

FED. RD. DIV. NO.	6			SHEET NO.	1
STATE	STATE DIST.	COUNTY			
TEXAS	CRP	SAN PATRICIO			
CONT.	SECT.	JOB	HIGHWAY NO.		
0916	28	082	CR 3861		

# STATE OF TEXAS

## DEPARTMENT OF TRANSPORTATION

**INDEX OF SHEETS**  
SEE SHEET 2 FOR INDEX OF SHEETS

### PLANS OF PROPOSED STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT  
PROJECT NO. BR 2B24(048)  
CSJ: 0916-28-082

#### SAN PATRICIO COUNTY CR 3861 (CR 1028)

LIMITS: AT DRAINAGE APPROX. 1.0 MI S OF SH 188

NET LENGTH OF ROADWAY = 526.93 FT = 0.100 MI  
NET LENGTH OF BRIDGE = 35.00 FT = 0.006 MI  
NET LENGTH OF PROJECT = 561.93 FT = 0.106 MI

FOR THE CONSTRUCTION OF: BRIDGE REPLACEMENT  
CONSISTING OF: REPLACE BRIDGE AND APPROACHES

DESIGN SPEED = (MEET OR IMPROVE EXISTING)

GUIDELINES: RDM (JULY 2020) CH 6, SEC 1  
FUNCTIONAL CLASS: LOCAL ROAD  
ADT: 28 (2022) 78 (2042)

NO RAS REVIEW REQUIRED

#### FINAL PLANS

LETTING DATE: \_\_\_\_\_  
DATE CONTRACTOR BEGAN WORK: \_\_\_\_\_  
DATE WORK WAS ACCEPTED: \_\_\_\_\_  
FINAL CONTRACT COST: \$ \_\_\_\_\_  
CONTRACTOR: \_\_\_\_\_

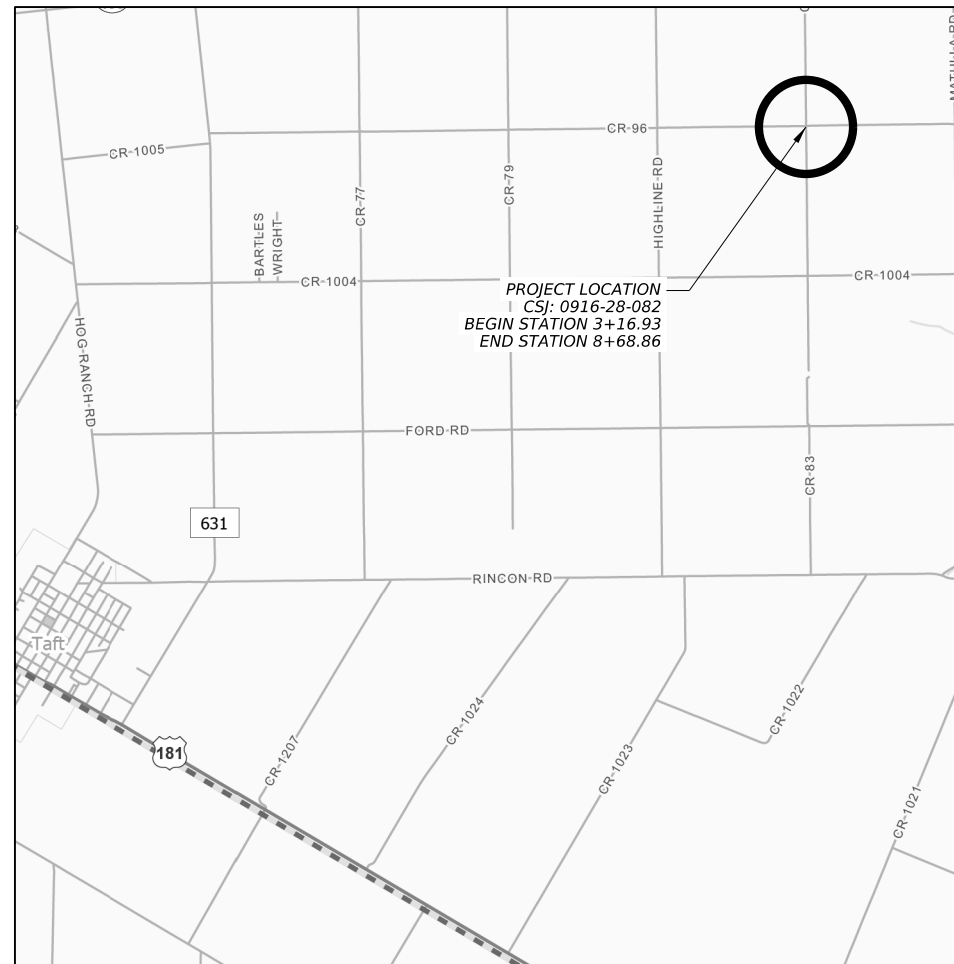
**FINAL PLANS STATEMENT:**

THE CONSTRUCTION WORK WAS PERFORMED IN ACCORDANCE WITH THE PLANS.

P. E. \_\_\_\_\_  
DATE \_\_\_\_\_

AREA ENGINEER \_\_\_\_\_

TEXAS DEPARTMENT OF TRANSPORTATION



N. T. S.

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

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, OCTOBER, 2023)



© 2024 by Texas Department of Transportation; all rights reserved

RECOMMENDED FOR LETTING 5/22/2024

DocuSigned by:  
*Paula Sales-Evans, P.E.*  
5975450A19C0435  
DIRECTOR OF TRANSPORTATION  
PLANNING & DEVELOPMENT

APPROVED FOR LETTING 5/22/2024

DocuSigned by:  
*Valente Olivarez*  
303F64E8A9B44E0  
DISTRICT ENGINEER

FILE LOCATION  
<http://www.txdot.gov/inside-txdot/district/san-antonio/specinfo.html>

COUNTY: SAN PATRICIO PROJ. NO. \_\_\_\_\_  
HWY. NO.: CR 3861 LETTING DATE: AUGUST 2024  
DATE ACCEPTED: \_\_\_\_\_

LEVELS DISPLAYED	
1	

SHEET NO. DESCRIPTION

GENERAL

- 1 TITLE SHEET
- 2 INDEX OF SHEETS
- 3 CR 3861 PROJECT LOCATION MAP
- 4 CR 3861 TYPICAL SECTIONS
- 5, 5A - 5E GENERAL NOTES
- 6, 6A ESTIMATE AND QUANTITY
- 7 SUMMARY OF QUANTITIES

TRAFFIC CONTROL PLAN

- 8 TRAFFIC CONTROL PLAN GENERAL NOTES, AND SEQUENCE OF CONSTRUCTION
- 9 CR 3861 DETOUR LAYOUT

TRAFFIC CONTROL PLAN STANDARDS

- 10 - 21 ## BC(1)-21 THRU BC(12)-21
- 22 ## TCP(3-1)-13
- 23 ## TCP(3-3)-14
- 24 ## TCP(7-1)-13
- 25 ## TCP(S-1)-08A
- 26 ## TCP(S-2)-08A
- 27 ## WZ(RCD)-13
- 28 ## WZ(RS)-22

ROADWAY

- 29 SURVEY CONTROL INDEX SHEET
- 30 HORIZONTAL & VERTICAL CONTROL SHEET
- 31 HORIZONTAL ALIGNMENT DATA
- 32 CR 3861 PLAN & PROFILE
- 33 CR 1064 PLAN & PROFILE
- 34 INTERSECTIONS AND DRIVEWAYS DETAILS

ROADWAY STANDARDS

- 35 ## BED-14
- 36 ## CCCG-22
- 37 ## GF(31)-19
- 38 ## CRP-GF(31)MS-19
- 39, 40 ## GF(31)TRTL3-20
- 41 ## SGT(10S)31-16
- 42 ## SGT(11S)31-18
- 43 ## SGT(12S)31-18
- 44 ## SGT(15)31-20
- 45 ## QGUARD(M10)(N)-20
- 46 ## TAU(M)(N)-19

DRAINAGE

- 47, 48 CR 3861 DRAINAGE AREA MAP
- 49 - 52 CULVERT HYDRAULIC DATA
- 53 - 55 CULVERT LAYOUT
- 56 CEMENT STABILIZED BACKFILL DETAIL
- 57 BCS

DRAINAGE STANDARDS

- 58 ## SCC-MD
- 59, 60 ## SCC-5 & 6
- 61 ## SCP-MD
- 62 ## SCP-6
- 63, 64 ## SETB-PD
- 65 ## SETP-PD
- 66 ## PSET-SP
- 67 ## PSET-RP
- 68 ## PSET-RC
- 69 ## PSET-SC
- 70 ## PSET-RR
- 71, 72 ## SETP-CD

SHEET NO. DESCRIPTION

BRIDGE

- 73 - 76 CR 3861 HYDRAULIC DATA
- 77 CR 3861 BRIDGE LAYOUT
- 78 CR 3861 BOREHOLE DATA
- 79 CR 3861 ESTIMATED QUANTITIES
- 80 CR 3861 CAP ELEVATION DETAILS
- 81 CR 3861 FRAMING PLAN (SPANS NO. 1)

BRIDGE STANDARDS

- 82 ## APSB-24
- 83 ## SPSB-24
- 84 ## CRR
- 85, 86 ## CSAB
- 87, 88 ## FD
- 89 ## PSB-5SB12
- 90 ## PSBEB
- 91 ## PSBRA
- 92 ## PSBSD
- 93, 94 ## SRR
- 95 - 97 ## TYPE T223 RAIL
- 98 ## NBIS

UTILITY

- 99 CR 3861 UTILITY LAYOUT

TRAFFIC

- 100 CR 3861 SIGNING & PAVEMENT MARKERS

TRAFFIC STANDARDS

- 101 ## D & OM(1)-20
- 102 ## D & OM(2)-20
- 103 ## D & OM(3)-20
- 104 ## D & OM(4)-20
- 105 ## D & OM(5)-20
- 106 ## D & OM(VIA)-20

ENVIRONMENTAL

- 107, 108 CR 3861 STORMWATER POLLUTION PREVENTION PLAN (SWP3)
- 109, 110 CR 3861 ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC)
- 111 CR 3861 STORMWATER POLLUTION PREVENTION PLAN LAYOUT

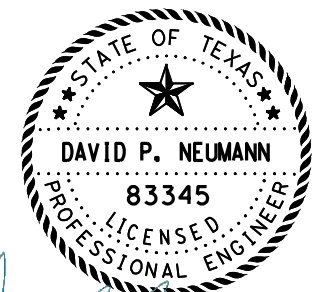
ENVIRONMENTAL STANDARDS

- 112 ## EC(1)-16
- 113 ## EC(2)-16
- 114 ## EC(3)-16
- 115 - 117 ## EC(9)-16

THIS STANDARD SHEETS SPECIFICALLY IDENTIFIED WITH A "##" HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

David P. Neumann, P.E.  
DAVID P. NEUMANN, P.E. 5/9/2024

2024.05.09 14:36:31-05'00'



David P. Neumann, P.E.  
**LOCHNER**  
TBPE Firm Reg. No. 10488

Texas Department of Transportation

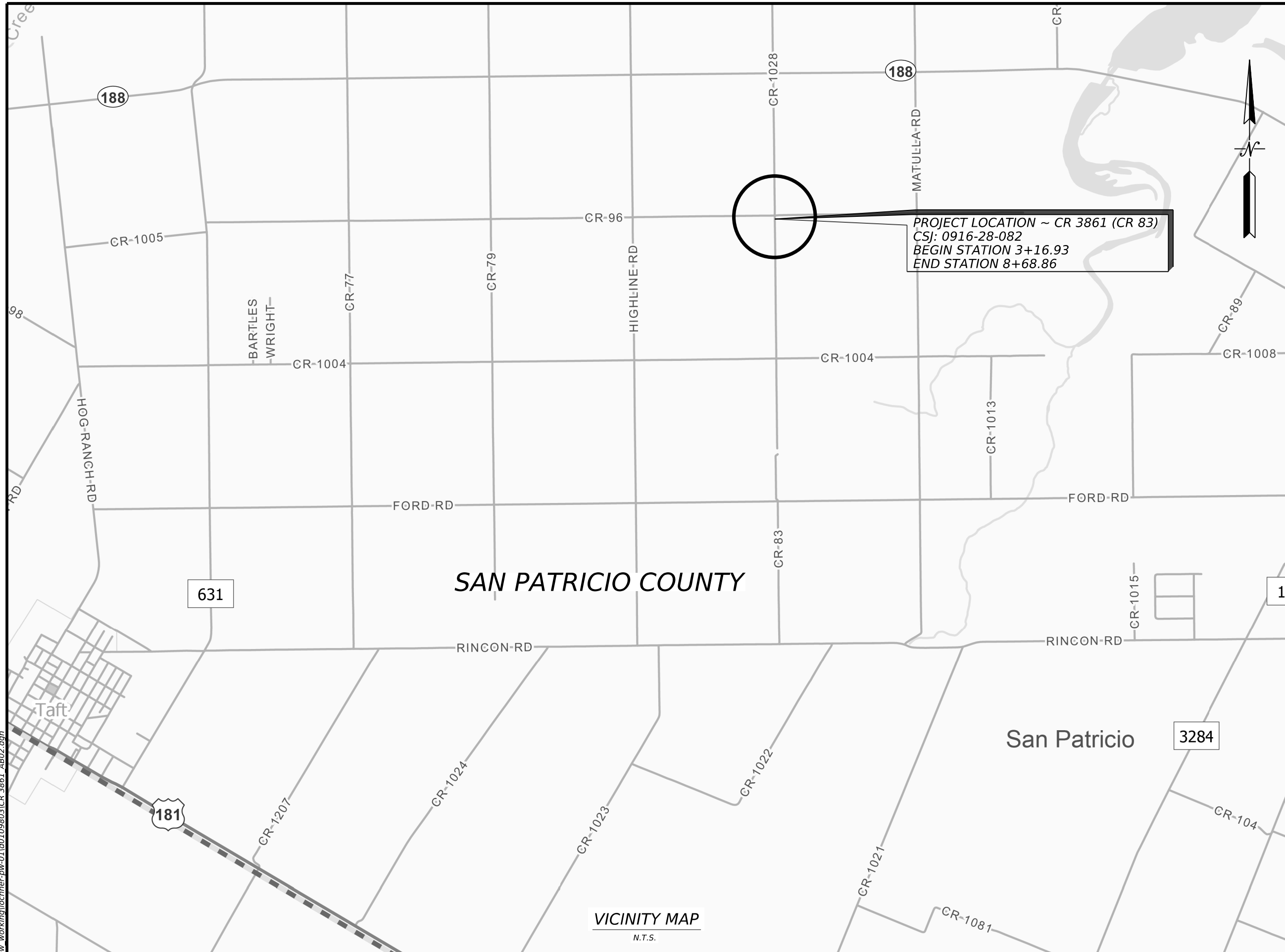
©2024

INDEX OF SHEETS

CONT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	002	

DATE: 5/9/2024 8:52:33 AM  
FILE: c:\pw\_working\lochner-pw-01\0109803\CR3861\_AB01.dgn

DATE: 5/9/2024 8:52:49 AM  
 FILE: c:\pw\_working\lochner-pw-01\0109803\CR 3861 AB02.dgn



**PROJECT LOCATION ~ CR 3861 (CR 83)**  
 CSJ: 0916-28-082  
 BEGIN STATION 3+16.93  
 END STATION 8+68.86

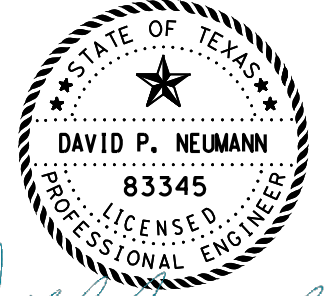


**SAN PATRICIO COUNTY**

San Patricio

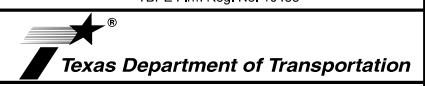
**VICINITY MAP**  
 N.T.S.

2024.05.09 14:36:44-05'00'



*David P. Neumann, P.E.*

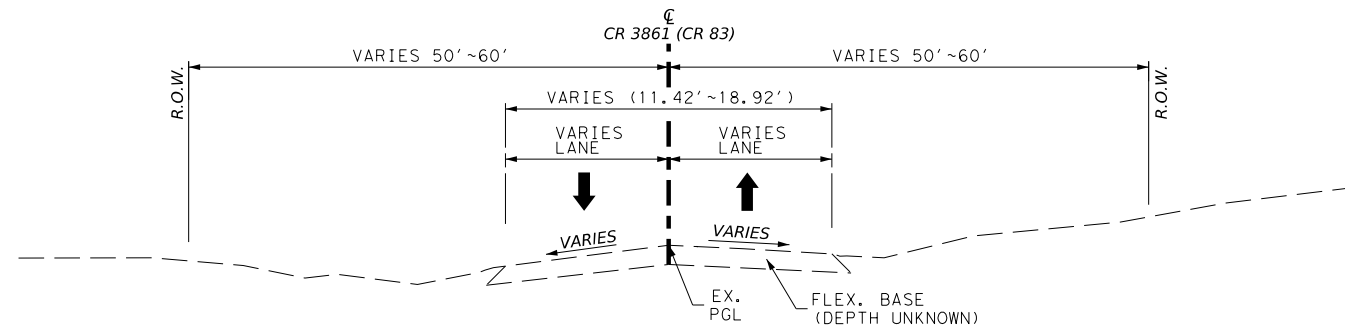
**LOCHNER**  
 TBPE Firm Reg. No. 10488



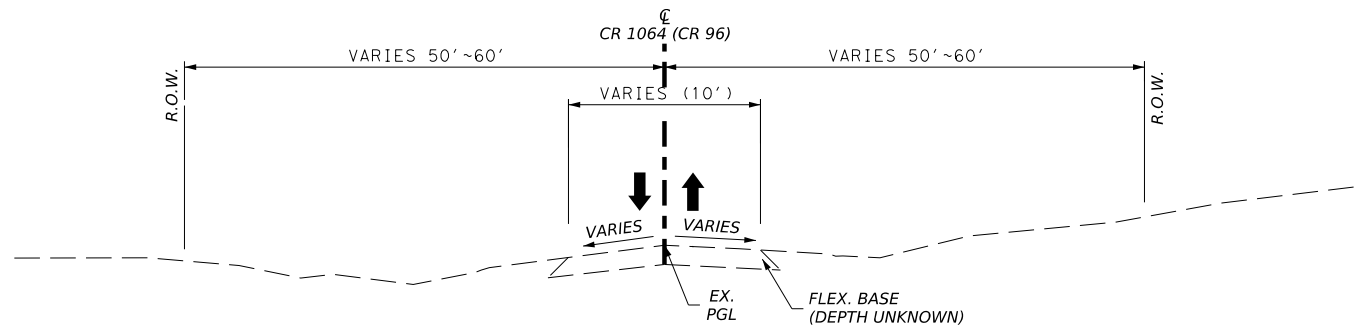
©2024

**CR 3861  
 PROJECT LOCATION  
 MAP**

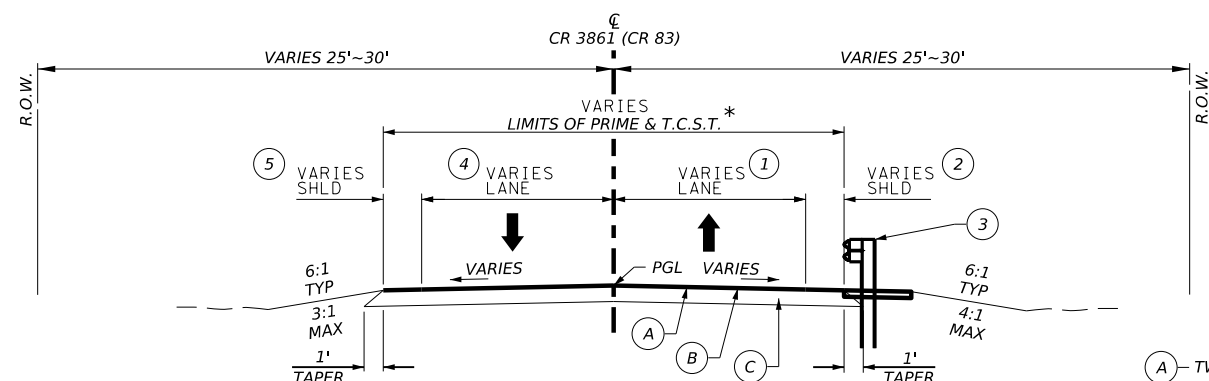
CONT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	003	



EXISTING TYPICAL SECTION



EXISTING TYPICAL SECTION

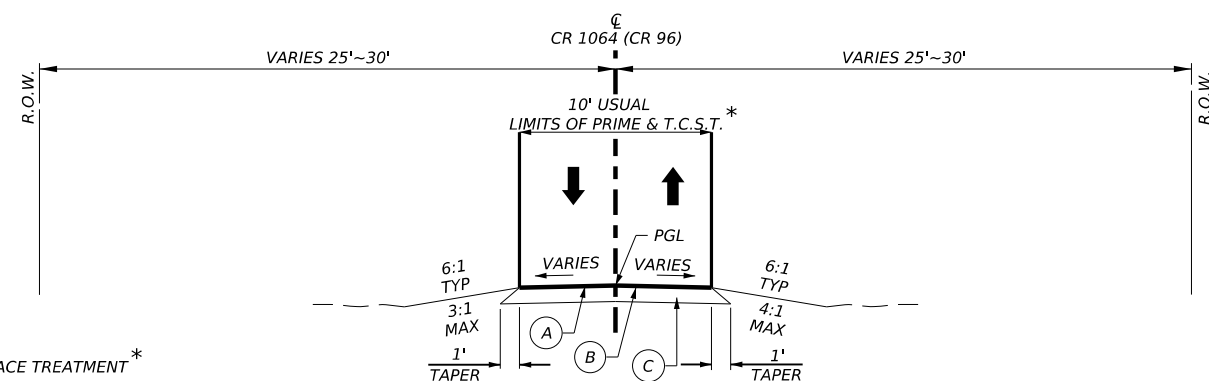


PROPOSED TYPICAL SECTION

CR 3861 CL STA. 3+17.26 TO STA. 4+17.25  
 CR 3861 CL STA. 6+32.30 TO STA. 8+68.86

- ① TRANSITION FROM EXISTING WIDTH OF 5.28' AT STA. 3+17.26 TO 10.00' AT STA. 4+17.25  
 TRANSITION FROM 10.00' AT STA. 6+48.30 TO EXISTING WIDTH OF 5.52' AT STA. 8+68.86
- ② TRANSITION FROM 0.0' AT STA. 3+17.26 TO 2.0' AT STA. 4+17.25  
 TRANSITION FROM 2.0' AT STA. 6.32.30 TO 0.0' AT STA. 8+68.86
- ③ BEGIN MBGF AT END OF WINGWALL/RAIL STA. 5+26.00; END MBGF LENGTH OF NEED AT ABOUT STA. 6+20  
 END MBGF MOWSTRIP STA. 6+76.72
- ④ TRANSITION FROM EXISTING WIDTH OF 6.58' AT STA. 3+17.26 TO 10.00' AT STA. 4+17.25  
 TRANSITION FROM 10.00' AT STA. 6+82.80 TO EXISTING WIDTH OF 3.91' AT STA. 8+68.86
- ⑤ TRANSITION FROM 0.0' AT STA. 3+17.26 TO 2.0' AT STA. 4+17.25  
 TRANSITION FROM 2.0' AT STA. 8+06.45 TO 0.0' AT STA. 8+68.86

- (A) TWO COURSE SURFACE TREATMENT\*
- (B) PRIME (MC-30)
- (C) 12" FLEX BASE (TY A GR 1-2 OR 5)



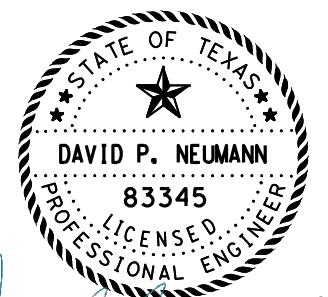
PROPOSED TYPICAL SECTION

CR 1064 CL STA. 10+49.07 TO STA. 13+52.89

(CR 1064) SCARIFY AND MIX EXIST PAV COURSE AND EXIST BASE BEFORE ADDING EMBANKMENT.  
 STA. 10+49.07 TO STA. 11+75.48 - REWORK BS MTL (TY C)(6\*)(ORD COMP)  
 STA. 11+99.48 TO STA. 13+52.89 - REMORK BS MTL (TY C)(6\*)(ORD COMP)  
 INTENT OF THIS ITEM IS TO SCARIFY AND MIX EXISTING PAVEMENT MATERIAL AND UTILIZE IT AS EMBANKMENT MATERIAL IN AREAS OF THE EXISTING ROADBED. IN AREAS OUTSIDE THE EXISTING ROADBED, THE INTENT OF THIS ITEM IS TO TAKE MATERIAL PROVIDED UNDER ITEM 106-6002 (SEE NOTE BELOW) AND UTILIZE AS EMBANKMENT MATERIAL THAT IS SCARIFIED, MIXED, AND COMPACTED UNDER THIS ITEM OF WORK.

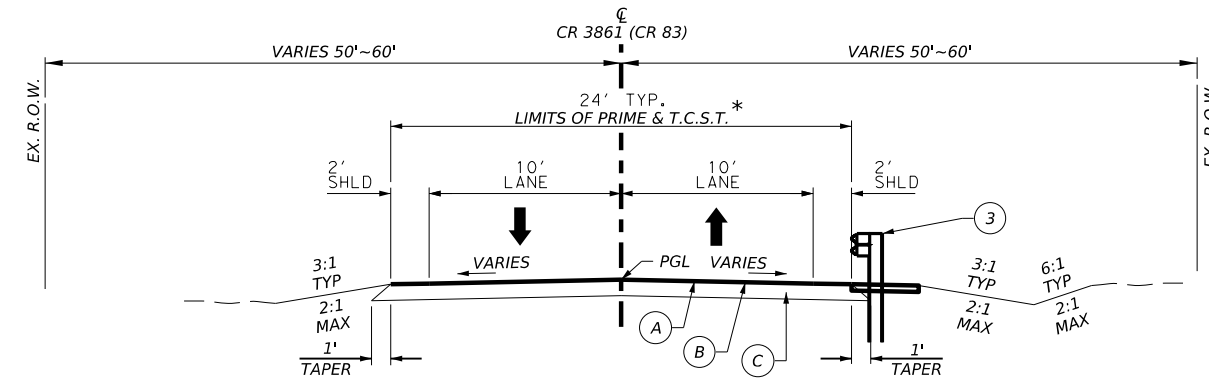
NOTE: EXISTING ROADBED MATERIAL TO BE REMOVED (STA. 10+90 TO STA. 11+75.48 & STA. 11+99.48 TO STA. 13+11) AND RELAYED ALONG CR 1064 PROPOSED ALIGNMENT.  
 PAYMENT FOR REMOVAL AND RELAYING UNDER ITEM 106-6002 "OBLITERATING ABANDONED ROAD".

2024.05.09 14:36:55-05'00"



David P. Neumann, P.E.  
**LOCHNER**  
 TBPE Firm Reg. No. 10488

- \* TWO COURSE SURFACE TREATMENT
- FIRST COURSE:  
 - ASPH (MULTI-OPTION)  
 (AC-10, CRS-2 OR HFRS-2)  
 - AGGR  
 (TY-PB GR-3 OR TY-PB GR-3S)(SAC-B)
- SECOND COURSE:  
 - ASPH  
 (AC-15P, CRS-2P OR HFRS-2P)  
 - AGGR  
 (TY-PB GR-4 OR TY-PB GR-4S)(SAC-B)

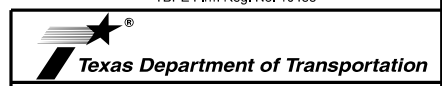


PROPOSED TYPICAL SECTION

CR 3861 CL STA. 4+17.25 TO STA. 6+32.30  
 (BRIDGE STA. 4+85.00 TO 5+20.00 - SEE BRIDGE LAYOUT FOR DETAILS)

(CR 3861) SCARIFY AND MIX EXIST PAV COURSE AND EXIST BASE BEFORE ADDING EMBANKMENT.  
 STA. 3+17.26 TO STA. 4+85.00 - REWORK BS MTL (TY C)(6\*)(ORD COMP)  
 STA. 5+20.00 TO STA. 8+68.86 - REMORK BS MTL (TY C)(6\*)(ORD COMP)

DATE: 5/9/2024 8:53:14 AM  
 FILE: c:\pw\_working\lochner-pw-01\0109803\CR3861\_AC01.dgn



© 2024

**CR 3861 TYPICAL SECTIONS**

CONT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	004	



County: SAN PATRICIO

Control: 0916-28-082

Highway: CR 3861

**GENERAL NOTES:**

Find, for your information and convenience, tools such as forms, software, materials, and various other information provided by the Department at <https://www.txdot.gov/business.html>. Please note that these tools are updated periodically, and your attention is directed to the latest edition.

In the event of a called evacuation, emergencies, impending adverse weather or as directed, do not perform any work without written authorization. The District reserves the right to suspend all work in support of evacuations or emergencies occurring from other parts of the state. Any work performed, other than work directed by the Department, is unauthorized work in accordance with Item 5.

Sweep, clean and remove any construction waste, surplus materials or debris from the roadway and right of way at the end of each day unless otherwise approved. The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

Asphalt application season will be established in accordance with Item 316.4.4 Adverse Weather Conditions or as directed by the Engineer.

Cut existing pavement using a saw or other approved method to ensure a neat transverse and/or longitudinal line to assure a smooth tie-in with new pavement. Cut to a minimum depth of the final lift thickness. The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

Promptly pick up and properly dispose of paper and other materials used for pavement joints.

All pavement markings shall be in accordance with the latest edition of Texas MUTCD.

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

Fidencio Lopez, P.E.      [Fidencio.Lopez@txdot.gov](mailto:Fidencio.Lopez@txdot.gov)  
Chandler Williams, P.E.      [Chandler.Williams@txdot.gov](mailto:Chandler.Williams@txdot.gov)

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

<https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors>

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

The Letting Pre-Bid Q&A web page for each project can be accessed by using the dashboard to navigate to the project you are interested in by scrolling or filtering the dashboard using the controls on the left.

General Notes

Sheet A

County: SAN PATRICIO

Control: 0916-28-082

Highway: CR 3861

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.

**ITEM 2**

It is recommended that prospective bidders examine the specified work locations with the Engineer to view the nature of the work, the need for close coordination with the various utilities, traffic control considerations, and other factors influencing the prosecution of the work.

**ITEM 5**

For this project submit shop drawings for the fabrication of structural items to:

[kdickey@hwlochner.com](mailto:kdickey@hwlochner.com), copy TxDOT Area Engineer and [CRP-ShopPlanReview@txdot.gov](mailto:CRP-ShopPlanReview@txdot.gov) and others as shown in the *Guide to Electronic Shop Drawing Submittal* found at [https://ftp.txdot.gov/pub/txdot-info/library/pubs/bus/bridge/e\\_submit\\_guide.pdf](https://ftp.txdot.gov/pub/txdot-info/library/pubs/bus/bridge/e_submit_guide.pdf).

Field verify all dimensions and notify Engineer prior to initiating any work.

Verify the locations of utilities, underground or overhead, shown within the limits of the right-of-way. Adhere to OSHA Standards when working within the vicinity of overhead power lines. Coordinate with the utility companies and notify the Engineer of any possible conflicts. The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

The 811 call services for a utility location does not include TxDOT facilities. Provide notification to the District Traffic Signal Shop by email at [CRP\\_Utility\\_Locate@txdot.gov](mailto:CRP_Utility_Locate@txdot.gov) or call 361-739-6044 when planning, drilling, or excavating in areas where existing TxDOT underground utilities exist. Visual evidence of TxDOT underground utilities in the area include illumination poles, ground boxes, flashing beacons, traffic signals, etc. This notification must be provided 48 hours in advance of performing the work, but no earlier than 72 business hours before the work will commence. Drilled shaft locations or excavation areas must be staked prior to the notification so that the underground utilities can be located in relationship to the proposed work.

Notify the Engineer immediately of utility conflicts in accordance with Item 5.6. Refer to Item 4.5 for consideration of differing site conditions.

The responsibility for the construction surveying on this contract will be in accordance with Item 5.9.1, "Method A".

This project was developed using 3D design software and tools. A proposed 3D model of the project In Extensible Markup Language (XML) and 3D PDF format is available upon

General Notes

Sheet B

DATE: 2/16/2022  
FILE:

		FED. RD. DIV. NO.		FEDERAL AID PROJECT NO.	
		0916	28	082	CR 3861
<b>GENERAL NOTES</b>		DIST.		SHEET NO.	
		CRP	SAN PATRICIO	005	

County: SAN PATRICIO

Control: 0916-28-082

Highway: CR 3861

request. These models are specifically intended to aid the contractor in preparing bids and in the use of automated machine guidance equipment for the project construction. If discrepancies are found, numerical dimensions in the cross-sections and plan sheets govern over the 3D model.

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

**ITEM 6**

Inspection at Precast Concrete Fabrication Plants is as follows: TxDOT's Materials and Pavements Section will inspect any precast units at commercial fabrication yards and staging areas. The Area Engineer will inspect all other precast units.

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

Refer to the Buy America Material Classification Sheet for clarification on material categorization.

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

**ITEM 7**

The work performed for Item 7.2.4, "Public Safety and Convenience" will not be measured or paid for directly but will be subsidiary to pertinent Items.

When working at street, farm-to-market, state highway, and county road intersections, schedule work to minimize intersection closures. During nonworking hours, all public road intersections will be open to the traveling public.

The total disturbed area for this project is 0.96 acres. The disturbed area in this project, all project locations in the Contract, and Contractor project specific locations (PSLs), within 1 mile of the project limits, for the Contract will further establish the authorization requirements for storm water discharges. The Department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities

General Notes

Sheet C

County: SAN PATRICIO

Control: 0916-28-082

Highway: CR 3861

shown on the plans. The Contractor is to obtain any required authorization from the TCEQ for any Contractor PSLs for construction support activities on or off ROW. When the total area disturbed for all projects in the Contract and PSLs within 1 mile of the project limits exceeds 5 acres, provide a copy of the Contractor NOI for PSLs on the ROW to the Engineer.

Establish uniform perennial vegetative coverage with a density of at least 70% of the native background vegetative cover to achieve final stabilization.

Comply with the Texas Aggregate Quarry and Pit Safety Act for waste areas or material source areas resulting from this project.

No significant traffic generator events identified.

**ITEM 8**

Prepare the progress schedule using the Critical Path Method (CPM). Submit (2) two 11" x 17" hard copies and an electronic file of the original or updated progress schedule. Submit the original progress schedule seven (7) days before the Preconstruction Conference.

Submit an updated progress schedule as directed to show proposed major changes, changes affecting compliance with the contract requirements, or changes affecting the critical path/controlling item of work.

Working days will be computed and charge in accordance with Article 8.3.1.4, "Standard Workweek".

Work above traffic is not allowed.

Nighttime work is allowable.

Notify the Engineer at least 48 hours in advance of weekend or nighttime work.

**ITEM 9**

Monthly progress payments will be made for items of work completed by the 28th day of each month. Any work completed after the 28th will be included for payment in the subsequent monthly progress estimate.

Submit signed request for compensation of material-on-hand (MOH), including any requests from subcontractors, suppliers, or fabricators for MOH, at least two (2) working days prior to the end of the month on the Departments approved forms.

General Notes

Sheet D

DATE: 2/16/2022  
FILE:

		FED. RD. DIV. NO.		FEDERAL AID PROJECT NO.	
		CONT	SECT	JOB	HIGHWAY
GENERAL NOTES		0916	28	082	CR 3861
		DIST	COUNTY	SHEET NO.	
		CRP	SAN PATRICIO	005A	

County: SAN PATRICIO

Control: 0916-28-082

Highway: CR 3861

**ITEM 100**

Coordinate all right of way preparation activities with the project's Storm Water Pollution Prevention Plan (SWP3) and Environmental Permit Issues, and Commitments Sheet (EPIC) or as approved.

Prune trees and shrubs as directed. Use accepted pruning practices in accordance with Item 192 and as defined by the National Arborist Association. The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

**ITEM 110**

For earth cuts, manipulate and compact subgrade in accordance with Item 132.3.4.2, "Compaction Methods, Density Control".

**ITEM 132**

Use embankment material with a plasticity index (PI) ranging from 10 to 40. Blend or treat approved materials to achieve the desired PI and pulverize the material so that 100% passes the 3-inch sieve. Retest materials as borrow sources change or when the material changes significantly. Notify the Engineer of the proposed material sources and of changes to material sources. The Engineer may sample and test project materials at any time before compaction throughout the duration of the project to assure specification compliance. The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

Obtain approval to incorporate existing salvaged asphaltic surface and flexible base materials in the surface layer. If approved, incorporate existing materials no larger than 2 inches in the surface layer. The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

The estimated quantities for embankments adjacent to culverts and bridges were calculated using the average-end-area method.

**ITEM 164**

Restore and seed areas not shown in the plans disturbed by the Contractor's operations. The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

Notify the Engineer of the unavailability of any seed mix. Make changes to the seed mix as approved.

General Notes

Sheet E

County: SAN PATRICIO

Control: 0916-28-082

Highway: CR 3861

Use a tacking agent of 50% SS-1 and 50% water and apply the agent at a rate of 0.10 gal/sy or as directed. A biodegradable tacking agent may be used in lieu of the SS-1 tacking agent in accordance with the manufacturer's recommendations when approved. The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

**ITEM 166**

Furnish and apply slow-release nitrogen fertilizer with a rate of 60 pounds of nitrogen per acre.

**ITEM 168**

Distribute water to only those areas shown in the plans or as directed. Excessive overspray will not be permitted.

Water all areas of the project to be seeded or sodded every two (2) days for 90 days or as directed. Apply water in a manner to ensure adequate moisture but not to erode the soil in-place. During periods of adequate moisture, mechanical watering may not be required as approved. Upon final stabilization, the Engineer may require to continue watering as specified for a period not to exceed 30 days.

The Basis of Estimate below establishes the approximate quantity of water required to complete the 90-day watering cycle:

Rate	Water (Gal/Acre/Day)	Area (Acre)	Total Gallons (Min)
0.25 inch/week	1961	1	88,245

**ITEM 247**

For Table 1, "Material Requirements" a minimum plasticity index (PI) of 4 is required for Ty A Gr 1-2 Flex Base.

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

**ITEM 310**

Use MC-30 at a rate of 0.20 gallons per square yard or as directed.

General Notes

Sheet F

DATE: 2/16/2022  
FILE:

		FED. RD. DIV. NO.		FEDERAL AID PROJECT NO.	
		0916	28	082	CR 3861
<b>GENERAL NOTES</b>		DIST.		SHEET NO.	
		CRP	SAN PATRICIO		005B

County: SAN PATRICIO

Control: 0916-28-082

Highway: CR 3861

A minimum prime coat curing period shall be determined by the Engineer during or prior to the preconstruction meeting. This curing period may be revised by the Engineer throughout the duration of the project pending weather and observed performance.

**ITEM 316**

Do not place surface treatment on exposed concrete structures unless directed.

Furnish a distributor equipped with a working hand hose.

Material rates shown are for estimating purposes only. Adjust actual rates based on the material used, the existing condition and type of roadway surface, and as approved.

When using asphalt emulsion, a minimum 24-hour curing period is required before placing any subsequent asphalt courses.

Remove vegetation and blade pavement edges prior to surfacing operations. The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

Broom and clean sealed sections of roadway and all adjacent paved surfaces, including the gutter line, of any surplus aggregate before opening to traffic or as directed.

**ITEM 400**

Compact each layer to meet the density and consolidation of the adjacent undisturbed material.

Use cement-stabilized backfill for culvert and storm drains located beneath the pavement structure.

**ITEM 420**

Set a Department-furnished brass disk on all bridge abutments and culvert headwalls as directed. The work performed will not be measured or paid directly but will be subsidiary to pertinent Items.

Bent concrete will be a plans quantity item.

Place longitudinal construction joints at the lane line for bridge approach slabs. These construction joints will be subsidiary to Item 420.

When a precast or cast-in-place concrete element is included in the plans, a precast concrete alternate may be submitted in accordance with "Standard Operating Procedure for Alternate

General Notes

Sheet G

County: SAN PATRICIO

Control: 0916-28-082

Highway: CR 3861

Precast Proposal Submission" found online at <https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/publications/bridge.html#design>. Acceptance or denial of an alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor.

**ITEM 421**

The Engineer will provide strength-testing equipment for acceptance testing.

Furnish curing facilities adequately sized for this project as approved.

Furnish test molds for cylindrical concrete specimens measuring four (4") inches in diameter by eight (8") inches in length.

**ITEM 422**

Power-wash the surface of the precast beams before placement of concrete deck concrete to the satisfaction of the Engineer.

**ITEM 427**

Provide a rub finish for Surface Area II unless otherwise directed.

**ITEM 432**

Saw cut the existing riprap to ensure a neat transverse and/or longitudinal line to assure a smooth tie-in with new riprap. The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

Use Cap Option C for the joint between the face of the abutment and riprap as shown on the standard sheet "Concrete Riprap (CRR)".

Use intermediate toewalls as shown on the standard sheet "Concrete Riprap (CRR)".

Reinforce concrete riprap with flat sheets of welded wire fabric or with No. 3 reinforcing bars spaced at a maximum of 12 inch in each direction.

Weep holes shall be required unless otherwise directed by engineer.

General Notes

Sheet H

DATE: 2/16/2022  
FILE:

		FED. RD. DIV. NO.		FEDERAL AID PROJECT NO.	
		0916	28	082	CR 3861
<b>GENERAL NOTES</b>		DIST	COUNTY	SHEET NO.	
		CRP	SAN PATRICIO	005C	

County: SAN PATRICIO

Control: 0916-28-082

Highway: CR 3861

**ITEM 462**

Use cold-applied, plastic asphalt sewer joint compound for all joints. Provide sandproof tape for all pipe placed in cohesionless backfill material as approved or provide gaskets that conform to Item 464.2.7.3.

Cement stabilized backfill is not considered cohesionless for this item.

The work performed for concrete collars will not be measured or paid for directly but will be subsidiary to pertinent Items.

**ITEM 464**

The work performed for concrete collars will not be measured or paid for directly but will be subsidiary to pertinent Items.

**ITEM 467**

The flowline of the safety end treatment shall match the flowline of the culvert. Reinforce concrete riprap with 4 x 4 – W2.9 x W2.9 welded wire fabric or with No. 3 reinforcing bars spaced at a maximum of 12 inch in each direction.

The work performed for concrete collars will not be measured or paid for directly but will be subsidiary to pertinent Items.

All safety end treatments shall include riprap to the dimensions shown on PSET-RR. This riprap shall be subsidiary to Item 467.

**ITEM 496**

Contractor shall provide a demolition plan to the Engineer for approval.

**ITEM 500**

"Materials on Hand" payments are not considered when determining partial payments.

**ITEM 502**

Furnish additional barricades, signs, and traffic handling as directed. The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

General Notes

Sheet I

County: SAN PATRICIO

Control: 0916-28-082

Highway: CR 3861

Attach stop/slow paddle to a staff with a minimum length of 6 feet to the bottom of the sign.

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

All items marked as optional on all traffic control standards shall be required unless otherwise approved by an Engineer.

**ITEM 504**

No field office will be required for this project.

**ITEM 506**

Designate in writing a Contractor Responsible Person (CRP) for implementing, maintaining, and reviewing environmental requirements.

**ITEM 530**

If conditions warrant, driveway locations, widths, or lengths may be adjusted as directed.

**ITEM 540**

Mixing of wood post types and shapes will not be permitted at the same location.

Type II Galvanization coatings will be used.


**ITEM 644**

Use crash worthy supports as shown on the BC sheets, the CWZTCD, or as directed for signs relocated using temporary supports. The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

General Notes

Sheet J

DATE: 2/16/2022  
FILE:

		FED. RD. DIV. NO.		FEDERAL AID PROJECT NO.	
		CONT	SECT	JOB	HIGHWAY
GENERAL NOTES		0916	28	082	CR 3861
		DIST	COUNTY	SHEET NO.	
		CRP	SAN PATRICIO	005D	

County: SAN PATRICIO

Control: 0916-28-082

Highway: CR 3861

All slip bases and hardware including but not limited to nuts, bolts, screws and washers will be galvanized. All sign and housing components will be galvanized. Slip bases shall be clamp-style.

**ITEM 658**

Furnish round delineators and object markers.

**ITEM 6001**

Furnish the portable changeable message signs displaying the correct message at least seven (7) days prior to beginning work or as directed.

The Contractor's Responsible Person (CRP) will maintain full control of messages at all times.

The Engineer will provide the sign message text to use at each sign.

A minimum of 2 PCMS will be required per location. However, additional units may be necessary depending on the work in progress.

Standby time will not be measured or paid for directly but will be subsidiary to pertinent Items.

Portable changeable message signs may be moved, and message changed at any time as deemed necessary by the Engineer. This will be considered subsidiary to Item 6001.

**ITEM 6185**

A minimum of 1 TMA will be required per location. However, additional units may be necessary depending on the work in progress.

Provide manufacturer's curb weight or certified scales weight ticket to the Engineer for approval.

General Notes

Sheet K

County: SAN PATRICIO

Control: 0916-28-082

Highway: CR 3861

\*\*\*\*\*

**SPECIFICATION DATA**

**UNIT WEIGHT ESTIMATES**

ITEM 247: FL BS (CIP)(TY A GR 1-2 OR 5)(FINAL) ----- 135 LBS/CF

**MATERIAL PROPERTIES**

ITEM 132: EMBANKMENT (FINAL) (DENS CONT) (TY C)

PLASTICITY INDEX ----- 40 MAX

PLASTICITY INDEX ----- 10 MIN

**COMPACTION REQUIREMENTS FOR BASE COURSE**

ITEM 247: FL BS (CIP)(TY A GR 1-2 OR 5)(FINAL)

DENSITY ----- 100% MIN.

LIFTS ----- ALL

**PRIME COAT**

ASPHALT TYPE ----- MC-30

AVERAGE ASPHALT RATE ----- 0.20 GAL/SY

**TWO COURSE SURFACE TREATMENT**

**1<sup>ST</sup> COURSE:**

ASPHALT TYPE ----- AC-10, CRS-2 OR HFRS-2

AVERAGE ASPHALT RATE ----- 0.35 GAL/SY

AGGREGATE RATE ----- 1 CY/110 SY

AGGREGATE TYPE ----- PB

AGGREGATE GRADE ----- 3 OR 3S, SAC-B

**2<sup>ND</sup> COURSE:**

ASPHALT TYPE ----- AC-15P, CRS-2P OR HFRS-2P

AVERAGE ASPHALT RATE ----- 0.35 GAL/SY

AGGREGATE RATE ----- 1 CY/125 SY

AGGREGATE TYPE ----- PB

AGGREGATE GRADE ----- 4 OR 4S, SAC-B

General Notes

Sheet L

DATE: 2/16/2022  
FILE:

		FED. RD. DIV. NO.		FEDERAL AID PROJECT NO.	
		0916	28	082	CR 3861
<b>GENERAL NOTES</b>		COUNTY		SHEET NO.	
		SAN PATRICIO		005E	





# Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0916-28-082

DISTRICT Corpus Christi  
HIGHWAY CR 1028

COUNTY San Patricio

CONTROL SECTION JOB				0916-28-082		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00136649			
COUNTY				San Patricio			
HIGHWAY				CR 1028			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	100-6002	PREPARING ROW	STA	8.000		8.000	
	106-6002	OBLITERATING ABANDONED ROAD	SY	127.000		127.000	
	110-6001	EXCAVATION (ROADWAY)	CY	512.000		512.000	
	132-6006	EMBANKMENT (FINAL)(DENS CONT)(TY C)	CY	78.000		78.000	
	160-6003	FURNISHING AND PLACING TOPSOIL (4")	SY	2,914.000		2,914.000	
	164-6001	BROADCAST SEED (PERM) (RURAL) (SANDY)	SY	2,914.000		2,914.000	
	168-6001	VEGETATIVE WATERING	MG	53.100		53.100	
	247-6466	FL BS (CIP)(TY A GR 1-2 OR 5) FINAL POS	CY	493.000		493.000	
	251-6013	REWORK BS MTL (TY C) (6") (ORD COMP)	STA	9.000		9.000	
	310-6009	PRIME COAT (MC-30)	GAL	296.000		296.000	
	316-6001	ASPH (MULTI OPTION)	GAL	518.000		518.000	
	316-6413	ASPH(AC-15P, HFRS-2P OR CRS-2P)	GAL	518.000		518.000	
	316-6427	AGGR(TY-PB GR-4S OR TY-PB GR-4)(SAC-B)	CY	12.000		12.000	
	316-6430	AGGR(TY-PB GR-3 OR TY-PB GR-3S)(SAC-B)	CY	14.000		14.000	
	400-6005	CEM STABIL BKFL	CY	66.900		66.900	
	416-6002	DRILL SHAFT (24 IN)	LF	234.000		234.000	
	420-6013	CL C CONC (ABUT)	CY	20.400		20.400	
	422-6007	REINF CONC SLAB (SLAB BEAM)	SF	910.000		910.000	
	425-6010	PRESTR CONC SLAB BEAM (5SB12)	LF	172.500		172.500	
	432-6008	RIPRAP (CONC)(CL B)(RR8&RR9)	CY	8.000		8.000	
	432-6033	RIPRAP (STONE PROTECTION)(18 IN)	CY	100.000		100.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	6.000		6.000	
	450-6006	RAIL (TY T223)	LF	94.000		94.000	
	462-6010	CONC BOX CULV (6 FT X 3 FT)	LF	18.900		18.900	
	462-6099	CONC BOX CULV (6 FT X 2 FT)	LF	33.600		33.600	
	464-6005	RC PIPE (CL III)(24 IN)	LF	120.300		120.300	
	467-6204	SET (TY I)(S= 6 FT)(HW= 3 FT)(3:1) (C)	EA	2.000		2.000	
	467-6211	SET (TY I)(S= 6 FT)(HW= 4 FT)(3:1) (C)	EA	2.000		2.000	
	467-6395	SET (TY II) (24 IN) (RCP) (6: 1) (P)	EA	6.000		6.000	
	496-6007	REMOV STR (PIPE)	LF	232.000		232.000	
	496-6009	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	EA	1.000		1.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	7.000		7.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	45.000		45.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	45.000		45.000	
	506-6021	CONSTRUCTION EXITS (INSTALL) (TY 2)	SY	78.000		78.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	78.000		78.000	



Report Generated By: txdotconnect\_internal\_ext

Report Created On: Jun 19, 2024 1:13:56 PM

DISTRICT	COUNTY	CCSJ	SHEET
Corpus Christi	San Patricio	0916-28-082	6



# Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0916-28-082

DISTRICT Corpus Christi  
HIGHWAY CR 1028

COUNTY San Patricio

CONTROL SECTION JOB				0916-28-082		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00136649			
COUNTY				San Patricio			
HIGHWAY				CR 1028			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	30.000		30.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	30.000		30.000	
	530-6003	INTERSECTIONS (SURF TREAT)	SY	94.000		94.000	
	530-6006	DRIVEWAYS (SURF TREAT)	SY	34.000		34.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	25.000		25.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	1.000		1.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	1.000		1.000	
	545-6018	CRASH CUSH ATTEN (INSTL)(S)(N)(TL2)	EA	3.000		3.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	1.000		1.000	
	658-6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	EA	4.000		4.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	3.000		3.000	
	658-6100	INSTL OM ASSM (OM-2Z)(WFLX)GND(BI)	EA	6.000		6.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2.000		2.000	
	6185-6002	TMA (STATIONARY)	DAY	85.000		85.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	

**SUMMARY OF ROADWAY**

LOCATION	0100-6002 PREPARING ROW	0106-6002 OBILITERATING ABANDONED ROAD	0110-6001 EXCAVATION ROADWAY	0132-6006 EMBANKMENT (FINAL) (DENS CONT)(TY C)	0247-6466 FL BS (CIP) (TYA GR1-2 OR 5) FINAL POS	0251-6013 REWORK BS MTL (TY C)(6") (ORD COMP)	0310-6009 PRIME COAT (MC-30)	0316-6001 ASPH (MULTI OPTION)	0316-6413 ASPH (AC-15, HFRS-2P, OR CRS-2P)	0316-6427 AGGR (TY-PB GR-4S OR TY-PB GR-4)(SAC-B)	0316-6430 AGGR (TY-PB GR-3 OR TY-PB GR-3S)(SAC-B)
	STA	SY	CY	CY	CY	STA	GAL	GAL	GAL	CY	CY
CR 3861 ~ 0916-28-082	6		448	51	418	5.2	251	439	439	10	12
CR 1064 ~ 0916-28-082	2	127	64	27	75	3.8	45	79	79	2	2
<b>PROJECT TOTALS:</b>	8	127	512	78	493	9.0	296	518	518	12	14

■ - ASPH (AC-10, CRS-2, OR HFRS-2)

**SUMMARY OF BRIDGE QUANTITIES**

LOCATION	N.B.I. NO.	0400-6005 CEM STABIL BKFL	0416-6002 DRILL SHAFT (24 IN)	0420-6013 CL C CONC (ABUT)	0422-6007 REINF CONC SLAB (SLAB BEAM)	0425-6010 PRESTR CONC SLAB BEAM (5S812)	0432-6008 RIPRAP (CONC) (CL B)(RR8&RR9)	0432-6033 RIPRAP (STONE PROTECTION) (18 IN)	0450-6006 RAIL (TY T223)	0496-6009 REMOV STR (BRIDGE 0 - 99 FT LENGTH)
		CY	LF	CY	SF	LF	CY	CY	LF	EA
CR 3861 ~ BRIDGE STA. 4+85.00 TO STA. 5+20.00	N.B.I. NO. 16-205-0-AA10-28-001	21	234	20.4	910	172.50	8	100	94	1
<b>PROJECT TOTALS:</b>		21	234	20.4	910	172.50	8	100	94	1

**SUMMARY OF DRAINAGE QUANTITIES**

LOCATION	0400-6005 CEM STABIL BKFL	0462-6010 CONC BOX CULV (6 FT X 3 FT)	0462-6099 CONC BOX CULV (6 FT X 2 FT)	0477-6204 SET (TY I) (S= 6FT)(HW= 3FT) (3:1)(C)	0467-6211 SET (TY I) (S= 6FT)(HW= 4FT) (3:1)(C)	0496-6007 REMOV STR (PIPE)
	CY	LF	LF	EA	EA	LF
CR 3861 ~ 0916-28-082	25.7	18.9	33.6	2	2	118
<b>PROJECT TOTALS:</b>	25.7	18.9	33.6	2	2	118

**SUMMARY OF SIGNS**

LOCATION	0644-6076 REMOVE SM RD SN SUP&AM	0658-6014 INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	0658-6062 INSTL DEL ASSM (D-SW)SZ 1 (BRF)GF2(BI)	0658-6100 INSTL OM ASSM (OM-2Z)(WFLX) GND(BI)
	EA	EA	EA	EA
CR 3861 ~ 0916-28-082	1	4	3	6
<b>PROJECT TOTALS:</b>	1	4	3	6

**SUMMARY OF METAL BEAM GUARD FENCE**

LOCATION	0432-6045 RIPRAP (MOW STRIP) (4 IN)	0540-6001 MTL BEAM GD FEN(TIM POST)	0540-6006 MTL BEAM GD FEN TRANS (THRIE-BEAM)	0544-6001 GUARDRAIL END TREATMENT (INSTALL)	0545-6018 CRASH CUSHION ATTEN (INSTL)(S)(N)(TL2)
	CY	LF	EA	EA	EA
CR 3861 ~ 0916-28-082	6	25	1	1	3
<b>PROJECT TOTALS:</b>	6	25	1	1	3

**SUMMARY OF EROSION CONTROL (SW3P)**

LOCATION	0160-6003 FURNISHING AND PLACING TOPSOIL (4")	0164-6001 BROADCAST SEET (PERM)(RURAL) (SANDY)	0168-6001 VEGETATIVE WATERING	0506-6002 ROCK FILTER DAMS (INSTALL)(TY 2)	0506-6011 ROCK FILTER DAMS (REMOVE)	0506-6021 CONSTRUCTION EXITS (INSTALL)(TY 2)	0506-6024 ROCK FILTER DAMS (REMOVE)	0506-6038 TEMP SEDMT CONT FENCE (INSTALL)	0506-6039 TEMP SEDMT CONT FENCE (REMOVE)
	SY	SY	MG	LF	LF	SY	SY	LF	LF
CR 3861 ~ 0916-28-082	2914	2914	53.1	45	45	78	78	30	30
<b>PROJECT TOTALS:</b>	2914	2914	53.1	45	45	78	78	30	30

**SUMMARY OF DRIVEWAY ITEMS**

LOCATION	STATION	INT / DRV #	AVG WIDTH FT	AVG LENGTH FT	RADIUS		0530-6003 INTERSECTIONS (SURF TREAT)	0530-6006 DRIVEWAYS (SURF TREAT)	0400-6005 CEM STABIL BKFL	0464-6005 RC PIPE (CL III)(24 IN)	0467-6395 SET (TY II) (24 IN)(RCP) (6:1)(P)	0496-6007 REMOV STR (PIPE)
					R1	R2						
					SY	SY						
CR 3861 ~ 0916-28-082	3+66.00, RT.	INT 1-2	38	40	15	15	94		20.2	120.3	6	114
CR 3861 ~ 0916-28-082	5+80.00, LT.	DRV 1-2	18	14	15	15	34					
<b>PROJECT TOTALS:</b>							94	34	20.2	120.3	6	114


NOTE: DRIVEWAYS WILL BE CONSTRUCTED TO THE R.O.W. TO TIE-IN AS DIRECTED. REFER TO DRIVEWAY DETAILS FOR ADDITIONAL INFORMATION.

**SUMMARY OF TRAFFIC CONTROL**

LOCATION	6001-6002 PORTABLE CHANGEABLE MESSAGE SIGN	6185-6002 TMA (STATIONARY)
	EA	DAY
CR 3861 ~ 0916-28-088	2	85
<b>PROJECT TOTALS:</b>	2	85

DATE: 5/9/2024 1:34:45 PM  
FILE: c:\pw\_working\lochner-pw-01\0109803\CR 102\_ETC\_SUMMARY.dgn

**LOCHNER**  
TBPE Firm Reg. No. 10488

 **Texas Department of Transportation**

©2024

**SUMMARY OF QUANTITIES**

CONT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		007

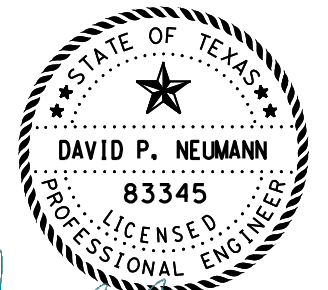
GENERAL NOTES FOR THE CONSTRUCTION SEQUENCE

1. ALL BEGINNING AND ENDING BARRICADES AND SIGNS ARE TO REMAIN IN PLACE FOR THE DURATION OF THE PROJECT.
2. ALL SIGNS, BARRICADES AND PAVEMENT MARKINGS SHALL CONFORM WITH THE BC STANDARD SHEETS, TCP SHEETS AND THE LATEST EDITION OF THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".
3. CW20-1D, G20-2A & EITHER G20-1bl or G20-1br SIGNS WILL BE REQUIRED AT ALL PUBLIC ROADS, AND INTERSECTIONS WITHIN LIMITS. G20-2A SIGNS MAY BE MOUNTED ON BACK OF CW20-1D, SEE BC(2)-21.
4. THE CONTRACTOR SHALL PROVIDE FOR SAFE AND CONVENIENT INGRESS AND EGRESS TO ABUTTING PROPERTY HIGHWAY, PUBLIC ROAD, AND STREET CROSSINGS IN A SAFE AND PASSABLE CONDITION.
5. REFER TO THE BC STANDARD SHEETS FOR REQUIRED SPACING OF SIGNS AND BARRICADES.
6. THE CONTRACTOR MAY BE REQUIRED TO FURNISH ADDITIONAL BARRICADES, SIGNS, AND WARNING LIGHTS TO MAINTAIN TRAFFIC AND PROMOTE MOTORISTS SAFETY. ANY SUCH ADDITIONAL SIGNS AND BARRICADES SHALL BE CONSIDERED SUBSIDIARY TO ITEM 502.
7. ALL SIGNS SHALL BE NEW OR FRESHLY PAINTED, AND KEPT CLEAN FOR THE DURATION OF THE PROJECT.
8. ALL TRAFFIC BARRELS AND EDGE LINE CHANNELIZERS SHALL BE USED IN ACCORDANCE WITH THE PLANS AND MANUFACTURER'S RECOMMENDATIONS AND SHALL HAVE A 7 INCH PRISMATIC REFLECTOR UNIT, AS APPROVED BY THE ENGINEER. ALL MATERIALS SHALL BE CONSIDERED SUBSIDIARY TO ITEM 502.
9. SIGNS, PAVEMENT MARKINGS, CHANNELIZING DEVICES, AND OTHER TRAFFIC CONTROL DEVICES THAT ARE INCONSISTENT WITH INTENDED TRAVEL PATHS THROUGH THE PROJECT AREA SHALL BE REMOVED IMMEDIATELY.
10. ALL TRAFFIC CONTROL DEVICES SHALL BE REMOVED WHEN NO LONGER NEEDED. WHEN WORK IS SUSPENDED FOR SHORT TIME PERIOD, ADVANCED WARNING SIGNS THAT ARE NO LONGER APPROPRIATE SHALL BE REMOVED FROM THE PROJECT AREA.
11. THE CONTRACTOR MAY SUBMIT AN ALTERNATE TRAFFIC CONTROL PLAN AND/OR AN ALTERNATE SEQUENCE OF CONSTRUCTION, IN ADVANCE AND IN WRITING, SUBJECT TO THE APPROVAL OF THE ENGINEER.

CR 3861 ~ SUGGESTED SEQUENCE OF CONSTRUCTION

1. PLACE THE FOLLOWING ADVANCE WARNING SIGNS IN ACCORDANCE WITH BC(2)-21; R20-3T, G20-10T, G20-9TP, R20-5T, R20-5aTP, CW20-1D, G20-5T, G20-6T, G20-2bT, & G20-2 PRIOR TO BEGINNING CONSTRUCTION.
2. PLACE APPLICABLE SIGNS AND CLOSE COUNTY ROAD 3861 & COUNTY ROAD 1064, APPROACHING THE BRIDGE, IN ACCORDANCE WITH WZ(RCD)-13 STANDARD SHEET.
3. PLACE SW3P EROSION CONTROL MEASURES IN ACCORDANCE WITH THE SW3P LAYOUT AND APPLICABLE STANDARDS.
4. REMOVE EXISTING BRIDGE AND PLACE BRIDGE CLASS CULVERT.
5. COMPLETE ROADWAY, SIGNING & DELINEATOR, AND EROSION CONTROL ITEMS WITHIN THE CLOSED SECTION.
6. REOPEN TO THRU TRAFFIC.

2024.05.09 14:37:07-05'00'



*David P. Neumann, P.E.*

**LOCHNER**  
TBPE Firm Reg. No. 10488

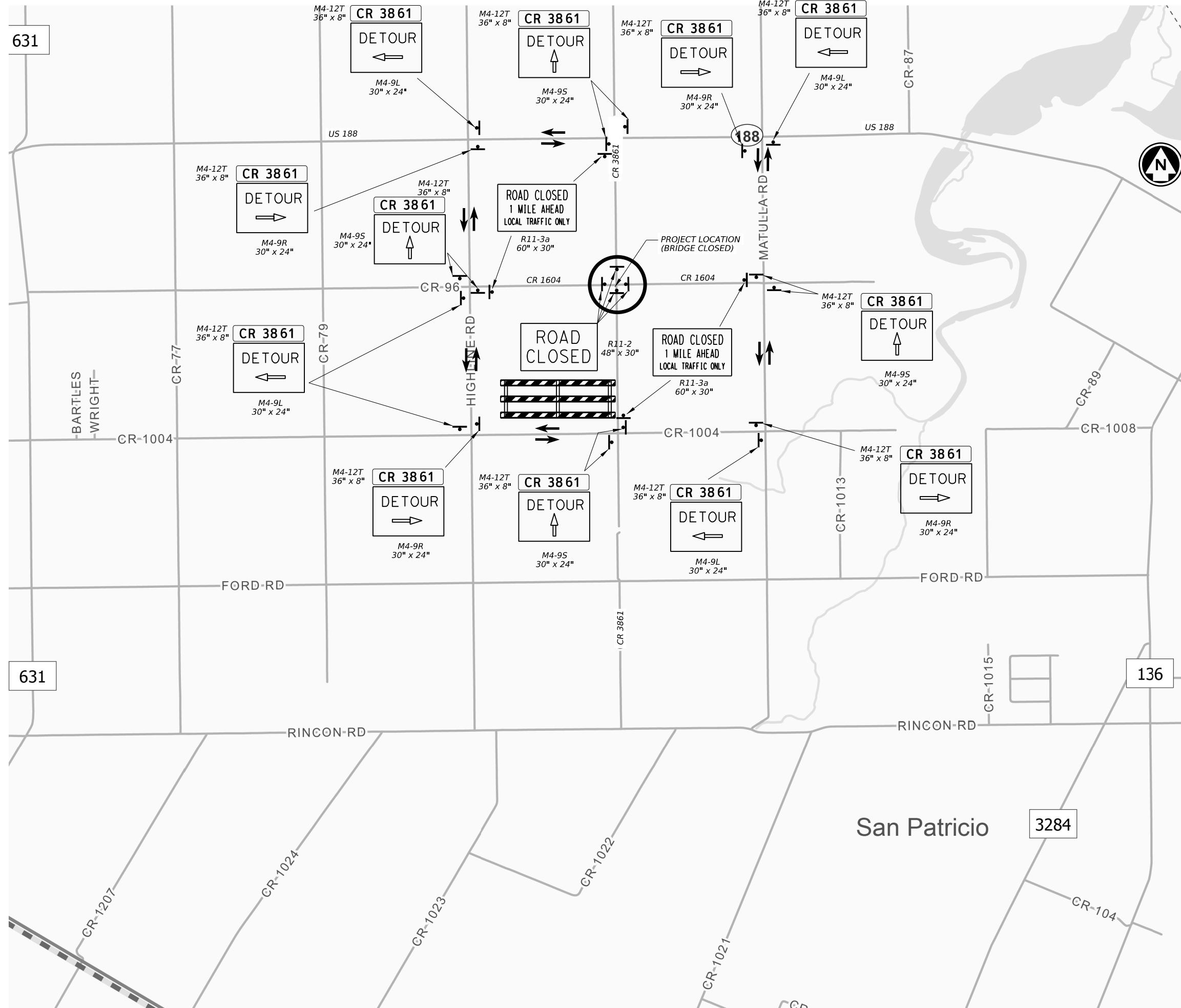


© 2024

**TRAFFIC CONTROL PLAN  
GENERAL NOTES, AND  
SEQUENCE OF  
CONSTRUCTION**

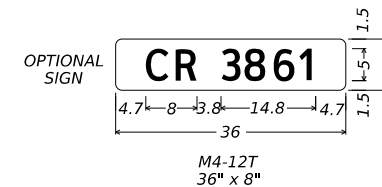
CONT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	008	

DATE: 5/9/2024 8:54:55 AM  
 FILE: c:\pw\_working\lochner-pw-01\0109807\CR 3861 DETOUR LAYOUT.dgn



**LEGEND**

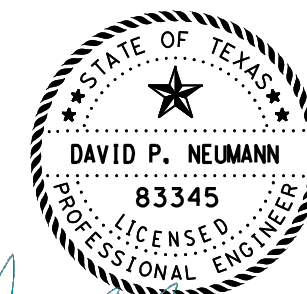
- ← DIRECTIONAL TRAFFIC FLOW ARROWS
- ↑ SIGN POST



**NOTES:**

- 1) REFER TO BARRICADE AND CONSTRUCTION PROJECT LIMIT DETAILS IN "BC(2)" AND WORK ZONE ROAD CLOSURE DETAILS IN "WZ(RCD)" FOR ADDITIONAL DETAILS, BARRICADES, AND SIGNAGE.

2024.05.09 14:37:20-05'00'



*David P. Neumann, P.E.*

**LOCHNER**

TBPE Firm Reg. No. 10488



©2024

**CR 3861  
 DETOUR LAYOUT**

CONT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	009	

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:

**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).

<p><b>THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT</b>  <a href="http://www.txdot.gov">http://www.txdot.gov</a></p>
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

SHEET 1 OF 12



**BARRICADE AND CONSTRUCTION  
 GENERAL NOTES  
 AND REQUIREMENTS**

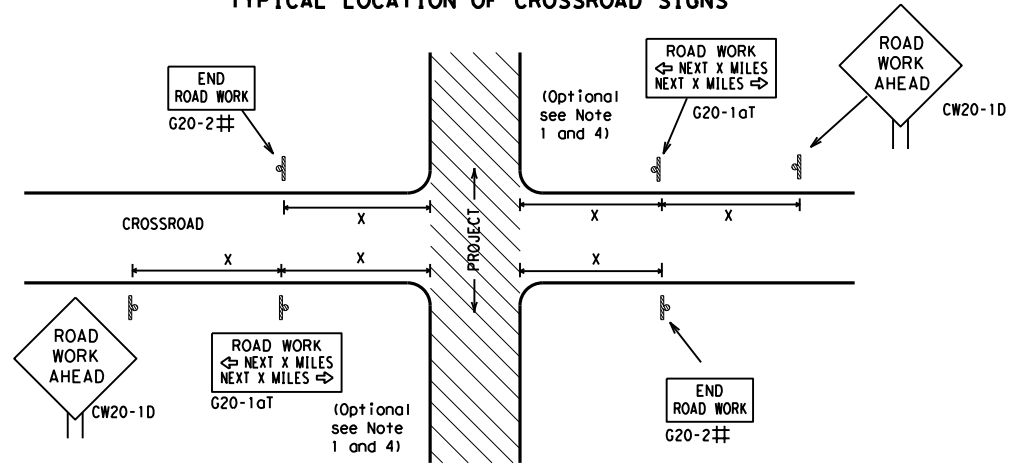
**BC (1) - 21**

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
	0916	28	082	CR 3861
	DIST	COUNTY	SHEET NO.	
4-03 7-13				
9-07 8-14				
5-10 5-21	CRP	SAN PATRICIO	010	



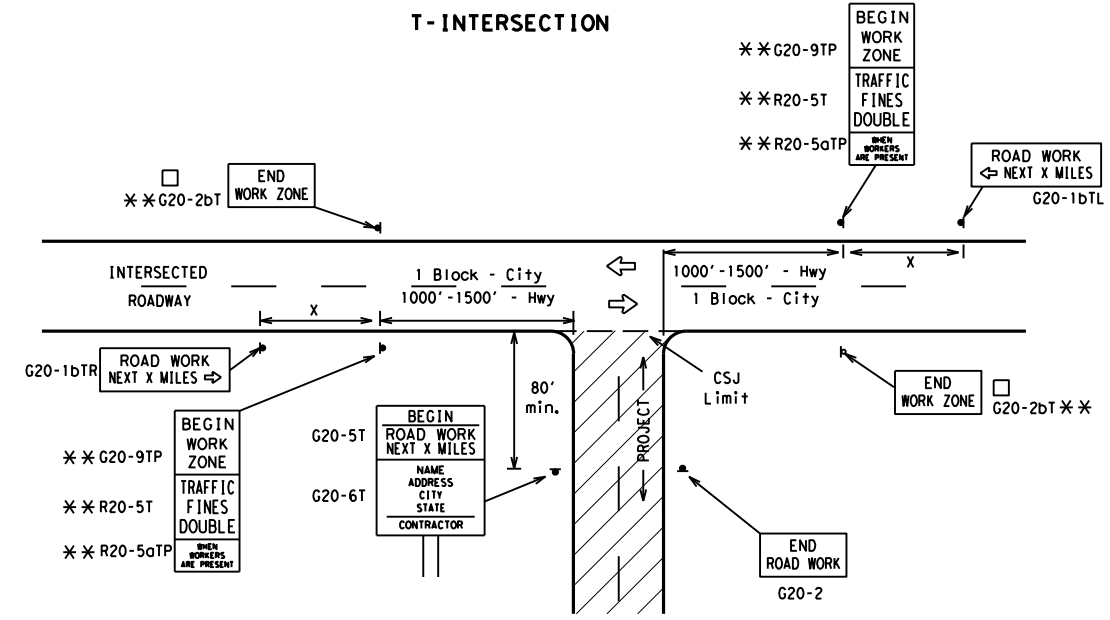
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

**TYPICAL LOCATION OF CROSSROAD SIGNS**



- ## May be mounted on back of "ROAD WORK AHEAD" (CW20-1D) sign with approval of Engineer. (See note 2 below)
- 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.
  - 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.
  - 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.
  - 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.
  - Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
  - 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**

- 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.
- 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<sup>1,5,6</sup>**

Sign Number or Series	SIZE		SPACING	
	Conventional Road	Expressway/Freeway	Posted Speed MPH	Sign Δ Spacing "x" Feet (Apprx.)
CW20 <sup>4</sup>	48" x 48"	48" x 48"	30	120
CW21			35	160
CW22			40	240
CW23			45	320
CW25			50	400
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"	55	500 <sup>2</sup>
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"	60	600 <sup>2</sup>
			65	700 <sup>2</sup>
			70	800 <sup>2</sup>
			75	900 <sup>2</sup>
			80	1000 <sup>2</sup>
			*	* <sup>3</sup>

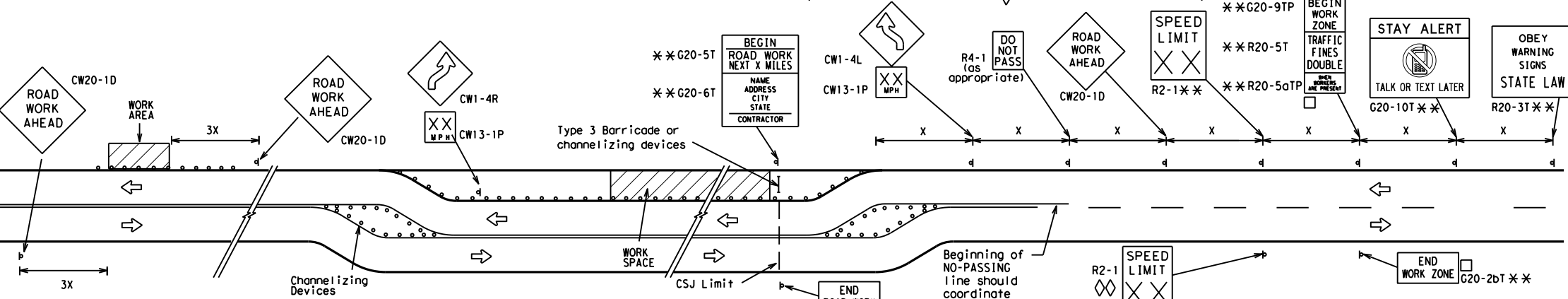
\* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

**GENERAL NOTES**

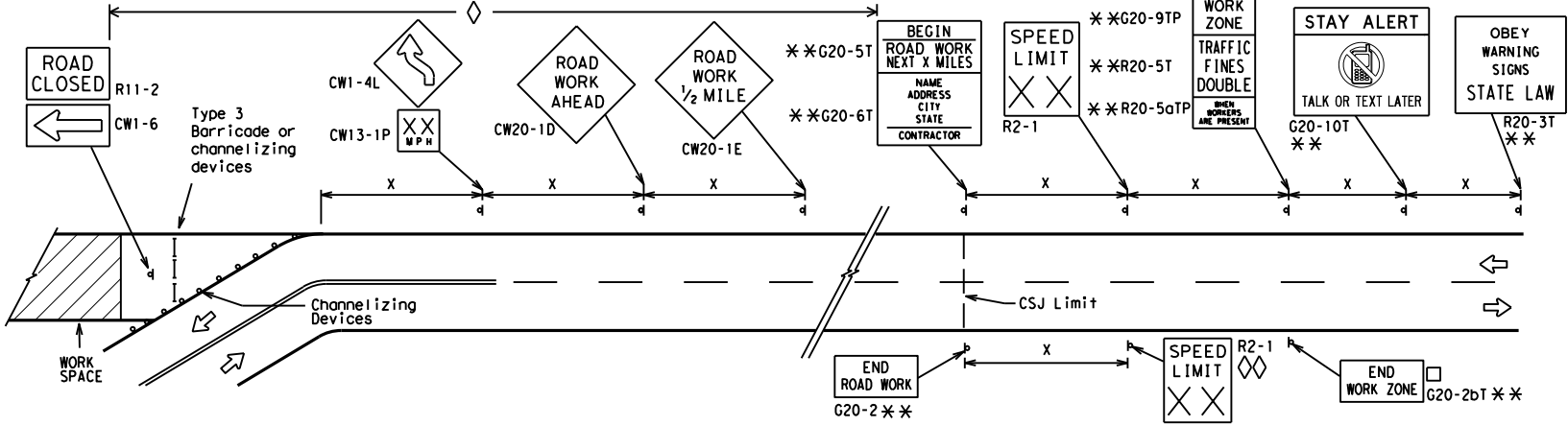
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be 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".
- Only diamond shaped warning sign sizes are indicated.
- 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**

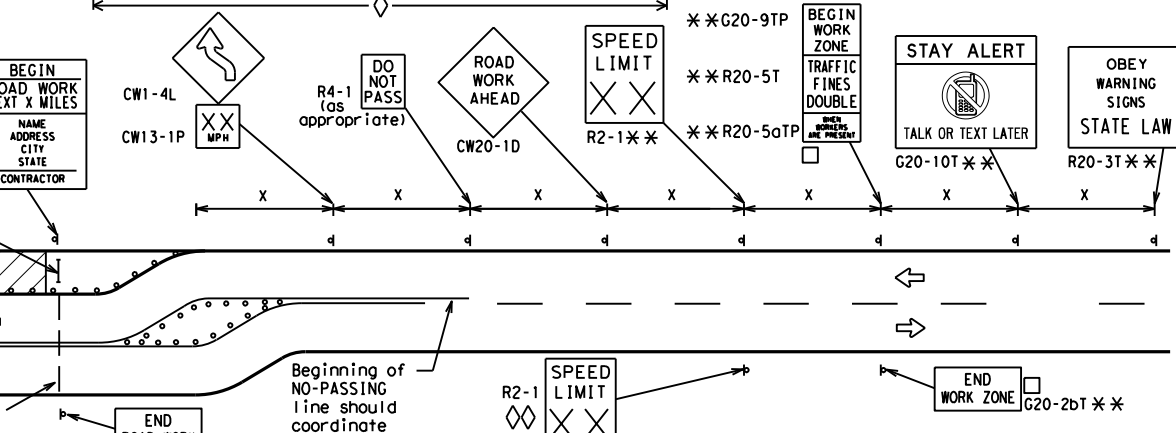


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD" (CW20-1D) signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

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



**SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS**



**NOTES**

- The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES" (G20-5T) sign for each specific project. This distance shall replace the "x" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.
- The "BEGIN WORK ZONE" (G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.
  - CSJ limit signing is required for highway construction and maintenance work, with the exception of mobile operations.
  - Area for placement of "ROAD WORK AHEAD" (CW20-1D) sign and other signs or devices as called for on the Traffic Control Plan.
  - Contractor will install a regulatory speed limit sign at the end of the work zone.

**LEGEND**

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

SHEET 2 OF 12



**BARRICADE AND CONSTRUCTION PROJECT LIMIT**

**BC(2)-21**

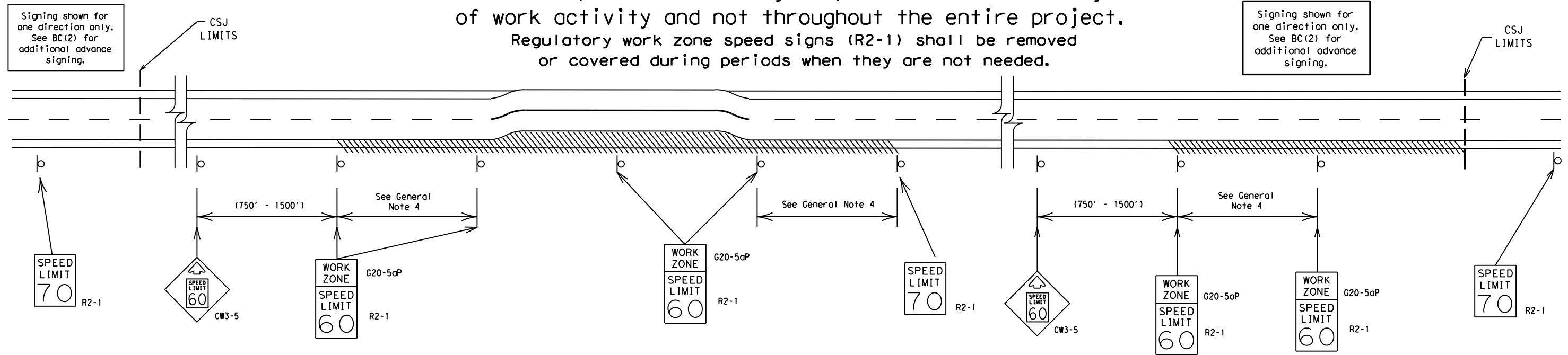
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0916	28	082	CR 3861
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	CRP	SAN PATRICIO	011	

DATE: FILE:

# 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:

- rough road or damaged pavement surface
- substantial alteration of roadway geometrics (diversions)
- construction detours
- grade
- width
- 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

- Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
- Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
- Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
- 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
- Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
- 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.
- Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
- Techniques that may help reduce traffic speeds include but are not limited to:
  - Law enforcement.
  - Flagger stationed next to sign.
  - Portable changeable message sign (PCMS).
  - Low-power (drone) radar transmitter.
  - Speed monitor trailers or signs.
- Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
- 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.

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:

SHEET 3 OF 12



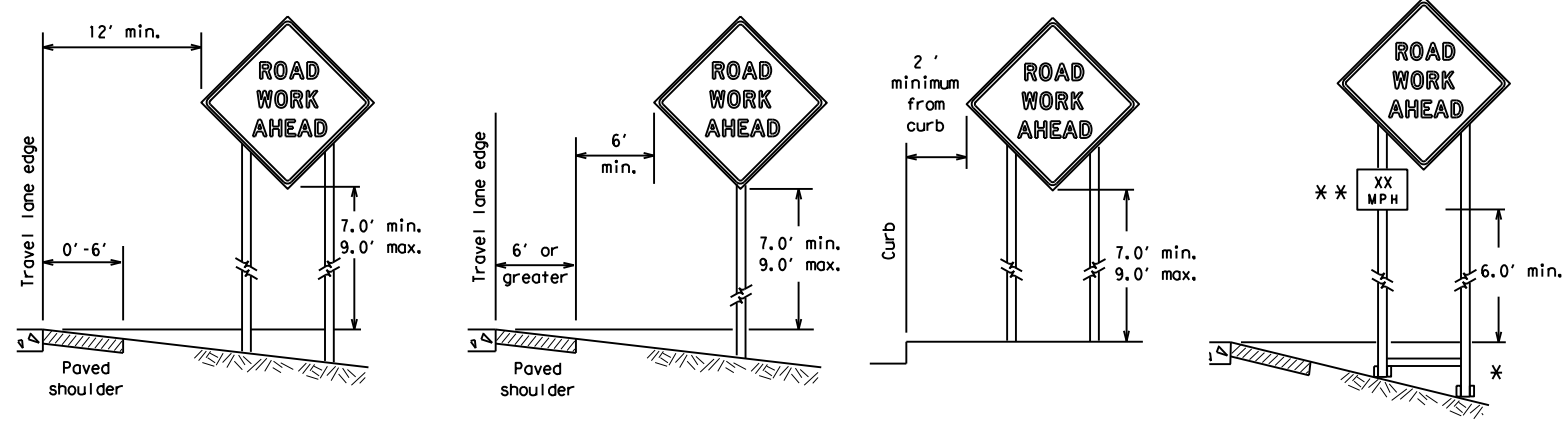
## BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC (3) - 21

FILE:	bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS		0916	28	082	CR 3861
9-07	8-14	DIST	COUNTY	SHEET NO.	
7-13	5-21	CRP	SAN PATRICIO	012	

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

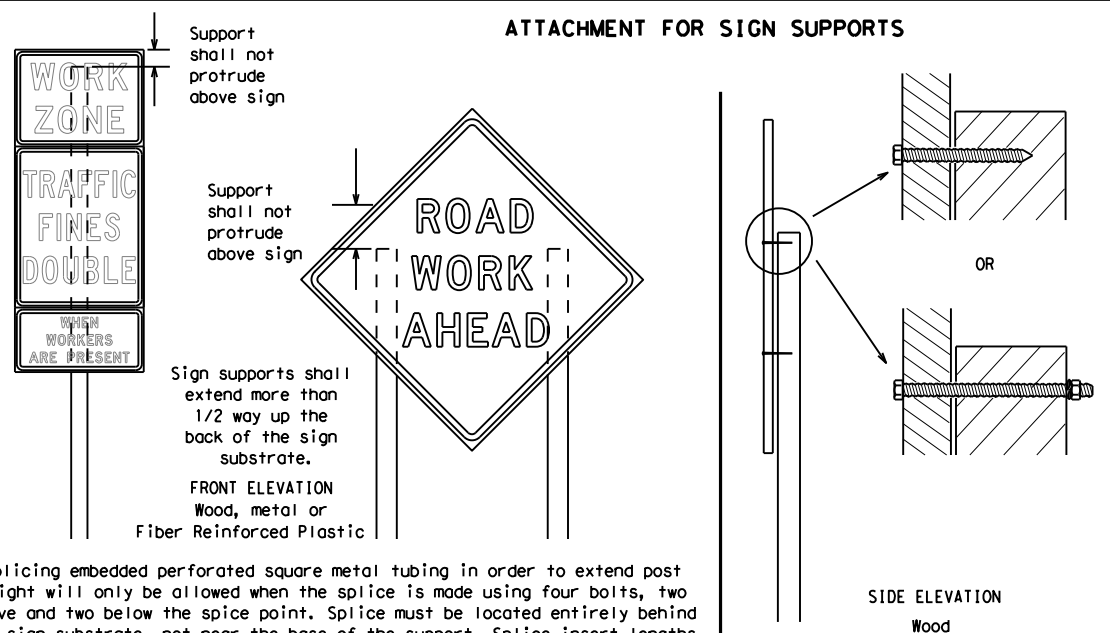
**TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS**



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

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

**ATTACHMENT FOR SIGN SUPPORTS**



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 splice 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.

**GENERAL NOTES FOR WORK ZONE SIGNS**

- Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
- Wooden sign posts shall be painted white.
- Barricades shall NOT be used as sign supports.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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)**

- 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.
  - Long-term stationary - work that occupies a location more than 3 days.
  - 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.
  - Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
  - Short, duration - work that occupies a location up to 1 hour.
  - Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

**SIGN MOUNTING HEIGHT**

- 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.
- 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.
- Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
- 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.
- 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**

- 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**

- 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.
- "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
- 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**

- 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).
- White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
- Orange sheeting, meeting the requirements of DMS-8300 Type B<sub>FL</sub> or Type C<sub>FL</sub>, shall be used for rigid signs with orange backgrounds.

**SIGN LETTERS**

- 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**

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

**SIGN SUPPORT WEIGHTS**

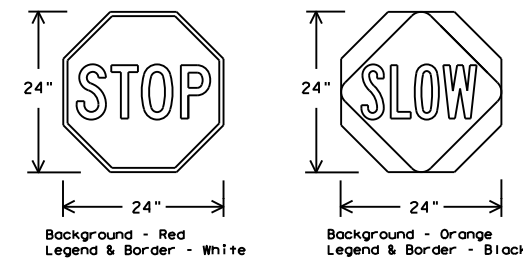
- Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
- 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.
- 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.
- 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.
- Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

**FLAGS ON SIGNS**

- 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.

**STOP/SLOW PADDLES**

- STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24".
- STOP/SLOW paddles shall be retroreflective when used at night.
- STOP/SLOW paddles may be attached to a staff with a minimum length of 6' to the bottom of the sign.
- 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 <sub>FL</sub> OR C <sub>FL</sub> 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**

- 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.
- 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.
- When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
- 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.
- 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.
- 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.

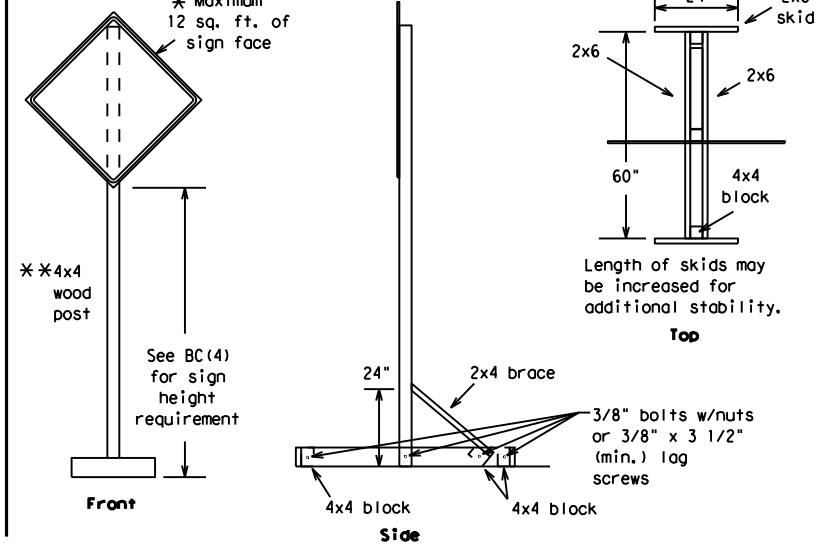
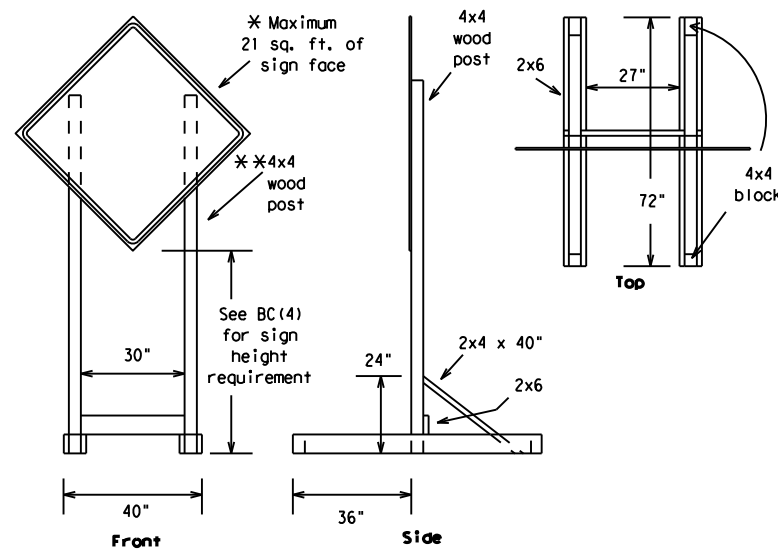


**BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES**

**BC (4) - 21**

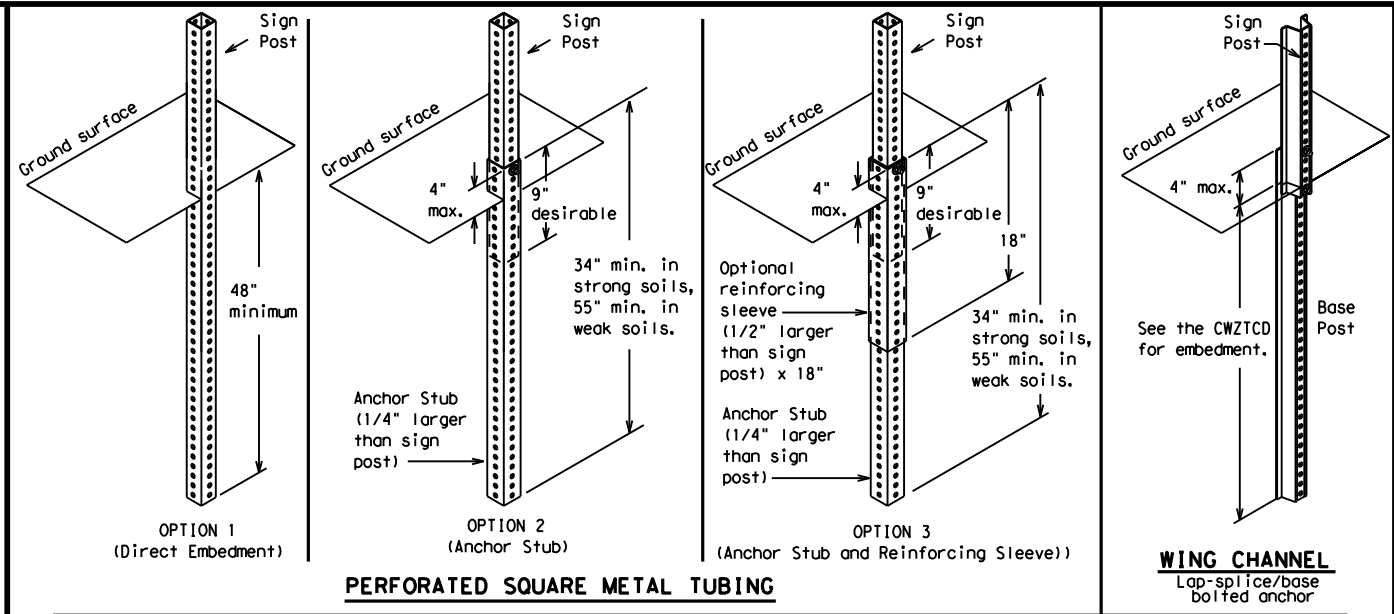
FILE:	bc-21.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0916	28	082	CR 3861				
9-07	8-14	DIST	COUNTY	SHEET NO.					
7-13	5-21	CRP	SAN PATRICIO	013					

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



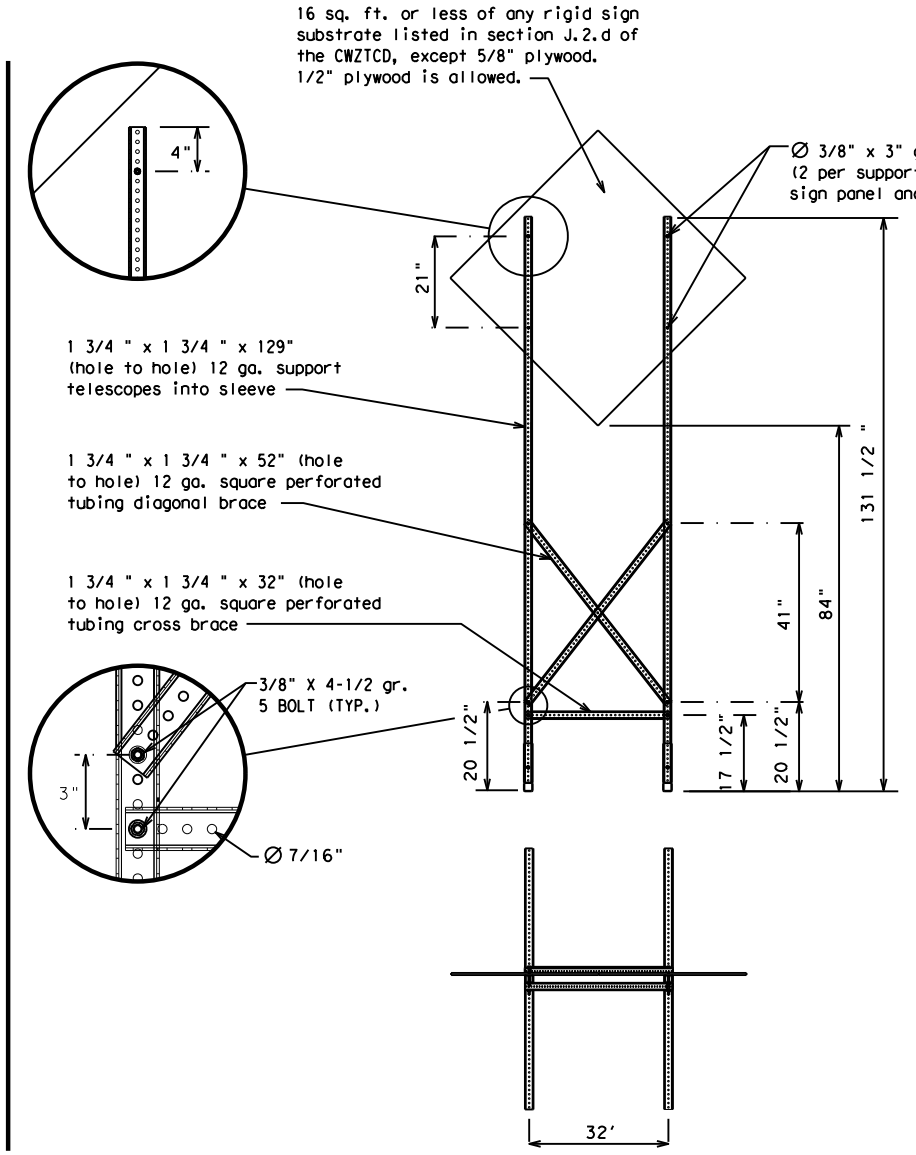
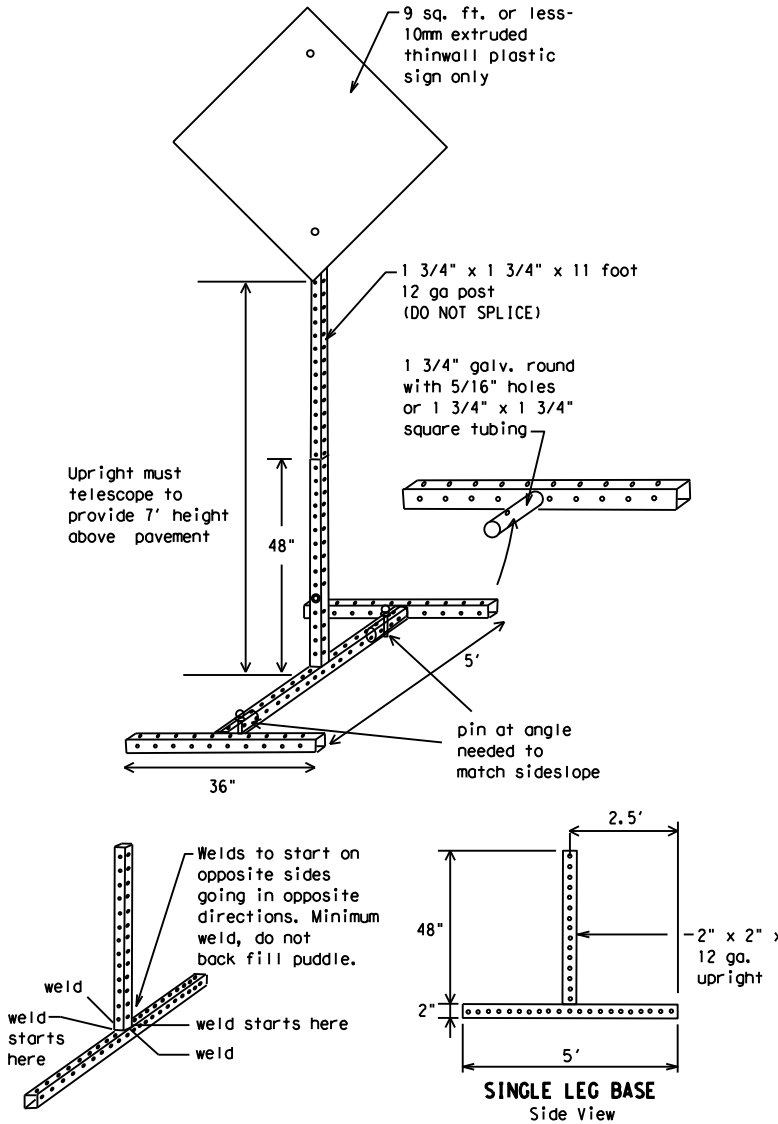
### SKID MOUNTED WOOD SIGN SUPPORTS

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



### GROUND MOUNTED SIGN SUPPORTS

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



### SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

### WEDGE ANCHORS

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

### OTHER DESIGNS

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

### GENERAL NOTES

- 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.
- No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
- 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



## 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	0916	28	082	CR 3861
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	CRP	SAN PATRICIO	014	

DATE: FILE:

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

# RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

## PORTABLE CHANGEABLE MESSAGE SIGNS

- The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
- 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.
- 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.
- Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
- Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
- When in use, the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
- 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.
- 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.
- Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
- 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.
- Do not use the word "Danger" in message.
- Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
- Do not display messages that scroll horizontally or vertically across the face of the sign.
- 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.
- 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.
- Each line of text should be centered on the message board rather than left or right justified.
- 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.

## Phase 1: Condition Lists

### Road/Lane/Ramp Closure List

FREEWAY CLOSED X MILE
ROAD CLOSED AT SH XXX
ROAD CLSD AT FM XXXX
RIGHT X LANES CLOSED
CENTER LANE CLOSED
NIGHT LANE CLOSURES
VARIOUS LANES CLOSED
EXIT CLOSED
MALL DRIVEWAY CLOSED
XXXXXXXX BLVD CLOSED

### Other Condition List

FRONTAGE ROAD CLOSED
SHOULDER CLOSED XXX FT
RIGHT LN CLOSED XXX FT
RIGHT X LANES OPEN
DAYTIME LANE CLOSURES
I-XX SOUTH EXIT CLOSED
EXIT XXX CLOSED X MILE
RIGHT LN TO BE CLOSED
X LANES CLOSED TUE - FRI

ROADWORK XXX FT
FLAGGER XXXX FT
RIGHT LN NARROWS XXXX FT
MERGING TRAFFIC XXXX FT
LOOSE GRAVEL XXXX FT
DETOUR X MILE
ROADWORK PAST SH XXXX
BUMP XXXX FT
TRAFFIC SIGNAL XXXX FT

ROAD REPAIRS XXXX FT
LANE NARROWS XXXX FT
TWO-WAY TRAFFIC XX MILE
CONST TRAFFIC XXX FT
UNEVEN LANES XXXX FT
ROUGH ROAD XXXX FT
ROADWORK NEXT FRI-SUN
US XXX EXIT X MILES
LANES SHIFT *

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

## Phase 2: Possible Component Lists

### Action to Take/Effect on Travel List

MERGE RIGHT
DETOUR NEXT X EXITS
USE EXIT XXX
STAY ON US XXX SOUTH
TRUCKS USE US XXX N
WATCH FOR TRUCKS
EXPECT DELAYS
REDUCE SPEED XXX FT
USE OTHER ROUTES
STAY IN LANE *

FORM X LINES RIGHT
USE XXXXX RD EXIT
USE EXIT I-XX NORTH
USE I-XX E TO I-XX N
WATCH FOR TRUCKS
EXPECT DELAYS
PREPARE TO STOP
END SHOULDER USE
WATCH FOR WORKERS

### Location List

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

### Warning List

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

### \*\* Advance Notice List

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

\*\* See Application Guidelines Note 6.

## APPLICATION GUIDELINES

- Only 1 or 2 phases are to be used on a PCMS.
- The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
- A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
- A Location Phase is necessary only if a distance or location is not included in the first phase selected.
- 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.
- 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

- The words RIGHT, LEFT and ALL can be interchanged as appropriate.
- Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
- EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
- Highway names and numbers replaced as appropriate.
- ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
- AHEAD may be used instead of distances if necessary.
- FT and MI, MILE and MILES interchanged as appropriate.
- AT, BEFORE and PAST interchanged as needed.
- 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

- 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.
- 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.
- 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.
- 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.

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.

WORD OR PHRASE	ABBREVIATION	WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD	Major	MAJ
Alternate	ALT	Miles	MI
Avenue	AVE	Miles Per Hour	MPH
Best Route	BEST RTE	Minor	MNR
Boulevard	BLVD	Monday	MON
Bridge	BRDG	Normal	NORM
Canal	CANT	North	N
Center	CTR	Northbound	(route) N
Construction Ahead	CONST AHD	Parking	PKING
CROSSING	XING	Road	RD
Detour Route	DETOUR RTE	Right Lane	RT LN
Do Not	DONT	Saturday	SAT
East	E	Service Road	SERV RD
Eastbound	(route) E	Shoulder	SHLDR
Emergency	EMER	Slippery	SLIP
Emergency Vehicle	EMER VEH	South	S
Entrance, Enter	ENT	Southbound	(route) S
Express Lane	EXP LN	Speed	SPD
Expressway	EXPWY	Street	ST
XXXX Feet	XXXX FT	Sunday	SUN
Fog Ahead	FOG AHD	Telephone	PHONE
Freeway	FRWY, FWY	Temporary	TEMP
Freeway Blocked	FWY BLKD	Thursday	THURS
Friday	FRI	To Downtown	TO DWNTN
Hazardous Driving	HAZ DRIVING	Traffic	TRAF
Hazardous Material	HAZMAT	Travelers	TRVLR
High-Occupancy Vehicle	HOV	Tuesday	TUES
Highway	HWY	Time Minutes	TIME MIN
Hour(s)	HR, HRS	Upper Level	UPR LEVEL
Information	INFO	Vehicles (s)	VEH, VEHS
It Is	ITS	Warning	WARN
Junction	JCT	Wednesday	WED
Left	LFT	Weight Limit	WT LIMIT
Left Lane	LFT LN	West	W
Lane Closed	LN CLOSED	Westbound	(route) W
Lower Level	LWR LEVEL	Wet Pavement	WET PVMT
Maintenance	MAINT	Will Not	WONT

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

DATE: FILE:



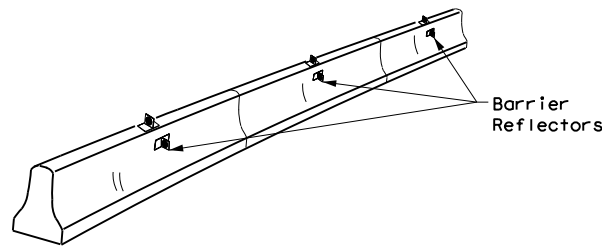
## BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC (6) - 21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0916	28	082	CR 3861
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	CRP	SAN PATRICIO	015	

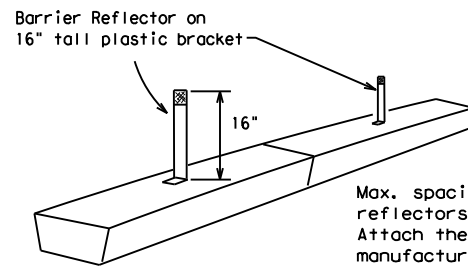
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

- 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).
- 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)**

- 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.
- 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.
- When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
- Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
- Maximum spacing of Barrier Reflectors is forty (40) feet.
- Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
- Attachment of Barrier Reflectors to CTB shall be per manufacturer's recommendations.
- Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer.
- Single slope barriers shall be delineated as shown on the above detail.

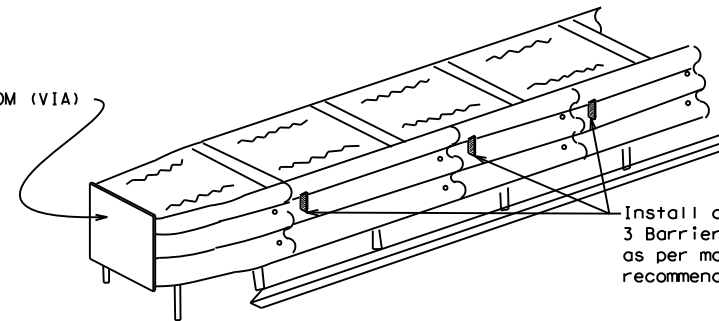


**LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES**

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

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

**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 appropriate 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**

**WARNING LIGHTS**

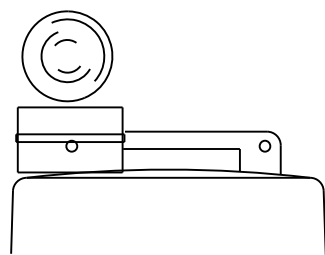
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet 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<sub>FL</sub> or C<sub>FL</sub> Sheeting meeting the requirements of Departmental Material Specification DMS-8300.
- 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".
- The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
- 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.
- 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.
- The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

**WARNING LIGHTS MOUNTED ON PLASTIC DRUMS**

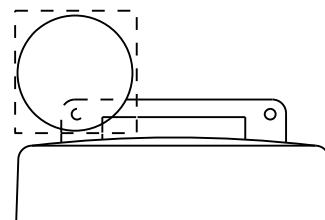
- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- A series of sequential flashing warning lights placed on channelizing 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.
- 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.
- Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
- Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
- 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**

- 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.
- 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.
- The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
- Round reflectors shall be fully reflectorized, including the area where attached to the drum.
- 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.
- 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.
- When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
- The warning reflector should be mounted on the side of the handle nearest approaching traffic.
- The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.



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

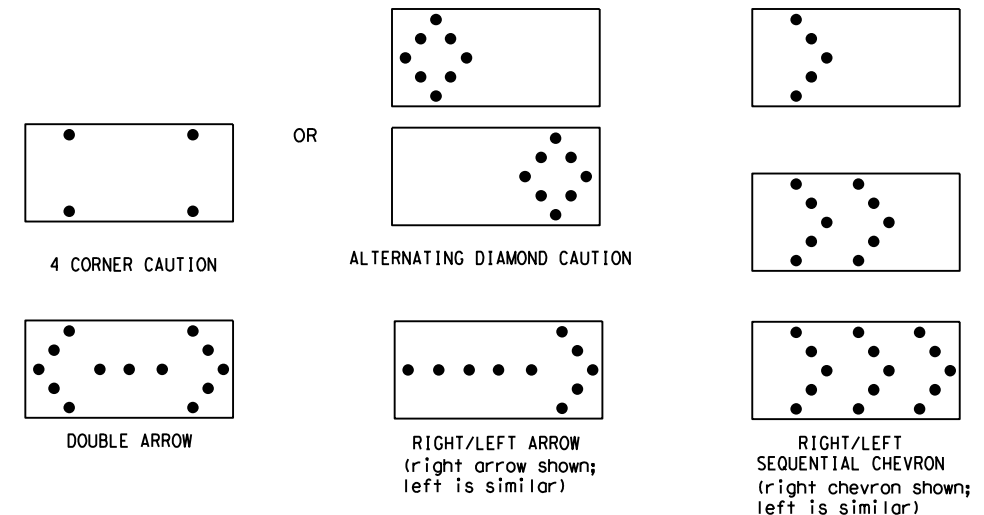


Warning reflector may be round or square. Must have a yellow reflective surface area of at least 30 square inches

DATE:  
FILE:

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.

- 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.
- 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.
- 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.
- The Flashing Arrow Board should be able to display the following symbols:



- The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
- The straight line caution display is NOT ALLOWED.
- 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.
- 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.
- The sequential arrow display is NOT ALLOWED.
- The flashing arrow display is the TxDOT standard; however, the sequential chevron display may be used during daylight operations.
- The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
- A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
- 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.
- 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**

- Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).
- Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
- Refer to the CWZTCD for a list of approved TMAs.
- TMAs are required on freeways unless otherwise noted in the plans.
- 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.
- 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.



**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		0916	28	082	CR 3861				
9-07	8-14	DIST	COUNTY		SHEET NO.				
7-13	5-21	CRP	SAN PATRICIO		016				



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

**GENERAL NOTES**

- For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
- 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.
- 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.
- 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).
- 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.
- 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:

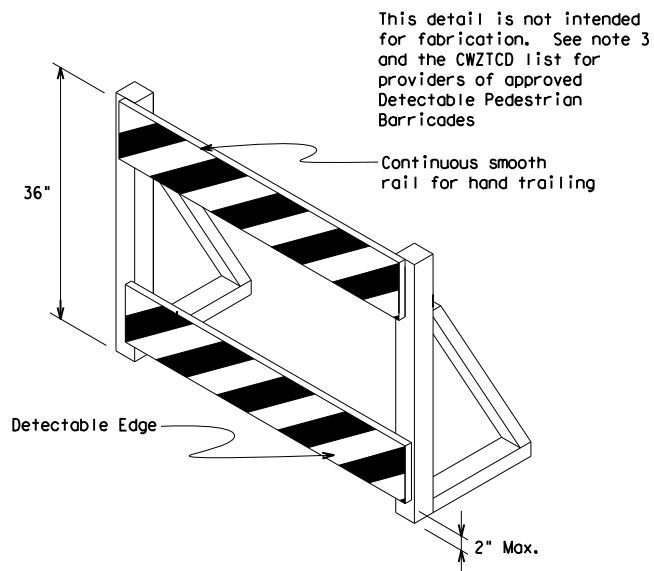
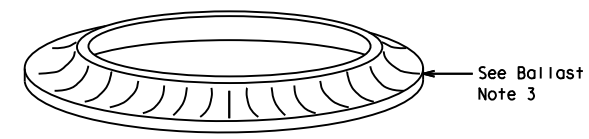
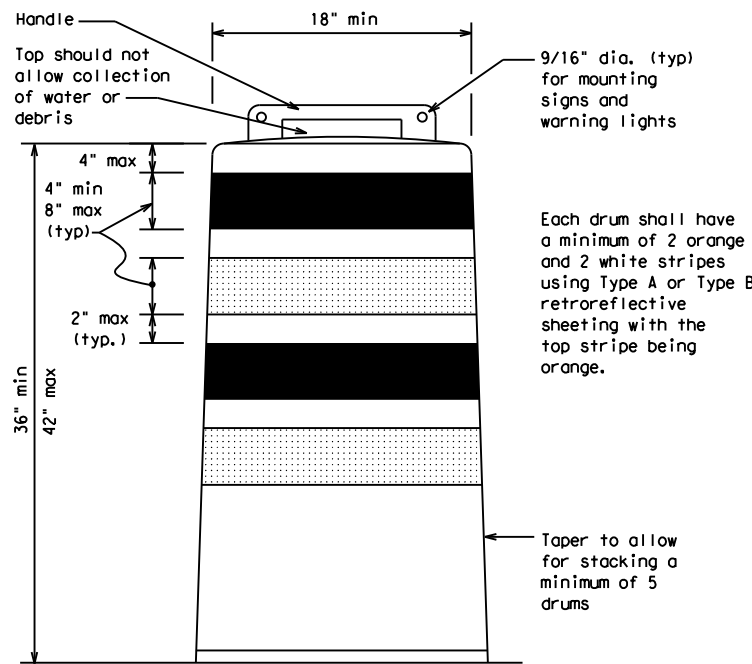
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
- 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.
- 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.
- 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.
- 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.
- 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.
- Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
- Drum body shall have a maximum unballasted weight of 11 lbs.
- Drum and base shall be marked with manufacturer's name and model number.

**RETROREFLECTIVE SHEETING**

- 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.
- 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.

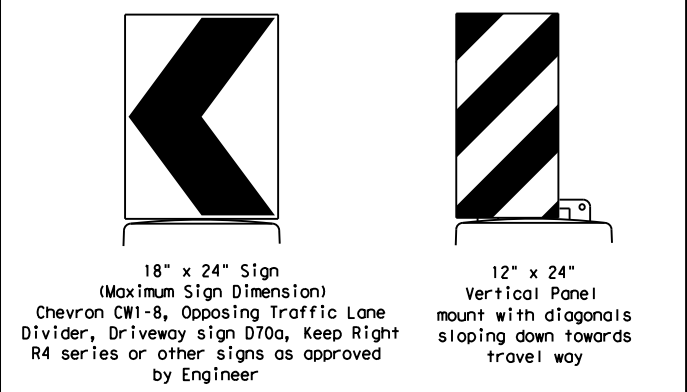
**BALLAST**

- 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.
- 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.
- Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
- 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.
- 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.
- Ballast shall not be placed on top of drums.
- Adhesives may be used to secure base of drums to pavement.



**DETECTABLE PEDESTRIAN BARRICADES**

- 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.
- 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.
- 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.
- 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.
- Warning lights shall not be attached to detectable pedestrian barricades.
- 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.



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

**SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS**

- Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
- Chevrons and other work zone signs with an orange background shall be manufactured with Type B<sub>FL</sub> or Type C<sub>FL</sub> Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.
- 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.
- 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.
- Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
- Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
- 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.
- 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.



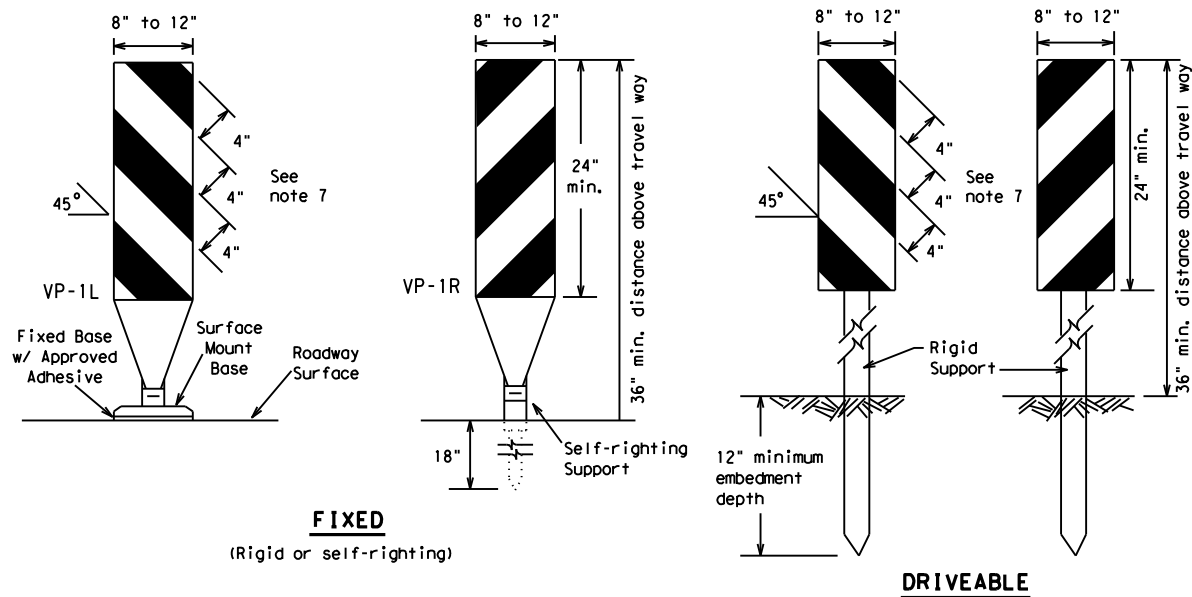
**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC (8) - 21**

FILE:	bc-21.dgn	DN:	TxDOT	CK:	TxDOT	DN:	TxDOT	CK:	TxDOT
© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0916	28	082	CR 3861				
4-03	8-14			DIST		COUNTY	SHEET NO.		
9-07	5-21			CRP		SAN PATRICIO	017		
7-13									

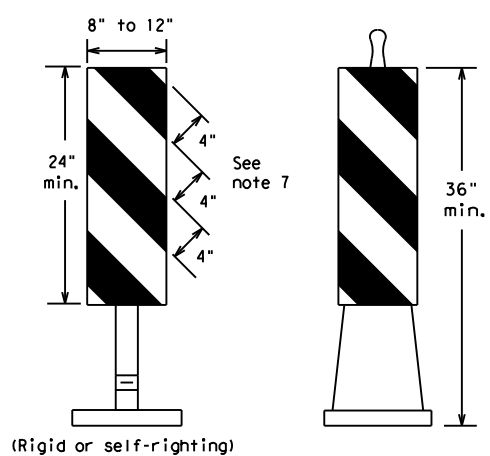
DATE:  
FILE:

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



**FIXED**  
(Rigid or self-righting)

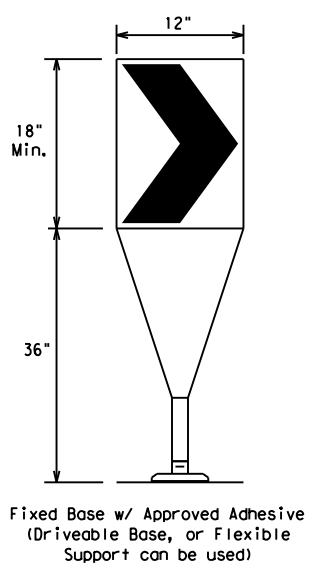
**DRIVEABLE**



**PORTABLE**

**VERTICAL PANELS (VPs)**

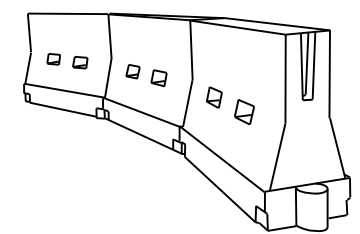
- Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
- VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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



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

- The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
- 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.
- 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.
- To be effective, the chevron should be visible for at least 500 feet.
- Chevrons shall be orange with a black nonreflective legend. Sheeting for the chevron shall be retroreflective Type B<sub>FL</sub> or Type C<sub>FL</sub> conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.
- 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**



**LONGITUDINAL CHANNELIZING DEVICES (LCD)**

- 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.
- LCDs may be used instead of a line of cones or drums.
- LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
- LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
- LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
- 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**

- 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.
- 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.
- 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.
- 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.
- 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**

**GENERAL NOTES**

- 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).
- 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.
- 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).
- 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.
- Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
- 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.
- 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.

Posted Speed	Formula	Minimum Desirable Taper Lengths * *			Suggested Maximum Spacing of Channelizing Devices	
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent
30	L = WS <sup>2</sup> / 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



**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	0916	28	082	CR 3861
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	CRP	SAN PATRICIO	018	

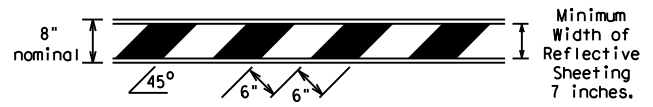
DATE: FILE:

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

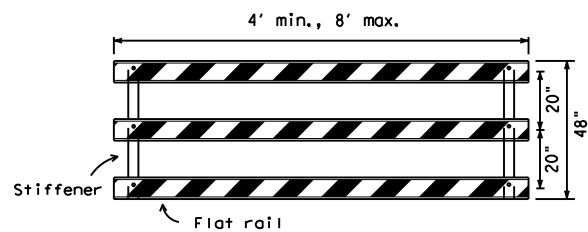
**TYPE 3 BARRICADES**

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.



