CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		1

INDEX OF SHEETS

SHEET NO.	DESCRIPTION
	SEE SHEET 2

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

STATE PROJECT NO. C 155-6-213

FM 2678
REFUGIO COUNTY

DESIGN SPEED = 75 MPH
A.D.T. (2022)= 3,565
A.D.T. (2021)= 4,271

FINAL PLANS

LETTING DATE: _____

DATE CONTRACTOR BEGAN WORK: _____

DATE WORK WAS COMPLETED & ACCEPTED: _____

FINAL CONTRACT COST: $ _____

CONTRACTOR : _____

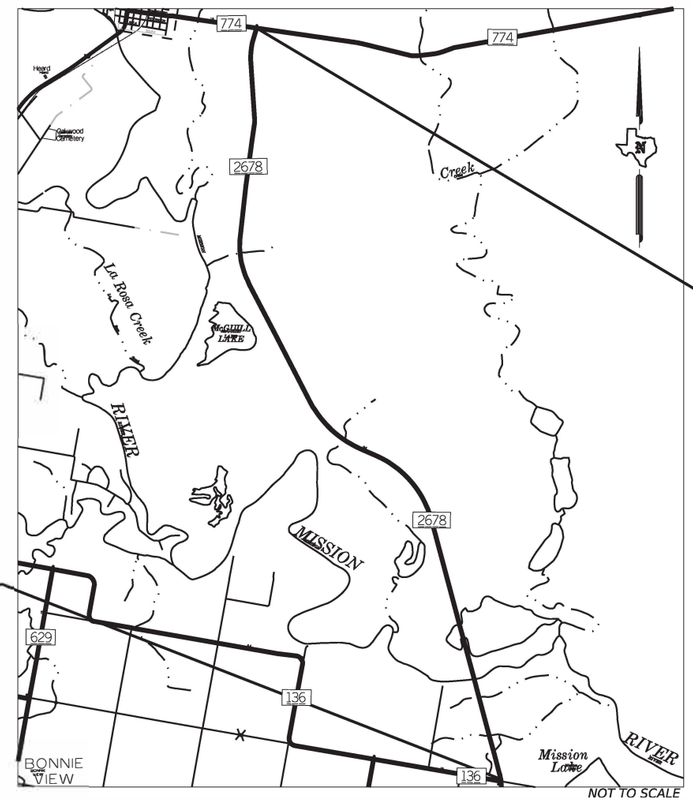
NET LENGTH OF ROADWAY =	51,595	FT.=	9.77 MI.
NET LENGTH OF BRIDGE =	0	FT.=	0 MI.
NET LENGTH OF PROJECT =	51,595	FT.=	9.77 MI.

LIMITS: FROM FM 136 TO FM 774

FOR THE CONSTRUCTION OF WIDENING AND REHABILITATION OF ROADWAY.

CONSISTING OF EXCAVATION OF FLEXBASE, SUPERPAVE, DRAINAGE STRUCTURES, SIGNS, AND PAVEMENT MARKINGS.

NO RAS REVIEW REQUIRED
CONSTRUCTION SPEED ZONE REQUESTED



BEGIN PROJECT
CSJ: 0155 06 213
STA: 0+00
REF MRK: 586+1.61

END PROJECT
CSJ: 0155 06 213
STA: 515+95
REF MRK: 576-0.023

NOT TO SCALE

EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD CROSSINGS: NONE

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND THE SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: SPECIAL LABOR PROVISIONS FOR STATE PROJECTS (000---008).

Texas Department of Transportation

RECOMMENDED FOR LETTING: DocuSigned by: Paula Sales-Evans, P.E. 10/3/2023
DISTRICT DIRECTOR OF TRANSPORTATION PLANNING & DEVELOPMENT

APPROVED FOR LETTING: DocuSigned by: Valente Olivarez 10/3/2023
DISTRICT ENGINEER

DATE: 09/29/2023 02:47 PM
FILE: DOCUMENT NAME e.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062213/4 - Design/Plan Set/1. General/FM2678 TITLE SHEET

CK:
DW:
CK:
DW:

DATE: 10/06/2023 09:18 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design/Plan Set/1. General/INDEX OF SHEETS

STATE OF TEXAS
ERIC R MARTINEZ
125657
LICENSED
PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE BY A (*) HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

P.E. 10/13/2023
DATE

Texas Department of Transportation

FM 2678

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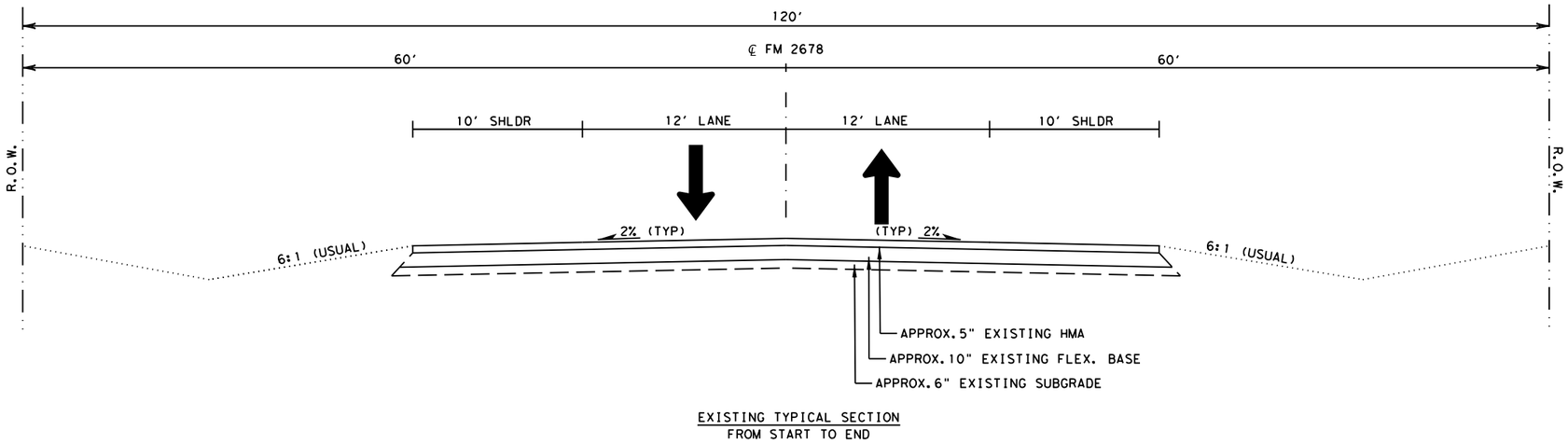
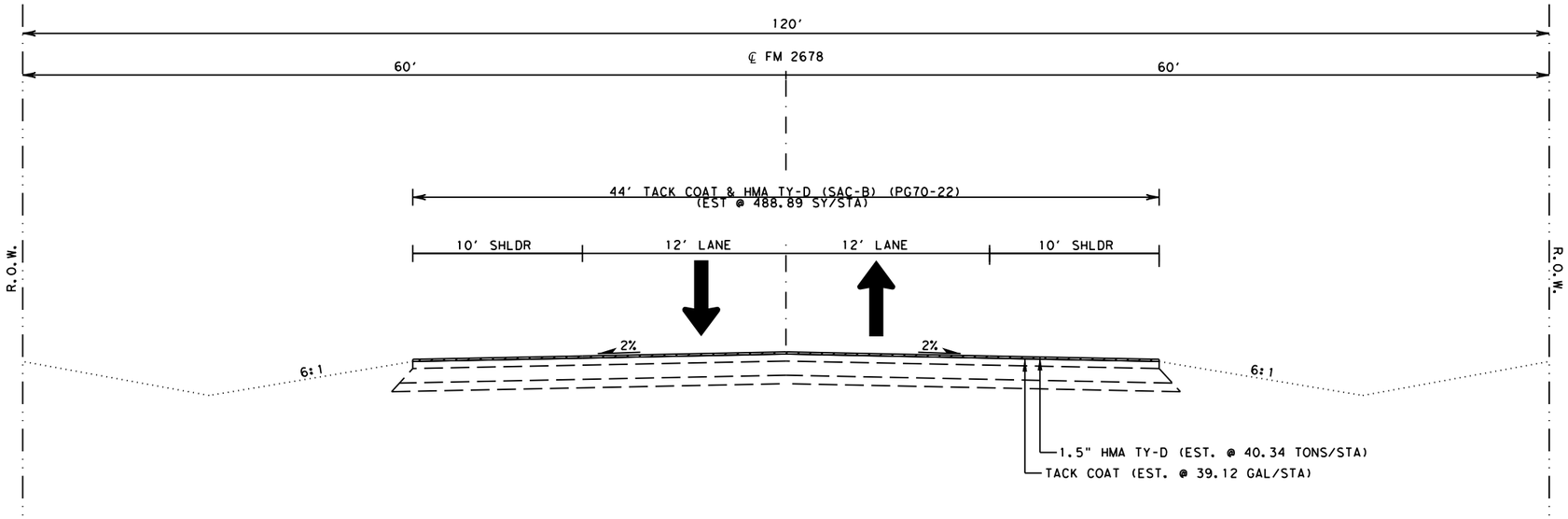


EXISTING TYPICAL SECTION
FROM START TO END



PROPOSED TYPICAL SECTION
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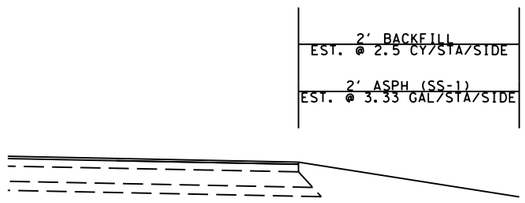
FROM STA. 429+83.00 TO STA. 495+00.00



BACKFILL DETAIL
OVERLAY PAVEMENT EDGES

STATE OF TEXAS
ERIC R MARTINEZ
125657
LICENSED
PROFESSIONAL ENGINEER

10/13/2023

Texas Department of Transportation

FM 2678

TYPICAL SECTION

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DATE: 10/11/2023 10:30:42 PM
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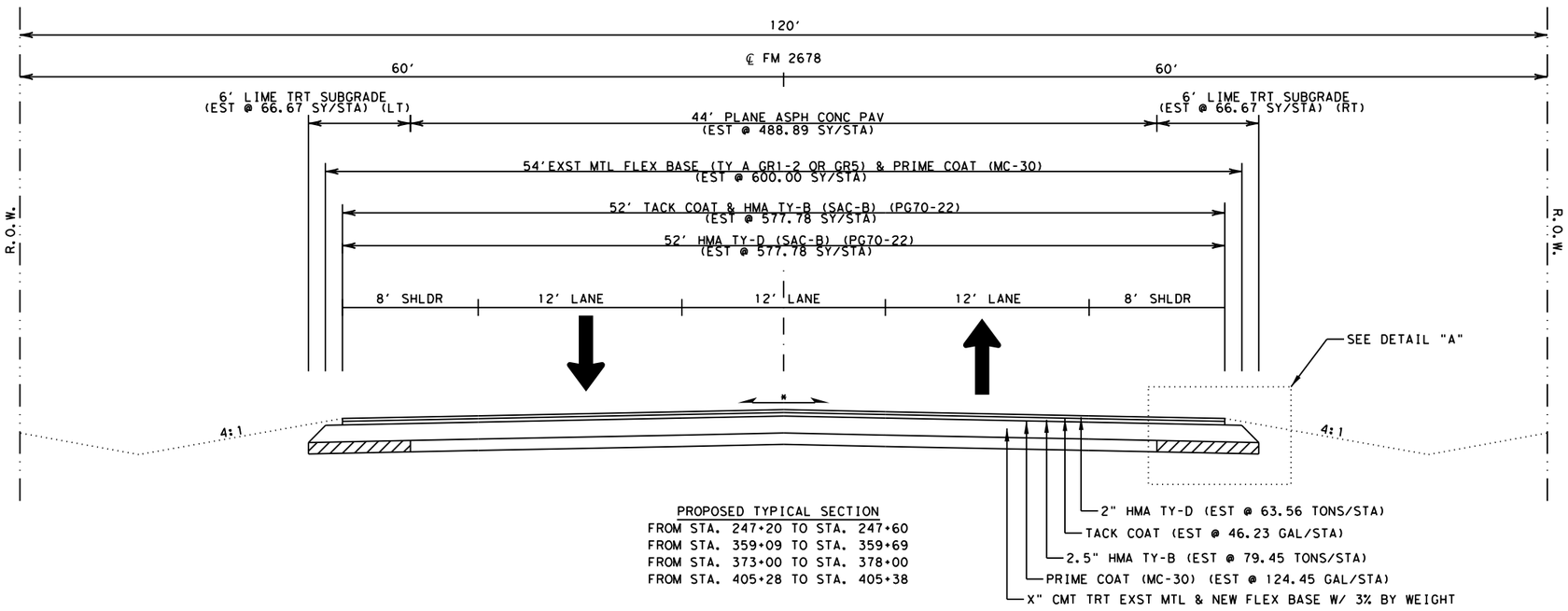
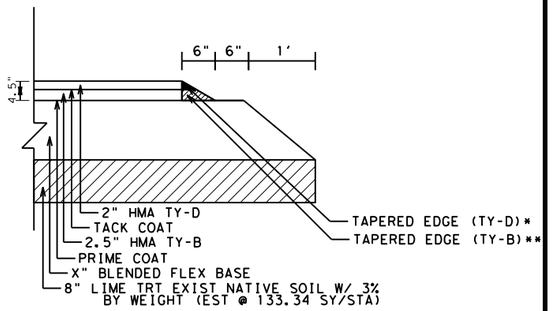


PROPOSED TYPICAL SECTION
FROM STA. 247+20 TO STA. 247+60
FROM STA. 359+09 TO STA. 359+69
FROM STA. 373+00 TO STA. 378+00
FROM STA. 405+28 TO STA. 405+38



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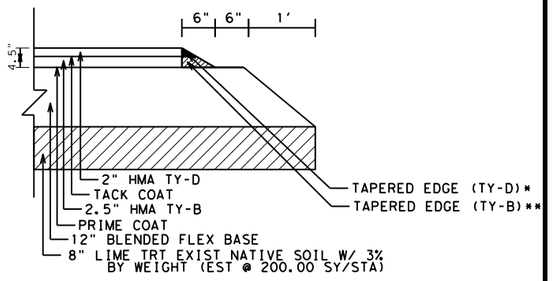

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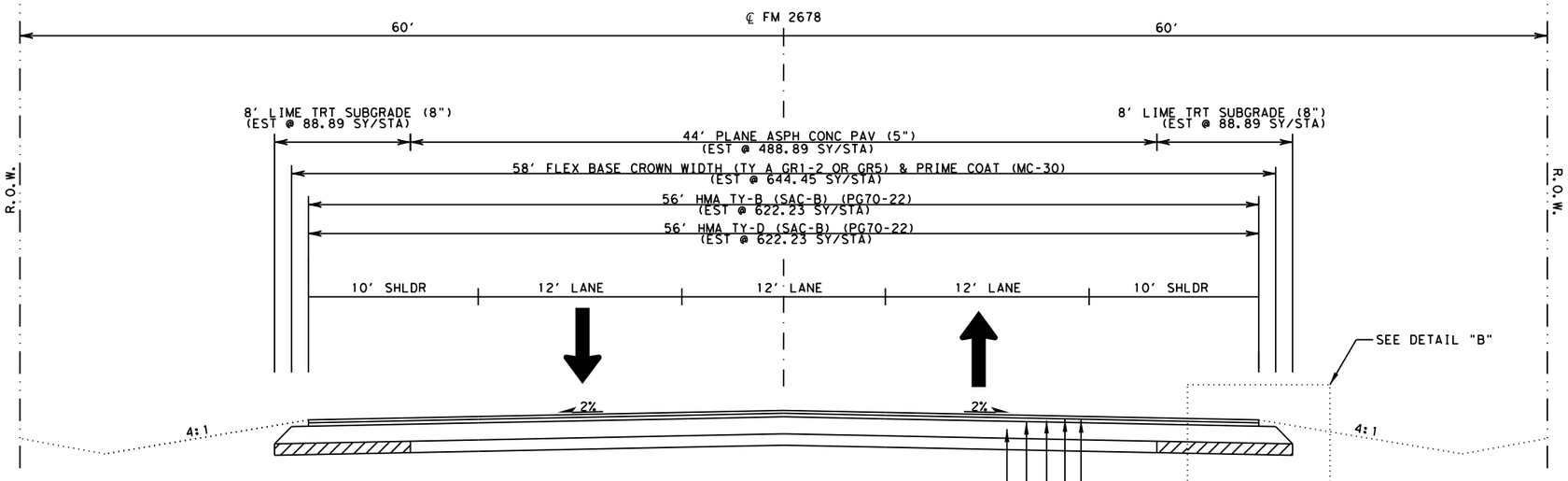

PROPOSED TYPICAL SECTION
FROM STA. 190+62 TO STA. 247+20 56'
FROM STA. 247+60 TO STA. 359+09 56'
FROM STA. 359+69 TO STA. 373+00 56'
FROM STA. 378+00 TO STA. 405+28 56'
FROM STA. 405+38 TO STA. 429+83 56'

*- SEE PLAN AND PROFILE SHEETS FOR SUPERELEVATION.
X- DEPTH VAIRES. SEE PLAN AND PROFILE SHEETS FOR PROPOSED DEPTH.

STATE OF TEXAS
ERIC R MARTINEZ
125657
LICENSED PROFESSIONAL ENGINEER

10/13/2023

Texas Department of Transportation

FM 2678

TYPICAL SECTION

SHEET 2 OF 2

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DATE: 10/10/2023 08:30:44 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design/Plan Set/1. General/TYPICAL SECTION 2

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.

Stencil the National Bridge Inventory (NBI) number on each bridge and bridge class culvert. Use 3" letters or numbers. Use stain and color as approved. Paint will not be permitted. Locate the NBI number on the outside beam immediately adjacent to the abutment on the downstream end, on the outside headwall upper right-hand corner, or as directed. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

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):

Robert Isassi, P.E.	Robert.Isassi@txdot.gov
Chandler Williams P.E.	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

County: Refugio **Control: 0155-06-213**

Highway: FM 2678

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

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

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

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 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"

Establish and mark the location of existing standard pavement markings including but not limited to edge lines, transitions, passing and no passing zones, gore areas, etc.

Texas Department of Transportation

GENERAL NOTES

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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.

For Department-furnished material, contact the Engineer or his designated representative to request material a minimum of one workday prior to pick up. Load material with contract personnel. Materials are to be stored in a safe location outside TXDOT property or right-of-way, {unless otherwise approved.} Use material furnished by the Department only on the project(s) intended. Return any unused material as soon as possible.

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 25 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 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.

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.

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Asphalt application season will be considered to be May 1 to Sept 30, except as established in Item 316.4.4 Adverse Weather Conditions or as directed by the Engineer.

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.

Weekend and nighttime work will be allowed if approved by the Engineer.

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

The Engineer reserves the right to change working hours as working conditions warrant.

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 estimate period on the Departments approved forms.

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.

ITEM 110

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

Texas Department of Transportation

GENERAL NOTES

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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 134

Backfill pavement edges with reclaimable asphalt material (R.A.P.) or material with a plasticity index (PI) ranging from 10 to 40. 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.

If electing to use R.A.P. material for backfill pavement edges, the R.A.P. material must pass a 2" sieve. All material not passing sieve will be removed and disposed of properly. This shall be considered subsidiary to Item 134.

In overlay sections, windrow the existing topsoil and grass along the edge of the grading operations or as directed. After grading operations are completed, spread the topsoil and grass uniformly on all slopes and ditch lines. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

Manipulate and compact backfill material in accordance with Item 132.3.4.1, "Ordinary Compaction". The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

Apply SS-1 at a rate of application of 0.15 gallon per square yard. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

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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 275

Cement and/or asphalt stabilized base may be encountered in the existing pavement structure. Pulverize or scarify the existing material after shaping so that 100% passes a 2-1/2 inch sieve.

Use a mechanical mixer to mix the cement with the existing base material.

ITEM 302

Provide aggregates with a minimum surface aggregate classification (SAC) of "B" unless otherwise shown. The SAC for sources on the Department's Aggregate Quality Monitoring Program (AQMP) is listed in the Department's Bituminous Rated Source Quality Catalogue (BRSQC). SAC requirements apply to aggregates used on all final roadway surfaces, including shoulders.

For precoated aggregate Type PB crushed gravel will not be used.

ITEM 310

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

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

ITEM 354

Reclaimable asphalt material (RAP) may be retained only if incorporated into the project. Incorporate the RAP into the pavement mix design, into the backfill for pavement edges, into temporary structures, or as approved.

Any RAP remaining from the contract is to remain property of TXDOT. Excess RAP will be stockpiled at the intersection of FM 136 and FM 2678.

Texas Department of Transportation

GENERAL NOTES

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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 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 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.

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.

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.

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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 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.

Traffic control for daytime lane closures shall be in accordance with applicable standards. Traffic control shall include temporary rumble strips in accordance with WZ (RS)-22.

When advanced warning flashing arrow panels are specified, furnish one (1) standby unit in good condition at the job site for immediate use.

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

The use of a pilot vehicle in conjunction with flaggers will be permitted. If used, provide positive and unrestricted communication between the driver of the pilot vehicle and the flaggers. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

Contractors attention is directed to a construction speed zone, signage is subsidiary to Item 502.

Texas Department of Transportation

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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.

Trail vehicle shall be required on all mobile traffic control operations.

ITEM 506

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

Do not discharge onto the ground or surface waters any pollutants such as chemicals, raw sewage, fuels, lubricants, coolants, hydraulic fluids, bitumens, or any other petroleum product. Operate and maintain equipment on site in a manner as to prevent actual or potential water pollution. Manage, control, and dispose of litter on site such that no adverse impacts to water quality occur. Prevent dust from creating a potential or actual unsafe condition, public nuisance, or condition endangering the value, utility, or appearance of any property. Wash out concrete trucks only in approved contained areas. Use appropriate controls to minimize the offsite transport of suspended sediments and other pollutants if it is necessary to pump or channel standing water (i.e. dewatering). Prevent discharges that would contribute to a violation of Edwards Aquifer Rules, water quality standards, the impairment of a listed water body, or other state or federal law.

The Storm Water Pollution Prevention Plan (SWP3) consists of temporary erosion control measures needed and provided for under this Item. If physical conditions encountered at the job site require necessary controls, BMP installation, maintenance, and removal will be paid as extra work on a force account basis per Articles 4.4 and 9.7.

ITEM 512

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

County: Refugio **Control: 0155-06-213**

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ITEM 530

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

ITEM 533

Construct shoulder texturing at a distance of 6 inches from the edgeline in accordance to RS(2)-23 Option 4.

ITEM 540

Complete each location during the working day. No exposed bridge rail or guard fence ends will be permitted at the end of the working day or unattended during the working day.

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

Type II Galvanization coatings will be used.

ITEM 585

Use Surface Test Type B and Pay Adjustment Schedule 1 to evaluate ride quality of the travel lanes in accordance with Item 585, "Ride Quality for Pavement Surfaces."

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.

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 662

All WK ZN MRK REMOV items shall be raised pavement markers in accordance with BC (12)-21 standard sheet.

Texas Department of Transportation

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Use temporary flexible-reflective roadway marker tabs at the beginning and end of no passing zones as shown on the TCP (7-1)-13 for seal coats and WZ(STPM)-23 for hot mix overlays.

ITEM 666

Establish and mark the location of existing standard pavement markings including but not limited to edge lines, transitions, passing and no passing zones, gore areas, etc.

ITEM 677

Eliminate all conflicting pavement markings as work progresses or as directed.

Removal method must be approved by the Engineer.

No Surface Treatment Method on concrete surfaces.

When using Surface Treatment Method for asphaltic pavements, use a PB Grade 5 aggregate at an application rate of 1 cy/130 sy and asphalt AC-10, CRS-2 or HFRS-2 at a application rate of 0.39 Gal/sy.

ITEM 3076

SAC requirements apply to aggregates used on all surfaces.

Construct longitudinal joints with a joint maker providing a maximum one (1) inch vertical edge (1/2 inch desirable) with an adjacent 6:1 taper. Backfill edges within the same day.

The Engineer reserves the right to test all sources even if the source is listed in the Bituminous Source Rated Quality Catalog

Provide the testing lab samples to calibrate the ignition oven no later than five (5) working days prior to mix design verification.
Place HMA utilizing an automatic, dual, longitudinal-grade control system and automatic transverse-grade control system as specified under Item 320, unless otherwise approved by the Engineer.

Contractor shall temporarily cover all inlets during the milling and paving operations. Inlets shall be uncovered when milling and paving operations are complete. This shall be subsidiary to Item 3076 and not paid for directly.

Unless otherwise approved by the Engineer, non-tracking tack coat SS-1H OR CSS-1H will be placed on all lifts in accordance with 3076.2.5 Tack Coat.

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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.

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.

Portable changeable message signs paid by the each apply to the full contract, regardless of the sub CSJ's.

ITEM 6185

A minimum of 2 TMAS will be required. 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.

Texas Department of Transportation

GENERAL NOTES

FED.RD. DIV.NO.			HIGHWAY NO.
6			FM 2678
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	CRP	REFUGIO	
CONTROL	SECTION	JOB	
0155	06	213	5E

County: Refugio **Control: 0155-06-213**

Highway: FM 2678

****

SPECIFICATION DATA

UNIT WEIGHT ESTIMATES

ITEM 247 – FL BS (CIP) (TY A GR 1-2 OR 5)(FNAL POS) ----------136 LBS/CF
ITEM 260 – LIME TRT (EXIST MATERIAL) (8")(3 % BY WT) ----------110 LBS/CF
ITEM 3076 – 2" D-GR HMA TY-D SAC-B PG70-22 ----------220 LBS/SY
ITEM 3076 – 2.5" D-GR HMA TY-B SAC-B PG70-22----------275 LBS/SY

COMPACTION REQUIREMENTS

ITEM 132 – EMBANKMENT (FINAL)(DENS CONT) (TY C)
PLASTICITY INDEX ---------- 40 MAX
PLASTICITY INDEX---------- 10 MIN
DENSITY ---------- AS SHOWN ON TABLE 2 OF ITEM 132
LIFTS ---------- ALL

COMPACTION REQUIREMENTS FOR BASE COURSE

ITEM 247—FL BS (CMP IN PLC)(TY A GR 1-2 OR 5) (FNAL POS)
DENSITY---------- 100% MIN
LIFTS ---------- ALL

PRIME COAT

ASPHALT, TYPE ----------MC-30
AVERAGE ASPHALT RATE (GAL/SY) ----------0.20

TACK COAT

ASPHALT, TYPE ----------SS-1H
AVERAGE ASPHALT RATE (GAL/SY) ----------0.08

Texas Department of Transportation

GENERAL NOTES

FED.RD. DIV.NO.			HIGHWAY NO.
6			FM 2678
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	CRP	REFUGIO	
CONTROL	SECTION	JOB	
0155	06	213	5F

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0155-06-213 **DISTRICT** Corpus Christi **COUNTY** Refugio
HIGHWAY FM 2678

			CONTROL SECTION JOB		**0155-06-213**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00126441**		
			COUNTY		**Refugio**		
			HIGHWAY		**FM 2678**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	104-6009	REMOVING CONC (RIPRAP)	SY	682.000		682.000	
	110-6001	EXCAVATION (ROADWAY)	CY	65,552.000		65,552.000	
	132-6006	EMBANKMENT (FINAL)(DENS CONT)(TY C)	CY	15,820.000		15,820.000	
	134-6004	BACKFILL (TY A OR B)	STA	251.000		251.000	
	134-6011	BACKFILLING PAVEMENT EDGES	CY	300.000		300.000	
	247-6466	FL BS (CIP)(TY A GR 1-2 OR 5) FINAL POS	CY	20,713.000		20,713.000	
	260-6043	LIME (HYD, COM OR QK)(SLURRY)	TON	285.000		285.000	
	260-6073	LIME TRT (SUBGRADE)(8")	SY	26,597.000		26,597.000	
	275-6001	CEMENT	TON	2,893.000		2,893.000	
	275-6023	CEMENT TREAT(MX EXST MTL & NW BS)(12")	SY	155,866.000		155,866.000	
	310-6009	PRIME COAT (MC-30)	GAL	36,023.000		36,023.000	
	316-6226	AGGR(TY-PB GR-5 SAC-B)	CY	1,411.000		1,411.000	
	351-6001	FLEXIBLE PAVEMENT STRUCTURE REPAIR(5")	SY	10,568.000		10,568.000	
	354-6100	PLANE ASPH CONC PAV (5")	SY	147,892.000		147,892.000	
	432-6001	RIPRAP (CONC)(4 IN)	CY	6.000		6.000	
	432-6035	RIPRAP (STONE PROTECTION)(24 IN)	CY	163.000		163.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	116.000		116.000	
	462-6050	CONC BOX CULV (5 FT X 2 FT)(EXTEND)	LF	10.000		10.000	
	462-6051	CONC BOX CULV (5 FT X 3 FT)(EXTEND)	LF	36.000		36.000	
	462-6076	CONC BOX CULV (10 FT X 8 FT)(EXTEND)	LF	6.000		6.000	
	464-6005	RC PIPE (CL III)(24 IN)	LF	490.000		490.000	
	466-6171	WINGWALL (PW - 1) (HW=10 FT)	EA	2.000		2.000	
	466-6182	WINGWALL (PW - 1) (HW=7 FT)	EA	1.000		1.000	
	467-6177	SET (TY I)(S= 5 FT)(HW= 4 FT)(4:1) (C)	EA	3.000		3.000	
	467-6179	SET (TY I)(S= 5 FT)(HW= 4 FT)(6:1) (C)	EA	1.000		1.000	
	467-6182	SET (TY I)(S= 5 FT)(HW= 5 FT)(4:1) (C)	EA	3.000		3.000	
	467-6185	SET (TY I)(S= 5 FT)(HW= 6 FT)(3:1) (C)	EA	1.000		1.000	
	467-6186	SET (TY I)(S= 5 FT)(HW= 6 FT)(4:1) (C)	EA	1.000		1.000	
	467-6249	SET (TY I)(S= 7 FT)(HW= 5 FT)(4:1) (C)	EA	1.000		1.000	
	467-6254	SET (TY I)(S= 7 FT)(HW= 6 FT)(4:1) (C)	EA	1.000		1.000	
	467-6395	SET (TY II) (24 IN) (RCP) (6: 1) (P)	EA	26.000		26.000	
	480-6001	CLEAN EXIST CULVERTS	EA	31.000		31.000	
	496-6004	REMOV STR (SET)	EA	26.000		26.000	
	496-6007	REMOV STR (PIPE)	LF	490.000		490.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	15.000		15.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	2,320.000		2,320.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0155-06-213 **DISTRICT** Corpus Christi **COUNTY** Refugio
HIGHWAY FM 2678

							TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0155-06-213**				
		PROJECT ID		**A00126441**				
		COUNTY		**Refugio**				
		HIGHWAY		**FM 2678**				
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL			
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	2,320.000			2,320.000	
	512-6001	PORT CTB (FUR & INST)(SGL SLOPE)(TY 1)	LF	12,660.000			12,660.000	
	512-6025	PORT CTB (MOVE)(SGL SLP)(TY 1)	LF	37,980.000			37,980.000	
	512-6049	PORT CTB (REMOVE)(SGL SLP)(TY 1)	LF	12,660.000			12,660.000	
	530-6005	DRIVEWAYS (ACP)	SY	434.000			434.000	
	533-6001	RUMBLE STRIPS (SHOULDER)	LF	101,140.000			101,140.000	
	533-6002	RUMBLE STRIPS (CENTERLINE)	LF	47,950.000			47,950.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	1,650.000			1,650.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	1,600.000			1,600.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	8.000			8.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	8.000			8.000	
	545-6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	6.000			6.000	
	545-6005	CRASH CUSH ATTEN (REMOVE)	EA	2.000			2.000	
	545-6019	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	EA	2.000			2.000	
	644-6027	IN SM RD SN SUP&AM TYS80(1)SA(P)	EA	21.000			21.000	
	644-6028	IN SM RD SN SUP&AM TYS80(1)SA(P-BM)	EA	3.000			3.000	
	644-6030	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA	7.000			7.000	
	644-6033	IN SM RD SN SUP&AM TYS80(1)SA(U)	EA	1.000			1.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	28.000			28.000	
	662-6008	WK ZN PAV MRK NON-REMOV (W)6"(SLD)	LF	51,350.000			51,350.000	
	662-6035	WK ZN PAV MRK NON-REMOV (Y)6"(BRK)	LF	4,958.000			4,958.000	
	662-6037	WK ZN PAV MRK NON-REMOV (Y)6"(SLD)	LF	14,451.000			14,451.000	
	662-6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	4,800.000			4,800.000	
	662-6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	55,440.000			55,440.000	
	662-6110	WK ZN PAV MRK SHT TERM (TAB)TY Y	EA	4,375.000			4,375.000	
	666-6305	RE PM W/RET REQ TY I (W)6"(BRK)(090MIL)	LF	4,594.000			4,594.000	
	666-6308	RE PM W/RET REQ TY I (W)6"(SLD)(090MIL)	LF	104,440.000			104,440.000	
	666-6317	RE PM W/RET REQ TY I (Y)6"(BRK)(090MIL)	LF	6,290.000			6,290.000	
	666-6320	RE PM W/RET REQ TY I (Y)6"(SLD)(090MIL)	LF	62,808.000			62,808.000	
	668-6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	20.000			20.000	
	668-6106	PREFAB PAV MRK TY C (Y) (12") (SLD)	LF	1,938.000			1,938.000	
	672-6007	REFL PAV MRKR TY I-C	EA	41.000			41.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	1,997.000			1,997.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF	72,599.000			72,599.000	
	3076-6007	D-GR HMA TY-B SAC-B PG70-22	TON	20,350.000			20,350.000	
	3076-6042	D-GR HMA TY-D SAC-B PG70-22	TON	26,415.000			26,415.000	
	3076-6066	TACK COAT	GAL	21,683.000			21,683.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0155-06-213

DISTRICT Corpus Christi
COUNTY Refugio
HIGHWAY FM 2678

CONTROL SECTION JOB		**0155-06-213**		TOTAL EST.	TOTAL FINAL
PROJECT ID		**A00126441**			
COUNTY		**Refugio**			
HIGHWAY		**FM 2678**			
UNIT		EST.	FINAL		
E MESSAGE SIGN	DAY	500.000		500.000	
	DAY	500.000		500.000	
CCOUNT EROSION E (NON-PARTICIPATING)	LS	1.000		1.000	
CCOUNT SAFETY RTICIPATING)	LS	1.000		1.000	

FM 2678 ROADWAY ALIGNMENT				
STATION	EXCAVATION (CY)	EMBANKMENT (CY)	CUMULATIVE (CY)	CUMULATIVE (CY)
190+62.000	0	0	0	0
191+00.000	109	5	109	5
192+00.000	305	19	415	24
193+00.000	318	29	733	53
194+00.000	310	41	1042	94
195+00.000	314	51	1356	145
196+00.000	326	56	1682	201
197+00.000	317	59	1998	260
198+00.000	295	72	2293	333
199+00.000	275	80	2568	413
200+00.000	271	80	2839	493
201+00.000	273	78	3112	570
202+00.000	272	73	3384	643
203+00.000	272	72	3656	715
204+00.000	274	69	3930	785
205+00.000	275	57	4205	842
206+00.000	282	47	4487	888
207+00.000	286	43	4774	931
208+00.000	282	46	5056	976
209+00.000	266	54	5321	1031
210+00.000	260	66	5581	1097
211+00.000	265	65	5846	1161
212+00.000	269	57	6115	1219
213+00.000	274	58	6389	1277
214+00.000	274	58	6662	1334
215+00.000	281	54	6944	1388
216+00.000	256	67	7199	1455
217+00.000	195	102	7394	1557
218+00.000	131	126	7525	1682
219+00.000	87	217	7613	1899
220+00.000	88	227	7700	2126
221+00.000	120	135	7820	2261
222+00.000	181	112	8001	2373
223+00.000	245	85	8247	2458
224+00.000	268	59	8514	2517
225+00.000	268	50	8782	2566
226+00.000	274	42	9056	2608
227+00.000	277	45	9333	2653
228+00.000	279	50	9612	2703
229+00.000	298	44	9910	2747
230+00.000	332	37	10242	2784
231+00.000	346	36	10588	2820
232+00.000	347	35	10935	2855
233+00.000	350	35	11284	2890
234+00.000	340	43	11625	2934
235+00.000	334	45	11959	2979
236+00.000	327	45	12286	3024
237+00.000	327	46	12613	3070
238+00.000	315	45	12928	3114
239+00.000	298	65	13226	3179
240+00.000	269	101	13495	3280
241+00.000	227	100	13722	3380
242+00.000	224	82	13945	3461
243+00.000	253	72	14198	3533
244+00.000	270	61	14468	3595
245+00.000	312	64	14780	3659
246+00.000	354	61	15133	3720
247+00.000	347	33	15480	3753
248+00.000	359	13	15839	3766
249+00.000	354	53	16193	3819
250+00.000	332	81	16525	3900
251+00.000	295	84	16820	3984
252+00.000	259	97	17079	4080
253+00.000	259	94	17338	4174
254+00.000	267	81	17605	4254
255+00.000	370	56	17975	4310
256+00.000	375	60	18350	4370
257+00.000	277	79	18627	4449
258+00.000	284	80	18911	4529
259+00.000	333	76	19244	4605
260+00.000	363	69	19607	4673
261+00.000	329	65	19936	4739
262+00.000	286	72	20222	4811
263+00.000	279	79	20501	4890
264+00.000	338	74	20840	4964
265+00.000	340	73	21179	5037
266+00.000	274	84	21453	5121
267+00.000	254	93	21708	5214
268+00.000	182	111	21890	5325
269+00.000	118	241	22008	5565
270+00.000	110	251	22118	5816
271+00.000	168	109	22285	5925
272+00.000	235	75	22520	6000
273+00.000	244	84	22764	6084
274+00.000	238	103	23002	6187
275+00.000	227	120	23228	6307
276+00.000	227	119	23455	6426
277+00.000	235	104	23690	6531

FM 2678 ROADWAY ALIGNMENT				
STATION	EXCAVATION (CY)	EMBANKMENT (CY)	CUMULATIVE (CY)	CUMULATIVE (CY)
278+00.000	242	94	23933	6625
279+00.000	255	80	24188	6704
280+00.000	285	55	24473	6760
281+00.000	315	44	24788	6804
282+00.000	318	47	25106	6851
283+00.000	299	55	25405	6906
284+00.000	287	50	25692	6956
285+00.000	282	42	25974	6998
286+00.000	296	38	26269	7036
287+00.000	301	39	26570	7076
288+00.000	283	48	26853	7124
289+00.000	272	55	27126	7179
290+00.000	269	56	27395	7235
291+00.000	287	54	27682	7289
292+00.000	312	47	27994	7336
293+00.000	309	43	28303	7379
294+00.000	310	38	28614	7417
295+00.000	326	30	28940	7447
296+00.000	345	26	29285	7473
297+00.000	349	19	29635	7491
298+00.000	326	25	29960	7517
299+00.000	307	33	30268	7550
300+00.000	306	32	30574	7582
301+00.000	308	31	30882	7613
302+00.000	310	31	31192	7644
303+00.000	302	34	31494	7679
304+00.000	281	42	31776	7721
305+00.000	279	47	32055	7768
306+00.000	298	38	32353	7806
307+00.000	317	23	32670	7828
308+00.000	336	12	33006	7840
309+00.000	337	13	33344	7853
310+00.000	308	25	33652	7878
311+00.000	293	34	33944	7911
312+00.000	296	35	34240	7946
313+00.000	291	33	34531	7979
314+00.000	294	26	34825	8005
315+00.000	296	24	35121	8029
316+00.000	307	26	35427	8055
317+00.000	329	24	35757	8080
318+00.000	320	30	36076	8110
319+00.000	298	36	36375	8146
320+00.000	292	42	36666	8188
321+00.000	307	40	36973	8228
322+00.000	334	26	37307	8255
323+00.000	346	19	37653	8273
324+00.000	348	20	38001	8293
325+00.000	327	33	38328	8326
326+00.000	294	60	38623	8386
327+00.000	229	117	38852	8504
328+00.000	194	201	39046	8704
329+00.000	254	181	39300	8885
330+00.000	306	203	39606	9088
331+00.000	296	258	39902	9347
332+00.000	272	203	40174	9550
333+00.000	283	119	40457	9669
334+00.000	306	48	40764	9716
335+00.000	318	27	41082	9744
336+00.000	316	15	41398	9759
337+00.000	287	37	41684	9797
338+00.000	269	57	41953	9853
339+00.000	273	50	42227	9903
340+00.000	280	45	42507	9948
341+00.000	286	47	42793	9995
342+00.000	286	51	43079	10046
343+00.000	286	53	43365	10099
344+00.000	283	55	43648	10154
345+00.000	283	55	43931	10209
346+00.000	291	51	44222	10260
347+00.000	270	65	44492	10325
348+00.000	267	68	44759	10393
349+00.000	296	51	45055	10444
350+00.000	274	58	45329	10503
351+00.000	253	65	45582	10567
352+00.000	248	65	45830	10632
353+00.000	241	62	46071	10694
354+00.000	249	65	46319	10759
355+00.000	263	63	46583	10822
356+00.000	273	60	46856	10881
357+00.000	248	80	47104	10962
358+00.000	189	121	47293	11083
359+00.000	142	105	47435	11188
360+00.000	124	64	47559	11252
361+00.000	128	67	47687	11319
362+00.000	190	84	47876	11402
363+00.000	264	88	48140	11490
364+00.000	282	82	48423	11572
365+00.000	271	85	48693	11658

10/13/2023

Texas Department of Transportation

FM 2678

EARTHWORK SUMMARY

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		7

DATE: 10/13/2023 10:18 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design/Plan Set/3. Roadway/EARTHWORK SUMMARY

FM 2678 ROADWAY ALIGNMENT				
STATION	EXCAVATION (CY)	EMBANKMENT (CY)	CUMULATIVE (CY)	CUMULATIVE (CY)
366+00.000	265	88	48958	11746
367+00.000	274	88	49232	11834
368+00.000	278	103	49509	11937
369+00.000	262	126	49771	12063
370+00.000	223	124	49994	12187
371+00.000	166	123	50160	12310
372+00.000	126	134	50286	12444
373+00.000	108	140	50394	12584
374+00.000	95	145	50489	12729
375+00.000	94	137	50583	12866
376+00.000	105	193	50687	13059
377+00.000	134	198	50821	13257
378+00.000	202	117	51023	13374
379+00.000	257	97	51280	13470
380+00.000	255	108	51535	13578
381+00.000	251	110	51786	13689
382+00.000	271	89	52057	13778
383+00.000	298	69	52355	13847
384+00.000	310	50	52665	13896
385+00.000	307	47	52971	13943
386+00.000	318	30	53290	13974
387+00.000	312	8	53602	13982
388+00.000	298	15	53900	13997
389+00.000	314	23	54214	14020
390+00.000	323	28	54538	14049
391+00.000	305	34	54843	14083
392+00.000	286	37	55128	14120
393+00.000	300	34	55428	14154
394+00.000	303	33	55732	14187
395+00.000	288	44	56019	14231
396+00.000	280	51	56299	14282
397+00.000	277	42	56576	14325
398+00.000	280	43	56856	14367
399+00.000	303	35	57159	14402
400+00.000	310	34	57469	14436
401+00.000	292	40	57761	14477
402+00.000	297	33	58059	14510
403+00.000	282	36	58340	14546
404+00.000	210	60	58551	14605
405+00.000	142	100	58693	14706
406+00.000	124	124	58817	14830
407+00.000	164	102	58981	14932
408+00.000	242	62	59223	14994
409+00.000	289	42	59513	15037
410+00.000	304	34	59816	15071
411+00.000	310	31	60126	15102
412+00.000	308	33	60434	15135
413+00.000	301	35	60736	15170
414+00.000	285	37	61021	15207
415+00.000	268	42	61289	15249
416+00.000	252	58	61541	15307
417+00.000	251	51	61792	15358
418+00.000	259	50	62051	15408
419+00.000	263	53	62314	15461
420+00.000	264	51	62577	15512
421+00.000	278	46	62855	15558
422+00.000	313	26	63169	15584
423+00.000	327	30	63495	15614
424+00.000	320	38	63815	15652
425+00.000	316	42	64131	15694
426+00.000	307	41	64438	15735
427+00.000	308	33	64747	15768
428+00.000	302	24	65049	15792
429+00.000	285	16	65334	15808
429+83.000	218	13	65552	15820

LOCATION	110 6001 EXCAVATION (ROADWAY) CY	132 6006 EMBANKMENT (FINAL) (DENS CONT)(TY C) CY
FM 2678 ROADWAY ALIGNMENT	65552	15820
TOTALS:	65552	15820

STATE OF TEXAS
ERIC R MARTINEZ
125657
LICENSED
PROFESSIONAL ENGINEER

10/13/2023

Texas Department of Transportation

FM 2678

EARTHWORK SUMMARY

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		8

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CSJ: 0155-06-213 FM 2678 ROADWAY SUMMARY

LOCATION						104	247	260	260	275	275	310	354	432	540	542	544	544	3076	3076	3076
						6009	6466	6043	6073	6001	6023	6009	6100	6045	6001	6001	6001	6003	6007	6042	6066
SHEET	STATION		LENGTH	WIDTH	AREA	REMOVING CONC (RIPRAP)	FL BS (CIP) (TYA GR1-2 OR 5) FINAL POS	LIME (HYD, COM OR QK) (SLURRY)	LIME TRT (SUBGRADE) (8")	CEMENT	CEMENT TREAT (MX EXST MTL & NW BS) (12")	PRIME COAT (MC-30)	PLANE ASPH CONC PAV (5")	RIPRAP (MOW STRIP) (4 IN)	MTL W-BEAM GD FEN (TIM POST)	REMOVE METAL BEAM GUARD FENCE	GUARDRAIL END TREATMENT (INSTALL)	GUARDRAIL END TREATMENT (REMOVE)	D-GR HMA TY-B SAC-B PG70-22	D-GR HMA TY-D SAC-B PG70-22	TACK COAT
NO	BEGIN	END	LF	LF	SY	SY	CY	TON	SY	TON	SY	GAL	SY	CY	LF	LF	EA	EA	TON	TON	GAL
1	190+62	195+12	450	50	2500		332	5	500	48	2650	520	2500						344	275	200
1	195+12	202+60	748	56	4655		613	9	832	89	4904	965	4655						641	513	373
2	202+60	214+60	1200	56	7467		984	14	1334	142	7867	1547	7467						1027	822	598
3	214+60	226+60	1200	56	7467		1381	14	1334	164	7867	1547	7467						1027	822	598
4	226+60	238+60	1200	56	7467		984	14	1334	143	7867	1547	7467						1027	822	598
5	238+60	246+70	810	56	5040		664	9	900	96	5310	1044	5040						693	555	404
5	246+70	247+20	50	54	300		40	1	56	6	317	63	300						42	33	24
5	247+20	247+60	40	52	232	292	31	1	45	5	245	48	232	60	850	600	4	4	32	26	19
5	247+60	248+10	50	54	300		40	1	56	6	317	63	300						42	33	24
5	248+10	250+60	250	56	1556		205	3	278	30	1639	323	1556						214	172	125
6	250+60	262+60	1200	56	7467		984	14	1334	142	7867	1547	7467						1027	822	598
7	262+60	274+60	1200	56	7467		1042	14	1334	146	7867	1547	7467						1027	822	598
8	274+60	286+60	1200	56	7467		984	14	1334	142	7867	1547	7467						1027	822	598
9	286+60	298+60	1200	56	7467		984	14	1334	142	7867	1547	7467						1027	822	598
10	298+60	310+60	1200	56	7467		984	14	1334	142	7867	1547	7467						1027	822	598
11	310+60	322+60	1200	56	7467		984	14	1334	142	7867	1547	7467						1027	822	598
12	322+60	334+60	1200	56	7467		984	14	1334	142	7867	1547	7467	56	800		4	4	1027	822	598
13	334+60	346+60	1200	56	7467		984	14	1334	142	7867	1547	7467						1027	822	598
14	346+60	358+60	1200	56	7467		984	14	1334	142	7867	1547	7467						1027	822	598
15	358+60	359+09	49	54	294		68	1	55	8	311	61	294						41	33	24
15	359+09	359+69	60	52	347	278	158	1	67	13	367	72	347			1000			48	39	28
15	359+70	360+20	50	54	300		155	1	56	13	317	63	300						42	33	24
15	360+20	370+60	1040	56	6472		853	12	1156	124	6818	1341	6472						890	712	518
16	370+60	372+50	190	56	1183		156	3	212	23	1246	245	1183						163	131	95
16	372+50	373+00	50	54	300		53	1	56	7	317	63	300						42	33	24
16	373+00	377+50	450	52	2600		655	5	500	67	2750	540	2600						358	286	208
16	377+50	378+00	50	54	300		40	1	56	6	317	63	300						42	33	24
16	378+00	382+60	460	56	2863		377	6	512	55	3016	593	2863						394	315	230
17	382+60	394+60	1200	56	7467		984	14	1334	142	7867	1547	7467						1027	822	598
18	394+60	402+40	780	56	4854		640	9	867	93	5114	1006	4854						668	534	389
18	402+40	402+90	50	54	300		40	1	56	6	317	63	300						42	33	24
18	402+90	406+60	370	52	2138		461	5	412	51	2262	444	2138						294	236	172
19	406+60	407+90	130	52	752		100	2	145	15	795	156	752						104	83	61
19	407+90	408+40	50	54	300		40	1	56	6	317	63	300						42	33	24
19	408+40	418+60	1020	56	6347		836	12	1134	121	6687	1315	6347						873	699	508
20	418+60	425+33	673	56	4188		552	8	748	80	4412	868	4188						576	461	336
20	425+33	429+83	450	54	2700		357	5	500	52	2850	560	2700						372	297	216
				PROJECT TOTALS		570	20713	285	26597	2893	155866	30653	147892	116	1650	1600	8	8	20350	16284	11848

Texas Department of Transportation

FM 2678

ROADWAY SUMMARY

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		9

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CSJ: 0155-06-213 FM 2678 OVERLAY QUANTITY SUMMARY								
LOCATION			LENGTH	WIDTH	AREA	134 6004 BACKFILL (TY A OR B)	3076 6042 D-GR HMA TY-D SAC-B PG70-22	3076 6066 TACK COAT
SHEET	BEGIN	END	FT	FT	SY	STA	TON	GAL
1	09+50	21+00	1150	44	5622	12	464	450
1	21+00	33+00	1200	44	5867	12	484	470
2	33+00	45+00	1200	44	5867	12	484	470
2	45+00	57+00	1200	44	5867	12	484	470
3	57+00	61+29	429	44	2097	4	174	168
3	64+02	69+00	498	44	2435	5	201	195
3	69+00	72+00	300	44	1467	3	121	118
3	76+11	81+00	489	44	2391	5	198	192
4	81+00	93+00	1200	44	5867	12	484	470
4	93+00	99+89	689	44	3368	7	278	270
5	108+07	117+00	893	44	4366	9	361	350
5	117+00	129+00	1200	44	5867	12	484	470
6	129+00	141+00	1200	44	5867	12	484	470
6	141+00	153+00	1200	44	5867	12	484	470
7	153+00	165+00	1200	44	5867	12	484	470
7	165+00	177+00	1200	44	5867	12	484	470
8	177+00	189+00	1200	44	5867	12	484	470
8	189+00	190+62	162	44	792	2	66	64
9	429+83	441+00	1117	44	5461	11	451	437
9	441+00	453+00	1200	44	5867	12	484	470
10	453+00	465+00	1200	44	5867	12	484	470
10	465+00	477+00	1200	44	5867	12	484	470
11	477+00	489+00	1200	44	5867	12	484	470
11	489+00	501+00	1200	44	5867	12	484	470
12	501+00	513+00	1200	44	5867	12	484	470
12	513+00	514+80	180	44	880	2	73	71
					TOTALS	251	10131	9835

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Texas Department of Transportation

FM 2678

ROADWAY SUMMARY

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		10

CSJ: 0155-06-213 FM 2678 SURFACE DETAILS SUMMARY															
STATIONS		LENGTH	WIDTH	AREA	533	533	666	666	666	666	668	668	672	672
					6001	6002	6305	6308	6317	6320	6076	6106	6007	6009
					RUMBLE STRIPS (SHOULDER)	RUMBLE STRIPS (CENTERLINE)	RE PM W/RET REQ TY I (W)6"(BRK) (090MIL)	RE PM W/RET REQ TY I (W)6"(SLD) (090MIL)	RE PM W/RET REQ TY I (Y)6"(BRK) (090MIL)	RE PM W/RET REQ TY I (Y)6"(SLD) (090MIL)	PREFAB PAV MRK TY C (W) (24") (SLD)	PREFAB PAV MRK TY C (Y) (12") (SLD)	REFL PAV MRKR TY I-C	REFL PAV MRKR TY II-A-A
BEGIN	END	FT	FT	SQFT	LF	LF	LF	LF	LF	LF	LF	EA	EA	EA
9+50	190+62	18112	44	796928	36224	18112		39524	4155	6920	20	318	41	173
190+62	297+12	10650	52	553800	21300	10650	2297	21300		21300				533
297+12	323+33	2621	52	136292	5242			5242		12118		1620		120
323+33	429+83	10650	52	553800	21300	10650	2297	21300		21300				533
429+83	515+20	8537	44	375628	17074	8538		17074	2135	1170				29
				TOTALS:	101140	47950	4594	104440	6290	62808	20	1938	41	1387

Texas Department of Transportation

FM 2678

SURFACE DETAILS SUMMARY

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		11

DW: CK: DW: CK:

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FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design/Plan Set/8. Traffic/SURFACE DETAILS SUMMARY.dgn

CSJ: 0155-06-213 CROSS DRAINAGE SUMMARY

STATIONS	EXISTING STRUCTURE	PROPOSED STRUCTURE	104 6009 REMOVING CONC (RIPRAP) SY	432 6001 RIP RAP (CONC) (4 IN) CY	432 6035 RIPRAP (STONE PROTECTION) (24 IN) CY	462 6050 CONC BOX CULV (5 FT X 2 FT) (EXTEND) LF	462 6051 CONC BOX CULV (5 FT X 3 FT) (EXTEND) LF	462 6076 CONC BOX CULV (10 FT X 8 FT) (EXTEND) LF	466 6171 WINGWALL (PW - 1) (HW=10 FT) EA	466 6182 WINGWALL (PW - 1) (HW=7 FT) EA	467 6177 SET (TY I) (S= 5 FT) (HW= 4 FT) (4:1) (C) EA	467 6179 SET (TY I) (S= 5 FT) (HW= 4 FT) (6:1) (C) EA	467 6182 SET (TY I) (S= 5 FT) (HW= 5 FT) (4:1) (C) EA	467 6185 SET (TY I) (S= 5 FT) (HW= 6 FT) (3:1) (C) EA	467 6186 SET (TY I) (S= 5 FT) (HW= 6 FT) (4:1) (C) EA	467 6249 SET (TY I) (S= 7 FT) (HW= 5 FT) (4:1) (C) EA	467 6254 SET (TY I) (S= 7 FT) (HW= 6 FT) (4:1) (C) EA	480 6001 CLEAN EXIST CULVERTS EA
29+43	4- 5' X 2' BOX CULV																	4
38+70	3- 7' X 6' BOX CULV																	3
136+60	1- 30" X 63' RCP																	1
156+00	2- 6' X 3' BOX CULV		112		163													2
186+00	2- 6' X 3' BOX CULV																	2
219+00	1- 5' X 2' BOX CULV	1- 5' X 2' X - 69'				5					2							
247+40	3- 10' X 8' BOX CULV	BRIDGE																
269+00	2- 5' X 3' BOX CULV	2- 5' X 3' X - 65'					6						1		1			
329+69	1- 10' X 8' BOX CULV	1- 10' X 8' X - 66'						6	2									
359+36	3- 5' X 3' BOX CULV	3- 5' X 3' X - 73'					24			1			1					
374+00	2- 5' X 3' BOX CULV	2- 5' X 3' X - 66'					6						1	1				
375+68	6- 7' X 3' BOX CULV	BRIDGE		6												1	1	
405+33	1- 5' X 2' BOX CULV	1- 5' X 2' X - 59'				5					1	1						
430+21	2- 5' X 2' BOX CULV																	2
461+63	3- 5' X 2' BOX CULV																	3
491+02	1- 5' X 2' BOX CULV																	1
		TOTALS:	112	6	163	10	36	6	2	1	3	1	3	1	1	1	1	18

CSJ: 0155-06-213 PARALLEL DRAINAGE SUMMARY

STATIONS	EXISTING STRUCTURE	PROPOSED STRUCTURE	464 6005 RC PIPE (CL III) (24 IN) LF	467 6395 SET (TY II) (24 IN) (RCP) (6: 1) (P) EA	480 6001 CLEAN EXIST CULVERTS EA	496 6004 REMOV STR (SET) EA	496 6007 REMOVE STR (PIPE) LF
36+00	1- 24" X 40' RCP				1		
37+00	1- 24" X 40' RCP				1		
172+00	1- 18" X 22' CMP	1- 24" X 22' RCP	22	2		2	22
172+32	1- 18" X 22' RCP	1- 24" X 22' RCP	22	2		2	22
183+50	1- 3' X 5' BOX CULV				1		
183+50	1- 18" X 80' RCP'	1- 24" X 80' RCP'	80	2		2	80
209+43	1- 24" X 20' RCP				1		
214+41	2- 24" X 26' RCP				2		
255+35 RT	1- 30" X 82' RCP				1		
255+35 LT	1- 24" X 75' RCP				1		
264+00	1- 18" X 46' RCP	1- 24" X 46' RCP	46	2		2	46
276+73	1- 18" X 40' RCP	1- 24" X 40' RCP	40	2		2	40
311+27	1- 24" X 28' RCP				1		
335+00	1- 24" X 40' RCP				1		
335+61	1- 30" X 43' RCP				1		
336+03	1- 24" X 40' RCP				1		
336+50	1- 30" X 39' RCP				1		
417+00	2- 18" X 32' CMP	2- 24" X 32' CMP	64	4		4	64
420+87	1- 18" X 24' RCP	1- 24" X 24' RCP	24	2		2	24
434+87	2- 18" X 30' RCP	2- 24" X 30' RCP	60	4		4	60
442+67	2- 18" X 52' RCP	2- 24" X 52' RCP	104	4		4	104
449+44	1- 18" X 28' RCP	1- 24" X 28' RCP	28	2		2	28
		TOTALS:	490	26	13	26	490

Texas Department of Transportation

FM 2678

DRAINAGE SUMMARY

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		12

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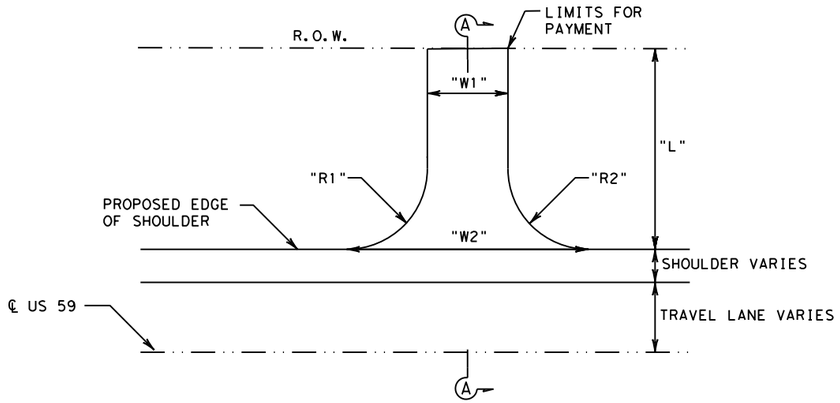
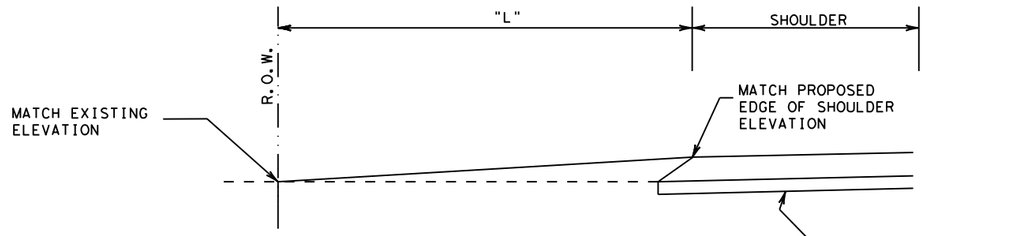
CK:
DW:
CK:
DW:

CSJ: 0155-06-213 FM 2678 DRIVEWAY SUMMARY												
DRIVEWAY	STATION	WIDTH 1	WIDTH 2	LENGTH	RADIUS		AREA	*	*	*	530	530
											6005	6016
					R1	R2		FL BS (CMP IN PLC) (TYA GR1-2) (FNAL	D-GR HMA TY-D SAC-B PG70-22	TACK COAT	DRIVEWAYS (ACP)	DRIVEWAYS (BASE)
		FT	FT	FT	FT	FT	SF	CY	TON	GAL	SY	SY
1	209+40 LT	20	40	10	10	10	300	0	4	3	33	0
2	214+40 RT	20	40	10	10	10	300	2	0	0	0	33
3	255+37 RT	24	44	10	10	10	340	2	0	0	0	38
4	264+00 RT	20	40	10	10	10	300	0	4	3	33	0
5	276+71 LT	20	40	10	10	10	300	0	4	3	33	0
6	311+26 RT	20	40	10	10	10	300	2	0	0	0	33
7	335+61 RT	20	40	10	10	10	300	0	4	3	33	0
8	336+00 LT	20	40	10	10	10	300	2	0	0	0	33
9	336+47 RT	20	40	10	10	10	300	2	0	0	0	33
10	375+05 RT	20	40	10	10	10	300	0	4	3	33	0
11	375+40 LT	20	40	10	10	10	300	0	4	3	33	0
12	417+00 LT	20	40	10	10	10	300	0	4	3	33	0
13	420+86 LT	20	40	10	10	10	300	0	4	3	33	0
							TOTALS:	10	29	21	267	171

* FOR CONTRACTOR INFORMATION ONLY, PAID THROUGH ITEM 530.



DRIVEWAY PLAN VIEW



SECTION A-A

STATE OF TEXAS
ERIC R MARTINEZ
125657
LICENSED PROFESSIONAL ENGINEER

10/13/2023

Texas Department of Transportation

FM 2678

DRIVEWAY SUMMARY

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		13

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SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)					BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)
							POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION		TY = TYPE
							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	TY N TY S
1	1	M1-6F	<FM SHIELD> FARM ROAD (ROUTE 136)	24 x 24			S80	1	SA	P		
		M6-1	<ARROW - HORIZ. STRGHT> <AUXILIARY SIGN	21 x 15								
1	2	R1-1	STOP	36 x 36			S80	1	SA	P	BM	
1	3	M1-6F	<FM SHIELD> FARM ROAD (ROUTE 2678)	24 x 24			S80	1	SA	P		
		M6-1	<ARROW - HORIZ. STRGHT> <AUXILIARY SIGN	21 x 15								
1	4	R1-1	STOP	36 x 36			S80	1	SA	P	BM	
1	5	M1-6F	<FM SHIELD> FARM ROAD (ROUTE 136)	24 x 24			S80	1	SA	P		
		M6-1	<ARROW - HORIZ. STRGHT> <AUXILIARY SIGN	21 x 15								
1	6	M3-1	NORTH <AUXILIARY SIGN>	24 x 12			S80	1	SA	P		
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE 2678)	24 x 24								
1	7	D1-1R	WOODSBORO (RT)	96 x 18			S80	1	SA	P		
1	8	R2-1	SPEED LIMIT (75 MPH)	30 x 36			S80	1	SA	P		
1	9	M2-1	JCT <AUXILIARY SIGN>	21 x 15			S80	1	SA	P		
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE 136)	24 x 24								
3	10	W8-13AT	BRIDGE MAY ICE IN COLD WEATHER	36 x 36			S80	1	SA	T		
3	11	I-3	MISSION RIVER	36 x 18			S80	1	SA	P		
4	12	I-3	MISSION RIVER	36 x 18			S80	1	SA	P		
4	13	D15-10T	PASSING LANE 2 MILES	54 x 42			S80	1	SA	P		
5	14	W8-13AT	BRIDGE MAY ICE IN COLD WEATHER	36 x 36			S80	1	SA	T		
7	15	W8-18	ROAD MAY FLOOD	36 x 36			S80	1	SA	T		
9	16	R4-3	SLOWER TRAFFIC KEEP RIGHT	24 x 30			S80	1	SA	P		
9	17	M3-1	NORTH <AUXILIARY SIGN>	24 x 12			S80	1	SA	P		
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE 2678)	24 x 24								
		D10-7aT	<3 DIGIT VERTICAL NUMBER>	3 x 10								
		D10-7aT	<3 DIGIT VERTICAL NUMBER>	3 x 10								
12	18	*	THE GREAT TEXAS COASTAL BIRDING TRAIL	24 x 24			S80	1	SA	P		
12	19	W9-2TR	LANE ENDS MERGE RIGHT	48 x 48			S80	1	SA	T		
14	20	M3-3	SOUTH <AUXILIARY SIGN>	24 x 12			S80	1	SA	P		
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE 2678)	24 x 24								
		D10-7aT	<3 DIGIT VERTICAL NUMBER>	3 x 10								
		D10-7aT	<3 DIGIT VERTICAL NUMBER>	3 x 10								
15	21	W9-2TR	LANE ENDS MERGE RIGHT	48 x 48			S80	1	SA	T		
18	22	M3-1	NORTH <AUXILIARY SIGN>	24 x 12			S80	1	SA	P		
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE 2678)	24 x 24								
		D10-7aT	<3 DIGIT VERTICAL NUMBER>	3 x 10								
		D10-7aT	<3 DIGIT VERTICAL NUMBER>	3 x 10								
18	23	R4-3	SLOWER TRAFFIC KEEP RIGHT	24 x 30			S80	1	SA	P		
20	24	W2-1aT(1)	HIGHWAY INTERSECTION AHEAD	48 x 48			S80	1	SA	T		
21	25	M2-1	JCT <AUXILIARY SIGN>	21 x 15			S80	1	SA	P		
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE 774)	24 x 24								
21	26	D15-10T	PASSING LANE 1 MILES	54 x 42			S80	1	SA	P		
21	27	W3-1	SYMBOL - STOP AHEAD	30 x 30			S80	1	SA	T		
22	28	R2-1	SPEED LIMIT (75 MPH)	30 x 36			S80	1	SA	P		
22	29	R7-1R	NO PARKING ANY TIME <ARROW RIGHT>	12 x 18			S80	1	SA	P		
22	30	R7-1L	NO PARKING ANY TIME <ARROW LEFT>	12 x 18			S80	1	SA	P		
22	31	R12-1T	WEIGHT LIMIT/GROSS (58,420) LBS	24 x 36			S80	1	SA	U		
		M3-3	SOUTH <AUXILIARY SIGN>	24 x 12								
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE 2678)	24 x 24								
		D10-7aT	<3 DIGIT VERTICAL NUMBER>	3 x 10								
		D10-7aT	<3 DIGIT VERTICAL NUMBER>	3 x 10								
22	32	R1-1	STOP	36 x 36			S80	1	SA	P	BM	

*- TXDOT WILL PROVIDE SIGN

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

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

http://www.txdot.gov/

NOTE:

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

SHEET 1 OF 1

Texas Department of Transportation | Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0155	06	213	FM 2678
4-16		DIST	COUNTY		SHEET NO.
8-16		CRP	REFUGIO		14

18

DATE: 10/12/2023 1:27:59 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/94394 other/SMALL SIGNS/SUMMARY OF SMALL SIGNS.dgn

SHEET	644 6027 IN SM RD SN SUP&AM TYS80(1)SA(P) EA	644 6028 IN SM RD SN SUP&AM TYS80(1)SA(P-BM) EA	644 6030 IN SM RD SN SUP&AM TYS80(1)SA(T) EA	644 6033 IN SM RD SN SUP&AM TYS80(1)SA(U) EA
1	7	2		
3	1		1	
4	2			
5			1	
7			1	
9	2			
12	1		1	
14	1			
15			1	
18	2			
20			1	
21	2		1	
22	3	1		1
TOTAL:	21	3	7	1

CSJ: 0155-06-213 SIGN REMOVAL SUMMARY	
	644 6076 REMOVE SM RD SN SUP&AM EA
SIGN REMOVAL QUANTITY	
TOTAL:	28

Texas Department of Transportation

FM 2678

SIGN MOUNTING
& REMOVAL SUMMARY

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		15

DATE: 10/12/2023 10:41 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design/Plan Set/8. Traffic/SIGN MOUNTING & REMOVAL SUMMARY.dgn

DW: CK: DW: CK:

CSJ: 0155-06-213 SW3P SUMMARY						
			506	506	INSTALL	REMOVE
			6041	6043	DATE	DATE
LOCATION	STATION	STRUCTURE	BIODEG EROSN CONT LOGS (INSTL) (12")	BIODEG EROSN CONT LOGS (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (12")	BIODEG EROSN CONT LOGS (REMOVE)
			LF	LF		
FM 2678	209+43	RCP w/ SET	80	80		
FM 2678	214+41	RCP w/ SET	80	80		
FM 2678	219+00	EXIST CULV	160	160		
FM 2678	247+40	EXIST CULV	160	160		
FM 2678	255+35 RT	RCP w/ SET	80	80		
FM 2678	255+35 LT	RCP w/ SET	80	80		
FM 2678	264+00	RCP w/ SET	80	80		
FM 2678	269+00	EXIST CULV	160	160		
FM 2678	276+73	RCP w/ SET	80	80		
FM 2678	311+27	RCP w/ SET	80	80		
FM 2678	329+70	EXIST CULV	160	160		
FM 2678	335+00	RCP w/ SET	80	80		
FM 2678	335+61	RCP w/ SET	80	80		
FM 2678	336+03	RCP w/ SET	80	80		
FM 2678	336+50	RCP w/ SET	80	80		
FM 2678	359+39	EXIST CULV	160	160		
FM 2678	374+53	EXIST CULV	160	160		
FM 2678	375+68	EXIST CULV	160	160		
FM 2678	405+33	EXIST CULV	160	160		
FM 2678	417+00	RCP w/ SET	80	80		
FM 2678	420+87	RCP w/ SET	80	80		
		TOTALS:	2320	2320		

Texas Department of Transportation

FM 2678

SW3P SUMMARY

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		16

DATE: 09/20/2023 04:40 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design/Plan Set/9. Environmental/SW3P SUMMARY

CSJ: 0155-06-213 FM 2678 TCP QUANTITIES SUMMARY															
CONSTRUCTION PHASE	*134	512	512	512	545	545	545	662	662	662	**662	**662	662	672	677
	6011	6001	6025	6049	6003	6005	6019	6008	6035	6037	6063	6095	6110	6009	6001
	BACKFILLING PAVEMENT EDGES	PORT CTB (FUR & INST) (SGL SLOPE) (TY 1)	PORT CTB (MOVE) (SGL SLP) (TY 1)	PORT CTB (REMOVE) (SGL SLP) (TY 1)	CRASH CUSH ATTEN (MOVE & RESET)	CRASH CUSH ATTEN (REMOVE)	CRASH CUSH ATTEN (INSTL) (S) (N) (TL3)	WK ZN PAV MRK NON-REMOV (W)6" (SLD)	WK ZN PAV MRK NON-REMOV (Y)6" (BRK)	WK ZN PAV MRK NON-REMOV (Y)6" (SLD)	WK ZN PAV MRK REMOV (W)4" (SLD)	WK ZN PAV MRK REMOV (Y)4" (SLD)	WK ZN PAV MRK SHT TERM (TAB)TY Y	REFL PAV MRKR TY II-A-A	ELIM EXT PAV MRK & MRKS (4")
	CY	LF	LF	LF	EA	EA	EA	LF	LF	LF	LF	LF	EA	EA	LF
PHASE 1A															
STA 187+12 TO STA 313+72 (SB)	150	12660			2						1200	13860			33947
PHASE 1B															
STA 306+72 TO STA 433+32 (SB)	150		12660			2		27365	3348	3291	1200	13860		250	38652
PHASE 2A															
STA 306+72 TO STA 433+32 (NB)			12660			2					1200	13860			
PHASE 2B															
STA 187+12 TO STA 313+72 (NB)			12660	12660		2	2	23985	1610	11160	1200	13860		360	
PHASE 3													4375		
PROJECT TOTALS	300	12660	37980	12660	2	6	2	51350	4958	14451	4800	55440	4375	610	72599

*BACKFILL PAVEMENT EDGES AS NEEDED TO MAINTAIN EXISTING EDGE OF PAVEMENT DROPOFF DURING PHASE 1 OF CONSTRUCTION.

**ITEM 662 WK ZN PAV MRK REMOV WILL BE RAISED PAVEMENT MARKERS IN ACCORDANCE WITH SHEET BC(12)-21.

DATE: 10/12/2023 05:23 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design/Plan Set/2. TCP/TCP SUMMARY

Texas Department of Transportation

FM 2678

TCP SUMMARY

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		17

CSJ 0155-06-213 FM 2678 CRASH CUSHION ATTENUATOR SUMMARY

LOCATION NO.	TCP PHASE	LOCATION	TEST LEVEL	DIRECTION OF TRAFFIC (UNI/BI)	FOUNDATION PAD		BACKUP SUPPORT			AVAILABLE SITE LENGTH	CRASH CUSHION									
					PROPOSED MATERIAL	PROPOSED THICKNESS	DESCRIPTION	WIDTH	HEIGHT				MOVE/RESET		L	L	R	R	S	S
											INSTALL	REMOVE	MOVE/RESET	FROM LOC. #	N	W	N	W	N	W
1	1A	STA 187+12 (LT)	TL3	BI	ACP	5"	PCTB (SSCB)	24"	42"	32"	1			STOCKPILE					*	
2	1A	STA 313+72 (LT)	TL3	BI	ACP	5"	PCTB (SSCB)	24"	42"	32"	1			STOCKPILE					*	
3	1B	STA 306+72 (LT)	TL3	BI	ACP	5"	PCTB (SSCB)	24"	42"	32"			1	1					*	
4	1B	STA 433+32 (LT)	TL3	BI	ACP	5"	PCTB (SSCB)	24"	42"	32"			1	2					*	
5	2A	STA 306+72 (RT)	TL3	BI	ACP	5"	PCTB (SSCB)	24"	42"	32"			1	3					*	
6	2A	STA 433+32 (RT)	TL3	BI	ACP	5"	PCTB (SSCB)	24"	42"	32"			1	4					*	
7	2B	STA 187+12 (RT)	TL3	BI	ACP	5"	PCTB (SSCB)	24"	42"	32"		1	1	5					*	
8	2B	STA 313+72 (RT)	TL3	BI	ACP	5"	PCTB (SSCB)	24"	42"	32"		1	1	6					*	
TOTALS											2	2	6							

DATE: 10/12/2023 05:24 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design/Plan Set/2. TCP/CRASH CUSHION SUMMARY

Texas Department of Transportation

FM 2678

CRASH CUSHION SUMMARY

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		18

CK:
DW:
CK:
DW:

DATE: 10/13/2023 11:45 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design/Plan Set/1. General/SUGGESTED SEQUENCE OF CONSTRUCTION

GENERAL NOTES FOR SEQUENCE OF CONSTRUCTION

1. TO ALERT THE PUBLIC OF POSSIBLE LANE CLOSURES, CHANGEABLE MESSAGE BOARDS SHALL BE PLACED AT THE PROJECT LIMITS SEVEN(7) DAYS IN ADVANCE OF BEGINNING WORK.

2. CHANGEABLE MESSAGE SIGNS SHALL BE PLACED AS NEEDED TO ALERT TRAFFIC OF LANE CLOSURES. MESSAGES SHALL BE APPROVED BY THE ENGINEER.

3. 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" (T.M.U.T.C.D.).

4. FOR SPACING OF SIGNS AND BARRICADES SEE "BC" AND "TCP" STANDARD SHEETS OR AS DIRECTED BY THE ENGINEER.

5. BARRICADES, SIGNS, CHANNELIZING DEVICES AND OTHER TRAFFIC HANDLING DEVICES, MAY BE ADJUSTED OR SHIFTED TO FIT FIELD CONDITIONS.

6. ADEQUATE SIGNS AND BARRICADES SHALL BE INSTALLED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER PRIOR TO OPENING ANY SECTION TO TRAFFIC. THE ENGINEER MAY DIRECT THE CONTRACTOR TO FURNISH ADDITIONAL SIGNS, BARRICADES, AND CHANNELIZING DEVICES, AS REQUIRED TO MAINTAIN TRAFFIC AND MOTORIST SAFETY DURING CONSTRUCTION. ANY SUCH ADDITIONAL SIGNS AND BARRICADES, ETC. SHALL BE CONSIDERED AS PART OF PAY ITEM 502 "BARRICADES, SIGNS, AND TRAFFIC HANDLING".

7. ALL SIGNS SHALL BE NEW OR FRESHLY PAINTED, AND KEPT CLEAN FOR THE DURATION OF THE PROJECT.

8. ALL BEGINNING AND ENDING BARRICADES AND SIGNS ARE TO REMAIN IN PLACE FOR THE DURATION OF THE PROJECT.

9. CW20-1D & G20-2A 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)-14.

10. THE CONTRACTOR WILL BE RESPONSIBLE FOR MARKING THE LOCATION OF ALL TRAFFIC CONTROL STRIPING AND PERMANENT STRIPING AS DIRECTED BY THE ENGINEER.

11. WORK ZONE PAVEMENT MARKINGS AND FINAL PAVEMENT MARKINGS SHALL BE PLACED UNDER TRAFFIC. REFER TO TCP(3-2)-13 AND TCP(3-3)-14 STANDARD SHEETS.

12. THE CONTRACTOR MAY SUBMIT AN ALTERNATIVE TRAFFIC CONTROL PLAN AND/OR AN ALTERNATIVE SEQUENCE OF CONSTRUCTION IN ADVANCE AND IN WRITING, AND SUBJECT TO THE APPROVAL OF THE ENGINEER. REFER TO ITEM 502.2 "CONSTRUCTION".

13. SHORT TERM FLEXIBLE REFLECTIVE ROADWAY TABS SHALL BE USED TO DELINEATE THE CENTERLINE AND TURNING LANES FOR A MAXIMUM OF 14 DAYS. PERMANENT STRIPING SHALL THEN BE PLACED. PERMANENT STRIPING SHALL BE DONE IN ACCORDANCE WILL ALL APPLICABLE STANDARDS. THE CONTRACTOR SHOULD BE AWARE, DEPENDING ON THE SEQUENCE OF CONSTRUCTION, THE STRIPING CREW MAY HAVE SEVERAL MOVE-INS. ALL SHORT TERM FLEXIBLE REFLECTIVE ROADWAY TABS SHALL BE REPLACED AS NEEDED WITHIN THAT 14 DAY PERIOD AT THE CONTRACTOR'S EXPENSE.

14. THE CONTRACTOR SHALL MAINTAIN ADEQUATE LIGHTNING DURING CONSTRUCTION. A LIGHTING PLAN MUST BE SUBMITTED AND APPROVED BY THE ENGINEER PRIOR TO CONSTRUCTION. LIGHTING NEEDED TO PERFORM WORK SHALL NOT BE PAID FOR DIRECTLY AND SHOULD BE CONSIDERED SUBSIDIARYTO ITEM 502.

15. SAW CUTS SHALL BE USED AT ALL LONGITUDINAL AND TRAVERSE JOINTS FOR PAVEMENT WIDENING, ROADWAY OBLITERAING, AND CULVERT EXTENSIONS.

UNEVEN LANES

1. ANY VERTICAL OR NEAR VERTICAL LONGITUDINAL FACE EXCEEDING 1 INCH IN HEIGHT IN THE PAVEMENT SURFACE OPEN TO TRAFFIC AT THE END OF THE WORK DAY SHALL BE SLOPED A MINIMUM OF 3:1. TRANSVERSE FACES THAT ARE PRESENT AT THE END OF THE WORK DAY SHALL BE TAPERED IN A MANNER ACCEPTABLE TO THE ENGINEER.

2. SIGNING FOR UNEVEN LANES (CW8-11) SHALL BE INSTALLED IN ADVANCE TO THE CONDITION AND REPEATED EVERY 1 MILE. SIGNS INSTALLED ALONG THE UNEVEN LANE CONDITION SHOULD BE SUPPLEMENTED WITH THE "NEXT XX MILES" MILES SIGN (CW21-16) OR ADVISORY SPPED SIGN (SCW13-1). SEE WZ(UL)-13 FOR ADDITIONAL DETAILS.

3. UNEVEN LANE SIGNS (CW8-11) SHALL BE ERECTED ON BOTH ENDS ON THE AREA WHERE THERE IS A DIFFERENCE IN ELEVATION BETWEEN ADJACENT LANES GREATER THAN ONE INCH.

PAVEMENT DROP-OFF

1. MAXIMUM ELEVATION DROP-OFF ON PAVEMENT EDGE SHALL NOT EXCEED 1 INCH WHEN TRAFFIC IS ALLOWED ADJACENT TO THE DROP-OFF. THE SLOPE MUST BE COMPACTED MATERIAL CAPABLE OF SUPPORTING VEHICLES. THIS WORK WILL NOT BE PAID FOR DIRECTLY BUT SHALL BE CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS.

2. SIGNING FOR PAVEMENT DROP-OFF (CW8-9a) SHOULD BE INSTALLED IN ADVANCE OF THE CONDITION AND REPEATED EVERY 1 MILE. SIGNS INSTALLED ALONG THE PAVEMENT EDGE SHOULD BE SUPPLEMENTED WITH THE NEXT XX MILES SIGN (CW21-16) OR ADVISORY SPEED SIGN (SCW13-1).

SUGGESTED SEQUENCE OF CONSTRUCTION

1. PLACE ADVANCE WARNING SIGNS AND BARRICADES THROUGHOUT THE PROJECT LIMITS IN ACCORDANCE WITH THE APPLICABLE STANDARD SHEETS, BARRICADE AND CONSTRUCTION, TCP, AND WORK ZONE STANDARD SHEETS. INSTALL SW3P EROSION CONTROL MEASURES IN ACCORDANCE WITH APPLICABLE STANDARDS.

PHASE 1 - WEST SIDE REHAB AND WIDEN

PHASE 1A:

2. INSTALL PCTB ON THE WEST SIDE OF THE ROADWAY FROM STA 187+12 TO STA 313+72.

3. COMPLETE CULVERT EXTENSION, MBGF, AND SMALL SIGN WORK ON THE WEST SIDE OF THE ROADWAY.

4. COMPLETE SUBGRADE WIDEN WORK, NEW/EXISTING BASE MIXING AND PLACEMENT AND PLACE HMA TO THE TY-B LAYER FROM STA 190+62 TO STA 310+23.

5. PLACE WORK ZONE STRIPING FOR PHASE 1B FROM STA 187+12 TO STA 306+73.

PHASE 1B

6. MOVE PCTB TO NEXT SECTION ON WEST SIDE OF THE ROADWAY FROM STA 306+73 TO STA 433+33.

7. REPEAT STEPS 1 ?3 FROM STA 310+23 TO STA 429+83.

8. PLACE WORK ZONE STRIPING FOR PHASE 2A FROM STA 306+73 TO STA 433+33.

PHASE 2 - EAST SIDE REHAB AND WIDEN

PHASE 2A:

9. INSTALL PCTB ON THE EAST SIDE OF THE ROADWAY FROM STA 306+73 TO STA 433+33.

10. COMPLETE CULVERT EXTENSION, MBGF, AND SMALL SIGN WORK ON THE EAST SIDE OF THE ROADWAY.

11. COMPLETE SUBGRADE WIDEN WORK, NEW/EXISTING BASE MIXING AND PLACEMENT AND PLACE HMA TO THE TY-B LAYER FROM STA 310+23 TO STA 429+83.

12. PLACE WORK ZONE STRIPING FOR PHASE 2B FROM STA 187+12 TO STA 306+73.

PHASE 2B:

13. MOVE PCTB TO NEXT SECTION ON EAST SIDE FROM STA 187+12 TO STA 313+72.

14. REPEAT STEPS 1 ?3 FROM STA 190+62 TO STA 310+23.

15. REMOVE PCTB AND PLACE WORK ZONE TABS TO EXISTING ROADWAY CONFIGURATION.

PHASE 3

16. COMPLETE PAVEMENT REPAIR AND FINAL HMA TY-D OVERLAY WORK FROM STA 9+50 TO STA 515+95.

17. PLACE FINAL PAVEMENT MARKINGS AND RUMBLE STRIPS IN ACCORDANCE WITH THE TRAFFIC LAYOUT SHEETS.

18. COMPLETE FINAL CLEANUP AND REMOVE ADVANCE WARNING SIGNS AND BARRICADES FROM THE PROJECT LIMITS.

STATE OF TEXAS
ERIC R MARTINEZ
125657
LICENSED PROFESSIONAL ENGINEER

10/13/2023

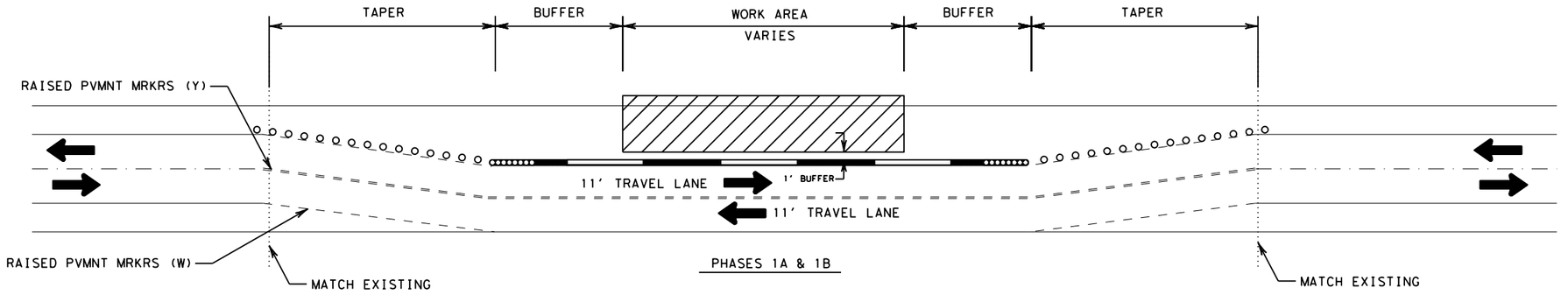
Texas Department of Transportation

FM 2678

SUGGESTED SEQUENCE OF CONSTRUCTION

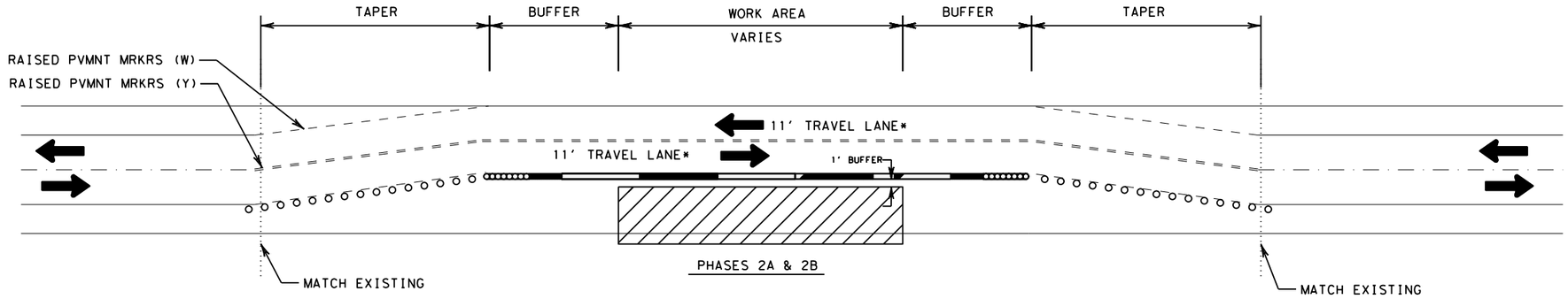
SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		19



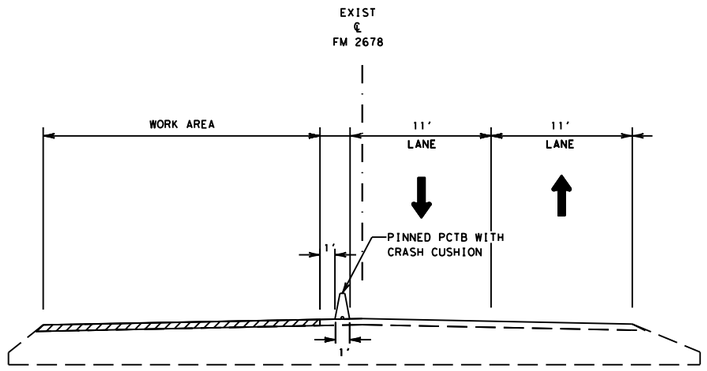
PHASES 1A & 1B

- WORK AREA
- CRASH CUSHION
- PLASTIC DRUMS
- TRAFFIC BARRIER
- DIRECTION OF TRAFFIC



PHASES 2A & 2B

* LANE WIDTHS REDUCED TO 10' DURING PHASES 3 & 4 AT THE FOLOWING LOCATIONS:
- STA 247+20 TO STA 247+60
- STA 359+09 TO STA 359+69
- STA 373+00 TO STA 378+00
- STA 405+28 TO STA 405+38



NOTE:
DETAILS DEPICT LANE WIDTH REQUIREMENTS AND BARRIER LOCATION ONLY. ALL SHIFT/BUFFER SPACING, SIGNAGE, AND RELATED TRAFFIC CONTROL DEVICES SHALL BE PLACED IN ACCORDANCE WITH TCP (2-3)-23 AND RELATED APPLICABLE STANDARDS.

STATE OF TEXAS
ERIC R MARTINEZ
125657
LICENSED
PROFESSIONAL ENGINEER

10/13/2023

NOT TO SCALE

Texas Department of Transportation

FM 2678

TCP DETAIL

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		20

DATE: 10/12/2023 09:53 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design/Plan Set/2. TCP/TCP DETAIL

DATE: 10/12/2023 1:30:20 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design/Plan Set/13. Standards/TCP Standards/BC(1)-21.dgn

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

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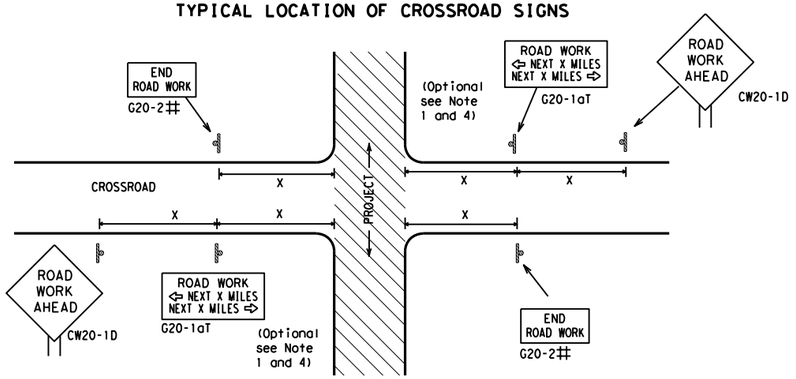
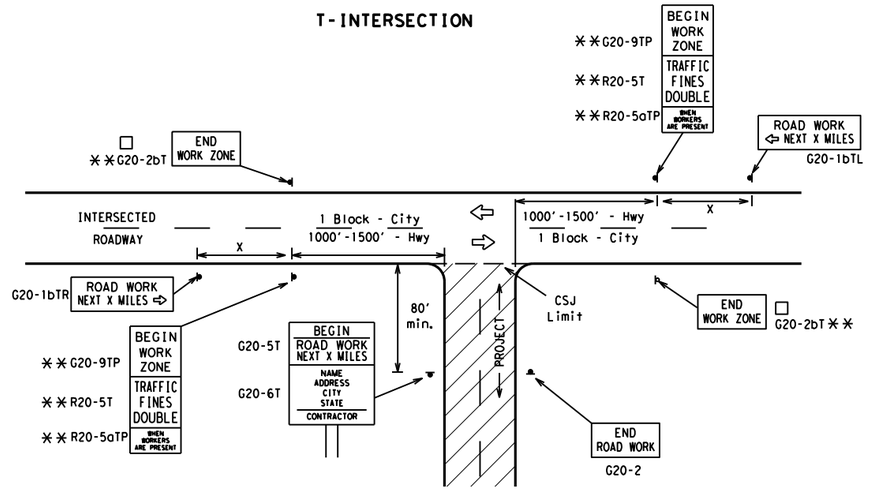
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

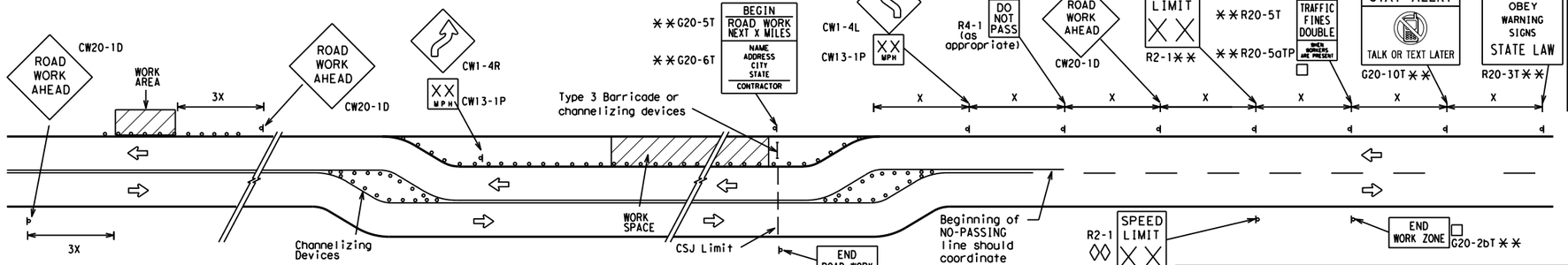
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

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

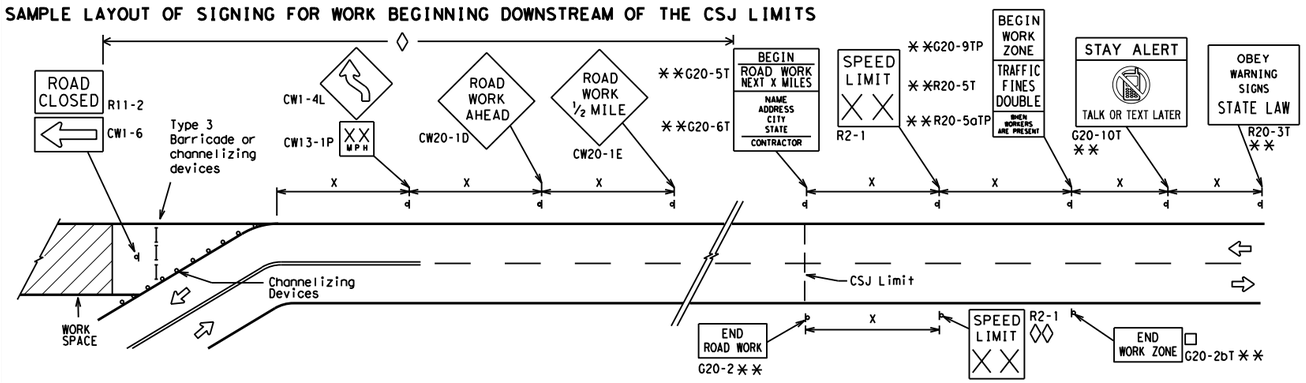
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

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



NOTES

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

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

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

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

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

LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

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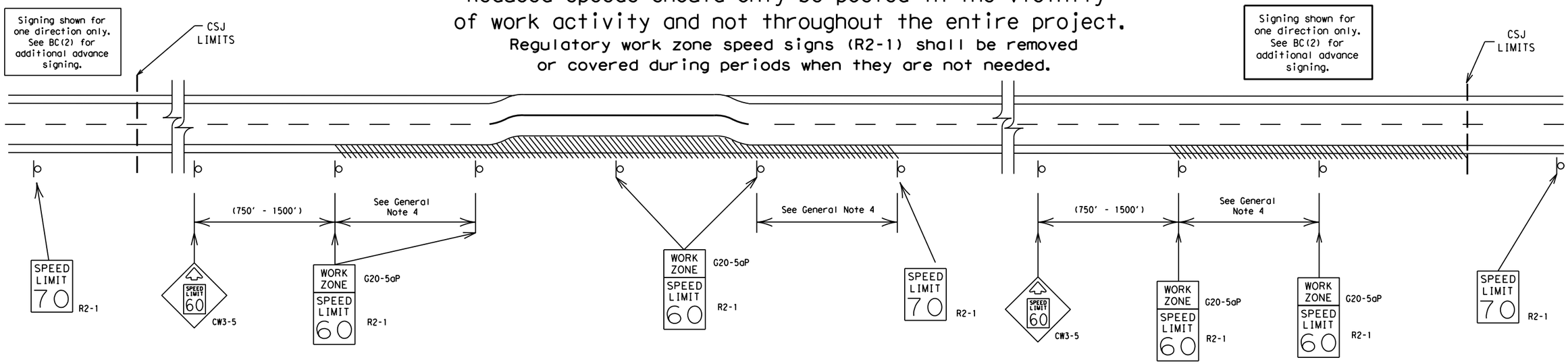
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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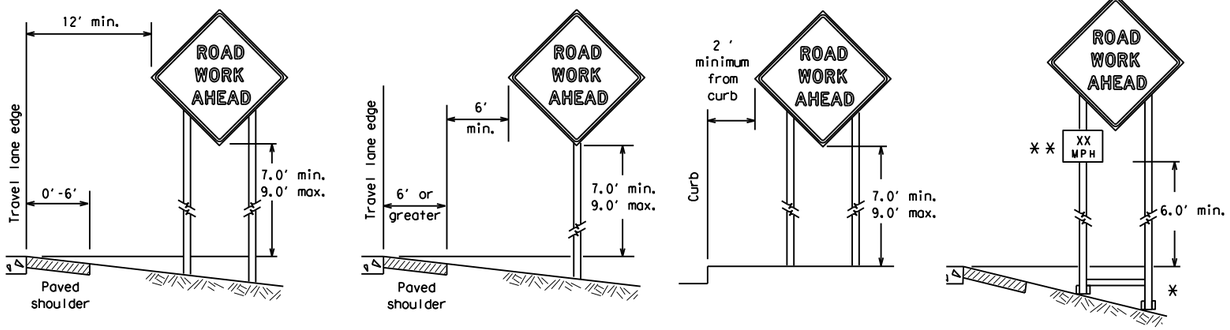
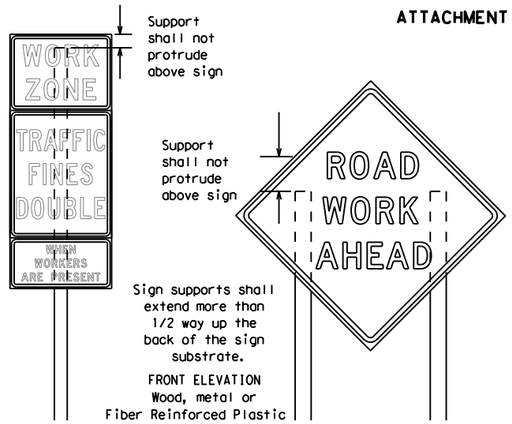
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

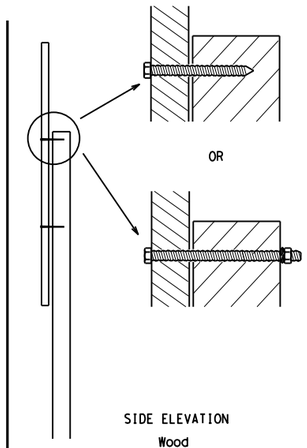


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





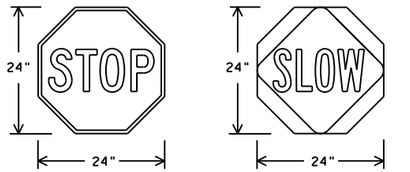
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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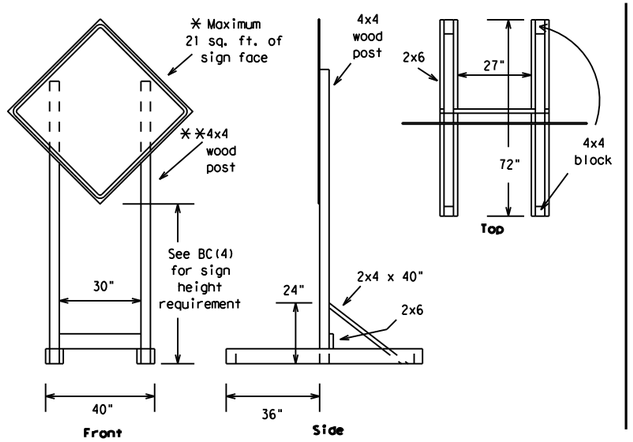
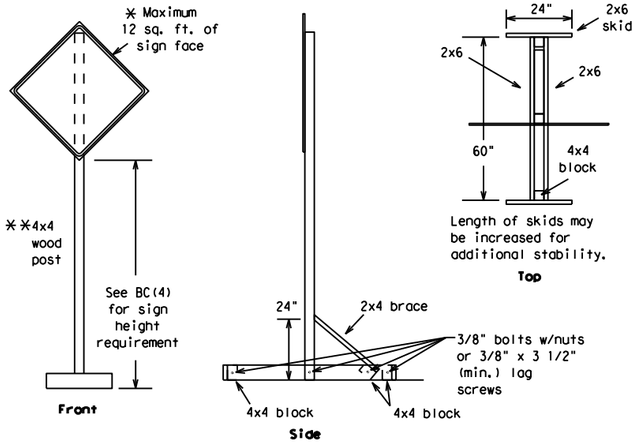
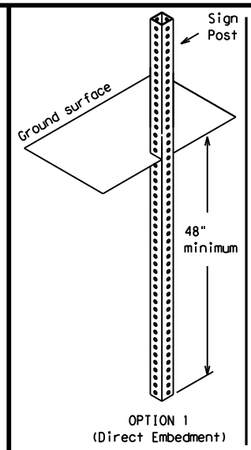
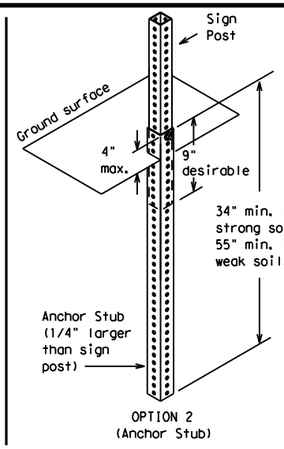


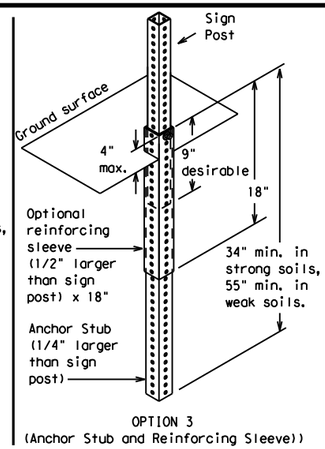


SKID MOUNTED WOOD SIGN SUPPORTS

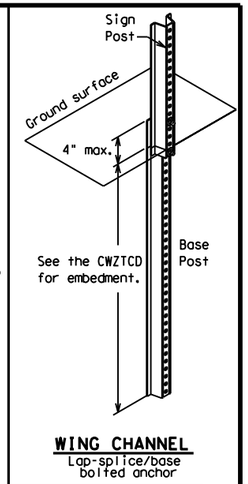
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS







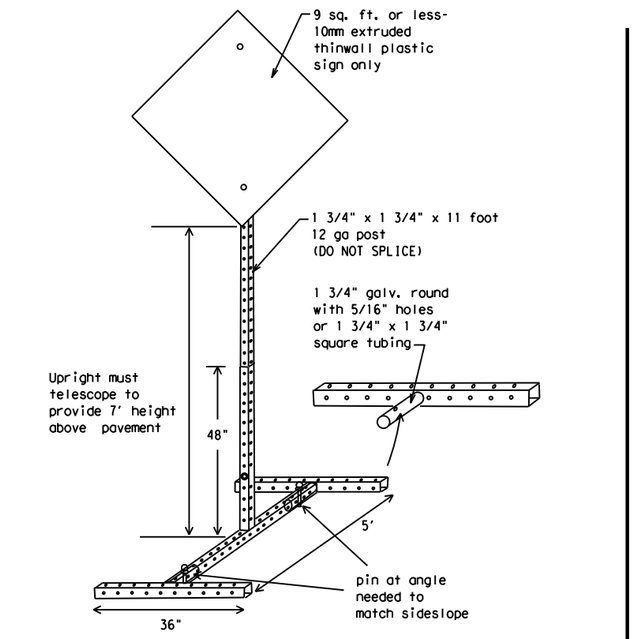
PERFORATED SQUARE METAL TUBING

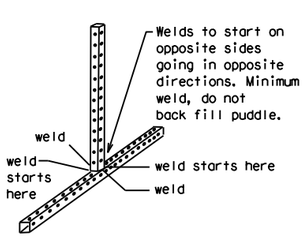


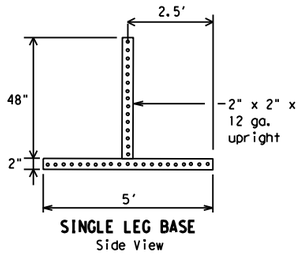
WING CHANNEL
Lap-splice/base bolted anchor

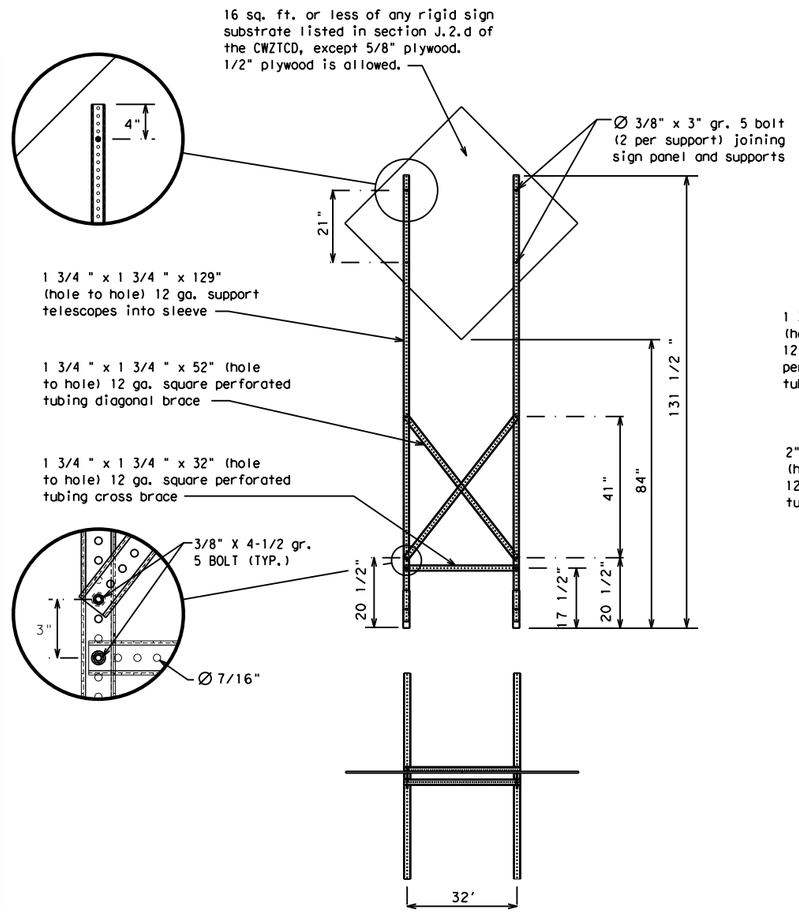
GROUND MOUNTED SIGN SUPPORTS

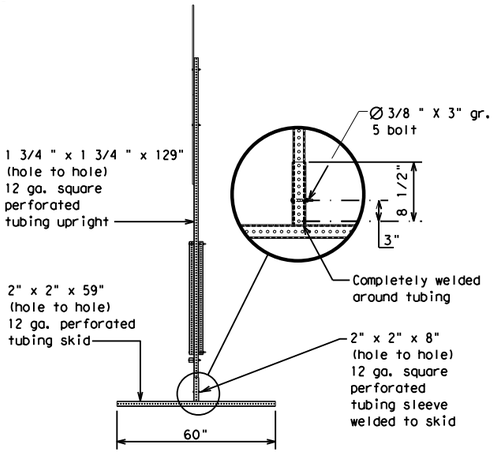
Refer to the CWZTCD and the manufacturer's installation procedure for each type sign support.
The maximum sign square footage shall adhere to the manufacturer's recommendation.
Two post installations can be used for larger signs.











SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0155	06	213	FM 2678
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	CRP	REFUGIO		25

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

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

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

Phase 2: Possible Component Lists

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0155	06	213	FM 2678
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	CRP	REFUGIO		26

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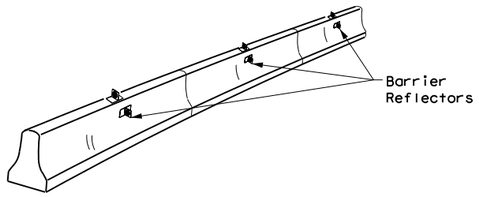
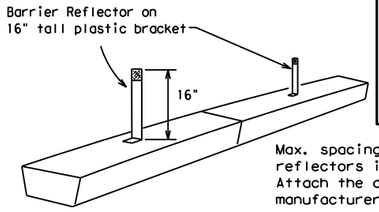
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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



CONCRETE TRAFFIC BARRIER (CTB)

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

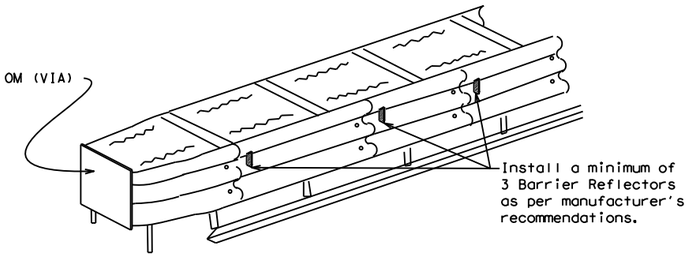


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

LOW PROFILE CONCRETE BARRIER (LPCB)

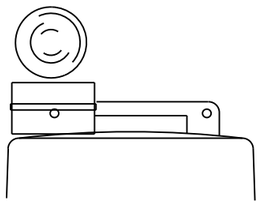


DELINEATION OF END TREATMENTS

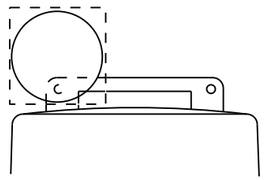
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

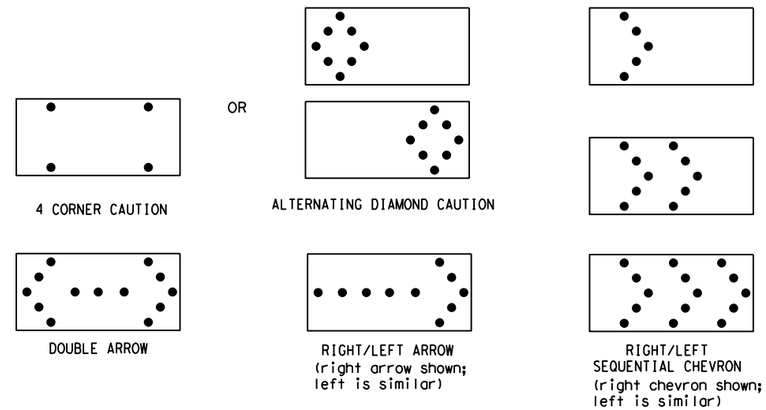
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0155	06	213	FM 2678
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	CRP	REFUGIO		27

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

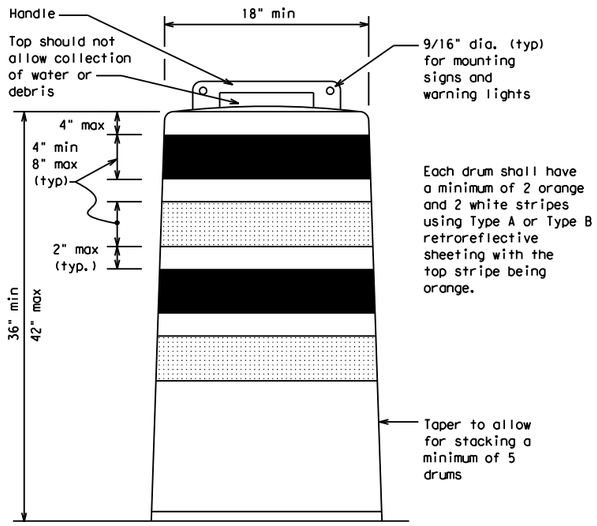
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

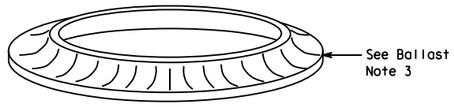
RETROREFLECTIVE SHEETING

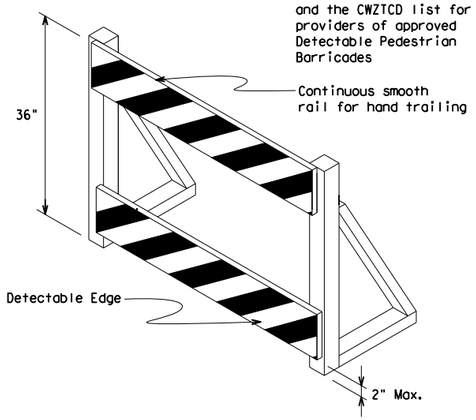
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

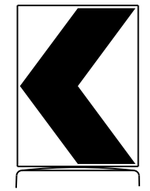




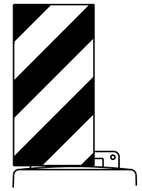


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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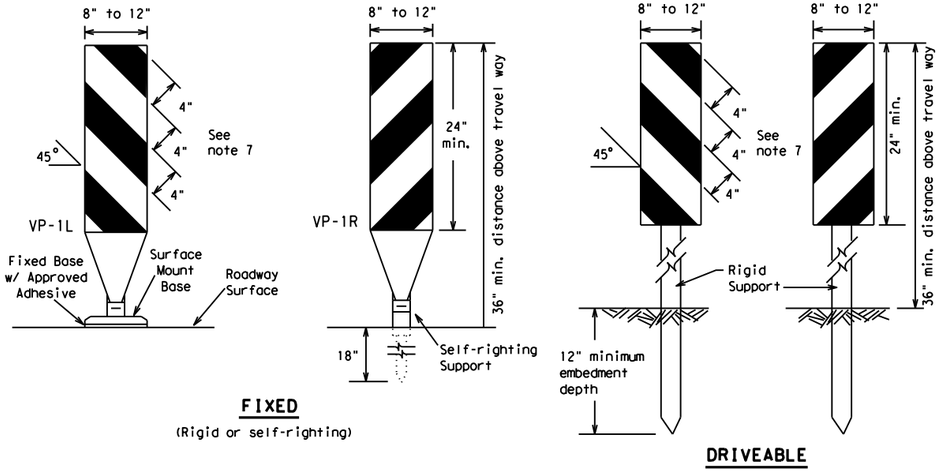
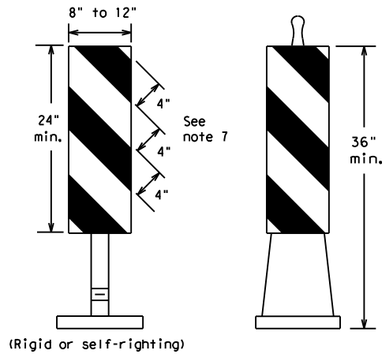


FIXED
(Rigid or self-righting)

DRIVEABLE

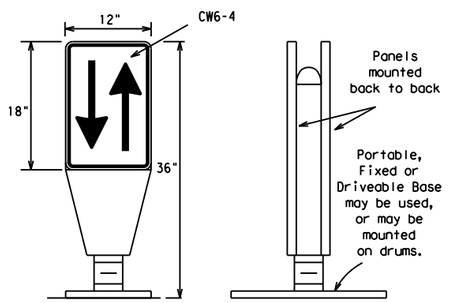


(Rigid or self-righting)

PORTABLE

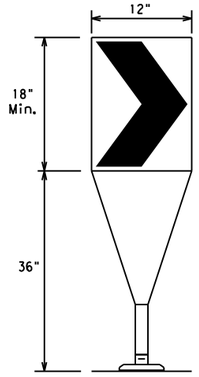
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



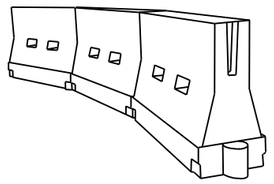
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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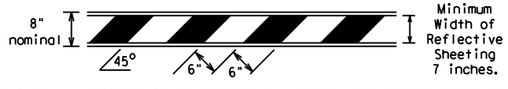
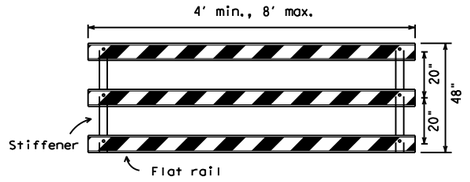
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



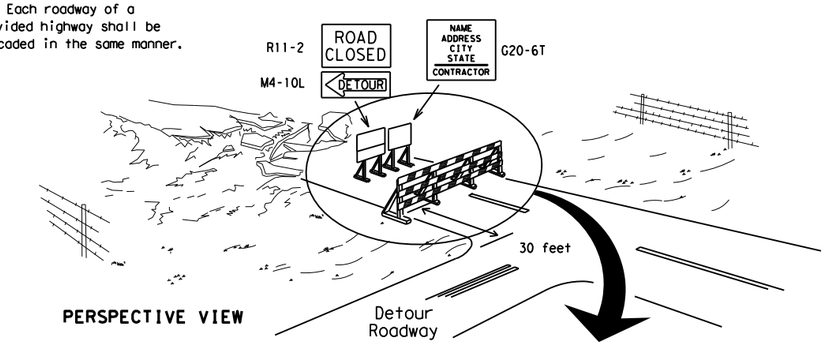
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

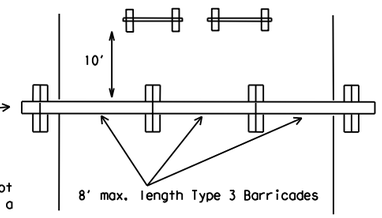
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

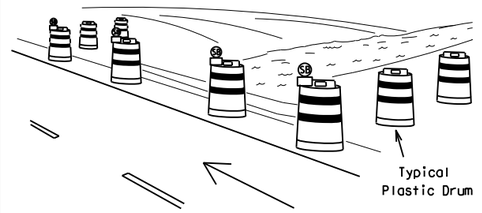
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

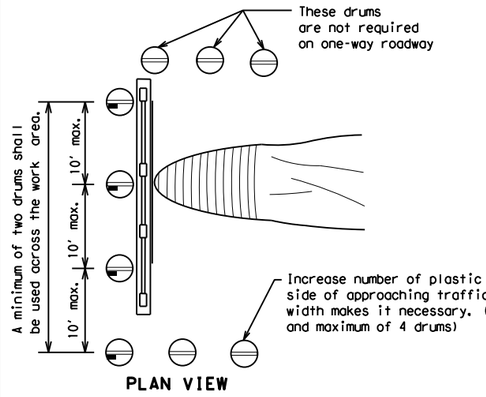
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

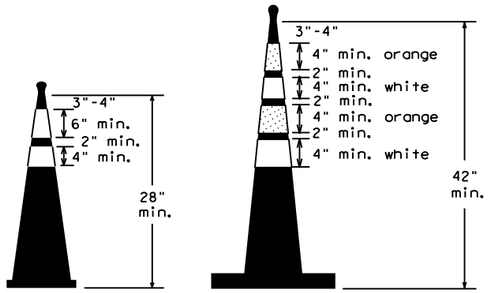
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



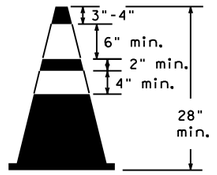
LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

PLAN VIEW

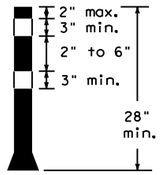
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

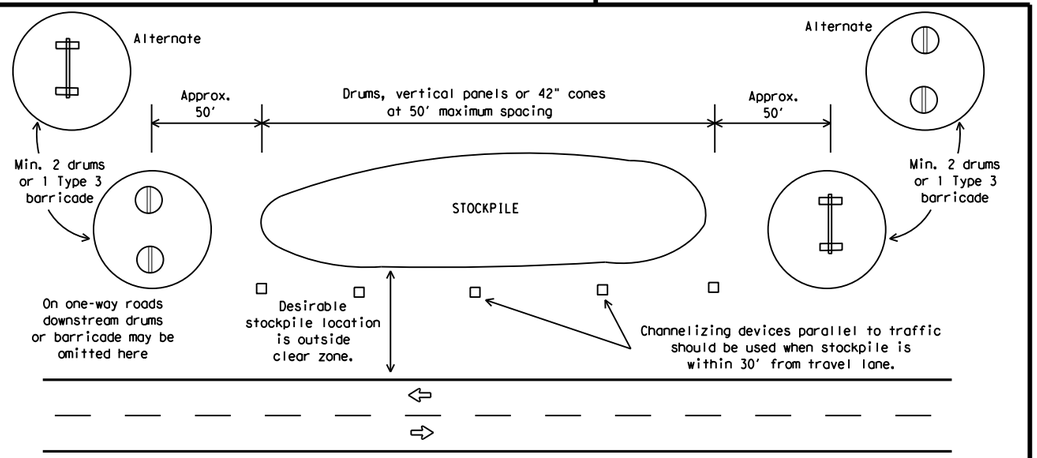


Tubular Marker

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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

SHEET 10 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0155	06	213	FM 2678
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7-13 5-21	CRP	REFUGIO		30

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

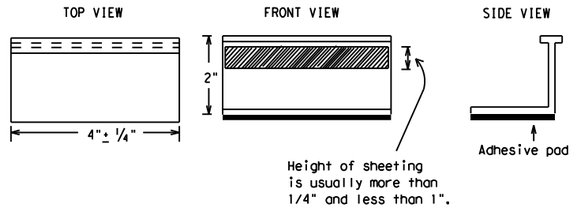
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0155	06	213	FM 2678
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
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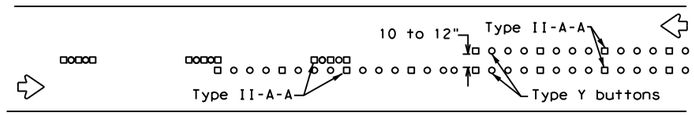
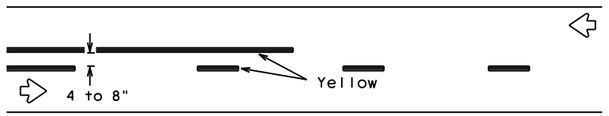
DATE: 10/12/2023 1:33:56 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/015506213/4 - Design/Plan Set/13. Standards/TCP Standards/BC (12)-21.dgn

PAVEMENT MARKING PATTERNS

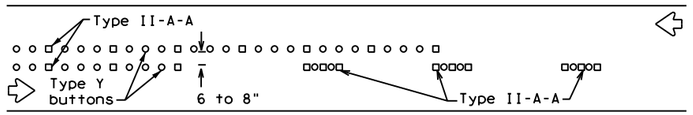
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



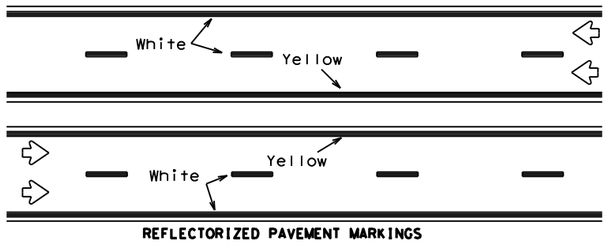
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



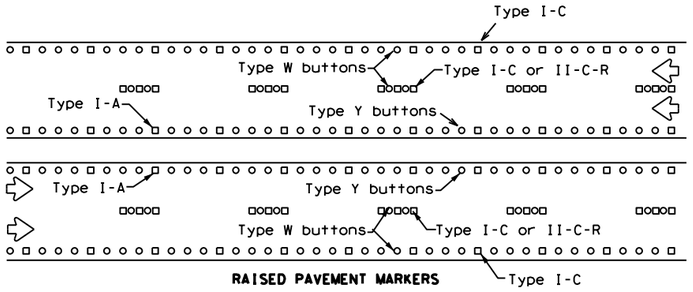
RAISED PAVEMENT MARKERS - PATTERN B

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

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



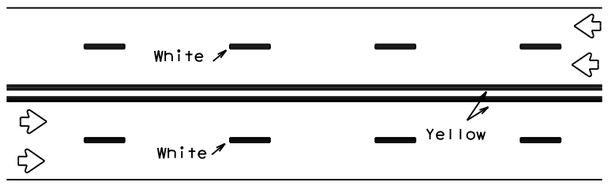
REFLECTORIZED PAVEMENT MARKINGS



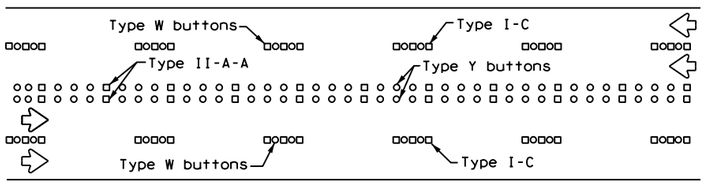
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



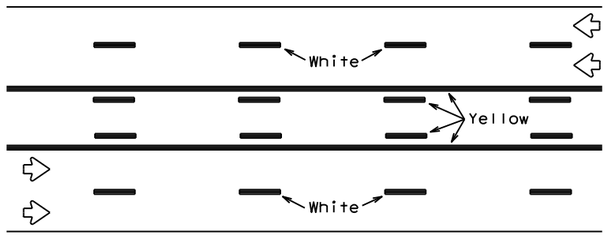
REFLECTORIZED PAVEMENT MARKINGS



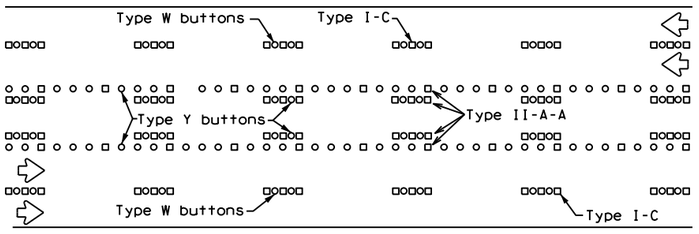
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

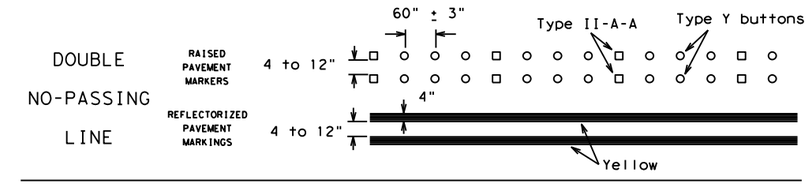
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

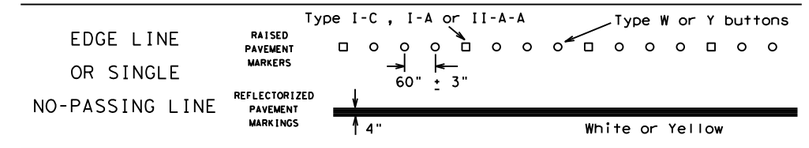
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

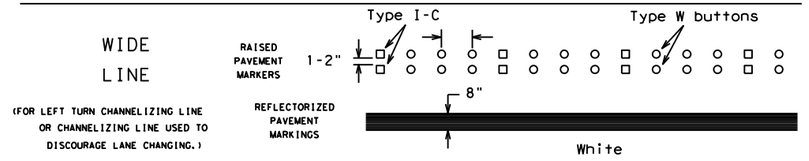


EDGE LINE OR SINGLE NO-PASSING LINE



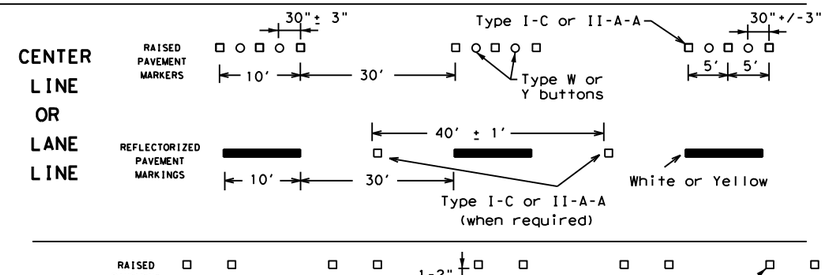
WIDE LINE

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

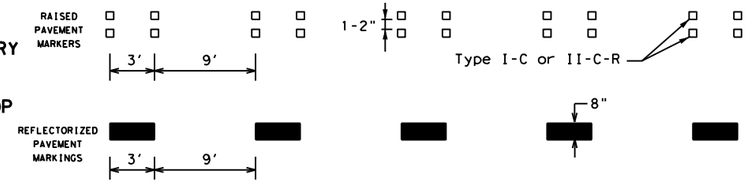


BROKEN LINES

CENTER LINE OR LANE LINE

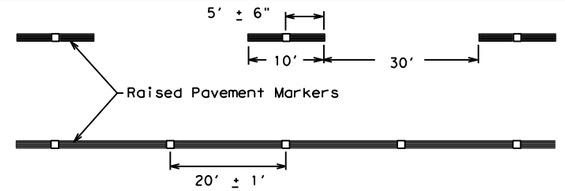


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS 1-97 9-07 5-21	0155	06	213	FM 2678
2-98 7-13	DIST	COUNTY		SHEET NO.
11-02 8-14	CRP	REFUGIO		32

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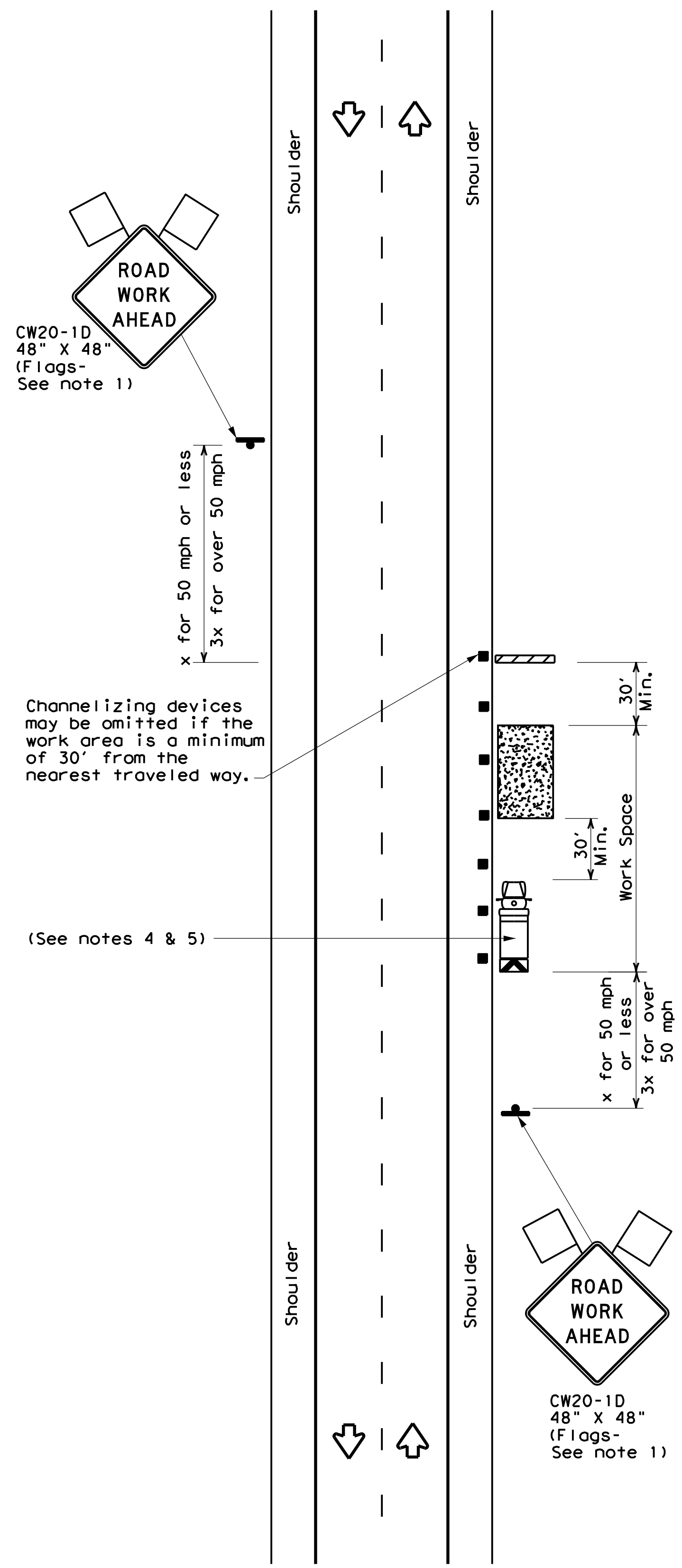
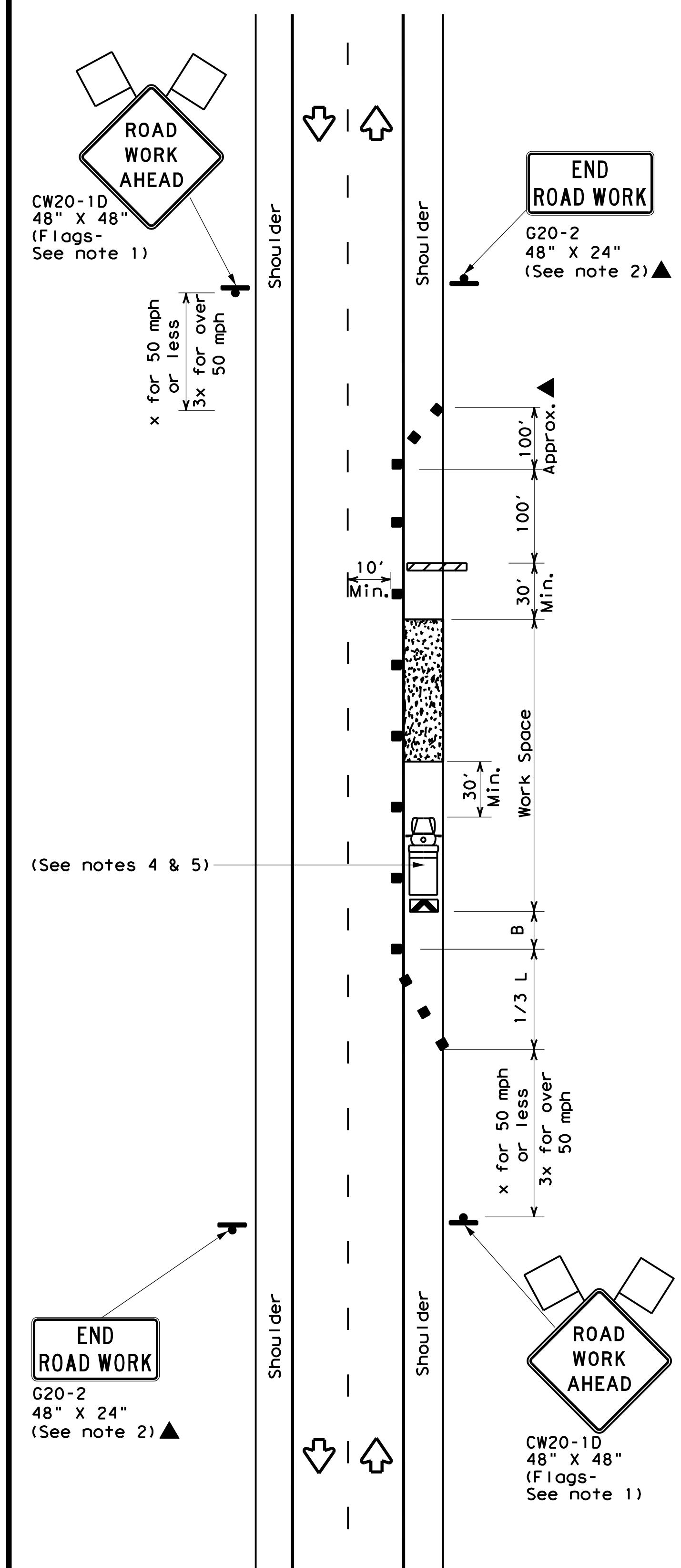


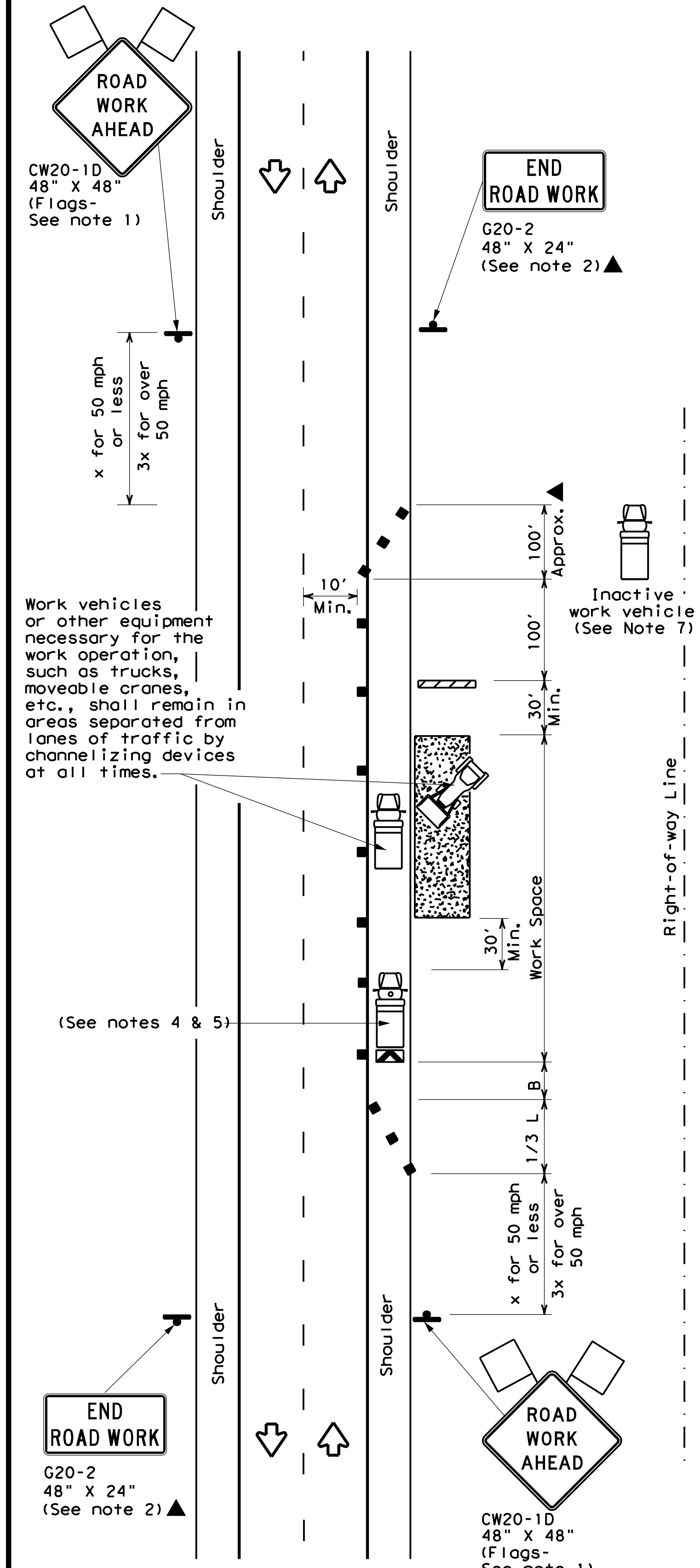
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

LEGEND

	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		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	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L = WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only

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

TYPICAL USAGE

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0155	06	213	FM 2678
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8-95 2-12 / 1-97 2-18	CRP	REFUGIO		33

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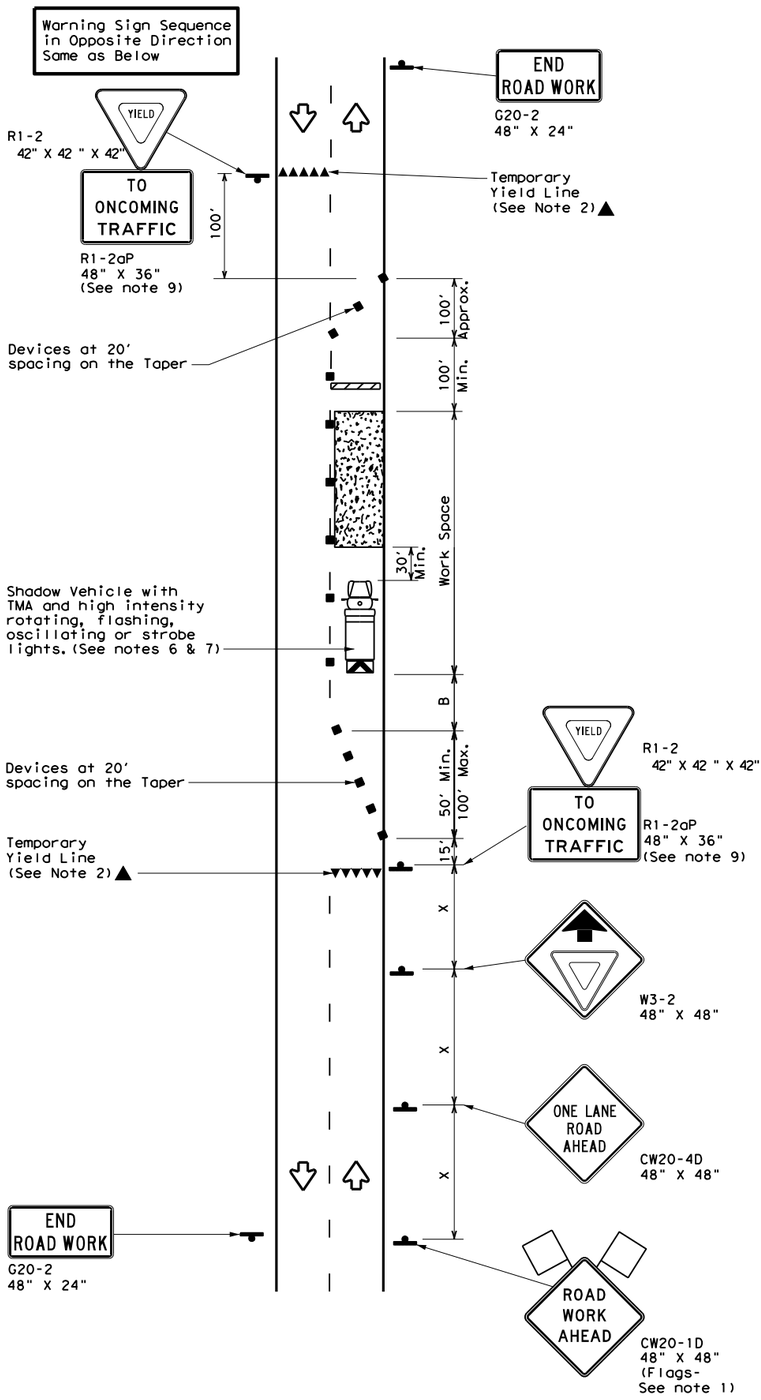
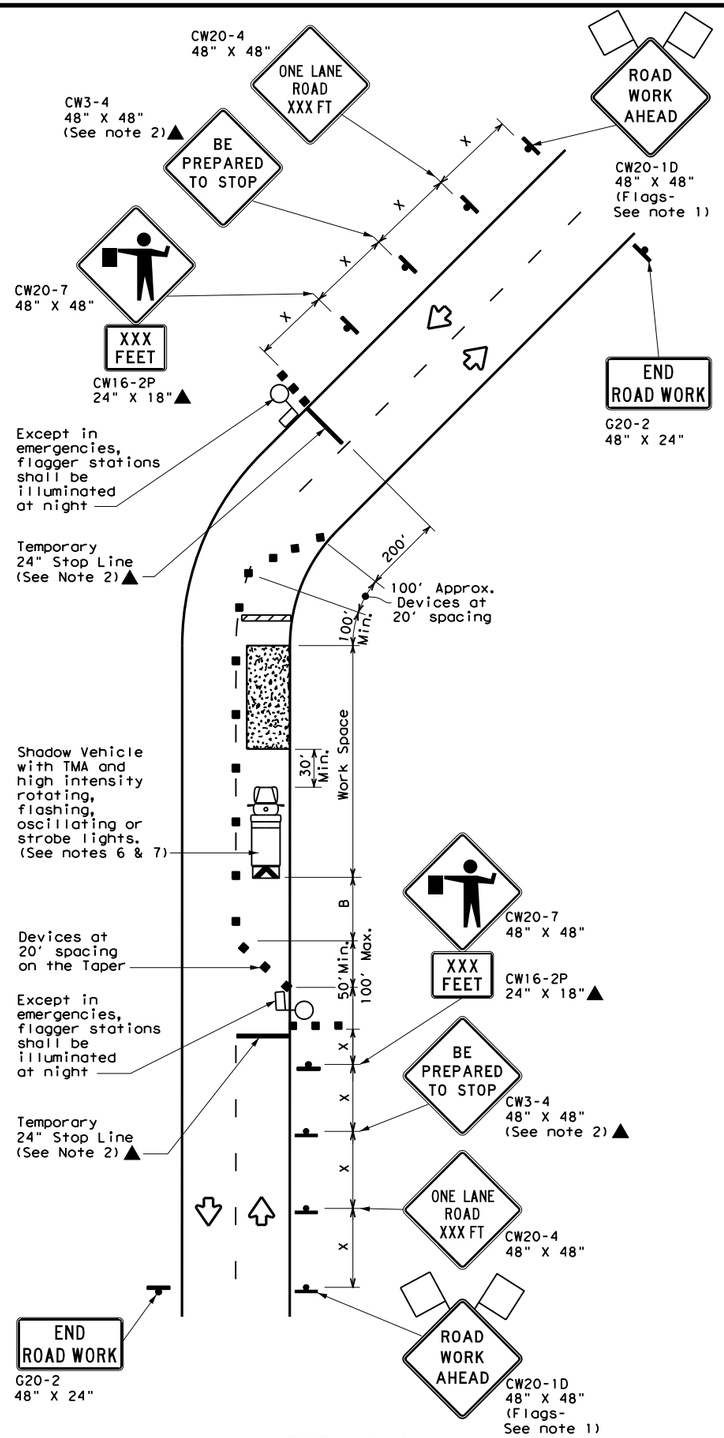


TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



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

LEGEND

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L=WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4 "ONE LANE ROAD XXX FT" sign, but proper sign spacing shall be maintained.
4. Flaggers should use two-way radios or other methods of communication to control traffic.
5. Length of work space should be based on the ability of flaggers to communicate.
6. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-2a)

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

TCP (2-2b)

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY
TRAFFIC CONTROL

TCP(2-2)-18

FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
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REVISIONS	0155	06	213	FM 2678
8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12	CRP	REFUGIO		34
4-98 2-18				

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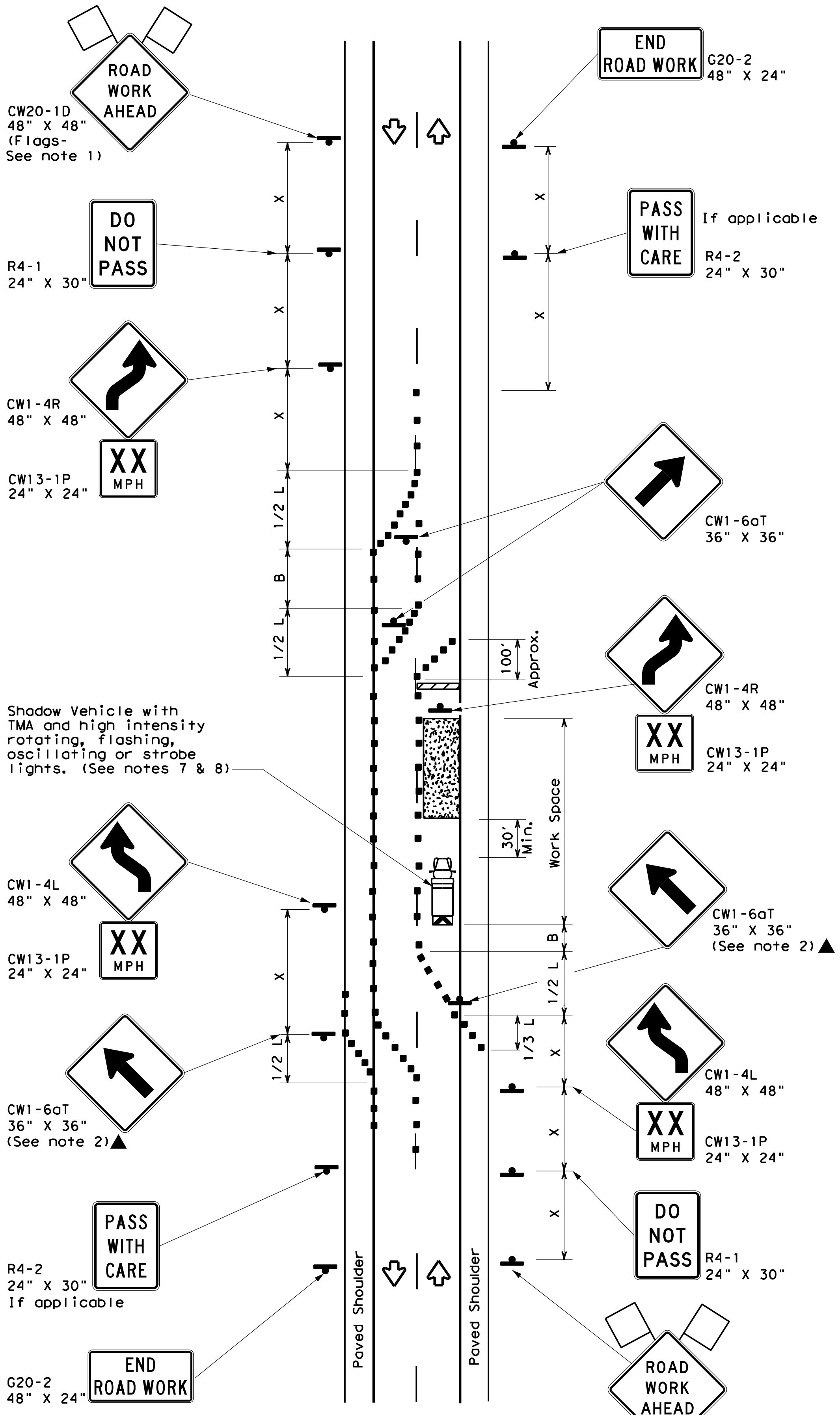
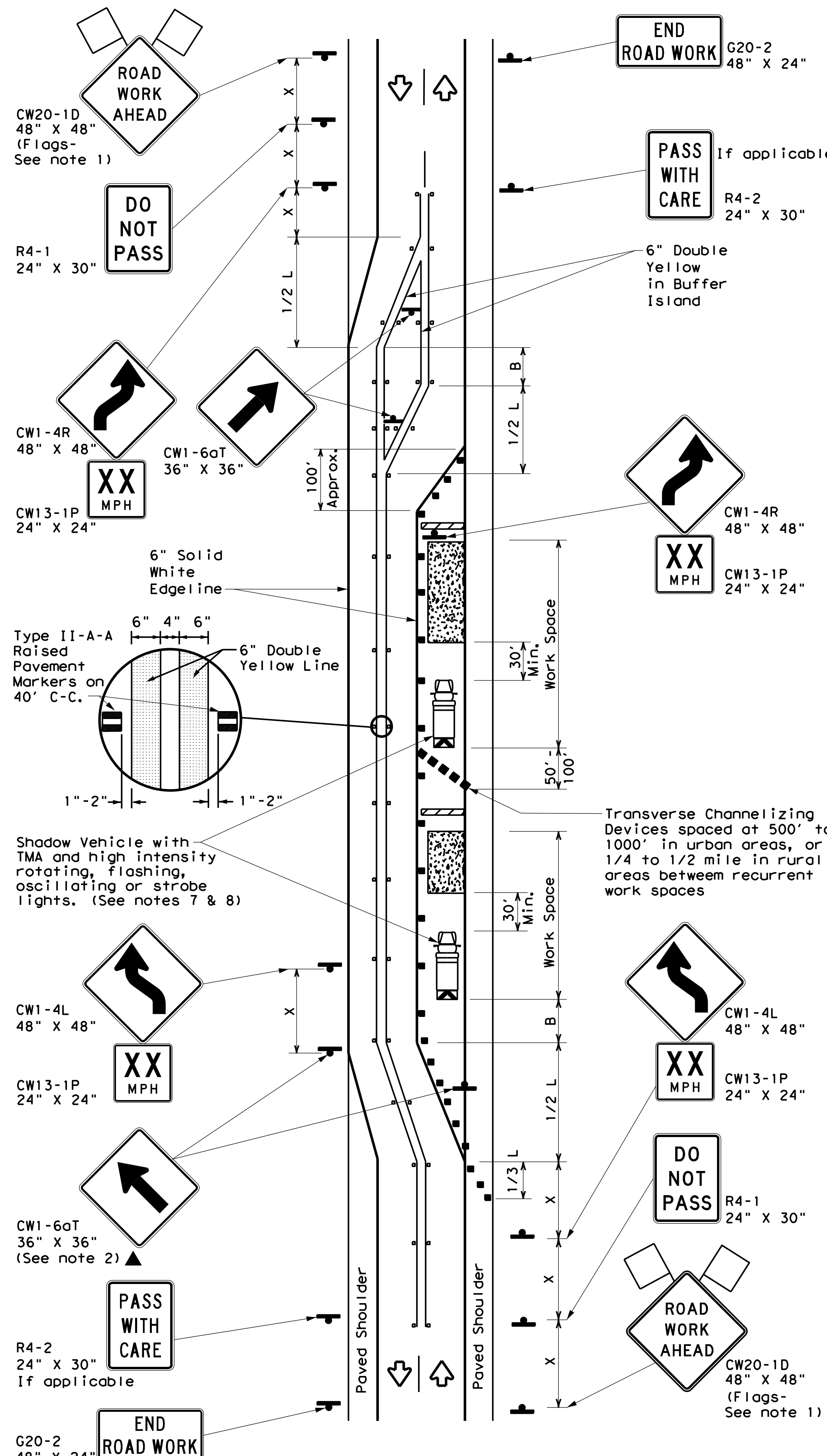


TCP (2-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
ADEQUATE FIELD OF VIEW



TCP (2-3b)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

LEGEND

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

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

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

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY TCP(2-3b)ONLY
			✓	✓

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. When work space will be in place less than three days existing pavement markings may remain in place. Channelizing devices shall be used to separate traffic.
4. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Flagger should be positioned at end of traffic queue.
5. The R4-1 "DO NOT PASS," R4-2 " PASS WITH CARE" and construction regulatory speed zone signs may be installed within CW20-1D "ROAD WORK AHEAD" signs. Proper spacing of signs shall be maintained.
6. Conflicting pavement marking shall be removed for long term projects.
7. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted.
8. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-3a)

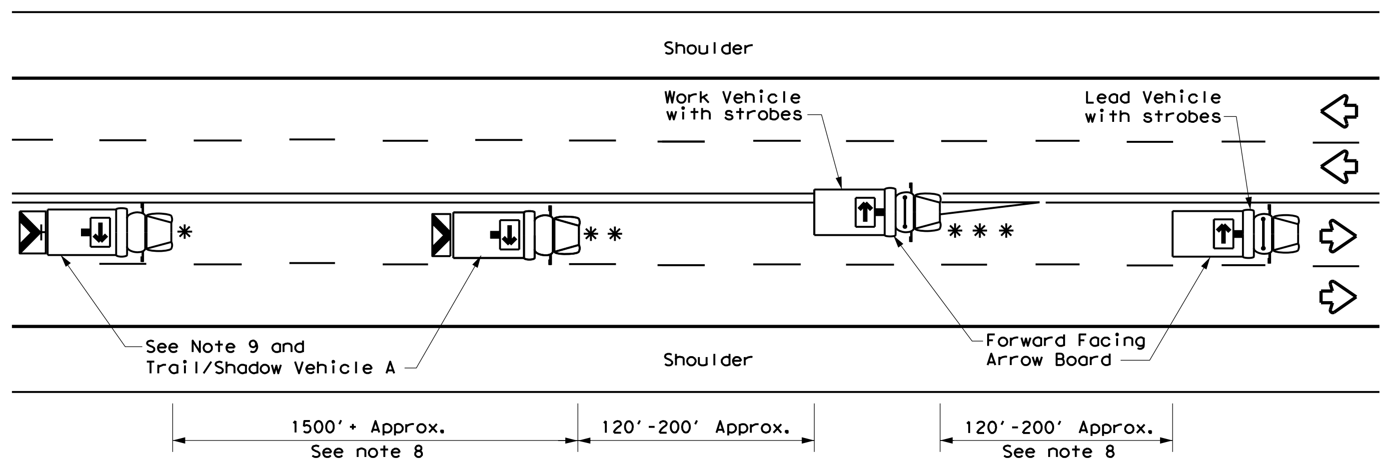
9. Conflicting pavement markings shall be removed for long-term projects. For shorter durations where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections,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

Texas Department of Transportation
Traffic Safety Division Standard

TRAFFIC CONTROL PLAN TRAFFIC SHIFTS ON TWO-LANE ROADS

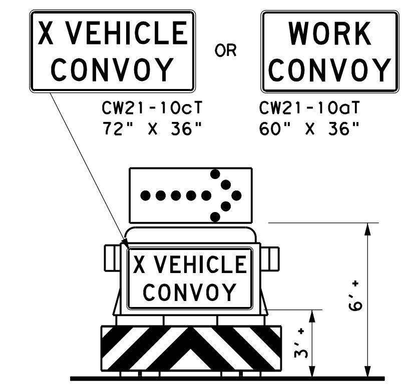
TCP(2-3)-23

FILE: tcp(2-3)-23.dgn	DN:	CK:	DW:	CK:
©TxDOT April 2023	CONT 0155	SECT 06	JOB 213	HIGHWAY FM 2678
REVISIONS 12-85 4-98 2-18 8-95 3-03 4-23 1-97 2-12	DIST CRP		COUNTY REFUGIO	SHEET NO. 35



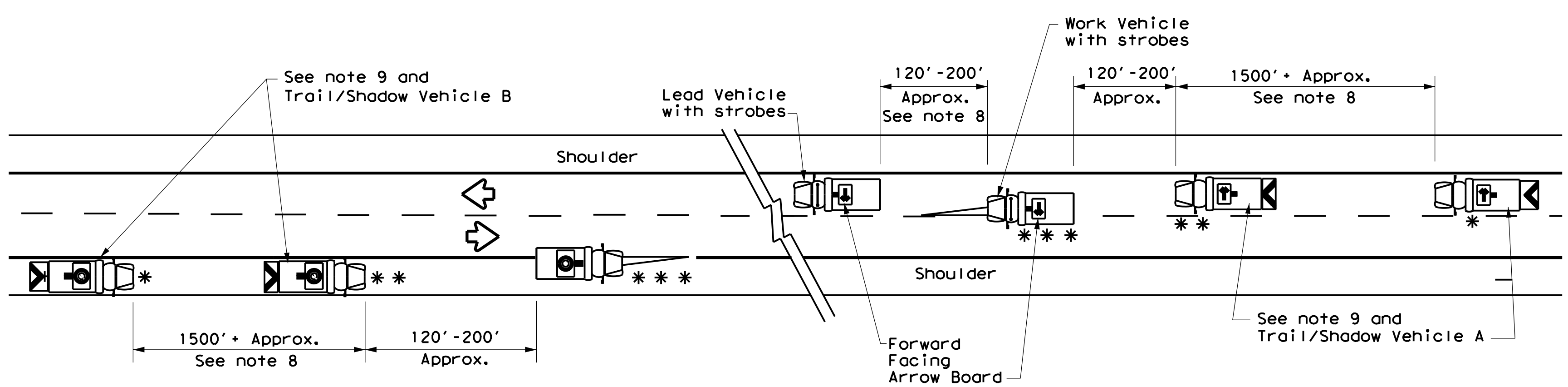
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

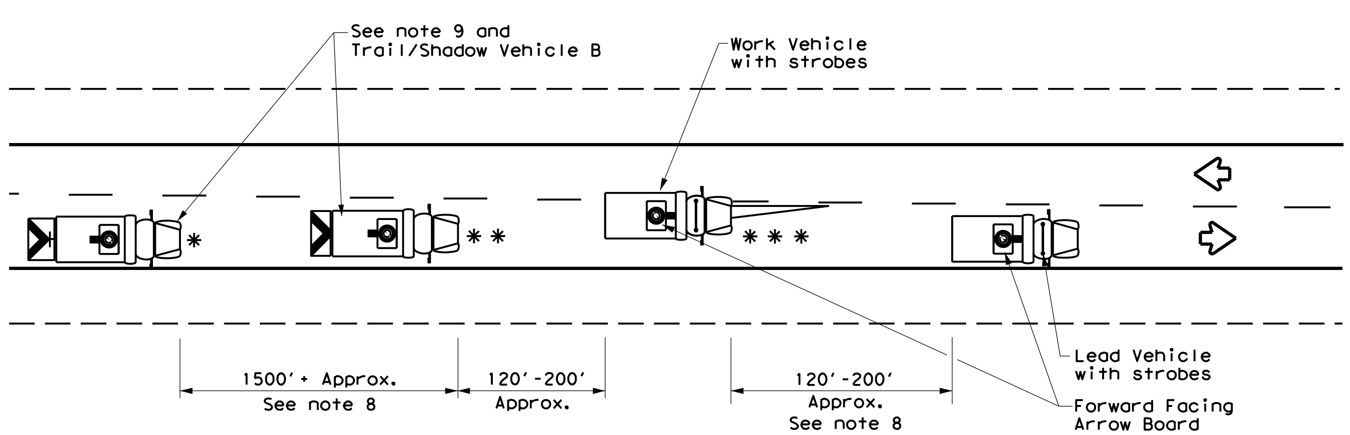


WORK ON SHOULDER

WORK ON TRAVEL LANE

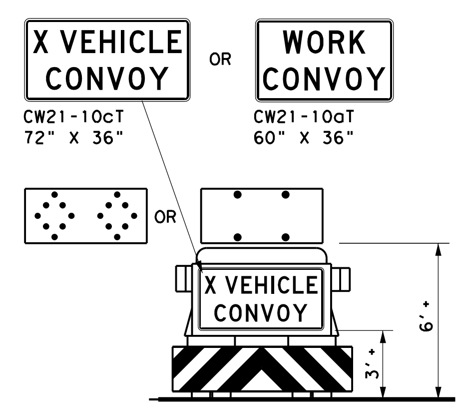
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board in CAUTION display

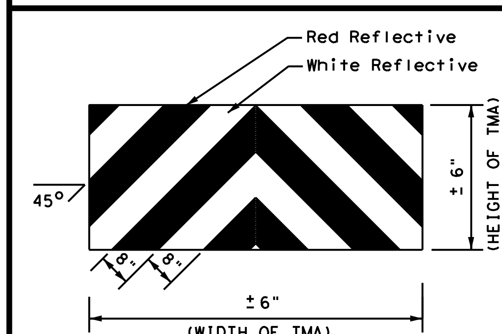
LEGEND

Symbol	Description	Arrow Board Display	
*	Trail Vehicle		
**	Shadow Vehicle		
***	Work Vehicle		RIGHT Directional
	Heavy Work Vehicle		LEFT Directional
	Truck Mounted Attenuator (TMA)		Double Arrow
	Traffic Flow		CAUTION (Alternating Diamond or 4 Corner Flash)

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

GENERAL NOTES

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



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

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© TxDOT December 1985	CONT 0155	SECT 06	JOB 213	HIGHWAY FM 2678
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175

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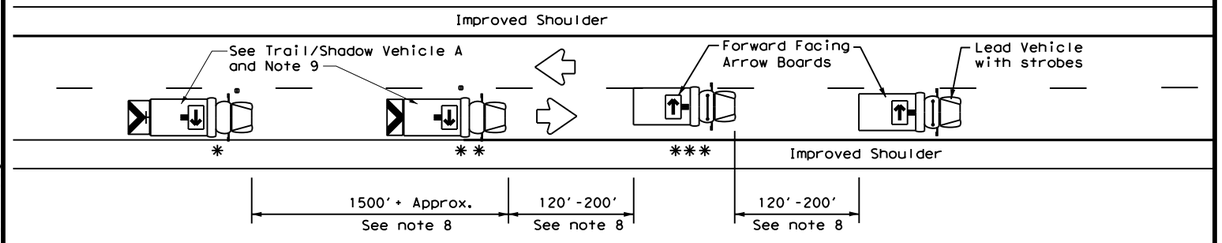
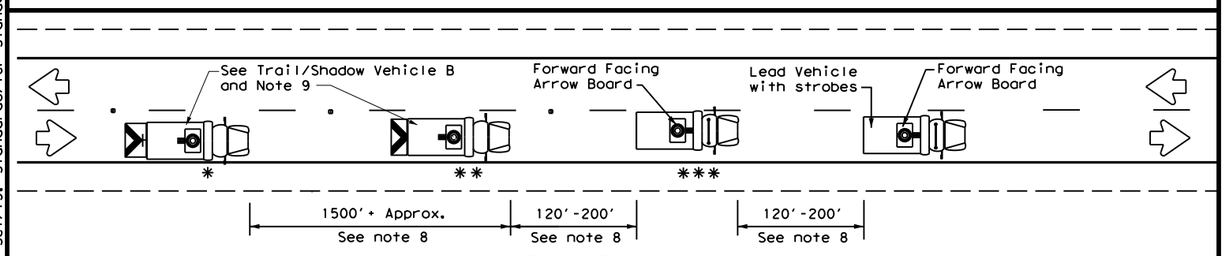


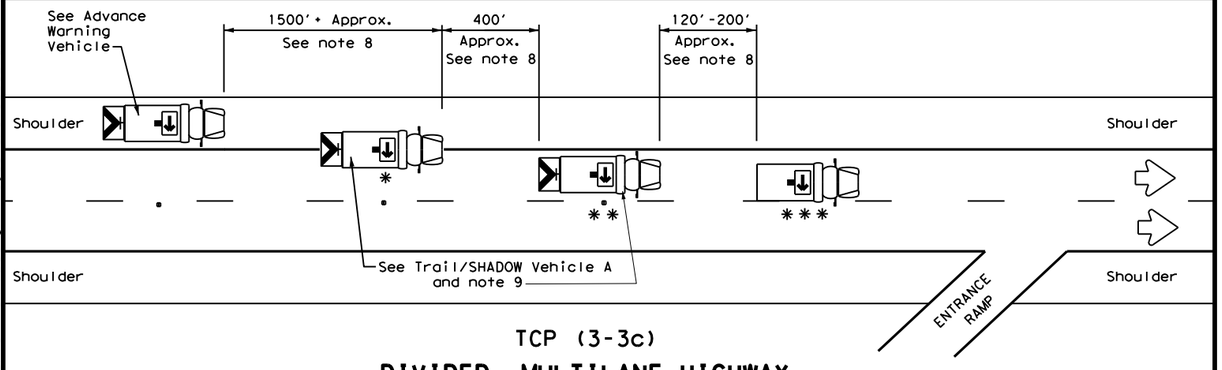
TCP (3-3a)

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



TCP (3-3b)

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

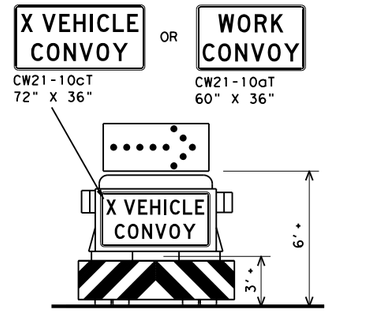


TCP (3-3c)

DIVIDED MULTILANE HIGHWAY

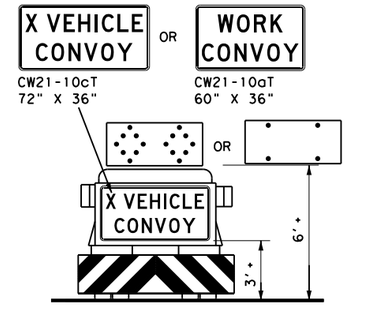
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



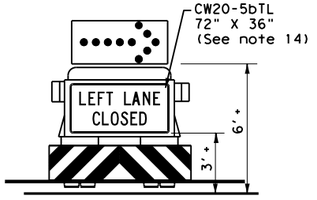
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

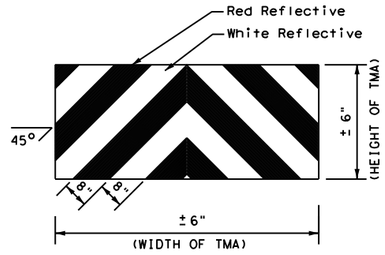


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

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

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
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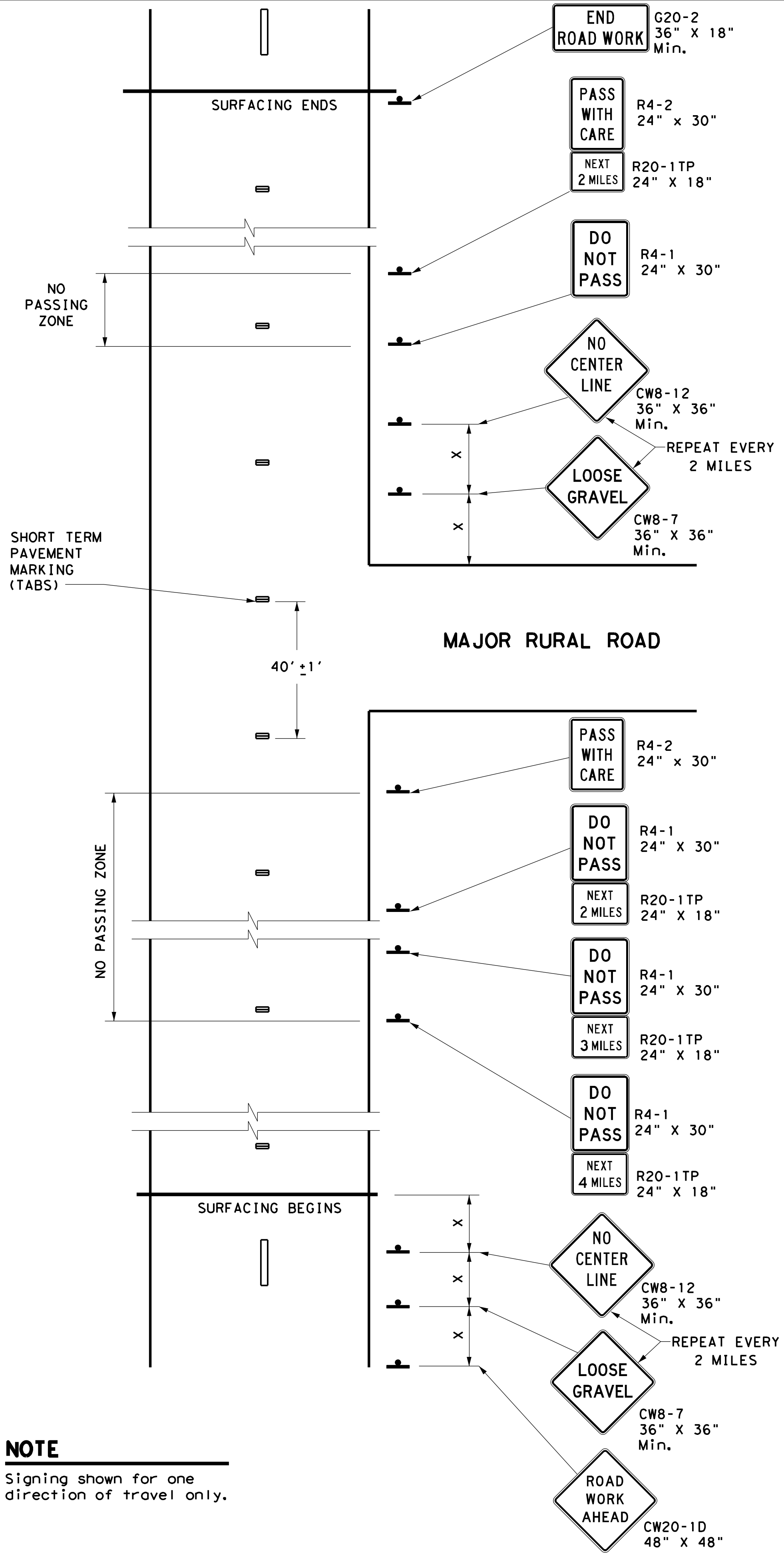
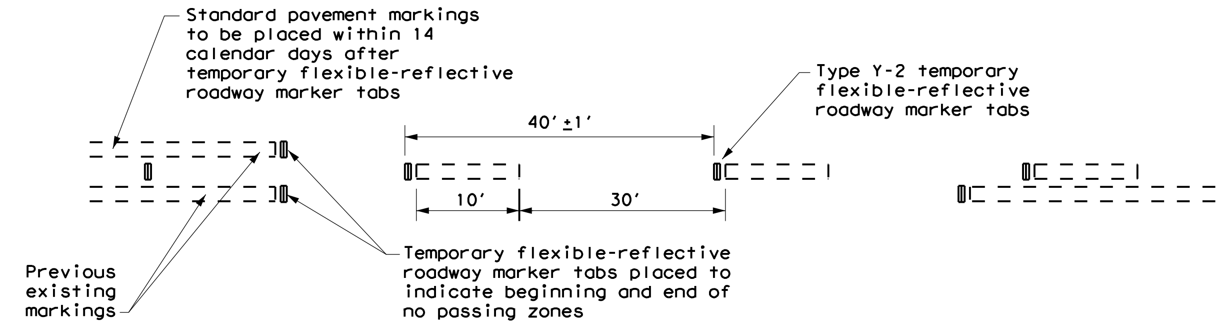
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	CRP	REFUGIO		37
1-97 7-14				



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.

Texas Department of Transportation

Traffic Operations Division Standard

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 0155	SECT 06	JOB 213	HIGHWAY FM 2678
REVISIONS 4-92 4-98 1-97 7-13	DIST CRP		COUNTY REFUGIO	SHEET NO. 38

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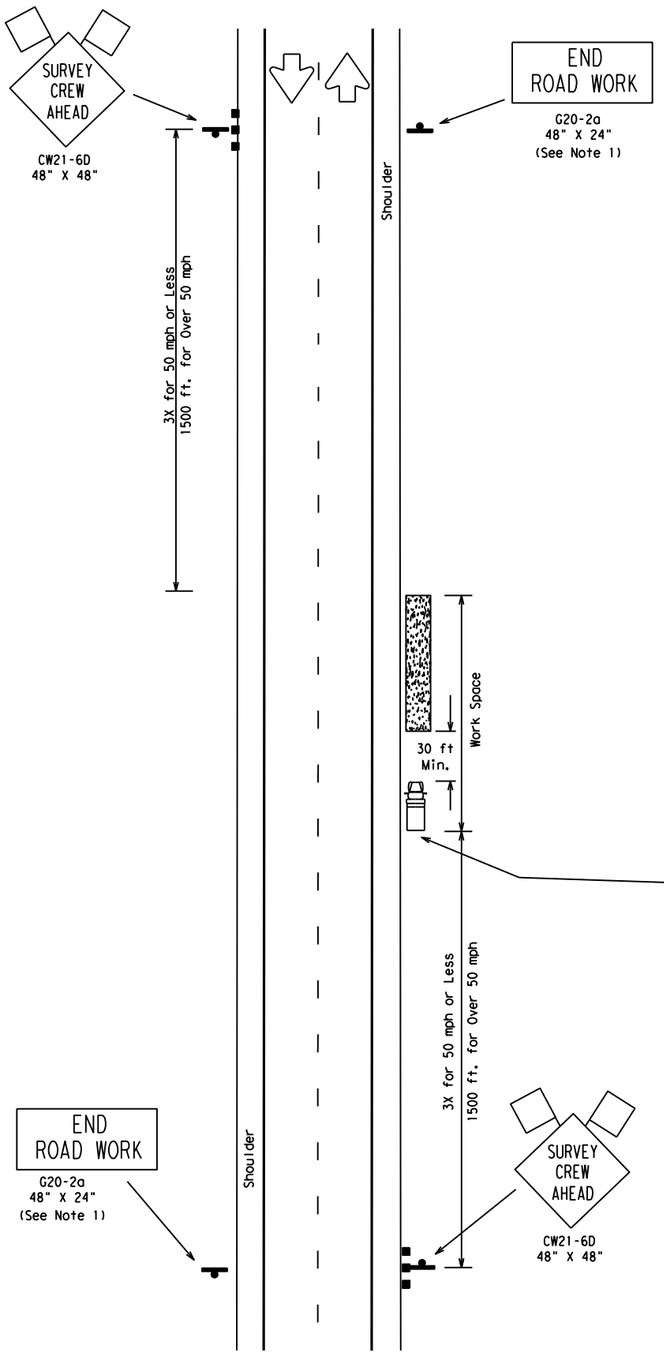
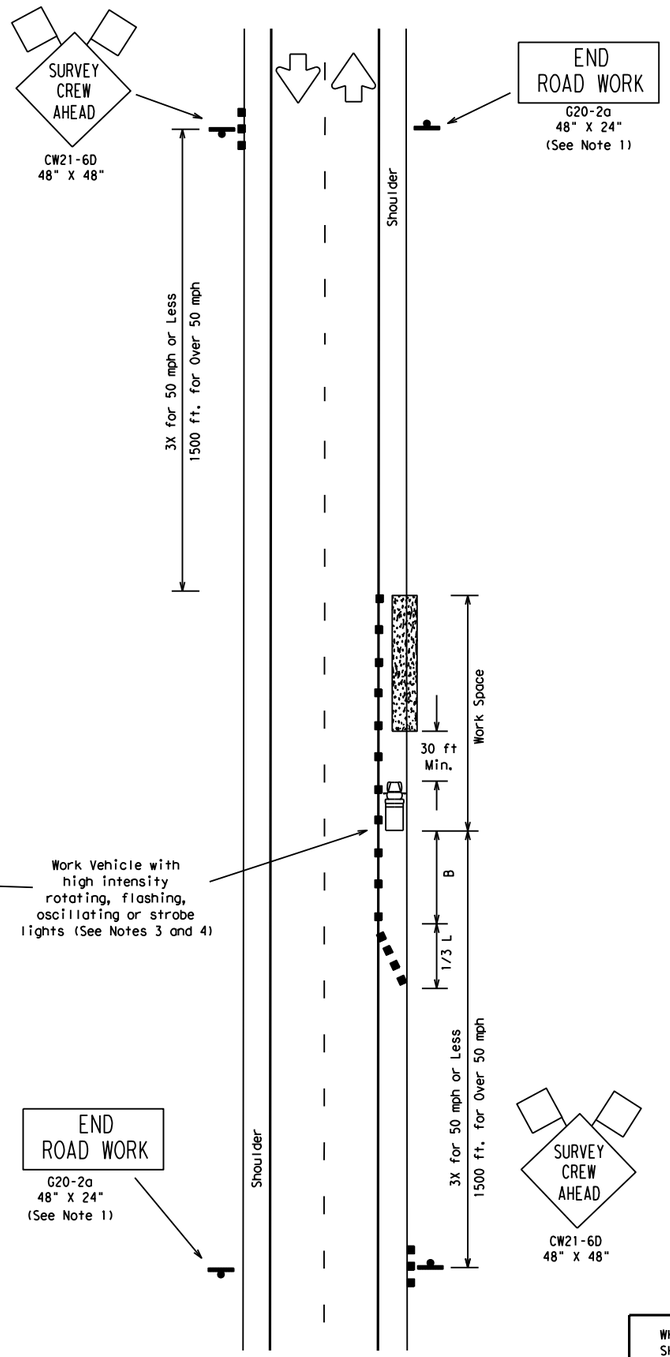


TCP (S-1a)
WORK OFF SHOULDER
OR PAVED SURFACE



TCP (S-1b)
WORK ON SHOULDER

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 ✳✳ 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent	Min. Sign Spacing "X" Distance	Longitudinal Buffer Space "B"
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	L=WS	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:

1. 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.
2. Channelizing devices on the shoulder taper and tangent section may be omitted for short duration (less than 1 hour) work.
3. 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.
4. ⚠ 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.
5. The CW20-1D "ROAD WORK AHEAD" sign may be substituted for the CW21-6D "SURVEY CREW AHEAD" sign.
6. This plan may also be used for shoulder work or off shoulder work for multilane undivided roadways.
7. 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)

8. Cones may be placed at edge of pavement adjacent to the work space to enhance safety.

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

8-18-08 Revision
⚠ Corrected misspelling.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP(S-1)-08A

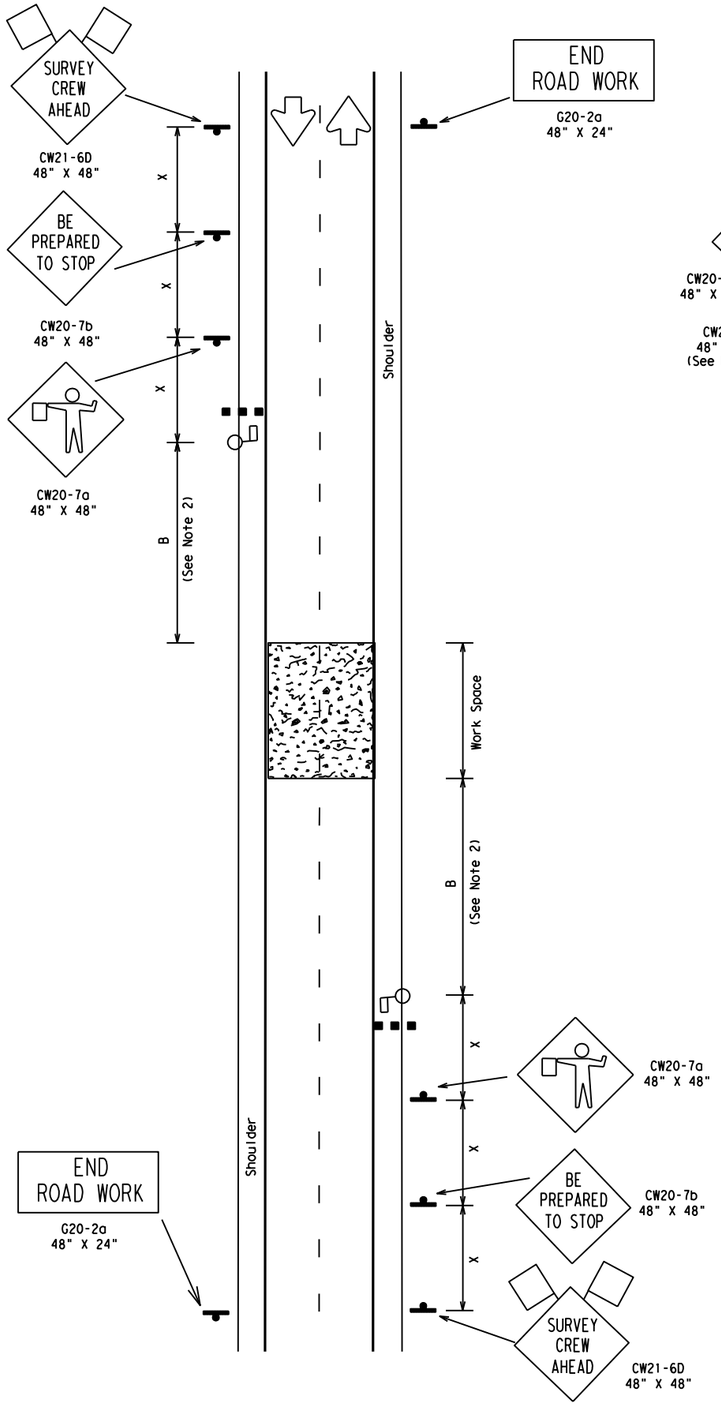
REVISIONS
8-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

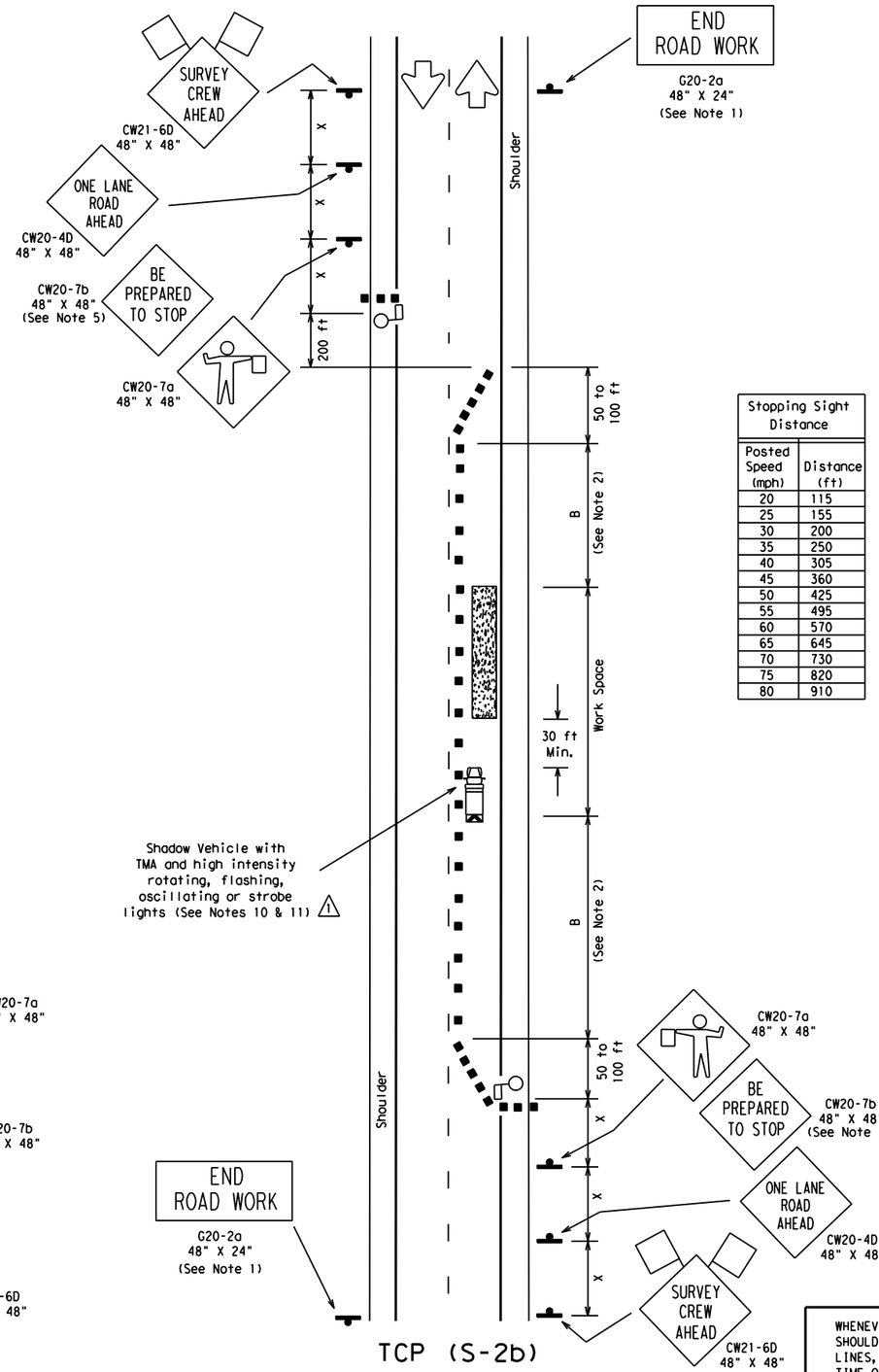
CONT	SECT	JOB	HIGHWAY
0155	06	213	FM 2678

DIST	COUNTY	SHEET NO.
CRP	REFUGIO	39

DATE: 10/12/2023 1:38:15 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/01550621 3/4 - Design/Plan Set/13. Standards/TCP Standards/TCP (S-2)-08A.dgn



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

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 ✳✳ 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent	Min. Sign Spacing "X" Distance	Longitudinal Buffer Space "B"
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	L=WS	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:
1. 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.
2. 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.
3. Flaggers should use two-way radios or other means of communication while flagging.
4. The length of the work space should be based on the ability of the flaggers to communicate.
5. CW20-1D "ROAD WORK AHEAD" signs may be substituted for CW21-6D "SURVEY CREW AHEAD" signs.
6. 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)

7. Road closures shall be less than 20 minutes. Closures less than 5 minutes are desirable.
8. Sign spacing should be increased if traffic repeatedly queues past the CW20-7b "BE PREPARED TO STOP" sign.
9. The surveying instrument should not be located on the paved surface.

TCP (S-2B)

10. 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.
11. 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.
12. 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.

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

8-18-08 Revision
1 Corrected referrence to notes.

Texas Department of Transportation
Traffic Operations Division

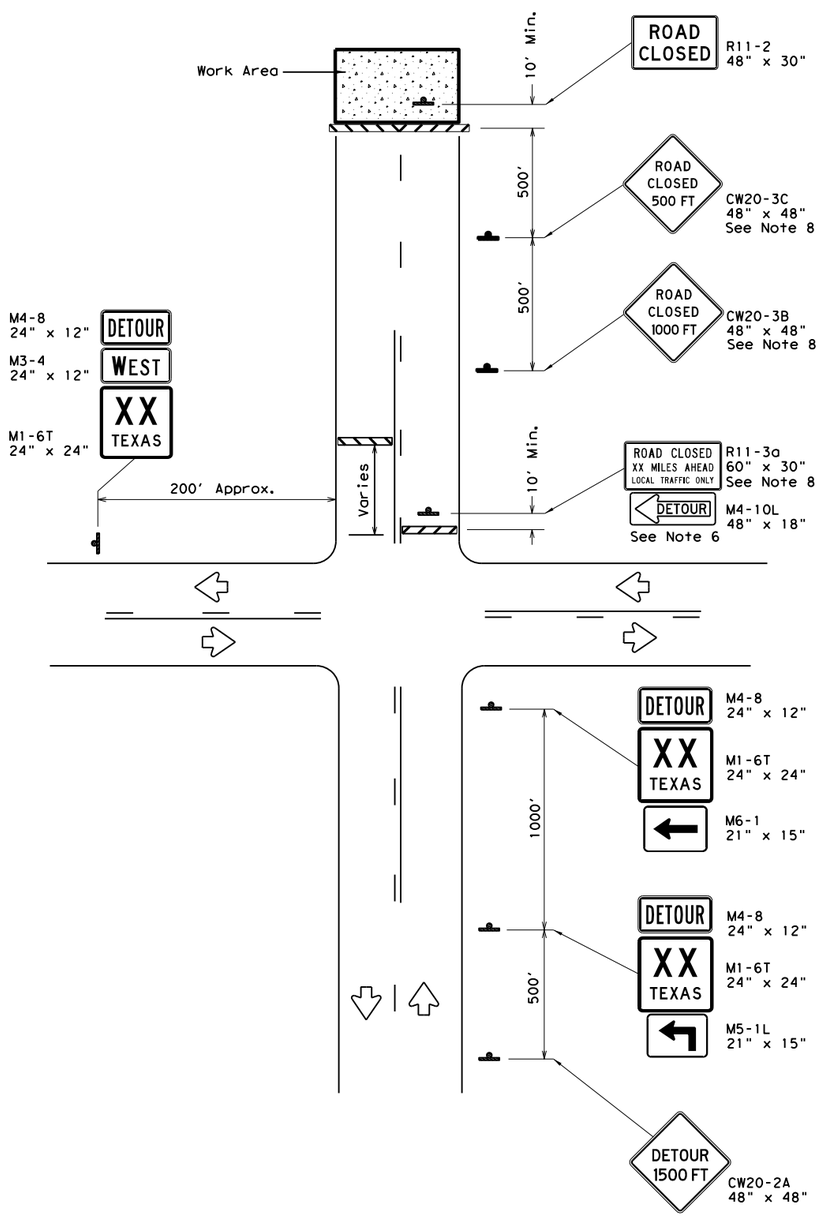
TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP(S-2)-08A

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

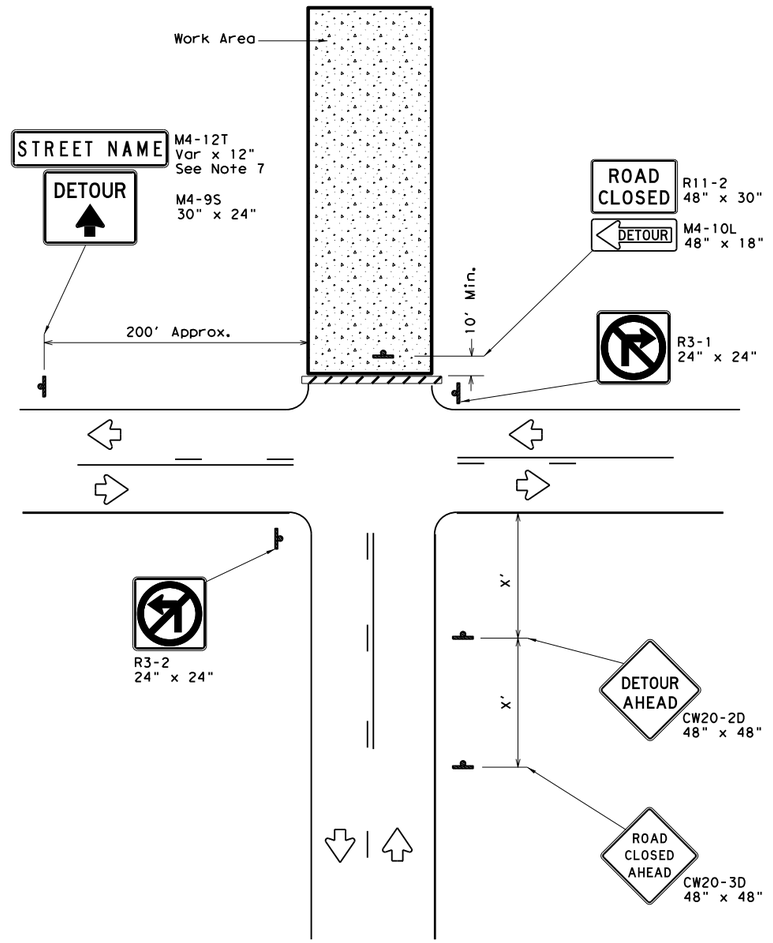
REVISIONS
8-08

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM 2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		40



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

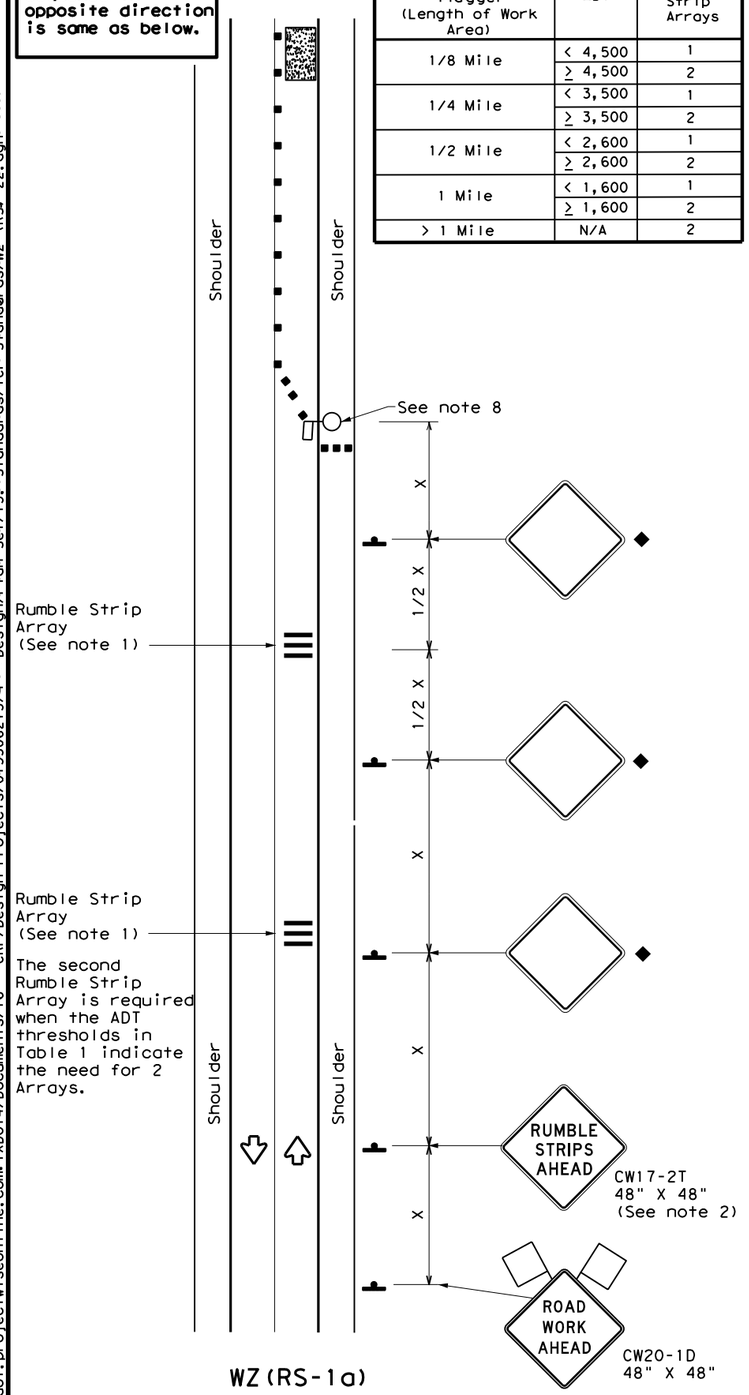
WZ(RCD)-13

FILE: wzrcd-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	0155	06	213	FM 2678
1-97 4-98 7-13	DIST	COUNTY		SHEET NO.
2-98 3-03	CRP	REFUGIO		41

DATE: 10/12/2023 1:39:10 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/Temporary Rumble Strips 22.dgn

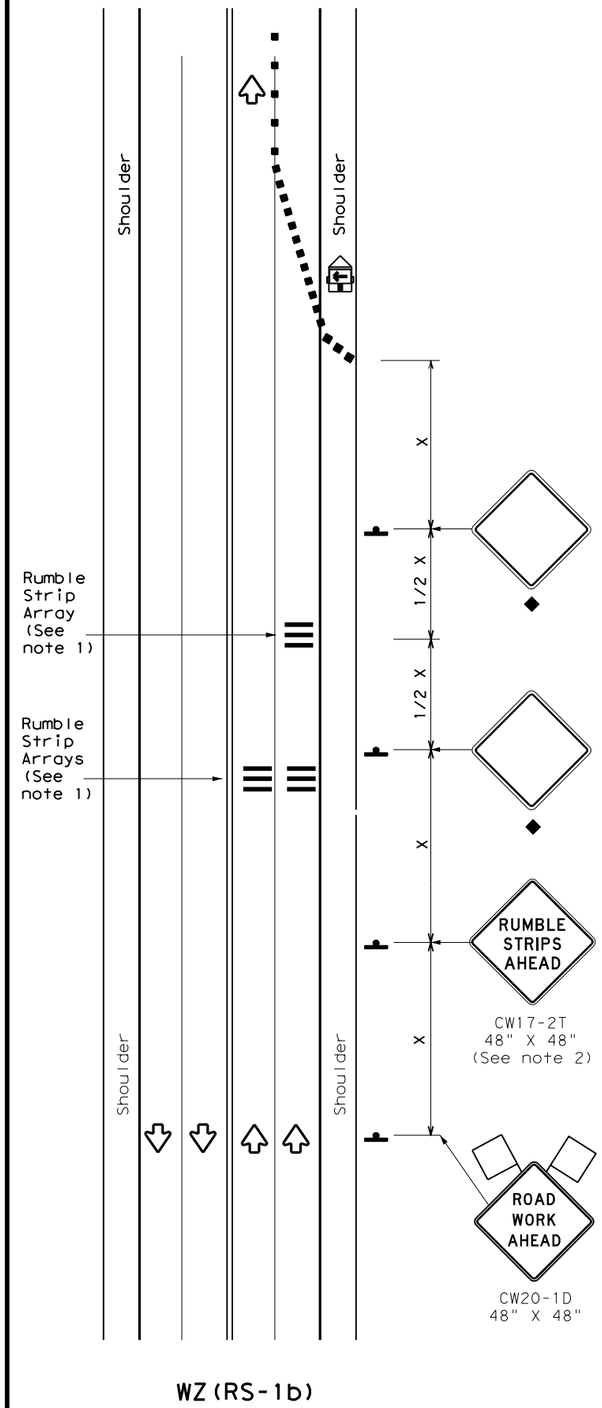
Warning sign and rumble strip sequence in opposite direction is same as below.

TABLE 1		
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



WZ(RS-1a)

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

1. 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.
2. 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.
3. Temporary Rumble Strips will be considered subsidiary to Item 502, and shall be a product listed on the Compliant Work Zone Traffic Control Devices.
4. Remove Temporary Rumble Strips before removing the advanced warning signs.
5. Temporary Rumble Strips should not be used on horizontal curves, loose gravel, soft or bleeding asphalt, heavily rutted pavements or unpaved surfaces.
6. Temporary Rumble Strips shall be installed and maintained as per manufacturer's recommendations.
7. This standard sheet shall be used in conjunction with other appropriate TCP standard, TMUTCD typical application or project specific detail for the project.
8. The one-lane two-way application may utilize a flagger, an Automated Flagger Assistance Device (AFAD) or a Portable Traffic Signal (PTS).
9. Replace defective Temporary Rumble Strips as directed by the Engineer.
10. Temporary Rumble Strips may be used on freeways or expressways based on engineering judgment and written direction from the Engineer.

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

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

* Conventional Roads Only

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

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

◆ 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.

TABLE 2	
Speed	Approximate distance between strips in an array
≤ 40 MPH	10'
> 40 MPH & ≤ 55 MPH	15'
= 60 MPH	20'
≥ 65 MPH	* 35' +

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 2-14 1-22 4-16	0155	06	213	FM 2678
	DIST	COUNTY		SHEET NO.
	CRP	REFUGIO		42

117

DATE: 10/12/2023 1:39:37 PM
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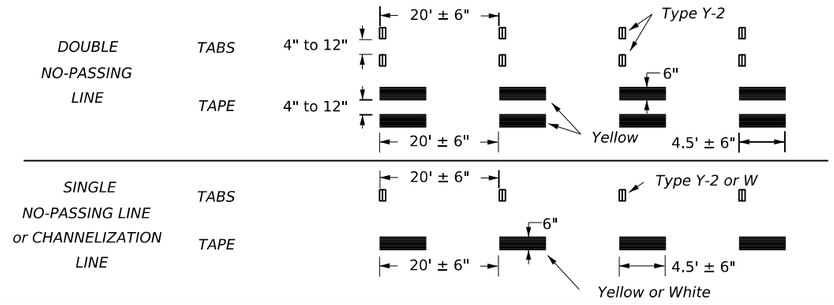
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



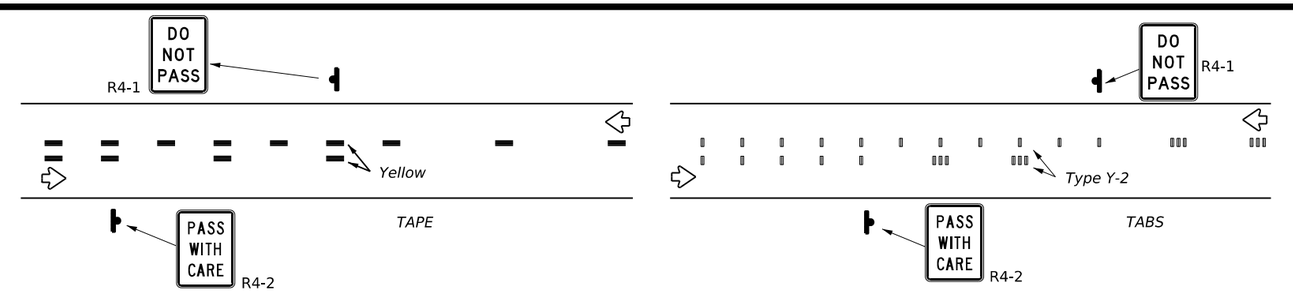
NOTES:

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

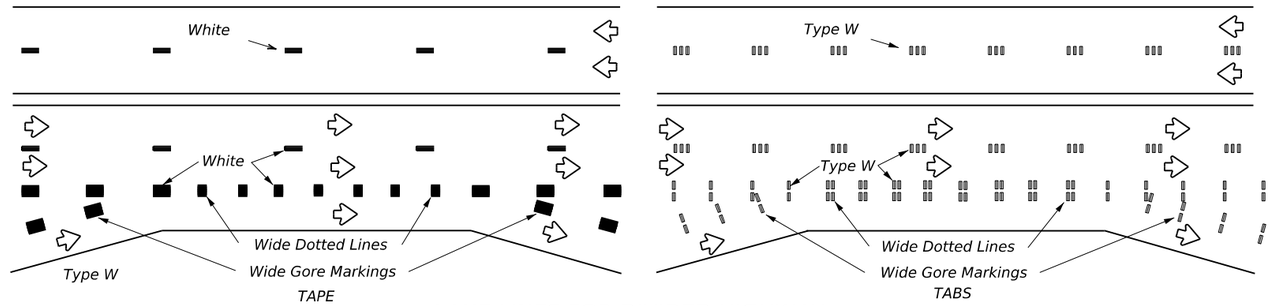
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

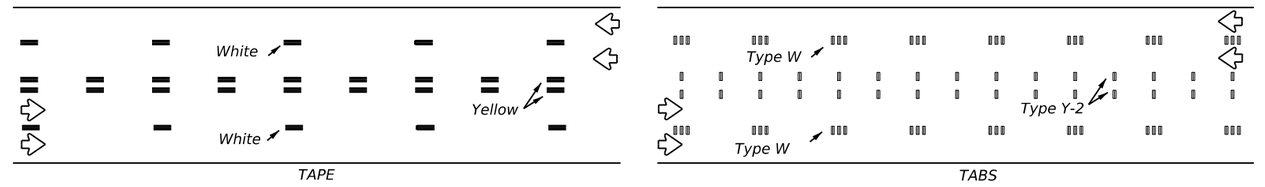
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



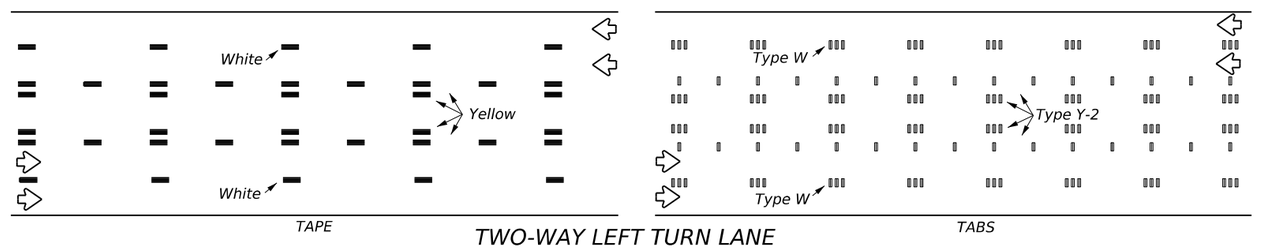
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



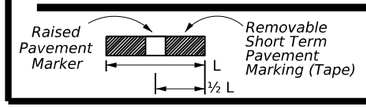
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

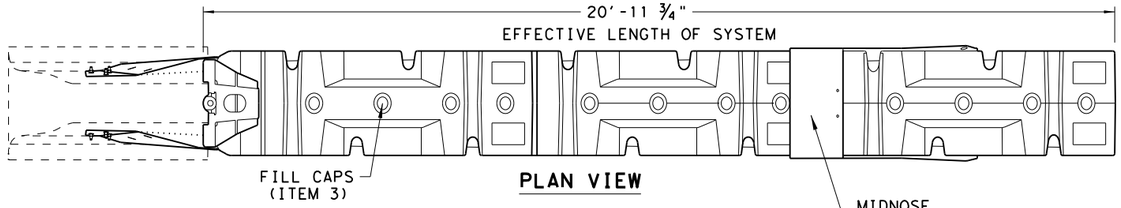
WORK ZONE SHORT TERM PAVEMENT MARKINGS

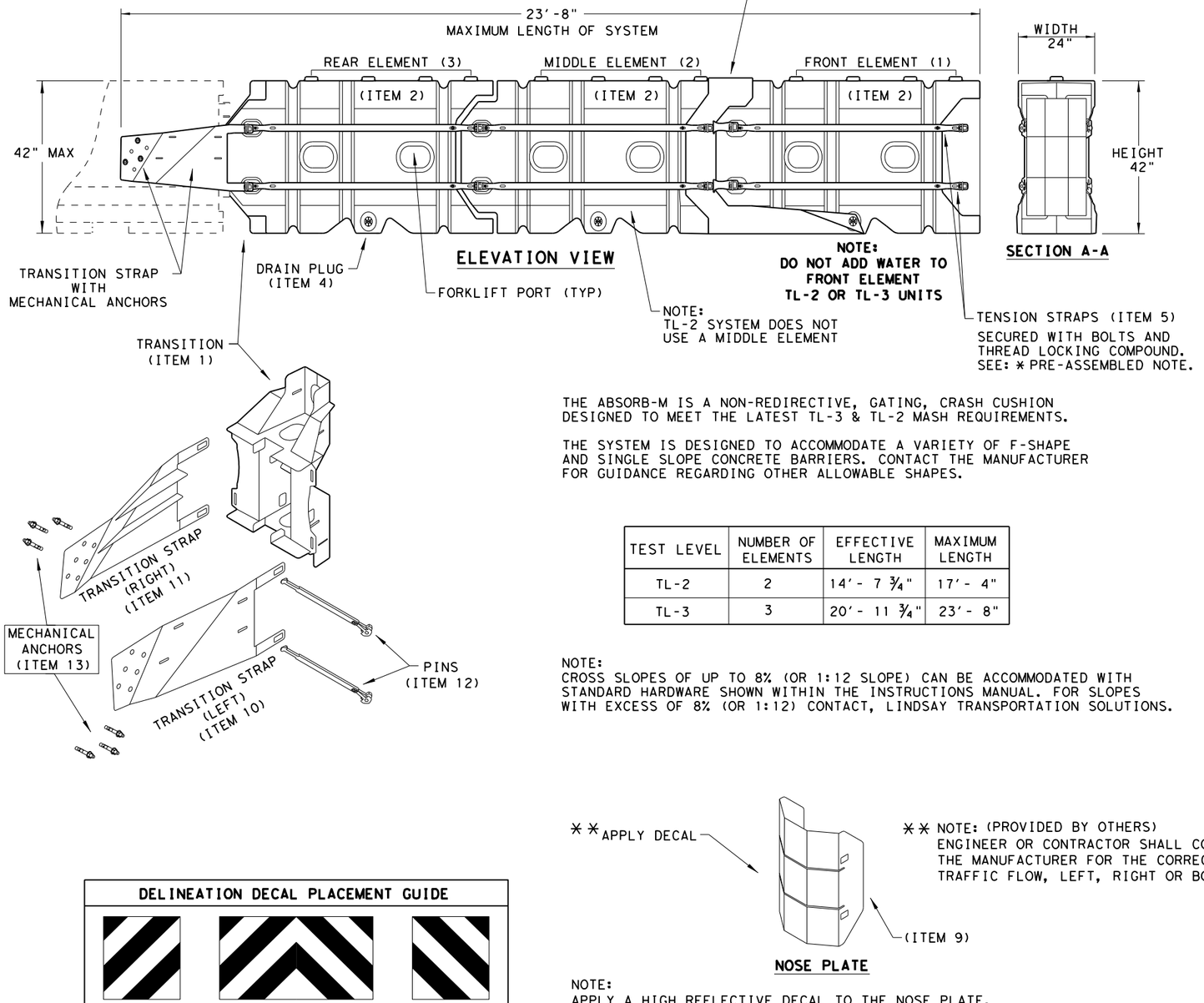
WZ(STPM)-23

FILE: wzstpm-23.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0155	06	213	FM 2678
4-92 7-13	DIST	COUNTY		SHEET NO.
1-97 2-23	CRP	REFUGIO		43
3-03				

DATE: 10/12/2023
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design/Plan Set/13. Standards/TCP Standards/ABSORB (M)-19

SYSTEM SHOWN - ABSORB-M TL-3





THE ABSORB-M IS A NON-REDIRECTIVE, GATING, CRASH CUSHION DESIGNED TO MEET THE LATEST TL-3 & TL-2 MASH REQUIREMENTS.

THE SYSTEM IS DESIGNED TO ACCOMMODATE A VARIETY OF F-SHAPE AND SINGLE SLOPE CONCRETE BARRIERS. CONTACT THE MANUFACTURER FOR GUIDANCE REGARDING OTHER ALLOWABLE SHAPES.

TEST LEVEL	NUMBER OF ELEMENTS	EFFECTIVE LENGTH	MAXIMUM LENGTH
TL-2	2	14'- 7 3/4"	17'- 4"
TL-3	3	20'- 11 3/4"	23'- 8"

NOTE:
CROSS SLOPES OF UP TO 8% (OR 1:12 SLOPE) CAN BE ACCOMMODATED WITH STANDARD HARDWARE SHOWN WITHIN THE INSTRUCTIONS MANUAL. FOR SLOPES WITH EXCESS OF 8% (OR 1:12) CONTACT, LINDSAY TRANSPORTATION SOLUTIONS.

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING THE INSTALLATION AND TECHNICAL GUIDANCE, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800. 180 RIVER ROAD, RIO VISTA, CA 94571
2. THE ABSORB-M SYSTEM IS ONLY APPROVED FOR USE IN (TEMPORARY WORK ZONE) LOCATIONS.
3. THE ABSORB-M IS A WATER FILLED NON-REDIRECTIVE, GATING CRASH CUSHION THAT DOES NOT NEED TO BE ATTACHED TO A FOUNDATION AND CAN BE INSTALLED ON TOP OF CONCRETE, ASPHALT, OR ANY SURFACE CAPABLE OF BEARING THE WEIGHT OF THE SYSTEM.
4. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
5. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
6. THE ABSORB-M SHOULD BE LOCATED APPROXIMATELY PARALLEL WITH THE BARRIER.
7. THE USE OF THE ABSORB-M IS RESTRICTED TO A BARRIER HEIGHT OF UP TO 42 INCHES.
8. DO NOT ADD WATER TO FRONT ELEMENT (TL-2 OR TL-3 UNIT).

	BILL OF MATERIALS (BOM) ABSORB-M TL-3 & TL-2 SYSTEMS		QTY	QTY
ITEM #	PART NUMBER	PART DESCRIPTION	TL-2 SYSTEM	TL-3 SYSTEM
1	BSI-1809036-00	TRANSITION-(GALV)	1	1
* 2	BSI-1808002-00	PRE-ASSEMBLED ABSORBING (ELEMENTS)	2	3
* 3	BSI-4004598	FILL CAPS	8	12
* 4	BSI-4004599	DRAIN PLUGS	2	3
* 5	BSI-1809053-00	TENSION STRAP-(GALV)	8	12
* 6	BSI-2001998	C-SCR FH 3/8-16 X 1 1/2 GR5 PLT	8	12
* 7	BSI-2001999	C-SCR FH 3/8-16 X 1 GR5 PLT	8	12
8	BSI-1809035-00	MIDNOSE-(GALV)	1	1
9	BSI-1808014-00	NOSE PLATE	1	1
10	BSI-1809037-00	TRANSITION STRAP (LEFT-HAND)-(GALV)	1	1
11	BSI-1809038-00	TRANSITION STRAP (RIGHT-HAND)-(GALV)	1	1
12	BSI-1808005-00	PIN ASSEMBLY	8	10
13	BSI-2002001	ANC MECH 5/8-11X5 (GALV)	6	6
14	ABSORB-M	INSTALLATION AND INSTRUCTIONS MANUAL	1	1

*COMPONENTS PRE-ASSEMBLED WITH ELEMENT ASSEMBLY

DELINEATION DECAL PLACEMENT GUIDE

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

NOTE:
APPLY A HIGH REFLECTIVE DECAL TO THE NOSE PLATE. 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.

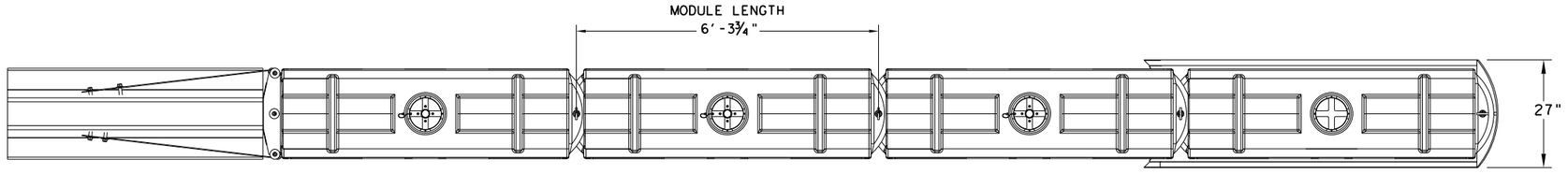
NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE ABSORB-M, IT IS NOT INTENDED TO REPLACE THE INSTALLATION INSTRUCTIONS MANUAL.

SACRIFICIAL

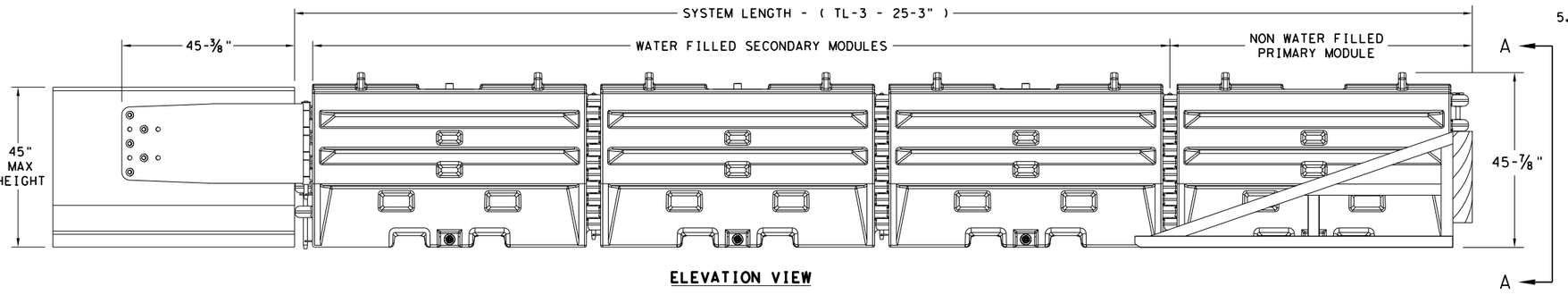
Texas Department of Transportation
Design Division Standard

LINDSAY TRANSPORTATION SOLUTIONS
CRASH CUSHION
(MASH TL-3 & TL-2)
TEMPORARY - WORK ZONE
ABSORB(M)-19

FILE: absorbm19	DN: TxDOT	CK: KM	DW: VP	CK:
© TxDOT: JULY 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0155	06	213	FM 2678
	DIST	COUNTY		SHEET NO.
	CRP	REFUGIO		44



PLAN VIEW



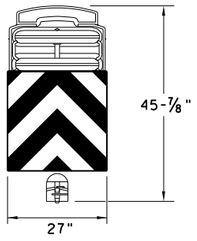
ELEVATION VIEW

GENERAL NOTES

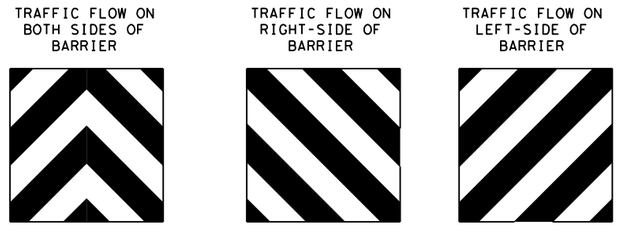
1. REFER TO THE INSTALLATION MANUAL FOR SPECIFIC SYSTEM ASSEMBLY AND MODULE ORIENTATION. FOR ADDITIONAL INFORMATION, CONTACT TRAFFIX, INC. AT (949) 361-5663.
2. THE SLED SYSTEM IS A MASH APPROVED TEST LEVEL 3 (TL-3) CRASH CUSHION APPROVED FOR USE IN TEMPORARY WORK ZONES. THE SLED SYSTEM IS A NON-REDIRECTIVE, GATING CRASH CUSHION THAT DOES NOT NEED TO BE ATTACHED TO THE GROUND AND CAN BE INSTALLED ON CONCRETE, ASPHALT, GRAVEL OR COMPACTED SOIL.
3. MAXIMUM PERMISSIBLE CROSS SLOPE IS 8° (DEGREES) (14%).
4. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
5. THE SLED SYSTEM CAN BE ATTACHED TO:

- CONCRETE BARRIER, TEMPORARY OR PERMANENT, 45" MAXIMUM HEIGHT
- STEEL BARRIER
- PLASTIC BARRIER
- CONCRETE BRIDGE ABUTMENTS
- W-BEAM GUARD RAIL
- THRIE BEAM GUARD RAIL

TEST LEVEL	NUMBER OF SECONDARY MODULES	SYSTEM LENGTH
TL-3	3	25' 3"

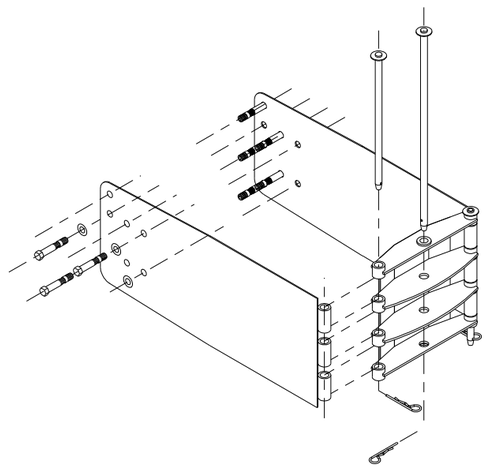


SECTION A-A



NOSE SHEETING PANEL DELINEATION

NOTE:
SEE INSTALLATION MANUAL FOR CUSTOMIZED DELINEATION NOSE SHEETING FOR DECAL PLACEMENT.



