not be disturbed. If active nests are observed during surveys, TPWD recommends a 150-foot buffer of vegetation remain around the nests until the young have fledged or the nest is abandoned

C. Do not disturb, destroy, or remove active nests, including ground nesting birds, during the nesting season.

D. If unoccupied, inactive nests will be removed, ensure that nests are not protected under the Endangered Species Act (ESA), MBTA, or BGEPA.

E. Prevent the establishment of active nests during the nesting season on TxDOT owned and operated facilities and structures proposed for replacement or repair.

F. Do not collect, capture, relocate, or transport birds, eggs, young, or active nests without a permit.

G. Minimize extended human presence near nesting birds during construction and maintenance activities. Protect sensitive habitat areas with temporary barriers or fencing to limit human foot-traffic and off-road vehicle use to alert and discourage contractors from causing any unintentional impacts.

H. Minimize construction noise above ambient levels during general bird nesting season to minimize adverse impacts on birds.

I. Minimize construction lighting during the general bird nesting season by scheduling work activities between dawn and dusk

2. Terrestrial Amphibian and Reptile BMP:

A. The following Terrestrial Amphibian and Reptile BMP apply to projects within the range and in suitable habitat for herpetofauna SGCN listed below and that are also listed on TPWD's RTEST online application. Please note that some species may require both aquatic and terrestrial BMP. It is difficult to confirm absence for most species of amphibians and reptiles; therefore, assume presence in suitable habitat and implement the following BMP.

B. For open trenches and excavated pits, install escape ramps at an angle of less than 45 degrees (1:1) in areas left uncovered. Visually inspect excavation areas for trapped wildlife prior to backfilling.

C. Avoid or minimize disturbing or removing cover objects, such as downed trees, rotting stumps, brush piles, and leaf litter.

D. Examine heavy equipment stored on site before use, particularly after rain events when reptile and amphibian movements occur more often, to ensure use will not harm individuals that might be seeking temporary refuge.

E. Due to increased activity (mating) of reptiles and amphibian during the spring, construction activities like clearing or grading should attempt to be scheduled outside of the spring (March-May) season. Also, timing ground disturbing activities before October when reptiles and amphibians become less active and may be using burrows in the project area is also encouraged.

F. After project is complete, revegetate disturbed areas with an appropriate locally sourced native seed mix. If erosion control blankets or mats will be used, the product should not contain netting, but should only contain loosely woven natural fiber netting in which the mesh design allows the threads to move, therefore allowing expansion of the mesh openings. Plastic netting should be avoided.

G. For the Texas Horned Lizard, also avoid harvester ant mounds in the selection of Project Specific Locations (PSLs) where feasible.

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

SHEET 1 OF 2

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035,ETC.	SH 20
12-12-2011 (DS)	DIST	COUNTY		SHEET NO.
05-07-14 ADDED NOTE SECTION IV.	ELP	HUDSPETH		10
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.				

DATE: 11/1/2023
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Plan Set/13. Standards/ENVIRONMENTAL ISSUES STANDARDS/ENV_EPIC

3. Bat BMP:

A. Inform TPWD WHAB during initial collaborative review phase for projects that may impact the following bat species:

   a. Any Myotis spp.

B. If identification of a bat species is in question, consult with TPWD or a qualified TxDOT biologist during initial collaborative review phase.

C. For activities that have the potential to impact structures, cliffs or caves, or trees; a qualified biologist will perform a habitat assessment and occupancy survey of the feature(s) with roost potential as early in the planning process as possible or within one year before project letting.

D. For roosts where occupancy is strongly suspected but unconfirmed during the initial survey, revisit feature(s) at most four weeks prior to scheduled disturbance to confirm absence of bats.

E. If bats are present or recent signs of occupation (i.e., piles of guano, distinct musky odor, or staining and rub marks at potential entry points) are observed, take appropriate measures to ensure that bats are not harmed, such as implementing non-lethal exclusion activities or timing or phasing of construction.

F. Exclusion devices can be installed by a qualified individual between September 1 and March 31. Exclusion devices should be used for a minimum of seven days when minimum nighttime temperatures are above 50°F AND minimum daytime temperatures are above 70°F. Prior to exclusion, ensure that alternate roosting habitat is available in the immediate area. If no suitable roosting habitat is available, installation of alternate roosts is recommended to replace the loss of an occupied roost. If alternate roost sites are not provided, bats may seek shelter in other inappropriate sites, such as buildings, in the surrounding area.

G. If feature(s) used by bats are removed as a result of construction, replacement structures should incorporate bat-friendly design or artificial roosts should be constructed to replace these features.

H. In all instances, avoid harm or death to bats. Bats should only be handled as a last resort and after communication with TPWD.

I. Coordinate with TPWD about the latest bat handling restrictions and protocols involving COVID- 19 and bat handling. In general, all staff must follow the guidelines listed below:

   a. Do not handle bats if not part of a critical or time sensitive research project. Contact TPWD to discuss your project needs before beginning work.

   b. All participants must follow CDC social-distancing guidelines. o Wear a face mask to minimize the exchange of respiratory droplets such as a surgical mask, dust mask, or cloth mask when within 6 feet of a living bat.

   c. Use disposable exam gloves or other reusable gloves (e.g., rubber dish-washing gloves) that can be decontaminated to prevent spread of pathogens. Do not touch your face or other potentially contaminated surfaces with your gloves prior to handling bats.

   d. Limit handling to as few handlers as possible.

   e. Do not blow on bats for any reason.

   f. Use separate temporary holding containers for each bat such as disposable paper bags.

   g. Caves housing bats should be avoided unless absolutely necessary.

   h. Implement additional disinfection, quarantine, and cleaning procedures.

J. Bat surveys of structures should include visual inspections of structural fissures (cracked or spalled concrete, damaged or split beams, split or damaged timber railings), crevices (expansion joints, space between parallel beams, spaces above supports piers), and alternative structures (drainage pipes, bolt cavities, open sections between support beams, swallow nests) for the presence of bats.

K. Before excluding bats from any occupied structure, bat species, weather, temperature, season, and geographic location must be incorporated into any exclusion plans to avoid unnecessary harm or death to bats. Winter exclusion must entail a survey to confirm either, 1) bats are absent or 2) present but active (i.e., continuously active not intermittently active due to arousals from hibernation).

   a. Avoid using materials that degrade quickly, like paper, steel wool or rags, to close holes.

   b. Avoid using products or making structural modifications that may block natural ventilation, like hanging plastic sheeting over an active roost entrance, thereby altering roost microclimate.

   c. Avoid using chemical and ultrasonic repellents.

   d. Avoid use of silicone, polyurethane or similar non-water-based caulk products.

   e. Avoid use of expandable foam products at occupied sites.

   f. Avoid the use of flexible netting attached with duct tape.

L. In order to avoid entombing bats, exclusion activities should be only implemented by a qualified individual. A qualified individual or company should possess at least the following minimum qualifications:

   a. Experience in bat exclusion (the individual, not just the company).

   b. Proof of rabies pre-exposure vaccinations.

   c. Demonstrated knowledge of the relevant bat species, including maternity season date range and habitat requirements.

   d. Demonstrated knowledge of rabies and histoplasmosis in relation to bat roosts.

M. Contact TPWD for additional resources and information to assist in executing successful bat exclusions that will avoid unnecessary harm or death in bats.

LIST OF ABBREVIATIONS

BMP:	Best Management Practice	SPCC:	Spill Prevention Control and Countermeasure
CGP:	Construction General Permit	SW3P:	Storm Water Pollution Prevention Plan
DSHS:	Texas Department of State Health Services	PCN:	Pre-Construction Notification
FHWA:	Federal Highway Administration	PSL:	Project Specific Location
MOA:	Memorandum of Agreement	TCEQ:	Texas Commission on Environmental Quality
MOU:	Memorandum of Understanding	TPDES:	Texas Pollutant Discharge Elimination System
MS4:	Municipal Separate Stormwater Sewer System	TPWD:	Texas Parks and Wildlife Department
MBTA:	Migratory Bird Treaty Act	TxDOT:	Texas Department of Transportation
NOT:	Notice of Termination	T&E:	Threatened and Endangered Species
NWP:	Nationwide Permit	USACE:	U.S. Army Corps of Engineers
NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

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 following 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

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

☐ Yes ☒ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☐ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☐ No Action Required ☒ Required Action

Action No.

1. Employees and contractors will be provided information prior to start of construction to educate personnel of the potential for all state-listed threatened species or other SGCN to occur within the project area and should be advised of relevant rules and regulations to protect plants and wildlife.

2. Contractors will be informed to avoid harming all wildlife species if encountered and allow them to safely leave the project site. Due diligence should be used to avoid killing or harming any wildlife species in the implementation of transportation projects.

3. Direct animals away from the construction area with the judicious use and placement of sediment control fencing to exclude wildlife. Exclusion fence should be buried at least 6 inches and be at least 24 inches high, maintained for the life of the project, and removed after construction is completed. Contractors should examine the inside of the exclusion area daily to determine if any wildlife species have been trapped inside the area of impact and provide safe egress opportunities prior to initiation of construction activities.

4. Project staging areas, stockpiles, temporary construction easements, and other project related sites should be situated in previously disturbed areas to avoid or minimize impacts to sensitive or unique habitats including intact native vegetation, floodplains, riparian corridors, wetlands, playa lakes, and habitat for wildlife species.

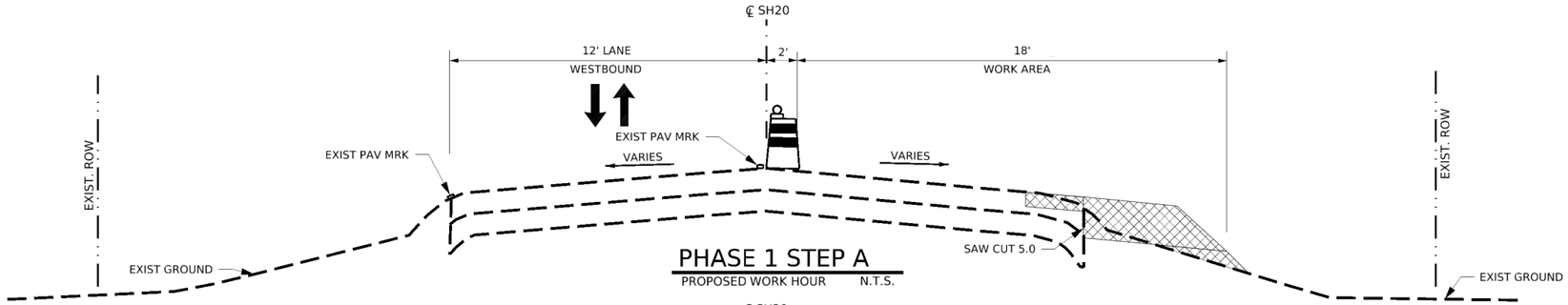
5. When lighting is added, consider wildlife impacts from light pollution and incorporating dark-sky practices into design strategies. Minimize sky glow by focusing light downward, with full cutoff luminaries to avoid light emitting above the horizontal. The minimum amount of night-time lighting needed for safety and security should be used.

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

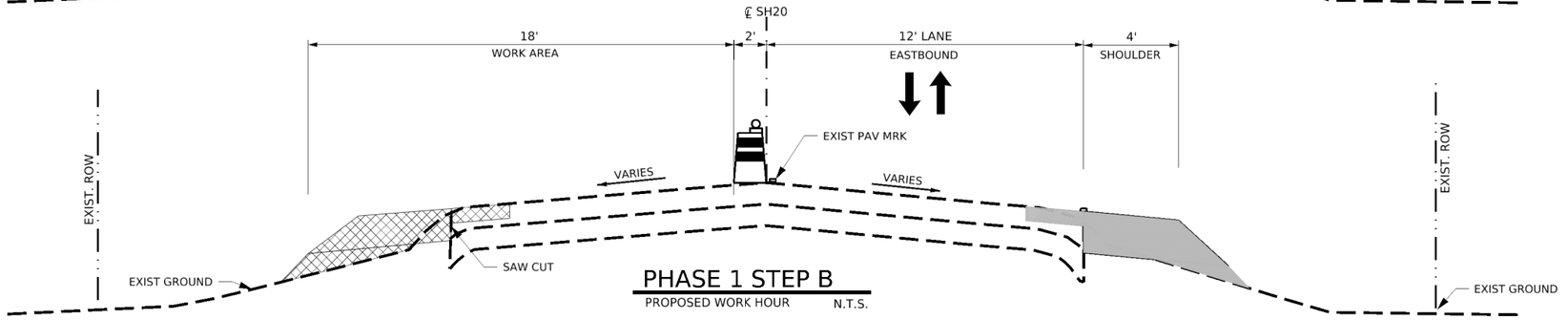
EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR	
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0002	04	035,ETC.	SH 20	
12-12-2011 (DS)	DIST	COUNTY		SHEET NO.	
05-07-14 ADDED NOTE SECTION IV.	ELP	HUDSPETH		11	
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.					



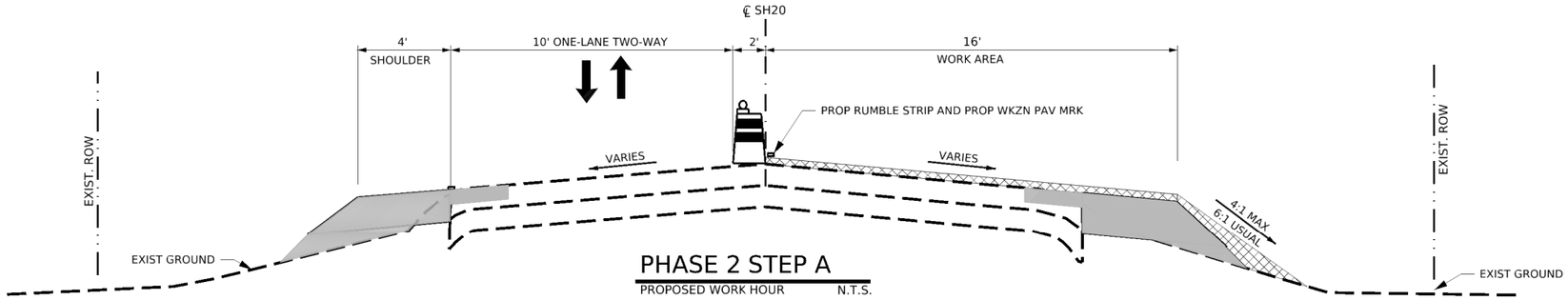
PHASE 1 STEP A

PROPOSED WORK HOUR N.T.S.



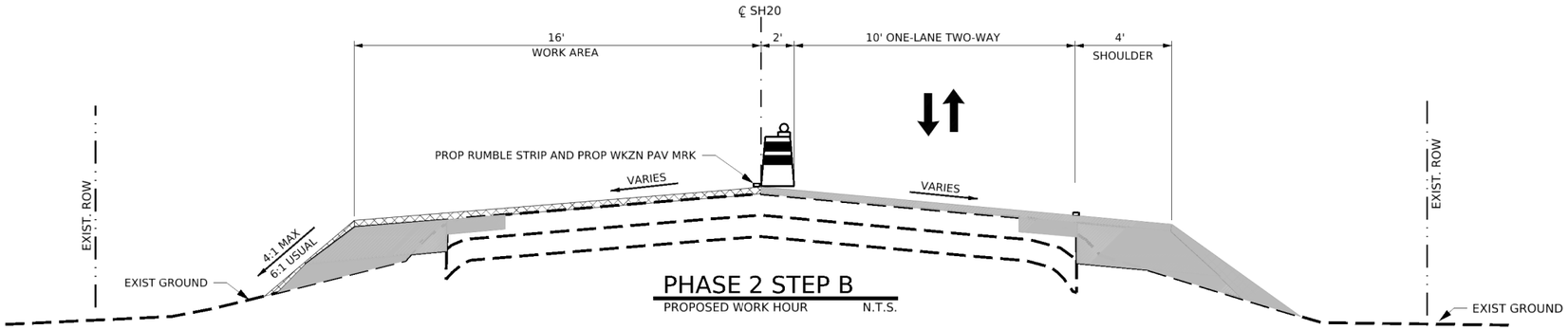
PHASE 1 STEP B

PROPOSED WORK HOUR N.T.S.



PHASE 2 STEP A

PROPOSED WORK HOUR N.T.S.



PHASE 2 STEP B

PROPOSED WORK HOUR N.T.S.

LEGEND

- TRAFFIC FLOW
- CONSTRUCTED CURRENT PHASE
- CONSTRUCTED PREVIOUS PHASE
- EXISTING PAVEMENT
- DRUM WITH WARNING REFLECTOR

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

SH 20
TRAFFIC CONTROL PLAN

TCP
TYPICAL SECTIONS

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		12

DATE: 11/1/2023 11:21:11 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040354 - Design/Plan Set/2. TCP/SH20_TCP TYPICAL SECTIONS

LEGEND

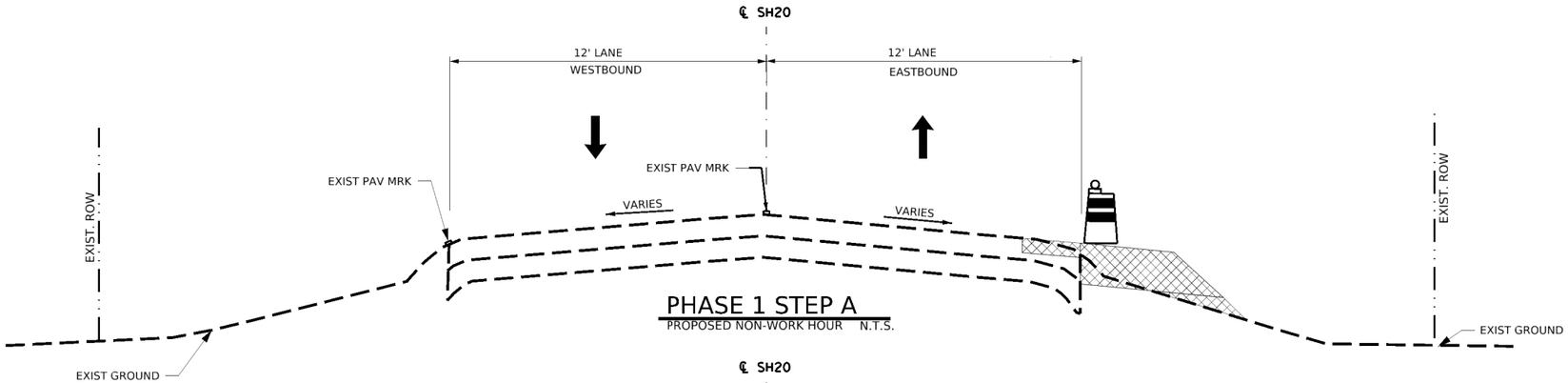
TRAFFIC FLOW

CONSTRUCTED CURRENT PHASE

CONSTRUCTED PREVIOUS PHASE

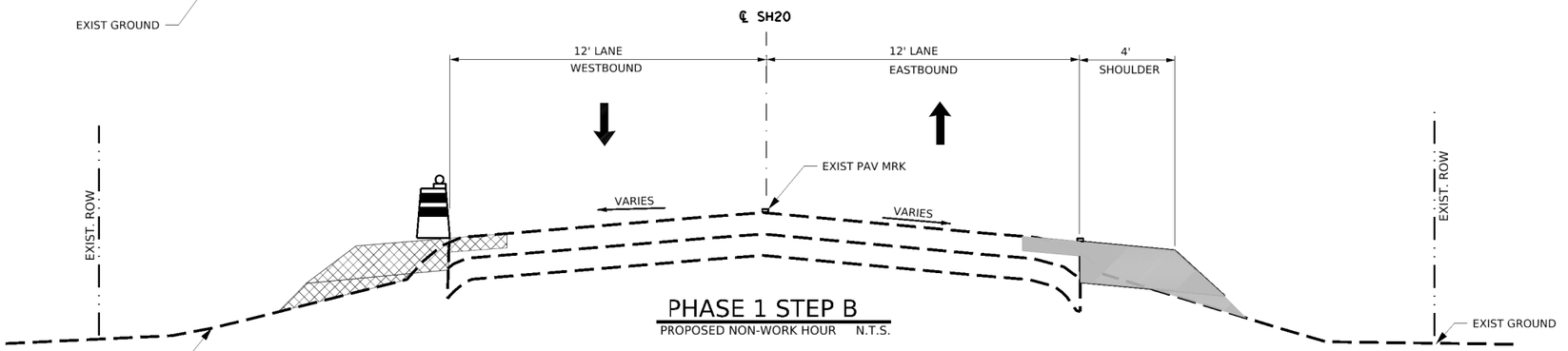
EXISTING PAVEMENT

DRUM WITH WARNING REFLECTOR



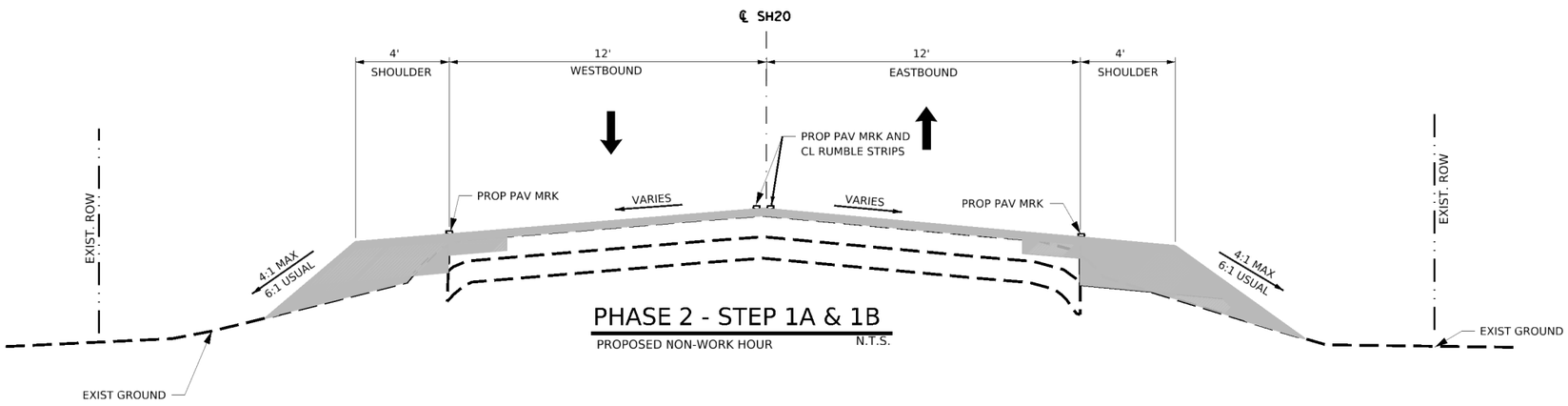
PHASE 1 STEP A

PROPOSED NON-WORK HOUR N.T.S.



PHASE 1 STEP B

PROPOSED NON-WORK HOUR N.T.S.



PHASE 2 - STEP 1A & 1B

PROPOSED NON-WORK HOUR N.T.S.

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

SH 20
TRAFFIC CONTROL PLAN

TCP
TYPICAL SECTIONS

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		13

DATE: 11/1/2023 11:21:36 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/000204035/4 - Design/Plan Set/2. TCP/SH20 TCP TYPICAL SECTIONS

CK
DW
CK
DW

GENERAL NOTES:

1. PRIOR TO START OF THE PROJECT, INSTALL ADVANCED WARNING SIGNS ACCORDING TO THE BC STANDARDS OR AS DIRECTED AND SHALL REMAIN IN PLACE THROUGHOUT THE DURATION OF CONSTRUCTION.
2. PLACE TRAFFIC CONTROL DEVICES AND WORK ZONE PAVEMENT MARKINGS PRIOR TO MOVING TRAFFIC AND BEGINNING CONSTRUCTION. REMOVE ALL EXISTING PAVEMENT MARKINGS AND SIGNS CONFLICTING WITH WORK ZONE PAVEMENT MARKINGS AND TEMPORARY SIGNS.
3. PLACE TEMPORARY SW3P MEASURES ACCORDING TO PROJECT PLANS, OR AS OTHERWISE INSTRUCTED BY ENGINEER, BUT NO SOONER THAN TWO WEEKS PRIOR TO SOIL DISTURBANCE OR POTENTIAL POLLUTANT GENERATING ACTIVITIES IN THEIR CONTROL AREA. REMOVE TEMPORARY SW3P EROSION CONTROL MEASURES IN EACH AREA AS DIRECTED BY THE ENGINEER.
4. MAINTAIN POSITIVE DRAINAGE DURING CONSTRUCTION.
5. PROVIDE ACCESS TO PRIVATE PROPERTY AT ALL TIMES. MATERIALS, MAINTENANCE AND LABOR FOR TEMPORARY ACCESS IS SUBSIDIARY TO THE VARIOUS BID ITEMS.
6. MAINTAIN ACCESS TO MAILBOXES AT ALL TIMES. IN THE EVENT THIS IS NOT POSSIBLE, PROVIDE TEMPORARY MAILBOXES AS DIRECTED AND COORDINATE WITH THE UNITED STATES POSTAL SERVICE AND PROPERTY OWNERS. MATERIALS, MAINTENANCE AND LABOR FOR THIS SHALL BE SUBSIDIARY TO THE VARIOUS BID ITEMS.
7. COORDINATE WITH SCHOOL DISTRICTS AND PROVIDE ACCOMMODATIONS FOR TEMPORARY SCHOOL BUS STOPS AS DIRECTED BY THE ENGINEER. THIS SHALL BE SUBISDARY TO THE VARIOUS BID ITEMS.
8. ALL THROUGH LANES WILL BE OPENED TO TRAFFIC AT THE END OF EACH WORKDAY, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
9. FLAGGERS WILL BE REQUIRED TO BE AT ANY ACCESS OR BUSINESS DRIVEWAYS.

SEQUENCE OF CONSTRUCTION

PHASE 1 STEP A:

1. INSTALL ADDITIONAL SIGNAGE, CHANNELIZING DEVICES, AND WORK ZONE BARRICADES.
2. INSTALL SW3P DEVICES AS REQUIRED IN THE PLANS AND/OR AS DIRECTED.
3. FOLLOW TCP (2-2b) FOR DAILY LANE CLOSURES USING BOTH FLAGGERS AND PILOT CAR TO CONSTRUCT THE WESTBOUND SHOULDER AS SHOWN IN THE PLANS.
4. PERFORM MICROMILL TO CORRECT LOCALIZED ROUGHNESS AT THE AREAS IDENTIFIED BY SURFACE TEST TYPE B AS PER ITEM 585.
5. LEVEL-UP EDGE CONDITIONS PRIOR TO CONSTRUCTION OF SHOULDER.
6. SAW CUT EXISTING PAVEMENT STRUCTURE TO THE PROPOSED PAVEMENT DEPTH OR AS DIRECTED BY THE ENGINEER.
7. CONSTRUCT SHOULDER WIDENING AND SEAL COAT.
8. PROPOSED CONSTRUCTION TO REMAIN CLOSED TO TRAFFIC DURING WORK HOURS UNTIL ALL WESTBOUND CONSTRUCTION HAS BEEN COMPLETED.
9. SHIFT TRAFFIC BACK TO ORIGINAL TWO-WAY CONFIGURATION AND TREAT DROP OFF CONDITIONS PRIOR TO END OF EACH DAY AS SHOWN ON TREATMENT FOR VARIOUS EDGE CONDITIONS SHEET.

PHASE 1 STEP B

1. FOLLOW TCP (2-2b) FOR DAILY LANE CLOSURES USING BOTH FLAGGERS AND PILOT CAR TO CONSTRUCT THE EASTBOUND SHOULDER AS SHOWN IN THE PLANS.
2. LEVEL-UP EDGE CONDITIONS PRIOR TO CONSTRUCTION OF SHOULDER.
3. SAW CUT EXISTING PAVEMENT STRUCTURE TO THE PROPOSED PAVEMENT DEPTH OR AS DIRECTED BY THE ENGINEER.
4. CONSTRUCT SHOULDER WIDENING AND SEAL COAT.
5. PROPOSED CONSTRUCTION TO REMAIN CLOSED TO TRAFFIC DURING WORK HOURS UNTIL ALL EASTBOUND CONSTRUCTION HAS BEEN COMPLETED.
6. SHIFT TRAFFIC BACK TO ORIGINAL TWO-WAY CONFIGURATION AND TREAT DROP OFF CONDITIONS PRIOR TO END OF EACH DAY AS SHOWN ON TREATMENT FOR VARIOUS EDGE CONDITIONS SHEET.

PHASE 2 STEP A AND PHASE 2 STEP B

1. FOLLOW TCP (2-2b) FOR DAILY LANE CLOSURES USING BOTH FLAGGERS AND PILOT CAR.
2. PLACE UNDERSEAL AND OVERLAY ON EASTBOUND FOLLOWED BY UNDERSEAL AND OVERLAY ON WESTBOUND PRIOR TO END OF WORKDAY OR AS DIRECTED BY THE ENGINEER. THE INTENT IS TO OVERLAY THE FULL ROADWAY BY ELIMINATING THE CENTERLINE LONGITUDINAL DROP-OFF BETWEEN THE OPPOSING TRAVEL LANES PRIOR TO END OF WORKDAY.
3. WORK ZONE LENGTH WILL BE RESTRICTED TO WHAT CAN BE OVERLAID ON FULL ROADWAY WIDTH PRIOR TO END OF WORKDAY OR AS APPROVED BY THE ENGINEER.
4. INSTALL WORKZONE PAVEMENT MARKINGS.
5. PROPOSED CONSTRUCTION LANE TO REMAIN CLOSED TO TRAFFIC AND OPENED AT END OF WORKING DAY OR AS DIRECTED BY THE ENGINEER.
6. MAINTAIN ACCESS TO MAILBOXES AND PROVIDE ACCESS TO PRIVATE PROPERTY AT ALL TIMES.
7. PLACE PROPOSED PAVEMENT MARKNGS AND CENTERLINE RUMBLE STRIPS, METAL BEAM GUARD FENCE AND TERMINALS FOLLOWING TCP (3-1b), TCP (3-3a) and TCP (2-2b).
8. REMOVE ALL TRAFFIC CONTROL DEVICES, TEMPORARY SIGNS, AND SW3P DEVICES AND INSTALL PERMANENT SMALL SIGNS SIMULTANEOUSLY.

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

SH 20
TRAFFIC CONTROL PLAN

TCP NARRATIVE

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		14

DATE: 11/1/2023 11:22:23 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/000204035/4 - Design/Plan Set/2. TCP/SH20_TCP_NARRATIVE

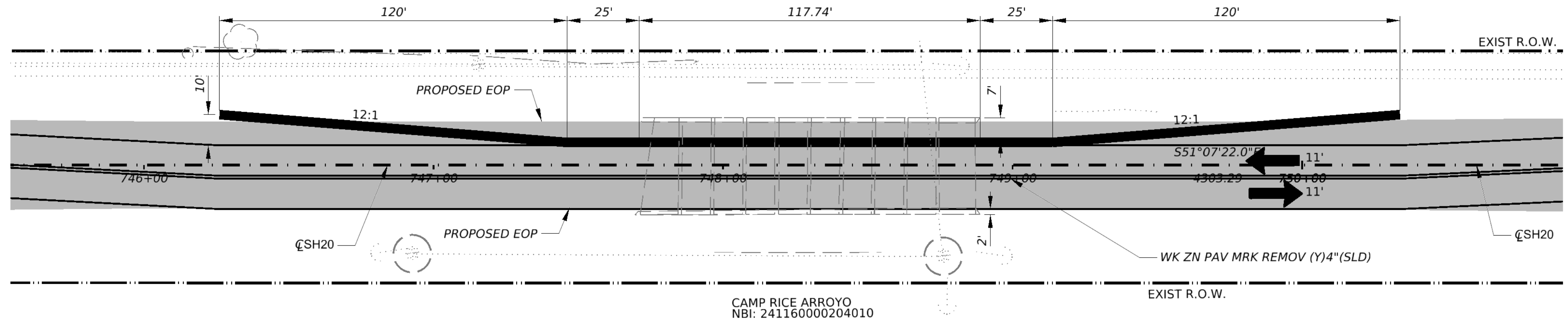
0 25 50
SCALE IN FEET

LEGEND

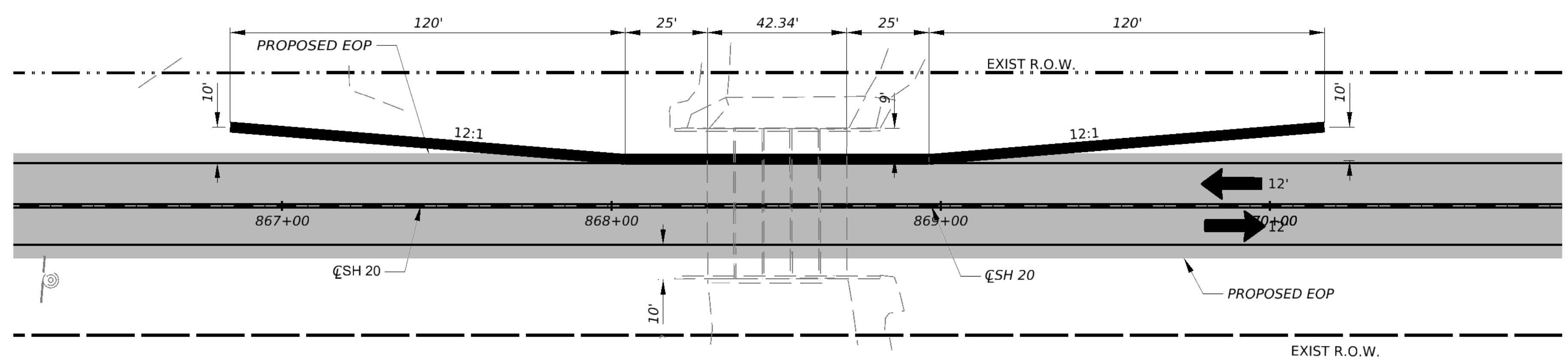
←	TRAFFIC FLOW
▬	LOW PROFILE BARRIER
▒	PROPOSED CONSTRUCTION

NOTES:

1. ONE LANE TWO-WAY CLOSURE IS OPTIONAL AND AT THE DISCRETION OF THE ENGINEER.



CAMP RICE ARROYO
NBI: 241160000204010



DRAW ARROYO BRIDGE
NBI: 241160000204011

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/28/2023

Texas Department of Transportation

SH 20
TRAFFIC CONTROL PLAN

TCP BRIDGE STRUCTURE

SHEET 1 OF 1

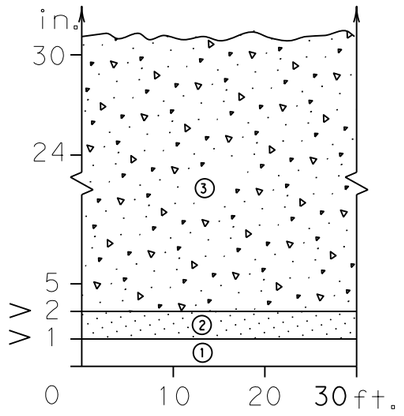
CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		15

DATE: 11/27/2023 4:00:55 PM
FILE: pw:\\...com:TxDOT5/Documents/24 - ELP/Design Projects/000204035/4 - Design/Master Design Files/Sheet Boundary Files/Sheet Boundary Container/SH20Container BRIDGE.dgn

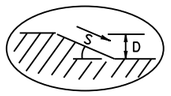
DATE: 11/1/2023 11:23:27 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/000204035/4 - Design/Plan Set/13. Standards/PAVEMENT MARKINGS & DELINEATION STANDARDS/TREATMENT FOR

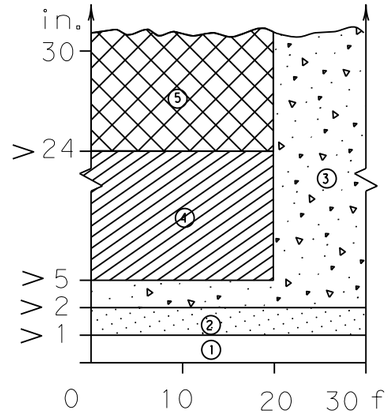
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

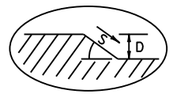


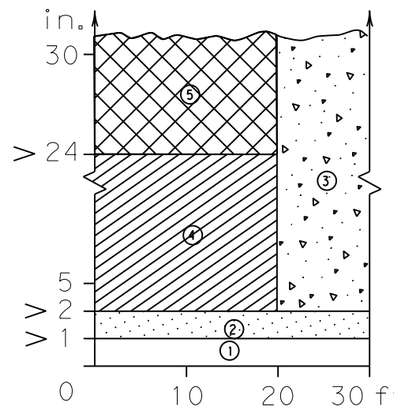
Edge Condition I
S = (3:1) (or flatter)



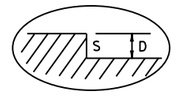


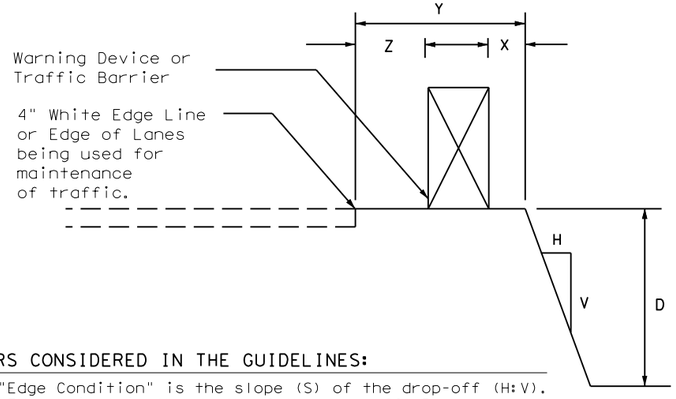
Edge Condition II
S = ((2.99):1) to (1:1)





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:

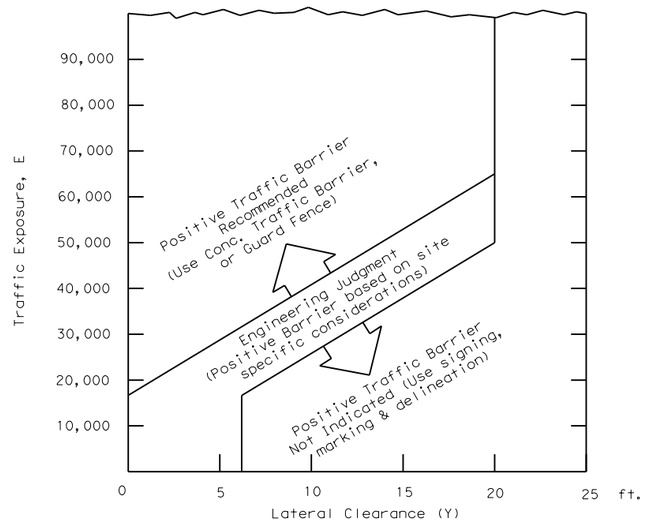
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

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.

N.T.S. SHEET 1 OF 1

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

Traffic Safety Division Standard

TREATMENT FOR VARIOUS EDGE CONDITIONS

FILE: edgecon.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2000	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035,ETC.	SH 20
03-01 08-01 9-21	DIST	COUNTY		SHEET NO.
	ELP	HUDSPETH		16

DATE: 11/1/2023 11:23:46 AM
FILE: pw:/txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040354 - Design/Plan Set/13. Standards/Traffic Control Plan Standards/BC-21.dgn

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

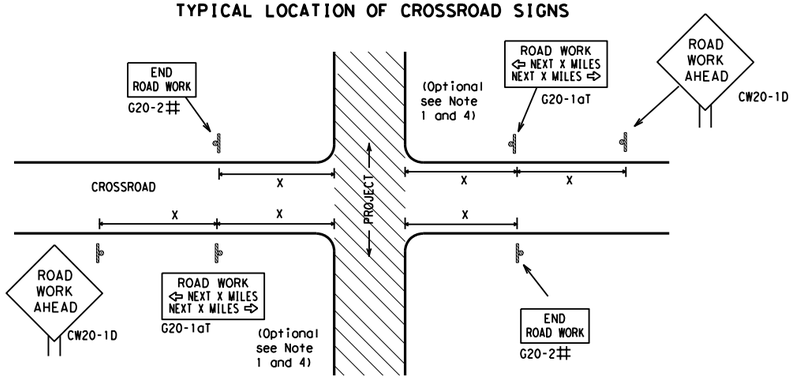
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035,ETC.	SH 20
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	ELP	HUDSPETH		17
5-10 5-21				

DATE: 11/1/2023 11:23:46 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/000204035/24 - Design/Plan Set/13. Standards/Traffic Control Plan Standards/BC-21.dgn

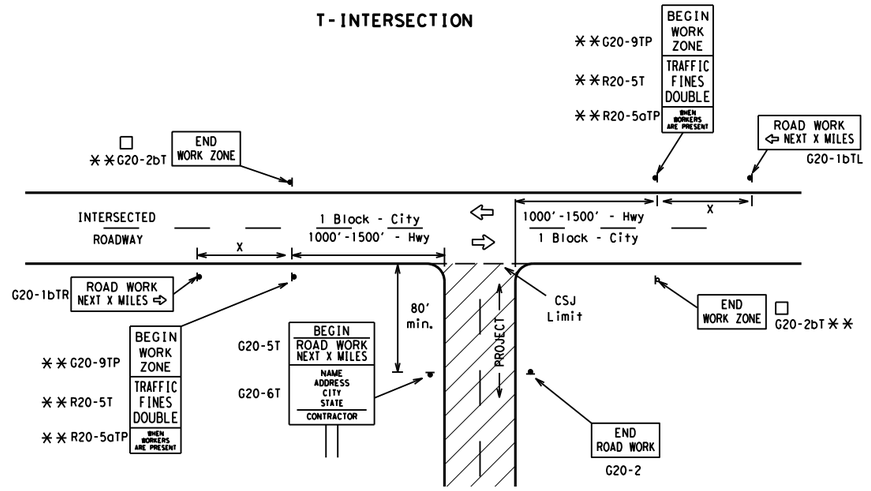
TYPICAL LOCATION OF CROSSROAD SIGNS



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]

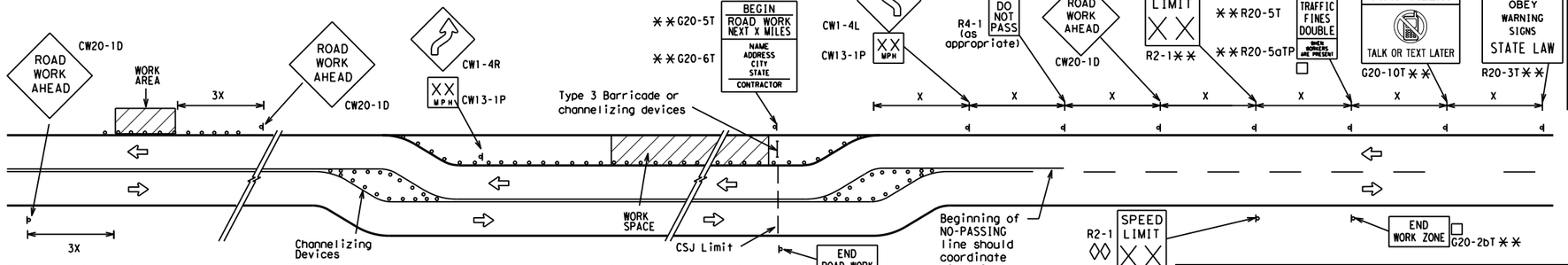
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

△ 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.

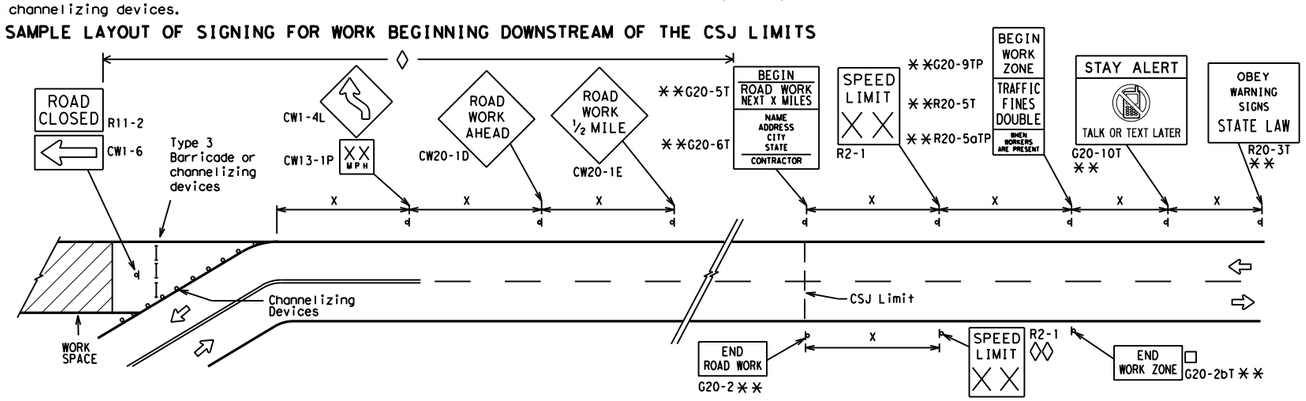
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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 AT THE CSJ LIMITS

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.

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

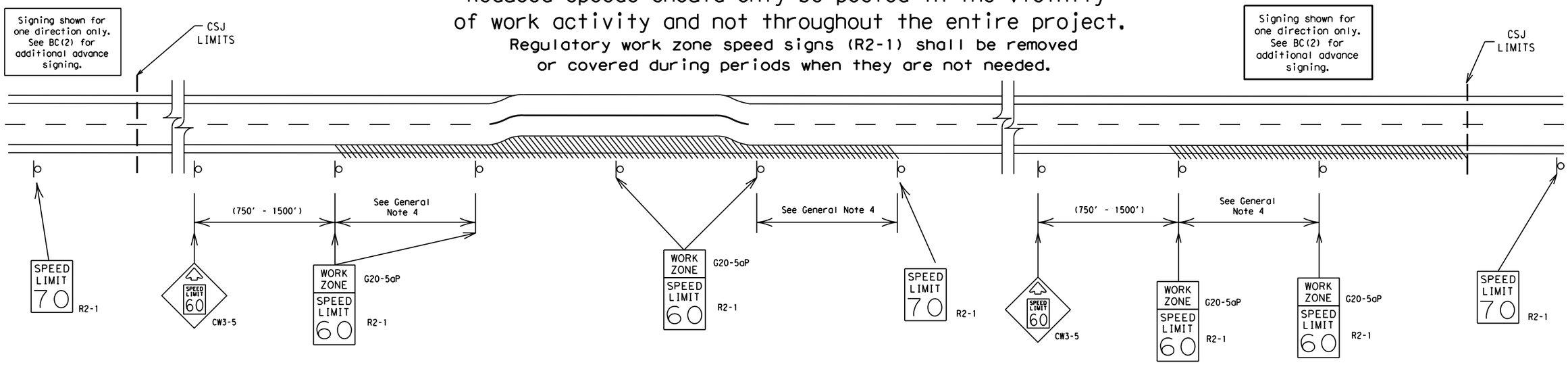
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035,ETC.	SH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ELP	HUDSPETH		18

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.

DATE: 11/1/2023 11:23:46 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/000204035/24 - Design Standards/BC-21.dgn

SHEET 3 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

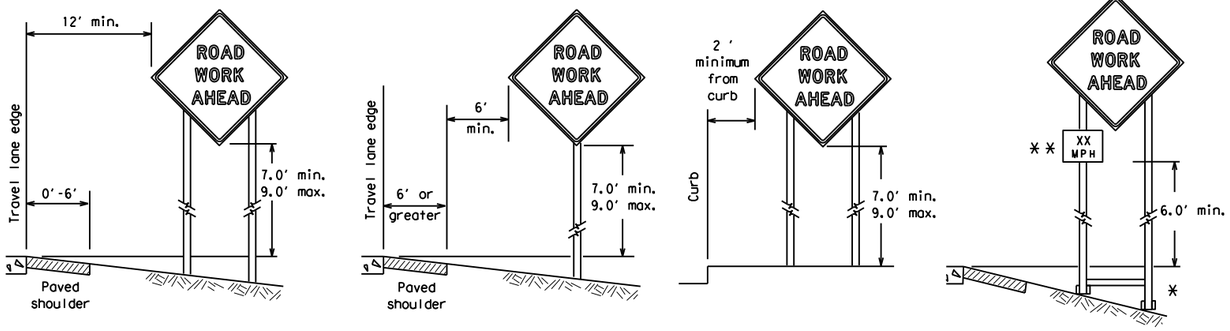
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035,ETC.	SH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ELP	HUDSPETH		19

DATE: 11/1/2023 11:23:47 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/000204035/4 - Design/Plan Set/13. Standards/Traffic Control Plan Standards/BC-21.dgn

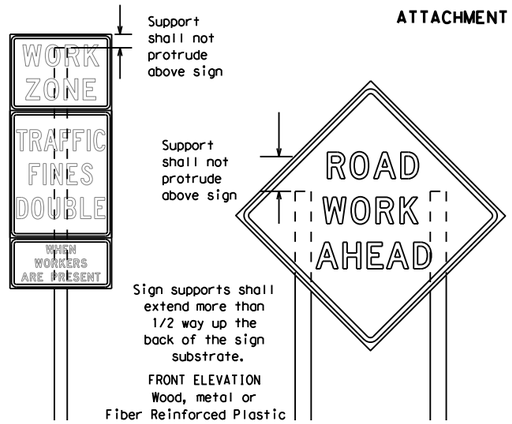
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

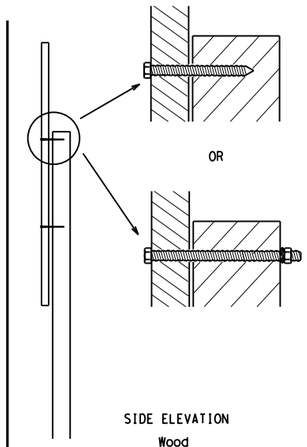


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

** 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





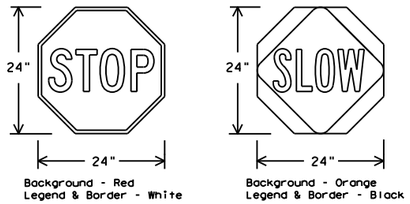
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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.

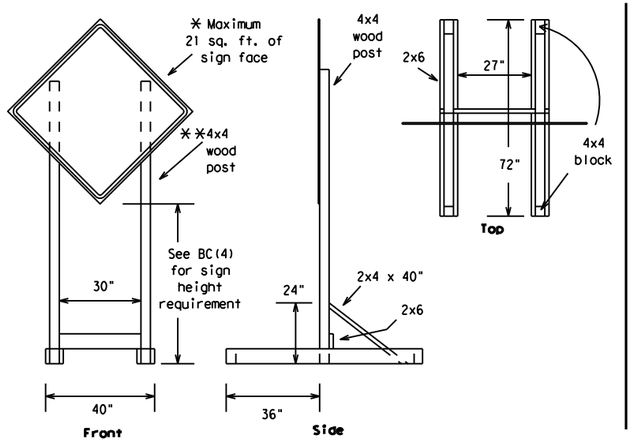
Texas Department of Transportation | Traffic Safety Division Standard

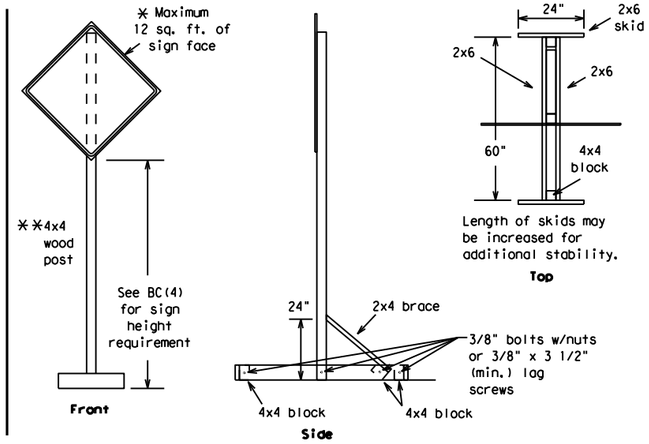
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035,ETC.	SH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ELP	HUDSPETH		20

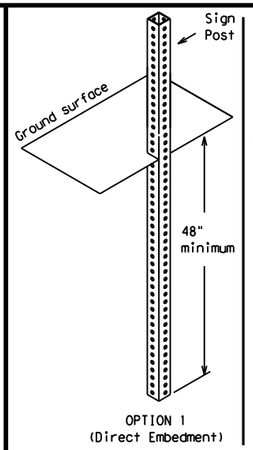
DATE: 11/1/2023 11:23:47 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040354 - Design/Plan Set/13. Standards/Traffic Control Plan Standards/BC-21.dgn

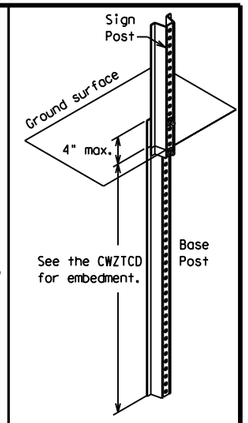




SKID MOUNTED WOOD SIGN SUPPORTS

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



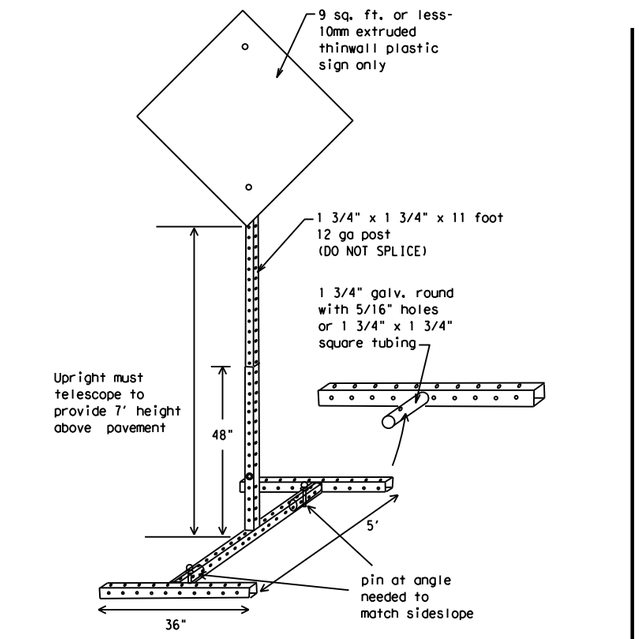


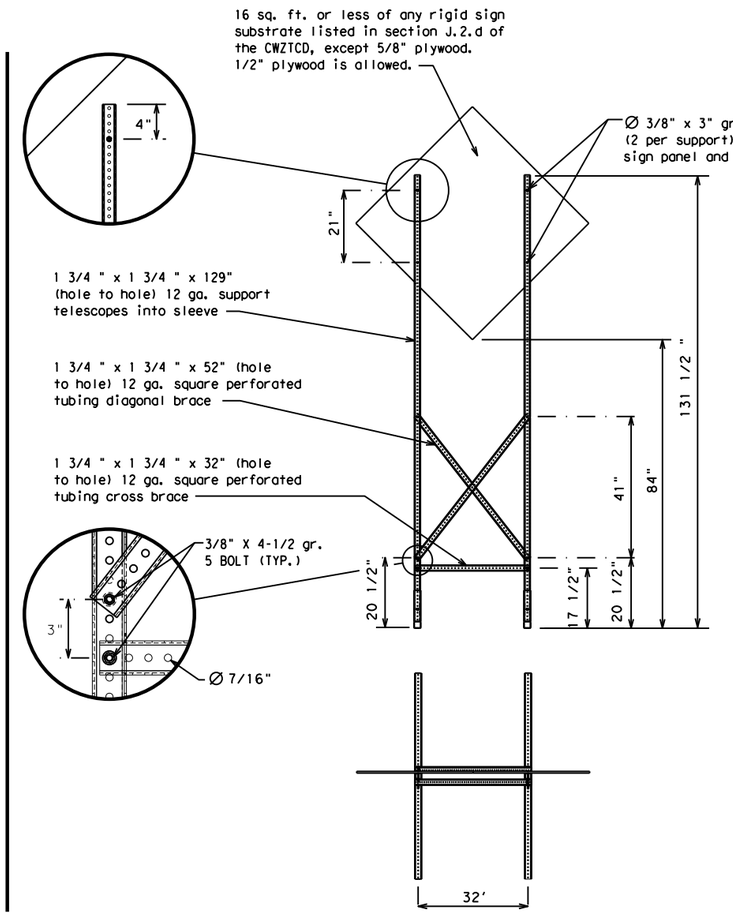
WING CHANNEL
Lap-splice/base bolted anchor

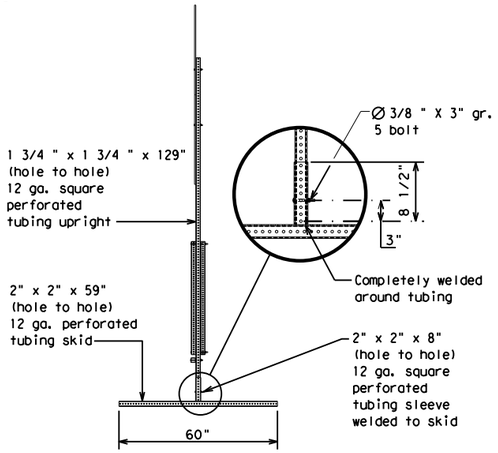
PERFORATED SQUARE METAL TUBING

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.

SHEET 5 OF 12

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	0002	04	035,ETC.	SH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ELP	HUDSPETH		21

DATE: 11/1/2023 11:23:48 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040354 - Design/Plan Set/13. Standards/Traffic Control Plan Standards/BC-21.dgn

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		Other Condition List	
FREEWAY CLOSED X MILE	FRONTAGE ROAD CLOSED	ROADWORK XXX FT	ROAD REPAIRS XXXX FT
ROAD CLOSED AT SH XXX	SHOULDER CLOSED XXX FT	FLAGGER XXXX FT	LANE NARROWS XXXX FT
ROAD CLSD AT FM XXXX	RIGHT LN CLOSED XXX FT	RIGHT LN NARROWS XXXX FT	TWO-WAY TRAFFIC XX MILE
RIGHT X LANES CLOSED	RIGHT X LANES OPEN	MERGING TRAFFIC XXXX FT	CONST TRAFFIC XXX FT
CENTER LANE CLOSED	DAYTIME LANE CLOSURES	LOOSE GRAVEL XXXX FT	UNEVEN LANES XXXX FT
NIGHT LANE CLOSURES	I-XX SOUTH EXIT CLOSED	DETOUR X MILE	ROUGH ROAD XXXX FT
VARIOUS LANES CLOSED	EXIT XXX CLOSED X MILE	ROADWORK PAST SH XXXX	ROADWORK NEXT FRI-SUN
EXIT CLOSED	RIGHT LN TO BE CLOSED	BUMP XXXX FT	US XXX EXIT X MILES
MALL DRIVEWAY CLOSED	X LANES CLOSED TUE - FRI	TRAFFIC SIGNAL XXXX FT	LANES SHIFT *
XXXXXXXX BLVD CLOSED			

* 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		Location List	Warning List	** Advance Notice List
MERGE RIGHT	FORM X LINES RIGHT	AT FM XXXX	SPEED LIMIT XX MPH	TUE-FRI XX AM- X PM
DETOUR NEXT X EXITS	USE XXXXX RD EXIT	BEFORE RAILROAD CROSSING	MAXIMUM SPEED XX MPH	APR XX-XX X PM-X AM
USE EXIT XXX	USE EXIT I-XX NORTH	NEXT X MILES	MINIMUM SPEED XX MPH	BEGINS MONDAY
STAY ON US XXX SOUTH	USE I-XX E TO I-XX N	PAST US XXX EXIT	ADVISORY SPEED XX MPH	BEGINS MAY XX
TRUCKS USE US XXX N	WATCH FOR TRUCKS	XXXXXXX TO XXXXXXX	RIGHT LANE EXIT	MAY X-X XX PM - XX AM
WATCH FOR TRUCKS	EXPECT DELAYS	US XXX TO FM XXXX	USE CAUTION	NEXT FRI-SUN
EXPECT DELAYS	PREPARE TO STOP		DRIVE SAFELY	XX AM TO XX PM
REDUCE SPEED XXX FT	END SHOULDER USE		DRIVE WITH CARE	NEXT TUE AUG XX
USE OTHER ROUTES	WATCH FOR WORKERS			TONIGHT XX PM- XX AM
STAY IN LANE *				

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

** 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)

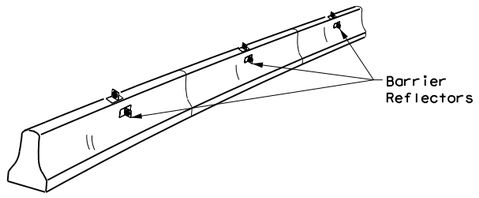
BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035,ETC.	SH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ELP	HUDSPETH		22

100

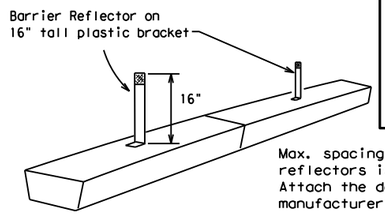
DATE: 11/1/2023 11:23:48 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/000204035/4 - Design/Plan Set/13. Standards/Traffic Control Plan Standards/BC-21.dgn

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.

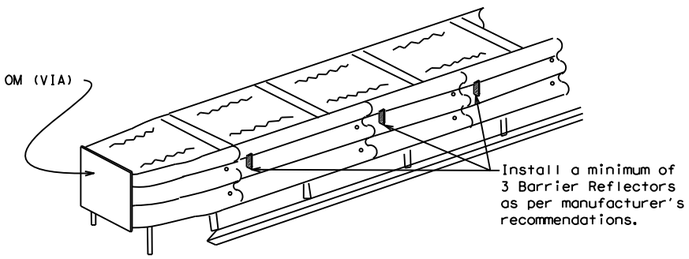


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

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)

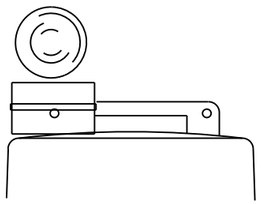


DELINEATION OF END TREATMENTS

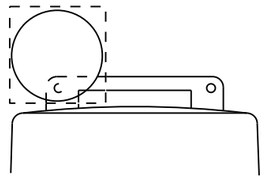
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

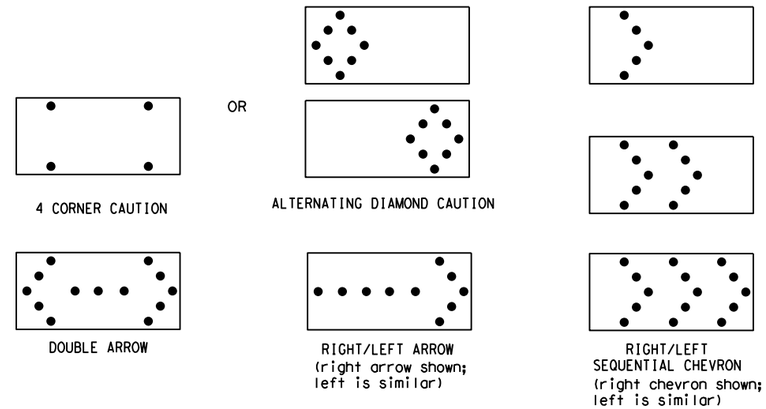
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing 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

SHEET 7 OF 12

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	0002	04	035,ETC.	SH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ELP	HUDSPETH		23

101

DATE: 11/1/2023 11:23:48 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/00020403S/4 - Design/Plan Set/13. Standards/Traffic Control Plan Standards/BC-21.dgn

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:

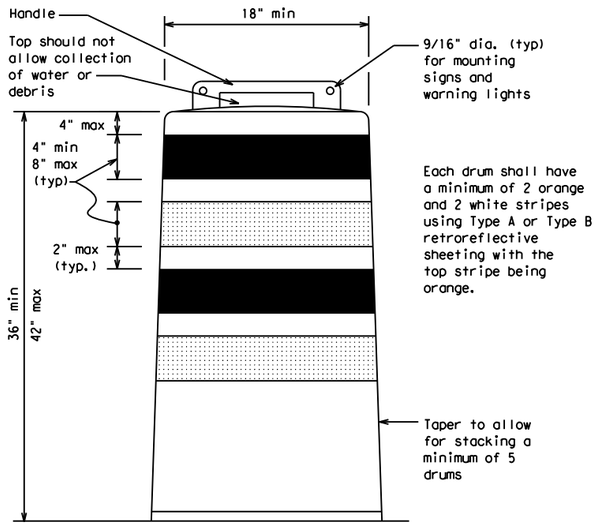
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents 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.

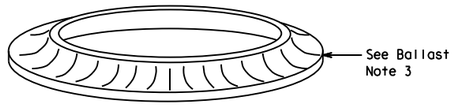
RETROREFLECTIVE SHEETING

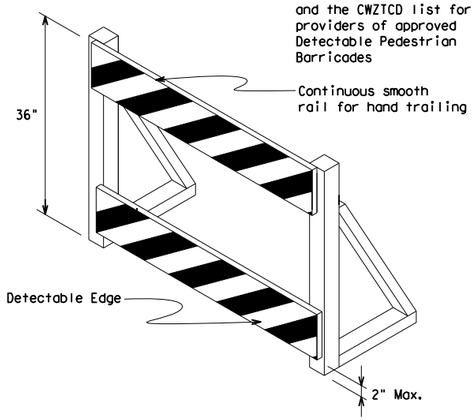
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall 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.

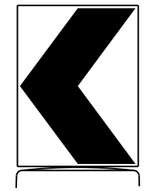




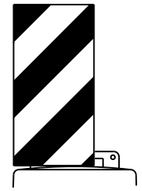


DETECTABLE PEDESTRIAN BARRICADES

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

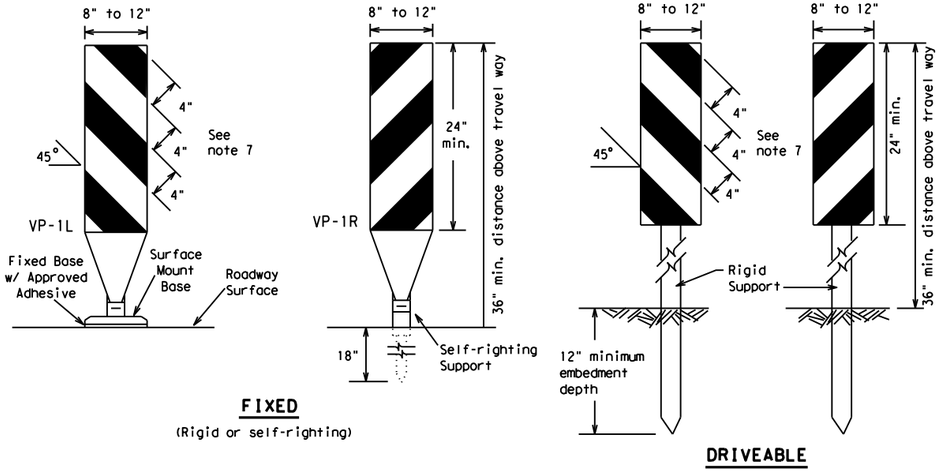
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035,ETC.	SH 20
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	ELP	HUDSPETH		24
7-13				

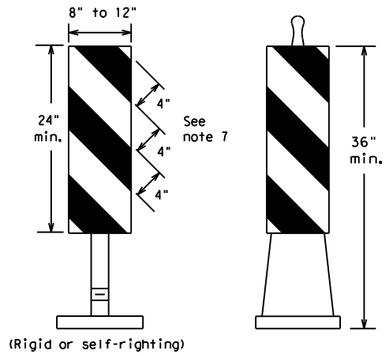
102

DATE: 11/1/2023 11:23:49 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040354 - Design/Plan Set/13. Standards/Traffic Control Plan Standards/BC-21.dgn



FIXED
(Rigid or self-righting)

DRIVEABLE

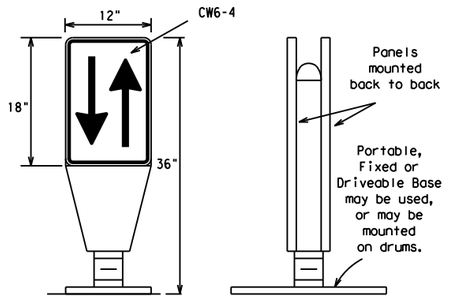


(Rigid or self-righting)

PORTABLE

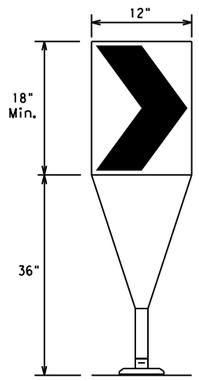
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is 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.

VERTICAL PANELS (VPs)



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)



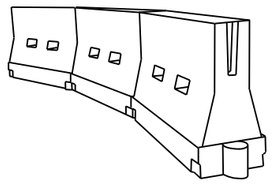
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

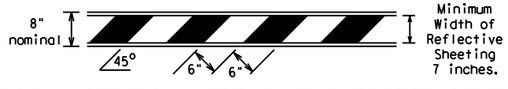
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035,ETC.	SH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ELP	HUDSPETH		25

DATE: 2023/00233 11:23:49 AM
FILE: DOCUMENTNAME:c:\ectrwi\seonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Plan Set/13. Standards/Traffic Control Plan Standards/BC-21.dgn

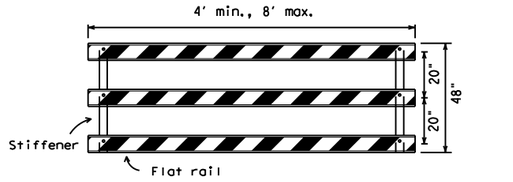
TYPE 3 BARRICADES

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.



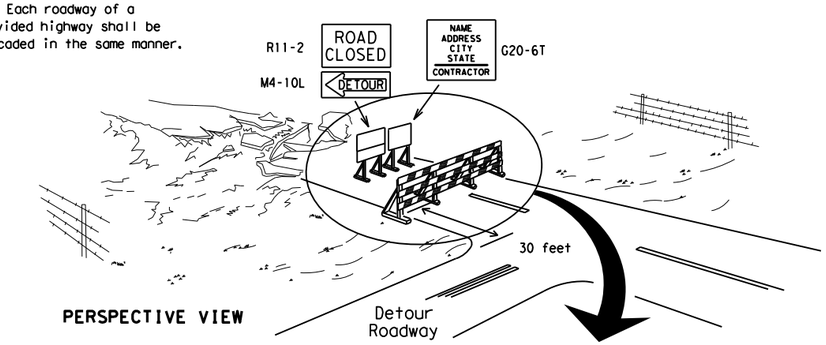
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

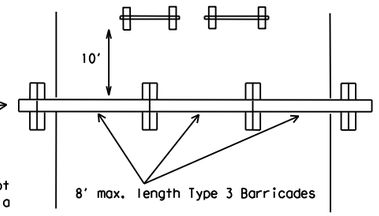
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

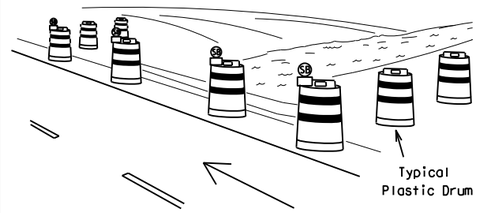
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

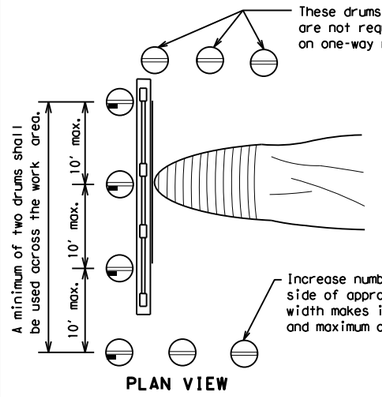
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

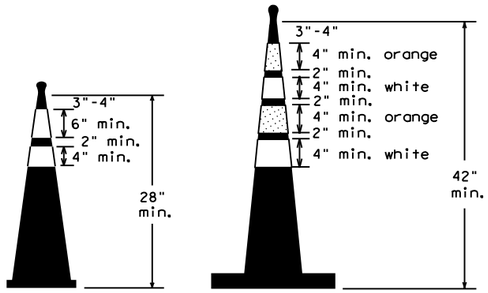
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder 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

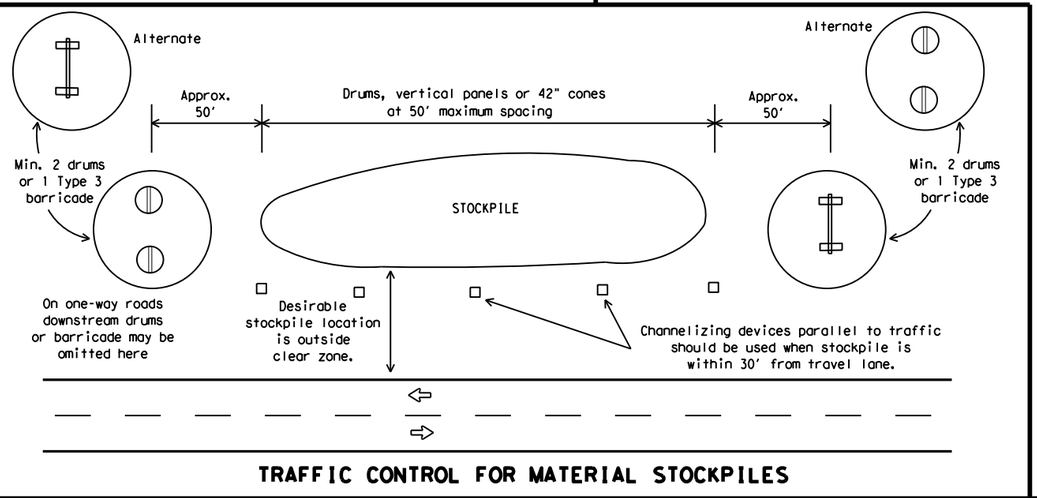
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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	0002	04	035,ETC.	SH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ELP	HUDSPETH		26

104

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.

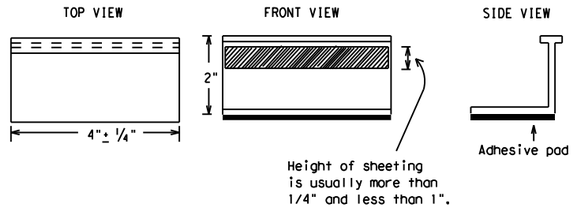
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

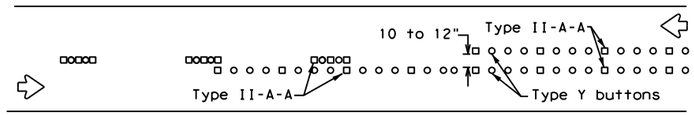
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035,ETC.	SH 20
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	ELP	HUDSPETH		27
11-02 8-14				

105

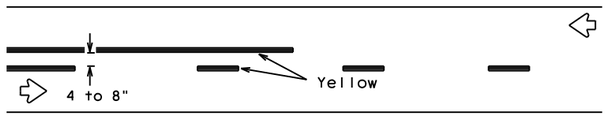
DATE: 11/1/2023 11:23:50 AM
FILE: pw:/txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/Design/Plan Set/13. Standards/Traffic Control Plan Standards/BC-21.dgn

PAVEMENT MARKING PATTERNS

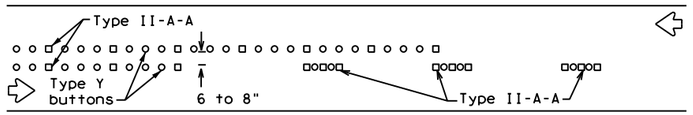
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



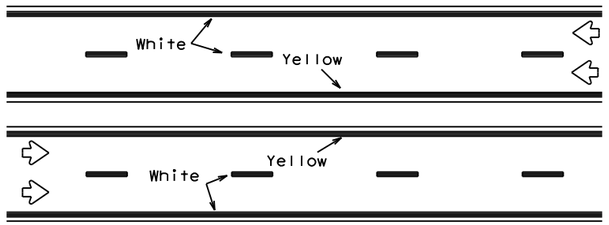
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



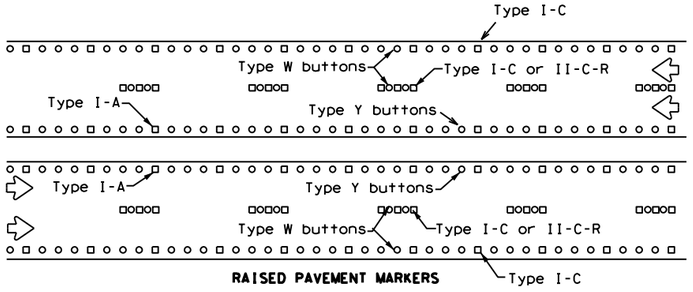
RAISED PAVEMENT MARKERS - PATTERN B

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



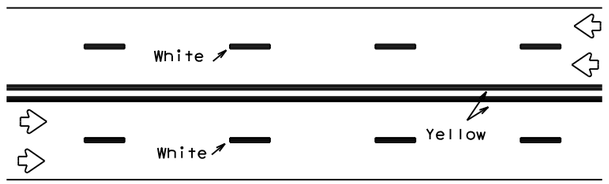
REFLECTORIZED PAVEMENT MARKINGS



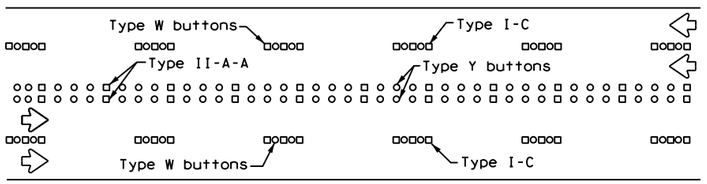
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



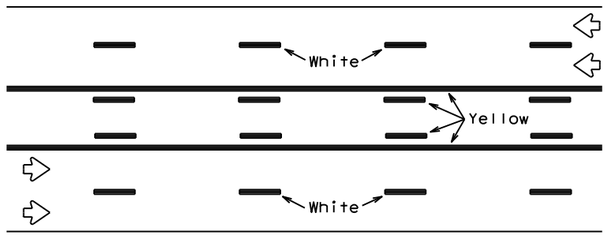
REFLECTORIZED PAVEMENT MARKINGS



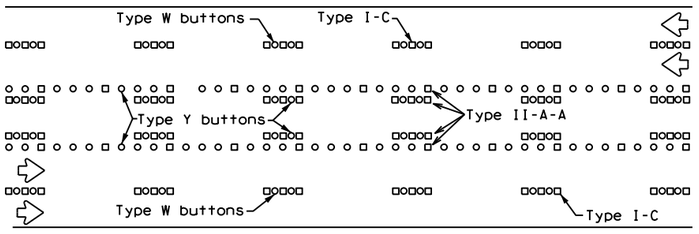
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

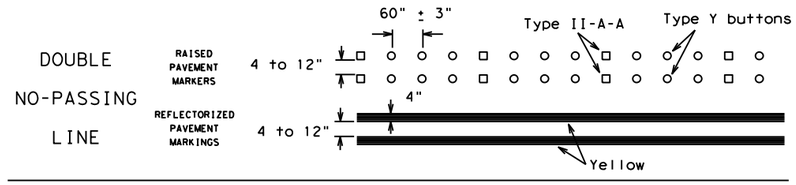
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

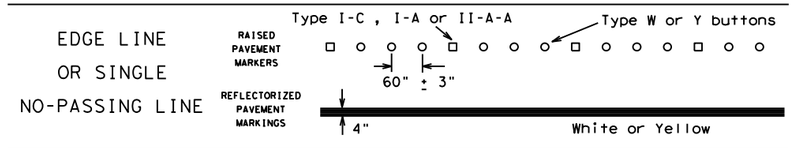
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

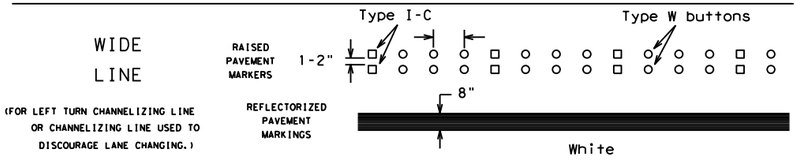


EDGE LINE OR SINGLE NO-PASSING LINE



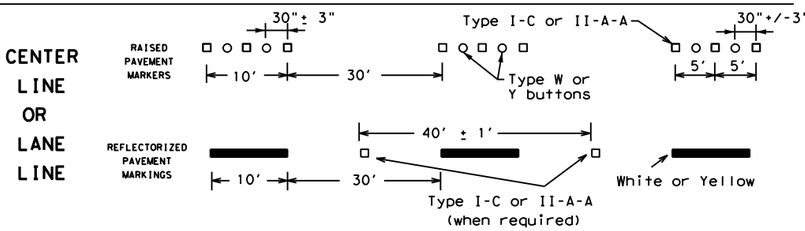
WIDE LINE

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

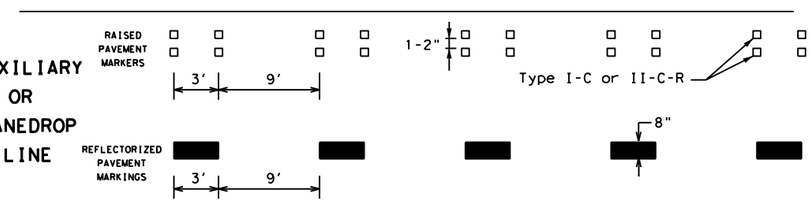


BROKEN LINES

CENTER LINE OR LANE LINE

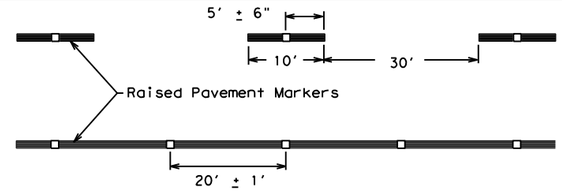


AUXILIARY OR LANEDROP LINE



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

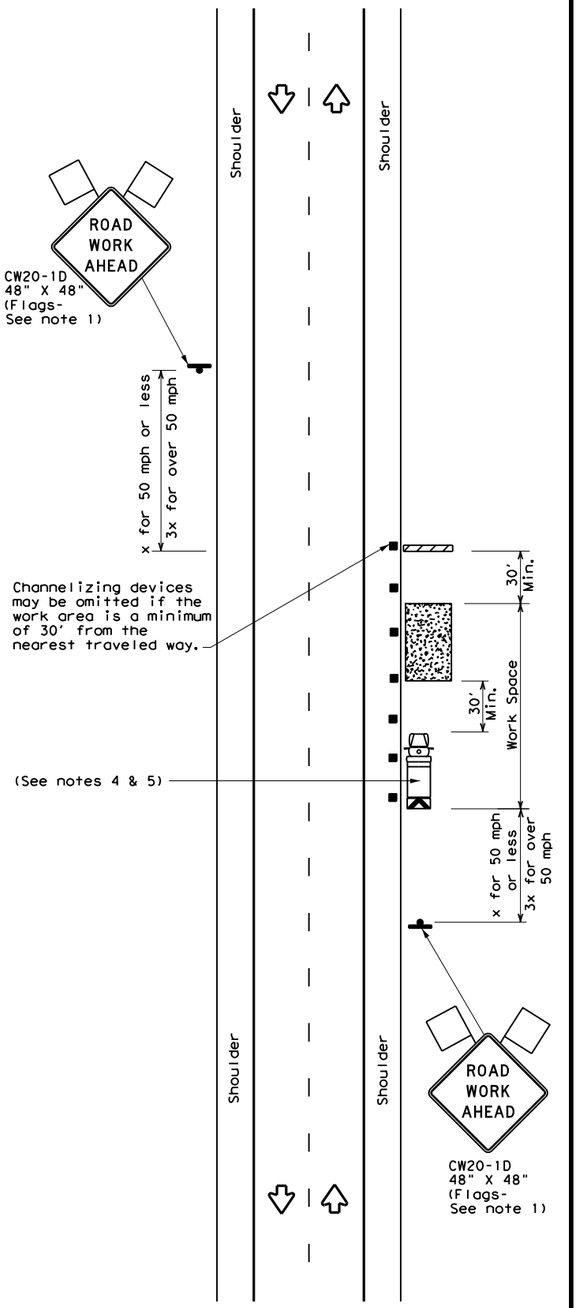
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

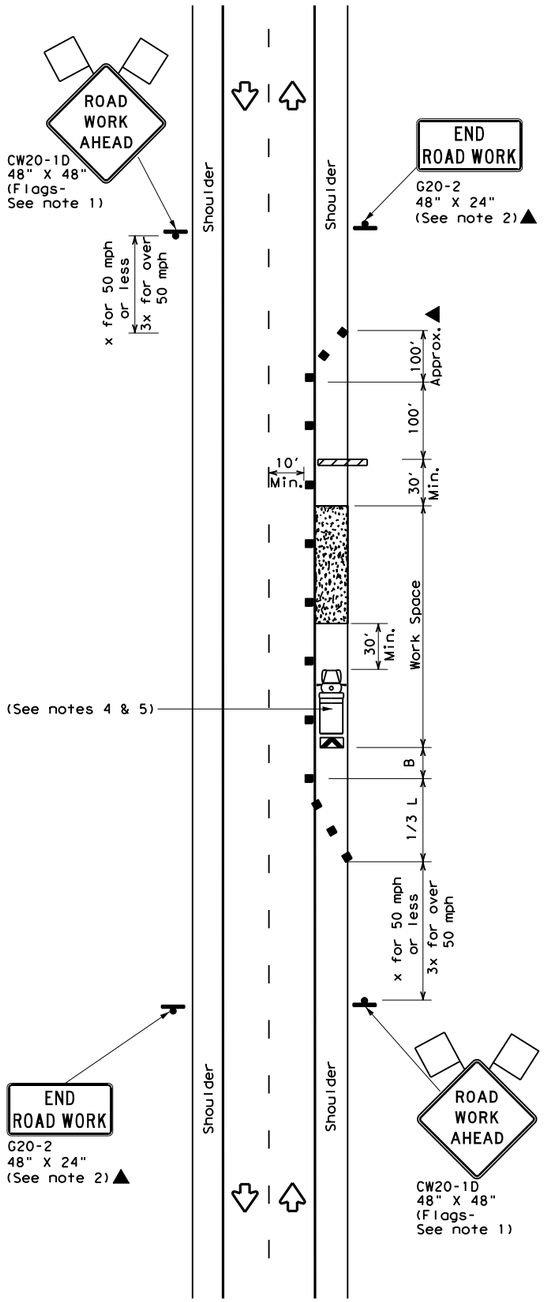
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0002	04	035,ETC.	SH 20
	DIST	COUNTY		SHEET NO.
	ELP	HUDSPETH		28

DATE: 11/1/2023 11:24:09 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/00020403/4 - Design/Plan Set/13. Standards/Traffic Control Plan Standards/TCP (2-1)-18.dgn



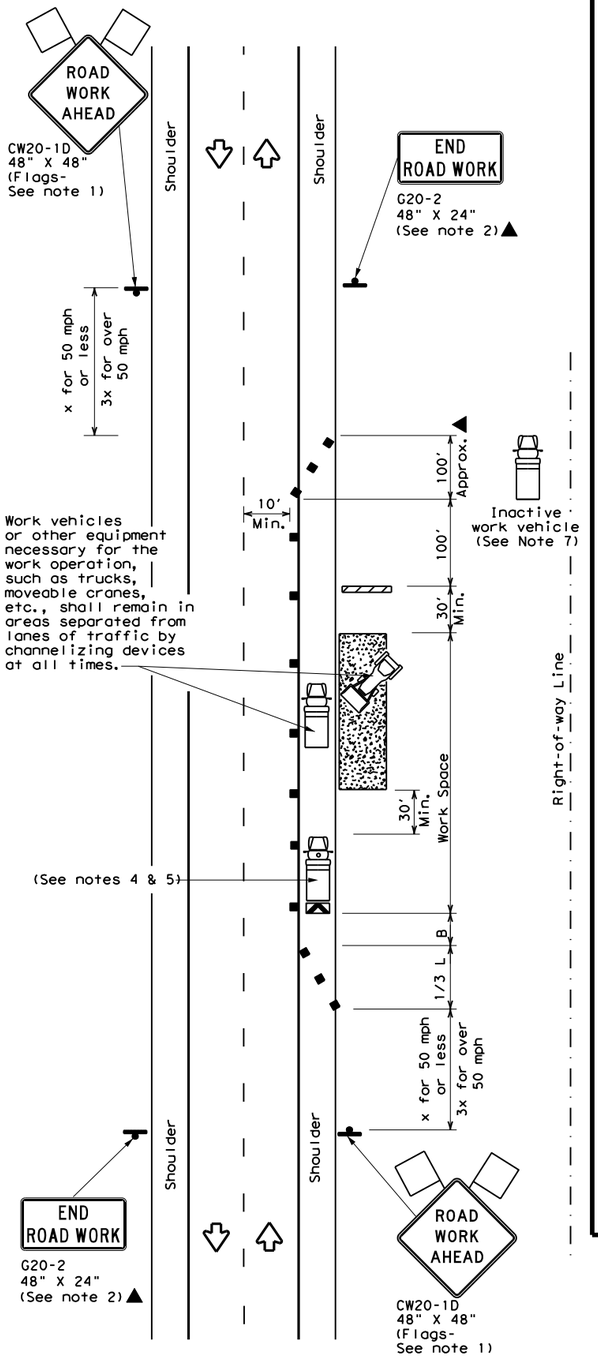
TCP (2-1a)

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

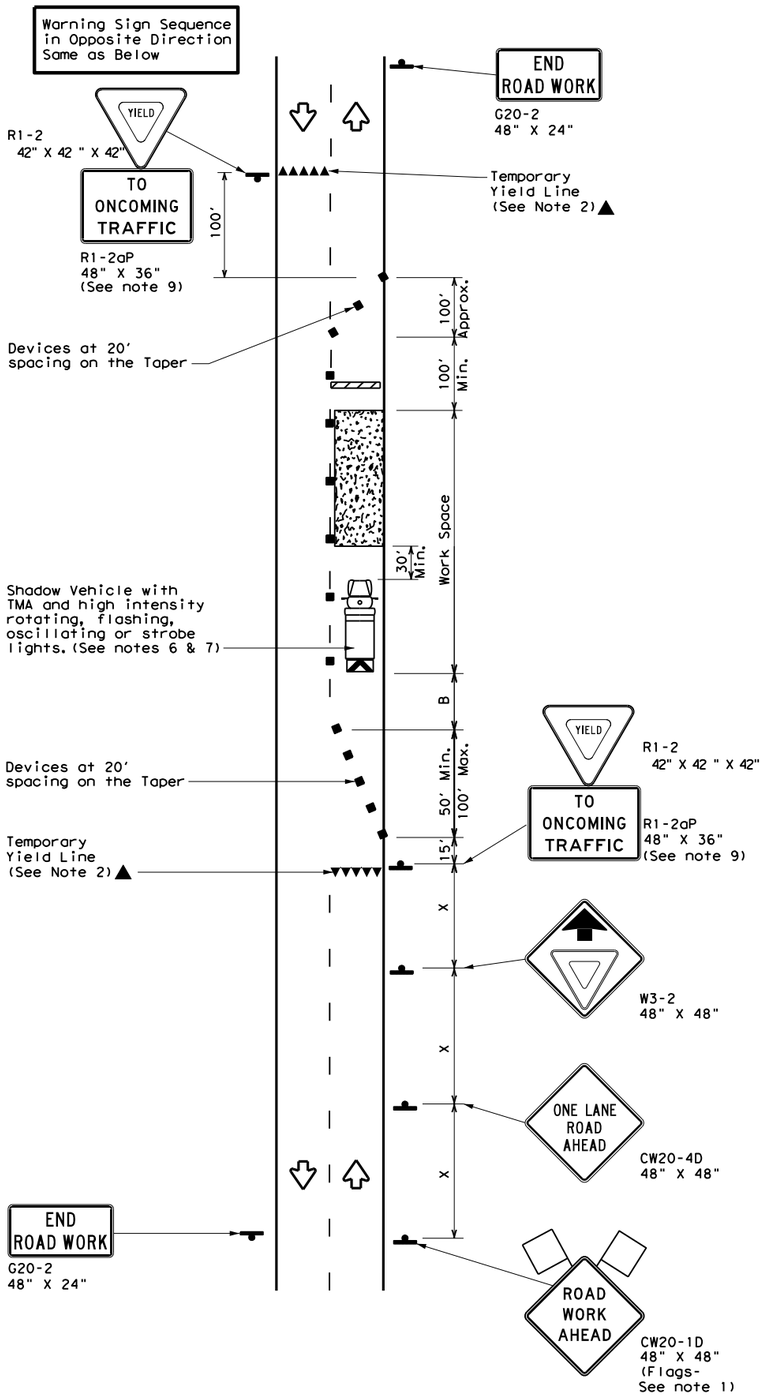
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

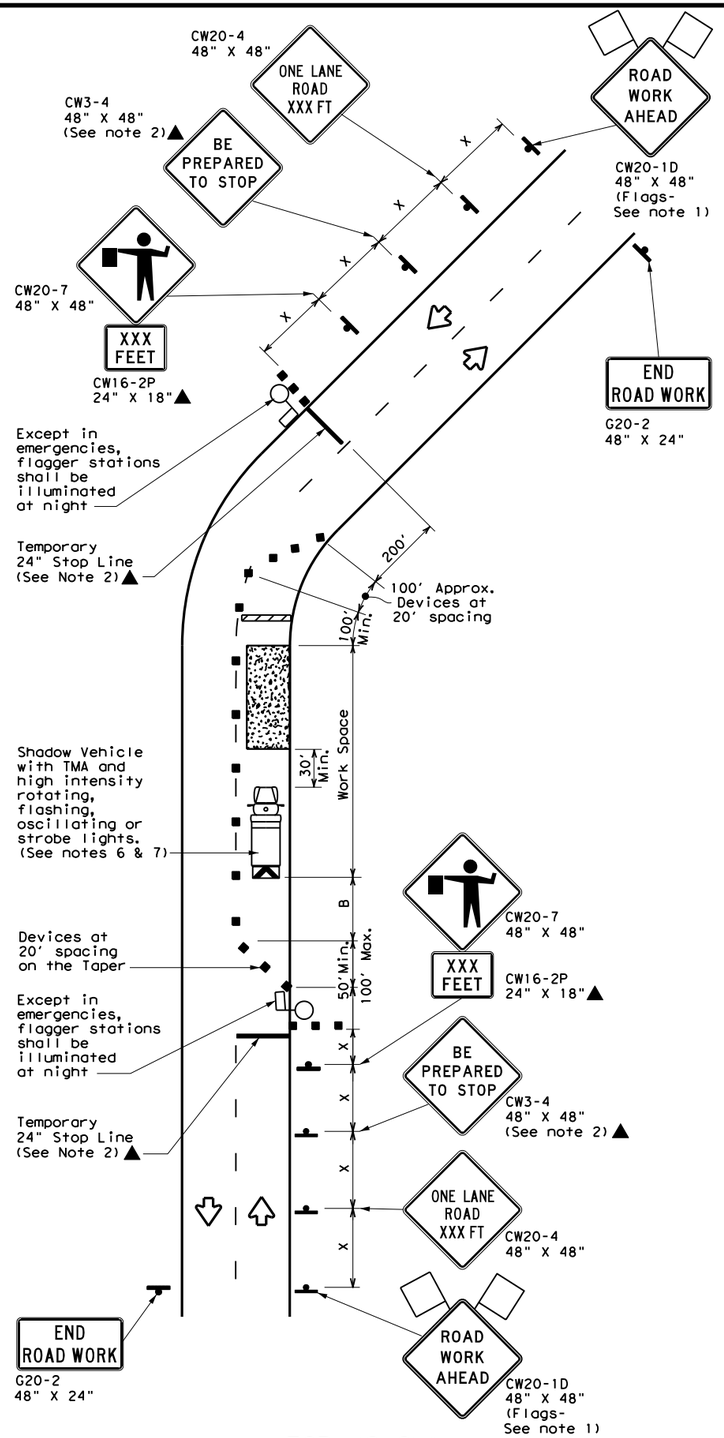
TCP(2-1)-18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035,ETC.	SH 20
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	ELP	HUDSPETH		29
1-97 2-18				

DATE: 11/1/2023 11:24:29 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/000204035/4 - Design/Plan Set/13. Standards/Traffic Control Plan Standards/TCP (2-2)-18.dgn



TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



TCP (2-2b)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH FLAGGERS

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"	Stopping Sight Distance
30		150'	165'	180'	30'	60'	120'	90'	200'
35	$L = \frac{WS^2}{60}$	205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45		450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55	L=WS	550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

* 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 CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4 "ONE LANE ROAD XXX FT" sign, but proper sign spacing shall be maintained.
4. Flaggers should use two-way radios or other methods of communication to control traffic.
5. Length of work space should be based on the ability of flaggers to communicate.
6. 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.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-2a)

8. The R1-2 "YIELD" sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work space should be no longer than one half city block. In rural areas, roadways with less than 2000 ADT, work space should be no longer than 400 feet.
9. The R1-2aP "YIELD TO ONCOMING TRAFFIC" sign shall be placed on a support at a 7 foot minimum mounting height.