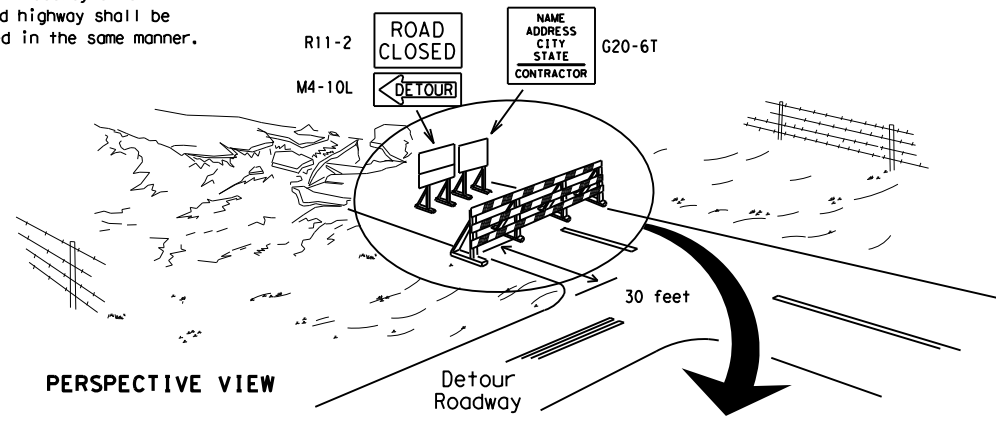
**TYPICAL STRIPING DETAIL FOR BARRICADE RAIL**



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

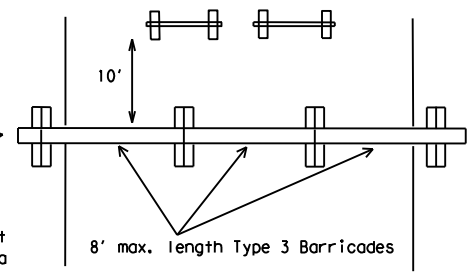
**TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES**

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



PERSPECTIVE VIEW

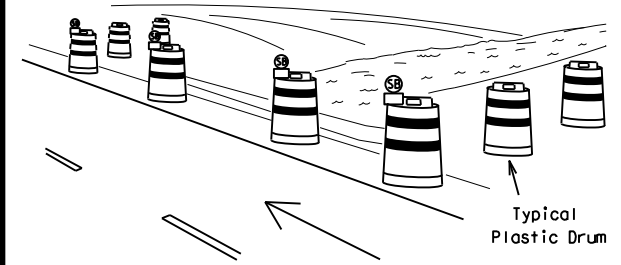
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.



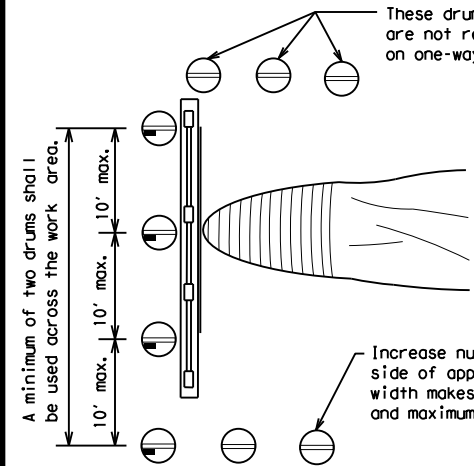
PLAN VIEW

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

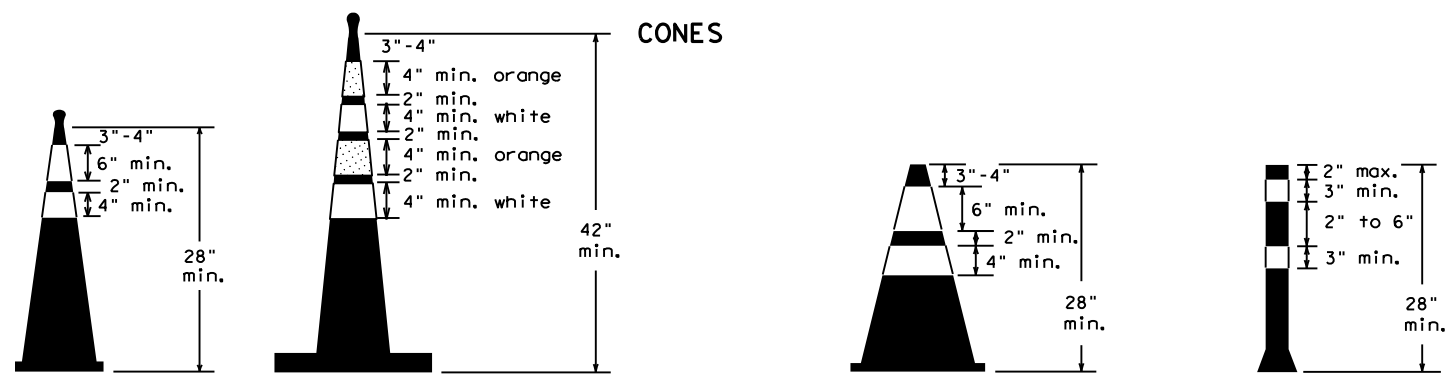


PLAN VIEW

**CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS**

1. Where positive redirection 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
	Steady burn warning light or yellow warning reflector



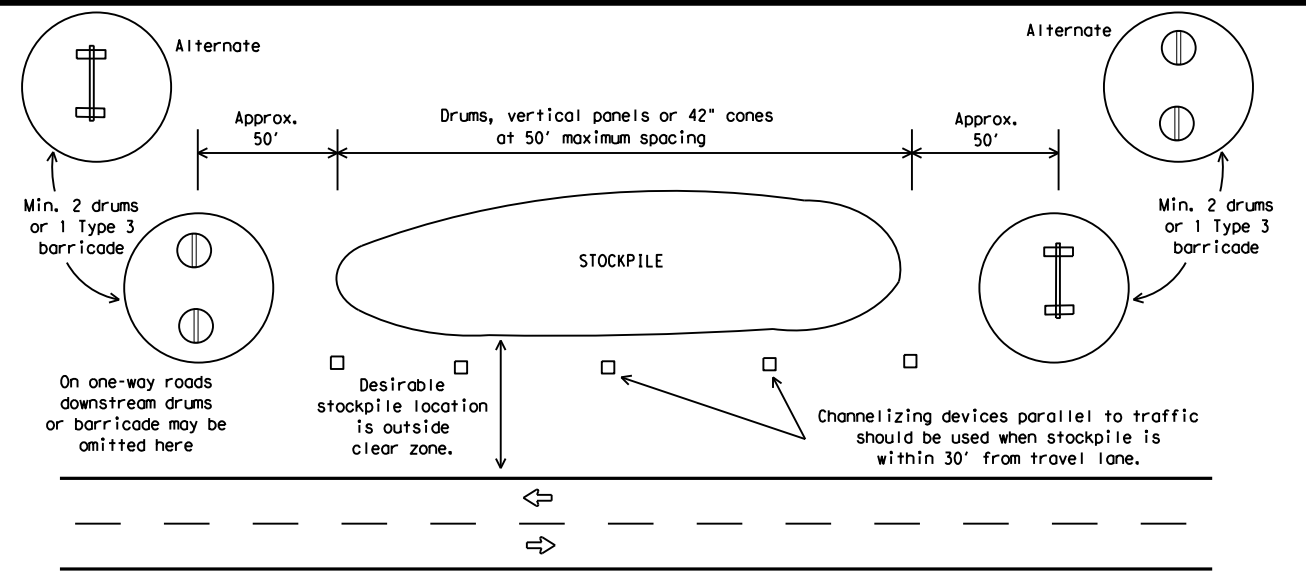
Two-Piece cones

One-Piece cones

Tubular Marker

28" Cones shall have a minimum weight of 9 1/2 lbs.  
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

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



**TRAFFIC CONTROL FOR MATERIAL STOCKPILES**



**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	0916	28	082	CR 3861
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	CRP	SAN PATRICIO	019	

DATE: FILE:

## WORK ZONE PAVEMENT MARKINGS

### GENERAL

- 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.
- Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- Additional supplemental pavement marking details may be found in the plans or specifications.
- Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
- 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).
- 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.
- All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

### RAISED PAVEMENT MARKERS

- Raised pavement markers are to be placed according to the patterns on BC(12).
- 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

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

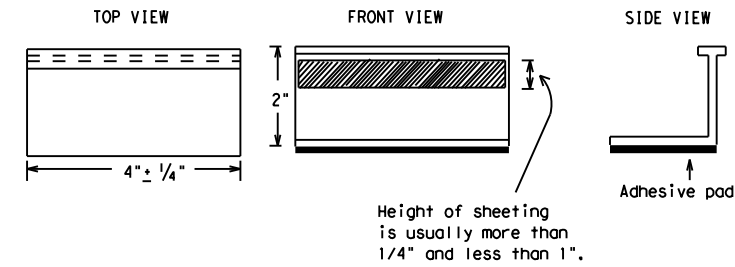
### MAINTAINING WORK ZONE PAVEMENT MARKINGS

- The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
- 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.
- 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.
- 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

- 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.
- 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.
- 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".
- The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
- Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
- Blast cleaning may be used but will not be required unless specifically shown in the plans.
- Over-painting of the markings SHALL NOT BE permitted.
- Removal of raised pavement markers shall be as directed by the Engineer.
- 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.
- 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**

- Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
- 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.
  - 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.
  - 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.
- Small design variances may be noted between tab manufacturers.
- 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

- Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
- All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
- 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).

SHEET 11 OF 12



## 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	0916	28	082	CR 3861
2-98 9-07 5-21	DIST	COUNTY	SHEET NO.	
1-02 7-13	CRP	SAN PATRICIO	020	
11-02 8-14				

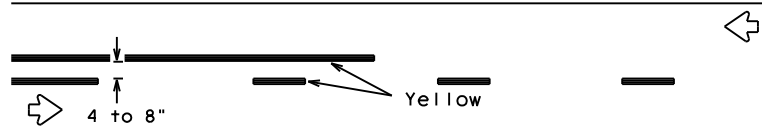
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:  
FILE:

## PAVEMENT MARKING PATTERNS

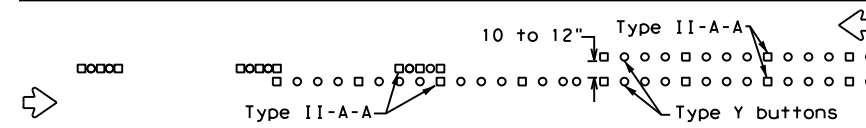


REFLECTORIZED PAVEMENT MARKINGS - PATTERN A

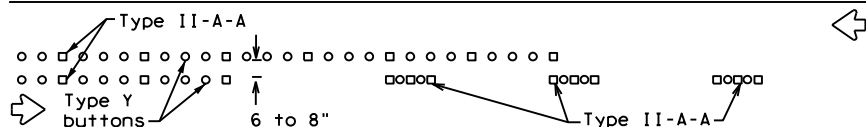


REFLECTORIZED PAVEMENT MARKINGS - PATTERN B

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.

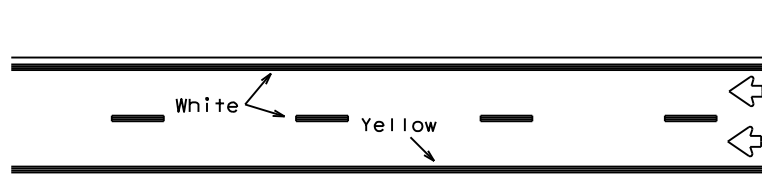


RAISED PAVEMENT MARKERS - PATTERN A



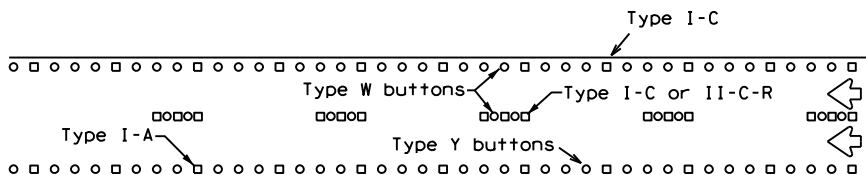
RAISED PAVEMENT MARKERS - PATTERN B

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



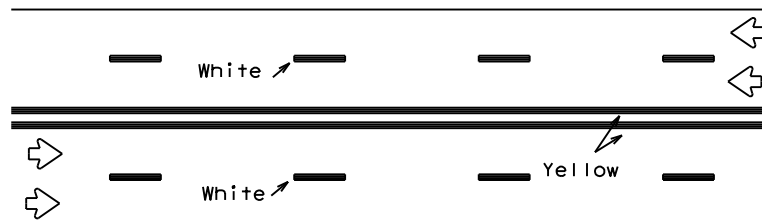
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



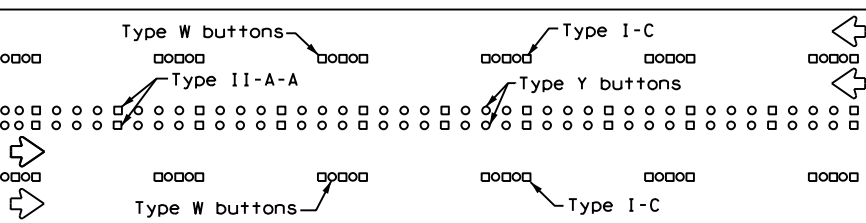
RAISED PAVEMENT MARKERS

## EDGE & LANE LINES FOR DIVIDED HIGHWAY



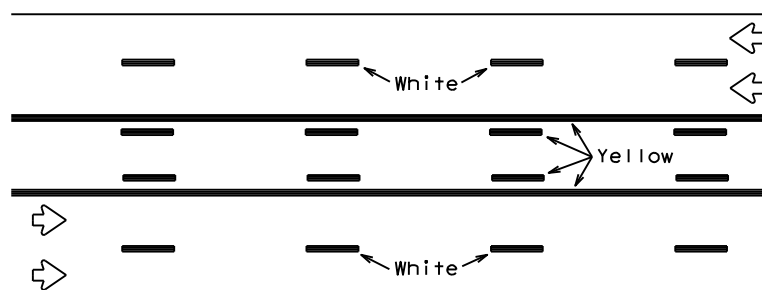
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



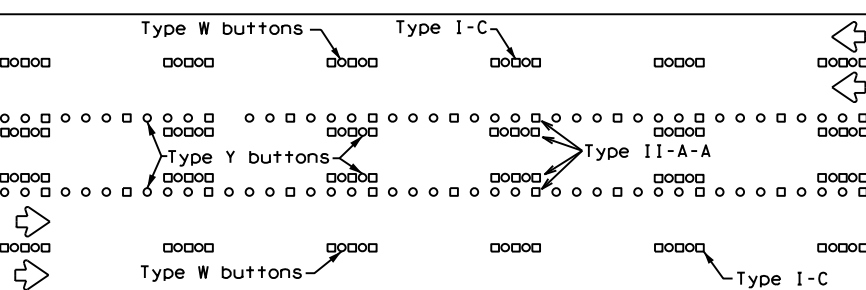
RAISED PAVEMENT MARKERS

## LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

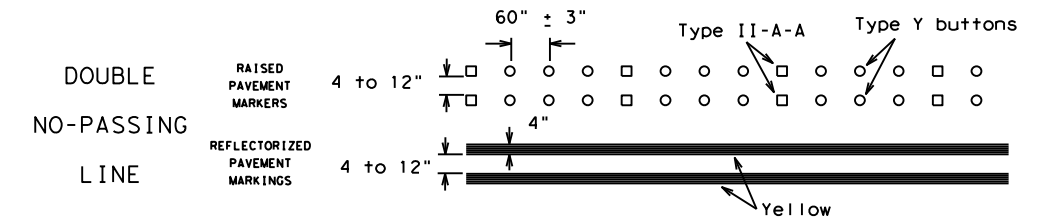
Prefabricated markings may be substituted for reflectORIZED pavement markings.



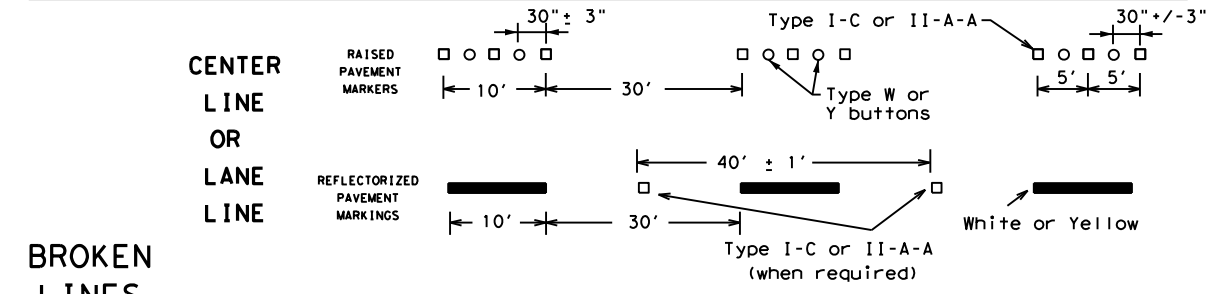
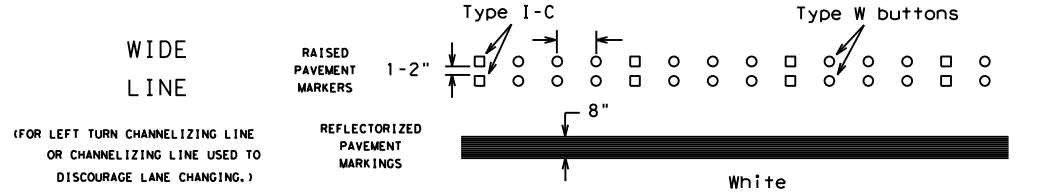
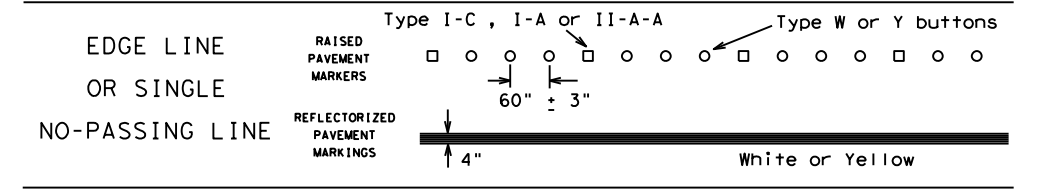
RAISED PAVEMENT MARKERS

## TWO-WAY LEFT TURN LANE

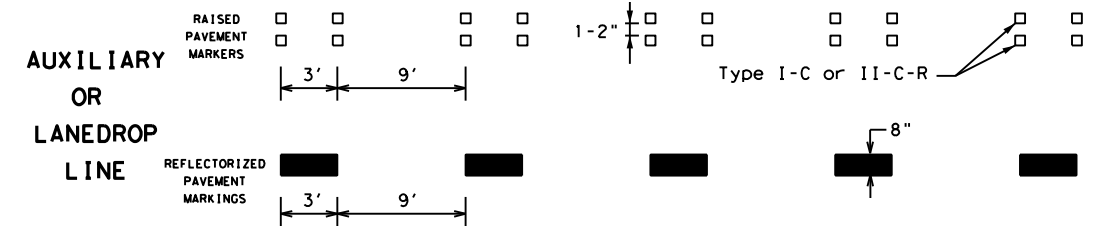
## STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



### SOLID LINES

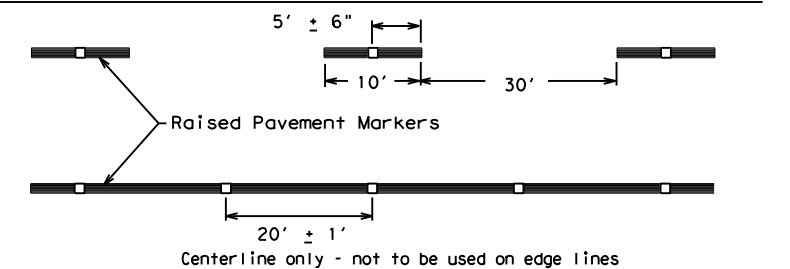


### BROKEN LINES



### 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.



SHEET 12 OF 12



## BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

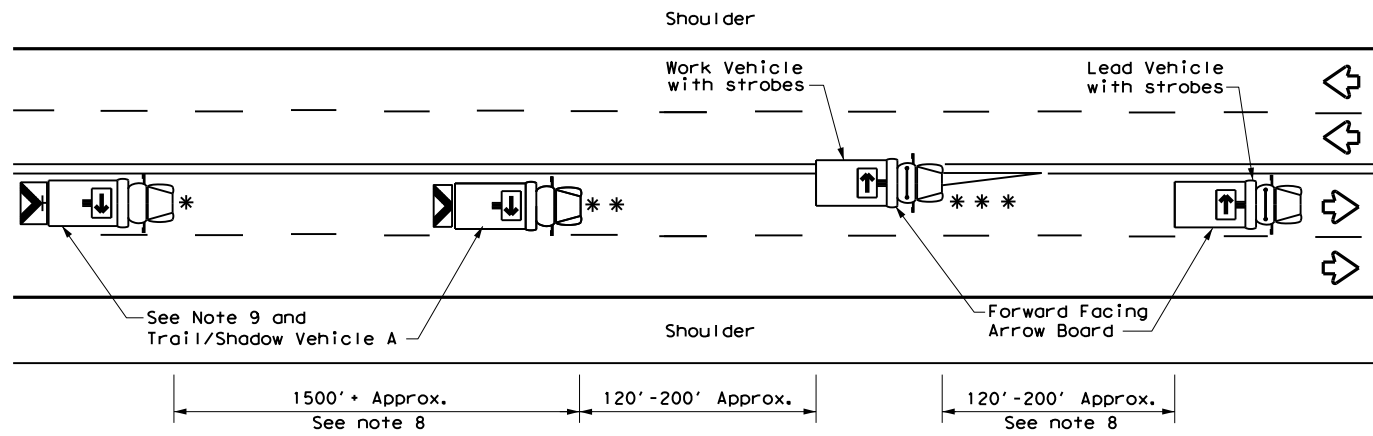
BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0916	28	082	CR 3861
1-97 9-07 5-21				
2-98 7-13				
11-02 8-14				
DIST	COUNTY	SHEET NO.		
CRP	SAN PATRICIO	021		

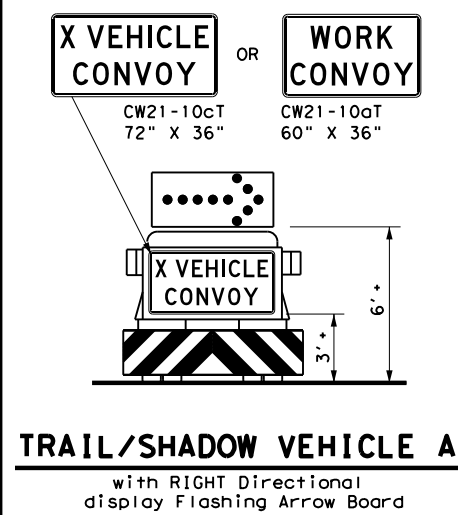
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: FILE:

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



**TCP (3-1a)**  
**UNDIVIDED MULTILANE ROADWAY**



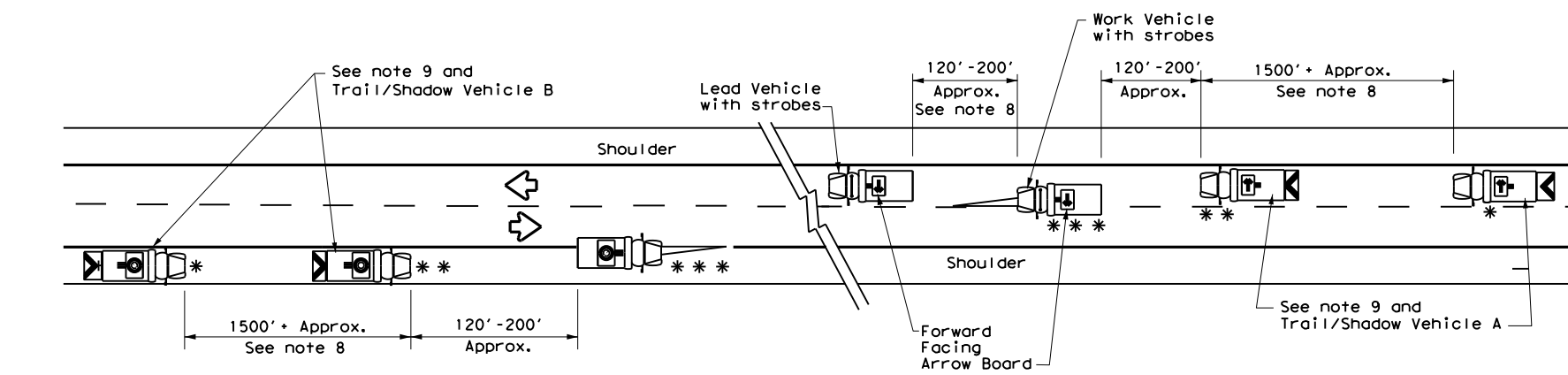
**TRAIL/SHADOW VEHICLE A**  
with RIGHT Directional display Flashing Arrow Board

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)

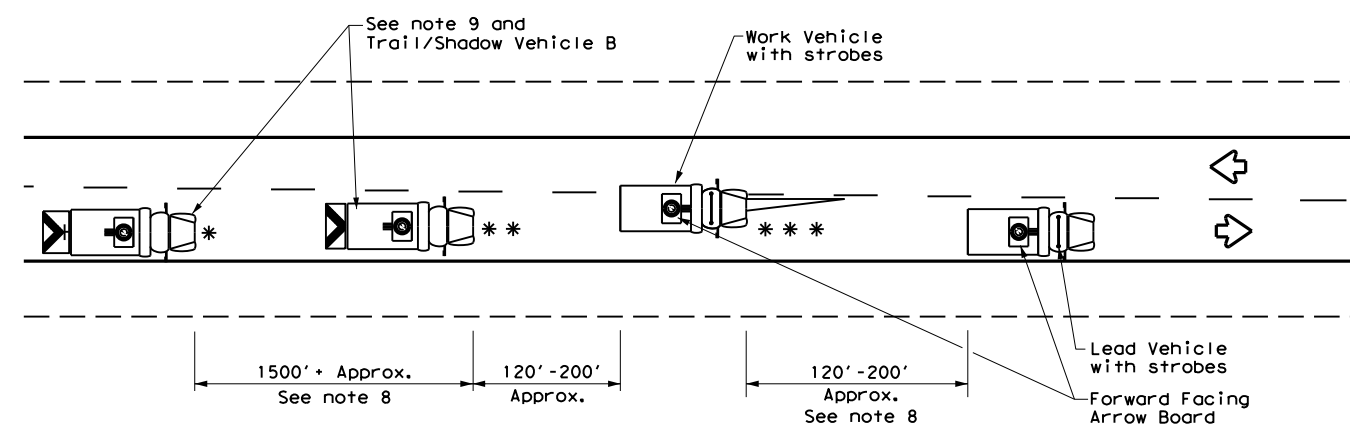
TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**GENERAL NOTES**

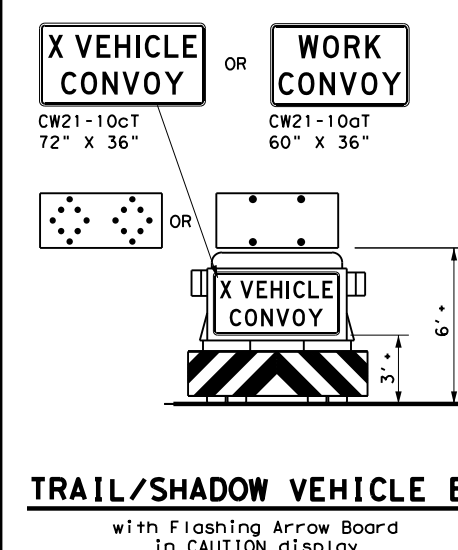
1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used the WORK vehicle must be equipped with an arrow board. The Engineer will determine if the LEAD VEHICLE and/or TRAIL VEHICLE are required based on prevailing roadway conditions, traffic 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.



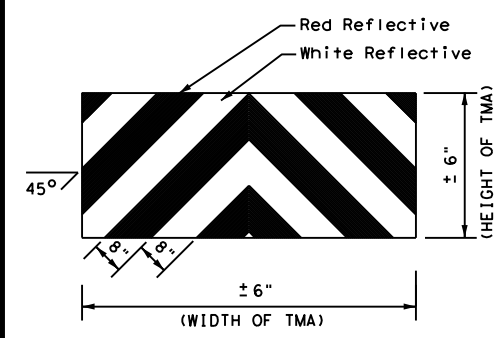
**TCP (3-1b)**  
**TWO-WAY ROADWAY WITH PAVED SHOULDERS**



**TCP (3-1c)**  
**TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS**



**TRAIL/SHADOW VEHICLE B**  
with Flashing Arrow Board in CAUTION display



**STRIPING FOR TMA**



**TRAFFIC CONTROL PLAN  
MOBILE OPERATIONS  
UNDIVIDED HIGHWAYS**

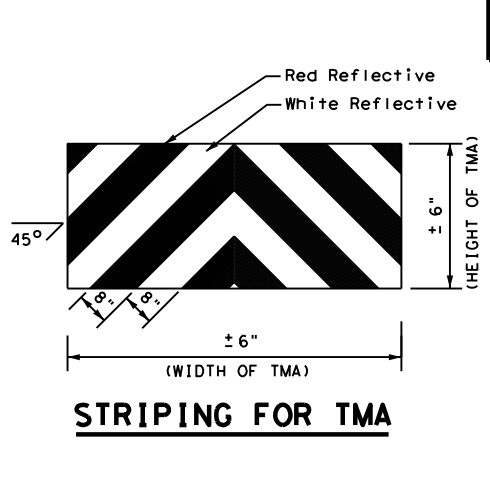
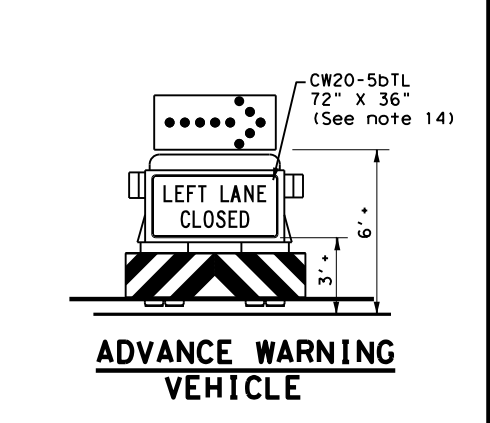
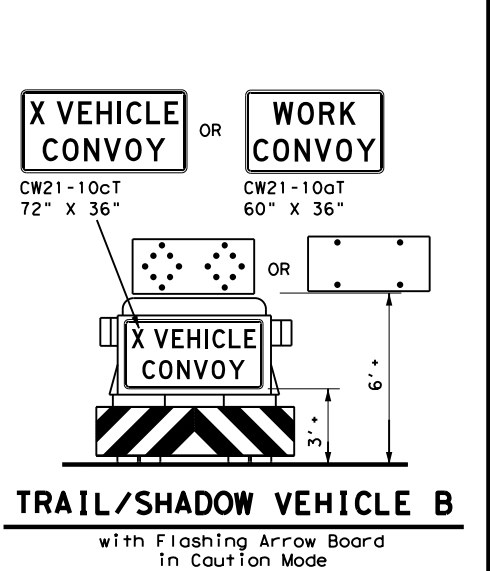
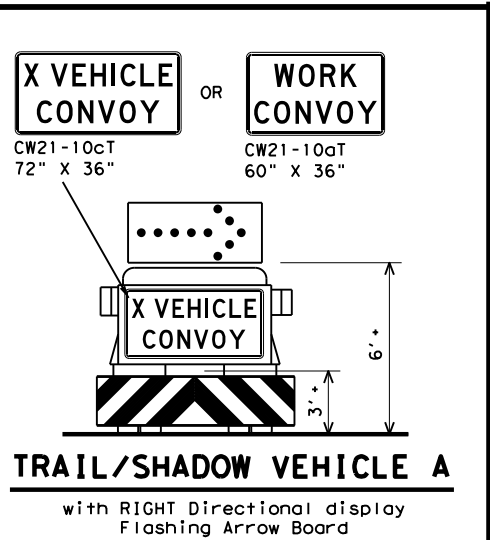
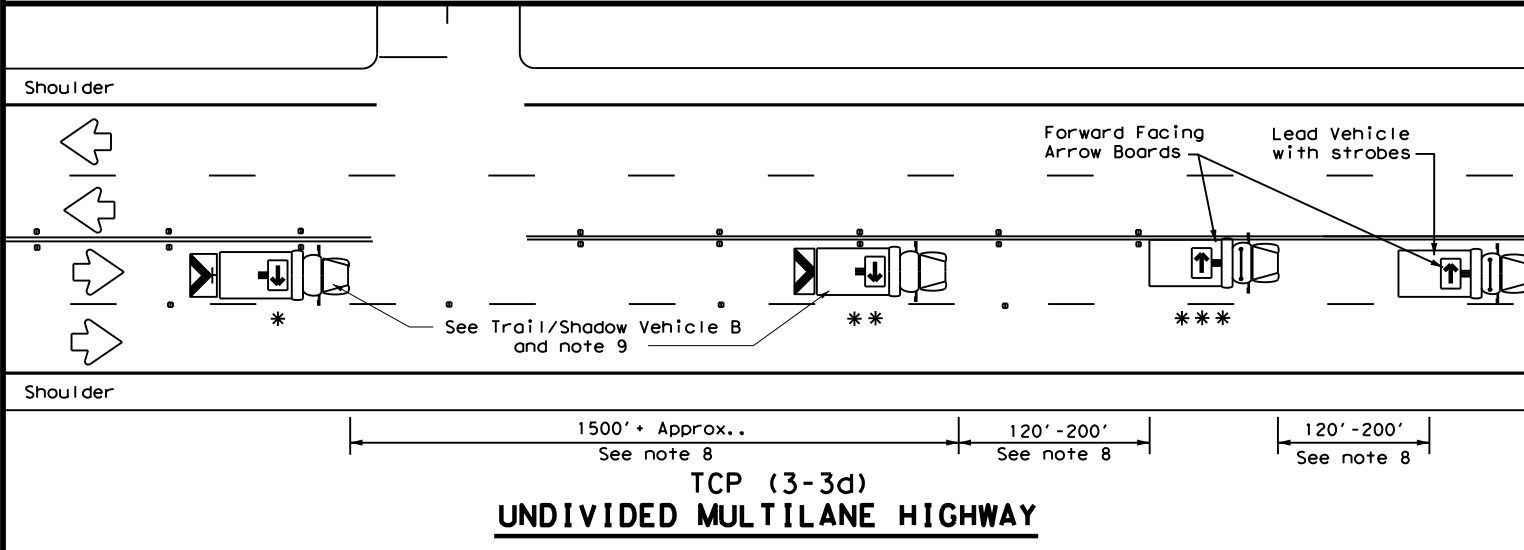
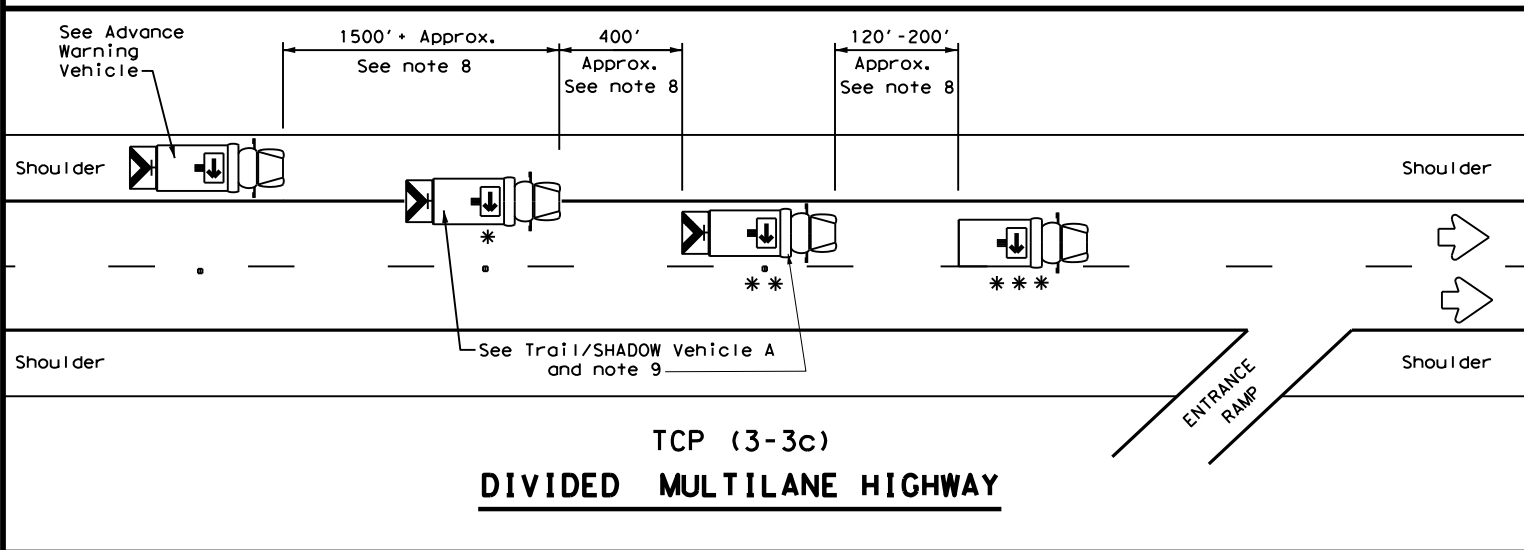
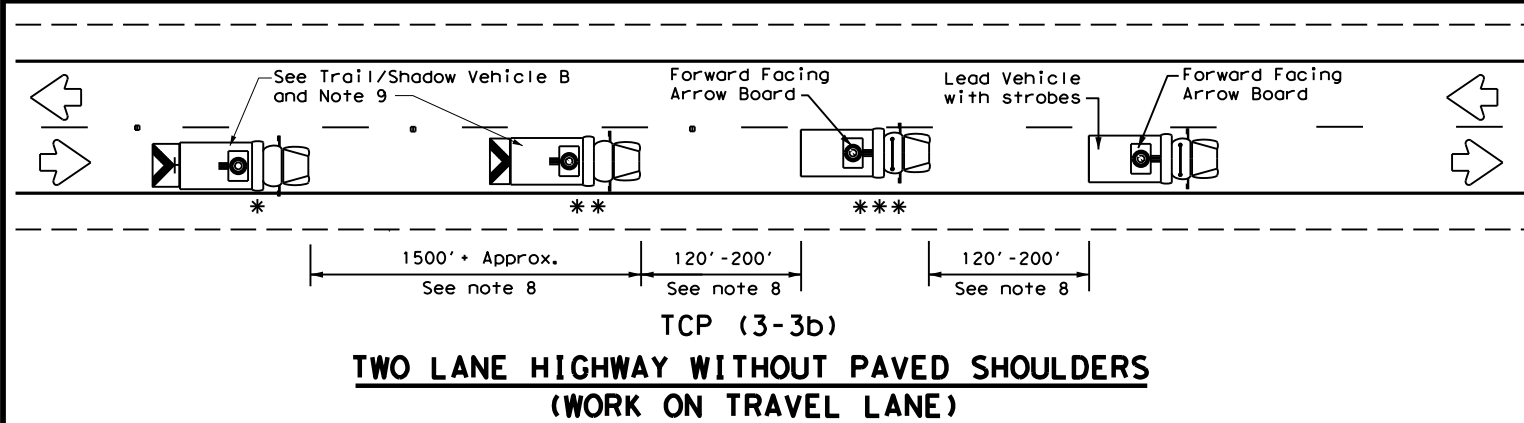
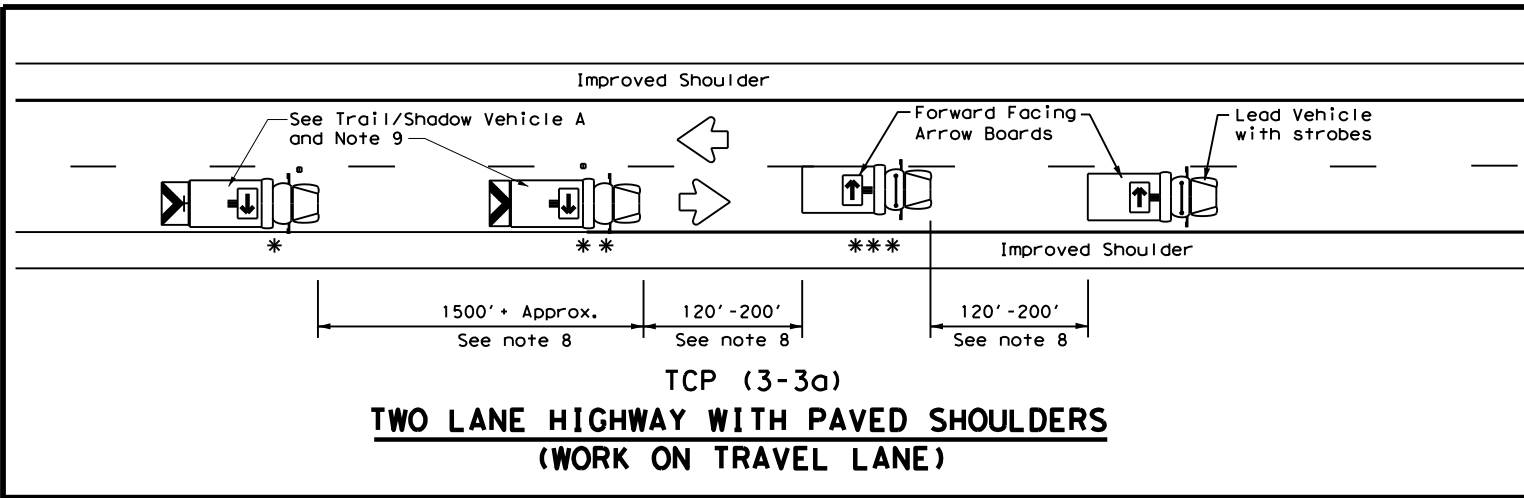
**TCP (3-1) - 13**

FILE:	tcp3-1.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
© TxDOT	December 1985	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0916	28	082	CR 3861				
2-94	4-98								
8-95	7-13								
1-97									
CRP	SAN PATRICIO		SHEET NO.		022				

DATE:  
FILE:



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



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.

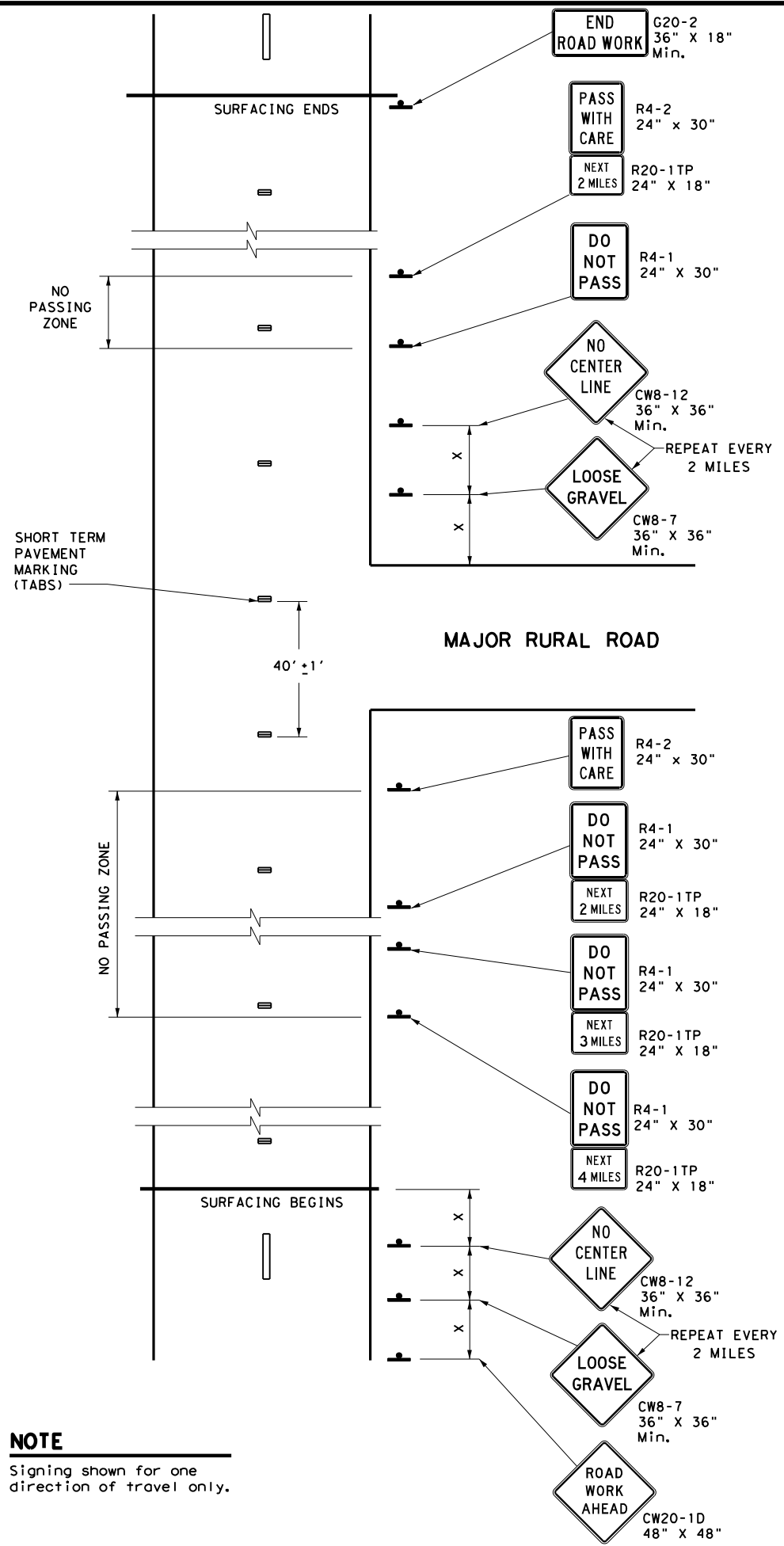
Texas Department of Transportation  
 Traffic Operations Division Standard

**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	0916	28	082	CR 3861
2-94 4-98	DIST	COUNTY	SHEET NO.	
8-95 7-13	CRP	SAN PATRICIO	023	
1-97 7-14				

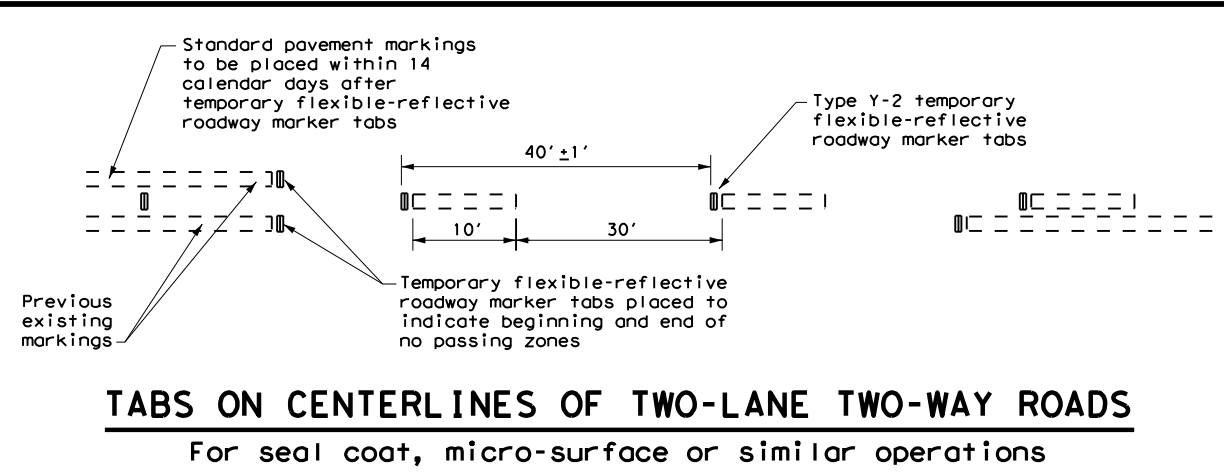
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: FILE:



**NOTE**  
 Signing shown for one direction of travel only.

**NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS**



**TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS**  
 For seal coat, micro-surface or similar operations

**"DO NOT PASS" SIGN (R4-1) and NO-PASSING ZONES**

- A. Prior to the beginning of construction, all currently striped no-passing zones shall be signed with the DO NOT PASS (R4-1) signs and PASS WITH CARE (R4-2) signs placed at the beginning and end of each zone for each direction of travel except as otherwise provided herein. Signs marking these individual no-passing zones need not be covered prior to construction if the signs supplement the existing pavement markings.
- B. At the discretion of the Engineer, in areas of numerous no-passing zones, several zones may be combined as a single zone. If passing is to be prohibited over one or more lengthy sections, a DO NOT PASS sign and a NEXT XX MILES (R20-1TP) plaque may be used at the beginning of such zones. The DO NOT PASS sign and the NEXT XX MILES plaque should be repeated every mile to the end of the no-passing zone. In areas where there is considerable distance between no-passing zones, the end of the no-passing zone may be signed with a PASS WITH CARE sign and a NEXT XX MILES plaque.
- C. Depending on traffic volumes and length of sections, it may be desirable to prohibit passing throughout the project to prevent damage to windshield and lights. The DO NOT PASS sign and NEXT XX MILES plaque should be used and repeated as often as necessary for this purpose. Where several existing zones are to be combined into one individual no-passing zone, the sign at the beginning of the zone should be covered until the surfacing operation has passed this location so as not to have the DO NOT PASS sign conflict with the existing pavement markings. Also, unless one days operation completes the entire length of such combined zones, appropriate DO NOT PASS and PASS WITH CARE signs should be placed at the beginning and end of the no-passing zones where the surfacing operation has stopped for the day.
- D. R4-1 and R4-2 are to remain in place until standard pavement markings are installed.

**"NO CENTER LINE" SIGN (CW8-12)**

- A. Center line markings are yellow pavement markings that delineate the separation of travel lanes that have opposite directions of travel on a roadway. Divided highways do not typically have center line markings.
- B. At the time construction activity obliterates the existing center line markings (low volume roads may not have an existing centerline), a NO CENTER LINE (CW8-12) sign should be erected at the beginning of the work area, at approximately 2 mile intervals within the work area, beyond major intersections and other locations deemed necessary by the Engineer.
- C. The NO CENTER LINE signs are to remain in place until standard pavement markings are installed.

**"LOOSE GRAVEL" SIGN (CW8-7)**

- A. When construction begins, a LOOSE GRAVEL (CW8-7) sign should be erected at each end of the work area and repeated at intervals of approximately 2 miles in rural areas and closer in urban areas.
- B. The LOOSE GRAVEL signs are to remain in place until the condition no longer exists.

**PAVEMENT MARKINGS**

- A. Temporary markings for surfacing projects shall be Temporary Flexible-reflective Roadway Marker Tabs unless otherwise approved by the Engineer. Tabs are to be installed to provide true alignment for striping crews or as directed by the Engineer. Tabs will be placed at the spacing indicated. Tabs should be applied to the pavement no more than two (2) days before the surfacing is applied. After the surfacing is rolled and swept, the cover over the reflective strip shall be removed.
- B. Tabs shall not be used to simulate edge lines.
- C. Tab placement for overlay/inlay operations shall be as shown on the WZ(STPM) standard sheet.

**COORDINATION OF SIGN LOCATIONS**

- A. The location of warning signs at the beginning and end of a work area are to be coordinated with other signing typically shown on the Barricade and Construction Standards for project limits to ensure adequate sign spacing.
- B. Where possible the ROAD WORK AHEAD (CW20-1D), LOOSE GRAVEL (CW8-7), and NO CENTER LINE (CW8-12) signs should be placed in the sequence shown following the OBEY WARNING SIGNS STATE LAW (R20-3T) and the TRAFFIC FINES DOUBLE (R20-5T) sign, and one "X" sign spacing prior to the CONTRACTOR (G20-6T) sign typically located at or near the limits of surfacing. LOOSE GRAVEL and NO CENTER LINE signs will then be repeated as described above.

Posted Speed *	Minimum Sign Spacing "X" Distance
30	120'
35	160'
40	240'
45	320'
50	400'
55	500'
60	600'
65	700'
70	800'
75	900'

\* Conventional Roads Only

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

**GENERAL NOTES**

1. The traffic control devices detailed on this sheet will be furnished and erected as directed by the Engineer on sections of roadway where tabs must be placed prior to the surfacing operation which will cover or obliterate the existing pavement markings.
2. The devices shown on this sheet are to be used to supplement those required by the BC Standards or others required elsewhere in the plans.
3. Signs shall be erected as detailed on the BC Standards or the Compliant Work Zone Traffic Control Devices List (CWZTCD) on supports approved for Long-Term / Intermediate-Term Work Zone Sign Supports.
4. When surfacing operations take place on divided highways, freeways or expressways, the size of diamond shaped construction warning signs shall be 48" x 48".
5. Signs on divided highways, freeways and expressways will be placed on both right and left sides of the roadway based on roadway conditions as directed by the Engineer.

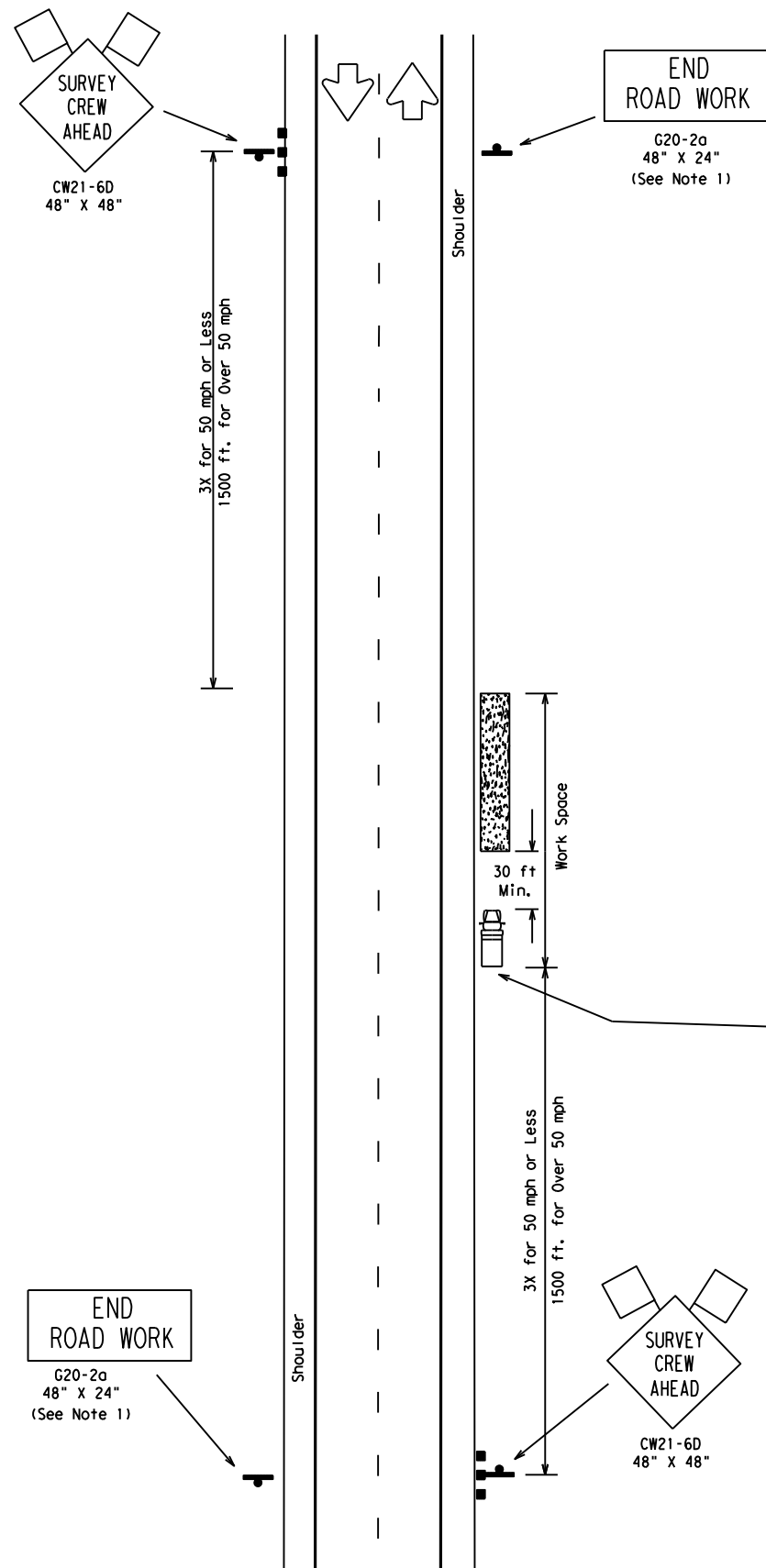


**TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS**  
**TCP (7-1) - 13**

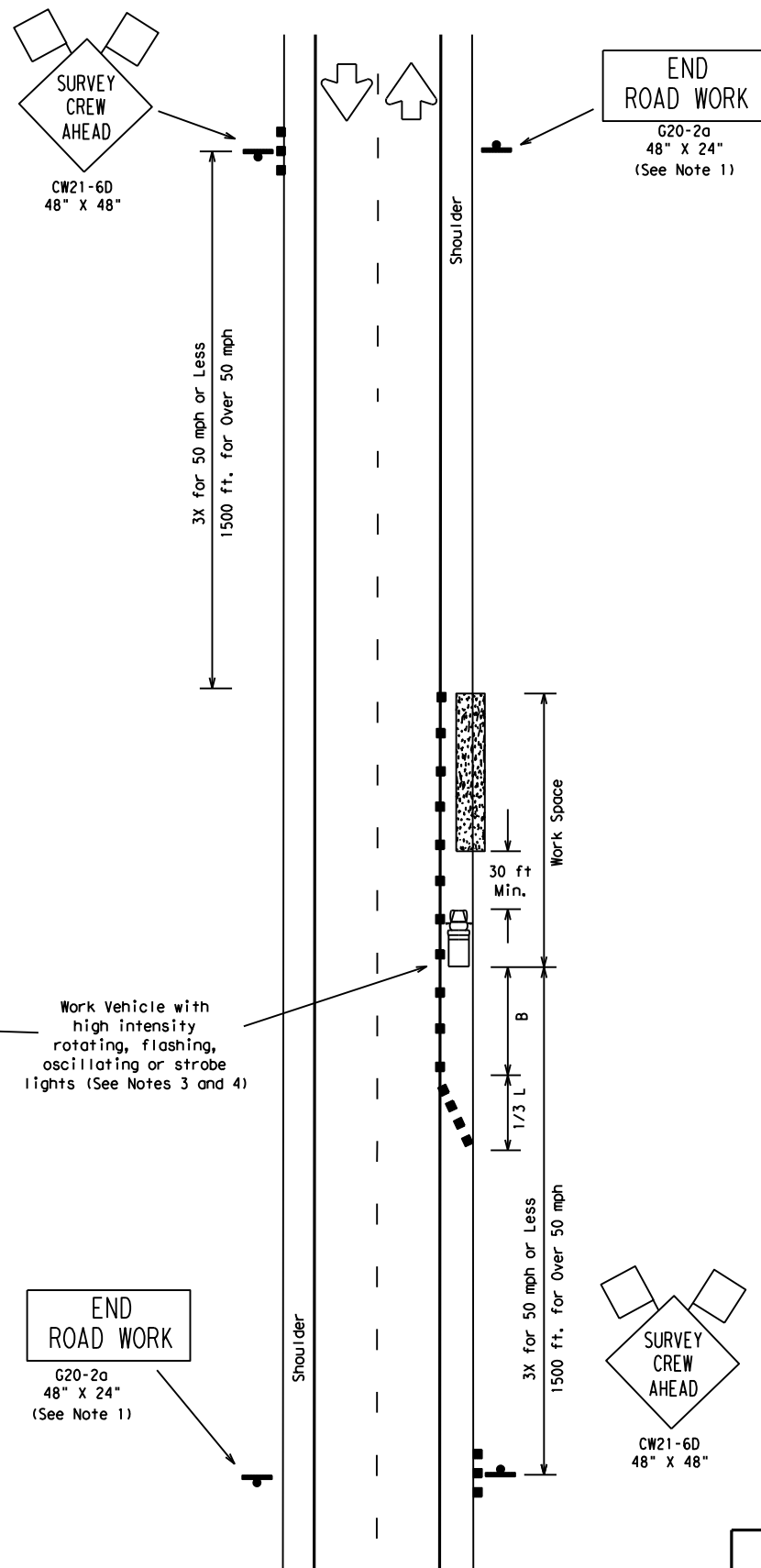
FILE: tcp7-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT March 1991	CONT	SECT	JOB	HIGHWAY
REVISIONS	0916	28	082	CR 3861
4-92 4-98	DIST	COUNTY	SHEET NO.	
1-97 7-13	CRP	SAN PATRICIO	024	

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

DATE:  
FILE:



TCP (S-1a)  
WORK OFF SHOULDER  
OR PAVED SURFACE



TCP (S-1b)  
WORK ON SHOULDER

WHENEVER POSSIBLE, SURVEY PARTIES SHOULD AVOID, BY THE USE OF OFFSET LINES, ANY UNNECESSARY PERIODS OF TIME ON THE ROAD SURFACE.

8-18-08 Revision  
 Corrected misspelling.

LEGEND

	Type III Barricade		Channelizing Devices		Flag
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)		
	Trailer Mounted Flashing Arrow Panel		Portable Changeable Message Sign (PCMS)		
	Flagger		Sign Post		

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Device		Min. Sign Spacing "X" Distance	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' - 75'	120'	90'
35		205'	225'	245'	35'	70' - 90'	160'	120'
40		265'	295'	320'	40'	80' - 100'	240'	155'
45		450'	495'	540'	45'	90' - 110'	320'	195'
50		500'	550'	600'	50'	100' - 125'	400'	240'
55		550'	605'	660'	55'	110' - 140'	500'	295'
60		600'	660'	720'	60'	120' - 150'	600'	350'
65	650'	715'	780'	65'	130' - 165'	700'	410'	
70	700'	770'	840'	70'	140' - 175'	800'	475'	
75	750'	825'	900'	75'	150' - 185'	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
	✓	✓		

DEFINITIONS:  
 SHORT DURATION - work that occupies a location up to 1 hour.  
 SHORT TERM STATIONARY - daytime work that occupies a location for more than 1 hour within a single daylight period.

- GENERAL NOTES:
- The G20-2a "END ROAD WORK" sign may be placed on the back of the CW21-6D "SURVEY CREW AHEAD" sign or may be omitted for short duration (less than 1 hour) work.
  - Channelizing devices on the shoulder taper and tangent section may be omitted for short duration (less than 1 hour) work.
  - If line-of-sight requirements for surveying operations will preclude the placement of the Work Vehicle to protect workers, the channelizing devices mentioned in Note 2 are required.
  - A Shadow Vehicle with a Truck Mounted Attenuator and flashing warning lights/arrow panel in caution mode may be used in lieu of the Work Vehicle to protect the work space.
  - The CW20-1D "ROAD WORK AHEAD" sign may be substituted for the CW21-6D "SURVEY CREW AHEAD" sign.
  - This plan may also be used for shoulder work or off shoulder work for multilane undivided roadways.
  - The CW21-6D "SURVEY CREW AHEAD" sign for low volume intersecting side roads is desirable, but is not required when working less than 15 minutes in area of the side road, as determined by the Engineer.
- TCP (S-1a)
- Cones may be placed at edge of pavement adjacent to the work space to enhance safety.

Texas Department of Transportation  
Traffic Operations Division

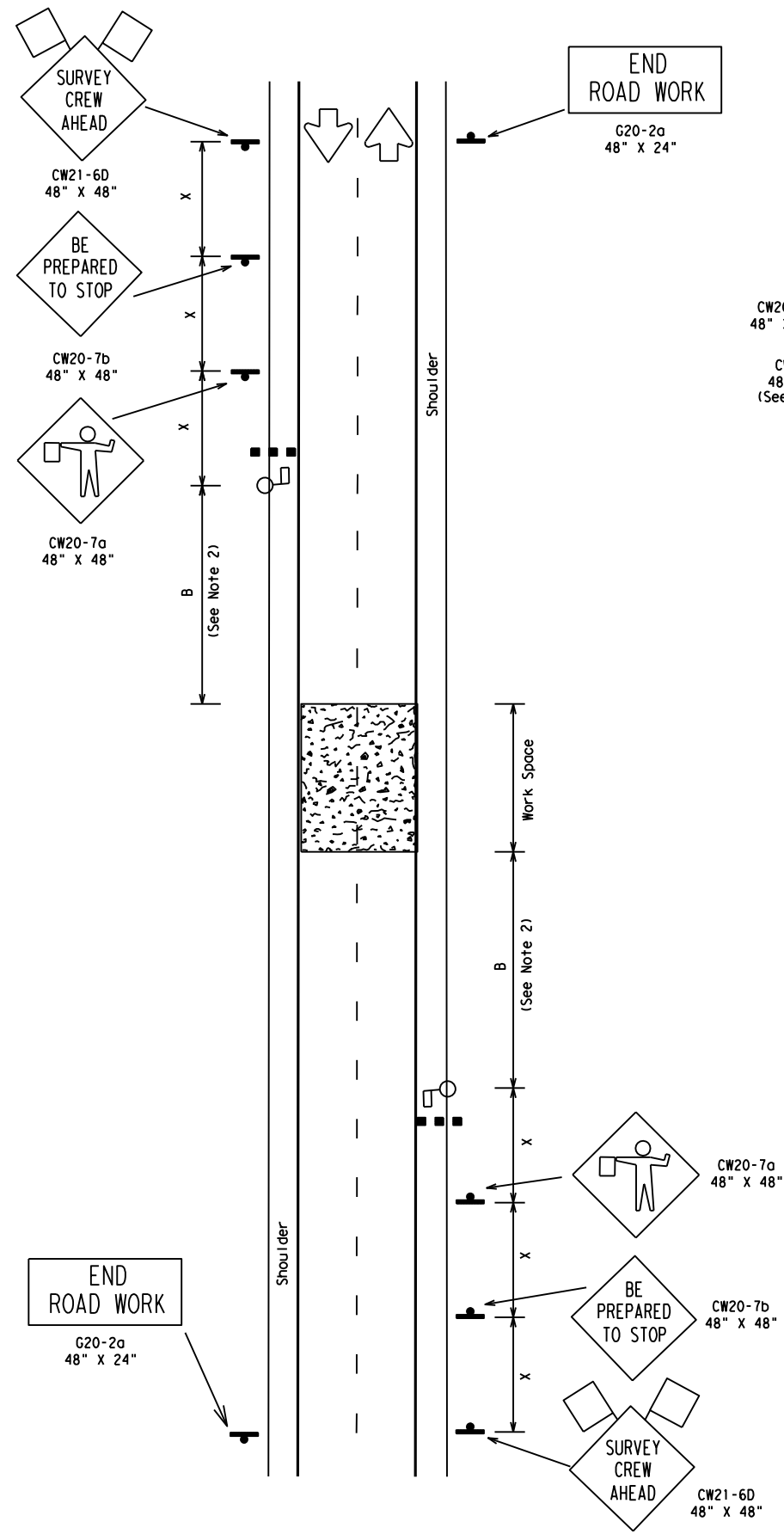
**TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS**

**TCP (S-1) - 08A**

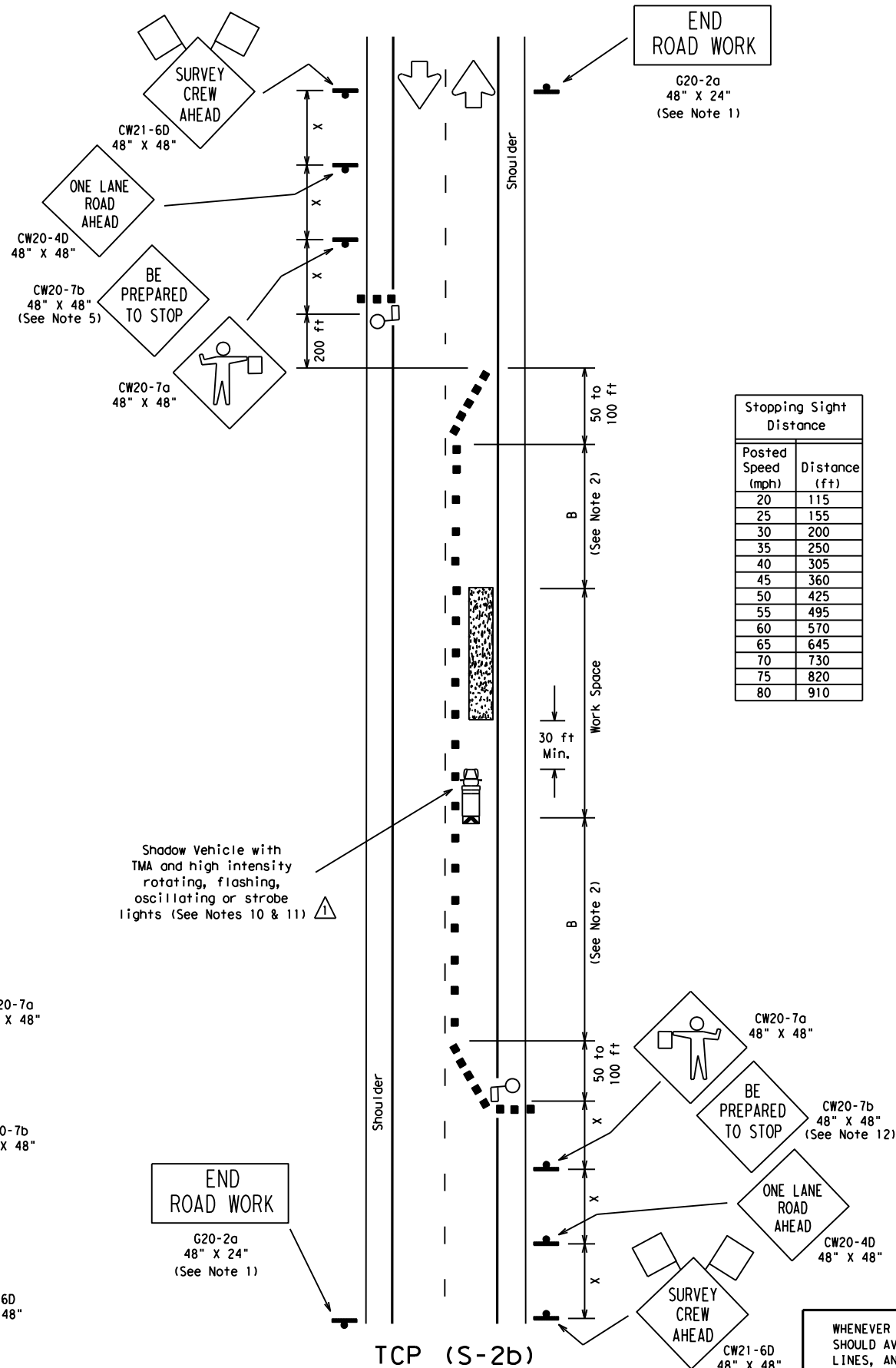
© TxDOT August 2008		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
8-08	REVISIONS	CONT	SECT	JOB	HIGHWAY
		0916	28	082	CR 3861
		DIST	COUNTY	SHEET NO.	
		CRP	SAN PATRICIO	025	

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

DATE:  
FILE:



TCP (S-2a)  
ROAD CLOSED FOR LESS THAN 20 MINUTES -  
OFF PEAK TRAFFIC HOURS  
WITH OR WITHOUT SHOULDERS



TCP (S-2b)  
WORK IN ROADWAY  
OFF PEAK TRAFFIC HOURS  
WITH OR WITHOUT SHOULDERS

Stopping Sight Distance	
Posted Speed (mph)	Distance (ft)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820
80	910

WHENEVER POSSIBLE, SURVEY PARTIES SHOULD AVOID, BY THE USE OF OFFSET LINES, ANY UNNECESSARY PERIODS OF TIME ON THE ROAD SURFACE.

8-18-08 Revision  
 Corrected reference to notes.

- LEGEND
- Type III Barricade
  - Channelizing Devices
  - Flag
  - Heavy Work Vehicle
  - Truck Mounted Attenuator (TMA)
  - Trailer Mounted Flashing Arrow Panel
  - Portable Changeable Message Sign (PCMS)
  - Flagger
  - Sign Post

Posted Speed $\times$	Formula	Minimum Desirable Taper Lengths $\times \times$			Suggested Maximum Spacing of Device		Min. Sign Spacing "X" Distance	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' - 75'	120'	90'
35		205'	225'	245'	35'	70' - 90'	160'	120'
40	$L = WS$	265'	295'	320'	40'	80' - 100'	240'	155'
45		450'	495'	540'	45'	90' - 110'	320'	195'
50	$L = WS$	500'	550'	600'	50'	100' - 125'	400'	240'
55		550'	605'	660'	55'	110' - 140'	500'	295'
60	$L = WS$	600'	660'	720'	60'	120' - 150'	600'	350'
65		650'	715'	780'	65'	130' - 165'	700'	410'
70	$L = WS$	700'	770'	840'	70'	140' - 175'	800'	475'
75		750'	825'	900'	75'	150' - 185'	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
	✓	✓		

DEFINITIONS:  
 SHORT DURATION - work that occupies a location up to 1 hour.  
 SHORT TERM STATIONARY - daytime work that occupies a location for more than 1 hour within a single daylight period.

- GENERAL NOTES:
- The G20-2a "END ROAD WORK" sign may be placed on the back of the CW21-6D "SURVEY CREW AHEAD" sign or may be omitted for short duration (less than 1 hour) work.
  - Adequate Stopping Sight Distance (see Stopping Sight Distance table) should be maintained from approaching traffic to the flagger or a queue of stopped vehicles. The Buffer Space "B" should be extended around curves or other obstacles, when necessary, to have adequate Stopping Sight Distance to the flagger station.
  - Flaggers should use two-way radios or other means of communication while flagging.
  - The length of the work space should be based on the ability of the flaggers to communicate.
  - CW20-1D "ROAD WORK AHEAD" signs may be substituted for CW21-6D "SURVEY CREW AHEAD" signs.
  - The CW21-6D "SURVEY CREW AHEAD" sign for low volume intersecting side roads is desirable, but is not required when working less than 15 minutes in area of the side road, as determined by the Engineer.
- TCP (S-2a)
- Road closures shall be less than 20 minutes. Closures less than 5 minutes are desirable.
  - Sign spacing should be increased if traffic repeatedly queues past the CW20-7b "BE PREPARED TO STOP" sign.
  - The surveying instrument should not be located on the paved surface.
- TCP (S-2b)
- For short duration work the Shadow Vehicle with a TMA may be replaced by another Work Vehicle with high intensity rotating, flashing or strobe lights.
  - Shadow Vehicles with a TMA are desirable when workers or equipment are in the work space. When approved by the engineer, Type III barricades or other channelizing devices may be substituted for the Shadow Vehicle.
  - The CW20-7b "BE PREPARED TO STOP" sign is optional. When used, it should be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign.

Texas Department of Transportation  
Traffic Operations Division

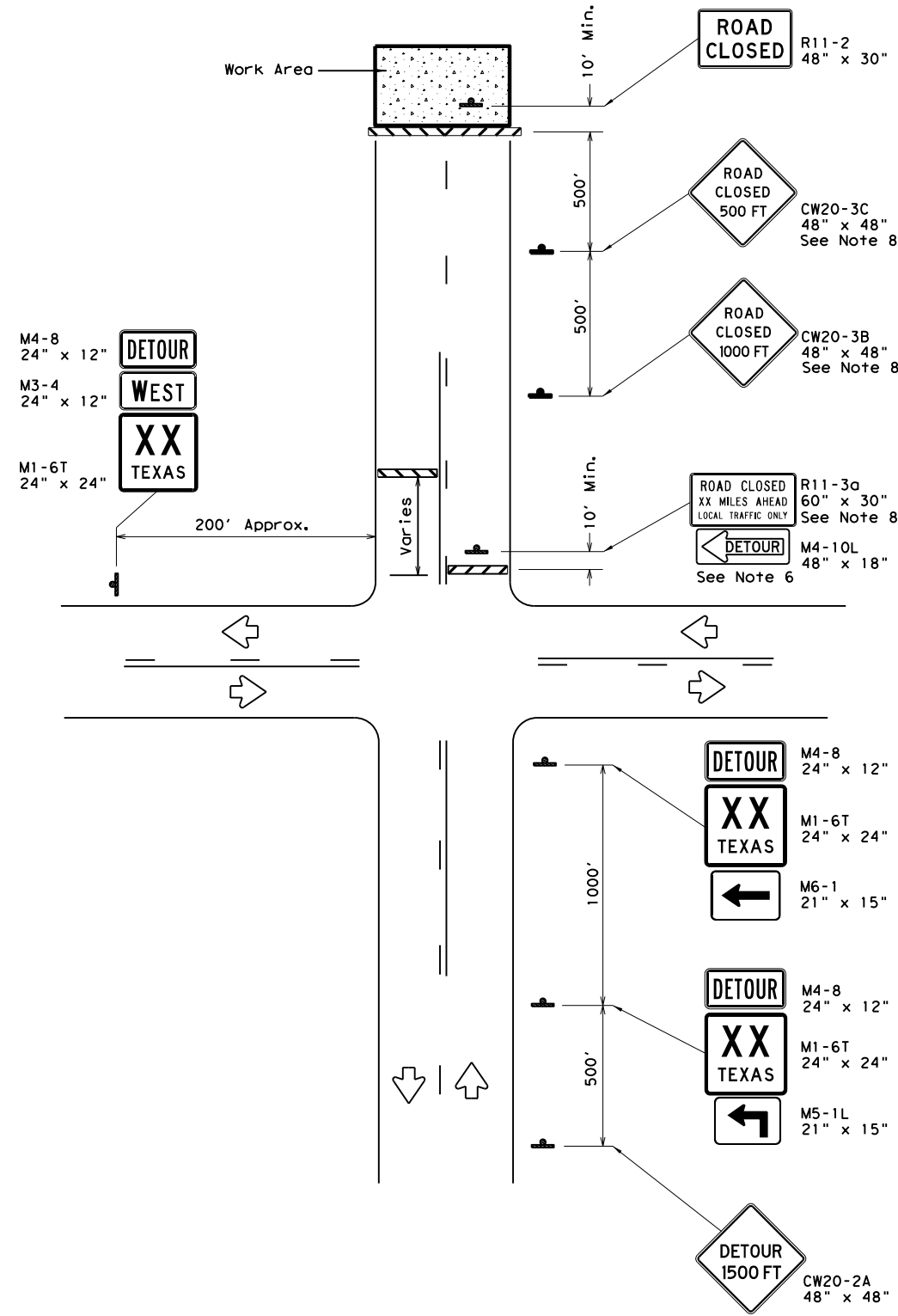
TRAFFIC CONTROL PLAN  
FOR SURVEYING  
OPERATIONS

TCP (S-2) - 08A

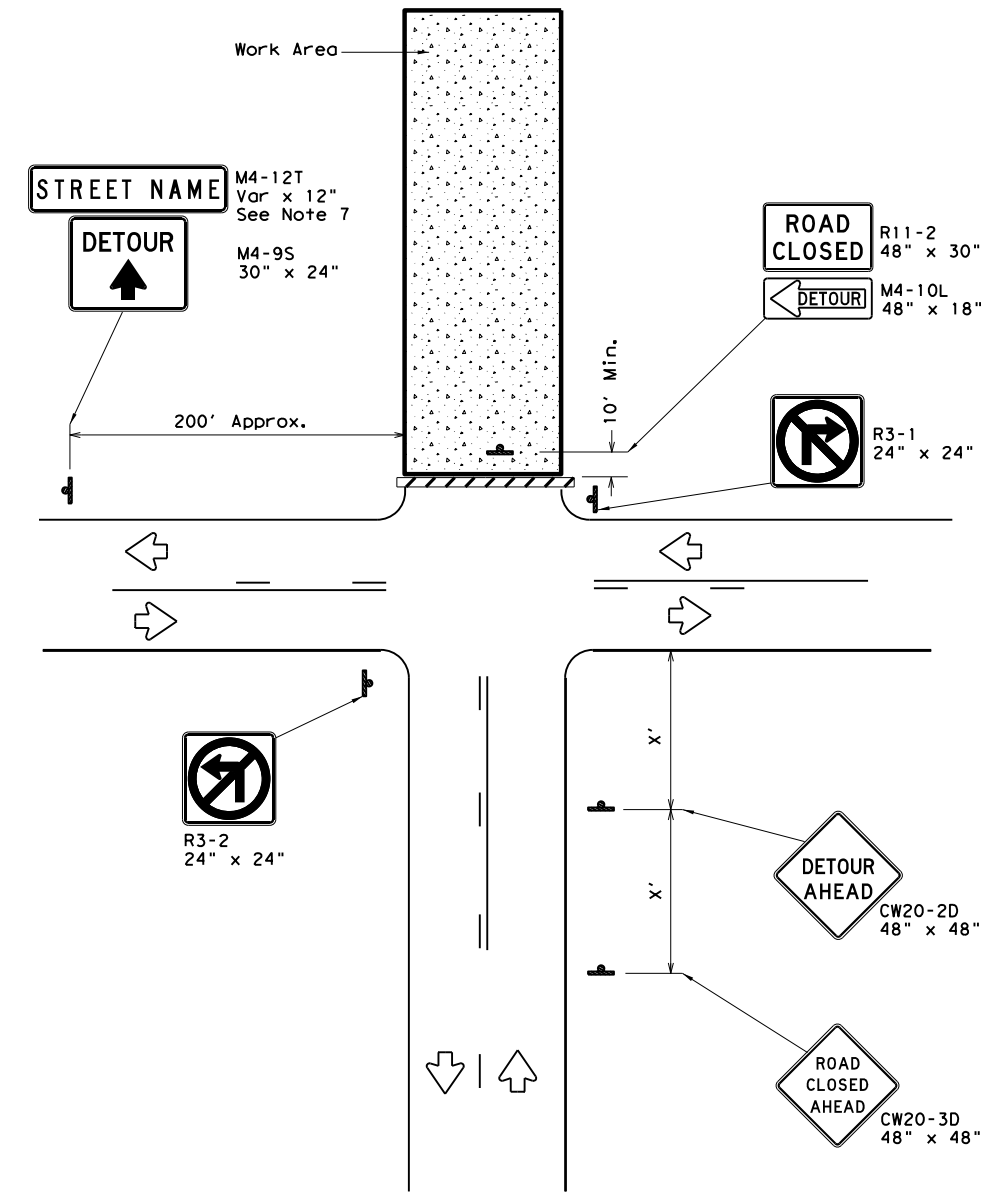
© TxDOT August 2008	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
8-08	REVISIONS	CONT	SECT	JOB
		0916	28	082
		DIST	COUNTY	HIGHWAY
		CRP	SAN PATRICIO	CR 3861
				SHEET NO.
				026

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:



**ROAD CLOSURE BEYOND THE INTERSECTION**  
 Signing for a Numbered Route with an Off-Site Detour



**ROAD CLOSURE AT THE INTERSECTION**  
 Signing for an Un-numbered Route with an Off-Site Detour

LEGEND	
	Type 3 Barricade
	Sign

Posted Speed *	Minimum Sign Spacing "X" Distance
30	120'
35	160'
40	240'
45	320'
50	400'
55	500'
60	600'
65	700'
70	800'
75	900'

\* Conventional Roads Only

**GENERAL NOTES**

1. This sheet is intended to provide details for temporary work zone road closures. For permanent road closure details see the D&OM standards.
2. Barricades used shall meet the requirements shown on Barricade and Construction Standard BC(10) and listed on the Compliant Work Zone Traffic Control Devices List (CWZTCD).
3. Stockpiled materials shall not be placed on the traffic side of barricades.
4. Barricades at the road closure should extend from pavement edge to pavement edge.
5. Detour signing shown is intended to illustrate the type of signing that is appropriate for numbered routes or un-numbered routes as labeled. It does not indicate the full extent of detour signing required. Detour routes should be signed as shown elsewhere in the plans.
6. If the road is open for a significant distance beyond the intersection or there are significant origin/destination points beyond the intersection, the signs and barricades at this location should be located at the edge of the traveled way.
7. The Street Name (M4-12T) sign is to be placed above the DETOUR (M4-9S) sign.
8. For urban areas where there is a shorter distance between the intersection and the actual closure location, the ROAD CLOSED XX MILES AHEAD (R11-3a) sign may be replaced with a ROAD CLOSED TO THRU TRAFFIC (R11-4) sign. If adequate space does not exist between the intersection and the closure a single ROAD CLOSED AHEAD (CW20-3D) sign spaced as per the table above may replace the ROAD CLOSED 1000 FT (CW20-3B) and ROAD CLOSED 500 FT (CW20-3C) signs.
9. Signs and barricades shown shall be subsidiary to Item 502. Locations where these details will be required shall be as shown elsewhere in the plans.

Texas Department of Transportation  
 Traffic Operations Division Standard

**WORK ZONE ROAD CLOSURE DETAILS**

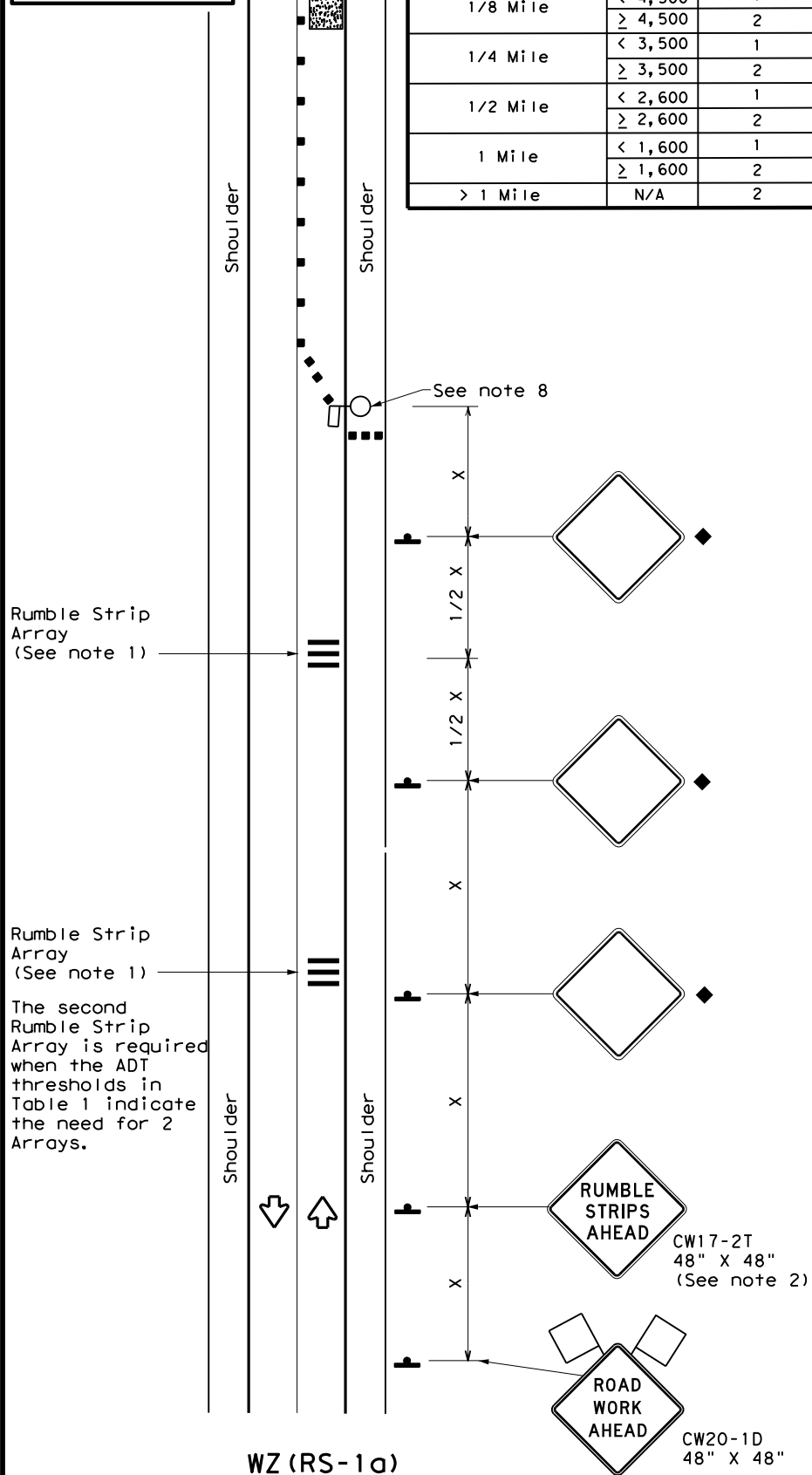
**WZ (RCD) - 13**

FILE: wzrcd-13.dgn	DN: TxDOT	CK: TxDOT	DN: TxDOT	CK: TxDOT
© TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	0916	28	082	CR 3861
1-97 4-98 7-13	DIST	COUNTY	SHEET NO.	
2-98 3-03	CRP	SAN PATRICIO	027	

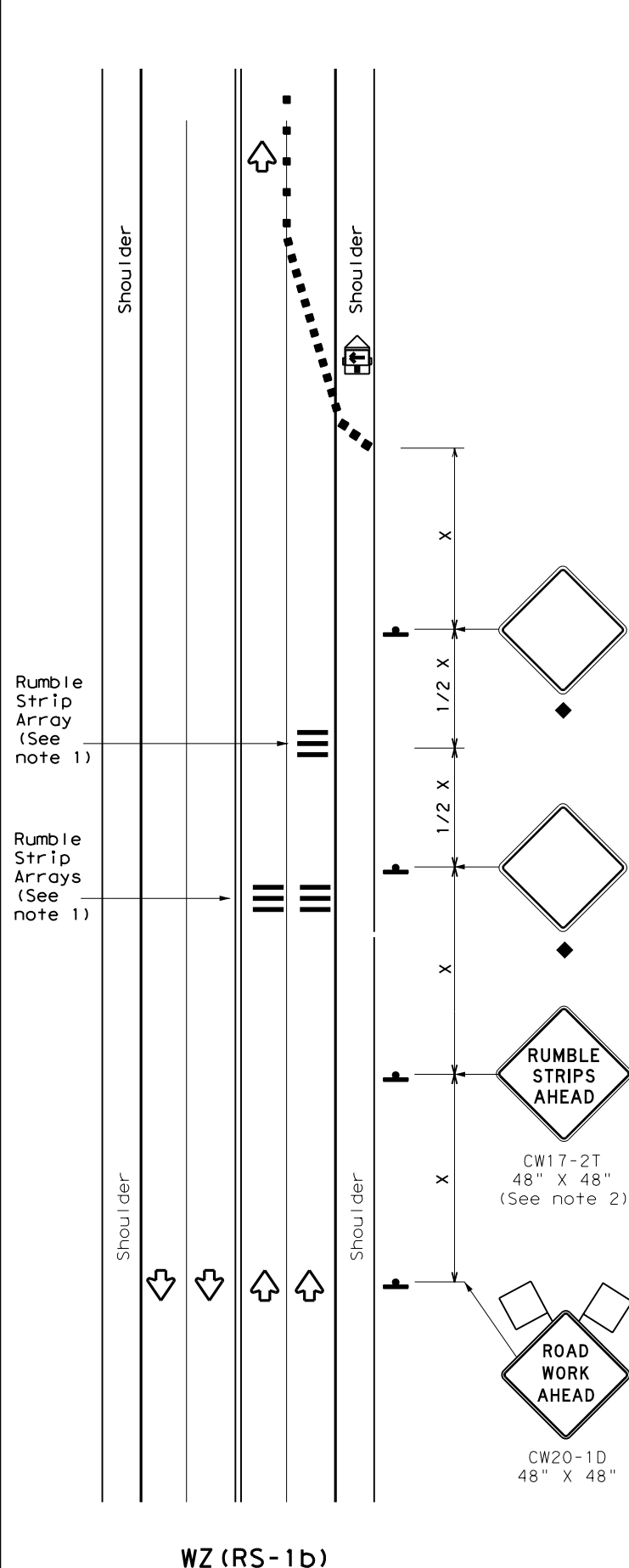
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

Warning sign and rumble strip sequence in opposite direction is same as below.

Flagger to Flagger (Length of Work Area)	ADT	# of Rumble Strip Arrays
1/8 Mile	< 4,500	1
	≥ 4,500	2
1/4 Mile	< 3,500	1
	≥ 3,500	2
1/2 Mile	< 2,600	1
	≥ 2,600	2
1 Mile	< 1,600	1
	≥ 1,600	2
> 1 Mile	N/A	2



RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

- Each Rumble Strip Array should consist of three rumble strips spaced center to center at the spacing shown in Table 2, placed transverse across the lane at locations shown.
- The CW17-2T "RUMBLE STRIPS AHEAD" sign should be located after the CW20-1D "ROAD WORK AHEAD" sign and spaced as shown. If traffic is observed to be queuing, or is expected to queue beyond the Rumble Strips, the CW17-2T sign and the first Rumble Strip Array may be located upstream of the CW20-1D sign as necessary to provide needed warning.
- Temporary Rumble Strips will be considered subsidiary to Item 502, and shall be a product listed on the Compliant Work Zone Traffic Control Devices.
- Remove Temporary Rumble Strips before removing the advanced warning signs.
- Temporary Rumble Strips should not be used on horizontal curves, loose gravel, soft or bleeding asphalt, heavily rutted pavements or unpaved surfaces.
- Temporary Rumble Strips shall be installed and maintained as per manufacturer's recommendations.
- This standard sheet shall be used in conjunction with other appropriate TCP standard, TMUTCD typical application or project specific detail for the project.
- The one-lane two-way application may utilize a flagger, an Automated Flagger Assistance Device (AFAD) or a Portable Traffic Signal (PTS).
- Replace defective Temporary Rumble Strips as directed by the Engineer.
- Temporary Rumble Strips may be used on freeways or expressways based on engineering judgment and written direction from the Engineer.

Speed	Approximate distance between strips in an array
≤ 40 MPH	10'
> 40 MPH & ≤ 55 MPH	15'
= 60 MPH	20'
≥ 65 MPH	* 35' +

	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Panel		Portable Changeable Message Sign (PCMS)
	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 = WS <sup>2</sup> / 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)

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

◆ Signs are for illustrative purposes only. Signs required may vary depending on the TCP, TMUTCD Typical Application, or project specific details for the project.

\* For posted speeds in excess of 65 MPH, it is recommended that spacing is increased as speed limits increase. Increasing space between rumble strips will improve effectiveness.

Texas Department of Transportation Traffic Safety Division Standard

## TEMPORARY RUMBLE STRIPS

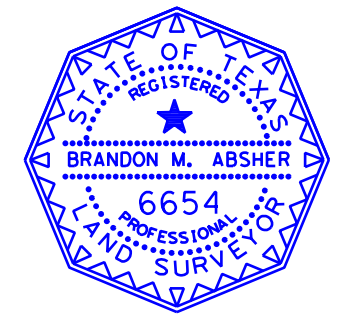
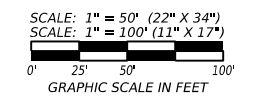
### WZ (RS) - 22

FILE: wzrs22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	0916	28	082	CR 3861
2-14 1-22	DIST	COUNTY	SHEET NO.	
4-16	CRP	SAN PATRICIO	028	

DATE: FILE:

CK: DW: CK: DW:

- NOTES:
1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH ZONE (4205), NAD83. ALL COORDINATES AND DISTANCES SHOWN HEREON ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 0.999960.
  2. ALL HORIZONTAL VALUES WERE DERIVED AND VERIFIED BY GPS (RTK) OBSERVATION USING THE TXDOT RTN NETWORK.
  3. ALL VERTICAL VALUES WERE DERIVED FROM DIGITAL LEVEL LOOPS HOLDING ELEVATION OF 26.605' ON CP 2101 AND VERIFIED BY GPS (RTK) OBSERVATION USING THE TXDOT RTN NETWORK.
  4. THE CONTROL POINTS SHOWN HEREIN WAS DETERMINED BY SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.
  5. ALL MEASUREMENTS ARE U.S. SURVEY FEET.



2024.03.21  
14:59:51  
-05'00"  
SIGNED: *Brandon Absher*  
BRANDON M. ABSHER  
REGISTERED PROFESSIONAL  
LAND SURVEYOR TEXAS No. 6654

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

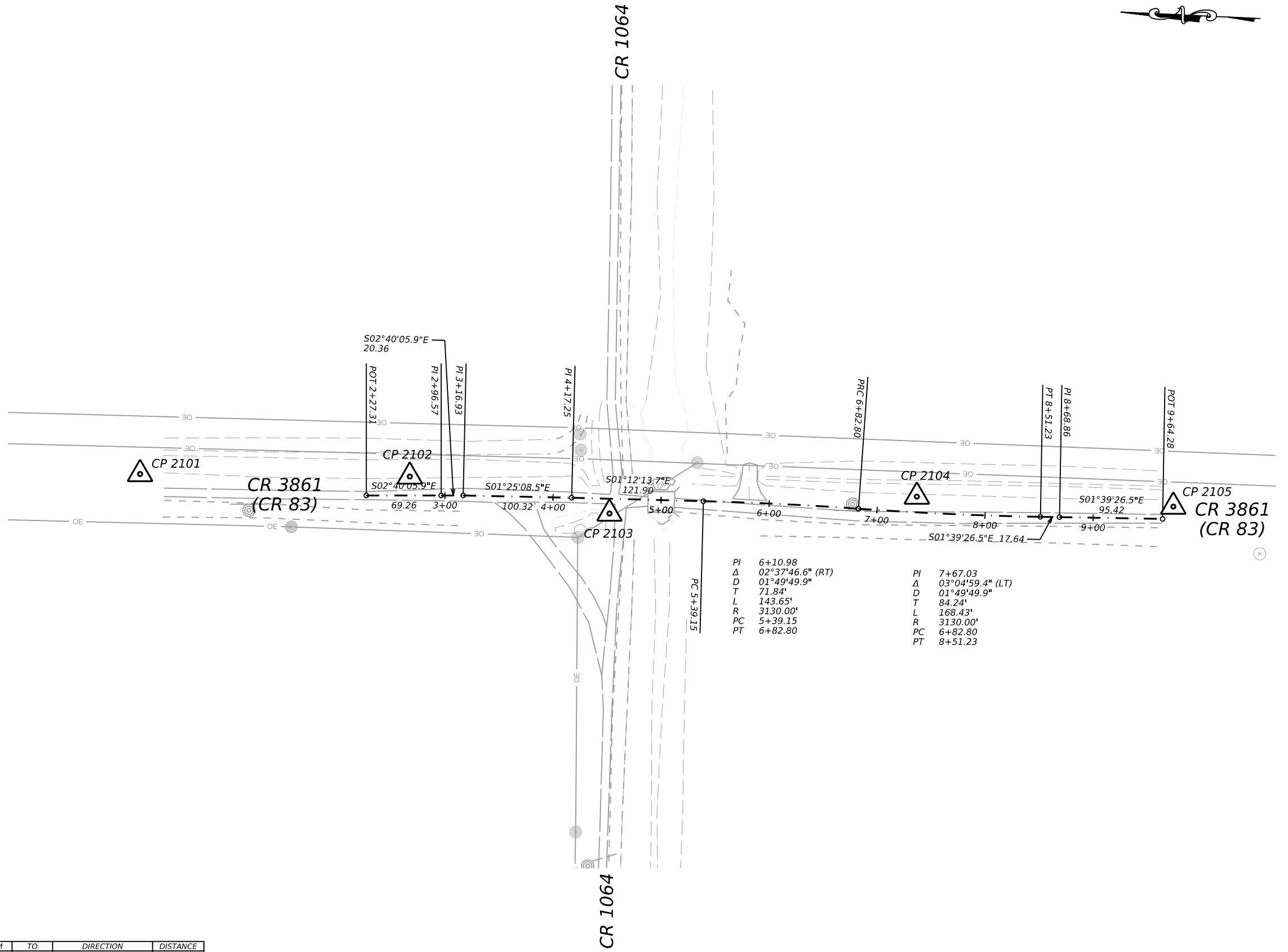


©2024

SURVEY CONTROL INDEX SHEET

SHEET 1 OF 1

CONTRACT	SECTION	JOB	HIGHWAY
0916	28	082, ETC.	CR 3861, ETC.
DISTRICT	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	29	



PI	6+10.98	PI	7+67.03
Δ	02°37'46.6" (RT)	Δ	03°04'59.4" (LT)
D	01°49'49.9"	D	01°49'49.9"
T	71.84'	T	84.24'
L	143.65'	R	168.43'
R	3130.00'	L	3130.00'
PC	5+39.15	PC	6+82.80
PT	6+82.80	PT	8+51.23

FROM	TO	DIRECTION	DISTANCE
CP 2101	CP 2102	S02°07'48"E	249.51'
CP 2102	CP 2103	S07°50'12"W	187.85'
CP 2103	CP 2104	S05°49'28"E	284.74'
CP 2104	CP 2105	S00°26'17"E	237.41'

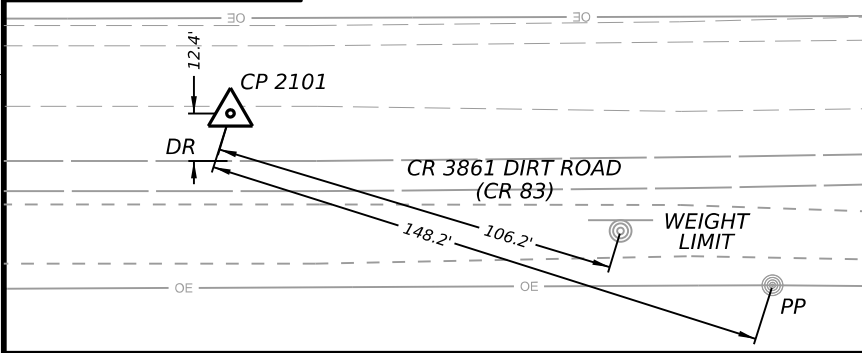
POINT	NORTH	EAST	ELEVATION	STATION	OFFSET	DESCRIPTION
CP 2101	17,264,762.72	1,368,460.74	26.60'	NA	NA	SET 5/8" IRON ROD W/RED CAP STAMPED "CONTROL POINT"
CP 2102	17,264,513.38	1,368,470.01	25.97'	2+67.52	-17.50'	SET 5/8" IRON ROD W/RED CAP STAMPED "CONTROL POINT"
CP 2103	17,264,327.29	1,368,444.40	27.33'	4+52.61	13.66'	SET 5/8" IRON ROD W/RED CAP STAMPED "CONTROL POINT"
CP 2104	17,264,044.02	1,368,473.30	26.65'	7+36.08	-14.57'	SET 5/8" IRON ROD W/RED CAP STAMPED "CONTROL POINT"
CP 2105	17,263,806.61	1,368,475.11	26.96'	NA	NA	SET 5/8" IRON ROD W/RED CAP STAMPED "CONTROL POINT"

DATE: \$DATE\$  
FILE: \$FILES\$



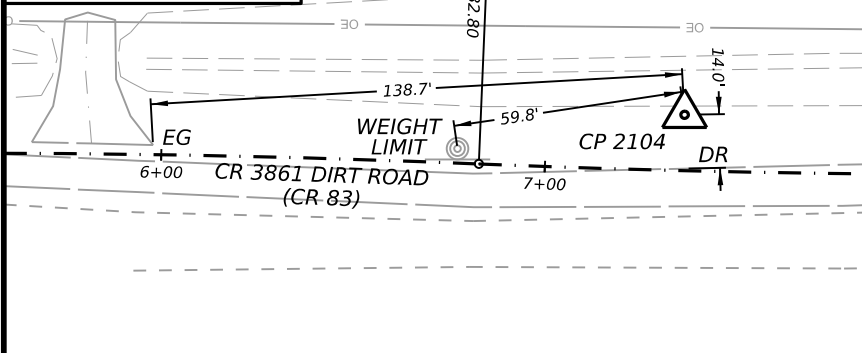
DATE: \$DATES\$ FILE: \$FILES\$

CP 2101  
 STA: NA  
 OFF: NA  
 N=17,264,762.72  
 E=1,368,460.74  
 ELEV=26.60'  
 SET 5/8" IRON ROD  
 W/RED CAP STAMPED  
 "CONTROL POINT"



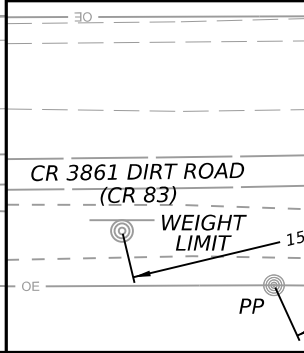
SITUATED ON THE EAST SIDE OF CR 3861  
 APPROXIMATELY 440 FEET NORTH OF CR 1064

CP 2104  
 STA: 7+36.08  
 OFF: 14.57' LT  
 N=17,264,044.02  
 E=1,368,473.30  
 ELEV=26.65'  
 SET 5/8" IRON ROD  
 W/RED CAP STAMPED  
 "CONTROL POINT"



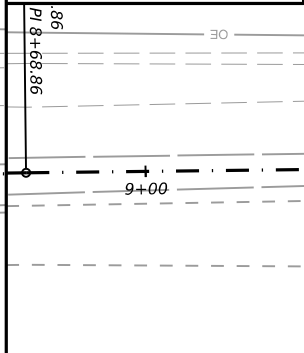
SITUATED ON THE EAST SIDE OF CR 3861  
 APPROXIMATELY 275 FEET SOUTH OF CR 1064

CP 2102  
 STA: 2+67.52  
 OFF: 17.50' LT  
 N=17,264,513.38  
 E=1,368,470.01  
 ELEV=25.97'  
 SET 5/8" IRON ROD  
 W/RED CAP STAMPED  
 "CONTROL POINT"



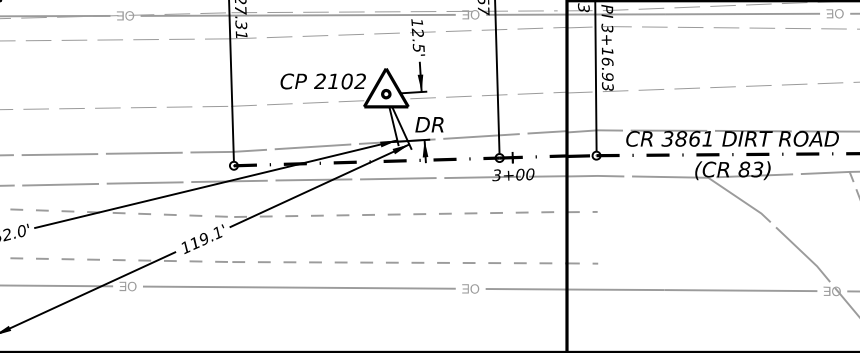
SITUATED ON THE EAST SIDE OF CR 3861  
 APPROXIMATELY 190 FEET NORTH OF CR 1064

CP 2105  
 STA: NA  
 OFF: NA  
 N=17,263,806.61  
 E=1,368,475.11  
 ELEV=26.96'  
 SET 5/8" IRON ROD  
 W/RED CAP STAMPED  
 "CONTROL POINT"



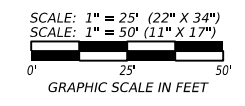
SITUATED ON THE EAST SIDE OF CR 3861  
 APPROXIMATELY 510 FEET SOUTH OF CR 1064

CP 2103  
 STA: 4+52.61  
 OFF: 13.66' RT  
 N=17,264,327.29  
 E=1,368,444.40  
 ELEV=27.33'  
 SET 5/8" IRON ROD  
 W/RED CAP STAMPED  
 "CONTROL POINT"



SITUATED AT THE INTERSECTION OF THE WEST ROW  
 OF CR 3861 AND THE NORTH ROW OF CR 1064

- NOTES:
1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH ZONE (4205), NAD83. ALL COORDINATES AND DISTANCES SHOWN HEREON ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 0.999960.
  2. ALL HORIZONTAL VALUES WERE DERIVED AND VERIFIED BY GPS (RTK) OBSERVATION USING THE TXDOT RTN NETWORK.
  3. ALL VERTICAL VALUES WERE DERIVED FROM DIGITAL LEVEL LOOPS HOLDING ELEVATION OF 26.605' ON CP 2101 AND VERIFIED BY GPS (RTK) OBSERVATION USING THE TXDOT RTN NETWORK.
  4. THE CONTROL POINTS SHOWN HEREIN WAS DETERMINED BY SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.
  5. ALL MEASUREMENTS ARE U.S. SURVEY FEET.



2024.03.21  
 15:00:36  
 -05'00"  
 SIGNED: *Brandon Absher*  
 BRANDON M. ABSHER  
 REGISTERED PROFESSIONAL  
 LAND SURVEYOR TEXAS No. 6654

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



©2024

HORIZONTAL AND VERTICAL CONTROL SHEET

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0916	28	082, ETC.	CR 3861, ETC.
DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	30	

### CR 3861 ALIGNMENT DATA

Alignment Name: CR 3861 BL

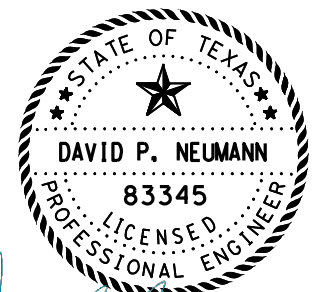
Station	Northing	Easting
Element: Linear		
POT ( ) 39.835 R1	17264739.9654	1368444.9367
PI ( ) 134.835 R1	17264645.0010	1368447.5407
Tangential Direction: S1.571°E		
Tangential Length: 95.000		
Element: Linear		
PI ( ) 134.835 R1	17264645.0010	1368447.5407
PI ( ) 227.154 R1	17264552.7352	1368450.6554
Tangential Direction: S1.933°E		
Tangential Length: 92.318		
Element: Linear		
PI ( ) 227.154 R1	17264552.7352	1368450.6554
PC ( ) 296.417 R1	17264483.5471	1368453.8799
Tangential Direction: S2.668°E		
Tangential Length: 69.263		
Element: Circular		
PC ( ) 296.417 R1	17264483.5471	1368453.8799
PI ( ) 409.735 R1	17264370.3515	1368459.1552
CC ( )	17264337.8342	1365327.2734
PT ( ) 522.955 R1	17264257.0708	1368456.2313
Radius: 3130.000		
Delta: 4.147° Right		
Degree of Curvature (Arc): 1.831°		
Length: 226.538		
Tangent: 113.318		
Chord: 226.489		
Middle Ordinate: 2.049		
External: 2.051		
Back Tangent Direction: S2.668°E		
Back Radial Direction: S87.332°W		
Chord Direction: S0.595°E		
Ahead Radial Direction: N88.521°W		
Ahead Tangent Direction: S1.479°W		
Element: Linear		
PT ( ) 522.955 R1	17264257.0708	1368456.2313
PI ( ) 681.366 R1	17264098.7122	1368452.1438
Tangential Direction: S1.479°W		
Tangential Length: 158.411		
Element: Linear		
PI ( ) 681.366 R1	17264098.7122	1368452.1438
PI ( ) 777.601 R1	17264002.5522	1368455.9306
Tangential Direction: S2.255°E		
Tangential Length: 96.235		
Element: Linear		
PI ( ) 777.601 R1	17264002.5522	1368455.9306
PI ( ) 868.888 R1	17263911.3763	1368460.4450
Tangential Direction: S2.835°E		
Tangential Length: 91.288		
Element: Linear		
PI ( ) 868.888 R1	17263911.3763	1368460.4450
POT ( ) 964.305 R1	17263815.9995	1368463.2047
Tangential Direction: S1.657°E		
Tangential Length: 95.417		

### CR 1604 ALIGNMENT DATA

Alignment Name: CR 1064 BL

Station	Northing	Easting
Element: Linear		
POT ( ) 1000.000 R1	17264332.958	1368644.955
PC ( ) 1076.056 R1	17264331.016	1368568.924
Tangential Direction: S88.537°W		
Tangential Length: 76.056		
Element: Circular		
PC ( ) 1076.056 R1	17264331.016	1368568.924
PI ( ) 1108.798 R1	17264330.180	1368536.193
CC ( )	17264663.908	1368560.423
PRC ( ) 1141.330 R1	17264335.735	1368503.926
Radius: 333.000		
Delta: 11.231° Right		
Degree of Curvature (Arc): 17.206°		
Length: 65.273		
Tangent: 32.742		
Chord: 65.169		
Middle Ordinate: 1.598		
External: 1.606		
Back Tangent Direction: S88.537°W		
Back Radial Direction: N1.463°W		
Chord Direction: N85.847°W		
Ahead Radial Direction: N9.768°E		
Ahead Tangent Direction: N80.232°W		
Element: Circular		
PRC ( ) 1141.330 R1	17264335.735	1368503.926
PI ( ) 1150.934 R1	17264337.365	1368494.461
CC ( )	17264237.185	1368486.960
PT ( ) 1160.479 R1	17264337.163	1368484.859
Radius: 100.000		
Delta: 10.972° Left		
Degree of Curvature (Arc): 57.296°		
Length: 19.150		
Tangent: 9.604		
Chord: 19.120		
Middle Ordinate: 0.458		
External: 0.460		
Back Tangent Direction: N80.232°W		
Back Radial Direction: N9.768°E		
Chord Direction: N85.718°W		
Ahead Radial Direction: N1.204°W		
Ahead Tangent Direction: S88.796°W		
Element: Linear		
PT ( ) 1160.479 R1	17264337.163	1368484.859
PI ( ) 1187.479 R1	17264336.596	1368457.865
Tangential Direction: S88.796°W		
Tangential Length: 27.000		
Element: Linear		
PI ( ) 1187.479 R1	17264336.596	1368457.865
PC ( ) 1214.479 R1	17264336.028	1368430.871
Tangential Direction: S88.796°W		
Tangential Length: 27.000		
Element: Circular		
PC ( ) 1214.479 R1	17264336.028	1368430.871
PI ( ) 1227.068 R1	17264335.764	1368418.285
CC ( )	17264236.051	1368432.972
PRC ( ) 1239.525 R1	17264332.388	1368406.157
Radius: 100.000		
Delta: 14.350° Left		
Degree of Curvature (Arc): 57.296°		
Length: 25.046		
Tangent: 12.589		
Chord: 24.981		
Middle Ordinate: 0.783		
External: 0.789		
Back Tangent Direction: S88.796°W		
Back Radial Direction: N1.204°W		
Chord Direction: S81.621°W		
Ahead Radial Direction: N15.554°W		
Ahead Tangent Direction: S74.446°W		
Element: Circular		
PRC ( ) 1239.525 R1	17264332.388	1368406.157
PI ( ) 1286.986 R1	17264319.662	1368360.434
CC ( )	17264653.193	1368316.864
PT ( ) 1333.812 R1	17264320.216	1368312.976
Radius: 333.000		
Delta: 16.223° Right		
Degree of Curvature (Arc): 17.206°		
Length: 94.287		
Tangent: 47.461		
Chord: 93.973		
Middle Ordinate: 3.332		
External: 3.365		
Back Tangent Direction: S74.446°W		
Back Radial Direction: N15.554°W		
Chord Direction: S82.557°W		
Ahead Radial Direction: N0.669°E		
Ahead Tangent Direction: N89.331°W		
Element: Linear		
PT ( ) 1333.812 R1	17264320.216	1368312.976
POT ( ) 1384.145 R1	17264320.804	1368262.647
Tangential Direction: N89.331°W		
Tangential Length: 50.333		

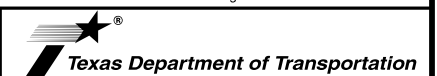
2024.05.09 14:37:33-05'00'



*David P. Neumann, P.E.*

**LOCHNER**

TBPE Firm Reg. No. 10488



©2024

### HORIZONTAL ALIGNMENT DATA

CONT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		031

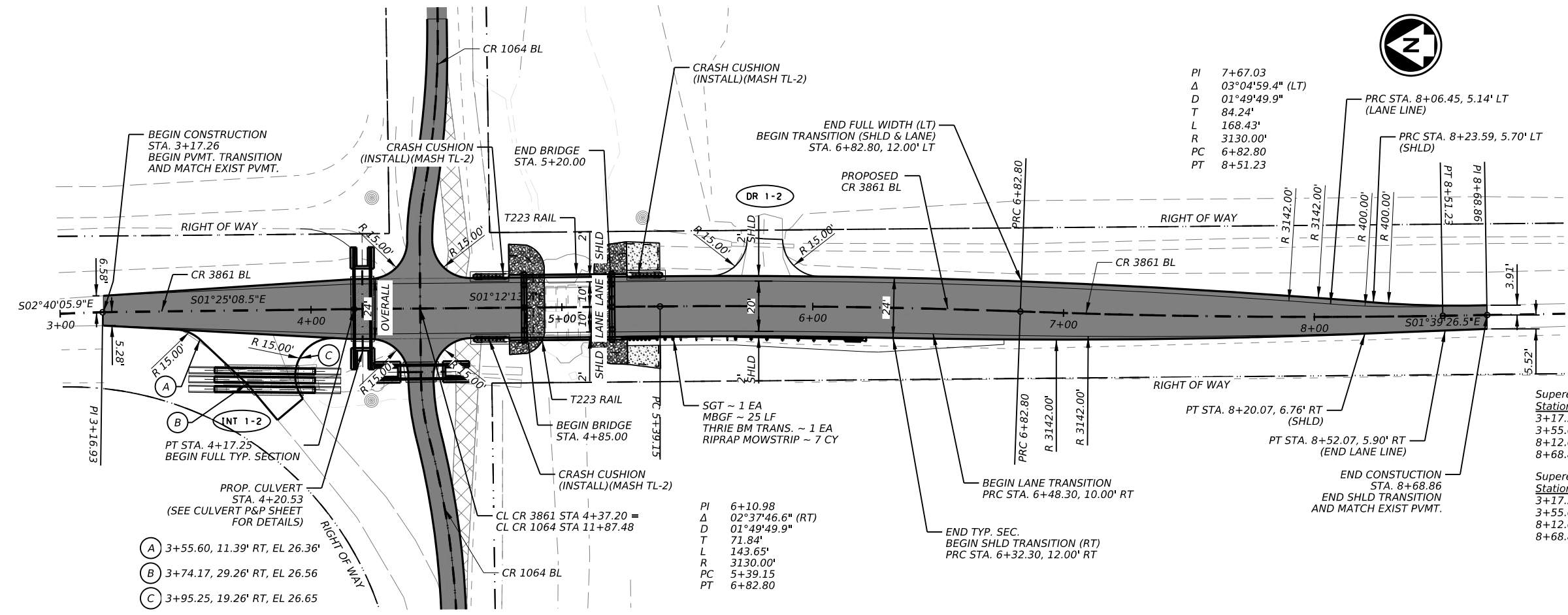
**LEGEND:**

- METAL BEAM GUARD FENCE
- TRAFFIC FLOW ARROW
- APPARENT RIGHT OF WAY
- PROPOSED PAVEMENT
- RIPRAP (CONC)
- RIPRAP (STONE PROTECTION)
- INT 1-1 INTERSECTION REFERENCE
- DR 1-1 DRIVEWAY REFERENCE

- NOTES:**
- REFER TO TYPICAL SECTION SHEETS FOR MORE INFORMATION.
  - STATION AND OFFSET CALLOUTS ARE RELATIVE TO CR 3861 CENTERLINE UNLESS OTHERWISE NOTED.
  - CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING UTILITIES BEFORE BEGINNING ANY TYPE OF WORK.