SLED TRANSITION COMPONENTS FOR ATTACHMENT TO CMB

NOTE:
SEE MANUFACTURER'S INSTALLATION MANUAL FOR FURTHER DETAILS.

TRANSITION OPTIONS
SLED TRANSITION TO CONCRETE TRAFFIC BARRIER (TEMPORARY OR PERMANENT)
SLED TRANSITION TO STEEL TRAFFIC BARRIER (CONTACT MFGR FOR PROPER TRANSITION)
SLED TRANSITION TO PLASTIC TRAFFIC BARRIER (CONTACT MFGR FOR PROPER TRANSITION)
SLED TRANSITION TO W-BEAM OR THRIE BEAM GUARD RAIL (CONTACT MFGR FOR PROPER TRANSITION)
SLED TRANSITION TO CONCRETE BRIDGE ABUTMENT

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SLED, IT IS NOT INTENDED TO REPLACE THE INSTALLATION INSTRUCTIONS MANUAL.

SACRIFICIAL

BILL OF MATERIAL

PART NUMBER	DESCRIPTION	QTY: TL-3
45131	TRANSITION FRAME, GALVANIZED	1
45150	TRANSITION PANEL, GALVANIZED	2
45147-CP	TRANSITION SHORT DROP PIN W/ KEEPER PIN, GALVANIZED	2
45148-CP	TRANSITION LONG DROP PIN W/ KEEPER PIN, GALVANIZED	1
45050	ANCHOR BOLTS	9
12060	WASHER, 3/4" ID X 2" OD	9
45044-Y	SLED YELLOW WATER FILLED MODULE	3
45044-YH	SLED YELLOW "NO FILL" MODULE	1
45044-S	CIS (CONTAINMENT IMPACT SLED), GALVANIZED	1
45043-CP	T-PIN W/ KEEPER PIN	4
18009-B-I	FILL CAP W/ "DRIVE BY" FLOAT INDICATOR	3
45033-RC-B	DRAIN PLUG	3
45032-DPT	DRAIN PLUG REMOVAL TOOL	1

Texas Department of Transportation

Design Division Standard

SLED
CRASH CUSHION
TL-3 MASH COMPLIANT
(TEMPORARY, WORK ZONE)
SLED-19

FILE: sled19.dgn	DN: TxDOT	CK: KM	DW: VP	CK:
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REVISIONS	0155	06	213	FM 2678
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	CRP	REFUGIO		45

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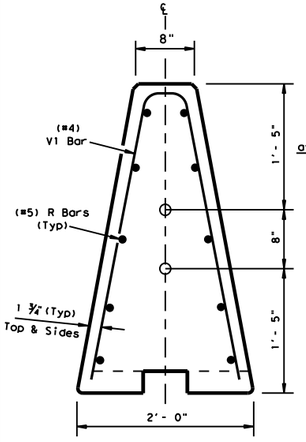
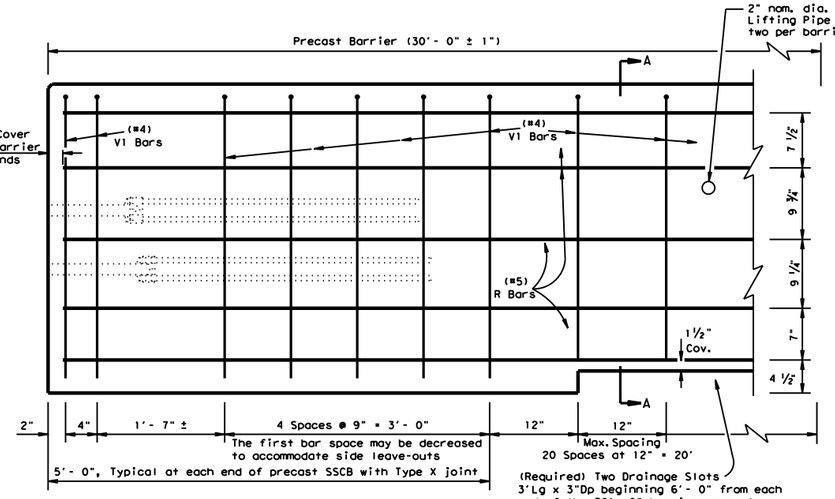
DATE: 10/12/2023
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/01550621 3/4 - Design/Plan Set/13. Standards/TCP Standards/SSCB (2)-10



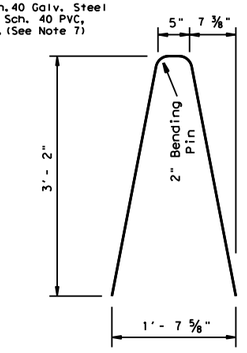
End View
Precast Barrier

Pipe locations for Joint Type X connection



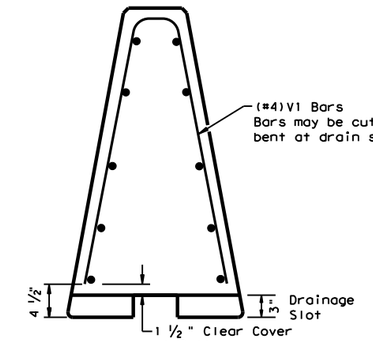
Reinforcement for Precast (SSCB)
Single Slope Concrete Barrier (Type 1)

Showing reinforcement for Joint Connection (Type X)



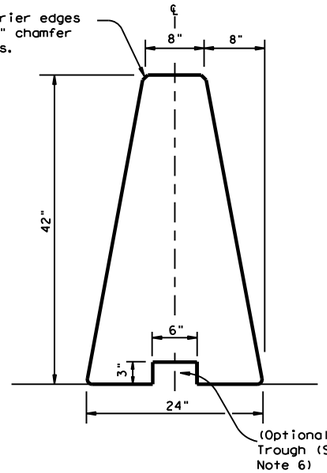
V1 Bar
#4 Rebar

Note:
V1 Bars above the drainage slots may bent to accomadate 1 ½" clear cover as directed by the Engineer.



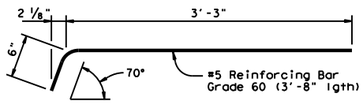
Section A-A
Steel Placement at (Required) Drainage Slots

All precast barrier edges shall have a ¾" chamfer or tooled radius.



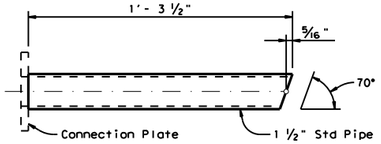
Single Slope Concrete Traffic Barrier

Precast SSCB barrier may be connected to cast-in-place SSBC. The joint connection "Types" may be used in the cast-in-place barrier, to match the precast barrier connection.



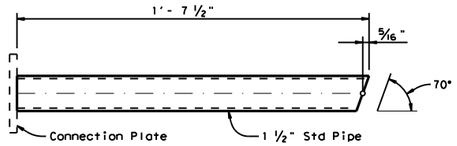
DEFORMED BAR ANCHOR DETAILS

Two (2) Bars required per assembly.
Eight (8) required per Joint.



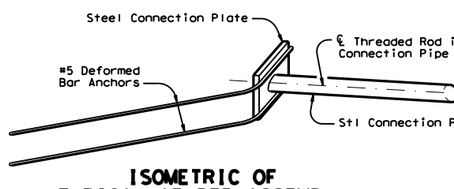
UPPER CONNECTION PIPE DETAILS

One (1) Steel Pipe required per Upper Assembly.
Two (2) required per Joint.



LOWER CONNECTION PIPE DETAILS

One (1) Steel Pipe required per Lower Assembly.
Two (2) required per Joint.

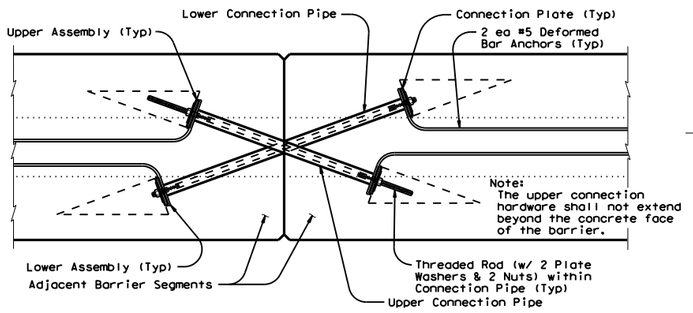


ISOMETRIC OF TYPICAL WELDED ASSEMBLY

Four (4) [2 Upper & 2 Lower] Assemblies required per Joint.

General Notes

1. Concrete shall be Class H with a minimum compressive strength of 3,600 psi.
2. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
3. Precast barrier length shall be 30 ft. unless otherwise specified on the plans.
4. All precast barrier edges shall have a ¾" chamfer or a tooled radius.
5. All concrete, reinforcement, joint connection systems, grout etc. as shown, are considered as part of the barrier payment.
6. Conduit trough when required shall be shown elsewhere on the plans, or as directed by the Engineer.
7. Regardless of the method of handling, barrier lifting points shall be approx. 7.5 feet from the ends of the barrier. Lifting devices and attachments to barrier sections shall be approved by the Engineer.
8. Surface finishing and grouting (where required) shall be two parts sand one part cement with enough water to make the mixture plastic. Grouting shall be done in a manner that will assure a smooth surface. Surface finishing shall be considered subsidiary to the various bid items.
9. All steel assemblies shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."



TYPE X JOINT INSTALLATION DETAIL

Barrier reinforcing and Type X Joint Leave-Out dimensions not shown for clarity.

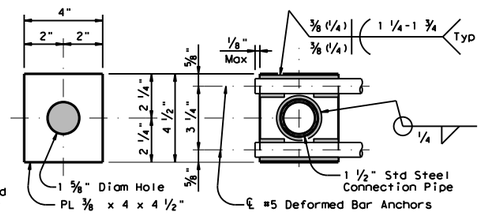
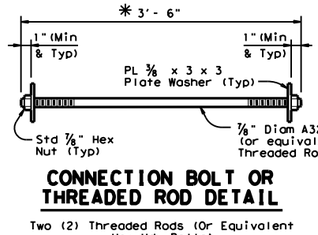


PLATE DIMENSIONS **WELDING DETAILS**

CONNECTION PLATE DETAILS

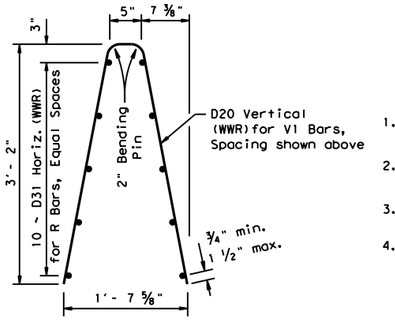
One (1) Plate required per assembly.
Four (4) required per Joint. All steel fittings for joint Type X shall be galvanized after fabrication in accordance with Item 445.



CONNECTION BOLT OR THREADED ROD DETAIL

Two (2) Threaded Rods (Or Equivalent Hex Hd. Bolts)
(w/ Two (2) PL ⅜ x 3 x 3 Plate Washers & Two (2) Std Hex Nuts)
required per Joint.

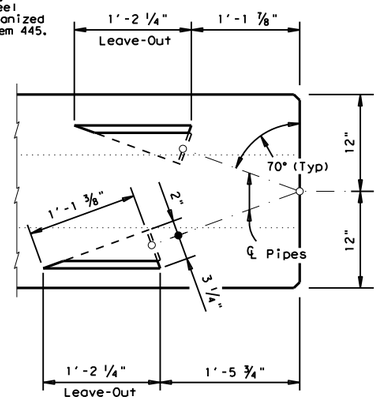
Weight of one precast 30 ft. (SSCB) segment = Approx. 10.5 Tons or 717 lbs per ft.



Welded Wire Reinforcement (WWR) Option for Bars R and V1

(WWR) General Notes

1. Deformed Welded Wire Reinforcement (WWR) shall conform to ASTM A497.
2. Welded wire cage may be cut or bent to accommodate the Type X joint connection and drainage slots, as directed by the Engineer.
3. All reinforcement shall comply with Item 440, "Reinforcing Steel."
4. Combinations of reinforcing steel and WWR will be permitted, as directed by the Engineer. The dimension from the end of the barrier section to the first wire shall not exceed 3".



BARRIER PLAN AT JOINT

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER (TYPE 1)

SSCB(2)-10

FILE: sscb210.dgn	DN: TxDOT	CK: AM	DW: BD	CK:
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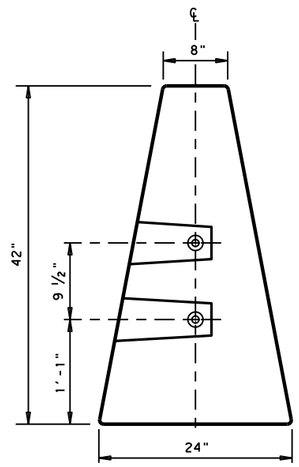
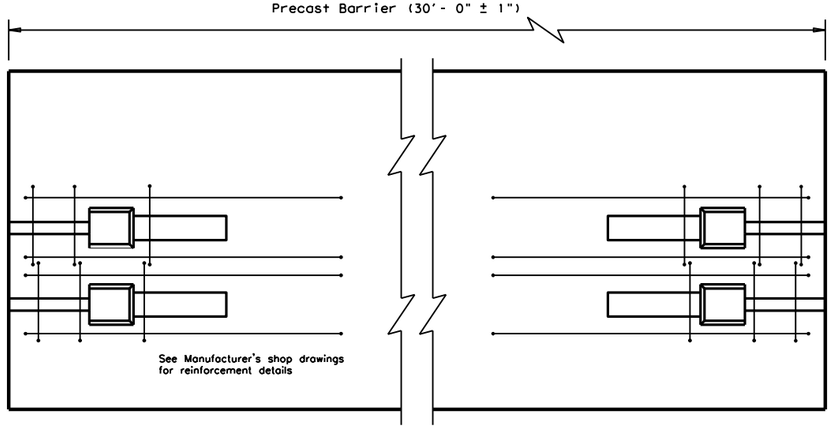
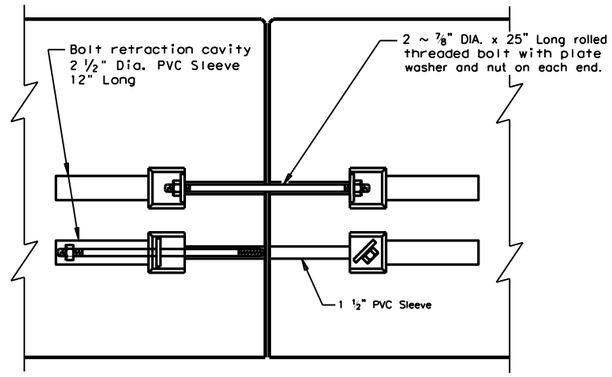


END VIEW
"QUICK-BOLT" POCKET LOCATIONS

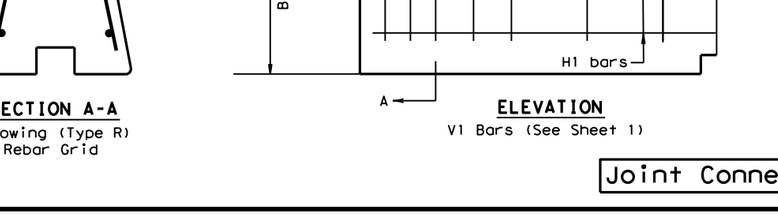


ELEVATION VIEW
"QUICK-BOLT" (SSCB)
See Manufacturer's shop drawing for additional details

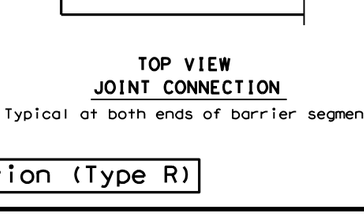


ELEVATION VIEW SHOWING JOINT CONNECTION
"QUICK-BOLT"

Joint Connection (Type Q)



TOP VIEW
PRECAST (SSCB) WITH J-J HOOKS
See Manufacturer's shop drawing for additional details



VIEW FROM ABOVE
J-J HOOK CONNECTION

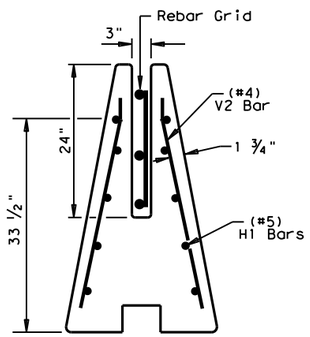
END VIEW

Proprietary Joint Connections (SSCB)

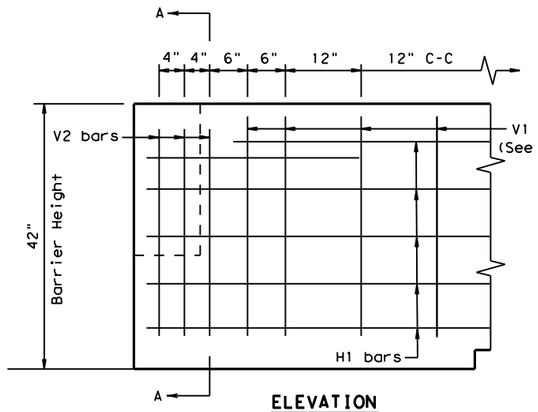
Two proprietary joint connections are acceptable as alternates to the (Type X) connection shown, here on. These joint connections types are:

J-J Hooks by Easi-Set Industries, (800)547-4045
Quick-Bolt by Bexar Concrete, (210)497-3773

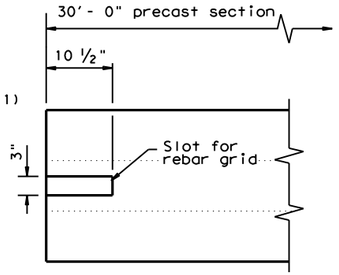
If one of these connection systems are exclusively specified in the plans, prior approval for sole source use must be obtained. Details of the connection components and barrier reinforcement for these systems, will be shown on the manufacturer's shop drawing(s) furnished to the Engineer.



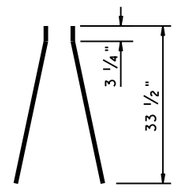
SECTION A-A
Showing (Type R) Rebar Grid



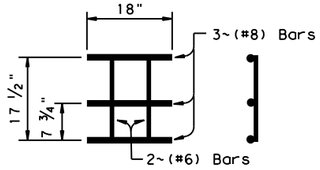
ELEVATION
V1 Bars (See Sheet 1)



TOP VIEW
JOINT CONNECTION
Typical at both ends of barrier segment



(#4) V2 BARS
6 ~ two piece bars per barrier segment



WELDED REBAR GRID

Joint Connection (Type R)

Texas Department of Transportation — Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER
(TYPE 1)

SSCB(2)-10

FILE: sscb210.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
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	CRP	REFUGIO		47

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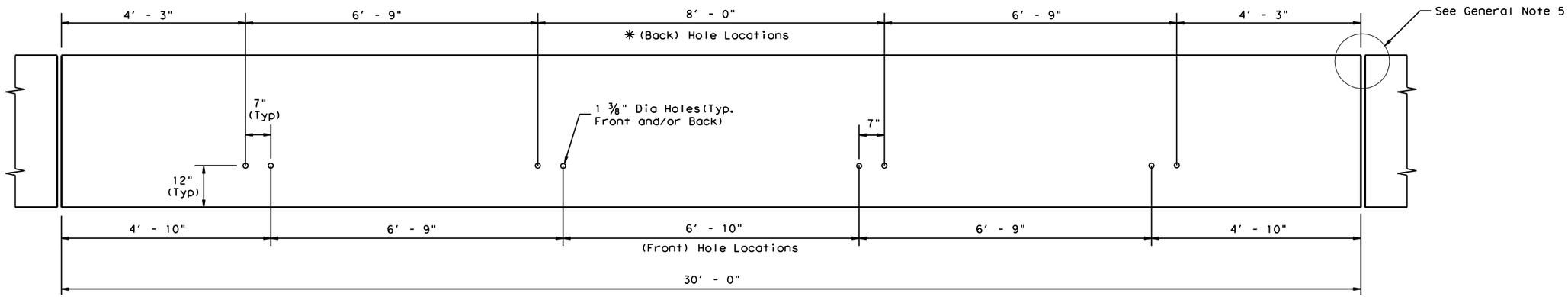
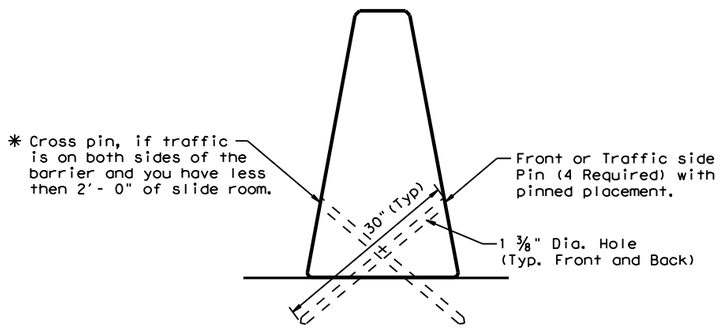


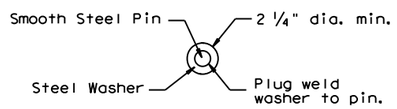
DETAIL 1

Precast SSCB(42")
Showing hole locations

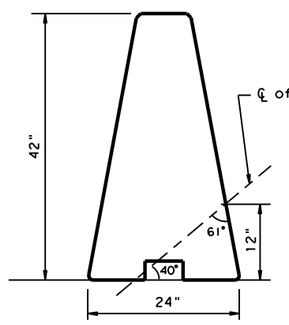


DETAIL 2

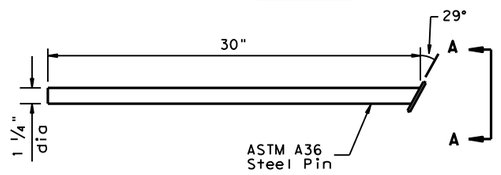
Placement on (ACP)
Asphalt Conc. Pavement
or Treated Base Material
(30" Pin required)



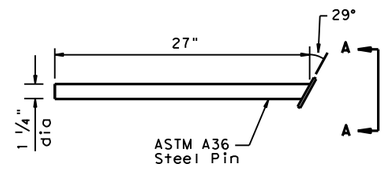
VIEW A-A



HOLE LOCATION DETAIL



(30") PIN DETAIL
See Detail 2

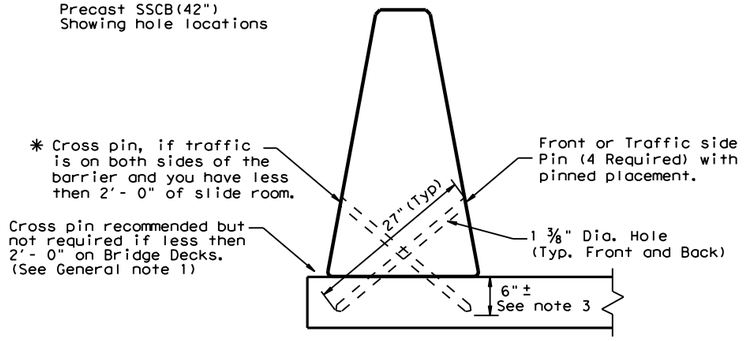


(27") PIN DETAIL
See Detail 3

Note:
Steel washer welded to pin at 29° angle so that the washer is flush with barrier surface. (See View A-A)

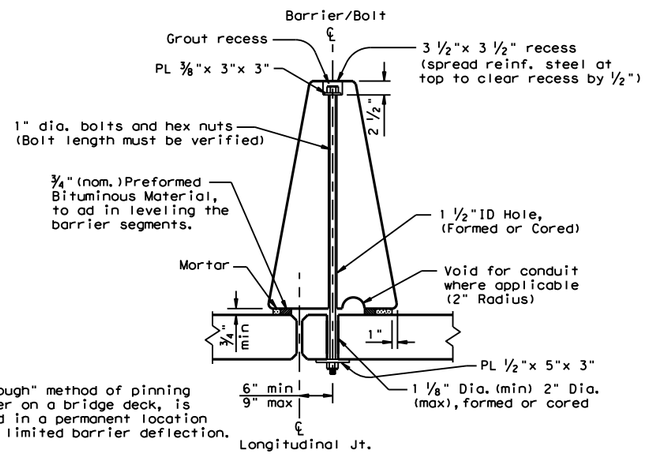
DETAIL 3

Bridge Deck or CRCP
(27" Pin required).



CORE DRILLING EXISTING BARRIER

Core drilling existing concrete barrier is permitted. Holes shall be drilled with coring or masonry drilling type equipment. Percussion (star) drilling shall not be used. A special drill bit (to cut through existing reinforcing) will likely be required. Spalls in the concrete exceeding ½" shall be patched.



Note:
The "Bolt Through" method of pinning precast barrier on a bridge deck, is primarily used in a permanent location that requires limited barrier deflection.

PRECAST SSCB (BOLT THROUGH) PLACEMENT OVER LONGITUDINAL EXPANSION JOINT

For bolt through locations, use the (Front) hole locations shown on Detail 1.

GENERAL NOTES

1. These details provide a method of laterally restraining precast concrete barrier to limit deflections under normally expected passenger vehicle impacts. These details are intended for use in work zones, primarily on bridge decks, or pavement where temporary barrier must be placed less then 2 ft. from the longitudinal edge of the deck or dropoff and parallel to the direction of travel. Other applications of these details are acceptable as directed by the Engineer.
2. Each precast concrete barrier section shall have a minimum of four or total of eight 1 3/8in. ID holes formed or cored through the barrier. The center lines of the holes are shown in the hole location detail. If rebar is encountered, the entry point may be shifted 2" plus or minus longitudinally along the barrier. The eight holes are spaced along the length of the barrier as shown in Detail 1.
3. The drilling of the travel surface is accomplished by placing the pre-drilled barrier section on the travel surface in the desired position. Then the hole is drilled with the bit passing though the hole in the barrier. The bit is to be inserted into the hole in the barrier so that the travel surface is drilled to a point which is slightly more than the pin length.
4. Note that steel washers have been welded to the top of the steel pins to aid in the removal of the pins, when the barrier is removed.
5. See SSCB(2) standard sheet for reinforcement requirements and joint connection types.
6. The forming or coring of holes in the barrier, drilling of holes in bridge deck or pavement, fabrication and materials for the 1 1/4in. pins, installation of pins, and any repair to the barrier shall be considered as subsidiary to the barrier bid items.
7. The barrier and travel surface will be repaired as directed by the Engineer in accordance with Item 429, "Concrete Structure Repair."
8. All steel pins shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."
9. Weight of barrier is approx. 700 lbs per foot.

Texas Department of Transportation

Design Division Standard

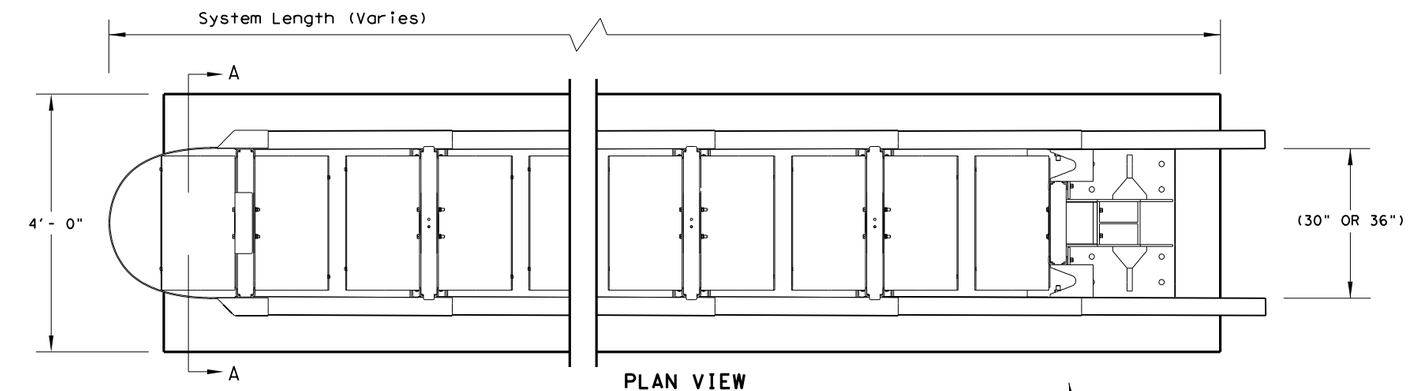
SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER (TYPE 1) PINNED PLACEMENT

SSCB(5)-10

FILE: sscb510.dgn	DN: TxDOT	CK: AM	DW: BD	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0155	06	213	FM 2678
	DIST	COUNTY		SHEET NO.
	CRP	REFUGIO		48

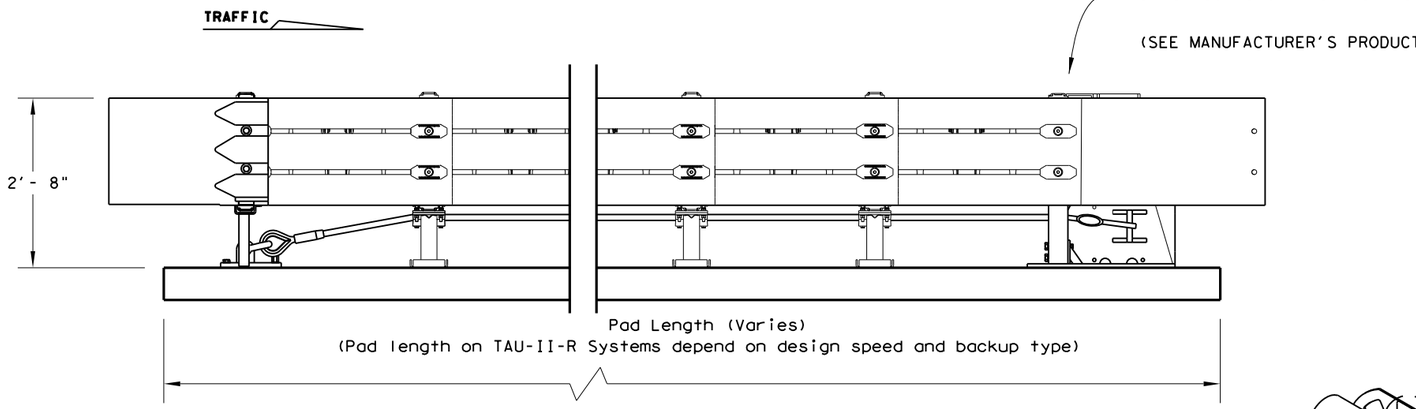
DATE: 10/12/2023
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design/Plan Set/13. Standards/TCP Standards/TAU-II-R(N)-16



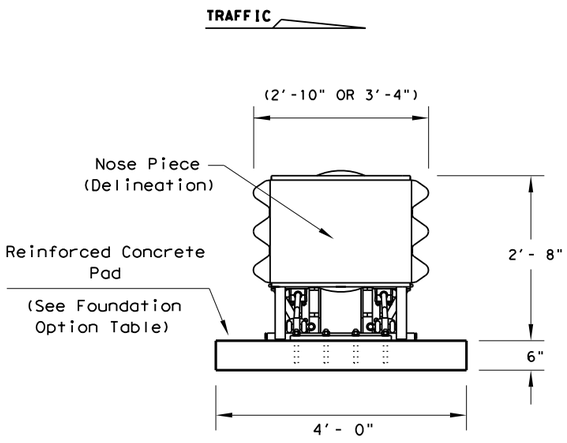
PLAN VIEW

Attachments and transitions to various barrier shapes, barrier railings and bi-directional traffic flows are available.

(SEE MANUFACTURER'S PRODUCT MANUAL)



ELEVATION VIEW



SECTION A-A

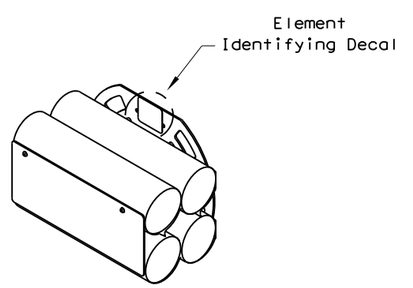
Nose Piece delineation orientation, is shown elsewhere on the plans.

TRANSITION OPTIONS
Vertical Wall
Concrete Traffic Barriers
W-Beam Guardrail
Thrie Beam Guardrail

For bi-directional transition panel and end shoe details. (See manufacturer's product manual.)

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

For steel placement in concrete foundations. (See manufacturer's product manual)



ENERGY ABSORBING ELEMENTS (EAE)

BACKUP SUPPORT OPTIONS
Compact (Stand Alone)
Flush Mount
PCB (Concrete Barrier)

TAU-II-R (NARROW) SYSTEM LENGTHS			
BACKSTOP	TL-2	TL-3	70 mph
PCB	13'-7"	27'-10"	30'-7"
Flush Mount	14'-0"	28'-3"	31'-0"
Compact	15'-3"	29'-6"	32'-3"

Backup and Transition types are shown elsewhere on the plans, (i.e. Attenuator location details or in the general notes).

Note: System lengths are ± 2"

GENERAL NOTES

1. For specific information regarding installation and technical guidance of the system, contact: Lindsay Transportation Solutions - Barrier Systems, Inc. at (707) 374-6800. 180 River Road, Rio Vista, CA 94571
2. For bi-directional traffic, appropriate transition panels will be required.
3. Additional details for the backup support option, transition options and foundation option will be shown on the manufacturer's shop drawings furnished to the Engineer.
4. Concrete shall be class "S" with a minimum compressive strength of 4,000 psi.
5. Maximum permissible cross-slope is 8%.
6. The installation area should be free from curbs, elevated objects, or depressions.
7. The TAU-II-R system should be approximately parallel with the barrier or center of merging barriers.
8. Refer to Universal TAU-II-R configuration chart for specific systems configuration number and location of each type of energy absorbing element.
9. 30-inch (30") model shown, also available in 36-inch (36") configuration.

BILL OF MATERIAL

PRODUCT CODE	QTY	DESCRIPTION
B030704	1	Front Support
B030703	TBD	Mid Support
TBD	1	Backstop Assembly (See Table)
TBD	1	Front Cable Anchor
TBD	1	Nose Assembly
B010202	TBD	Sliding Panel
B010659	2	End Panel
K001003	1	Slider Assembly Kit
BSI-1202006-KT	TBD	TAU-II-R Slider Kit
BSI-1107131-KT	TBD	TAU-II-R EAE Mounting Hw Kit
BSI-1012069-00	TBD	Energy Absorbing Element, Type 1
BSI-1012070-00	TBD	Energy Absorbing Element, Type 2
BSI-1012071-00	TBD	Energy Absorbing Element, Type 3
BSI-1110009-00	TBD	Energy Absorbing Element, Type 3N
TBD	TBD	Cable Assembly
K001004	TBD	Cable Guide Kit
K001005	2	Front Support Leg Kit
B010651	4	Pipe Panel Mount
TBD	1	Anchoring Package

(TBD) = To Be Determined, depending on Backup Type and System Length.

(See manufacturer's product manual for details)

Texas Department of Transportation

Design Division Standard

LTS-BARRIER SYSTEMS CRASH CUSHION (R-NARROW)

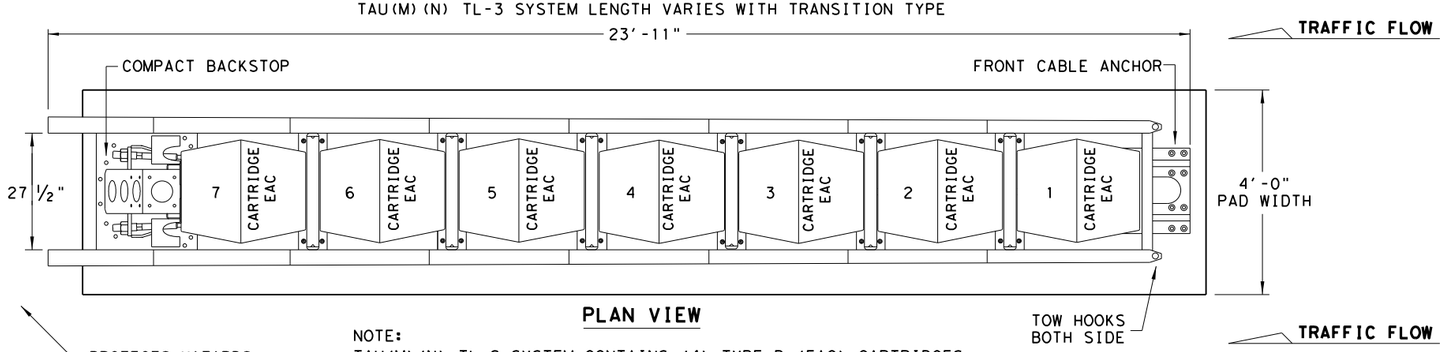
TAU-II-R(N)-16

FILE: tauiirn16.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL
©TxDOT: January 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	0155	06	213	FM 2678
REVISED 06,2013 (VP)	DIST	COUNTY		SHEET NO.
REVISED 03,2016 (VP)	CRP	REFUGIO		49

LOW MAINTENANCE

DATE: 10/12/2023
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design/Plan Set/13. Standards/TCP Standards/TAU (M)(N)-19

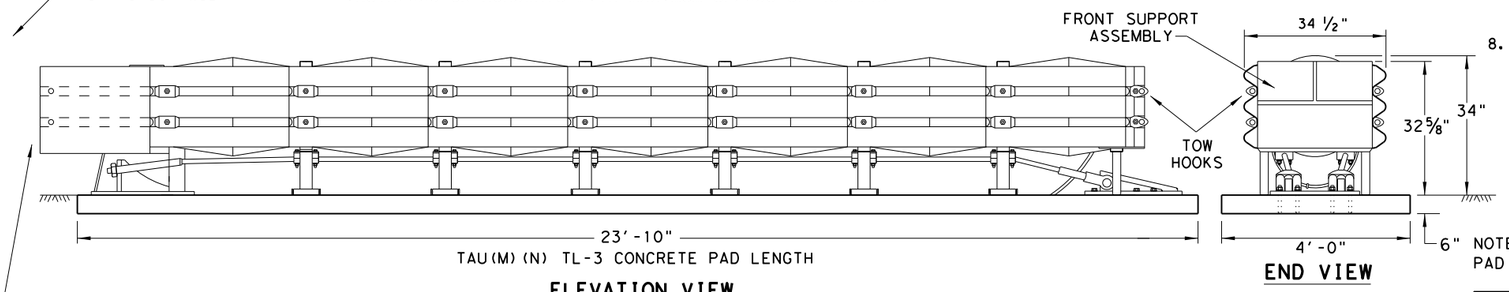
TAU(M)(N) TL-3 SYSTEM LENGTH VARIES WITH TRANSITION TYPE



PLAN VIEW

PROTECTS HAZARDS UP TO 30" WIDTH

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



ELEVATION VIEW

END 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.

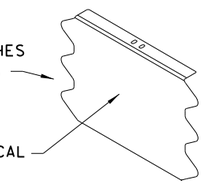
NOTE:
SEE MANUFACTURER'S INSTALLATION INSTRUCTION MANUAL FOR FOUNDATION SPECIFICATIONS THAT INCLUDE, STONE AGGREGATE MIX, COMPRESSION STRENGTH, STEEL SIZE, ANCHOR SIZE, AND EMBEDMENT DEPTH.

TRANSITION OPTIONS	
USE THE COMPACT BACKSTOP	VERTICAL WALL
	CONCRETE TRAFFIC BARRIERS
	W-BEAM GUARDRAIL
	THRIE BEAM GUARDRAIL

NOTE:
FOR BI-DIRECTIONAL TRANSITION PANELS AND BRIDGE RAIL END SHOE DETAILS. SEE MANUFACTURER'S INSTALLATION INSTRUCTIONS MANUAL.

** 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.

GENERAL NOTES

1. 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
2. REFER TO THE LATEST (LTS) INSTALLATION INSTRUCTION MANUAL FOR IMPORATANT SAFETY MESSAGES, COMPLETE SYSTEM ASSEMBLY, AND ANCHOR INSTALLATION REQUIREMENTS FOR THE NINE (9) DIFFERENT SITE TRANSITIONS.
3. INSTALLATION DETAILS FOR THE COMPACT BACKSTOP, FRONT CABLE ANCHOR AND FOUNDATION OPTIONS ARE SHOWN ON THE INSTALLATION INSTRUCTION MANUAL FURNISHED TO THE ENGINEER.
4. CONCRETE SHALL BE CLASS "S" WITH A MINIMUM COMPRESSIVE STRENGTH OF 4,000 P.S.I.
5. 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%
6. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
7. THE TAU(M)(N) SYSTEM SHOULD BE APPROXIMATELY PARALLEL WITH THE BARRIER OR CENTER LINE OF MERGING BARRIERS.
8. 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

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

Texas Department of Transportation — Design Division Standard

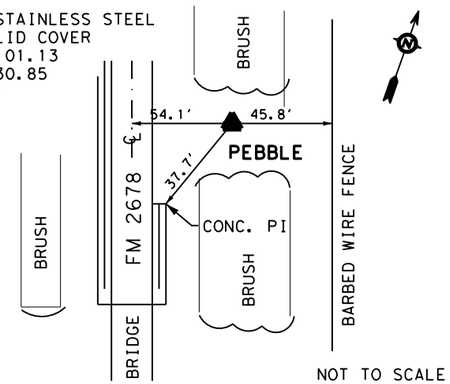
LINDSAY TRANSPORTATION SOLUTIONS

UNIVERSAL CRASH CUSHION (MASH TL-3 & TL-2)

TAU(M)(N)-19

FILE: taumn19.dgn	DN: TxDOT	CK: KM	DW: VP	CK:
©TxDOT: APRIL 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0155	06	213	FM 2678
	DIST	COUNTY		SHEET NO.
	CRP	REFUGIO		50

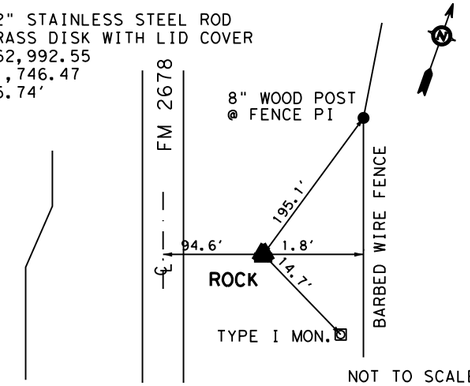
PEBBLE
SET 1/2" STAINLESS STEEL
ROD WITH LID COVER
N=13,258,101.13
E=2,543,030.85
ELEV=2.43'



NOT TO SCALE

FROM THE INTERSECTION OF FM 2678 & FM 136 TRAVEL NORTH ALONG FM 2678 1.90 MILE, LOCATED 54.1 FEET EAST OF THE PAVEMENT CENTERLINE AND APPROXIMATELY 150 NORTH OF A BRIDGE CROSSING.

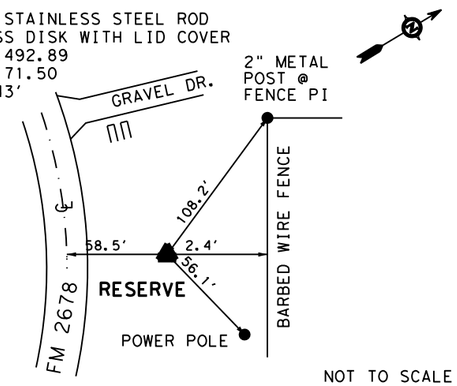
ROCK
SET 1/2" STAINLESS STEEL ROD
WITH BRASS DISK WITH LID COVER
N=13,262,992.55
E=2,541,746.47
ELEV=25.74'



NOT TO SCALE

FROM THE INTERSECTION OF FM 2678 & FM 136 TRAVEL NORTH ALONG FM 2678 2.80 MILE, LOCATED 94.6 FEET EAST OF THE PAVEMENT CENTERLINE AND APPROXIMATELY 1.0 MILE NORTH OF A BRIDGE CROSSING.

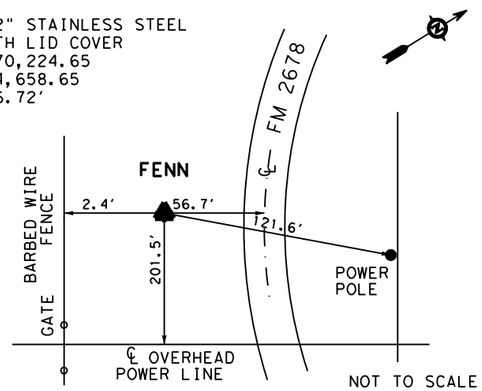
RESERVE
SET 1/2" STAINLESS STEEL ROD
WITH BRASS DISK WITH LID COVER
N=13,267,492.89
E=2,539,171.50
ELEV=27.43'



NOT TO SCALE

FROM THE INTERSECTION OF FM 2678 & FM 136 TRAVEL NORTH ALONG FM 2678 3.80 MILE, LOCATED 58.5 FEET NORTHEAST OF THE PAVEMENT CENTERLINE AND APPROXIMATELY 250 FEET WEST OF A PIPELINE CROSSING.

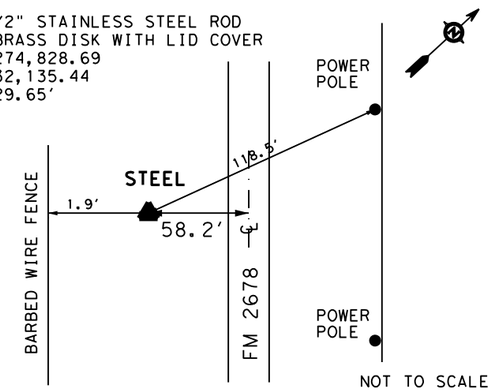
FENN
SET 1/2" STAINLESS STEEL
ROD WITH LID COVER
N=13,270,224.65
E=2,534,658.65
ELEV=26.72'



NOT TO SCALE

FROM THE INTERSECTION OF FM 2678 & FM 774 TRAVEL SOUTH ALONG FM 2678 4.75 MILE, LOCATED 56.7 FEET WEST OF THE PAVEMENT CENTERLINE AND APPROXIMATELY 120 FEET NORTH OF A POWER TRANSMISSION LINE.

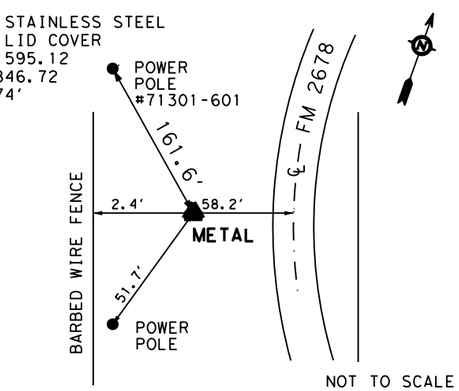
STEEL
SET 1/2" STAINLESS STEEL ROD
WITH BRASS DISK WITH LID COVER
N=13,274,828.69
E=2,532,135.44
ELEV=29.65'



NOT TO SCALE

FROM THE INTERSECTION OF FM 2678 & FM 774 TRAVEL SOUTH ALONG FM 2678 3.75 MILE, LOCATED 58.2 FEET WEST OF THE PAVEMENT CENTERLINE AND APPROXIMATELY 770 FEET (0.15 MILE) NORTH OF A PIPELINE CROSSING.

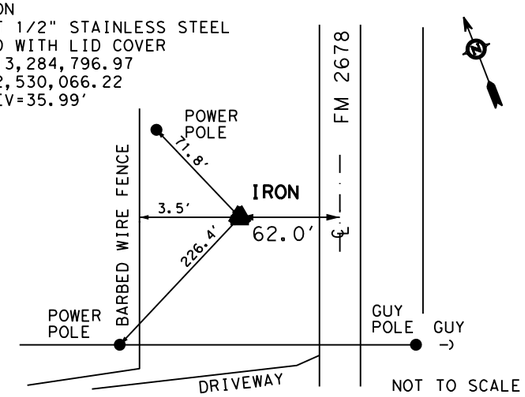
METAL
SET 1/2" STAINLESS STEEL
ROD WITH LID COVER
N=13,279,595.12
E=2,529,846.72
ELEV=30.74'



NOT TO SCALE

FROM THE INTERSECTION OF FM 2678 & FM 774 TRAVEL SOUTH ALONG FM 2678 2.75 MILE, LOCATED 58.2 FEET WEST OF THE PAVEMENT CENTERLINE AND APPROXIMATELY 420 FEET SOUTH OF A DRIVEWAY.

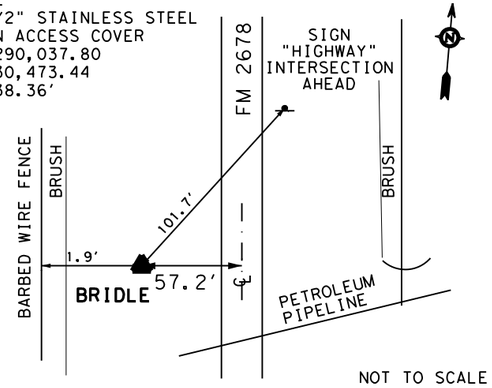
IRON
SET 1/2" STAINLESS STEEL
ROD WITH LID COVER
N=13,284,796.97
E=2,530,066.22
ELEV=35.99'



NOT TO SCALE

FROM THE INTERSECTION OF FM 2678 & FM 774 TRAVEL SOUTH ALONG FM 2678 1.75 MILE, LOCATED 62 FEET WEST OF THE PAVEMENT CENTERLINE AND APPROXIMATELY 230 FEET NORTH OF A DRIVEWAY.

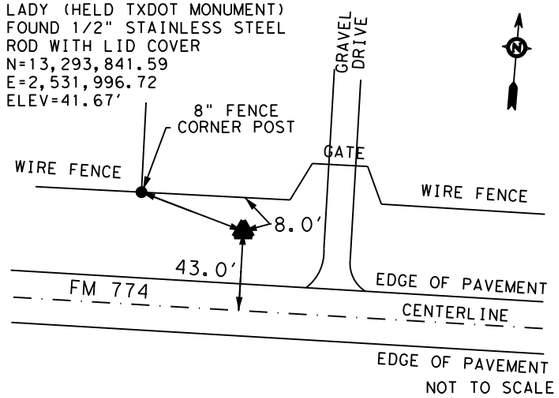
BRIDLE
SET 1/2" STAINLESS STEEL
ROD IN ACCESS COVER
N=13,290,037.80
E=2,530,473.44
ELEV=38.36'



NOT TO SCALE

FROM THE INTERSECTION OF FM 2678 & FM 774 TRAVEL SOUTH ALONG FM 2678 0.75 MILE, LOCATED 57.2 FEET WEST OF THE PAVEMENT CENTERLINE.

LADY (HELD TXDOT MONUMENT)
FOUND 1/2" STAINLESS STEEL
ROD WITH LID COVER
N=13,293,841.59
E=2,531,996.72
ELEV=41.67'



NOT TO SCALE

LOCATED AT THE INTERSECTION OF FM 2678 AND FM 774, TRAVEL 1,300 FEET EAST ALONG FM 774, THE MONUMENT IS LOCATED ON THE NORTH SIDE OF FM 774, 43.0 FEET NORTH OF THE PAVEMENT CENTERLINE.

STATE OF TEXAS
ERIC R MARTINEZ
125657
LICENSED
PROFESSIONAL ENGINEER

10/13/2023

Texas Department of Transportation

FM 2678

HORIZONTAL & VERTICAL CONTROL SHEET

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		51

DATE: 10/06/2023 10:14 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design/Plan Set/1. General/HORIZONTAL & VERTICAL CONTROL SHEET

Alignment Name: BL CL-
Alignment Description:
Alignment Style: Alignment\Baseline

		Station	Northing	Easting
Element: Circular				
PC	( )	0+00.000	13247467	2545480.
PI	( )	8+53.871	13248308	2545629.
CC	( )		13248132	2541719.
PT	( )	16+80.124	13249132	2545406.
Radius:		3820		
Delta:		25?°	Left	
Degree of Curvature (Arc):		01?°		
Length:		1680.124		
Tangent:		853.871		
Chord:		1666.614		
Middle Ordinate:		91.998		
External:		94.268		
Back Tangent Direction:		N10?°		
Back Radial Direction:		S79?°		
Chord Direction:		N02?°		
Ahead Radial Direction:		N74?°		
Ahead Tangent Direction:		N15?°		
Element: Linear				
PT	( )	16+80.124	13249132	2545406.
PC	( )	174+12.432	13264316	2541288.
Tangential Direction:		N15?°		
Tangential Length:		15732.308		
Element: Circular				
PC	( )	174+12.432	13264316	2541288.
PI	( )	201+01.712	13266912	2540585.
CC	( )		13262816	2535758.
PT	( )	224+41.249	13268029	2538138.
Radius:		5730		
Delta:		50?°	Left	
Degree of Curvature (Arc):		00?°		
Length:		5028.817		
Tangent:		2689.28		
Chord:		4868.973		
Middle Ordinate:		542.884		
External:		599.702		
Back Tangent Direction:		N15?°		
Back Radial Direction:		N74?°		
Chord Direction:		N40?°		
Ahead Radial Direction:		N24?°		
Ahead Tangent Direction:		N65?°		
Element: Linear				
PT	( )	224+41.249	13268029	2538138.
PC	( )	239+35.495	13268649	2536779.
Tangential Direction:		N65?°		
Tangential Length:		1494.246		
Element: Circular				
PC	( )	239+35.495	13268649	2536779.
PI	( )	259+08.805	13269469	2534984.
CC	( )		13273862	2539160.
PT	( )	277+36.334	13271220	2534075.
Radius:		5730		
Delta:		38?°	Right	
Degree of Curvature (Arc):		00?°		
Length:		3800.839		
Tangent:		1973.31		
Chord:		3731.54		
Middle Ordinate:		312.27		
External:		330.268		
Back Tangent Direction:		N65?°		
Back Radial Direction:		N24?°		
Chord Direction:		N46?°		
Ahead Radial Direction:		N62?°		
Ahead Tangent Direction:		N27?°		
Element: Linear				
PT	( )	277+36.334	13271220	2534075.
PC	( )	357+43.729	13278326	2530384.
Tangential Direction:		N27?°		
Tangential Length:		8007.395		
Element: Circular				
PC	( )	357+43.729	13278326	2530384.
PI	( )	374+57.279	13279847	2529594.
CC	( )		13280968	2535468.
PT	( )	390+73.821	13281552	2529768.
Radius:		5730		
Delta:		33?°	Right	
Degree of Curvature (Arc):		00?°		
Length:		3330.093		
Tangent:		1713.55		
Chord:		3283.425		
Middle Ordinate:		240.22		
External:		250.732		
Back Tangent Direction:		N27?°		
Back Radial Direction:		N62?°		
Chord Direction:		N10?°		
Ahead Radial Direction:		S84?°		
Ahead Tangent Direction:		N05?°		
Element: Linear				
PT	( )	390+73.821	13281552	2529768.
PC	( )	415+54.531	13284019	2530021.
Tangential Direction:		N05?°		
Tangential Length:		2480.71		
Element: Circular				
PC	( )	415+54.531	13284019	2530021.
PI	( )	416+77.977	13284142	2530033.
CC	( )		13283436	2535721.
PT	( )	418+01.386	13284264	2530051.
Radius:		5730		
Delta:		02?°	Right	
Degree of Curvature (Arc):		00?°		
Length:		246.855		
Tangent:		123.447		
Chord:		246.836		
Middle Ordinate:		1.329		
External:		1.33		
Back Tangent Direction:		N05?°		
Back Radial Direction:		S84?°		
Chord Direction:		N07?°		
Ahead Radial Direction:		S81?°		
Ahead Tangent Direction:		N08?°		
Element: Linear				
PT	( )	418+01.386	13284264	2530051.
PC	( )	452+76.251	13287703	2530554.
Tangential Direction:		N08?°		
Tangential Length:		3474.866		
Element: Circular				
PC	( )	452+76.251	13287703	2530554.
PI	( )	458+74.451	13288295	2530640.
CC	( )		13288531	2524884.
PT	( )	464+68.332	13288892	2530603.
Radius:		5730		
Delta:		11?°	Left	
Degree of Curvature (Arc):		00?°		
Length:		1192.08		
Tangent:		598.199		
Chord:		1189.932		
Middle Ordinate:		30.972		
External:		31.141		
Back Tangent Direction:		N08?°		
Back Radial Direction:		S81?°		
Chord Direction:		N02?°		
Ahead Radial Direction:		N86?°		
Ahead Tangent Direction:		N03?°		
Element: Linear				
PT	( )	464+68.332	13288892	2530603.
PC	( )	493+04.775	13291722	2530424.
Tangential Direction:		N03?°		
Tangential Length:		2836.443		
Element: Circular				
PC	( )	493+04.775	13291722	2530424.
PI	( )	501+89.266	13292605	2530369.
CC	( )		13292083	2536143.
PT	( )	510+59.904	13293464	2530582.
Radius:		5730		
Delta:		17?°	Right	
Degree of Curvature (Arc):		00?°		
Length:		1755.129		
Tangent:		884.491		
Chord:		1748.276		
Middle Ordinate:		67.069		
External:		67.864		
Back Tangent Direction:		N03?°		
Back Radial Direction:		N86?°		
Chord Direction:		N05?°		
Ahead Radial Direction:		S76?°		
Ahead Tangent Direction:		N13?°		
Element: Linear				
PT	( )	510+59.904	13293464	2530582.
POT	( )	515+95.061	13293983	2530711.
Tangential Direction:		N13?°		
Tangential Length:		535.157		

STATE OF TEXAS
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10/13/2023

Texas Department of Transportation

FM 2678

HORIZONTAL ALIGNMENT DATA SHEET

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		52

DATE: 10/12/2023 05:33 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design/Plan Set/1. General/HORIZONTAL ALIGNMENT DATA

Horizontal Alignment: BL CL-
Horizontal Description:
Horizontal Style: Alignment\Bas
Vertical Alignment: BL CL-48
Vertical Description:
Vertical Style: Alignment\Bas

	Station	Elevat
Element: Linear		
POT	190+62.	28.803
VPC	195+61.	29.878
Tangent Grade:	0.002	
Tangent Length:	499.005	
Element: Symmetrical Parabola		
VPC	195+61.	29.878
VPI	197+23.	30.228
VPT	198+85.	30.17
VHP	198+39.	30.178
Length:	324.724	
Entrance Grade:	0.002	
Exit Grade:	0	
r = 100 * (g2 - g1) / L:	-0.077	
K = l / (g2 - g1):	1294.36	
Middle Ordinate:	-0.102	
Element: Linear		
VPT	198+85.	30.17
VPC	200+86.	30.099
Tangent Grade:	0	
Tangent Length:	200.895	
Element: Symmetrical Parabola		
VPC	200+86.	30.099
VPI	202+11.	30.055
VPT	203+36.	30.171
VLP	201+55.	30.087
Length:	250	
Entrance Grade:	0	
Exit Grade:	0.001	
r = 100 * (g2 - g1) / L:	0.051	
K = l / (g2 - g1):	1944.20	
Middle Ordinate:	0.04	
Element: Linear		
VPT	203+36.	30.171
VPC	203+52.	30.186
Tangent Grade:	0.001	
Tangent Length:	16.166	
Element: Symmetrical Parabola		
VPC	203+52.	30.186
VPI	204+02.	30.233
VPT	204+52.	30.12
VHP	203+81.	30.2
Length:	100	
Entrance Grade:	0.001	
Exit Grade:	-0.002	
r = 100 * (g2 - g1) / L:	-0.32	
K = l / (g2 - g1):	312.825	
Middle Ordinate:	-0.04	
Element: Linear		
VPT	204+52.	30.12
VPC	205+63.	29.87
Tangent Grade:	-0.002	
Tangent Length:	110.34	
Element: Symmetrical Parabola		
VPC	205+63.	29.87
VPI	206+13.	29.757
VPT	206+63.	29.776
VLP	206+48.	29.773
Length:	100	
Entrance Grade:	-0.002	
Exit Grade:	0	
r = 100 * (g2 - g1) / L:	0.265	
K = l / (g2 - g1):	377.913	
Middle Ordinate:	0.033	
Element: Linear		
VPT	206+63.	29.776
VPC	206+93.	29.787
Tangent Grade:	0	
Tangent Length:	30.74	
Element: Symmetrical Parabola		
VPC	206+93.	29.787
VPI	209+43.	29.883
VPT	211+93.	29.827
VHP	210+09.	29.848
Length:	500	
Entrance Grade:	0	
Exit Grade:	0	
r = 100 * (g2 - g1) / L:	-0.012	
K = l / (g2 - g1):	8282.79	
Middle Ordinate:	-0.038	
Element: Linear		
VPT	211+93.	29.827
VPC	215+05.	29.758
Tangent Grade:	0	
Tangent Length:	311.328	

	Station	Elevat
Element: Symmetrical Parabola		
VPC	215+05.	29.758
VPI	215+80.	29.741
VPT	216+55.	30.241
VLP	215+10.	29.758
Length:	150	
Entrance Grade:	0	
Exit Grade:	0.007	
r = 100 * (g2 - g1) / L:	0.459	
K = l / (g2 - g1):	217.984	
Middle Ordinate:	0.129	
Element: Linear		
VPT	216+55.	30.241
VPC	217+50.	30.872
Tangent Grade:	0.007	
Tangent Length:	94.806	
Element: Symmetrical Parabola		
VPC	217+50.	30.872
VPI	219+00.	31.871
VPT	220+50.	30.751
VHP	218+91.	31.343
Length:	300	
Entrance Grade:	0.007	
Exit Grade:	-0.007	
r = 100 * (g2 - g1) / L:	-0.471	
K = l / (g2 - g1):	212.421	
Middle Ordinate:	-0.53	
Element: Linear		
VPT	220+50.	30.751
VPC	220+66.	30.628
Tangent Grade:	-0.007	
Tangent Length:	16.498	
Element: Symmetrical Parabola		
VPC	220+66.	30.628
VPI	221+91.	29.695
VPT	223+16.	29.593
Length:	250	
Entrance Grade:	-0.007	
Exit Grade:	-0.001	
r = 100 * (g2 - g1) / L:	0.266	
K = l / (g2 - g1):	376.228	
Middle Ordinate:	0.208	
Element: Linear		
VPT	223+16.	29.593
VPC	223+70.	29.548
Tangent Grade:	-0.001	
Tangent Length:	54.377	
Element: Symmetrical Parabola		
VPC	223+70.	29.548
VPI	224+24.	29.504
VPT	224+78.	29.676
VLP	223+92.	29.539
Length:	107.535	
Entrance Grade:	-0.001	
Exit Grade:	0.003	
r = 100 * (g2 - g1) / L:	0.373	
K = l / (g2 - g1):	267.916	
Middle Ordinate:	0.054	
Element: Linear		
VPT	224+78.	29.676
VPC	224+88.	29.709
Tangent Grade:	0.003	
Tangent Length:	10.404	
Element: Symmetrical Parabola		
VPC	224+88.	29.709
VPI	225+38.	29.869
VPT	225+88.	29.882
Length:	100	
Entrance Grade:	0.003	
Exit Grade:	0	
r = 100 * (g2 - g1) / L:	-0.294	
K = l / (g2 - g1):	340.322	
Middle Ordinate:	-0.037	
Element: Linear		
VPT	225+88.	29.882
VPC	238+57.	30.208
Tangent Grade:	0	
Tangent Length:	1268.27	
Element: Symmetrical Parabola		
VPC	238+57.	30.208
VPI	240+58.	30.259
VPT	242+59.	26.555
VHP	238+62.	30.208
Length:	402.72	
Entrance Grade:	0	
Exit Grade:	-0.018	
r = 100 * (g2 - g1) / L:	-0.463	
K = l / (g2 - g1):	215.882	
Middle Ordinate:	-0.939	

	Station	Elevat
Element: Linear		
VPT	242+59.	26.555
VPC	244+08.	23.813
Tangent Grade:	-0.018	
Tangent Length:	149.014	
Element: Symmetrical Parabola		
VPC	244+08.	23.813
VPI	246+88.	19.182
VPT	249+68.	21.912
VLP	247+60.	20.9
Length:	559.633	
Entrance Grade:	-0.017	
Exit Grade:	0.01	
r = 100 * (g2 - g1) / L:	0.47	
K = l / (g2 - g1):	212.735	
Middle Ordinate:	1.84	
Element: Linear		
VPT	249+68.	21.912
VPC	249+87.	22.092
Tangent Grade:	0.01	
Tangent Length:	18.551	
Element: Symmetrical Parabola		
VPC	249+87.	22.092
VPI	250+37.	22.576
VPT	250+87.	23.471
Length:	100	
Entrance Grade:	0.01	
Exit Grade:	0.018	
r = 100 * (g2 - g1) / L:	0.821	
K = l / (g2 - g1):	121.788	
Middle Ordinate:	0.103	
Element: Linear		
VPT	250+87.	23.471
VPC	251+99.	25.489
Tangent Grade:	0.018	
Tangent Length:	112.721	
Element: Symmetrical Parabola		
VPC	251+99.	25.489
VPI	254+76.	30.451
VPT	257+54.	29.791
VHP	256+89.	29.868
Length:	554.446	
Entrance Grade:	0.018	
Exit Grade:	-0.002	
r = 100 * (g2 - g1) / L:	-0.366	
K = l / (g2 - g1):	273.364	
Middle Ordinate:	-1.406	
Element: Linear		
VPT	257+54.	29.791
VPC	258+06.	29.666
Tangent Grade:	-0.002	
Tangent Length:	52.358	
Element: Symmetrical Parabola		
VPC	258+06.	29.666
VPI	259+31.	29.368
VPT	260+56.	29.527
VLP	259+69.	29.472
Length:	250	
Entrance Grade:	-0.002	
Exit Grade:	0.001	
r = 100 * (g2 - g1) / L:	0.146	
K = l / (g2 - g1):	683.519	
Middle Ordinate:	0.114	
Element: Linear		
VPT	260+56.	29.527
VPC	261+15.	29.602
Tangent Grade:	0.001	
Tangent Length:	58.717	
Element: Symmetrical Parabola		
VPC	261+15.	29.602
VPI	262+65.	29.793
VPT	264+15.	29.757
VHP	263+66.	29.763
Length:	300	
Entrance Grade:	0.001	
Exit Grade:	0	
r = 100 * (g2 - g1) / L:	-0.051	
K = l / (g2 - g1):	1974.23	
Middle Ordinate:	-0.057	
Element: Linear		
VPT	264+15.	29.757
VPC	266+66.	29.695
Tangent Grade:	0	
Tangent Length:	251.301	

	Station	Elevat
Element: Symmetrical Parabola		
VPC	266+66.	29.695
VPI	267+06.	29.685
VPT	267+46.	29.982
VLP	266+69.	29.695
Length:	80	
Entrance Grade:	0	
Exit Grade:	0.007	
r = 100 * (g2 - g1) / L:	0.958	
K = l / (g2 - g1):	104.369	
Middle Ordinate:	0.077	
Element: Linear		
VPT	267+46.	29.982
VPC	267+50.	30.008
Tangent Grade:	0.007	
Tangent Length:	3.456	
Element: Symmetrical Parabola		
VPC	267+50.	30.008
VPI	269+00.	31.121
VPT	270+50.	29.836
VHP	268+89.	30.524
Length:	300	
Entrance Grade:	0.007	
Exit Grade:	-0.009	
r = 100 * (g2 - g1) / L:	-0.533	
K = l / (g2 - g1):	187.646	
Middle Ordinate:	-0.6	
Element: Linear		
VPT	270+50.	29.836
VPC	270+53.	29.807
Tangent Grade:	-0.009	
Tangent Length:	3.32	
Element: Symmetrical Parabola		
VPC	270+53.	29.807
VPI	270+93.	29.465
VPT	271+33.	29.485
VLP	271+28.	29.484
Length:	80	
Entrance Grade:	-0.009	
Exit Grade:	0.001	
r = 100 * (g2 - g1) / L:	1.136	
K = l / (g2 - g1):	88.022	
Middle Ordinate:	0.091	
Element: Linear		
VPT	271+33.	29.485
VPC	277+45.	29.805
Tangent Grade:	0.001	
Tangent Length:	612.669	
Element: Symmetrical Parabola		
VPC	277+45.	29.805
VPI	278+33.	29.85
PVRC	279+20.	29.739
VHP	277+96.	29.818
Length:	175	
Entrance Grade:	0.001	
Exit Grade:	-0.001	
r = 100 * (g2 - g1) / L:	-0.103	
K = l / (g2 - g1):	973.606	
Middle Ordinate:	-0.039	
Element: Symmetrical Parabola		
PVRC	279+20.	29.739
VPI	280+22.	29.607
PVRC	281+23.	29.807
VLP	280+01.	29.687
Length:	203	
Entrance Grade:	-0.001	
Exit Grade:	0.002	
r = 100 * (g2 - g1) / L:	0.161	
K = l / (g2 - g1):	621.509	
Middle Ordinate:	0.083	
Element: Symmetrical Parabola		
PVRC	281+23.	29.807
VPI	286+09.	30.848
VPT	290+94.	30.366
VHP	287+87.	30.519
Length:	970.245	
Entrance Grade:	0.002	
Exit Grade:	-0.001	
r = 100 * (g2 - g1) / L:	-0.032	
K = l / (g2 - g1):	3091.18	
Middle Ordinate:	-0.381	
Element: Linear		
VPT	290+94.	30.366
VPC	291+38.	30.322
Tangent Grade:	-0.001	
Tangent Length:	43.994	

STATE OF TEXAS
ERIC R MARTINEZ
125657
LICENSED
PROFESSIONAL ENGINEER

10/13/2023

Texas Department of Transportation

FM 2678

VERTICAL ALIGNMENT DATA SHEET

SHEET 1 OF 3

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		53

DATE: 10/06/2023 10:20 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design/Plan Set/1. General/VERTICAL ALIGNMENT DATA

Element: Symmetrical Parabola
VPC 291+38. 30.322
VPI 291+88. 30.273
VPT 292+38. 30.32
VLP 291+89. 30.297
Length: 100
Entrance Grade: -0.001
Exit Grade: 0.001
r = 100 * (g2 - g1) / L: 0.194
K = 1 / (g2 - g1): 516.245
Middle Ordinate: 0.024

Element: Linear
VPT 292+38. 30.32
VPC 292+74. 30.354
Tangent Grade: 0.001
Tangent Length: 35.977

Element: Symmetrical Parabola
VPC 292+74. 30.354
VPI 293+46. 30.422
VPT 294+19. 30.308
VHP 293+28. 30.379
Length: 145.272
Entrance Grade: 0.001
Exit Grade: -0.002
r = 100 * (g2 - g1) / L: -0.173
K = 1 / (g2 - g1): 577.473
Middle Ordinate: -0.046

Element: Linear
VPT 294+19. 30.308
VPC 294+91. 30.196
Tangent Grade: -0.002
Tangent Length: 71.647

Element: Symmetrical Parabola
VPC 294+91. 30.196
VPI 296+52. 29.942
PVRC 298+14. 30.546
VLP 295+86. 30.12
Length: 322.926
Entrance Grade: -0.002
Exit Grade: 0.004
r = 100 * (g2 - g1) / L: 0.165
K = 1 / (g2 - g1): 607.489
Middle Ordinate: 0.215

Element: Symmetrical Parabola
PVRC 298+14. 30.546
VPI 298+68. 30.752
PVRC 299+23. 30.748
VHP 299+22. 30.748
Length: 109.747
Entrance Grade: 0.004
Exit Grade: 0
r = 100 * (g2 - g1) / L: -0.347
K = 1 / (g2 - g1): 288.55
Middle Ordinate: -0.052

Element: Symmetrical Parabola
PVRC 299+23. 30.748
VPI 300+74. 30.574
PVRC 302+24. 30.904
VLP 300+27. 30.688
Length: 300.742
Entrance Grade: -0.001
Exit Grade: 0.002
r = 100 * (g2 - g1) / L: 0.112
K = 1 / (g2 - g1): 895.207
Middle Ordinate: 0.126

Element: Symmetrical Parabola
PVRC 302+24. 30.904
VPI 304+46. 31.509
PVRC 306+68. 31.515
Length: 444.33
Entrance Grade: 0.003
Exit Grade: 0
r = 100 * (g2 - g1) / L: -0.061
K = 1 / (g2 - g1): 1648.56
Middle Ordinate: -0.15

Element: Symmetrical Parabola
PVRC 306+68. 31.515
VPI 307+74. 31.438
PVRC 308+79. 31.63
VLP 307+28. 31.493
Length: 210.804
Entrance Grade: -0.001
Exit Grade: 0.002
r = 100 * (g2 - g1) / L: 0.121
K = 1 / (g2 - g1): 824.394
Middle Ordinate: 0.067

Element: Symmetrical Parabola
PVRC 308+79. 31.63
VPI 312+57. 32.414
PVRC 316+35. 32.58
Length: 756.198
Entrance Grade: 0.002
Exit Grade: 0
r = 100 * (g2 - g1) / L: -0.022
K = 1 / (g2 - g1): 4622.61
Middle Ordinate: -0.155

Element: Symmetrical Parabola
PVRC 316+35. 32.58
VPI 316+89. 32.575
PVRC 317+43. 32.676
VLP 316+40. 32.58
Length: 108.124
Entrance Grade: 0
Exit Grade: 0.002
r = 100 * (g2 - g1) / L: 0.181
K = 1 / (g2 - g1): 551.581
Middle Ordinate: 0.026

Element: Symmetrical Parabola
PVRC 317+43. 32.676
VPI 320+46. 33.422
PVRC 323+49. 33.627
Length: 605.859
Entrance Grade: 0.002
Exit Grade: 0.001
r = 100 * (g2 - g1) / L: -0.029
K = 1 / (g2 - g1): 3400.08
Middle Ordinate: -0.135

Element: Symmetrical Parabola
PVRC 323+49. 33.627
VPI 324+79. 33.567
VPT 326+09. 34.981
VLP 323+60. 33.625
Length: 259.897
Entrance Grade: 0
Exit Grade: 0.011
r = 100 * (g2 - g1) / L: 0.437
K = 1 / (g2 - g1): 229.057
Middle Ordinate: 0.369

Element: Linear
VPT 326+09. 34.981
VPC 326+42. 35.336
Tangent Grade: 0.011
Tangent Length: 32.644

Element: Symmetrical Parabola
VPC 326+42. 35.336
VPI 328+84. 37.974
VPT 331+27. 35.949
VHP 329+16. 36.829
Length: 484.944
Entrance Grade: 0.011
Exit Grade: -0.008
r = 100 * (g2 - g1) / L: -0.397
K = 1 / (g2 - g1): 252.137
Middle Ordinate: -1.166

Element: Linear
VPT 331+27. 35.949
VPC 332+51. 34.916
Tangent Grade: -0.008
Tangent Length: 123.742

Element: Symmetrical Parabola
VPC 332+51. 34.916
VPI 333+26. 34.289
VPT 334+01. 34.321
VLP 333+93. 34.319
Length: 150
Entrance Grade: -0.008
Exit Grade: 0
r = 100 * (g2 - g1) / L: 0.585
K = 1 / (g2 - g1): 171.055
Middle Ordinate: 0.164

Element: Linear
VPT 334+01. 34.321
VPC 335+24. 34.372
Tangent Grade: 0
Tangent Length: 123.293

Element: Symmetrical Parabola
VPC 335+24. 34.372
VPI 337+74. 34.476
VPT 340+24. 34.371
VHP 337+72. 34.424
Length: 500
Entrance Grade: 0
Exit Grade: 0
r = 100 * (g2 - g1) / L: -0.017
K = 1 / (g2 - g1): 5955.59
Middle Ordinate: -0.052

Element: Linear
VPT 340+24. 34.371
VPC 340+59. 34.356
Tangent Grade: 0
Tangent Length: 34.807

Element: Symmetrical Parabola
VPC 340+59. 34.356
VPI 341+34. 34.324
VPT 342+09. 34.385
VLP 341+10. 34.345
Length: 150
Entrance Grade: 0
Exit Grade: 0.001
r = 100 * (g2 - g1) / L: 0.082
K = 1 / (g2 - g1): 1217.76
Middle Ordinate: 0.023

Element: Linear
VPT 342+09. 34.385
VPC 351+43. 35.141
Tangent Grade: 0.001
Tangent Length: 934.533

Element: Symmetrical Parabola
VPC 351+43. 35.141
VPI 353+71. 35.326
PVRC 355+99. 35.204
VHP 354+18. 35.252
Length: 456.051
Entrance Grade: 0.001
Exit Grade: -0.001
r = 100 * (g2 - g1) / L: -0.029
K = 1 / (g2 - g1): 3392.25
Middle Ordinate: -0.077

Element: Symmetrical Parabola
PVRC 355+99. 35.204
VPI 356+92. 35.154
PVRC 357+86. 36
VLP 356+10. 35.201
Length: 186.249
Entrance Grade: -0.001
Exit Grade: 0.009
r = 100 * (g2 - g1) / L: 0.517
K = 1 / (g2 - g1): 193.544
Middle Ordinate: 0.224

Element: Symmetrical Parabola
PVRC 357+86. 36
VPI 359+36. 37.363
PVRC 360+86. 36
VHP 359+36. 36.682
Length: 299.998
Entrance Grade: 0.009
Exit Grade: -0.009
r = 100 * (g2 - g1) / L: -0.606
K = 1 / (g2 - g1): 165.053
Middle Ordinate: -0.682

Element: Symmetrical Parabola
PVRC 360+86. 36
VPI 362+53. 34.476
PVRC 364+21. 35.1
VLP 363+23. 34.919
Length: 335.409
Entrance Grade: -0.009
Exit Grade: 0.004
r = 100 * (g2 - g1) / L: 0.382
K = 1 / (g2 - g1): 261.817
Middle Ordinate: 0.537

Element: Symmetrical Parabola
PVRC 364+21. 35.1
VPI 364+97. 35.384
PVRC 365+74. 35.228
VHP 365+19. 35.284
Length: 152.603
Entrance Grade: 0.004
Exit Grade: -0.002
r = 100 * (g2 - g1) / L: -0.378
K = 1 / (g2 - g1): 264.542
Middle Ordinate: -0.11

Element: Symmetrical Parabola
PVRC 365+74. 35.228
VPI 368+91. 34.578
PVRC 372+09. 35.808
VLP 367+93. 35.004
Length: 635.313
Entrance Grade: -0.002
Exit Grade: 0.004
r = 100 * (g2 - g1) / L: 0.093
K = 1 / (g2 - g1): 1073.58
Middle Ordinate: 0.47

Element: Symmetrical Parabola
PVRC 372+09. 35.808
VPI 373+06. 36.186
VPT 374+04. 36.183
VHP 374+02. 36.183
Length: 195.214
Entrance Grade: 0.004
Exit Grade: 0
r = 100 * (g2 - g1) / L: -0.2
K = 1 / (g2 - g1): 500
Middle Ordinate: -0.095

Element: Linear
VPT 374+04. 36.183
VPC 375+04. 36.18
Tangent Grade: 0
Tangent Length: 100

Element: Symmetrical Parabola
VPC 375+04. 36.18
VPI 376+04. 36.177
PVRC 377+04. 35.773
Length: 200
Entrance Grade: 0
Exit Grade: -0.004
r = 100 * (g2 - g1) / L: -0.2
K = 1 / (g2 - g1): 500
Middle Ordinate: -0.1

Element: Symmetrical Parabola
PVRC 377+04. 35.773
VPI 378+20. 35.305
PVRC 379+36. 35.72
VLP 378+27. 35.525
Length: 232.066
Entrance Grade: -0.004
Exit Grade: 0.004
r = 100 * (g2 - g1) / L: 0.328
K = 1 / (g2 - g1): 304.999
Middle Ordinate: 0.221

Element: Symmetrical Parabola
PVRC 379+36. 35.72
VPI 381+02. 36.312
PVRC 382+67. 36.055
VHP 381+67. 36.133
Length: 330.973
Entrance Grade: 0.004
Exit Grade: -0.002
r = 100 * (g2 - g1) / L: -0.155
K = 1 / (g2 - g1): 645.271
Middle Ordinate: -0.212

Element: Symmetrical Parabola
PVRC 382+67. 36.055
VPI 384+01. 35.847
PVRC 385+35. 36.19
VLP 383+68. 35.977
Length: 268.286
Entrance Grade: -0.002
Exit Grade: 0.003
r = 100 * (g2 - g1) / L: 0.153
K = 1 / (g2 - g1): 652.839
Middle Ordinate: 0.138

Element: Symmetrical Parabola
PVRC 385+35. 36.19
VPI 385+88. 36.325
PVRC 386+41. 36.311
VHP 386+31. 36.312
Length: 105.687
Entrance Grade: 0.003
Exit Grade: 0
r = 100 * (g2 - g1) / L: -0.267
K = 1 / (g2 - g1): 374.961
Middle Ordinate: -0.037

Element: Symmetrical Parabola
PVRC 386+41. 36.311
VPI 387+20. 36.291
VPT 387+99. 36.387
VLP 386+69. 36.308
Length: 157.54
Entrance Grade: 0
Exit Grade: 0.001
r = 100 * (g2 - g1) / L: 0.094
K = 1 / (g2 - g1): 1062.51
Middle Ordinate: 0.029

Element: Linear
VPT 387+99. 36.387
VPC 390+22. 36.66
Tangent Grade: 0.001
Tangent Length: 223.493

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VERTICAL ALIGNMENT DATA SHEET

SHEET 2 OF 3

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		54

DATE: 10/06/2023 10:22 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design/Plan Set/1. General/VERTICAL ALIGNMENT DATA 2

Element: Symmetrical Parabola		
VPC	390+22.	36.66
VPI	391+07.	36.764
PVRC	391+93.	36.586
VHP	390+85.	36.698
Length:	170.588	
Entrance Grade:	0.001	
Exit Grade:	-0.002	
r = 100 * (g2 - g1) / L:	-0.193	
K = l / (g2 - g1):	516.886	
Middle Ordinate:	-0.07	
Element: Symmetrical Parabola		
PVRC	391+93.	36.586
VPI	392+43.	36.482
PVRC	392+93.	36.635
VLP	392+33.	36.544
Length:	100	
Entrance Grade:	-0.002	
Exit Grade:	0.003	
r = 100 * (g2 - g1) / L:	0.514	
K = l / (g2 - g1):	194.517	
Middle Ordinate:	0.064	
Element: Symmetrical Parabola		
PVRC	392+93.	36.635
VPI	393+39.	36.777
VPT	393+85.	36.714
VHP	393+57.	36.733
Length:	92.763	
Entrance Grade:	0.003	
Exit Grade:	-0.001	
r = 100 * (g2 - g1) / L:	-0.478	
K = l / (g2 - g1):	209.226	
Middle Ordinate:	-0.051	
Element: Linear		
VPT	393+85.	36.714
VPC	394+14.	36.674
Tangent Grade:	-0.001	
Tangent Length:	29.013	
Element: Symmetrical Parabola		
VPC	394+14.	36.674
VPI	394+64.	36.605
VPT	395+14.	36.762
VLP	394+45.	36.653
Length:	100	
Entrance Grade:	-0.001	
Exit Grade:	0.003	
r = 100 * (g2 - g1) / L:	0.45	
K = l / (g2 - g1):	222.106	
Middle Ordinate:	0.056	
Element: Linear		
VPT	395+14.	36.762
VPC	395+18.	36.773
Tangent Grade:	0.003	
Tangent Length:	3.422	
Element: Symmetrical Parabola		
VPC	395+18.	36.773
VPI	396+54.	37.199
PVRC	397+90.	37.164
VHP	397+69.	37.166
Length:	272.454	
Entrance Grade:	0.003	
Exit Grade:	0	
r = 100 * (g2 - g1) / L:	-0.124	
K = l / (g2 - g1):	803.836	
Middle Ordinate:	-0.115	
Element: Symmetrical Parabola		
PVRC	397+90.	37.164
VPI	399+02.	37.135
PVRC	400+13.	37.323
VLP	398+20.	37.16
Length:	222.419	
Entrance Grade:	0	
Exit Grade:	0.002	
r = 100 * (g2 - g1) / L:	0.088	
K = l / (g2 - g1):	1139.17	
Middle Ordinate:	0.054	
Element: Symmetrical Parabola		
PVRC	400+13.	37.323
VPI	400+99.	37.469
PVRC	401+85.	37.5
Length:	172.266	
Entrance Grade:	0.002	
Exit Grade:	0	
r = 100 * (g2 - g1) / L:	-0.078	
K = l / (g2 - g1):	1288.89	
Middle Ordinate:	-0.029	

Element: Symmetrical Parabola		
PVRC	401+85.	37.5
VPI	403+10.	37.544
PVRC	404+35.	38.409
Length:	250	
Entrance Grade:	0	
Exit Grade:	0.007	
r = 100 * (g2 - g1) / L:	0.263	
K = l / (g2 - g1):	380.814	
Middle Ordinate:	0.205	
Element: Symmetrical Parabola		
PVRC	404+35.	38.409
VPI	405+45.	39.17
PVRC	406+55.	38.317
VHP	405+39.	38.768
Length:	219.646	
Entrance Grade:	0.007	
Exit Grade:	-0.008	
r = 100 * (g2 - g1) / L:	-0.668	
K = l / (g2 - g1):	149.622	
Middle Ordinate:	-0.403	
Element: Symmetrical Parabola		
PVRC	406+55.	38.317
VPI	407+30.	37.736
VPT	408+05.	37.764
VLP	407+98.	37.763
Length:	150	
Entrance Grade:	-0.008	
Exit Grade:	0	
r = 100 * (g2 - g1) / L:	0.543	
K = l / (g2 - g1):	184.206	
Middle Ordinate:	0.153	
Element: Linear		
VPT	408+05.	37.764
VPC	414+55.	38.014
Tangent Grade:	0	
Tangent Length:	650.065	
Element: Symmetrical Parabola		
VPC	414+55.	38.014
VPI	415+05.	38.034
PVRC	415+55.	38.179
Length:	100	
Entrance Grade:	0	
Exit Grade:	0.003	
r = 100 * (g2 - g1) / L:	0.251	
K = l / (g2 - g1):	398.024	
Middle Ordinate:	0.031	
Element: Symmetrical Parabola		
PVRC	415+55.	38.179
VPI	416+19.	38.365
VPT	416+84.	38.334
VHP	416+65.	38.338
Length:	128.941	
Entrance Grade:	0.003	
Exit Grade:	0	
r = 100 * (g2 - g1) / L:	-0.262	
K = l / (g2 - g1):	380.953	
Middle Ordinate:	-0.055	
Element: Linear		
VPT	416+84.	38.334
VPC	417+66.	38.302
Tangent Grade:	0	
Tangent Length:	82.469	
Element: Symmetrical Parabola		
VPC	417+66.	38.302
VPI	418+99.	38.25
VPT	420+32.	38.117
Length:	265.413	
Entrance Grade:	0	
Exit Grade:	-0.001	
r = 100 * (g2 - g1) / L:	-0.023	
K = l / (g2 - g1):	4336.32	
Middle Ordinate:	-0.02	
Element: Linear		
VPT	420+32.	38.117
VPC	421+33.	38.015
Tangent Grade:	-0.001	
Tangent Length:	101.884	
Element: Symmetrical Parabola		
VPC	421+33.	38.015
VPI	422+79.	37.869
PVRC	424+25.	37.957
VLP	423+15.	37.924
Length:	291.101	
Entrance Grade:	-0.001	
Exit Grade:	0.001	
r = 100 * (g2 - g1) / L:	0.055	
K = l / (g2 - g1):	1807.04	
Middle Ordinate:	0.059	

Element: Symmetrical Parabola		
PVRC	424+25.	37.957
VPI	424+92.	37.999
PVRC	425+60.	37.96
VHP	424+95.	37.979
Length:	135.872	
Entrance Grade:	0.001	
Exit Grade:	-0.001	
r = 100 * (g2 - g1) / L:	-0.086	
K = l / (g2 - g1):	1158.03	
Middle Ordinate:	-0.02	
Element: Symmetrical Parabola		
PVRC	425+60.	37.96
VPI	426+85.	37.89
VPT	428+10.	37.98
VLP	426+70.	37.929
Length:	250	
Entrance Grade:	-0.001	
Exit Grade:	0.001	
r = 100 * (g2 - g1) / L:	0.052	
K = l / (g2 - g1):	1940.34	
Middle Ordinate:	0.04	
Element: Linear		
VPT	428+10.	37.98
POT	429+83.	38.105
Tangent Grade:	0.001	
Tangent Length:	172.114	

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VERTICAL ALIGNMENT
DATA SHEET

SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		55

DATE: 10/06/2023 10:27 AM
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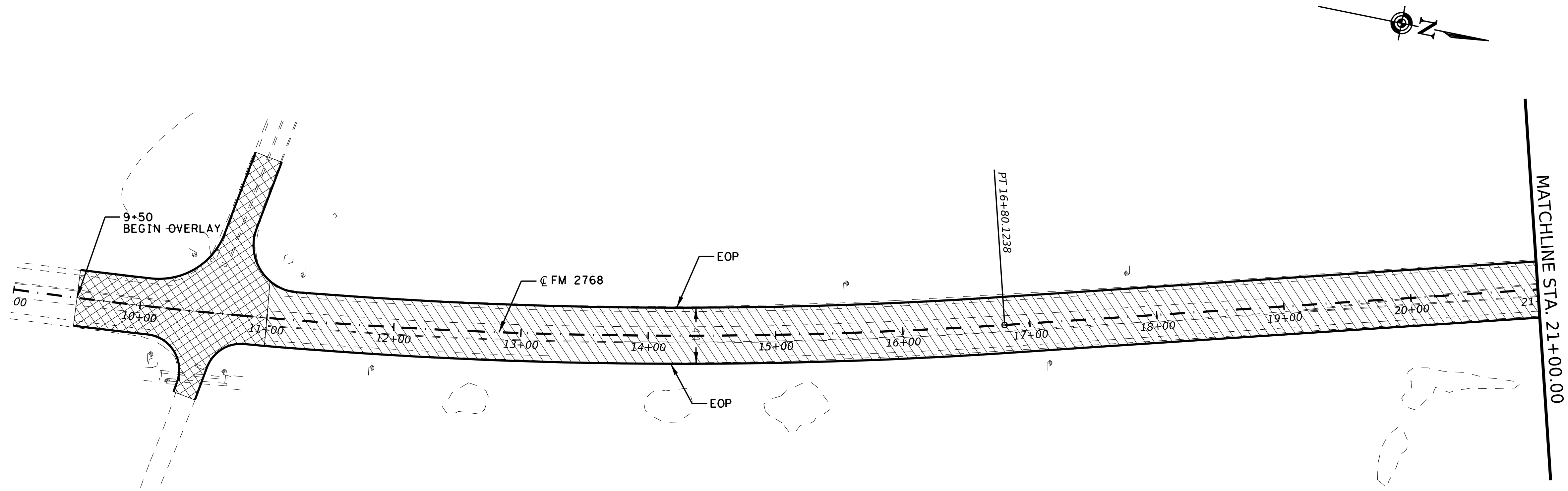
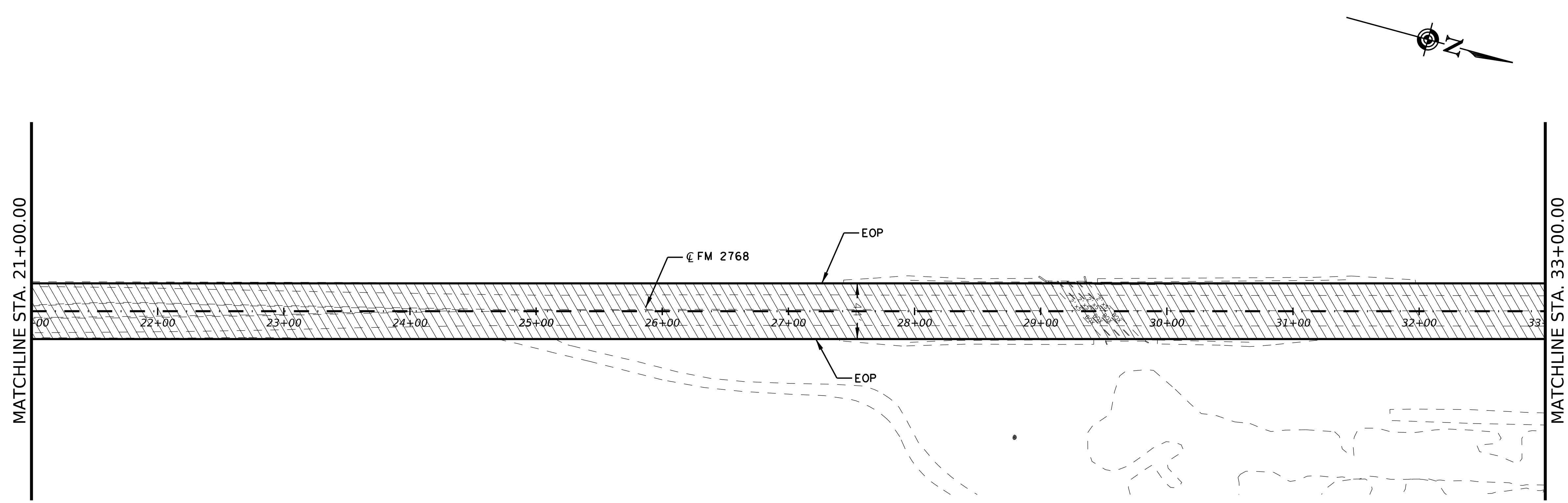
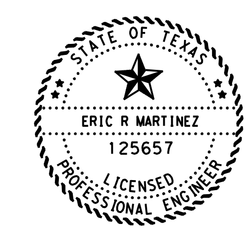


LEGEND

- 5" PVMT REPAIR + 1.5" OVERLAY HMA TY-D
- 1.5" OVERLAY HMA TY-D





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OVERLAY LAYOUT

SHEET 1 OF 14

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		56

DATE: 10/13/2023 09:43:05 PM
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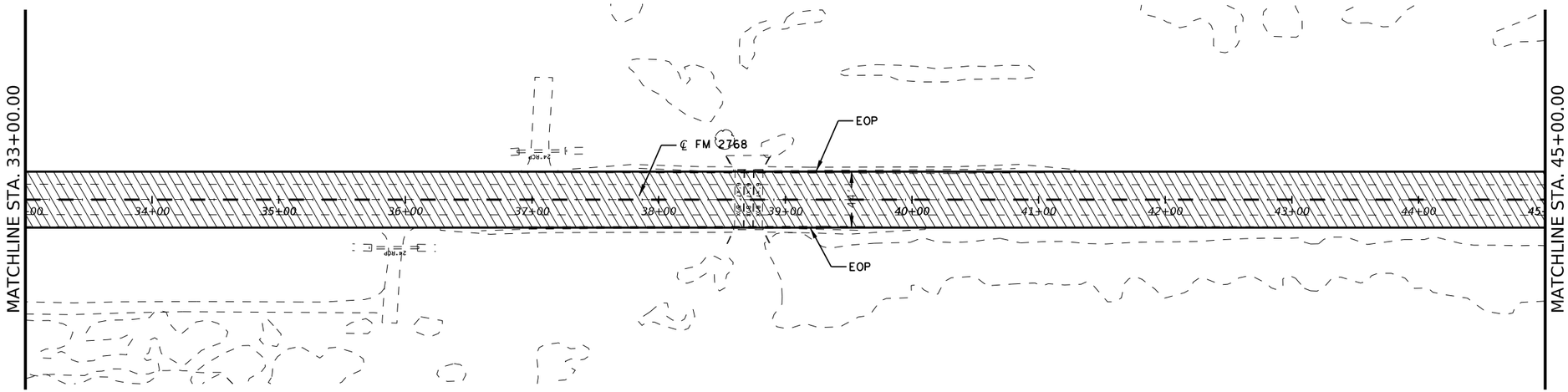

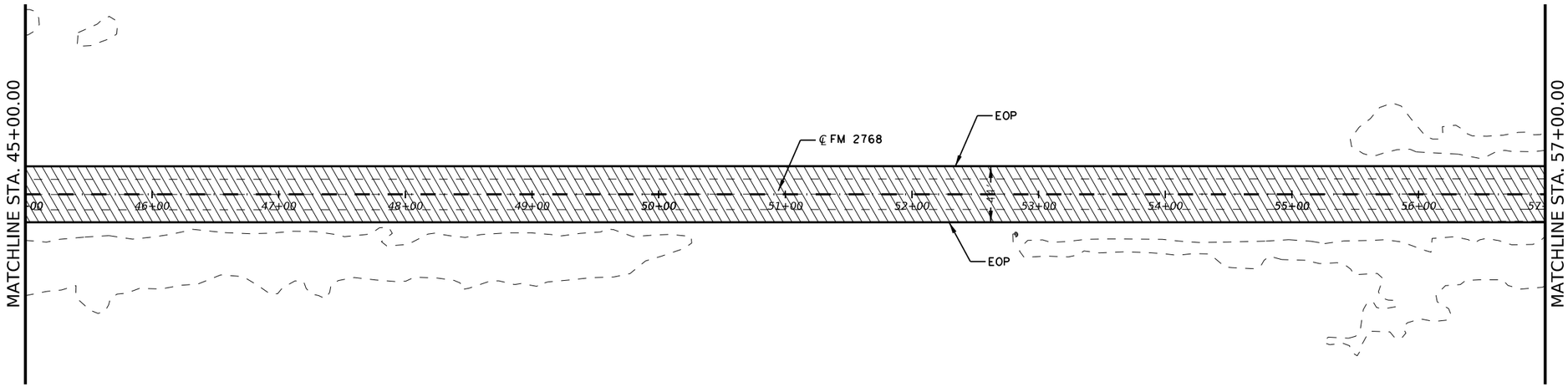

LEGEND

- 5" PVMT REPAIR + 1.5" OVERLAY HMA TY-D
- 1.5" OVERLAY HMA TY-D

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OVERLAY LAYOUTS

SHEET 2 OF 14

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		57

DATE: 10/09/2023 10:14 AM
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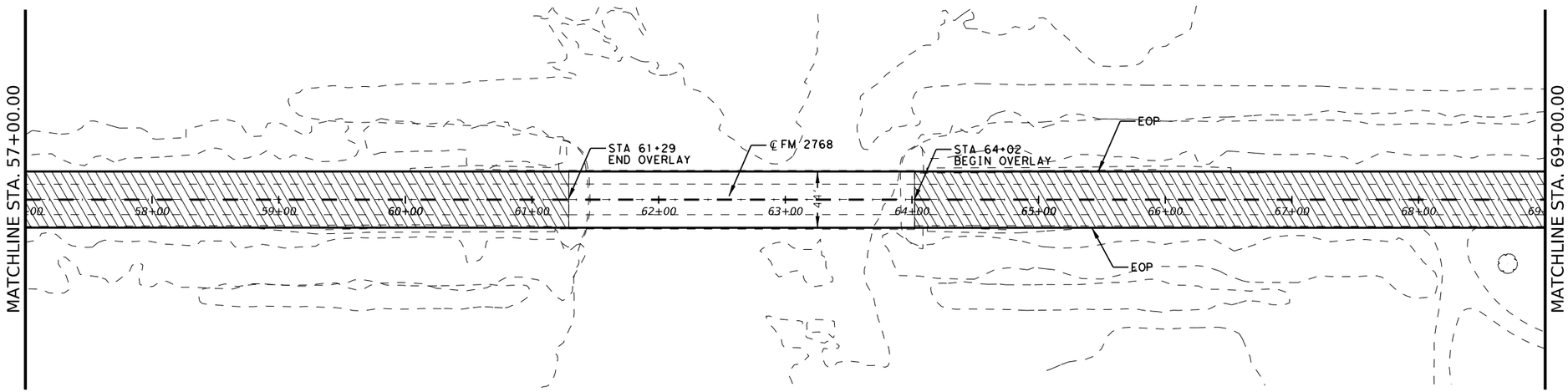
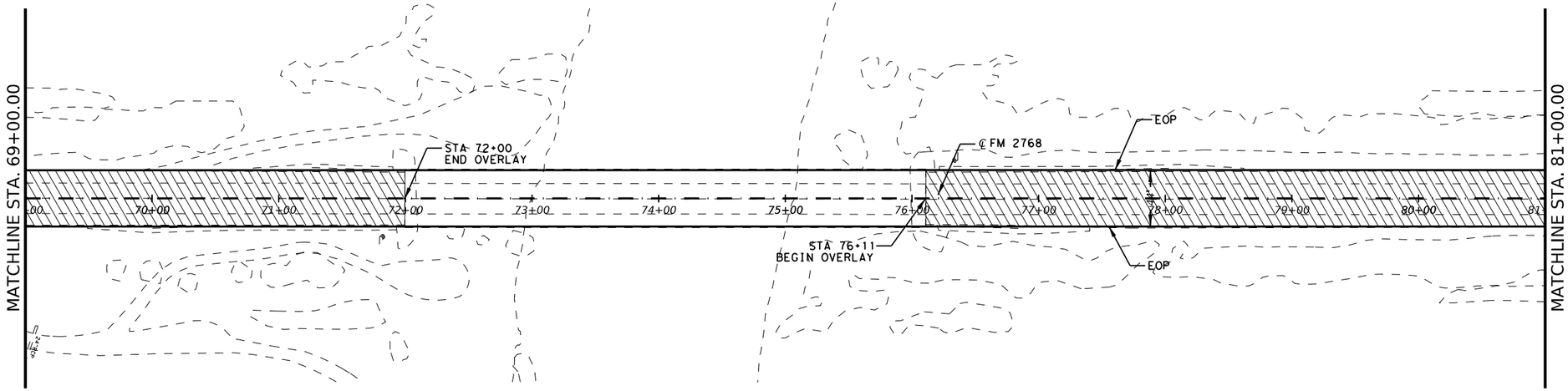
DW:
CK:
DW:



LEGEND

- 5" PVMT REPAIR + 1.5" OVERLAY HMA TY-D
- 1.5" OVERLAY HMA TY-D



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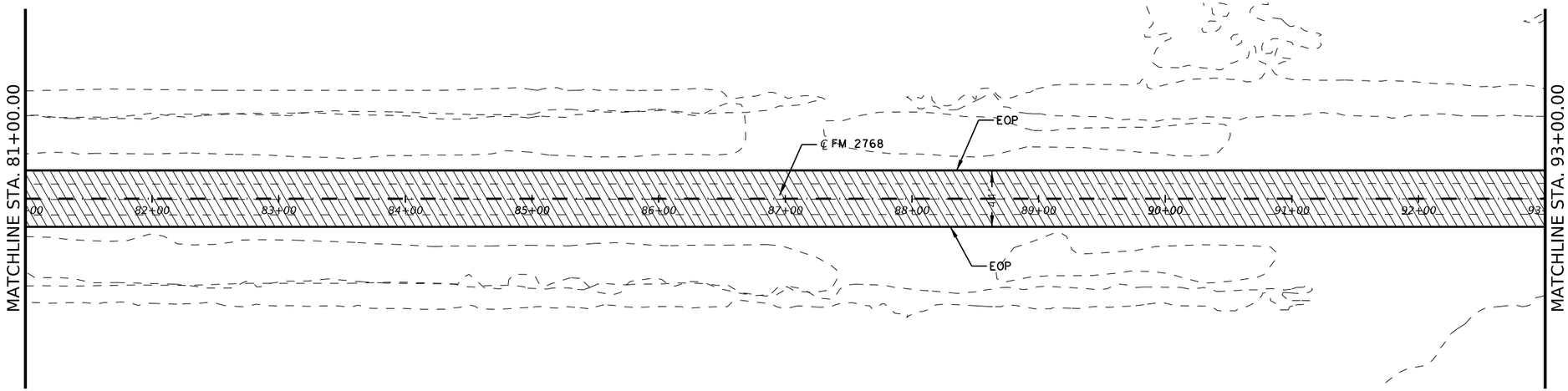
OVERLAY LAYOUTS

SHEET 3 OF 14

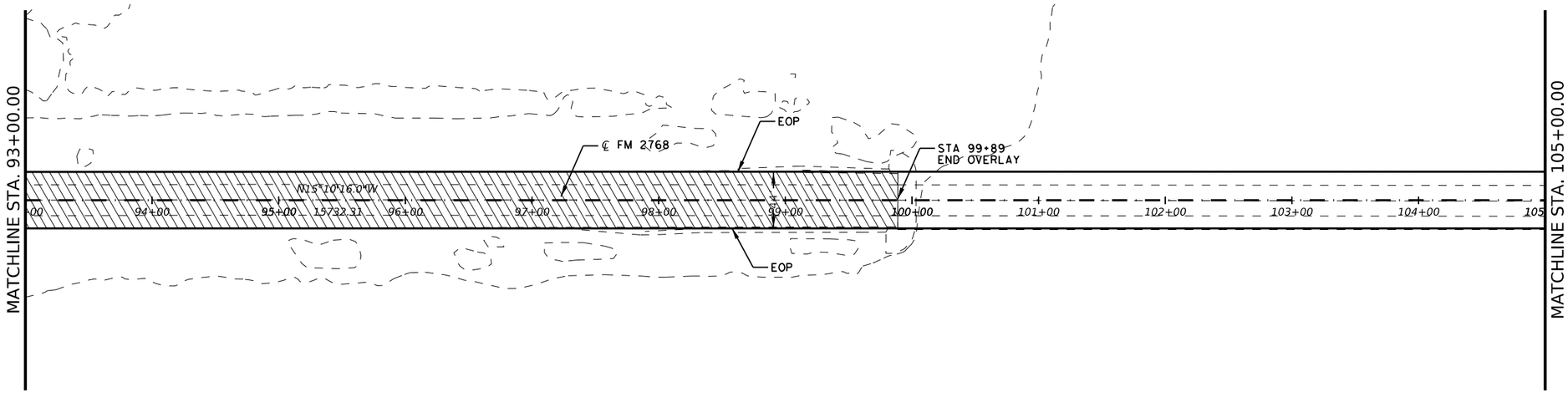
CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		58

DATE: 10/09/2023 11:06 AM
FILE:



LEGEND

- 5" PVMT REPAIR + 1.5" OVERLAY HMA TY-D
- 1.5" OVERLAY HMA TY-D



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OVERLAY LAYOUTS

SHEET 4 OF 14

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		59

DATE: 10/09/2023 11:25 AM
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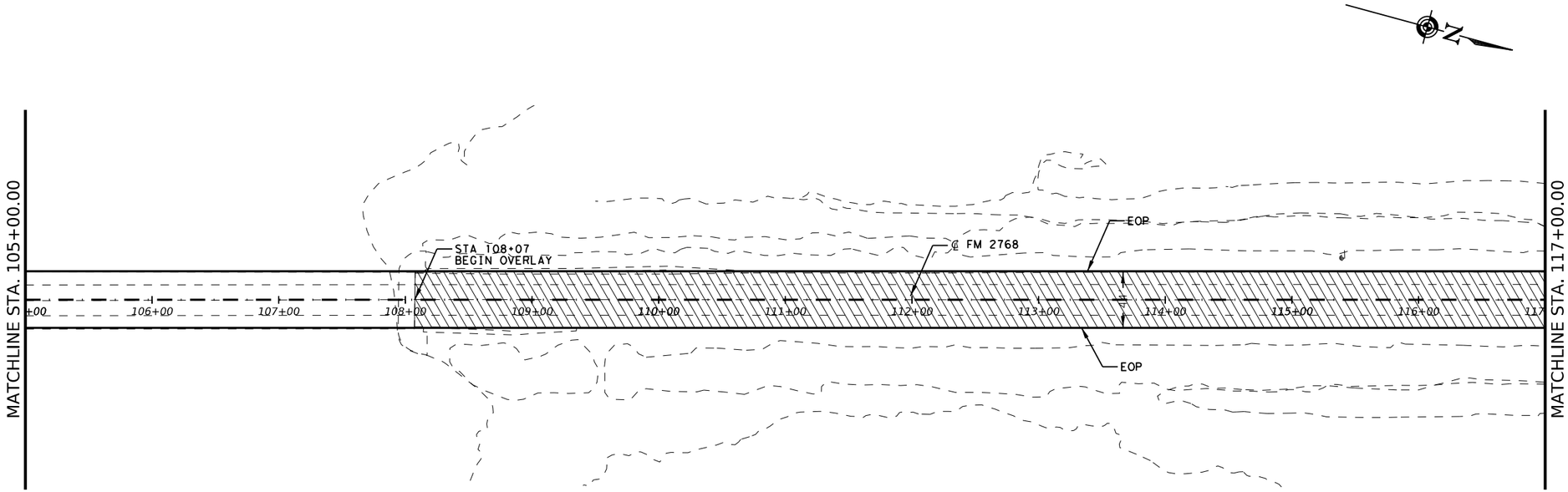