TCP (2-2b)

10. Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain stopping sight distance to the flagger and a queue of stopped vehicles. (See table above).
12. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situtations.

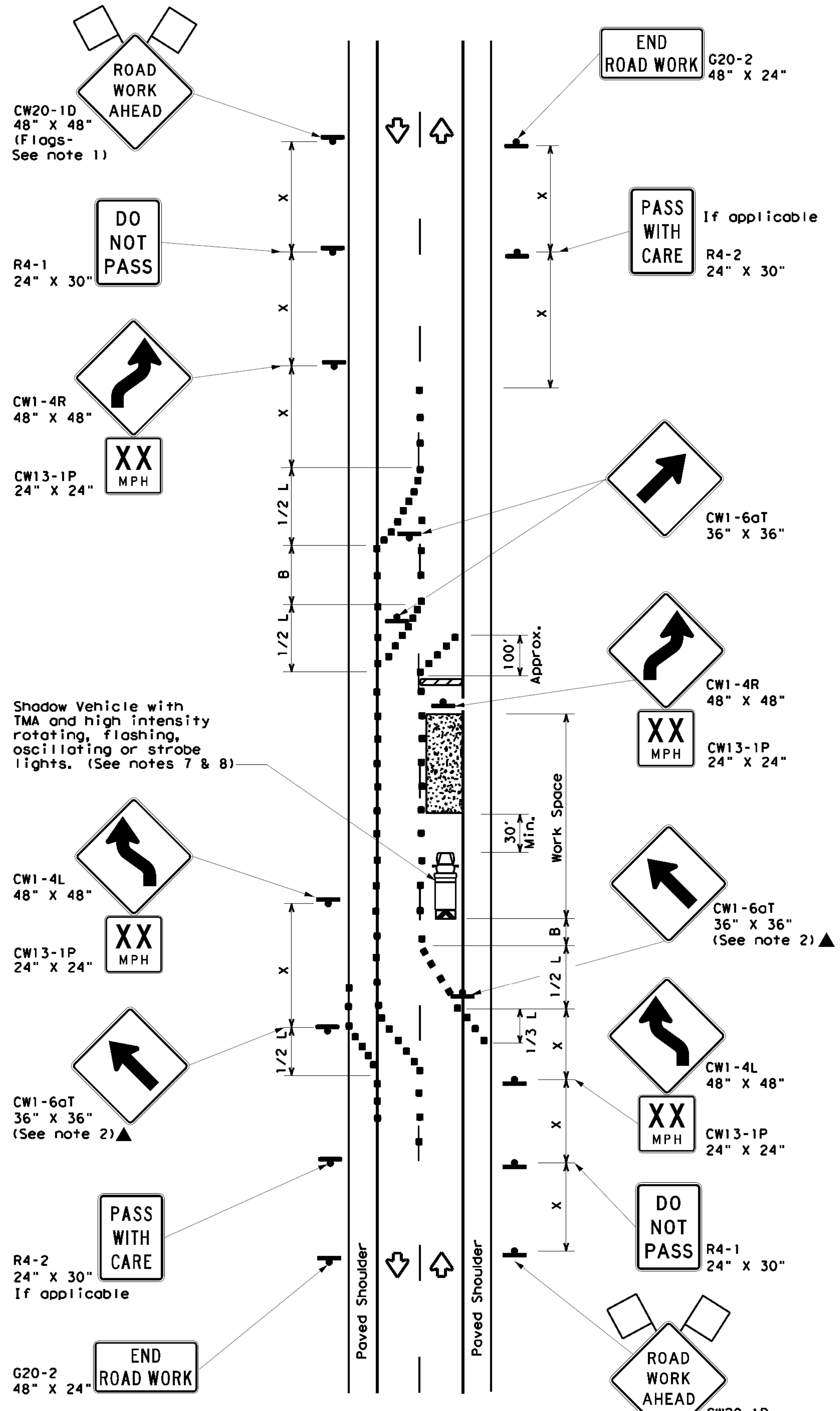
Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

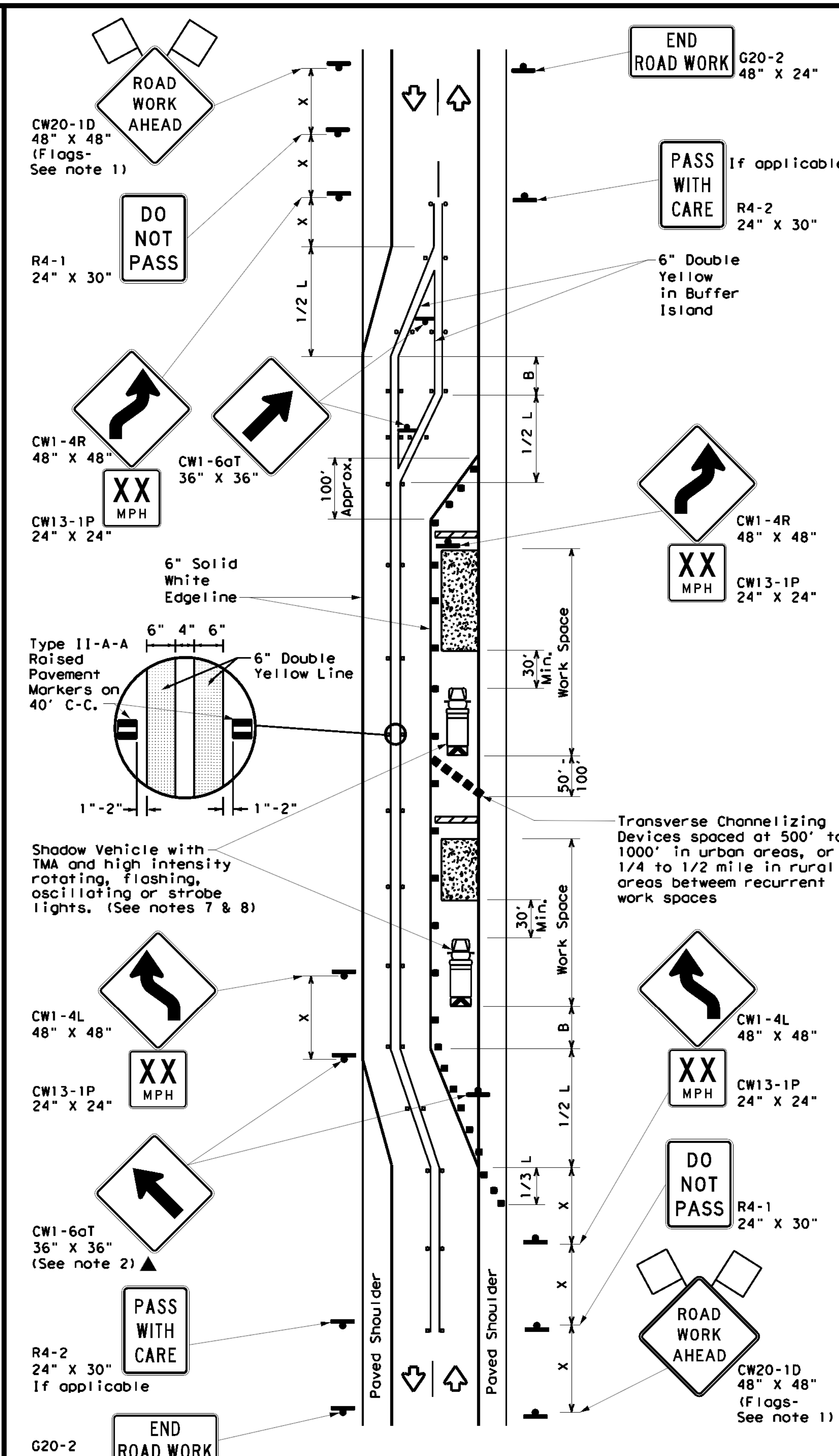
TCP(2-2)-18

FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03 1-97 2-12 4-98 2-18	0002	04	035,ETC.	SH 20
	DIST	COUNTY		SHEET NO.
	ELP	HUDSPETH		30

DATE: 11/1/2023 11:24:49 AM
FILE: pw://txdot.projectwiseonline.com:TXDOTS/Documents/24 - ELP/Design Projects/...



TCP (2-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS
ONE LANE CLOSED
ADEQUATE FIELD OF VIEW



TCP (2-3b)
2-LANE ROADWAY WITH PAVED SHOULDERS
ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

LEGEND

Symbol	Description	Symbol	Description
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Raised Pavement Markers Ty II-AA
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
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 TCP(2-3b)ONLY
			✓	✓

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. When work space will be in place less than three days existing pavement markings may remain in place. Channelizing devices shall be used to separate traffic.
4. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Flagger should be positioned at end of traffic queue.
5. The R4-1 "DO NOT PASS," R4-2 " PASS WITH CARE" and construction regulatory speed zone signs may be installed within CW20-1D "ROAD WORK AHEAD" signs. Proper spacing of signs shall be maintained.
6. Conflicting pavement marking shall be removed for long term projects.
7. 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.
8. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-3a)

9. Conflicting pavement markings shall be removed for long-term projects. 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 device spacing is intended for the area of the conflicting markings, not the entire work zone.

Texas Department of Transportation — Traffic Safety Division Standard

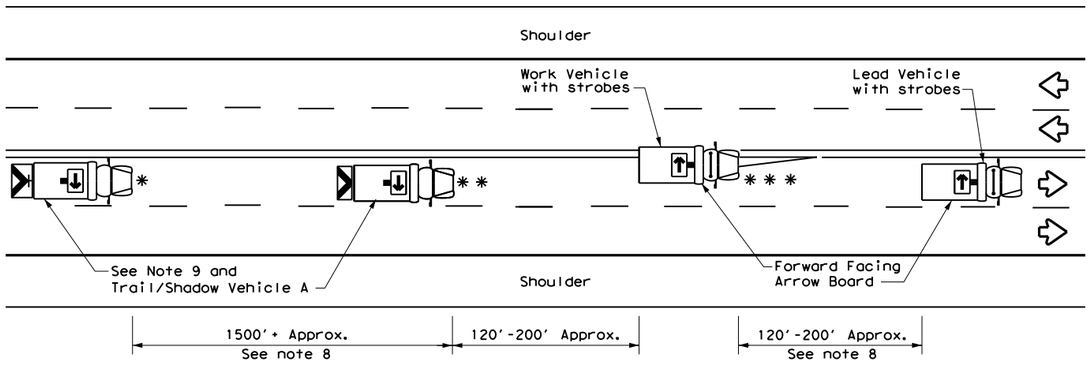
TRAFFIC CONTROL PLAN
TRAFFIC SHIFTS ON TWO-LANE ROADS

TCP(2-3)-23

FILE: tcp(2-3)-23.dgn	DN:	CK:	DW:	CK:	
©TxDOT April 2023	CONT	SECT	JOB	HIGHWAY	
REVISIONS 12-85 4-98 2-18 / 8-95 3-03 4-23 / 1-97 2-12	0002	04	035, ETC.	SH 20	
	DIST	COUNTY		SHEET NO.	
	ELP	HUDSPETH		31	

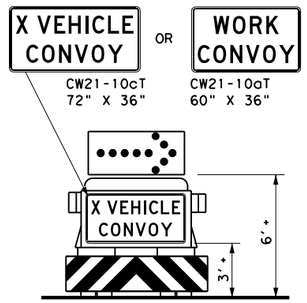
163

DATE: 11/1/2023 11:25:07 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Plan Set/13. Standards/Traffic Control Plan Standards/TCP (3-1)-13.dgn



TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

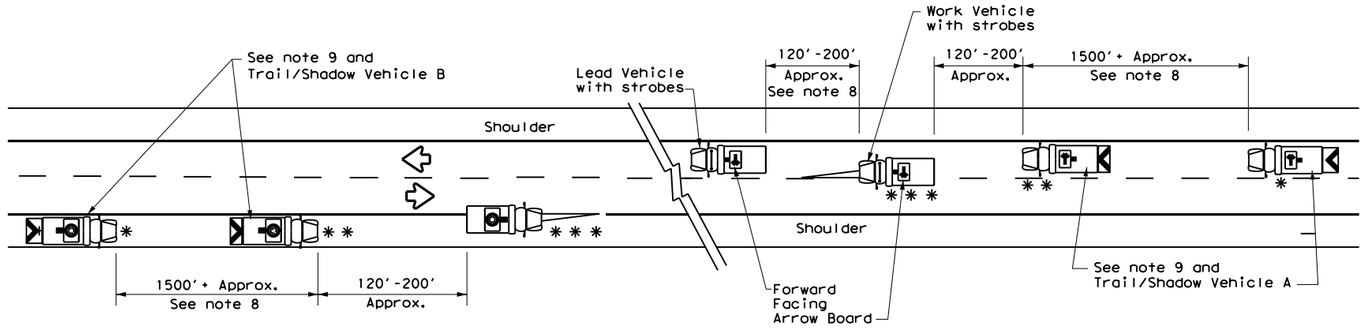
with RIGHT Directional display Flashing Arrow Board

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.

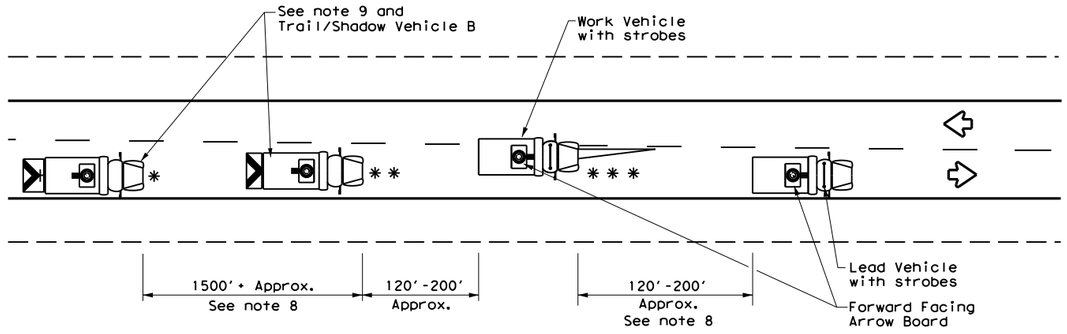


WORK ON SHOULDER

WORK ON TRAVEL LANE

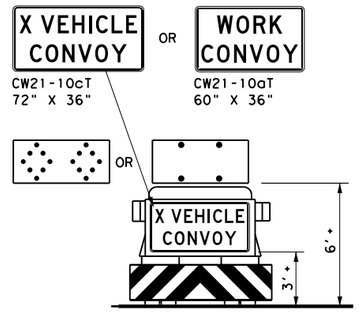
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



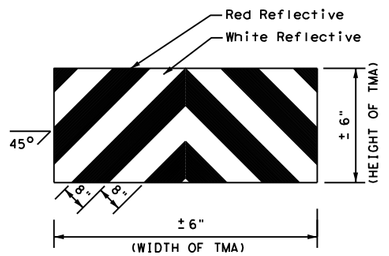
TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board in CAUTION display



STRIPING FOR TMA

Texas Department of Transportation

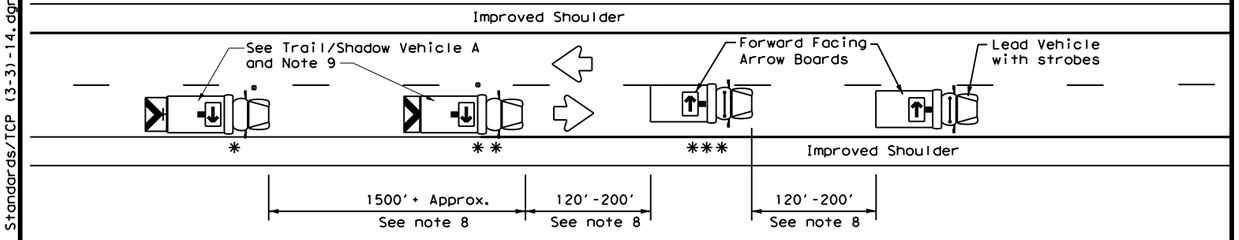
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

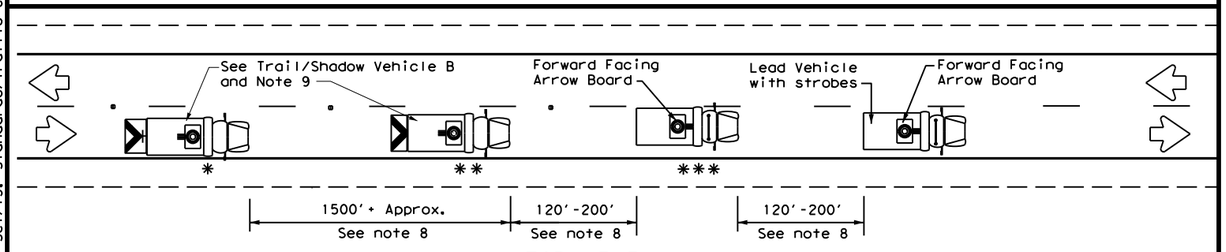
FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035,ETC.	SH 20
2-94 4-98 8-95 7-13 1-97	DIST	COUNTY		SHEET NO.
	ELP	HUDSPETH		32

DATE: 11/1/2023 11:25:24 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040354 - Design/Plan Set/13. Standards/Traffic Control Plan Standards/TCP (3-3)-14.dgn



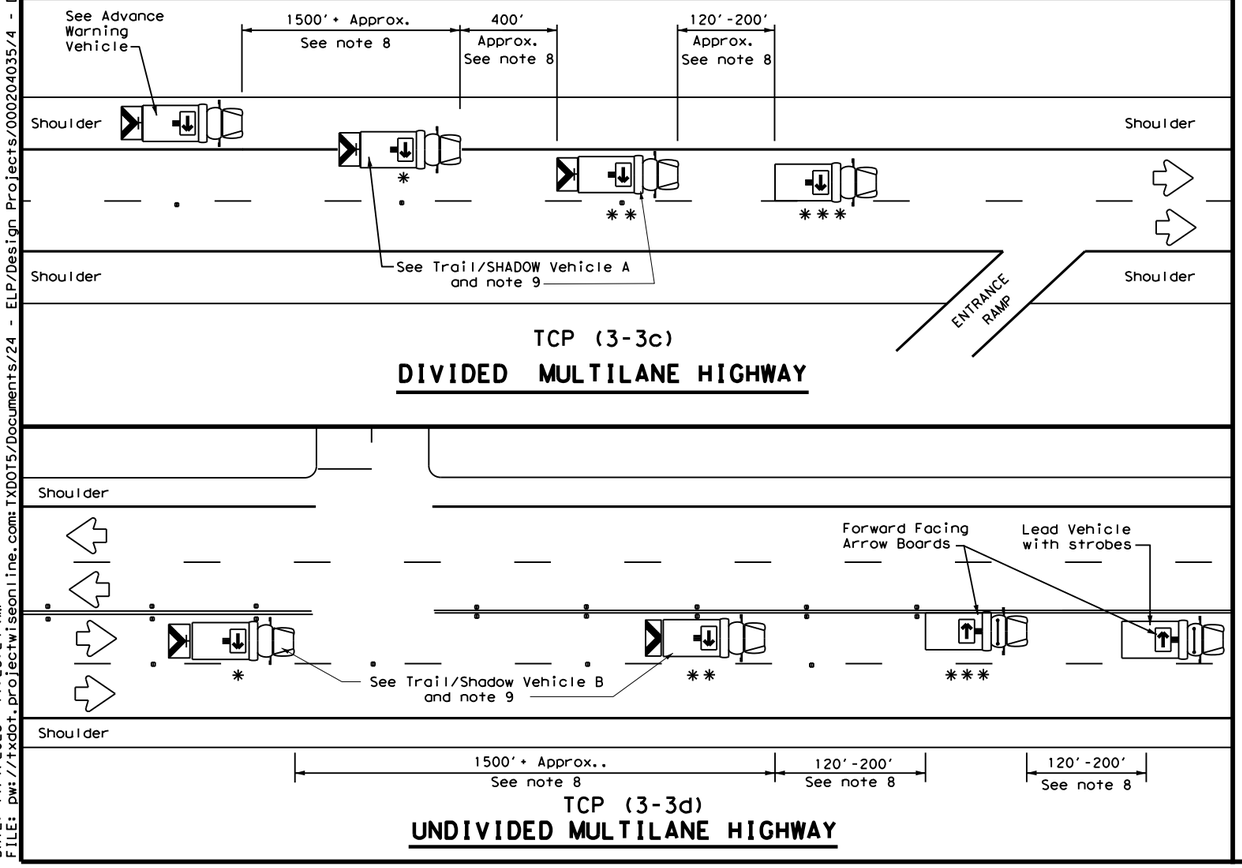
TCP (3-3a)

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



TCP (3-3b)

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

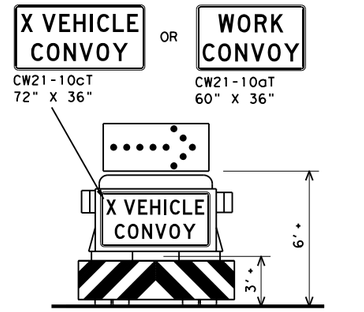


TCP (3-3c)

DIVIDED MULTILANE HIGHWAY

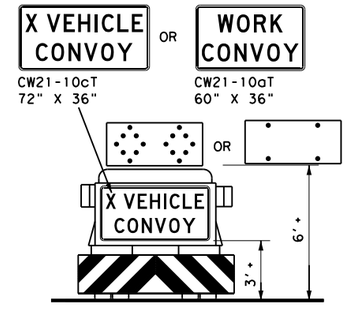
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



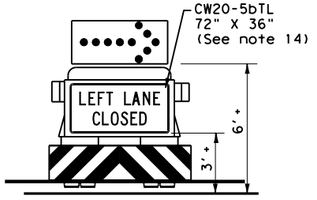
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

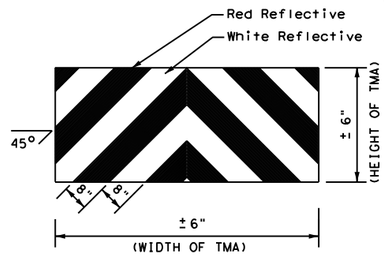


TRAIL/SHADOW VEHICLE B

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.

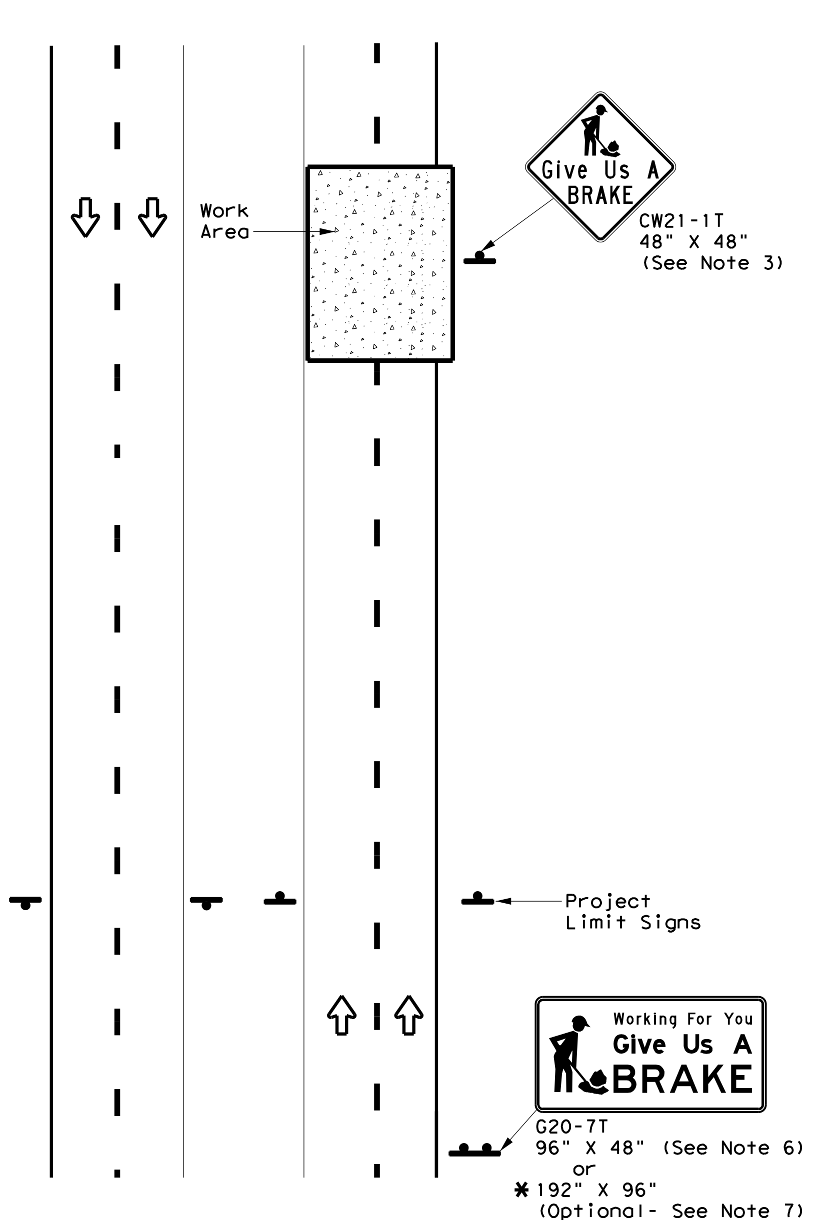
Texas Department of Transportation

Traffic Operations Division Standard

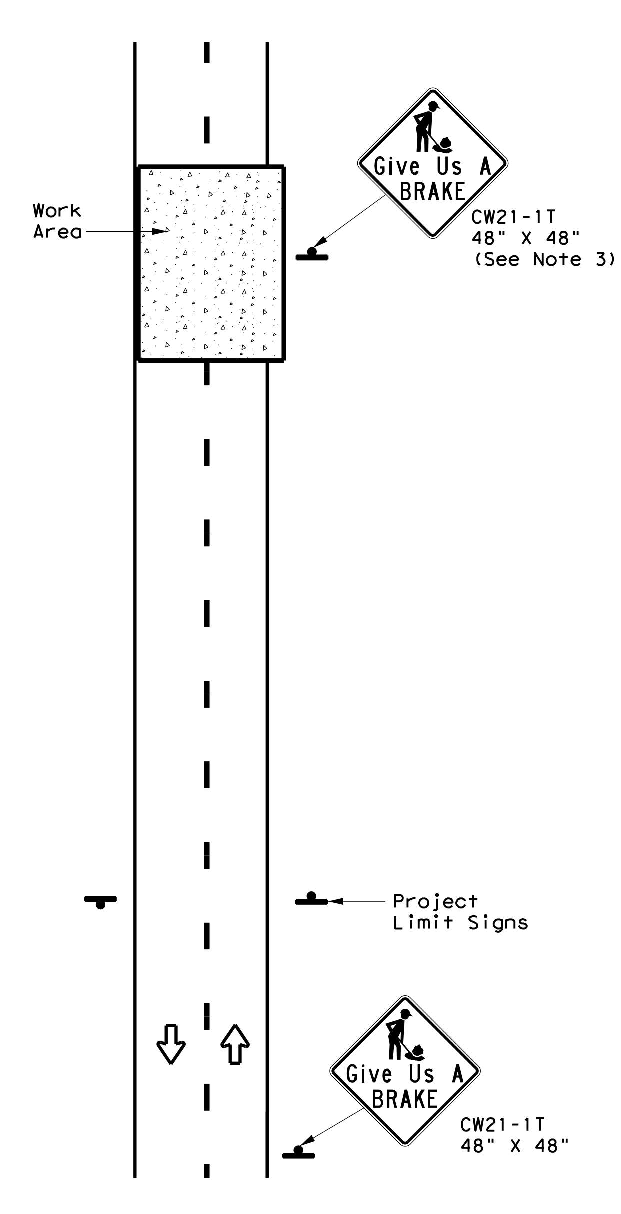
TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL

TCP(3-3)-14

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035,ETC.	SH 20
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	ELP	HUDSPETH		33
1-97 7-14				



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 Size	(LF) ①	(LF) ②	DRILLED SHAFT 24" DIA. (LF)
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

Symbol	Meaning
(sign symbol)	Sign
(large sign symbol)	Large Sign
(arrow)	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

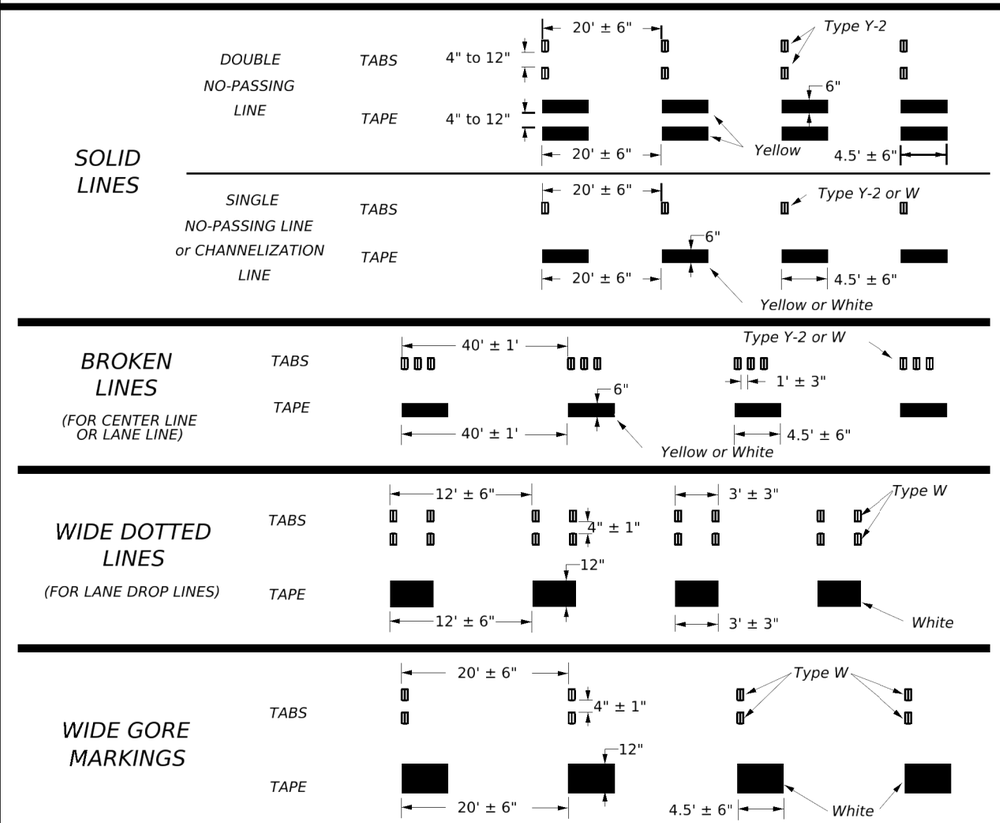
WZ(BRK)-13

FILE: wzbrk-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT 0002	SECT 04	JOB 035, ETC.	HIGHWAY SH 20
REVISIONS 6-96 5-98 7-13 8-96 3-03	DIST ELP		COUNTY HUDSPETH	SHEET NO. 34

116

DATE: 11/1/2023 11:26:05 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040354 - Design/Plan Set/13. Standards/wzstpm-23.dgn

WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



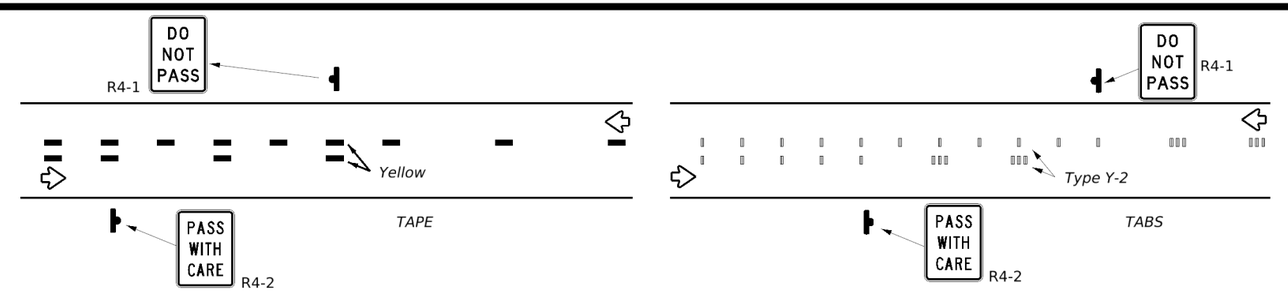
NOTES:

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.

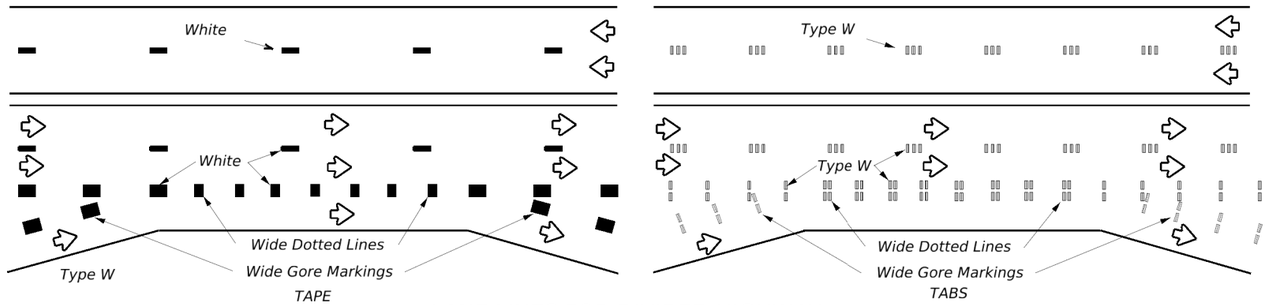
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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.

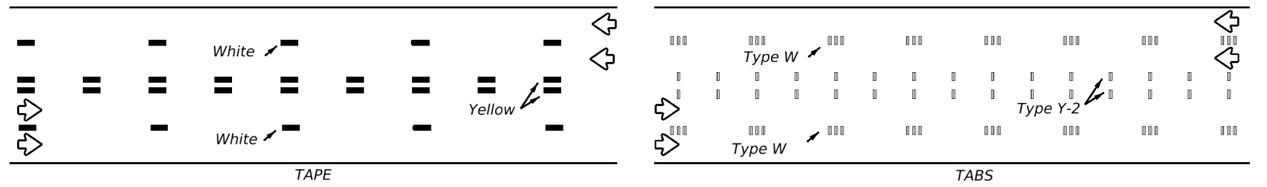
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



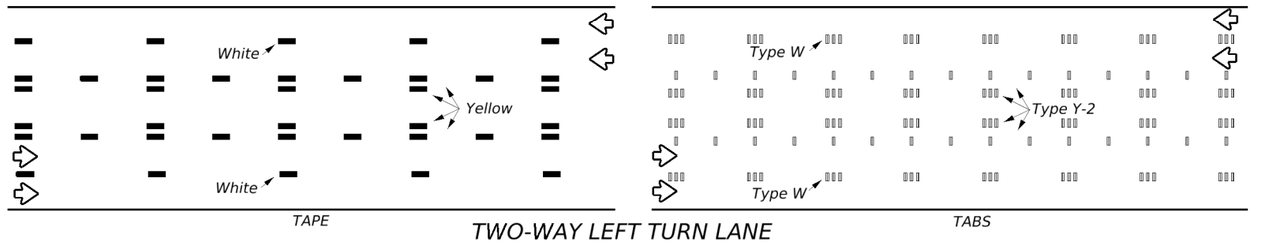
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



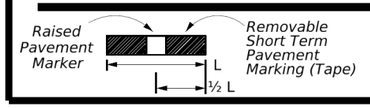
LANE LINES FOR DIVIDED HIGHWAY



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

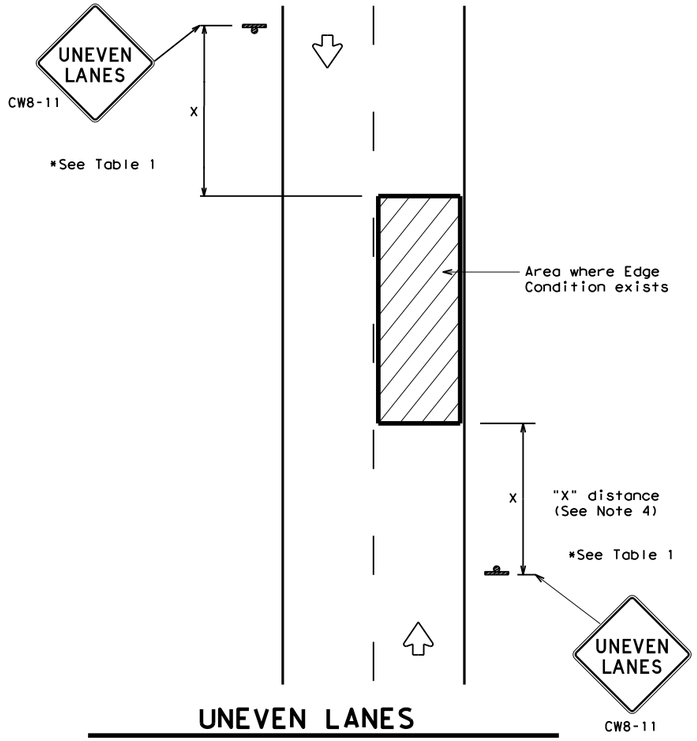
Traffic Safety Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

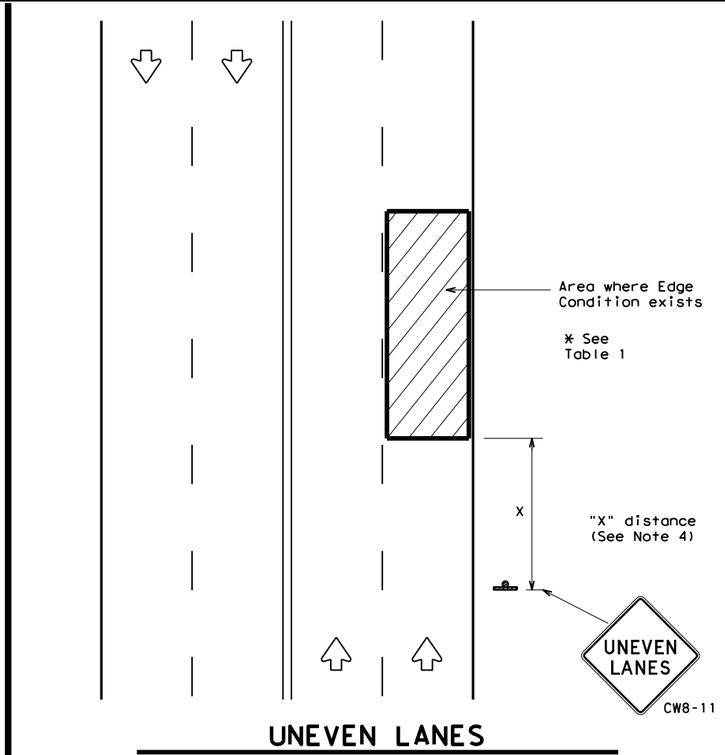
WZ(STPM)-23

FILE: wzstpm-23.dgn	DN:	CK:	DW:	CK:
© TxDOT February 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035,ETC.	SH 20
4-92 7-13	DIST	COUNTY		SHEET NO.
1-97 2-23	ELP	HUDSPETH		35
3-03				

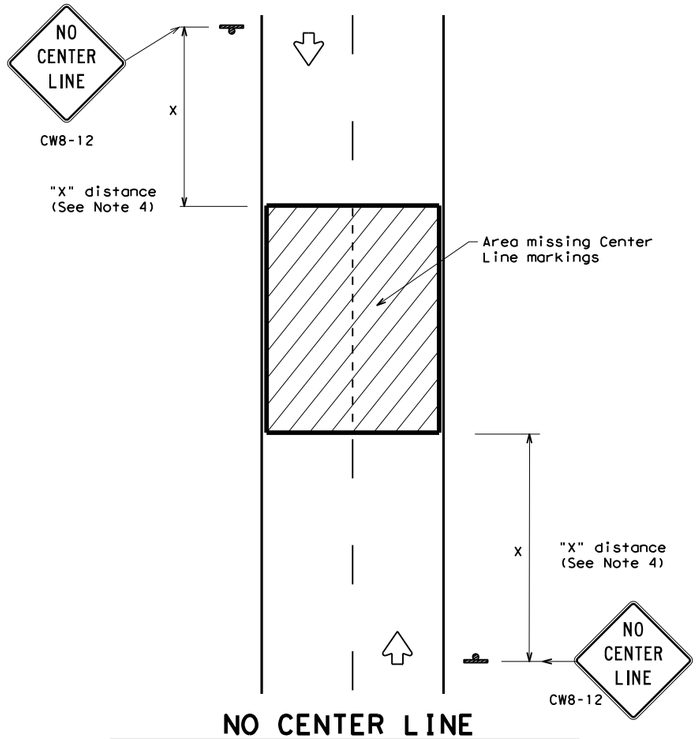
DATE: 11/1/2023 11:26:23 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Plan Set/13. Standards/Traffic Control Plan Standards/WZ (UL)-13.dgn



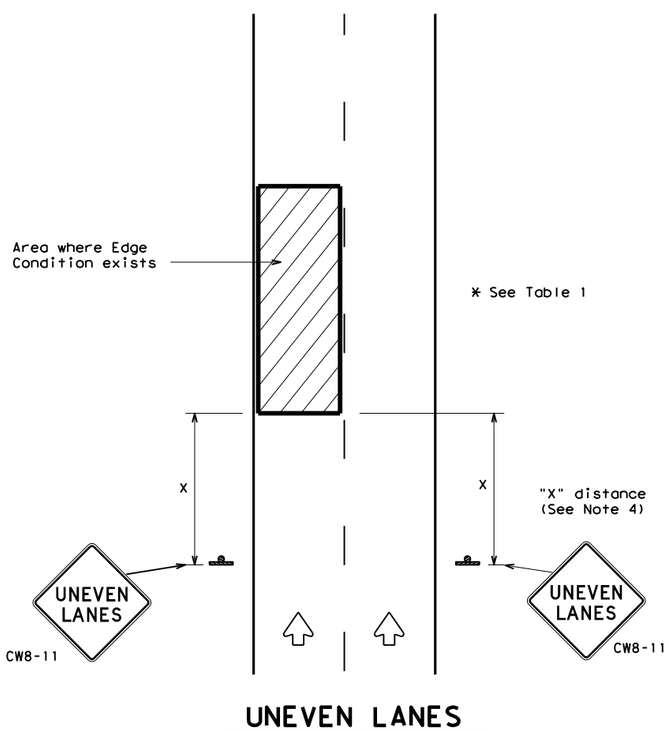
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

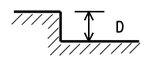
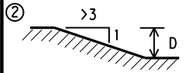
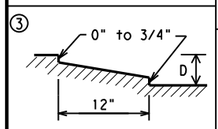
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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"

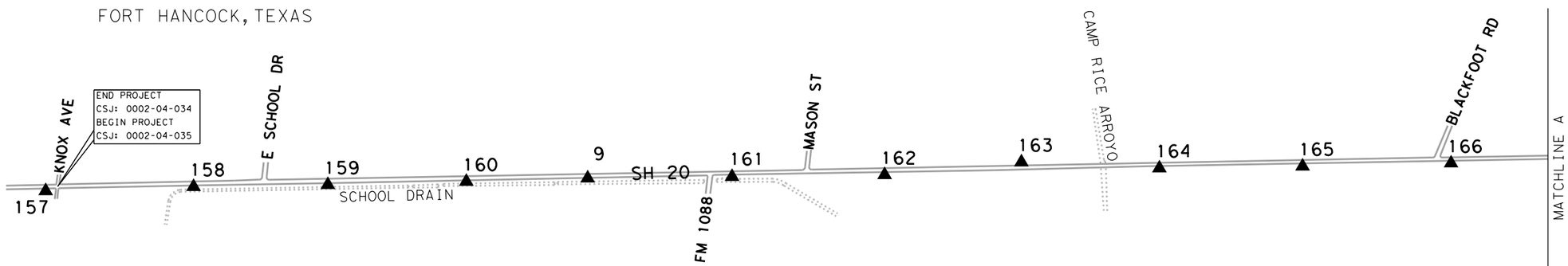
Texas Department of Transportation

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		0002	04	035,ETC.	SH 20
8-95 2-98 7-13		DIST	COUNTY		SHEET NO.
1-97 3-03		ELP	HUDSPETH		36



LEGEND

▲ SURVEY CONTROL MONUMENT

NOTES:

1. ALL COORDINATES ARE BASED ON NORTH AMERICAN DATUM OF 1983 (NAD 83) (2011 ADJUSTMENT), EPOCH 2010.00, TEXAS COORDINATE SYSTEM, CENTRAL ZONE. ALL DISTANCES ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE SURFACE ADJUSTMENT FACTOR OF 1.000231. ALL MEASUREMENTS ARE IN U.S. SURVEY FEET.

2. TXDOT MONUMENTS 3, 4, 7, 8, 9, & 11 WERE HELD FOR HORIZONTAL CONTROL, AS PUBLISHED. HORIZONTAL SURVEY METHOD: STATIC GPS.

3. ALL ELEVATIONS ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), USING GEOID 12B.

4. TXDOT MONUMENTS 7, 8, 10, & 11 WERE HELD FOR VERTICAL CONTROL, AS PUBLISHED. VERTICAL SURVEY METHOD: DIGITAL LEVEL.

5. SURVEY CONTROL MEETS THE SPECIFICATIONS FOR TXDOT SURVEY LEVEL 2 AND 3 GPS SURVEYS.

STATE OF TEXAS
REGISTERED
ROBERT M ANGUIANO
6347
PROFESSIONAL
LAND SURVEYOR

02/28/2022

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND AND UNDER MY SUPERVISION.

Survey Control Monument Inverse Table			
157	158	S51°37'36"E	979.51'
158	159	S50°52'48"E	889.44'
159	160	S51°17'09"E	917.11'
160	9	S51°34'04"E	803.71'
9	161	S50°37'01"E	955.82'
161	162	S50°41'30"E	1,010.33'
162	163	S55°19'37"E	909.85'
163	164	S47°31'45"E	914.71'
164	165	S50°44'11"E	948.20'
165	166	S51°10'13"E	983.14'
166	167	S51°42'52"E	960.53'

CONTROL POINT NAME	PUBLISHED INFORMATION			OBSERVED INFORMATION			DIFFERENCE			MONUMENT DESCRIPTION
	N COORD.	E COORD.	ELEV.	N COORD.	E COORD.	ELEV.	N COORD.	E COORD.	ELEV.	
9	10,475,805.00*	575,509.20*	3,525.71'	10,475,805.00	575,509.20	3,525.62'	0.00	0.00	0.09'	3-1/4" TXDOT ALUMINUM CAP FOUND IN CONCRETE
158				10,477,439.36	573,473.97	3,527.02'				3-1/4" TXDOT ALUMINUM CAP SET ATOP A 5/8" IRON ROD
159				10,476,878.17	574,164.02	3,526.77'				3-1/4" TXDOT ALUMINUM CAP SET ATOP A 5/8" IRON ROD
160				10,476,304.58	574,879.62	3,526.25'				3-1/4" TXDOT ALUMINUM CAP SET ATOP A 5/8" IRON ROD
161				10,475,198.53	576,247.97	3,525.35'				3-1/4" TXDOT ALUMINUM CAP SET ATOP A 5/8" IRON ROD
162				10,474,558.49	577,029.71	3,527.82'				3-1/4" TXDOT ALUMINUM CAP SET ATOP A 5/8" IRON ROD
163				10,474,040.88	577,777.99	3,532.81'				3-1/4" TXDOT ALUMINUM CAP SET ATOP A 5/8" IRON ROD
164				10,473,423.26	578,452.69	3,532.93'				3-1/4" TXDOT ALUMINUM CAP SET ATOP A 5/8" IRON ROD
165				10,472,823.15	579,186.83	3,526.42'				3-1/4" TXDOT ALUMINUM CAP SET ATOP A 5/8" IRON ROD
166				10,472,206.72	579,952.71	3,525.66'				3-1/4" TXDOT ALUMINUM CAP SET ATOP A 5/8" IRON ROD
*HELD INFORMATION										

GRAPHIC SCALE

0' 100' 200' 800'

SCALE: 1"=400' (22" x 34")
SCALE: 1"=800' (11" x 17")

UNIT OF MEASUREMENT: U.S. SURVEY FEET

THE SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E.

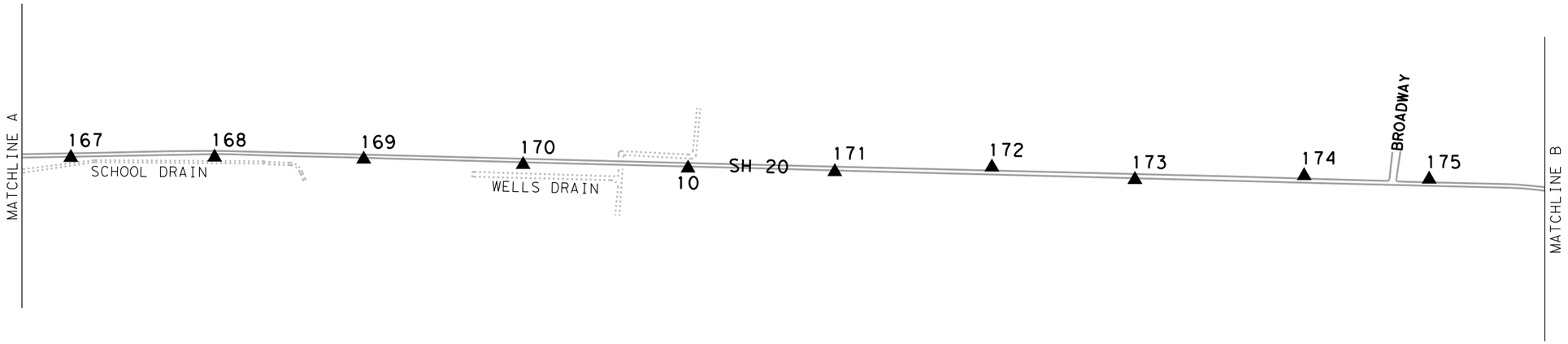
Texas Department of Transportation

VICKREY & ASSOCIATES, LLC.
CONSULTING ENGINEERS
CIVIL • ENVIRONMENTAL • SURVEY
12940 Country Parkway
San Antonio, TX 78216
Telephone: (210) 349-3271
TBPELS #10004100

SH 20
SURVEY CONTROL INDEX SHEET

SHEET 1 OF 3

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
	TEXAS					SH 20
STATE DIST. NO.	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
ELP	HUDSPETH		0002	04	035	37



LEGEND

▲ SURVEY CONTROL MONUMENT

NOTES:

1. ALL COORDINATES ARE BASED ON NORTH AMERICAN DATUM OF 1983 (NAD 83) (2011 ADJUSTMENT), EPOCH 2010.00, TEXAS COORDINATE SYSTEM, CENTRAL ZONE. ALL DISTANCES ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE SURFACE ADJUSTMENT FACTOR OF 1.000231. ALL MEASUREMENTS ARE IN U.S. SURVEY FEET.

2. TXDOT MONUMENTS 3, 4, 7, 8, 9, & 11 WERE HELD FOR HORIZONTAL CONTROL, AS PUBLISHED. HORIZONTAL SURVEY METHOD: STATIC GPS.

3. ALL ELEVATIONS ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), USING GEOID 12B.

4. TXDOT MONUMENTS 7, 8, 10, & 11 WERE HELD FOR VERTICAL CONTROL, AS PUBLISHED. VERTICAL SURVEY METHOD: DIGITAL LEVEL.

5. SURVEY CONTROL MEETS THE SPECIFICATIONS FOR TXDOT SURVEY LEVEL 2 AND 3 GPS SURVEYS.

STATE OF TEXAS
REGISTERED
ROBERT M ANGUIANO
6347
PROFESSIONAL
LAND SURVEYOR

02/28/2022

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND AND UNDER MY SUPERVISION.

Survey Control Monument Inverse Table			
166	167	S51°42'52"E	960.53'
167	168	S50°09'07"E	934.13'
168	169	S49°11'03"E	968.80'
169	170	S48°06'29"E	1,036.13'
170	10	S48°45'11"E	1,071.70'
10	171	S48°35'06"E	953.86'
171	172	S51°40'27"E	1,021.03'
172	173	S45°02'40"E	932.62'
173	174	S51°17'55"E	1,100.21'
174	175	S48°24'02"E	812.38'
175	176	S44°39'57"E	1,069.89'

CONTROL POINT NAME	PUBLISHED INFORMATION			OBSERVED INFORMATION			DIFFERENCE			MONUMENT DESCRIPTION
	N COORD.	E COORD.	ELEV.	N COORD.	E COORD.	ELEV.	N COORD.	E COORD.	ELEV.	
10	10,468,981.41	583,734.10	3,517.99'*	10,468,981.38	583,734.12	3,517.99'	0.03	0.02	0.00'	3-1/4" TXDOT ALUMINUM CAP FOUND IN CONCRETE
167				10,471,611.59	580,706.66	3,523.95'				3-1/4" TXDOT ALUMINUM CAP SET ATOP A 5/8" IRON ROD
168				10,471,013.05	581,423.84	3,520.64'				3-1/4" TXDOT ALUMINUM CAP SET ATOP A 5/8" IRON ROD
169				10,470,379.81	582,157.04	3,518.15'				3-1/4" TXDOT ALUMINUM CAP SET ATOP A 5/8" IRON ROD
170				10,469,687.96	582,928.34	3,517.78'				3-1/4" TXDOT ALUMINUM CAP SET ATOP A 5/8" IRON ROD
171				10,468,350.39	584,449.46	3,516.87'				3-1/4" TXDOT ALUMINUM CAP SET ATOP A 5/8" IRON ROD
172				10,467,717.21	585,250.45	3,517.39'				3-1/4" TXDOT ALUMINUM CAP SET ATOP A 5/8" IRON ROD
173				10,467,058.26	585,910.42	3,516.89'				3-1/4" TXDOT ALUMINUM CAP SET ATOP A 5/8" IRON ROD
174				10,466,370.34	586,769.04	3,526.33'				3-1/4" TXDOT ALUMINUM CAP SET ATOP A 5/8" IRON ROD
175				10,465,830.99	587,376.54	3,536.06'				3-1/4" TXDOT ALUMINUM CAP SET ATOP A 5/8" IRON ROD

*HELD INFORMATION

THE SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E.

GRAPHIC SCALE

0' 200' 400' 800'

SCALE: 1"=400' (22" x 34")
SCALE: 1"=800' (11" x 17")

UNIT OF MEASUREMENT: U.S. SURVEY FEET

Texas Department of Transportation

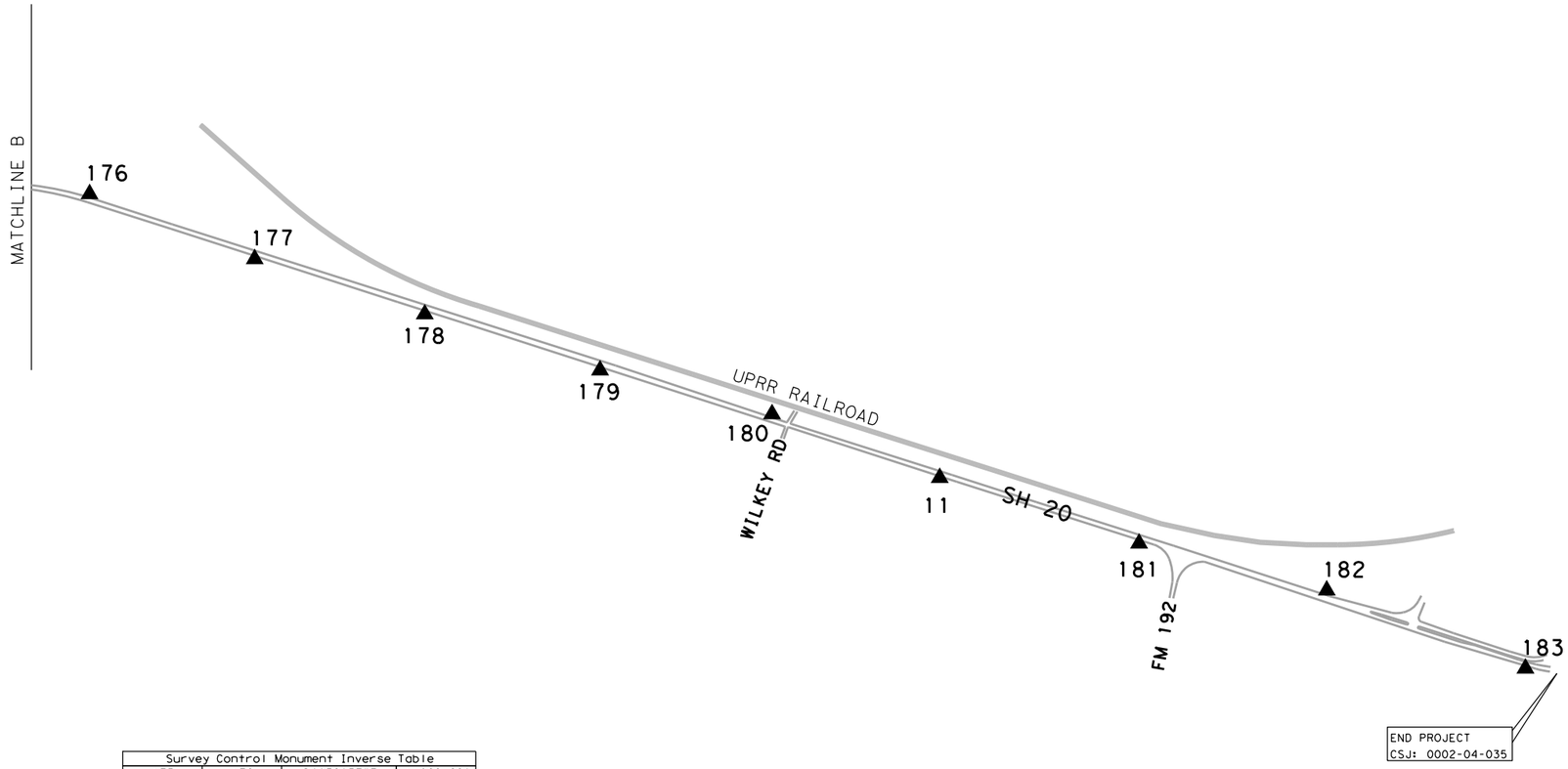
VICKREY & ASSOCIATES, LLC.
CONSULTING ENGINEERS
CIVIL • ENVIRONMENTAL • SURVEY
12940 Country Parkway
San Antonio, TX 78216
Telephone: (210) 349-3271
TBPELS #10004100

SH 20

SURVEY CONTROL INDEX SHEET

SHEET 2 OF 3

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
	TEXAS				SH 20
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
ELP	HUDSPETH	0002	04	035	38



LEGEND

▲ SURVEY CONTROL MONUMENT

NOTES:

1. ALL COORDINATES ARE BASED ON NORTH AMERICAN DATUM OF 1983 (NAD 83) (2011 ADJUSTMENT), EPOCH 2010.00, TEXAS COORDINATE SYSTEM, CENTRAL ZONE. ALL DISTANCES ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE SURFACE ADJUSTMENT FACTOR OF 1.000231. ALL MEASUREMENTS ARE IN U.S. SURVEY FEET.

2. TXDOT MONUMENTS 3, 4, 7, 8, 9, & 11 WERE HELD FOR HORIZONTAL CONTROL, AS PUBLISHED. HORIZONTAL SURVEY METHOD: STATIC GPS.

3. ALL ELEVATIONS ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), USING GEOID 12B.

4. TXDOT MONUMENTS 7, 8, 10, & 11 WERE HELD FOR VERTICAL CONTROL, AS PUBLISHED. VERTICAL SURVEY METHOD: DIGITAL LEVEL.

5. SURVEY CONTROL MEETS THE SPECIFICATIONS FOR TXDOT SURVEY LEVEL 2 AND 3 GPS SURVEYS.

STATE OF TEXAS
REGISTERED
ROBERT M ANGUIANO
6347
PROFESSIONAL
LAND SURVEYOR
02/28/2022

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND AND UNDER MY SUPERVISION.

Survey Control Monument Inverse Table			
175	176	S44°39'57"E	1,069.89'
176	177	S28°29'40"E	959.13'
177	178	S32°01'05"E	966.09'
178	179	S32°14'53"E	994.37'
179	180	S35°42'22"E	958.61'
180	11	S29°10'22"E	969.30'
11	181	S31°47'32"E	1,133.87'
181	182	S35°57'49"E	1,045.09'
182	183	S28°32'33"E	1,153.23'

CONTROL POINT NAME	PUBLISHED INFORMATION			OBSERVED INFORMATION			DIFFERENCE			MONUMENT DESCRIPTION
	N COORD.	E COORD.	ELEV.	N COORD.	E COORD.	ELEV.	N COORD.	E COORD.	ELEV.	
11	10,460,942.25*	590,660.96*	3,575.58'*	10,460,942.25	590,660.96	3,575.58'	0.00	0.00	0.00'	3-1/4" TXDOT ALUMINUM CAP FOUND IN CONCRETE
176				10,465,070.06	588,128.65	3,545.55'				3-1/4" TXDOT ALUMINUM CAP SET ATOP A 5/8" IRON ROD
177				10,464,227.12	588,586.22	3,554.08'				3-1/4" TXDOT ALUMINUM CAP SET ATOP A 5/8" IRON ROD
178				10,463,407.99	589,098.43	3,560.32'				3-1/4" TXDOT ALUMINUM CAP SET ATOP A 5/8" IRON ROD
179				10,462,567.00	589,629.01	3,565.68'				3-1/4" TXDOT ALUMINUM CAP SET ATOP A 5/8" IRON ROD
180				10,461,788.60	590,188.48	3,574.47'				3-1/4" TXDOT ALUMINUM CAP SET ATOP A 5/8" IRON ROD
181				10,459,978.50	591,258.33	3,573.98'				3-1/4" TXDOT ALUMINUM CAP SET ATOP A 5/8" IRON ROD
182				10,459,132.61	591,872.08	3,565.83'				3-1/4" TXDOT ALUMINUM CAP SET ATOP A 5/8" IRON ROD
183				10,458,119.54	592,423.11	3,558.74'				3-1/4" TXDOT ALUMINUM CAP SET ATOP A 5/8" IRON ROD
*HELD INFORMATION										

THE SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E.

GRAPHIC SCALE

0' 200' 400' 800'

SCALE: 1"=400' (22" x 34")
SCALE: 1"=800' (11" x 17")

UNIT OF MEASUREMENT: U.S. SURVEY FEET

Texas Department of Transportation

VICKREY & ASSOCIATES, LLC.
CONSULTING ENGINEERS
CIVIL • ENVIRONMENTAL • SURVEY
12940 Country Parkway
San Antonio, TX 78216
Telephone: (210) 349-3271
TBPELS #10004100

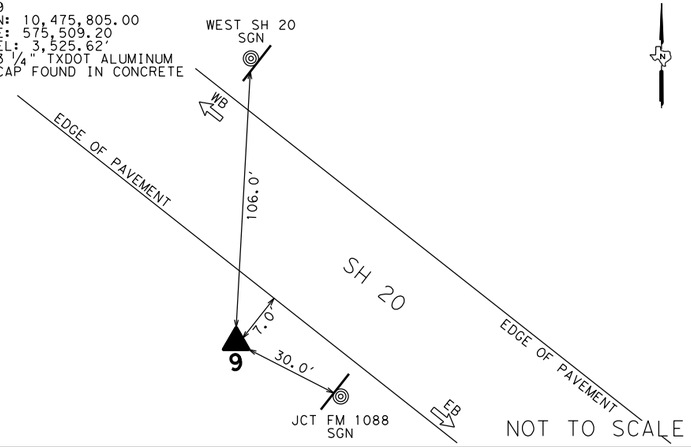
SH 20

SURVEY CONTROL INDEX SHEET

SHEET 3 OF 3

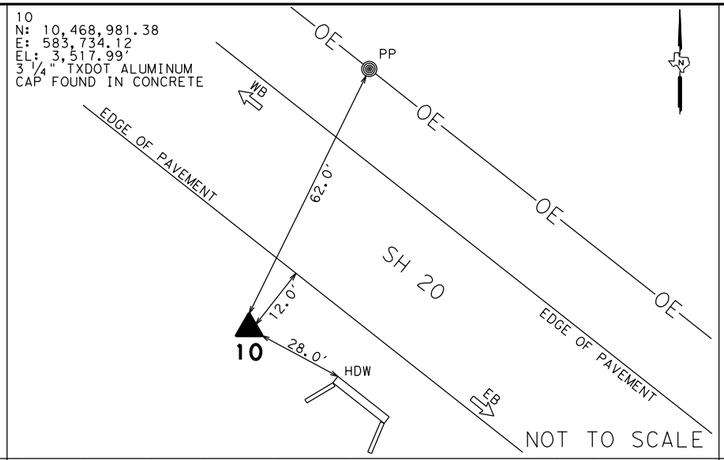
FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
	TEXAS					SH 20
STATE DIST. NO.	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
ELP	HUDSPETH		0002	04	035	39

9
N: 10,475,805.00
E: 575,509.20
EL: 3,525.62'
3 1/4" TXDOT ALUMINUM
CAP FOUND IN CONCRETE



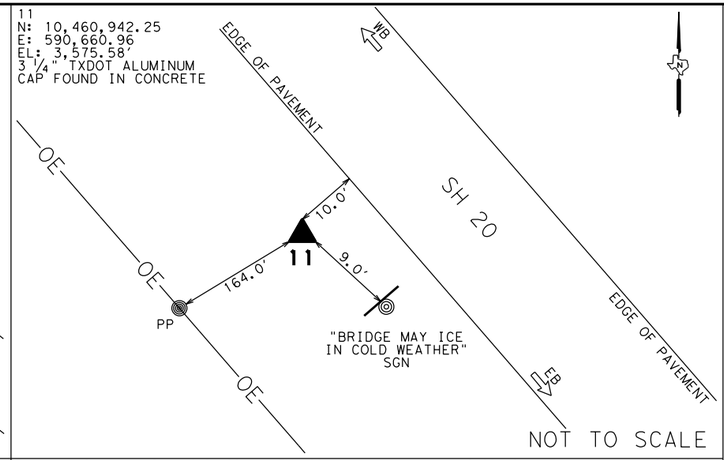
From the intersection of SH 20 and FM 1088, travel north +/- 0.15 mile. The control point is located on the southwest side of SH 20.

10
N: 10,468,981.38
E: 583,734.12
EL: 3,517.99'
3 1/4" TXDOT ALUMINUM
CAP FOUND IN CONCRETE



From the intersection of SH 20 and Broadway Rd., travel north +/- 0.87 mile. The control point is located on the southwest side of SH 20.

11
N: 10,460,942.25
E: 590,660.96
EL: 3,575.58'
3 1/4" TXDOT ALUMINUM
CAP FOUND IN CONCRETE



From the intersection of SH 20 and FM 192, travel north +/- 0.26 mile. The control point is located on the southwest side of SH 20.

NOTES:

1. ALL COORDINATES ARE BASED ON NORTH AMERICAN DATUM OF 1983 (NAD 83) (2011 ADJUSTMENT), EPOCH 2010.00, TEXAS COORDINATE SYSTEM, CENTRAL ZONE. ALL DISTANCES ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE SURFACE ADJUSTMENT FACTOR OF 1.000231. ALL MEASUREMENTS ARE IN U.S. SURVEY FEET.

2. TXDOT MONUMENTS 3, 4, 7, 8, 9, & 11 WERE HELD FOR HORIZONTAL CONTROL, AS PUBLISHED. HORIZONTAL SURVEY METHOD: STATIC GPS.

3. ALL ELEVATIONS ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), USING GEOID 12B.

4. TXDOT MONUMENTS 7, 8, 10, & 11 WERE HELD FOR VERTICAL CONTROL, AS PUBLISHED. VERTICAL SURVEY METHOD: DIGITAL LEVEL.

5. SURVEY CONTROL MEETS THE SPECIFICATIONS FOR TXDOT SURVEY LEVEL 2 AND 3 GPS SURVEYS.

LEGEND

▲	SURVEY CONTROL MONUMENT
HDW	HEADWALL
SGN	SIGN
PP	POWER POLE

STATE OF TEXAS
REGISTERED
ROBERT M ANGUIANO
6347
PROFESSIONAL
LAND SURVEYOR

02/28/2022

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND AND UNDER MY SUPERVISION.

THE SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E

DESIGN ENGINEER DATE

Texas Department of Transportation

VICKREY & ASSOCIATES, LLC.
CONSULTING ENGINEERS
CIVIL • ENVIRONMENTAL • SURVEY
12940 Country Parkway
San Antonio, TX 78216
Telephone: (210) 349-3271
TBPELS #10004100

SH 20

HORIZONTAL & VERTICAL CONTROL SHEET

SHEET 1 OF 1

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
	TEXAS				SH 20
DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
ELP	HUDSPETH	0002	04	035	40

Horizontal Alignment Review Report

Report Created: Wednesday, March 29, 2023
Time: 1:35:07 PM

Project: Default

Description:

File Name: c:\txdot\pw_online\txdot5\marisol.salado\d0842738\SH20_ALGNT.dgn

Last Revised: 3/29/2023 13:34:48

Note: All units in this report are in feet unless specified otherwise.

Alignment Name: SH 20

Alignment Description:

Alignment Style: Alignment\Baseline

		Station	Northing	Easting
Element: Linear				
POT	( )	67800.00 R1	10478098.19	572697.53
PI	( )	72819.08 R1	10474947.63	576604.59
Tangential Direction:		S51.118°E		
Tangential Length:		5019.08		
Element: Linear				
PI	( )	72819.08 R1	10474947.63	576604.59
PI	( )	77122.37 R1	10472246.65	579954.67
Tangential Direction:		S51.123°E		
Tangential Length:		4303.29		
Element: Linear				
PI	( )	77122.37 R1	10472246.65	579954.67
PC	( )	78746.54 R1	10471227.18	581219.03
Tangential Direction:		S51.120°E		
Tangential Length:		1624.17		
Element: Circular				
PC	( )	78746.54 R1	10471227.18	581219.03
PI	( )	79002.24 R1	10471066.68	581418.08
CC	( )		10462573.69	574241.60
PT	( )	79257.85 R1	10470897.19	581609.55
Radius:		11116.08		
Delta:		2.635°	Right	
Degree of Curvature (Arc):		0.515°		
Length:		511.31		
Tangent:		255.70		
Chord:		511.26		
Middle Ordinate:		2.94		
External:		2.94		
Back Tangent Direction:		S51.120°E		
Back Radial Direction:		S38.880°W		
Chord Direction:		S49.803°E		
Ahead Radial Direction:		S41.515°W		
Ahead Tangent Direction:		S48.485°E		
Element: Linear				
PT	( )	79257.85 R1	10470897.19	581609.55
PC	( )	87495.97 R1	10465436.82	587778.08
Tangential Direction:		S48.485°E		
Tangential Length:		8238.12		
Element: Circular				
PC	( )	87495.97 R1	10465436.89	587778.08
PI	( )	87727.01 R1	10465283.68	587951.08
CC	( )		10464199.29	586682.63
PT	( )	87955.07 R1	10465088.97	588075.45
Radius:		1652.73		
Delta:		15.916°	Right	
Degree of Curvature (Arc):		3.467°		
Length:		459.10		
Tangent:		231.04		
Chord:		457.63		
Middle Ordinate:		15.92		
External:		16.07		
Back Tangent Direction:		S48.485°E		
Back Radial Direction:		S41.515°W		
Chord Direction:		S40.527°E		
Ahead Radial Direction:		S57.431°W		
Ahead Tangent Direction:		S32.569°E		
Element: Linear				
PT	( )	87955.07 R1	10465088.97	588075.45
PI	( )	88300.22 R1	10464798.10	588261.25
Tangential Direction:		S32.569°E		
Tangential Length:		345.15		
Element: Linear				
PI	( )	88300.22 R1	10464798.10	588261.25
PI	( )	89624.76 R1	10463677.01	588966.64
Tangential Direction:		S32.178°E		
Tangential Length:		1324.55		
Element: Linear				
PI	( )	89624.76 R1	10463677.01	588966.64
PI	( )	92321.88 R1	10461394.30	590403.18
Tangential Direction:		S32.183°E		
Tangential Length:		2697.11		
Element: Linear				
PI	( )	92321.88 R1	10461394.30	590403.18
POT	( )	95261.91 R1	10458905.56	591968.41
Tangential Direction:		S32.167°E		
Tangential Length:		2940.03		

NOTES:

HORIZONTAL ALIGNMENT IS GENERATED FROM BEST FIT OF EXISTING GROUND LINE AT THE CENTERLINE AND IS PROVIDED FOR INFORMATION ONLY.

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

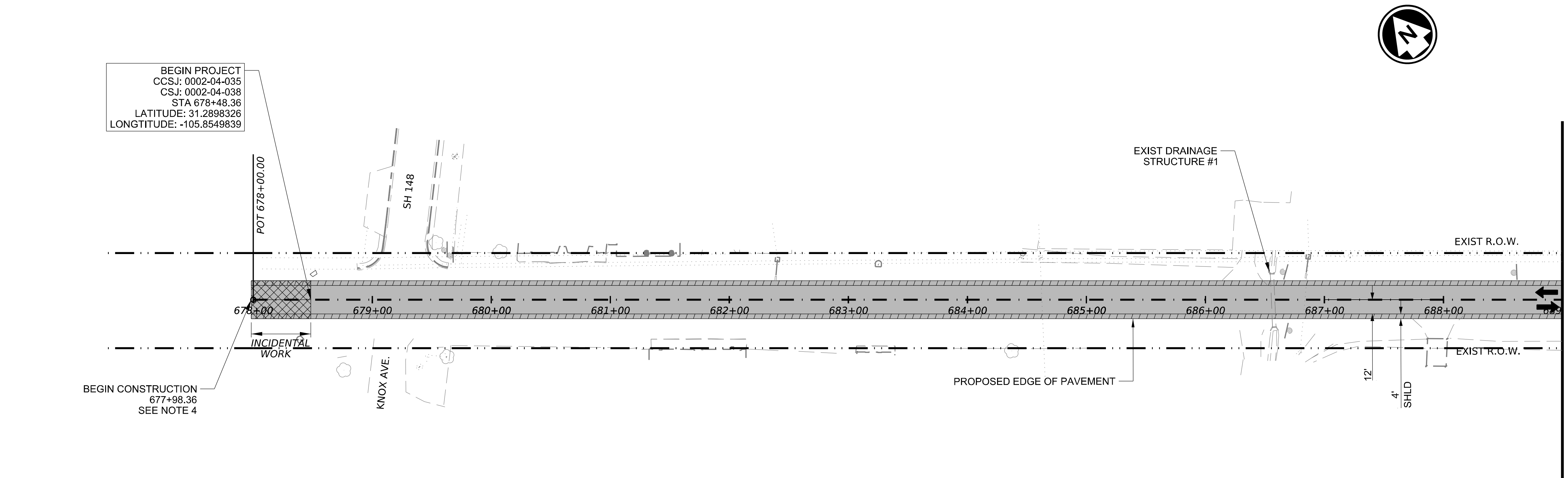
SH 20
ROADWAY

HORIZONTAL ALIGNMENT DATA

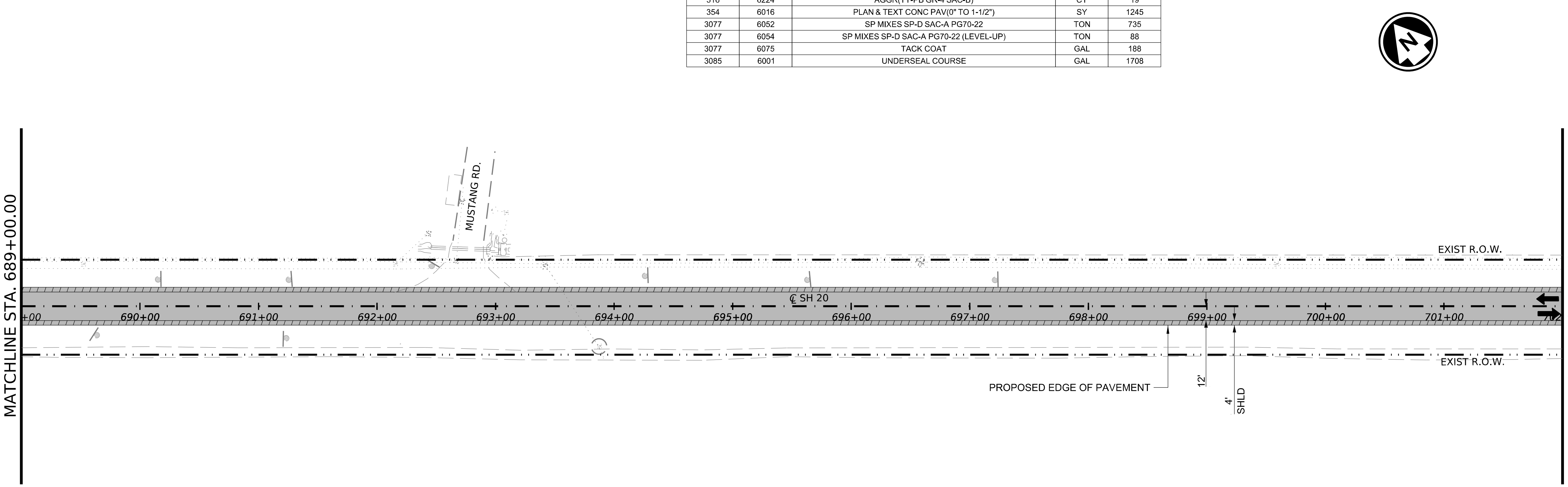
SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		41

DATE: 11/1/2023 3:17:38 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040354 - Design/Plan Set/3. Roadway/SH20_HORIZONTAL ALIGNMENT DATA10.12



CSJ: 0002-04-035; ROADWAY ESTIMATED QUANTITIES				
ITEM	CODE	DESCRIPTION	UNIT	QTY
100	6002	PREPARING ROW	STA	23.5
112	6003	SUBGRADE WIDENING (DENS CONT)	SY	3136
134	6004	BACKFILL (TY A OR B)	STA	24
216	6001	PROOF ROLLING	HR	1.0
247	6230	FL BS (CMP IN PLACE)(TY A GR 1-2)(8")	SY	2553
310	6014	PRIME COAT (SS-1H)	GAL	427
316	6001	ASPH (MULTI OPTION)	GAL	715
316	6224	AGGR(TY-PB GR-4 SAC-B)	CY	19
354	6016	PLAN & TEXT CONC PAV(0" TO 1-1/2")	SY	1245
3077	6052	SP MIXES SP-D SAC-A PG70-22	TON	735
3077	6054	SP MIXES SP-D SAC-A PG70-22 (LEVEL-UP)	TON	88
3077	6075	TACK COAT	GAL	188
3085	6001	UNDERSEAL COURSE	GAL	1708



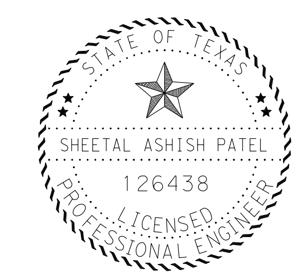
0 50 100
SCALE IN FEET

LEGEND

- PROPOSED FULL-WIDTH 1.5" OVERLAY
- PROPOSED SHOULDER PAVEMENT STRUCTURE WITH 1.5" OVERLAY
- TRAFFIC FLOW
- MILL 1.5" TO 0"

NOTES:

1. UTILITIES SHOWN ARE FOR INFORMATION PURPOSES ONLY. CONTRACTOR SHALL IDENTIFY & LOCATE ALL UTILITIES WITHIN PROJECT LIMITS PRIOR TO PERFORMING ANY WORK.
2. EXISTING DRAINAGE AND IRRIGATION STRUCTURES TO REMAIN AND ARE NOT TO BE DISTURBED.
3. HORIZONTAL ALIGNMENT IS GENERATED FROM BEST FIT OF EXISTING GROUND LINE AT THE CENTERLINE AND IS PROVIDED FOR INFORMATION ONLY.
4. REFER TO PAVEMENT TRANSITION DETAILS FOR BEGINNING AND END OF PAVEMENT TRANSITIONS.
5. REFER TO MISCELLANEOUS DETAILS SHEET FOR DRAINAGE STRUCTURES.



Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

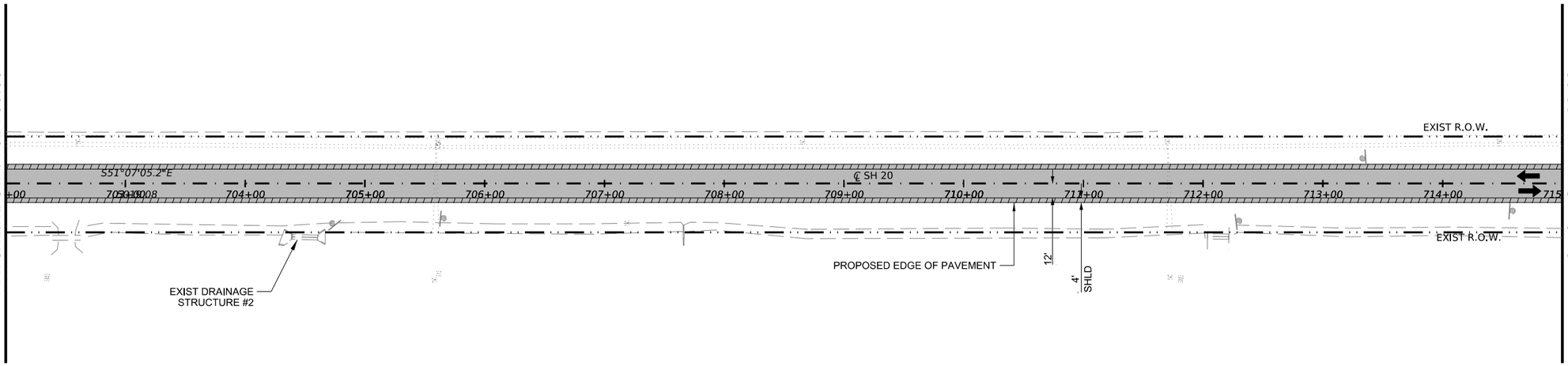
SH 20
ROADWAY

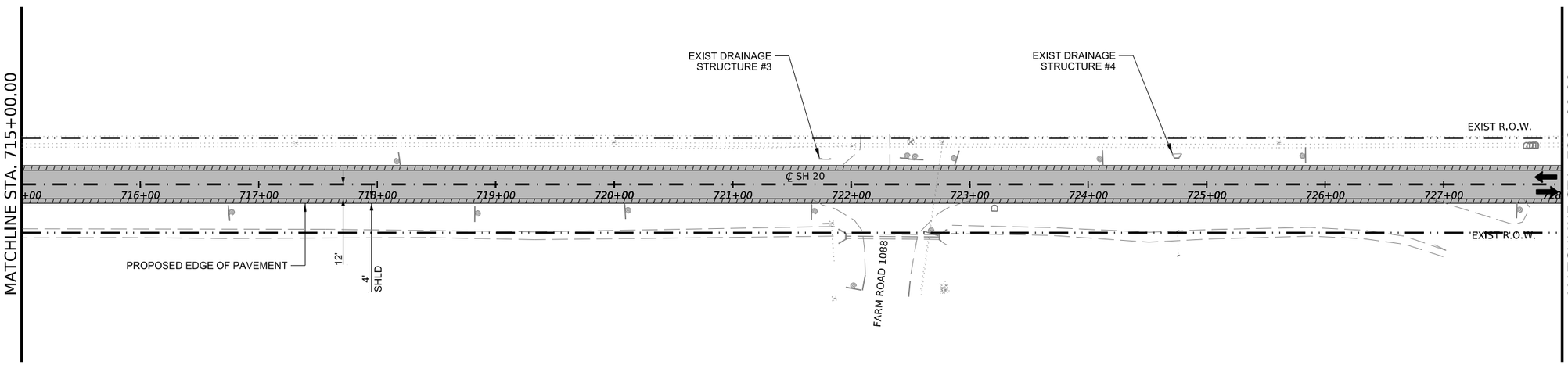
ROADWAY LAYOUT
STA.678+48.36 STA. 702+00.00

SHEET 1 OF 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		42

DATE: 11/01/2023 5:12:14 PM
FILE: pw://txdot.projectwiseonline.com:TxDOT_Documents/214 ELP/Design Projects/0002-04-035/14 Design/Master Design Files/Sheet Boundary Container/SB20Container Roadway





CSJ: 0002-04-035; ROADWAY ESTIMATED QUANTITIES				
ITEM	CODE	DESCRIPTION	UNIT	QTY
100	6002	PREPARING ROW	STA	26
112	6003	SUBGRADE WIDENING (DENS CONT)	SY	3467
134	6004	BACKFILL (TY A OR B)	STA	26
216	6001	PROOF ROLLING	HR	1
247	6230	FL BS (CMP IN PLACE)(TY A GR 1-2)(8")	SY	2542
310	6014	PRIME COAT (SS-1H)	GAL	462
316	6001	ASPH (MULTI OPTION)	GAL	712
316	6224	AGGR(TY-PB GR-4 SAC-B)	CY	18
354	6016	PLAN & TEXT CONC PAV(0" TO 1-1/2")	SY	1156
3077	6052	SP MIXES SP-D SAC-A PG70-22	TON	854
3077	6054	SP MIXES SP-D SAC-A PG70-22 (LEVEL-UP)	TON	95
3077	6075	TACK COAT	GAL	257
3085	6001	UNDERSEAL COURSE	GAL	1849

0 50 100
SCALE IN FEET

LEGEND

PROPOSED FULL-WIDTH 1.5" OVERLAY

PROPOSED SHOULDER PAVEMENT STRUCTURE WITH 1.5" OVERLAY

TRAFFIC FLOW

NOTES:

1. UTILITIES SHOWN ARE FOR INFORMATION PURPOSES ONLY. CONTRACTOR SHALL IDENTIFY & LOCATE ALL UTILITIES WITHIN PROJECT LIMITS PRIOR TO PERFORMING ANY WORK.
2. EXISTING DRAINAGE AND IRRIGATION STRUCTURES TO REMAIN AND ARE NOT TO BE DISTURBED.
3. HORIZONTAL ALIGNMENT IS GENERATED FROM BEST FIT OF EXISTING GROUND LINE AT THE CENTERLINE AND IS PROVIDED FOR INFORMATION ONLY.
4. REFER TO MISCELLANEOUS DETAILS SHEET FOR DRAINAGE STRUCTURES.

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

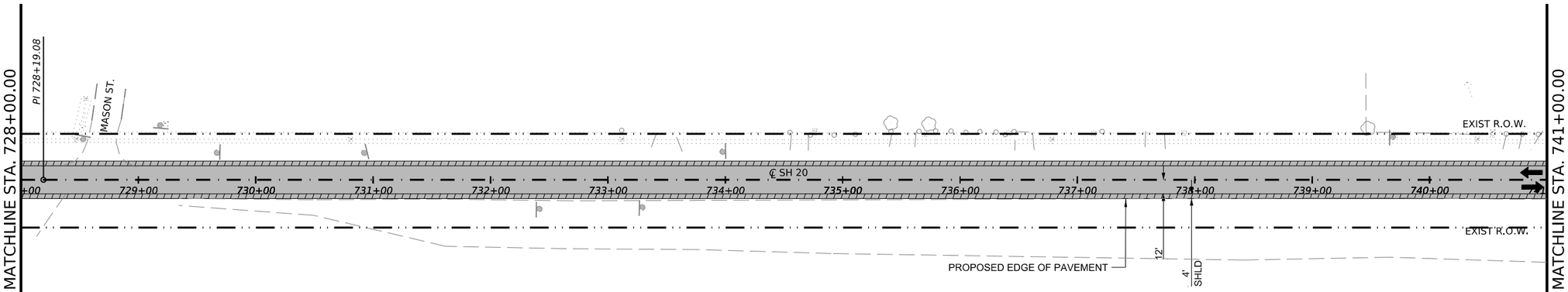
SH 20
ROADWAY

ROADWAY LAYOUT
STA.702+00.00 STA.728+00.00

SHEET 2 OF 11

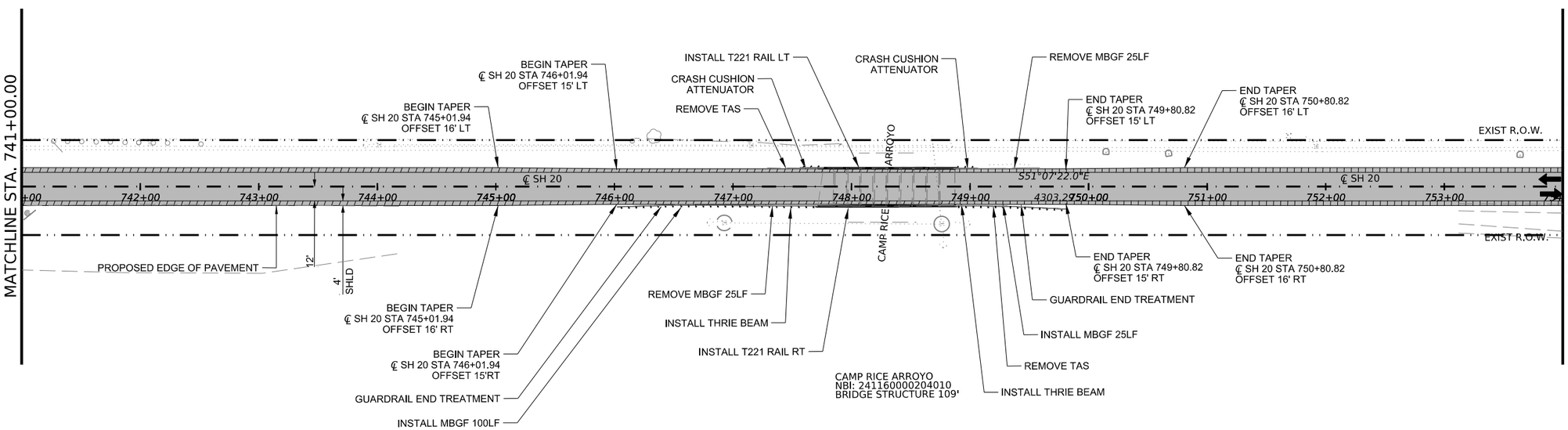
CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		43

DATE: 11/1/2023 4:54:14 PM
FILE: pw://txdot.projectwiseonline.com:TxDOT5/Documents/24 - ELP/Design Projects/000204035/4 - Design/Master Design Files/Sheet Boundary Container/SH20ContainerRoadway



CSJ: 0002-04-035: ROADWAY ESTIMATED QUANTITIES				
ITEM	CODE	DESCRIPTION	UNIT	QTY
100	6002	PREPARING ROW	STA	26
112	6003	SUBGRADE WIDENING (DENS CONT)	SY	3467
134	6004	BACKFILL (TY A OR B)	STA	26
216	6001	PROOF ROLLING	HR	1
247	6230	FL BS (CMP IN PLACE)(TY A GR 1-2)(8")	SY	2889
310	6014	PRIME COAT (SS-1H)	GAL	462
316	6001	ASPH (MULTI OPTION)	GAL	809
316	6224	AGGR(TY-PB GR-4 SAC-B)	CY	21
354	6016	PLAN & TEXT CONC PAV(0" TO 1-1/2")	SY	2447
3077	6052	SP MIXES SP-D SAC-A PG70-22	TON	763
3077	6054	SP MIXES SP-D SAC-A PG70-22 (LEVEL-UP)	TON	95
3077	6075	TACK COAT	GAL	173
3085	6001	UNDERSEAL COURSE	GAL	1849

CSJ: 0002-04-038; BRIDGE ESTIMATED QUANTITIES				
ITEM	CODE	DESCRIPTION	UNIT	QTY
451	6005	RETROFIT RAIL (TY T221)	LF	221
540	6002	MTL W-BEAM GD FEN (STEEL POST)	LF	125
540	6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	2
542	6001	REMOVE METAL BEAM GUARD FENCE	LF	50
542	6002	REMOVE TERMINAL ANCHOR SECTION	EA	2
544	6001	GUARDRAIL END TREATMENT (INSTALL)	EA	2
544	6003	GUARDRAIL END TREATMENT (REMOVE)	EA	2
545	6007	CRASH CUSH ATTEN (INSTL)(L)(N)(TL3)	LF	2



0 50 100
SCALE IN FEET

LEGEND

- PROPOSED FULL-WIDTH 1.5" OVERLAY
- PROPOSED SHOULDER PAVEMENT STRUCTURE WITH 1.5" OVERLAY
- TRAFFIC FLOW

NOTES:

1. UTILITIES SHOWN ARE FOR INFORMATION PURPOSES ONLY. CONTRACTOR SHALL IDENTIFY & LOCATE ALL UTILITIES WITHIN PROJECT LIMITS PRIOR TO PERFORMING ANY WORK.
2. EXISTING DRAINAGE AND IRRIGATION STRUCTURES TO REMAIN AND ARE NOT TO BE DISTURBED.
3. HORIZONTAL ALIGNMENT IS GENERATED FROM BEST FIT OF EXISTING GROUND LINE AT THE CENTERLINE AND IS PROVIDED FOR INFORMATION ONLY.
4. REFER TO MISCELLANEOUS DETAILS SHEET FOR DRAINAGE STRUCTURES.
5. REFER TO PAVEMENT TRANSITION DETAILS FOR BEGINNING AND END OF PAVEMENT TRANSITIONS.
6. REFER TO MBGF BRIDGE RAILING FOR CAMP ARROYO FOR ADDITIONAL INFORMATION.

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/28/2023

Texas Department of Transportation

SH 20
ROADWAY

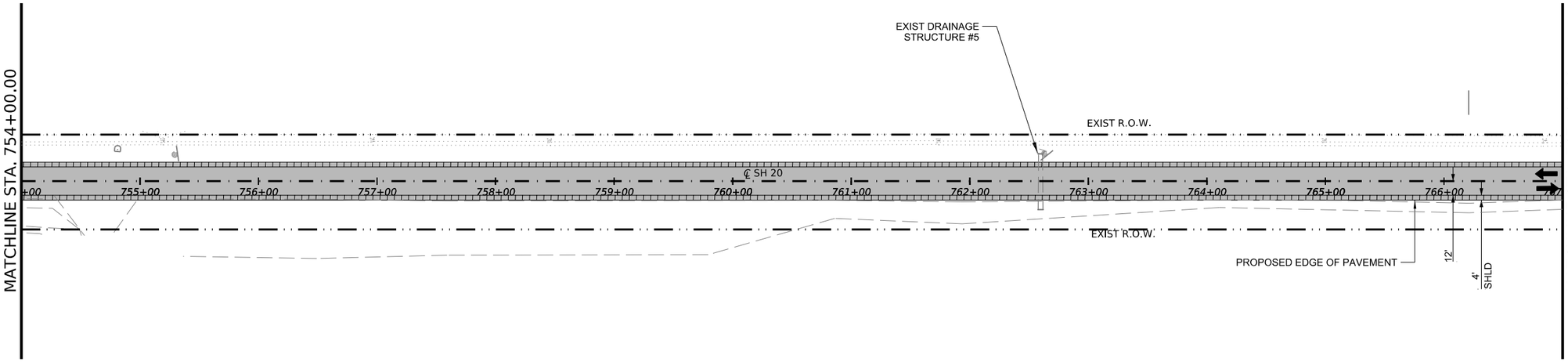
ROADWAY LAYOUT
STA.728+00.00 STA.754+00.00

SHEET 3 OF 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		44

DATE: 11/28/2023 4:47:39 PM
FILE: pw://txdot.projectwiseonline.com:TxDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Master Design Files/Sheet Boundary Container/SH20ContainerRoadway

CK DW CK DW



0 50 100
SCALE IN FEET

LEGEND

PROPOSED FULL-WIDTH 1.5" OVERLAY

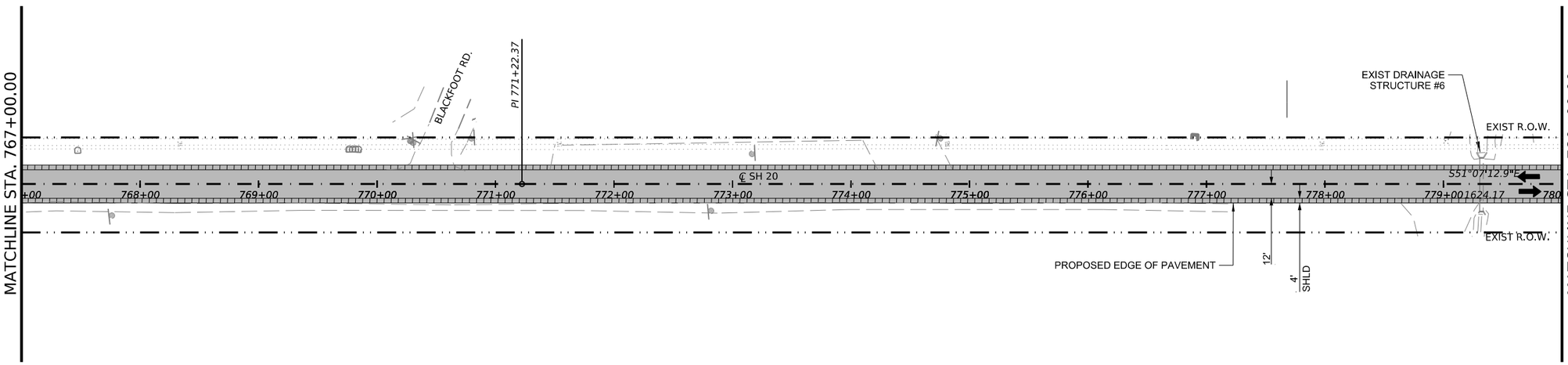
PROPOSED SHOULDER PAVEMENT STRUCTURE WITH 1.5" OVERLAY

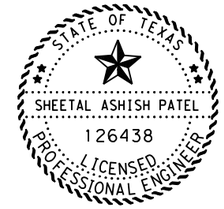
TRAFFIC FLOW

NOTES:

1. UTILITIES SHOWN ARE FOR INFORMATION PURPOSES ONLY. CONTRACTOR SHALL IDENTIFY & LOCATE ALL UTILITIES WITHIN PROJECT LIMITS PRIOR TO PERFORMING ANY WORK.
2. EXISTING DRAINAGE AND IRRIGATION STRUCTURES TO REMAIN AND ARE NOT TO BE DISTURBED.
3. HORIZONTAL ALIGNMENT IS GENERATED FROM BEST FIT OF EXISTING GROUND LINE AT THE CENTERLINE AND IS PROVIDED FOR INFORMATION ONLY.
4. REFER TO MISCELLANEOUS DETAILS SHEETS FOR DRAINAGE STRUCTURES.

CSJ: 0002-04-035; ROADWAY ESTIMATED QUANTITIES				
ITEM	CODE	DESCRIPTION	UNIT	QTY
100	6002	PREPARING ROW	STA	26
112	6003	SUBGRADE WIDENING (DENS CONT)	SY	3467
134	6004	BACKFILL (TY A OR B)	STA	26
216	6001	PROOF ROLLING	HR	1
247	6230	FL BS (CMP IN PLACE)(TY A GR 1-2)(8")	SY	2831
310	6014	PRIME COAT (SS-1H)	GAL	462
316	6001	ASPH (MULTI OPTION)	GAL	793
316	6224	AGGR(TY-PB GR-4 SAC-B)	CY	21
354	6016	PLAN & TEXT CONC PAV(0" TO 1-1/2")	SY	1156
3077	6052	SP MIXES SP-D SAC-A PG70-22	TON	778
3077	6054	SP MIXES SP-D SAC-A PG70-22 (LEVEL-UP)	TON	95
3077	6075	TACK COAT	GAL	187
3085	6001	UNDERSEAL COURSE	GAL	1849





Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

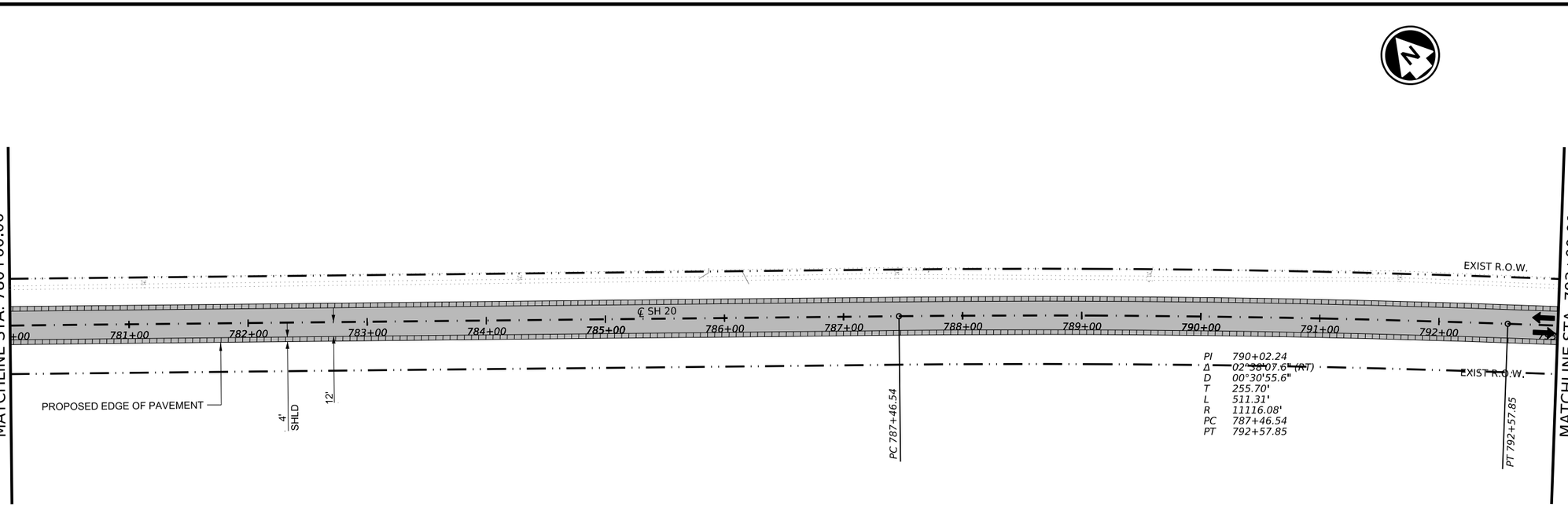
SH 20
ROADWAY

ROADWAY LAYOUT
STA.754+00.00 STA.780+00.00

SHEET 4 OF 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		45

DATE: 11/1/2023 4:54:47 PM
FILE: pw://txdot.projectwiseonline.com:TxDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Master Design Files/Sheet Boundary Container/SH20ContainerRoadway



0 50 100
SCALE IN FEET

LEGEND

PROPOSED FULL-WIDTH 1.5" OVERLAY

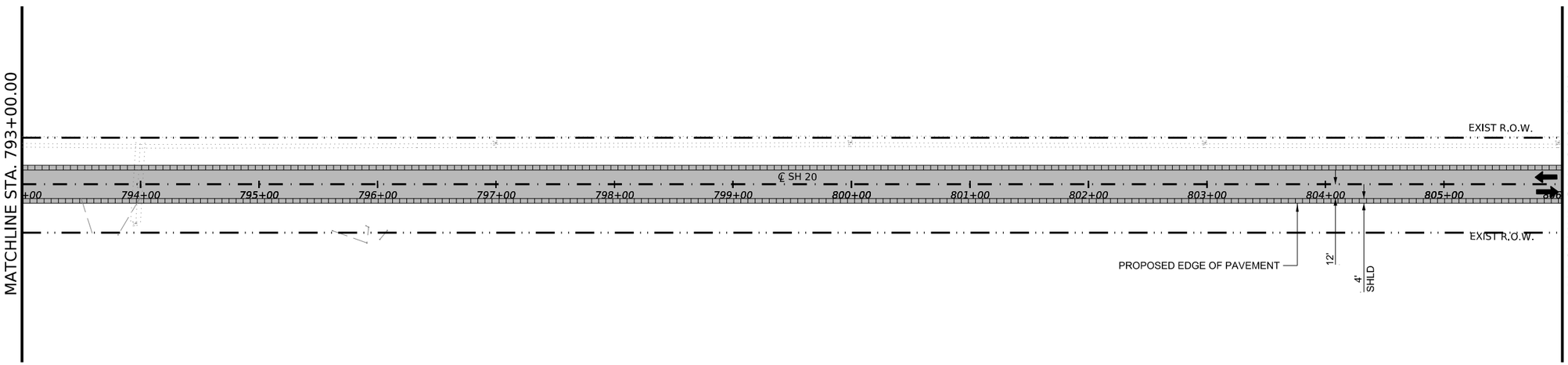
PROPOSED SHOULDER PAVEMENT STRUCTURE WITH 1.5" OVERLAY

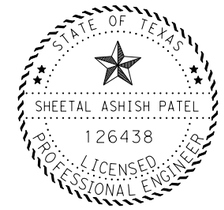
TRAFFIC FLOW

NOTES:

1. UTILITIES SHOWN ARE FOR INFORMATION PURPOSES ONLY. CONTRACTOR SHALL IDENTIFY & LOCATE ALL UTILITIES WITHIN PROJECT LIMITS PRIOR TO PERFORMING ANY WORK.
2. EXISTING DRAINAGE AND IRRIGATION STRUCTURES TO REMAIN AND ARE NOT TO BE DISTURBED.
3. HORIZONTAL ALIGNMENT IS GENERATED FROM BEST FIT OF EXISTING GROUND LINE AT THE CENTERLINE AND IS PROVIDED FOR INFORMATION ONLY.

CSJ: 0002-04-035; ROADWAY ESTIMATED QUANTITIES				
ITEM	CODE	DESCRIPTION	UNIT	QTY
100	6002	PREPARING ROW	STA	26
112	6003	SUBGRADE WIDENING (DENS CONT)	SY	3467
134	6004	BACKFILL (TY A OR B)	STA	26
216	6001	PROOF ROLLING	HR	1
247	6230	FL BS (CMP IN PLACE)(TY A GR 1-2)(8")	SY	2889
310	6014	PRIME COAT (SS-1H)	GAL	462
316	6001	ASPH (MULTIOPTION)	GAL	809
316	6224	AGGR(TY-PB GR-4 SAC-B)	CY	21
354	6016	PLAN & TEXT CONC PAV(0" TO 1-1/2")	SY	1156
3077	6052	SP MIXES SP-D SAC-A PG70-22	TON	763
3077	6054	SP MIXES SP-D SAC-A PG70-22 (LEVEL-UP)	TON	95
3077	6075	TACK COAT	GAL	173
3085	6001	UNDERSEAL COURSE	GAL	1849





Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

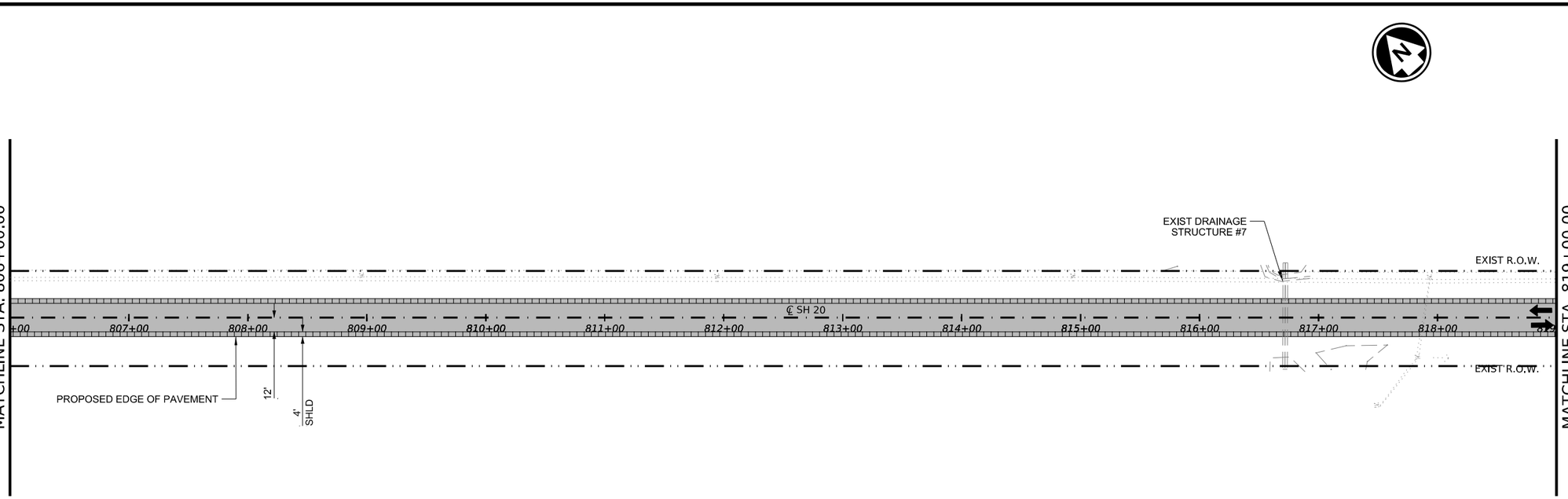
SH 20
ROADWAY

ROADWAY LAYOUT
STA.780+00.00 STA.806+00.00

SHEET 5 OF 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		46

DATE: 11/1/2023 4:55:06 PM
FILE: pw://txdot.projectwiseonline.com:TxDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Master Design Files/Sheet Boundary Container/SH20ContainerRoadway



LEGEND

PROPOSED FULL-WIDTH 1.5" OVERLAY

PROPOSED SHOULDER PAVEMENT STRUCTURE WITH 1.5" OVERLAY

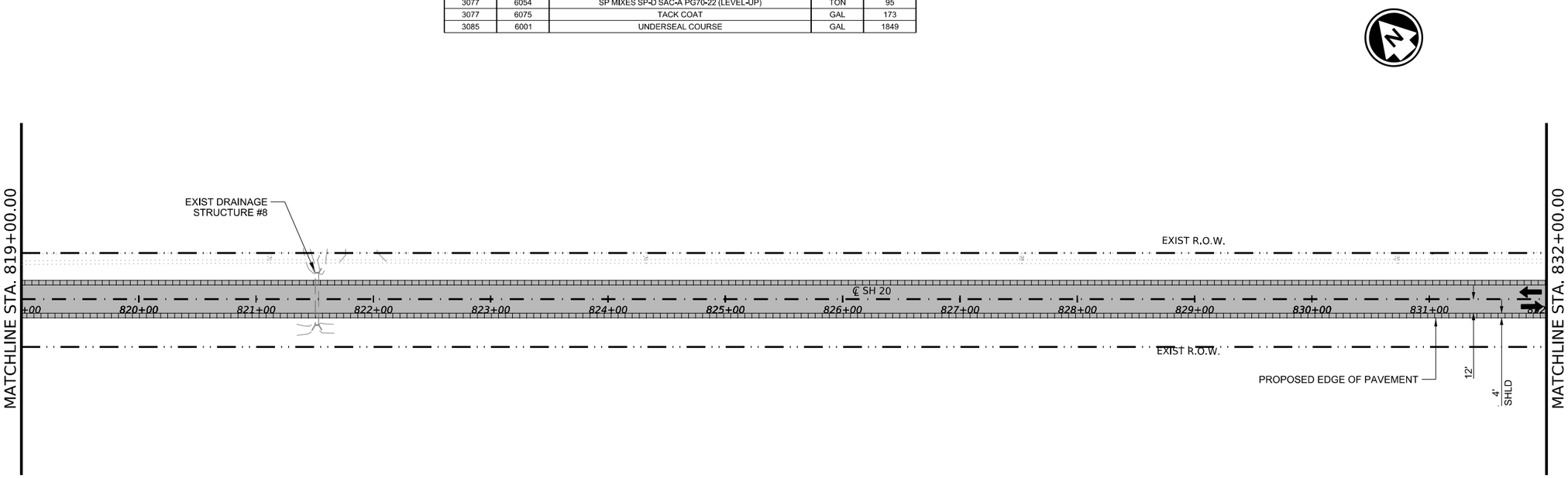
TRAFFIC FLOW

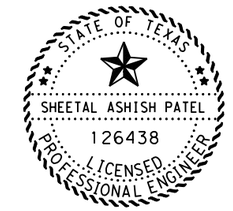
NOTES:

1. UTILITIES SHOWN ARE FOR INFORMATION PURPOSES ONLY. CONTRACTOR SHALL IDENTIFY & LOCATE ALL UTILITIES WITHIN PROJECT LIMITS PRIOR TO PERFORMING ANY WORK.
2. EXISTING DRAINAGE AND IRRIGATION STRUCTURES TO REMAIN AND ARE NOT TO BE DISTURBED.
3. HORIZONTAL ALIGNMENT IS GENERATED FROM BEST FIT OF EXISTING GROUND LINE AT THE CENTERLINE AND IS PROVIDED FOR INFORMATION ONLY.
4. REFER TO MISCELLANEOUS DETAILS SHEETS FOR DRAINAGE STRUCTURES.

CSJ: 0002-04-035; ROADWAY ESTIMATED QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QTY
100	6002	PREPARING ROW	STA	26
112	6003	SUBGRADE WIDENING (DENS CONT)	SY	3467
134	6004	BACKFILL (TY A OR B)	STA	26
216	6001	PROOF ROLLING	HR	1.0
247	6230	FL BS (CMP IN PLACE)(TY A GR 1-2)(8")	SY	2889
310	6014	PRIME COAT (SS-1H)	GAL	462
316	6001	ASPH (MULTI OPTION)	GAL	809
316	6224	AGGR(TY-PB GR-4 SAC-B)	CY	21
354	6016	PLAN & TEXT CONC PAV(0" TO 1-1/2")	SY	1156
3077	6052	SP MIXES SP-D SAC-A PG70-22	TON	763
3077	6054	SP MIXES SP-D SAC-A PG70-22 (LEVEL-UP)	TON	95
3077	6075	TACK COAT	GAL	173
3085	6001	UNDERSEAL COURSE	GAL	1849





Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

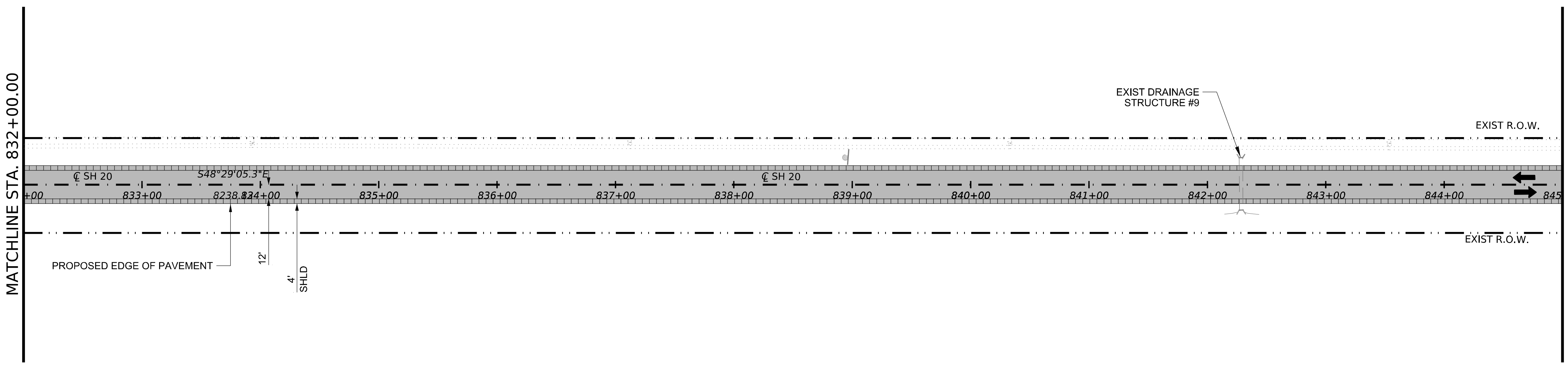
SH 20
ROADWAY

ROADWAY LAYOUT
STA.806+00.00 STA.832+00.00

SHEET 6 OF 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		47

DATE: 11/1/2023 4:55:19 PM
FILE: pw://txdot.projectwiseonline.com:TxDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Master Design Files/SH20ContainerRoadway



0 50 100
SCALE IN FEET

LEGEND

PROPOSED FULL-WIDTH 1.5" OVERLAY

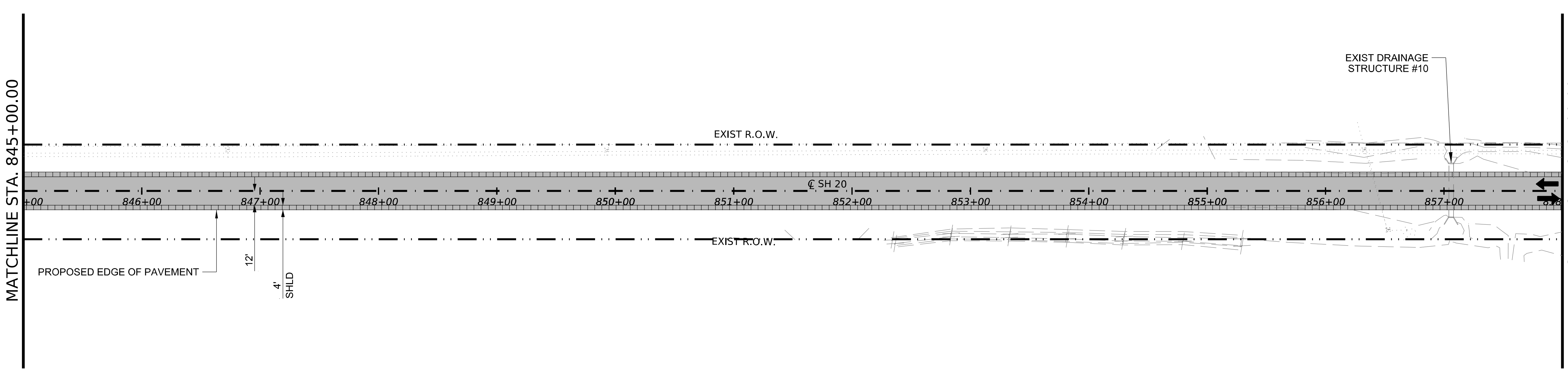
PROPOSED SHOULDER PAVEMENT STRUCTURE WITH 1.5" OVERLAY

TRAFFIC FLOW

NOTES:

1. UTILITIES SHOWN ARE FOR INFORMATION PURPOSES ONLY. CONTRACTOR SHALL IDENTIFY & LOCATE ALL UTILITIES WITHIN PROJECT LIMITS PRIOR TO PERFORMING ANY WORK.
2. EXISTING DRAINAGE AND IRRIGATION STRUCTURES TO REMAIN AND ARE NOT TO BE DISTURBED.
3. HORIZONTAL ALIGNMENT IS GENERATED FROM BEST FIT OF EXISTING GROUND LINE AT THE CENTERLINE AND IS PROVIDED FOR INFORMATION ONLY.
4. REFER TO MISCELLANEOUS DETAILS SHEETS FOR DRAINAGE STRUCTURES.

ITEM	CODE	DESCRIPTION	UNIT	QTY
100	6002	PREPARING ROW	STA	26
112	6003	SUBGRADE WIDENING (DENS CONT)	SY	3467
134	6004	BACKFILL (TY A OR B)	STA	26
216	6001	PROOF ROLLING	HR	1.0
247	6230	FL BS (CMP IN PLACE)(TY A GR 1-2)(8")	SY	2889
310	6014	PRIME COAT (SS-1H)	GAL	462
316	6001	ASPH (MULTI OPTION)	GAL	809
316	6224	AGGR(TY-PB GR-4 SAC-B)	CY	21
354	6016	PLAN & TEXT CONC PAV(0" TO 1-1/2")	SY	1156
3077	6052	SP MIXES SP-D SAC-A PG70-22	TON	763
3077	6054	SP MIXES SP-D SAC-A PG70-22 (LEVEL-UP)	TON	95
3077	6075	TACK COAT	GAL	173
3085	6001	UNDERSEAL COURSE	GAL	1849



STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED PROFESSIONAL ENGINEER

Sheetal Patel, P.E.
11/01/2023

Texas Department of Transportation

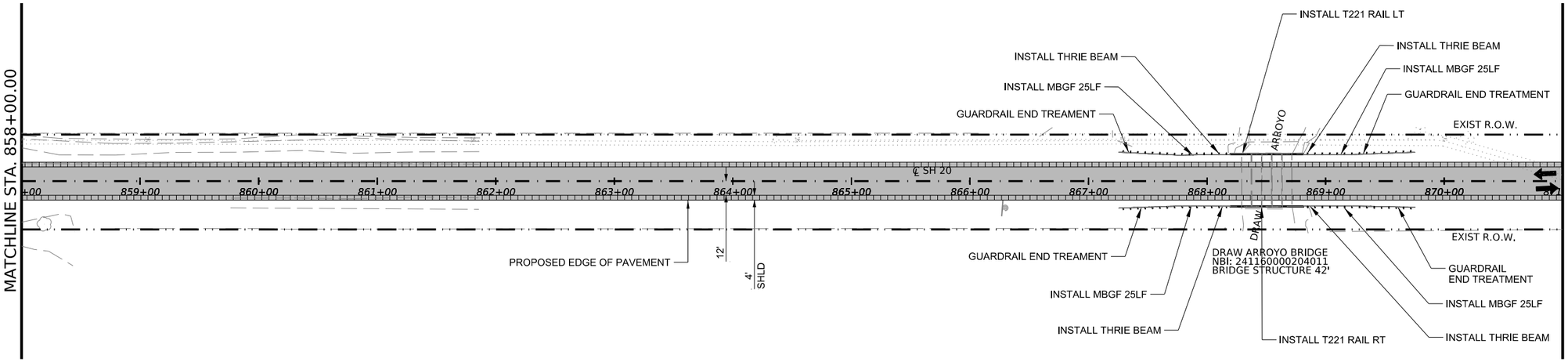
SH 20
ROADWAY

ROADWAY LAYOUT
STA.832+00.00 STA.858+00.00

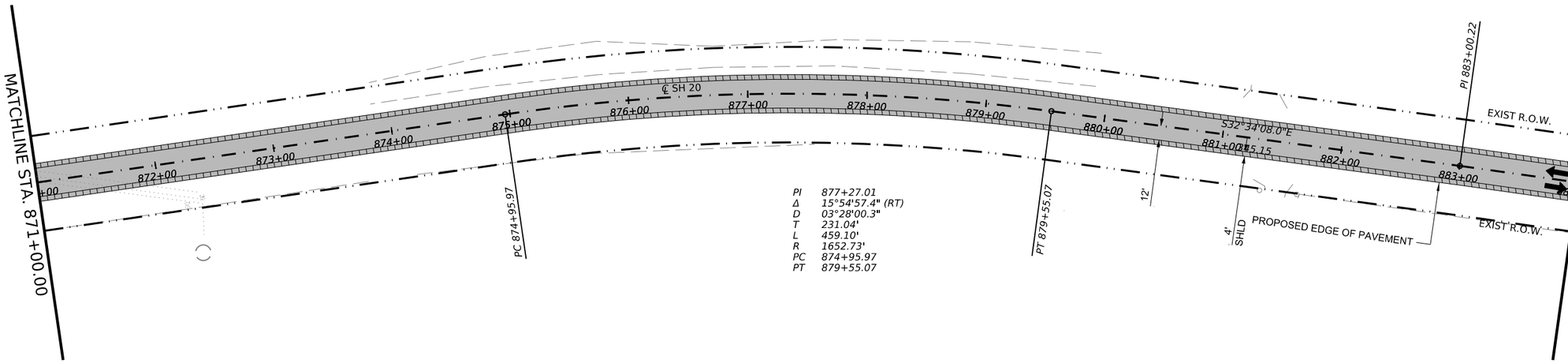
SHEET 7 OF 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		48

DATE: 11/2/2023 2:30:25 PM
FILE: pw://tdot-pw.bentley.com:TXDOT-PW/Documents/...



CSJ: 0002-04-035: ROADWAY ESTIMATED QUANTITIES				
ITEM	CODE	DESCRIPTION	UNIT	QTY
100	6002	PREPARING ROW	STA	26
112	6003	SUBGRADE WIDENING (DENS CONT)	SY	3467
134	6004	BACKFILL (TY A OR B)	STA	26
216	6001	PROOF ROLLING	HR	1
247	6230	FL BS (CMP IN PLACE)(TY A GR 1-2)(8")	SY	2889
310	6014	PRIME COAT (SS-1H)	GAL	462
316	6001	ASPH (MULTI OPTION)	GAL	809
316	6224	AGGR(TY-PB GR-4 SAC-B)	CY	21
354	6016	PLAN & TEXT CONC PAV(0" TO 1-1/2")	SY	2250
451	6005	RETROFIT RAIL (TY T221)	LF	124
540	6002	MTL W-BEAM GD FEN (STEEL POST)	LF	100
540	6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	4
544	6001	GUARDRAIL END TREATMENT (INSTALL)	EA	4
3077	6052	SP MIXES SP-D SAC-A PG70-22	TON	763
3077	6054	SP MIXES SP-D SAC-A PG70-22 (LEVEL-UP)	TON	95
3077	6075	TACK COAT	GAL	173
3085	6001	UNDERSEAL COURSE	GAL	1849



0 50 100
SCALE IN FEET

LEGEND

- PROPOSED FULL-WIDTH 1.5" OVERLAY
- PROPOSED SHOULDER PAVEMENT STRUCTURE WITH 1.5" OVERLAY
- TRAFFIC FLOW

NOTES:

1. UTILITIES SHOWN ARE FOR INFORMATION PURPOSES ONLY. CONTRACTOR SHALL IDENTIFY & LOCATE ALL UTILITIES WITHIN PROJECT LIMITS PRIOR TO PERFORMING ANY WORK.
2. EXISTING DRAINAGE AND IRRIGATION STRUCTURES TO REMAIN AND ARE NOT TO BE DISTURBED.
3. HORIZONTAL ALIGNMENT IS GENERATED FROM BEST FIT OF EXISTING GROUND LINE AT THE CENTERLINE AND IS PROVIDED FOR INFORMATION ONLY.
4. REFER TO PAVEMENT TRANSITION DETAILS FOR BEGINNING AND END OF PAVEMENT TRANSITIONS.
5. REFER TO MBGF BRIDGE RAILING FOR DRAW ARROYO FOR ADDITIONAL INFORMATION.

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

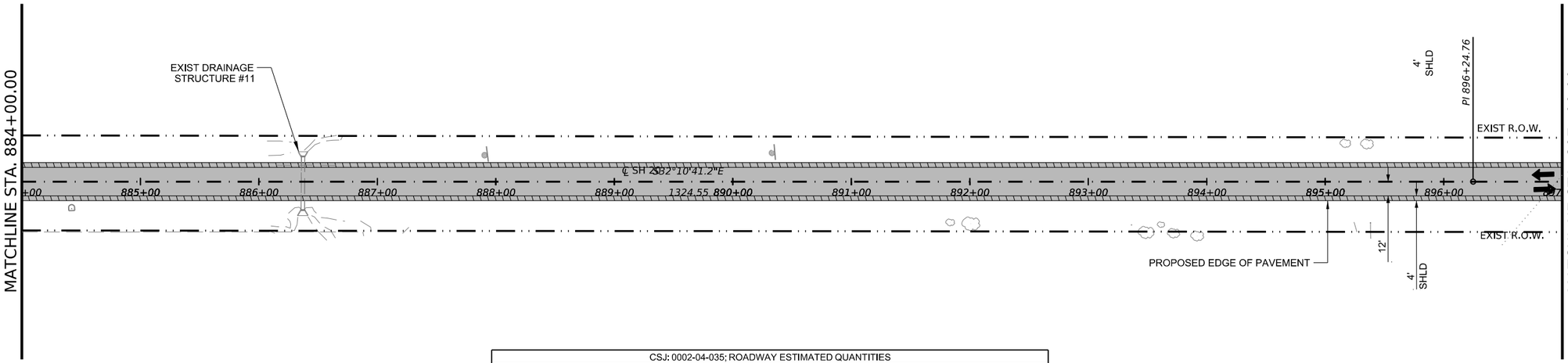
SH 20
ROADWAY

ROADWAY LAYOUT
STA.858+00.00 STA.884+00.00

SHEET 8 OF 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		49

DATE: 11/1/2023 4:55:38 PM
FILE: pw://txdot.projectwiseonline.com:TxDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Master Design Files/Sheet Boundary Container/SH20ContainerRoadway



0 50 100
SCALE IN FEET

LEGEND

PROPOSED FULL-WIDTH 1.5" OVERLAY

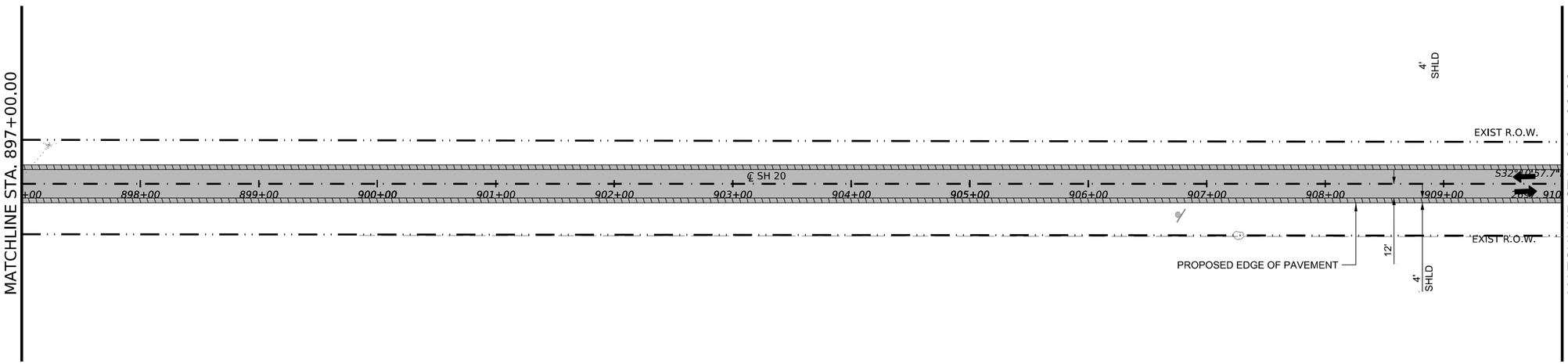
PROPOSED SHOULDER PAVEMENT STRUCTURE WITH 1.5" OVERLAY

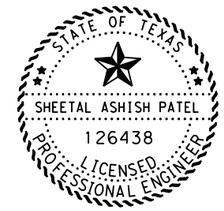
TRAFFIC FLOW

NOTES:

1. UTILITIES SHOWN ARE FOR INFORMATION PURPOSES ONLY. CONTRACTOR SHALL IDENTIFY & LOCATE ALL UTILITIES WITHIN PROJECT LIMITS PRIOR TO PERFORMING ANY WORK.
2. EXISTING DRAINAGE AND IRRIGATION STRUCTURES TO REMAIN AND ARE NOT TO BE DISTURBED.
3. HORIZONTAL ALIGNMENT IS GENERATED FROM BEST FIT OF EXISTING GROUND LINE AT THE CENTERLINE AND IS PROVIDED FOR INFORMATION ONLY.
4. REFER TO MISCELLANEOUS DETAILS SHEET FOR DRAINAGE STRUCTURES.

CSJ: 0002-04-035; ROADWAY ESTIMATED QUANTITIES				
ITEM	CODE	DESCRIPTION	UNIT	QTY
100	6002	PREPARING ROW	STA	26
112	6003	SUBGRADE WIDENING (DENS CONT)	SY	3467
134	6004	BACKFILL (TY A OR B)	STA	26
216	6001	PROOF ROLLING	HR	1
247	6230	FL BS (CMP IN PLACE)(TY A GR 1-2)(8")	SY	2889
310	6014	PRIME COAT (SS-1H)	GAL	462
316	6001	ASPH (MULTI OPTION)	GAL	809
316	6224	AGGR(TY-PB GR-4 SAC-B)	CY	21
354	6016	PLAN & TEXT CONC PAV(0" TO 1-1/2")	SY	1156
3077	6052	SP MIXES SP-D SAC-A PG70-22	TON	763
3077	6054	SP MIXES SP-D SAC-A PG70-22 (LEVEL-UP)	TON	95
3077	6075	TACK COAT	GAL	173
3085	6001	UNDERSEAL COURSE	GAL	1849





Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

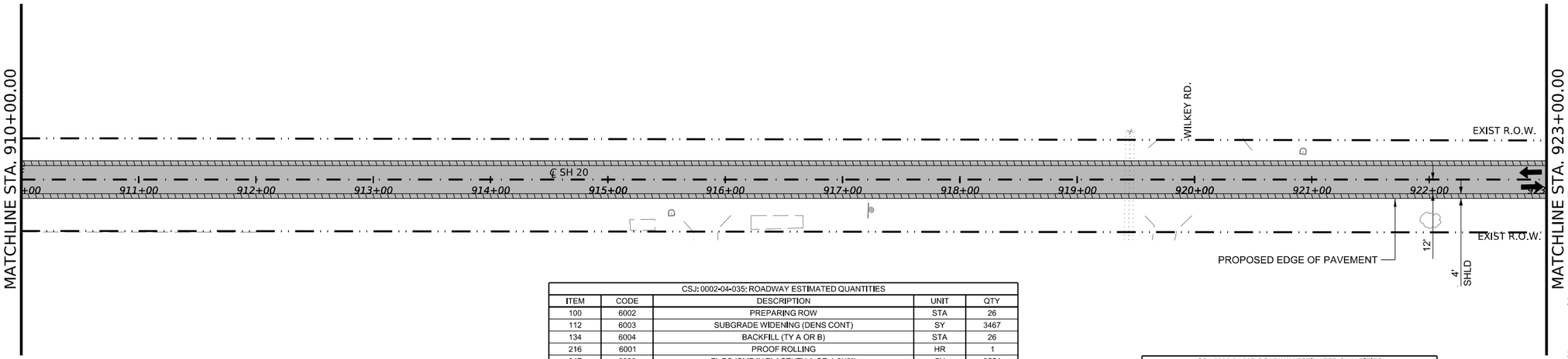
SH 20
ROADWAY

ROADWAY LAYOUT
STA.884+00.00 STA.910+00.00

SHEET 9 OF 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		50

DATE: 11/1/2023 4:55:52 PM
FILE: pw://txdot.projectwiseonline.com:TxDOT5/Documents/24 - ELP/Design Projects/000204035/4 - Design/Master Design Files/Sheet Boundary Container/SH20ContainerRoadway



LEGEND

PROPOSED FULL-WIDTH 1.5" OVERLAY

PROPOSED SHOULDER PAVEMENT STRUCTURE WITH 1.5" OVERLAY

TRAFFIC FLOW

NOTES:

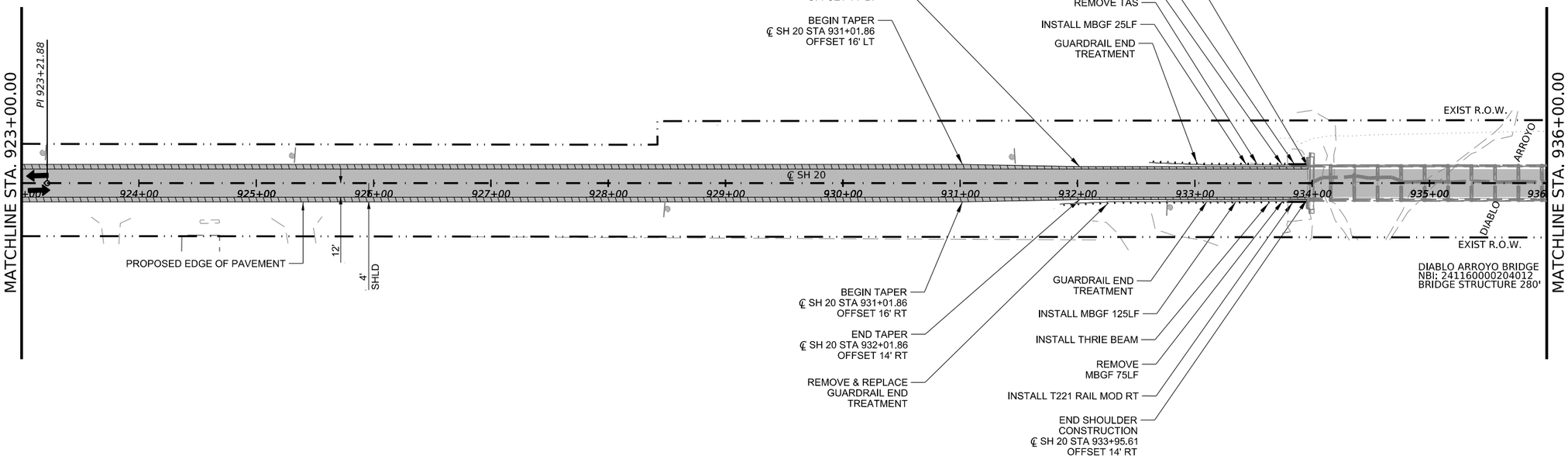
1. UTILITIES SHOWN ARE FOR INFORMATION PURPOSES ONLY. CONTRACTOR SHALL IDENTIFY & LOCATE ALL UTILITIES WITHIN PROJECT LIMITS PRIOR TO PERFORMING ANY WORK.
2. EXISTING DRAINAGE AND IRRIGATION STRUCTURES TO REMAIN AND ARE NOT TO BE DISTURBED.
3. HORIZONTAL ALIGNMENT IS GENERATED FROM BEST FIT OF EXISTING GROUND LINE AT THE CENTERLINE AND IS PROVIDED FOR INFORMATION ONLY.
4. REFER TO TRANSITION RAIL DETAILS FOR DIABLO ARROYO BRIDGE.

CSJ: 0002-04-035; ROADWAY ESTIMATED QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QTY
100	6002	PREPARING ROW	STA	26
112	6003	SUBGRADE WIDENING (DENS CONT)	SY	3467
134	6004	BACKFILL (TY A OR B)	STA	26
216	6001	PROOF ROLLING	HR	1
247	6230	FL BS (CMP IN PLACE)(TY A GR 1-2)(8")	SY	2554
310	6014	PRIME COAT (SS-1H)	GAL	404
316	6001	ASPH (MULTI OPTION)	GAL	708
316	6224	AGGR(TY-PB GR-4 SAC-B)	CY	18
354	6016	PLAN & TEXT CONC PAV(0" TO 1-1/2")	SY	2232
450	6055	RAIL (TY T221) (MOD)	LF	34
540	6002	MTL W-BEAM GD FEN (STEEL POST)	LF	150
540	6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	2
542	6001	REMOVE METAL BEAM GUARD FENCE	LF	75
542	6002	REMOVE TERMINAL ANCHOR SECTION	EA	1
544	6001	GUARDRAIL END TREATMENT (INSTALL)	EA	2
544	6003	GUARDRAIL END TREATMENT (REMOVE)	EA	1
3077	6052	SP MIXES SP-D SAC-A PG70-22	TON	739
3077	6054	SP MIXES SP-D SAC-A PG70-22 (LEVEL-UP)	TON	95
3077	6075	TACK COAT	GAL	173
3085	6001	UNDERSEAL COURSE	GAL	1791

CSJ: 0002-04-035; ROADWAY ESTIMATED QUANTITIES

ITEM	DESCRIPTION	UNIT	QTY
420	DRILL SHAFT (18 IN)	LF	24
450	CL C CONC (RAIL FOUNDATION)	CY	16.4



STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/28/2023

Texas Department of Transportation

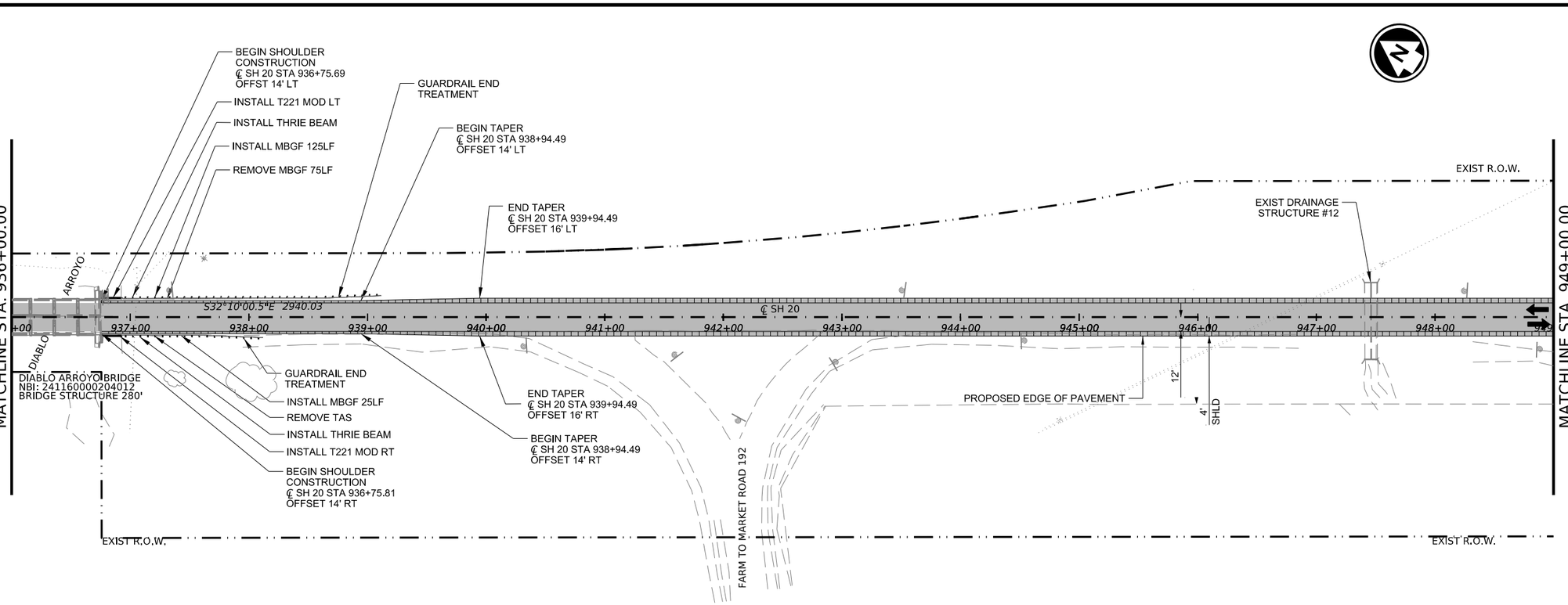
SH 20
ROADWAY

ROADWAY LAYOUT
STA.910+00.00 STA.936+00.00

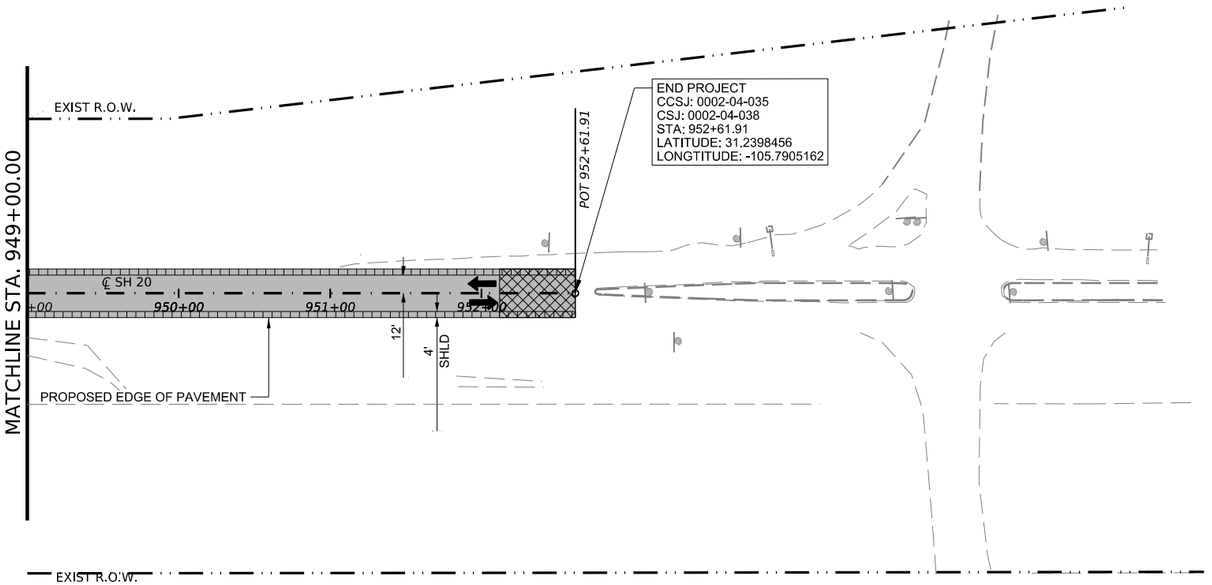
SHEET 10 OF 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		51

DATE: 11/28/2023 4:50:32 PM
FILE: pw://txdot.projectwiseonline.com:TxDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Master Design Files/Sheet Boundary Container/SH20ContainerRoadway



CSJ: 0002-04-035; ROADWAY ESTIMATED QUANTITIES			
ITEM	DESCRIPTION	UNIT	QTY
420	DRILL SHAFT (18 IN)	LF	24
450	CL C CONC (RAIL FOUNDATION)	CY	16.4



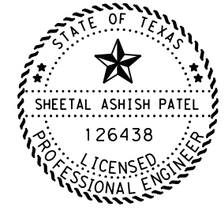
LEGEND

- PROPOSED FULL-WIDTH 1.5" OVERLAY
- PROPOSED SHOULDER PAVEMENT STRUCTURE WITH 1.5" OVERLAY
- TRAFFIC FLOW
- MILL 1.5" TO 0"

NOTES:

1. UTILITIES SHOWN ARE FOR INFORMATION PURPOSES ONLY. CONTRACTOR SHALL IDENTIFY & LOCATE ALL UTILITIES WITHIN PROJECT LIMITS PRIOR TO PERFORMING ANY WORK.
2. EXISTING DRAINAGE AND IRRIGATION STRUCTURES TO REMAIN AND ARE NOT TO BE DISTURBED.
3. HORIZONTAL ALIGNMENT IS GENERATED FROM BEST FIT OF EXISTING GROUND LINE AT THE CENTERLINE AND IS PROVIDED FOR INFORMATION ONLY.
4. REFER TO MISCELLANEOUS DETAILS SHEET FOR DRAINAGE STRUCTURES.
5. REFER TO PAVEMENT TRANSITION DETAILS FOR BEGINNING AND END OF PAVEMENT TRANSITIONS.
6. REFER TO TRANSITION RAIL DETAIL FOR DIABLO ARROYO BRIDGE.

CSJ: 0002-04-035; ROADWAY ESTIMATED QUANTITIES				
ITEM	CODE	DESCRIPTION	UNIT	QTY
100	6002	PREPARING ROW	STA	16.6
112	6003	SUBGRADE WIDENING (DENS CONT)	SY	2216
134	6004	BACKFILL (TY A OR B)	STA	17
216	6001	PROOF ROLLING	HR	1
247	6230	FL BS (CMP IN PLACE)(TY A GR 1-2)(8")	SY	1519
310	6014	PRIME COAT (SS-1H)	GAL	258
316	6001	ASPH (MULTI OPTION)	GAL	417
316	6224	AGGR(TY-PB GR-4 SAC-B)	CY	11
351	6002	FLEXIBLE PAVEMENT STRUCTURE REPAIR(6")	SY	178
354	6016	PLAN & TEXT CONC PAV(0" TO 1-1/2")	SY	1423
450	6055	RAIL (TY T221) (MOD)	LF	34
540	6002	MTL W-BEAM GD FEN (STEEL POST)	LF	150
540	6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	2
542	6001	REMOVE METAL BEAM GUARD FENCE	LF	75
542	6002	REMOVE TERMINAL ANCHOR SECTION	EA	1
544	6001	GUARDRAIL END TREATMENT (INSTALL)	EA	2
544	6003	GUARDRAIL END TREATMENT (REMOVE)	EA	1
3077	6052	SP MIXES SP-D SAC-A PG70-22	TON	505
3077	6054	SP MIXES SP-D SAC-A PG70-22 (LEVEL-UP)	TON	61
3077	6075	TACK COAT	GAL	141
3085	6001	UNDERSEAL COURSE	GAL	1145



Sheetal Patel, P.E.

11/28/2023

Texas Department of Transportation

SH 20
ROADWAY

ROADWAY LAYOUT
STA.936+00.00 STA.952+61.91

SHEET 11 *OF* 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		52

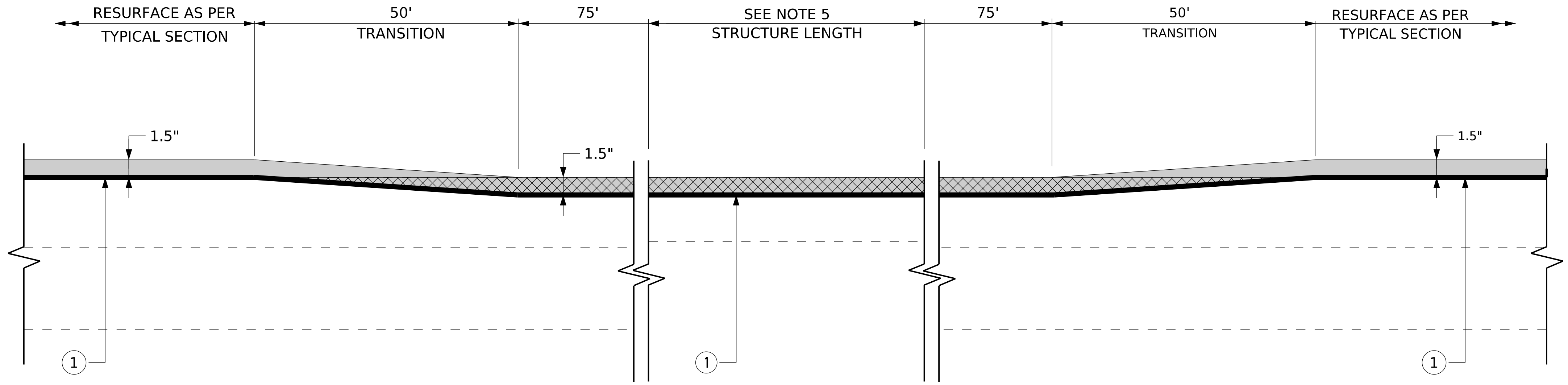
DATE: 11/28/2023 4:50:56 PM
FILE: pw://txdot.projectwiseonline.com:TxDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Master Design Files/Sheet Boundary Container/SH20ContainerRoadway

NOTES

1. FIELD VERIFY STRUCTURE LOCATION AND DIMENSIONS
2. REFER TO ROADWAY SHEETS FOR METAL BEAM GUARD FENCE LOCATIONS, PROJECT END LOCATION, AND ROADWAY DIMENSIONS.
3. REFER TO TYPICAL SECTIONS FOR PROPOSED PAVEMENT STRUCTURE AND DIMENSIONS.
4. MILLING ON BRIDGE WILL BE PAID UNDER ITEM 354-6020
5. SHOULDER ACP PAVEMENT THICKNESS MAY VARY, CONTRACTOR TO VERITY THE THICKNESS MAY VARY, CONTRACTOR TO VERITY THE THICKNESS BEFORE MILLING

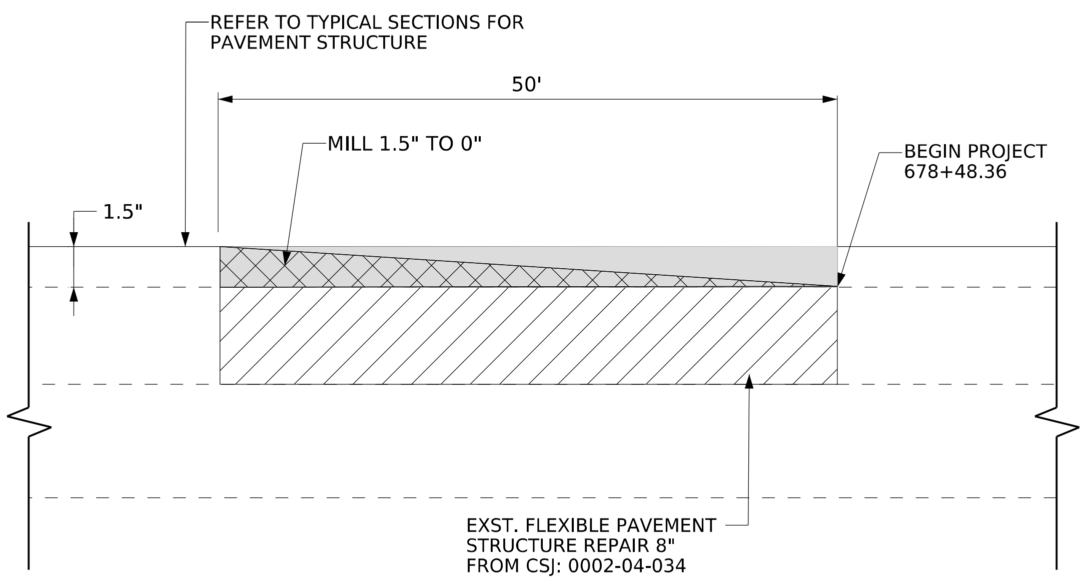
LEGEND

- 8" FLEXIBLE PAVEMENT
- PROPOSED 1.5" SP MIXES SP-D SAC-A PG70-22
- MILL 1.5" TO 0"
- (1) UNDERSEAL COURSE

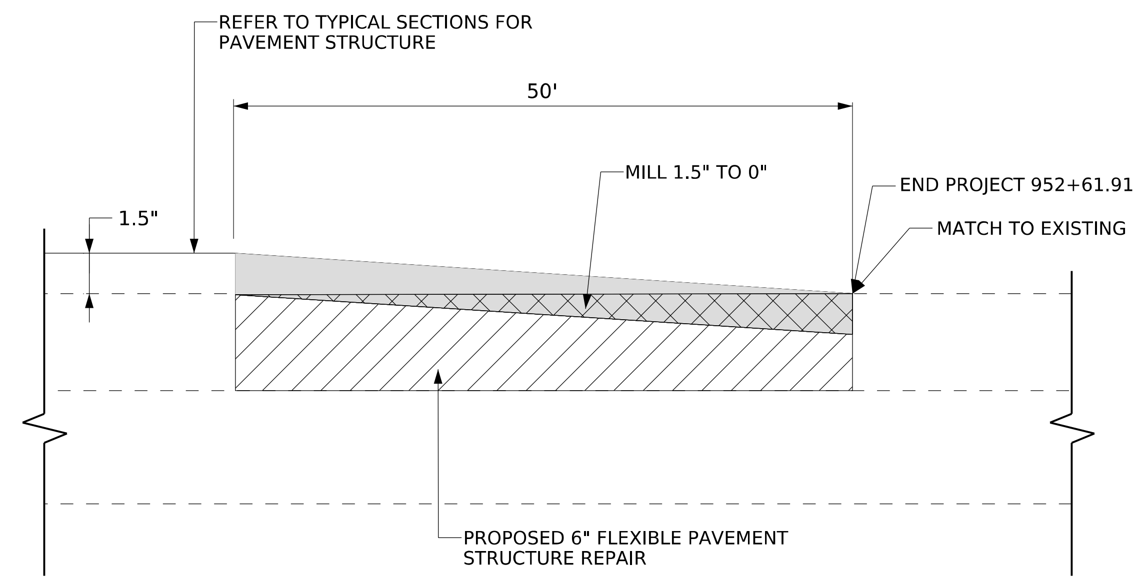


PAVEMENT TRANSITION AT MULTIPLE ARROYO BRIDGE LOCATIONS

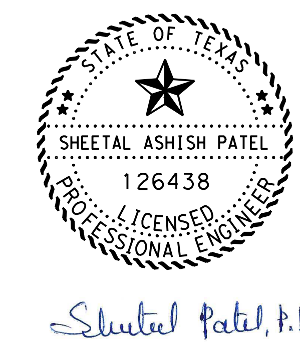
STRUCTURE LENGTH
CAMP RICE ARROYO BRIDGE = 109'
DRAW ARROYO BRIDGE = 42'
DIABLO ARROYO BRIDGE = 280'



BEGINNING OF PROJECT OVERLAY TRANSITION



END OF PROJECT OVERLAY TRANSITION



11/01/2023

Texas Department of Transportation

SH 20
ROADWAY

PAVEMENT TRANSITION
DETAIL

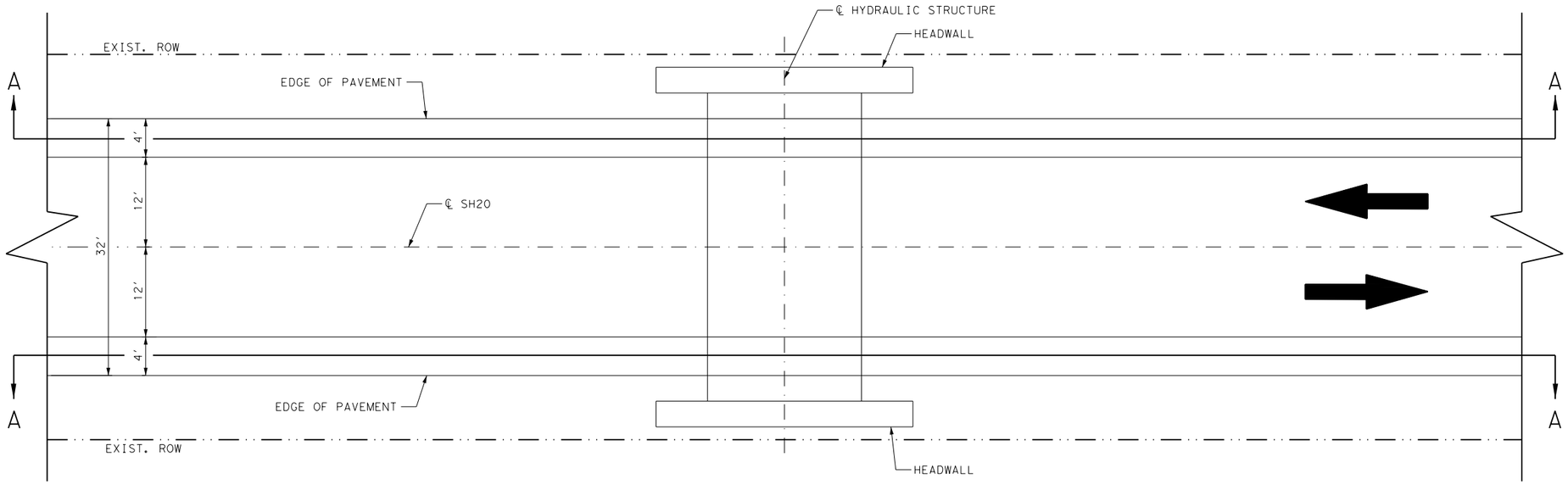
SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20

DIST	COUNTY	SHEET NO.
ELP	HUDSPETH	53

CK: DW: CK: DN:

DATE: 1:16:35 PM
FILE: ...iseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040354 - Design/Plan Set/3. Roadway/SH20 PAVEMENT TRANSITION DETAIL



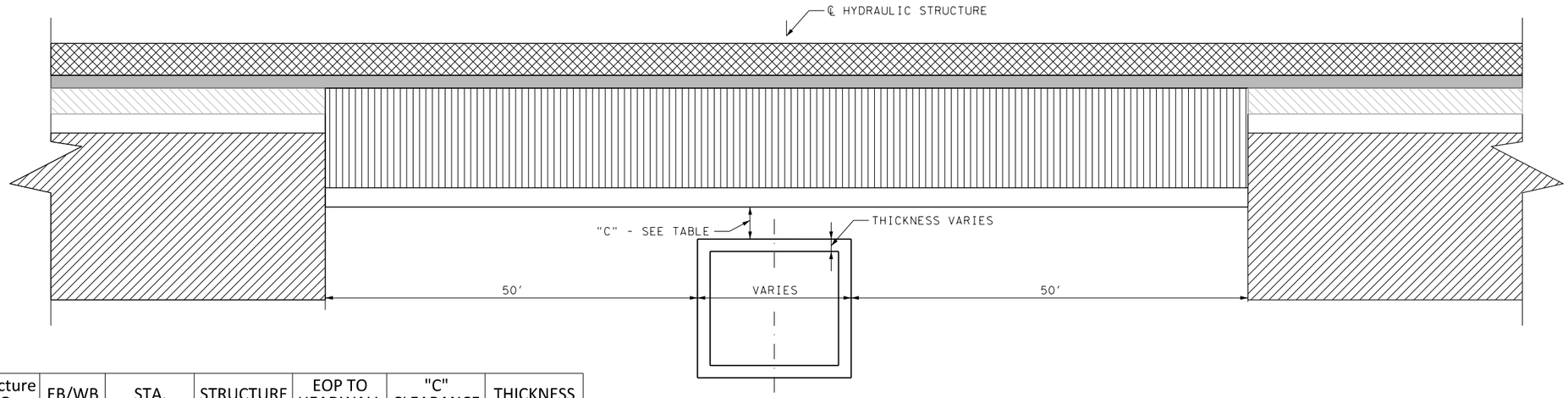
PLAN VIEW

NOTES

1. FIELD VERIFY STRUCTURE LOCATION AND DIMENSIONS.
2. CARE SHALL BE TAKEN DURING EXCAVATING AS NOT TO DAMAGE EXISTING HYDRAULIC STRUCTURES.
3. REFER TO ROADWAY SHEETS FOR METAL BEAM GUARD FENCE LOCATIONS.
4. REFER TO TYPICAL SECTION AND TYPICAL SECTION DETAILS SHEET FOR SHOULDER STRUCTURE.