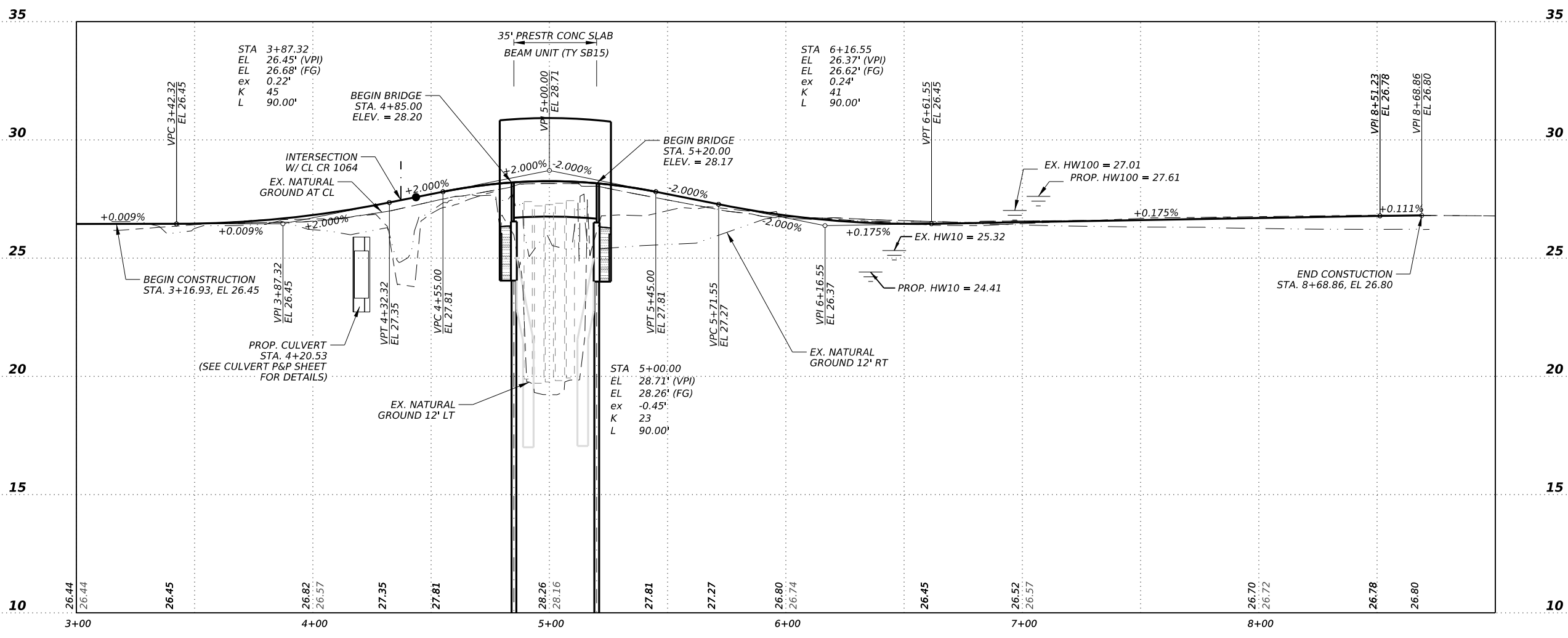
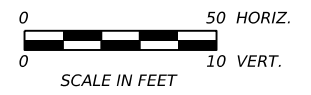
PI 7+67.03  
 Δ 03°04'59.4" (LT)  
 D 01°49'49.9"  
 T 84.24'  
 L 168.43'  
 R 3130.00'  
 PC 6+82.80  
 PT 8+51.23



Superelevation: LEFT LANE		Point Type	Transition Type
Station	X-Slope		
3+17.26 R1	-0.45%	Existing x-slope	Linear
3+55.00 R1	-2.00%	Begin Normal Crown	Linear
8+12.00 R1	-2.00%	End Normal Crown	Linear
8+68.86 R1	+0.33%	Existing x-slope	Linear

Superelevation: RIGHT LANE		Point Type	Transition Type
Station	X-Slope		
3+17.26 R1	-0.79%	Existing x-slope	Linear
3+55.00 R1	-2.00%	Begin Normal Crown	Linear
8+12.00 R1	-2.00%	End Normal Crown	Linear
8+68.86 R1	-1.62%	Existing x-slope	Linear



2024.05.09 14:37:46-05'00"

David P. Neumann, P.E.

**LOCHNER**  
 TBPE Firm Reg. No. 10488

Texas Department of Transportation

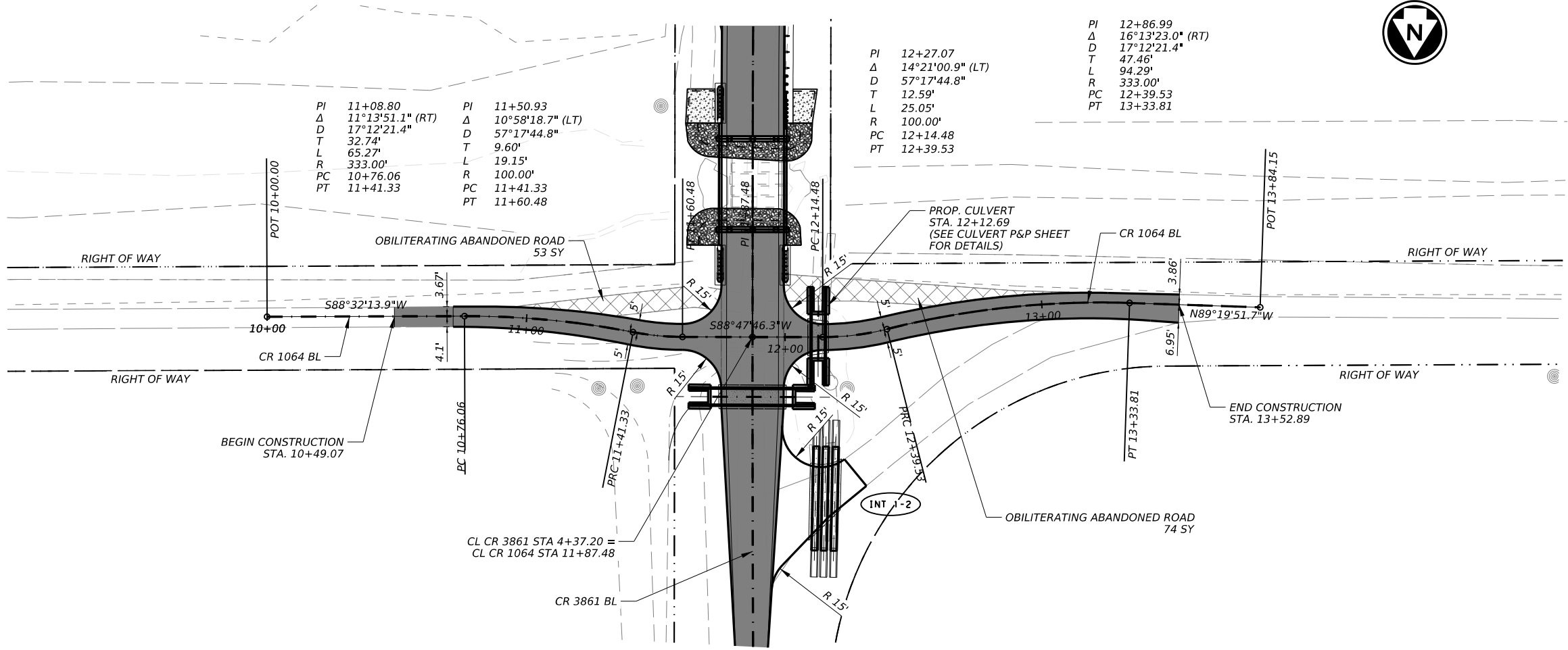
©2024

**CR 3861  
 PLAN & PROFILE**

CONT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	032	

DATE: 5/9/2024 8:58:39 AM  
 FILE: c:\pw\_working\lochner-pw-01\0109808\CR3861\_CD01.dgn

DATE: 5/9/2024 8:58:43 AM  
 FILE: c:\pw\_working\lochner-pw-01\0109808\CR3861\_CD01.dgn



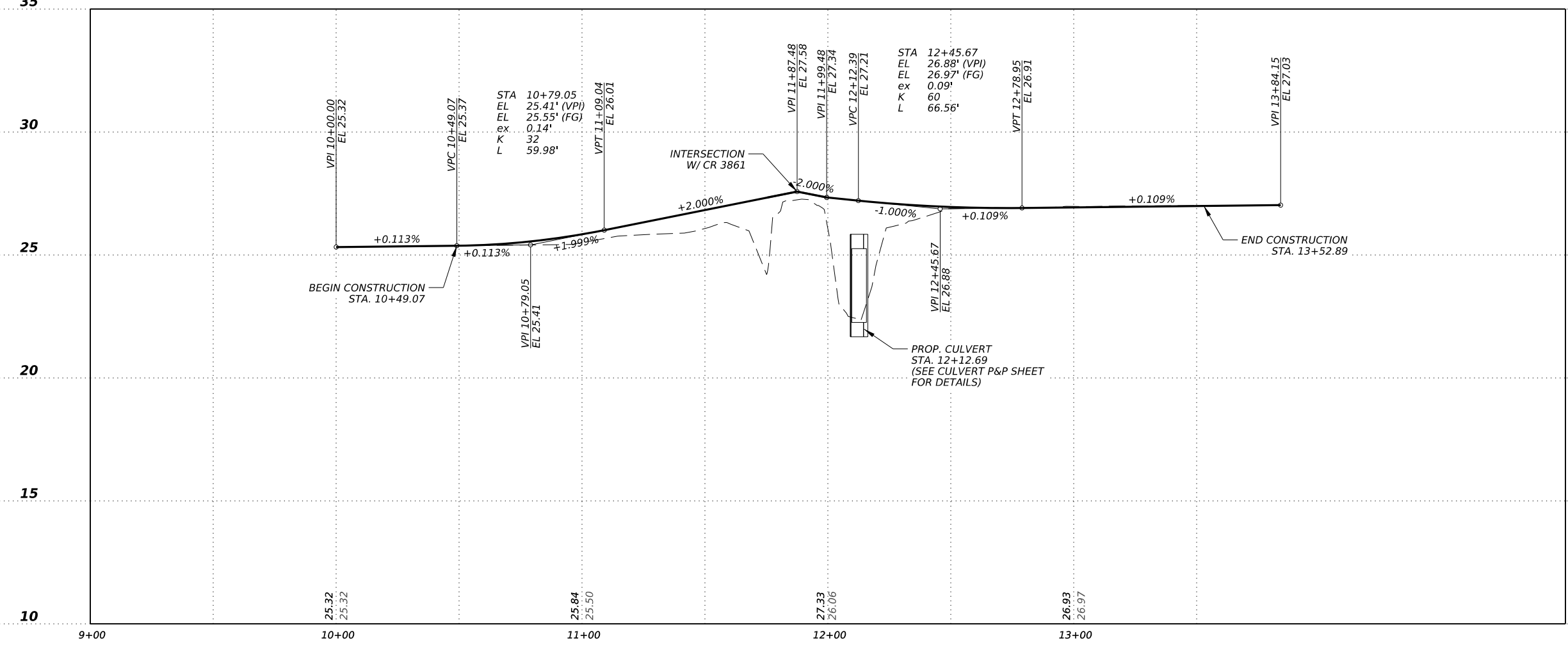
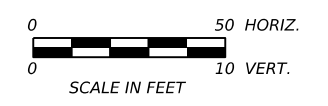
PI 12+27.07  
 Δ 14°21'00.9" (LT)  
 D 57°17'44.8"  
 T 12.59'  
 L 25.05'  
 R 100.00'  
 PC 12+14.48  
 PT 12+39.53

PI 12+86.99  
 Δ 16°13'23.0" (RT)  
 D 17°12'21.4"  
 T 47.46'  
 L 94.29'  
 R 333.00'  
 PC 12+39.53  
 PT 13+33.81



- LEGEND:**
- METAL BEAM GUARD FENCE
  - TRAFFIC FLOW ARROW
  - APPARENT RIGHT OF WAY
  - PROPOSED PAVEMENT
  - RIPRAP (CONC)
  - RIPRAP (STONE PROTECTION)

- NOTES:**
1. REFER TO TYPICAL SECTION SHEETS FOR MORE INFORMATION.
  2. STATION AND OFFSET CALLOUTS ARE RELATIVE TO CR 1064 CENTERLINE UNLESS OTHERWISE NOTED.
  3. CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING UTILITIES BEFORE BEGINNING ANY TYPE OF WORK.
  4. CONTRACTOR UNDER ITEM 106-6002 "OBLITERATING ABANDONED ROAD" WILL REMOVE EXISTING PAVEMENT MATERIAL AND DEPOSIT IT ALONG PROPOSED CR 1604 ALIGNMENT FOR USE AS EMBANKMENT. RELAYING, MIXING, AND COMPACTION OF MATERIAL IS PAID UNDER ITEM 251-6013 "REWORK BASE MATERIAL (TY C)(6") (ORD COMP)".
- AS PER ITEM 106-6002, THE CONTRACTOR WILL REGRADE THE EXISTING AREA TO BE OBLITERATED TO BLEND INTO THE SURROUNDING TERRAIN AND DRAINAGE PATTERNS.



2024.05.09 14:38:04-05'00'

David P. Neumann, P.E.

**LOCHNER**  
 TBPE Firm Reg. No. 10488

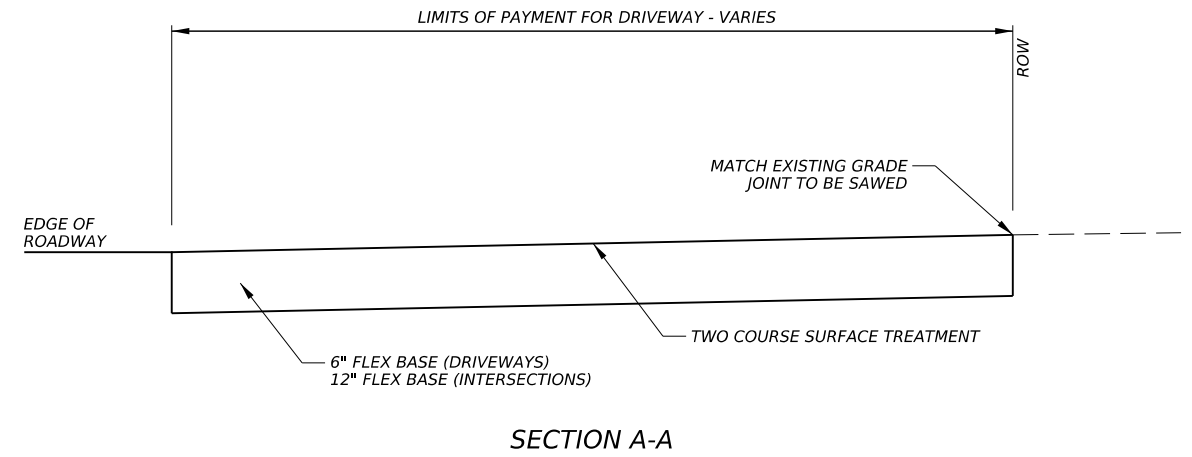
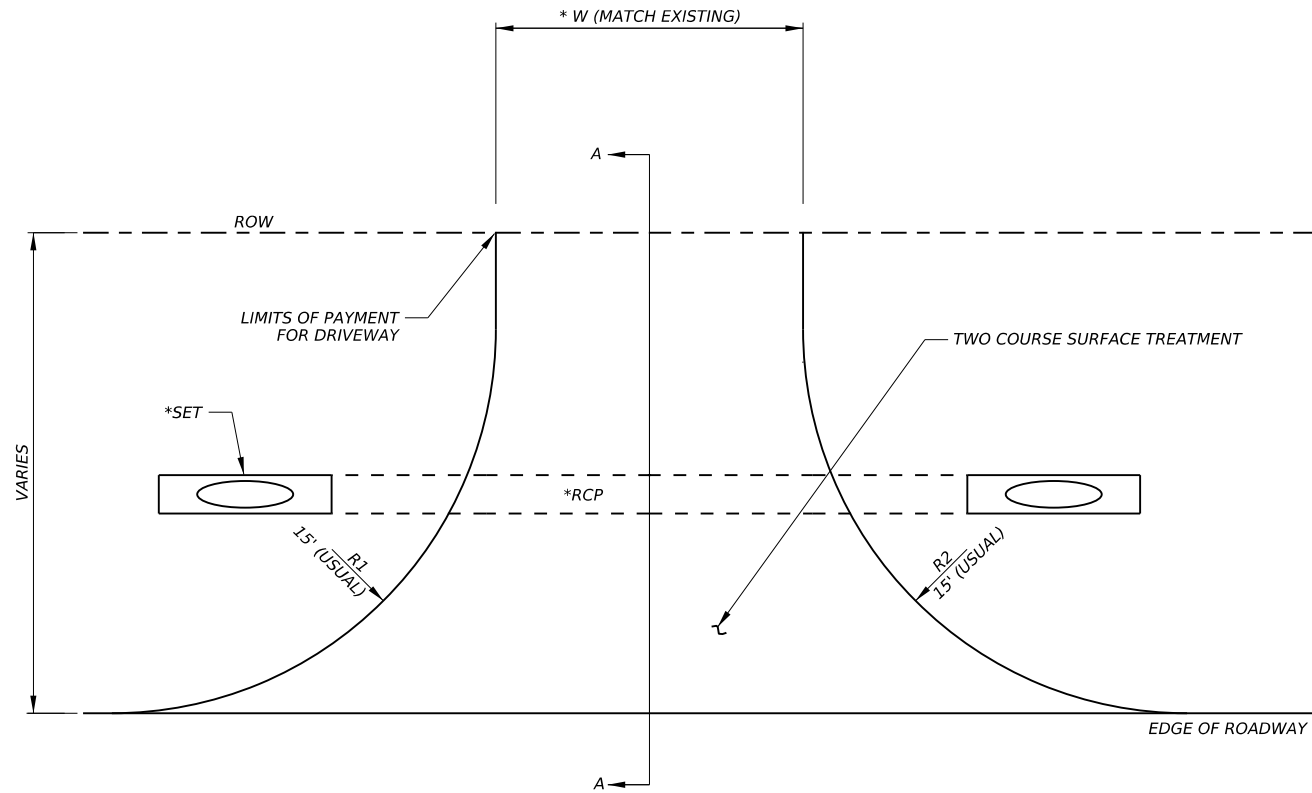
Texas Department of Transportation

©2024

CR 1064  
 PLAN & PROFILE

CONT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	033	

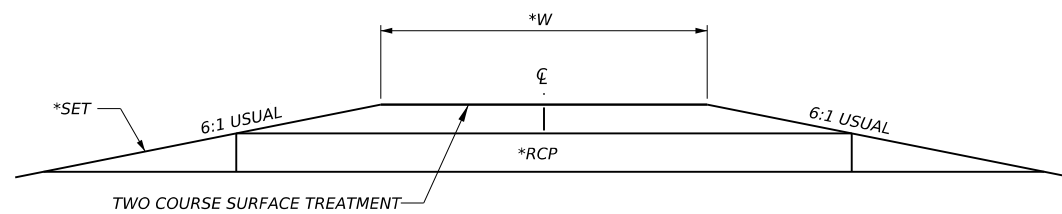




**INTERSECTIONS / DRIVEWAYS (SURF TREAT)**

INTERSECTIONS (SURF TREAT) WILL CONSIST OF: BLADING AND RESHAPING THE SUBGRADE, ANY EXTRA EMBANKMENT MATERIAL NECESSARY TO ACHIEVE THE PROPER SUBGRADE WIDTH, (PROVIDE TYA GR1-2 FLEX BASE ~ (12 IN), PRIME (MC-30), AND PLACEMENT OF TWO COURSE SURFACE TREATMENT.

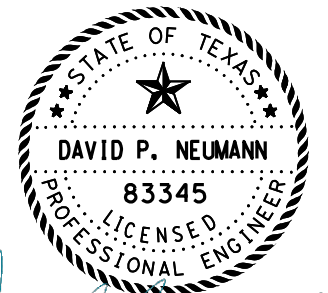
DRIVEWAYS (SURF TREAT) WILL CONSIST OF: BLADING AND RESHAPING THE SUBGRADE, ANY EXTRA EMBANKMENT MATERIAL NECESSARY TO ACHIEVE THE PROPER SUBGRADE WIDTH, (PROVIDE TYA GR1-2 FLEX BASE ~ (6 IN), PRIME (MC-30), AND PLACEMENT OF TWO COURSE SURFACE TREATMENT.



**DRIVEWAY TYPICAL SECTION**

\* SEE SUMMARY OF DRIVEWAYS FOR: LOCATION, DIMENSION "W" AND RCP/SET DETAILS (IF REQ'D)

2024.05.09 14:38:17-05'00'



*David P. Neumann, P.E.*  
**LOCHNER**  
 TBPE Firm Reg. No. 10488



©2024

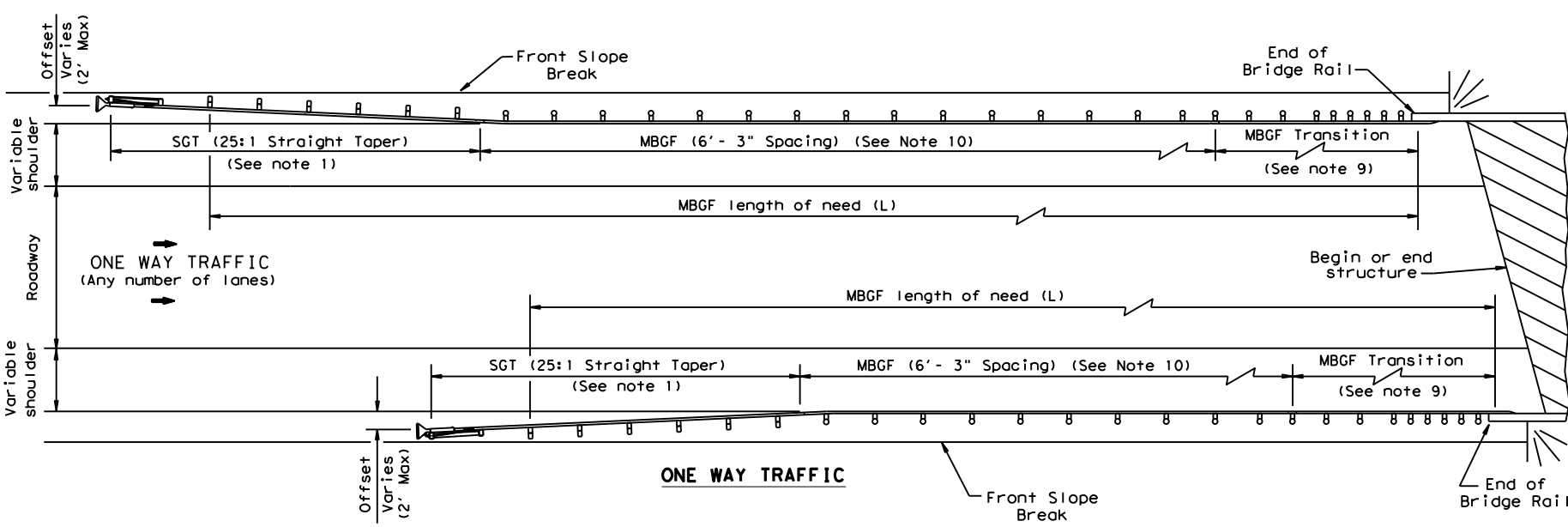
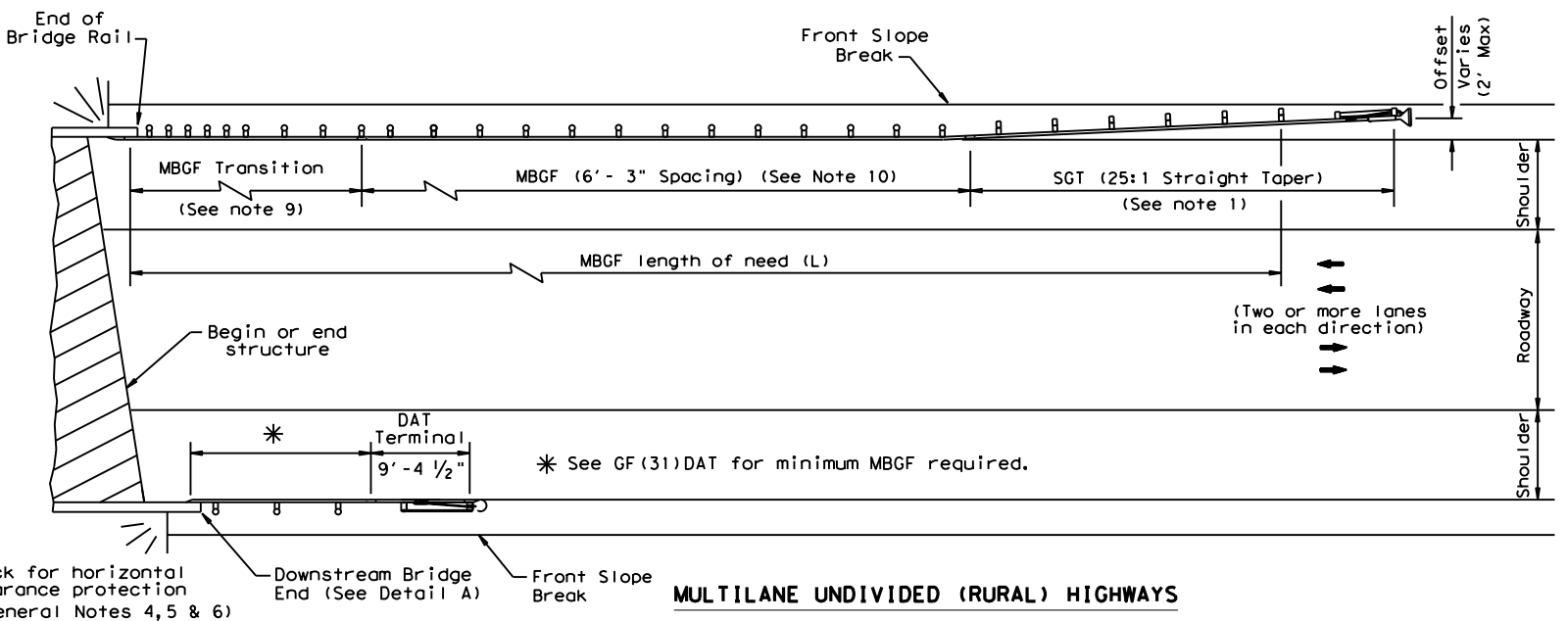
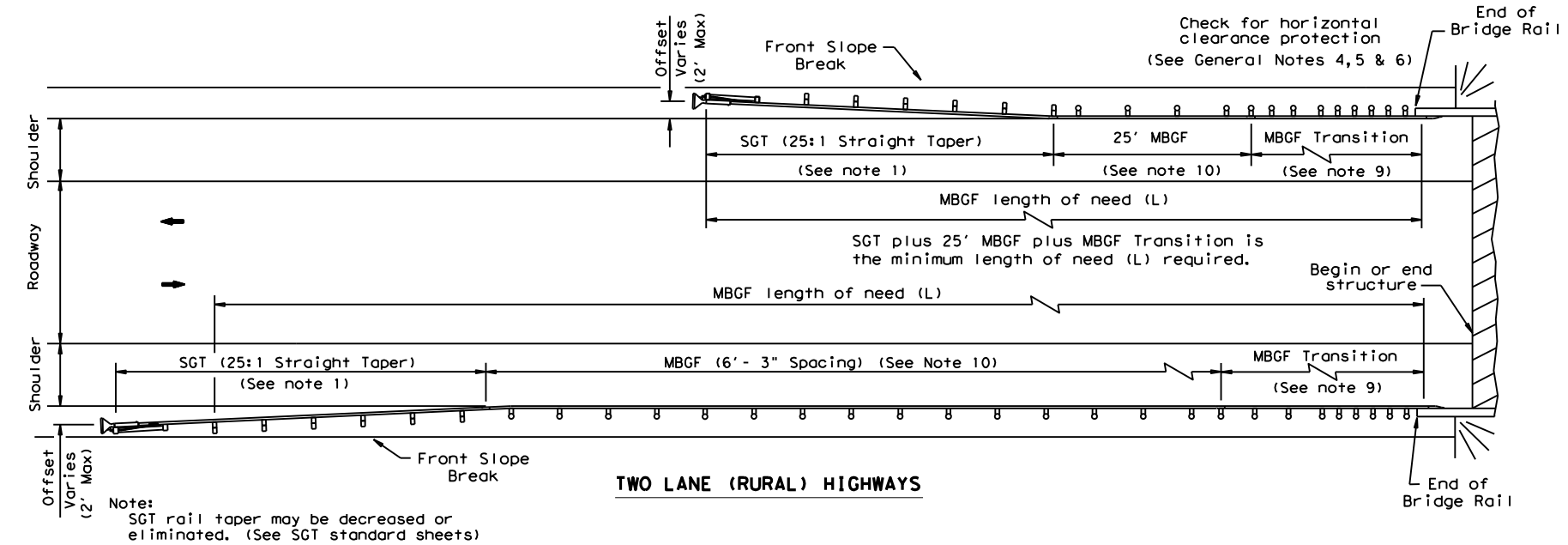
**INTERSECTIONS AND DRIVEWAYS DETAILS**

CONT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	034	

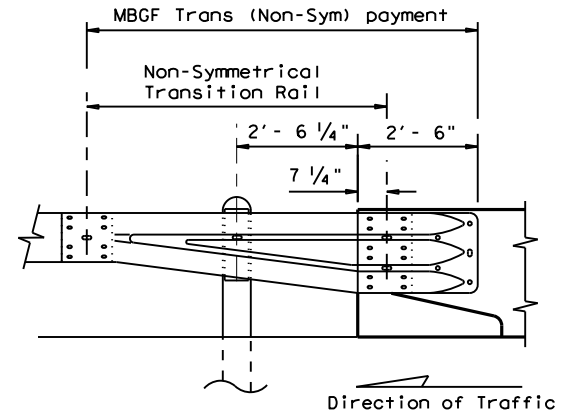
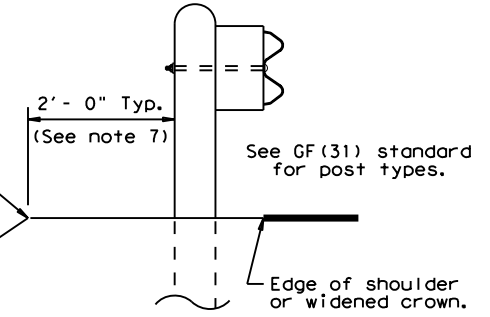
DATE: 5/9/2024 8:58:59 AM  
 FILE: c:\pw\_working\lochner-pw-01\0109808\CR3861\_Drwy & Sidewalk\_Detail.dgn

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

DATE: FILE:



- GENERAL NOTES**
- For more detail: See GF(31), SGT( )31, GF(31)TR, and GF(31)TL2 standard sheets.
  - Quantities of metal beam guard fence (MBGF) at individual bridge ends are as shown in the plans.
  - 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.
  - 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.
  - Downstream anchor terminals (DAT) are only for downstream end anchorage use, outside the horizontal clearance area of opposing traffic.
  - 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)
  - 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).
  - 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.
  - Transition length and post spacing will vary depending on the transition type. Transition type will be shown elsewhere in the plans.
  - A minimum 25' length of MBGF will be required.



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

**Texas Department of Transportation** Design Division Standard

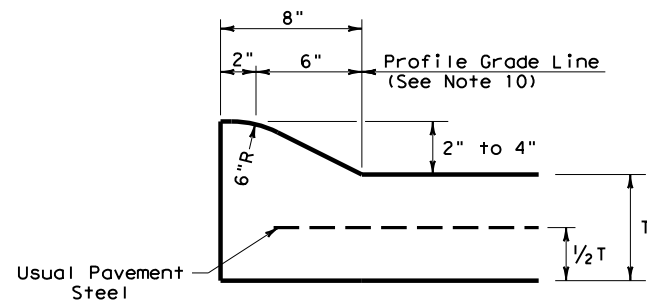
**BRIDGE END DETAILS**  
(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

**BED-14**

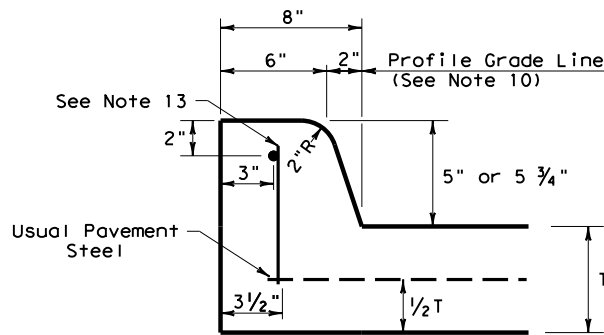
FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0916	28	082	CR 3861
REVISED APRIL 2014 SEE (MEMO 0414)	DIST	COUNTY	SHEET NO.	
	CRP	SAN PATRICIO	035	

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

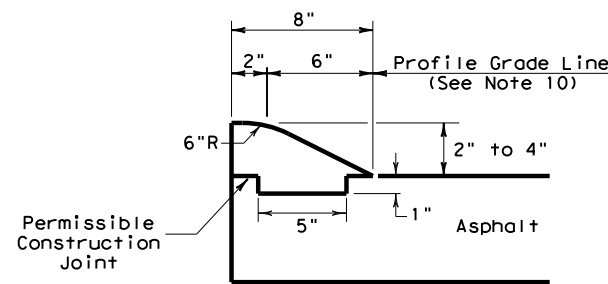
DATE: FILE:



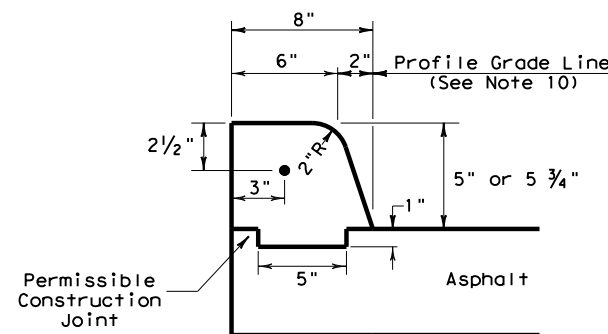
**TYPE I CURB (MONOLITHIC)  
2" - 4" HEIGHT**



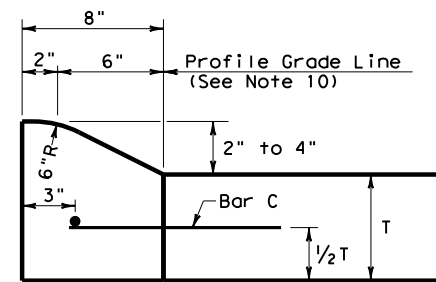
**TYPE II CURB (MONOLITHIC)  
5" - 5 3/4" HEIGHT**



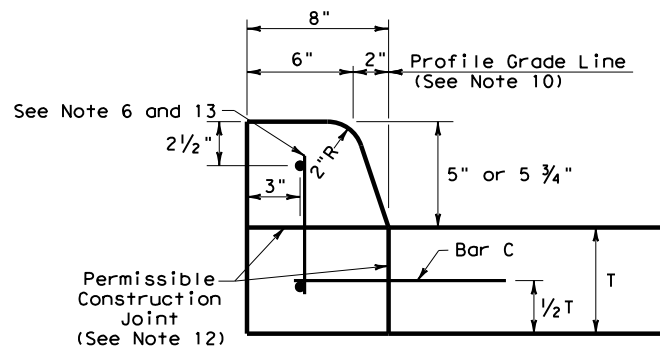
**TYPE III CURB (KEYED)  
2" - 4" HEIGHT**



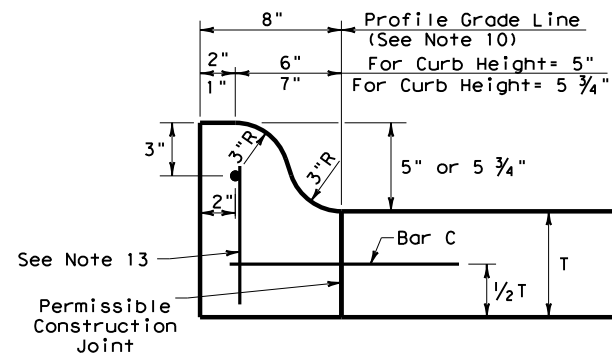
**TYPE IV CURB (KEYED)  
5" - 5 3/4" HEIGHT**



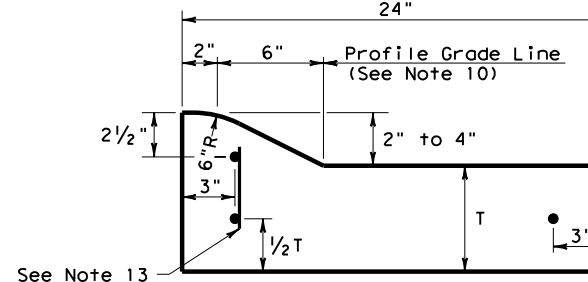
**TYPE I CURB  
2" - 4" HEIGHT**



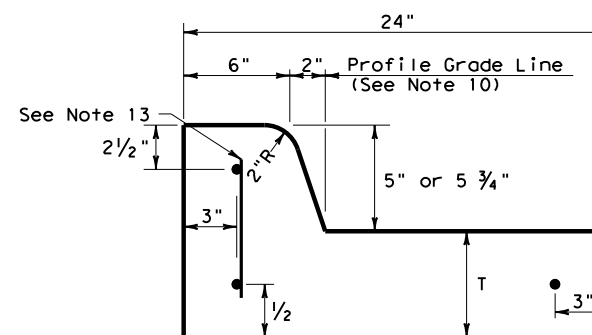
**TYPE II CURB  
5" - 5 3/4" HEIGHT**



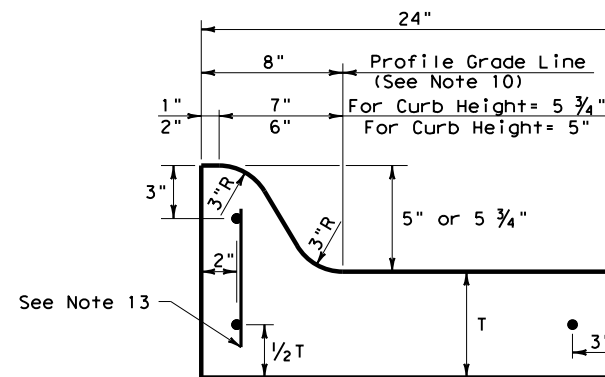
**TYPE IIa CURB  
5" - 5 3/4" HEIGHT**



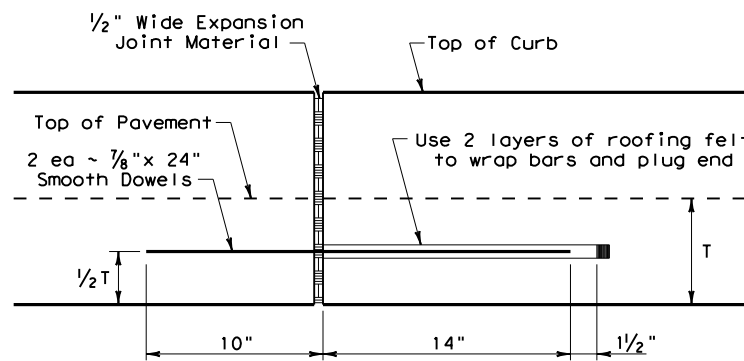
**TYPE I CURB AND GUTTER  
2" - 4" HEIGHT**



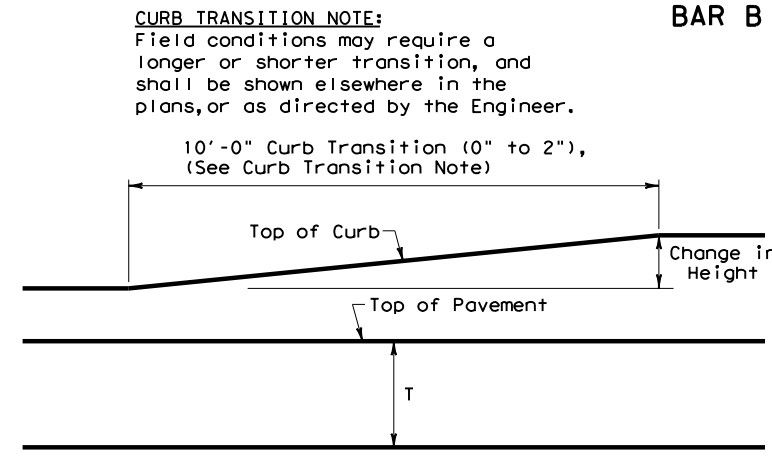
**TYPE II CURB AND GUTTER  
5" - 5 3/4" HEIGHT**



**TYPE IIa CURB AND GUTTER  
5" - 5 3/4" HEIGHT**



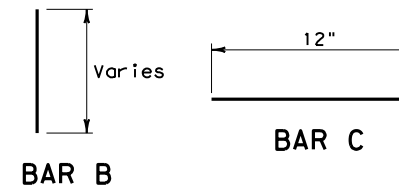
**EXPANSION JOINT DETAIL**



**CURB TRANSITION**  
Note: To be paid for as Highest Curb

**GENERAL NOTES**

- All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
- Concrete shall be Class A.
- When reinforcing bars are used, they shall be No.4 unless otherwise shown. The use of fiber reinforced concrete in lieu of reinforcing steel is acceptable. Use fibers meeting the requirements of DMS 4550, "Fibers for Concrete," and dose fibers in accordance with Material Producers List (MPL) "Fibers for Class A and B Concrete Applications."
- Round exposed sharp edges with a rounding tool, to a minimum radius of 1/4 inch.
- All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
- Where concrete curb is to be placed on existing concrete pavement, Bar B may be drilled and grouted in place, or may be inserted into fresh concrete.
- Expansion and contraction joints shall be constructed to match pavement joints in all curbs and curb and gutter adjacent to jointed concrete pavement. Where placement of curb or curb and gutter is not adjacent to concrete pavement, expansion joints shall be provided at structures, curb returns at streets, and at locations directed by The Engineer.
- Vertical and horizontal dowel bars and transverse reinforcing bars shall be placed at four feet C-C.
- Dimension 'T' shown is the thickness of concrete pavement. When curb is installed adjacent to flexible pavement dimension 'T' is 8" maximum.
- Usual profile grade line. Refer to typical sections and plan-profile sheets for exact locations.
- One-half inch expansion joint material shall be provided where curb or curb and gutter is adjacent to sidewalk or riprap.
- When horizontal permissible construction joints are used, the longitudinal pavement steel shall be placed in accordance with pavement details shown elsewhere in the plans. Reinforcing steel for curb section shall then conform to that required for concrete curb.
- Bar B placement as needed (typically at four ft. C-C) to support curb reinforcing steel during concrete placement.

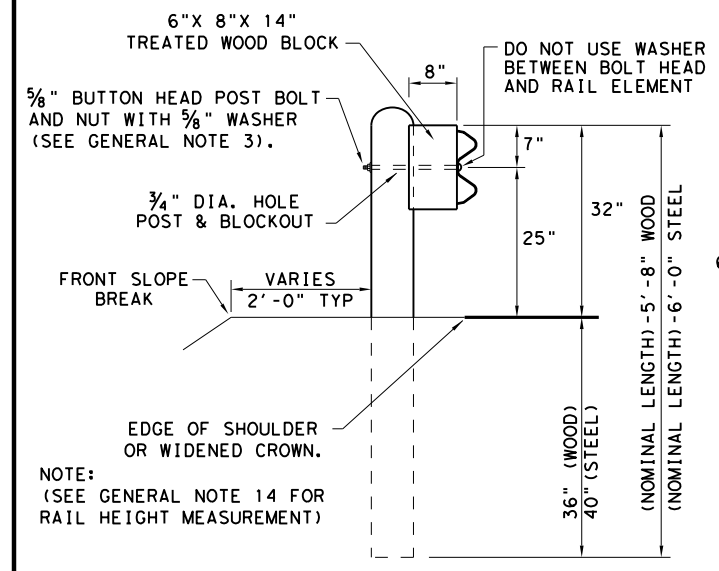


**CURB TRANSITION NOTE:**  
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.

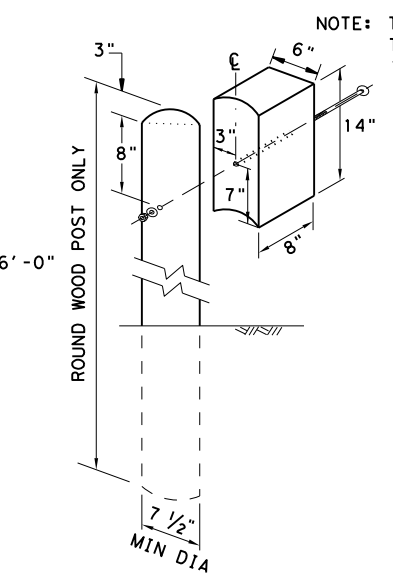
		<b>Design Division Standard</b>	
<h2>CONCRETE CURB AND GUTTER</h2>			
<h3>CCCG-22</h3>			
FILE: cccg21.dgn	DN: TxDOT	CK: AN	DW: CS
© TxDOT: JUNE 2022	CONT SECT	JOB	HIGHWAY
REVISIONS	0916 28	082	CR 3861
DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	036	



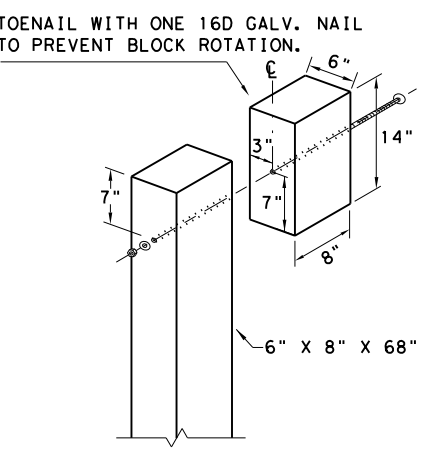
DISCLAIMER: THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.



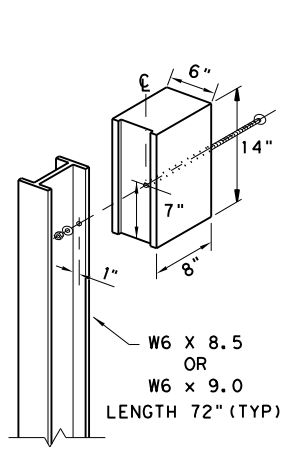
**TYPICAL POST PLACEMENT**



**WOOD BLOCK TO ROUND WOOD POST**



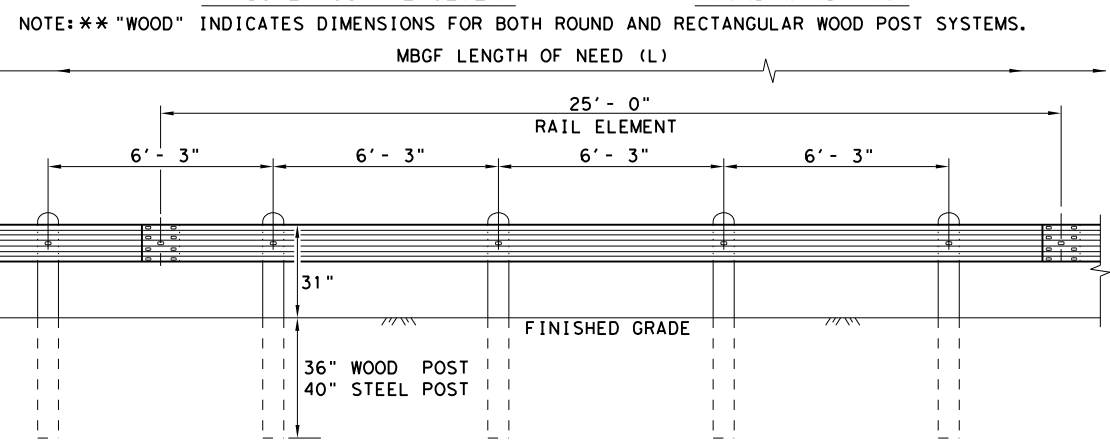
**WOOD BLOCK TO RECTANGULAR WOOD POST**



**ROUTED WOOD BLOCK TO I-BEAM STEEL POST**

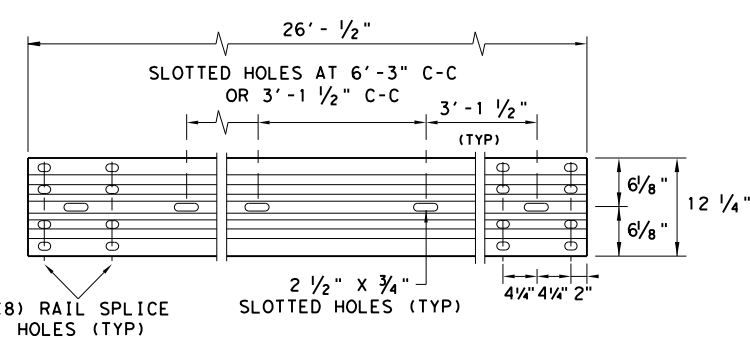
**GENERAL NOTES**

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBSG SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'-0", OR 12'-6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 1/2" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE DOWNSTREAM ANCHOR TERMINAL (DAT) AND THE TRANSITION SECTIONS OF GUARDRAIL.
3. 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 5/8" WASHER (FWC16G) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED AT A RATE OF 25:1 OR FLATTER.
8. UNLESS OTHERWISE SHOWN IN THE PLANS, GUARD FENCE PLACED IN THE VICINITY OF CURBS SHALL BE POSITIONED SO THAT THE FACE OF CURB IS LOCATED DIRECTLY BELOW OR BEHIND THE FACE OF THE RAIL. RAIL PLACED OVER CURBS SHALL BE INSTALLED SO THAT THE POST BOLT IS LOCATED APPROXIMATELY 25 INCHES ABOVE THE GUTTER PAN OR EDGE OF SHOULDER.
9. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. IF SOLID ROCK IS ENCOUNTERED WITHIN 0 TO 18" OF THE FINISHED GRADE, DRILL A 24" DIA. HOLE, 24" INTO THE ROCK. IF SOLID ROCK IS ENCOUNTERED BELOW 18", DRILL A 12" DIA. HOLE, 12" INTO THE ROCK OR TO THE STANDARD EMBEDMENT DEPTH, WHICHEVER MAYBE LESS. ANY EXCESS POST LENGTH, AFTER MEETING THESE DEPTHS, MAY BE FIELD CUT TO ENSURE PROPER GUARDRAIL MOUNTING HEIGHT. BACKFILL WITH COARSE AGGREGATE MATERIAL.
10. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
11. SPECIAL FABRICATION WILL BE REQUIRED AT INSTALLATION LOCATIONS HAVING A CURVATURE OF LESS THAN 150 FT. RADIUS.
12. 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. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210 ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
13. FOR THE LOW FILL CULVERT OPTION, POSTS LOCATED PARTIALLY OR WHOLLY BETWEEN PRECAST BOX CULVERT UNITS, THE USE OF A CAST-IN-PLACE CONCRETE CLOSURE BETWEEN BOXES IS REQUIRED. THE LENGTH OF THE CAST-IN-PLACE CONCRETE CLOSURE SHALL ACCOMMODATE THE PLACEMENT OF THE LOW FILL CULVERT OPTION. SEE CONCRETE CLOSURE DETAILS ON BRIDGE STANDARD SCP-MD.
14. GUARDRAIL HEIGHT MEASUREMENT: WHEN THE GUARDRAIL IS LOCATED ABOVE PAVEMENT, MEASURE THE HEIGHT FROM THE PAVEMENT TO THE TOP OF THE W-BEAM RAIL. WHEN THE GUARDRAIL IS LOCATED UP TO 2 FT. OFF OF THE EDGE OF PAVEMENT OR FOR A PAVEMENT OVERLAY, USE A 10-FOOT STRAIGHTEDGE TO EXTEND THE PAVEMENT/SHOULDER SLOPE TO THE BACK OF RAIL, MEASURE FROM THE BOTTOM OF STRAIGHTEDGE TO THE TOP OF RAIL. FOR GUARDRAIL LOCATED DOWN A 10:1 SLOPE, MEASURE FROM THE NOMINAL TERRAIN.



**ELEVATION MID-SPAN RAIL SPLICE**

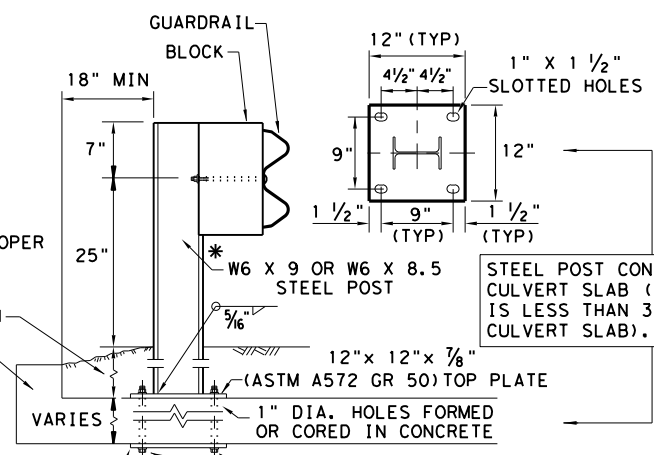
NOTE: \*\* "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.



**ELEVATION 25'-0" (NOM.) W-BEAM SECTION**

NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES. SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.

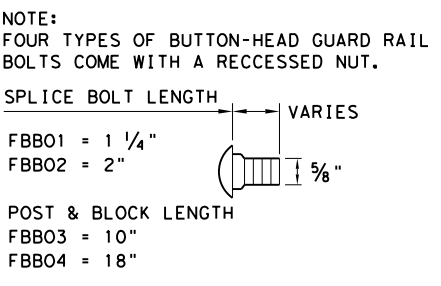
\* POST(S) MAY REQUIRE FIELD MODIFICATION TO ENSURE PROPER GUARDRAIL HEIGHT.



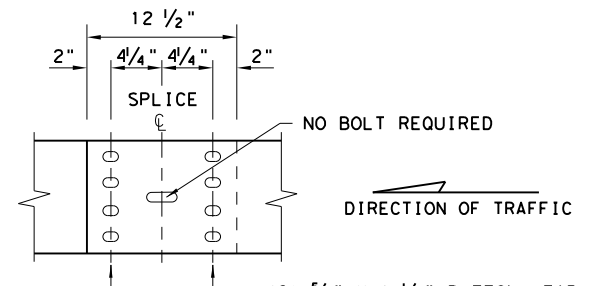
**LOW FILL CULVERT POST**

- NOTE: TWO INSTALLATION OPTIONS.
1. **BOLT-THROUGH OPTION:** REQUIRES A 6" MIN. SLAB THICKNESS. 7/8" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS. NOTE: BOLT LENGTH = SLAB PLUS 2 1/4" MIN.
  2. **EPOXY ANCHOR OPTION:** THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE 7/8" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTI HIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH OF HILTI HIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS 1/4" MIN. BEYOND NUT.

NOTE: CULVERTS OF 25 FT. OR LESS, SEE GF(31)LS STANDARD FOR "LONG SPAN" OPTION.



**BUTTON HEAD BOLT**



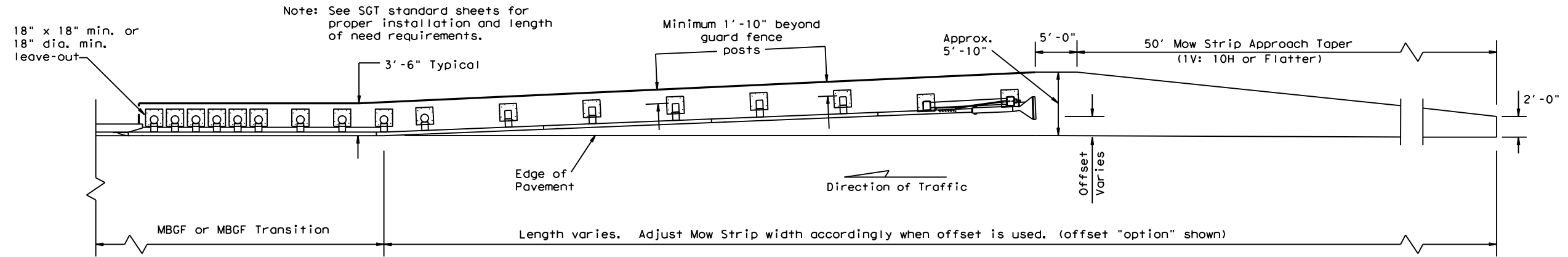
**MID-SPAN RAIL SPLICE DETAIL**

NOTE: GF(31), MID-SPAN RAIL SPLICES ARE REQUIRED WITH 6'-3" POST SPACINGS.

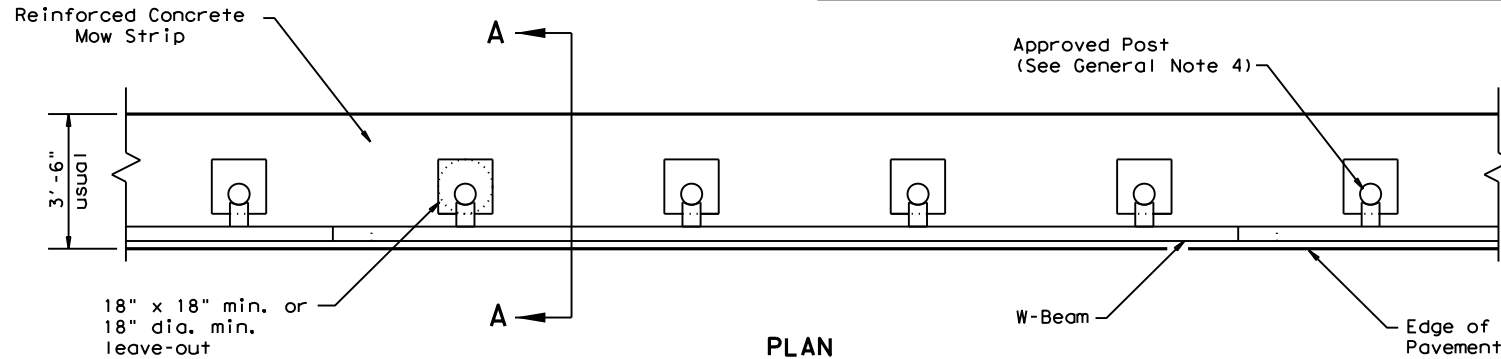
		<b>Design Division Standard</b>	
<b>METAL BEAM GUARD FENCE</b> <b>TL-3 MASH COMPLIANT</b> <b>GF(31)-19</b>			
FILE: gf3119.dgn	DN: TXDOT	CK: KM	OW: VP
© TXDOT: NOVEMBER 2019	CONT	SECT	JOB
REVISIONS	0916	28	082
	DIST	COUNTY	SHEET NO.
	CRP	SAN PATRICIO	037

DATE: FILE:

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



**GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS**



**PLAN**

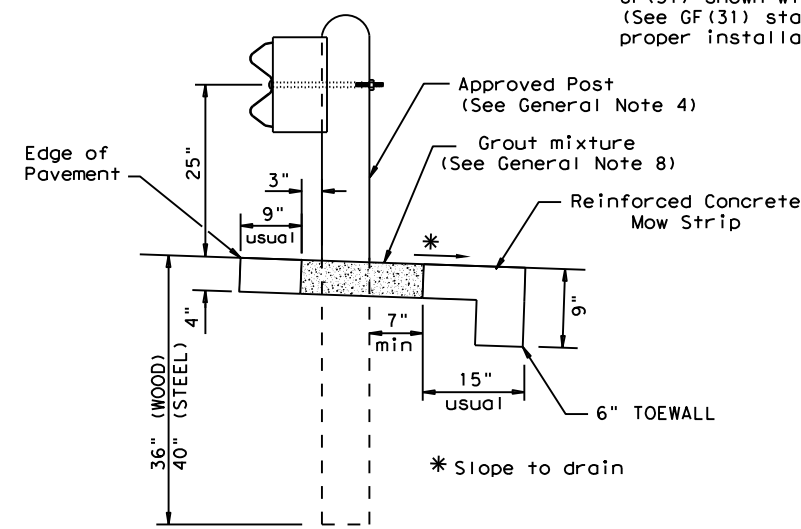
GF(31) shown with Mow Strip  
(See GF(31) standard sheet for proper installation)

Note: Site Condition(s)

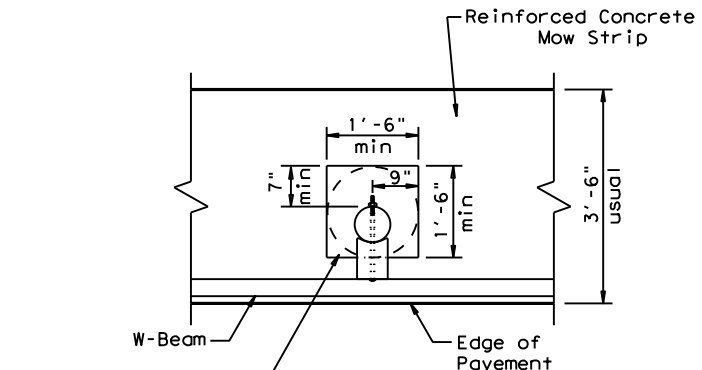
Site conditions may exist where grading is required for the proper installation of metal guard fence and end treatments. Approach grading or mow strip may be decreased or eliminated, as directed by the Engineer.

**GENERAL NOTES**

1. This mow strip design is for use with metal beam guard fence, guard fence transitions, and guard fence end treatments. See applicable GF(31) MBSGF or GF(31) Transition Standard sheet for additional information.
2. Mow strips shall be asphaltic pavement or reinforced concrete (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item. Asphaltic pavement shall meet the requirements of the item, and be placed in accordance with the pertinent bid item as shown in the plans. Reinforced concrete shall be placed in accordance with Item 432, "Riprap." The use of the synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Material Producer List (MPL), maintained by TxDOT, Construction Division.
3. The leave-out behind the post shall be a minimum of 7".
4. Only steel (W6 x 8.5 or W6 x 9.0), or 7 1/2" Dia. round wood posts are acceptable for use in the mow strip. See GF(31) Standard for additional details.
5. Other curb placement options may be used. Curbs are not considered part of the mow strip and will be paid for under other pertinent bid item.
6. Thickness of the mow strip will be 4".
7. The limits of payment for asphaltic pavement or reinforced concrete will include leave-outs for the posts.
8. The leave-outs shall be filled with a Grout mixture consisting of: 2719 pounds sand, 188 pounds Type I or II cement, and 550 pounds of water per cubic yard, with a 28-day compressive strength of approximately 230 psi or less. Provide grout with a consistency that will flow into and completely fill all voids. Due to auger size, larger leave-out dimensions are acceptable from both an impact performance and maintenance repair standpoint (Suggested Maximum leave-out of 20"). Payment for furnishing and placing the grout mixture will be subsidiary to the pay item of riprap mow strip.

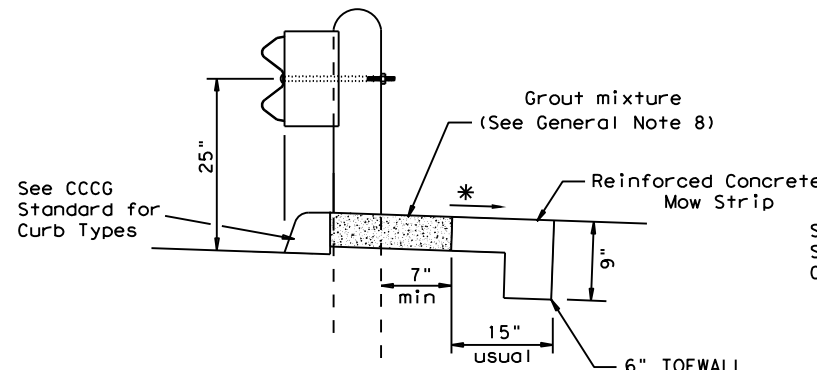


**SECTION A-A**  
Typical



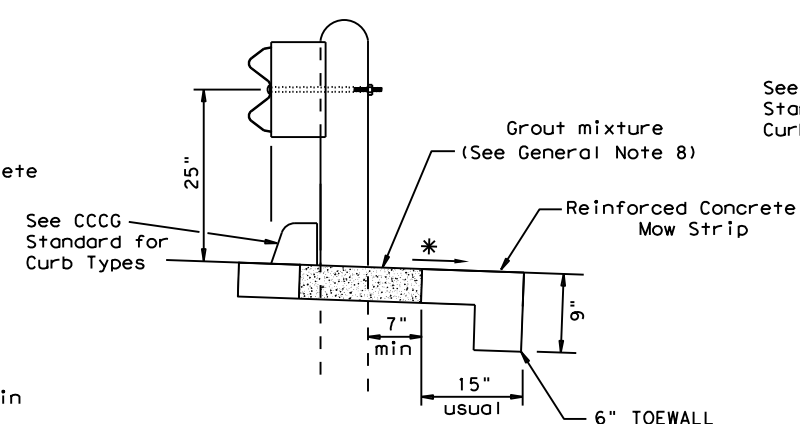
**MOW STRIP DETAIL**

Reinforced Concrete Mow Strip with 18" x 18" Square or 18" Dia. minimum leave-out.



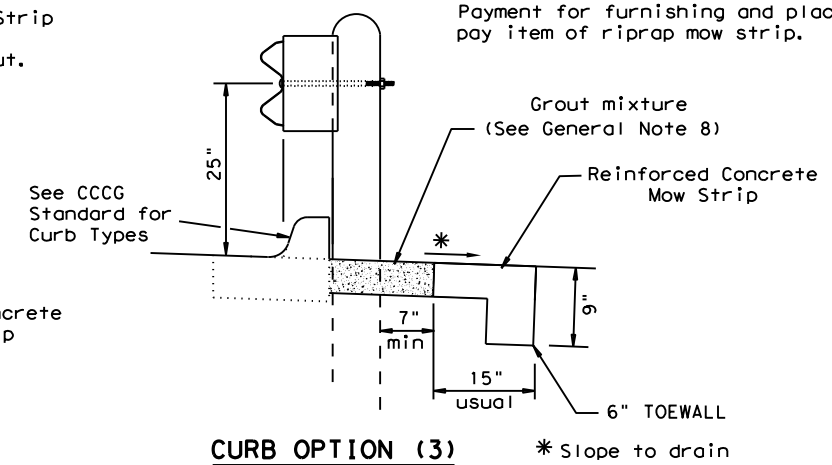
**CURB OPTION (1)**

This option will increase the post embedment through out the system.



**CURB OPTION (2)**

Curb shown on top of mow strip \* Slope to drain



**CURB OPTION (3)**

\* Slope to drain

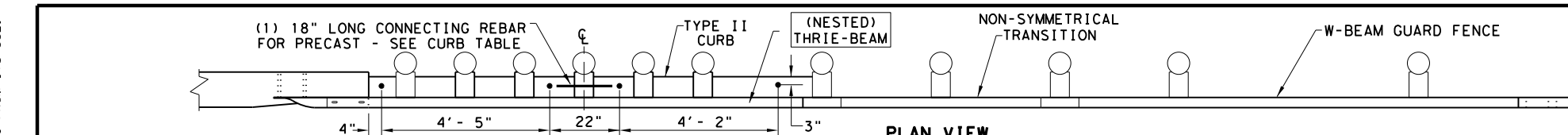
Corpus Christi Standard

**METAL BEAM GUARD FENCE**  
**(MOW STRIP)**  
**CRP-GF(31)MS-19**

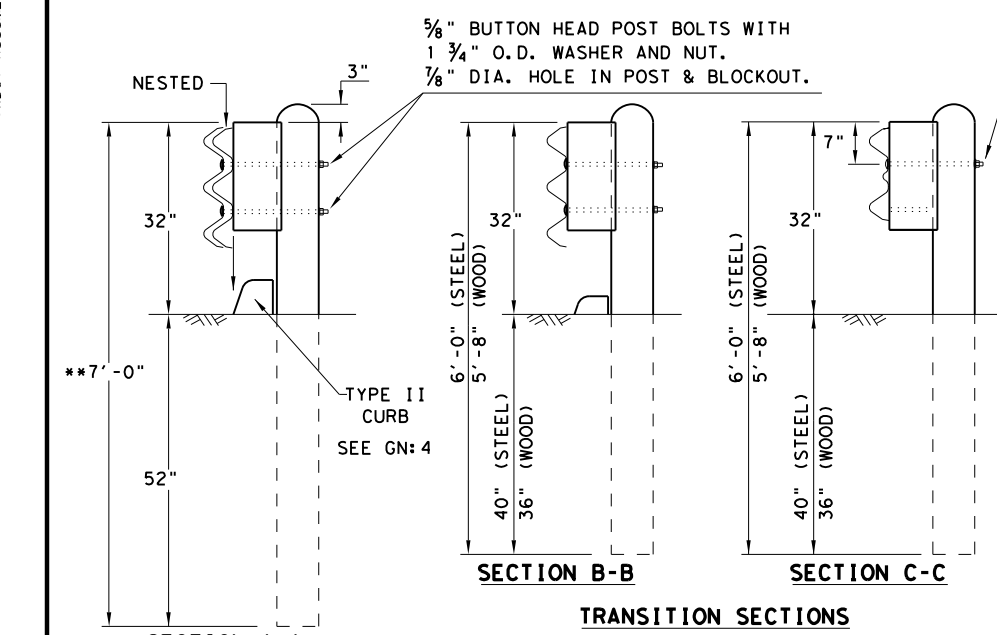
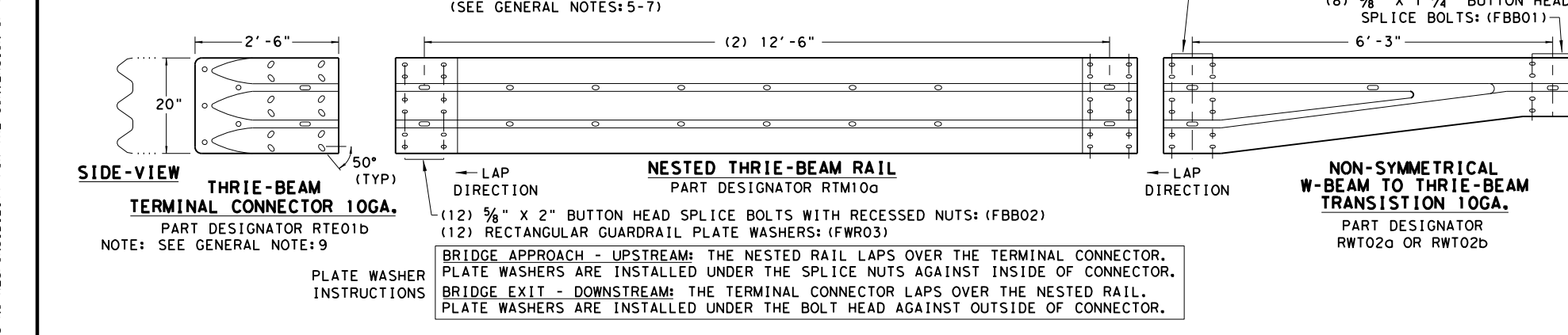
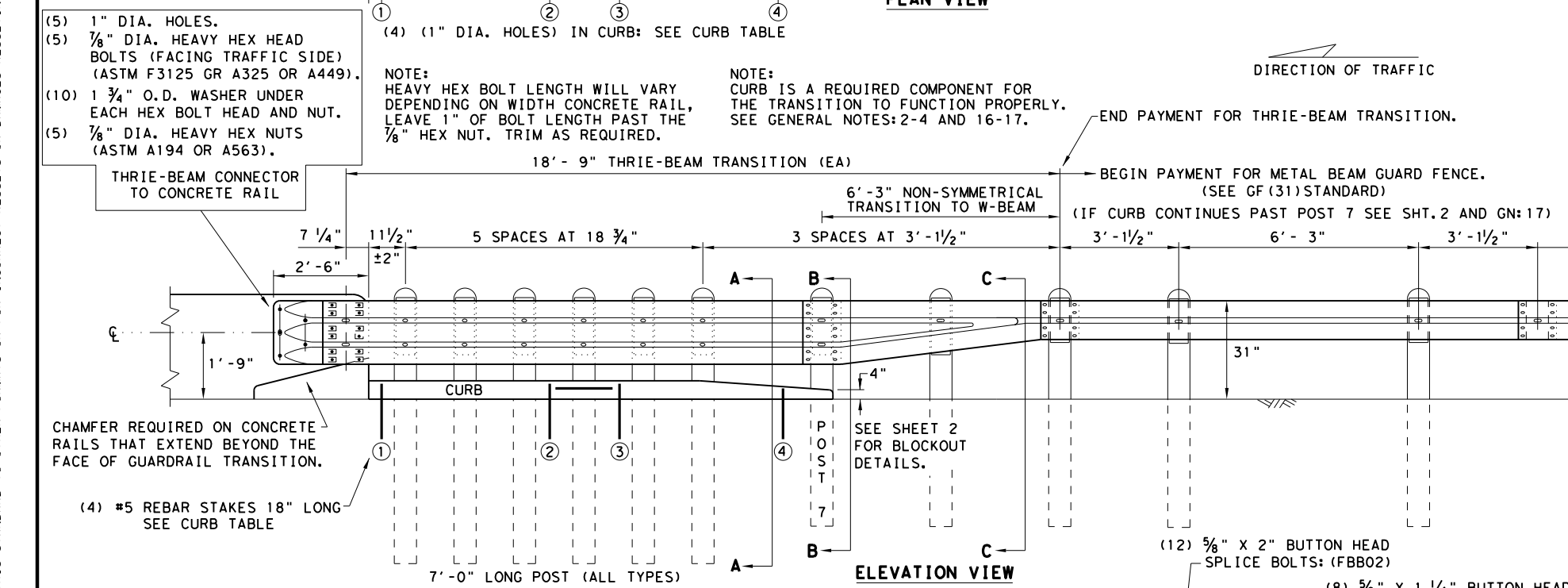
FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0916	28	082	CR 3861
Revised 11, 2019 KM	DIST	COUNTY	SHEET NO.	
	CRP	SAN PATRICIO	038	

DATE: FILE:

DISCLAIMER: THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TxDOT FOR ANY PURPOSE WHATSOEVER. TxDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

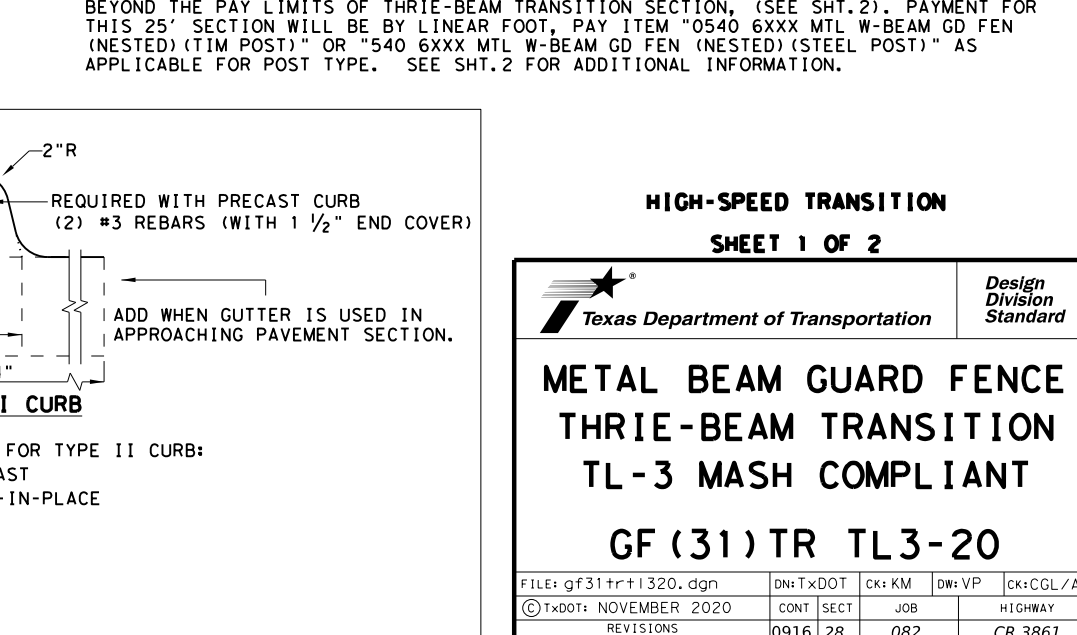


- ### GENERAL NOTES
- CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
  - CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION WITH THE THRIE-BEAM TRANSITIONS, CURB SHALL BE TYPE II (5'-3/4" HEIGHT); SEE CURRENT CCG 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.
  - 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.
  - 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.
  - FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 1/2" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
  - 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.
  - 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 5/8" IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.
  - POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
  - 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.
  - 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 5/8" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
  - FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
  - CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
  - WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
  - 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.
  - REFER TO GF (31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
  - 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.
  - 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.



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 1/2" BELOW TOP OF CURB.
FILL HOLES WITH APPROVED GROUT MIXTURE.	
* 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.	

- CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
- 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'-3/4" HEIGHT); SEE CURRENT CCG 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.
- 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.
- 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.
- FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 1/2" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
- 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.
- 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 5/8" IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.
- POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
- 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.
- 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 5/8" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
- FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
- CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
- WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
- 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.
- REFER TO GF (31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
- 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.
- 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**  
**SHEET 1 OF 2**

Design  
Division  
Standard

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

### GF (31) TR TL3-20

FILE: gf31tr+1320.dgn	DN:TxDOT	CK: KM	DW: VP	CK:CGL/AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0916	28	082	CR 3861
	DIST	COUNTY	SHEET NO.	
	CRP	SAN PATRICIO	039	

DATE: FILE: NOTE: \*\* "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.

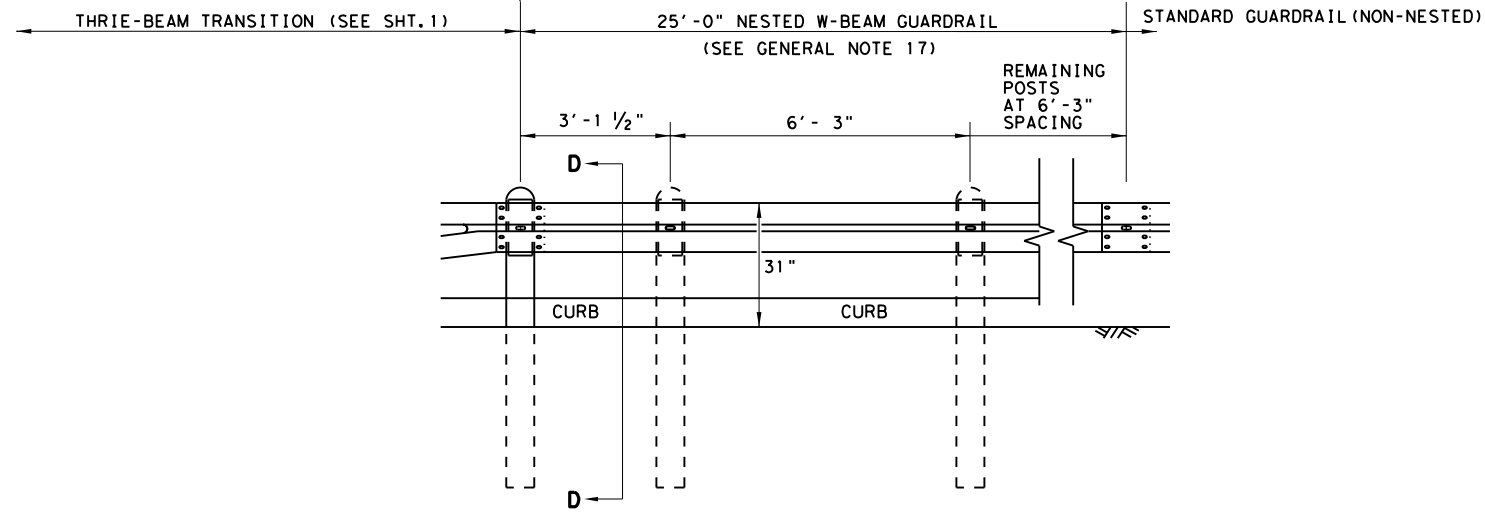
DISCLAIMER: THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

DATE:  
 FILE:

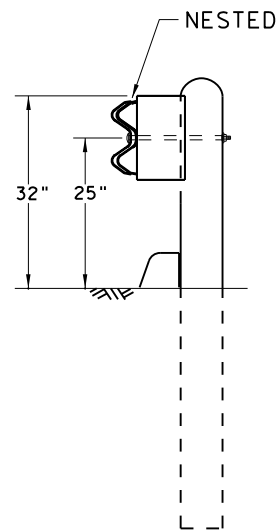
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)

END PAYMENT FOR METAL BEAM GUARD FENCE TRANSITION.  
 BEGIN PAYMENT FOR METAL BEAM GUARD FENCE.

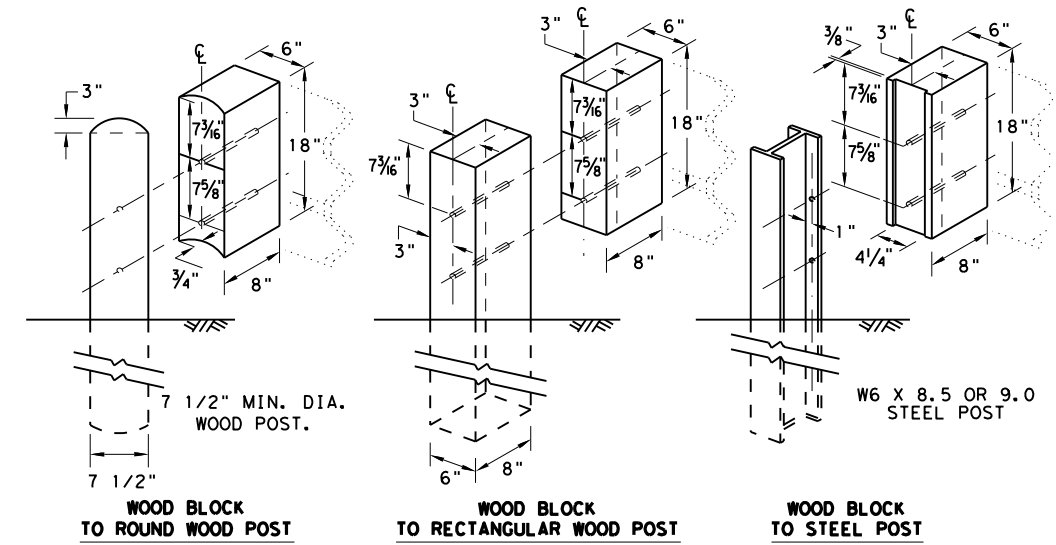
(SEE GF (31) STANDARD SHEET)



**ELEVATION VIEW**



**SECTION D-D**



**THRIE BEAM TRANSITION BLOCKOUT DETAILS**

**HIGH-SPEED TRANSITION**

**SHEET 2 OF 2**

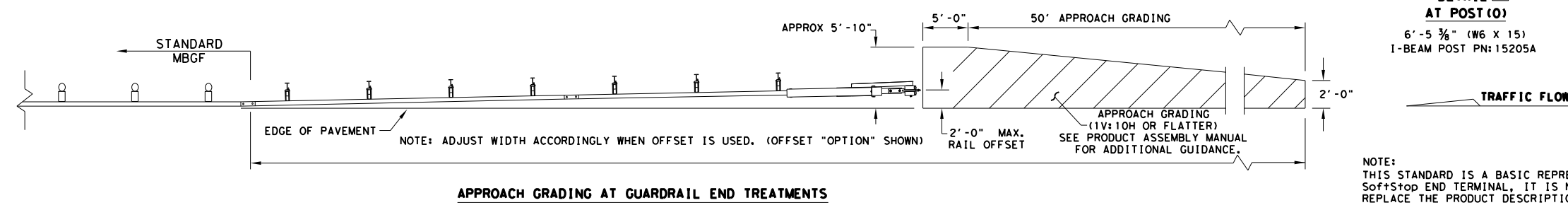
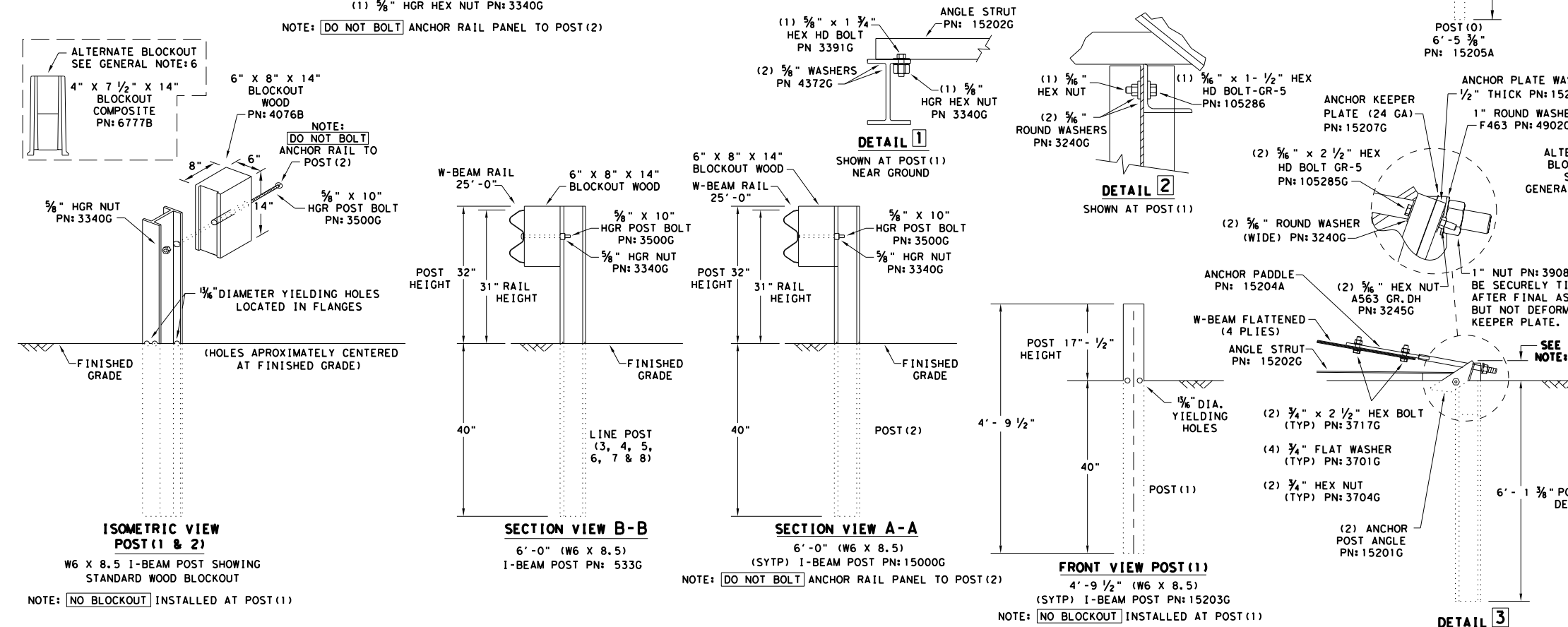
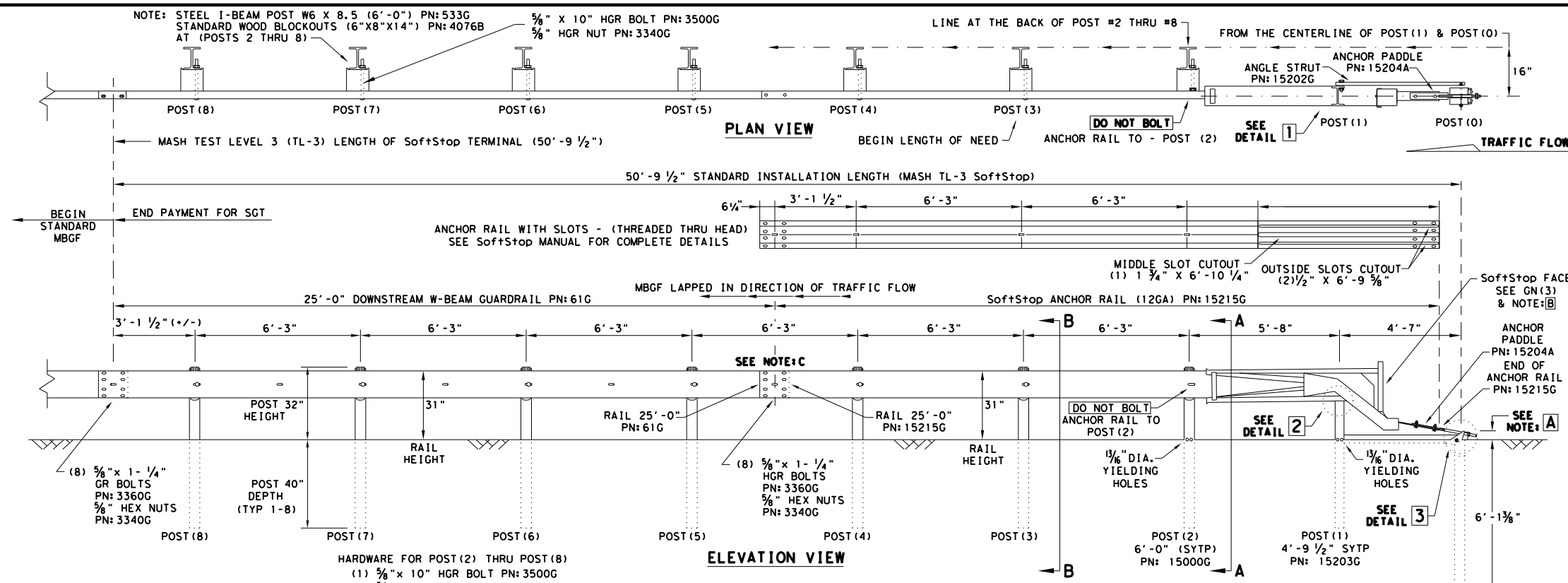


**METAL BEAM GUARD FENCE**  
**THRIE-BEAM TRANSITION**  
**TL-3 MASH COMPLIANT**

**GF (31) TR TL3-20**

FILE: gf31+r+r1320.dgn	DN: TXDOT	CK: KM	DW: KM	CK: CGL/AG
© TXDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0916	28	082	CR 3861
	DIST	COUNTY	SHEET NO.	
	CRP	SAN PATRICIO	040	

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



- GENERAL NOTES**
- 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
  - FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE; SoftStop END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL. PN:620237B
  - 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.
  - FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TxDOT'S LATEST ROADWAY MOW STRIP STANDARD.
  - HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
  - 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.
  - IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL AND REFER TO THE LATEST ROADWAY MGBF STANDARD FOR INSTALLATION GUIDANCE.
  - POSTS SHALL NOT BE SET IN CONCRETE.
  - IT IS ACCEPTABLE TO INSTALL THE SoftStop IMPACT HEAD PARALLEL TO THE GRADE LINE OR WITH AN UPWARD TILT.
  - DO NOT ATTACH THE SoftStop SYSTEM DIRECTLY TO A RIGID BARRIER.
  - UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE SoftStop SYSTEM BE CURVED.
  - 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 3-3/4" 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 7/8")
15203G	1	POST #1 - (SYTP) (4' - 9 1/2")
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 1/2" X 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (1/2" 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	3/4" X 2 1/2" HEX BOLT A325
3701G	4	3/4" ROUND WASHER F436
3704G	2	3/4" HEAVY HEX NUT A563 GR.DH
3360G	16	5/8" X 1 1/4" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	5/8" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	5/8" X 10" HGR POST BOLT A307
3391G	1	5/8" X 1 3/4" HEX HD BOLT A325
4489G	1	5/8" X 9" HEX HD BOLT A325
4372G	4	5/8" WASHER F436
105285G	2	5/8" X 2 1/2" HEX HD BOLT GR-5
105286G	1	5/8" X 1 1/2" HEX HD BOLT GR-5
3240G	6	5/8" ROUND WASHER (WIDE)
3245G	3	5/8" HEX NUT A563 GR.DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE: B

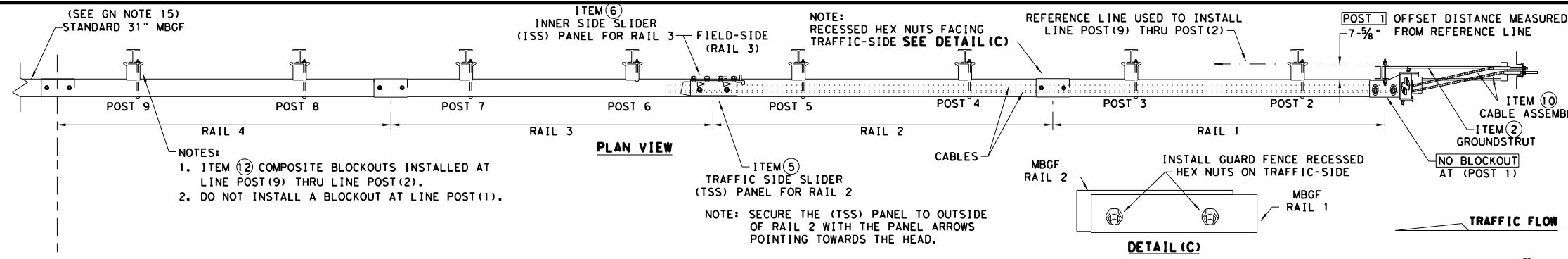
Texas Department of Transportation  
**TRINITY HIGHWAY**  
**SOFTSTOP END TERMINAL**  
**MASH - TL-3**  
**SGT (10S) 31-16**

FILE: sgt10s3116	DW: TxDOT	CK: KM	DW: VP	CK: MB/VP
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0916	28	082	CR 3861
	DIST	COUNTY	SHEET NO.	
	CRP	SAN PATRICIO	041	

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

DATE: FILE:

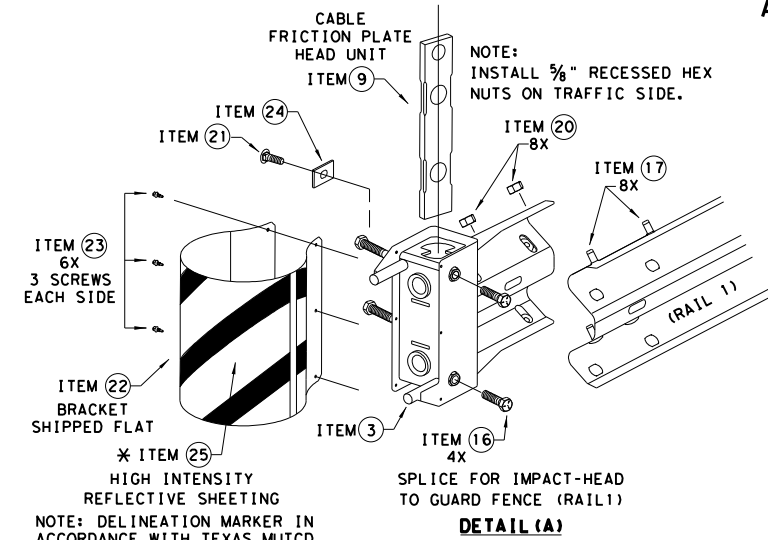
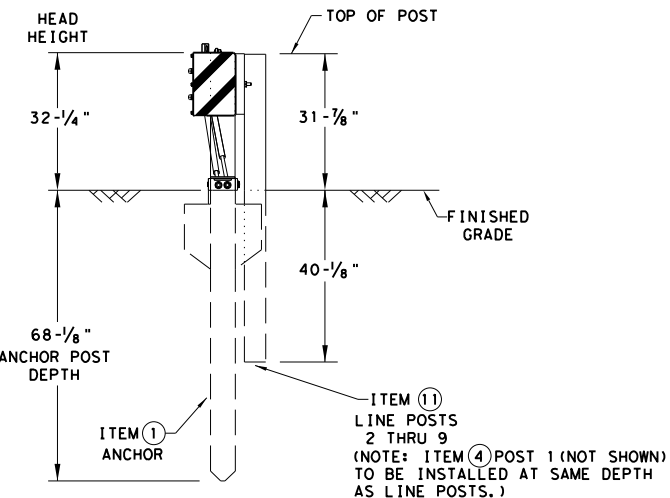
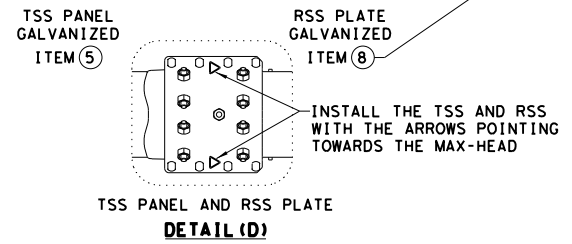
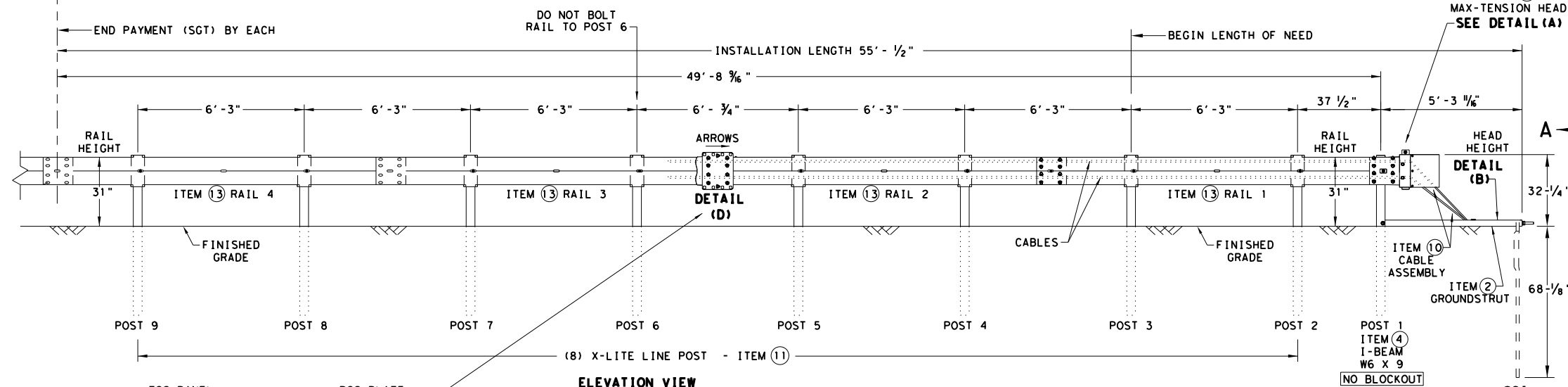
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



- NOTES:
- ITEM (2) COMPOSITE BLOCKOUTS INSTALLED AT LINE POST (9) THRU LINE POST (2).
  - DO NOT INSTALL A BLOCKOUT AT LINE POST (1).

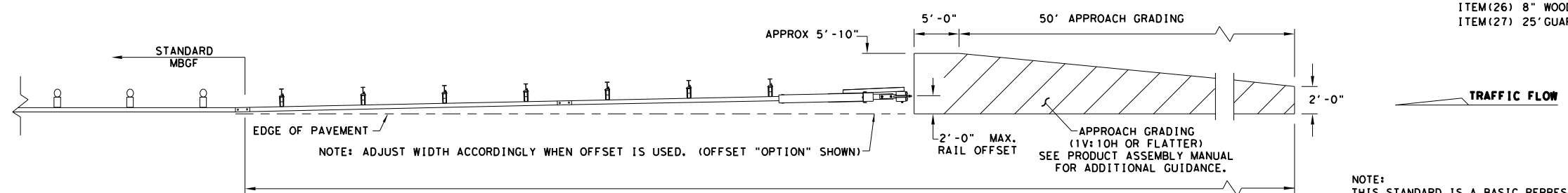
NOTE: SECURE THE (TSS) PANEL TO OUTSIDE OF RAIL 2 WITH THE PANEL ARROWS POINTING TOWARDS THE HEAD.

- GENERAL NOTES**
- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800
  - FOR INSTALLATION, REPAIR, & MAINTENANCE REFER TO THE: MAX-TENSION INSTALLATION INSTRUCTION MANUAL. P/N MANMAX REV D (ECN 3516).
  - 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.
  - FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TxDOT'S LATEST ROADWAY MOW STRIP STANDARD.
  - ALL STEEL COMPONENTS ARE GALVANIZED PER ASTM A123 OR EQUIVALENT UNLESS OTHERWISE STATED.
  - SYSTEM SHOWN USING STEEL WIDE FLANGE POST WITH COMPOSITE BLOCKOUTS.
  - 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.
  - REFER TO INSTALLATION MANUAL FOR SPECIFIC PANEL LAPPING GUIDANCE.
  - IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL FOR INSTALLATION GUIDANCE.
  - POSTS SHALL NOT BE SET IN CONCRETE.
  - 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.
  - MAX-TENSION SYSTEM SHALL NEVER BE INSTALLED WITHIN A CURVED SECTION OF GUARDRAIL.
  - IF A DELINEATION MARKER IS REQUIRED, MARKER SHALL BE IN ACCORDANCE WITH TEXAS MUTCD.
  - THE SYSTEM IS SHOWN WITH 12'-6" MBGF PANELS, 25'-0" MBGF PANELS ARE ALSO ALLOWED.
  - 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	3/8" X 7" THREAD BOLT HH (GR.5)GEOMET	1
16	BSI-2001885	3/4" X 3" ALL-THREAD BOLT HH (GR.5)GEOMET	4
17	4001115	3/8" X 1 1/4" GUARD FENCE BOLTS (GR.2)MGAL	48
18	2001840	3/8" X 10" GUARD FENCE BOLTS MGAL	8
19	2001636	3/8" WASHER F436 STRUCTURAL MGAL	2
20	4001116	3/8" RECESSED GUARD FENCE NUT (GR.2)MGAL	59
21	BSI-2001888	3/8" X 2" ALL THREAD BOLT (GR.5)GEOMET	1
22	BSI-1701063-00	DELINEATION MOUNTING (BRACKET)	1
23	BSI-2001887	1/4" X 3/4" SCREW SD HH 410SS	7
24	4002051	GUARDRAIL WASHER RECT AASHTO FWRO3	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: TxDOT GENERIC APPROACH GRADING LAYOUT USED FOR ALL TANGENT TYPE END TREATMENTS.

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

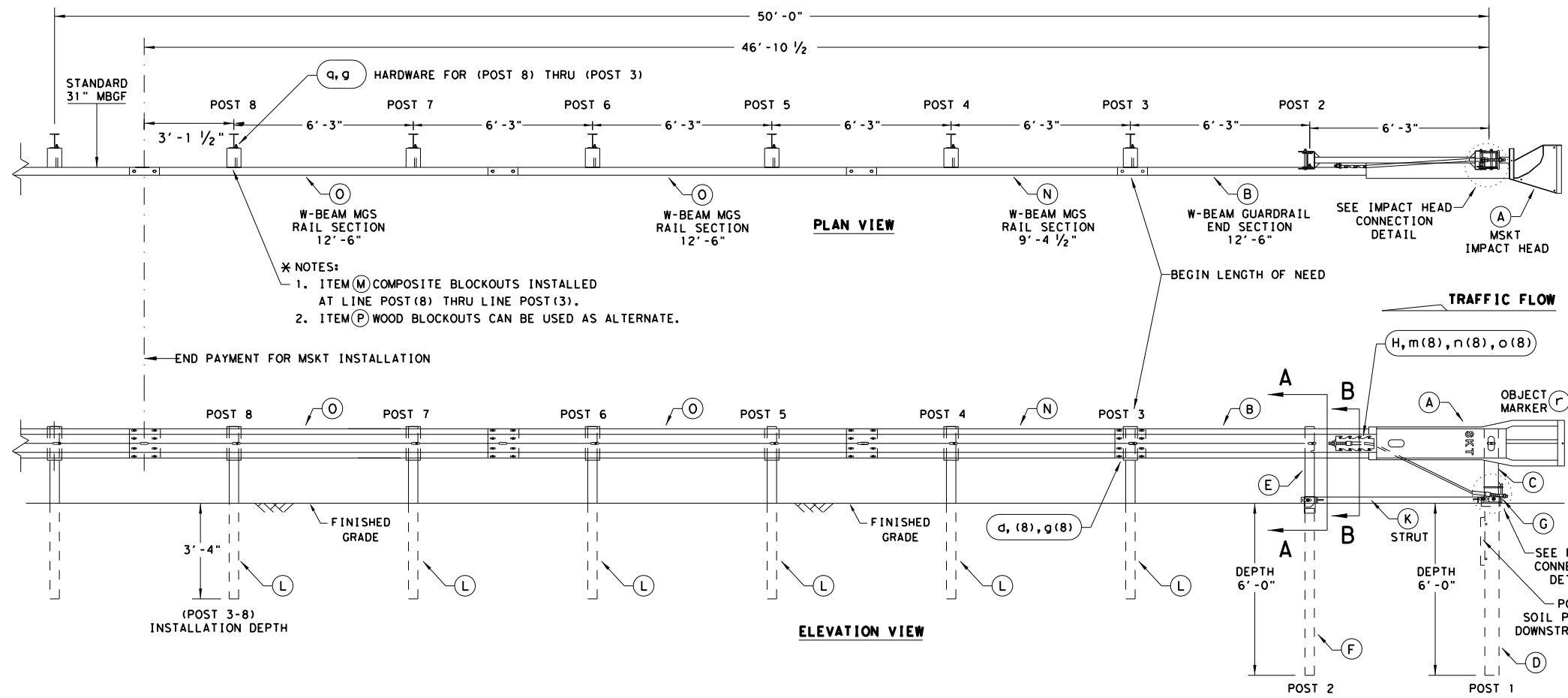
### MASH - TL-3

### SGT (11S) 31-18

FILE: sg+11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0916	28	082	CR 3861
	DIST	COUNTY	SHEET NO.	
	CRP	SAN PATRICIO	042	

DATE: FILE:

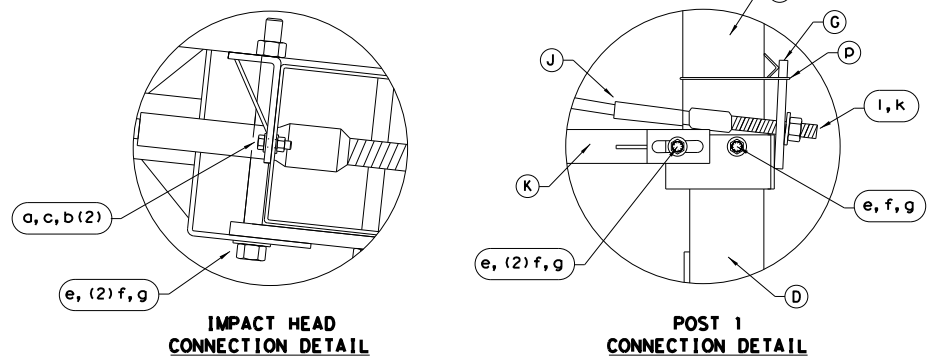
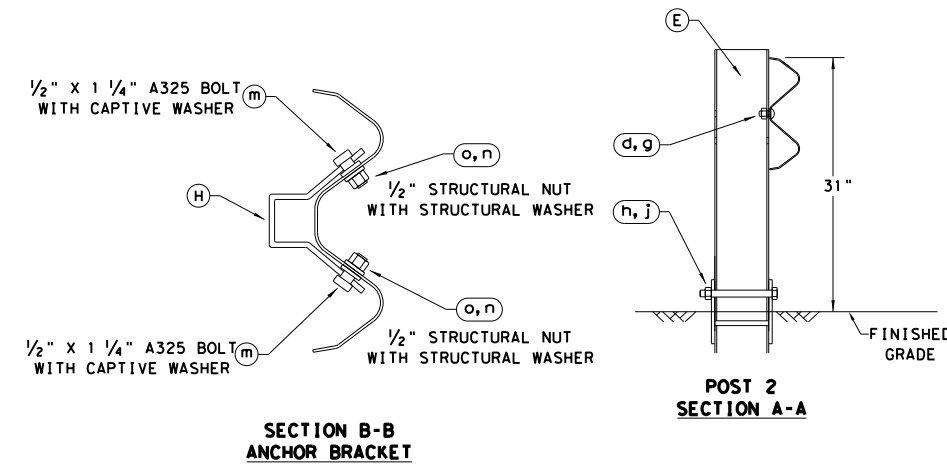
DISCLAIMER: THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.



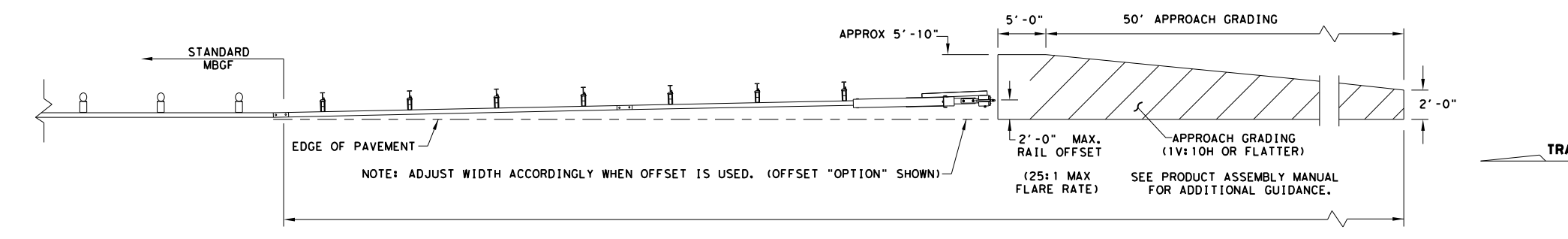
- \* NOTES:**
- ITEM (M) COMPOSITE BLOCKOUTS INSTALLED AT LINE POST (8) THRU LINE POST (3).
  - ITEM (P) WOOD BLOCKOUTS CAN BE USED AS ALTERNATE.

- GENERAL NOTES**
- 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
  - FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE: MSKT END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL (PUBLICATION-062717).
  - 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.
  - FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
  - HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
  - SYSTEM SHOWN USING STEEL WIDE FLANGE POSTS WITH COMPOSITE BLOCKOUTS.
  - 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.
  - 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.
  - POSTS SHALL NOT BE SET IN CONCRETE.
  - SYSTEM MUST BE ATTACHED TO STANDARD 31" MBGF.
  - UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE MSKT SYSTEM BE CURVED.
  - A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCRANCHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.
  - THE SYSTEM IS SHOWN WITH TWO 12'-6" MBGF PANELS, ONE 25'-0" MBGF PANEL IS ALSO ALLOWED IN ITS PLACE.
  - 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 Go.	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	3/8" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	3/8" WASHER	W0516
c	2	3/8" HEX NUT	N0516
d	25	3/8" Dia. x 1 1/4" SPLICE BOLT (POST 2)	B580122
e	2	3/8" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	3/8" WASHER	W050
g	33	3/8" 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 1/8" O.D. x 3/8" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	3/8" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151



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



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.

Design Division Standard

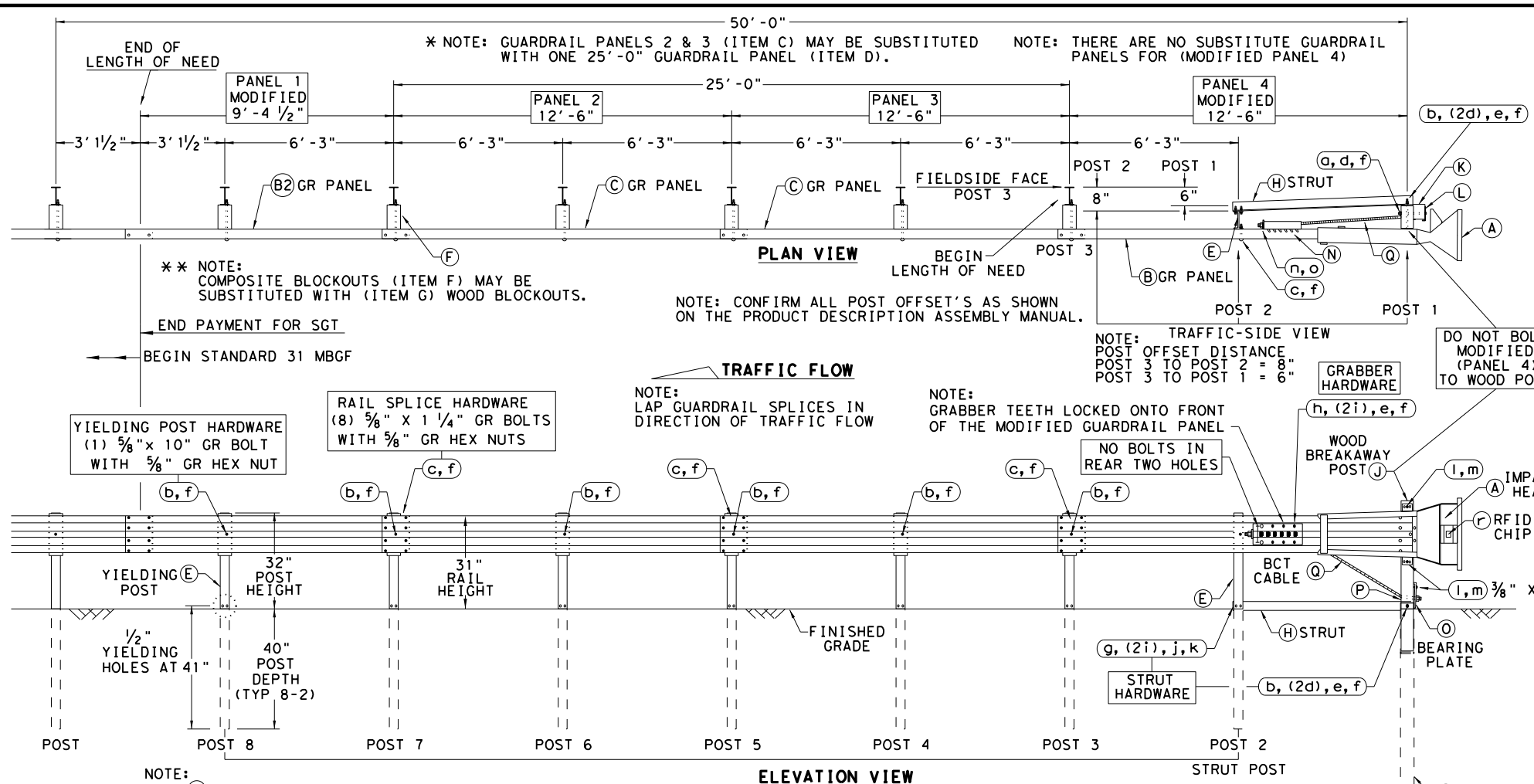
SINGLE GUARDRAIL TERMINAL  
 MSKT-MASH-TL-3  
 SGT (12S) 31-18

FILE: sg12s3118.dgn	DN: TXDOT	CK: KM	DW: VP	CK: CL
© TXDOT: APRIL 2018	CONT SECT	JOB	HIGHWAY	
REVISIONS	0916 28	082	CR 3861	
DIST	COUNTY	SHEET NO.		
CRP	SAN PATRICIO	043		

DATE: FILE:

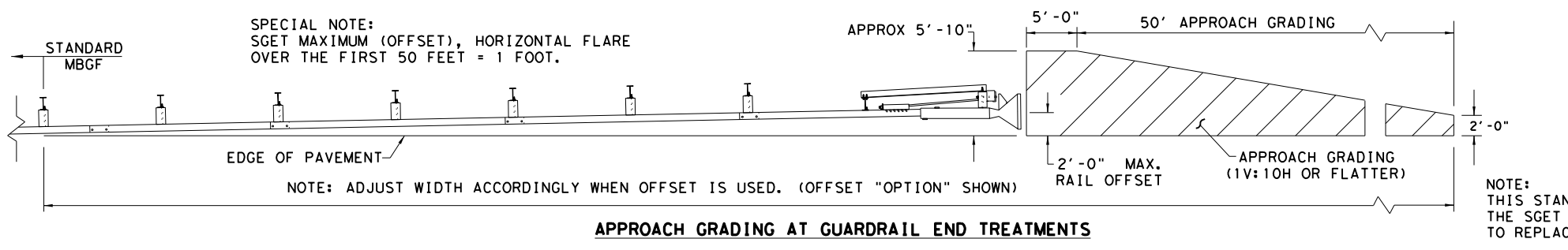
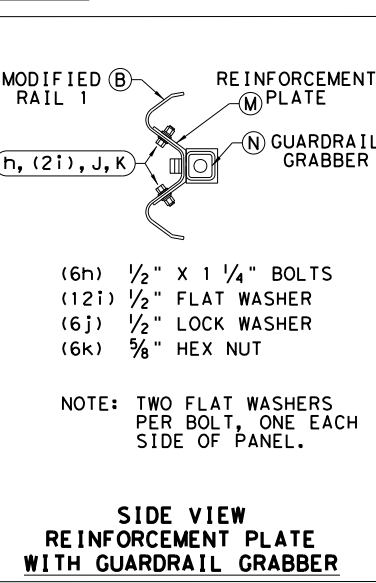
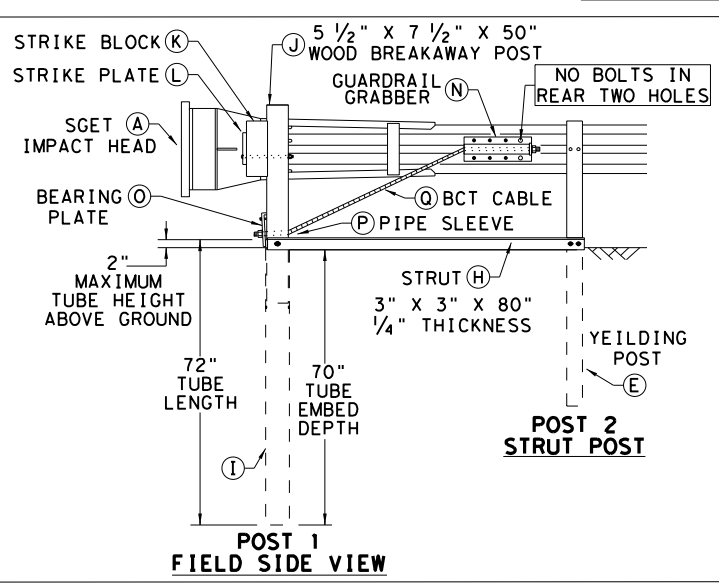
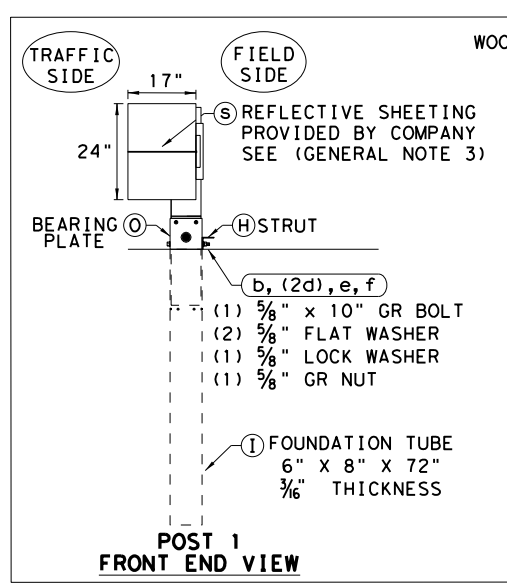
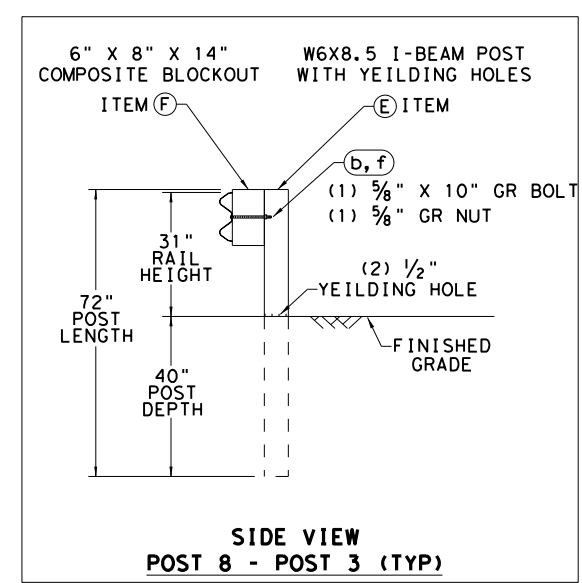


DISCLAIMER: THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.



- ### GENERAL NOTES
- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
  - FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL.
  - MANUFACTURER WILL APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" TO THE FACE PLATE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. THE OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
  - THE NOMINAL HEIGHT OF THE GUARDRAIL BEAM IS 31 INCHES WITH A TOLERANCE OF +/- ONE INCH.
  - FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
  - (POST 2 THROUGH POST 8) ARE MODIFIED STEEL-YIELDING POSTS WITH YIELDING HOLES AT GROUND LEVEL. THERE ARE NO SUBSTITUTE POSTS.
  - POSTS SHALL NOT BE SET IN CONCRETE.
  - IF SOLID ROCK IS ENCOUNTERED FOR ANY OF THE POSTS IN THE SYSTEM, CONTACT THE MANUFACTURER FOR SPECIFIC INSTALLATION GUIDANCE.
  - HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
  - A COMPOSITE MATERIAL BLOCKOUT THAT MEETS DMS-7210 REQUIREMENTS MAY BE SUBSTITUTED FOR AN APPROVED WOOD BLOCKOUT. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
  - THE ENTIRE SYSTEM MUST BE INSTALLED IN A STRAIGHT LINE WITHOUT ANY CURVE. HOWEVER, THE SYSTEM CAN BE OFFSET BY TWO FEET AS SHOWN ON THE APPROACH GRADING DETAIL TO HELP OFF-SET THE IMPACT HEAD FROM SHOULDER OF THE ROAD.

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM #
A	1	SGET IMPACT HEAD	SIH1A
B	1	MODIFIED GUARDRAIL PANEL 12'-6" 12GA	126SPZGP
B2	1	MODIFIED GUARDRAIL PANEL 9'-4 1/2" 12GA	GP94
C	2	STANDARD GUARDRAIL PANEL 12'-6" 12GA	GP126
D	1	STANDARD GUARDRAIL PANEL 25'-0" 12GA	GP25
E	7	MODIFIED YIELDING I-BEAM POST W6x8.5	YP6MOD
F	6	COMPOSITE BLOCKOUT 6" X 8" X 14"	CB08
G	6	WOOD BLOCKOUT 6" X 8" X 14"	WB08
H	1	STRUT 3" X 3" X 80" X 1/4" A36 ANGLE	STR80
I	1	FOUNDATION TUBE 6" X 8" X 72" X 3/8"	FNDT6
J	1	WOOD BREAKAWAY POST 5 1/2" X 7 1/2" X 50"	WBRK50
K	1	WOOD STRIKE BLOCK	WSBK14
L	1	STRIKE PLATE 1/4" A36 BENT PLATE	SPLT8
M	1	REINFORCEMENT PLATE 12 GA. GR55	REPLT17
N	1	GUARDRAIL GRABBER 2 1/2" X 2 1/2" X 16 1/2"	GGRI17
O	1	BEARING PLATE 8" X 8 5/8" X 5/8" A36	BPLT8
P	1	PIPE SLEEVE 4 1/4" X 2 3/8" O.D. (2 1/8" I.D.)	PSLV4
Q	1	BCT CABLE 3/4" X 81" LENGTH	CBL81
SMALL HARDWARE			
a	1	5/8" X 12" GUARDRAIL BOLT 307A HDG	12GRBLT
b	7	5/8" X 10" GUARDRAIL BOLT 307A HDG	10GRBLT
c	33	5/8" X 1 1/4" GR SPLICE BOLTS 307A HDG	1GRBLT
d	3	5/8" FLAT WASHER F436 A325 HDG	58FW436
e	1	5/8" LOCK WASHER HDG	58LW
f	39	5/8" GUARDRAIL HEX NUT HDG	58HN563
g	2	1/2" X 2" STRUT BOLT A325 HDG	2BLT
h	6	1/2" X 1 1/4" PLATE BOLT A325 HDG	125BLT
i	16	1/2" FLAT WASHER F436 A325 HDG	12FWF436
j	8	1/2" LOCK WASHER HDG	12LW
k	8	1/2" HEX NUT A563 HDG	12HN563
l	4	3/8" X 3" HEX LAG SCREW GR5 HDG	38LS
m	4	3/8" FLAT WASHER F436 A325 HDG	38FW844
n	2	1" FLAT WASHER F436 A325 HDG	1FWF436
o	2	1" HEX NUT A563HDG	1HN563
p	1	18" TO 24" LONG ZIP TIE RATED 175-200LB	ZPT18
q	1	1 1/2" X 4" SCH-40 PVC PIPE	PSPCR4
r	1	RFID CHIP RATED MIL-STD-810F	RFID810F
s	1	IMPACT HEAD REFLECTIVE SHEETING	RS30M



NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE SGET TERMINAL SYSTEM AND IS NOT INTENDED TO REPLACE THE MANUFACTURER'S ASSEMBLY MANUAL.