LEGEND

- 5" PVMT REPAIR + 1.5" OVERLAY HMA TY-D
- 1.5" OVERLAY HMA TY-D

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PROFESSIONAL ENGINEER

10/13/2023

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OVERLAY LAYOUTS

SHEET 5 OF 14

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		60

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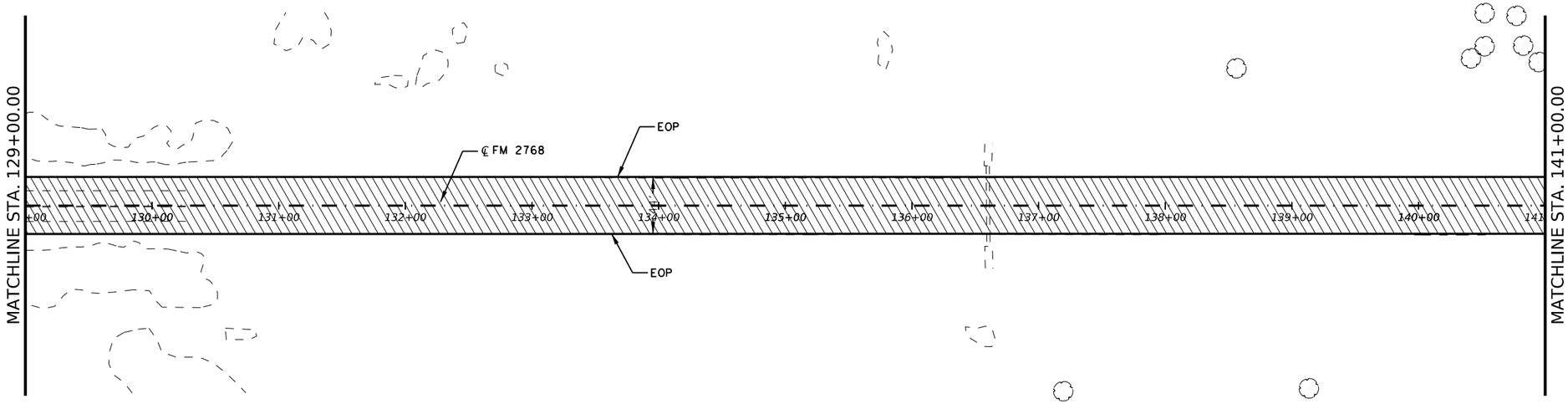

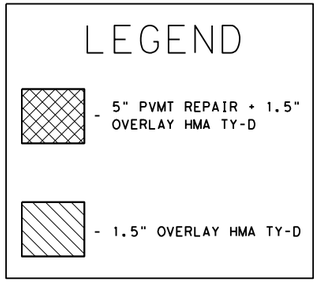

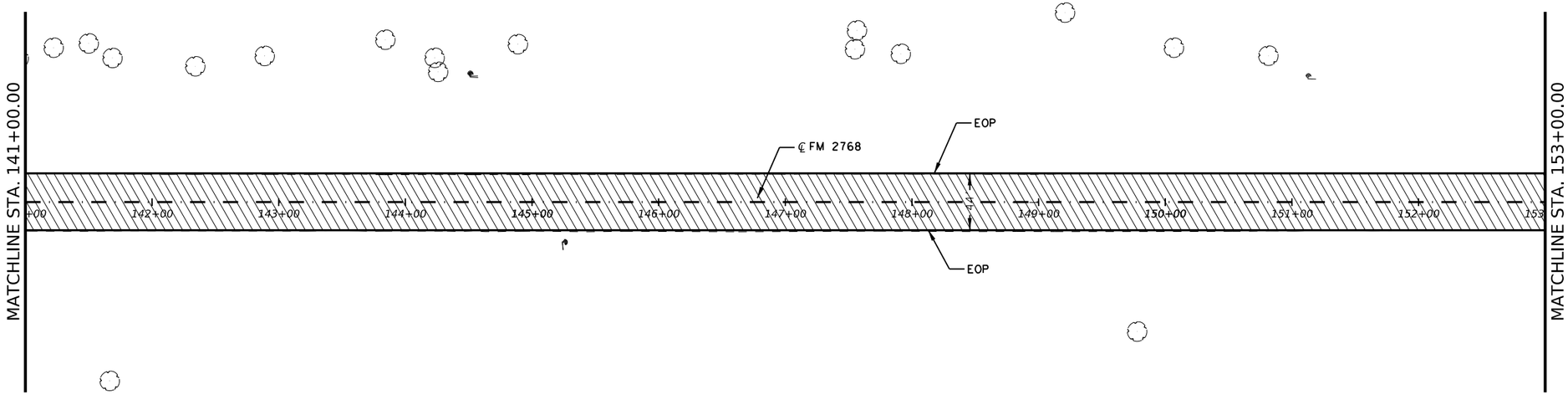

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OVERLAY LAYOUTS

SHEET 6 OF 14

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		61

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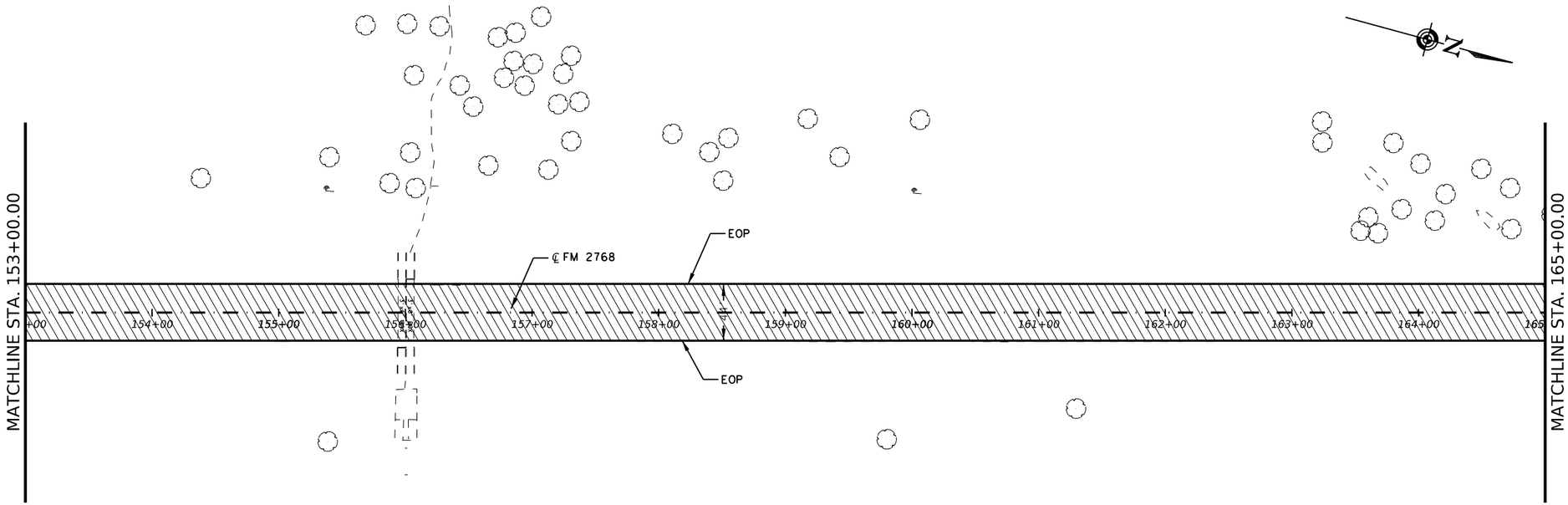

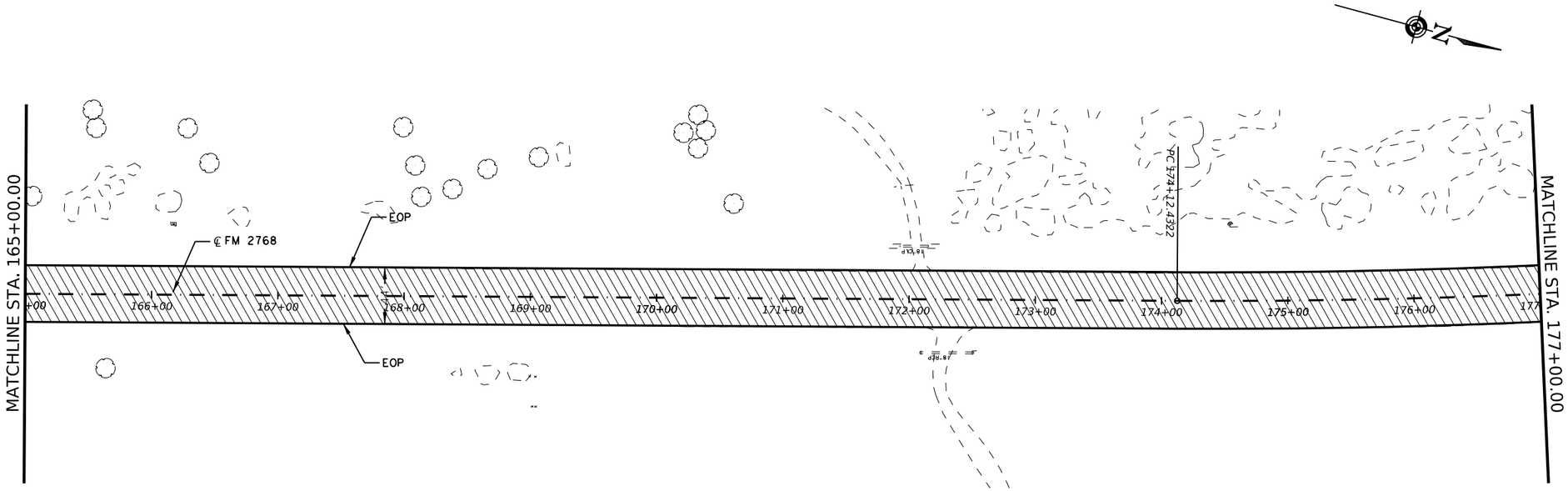

LEGEND

- 5" PVMT REPAIR + 1.5" OVERLAY HMA TY-D
- 1.5" OVERLAY HMA TY-D

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SHEET 7 OF 14

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		62

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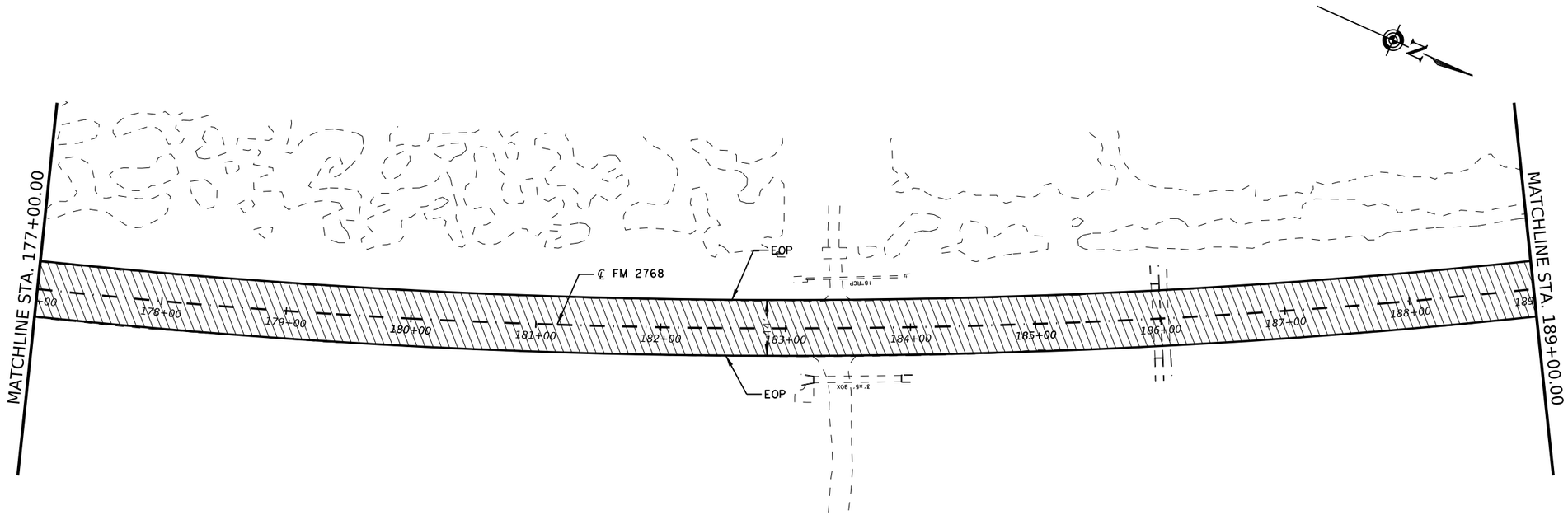
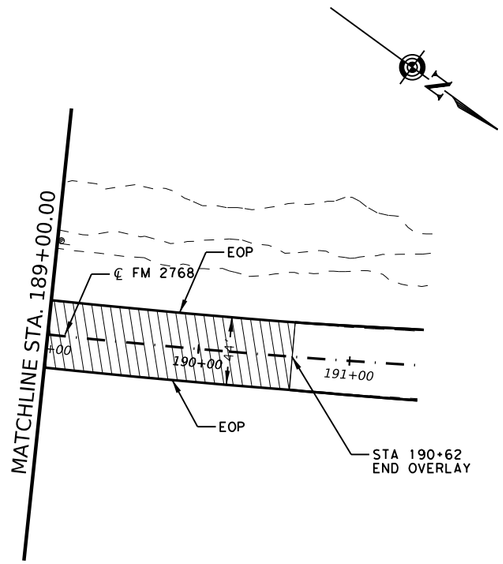


LEGEND

- 5" PVMT REPAIR + 1.5" OVERLAY HMA TY-D
- 1.5" OVERLAY HMA TY-D



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OVERLAY LAYOUTS

SHEET 8 OF 14

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		63

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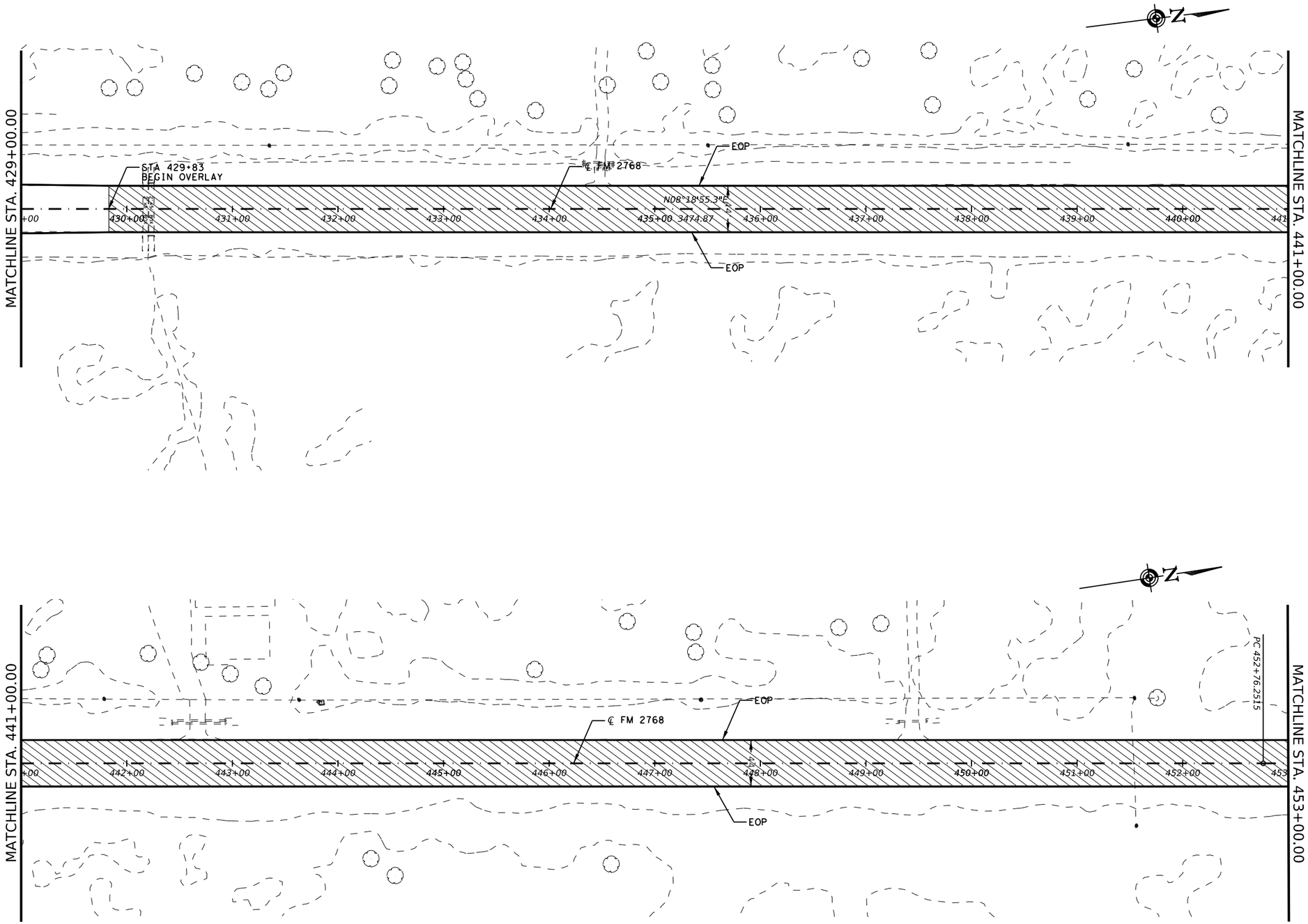

LEGEND

- 5" PVMT REPAIR + 1.5" OVERLAY HMA TY-D
- 1.5" OVERLAY HMA TY-D

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OVERLAY LAYOUTS

SHEET 9 OF 14

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		64

DATE: 10/09/2023 05:13 PM
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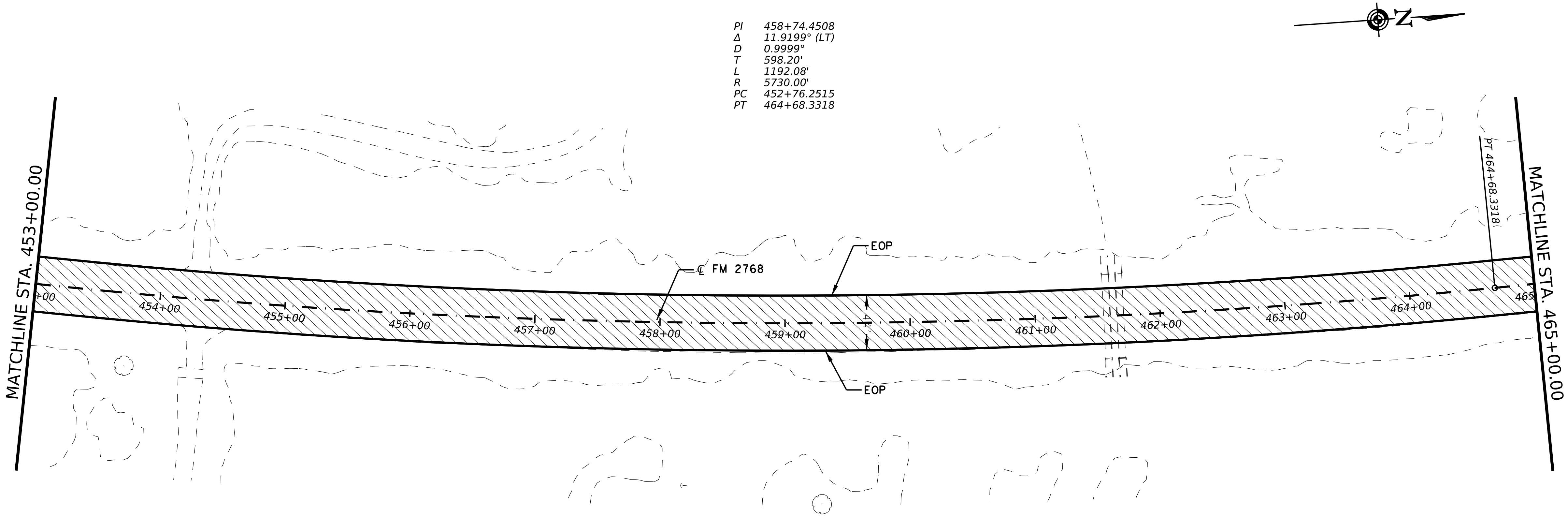

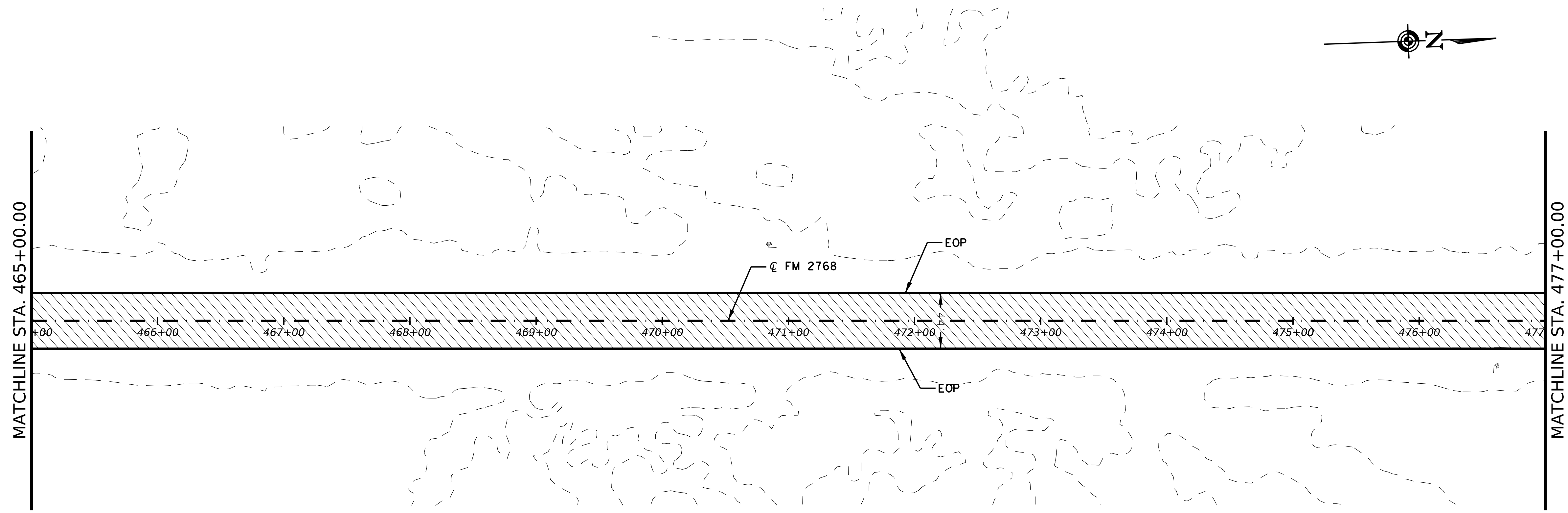

LEGEND

- 5" PVMT REPAIR + 1.5" OVERLAY HMA TY-D
- 1.5" OVERLAY HMA TY-D

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OVERLAY LAYOUTS

SHEET 10 OF 12

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		65

DATE: 10/13/2023 09:42:38 PM
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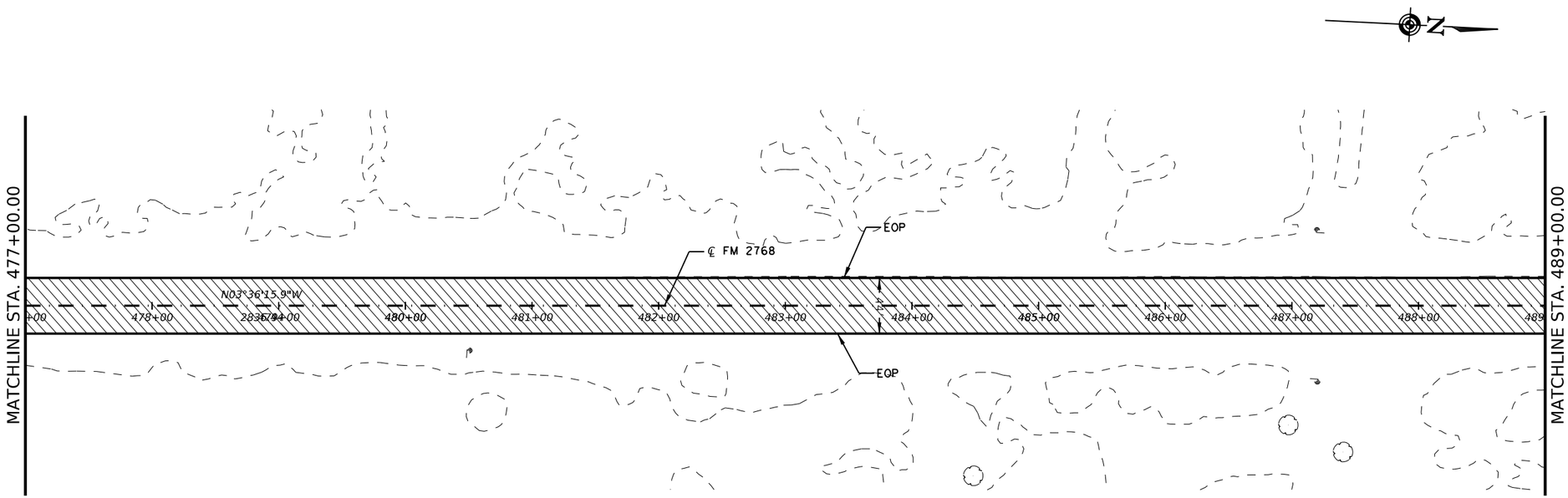

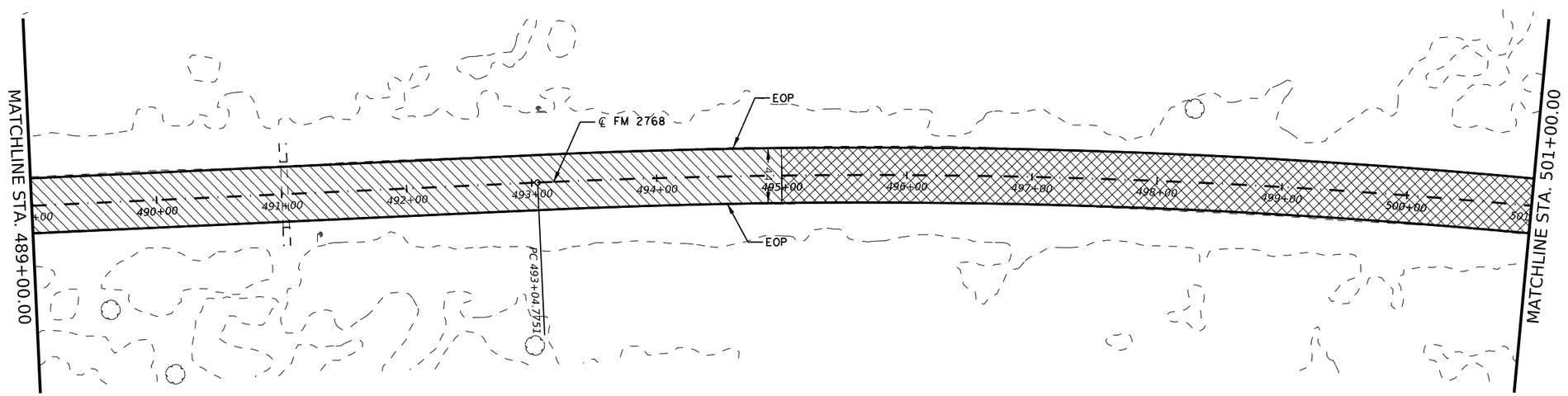

LEGEND

- 5" PVMT REPAIR + 1.5" OVERLAY HMA TY-D
- 1.5" OVERLAY HMA TY-D

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OVERLAY LAYOUTS

SHEET 11 OF 12

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		66

DATE: 10/13/2023 09:47 AM
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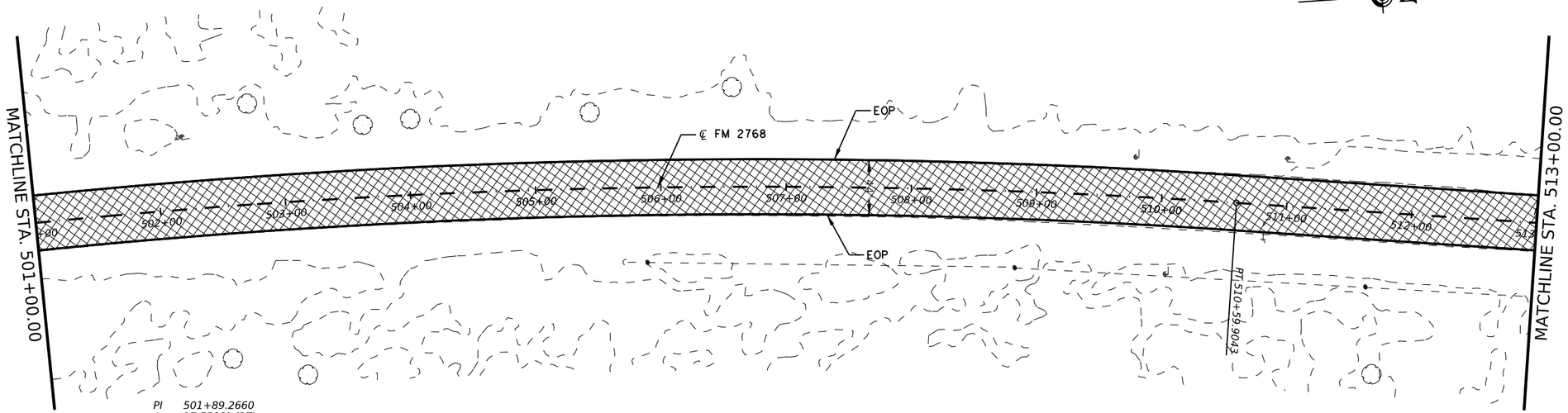

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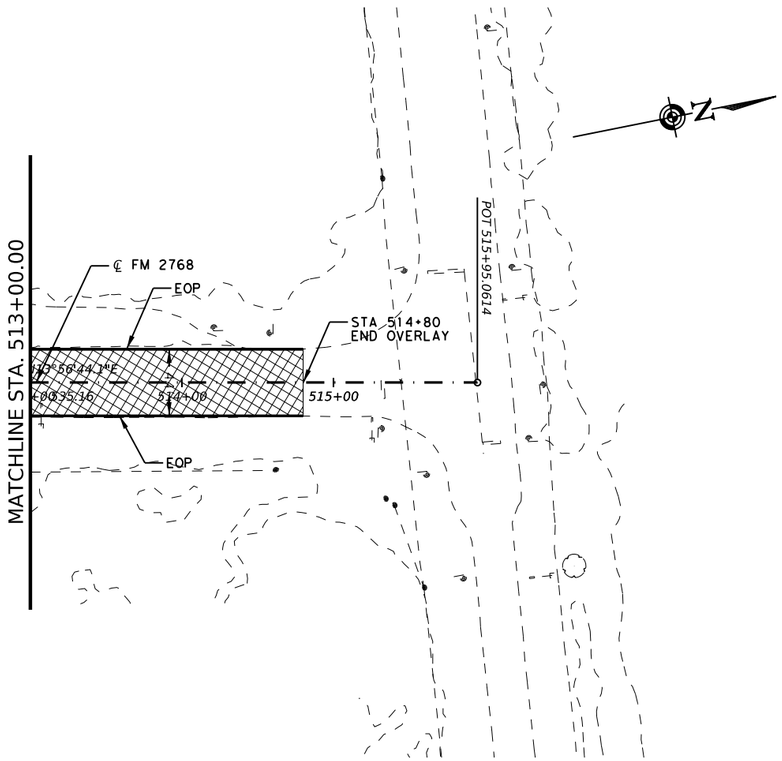

LEGEND

- 5" PVMT REPAIR + 1.5" OVERLAY HMA TY-D
- 1.5" OVERLAY HMA TY-D

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OVERLAY LAYOUTS

SHEET 12 OF 12

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		67

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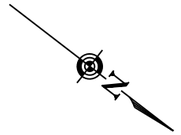
LEGEND:

DIRECTION OF TRAFFIC

OM ASSM (OM-2Z) (WFLX)GND(BI)



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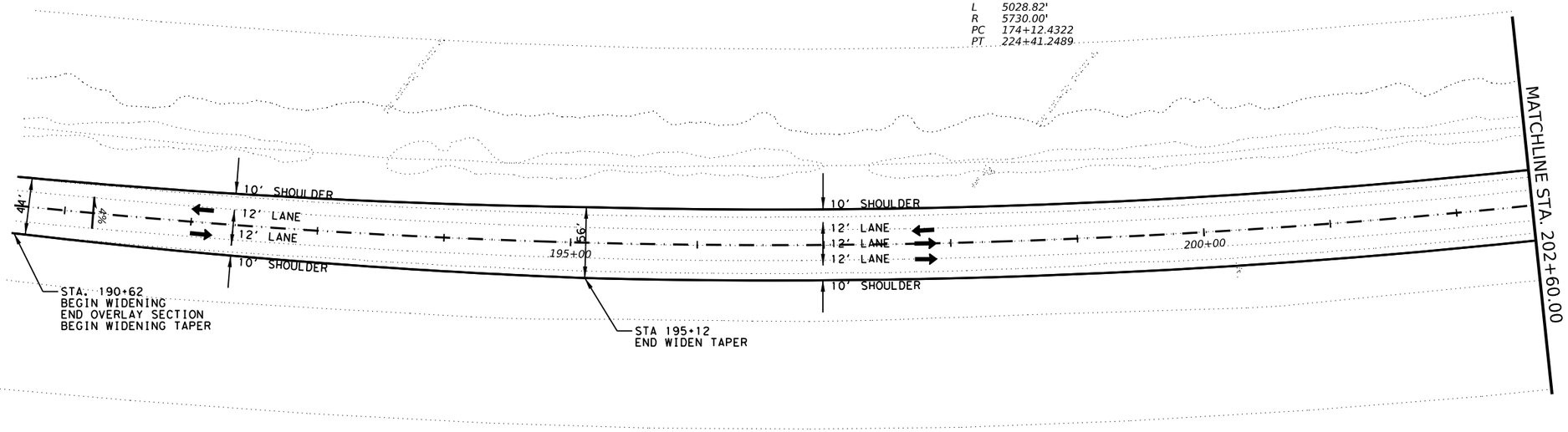

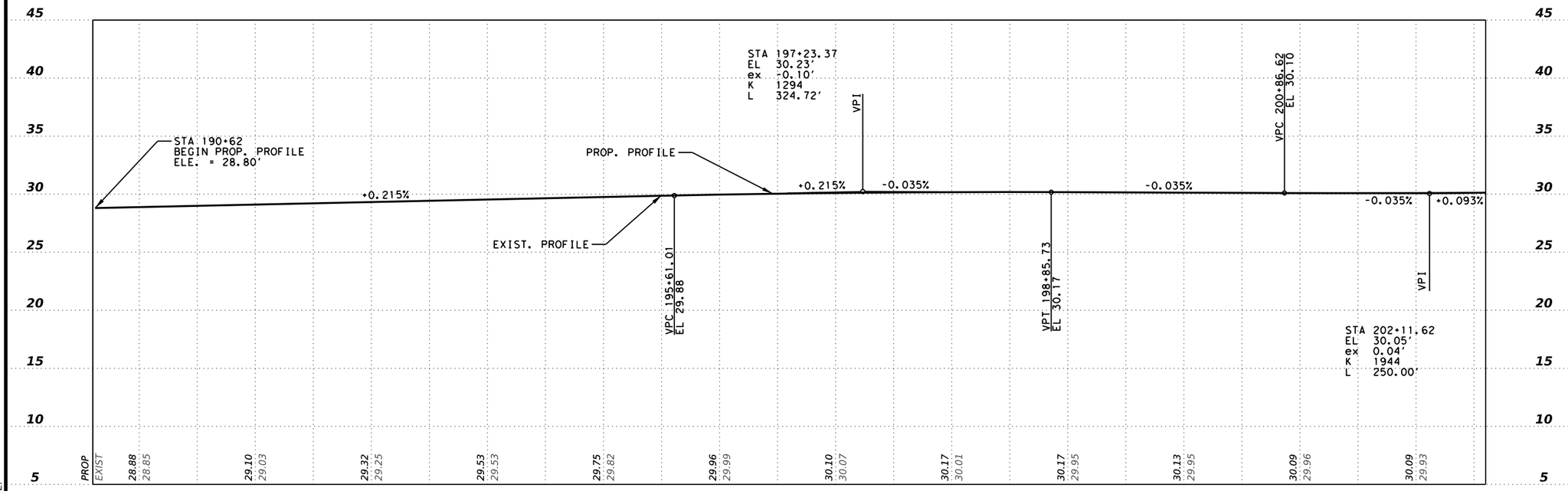

DATE: 10/13/2023 12:11 PM
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PLAN AND PROFILE SHEETS

SHEET 1 OF 20

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		68

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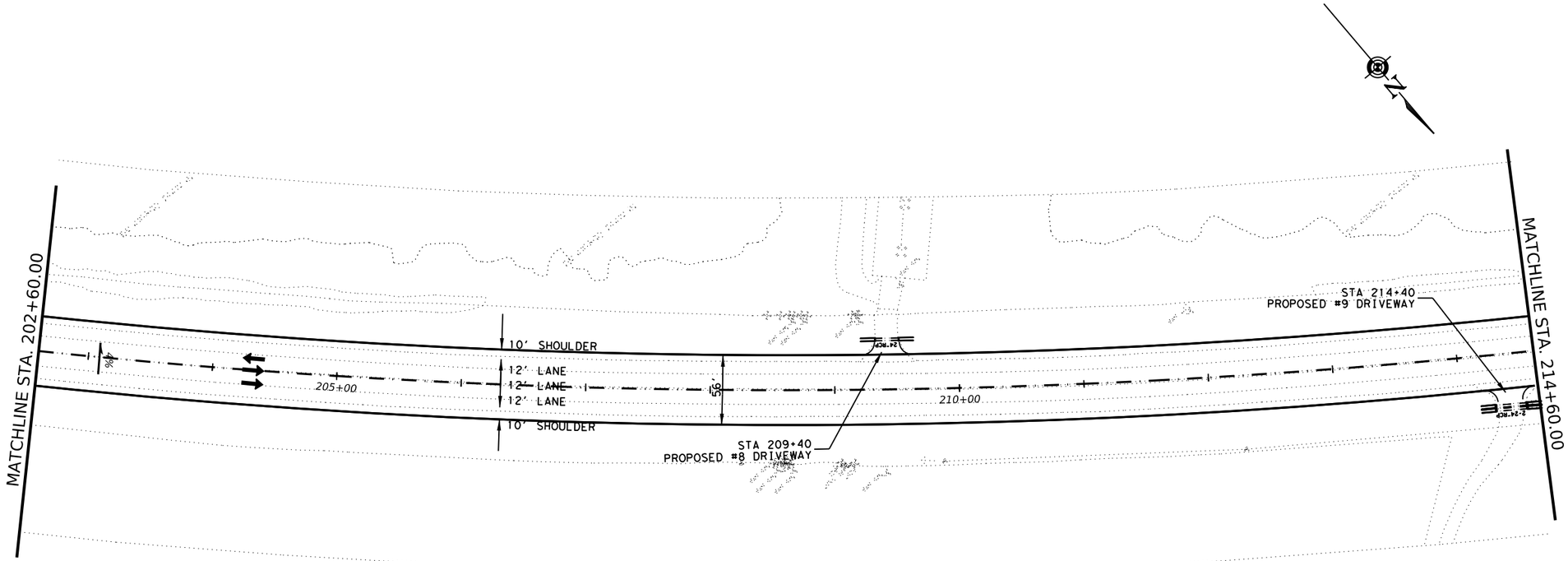
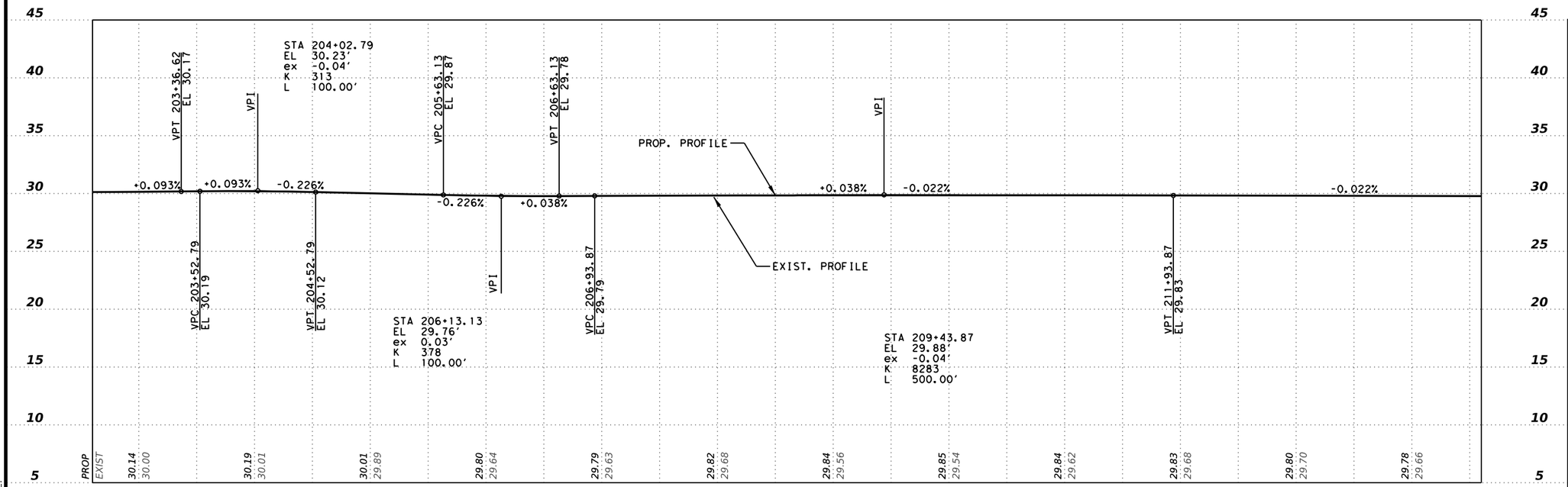
DIRECTION OF TRAFFIC

OM ASSM (OM-2Z) (WFLX)GND(BI)





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PLAN AND PROFILE SHEETS

SHEET 2 OF 20

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		69

DATE: 10/13/2023 12:21 PM
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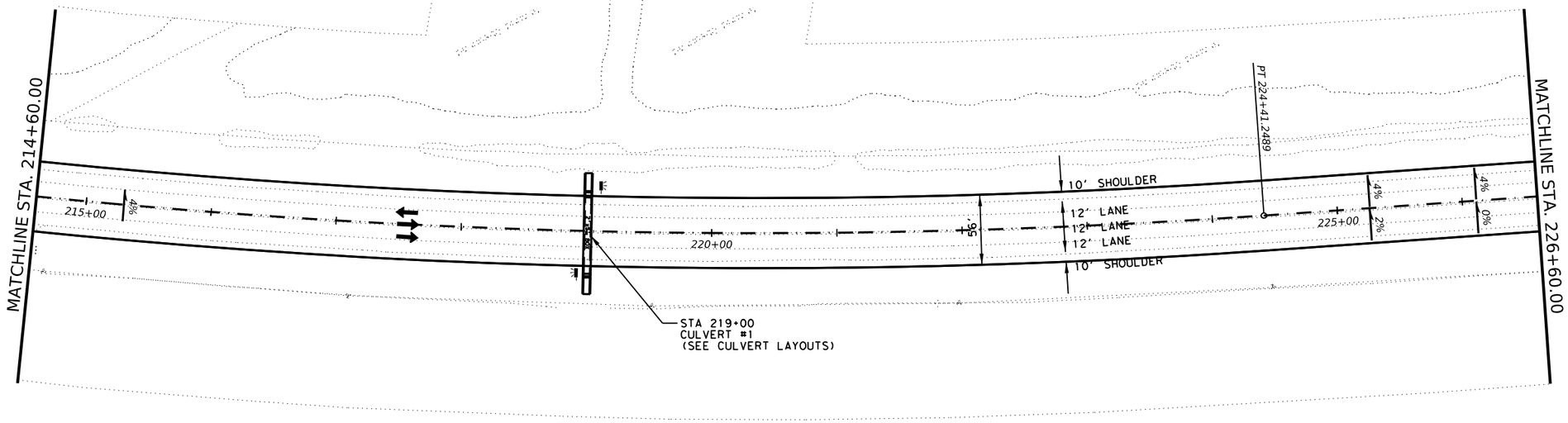
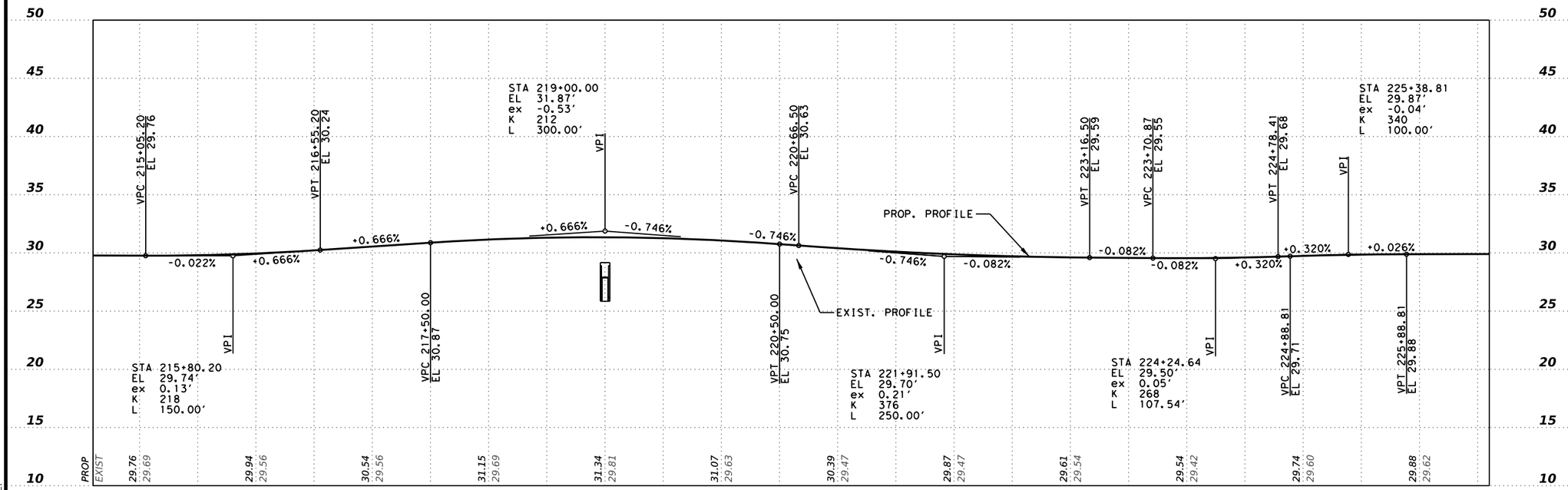
LEGEND:

- DIRECTION OF TRAFFIC
- OM ASSM (OM-2Z) (WFLX)GND(BI)





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STATE OF TEXAS
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LICENSED PROFESSIONAL ENGINEER

10/13/2023

Texas Department of Transportation

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PLAN AND PROFILE SHEETS

SHEET 3 OF 20

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		70

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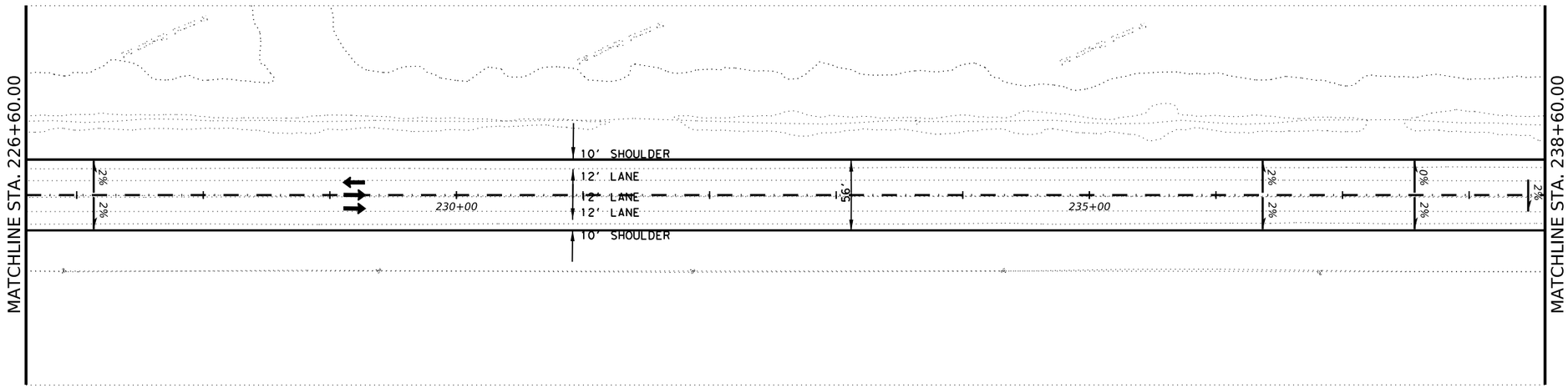

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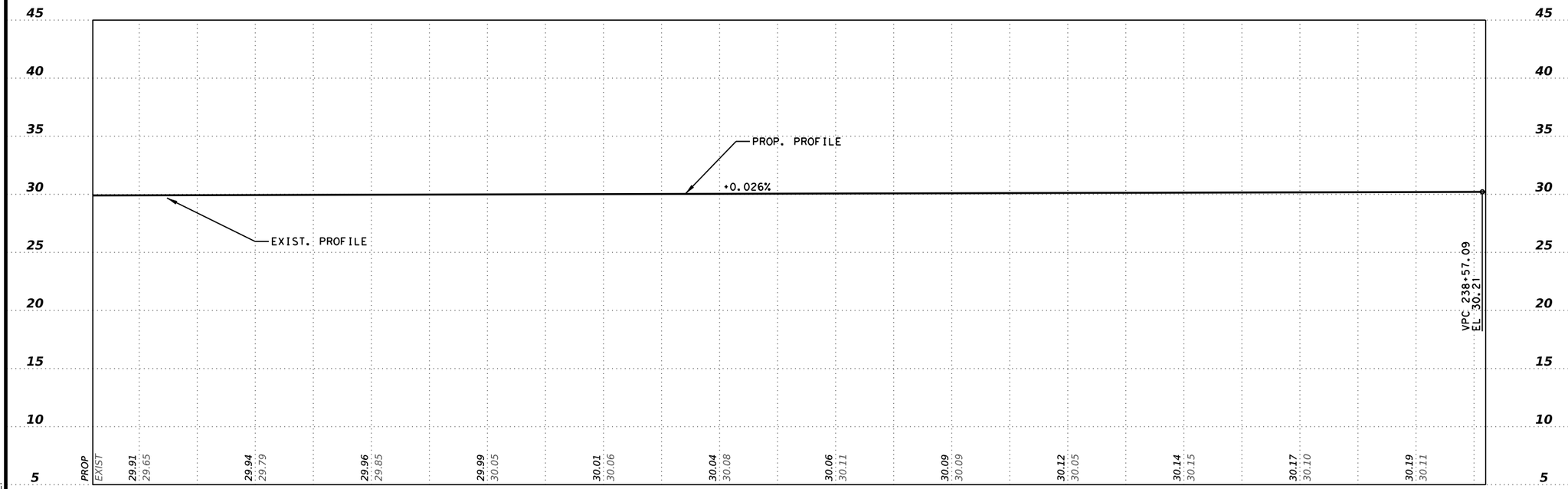
DIRECTION OF TRAFFIC

OM ASSM (OM-2Z) (WFLX)GND(BI)



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PLAN AND PROFILE SHEETS

SHEET 4 OF 20

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		71

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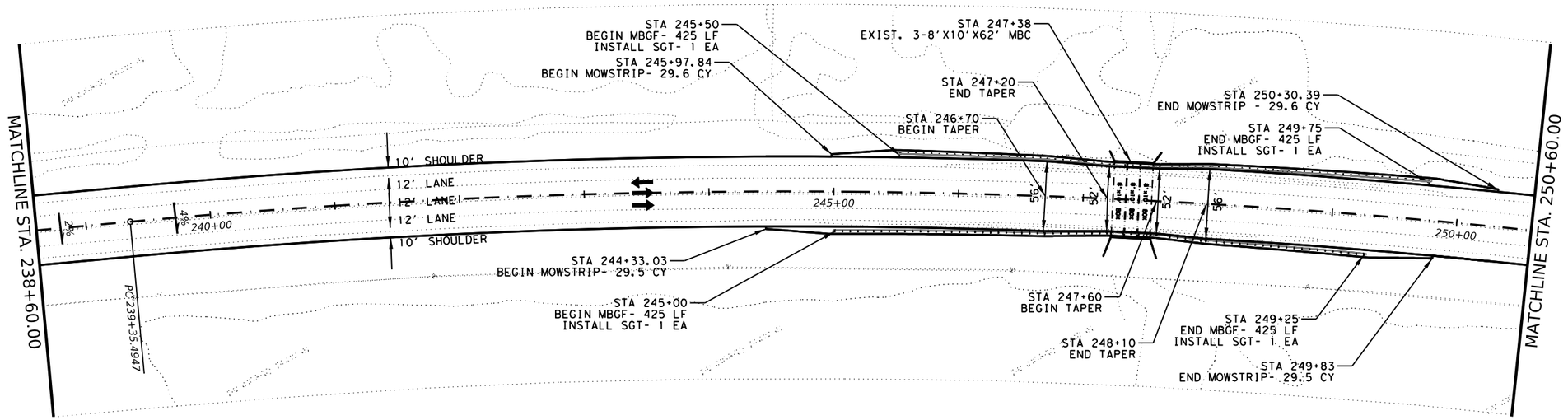

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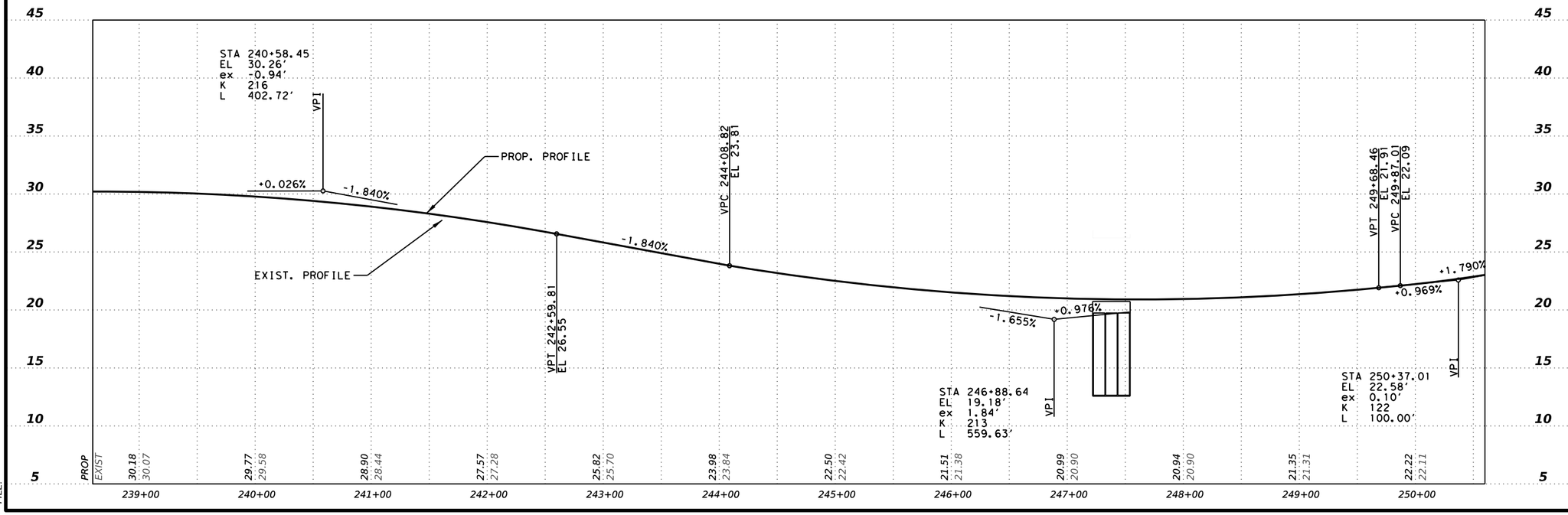
- DIRECTION OF TRAFFIC
- OM ASSM (OM-2Z) (WFLX)GND(BI)



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PLAN AND PROFILE SHEETS

SHEET 5 OF 20

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		72

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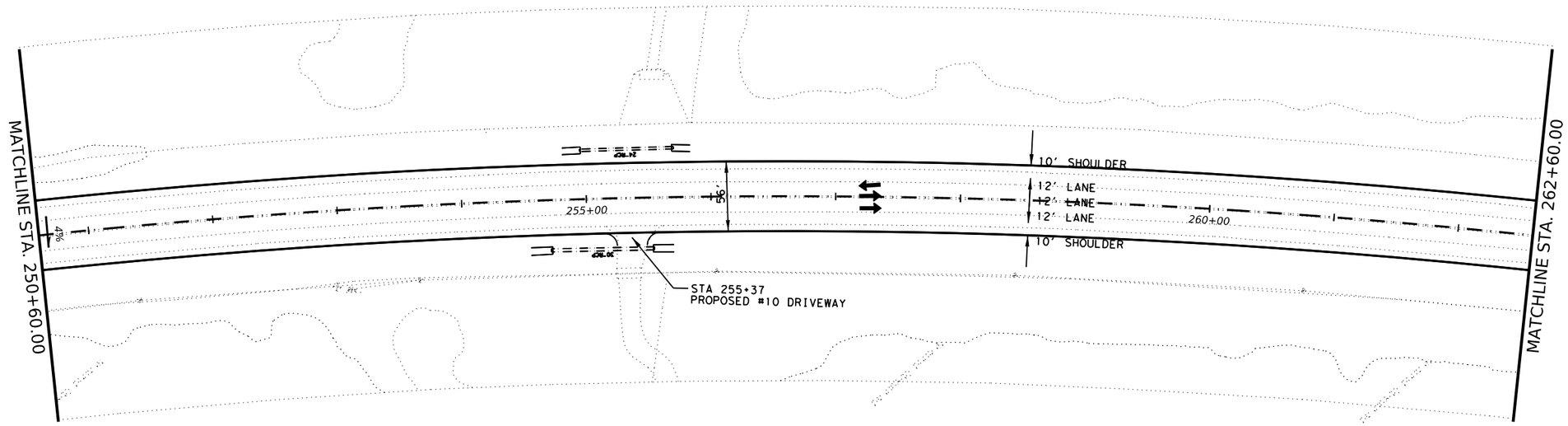

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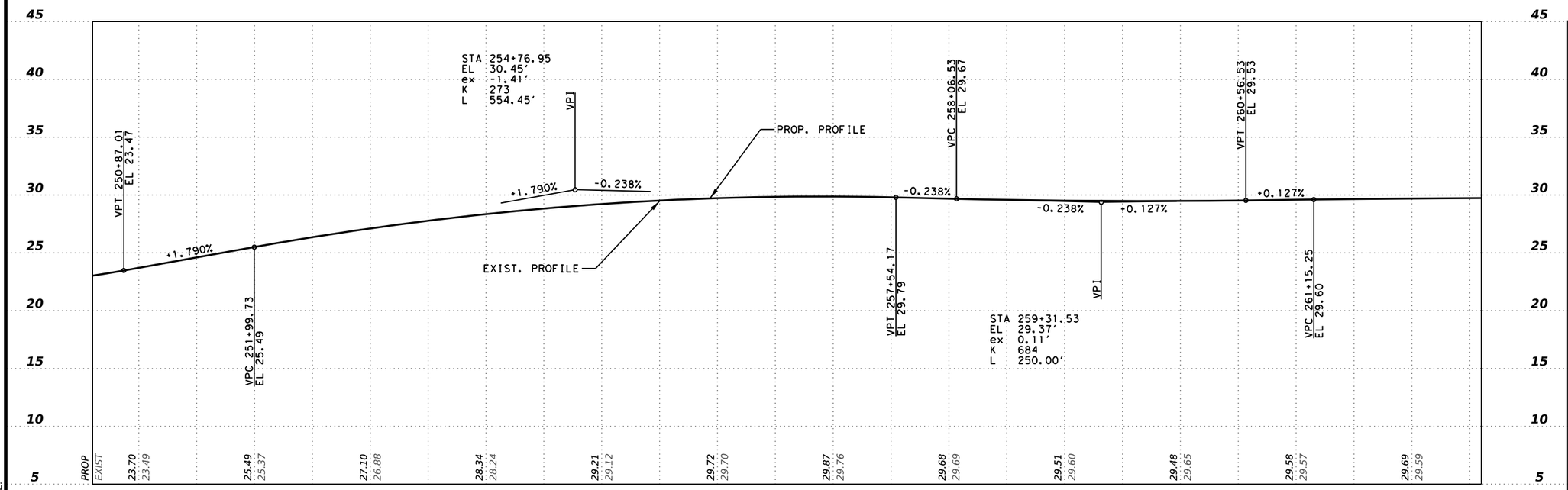

LEGEND:

- DIRECTION OF TRAFFIC
- OM ASSM (OM-2Z) (WFLX)GND(BI)

STATE OF TEXAS
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PLAN AND PROFILE PROFILE SHEETS

SHEET 6 OF 20

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		73

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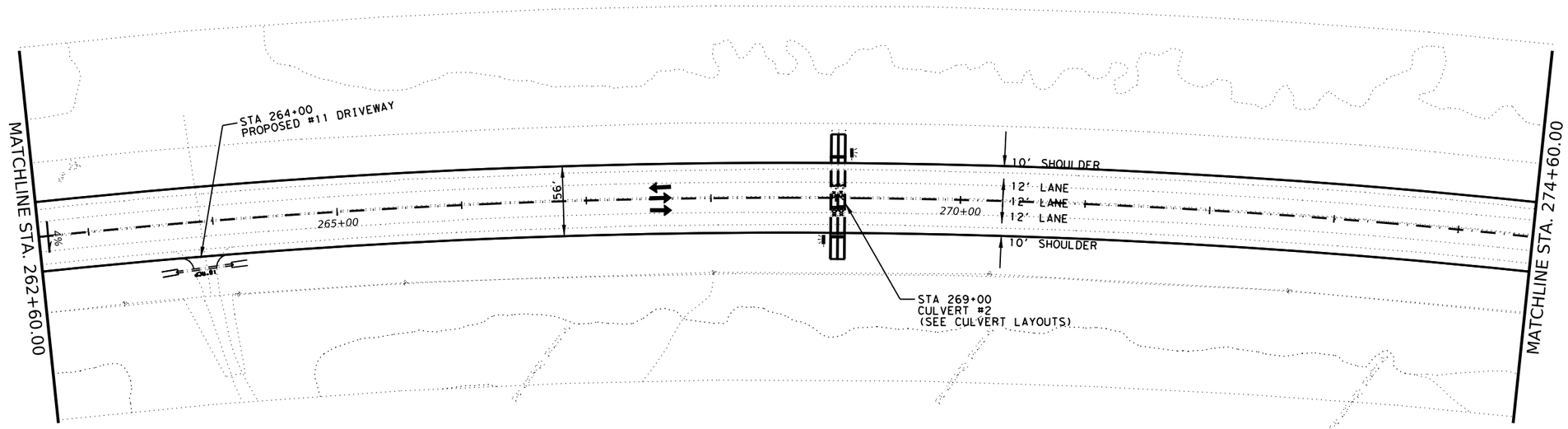

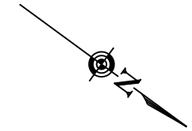

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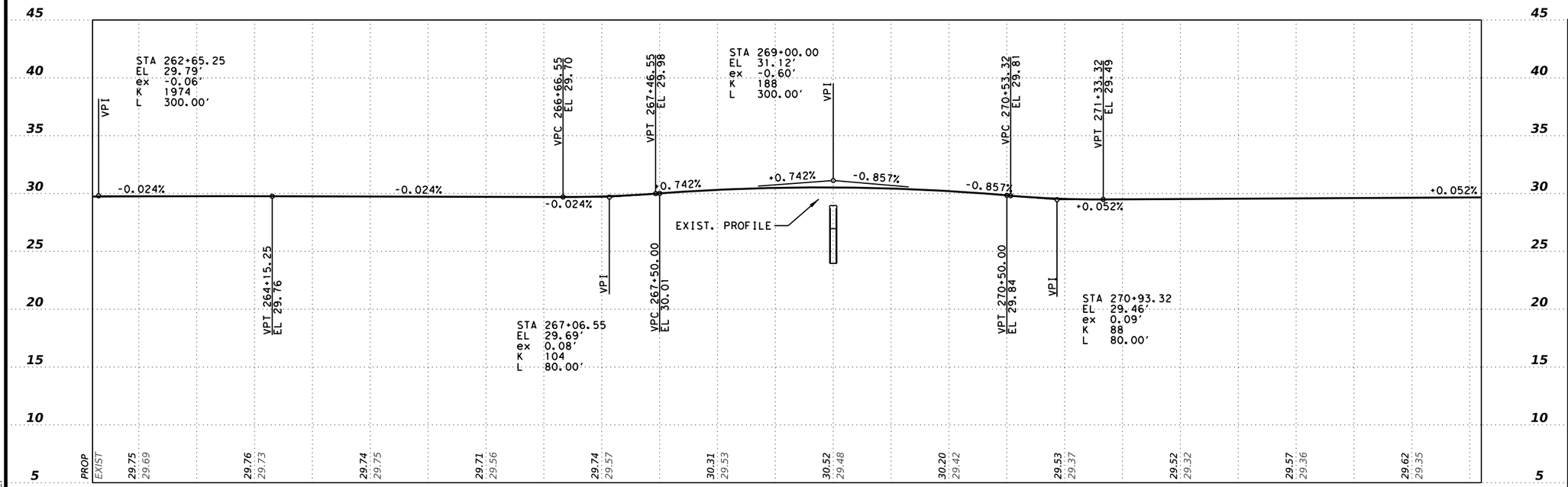
- DIRECTION OF TRAFFIC
- OM ASSM (OM-2Z) (WFLX)GND(BI)



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PLAN AND PROFILE SHEETS

SHEET 7 OF 20

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		74

DATE: 10/13/2023 12:53 PM
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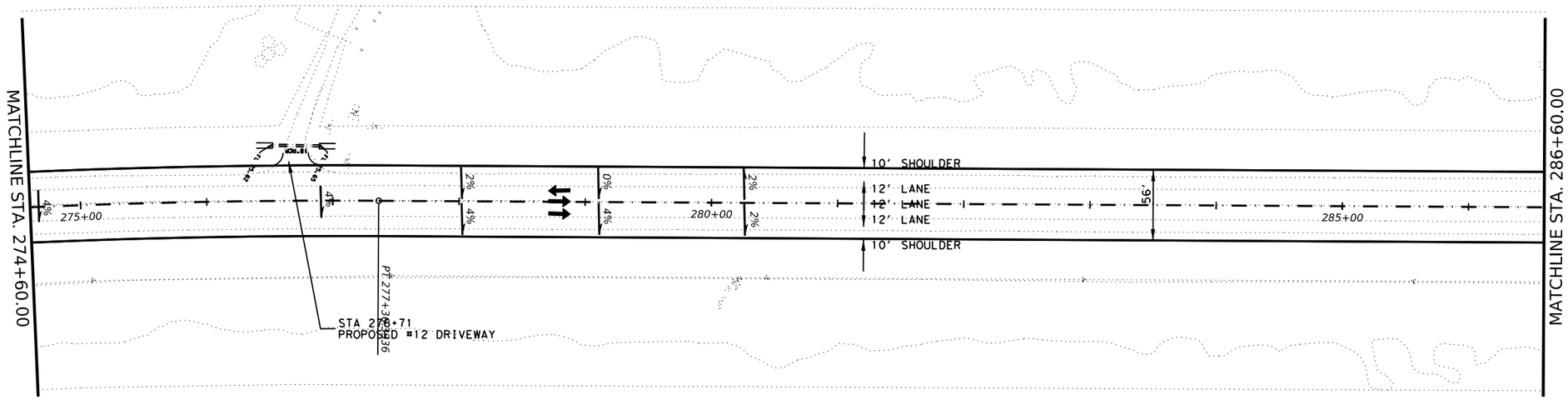

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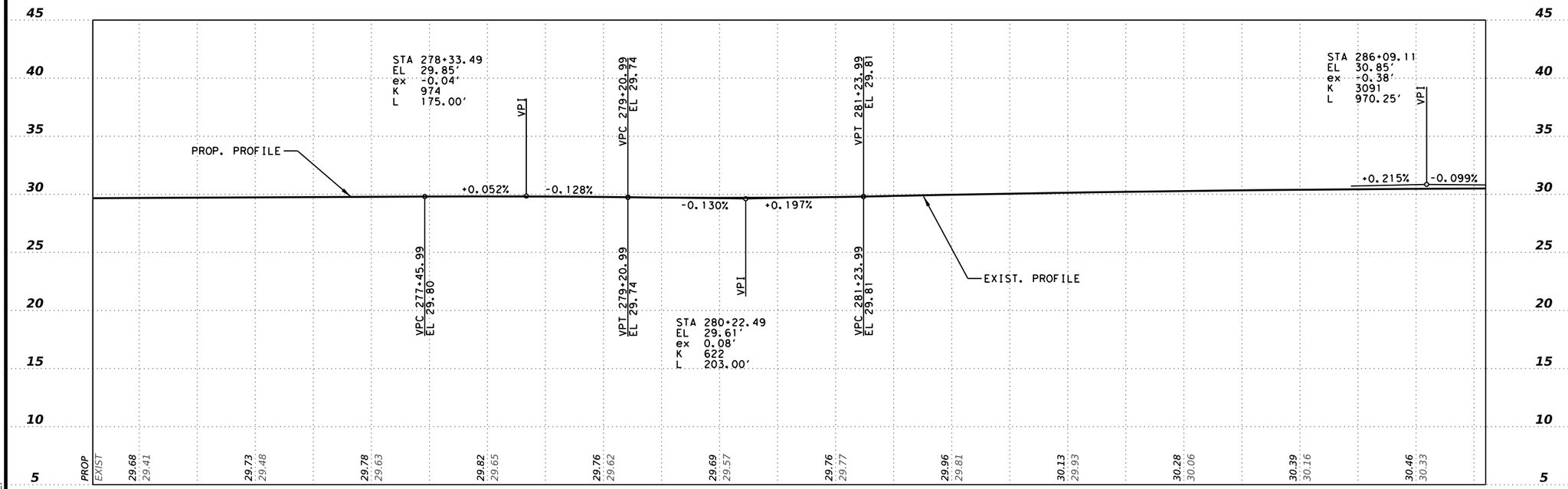
DIRECTION OF TRAFFIC

OM ASSM (OM-2Z) (WFLX)GND(BI)



DATE: 10/13/2023 01:01 PM
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STATE OF TEXAS
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PROFESSIONAL ENGINEER

10/13/2023

Texas Department of Transportation

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PLAN AND PROFILE SHEETS

SHEET 8 OF 20

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		75

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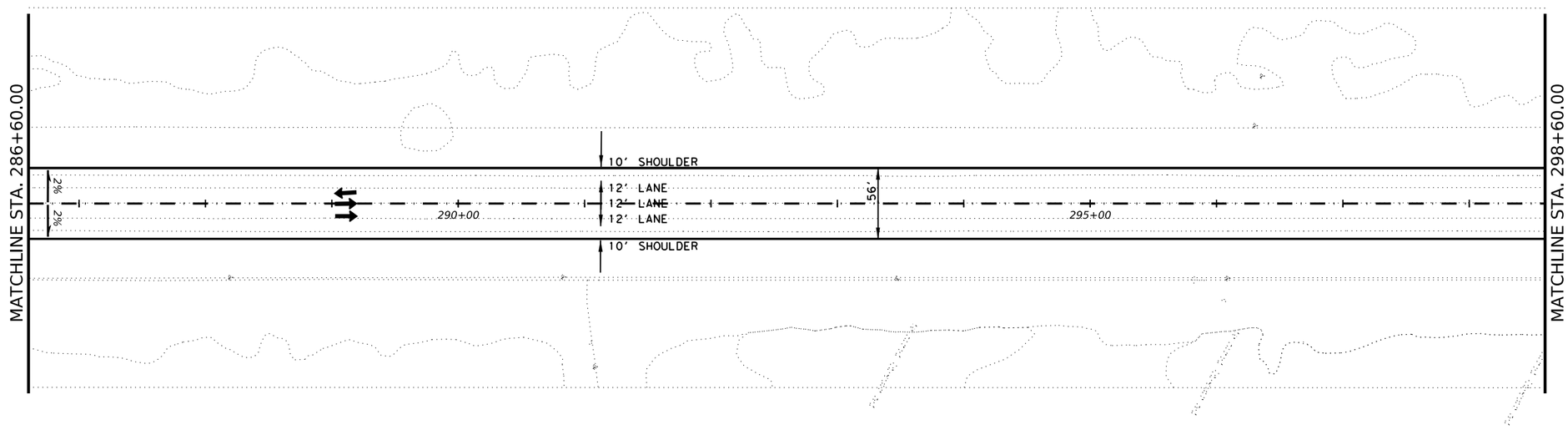
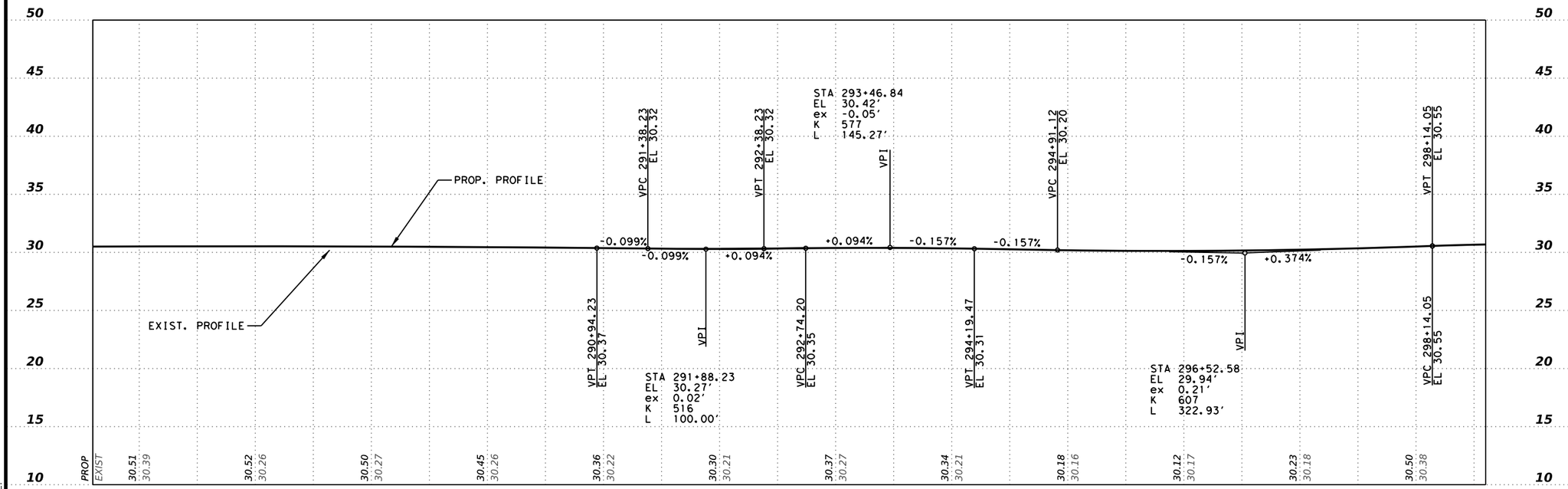
DIRECTION OF TRAFFIC

OM ASSM (OM-2Z) (WFLX)GND(BI)





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10/13/2023

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PLAN AND PROFILE SHEETS

SHEET 9 OF 20

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		76

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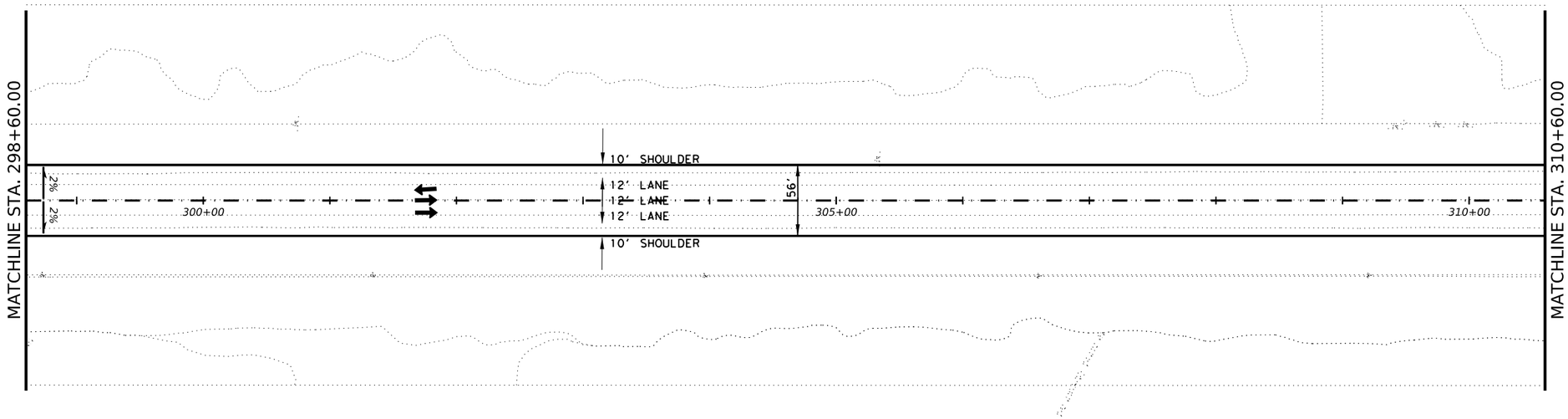
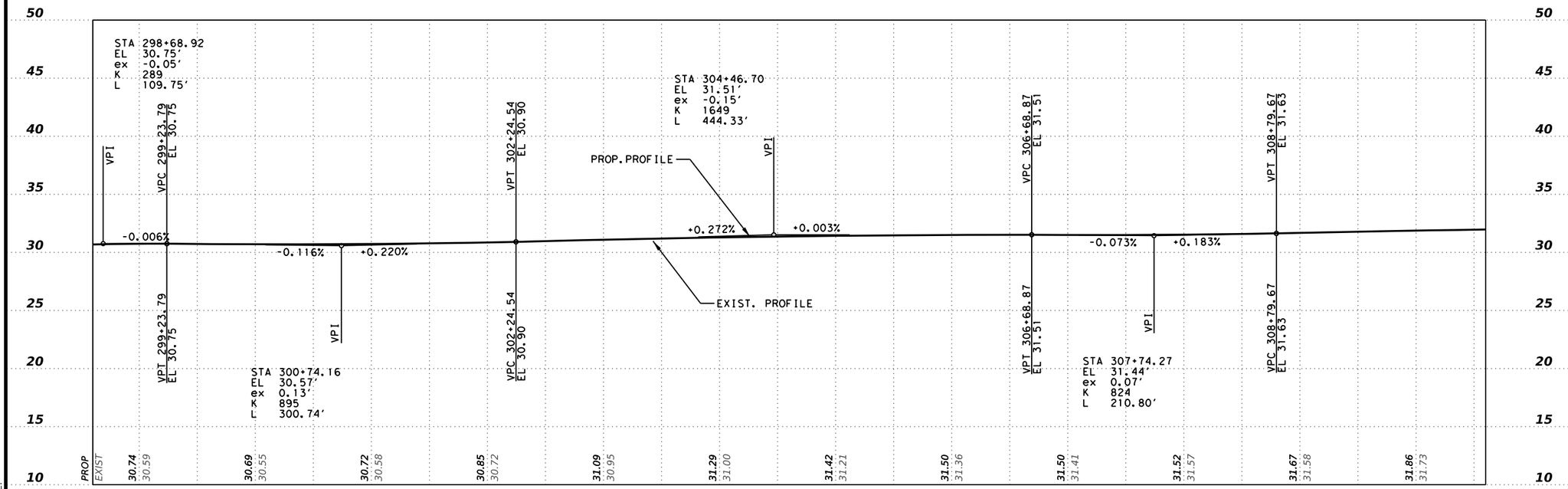
LEGEND:

DIRECTION OF TRAFFIC

OM ASSM (OM-2Z)
(WFLX)GND(BI)





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FILE:

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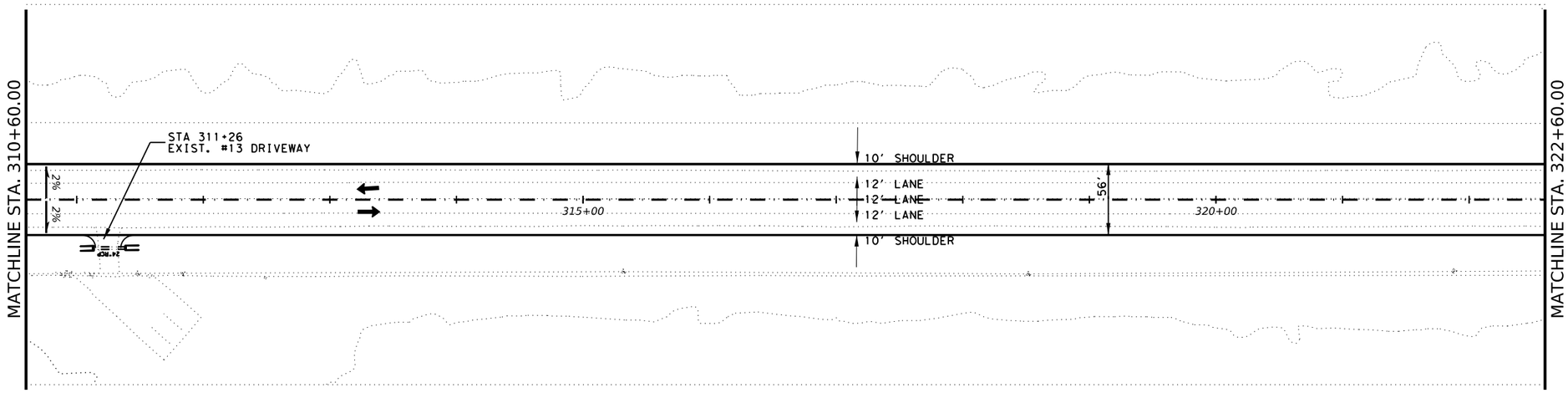
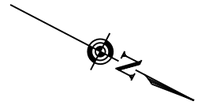
PROFILE SHEETS

SHEET 10 OF 20

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		77





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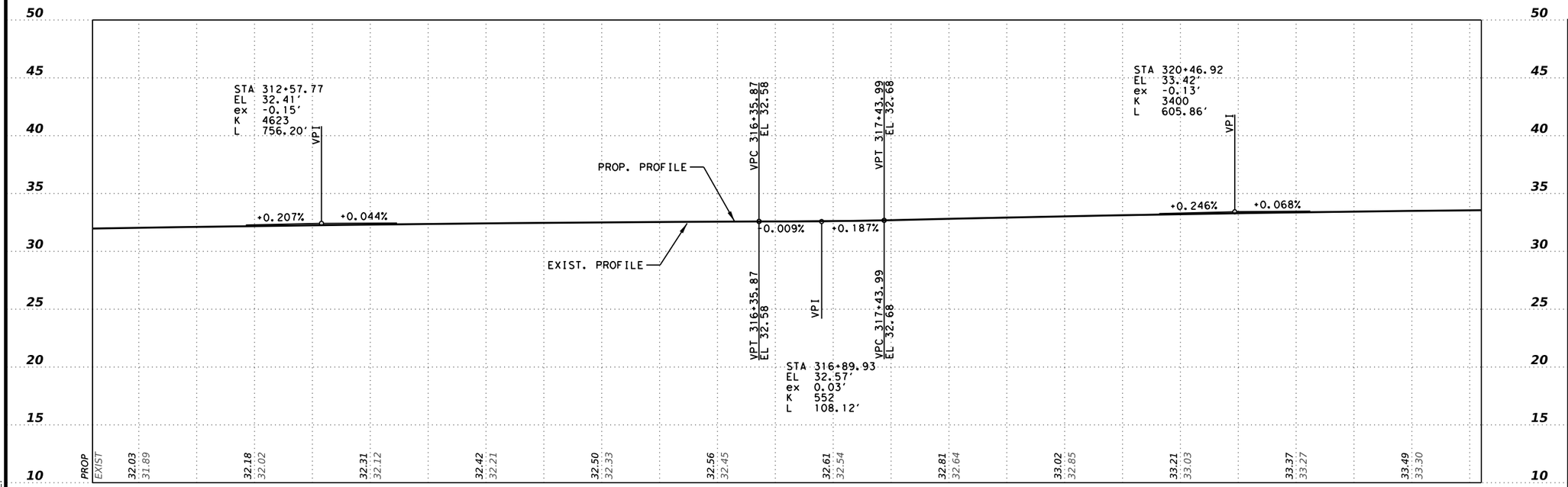
OM ASSM (OM-2Z) (WFLX)GND(BI)



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125657
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10/13/2023

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PLAN AND PROFILE SHEETS

SHEET 11 OF 20

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		78

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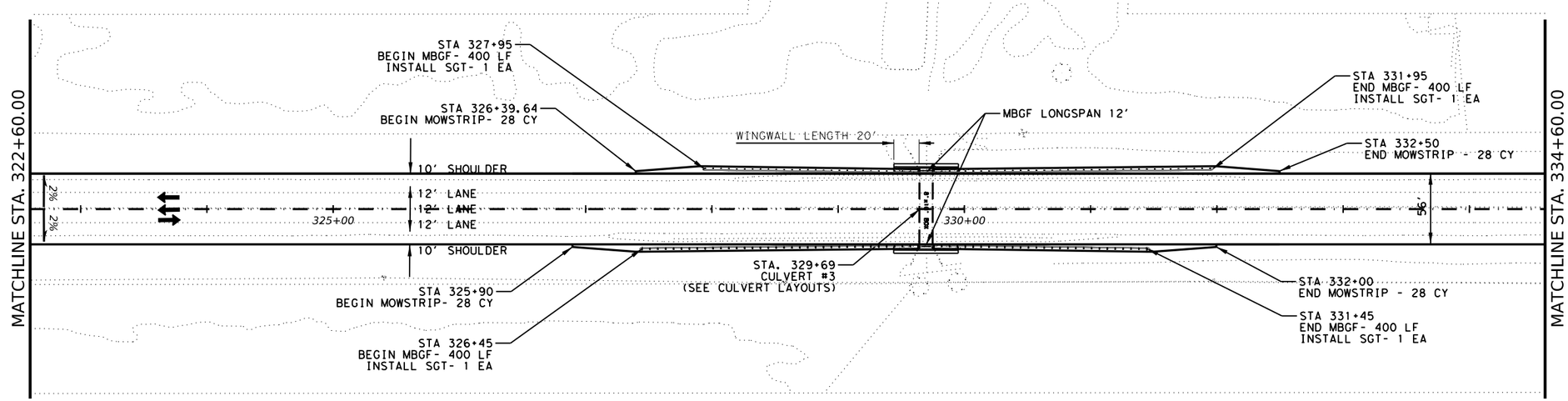

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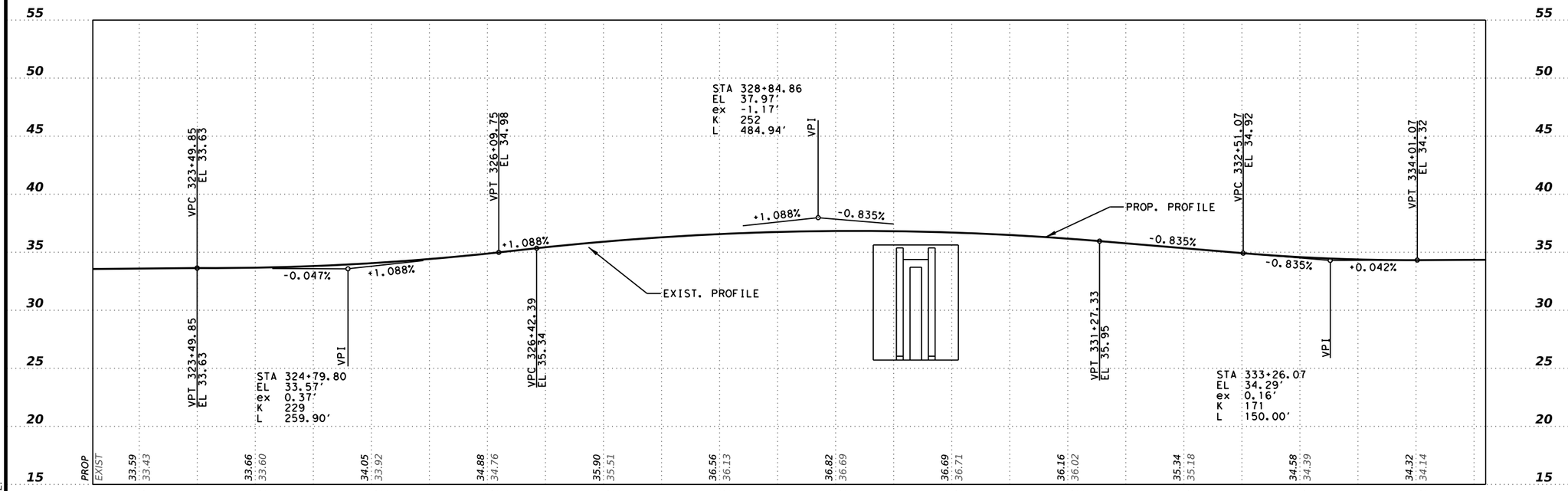
- OM ASSM (OM-2Z) (WFLX)GND(BI)



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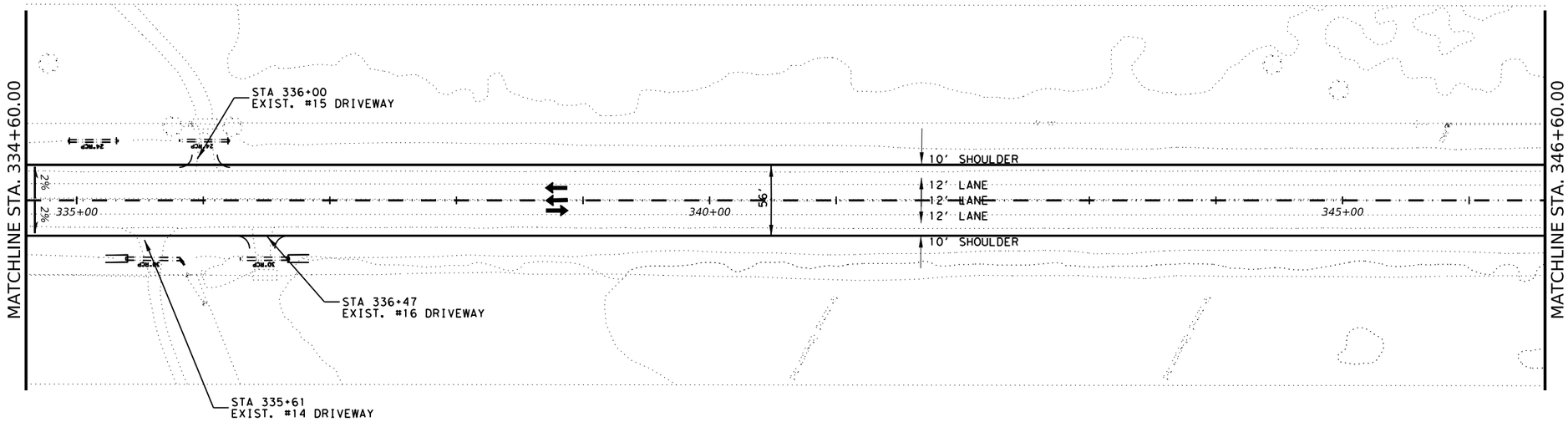
PLAN AND PROFILE SHEETS

SHEET 12 OF 20

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		79



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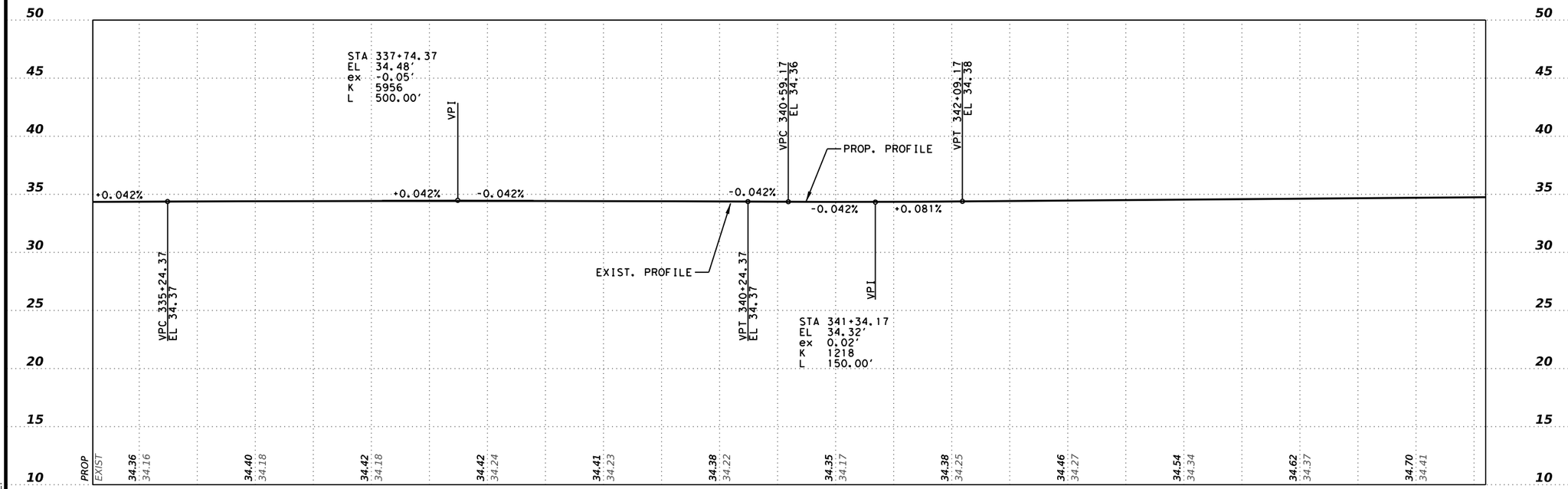
DIRECTION OF TRAFFIC

OM ASSM (OM-2Z)
(WFLX)GND(BI)



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CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		80

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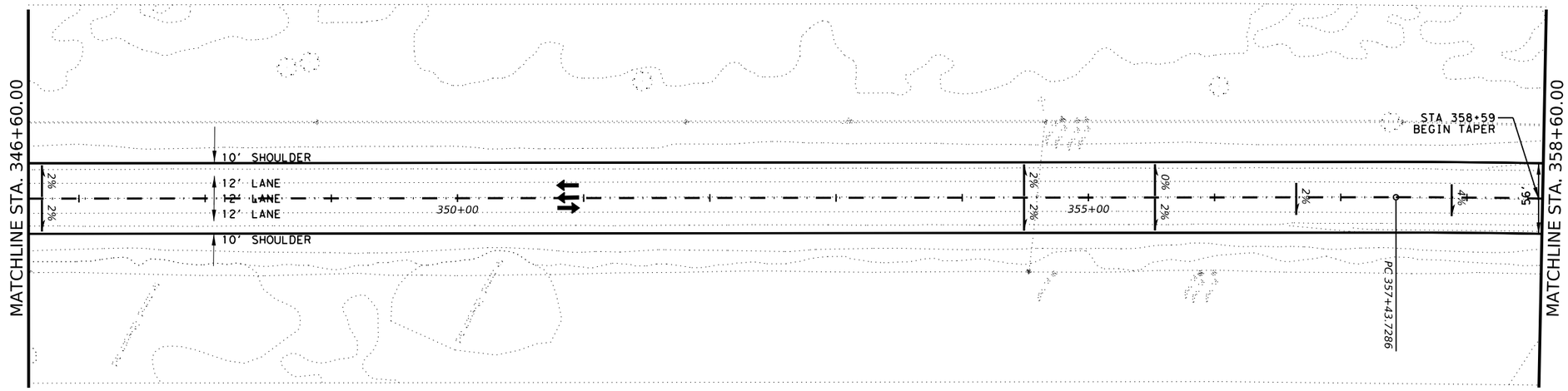

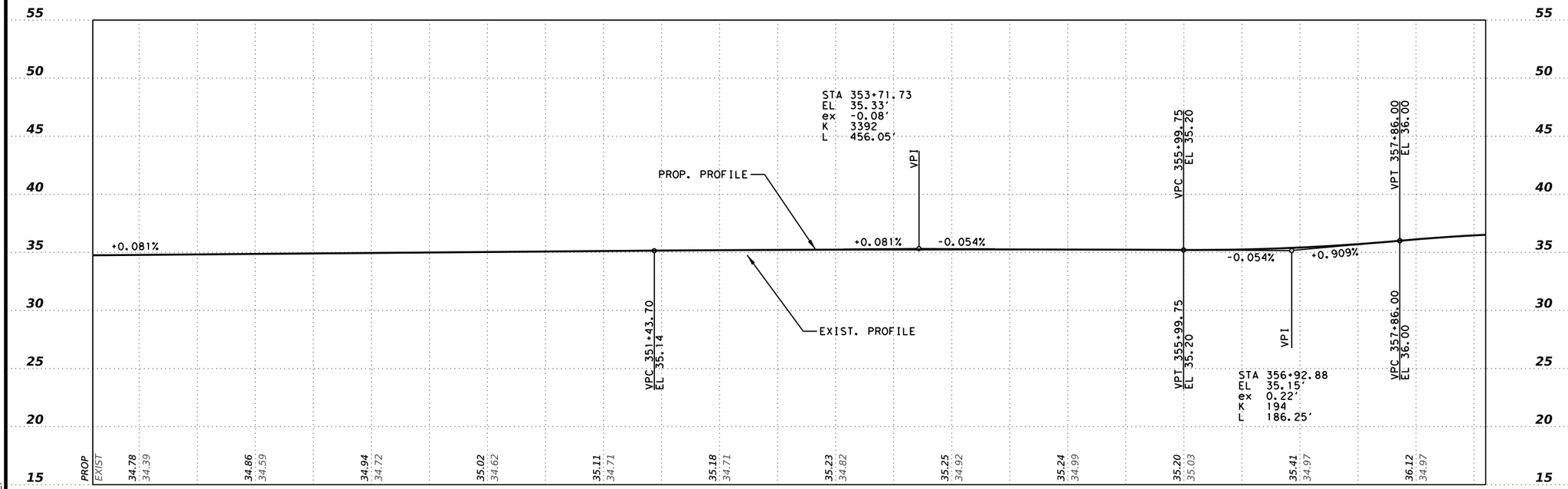

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DIRECTION OF TRAFFIC

OM ASSM (OM-2Z) (WFLX)GND(BI)

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CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
CRP	REFUGIO		81

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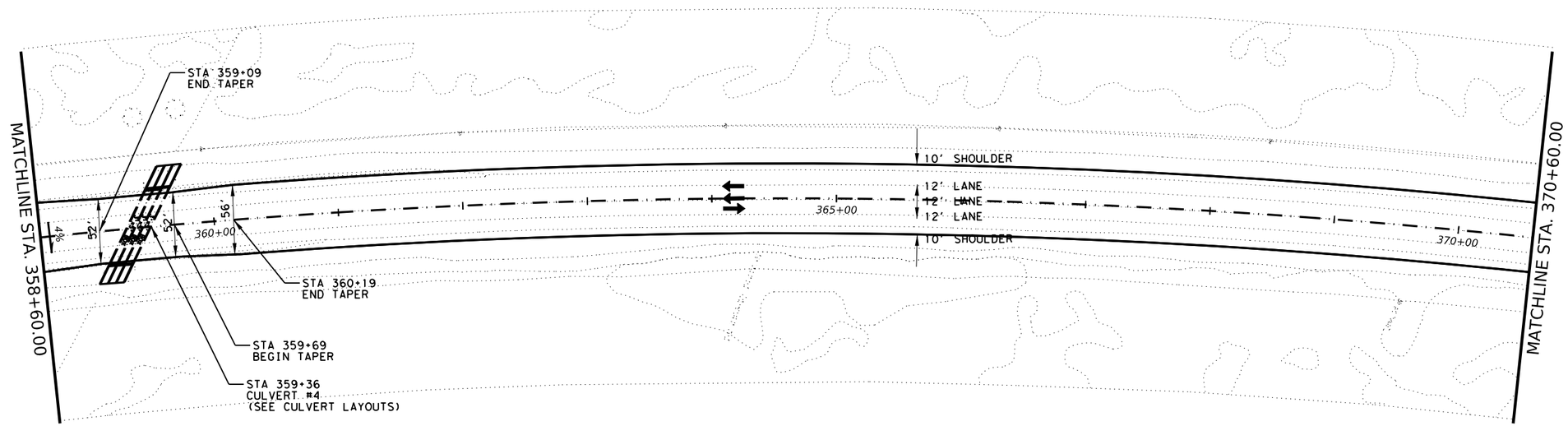

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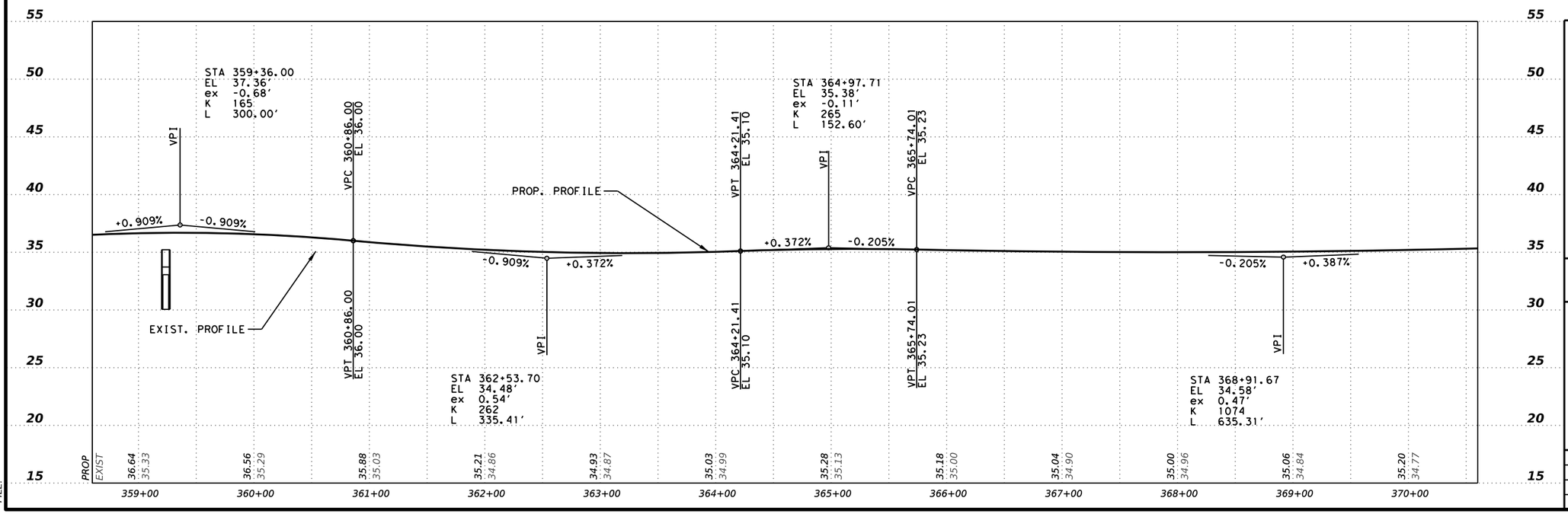
- OM ASSM (OM-2Z) (WFLX)GND(BI)



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PLAN AND PROFILE SHEETS

SHEET 15 OF 20

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
CRP	REFUGIO		82

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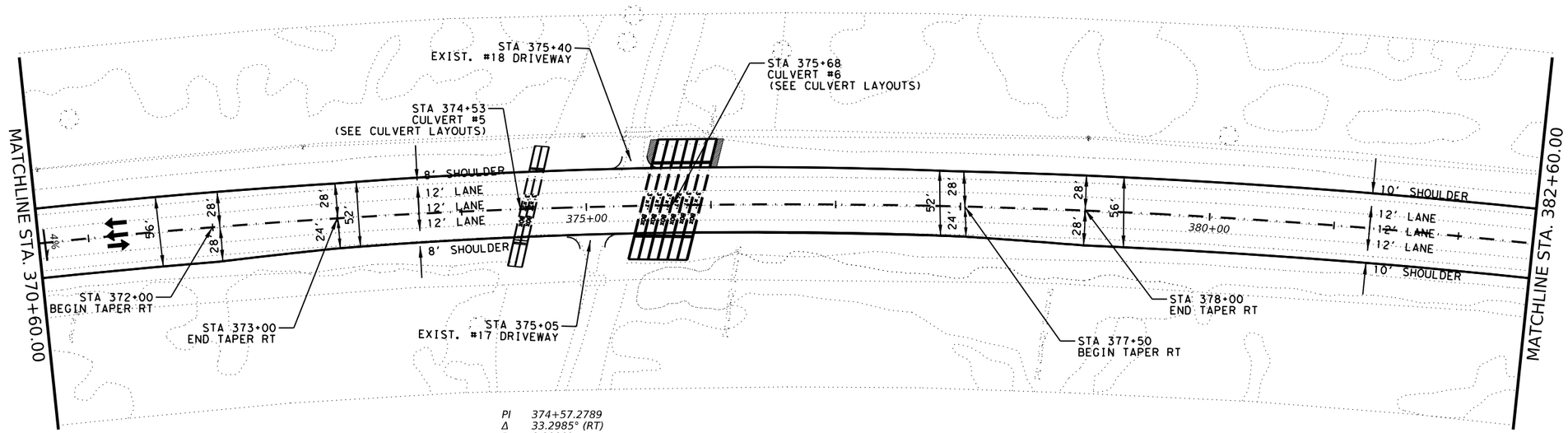

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D	0.9999°
T	1713.55'
L	3330.09'
R	5730.00'
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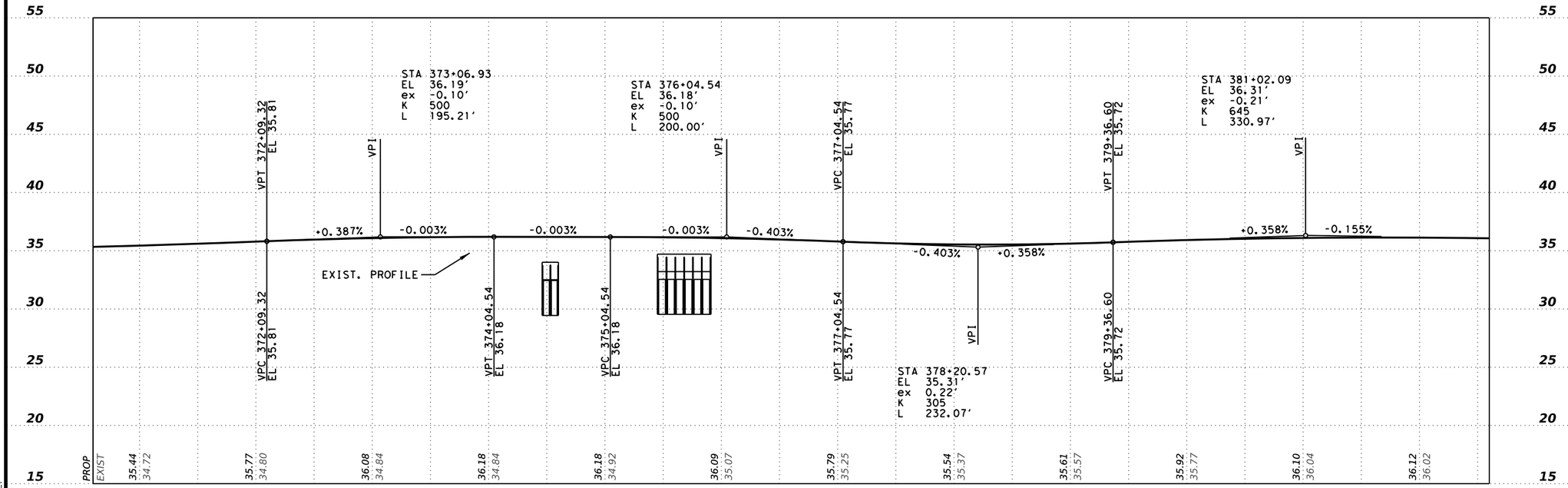
PT	390+73.8214

LEGEND:

- DIRECTION OF TRAFFIC
- OM ASSM (OM-2Z) (WFLX)GND(BI)



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PLAN AND PROFILE SHEETS

SHEET 16 OF 20

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		83

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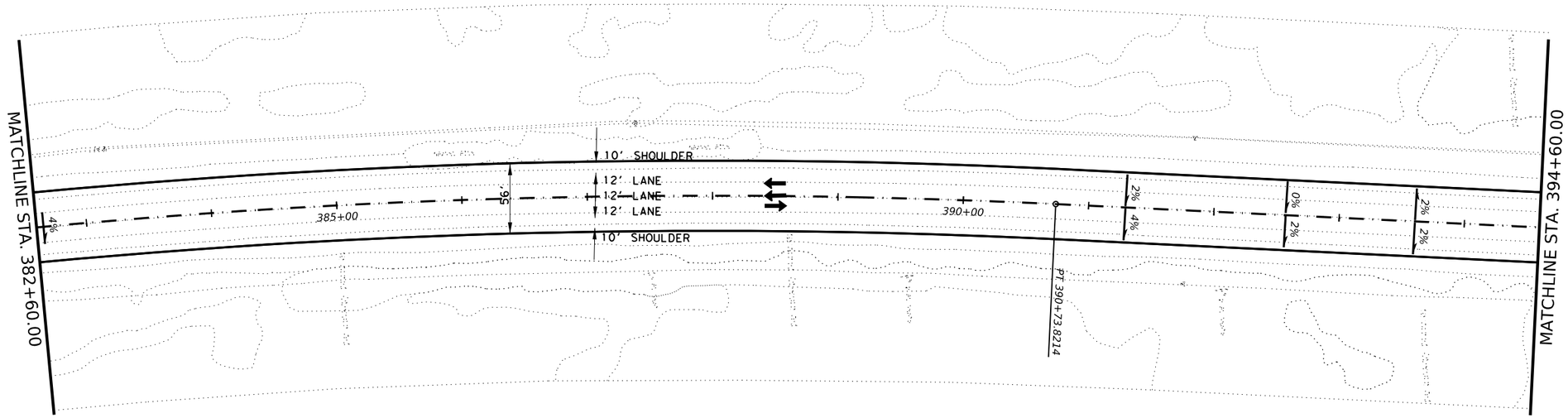