LEGEND

- TRAFFIC FLOW
- 8" FLEX BASE (TY A)(GR1-2)
- PRIME COAT (SS-1H)
- SEAL COAT
- UNDERSEAL COURSE
- 1.5" SP MIXES SP-D SAC-A PG70-22
- 6" SP MIXES SP-D SAC-A PG70-22



SECTION A-A
ROADWAY ELEVATION

Structure NO.	EB/WB	STA.	STRUCTURE	EOP TO HEADWALL	"C" CLEARANCE	THICKNESS
1	EB	686+56.85	3'X2'	10.5'	0.65'	6"
1	WB	686+56.85	3'X2'	10.5'	0.58'	6"
2	EB	704+49.86	3'X2'	11.0'	0.10'	6"
2	WB	704+49.86	3'X2'	11.0'	0.10'	6"
3	EB	721+78.03	3'X2'	NO OUTLET	0.20'	6"
3	WB	721+78.03	3'X2'	10.0'	0.20'	6"
4	EB	724+74.75	3'X2'	NO OUTLET	NO OUTLET	6"
4	WB	724+74.75	3'X2'	10.5'	0.10'	6"
6	EB	779+32.08	3'X2'	11.0'	0.70'	6"
12	EB	947+46.12	2-5'X5'	24.5'	0.83'	6"
12	WB	947+46.12	2-5'X5'	16.0'	0.71'	6"

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

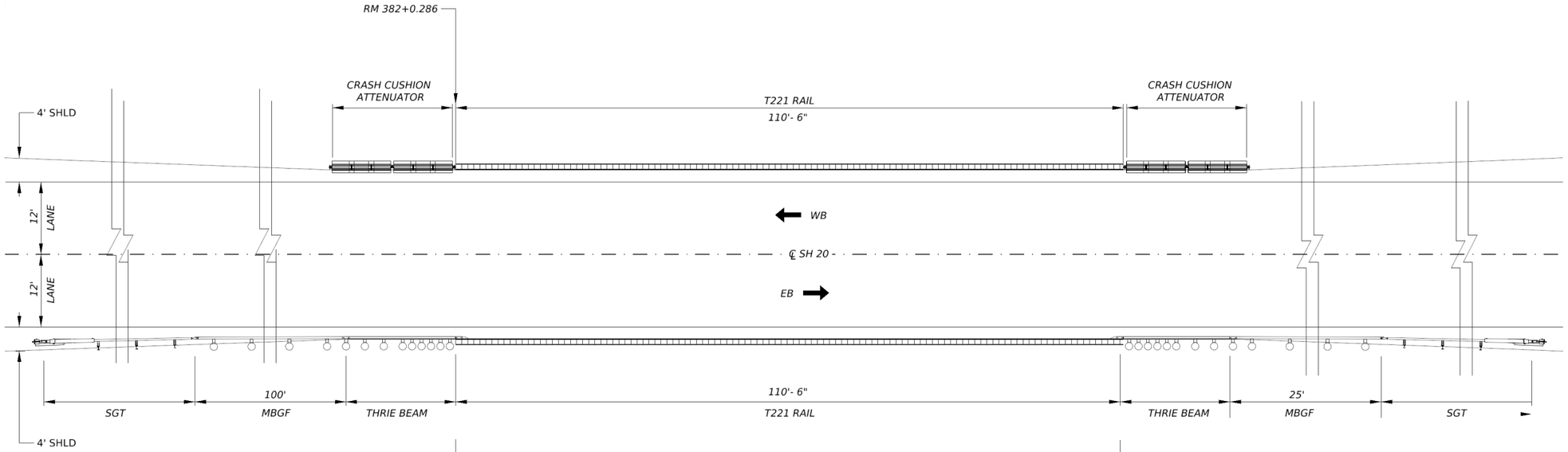
SH 20
ROADWAY

MISCELLANEOUS
DETAILS

SHEET 1 OF 1

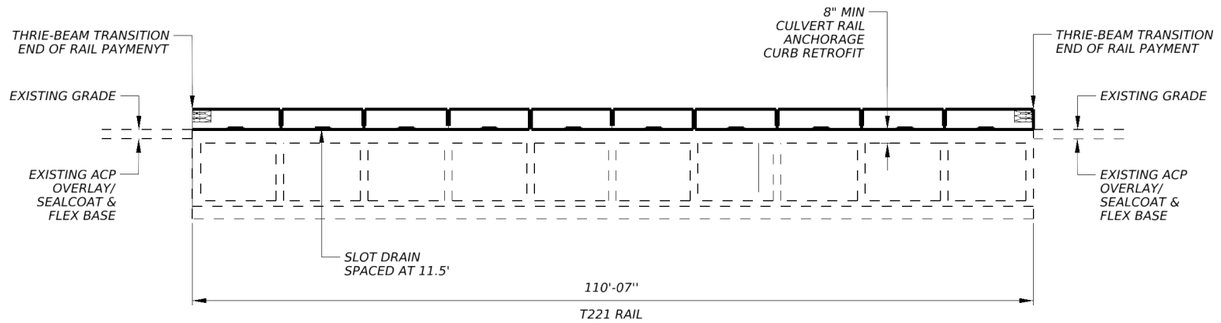
CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		54

DATE: 11/1/2023 1:16:52 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/000204035/4 - Design/Plan Set/3. Roadway/SH20_MISCELLANEOUS DETAILS



CAMP RICE ARROYO BRIDGE

PROPOSED SH 20 CONDITIONS N.T.S.



BRIDGE CLASS CULVERT

NBI: 24-116-0-0002-04-010 N.T.S.
RM 382+0.286

NOTES:

1. THE PROPOSED MBGF WILL BE PLACED AT THE EXISTING EDGE OF PAVEMENT.
2. REFERENCE MARKERS ARE APPROXIMATE,FIELD VERIFY.
3. REFER TO THE STANDARD FOR SINGLE GUARDRAIL TEREMINAL (SGT) DETAILS.
4. REFER TO GF(31) TR TL3-20 STANDARD FOR ADDITIONAL METAL BEAM GUARD FENCE DETAIL.
5. PLACE THE PROPOSED MBGF TO MATCH THE FACE OF RAIL ON BRIDGE, OR ASDIRECTED BY THE ENGINEER.
6. REFER TO RETROFIT GUIDE FOR CONCRETE RAILS (T221), C-RAIL-R (MOD) FOR ADDITIONAL DETAIL INFORMATION.

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

NOT TO SCALE

Texas Department of Transportation

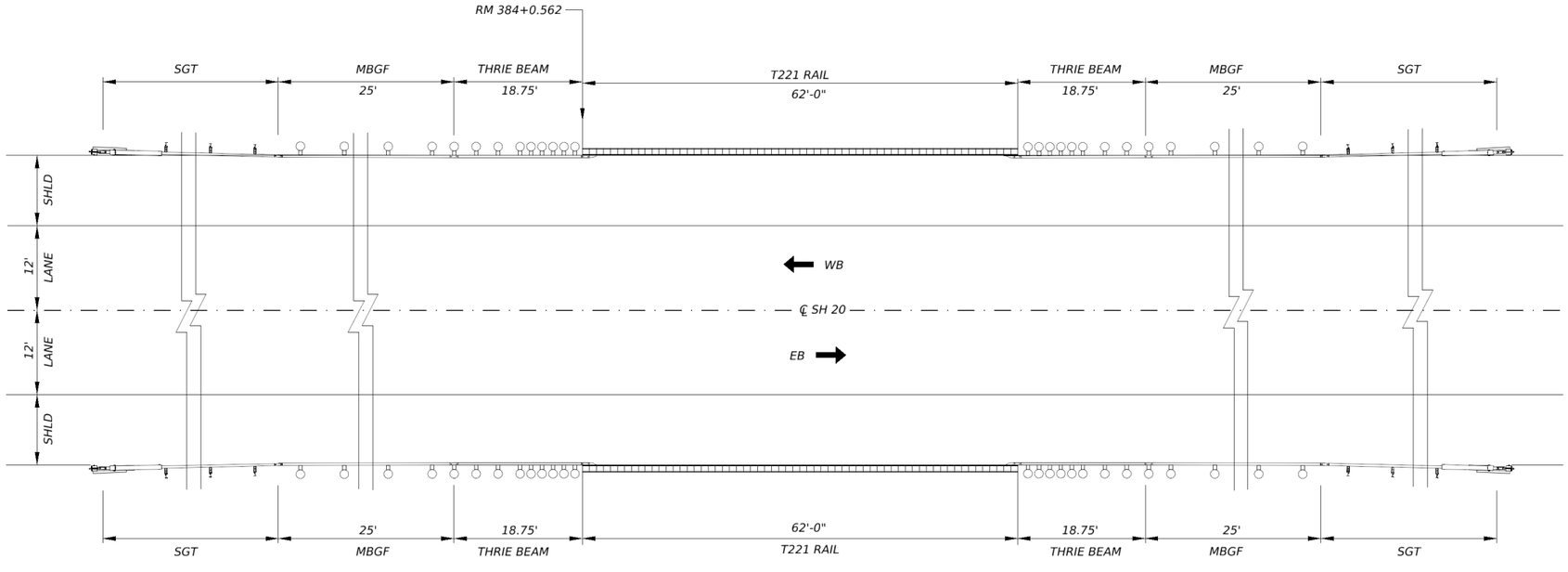
SH 20
ROADWAY

BRIDGE RAILING LAYOUT

2023 SHEET 1 OF 2

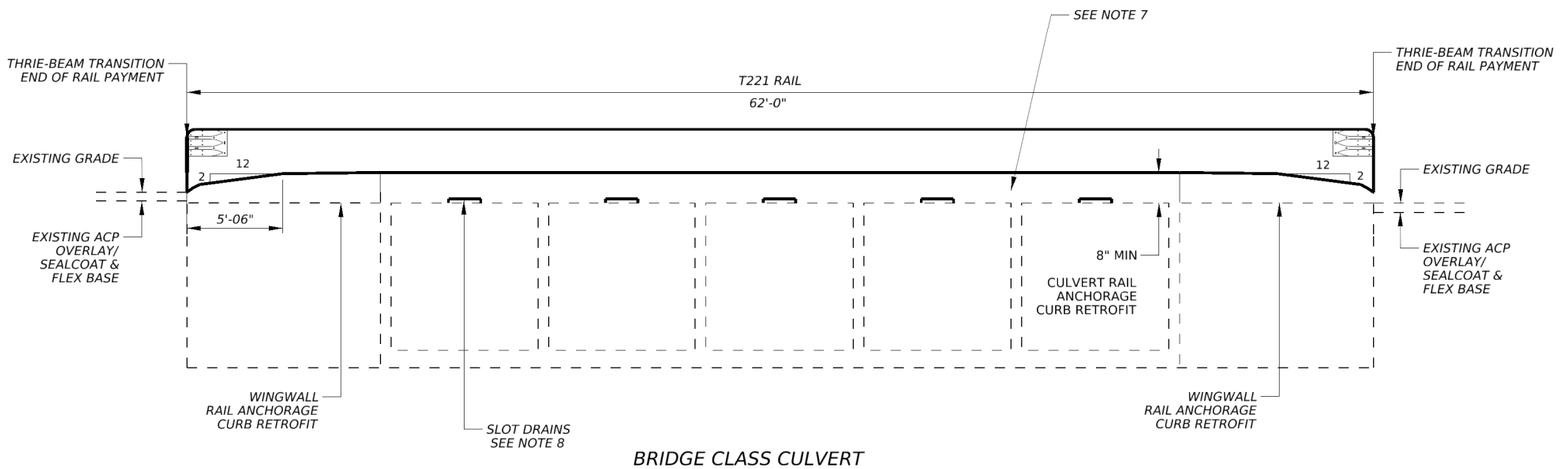
CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		55

DATE: 11/1/2023 1:17:10 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Plan Set/3_Roadway/SH20_Bridge_Railing_Layout



DRAW ARROYO BRIDGE

PROPOSED SH 20 CONDITIONS N.T.S.



BRIDGE CLASS CULVERT

NBI: 24-116-0-0002-04-011 N.T.S.
RM 384+0.562

NOTES:

1. THE PROPOSED MBGF WILL BE PLACED AT THE EXISTING EDGE OF PAVEMENT.
2. REFERENCE MARKERS ARE APPROXIMATE,FIELD VERIFY.
3. REFER TO THE STANDARD FOR SINGLE GUARDRAIL TEREMINAL (SGT) DETAILS.
4. REFER TO GF(31) TR TL3-20 STANDARD FOR ADDITIONAL METAL BEAM GUARD FENCE DETAIL.
5. PLACE THE PROPOSED MBGF TO MATCH THE FACE OF RAIL ON BRIDGE, OR ASDIRECTED BY THE ENGINEER.
6. REFER TO TYPE T221 RAIL RETROFIT (MOD), C-RAIL-R (MOD) LAYOUT FOR ADDITIONAL BRIDGE RAIL DETAILS.
7. EXISITNG 10" HEADWALLS TO BE REMAINED.
8. ALIGN EXISTING SLOT DRAINS TO THE PROPOSED SLOT DRAIN AS PER DETAIL SHOWN ON TRAFFIC RAIL T221

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

NOT TO SCALE

Texas Department of Transportation

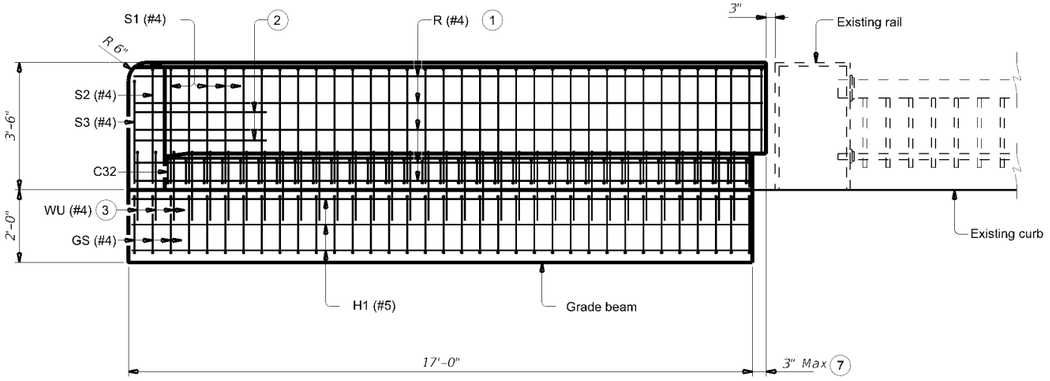
SH 20
ROADWAY

BRIDGE RAILING LAYOUT

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		56

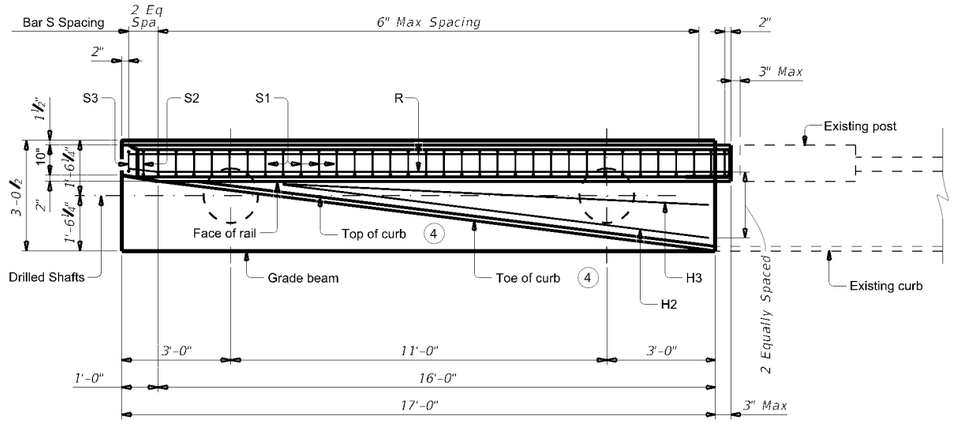
DATE: 11/1/2023 4:58:19 PM
FILE: pw://txdot.projectwiseonline.com:TxDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Plan Set/3. Roadway/SH20 Bridge Railing Layout



ELEVATION - RAIL AND GRADE BEAM REINFORCEMENT

(Drilled shaft reinforcing omitted for clarity.)

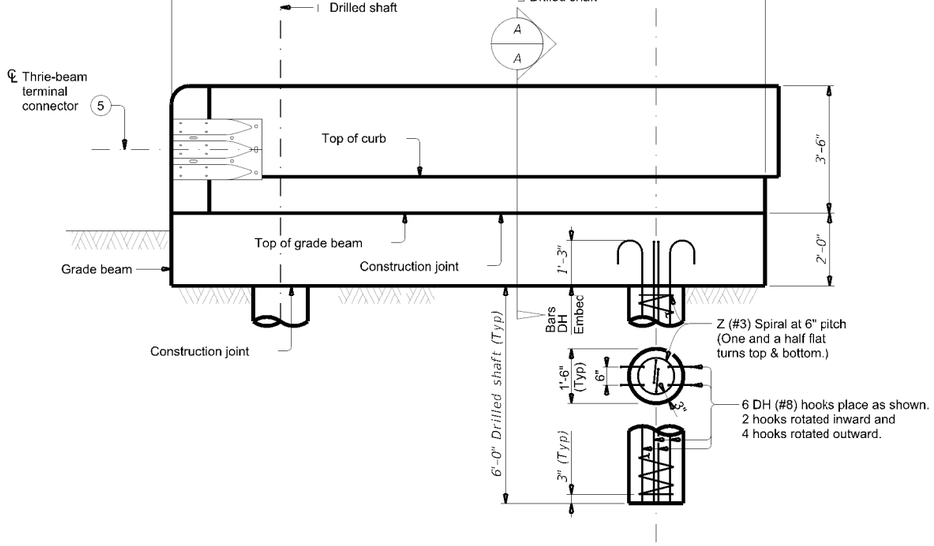
DIABLO ARROYO BRIDGE
NBI: 241160000204012



PLAN VIEW

(Grade beam and drilled shaft reinforcing omitted for clarity.)

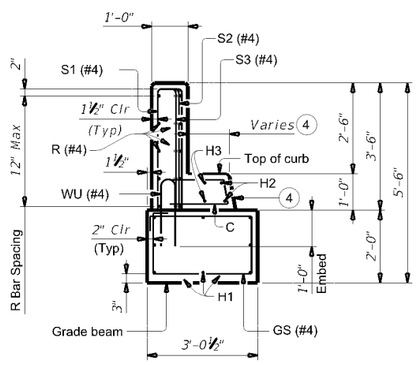
DIABLO ARROYO BRIDGE
NBI: 241160000204012



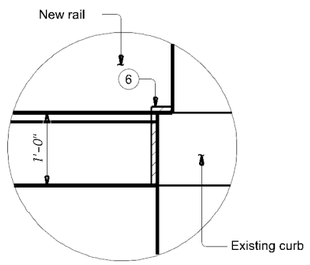
TRANSITION ELEVATION - GRADE BEAM ON DRILLED SHAFTS

(Rail reinforcing omitted for clarity.)

DIABLO ARROYO BRIDGE
NBI: 241160000204012



SECTION A-A



DETAIL "A"

1. CUT AS NEEDED TO AVOID EXISTING CURB.
2. PLACE 4 ADDITONAL BARS R (#4) 3'-8" IN LENGTH INSIDE BARS S (#4) AND CENTERED 2'-0" FROM END OF RAIL. FIELD BEND AS NEEDED.
3. FIELD BEND AS NECESSARY TO MAINTAIN 1" COVER AT TAPER.
4. MATCH EXISTING CURB SHPAE AT START OF TRANSITION AND TAPER TO VERTICAL FACE NEAR TERMINAL CONNECTION, AS SHOWN IN PLAN VIEW.
5. TERMINAL CONNECTORS AND ASSOCIATED HARDWARE ARE TO BE PAID FOR UNDER THE ITEM "METAL BEAM GUARD FENCE." ATTACH METAL BEAM GUARD FENCE TRANSITIONS TO BRIDGE RAIL AND EXTEND ALONG EMBANKMENT UNLESS OTHERWISE SHOWN IN PLANS.
6. 1/2" BITUMINOUS FIBER MATERIAL BETWEEN NEW RAIL AND EXISTING WINGWALL. BOND TO RAIL WITH AN APPROVED ADHESIVE.
7. COVER AND PROTECT ALL BRIDGE ELEMENTS. CLEAN ALL OF THESE FEATURES IF THEY WEREN'T PROPERLY PROTECTED.
8. REMOVAL OF EXISTING CONCRETE WILL BE SUBSIDIARY TO ITEM 420-6066.

SHEETAL ASHISH PATEL
126438
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

Sheetal Patel, P.E.

11/01/2023

N.T.S.

Texas Department of Transportation

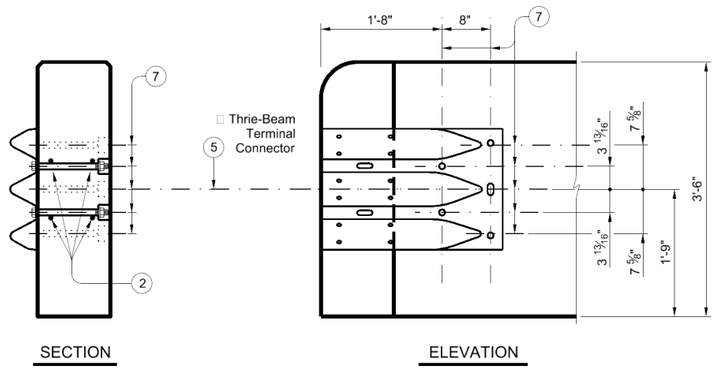
SH 20
ROADWAY

TRANSITION RAIL DETAILS

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		57

DATE: 11/1/2023 3:01:58 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Plan Set/3. Roadway/SH20 TRANSITION ROIL DETAILS



SECTION ELEVATION

TERMINAL CONNECTION DETAILS

DIABLO ARROYO BRIDGE
NBI: 241160000204012

(2) *PLACE 4 ADDITONAL BARS R (#4) 3'-8" IN LENGTH INSIDE BARS S (#4) AND CENTERED 2'-0" FROM END OF RAIL. FIELD BEND AS NEEDED.*

(5) *TERMINAL CONNECTORS AND ASSOCIATED HARDWARE ARE TO BE PAID FOR UNDER THE ITEM "METAL BEAM GUARD FENCE." ATTACH METAL BEAM GUARD FENCE TRANSITIONS TO BRIDGE RAIL AND EXTEND ALONG EMBANKMENT UNLESS OTHERWISE SHOWN IN PLANS.*

(7) *[5~1" DIA. AND 21#2" DIA. X 2" DEEP RECESSES. FORM OR CORE HOLES AND RECESSES. PERCUSSION DRILLING IS NOT PERMITTED. ADJUST PLACEMENT OF REINFORCING STEEL AS NEESSARY TO AVOID BOLT HOLES AND RECESSES. BOLT RECESSES ARE ONLY REQUIRED WHEN PEDESTRIAN SIDEWALKS ARE ADJACENT TO BACK OF RAIL. TIGHTEN THE 5 TERMINAL CONNECTION BOLTS IN A WELL DISTRIBUTED PATTER TO PREVENT DAMAGE OR DISTORTION OF THE THRIE-BEAM CONNECTION AND THE MBGF TRANSITION. CUT BOLTS OFF AFTER INSTALLATION SO AS TO EXTEND NO MORE THAN 3/4" BEYOND NUT. PAINT ENDS OF CUT-OFF BOLTS WITH ZINC-RICH PAINT.*

FIELD VERIFY PROPOSED THRIE-BEAM HEIGHT TO MEET HEIGHT REQUIREMENT ON GF(31)TRTL3-20 PRIOR TO DRILLING CONNECTION BOLT HOLES.

CONSTRUCTION NOTES:

The back of railing must be vertical unless otherwise shown on the plans or approved by the Engineer.

Chamfer all exposed corners.

MATERIAL NOTES:

Provide Class C concrete.

Provide Grade 60 reinforcing steel.

GENERAL NOTES:

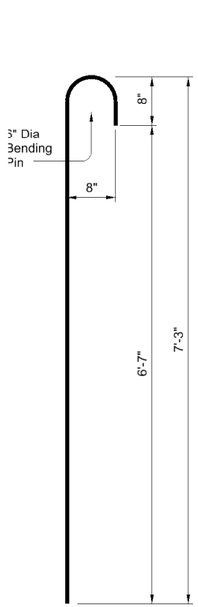
Payment for drilled shafts and grade beam will be by Class C concrete.

Payment for railing will be as per Item 450-6055, "Rail (Ty T221) (MOD)."

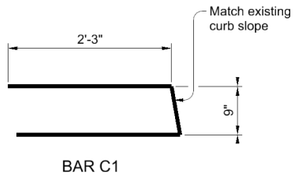
Excavation will be subsidiary to other Items.

Cover dimensions are clear dimensions, unless noted otherwise.

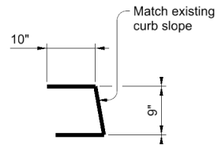
Reinforcing bar dimensions shown are out-to-out of bar.



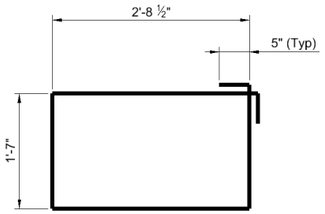
BARS DH (#8)



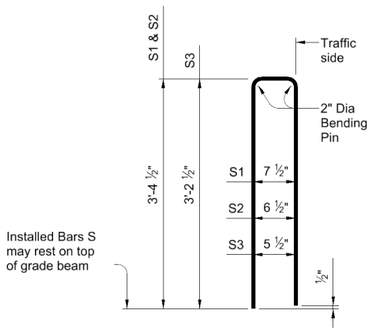
BAR C1



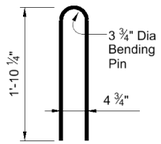
BAR C32



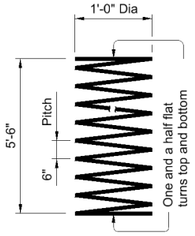
BARS GS (#4)



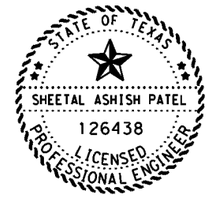
BARS S (#4)



BARS WU (#4)



BARS Z (#3)



Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

SH 20
ROADWAY

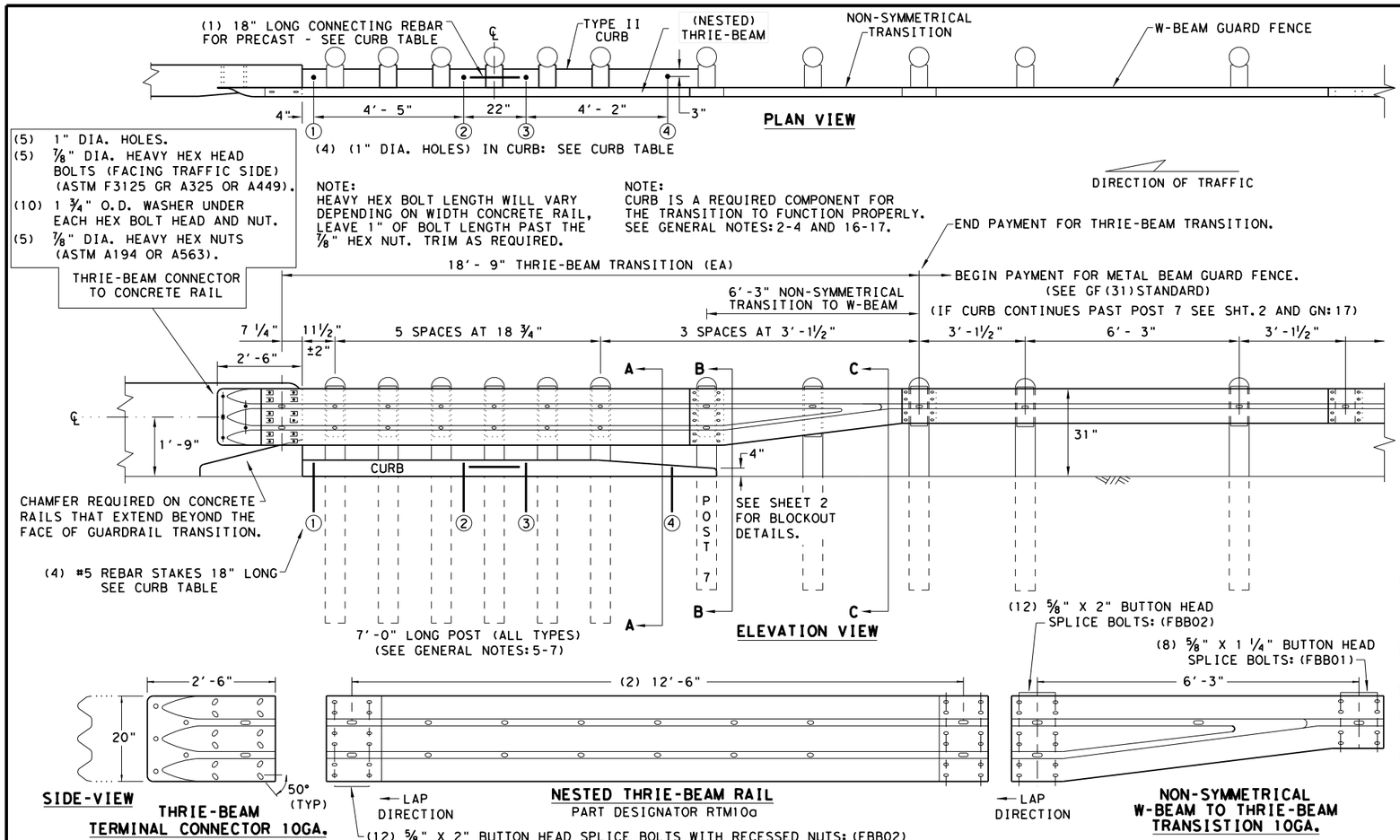
TRANSITION RAIL DETAILS

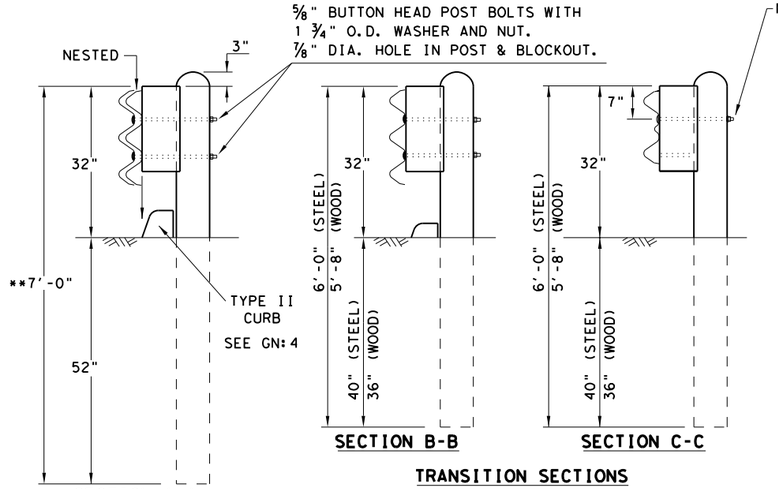
SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		58

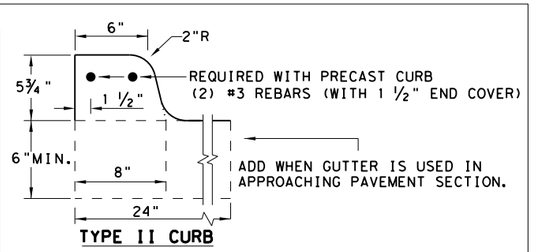
DATE: 11/1/2023 1:17:47 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Plan Set/3_Roadway/SH20_TRANSITION_ROIL_DETAILS

DATE:
FILE:





THRIE-BEAM TERMINAL - CURB TABLE
PRECAST CURB FULL LENGTH EQUALS 12'- 2" THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.
CURB (1) LENGTH 5'- 8"
CURB (2) LENGTH 6'- 6"
TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7
CONNECTING PRECAST CURB SECTIONS (1) & (2):
FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB END. USE (1) #5 GR.60 REBAR 18" LONG TO CONNECT BOTH CURBS.
SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE *:
FORM OR CORE (4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR.60 REBAR STAKES 18" LONG INTO THE GROUND AND ½" BELOW TOP OF CURB. FILL HOLES WITH APPROVED GROUT MIXTURE.



NOTE: OPTIONS FOR TYPE II CURB:
1. PRECAST
2. CAST-IN-PLACE

* NOTES: NOT NEEDED FOR CAST-IN-PLACE.
SEE TYPE II CURB DETAIL FOR REBAR AND COVER REQUIREMENTS.
PERCUSSION DRILLING IS NOT PERMITTED WITH:
TYPE II CURB, BRIDGE RAIL OR CONCRETE TRAFFIC RAIL.

TYPE II CURB DETAILS

GENERAL NOTES

1. CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
2. CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION WITH THE THRIE-BEAM TRANSITIONS, CURB SHALL BE TYPE II (5- ¾" HEIGHT); SEE CURRENT CCCG STANDARD SHEET FOR FURTHER DETAILS. IF OTHER CURB HEIGHTS ARE SHOWN IN THE PLANS IN CONJUNCTION WITH THE TRANSITION, THE CURB HEIGHT MAY BE FROM 4" TO 8" WITH A RELATIVELY VERTICAL FACE. CONCRETE CURB SHALL BE CONTINUOUS TO THE SEVENTH POST UNLESS OTHERWISE SHOWN IN THE PLANS. SEE GENERAL NOTE: 17 FOR CIRCUMSTANCES WHERE CURB CONTINUES PAST POST 7.
3. CONCRETE CURB TYPE II SUBSIDIARY TO "METAL BEAM GUARD FENCE TRANSITION". IF NO ADDITIONAL CURB IS INDICATED BEYOND THE TRANSITION, THEN ANY CURB HEIGHT GREATER THAN 4" WILL BE TAPERED DOWN BEGINNING AT THE LAST 7 FT. POST TO A MAXIMUM HEIGHT OF 4" AT POST 7. IF SHOWN ELSEWHERE IN THE PLANS, ADDITIONAL CURB UNDERNEATH GUARDRAIL WILL BE PAID FOR BY THE LINEAR FOOT.
4. UNLESS OTHERWISE SHOWN IN THE PLANS, TRANSITIONS SHALL BE PLACED WITH THE BLOCKOUT FACE IN FRONT OF OR DIRECTLY ABOVE THE CURB FACE. SEE SECTION A-A.
5. FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 ½" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
6. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. REFER TO GF(31) STANDARD SHEET.
7. THE POST LENGTH SHALL BE MARKED ON ALL 7'- 0" LONG POSTS BY THE MANUFACTURER. THE MARK SHALL BE LOCATED WITHIN THE TOP 1 FT. REGION OF THE POST, AT LEAST ⅝" IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.
8. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
9. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE THRIE-BEAM TERMINAL CONNECTOR AND THE THRIE-BEAM TRANSITION TO W-BEAM SHALL BE OF THE SAME MATERIAL, BUT SHALL NOT BE LESS THAN 10 GAUGE. CONTRACTOR SHALL VERIFY THAT THE LOCATIONS OF BOLT HOLES MATCH THOSE IN THE THRIE-BEAM TERMINAL CONNECTOR PRIOR TO ORDERING MATERIALS.
10. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
11. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
12. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
13. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
14. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. TXDOT'S MATERIALS AND TESTS DIVISION MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
15. REFER TO GF(31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
16. THE INSTALLATION OF THE TYPE II CURB IS CRITICAL FOR THE PERFORMANCE OF THE THRIE-BEAM TRANSITION SYSTEM. THE CURB PREVENTS (VEHICLE WHEEL SNAGGING) AT THE CONCRETE RAIL AND IS REQUIRED TO MEET MASH CRASH TEST CRITERIA.
17. IF CURB EXTENDS BEYOND POST 7, 25' OF NESTED W-BEAM GUARDRAIL SHALL BE INSTALLED BEYOND THE PAY LIMITS OF THRIE-BEAM TRANSITION SECTION, (SEE SHT.2). PAYMENT FOR THIS 25' SECTION WILL BE BY LINEAR FOOT, PAY ITEM "0540 6XXX MTL W-BEAM GD FEN (NESTED)(TIM POST)" OR "540 6XXX MTL W-BEAM GD FEN (NESTED)(STEEL POST)" AS APPLICABLE FOR POST TYPE. SEE SHT.2 FOR ADDITIONAL INFORMATION.

HIGH-SPEED TRANSITION

Texas Department of Transportation — Design Division Standard

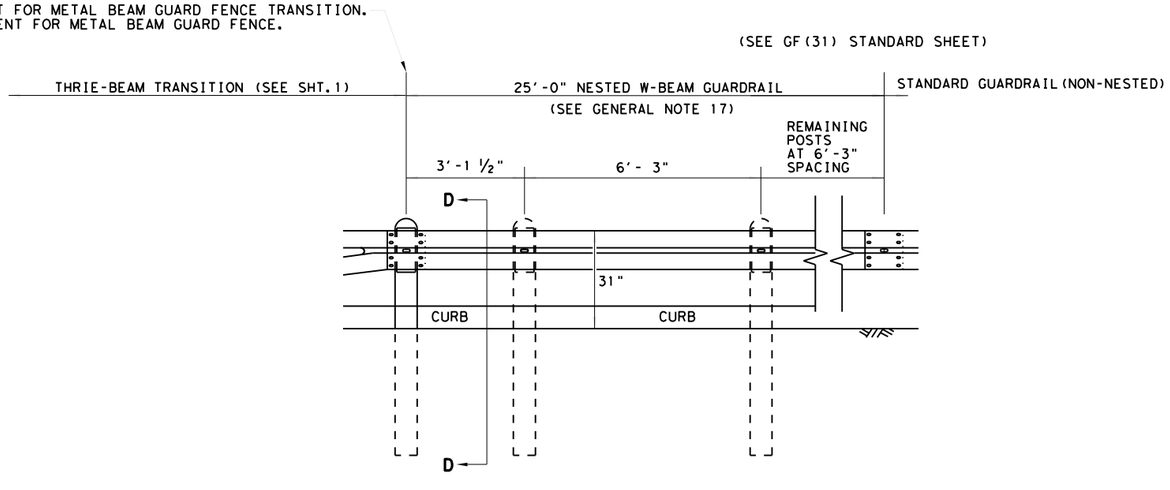
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

GF(31)TR TL3-20

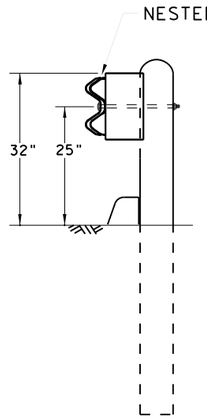
FILE: gf31trtl320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035,ETC.	SH 20
	DIST	COUNTY		SHEET NO.
	ELP	HUDSPETH		59

DATE:
FILE:

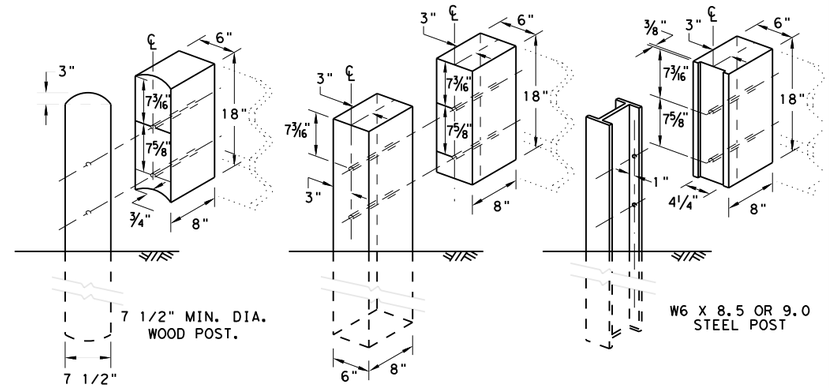
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

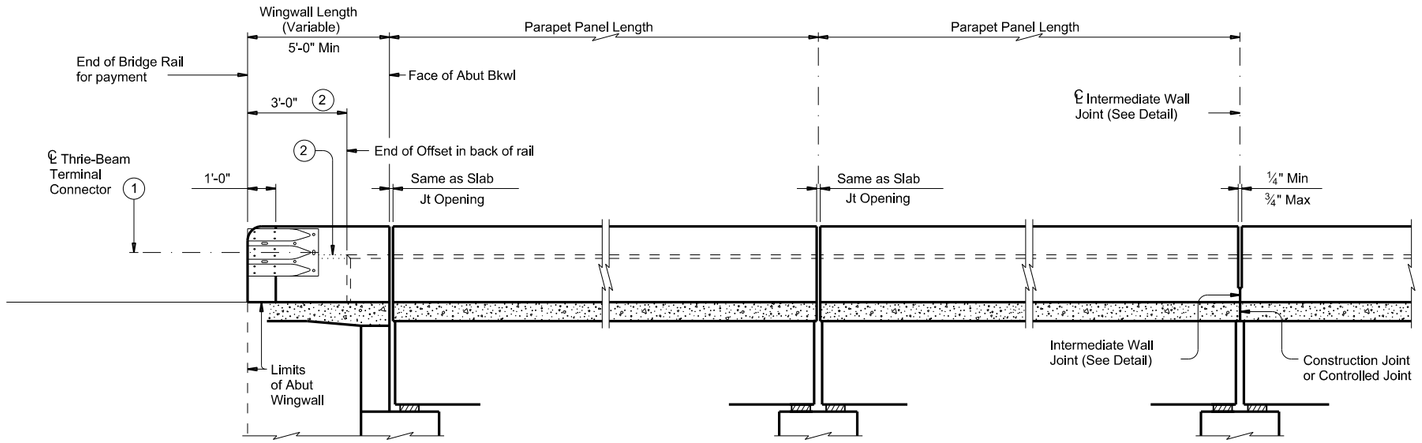
Texas Department of Transportation | Design Division Standard

METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

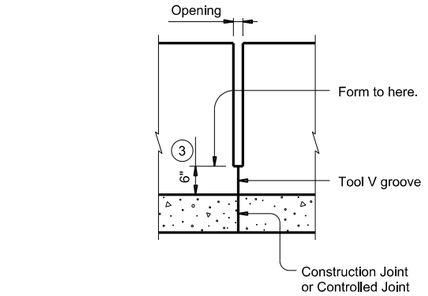
GF(31)TR TL3-20

FILE: gf31tr1320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG	
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY	
	0002	04	035, ETC.	SH 20	
				SHEET NO.	
	ELP	HUDSPETH		60	

DATE: 11/1/2023 1:18:25 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Plan Set/13. Standards/Roadway Standards/TYPE_T221

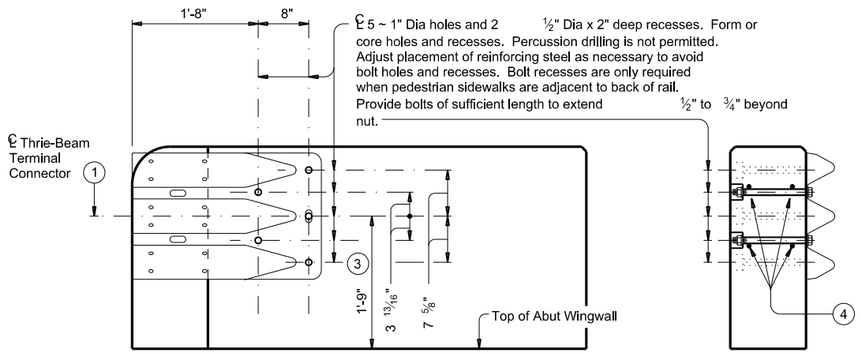


ROADWAY ELEVATION OF RAIL



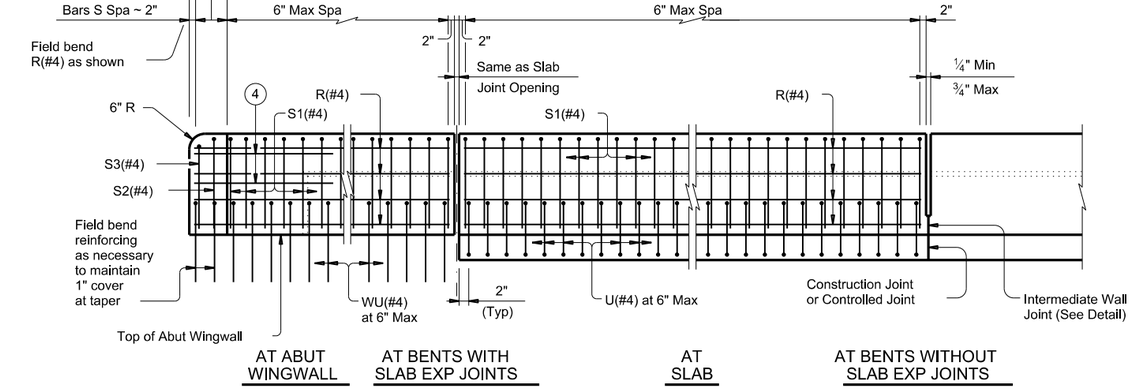
INTERMEDIATE WALL JOINT DETAIL

Provide at all interior bents without slab expansion joints.

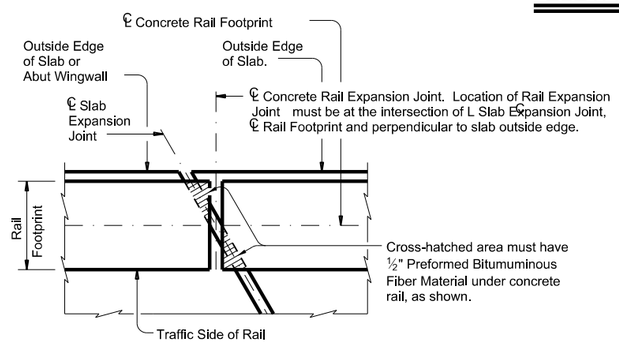


TERMINAL CONNECTION DETAILS

1. Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.
2. Back of rail offset may, with Engineer's approval, be continued to the end of the railing.
3. Increase 2" for structures with overlay.
4. Place 4 additional Bars R(#4) 3'-8" in length inside Bars S(#4) and centered 2'-0" from end of rail when Terminal Connections are required. Field bend as needed.



ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

SHEET 1 OF 2

Texas Department of Transportation

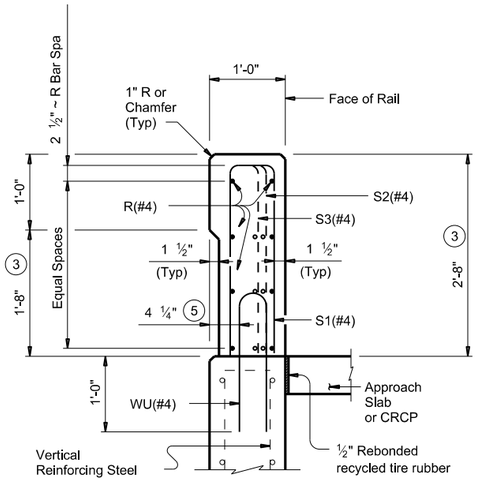
Bridge Division Standard

TRAFFIC RAIL

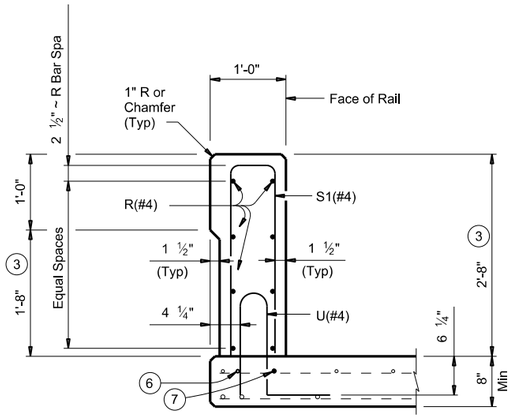
TYPE T221

FILE: rlstd004-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035,ETC.	SH 20
	DIST	COUNTY		SHEET NO.
	ELP	HUDSPETH		61

DATE: 11/1/2023 1:18:25 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Plan Set/13. Standards/Roadway Standards/TYPE_T221



ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS



ON BRIDGE SLAB

SECTIONS THRU RAIL

(3) Increase 2" for structures with overlay.

(5) 5 ¼" when vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls or retaining walls on traffic side of wall.

(6) As an aid in supporting reinforcement, additional longitudinal bars may be used in the slab with the approval of the Engineer. Such bars will be furnished at the Contractors expense.

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

(8) Bend or cut as required to clear drain slots.

(9) No longitudinal wires may be in top center of cage.

(10) Space U(#4) bars at 4" Max when end region of panel length is less than 6'-0" to side slot drain. Space U(#4) bars at 6" Max when end region of panel length is 6'-0" and greater to side slot drain.

CONSTRUCTION NOTES:

This railing may be constructed by the slipform process when approved by the Engineer, with equipment approved by the Engineer. Provide sensor control for both line and grade. Tack welding to provide bracing for slipform operations is acceptable. Welding may be performed at a minimum spacing of 3 ft between the cage and the anchorage. It is permissible to weld to bars U, WU and S at any location on the cage. If increased bracing is needed, provide additional anchorage devices and weld in the upper two thirds of the cage. Paint welded areas on epoxy coated and/or galvanized reinforcing with an organic zinc rich paint in accordance with Item 445 "Galvanizing".

If rail is slipformed, apply an heavy epoxy bead 1" behind toe of traffic side of rail to concrete deck just prior to slip forming. Provide a ⅜" width x ¼" tall heavy epoxy bead with Type III, Class C or a Type V epoxy.

Face of rail and parapet must be vertical transversely unless otherwise shown in the plans or approved by the Engineer.

Chamfer all exposed concrete corners.

MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

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

Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U and WU unless noted otherwise. Deformed WWR (ASTM 1064) may be substituted for Bars R and S, as shown. Combinations of reinforcing steel and WWR or configurations of WWR other that shown are permitted if conditions in the table are satisfied. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #4 = 1'-7"

Epoxy coated ~ #4 = 2'-5"

GENERAL NOTES:

This rail has been evaluated and accepted to be of equal strength to railings with like geometry, which have been crash tested to meet MASH TL-3 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

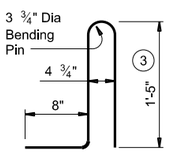
Do not use this railing on bridges with expansion joints providing more than 5" movement.

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

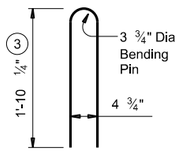
Shop drawings are not required for this rail.

Average weight of railing with no overlay is 370 plf.

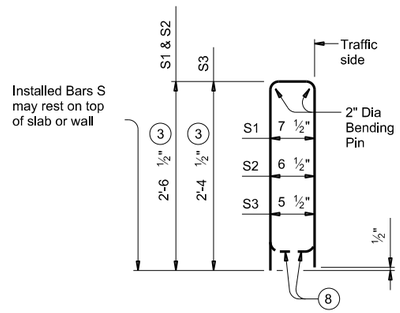
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



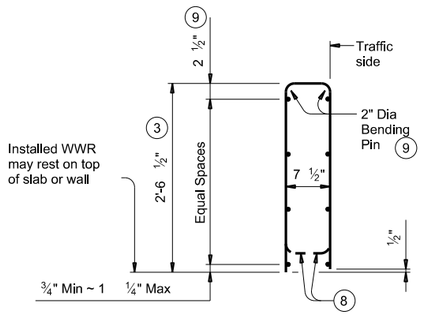
BARS U (#4)



BARS WU (#4)

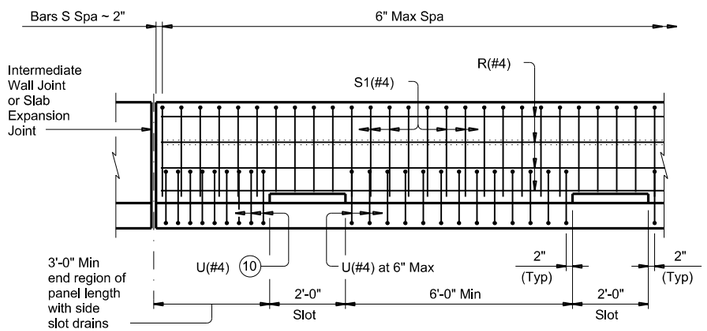


BARS S (#4)



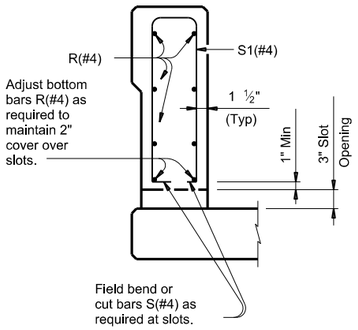
OPTIONAL WELDED WIRE REINFORCEMENT (WWR)

DESCRIPTION	LONGITUDINAL WIRES	VERTICAL WIRES
Minimum (Cumulative Total) Wire Area	1.067 Sq In.	0.267 Sq In. per Ft
	No. of Wires	Spacing
Minimum	8	4"
Maximum	10	8"
Maximum Wire Size Differential	The smaller wire must have an area of 40% or more of the larger wire.	



OPTIONAL SIDE SLOT DRAIN DETAIL

Note: Side Slot Drains may be used where shown elsewhere on the plans or as directed by the Engineer. Drains should not be placed over railroad tracks, lower roadways, or sidewalks. When this rail is used as a separator between a roadway surface and a sidewalk surface, side drain slots will not be permitted.



SECTION THRU OPTIONAL SIDE SLOT DRAIN

SHEET 2 OF 2

Texas Department of Transportation

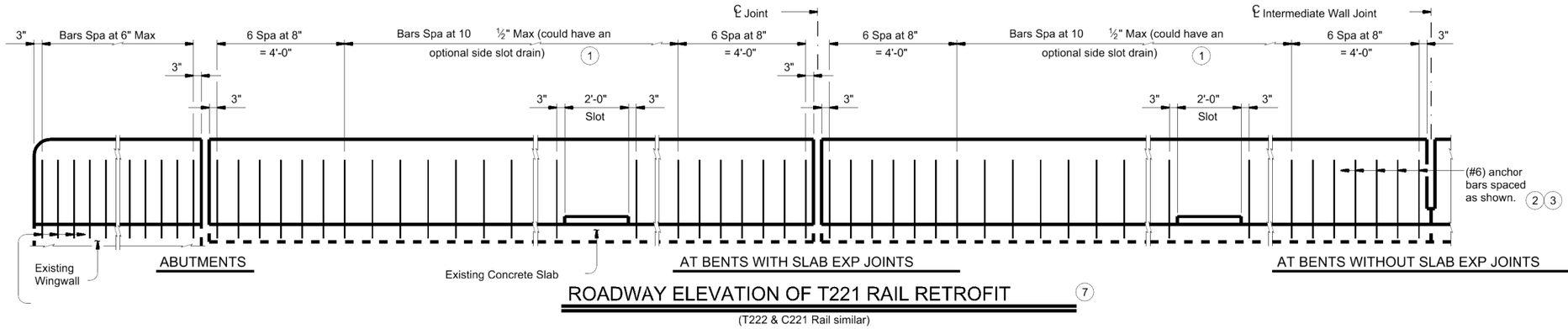
Bridge Division Standard

TRAFFIC RAIL

TYPE T221

FILE:	tlstd004-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT	September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS		0002	04	035, ETC.	SH 20
		DIST	COUNTY		SHEET NO.
		ELP	HUDSPETH		62

DATE: 11/1/2023 3:02:53 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/000204035/4 - Design/Plan Set/13. Standards/Roadway Standards/RLSTD 022-20.dgn



ROADWAY ELEVATION OF T221 RAIL RETROFIT 7

(T222 & C221 Rail similar)

1 When side slot drains are used, provide 8'-0" Min clear spacing between drain slots.

2 Embed (#6) anchor bars with a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 5 ¼". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 20 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing".

3 See T221, T222 or C221 Rail Sections in "Rail Retrofit Section on Wingwalls using Adhesive Anchors" and/or "Rail Retrofit Section on Concrete Slabs using Adhesive Anchors".

7 Showing spacing of (#6) adhesive anchor in a rail retrofit condition. Secondary (#4) adhesive anchor in a rail retrofit not shown for clarity. Reinforcing steel and terminal connections not shown for clarity. See rail standard for details and notes not shown.

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023
SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

RETROFIT GUIDE FOR CONCRETE RAILS

C-RAIL-R (MOD)

FILE: rlstd022-20.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT September 2019	CONT.	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035, ETC.	SH 20
07-20: Text change from epoxy to adhesive and changed MASH Test Level note.	DIST	COUNTY		SHEET NO.
	ELP	HUDSPETH		63

PROPOSED DETAIL FOR T221 RAIL RETROFIT FOR DRAW ARROYO BRIDGE (9)
NBI: 241160000204011

(2) Embed (#6) anchor bars with a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 5 ¼". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 20 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing".

(9) Showing location or locations of anchor bars in a rail retrofit condition. See appropriate rail standard for details and notes not shown.

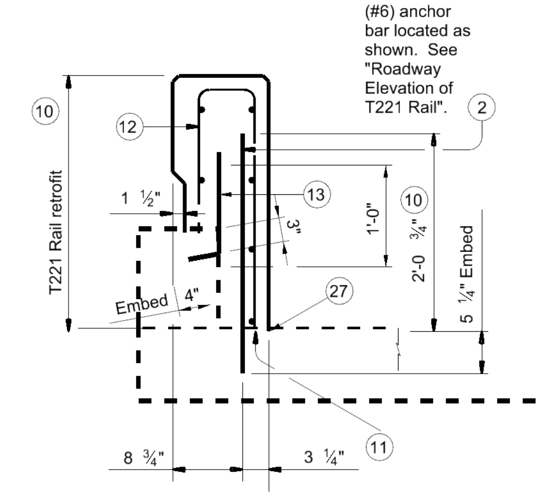
(10) Increase by amount of existing overlay/seal coat thickness, not to exceed 2". If thickness of existing overlay/seal coat is greater than 2" at toe of rail, taper overlay at a 1:10 or flatter slope over shoulder width to a thickness of 2" or less at toe of rail.

(11) Do not cast rails or parapet walls on top of overlays/seal coats.

(12) See appropriate rail standard for reinforcing steel. Modify length of vertical reinforcing bars as required to fit existing structure. Longitudinal reinforcing bars may be removed only if their position puts them in conflict with un-removed portions of existing structure.

(13) Embed secondary (#4) anchor bars 1'-4" in length with a Type III Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 10 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing". (#4) anchor bars spaced longitudinally along rail at 4 ft Max (Spaced 3" longitudinally from outside edge and edge of side slot drains).

(27) Void out area in rail retrofit to accommodate existing drain holes in deck.



Case (C): Locate anchor bar no closer than 2" from toe of curb.

CONSTRUCTION NOTES:

Field verify dimensions before commencing work and ordering materials.

By adding additional anchorage, welding can be performed at a minimum spacing of 3 ft between the cage and additional anchorage. By satisfying additional anchorage requirements slip forming is allowed. Do not weld to the required anchorage.

Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 3 anchors per 100 anchors installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if required elsewhere.

(#6) and (#4) anchor bars used for the adhesive anchorage system must not be epoxy coated within the required embedment.

GENERAL NOTES:

Use of these retrofit details will result in a railing acceptable for the MASH Test Level indicated on the applicable rail standard.

Rail anchorage details shown on this guide may require modification for select structure types. See appropriate details elsewhere in plans for these modifications. Not all possible combinations of existing railing, curbs, parapets etc. have been shown on this sheet. Other combinations and reinforcement arrangements are permissible if they meet the same strength requirements as indicated on this guide.

Do not remove any part of a curb until it has been evaluated to not be a load-carrying structural component.

Removal and replacement of backfill, subgrade, and asphalt or concrete pavement necessary for this installation is considered subsidiary to the retrofit railing.

Payment for a rail retrofit will be as per Item 451, "Retrofit Railing", by the type of the rail retrofit. All details shown herein are subsidiary to rail retrofit. Examples are "Retrofit Rail (Ty T551)", "Retrofit Rail (Ty SSTR)", etc.

Reinforcing bar dimensions shown are out-to-out of bar.

PROPOSED DETAIL FOR T221 RAIL RETROFIT FOR CAMP RICE ARROYO BRIDGE (9)
NBI: 241160000204010

(2) Embed (#6) anchor bars with a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 5 ¼". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 20 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing".

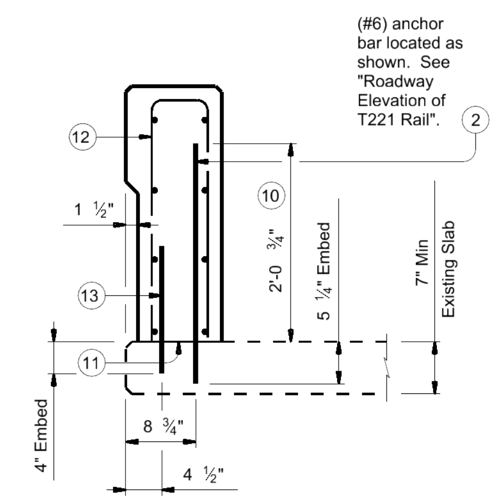
(9) Showing location or locations of anchor bars in a rail retrofit condition. See appropriate rail standard for details and notes not shown.

(10) Increase by amount of existing overlay/seal coat thickness, not to exceed 2". If thickness of existing overlay/seal coat is greater than 2" at toe of rail, taper overlay at a 1:10 or flatter slope over shoulder width to a thickness of 2" or less at toe of rail.

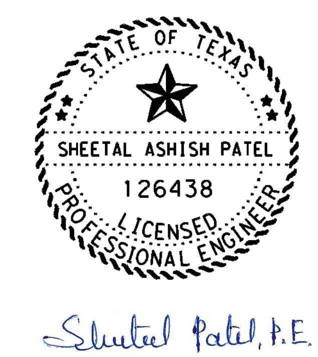
(11) Do not cast rails or parapet walls on top of overlays/seal coats.

(12) See appropriate rail standard for reinforcing steel. Modify length of vertical reinforcing bars as required to fit existing structure. Longitudinal reinforcing bars may be removed only if their position puts them in conflict with un-removed portions of existing structure.

(13) Embed secondary (#4) anchor bars 1'-4" in length with a Type III Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 10 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing". (#4) anchor bars spaced longitudinally along rail at 4 ft Max (Spaced 3" longitudinally from outside edge and edge of side slot drains).



T221



11/01/2023

SHEET 2 OF 2

Texas Department of Transportation	Bridge Division Standard

RETROFIT GUIDE FOR CONCRETE RAILS

C-RAIL-R (MOD)

FILE: rlstd022-20.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035, ETC.	SH 20
07-20: Text change from epoxy to adhesive and changed MASH Test Level note.	DIST	COUNTY		SHEET NO.
	ELP	HUDSPETH		64

DATE: 11/1/2023 3:03:58 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/000204035744 - Design Plan Set/3. Standards/Roadway Standards/RLSTD 022-20.dgn

DATE: 11/1/2023
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/00020403S/4 - Design/Plan Set/13. Standards/Roadway Standards/SGT(10S)31-16.dgn

NOTE: STEEL I-BEAM POST W6 X 8.5 (6'-0") PN: 533G
STANDARD WOOD BLOCKOUTS (6"X8"X14") PN: 4076B
AT (POSTS 2 THRU 8)

⅝" X 10" HGR BOLT PN: 3500G
⅝" HGR NUT PN: 3340G

LINE AT THE BACK OF POST #2 THRU #8

FROM THE CENTERLINE OF POST(1) & POST(0)

ANCHOR PADDLE PN: 15204A

ANGLE STRUT PN: 15202G

16"

POST(8) POST(7) POST(6) POST(5) POST(4) POST(3) POST(1) POST(0)

PLAN VIEW

MASH TEST LEVEL 3 (TL-3) LENGTH OF SoftStop TERMINAL (50'-9 ½")

BEGIN LENGTH OF NEED

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

TRAFFIC FLOW

50'-9 ½" STANDARD INSTALLATION LENGTH (MASH TL-3 SoftStop)

BEGIN STANDARD MBGF

END PAYMENT FOR SGT

6¼" 3'-1 ½" 6'-3" 6'-3"

ANCHOR RAIL WITH SLOTS - (THREADED THRU HEAD)
SEE SoftStop MANUAL FOR COMPLETE DETAILS

MIDDLE SLOT CUTOUT (1) 1 ¾" X 6'-10 ¼"

OUTSIDE SLOTS CUTOUT (2)1½" X 6'-9 ⅝"

SoftStop FACE SEE GN(3) & NOTE:B

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

25'-0" DOWNSTREAM W-BEAM GUARDRAIL PN: 61G

SoftStop ANCHOR RAIL (12GA) PN: 15215G

3'-1 ½"(+/-) 6'-3" 6'-3" 6'-3" 6'-3" 6'-3" 6'-3" 5'-8" 4'-7"

B B A A

ANCHOR PADDLE PN: 15204A

END OF ANCHOR RAIL PN: 15215G

SEE NOTE: A

SEE NOTE: C

POST 32" HEIGHT

31" RAIL HEIGHT

RAIL 25'-0" PN: 61G

RAIL 25'-0" PN: 15215G

31" RAIL HEIGHT

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

13/16" DIA. YIELDING HOLES

13/16" DIA. YIELDING HOLES

SEE DETAIL 3

6'-1⅜"

(8) ⅝"x 1-¼" GR BOLTS PN: 3360G
⅝" HEX NUTS PN: 3340G

POST 40" DEPTH (TYP 1-8)

(8) ⅝"x 1-¼" HGR BOLTS PN: 3360G
⅝" HEX NUTS PN: 3340G

POST(8) POST(7) POST(6) POST(5) POST(4) POST(3) POST(2) 6'-0" (SYTP) PN: 15000G POST(1) 4'-9 ½" SYTP PN: 15203G POST(0) 6'-5 ⅜" PN: 15205A

ELEVATION VIEW

HARDWARE FOR POST(2) THRU POST(8)
(1) ⅝"x 10" HGR BOLT PN: 3500G
(1) ⅝" HGR HEX NUT PN: 3340G

NOTE: DO NOT BOLT ANCHOR RAIL PANEL TO POST(2)

ALTERNATE BLOCKOUT SEE GENERAL NOTE:6

4" X 7 ½" X 14" BLOCKOUT COMPOSITE PN: 6777B

6" X 8" X 14" BLOCKOUT WOOD PN: 4076B

NOTE: DO NOT BOLT ANCHOR RAIL TO POST(2)

8" 6" 14"

⅝" HGR NUT PN: 3340G

⅝" X 10" HGR POST BOLT PN: 3500G

1⅜"DIAMETER YIELDING HOLES LOCATED IN FLANGES

FINISHED GRADE

(HOLES APROXIMATELY CENTERED AT FINISHED GRADE)

ISOMETRIC VIEW POST(1 & 2)

W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

(1) ⅝" x 1 ¾" HEX HD BOLT PN 3391G

ANGLE STRUT PN: 15202G

(2) ⅝" WASHERS PN 4372G

(1) ⅝" HGR HEX NUT PN 3340G

DETAIL 1

SHOWN AT POST(1) NEAR GROUND

(1) ⅝" HEX NUT

(1) ⅝" x 1-½" HEX HD BOLT-GR-5 PN: 105286

(2) ⅝" ROUND WASHERS PN: 3240G

DETAIL 2

SHOWN AT POST(1)

ANCHOR KEEPER PLATE (24 GA) PN: 15207G

ANCHOR PLATE WASHER ½" THICK PN: 15206G

1" ROUND WASHER F463 PN: 4902G

(2) ⅝" x 2 ½" HEX HD BOLT GR-5 PN: 105285G

ALTERNATE BLOCKOUT SEE GENERAL NOTE:6

(2) ⅝" ROUND WASHER (WIDE) PN: 3240G

1" NUT PN: 3908G SHALL BE SECURELY TIGHTENED AFTER FINAL ASSEMBLY, BUT NOT DEFORMING THE KEEPER PLATE.

ANCHOR PADDLE PN: 15204A

(2) ⅝" HEX NUT A563 GR. DH PN: 3245G

W-BEAM FLATTENED (4 PLIES)

ANGLE STRUT PN: 15202G

SEE NOTE: A

(2) ¾" x 2 ½" HEX BOLT (TYP) PN: 3717G

(4) ¾" FLAT WASHER (TYP) PN: 3701G

(2) ¾" HEX NUT (TYP) PN: 3704G

6'-1 ⅜" POST DEPTH

(2) ANCHOR POST ANGLE PN: 15201G

DETAIL 3 AT POST(0)

6'-5 ⅜" (W6 X 15) I-BEAM POST PN: 15205A

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

FINISHED GRADE

LINE POST (3, 4, 5, 6, 7 & 8)

SECTION VIEW B-B

6'-0" (W6 X 8.5) I-BEAM POST PN: 533G

POST(2)

SECTION VIEW A-A

6'-0" (W6 X 8.5) (SYTP) I-BEAM POST PN: 15000G

NOTE: DO NOT BOLT ANCHOR RAIL PANEL TO POST(2)

POST 17"- ½" HEIGHT

4'- 9 ½"

13/16" DIA. YIELDING HOLES

40"

POST(1)

FRONT VIEW POST(1)

4'-9 ½" (W6 X 8.5) (SYTP) I-BEAM POST PN: 15203G

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

2'-0"

STANDARD MBGF

EDGE OF PAVEMENT

NOTE: ADJUST WIDTH ACCORDINGLY WHEN OFFSET IS USED. (OFFSET "OPTION" SHOWN)

2'-0" MAX. RAIL OFFSET

APPROACH GRADING (1V:10H OR FLATTER) SEE PRODUCT ASSEMBLY MANUAL FOR ADDITIONAL GUIDANCE.

APPROACH GRADING AT GUARDRAIL END TREATMENTS

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY AT 1(888)323-6374. 2525 N. STEMMONS FREEWAY, DALLAS, TX 75207
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE; SoftStop END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL. PN: 620237B
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. A COMPOSITE MATERIAL BLOCKOUT THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS OF SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
7. IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL AND REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
8. POSTS SHALL NOT BE SET IN CONCRETE.
9. IT IS ACCEPTABLE TO INSTALL THE SoftStop IMPACT HEAD PARALLEL TO THE GRADE LINE OR WITH AN UPWARD TILT.
10. DO NOT ATTACH THE SoftStop SYSTEM DIRECTLY TO A RIGID BARRIER.
11. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE SoftStop SYSTEM BE CURVED.
12. A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCROACHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.

NOTE: A	THE INSTALLATION HEIGHT OF FULLY ASSEMBLED ANCHOR POST WILL VARY FROM 3-¾" MIN. TO 4" MAX. ABOVE FINISHED GRADE.
NOTE: B	PART PN: 5852B RIGHT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING) PART PN: 5851B LEFT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING)
NOTE: C	W-BEAM SPLICE LOCATED BETWEEN LINE POST(4) AND LINE POST(5) GUARDRAIL PANEL 25'-0" PN: 61G ANCHOR RAIL 25'-0" PN: 15215G LAP GUARDRAIL IN DIRECTION OF TRAFFIC FLOW.

PART	QTY	MAIN SYSTEM COMPONENTS
620237B	1	PRODUCT DESCRIPTION ASSEMBLY MANUAL (LATEST REV.)
15208A	1	SoftStop HEAD (SEE MANUAL FOR RIGHT-LEFT APPROACH)
15215G	1	SoftStop ANCHOR RAIL (12GA) WITH CUTOUT SLOTS
61G	1	SoftStop DOWNSTREAM W-BEAM RAIL (12GA) (25'- 0")
15205A	1	POST #0 - ANCHOR POST (6'- 5 ⅞")
15203G	1	POST #1 - (SYTP) (4'- 9 ½")
15000G	1	POST #2 - (SYTP) (6'- 0")
533G	6	POST #3 THRU #8 - I-BEAM (W6 x 8.5) (6'- 0")
4076B	7	BLOCKOUT - WOOD (ROUTED) (6" x 8" x 14")
6777B	7	BLOCKOUT - COMPOSITE (4" x 7 ½" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (½" THICK)
15201G	2	ANCHOR POST ANGLE (10" LONG)
15202G	1	ANGLE STRUT
		HARDWARE
4902G	1	1" ROUND WASHER F436
3908G	1	1" HEAVY HEX NUT A563 GR. DH
3717G	2	¾" x 2 ½" HEX BOLT A325
3701G	4	¾" ROUND WASHER F436
3704G	2	¾" HEAVY HEX NUT A563 GR. DH
3360G	16	⅝" x 1 ¼" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	⅝" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	⅝" x 10" HGR POST BOLT A307
3391G	1	⅝" x 1 ¾" HEX HD BOLT A325
4489G	1	⅝" x 9" HEX HD BOLT A325
4372G	4	⅝" WASHER F436
105285G	2	⅝" x 2 ½" HEX HD BOLT GR-5
105286G	1	⅝" x 1 ½" HEX HD BOLT GR-5
3240G	6	⅝" ROUND WASHER (WIDE)
3245G	3	⅝" HEX NUT A563 GR. DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE:B

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SoftStop END TERMINAL, IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

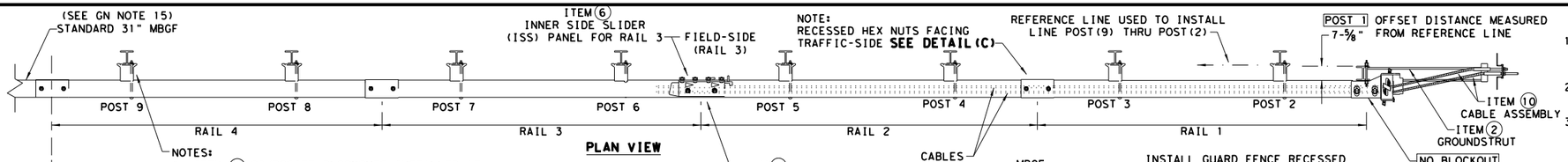
Texas Department of Transportation

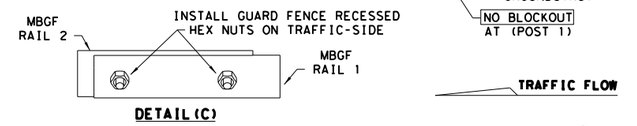
Design Division Standard

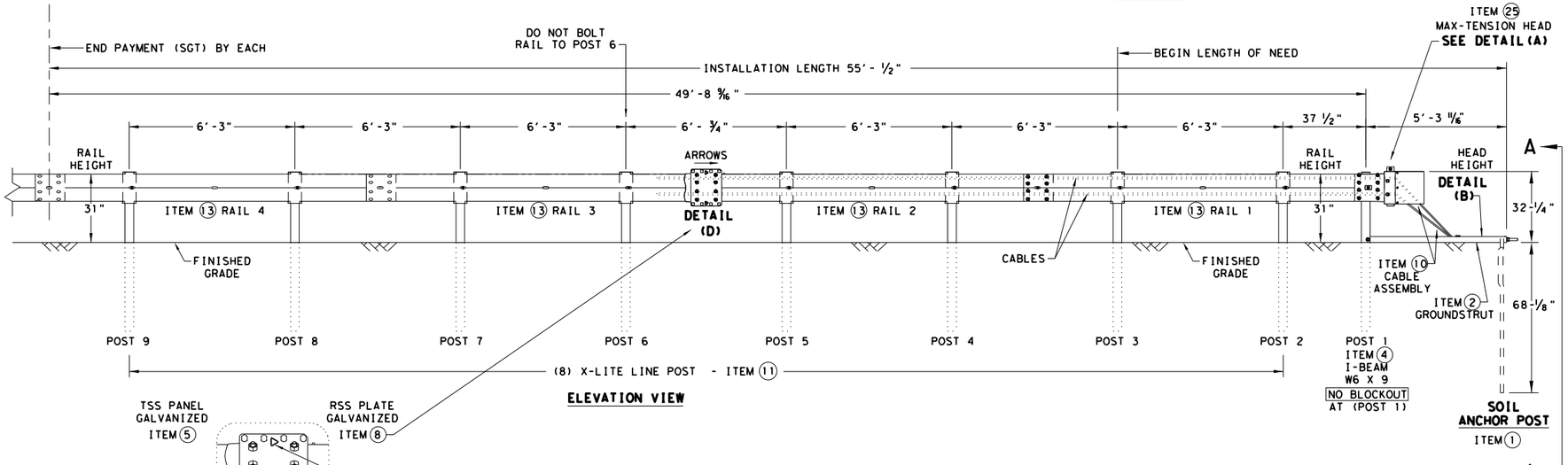
TRINITY HIGHWAY
SOFTSTOP END TERMINAL
MASH - TL-3
SGT(10S)31-16

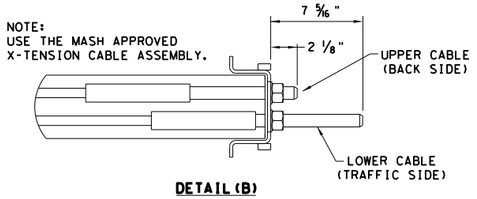
FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP		
©TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0002	04	035,ETC.		SH 20	
	DIST	COUNTY			SHEET NO.	
	ELP	HUDSPETH			65	

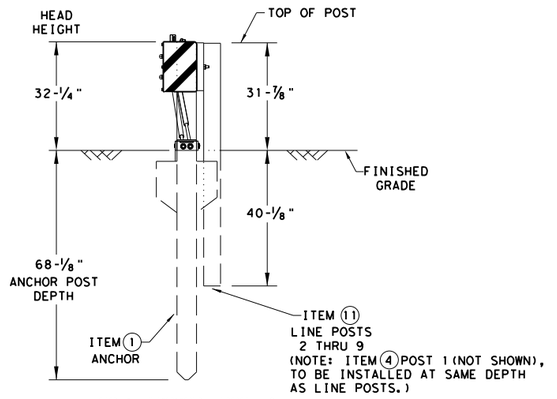
DATE: 11/1/2023
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/00020403574 - Design/Plan Set/13. Standards/Roadway Standards/SGT(11S)31-18.dgn

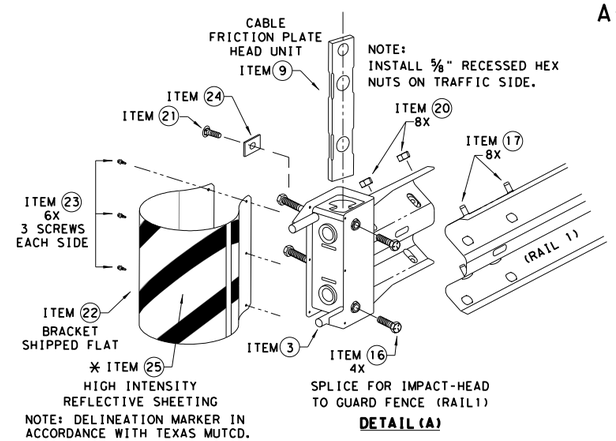


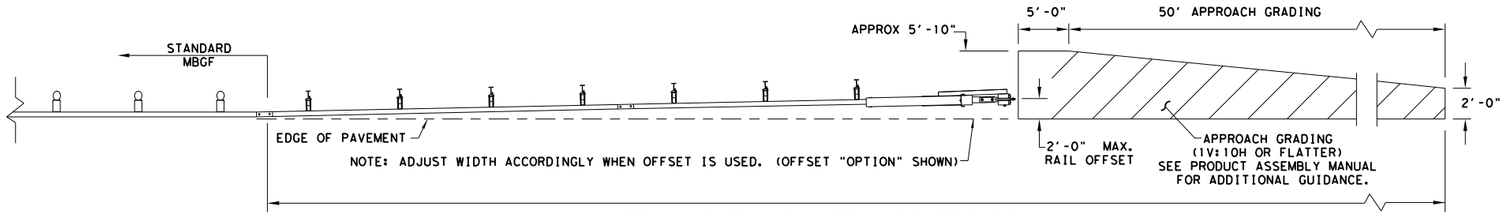












GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800
2. FOR INSTALLATION, REPAIR, & MAINTENANCE REFER TO THE; MAX-TENSION INSTALLATION INSTRUCTION MANUAL. P/N MANMAX REV D (ECN 3516).
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURE'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. ALL STEEL COMPONENTS ARE GALVANIZED PER ASTM A123 OR EQUIVALENT UNLESS OTHERWISE STATED.
6. SYSTEM SHOWN USING STEEL WIDE FLANGE POST WITH COMPOSITE BLOCKOUTS.
7. COMPOSITE MATERIAL BLOCKOUT THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST(MPL)FOR CERTIFIED PRODUCERS.
8. REFER TO INSTALLATION MANUAL FOR SPECIFIC PANEL LAPPING GUIDANCE.
9. IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL FOR INSTALLATION GUIDANCE.
10. POSTS SHALL NOT BE SET IN CONCRETE.
11. A DRIVING CAP WITH A TIMBER OR PLASTIC INSERT SHALL BE USED WHEN DRIVING POST TO PREVENT DAMAGE TO THE GALVANIZING ON TOP OF THE POST.
12. MAX-TENSION SYSTEM SHALL NEVER BE INSTALLED WITHIN A CURVED SECTION OF GUARDRAIL.
13. IF A DELINEATION MARKER IS REQUIRED, MARKER SHALL BE IN ACCORDANCE WITH TEXAS MUTCD.
14. THE SYSTEM IS SHOWN WITH 12'-6" MBGF PANELS, 25'-0" MBGF PANELS ARE ALSO ALLOWED.
15. A MINIMUM OF 12'-6" OF 12GA. MBGF IS REQUIRED IMMEDIATELY DOWNSTREAM OF THE MAX-TENSION SYSTEM.

ITEM #	PART NUMBER	DESCRIPTION	QTY
1	BSI-1610060-00	SOIL ANCHOR - GALVANIZED	1
2	BSI-1610061-00	GROUND STRUT - GALVANIZED	1
3	BSI-1610062-00	MAX-TENSION IMPACT HEAD	1
4	BSI-1610063-00	W6x9 I-BEAM POST 6FT.-GALVANIZED	1
5	BSI-1610064-00	TSS PANEL - TRAFFIC SIDE SLIDER	1
6	BSI-1610065-00	ISS PANEL - INNER SIDE SLIDER	1
7	BSI-1610066-00	TOOTH - GEOMET	1
8	BSI-1610067-00	RSS PLATE - REAR SIDE SLIDER	1
9	B061058	CABLE FRICTION PLATE - HEAD UNIT	1
10	BSI-1610069-00	CABLE ASSEMBLY - MASH X-TENSION	2
11	BSI-1012078-00	X-LITE LINE POST-GALVANIZED	8
12	B090534	8" W-BEAM COMPOSITE-BLOCKOUT XT110	8
13	BSI-4004386	12'-6" W-BEAM GUARD FENCE PANELS 12GA.	4
14	BSI-1102027-00	X-LITE SQUARE WASHER	1
15	BSI-2001886	⅝" X 7" THREAD BOLT HH (GR.5)GEOMET	1
16	BSI-2001885	¾" X 3" ALL-THREAD BOLT HH (GR.5)GEOMET	4
17	4001115	⅝" X 1 ¼" GUARD FENCE BOLTS (GR.2)MGAL	48
18	2001840	⅝" X 10" GUARD FENCE BOLTS MGAL	8
19	2001636	⅝" WASHER F436 STRUCTURAL MGAL	2
20	4001116	⅝" RECESSED GUARD FENCE NUT (GR.2)MGAL	59
21	BSI-2001888	⅝" X 2" ALL THREAD BOLT (GR.5)GEOMET	1
22	BSI-1701063-00	DELINEATION MOUNTING (BRACKET)	1
23	BSI-2001887	¼" X ¾" SCREW SD HH 410SS	7
24	4002051	GUARDRAIL WASHER RECT AASHTO FWR03	1
* 25	SEE NOTE BELOW	HIGH INTENSITY REFLECTIVE SHEETING	1
** 26	4002337	8" W-BEAM TIMBER-BLOCKOUT, PDB01B	8
** 27	BSI-4004431	25' W-BEAM GUARDRAIL PANEL,8-SPACE,12GA.	2
28	MANMAX Rev-(D)	MAX-TENSION INSTALLATION INSTRUCTIONS	1

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

** ALTERNATIVE ITEMS NOT SHOWN.
ITEM(26) 8" WOOD-BLOCKOUTS
ITEM(27) 25'GUARD FENCE PANELS

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE MAX-TENSION END TERMINAL, IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

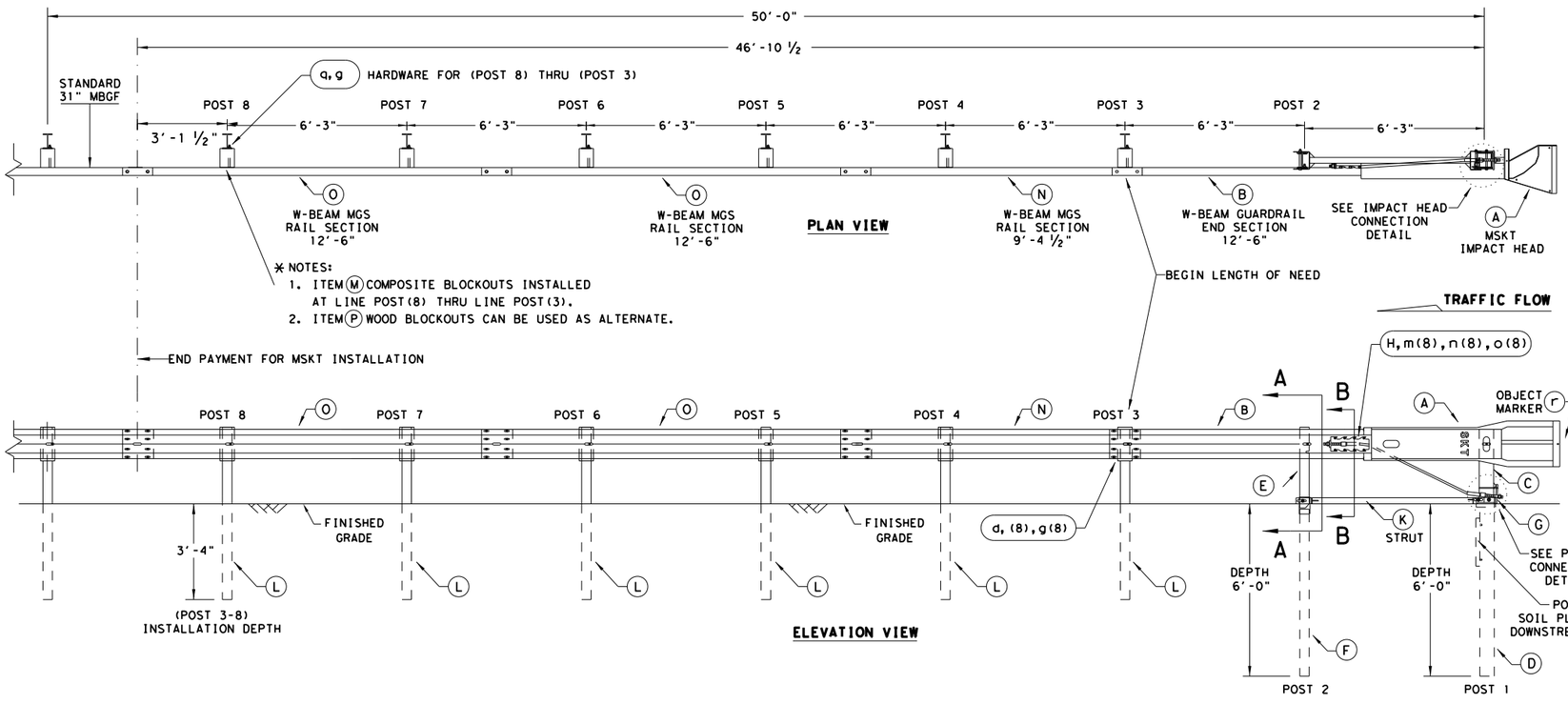
Texas Department of Transportation

Design Division Standard

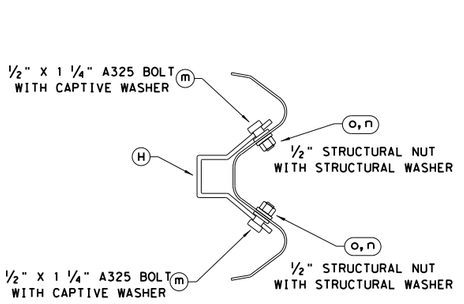
MAX-TENSION END TERMINAL MASH - TL-3

SGT(11S)31-18

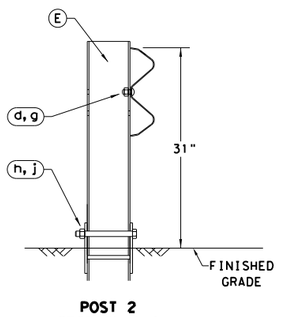
FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035,ETC.	SH 20
	DIST	COUNTY		SHEET NO.
	ELP	HUDSPETH		66



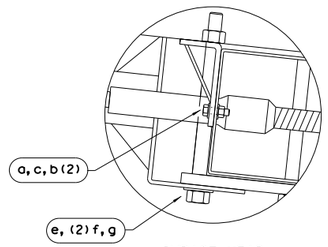
NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.