**Texas Department of Transportation**  
Design Division Standard

## SPIG INDUSTRY, LLC SINGLE GUARDRAIL TERMINAL SGET - TL-3 - MASH SGT (15) 31-20

FILE: sg+153120.dgn	DN: TXDOT	CK: KM	DW: VP	CK: VP
© TXDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0916	28	082	CR 3861
	DIST	COUNTY	SHEET NO.	
	CRP	SAN PATRICIO	044	

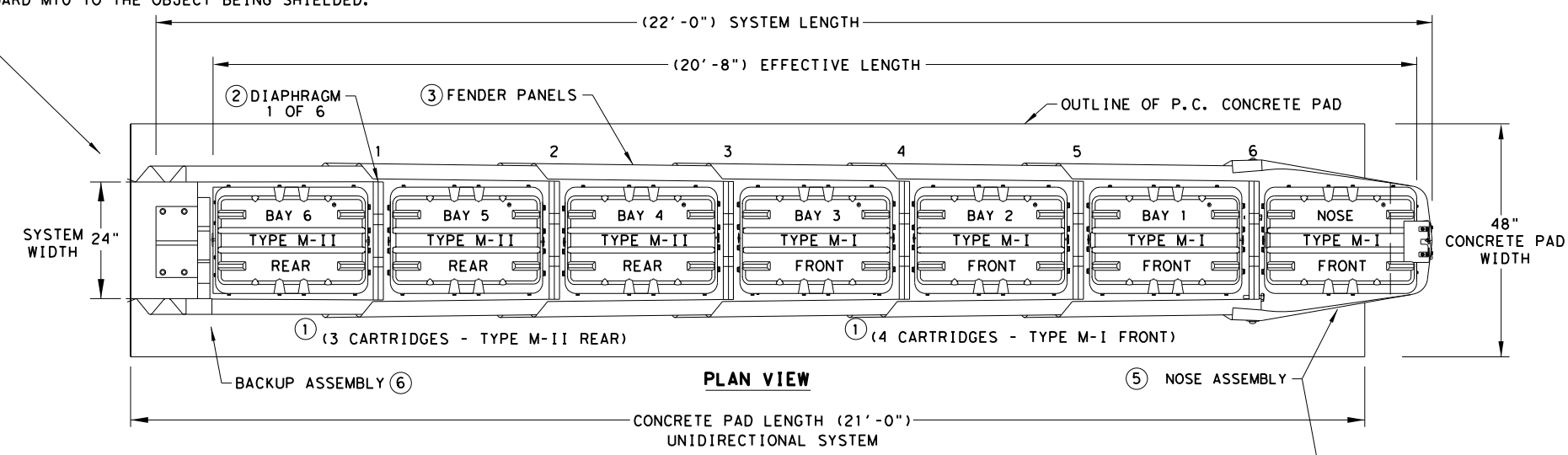
DATE:  
FILE:

DISCLAIMER: 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:

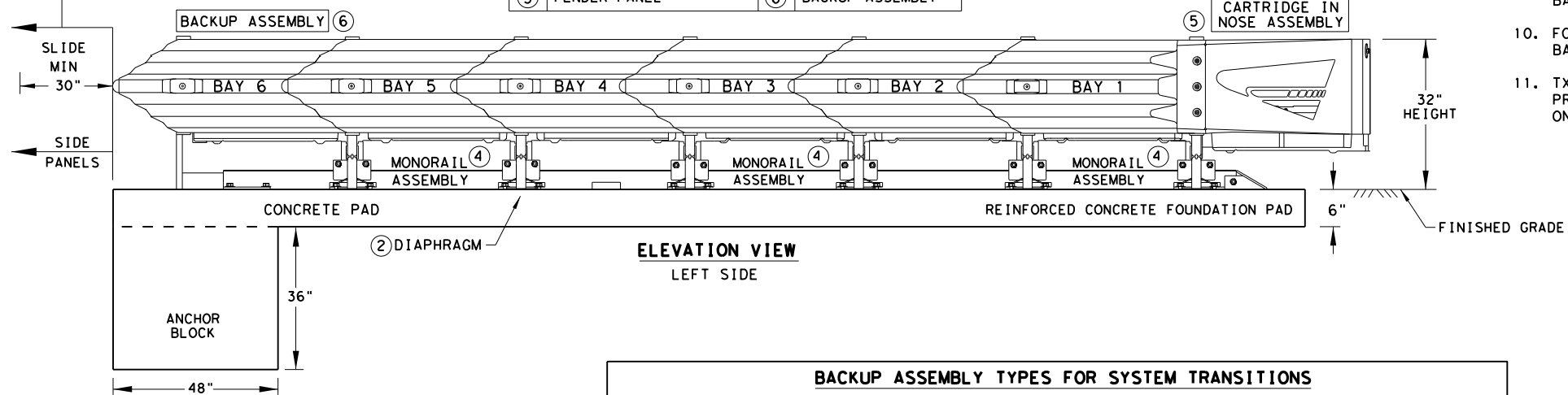
NOTE:  
A TRANSITION MAY BE REQUIRED TO INSTALL THE QUADGUARD M10 TO THE OBJECT BEING SHIELDED.

**QUADGUARD M10 24" WIDE 6-BAY SYSTEM**

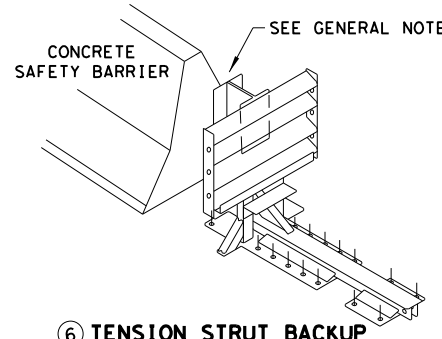


KEY		KEY	
①	QUADGUARD CARTRIDGE	④	MONORAILS
②	DIAPHRAGM	⑤	NOSE ASSEMBLY
③	FENDER PANEL	⑥	BACKUP ASSEMBLY

NOTE:  
PROVISION SHALL BE MADE FOR REAR FENDER SIDE PANELS TO SLIDE REARWARD UPON IMPACT, 30" MIN.



**BACKUP ASSEMBLY TYPES FOR SYSTEM TRANSITIONS**



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 M10 TO THRIE-BEAM OR W-BEAM FENCE REQUIRES I-BEAM POSTS:  
ALL POSTS W6X8.5/9 I-BEAMS (78" LONG).

NOTE:  
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.

**GENERAL NOTES**

- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY - ENERGY ABSORPTION INC. AT 1 (888) 323-6374.
- SEE THE RECENT QUADGUARD 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 M10 SYSTEM AT ANY GIVEN LOCATION.
- FOR BI-DIRECTIONAL TRAFFIC: THE PLACEMENT OF THE QUADGUARD M10 IS RESTRICTED. AS BI-DIRECTIONAL TRAFFIC APPROACHES THE REAR OF THE QUADGUARD M10 THE CRASH CUSHION MUST BE PLACED SUCH THAT THE TRAFFIC SIDE OF CRASH CUSHION IS AT LEAST AS FAR FROM ADJACENT TRAVEL LANE LINE AS THE TRAFFIC SIDE OF BARRIER/OBJECT BEING SHIELDED.
- 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 M10 SYSTEM IS SHIELDING. SEE THE QUADGUARD M10 PRODUCT DESCRIPTION & ASSEMBLY MANUAL FOR FURTHER DETAILS.
- COMPONENTS FOR THE QUADGUARD M10 BACKUP AND REINFORCING DETAILS ARE SHOWN ON THE QUADGUARD M10 PRODUCT DESCRIPTION & ASSEMBLY MANUAL.
- 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.
- 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%.
- THE INSTALLATION AREA SHOULD BE FREE OF CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
- THE QUADGUARD M10 SYSTEM SHOULD BE INSTALLED APPROXIMATELY PARALLEL WITH THE BARRIER.
- FOR THE TENSION STRUT BACKUP THE DISTANCE BETWEEN THE BACK OF BACKUP AND THE BARRIER WALL SHOULD NOT EXCEED 7" IN ANY CASE.
- TXDOT HAS ONLY APPROVED THE 24" WIDE QUADGUARD M10 SYSTEM. THE QUADGUARD 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 1/2" - 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 1/2" - APPROVED ADHESIVE
FOUNDATION TYPE: C	ASPHALT OVER SUBBASE
FOUNDATION:	6" MIN. (A.C.) OVER 6" MIN. (C.S.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 1/2" - APPROVED ADHESIVE
FOUNDATION TYPE: D	ASPHALT ONLY
FOUNDATION:	8" MIN. (A.C.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 1/2" - 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.

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 M10 (N) INSTALLATION AND DETAILED INFORMATION REGARDING THE TYPE OF BACKUP ASSEMBLY FOR THE REQUIRED TRANSITION WILL BE PROVIDED 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 M10 24" WIDE 6-BAY - NARROW SYSTEM HAS BEEN TESTED TO MASH TEST LEVEL 3.

TL-3 MODEL #	QM10024	CARTRIDGE TYPES IN BAYS		
BAYS	6	TYPE-MII	TYPE-MI	TYPE-MI
DIAPHRAGMS	6	3	3	1
WIDTH	24"	REAR	FRONT	NOSE

TL-2 MODEL #	QM7024	CARTRIDGE TYPES IN BAYS		
BAYS	3	TYPE-MII	TYPE-MI	TYPE-MI
DIAPHRAGMS	3	1	2	1
WIDTH	24"	REAR	FRONT	NOSE

Design Division Standard

TRINITY HIGHWAY  
 ENERGY ABSORPTION  
 QUADGUARD M10  
 (MASH TL-3 & TL-2 NARROW-24" ONLY)  
 QUADGUARD (M10) (N) - 20

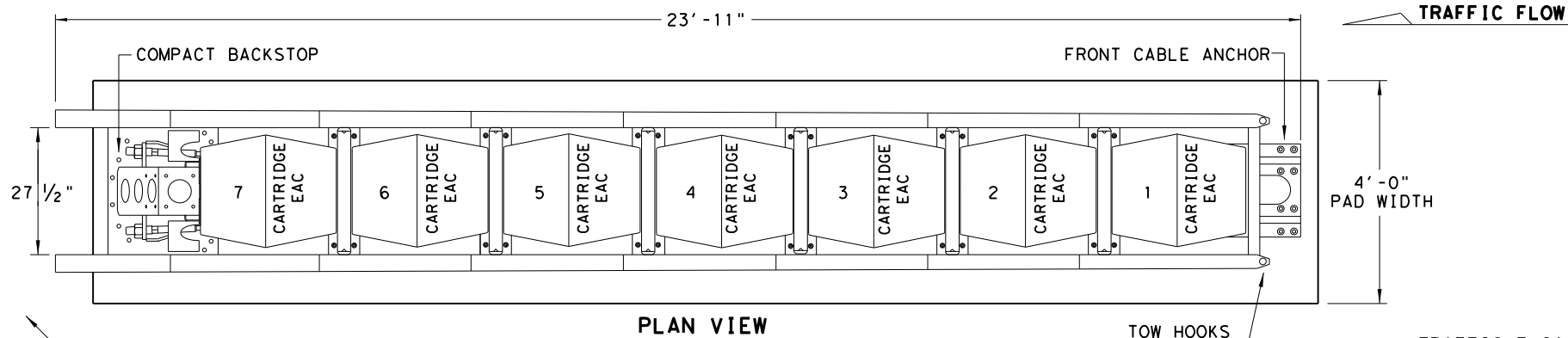
FILE: aguardm10n20.dgn	DN: TXDOT	CK: KM	DW: VP	CK: AG
© TXDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0916	28	082	CR 3861
	DIST	COUNTY	SHEET NO.	
	CRP	SAN PATRICIO	045	

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

**REUSABLE**

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.

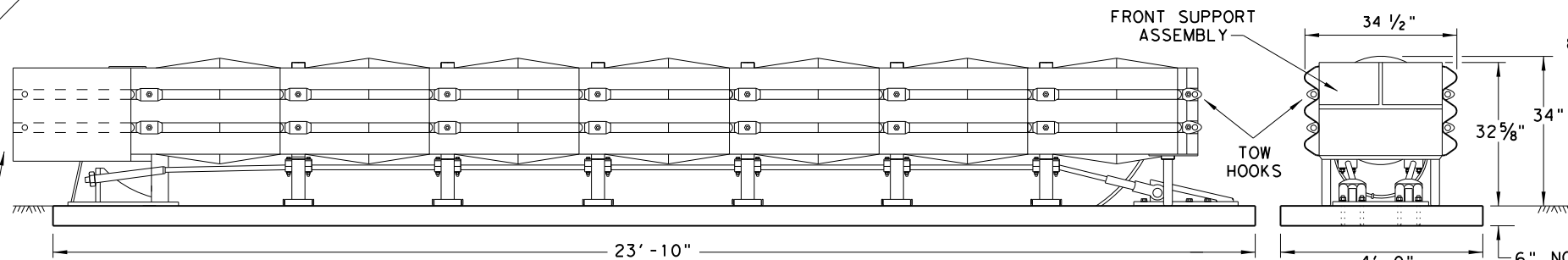
TAU(M) (N) TL-3 SYSTEM LENGTH VARIES WITH TRANSITION TYPE



PLAN VIEW

NOTE:  
TAU(M) (N) TL-2 SYSTEM CONTAINS (4) TYPE B (EAC) CARTRIDGES,  
INSTALLED ON ROADWAYS WITH MAXIMUM SPEEDS OF 45 MPH.

PROTECTS HAZARDS  
UP TO 30" WIDTH



ELEVATION VIEW

NOTE:  
PAD THICKNESS VARIES - SEE FOUNDATION OPTIONS

NOTES:  
TRANSITIONS AND ATTACHMENTS TO VARIOUS BARRIER SHAPES,  
RAILINGS AND BI-DIRECTIONAL TRAFFIC FLOWS ARE AVAILABLE.  
SEE MANUFACTURER'S INSTALLATION INSTRUCTIONS MANUAL FOR  
ADDITIONAL TRANSITION DETAILS.

NOTE:  
CONCRETE FOUNDATION PAD LENGTH VARIES WITH TL-3 AND  
TL-2 SYSTEMS, SEE SYSTEM & FOUNDATION LENGTH TABLE.

FOUNDATION OPTIONS
6" REINFORCED CONCRETE
8" UNREINFORCED CONCRETE
ASPHALT OVER CONCRETE WITH MINIMUM 6" EMBEDMENT IN CONCRETE
* 6" ASPHALT OVER 6" COMPACT SUBBASE
* 8" MINIMUM ASPHALT

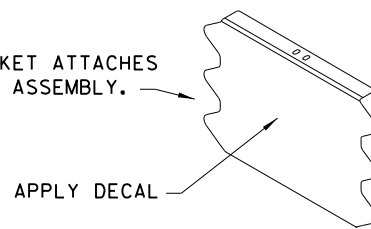
SYSTEM & FOUNDATION LENGTH TABLE	
SYSTEM LENGTH	FOUNDATION LENGTH
TL-2 = 15'-5"	TL-2 = 15'-4"
TL-3 = 23'-11"	TL-3 = 23'-10"

\* NOTE:  
REQUIRES AN ASPHALT ANCHORAGE PACKAGE: INCLUDES ADDITIONAL BRACES  
FOR THE FRONT CABLE ANCHOR AND THE COMPACT BACKSTOP, AND ASPHALT  
HARDWARE KIT. THE TL-3 ASPHALT CONFIGURATION ALSO REQUIRES NESTED  
SLIDER PANELS AND SHIMS AT THE LAST TWO BAYS. SEE MANUFACTURER'S  
INSTALLATION INSTRUCTION MANUAL FOR DETAILS.

NOTE:  
SEE MANUFACTURER'S INSTALLATION INSTRUCTION MANUAL FOR FOUNDATION  
SPECIFICATIONS THAT INCLUDE, STONE AGGREGATE MIX, COMPRESSION  
STRENGTH, STEEL SIZE, ANCHOR SIZE, AND EMBEDMENT DEPTH.

\* \* NOTE:  
ENGINEER OR CONTRACTOR SHALL COORDINATE WITH  
THE MANUFACTURER FOR THE CORRECT DECAL PER  
TRAFFIC FLOW, LEFT, RIGHT OR BOTH-SIDES.

NOTE:  
DELINEATION BRACKET ATTACHES  
TO FRONT SUPPORT ASSEMBLY.



DELINEATION BRACKET

NOTE:  
APPLY A HIGH REFLECTIVE DECAL TO THE DELINEATION BRACKET.  
DELINEATION DECAL ORIENTATION IS SHOWN ON THE CONSTRUCTION  
PLAN SET AND SHALL BE IN ACCORDANCE WITH THE TEXAS MUTCD  
FOR (TRAFFIC CONTROL DEVICES). DECALS ARE AVAILABLE FOR  
TRAFFIC FLOW ON THE LEFT-SIDE, BOTH -SIDES AND RIGHT-SIDE.

NOTES:  
UPGRADE KITS ARE AVAILABLE TO RETROFIT EXISTING  
NCHRP 350 TAU-II SYSTEMS TO MASH COMPLIANT SYSTEMS.  
SEE MANUFACTURER'S PRODUCT INFORMATION.

THE TAU(M) (N) UNIDIRECTIONAL SYSTEM IS FREE STANDING  
AND IS NOT REQUIRED TO BE CONNECTED TO THE HAZARD.

TRANSITIONS TO GUARD FENCE, BRIDGE RAILS AND ROADSIDE  
BARRIERS SHALL BE IN ACCORDANCE WITH TxDOT'S POLICY.

NOTE:  
THIS STANDARD IS A BASIC REPRESENTATION OF THE  
UNIVERSAL TAU(M) (N) SYSTEM, IT IS NOT INTENDED TO  
REPLACE THE INSTALLATION INSTRUCTION MANUAL.

REUSABLE

GENERAL NOTES

- FOR SPECIFIC INFORMATION REGARDING THE INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800. 180 RIVER ROAD, RIO VISTA, CA 94571
- REFER TO THE LATEST (LTS) INSTALLATION INSTRUCTION MANUAL FOR IMPORTANT SAFETY MESSAGES, COMPLETE SYSTEM ASSEMBLY, AND ANCHOR INSTALLATION REQUIREMENTS FOR THE NINE (9) DIFFERENT SITE TRANSITIONS.
- INSTALLATION DETAILS FOR THE COMPACT BACKSTOP, FRONT CABLE ANCHOR AND FOUNDATION OPTIONS ARE SHOWN ON THE INSTALLATION INSTRUCTION MANUAL FURNISHED TO THE ENGINEER.
- CONCRETE SHALL BE CLASS "S" WITH A MINIMUM COMPRESSIVE STRENGTH OF 4,000 P.S.I.
- IF THE CROSS-SLOPES VARIES MORE THAN 2% OVER THE LENGTH OF THE SYSTEM, THE CONCRETE PAD WILL REQUIRE LEVELING. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%
- THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
- THE TAU(M) (N) SYSTEM SHOULD BE APPROXIMATELY PARALLEL WITH THE BARRIER OR CENTER LINE OF MERGING BARRIERS.
- THIS DRAWING REPRESENTS THE UNIVERSAL TAU(M) (N) TL-3 SYSTEM, A RE-DIRECTIVE NON-GATING CRASH CUSHION THAT CAN PROTECT HAZARDS UP TO 30-INCHES IN WIDTH. ALSO AVAILABLE IN TL-2 CONFIGURATION.

BILL OF MATERIALS FOR TAU(M) (N) TL-3 & TL-2 SYSTEMS		QUANTITIES	
PART NUMBER	PART DESCRIPTION	TL-3 SYSTEM	TL-2 SYSTEM
BSI-1708019-00	SLIDING PANEL GALVANIZED TAU(M) (N)	14	8
BSI-1708030-00	END PANEL, THRIE BEAM, GALV, TAU(M) (N)	2	2
BSI-1706001-00	CABLE ASSEMBLY, 7 BAY, TAU(M) (N)	2	-
BSI-1805036-00	CABLE ASSEMBLY, 4 BAY, TAU(M) (N)	-	2
BSI-1708018-00	FRONT CABLE ANCHOR	1	1
BSI-1707034-00	COMPACT BACKSTOP	1	1
B030703	MIDDLE SUPPORT ASSEMBLY	6	3
B030704	FRONT SUPPORT	1	1
B010722	ENERGY ABSORBING CARTRIDGE, TYPE B	7	4
K001005	TAU-II FRONT SUPPORT LEG KIT	1	1
BSI-1709083-KT	TETHER KIT (INCLUDES ALL HARDWARE)	1	1
BSI-1809041-KT	SLIDER KIT (INCLUDES ALL HARDWARE)	7	4
BSI-1808033-KT	CABLE GUIDE KIT (INCLUDES ALL HARDWARE)	6	3
BSI-1809040-KT	TOW HOOK KIT (INCLUDES ALL HARDWARE)	1	1
BSI-1808034-KT	DELINEATION BRACKET KIT (INCLUDES ALL HARDWARE)	1	1
BSI-1808035-KT	END PANEL MOUNT KIT (INCLUDES ALL HARDWARE)	1	1
BSI-1808036-KT	CONCRETE ANCHORING KIT	1	1
* * SEE NOTE	HIGH REFLECTIVE DECAL	1	1
ECN 3883	INSTALLATION AND INSTRUCTIONS MANUAL	1	1

		<b>Design Division Standard</b>	
<b>LINDSAY TRANSPORTATION SOLUTIONS</b> <b>UNIVERSAL CRASH CUSHION</b> <b>(MASH TL-3 &amp; TL-2)</b> <b>TAU(M) (N) - 19</b>			
FILE: tau19.dgn	DN: TxDOT	CK: KM	DW: VP
© TxDOT: APRIL 2019	CONT SECT	JOB	HIGHWAY
REVISIONS	0916 28	082	CR 3861
DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	046	

DATE:  
FILE:

DRAINAGE AREA FLOW SUMMARY

HYDROLOGIC METHOD		2-YR (cfs)	5-YR (cfs)	10-YR (Design) (cfs)	25-YR (cfs)	50-YR (cfs)	100-YR (Check) (cfs)	200-YR (cfs)	500-YR (cfs)
Omega Regional Regression	Omega RR	316	534	697	916	1085	1263	1458	1715
Atlas 14 / NRCS Hyetograph (freq storm) / NRCS CN loss	NRCS	398	708	968	1343	1647	1990	2362	2921
Atlas 14 / NRCS Hyetograph (freq storm) / Tx C&I loss	Tx C & I	514	763	987	1337	1625	1961	2344	2924
Atlas 14 / Hyetograph using TXHYETO / NRCS CN loss	Tx Hyeto	218	399	591	898	1159	1472	1828	2372

NOTES:

HYDROLOGY DEVELOPED USING ATLAS 14 RAINFALL DETPHS, TX HYETO HYDROGRAPH WITH THE NRCS CN LOSS MODEL PROCESSED WITH HEC-HMS (V 4.11).

CONTOURS SHOWN ARE FROM USGS TOPOGRAPHIC 7.5 MIN QUAD MAPS (RINCON BEND)(SCALE 1:24,000).

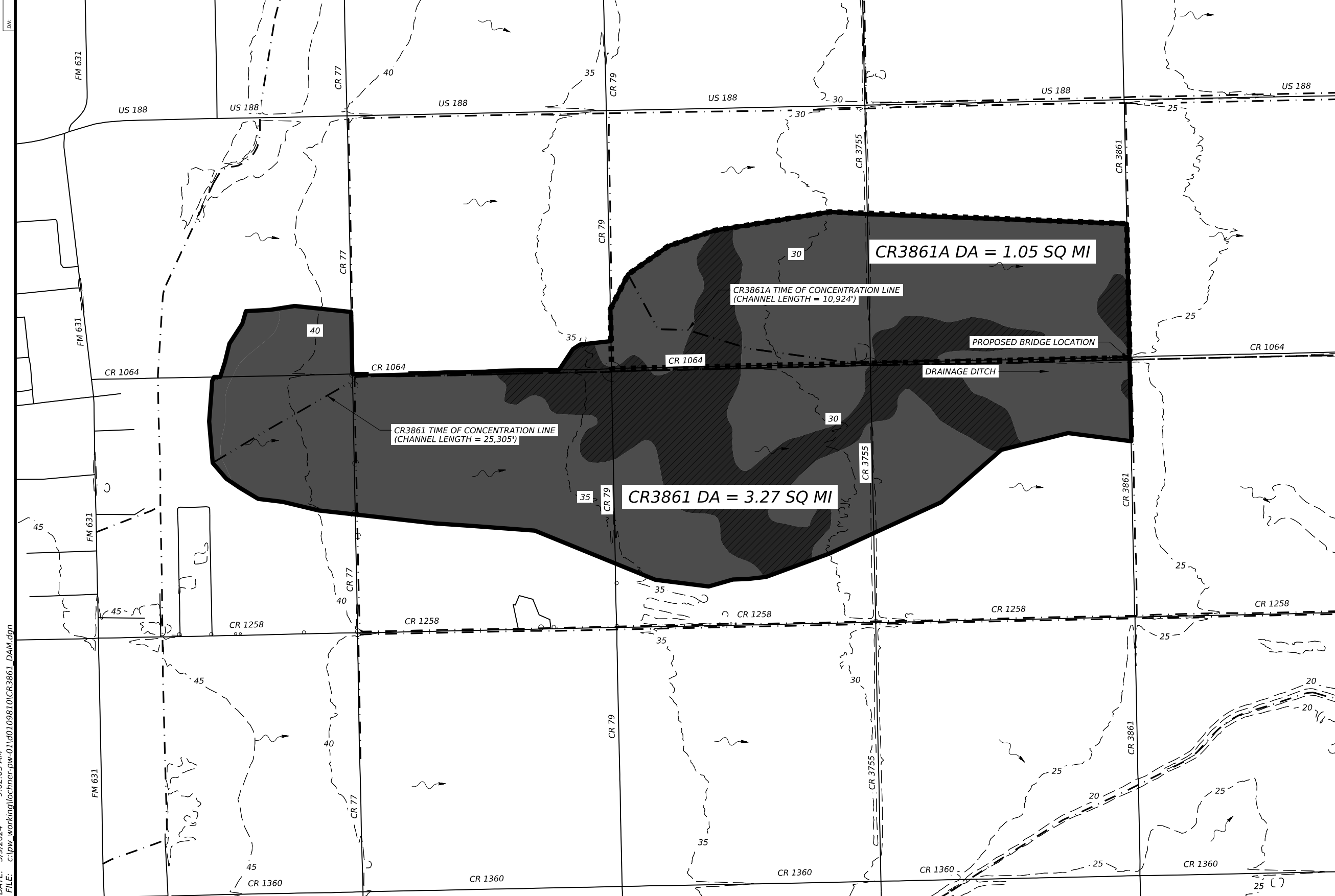
DRAINAGE AREA PART OF HUC-12: 121004070403 (TAFT DRAINAGE DITCH)

PART OF "OTHER AREAS" (ZONE X OR D) IN FEMA FIRM MAP #48409C0300E, 11/4/2016)

DRAINAGE AREA "CR3861A" IS PART OF THE OVERALL DRAINAGE AREA "CR3861" AND IS THE AREA FOR THE CULVERTS AT THE INTERSECTION OF CR 3861 & CR 1064.

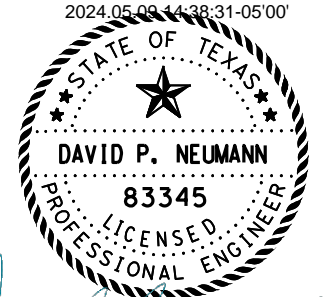
LEGEND:

- FLOW ARROWS
- STREAM FLOWLINE
- USGS CONTOUR LINE
- TIME OF CONCENTRATION
- HYDRAULIC SOIL GROUP C
- HYDRAULIC SOIL GROUP D



SCALE: 0 500 1000 2000 FEET

2024.05.09 14:38:31-05'00'



*David P. Neumann, P.E.*

**LOCHNER**  
TBPE Firm Reg. No. 10488

Texas Department of Transportation

©2024  
**CR 3861 DRAINAGE AREA MAP**

SHEET 1 OF 2

COUNT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	047	

DATE: 5/9/2024 9:02:05 AM  
FILE: c:\pw\_working\lochner-pw-01\0109810\CR3861\_DAM.dgn



NOTES:

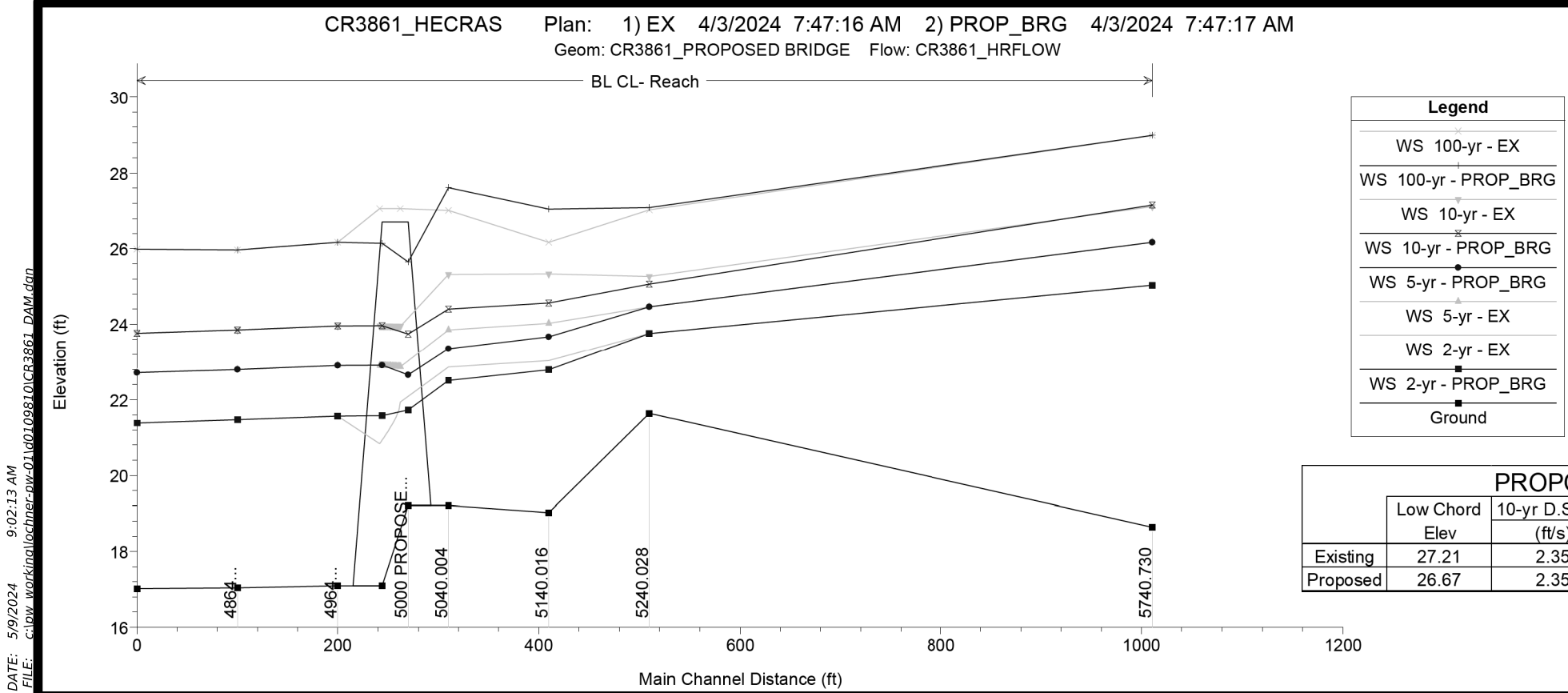
HYDRAULICS ANALYZED USING HEC-RAS (V 6.3).

THE MODEL WAS RUN AS SUB-CRITICAL BASED ON THE PROJECT LOCATION AND STREAM SLOPES WITH THE STARTING BOUNDARY CONDITION BASED ON NORMAL DEPTH USING STREAM SLOPE INITIALLY AND UPDATED BASED ON ENERGY GRADE LINE.

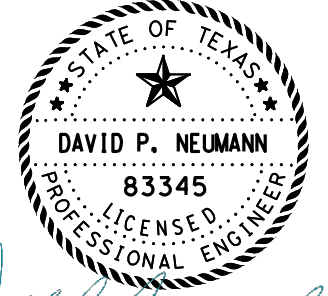
CONTOURS SHOWN ARE FROM USGS OPR SOUTH TEXAS 2018 LIDAR DATA (70 CM RESOLUTION).

LEGEND:

- FLOW ARROWS
- HEC-RAS CROSS-SECTIONS
- OVERALL DRAINAGE AREA BOUNDARY
- CULVERT DRAINAGE AREA BOUNDARY (CR3861A)



2024.05.09 14:38:43-05'00'



David P. Neumann, P.E.  
**LOCHNER**  
TBPE Firm Reg. No. 10488



©2024

CR 3861  
DRAINAGE AREA MAP  
(INSET)

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	048	

DATE: 5/9/2024 9:02:13 AM  
FILE: c:\pwworking\lochner-pw-011d0109810\CR3861\_DAM.dgn



DW: \_\_\_\_\_  
 CK: \_\_\_\_\_  
 DN: \_\_\_\_\_

NOTES:

HYDROLOGY DEVELOPED USING HEC-HMS (VER 4.11).

PART OF "OTHER AREAS" (ZONE X OR D) IN FEMA FIRM MAP #48409C0300E, 11/4/2016).

NO COORDINATION WILL BE MADE WITH THE FLOODPLAIN ADMINISTRATOR SINCE THE SITE IS NOT LOCATED IN A DESIGNATED FEMA FLOOD ZONE.

SITE SURVEY BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH ZONE (4205) NAD 83 WITH A SURFACE ADJUSTMENT FACTOR OF 0.99996. ALL ELEVATIONS BASED ON NAVD88 (GEOID12A).

HYDRAULIC DESIGN PERFORMED UTILIZING HY-8 (V 7.80).

DRAINAGE AREA "CR3861A" IS USED FOR ALL CULVERT ANALYSIS. FLOW OF CULVERT ON CR 1064 IS SPLIT WITH CULVERT ON CR 3861. CULVERTS ARE BALANCED USING HEADWATER ELEVATION.

**DRAINAGE AREA SUMMARY**

DRAINAGE AREA #	STATION	DA SIZE		TIME OF CONCENTRATION									NRCS CN Value	RATIONAL C Value	OMEGA REGRESSION EQ.			
				Kirby-Kirpich or NRCS Method	Overland, T <sub>OV</sub>			Shallow Flow, T <sub>S</sub> (NRCS Only)			Channel, T <sub>CH</sub>				T <sub>c</sub> (min)	P (in)	S (ft/ft)	Ω
					N	Length (ft)	Slope (ft/ft)	Surface	Length (ft)	Slope (ft/ft)	Length (ft)	Slope (ft/ft)						
CR3861A		674.9	1.05	Kirby-Kirpich	0.20	1200.00	0.00100*	n/a	n/a	n/a	9724.00	0.00111*	180	77	n/a	35	0.00080	0.197
				NRCS	0.17	100.00	0.00100	Unpaved	5128	0.00072	5696.00	0.00047	363					

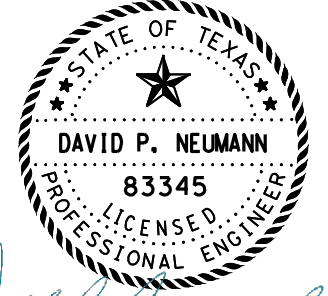
\* NOTE: Low (flat) slopes adjusted using "Slope + 0.0005"

**DRAINAGE AREA FLOW SUMMARY**

HYDROLOGIC METHOD	2-YR (cfs)	5-YR (cfs)	10-YR (cfs)	25-YR (cfs)	50-YR (cfs)	100-YR (cfs)	200-YR (cfs)	500-YR (cfs)
Omega Regional Regression	130	190	236	288	325	361	401	446
Atlas 14 / NRCS Hyetograph (freq storm) / NRCS CN loss	193	344	469	648	790	950	1121	1377
Atlas 14 / NRCS Hyetograph (freq storm) / Tx C & I loss	348	508	657	881	1061	1261	1487	1820
Atlas 14 / Hyetograph using TXHYETO / NRCS CN loss	70	121	180	272	352	448	554	716

USED IN DESIGN →

2024.05.09 14:38:55-05'00'



*David P. Neumann, P.E.*  
**LOCHNER**  
 TBPE Firm Reg. No. 10488

Texas Department of Transportation

©2024

**CULVERT HYDRAULIC DATA**

SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	049	

DATE: 5/9/2024 9:02:32 AM  
 FILE: c:\pw\_working\lochner-pw-01\0109810\CR3861\_EC01.dgn

DW:   
 CK:   
 DN:

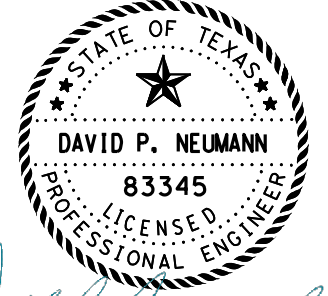
NOTES:  
 HYDROLOGY DEVELOPED USING THE TEXAS  
 HYETOGRAPH METHOD WITH HEC-HMS (VER 4.11).  
 PART OF "OTHER AREAS" (ZONE X OR D) IN FEMA  
 FIRM MAP #48409C0300E, 11/4/2016).  
 NO COORDINATION WILL BE MADE WITH THE  
 FLOODPLAIN ADMINISTRATOR SINCE THE SITE IS  
 NOT LOCATED IN A DESIGNATED FEMA FLOOD  
 ZONE.  
 SITE SURVEY BASED ON THE TEXAS STATE PLANE  
 COORDINATE SYSTEM, SOUTH ZONE (4205) NAD  
 83 WITH A SURFACE ADJUSTMENT FACTOR OF  
 0.99996. ALL ELEVATIONS BASED ON NAVD88  
 (GEOID12A).  
 HYDRAULIC DESIGN PERFORMED UTILIZING HY-8 (V  
 7.80).  
 DRAINAGE AREA "CR3861A" IS USED FOR ALL  
 CULVERT ANALYSIS. FLOW OF CULVERT ON CR  
 1064 IS SPLIT WITH CULVERT ON CR 3861.  
 CULVERTS ARE BALANCED USING HEADWATER  
 ELEVATION.

EXISTING CULVERT 1													
Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth(ft)	Outlet Control Depth(ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)	Tailwater Elevation (ft)
2-YR	62.41	29.04	24.49	2.49	1.1	1-S2n	0.98	1.74	1.19	1.74	11.14	1.54	22.71
5-YR	95.91	46.13	25.39	3.38	2.13	5-S2n	1.26	2.21	1.57	2.22	12.3	1.77	23.19
10-YR	132.25	64.82	26.69	4.68	3.46	5-S2n	1.53	2.58	1.93	2.66	13.48	1.96	23.63
25-YR	164.89	74.86	27.59	5.58	4.42	5-S2n	1.67	2.72	2.1	3.01	14.15	2.1	23.98
50-YR	199.23	77.92	27.89	5.88	4.96	5-S2n	1.72	2.75	2.15	3.34	14.37	2.22	24.31
100-YR	241.78	80.65	28.16	6.16	5.52	5-S2n	1.75	2.78	2.19	3.71	14.56	2.35	24.69
200-YR	289.9	83.1	28.43	6.42**	6.08	4-FFf	1.79	2.8	3	4.1	11.76	2.48	25.07
500-YR	363.52	85.28	28.78	6.65	6.77	4-FFf	1.82	2.81	3	4.62	12.06	2.65	25.6

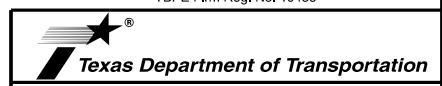
EXISTING CULVERT 2													
Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth(ft)	Outlet Control Depth(ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)	Tailwater Elevation (ft)
2-YR	62.41	33.37	24.49	2.69	1.4	1-S2n	1.01	1.88	1.25	1.74	11.98	1.54	22.71
5-YR	95.91	49.78	25.39	3.59	2.48	5-S2n	1.25	2.3	1.59	2.22	13.07	1.77	23.19
10-YR	132.25	67.42	26.69	4.89	3.82	5-S2n	1.49	2.62	1.91	2.66	14.17	1.96	23.63
25-YR	164.89	77.09	27.59	5.79	4.78	5-S2n	1.62	2.74	2.07	3.01	14.81	2.1	23.98
50-YR	199.23	80.06	27.89	6.09	5.33	5-S1f	1.65	2.77	3	3.34	11.33	2.22	24.31
100-YR	241.78	82.71	28.16	6.36	5.88	5-JS1f	1.69	2.79	3	3.71	11.7	2.35	24.69
200-YR	289.9	85.11	28.43	6.63**	6.44	4-FFf	1.72	2.81	3	4.1	12.04	2.48	25.07
500-YR	363.52	85.3	28.78	6.65	6.98	4-FFf	1.72	2.81	3	4.62	12.07	2.65	25.6

PROPOSED 6' X 3' X 19' SBC													
Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth(ft)	Outlet Control Depth(ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)	Tailwater Elevation (ft)
2-YR	49.77	49.77	24.66	2.14	1.14	1-S2n	0.63	1.29	0.85	1.5	9.71	1.39	23.47
5-YR	78.11	78.11	25.43	2.91	1.85	1-S2n	0.84	1.74	1.21	1.93	10.78	1.6	23.9
10-YR	111.25	111.25	26.33	3.82	2.74	5-S2n	1.06	2.2	1.58	2.35	11.71	1.79	24.32
25-YR	159.86	147.38	27.51	5	3.96	5-S2n	1.29	2.66	1.96	2.86	12.53	1.99	24.83
50-YR	199.05	158.09	27.92	5.4	4.57	5-S2n	1.35	2.78	2.07	3.22	12.74	2.12	25.19
100-YR	246.34	168.01	28.32	5.81**	5.2	4-FFf	1.41	2.9	3	3.6	9.33	2.26	25.57
200-YR	300.71	177.28	28.72	6.21**	5.84	4-FFf	1.46	3	3	3.99	9.85	2.39	25.97
500-YR	383.22	188.93	29.26	6.74**	6.69	4-FFf	1.53	3	3	4.53	10.5	2.56	26.5

2024.05.09 14:39:06-05'00'



David P. Neumann, P.E.  
**LOCHNER**  
 TBPE Firm Reg. No. 10488



©2024  
**CULVERT HYDRAULIC DATA (CR 1064)**

SHEET 2 OF 4			
CONT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		050

DATE: 5/9/2024 9:02:37 AM  
 FILE: c:\pw\_working\lochner-pw-01\0109810\CR3861\_EC01.dgn



DW:   
 CK:   
 DN:

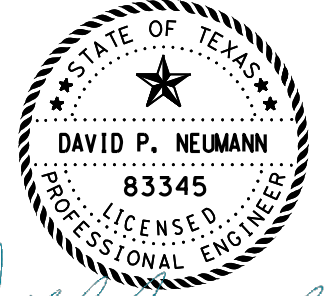
NOTES:  
 HYDROLOGY DEVELOPED USING THE TEXAS HYETOGRAPH METHOD WITH HEC-HMS (VER 4.11).  
 PART OF "OTHER AREAS" (ZONE X OR D) IN FEMA FIRM MAP #48409C0300E, 11/4/2016).  
 NO COORDINATION WILL BE MADE WITH THE FLOODPLAIN ADMINISTRATOR SINCE THE SITE IS NOT LOCATED IN A DESIGNATED FEMA FLOOD ZONE.  
 SITE SURVEY BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH ZONE (4205) NAD 83 WITH A SURFACE ADJUSTMENT FACTOR OF 0.99996. ALL ELEVATIONS BASED ON NAVD88 (GEOID12A).  
 HYDRAULIC DESIGN PERFORMED UTILIZING HY-8 (V 7.80).  
 DRAINAGE AREA "CR3861A" IS USED FOR ALL CULVERT ANALYSIS. FLOW OF CULVERT ON CR 3861 IS SPLIT WITH CULVERT ON CR 1064. CULVERTS ARE BALANCED WITH HEADWATER ELEVATION

EXISTING CULVERT 1													
Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth(ft)	Outlet Control Depth(ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)	Tailwater Elevation (ft)
2-YR	7.69	3.65	24.49	0.92	1.02	3-M1t	0.85	0.67	0.9	0.46	2.68	0.54	24.33
5-YR	25.19	12.14	25.39	1.83	1.92	3-M2t	2	1.25	1.36	0.92	5.35	0.83	24.79
10-YR	48.05	24.01	26.69	3.22~	3.17	7-M2t	2	1.74	1.77	1.34	8.16	1.03	25.2
25-YR	107.21	26.59	27.59	3.64	4.12	4-FFf	2	1.8	2	2.09	8.46	1.33	25.96
50-YR	153.07	25.32	27.89	3.43	4.42	4-FFf	2	1.77	2	2.54	8.06	1.48	26.41
100-YR	206.12	23.91	28.16	3.21	4.69	4-FFf	2	1.73	2	2.98	7.61	1.62	26.85
200-YR	264.4	22.46	28.43	2.99	4.96	4-FFf	2	1.69	2	3.4	7.15	1.74	27.27
500-YR	352.78	20.45	28.78	2.72	5.31	4-FFf	2	1.62	2	3.95	6.51	1.89	27.82

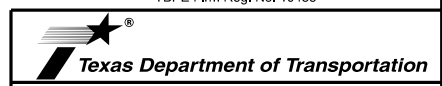
EXISTING CULVERT 2													
Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth(ft)	Outlet Control Depth(ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)	Tailwater Elevation (ft)
2-YR	7.69	4.04	24.49	0.96	1.01	1-S1t	0.57	0.71	1.07	0.46	2.37	0.54	24.33
5-YR	25.19	13.05	25.39	1.91	1.7	1-S2n	1.08	1.3	1.13	0.92	7.1	0.83	24.79
10-YR	48.05	23.99	26.69	3.21~	3.04	7-M1t	1.74	1.73	1.94	1.34	7.7	1.03	25.2
25-YR	107.21	26.59	27.59	3.64	4.11	4-FFf	2	1.8	2	2.09	8.46	1.33	25.96
50-YR	153.07	25.32	27.89	3.42	4.41	4-FFf	2	1.77	2	2.54	8.06	1.48	26.41
100-YR	206.12	23.91	28.16	3.2	4.68	4-FFf	1.73	1.73	2	2.98	7.61	1.62	26.85
200-YR	264.4	22.46	28.43	2.98	4.95	4-FFf	1.6	1.69	2	3.4	7.15	1.74	27.27
500-YR	352.78	20.45	28.78	2.71	5.3	4-FFf	1.47	1.62	2	3.95	6.51	1.89	27.82

PROPOSED 6' X 2' X 32' SBC													
Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth(ft)	Outlet Control Depth(ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)	Tailwater Elevation (ft)
2-YR	20.33	20.33	24.66	1.2	0.59	1-S2n	0.49	0.71	0.53	0.83	6.43	0.79	23.98
5-YR	42.99	42.99	25.43	1.97	1.31	1-S2n	0.8	1.17	0.9	1.28	7.97	1.03	24.43
10-YR	68.87	68.87	26.33	2.87	2.24	5-S2n	1.09	1.6	1.27	1.68	9.07	1.21	24.83
25-YR	112.24	94.59	27.51	4.05	3.55	5-JS1f	1.35	1.98	2	2.23	7.88	1.43	25.38
50-YR	153.25	101.89	27.92	4.46**	4.24	4-FFf	1.42	2	2	2.65	8.49	1.58	25.8
100-YR	201.56	106.6	28.32	4.74	4.86	4-FFf	1.47	2	2	3.09	8.88	1.72	26.24
200-YR	253.59	106.27	28.72	4.72	5.26	4-FFf	1.47	2	2	3.51	8.86	1.84	26.66
500-YR	333.08	105.58	29.26	4.67	5.8	4-FFf	1.46	2	2	4.07	8.8	2	27.22

2024.05.09 14:39:23-05'00'



David P. Neumann, P.E.  
**LOCHNER**  
 TBPE Firm Reg. No. 10488



©2024

**CULVERT HYDRAULIC DATA**  
**(CR 3861)**

SHEET 3 OF 4

CONT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST		COUNTY	SHEET NO.
CRP		SAN PATRICIO	051

DATE: 5/9/2024 9:02:43 AM  
 FILE: c:\pw\_working\lochner-pw-01\0109810\CR3861\_EC01.dgn

**EXISTING CULVERT 1**

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth(ft)	Outlet Control Depth(ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)	Tailwater Elevation (ft)
2-YR	70.1	13.47	26.86	2.87	3.2	4-FFF	1.5	1.37	1.5	1.65	7.62	1.16	25.26
5-YR	121.1	12.18	27.15	2.53	3.49	4-FFF	1.5	1.32	1.5	2.24	6.89	1.38	25.85
10-YR	180.3	10.83	27.42	2.22	3.76	4-FFF	1.5	1.26	1.5	2.78	6.13	1.55	26.39
25-YR	272.1	8.92	27.76	1.84	4.1	4-FFF	1.5	1.16	1.5	3.45	5.05	1.75	27.06
50-YR	352.3	7.28	28.02	1.57	4.36	4-FFF	1.1	1.04	1.5	3.95	4.12	1.89	27.56
100-YR	447.9	5.74	28.36	1.35	4.7	4-FFF	0.92	0.92	1.5	4.46	3.25	2.02	28.07
200-YR	554.3	5.16	28.81	1.27	5.15	4-FFF	0.86	0.87	1.5	4.97	2.92	2.14	28.58
500-YR	716.3	4.7	29.45	1.2	5.79	4-FFF	0.81	0.83	1.5	5.64	2.66	2.29	29.25

**EXISTING CULVERT 2**

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth(ft)	Outlet Control Depth(ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)	Tailwater Elevation (ft)
2-YR	70.1	13.47	26.86	2.88	3.27	4-FFF	NA	1.37	1.5	1.65	7.62	1.16	25.26
5-YR	121.1	12.18	27.15	2.54	3.56	4-FFF	NA	1.32	1.5	2.24	6.89	1.38	25.85
10-YR	180.3	10.83	27.42	2.22	3.83	4-FFF	NA	1.26	1.5	2.78	6.13	1.55	26.39
25-YR	272.1	8.92	27.76	1.85	4.17	4-FFF	NA	1.16	1.5	3.45	5.05	1.75	27.06
50-YR	352.3	7.28	28.02	1.58	4.43	4-FFF	NA	1.04	1.5	3.95	4.12	1.89	27.56
100-YR	447.9	5.74	28.36	1.35	4.77	4-FFF	NA	0.92	1.5	4.46	3.25	2.02	28.07
200-YR	554.3	5.16	28.81	1.27	5.22	4-FFF	NA	0.87	1.5	4.97	2.92	2.14	28.58
500-YR	716.3	4.7	29.45	1.21	5.86	4-FFF	NA	0.83	1.5	5.64	2.66	2.29	29.25

**EXISTING CULVERT 3**

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth(ft)	Outlet Control Depth(ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)	Tailwater Elevation (ft)
2-YR	70.1	3.16	26.86	1.51	1.96	7-M2c	1	0.76	0.76	1.65	4.92	1.16	25.26
5-YR	121.1	2.99	27.15	1.42	2.25	4-FFF	1	0.74	1	2.24	3.81	1.38	25.85
10-YR	180.3	2.66	27.42	1.27	2.52	4-FFF	1	0.7	1	2.78	3.39	1.55	26.39
25-YR	272.1	2.19	27.76	1.07	2.86	4-FFF	1	0.63	1	3.45	2.79	1.75	27.06
50-YR	352.3	1.79	28.02	0.92	3.12	4-FFF	0.76	0.57	1	3.95	2.27	1.89	27.56
100-YR	447.9	1.41	28.36	0.78	3.46	4-FFF	0.63	0.5	1	4.46	1.79	2.02	28.07
200-YR	554.3	1.27	28.81	0.73	3.91	4-FFF	0.59	0.48	1	4.97	1.61	2.14	28.58
500-YR	716.3	1.15	29.45	0.69	4.55	4-FFF	0.55	0.45	1	5.64	1.47	2.29	29.25

**PROPOSED 3 ~ 2' X 40' RCP**

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth(ft)	Outlet Control Depth(ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)	Tailwater Elevation (ft)
2-YR	70.1	49.89	26.71	2.45	1.92	5-S2n	1.08	1.47	1.16	1.65	8.79	1.16	25.26
5-YR	121.1	56.15	27	2.74	2.74	1-S1f	1.16	1.56	2	2.24	5.96	1.38	25.85
10-YR	180.3	50.1	27.31	2.46	3.05	4-FFF	1.08	1.47	2	2.78	5.32	1.55	26.39
25-YR	272.1	40.41	27.69	2.07	3.43	4-FFF	0.95	1.32	2	3.45	4.29	1.75	27.06
50-YR	352.3	31.89	27.98	1.76	3.72	4-FFF	0.83	1.17	2	3.95	3.38	1.89	27.56
100-YR	447.9	26.37	28.39	1.56	4.13	4-FFF	0.75	1.06	2	4.46	2.8	2.02	28.07
200-YR	554.3	23.82	28.85	1.47	4.59	4-FFF	0.71	1	2	4.97	2.53	2.14	28.58
500-YR	716.3	22.71	29.51	1.42	5.25	4-FFF	0.69	0.98	2	5.64	2.41	2.29	29.25

NOTES:

HYDROLOGY DEVELOPED USING THE TEXAS HYETOGRAPH METHOD WITH HEC-HMS (VER 4.11).

PART OF "OTHER AREAS" (ZONE X OR D) IN FEMA FIRM MAP #48409C0300E, 11/4/2016).

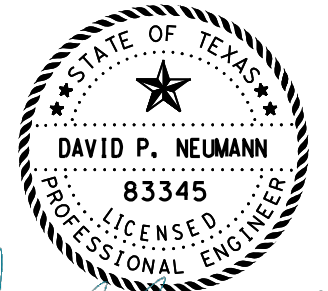
NO COORDINATION WILL BE MADE WITH THE FLOODPLAIN ADMINISTRATOR SINCE THE SITE IS NOT LOCATED IN A DESIGNATED FEMA FLOOD ZONE.

SITE SURVEY BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH ZONE (4205) NAD 83 WITH A SURFACE ADJUSTMENT FACTOR OF 0.99996. ALL ELEVATIONS BASED ON NAVD88 (GEOID12A).

HYDRAULIC DESIGN PERFORMED UTILIZING HY-8 (V 7.80).

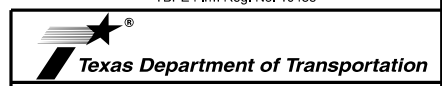
DRAINAGE AREA CR3861A IS USED FOR ALL CULVERT ANALYSIS. CULVERT AT INT 1-2 ACCEPTS ALL FLOW OF DRAINAGE AREA BEFORE SPLITTING BETWEEN CULVERTS AT CR 1064 AND CR 3861.

2024.05.09 14:39:35-05'00'



*David P. Neumann, P.E.*

**LOCHNER**  
TBPE Firm Reg. No. 10488



©2024  
**CULVERT HYDRAULIC DATA (INT 1-2)**

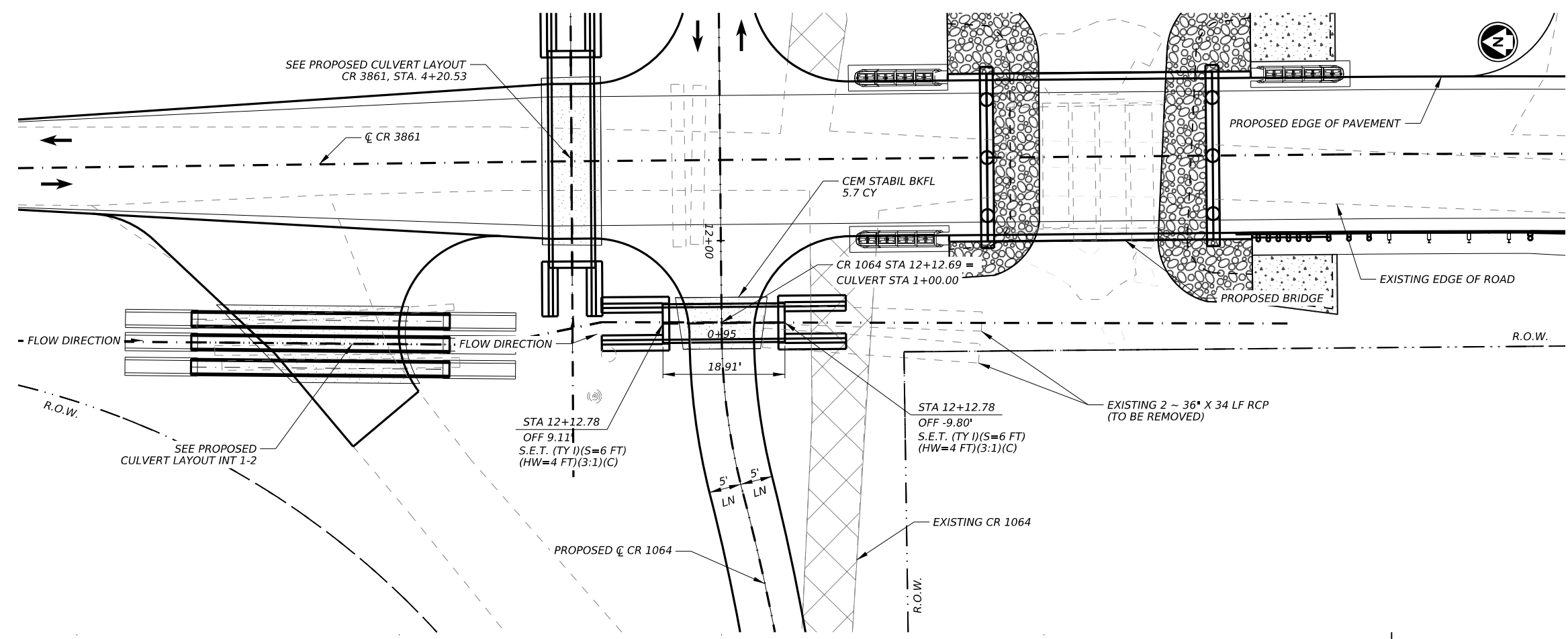
SHEET 4 OF 4

CONT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	052	

CK: DW: CK: DN:

DATE: 5/9/2024 9:02:48 AM  
 FILE: c:\pw\_working\lochner-pw-01\0109810\CR3861\_EC01.dgn

CK: DW: CK: DW:



NOTES:

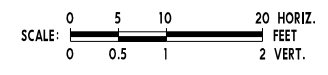
HYDROLOGY DEVELOPED USING THE TEXAS HYETOGRAPH METHOD WITH HEC-HMS (VER 4.11).

PART OF "OTHER AREAS" (ZONE X OR D) IN FEMA FIRM MAP #48409C0300E, 11/4/2016).

NO COORDINATION WILL BE MADE WITH THE FLOODPLAIN ADMINISTRATOR SINCE THE SITE IS NOT LOCATED IN A DESIGNATED FEMA FLOOD ZONE.

SITE SURVEY BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH ZONE (4205) NAD 83 WITH A SURFACE ADJUSTMENT FACTOR OF 0.99996. ALL ELEVATIONS BASED ON NAVD88 (GEOID12A).

HYDRAULIC DESIGN PERFORMED UTILIZING HY-8 (V 7.80).



DATE: 5/9/2024 9:02:58 AM  
FILE: c:\pw\_working\lochner-pw-01\109810\CR3861\_EC01.dgn

2024.05.09 14:39:47-05'00'

DAVID P. NEUMANN  
83345  
PROFESSIONAL ENGINEER

LOCHNER  
TBPE Firm Reg. No. 10488

Texas Department of Transportation

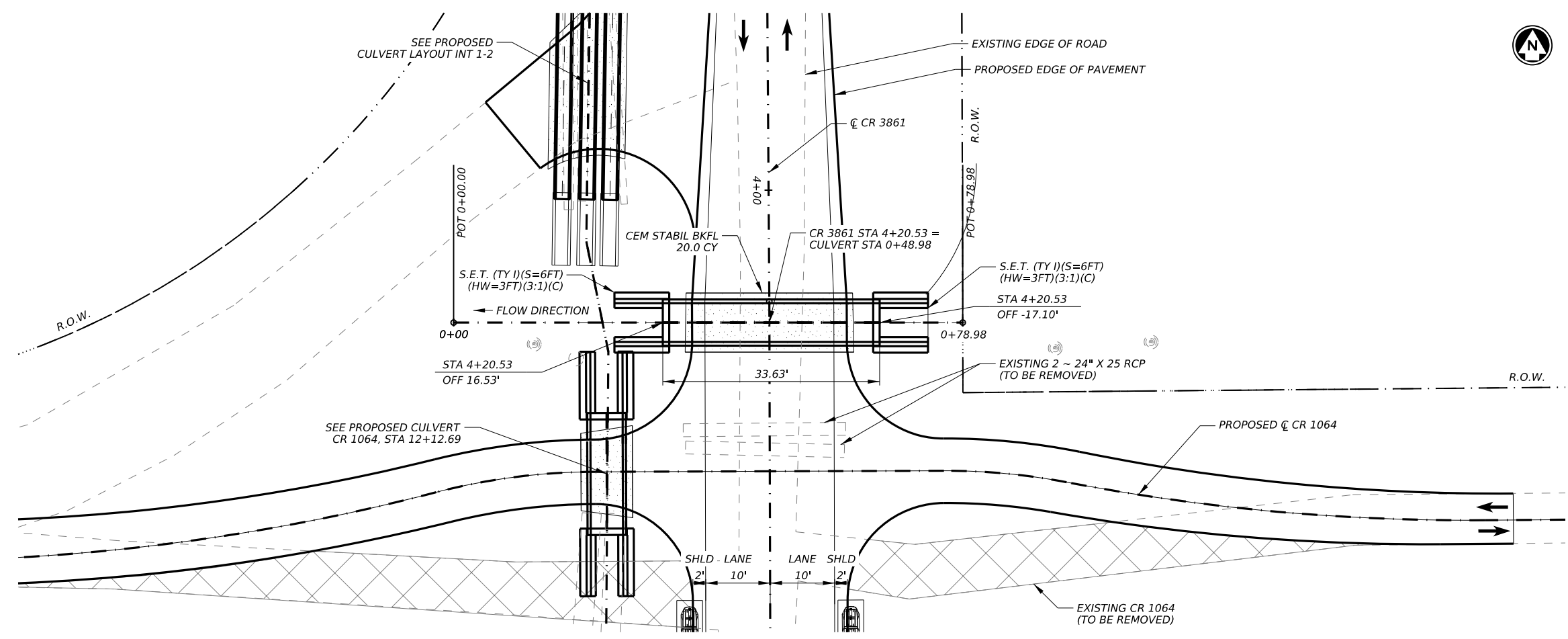
©2024

CULVERT LAYOUT  
(CR 1064)

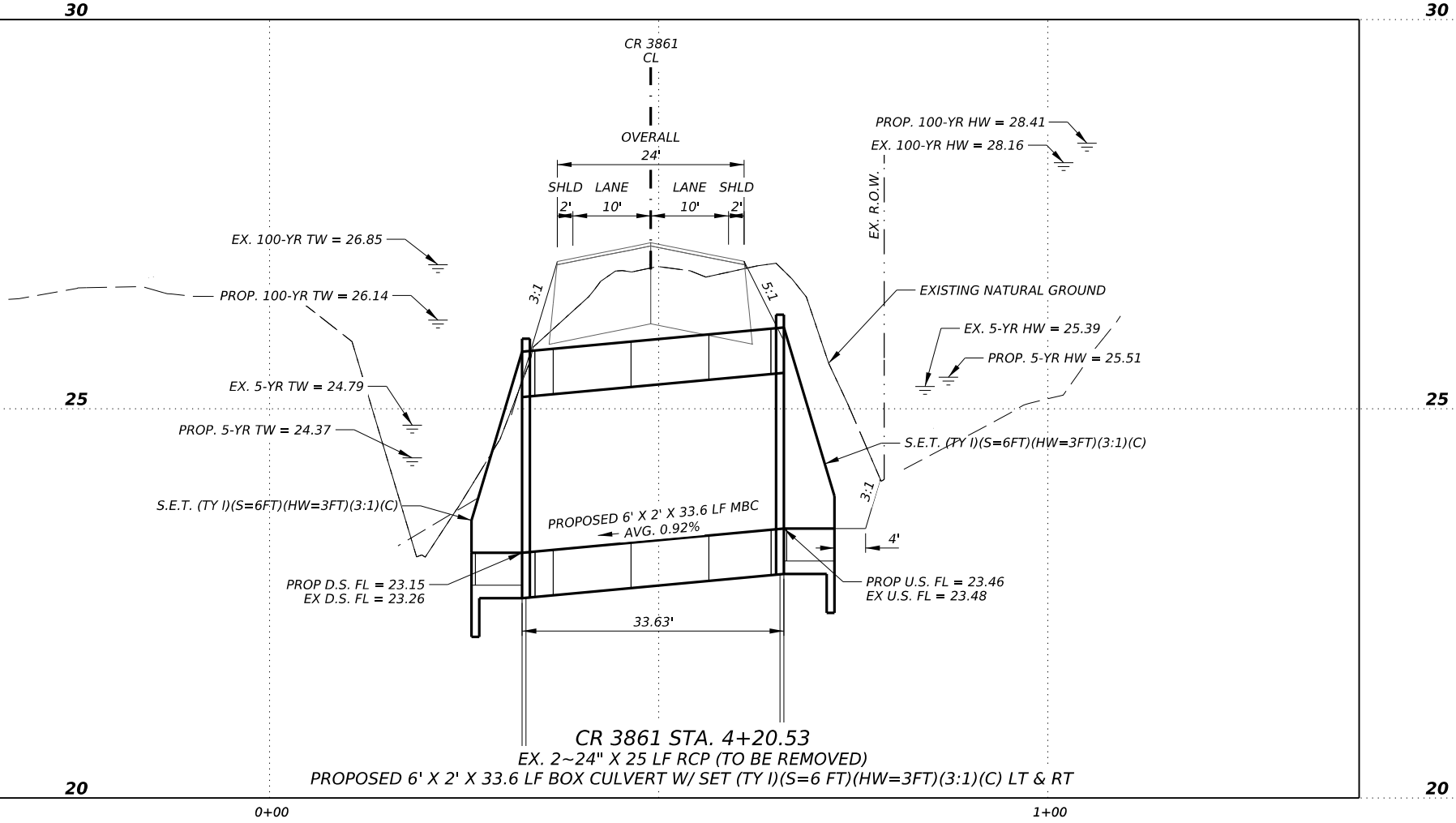
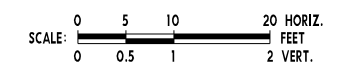
SHEET 2 OF 3

CONT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	053	

CK:  
DW:  
CK:  
DW:

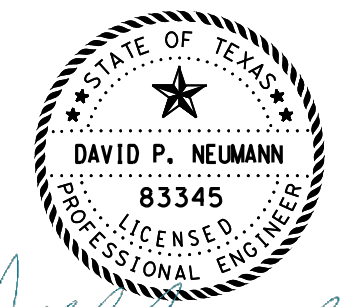


NOTES:  
HYDROLOGY DEVELOPED USING THE TEXAS HYETOGRAPH METHOD WITH HEC-HMS (VER 4.11).  
PART OF "OTHER AREAS" (ZONE X OR D) IN FEMA FIRM MAP #48409C0300E, 11/4/2016).  
NO COORDINATION WILL BE MADE WITH THE FLOODPLAIN ADMINISTRATOR SINCE THE SITE IS NOT LOCATED IN A DESIGNATED FEMA FLOOD ZONE.  
SITE SURVEY BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH ZONE (4205) NAD 83 WITH A SURFACE ADJUSTMENT FACTOR OF 0.99996. ALL ELEVATIONS BASED ON NAVD88 (GEOID12A).  
HYDRAULIC DESIGN PERFORMED UTILIZING HY-8 (V 7.80).



DATE: 5/9/2024 9:03:03 AM  
FILE: c:\pw\_working\lochner-pw-01\0109810\CR3861\_EC01.dgn

2024.05.09 14:40:01-05'00'



*David P. Neumann, P.E.*

**LOCHNER**  
TBPE Firm Reg. No. 10488



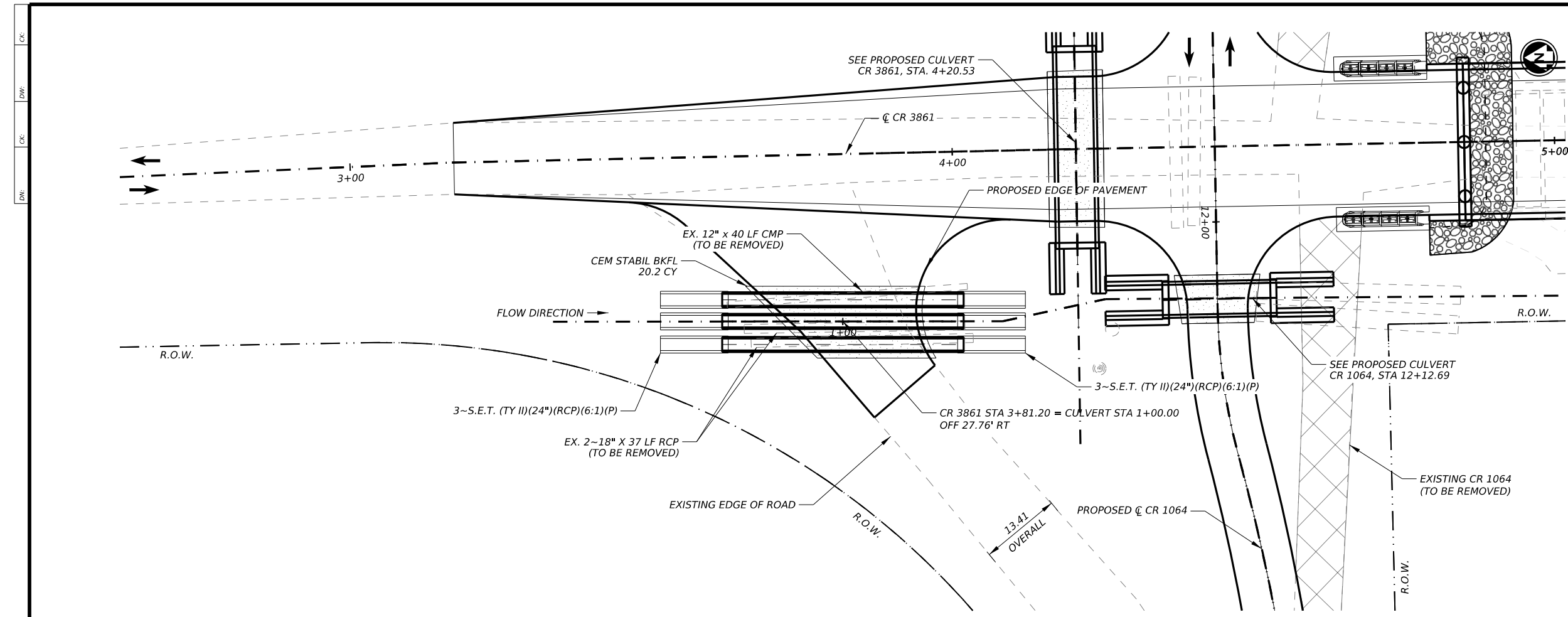
©2024

**CULVERT LAYOUT**  
(CR 3861)

SHEET 1 OF 3

CONT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	054	





NOTES:

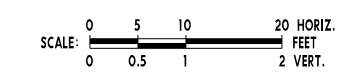
HYDROLOGY DEVELOPED USING THE TEXAS HYETOGRAPH METHOD WITH HEC-HMS (VER 4.11).

PART OF "OTHER AREAS" (ZONE X OR D) IN FEMA FIRM MAP #48409C0300E, 11/4/2016).

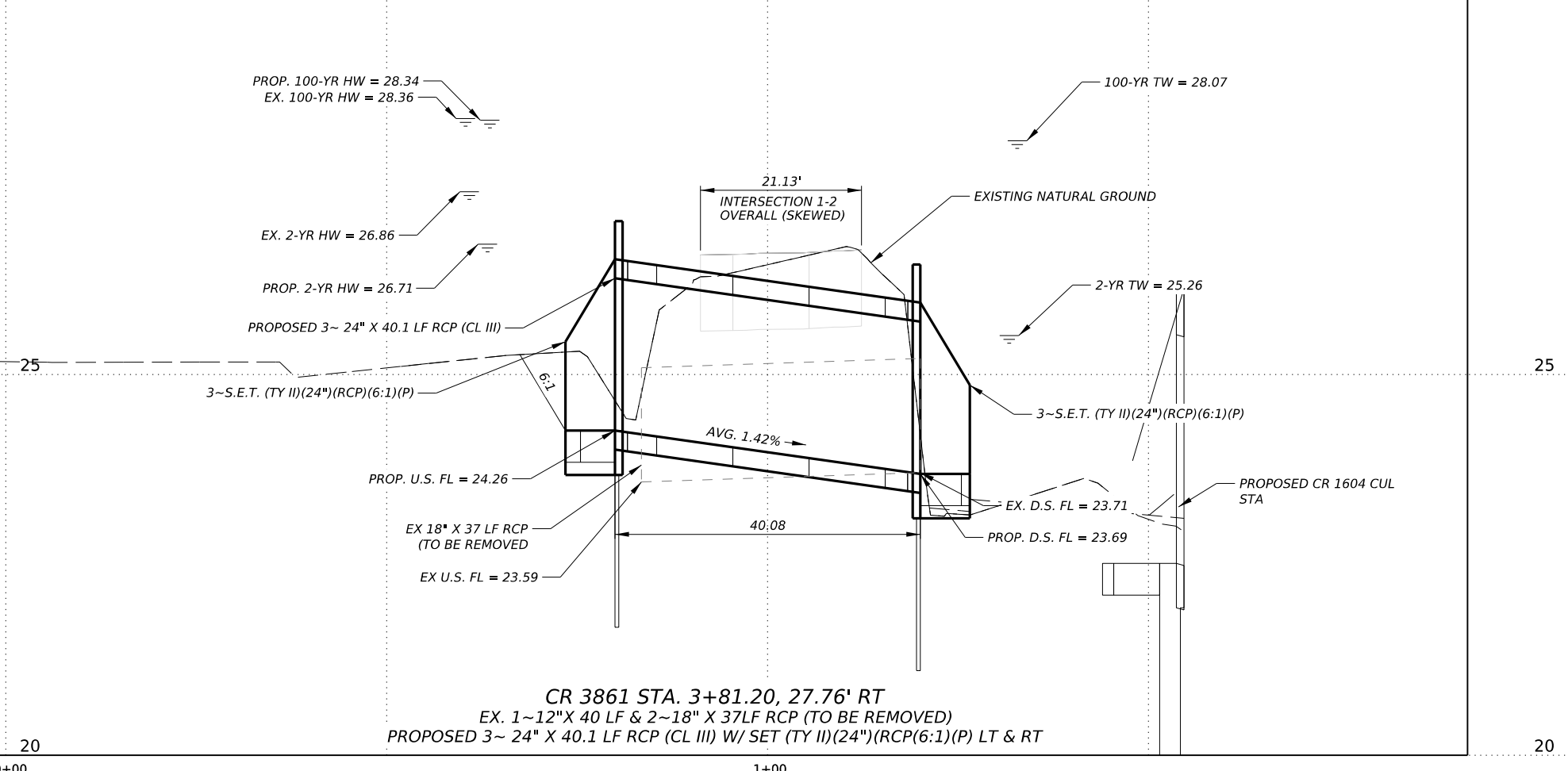
NO COORDINATION WILL BE MADE WITH THE FLOODPLAIN ADMINISTRATOR SINCE THE SITE IS NOT LOCATED IN A DESIGNATED FEMA FLOOD ZONE.

SITE SURVEY BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH ZONE (4205) NAD 83 WITH A SURFACE ADJUSTMENT FACTOR OF 0.99996. ALL ELEVATIONS BASED ON NAVD88 (GEOID12A).

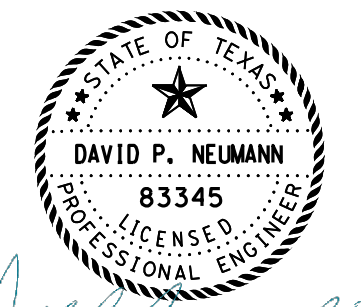
HYDRAULIC DESIGN PERFORMED UTILIZING HY-8 (V 7.80).



30 30



2024.05.09 14:40:22-05'00'



David P. Neumann, P.E.

**LOCHNER**  
TBPE Firm Reg. No. 10488



©2024

**CULVERT LAYOUT**  
(INT 1-2)

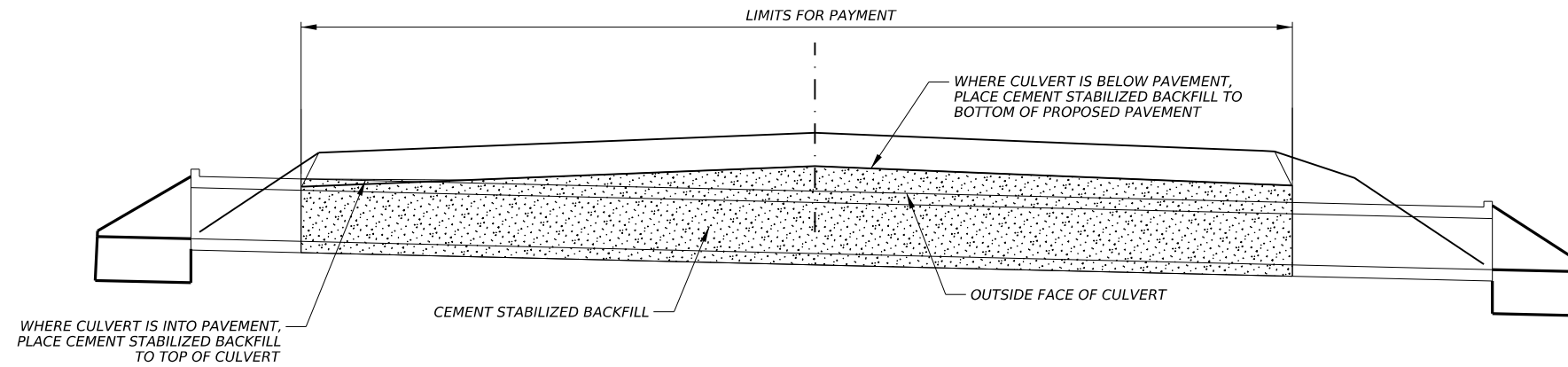
SHEET 3 OF 3

COUNT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	055	

DATE: 5/9/2024 9:03:08 AM  
FILE: c:\pw\_working\lochner-pw-01\109810\CR3861\_EC01.dgn

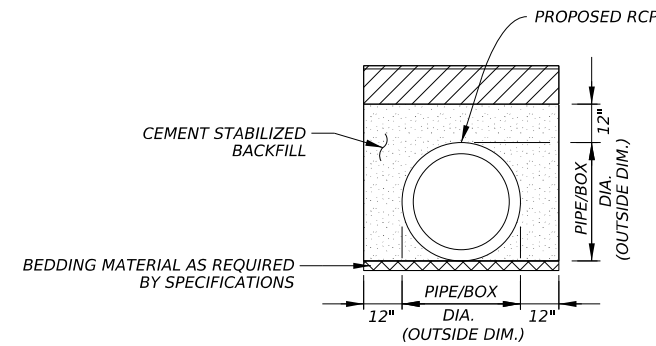
GENERAL NOTES:

1. PAYMENT FOR CEMENT STABILIZED BACKFILL WILL BE PAID AS ITEM 400-6005 "CEM STABIL BKFL" BY THE C.Y.



**CEMENT STABILIZED BACKFILL DETAIL**

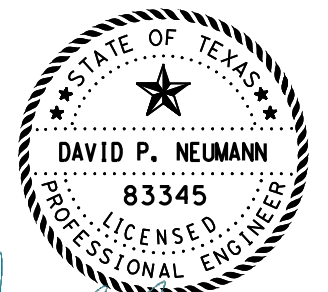
SCALE: N.T.S.



**BACKFILL DETAIL**

CONTRACTOR WILL USE CEMENT STABILIZED BACKFILL AT ALL CROSSINGS ON THE MAINLANES OR INTERSECTION CROSSINGS.

2024.05.09 14:40:34-05'00'



*David P. Neumann, P.E.*

**LOCHNER**

TBPE Firm Reg. No. 10488



©2024

**CEMENT STABILIZED BACKFILL DETAIL**

CONT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	056	

DATE: 5/9/2024 9:03:22 AM  
FILE: c:\pw\_working\lochner-pw-01\0109810\CR 3861\_Drainage\_Details.dgn

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

Culvert Station and/or Creek Name followed by applicable end (Lt, Rt or Both)	Description of Box Culvert No. Spans ~ Span X Height	Max Fill Height (Ft)	Applicable Box Culvert Standard (4)	Applicable Wingwall or End Treatment Standard	Skew Angle (0°, 15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (In)	U Culvert Wall Thickness (In)	C Estimated Curb Height (Ft)	Hw Height of Wingwall (Ft) (1)	A Curb to End of Wingwall (Ft)	B Offset of End of Wingwall (Ft)	Lw Length of Longest Wingwall (Ft)	Ltw Culvert Toewall Length (Ft)	Atw Anchor Toewall Length (Ft)	Riprap Apron (CY)	Class "C" Conc (Curb) (CY) (2)	Class "C" Conc (Wingwall) (CY) (3)	Total Wingwall Area (SF)
CR 3861 STA 4+20.53 (Both)	1~6' x 2'	2'	SCP-6	SETB-CD	0°	3:1	7"	7"	0.500'	2.833'	N/A	N/A	7.500'	N/A	7.167'	0.0	0.2	3.8	N/A
CR 1604 STA 12+12.69 (Both)	1~6' x 3'	2'	SCP-6	SETB-CD	0°	3:1	7"	7"	0.500'	3.833'	N/A	N/A	10.500'	N/A	7.167'	0.0	0.2	5.6	N/A

DATE: FILE:

**NOTES:**

Skew = 0° on SW-0, FW-0, SETB-CD, SETB-SW-0, and SETB-FW-0 standard sheets; 30° maximum for safety end treatment

- SL:1 = Horizontal : 1 Vertical
- Side slope at culvert for flared or straight wingwalls.
  - Channel slope for parallel wingwalls.
  - Slope must be 3:1 or flatter for safety end treatments.

T = Box culvert top slab thickness. Dimension can be found on the applicable box culvert standard sheet.

U = Box culvert wall thickness. Dimension can be found on the applicable box culvert standard sheet.

C = Curb height

See applicable wing or end treatment standard sheets for calculations of Hw, A, B, Lw, Ltw, Atw, and Total Wingwall Area.

Hw = Height of wingwall

A = Distance from face of curb to end of wingwall (not applicable to parallel or straight wingwalls)

B = Offset of end of wingwall (not applicable to parallel or straight wingwalls)

Lw = Length of longest wingwall.

Ltw = Length of culvert toewall (not applicable when using riprap apron)

Atw = Length of anchor toewall (applicable to safety end treatment only)  
 Total Wingwall Area = Wingwall area in sq. ft. for two wingwalls (one structure end) if Lt or Rt.  
 Area for four wingwalls (two structure ends) if Both.

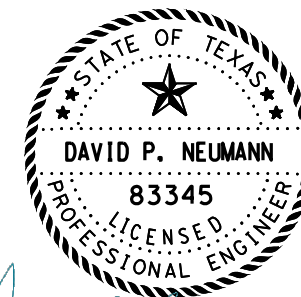
- Round the wall heights shown to the nearest foot for bidding purposes.
- Concrete volume shown is for box culvert curb only. For curbs using the Box Culvert Rail Mounting Details (RAC) standard sheet quantities shown must be increased by a factor of 2.25. If Class S concrete is required for the top slab of the culvert, also provide Class S concrete for the curb. Curb concrete is considered part of the Box Culvert for payment.
- Concrete volume shown is total of wings, footings, culvert toewall (if any), anchor toewalls (if any) and wingwall toewalls. Riprap aprons, culverts, and curb quantities are not included.
- Regardless of the type of culvert shown on this sheet, the Contractor has the option of furnishing cast-in-place or precast culverts unless otherwise shown elsewhere on the plans. If the Contractor elects to provide culverts of a different type than those shown on this sheet, it is the Contractor's responsibility to make the necessary adjustments to the dimensions and quantities shown.

**SPECIAL NOTE:**

This sheet is a supplement to the box culvert standards. It is to be filled out by the culvert specifier and provides dimensions for the construction of the box culvert wingwalls and safety end treatments.

An Excel 2010 spreadsheet to assist in completing this table can be downloaded from the Bridge Standards (English) web page on the TxDOT web site. The completed sheet must be signed, sealed, and dated by a licensed Professional Engineer.

2024.05.09  
14:40:50-05'00'



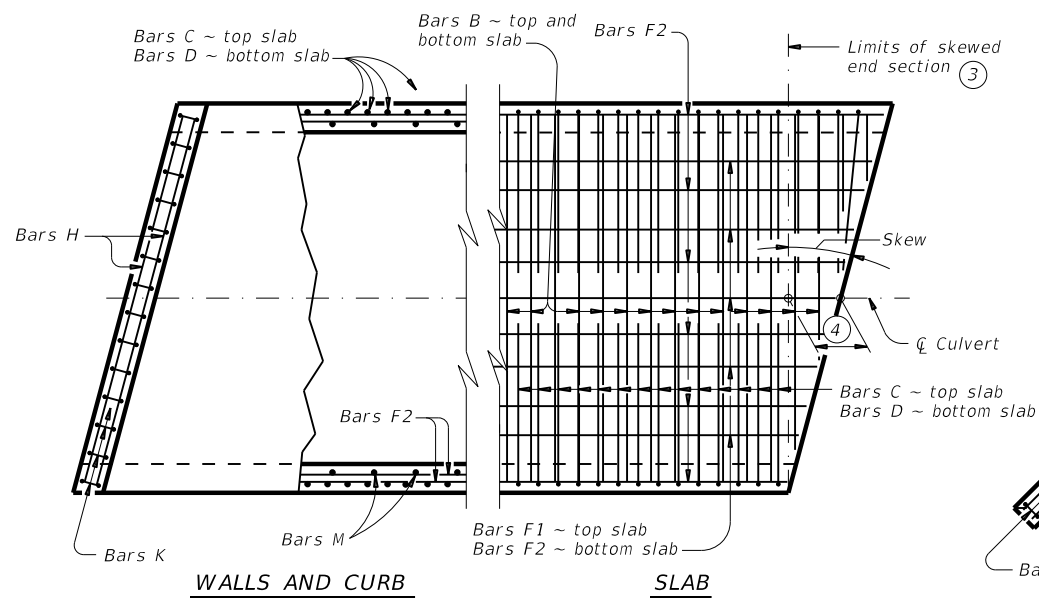
*David P. Neumann, P.E.*

		<b>Bridge Division Standard</b>	
<b>BOX CULVERT SUPPLEMENT WINGS AND END TREATMENTS</b>			
<b>BCS</b>			
FILE:	DN: TxDOT	CK: TxDOT	OW: TxDOT
©TxDOT February 2020	CONT	SECT	JOB
0916	28	082	CR 3861
DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	057	

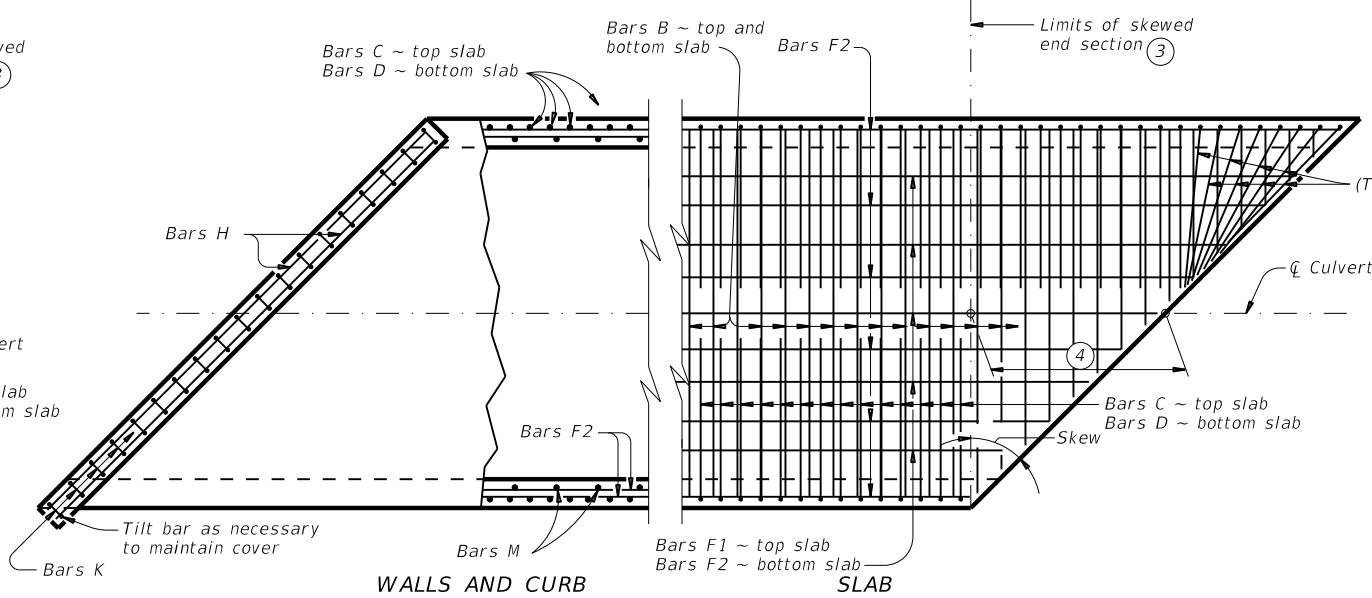


DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act." No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

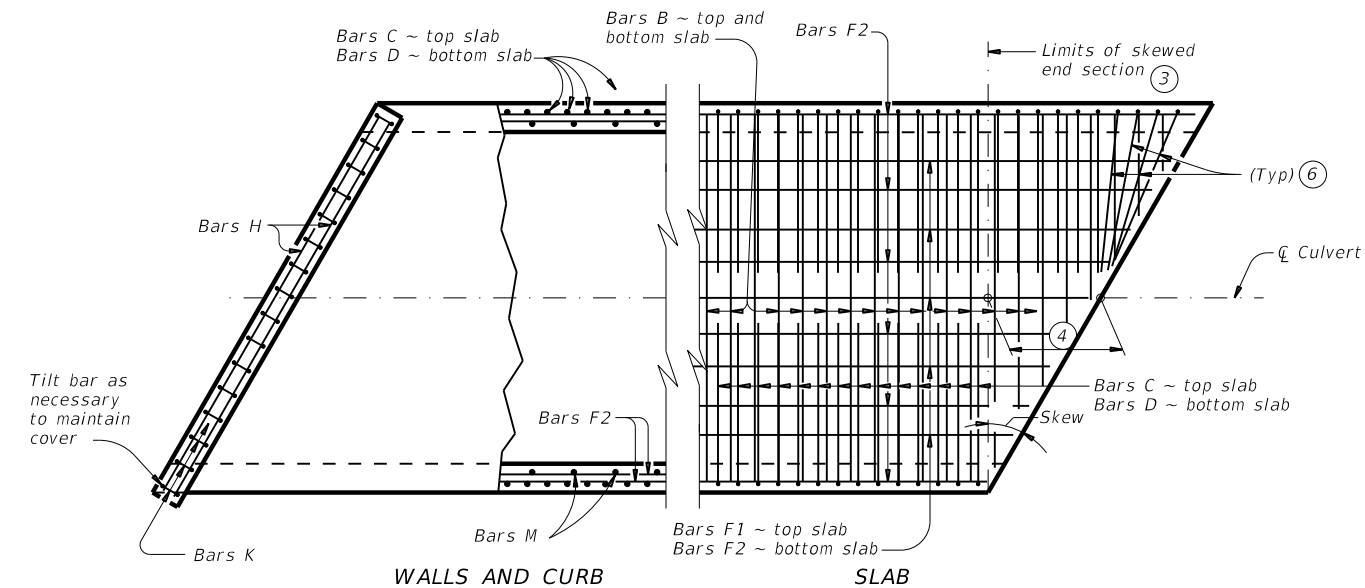
DATE: FILE:



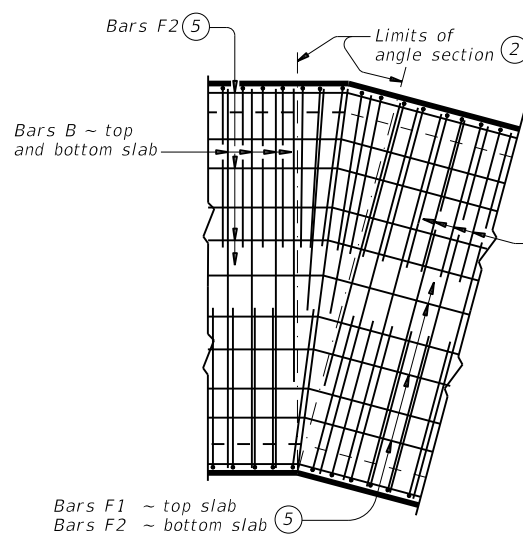
PLAN OF SKEWED ENDS ~ FROM 0° TO 15°



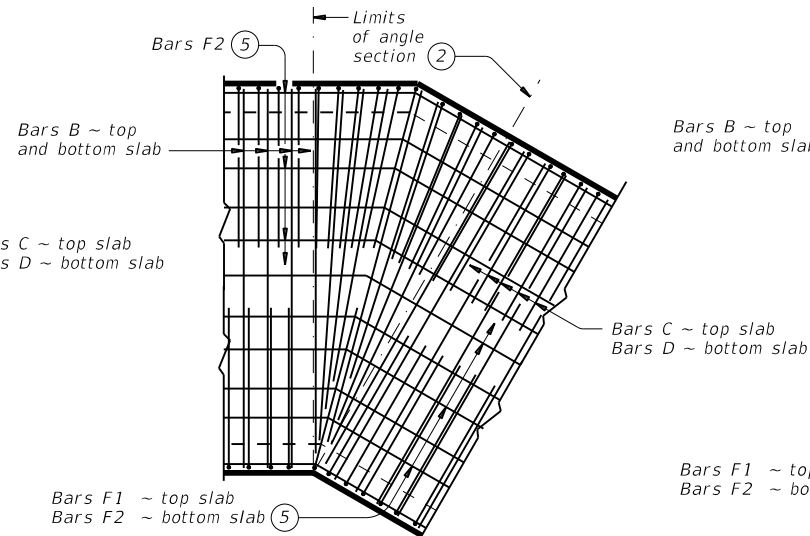
PLAN OF SKEWED ENDS ~ OVER 30° TO 45°



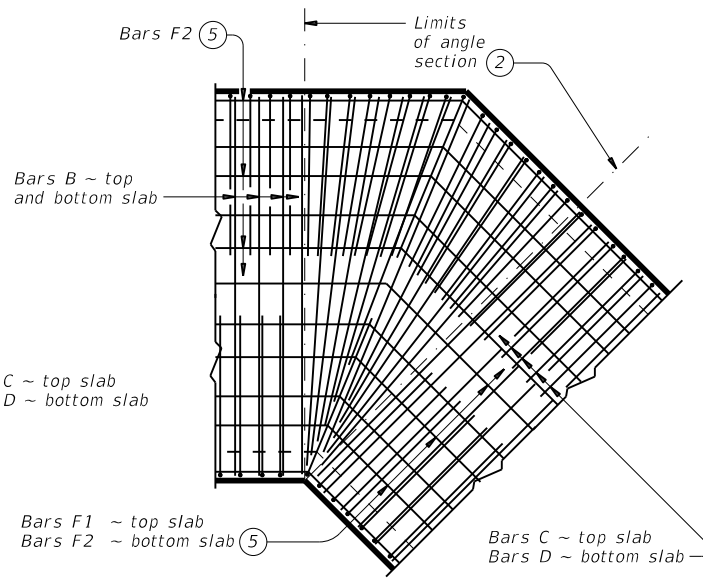
PLAN OF SKEWED ENDS ~ OVER 15° TO 30°



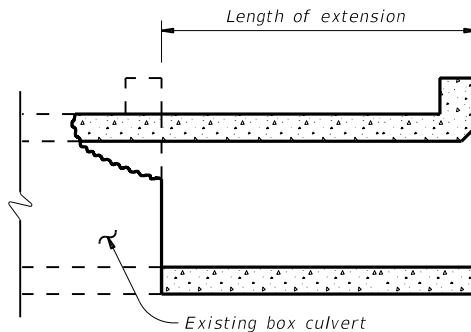
PLAN OF ANGLE SECTION ~ FROM 0° TO 15°



PLAN OF ANGLE SECTION ~ OVER 15° TO 30°



PLAN OF ANGLE SECTION ~ OVER 30° TO 45°



LENGTHENING DETAIL

- For skewed box culverts with less than 2'-0" of fill, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension. For non-skewed box culverts with less than 2'-0" of fill and for skewed or non-skewed culverts with a fill depth of 2'-0" or greater, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension. Alternatively, if the box is non-skewed, embed #6 anchor bars with a Type III, C, D, E, or F anchor adhesive into the existing walls, top and bottom slab at 1'-6" center-to-center spacing. Minimum embedment depth is 8". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 26.4 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." Test adhesive anchors in accordance with Item 450.3.3, "Tests." Test 3 anchors per 100 anchors installed. Break back wings and apron as necessary to install the extension. Clean and extend the exposed wingwall and apron reinforcing into the extension. When lengthening existing box culverts with dimensions different than current standard dimensions, form horizontal and vertical transitions as directed by the Engineer. Match bottom slabs to maintain an uninterrupted flow line. Field bend existing and new reinforcing into transitions and maintain specified cover requirements. For top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface, adjust the "H" dimension to provide a smooth riding surface.

- When the spacing between Bars B becomes less than half of the normal spacing, cut bars to avoid conflict.
- The length of Bars B vary in the skewed end sections.
- $[One\ half\ of\ overall\ width] \times [tangent\ of\ the\ skew\ angle]$
- Place Bars F1 and F2 continuously through the angle section. Bend Bars F1 and F2 to remain parallel to the walls of the box culvert.
- When necessary to avoid conflict in acute corners, shorten the slab extension leg of Bars C and Bars D to a minimum of 1'-6" for skews of 30° thru 45°.
- At the Contractor's option, for skews of 15° or less, place Bars B, C, and D parallel to the skewed end while maintaining spacing along centerline of box. Increase lengths of Bars B shown on the Single Box Culverts Cast-In-Place (SCC) standards sheets to accommodate the skew.

**CONSTRUCTION NOTES:**

Do not use permanent forms.  
When required, lap Bars H 1'-8" for uncoated or galvanized bars.  
Provide a minimum of 1 1/2" clear cover.

**MATERIAL NOTES:**

Provide Grade 60 reinforcing steel.  
Provide galvanized reinforcing steel, if required elsewhere in the plans.  
Provide Class C concrete ( $f'c = 3,600$  psi) with these exceptions:  
provide Class S concrete ( $f'c = 4,000$  psi) for top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface.

**GENERAL NOTES:**

Designed according to AASHTO LRFD Bridge Design Specifications.  
Refer to Single Box Culverts Cast-in-Place (SCC) standard sheets for details of straight sections of culvert.  
For skewed sections and angle sections, refer to Single Box Culverts Cast-in-Place (SCC) standard sheets for slab and wall dimensions, bar sizes, maximum bar spacing, and any other details not shown.  
For skewed ends with curbs, adjust length of Bars H, number of Bars K, curb concrete volume, and reinforcing steel weight by dividing the values shown on the culvert Single Box Culverts Cast-In-Place (SCC) standard sheets by the cosine of the skew angle.

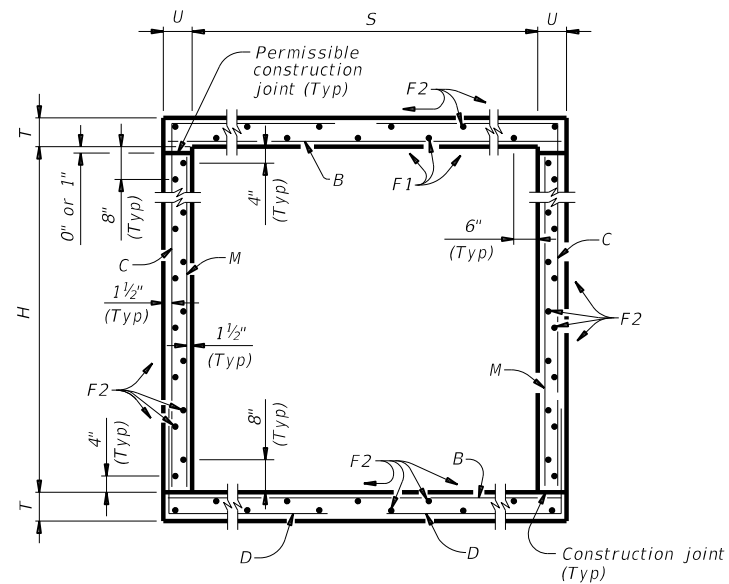
Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

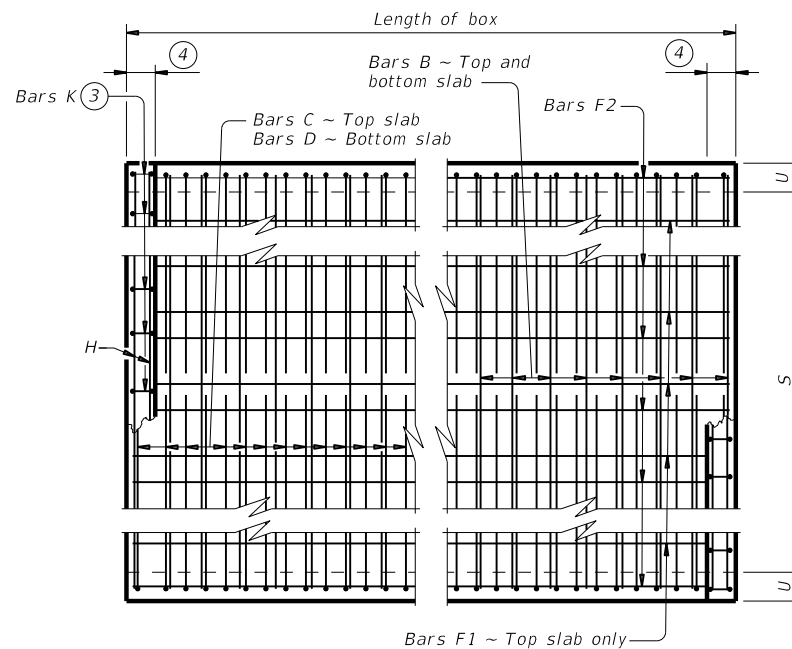
		<b>Bridge Division Standard</b>	
<b>SINGLE BOX CULVERTS CAST-IN-PLACE MISCELLANEOUS DETAILS</b>			
<b>SCC-MD</b>			
FILE:	DN: TxDOT	CK: TxDOT	OW: TxDOT
©TxDOT February 2020	CONT	SECT	JOB
REVISIONS	0916	28	082
	DIST	COUNTY	SHEET NO.
	CRP	SAN PATRICIO	058

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

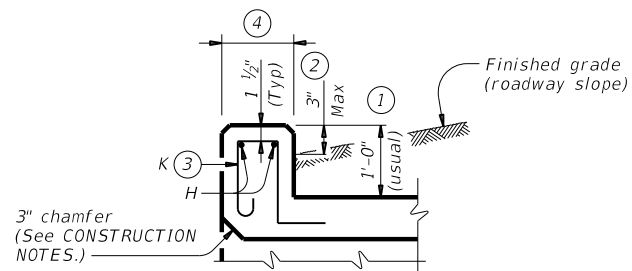
DATE: FILE:



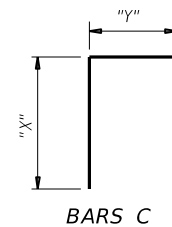
**TYPICAL SECTION**



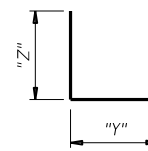
**PLAN OF REINF STEEL**



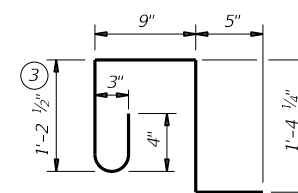
**SECTION THRU CURB**



BARS C



BARS D



BARS K (#4)  
(Spa = 1'-0" Max)  
(Length = 4'-2")

- ① 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Rail Anchorage Curb (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
- ② For vehicle safety, the following requirements must be met:
  - For structures without bridge rail, construct curbs no more than 3" above finished grade.
  - For structures with bridge rail, construct curbs flush with finished grade. Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
- ③ For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.
- ④ 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

The Contractor may replace Bars B, C, D, E, F1, F2, M, Y, and/or Z with deformed welded wire reinforcement (WWR) meeting the requirements of ASTM A1064. The area of required reinforcement may be reduced by the ratio of 60 ksi / 70 ksi. Spacing of WWR is limited to 4" Min and 18" Max. When required, provide lap splices in the WWR of the same length required for the equivalent bar size, rounded up for wire sizes between conventional bar sizes. The lap length required for WWR is never less than the lap length required for uncoated #4 bars.

Example conversion: Replacing No. 6 Gr 60 at 6" Spacing with WWR.  
 Required WWR = (0.44 sq. in. per 0.5 ft.) x (60 ksi / 70 ksi) = 0.755 sq. in. per ft.  
 If D30.6 wire is used to meet the 0.755 sq. in. per ft. requirement in this example, the required spacing = (0.306 sq. in.) / (0.755 sq. in. per ft.) x (12 in. per ft.) = 4.86" Max spacing. Required lap length for the provided D30.6 wire is 2'-1" (the same minimum lap length required for uncoated #5 bars, as listed under MATERIAL NOTES).

**CONSTRUCTION NOTES:**

- Do not use permanent forms.
- Chamfer the bottom edge of the top slab 3" at the entrance.
- Optionally, raise construction joints shown at the flow line by a maximum of 6". If this option is taken, Bars M may be cut off or raised, Bars C and D may be reversed.

**MATERIAL NOTES:**

- Provide Grade 60 reinforcing steel.
- Provide galvanized reinforcing steel if required elsewhere in the plans.
- Provide Class C concrete (f'c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of:
  - culverts with overlay,
  - culverts with 1-to-2 course surface treatment, or
  - culverts with the top slab as the final riding surface.
- Provide bar laps, where required, as follows:
  - Uncoated or galvanized ~ #4 = 1'-8" Min
  - Uncoated or galvanized ~ #5 = 2'-1" Min
  - Uncoated or galvanized ~ #6 = 2'-6" Min

**GENERAL NOTES:**

- Designed according to AASHTO LRFD Bridge Design Specifications for the range of fill heights shown.
- See the Single Box Culverts Cast-In-Place Miscellaneous Detail (SCC-MD) standard sheet for details pertaining to skewed ends, angle sections, and lengthening.

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

HL93 LOADING

SHEET 1 OF 2



**SINGLE BOX CULVERTS  
CAST-IN-PLACE  
0' TO 30' FILL**

**SCC-5 & 6**


FILE:	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0916	28	082	CR 3861
04/2021 Updated X values.	DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO		059	

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:

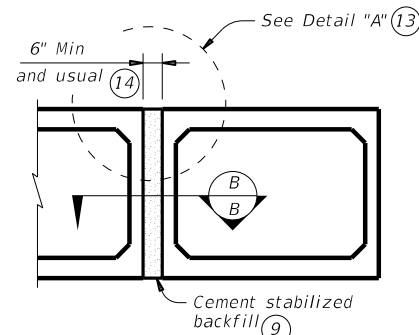
SECTION DIMENSIONS				FILL HEIGHT ⑤	BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																								QUANTITIES														
					Bars B					Bars C					Bars D					Bars M ~ #4				Bars F1 ~ #4 at 18" Spa			Bars F2 ~ #4 at 18" Spa			Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total					
S	H	T	U		No.	Size	Spa	Length	Weight	No.	Size	Spa	Length	Weight	" X "	" Y "	No.	Size	Spa	Length	Weight	" Y "	" Z "	No.	Spa	Length	Weight	No.	Length	Wt	No.	Length	Weight	Length	Wt	No.	Wt	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)
5'-0"	2'-0"	8"	7"	26'	108	#6	9"	5'-11"	960	108	#5	9"	6'-3"	704	2'-6"	3'-9"	108	#5	9"	6'-5"	723	3'-9"	2'-8"	108	9"	2'-0"	144	4	39'-9"	106	22	39'-9"	584	5'-11"	16	14	39	0.391	80.5	0.5	55	16.1	3,276
5'-0"	2'-0"	9"	7"	30'	108	#6	9"	5'-11"	960	108	#5	9"	6'-4"	713	2'-7"	3'-9"	108	#5	9"	6'-6"	732	3'-9"	2'-9"	108	9"	2'-0"	144	4	39'-9"	106	22	39'-9"	584	5'-11"	16	14	39	0.429	81.0	0.5	55	17.6	3,294
5'-0"	3'-0"	8"	7"	26'	108	#6	9"	5'-11"	960	108	#5	9"	7'-3"	817	3'-6"	3'-9"	108	#5	9"	6'-5"	723	3'-9"	2'-8"	108	9"	3'-0"	216	4	39'-9"	106	26	39'-9"	690	5'-11"	16	14	39	0.434	87.8	0.5	55	17.8	3,567
5'-0"	3'-0"	9"	7"	30'	108	#6	9"	5'-11"	960	108	#5	9"	7'-4"	826	3'-7"	3'-9"	108	#5	9"	6'-6"	732	3'-9"	2'-9"	108	9"	3'-0"	216	4	39'-9"	106	26	39'-9"	690	5'-11"	16	14	39	0.472	88.3	0.5	55	19.3	3,585
5'-0"	4'-0"	8"	7"	26'	108	#6	9"	5'-11"	960	108	#5	9"	8'-3"	929	4'-6"	3'-9"	108	#5	9"	6'-5"	723	3'-9"	2'-8"	108	9"	4'-0"	289	4	39'-9"	106	26	39'-9"	690	5'-11"	16	14	39	0.477	92.4	0.5	55	19.5	3,752
5'-0"	4'-0"	9"	7"	30'	108	#6	9"	5'-11"	960	108	#5	9"	8'-4"	939	4'-7"	3'-9"	108	#5	9"	6'-6"	732	3'-9"	2'-9"	108	9"	4'-0"	289	4	39'-9"	106	26	39'-9"	690	5'-11"	16	14	39	0.515	92.9	0.5	55	21.1	3,771
5'-0"	5'-0"	8"	7"	26'	108	#6	9"	5'-11"	960	108	#5	9"	9'-3"	1,042	5'-6"	3'-9"	108	#5	9"	6'-5"	723	3'-9"	2'-8"	108	9"	5'-0"	361	4	39'-9"	106	30	39'-9"	797	5'-11"	16	14	39	0.521	99.7	0.5	55	21.3	4,044
5'-0"	5'-0"	9"	7"	30'	108	#6	9"	5'-11"	960	108	#5	9"	9'-4"	1,051	5'-7"	3'-9"	108	#5	9"	6'-6"	732	3'-9"	2'-9"	108	9"	5'-0"	361	4	39'-9"	106	30	39'-9"	797	5'-11"	16	14	39	0.559	100.2	0.5	55	22.8	4,062
6'-0"	2'-0"	8"	7"	20'	108	#6	9"	6'-11"	1,122	108	#5	9"	6'-7"	742	2'-6"	4'-1"	108	#5	9"	6'-9"	760	4'-1"	2'-8"	108	9"	2'-0"	144	5	39'-9"	133	25	39'-9"	664	6'-11"	18	16	45	0.440	89.1	0.5	63	18.1	3,628
6'-0"	2'-0"	9"	7"	26'	108	#6	9"	6'-11"	1,122	162	#5	6"	6'-8"	1,126	2'-7"	4'-1"	162	#5	6"	6'-10"	1,155	4'-1"	2'-9"	108	9"	2'-0"	144	5	39'-9"	133	25	39'-9"	664	6'-11"	18	16	45	0.485	108.6	0.5	63	19.9	4,407
6'-0"	2'-0"	10"	8"	30'	108	#6	9"	7'-1"	1,149	162	#5	6"	6'-10"	1,155	2'-8"	4'-2"	162	#5	6"	7'-0"	1,183	4'-2"	2'-10"	82	12"	2'-0"	110	5	39'-9"	133	25	39'-9"	664	7'-1"	19	18	50	0.551	109.9	0.5	69	22.6	4,463
6'-0"	3'-0"	8"	7"	20'	108	#6	9"	6'-11"	1,122	108	#5	9"	7'-7"	854	3'-6"	4'-1"	108	#5	9"	6'-9"	760	4'-1"	2'-8"	108	9"	3'-0"	216	5	39'-9"	133	29	39'-9"	770	6'-11"	18	16	45	0.484	96.4	0.5	63	19.9	3,918
6'-0"	3'-0"	9"	7"	26'	108	#6	9"	6'-11"	1,122	162	#5	6"	7'-8"	1,295	3'-7"	4'-1"	162	#5	6"	6'-10"	1,155	4'-1"	2'-9"	108	9"	3'-0"	216	5	39'-9"	133	29	39'-9"	770	6'-11"	18	16	45	0.528	117.3	0.5	63	21.6	4,754
6'-0"	3'-0"	10"	8"	30'	108	#6	9"	7'-1"	1,149	162	#5	6"	7'-10"	1,324	3'-8"	4'-2"	162	#5	6"	7'-0"	1,183	4'-2"	2'-10"	82	12"	3'-0"	164	5	39'-9"	133	29	39'-9"	770	7'-1"	19	18	50	0.601	118.1	0.5	69	24.6	4,792
6'-0"	4'-0"	8"	7"	20'	108	#6	9"	6'-11"	1,122	108	#5	9"	8'-7"	967	4'-6"	4'-1"	108	#5	9"	6'-9"	760	4'-1"	2'-8"	108	9"	4'-0"	289	5	39'-9"	133	29	39'-9"	770	6'-11"	18	16	45	0.527	101.0	0.5	63	21.6	4,104
6'-0"	4'-0"	9"	7"	26'	108	#6	9"	6'-11"	1,122	162	#5	6"	8'-8"	1,464	4'-7"	4'-1"	162	#5	6"	6'-10"	1,155	4'-1"	2'-9"	108	9"	4'-0"	289	5	39'-9"	133	29	39'-9"	770	6'-11"	18	16	45	0.571	123.3	0.5	63	23.4	4,996
6'-0"	4'-0"	10"	8"	30'	108	#6	9"	7'-1"	1,149	162	#5	6"	8'-10"	1,493	4'-8"	4'-2"	162	#5	6"	7'-0"	1,183	4'-2"	2'-10"	82	12"	4'-0"	219	5	39'-9"	133	29	39'-9"	770	7'-1"	19	18	50	0.650	123.7	0.5	69	26.5	5,016
6'-0"	5'-0"	8"	7"	20'	108	#6	9"	6'-11"	1,122	108	#5	9"	9'-7"	1,080	5'-6"	4'-1"	108	#5	9"	6'-9"	760	4'-1"	2'-8"	108	9"	5'-0"	361	5	39'-9"	133	33	39'-9"	876	6'-11"	18	16	45	0.570	108.3	0.5	63	23.3	4,395
6'-0"	5'-0"	9"	7"	26'	108	#6	9"	6'-11"	1,122	162	#5	6"	9'-8"	1,633	5'-7"	4'-1"	162	#5	6"	6'-10"	1,155	4'-1"	2'-9"	108	9"	5'-0"	361	5	39'-9"	133	33	39'-9"	876	6'-11"	18	16	45	0.614	132.0	0.5	63	25.1	5,343
6'-0"	5'-0"	10"	8"	30'	108	#6	9"	7'-1"	1,149	162	#5	6"	9'-10"	1,661	5'-8"	4'-2"	162	#5	6"	7'-0"	1,183	4'-2"	2'-10"	82	12"	5'-0"	274	5	39'-9"	133	33	39'-9"	876	7'-1"	19	18	50	0.700	131.9	0.5	69	28.5	5,345
6'-0"	6'-0"	8"	7"	20'	108	#6	9"	6'-11"	1,122	108	#5	9"	10'-7"	1,192	6'-6"	4'-1"	108	#5	9"	6'-9"	760	4'-1"	2'-8"	108	9"	6'-0"	433	5	39'-9"	133	37	39'-9"	982	6'-11"	18	16	45	0.613	115.6	0.5	63	25.0	4,685
6'-0"	6'-0"	9"	7"	26'	108	#6	9"	6'-11"	1,122	162	#5	6"	10'-8"	1,802	6'-7"	4'-1"	162	#5	6"	6'-10"	1,155	4'-1"	2'-9"	108	9"	6'-0"	433	5	39'-9"	133	37	39'-9"	982	6'-11"	18	16	45	0.657	140.7	0.5	63	26.8	5,690
6'-0"	6'-0"	10"	8"	30'	108	#6	9"	7'-1"	1,149	162	#5	6"	10'-10"	1,830	6'-8"	4'-2"	162	#5	6"	7'-0"	1,183	4'-2"	2'-10"	82	12"	6'-0"	329	5	39'-9"	133	37	39'-9"	982	7'-1"	19	18	50	0.749	140.2	0.5	69	30.5	5,675

⑤ For direct traffic culverts (fill height ≤ 2 ft.), identify the required box size and select the option with the minimum fill height.

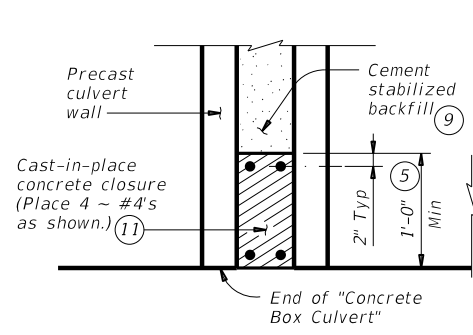
				<b>Bridge Division Standard</b>	
<h2>SINGLE BOX CULVERTS CAST-IN-PLACE 0' TO 30' FILL</h2>					
<h3>SCC-5 &amp; 6</h3>					
FILE:	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT	
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0916	28	082	CR 3861	
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.	
CRP	SAN PATRICIO		060		

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.

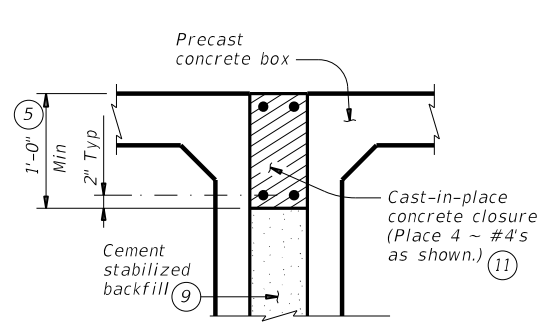
DATE: FILE:



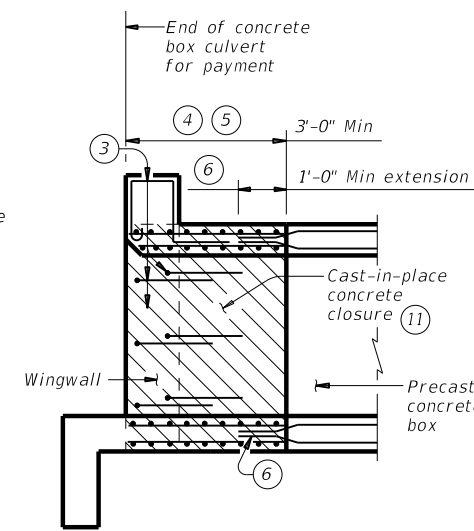
**MULTIPLE UNIT PLACEMENT**



**SECTION B-B**

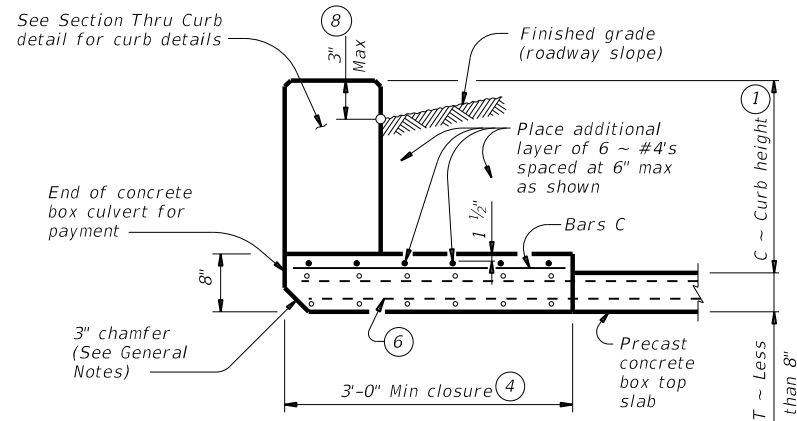


**DETAIL "A" (13)**

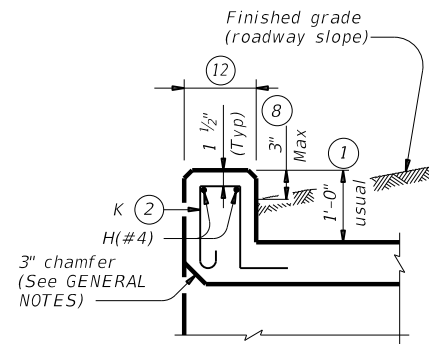


**WINGWALL CONNECTION**

(Also applies to safety end treatment.)