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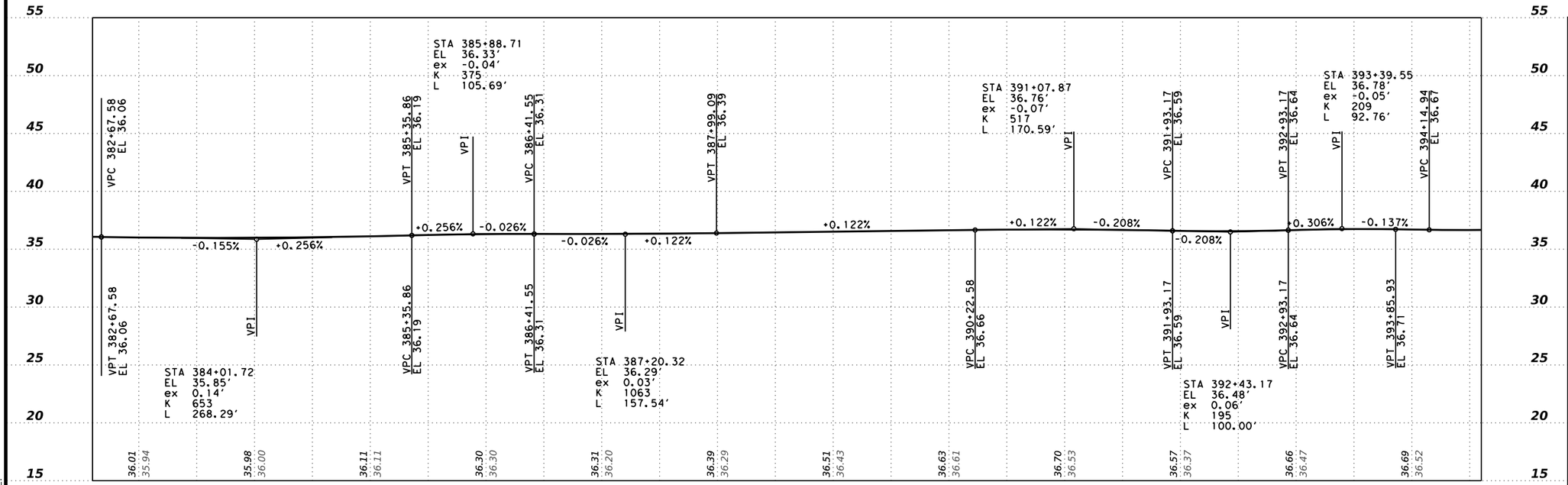
OM ASSM (OM-2Z) (WFLX)GND(BI)



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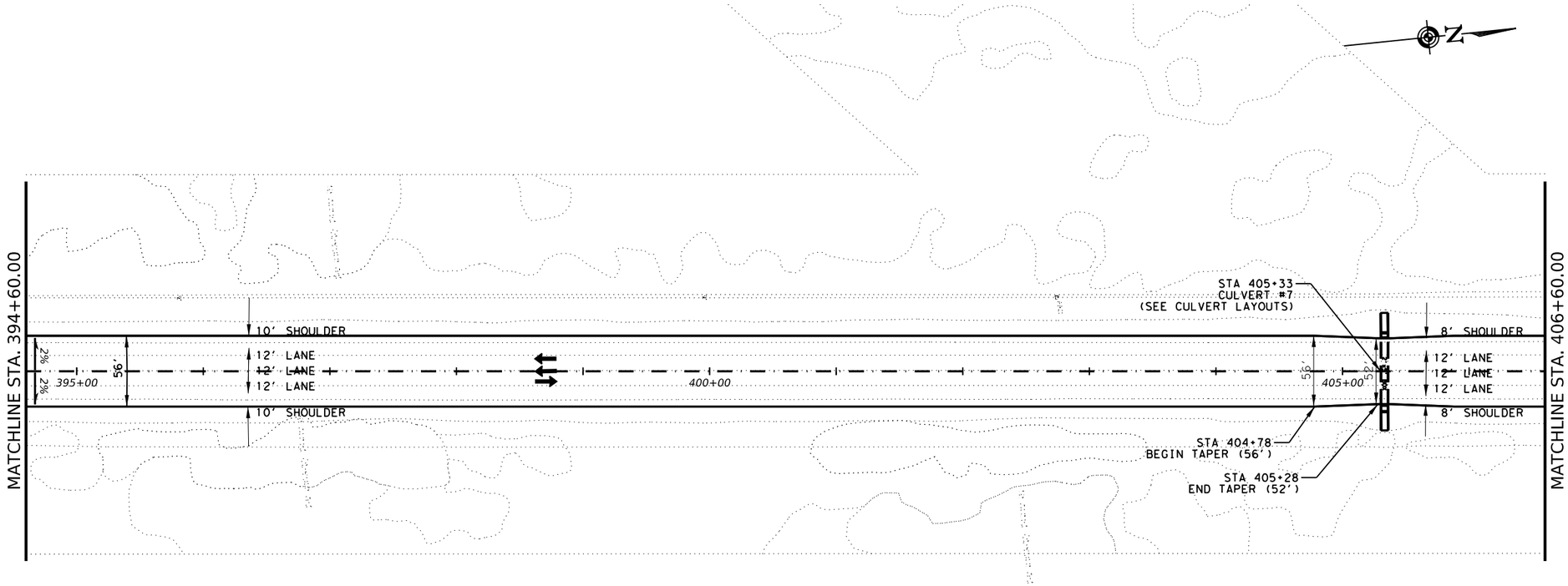
PLAN AND PROFILE SHEETS

SHEET 17 OF 20

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		84



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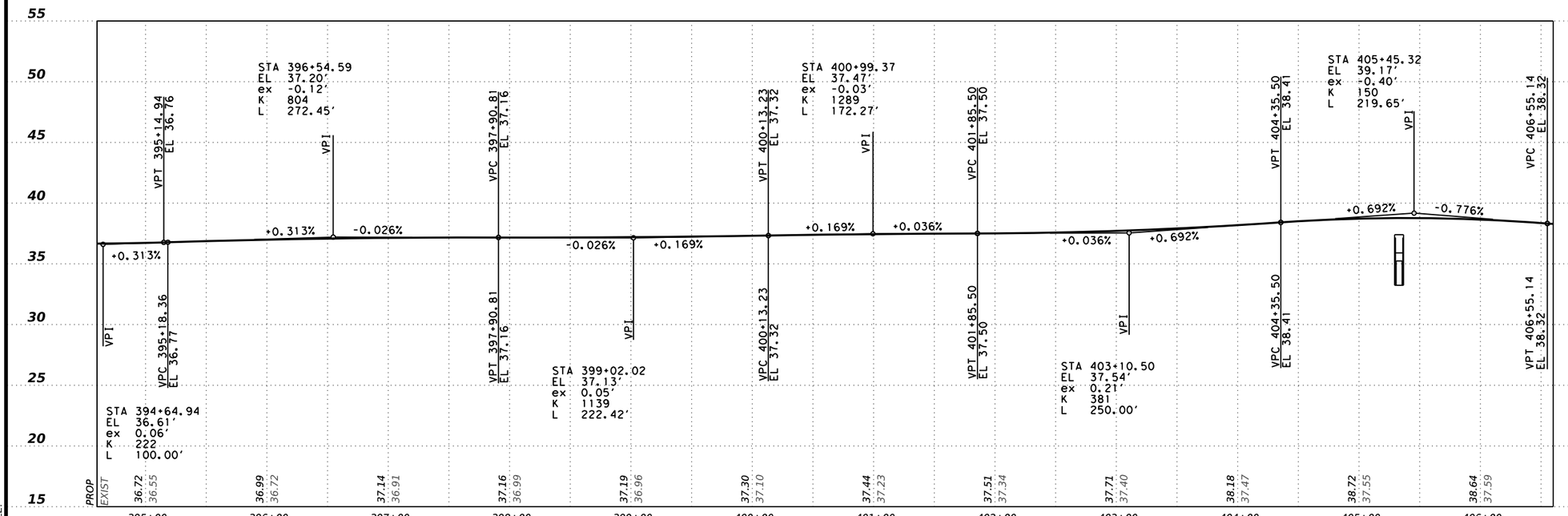
- OM ASSM (OM-2Z) (WFLX)GND(BI)



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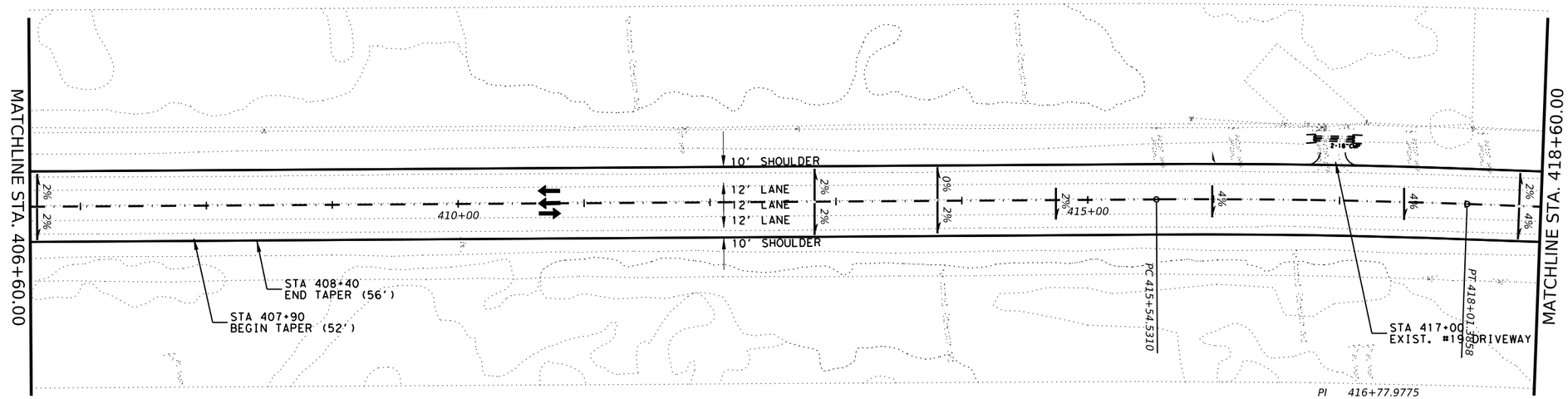
PLAN AND PROFILE SHEETS

SHEET 18 OF 20

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		85



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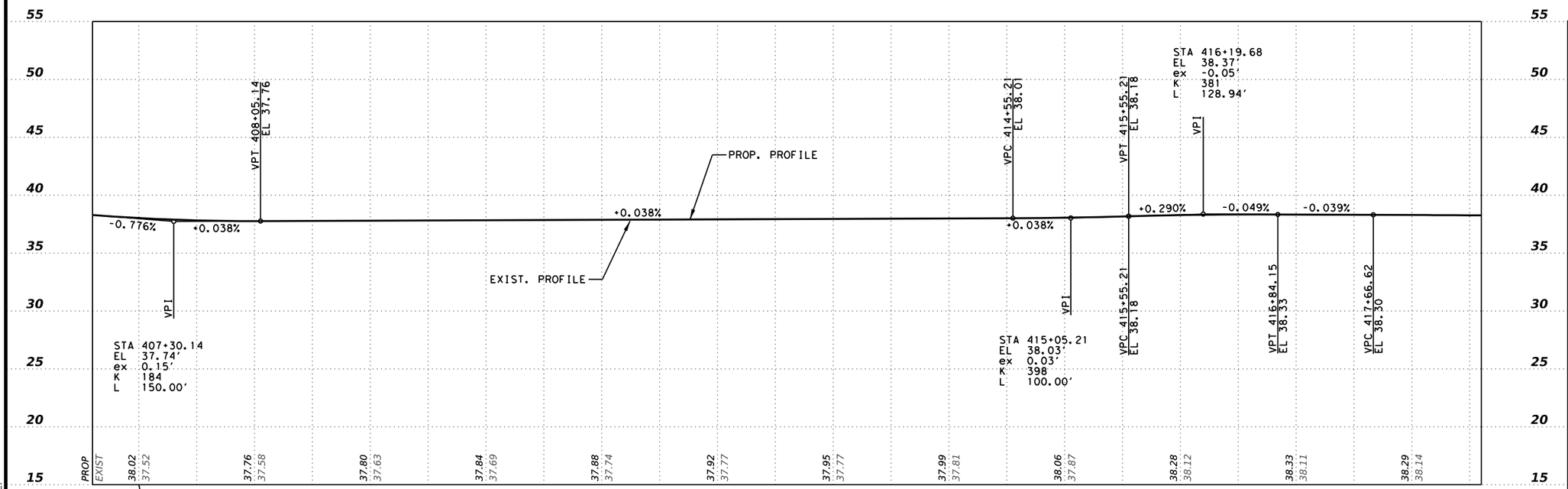
- OM ASSM (OM-2Z) (WFLX)GND(BI)



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PLAN AND PROFILE SHEETS

SHEET 19 OF 20

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
CRP	REFUGIO		86

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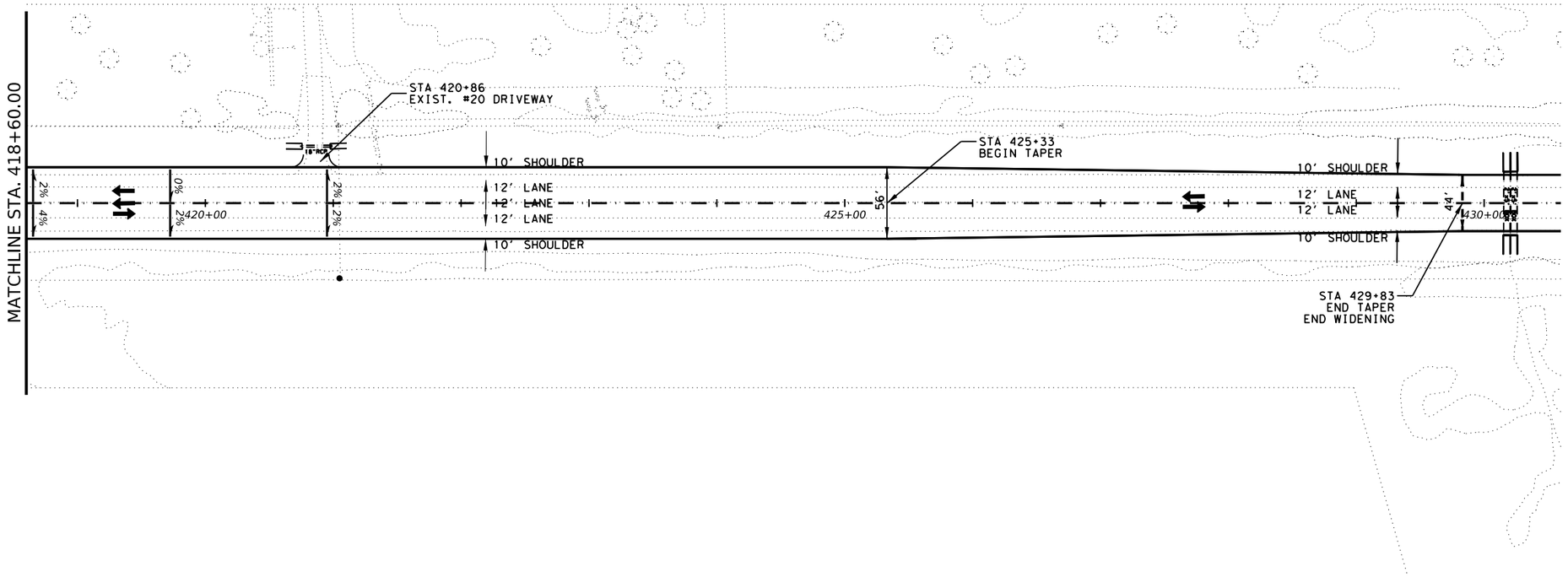

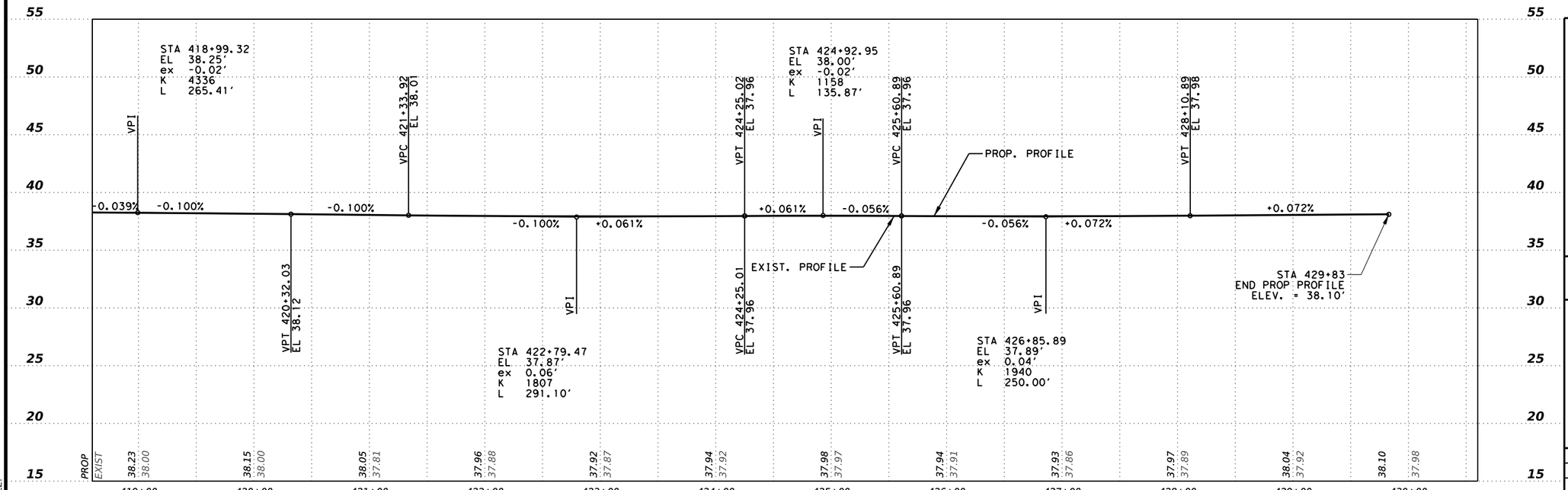

LEGEND:

- DIRECTION OF TRAFFIC
- OM ASSM (OM-2Z) (WFLX)GND(BI)

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SHEET 20 OF 20

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
CRP	REFUGIO		87

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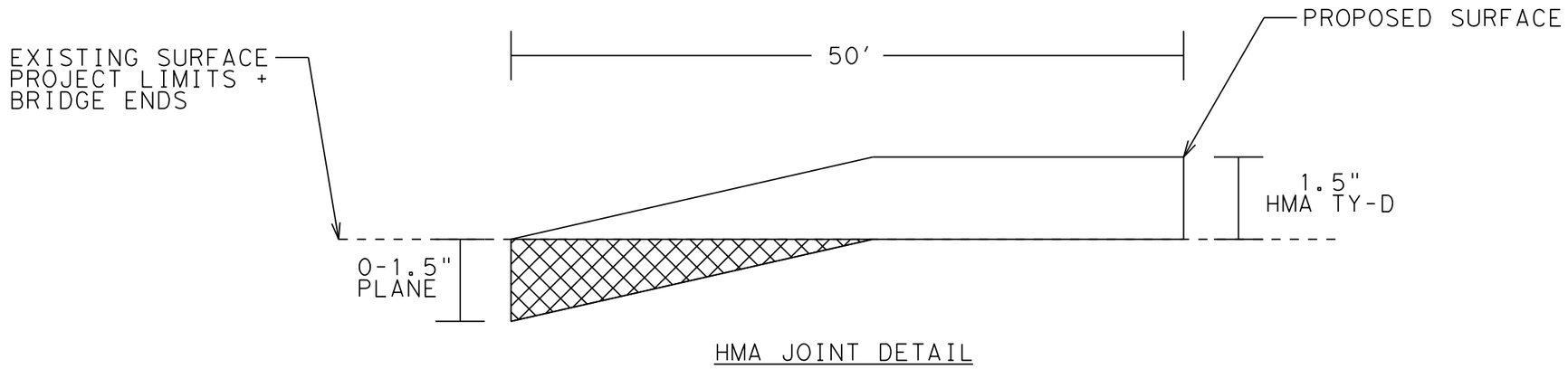

HMA JOINT DETAIL

5" PAVEMENT REPAIR DETAIL

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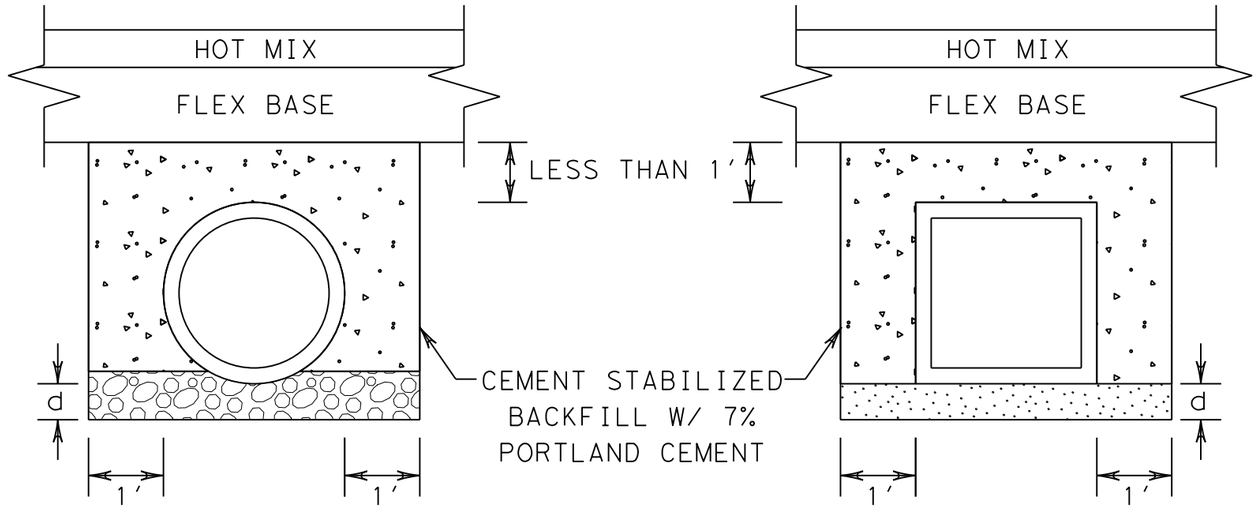
MISCELLANEOUS DETAILS

SHEET 1 OF 2

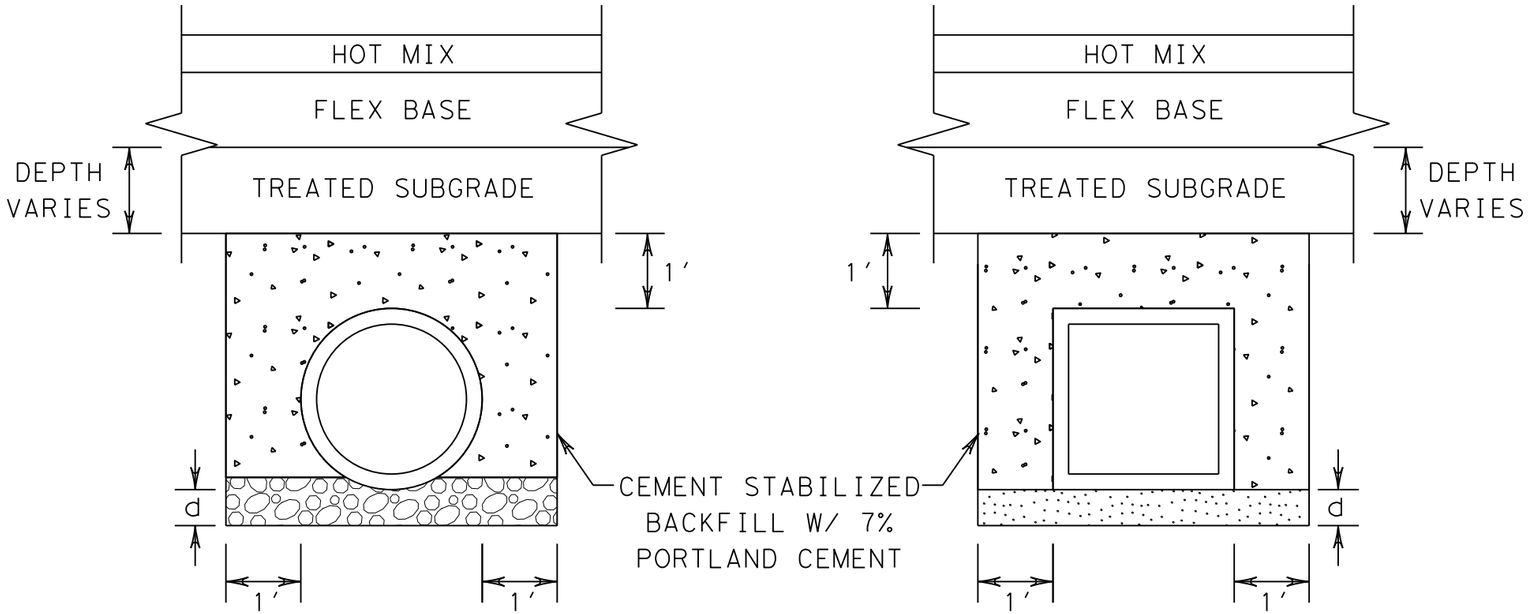
CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		88

DATE: 10/13/2023 03:19 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design/Plan Set/3. Roadway/MISCELLANEOUS DETAILS



TYPICAL CEMENT STABILIZED BACKFILL DETAIL

(IF DEPTH BETWEEN FLEX BASE AND PIPE < 1')



TYPICAL CEMENT STABILIZED BACKFILL DETAIL

(IF DEPTH BETWEEN FLEX BASE AND PIPE > 1')

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MISCELLANEOUS DETAILS

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		89

DATE: 10/13/2023 03:19 PM
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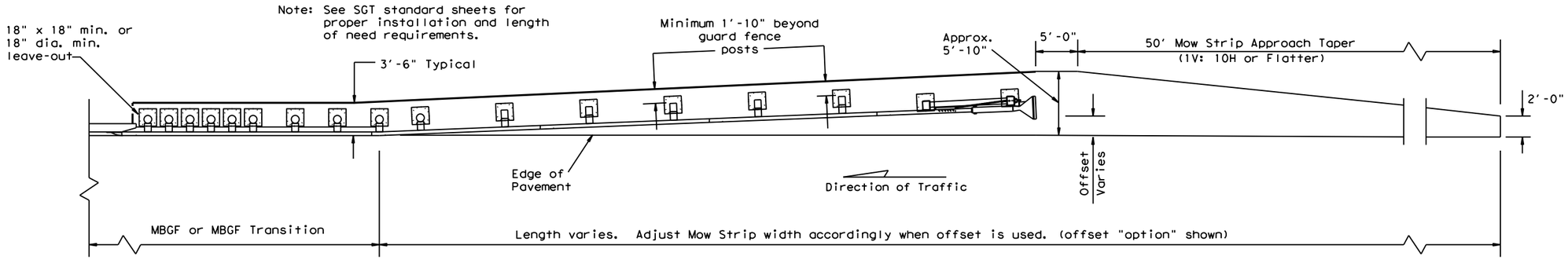
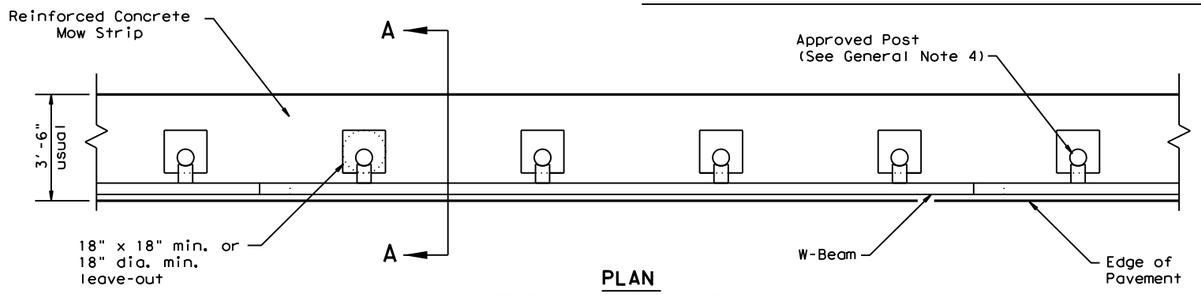
DATE: 10/13/2023
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design/Plan Set/13. Standards/Guard Fence Standards/CRP-GF (31) MS-19.dgn

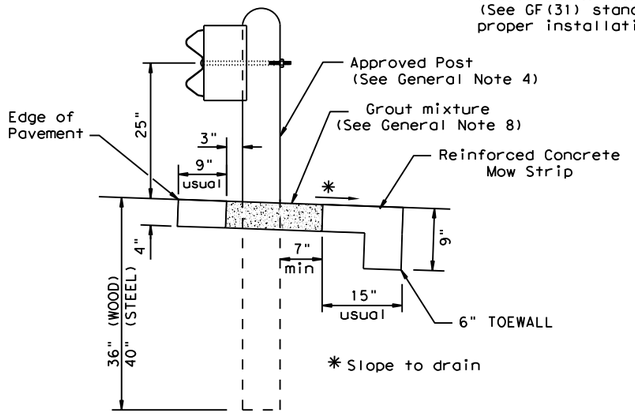


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



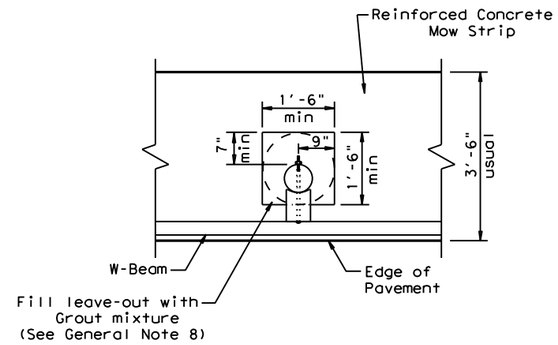
PLAN

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



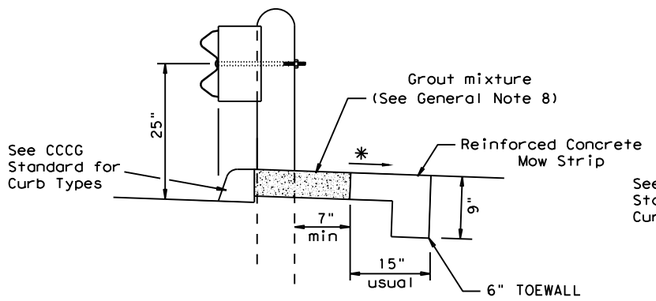
SECTION A-A

Typical



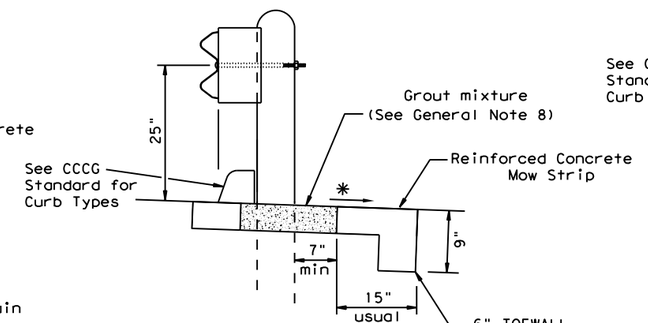
MOW STRIP DETAIL

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



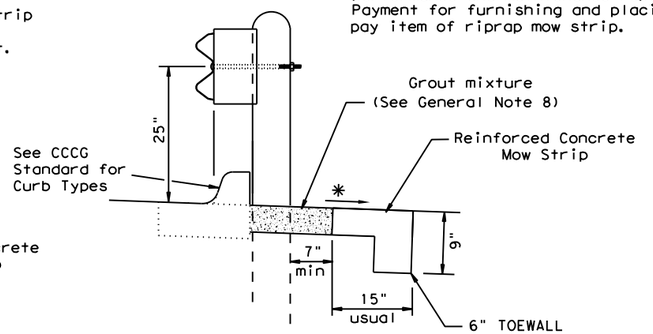
CURB OPTION (1)

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



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

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) MBGF 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 ½" 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 1 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.

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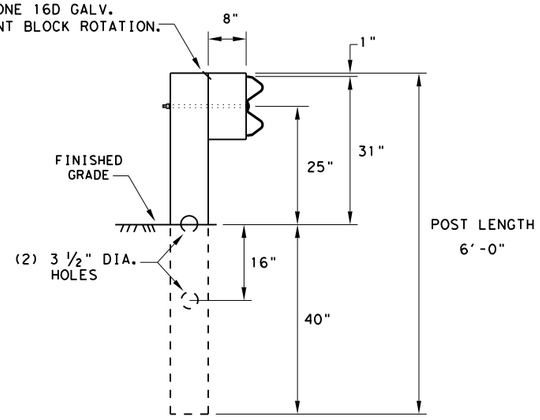
Design Division Standard

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	0155	06	213	FM 2678
Revised 11, 2019 KM	DIST	COUNTY		SHEET NO.
	CRP	REFUGIO		90

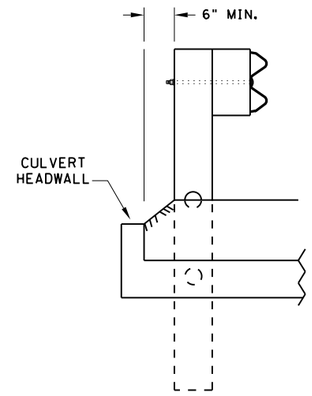
DATE: 10/13/2023
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design/Plan Set/13. Standards/Guard Fence Standards/GF (31) LS-19.dgn

NOTE: TOENAIL WITH ONE 16D GALV. NAIL TO PREVENT BLOCK ROTATION.



RECTANGULAR CRT POST (6"X 8" X 6' LONG)

(6) CRT REQUIRED
SEE ELEVATION DETAIL FOR LOCATIONS



LATERAL OFFSET BETWEEN THE GUARDRAIL AND THE CULVERT HEADWALL

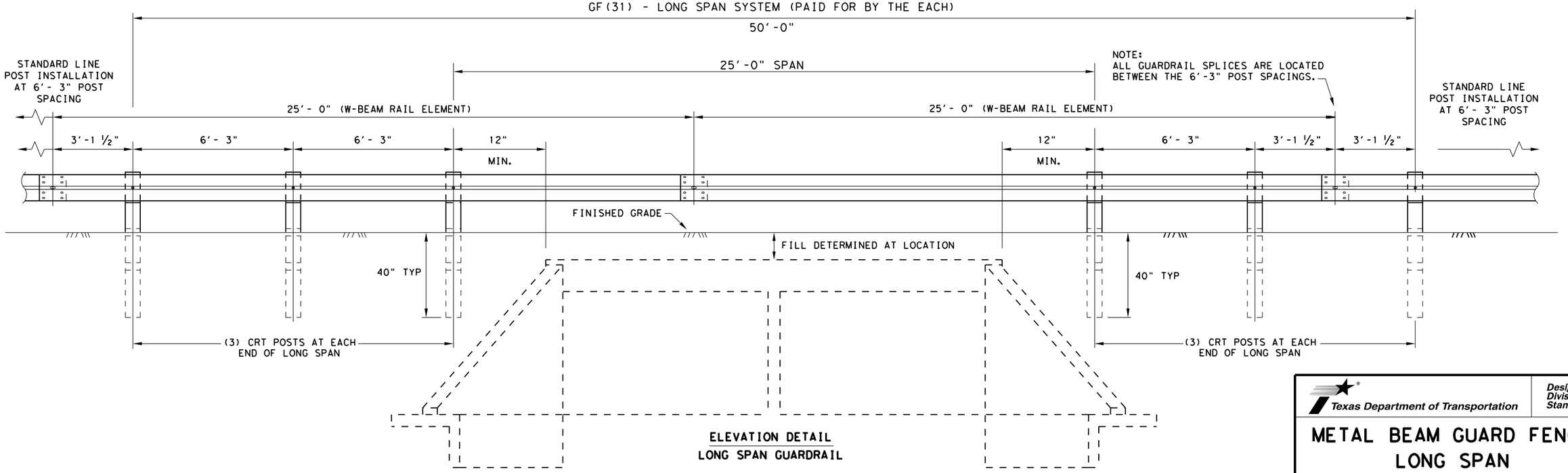
GENERAL NOTES

1. THE TYPE OF LINE POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF THE TRANSITIONS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENT SHALL MEET ALL REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 12'- 6" OR 25'- 0" NOMINAL LENGTHS.
3. RAIL POST HOLES ARE OFFSET 3'- 1 ½" FROM STANDARD GUARDRAIL TO ACCOMMODATE THE MIDSPAN SPLICING.
4. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NO MORE THAN 1" BEYOND IT.
5. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
7. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
8. REFER TO GF(31) STANDARD SHEET FOR ADDITIONAL DETAILS.
9. FLAME CUTTING OF HOLES IN GUARDRAIL SHALL NOT BE PERMITTED. IF YOU ENCOUNTER MIS-ALIGNED BOLT HOLES IN GUARDRAIL CONTACT THE DESIGN DIVISION FOR ADDITIONAL INFORMATION & OPTIONS.

DIRECTION OF TRAFFIC

NOTE: SEE GF(31) STANDARD FOR STANDARD LINE POSTS.

GF(31) - LONG SPAN SYSTEM (PAID FOR BY THE EACH)



ELEVATION DETAIL
LONG SPAN GUARDRAIL

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE LONG SPAN TL-3 MASH COMPLIANT

GF(31)LS-19

FILE: gf31ls19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
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REVISIONS	0155	06	213	FM 2678
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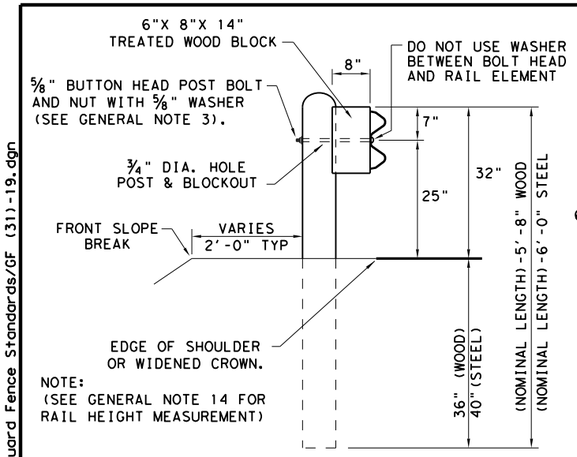
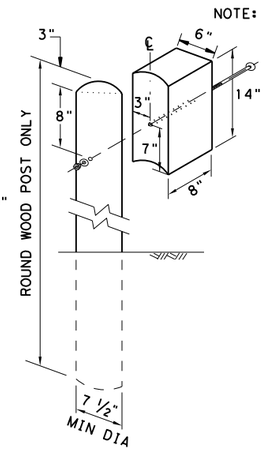
	CRP	REFUGIO		91

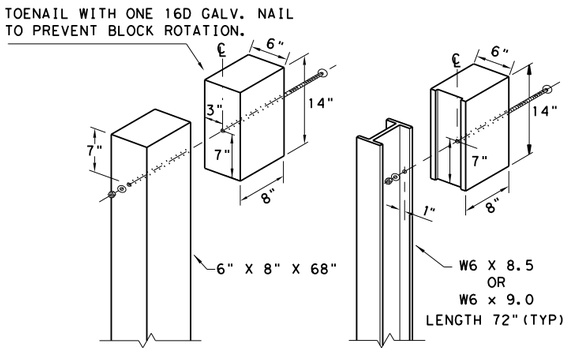
DATE: 10/13/2023
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design/Plan Set/13. Standards/Guard Fence Standards/GF (31)-19.dgn



TYPICAL POST PLACEMENT



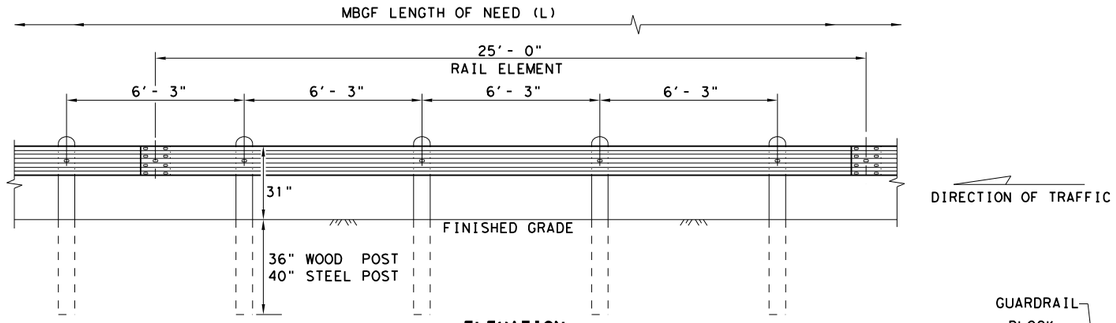
WOOD BLOCK TO ROUND WOOD POST



WOOD BLOCK TO RECTANGULAR WOOD POST

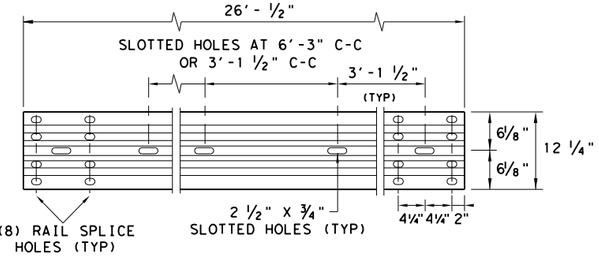
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



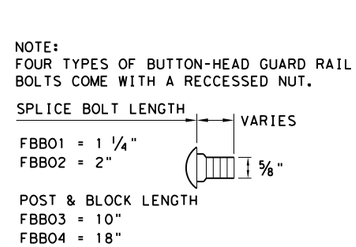
ELEVATION MID-SPAN RAIL SPLICE

SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



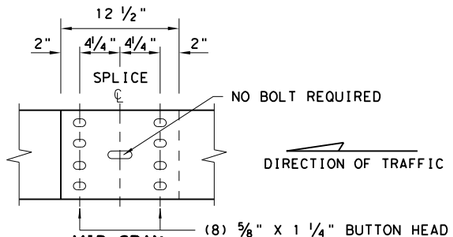
ELEVATION 25'- 0" (NOM.) W-BEAM SECTION

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



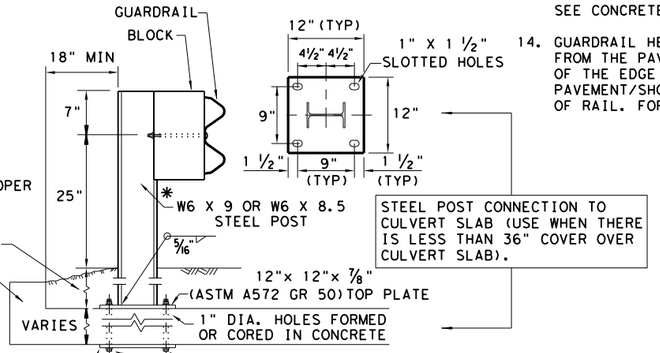
BUTTON HEAD BOLT

NOTE: SEE GENERAL NOTE 3 FOR SPLICE & POST BOLT DETAILS.



MID-SPAN RAIL SPLICE DETAIL

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



LOW FILL CULVERT POST

STEEL POST CONNECTION TO CULVERT SLAB (USE WHEN THERE IS LESS THAN 36" COVER OVER CULVERT SLAB).

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.

NOTE: TRANSISTIONS TO BRIDGE RAILS OR TRAFFIC BARRIERS.
SEE GF(31)TL3 TR STANDARD FOR HIGH-SPEED TL-3 TRANSITIONS.
SEE GF(31)TL2 TR STANDARD FOR LOW-SPEED TL-2 TRANSITIONS.

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 MBGF 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 (FWC16a) 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.

Texas Department of Transportation — Design Division Standard

METAL BEAM GUARD FENCE
TL-3 MASH COMPLIANT
GF(31)-19

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
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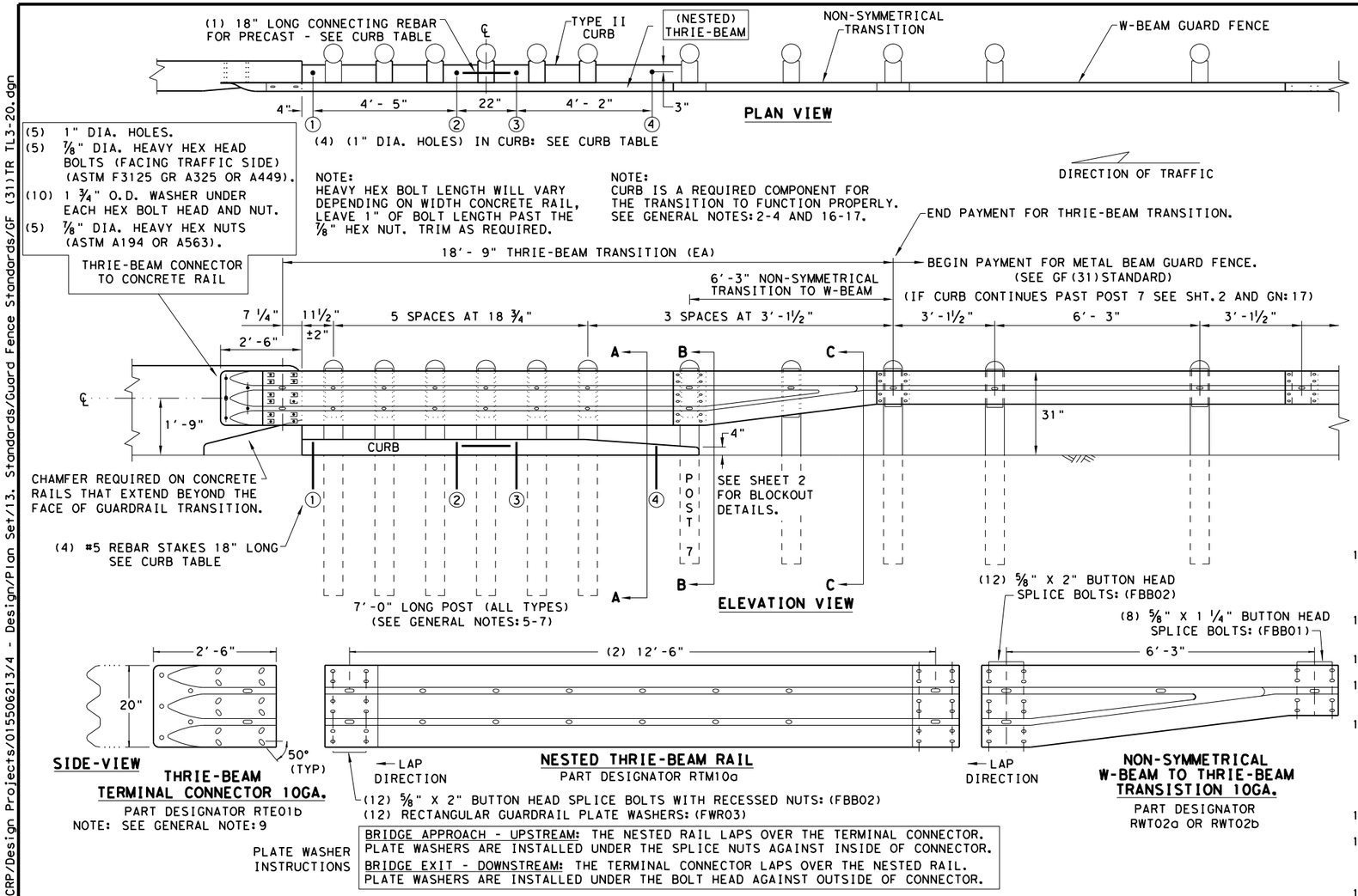
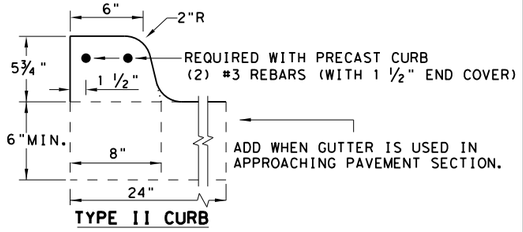


GENERAL NOTES

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

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



TYPE II CURB

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

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

TYPE II CURB DETAILS

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31tr1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
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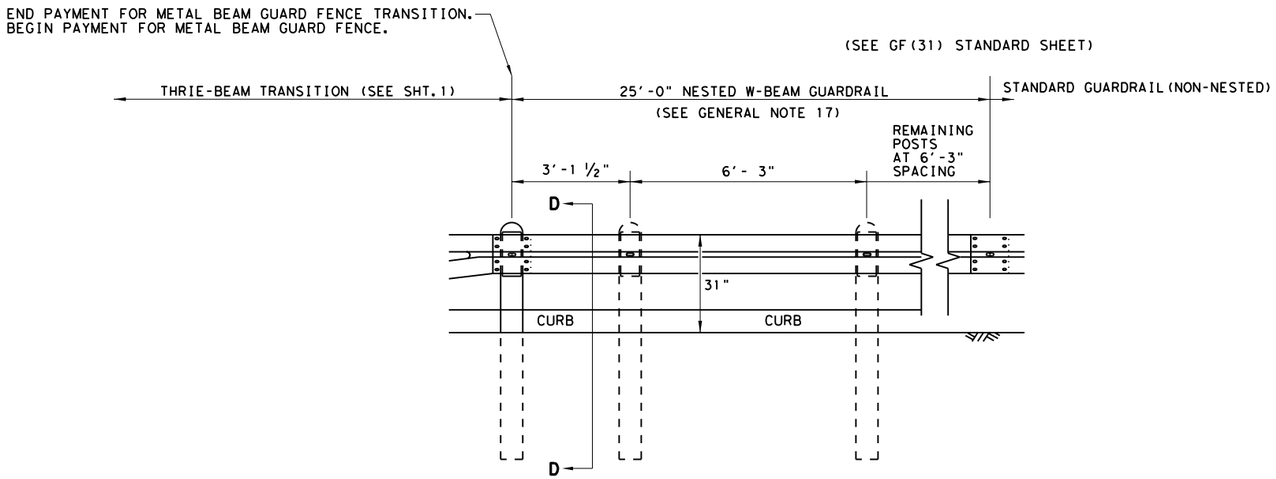
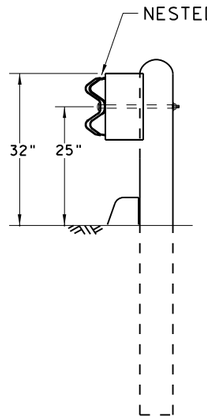
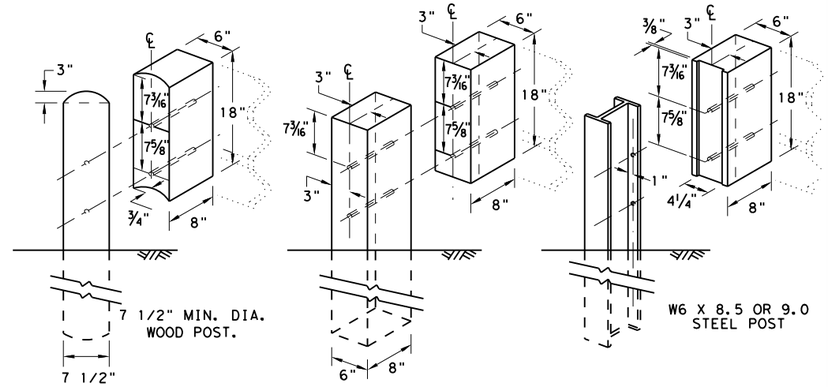
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation — Design Division Standard

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

GF(31)TR TL3-20

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

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

LINE AT THE BACK OF POST #2 THRU #8

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

ANCHOR PADDLE PN: 15204A

ANGLE STRUT PN: 15202G

16"

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

PLAN VIEW

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

BEGIN LENGTH OF NEED

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

TRAFFIC FLOW

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

BEGIN STANDARD MBGF

END PAYMENT FOR SGT

6¼"

3'-1 ½" 6'-3" 6'-3"

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

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

OUTSIDE SLOTS CUTOUT (2)½" X 6'-9 ⅝"

SoftStop FACE SEE GN(3) & NOTE:B

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

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

SoftStop ANCHOR RAIL (12GA) PN: 15215G

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

ANCHOR PADDLE PN: 15204A

END OF ANCHOR RAIL PN: 15215G

SEE NOTE:C

SEE NOTE:A

POST 32" HEIGHT

31" RAIL HEIGHT

RAIL 25'-0" PN: 61G

RAIL 25'-0" PN: 15215G

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

SEE DETAIL 3

13/16" DIA. YIELDING HOLES

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

POST 40" DEPTH (TYP 1-8)

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

POST(2) 6'-0" (SYTP) PN: 15000G

POST(1) 4'-9 ½" SYTP PN: 15203G

6'-1⅜"

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

ELEVATION VIEW

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

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

POST(0) 6'-5 ⅜" PN: 15205A

ALTERNATE BLOCKOUT SEE GENERAL NOTE:6

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

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

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

8" 6" 14"

⅝" HGR NUT PN: 3340G

⅝" X 10" HGR POST BOLT PN: 3500G

13/16" DIAMETER YIELDING HOLES LOCATED IN FLANGES

FINISHED GRADE

(HOLES APROXIMATELY CENTERED AT FINISHED GRADE)

ISOMETRIC VIEW POST(1 & 2)

W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

(1) ⅝" x 1 ¾" HEX HD BOLT PN 3391G

ANGLE STRUT PN: 15202G

(2) ⅝" WASHERS PN 4372G

(1) ⅝" HGR HEX NUT PN 3340G

DETAIL 1

SHOWN AT POST(1) NEAR GROUND

(1) ⅝" HEX NUT

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

(2) ⅝" ROUND WASHERS PN: 3240G

DETAIL 2

SHOWN AT POST(1)

ANCHOR KEEPER PLATE (24 GA) PN: 15207G

ANCHOR PLATE WASHER ½" THICK PN: 15206G

1" ROUND WASHER F463 PN: 4902G

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

ALTERNATE BLOCKOUT SEE GENERAL NOTE:6

(2) ⅝" ROUND WASHER (WIDE) PN: 3240G

ANCHOR PADDLE PN: 15204A

(2) ⅝" HEX NUT A563 GR.DH PN: 3245G

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

W-BEAM FLATTENED (4 PLIES)

ANGLE STRUT PN: 15202G

SEE NOTE:A

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

(4) ¾" FLAT WASHER (TYP) PN: 3701G

(2) ¾" HEX NUT (TYP) PN: 3704G

6'-1⅜" POST DEPTH

(2) ANCHOR POST ANGLE PN: 15201G

DETAIL 3 AT POST(0)

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

TRAFFIC FLOW

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

FINISHED GRADE

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

SECTION VIEW B-B

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

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

FINISHED GRADE

POST(2)

SECTION VIEW A-A

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

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

POST HEIGHT 17"- ½"

4'-9 ½"

13/16" DIA. YIELDING HOLES

40"

POST(1)

FRONT VIEW POST(1)

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

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

2'-0"

STANDARD MBGF

EDGE OF PAVEMENT

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

2'-0" MAX. RAIL OFFSET

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

GENERAL NOTES

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

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

PART	QTY	MAIN SYSTEM COMPONENTS
620237B	1	PRODUCT DESCRIPTION ASSEMBLY MANUAL (LATEST REV.)
15208A	1	SoftStop HEAD (SEE MANUAL FOR RIGHT-LEFT APPROACH)
15215G	1	SoftStop ANCHOR RAIL (12GA) WITH CUTOUT SLOTS
61G	1	SoftStop DOWNSTREAM W-BEAM RAIL (12GA) (25'- 0")
15205A	1	POST #0 - ANCHOR POST (6'- 5 ⅜")
15203G	1	POST #1 - (SYTP) (4'- 9 ½")
15000G	1	POST #2 - (SYTP) (6'- 0")
533G	6	POST #3 THRU #8 - I-BEAM (W6 x 8.5) (6'- 0")
4076B	7	BLOCKOUT - WOOD (ROUTED) (6" x 8" x 14")
6777B	7	BLOCKOUT - COMPOSITE (4" x 7 ½" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (½" THICK)
15201G	2	ANCHOR POST ANGLE (10" LONG)
15202G	1	ANGLE STRUT
		HARDWARE
4902G	1	1" ROUND WASHER F436
3908G	1	1" HEAVY HEX NUT A563 GR.DH
3717G	2	¾" x 2 ½" HEX BOLT A325
3701G	4	¾" ROUND WASHER F436
3704G	2	¾" HEAVY HEX NUT A563 GR.DH
3360G	16	⅝" x 1 ¼" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	⅝" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	⅝" x 10" HGR POST BOLT A307
3391G	1	⅝" x 1 ¾" HEX HD BOLT A325
4489G	1	⅝" x 9" HEX HD BOLT A325
4372G	4	⅝" WASHER F436
105285G	2	⅝" x 2 ½" HEX HD BOLT GR-5
105286G	1	⅝" x 1 ½" HEX HD BOLT GR-5
3240G	6	⅝" ROUND WASHER (WIDE)
3245G	3	⅝" HEX NUT A563 GR.DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE:B

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0155	06	213	FM 2678
	DIST	COUNTY		SHEET NO.
	CRP	REFUGIO		95

DATE: 10/13/2023
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Profiles/sgt11s31-18.dgn

(SEE GN NOTE 15)
STANDARD 31" MBGF

ITEM (6)
INNER SIDE SLIDER
(ISS) PANEL FOR RAIL 3

FIELD-SIDE
(RAIL 3)

NOTE:
RECESSED HEX NUTS FACING
TRAFFIC-SIDE **SEE DETAIL (C)**

REFERENCE LINE USED TO INSTALL
LINE POST(9) THRU POST(2)

POST 1 OFFSET DISTANCE MEASURED
7-⅝" FROM REFERENCE LINE

POST 9 | POST 8 | POST 7 | POST 6 | POST 5 | POST 4 | POST 3 | POST 2

RAIL 4 | RAIL 3 | RAIL 2 | RAIL 1

ITEM (10)
CABLE ASSEMBLY

ITEM (2)
GROUNDSTRUT

NO BLOCKOUT
AT (POST 1)

CABLES

ITEM (5)
TRAFFIC SIDE SLIDER
(TSS) PANEL FOR RAIL 2

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

NOTES:
1. ITEM (12) COMPOSITE BLOCKOUTS INSTALLED AT LINE POST(9) THRU LINE POST(2).
2. DO NOT INSTALL A BLOCKOUT AT LINE POST(1).

PLAN VIEW

MBGF
RAIL 2

INSTALL GUARD FENCE RECESSED
HEX NUTS ON TRAFFIC-SIDE

MBGF
RAIL 1

DETAIL (C)

TRAFFIC FLOW

END PAYMENT (SGT) BY EACH

DO NOT BOLT
RAIL TO POST 6

BEGIN LENGTH OF NEED

INSTALLATION LENGTH 55'- ½"

49'-8 9/16"

ITEM (25)
MAX-TENSION HEAD
SEE DETAIL (A)

6'-3" | 6'-3" | 6'-3" | 6'- ¾" | 6'-3" | 6'-3" | 6'-3" | 37 ½" | 5'-3 11/16"

RAIL
HEIGHT
31"

ARROWS

DETAIL (D)

ITEM (13) RAIL 4 | ITEM (13) RAIL 3 | ITEM (13) RAIL 2 | ITEM (13) RAIL 1

RAIL
HEIGHT
31"

HEAD
HEIGHT

DETAIL (B)

32-¼"

68-⅛"

CABLES

FINISHED
GRADE

FINISHED
GRADE

ITEM (10)
CABLE
ASSEMBLY

ITEM (2)
GROUNDSTRUT

POST 9 | POST 8 | POST 7 | POST 6 | POST 5 | POST 4 | POST 3 | POST 2 | POST 1
ITEM (4)
I-BEAM
W6 X 9
NO BLOCKOUT
AT (POST 1)

(8) X-LITE LINE POST - ITEM (11)

ELEVATION VIEW

**SOIL
ANCHOR POST**
ITEM (1)

A

A

TSS PANEL
GALVANIZED
ITEM (5)

RSS PLATE
GALVANIZED
ITEM (8)

INSTALL THE TSS AND RSS
WITH THE ARROWS POINTING
TOWARDS THE MAX-HEAD

TSS PANEL AND RSS PLATE
DETAIL (D)

HEAD
HEIGHT
32-¼"

TOP OF POST

31-⅞"

FINISHED
GRADE

40-⅛"

68-⅛"
ANCHOR POST
DEPTH

ITEM (1)
ANCHOR

ITEM (11)
LINE POSTS
2 THRU 9
(NOTE: ITEM (4) POST 1 (NOT SHOWN),
TO BE INSTALLED AT SAME DEPTH
AS LINE POSTS.)

**SOIL ANCHOR, POST 1
& LINE POST 2 THRU 9**

SECTION VIEW A-A

NOTE:
USE THE MASH APPROVED
X-TENSION CABLE ASSEMBLY.

7 5/16"

2 1/8"

UPPER CABLE
(BACK SIDE)

LOWER CABLE
(TRAFFIC SIDE)

DETAIL (B)

CABLE
FRICTION PLATE
HEAD UNIT
ITEM (9)

NOTE:
INSTALL ⅝" RECESSED HEX
NUTS ON TRAFFIC SIDE.

ITEM (24)

ITEM (21)

ITEM (20)
8X

ITEM (17)
8X

ITEM (23)
6X
3 SCREWS
EACH SIDE

(RAIL 1)

ITEM (22)
BRACKET
SHIPPED FLAT

ITEM (3)

ITEM (16)
4X

* ITEM (25)
HIGH INTENSITY
REFLECTIVE SHEETING

NOTE: DELINEATION MARKER IN
ACCORDANCE WITH TEXAS MUTCD.

SPLICE FOR IMPACT-HEAD
TO GUARD FENCE (RAIL1)

DETAIL (A)

GENERAL NOTES

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

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

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

STANDARD
MBGF

2'-0"

EDGE OF PAVEMENT

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

2'-0" MAX.
RAIL OFFSET

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

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

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

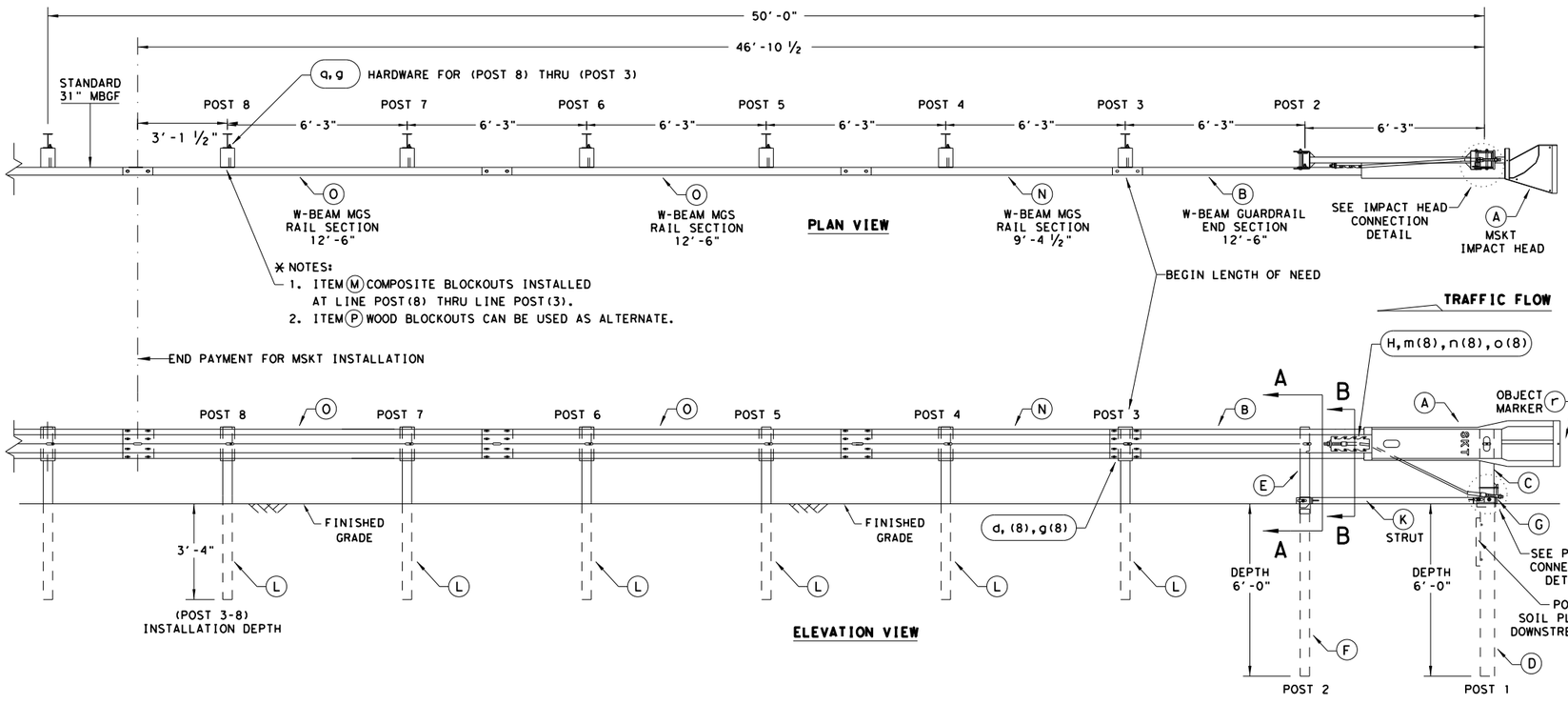
Texas Department of Transportation

Design Division Standard

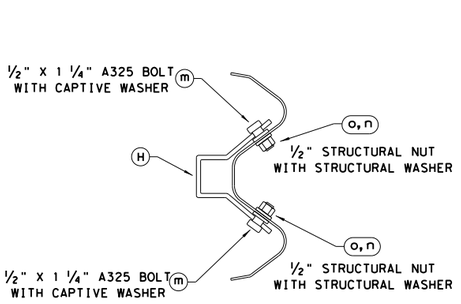
MAX-TENSION END TERMINAL
MASH - TL-3
SGT(11S)31-18

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0155	06	213	FM 2678
	DIST	COUNTY		SHEET NO.
	CRP	REFUGIO		96

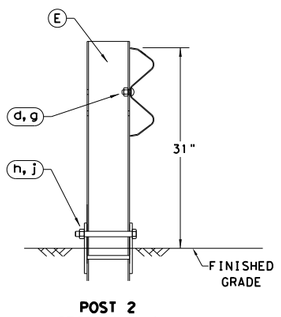
DATE: 10/13/2023
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design/Plan Set/13. Standards/Guard Fence Standards/SGT (12S) 31-18.dgn



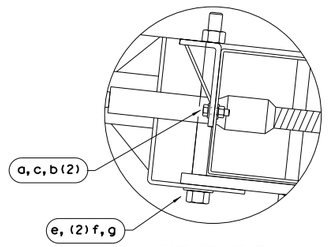
NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.



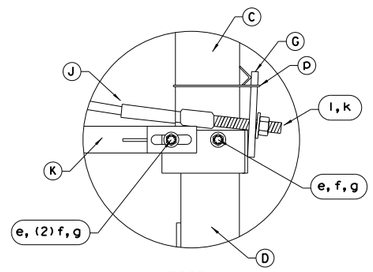
SECTION B-B
ANCHOR BRACKET



POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL

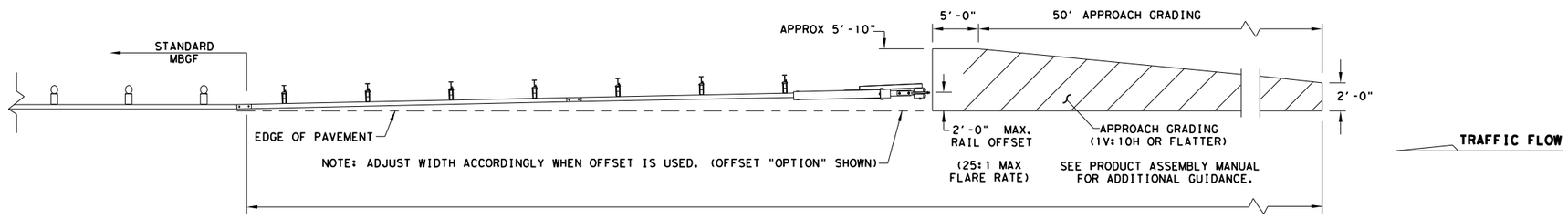
SEE NOTES: *

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

GENERAL NOTES

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

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



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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.

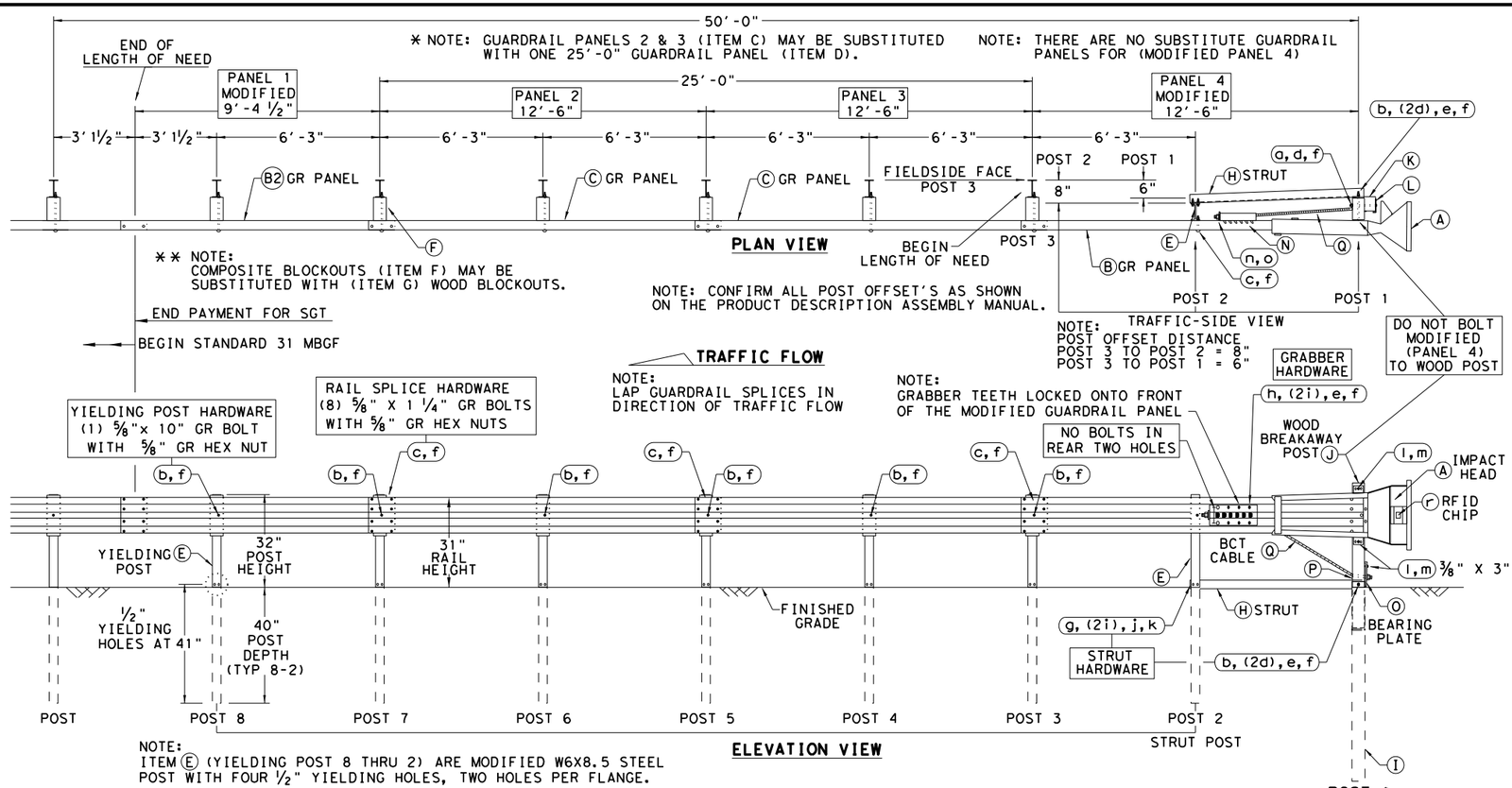
Texas Department of Transportation

Design Division Standard

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

FILE: sgt12s3118.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CL		
© TxDOT: APRIL 2018	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0155	06	213		FM 2678	
	DIST	COUNTY			SHEET NO.	
	CRP	REFUGIO			97	

DATE: 10/13/2023
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design/Plan Set/13. Standards/Guard Fence Standards/SGT (15) 31-20.dgn

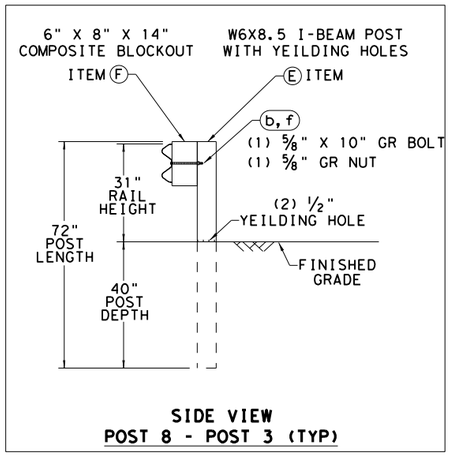


GENERAL NOTES

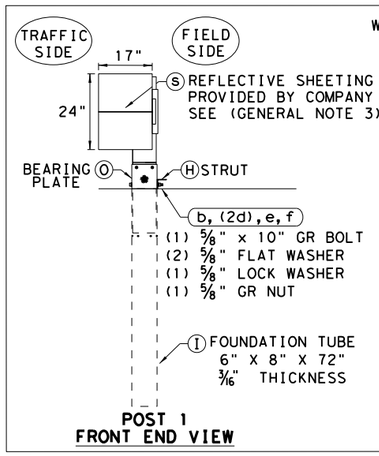
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL.
3. 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.
4. THE NOMINAL HEIGHT OF THE GUARDRAIL BEAM IS 31 INCHES WITH A TOLERANCE OF +/- ONE INCH.
5. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
6. (POST 2 THROUGH POST 8) ARE MODIFIED STEEL-YIELDING POSTS WITH YIELDING HOLES AT GROUND LEVEL. THERE ARE NO SUBSTITUTE POSTS.
7. POSTS SHALL NOT BE SET IN CONCRETE.
8. IF SOLID ROCK IS ENCOUNTERED FOR ANY OF THE POSTS IN THE SYSTEM, CONTACT THE MANUFACTURER FOR SPECIFIC INSTALLATION GUIDANCE.
9. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445,"GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
10. 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.
11. 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"	CBO8
G **	6	WOOD BLOCKOUT 6" X 8" X 14"	WBO8
H	1	STRUT 3" X 3" X 80" x 1/4" A36 ANGLE	STR80
I	1	FOUNDATION TUBE 6" X 8" X 72" x 3/16"	FNDT6
J	1	WOOD BREAKAWAY POST 5 1/2" x 7 1/2" x 50"	WBRK50
K	1	WOOD STRIKE BLOCK	WSBLK14
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"	GGR17
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 A563DH HDG	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

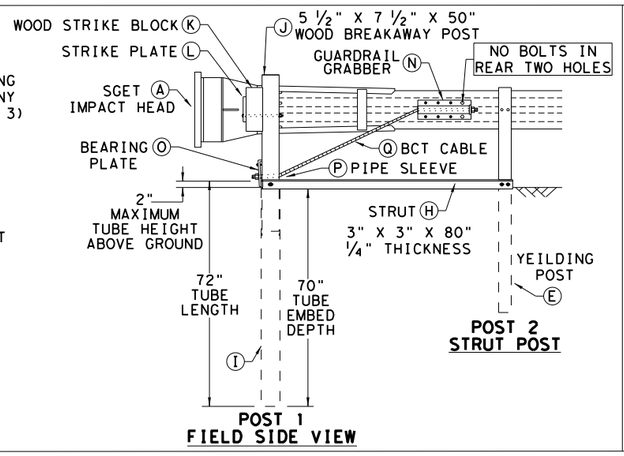
ALTERNATIVE ITEMS
NOTE: SEE PLAN VIEW



SIDE VIEW
POST 8 - POST 3 (TYP)

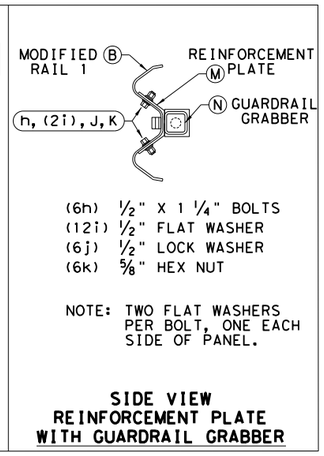


POST 1
FRONT END VIEW

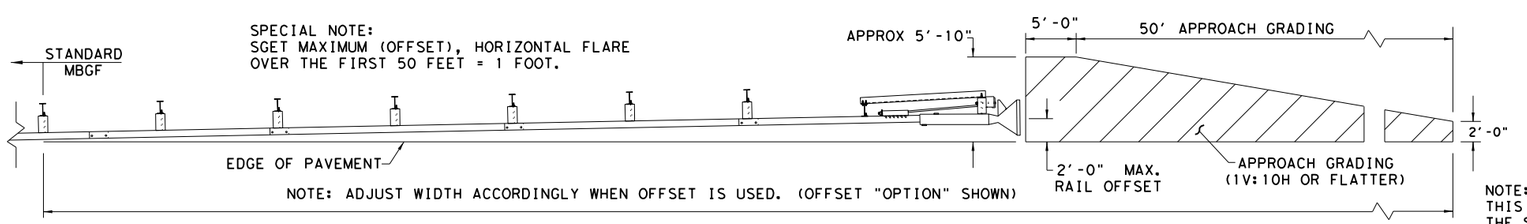


POST 1
FIELD SIDE VIEW

POST 2
STRUT POST



SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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: sgt153120.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
©TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY
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	CRP	REFUGIO		98

DATE:
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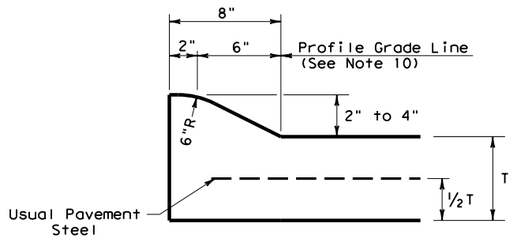
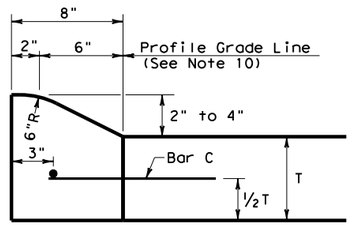


TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



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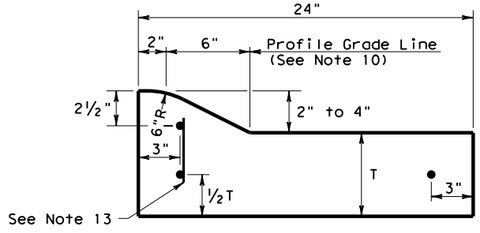
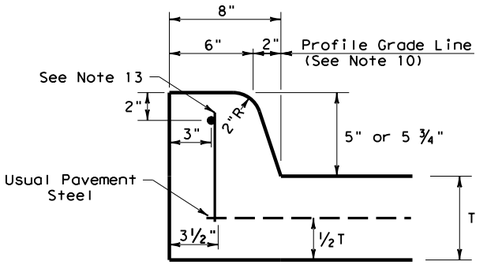


TYPE I CURB AND GUTTER
2" - 4" HEIGHT



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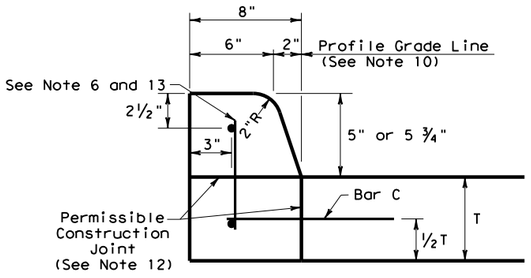
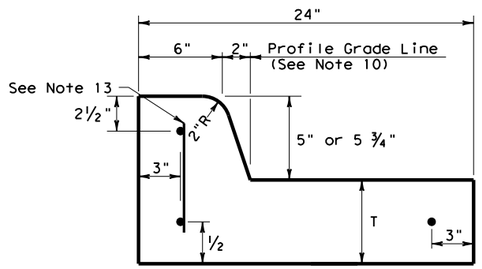
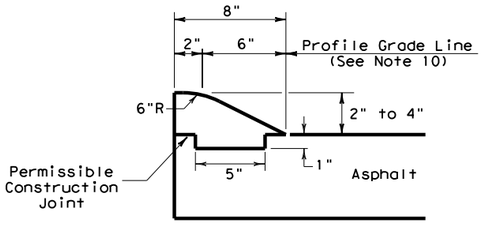
5" - 5 ¾" HEIGHT



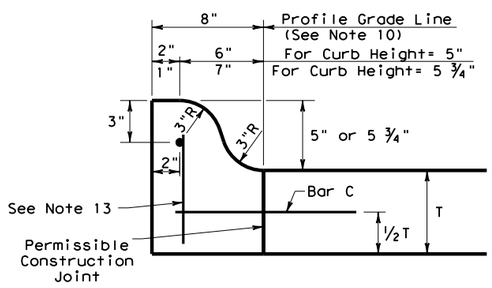
TYPE II CURB
5" - 5 ¾" HEIGHT



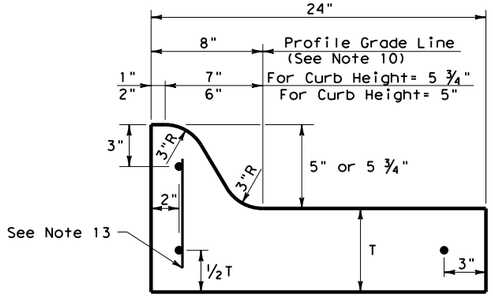
TYPE II CURB AND GUTTER
5" - 5 ¾" HEIGHT



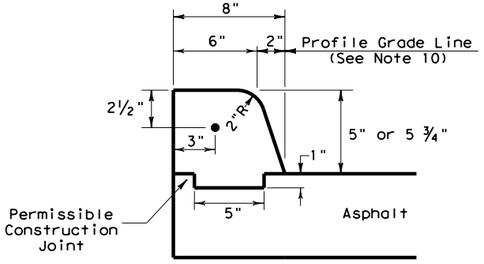
TYPE III CURB (KEYED)
2" - 4" HEIGHT



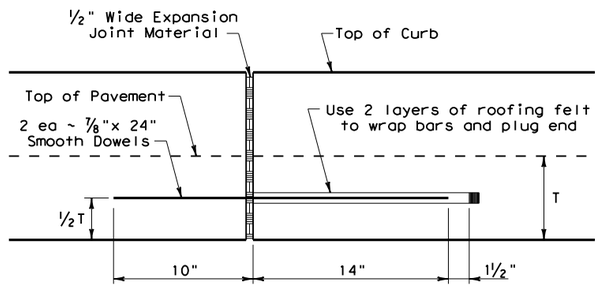
TYPE IIa CURB
5" - 5 ¾" HEIGHT



TYPE IIa CURB AND GUTTER
5" - 5 ¾" HEIGHT

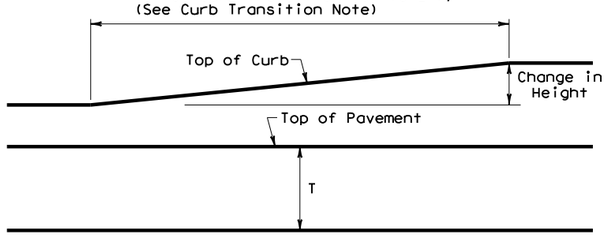


TYPE IV CURB (KEYED)
5" - 5 ¾" HEIGHT



EXPANSION JOINT DETAIL

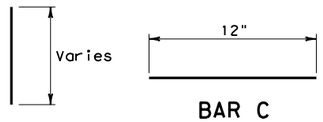
CURB TRANSITION NOTE:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.



CURB TRANSITION
Note: To be paid for as Highest Curb

GENERAL NOTES

1. All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
2. Concrete shall be Class A.
3. 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."
4. Round exposed sharp edges with a rounding tool, to a minimum radius of ¼ inch.
5. All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
6. 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.
7. 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.
8. Vertical and horizontal dowel bars and transverse reinforcing bars shall be placed at four feet C~C.
9. Dimension 'T' shown is the thickness of concrete pavement. When curb is installed adjacent to flexible pavement dimension 'T' is 8" maximum.
10. Usual profile grade line. Refer to typical sections and plan-profile sheets for exact locations.
11. One-half inch expansion joint material shall be provided where curb or curb and gutter is adjacent to sidewalk or riprap.
12. 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.
13. Bar B placement as needed (typically at four ft. C-C) to support curb reinforcing steel during concrete placement.



BAR B

BAR C

Texas Department of Transportation

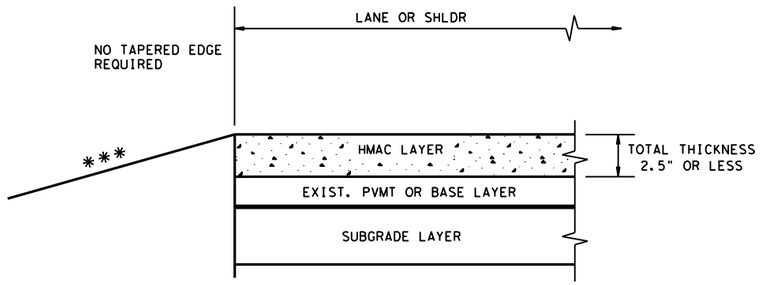
Design Division Standard

CONCRETE CURB AND CURB AND GUTTER

CCCG-22

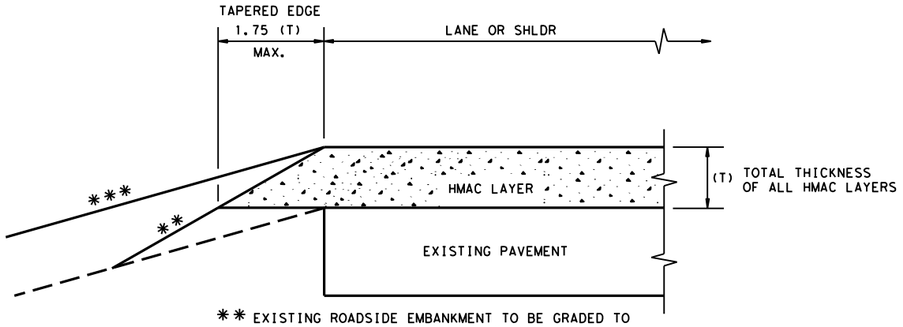
FILE: cccg21.dgn	DN: TXDOT		CK: AN		DW: CS		CK: KM
© TxDOT: JUNE 2022	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0155	06	213		FM 2678		
	DIST	COUNTY			SHEET NO.		
	CRP	REFUGIO			99		

DATE: 10/13/2023
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062l3/4 - Design/Plan Set/13. Standards/Roadway Standards/TE (HMAC)-11.dgn



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

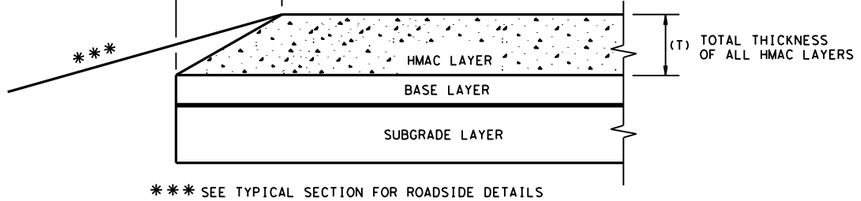
CONDITION - 1
THIN HMAC SURFACES OR HMAC OVERLAY WITH THICKNESS OF 2.5" OR LESS



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

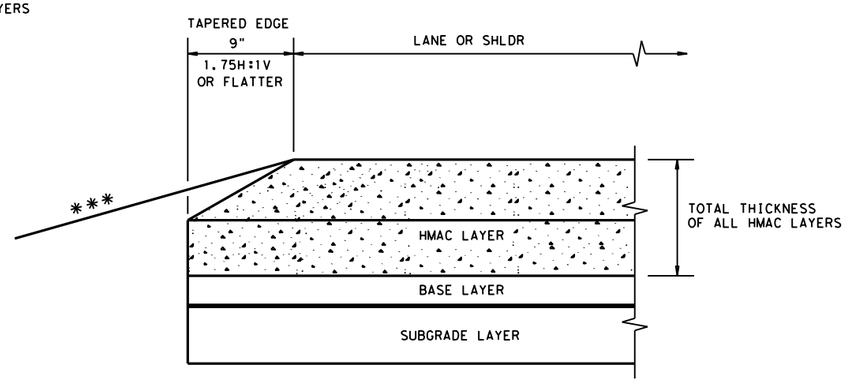
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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

(NOT TO SCALE)

GENERAL NOTES

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

Texas Department of Transportation | Design Division Standard

TAPERED EDGE DETAILS
HMAC PAVEMENT

TE(HMAC)-11

FILE: tehmac11.dgn		DN: TxDOT	CK: RL	DW: KB	CK:		
©TxDOT January 2011		CONT	SECT	JOB		HIGHWAY	
REVISIONS		0155	06	213		FM 2678	
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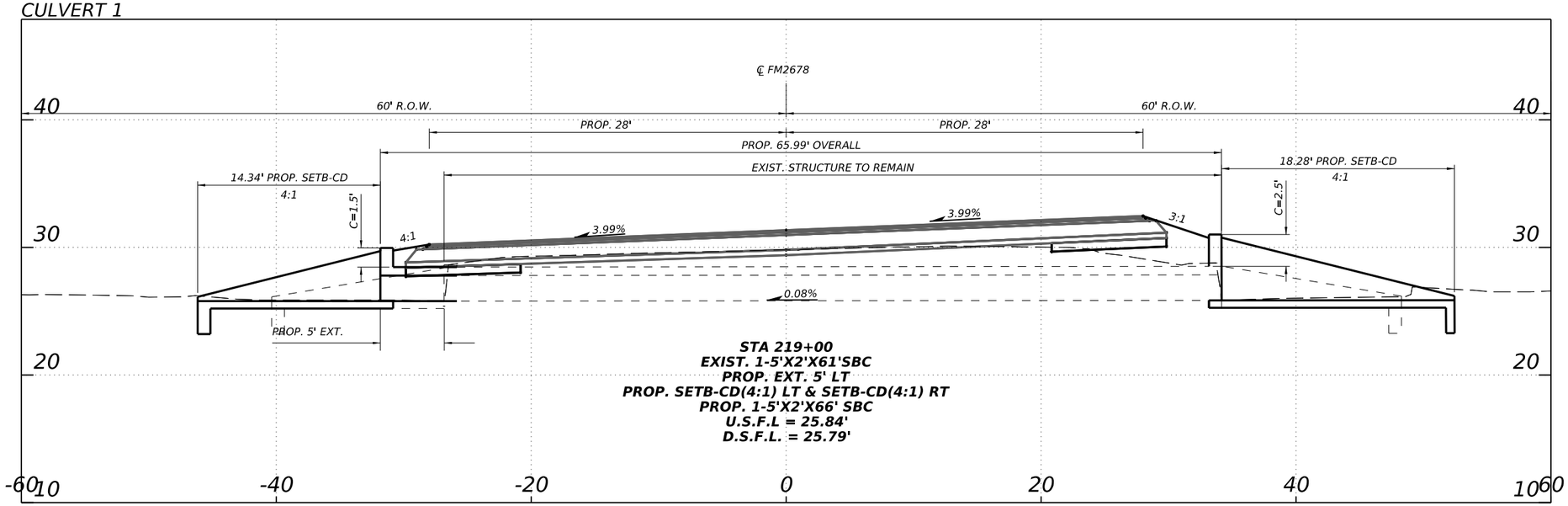
		CRP	REFUGIO			100	

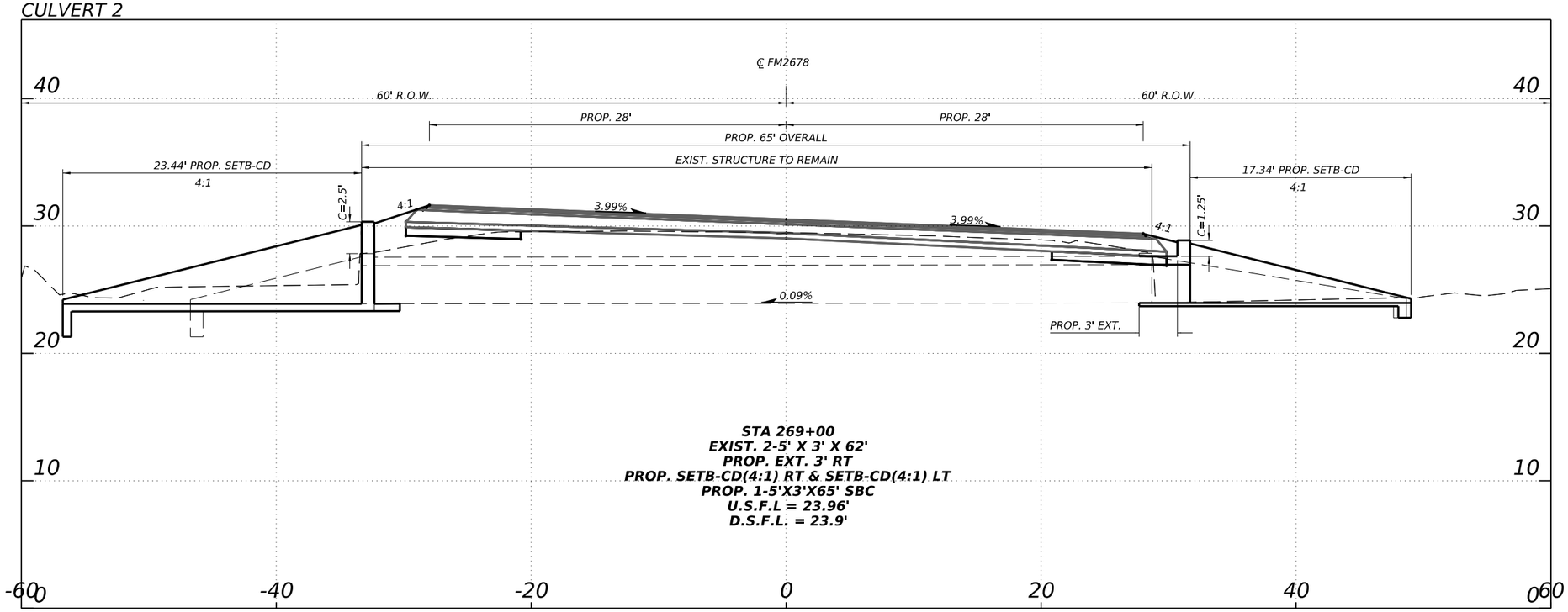
CK:
DW:
CK:
DW:

CULVERT 1



STA 219+00
EXIST. 1-5'X2'X61'SBC
PROP. EXT. 5' LT
PROP. SETB-CD(4:1) LT & SETB-CD(4:1) RT
PROP. 1-5'X2'X66' SBC
U.S.F.L = 25.84'
D.S.F.L. = 25.79'

CULVERT 2



STA 269+00
EXIST. 2-5' X 3' X 62'
PROP. EXT. 3' RT
PROP. SETB-CD(4:1) RT & SETB-CD(4:1) LT
PROP. 1-5'X3'X65' SBC
U.S.F.L = 23.96'
D.S.F.L. = 23.9'

NOTES:

ALL CULVERTS HAVE BEEN OBSERVED IN OPERATION AND HAVE BEEN DEEMED BY ENGINEERING JUDGEMENT TO BE OPERATING HYDRAULICALLY SUFFICIENT THAT A FULL HYDRAULIC ANALYSIS IS UNNECESSARY FOR THIS PROJECT

STATE OF TEXAS
ERIC R MARTINEZ
125657
LICENSED
PROFESSIONAL ENGINEER

10/13/2023

Texas Department of Transportation

FM 2678

CULVERT LAYOUTS

SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		101

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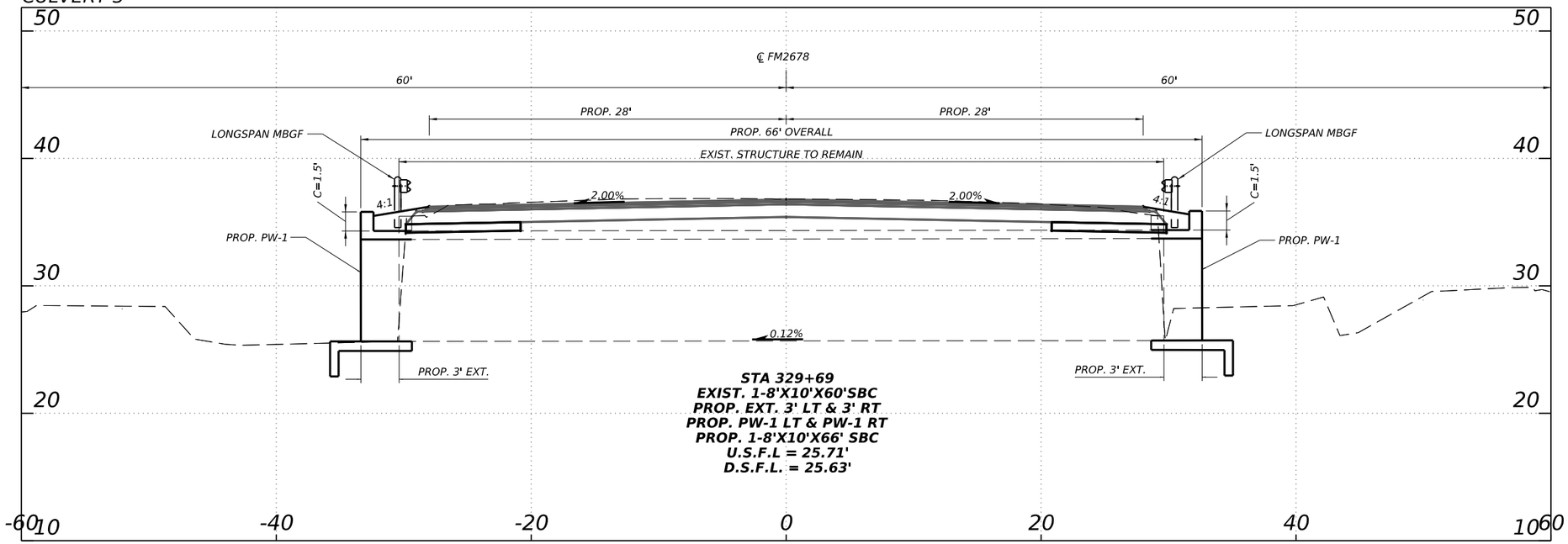
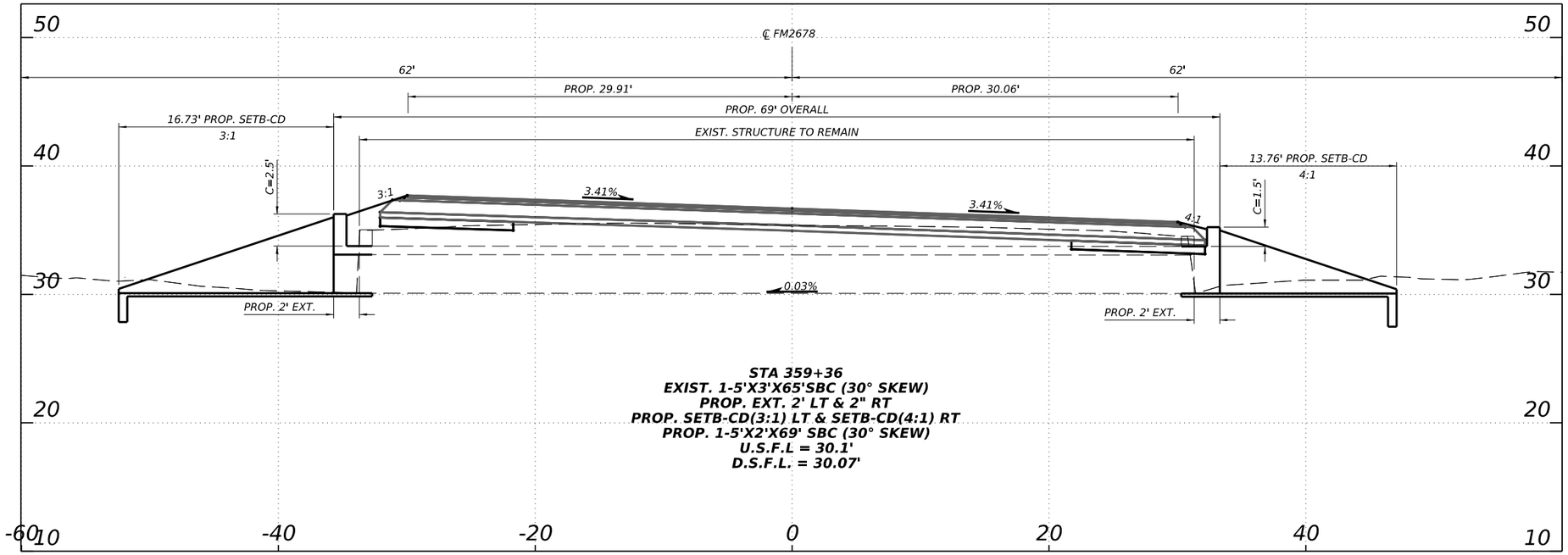
CULVERT 3



STA 329+69
EXIST. 1-8'X10'X60'SBC
PROP. EXT. 3' LT & 3' RT
PROP. PW-1 LT & PW-1 RT
PROP. 1-8'X10'X66' SBC
U.S.F.L = 25.71'
D.S.F.L. = 25.63'

CULVERT 4



STA 359+36
EXIST. 1-5'X3'X65'SBC (30° SKEW)
PROP. EXT. 2' LT & 2" RT
PROP. SETB-CD(3:1) LT & SETB-CD(4:1) RT
PROP. 1-5'X2'X69' SBC (30° SKEW)
U.S.F.L = 30.1'
D.S.F.L. = 30.07'

NOTES:

ALL CULVERTS HAVE BEEN OBSERVED IN OPERATION AND HAVE BEEN DEEMED BY ENGINEERING JUDGMENT TO BE OPERATING HYDRAULICALLY SUFFICIENT THAT A FULL HYDRAULIC ANALYSIS IS UNNECESSARY FOR THIS PROJECT

STATE OF TEXAS
ERIC R MARTINEZ
125657
LICENSED
PROFESSIONAL ENGINEER

10/13/2023

Texas Department of Transportation

FM 2678

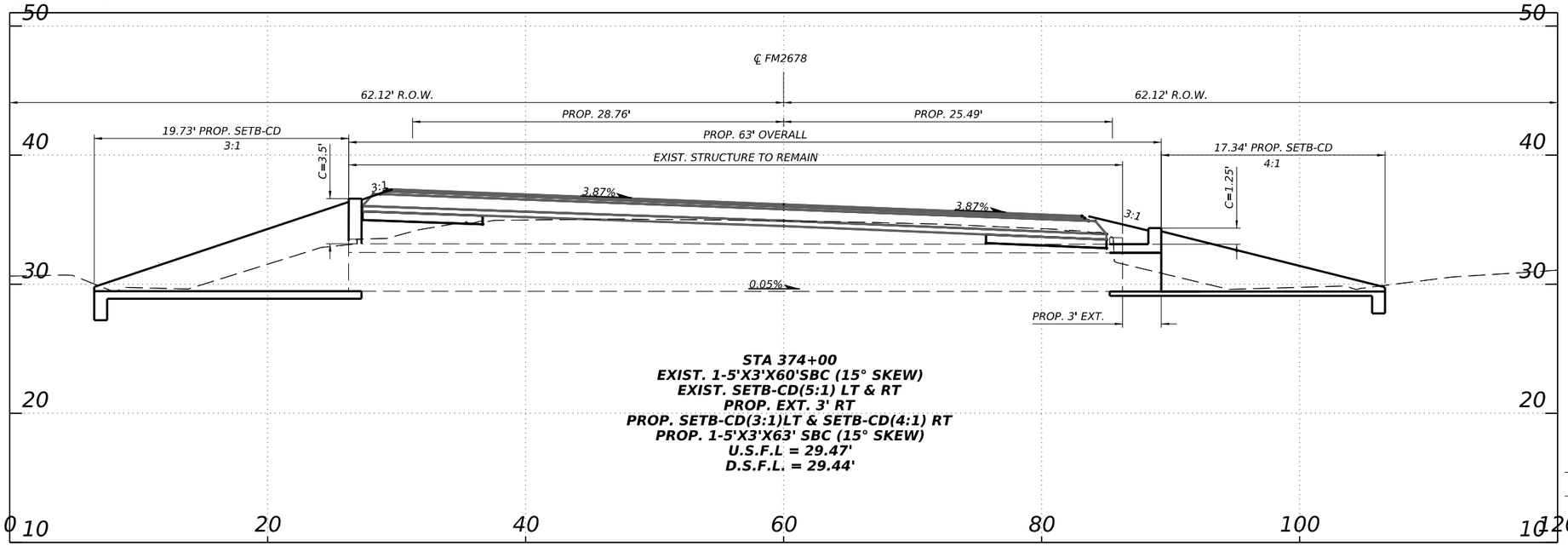
CULVERT LAYOUTS

2024 SHEET 2 OF 4

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		102

CK:
DW:
CK:
DW:

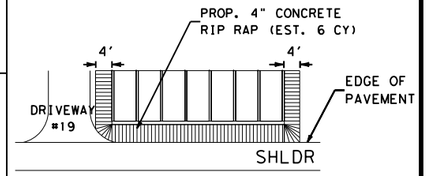
CULVERT 5



STA 374+00
EXIST. 1-5'X3'X60'SBC (15° SKEW)
EXIST. SETB-CD(5:1) LT & RT
PROP. EXT. 3' RT
PROP. SETB-CD(3:1)LT & SETB-CD(4:1) RT
PROP. 1-5'X3'X63' SBC (15° SKEW)
U.S.F.L = 29.47'
D.S.F.L. = 29.44'

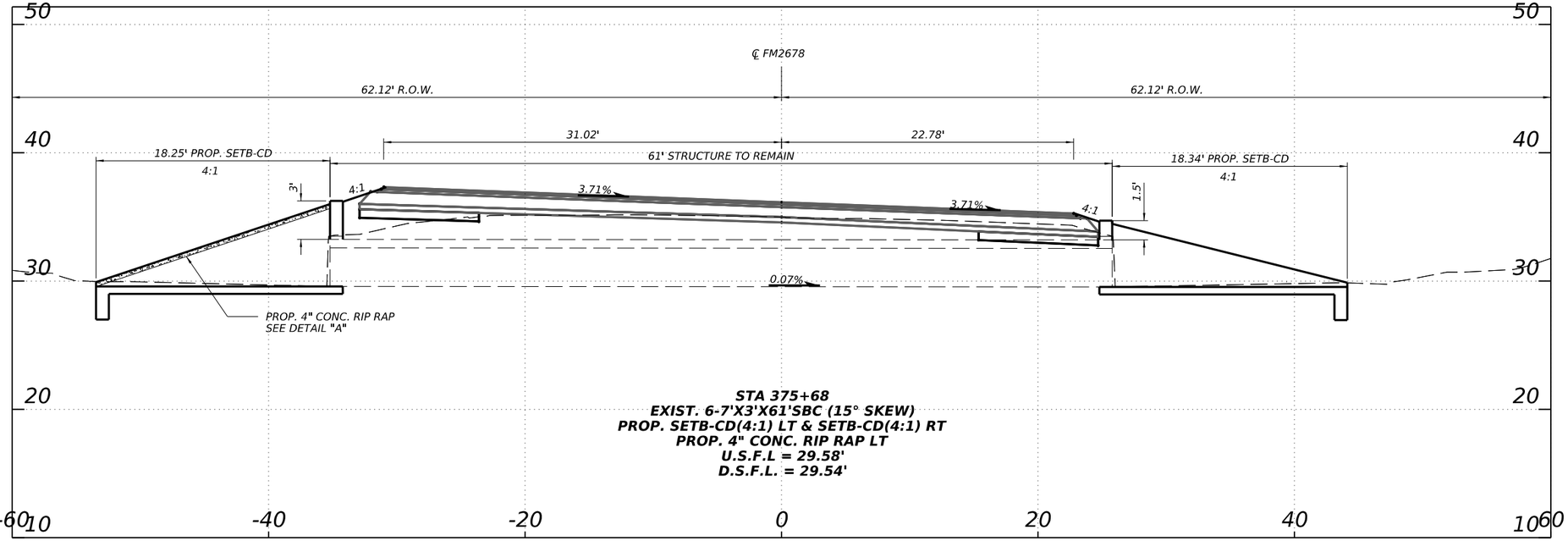
NOTES:

ALL CULVERTS HAVE BEEN OBSERVED IN OPERATION AND HAVE BEEN DEEMED BY ENGINEERING JUDGMENT TO BE OPERATING HYDRAULICALLY SUFFICIENT THAT A FULL HYDRAULIC ANALYSIS IS UNNECESSARY FOR THIS PROJECT



DETAIL A

CULVERT 6



STA 375+68
EXIST. 6-7'X3'X61'SBC (15° SKEW)
PROP. SETB-CD(4:1) LT & SETB-CD(4:1) RT
PROP. 4" CONC. RIP RAP LT
U.S.F.L = 29.58'
D.S.F.L. = 29.54'

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CULVERT LAYOUTS

2024 SHEET 3 OF 4

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		103

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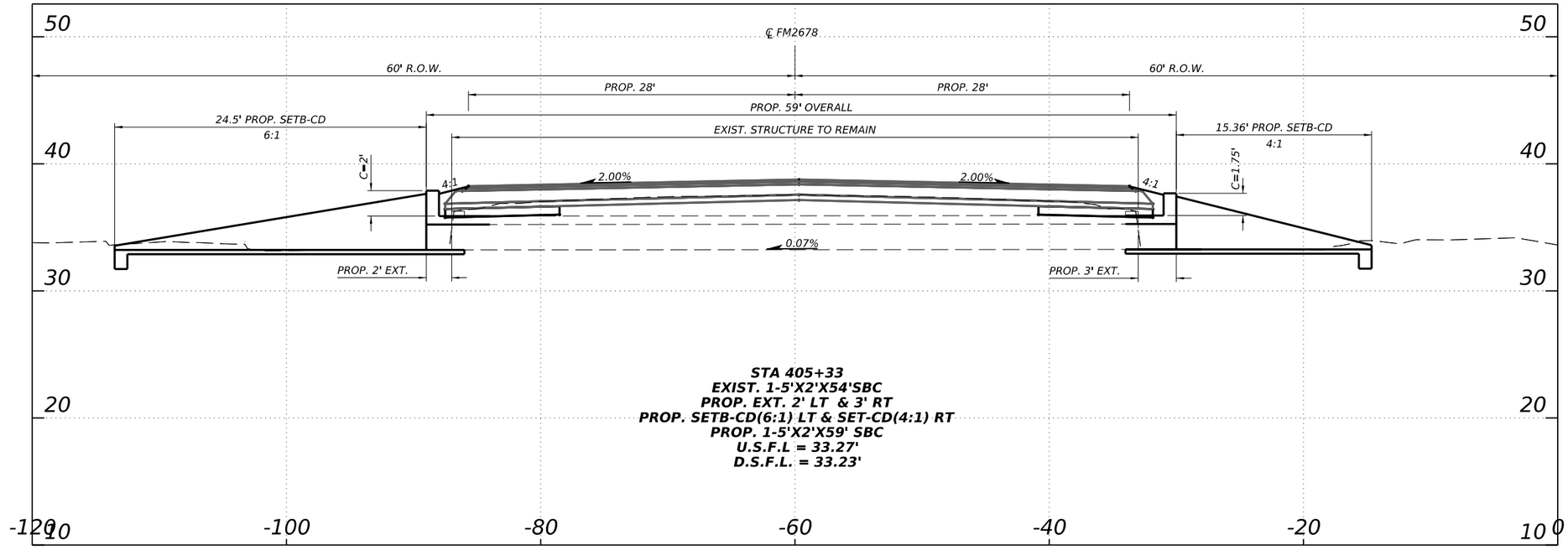
DATE: 10/13/2023 1:26:02 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design/Plan Set/5. Drainage/CULVERT LAYOUT 4.dgn

NOTES:

ALL CULVERTS HAVE BEEN OBSERVED IN OPERATION AND HAVE BEEN DEEMED BY ENGINEERING JUDGEMENT TO BE OPERATIONG HYDRAULICALLY SUFFICIENT THAT A FULL HYDRAULIC ANALYSIS IS UNNECESSARY FOR THIS PROJECT

CULVERT 7



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10/13/2023

Texas Department of Transportation

FM 2678

CULVERT LAYOUTS

2024 SHEET 4 OF 4

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		104

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 (1) (Ft)	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) (2) (CY)	Class "C" Conc (Wingwall) (3) (CY)	Total Wingwall Area (SF)
219+00 LT	1- 5' x 2'	1.3	SCP-5	SETB-CD	0	4:1	8	6	1.50	3.917	N/A	N/A	14.333	N/A	6.167	0.0	0.3	3.4	N/A
219+00 RT	1- 5' x 2'	2.0	SCP-5	SETB-CD	0	4:1	6	6	2.50	4.750	N/A	N/A	17.667	N/A	6.167	0.0	0.6	4.4	N/A
269+00 LT	2- 5' x 3'	2.4	SCP-5	SETB-CD	0	4:1	6	6	2.50	5.750	N/A	N/A	21.667	N/A	12.667	0.0	1.2	10.5	N/A
269+00 RT	2- 5' x 3'	1.1	SCP-5	SETB-CD	0	4:1	8	6	1.25	4.667	N/A	N/A	17.333	N/A	12.667	0.0	0.6	7.9	N/A
329+69 LT	1- 10' x 8'	1.1	SCP-10	PW-1	0	2:1	10	10	1.50	10.333	N/A	N/A	20.667	11.667	N/A	0.0	0.6	26.9	427
329+69 RT	1- 10' x 8'	1.2	SCP-10	PW-1	0	2:1	10	10	1.50	10.333	N/A	N/A	20.667	11.667	N/A	0.0	0.6	26.9	427
359+36 LT	3- 5' x 3'	2.3	SCP-5	SETB-CD	0	3:1	6	6	2.50	5.750	N/A	N/A	16.250	N/A	19.167	0.0	1.8	11.5	N/A
359+36 RT	3- 5' x 3'	1.3	SCP-5	SETB-CD	0	4:1	8	6	1.50	4.917	N/A	N/A	18.333	N/A	19.167	0.0	1.1	12.2	N/A
374+00 LT	2- 5' x 3'	2.7	SCP-5	SETB-CD	0	3:1	6	6	3.50	6.750	N/A	N/A	19.250	N/A	12.667	0.0	1.6	10.0	N/A
374+00 RT	2- 5' x 3'	1.0	SCP-5	SETB-CD	0	4:1	8	6	1.25	4.667	N/A	N/A	17.333	N/A	12.667	0.0	0.6	7.9	N/A
375+68 LT	6- 7' x 3'	2.9	SCP-7	SETB-CD	0	4:1	8	8	3.00	6.417	N/A	N/A	24.333	N/A	52.500		5.8	41.3	N/A
375+68 RT	6- 7' x 3'	1.3	SCP-7	SETB-CD	0	4:1	8	7	1.50	4.917	N/A	N/A	18.333	N/A	51.500	0.0	2.9	29.0	N/A
405+33 LT	1- 5' x 2'	1.6	SCP-5	SETB-CD	0	4:1	8	6	2.00	4.417	N/A	N/A	16.333	N/A	6.167	0.0	0.4	4.0	N/A
405+33 RT	1- 5' x 2'	1.5	SCP-5	SETB-CD	0	4:1	8	6	1.75	4.167	N/A	N/A	15.333	N/A	6.167	0.0	0.4	3.7	N/A

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FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design/Plan Set/5. Drainage/BCS.dgn

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.