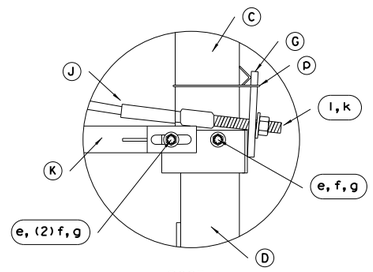
SECTION B-B
ANCHOR BRACKET



POST 2
SECTION A-A



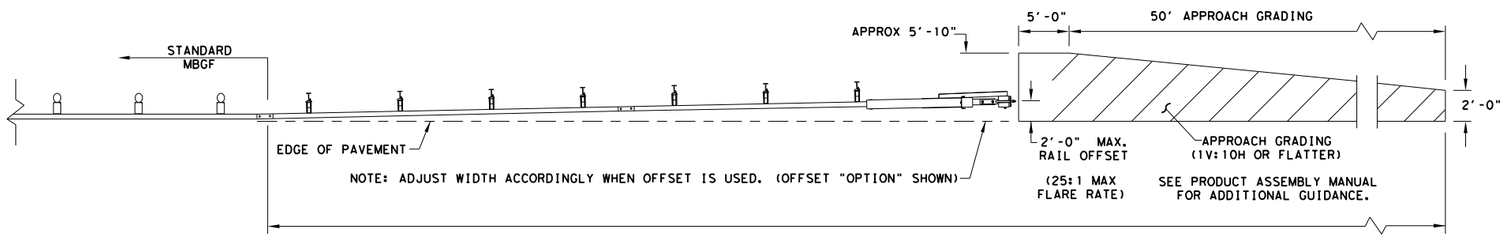
IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL

SEE NOTES: *

ALTERNATIVE ITEMS NOT SHOWN. **
* ITEM(P) 8" WOOD-BLOCKOUT
** ITEM(Q) 25'GUARD FENCE PANEL



APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

NOTE: TXDOT GENERIC APPROACH GRADING LAYOUT USED FOR ALL TANGENT TYPE END TREATMENTS.

NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE MSKT END TERMINAL. IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: ROAD SYSTEMS, INC. (432)263-2435. 3616 OLD HOWARD COUNTY AIRPORT, BIG SPRING, TX 79720
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE; MSKT END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL (PUBLICATION~062717).
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. SYSTEM SHOWN USING STEEL WIDE FLANGE POSTS WITH COMPOSITE BLOCKOUTS.
7. A COMPOSITE MATERIAL BLOCKOUTS THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS OF SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
8. IF SOLID ROCK IS ENCOUNTERED IN THE AREA OF (POST 1) AND / OR (POST 2) CONTACT THE MANUFACTURER, & REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
9. POSTS SHALL NOT BE SET IN CONCRETE.
10. SYSTEM MUST BE ATTACHED TO STANDARD 31" MBGF.
11. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE MSKT SYSTEM BE CURVED.
12. A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCROACHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.
13. THE SYSTEM IS SHOWN WITH TWO 12'-6" MBGF PANELS, ONE 25'-0" MBGF PANEL IS ALSO ALLOWED IN THEIR PLACE.
14. A DRIVING CAP WITH A TIMBER OR PLASTIC INSERT SHALL BE USED WHEN DRIVING POSTS 3-8 TO PREVENT DAMAGE TO THE GALVANIZING ON TOP OF THE POST. SPECIAL DRIVING CAP TO BE USED ON LOWER POSTS 1 & 2 TO PREVENT DAMAGE TO THE WELDED PLATES.

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X 1/8" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	GROUND STRUT	MS785
L	6	W6x9 OR W6x8.5 STEEL POST	P621
M	6	COMPOSITE BLOCKOUTS	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9'-4 1/2")	G12025
O	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
Q	1	W-BEAM MGS RAIL SECTION (25'-0")	G1209
		SMALL HARDWARE	
a	2	5/16" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	5/16" WASHER	W0516
c	2	5/16" HEX NUT	N0516
d	25	5/8" Dia. x 1 1/4" SPLICE BOLT (POST 2)	B580122
e	2	5/8" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	5/8" WASHER	W050
g	33	5/8" Dia. H.G.R NUT	N050
h	1	3/4" Dia. x 8 1/2" HEX BOLT (GRD A449)	B340854A
j	1	3/4" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	1/2" x 1 1/4" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	1/2" STRUCTURAL NUTS	N012A
o	8	1 1/16" O.D. x 5/16" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	5/8" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151

Texas Department of Transportation

Design Division Standard

SINGLE GUARDRAIL TERMINAL

MSKT-MASH-TL-3

SGT(12S)31-18

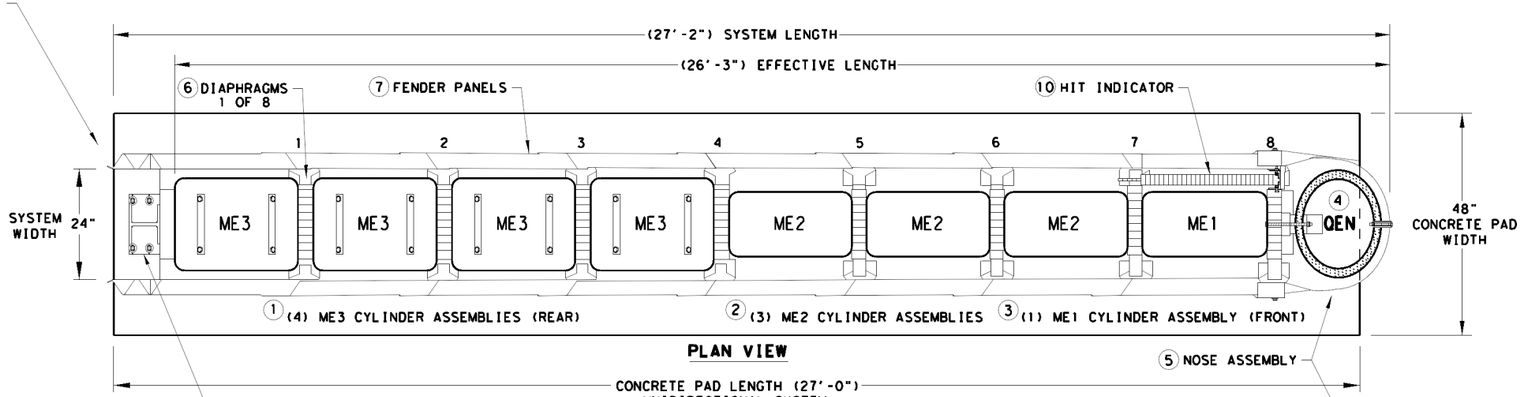
FILE: sgt12s3118.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CL	
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0002	04	035,ETC.	SH 20	
	DIST	COUNTY		SHEET NO.	
	ELP	HUDSPETH		67	

DATE: 11/1/2023
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Plan Set/13. Standards/Roadway Standards/SGT(12S)31-18.dgn

DATE: 11/1/2023
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Plan Set/13. Standards/Roadway Standards/qgelitem10n20.dgn

NOTE:
A TRANSITION MAY BE REQUIRED TO INSTALL THE QUADGUARD ELITE M10 TO THE OBJECT BEING SHIELDED.

QUADGUARD ELITE M10 24" WIDE (8 BAY) SYSTEM



PLAN VIEW

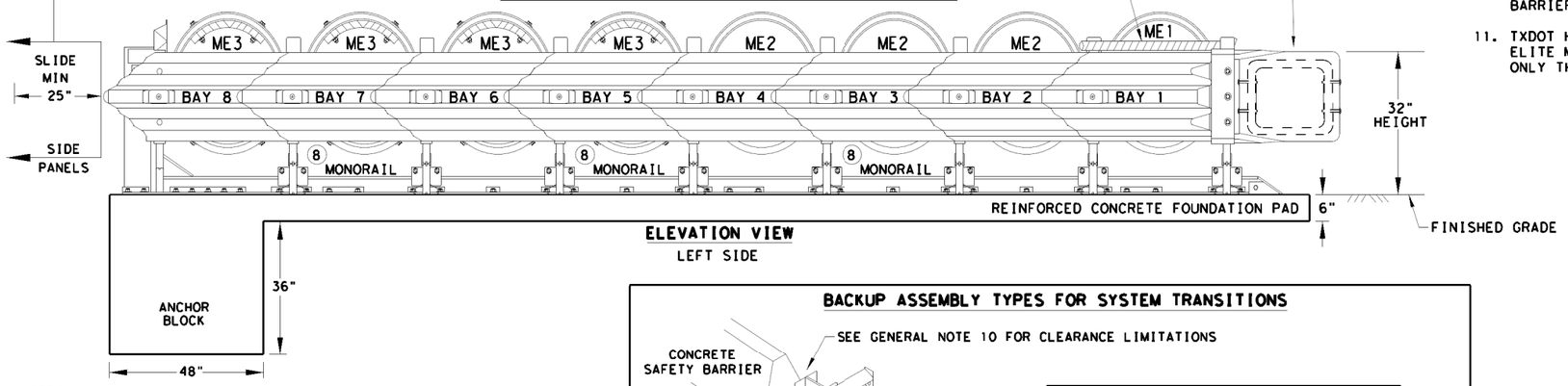
KEY		KEY	
1	ME3 CYLINDER ASSEMBLIES	6	DIAPHRAGMS
2	ME2 CYLINDER ASSEMBLIES	7	FENDER PANELS
3	ME1 CYLINDER ASSEMBLY	8	MONORAILS
4	QEN CYLINDER	9	TYPE OF BACKUP
5	NOSE BELT ASSEMBLY	10	HIT INDICATOR

9 SHOWN WITH TENSION STRUT BACKUP ASSEMBLY

4 QEN CYLINDER INSTALLED INSIDE OF NOSE BELT ASSEMBLY 5

NOTE:
PROVISION SHALL BE MADE FOR REAR FENDER SIDE PANELS TO SLIDE REARWARD UPON IMPACT, 25" MIN.

NOTE:
HIT INDICATOR WILL RAISE UPON IMPACT.



ELEVATION VIEW
LEFT SIDE

NOTES:
CONTACT THE MANUFACTURER WITH SITE SPECIFIC DATA (SSD) FOR CONCRETE PAD AND ANCHOR BLOCK INSTALLATION REQUIREMENTS.

A MANUFACTURER'S DRAWING PACKAGE UNIQUE AND SPECIFIC FOR THE QUADGUARD ELITE M10 FIELD INSTALATION AND INFORMATION REGARDING THE TYPE OF BACKUP ASSEMBLY REQUIRED FOR THE TRANSITION WILL BE PROVIDED BY THE MANUFACTURER TO THE ENGINEER AND INSTALLER.

6" REINFORCED CONCRETE PAD REQUIRES THE INSTALLATION OF AN ANCHOR BLOCK AS SHOWN ON THE MANUFACTURER'S DRAWING PACKAGE.

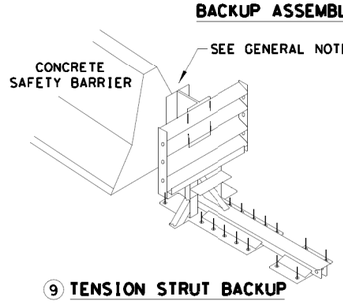
8" NON-REINFORCED CONCRETE PAD MAY NOT REQUIRE AN ANCHOR BLOCK, IF THE PAD IS INSTALLED AGAINST AN IMMOVABLE CONCRETE BACKUP.

CONCRETE PAD AND ANCHOR BLOCK COMBINATIONS SHALL BE CONFIRMED WITH THE MANUFACTURER BASED UPON SITE SPECIFIC DATA (SSD).

NOTE:
THE QUADGUARD ELITE M10 8-BAY, 24" WIDE - NARROW SYSTEM TESTED TO MASH TEST LEVEL 3.

TL-3 MODEL #	QM10024E	CYLINDER TYPES IN BAYS			
BAYS	8	TYPE-ME3	TYPE-ME2	TYPE-ME1	TYPE-QEN
DIAPHRAGMS	8	4	3	1	1
WIDTH	24"	REAR	FRONT		NOSE

BACKUP ASSEMBLY TYPES FOR SYSTEM TRANSITIONS

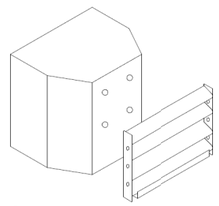


9 TENSION STRUT BACKUP

SYSTEM TRANSITIONS TYPES	
1	QUAD-BEAM TO CONCRETE SAFETY BARRIER
2	QUAD-BEAM TO CONCRETE BRIDGE RAIL
3	QUAD-BEAM TO CONCRETE END SHOE
4	QUAD-BEAM TO THRIE-BEAM RAIL
5	QUAD-BEAM TO W-BEAM RAIL

NOTE:
TRANSITION ASSEMBLIES FOR THE QUADGUARD ELITE M10 TO THRIE-BEAM OR W-BEAM FENCE REQUIRES I-BEAM POSTS:

ALL POSTS W6X8.5/9 I-BEAMS (78" LONG).



9 CONCRETE BACKUP

NOTES:
CONTACT THE MANUFACTURER WITH SITE SPECIFIC DATA (SSD) FOR THE CORRECT BACKUP ASSEMBLY AND TRANSITION PANELS OR SIDE PANELS USED FOR STANDARD AND BI-DIRECTIONAL INSTALLATIONS: AT DIVIDED-HIGHWAY MEDIANS OR UNDIVIDED ROADWAYS WHERE THE SYSTEM IS EXPOSED TO IMPACTS FROM ONE OR TWO DIFFERENT DIRECTIONS OF TRAFFIC FLOW.

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE QUADGUARD ELITE M10 SYSTEM AND IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY - ENERGY ABSORPTION INC. AT 1(888)323-6374.
2. SEE THE RECENT QUADGUARD ELITE M10 PRODUCT DESCRIPTION ASSEMBLY MANUAL FOR IMPACT PERFORMANCE CHARACTERISTICS AND DESIGN LIMITATIONS AND THE DRAWING PACKAGE FOR THE NARROW 24" SYSTEM BEFORE INSTALLING THE QUADGUARD ELITE M10 AT ANY GIVEN LOCATION.
3. FOR BI-DIRECTIONAL TRAFFIC: THE LOCATION AND OR WIDTH OF THE QUADGUARD ELITE M10 IS RESTRICTED. AS BI-DIRECTIONAL TRAFFIC APPROACHES THE REAR OF THE QUADGUARD ELITE M10, THE QUADGUARD ELITE M10 SHOULD NOT EXTEND FURTHER INTO THE TRAFFIC-SIDE OF THE BARRIER THAN THE OBSTACLE. ANY TRANSITION INSTALLED MUST EITHER BE TANGENT TO BOTH QUADGUARD ELITE M10 AND OBSTACLE OR MUST ANGLE TOWARD FIELD SIDE OF THE BARRIER.
4. SYSTEM TRANSITION: APPROPRIATE TRANSITION PANELS OR SIDE PANELS WILL BE REQUIRED FOR PROPER IMPACT PERFORMANCE. THE CORRECT PANEL(S) TO USE WILL DEPEND ON THE DIRECTION OF TRAFFIC FLOW AND WHAT TYPE OF BARRIER OR ROAD FEATURE THE QUADGUARD ELITE M10 SYSTEM IS SHIELDING. SEE THE QUADGUARD ELITE M10 PRODUCT DESCRIPTION & ASSEMBLY MANUAL FOR FURTHER DETAILS.
5. COMPONENTS FOR THE QUADGUARD ELITE (M10) BACKUP AND REINFORCING DETAILS ARE SHOWN ON THE QUADGUARD ELITE M10 PRODUCT DESCRIPTION & ASSEMBLY MANUAL.
6. CONCRETE PAD SHALL BE 6" MIN. REINFORCED 28MPa [4,000 PSI] (P.C.) OR 8" MIN. NON-REINFORCED 28MPa [4,000 PSI] CONCRETE ROADWAY MEASURING AT LEAST 12'-0" WIDE BY 50'-0" LONG. ANCHOR BLOCK IS NOT REQUIRED WHEN USING 8" CONCRETE PAD INSTALLED AGAINST AN IMMOVABLE STRUCTURE, E.G. CONCRETE WALL.
7. IF THE CROSS-SLOPE VARIES MORE THAN 2% OVER THE LENGTH OF THE SYSTEM, THE CONCRETE PAD WILL REQUIRE LEVELING. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
8. THE INSTALLATION AREA SHOULD BE FREE OF CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
9. THE QUADGUARD ELITE M10 SYSTEM SHOULD BE INSTALLED APPROXIMATELY PARALLEL WITH THE BARRIER.
10. FOR THE TENSION STRUT BACKUP THE DISTANCE BETWEEN THE BACK OF BACKUP AND THE BARRIER WALL SHOULD NOT EXCEED 7" IN ANY CASE.
11. TXDOT HAS ONLY APPROVED THE 24" WIDE QUADGUARD ELITE M10 SYSTEM. THE QUADGUARD ELITE M10 PRODUCT DESCRIPTION AND ASSEMBLY MANUAL INCLUDES SYSTEM WIDTH OF 24". ONLY THE 24" SYSTEM IS ALLOWED TO BE INSTALLED ON TEXAS ROADWAYS.

FOUNDATION & ANCHORING REQUIREMENTS
FOUNDATION TYPES: A, B, C, & D

FOUNDATION TYPE: A	REINFORCED CONCRETE PAD OR ROADWAY
FOUNDATION:	6" MINIMUM DEPTH (P.C.C.)
ANCHORAGE:	7" STUDS EMBEDDED 5 ½" - APPROVED ADHESIVE
FOUNDATION TYPE: B	ASPHALT OVER P.C.C.
FOUNDATION:	3" MIN. (A.C.) OVER 3" MIN. (P.C.C.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 ½" - APPROVED ADHESIVE
FOUNDATION TYPE: C	ASPHALT OVER SUBBASE
FOUNDATION:	6" MIN. (A.C.) OVER 6" MIN. (C.S.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 ½" - APPROVED ADHESIVE
FOUNDATION TYPE: D	ASPHALT ONLY
FOUNDATION:	8" MIN. (A.C.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 ½" - APPROVED ADHESIVE

KEY:
ASPHALT CONCRETE (A.C.)
COMPACTED SUBBASE (C.S.)
PORTLAND CEMENT CONCRETE (P.C.C.)

NOTE: SEE TRINITY'S PRODUCT DESCRIPTION ASSEMBLY MANUAL FOR THE APPROVED ADHESIVE.

IF THE UNIT IS ANCHORED TO ASPHALTIC CONCRETE, IT SHOULD BE RELOCATED TO FRESH, UNDISTURBED ASPHALT AND RE-ANCHORED AFTER EACH IMPACT TO ENSURE ADEQUATE FUTURE PERFORMANCE.

TENSION STRUT BACKUP MAY BE USED IN CONSTRUCTION ZONES ON ASPHALT CONCRETE (A.C.) FOR TEMPORARY USE ONLY.

Texas Department of Transportation — Design Division Standard

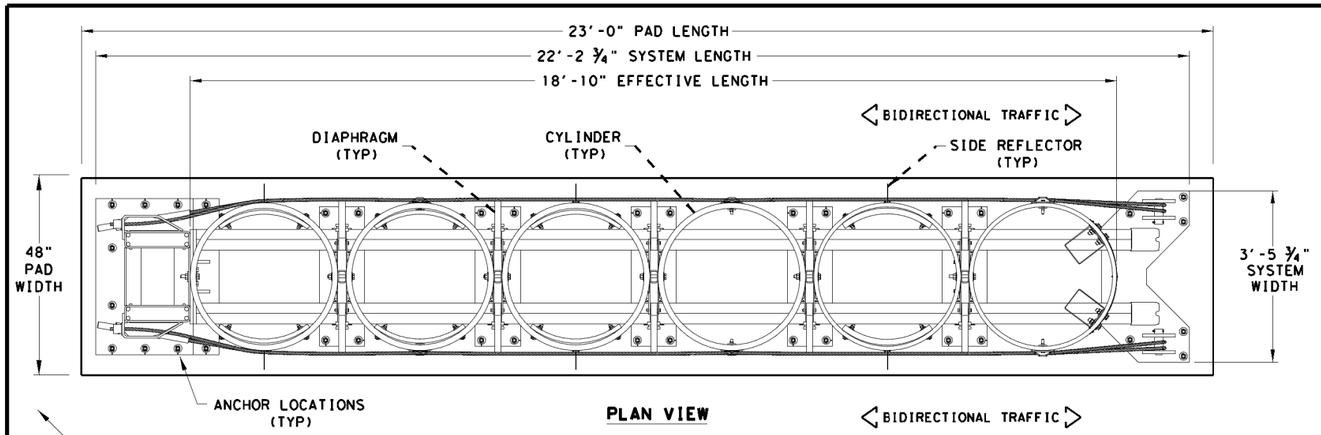
TRINITY HIGHWAY ENERGY ABSORPTION QUADGUARD ELITE M10 (MASH TL-3)

QGELITE(M10)(N)-20

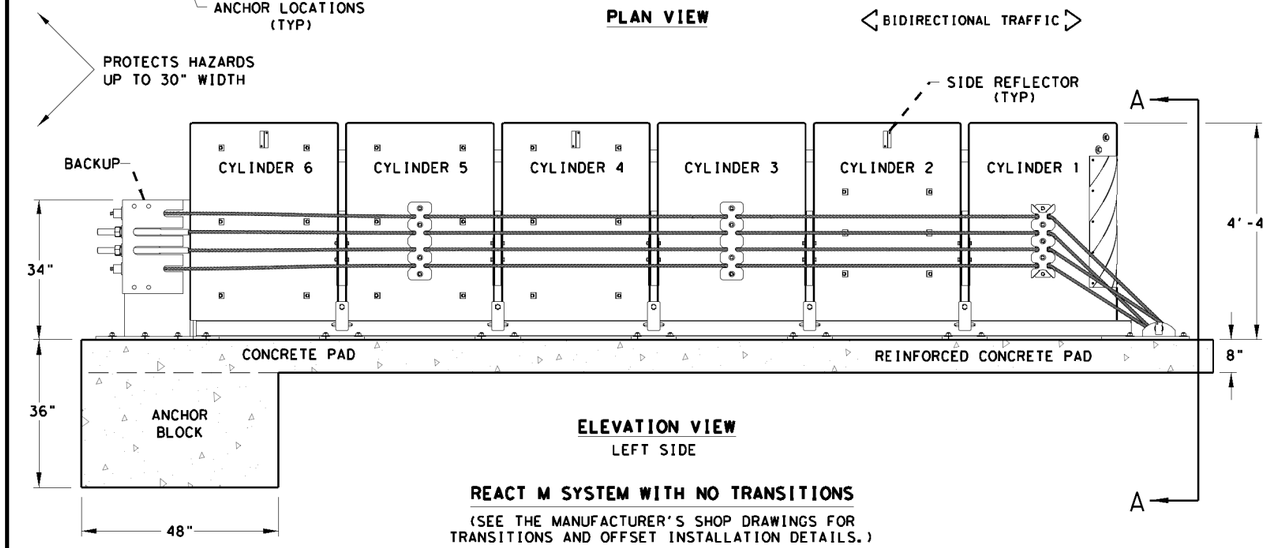
LOW MAINTENANCE

FILE: qgelitem10n20.dgn	DN: TxDOT	CK: KM	DW: VP	CK: AG
	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035,ETC.	SH 20
	DIST	COUNTY		SHEET NO.
	ELP	HUDSPETH		68

DATE:
FILE:



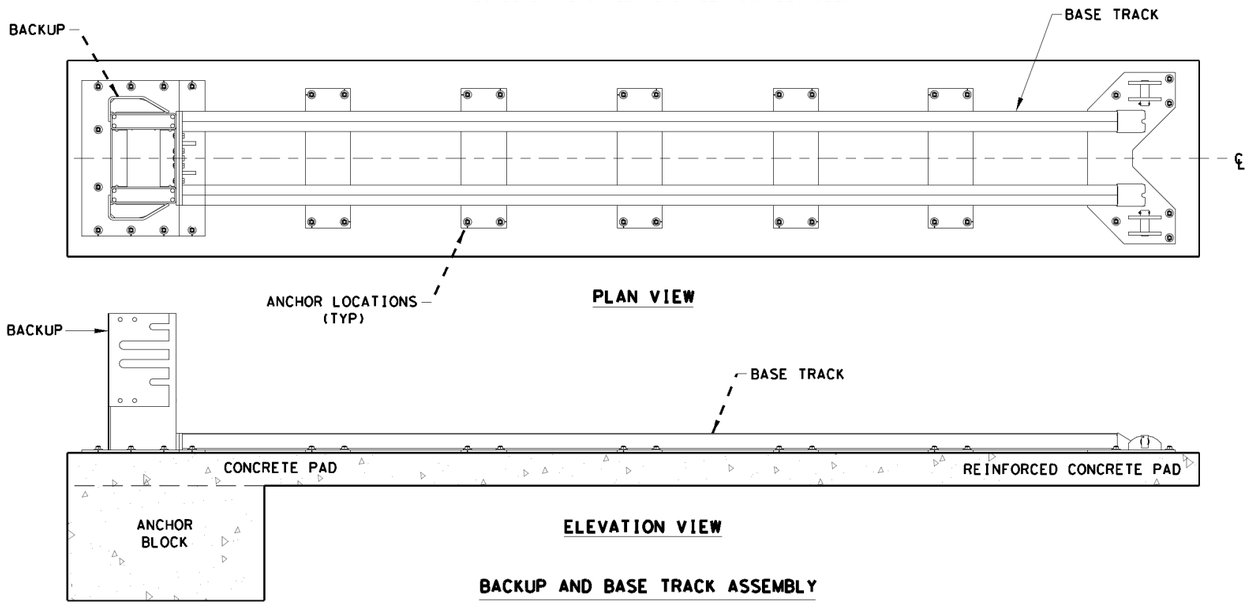
PLAN VIEW



ELEVATION VIEW
LEFT SIDE

REACT M SYSTEM WITH NO TRANSITIONS

(SEE THE MANUFACTURER'S SHOP DRAWINGS FOR TRANSITIONS AND OFFSET INSTALLATION DETAILS.)

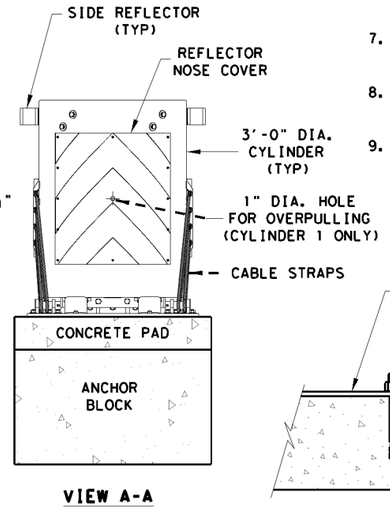


PLAN VIEW

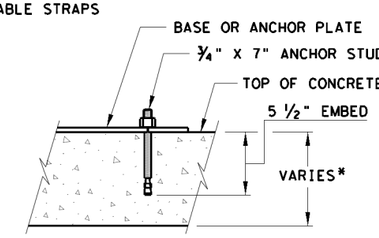
ELEVATION VIEW

BACKUP AND BASE TRACK ASSEMBLY

(SEE THE MANUFACTURER'S SHOP DRAWINGS FOR TRANSITIONS, OFFSETS, BIDIRECTIONAL AND UNIDIRECTIONAL INSTALLATION DETAILS.)



VIEW A-A



ANCHORING DETAIL
*SEE FOUNDATION TYPES TABLE

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY - ENERGY ABSORPTION AT 1(888)323-6374 OR WEBSITE: www.trinityhighway.com.
2. THE NOSE OF THE REACT M SHALL BE CLAD WITH A PLASTIC WRAP WITH STANDARD DELINEATION ADHERED TO THE WRAP AND SHALL HAVE A SERIES OF SIDE MARKER REFLECTORS ON BOTH SIDES OF THE UNIT. SEE SITE PLAN VIEWS FOR MARKER AND PLASTIC WRAP COLOR ORIENTATION.
3. FOR BI-DIRECTIONAL TRAFFIC, APPROPRIATE TRANSITION DETAILS WILL BE AS SHOWN ON THE MANUFACTURER'S SHOP DRAWINGS.
4. DETAILS OF COMPONENTS FOR THE REACT M, BACKUPS AND REINFORCING DETAILS WILL BE SHOWN ON THE MANUFACTURER'S SHOP DRAWINGS FURNISHED TO THE ENGINEER.
5. IF THE CROSS-SLOPE VARIES MORE THAN 2% OVER THE LENGTH OF THE SYSTEM, THE CONCRETE PAD WILL REQUIRE LEVELING. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
6. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
7. THE REACT M SYSTEM SHOULD BE APPROXIMATELY PARALLEL WITH THE BARRIER OR CENTERLINE OF MERGING BARRIERS.
8. ALL STEEL COMPONENTS TO BE HOT DIPPED GALVANIZED EXCEPT STAKES, DRIVE SPIKES, THREADED BOLTS IN BACKUP UNIT, AND WEDGE FITTINGS ON CABLES.
9. THIS DRAWING REPRESENTS THE REACT M TL-3 SYSTEM, RE-DIRECTIVE, NON-GATING CRASH CUSHION THAT CAN PROTECT HAZARDS UP TO 30-INCHES IN WIDTH.

DESIGN DATA TABLE FOR REACT M

TEST NUMBER	TEST LEVEL	OVERALL LENGTH	TRANSITION LENGTH	SYSTEM WIDTH
3-30 TO 3-36	TL-3	22'-2 ¾"	-	3'-5 ¾"
3-37A	TL-3	22'-2 ¾"	9'-10 ¾"	3'-5 ¾"
3-38	TL-3	22'-2 ¾"	-	3'-5 ¾"

ANCHOR SYSTEM TYPE

APPROVED ADHESIVE, 7" STUDS, 5.5" EMBEDMENT

FOUNDATION TYPES

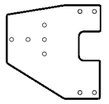
MINIMUM 8" REINFORCED PORTLAND CEMENT CONCRETE PAD (REQUIRED REINFORCING STEEL FOR CONCRETE PAD SHALL BE SHOWN ON THE MANUFACTURER'S SHOP DRAWINGS.

MINIMUM 8" NON-REINFORCED PORTLAND CEMENT CONCRETE ROADWAY MEASURING AT LEAST 12' WIDE BY 50' LONG)

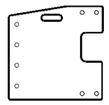
MINIMUM 7" CONCRETE DECK STRUCTURE, OR MINIMUM 6" REINFORCED CONCRETE ROADWAY

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE REACT M SYSTEM AND IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

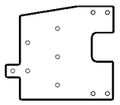
BACKUP ASSEMBLY TYPES FOR SYSTEM TRANSITIONS



SAFETY SHAPE BARRIER TRANSITION (ADAPTER)
TRANSITION PLATE(S) (OPTIONAL)
REQUIRED W/BI-DIRECTIONAL TRAFFIC FLOWS ONLY.



VERTICAL WALL BARRIER TRANSITION (ADAPTER)
TRANSITION PLATE(S) (OPTIONAL)
REQUIRED W/UNIDIRECTIONAL TRAFFIC FLOWS ONLY.



VERTICAL WALL BARRIER TRANSITION (ADAPTER)
TRANSITION PLATE(S) (OPTIONAL)
REQUIRED W/BI-DIRECTIONAL TRAFFIC FLOWS ONLY.

NOTES:
CONTACT THE MANUFACTURER WITH SITE SPECIFIC DATA (SSD) FOR THE CORRECT BACKUP ASSEMBLY AND TRANSITION PANELS OR SIDE PANELS USED FOR STANDARD AND BI-DIRECTIONAL INSTALLATIONS: AT DIVIDED-HIGHWAY MEDIANS OR UNDIVIDED ROADWAYS WHERE THE SYSTEM IS EXPOSED TO IMPACTS FROM ONE OR TWO DIFFERENT DIRECTIONS OF TRAFFIC FLOW.

LOW MAINTENANCE

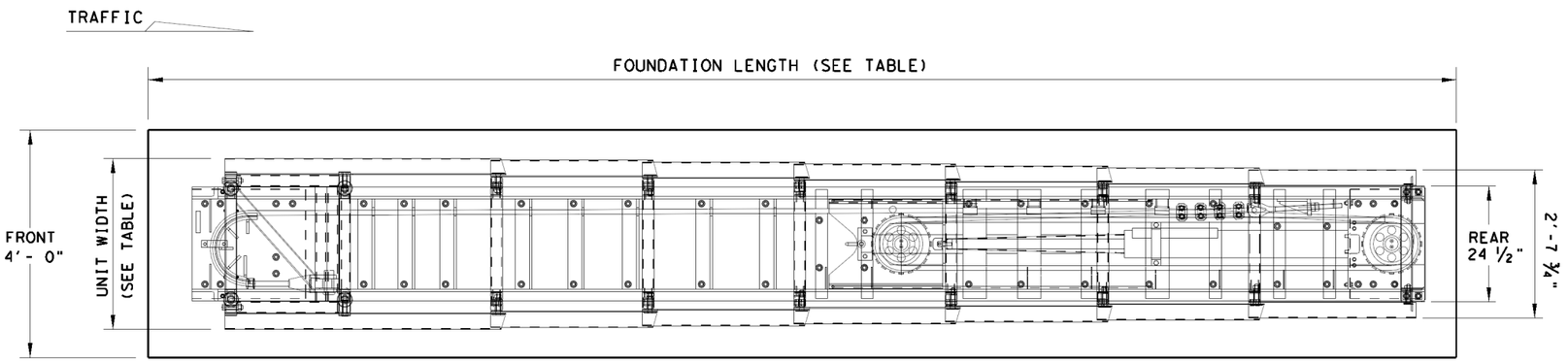
Texas Department of Transportation — Design Division Standard

TRINITY HIGHWAY ENERGY ABSORPTION CRASH CUSHION REACT M (NARROW) (MASH TL-3)

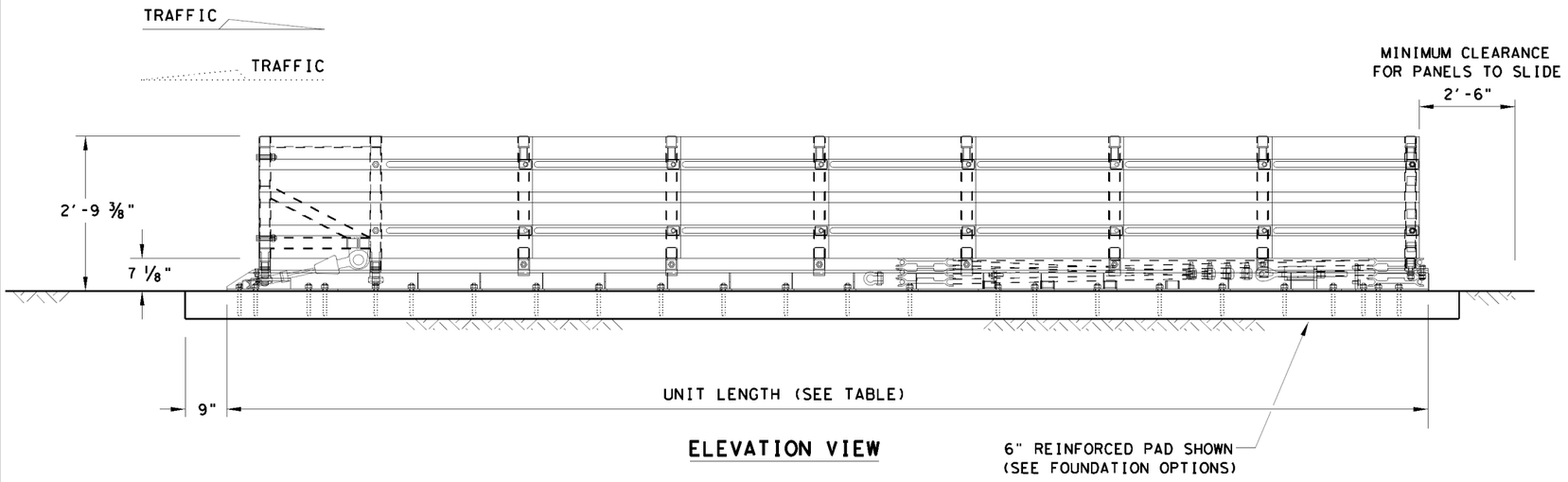
REACT(M)-21

FILE: reactm21.dgn	DN: TXDOT	CK: KM	DW: SS	CK: CL
©TxDOT: JULY 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035, ETC.	SH 20
	DIST	COUNTY		SHEET NO.
	ELP	HUDSPETH		69

DATE: 11/1/2023
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Plan Set/13. Standards/Roadway Standards/smtcn16.dgn



PLAN VIEW



ELEVATION VIEW

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: WORK AREA PROTECTION, CORP. AT (800) 327-4417, OR (630) 377-9100.
2. FOR BI-DIRECTIONAL TRAFFIC, APPROPRIATE TRANSITION PANELS WILL BE REQUIRED.
3. ADDITIONAL DETAILS FOR THE TRANSITION OPTION AND FOUNDATION OPTION WILL BE SHOWN ON THE MANUFACTURER'S SHOP DRAWINGS FURNISHED TO THE ENGINEER.
4. CONCRETE SHALL BE CLASS "S" WITH A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI.
5. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
6. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
7. THE SCI100GM & SCI70GM SYSTEMS SHOULD BE APPROXIMATELY PARALLEL WITH THE BARRIER OR CENTERLINE OF MERGING BARRIERS.

NOTE:
FOR ATTACHMENT AND TRANSITIONS TO OTHER SHAPES, BARRIERS, RAILINGS AND BI-DIRECTIONAL TRAFFIC FLOWS ARE AVAILABLE. (SEE MANUFACTURER'S PRODUCT MANUAL)

NOTE:
SIDE PANELS CAN TRAVEL 30" BEYOND THE LAST TERMINAL BRACE AT THE REAR OF THE CUSHION. ALL OBJECTS THAT MAY INTERFERE WITH THIS MOTION CAN AFFECT PERFORMANCE OF AND MAY CAUSE UNDUE DAMAGE TO THE CRASH CUSHION.

MODEL	TEST LEVEL	UNIT LENGTH (approx.)	UNIT WIDTH	FOUNDATION LENGTH	OBSTACLE WIDTH
SCI70GM	TL-2	13'-6"	2'-10 ⅝"	15'- 6 ¼"	24"to 36"
SCI100GM	TL-3	21'-6"	3'-1 ½"	23'- 0"	24"to 36"

SYSTEM AND PAD LENGTHS VARY DEPENDING ON BACKUP TYPE.

FOUNDATION OPTIONS
6" REINFORCED CONCRETE (5 ½" ANCHOR EMBEDMENT)
8" UNREINFORCED CONCRETE (5 ½" ANCHOR EMBEDMENT)
3" MIN. ASPHALT OVER 3" MIN. CONCRETE (16 ½" ANCHOR EMBED.)
6" ASPHALT OVER 6" COMPACT SUBBASE (16 ½" ANCHOR EMBED.)
8" MINIMUM ASPHALT (16 ½" ANCHOR EMBEDMENT)

FOR STEEL PLACEMENT IN CONCRETE FOUNDATIONS, SEE MANUFACTURER'S PRODUCT MANUAL.

TRANSITION OPTIONS
CONCRETE VERTICAL WALL
CONCRETE TRAFFIC BARRIERS
GUARDRAIL (W-BEAM)
GUARDRAIL (THRIE-BEAM)

TRANSITION TYPES ARE SHOWN ELSEWHERE ON THE PLANS (I.E. ATTENUATOR LOCATION DETAILS OR IN THE GENERAL NOTES).

FOR BI-DIRECTIONAL TRANSITION PANEL AND END SHOE DETAILS, SEE MANUFACTURER'S PRODUCT MANUAL.

LOW MAINTENANCE

Texas Department of Transportation

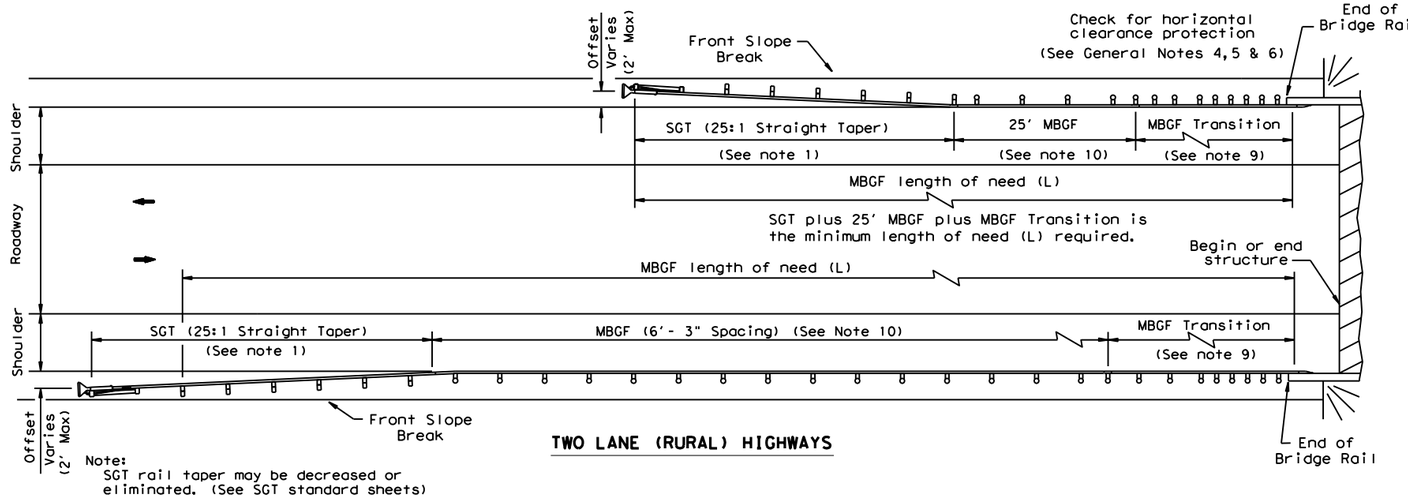
Design Division Standard

WORK AREA PROTECTION CORP (SMART-NARROW)

SMTC(N)-16

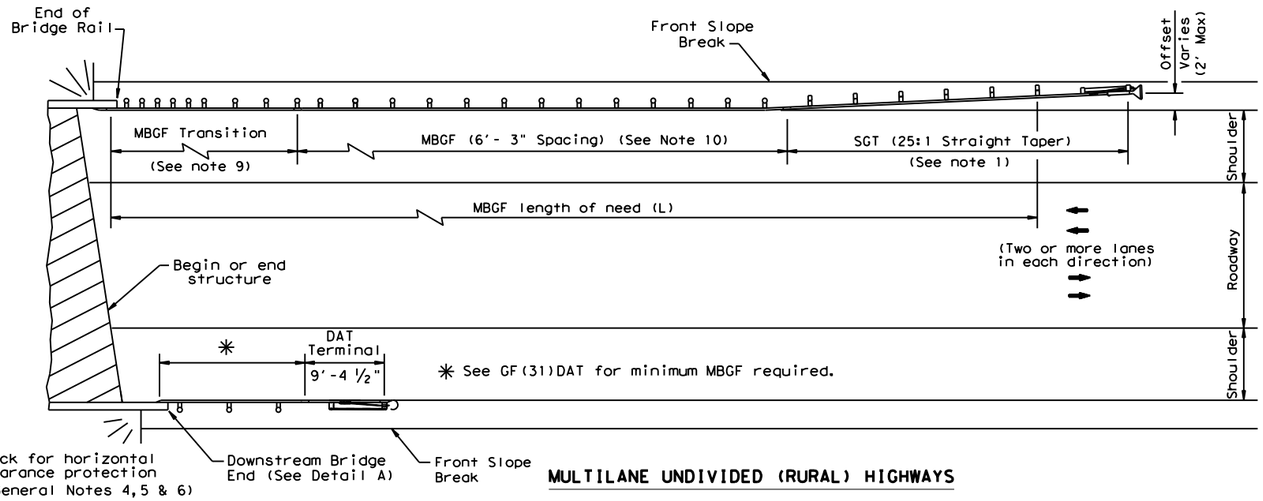
FILE: smtcn16.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
©TxDOT: February 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED 06, 2013 (VP) REVISED 03, 2016 (VP)	0002	04	035,ETC.	SH 20
	DIST	COUNTY		SHEET NO.
	ELP	HUDSPETH		70

DATE:
FILE:

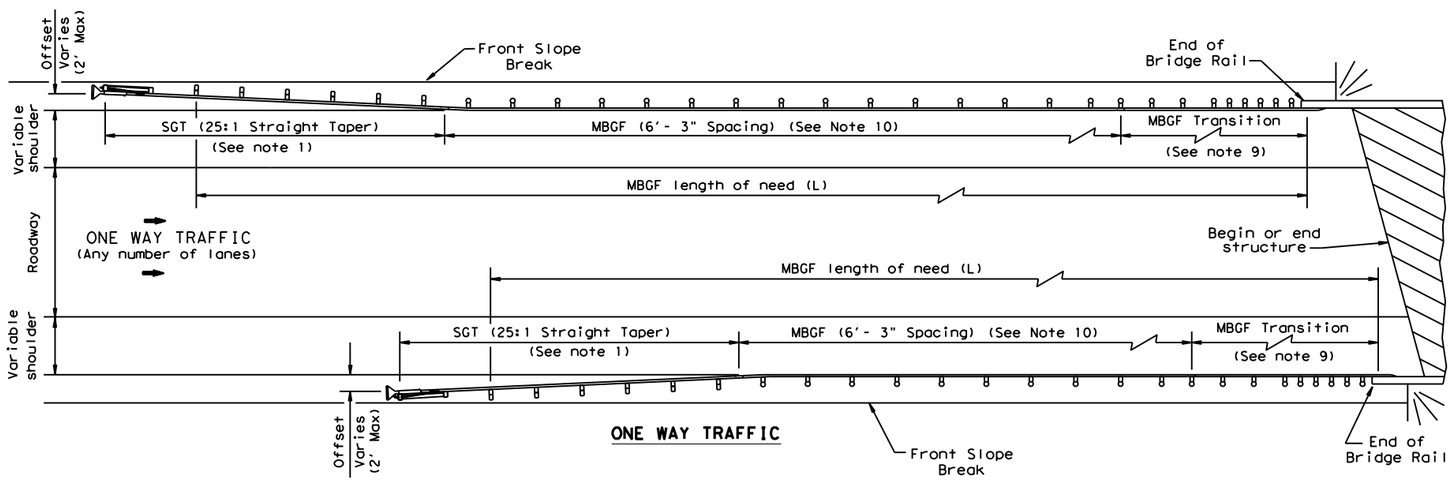


TWO LANE (RURAL) HIGHWAYS

Note:
SGT rail taper may be decreased or eliminated. (See SGT standard sheets)



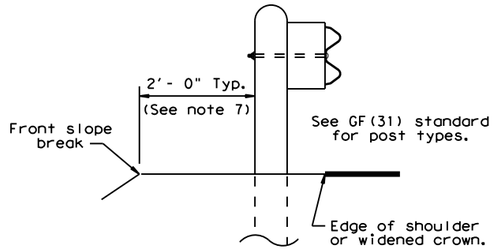
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



ONE WAY TRAFFIC

GENERAL NOTES

1. For more detail: See GF(31), SGT( )31, GF(31)TR, and GF(31)TL2 standard sheets.
2. Quantities of metal beam guard fence (MBGF) at individual bridge ends are as shown in the plans.
3. Use average daily traffic (ADT) for the current year to determine MBGF length of need in accordance with the Roadway Design Manual unless otherwise specified. Where significant traffic volume growth is anticipated on low volume (0-750 ADT) highways, use length determinations for the higher volume category.
4. MBGF may not be required to shield departure end of bridge unless other obstacles within the horizontal clearance limits or opposing traffic indicate a MBGF consideration.
5. Downstream anchor terminals (DAT) are only for downstream end anchorage use, outside the horizontal clearance area of opposing traffic.
6. Direct connection of MBGF to concrete rails are only for downstream rail connections outside the horizontal clearance area of opposing traffic. (This requires a minimum of three standard line posts plus the DAT terminal, See Detail A)
7. The crown shall be widened to accommodate MBGF. Typically the "front slope" break should be 2'- 0" from the back of the MBGF post. This applies to new construction on new alignment or where existing roadway cross section is to be widened to increase roadway width. This does not apply to rehabilitation work where existing roadway crown width is to be retained (See Typical Cross Section at MBGF).
8. For restrictive bridge widths: The MBGF should be properly transitioned from the existing bridge rail to the adjoining MBGF (See MBGF Transition Standards). Metal beam guard fence at these bridge location(s) shall be flared at the rate of 25:1 or flatter, and be of the length necessary to locate the terminal end at the 2 ft. "maximum" offset from the shoulder edge in the approach direction.
9. Transition length and post spacing will vary depending on the transition type. Transition type will be shown elsewhere in the plans.
10. A minimum 25' length of MBGF will be required.



TYPICAL CROSS SECTION AT MBGF

Note:
All rail elements shall be lapped in the direction of adjacent traffic.

DETAIL A

Showing Downstream Rail Attachment

Texas Department of Transportation

Design Division Standard

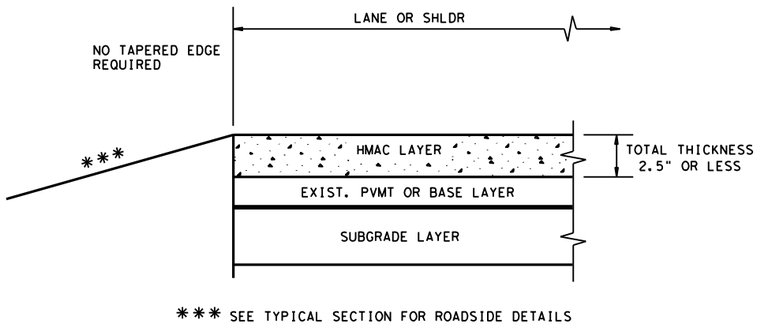
BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

BED-14

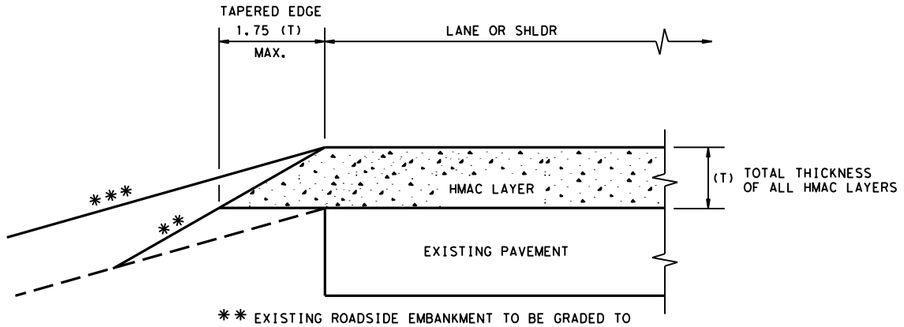
FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035,ETC.	SH 20
REVISED APRIL 2014 SEE (MEMO 0414)	DIST	COUNTY		SHEET NO.
	ELP	HUDSPETH		71

DATE: 11/1/2023
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Plan Set/13. Standards/Roadway Standards/TE(HMAC)-11.dgn



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

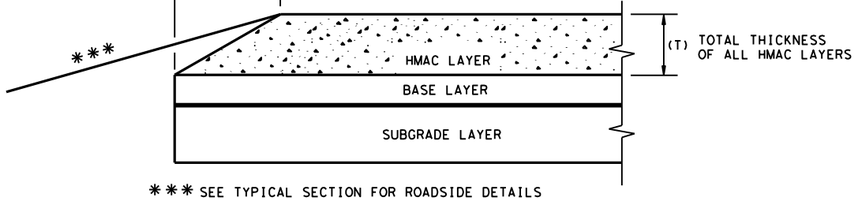
CONDITION - 1
THIN HMAC SURFACES OR HMAC OVERLAY WITH THICKNESS OF 2.5" OR LESS



** EXISTING ROADSIDE EMBANKMENT TO BE GRADED TO PRODUCE A SMOOTH LEVEL SURFACE FOR PLACEMENT OF TAPERED EDGE. THIS WORK IS SUBSIDIARY TO THE VARIOUS BID ITEMS.

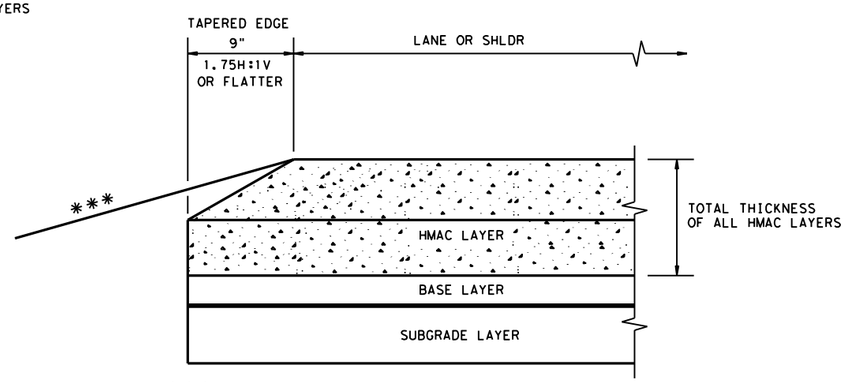
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 2
OVERLAY OF EXISTING PAVEMENT HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 3
NEW OR RECONSTRUCTED PAVEMENT HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 4
NEW OR RECONSTRUCTED PAVEMENT HMAC THICKNESS 5" OR GREATER

(NOT TO SCALE)

GENERAL NOTES

1. UNLESS OTHERWISE SHOWN IN THE PLANS, A VERTICAL EDGE IS PERMISSIBLE FOR HMAC PLACED GREATER THAN 5" BELOW THE EDGE OF PAVEMENT AND FOR THICKNESS OF HMAC LESS THAN 2.5".
2. FOR FURTHER INFORMATION REGARDING THE ROADSIDE AND PAVEMENT DETAILS, SEE TYPICAL SECTIONS.
3. PAYMENT FOR TAPERED EDGE WILL BE IN ACCORDANCE WITH APPLICABLE ITEMS IN THE CONTRACT.
4. THE SLOPE OF THE TAPERED EDGE SHALL BE 1.75H:1V OR FLATTER.
5. THE TAPERED EDGE SHALL BE PRODUCED BY USE OF A SCREED ATTACHMENT CAPABLE OF PRODUCING A SMOOTH COMPACTED SURFACE. ADDITIONAL COMPACTING EFFORT BEHIND THE SCREED IS NOT REQUIRED.

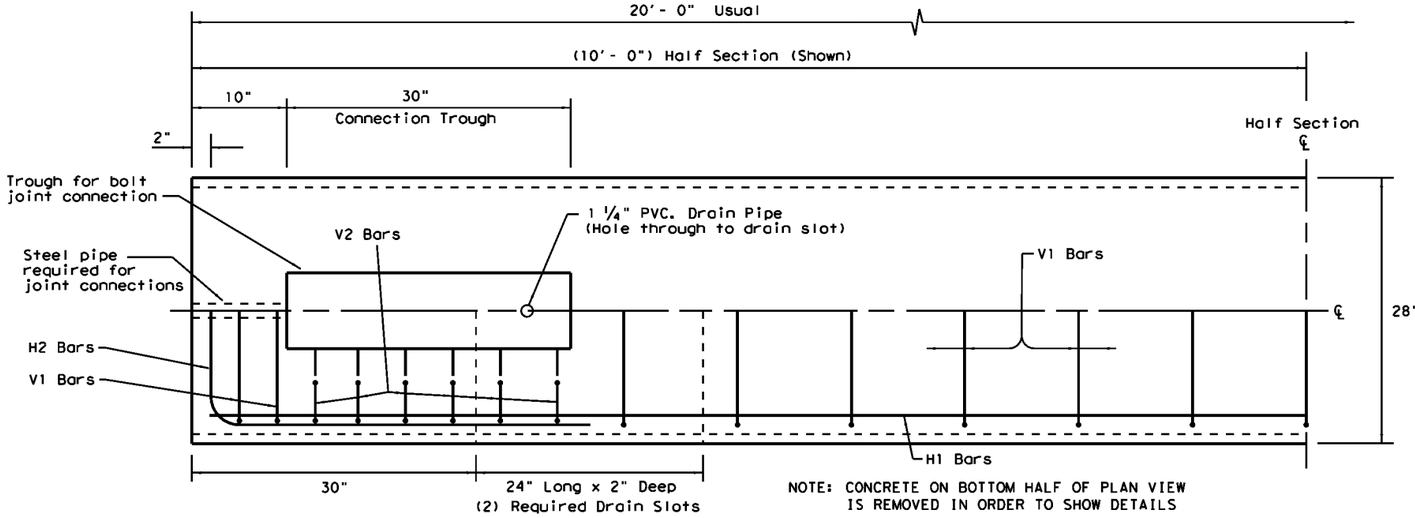
Texas Department of Transportation | Design Division Standard

TAPERED EDGE DETAILS
HMAC PAVEMENT

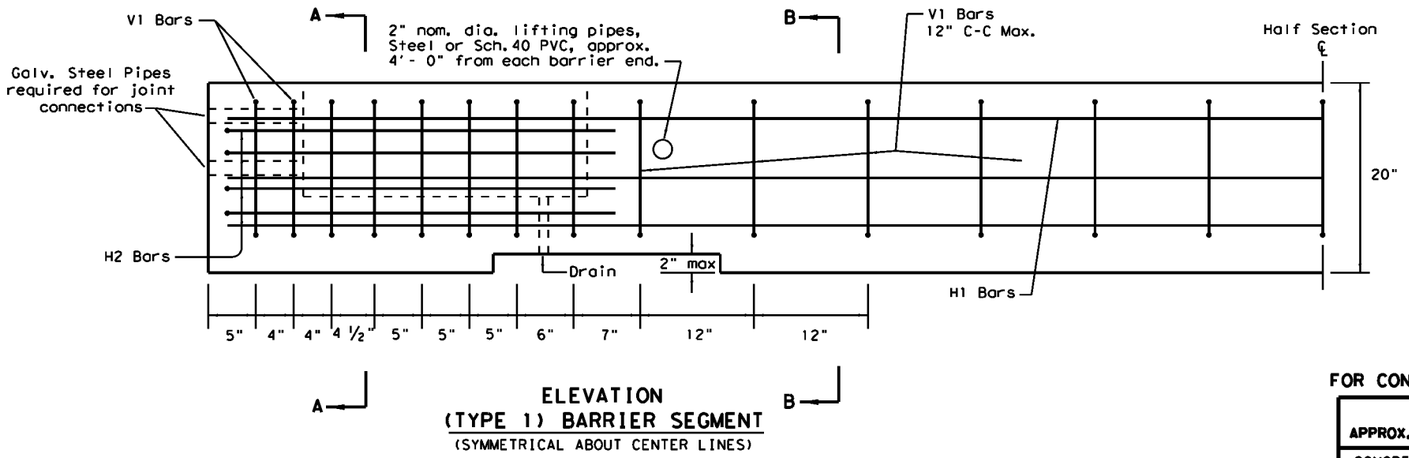
TE(HMAC)-11

FILE: tehmac11.dgn	DN: TxDOT	CK: RL	DW: KB	CK:
©TxDOT January 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035,ETC.	SH 20
	DIST	COUNTY		SHEET NO.
	ELP	HUDSPETH		72

DATE: 11/1/2023
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/000204035/4 - Design/Plan Set/13. Standards/Roadway Standards/LPCB_13.dgn

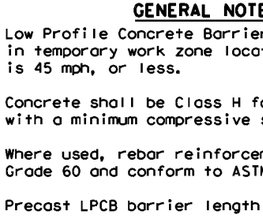


PLAN
(TYPE 1) BARRIER SEGMENT
(SYMMETRICAL ABOUT CENTER LINES)

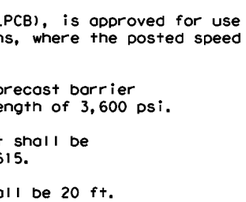


ELEVATION
(TYPE 1) BARRIER SEGMENT
(SYMMETRICAL ABOUT CENTER LINES)

(8)~H2 Bars
(#5) Bars



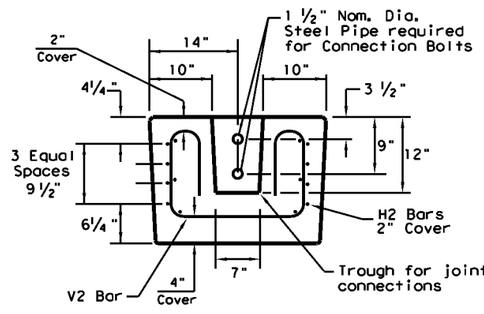
(12)~V2 Bars
(#4) Bars



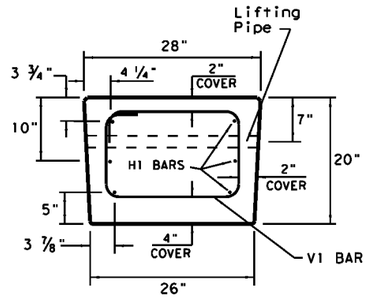
(17)~V1 Bars
(#4) Bars

REINFORCING STEEL DETAILS
TYPE 1 - BARRIER SEGMENT

Note: Use 2" Dia. Bending Pin, unless otherwise shown



SECTION A-A



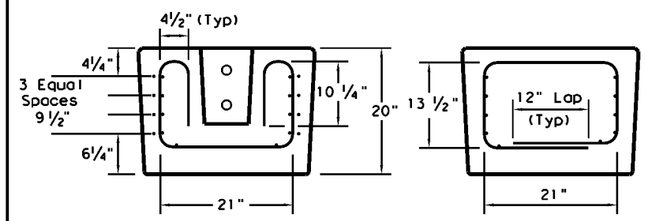
SECTION B-B

GENERAL NOTES

1. Low Profile Concrete Barrier (LPCB), is approved for use in temporary work zone locations, where the posted speed is 45 mph, or less.
2. Concrete shall be Class H for precast barrier with a minimum compressive strength of 3,600 psi.
3. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
4. Precast LPCB barrier length shall be 20 ft.
5. All barrier edges shall have ¾" chamfer or a tooled radius.
6. Joint connection hardware shall be in accordance with Item 449, "Anchor Bolts." and is considered subsidiary.
7. Steel pipe required for joint connection bolts shall be galvanized in accordance with Item 445, "Galvanizing."
8. Welded wire reinforcement (WWR) may be used in lieu of conventional reinforcement for Type 1 barrier, and shall meet the requirements shown.

FOR CONTRACTORS INFORMATION ONLY

(TYPE 1) APPROX. QUANTITIES 20 FT. SECTION		
CONCRETE	CY	2.6
REINFORCING STEEL	LBS	330
TOTAL BARRIER WT.	LBS	11000



SECTION A-A **SECTION B-B**

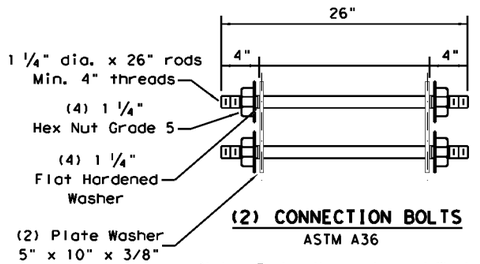
(WWR) GENERAL NOTES

1. Deformed Welded Wire Reinforcement shall conform to ASTM A497.
2. Welded wire cage may be cut or bent, if necessary, but must be approved by the Engineer.
3. Combinations of reinforcing steel and WWR are permitted, as directed by the Engineer. The dimensions from the end of the barrier section to the first wire shall not exceed 3".

REQUIRED (WWR) WIRE DESIGN

8 ~ (D31) Horizontal Wires (Equally spaced)
10 ~ (D20) Horizontal Wires (Equally spaced)
29 ~ (D20) Vertical Wires (Spaced as shown in Elevation View)

WELDED WIRE REINFORCEMENT (WWR)- OPTIONAL REINFORCING



(2) CONNECTION BOLTS
ASTM A36

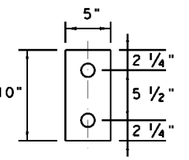


PLATE WASHER
5" x 10" x ⅜"

Note: Rods, Hex nuts and Washers shall be Galvanized.

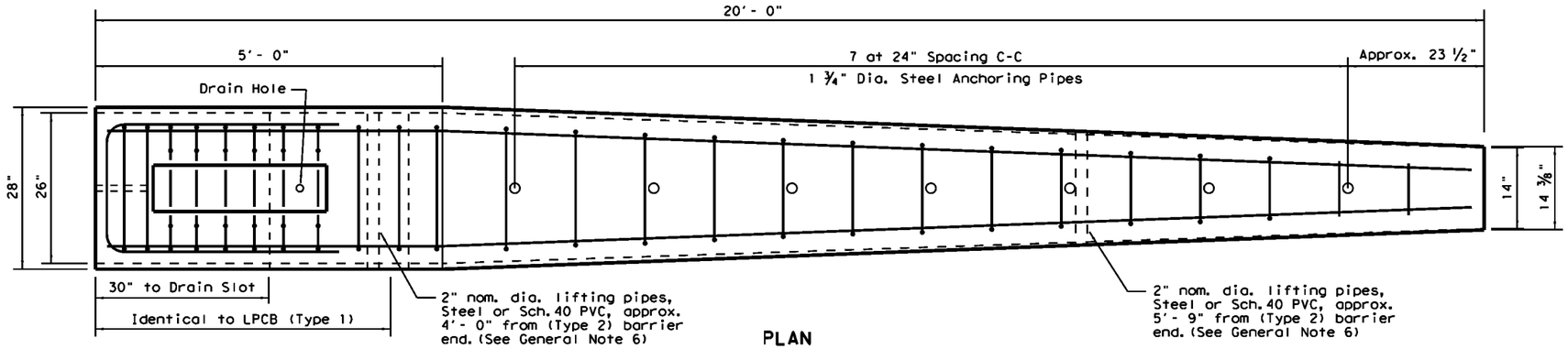
SHEET 1 OF 2

Texas Department of Transportation
Design Division Standard

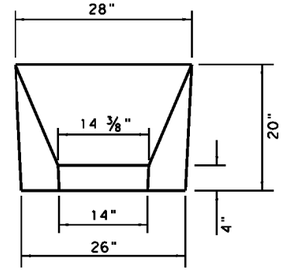
LOW PROFILE CONCRETE BARRIER
PRECAST BARRIER (TYPE 1)
LPCB-13

FILE: lpcb13.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035, ETC.	SH 20
	DIST	COUNTY		SHEET NO.
	ELP	HUDSPETH		73

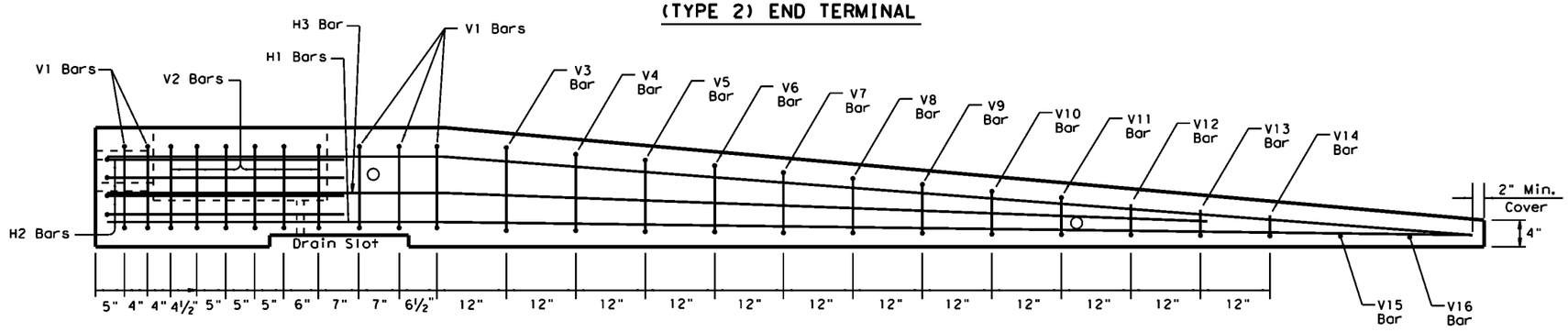
DATE: 11/1/2023
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/000204035/4 - Design/Plan Set/13. Standards/Roadway Standards/LPCB_13.dgn



PLAN
(TYPE 2) END TERMINAL



APPROACH VIEW

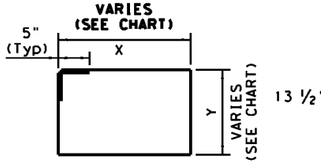


ELEVATION
(TYPE 2) END TERMINAL

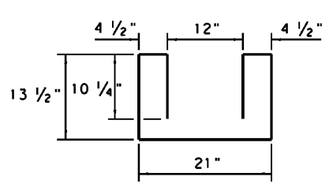
Note:
Anchoring pipes not shown in Elevation View

TYPE 2 - NOTES

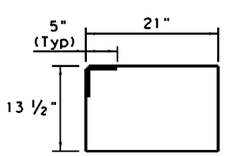
1. Welded wire reinforcment (WWR) is "not" an option for Type 2 Barrier.
2. Type 2 Barrier shall be used as an end treatment for the Type 1 barrier segments, when applicable.
3. The end treatment can be used without the anchor pins in locations that can accommodate approximately 4 ft. of lateral displacement of the end treatment. The use of non-pinned end treatment does not affect the performance or the deflection of the Low-Profile barrier system.
4. The anchor pins are all the same length and are to be driven flush with the top of the (Type 2) barrier surface.
5. The bends in the H3 and H1 bars are slight, no formal bend is necessary.
6. The Type 2 barrier segment must be lifted from the rear first, to prevent cracking of sloped section.
7. See LPCB sheet 1 for additional information.



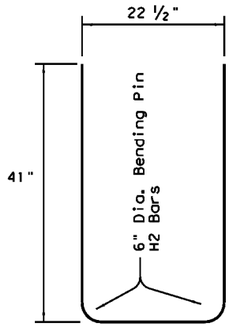
V3-V14 Bars



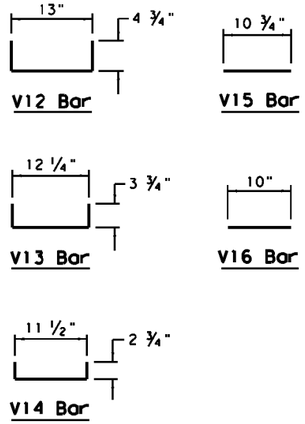
(6)~V2 Bars



(5)~V1 Bars



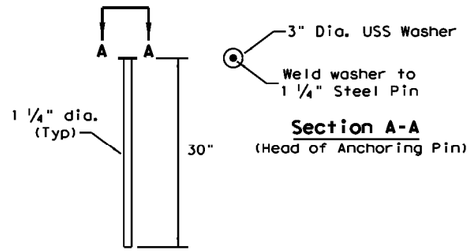
(4)~H2 Bars
(#5) Bars



Note: All V Bars are (#4)

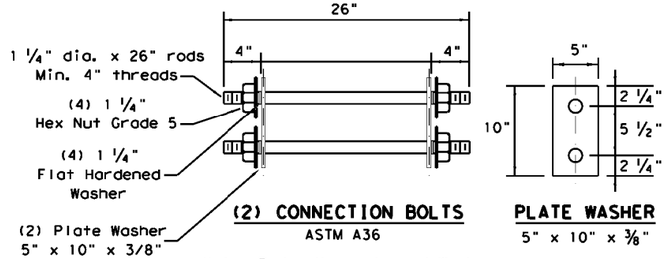
BAR(#4)	X (IN.)	Y (IN.)
V3 BAR	20 ¼	14 ½
V4 BAR	19 ½	13 ½
V5 BAR	18 ½	12 ¼
V6 BAR	17 ½	11 ¼
V7 BAR	17	10 ¼
V8 BAR	16 ¼	9
V9 BAR	15 ½	8
V10 BAR	14 ½	7
V11 BAR	13 ¾	6

REINFORCING STEEL DETAILS
TYPE 2 - END TERMINAL



Section A-A
(Head of Anchoring Pin)

(7) Anchor Pins
ASTM A36 Steel
(See Note 3)

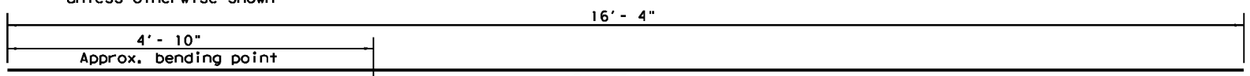


(2) CONNECTION BOLTS
ASTM A36

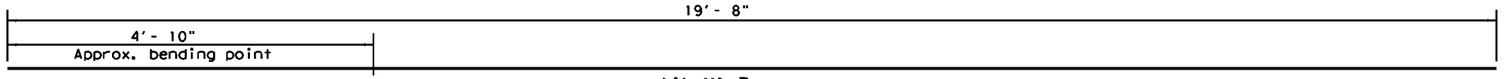
PLATE WASHER
5" x 10" x ⅜"

Note: Rods, Hex nuts and Washers shall be Galvanized.

Note: Use 2" Dia. Bending Pin, unless otherwise shown



(2)~H3 Bars
(#5) Bar



Note: Bends on H1 and H3 bars are slight and do not require formal bends.

(4)~H1 Bars
(#5) Bar

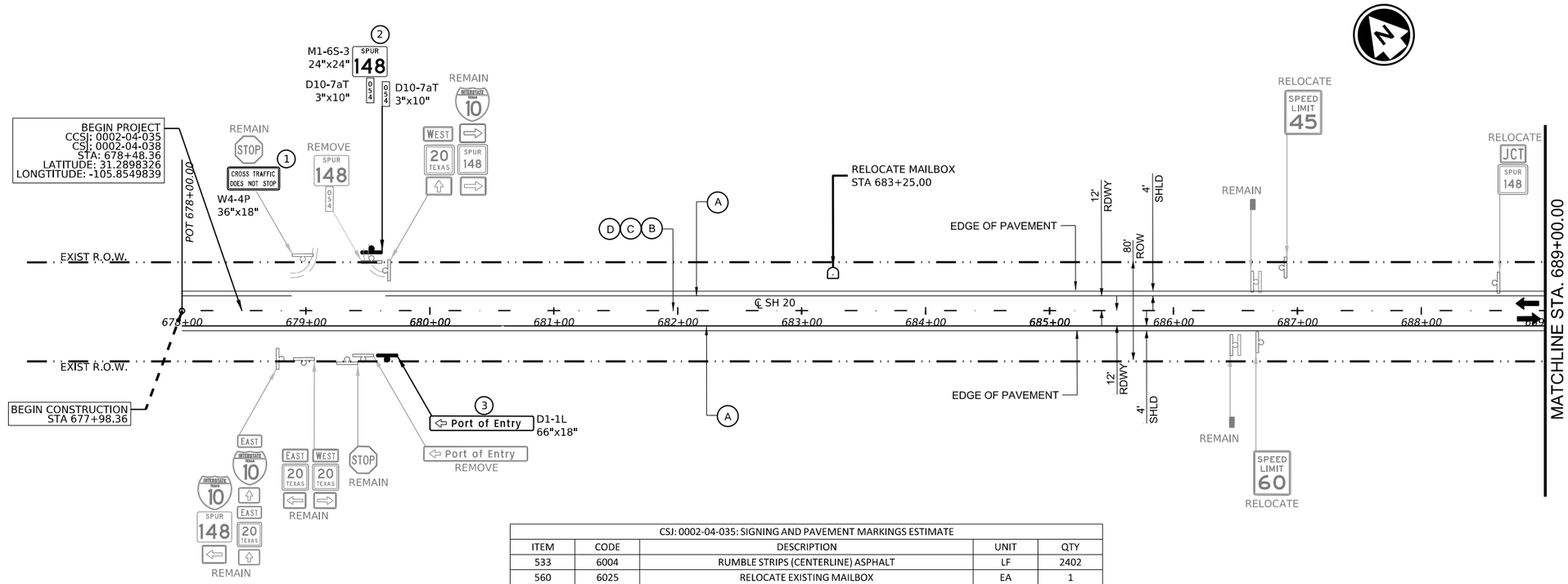
FOR CONTRACTORS INFORMATION ONLY

(TYPE 2) APPROX. QUANTITIES 20 FT. SECTION		
CONCRETE	CY	1.65
REINFORCING STEEL	LBS	240
TOTAL BARRIER WT.	LBS	7000

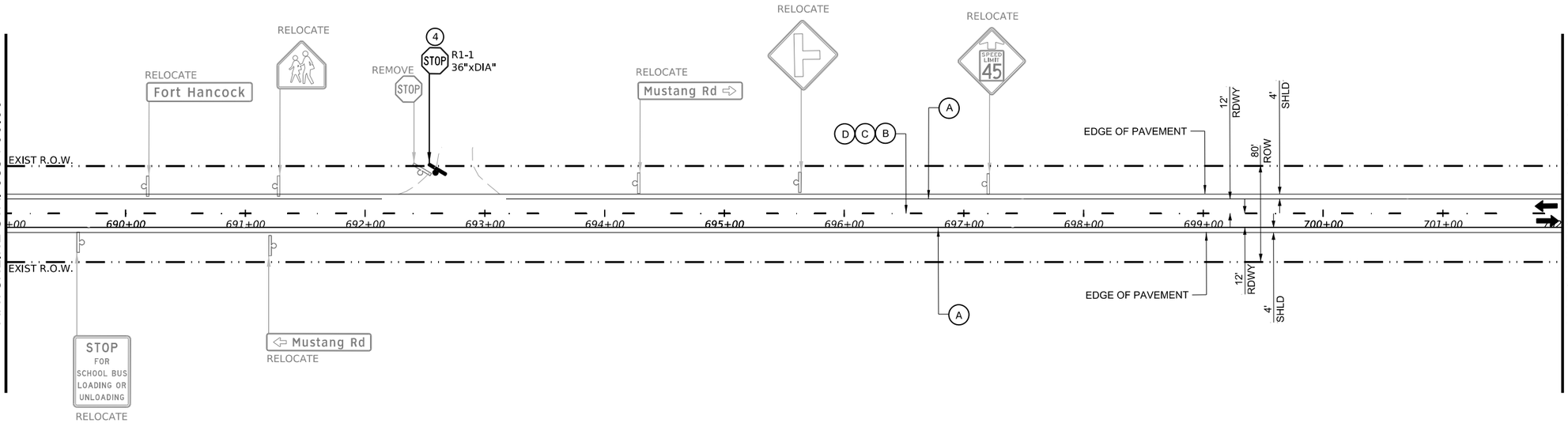
Texas Department of Transportation
Design Division Standard

LOW PROFILE CONCRETE BARRIER
PRECAST BARRIER (TYPE 2)
LPCB-13

FILE: lpcb13.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035, ETC.	SH 20
	DIST	COUNTY		SHEET NO.
	ELP	HUDSPETH		74



CSJ: 0002-04-035: SIGNING AND PAVEMENT MARKINGS ESTIMATE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
533	6004	RUMBLE STRIPS (CENTERLINE) ASPHALT	LF	2402
560	6025	RELOCATE EXISTING MAILBOX	EA	1
644	6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	2
644	6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	1
644	6067	IN SM RD SN SUP&AM (INST SIGN ONLY)	EA	1
644	6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	10
644	6076	REMOVE SM RD SN SUP&AM	EA	3
666	6285	REF PROF PAV MRK TY I(W)6"(SLD)(090MIL)	LF	4625
666	6317	RE PM W/RET REQ TY I (Y)6"(BRK)(090MIL)	LF	600
672	6009	REFL PAV MRKR TY II-A-A	EA	30
677	6028	ELIM EXT PV MRK & MRKS (RUMBLE STRIP)	LF	4704



0 50 100
SCALE IN FEET

NOTES:

1. MATCH TO EXISTING STRIPING ON BOTH ENDS OF THE PROJECT. REFER TO PM STANDARDS FOR FURTHER DETAILS.
2. PLACE RELOCATED AND PROPOSED SIGNS IN APPROPIATE LOCATION TO EXISTING SIGN UNLESS OTHERWISE INDICATED ON PLANS OR AS DIRECTED. FOLLOW SMD (GEN)-18 FOR LATERAL SIGN PLACEMENT.
3. CARE SHALL BE TAKEN WHEN RELOCATING SIGNS AND MAILBOXES. REFER TO SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS SHEET FOR LOCATION PLACEMENT.
4. HORIZONTAL ALIGMENT IS GENRATED FROM BEST FIT OF EXISTING GROUND LINE AT THE CENTERLINE AND IS PROVIDED FOR INFORMATION ONLY.
5. REFER TO PAVEMENT MARKING DETAIL FOR FURTHER INFORMATION.

LEGEND

- (A) REF PROF PAV MRK TY I (W) 6" (SLD) (090 MIL)
- (B) RE PM W/RET REQ TY I (Y) 6" (BRK) (90MIL)
- (C) REFL PAV MARKR TY II A-A
- (D) CENTERLINE RUMBLE STRIPS
- (E) RE PM W/RET REQ TY I (Y)6" (SLD) (090MIL)
- (#) SIGN NUMBER
- PROPOSED SIGN
- EXISTING SIGN
- TRAFFIC FLOW
- MAILBOX
- OM-2Y
- OM-3

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

SH 20
TRAFFIC

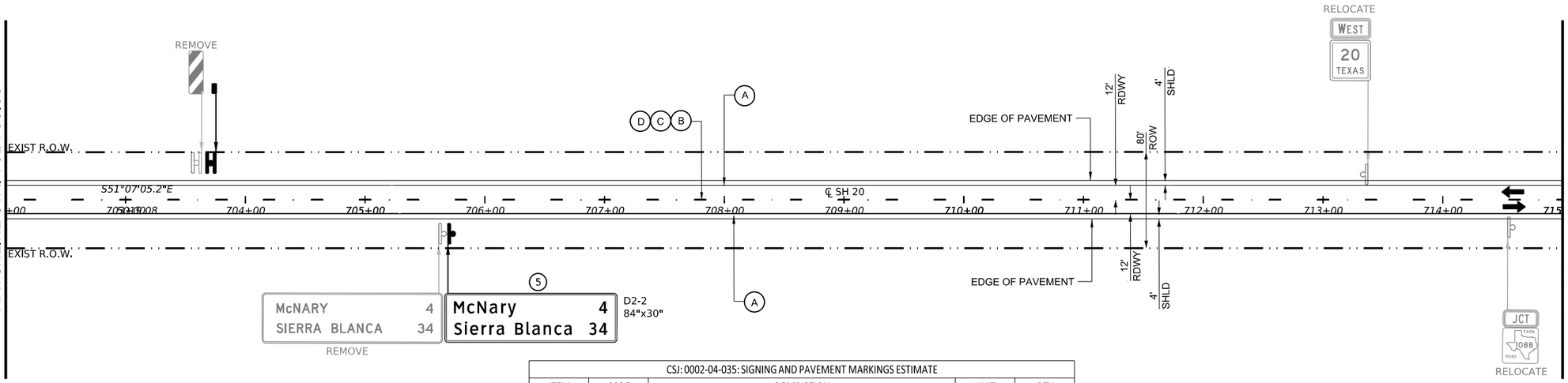
SIGNING & PAVEMENT MARKINGS

BEGIN STA. 678+48.36 TO STA. 702+00.00

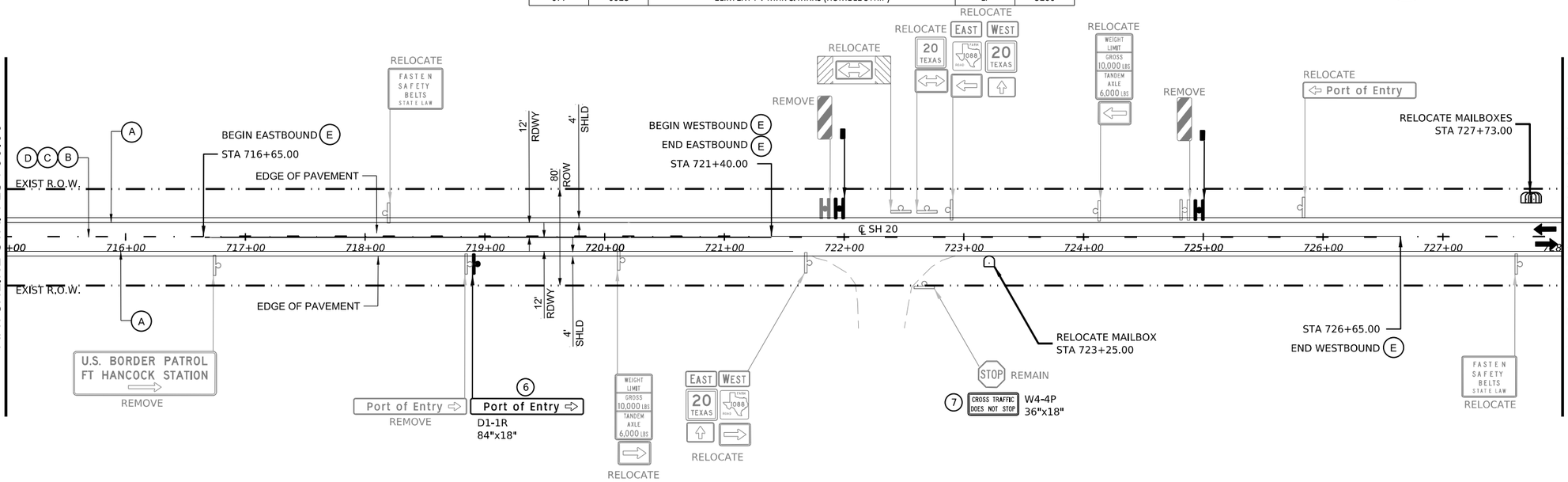
SHEET 1 OF 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		75

DATE: 11/1/2023 5:18:46 PM
FILE: pw://txdot.projectwiseonline.com:TxDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Master Design Files/Sheet Boundary Container/SH20 Container Signs&Strp



CSJ: 0002-04-035: SIGNING AND PAVEMENT MARKINGS ESTIMATE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
533	6004	RUMBLE STRIPS (CENTERLINE) ASPHALT	LF	2600
560	6025	RELOCATE EXISTING MAILBOX	EA	2
644	6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	2
644	6067	IN SM RD SN SUP&AM (INST SIGN ONLY)	EA	1
644	6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	11
644	6076	REMOVE SM RD SN SUP&AM	EA	3
658	6047	INSTL OM ASSM (OM-2Y)(WC)GND	EA	3
658	6060	REMOVE DELIN & OBJECT MARKER ASSMS	EA	3
666	6285	REF PROF PAV MRK TY I(W)6"(SLD)(090MIL)	LF	5050
666	6317	RE PM W/RET REQ TY I (Y)6"(BRK)(090MIL)	LF	650
666	6320	RE PM W/RET REQ TY I (Y)6"(SLD)(090MIL)	LF	1000
672	6009	REFL PAV MRKR TY II-A-A	EA	45
677	6028	ELIM EXT PV MRK & MRKS (RUMBLE STRIP)	LF	5200



NOTES:

1. MATCH TO EXISTING STRIPING ON BOTH ENDS OF THE PROJECT. REFER TO PM STANDARDS FOR FURTHER DETAILS.
2. PLACE RELOCATED AND PROPOSED SIGNS IN APPROPIATE LOCATION TO EXISTING SIGN UNLESS OTHERWISE INDICATED ON PLANS OR AS DIRECTED. FOLLOW SMD (GEN)-18 FOR LATERAL SIGN PLACEMENT.
3. CARE SHALL BE TAKEN WHEN RELOCATING SIGNS AND MAILBOXES. REFER TO SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS SHEET FOR LOCATION PLACEMENT.
4. HORIZONTAL ALIGMENT IS GENRATED FROM BEST FIT OF EXISTING GROUND LINE AT THE CENTERLINE AND IS PROVIDED FOR INFORMATION ONLY.
5. REFER TO PAVEMENT MARKING DETAIL FOR FURTHER INFORMATION.

SCALE IN FEET: 0 50 100

LEGEND

- (A) REF PROF PAV MRK TY I (W) 6" (SLD) (090 MIL)
- (B) RE PM W/RET REQ TY I (Y) 6" (BRK) (90MIL)
- (C) REFL PAV MARKR TY II A-A
- (D) CENTERLINE RUMBLE STRIPS
- (E) RE PM W/RET REQ TY I (Y)6" (SLD) (090MIL)
- (#) SIGN NUMBER
- PROPOSED SIGN
- EXISTING SIGN
- TRAFFIC FLOW
- MAILBOX
- OM-2Y
- OM-3

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

SH 20
TRAFFIC

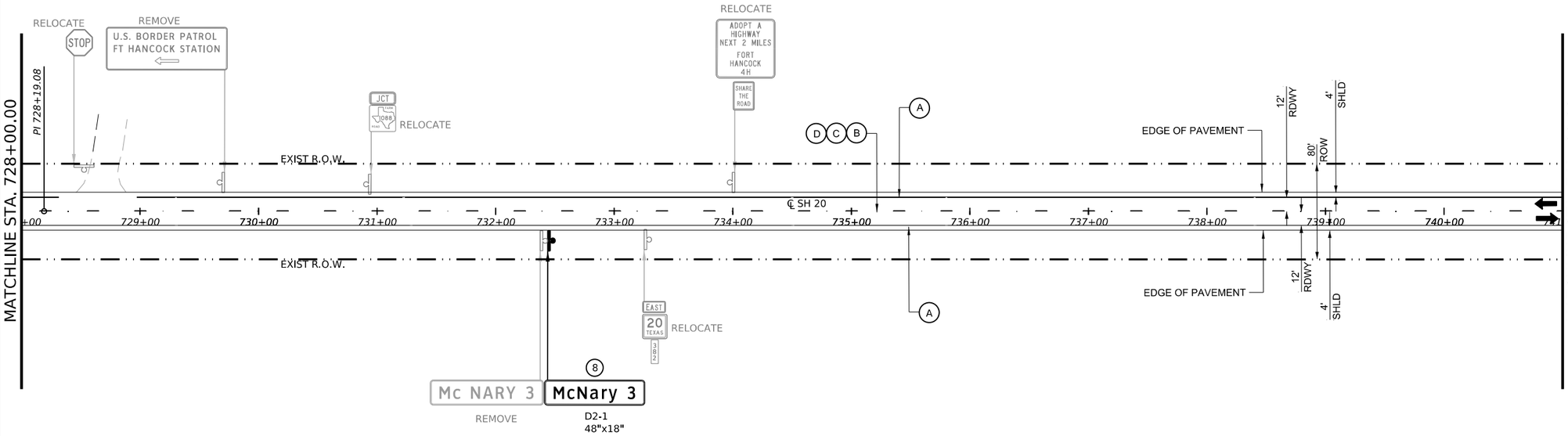
SIGNING & PAVEMENT MARKINGS

STA. 702+00.00 TO STA. 728+00.00

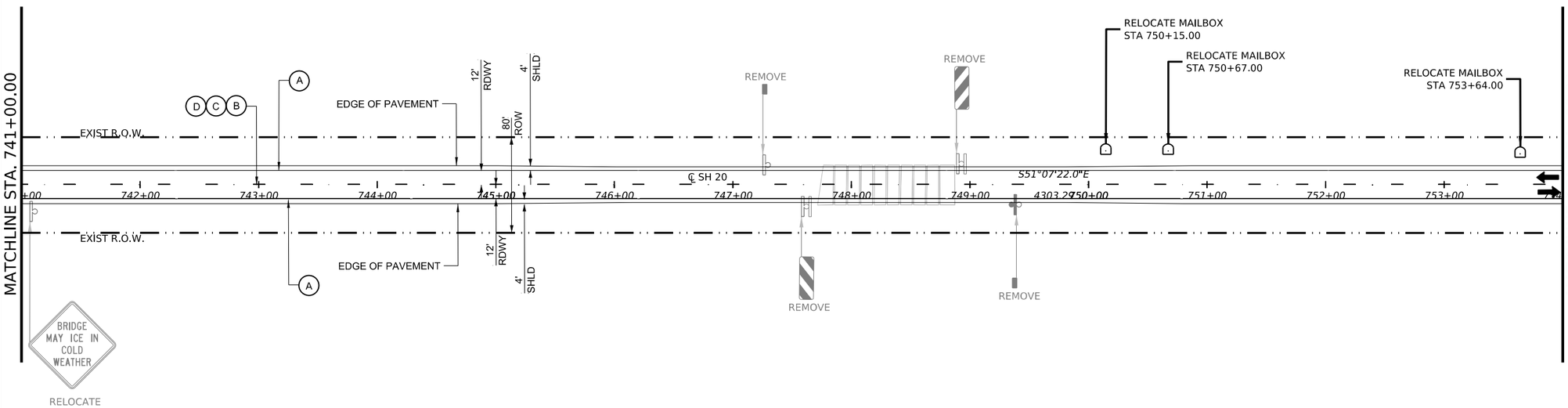
SHEET 2 OF 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		76

DATE: 12/22/2023 1:22:11 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Master Design Files/Sheet Boundary Container/SH20 Container Signs&Strp



CSJ: 0002-04-035: SIGNING AND PAVEMENT MARKINGS ESTIMATE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
533	6004	RUMBLE STRIPS (CENTERLINE) ASPHALT	LF	2600
560	6025	RELOCATE EXISTING MAILBOX	EA	3
644	6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	1
644	6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	5
644	6076	REMOVE SM RD SN SUP&AM	EA	2
658	6060	REMOVE DELIN & OBJECT MARKER ASSMS	EA	4
666	6285	REF PROF PAV MRK TY I(W)6"(SLD)(090MIL)	LF	5135
666	6317	RE PM W/RET REQ TY I (Y)6"(BRK)(090MIL)	LF	650
672	6009	REFL PAV MRKR TY II-A-A	EA	33
677	6028	ELIM EXT PV MRK & MRKS (RUMBLE STRIP)	LF	5200



0 50 100
SCALE IN FEET

NOTES:

1. MATCH TO EXISTING STRIPING ON BOTH ENDS OF THE PROJECT. REFER TO PM STANDARDS FOR FURTHER DETAILS.
2. PLACE RELOCATED AND PROPOSED SIGNS IN APPROPIATE LOCATION TO EXISTING SIGN UNLESS OTHERWISE INDICATED ON PLANS OR AS DIRECTED. FOLLOW SMD (GEN)-18 FOR LATERAL SIGN PLACEMENT.
3. CARE SHALL BE TAKEN WHEN RELOCATING SIGNS AND MAILBOXES. REFER TO SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS SHEET FOR LOCATION PLACEMENT.
4. HORIZONTAL ALIGMENT IS GENRATED FROM BEST FIT OF EXISTING GROUND LINE AT THE CENTERLINE AND IS PROVIDED FOR INFORMATION ONLY.
5. REFER TO PAVEMENT MARKING DETAIL FOR FURTHER INFORMATION.

LEGEND

- (A) REF PROF PAV MRK TY I (W) 6" (SLD) (090 MIL)
- (B) RE PM W/RET REQ TY I (Y) 6" (BRK) (90MIL)
- (C) REFL PAV MARKR TY II A-A
- (D) CENTERLINE RUMBLE STRIPS
- (E) RE PM W/RET REQ TY I (Y)6" (SLD) (090MIL)
- (#) SIGN NUMBER
- PROPOSED SIGN
- EXISTING SIGN
- TRAFFIC FLOW
- MAILBOX
- OM-2Y
- OM-3

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

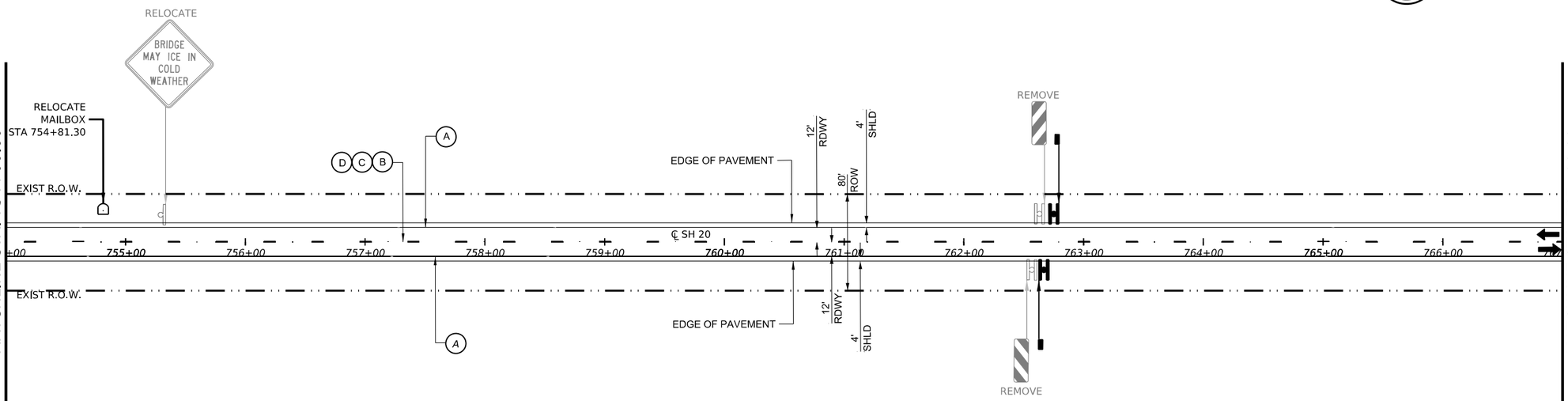
SH 20
TRAFFIC

SIGNING & PAVEMENT MARKINGS

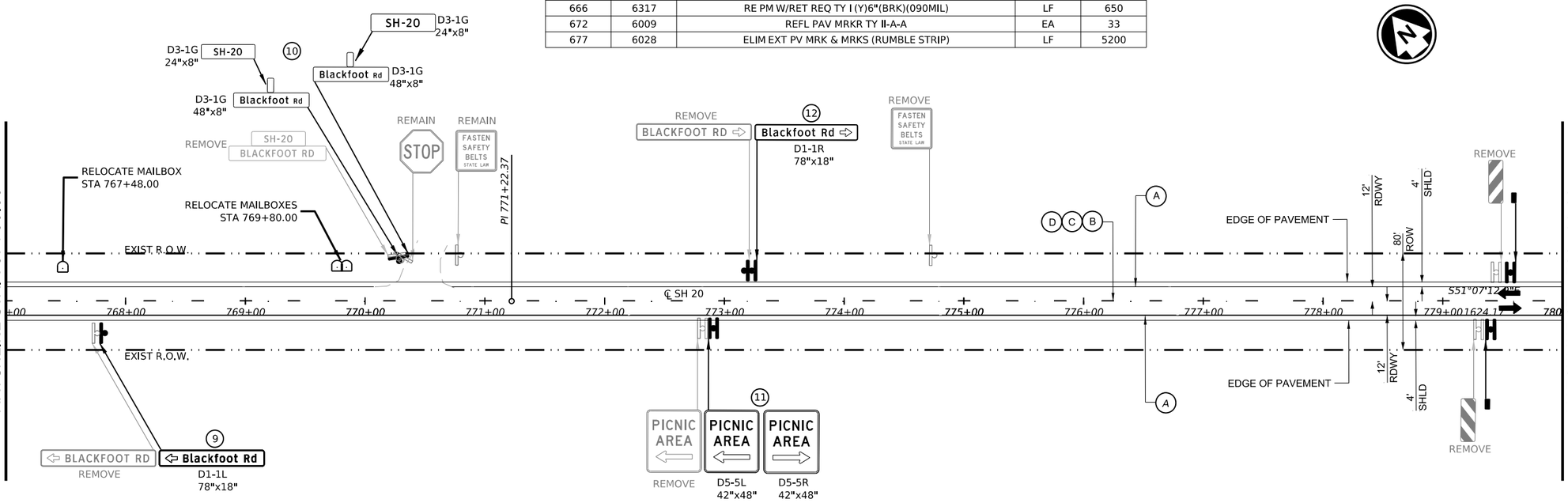
SHEET 3 OF 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		77

DATE: 11/1/2023 1:22:13 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Master Design Files/Sheet Boundary Container/SH20 Container Signs&Strp



CSJ: 0002-04-035: SIGNING AND PAVEMENT MARKINGS ESTIMATE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
533	6004	RUMBLE STRIPS (CENTERLINE) ASPHALT	LF	2600
560	6025	RELOCATE EXISTING MAILBOX	EA	3
644	6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	2
644	6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	2
644	6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	1
644	6076	REMOVE SM RD SN SUP&AM	EA	5
658	6047	INSTL OM ASSM (OM-2Y)(WC)GND	EA	4
658	6060	REMOVE DELIN & OBJECT MARKER ASSMS	EA	4
666	6285	REF PROF PAV MRK TY I(W)6"(SLD)(090MIL)	LF	5135
666	6317	RE PM W/RET REQ TY I (Y)6"(BRK)(090MIL)	LF	650
672	6009	REFL PAV MRKR TY II-A-A	EA	33
677	6028	ELIM EXT PV MRK & MRKS (RUMBLE STRIP)	LF	5200



0 50 100
SCALE IN FEET

NOTES:

1. MATCH TO EXISTING STRIPING ON BOTH ENDS OF THE PROJECT. REFER TO PM STANDARDS FOR FURTHER DETAILS.
2. PLACE RELOCATED AND PROPOSED SIGNS IN APPROPIATE LOCATION TO EXISTING SIGN UNLESS OTHERWISE INDICATED ON PLANS OR AS DIRECTED. FOLLOW SMD (GEN)-18 FOR LATERAL SIGN PLACEMENT.
3. CARE SHALL BE TAKEN WHEN RELOCATING SIGNS AND MAILBOXES. REFER TO SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS SHEET FOR LOCATION PLACEMENT.
4. HORIZONTAL ALIGMENT IS GENRATED FROM BEST FIT OF EXISTING GROUND LINE AT THE CENTERLINE AND IS PROVIDED FOR INFORMATION ONLY.
5. REFER TO PAVEMENT MARKING DETAIL FOR FURTHER INFORMATION.

LEGEND

- (A) REF PROF PAV MRK TY I (W) 6" (SLD) (090 MIL)
- (B) RE PM W/RET REQ TY I (Y) 6" (BRK) (90MIL)
- (C) REFL PAV MARKR TY II A-A
- (D) CENTERLINE RUMBLE STRIPS
- (E) RE PM W/RET REQ TY I (Y)6" (SLD) (090MIL)
- (#) SIGN NUMBER
- PROPOSED SIGN
- EXISTING SIGN
- TRAFFIC FLOW
- MAILBOX
- OM-2Y
- OM-3

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

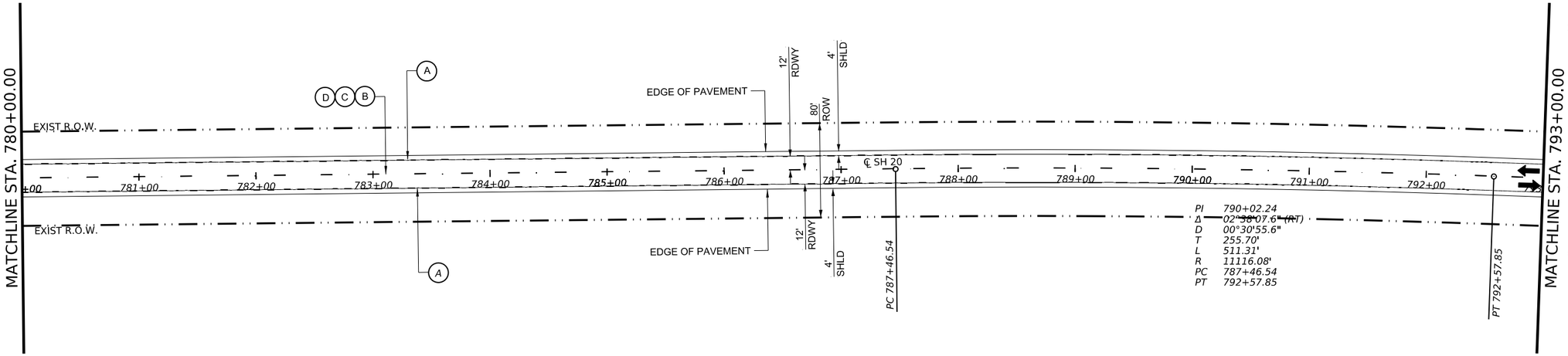
SH 20
TRAFFIC

SIGNING & PAVEMENT MARKINGS

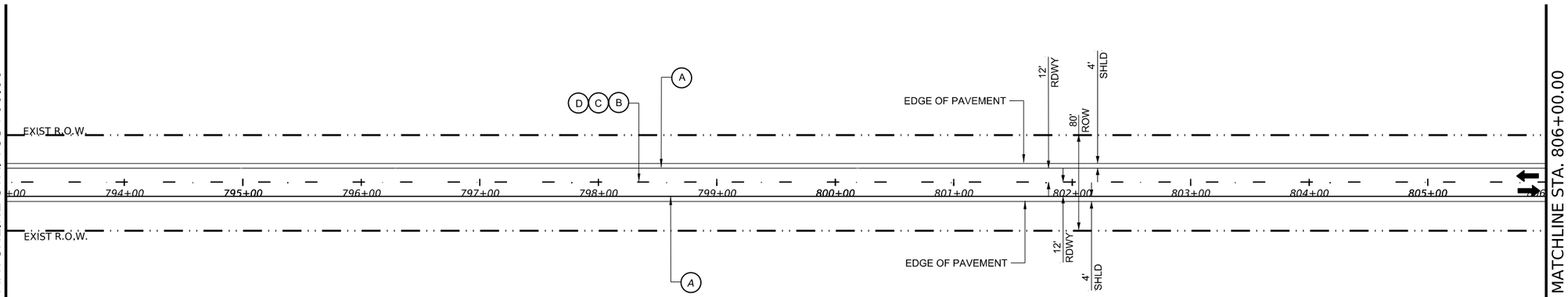
STA. 754+00.00 TO STA. 780+00.00
SHEET 4 OF 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		78

DATE: 11/1/2023 1:22:14 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Master Design Files/Sheet Boundary Container/SH20 Container Signs&Strp



CSJ: 0002-04-035: SIGNING AND PAVEMENT MARKINGS ESTIMATE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
533	6004	RUMBLE STRIPS (CENTERLINE) ASPHALT	LF	2600
666	6285	REF PROF PAV MRK TY I(W)6"(SLD)(090MIL)	LF	5200
666	6317	RE PM W/RET REQ TY I (Y)6"(BRK)(090MIL)	LF	650
672	6009	REFL PAV MRKR TY II-A-A	EA	33
677	6028	ELIM EXT PV MRK & MRKS (RUMBLE STRIP)	LF	5200



0 50 100
SCALE IN FEET

NOTES:

1. MATCH TO EXISTING STRIPING ON BOTH ENDS OF THE PROJECT. REFER TO PM STANDARDS FOR FURTHER DETAILS.
2. PLACE RELOCATED AND PROPOSED SIGNS IN APPROPIATE LOCATION TO EXISTING SIGN UNLESS OTHERWISE INDICATED ON PLANS OR AS DIRECTED. FOLLOW SMD (GEN)-18 FOR LATERAL SIGN PLACEMENT.
3. CARE SHALL BE TAKEN WHEN RELOCATING SIGNS AND MAILBOXES. REFER TO SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS SHEET FOR LOCATION PLACEMENT.
4. HORIZONTAL ALIGMENT IS GENRATED FROM BEST FIT OF EXISTING GROUND LINE AT THE CENTERLINE AND IS PROVIDED FOR INFORMATION ONLY.
5. REFER TO PAVEMENT MARKING DETAIL FOR FURTHER INFORMATION.

LEGEND

- (A) REF PROF PAV MRK TY I (W) 6" (SLD) (090 MIL)
- (B) RE PM W/RET REQ TY I (Y) 6" (BRK) (90MIL)
- (C) REFL PAV MARKR TY II A-A
- (D) CENTERLINE RUMBLE STRIPS
- (E) RE PM W/RET REQ TY I (Y)6" (SLD) (090MIL)
- (#) SIGN NUMBER
- PROPOSED SIGN
- EXISTING SIGN
- TRAFFIC FLOW
- MAILBOX
- OM-2Y
- OM-3

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

SH 20
TRAFFIC

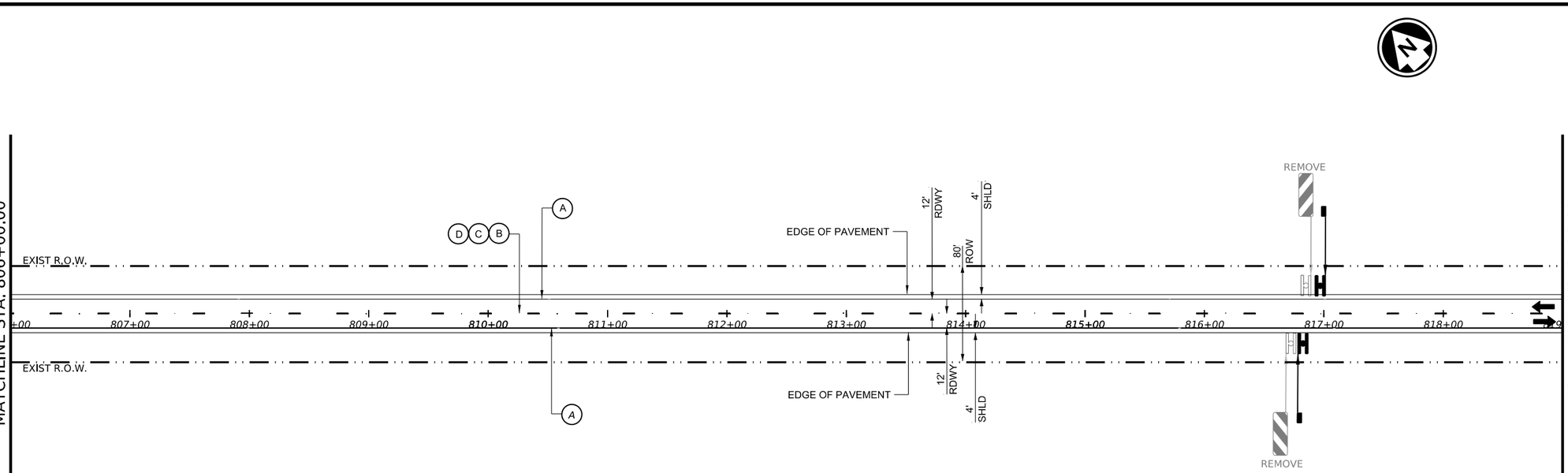
SIGNING & PAVEMENT MARKINGS

STA. 780+00.00 TO STA. 806+00.00

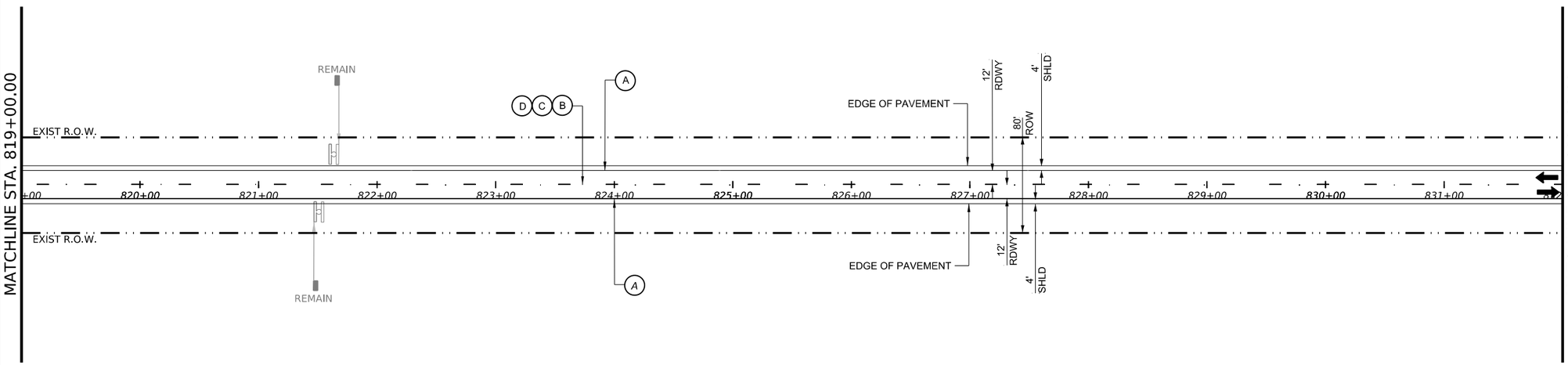
SHEET 5 OF 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		79

DATE: 11/1/2023 1:22:14 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Master Design Files/Sheet Boundary Container/SH20 Container Signs&Strp



CSJ: 0002-04-035: SIGNING AND PAVEMENT MARKINGS ESTIMATE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
533	6004	RUMBLE STRIPS (CENTERLINE) ASPHALT	LF	2600
658	6047	INSTL OM ASSM (OM-2Y)(WC)GND	EA	2
658	6060	REMOVE DELIN & OBJECT MARKER ASSMS	EA	2
666	6285	REF PROF PAV MRK TY I(W)6"(SLD)(090MIL)	LF	5200
666	6317	RE PM W/RET REQ TY I (Y)6"(BRK)(090MIL)	LF	650
672	6009	REFL PAV MRKR TY II-A-A	EA	33
677	6028	ELIM EXT PV MRK & MRKS (RUMBLE STRIP)	LF	5200



0 50 100
SCALE IN FEET

NOTES:

1. MATCH TO EXISTING STRIPING ON BOTH ENDS OF THE PROJECT. REFER TO PM STANDARDS FOR FURTHER DETAILS.
2. PLACE RELOCATED AND PROPOSED SIGNS IN APPROPIATE LOCATION TO EXISTING SIGN UNLESS OTHERWISE INDICATED ON PLANS OR AS DIRECTED. FOLLOW SMD (GEN)-18 FOR LATERAL SIGN PLACEMENT.
3. CARE SHALL BE TAKEN WHEN RELOCATING SIGNS AND MAILBOXES. REFER TO SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS SHEET FOR LOCATION PLACEMENT.
4. HORIZONTAL ALIGMENT IS GENRATED FROM BEST FIT OF EXISTING GROUND LINE AT THE CENTERLINE AND IS PROVIDED FOR INFORMATION ONLY.
5. REFER TO PAVEMENT MARKING DETAIL FOR FURTHER INFORMATION.

LEGEND

- (A) REF PROF PAV MRK TY I (W) 6" (SLD) (090 MIL)
- (B) RE PM W/RET REQ TY I (Y) 6" (BRK) (90MIL)
- (C) REFL PAV MARKR TY II A-A
- (D) CENTERLINE RUMBLE STRIPS
- (E) RE PM W/RET REQ TY I (Y)6" (SLD) (090MIL)
- (#) SIGN NUMBER
- PROPOSED SIGN
- EXISTING SIGN
- TRAFFIC FLOW
- MAILBOX
- OM-2Y
- OM-3

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

SH 20
TRAFFIC

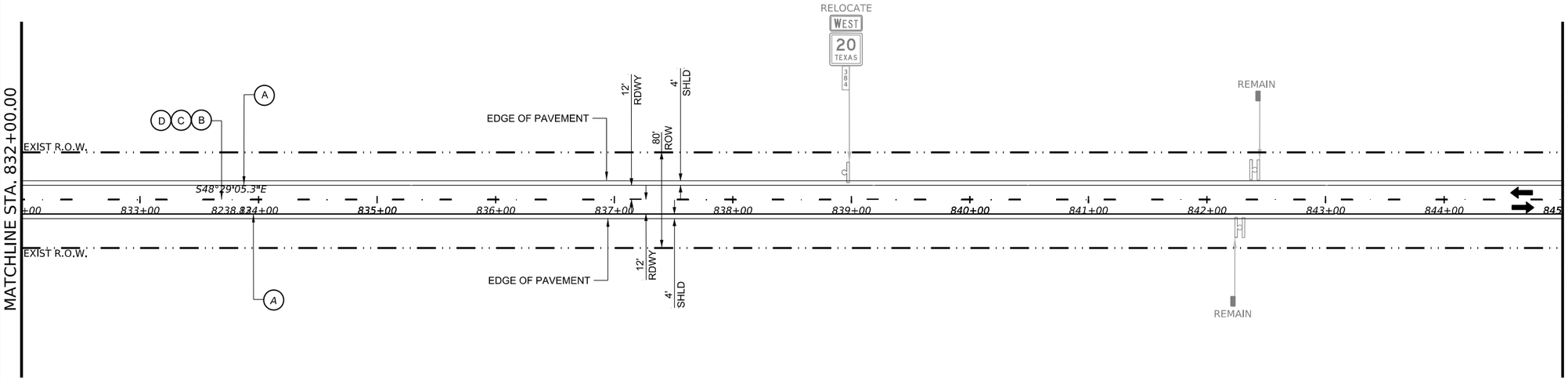
SIGNING & PAVEMENT MARKINGS

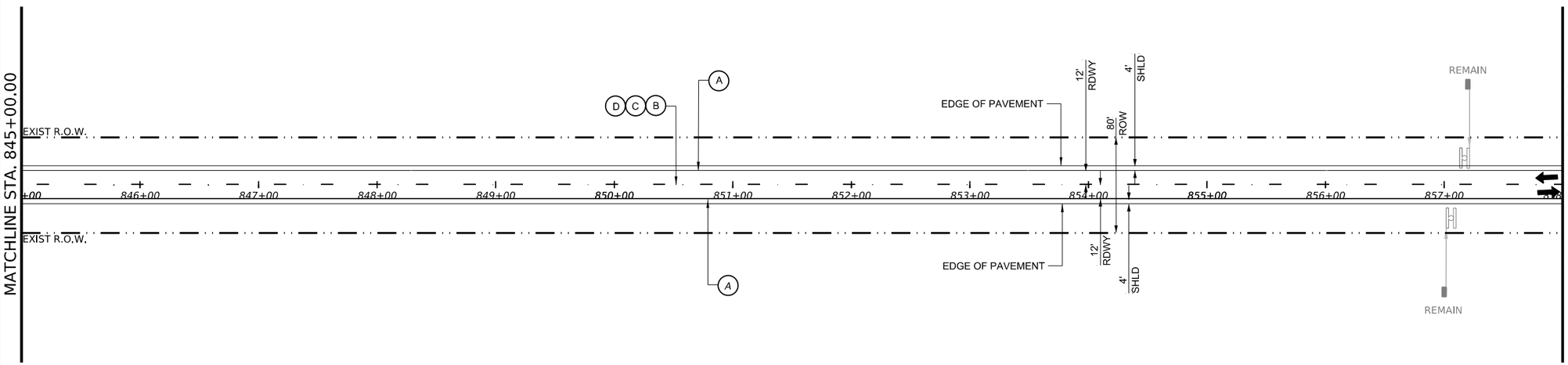
STA. 806+00.00 TO STA. 832+00.00

SHEET 6 OF 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		80

DATE: 11/1/2023 1:22:15 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Master Design Files/Sheet Boundary Container/SH20 Container Signs&Strp





CSJ: 0002-04-035: SIGNING AND PAVEMENT MARKINGS ESTIMATE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
533	6004	RUMBLE STRIPS (CENTERLINE) ASPHALT	LF	2600
644	6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	1
666	6285	REF PROF PAV MRK TY I(W)6"(SLD)(090MIL)	LF	5200
666	6317	RE PM W/RET REQ TY I (Y)6"(BRK)(090MIL)	LF	650
672	6009	REFL PAV MRKR TY II-A-A	EA	32
677	6028	ELIM EXT PV MRK & MRKS (RUMBLE STRIP)	LF	5200

0 50 100
SCALE IN FEET

NOTES:

1. MATCH TO EXISTING STRIPING ON BOTH ENDS OF THE PROJECT. REFER TO PM STANDARDS FOR FURTHER DETAILS.
2. PLACE RELOCATED AND PROPOSED SIGNS IN APPROPIATE LOCATION TO EXISTING SIGN UNLESS OTHERWISE INDICATED ON PLANS OR AS DIRECTED. FOLLOW SMD (GEN)-18 FOR LATERAL SIGN PLACEMENT.
3. CARE SHALL BE TAKEN WHEN RELOCATING SIGNS AND MAILBOXES. REFER TO SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS SHEET FOR LOCATION PLACEMENT.
4. HORIZONTAL ALIGMENT IS GENRATED FROM BEST FIT OF EXISTING GROUND LINE AT THE CENTERLINE AND IS PROVIDED FOR INFORMATION ONLY.
5. REFER TO PAVEMENT MARKING DETAIL FOR FURTHER INFORMATION.

LEGEND

- (A) REF PROF PAV MRK TY I (W) 6" (SLD) (090 MIL)
- (B) RE PM W/RET REQ TY I (Y) 6" (BRK) (90MIL)
- (C) REFL PAV MARKR TY II A-A
- (D) CENTERLINE RUMBLE STRIPS
- (E) RE PM W/RET REQ TY I (Y)6" (SLD) (090MIL)
- (#) SIGN NUMBER
- PROPOSED SIGN
- EXISTING SIGN
- TRAFFIC FLOW
- MAILBOX
- OM-2Y
- OM-3

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

SH 20
TRAFFIC

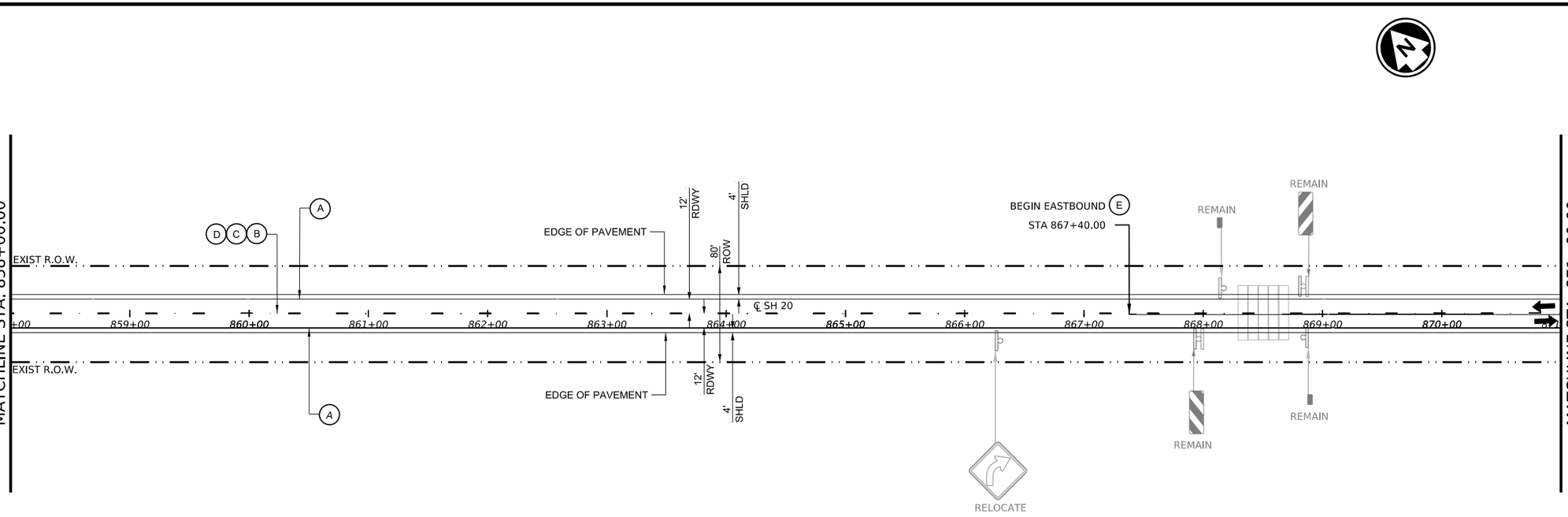
SIGNING & PAVEMENT MARKINGS

STA. 832+00.00 TO STA. 858+00.00

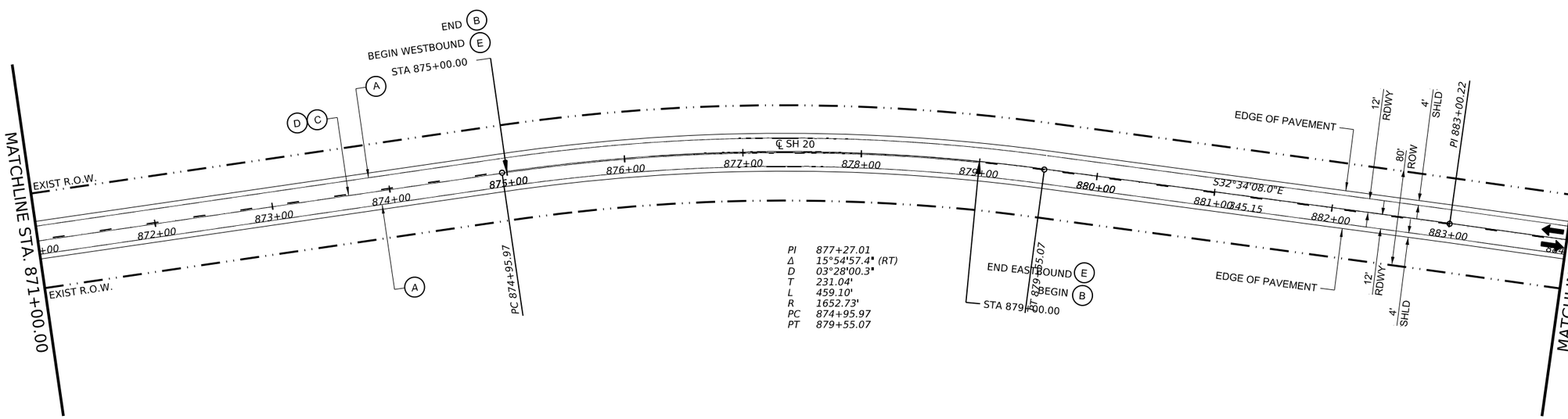
SHEET 7 OF 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		81

DATE: 11/1/2023 1:22:16 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Master Design Files/Sheet Boundary Container/SH20 Container Signs&Strp



CSJ: 0002-04-035: SIGNING AND PAVEMENT MARKINGS ESTIMATE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
533	6004	RUMBLE STRIPS (CENTERLINE) ASPHALT	LF	2600
644	6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	1
666	6285	REF PROF PAV MRK TY I(W)6"(SLD)(090MIL)	LF	5200
666	6317	RE PM W/RET REQ TY I (Y)6"(BRK)(090MIL)	LF	550
666	6320	RE PM W/RET REQ TY I (Y)6"(SLD)(090MIL)	LF	2060
672	6009	REFL PAV MRKR TY II-A-A	EA	53
677	6028	ELIM EXT PV MRK & MRKS (RUMBLE STRIP)	LF	5200



0 50 100
SCALE IN FEET

NOTES:

1. MATCH TO EXISTING STRIPING ON BOTH ENDS OF THE PROJECT. REFER TO PM STANDARDS FOR FURTHER DETAILS.
2. PLACE RELOCATED AND PROPOSED SIGNS IN APPROPIATE LOCATION TO EXISTING SIGN UNLESS OTHERWISE INDICATED ON PLANS OR AS DIRECTED. FOLLOW SMD (GEN)-18 FOR LATERAL SIGN PLACEMENT.
3. CARE SHALL BE TAKEN WHEN RELOCATING SIGNS AND MAILBOXES. REFER TO SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS SHEET FOR LOCATION PLACEMENT.
4. HORIZONTAL ALIGMENT IS GENRATED FROM BEST FIT OF EXISTING GROUND LINE AT THE CENTERLINE AND IS PROVIDED FOR INFORMATION ONLY.
5. REFER TO PAVEMENT MARKING DETAIL FOR FURTHER INFORMATION.

LEGEND

- (A) REF PROF PAV MRK TY I (W) 6" (SLD) (090 MIL)
- (B) RE PM W/RET REQ TY I (Y) 6" (BRK) (90MIL)
- (C) REFL PAV MARKR TY II A-A
- (D) CENTERLINE RUMBLE STRIPS
- (E) RE PM W/RET REQ TY I (Y)6" (SLD) (090MIL)
- (#) SIGN NUMBER
- PROPOSED SIGN
- EXISTING SIGN
- TRAFFIC FLOW
- MAILBOX
- OM-2Y
- OM-3

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

SH 20
TRAFFIC

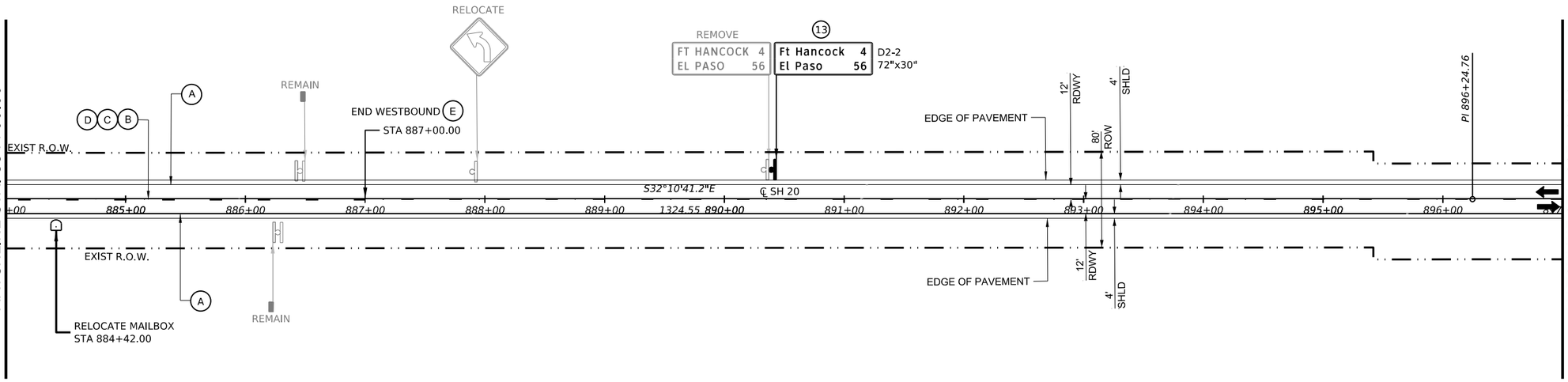
SIGNING & PAVEMENT MARKINGS

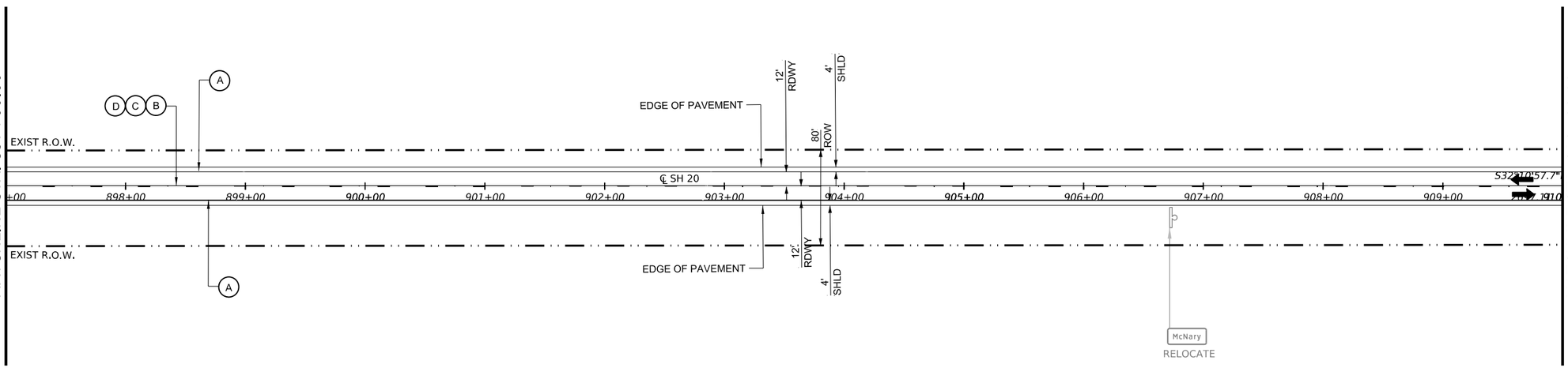
STA. 858+00.00 TO STA. 884+00.00

SHEET 8 OF 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		82

DATE: 11/1/2023 1:22:17 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Master Design Files/Sheet Boundary Container/SH20 Container Signs&Strp





CSJ: 0002-04-035: SIGNING AND PAVEMENT MARKINGS ESTIMATE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
533	6004	RUMBLE STRIPS (CENTERLINE) ASPHALT	LF	2600
560	6025	RELOCATE EXISTING MAILBOX	EA	1
644	6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	1
644	6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	2
644	6076	REMOVE SM RD SN SUP&AM	EA	1
666	6285	REF PROF PAV MRK TY I(W)6"(SLD)(090MIL)	LF	5200
666	6317	RE PM W/RET REQ TY I (Y)6"(BRK)(090MIL)	LF	650
666	6320	RE PM W/RET REQ TY I (Y)6"(SLD)(090MIL)	LF	300
672	6009	REFL PAV MRKR TY II-A-A	EA	37
677	6028	ELIM EXT PV MRK & MRKS (RUMBLE STRIP)	LF	5200

0 50 100
SCALE IN FEET

NOTES:

1. MATCH TO EXISTING STRIPING ON BOTH ENDS OF THE PROJECT. REFER TO PM STANDARDS FOR FURTHER DETAILS.
2. PLACE RELOCATED AND PROPOSED SIGNS IN APPROPIATE LOCATION TO EXISTING SIGN UNLESS OTHERWISE INDICATED ON PLANS OR AS DIRECTED. FOLLOW SMD (GEN)-18 FOR LATERAL SIGN PLACEMENT.
3. CARE SHALL BE TAKEN WHEN RELOCATING SIGNS AND MAILBOXES. REFER TO SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS SHEET FOR LOCATION PLACEMENT.
4. HORIZONTAL ALIGMENT IS GENRATED FROM BEST FIT OF EXISTING GROUND LINE AT THE CENTERLINE AND IS PROVIDED FOR INFORMATION ONLY.
5. REFER TO PAVEMENT MARKING DETAIL FOR FURTHER INFORMATION.

LEGEND

- (A) REF PROF PAV MRK TY I (W) 6" (SLD) (090 MIL)
- (B) RE PM W/RET REQ TY I (Y) 6" (BRK) (90MIL)
- (C) REFL PAV MARKR TY II A-A
- (D) CENTERLINE RUMBLE STRIPS
- (E) RE PM W/RET REQ TY I (Y)6" (SLD) (090MIL)
- (#) SIGN NUMBER
- PROPOSED SIGN
- EXISTING SIGN
- TRAFFIC FLOW
- MAILBOX
- OM-2Y
- OM-3

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

SH 20
TRAFFIC

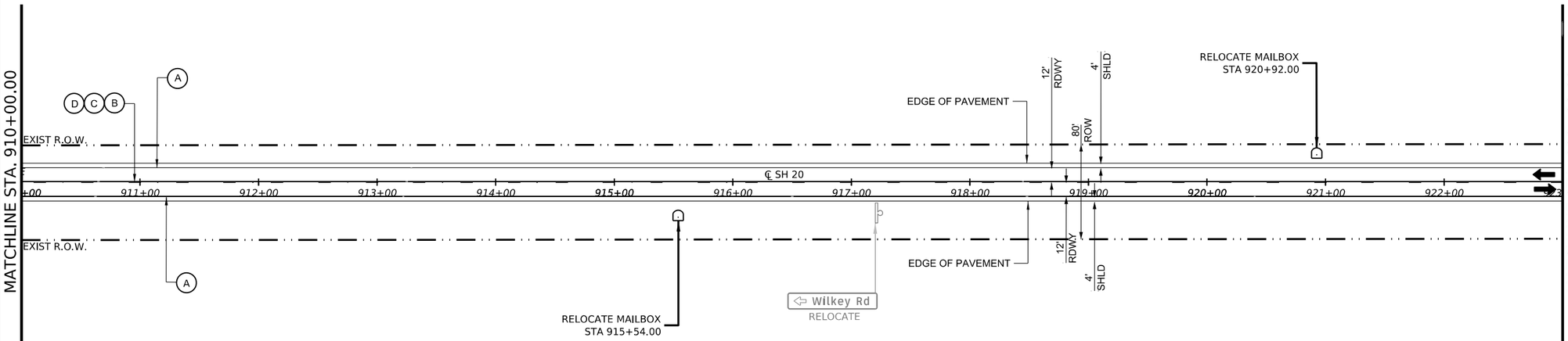
SIGNING & PAVEMENT MARKINGS

STA. 884+00.00 TO STA. 910+00.00

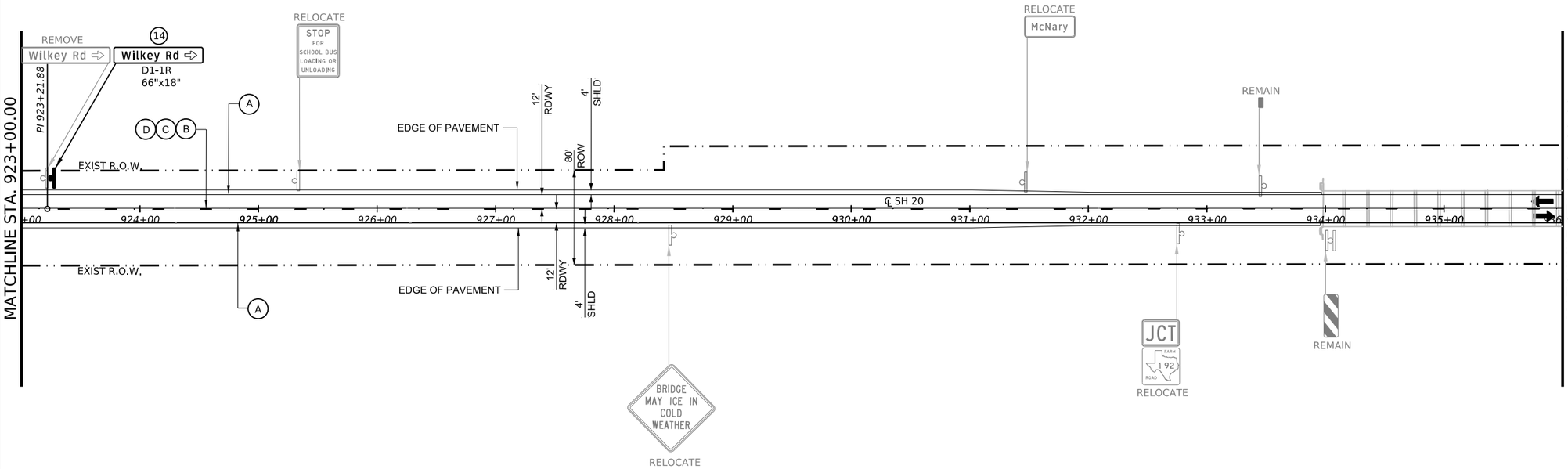
SHEET 9 OF 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		83

DATE: 12/02/2021 1:22:18 PM
FILE: p:\0002\04\035\Design Files\Sheet Boundary Container\SH20 Container Signs&Strp



CSJ: 0002-04-035: SIGNING AND PAVEMENT MARKINGS ESTIMATE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
533	6004	RUMBLE STRIPS (CENTERLINE) ASPHALT	LF	2600
560	6025	RELOCATE EXISTING MAILBOX	EA	2
644	6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	1
644	6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	5
644	6076	REMOVE SM RD SN SUP&AM	EA	1
666	6285	REF PROF PAV MRK TY I(W)6"(SLD)(090MIL)	LF	5200
666	6317	RE PM W/RET REQ TY I (Y)6"(BRK)(090MIL)	LF	650
672	6009	REFL PAV MRKR TY II-A-A	EA	33
677	6028	ELIM EXT PV MRK & MRKS (RUMBLE STRIP)	LF	5200



0 50 100
SCALE IN FEET

NOTES:

1. MATCH TO EXISTING STRIPING ON BOTH ENDS OF THE PROJECT. REFER TO PM STANDARDS FOR FURTHER DETAILS.
2. PLACE RELOCATED AND PROPOSED SIGNS IN APPROPIATE LOCATION TO EXISTING SIGN UNLESS OTHERWISE INDICATED ON PLANS OR AS DIRECTED. FOLLOW SMD (GEN)-18 FOR LATERAL SIGN PLACEMENT.
3. CARE SHALL BE TAKEN WHEN RELOCATING SIGNS AND MAILBOXES. REFER TO SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS SHEET FOR LOCATION PLACEMENT.
4. HORIZONTAL ALIGMENT IS GENRATED FROM BEST FIT OF EXISTING GROUND LINE AT THE CENTERLINE AND IS PROVIDED FOR INFORMATION ONLY.
5. REFER TO PAVEMENT MARKING DETAIL FOR FURTHER INFORMATION.

LEGEND

- (A) REF PROF PAV MRK TY I (W) 6" (SLD) (090 MIL)
- (B) RE PM W/RET REQ TY I (Y) 6" (BRK) (90MIL)
- (C) REFL PAV MARKR TY II A-A
- (D) CENTERLINE RUMBLE STRIPS
- (E) RE PM W/RET REQ TY I (Y)6" (SLD) (090MIL)
- (#) SIGN NUMBER
- PROPOSED SIGN
- EXISTING SIGN
- TRAFFIC FLOW
- MAILBOX
- OM-2Y
- OM-3

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

SH 20
TRAFFIC

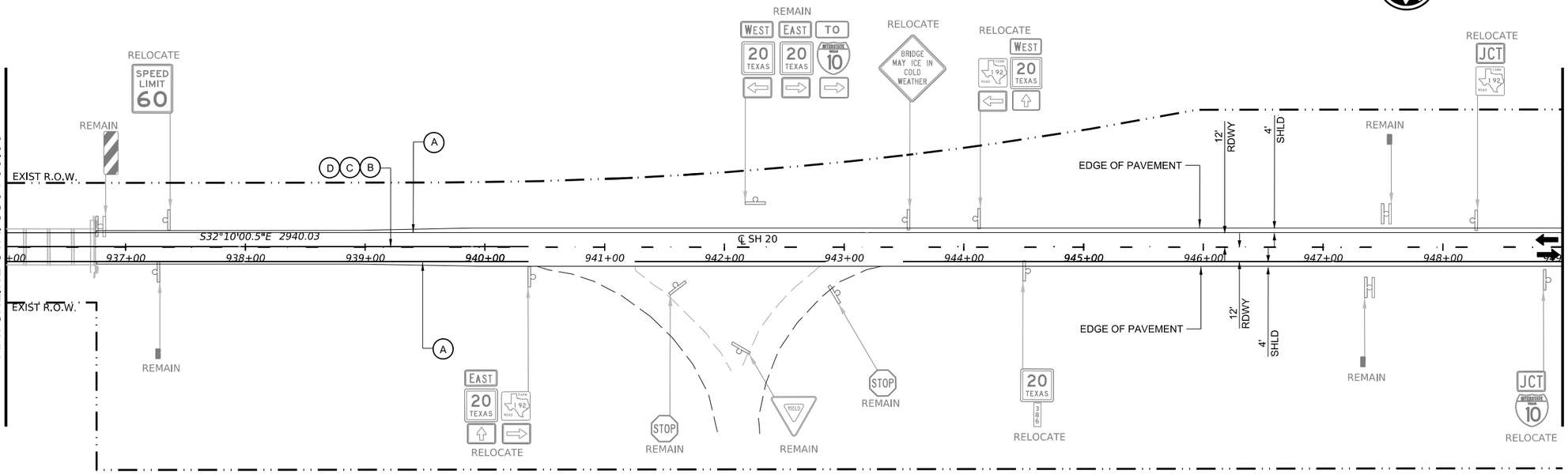
SIGNING & PAVEMENT MARKINGS

STA. 910+00.00 TO STA. 936+00.00

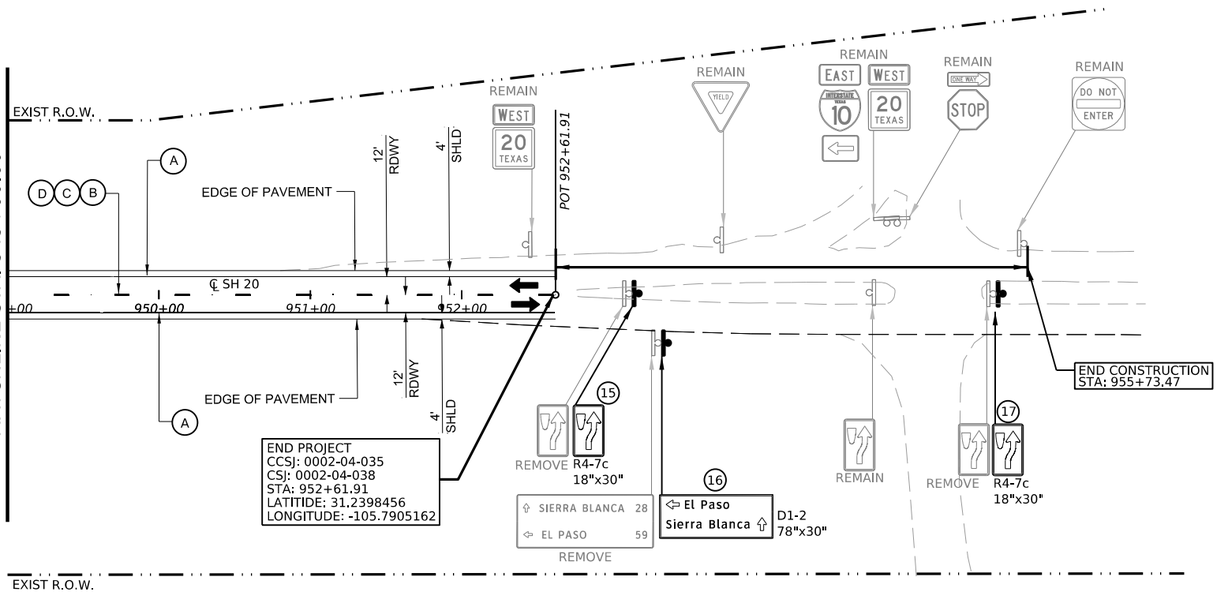
SHEET10 OF 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		84

DATE: 11/1/2023 1:22:19 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Master Design Files/Sheet Boundary Container/SH20 Container Signs&Strp



CSJ: 0002-04-035: SIGNING AND PAVEMENT MARKINGS ESTIMATE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
533	6004	RUMBLE STRIPS (CENTERLINE) ASPHALT	LF	1662
644	6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	2
644	6030	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA	1
644	6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	7
644	6076	REMOVE SM RD SN SUP&AM	EA	3
666	6285	REF PROF PAV MRK TY I(W)6"(SLD)(090MIL)	LF	3170
666	6317	RE PM W/RET REQ TY I (Y)6"(BRK)(090MIL)	LF	420
672	6009	REFL PAV MRKR TY II-A-A	EA	21
677	6028	ELIM EXT PV MRK & MRKS (RUMBLE STRIP)	LF	3324



0 50 100
SCALE IN FEET

NOTES:

1. MATCH TO EXISTING STRIPING ON BOTH ENDS OF THE PROJECT. REFER TO PM STANDARDS FOR FURTHER DETAILS.
2. PLACE RELOCATED AND PROPOSED SIGNS IN APPROPIATE LOCATION TO EXISTING SIGN UNLESS OTHERWISE INDICATED ON PLANS OR AS DIRECTED. FOLLOW SMD (GEN)-18 FOR LATERAL SIGN PLACEMENT.
3. CARE SHALL BE TAKEN WHEN RELOCATING SIGNS AND MAILBOXES. REFER TO SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS SHEET FOR LOCATION PLACEMENT.
4. HORIZONTAL ALIGMENT IS GENRATED FROM BEST FIT OF EXISTING GROUND LINE AT THE CENTERLINE AND IS PROVIDED FOR INFORMATION ONLY.
5. REFER TO PAVEMENT MARKING DETAIL FOR FURTHER INFORMATION.

LEGEND

- (A) REF PROF PAV MRK TY I (W) 6" (SLD) (090 MIL)
- (B) RE PM W/RET REQ TY I (Y) 6" (BRK) (90MIL)
- (C) REFL PAV MARKR TY II A-A
- (D) CENTERLINE RUMBLE STRIPS
- (E) RE PM W/RET REQ TY I (Y)6" (SLD) (090MIL)
- (#) SIGN NUMBER
- PROPOSED SIGN
- EXISTING SIGN
- TRAFFIC FLOW
- MAILBOX
- OM-2Y
- OM-3

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

SH 20
TRAFFIC

SIGNING & PAVEMENT MARKINGS

STA. 936+00.00 TO STA. 952+61.91

SHEET 11 OF 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		85

DATE: 11/1/2023 1:22:20 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Master Design Files/Sheet Boundary Container/SH20 Container Signs&Strp

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
76	1	W4-4P	CROSS TRAFFIC DOES NOT STOP *TO BE INSTALLED ON EXISTING STOP SIGN	36"x18"	✓		NA	NA	NA	NA		
76	2	M1-6S-3	SPUR 148	24"x24"	✓		10BWG	1	SA	P		
		D10-7aT	054	3"x10"	✓							
		D10-7aT	054	3"x10"	✓							
76	3	D1-1L	⇦ Port of Entry	66"x18"	✓		10BWG	1	SA	T		
76	4	R1-1	STOP	36"x36"	✓		10BWG	1	SA	P		
77	5	D2-2	McNary 4 Sierra Blanca 34	84"x30"	✓		10BWG	1	SA	T		
77	6	D1-1R	Port of Entry ⇨	66"x18"	✓		10BWG	1	SA	T		
77	7	W4-4P	CROSS TRAFFIC DOES NOT STOP *TO BE INSTALLED ON EXISTING STOP SIGN	36"x18"	✓		NA	NA	NA	NA		
78	8	D2-1	McNary 3	48"x18"	✓		10BWG	1	SA	T		
79	9	D1-1L	⇦ Blackfoot Rd	78"x18"	✓		10BWG	1	SA	T		
79	10	D3-1G	SH-20 Blackfoot Rd	30"x8"	✓		10BWG	1	SA	P		
		D3-1G		42"x8"	✓							
		D3-1G	SH-20 Blackfoot Rd	30"x8"	✓							
		D3-1G		42"x8"	✓							

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:

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

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

FILE:	sums16ex.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0002	04	035,ETC.	SH 20
4-16		DIST	COUNTY		SHEET NO.
8-16		ELP	HUDSPETH		86

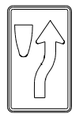
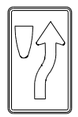
TB

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
79	11	D5-5L	PICNIC AREA ⇐	42"x48"	✓		10BWG	1	SA	P		
		D5-5R	PICNIC AREA ⇒	42"x48"	✓							
79	12	D1-1R	Blackfoot Rd ⇨	78"x18"	✓		10BWG	1	SA	T		
84	13	D2-2	Ft Hancock 4 El Paso 56	72"x30"	✓		10BWG	1	SA	T		
85	14	D1-1R	Wilkey Rd ⇨	66"x18"	✓		10BWG	1	SA	T		
86	15	R4-7c		18"x30"	✓		10BWG	1	SA	T		
86	16	D1-2	⇦ El Paso Sierra Blanca ⇧	78"x30"	✓		S80	1	SA	T		
86	17	R4-7c		18"x30"	✓		10BWG	1	SA	T		

Sheetal Patel, P.E.

11/01/2023

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

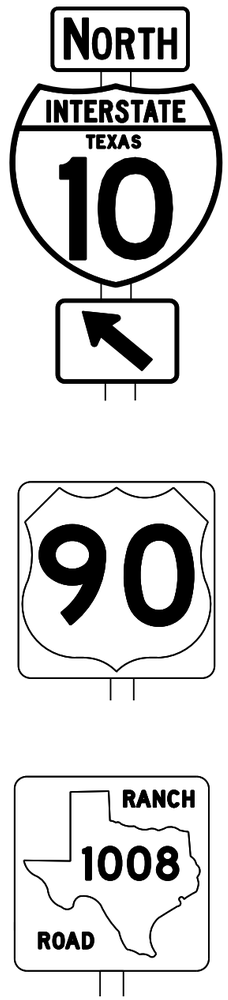
FILE: sums16ex.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035,ETC.	SH 20
4-16	DIST	COUNTY		SHEET NO.
8-16	ELP	HUDSPETH		87

TB

DATE: 11/1/2023 1:22:56 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/000204035/4 - Design/Plan Set/13. Standards/PAVEMENT MARKINGS & DELINEATION STANDARDS/TSR(3)-13.dgn

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

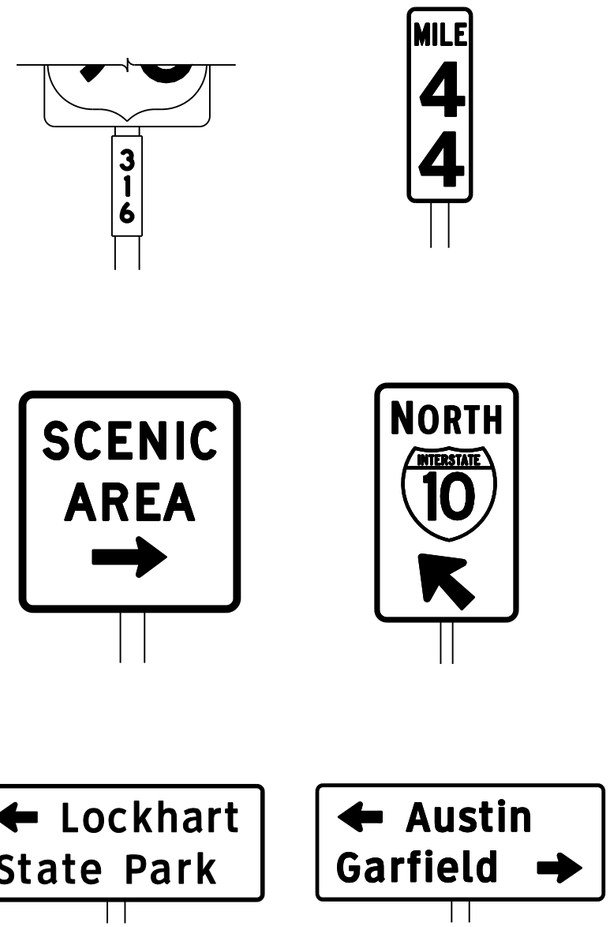
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



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

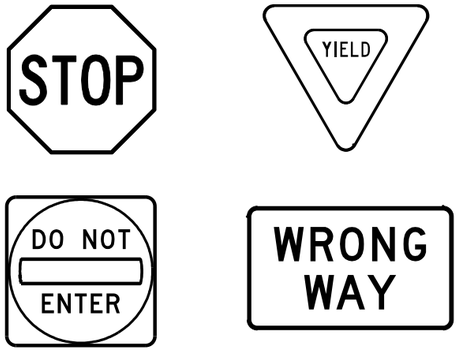
TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035,ETC.	SH 20
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	ELP	HUDSPETH		88

DATE: 11/1/2023 1:23:17 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/000204035/4 - Design/Plan Set/13. Standards/PAVEMENT MARKINGS & DELINEATION STANDARDS/TSR(4)-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

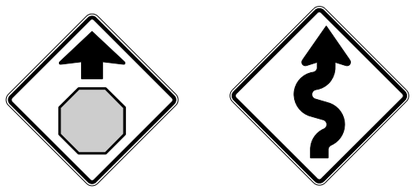
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(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

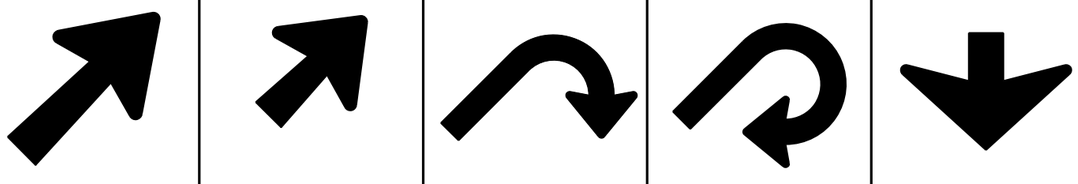
TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035,ETC.	SH 20
12-03 7-13 9-08	DIST	COUNTY		SHEET NO.
	ELP	HUDSPETH		89

4

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

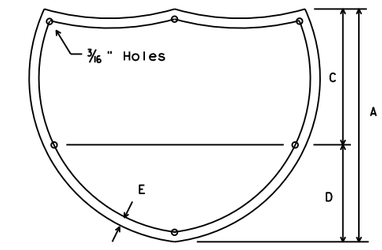
NOTE

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.

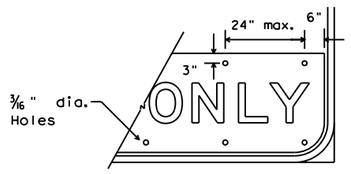
http://www.txdot.gov/

SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)

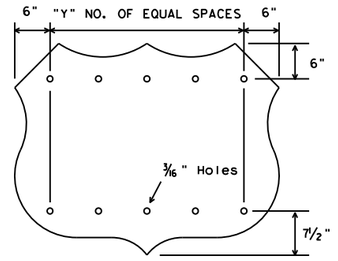


INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1 1/2
48	28	20	1 3/4

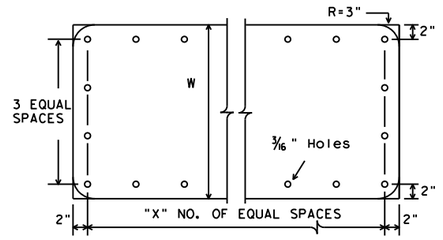


EXIT ONLY PANEL



U.S. ROUTE MARKERS

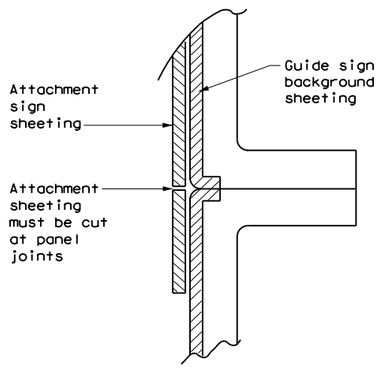
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



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

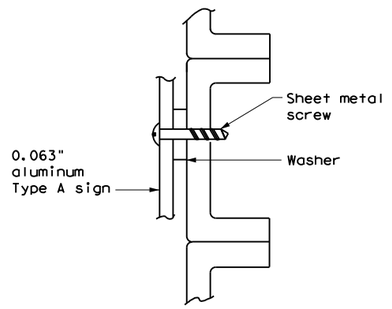
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



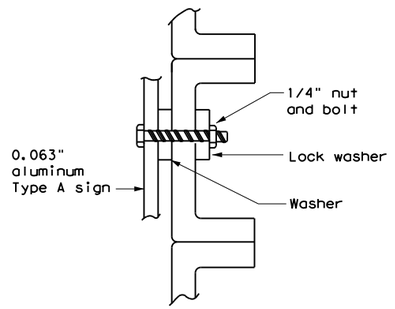
DIRECT APPLIED ATTACHMENT

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".



SCREW ATTACHMENT



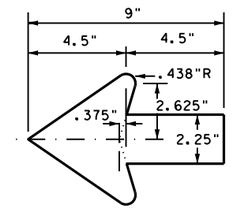
NUT/BOLT ATTACHMENT

NOTE:

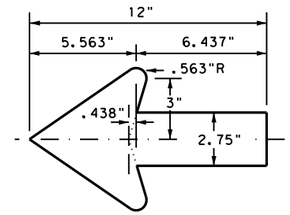
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

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	0002	04	035,ETC.	SH 20
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	ELP	HUDSPETH		90

5

DATE: 11/1/2023 1:23:56 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040354 - Design/Plan Set/13. Standards/PAVEMENT MARKINGS & DELINEATION STANDARDS/SMD(GEN)-08.dgn

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)

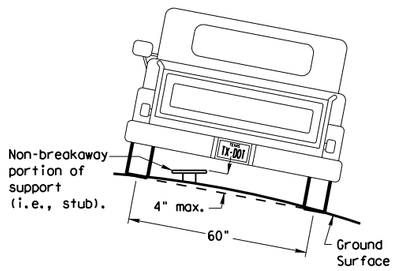
Anchor Type

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-3))

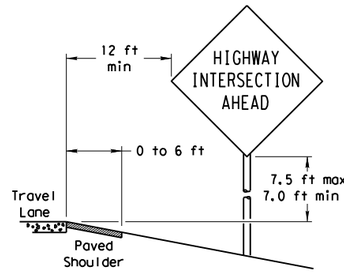
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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).

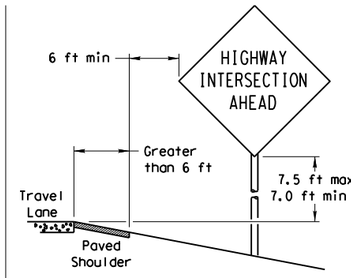
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

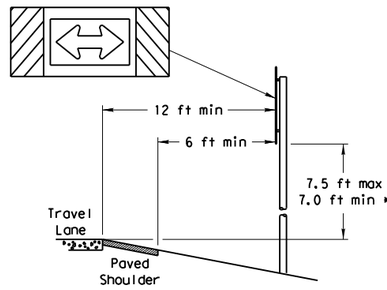
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



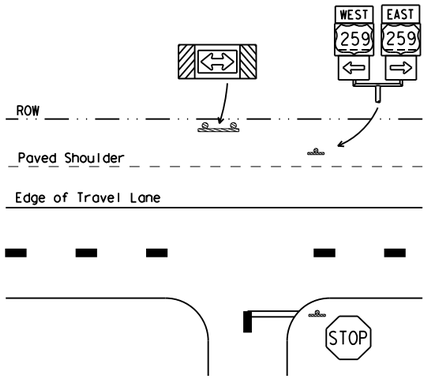
GREATER THAN 6 FT. WIDE

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.

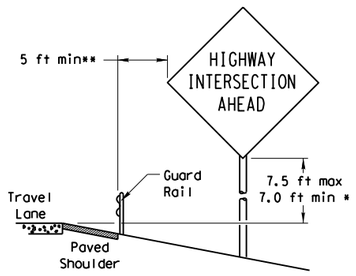
T-INTERSECTION



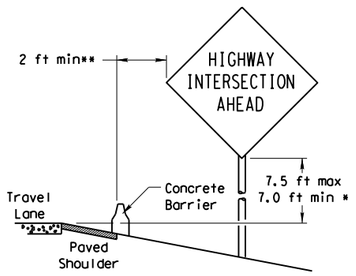
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

* Signs shall be mounted using the following condition that results in the greatest sign elevation:

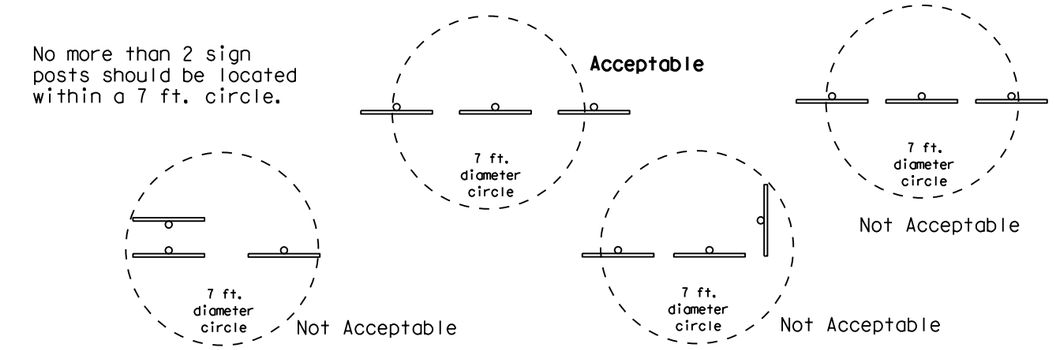
(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

(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.

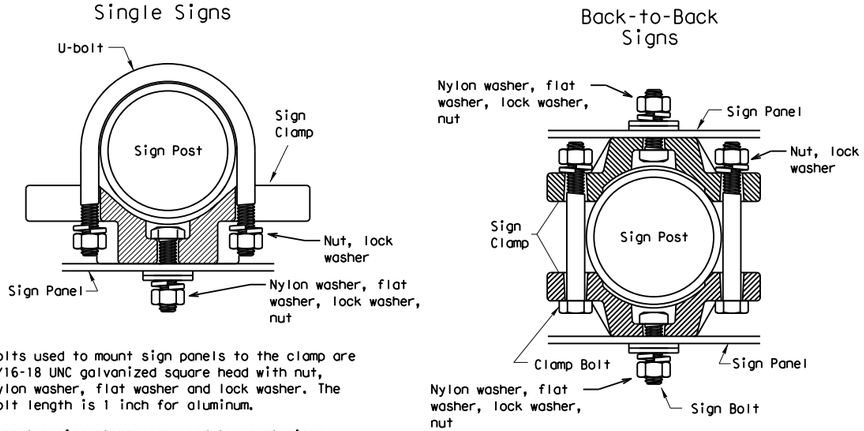
The maximum values may be increased when directed by the Engineer.

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



TYPICAL SIGN ATTACHMENT DETAIL



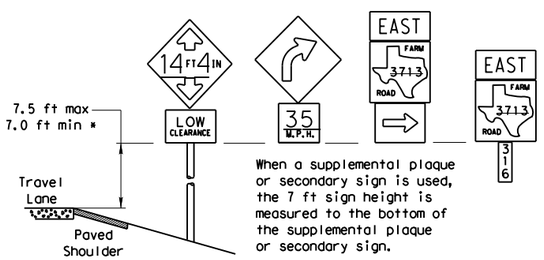
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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.

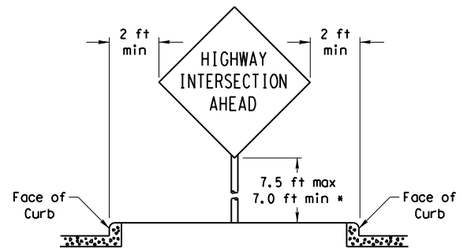
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



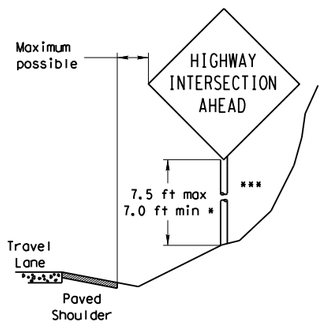
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

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.

Texas Department of Transportation
Traffic Operations Division

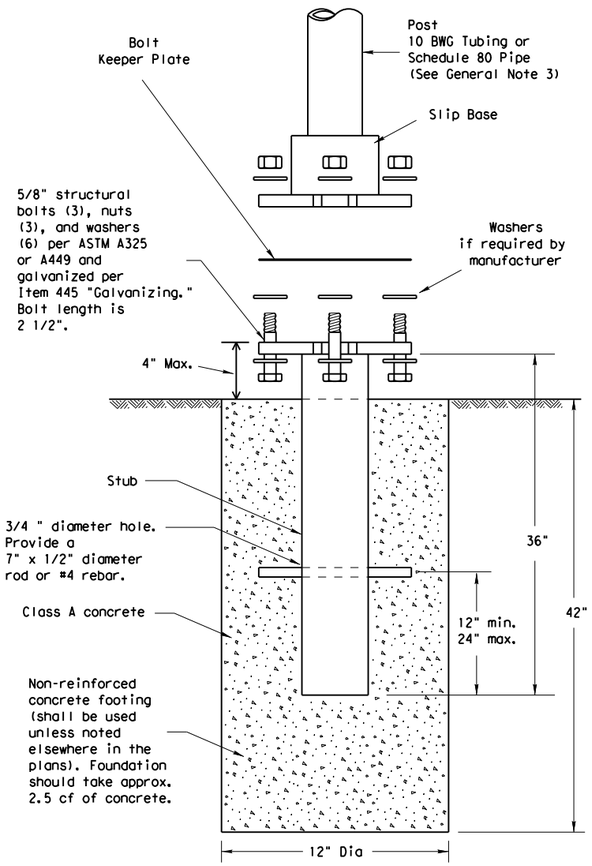
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0002	04	035,ETC.	SH 20
	DIST	COUNTY		SHEET NO.
	ELP	HUDSPETH		91

DATE: 11/1/2023 1:24:14 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/00020403 5/4 - Design/Plan Set/13. Standards/PAVEMENT MARKINGS & DELINEATION STANDARDS/SMD(SLIP-1)-0

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:

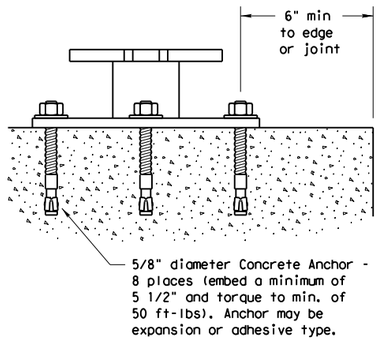
1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   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.

Texas Department of Transportation
Traffic Operations Division

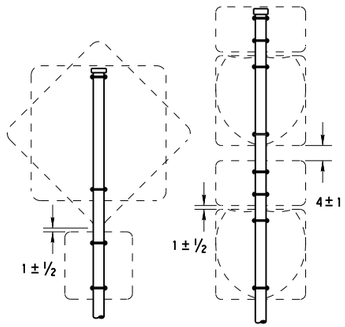
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

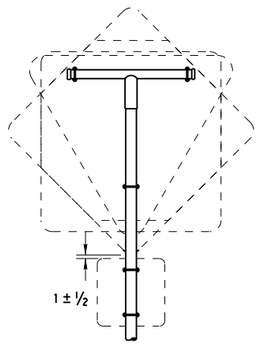
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS 9-08			

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		92

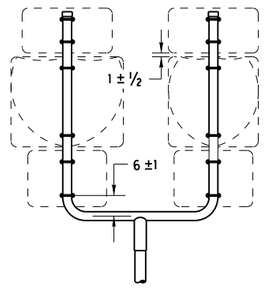
DATE: 11/1/2023 1:24:34 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Plan Set/13. Standards/PAVEMENT MARKINGS & DELINEATION STANDARDS/SMD(SLIP-2



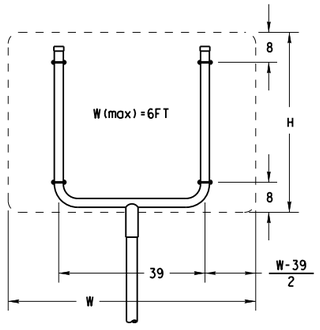
SM RD SGN ASSM TY XXXXX(1)XX(P)



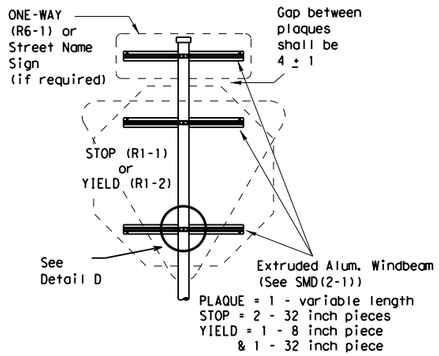
SM RD SGN ASSM TY XXXXX(1)XX(T)



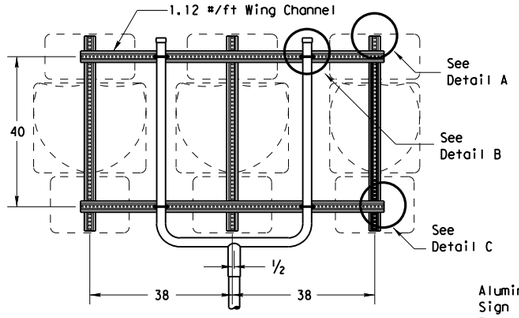
SM RD SGN ASSM TY XXXXX(1)XX(U)



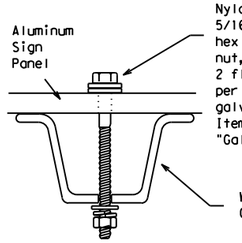
SM RD SGN ASSM TY XXXXX(1)XX(U)



SM RD SGN ASSM TY XXXXX(1)XX(P-BM)

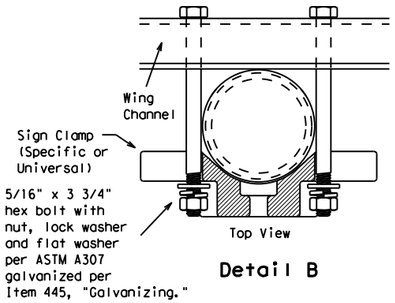


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)



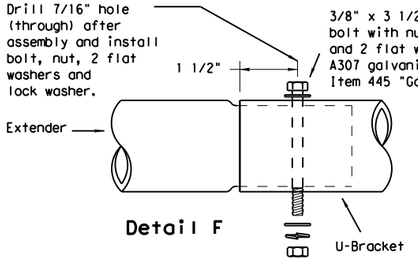
Top View

Detail A



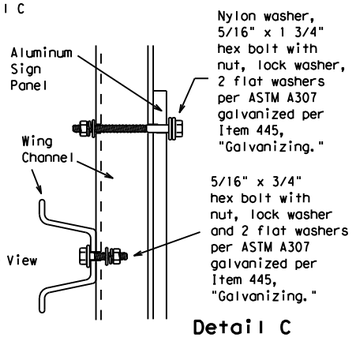
Top View

Detail B

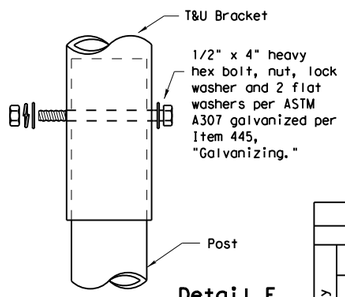


Detail F

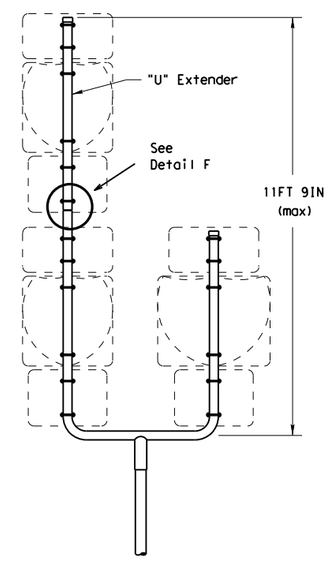
Splices shall only be allowed behind the sign substrate.