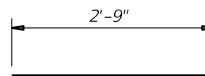


**SECTION THRU TOP SLABS LESS THAN 8"**

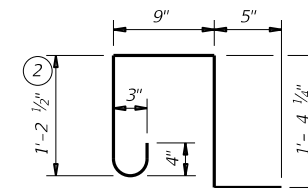


**SECTION THRU CURB**

QUANTITIES PER FOOT OF CURB (10)	
Reinforcing Steel	4.12 Lb
Concrete	0.037 CY



**BARS C (#4)**  
(Spa = 1'-0" Max)



**BARS K (#4)**  
(Spa = 1'-0" Max)  
(Length = 4'-2")

- 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail, bicycle rail, or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
- For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.
- Extend curb, wingwall, or safety end treatment reinforcing into concrete closure. Bend or trim, as necessary, any reinforcing that does not fit into closure area.
- Provide a 3'-0" Min cast-in-place concrete closure. Break back boxes in the field or cast boxes short. Provide bands of reinforcing in the closure that are the same size and spacing as in the precast box section. Provide #4 longitudinal reinforcement spaced at 12 inches Max within the closure. Except where shown otherwise, construct the cast-in-place closure flush with the inside and outside faces of the precast box section.
- For multiple unit placements, adjust the length of the closure for the interior walls as necessary. Provide a 3'-0" Min cast-in-place closure in the top slab, bottom slab, and exterior wall. See Section B-B detail when interior walls are cast full length.
- Extend precast box reinforcing a minimum of 1'-0" into concrete closure (Typ).
- Place bands of reinforcing matching the inside and outside face reinforcing in the gaps of the top and bottom slabs. Place a band matching the outside face reinforcing of the wall in the gaps of the walls (placed in the outside face only). Tack weld the bands to the exposed reinforcing at each point of contact.
- For vehicle safety, the following requirements must be met:
  - For structures without bridge rail, construct curbs no more than 3" above finished grade.
  - For structures with bridge rail, construct curbs flush with finished grade. Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
- Cement stabilized backfill between boxes is considered part of the box culvert for payment.
- All curb concrete and reinforcing is considered part of the box culvert for payment.
- Any additional concrete and reinforcing required for the closures will be considered subsidiary to the box culvert for payment.
- 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elsewhere in the plans.
- For multiple unit placement with overlay, with 1 to 2 course surface treatment, or with the top slab as the final riding surface, provide wall closure as shown in Detail "A".
- This dimension may be increased with approval of the Engineer to allow the precast boxes to be tunneled or jacked in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box." No payment will be made for any additional material in the gap between adjacent boxes.

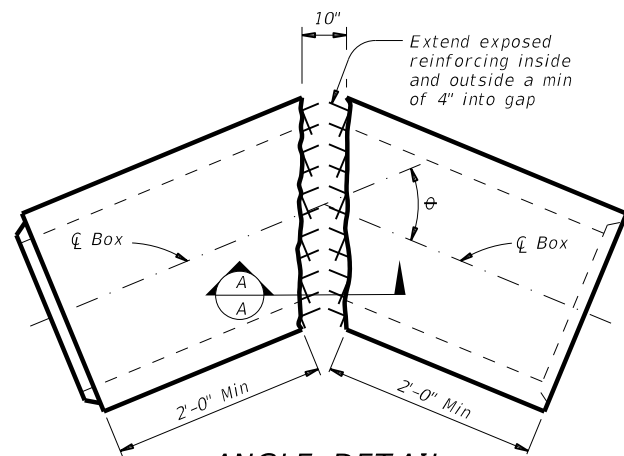
**MATERIAL NOTES:**

- Provide Grade 60 reinforcing steel.
- Provide ASTM A1064 welded wire reinforcement.
- Provide Class C concrete (f'c = 3,600 psi) for the closures.
- Provide cement stabilized backfill meeting the requirements of Item 400, "Excavation and Backfill for Structures."
- Any additional concrete required for the closures will be considered subsidiary to the box culvert.

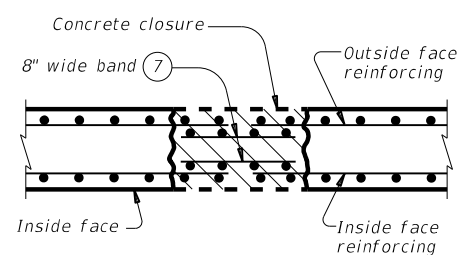
**GENERAL NOTES:**

- Designed according to AASHTO LRFD Bridge Design Specifications.
- Refer to the Single Box Culverts Precast (SCP) standard sheets for details and notes not shown.
- Chamfer the bottom edge of the top slab closure 3 inches at culvert closure ends.

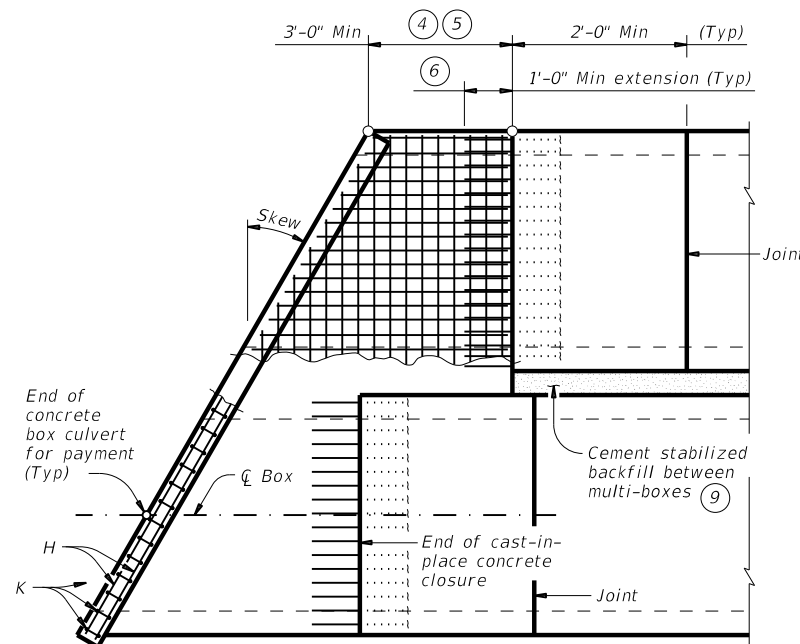
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bars dimensions are out-to-out of bars.



**ANGLE DETAIL**



**SECTION A-A**



**PLAN OF SKEWED ENDS**

(Showing multi-box placement.)

HL93 LOADING

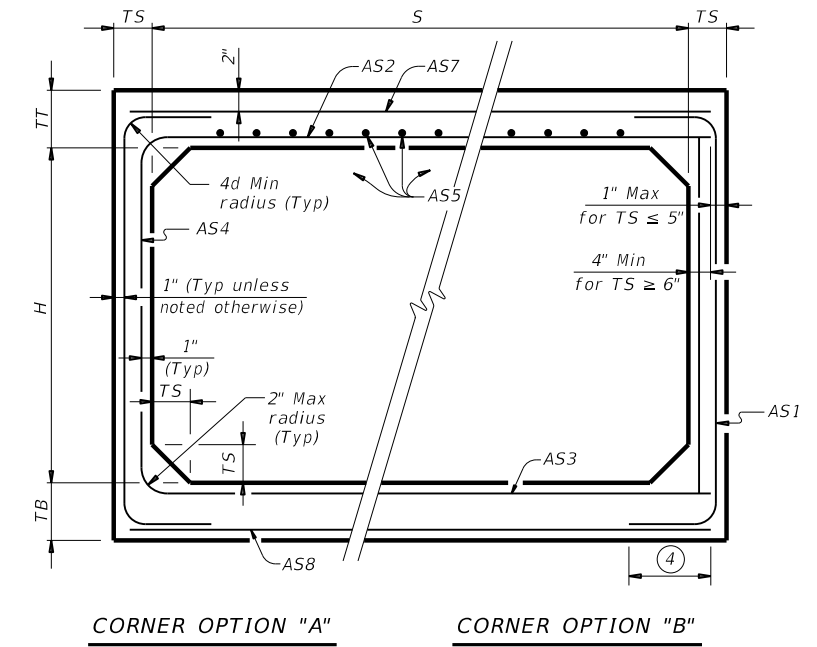
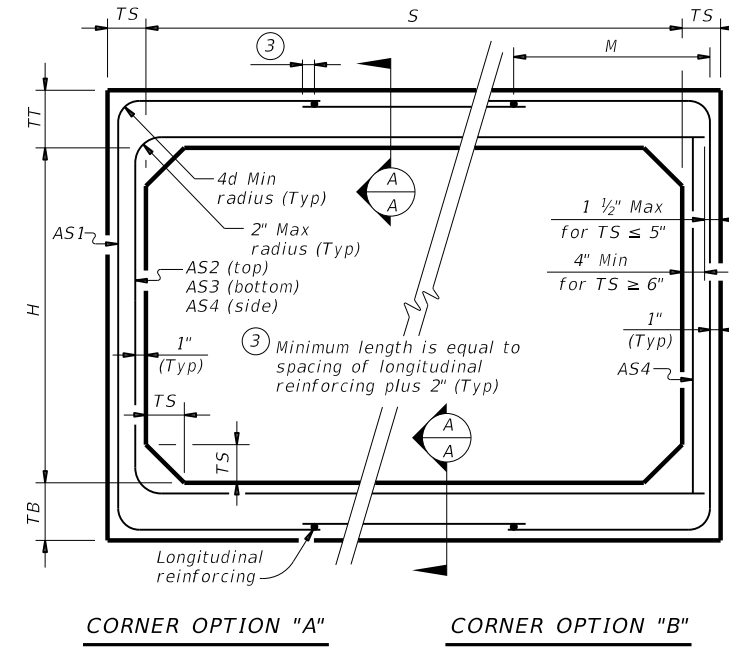
		<b>Bridge Division Standard</b>	
<b>BOX CULVERTS PRECAST MISCELLANEOUS DETAILS</b>			
<b>SCP-MD</b>			
FILE:	DN: GAF	CK: LMW	DW: BWH/TxDOT
©TxDOT February 2020	CONT	SECT	JOB
REVISIONS	0916	28	082
	DIST	COUNTY	SHEET NO.
	CRP	SAN PATRICIO	061

DISCLAIMER: 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: 2/16/2022  
FILE:

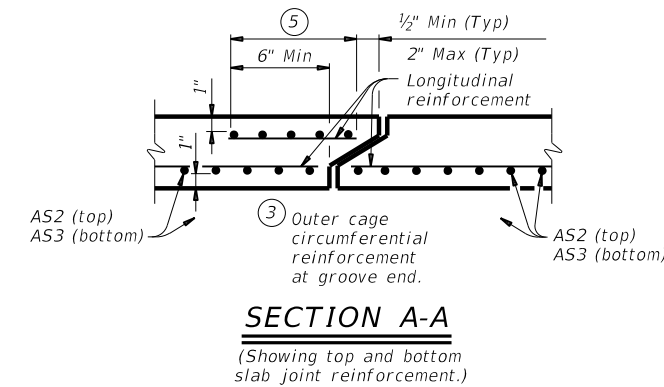
**BOX DATA**

SECTION DIMENSIONS					Fill Height (ft.)	M (Min) (in.)	REINFORCING (sq. in. / ft.) <sup>②</sup>						① Lift Weight (tons)
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)			AS1	AS2	AS3	AS4	AS5	AS7	
6	2	8	7	7	< 2	-	0.23	0.27	0.19	0.17	0.19	0.17	7.2
6	2	7	7	7	2 < 3	43	0.25	0.21	0.17	0.17	-	-	6.8
6	2	7	7	7	3 - 5	43	0.20	0.17	0.17	0.17	-	-	6.8
6	2	7	7	7	10	39	0.20	0.17	0.17	0.17	-	-	6.8
6	2	7	7	7	15	39	0.26	0.20	0.20	0.17	-	-	6.8
6	2	7	7	7	20	39	0.34	0.26	0.26	0.17	-	-	6.8
6	2	7	7	7	25	39	0.43	0.32	0.32	0.17	-	-	6.8
6	2	7	7	7	30	39	0.52	0.38	0.39	0.17	-	-	6.8
6	3	8	7	7	< 2	-	0.20	0.31	0.22	0.17	0.19	0.19	7.9
6	3	7	7	7	2 < 3	43	0.21	0.24	0.19	0.17	-	-	7.5
6	3	7	7	7	3 - 5	39	0.17	0.18	0.17	0.17	-	-	7.5
6	3	7	7	7	10	39	0.17	0.18	0.19	0.17	-	-	7.5
6	3	7	7	7	15	38	0.22	0.24	0.24	0.17	-	-	7.5
6	3	7	7	7	20	38	0.28	0.31	0.31	0.17	-	-	7.5
6	3	7	7	7	25	38	0.35	0.38	0.39	0.17	-	-	7.5
6	3	7	7	7	30	38	0.42	0.46	0.46	0.17	-	-	7.5
6	4	8	7	7	< 2	-	0.19	0.34	0.25	0.17	0.19	0.19	8.6
6	4	7	7	7	2 < 3	43	0.19	0.27	0.21	0.17	-	-	8.2
6	4	7	7	7	3 - 5	39	0.17	0.21	0.19	0.17	-	-	8.2
6	4	7	7	7	10	39	0.17	0.20	0.21	0.17	-	-	8.2
6	4	7	7	7	15	38	0.18	0.27	0.27	0.17	-	-	8.2
6	4	7	7	7	20	38	0.24	0.34	0.35	0.17	-	-	8.2
6	4	7	7	7	25	38	0.29	0.43	0.42	0.17	-	-	8.2
6	4	7	7	7	30	38	0.35	0.51	0.52	0.17	-	-	8.2
6	5	8	7	7	< 2	-	0.19	0.37	0.28	0.17	0.19	0.19	9.3
6	5	7	7	7	2 < 3	43	0.17	0.30	0.24	0.17	-	-	8.9
6	5	7	7	7	3 - 5	43	0.17	0.23	0.21	0.17	-	-	8.9
6	5	7	7	7	10	39	0.17	0.22	0.23	0.17	-	-	8.9
6	5	7	7	7	15	38	0.17	0.28	0.29	0.17	-	-	8.9
6	5	7	7	7	20	38	0.20	0.37	0.38	0.17	-	-	8.9
6	5	7	7	7	25	38	0.25	0.45	0.46	0.17	-	-	8.9
6	5	7	7	7	30	38	0.30	0.54	0.55	0.17	-	-	8.9
6	6	8	7	7	< 2	-	0.19	0.38	0.30	0.17	0.19	0.19	10
6	6	7	7	7	2 < 3	52	0.17	0.32	0.26	0.17	-	-	9.6
6	6	7	7	7	3 - 5	52	0.17	0.24	0.22	0.17	-	-	9.6
6	6	7	7	7	10	43	0.17	0.23	0.24	0.17	-	-	9.6
6	6	7	7	7	15	39	0.17	0.29	0.31	0.17	-	-	9.6
6	6	7	7	7	20	39	0.18	0.38	0.39	0.17	-	-	9.6
6	6	7	7	7	25	38	0.23	0.46	0.48	0.17	-	-	9.6
6	6	7	7	7	30	38	0.27	0.55	0.57	0.17	-	-	9.6



**FILL HEIGHT 2 FT AND GREATER**

**FILL HEIGHT LESS THAN 2 FT**



**MATERIAL NOTES:**  
Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.  
Provide Class H concrete (f'c = 5,000 psi).

**GENERAL NOTES:**  
Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.  
See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.  
In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)."

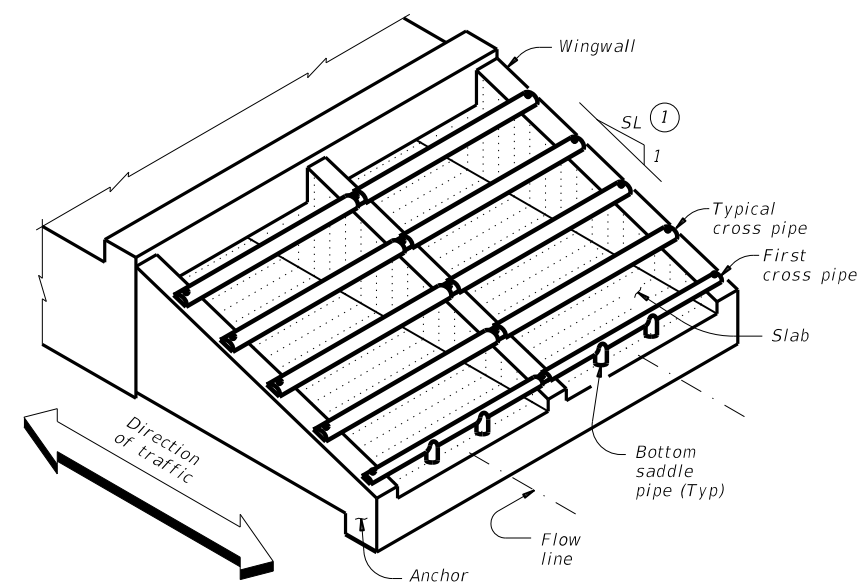
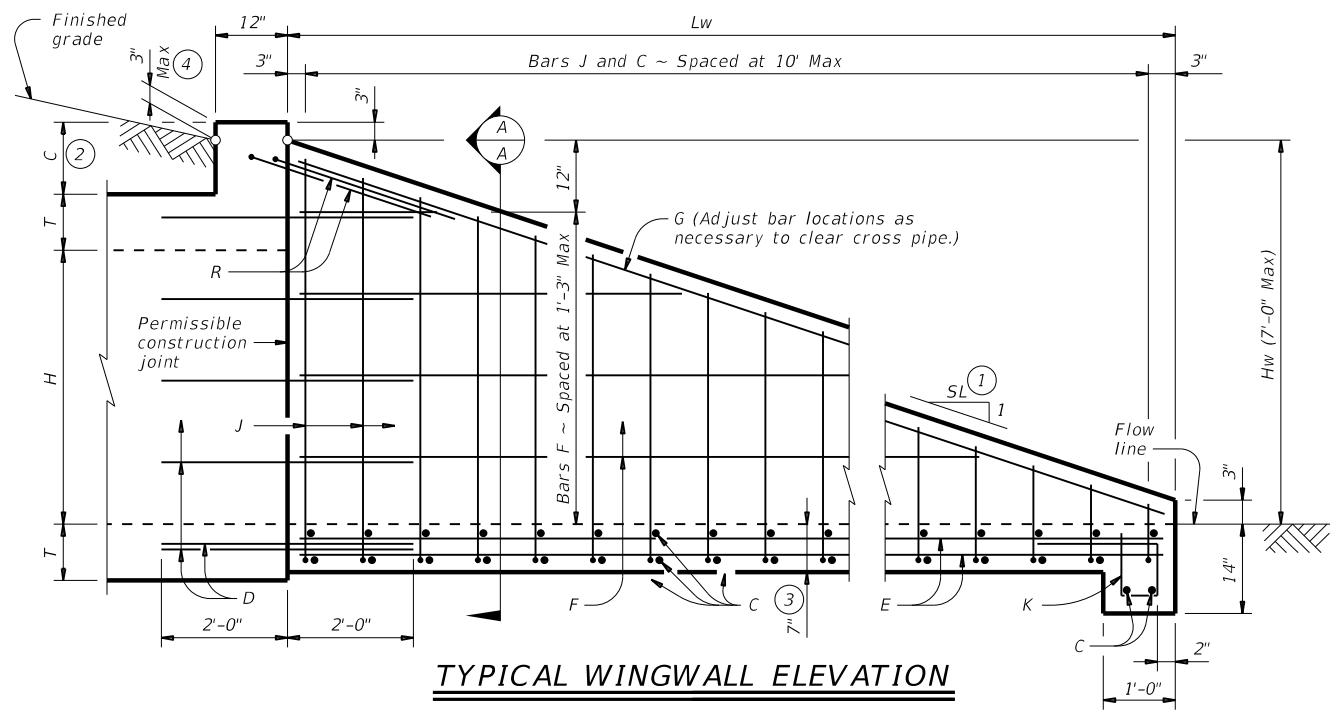
HL93 LOADING

		<b>Bridge Division Standard</b>	
<b>SINGLE BOX CULVERTS PRECAST</b> <b>6'-0" SPAN</b>			
<b>SCP-6</b>			
FILE: CD-SCP06-20 (1).dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
©TxDOT February 2020	CONT	SECT	JOB
REVISIONS	0916	28	082
	DIST	COUNTY	SHEET NO.
	CRP	SAN PATRICIO	062

① For box length = 8'-0"  
② AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.

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:



**WING DIMENSION CALCULATIONS:**

$$Hw = H + T + C - 0.250'$$

$$Lw = (Hw - 0.250') (SL)$$

For cast-in-place culverts:  
 $Atw = (N) (S) + (N + 1) (U)$

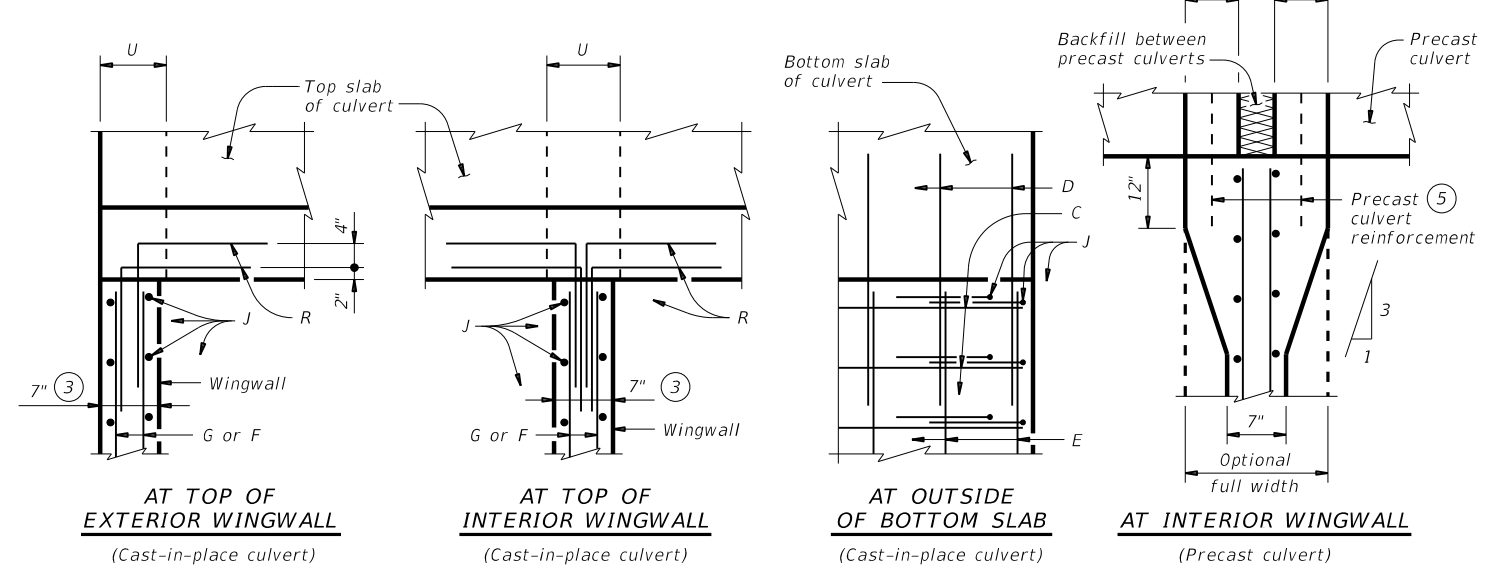
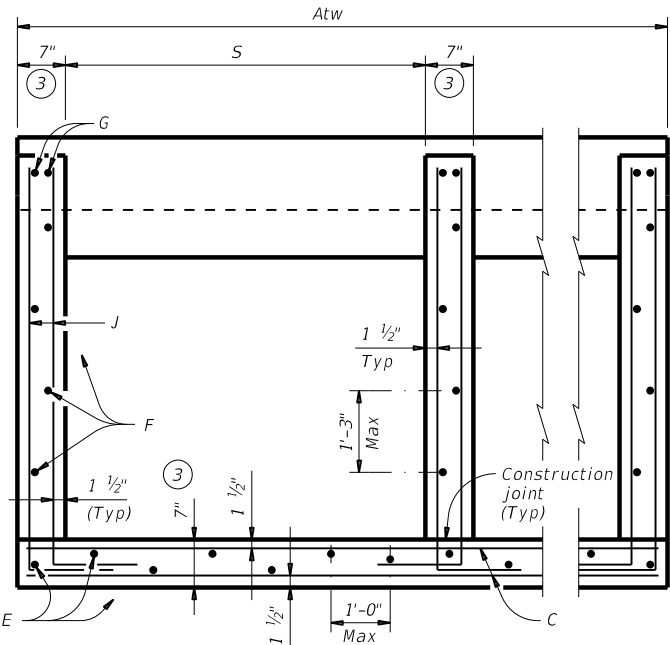
For precast culverts:  
 $Atw = (N) (2U + S) + (N - 1) (0.500')$

$$\text{Total Wingwall Area (SF)} = (0.5) (Hw + 0.250') (Lw) (N - 1)$$

$$\text{Total Concrete Volume (CY)} = [(Wingwall Area) (0.583') + (Lw) (Atw) (0.583') + (Atw) (1.000') (1.167' - 0.583')] \div (27)$$

$$\text{Total Reinforcing (Lb)} = (1.55) (Lw) (Atw) + (4.43) (Atw) + (K) (Hw) (N + 1) (\sqrt{Lw})$$

C = Height of curb above top of top slab (feet)  
 Hw = Height of wingwall (feet)  
 K = Constant value for use in formulas  
 Slope SL:1 K  
 6:1 ~ 10.41  
 Atw = Anchor toewall length (feet)  
 Lw = Length of wingwall (feet)  
 N = Number of culvert barrels  
 SL:1 = Side slope ratio (horizontal : 1 vertical)  
 See applicable box culvert standard for H, S, T, and U values.



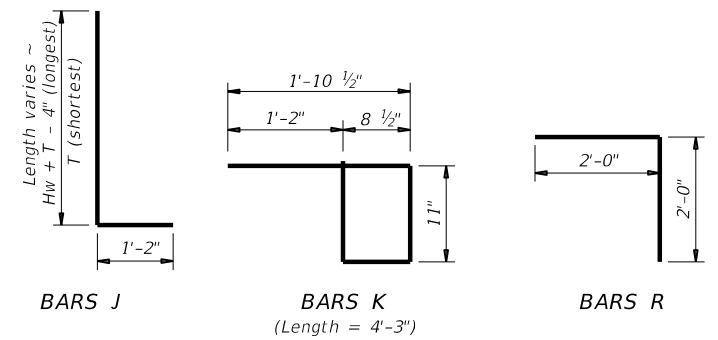
**MATERIAL NOTES:**  
 Provide Grade 60 reinforcing steel.  
 Provide galvanized reinforcing steel if required elsewhere in the plans. Adjust reinforcing as necessary to provide a minimum clear cover of 1 1/2".  
 Provide Class "C" concrete (f'c = 3,600 psi).  
 Provide pipe runners, cross pipes, and anchor pipes meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.  
 Provide ASTM A307 bolts.  
 Galvanize all steel components, except the concrete reinforcing, unless required elsewhere in the plans, after fabrication.  
 Repair galvanizing damaged during transport or construction in accordance with Item 445, "Galvanizing."

**GENERAL NOTES:**  
 Designed according to AASHTO LRFD Bridge Design Specifications.  
 The safety end treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes.  
 Cross pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.  
 The quantities for concrete, reinforcing steel, and cross pipes resulting from the formulas given herein are for Contractor's information only.  
 See the Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.  
 Alternate design drawings bearing the seal of a professional engineer will be acceptable for precast construction of the safety end treatments.

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

**SECTION A-A**  
 (Showing typical wingwall and wing slab reinforcing. Pipe runners not shown for clarity.)

**PLAN VIEWS OF CORNER DETAILS**



**TABLE OF REINFORCING BAR SIZES AND SPACING**

Bar	Size	Spacing
C	#4	10" Max
D	#4	Match F and E
E	#4	1'- 0" Max
F	#4	1'- 3" Max
G	#6	As shown
J	#4	10" Max
K	#4	1'- 0" Max
R	#4	As shown

- Provide 6:1 or flatter slope.
- 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures without railing and curbs taller than 1'-0", refer to Extended Curb Details the Extended Curb Details (ECD) standard sheet.
- Wingwall and slab thicknesses may be the same as the adjacent culvert wall and slab thicknesses (7" Minimum). If thicknesses greater than the minimum (7") are used, no changes will be made in quantities and no additional compensation will be allowed.
- For vehicle safety, reduce height, if necessary, to provide a maximum 3" projection above finished grade. No changes will be made in quantities and no additional compensation will be allowed for this work.
- For culverts with C = 0", the precast culvert reinforcing may extend 1'-0" minimum into wingwall. Wingwall bars D and R may be omitted. Otherwise, refer to the Wingwall Connection detail on the Box Culvert Precast Miscellaneous Details (SCP-MD) standard sheet.

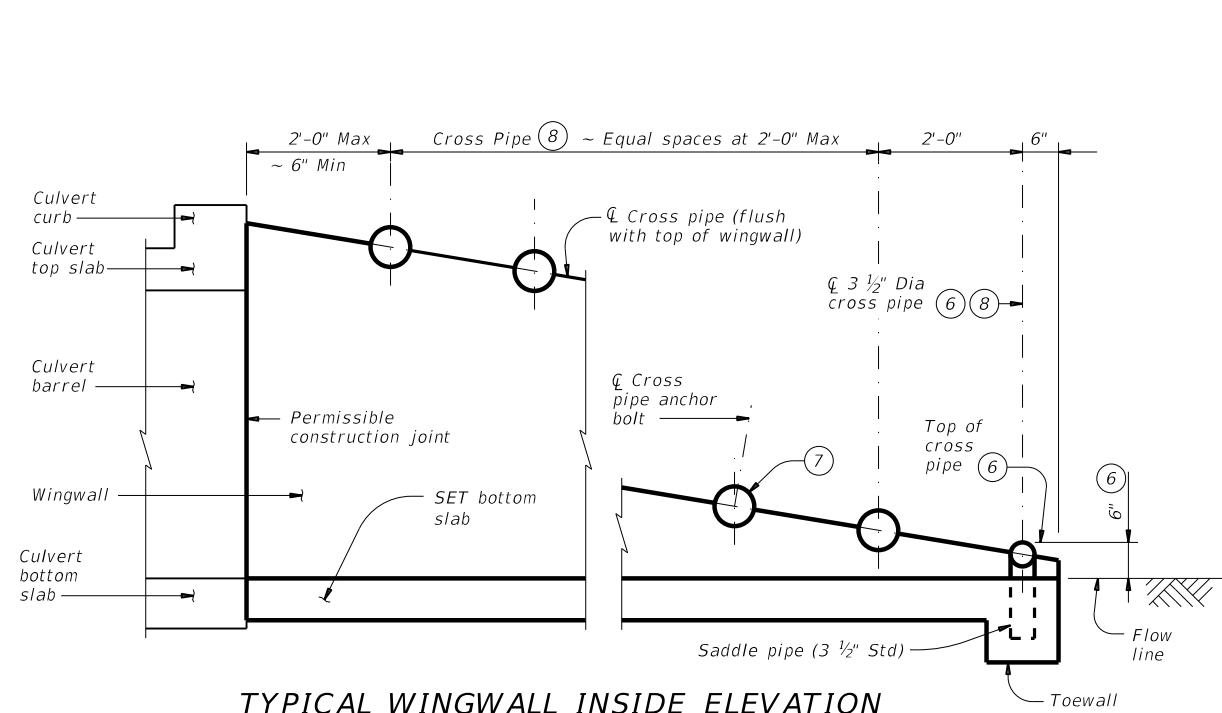
Texas Department of Transportation  
 Bridge Division Standard

**SAFETY END TREATMENT FOR BOX CULVERTS (MAXIMUM Hw = 7'-0") TYPE I ~ PARALLEL DRAINAGE SETB-PD**

FILE:	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
0916 28	February 2020	CONTRACT	SECTION	HIGHWAY
0916 28	082	082	CR 3861	
DIST	COUNTY	SHEET NO.		
CRP	SAN PATRICIO	063		

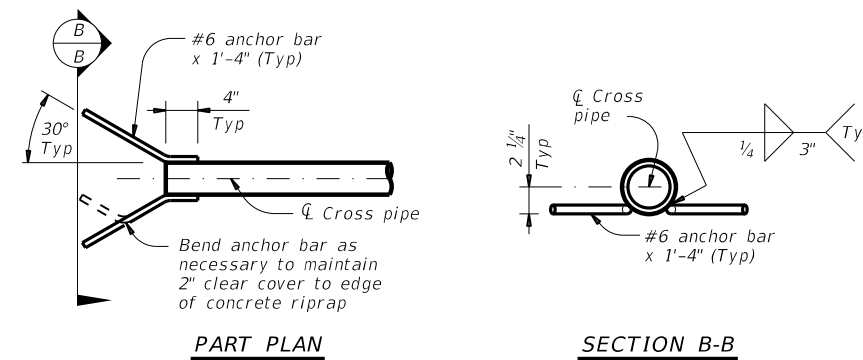
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act." No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: FILE:

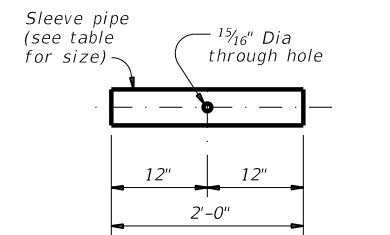


**TYPICAL WINGWALL INSIDE ELEVATION**

(Showing installation of cross pipes.)



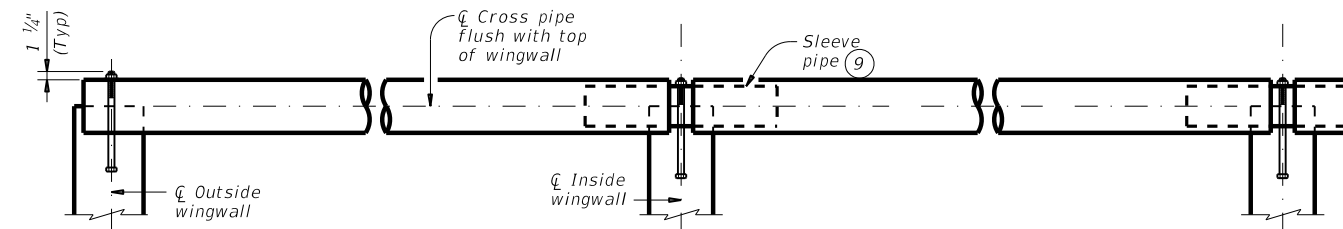
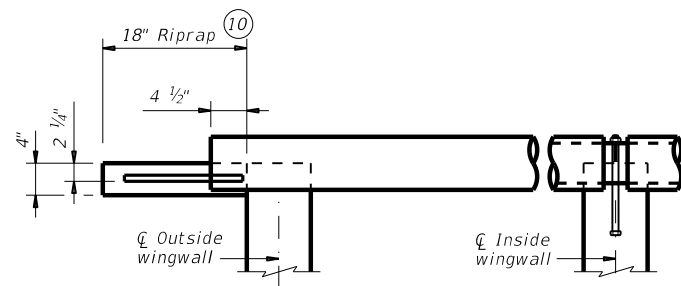
**OPTIONAL ANCHOR BAR DETAILS**



**SLEEVE PIPE DETAILS**

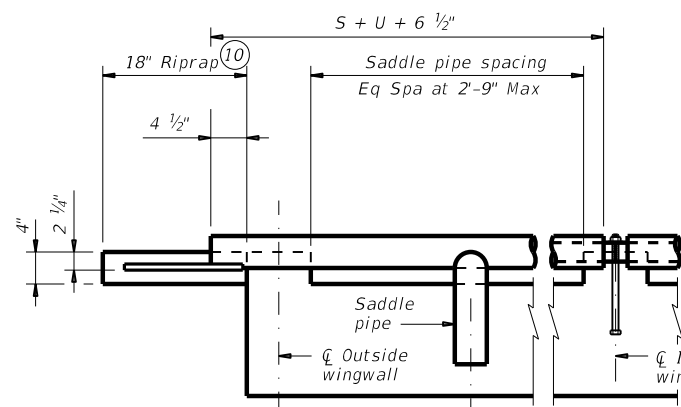
REQUIRED PIPE SIZES (8)			STANDARD PIPE SIZES		
Culvert Span Sizes	Cross Pipe Size	Sleeve Pipe Size (9)	Pipe Size	Pipe O.D.	Pipe I.D.
First Pipe	3 1/2" STD	2 1/2" STD	2 1/2" STD	2.875"	2.469"
30" to 42"	4" STD	3" STD	3" STD	3.500"	3.068"
48" to 72"	5" STD	4" STD	3 1/2" STD	4.000"	3.548"
78" to 120"	6" STD	5" STD	4" STD	4.500"	4.026"
			5" STD	5.563"	5.047"
			6" STD	6.625"	6.065"

- (6) The proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe at no more than 6" above the flow line.
- (7) Always install the third cross pipe from the bottom of the culvert using a bolted connection. Take care to ensure that concrete does not flow into this cross pipe so as to permit disassembly of the bolted connection to allow cleanout access.
- (8) Provide cross pipes and sleeve pipes (if required) as shown in the Required Pipe Sizes table. Provide 3 #2" saddle pipes for the 3 #2" first cross pipe.
- (9) At Contractor's option, make the cross pipe continuous across the inside wingwalls. If this option is selected, omit the sleeve pipe and make a 15#16" diameter throughhole in the cross pipe to accept the anchor bolt at the centerline of each interior wingwall.
- (10) Provide riprap when using the Optional Anchor Bar details. Riprap is included in the bid price for Safety End Treatment. Provide riprap in accordance with Item 432, "Riprap."

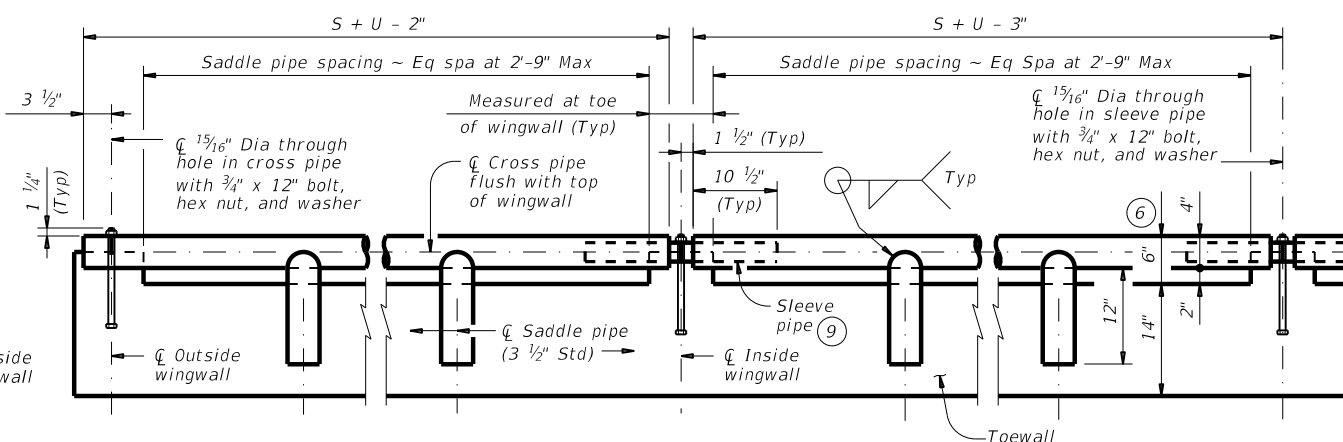


**SECTION THROUGH INSTALLATION OF TYPICAL FULL CROSS PIPE**

(Anchor details and dimensions are similar to those shown below in Section Through Installation of 3 1/2" First Cross Pipe detail.)



**OUTSIDE CULVERT BARREL WITH OPTIONAL ANCHOR BARS & RIPRAP**



**SECTION THROUGH INSTALLATION OF 3 1/2" FIRST CROSS PIPE**

**OUTSIDE CULVERT BARREL WITH BOLTED ANCHOR**

**INSIDE CULVERT BARREL**

**CROSS PIPE INSTALLATION DETAILS**

SHEET 2 OF 2

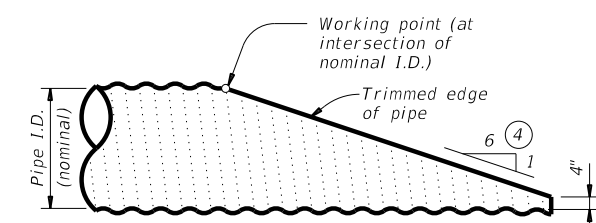


**SAFETY END TREATMENT FOR BOX CULVERTS (MAXIMUM Hw = 7'-0") TYPE I ~ PARALLEL DRAINAGE SETB-PD**

FILE:	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0916	28	082	CR 3861
06-2022 - Wing dimensions	DIST	COUNTY	SHEET NO.	
	CRP	SAN PATRICIO	064	



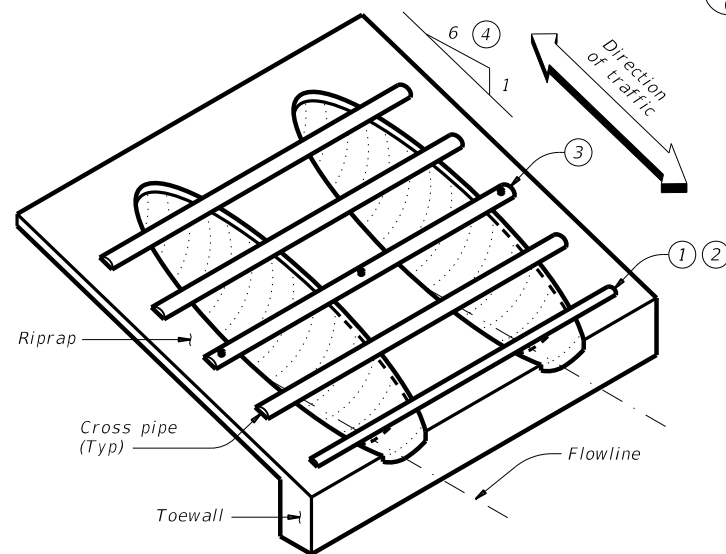
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act." No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



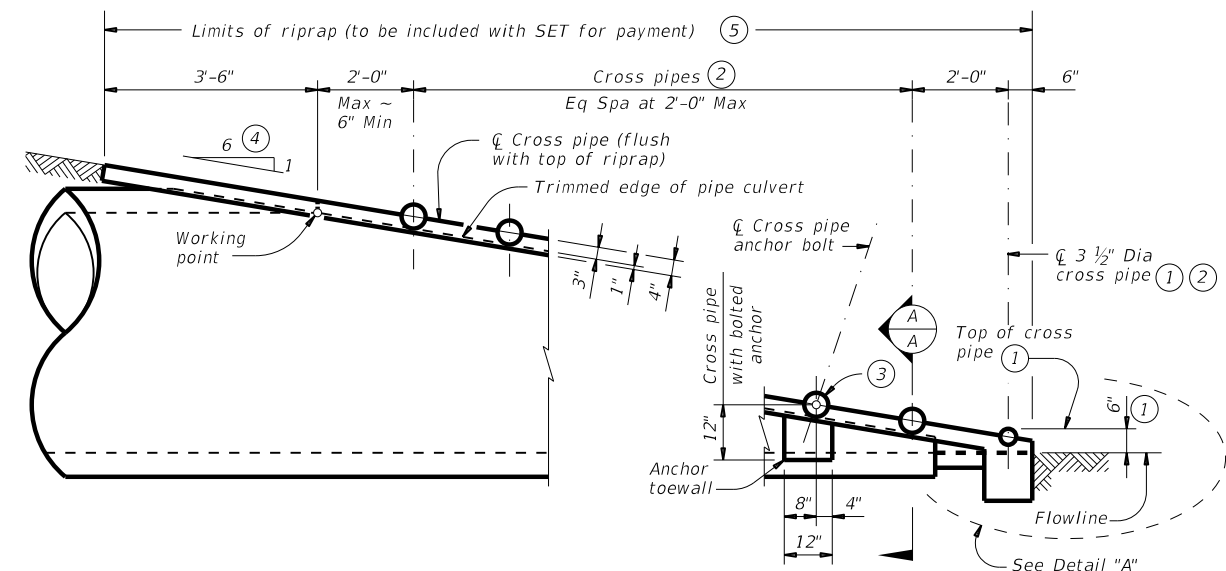
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

### SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

(Showing corrugated metal pipe (CMP) culvert. Details at reinforced concrete pipe (RCP) culvert are similar.)

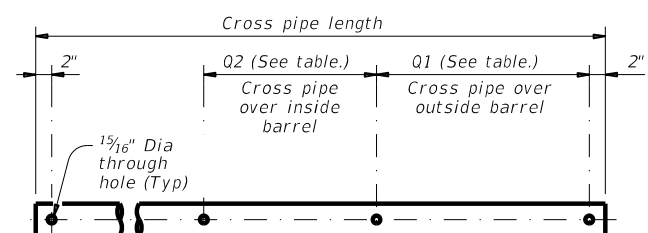


### ISOMETRIC VIEW OF TYPICAL INSTALLATION

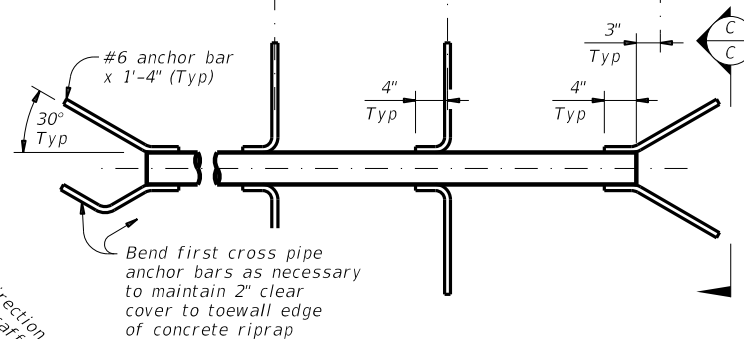


### SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

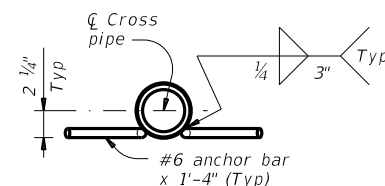
(Showing reinforced concrete pipe (RCP) culvert. Details at corrugated metal pipe (CMP) culvert are similar.)



### PIPE WITH BOLTED ANCHOR

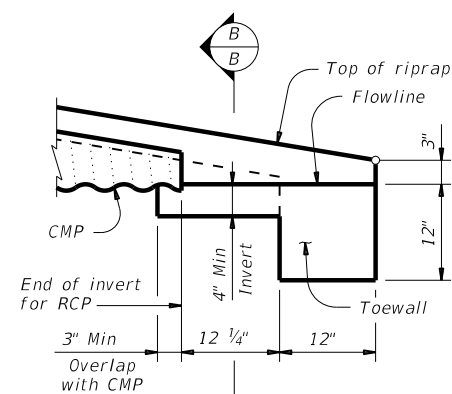


### PIPE WITH ANCHOR BARS



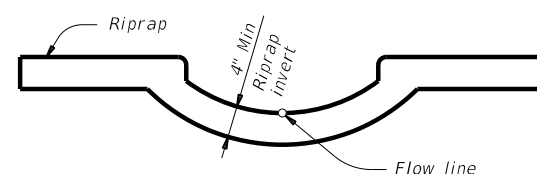
### SECTION C-C

### CROSS PIPE DETAILS



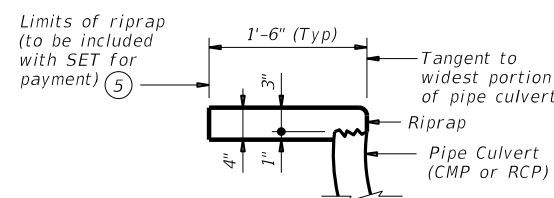
### DETAIL "A"

(Showing invert with corrugated metal pipe (CMP) culvert. Reinforced concrete pipe (RCP) culvert details are similar. Cross pipes not shown for clarity.)

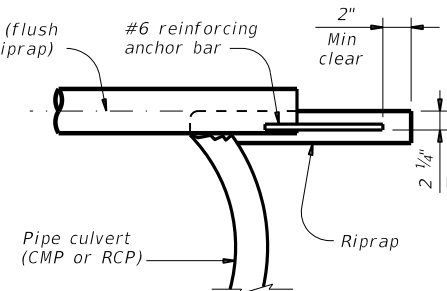


### SECTION B-B

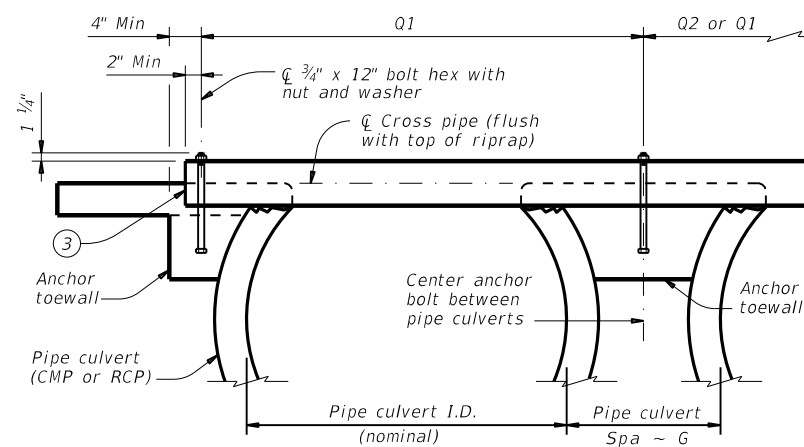
(Cross pipes not shown for clarity.)



### SHOWING TYPICAL PIPE CULVERT AND RIPRAP



### SHOWING CROSS PIPE WITH ANCHOR BAR



### SHOWING CROSS PIPE WITH BOLTED ANCHOR

### SECTION A-A

## CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, AND RIPRAP QUANTITIES

Nominal Culvert I.D.	Conc Riprap (CY) (6)	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for Use of Cross Pipes	Cross Pipe Sizes
12"	0.6	0' - 9"	N/A	2' - 1"	1' - 9"	3 or more pipe culverts	3" Std (3.500" O.D.)
15"	0.7	0' - 11"	N/A	2' - 5"	2' - 2"		
18"	0.8	1' - 2"	N/A	2' - 10"	2' - 8"		
21"	0.9	1' - 4"	N/A	3' - 2"	3' - 1"		
24"	0.9	1' - 7"	N/A	3' - 6"	3' - 7"	3 or more pipe culverts	3 1/2" Std (4.000" O.D.)
27"	1.0	1' - 8"	N/A	3' - 10"	3' - 11"		
30"	1.1	1' - 10"	N/A	4' - 2"	4' - 4"	2 or more pipe culverts	4" Std (4.500" O.D.)
33"	1.2	1' - 11"	4' - 2"	4' - 5"	4' - 8"		
36"	1.3	2' - 1"	4' - 5"	4' - 9"	5' - 1"	All pipe culverts	4" Std (4.500" O.D.)
42"	1.5	2' - 4"	4' - 11"	5' - 5"	5' - 10"		
48"	1.7	2' - 7"	5' - 5"	6' - 0"	6' - 7"	All pipe culverts	5" Std (5.563" O.D.)
54"	2.0	3' - 0"	5' - 11"	6' - 9"	7' - 6"		
60"	2.2	3' - 3"	6' - 5"	7' - 4"	8' - 3"		
66"	2.4	3' - 3"	6' - 11"	7' - 10"	8' - 9"		
72"	2.7	3' - 4"	7' - 5"	8' - 5"	9' - 4"		

- The proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe no more than 6" above the flow line.
- Provide cross pipes, except the first bottom pipe, of the size shown in the table. Provide a 3 1/2" standard pipe (4" O.D.) for the first bottom pipe.
- Install the third cross pipe from the bottom of the culvert using a bolted connection. Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, install all other cross pipes using the bolted connection details.
- Match cross slope as shown elsewhere in the plans. Cross slope of 6:1 or flatter is required for vehicle safety.
- Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap."
- Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for contractor's information only.

#### MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise. Provide cross pipes that meet the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 (Gr B), or API 5LX52. Provide ASTM A307 bolts and nuts. Galvanize all steel components, except concrete reinforcing, after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

#### GENERAL NOTES:

Cross pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981. Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes. Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap." Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.

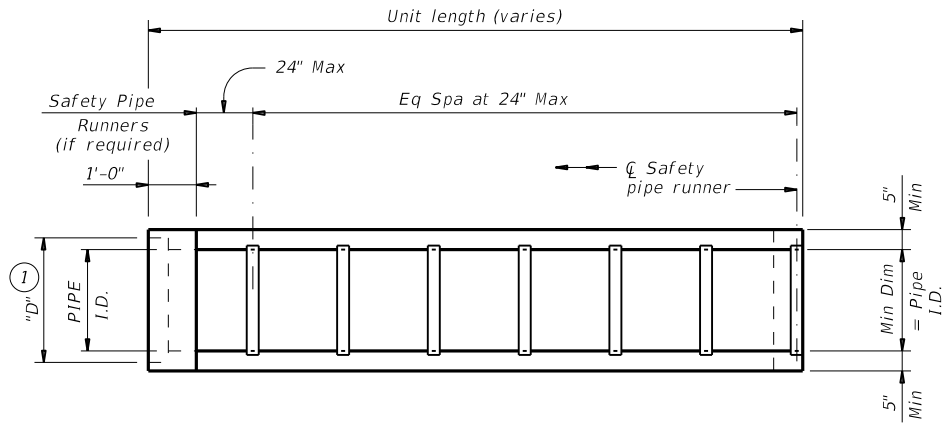


## SAFETY END TREATMENT FOR 12" DIA TO 72" DIA PIPE CULVERTS TYPE II ~ PARALLEL DRAINAGE SETP-PD

FILE:	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0916	28	082	CR 3861
	DIST	COUNTY	SHEET NO.	
	CRP	SAN PATRICIO	065	

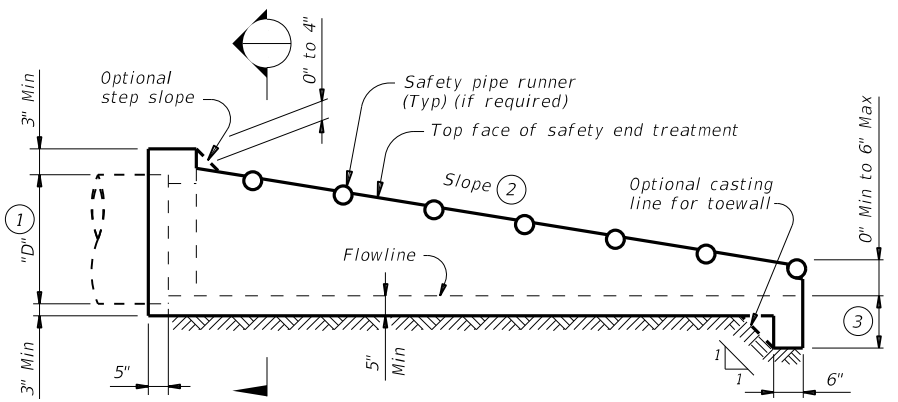
DATE: FILE:

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



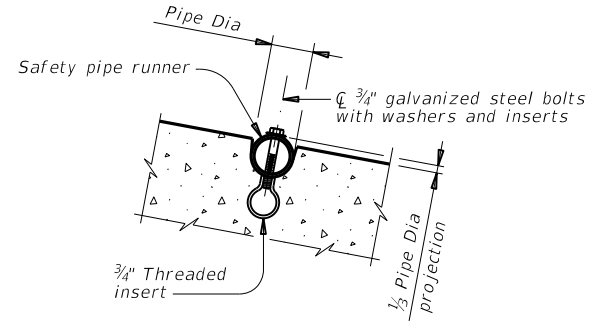
**PLAN**

(Showing bell end connection.)



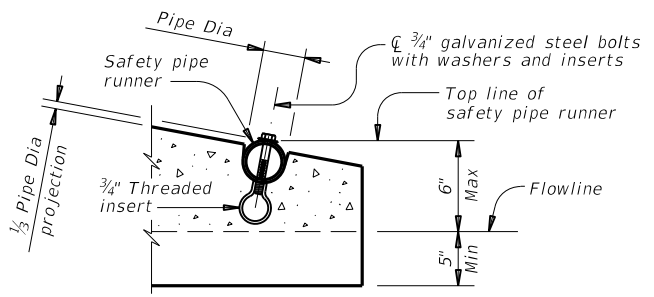
**LONGITUDINAL ELEVATION**

(Showing bell end connection.)

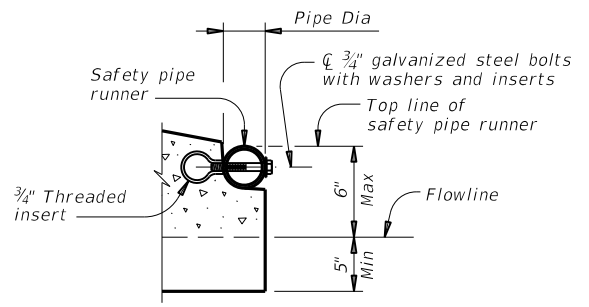


**INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS**

(If required)



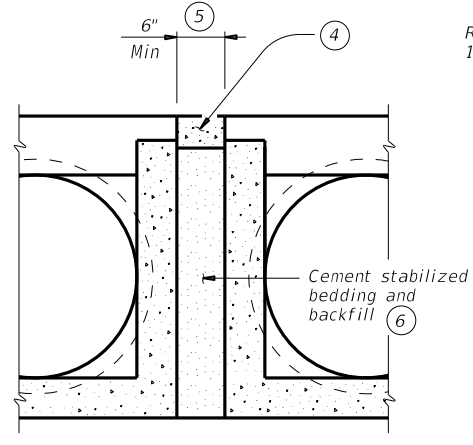
**OPTION A**



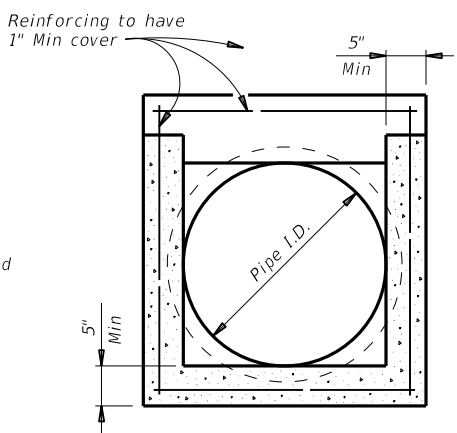
**OPTION B**

**END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS**

(If required)

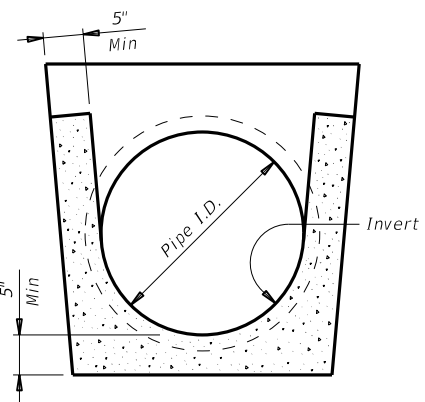


**MULTIPLE PIPE INSTALLATION**

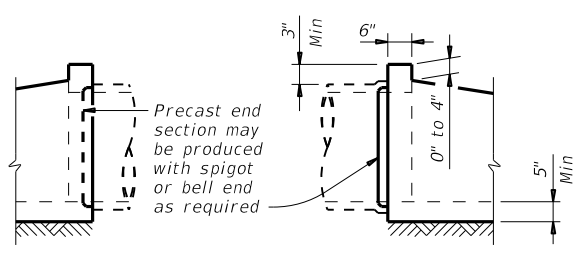


**OPTION WITH SQUARE BOTTOM**

**SECTION A-A**



**OPTION WITH INVERT BOTTOM**



**OPTIONAL JOINT FOR RCP**

(Showing joint between RCP and precast safety end treatment.)

**REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS**

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (7)	"D" (1)	Slope	Min Length	Pipe Runners Required		Required Pipe Runner Size		
						Single Pipe	Multiple Pipe	Nominal Dia.	O.D.	I.D.
12"	2"	1.15"	17.00"	6:1	4' - 9"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
15"	2 1/4"	1.30"	20.50"	6:1	6' - 5"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
18"	2 1/2"	1.60"	24.00"	6:1	8' - 0"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
24"	3"	1.95"	31.00"	6:1	11' - 3"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
30"	3 1/2"	2.65"	38.50"	6:1	14' - 8"	No	Yes	4" STD	4.500"	4.026"
36"	4"	2.75"	45.50"	6:1	17' - 11"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 1/2"	2.7"	52.50"	6:1	21' - 2"	Yes	Yes	4" STD	4.500"	4.026"

- (1) Dimension "D" is based on reinforced concrete pipe (RCP) meeting the requirements of ASTM C-76, Class III, (RCP Wall "B" thickness). Adjust "D" for any other wall thickness used. For thermoplastic pipe (TP) take into account the annular space requirements for grouted connections.
- (2) Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.
- (3) Toewall to be used only when dimension is shown elsewhere in the plans.
- (4) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment."
- (5) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.
- (6) Provide cement stabilized bedding and backfill in accordance with the Item 400, "Excavation and Backfill for Structures." Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment." When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.
- (7) Thermoplastic pipe wall thickness may vary. Adjust accordingly. Thermoplastic pipe requires the safety end treatments to have a bell end for grouted connections.

**GENERAL NOTES:**

Precast safety end treatment for reinforced concrete pipe (RCP), and thermoplastic pipe (TP) may be used for TYPE II end treatment as specified in Item "Safety End Treatment."

When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Manufacture this product in accordance with Item 467, "Safety End Treatment" except as noted below:

A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" - D12 x D12 or 5"x5" - D10 x D10 welded wire reinforcement (WWR).

B. For precast (steel formed) sections, provide Class "C" concrete (f'c = 3,600 psi).

At the option and expense of the Contractor the next larger size of safety end treatment may be furnished; as long as the "D" dimension cast is that of the required size of pipe.

Pipe runners are designed for a traversing load of 10,000 Lbs at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Provide pipe runners meeting the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Galvanize all steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

Connect RCP using the Optional Joint for RCP detail shown or in accordance with Item 464, "Reinforced Concrete Pipe." Connect TP by grouting. See Pipe and Box Grouted Connections (PBG) standard for grouted connections with TP and precast safety end treatment.

**Bridge Division Standard**

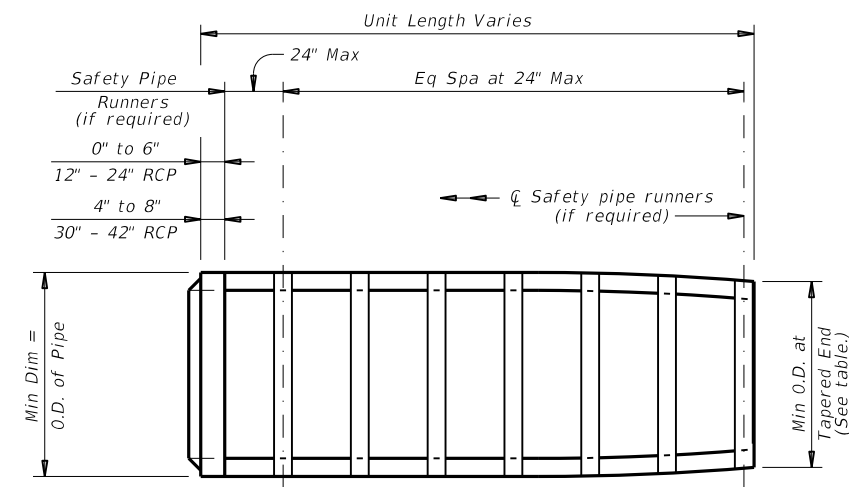
**PRECAST SAFETY END TREATMENT**  
**TYPE II ~ PARALLEL DRAINAGE**

**PSET-SP**

FILE:	DN: RLW	CK: KLR	DW: JTR	CK: GAF
0916	February 2020	CONT	SECT	JOB
REVISIONS	0916	28	082	CR 3861
12-21: Added 42" TP	DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO		066	

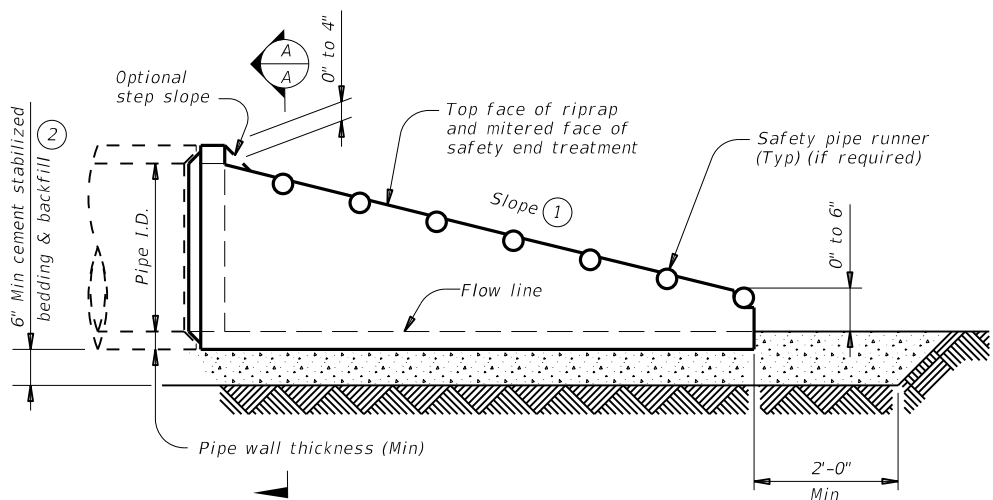
DATE: FILE:

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



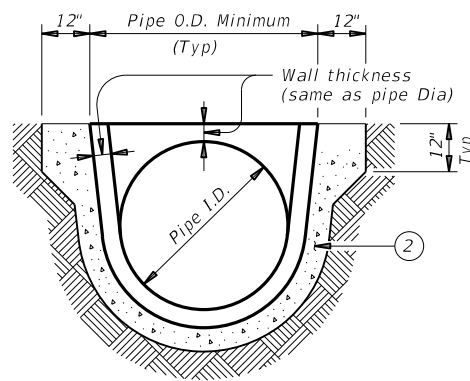
**PLAN VIEW - 12" THRU 24"**

(Showing spigot end connection.)

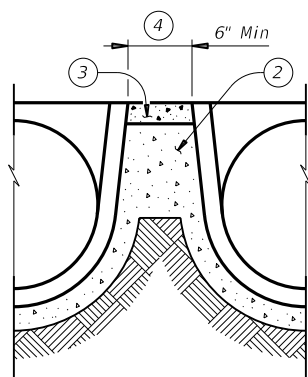


**LONGITUDINAL ELEVATION - 12" THRU 24"**

(Showing spigot end connection.)

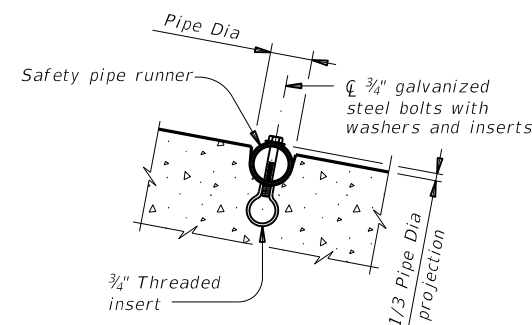


**SECTION A-A**



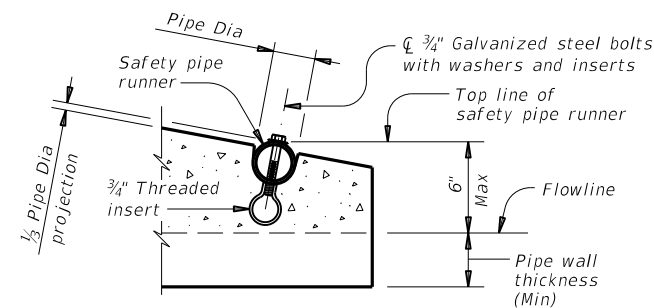
**MULTIPLE PIPE INSTALLATION**

- ① Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.
- ② Provide cement stabilized bedding and backfill in accordance with the Item, "Excavation and Backfill for Structures." Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment." When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.
- ③ Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment."
- ④ Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.
- ⑤ Safety pipe runners are required for multiple pipe culverts with more than two pipes.

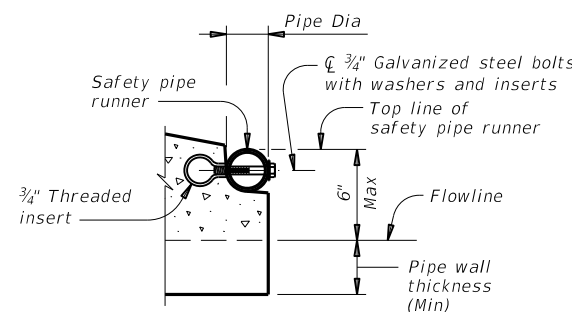


**INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS**

(If required)



**OPTION A**



**OPTION B**

**END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS**

(If required)

**REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS**

Pipe I.D.	Min Wall Thickness	Min O.D.	Min O.D. at Tapered End	Min Reinf Requirements (sq. in. per ft. of Pipe)	Max Slope	Min Length of Unit	Pipe Runner Requirements		Required Pipe Runner Sizes		
							Single Pipe	Multiple Pipe	Nominal Dia	O.D.	I.D.
12"	2"	16"	16"	0.07 Circ.	6:1	4'-0"	No	(5)	3" STD	3.500"	3.068"
15"	2 1/4"	19 1/2"	19"	0.07 Circ.	6:1	5'-8"	No	(5)	3" STD	3.500"	3.068"
18"	2 1/2"	23"	21 1/2"	0.07 Circ.	6:1	7'-3"	No	(5)	3" STD	3.500"	3.068"
24"	3"	30"	27"	0.07 Circ.	6:1	10'-6"	No	(5)	3" STD	3.500"	3.068"
30"	3 1/2"	37"	31"	0.18 Circ.	6:1	12'-1"	No	Yes	4" STD	4.500"	4.026"
36"	4"	44"	36"	0.19 Ellip.	6:1	15'-4"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 1/2"	51"	41 1/2"	0.23 Ellip.	6:1	18'-7"	Yes	Yes	4" STD	4.500"	4.026"

**MATERIAL NOTES:**

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.  
 Provide pipe runners meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.  
 Galvanize steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

**GENERAL NOTES:**

Precast safety end treatment for reinforced concrete pipe (RCP) may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment."  
 When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.  
 Manufacture precast concrete end sections in accordance with Item 464, "Reinforced Concrete Pipe" and in accordance with ASTM Specification C-76, Class III, Wall B for circular pipe.  
 Provide precast concrete end sections with a spigot or bell end for compatibility to upstream or downstream end conditions with sufficient annular space to allow for grout, mortar, cold applied asphalt joint compound or pre-formed plastic gasket material.  
 Methods of lifting shall be provided by the manufacturer for ease of loading, unloading and installation.  
 Pipe runners are designed for a traversing load of 10,000 Lbs at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

**Texas Department of Transportation** Bridge Division Standard

**PRECAST SAFETY END TREATMENT**  
**TYPE II ~ PARALLEL DRAINAGE**

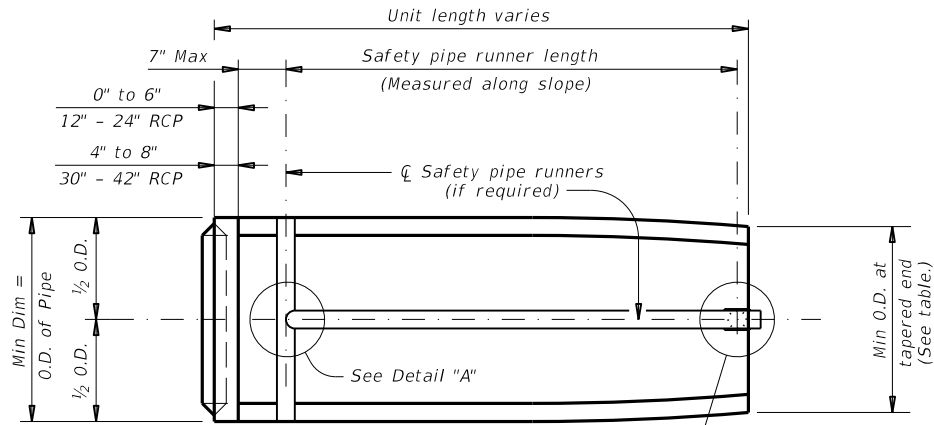
**PSET-RP**

FILE:	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0916	28	082	CR 3861
	DIST	COUNTY	SHEET NO.	
	CRP	SAN PATRICIO	067	

DATE: FILE:

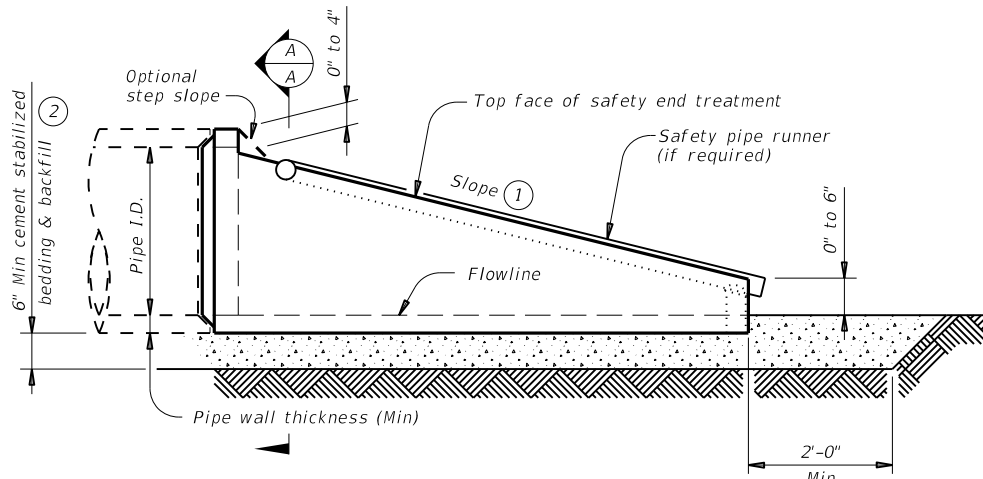
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act." No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: FILE:



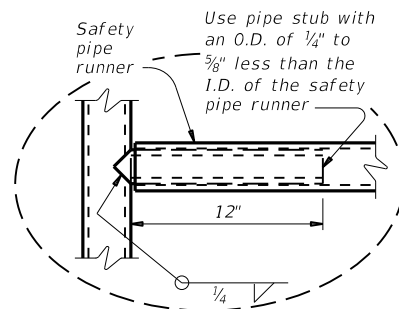
**PLAN VIEW**

(Showing spigot end connection.)

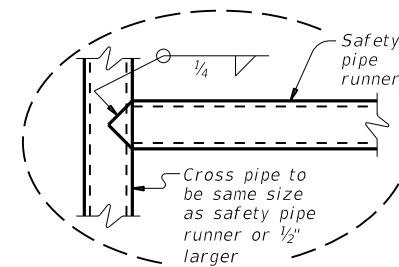


**LONGITUDINAL ELEVATION**

(Showing spigot end connection.)

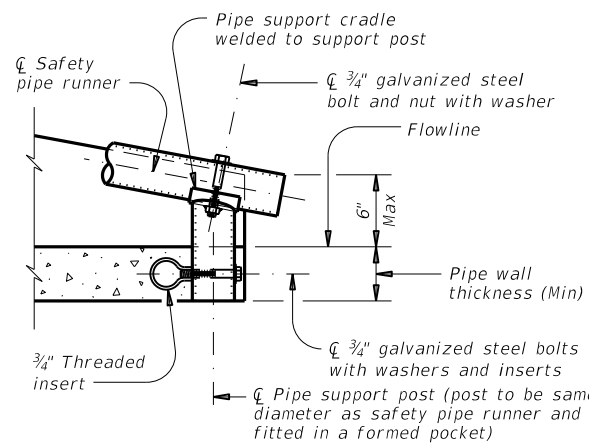


**OPTION A**



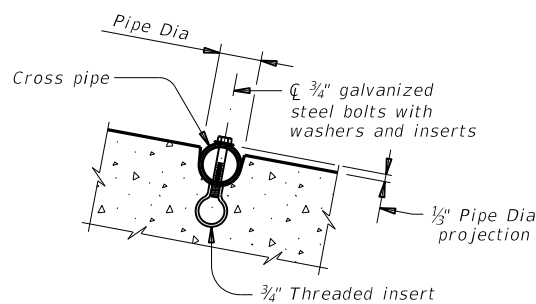
**OPTION B**

**DETAIL A**



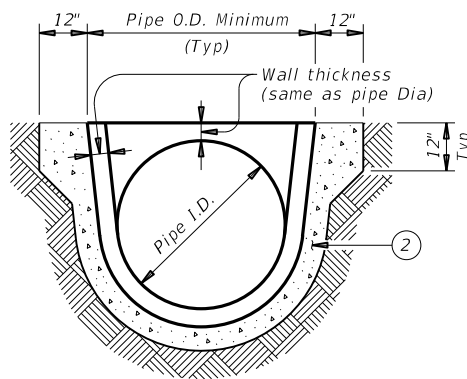
**END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS**

(If required)

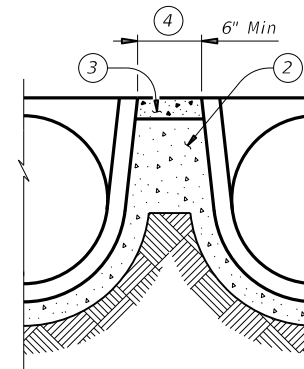


**INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS**

(If required)



**SECTION A-A**



**MULTIPLE PIPE INSTALLATION**

**MAX SAFETY PIPE RUNNER LENGTHS AND REQUIRED SAFETY PIPE RUNNER SIZES**

Max Safety Pipe Runner Length	Required Pipe Runner Size		
	Pipe Size	Pipe O.D.	Pipe I.D.
11' - 2"	3" STD	3.500"	3.068"
15' - 6"	3 1/2" STD	4.000"	3.548"
20' - 10"	4" STD	4.500"	4.026"
35' - 4"	5" STD	5.563"	5.047"

- Slope as shown elsewhere in the plans. Slope of 3:1 or flatter is required for vehicle safety.
- Provide cement stabilized bedding and backfill in accordance with the Item, "Excavation and Backfill for Structures." Bedding and backfill is considered subsidiary to the Item "Safety End Treatment." When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.
- Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap be considered subsidiary to the Item "Safety End Treatment."
- Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

**REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS**

Pipe I.D.	Min Wall Thickness	Min O.D.	Min O.D. at Tapered End	Min Reinf Requirements (sq. in. / ft. of pipe)	Slope	Minimum Length of Unit	Single Pipe		Multiple Pipe	
							Skew	Pipe Runners Required	Skew	Pipe Runners Required
12"	2"	16"	16"	0.07 Circ.	3:1	2' - 0"	≤ 45°	No	≤ 45°	No
15"	2 1/4"	19 1/2"	19"	0.07 Circ.	3:1	2' - 10"	≤ 45°	No	≤ 45°	No
18"	2 1/2"	23"	21 1/2"	0.07 Circ.	3:1	3' - 8"	≤ 45°	No	≤ 45°	No
24"	3"	30"	27"	0.07 Circ.	3:1	5' - 3"	≤ 45°	No	≤ 30°	No
									4:1	7' - 0"
30"	3 1/2"	37"	31"	0.18 Circ.	3:1	6' - 3"	≤ 15°	No	≤ 15°	No
									4:1	8' - 2"
36"	4"	44"	36"	0.19 Ellip.	3:1	7' - 10"	= 0°	No	≥ 0°	Yes
									4:1	10' - 4"
42"	4 1/2"	51"	41 1/2"	0.23 Ellip.	3:1	9' - 6"	≥ 0°	Yes	≥ 0°	Yes
									4:1	12' - 6"

**MATERIAL NOTES:**

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise. Provide safety pipe runners, cross pipes, pipe support posts, and pipe stubs meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52. Galvanize all steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

**GENERAL NOTES:**

Precast safety end treatment for reinforced concrete pipe (CRP) may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment." When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans. Manufacture precast concrete end sections in accordance with Item 464, "Reinforced Concrete Pipe" and in accordance with ASTM Specification C-76, Class III, Wall B for circular pipe. Provide precast concrete end sections with a spigot or bell end for compatibility to upstream or downstream end conditions with sufficient annular space to allow for grout, mortar, cold applied asphalt joint compound or pre-formed plastic gasket material. Methods of lifting shall be provided by the manufacturer for ease of loading, unloading, and installation. Pipe runners are designed for a traversing load of 1,800 Lbs at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

**Texas Department of Transportation** Bridge Division Standard

**PRECAST SAFETY END TREATMENT TYPE II ~ CROSS DRAINAGE**

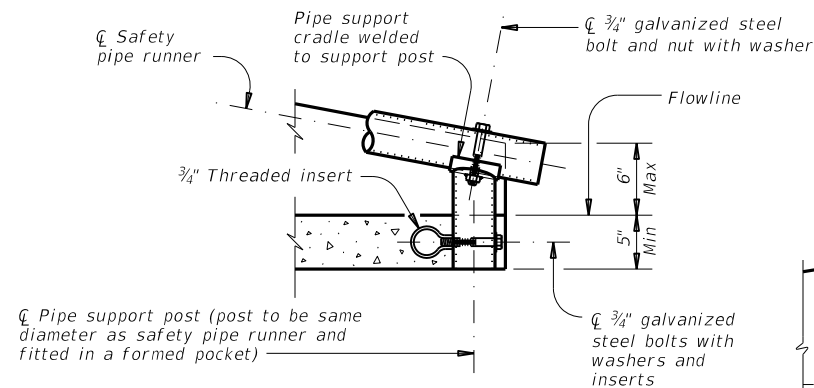
**PSET-RC**

FILE:	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT SECT	JOB	HIGHWAY	
REVISIONS	0916 28	082	CR 3861	
	DIST	COUNTY	SHEET NO.	
	CRP	SAN PATRICIO	068	

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.

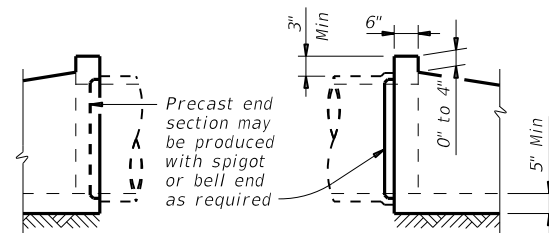
## REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (8)	"D" (1)	Slope	Min Length of Unit	Single Pipe		Multiple Pipes	
						Skew	Pipe Runners Required	Skew	Pipe Runners Required
12"	2"	1.15"	17.00"	3:1	2' - 11"	≤ 45°	No	≤ 45°	No
				4:1	3' - 6"				
				6:1	4' - 9"				
15"	2 1/4"	1.30"	20.50"	3:1	3' - 8"	≤ 45°	No	≤ 45°	No
				4:1	4' - 7"				
				6:1	6' - 5"				
18"	2 1/2"	1.60"	24.00"	3:1	4' - 6"	≤ 45°	No	≤ 45°	No
				4:1	5' - 8"				
				6:1	8' - 0"				
24"	3"	1.95"	31.00"	3:1	6' - 2"	≤ 45°	No	= 30°	No
				4:1	7' - 10"				
				6:1	11' - 3"				
30"	3 1/2"	2.65"	38.50"	3:1	7' - 10"	= 15°	No	= 15°	No
				4:1	10' - 1"				
				6:1	14' - 8"				
36"	4"	2.75"	45.50"	3:1	9' - 5"	= 0°	No	= 0°	Yes
				4:1	12' - 3"				
				6:1	17' - 11"				
42"	4 1/2"	2.7"	52.50"	3:1	11' - 1"	≥ 0°	Yes	≥ 0°	Yes
				4:1	14' - 5"				
				6:1	21' - 2"				



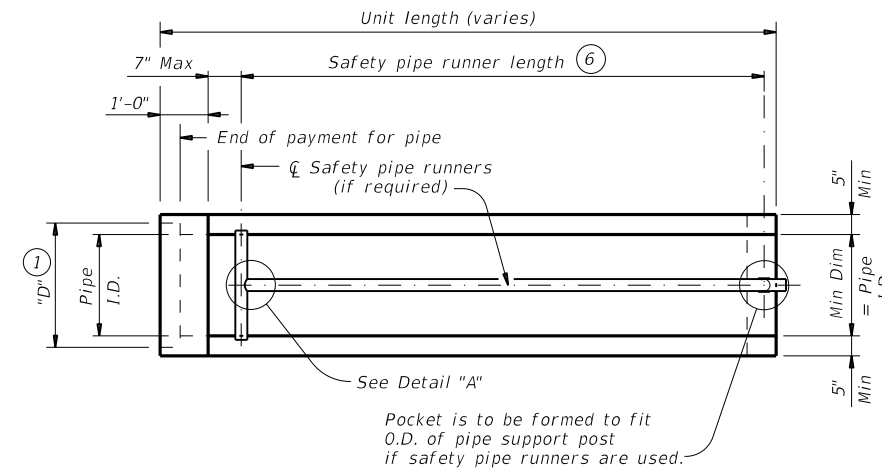
### END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)



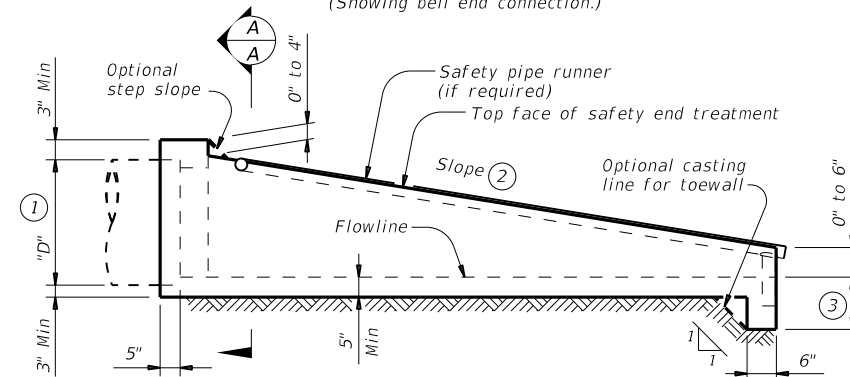
### OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment)



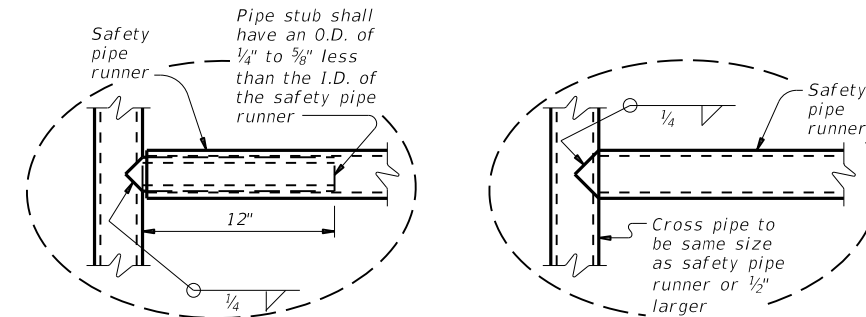
### PLAN

(Showing bell end connection.)



### LONGITUDINAL ELEVATION

(Showing bell end connection.)

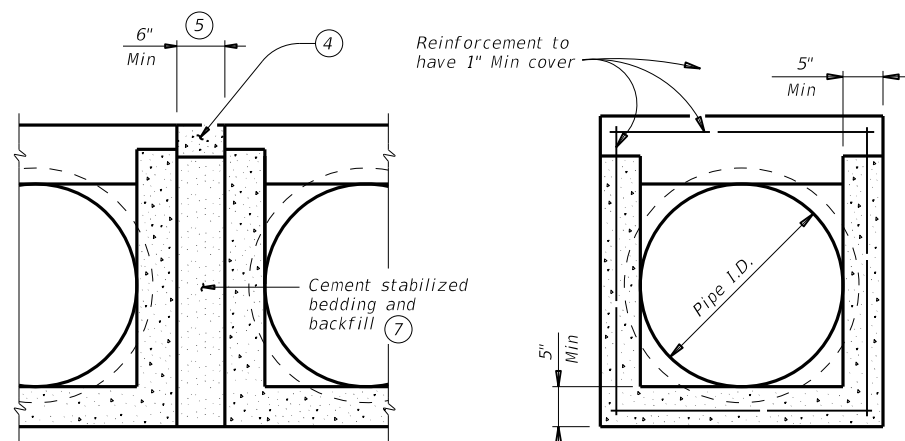


### OPTION A

### DETAIL A

### OPTION B

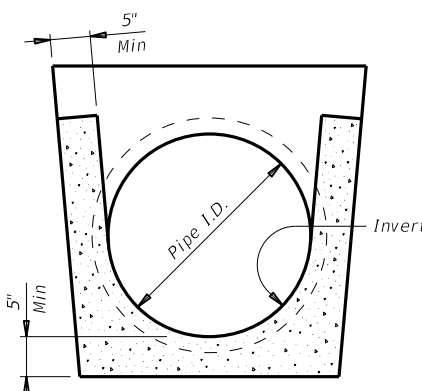
(If required)



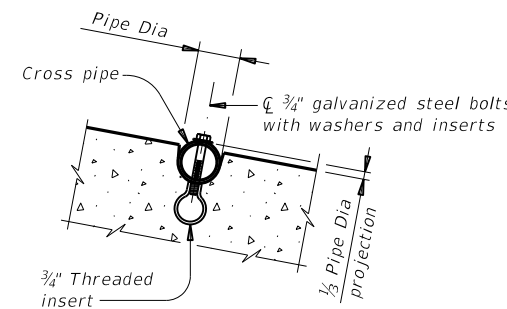
### MULTIPLE PIPE INSTALLATION

### OPTION WITH SQUARE BOTTOM

### SECTION A-A



### OPTION WITH INVERT BOTTOM



### INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)

## SAFETY PIPE RUNNER DIMENSIONS

Max Safety Pipe Runner Length	Required Pipe Runner Size		
	Pipe Size	Pipe O.D.	Pipe I.D.
11' - 2"	3" STD	3.500"	3.068"
15' - 6"	3 1/2" STD	4.000"	3.548"
20' - 10"	4" STD	4.500"	4.026"
35' - 4"	5" STD	5.563"	5.047"

- ① Dimension "D" is based on reinforced concrete pipe (RCP) meeting the requirements of ASTM C-76, Class III, (RCP Wall "B" thickness). Adjust "D" for any other wall thickness used. For thermoplastic pipe (TP) take into account the annular space requirements for grouted connections.
- ② Slope as shown elsewhere in plans. Slope of 3:1 or flatter is required for vehicle safety.
- ③ Toewall to be used only when dimension is shown elsewhere in the plans.
- ④ Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment."
- ⑤ Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.
- ⑥ Measured along slope.
- ⑦ Provide cement stabilized bedding and backfill in accordance with the Item 400, "Excavation and Backfill for Structures." Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment." When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.
- ⑧ Thermoplastic pipe wall thickness may vary. Adjust accordingly. Thermoplastic pipe requires the safety end treatments to have a bell end for grouted connections.

### GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (RCP), and thermoplastic pipe (TP) may be used for TYPE II end treatment as specified in Item "Safety End Treatment."

When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Manufacture this product in accordance with Item 467, "Safety End Treatment" except as noted below:

- A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" - D12 x D12 or 5"x5" - D10 x D10 welded wire reinforcement (WWR).
- B. For precast (steel formed) sections, provide Class "C" concrete (f'c = 3,600 psi).

At the option and expense of the Contractor, the next larger size of safety end treatment may be furnished as long as the "D" dimension cast is that of the required size of pipe.

Pipe runners are designed for a traversing load of 1,800 Lbs at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

Provide safety pipe runners, cross pipes, pipe support posts, and pipe stubs meeting the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Galvanize all steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

Connect RCP using the Optional Joint for RCP detail shown or in accordance with Item 464 "Reinforced Concrete Pipe." Connect TP by grouting. See Pipe and Box Grouted Connections (PBGC) standard for grouted connections with TP and precast safety end treatment.



## PRECAST SAFETY END TREATMENT TYPE II ~ CROSS DRAINAGE

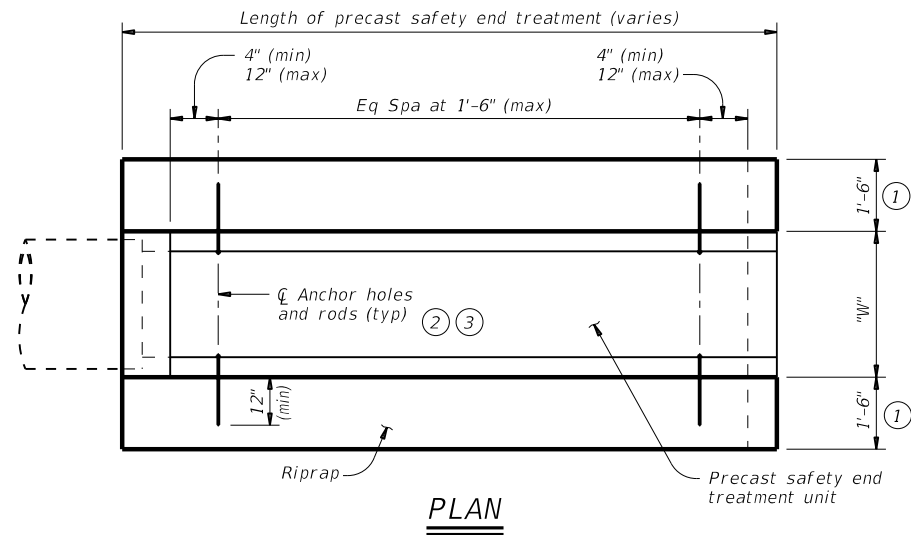
### PSET-SC

FILE:	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-21: Added 42" TP	0916	28	082	CR 3861
	DIST	COUNTY	SHEET NO.	
	CRP	SAN PATRICIO	069	

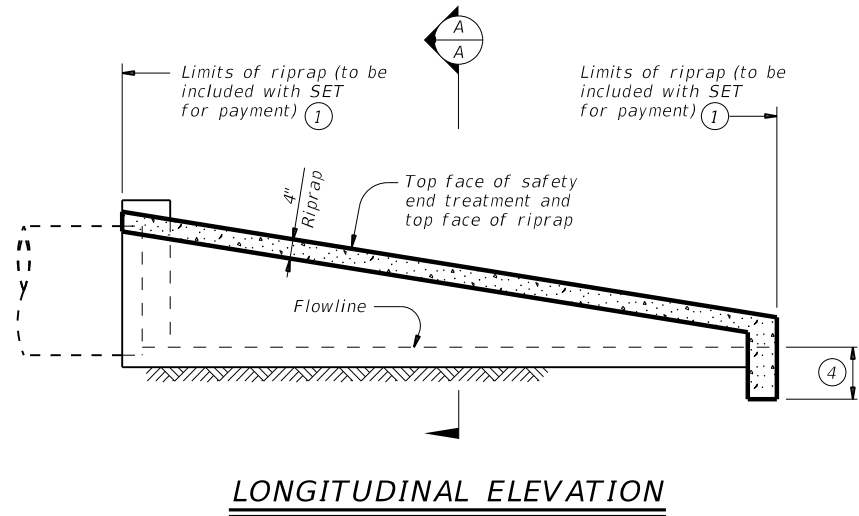
DATE:  
FILE:

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

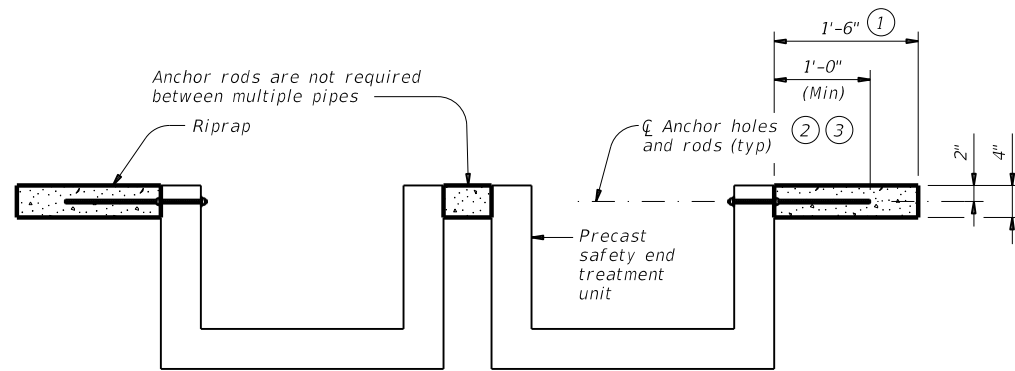
DATE: FILE:



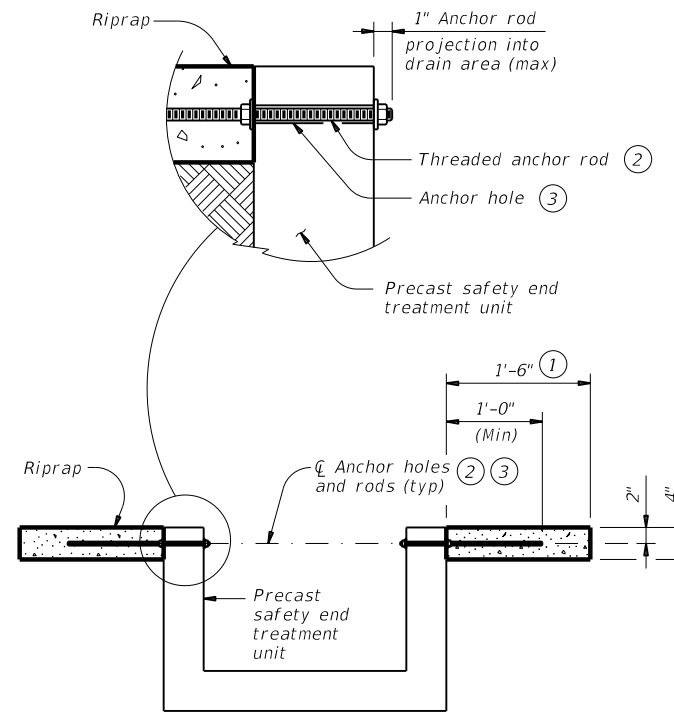
**PLAN**



**LONGITUDINAL ELEVATION**



**MULTIPLE PIPE INSTALLATION**



**SINGLE PIPE INSTALLATION**

**SECTION A-A**

**ESTIMATED CONCRETE RIPRAP QUANTITIES (CY)**

Nominal Culvert (Pipe) I.D.	PSET-SC and PSET-SP Standards					PSET-RC and PSET-RP Standards		
	Unit Width "W"	Side Slope			Unit Width "W"	Side Slope		
		3:1	4:1	6:1		3:1	4:1	6:1
12"	23.0"	0.1	0.2	0.2	16.0"	0.1	0.1	0.2
15"	26.5"	0.2	0.2	0.3	19.5"	0.1	0.2	0.2
18"	30.0"	0.2	0.2	0.3	23.0"	0.2	0.2	0.3
24"	37.0"	0.3	0.3	0.5	30.0"	0.2	0.3	0.4
30"	44.5"	0.3	0.4	0.6	37.0"	0.3	0.3	0.5
36"	51.5"	0.4	0.5	0.7	44.0"	0.3	0.4	0.6
42"	58.5"	0.5	0.6	0.8	51.0"	0.4	0.5	0.7

- ① Riprap placed beyond the limits shown will be paid as concrete riprap in accordance with Item 432, "Riprap." When riprap is cast integrally with the precast safety end treatment, this dimension is 1'-0" minimum.
- ② 1#2" Dia ASTM A307 Gr A threaded anchor rod with 2 nuts and 2 washers. Galvanize all components in accordance with Item 445, "Galvanizing." Repair galvanizing that is damaged during transport or construction in accordance with the specifications.
- ③ 3#4" through holes in walls of safety end treatment for riprap anchor rods may be drilled with rotary (coring or masonry) type drilling equipment or may be formed. Do not use percussive (star) type drilling equipment. If holes are drilled, patch spalls in the inside face of the wall exceeding 1#2" from the holes.
- ④ Provide riprap toe wall when dimension is shown elsewhere in the plans or when field conditions require a toe wall.
- ⑤ Quantities shown are for one end of one reinforced concrete pipe culvert. For multiple pipe culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only. Quantities are based on the minimum unit lengths shown on the Precast Safety End Treatment (SET) standard sheets.

**MATERIAL NOTES:**

Provide Class "B" riprap in accordance with Item 432, "Riprap." Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise. The anchor rods shown are always required.

**GENERAL NOTES:**

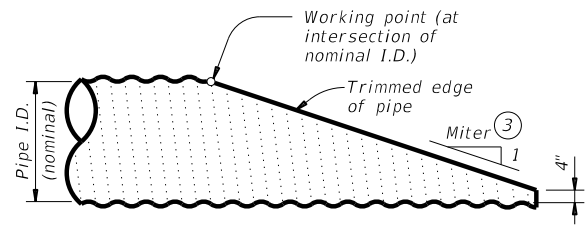
Precast safety end treatment for reinforced concrete pipe may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment." Refer to PSET-SC or PSET-SP standard sheets for details of square safety end treatments not shown. Refer to PSET-RC or PSET-RP standard sheets for details of round safety end treatments not shown. For precast units with integrally cast riprap, substitute reinforcing steel in the amount on 0.26 in./ft. minimum for the threaded anchor rods shown. When requested, submit sealed engineering drawings for approval prior to construction. Shop drawings will not be required. Note that a proprietary precast unit with integral riprap is available from L&R Precast Concrete Works, Inc. (956) 583-6293 or www.lrpccast.com. Payment for riprap and toewalls is included in the price bid for each safety end treatment.

These riprap details are only applicable when notes that require placement of riprap with precast safety end treatments are shown elsewhere in the plans.  
Precast units with integrally cast riprap are permitted unless noted otherwise on the plans.

				<b>Bridge Division Standard</b>		
<b>PRECAST SAFETY END TREATMENT</b> <b>TYPE II</b> <b>RIPRAP DETAILS</b> <b>PSET-RR</b>						
FILE:	DN: GAF	CK: TxDOT	DW: JRP	CK: GAF		
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY		
REVISIONS	0916	28	082	CR 3861		
	DIST	COUNTY		SHEET NO.		
	CRP	SAN PATRICIO		070		



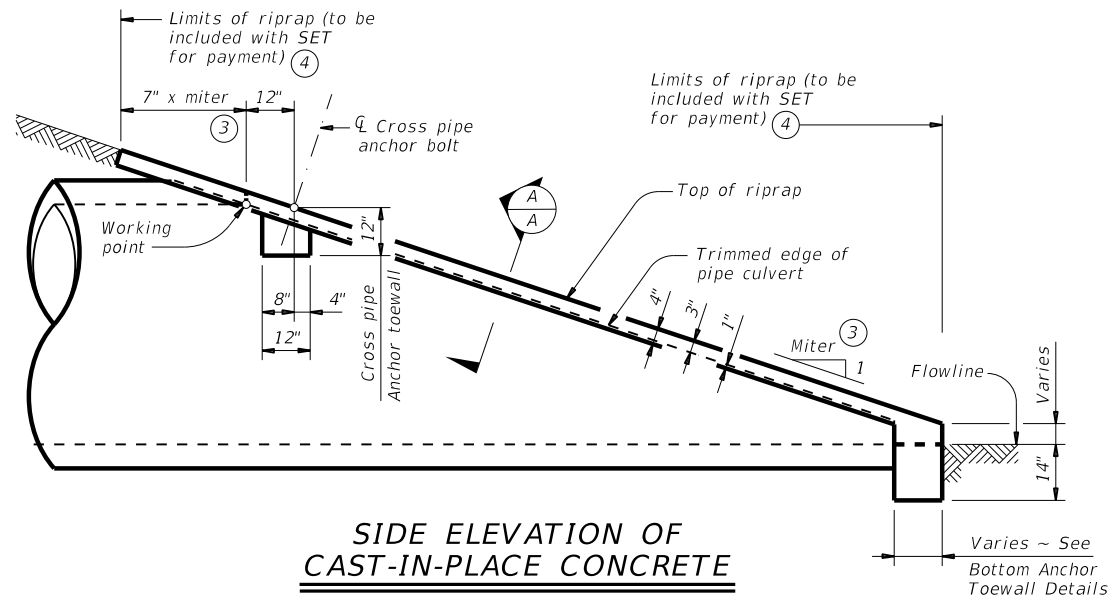
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act." No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



NOTE: All pipe runners, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

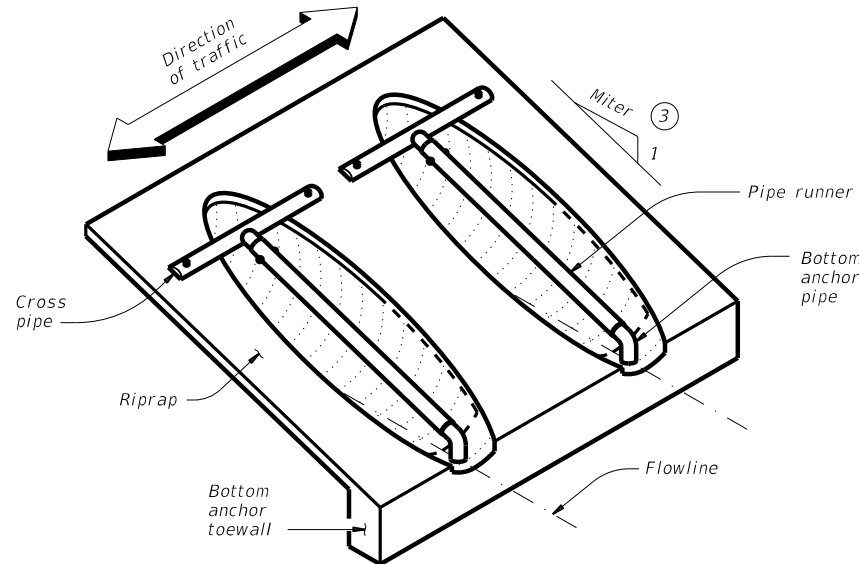
**SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER**

(Showing corrugated metal pipe (CMP) culvert. Details of reinforced concrete pipe (RCP) culvert are similar.)



**SIDE ELEVATION OF CAST-IN-PLACE CONCRETE**

(Showing reinforced concrete pipe (RCP) culvert. Details of corrugated metal pipe (CMP) culvert are similar. Pipe runners not shown for clarity)



**ISOMETRIC VIEW OF TYPICAL INSTALLATION**

(Showing installation with no skew.)

**CROSS PIPE LENGTHS AND PIPE RUNNER LENGTHS (1)(2)**

Nominal Culvert I.D.	Pipe Culvert Spa ~ G	Cross Pipe Length	Pipe Runner Length											
			3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
			0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
24"	1' - 7"	3' - 5"	N/A	N/A	N/A	5' - 10"	N/A	N/A	N/A	8' - 1"	N/A	N/A	N/A	12' - 9"
27"	1' - 8"	3' - 8"	N/A	N/A	5' - 5"	6' - 11"	N/A	N/A	7' - 7"	9' - 7"	N/A	N/A	11' - 11"	14' - 11"
30"	1' - 10"	3' - 11"	N/A	N/A	6' - 4"	8' - 0"	N/A	N/A	8' - 9"	11' - 0"	N/A	N/A	13' - 8"	17' - 0"
33"	1' - 11"	4' - 2"	6' - 2"	6' - 5"	7' - 3"	9' - 1"	8' - 6"	8' - 10"	10' - 0"	12' - 5"	13' - 3"	13' - 9"	15' - 5"	19' - 2"
36"	2' - 1"	4' - 5"	6' - 11"	7' - 3"	8' - 2"	10' - 2"	9' - 6"	9' - 11"	11' - 2"	13' - 10"	14' - 9"	15' - 3"	17' - 2"	21' - 3"
42"	2' - 4"	4' - 11"	8' - 6"	8' - 10"	9' - 11"	12' - 4"	11' - 7"	12' - 0"	13' - 6"	16' - 8"	17' - 9"	18' - 5"	20' - 8"	25' - 7"
48"	2' - 7"	5' - 5"	10' - 1"	10' - 5"	11' - 9"	N/A	13' - 7"	14' - 2"	15' - 10"	N/A	20' - 9"	21' - 6"	24' - 2"	N/A
54"	3' - 0"	5' - 11"	11' - 8"	12' - 1"	N/A	N/A	15' - 8"	16' - 3"	N/A	N/A	23' - 10"	24' - 8"	N/A	N/A
60"	3' - 3"	6' - 5"	13' - 3"	N/A	N/A	N/A	17' - 9"	N/A	N/A	N/A	26' - 10"	N/A	N/A	N/A

**TYPICAL PIPE CULVERT MITERS (3)**

Side Slope	0° Skew	15° Skew	30° Skew	45° Skew
3:1	3:1	3.106:1	3.464:1	4.243:1
4:1	4:1	4.141:1	4.619:1	5.657:1
6:1	6:1	6.212:1	6.928:1	8.485:1

**CONDITIONS WHERE PIPE RUNNERS ARE NOT REQUIRED (2)**

Nominal Culvert I.D.	Single Pipe Culvert	Multiple Pipe Culverts
12" thru 21"	Skews thru 45°	Skews thru 45°
24"	Skews thru 45°	Skews thru 30°
27"	Skews thru 30°	Skews thru 15°
30"	Skews thru 15°	Skews thru 15°
33"	Skews thru 15°	Always required
36"	Normal (no skew)	Always required
42" thru 60"	Always required	Always required

**STANDARD PIPE SIZES AND MAX PIPE RUNNER LENGTHS (1)**

Pipe Size	Pipe O.D.	Pipe I.D.	Max Pipe Runner Length
2" STD	2.375"	2.067"	N/A
3" STD	3.500"	3.068"	10' - 0"
4" STD	4.500"	4.026"	19' - 8"
5" STD	5.563"	5.047"	34' - 2"

**ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) (5)**

Nominal Culvert I.D.	3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
12"	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.7	0.7	0.7	0.8
15"	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.9
18"	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.8	0.8	0.8	0.9	1.0
21"	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.9	0.9	0.9	1.0	1.2
24"	0.6	0.7	0.7	0.8	0.8	0.8	0.8	1.0	1.0	1.0	1.1	1.3
27"	0.7	0.7	0.8	0.9	0.8	0.9	0.9	1.1	1.1	1.1	1.2	1.4
30"	0.8	0.8	0.8	0.9	0.9	0.9	1.0	1.2	1.2	1.2	1.3	1.6
33"	0.8	0.8	0.9	1.0	1.0	1.0	1.1	1.3	1.3	1.4	1.5	1.7
36"	0.9	0.9	0.9	1.1	1.1	1.1	1.2	1.4	1.4	1.5	1.6	1.8
42"	1.0	1.0	1.1	1.3	1.2	1.3	1.3	1.6	1.6	1.7	1.8	2.1
48"	1.1	1.1	1.2	N/A	1.4	1.4	1.5	N/A	1.9	1.9	2.1	N/A
54"	1.3	1.3	N/A	N/A	1.6	1.6	N/A	N/A	2.1	2.1	N/A	N/A
60"	1.4	N/A	N/A	N/A	1.7	N/A	N/A	N/A	2.3	N/A	N/A	N/A

(1) Provide pipe runner of the size shown in the tables. Provide cross pipe of the same size as the pipe runner. Provide cross pipe stub out and bottom anchor pipe of the next smaller size pipe as shown in the Standard Pipe Sizes and Max Pipe Runner Lengths table.

(2) This standard allows for the placement of only one pipe runner across each culvert pipe opening. In order to limit the clear opening to be traversed by an errant vehicle, the following conditions must be met:

- For 60" culvert pipes, the skew must not exceed 0°.
- For 54" culvert pipes, the skew must not exceed 15°.
- For 48" culvert pipes, the skew must not exceed 30°.
- For all culvert pipe sizes 42" and less, the skew must not exceed 45°.

If the above conditions cannot be met, the designer should consider using a safety end treatment with flared wings. For further information, refer to the TxDOT Roadway Design Manual.

(3) Miter = slope of mitered end of pipe culvert.

(4) Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap."

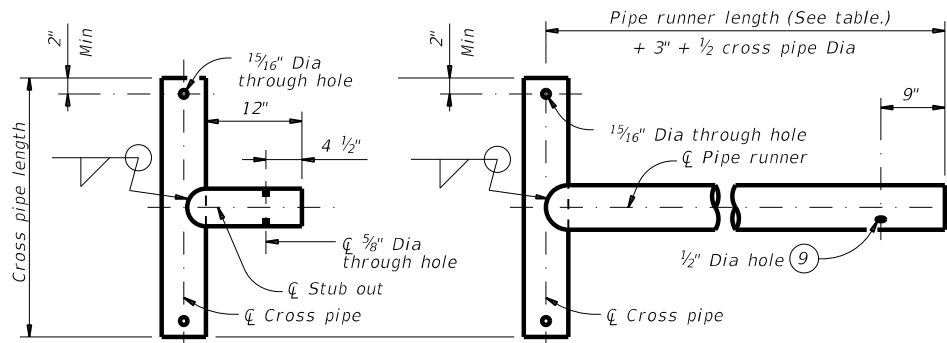
(5) Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.



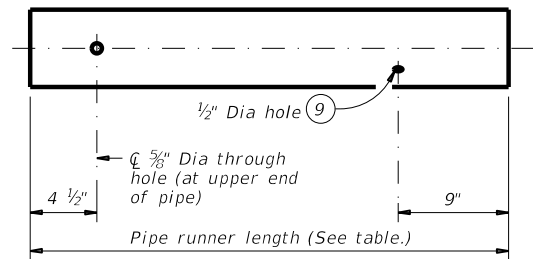
**SAFETY END TREATMENT FOR 12" DIA TO 60" DIA PIPE CULVERTS TYPE II ~ CROSS DRAINAGE SETP-CD**

FILE:	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0916	28	082	CR 3861
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATRICIO		071

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.

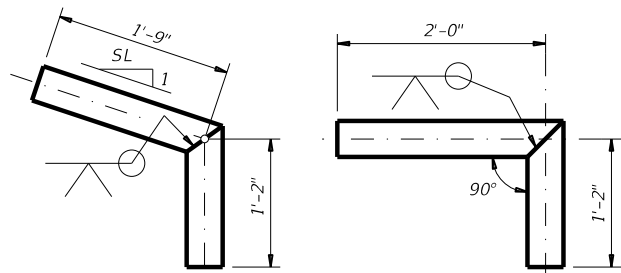


**OPTION A1** **OPTION A2**  
**CROSS PIPE AND CONNECTIONS DETAILS**

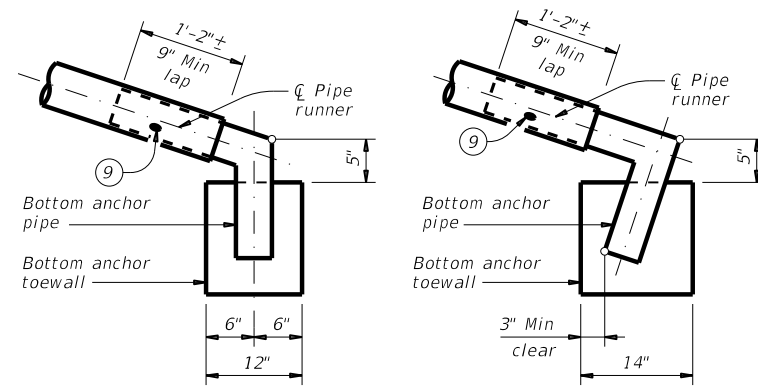


NOTE: The separate pipe runner shown is required when Cross Pipe Connection Option A1 is used.

**PIPE RUNNER DETAILS**

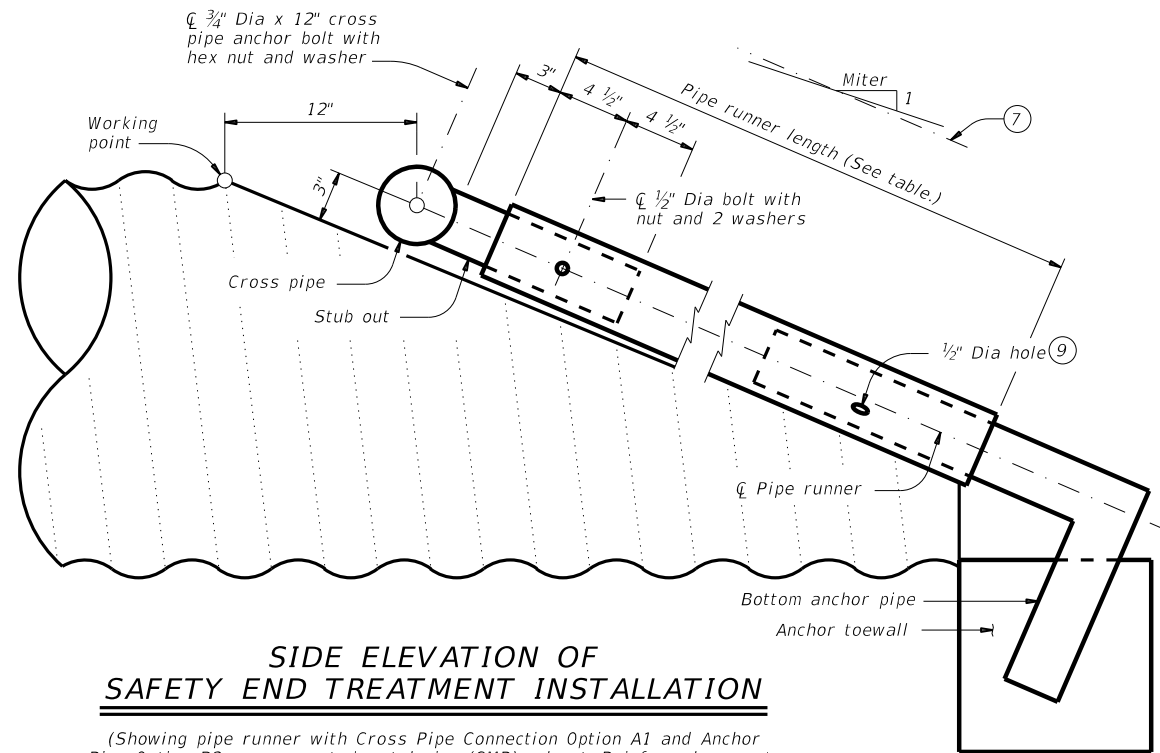


**OPTION B1** **OPTION B2**  
**BOTTOM ANCHOR PIPE DETAILS** ⑩



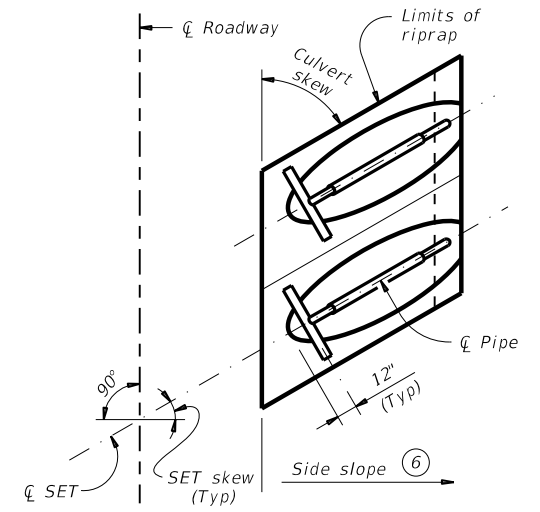
**OPTION B1** **OPTION B2**  
**BOTTOM ANCHOR TOEWALL DETAILS**

(Culvert and riprap not shown for clarity.)

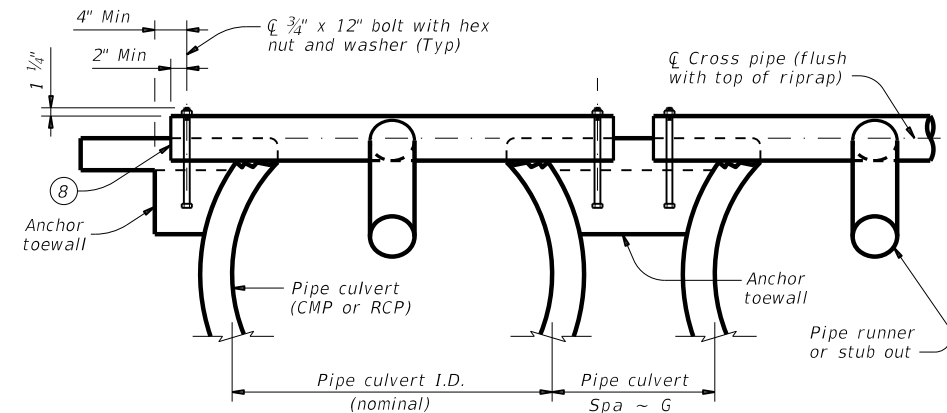


**SIDE ELEVATION OF SAFETY END TREATMENT INSTALLATION**

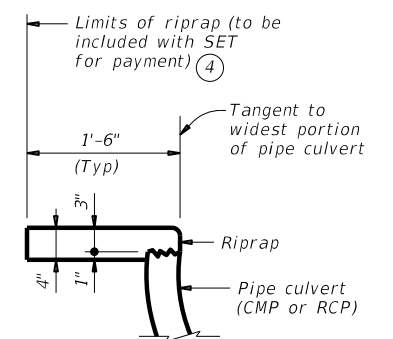
(Showing pipe runner with Cross Pipe Connection Option A1 and Anchor Pipe Option B2 on corrugated metal pipe (CMP) culvert. Reinforced concrete pipe culvert (RCP) details are similar. Riprap not shown for clarity)



**PLAN OF SKEWED INSTALLATION**



**SHOWING CROSS PIPE AND ANCHOR TOEWALL**



**SHOWING TYPICAL PIPE CULVERT AND RIPRAP**

**SECTION A-A**

- ④ Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap."
- ⑥ Recommended values of side slope are 3:1, 4:1, and 6:1. All quantities, calculations, and dimensions shown herein are based on these recommended values. Slope of 3:1 or flatter is required for vehicle safety.
- ⑦ Note that actual slope of pipe runner may vary slightly from side slope of riprap and trimmed culvert pipe edge.
- ⑧ Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access.
- ⑨ After installation, inspect the 1/2" hole to ensure that the lap of the pipe runner with the bottom anchor pipe is adequate.
- ⑩ At fabricator's option, a heat bend to a smooth 5" radius or a manufactured elbow (of the same material as the runner) may be substituted for the mitered and welded joint in the bottom anchor pipe.