(1) Round the wall heights shown to the nearest foot for bidding purposes.

(2) 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.

(3) 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.

(4) 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.

STATE OF TEXAS
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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.

Texas Department of Transportation

Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

BCS

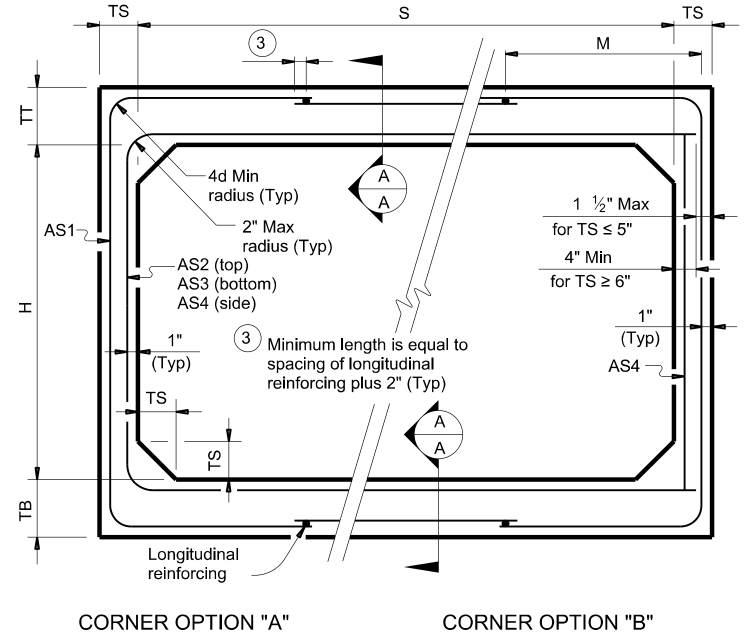
FILE: BCS.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0155	06	213	FM 2678
	DIST	COUNTY		SHEET NO.
	CRP	REFUGIO		105

BOX DATA

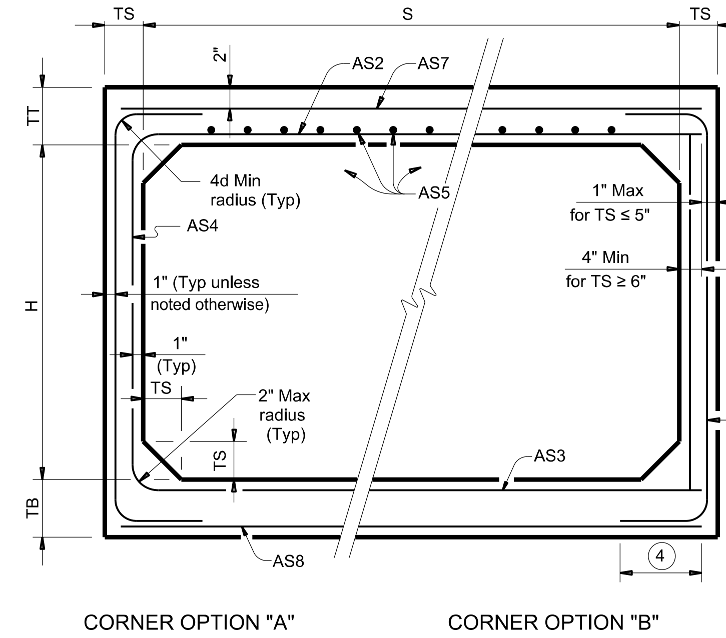
SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
4	2	7.5	6	5	< 2	-	0.18	0.27	0.15	0.12	0.18	0.18	0.14	4.5
4	2	5	5	5	2 < 3	38	0.18	0.19	0.17	0.12	-	-	-	3.6
4	2	5	5	5	3 - 5	38	0.13	0.13	0.13	0.12	-	-	-	3.6
4	2	5	5	5	10	38	0.12	0.12	0.12	0.12	-	-	-	3.6
4	2	5	5	5	15	38	0.14	0.16	0.16	0.12	-	-	-	3.6
4	2	5	5	5	20	38	0.18	0.20	0.21	0.12	-	-	-	3.6
4	2	5	5	5	25	38	0.23	0.25	0.25	0.12	-	-	-	3.6
4	2	5	5	5	30	38	0.28	0.30	0.30	0.12	-	-	-	3.6
4	3	7.5	6	5	< 2	-	0.18	0.31	0.18	0.12	0.18	0.18	0.14	5.0
4	3	5	5	5	2 < 3	38	0.15	0.23	0.20	0.12	-	-	-	4.1
4	3	5	5	5	3 - 5	38	0.12	0.16	0.16	0.12	-	-	-	4.1
4	3	5	5	5	10	38	0.12	0.14	0.14	0.12	-	-	-	4.1
4	3	5	5	5	15	38	0.12	0.18	0.18	0.12	-	-	-	4.1
4	3	5	5	5	20	38	0.14	0.23	0.24	0.12	-	-	-	4.1
4	3	5	5	5	25	38	0.17	0.29	0.29	0.12	-	-	-	4.1
4	3	5	5	5	30	38	0.21	0.35	0.35	0.12	-	-	-	4.1
4	4	7.5	6	5	< 2	-	0.18	0.33	0.20	0.12	0.18	0.18	0.14	5.5
4	4	5	5	5	2 < 3	38	0.12	0.26	0.23	0.12	-	-	-	4.6
4	4	5	5	5	3 - 5	38	0.12	0.18	0.18	0.12	-	-	-	4.6
4	4	5	5	5	10	38	0.12	0.15	0.15	0.12	-	-	-	4.6
4	4	5	5	5	15	38	0.12	0.19	0.20	0.12	-	-	-	4.6
4	4	5	5	5	20	38	0.12	0.25	0.25	0.12	-	-	-	4.6
4	4	5	5	5	25	38	0.14	0.31	0.31	0.12	-	-	-	4.6
4	4	5	5	5	30	38	0.17	0.37	0.37	0.12	-	-	-	4.6

(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.

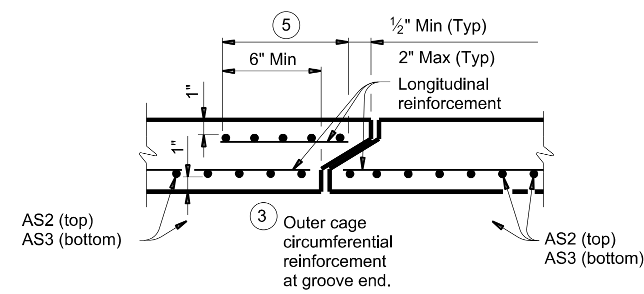


FILL HEIGHT 2 FT AND GREATER



FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

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

Texas Department of Transportation — Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

4'-0" SPAN

SCP-4

FILE: scp04sts-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT 0155	SECT 06	JOB 213	HIGHWAY FM 2678
REVISIONS	DIST CRP		COUNTY REFUGIO	SHEET NO. 106

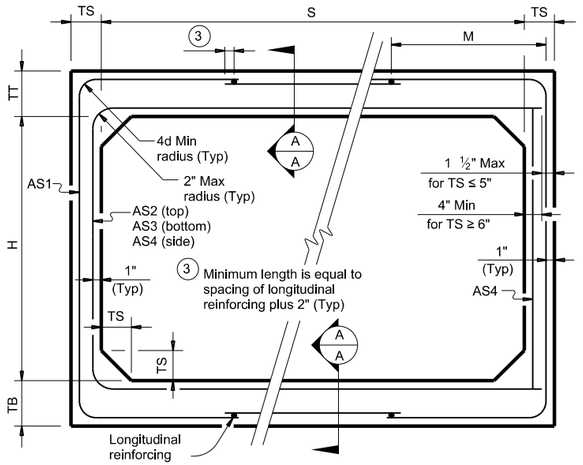
DATE: 10/13/2023 3:39:27 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/Standards/Drainage Standards/SCP-5.dgn

BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
5	2	8	7	6	< 2	-	0.19	0.27	0.18	0.14	0.19	0.19	0.17	6.0
5	2	6	6	6	2 < 3	44	0.22	0.20	0.16	0.14	-	-	-	5.1
5	2	6	6	6	3 - 5	44	0.16	0.14	0.14	0.14	-	-	-	5.1
5	2	6	6	6	10	36	0.15	0.14	0.14	0.14	-	-	-	5.1
5	2	6	6	6	15	36	0.20	0.18	0.18	0.14	-	-	-	5.1
5	2	6	6	6	20	36	0.26	0.23	0.24	0.14	-	-	-	5.1
5	2	6	6	6	25	36	0.33	0.29	0.29	0.14	-	-	-	5.1
5	2	6	6	6	30	36	0.39	0.34	0.35	0.14	-	-	-	5.1
5	3	8	7	6	< 2	-	0.19	0.31	0.21	0.14	0.19	0.19	0.17	6.6
5	3	6	6	6	2 < 3	45	0.18	0.24	0.19	0.14	-	-	-	5.7
5	3	6	6	6	3 - 5	36	0.14	0.17	0.16	0.14	-	-	-	5.7
5	3	6	6	6	10	36	0.14	0.16	0.17	0.14	-	-	-	5.7
5	3	6	6	6	15	35	0.16	0.21	0.22	0.14	-	-	-	5.7
5	3	6	6	6	20	35	0.21	0.27	0.28	0.14	-	-	-	5.7
5	3	6	6	6	25	35	0.26	0.34	0.34	0.14	-	-	-	5.7
5	3	6	6	6	30	35	0.31	0.41	0.41	0.14	-	-	-	5.7
5	4	8	7	6	< 2	-	0.19	0.33	0.24	0.14	0.19	0.19	0.17	7.2
5	4	6	6	6	2 < 3	45	0.16	0.27	0.22	0.14	-	-	-	6.3
5	4	6	6	6	3 - 5	45	0.14	0.19	0.18	0.14	-	-	-	6.3
5	4	6	6	6	10	36	0.14	0.18	0.18	0.14	-	-	-	6.3
5	4	6	6	6	15	35	0.14	0.23	0.24	0.14	-	-	-	6.3
5	4	6	6	6	20	35	0.17	0.30	0.31	0.14	-	-	-	6.3
5	4	6	6	6	25	35	0.21	0.37	0.38	0.14	-	-	-	6.3
5	4	6	6	6	30	35	0.25	0.44	0.45	0.14	-	-	-	6.3
5	5	8	7	6	< 2	-	0.19	0.35	0.26	0.14	0.19	0.19	0.17	7.8
5	5	6	6	6	2 < 3	45	0.14	0.29	0.24	0.14	-	-	-	6.9
5	5	6	6	6	3 - 5	45	0.14	0.21	0.20	0.14	-	-	-	6.9
5	5	6	6	6	10	45	0.14	0.19	0.20	0.14	-	-	-	6.9
5	5	6	6	6	15	36	0.14	0.24	0.25	0.14	-	-	-	6.9
5	5	6	6	6	20	35	0.15	0.31	0.32	0.14	-	-	-	6.9
5	5	6	6	6	25	35	0.18	0.38	0.39	0.14	-	-	-	6.9
5	5	6	6	6	30	35	0.21	0.46	0.47	0.14	-	-	-	6.9

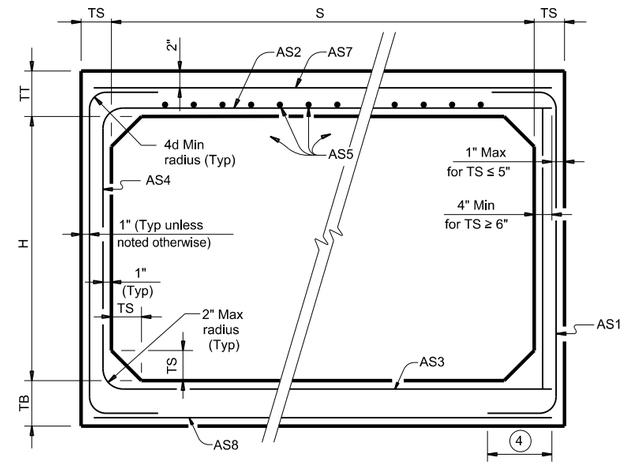
(1) For box length = 8'-0"

(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.



CORNER OPTION "A" CORNER OPTION "B"

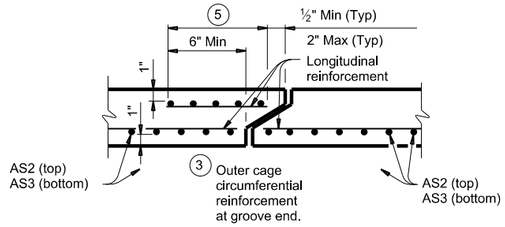
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

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

Texas Department of Transportation — Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

5'-0" SPAN

SCP-5

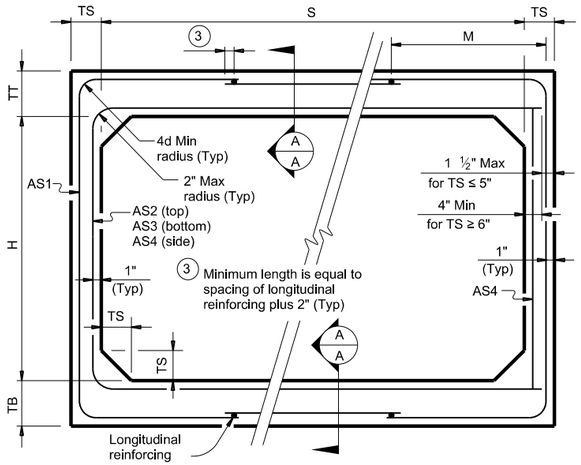
FILE: scp05sts-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0155	06	213	FM 2678
	DIST	COUNTY		SHEET NO.
	CRP	REFUGIO		107

BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
7	3	8	8	8	< 2	-	0.23	0.31	0.22	0.19	0.19	0.19	0.19	9.6
7	3	8	8	8	2 < 3	47	0.27	0.25	0.24	0.19	-	-	-	9.6
7	3	8	8	8	3 - 5	43	0.19	0.19	0.19	0.19	-	-	-	9.6
7	3	8	8	8	10	43	0.21	0.20	0.21	0.19	-	-	-	9.6
7	3	8	8	8	15	43	0.28	0.26	0.27	0.19	-	-	-	9.6
7	3	8	8	8	20	43	0.36	0.34	0.35	0.19	-	-	-	9.6
7	3	8	8	8	25	43	0.45	0.42	0.43	0.19	-	-	-	9.6
7	3	8	8	8	30	43	0.54	0.50	0.51	0.19	-	-	-	9.6
7	4	8	8	8	< 2	-	0.21	0.34	0.25	0.19	0.19	0.19	0.19	10.4
7	4	8	8	8	2 < 3	43	0.23	0.28	0.28	0.19	-	-	-	10.4
7	4	8	8	8	3 - 5	43	0.19	0.22	0.19	0.19	-	-	-	10.4
7	4	8	8	8	10	43	0.19	0.23	0.23	0.19	-	-	-	10.4
7	4	8	8	8	15	41	0.24	0.30	0.30	0.19	-	-	-	10.4
7	4	8	8	8	20	41	0.31	0.38	0.39	0.19	-	-	-	10.4
7	4	8	8	8	25	41	0.38	0.47	0.48	0.19	-	-	-	10.4
7	4	8	8	8	30	41	0.46	0.57	0.57	0.19	-	-	-	10.4
7	5	8	8	8	< 2	-	0.19	0.36	0.27	0.19	0.19	0.19	0.19	11.2
7	5	8	8	8	2 < 3	47	0.21	0.31	0.31	0.19	-	-	-	11.2
7	5	8	8	8	3 - 5	43	0.19	0.24	0.21	0.19	-	-	-	11.2
7	5	8	8	8	10	43	0.19	0.25	0.26	0.19	-	-	-	11.2
7	5	8	8	8	15	41	0.21	0.32	0.33	0.19	-	-	-	11.2
7	5	8	8	8	20	41	0.27	0.41	0.42	0.19	-	-	-	11.2
7	5	8	8	8	25	41	0.33	0.51	0.52	0.19	-	-	-	11.2
7	5	8	8	8	30	41	0.40	0.61	0.62	0.19	-	-	-	11.2
7	6	8	8	8	< 2	-	0.19	0.38	0.30	0.19	0.19	0.19	0.19	12.0
7	6	8	8	8	2 < 3	59	0.19	0.33	0.34	0.19	-	-	-	12.0
7	6	8	8	8	3 - 5	47	0.19	0.25	0.23	0.19	-	-	-	12.0
7	6	8	8	8	10	43	0.19	0.26	0.27	0.19	-	-	-	12.0
7	6	8	8	8	15	41	0.19	0.34	0.35	0.19	-	-	-	12.0
7	6	8	8	8	20	41	0.24	0.43	0.45	0.19	-	-	-	12.0
7	6	8	8	8	25	41	0.29	0.53	0.55	0.19	-	-	-	12.0
7	6	8	8	8	30	41	0.35	0.64	0.65	0.19	-	-	-	12.0
7	7	8	8	8	< 2	-	0.19	0.40	0.33	0.19	0.19	0.19	0.19	12.8
7	7	8	8	8	2 < 3	59	0.19	0.36	0.37	0.19	-	-	-	12.8
7	7	8	8	8	3 - 5	59	0.19	0.27	0.25	0.19	-	-	-	12.8
7	7	8	8	8	10	47	0.19	0.27	0.29	0.19	-	-	-	12.8
7	7	8	8	8	15	43	0.19	0.35	0.37	0.19	-	-	-	12.8
7	7	8	8	8	20	43	0.22	0.44	0.46	0.19	-	-	-	12.8
7	7	8	8	8	25	43	0.27	0.54	0.57	0.19	-	-	-	12.8
7	7	8	8	8	30	41	0.32	0.65	0.67	0.19	-	-	-	12.8

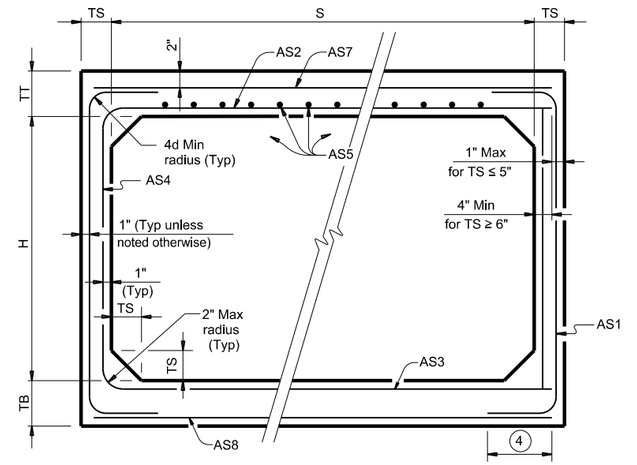
(1) For box length = 8'-0"

(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.



CORNER OPTION "A" CORNER OPTION "B"

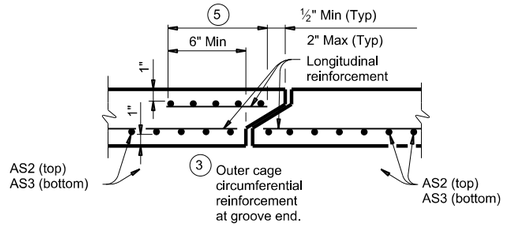
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

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

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

7'-0" SPAN

SCP-7

FILE:	scp07sts-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	February 2020	CONT	SECT	JOB	HIGHWAY
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		CRP	REFUGIO		108

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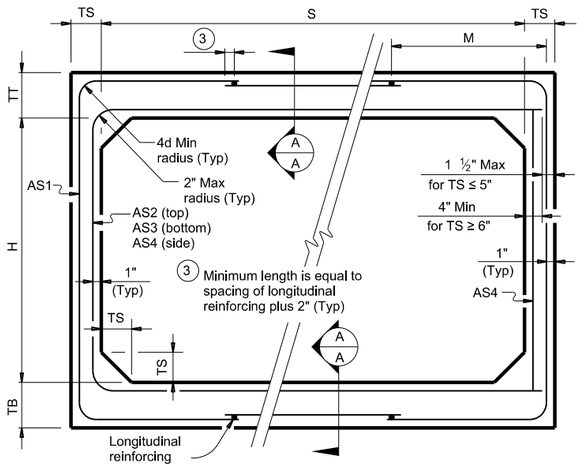
BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
10	4	10	10	10	< 2	-	0.33	0.34	0.27	0.24	0.24	0.24	0.24	16.5
10	4	10	10	10	2 < 3	58	0.38	0.35	0.30	0.24	-	-	-	16.5
10	4	10	10	10	3 - 5	53	0.31	0.28	0.27	0.24	-	-	-	16.5
10	4	10	10	10	10	52	0.36	0.32	0.33	0.24	-	-	-	16.5
10	4	10	10	10	15	52	0.47	0.42	0.43	0.24	-	-	-	16.5
10	4	10	10	10	20	52	0.61	0.54	0.55	0.24	-	-	-	16.5
10	4	10	10	10	25	52	0.75	0.67	0.68	0.24	-	-	-	16.5
10	5	10	10	10	< 2	-	0.30	0.36	0.30	0.24	0.24	0.24	0.24	17.5
10	5	10	10	10	2 < 3	58	0.35	0.39	0.34	0.24	-	-	-	17.5
10	5	10	10	10	3 - 5	52	0.28	0.31	0.30	0.24	-	-	-	17.5
10	5	10	10	10	10	52	0.33	0.35	0.36	0.24	-	-	-	17.5
10	5	10	10	10	15	47	0.42	0.46	0.47	0.24	-	-	-	17.5
10	5	10	10	10	20	47	0.55	0.59	0.61	0.24	-	-	-	17.5
10	5	10	10	10	25	47	0.68	0.73	0.75	0.24	-	-	-	17.5
10	6	10	10	10	< 2	-	0.28	0.38	0.33	0.24	0.24	0.24	0.24	18.5
10	6	10	10	10	2 < 3	58	0.32	0.42	0.37	0.24	-	-	-	18.5
10	6	10	10	10	3 - 5	53	0.26	0.34	0.33	0.24	-	-	-	18.5
10	6	10	10	10	10	52	0.30	0.38	0.39	0.24	-	-	-	18.5
10	6	10	10	10	15	47	0.39	0.49	0.51	0.24	-	-	-	18.5
10	6	10	10	10	20	47	0.50	0.63	0.65	0.24	-	-	-	18.5
10	6	10	10	10	25	47	0.61	0.78	0.80	0.24	-	-	-	18.5
10	7	10	10	10	< 2	-	0.25	0.40	0.36	0.24	0.24	0.24	0.24	19.5
10	7	10	10	10	2 < 3	58	0.30	0.45	0.40	0.24	-	-	-	19.5
10	7	10	10	10	3 - 5	58	0.24	0.36	0.35	0.24	-	-	-	19.5
10	7	10	10	10	10	52	0.28	0.40	0.42	0.24	-	-	-	19.5
10	7	10	10	10	15	47	0.36	0.52	0.54	0.24	-	-	-	19.5
10	7	10	10	10	20	47	0.46	0.67	0.69	0.24	-	-	-	19.5
10	7	10	10	10	25	47	0.56	0.82	0.85	0.24	-	-	-	19.5
10	8	10	10	10	< 2	-	0.24	0.41	0.38	0.24	0.24	0.24	0.24	20.5
10	8	10	10	10	2 < 3	64	0.27	0.47	0.43	0.24	-	-	-	20.5
10	8	10	10	10	3 - 5	58	0.24	0.38	0.38	0.24	-	-	-	20.5
10	8	10	10	10	10	52	0.26	0.42	0.44	0.24	-	-	-	20.5
10	8	10	10	10	15	47	0.34	0.54	0.57	0.24	-	-	-	20.5
10	8	10	10	10	20	47	0.43	0.69	0.72	0.24	-	-	-	20.5
10	9	10	10	10	< 2	-	0.24	0.42	0.41	0.24	0.24	0.24	0.24	21.5
10	9	10	10	10	2 < 3	70	0.26	0.50	0.46	0.24	-	-	-	21.5
10	9	10	10	10	3 - 5	64	0.24	0.40	0.40	0.24	-	-	-	21.5
10	9	10	10	10	10	58	0.25	0.43	0.46	0.24	-	-	-	21.5
10	9	10	10	10	15	52	0.32	0.56	0.59	0.24	-	-	-	21.5
10	9	10	10	10	20	47	0.40	0.71	0.75	0.24	-	-	-	21.5
10	10	10	10	10	< 2	-	0.24	0.44	0.44	0.24	0.24	0.24	0.24	22.5
10	10	10	10	10	2 < 3	79	0.25	0.52	0.48	0.24	-	-	-	22.5
10	10	10	10	10	3 - 5	70	0.24	0.42	0.43	0.24	-	-	-	22.5
10	10	10	10	10	10	64	0.24	0.44	0.48	0.24	-	-	-	22.5
10	10	10	10	10	15	52	0.30	0.57	0.61	0.24	-	-	-	22.5
10	10	10	10	10	20	52	0.38	0.73	0.77	0.24	-	-	-	22.5

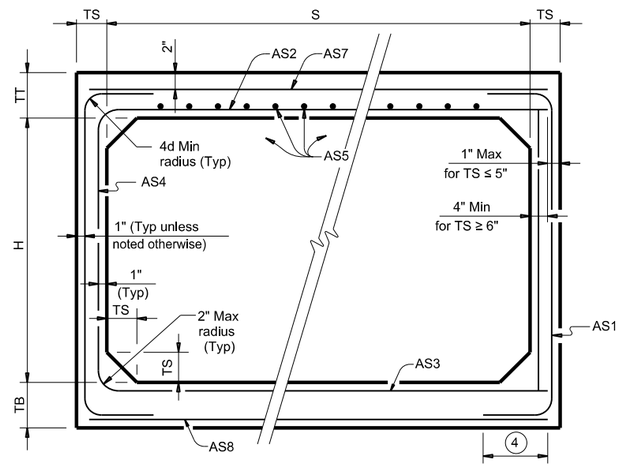
(1) For box length = 8'-0"

(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.



CORNER OPTION "A" CORNER OPTION "B"

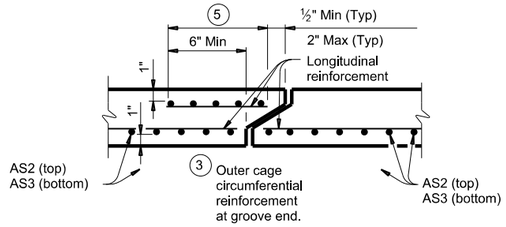
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

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

Texas Department of Transportation | Bridge Division Standard

SINGLE BOX CULVERTS PRECAST
10'-0" SPAN

SCP-10

FILE: SCP-10.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
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	CRP	REFUGIO		109

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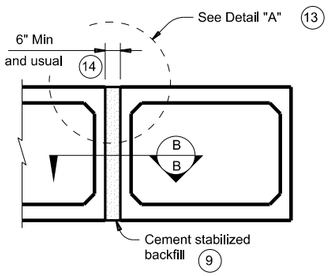
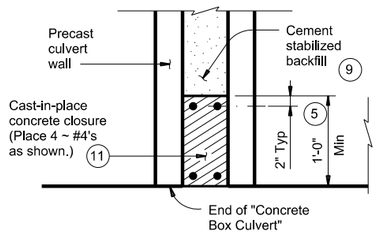
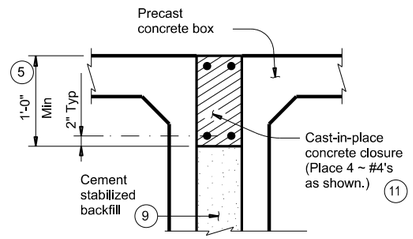


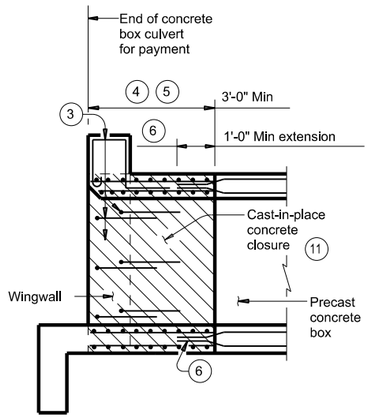
MULTIPLE UNIT PLACEMENT



SECTION B-B

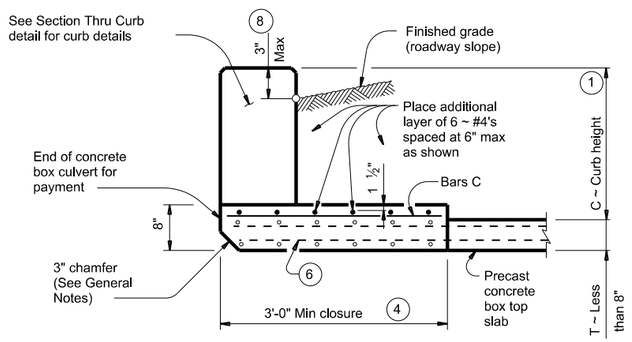


DETAIL "A" 13

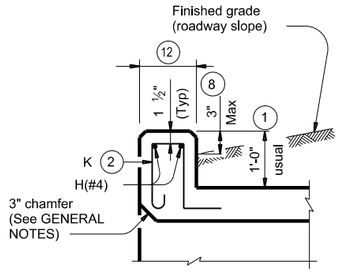


WINGWALL CONNECTION

(Also applies to safety end treatment.)

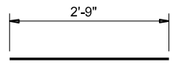


SECTION THRU TOP SLABS LESS THAN 8"

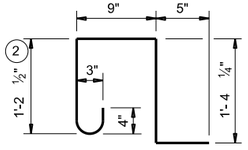


SECTION THRU CURB

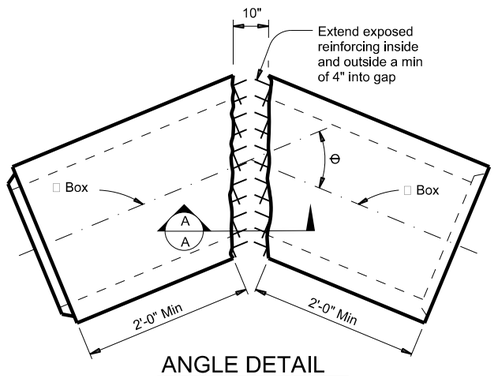
QUANTITIES PER FOOT OF CURB 10	
Reinforcing Steel	4.12 Lb
Concrete	0.037 CY



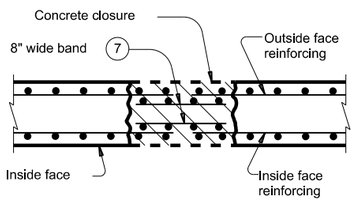
BARS C (#4)
(Spa = 1'-0" Max)



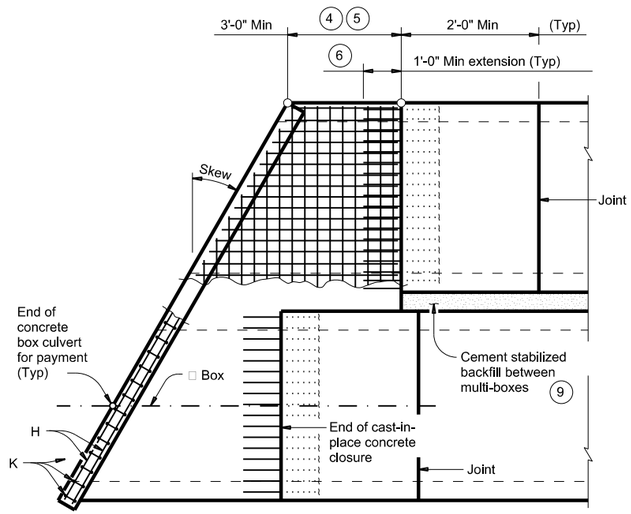
BARS K (#4)
(Spa = 1'-0" Max)
(Length = 4'-2")



ANGLE DETAIL



SECTION A-A



PLAN OF SKEWED ENDS

(Showing multi-box placement.)

1. 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.
2. 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.
3. 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.
4. 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.
5. 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.
6. Extend precast box reinforcing a minimum of 1'-0" into concrete closure (Typ).
7. 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.
8. 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.
9. Cement stabilized backfill between boxes is considered part of the box culvert for payment.
10. All curb concrete and reinforcing is considered part of the box culvert for payment.
11. Any additional concrete and reinforcing required for the closures will be considered subsidiary to the box culvert for payment.
12. 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elsewhere in the plans.
13. 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".
14. 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.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

BOX CULVERTS PRECAST MISCELLANEOUS DETAILS

SCP-MD

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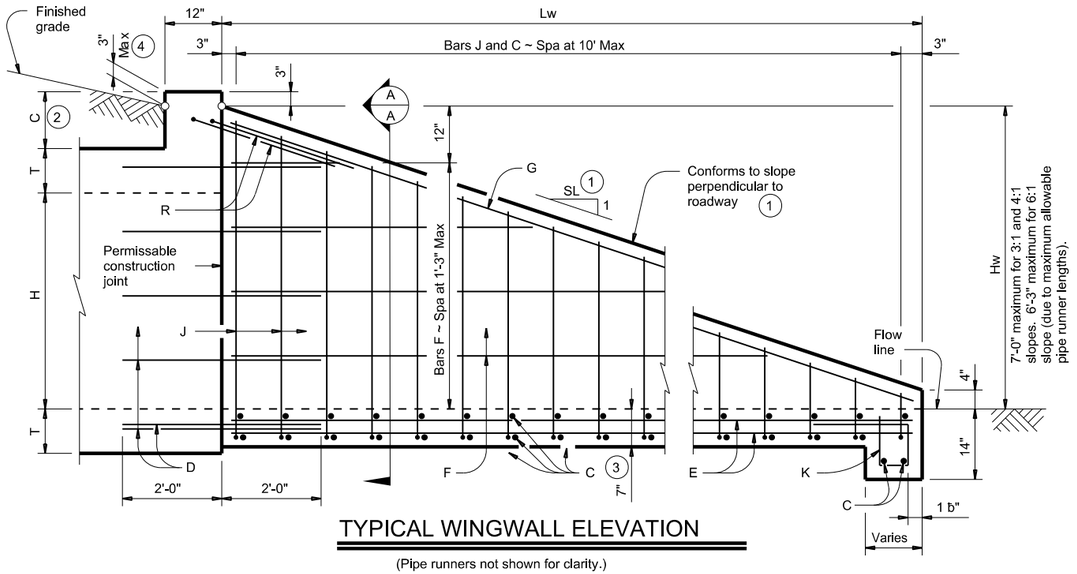
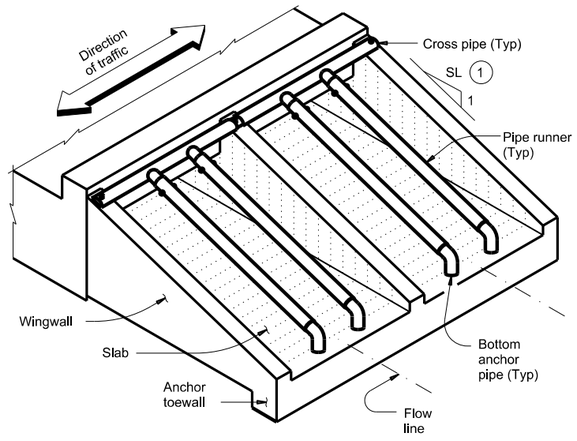


TYPICAL WINGWALL ELEVATION

(Pipe runners not shown for clarity.)



ISOMETRIC VIEW OF TYPICAL INSTALLATION

WING DIMENSION CALCULATIONS:

Hw = H + T + C - 0.250'
Lw = (Hw - 0.333') (SL)

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

Total Wingwall Area (SF)
= (0.5) (Hw + 0.333') (Lw) (N + 1)
Total Concrete Volume (CY)
= [(Wingwall Area) (0.583') +
(Lw) (Atw) (0.583') +
(Atw) (1.167') (1.167' - 0.583')] ÷ (27)

PIPE RUNNER DIMENSION CALCULATIONS:

Pipe Runner Length
= (Lw) (K1) (1.917')
Total Reinforcing (Lb)
= (1.55) (Lw) (Atw) +
(4.43) (Atw) +
(K2) (Hw) (N + 1) (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	K1	K2
3:1	~ 1.054 ~	7.45
4:1	~ 1.031 ~	8.49
6:1	~ 1.014 ~	10.30

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.

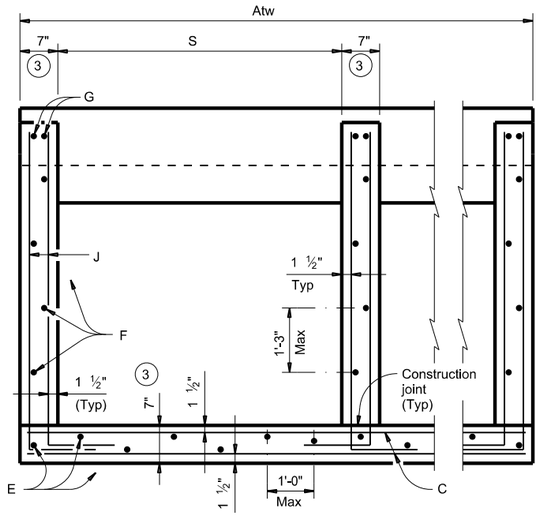
MATERIAL NOTES:

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 ½".
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 the Item 445, "Galvanizing".

GENERAL NOTES:

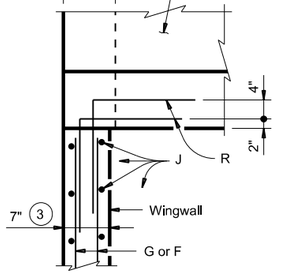
Designed according to AASHTO LRFD Bridge Design Specifications.
The safety end treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the pipe runners.
Pipe runners are designed for a traversing 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.
The quantities for pipe runners, reinforcing steel, and concrete 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.

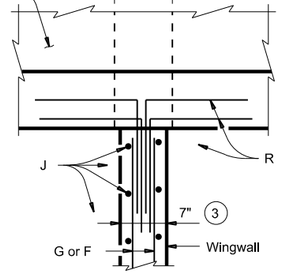


SECTION A-A

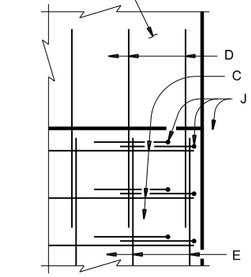
(Showing typical wingwall and wing slab reinforcing. Pipe runners not shown for clarity.)



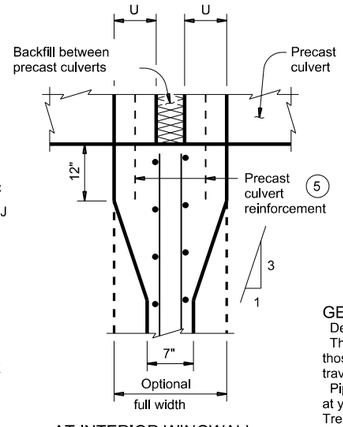
AT TOP OF EXTERIOR WINGWALL
(Cast-in-place culvert)



AT TOP OF INTERIOR WINGWALL
(Cast-in-place culvert)



AT OUTSIDE OF BOTTOM SLAB
(Cast-in-place culvert)



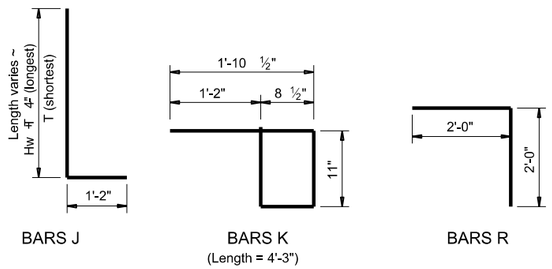
AT INTERIOR WINGWALL
(Precast culvert)

PLAN VIEWS OF CORNER DETAILS

1. Recommended values of slope are: 3:1, 4:1, and 6:1. Provide 3:1 or flatter slope.
2. 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 the Extended Curb Details (ECD) standard sheet.
3. 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.
4. For vehicle safety, reduce curb height, if necessary, to provide a maximum 3" projection. No changes will be made in quantities and no additional compensation will be allowed for this work.
5. 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.

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



SHEET 1 OF 2

Texas Department of Transportation
Bridge Division Standard

SAFETY END TREATMENT

FOR 0° SKEW BOX CULVERTS
(MAXIMUM Hw = 7'-0")
TYPE I ~ CROSS DRAINAGE

SETB-CD

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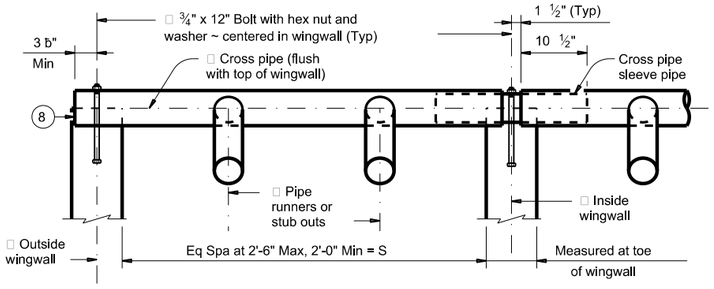
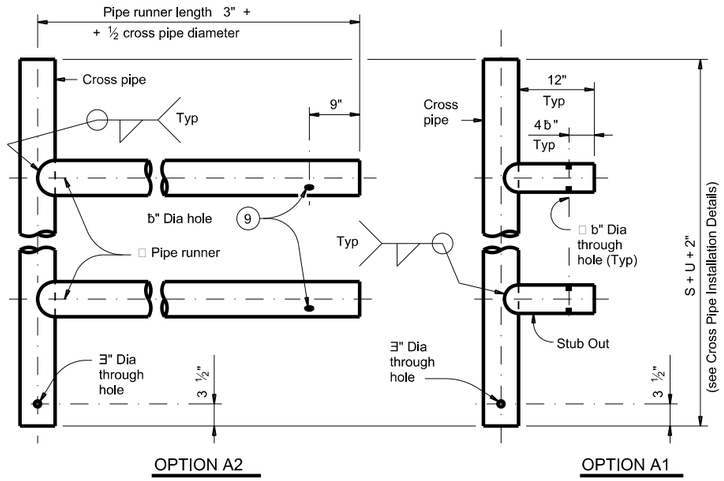


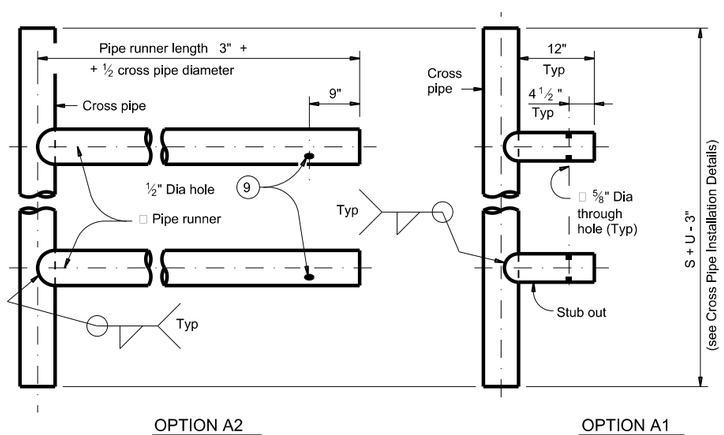
NOTE: At Contractor's option, make the cross pipe continuous across the inside wingwalls. If option is selected, omit the sleeve pipe and make a ∃" diameter through hole in the cross pipe to accept the anchor bolt at the centerline of each inside wingwall.

CROSS PIPE INSTALLATION DETAILS



OPTION A2 OPTION A1

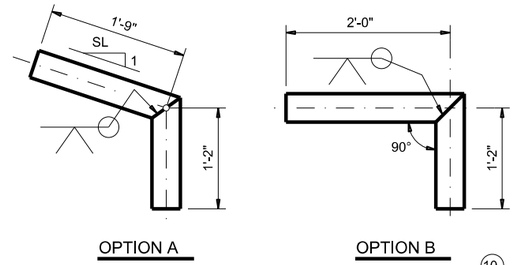
FOR USE IN OUTSIDE CULVERT BAY



OPTION A2 OPTION A1

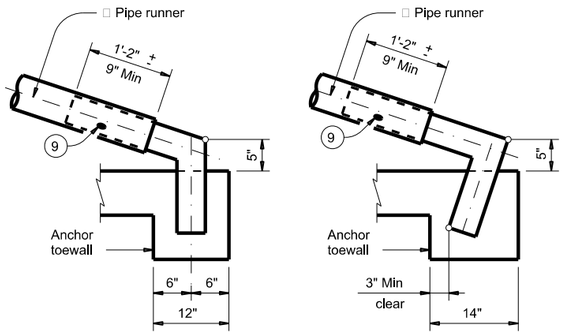
FOR USE IN INSIDE CULVERT BAY

CROSS PIPE AND CONNECTIONS DETAILS



OPTION A OPTION B

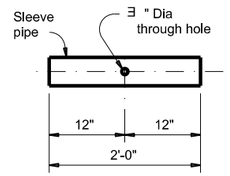
BOTTOM ANCHOR PIPE DETAILS



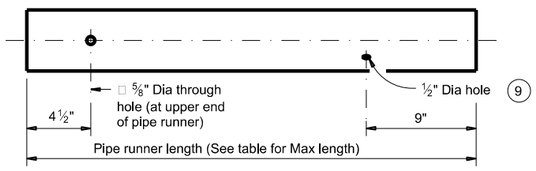
OPTION B1 OPTION B2

BOTTOM ANCHOR TOEWALL DETAILS

(Wingwall not shown for clarity.)

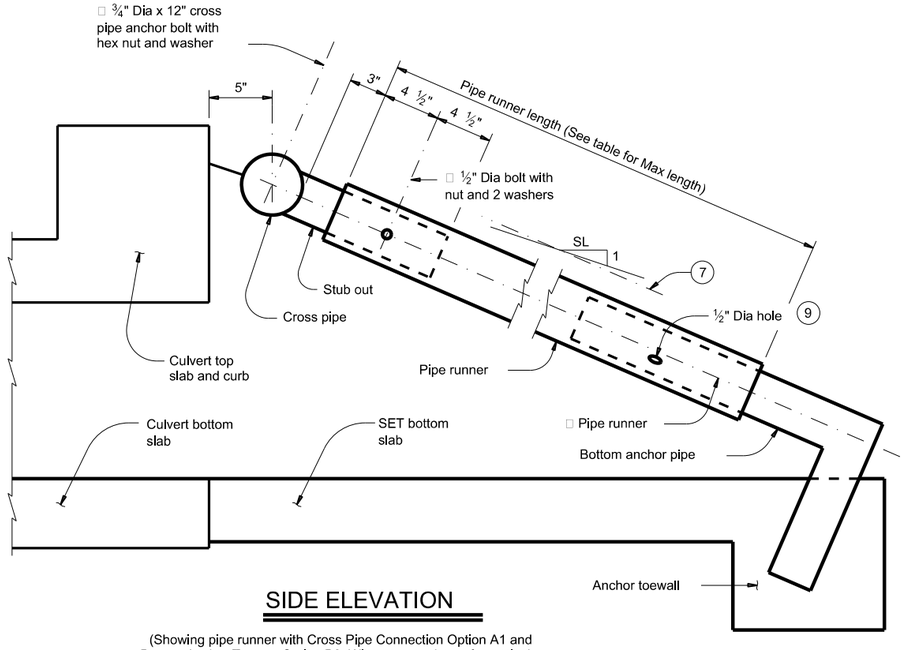


CROSS PIPE SLEEVE PIPE DETAILS



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

PIPE RUNNER DETAILS



SIDE ELEVATION

(Showing pipe runner with Cross Pipe Connection Option A1 and Bottom Anchor Toewall Option B2. Wingwall not shown for clarity.)

6 Cross pipe is the same size as the pipe runner. Cross pipe stub out is the same size as the anchor pipe.

7 Note that actual slope of safety pipe runner may vary slightly from side slope.

8 Take care to 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 safety 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.

MAXIMUM PIPE RUNNER LENGTHS AND REQUIRED PIPE RUNNER AND ANCHOR PIPE SIZES (6)

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

SHEET 2 OF 2

Texas Department of Transportation — Bridge Division Standard

SAFETY END TREATMENT

FOR 0° SKEW BOX CULVERTS
(MAXIMUM Hw = 7'-0")
TYPE I ~ CROSS DRAINAGE

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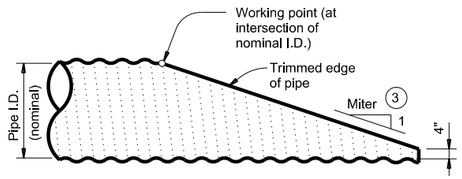
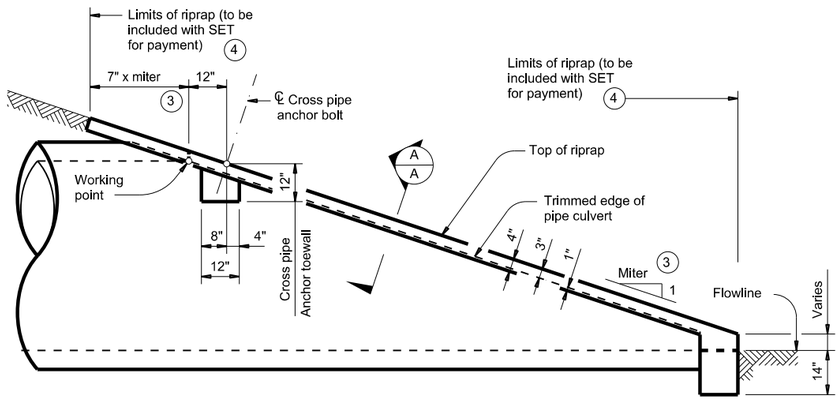


NOTE: All pipe runners, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

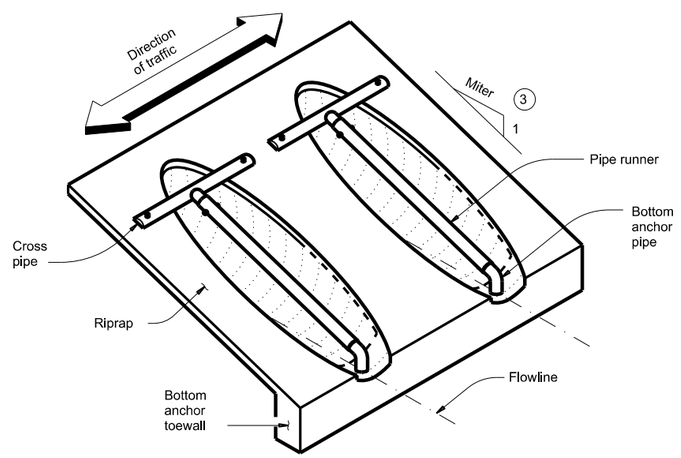
SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

(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.

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SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

FOR 12" DIA TO 60" DIA
PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

SETP-CD

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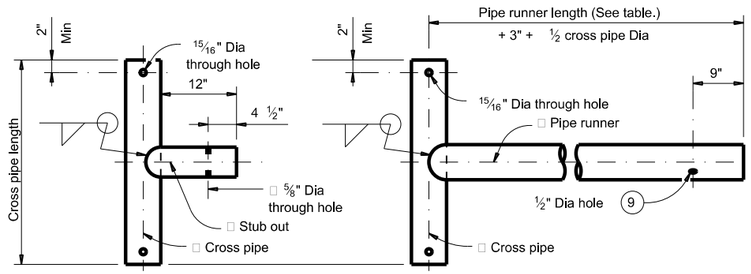
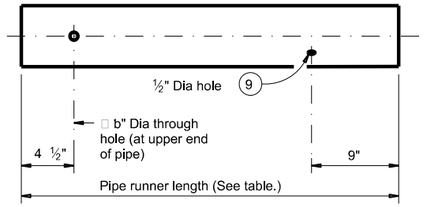


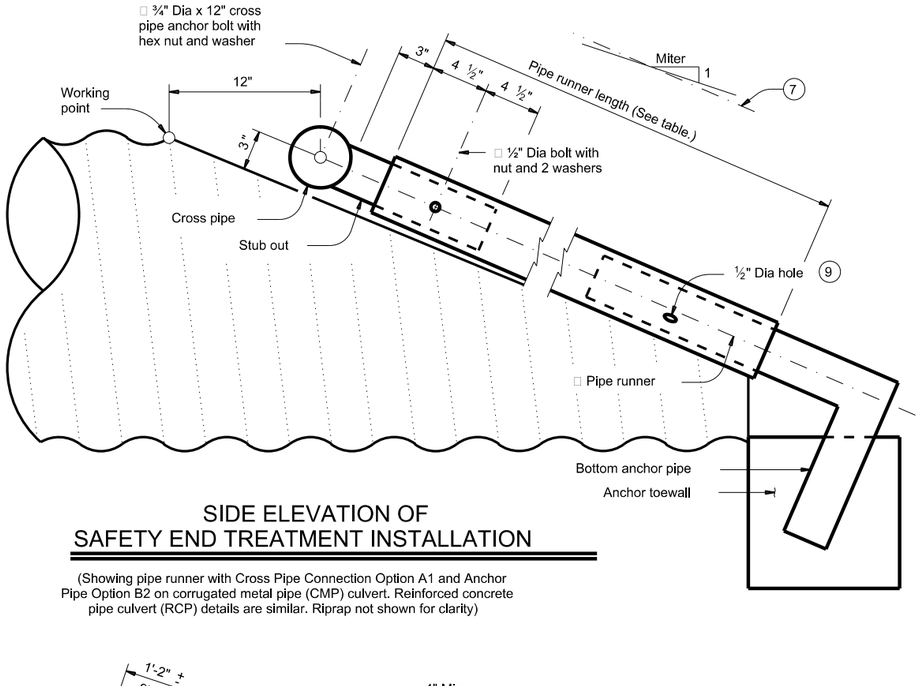
OPTION A1 OPTION A2

CROSS PIPE AND CONNECTIONS DETAILS



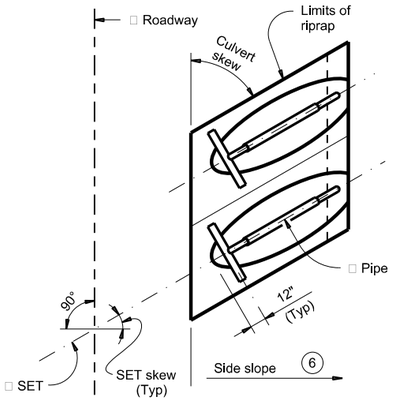
NOTE: The separate pipe runner shown is required when Cross Pipe Connection Option A1 is used.

PIPE RUNNER DETAILS

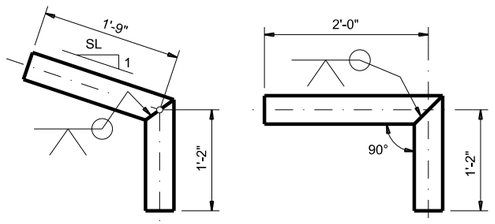


SIDE ELEVATION OF SAFETY END TREATMENT INSTALLATION

(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)

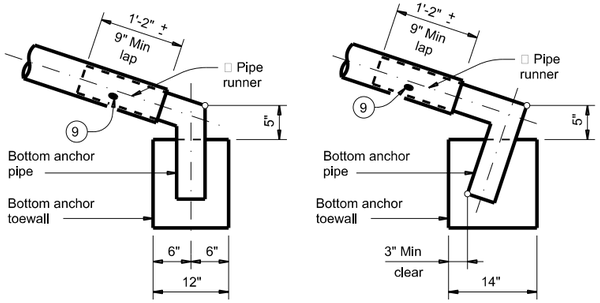


PLAN OF SKEWED INSTALLATION



OPTION B1 OPTION B2

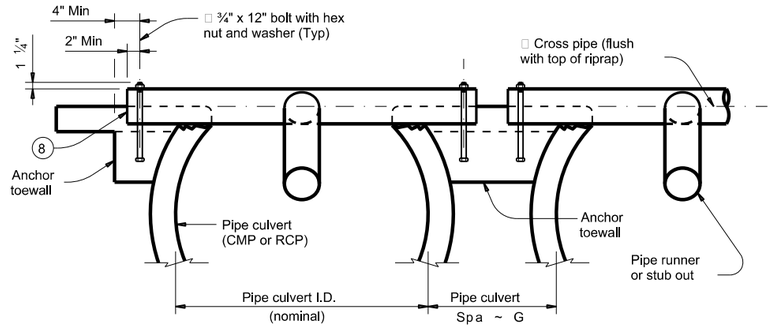
BOTTOM ANCHOR PIPE DETAILS (10)



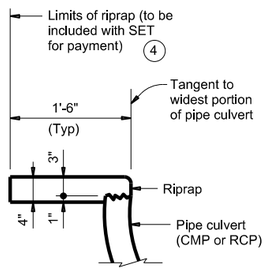
OPTION B1 OPTION B2

BOTTOM ANCHOR TOEWALL DETAILS

(Culvert and riprap not shown for clarity.)



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".

Texas Department of Transportation
Bridge Division Standard

SAFETY END TREATMENT

FOR 12" DIA TO 60" DIA
PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

SETP-CD

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©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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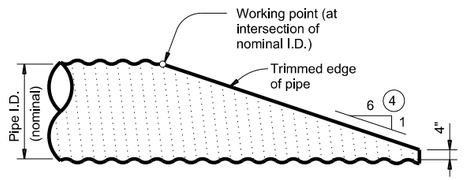
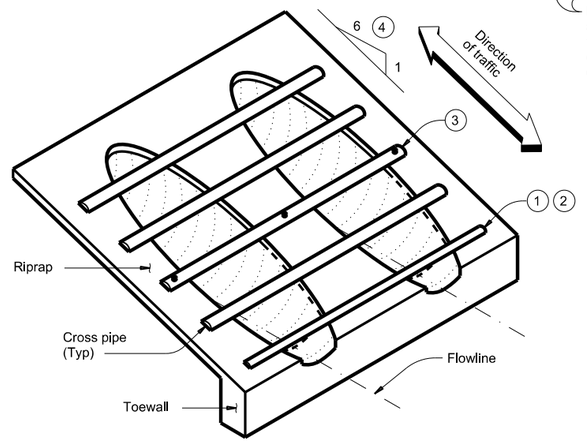


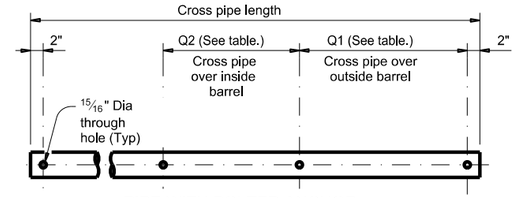
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

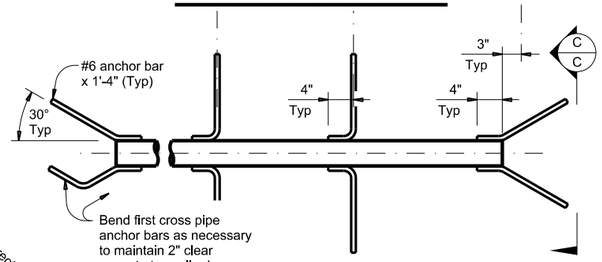
(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)



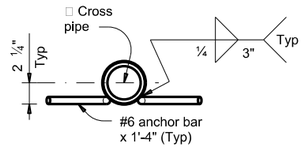
ISOMETRIC VIEW OF TYPICAL INSTALLATION



PIPE WITH BOLTED ANCHOR

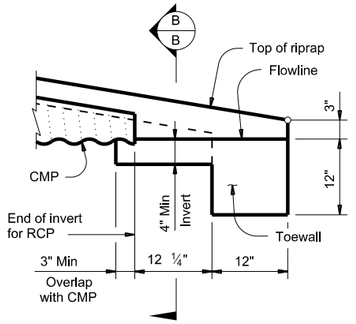


PIPE WITH ANCHOR BARS



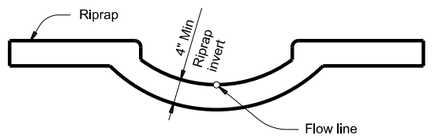
SECTION C-C

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.)

CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, AND RIPRAP QUANTITIES (2)

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"		
27"	1.0	1' - 8"	N/A	3' - 10"	3' - 11"	3 or more pipe culverts	3 1/2" Std (4.000" O.D.)
30"	1.1	1' - 10"	N/A	4' - 2"	4' - 4"	2 or more pipe culverts	
33"	1.2	1' - 11"	4' - 2"	4' - 5"	4' - 8"	All pipe culverts	
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"		

(1) 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.

(2) 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.

(3) 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.

(4) Match cross slope as shown elsewhere in the plans. Cross slope of 6:1 or flatter is required for vehicle safety.

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

(6) 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.

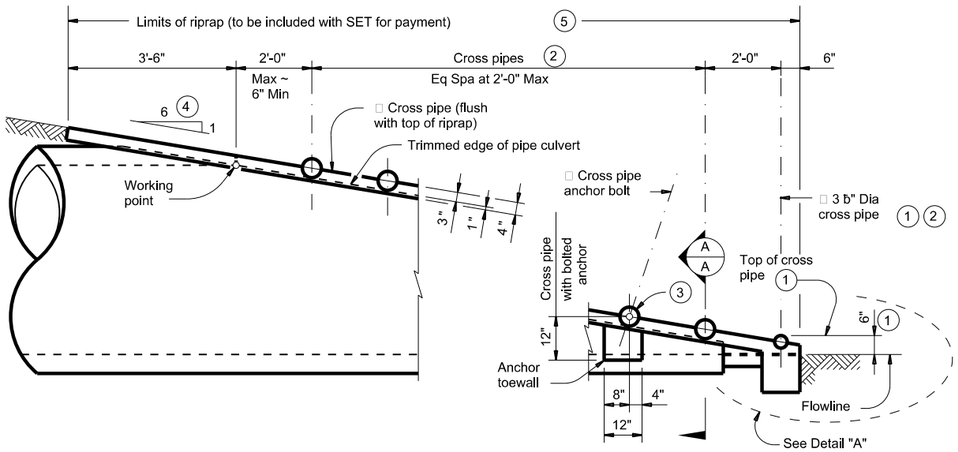
GENERAL NOTES:

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.

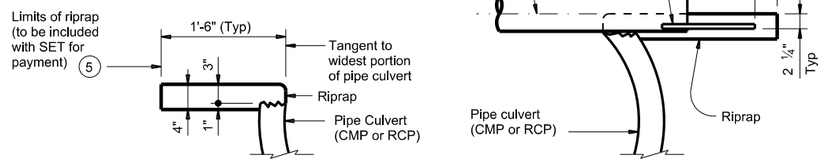
Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.



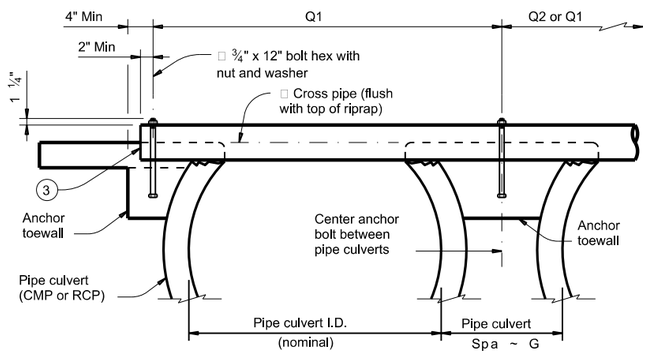
SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

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



SHOWING CROSS PIPE WITH ANCHOR BAR

SHOWING TYPICAL PIPE CULVERT AND RIPRAP



SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

FOR 12" DIA TO 72" DIA PIPE CULVERTS
TYPE II ~ PARALLEL DRAINAGE

SETP-PD

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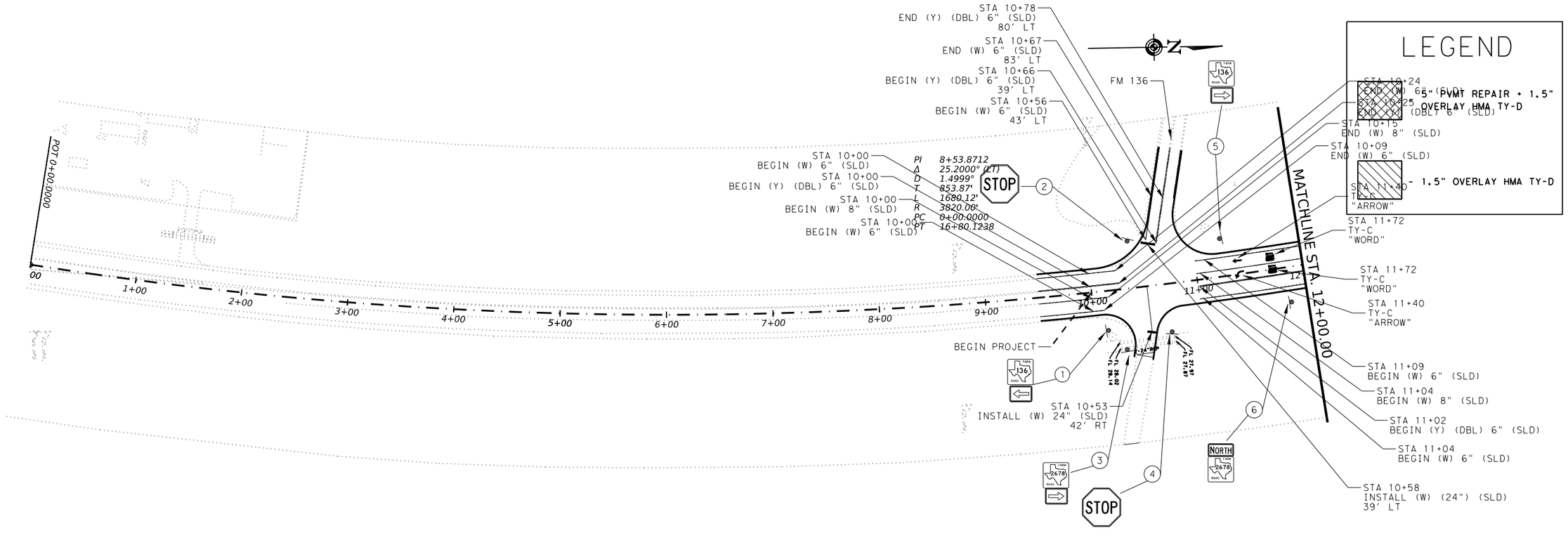

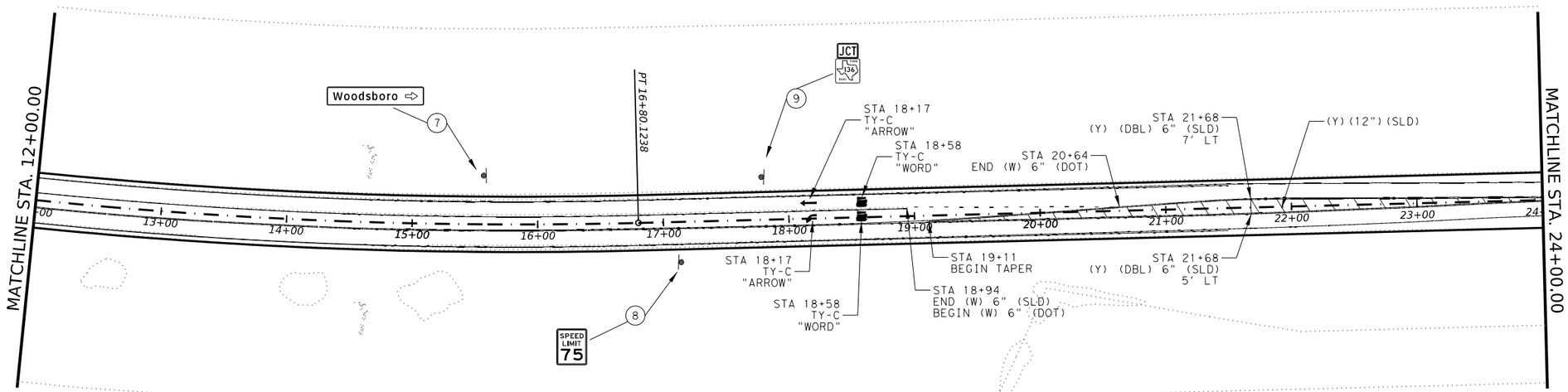

STATE OF TEXAS
ERIC R MARTINEZ
125657
LICENSED PROFESSIONAL ENGINEER

10/13/2023

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TRAFFIC LAYOUTS

SHEET 1 OF 22

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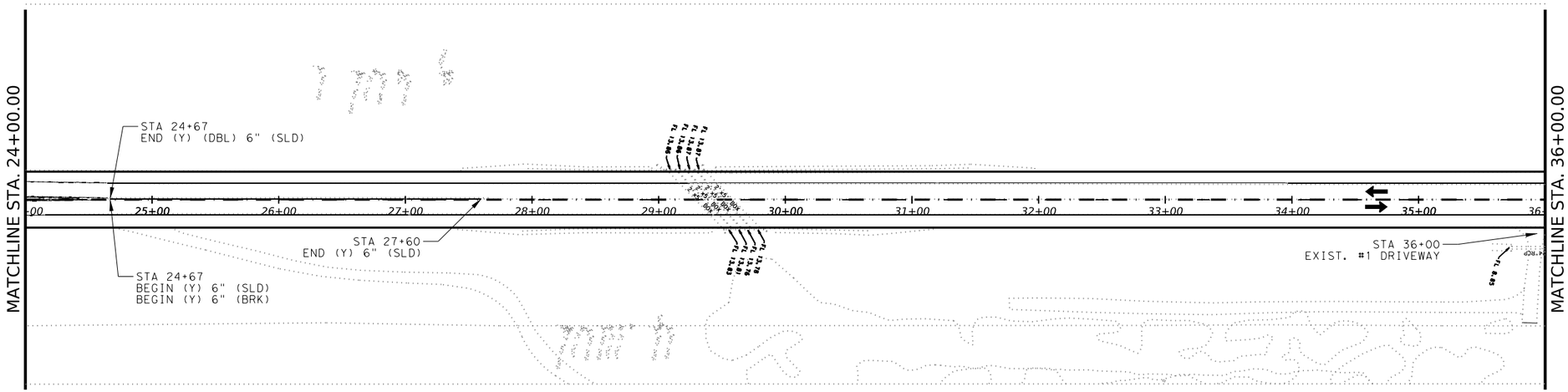

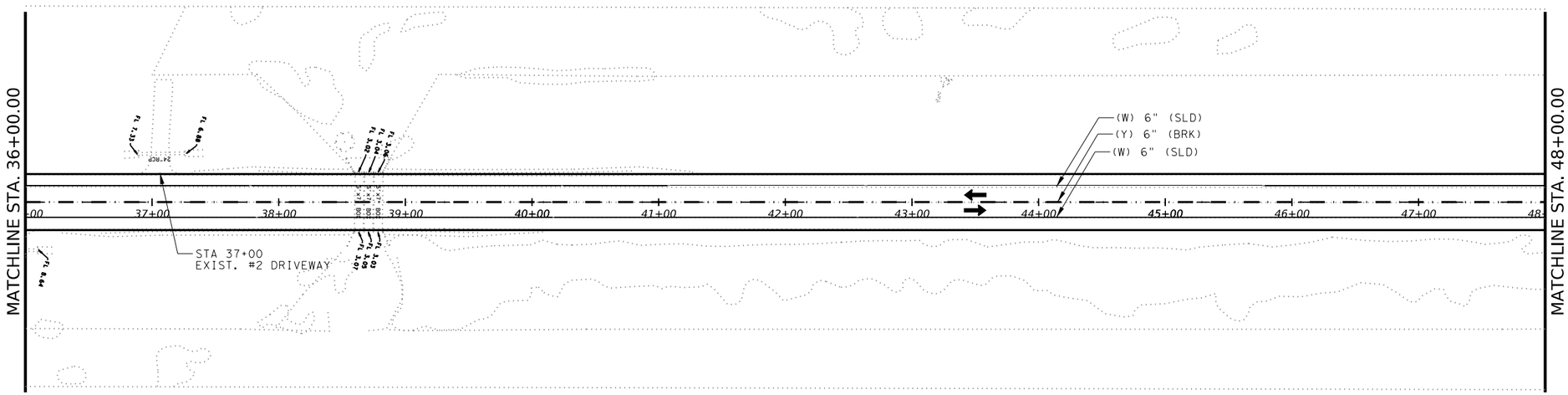

LEGEND

- 5" PVMT REPAIR + 1.5" OVERLAY HMA TY-D
- 1.5" OVERLAY HMA TY-D

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TRAFFIC LAYOUTS

SHEET 2 OF 22

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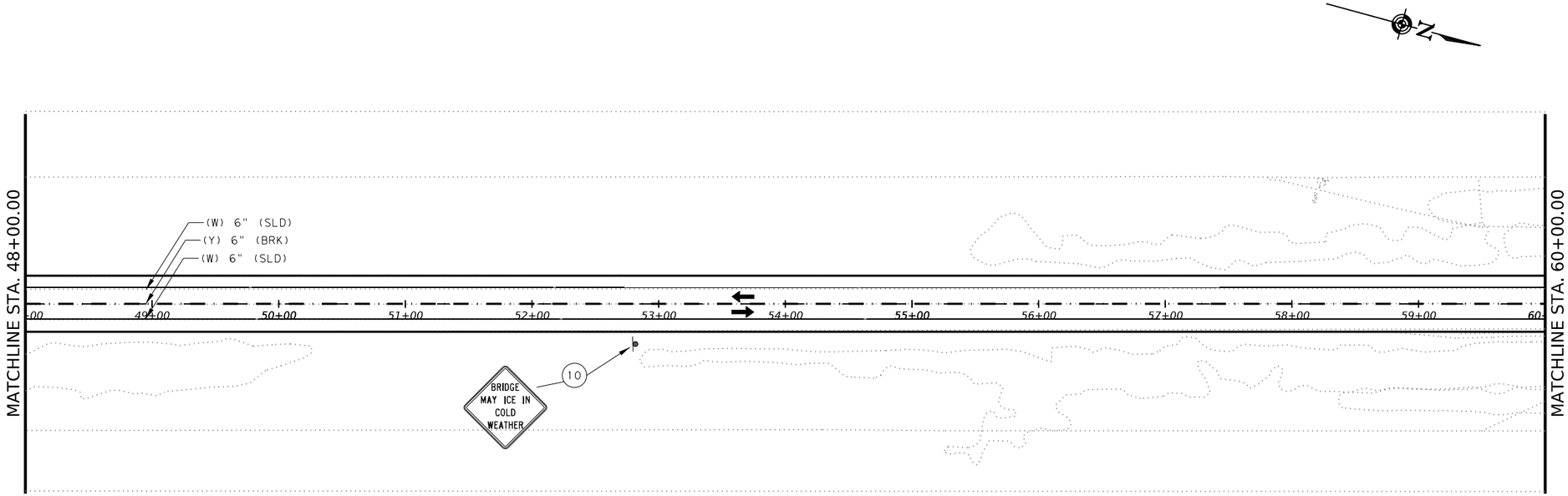

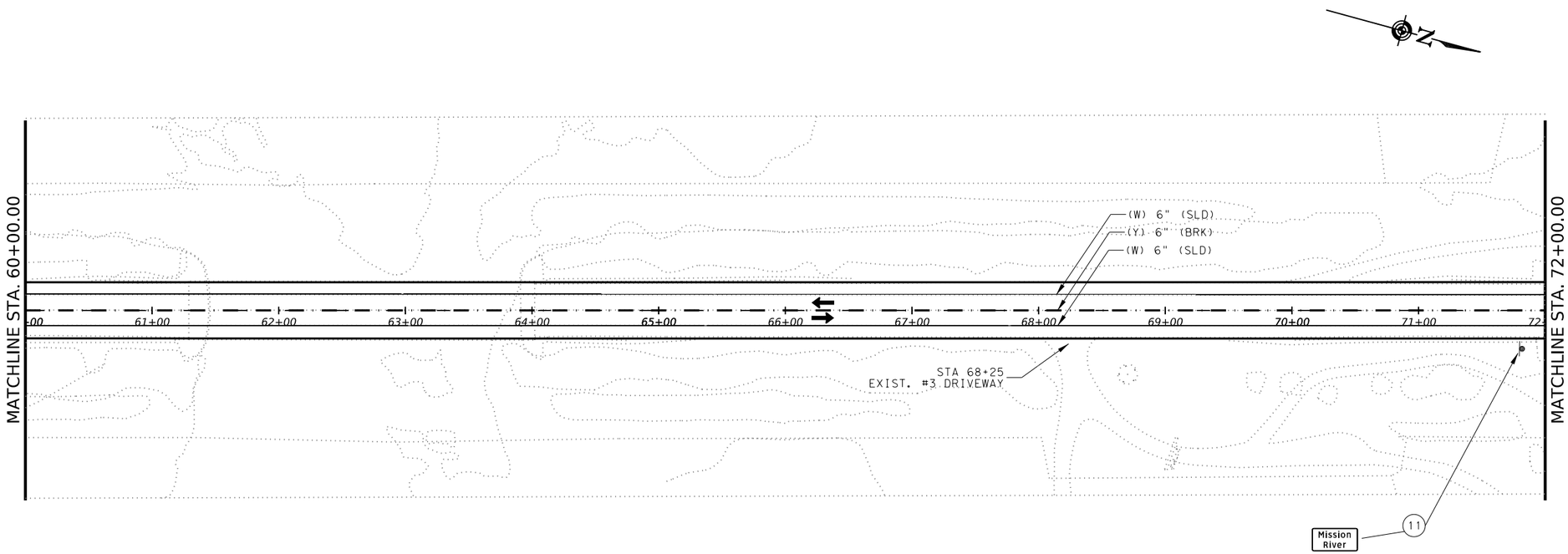

LEGEND

- 5" PVMT REPAIR + 1.5" OVERLAY HMA TY-D
- 1.5" OVERLAY HMA TY-D

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10/13/2023

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TRAFFIC LAYOUTS

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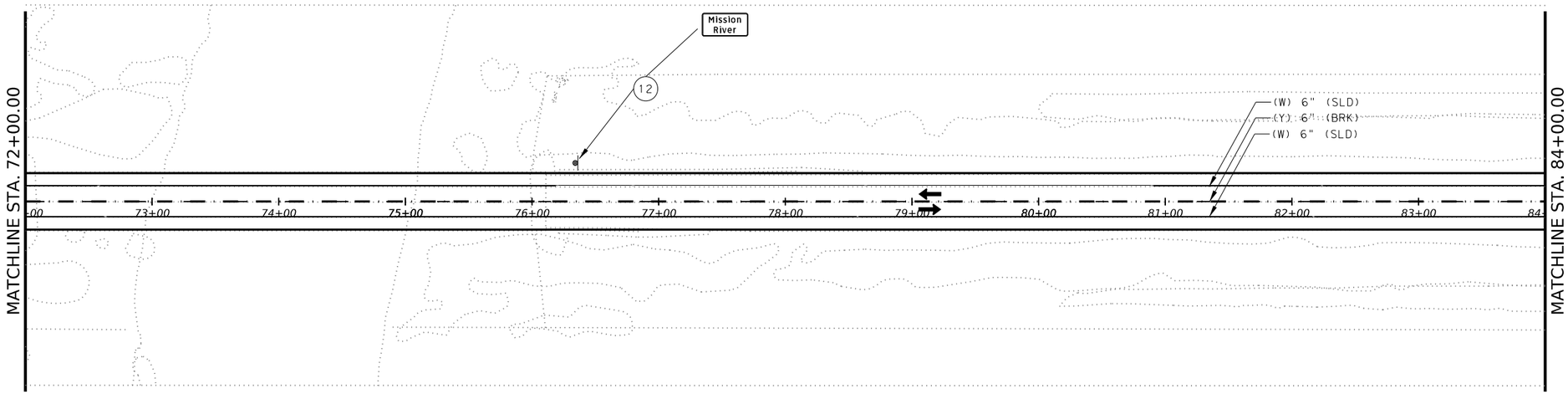

LEGEND

- 5" PVMT REPAIR + 1.5" OVERLAY HMA TY-D
- 1.5" OVERLAY HMA TY-D

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TRAFFIC LAYOUTS

SHEET 4 OF 22

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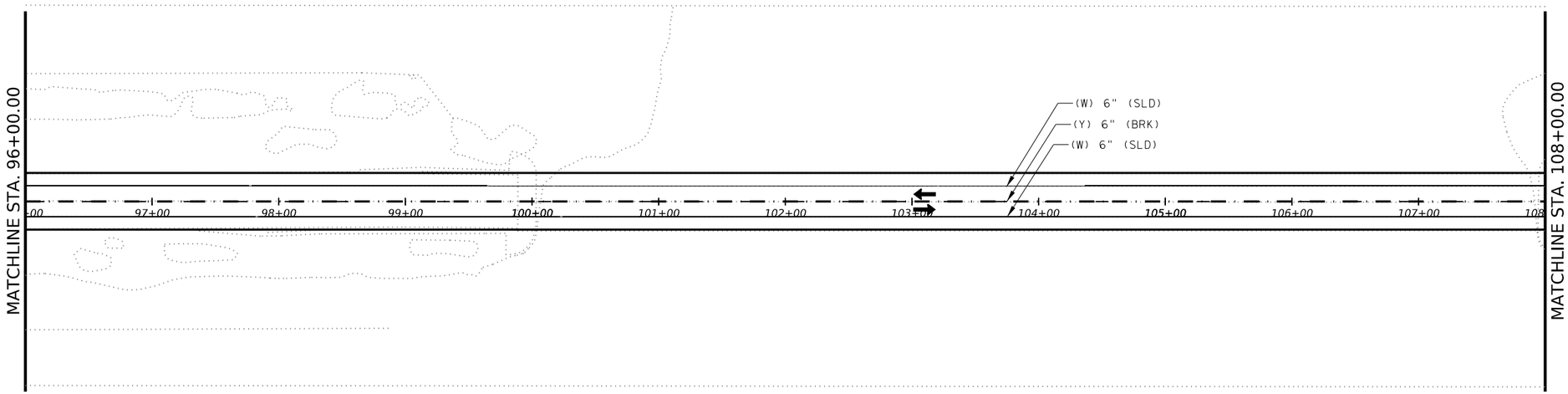

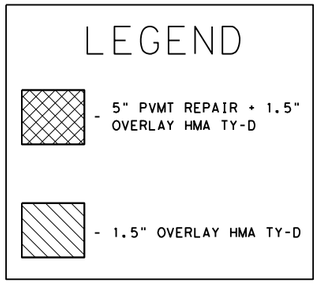

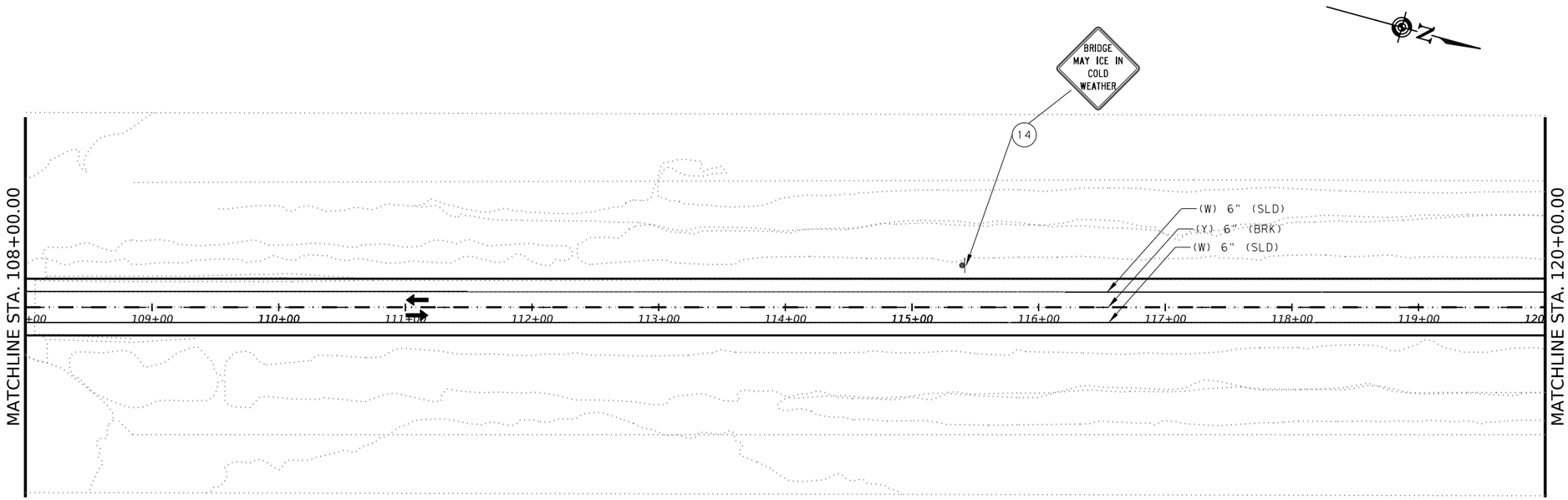

10/13/2023

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FM 2678

TRAFFIC LAYOUTS

SHEET 5 OF 22

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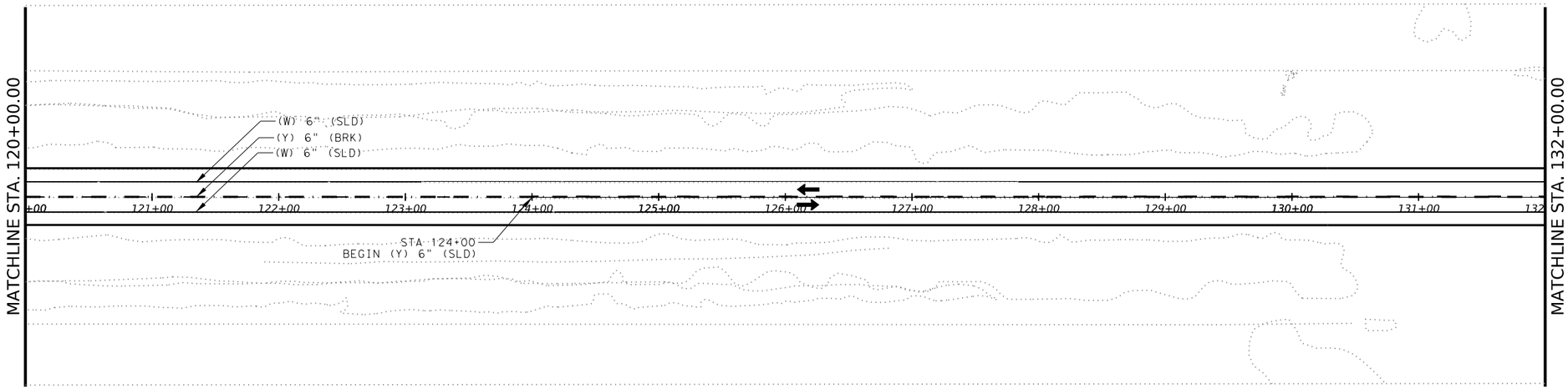

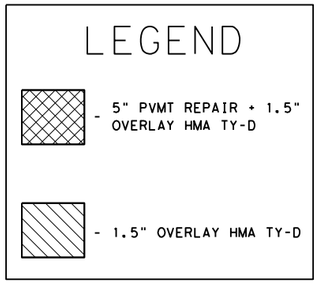

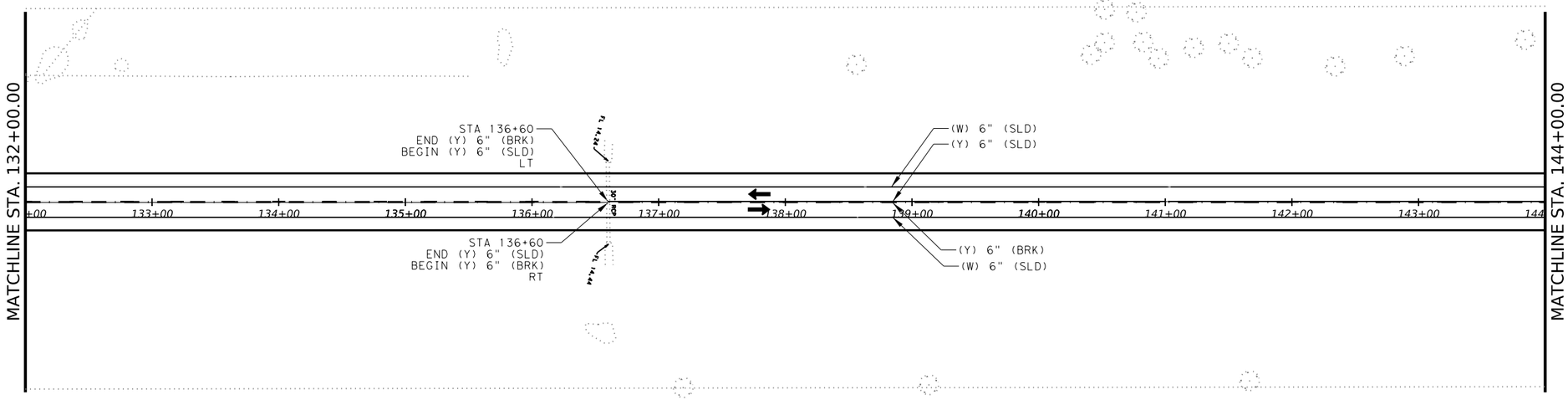

10/13/2023

Texas Department of Transportation

FM 2678

TRAFFIC LAYOUTS

SHEET 6 OF 22

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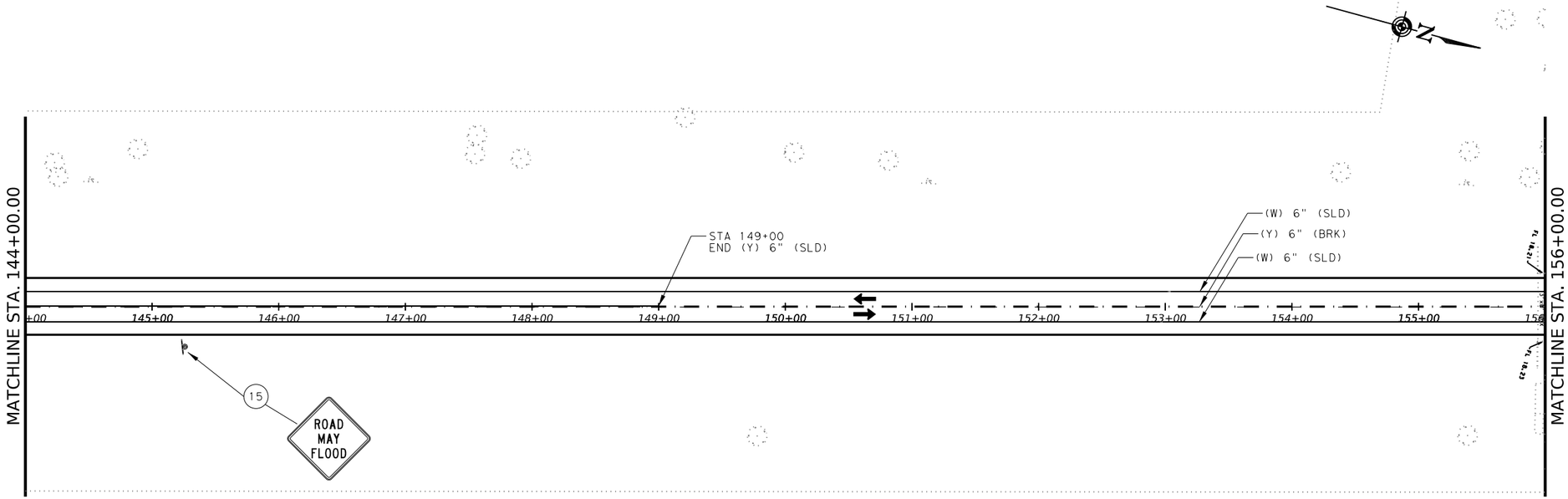

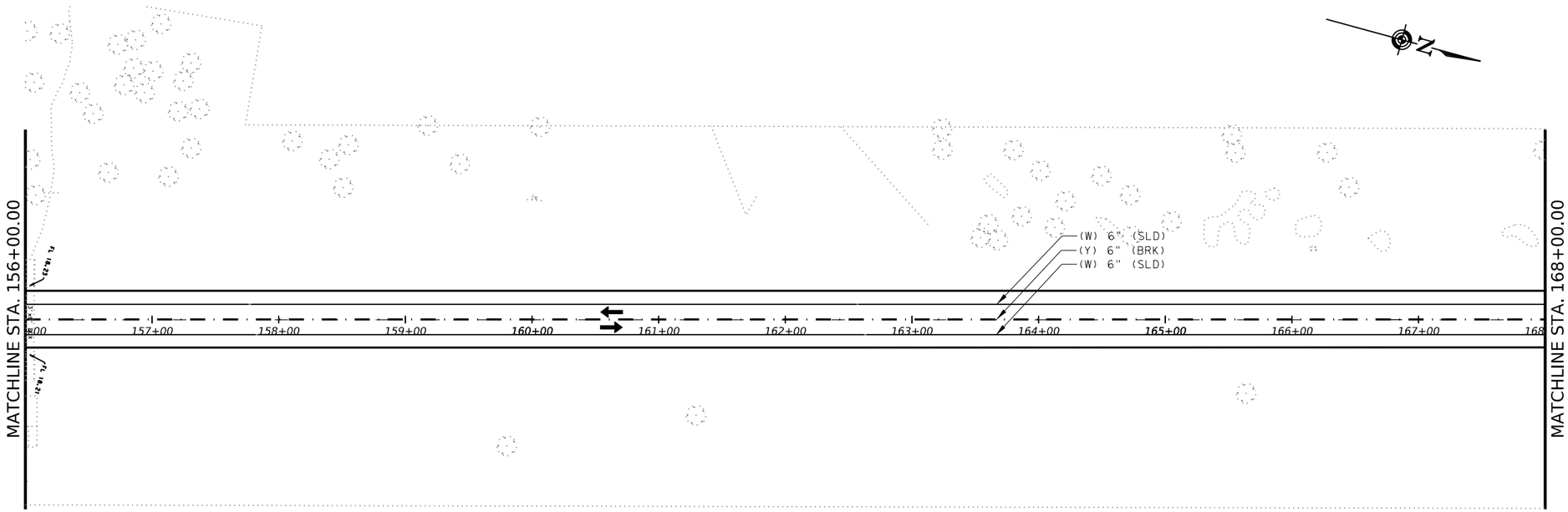

LEGEND

- 5" PVMT REPAIR + 1.5" OVERLAY HMA TY-D
- 1.5" OVERLAY HMA TY-D

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TRAFFIC LAYOUTS

SHEET 7 OF 22

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DATE: 09/30/2023 03:01 PM
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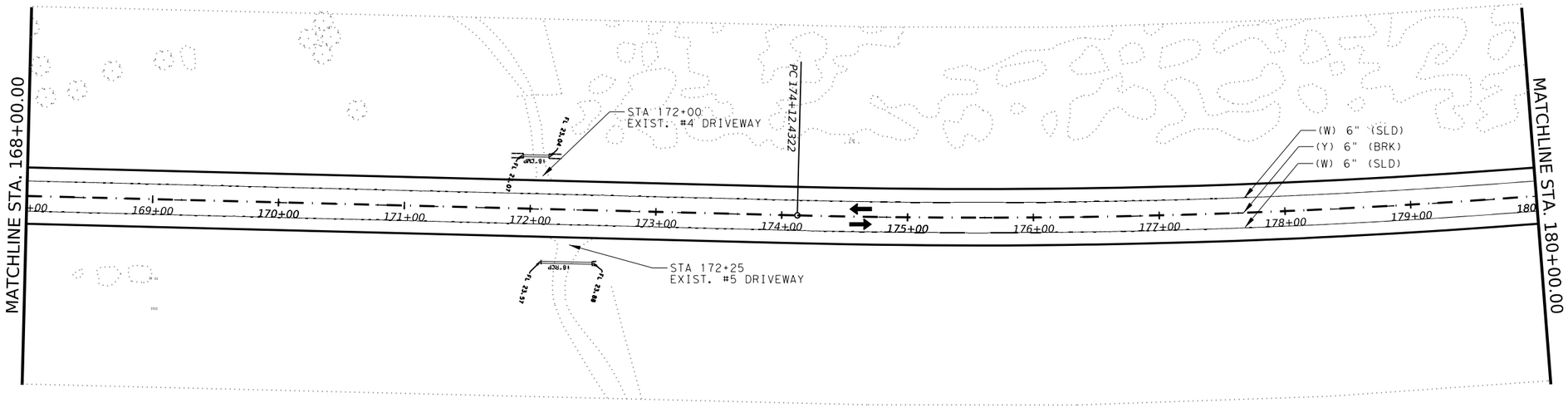

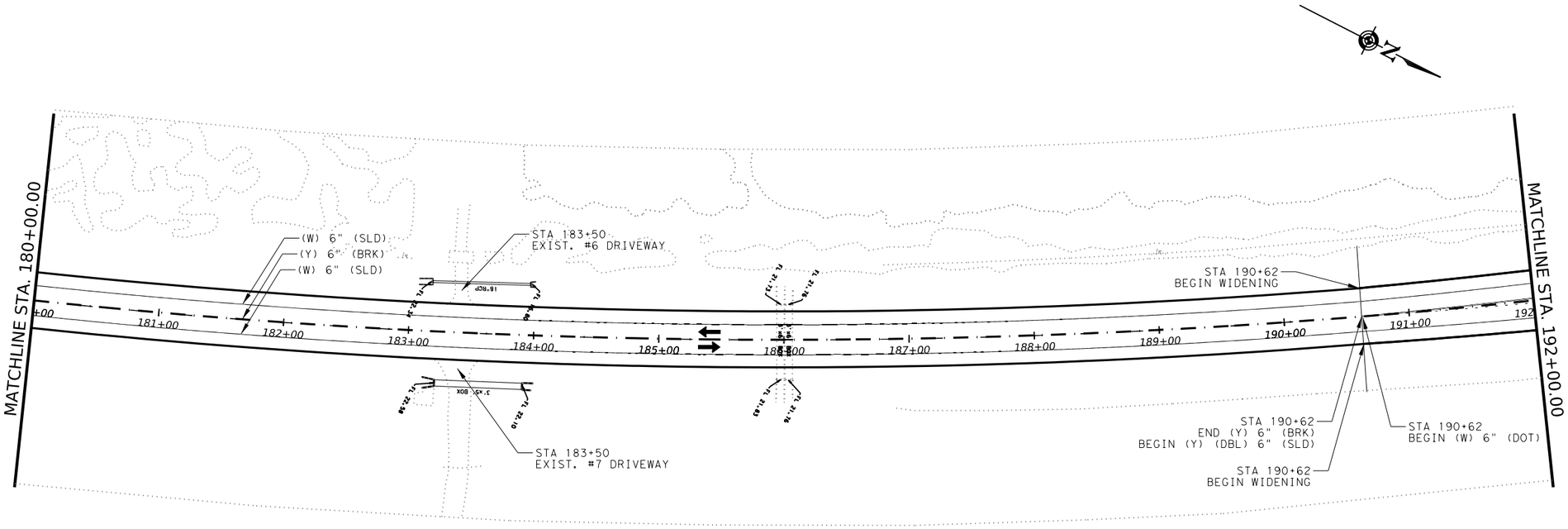

LEGEND

- 5" PVMT REPAIR + 1.5" OVERLAY HMA TY-D
- 1.5" OVERLAY HMA TY-D

STATE OF TEXAS
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125657
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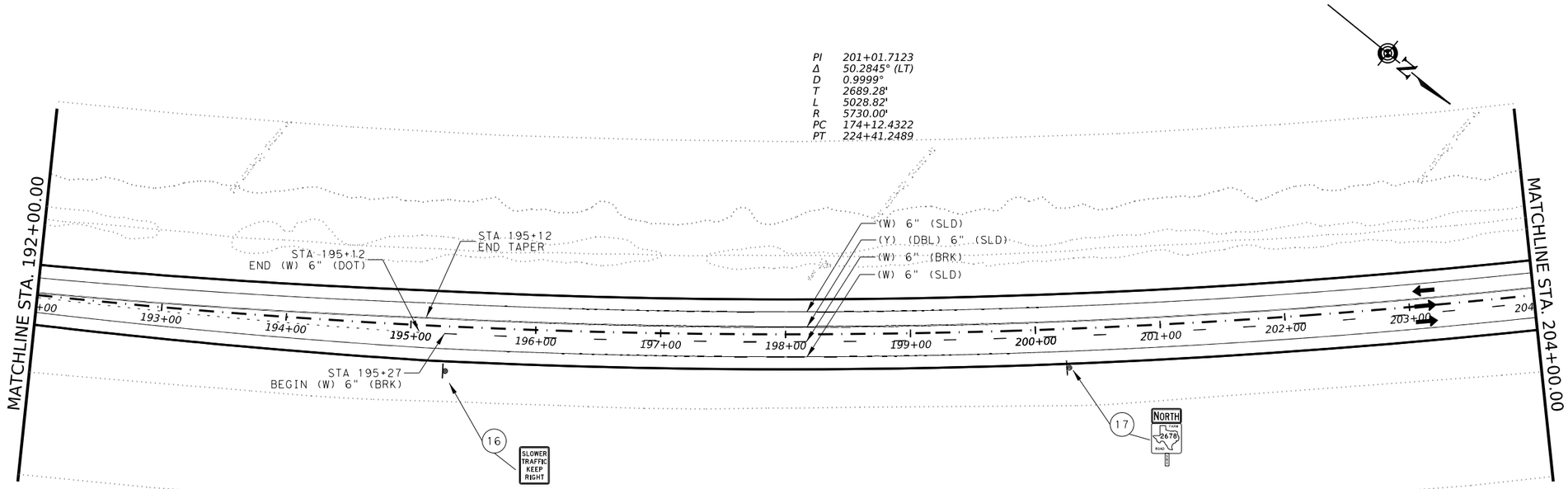
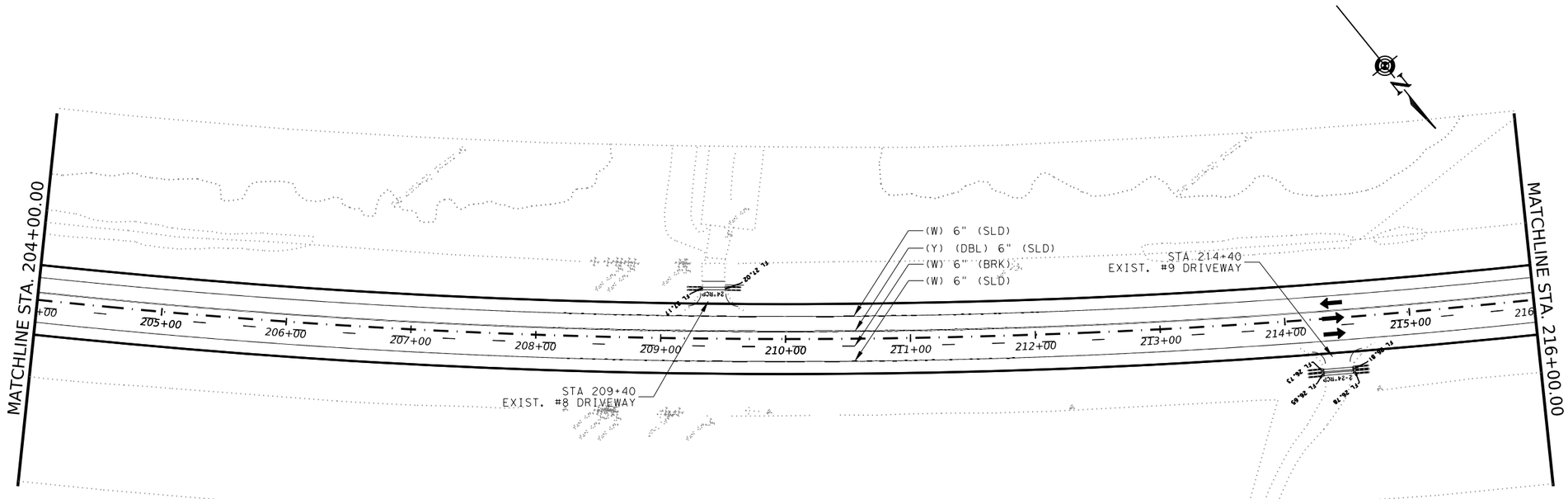
TRAFFIC LAYOUTS

SHEET 8 OF 22

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		123

DATE: 09/30/2023 03:02 PM
FILE:





LEGEND

- 5" PVMT REPAIR + 1.5" OVERLAY HMA TY-D
- 1.5" OVERLAY HMA TY-D

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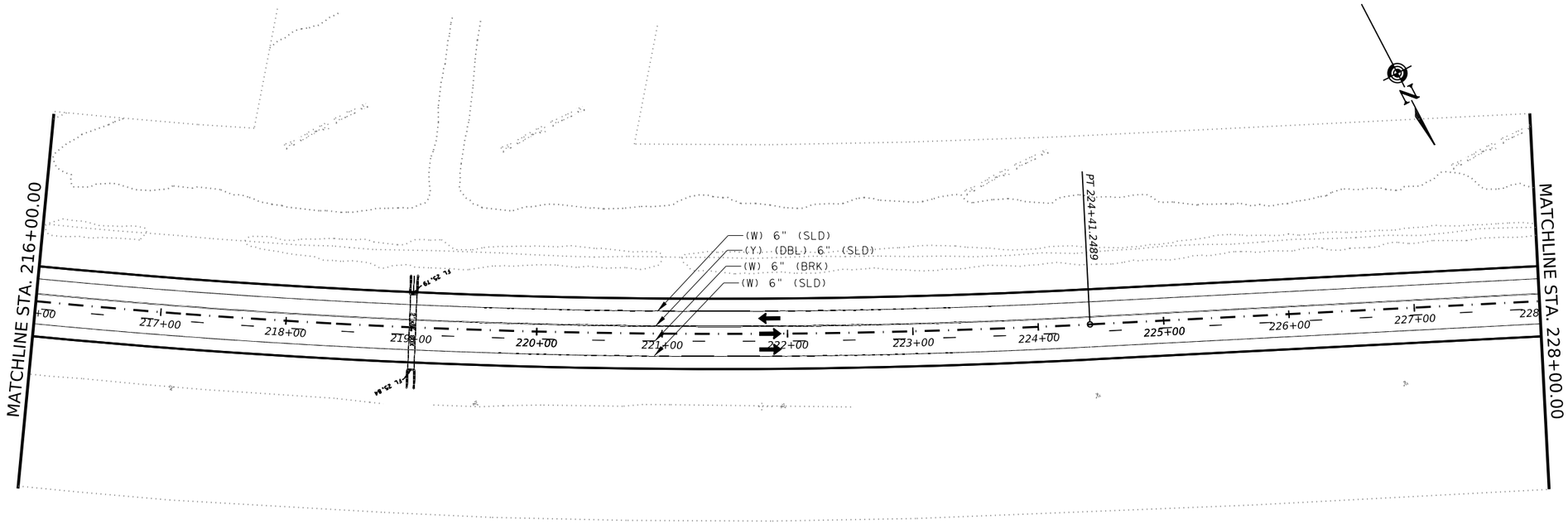
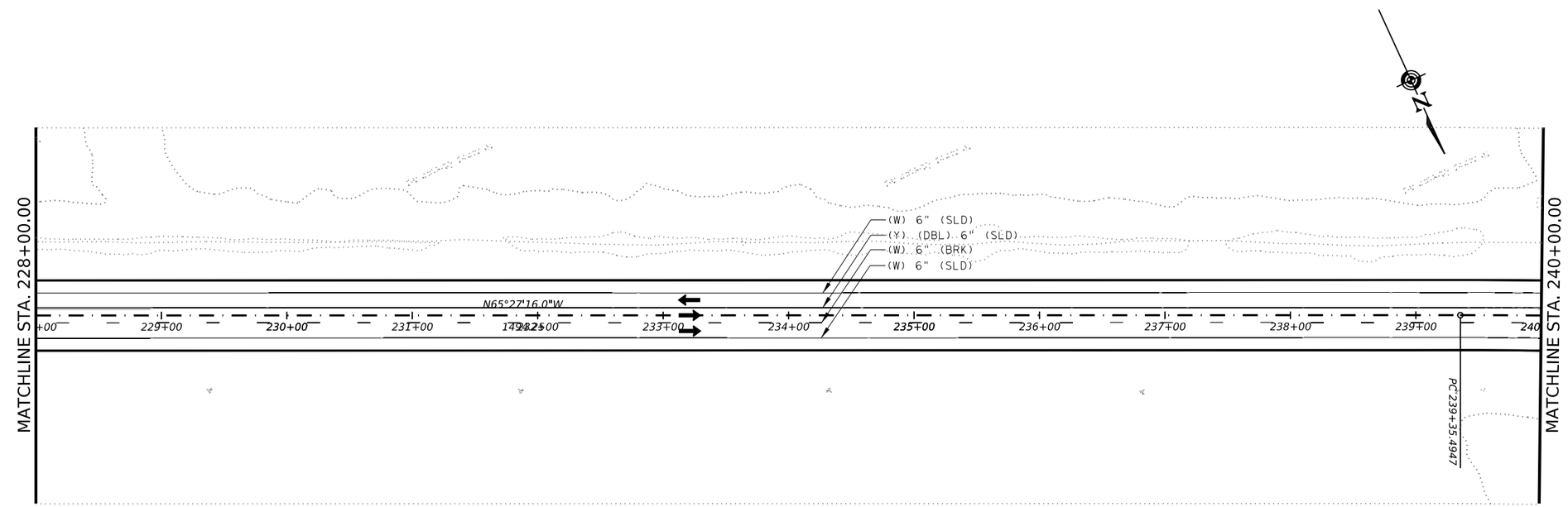
TRAFFIC LAYOUTS

SHEET 9 OF 22

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		124

DATE: 09/30/2023 03:04 PM
FILE:





LEGEND

- 5" PVMT REPAIR + 1.5" OVERLAY HMA TY-D
- 1.5" OVERLAY HMA TY-D

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TRAFFIC LAYOUTS

SHEET 10 OF 22

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		125

DATE: 10/12/2023 06:10 PM
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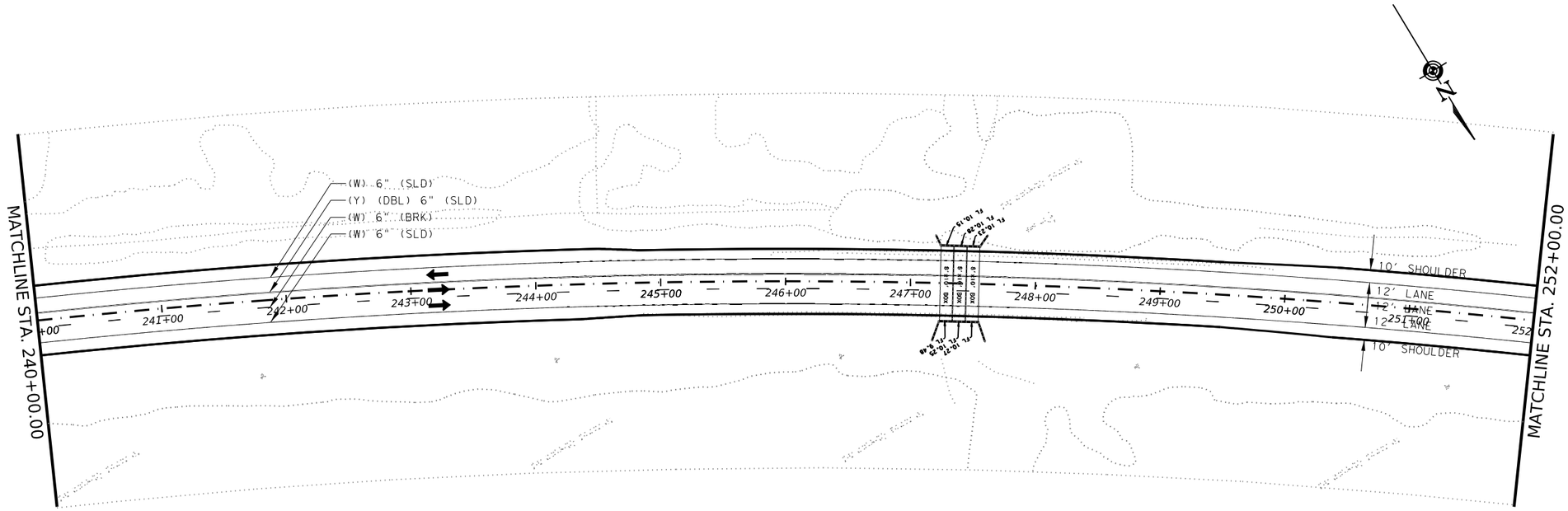

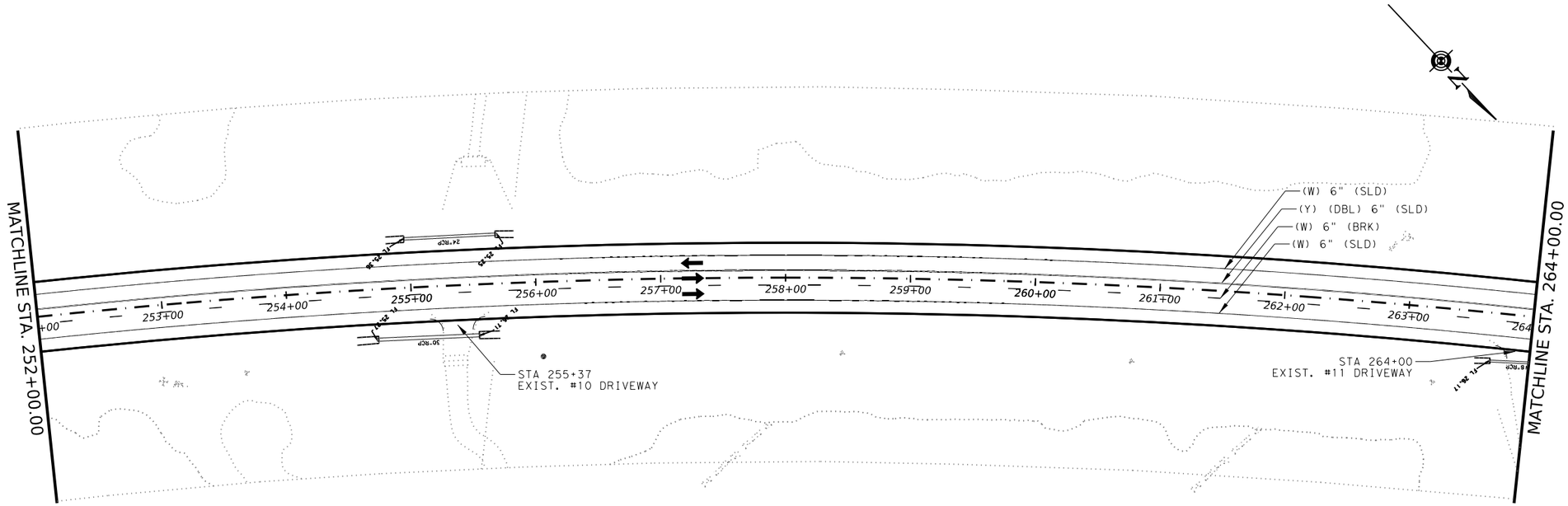

PI 259+08.8046
Δ 38.0056° (RT)
D 0.9999°
T 1973.31'
L 3800.84'

LEGEND

- 5" PVMT REPAIR + 1.5" OVERLAY HMA TY-D
- 1.5" OVERLAY HMA TY-D

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TRAFFIC LAYOUTS

SHEET 11 OF 22

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		126

DATE: 10/12/2023 06:11 PM
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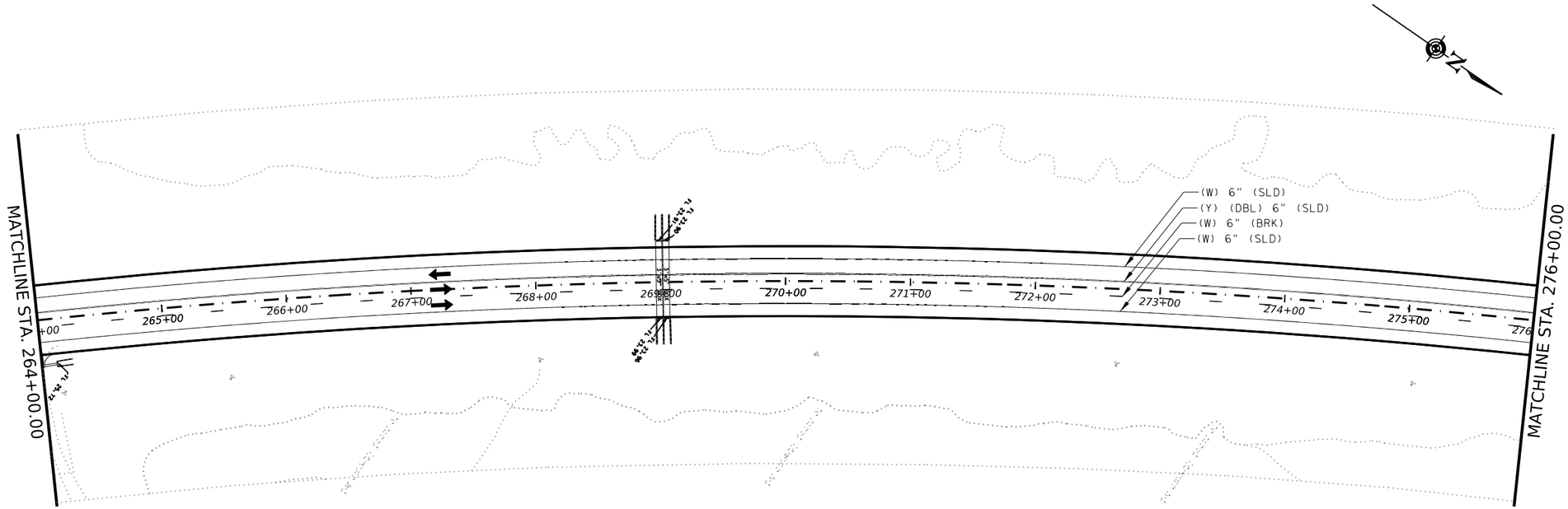

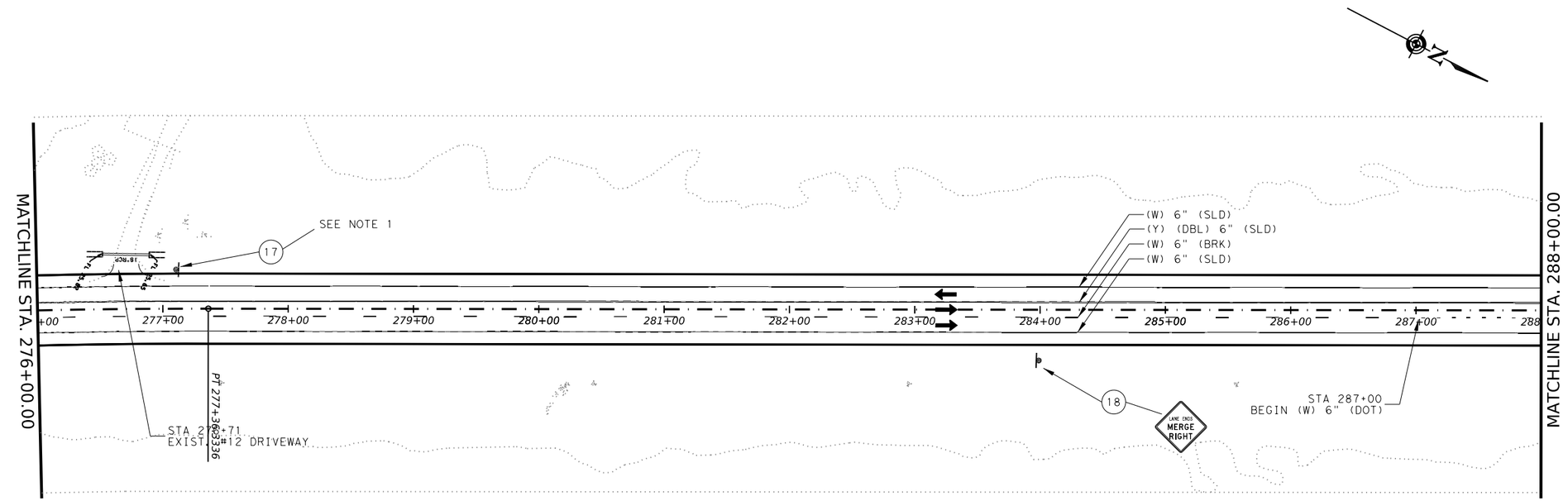

LEGEND

- 5" PVMT REPAIR + 1.5" OVERLAY HMA TY-D
- 1.5" OVERLAY HMA TY-D

NOTES:
1. TEXAS COASTAL BIRDING TRAIL SIGN TO BE PROVIDED BY TXDOT. CONTRACTOR SHALL COORDINATE WITH TXDOT TRAFFIC ENGINEERING DEPARTMENT FOR ORDERING OF SIGN.