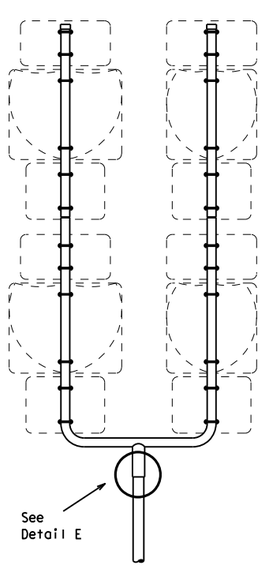
Detail C



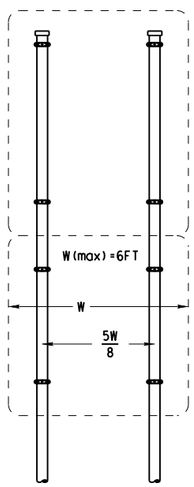
Detail E



SM RD SGN ASSM TY S80(1)XX(U-1EXT)

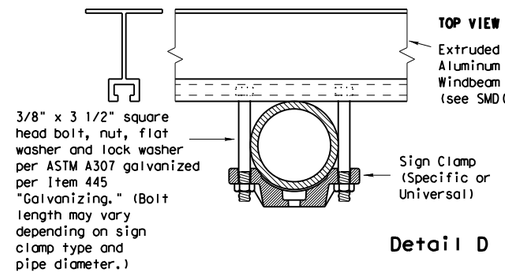


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

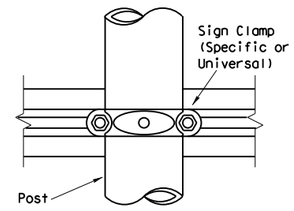


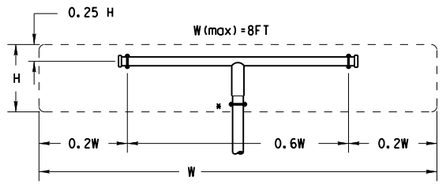
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

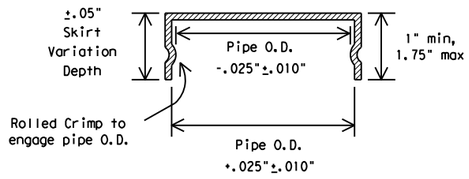




SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

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

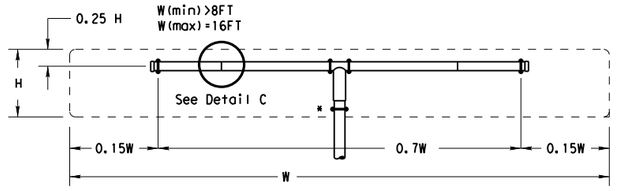
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

9-08 REVISIONS

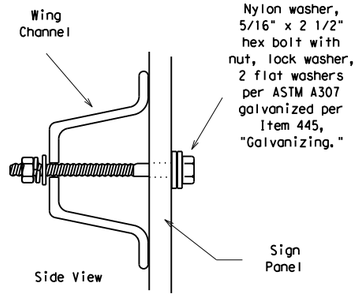
CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20

DIST	COUNTY	SHEET NO.
ELP	HUDSPETH	93

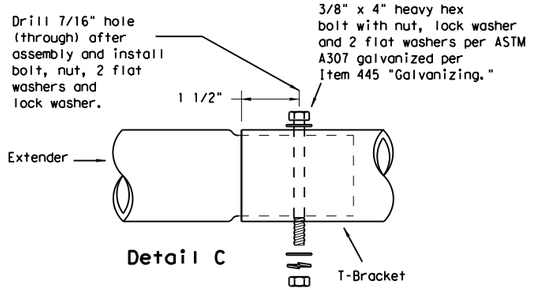
DATE: 11/1/2023 1:24:51 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/00020403 5/4 - Design/Plan Set/13. Standards/PAVEMENT MARKINGS & DELINEATION STANDARDS/SMD(SLIP-3)-0



SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



Detail B



Detail C

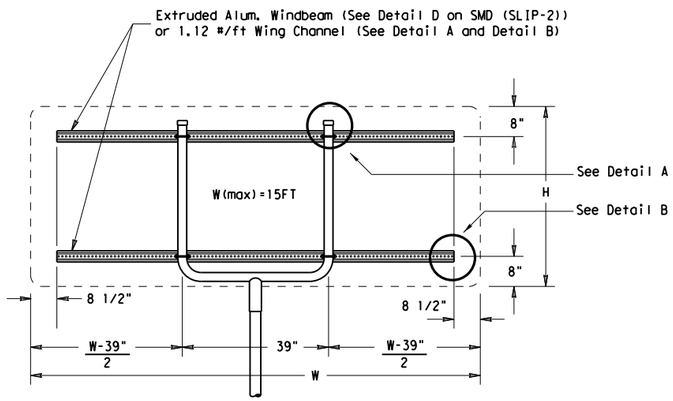
Splices shall only be allowed behind the sign substrate.

GENERAL NOTES:

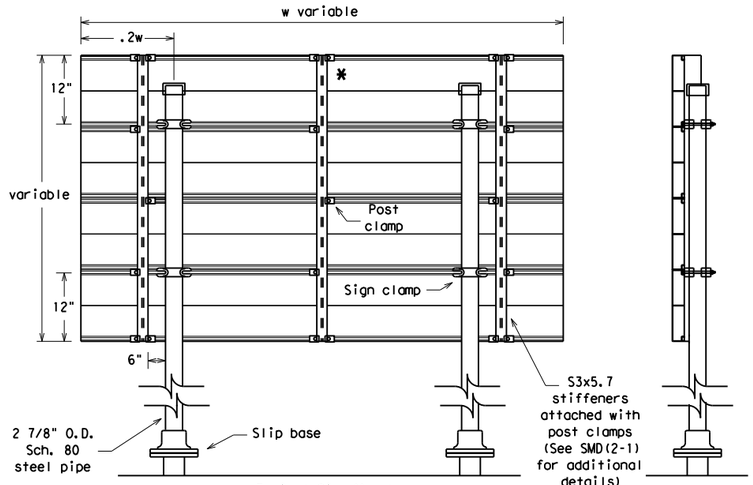
1.

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.



SM RD SGN ASSM TY XXXXX(1)XX(U-XX)

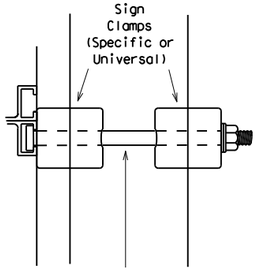


Typical Sign Mount

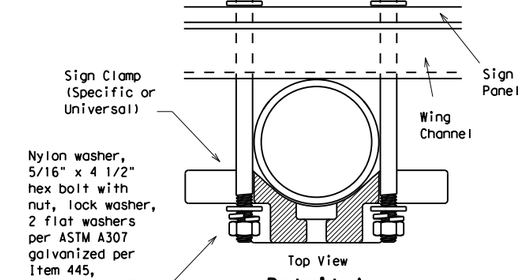
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

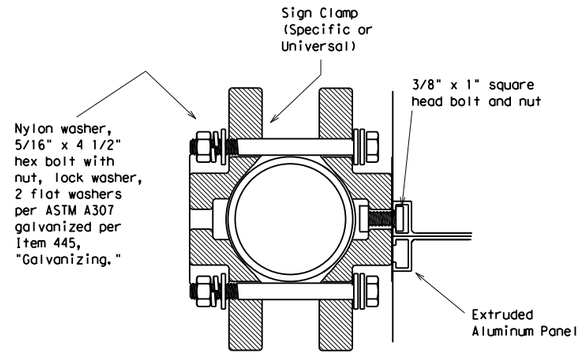
See Detail E
for clamp installation



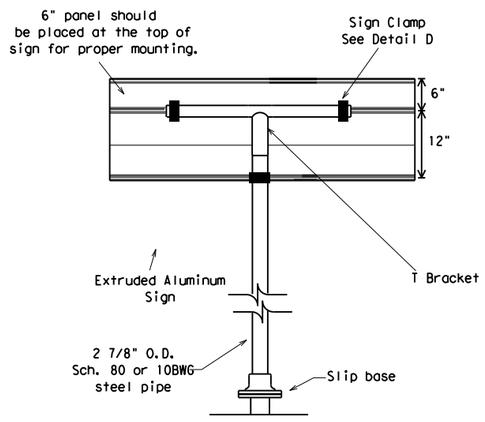
Detail E



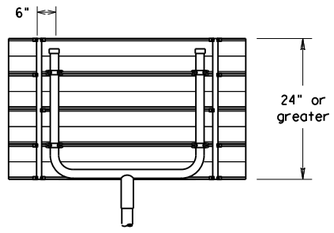
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET



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

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

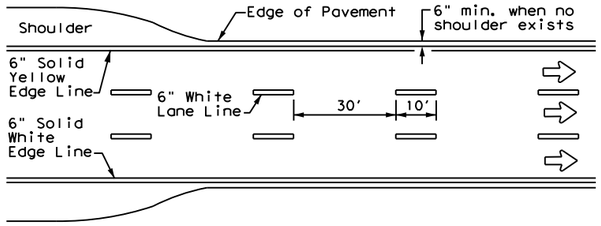
SMD(SLIP-3)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

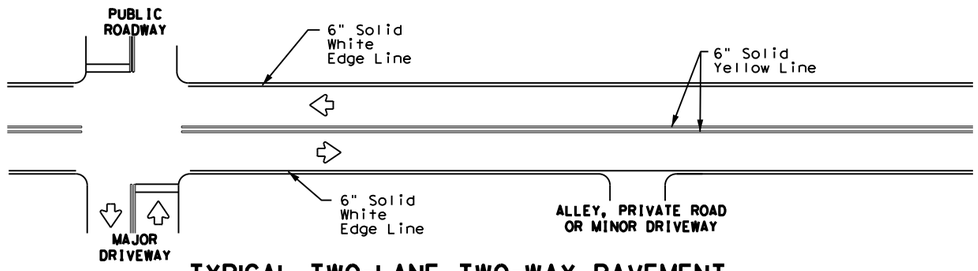
CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20

DIST	COUNTY	SHEET NO.
ELP	HUDSPETH	94

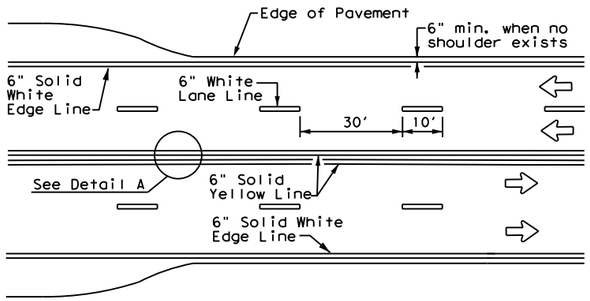
REVISIONS
9-08

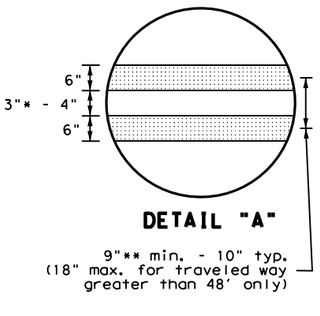


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

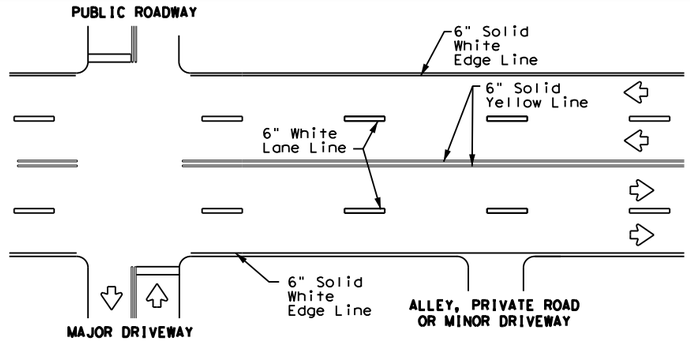




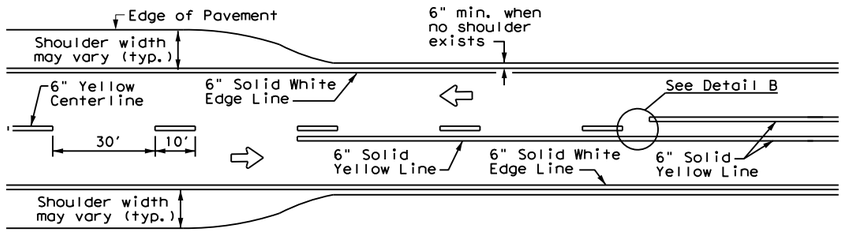
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

* 2" minimum for restripe projects when approved by the Engineer.

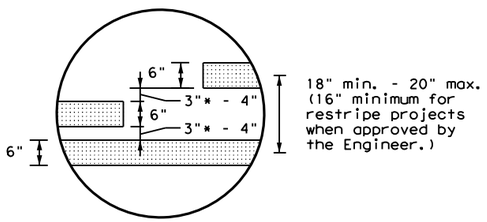
** 8" minimum for restripe projects when approved by the Engineer.



TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

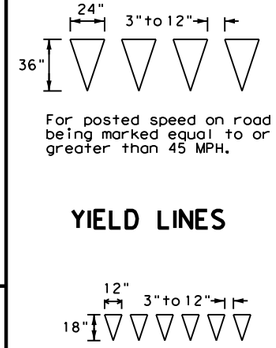


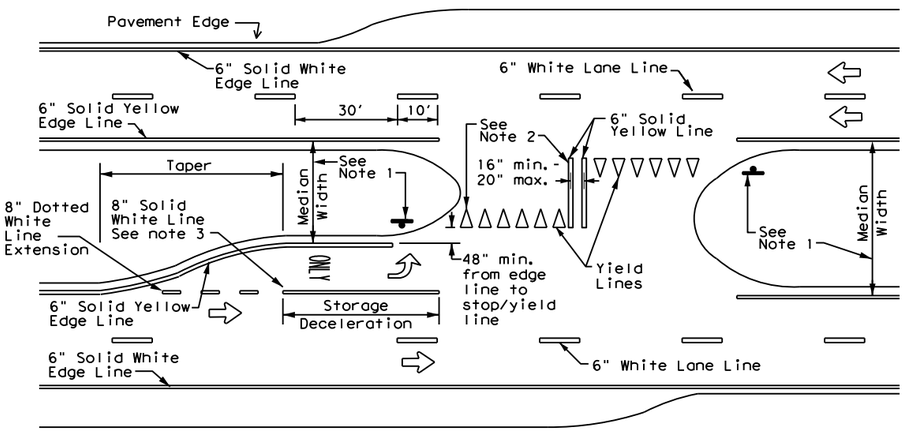
TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



DETAIL "B"

* 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

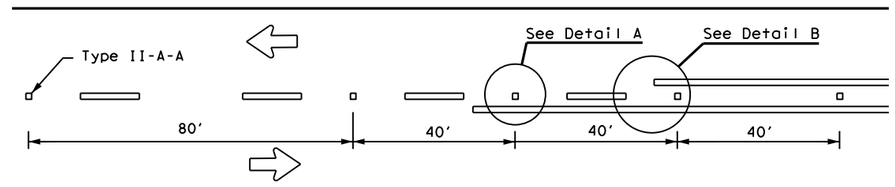
PM(1)-22

FILE: pm1-22.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 11-78 8-00 6-20		04	035, ETC.	SH 20
8-95 3-03 12-22	DIST	COUNTY		SHEET NO.
5-00 2-12	ELP	HUDSPETH		95

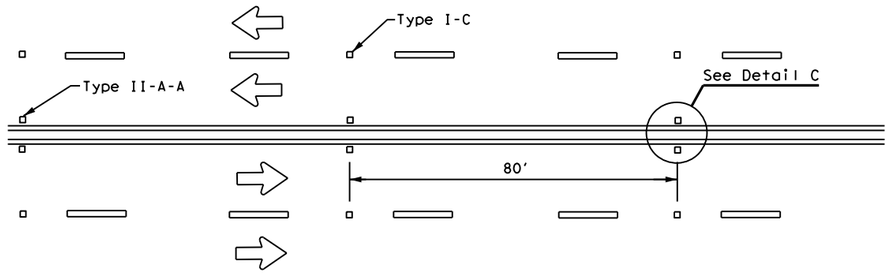
22A

DATE:
FILE:

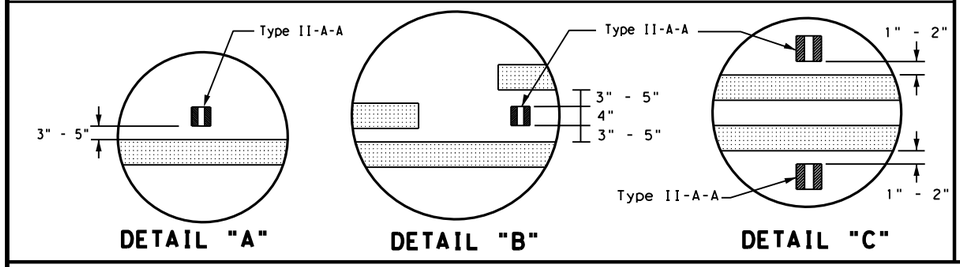
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



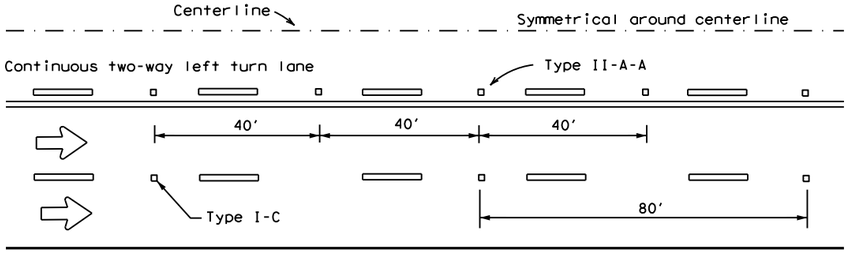
CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS



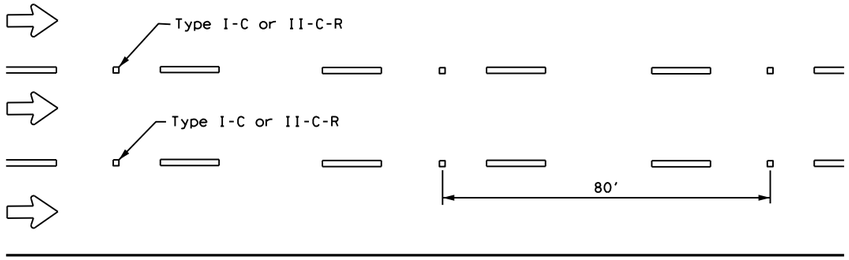
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS



DETAIL "A" **DETAIL "B"** **DETAIL "C"**



CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



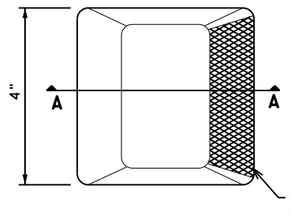
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

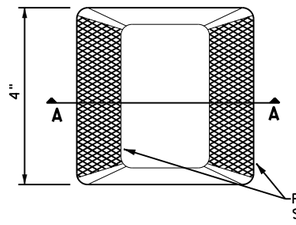
See Note 3.

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

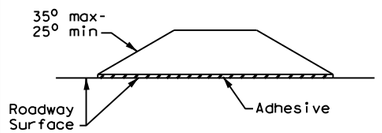
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

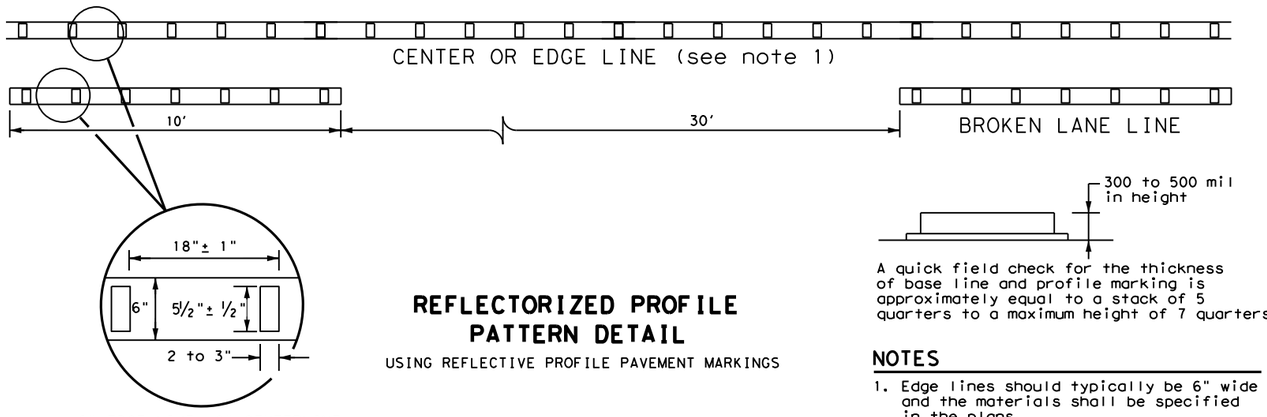


Type II (Top View)



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

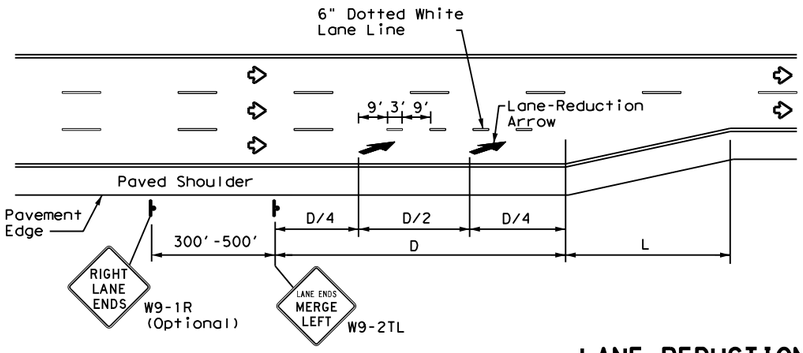
Traffic Safety Division Standard

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	0002	04	035,ETC.	SH 20
	DIST	COUNTY		SHEET NO.
	ELP	HUDSPETH		96

22B

DATE:
FILE:



LANE REDUCTION

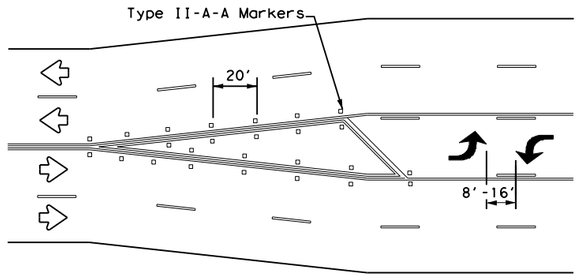
NOTES

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.

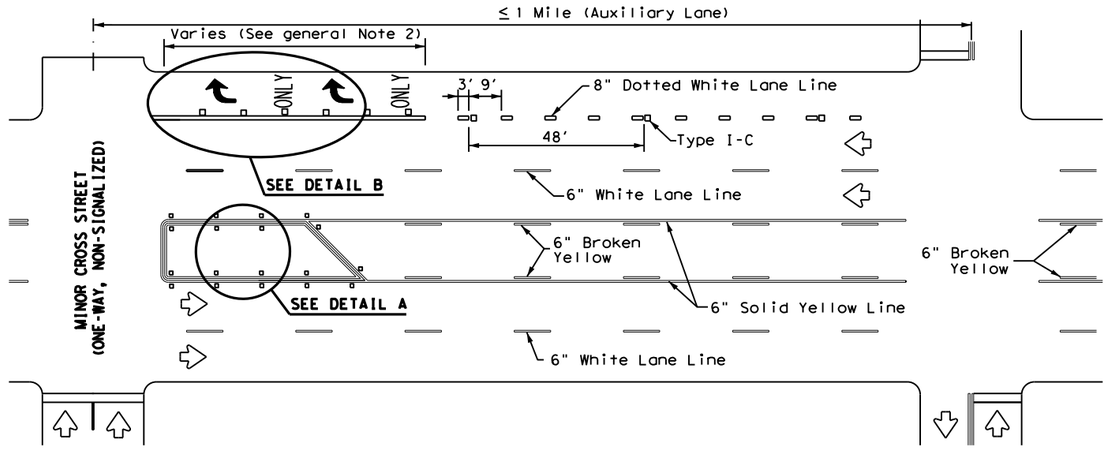


A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

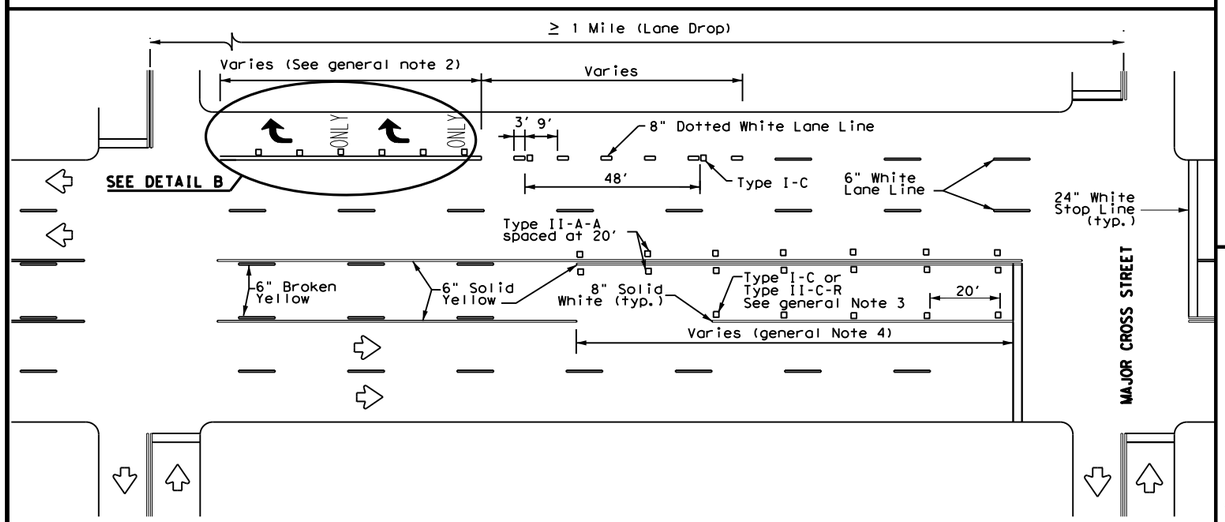
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

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

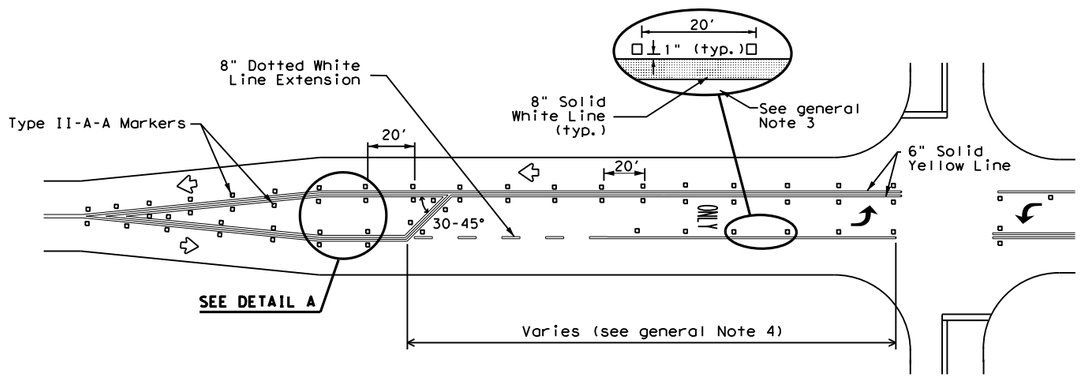
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



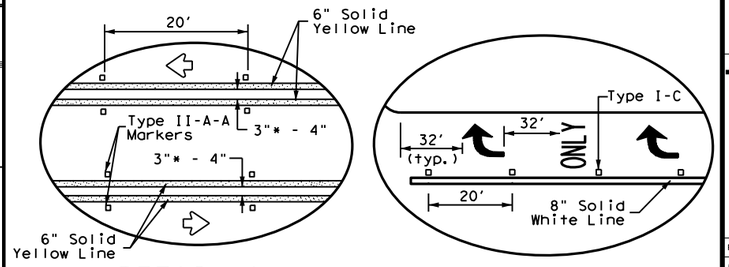
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



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

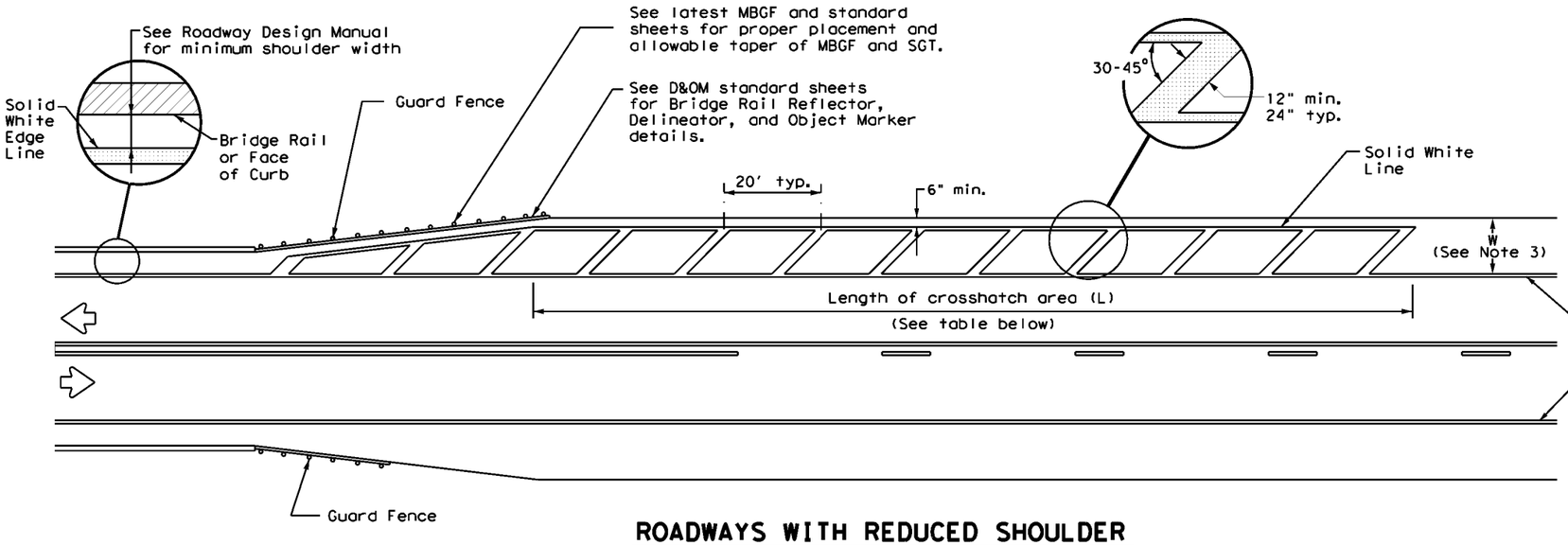
PM(3)-22

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	0002	04	035,ETC.	SH 20
	DIST	COUNTY		SHEET NO.
	ELP	HUDSPETH		97

22C

DATE:
FILE:

DATE: 11/1/2023 1:26:05 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Plan Set/13. Standards/PAVEMENT MARKINGS & DELINEATION STANDARDS/PM(5)-22.dgn



ROADWAYS WITH REDUCED SHOULDER WIDTHS ACROSS BRIDGE OR CULVERT

CROSSHATCH LENGTH (L)	
Posted Speed (MPH)	L (ft)
30	300 ft
35	
40	
45	
50	500 ft
55	
60	
65	
70	
75	

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 4 inches from the bridge rail or face of curb or 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions.
2. No-passing zone on bridge approach is optional. If used, the no-passing zone shall be a minimum 500 feet long from the beginning of the bridge.
3. The crosshatching should be required if the shoulder width in advance of the bridge is 4 feet or wider and a reduction of at least 3 feet in shoulder width across the bridge occurs.
4. On divided highways, review both the right and left shoulder widths for the need for narrow bridge pavement markings.

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.

Texas Department of Transportation

Traffic Safety Division Standard

PAVEMENT MARKINGS FOR ROADWAYS WITH REDUCED SHOULDER WIDTHS ACROSS BRIDGE OR CULVERT

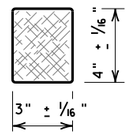
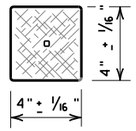
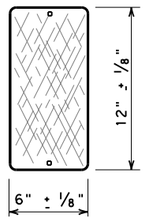
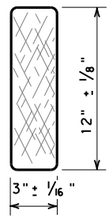
PM(5)-22

FILE: pm5-22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035,ETC.	SH 20
	DIST	COUNTY		SHEET NO.
	ELP	HUDSPETH		98

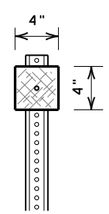
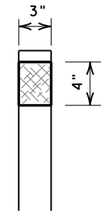
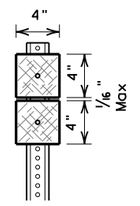
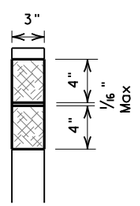
22E

DATE: 11/1/2023 1:26:24 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/000204035/4 - Design/Plan Set/13. Standards/PAVEMENT MARKINGS & DELINEATION STANDARDS/D&OM (1)-20.dgn

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

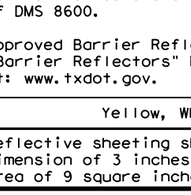
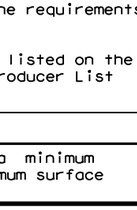
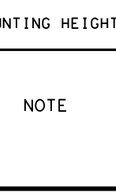
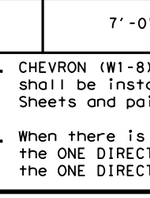
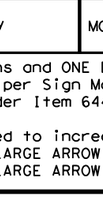
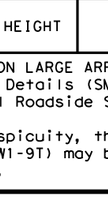
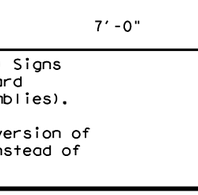
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

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

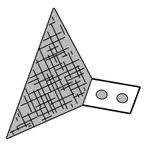
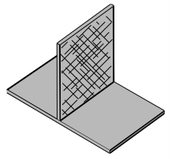
OBJECT MARKERS

	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

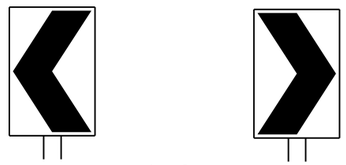
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

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



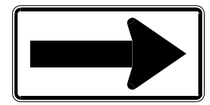
W1-8

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



W1-6

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	0002	04	035,ETC.	SH 20
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	ELP	HUDSPETH		99

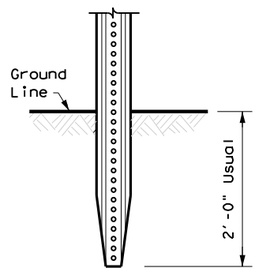
20A

DATE: 11/1/2023 1:26:41 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/000204035/4 - Design/Plan Set/13. Standards/PAVEMENT MARKINGS & DELINEATION STANDARDS/D&OM (2)-20.dgn

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

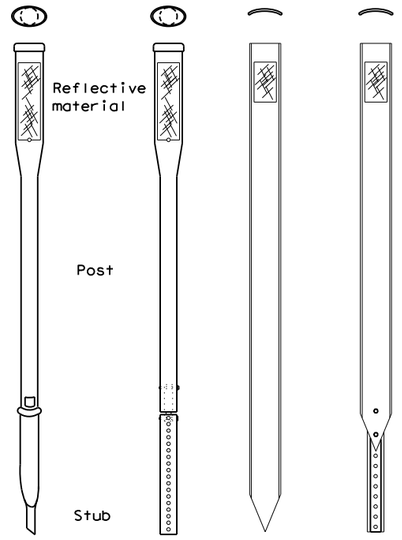


NOTES

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.

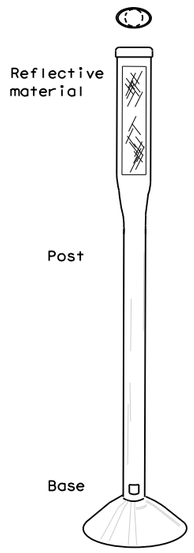
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



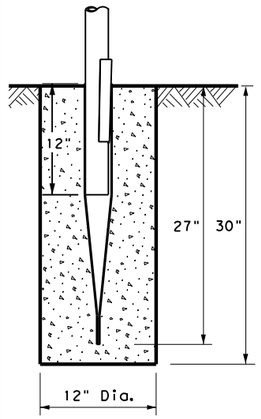
SURFACE MOUNT

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.

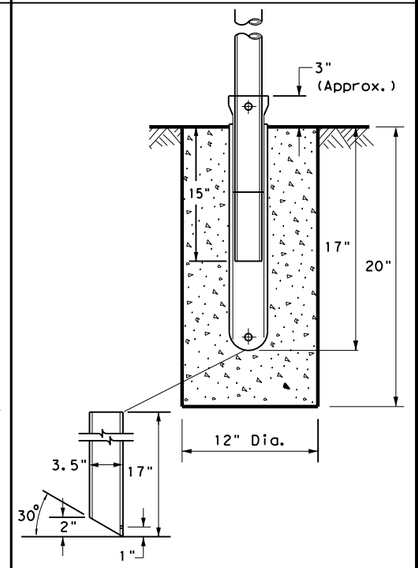
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

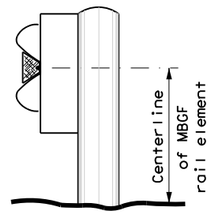
NOTE

1. Install per manufacturer's recommendations.

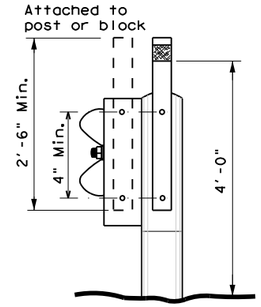
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

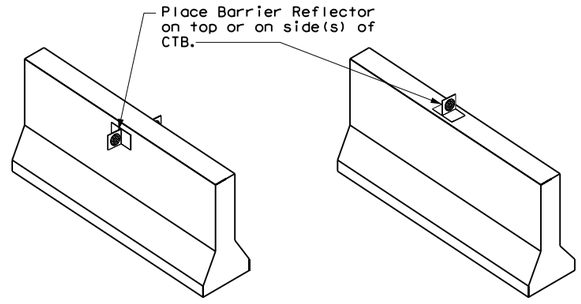
GF1



GF2



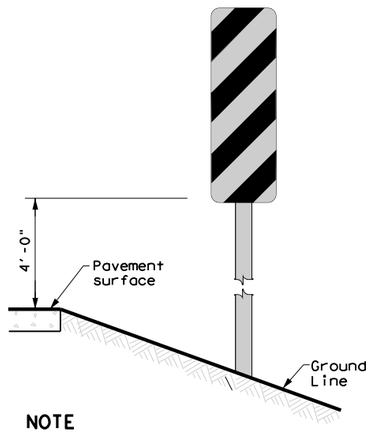
CONCRETE TRAFFIC BARRIER (CTB)



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.

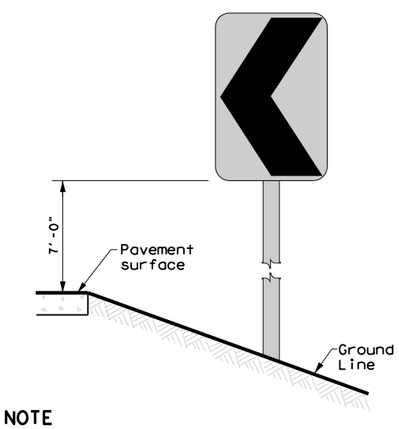
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

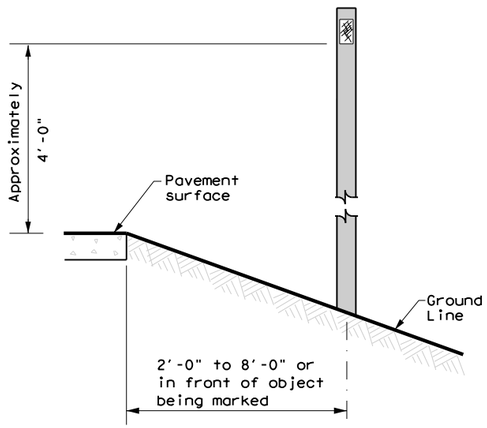
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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	0002	04	035,ETC.	SH 20
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	ELP	HUDSPETH		100

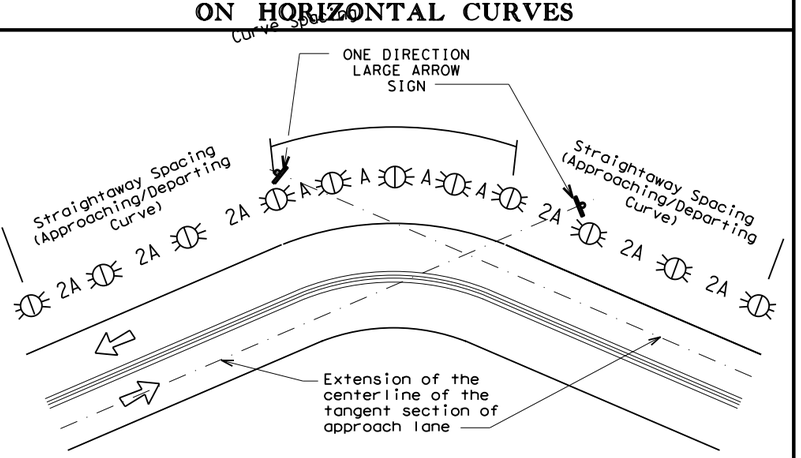
20B

DATE: 11/1/2023 1:27:04 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Plan Set/13. Standards/PAVEMENT MARKINGS & DELINEATION STANDARDS/D&OM (3)-20.dgn

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

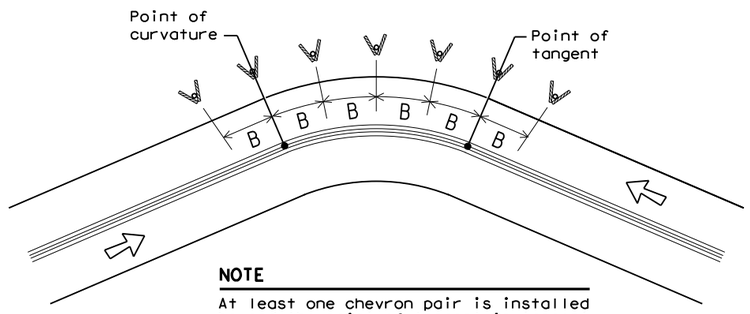
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
		A	2A	B
1	5730	225	450	—
2	2865	160	320	—
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp.Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete)and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100'max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100'max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND	
	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

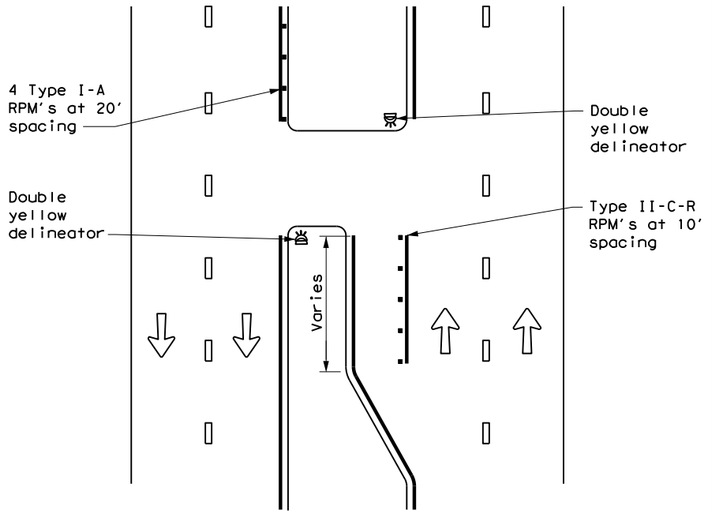
D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035,ETC.	SH 20
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	ELP	HUDSPETH		101

20C

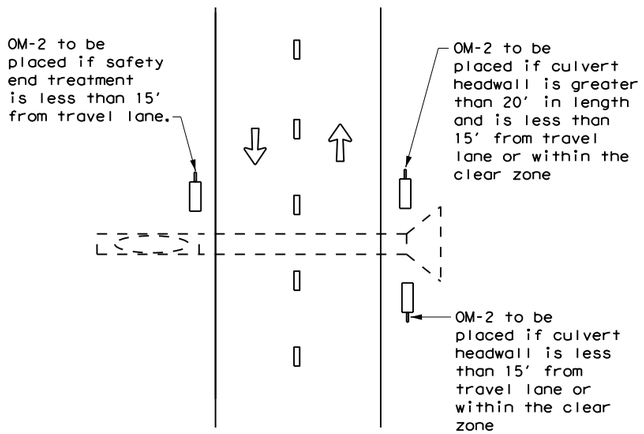
DATE: 11/1/2023 1:27:21 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/000204035/4 - Design/Plan Set/13. Standards/PAVEMENT MARKINGS & DELINEATION STANDARDS/D&OM (4)-20.dgn

CROSSOVERS



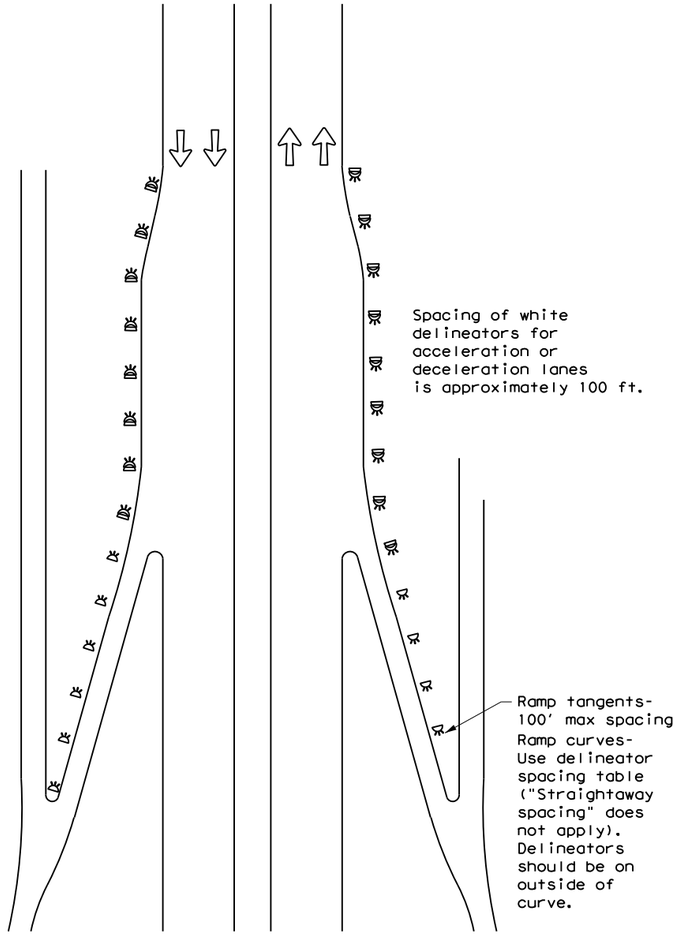
DETAIL 1

FOR CULVERTS WITHOUT MBGF



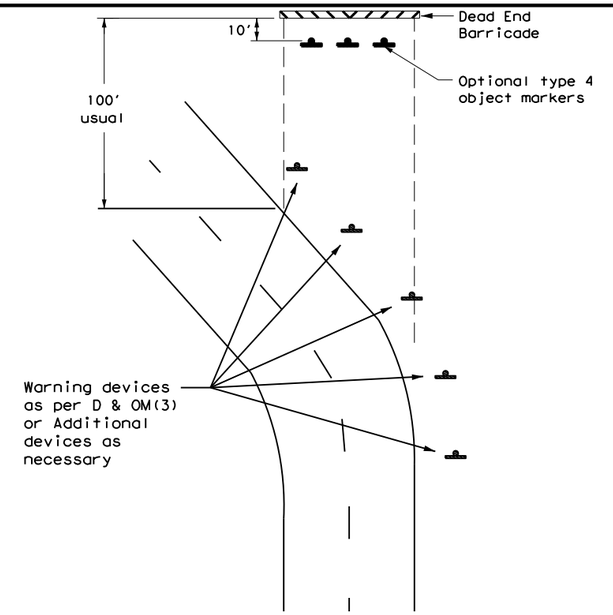
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



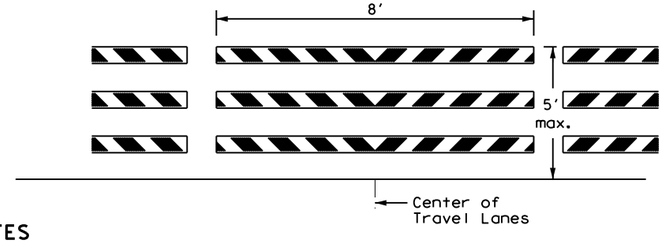
DETAIL 3

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

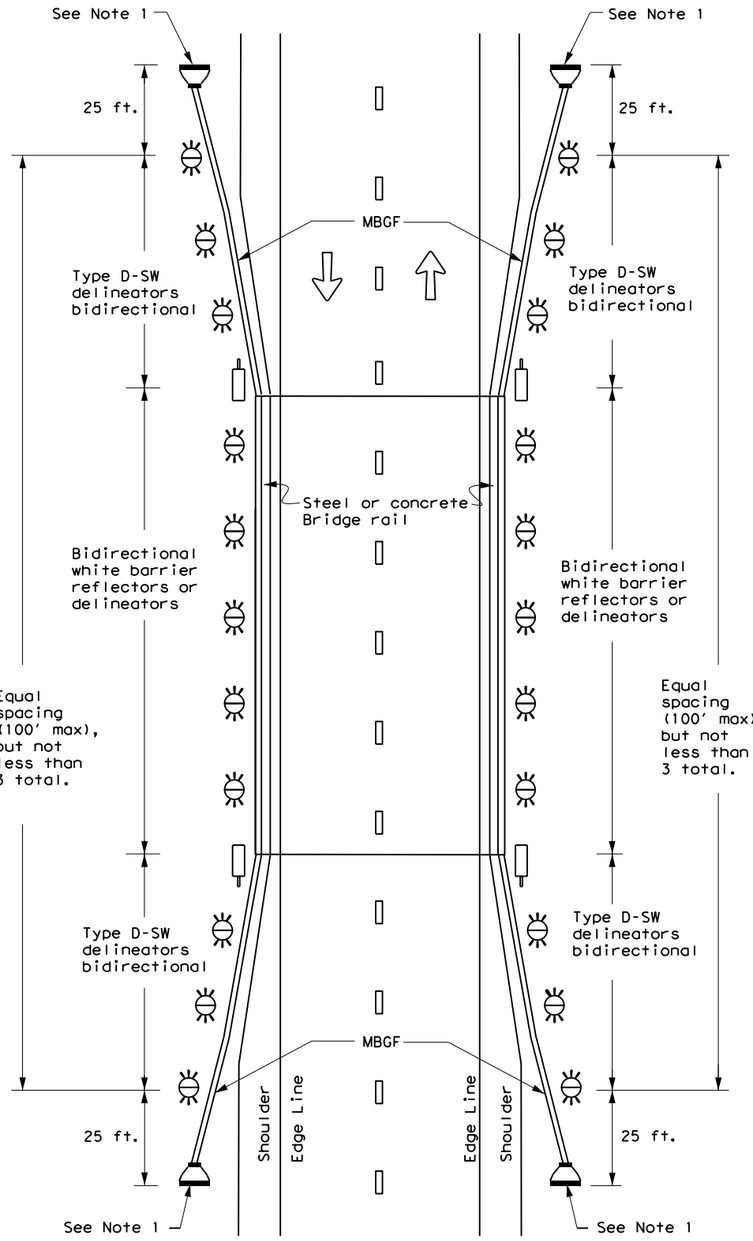
D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035,ETC.	SH 20
3-15	DIST	COUNTY		SHEET NO.
7-20	ELP	HUDSPETH		102

20D

DATE: 11/1/2023 1:27:39 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/000204035/4 - Design/Plan Set/13. Standards/PAVEMENT MARKINGS & DELINEATION STANDARDS/D&OM(5)-20

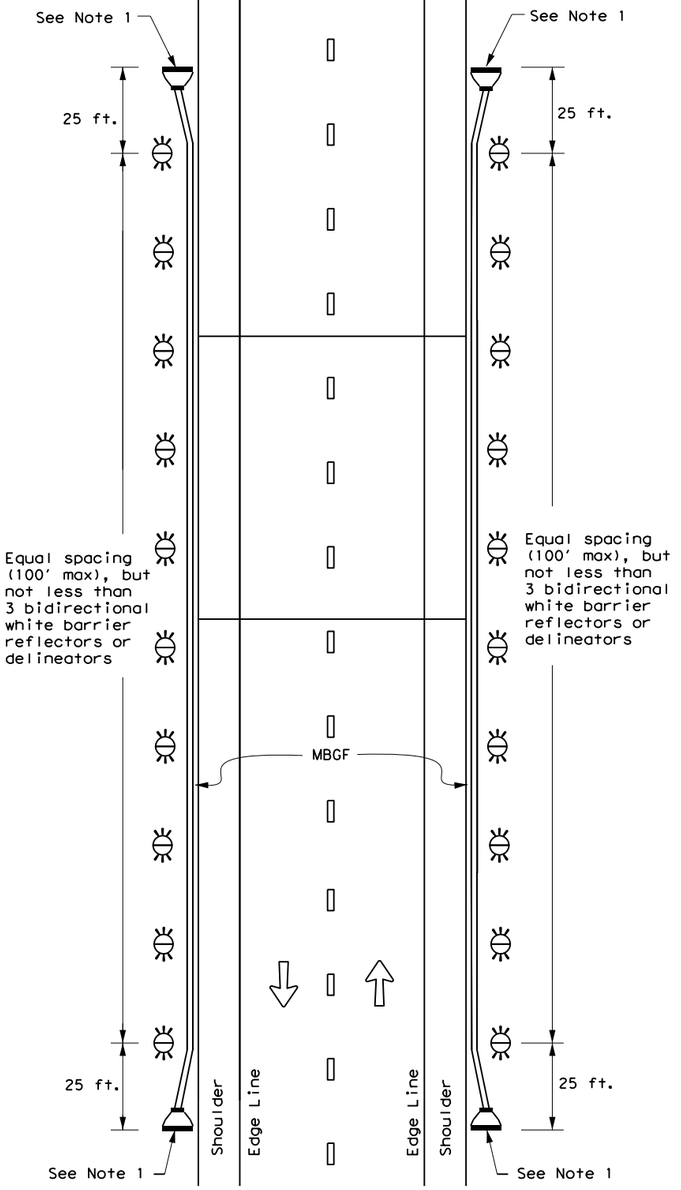
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

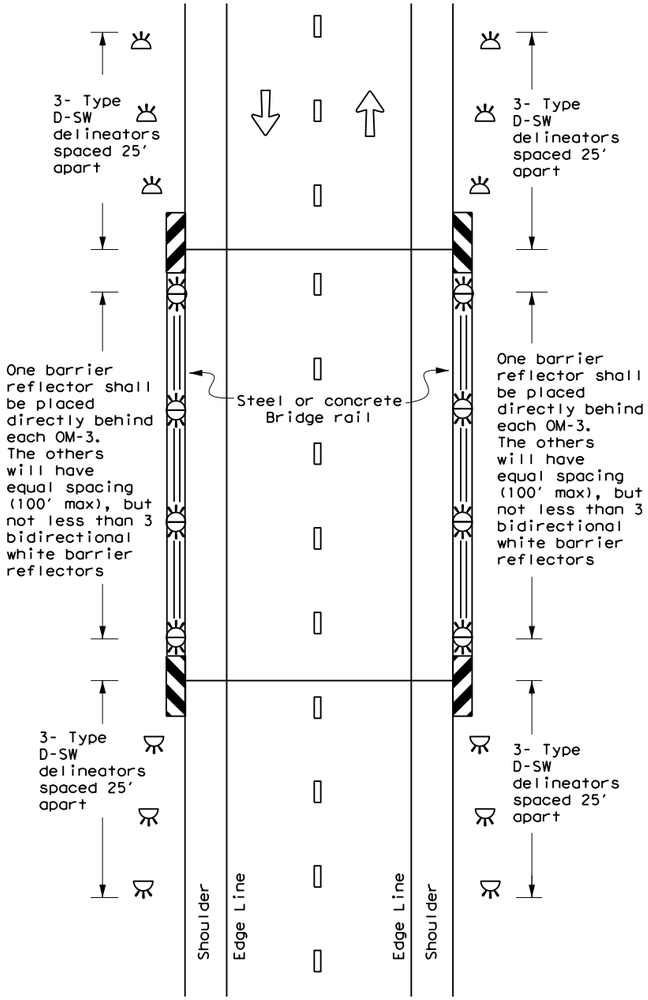
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

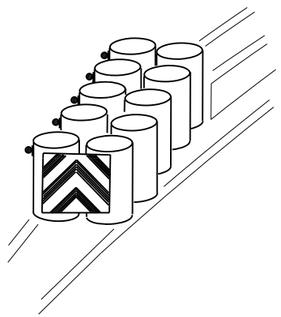
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

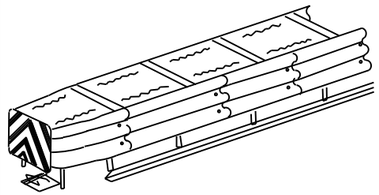
D & OM(5)-20

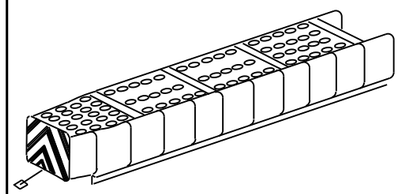
FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035, ETC.	SH 20
7-20	DIST	COUNTY		SHEET NO.
	ELP	HUDSPETH		103

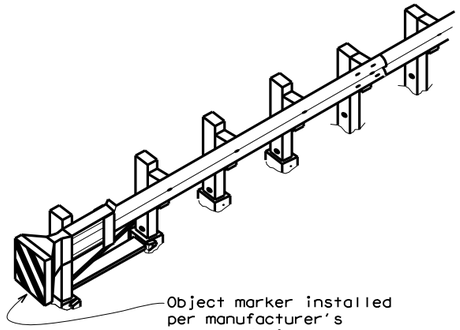
20E

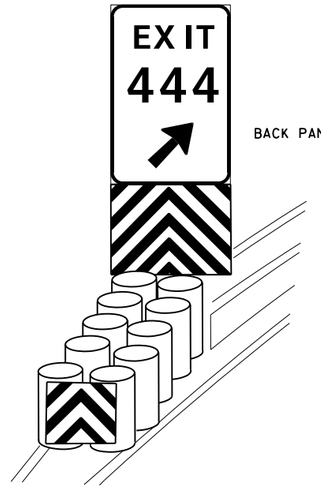
DATE: 11/1/2023 1:27:57 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/00020403 5/4 - Design/Plan Set/13. Standards/PAVEMENT MARKINGS & DELINEATION STANDARDS/D&OM (VIA)-20

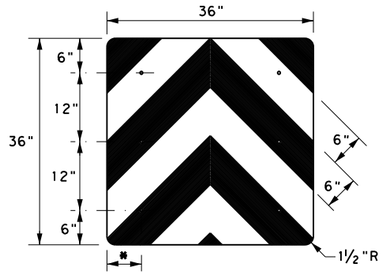


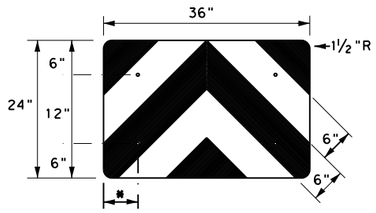




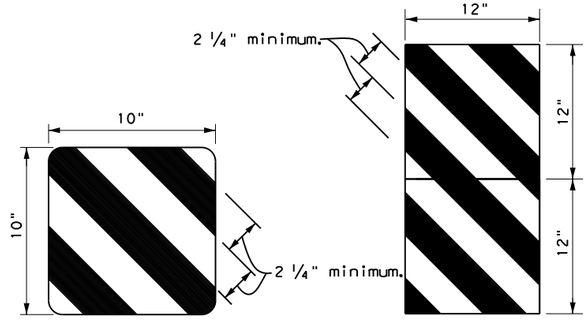




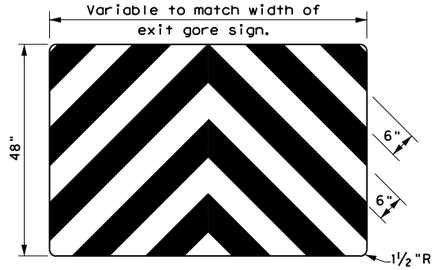


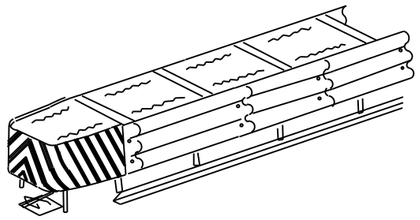


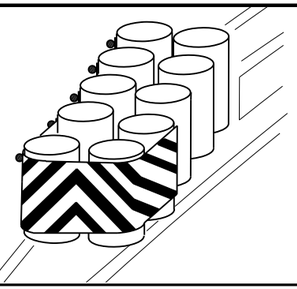
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

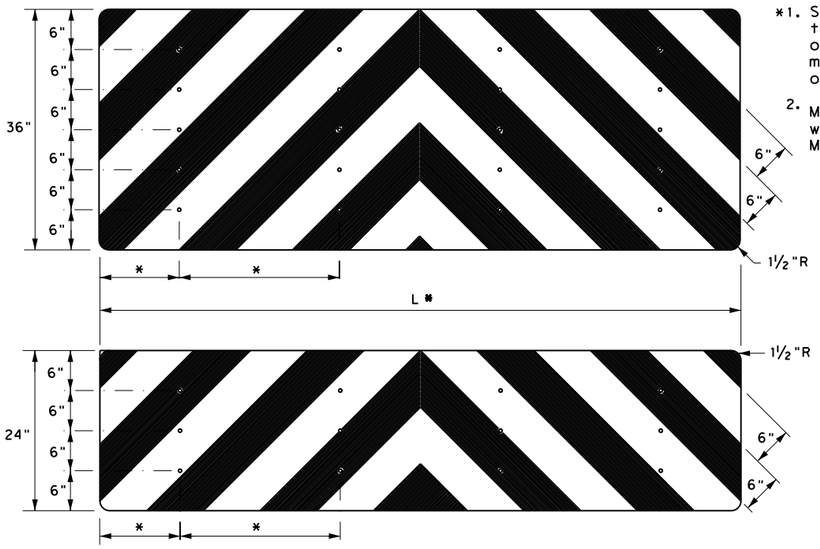


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation

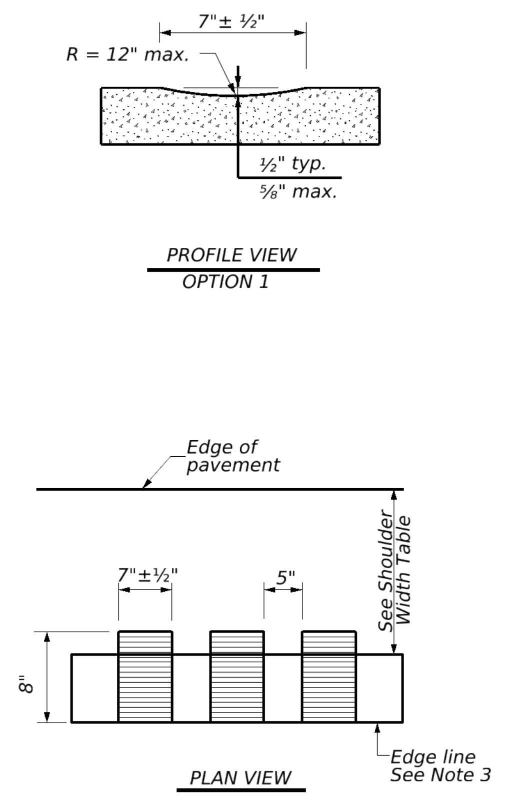
Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

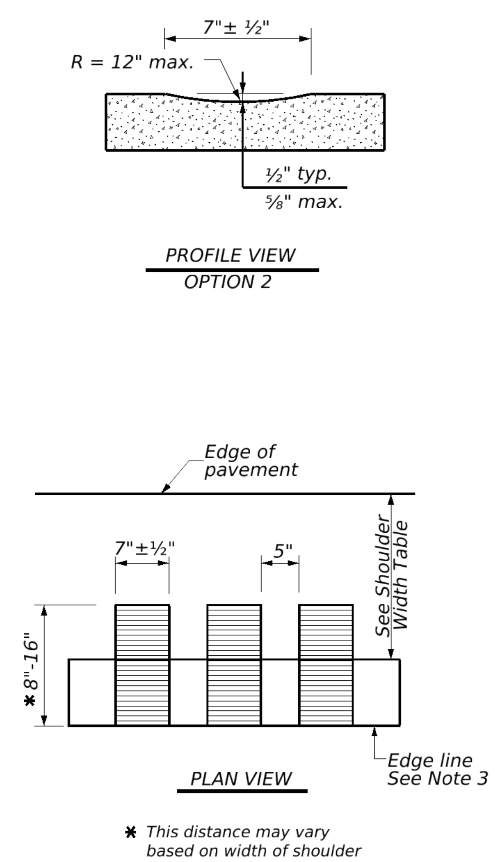
D & OM(VIA)-20

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035,ETC.	SH 20
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	ELP	HUDSPETH		104
4-98 7-20				

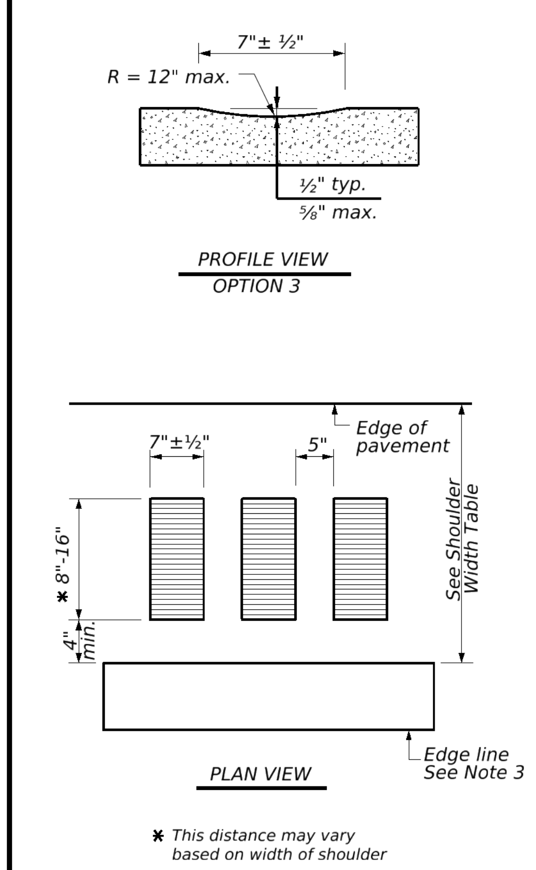
20G



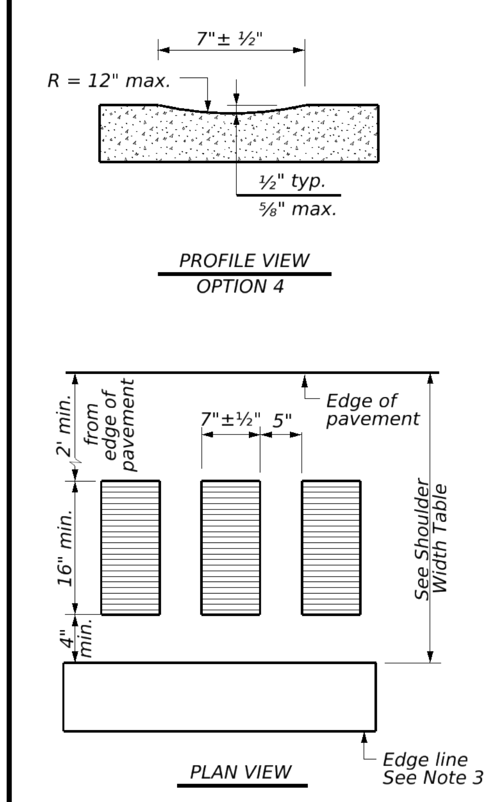
CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



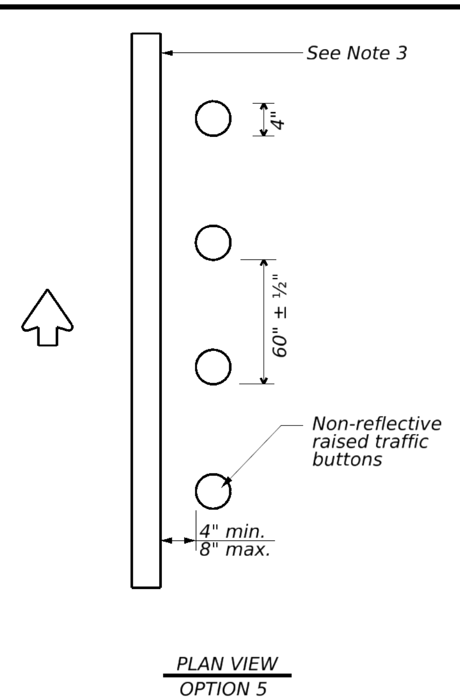
CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



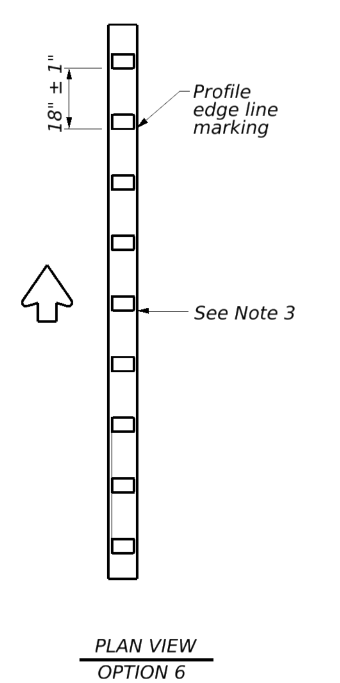
CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



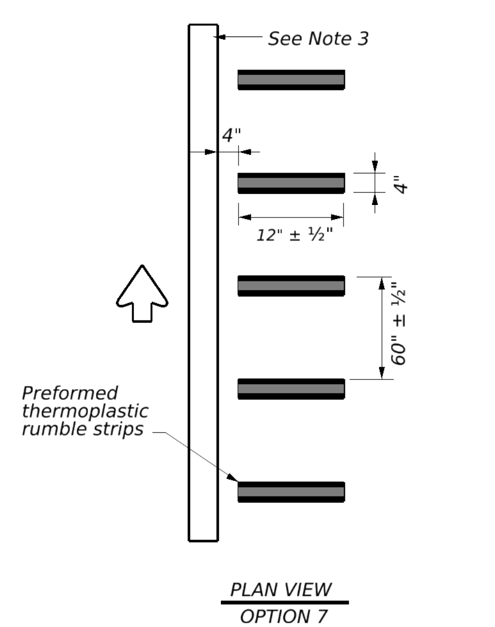
CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



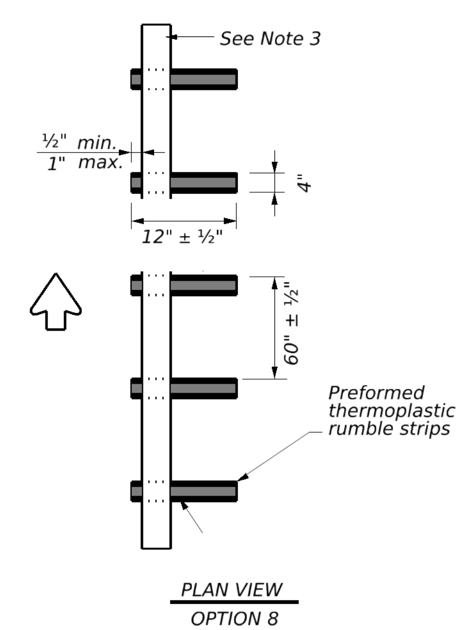
RAISED EDGE LINE (Rumble Strips)



PROFILE EDGE LINE MARKINGS (Rumble Strips)



PREFORMED THERMOPLASTIC EDGE LINE (Rumble Strips)



PREFORMED THERMOPLASTIC EDGE LINE (Rumble Strips)

SHOULDER WIDTH TABLE		
EQUAL TO OR LESS THAN 2 FEET	GREATER THAN 2 FEET LESS THAN 4 FEET	EQUAL TO OR GREATER THAN 4 FEET
Option 1, 5, 6 or 8	Option 1, 2, 3 5, 6 or 7	Option 2, 4, 5 6 or 7

GENERAL NOTES

1. Rumble strips and profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
2. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
3. Use Standard Sheet PM(2) and FPM(1) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
4. See the Shoulder Width Table below for determining what options may be used for edge line rumble strips.
5. Breaks in edge line rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections, or driveways with high usage of large trucks when installed on conventional highways.
6. Rumble strips shall not be placed across exit or entrance ramps, acceleration or deceleration lanes, crossovers, gore areas, or intersections with other roadways.
7. Consideration should be given to noise levels when edgeline rumble strips are to be installed near residential areas, schools, churches, etc. A 3/8 inch deep (minimum) milled rumble strip may be considered in these areas.
8. Consideration shall be given to bicyclists. See RS(6).

WHEN INSTALLING MILLED DEPRESSION EDGE LINE RUMBLE STRIPS:

9. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Safety Division.
10. Pavement markings can be applied over milled shoulder rumble strips to create an edge line rumble strip.

WHEN INSTALLING RAISED OR PROFILE EDGE LINE RUMBLE STRIPS:

11. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per the manufacturer's recommendations.
12. Non-reflective traffic buttons shall be placed adjacent to the pavement marking delineating the edge line when used as a rumble strip. The color of the button should match the color of the adjacent edge line marking (white or yellow). The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
13. Non-reflective traffic buttons shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
14. The minimum distance between the edge line and the buttons should be used if the shoulder is less than 8 feet in width.
15. Raised profile thermoplastic markings used as edge lines may substitute for buttons.

Texas Department of Transportation

Traffic Safety Division Standard

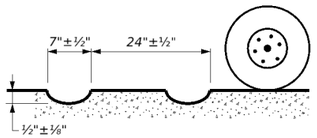
EDGE LINE RUMBLE STRIPS ON UNDIVIDED OR TWO LANE HIGHWAYS

RS(2)-23

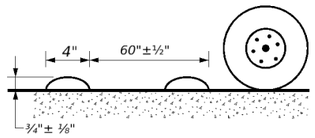
FILE: rs(2)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-13 1-23	0002	04	035,ETC.	SH 20
	DIST		COUNTY	SHEET NO.
	ELP		HUDSPETH	105

DATE: 2024 1:28:43 PM
FILE: DGN: C:\Projectwiseonline.com:TXDOT5\Documents\24 - ELP\Design Projects\0002040035\24 - Design\PIC Set\13. Standards\PAVEMENT MARKINGS & DELINEATION STANDARDS\RS (4)-23.dgn

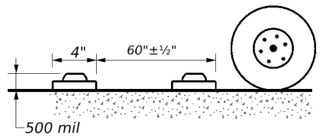
CENTERLINE RUMBLE STRIPS



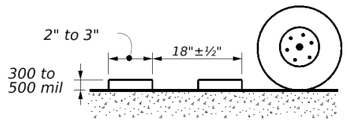
PROFILE VIEW



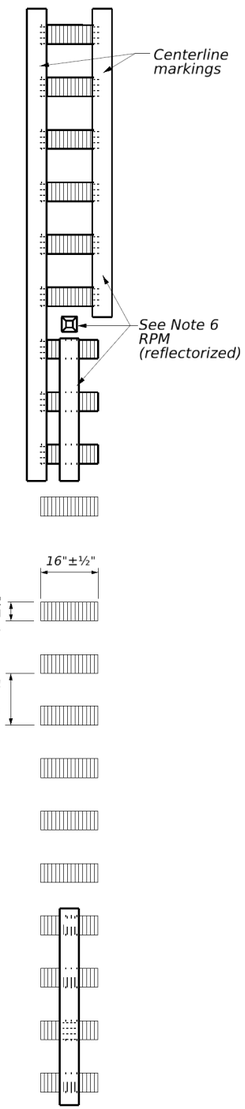
PROFILE VIEW



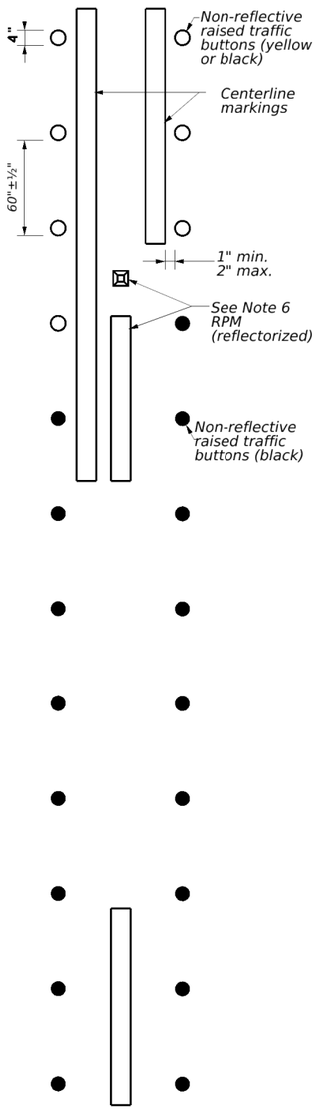
PROFILE VIEW



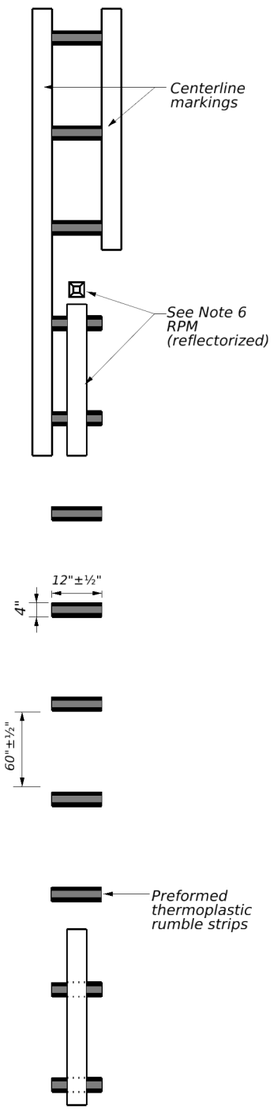
PROFILE VIEW



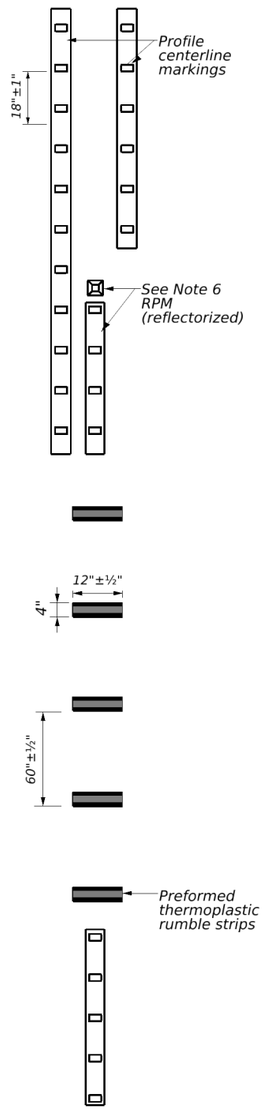
PLAN VIEW
OPTION 1



PLAN VIEW
OPTION 2



PLAN VIEW
OPTION 3



PLAN VIEW
OPTION 4

TWO LANE TWO-WAY HIGHWAYS

MILLED CENTERLINE RUMBLE STRIPS

RAISED CENTERLINE RUMBLE STRIPS

PREFORMED THERMOPLASTIC RUMBLE STRIPS

PROFILE CENTERLINE MARKINGS AND PREFORMED THERMOPLASTIC RUMBLE STRIPS

GENERAL NOTES

1. This standard sheet provides guidelines for installing centerline rumble strips on two-lane highways with or without shoulders.
2. Centerline and edge line rumble strips or profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
3. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
4. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Safety Division.
5. Breaks in milled centerline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections or driveways with high usage of large trucks.
6. Use standard sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings and profile markings.
7. Consideration should be given to noise levels when centerline rumble strips are to be installed near residential areas, schools, churches, etc. A 3/8 inch deep (minimum) milled rumble strip may be considered in these areas.
8. Pavement markings must be applied over milled centerline rumble strips.

WHEN INSTALLING CENTERLINE RUMBLE STRIPS:

9. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per manufacturer's recommendations.
10. When using non-reflective raised traffic buttons as a centerline rumble strip, the button shall be placed adjacent to the pavement marking delineating the centerline. The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
11. The color of the button should be yellow for a continuous no passing roadway. Black buttons should be used in areas where passing is allowed.
12. Consideration shall be given to bicyclists. See RS(6).

WHEN INSTALLING EDGE LINE RUMBLE STRIPS WITH OR WITHOUT CENTERLINE RUMBLE STRIPS ON UNDIVIDED HIGHWAYS:

13. See standard sheet RS(2).

Texas Department of Transportation

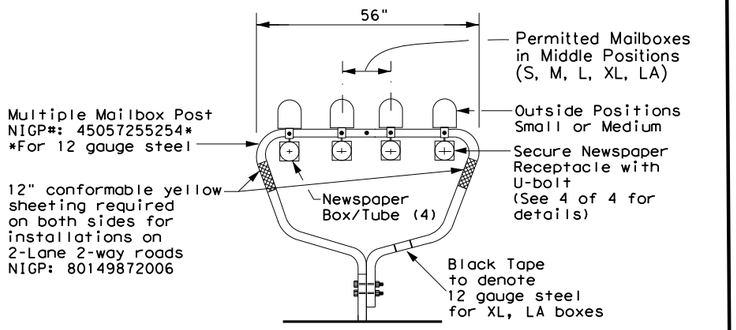
Traffic Safety Division Standard

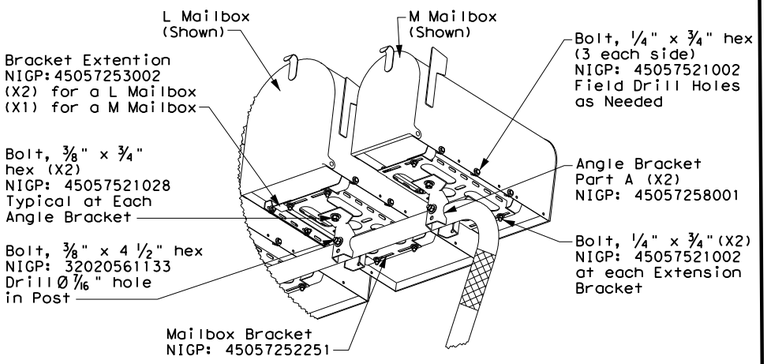
CENTERLINE RUMBLE STRIPS ON TWO LANE TWO-WAY HIGHWAYS RS(4)-23

FILE: rs(4)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0002	04	035,ETC.	SH 20
10-13	DIST	COUNTY		SHEET NO.
1-23	ELP	HUDSPETH		106

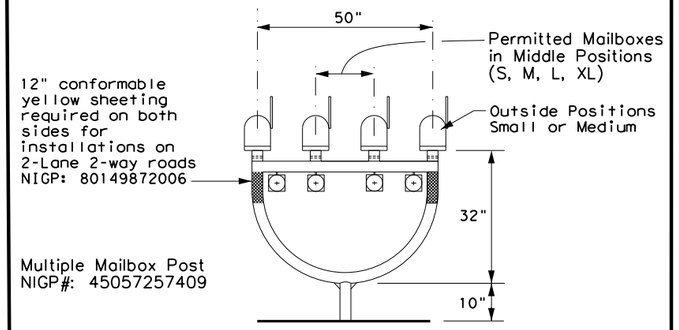
DATE: 11/1/2023 1:29:03 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/000204035/4 - Design/Plan Set/13. Standards/PAVEMENT MARKINGS & DELINEATION STANDARDS/MB (1)-12.dgn

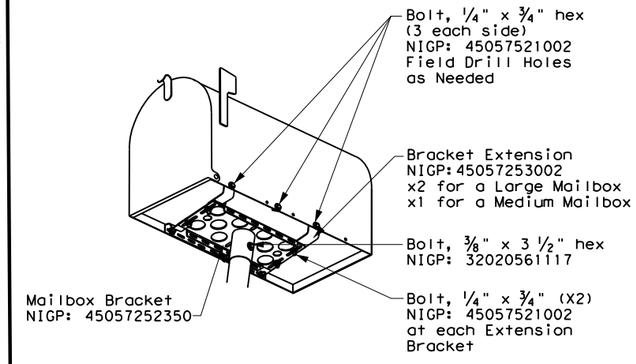
TYPE 1 - MULTIPLE





TYPE 4 - MULTIPLE





MAILBOX SIZES

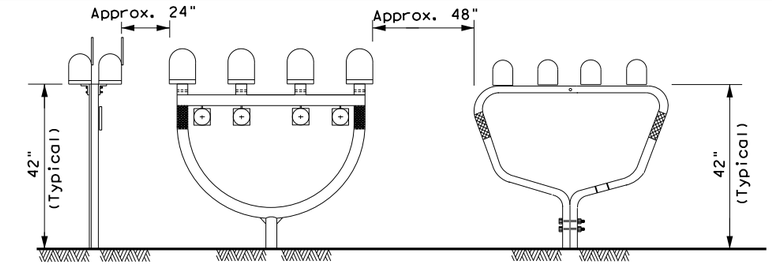
MAILBOX SIZE	TYPICAL DIMENSIONS			MAX **
	LENGTH	WIDTH	HEIGHT	WEIGHT
SMALL	19 1/2"	6"	7"	6 LBS
MEDIUM	22 1/2" *	8" *	11 1/2" *	8 LBS
LARGE	23 1/2"	11 1/2"	13 1/2"	11 LBS
EXTRA LARGE	18"	14"	12"	13 LBS
LOCKABLE	18"	11 1/2"	15"	23 LBS

* 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.

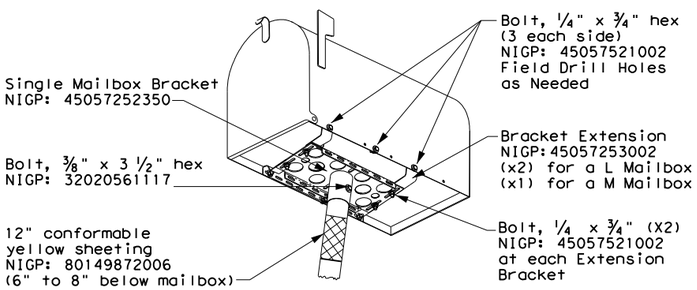
TYPICAL INSTALLATION MEASUREMENTS

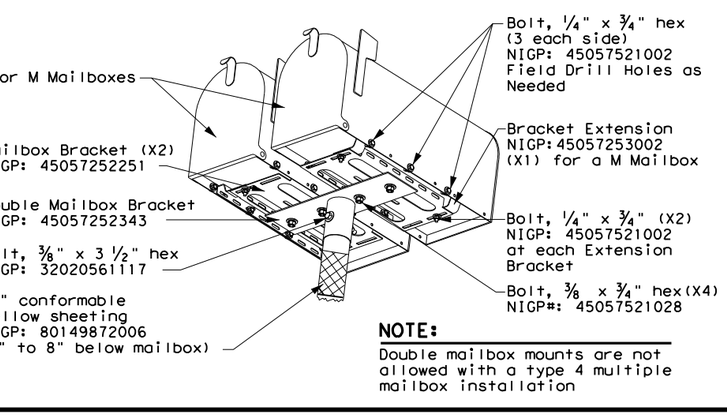


NOTE:

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

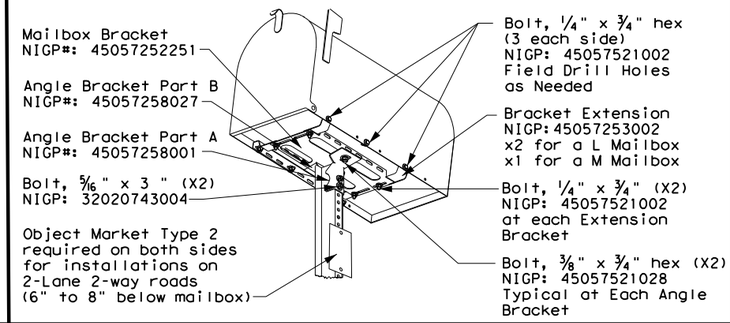


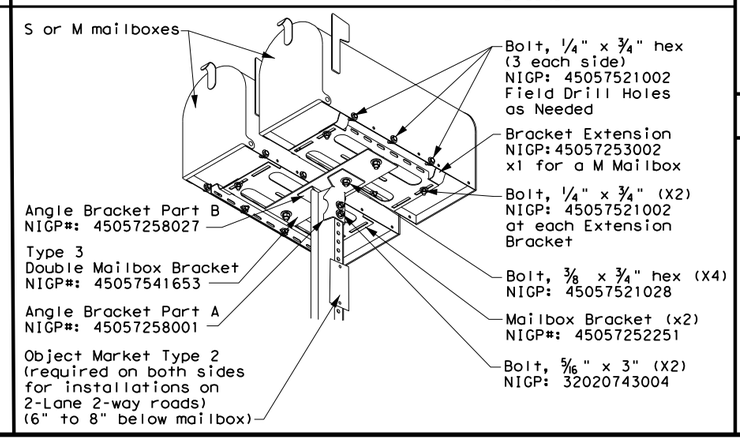


NOTE:

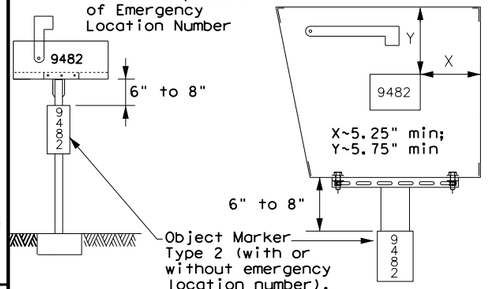
Double mailbox mounts are not allowed with a type 4 multiple mailbox installation

TYPE 3 - SINGLE/DOUBLE





PLACEMENT OF EMERGENCY LOCATION NUMBER

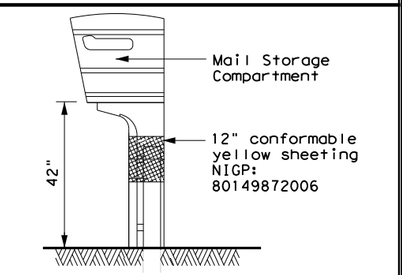


NOTES:

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

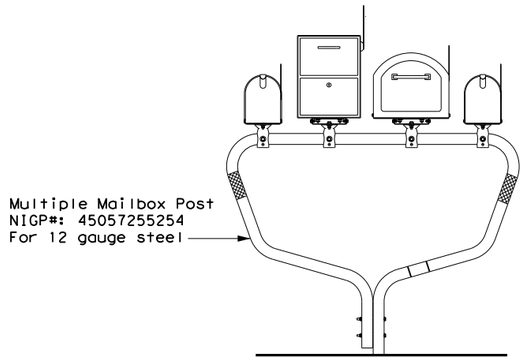
MAILBOX MOUNTING AND ASSEMBLY

MB(1)-21

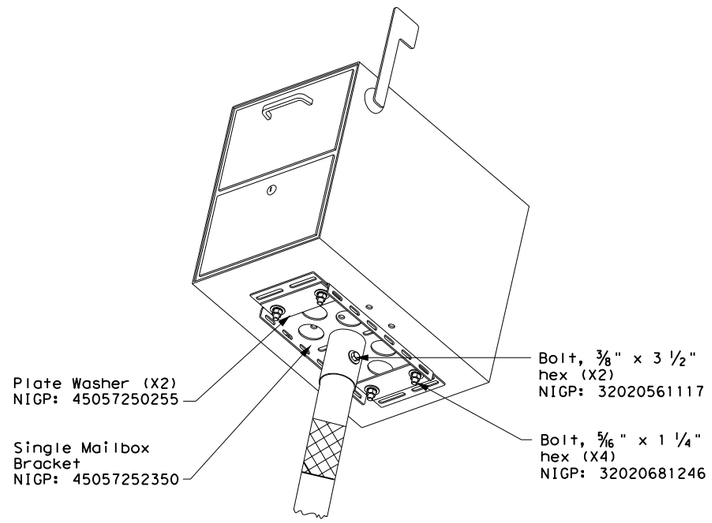
FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0002	04	035,ETC.	SH 20
	DIST	COUNTY		SHEET NO.
	ELP	HUDSPETH		107

DATE: 11/1/2023 1:29:23 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/000204035/4 - Design/Plan Set/13. Standards/PAVEMENT MARKINGS & DELINEATION STANDARDS/MB (2)-12.dgn

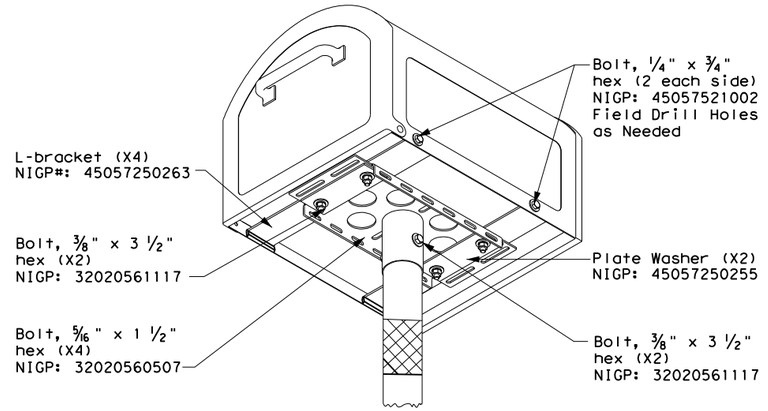
TYPE 1- MULTI LOCKABLE AND XL MAILBOX



TYPE 2/4 - SINGLE LOCKABLE MAILBOX

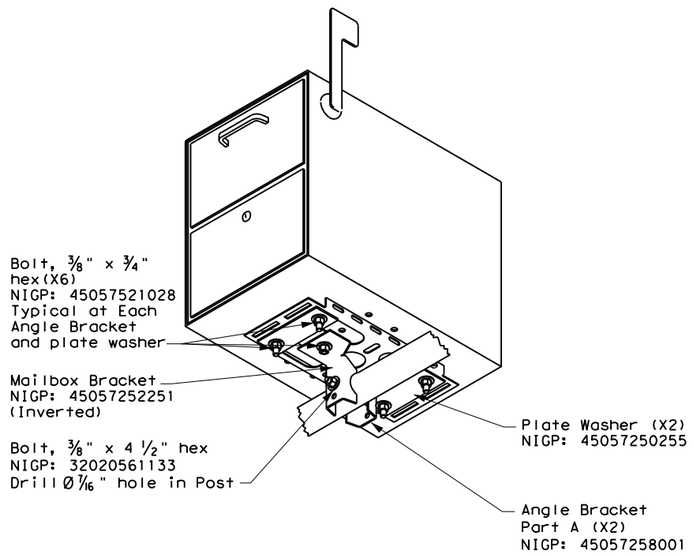


TYPE 2/4 - SINGLE XL MAILBOX

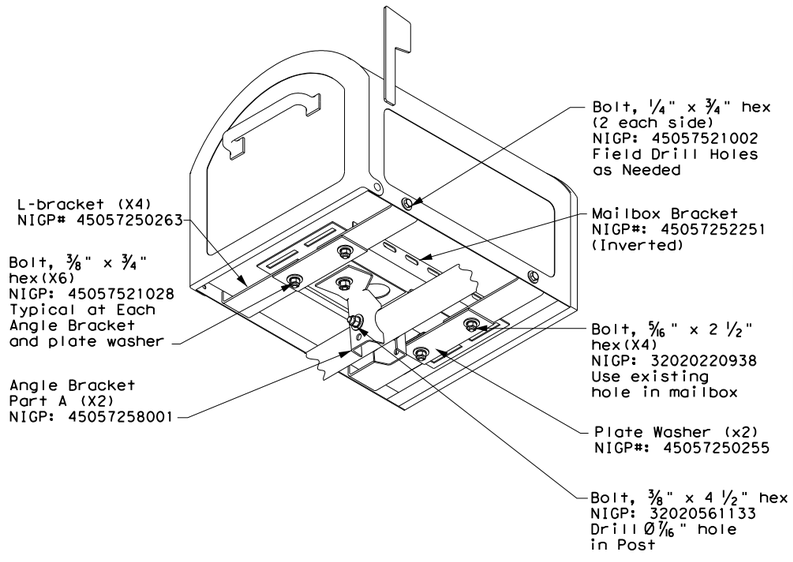


NOTE:
Follow same configuration when mounting an XL mailbox on a Type 4 multi post.

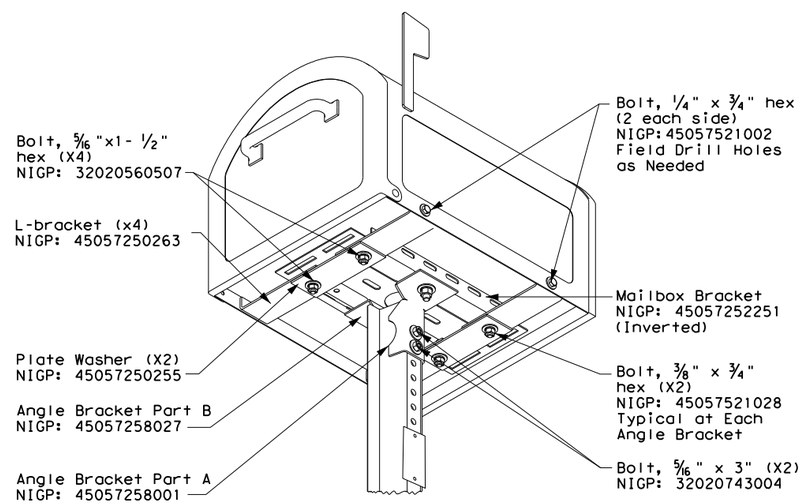
TYPE 1 MULTI – LOCKABLE ARCHITECTURAL (LA)



TYPE 1 MULTI – XL MAILBOX



TYPE 3 - XL MAILBOX MOUNTING



Texas Department of Transportation | Maintenance Division Standard

XL AND LOCKABLE ARCHITECTURAL MAILBOX ASSEMBLY

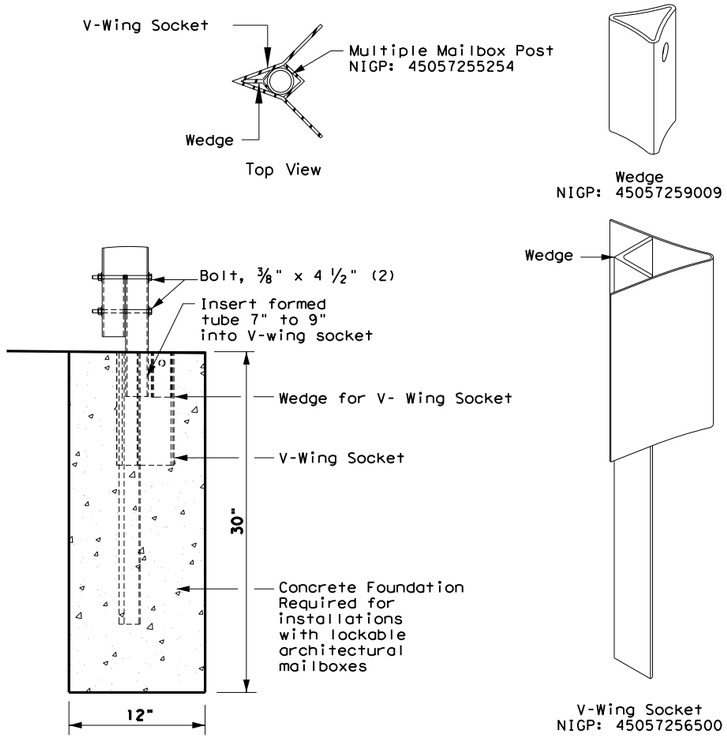
MB(2)-21

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	0002	04	035,ETC.	SH 20
	DIST	COUNTY		SHEET NO.
	ELP	HUDSPETH		108

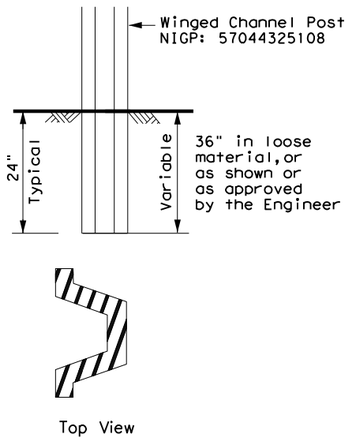
DATE: 11/1/2023 1:29:45 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/000204035/4 - Design/Plan Set/13. Standards/PAVEMENT MARKINGS & DELINEATION STANDARDS/MB (3)-12.dgn

TYPE 1 - SUPPORT/FOUNDATION

Thin Wall Tube w/ V-LOC Anchorage



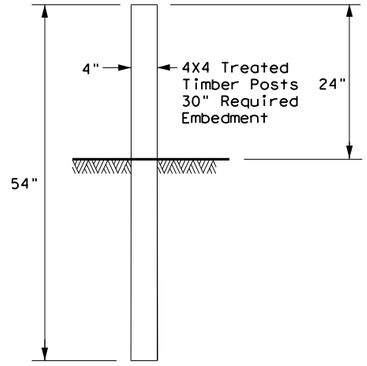
TYPE 3 - SUPPORT/FOUNDATION



NOTES:

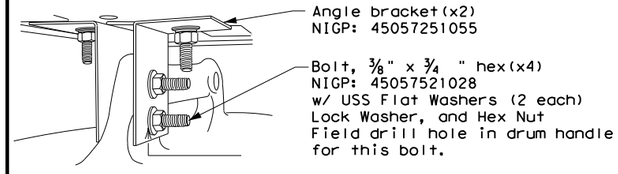
1. Attach Object Marker (OM) facing direction of traffic.
2. OM will also be required on opposite side if installed on a 2-Lane, 2-Way roadway.

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:

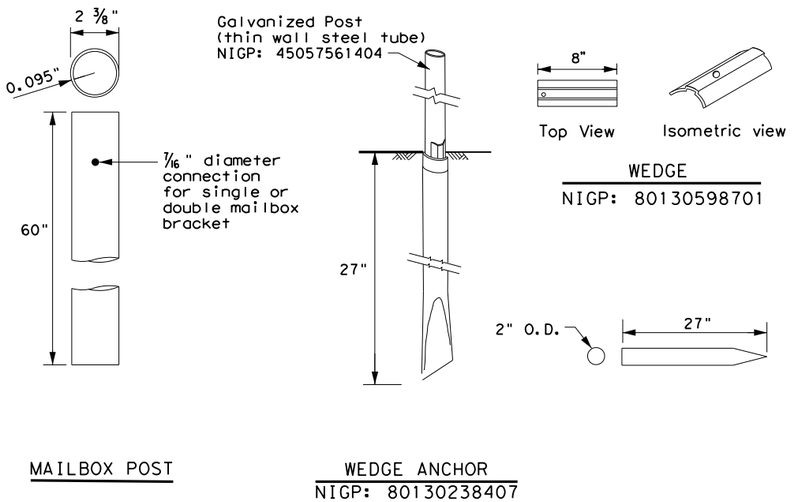
1. Place on approved plastic drum as shown in the Compliant Work Zone Traffic Control Devices (CWZTCD).
2. Existing attachment hardware shall be used unless damaged. Damaged hardware shall be replaced.

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

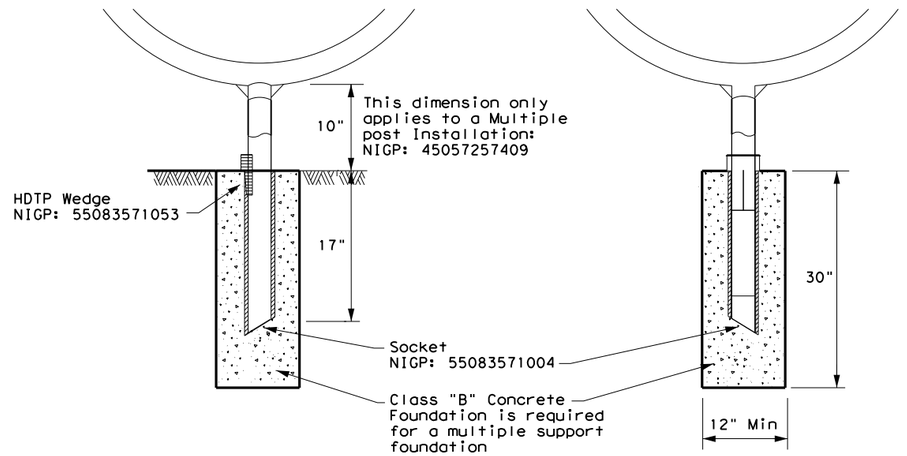


MAILBOX POST

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

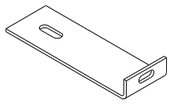
Maintenance Division Standard

MAILBOX SUPPORT AND FOUNDATION

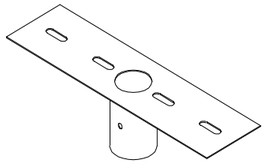
MB(3)-21

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	0002	04	035,ETC.	SH 20
	DIST	COUNTY		SHEET NO.
	ELP	HUDSPETH		109

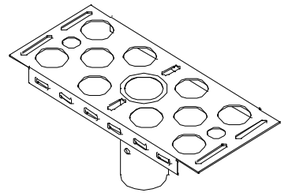
TYPE	TYPE 1	TYPE 2	TYPE 3	TYPE 4			TYPE 5	TYPE 6
Configuration	Multiple	Single or Double	Single or Double	Single	Double	Multiple	Single	Single
Mailbox Size NIGP #	Outside Position: S or M Inside Position: S, M, L, XL, or LA	Single: S, M, L, XL, or LA Double: SS, SM, MM	Single: S, M, L, or XL Double: 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



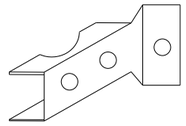
NIGP: 45057250263
L-Bracket x4 for
XL sized mailboxes



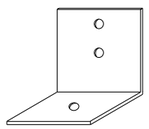
NIGP: 45057252343
Double Mailbox Bracket
For Type 2 and Type 4
double mount



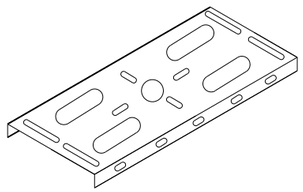
NIGP: 45057252350
Single Mailbox Bracket
For Type 2 single and for
Type 4 single and multi mount



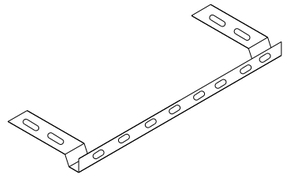
NIGP: 45057258001
Part "A" Angle Bracket
For Type 1 multi (2 per mailbox)
and Type 3 single and double



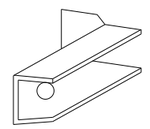
NIGP: 45057251055
Type 6 Angle Bracket
(2 per mailbox)



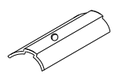
NIGP: 45057252251
Mailbox Bracket
For Type 1 multi and
any double mount (use 2)



NIGP: 45057253002
Bracket Extension
Use 1 for a medium Mailbox
Use 2 for a Large Mailbox

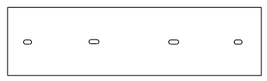


NIGP: 45057258027
Part "B" Angle Bracket
For Type 3 single
and double

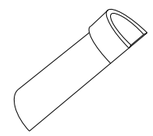


NIGP: 80130598701
Wedge for Type 2

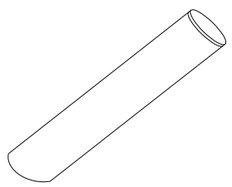
NIGP: 45057250255
Plate Washer for Architecural
and XL Mailboxes



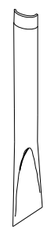
NIGP: 45057541653
Type 3 double mailbox bracket



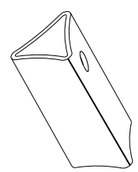
NIGP: 55083571053
Type 4 Mailbox Wedge



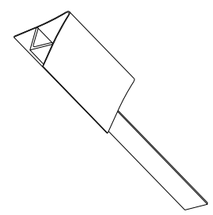
NIGP: 55083571004
Type 4 Mailbox Socket



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	0002	04	035,ETC.	SH 20
	DIST	COUNTY		SHEET NO.
	ELP	HUDSPETH		110

DATE: 11/1/2023 1:30:04 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/000204035/4 - Design/Plan Set/13. Standards/PAVEMENT MARKINGS & DELINEATION STANDARDS/MB (4)-12.dgn

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):
CSJ: 0002-04-035 STP 2024(607)HES

1.2 PROJECT LIMITS:
From: SH 148

To: 0.35 MI E OF FM 192

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 31.2898326 ,(Long) -105.8549839

END: (Lat) 31.2410397 ,(Long) -105.7914789

1.4 TOTAL PROJECT AREA (Acres): 20.14

1.5 TOTAL AREA TO BE DISTURBED (Acres): 5.03

1.6 NATURE OF CONSTRUCTION ACTIVITY:

Construction of paved shoulders, overlay,
Relocation and upgrade of signs, mailboxes, Pav markings

1.7 MAJOR SOIL TYPES:

Soil Type	Description
Belen,Glendaleand Popotosa soils, 0 to 1percent slopes, occasionally flooded	From beginning of project to 0.25 Mile west of Broadway Rd. Well drained, low to medium rate of runoff.
Copia-Nations complex, 1 to 10 percent slopes	From 0.25 Mile West of Broadway Rd. to end of project limit. Well drained, negligible rate of runoff.
Ybar-Chamberino complex, 1 to 30 percent slopes.	Small pockets within the project limit. Well drained, high rate of runoff.

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:

- [X] PSLs determined during preconstruction meeting
- [ ] PSLs determined during construction
- [ ] No PSLs planned for construction

Type	Sheet #s
Silt Fence	113-123

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.)

- [X] Mobilization
- [X] Install sediment and erosion controls
- [ ] Blade existing topsoil into windrows, prep ROW, clear and grub
- [X] Remove existing pavement
- [ ] Grading operations, excavation, and embankment
- [X] Excavate and prepare subgrade for proposed pavement widening
- [ ] Remove existing culverts, safety end treatments (SETs)
- [X] Remove existing metal beam guard fence (MBGF), bridge rail
- [X] Install proposed pavement per plans
- [ ] Install culverts, culvert extensions, SETs
- [X] Install mow strip, MBGF, bridge rail
- [X] 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: __Drilled shafts_____
- [ ] Other: _____
- [ ] Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

- [X] Sediment laden stormwater from stormwater conveyance over disturbed area
- [X] Fuels, oils, and lubricants from construction vehicles, equipment, and storage
- [X] Solvents, paints, adhesives, etc. from various construction activities
- [X] Transported soils from offsite vehicle tracking
- [X] Construction debris and waste from various construction activities
- [ ] Contaminated water from excavation or dewatering pump-out water
- [X] Sanitary waste from onsite restroom facilities
- [X] Trash from various construction activities/receptacles
- [X] 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
Camp Rice, Draw and Diablo Arroyos and nearby creeks.	Rio Grande River

* 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
NA

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/22/2023

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			111
STATE	STATE DIST.	COUNTY	
TEXAS	ELP	HUDSPETH	
CONT.	SECT.	JOB	HIGHWAY NO.
0002	04	035, ETC.	SH 20

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
NA		

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: The off site vehicle tracking of sediments shall be minimized by removal of excess dirt from the road and at entrances to the work site.The generation of dust will be minimized as directed by the Project Engineer by dampening haul roads and covering haul trucks with a tarpaulin.
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- ☐ Chemical Management
- ☐ Concrete and Materials Waste Management
- ☐ Debris and Trash Management
- ☐ Dust Control
- ☐ Sanitary Facilities
- ☒ Other: Staging areas and vehicle maintenance areas shall be located and constructed in a manner to minimize the runoff of pollutants. If potential pollutant sources are identified after the start of construction, controls and measures shall be implemented as directed by the Project Engineer.
- ☐ 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
NA		

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
SHEETAL ASHISH PATEL
126438
LICENSED PROFESSIONAL ENGINEER

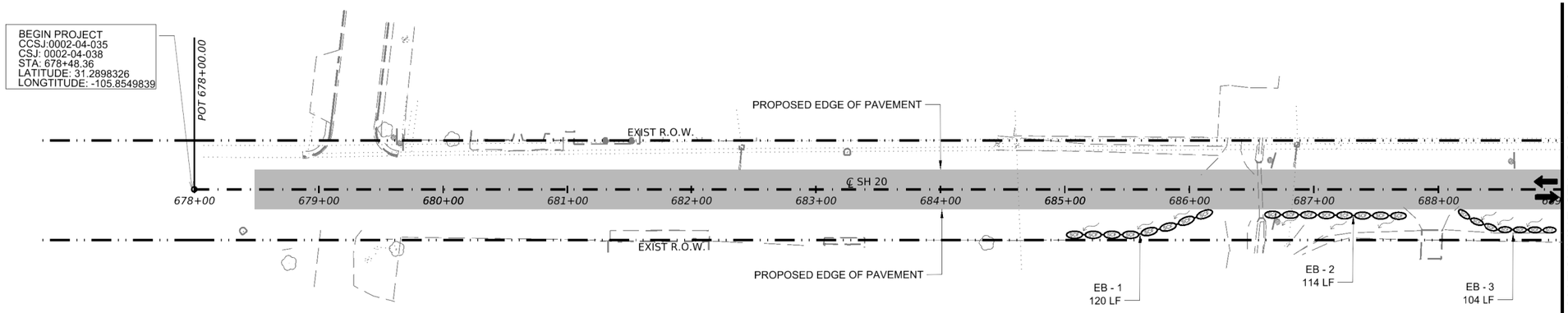
Sheetal Patel, P.E.

11/29/2023

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			112
STATE	STATE DIST.	COUNTY	
TEXAS	ELP	HUDSPETH	
CONT.	SECT.	JOB	HIGHWAY NO.
0002	04	035,ETC.	SH 20



0 50 100
SCALE IN FEET

LEGEND

- SEDIMENT CONTROL FENCE
- DIRECTION OF FLOW
- TRAFFIC FLOW
- PROPOSED CONSTRUCTION

MATCHLINE STA. 689+00.00

NOTES:

1. BMPS SHALL NOT BE INSTALLED ANY SOONER THAN TWO WEEKS PRIOR TO SOIL DISTURBING ACTIVITIES IN THEIR CONTROL AREA.

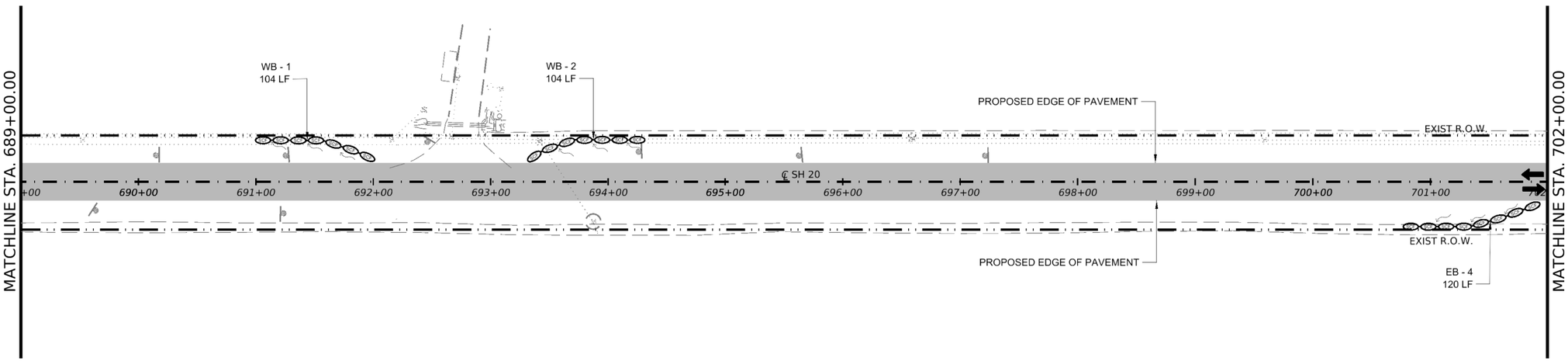
2. MINIMIZE DISTURBANCE OF EXISTING VEGETATION WITHIN THE CONSTRUCTION SITE.

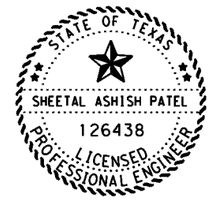
3. MAINTAIN SWP3 DEVICES FROM PREVIOUS PHASES THAT DO NOT CONFLICT WITH CURRENT WORK OR AS OTHERWISE DIRECTED BY ENGINEER.

4. SEE TYPICAL SECTION SHEETS FOR TYPE AND LIMITS OF SOIL DISTURBANCE

SEDIMENT CONTROL FENCE		
BMP ID	DATE INSTALLED	DATE REMOVED
WB-1		
WB-2		
EB-1		
EB-2		
EB-3		
EB-4		

CSJ: 0002-04-035; SWP3 ESTIMATE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
506	6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	666
506	6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	666





Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

SH 20
ENVIRONMENTAL ISSUES

SWP3 LAYOUT
STA: 678+48.36
TO STA: 702+00.00

SHEET 1 OF 11

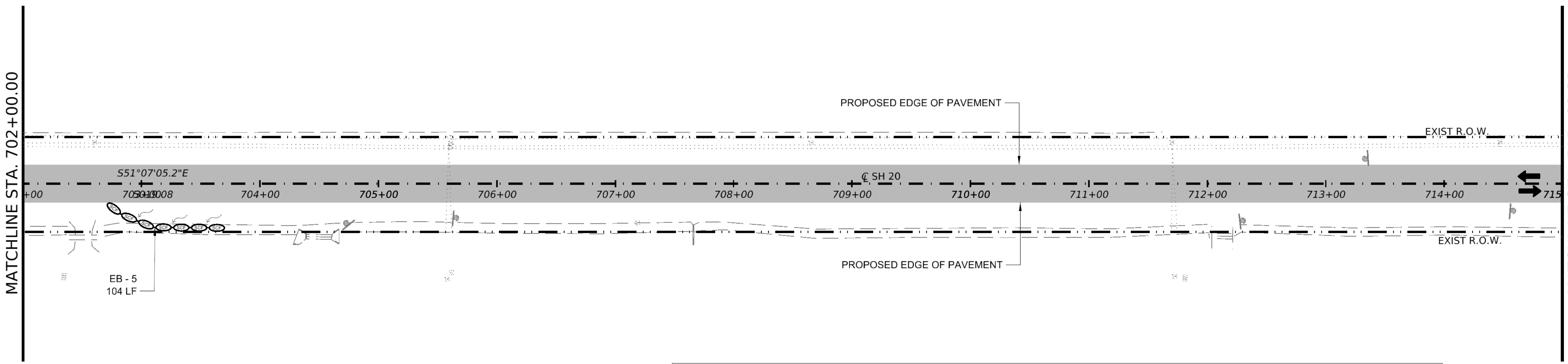
CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		113

DATE: 11/1/2023 1:31:13 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/000204035/4 - Design/Master Design Files/Sheet Boundary Container/SH20ContainerSWP

SCALE IN FEET (0 50 100)

LEGEND

- SEDIMENT CONTROL FENCE
- DIRECTION OF FLOW
- TRAFFIC FLOW
- PROPOSED CONSTRUCTION



NOTES:

1. BMPS SHALL NOT BE INSTALLED ANY SOONER THAN TWO WEEKS PRIOR TO SOIL DISTURBING ACTIVITIES IN THEIR CONTROL AREA.

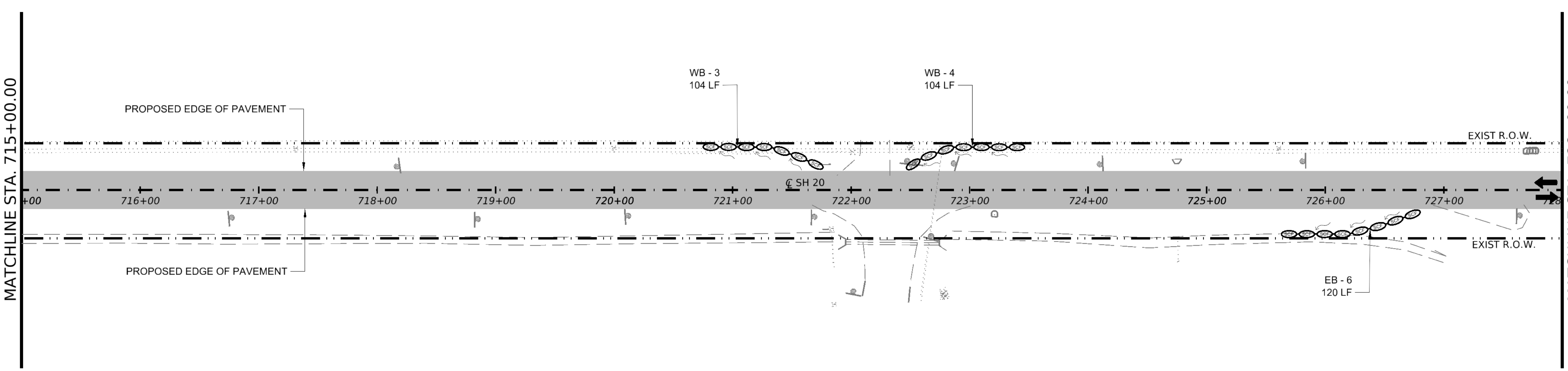
2. MINIMIZE DISTURBANCE OF EXISTING VEGETATION WITHIN THE CONSTRUCTION SITE.

3. MAINTAIN SWP3 DEVICES FROM PREVIOUS PHASES THAT DO NOT CONFLICT WITH CURRENT WORK OR AS OTHERWISE DIRECTED BY ENGINEER.

4. SEE TYPICAL SECTION SHEETS FOR TYPE AND LIMITS OF SOIL DISTURBANCE

SEDIMENT CONTROL FENCE		
BMP ID	DATE INSTALLED	DATE REMOVED
WB-3		
WB-4		
EB-5		
EB-6		

CSJ: 0002-04-035; SWP3 ESTIMATE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
506	6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	432
506	6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	432



STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

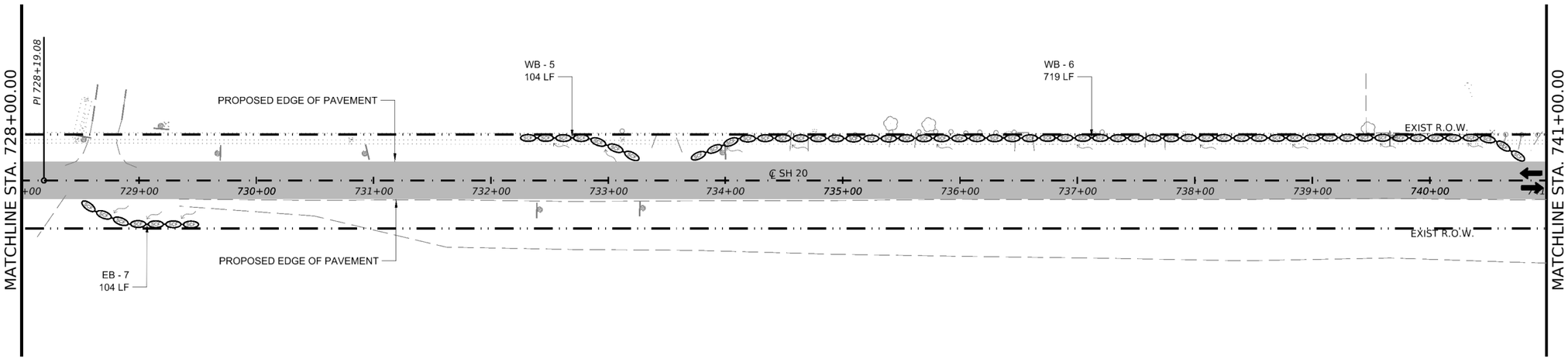
SH 20
ENVIRONMENTAL
ISSUES

SWP3 LAYOUT
STA: 702+00.00 TO
STA: 728+00.00

SHEET 2 OF 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		114

DATE: 1:31:37 PM
FILE: pw:\\...\TXDOT5/Documents/24 - ELP/Design Projects/0002040354 - Design/Master Design Files/Sheet Boundary Container/SH20ContainerSW3P



LEGEND

- SEDIMENT CONTROL FENCE
- DIRECTION OF FLOW
- TRAFFIC FLOW
- PROPOSED CONSTRUCTION

NOTES:

1. BMPS SHALL NOT BE INSTALLED ANY SOONER THAN TWO WEEKS PRIOR TO SOIL DISTURBING ACTIVITIES IN THEIR CONTROL AREA.

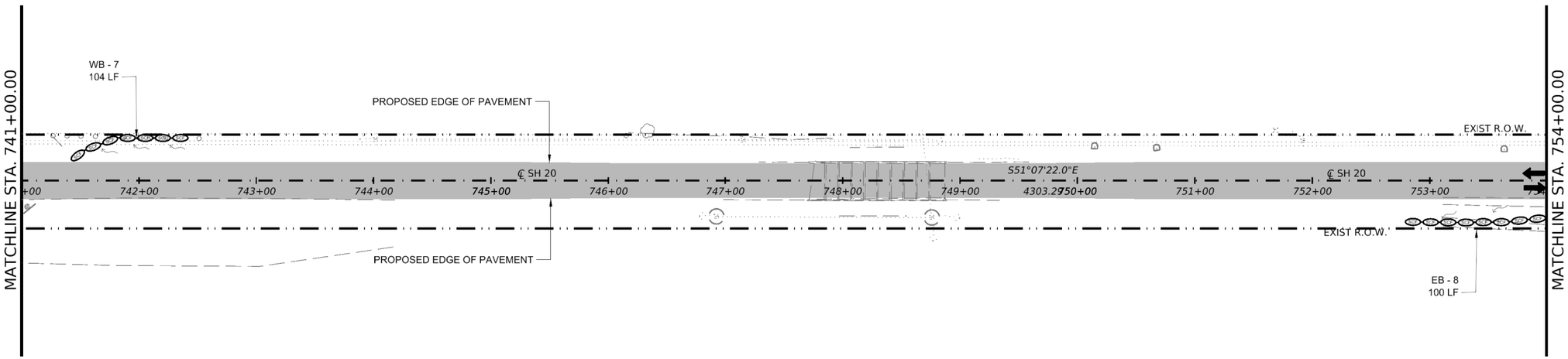
2. MINIMIZE DISTURBANCE OF EXISTING VEGETATION WITHIN THE CONSTRUCTION SITE.

3. MAINTAIN SWP3 DEVICES FROM PREVIOUS PHASES THAT DO NOT CONFLICT WITH CURRENT WORK OR AS OTHERWISE DIRECTED BY ENGINEER.

4. SEE TYPICAL SECTION SHEETS FOR TYPE AND LIMITS OF SOIL DISTURBANCE

SEDIMENT CONTROL FENCE		
BMP ID	DATE INSTALLED	DATE REMOVED
WB-5		
WB-6		
WB-7		
EB-7		
EB-8		

CSJ: 0002-04-035; SWP3 ESTIMATE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
506	6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	1131
506	6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	1131



Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

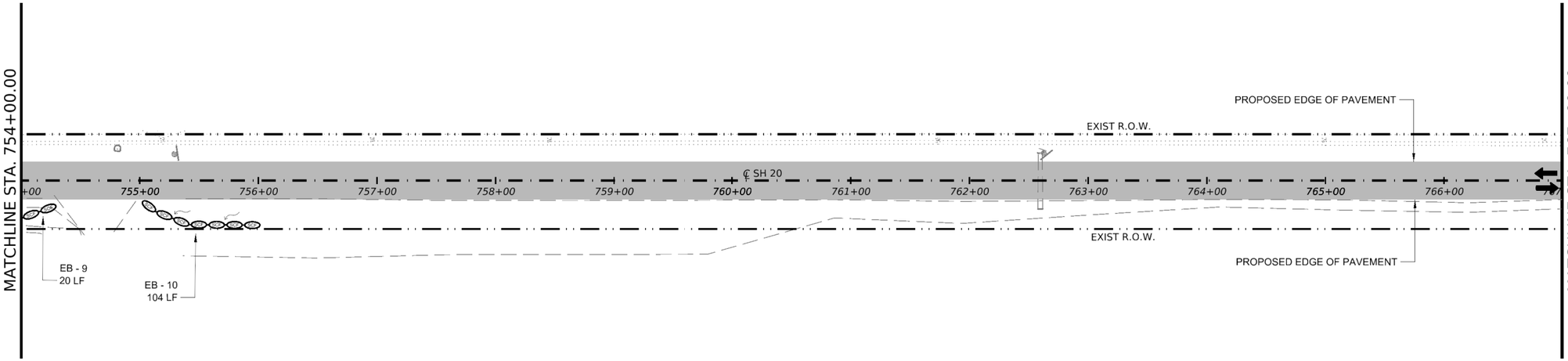
SH 20
ENVIRONMENTAL ISSUES

SWP3 LAYOUT
STA: 728+00.00 TO
STA: 754+00.00

SHEET 3 OF 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		115

DATE: 11/02/2023 1:32:05 PM
FILE: pw://txdot.bentley.com:TXDOT5/Documents/24 - ELP/Design Projects/000204035/4 - Design/Master Design Files/SH20ContainerSW3P



0 50 100
SCALE IN FEET

LEGEND

- SEDIMENT CONTROL FENCE
- DIRECTION OF FLOW
- TRAFFIC FLOW
- PROPOSED CONSTRUCTION

NOTES:

1. BMPS SHALL NOT BE INSTALLED ANY SOONER THAN TWO WEEKS PRIOR TO SOIL DISTURBING ACTIVITIES IN THEIR CONTROL AREA.

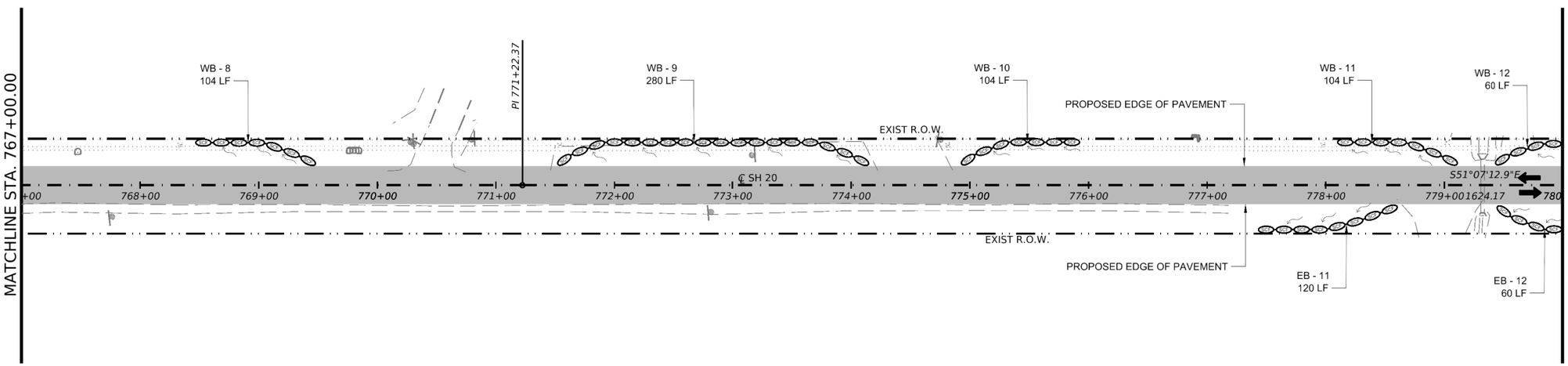
2. MINIMIZE DISTURBANCE OF EXISTING VEGETATION WITHIN THE CONSTRUCTION SITE.

3. MAINTAIN SWP3 DEVICES FROM PREVIOUS PHASES THAT DO NOT CONFLICT WITH CURRENT WORK OR AS OTHERWISE DIRECTED BY ENGINEER.

4. SEE TYPICAL SECTION SHEETS FOR TYPE AND LIMITS OF SOIL DISTURBANCE

SEDIMENT CONTROL FENCE		
BMP ID	DATE INSTALLED	DATE REMOVED
WB-8		
WB-9		
WB-10		
WB-13		
EB-9		
EB-10		
EB-11		
EB-12		

CSJ: 0002-04-035; SWP3 ESTIMATE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
506	6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	956
506	6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	956



STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

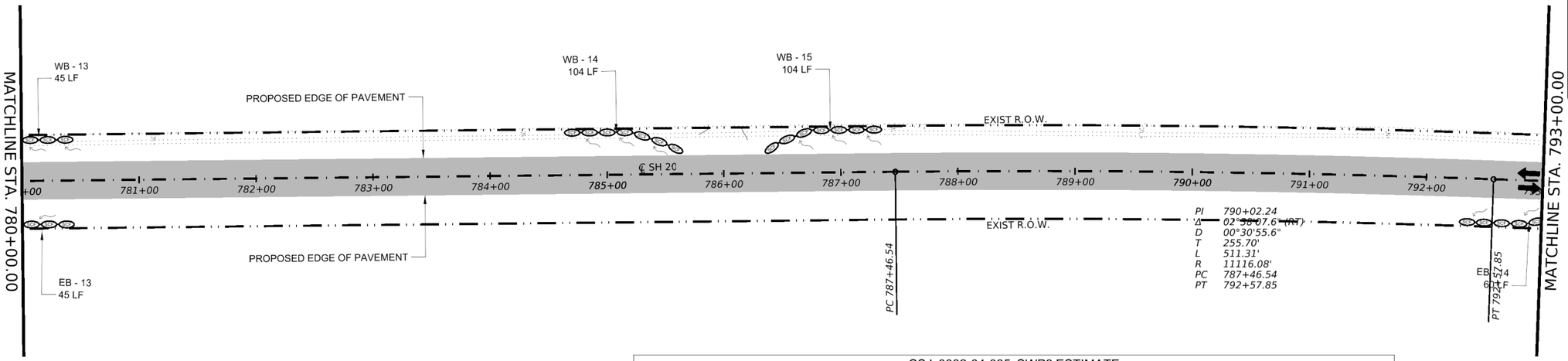
SH 20
ENVIRONMENTAL ISSUES

SWP3 LAYOUT
STA: 754+00.00 TO
STA: 780+00.00

SHEET 4 OF 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		116

DATE: 11/1/2023 1:32:29 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Master Design Files/Sheet Boundary Container/SH20ContainerSW3P



0 50 100
SCALE IN FEET

LEGEND

- SEDIMENT CONTROL FENCE
- DIRECTION OF FLOW
- TRAFFIC FLOW
- PROPOSED CONSTRUCTION

NOTES:

1. BMPS SHALL NOT BE INSTALLED ANY SOONER THAN TWO WEEKS PRIOR TO SOIL DISTURBING ACTIVITIES IN THEIR CONTROL AREA.

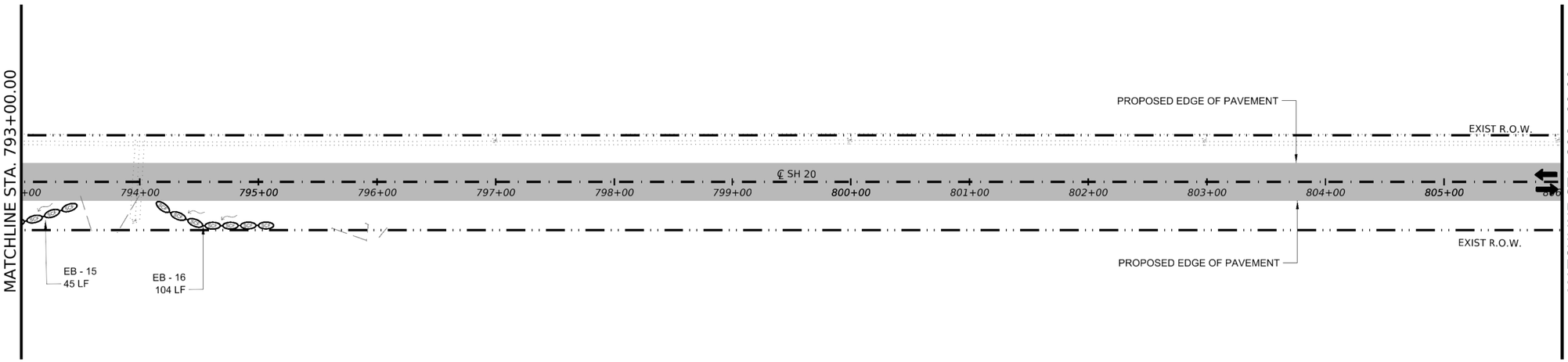
2. MINIMIZE DISTURBANCE OF EXISTING VEGETATION WITHIN THE CONSTRUCTION SITE.

3. MAINTAIN SWP3 DEVICES FROM PREVIOUS PHASES THAT DO NOT CONFLICT WITH CURRENT WORK OR AS OTHERWISE DIRECTED BY ENGINEER.

4. SEE TYPICAL SECTION SHEETS FOR TYPE AND LIMITS OF SOIL DISTURBANCE

SEDIMENT CONTROL FENCE		
BMP ID	DATE INSTALLED	DATE REMOVED
WB-13		
WB-14		
WB-15		
EB-13		
EB-14		
EB-15		
EB-16		

CSJ: 0002-04-035; SWP3 ESTIMATE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
506	6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	507
506	6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	507



STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

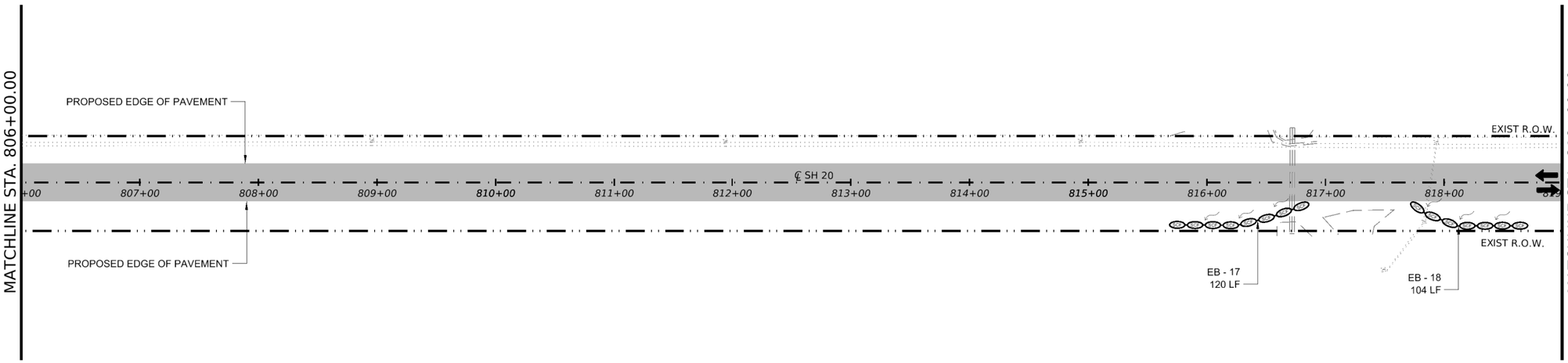
Texas Department of Transportation

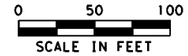
SH 20
ENVIRONMENTAL ISSUES
SWP3 LAYOUT
STA: 780+00.00 TO
STA: 806+00.00

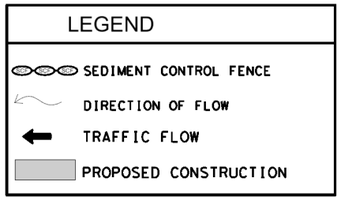
SHEET 5 OF 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		117

DATE: 11/1/2023 1:32:42 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Master Design Files/SH20ContainerSW3P







NOTES:

1. BMPS SHALL NOT BE INSTALLED ANY SOONER THAN TWO WEEKS PRIOR TO SOIL DISTURBING ACTIVITIES IN THEIR CONTROL AREA.

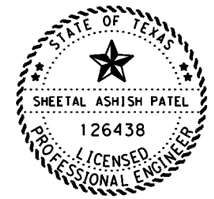
2. MINIMIZE DISTURBANCE OF EXISTING VEGETATION WITHIN THE CONSTRUCTION SITE.

3. MAINTAIN SWP3 DEVICES FROM PREVIOUS PHASES THAT DO NOT CONFLICT WITH CURRENT WORK OR AS OTHERWISE DIRECTED BY ENGINEER.

4. SEE TYPICAL SECTION SHEETS FOR TYPE AND LIMITS OF SOIL DISTURBANCE

SEDIMENT CONTROL FENCE		
BMP ID	DATE INSTALLED	DATE REMOVED
WB-16		
WB-17		
EB-17		
EB-18		
EB-19		
EB-20		

CSJ: 0002-04-035; SWP3 ESTIMATE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
506	6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	656
506	6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	656



Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

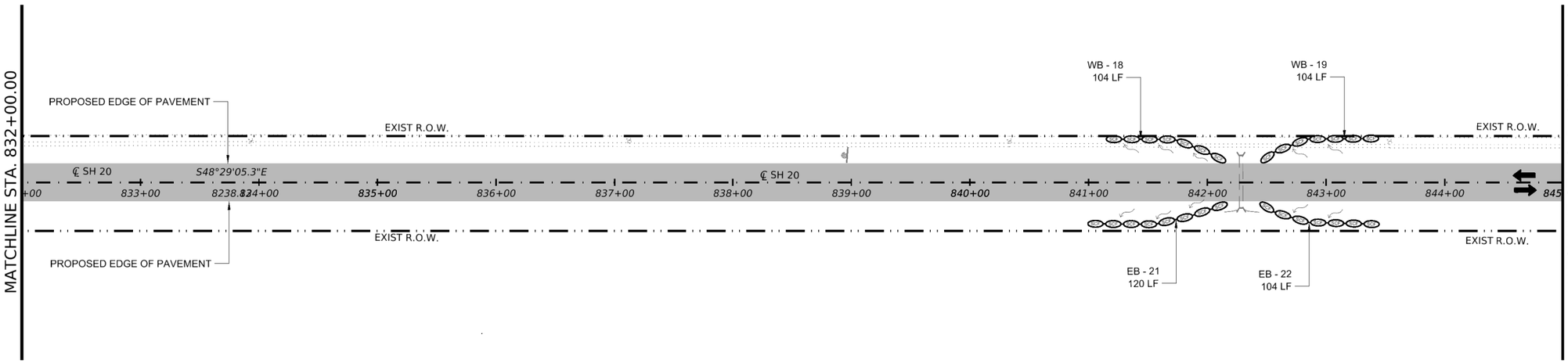
SH 20
ENVIRONMENTAL ISSUES

SWP3 LAYOUT
STA: 806+00.00 TO
STA: 832+00.00

SHEET 6 OF 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		118

DATE: 11/1/2023 1:33:08 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/000204035/4 - Design/Master Design Files/SH20ContainerSW3P



0 50 100
SCALE IN FEET

LEGEND

- SEDIMENT CONTROL FENCE
- DIRECTION OF FLOW
- TRAFFIC FLOW
- PROPOSED CONSTRUCTION

NOTES:

1. BMPS SHALL NOT BE INSTALLED ANY SOONER THAN TWO WEEKS PRIOR TO SOIL DISTURBING ACTIVITIES IN THEIR CONTROL AREA.

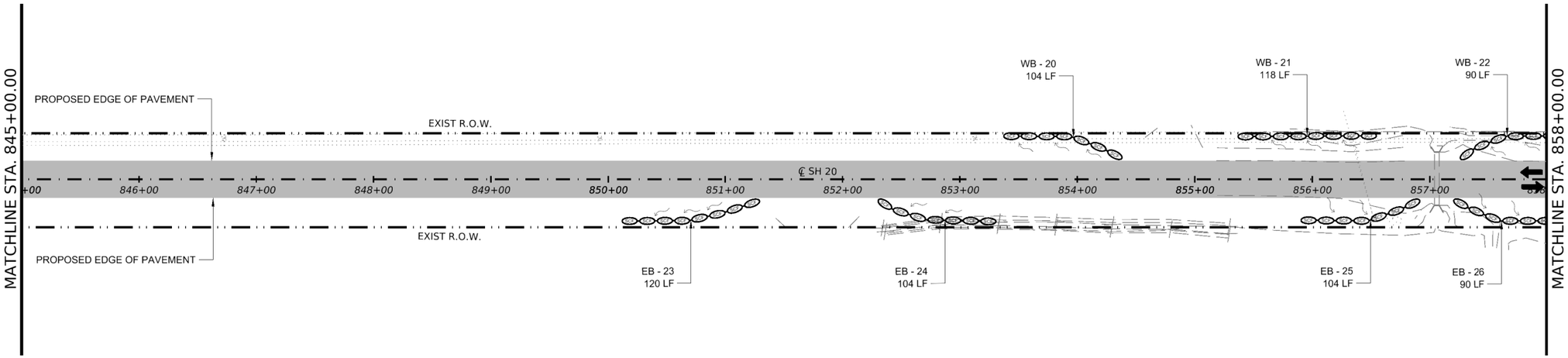
2. MINIMIZE DISTURBANCE OF EXISTING VEGETATION WITHIN THE CONSTRUCTION SITE.

3. MAINTAIN SWP3 DEVICES FROM PREVIOUS PHASES THAT DO NOT CONFLICT WITH CURRENT WORK OR AS OTHERWISE DIRECTED BY ENGINEER.

4. SEE TYPICAL SECTION SHEETS FOR TYPE AND LIMITS OF SOIL DISTURBANCE

SEDIMENT CONTROL FENCE		
BMP ID	DATE INSTALLED	DATE REMOVED
WB-18		
WB-19		
WB-20		
WB-21		
WB-22		
EB-21		
EB-22		
EB-23		
EB-24		
EB-25		
EB-26		

CSJ: 0002-04-035; SWP3 ESTIMATE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
506	6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	1162
506	6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	1162



STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

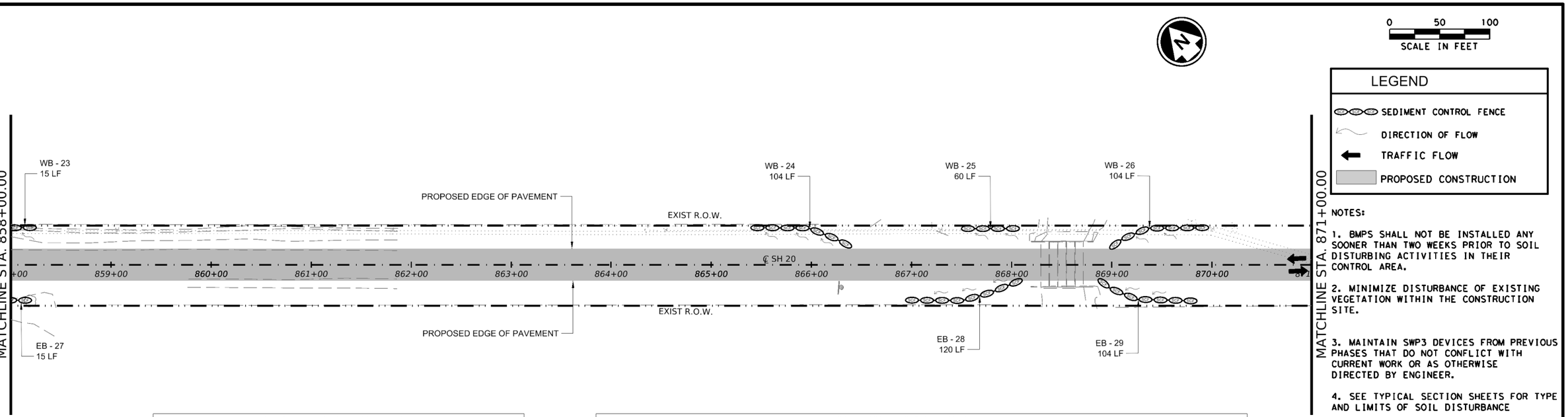
SH 20
ENVIRONMENTAL ISSUES

SWP3 LAYOUT
STA: 832+00.00 TO
STA: 858+00.00

SHEET 7 OF 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		119

DATE: 11/1/2023 1:33:24 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Master Design Files/SH20ContainerSW3P



0 50 100
SCALE IN FEET

LEGEND

- SEDIMENT CONTROL FENCE
- DIRECTION OF FLOW
- TRAFFIC FLOW
- PROPOSED CONSTRUCTION

NOTES:

1. BMPS SHALL NOT BE INSTALLED ANY SOONER THAN TWO WEEKS PRIOR TO SOIL DISTURBING ACTIVITIES IN THEIR CONTROL AREA.

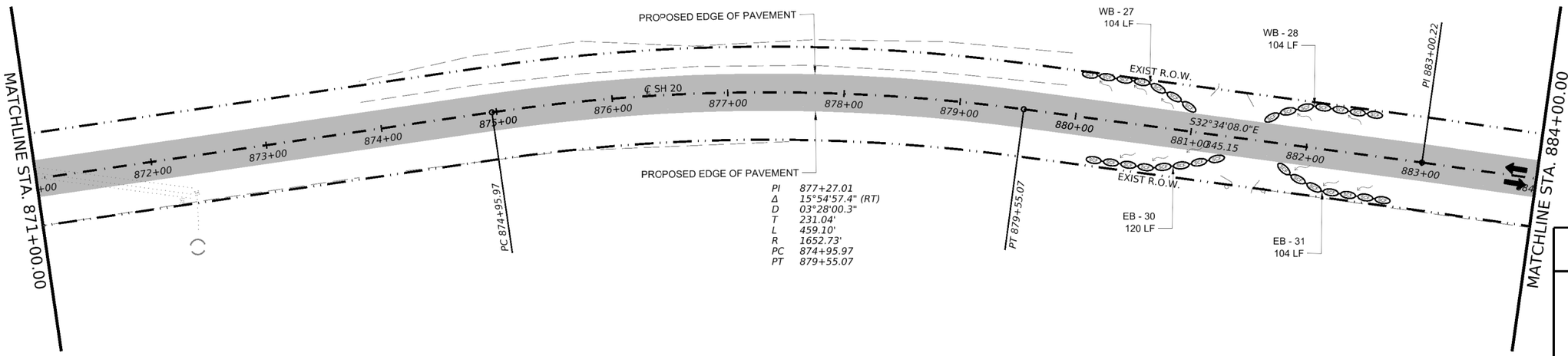
2. MINIMIZE DISTURBANCE OF EXISTING VEGETATION WITHIN THE CONSTRUCTION SITE.

3. MAINTAIN SWP3 DEVICES FROM PREVIOUS PHASES THAT DO NOT CONFLICT WITH CURRENT WORK OR AS OTHERWISE DIRECTED BY ENGINEER.

4. SEE TYPICAL SECTION SHEETS FOR TYPE AND LIMITS OF SOIL DISTURBANCE

SEDIMENT CONTROL FENCE		
BMP ID	DATE INSTALLED	DATE REMOVED
WB-23		
WB-24		
WB-25		
WB-26		
WB-27		
WB-28		
EB-27		
EB-28		
EB-29		
EB-30		
EB-31		

CSJ: 0002-04-035; SWP3 ESTIMATE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
506	6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	954
506	6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	954



STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

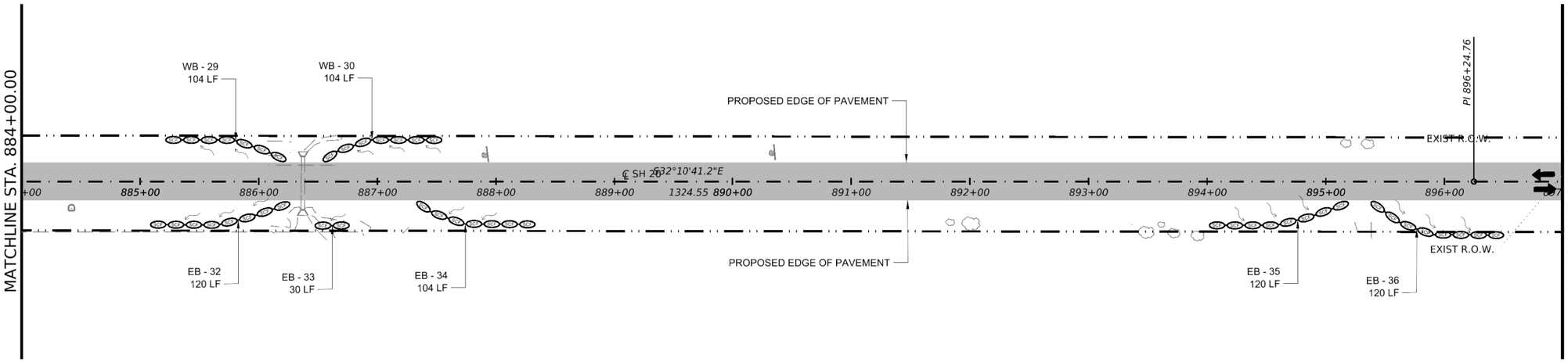
Texas Department of Transportation

SH 20
ENVIRONMENTAL ISSUES
SWP3 LAYOUT
STA: 858+00.00 TO
STA: 884+00.00

SHEET 8 OF 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		120

DATE: 11/1/2023 1:33:49 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Master Design Files/Sheet Boundary Container/SH20ContainerSW3P



LEGEND

- SEDIMENT CONTROL FENCE
- DIRECTION OF FLOW
- TRAFFIC FLOW
- PROPOSED CONSTRUCTION

NOTES:

1. BMPS SHALL NOT BE INSTALLED ANY SOONER THAN TWO WEEKS PRIOR TO SOIL DISTURBING ACTIVITIES IN THEIR CONTROL AREA.

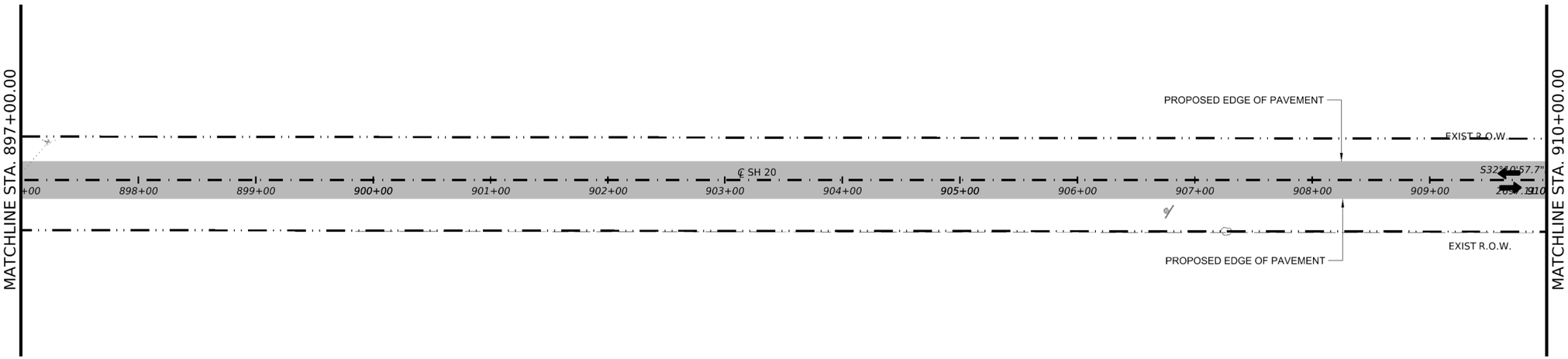
2. MINIMIZE DISTURBANCE OF EXISTING VEGETATION WITHIN THE CONSTRUCTION SITE.

3. MAINTAIN SWP3 DEVICES FROM PREVIOUS PHASES THAT DO NOT CONFLICT WITH CURRENT WORK OR AS OTHERWISE DIRECTED BY ENGINEER.

4. SEE TYPICAL SECTION SHEETS FOR TYPE AND LIMITS OF SOIL DISTURBANCE

SEDIMENT CONTROL FENCE		
BMP ID	DATE INSTALLED	DATE REMOVED
WB-29		
WB-30		
EB-32		
EB-33		
EB-34		
EB-35		
EB-36		

CSJ: 0002-04-035; SWP3 ESTIMATE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
506	6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	702
506	6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	702



STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

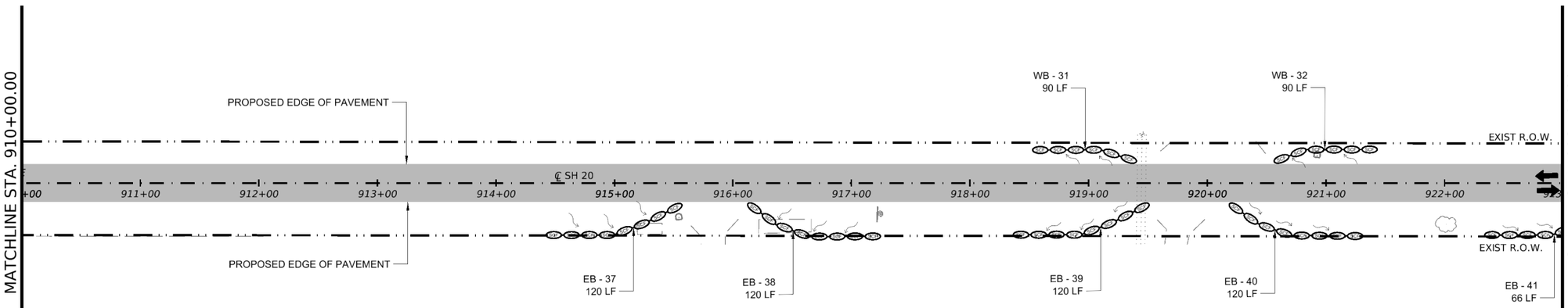
Texas Department of Transportation

SH 20
ENVIRONMENTAL ISSUES

SWP3 LAYOUT
STA: 884+00.00 TO
STA: 910+00.00

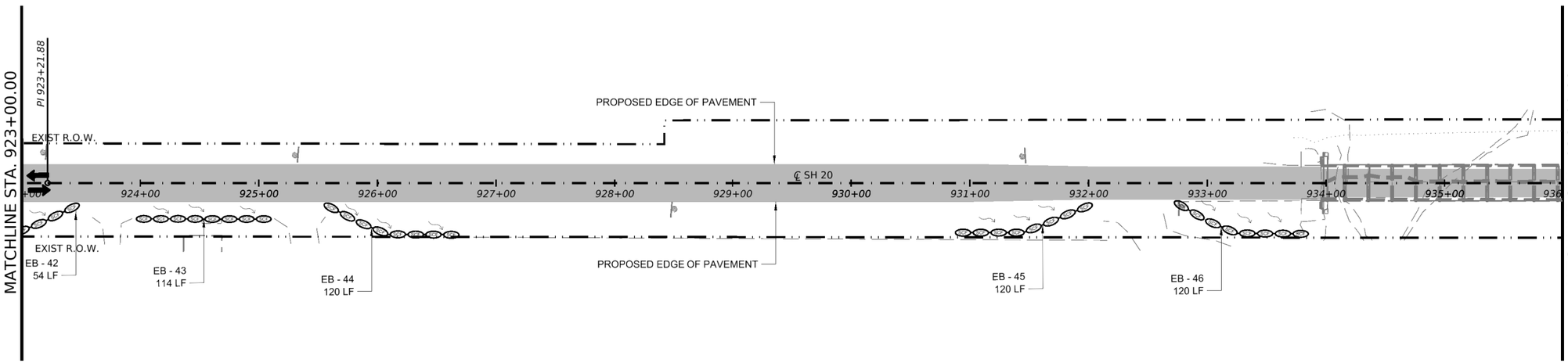
CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		121

DATE: 11/1/2023 1:34:18 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040035/4 - Design/Master Design Files/Sheet Boundary Container/SH20ContainerSW3P



SEDIMENT CONTROL FENCE		
BMP ID	DATE INSTALLED	DATE REMOVED
WB-31		
WB-32		
EB-37		
EB-38		
EB-39		
EB-40		
EB-41		
EB-42		
EB-43		
EB-44		
EB-45		
EB-46		

CSJ: 0002-04-035; SWP3 ESTIMATE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
506	6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	1254
506	6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	1254



0 50 100
SCALE IN FEET

LEGEND

- SEDIMENT CONTROL FENCE
- DIRECTION OF FLOW
- TRAFFIC FLOW
- PROPOSED CONSTRUCTION

NOTES:

1. BMPS SHALL NOT BE INSTALLED ANY SOONER THAN TWO WEEKS PRIOR TO SOIL DISTURBING ACTIVITIES IN THEIR CONTROL AREA.

2. MINIMIZE DISTURBANCE OF EXISTING VEGETATION WITHIN THE CONSTRUCTION SITE.

3. MAINTAIN SWP3 DEVICES FROM PREVIOUS PHASES THAT DO NOT CONFLICT WITH CURRENT WORK OR AS OTHERWISE DIRECTED BY ENGINEER.

4. SEE TYPICAL SECTION SHEETS FOR TYPE AND LIMITS OF SOIL DISTURBANCE

STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

SH 20

ENVIRONMENTAL ISSUES

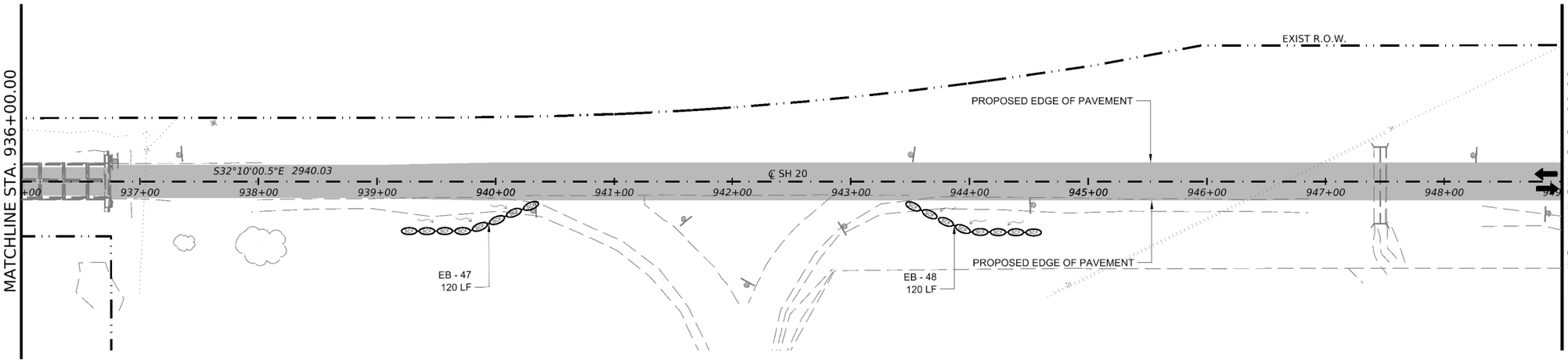
SWP3 LAYOUT

STA: 910+00.00 TO
STA: 936+00.00

SHEET10 OF 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		122

DATE: 11/1/2023 1:34:34 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/000204035/4 - Design/Master Design Files/SH20Container/SW3P



0 50 100
SCALE IN FEET

LEGEND

- SEDIMENT CONTROL FENCE
- DIRECTION OF FLOW
- TRAFFIC FLOW
- PROPOSED CONSTRUCTION

NOTES:

1. BMPS SHALL NOT BE INSTALLED ANY SOONER THAN TWO WEEKS PRIOR TO SOIL DISTURBING ACTIVITIES IN THEIR CONTROL AREA.

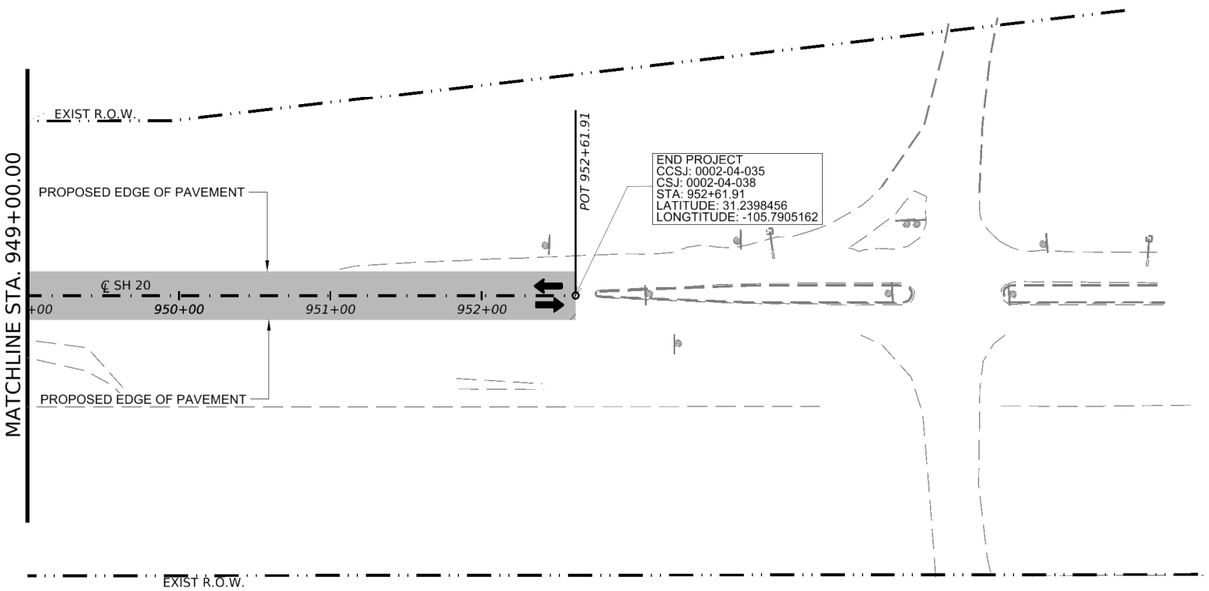
2. MINIMIZE DISTURBANCE OF EXISTING VEGETATION WITHIN THE CONSTRUCTION SITE.

3. MAINTAIN SWP3 DEVICES FROM PREVIOUS PHASES THAT DO NOT CONFLICT WITH CURRENT WORK OR AS OTHERWISE DIRECTED BY ENGINEER.

4. SEE TYPICAL SECTION SHEETS FOR TYPE AND LIMITS OF SOIL DISTURBANCE

SEDIMENT CONTROL FENCE		
BMP ID	DATE INSTALLED	DATE REMOVED
EB-47		
EB-48		

CSJ: 0002-04-035; SWP3 ESTIMATE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
506	6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	240
506	6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	240



STATE OF TEXAS
SHEETAL ASHISH PATEL
126438
LICENSED
PROFESSIONAL ENGINEER

Sheetal Patel, P.E.

11/01/2023

Texas Department of Transportation

SH 20
ENVIRONMENTAL ISSUES

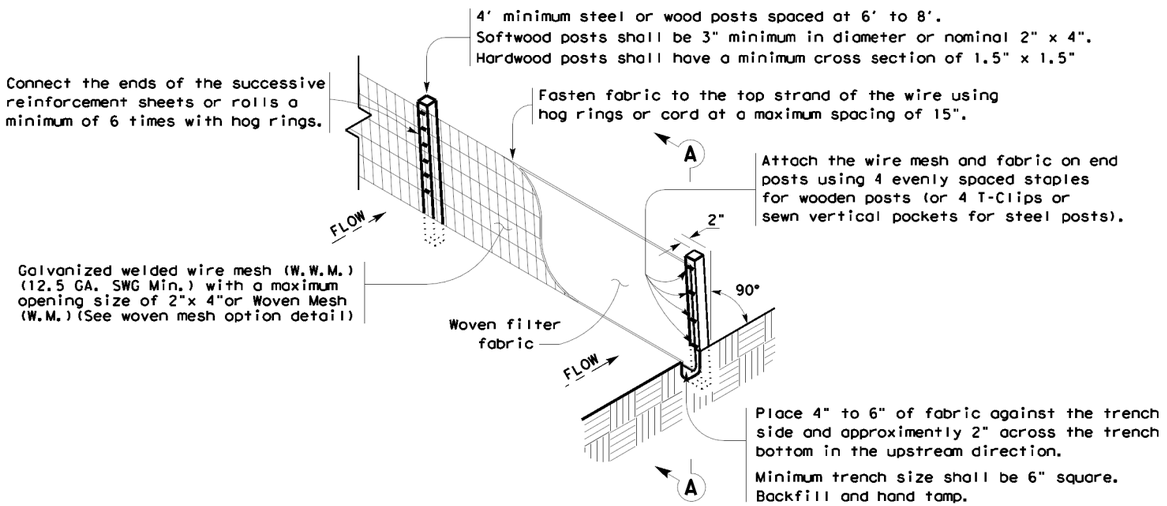
SWP3 LAYOUT
STA: 936+00.00 TO
STA: 952+61.91

SHEET 11 OF 11

CONT	SECT	JOB	HIGHWAY
0002	04	035,ETC.	SH 20
DIST	COUNTY		SHEET NO.
ELP	HUDSPETH		123

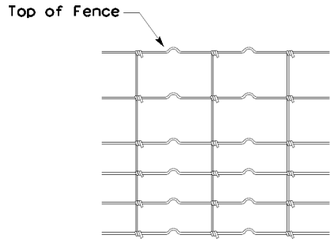
DATE: 11/1/2023 1:34:50 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT5/Documents/24 - ELP/Design Projects/0002040354 - Design/Master Design Files/SH20ContainerSW3P

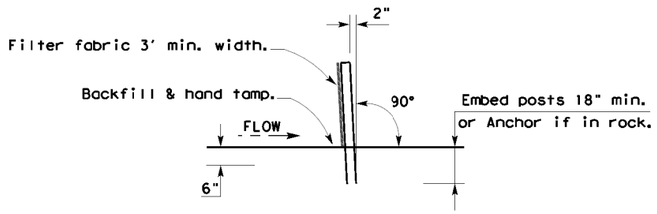
DATE 11/1/2023
FILE D:\#:\txdot.projectwiseonline.com\TXDOT5\Documents\24 - ELP\Design Projects\0002040354 - Design/Plan Set/13. Standards/ENVIRONMENTAL ISSUES STANDARDS/EC(1) - 16



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.

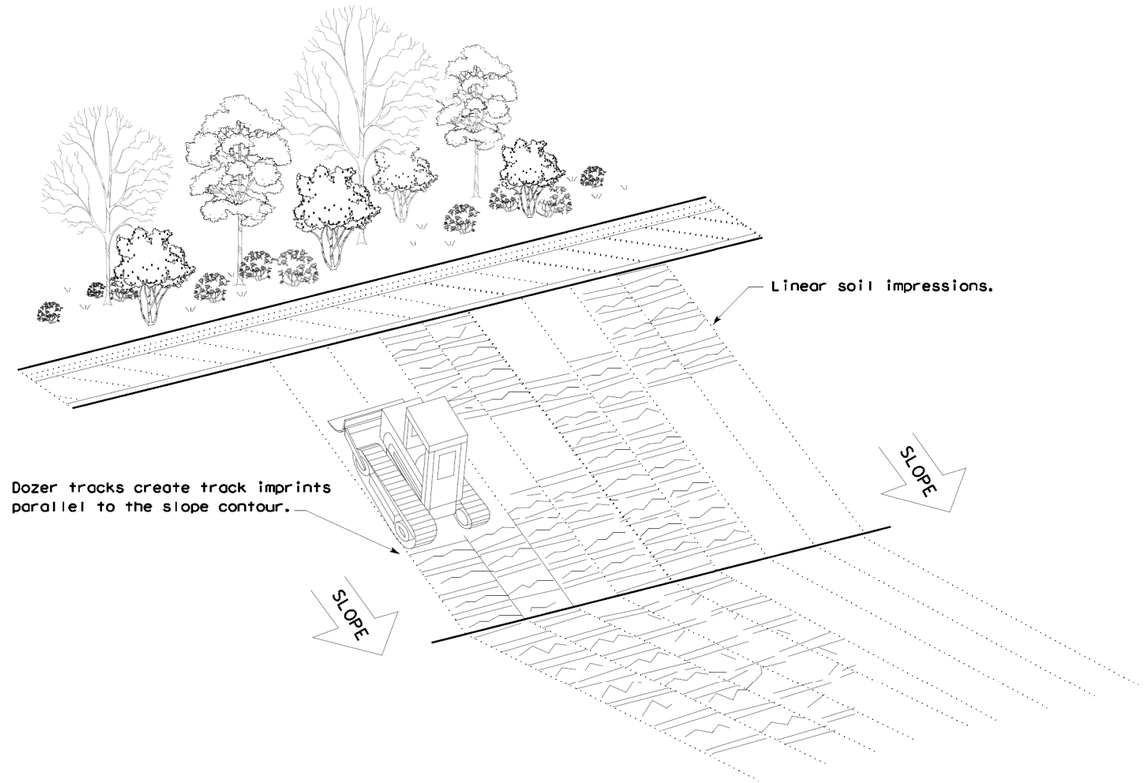
LEGEND

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	0002	04	035,ETC.		SH 20	
	DIST	COUNTY			SHEET NO.	
	ELP	HUDSPETH			124	