**MATERIAL NOTES:**

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.  
Provide pipe runners, cross pipes, and anchor pipes conforming to the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.  
Provide ASTM A307 bolts and nuts.  
Galvanize all steel components, except concrete reinforcing, after fabrication.  
Repair galvanizing damaged during transport or construction in accordance with the specifications.

**GENERAL NOTES:**

Pipe runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.  
Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the pipe runners.  
Payment for riprap and toewall is included in the price bid for each safety end treatment.  
Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap."

				<b>Bridge Division Standard</b>		
<b>SAFETY END TREATMENT FOR 12" DIA TO 60" DIA PIPE CULVERTS TYPE II ~ CROSS DRAINAGE SETP-CD</b>						
FILE:	DN: GAF	CK: CAT	DW: JRP	CK: GAF		
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY		
REVISIONS	0916	28	082	CR 3861		
	DIST	COUNTY		SHEET NO.		
	CRP	SAN PATRICIO		072		

DATE:  
FILE:



DW: \_\_\_\_\_  
 CK: \_\_\_\_\_  
 DN: \_\_\_\_\_

### ATLAS 14 DATA FOR HYDROGRAPH ANALYSIS

AMS-based precipitation frequency estimates with 90% confidence intervals (in inches)									
Duration	Annual exceedance probability								
	2-yr (50%)	5-yr (20%)	10-yr (10%)	25-yr (4%)	50-yr (2%)	100-yr (1%)	200-yr (0.5%)	500-yr (0.2%)	1000-yr (0.1%)
5-min	0.545	0.701	0.82	0.979	1.1	1.22	1.35	1.53	1.67
10-min	0.864	1.11	1.3	1.56	1.76	1.95	2.15	2.42	2.62
15-min	1.1	1.41	1.64	1.96	2.2	2.45	2.7	3.04	3.31
30-min	1.58	2	2.33	2.77	3.1	3.44	3.81	4.31	4.7
60-min	2.08	2.67	3.12	3.73	4.19	4.67	5.2	5.94	6.55
2-hr	2.56	3.41	4.06	4.96	5.65	6.39	7.21	8.38	9.34
3-hr	2.84	3.86	4.67	5.78	6.65	7.6	8.64	10.2	11.4
6-hr	3.32	4.66	5.72	7.22	8.42	9.75	11.2	13.4	15.1
12-hr	3.78	5.44	6.77	8.68	10.2	12	13.9	16.8	19.3
24-hr	4.27	6.26	7.87	10.2	12.1	14.3	16.7	20.3	23.4

Note: Data from NOAA Atlas 14 Point Precipitation Frequency Estimates (Annual Max.)

**NOTES:**

HYDROLOGY DEVELOPED USING THE TEXAS HYETOGRAPH METHOD WITH HEC-HMS (VER 4.11).

PART OF "OTHER AREAS" (ZONE X OR D) IN FEMA FIRM MAP #48409C0300E, 11/4/2016)

NO COORDINATION WILL BE MADE WITH THE FLOODPLAIN ADMINISTRATOR SINCE THE SITE IS NOT LOCATED IN A DESIGNATED FEMA FLOOD ZONE.

CROSS-SECTIONS WERE DEVELOPED FROM SITE SURVEY WITH ADDITIONAL ELEVATIONS TAKEN FROM USGS LIDAR DATA. SITE SURVEY BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH ZONE (4205) NAD 83 WITH A SURFACE ADJUSTMENT FACTOR OF 0.99996. ALL ELEVATIONS BASED ON NAVD88 (GEOID12A).

HYDRAULIC DESIGN PERFORMED UTILIZING HEC-RAS (V6.3.1)

FLOW REGIME IS SUBCRITICAL. THE STARTING TAILWATER ELEVATION BOUNDARY CONDITION WAS BASED ON NORMAL DEPTH AT THE MOST DOWNSTREAM CROSS-SECTION. THE INITIAL SLOPE UTILIZED WAS THE CHANNEL SLOPE ADJUSTED TO BE REPRESENTATIVE OF THE ENERGY GRADE LINE.

### DRAINAGE AREA SUMMARY

DRAINAGE AREA #	STATION	DA SIZE		TIME OF CONCENTRATION									NRCS CN Value	RATIONAL C Value	OMEGA REGRESSION EQ.			
				Kirby-Kirpich or NRCS Method	Overland, T <sub>ov</sub>		Shallow Flow, T <sub>s</sub> (NRCS Only)		Channel, T <sub>ch</sub>		T <sub>c</sub> (min)	P (in)			S (ft/ft)	Ω		
		N	Length (ft)		Slope (ft/ft)	Surface	Length (ft)	Slope (ft/ft)	Length (ft)	Slope (ft/ft)								
CR3861		2094	3.27	Kirby-Kirpich	0.20	1200.00	0.00292	n/a	n/a	n/a	17640.00	0.00125*	232	77	n/a	35	0.00080	0.197
				NRCS	0.17	100.00	0.00400	Unpaved	3250	0.00110	15850.00	0.00080						

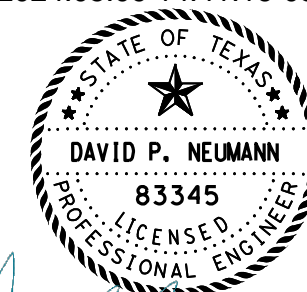
\* NOTE: Low (flat) slopes adjusted using "Slope + 0.0005"

### DRAINAGE AREA FLOW SUMMARY

HYDROLOGIC METHOD		2-YR	5-YR	10-YR (Design)	25-YR	50-YR	100-YR (Check)	200-YR	500-YR
		(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
Omega Regional Regression	Omega RR	316	534	697	916	1085	1263	1458	1715
Atlas 14 / NRCS Hyetograph (freq storm) / NRCS CN loss	NRCS	398	708	968	1343	1647	1990	2362	2921
Atlas 14 / NRCS Hyetograph (freq storm) / Tx C & I loss	Tx C & I	514	763	987	1337	1625	1961	2344	2924
Atlas 14 / Hyetograph using TXHYETO / NRCS CN loss	Tx Hyeto	218	399	591	898	1159	1472	1828	2372

USED FOR DESIGN →

2024.05.09 14:41:16-05'00'



*David P. Neumann, P.E.*

**LOCHNER**

TBPE Firm Reg. No. 10488



© 2024

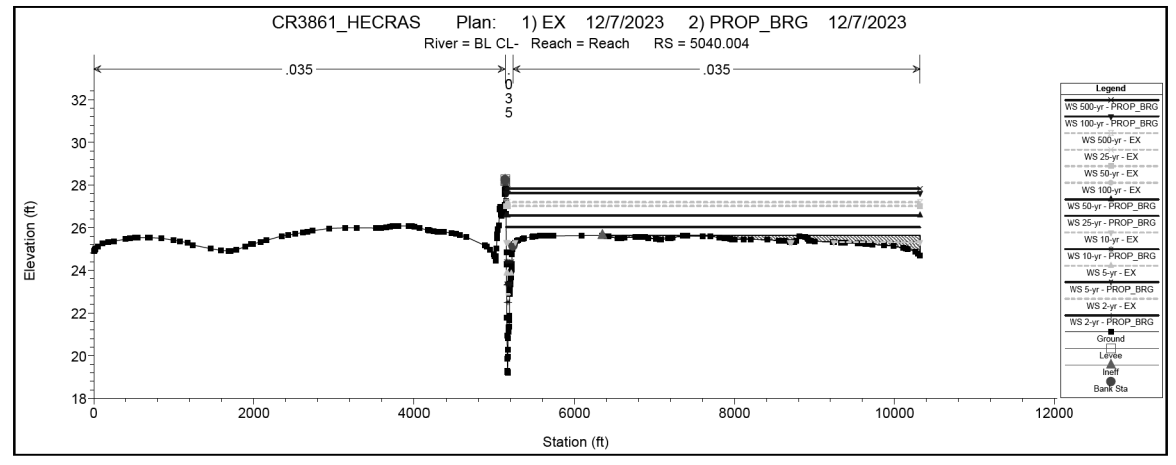
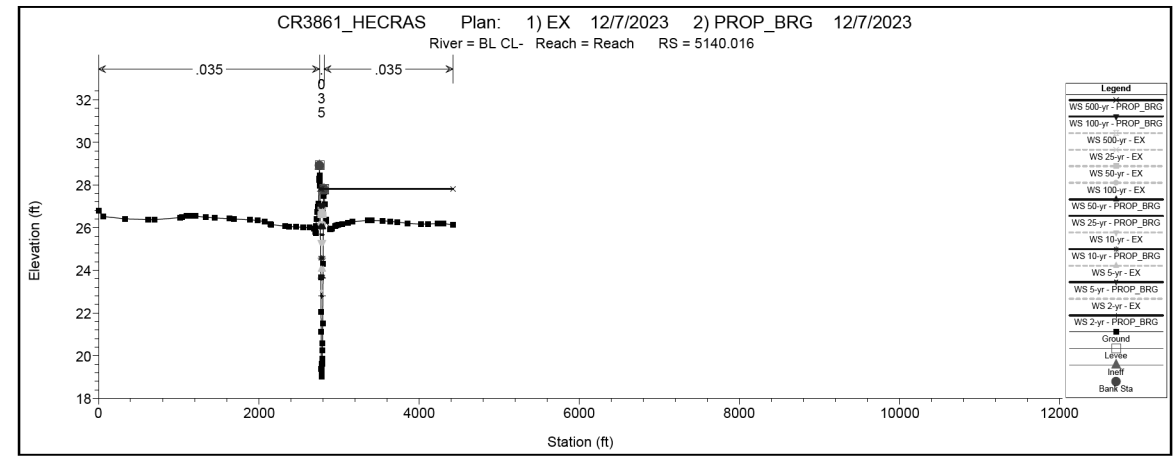
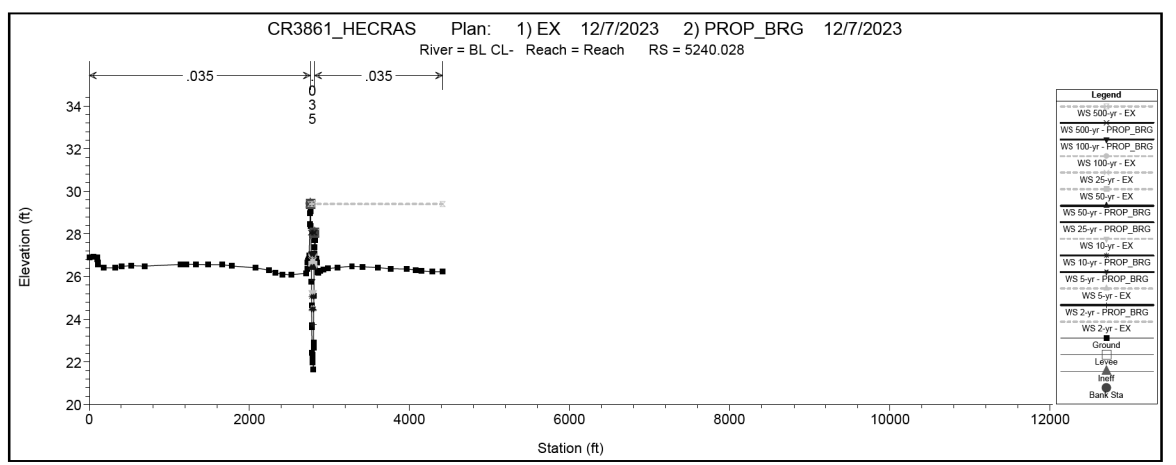
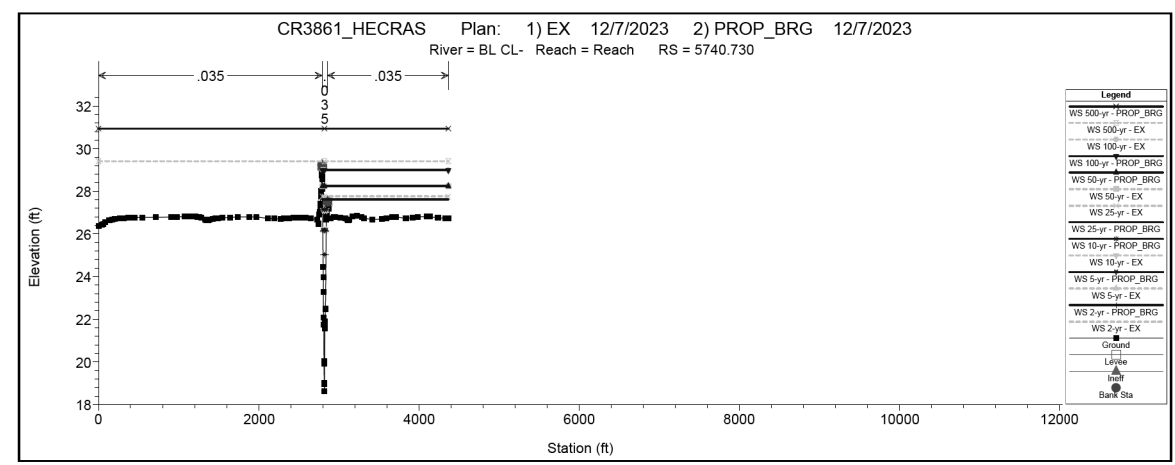
**CR 3861  
HYDRAULIC DATA**

SHEET 2 OF 4

CONT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	074	

DATE: 5/9/2024 9:07:06 AM  
 FILE: c:\pw\_working\lochner-pw-01\0109812\CR3861\_GA01.dgn

DW: \_\_\_\_\_  
 CK: \_\_\_\_\_  
 DN: \_\_\_\_\_



NOTES:

HYDROLOGY DEVELOPED USING THE TEXAS HYETOGRAPH METHOD WITH HEC-HMS (VER 4.11).

PART OF "OTHER AREAS" (ZONE X OR D) IN FEMA FIRM MAP #48409C0300E, 11/4/2016)

NO COORDINATION WILL BE MADE WITH THE FLOODPLAIN ADMINISTRATOR SINCE THE SITE IS NOT LOCATED IN A DESIGNATED FEMA FLOOD ZONE.

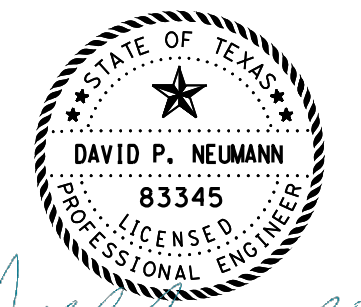
CROSS-SECTIONS WERE DEVELOPED FROM SITE SURVEY WITH ADDITIONAL ELEVATIONS TAKEN FROM USGS LIDAR DATA. SITE SURVEY BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH ZONE (4205) NAD 83 WITH A SURFACE ADJUSTMENT FACTOR OF 0.99996. ALL ELEVATIONS BASED ON NAVD88 (GEOID12A).

HYDRAULIC DESIGN PERFORMED UTILIZING HEC-RAS (V6.3.1)

FLOW REGIME IS SUBCRITICAL. THE STARTING TAILWATER ELEVATION BOUNDARY CONDITION WAS BASED ON NORMAL DEPTH AT THE MOST DOWNSTREAM CROSS-SECTION. THE INITIAL SLOPE UTILIZED WAS THE CHANNEL SLOPE ADJUSTED TO BE REPRESENTATIVE OF THE ENERGY GRADE LINE.

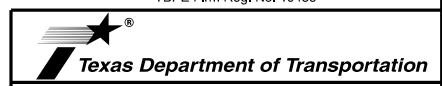
DATE: 5/9/2024 9:07:10 AM  
 FILE: c:\pw\_working\lochner-pw-01\0109812\CR3861\_GA01.dgn

2024.05.09 14:41:39-05'00'



*David P. Neumann, P.E.*

**LOCHNER**  
TBPE Firm Reg. No. 10488



**CR 3861  
HYDRAULIC DATA**

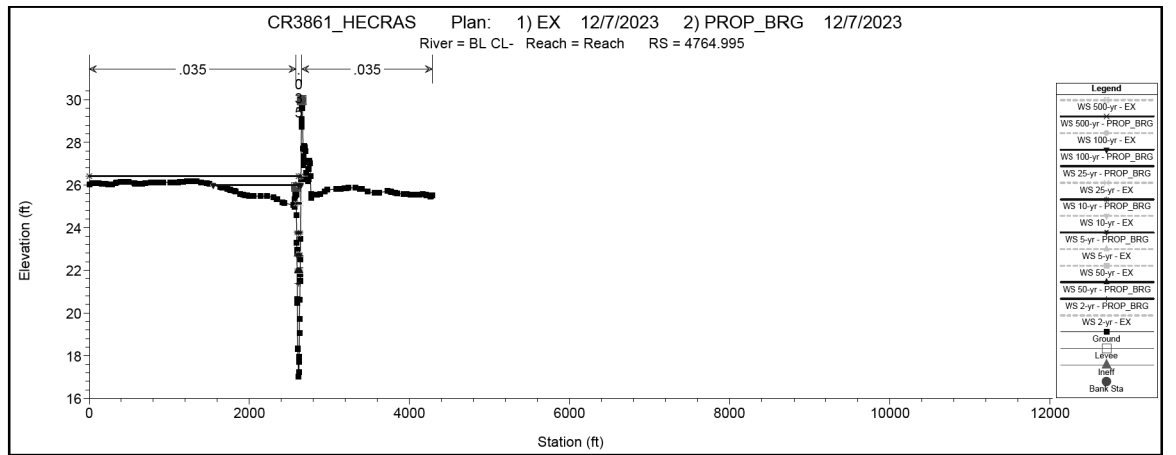
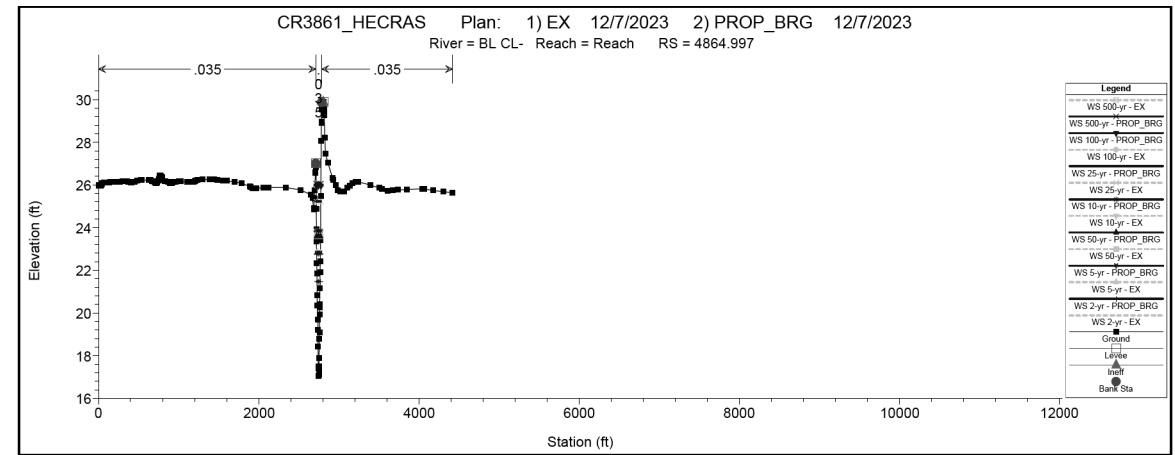
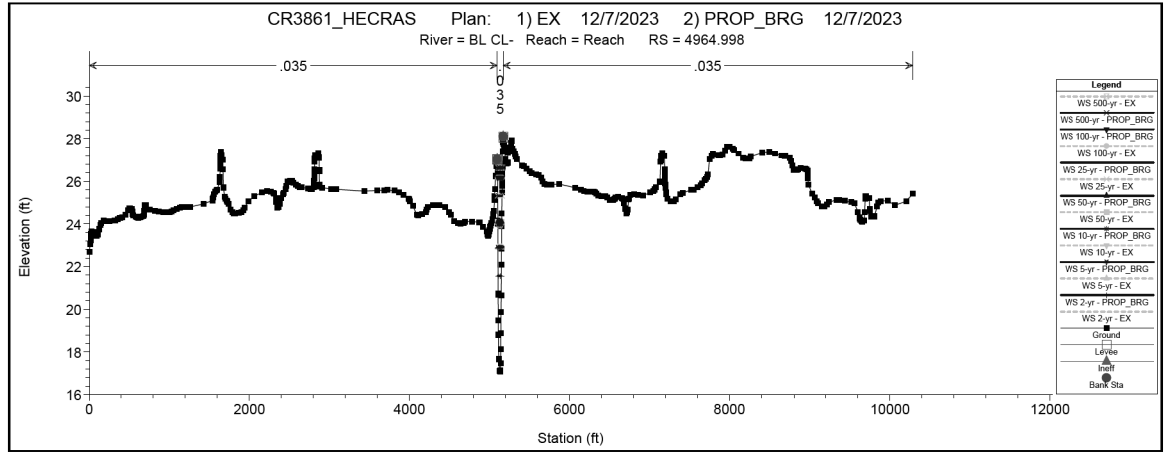
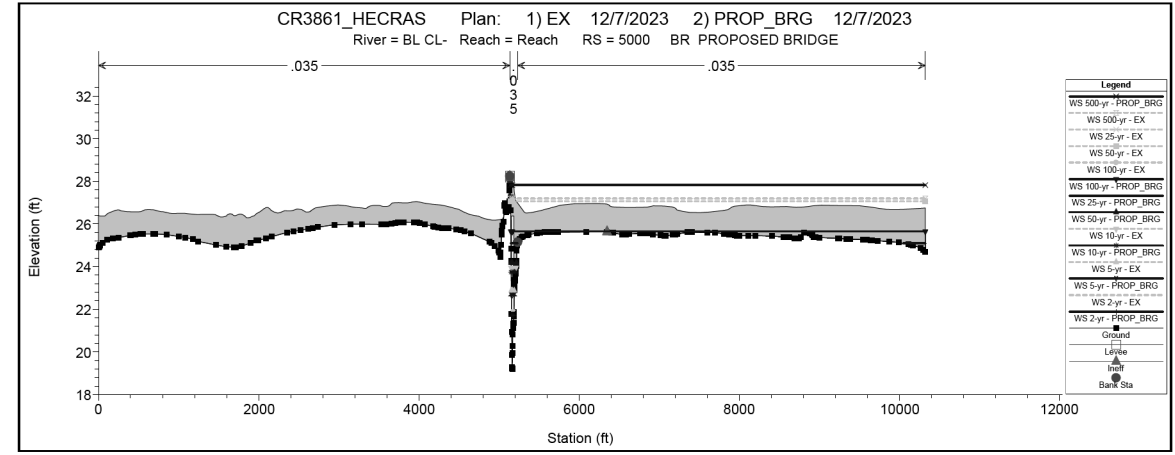
SHEET 3 OF 4

CONT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST		COUNTY	SHEET NO.
CRP		SAN PATRICIO	075

©2024



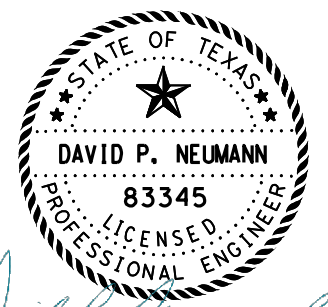
DW: \_\_\_\_\_  
 CK: \_\_\_\_\_  
 CK: \_\_\_\_\_  
 DW: \_\_\_\_\_



**NOTES:**  
 HYDROLOGY DEVELOPED USING THE TEXAS HYETOGRAH METHOD WITH HEC-HMS (VER 4.11).  
 PART OF "OTHER AREAS" (ZONE X OR D) IN FEMA FIRM MAP #48409C0300E, 11/4/2016)  
 NO COORDINATION WILL BE MADE WITH THE FLOODPLAIN ADMINISTRATOR SINCE THE SITE IS NOT LOCATED IN A DESIGNATED FEMA FLOOD ZONE.  
 CROSS-SECTIONS WERE DEVELOPED FROM SITE SURVEY WITH ADDITIONAL ELEVATIONS TAKEN FROM USGS LIDAR DATA. SITE SURVEY BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH ZONE (4205) NAD 83 WITH A SURFACE ADJUSTMENT FACTOR OF 0.99996. ALL ELEVATIONS BASED ON NAVD88 (GEOID12A).

HYDRAULIC DESIGN PERFORMED UTILIZING HEC-RAS (V6.3.1)  
 FLOW REGIME IS SUBCRITICAL. THE STARTING TAILWATER ELEVATION BOUNDARY CONDITION WAS BASED ON NORMAL DEPTH AT THE MOST DOWNSTREAM CROSS-SECTION. THE INITIAL SLOPE UTILIZED WAS THE CHANNEL SLOPE ADJUSTED TO BE REPRESENTATIVE OF THE ENERGY GRADE LINE.

2024.05.09 14:51:14-05'00'



*David P. Neumann, P.E.*

**LOCHNER**  
TBPE Firm Reg. No. 10488



**CR 3861  
HYDRAULIC DATA**

SHEET 4 OF 4

CONT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	076	

DATE: 5/9/2024 9:07:19 AM  
 FILE: c:\pw\_working\lochner-pw-01\0109812\CR3861\_GA01.dgn

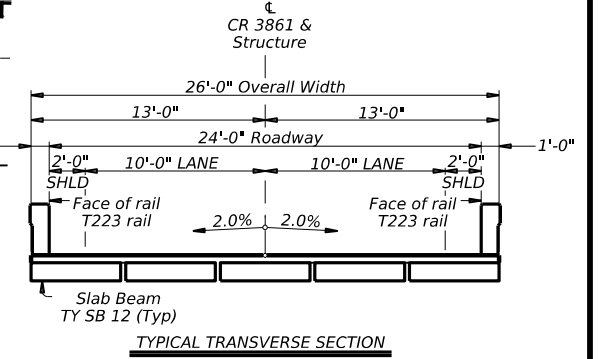


**LEGEND**

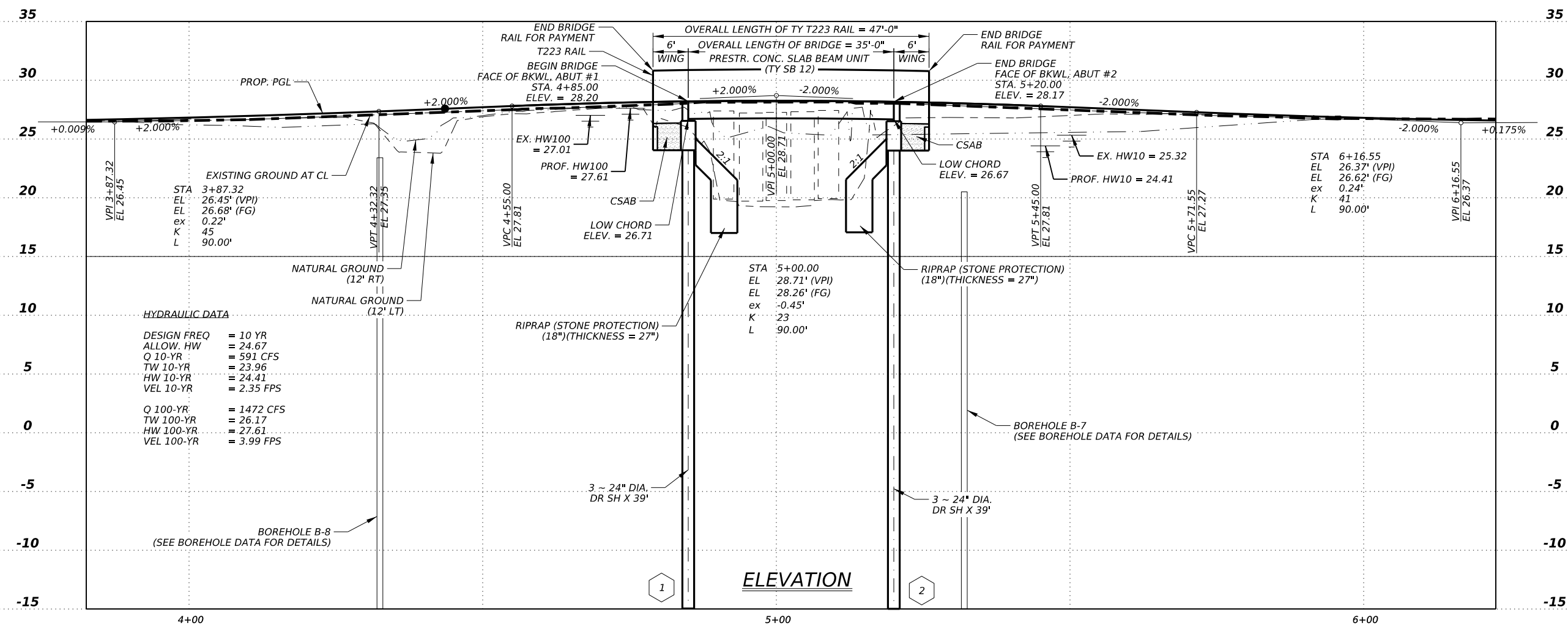
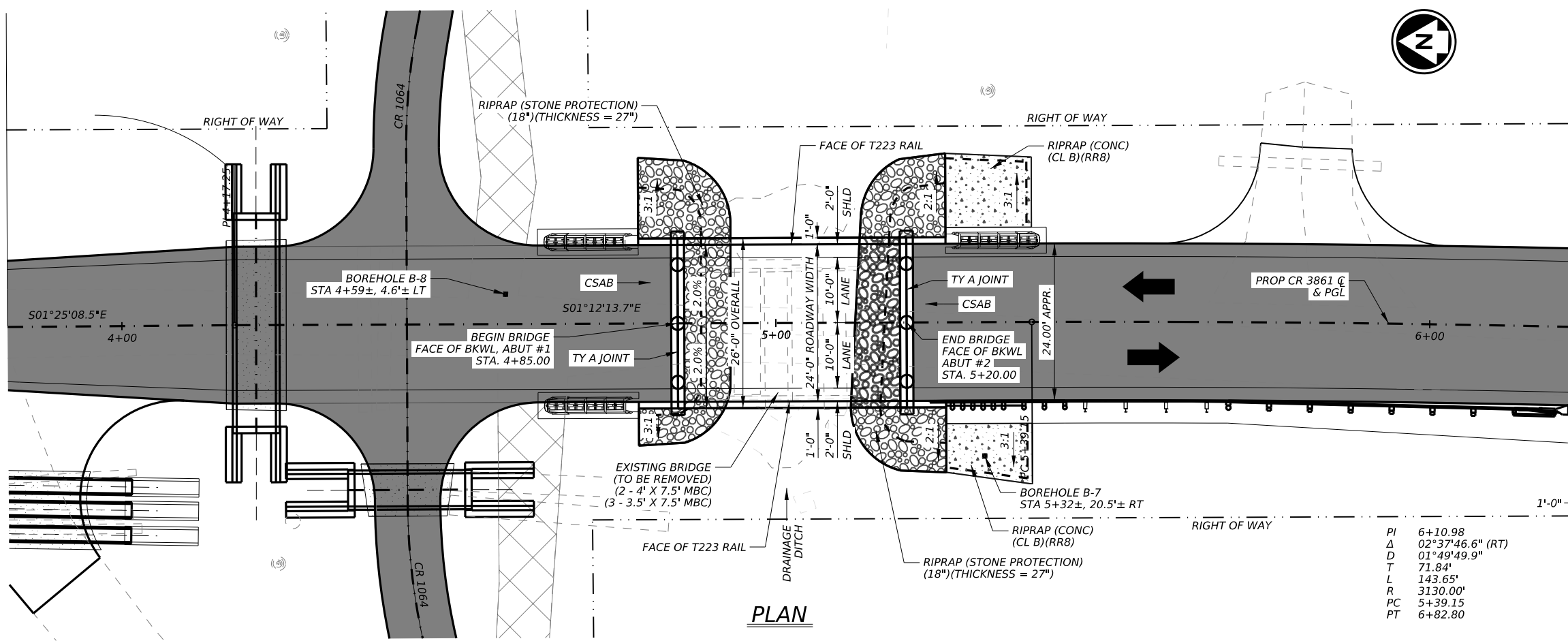
- METAL BEAM GUARD FENCE
- TRAFFIC FLOW ARROW
- RIGHT OF WAY
- RIPRAP (CONC)
- RIPRAP (STONE PROTECTION)
- PROPOSED PAVEMENT

- NOTES:**
- REFER TO TYPICAL SECTION SHEETS FOR MORE INFORMATION.
  - SEE HORIZONTAL ALIGNMENT DATA SHEETS FOR ROADWAY GEOMETRIC DATA.
  - STATION AND OFFSET CALLOUTS ARE RELATIVE TO CR 3861 CENTERLINE UNLESS OTHERWISE NOTED.
  - CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING UTILITIES BEFORE BEGINNING ANY TYPE OF WORK.
  - OPTION 1 SHOULD BE USED FOR CEMENT STABILIZED ABUTMENT BACKFILL (CSAB).
  - CONTRACTOR'S ATTENTION IS DRAWN TO THE WATER BEARING SAND & CLAY SHOWN IN THE BORING LOGS. HOLE STABILITY IS THE RESPONSIBILITY OF THE CONTRACTOR.

DESIGN SPEED: MEET OR EXCEED EXISTING  
 FUNCTIONAL CLASS: LOCAL RURAL (OFF-SYSTEM)  
 2022 ADT: 28  
 2042 ADT: 78  
 EXIST. NBI: 16-205-0-AA03-85-002

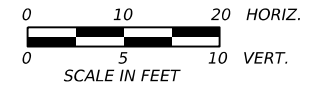


PI	6+10.98
Δ	02°37'46.6" (RT)
D	01°49'49.9"
T	71.84'
L	143.65'
R	3130.00'
PC	5+39.15
PT	6+82.80

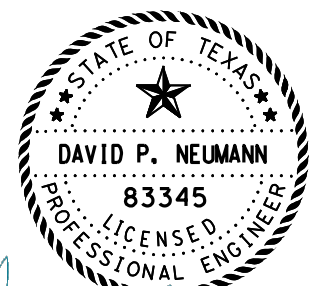


**HYDRAULIC DATA**

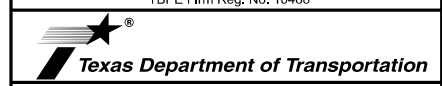
DESIGN FREQ	= 10 YR
ALLOW. HW	= 24.67
Q 10-YR	= 591 CFS
TW 10-YR	= 23.96
HW 10-YR	= 24.41
VEL 10-YR	= 2.35 FPS
Q 100-YR	= 1472 CFS
TW 100-YR	= 26.17
HW 100-YR	= 27.61
VEL 100-YR	= 3.99 FPS



2024.05.09 14:43:36-05'00'



David P. Neumann, P.E.  
**LOCHNER**  
 TBPE Firm Reg. No. 10488



**CR 3861 BRIDGE LAYOUT**  
 (DRAINAGE DITCH BRIDGE)  
 NBI NUMBER: 16-205-0-AA10-28-001

**HL-93 LOADING**

CONT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	077	

DATE: 5/9/2024 9:07:40 AM  
 FILE: c:\pwworking\lochner-pw-01\109812\CR3861\_GB01-B.dgn

NOTES:  
 BORE HOLE INFORMATION FROM GEOTECHNICAL REPORT PROVIDED BY HVJ SOUTH CENTRAL TEXAS - M&J, INC. DATED MARCH 1, 2024 AND NOTED AS REPORT NO. AG 19 10268.1.3A.



# DRILLING LOG

1 of 1

County San Patricio Hole B-7 District Corpus Christi  
 Highway CR 3861 (CR 1028) Structure Bridge Date 02/14/24  
 CSJ 0916-28-082 Station 5+32± Grnd. Elev. 20.50 ft  
 Offset 20.5' RT GW Elev. 5.50 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
15.5	5	6 (6) 6 (6)	CLAY, hard, moist, dark brown, fat, sandy. [Beaumont] (CH)	0	38	19.8	50	36	124	SS:3-3-5 PP = 4.5+ tsf Passing No. 200 Sieve= 65%
10	10	3 (6) 2 (6)	CLAY, soft to very soft, moist, brown to light gray, lean, with sand. [Beaumont] (CL)			27.9	44	34		PP = 1.5 tsf PP = 1.5 tsf Passing No. 200 Sieve= 72%
8.5	15	4 (6) 5 (6)	SAND, loose, moist, light brown, clayey. [Beaumont] (SC)			26.5				PP = 0.75 tsf Passing No. 200 Sieve= 29%
3.5	20	6 (6) 8 (6)	CLAY, soft to stiff, moist, light gray, lean, sandy. [Beaumont] (CL)							PP=3.0 tsf
25	25	12 (6) 10 (6)		0	18	18.8	49	33	132	PP=4.5+ tsf Passing No. 200 Sieve= 51%
-6.5	30	27 (6) 27 (6)	SAND, compact, moist, light gray, clayey. [Beaumont] (SC)			17.3	18	9		PP = 1.0 tsf Passing No. 200 Sieve= 47%
35	35	14 (6) 50 (6)								SS:12-14-24
-19.5	40	50 (2) 50 (1)								
45	45	3 (6) 10 (6)	CLAY, soft to very stiff, moist, light gray and light brown with reddish mottling, fat. [Beaumont] (CH)			31.1	63	45		SS:11-14-15 Passing No. 200 Sieve= 91% PP = 4.5+tsf
50	50	16 (6) 16 (6)		0	29	34.4	64	51	119	PP=3.75 tsf Passing No. 200 Sieve= 99%
55	55	9 (6) 8 (6)				20.6	35	22		ST: No Recovery -light brown, lean, sandy layer at 57-60' SS: 6-8-12 Passing No. 200 Sieve= 65%
60	60	10 (6) 9 (6)				30.4	83	63		SS:6-10-12 PP=4.25 tsf Passing No. 200 Sieve= 99%
65	65	10 (6) 15 (6)								PP=3.75 tsf
70	70	22 (6) 25 (6)								
75	75	12 (6) 14 (6)		0	56	29.7			120	PP = 4.5+ tsf Passing No. 200 Sieve= 85%
-59.5	80	18 (6) 19 (6)								

Driller: Envirocore Logger: Logan Organization: HVJSTX  
 g:\geo\projects\2019\lag 19 10268.1.3a bridge replacements no. 83 & 14, lochner\gint\lag 19 10268.1.3 - br no 82.gpj

Remarks: Split-Spoon values are not standard (170-lb hammer 24-in drop). Boring advanced by dry drilling techniques to 15 feet and then water was used as the fluid to promote drilling until 80 ft. Groundwater was encountered at 15 feet below existing ground surface elevation. (N,E)= (17264938.5, 1368494.0)



# DRILLING LOG

1 of 1

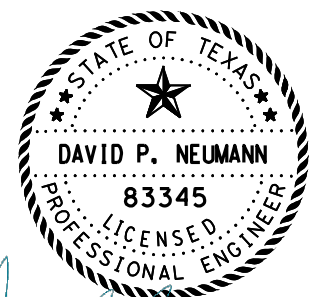
County San Patricio Hole B-8 District Corpus Christi  
 Highway CR 3861 (CR 1028) Structure Bridge Date 02/15/24  
 CSJ 0916-28-082 Station 4+59± Grnd. Elev. 23.40 ft  
 Offset 4.6' LT GW Elev. 8.90 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
5	5	5 (6) 5 (6)	CLAY, soft to very soft, moist, dark brown and light gray to gray, fat, trace sand. [Beaumont] (CH)			24.4	62	45		PP=4.5+ tsf PP=4.5+ tsf Passing No. 200 Sieve= 83%
10	10	4 (6) 3 (6)		0	28	27.3	61	45	123	PP = 2.75 tsf Passing No. 200 Sieve= 83% PP = 2.75 tsf
11.4	15	21 (6) 20 (6)	SAND, compact, moist, brown, clayey. [Beaumont] (SC)			25.6				Passing No. 200 Sieve= 17% SS: 5-7-10 PP = 2.5 tsf
5.4	20	7 (6) 11 (6)	CLAY, soft, moist, light gray to gray, lean, sandy. [Beaumont] (CL)							PP = 2.5 tsf Passing No. 200 Sieve= 58%
25	25	5 (6) 8 (6)		0	26	17.1	44	32	136	PP = 2.5 tsf Passing No. 200 Sieve= 58%
-4.6	30	14 (6) 19 (6)	SAND, slightly compact to very dense, moist, light gray and brown, clayey. [Beaumont] (SC)			20.3	35	16		PP = 1.0 tsf Passing No. 200 Sieve= 31%
35	35	28 (6) 39 (6)								SS: 8-13-22
40	40	50 (1) 50 (0.5)								SS:21-22-14
-19.6	45	19 (6) 20 (6)	CLAY, stiff to very hard, moist, reddish brown with light gray mottling, fat, trace sand. [Beaumont] (CH)							PP=4.5+ tsf Passing No. 200 Sieve= 100%
50	50	25 (6) 14 (6)		0	51	29	60	46	123	PP=4.5+ tsf
55	55	9 (6) 13 (6)				30.6	59	41	123	Passing No. 200 Sieve= 94% PP = 4.25 tsf
60	60	11 (6) 17 (4)								PP = 3.75 tsf
65	65	13 (6) 17 (6)								PP = 3.75 tsf Passing No. 200 Sieve= 96%
70	70	50 (1) 50 (2)		0	26	28.7			120	-brown sand layer at 70-74' SS: 12-9-8
75	75	14 (6) 17 (6)								PP = 3.75 tsf Passing No. 200 Sieve= 82%
-56.6	80	21 (6) 23 (6)		0	22	31.6	76	56	120	

Driller: Envirocore Logger: Logan Organization: HVJSTX  
 g:\geo\projects\2019\lag 19 10268.1.3a bridge replacements no. 83 & 14, lochner\gint\lag 19 10268.1.3 - br no 82.gpj

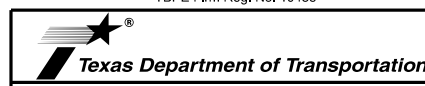
Remarks: Split-Spoon values are not standard (170-lb hammer 24-in drop). Boring advanced by dry drilling techniques to 15 feet and then water was used as the fluid to promote drilling until 80 ft. Groundwater was encountered at 14.5 feet below existing ground surface elevation. (N,E)= (17265012.2, 1368517.5)

2024.05.09 14:43:52-05'00'



David P. Neumann, P.E.

**LOCHNER**  
 TBPE Firm Reg. No. 10488



©2024

CR 3861  
 BOREHOLE DATA

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	078	

DATE: 5/9/2024 2:26:12 PM  
 FILE: c:\pw\_working\lochner-pw-01\0109812\CR88\_GC01.dgn

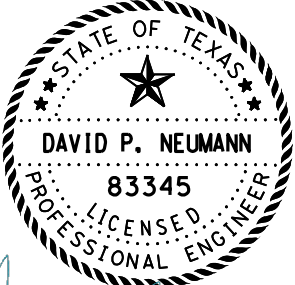
**SUMMARY OF ESTIMATED QUANTITIES**

BRIDGE ELEMENT BID ITEM DESCRIPTION	400 6005	416 6002	420 6013	422 6007	425 6010	432 6008	432 6033	450 6006	496 6009
	CEM STABIL BKFL	DRILL SHAFT (24 IN)	CL C CONC (ABUT)	REINF CONC SLAB (SLAB BEAM)	PRESTR CONC SLAB BEAM (5SB12)	RIPRAP (CONC) (CL B)(RR8&RR9)	RIPRAP (STONE PROTECTION)(18 IN)	RAIL (TY T223)	REMOVE STR (BRIDGE 0-99 FT LENGTH)
	CY	LF	CY	SF	LF	CY	CY	LF	EA
2-ABUTMENTS	21	234	20.4						
1-35' PRESTRESSED CONCRETE SLAB BEAM UNIT				910	172.50			94.0	
<b>TOTAL</b>	<b>21</b>	<b>234</b>	<b>20.4</b>	<b>910</b>	<b>172.50</b>	<b>8</b>	<b>100</b>	<b>94.0</b>	<b>1</b>


DATE: 5/9/2024 9:08:13 AM  
 FILE: c:\pw\_working\lochner-pw-01\0109812\CR3861\_EQ.dgn

HL93 LOADING

2024.05.09 14:57:05-05'00'



*David P. Neumann, P.E.*  
**LOCHNER**  
 TBPE Firm Reg. No. 10488

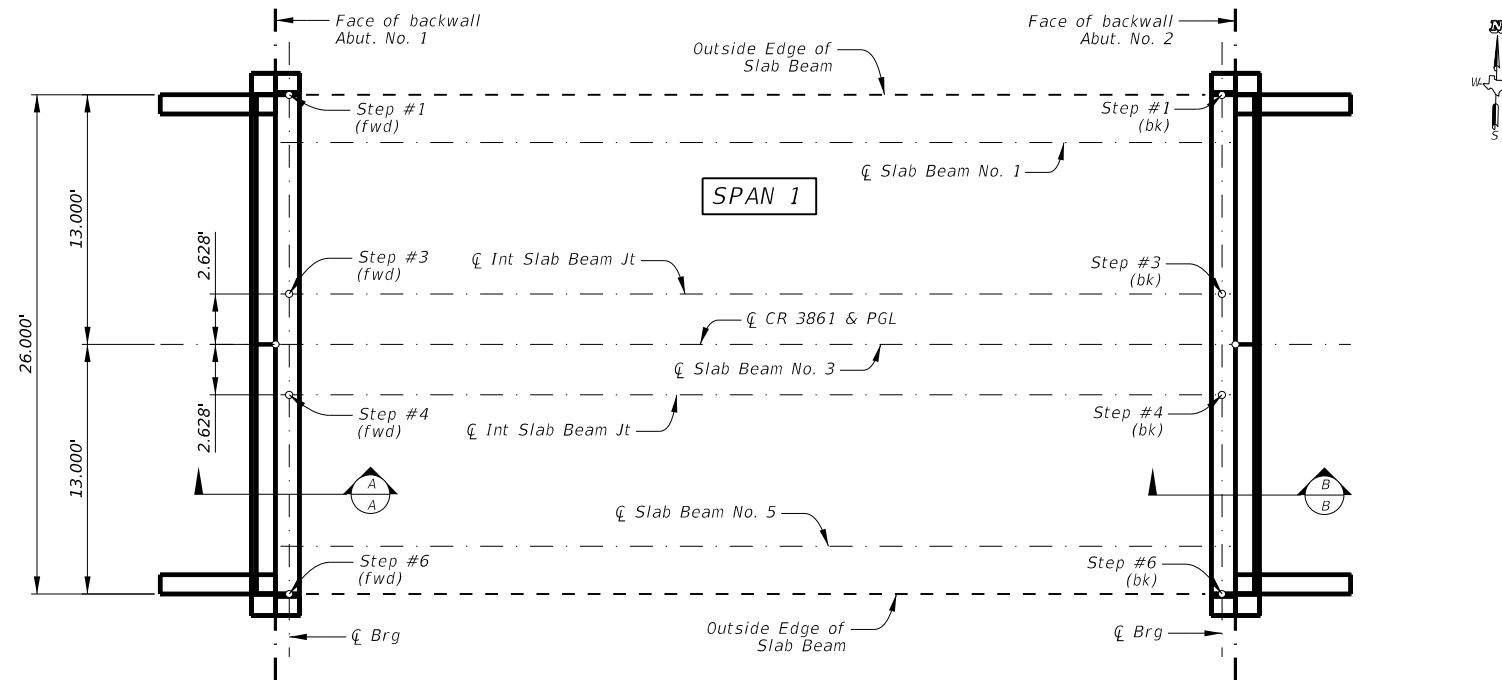


©2024

**ESTIMATED QUANTITIES**  
 CR 3861 BRIDGE  
 AT DRAINAGE DITCH

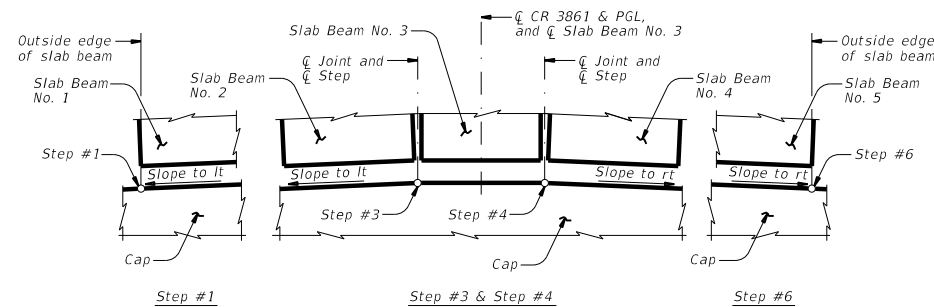
CONT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		079

DATE: 5/9/2024 9:08:28 AM  
 FILE: c:\pw\_working\lochner-pw-01\0109812\CR3861\_CAP ELEV DETAILS.dgn

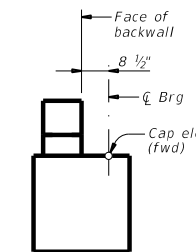


**PLAN OF STEP LOCATIONS**

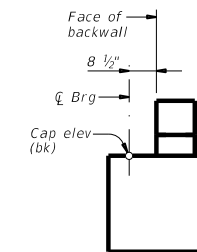
CAP ELEVATIONS				
	Step #1	Step #3	Step #4	Step #6
Abut No. 1 (Fwd)	26.284	26.491	26.491	26.284
Abut No. 2 (Bk)	26.246	26.454	26.454	26.246



**COMMON TRANSVERSE SECTIONS AT STEP LOCATIONS**



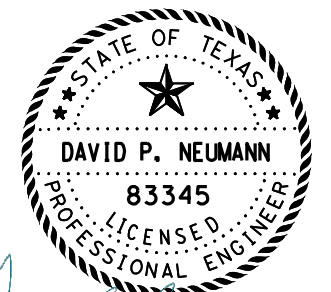
**SECTION A-A**



**SECTION B-B**

HL93 LOADING

2024.05.09 14:44:06-05'00'



*David P. Neumann, P.E.*

**LOCHNER**

TBPE Firm Reg. No. 10488

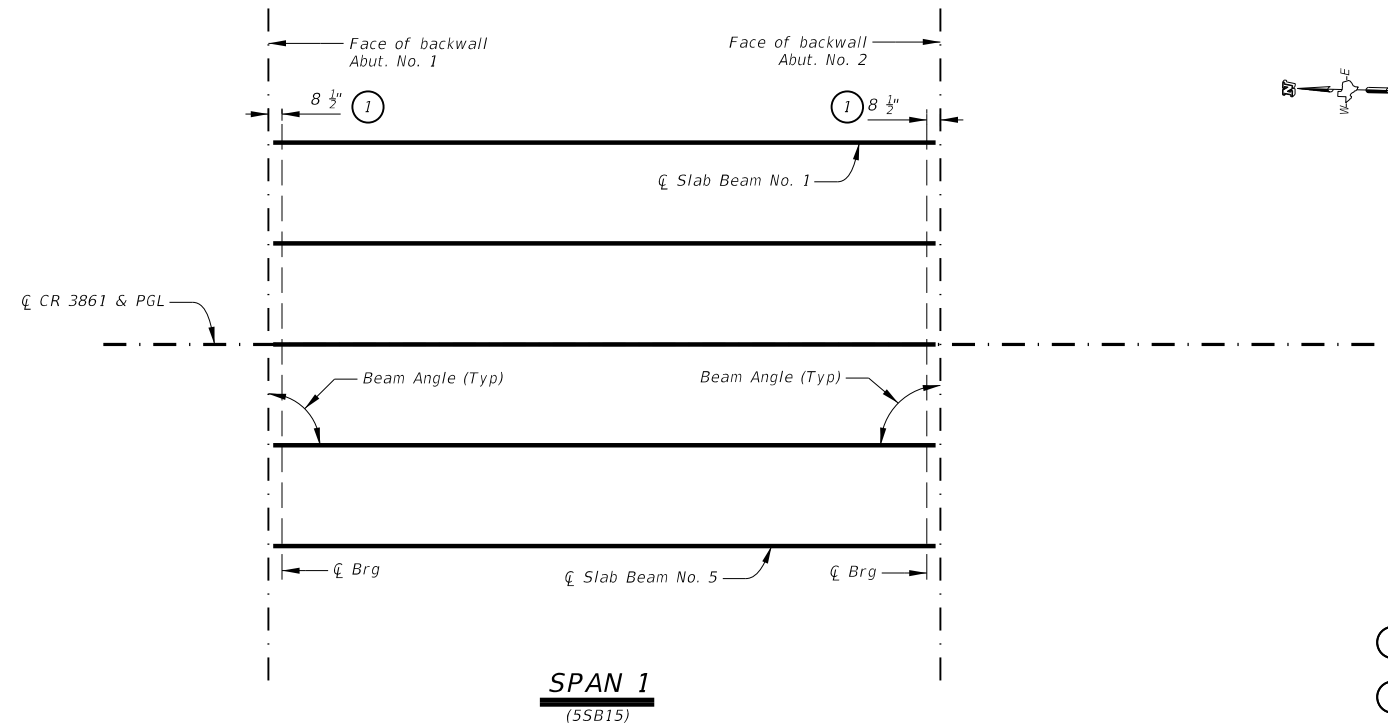


©2024

CAP ELEVATION  
 DETAILS

(CR 3861 BRIDGE  
 AT DRAINAGE DITCH)

CONT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		080



- ① See Elastomeric Bearing and Beam End Details (PSBEB) standard sheet for orientation of dimensions.
- ② Beam lengths shown are bottom girder flange lengths with adjustments for girder slope.

**SPAN 1**  
(55B15)

**BENT REPORT**

ABUT NO. 1 (S 88° 47' 46.2" W)  
DISTANCE BETWEEN STATION LINE AND STEP LINE 1 13.0000 L

SPAN 1	BEAM	STEP SPA. (C.L. BENT)	BEAM ANGLE		
			D	M	S
1	1	0.000	90	0	0
	2	5.255	90	0	0
	3	5.255	90	0	0
	4	5.255	90	0	0
	5	5.255	90	0	0
	TOTAL	21.020			

**BEAM REPORT**

BEAM REPORT, SPAN 1

BEAM	HORIZONTAL DISTANCE		TRUE DISTANCE BOT. BM. FLG. ②	BEAM SLOPE %
	C-C BENT	C-C BRG.		
1	35.0000	33.5833	34.5000	-0.1124
2	35.0000	33.5833	34.5000	-0.1124
3	35.0000	33.5833	34.5000	-0.1124
4	35.0000	33.5833	34.5000	-0.1124
5	35.0000	33.5833	34.5000	-0.1124

ABUT NO. 2 (S 88° 47' 46.2" W)  
DISTANCE BETWEEN STATION LINE AND STEP LINE 1 13.0000 L

SPAN 1	BEAM	STEP SPA. (C.L. BENT)	BEAM ANGLE		
			D	M	S
1	1	0.000	90	0	0
	2	5.255	90	0	0
	3	5.255	90	0	0
	4	5.255	90	0	0
	5	5.255	90	0	0
	TOTAL	21.020			

DATE: 5/9/2024 9:08:43 AM  
FILE: c:\pw\_working\lochner-pw-01\0109812\CR3861\_FRAMING PLAN.dgn

HL93 LOADING

2024.05.09 14:44:21-05'00'

Texas Department of Transportation

©2024

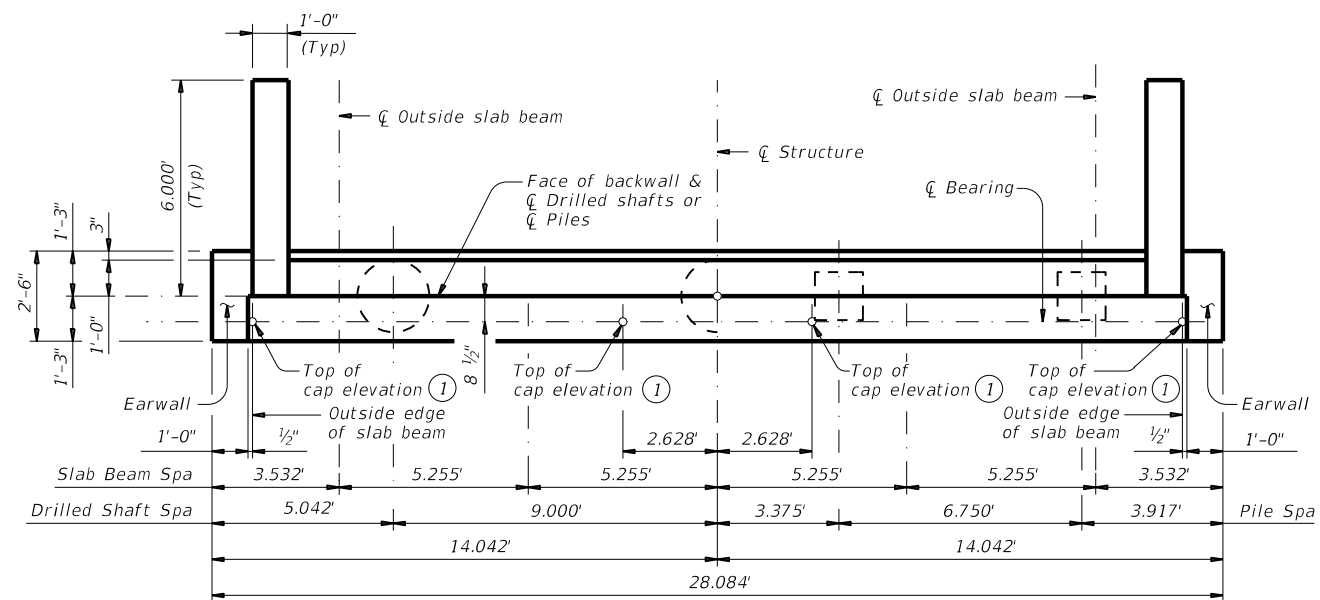
FRAMING PLAN  
(SPAN NO. 1)

CR 3861 BRIDGE  
AT DRAINAGE DITCH

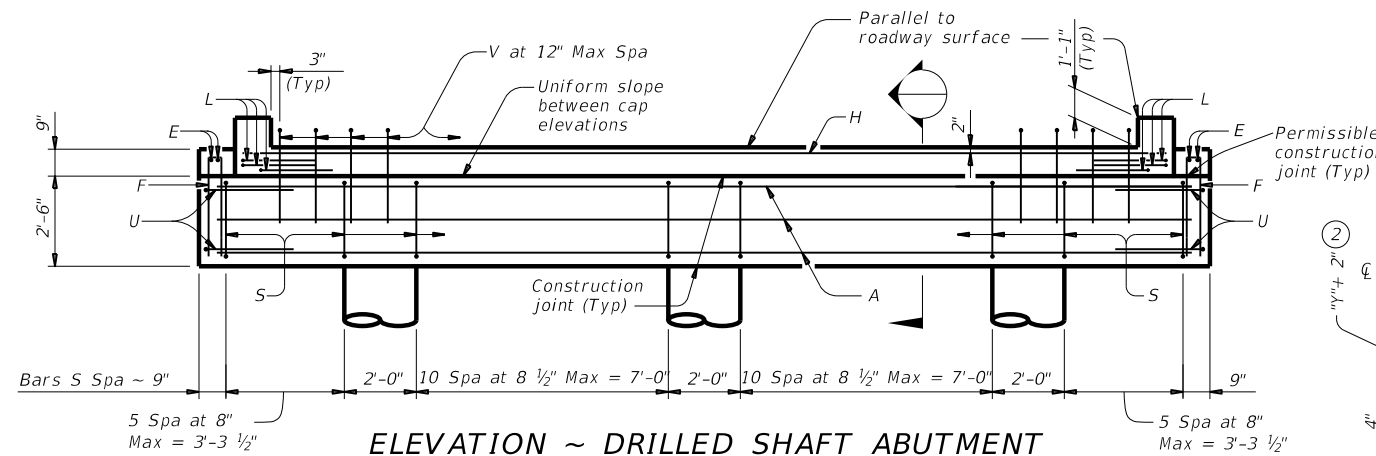
CONT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		081

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

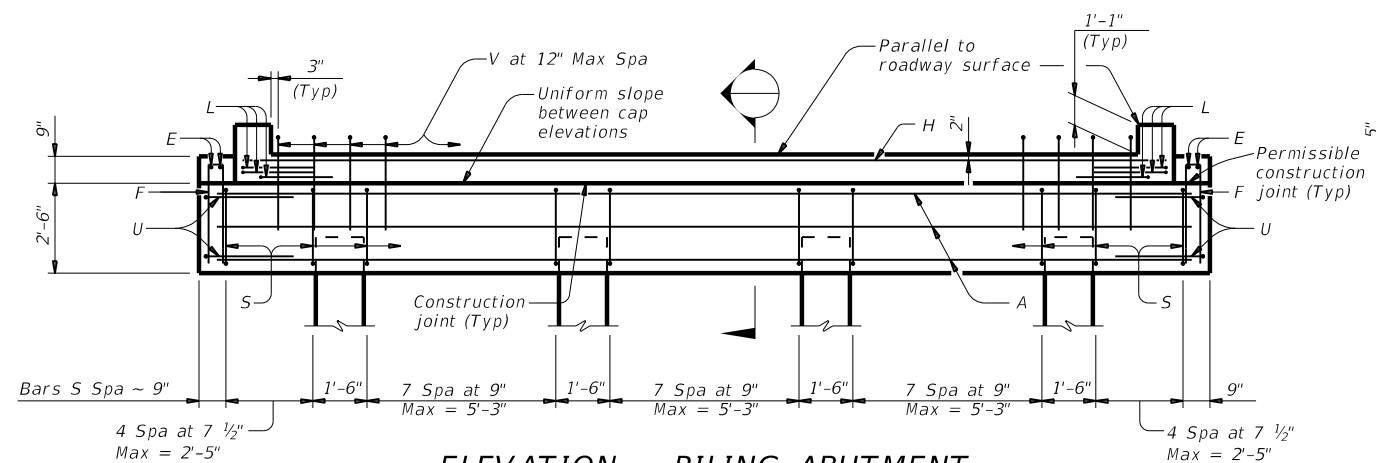
DATE: FILE:



SHOWING DRILLED SHAFTS PLAN SHOWING PILES

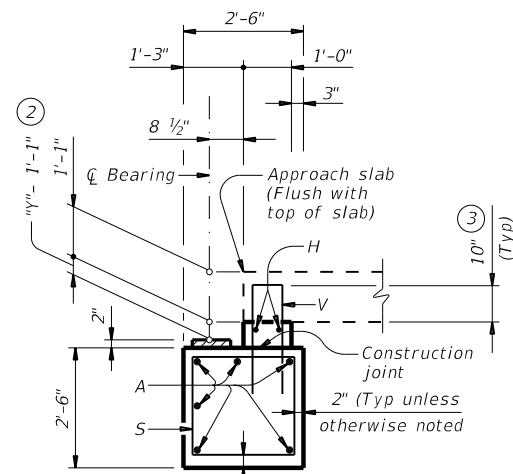
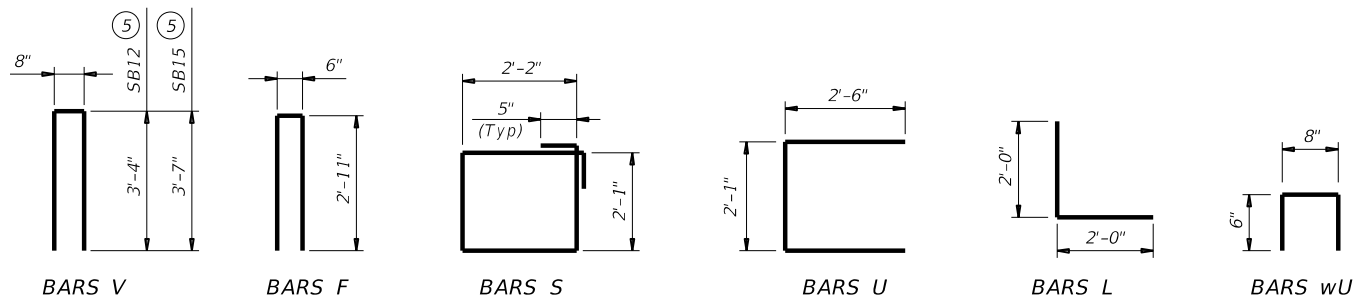


ELEVATION ~ DRILLED SHAFT ABUTMENT



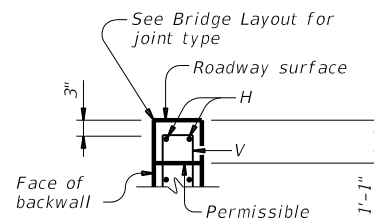
ELEVATION ~ PILING ABUTMENT

Note: For piles larger than 16", adjust Bars S spacing as required to avoid piles.



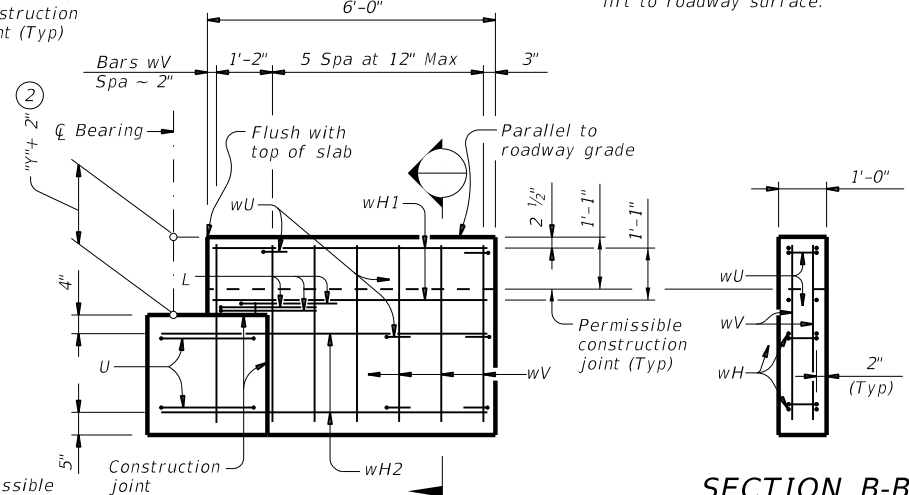
SECTION A-A (4)

(With approach slab)  
Note: At Contractor's option, backwall may be cast with approach slab.



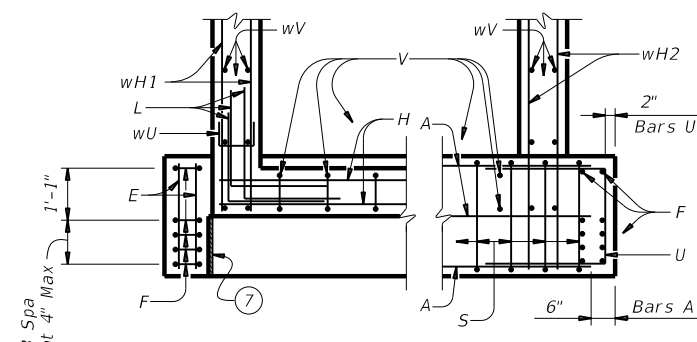
BACKWALL DETAIL (4)

(Without approach slab)  
Note: At Contractor's option, backwall may be cast in one lift to roadway surface.



WINGWALL ELEVATION

(Earwall not shown for clarity.)



BACKWALL CAP CORNER DETAILS

FOUNDATION LOADS

Span Length	Drilled Shaft Loads		Vertical Pile Loads	
	5SB12	5SB15	5SB12	5SB15
Ft	Tons/DS	Tons/DS	Tons/Pile	Tons/Pile
25	39	41	29	31
30	43	46	33	34
35	48	51	36	38
40	52	55	39	41
45	59		44	
50		63		47

TABLE OF ESTIMATED QUANTITIES (6)

Bar	No.	Size	Length (5)		Weight (5)		
			5SB12	5SB15	5SB12	5SB15	
A	6	#11	27'-1"	27'-1"	863	863	
E	4	#4	2'-2"	2'-2"	6	6	
F	10	#4	6'-4"	6'-4"	43	43	
H	2	#5	25'-8"	25'-8"	54	54	
L	6	#6	4'-0"	4'-0"	36	36	
S	34	#4	9'-4"	9'-4"	212	212	
U	4	#6	7'-1"	7'-1"	43	43	
V	25	#5	7'-4"	7'-10"	191	204	
wH1	8	#6	5'-8"	5'-8"	68	68	
wH2	8	#6	6'-11"	6'-11"	83	83	
wU	12	#4	1'-8"	1'-8"	14	14	
wV	28	#5	3'-10"	4'-1"	112	119	
Reinforcing Steel					Lb	1,725	1,745
CI "C" Conc (Abut)					CY	8.8	9.2

- Top of cap elevations are based on section depths shown on Span Details.
- See Span Details for "Y".
- Increase as required to maintain 3" from finished grade.
- See Bridge Layout to determine if approach slab is present.
- See Bridge Layout for beam type used in the superstructure.
- Quantities shown are for one abutment only (with approach slab). Without approach slab, add 1.0 CY Class "C" concrete and 54 Lb reinforcing steel for 2 additional Bars H.
- 1/2" preformed bituminous fiber material between slab beam and earwall. Bond to earwall with an approved adhesive. Cast inside face of earwall perpendicular to cap. (Typ)

**GENERAL NOTES:**  
Designed according to AASHTO LRFD Bridge Design Specifications.  
Designed for a normal embankment header slope of 3:1 and a maximum span length of 50 feet.  
See Bridge Layout for header slope and foundation type, size, and length.  
See Common Foundation Details (FD) standard sheet for all foundation details and notes.  
See Concrete Riprap (CRR) standard sheet or Stone Riprap (SRR) standard sheet for riprap attachment details, if applicable.  
See applicable rail details for rail anchorage in wingwalls.  
These abutment details may be used with standard SPSB-24 only.

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

**MATERIAL NOTES:**  
Provide Class C concrete (F<sub>c</sub> = 3,600 psi).  
Provide Class C (HPC) concrete if shown elsewhere in the plans.  
Provide Grade 60 reinforcing steel.

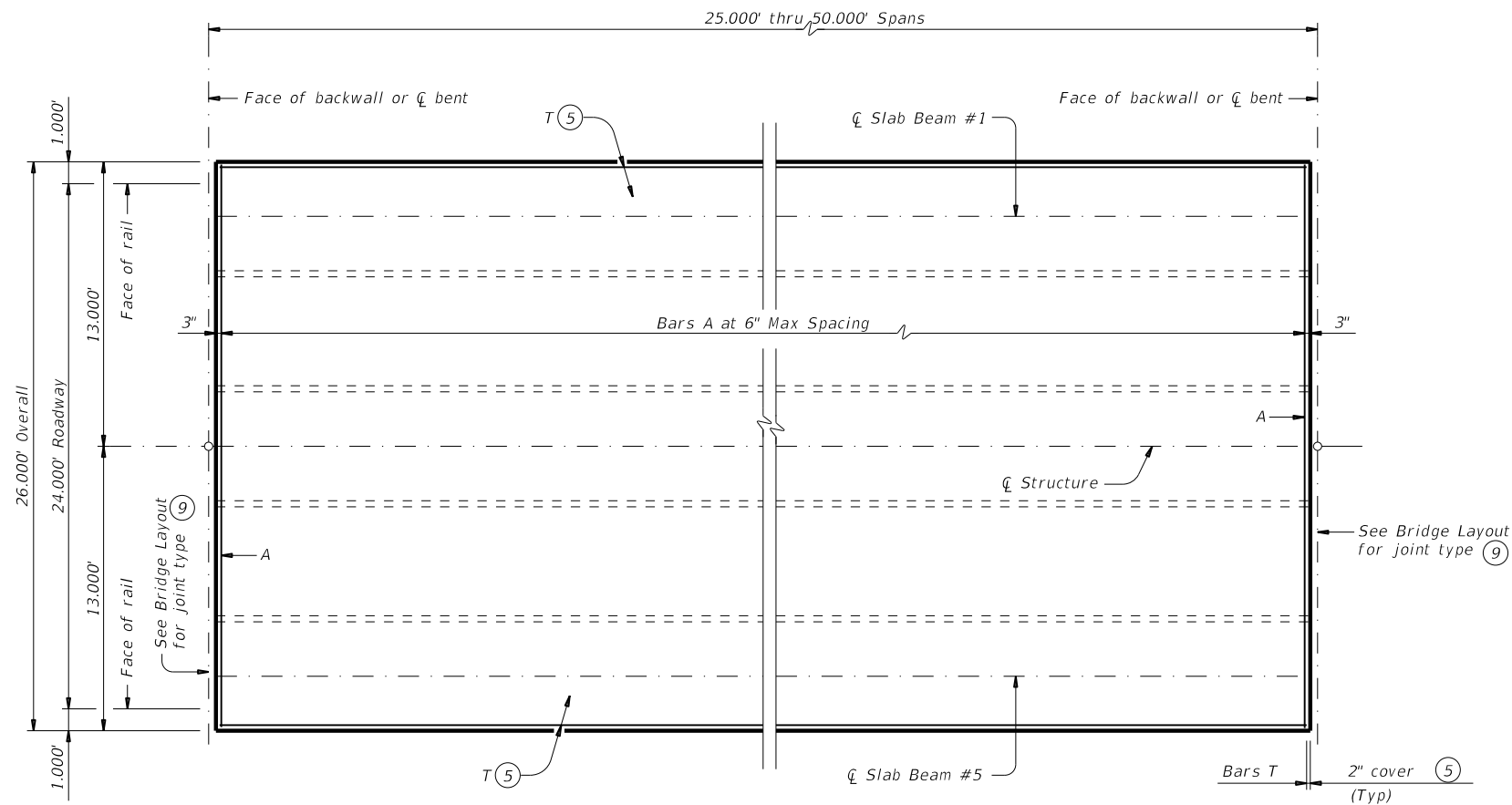
HL93 LOADING

				<b>Bridge Division Standard</b>	
<b>ABUTMENTS PRESTR CONC SLAB BEAM 24' ROADWAY</b>					
<b>APSB-24</b>					
FILE:	DN: TxDOT	CK: TxDOT	OW: TxDOT	CK: TxDOT	
©TxDOT	January 2017	CONT	SECT	JOB	HIGHWAY
	REVISIONS	0916	28	082	CR 3861
		DIST	COUNTY		SHEET NO.
		CRP	SAN PATRICIO		082

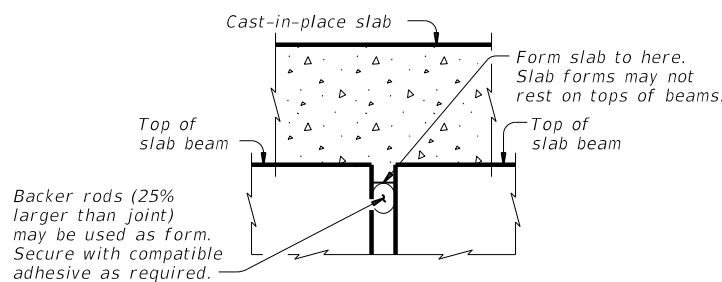


DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

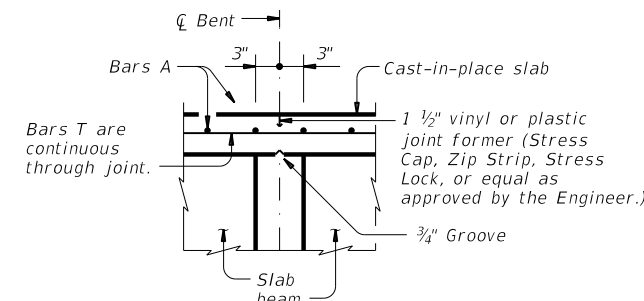
DATE: FILE:



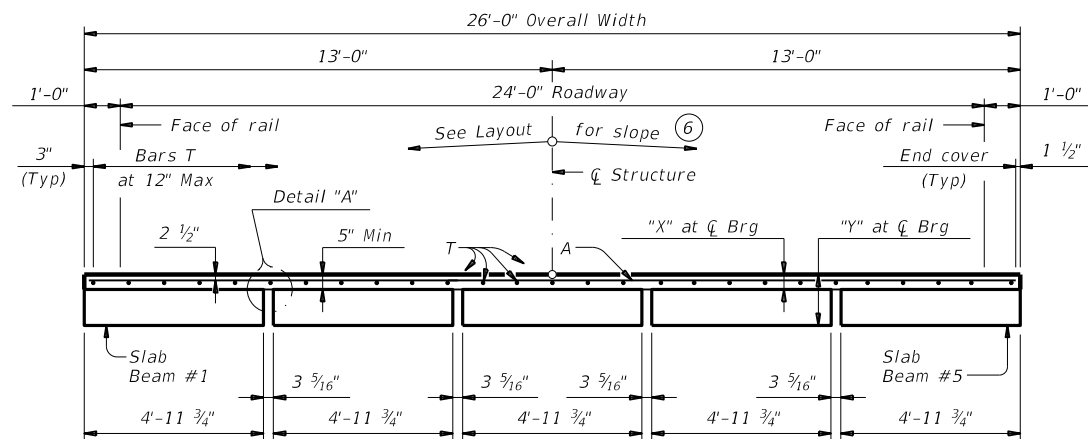
**PLAN**



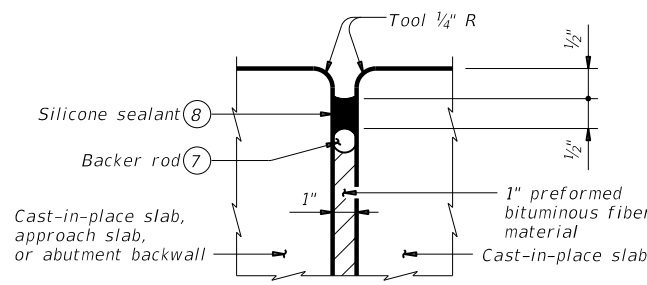
**DETAIL "A"**



**CONTINUOUS SLAB DETAIL**



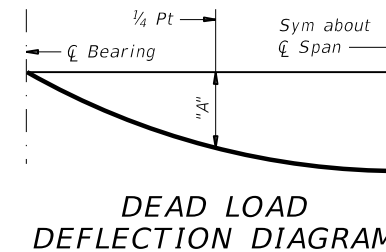
**TYPICAL TRANSVERSE SECTION**



**TYPE A JOINT DETAIL 9**

**TABLE OF VARIABLE VALUES**

Span Length	Beam Type	Dead Load Deflection		Section Depths 3	
		"A"	"B"	"x"	"y"
Ft	1	Ft	Ft	In	Ft/In
25	5SB12	0.004	0.005	5 1/4"	1'-5 1/4"
30	5SB12	0.008	0.011	5 1/2"	1'-5 1/2"
35	5SB12	0.015	0.021	6"	1'-6"
40	5SB12	0.026	0.036	6 1/2"	1'-6 1/2"
25	5SB15	0.002	0.003	5 1/4"	1'-8 1/4"
30	5SB15	0.004	0.006	5 1/2"	1'-8 1/2"
35	5SB15	0.008	0.011	5 1/2"	1'-8 1/2"
40	5SB15	0.013	0.019	5 3/4"	1'-8 3/4"
45	5SB15	0.022	0.030	6 1/2"	1'-9 1/2"
50	5SB15	0.034	0.047	7"	1'-10"



**DEAD LOAD DEFLECTION DIAGRAM**  
 NOTE: Deflections shown are due to concrete slab only ( $E_c = 5,000$  ksi). Calculated deflections shown are theoretical and actual dimensions may vary. Adjust based on field verification.

**BAR TABLE**

BAR	SIZE
A	#5
T	#4

**TABLE OF ESTIMATED QUANTITIES**

SPAN LENGTH	REINF CONCRETE SLAB (SLAB BEAM)	PRESTR CONC SLAB BEAM (5SB12 OR 5SB15) 1			TOTAL REINF STEEL 2
		ABUT TO INT BT	INT BT TO INT BT	ABUT TO ABUT	
Ft	SF	LF 4	LF 4	LF 4	Lb
25	650	122.50	122.50	122.50	1,820
30	780	147.50	147.50	147.50	2,180
35	910	172.50	172.50	172.50	2,550
40	1,040	197.50	197.50	197.50	2,910
45	1,170	222.50	222.50	222.50	3,280
50	1,300	247.50	247.50	247.50	3,640

- See Bridge Layout for beam type used in the superstructure. These standards do not provide for the use of both SB12 and SB15 beams within the same structure.
- Reinforcing steel weight is calculated using an approximate factor of 2.8 Lbs/SF.
- Based on theoretical beam camber, dead load deflections of 5" cast-in-place concrete slab and a constant grade. The Contractor will adjust these values for any vertical curve.
- Fabricator will adjust beam lengths for beam slopes as required.
- Where slab is continuous over Interior Bents, Bars T are continuous through Joint. See "Continuous Slab Detail".
- This standard does not provide for changes in roadway cross-slopes within the structure.
- 1 1/4" backer rod must be compatible with joint sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.
- Class 7 silicone sealant that conforms to DMS-6310. Install when ambient temperature is between 55°F and 85°F and rising. Engineer to determine allowable hours for sealant application.
- See Bridge Layout for expansion joint locations. If using Type A expansion joints, the maximum distance between joints is 100 feet. Type A joints are subsidiary to Item 422, "Concrete Superstructures".

**GENERAL NOTES:**

Designed according to AASHTO LRFD Bridge Design Specifications. Two- or three-span units, with slab continuous over interior bents, may be formed with the details shown on this sheet. See applicable rail details for rail anchorage in slab. This standard does not support the use of transition bents.

Cover dimensions are clear dimensions, unless noted otherwise.

**MATERIAL NOTES:**

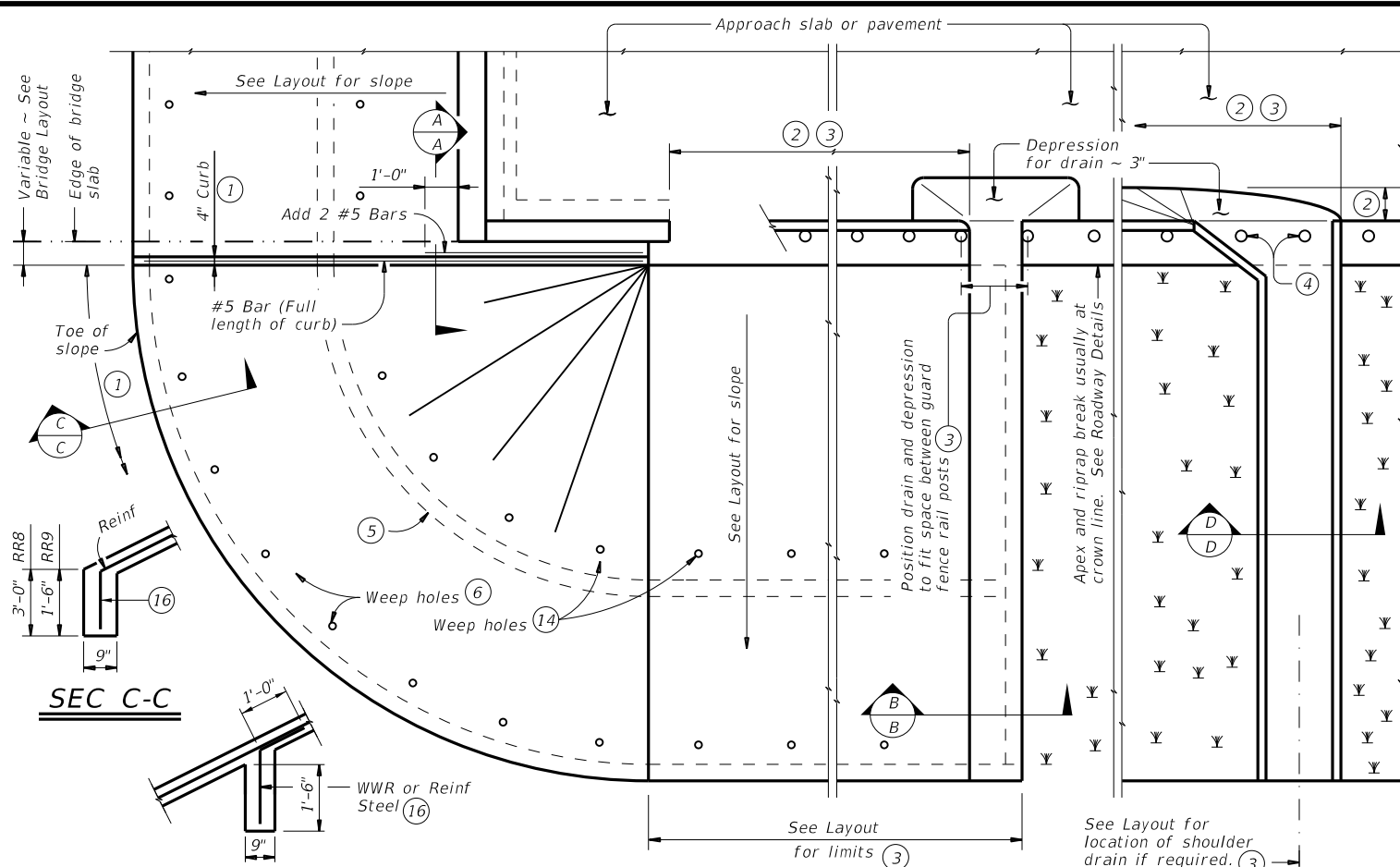
Provide Class S concrete ( $f'_c = 4,000$  psi).  
 Provide Class S (HPC) concrete if shown elsewhere in the plans.  
 Provide Grade 60 reinforcing steel.  
 Provide bar laps, where required, as follows:  
 Uncoated ~ #4 = 1'-7"  
 ~ #5 = 2'-0"  
 Epoxy coated ~ #4 = 2'-5"  
 ~ #5 = 3'-0"  
 Deformed welded wire reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars A or T unless noted otherwise.

HL93 LOADING

		<b>Bridge Division Standard</b>	
<b>PRESTRESSED CONCRETE SLAB BEAM SPANS (TYPE SB12 OR SB15) 24' ROADWAY SPSB-24</b>			
FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT
©TxDOT	January 2017	CON: 0916	SECT: 28
REVISIONS		JOB: 082	HIGHWAY: CR 3861
		DIST: COUNTY	SHEET NO.
		CRP: SAN PATRICIO	083

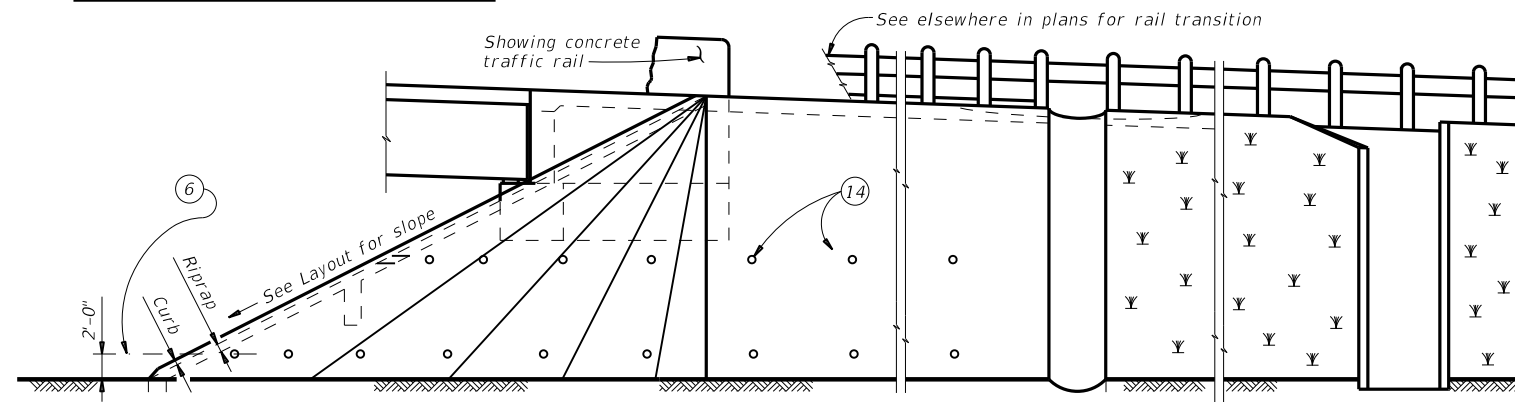


DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

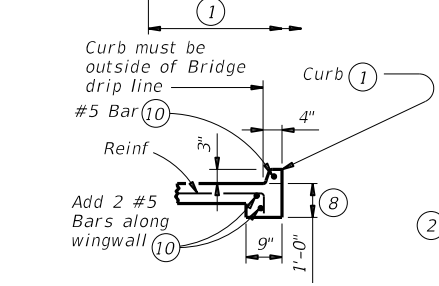


**INTERMEDIATE TOEWALL** (5)

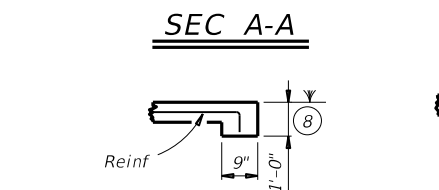
**PLAN**



**ELEVATION**

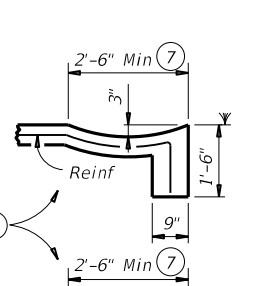


**SEC A-A**



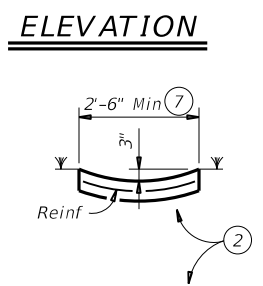
**SEC B-B**

(No drain)



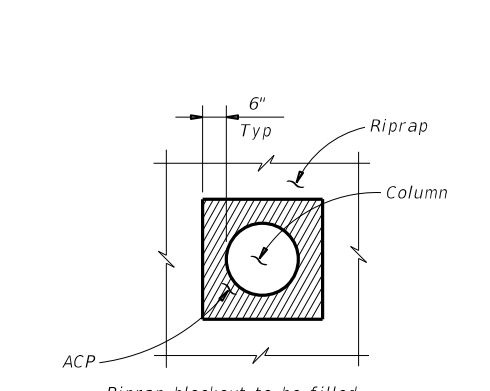
**SEC B-B**

(Shoulder drain integral with riprap)



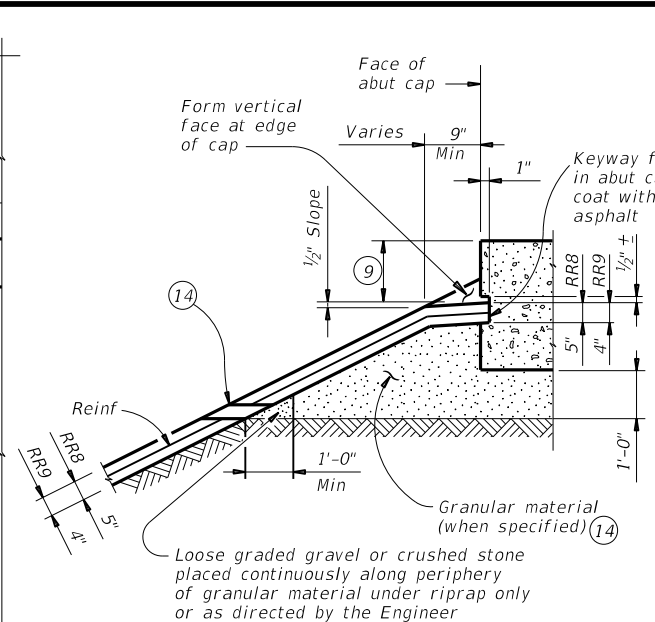
**SEC D-D**

(Shoulder drain)

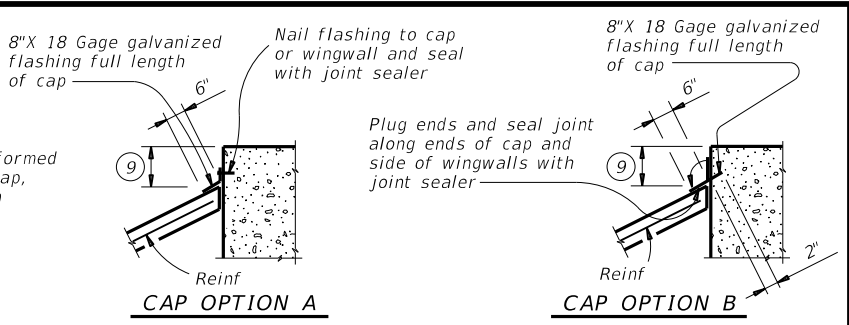


**RIPRAP DETAIL AT COLUMNS**

(As directed by the Engineer)

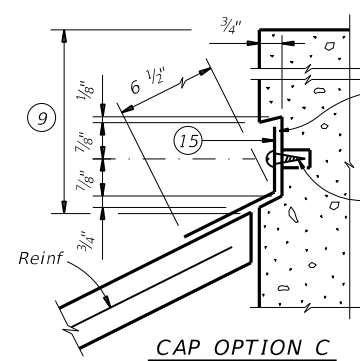


**SHOWING KEYWAY OPTION**

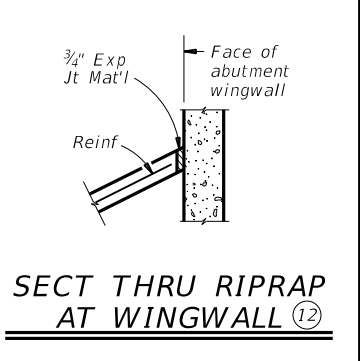


**CAP OPTION A**

**CAP OPTION B**

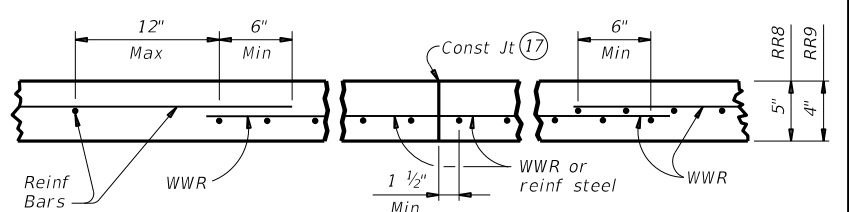


**CAP OPTION C**



**SECT THRU RIPRAP AT WINGWALL** (12)

**SECTIONS THRU RIPRAP AT CAP** (11)



**REINFORCEMENT DETAILS** (13)

See General Notes for optional synthetic fiber reinforcement.

- 1 When riprap is shown extended around header on layout, extend slab and toewall as shown and eliminate 4" curb.
- 2 Limits and configuration of drains and depressions are as shown elsewhere in plans or as directed by the Engineer.
- 3 Location of shoulder drain must consider limitations imposed by rail transition. Do not locate shoulder drains at expansion joints between approach slab and concrete pavement.
- 4 See details elsewhere in plans for installation of guard fence posts through concrete riprap.
- 5 Provide intermediate toewall only when designated elsewhere in the plans or included in the specifications.
- 6 Provide lower level of 2" Dia weep holes at 10' c-c backed by 1 CF packet of gravel and galvanized hardware cloth at all locations unless directed by the Engineer to eliminate.
- 7 Use wider or other drain configurations if shown elsewhere in plans or if directed by the Engineer.
- 8 Wall extension may be reduced or modified if approved by the Engineer. Increase wall extension to 1'-6" whenever the optional intermediate toewall is called for in the plans.
- 9 Top of cap to top of riprap dimension varies as directed by the Engineer. Should be 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.
- 10 #5 bars shown are required even when synthetic fiber reinforcing option is selected.
- 11 Provide sealing option for joint between the face of cap and riprap as designated by the Engineer or as shown elsewhere on plans.
- 12 Flashing (shown in Cap Option A) may be used at wingwall in addition to Exp Jt Mat'l if shown on plans or directed by the Engineer.
- 13 Provide #3 reinforcing bars at 18" Spa c-c. Provide Welded Wire Reinforcement (WWR) as 6x6-D2.9xD2.9 or D3xD3. Combinations of WWR and reinforcing bars may be used if both are permitted. Use lap splices of a minimum 6 inches, measured from the transverse wire of WWR, and the ends of reinforcing bars.
- 14 If granular material is specified, provide upper level of 2" Dia weep holes at 10' c-c backed by galvanized hardware cloth.
- 15 8" x 18 Gage Galv Sheet Metal
- 16 Provide WWR or #3 bars, with 1'-0" extension into slope.
- 17 WWR or reinforcing steel is continuous through riprap construction joints. Provide WWR or reinforcing steel that extends 1'-1" minimum into adjacent riprap on each side of construction joint even if synthetic reinforcing fiber is utilized.

**GENERAL NOTES:**

- Provide Class "B" concrete (f'c = 2,000 psi) unless noted elsewhere in plans.
- Provide Grade 60 reinforcing steel.
- Provide deformed welded wire reinforcement (WWR) meeting ASTM A1064, unless otherwise shown.
- Provide reinforcing bars, deformed WWR, or any suitable combination of both types for riprap reinforcing, unless specified elsewhere in the plans.
- Optionally synthetic fibers may be used if approved by the Engineer. Provide synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) in lieu of steel reinforcing in riprap concrete.
- Install construction joints or grooved joints extending the full slant slope height at intervals of approximately 20 feet unless otherwise directed by the Engineer.
- Hardware cloth, loose grade stone behind weep holes, flashing, or other sealing material are subsidiary to the bid item "Riprap". See Layout for limits of riprap.
- RR8 is to be used on stream crossings.
- RR9 is to be used on other embankments.

**FOR CONTRACTOR'S INFORMATION ONLY:**

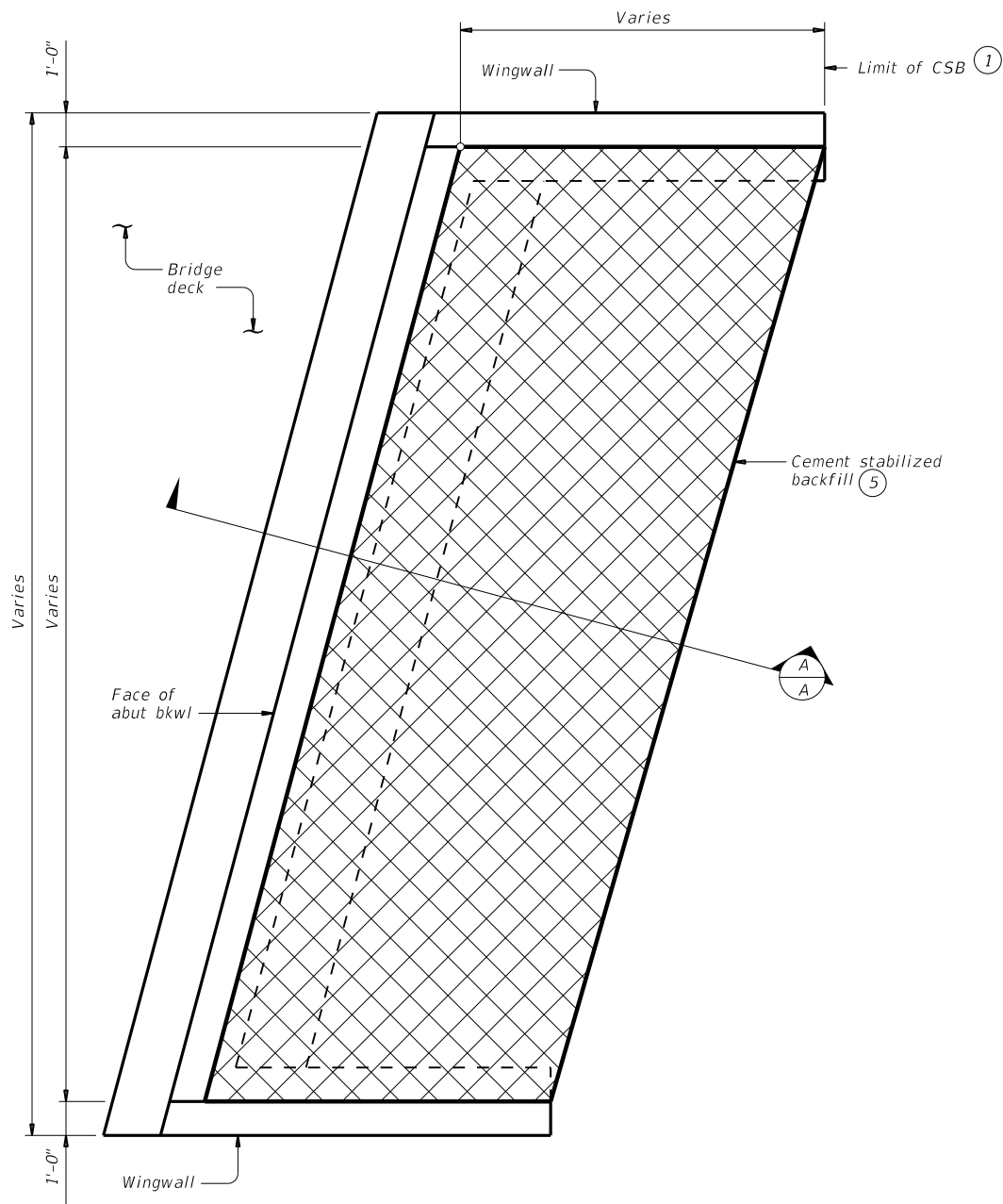
5" of RR8	= 0.015 CY/SF
4" of RR9	= 0.012 CY/SF
#3 Reinf at 18" c-c	= 0.501 Lbs/SF
6x6-D3xD3	= 0.408 Lbs/SF

		<b>Bridge Division Standard</b>	
<b>CONCRETE RIPRAP AND SHOULDER DRAINS EMBANKMENTS AT BRIDGE ENDS (TYPES RR8 &amp; RR9)</b>			
<b>CRR</b>			
FILE: MS-CRR-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
©TxDOT April 2019	CONT	SECT	JOB
REVISIONS	0916	28	082
	DIST	COUNTY	SHEET NO.
CRP	SAN PATRICIO		084

DATE: FILE:

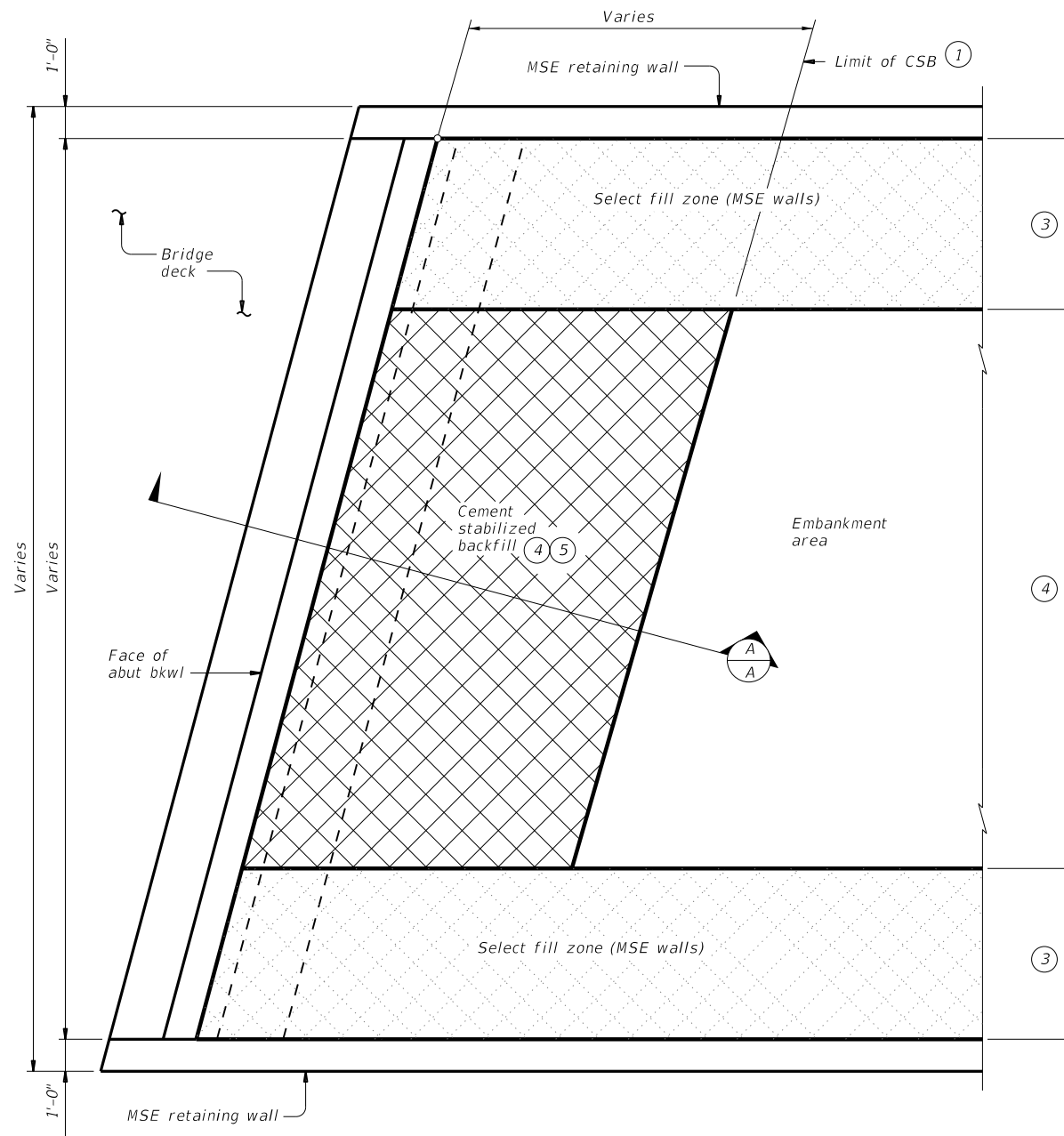
DISCLAIMER: This standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: FILE:



**OPTION 1 ~ PLAN WITH WINGWALLS**

Cast-in-place retaining walls similar.



**OPTION 1 ~ PLAN WITH MSE RETAINING WALLS**

- ① Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.
- ② Bench backfill as shown with 12" (approximate) bench depths.
- ③ Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.
- ④ When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.
- ⑤ If shown in the plans, flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
  - a) If flowable backfill is to be placed over MSE backfill, then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
  - b) Place flowable fill in lifts not exceeding 2 feet in height. Place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).

**GENERAL NOTES:**

See the Bridge Layout for selected Option. Option 1 is intended for construction only requiring plasticity index (PI) controlled embankment fill or excavation in competent soils/rocks in order to construct the abutment. Option 2 is intended for new construction requiring high plasticity embankment fill with a PI greater than 30 or pavement built in poor native soil. Poor soils are defined as high plasticity clays or expansive clays.

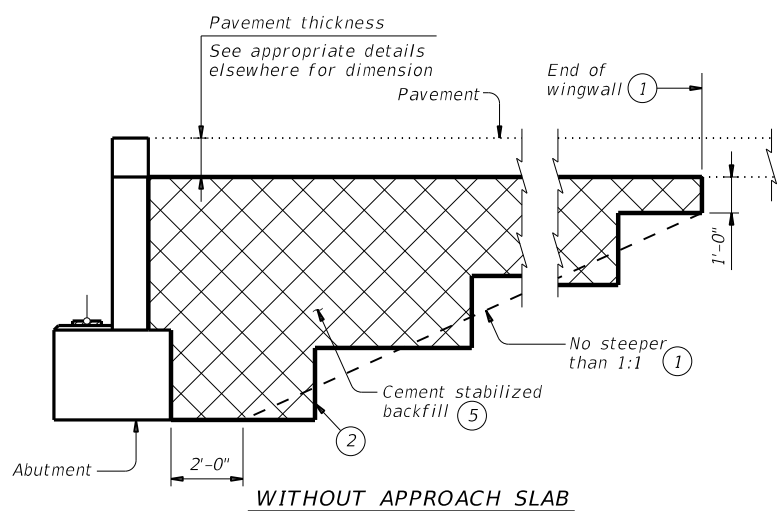
Construct abutment backfill in accordance with Item 400, "Excavation and Backfill for Structures".

Provide Cement Stabilized Backfill (CSB) meeting the requirements of Item 400, "Excavation and Backfill for Structures", to the limits shown at bridge abutments.

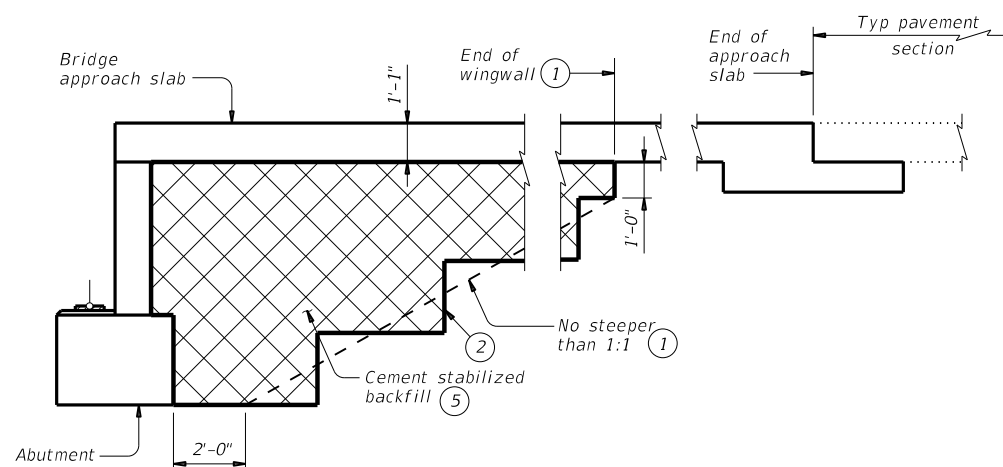
If required elsewhere in the plans, provide Flowable Backfill meeting the requirements of Item 401, "Flowable Backfill", to the limits shown at bridge abutments.

Details are drawn showing left forward skew. See Bridge Layout for actual skew direction.

These details do not apply when Concrete Block retaining walls are used in lieu of wingwalls.



**WITHOUT APPROACH SLAB**



**WITH APPROACH SLAB**

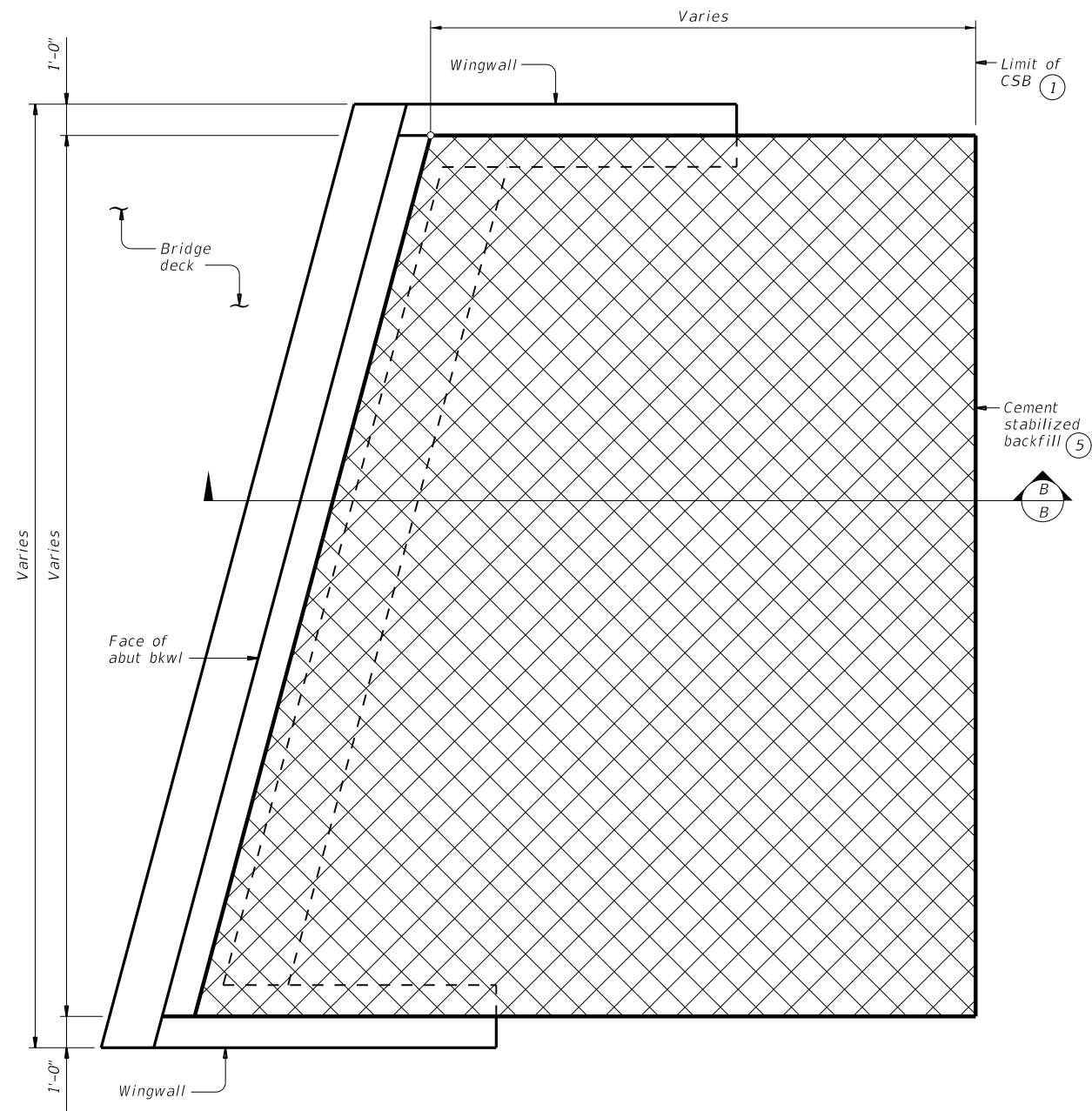
(Showing BAS-C, BAS-A similar.)

**SECTION A-A**

SHEET 1 OF 2

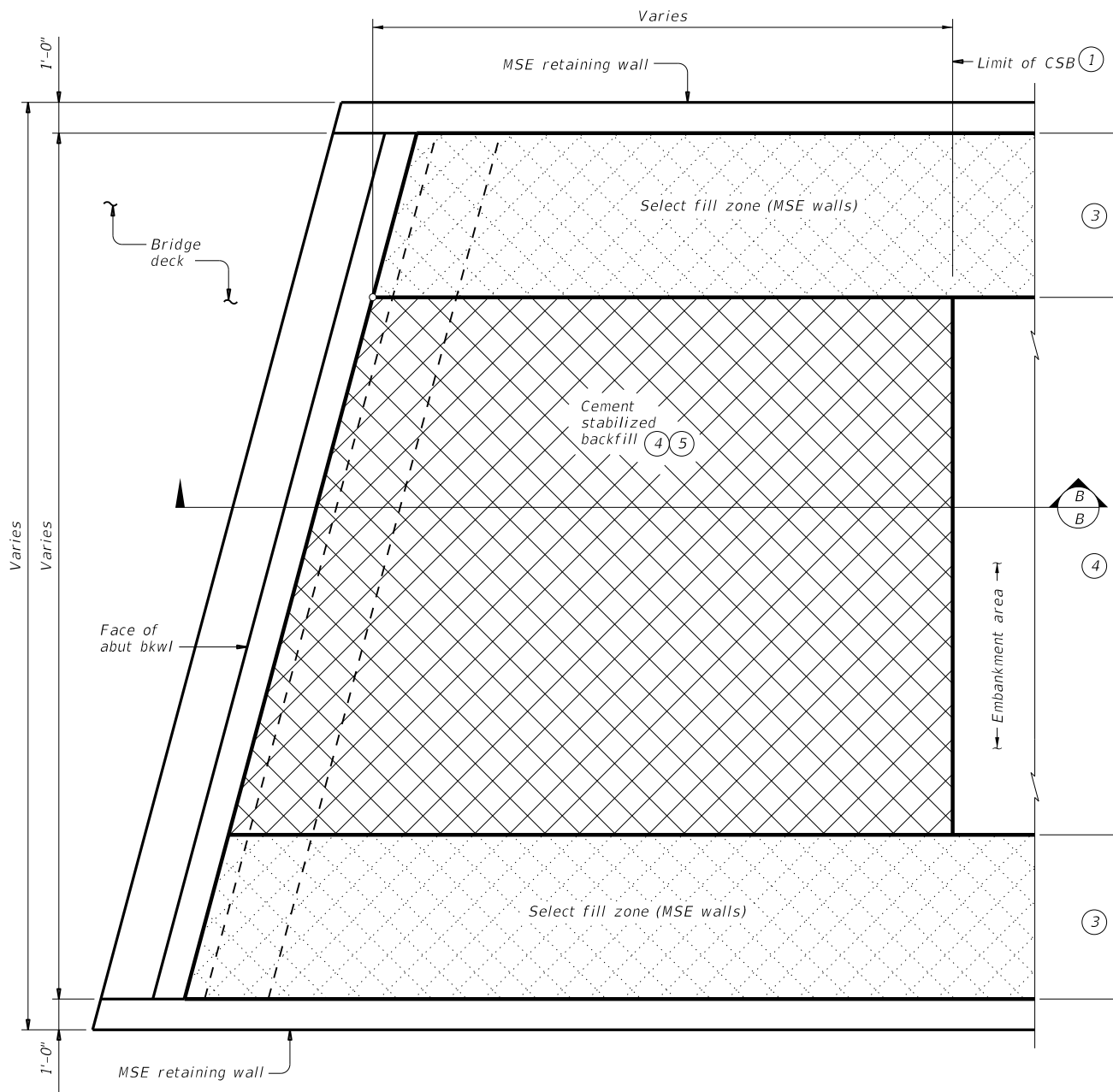
		<b>Bridge Division Standard</b>	
<b>CEMENT STABILIZED ABUTMENT BACKFILL BRIDGE ABUTMENT</b>			
<b>CSAB</b>			
FILE: MS-CSAB-23.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT
©TxDOT April 2019	CONT	SECT	JOB
REVISIONS	0916	28	082
02-20: Added Option 2.	DIST	COUNTY	SHEET NO.
03-23: Updated General Notes.	CRP	SAN PATRICIO	085

DISCLAIMER: 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.



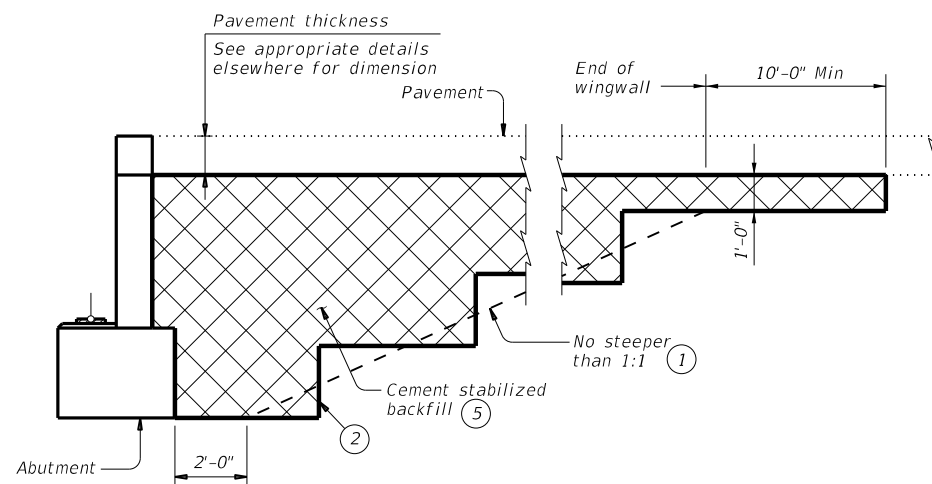
**OPTION 2 ~ PLAN WITH WINGWALLS**

Cast-in-place retaining walls similar.