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TRAFFIC LAYOUTS

SHEET 12 OF 22

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		127

DATE: 10/03/2023 06:47 PM
FILE:

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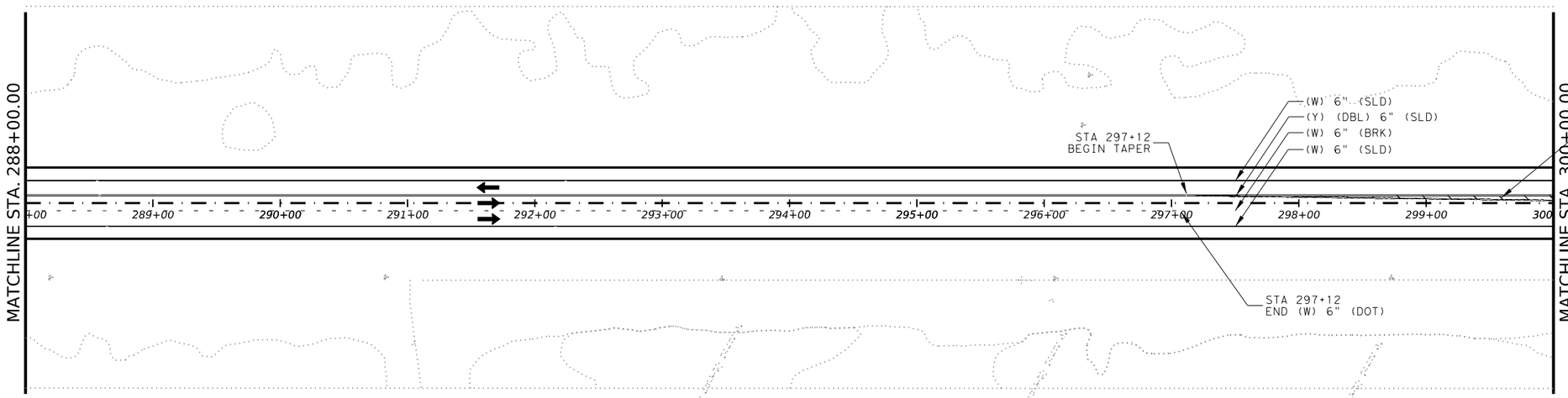
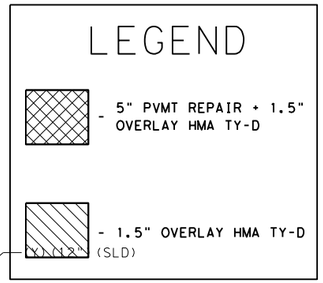
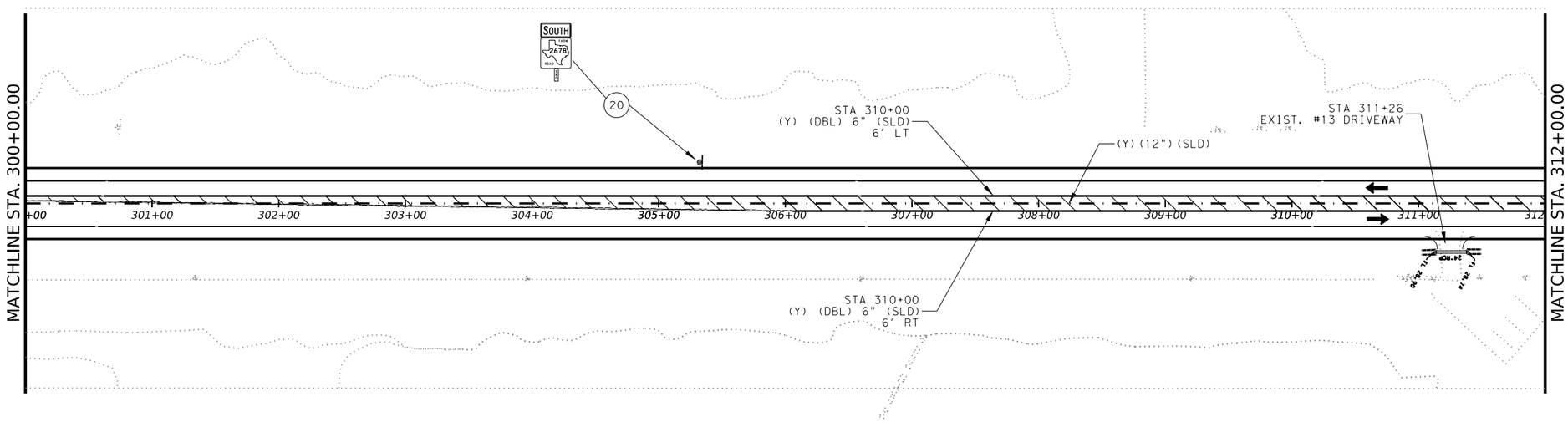
DW:
CK:
DW:







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Texas Department of Transportation

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TRAFFIC LAYOUTS

SHEET 13 OF 22

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		128

DATE: 10/12/2023 06:14 PM
FILE:

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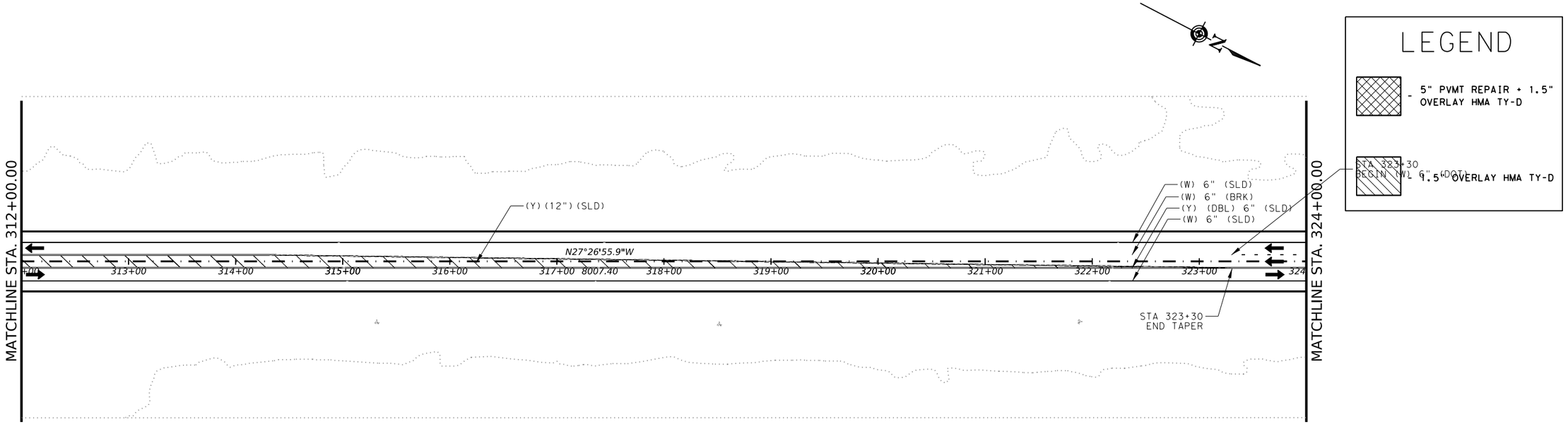
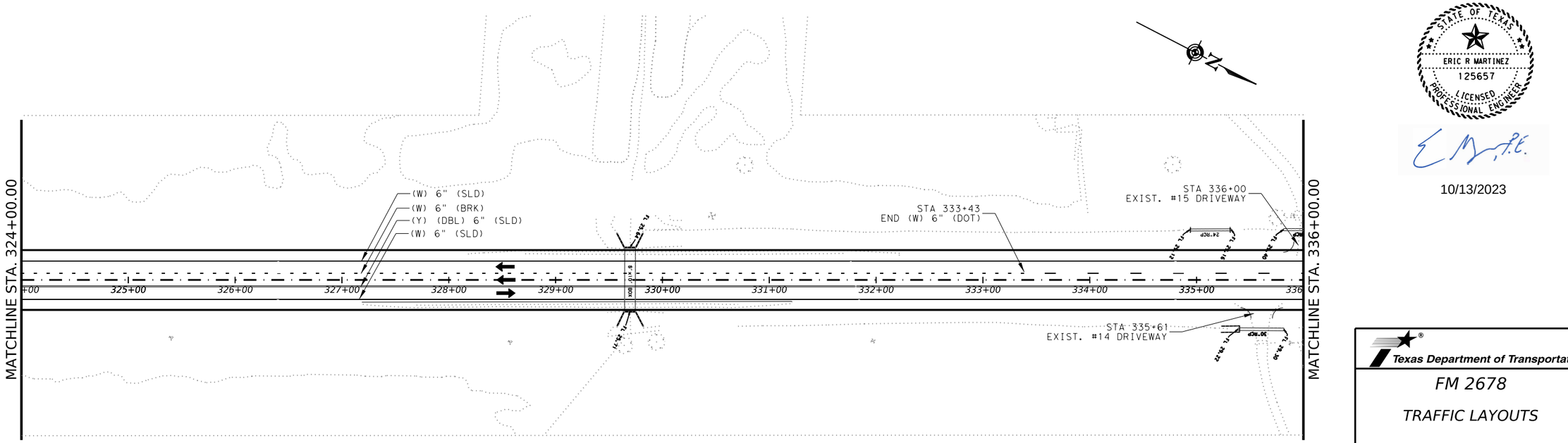
CK:
DW:





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10/13/2023

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TRAFFIC LAYOUTS

SHEET 14 OF 22

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		129

DATE: 09/30/2023 02:44 PM
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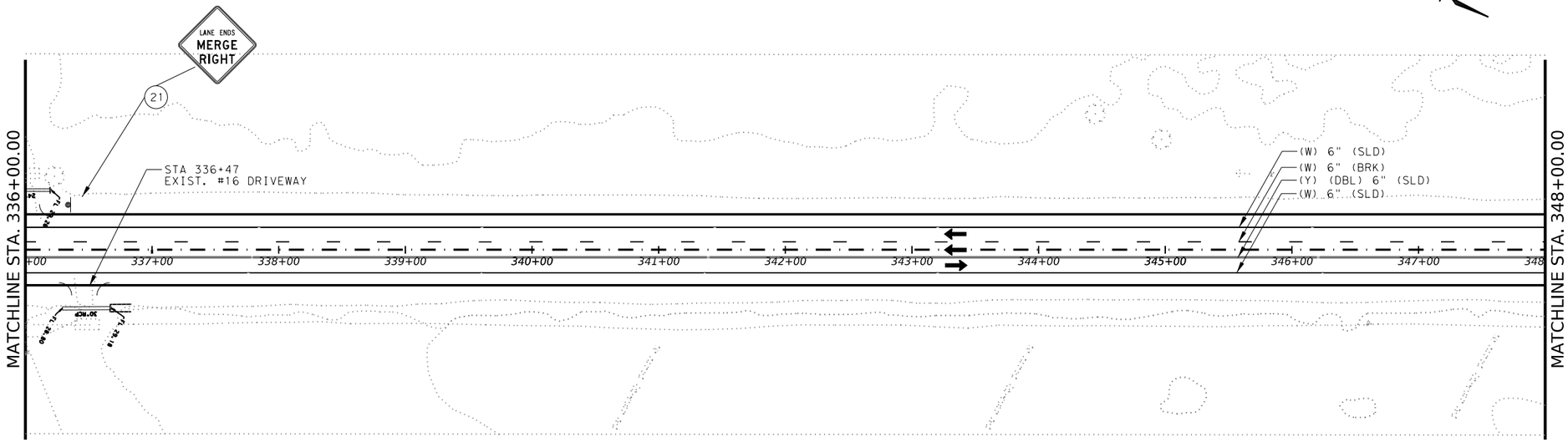

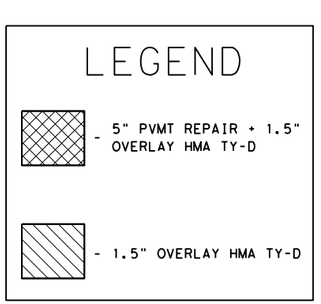

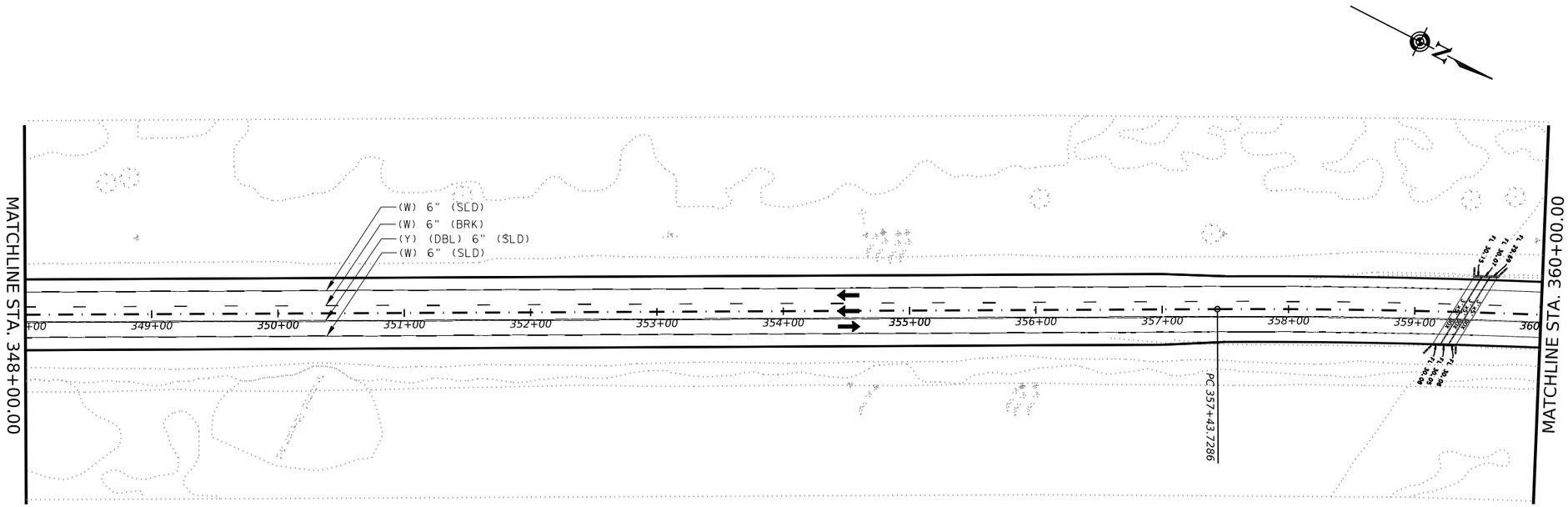

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TRAFFIC LAYOUTS

SHEET 15 OF 22

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		130

DATE: 09/30/2023 02:46 PM
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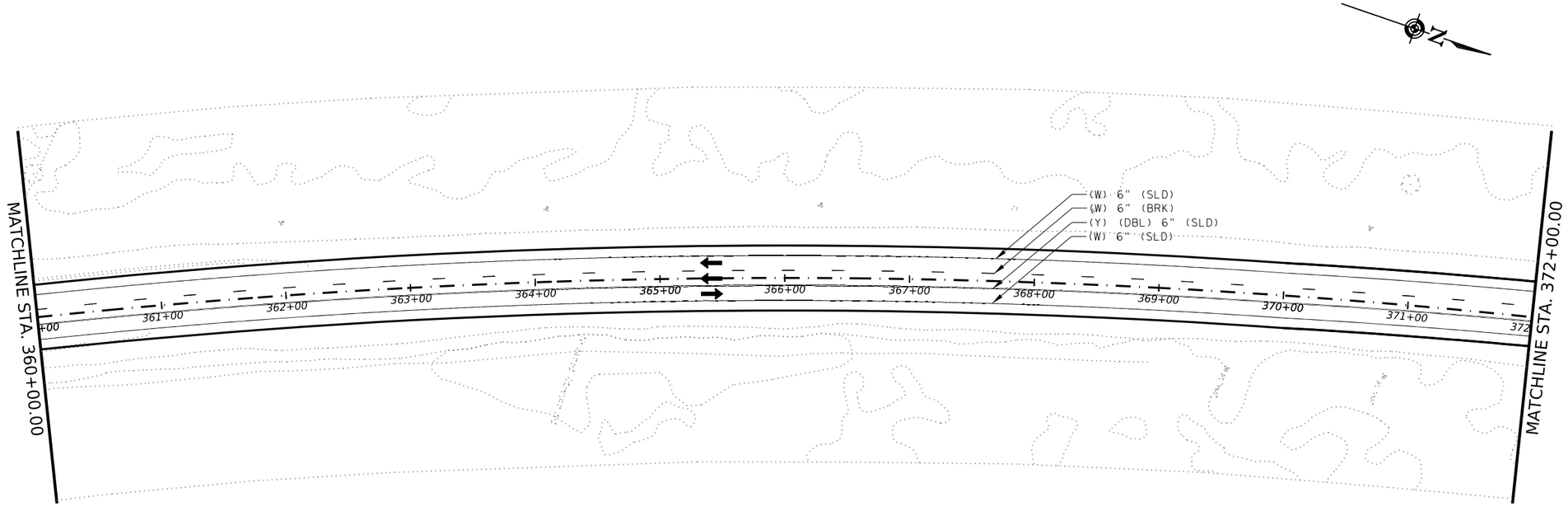
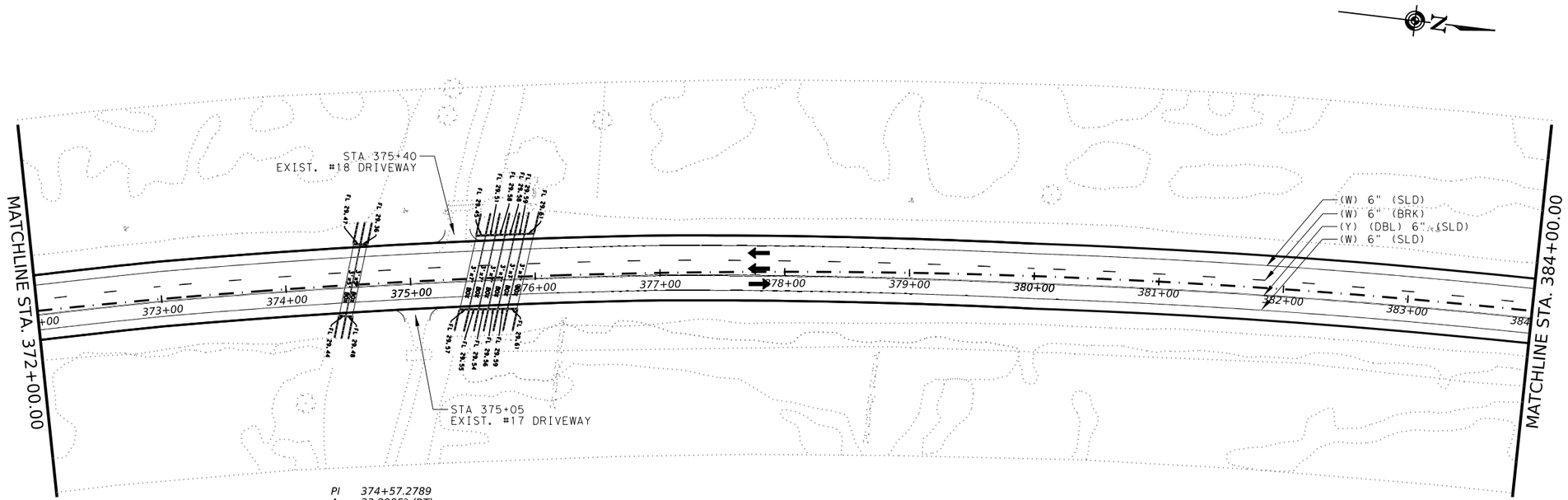
DW:
CK:
DW:



LEGEND

- 5" PVMT REPAIR + 1.5" OVERLAY HMA TY-D
- 1.5" OVERLAY HMA TY-D



PI 374+57.2789
Δ 33.2985° (RT)
D 0.9999°
T 1713.55'
L 3330.09'
R 5730.00'
PC 357+43.7286
PT 390+73.8214

STATE OF TEXAS
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TRAFFIC LAYOUTS

SHEET 16 OF 22

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		131

DATE: 09/30/2023 02:47 PM
FILE:

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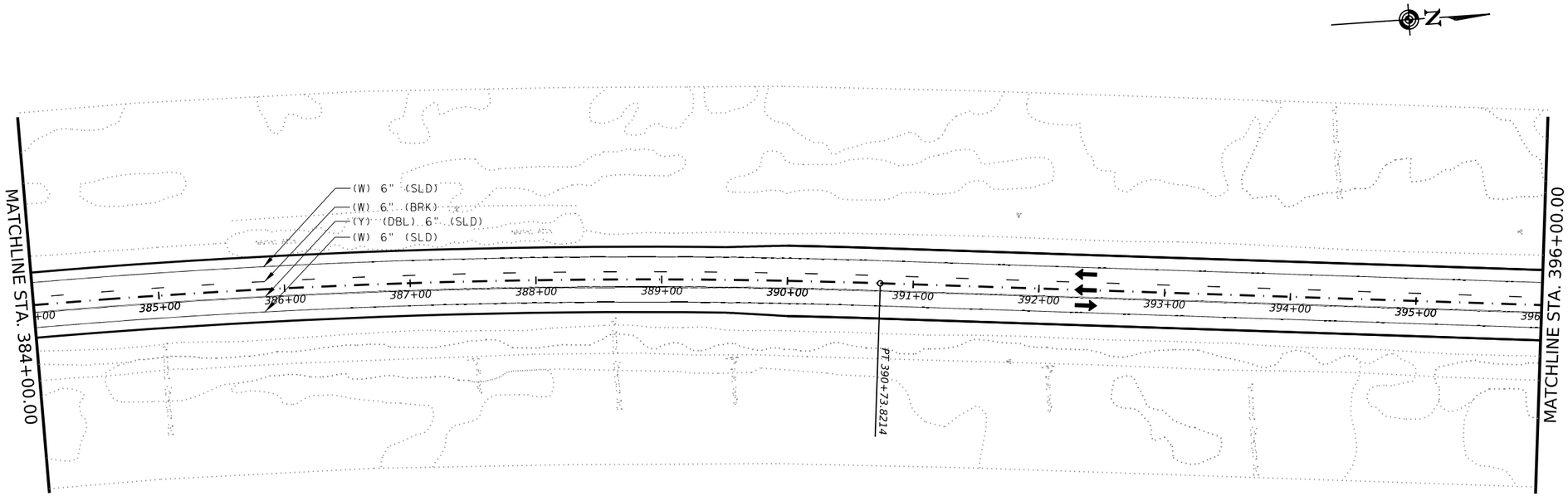
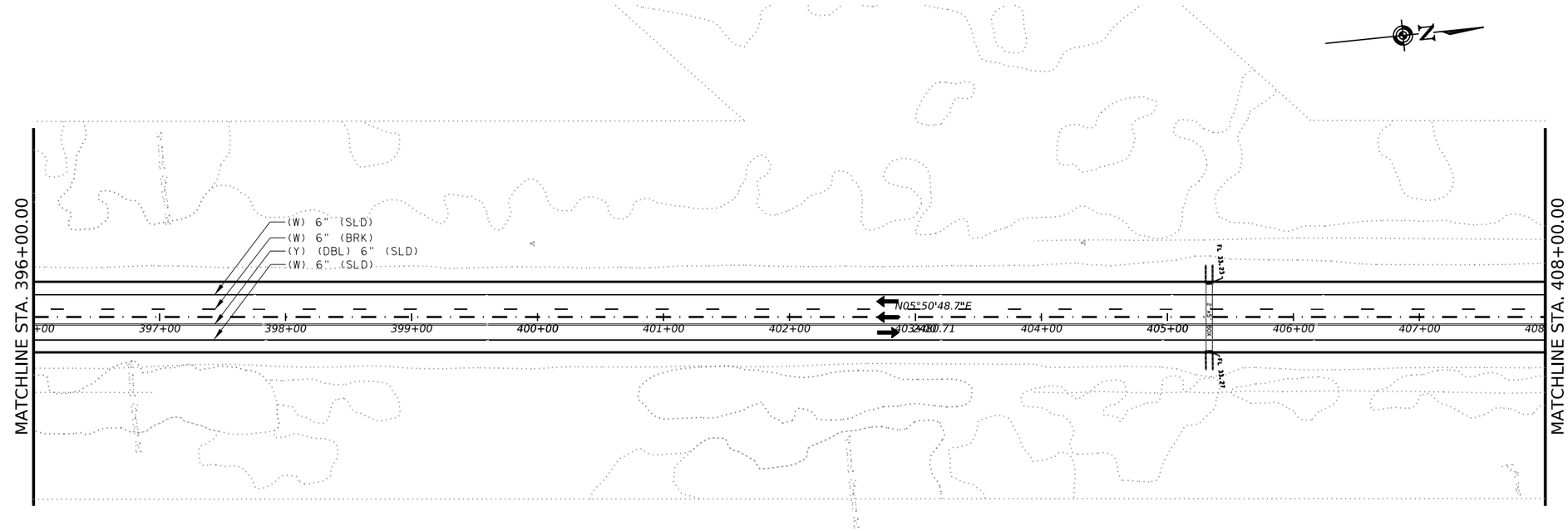
DW:
CK:
DW:





LEGEND

- 5" PVMT REPAIR + 1.5" OVERLAY HMA TY-D
- 1.5" OVERLAY HMA TY-D

STATE OF TEXAS
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TRAFFIC LAYOUTS

SHEET 17 OF 22

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		132

DATE: 09/30/2023 02:48 PM
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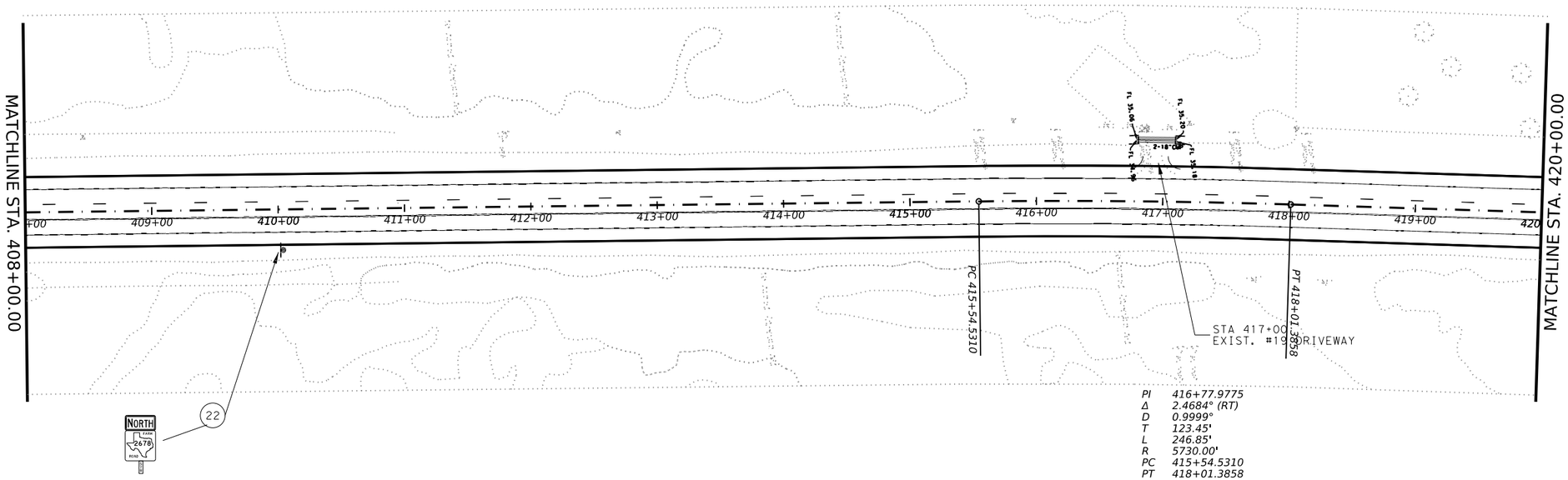

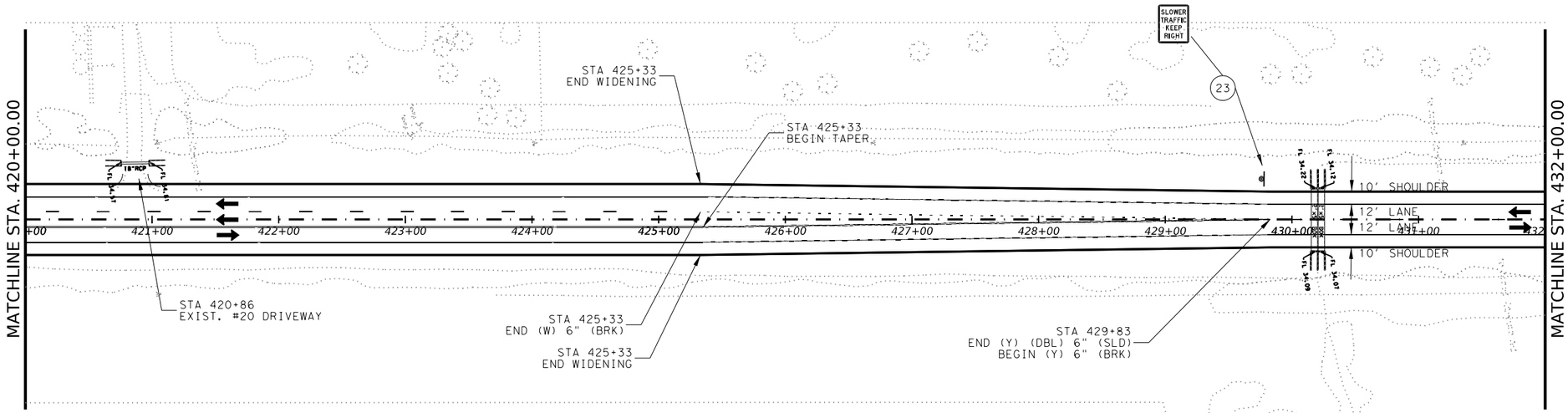

LEGEND

- 5" PVMT REPAIR + 1.5" OVERLAY HMA TY-D
- 1.5" OVERLAY HMA TY-D

STATE OF TEXAS
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TRAFFIC LAYOUTS

SHEET 18 OF 22

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		133

DATE: 09/30/2023 02:49 PM
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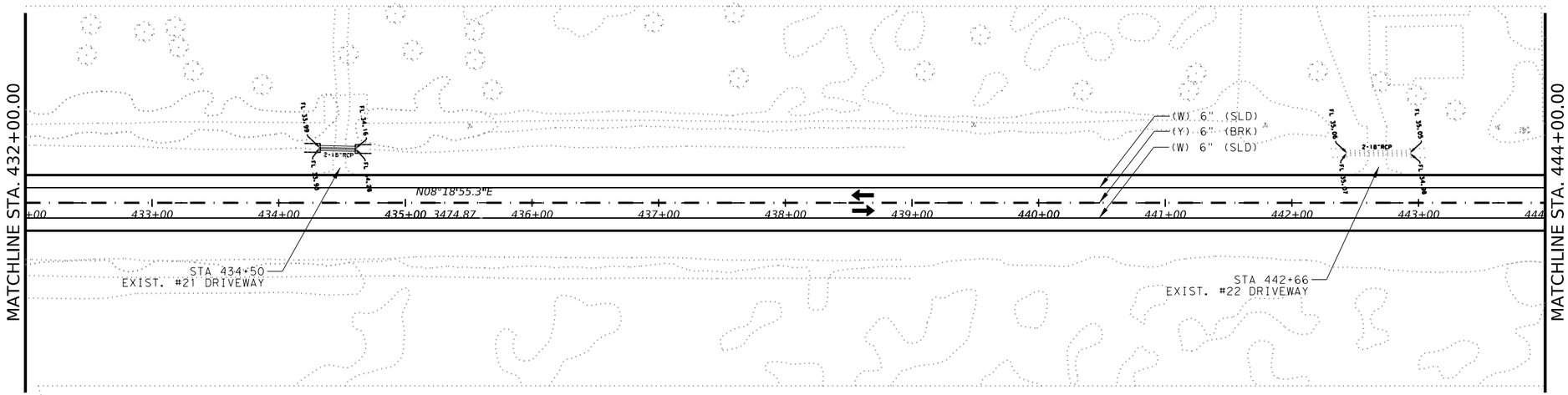

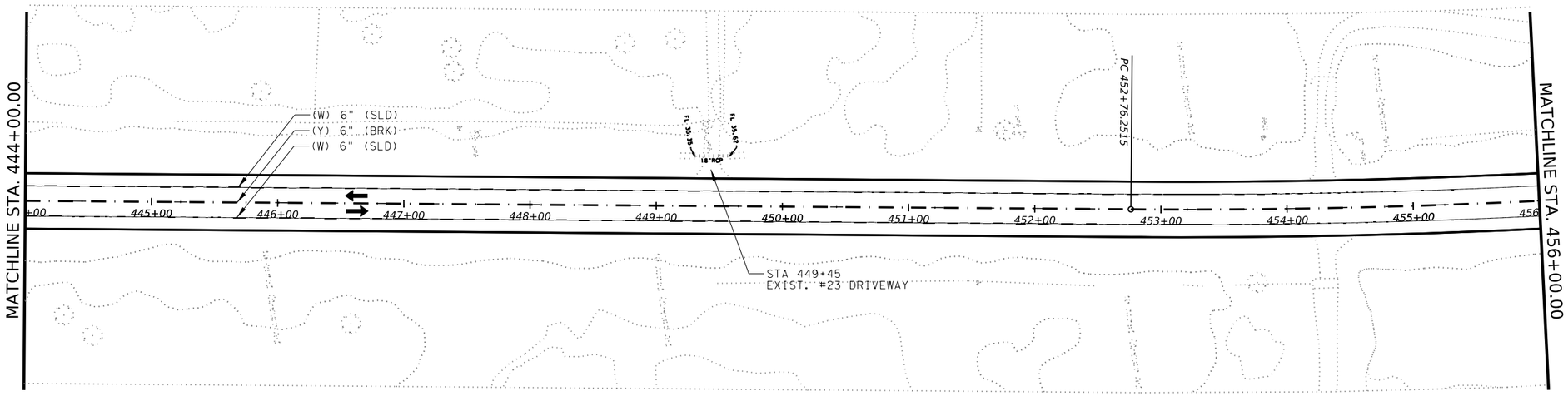

LEGEND

- 5" PVMT REPAIR + 1.5" OVERLAY HMA TY-D
- 1.5" OVERLAY HMA TY-D

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TRAFFIC LAYOUTS

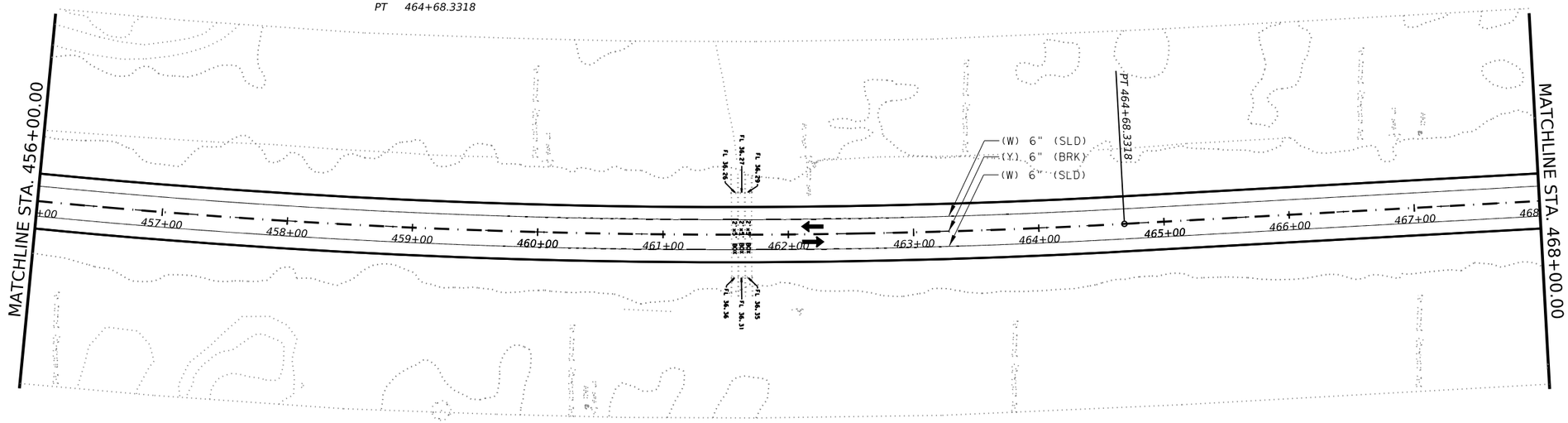
SHEET 19 OF 22

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		135

DATE: 09/30/2023 02:50 PM
FILE:

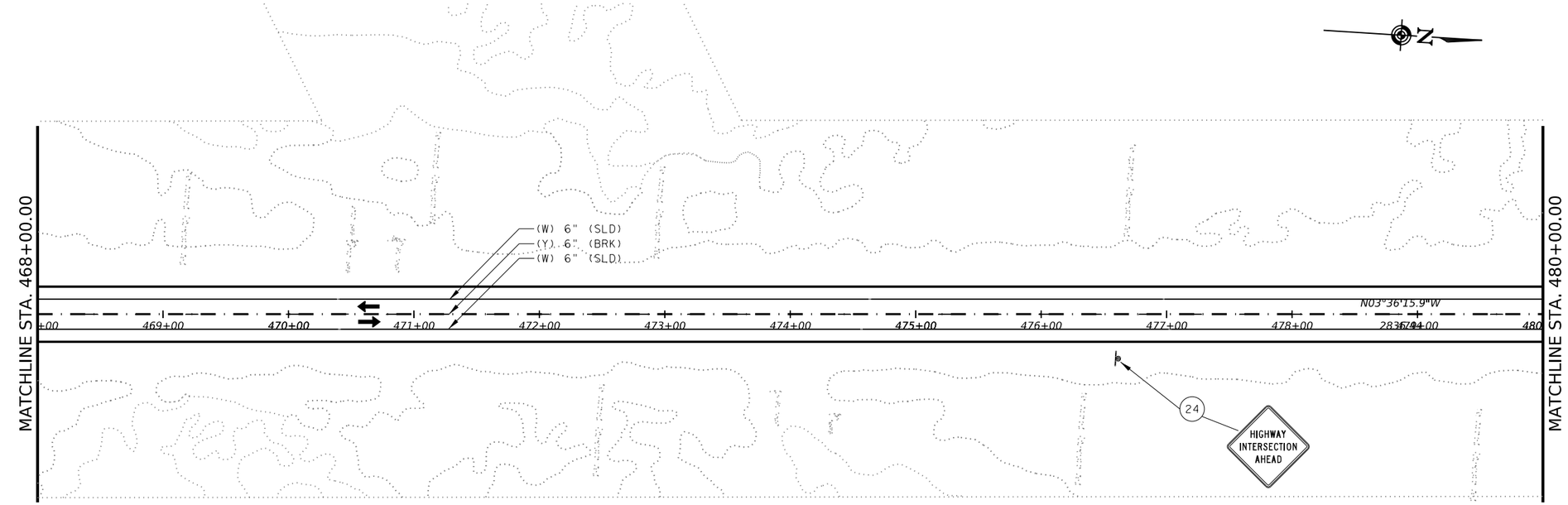
CK:
DW:
CK:
DW:

PI 458+74.4508
Δ 11.9199° (LT)
D 0.9999°
T 598.20'
L 1192.08'
R 5730.00'
PC 452+76.2515
PT 464+68.3318



LEGEND

- 5" PVMT REPAIR + 1.5" OVERLAY HMA TY-D
- 1.5" OVERLAY HMA TY-D



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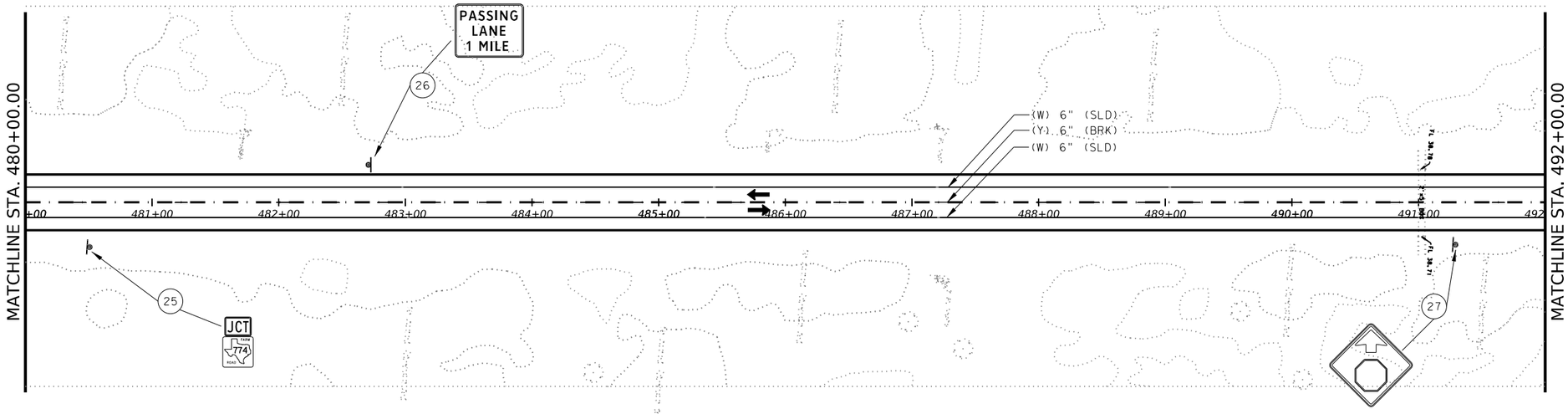
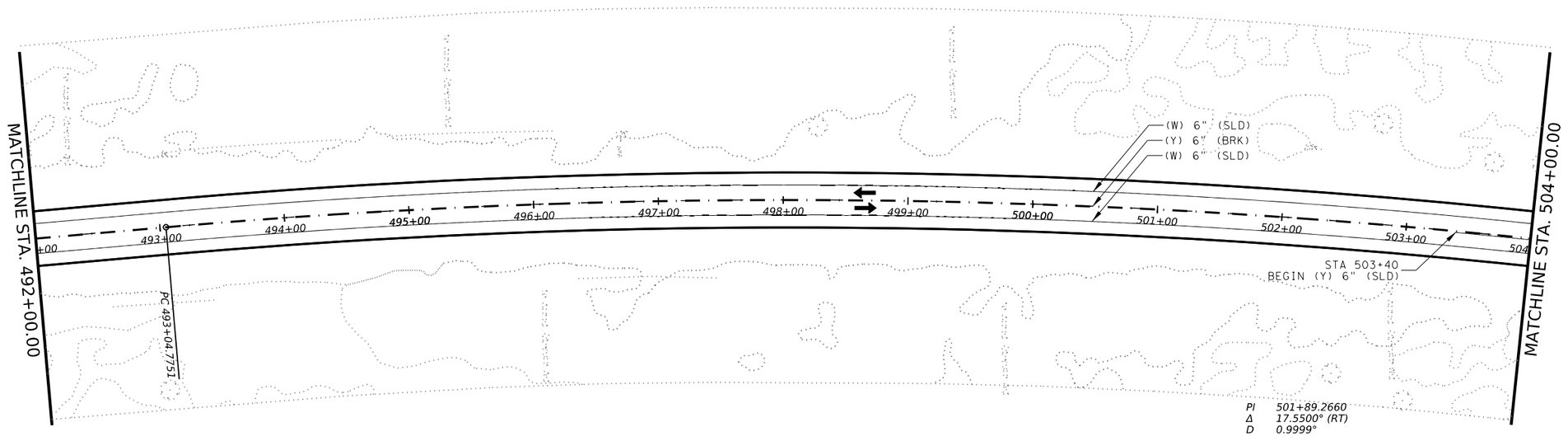
TRAFFIC LAYOUTS

SHEET 20 OF 22

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		135

DATE: 09/30/2023 02:53 PM
FILE:





LEGEND

- 5" PVMT REPAIR + 1.5" OVERLAY HMA TY-D
- 1.5" OVERLAY HMA TY-D

PI	501+89.2660
Δ	17.5500° (RT)
D	0.9999°
T	884.49'
L	1755.13'
R	5730.00'
PC	493+04.7751
PT	510+59.9043

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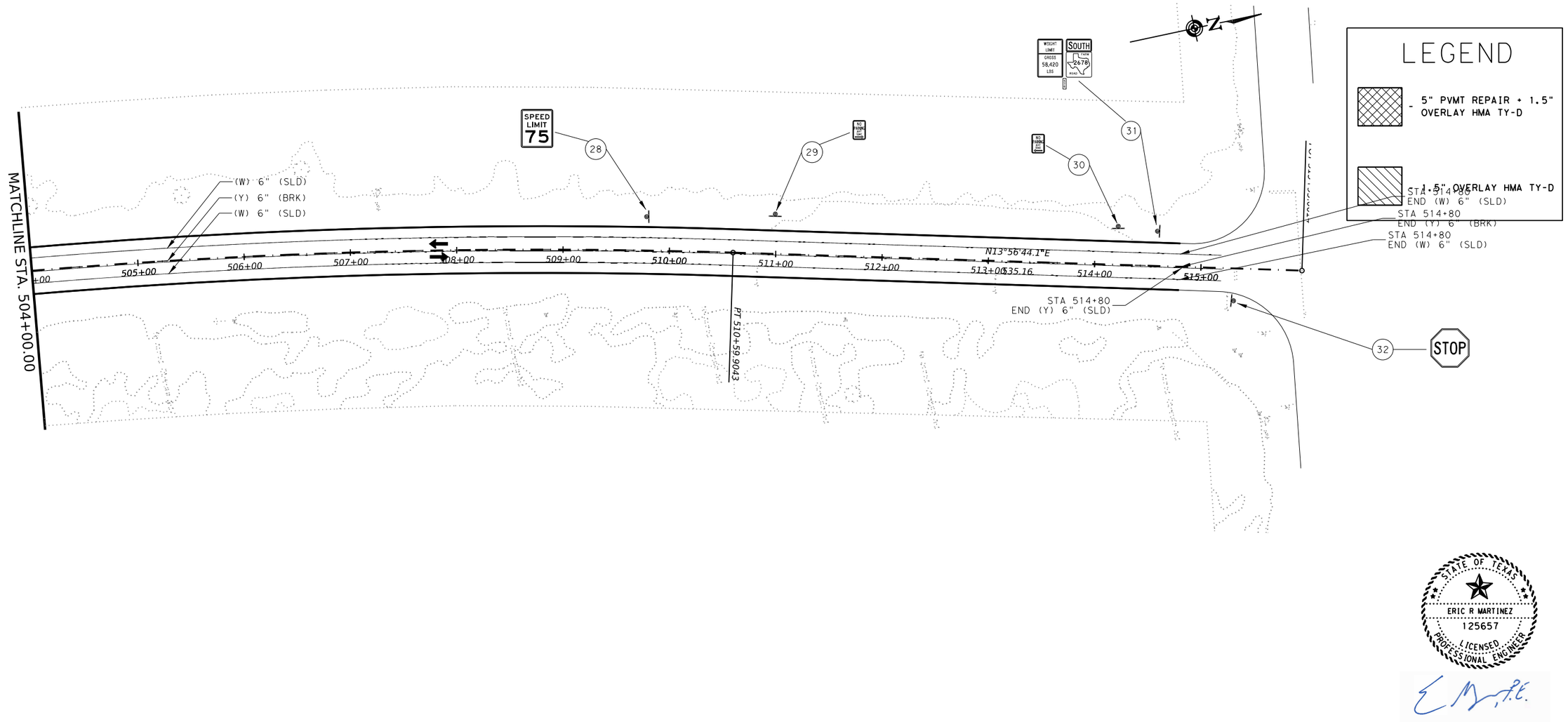
TRAFFIC LAYOUTS

SHEET 21 OF 22

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		136

DATE: 09/30/2023 02:54 PM
FILE:



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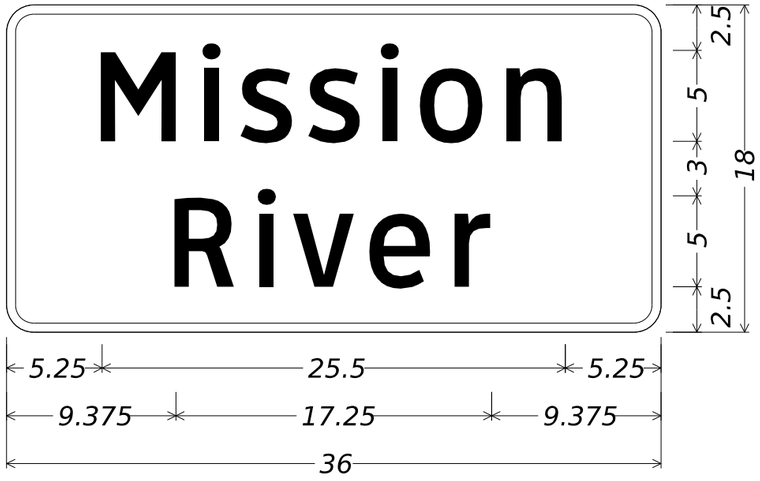
TRAFFIC LAYOUTS

SHEET 22 OF 22

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		137

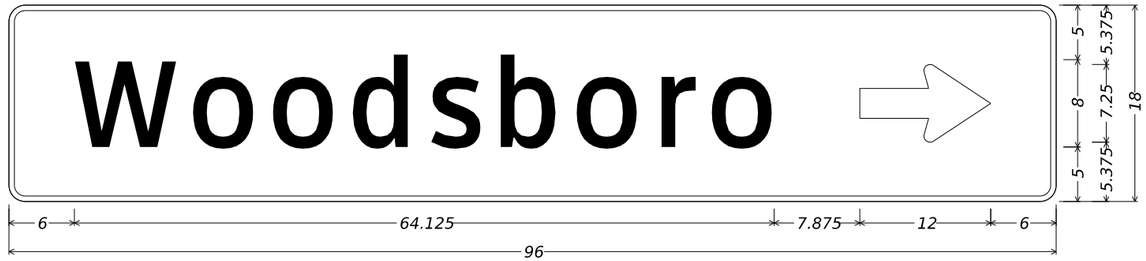
DATE: 09/30/2023 02:55 PM
FILE:



I-3 5in;
1.500" Radius, 0.500" Border, White on Green;
"Mission", ClearviewHwy-3-W;
"River", ClearviewHwy-3-W;
Table of letter and object lefts

M *5.250*	i *10.750*	s *12.875*	s *16.625*	i *20.625*	o *22.750*	n *27.625*

R *9.375*	i *13.750*	v *15.750*	e *20.000*	r *24.625*



D1-1 8in RT;
1.500" Radius, 0.500" Border, White on Green;
"Woodsboro", ClearviewHwy-3-W; Standard Arrow Custom 12.000" X 7.125" 0°;
Table of letter and object lefts

W *6.000*	o *17.000*	o *24.250*	d *31.625*	s *38.625*	b *45.125*	o *52.125*	r *59.750*	o *64.500*	⇨ *78.000*

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SMALL SIGN DETAILS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM2678
DIST	COUNTY		SHEET NO.
CRP	REFUGIO		138

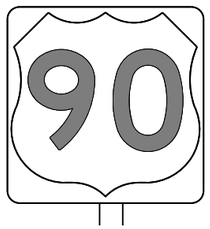
CK:
DW:
CK:
DW:

DATE: 10/03/2023 06:50 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design/Plan Set/8. Traffic/SMALL SIGN DETAILS

DATE: 10/13/2023 3:48:44 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/TSR(3)-13 dgn

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

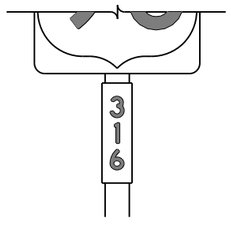
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING

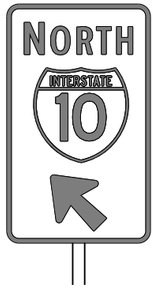


TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING





TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).
4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.
6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

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

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

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

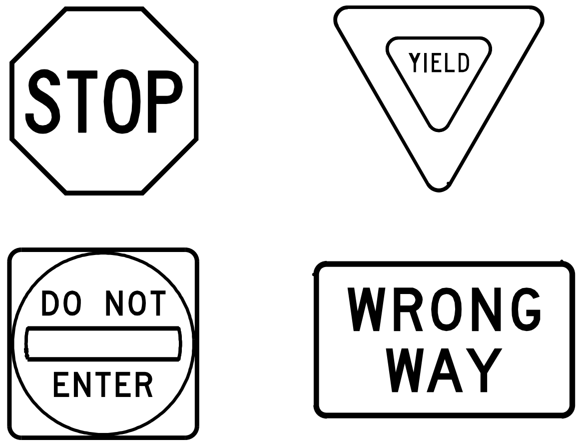
TYPICAL SIGN REQUIREMENTS

TSR(3)-13

FILE:	tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS		0155	06	213	FM 2678
12-03 7-13		DIST	COUNTY		SHEET NO.
9-08		CRP	REFUGIO		139

DATE: 10/13/2023 3:49:00 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Pro

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS
(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

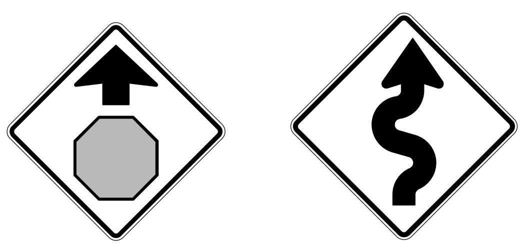
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS
(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

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

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

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.
http://www.txdot.gov/

Texas Department of Transportation — Traffic Operations Division Standard

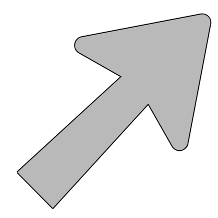
TYPICAL SIGN REQUIREMENTS

TSR(4)-13

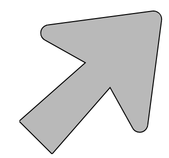
FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT 0155	SECT 06	JOB 213	HIGHWAY FM 2678
REVISIONS 12-03 7-13 9-08	DIST CRP	COUNTY REFUGIO		SHEET NO. 140

ARROW DETAILS

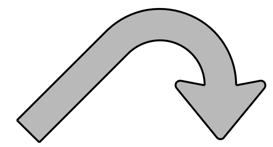
for Large Ground-Mounted and Overhead Guide Signs



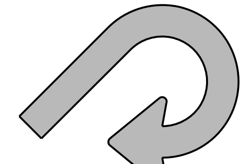
Type A



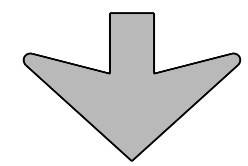
Type B



E-3



E-4



Down Arrow

TYPE	LETTER SIZE	USE
A-1	10.67" U/L and 10" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 20" U/L	
B-1	10.67" U/L and 10" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 20" U/L	

CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

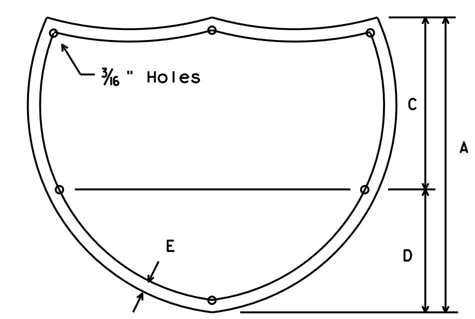
NOTE

Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

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

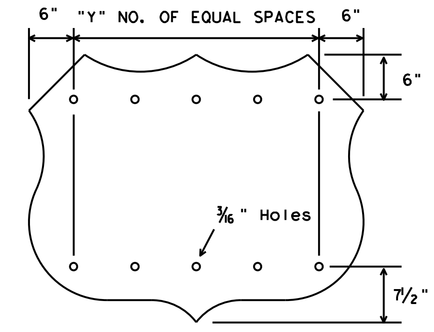
http://www.txdot.gov/

SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)



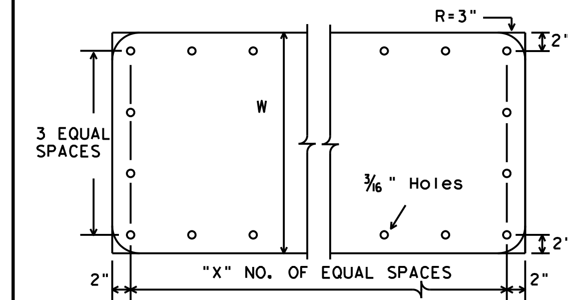
INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1 1/2
48	28	20	1 3/4



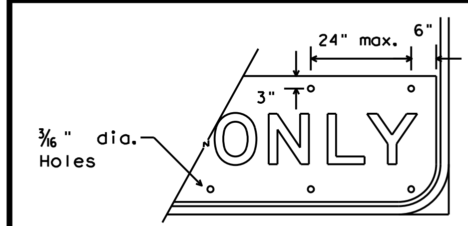
U.S. ROUTE MARKERS

Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



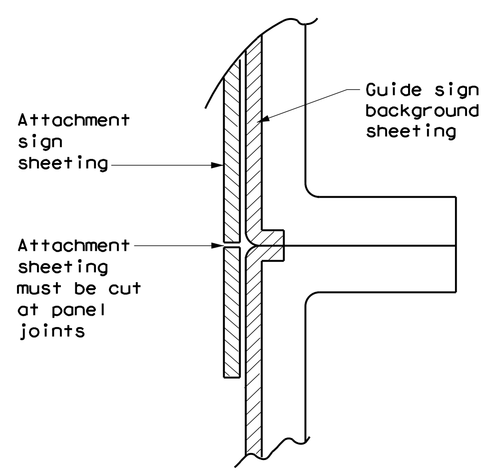
STATE ROUTE MARKERS

No. of Digits	W	X
4	24	4
4	36	5
4	48	6
3	24	3
3	36	4
3	48	5

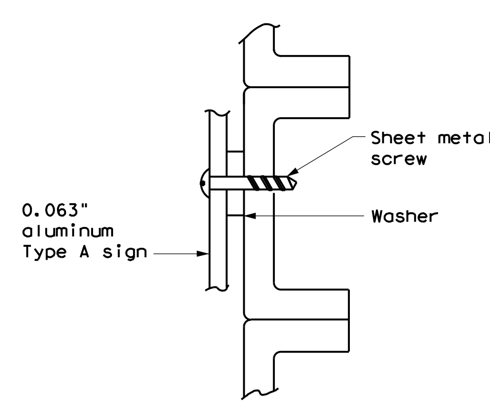


EXIT ONLY PANEL

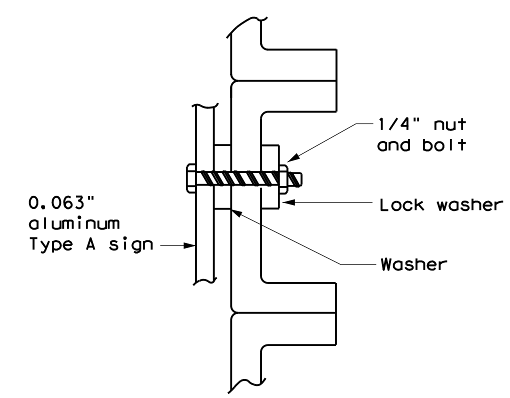
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



DIRECT APPLIED ATTACHMENT



SCREW ATTACHMENT



NUT/BOLT ATTACHMENT

NOTE:

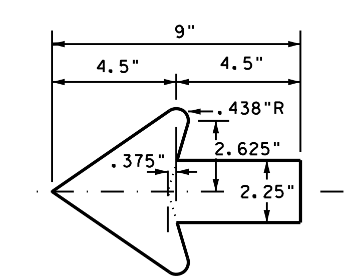
1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".

NOTE:

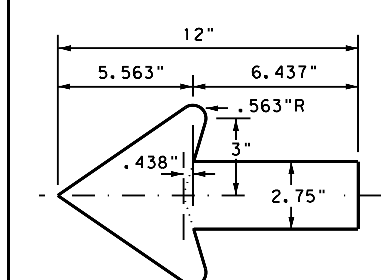
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(5)-13

FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0155	06	213	FM 2678
12-03 7-13 9-08	DIST		COUNTY	SHEET NO.
	CRP		REFUGIO	141

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FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/01550621 3/4 - Design/Plan Set/13. Standards/Signing Standards/SMD (GEN)-08.dgn

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

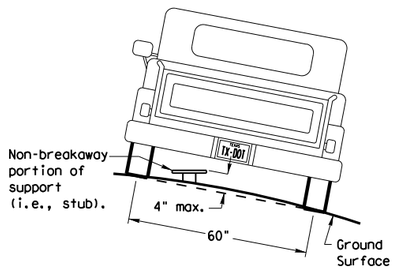
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-3))

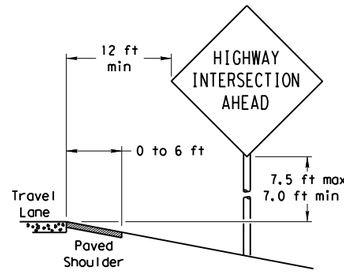
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

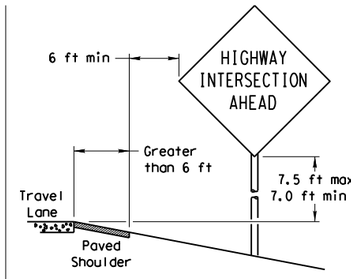
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

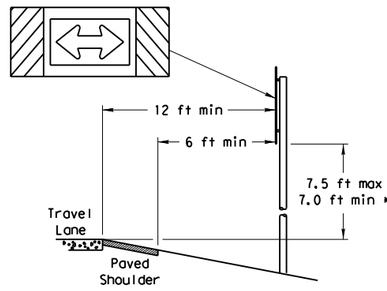
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



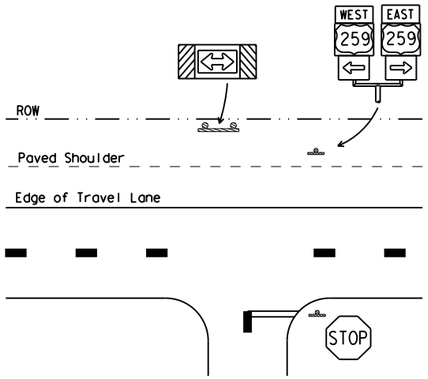
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

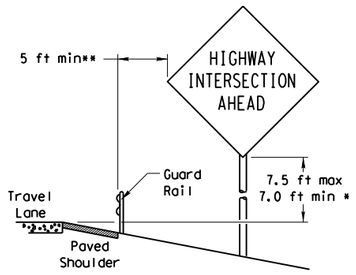
T-INTERSECTION



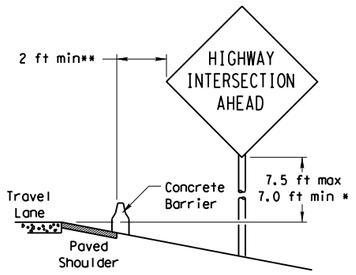
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



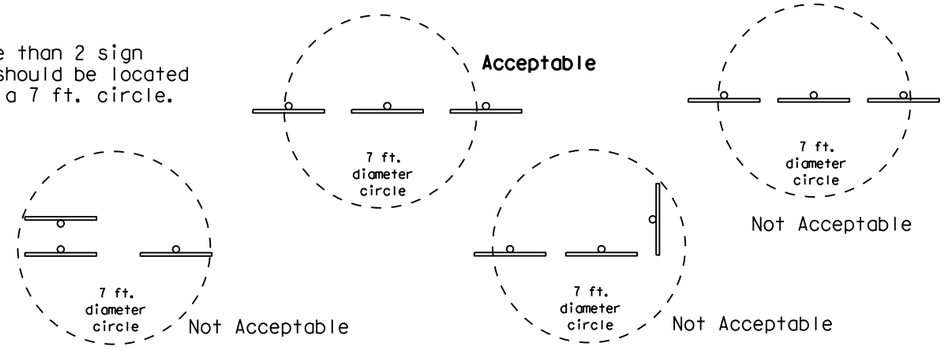
BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

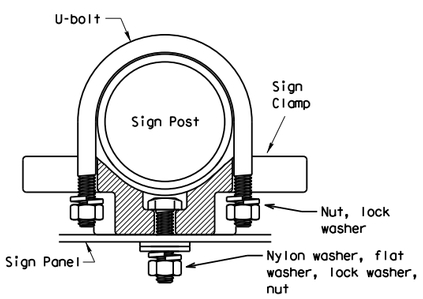
**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

No more than 2 sign posts should be located within a 7 ft. circle.



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

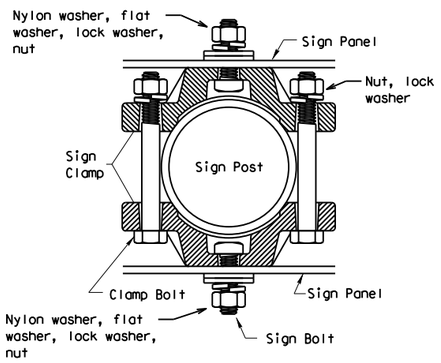


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

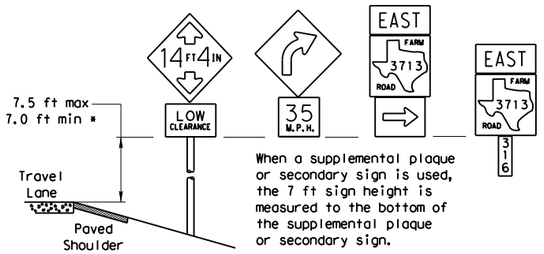
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



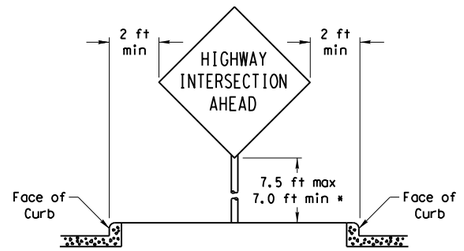
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



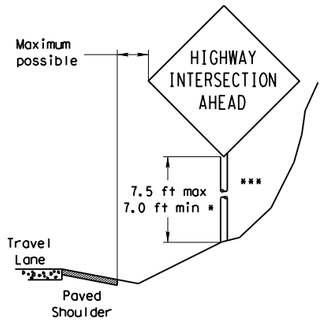
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

The website address is:
http://www.txdot.gov/publications/traffic.htm

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

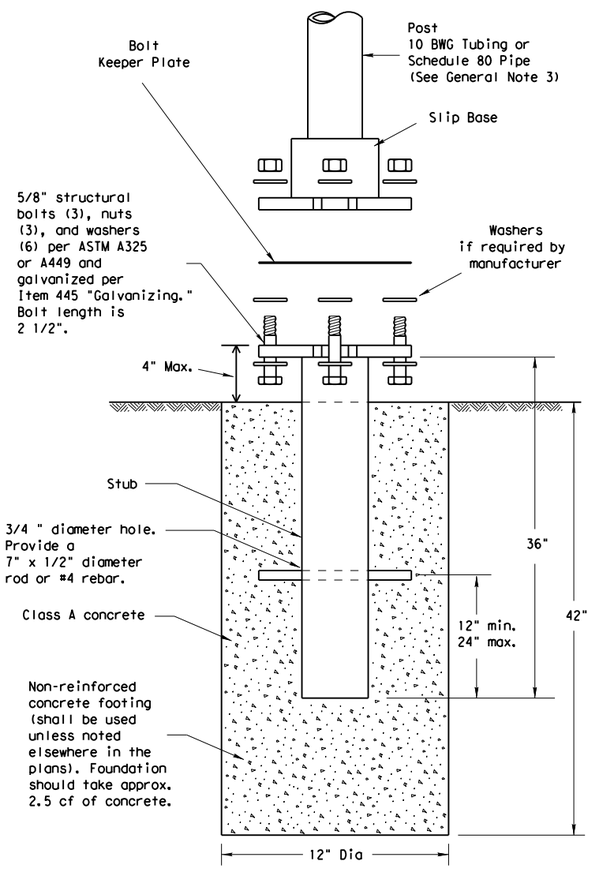
SMD(GEN)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0155	06	213	FM 2678
	DIST	COUNTY		SHEET NO.
	CRP	REFUGIO		142

DATE: 10/13/2023 3:49:51 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design/Plan Set/13. Standards/Signing Standards/SMD (SLIP-1)-08.dgn

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

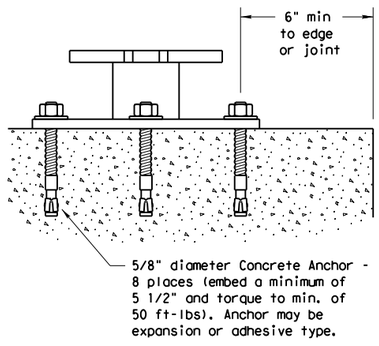
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

Foundation
1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



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

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM 2678

DIST	COUNTY	SHEET NO.
CRP	REFUGIO	143

DATE: 10/13/2023 3:50:08 PM
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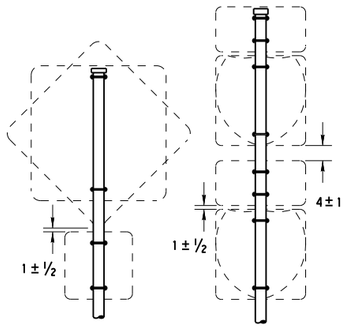
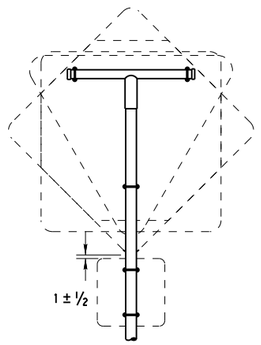


SM RD SGN ASSM TY XXXXX(1)XX(P)



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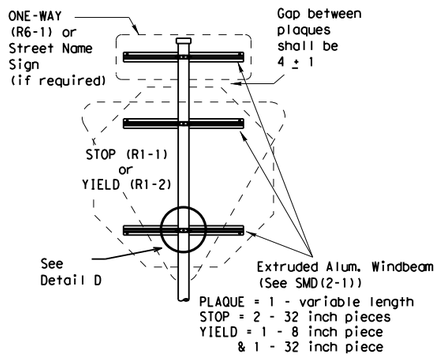

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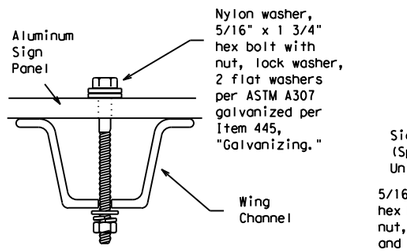
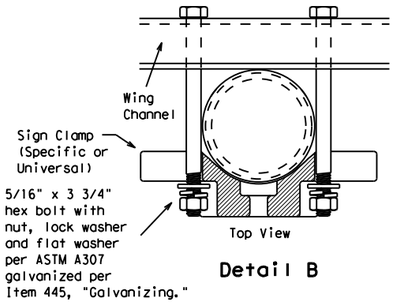
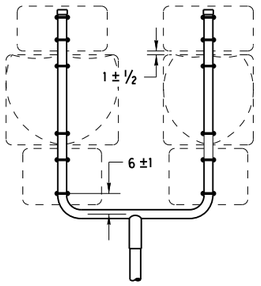


Detail A



Detail B



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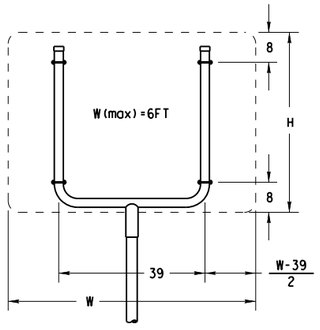

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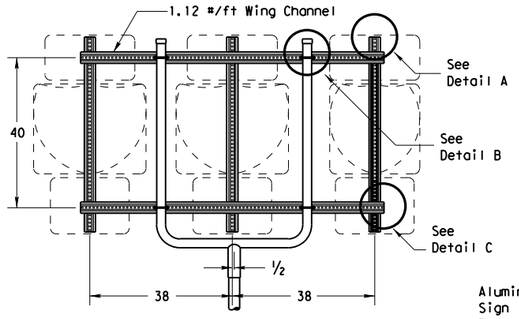
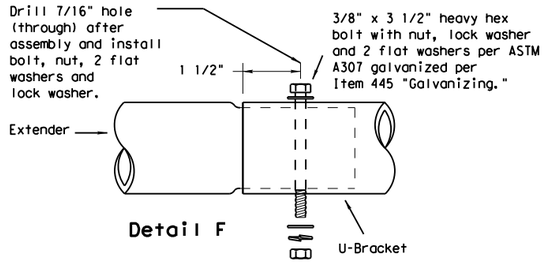
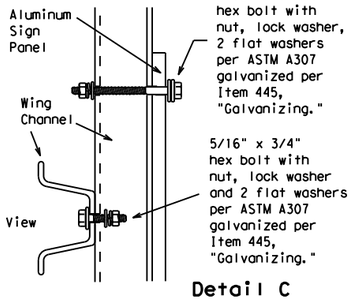


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

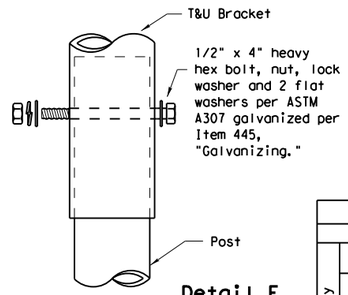


Detail F

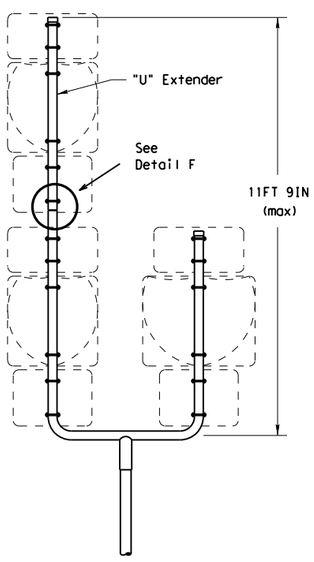
Splices shall only be allowed behind the sign substrate.



Detail C



Detail E



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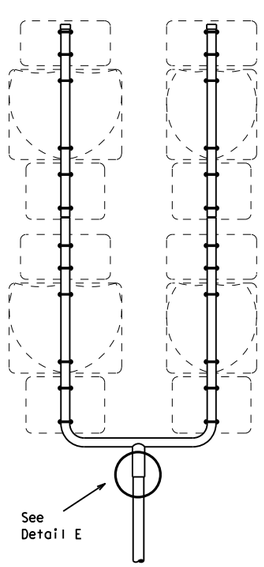

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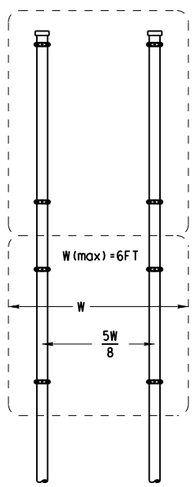
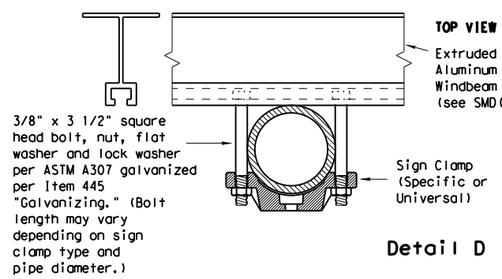
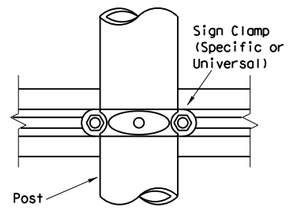


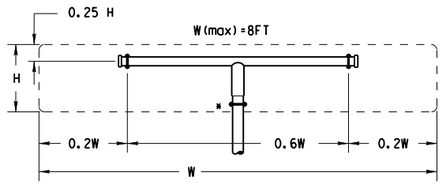
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

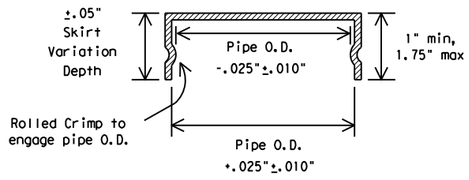




SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT

CONT	SECT	JOB	HIGHWAY
0155	06	213	FM 2678

DIST	COUNTY	SHEET NO.
CRP	REFUGIO	144

9-08 REVISIONS

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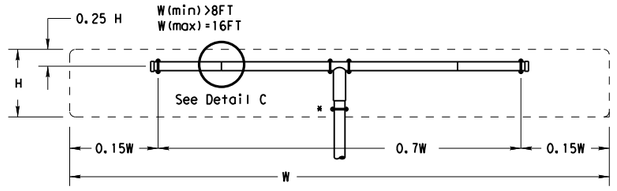
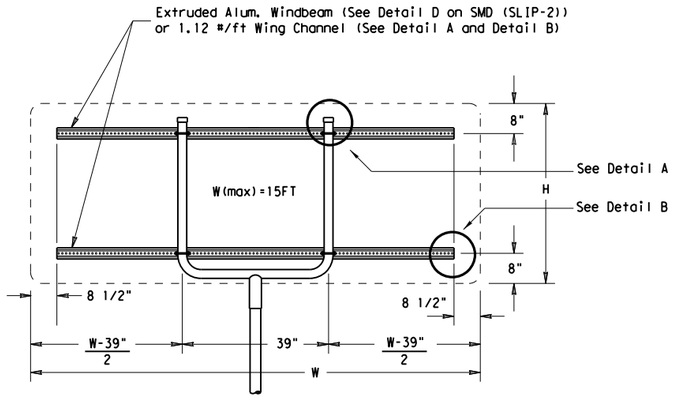
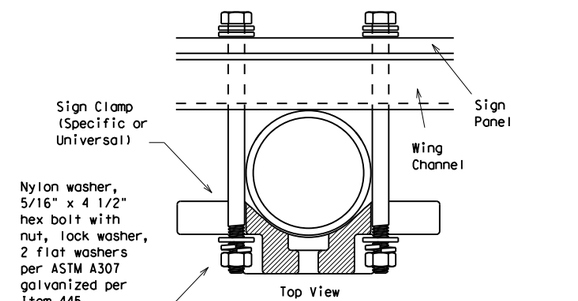


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



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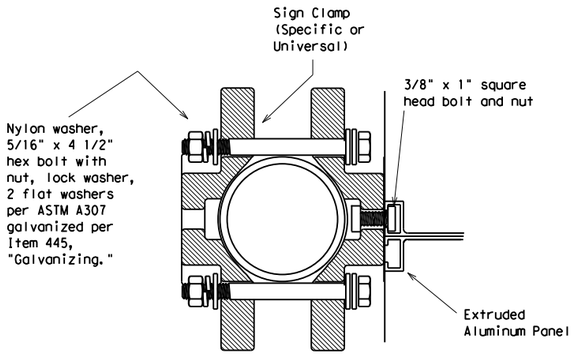
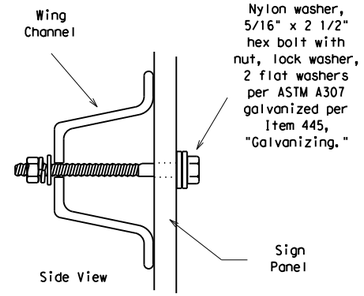
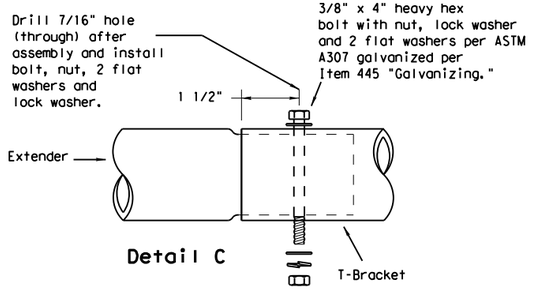


Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

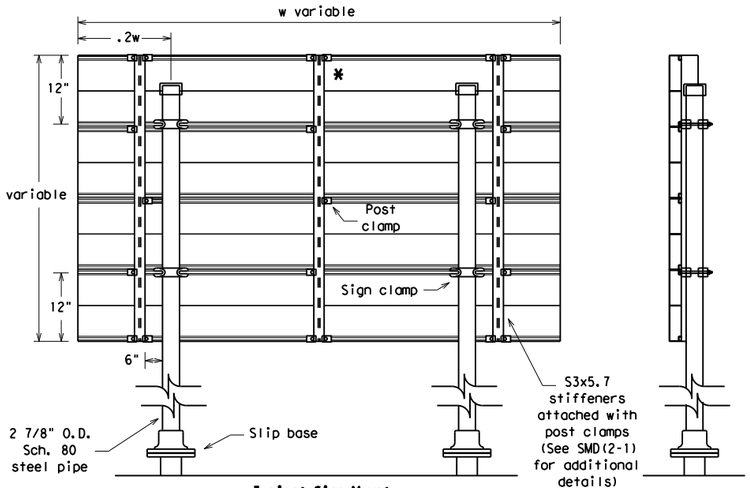


Detail B



Detail C

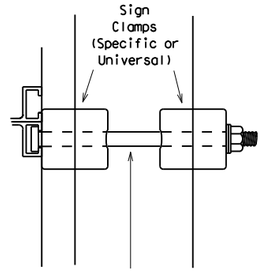
Splices shall only be allowed behind the sign substrate.



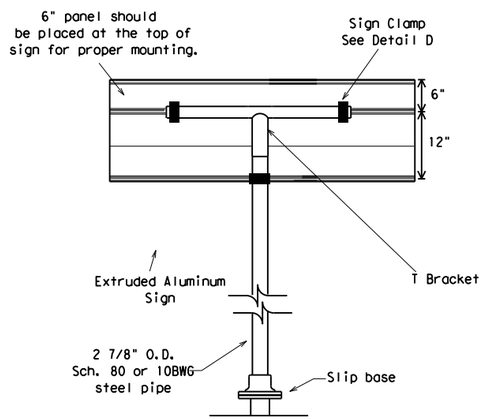
Typical Sign Mount

SM RD SGN ASSM TY S80(2)XX(P-EXAL)

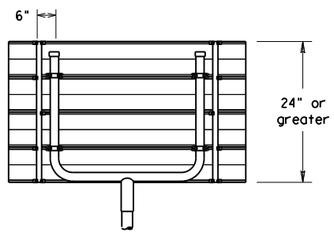
* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.



Detail E



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Sign blanks shall be the sizes and shapes shown on the plans.
11. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0155	06	213	FM 2678
	DIST	COUNTY		SHEET NO.
	CRP	REFUGIO		145

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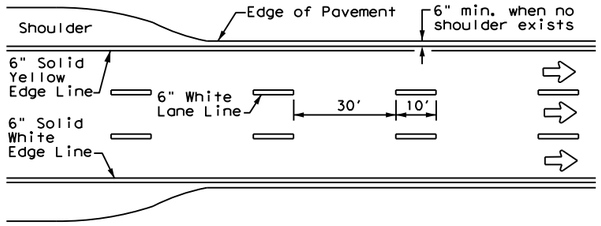
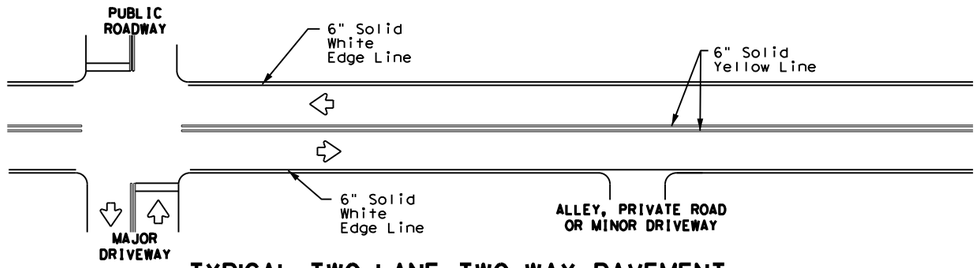
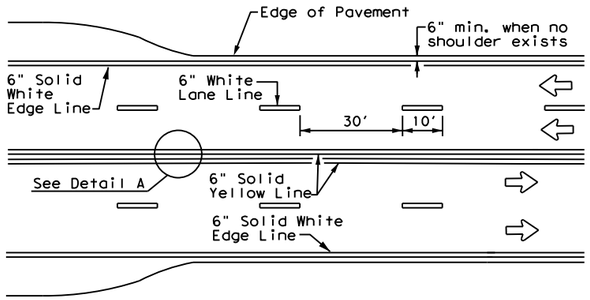
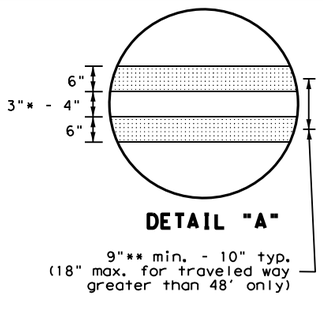


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS





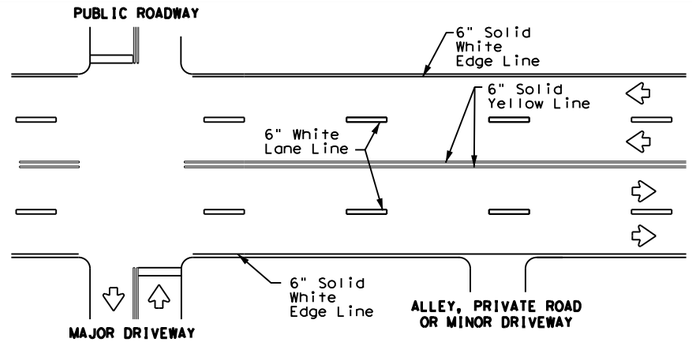
DETAIL "A"

9"** min. - 10" typ.
(18" max. for traveled way greater than 48' only)

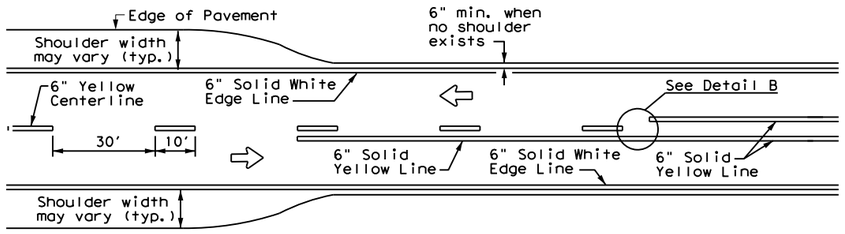
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

* 2" minimum for restripe projects when approved by the Engineer.

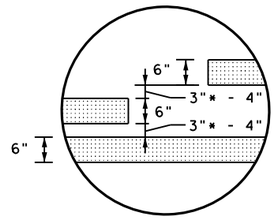
** 8" minimum for restripe projects when approved by the Engineer.



TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

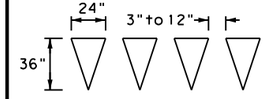


TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



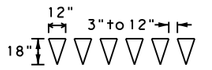
DETAIL "B"

* 2" minimum for restripe projects when approved by the Engineer.

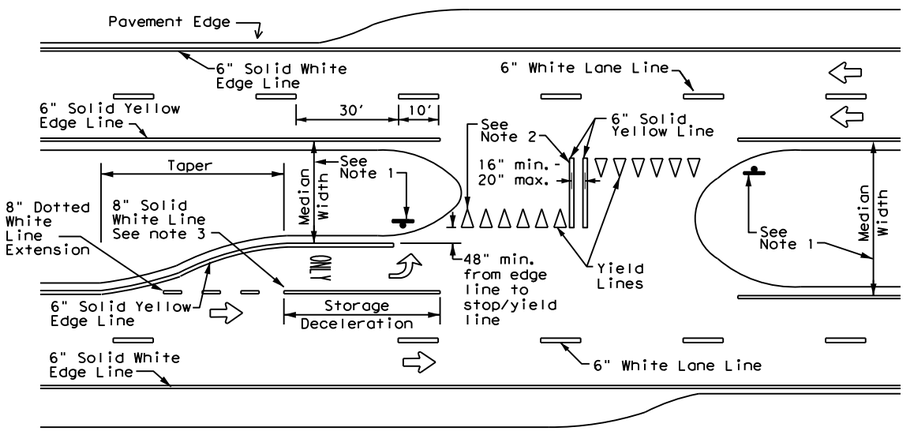


For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



For posted speed on road being marked equal to or less than 40 MPH.



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

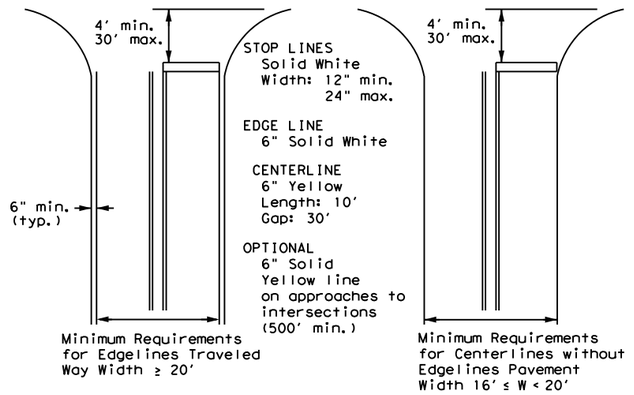
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

GENERAL NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

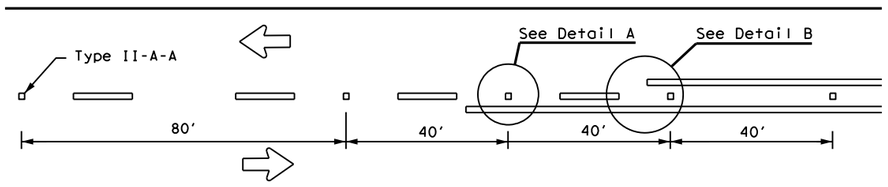
TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-22

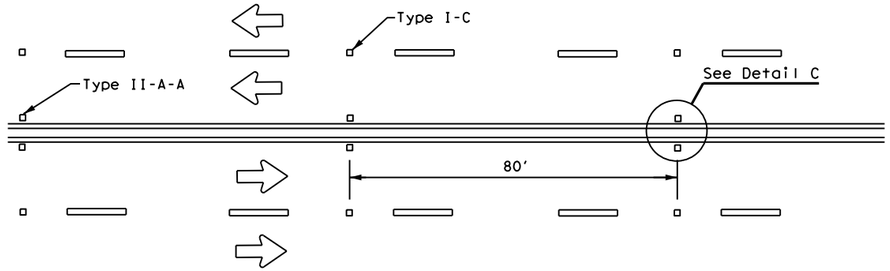
FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 11-78 8-00 6-20 8-95 3-03 12-22 5-00 2-12	0155	06	213	FM 2678
	DIST	COUNTY		SHEET NO.
	CRP	REFUGIO		146

22A

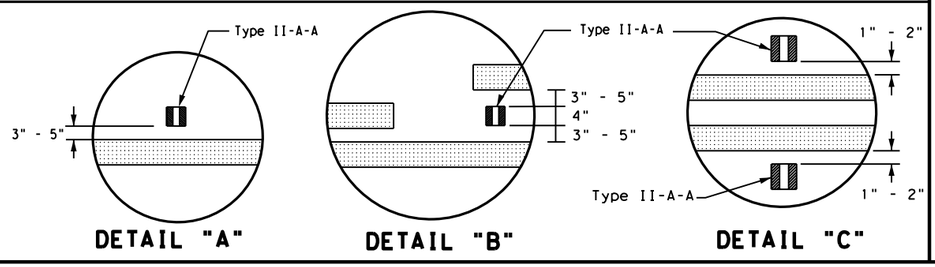
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

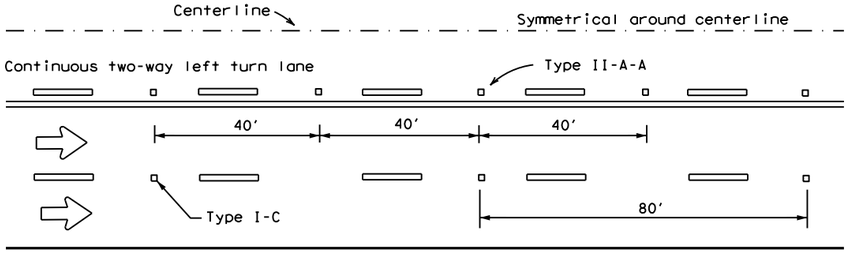


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

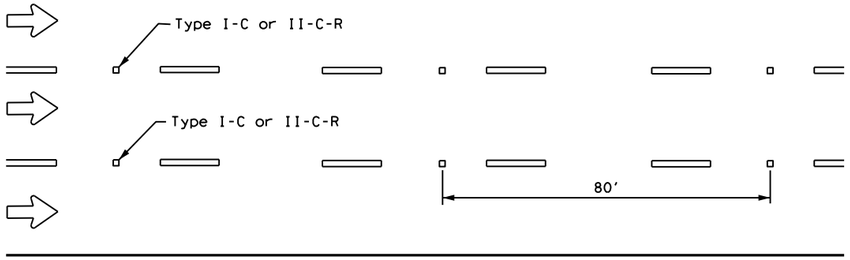


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS





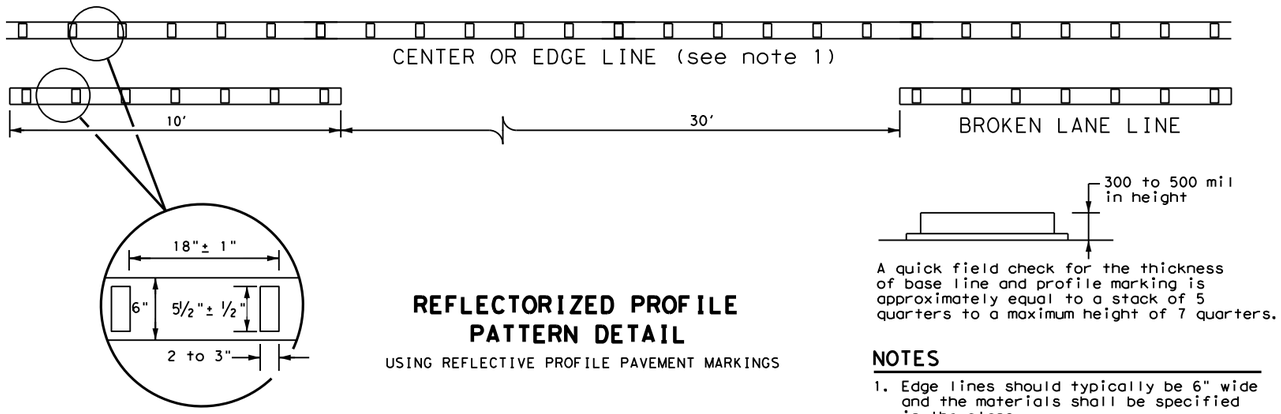
CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

See Note 3.



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

NOTES

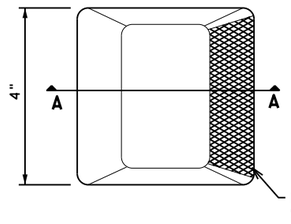
1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

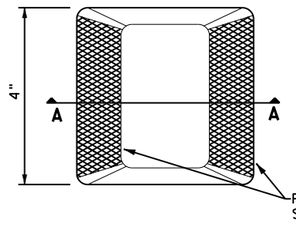
1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

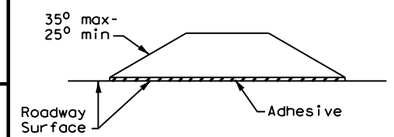
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-22

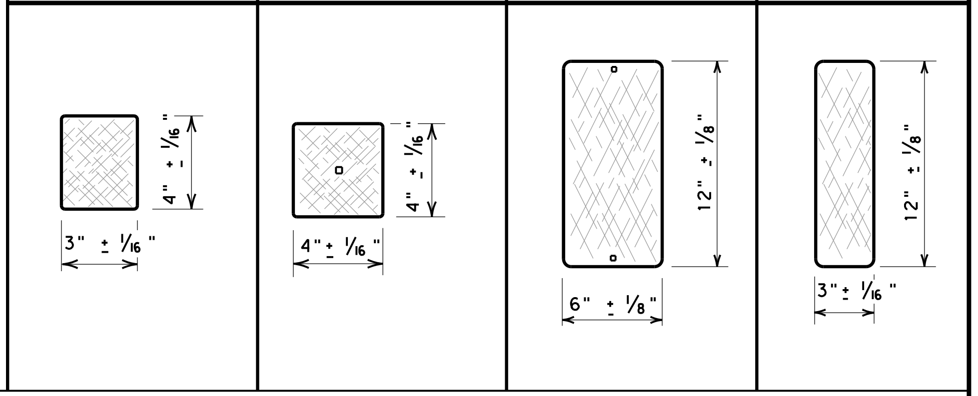
FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-77 8-00 6-20 4-92 2-10 12-22 5-00 2-12	0155	06	213	FM 2678
	DIST	COUNTY		SHEET NO.
	CRP	REFUGIO		147

22B

DATE: 10/13/2023 3:51:01 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/PM Stds/pm2-22.dgn

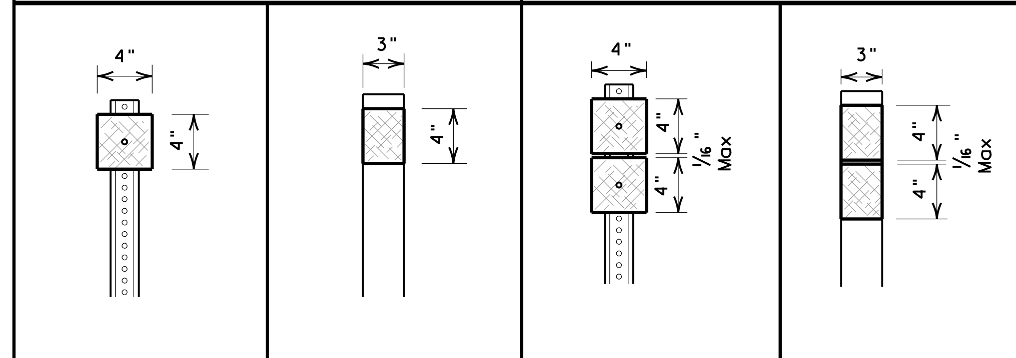
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE	3" ± 1/16" x 4" ± 1/16"	4" ± 1/16" x 4" ± 1/16"	6" ± 1/8" x 12" ± 1/8"	3" ± 1/16" x 12" ± 1/8"
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			



DELINEATORS

	SINGLE		DOUBLE	
DEVICE	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF



D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

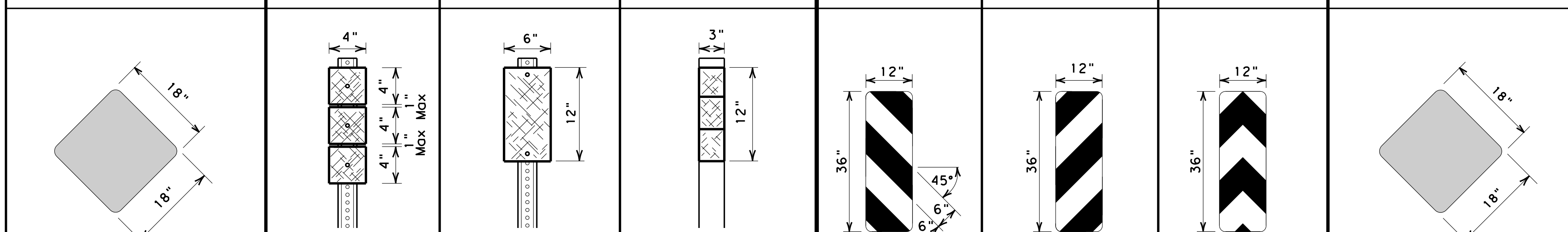
TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

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

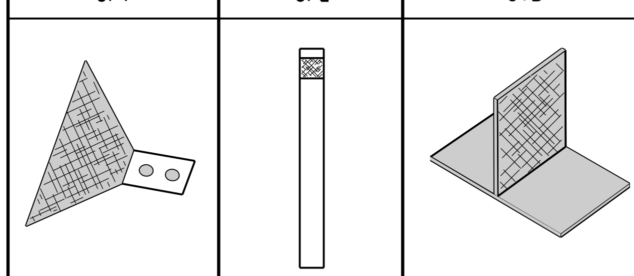
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP



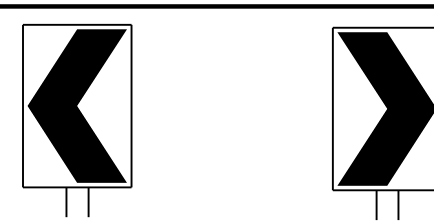
BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		



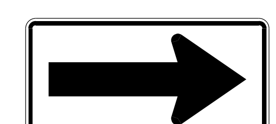
CHEVRONS

DEVICE	W1-8			
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	



ONE DIRECTION LARGE ARROW

DEVICE	W1-6	
SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	



NOTE

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).

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

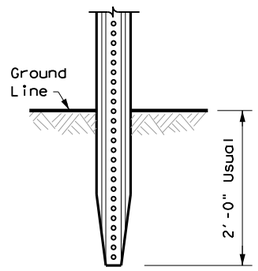
FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT 0155	SECT 06	JOB 213	HIGHWAY FM 2678
REVISIONS 10-09 3-15 4-10 7-20	DIST CRP		COUNTY REFUGIO	SHEET NO. 148

20A

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

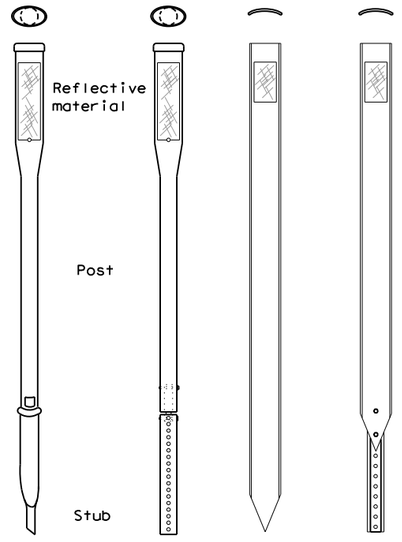


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

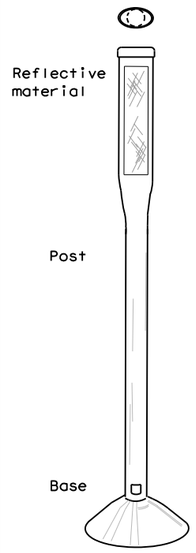
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



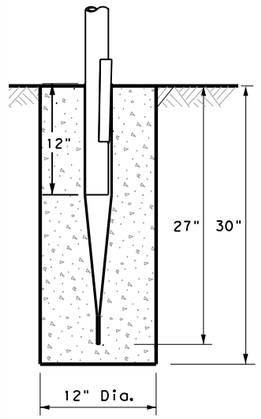
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

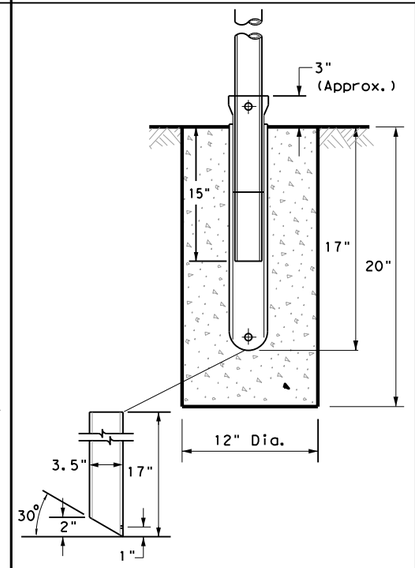
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

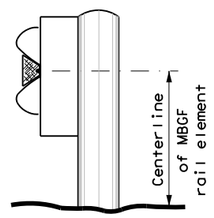
NOTE

1. Install per manufacturer's recommendations.

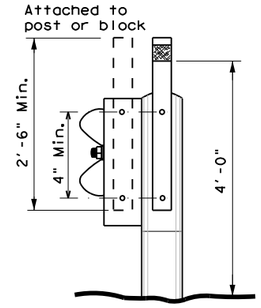
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

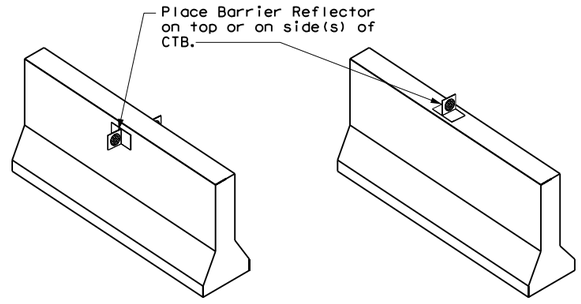
GF1



GF2



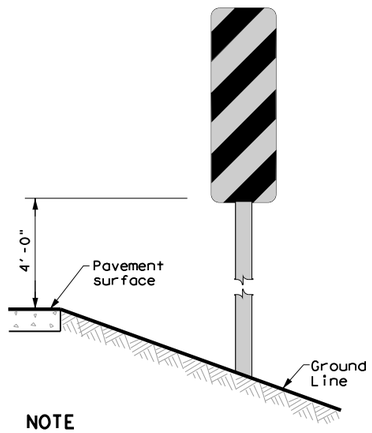
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

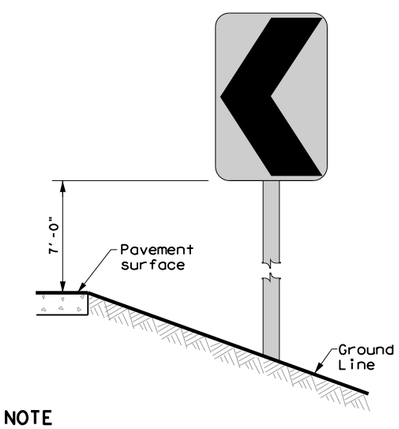
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

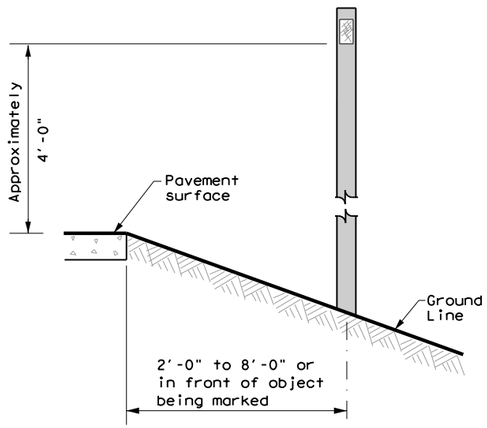
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

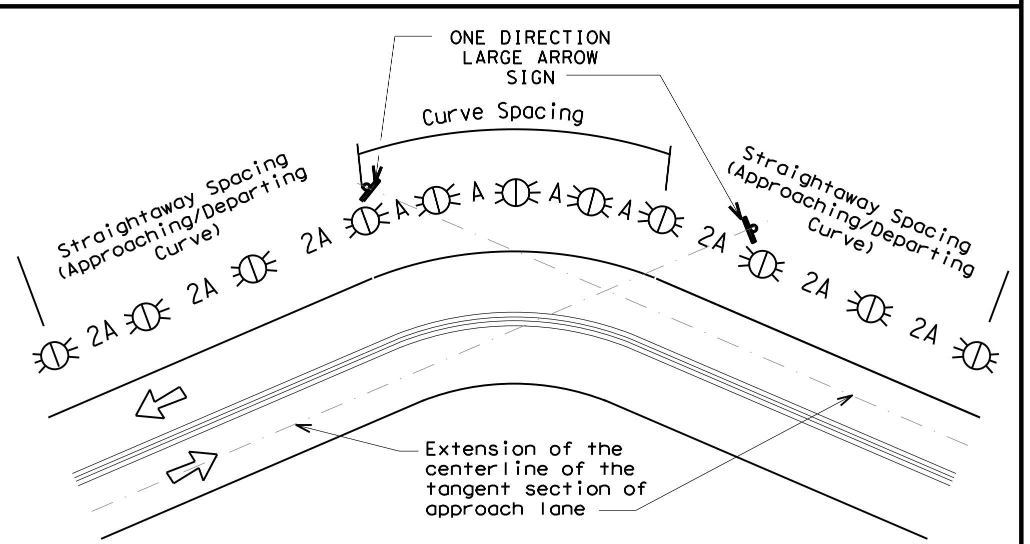
FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0155	06	213	FM 2678
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	CRP	REFUGIO		149

20B

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 Advisory Speed: 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

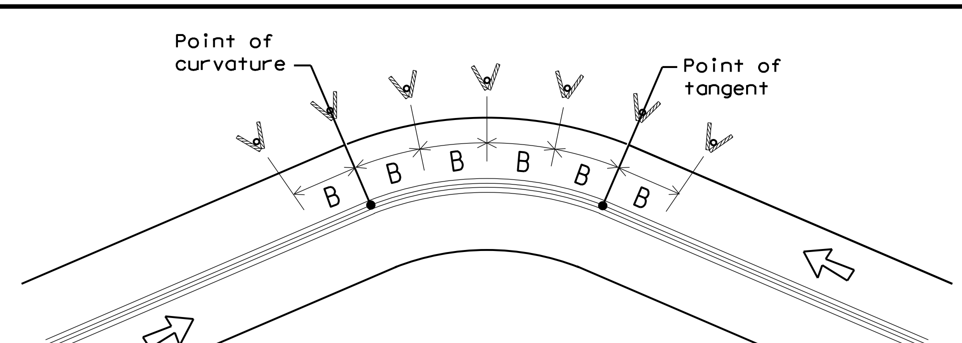
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



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	Radius of Curve (FEET)	Spacing in Curve (FEET)	Spacing in Straightaway (FEET)	Chevron Spacing in Curve (FEET)
		A	2A	B
1	5730	225	450	—
2	2865	160	320	—
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp.Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete)and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100'max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100'max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND

Symbol	Meaning
(symbol)	Bi-directional Delineator
(symbol)	Delineator
(symbol)	Sign

Texas Department of Transportation — Traffic Safety Division Standard

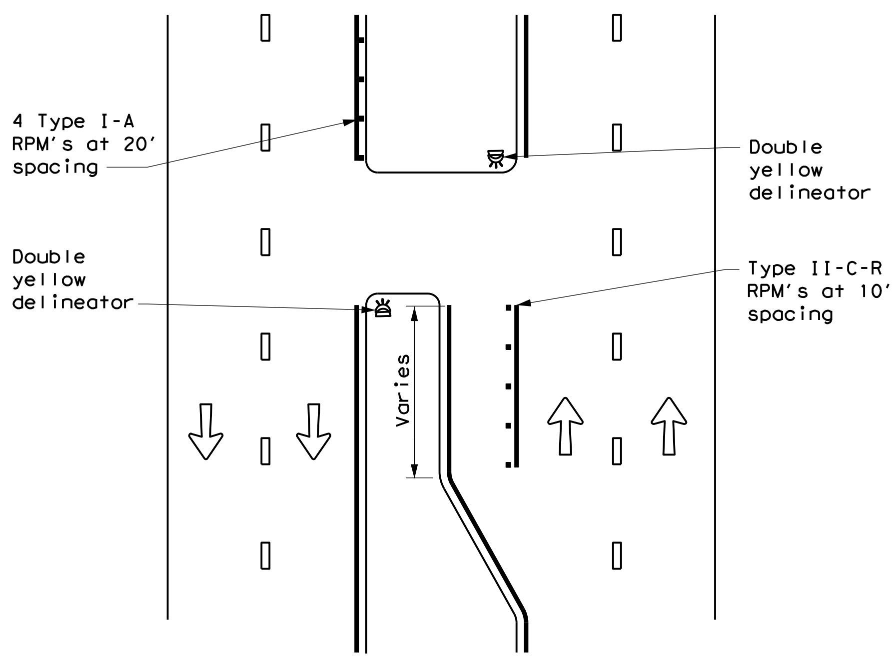
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT 0155	SECT 06	JOB 213	HIGHWAY FM 2678
REVISIONS 3-15 8-15 8-15 7-20	DIST CRP		COUNTY REFUGIO	SHEET NO. 150

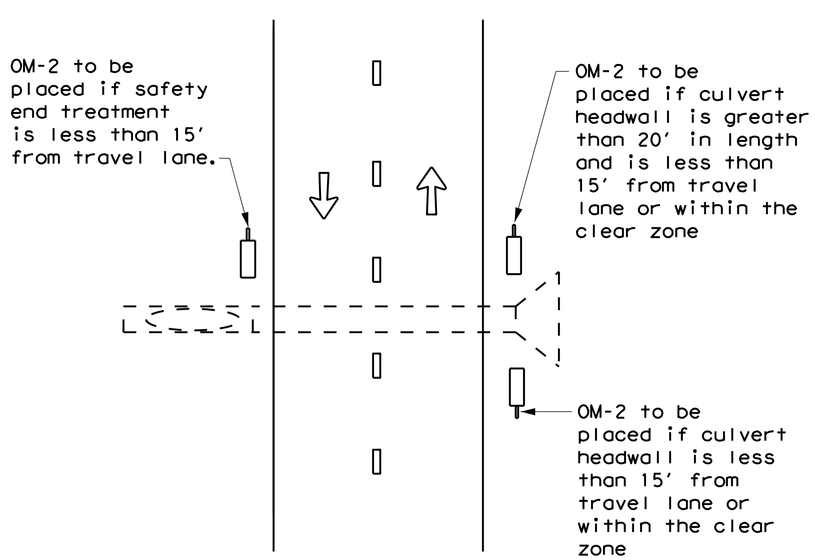
20C

CROSSOVERS



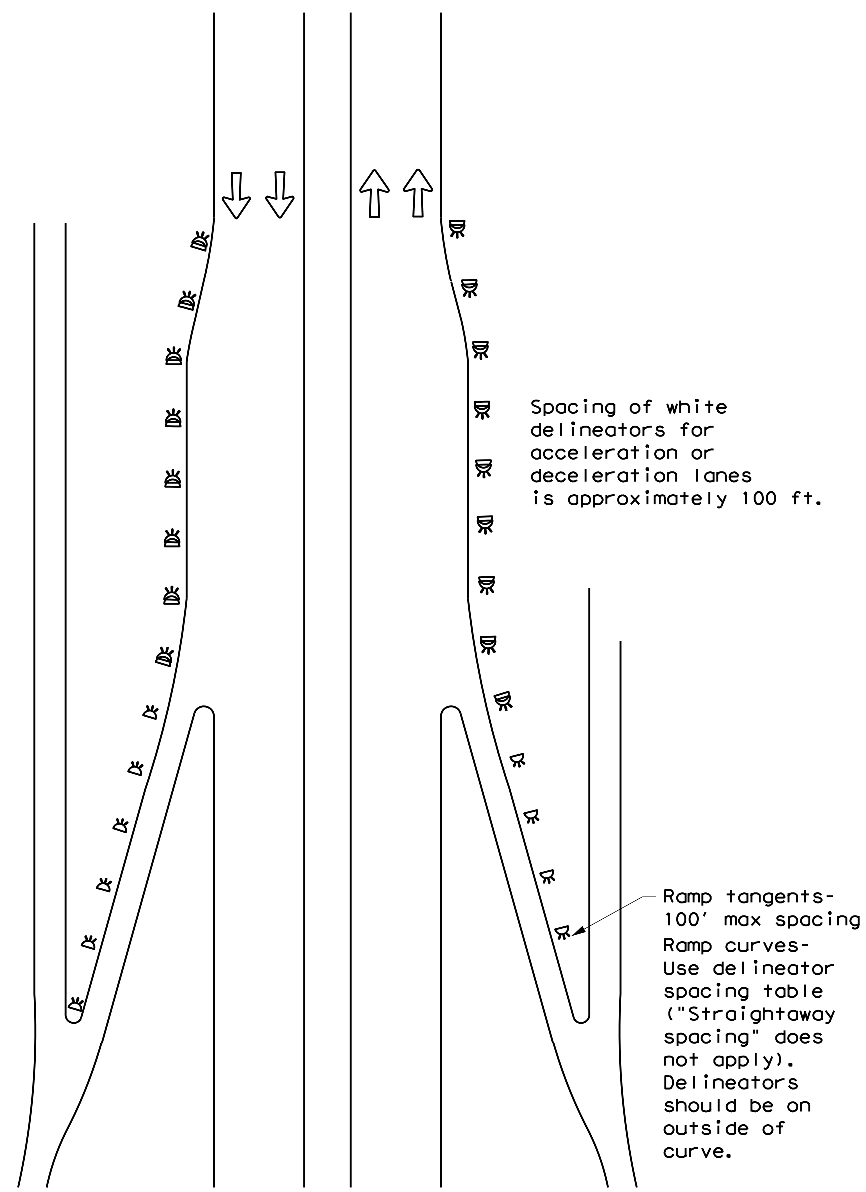
DETAIL 1

FOR CULVERTS WITHOUT MBGF



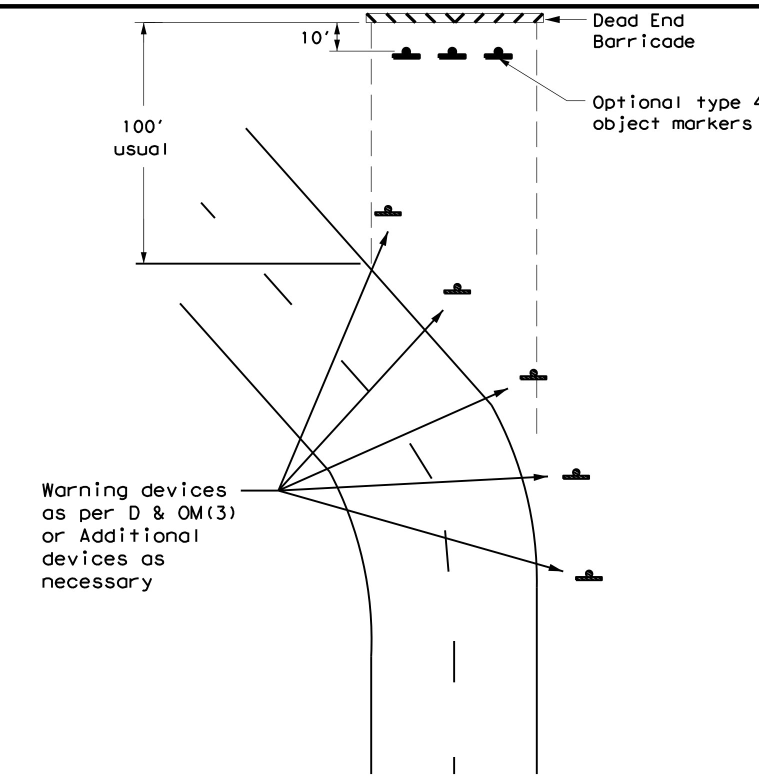
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



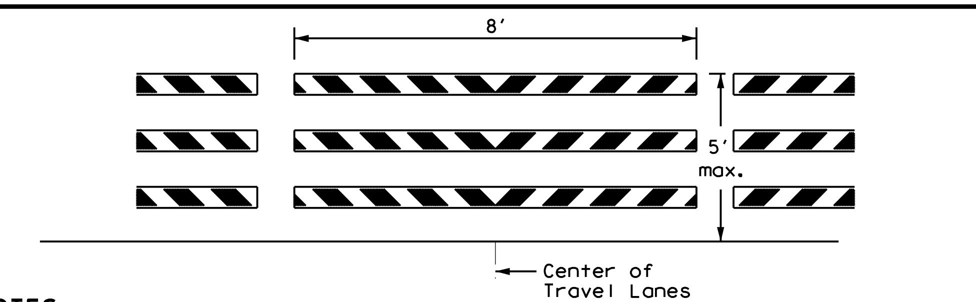
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND

Bidirectional Delineator
Delineator
OM-3
Barricade
Sign
OM-2
Double Delineator

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

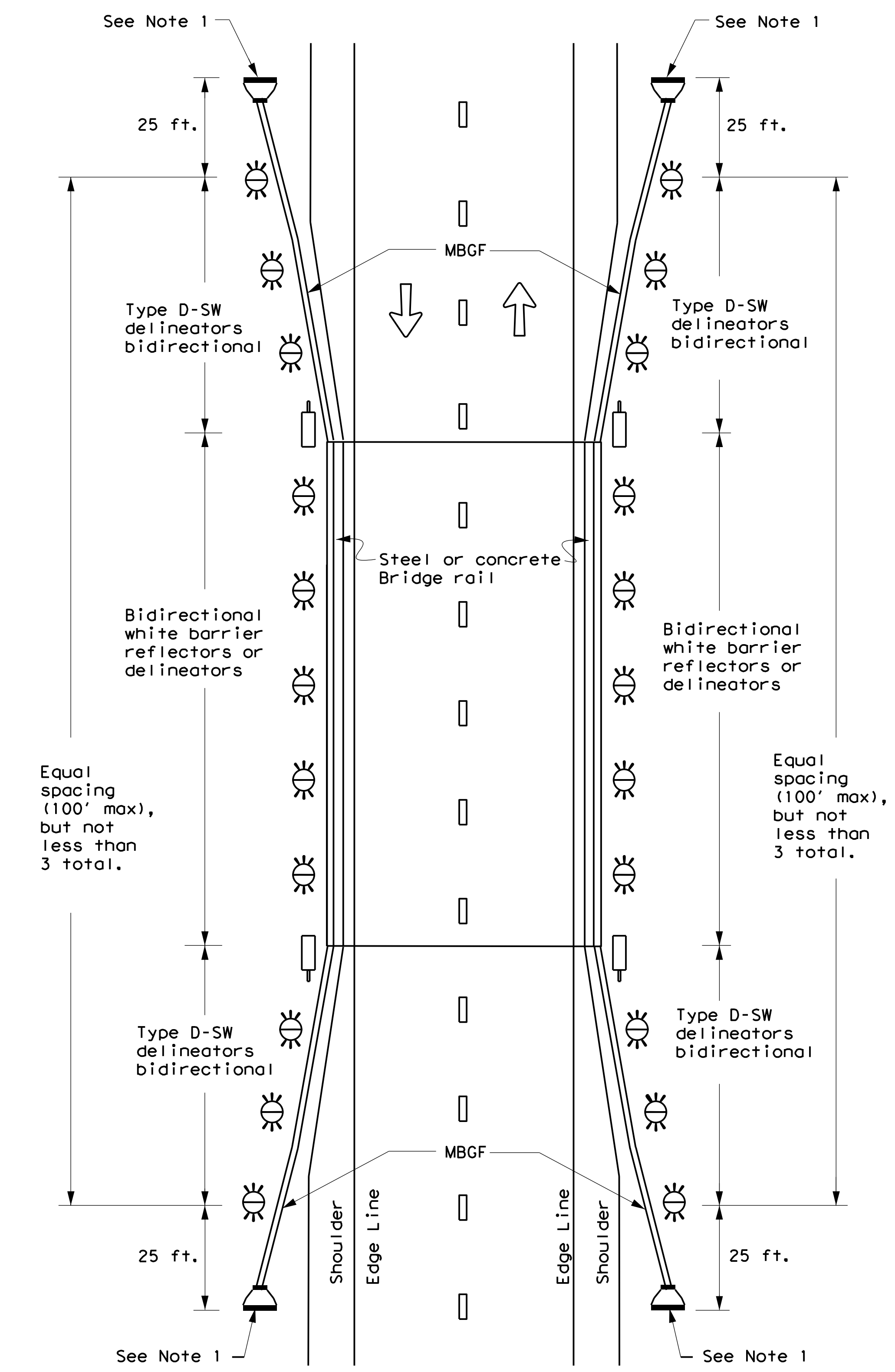
D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 3-15 7-20	0155	06	213	FM 2678
	DIST		COUNTY	SHEET NO.
	CRP		REFUGIO	151

20D

DATE: 10/13/2023 3:52:10 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/015506213/... D & OM (4)-20.dgn

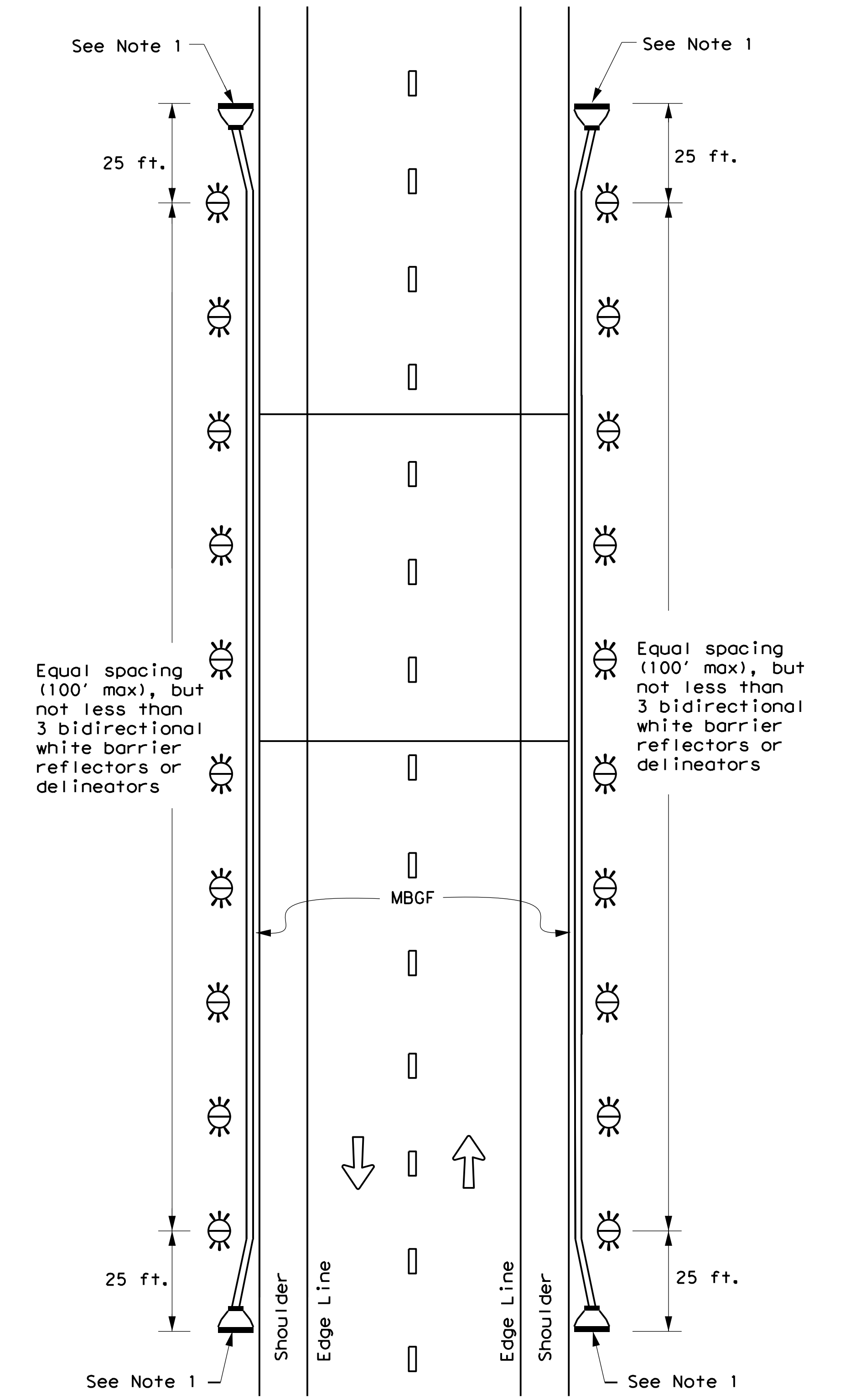
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



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.

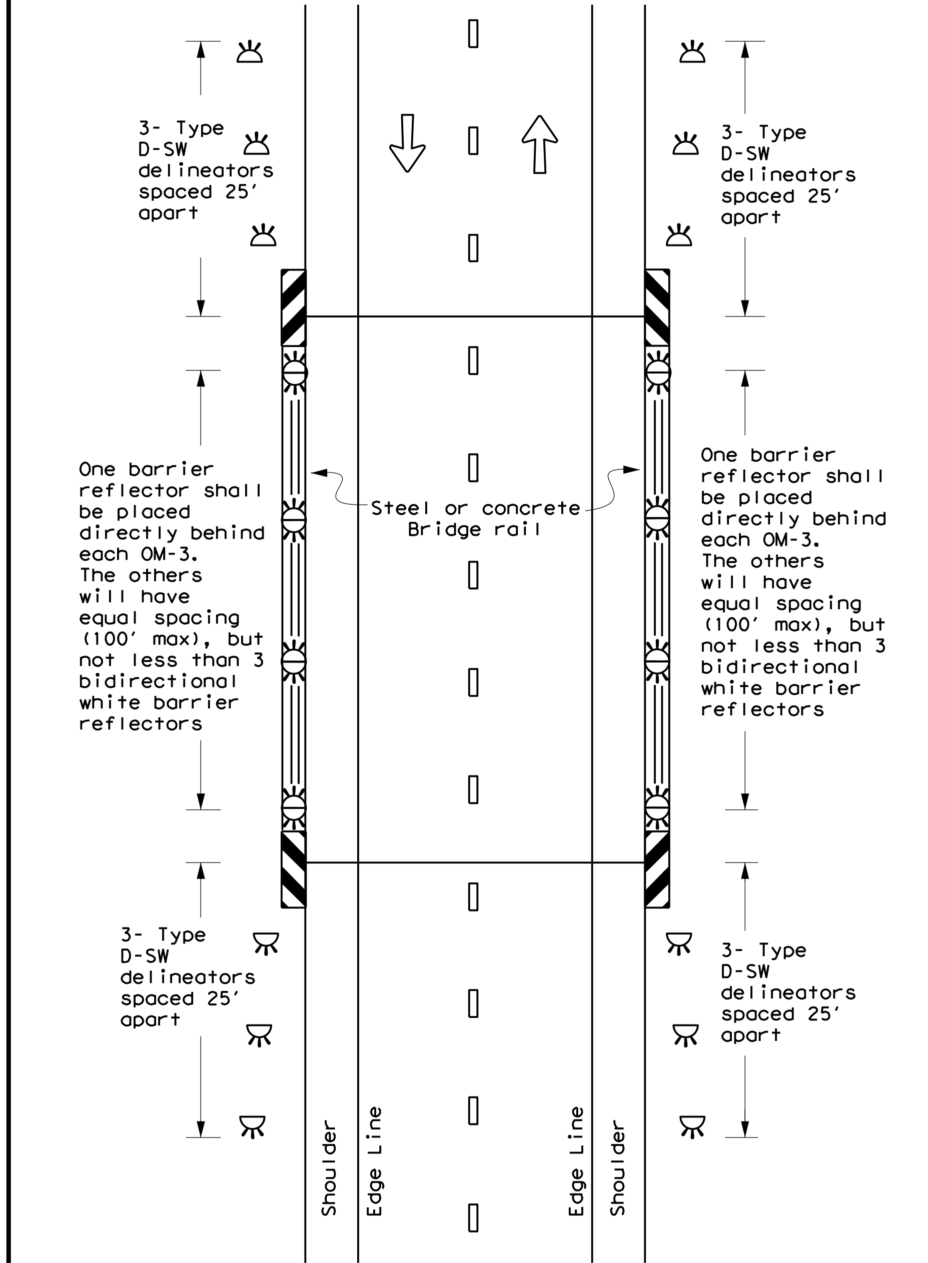
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



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

Symbol	Description
	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

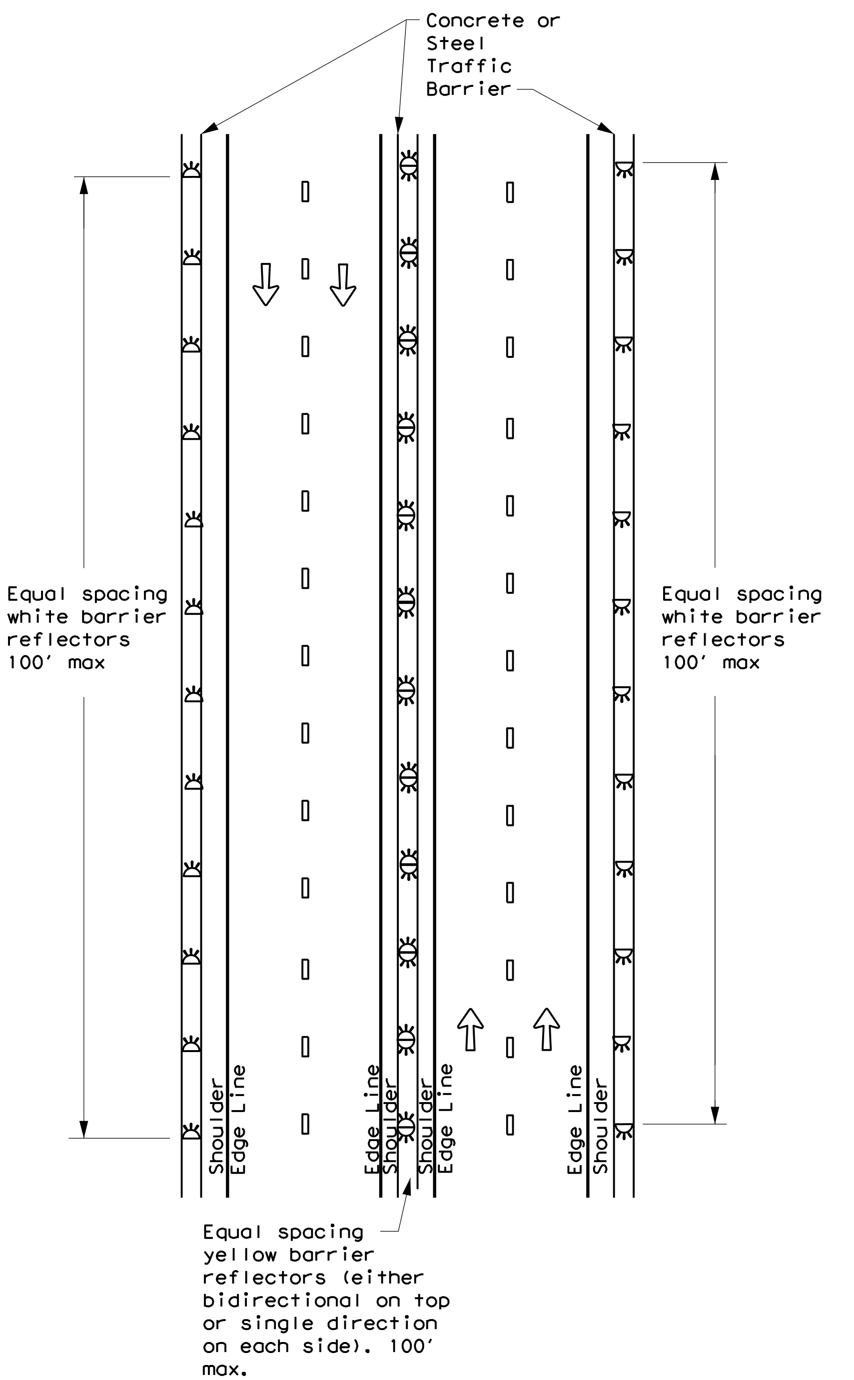
D & OM(5)-20

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0155	06	213	FM 2678
7-20	DIST		COUNTY	SHEET NO.
	CRP		REFUGIO	152

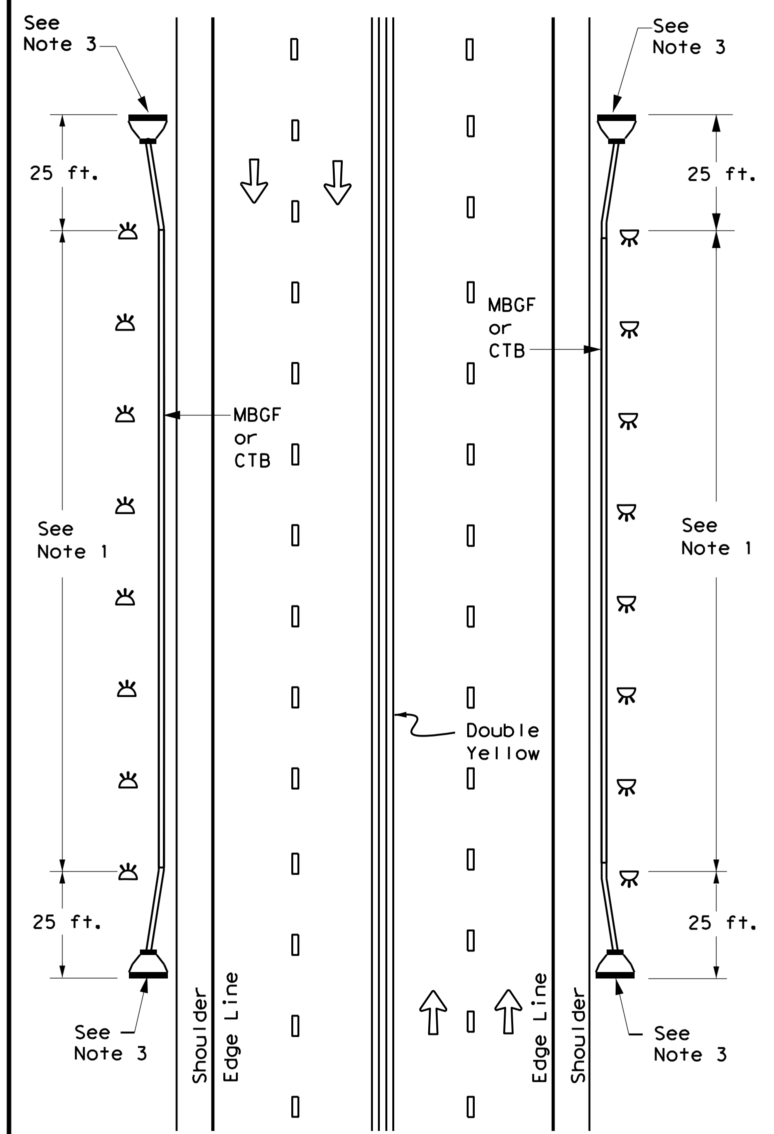
20E

DATE: 10/13/2023 3:52:44 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Pr

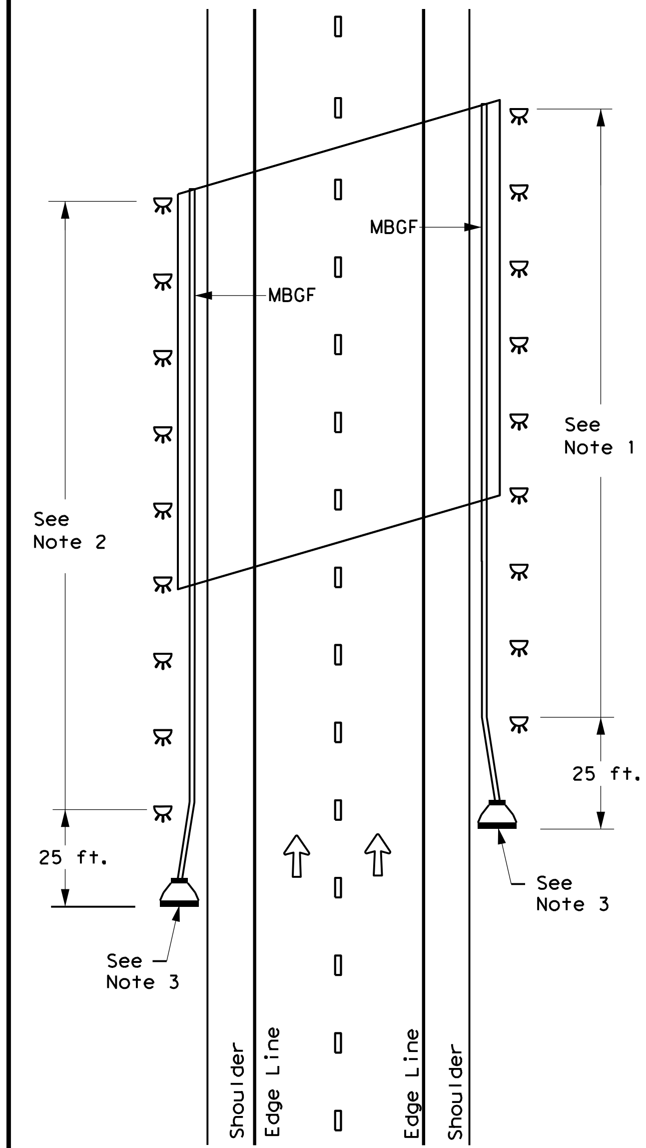
CONTINUOUS CONCRETE OR STEEL BARRIER



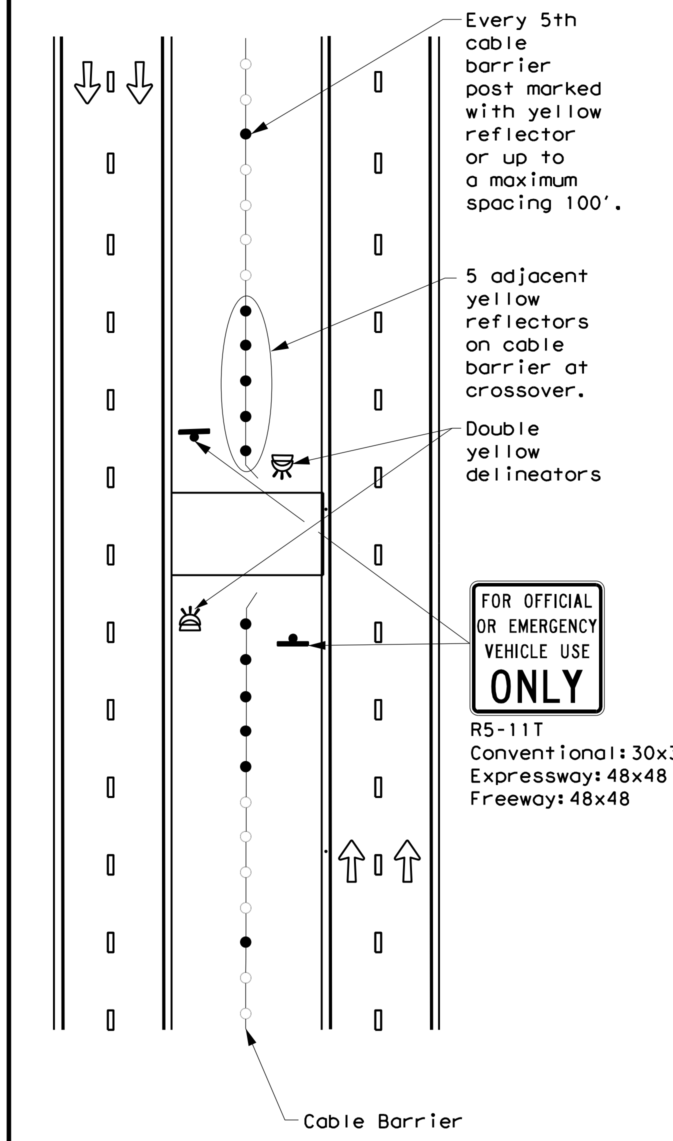
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



EMERGENCY CROSSOVER



NOTES

1. Equal spacing (100′ max), but not less than 3 single directional white barrier reflectors or delineators. On Continuos Barrier, equal spacing (100′ max.)

2. Equal spacing (100′ max), but not less than 3 single directional yellow barrier reflectors or delineators.

3. 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.

LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(6)-20

FILE: dom6-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0155	06	213	FM 2678
7-20	DIST		COUNTY	SHEET NO.
	CRP		REFUGIO	153

20F

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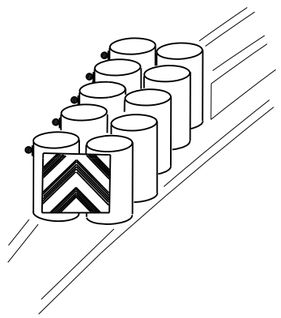
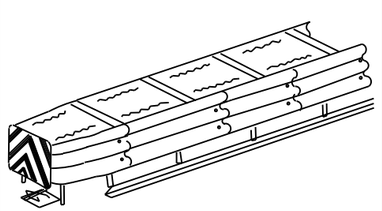
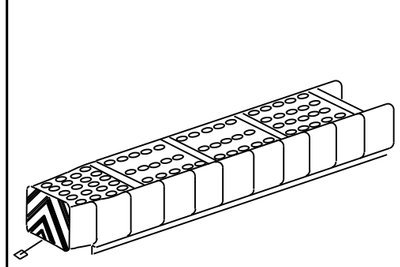
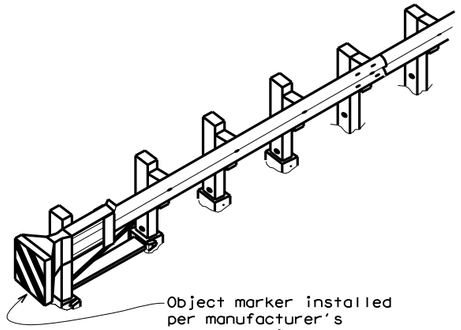
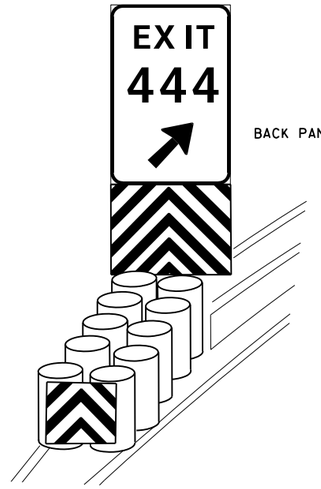
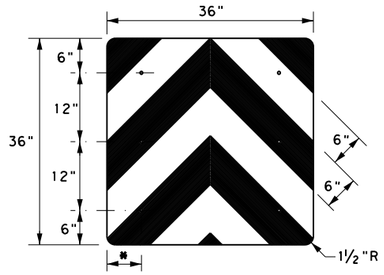


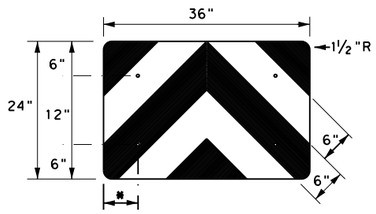




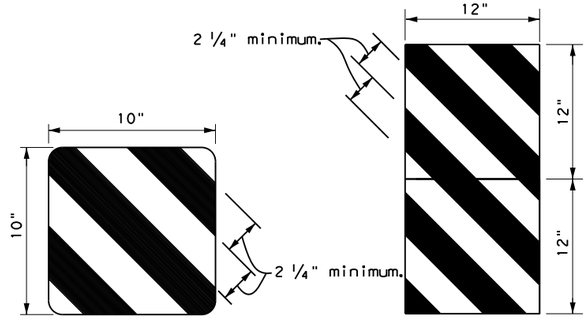




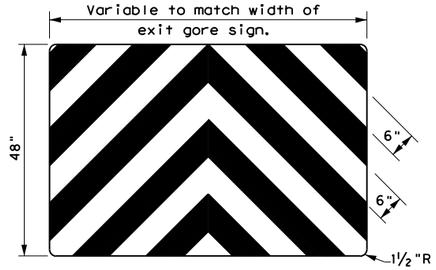


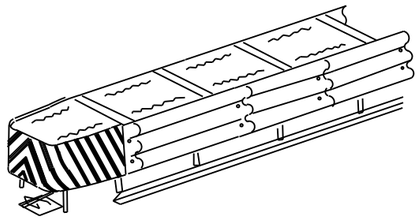


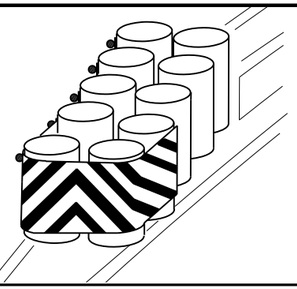
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

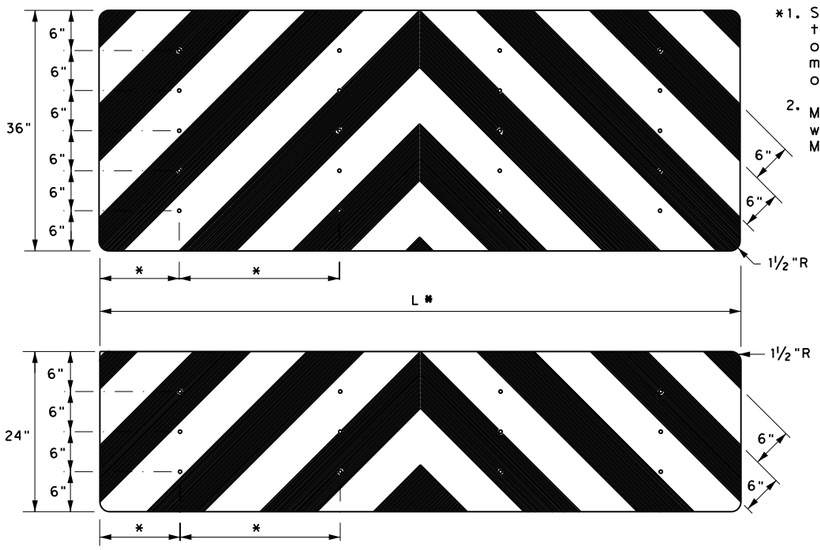


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation

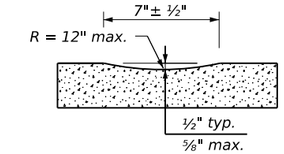
Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

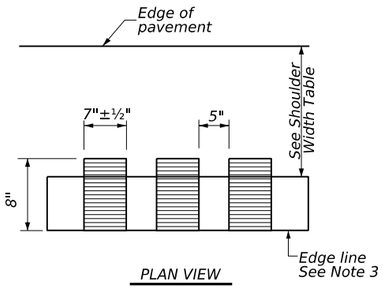
D & OM(VIA)-20

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	0155	06	213	FM 2678
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	CRP	REFUGIO		154
4-98 7-20				

20G

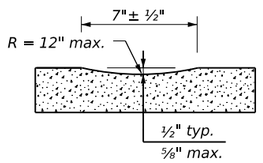


PROFILE VIEW
OPTION 1

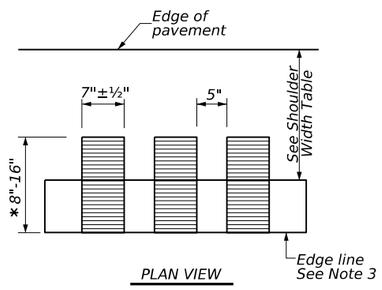


PLAN VIEW

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



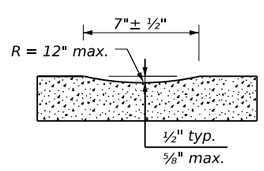
PROFILE VIEW
OPTION 2



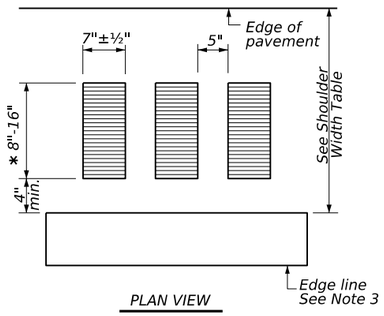
PLAN VIEW

∗ This distance may vary based on width of shoulder

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



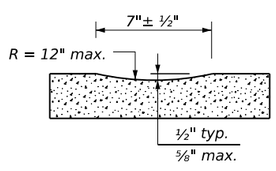
PROFILE VIEW
OPTION 3



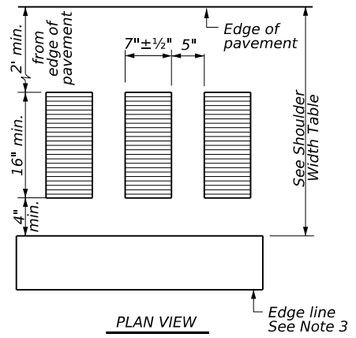
PLAN VIEW

∗ This distance may vary based on width of shoulder

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)

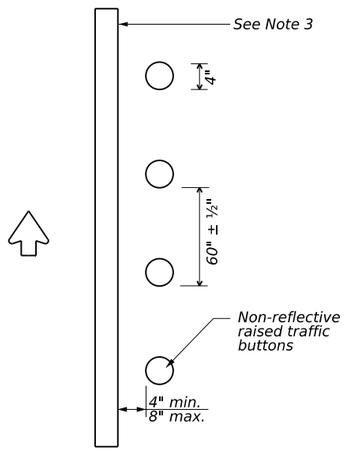


PROFILE VIEW
OPTION 4



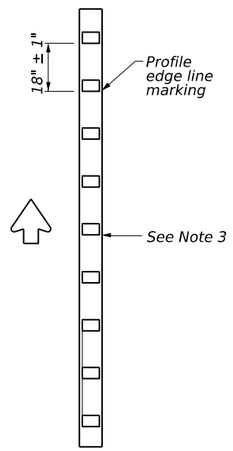
PLAN VIEW

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



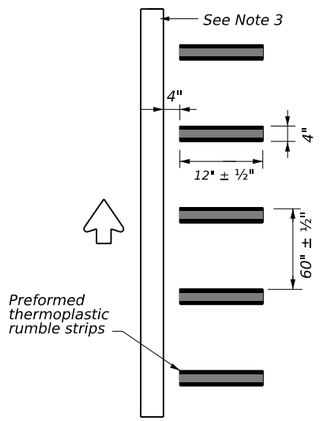
PLAN VIEW
OPTION 5

RAISED EDGE LINE (Rumble Strips)



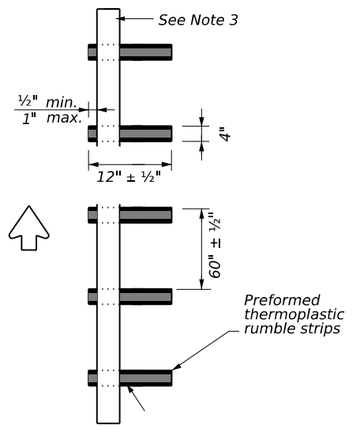
PLAN VIEW
OPTION 6

PROFILE EDGE LINE MARKINGS (Rumble Strips)



PLAN VIEW
OPTION 7

PREFORMED THERMOPLASTIC EDGE LINE (Rumble Strips)



PLAN VIEW
OPTION 8

PREFORMED THERMOPLASTIC EDGE LINE (Rumble Strips)

SHOULDER WIDTH TABLE		
EQUAL TO OR LESS THAN 2 FEET	GREATER THAN 2 FEET LESS THAN 4 FEET	EQUAL TO OR GREATER THAN 4 FEET
Option 1, 5, 6 or 8	Option 1, 2, 3 5, 6 or 7	Option 2, 4, 5 6 or 7

GENERAL NOTES

1. Rumble strips and profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
2. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
3. Use Standard Sheet PM(2) and FPM(1) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
4. See the Shoulder Width Table below for determining what options may be used for edge line rumble strips.
5. Breaks in edge line rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections, or driveways with high usage of large trucks when installed on conventional highways.
6. Rumble strips shall not be placed across exit or entrance ramps, acceleration or deceleration lanes, crossovers, gore areas, or intersections with other roadways.
7. Consideration should be given to noise levels when edgeline rumble strips are to be installed near residential areas, schools, churches, etc. A 3/8 inch deep (minimum) milled rumble strip may be considered in these areas.
8. Consideration shall be given to bicyclists. See RS(6).

WHEN INSTALLING MILLED DEPRESSION EDGE LINE RUMBLE STRIPS:

9. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Safety Division.
10. Pavement markings can be applied over milled shoulder rumble strips to create an edge line rumble strip.

WHEN INSTALLING RAISED OR PROFILE EDGE LINE RUMBLE STRIPS:

11. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per the manufacturer's recommendations.
12. Non-reflective traffic buttons shall be placed adjacent to the pavement marking delineating the edge line when used as a rumble strip. The color of the button should match the color of the adjacent edge line marking (white or yellow). The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
13. Non-reflective traffic buttons shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
14. The minimum distance between the edge line and the buttons should be used if the shoulder is less than 8 feet in width.
15. Raised profile thermoplastic markings used as edge lines may substitute for buttons.

Texas Department of Transportation

Traffic Safety Division Standard

EDGE LINE RUMBLE STRIPS ON UNDIVIDED OR TWO LANE HIGHWAYS RS(2)-23

FILE:	rs(2)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS		0155	06	213	FM 2678
10-13 1-23		DIST	COUNTY		SHEET NO.
		CRP	REFUGIO		155

DATE: 10/13/2023 3:53:17 PM
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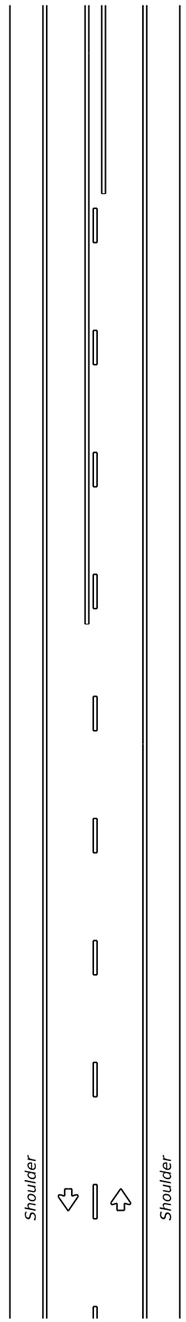
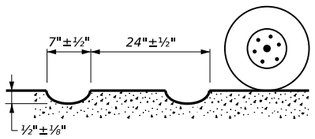
DATE: 10/13/2023 3:53:35 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design Set/13. Standards/Roadway Standards/RS(4)-23.dgn

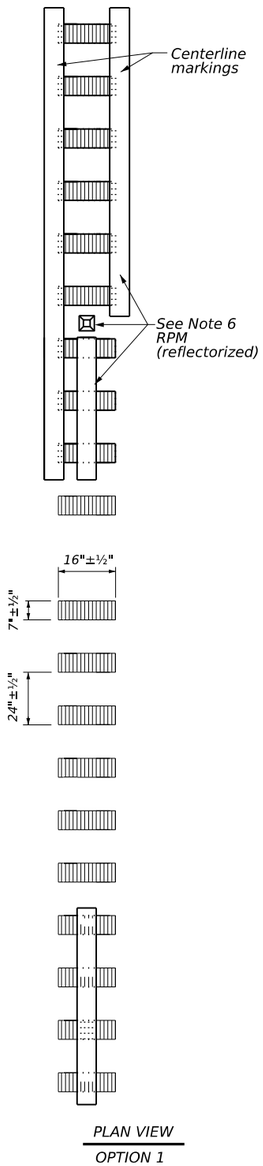
CENTERLINE RUMBLE STRIPS



TWO LANE TWO-WAY HIGHWAYS

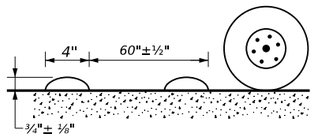


PROFILE VIEW

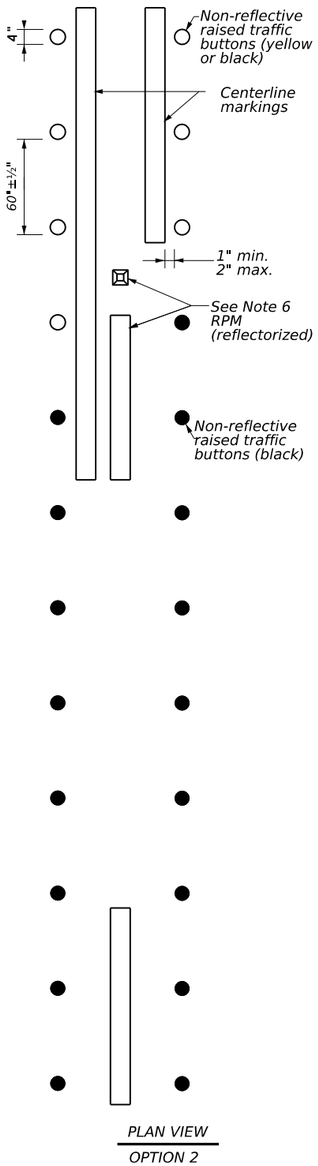


PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS

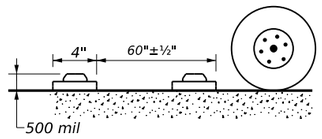


PROFILE VIEW

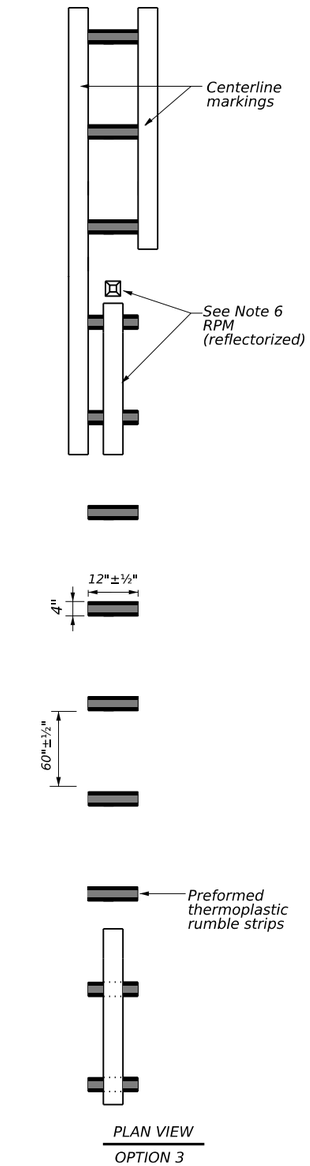


PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS

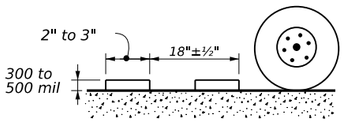


PROFILE VIEW

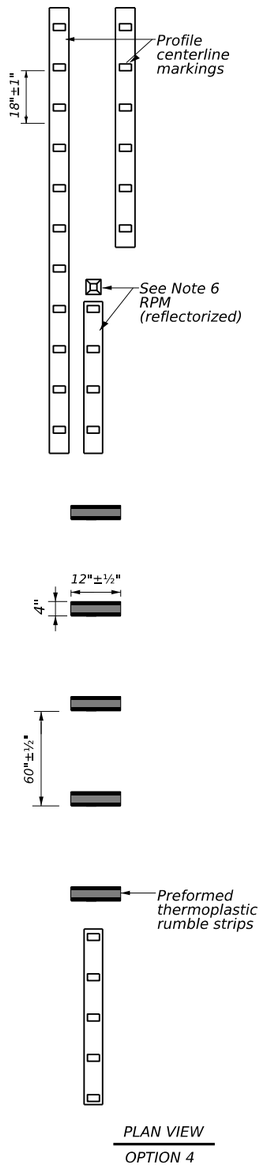


PLAN VIEW
OPTION 3

PREFORMED THERMOPLASTIC RUMBLE STRIPS



PROFILE VIEW



PLAN VIEW
OPTION 4

PROFILE CENTERLINE MARKINGS AND PREFORMED THERMOPLASTIC RUMBLE STRIPS

GENERAL NOTES

1. This standard sheet provides guidelines for installing centerline rumble strips on two-lane highways with or without shoulders.
2. Centerline and edge line rumble strips or profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
3. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
4. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Safety Division.
5. Breaks in milled centerline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections or driveways with high usage of large trucks.
6. Use standard sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings and profile markings.
7. Consideration should be given to noise levels when centerline rumble strips are to be installed near residential areas, schools, churches, etc. A 3/8 inch deep (minimum) milled rumble strip may be considered in these areas.
8. Pavement markings must be applied over milled centerline rumble strips.

WHEN INSTALLING CENTERLINE RUMBLE STRIPS:

9. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per manufacturer's recommendations.
10. When using non-reflective raised traffic buttons as a centerline rumble strip, the button shall be placed adjacent to the pavement marking delineating the centerline. The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
11. The color of the button should be yellow for a continuous no passing roadway. Black buttons should be used in areas where passing is allowed.
12. Consideration shall be given to bicyclists. See RS(6).

WHEN INSTALLING EDGE LINE RUMBLE STRIPS WITH OR WITHOUT CENTERLINE RUMBLE STRIPS ON UNDIVIDED HIGHWAYS:

13. See standard sheet RS(2).

Texas Department of Transportation

Traffic Safety Division Standard

CENTERLINE RUMBLE STRIPS ON TWO LANE TWO-WAY HIGHWAYS RS(4)-23

FILE: rs(4)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0155	06	213	FM 2678
10-13 1-23	DIST	COUNTY		SHEET NO.
	CRP	REFUGIO		156

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with the TPDES Construction General Permit TXR150000 (CGP). The Texas Department of Transportation (TxDOT) ensures that project specifications include adequate best management practices (BMPs) for this project.

For all projects with any soil disturbing activities, TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office. If no field office is available, then this SWP3 shall be kept in the appropriate TxDOT Area Office.

This SWP3 is consistent with requirements specified in applicable stormwater plans and the projects environmental permits, issues, and commitments (EPICs). A copy of the CGP is included in Attachment 2.12 of the SWP3 binder.

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0155-06-213

1.2 PROJECT LIMITS:
From: FM 136

To: FM 774

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 28.16710 ,(Long) 97.20882

END: (Lat) 28.29258 ,(Long) 97.25277

1.4 TOTAL PROJECT AREA (Acres): 133.3

1.5 TOTAL AREA TO BE DISTURBED (Acres): 25.3

1.6 NATURE OF CONSTRUCTION ACTIVITY:
ROADWAY EXCAVATION, FLEXIBLE BASE, SURFACE TREATMENT, PAVEMENT MARKINGS, SIGNS, AND DRAINAGE STRUCTURES.

1.7 MAJOR SOIL TYPES:

Soil Type	Description
ARANSAS CLAY, 0 TO 1% SLOPES	90% CLAY, POORLY DRAINED, HIGH RUNNOF RATE
BARRADA CLAY, 0 TO 1% SLOPES	90% CLAY, VERY POORLY DRAINED, RUNOFF NEGLIGIBLE
COPANO FINE SANDY LOAM, 0 TO 1% SLOPES	85% CLAY, POORLY DRAINED, RUNOFF NEGLIGIBLE
EDROY CLAY, 0 TO 1% SLOPES	85% CLAY, POORLY DRAINED, RUNOFF NEGLIGIBLE
MONTEOLA CLAY, 3 TO 5% SLOPES	85% CLAY, MODERATELY WELL DRAINED, VERY HIGH RUNOFF RATE
NARTA LOAM, 0 TO 1% SLOPES	90% CLAY, POORLY DRAINED, HIGH RUNOFF RATE
ORELIA FINE SANDY LOAM, 0 TO 1% SLOPES	90% CLAY, WELL DRAINED, LOW RUNOFF RATE
PAPALOTE FINE SANDY LOAM, 0 TO 1% SLOPES	85% CLAY, MODERATELY WELL DRAINED, MEDIUM RUNOFF RATE
SARITA-FALFURRIAS FINE SANDS, 0 TO 5% SLOPES	70% CLAY, WELL DRAINED, RUNOFF NEGLIGIBLE
VICTORIA CLAY, 0 TO 1% SLOPES	97% CLAY, WELL DRAINED, MEDIUM RUNOFF RATE

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):
PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

- ☐ PSLs determined during preconstruction meeting
- ☐ PSLs determined during construction
- ☐ No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:
(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.5.)

- ☒ Mobilization
- ☒ Install sediment and erosion controls
- ☒ Blade existing topsoil into windrows, prep ROW, clear and grub
- ☒ Remove existing pavement
- ☒ Grading operations, excavation, and embankment
- ☒ Excavate and prepare subgrade for proposed pavement widening
- ☐ Remove existing culverts, safety end treatments (SETs)
- ☐ Remove existing metal beam guard fence (MBGF), bridge rail
- ☒ Install proposed pavement per plans
- ☒ Install culverts, culvert extensions, SETs
- ☒ Install mow strip, MBGF, bridge rail
- ☒ Place flex base
- ☒ Rework slopes, grade ditches
- ☒ Blade windrowed material back across slopes
- ☒ Revegetation of unpaved areas
- ☒ Achieve site stabilization and remove sediment and erosion control measures
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

- ☐ Sediment laden stormwater from stormwater conveyance over disturbed area
- ☐ Fuels, oils, and lubricants from construction vehicles, equipment, and storage
- ☐ Solvents, paints, adhesives, etc. from various construction activities
- ☐ Transported soils from offsite vehicle tracking
- ☐ Construction debris and waste from various construction activities
- ☐ Contaminated water from excavation or dewatering pump-out water
- ☐ Sanitary waste from onsite restroom facilities
- ☐ Trash from various construction activities/receptacles
- ☐ Long-term stockpiles of material and waste
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.11 RECEIVING WATERS:
Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

- X Development of plans and specifications
- X Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- X Post Construction Site Notice
- X Submit NOI/CSN to local MS4
- X Perform SWP3 inspections
- X Maintain SWP3 records and update to reflect daily operations
- X Complete and submit Notice of Termination to TCEQ
- X Maintain SWP3 records for 3 years
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

- X Day To Day Operational Control
- X Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- X Post Construction Site Notice
- X Submit NOI/CSN to local MS4
- X Maintain schedule of major construction activities
- X Install, maintain and modify BMPs
- X Complete and submit Notice of Termination to TCEQ
- X Maintain SWP3 records for 3 years
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:

MS4 Entity

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			157
STATE	STATE DIST.	COUNTY	
TEXAS	CRP	REFUGIO	
CONT.	SECT.	JOB	HIGHWAY NO.
0155	06	213	FM 2678

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- ☐ ☐ Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Soil Retention Blankets
- ☐ ☐ Geotextiles
- ☐ ☐ Mulching/ Hydromulching
- ☐ ☐ Soil Surface Treatments
- ☐ ☐ Temporary Seeding
- ☐ ☐ Permanent Planting, Sodding or Seeding
- ☒ ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Vertical Tracking
- ☐ ☐ Interceptor Swale
- ☐ ☐ Riprap
- ☐ ☐ Diversion Dike
- ☐ ☐ Temporary Pipe Slope Drain
- ☐ ☐ Embankment for Erosion Control
- ☐ ☐ Paved Flumes
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- ☒ ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Dewatering Controls
- ☐ ☐ Inlet Protection
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- ☐ ☐ Sediment Control Fence
- ☐ ☐ Stabilized Construction Exit
- ☐ ☐ Floating Turbidity Barrier
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Vegetated Filter Strips
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

T / P

- ☐ ☐ Sediment Trap
  - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
  - ☐ 3,600 cubic feet of storage per acre drained
- ☐ ☐ Sedimentation Basin
  - ☐ Not required (<10 acres disturbed)
  - ☐ Required (>10 acres) and implemented.
    - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
    - ☐ 3,600 cubic feet of storage per acre drained
  - ☐ Required (>10 acres), but not feasible due to:
    - ☐ Available area/Site geometry
    - ☐ Site slope/Drainage patterns
    - ☐ Site soils/Geotechnical factors
    - ☐ Public safety
    - ☐ Other: _____

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- ☒ Excess dirt/mud on road removed daily
- ☐ Haul roads dampened for dust control
- ☒ Loaded haul trucks to be covered with tarpaulin
- ☐ Stabilized construction exit
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- ☒ Chemical Management
- ☒ Concrete and Materials Waste Management
- ☒ Debris and Trash Management
- ☒ Dust Control
- ☒ Sanitary Facilities
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- ☒ Fire hydrant flushings
- ☒ Irrigation drainage
- ☒ Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- ☒ Potable water sources
- ☒ Springs
- ☒ Uncontaminated groundwater
- ☒ Water used to wash vehicles or control dust
- ☒ Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3 .

2.9 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			158
STATE	STATE DIST.	COUNTY	
TEXAS	CRP	REFUGIO	
CONT.	SECT.	JOB	HIGHWAY NO.
0155	06	213	FM 2678

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.

2.

☒ No Action Required ☐ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

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

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

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

☐ No Permit Required

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

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

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1.

2.

3.

4.

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

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☐ Temporary Vegetation	☐ Silt Fence	☐ Vegetative Filter Strips
☐ Blankets/Matting	☐ Rock Berm	☐ Retention/Irrigation Systems
☐ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☐ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☒ Mulch Filter Berm and Socks
☒ Mulch Filter Berm and Socks	☒ Mulch Filter Berm and Socks	☒ Compost Filter Berm and Socks
☒ Compost Filter Berm and Socks	☒ Compost Filter Berm and Socks	☐ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☐ 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

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

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

☐ No Action Required ☒ Required Action

Action No.

Amphibians

1. Be advised of the potential occurrence of the black-spotted newt in the project area. This species prefers warm shallow watered areas with vegetative cover such as arroyos, canals, ditches, or even shallow depressions. During dry seasons, the newt lays dormant underground. Ensure that SW3Pand 401 BMPs are implemented and maintained during construction. Avoid harming this species if encountered.
2. Be advised of the potential occurrence of sheep frog in the project area. This species prefers subterranean burrows, such as those of pack rats. They will also burrow under fallen tree limbs. Although this species will remain in its burrow for most of the year, they may emerge with heavy rains in the late summer season. Breeding takes place in August and September. Minimize disturbance to downed woody debris. Ensure that SW3P and 401 BMPs are implemented and maintained during construction. Avoid harming this species if encountered.
3. Be advised of the potential occurrence of South Texas siren in the project area. This species prefers warm shallow waters with vegetative cover such as ponds, ditches and swamps. This is a nocturnal species that burrows during the day. Ensure that SWPPP and 401 BMPs are implemented and maintained during construction. Avoid harming this species if encountered.
4. Minimize impacts to wetland, temporary and permanent open water features, including depressions, and riverine habitats. Maintain hydrologic regime and connections between wetlands and other aquatic features. Use barrier fencing to direct animal movements away from construction activities and areas of potential wildlife-vehicle collisions in construction areas directly adjacent, or that may directly impact, potential habitat for the target species.
5. 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.
6. 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

7. 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.
8. Prior to construction, perform daytime surveys for nests including under bridges and in culverts to determine if they are active before removal. Nests that are active should not be disturbed. Do not disturb, destroy, or remove active nests, including ground nesting birds, during the nesting season. Avoid the removal of unoccupied, inactive nests, as practicable. Prevent the establishment of active nests during the nesting season on TxDOT owned and operated facilities and structures proposed for replacement or repair. Do not collect, capture, relocate, or transport birds, eggs, young, or active nests without a permit.

Insects

9. Be advised of the potential occurrence of Monarch Butterfly in the project area. This species can inhabit a variety of habitats including native prairies, pastures, o pen woodlands and savannas, desert scrub, roadsides, and other habitats with abundant nectar plants, including urbanized areas. Although adults may be present year-round, they are primarily observed between March and November (Caterpillars; April and September). Common host plants in Texas are milkweeds, milkweed vines, climbing milkweed, swallowworts, and Anglepod.

Reptiles

10. Be advised of the potential occurrence of Texas scarlet snake in the project area. This semi-fossorial species inhabits mixed hardwood scrub on sandy soils and feeds on reptile eggs. Avoid harming this species and unnecessary impacts to burrows if encountered.
11. Be advised of the potential occurrence of Texas indigo snake in the project area. This species prefers lightly vegetated areas not far from permanent water sources and is active year round. During severely dry weather, this species will retreat to dens/burrows left by other animals or brush piles. Avoid harming this species and unnecessary impacts to burrows if encountered.
12. Due to the increased activity (mating) of reptiles during the spring, construction activities like clearing or grading should attempt to be scheduled outside of the spring (April-May) season. It is also encouraged to conduct ground disturbing activities before October to prevent disturbing reptiles that become less active and may be using burrows in the project area.

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS)	0155	06	213	FM 2678
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	REFUGIO		159

13. Apply hydromulching and/or hydroseeding in areas for soil stabilization and/or revegetation of disturbed areas where feasible. If hydormulching and/or hydroseeding are not feasible due to site conditions, utilize erosion control blankets or mats that contain no netting or contain loosely woven natural fiber netting is preferred. Plastic netting should be avoided to the extent practicable.

14. If reptiles are found on project site allow species to safely leave the project area. Avoid or minimize disturbing or removing downed trees, rotting stumps, and leaf litter where feasible.

Plants

15. Minimize the amount of vegetation cleared. Removal of nat ive 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. The use of seed mix that contains seeds from only locally adapted native species is recommended.

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

Water Quality

17. Minimize the use of equipment in streams and riparian areas during construction. When possible, equipment access should be from banks, bridge decks, or barges. When temporary stream crossings are unavoidable, remove stream crossing once they are no longer needed and stabilize banks and soil around the crossings.

18. Rubbish found near bridges on TxDOT ROW should be removed and disposed of properly to minimize the risk of pollution. Rubbish does not include brush piles or snags.

Other

19. 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.

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.

LIST OF ABBREVIATIONS

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

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

☐ Yes ☒ No

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

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

☐ Yes ☒ No

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

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

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

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

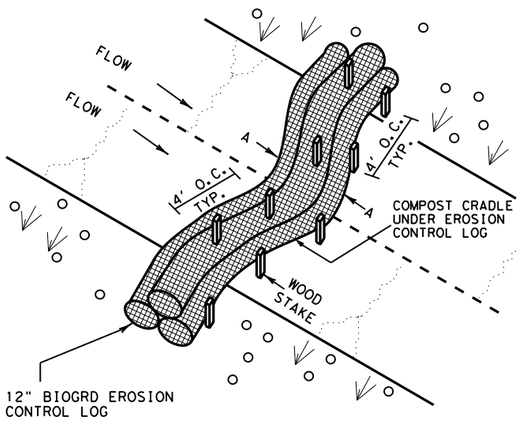
3.

Texas Department of Transportation — Design Division Standard

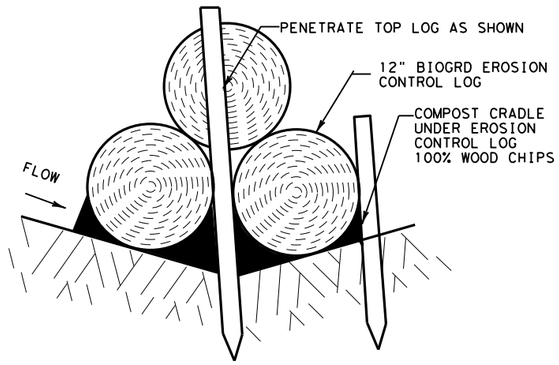
ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
© TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS)	0155	06	213	FM 2678
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	REFUGIO		160

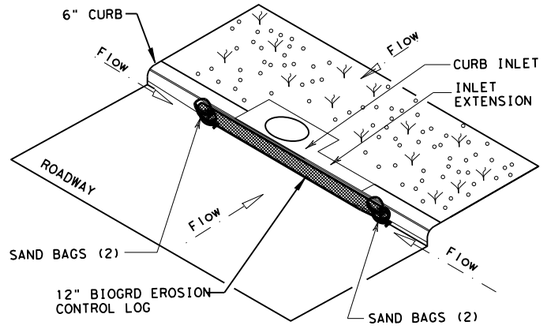


DITCH LINE SEDIMENT TRAP
NTS



SECTION A-A

DITCH LINE SEDIMENT TRAP A-A
NTS



CURB INLET SEDIMENT TRAP
NTS

SEDIMENT TRAP USAGE GUIDELINES

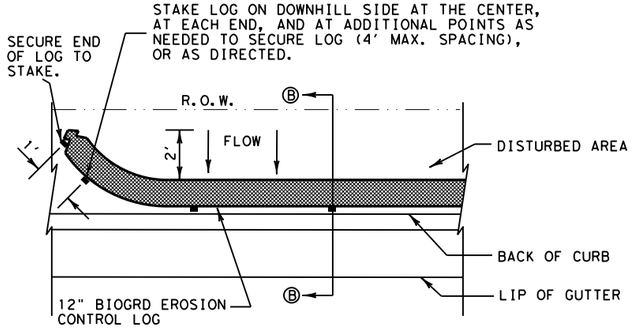
A sediment trap may be used to precipitate sediment out of runoff draining from an unstabilized area.

Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1,800 CF/Acre (0.5" over the drainage area).

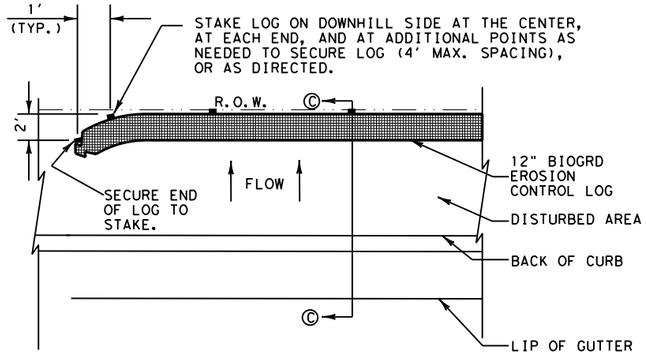
Sediment traps should be placed in the following locations:

1. Immediately preceding drain inlets
2. Just before the drainage enters a water course
3. Just before the drainage leaves the Right Of Way
4. Just before the drainage leaves the construction limits where drainage flows away from the project

The trap should be cleaned when the capacity has been reduced by half or the sediment has accumulated to a depth of 1', whichever is less. Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.



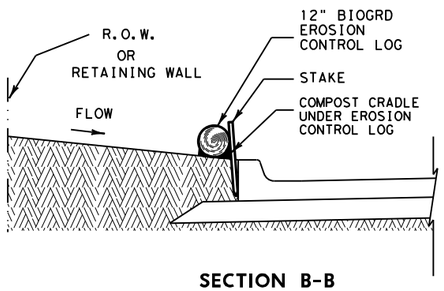
PLAN VIEW
NTS



PLAN VIEW
NTS

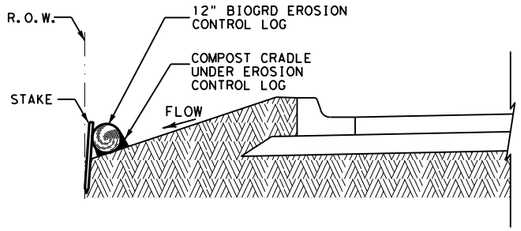
GENERAL NOTES

1. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED. MAXIMUM LENGTH OF LOGS SHALL BE 60' FOR 18" DIAMETER OR 30' FOR 12" DIAMETER LOGS.
2. 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.
3. STUFF LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE DENSITY THAT WILL HOLD SHAPE WITHOUT EXCESSIVE DEFORMATION.
4. STAKES SHALL BE 2" x 2" WOOD OR #3 REBAR, 4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED.
5. COMPOST CRADLE MATERIAL IS INCIDENTAL AND WILL NOT BE PAID FOR SEPARATELY.
6. SANDBAGS SHALL BE SUBSIDIARY TO ITEM 5049 BIODEGRADABLE EROSION CONTROL LOGS.



SECTION B-B

BACK OF CURB SEDIMENT TRAP
NTS



SECTION C-C

RIGHT-OF-WAY SEDIMENT TRAP
NTS

Texas Department of Transportation

BIODEGRADABLE EROSION CONTROL LOGS

CRP-BECL

CORPUS CHRISTI DISTRICT STANDARD — SHEET 1 OF 2

FILE: crp-becl.dgn	DN: TxDOT	CK:	DW: CAF	CK: PWS	STD:
ORIG DATE: MAY 2008	DIST	FED REG	FEDERAL AID PROJECT #		SHEET
REVISIONS	CRP	6			161
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	REFUGIO		0155	06	213	FM 2678

LEVELS DISPLAYED
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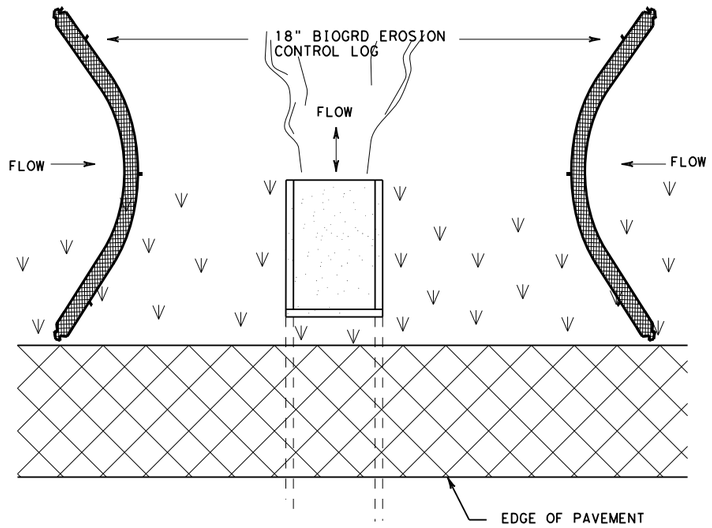
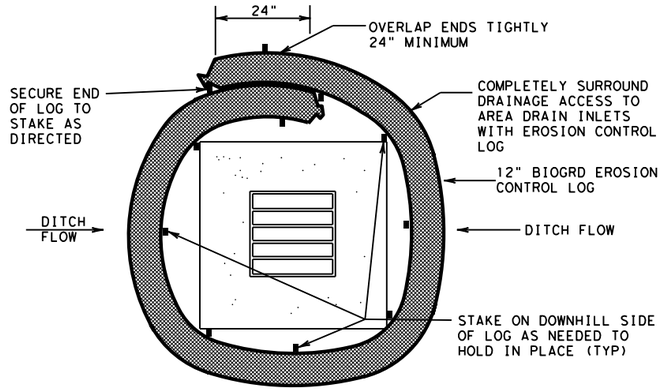
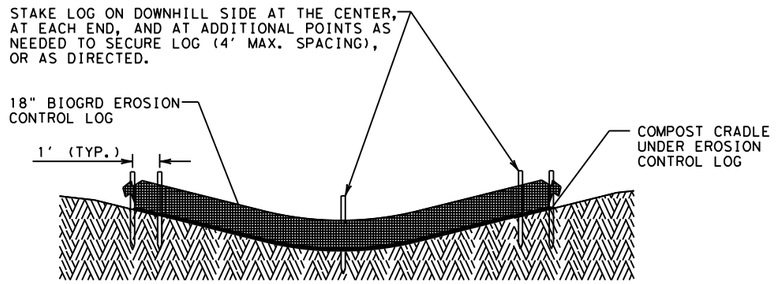


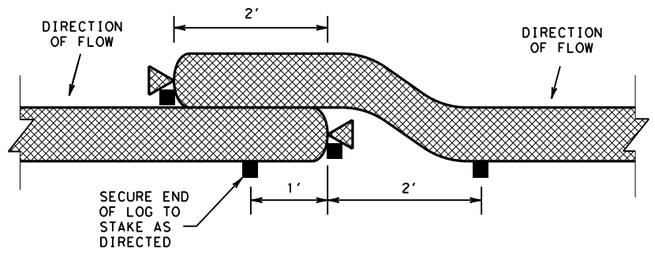
AT CULVERT ENDS
NTS



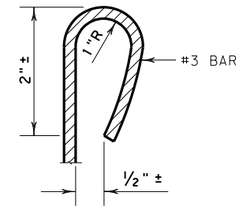
AT DROP INLETS
NTS



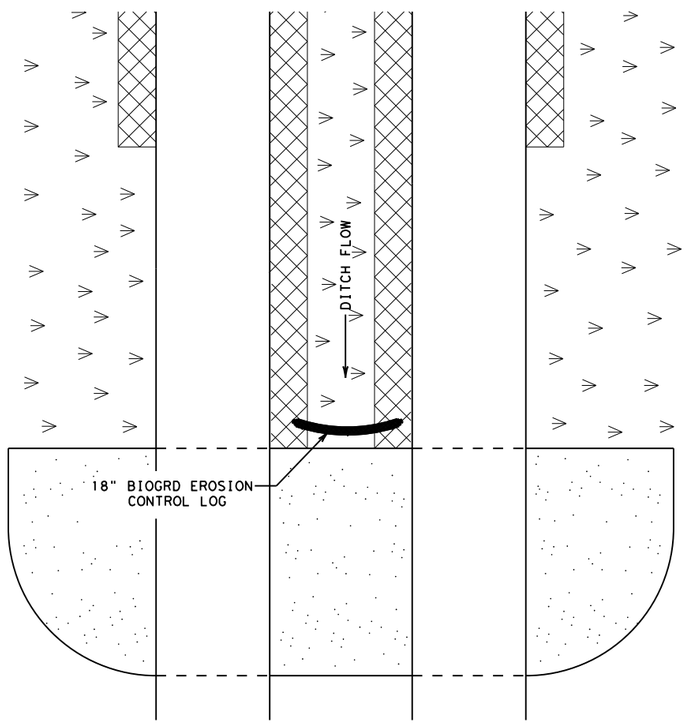
EROSION CONTROL LOG ELEVATION
NTS



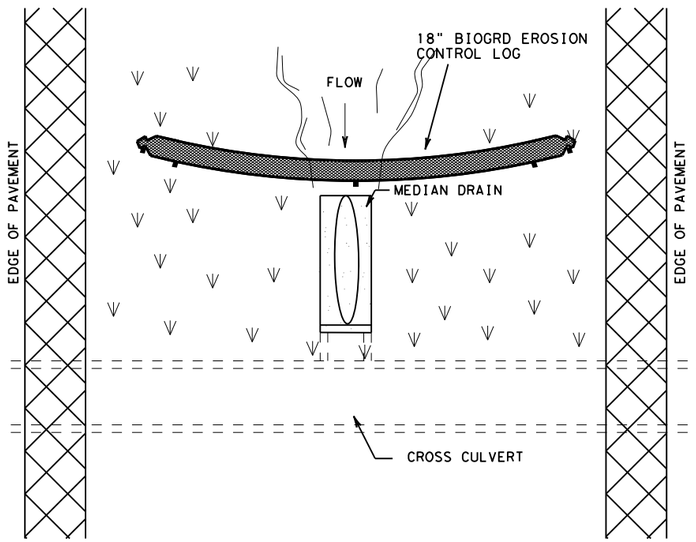
LAP DETAIL
NTS



REBAR STAKE DETAIL
NTS



AT BRIDGE MEDIAN
NTS



AT MEDIAN DRAINS
NTS

LEGEND

DISTURBED AREA

EXISTING VEGETATION

Texas Department of Transportation

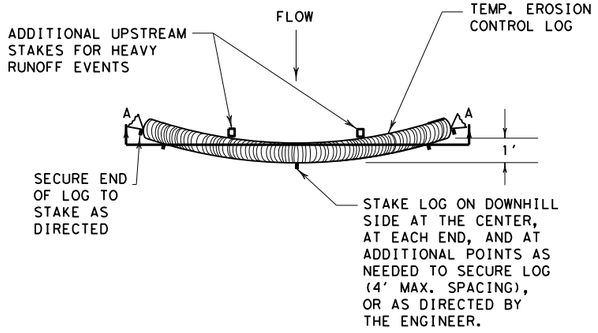
BIODEGRADABLE EROSION CONTROL LOGS

CRP-BECL

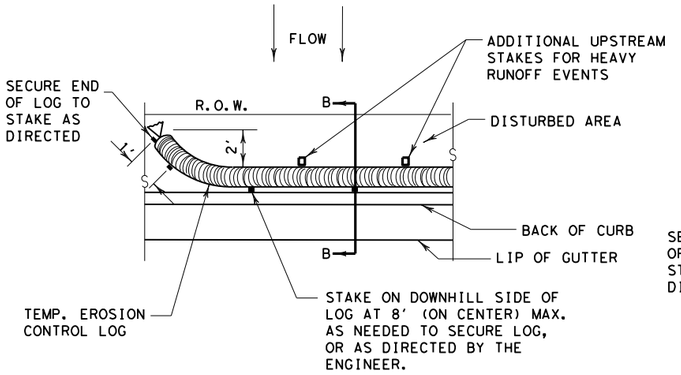
CORPUS CHRISTI DISTRICT STANDARD — SHEET 2 OF 2

FILE: crp-becl.dgn	DN: TxDOT	CK:	DW: CAF	CK: PWS	STD:
ORIG DATE: MAY 2008	DIST	FED REG	FEDERAL AID PROJECT #		SHEET
REVISIONS	CRP	6			162
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	REFUGIO	0155	06	213	FM 2678

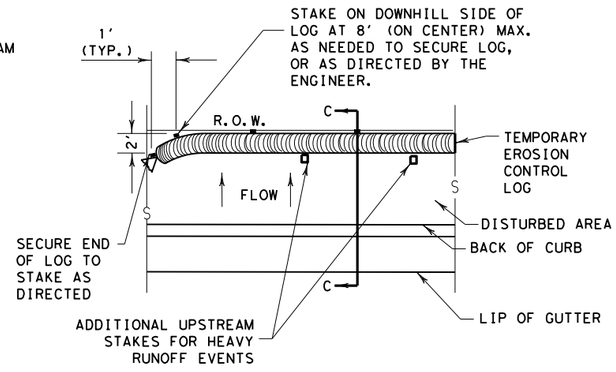
DATE: 10/13/2023
FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/0155062134 - Design/Plan Set/13. Standards/Environmental Standards/EC (1)-16.dgn



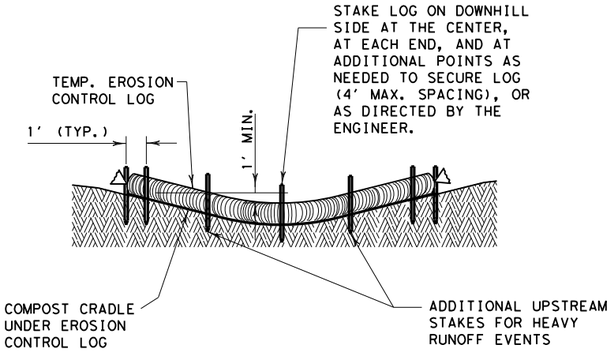
PLAN VIEW



PLAN VIEW



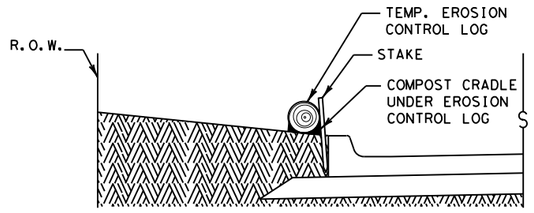
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

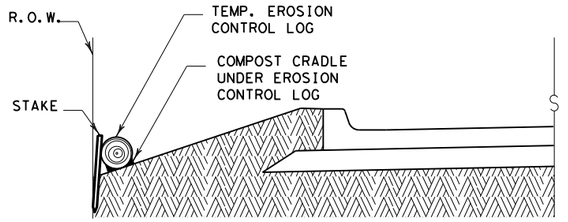
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

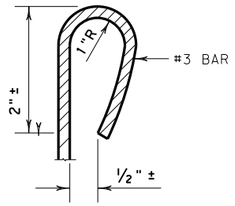
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL

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

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

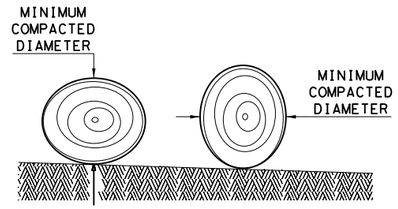
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916		DN: TxDOT		CK: KM	DW: LS/PT		CK: LS
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REVISIONS		0155	06	213		FM 2678	
		DIST		COUNTY			SHEET NO.
		CRP		REFUGIO			163

DATE: 10/13/2023
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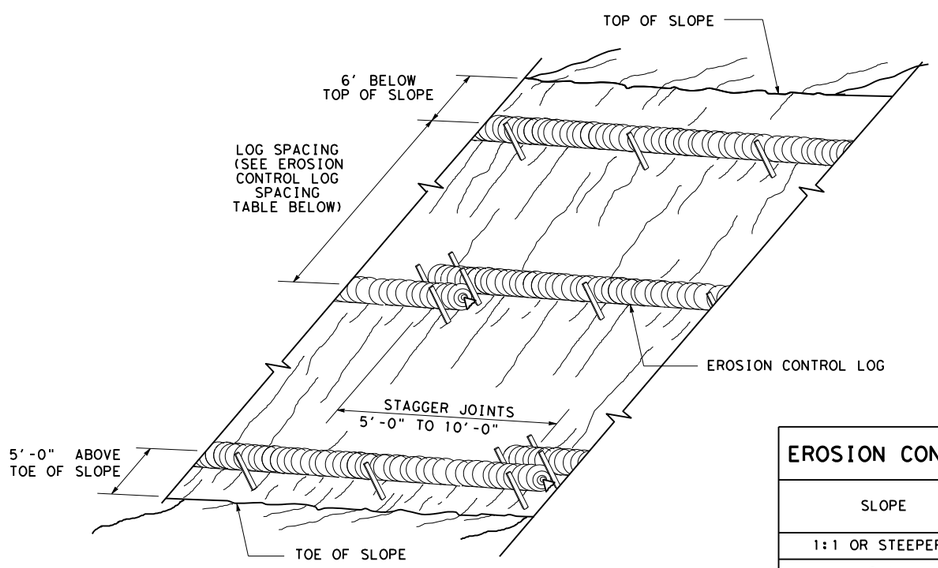
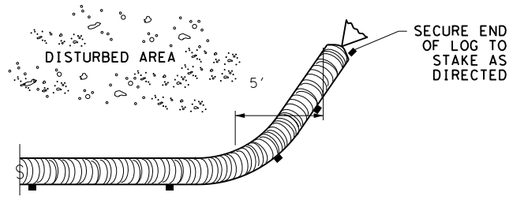


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

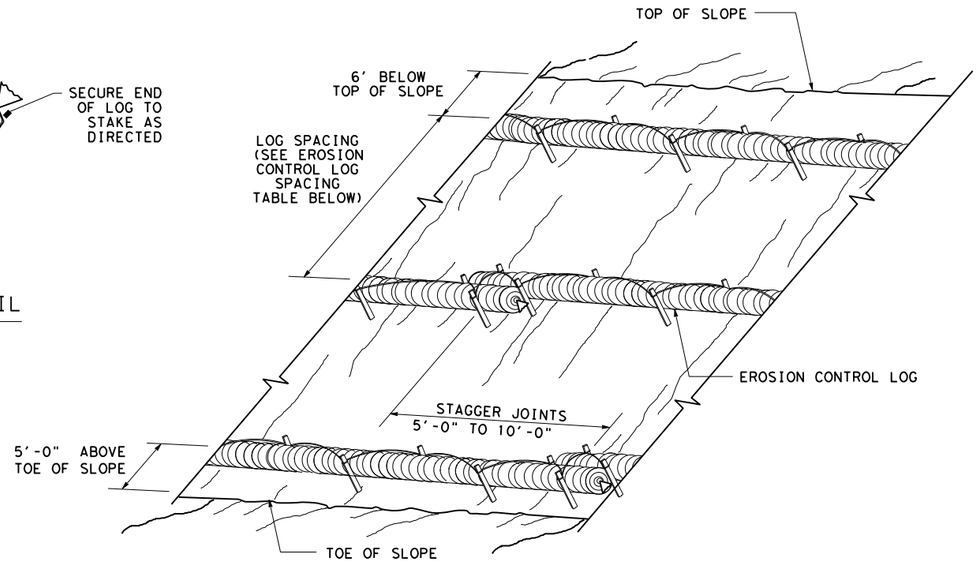
CL-SST



END SECTION RAP DETAIL

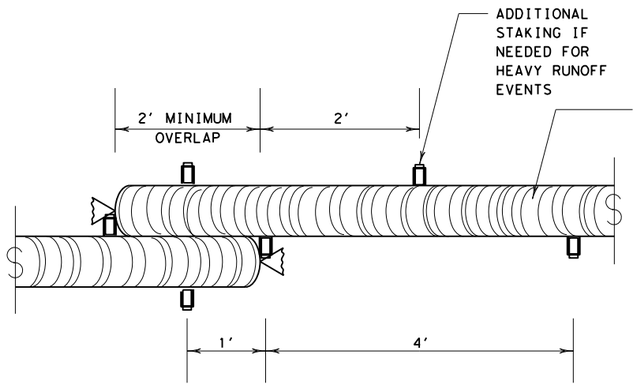
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

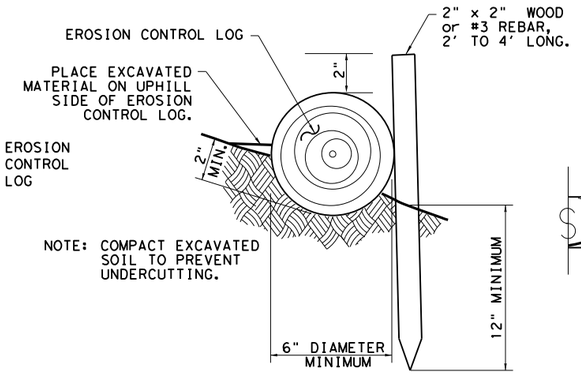
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

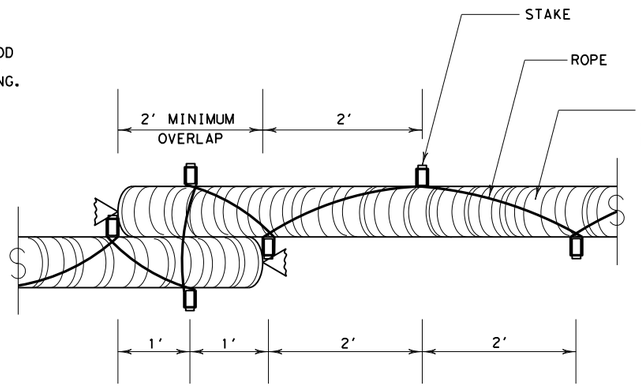


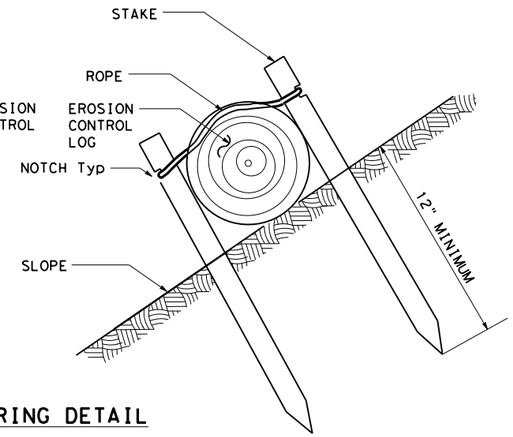


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

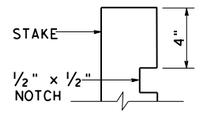
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

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REVISIONS	0155	06	213	FM 2678
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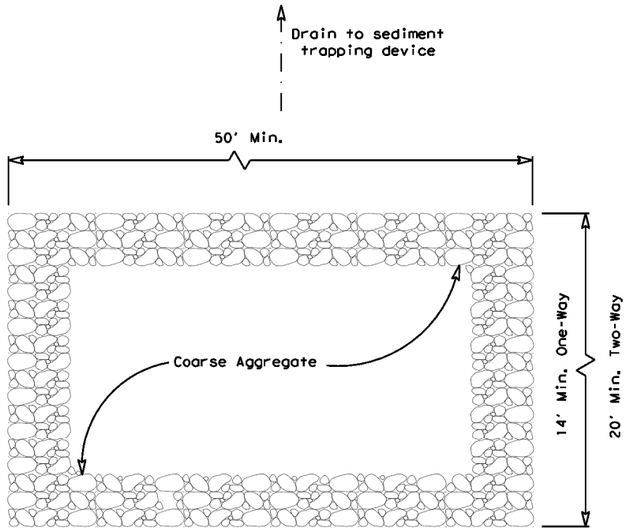
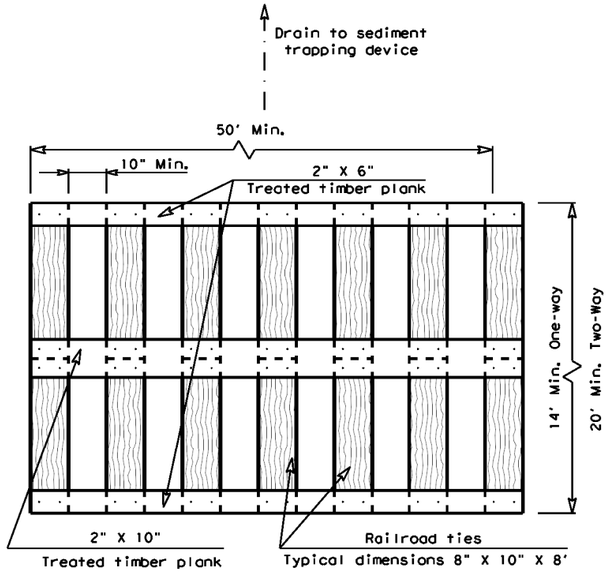
	CRP	REFUGIO		164

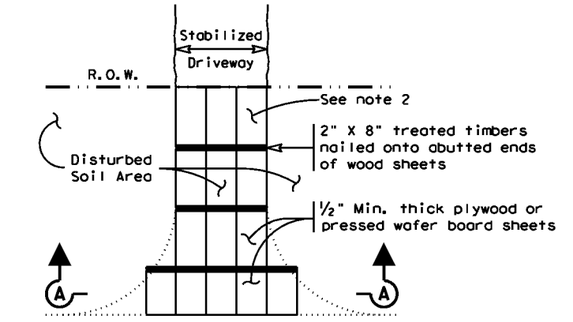
DATE:
FILE:



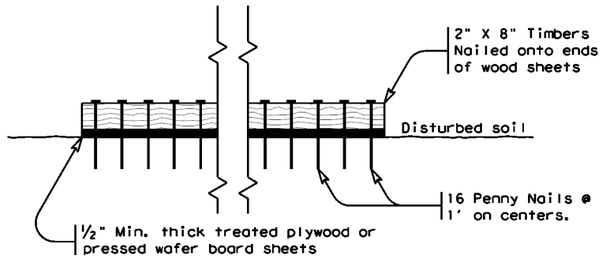
PLAN VIEW



PLAN VIEW



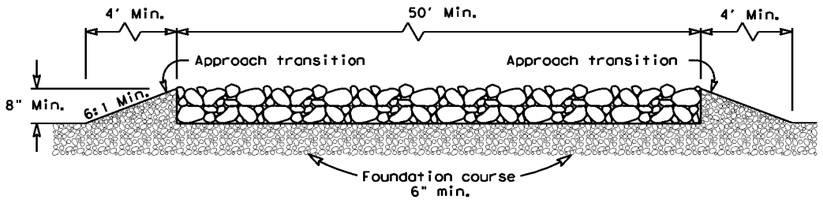
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

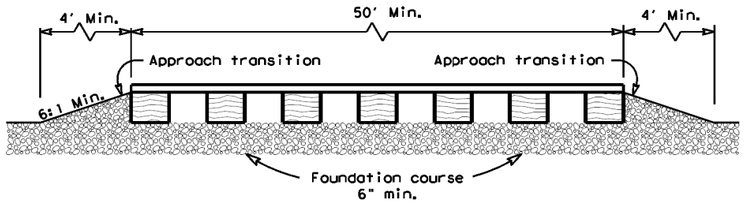
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
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	CRP	REFUGIO		165