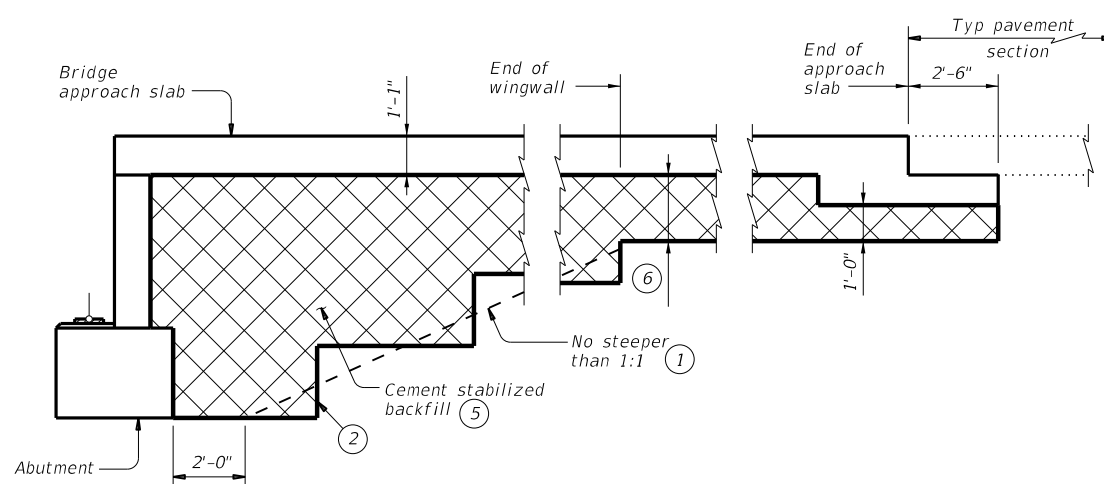


**OPTION 2 ~ PLAN WITH MSE RETAINING WALLS**

- ① Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.
- ② Bench backfill as shown with 12" (approximate) bench depths.
- ③ Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.
- ④ When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.
- ⑤ If shown in the plans, flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
  - a). If flowable backfill is to be placed over MSE backfill, then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
  - b). Place flowable fill in lifts not exceeding 2 feet in height. Place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).
- ⑥ 1'-0" for BAS-A  
1'-10" for BAS-C



**WITHOUT APPROACH SLAB**



**SECTION B-B**

**WITH APPROACH SLAB**  
(Showing BAS-C, BAS-A similar.)

SHEET 2 OF 2



**CEMENT STABILIZED  
ABUTMENT BACKFILL  
BRIDGE ABUTMENT**

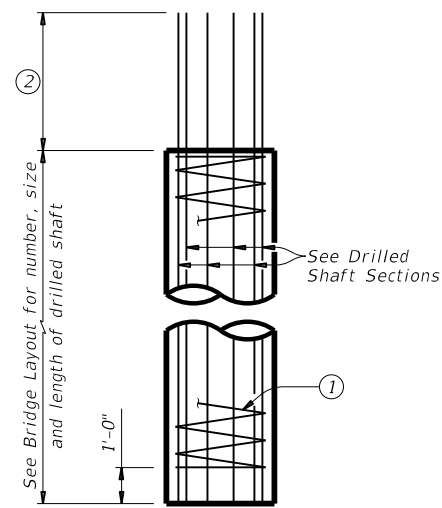
**CSAB**

FILE: MS-CSAB-23.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0916	28	082	CR 3861
02-20: Added Option 2. 03-23: Updated General Notes.	DIST	COUNTY	SHEET NO.	
	CRP	SAN PATRICIO	086	

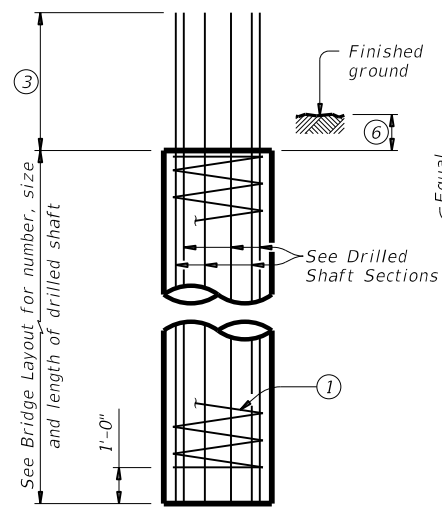
DATE:  
FILE:

DISCLAIMER: 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.

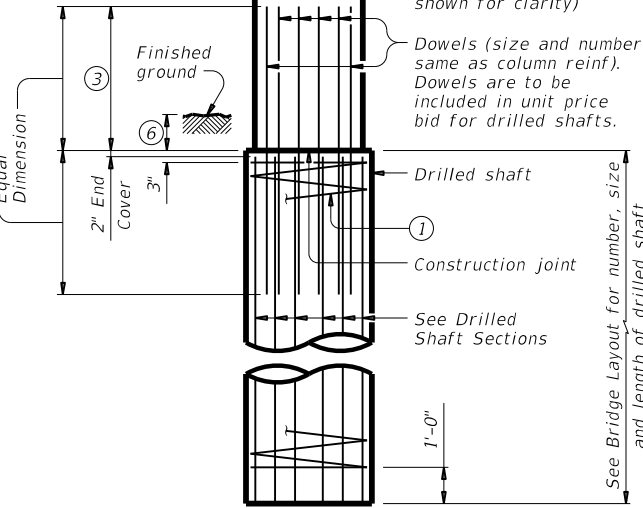
DATE: FILE:



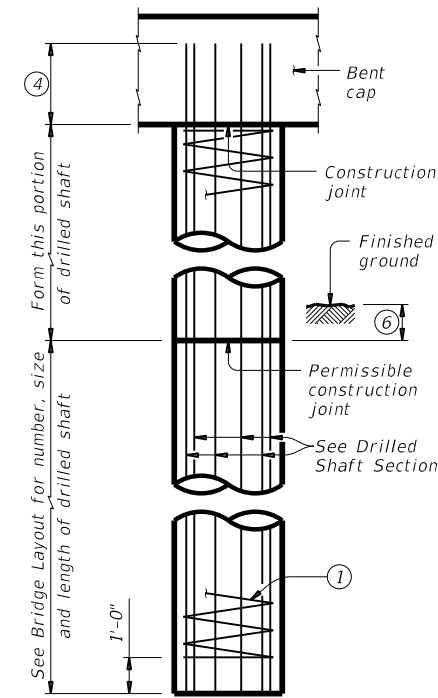
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



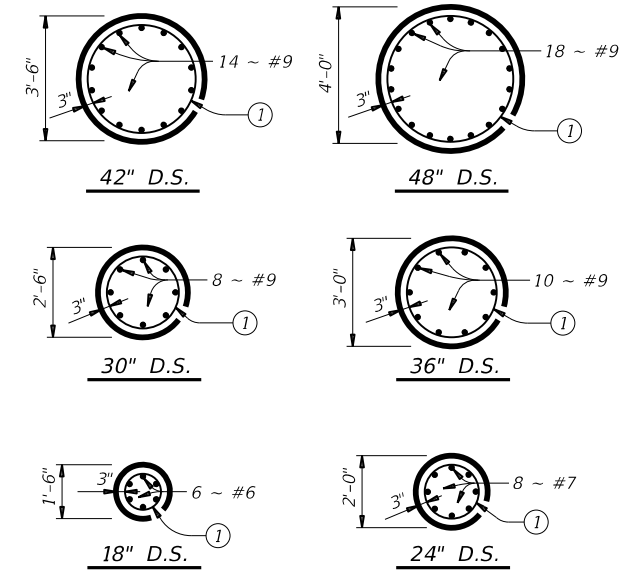
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL

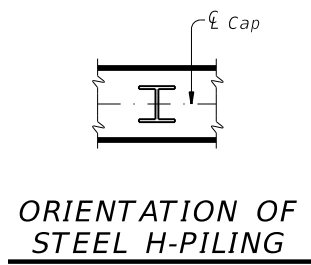


DRILLED SHAFT SECTIONS

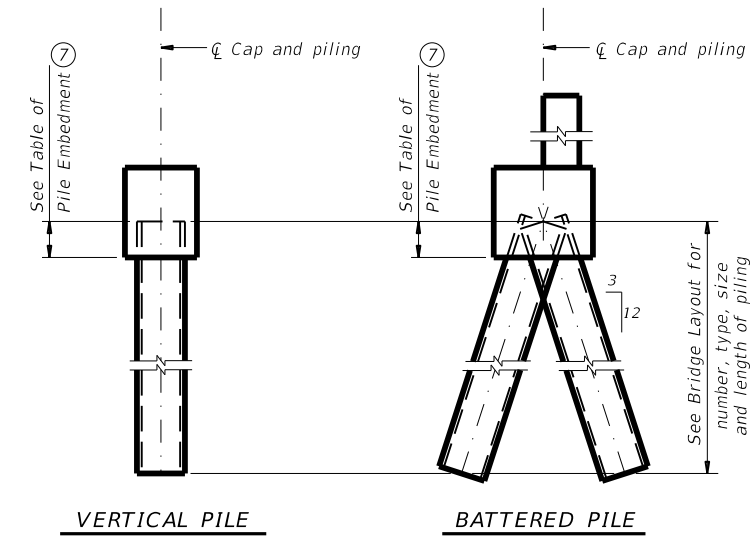
**DRILLED SHAFT DETAILS**

TABLE OF PILE EMBEDMENT	
Pile Type	Embedment Depth (Ft)
16" Sq Concrete 18" Sq Concrete HP14 Steel HP16 Steel	1'-0"
20" Sq Concrete 24" Sq Concrete HP18 Steel	1'-6"

See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.

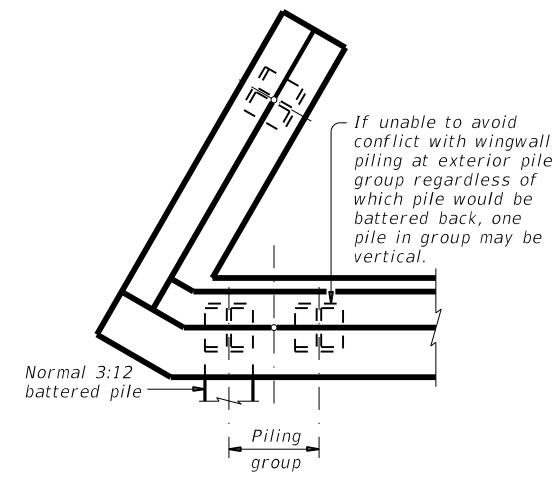


ORIENTATION OF STEEL H-PILING



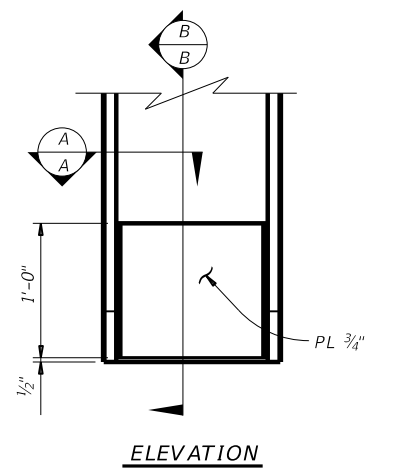
VERTICAL PILE BATTERED PILE

**PILING DETAILS**  
(Concrete or steel H)

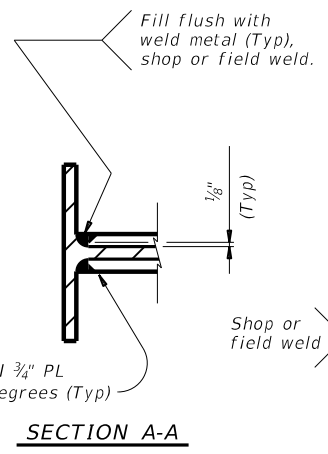


DETAIL "A"  
(Showing plan view of a 30° skewed abutment)

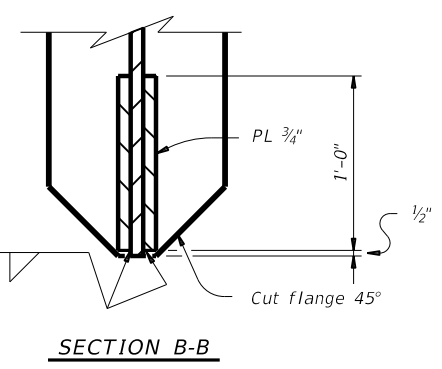
- ① #3 spiral at 6" pitch (one and a half flat turns top and bottom).
- ② Min extension into supported element:  
#6 Bars = 1'-11"  
#7 Bars = 2'-0"  
#9 Bars = 2'-3"
- ③ Min lap with column reinf:  
#7 Bars = 2'-11"  
#9 Bars = 3'-9"  
#11 Bars = 4'-8"
- ④ Min extension into supported element:  
#6 Bars = 1'-11"  
#7 Bars = 2'-3"  
#9 Bars = 2'-9"
- ⑤ Drilled shafts may extend to the bottom of bent caps for "H" heights of 6 ft and less (as shown on the Bridge Layout), if approved. This option can only be used when the drilled shaft diameter equals the column diameter. Obtain approval of the forming method above the ground line prior to construction. No adjustments in payment will be made if this option is used.
- ⑥ 1'-0" Min, unless shown otherwise on plans.
- ⑦ Or as shown on plans.



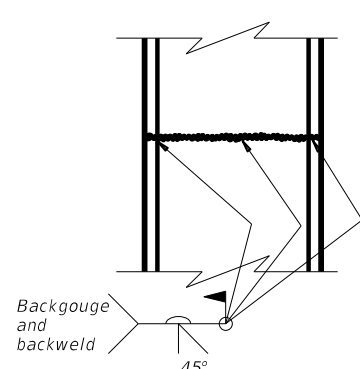
ELEVATION



SECTION A-A



SECTION B-B



SECTION THRU FLANGE OR WEB

**STEEL H-PILE TIP REINFORCEMENT**

See Item 407 "Steel Piling" to determine when tip reinforcement is required and for options to the details shown.

**STEEL H-PILE SPLICE DETAIL**

Use when required.

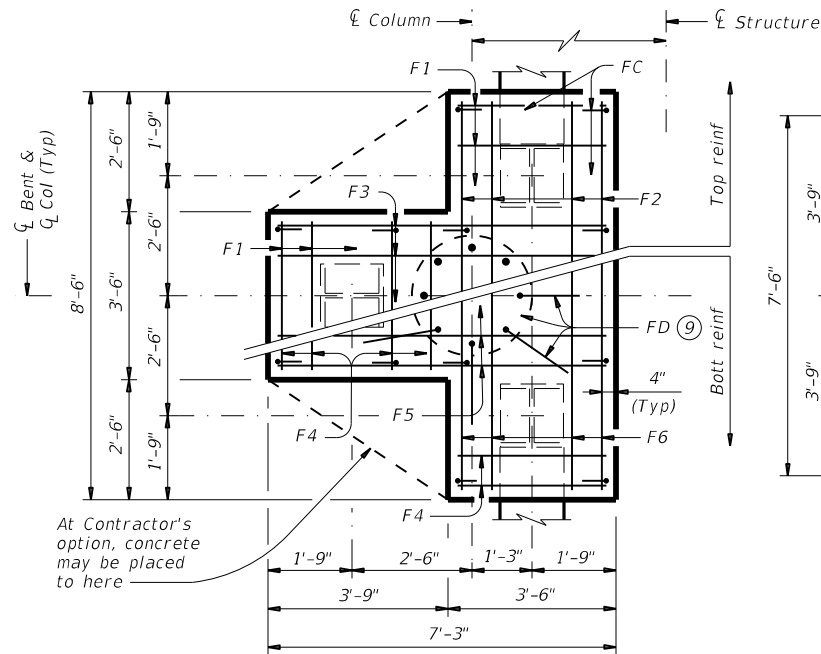
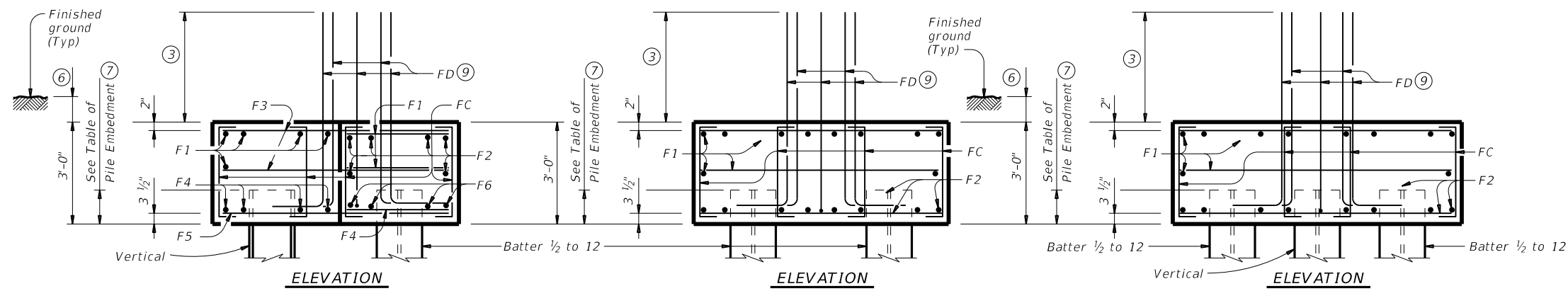
		<b>Bridge Division Standard</b>	
<b>COMMON FOUNDATION DETAILS</b>			
<b>FD</b>			
FILE: fdstd01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
©TxDOT April 2019	CONTRACT	SECTION	JOB
REVISIONS	0916	28	082
01-20: Added #11 bars to the FD bars.	DIST	COUNTY	SHEET NO.
CRP	SAN PATRICIO		087

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

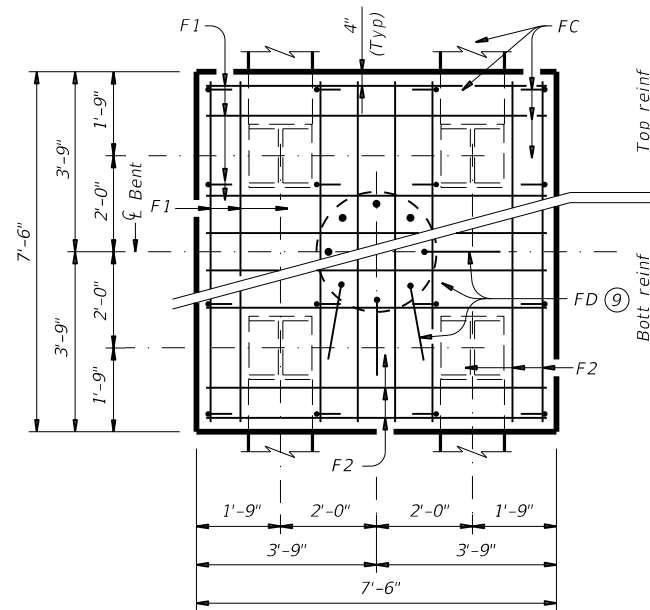
DATE: FILE:

### TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

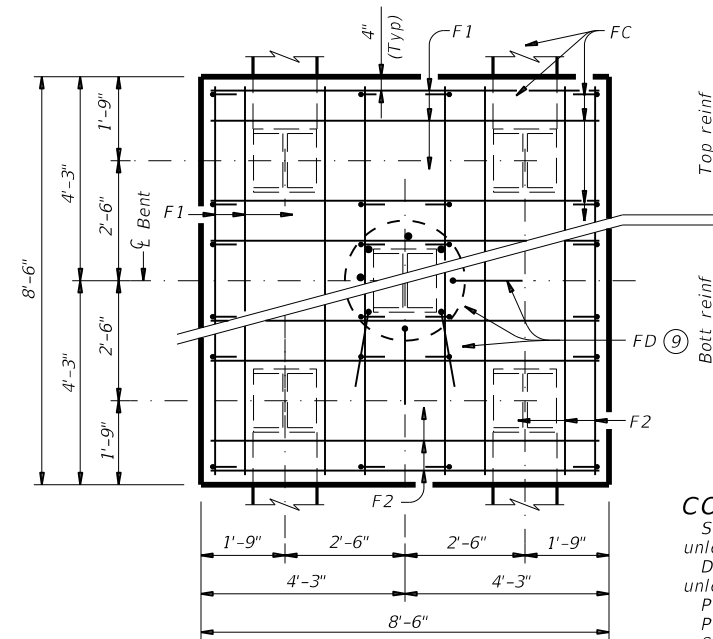
ONE 3 PILE FOOTING					
Bar	No.	Size	Length	Weight	
F1	11	#4	3'- 2"	23	
F2	6	#4	8'- 2"	33	
F3	6	#4	6'- 11"	28	
F4	8	#9	3'- 2"	86	
F5	4	#9	6'- 11"	94	
F6	4	#9	8'- 2"	111	
FC	12	#4	3'- 6"	28	
FD <sup>(10)</sup>	8	#9	8'- 1"	220	
Reinforcing Steel				Lb	623
Class "C" Concrete				CY	4.8
ONE 4 PILE FOOTING					
Bar	No.	Size	Length	Weight	
F1	20	#4	7'- 2"	96	
F2	16	#8	7'- 2"	306	
FC	16	#4	3'- 6"	37	
FD <sup>(10)</sup>	8	#9	8'- 1"	220	
Reinforcing Steel				Lb	659
Class "C" Concrete				CY	6.3
ONE 5 PILE FOOTING					
Bar	No.	Size	Length	Weight	
F1	20	#4	8'- 2"	109	
F2	16	#9	8'- 2"	444	
FC	24	#4	3'- 6"	56	
FD <sup>(10)</sup>	8	#9	8'- 1"	220	
Reinforcing Steel				Lb	829
Class "C" Concrete				CY	8.0



**THREE PILE FOOTING<sup>(8)</sup>**  
For 36" Dia and smaller columns.



**FOUR PILE FOOTING<sup>(8)</sup>**  
For 42" Dia and smaller columns.



**FIVE PILE FOOTING<sup>(8)</sup>**  
For 42" Dia and smaller columns.

#### CONSTRUCTION NOTES:

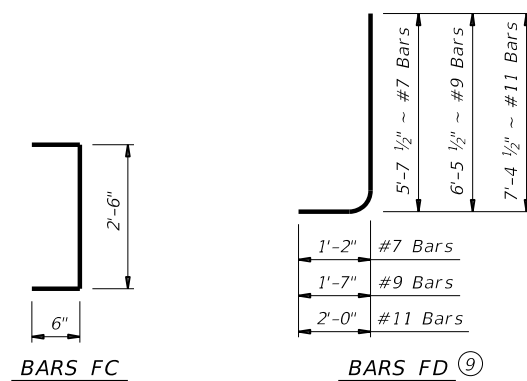
- See Bridge Layout for foundation type required. Use these foundation details unless shown otherwise.
- Drive piling under abutment wingwalls to a minimum resistance of 10 Tons/Pile unless shown otherwise.
- Provide Class C Concrete ( $f'_c = 3,600$  psi), unless shown otherwise.
- Provide Grade 60 reinforcing steel.
- Galvanize reinforcing if shown elsewhere in the plans.
- Provide bar laps for drilled shaft reinforcing, where required, as follows:
  - Uncoated or galvanized (#6) ~ 2'-6"
  - Uncoated or galvanized (#7) ~ 2'-11"
  - Uncoated or galvanized (#9) ~ 3'-9"

#### GENERAL NOTES:

- Designed according to AASHTO LRFD Bridge Design Specifications.
- Cover dimensions are clear dimensions, unless noted otherwise.
- Reinforcing bar dimensions shown are out-to-out of bar.

#### DESIGNER NOTES:

- Do not use the drilled shaft details shown on this standard for retaining wall, noise wall, barrier, or sign foundations without structural evaluation.
- Do not use the footings shown on this standard in direct contact with salt water or exposed to salt water spray.
- Maximum allowable pile loads for the footings shown are:
  - 72 Tons/Pile with 24" Dia Columns
  - 80 Tons/Pile with 30" Dia Columns
  - 100 Tons/Pile with 36" Dia Columns
  - 120 Tons/Pile with 42" Dia Columns



- ③ Min lap with column reinforcing:
  - #7 Bars = 2'-11"
  - #9 Bars = 3'-9"
  - #11 Bars = 4'-8"
- ⑥ 1'-0" Min, unless shown otherwise on plans.
- ⑦ Or as shown on plans.
- ⑧ See Bridge Layout for type, size and length of piling.
- ⑨ Number and size of FD bars must match column reinforcing. Tie FD bars to the top of the bottom reinforcing mat.
- ⑩ Adjust FD quantity, size and weight as needed to match column reinforcing.

SHEET 2 OF 2

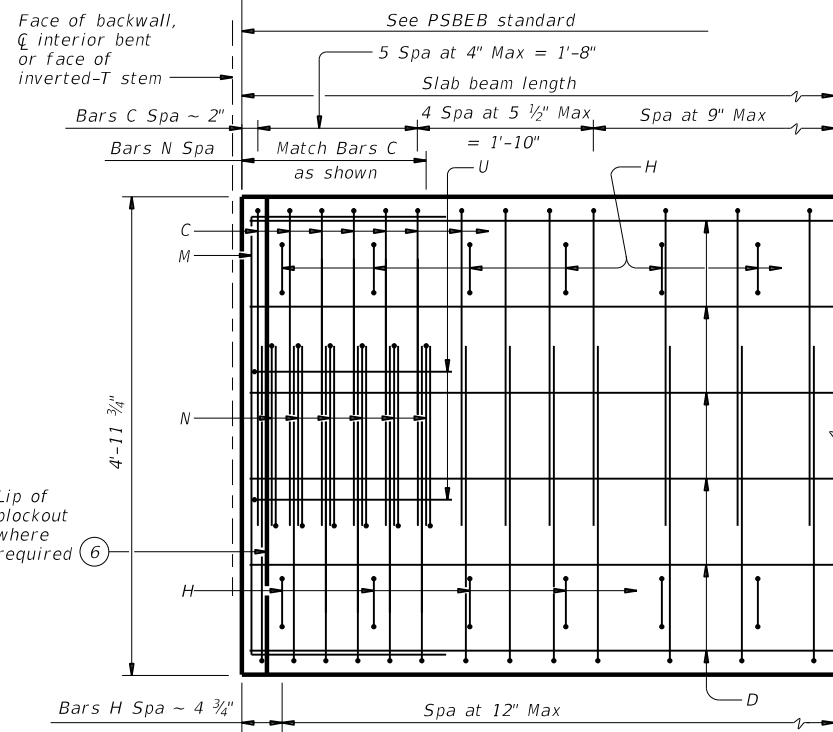


## COMMON FOUNDATION DETAILS

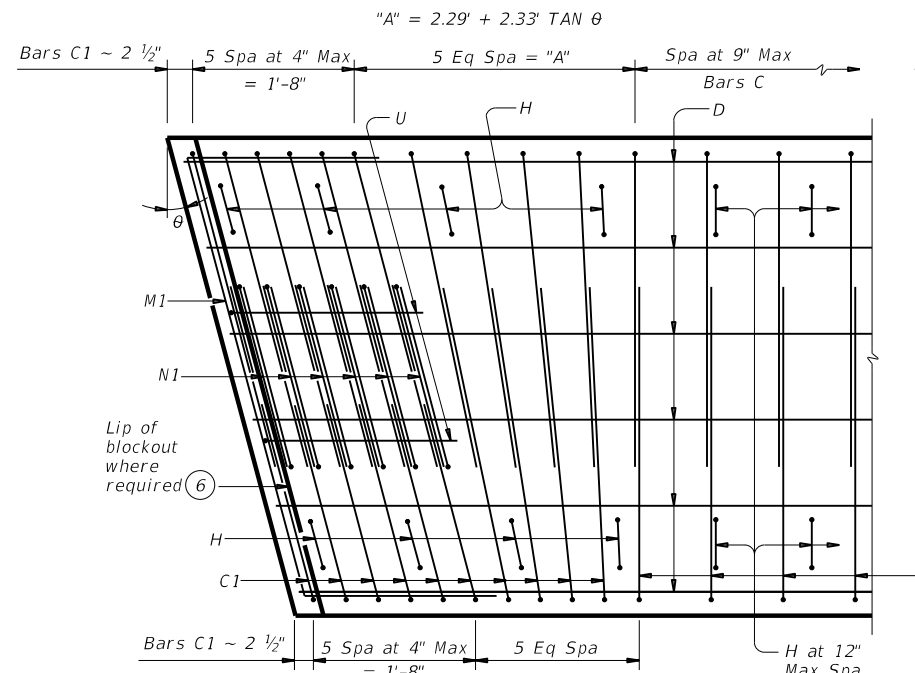
FD

FILE: fdstd01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0916	28	082	CR 3861
01-20: Added #11 bars to the FD bars.	DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO		088	

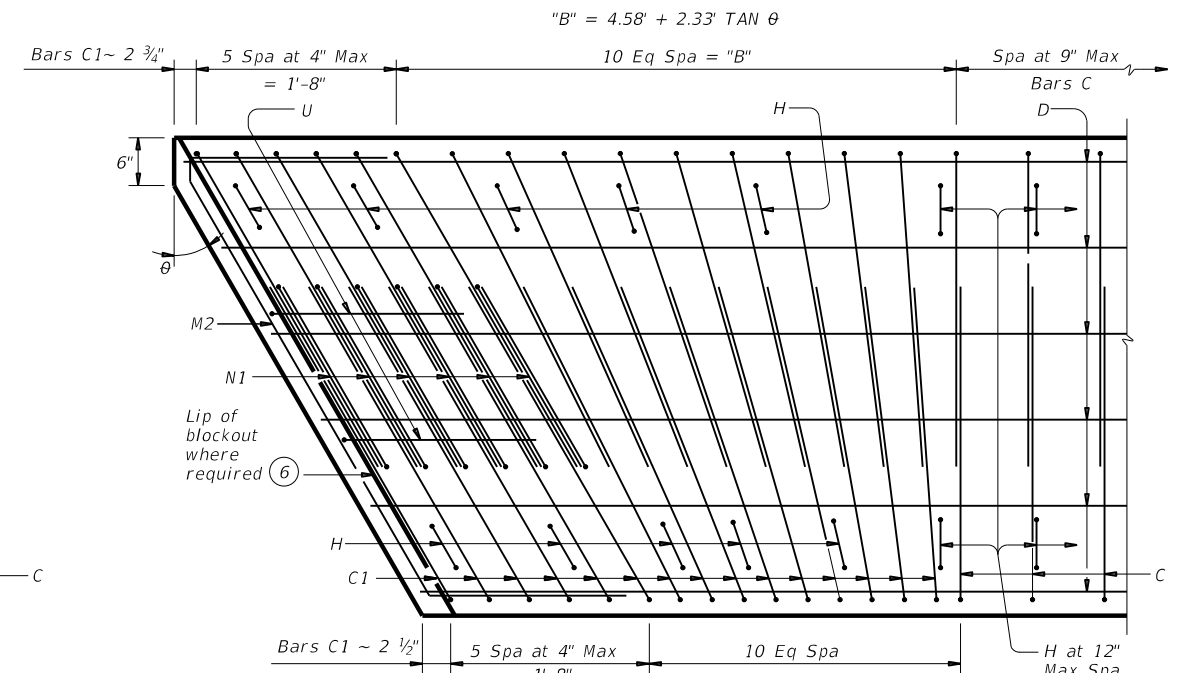
DISCLAIMER: This standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



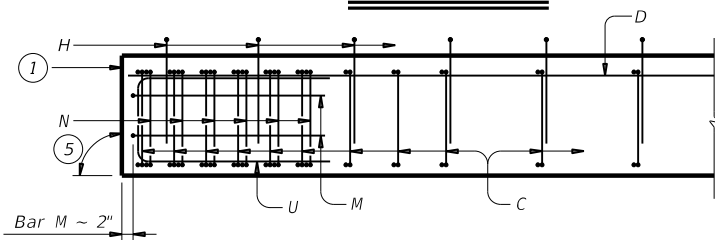
**PART PLAN**



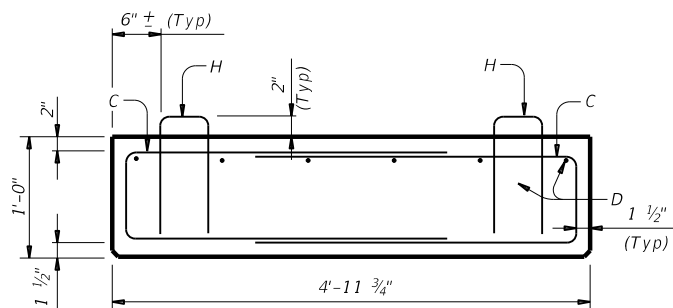
**PART SKEW PLAN**  
(Showing  $\theta$  over 0° to 15° Skew)



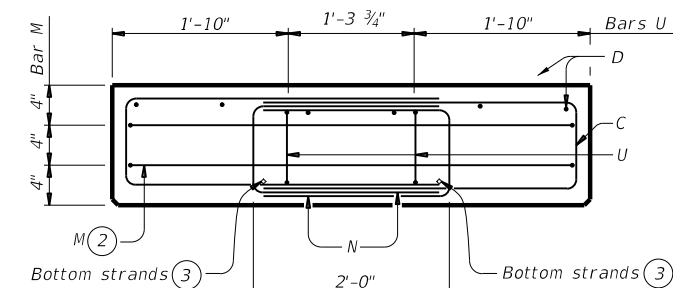
**PART SKEW PLAN**  
(Showing  $\theta$  over 15° to 30° Skew)



**ELEVATION**

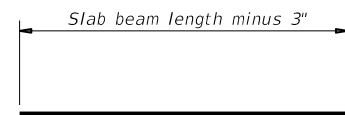


**SECTION**

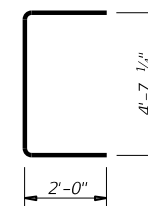


**END MAT REINFORCING**

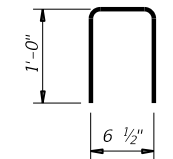
Bars H not shown for clarity.



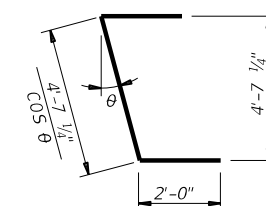
**BARS D(#6)**



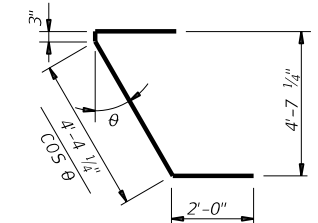
**BARS M(#4)**



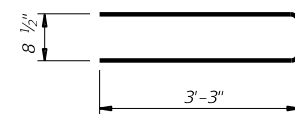
**BARS H(#4)**



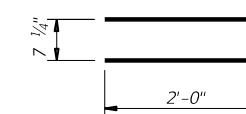
**BARS M1(#4)**



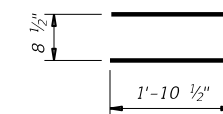
**BARS M2(#4)**



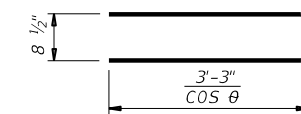
**BARS C(#4)**



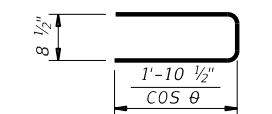
**BARS U(#5)**



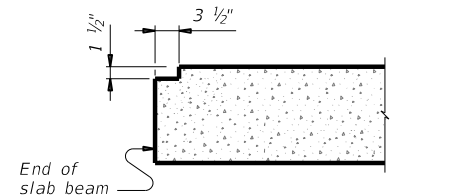
**BARS N(#4)**



**BARS C1(#4)**



**BARS N1(#4)**



**ELEVATION OF BLOCKOUT**

BEAM PROPERTIES		
Area	in <sup>2</sup>	717.0
Y top	in	6.00
Y bott	in	6.00
I	in <sup>4</sup>	8,604
Weight	lb/ft	747

**GENERAL NOTES:**

Designed according to AASHTO LRFD Bridge Design Specifications. Provide Class H concrete. Provide Class H (HPC) if shown elsewhere in the plans. Provide Grade 60 reinforcing steel. An equal area of welded wire reinforcement (WWR) (ASTM 1064) may be substituted for bars C and D if approved by the Engineer. These details can be used for any skew angle up to a maximum of 30 degrees. Chamfer all exposed corners 3/4" or round to a 3/4" radius. Details are drawn showing right forward skew. See Bridge Layout for actual direction.

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

- ① See End Mat Reinforcing detail.
- ② Adjust bars M vertically to avoid strands.
- ③ See sheet PSBND or PSBSD for strand locations.
- ④ Assumes 150 pcf weight density of concrete.
- ⑤ 90° at conventional interior bents. End of beam must be vertical at abutment backwall and inverted-T stem.
- ⑥ Blockout required at armor joint (AJ) and sealed expansion joint (SEJ) locations to accommodate joint anchorage.

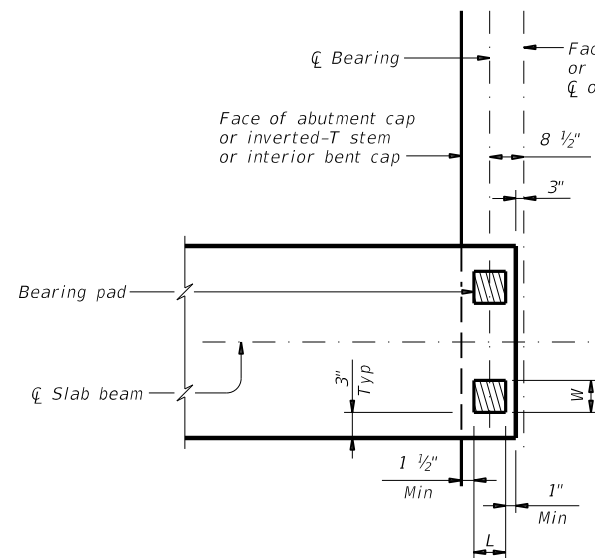
HL93 LOADING

Texas Department of Transportation  
**PRESTRESSED CONCRETE SLAB BEAM DETAILS (TYPE 5SB12)**  
**PSB-5SB12**

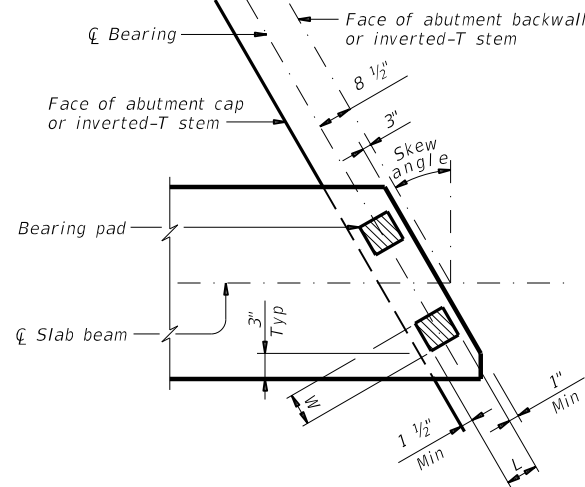
FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0916	28	082	CR 3861
DIST	COUNTY		SHEET NO.	
CRP	SAN PATRICIO		089	

DATE: FILE:

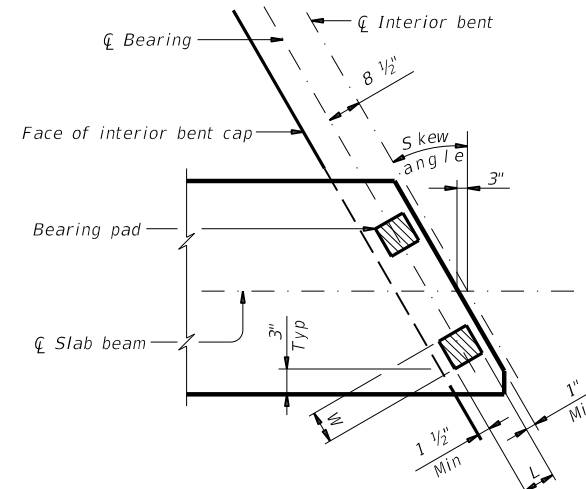
DISCLAIMER: This standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



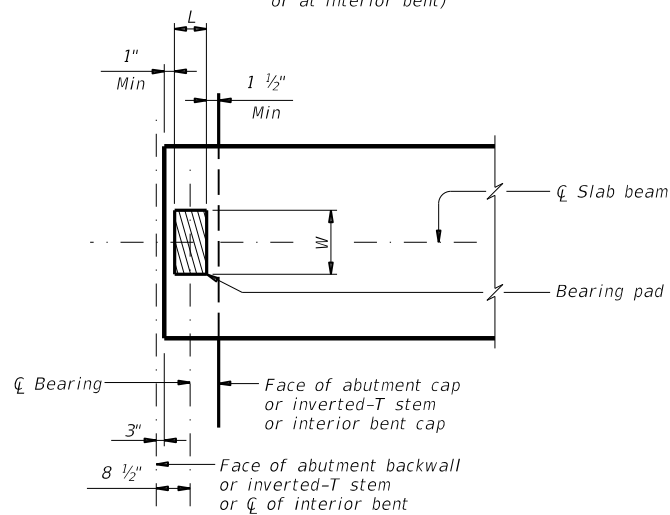
**TWO-PAD DETAIL PLAN**  
(At abutment or inverted-T cap or at interior bent)



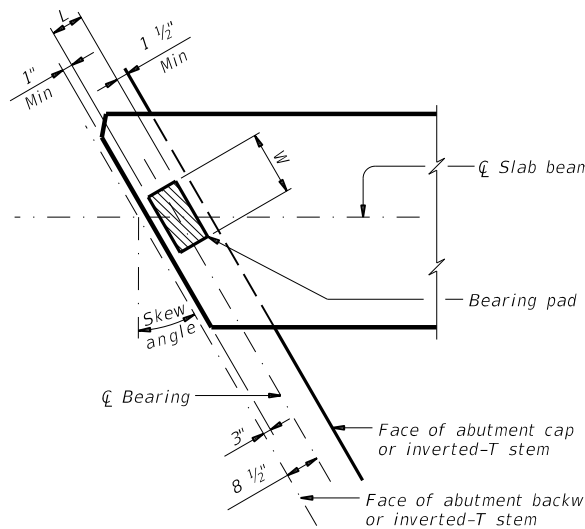
**TWO-PAD DETAIL SKEW PLAN**  
(At abutment or inverted-T cap)



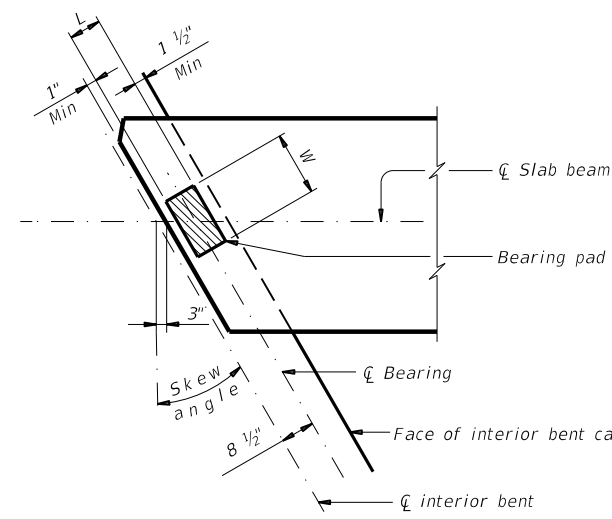
**TWO-PAD DETAIL SKEW PLAN**  
(At interior bent)



**ONE-PAD DETAIL PLAN**  
(At abutment or inverted-T cap or at interior bent)



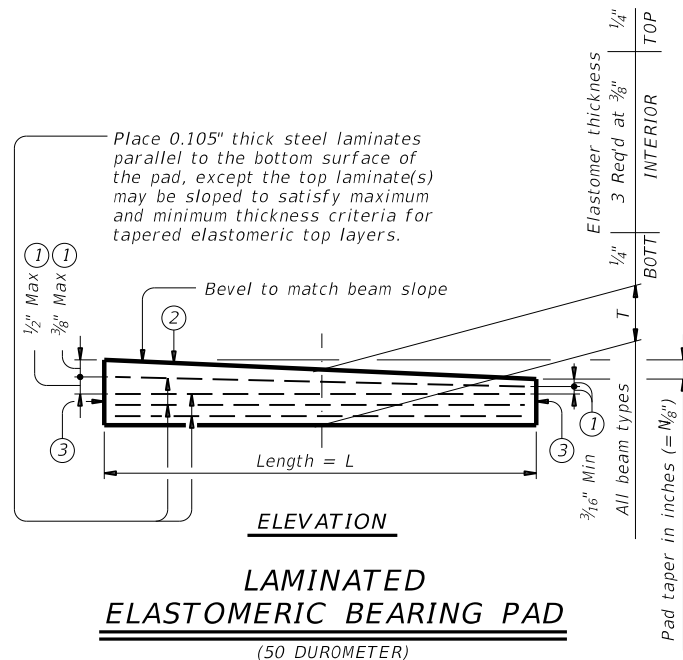
**ONE-PAD DETAIL SKEW PLAN**  
(At abutment or inverted-T cap)



**ONE-PAD DETAIL SKEW PLAN**  
(At interior bent)

**ELASTOMERIC BEARING PAD PLACEMENT AND BEAM END DIAGRAMS**

Place one bearing pad at forward station beam end.  
Place two bearing pads at back station beam end.



**LAMINATED ELASTOMERIC BEARING PAD**  
(50 DUROMETER)

- ① Maximum and minimum layer thicknesses shown are for elastomer only, on tapered layers.
- ② Indicate BEARING TYPE on all pads. For tapered pads, locate BEARING TYPE on the high side. The Fabricator must include the value of "N" (amount of taper in 1/8" increments) in this mark.  
Examples: N=0, (for 0" taper)  
N=1, (for 1/8" taper)  
N=2, (for 1/4" taper)  
(etc.)  
Fabricated pad top surface slope must not vary from plan beam slope by more than  $(\frac{0.0625"}{\text{Length}})$  IN/IN.
- ③ Locate permanent mark here.

**TABLE OF BEARING PAD DIMENSIONS (ALL PRESTR CONC SLAB BM TYPES)**

One-Pad (Ty SB1-"N") ②			Two-Pad (Ty SB2-"N") ②		
W	L	T	W	L	T
14"	7"	2"	7"	7"	2"

Pad sizes shown are applicable for the following conditions:

- (1) All one, two and three span units where the minimum span length is not less than 25' and the maximum span is not more than 50'.
- (2) Skews less than or equal to 30°.

**GENERAL NOTES:**

These details accommodate skew angles up to 30°. Shop drawings for approval are required. A bearing layout which identifies location and orientation of all bearings must be developed by the bearing fabricator. Permanently mark each bearing in accordance with the bearing layout. A copy of the bearing layout is to be provided to the Engineer. Cost of furnishing and installing elastomeric bearings must be included in unit price bid for "Prestressed Concrete Slab Beams".

HL93 LOADING



**ELASTOMERIC BEARING AND BEAM END DETAILS PRESTR CONCRETE SLAB BEAM**

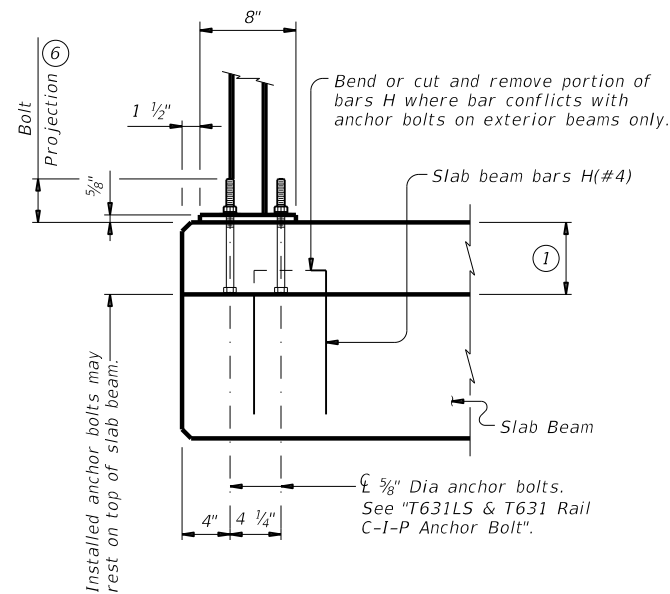
**PSBEB**

FILE:	DN: TxDOT	CK: TxDOT	OW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0916	28	082	CR 3861
	DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	090		

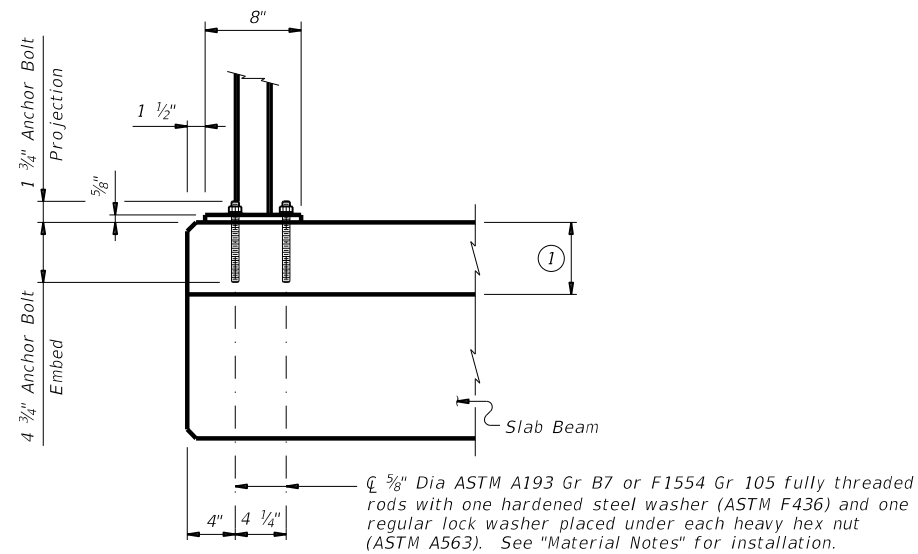
DATE:  
FILE:



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

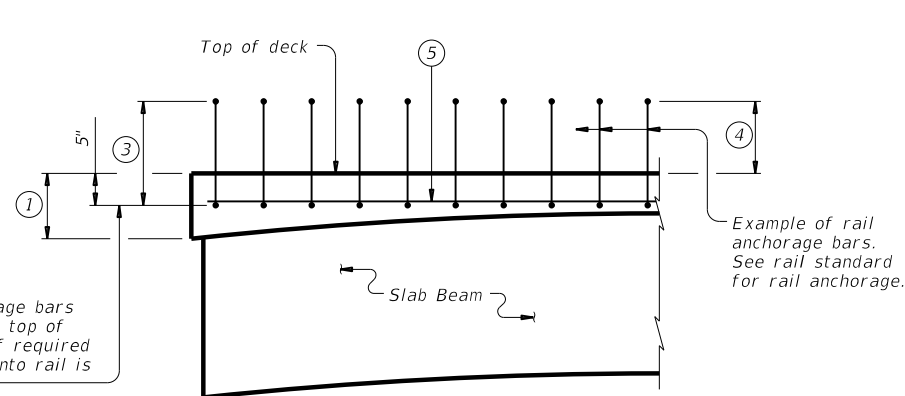


**CAST-IN-PLACE ANCHORAGE OPTION**

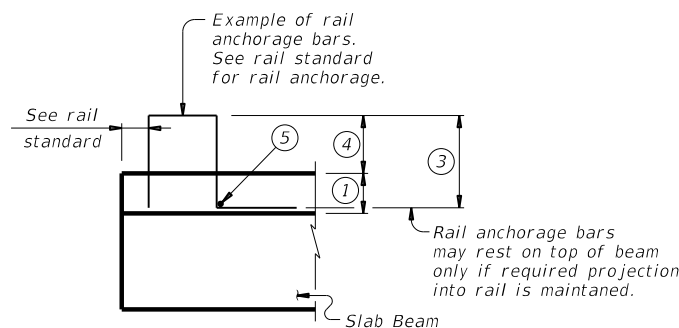


**ADHESIVE ANCHORAGE OPTION**

**T631LS & T631 RAIL ANCHORAGE PLACEMENT** (2)(7)



**PART SPAN ELEVATION**

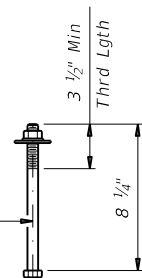


**SECTION**

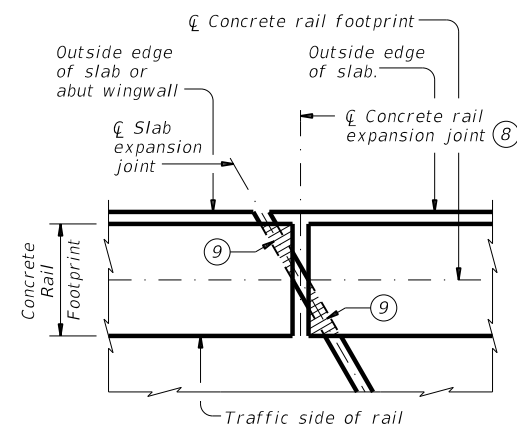
**TYPICAL CONCRETE RAIL ANCHORAGE**

(Showing typical concrete rail anchorage)

5/8" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563).



**T631LS & T631 RAIL C-I-P ANCHOR BOLT**



**PLAN OF CONCRETE RAILS AT EXPANSION JOINTS**

- ① Cast-in-place slab thickness varies due to beam camber (5" minimum).
- ② Replace cast-in-place anchor bolts shown on T631LS and T631 Rail standard with an adhesive anchor system or cast-in-place anchor bolts shown on this sheet.
- ③ Bar length shown on rail standard, minus 1 1/4". Adjust bar length for a raised sidewalk.
- ④ See rail standard for projection from finished grade or top of sidewalk.
- ⑤ Place additional (#5) longitudinal bar.
- ⑥ Excess bolt length has been provided to accommodate a variable slab thickness due to beam camber. If slab thickness on span details exceed 7", bolt length must be increased accordingly. After posts have been set and bolts tightened, bolt projection above nuts of more than 1/2" must be cut off and painted with two coats of zinc-rich paint conforming to the Item 445 "Galvanizing".
- ⑦ Distance from end of top outside edge of slab to center of first bolt group can not be less than 9", except: 15° Skew: 1'-0" (acute corner only) 30° Skew: 1'-3" (acute corner only)
- ⑧ Location of rail expansion joint must be at the intersection of centerline of slab expansion joint, centerline of rail footprint and perpendicular to slab outside edge.
- ⑨ Cross-hatched area must have 1/2" preformed bituminous fiber material under concrete rail, as shown.

**CONSTRUCTION NOTES:**

Rail anchorage bars may be field bent as required to clear rail reinforcing or provide minimum cover shown on standard rail detail sheets. 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:**

Galvanize all steel components of steel rail system. Provide Grade 60 reinforcing steel. Cast-in-place anchorage system for T631LS and T631 Rail must be 5/8" Dia heavy hex head anchor bolts (ASTM F3125 Gr 325 or A449) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed anchor bolts 4 1/2" minimum. Adhesive anchors for T631LS and T631 Rail must be 5/8" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed fully threaded rod into slab and/or abutment wingwall using a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4 3/4". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 8 kips (edge distance must be accounted for). 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." Epoxy coat or galvanize reinforcing steel shown on this standard if rail reinforcement is epoxy coated or galvanized.

**GENERAL NOTES:**

Designed in accordance with AASHTO LRFD Bridge Design Specifications. This standard is for use with structures with a 5" minimum cast-in-place concrete slab. This standard may require modification for interior rails. This standard does not apply to median barriers. This standard does not provide details for Type T221P, T224, T80HT, T80SS, C412, PR11, PR22 and PR3 rails on slab beam bridges. See rail standards for approved speed restrictions, notes and details not shown.

Cover dimensions are clear dimensions, unless noted otherwise.

		<b>Bridge Division Standard</b>	
<b>RAIL ANCHORAGE DETAILS</b> <b>PRESTR CONCRETE SLAB BEAMS</b>			
<b>PSBRA</b>			
FILE:	DN: TxDOT	CK: TxDOT	DW: JTR
0916	January 2017	CONTRACT	SECTION
0916	28	082	CR 3861
03-18: Updated adhesive anchor notes.		DIST	COUNTY
CRP	SAN PATRICIO	SHEET NO. 091	

DATE: FILE:

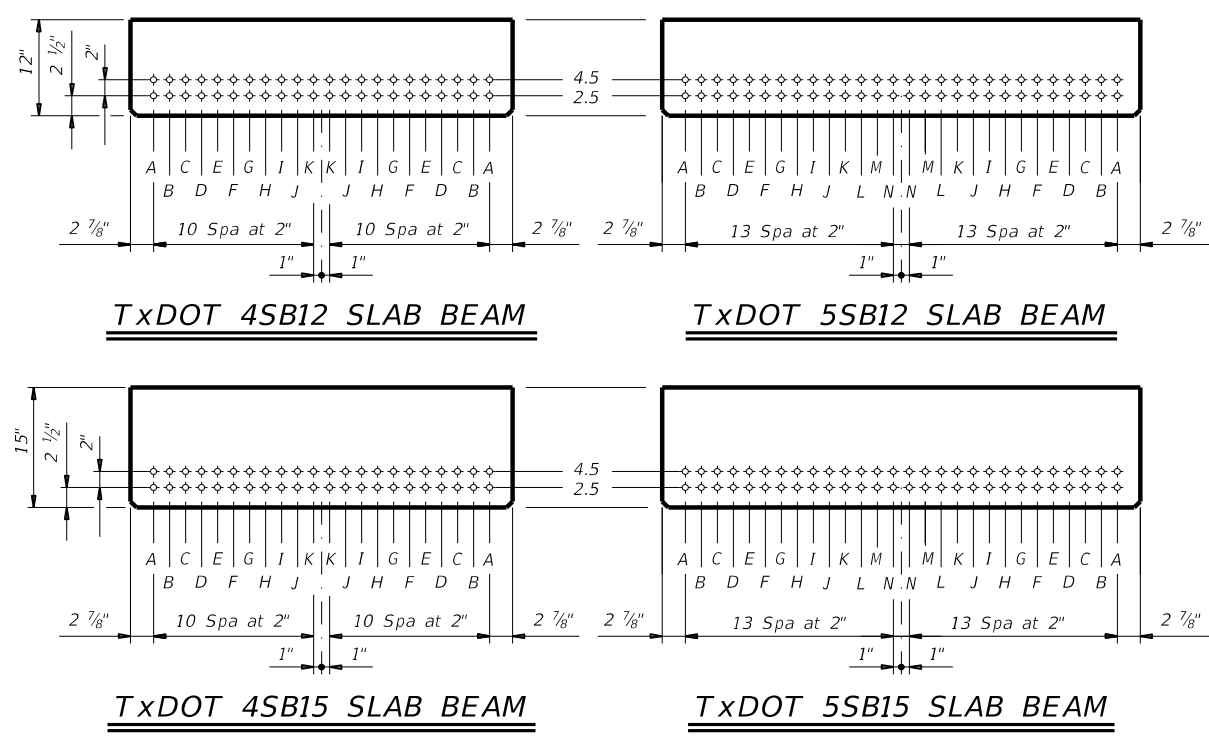
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

STRUCTURE	DESIGNED BEAMS (STRAIGHT STRANDS)																			OPTIONAL DESIGN					LOAD RATING FACTORS			
	SPAN LENGTH (ft)	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS							DEBONDED STRANDS PER ROW					CONCRETE		DESIGN LOAD COMP STRESS (TOP $\epsilon$ ) (SERVICE I)	DESIGN LOAD TENSILE STRESS (BOTT $\epsilon$ ) (SERVICE III)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I)	LIVE LOAD DISTRIBUTION FACTOR		STRENGTH I			SERVICE III		
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" $\bar{c}$ (in)	"e" END (in)	TOT NO. DEB	DIST FROM BOTTOM (in)	NO. OF STRANDS		NUMBER OF STRANDS DEBONDED TO (ft from end)							RELEASE STRGTH $f'_{ci}$ (ksi)	MINIMUM 28 DAY COMP STRGTH $f'_c$ (ksi)	②		Inv	Opr	Inv	
												TOTAL	DE-BONDED	3	6	9	12						15	Moment				Shear
24' ROADWAY SB12 BEAM	25	ALL	5SB12		8	0.6	270	3.50	3.50	0	2.5	8	0	0	0	0	0	0	4.000	5.000	0.914	-1.217	448	0.450	0.450	1.40	1.82	1.71
	30	ALL	5SB12		10	0.6	270	3.50	3.50	0	2.5	10	0	0	0	0	0	4.000	5.000	1.292	-1.685	530	0.450	0.450	1.25	1.62	1.29	
	35	ALL	5SB12		14	0.6	270	3.50	3.50	0	2.5	14	0	0	0	0	0	4.000	5.000	1.730	-2.219	675	0.450	0.450	1.33	1.73	1.23	
	40	ALL	5SB12		18	0.6	270	3.50	3.50	0	2.5	18	0	0	0	0	0	4.000	5.000	2.218	-2.796	820	0.440	0.440	1.34	1.74	1.12	
24' ROADWAY SB15 BEAM	25	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	4.000	5.000	0.725	-0.897	551	0.450	0.450	1.77	2.29	2.41	
	30	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	4.000	5.000	1.020	-1.244	574	0.450	0.450	1.23	1.59	1.45	
	35	ALL	5SB15		10	0.6	270	5.00	5.00	0	2.5	10	0	0	0	0	0	4.000	5.000	1.361	-1.640	708	0.450	0.450	1.15	1.49	1.14	
	40	ALL	5SB15		14	0.6	270	5.00	5.00	0	2.5	14	0	0	0	0	0	4.000	5.000	1.739	-2.068	864	0.440	0.440	1.32	1.71	1.19	
	45	ALL	5SB15		18	0.6	270	5.00	5.00	2	2.5	18	2	2	0	0	0	4.000	5.000	2.179	-2.574	1054	0.440	0.440	1.34	1.73	1.08	
28' ROADWAY SB12 BEAM	25	ALL	5SB12		8	0.6	270	3.50	3.50	0	2.5	8	0	0	0	0	0	4.000	5.000	0.903	-1.184	444	0.430	0.430	1.47	1.91	1.80	
	30	ALL	5SB12		10	0.6	270	3.50	3.50	0	2.5	10	0	0	0	0	0	4.000	5.000	1.276	-1.639	508	0.430	0.430	1.32	1.71	1.37	
	35	ALL	5SB12		12	0.6	270	3.50	3.50	0	2.5	12	0	0	0	0	0	4.000	5.000	1.708	-2.159	647	0.430	0.430	1.18	1.53	1.02	
	40	ALL	5SB12		18	0.6	270	3.50	3.50	0	2.5	18	0	0	0	0	0	4.000	5.000	2.200	-2.744	799	0.430	0.430	1.37	1.78	1.17	
28' ROADWAY SB15 BEAM	25	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	4.000	5.000	0.716	-0.874	529	0.430	0.430	1.85	2.40	2.53	
	30	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	4.000	5.000	1.007	-1.212	570	0.430	0.430	1.29	1.67	1.53	
	35	ALL	5SB15		10	0.6	270	5.00	5.00	0	2.5	10	0	0	0	0	0	4.000	5.000	1.343	-1.598	680	0.430	0.430	1.21	1.57	1.22	
	40	ALL	5SB15		14	0.6	270	5.00	5.00	0	2.5	14	0	0	0	0	0	4.000	5.000	1.725	-2.032	842	0.430	0.430	1.36	1.76	1.24	
	45	ALL	5SB15		18	0.6	270	5.00	5.00	2	2.5	18	2	2	0	0	0	4.000	5.000	2.149	-2.508	1013	0.420	0.420	1.41	1.82	1.16	
30' ROADWAY SB12 BEAM	25	ALL	4SB12		6	0.6	270	3.50	3.50	0	2.5	6	0	0	0	0	0	4.000	5.000	0.904	-1.187	341	0.340	0.340	1.38	1.79	1.67	
	30	ALL	4SB12		8	0.6	270	3.50	3.50	0	2.5	8	0	0	0	0	0	4.000	5.000	1.277	-1.646	407	0.340	0.340	1.32	1.71	1.37	
	35	ALL	4SB12		10	0.6	270	3.50	3.50	0	2.5	10	0	0	0	0	0	4.000	5.000	1.711	-2.169	518	0.340	0.340	1.24	1.60	1.08	
	40	ALL	4SB12		14	0.6	270	3.50	3.50	0	2.5	14	0	0	0	0	0	4.000	5.000	2.205	-2.758	640	0.340	0.340	1.34	1.73	1.11	
30' ROADWAY SB15 BEAM	25	ALL	4SB15		6	0.6	270	5.00	5.00	0	2.5	6	0	0	0	0	0	4.000	5.000	0.723	-0.888	431	0.350	0.350	1.69	2.19	2.32	
	30	ALL	4SB15		6	0.6	270	5.00	5.00	0	2.5	6	0	0	0	0	0	4.000	5.000	1.017	-1.231	438	0.350	0.350	1.16	1.50	1.37	
	35	ALL	4SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	4.000	5.000	1.346	-1.605	545	0.340	0.340	1.21	1.57	1.21	
	40	ALL	4SB15		12	0.6	270	5.00	5.00	0	2.5	12	0	0	0	0	0	4.000	5.000	1.729	-2.043	675	0.340	0.340	1.47	1.91	1.38	
	45	ALL	4SB15		14	0.6	270	5.00	5.00	2	2.5	14	2	2	0	0	0	4.000	5.000	2.166	-2.542	823	0.340	0.340	1.33	1.73	1.06	
50	ALL	4SB15		18	0.6	270	5.00	5.00	4	2.5	18	4	2	2	0	0	0	4.000	5.000	2.665	-3.115	998	0.340	0.340	1.32	1.71	1.02	

① Based on the following allowable stresses (ksi):  
 Compression = 0.65  $f'_{ci}$   
 Tension = 0.24  $\sqrt{f'_{ci}}$   
 Optional designs must likewise conform.  
 ② Portion of full HL93.

**DESIGN NOTES:**  
 Designed according to AASHTO LRFD Bridge Design Specifications. Load rated using Load and Resistance Factor Rating according to AASHTO Manual for Bridge Evaluation. Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

**FABRICATION NOTES:**  
 Provide Class H concrete. Provide Grade 60 reinforcing steel. Use low relaxation strands, each pretensioned to 75 percent of fpu. Full-length debonded strands are not permitted in positions "A" and "B". Strand debonding must comply with Item 424.4.2.2.4. When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas. Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5". Place strands within a row as follows:  
 1) Locate a strand in each "A" position.  
 2) Place strand symmetrically about vertical centerline of beam.  
 3) Space strands as equally as possible across the entire width. Do not debond strands in position "A". Distribute debonded strands symmetrically about the vertical centerline. Increase debonded lengths working outward, with debonding staggered in each row.



HL93 LOADING

Texas Department of Transportation  
 Bridge Division Standard

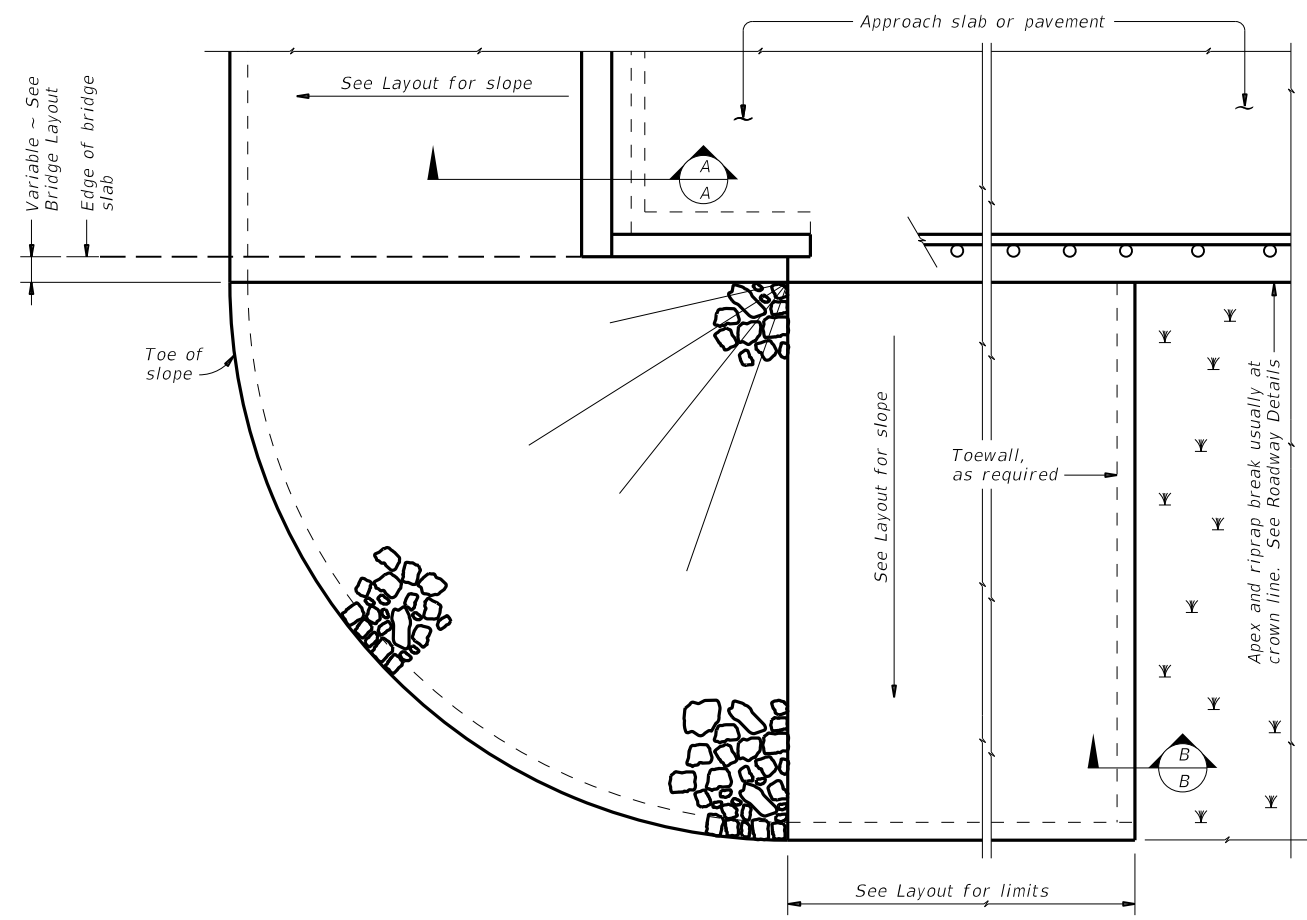
**PRESTRESSED CONCRETE SLAB BEAM STD DESIGNS (TYPE SB12 OR SB15) 24', 28' & 30' ROADWAY PSBSD**

FILE:	SRW	BMP	SFS	SDB
0916	28	082	CR 3861	
DIST		COUNTY	SHEET NO.	
CRP		SAN PATRICIO	092	

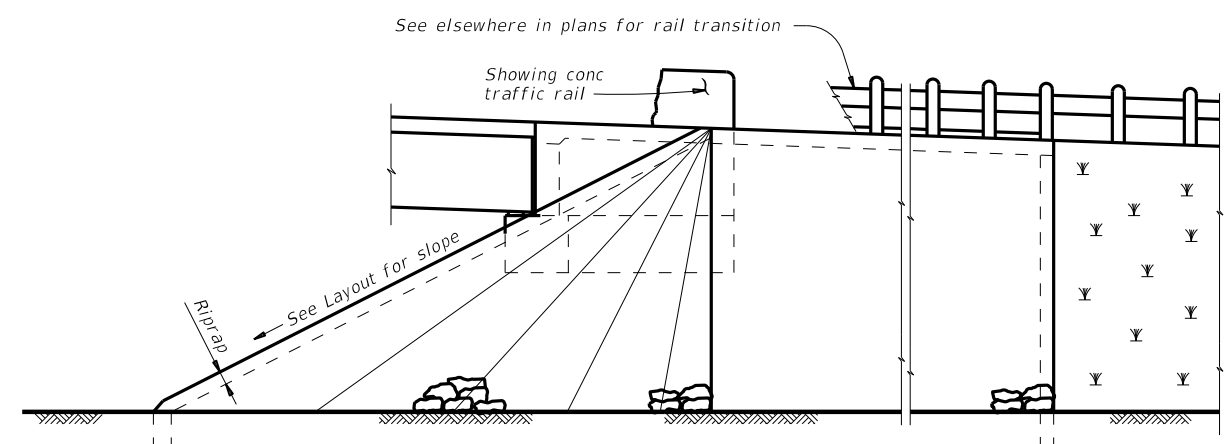
DATE: FILE:

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

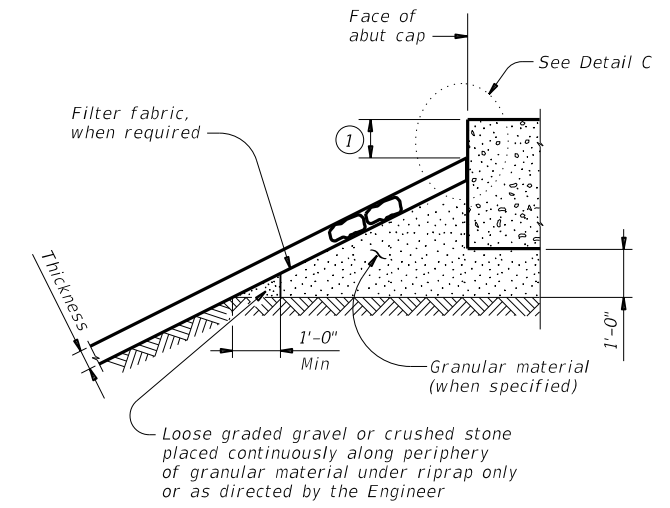
DATE:  
FILE:



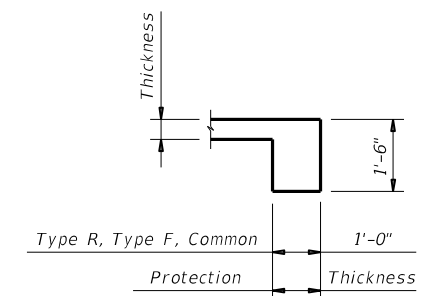
**PLAN**



**ELEVATION**

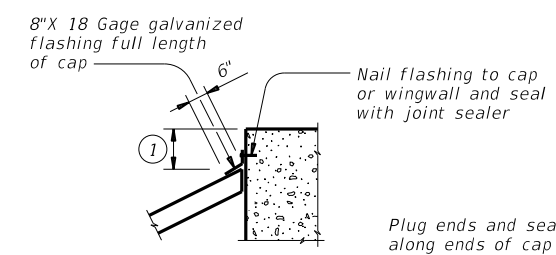


**SECTION A-A AT CAP**

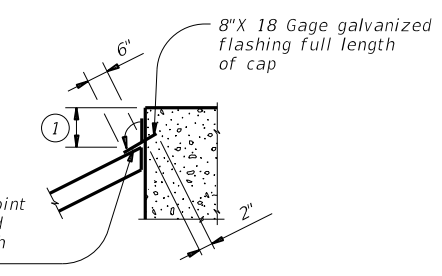


**SECTION B-B**

Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".



**CAP OPTION A**



**CAP OPTION B**

**DETAIL C**

① Top of cap to top of riprap dimension varies as directed by the Engineer. Provide 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.

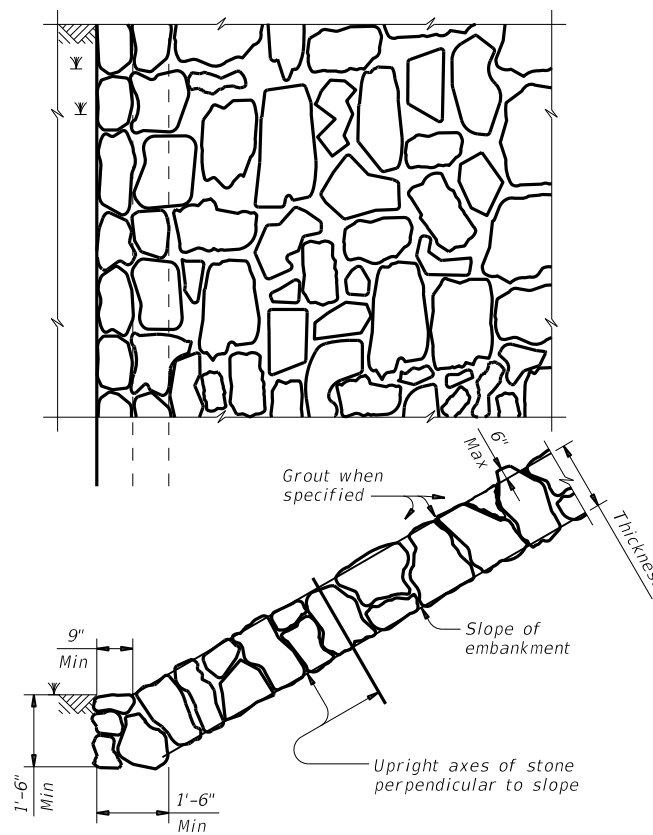
**GENERAL NOTES:**  
Refer to Item 432, "Riprap" for stone size and gradation, and construction details. See Layout for limits and thickness of riprap specified.  
See elsewhere in plans for locations and details of shoulder drains.

SHEET 1 OF 2

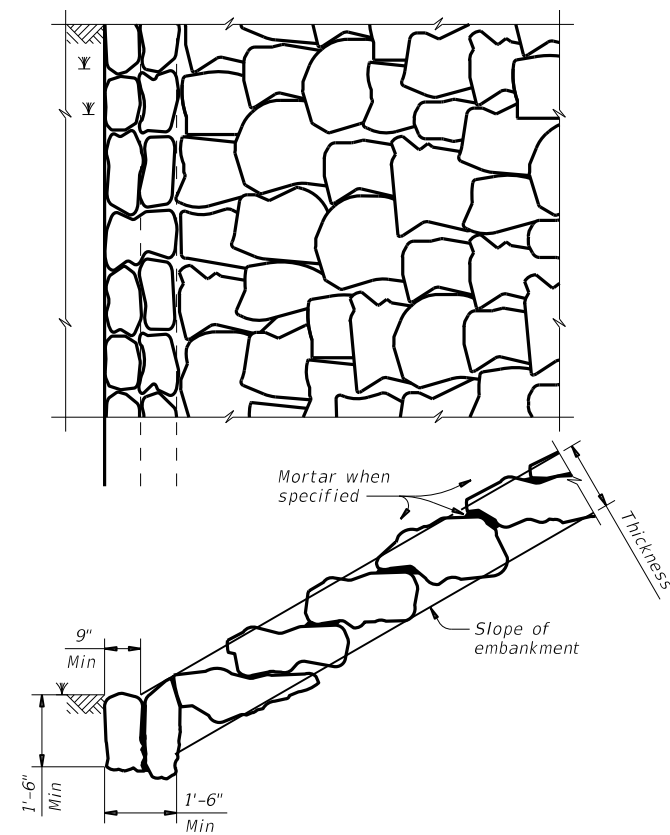
		<b>Bridge Division Standard</b>	
<h2>STONE RIPRAP</h2>			
<h3>SRR</h3>			
FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH
©TxDOT April 2019	CONT	SECT	JOB
REVISIONS	0916	28	082
	DIST	COUNTY	SHEET NO.
CRP	SAN PATRICIO		093

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.

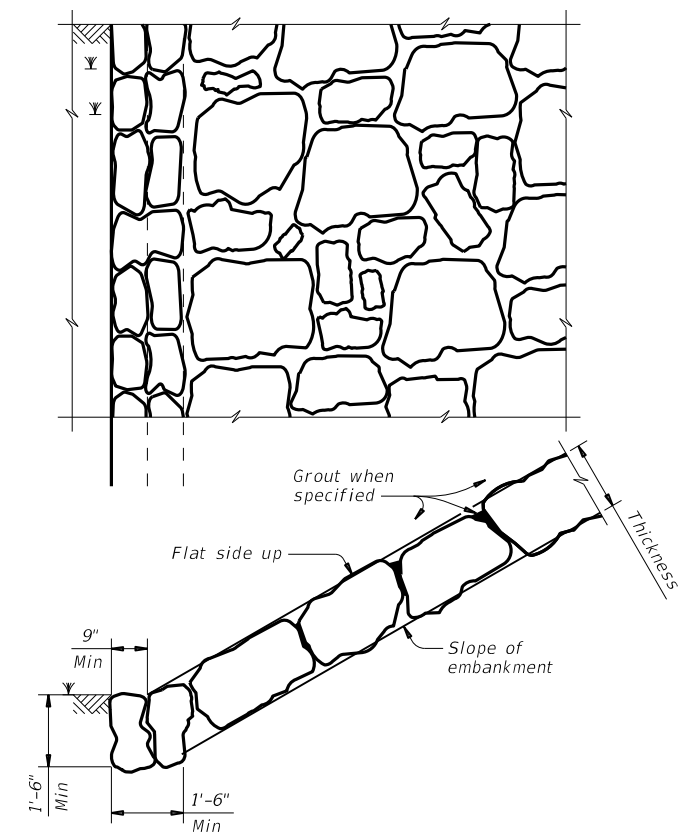
DATE: FILE:



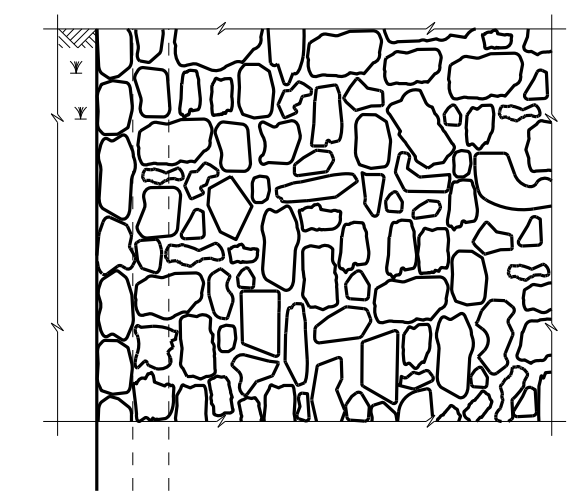
**FIGURE 1 ~ TYPE R STONE RIPRAP**  
dry or grouted



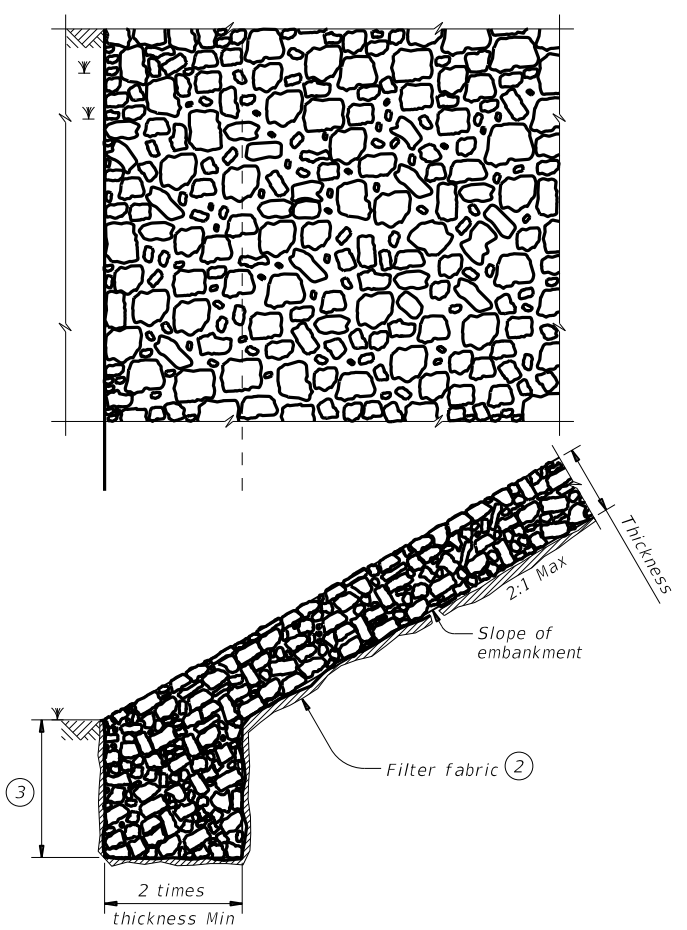
**FIGURE 2 ~ TYPE F STONE RIPRAP**  
dry or mortared



**FIGURE 3 ~ TYPE F STONE RIPRAP**  
grouted

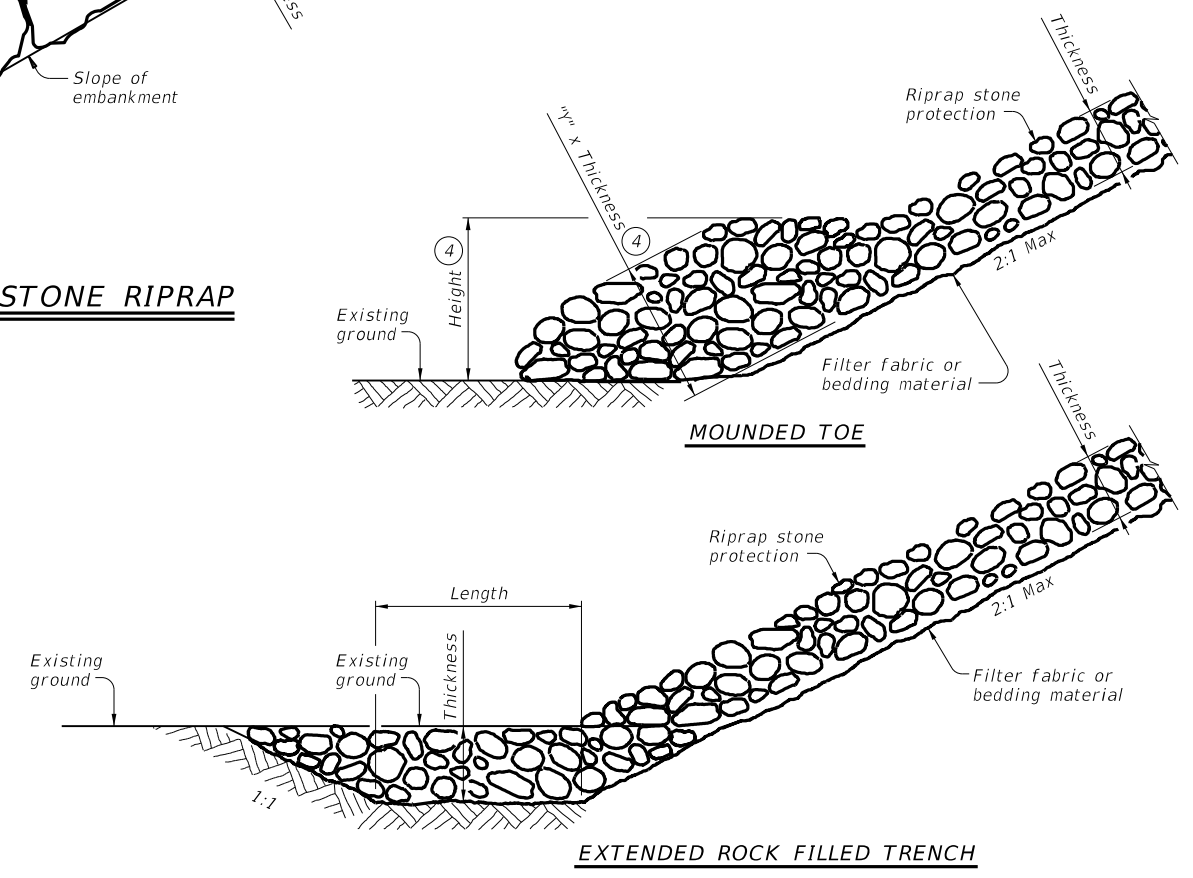


**FIGURE 4 ~ COMMON STONE RIPRAP**  
dry or grouted



**FIGURE 5 ~ PROTECTION STONE RIPRAP** ⑤

- ② Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.
- ③ Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.
- ④ "Y" and Height need to be defined. See layout or detail sheet for values if this option is used.
- ⑤ List Stone Protection as size (XX inch) and thickness (YY inch) on the layout.  
Example: Riprap (Stone Protection) XX inch, Thickness = YY inch.



**PROTECTION STONE RIPRAP TOE OPTIONS** ⑤

SHEET 2 OF 2



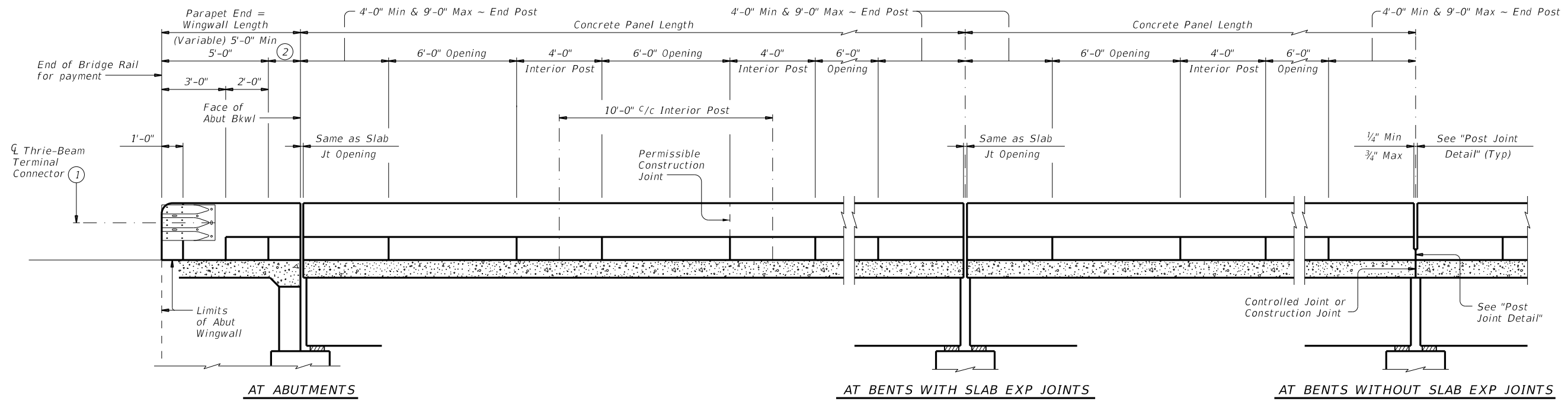
**STONE RIPRAP**

**SRR**

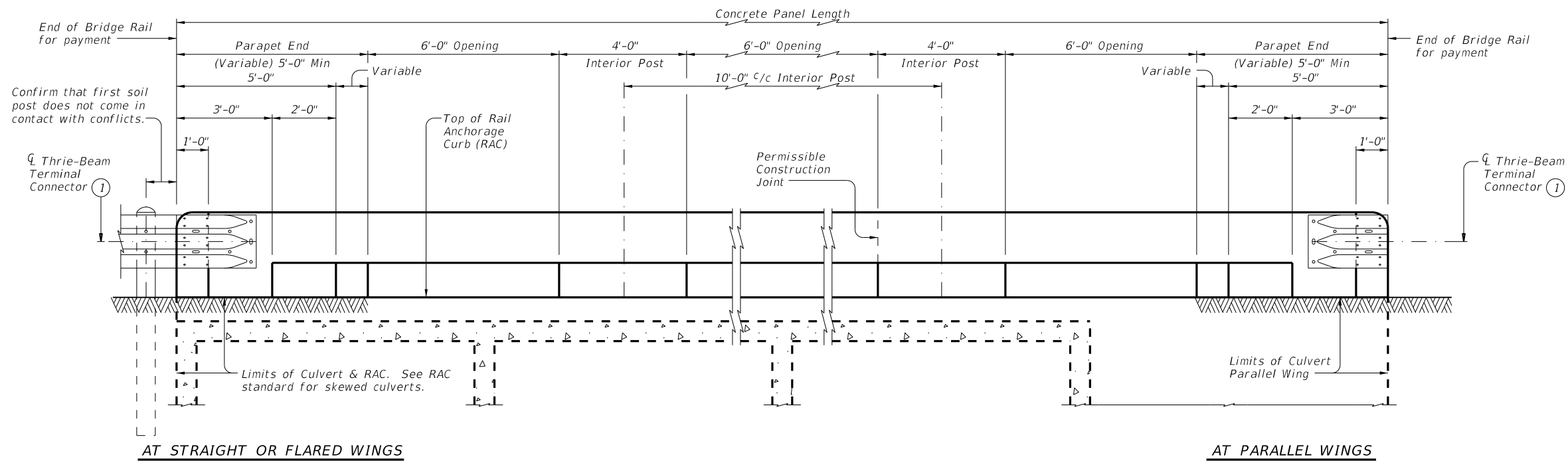
FILE: srrside1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT SECT	JOB	HIGHWAY	
REVISIONS	0916 28	082	CR 3861	
	DIST	COUNTY	SHEET NO.	
	CRP	SAN PATRICIO	094	

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

DATE:  
FILE:



**ROADWAY ELEVATION OF RAIL ON BRIDGE**



**ROADWAY ELEVATION OF RAIL ON BOX CULVERTS**

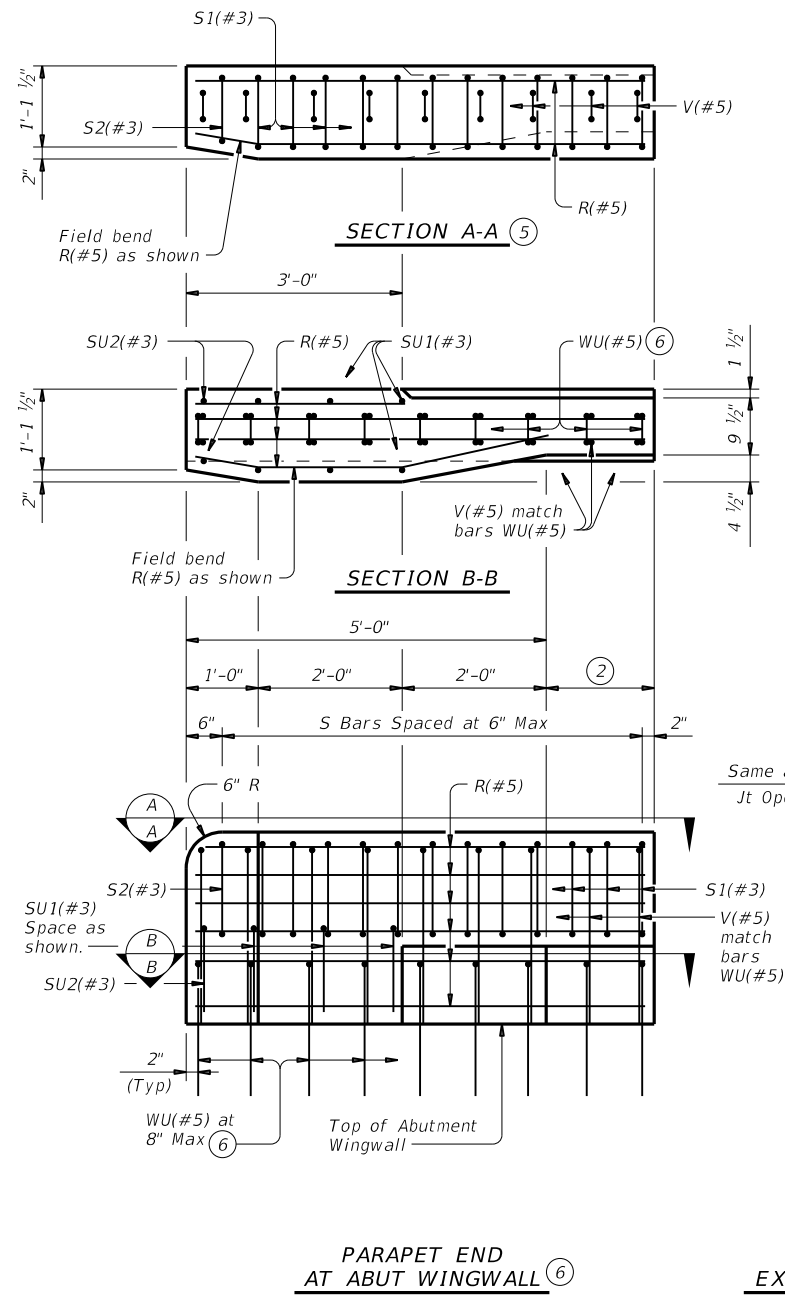
Showing 0° skew culvert. Skewed culverts similar. See RAC standard for details not shown. Vertical joints in concrete rail are not required, unless shown elsewhere.

- 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 Wingwall Length minus 5'-0" (Varies)

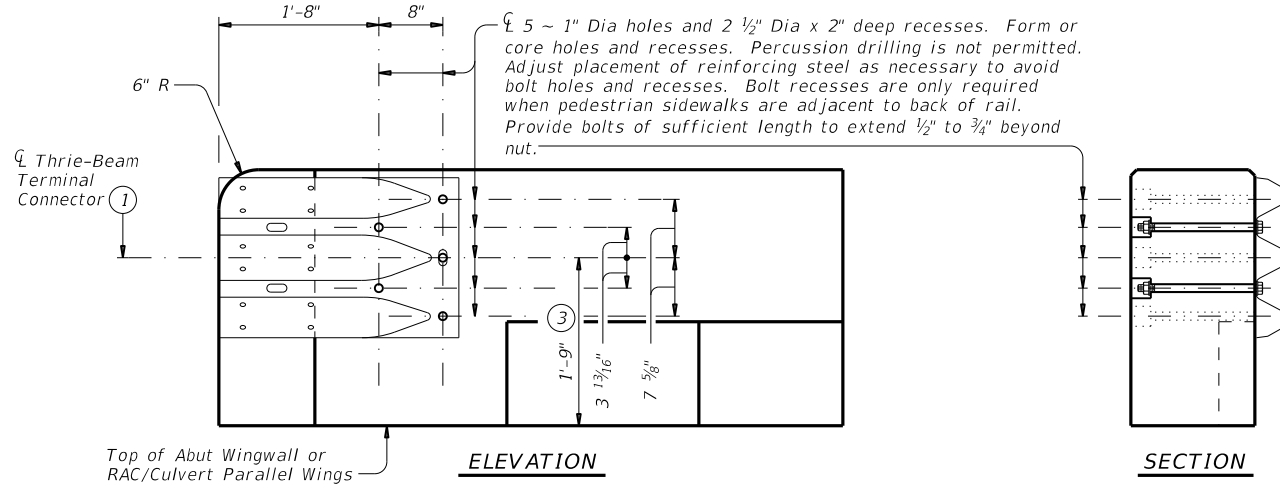
		<b>Bridge Division Standard</b>	
<h2>TRAFFIC RAIL</h2>			
<h3>TYPE T223</h3>			
FILE: r1std005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR
©TxDOT September 2019	CONT	SECT	JOB
REVISIONS	0916	28	082
	DIST	COUNTY	SHEET NO.
CRP	SAN PATRICIO		095

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.

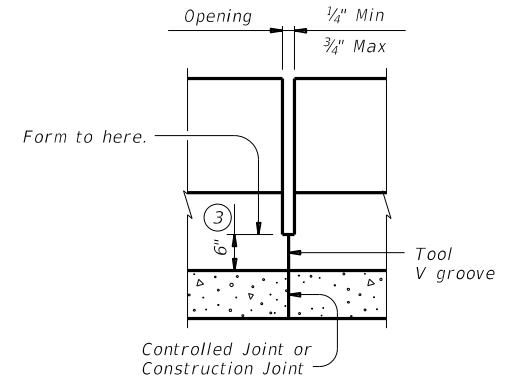
DATE:  
FILE:



PARAPET END AT ABUT WINGWALL ⑥

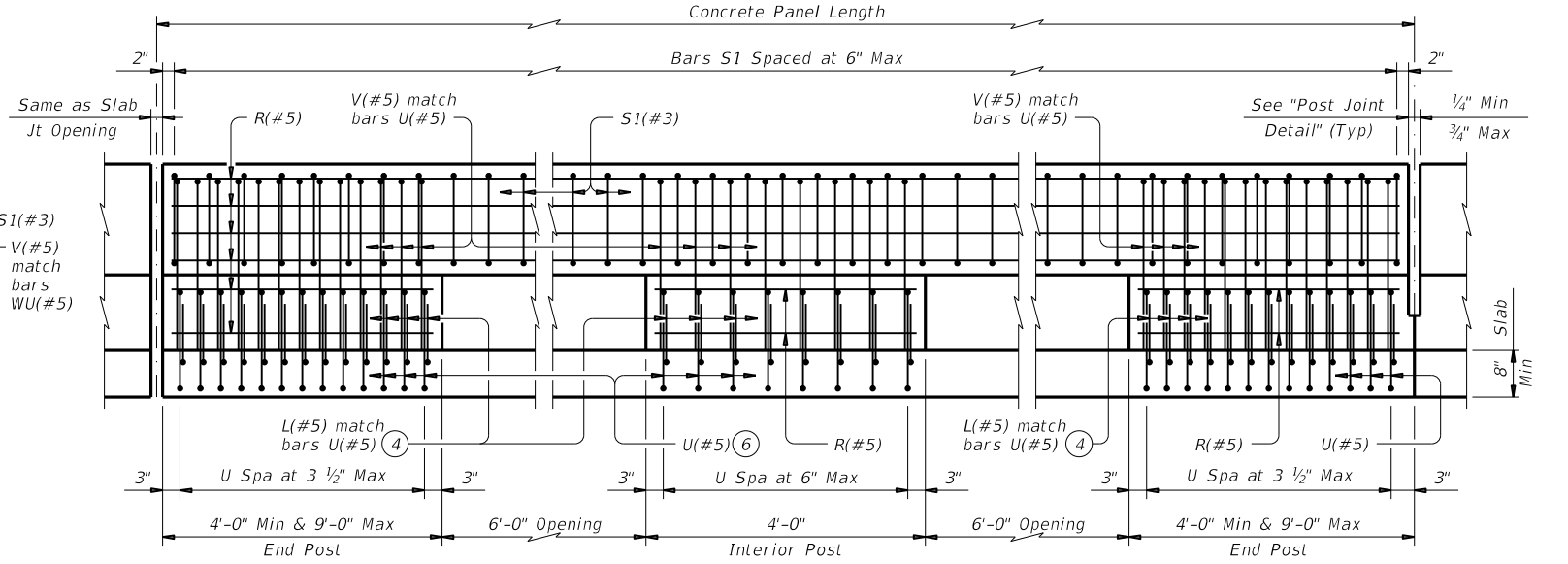


TERMINAL CONNECTION DETAILS



POST JOINT DETAIL

Provide at all interior bents without slab expansion joints.



ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

Showing rail on slab. Rail on box culvert similar.

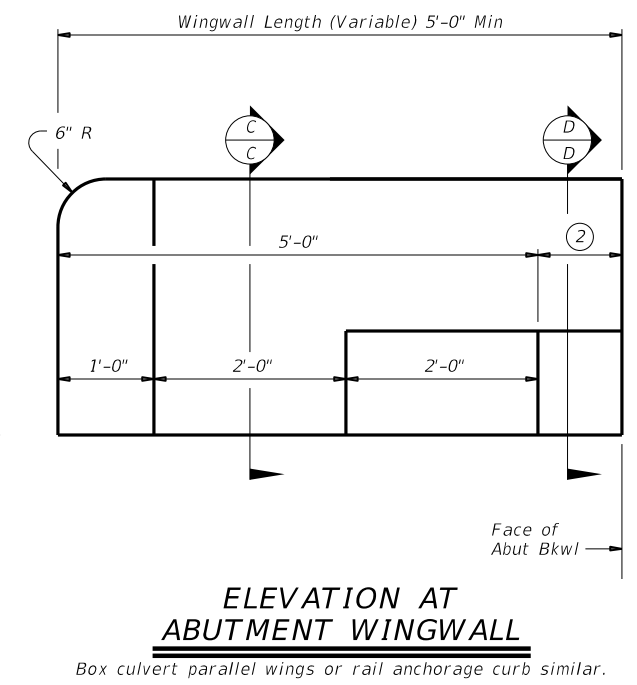
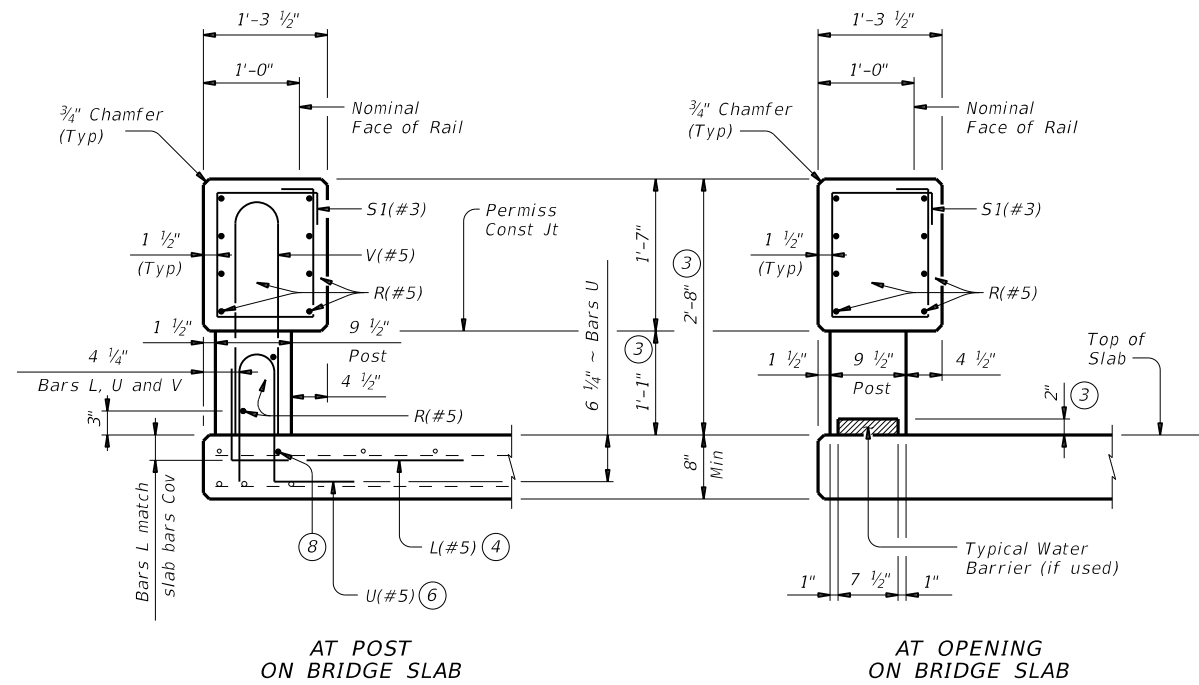
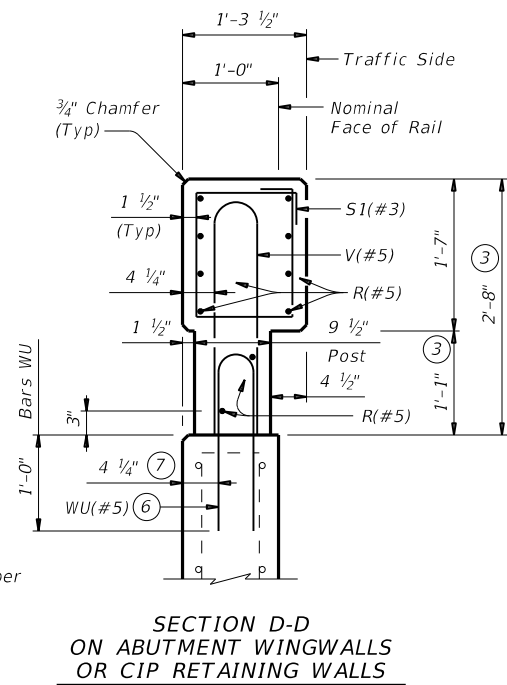
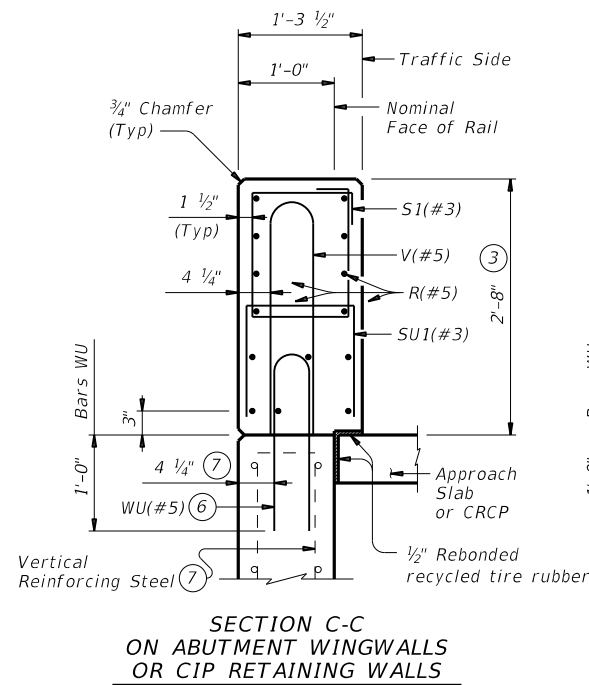
- ① Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.
- ② Wingwall Length minus 5'-0" (Varies)
- ③ Increase 2" for structures with overlay.
- ④ Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.
- ⑤ Bars SU1(#3), SU2(#3) and WU(#5) not shown for clarity.
- ⑥ Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

		<b>Bridge Division Standard</b>	
<h1>TRAFFIC RAIL</h1>			
<h2>TYPE T223</h2>			
FILE: r1std005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR
©TxDOT September 2019	CONT	SECT	JOB
REVISIONS	0916	28	082
	DIST	COUNTY	SHEET NO.
CRP	SAN PATRICIO		096



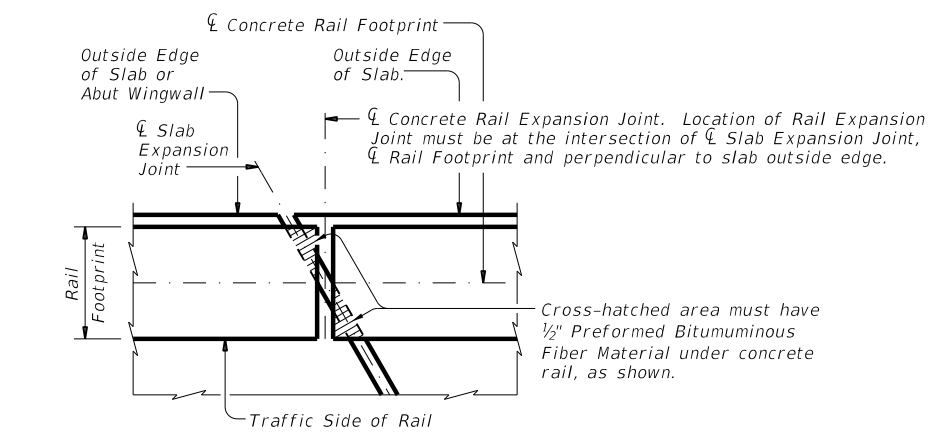
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: FILE:



**SECTIONS THRU RAIL**  
Sections on box culverts similar.

- ② Wingwall Length minus 5'-0" (Varies)
- ③ Increase 2" for structures with overlay.
- ④ Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.
- ⑥ Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.
- ⑦ When vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls on traffic side of wall, move the horizontal wingwall/retaining wall reinforcing to the inside of Bars WU where bars conflict.
- ⑧ Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.
- ⑨ At the Contractor's option, Bars V may be replaced by extending Bars U to 2'-5 1/4" above the roadway surface without overlay.



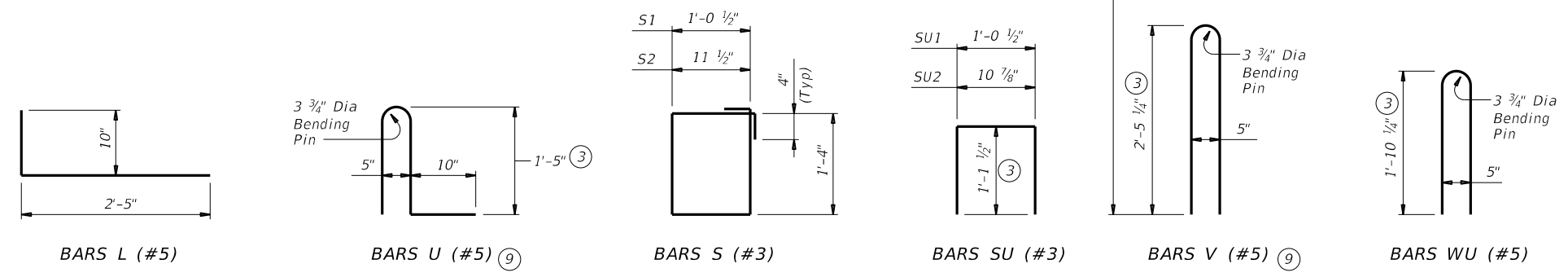
**PLAN OF RAIL AT EXPANSION JOINTS**  
Example showing Slab Expansion Joints without breakbacks.

**CONSTRUCTION NOTES:**  
Face of rail and parapet must be vertical transversely unless otherwise shown in the plans or approved by the Engineer.  
Provide water barriers at openings draining onto undercrossing roadways and sidewalks. They may be cast-in-place or precast in convenient lengths and bonded to the bridge deck with an approved epoxy cement.  
Chamfer all exposed 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 Reinforcing (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U, V, and WU unless noted otherwise. Provide the same laps as required for reinforcing bars.  
Provide bar laps, where required, as follows:  
Uncoated or galvanized ~ #5 = 2'-0"  
Epoxy coated ~ #5 = 3'-0"

**GENERAL NOTES:**  
This rail has been evaluated by full-scale crash test 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 358 plf.

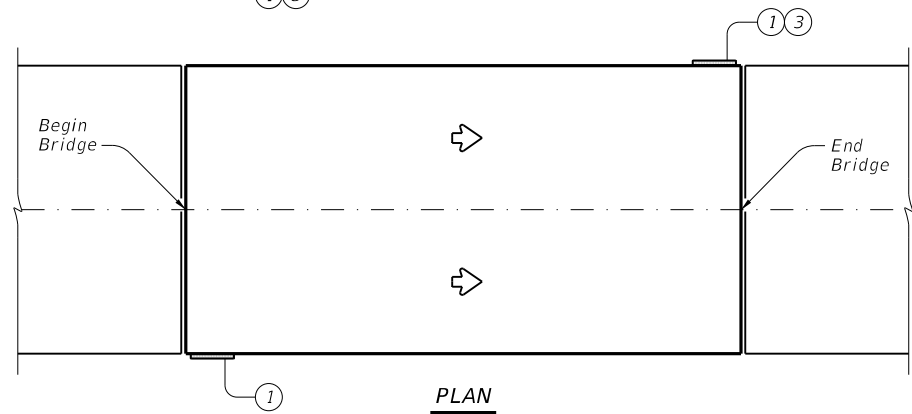
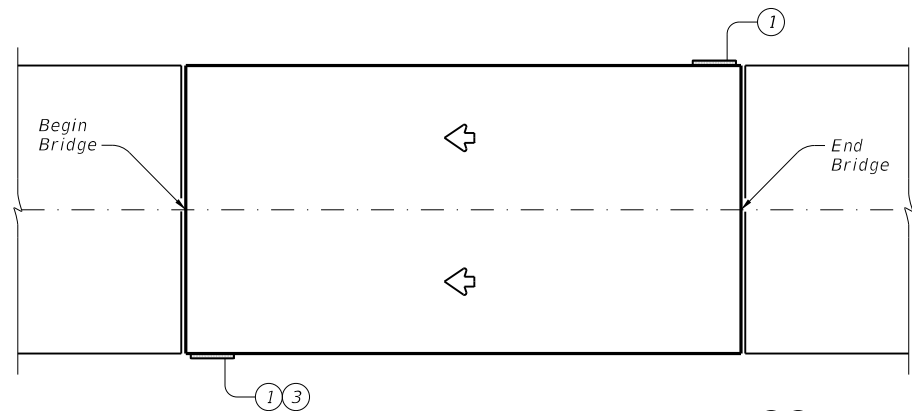
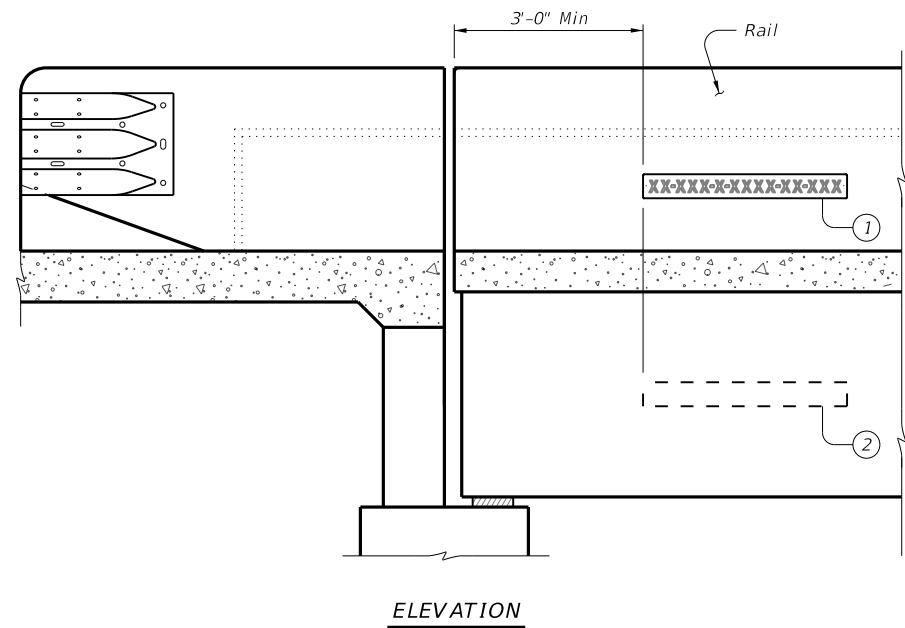
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.



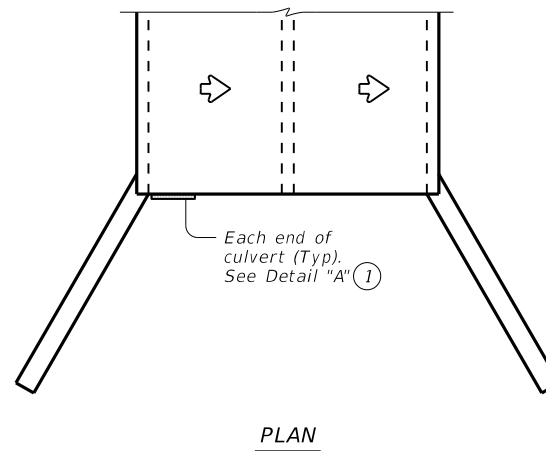
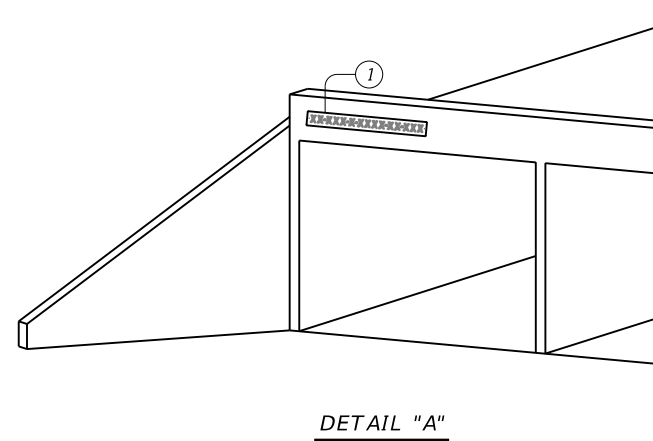
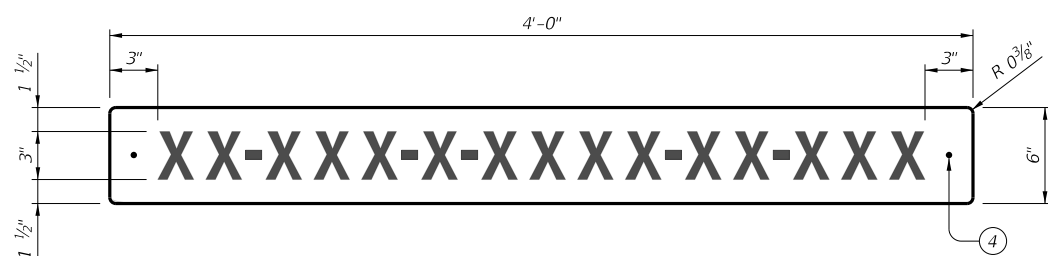
		<b>Bridge Division Standard</b>	
<h1>TRAFFIC RAIL</h1>			
<h2>TYPE T223</h2>			
FILE: r1std005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR
©TxDOT September 2019	CONT	SECT	JOB
REVISIONS	0916	28	082
	DIST	COUNTY	SHEET NO.
	CRP	SAN PATRICIO	097

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.

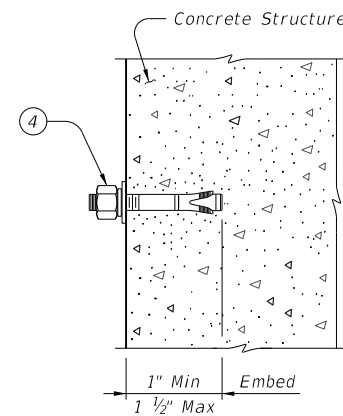
DATE: 2/16/2022  
FILE:



**BRIDGE SIGN LOCATIONS**



**BRIDGE CLASS CULVERT SIGN PLACEMENT**



**SHEETING REQUIREMENTS**

Usage	Color	Sign Face Material
Background	White	Type B or C Sheeting
Letters and Symbols	Black	Type B or C Sheeting

- ① Bridge identification sign location
- ② Alternate sign placement location for exterior concrete beams.
- ③ If adjacent bridges are less than 2 feet apart, these signs may be omitted.
- ④ 1/4" Diameter stainless steel expansion anchor with hex nut, washer, and spring-lock washer.

**SIGN NOTES:**

Standard sign designs can be found in the Standard Highway Sign Designs for Texas (SHSD).

Use the Clearview Alphabet CV-2W for the letters and symbols.

**MATERIAL NOTES:**

Provide lateral spacing between letters and numerals conforming with the SHSD, and any approved changes thereto. Provide a balanced appearance when spacing is not shown.

Provide aluminum sign blanks with a minimum thickness of 0.080" that meet the requirements of DMS-7110.

Provide sign face materials that meet the requirements of DMS-8300 and the sheeting requirements shown in the table.

Provide 1/4" diameter stainless steel expansion anchors with one hex head nut, one flat washer, and one helical spring-lock washer each.

Use torque controlled mechanical expansion anchors that are approved for use in cracked concrete by the International Code Council, Evaluation Service (ICC-ES). Provide anchor products that have a designated ICC-ES Evaluation Report number. The approval status must be maintained on the ICC-ES website under Division 031600 for Concrete Anchors.

Unless otherwise approved by the Engineer: do not use adhesive anchors; do not use expansion anchors that are not included in the ICC-ES approval list; and do not use expansion anchors that are only approved for use in uncracked concrete.

Use anchors manufactured with stainless steel expansion wedges. Anchors manufactured with carbon steel expansion wedges are not allowed. Anchor bodies can be either zinc-plated carbon steel or stainless steel. For application in marine environments, provide both stainless steel anchor bodies and expansion wedges.

**GENERAL NOTES:**

Prior to hole drilling, locate rebar to ensure clearing of existing reinforcement and/or strands.

Prior to installation, obtain approval of sign locations from the Engineer. Avoid placement of sign over travel lanes and pedestrian walkways. Submit proposed installation method to Engineer prior to beginning work. Install anchors as shown on plans and in accordance with the anchor manufacturer's published installation instructions.

Do not install anchors sections of members under tension.

For new construction, the signs and anchors are subsidiary to the bridge. For installations on existing structures, the signs and anchors are paid under Item 442, "Metal for Structures." Each sign weighs 28 lbs.

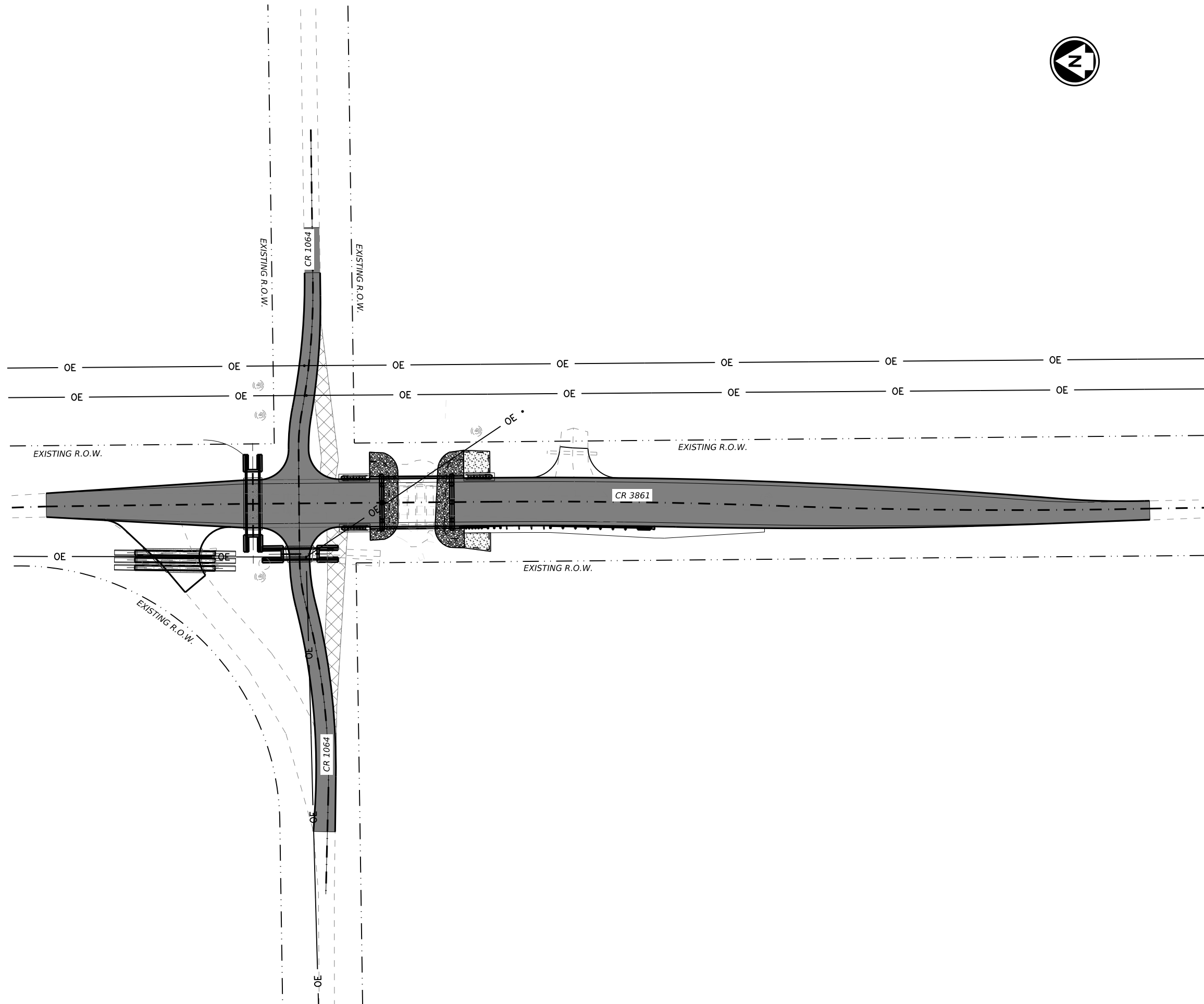


**NBIS  
BRIDGE IDENTIFICATION  
SIGN STANDARD**

**NBIS**

FILE: MS-NBIS-23 (1).dgn	DN: TAR	CK: TxDOT	DW: JER	CK: TAR
©TxDOT March 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0916	28	082	CR 3861
	DIST	COUNTY	SHEET NO.	
	CRP	SAN PATRICIO	098	

DATE: 5/9/2024 2:56:15 PM  
 FILE: c:\pw\_working\lochner-pw-01\0109811\CR3861\_UTILITY\_LAYOUT.dgn



**LEGEND OF UTILITY TYPES**

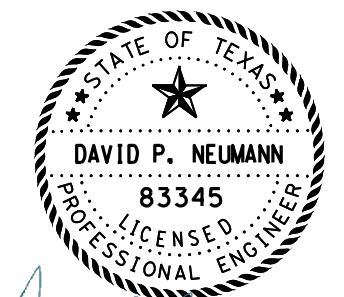
COMMUNICATIONS	QL "C"	FOC1
GAS	QL "C"	G2
ELECTRIC	QL "C"	OE1

**LEGEND OF UTILITY SYMBOLS**

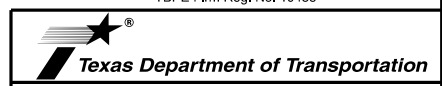
LEVEL STATUS CHANGE	*
GENERIC MANHOLE	⊙
GENERIC PEDESTAL	⊞
TELEPHONE PEDESTAL	⊞
TELEPHONE MARKER	⊙
TELEPHONE POLE	⊙
FIBER OPTIC MARKER	⊙
GAS VENT	⊙
GAS METER	⊙
GAS MARKER	⊙
POWER POLE	⊙
JUNCTION BOX	⊙
PBX PULL BOX	⊙
ELECTRIC PEDESTAL	⊞
WATER METER	⊙
FIRE HYDRANT	⊙
WATER VALVE	⊙
CO CLEANOUT	⊙
STORM SEWER MANHOLE	⊙
WASTEWATER MANHOLE	⊙



2024.05.09 14:56:48-05'00'



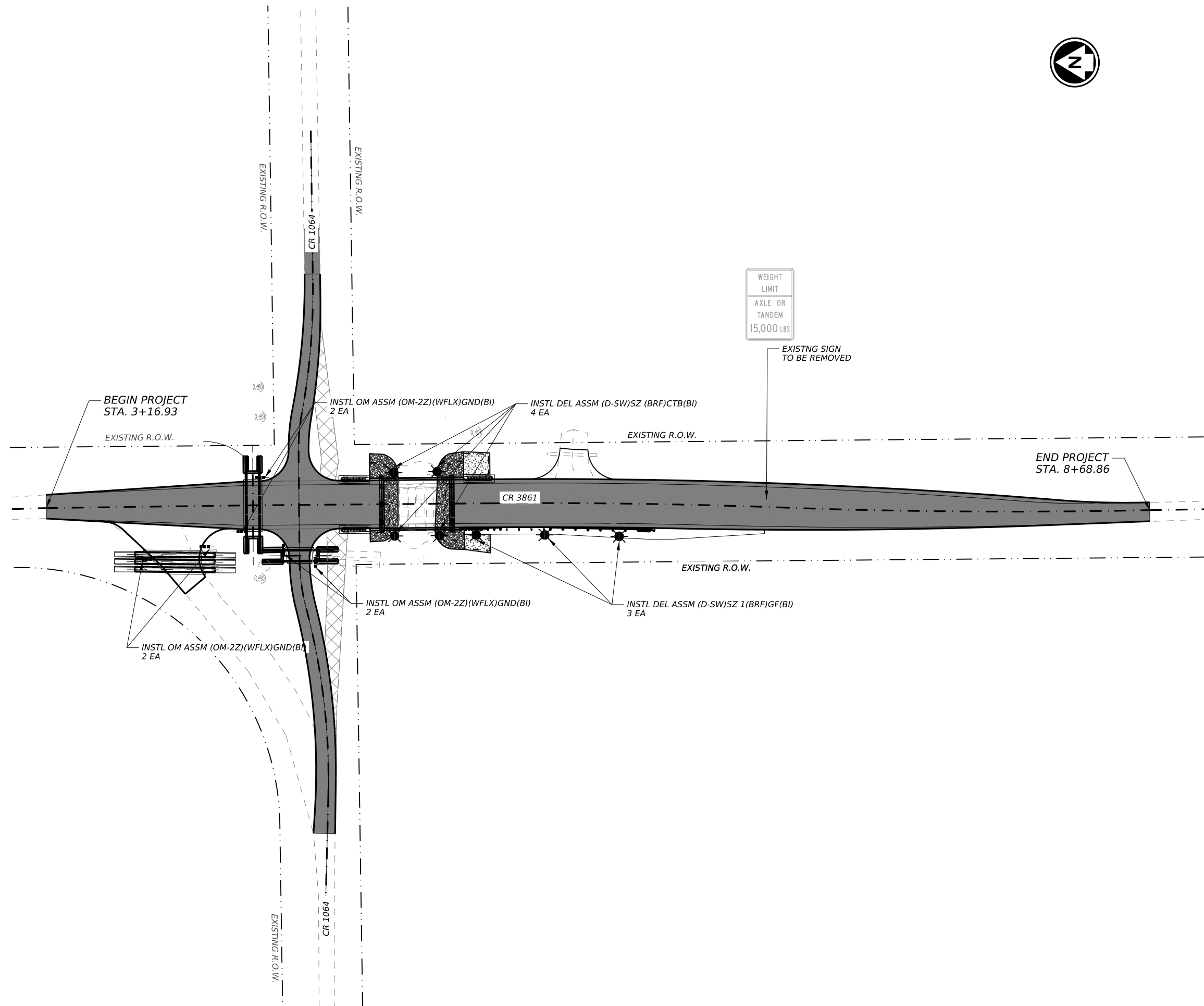
*David P. Neumann, P.E.*  
**LOCHNER**  
 TBPE Firm Reg. No. 10488



**CR 3861  
 UTILITY LAYOUT**

CONT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	099	

DATE: 5/9/2024 9:12:22 AM  
 FILE: c:\pw\_working\lochner-pw-01\0109813\CR3861\_Signing\_Striping\_Layout.dgn



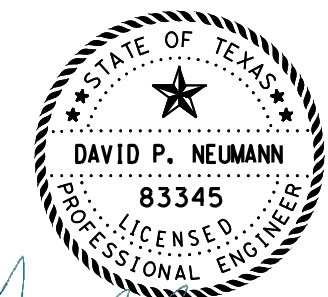
**TRAFFIC LEGEND**

- SIGN POST
- BI-DIRECTIONAL DELINEATOR ASSM
- OBJECT MARKER TY 2 (OM-2)
- REMOVE EXISTING SMALL SIGN  
- SHEET # - SIGN #
- EXISTING SIGN TO REMAIN - SHEET #  
- SIGN #
- EXISTING SMALL SIGN REMOVE & RELOCATE  
- SHEET # - SIGN #
- PROPOSED SMALL SIGN - SHEET # - SIGN #
- DIRECTIONAL TRAFFIC FLOW ARROWS

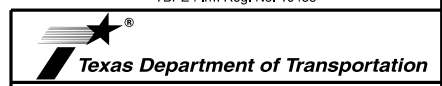


NOTES:  
 1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.

2024.05.09 14:44:46-05'00'



*David P. Neumann, P.E.*  
**LOCHNER**  
 TBPE Firm Reg. No. 10488



©2024  
**CR 3861  
 SIGNING & PAVEMENT  
 MARKERS**

CONT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	100	

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:

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS				DELINEATORS				D & OM DESCRIPTIVE CODES		
DEVICE	SIZE 1	SIZE 2	SIZE 3	SIZE 4	SINGLE		DOUBLE		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	
SHEETING	Yellow, White or Red Type B or C reflective sheeting				Yellow, White or Red Type B or C Reflective Sheeting				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 units (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	
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (fix). 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.				POST TYPE	WC	YFLX, WFLX	WC		YFLX, WFLX
					MOUNT TYPE	GND	GND, SRF	GND		GND, SRF

OBJECT MARKERS								
DEVICE	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
SHEETING	Yellow-Type B <sub>FL</sub> or C <sub>FL</sub> Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroreflective yellow - Type B <sub>FL</sub> or C <sub>FL</sub> Sheeting			Red -Type B <sub>FL</sub> or C <sub>FL</sub> 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)			CHEVRONS				ONE DIRECTION LARGE ARROW		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.								
DEVICE	GF1	GF2	CTB	W1-8				W1-6									
SHEETING	Yellow, White, Red			18" x 24" (Conventional)				24" x 30" (Conventional Oversize)		30" x 36" (Expressway)		36" x 48" (Freeway)		48" x 24" (Conventional)		60" x 30" (Expressway & Freeway)	
NOTE	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.			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).				MOUNTING HEIGHT		4'-0" or 7'-0"		7'-0" Only		MOUNTING HEIGHT		7'-0"	

Texas Department of Transportation  
 Traffic Safety Division Standard

## DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

### D & OM(1)-20

FILE: dcm1-20.dgn	DN: TXDOT	CK: TXDOT	DN: TXDOT	CK: TXDOT
© TXDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0916	28	082	CR 3861
10-09 3-15	DIST	COUNTY	SHEET NO.	
4-10 7-20	CRP	SAN PATRICIO	101	

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

POST TYPE AND SUPPORT FOUNDATION DETAILS				TYPE OF BARRIER MOUNTS	
WING CHANNEL (WC)	FLEXIBLE POSTS (YFLX, WFLX)		WEDGE ANCHOR SYSTEMS		GUARD FENCE ATTACHMENT
GND	GND	SRF	WAS	WAP	GF 1
	EMBEDDED		SURFACE MOUNT	STEEL	PLASTIC
<b>NOTES</b> 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.	<b>NOTES</b> 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.		<b>NOTE</b> 1. Install per manufacturer's recommendations.		

TYPE OF BARRIER MOUNTS	
GUARD FENCE ATTACHMENT	
GF 1	GF 2

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
<b>NOTE</b> 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
<b>NOTE</b> 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.

		<b>Traffic Safety Division Standard</b>	
<h2>DELINEATOR &amp; OBJECT MARKER INSTALLATION</h2> <h3>D &amp; OM(2)-20</h3>			
FILE: dom2-20.dgn	DW: TxDOT	CK: TxDOT	CR: TxDOT
© TxDOT August 2004	CONT	SECT	JOB
REVISIONS	0916	28	082
10-09 3-15	DIST	COUNTY	SHEET NO.
4-10 7-20	CRP	SAN PATRICIO	102

DATE: FILE:

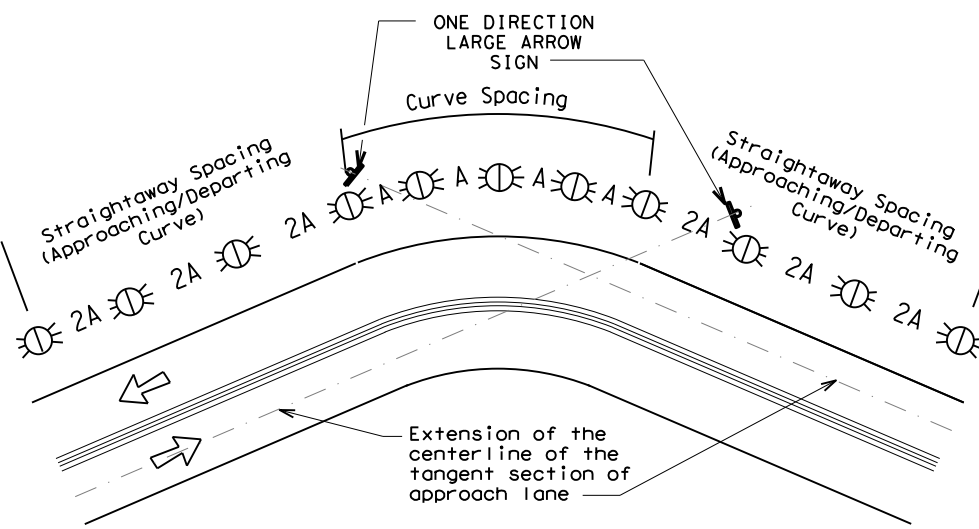


DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

### 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

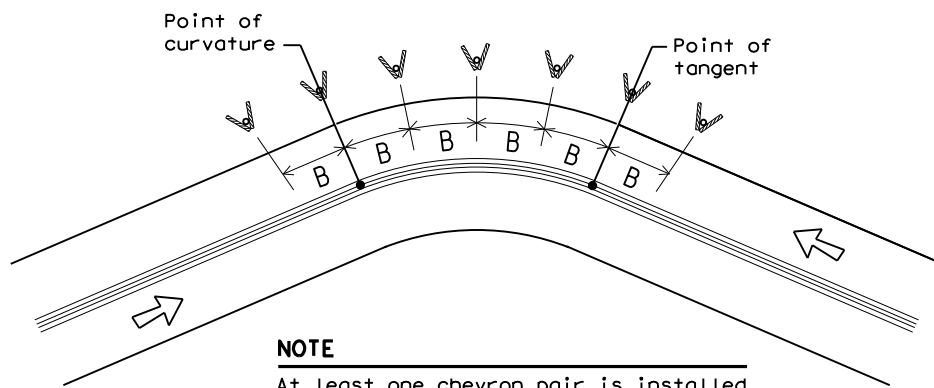
### SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



**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**

- 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.
- Barrier reflectors may be used to replace required delineators.
- Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

**LEGEND**

	Bi-directional Delineator
	Delineator
	Sign



## DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

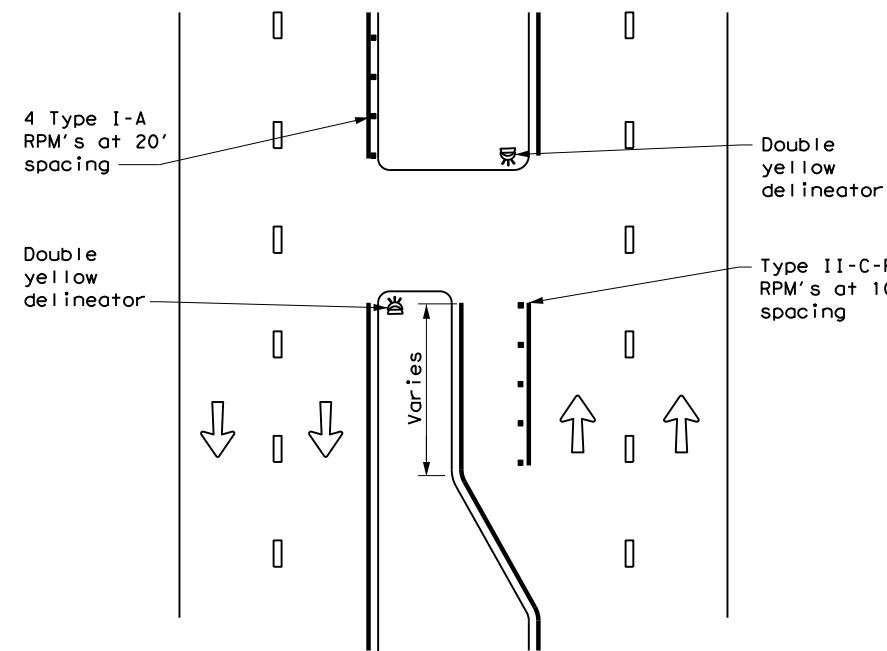
### D & OM(3)-20

FILE: dom3-20.dgn	DW: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TXDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0916	28	082	CR 3861
3-15 8-15	DIST	COUNTY	SHEET NO.	
8-15 7-20	CRP	SAN PATRICIO	103	

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.

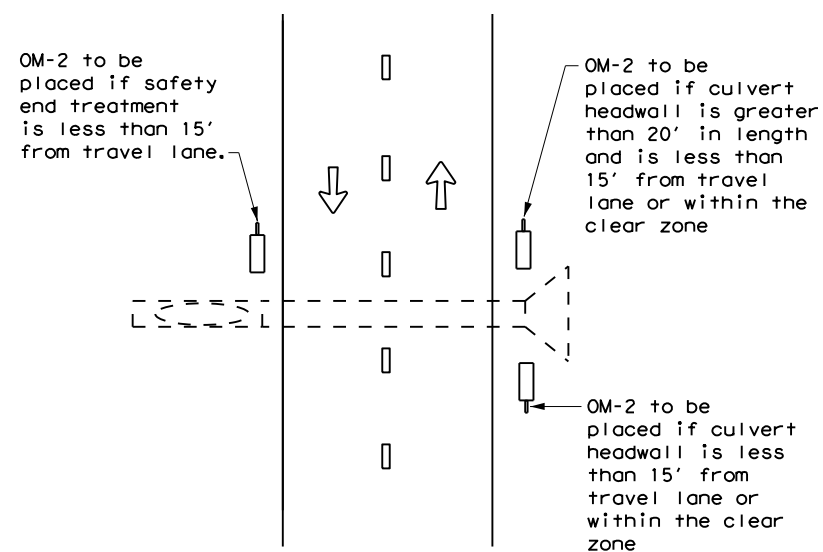
DATE:  
FILE:

**CROSSOVERS**



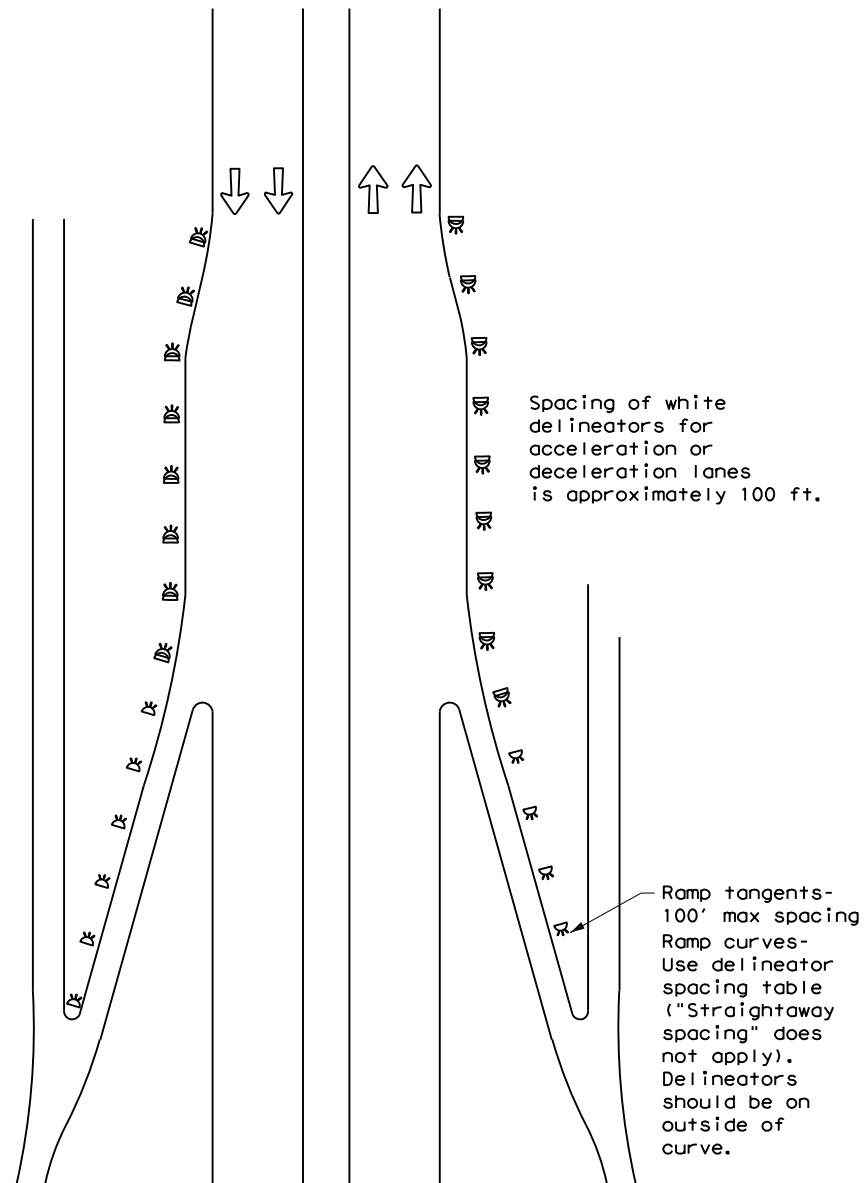
**DETAIL 1**

**FOR CULVERTS WITHOUT MBGF**



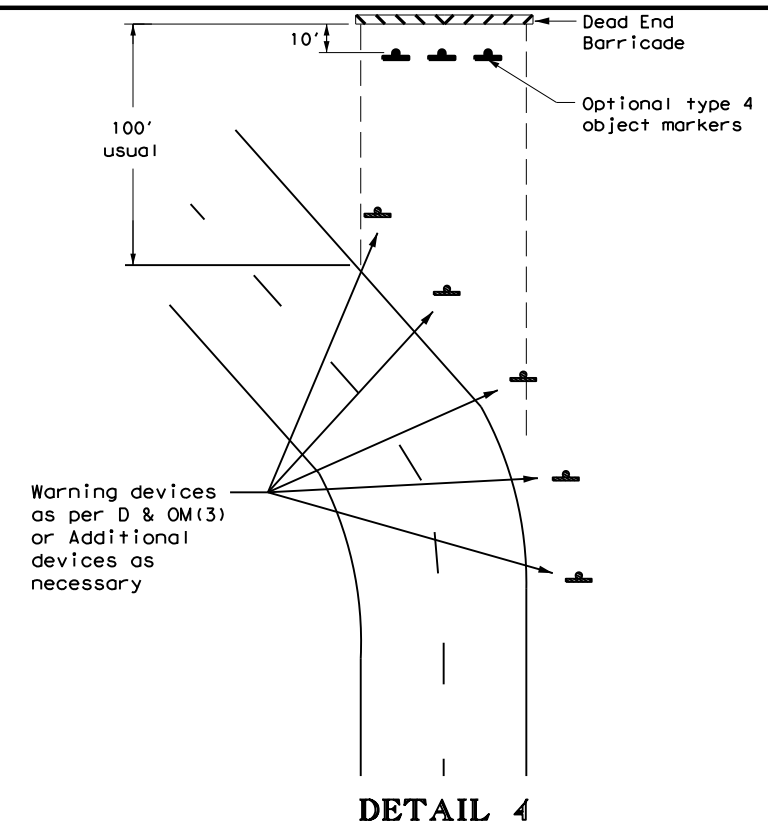
**DETAIL 2**

**FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES**



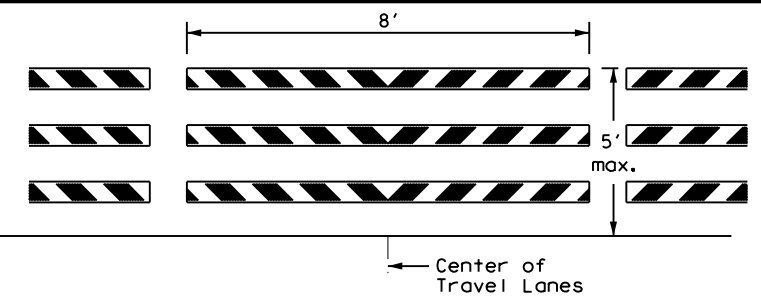
**DETAIL 3**

**TYPICAL APPLICATION OF DEAD END BARRICADE**



**DETAIL 4**

**TYPICAL DEAD END BARRICADE INSTALLATION**



**NOTES**

- Barricade striping shall be red and white reflective sheeting for all permanent road closures.
- Barricade striping is red and white sloping toward the center of the roadway.
- 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

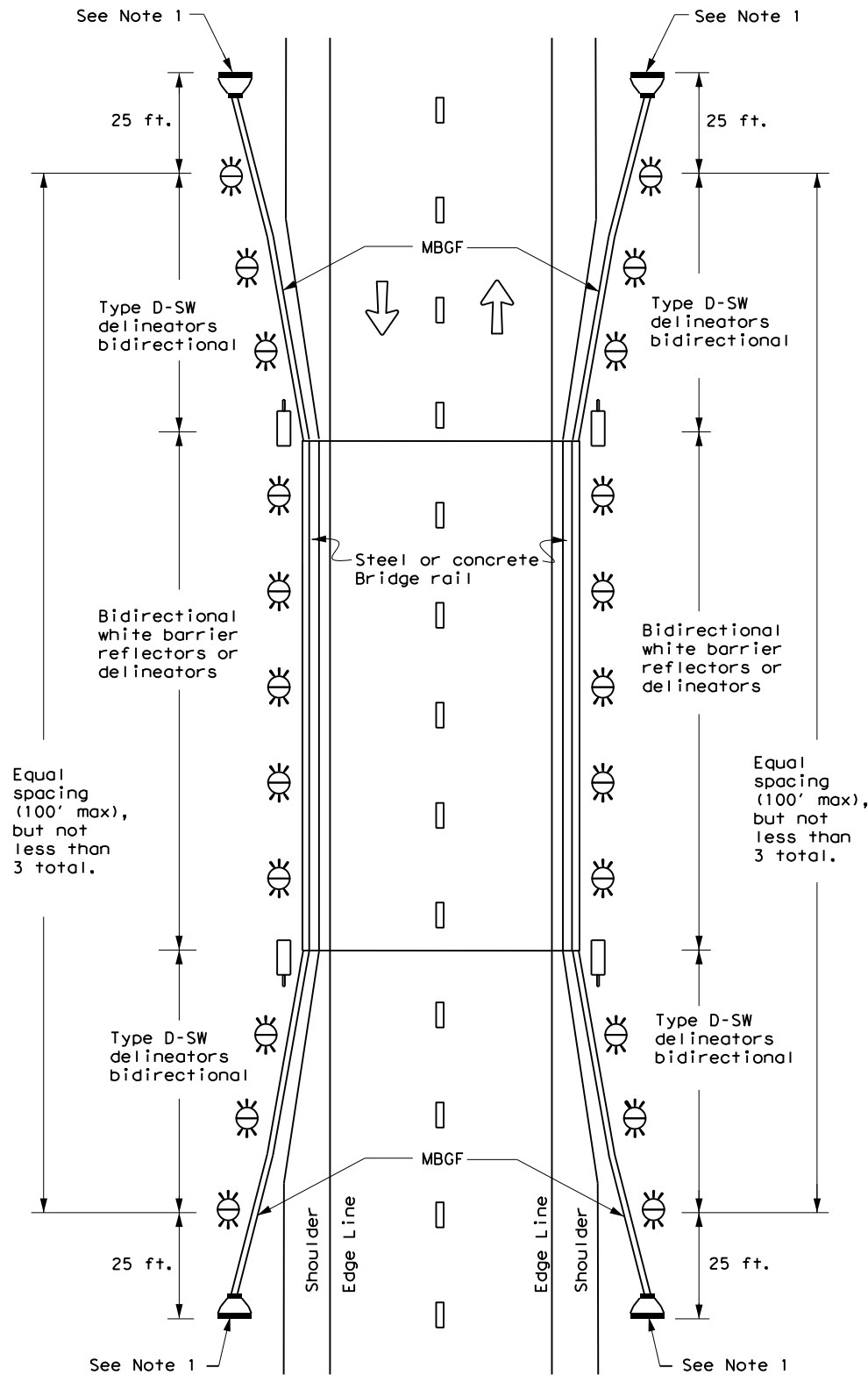


**DELINEATOR & OBJECT MARKER PLACEMENT DETAILS**

**D & OM(4) -20**

FILE: dom4-20.dgn	DW: TxDOT	CK: TxDOT	DN: TxDOT	CR: TxDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0916	28	082	CR 3861
3-15	DIST	COUNTY	SHEET NO.	
7-20	CRP	SAN PATRICIO	104	

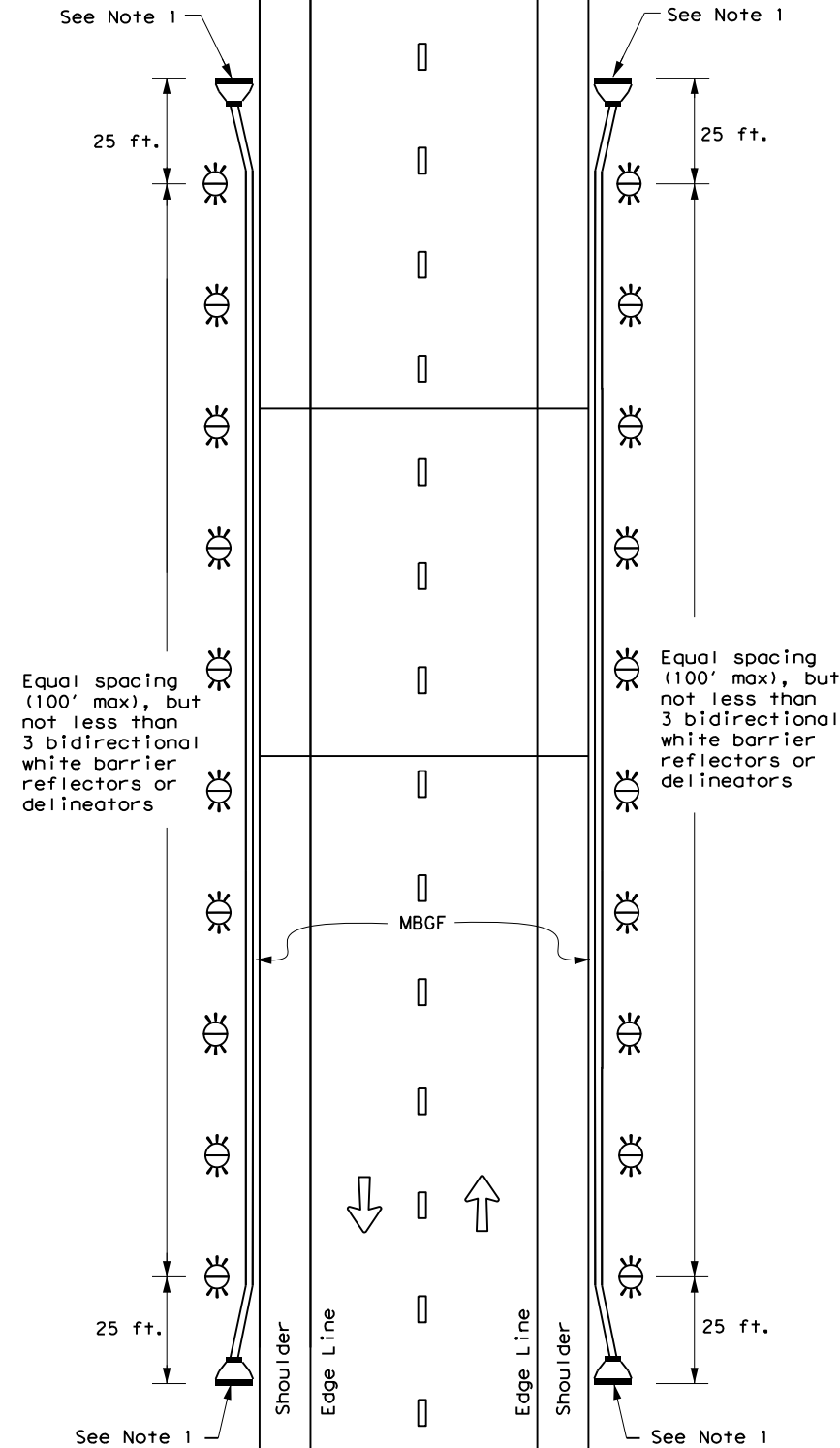
**TWO-WAY, TWO LANE ROADWAY  
WITH REDUCED WIDTH APPROACH RAIL**



**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.

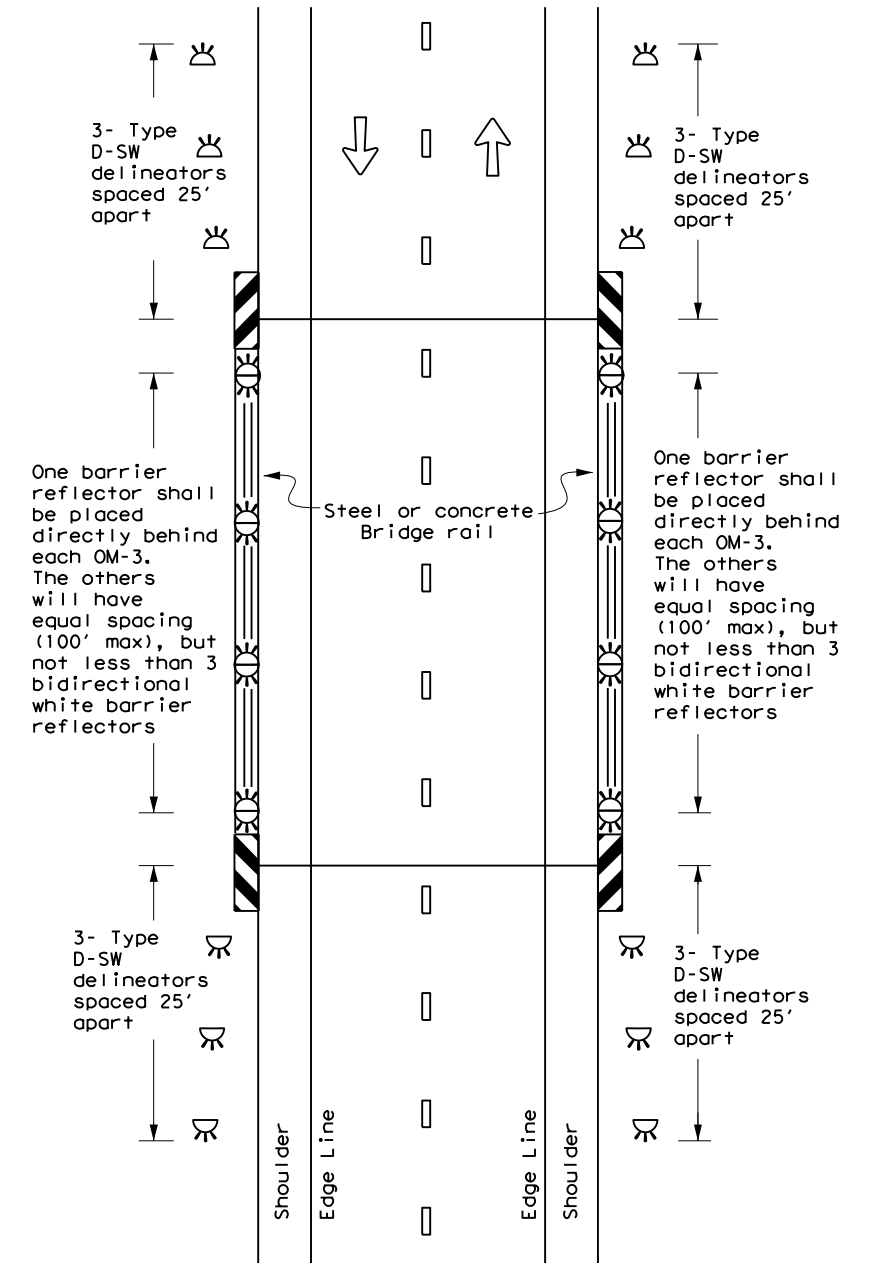
**TWO-WAY, TWO LANE ROADWAY  
WITH METAL BEAM GUARD FENCE (MBGF)**



**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



**DELINEATOR &  
OBJECT MARKER  
PLACEMENT DETAILS**

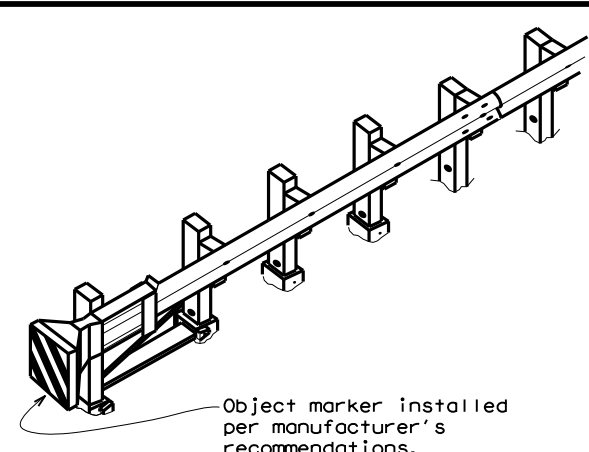
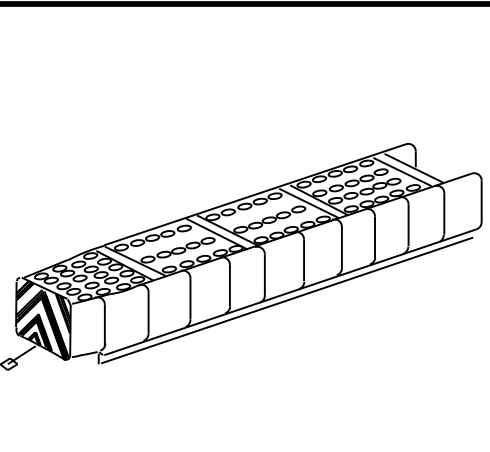
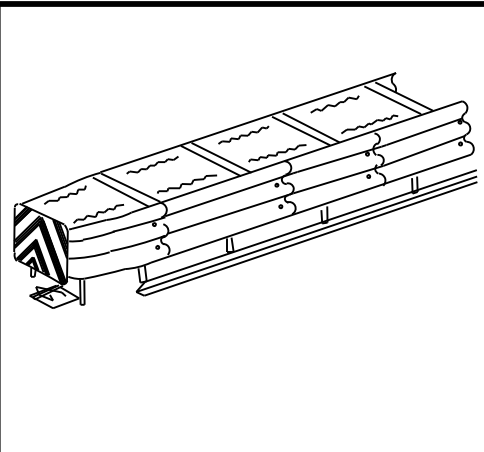
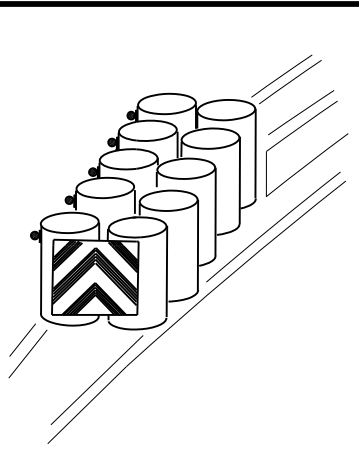
**D & OM(5) - 20**

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0916	28	082	CR 3861
7-20	DIST	COUNTY	SHEET NO.	
	CRP	SAN PATRICIO	105	

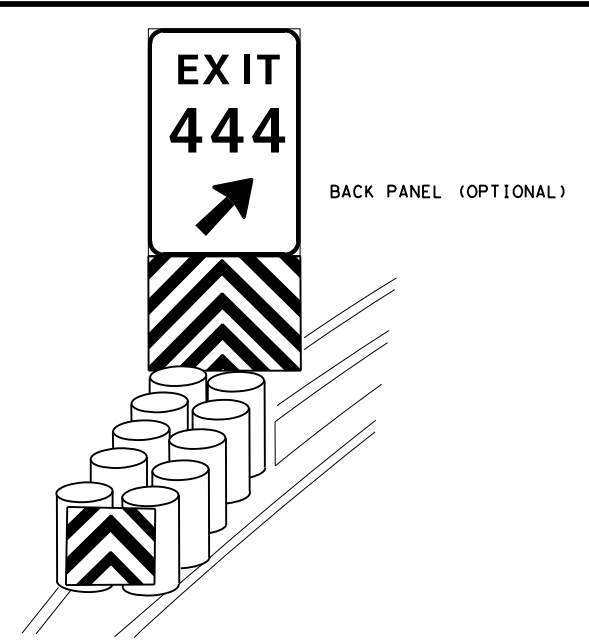
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: FILE:

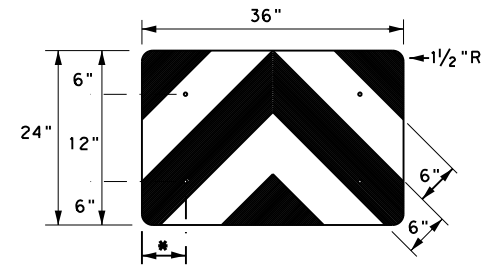
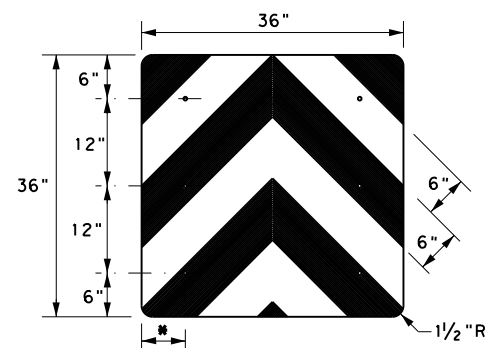
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



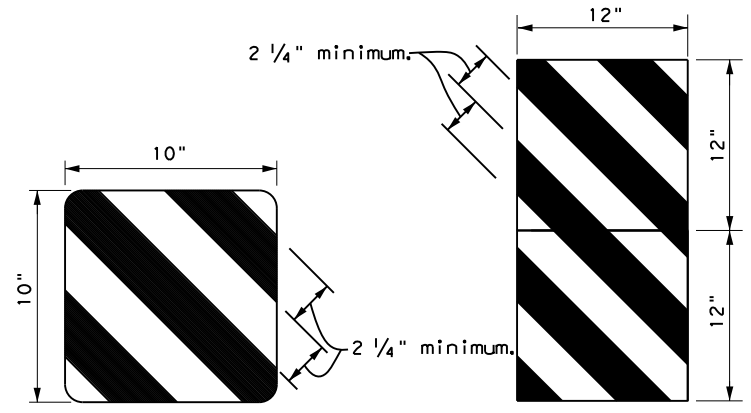
Object marker installed per manufacturer's recommendations.



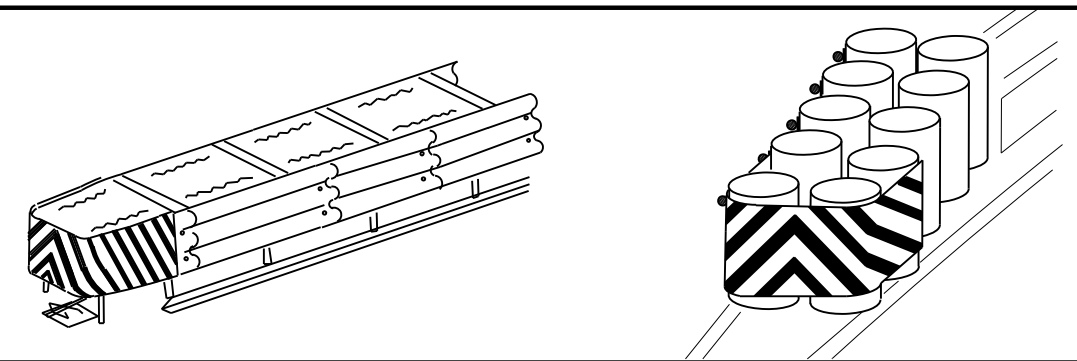
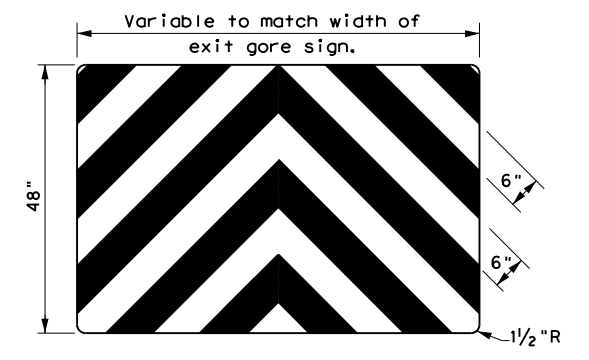
BACK PANEL (OPTIONAL)



\* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

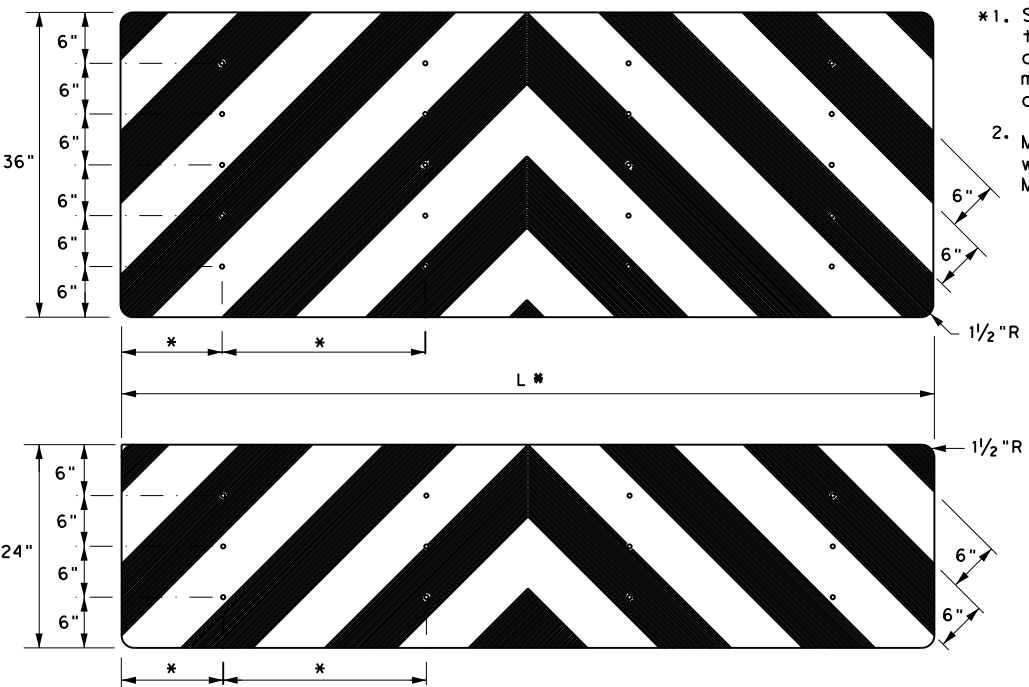


OBJECT MARKERS SMALLER THAN 3 FT<sup>2</sup>



**NOTES**

- \*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturer's 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 1/4".
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.

		<b>Traffic Safety Division Standard</b>	
<b>DELINEATOR &amp; OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS</b> <b>D &amp; OM(VIA) -20</b>			
FILE: domv1a20.dgn	DW: TxDOT	CK: TxDOT	CR: TxDOT
© TxDOT December 1989	CONT: 0916	SECT: 28	JOB: 082
REVISIONS		HIGHWAY: CR 3861	
4-92 8-04	DIST: COUNTY		SHEET NO.
8-95 3-15	CRP: SAN PATRICIO		106
4-98 7-20			
20G			

DATE: FILE:

**STORMWATER POLLUTION PREVENTION PLAN (SWP3):**

This SWP3 has been developed in accordance with TxDOT policy for projects disturbing less than 1 acre of soil, and not part of a larger common plan of development.

For projects with less than one acre of soil disturbing activity and that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

**1.0 SITE/PROJECT DESCRIPTION**

0916-28-082

**1.2 PROJECT LIMITS:**

From: @ Drainage Ditch

To:

**1.3 PROJECT COORDINATES:**

BEGIN: (Lat) 28.03022, (Long) -97.308985

END: (Lat) 28.028704, (Long) -97.308984

**1.4 TOTAL PROJECT AREA (Acres):** 0.96

**1.5 TOTAL AREA TO BE DISTURBED (Acres):** 0.96

**1.6 NATURE OF CONSTRUCTION ACTIVITY:**

Bridge replacement consisting of replacing

Bridge and approaches.

**1.7 MAJOR SOIL TYPES:**

Soil Type	Description

**1.8 PROJECT SPECIFIC LOCATIONS (PSLs):**

PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

- PSLs determined during preconstruction meeting
- PSLs determined during construction
- No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

**1.9 CONSTRUCTION ACTIVITIES:**

(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.3.)

- Mobilization
- Install sediment and erosion controls
- Blade existing topsoil into windrows, prep ROW, clear and grub
- Remove existing pavement
- Grading operations, excavation, and embankment
- Excavate and prepare subgrade for proposed pavement widening
- Remove existing culverts, safety end treatments (SETs)
- Remove existing metal beam guard fence (MBGF), bridge rail
- Install proposed pavement per plans
- Install culverts, culvert extensions, SETs
- Install mow strip, MBGF, bridge rail
- Place flex base
- Rework slopes, grade ditches
- Blade windrowed material back across slopes
- Revegetation of unpaved areas
- Achieve site stabilization and remove sediment and erosion control measures

Other: \_\_\_\_\_

Other: \_\_\_\_\_

Other: \_\_\_\_\_

**1.10 POTENTIAL POLLUTANTS AND SOURCES:**

- Sediment laden stormwater from stormwater conveyance over disturbed area
- Fuels, oils, and lubricants from construction vehicles, equipment, and storage
- Solvents, paints, adhesives, etc. from various construction activities
- Transported soils from offsite vehicle tracking
- Construction debris and waste from various construction activities
- Contaminated water from excavation or dewatering pump-out water
- Sanitary waste from onsite restroom facilities
- Trash from various construction activities/receptacles
- Long-term stockpiles of material and waste
- Discharges from concrete washout activities, runoff from concrete cutting activities, and other concrete related activities

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
Unnamed tributary that flows into Copano Bay / Port Bay / Mission Bay, Segment ID 2472 / 2472OW.	Receiving waters are unclassified. The segment type is Oyster Waters that are considered impaired.

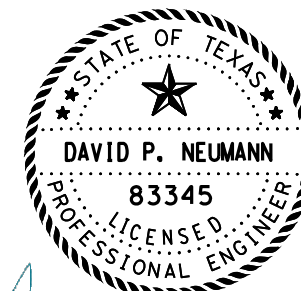
\* Add (\*) for impaired waterbodies with pollutant in ( ).

**1.12 ROLES AND RESPONSIBILITIES: TxDOT**

- Development of plans and specifications
- Perform SWP3 inspections
- Maintain SWP3 records and update to reflect daily operations
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

**1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR**

- Day To Day Operational Control
- Maintain schedule of major construction activities
- Install, maintain and modify BMPs
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_



*David P. Neumann, P.E.*  
2024.05.09 14:44:58-05'00'

**CR 3861**  
**STORMWATER POLLUTION PREVENTION PLAN (SWP3)**  
**(Less Than 1 Acre)**

FED. RD. DIV. NO.	PROJECT NO.			SHEET NO.
				107
STATE	STATE DIST.	COUNTY		
TEXAS	CRP	SAN PATRICIO		
CONT.	SECT.	JOB	HIGHWAY NO.	
0916	28	082	CR 3861	

**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

**2.3 PERMANENT CONTROLS:**

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

**2.4 OFFSITE VEHICLE TRACKING CONTROLS:**

- Excess dirt/mud on road removed daily
- Haul roads dampened for dust control
- Loaded haul trucks to be covered with tarpaulin
- Stabilized construction exit
- Daily street sweeping
- Other: \_\_\_\_\_

- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

- Other: \_\_\_\_\_

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

**2.5 POLLUTION PREVENTION MEASURES:**

- Chemical Management
- Concrete and Materials Waste Management
- Debris and Trash Management
- Dust Control
- Sanitary Facilities
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

**2.6 VEGETATED BUFFER ZONES:**

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

**2.7 ALLOWABLE NON-STORMWATER DISCHARGES:**

- Fire hydrant flushings
- Irrigation drainage
- Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- Potable water sources
- Springs
- Uncontaminated groundwater
- Water used to wash vehicles or control dust
- Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

**2.8 DEWATERING:**

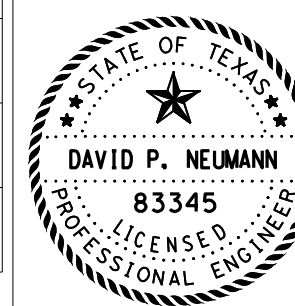
Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

**2.9 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 2.3 of this SWP3 .

**2.10 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 2.3 of this SWP3.



*David P. Neumann, P.E.*  
2024.05.09 14:45:25-05'00'  
**CR 3861**

**STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)**

FED. RD. DIV. NO.	PROJECT NO.			SHEET NO.
				108
STATE	STATE DIST.	COUNTY		
TEXAS	CRP	SAN PATRICIO		
CONT.	SECT.	JOB	HIGHWAY NO.	
0916	28	082	CR 3861	



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:

**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. None
2.  No Action Required  Required Action

Action No.

- Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
- Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
- Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
- 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. No equipment is allowed in any stream channel below the ordinary High Water Mark except on approved temporary stream crossings or drill pads.

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.

- 
- 
- 

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
<input checked="" type="checkbox"/> Temporary Vegetation	<input checked="" type="checkbox"/> Silt Fence	<input type="checkbox"/> Vegetative Filter Strips
<input type="checkbox"/> Blankets/Matting	<input type="checkbox"/> Rock Berm	<input type="checkbox"/> Retention/Irrigation Systems
<input type="checkbox"/> Mulch	<input type="checkbox"/> Triangular Filter Dike	<input type="checkbox"/> Extended Detention Basin
<input checked="" type="checkbox"/> Sodding	<input type="checkbox"/> Sand Bag Berm	<input type="checkbox"/> Constructed Wetlands
<input type="checkbox"/> Interceptor Swale	<input type="checkbox"/> Straw Bale Dike	<input type="checkbox"/> Wet Basin
<input type="checkbox"/> Diversion Dike	<input type="checkbox"/> Brush Berms	<input type="checkbox"/> Erosion Control Compost
<input type="checkbox"/> Erosion Control Compost	<input type="checkbox"/> Erosion Control Compost	<input type="checkbox"/> Mulch Filter Berm and Socks
<input type="checkbox"/> Mulch Filter Berm and Socks	<input type="checkbox"/> Mulch Filter Berm and Socks	<input type="checkbox"/> Compost Filter Berm and Socks
<input type="checkbox"/> Compost Filter Berm and Socks	<input type="checkbox"/> Compost Filter Berm and Socks	<input checked="" type="checkbox"/> Vegetation Lined Ditches
	<input type="checkbox"/> Stone Outlet Sediment Traps	<input type="checkbox"/> Sand Filter Systems
	<input type="checkbox"/> Sediment Basins	<input type="checkbox"/> 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.

- 
- 
- 

**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.

- See Sheet 2 of 2
- 
- 

**V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.**

- No Action Required  Required Action

Action No.

- See Sheet 2 of 2
- 
- 

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

**GENERAL NOTE:**

Any change orders and/or deviations from the final design must be reported to the Engineer prior to commencement of construction activities, as additional environmental clearance may be required.

**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.

- 


**VII. OTHER ENVIRONMENTAL ISSUES**

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

- No Action Required  Required Action

Action No.

- WATER QUALITY - Minimize the use of equipment in streams and riparian areas during construction. When possible, equipment access should be from banks, bridge decks, or barges.
- 
- 

 Texas Department of Transportation		<i>Design Division Standard</i>	
<b>ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS</b>			
<b>EPIC</b>			
FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP
©TxDOT: February 2015	CONT	SECT	JOB
12-12-2011 (DS) REVISIONS	0916	28	082
05-07-14 ADDED NOTE SECTION IV.	DIST	COUNTY	SHEET NO.
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	CRP	SAN PATRICIO	109

DISCLAIMER: 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:

**IV. VEGETATION RESOURCES**

Vegetation

a. Minimize the amount of vegetation cleared. Removal of native vegetation, particularly mature native trees and shrubs should be avoided to the greatest extent practicable. Wherever practicable, impacted vegetation should be replaced with in-kind on-site replacement/restoration of native vegetation.

**V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.**

Amphibians

a. Be advised of the potential occurrence of the **Black-spotted Newt** in the project area. Minimize the amount of vegetation cleared. It inhabits permanent and temporary water sources such as arroyos, canals, ponds, roadside ditches, stream pools, or shallow depressions with an abundance of macrophytic vegetation. Removal of native vegetation should be avoided. Impacted vegetation should be replaced with in-kind onsite replacement/restoration of native vegetation. Avoid harming this species if encountered.

b. Be advised of the potential occurrence of the **Sheep Frog** in the project area. Minimize the amount of vegetation cleared. Preferred habitat for the sheep frog includes vegetated field margins, drainages, and other areas that are not regularly plowed. Impacted vegetation should be replaced with in-kind onsite replacement/restoration of native vegetation. Avoid harming this species if encountered.

c. Be advised of the potential occurrence of the **South Texas Siren** in the project area. Minimize the amount of vegetation cleared. Prefers quiet bodies of water with or without submergent vegetation. Occurs in perennial and seasonally flooded features such as arroyos, canals, ditches, or even shallow depressions. Impacted vegetation should be replaced with in-kind onsite replacement/restoration of native vegetation. Avoid harming this species if encountered.

d. Consider applying hydromulching and/or hydroseeding in areas for soil stabilization and/or revegetation of disturbed areas where feasible. If hydromulching and/or hydroseeding are not feasible due to site conditions, using erosion control blankets or mats that contain no netting, or only contain loosely woven natural fiber netting is preferred. Plastic netting should be avoided to the extent practicable.

e. Project Specific Locations (PSLs) proposed within state-owned ROW should be located in uplands away from aquatic features. When work is directly adjacent to the water, minimize impacts to shoreline basking sites (e.g., downed trees, sand bars, exposed bedrock) and overwinter sites (e.g., brush and debris piles, crawfish burrows), where feasible. Avoid or minimize disturbing or removing downed trees, rotting stumps, and leaf litter, which may be refugia for terrestrial amphibians, where feasible.

Birds

f. The Federal Migratory Bird Treaty Act (MBTA) states that it is unlawful to pursue, hunt, take, kill, capture, collect, possess, buy, sell, trade, or transport any migratory bird, nest, young, feather, or egg in part or in whole, without a federal permit. This project does not have a federal permit; therefore, in accordance with this regulation, the Contractor will avoid disturbing, destroying, removing, or relocating migratory birds and active nests found in trees, culverts, bridges, on the ground, etc. Typical breeding season occurs from March through August; therefore, tree trimming and other vegetation clearing activities that may disturb breeding birds should be done in the non-breeding season (September-February), when possible. If work must be performed during the breeding season, the Contractor shall have a qualified biologist conduct a survey of the right of way to determine if bird nests are present. In the event that active nests are encountered on-site during construction, the Contractor shall notify the Engineer and measures shall be taken to avoid disturbance of these birds, their occupied nest, eggs, and/or young, in accordance with the MBTA. Phasing of work during construction may be necessary to stay in compliance with the MBTA. The Contractor can discuss other preventative measures with the Project Engineer and/or District Environmental Staff.

g. If the construction of the project requires the use of 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.

h. Avoid or minimize disturbing or removing downed trees, rotting stumps, and leaf litter where feasible.


Other

i. Do not attempt to handle or catch any of these species. Report all sightings and/or impacts to the TxDOT Corpus Christ District Environmental Section.

**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

SHEET 2 OF 2

		Design Division Standard	
<b>ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS EPIC</b>			
FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP
© TxDOT: February 2015	CONT	SECT	HIGHWAY
12-12-2011 (DS)	0916	28	082
05-07-14 ADDED NOTE SECTION IV.	DIST	COUNTY	SHEET NO.
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	CRP	SAN PATRICIO	110

DATE: 5/9/2024 9:14:39 AM  
 FILE: c:\pw\_working\lochner-pw-01\0109814\CR3861\_Environmental\_Layout.dgn

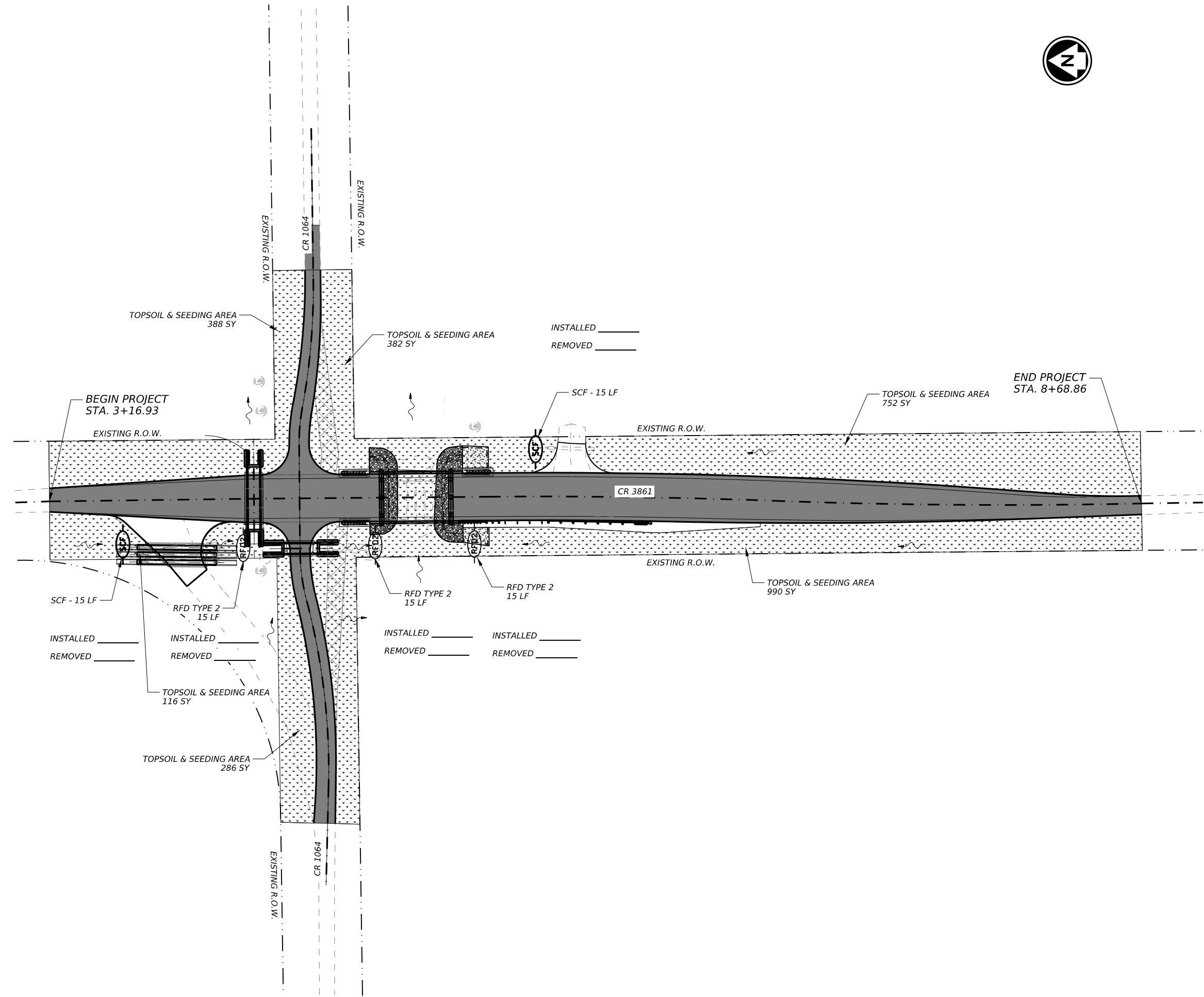


**NOTES:**

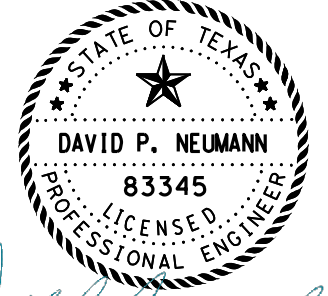
1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.
  2. AREAS NOT SHOWN BY SEEDING OR AREAS CONSIDERED TO BE VEGETATION BUFFERS AND MAY NOT BE DISTURBED UNLESS AS DIRECTED.
- EROSION CONTROL QUANTITIES LISTED ARE APPROXIMATE AND MAY NEED TO BE VARIED TO MEET FIELD CONDITIONS.

**LEGEND**

- SEEDING AREA
- SOIL RETENTION BLANKET
- SEDIMENT CONTROL FENCE
- EROSION CONTROL LOGS AT DROP INLET
- ROCK FILTER DAM TYPE 2
- DRAINAGE FLOW ARROWS



2024.05.09 14:41:52-05'00'



*David P. Neumann, P.E.*

**LOCHNER**  
 TBPE Firm Reg. No. 10488



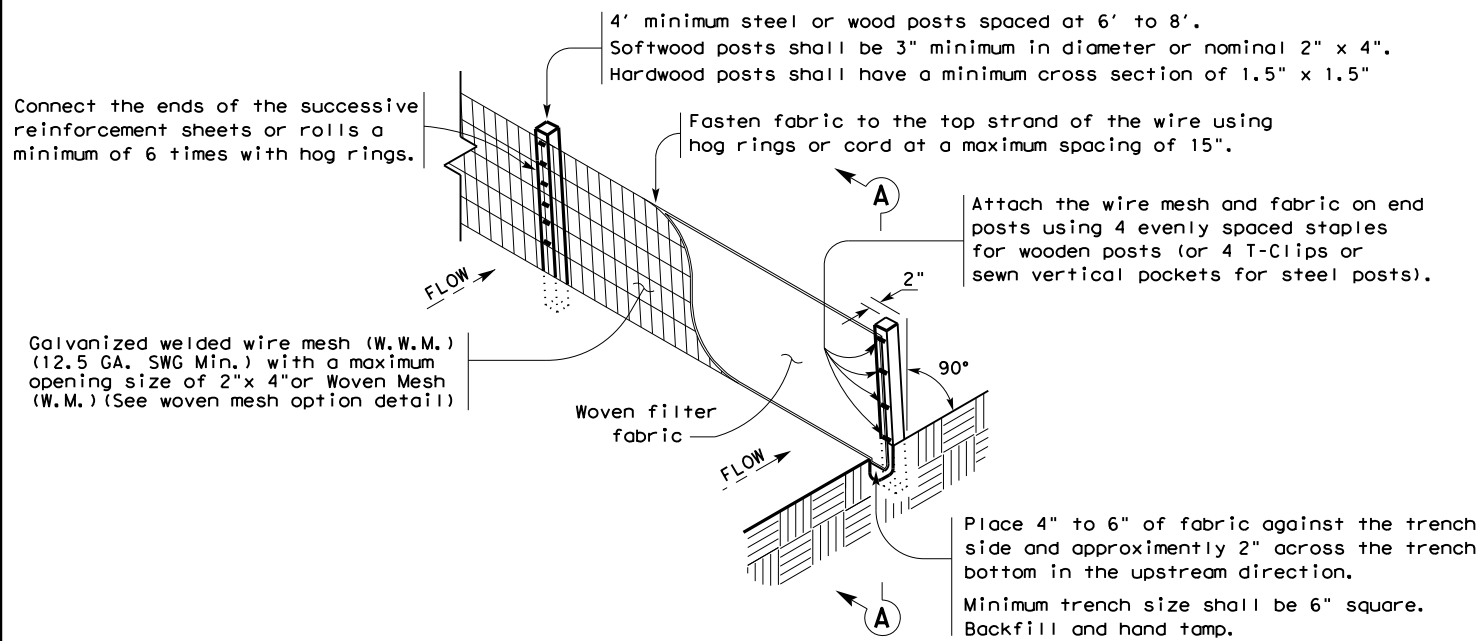
©2024

**CR 3861  
 STORM WATER  
 POLLUTION PREVENTION  
 PLAN LAYOUT**

CONT	SECT	JOB	HIGHWAY
0916	28	082	CR 3861
DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	111	

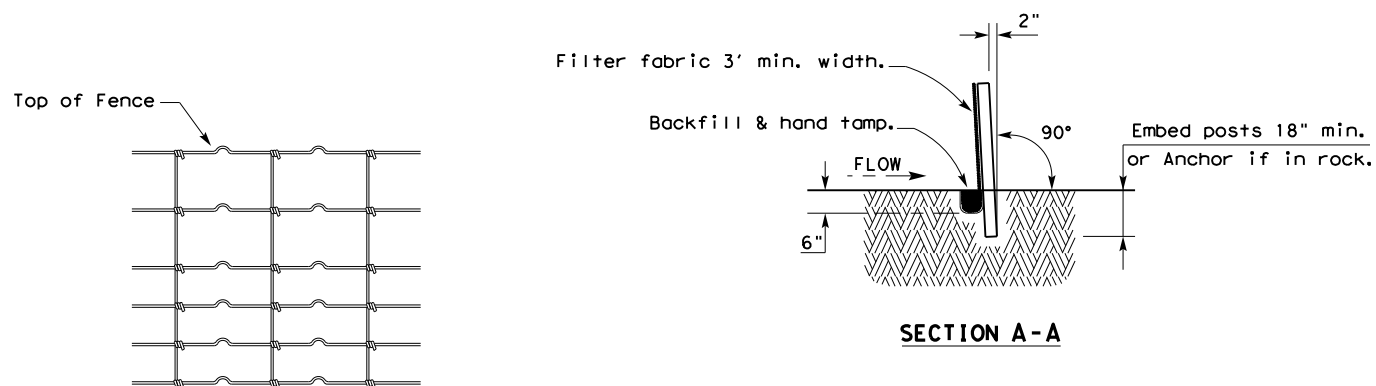
DISCLAIMER: This standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT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

DATE  
FILE



**TEMPORARY SEDIMENT CONTROL FENCE**

SCF



**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<sup>2</sup>. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

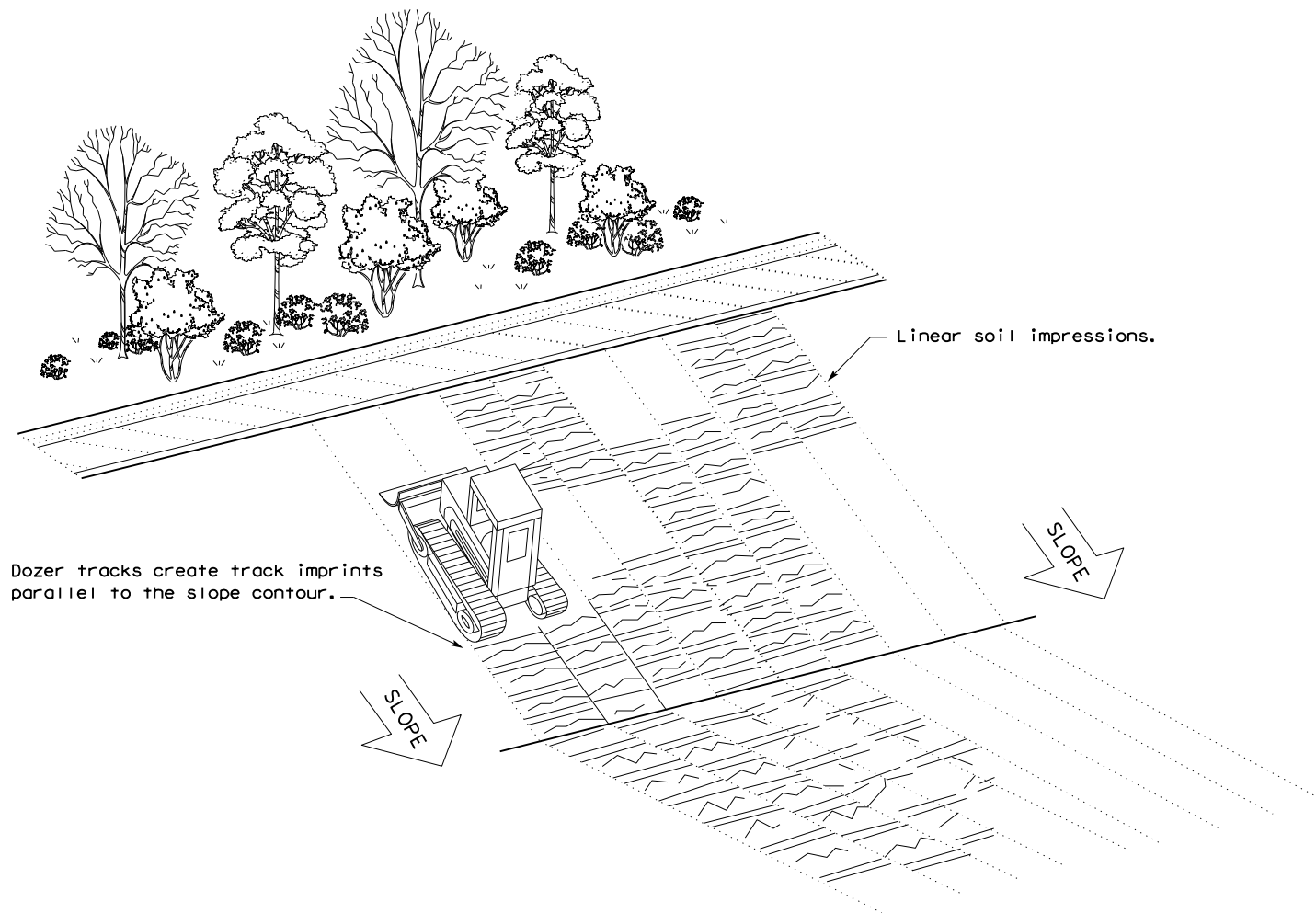
**LEGEND**

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 continuous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



**VERTICAL TRACKING**

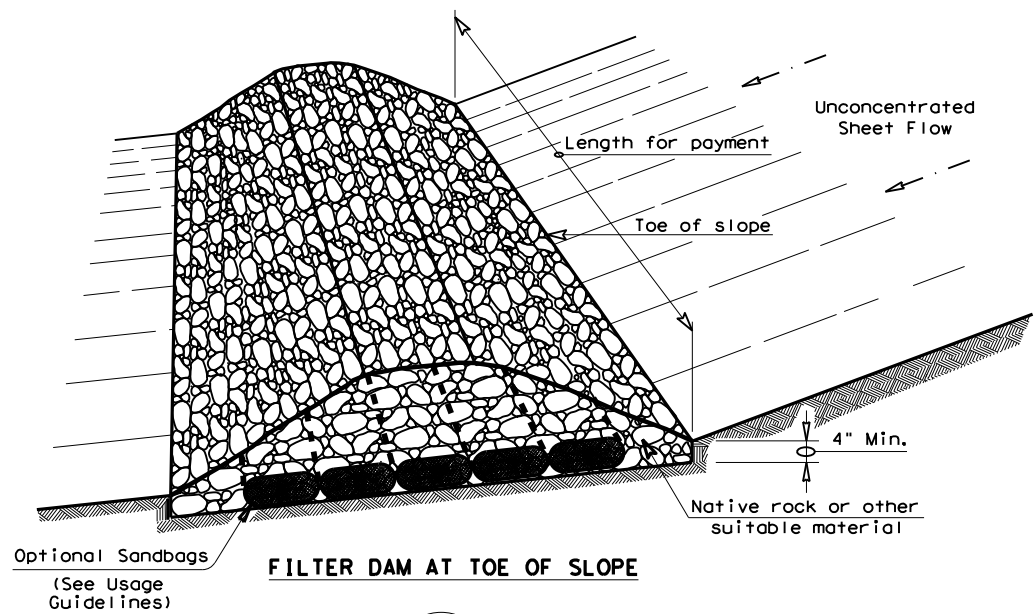


**TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES FENCE & VERTICAL TRACKING EC(1)-16**

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0916	28	082	CR 3861
	DIST	COUNTY	SHEET NO.	
	CRP	SAN PATRICIO	112	

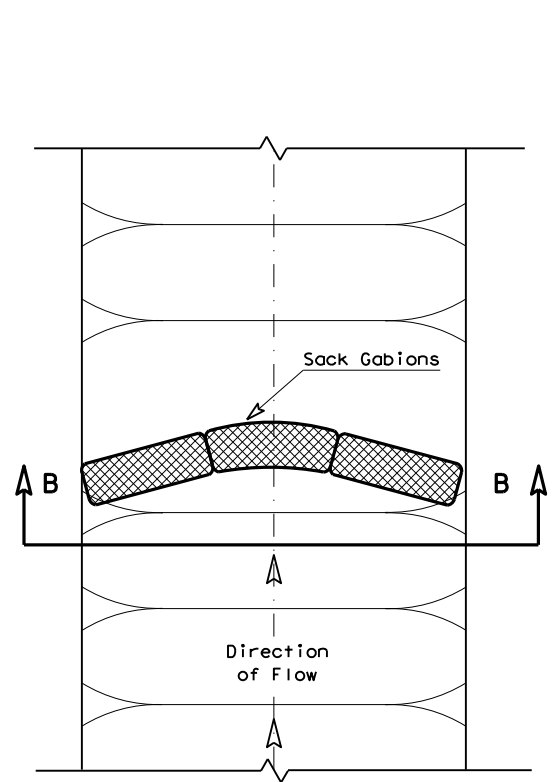
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: FILE:

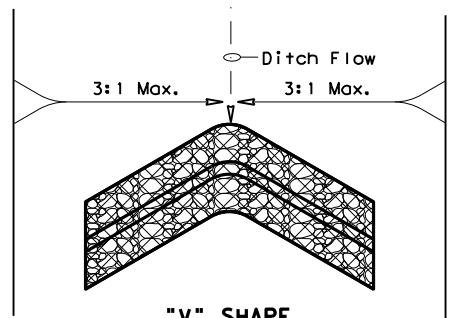


**FILTER DAM AT TOE OF SLOPE**

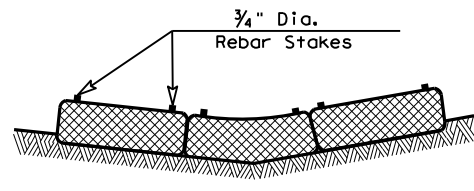
(RFD1)



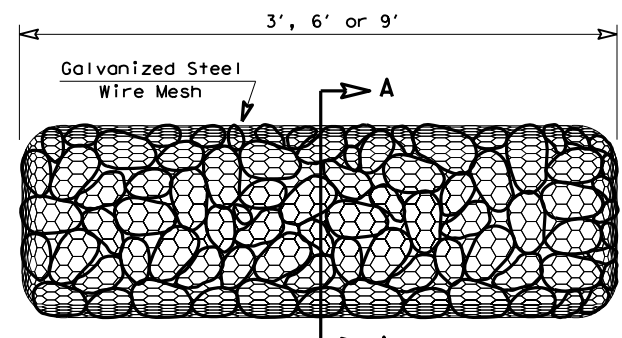
**PLAN VIEW**



**"V" SHAPE PLAN VIEW**

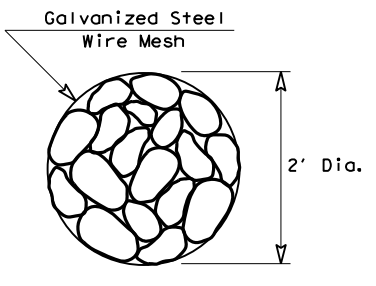


**SECTION B-B**

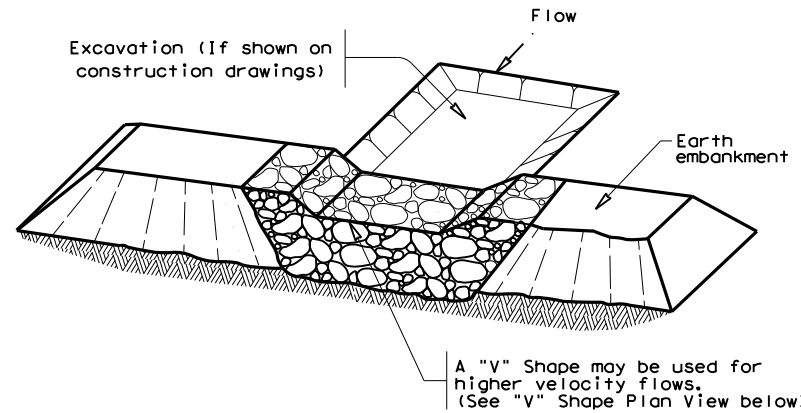


**TYPE 4 (SACK GABIONS)**

(RFD4)

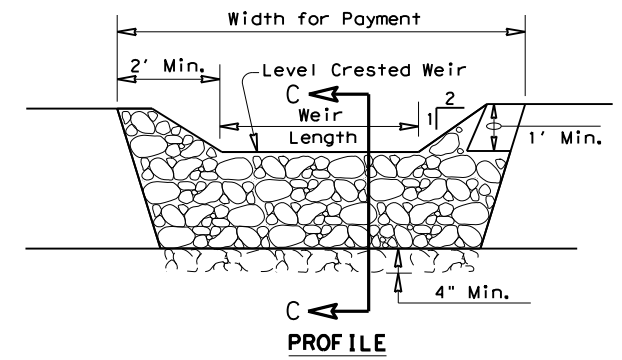


**SECTION A-A**

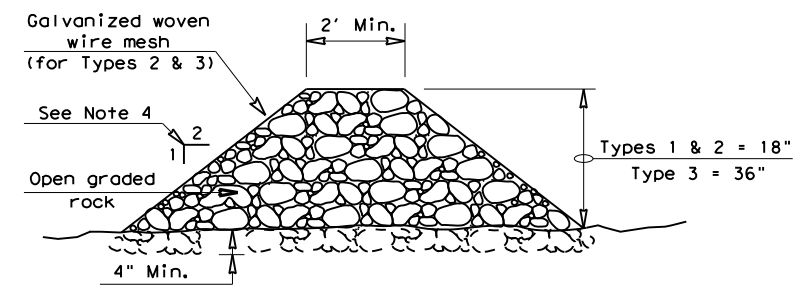


**FILTER DAM AT SEDIMENT TRAP**

(RFD1) OR (RFD2)



**PROFILE**



**SECTION C-C**

**ROCK FILTER DAM USAGE GUIDELINES**

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT<sup>2</sup> of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

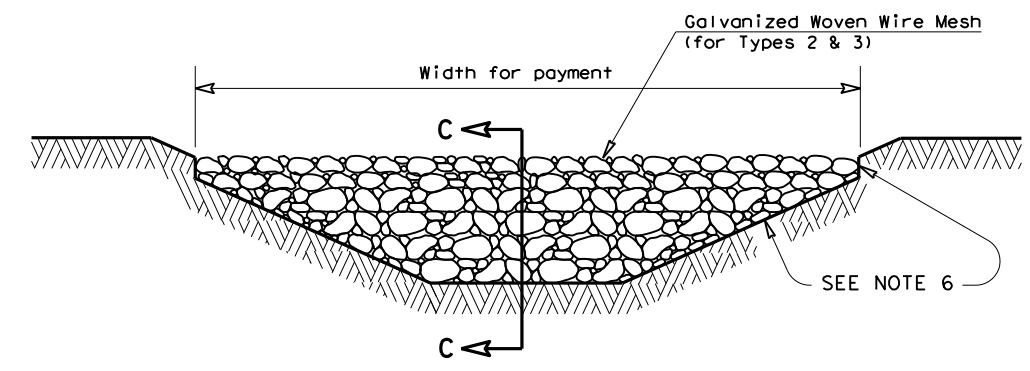
**Type 1 (18" high with no wire mesh) (3" to 6" aggregate):** Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximately 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

**Type 2 (18" high with wire mesh) (3" to 6" aggregate):** Type 2 may be used in ditches and at dike or swale outlets.

**Type 3 (36" high with wire mesh) (4" to 8" aggregate):** Type 3 may be used in stream flow and should be secured to the stream bed.

**Type 4 (Sack gabions) (3" to 6" aggregate):** Type 4 May be used in ditches and smaller channels to form an erosion control dam.

**Type 5:** Provide rock filter dams as shown on plans.



**FILTER DAM AT CHANNEL SECTIONS**

(RFD1) OR (RFD2) OR (RFD3)

**GENERAL NOTES**

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with 3/4" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 1/2" x 3 1/4".
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

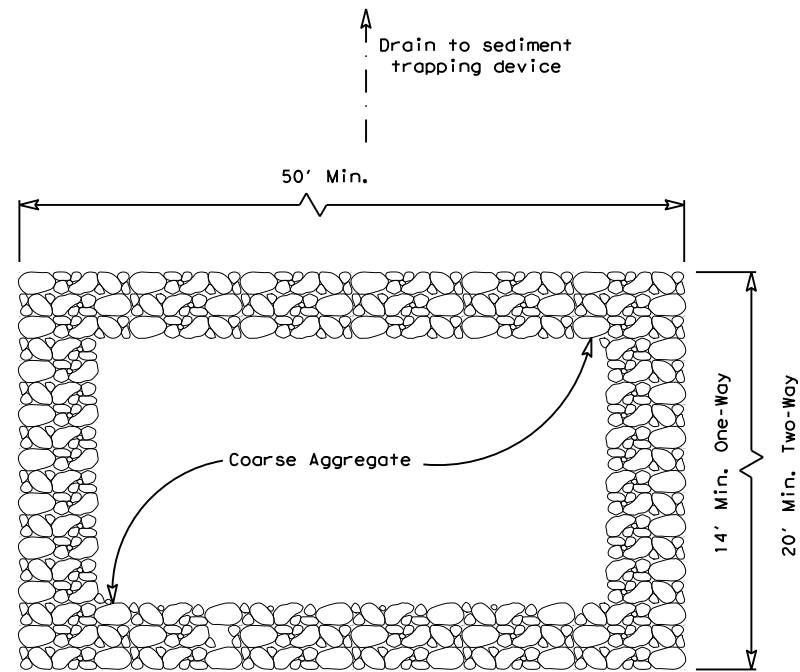
**PLAN SHEET LEGEND**

- Type 1 Rock Filter Dam (RFD1)
- Type 2 Rock Filter Dam (RFD2)
- Type 3 Rock Filter Dam (RFD3)
- Type 4 Rock Filter Dam (RFD4)

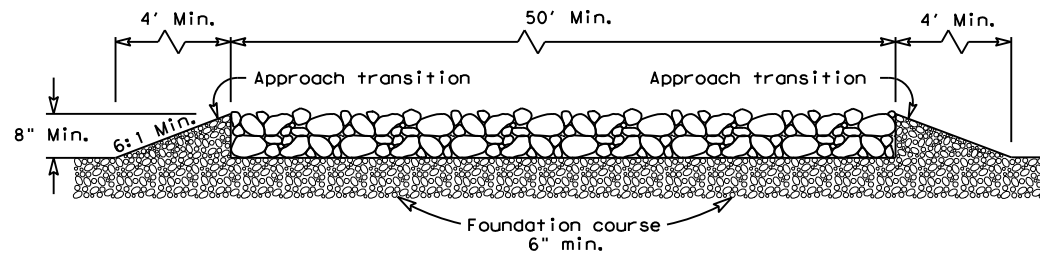
		<b>Design Division Standard</b>	
<b>TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES</b> <b>ROCK FILTER DAMS</b> <b>EC (2) - 16</b>			
FILE: ec216	DN: TxDOT	CK: KM	DW: VP
© TxDOT: JULY 2016	CONT SECT	JOB	HIGHWAY
REVISIONS	0916 28	082	CR 3861
	DIST	COUNTY	SHEET NO.
	CRP	SAN PATRICIO	113

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

DATE:  
 FILE:



**PLAN VIEW**

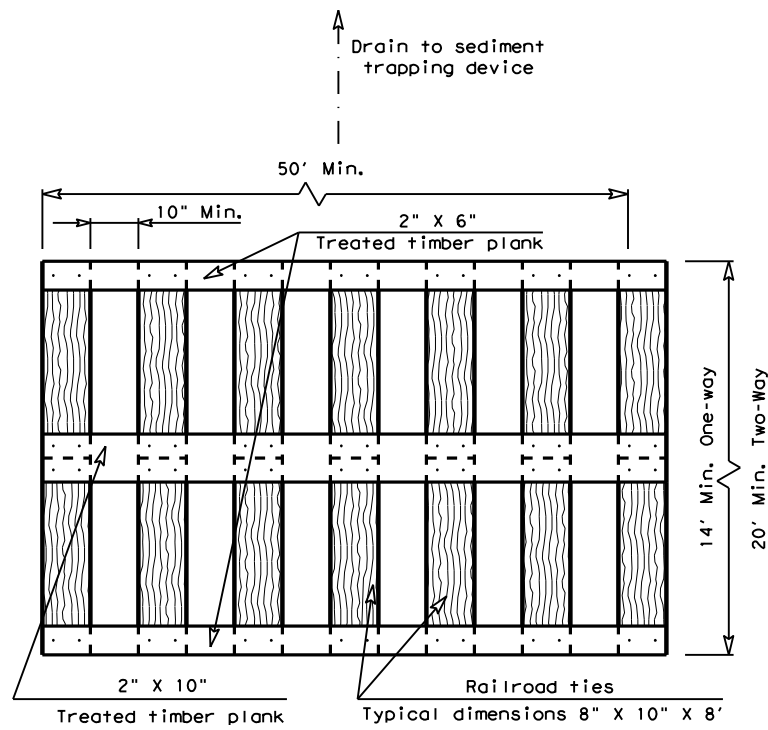


**ELEVATION VIEW**

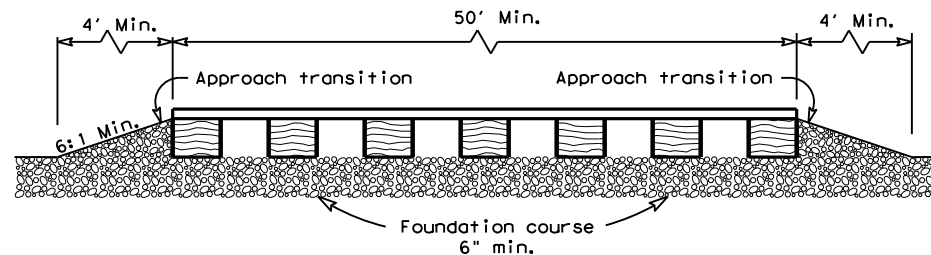
**CONSTRUCTION EXIT (TYPE 1)  
 ROCK CONSTRUCTION (LONG TERM)**

**GENERAL NOTES (TYPE 1)**

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materials approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.



**PLAN VIEW**

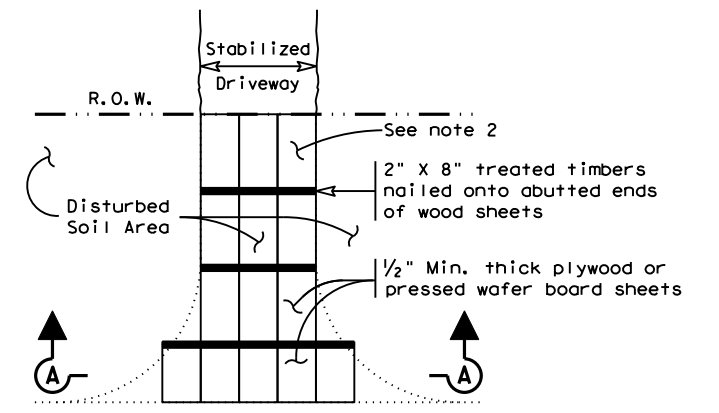


**ELEVATION VIEW**

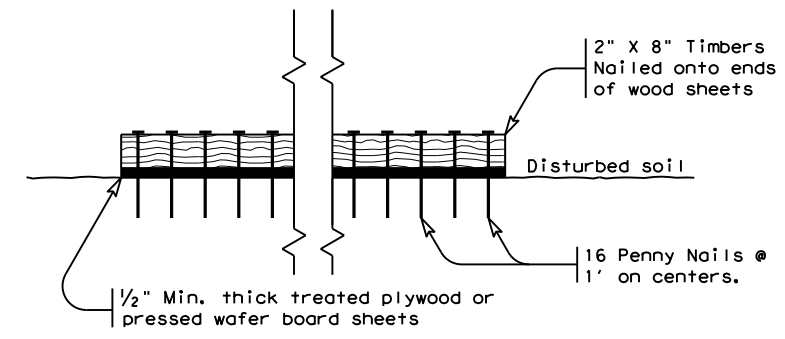
**CONSTRUCTION EXIT (TYPE 2)  
 TIMBER CONSTRUCTION (LONG TERM)**

**GENERAL NOTES (TYPE 2)**

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with 1/2" x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.



**PLAN VIEW**



**SECTION A-A  
 CONSTRUCTION EXIT (TYPE 3)  
 SHORT TERM**

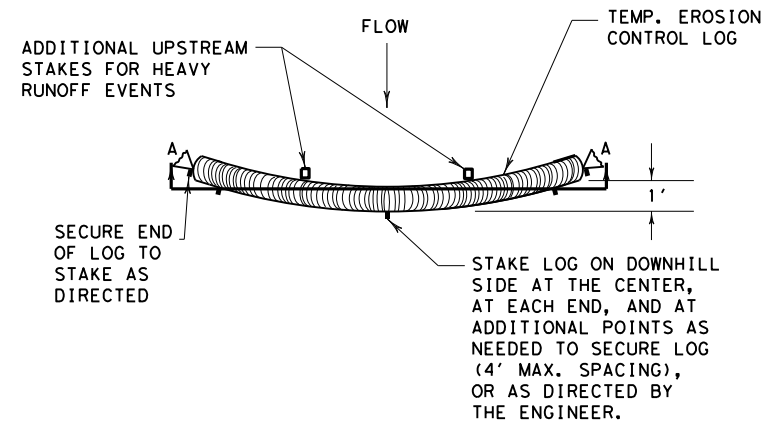
**GENERAL NOTES (TYPE 3)**

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

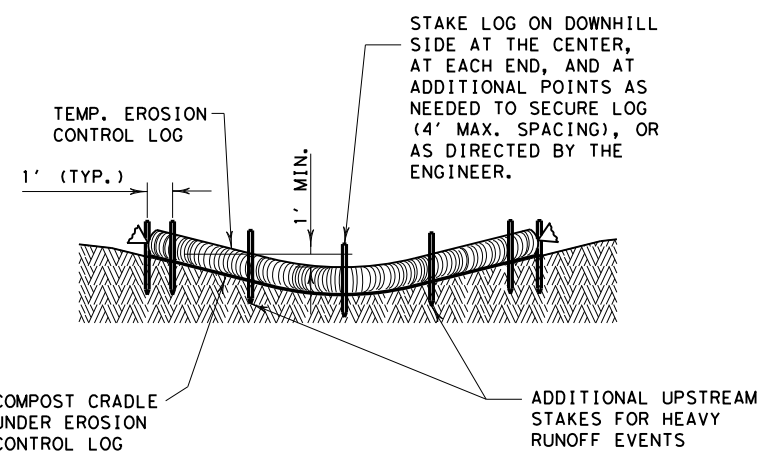
				Design Division Standard	
<b>TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES          CONSTRUCTION EXITS          EC(3)-16</b>					
FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS	
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
	0916	28	082	CR 3861	
	DIST	COUNTY	SHEET NO.		
	CRP	SAN PATRICIO	114		



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

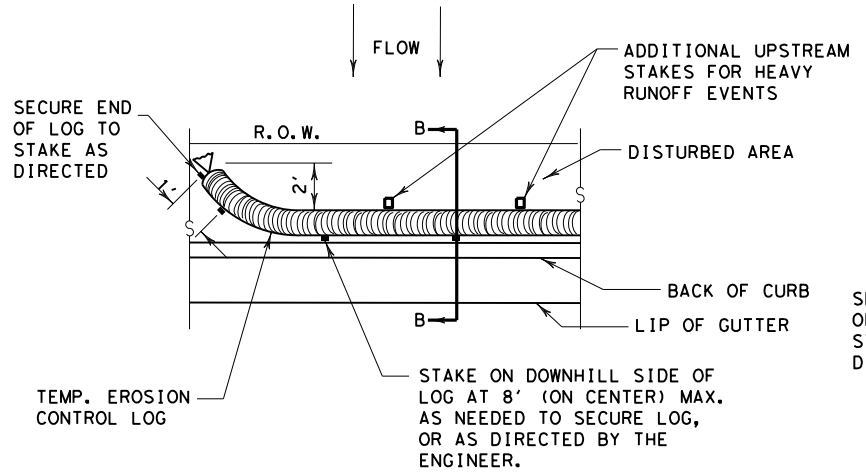


PLAN VIEW

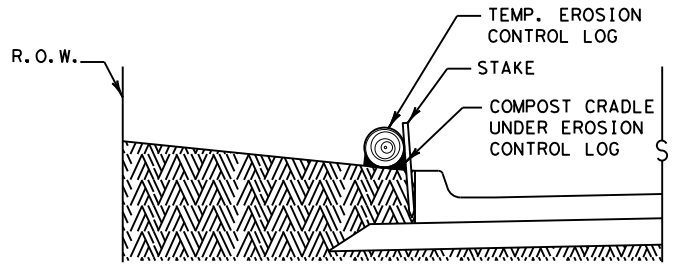


SECTION A-A  
EROSION CONTROL LOG DAM

CL-D

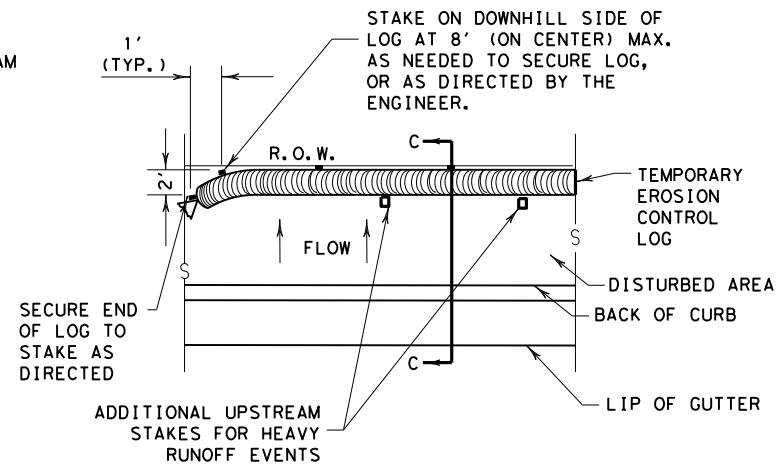


PLAN VIEW

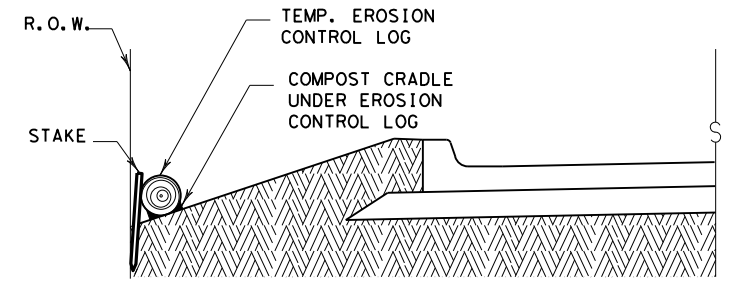


SECTION B-B  
EROSION CONTROL LOG AT BACK OF CURB

CL-BOC

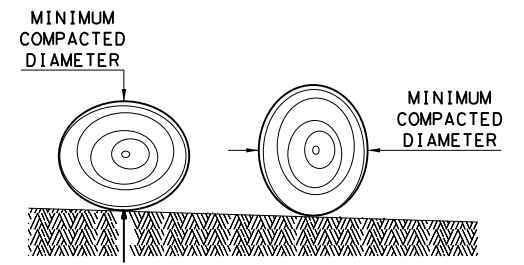


PLAN VIEW



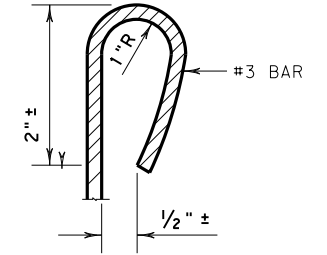
SECTION C-C  
EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

- LEGEND**
- CL-D EROSION CONTROL LOG DAM
  - CL-BOC EROSION CONTROL LOG AT BACK OF CURB
  - CL-ROW EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
  - CL-SST EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
  - CL-SSL EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
  - CL-DI EROSION CONTROL LOG AT DROP INLET
  - CL-CI EROSION CONTROL LOG AT CURB INLET
  - CL-GI EROSION CONTROL LOG AT CURB & GRATE INLET



REBAR STAKE DETAIL

**SEDIMENT BASIN & TRAP USAGE GUIDELINES**

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

**Log Traps:** The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.

**GENERAL NOTES:**

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.

SHEET 1 OF 3

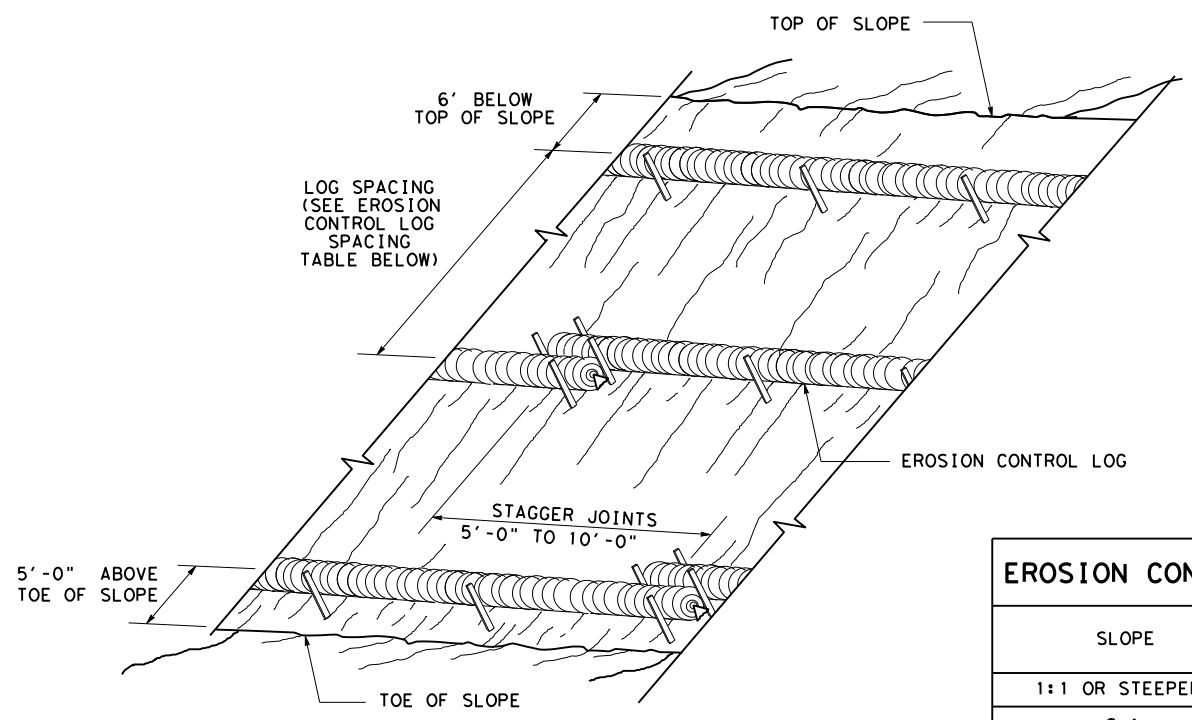
		<b>Design Division Standard</b>	
<b>TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES</b>			
<b>EROSION CONTROL LOG</b>			
<b>EC (9) - 16</b>			
FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT
© TxDOT: JULY 2016	CONT: 0916	SECT: 28	JOB: 082
REVISIONS	DIST: COUNTY		SHEET NO.
	CRP SAN PATRICIO		115

DATE: FILE:



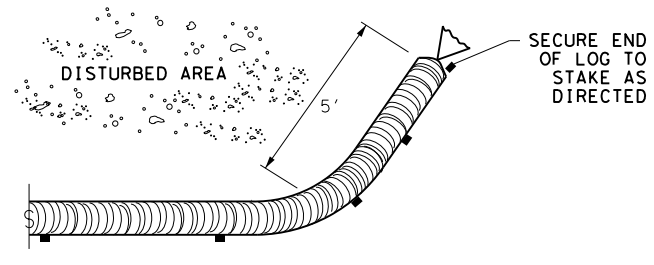
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: FILE:



**EROSION CONTROL LOGS ON SLOPES  
STAKE AND TRENCHING ANCHORING**

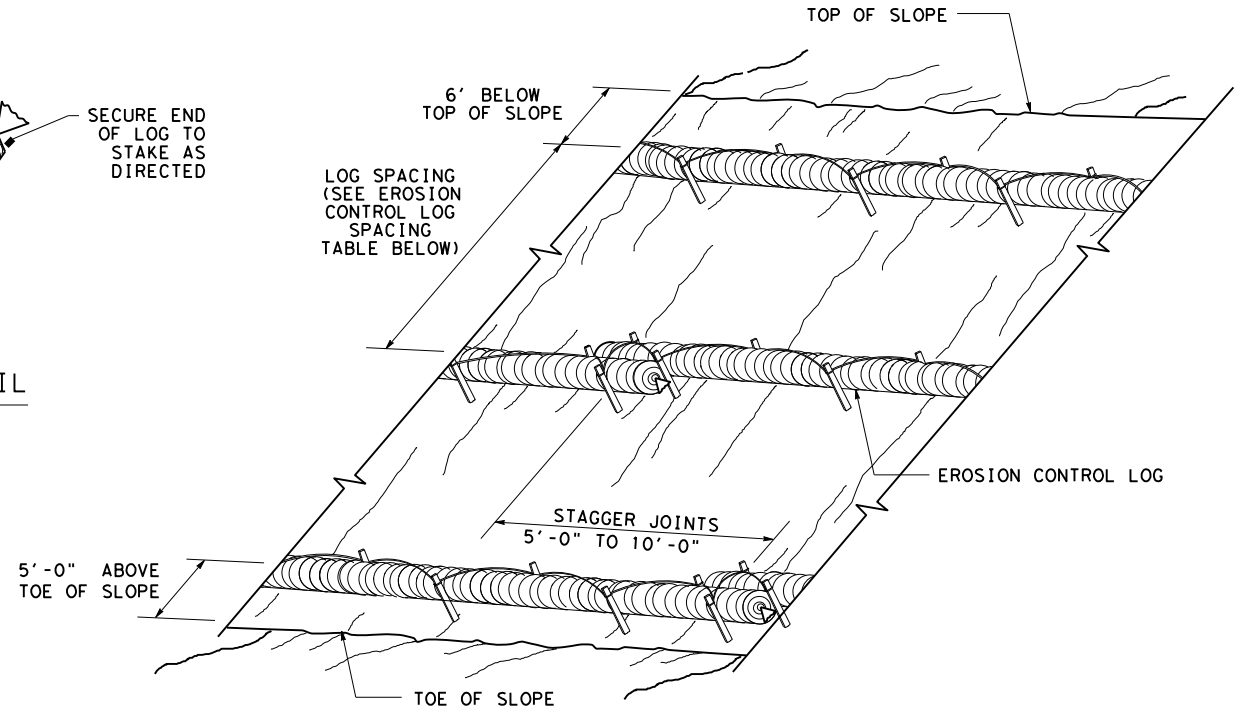
CL-SST



**END SECTION RAP DETAIL**

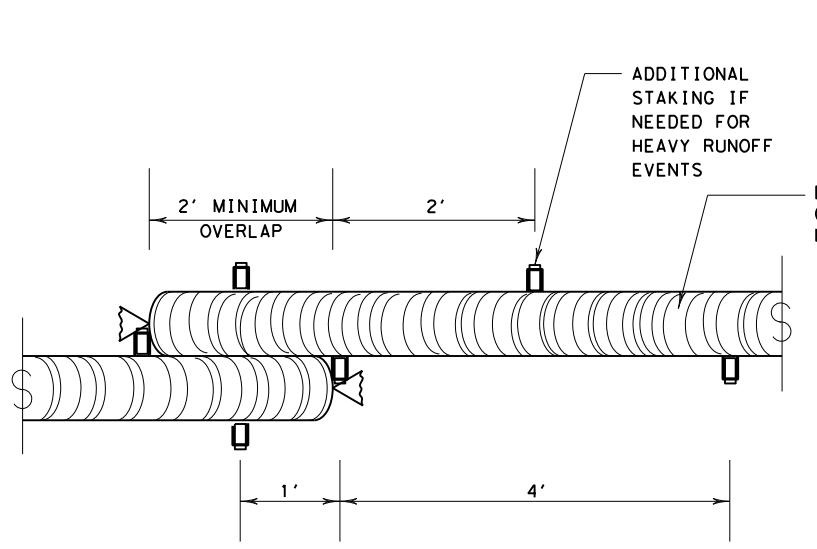
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

\* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:  
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;  
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



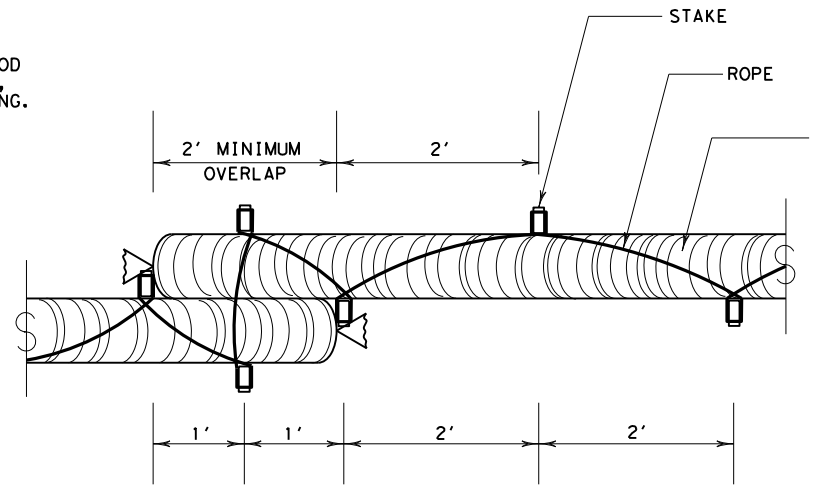
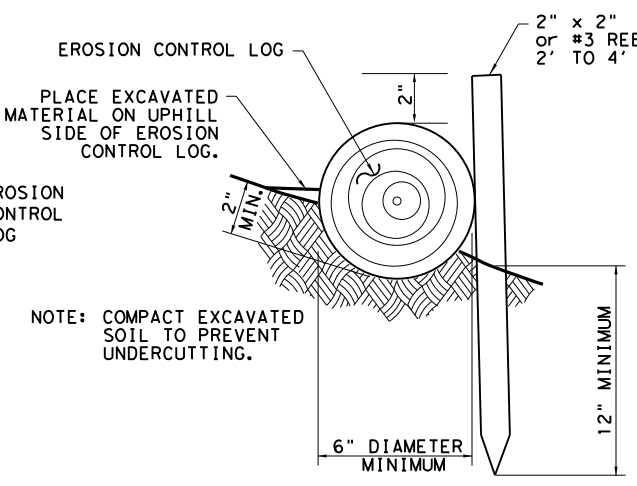
**EROSION CONTROL LOGS ON SLOPES  
STAKE AND LASHING ANCHORING**

CL-SSL



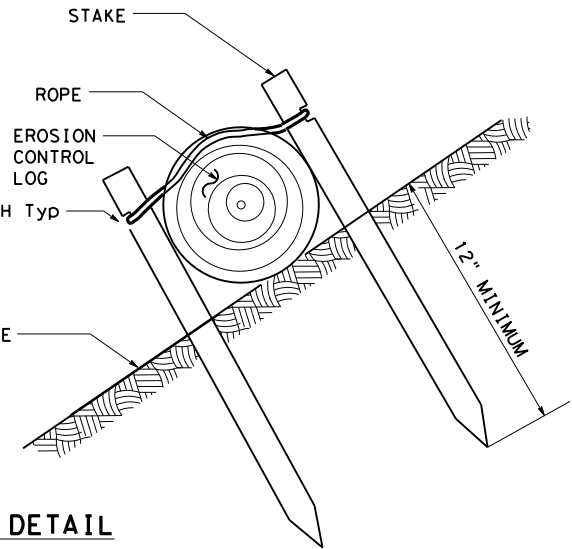
**STAKE AND TRENCHING ANCHORING DETAIL**

CL-SST

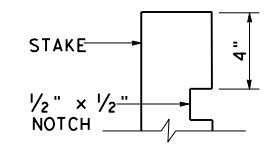


**STAKE AND LASHING ANCHORING DETAIL**

CL-SSL



TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"

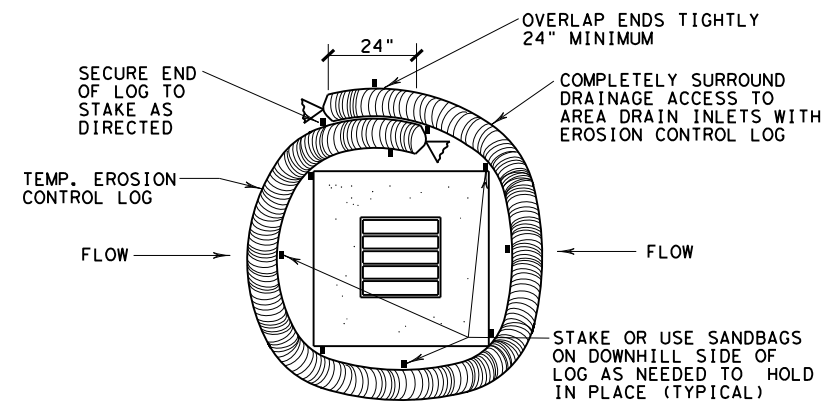


**STAKE NOTCH DETAIL**

SHEET 2 OF 3

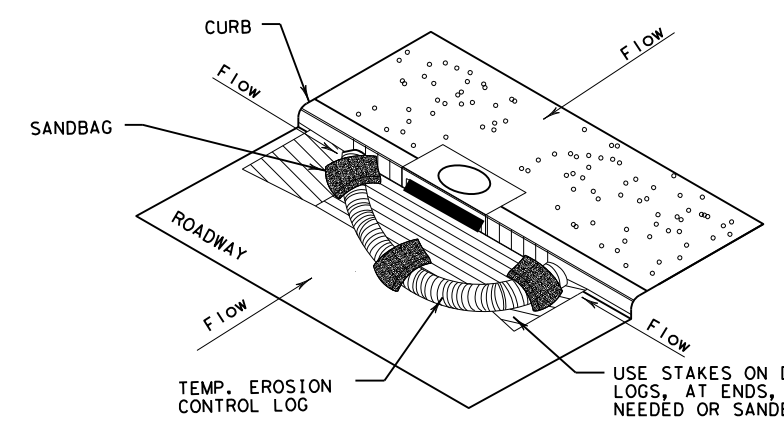
		<b>Design Division Standard</b>	
<b>TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES</b> <b>EROSION CONTROL LOG</b> <b>EC (9) - 16</b>			
FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT
© TxDOT: JULY 2016	CONT SECT	JOB	HIGHWAY
REVISIONS	0916 28	082	CR 3861
DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	116	

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



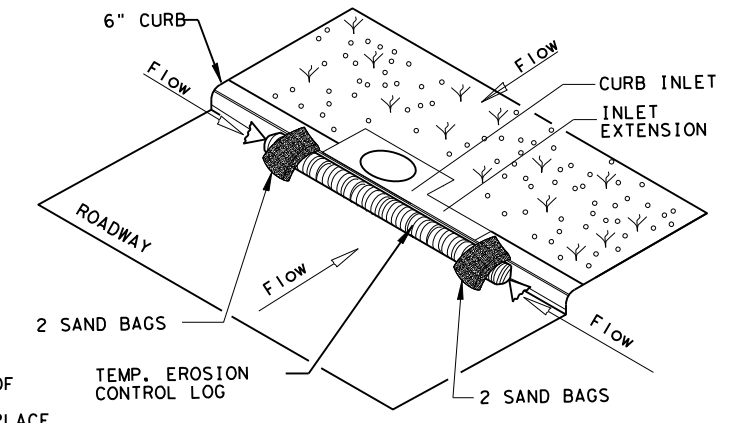
**EROSION CONTROL LOG AT DROP INLET**

CL-DI



**EROSION CONTROL LOG AT CURB INLET**

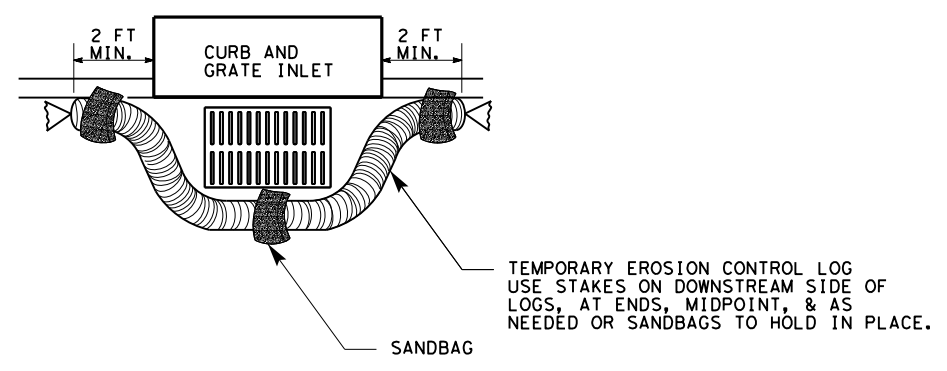
CL-CI



**EROSION CONTROL LOG AT CURB INLET**

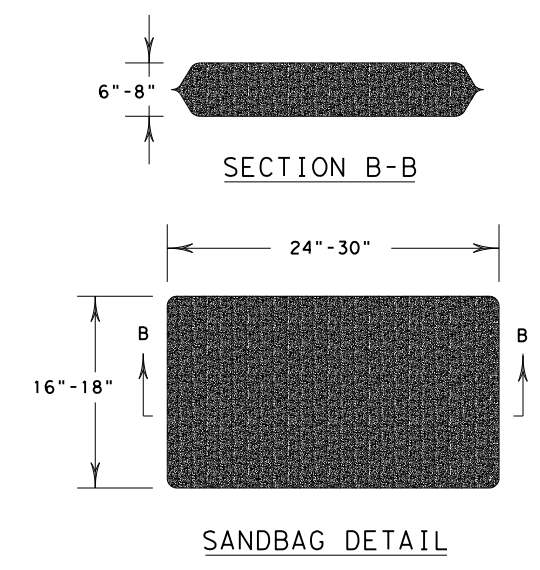
CL-CI

NOTE:  
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



**EROSION CONTROL LOG AT CURB & GRADE INLET**

CL-GI



SHEET 3 OF 3

		<b>Design Division Standard</b>	
<b>TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES</b> <b>EROSION CONTROL LOG</b> <b>EC (9) - 16</b>			
FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT
© TxDOT: JULY 2016	CONT	SECT	JOB
REVISIONS	0916	28	082
DIST	COUNTY	SHEET NO.	
CRP	SAN PATRICIO	117	

DATE:  
FILE: