FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
06	C 1599-3-17		1
STATE	DIST.		COUNTY
TEXAS	FTW		JOHNSON
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

PROJECT NO. C 1599-3-17

FM 2258

JOHNSON COUNTY

LIMITS : IH 35 TO CR 205

FOR THE REHABILITATION OF EXISTING ROADWAY
CONSISTING OF GRADING, FLEXBASE, HOT MIX ASPHALT CONCRETE,
DRAINAGE STRUCTURES, MBGF, SIGNING & PAVEMENT MARKINGS

NET LENGTH OF PROJECT

RDWY	= 15,496.30 FT	=	2.934 MI
BRG C CULV	= 32.00 FT	=	0.006 MI
TOTAL	= 15,528.30 FT	=	2.940 MI

INDEX OF SHEETS
SEE SHEET 2

FUNCTIONAL CLASSIFICATION : MAJOR COLLECTOR
TERRAIN = ROLLING
DESIGN SPEED = 40 MPH
CURRENT ADT (2022) = 2,033
FUTURE ADT (2042) = 2,846

FINAL PLANS

LETTING DATE: _____

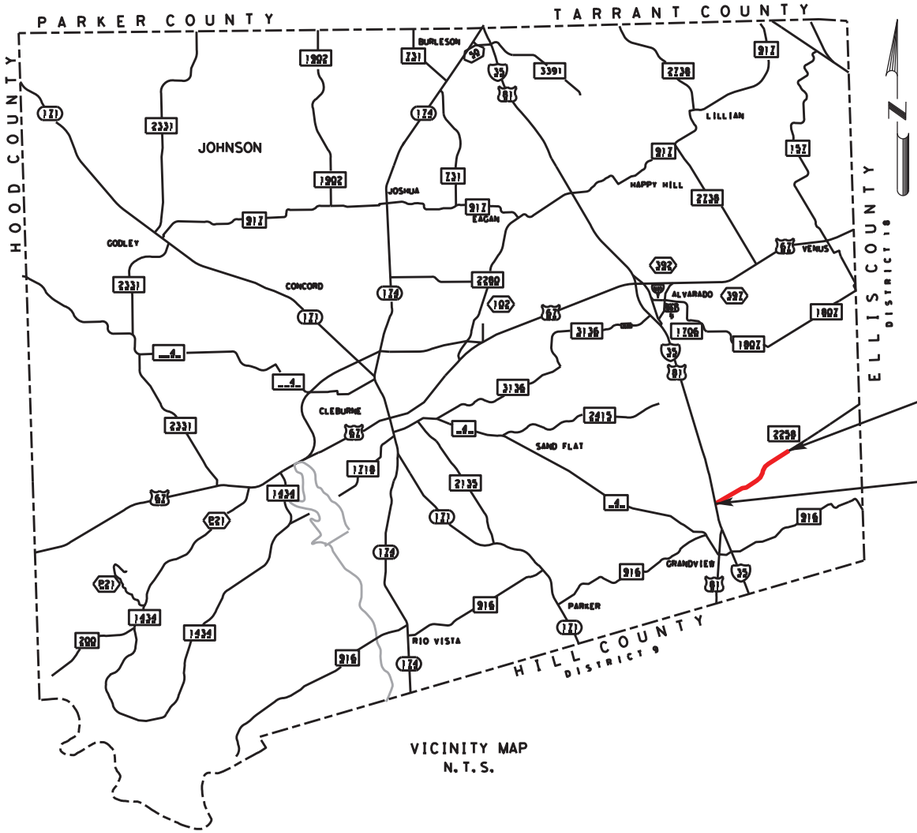
DATE CONTRACTOR BEGAN WORK: _____

DATE WORK COMPLETED & ACCEPTED: _____

FINAL CONTRACT COST: $ _____

CONTRACTOR: _____

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



VICINITY MAP
N. T. S.

END PROJECT FM 2258
STA. 165+00.00
CSJ 1599-03-017
REF MRK= 0568+1.142

BEGIN PROJECT FM 2258
STA. 06+60.00
CSJ 1599-03-017
REF MRK= 0566+0.192

EXCEPTIONS : NONE
RR CROSSINGS : NONE
EQUATIONS : 124+66.2 (124+79.2 - ASBUILTS)
BACK = 127+77.9 FWD (-311.7)

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

STATE OF TEXAS
HOMERO LUIS GUTIERREZ
36639
LICENSED PROFESSIONAL ENGINEER

Homero Luis Gutierrez
03/19/2024

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246
1202 LAKE POINTE PARKWAY PH: (713) 782-3811
SUGAR LAND, TX 77478 FAX: (713) 782-3812
TBPE REGISTRATION NO. F-5246

SUBMITTED FOR LETTING: _____

CONSULTANT PROJECT MANAGER

Texas Department of Transportation

SUBMITTED FOR LETTING 02/20/2024

AREA ENGINEER

RECOMMENDED FOR LETTING: 2/22/2024

DocuSigned by:
[signature]
DIRECTOR, TRANSPORTATION PLANNING & DEVELOPMENT

APPROVED FOR LETTING 2/22/2024

DocuSigned by:
David M Salazar, P.E.
DISTRICT ENGINEER

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STATE OF TEXAS
HOMERO LUIS GUTIERREZ
36639
LICENSED
PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED WITH AN '*' HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

Homero Luis Gutierrez, P.E. 2/19/2024
DATE

STATE OF TEXAS
JOHN HERNANDEZ
91831
LICENSED
PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED WITH AN '**' HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

John Hernandez, P.E. 2/19/2024
DATE

STATE OF TEXAS
KURT E KILLIAN
95742
LICENSED
PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED WITH AN '***' HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

Kurt Killian, P.E. 2/19/2024
DATE

STATE OF TEXAS
JOSE A. SANCHEZ
87890
LICENSED
PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED WITH AN '****' HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

Jose Sanchez, P.E. 2/19/2024
DATE

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

INDEX OF SHEETS

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06	SEE TITLE SHEET		2
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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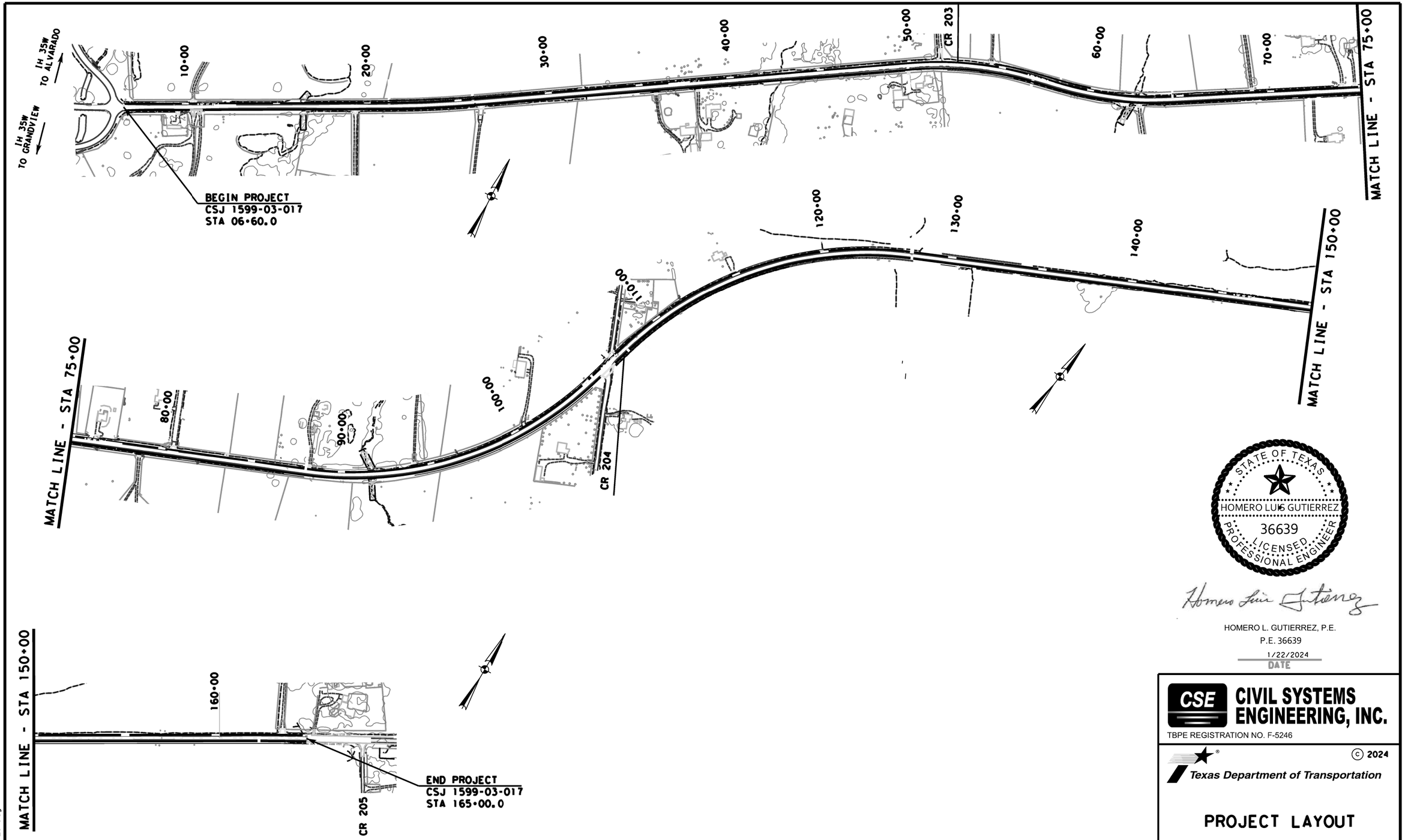

STATE OF TEXAS
HOMERO LUIS GUTIERREZ
36639
LICENSED PROFESSIONAL ENGINEER

HOMERO L. GUTIERREZ, P.E.
P.E. 36639
1/22/2024
DATE

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

PROJECT LAYOUT

SCALE : NTS SHEET 1 OF 1

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		3
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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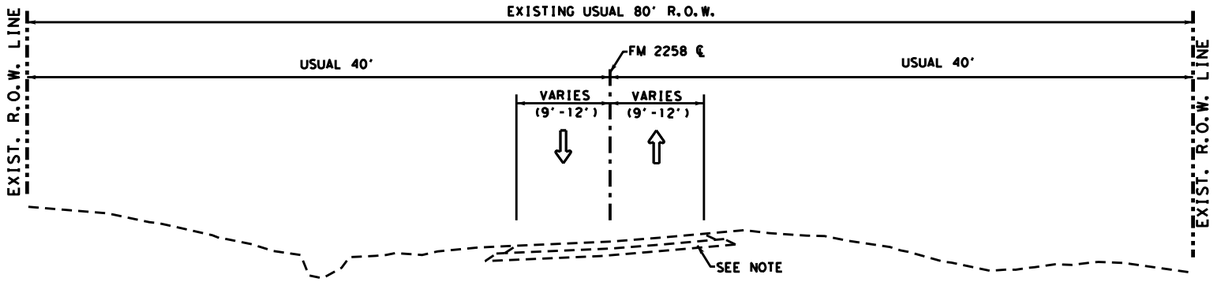


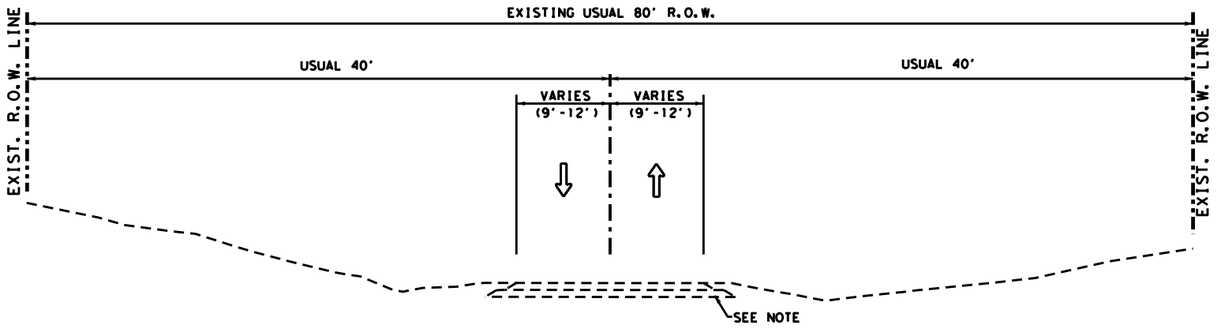
EXISTING FM 2258 TYPICAL SECTION W/ SUPERELEVATION

STA 20+55.0 TO STA 25+57.85
STA 48+85.0 TO STA 65+65.0
STA 87+50.35 TO STA 128+88.7

BORING LOCATIONS AND PAVEMENT DEPTHS									
STATION	BORING NO.	BORING DEPTH (FT)	PLASTICITY INDEX (PI)	BORING DEPTH (FT)	PLASTICITY INDEX (PI)	ASPHALT THICKNESS (IN.)	BASE THICKNESS (IN.)	PAVEMENT THICKNESS (IN.)	PAVEMENT LOCATION
11+94.35	B-1	1	41	4	25	2.00	6.00	8.0	EB
70+15.38	B-2	2	46	6	36	8.75	4.00	12.8	WB
131+47.75	B-3	1	54	8	52	5.375	4.00	9.375	EB

FOR CONTRACOTR'S INFORMATION. SEE NOTE.

ROW Widths by STA			
STA TO STA	(ROW) LT	(ROW) RT	TOTAL ROW
STA 6+60 TO STA 141+00	40'	40'	80'
STA 141+00 TO STA 167+00	50'	40'	90'
STA 167+00 TO STA 169+00	60'	40'	100'



EXISTING FM 2258 TYPICAL SECTION

STA 6+60.0 TO STA 20+55.0
STA 25+57.85 TO STA 48+85.0
STA 65+65.0 TO STA 87+50.35
STA 128+88.7 TO STA 165+00.0

NOTE:

1. AVERAGE ASPHALT DEPTH = 5.38"
   AVERAGE BASE DEPTH = 4.67"
   AVERAGE EXISTING PAVEMENT DEPTH = 10.0"

STATE OF TEXAS
HOMERO LUIS GUTIERREZ
36639
LICENSED PROFESSIONAL ENGINEER

HOMERO L. GUTIERREZ, P.E.
P.E. 36639
2/12/2024
DATE

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

EXISTING TYPICAL SECTIONS

FM 2258

SCALE = NTS SHEET 1 OF 1

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06	SEE TITLE SHEET		4
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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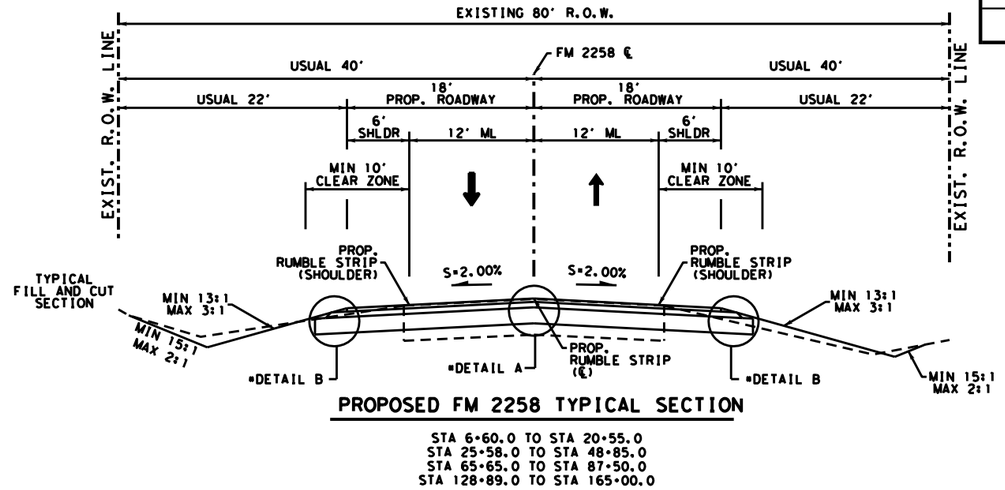
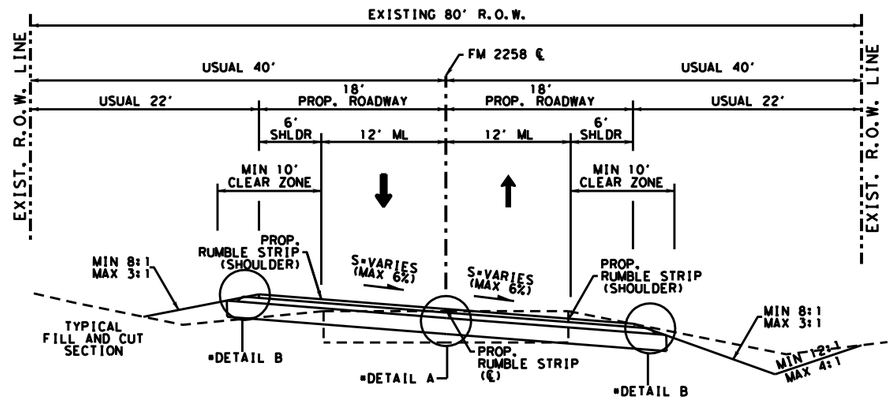


PROPOSED FM 2258 TYPICAL SECTION

STA 6+60.0 TO STA 20+55.0
STA 25+58.0 TO STA 48+85.0
STA 65+65.0 TO STA 87+50.0
STA 128+89.0 TO STA 165+00.0



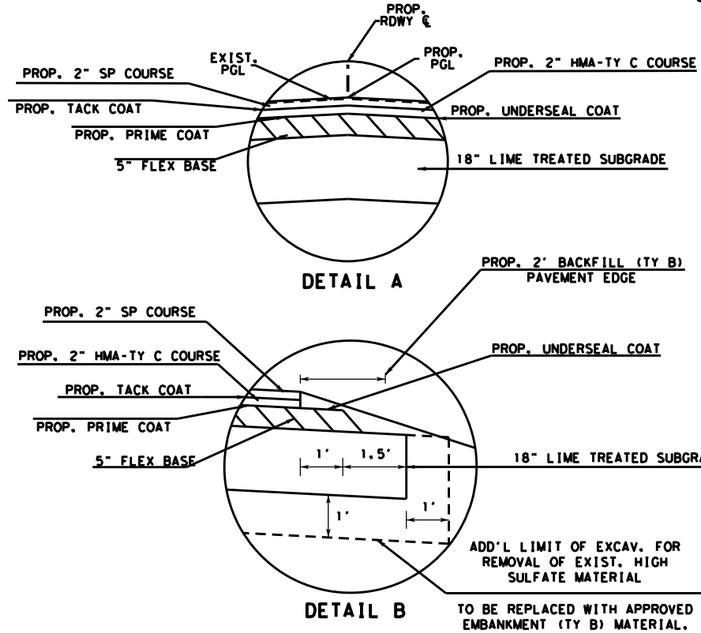
PROPOSED FM 2258 TYPICAL SECTION W/ SUPERELEVATION

STA 20+55.0 TO STA 25+58.0
STA 48+85.0 TO STA 65+65.0
STA 87+50.0 TO STA 128+89.0

ROW Widths by STA			
STA TO STA	(ROW) LT	(ROW) RT	TOTAL ROW
STA 6+60 TO STA 141+00	40'	40'	80'
STA 141+00 TO STA 167+00	50'	40'	90'
STA 167+00 TO STA 169+00	60'	40'	100'

NOTES:

1. ROADWAY CROSS SLOPES CHANGE AT SUPERELEVATIONS.
2. HIGH SULFATE MATERIAL APPROX. LOCATIONS FROM STA 160+40.0 TO STA 165+00.0. SEE DETAIL B BELOW FOR FURTHER INFORMATION.
3. ALL OTHER AREAS SHALL REQUIRE EMBANKMENT (TY D) MATERIAL.
4. THE PRIME COAT SHALL BE APPLIED FIRST FOLLOWED BY THE SEAL COAT.
5. EMULSIFIED ASPHALT (ITEM 314) SHALL BE USED WITH THE PROPOSED 2' BACKFILL AT PAVEMENT EDGE.



STATE OF TEXAS
HOMERO LUIS GUTIERREZ
36639
LICENSED PROFESSIONAL ENGINEER

HOMERO L. GUTIERREZ, P.E.
P.E. 36639
2/2/2024
DATE

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

PROPOSED TYPICAL SECTIONS

FM 2258

SCALE = NTS — SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		5
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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Specification Data

Basis of Estimate

Item	Description	Rate	Unit
168	Vegetative Watering	169,400 gal./acre 1,000 gal.	
210	Roll (Med Pneumatic Tire)(TY B) Surface Treat	1 hr./2000 sq. yd./crse**	hr.
216	Roll (Proof) 18" Lime Treated Subgrade	1 hr./10000 sq. yd./crse**	hr.
260	Lime (Hydrated, Commercial Or Quicklime)(Slry)	150 lb./cu. yd.	ton
310	Asph Mat'l (MC-30, or CBSMS-1S) (Flex Base)	0.30 gal./sq. yd.*	gal.
3076	D-GR HMA (TY C)	115 lb./sq. yd.-in.	ton
3077	SP MIXES SP-C (SAC-A)	115 lb./sq. yd.-in.	ton
3077	Tack Coat - CSS-1P	0.20 gal./sq. yd.	gal.
3077	Tack Coat - Trackless Tack	0.15-0.22 gal./sq. yd.	gal.

* Based On 50% Asphalt Residue.
** Non-Pay, for Contractor's Information Only.

Compaction Requirements for Base Courses

Item	Material	Course	Min. Density
247	Flex Base	All	100 %

(Minimum Density is the percentage of density required based on results of Tex-113-E, Tex-114-E, Tex-120-E, and/or Tex-121-E)

Seal Coat Data

One Course on Subgrade or Flexible Base

Asph Type AC-10, CRS-2 or RC-250
Rate 0.56 gal./sq. yd.

Aggr Type PB or Uncoated Aggregate
Grade 4
Rate 1 cu. yd./135 sq. yd.

Note: The rates of asphalt and aggregate application are for estimating purposes only and may be varied as directed.

Special Notes

Utilities:

The TxDOT Utility Coordinator shall contact all pipeline operators to ensure utility owner personnel is onsite during any construction over their utility.

Contractor Responsibilities:

Contractor shall field verify all existing materials prior to beginning work on pertinent bid items.

Electronic Files:

All files in the FTP site are subject to the License Agreement Shown on the FTP site.

Electronic files containing answered pre-letting questions and other project related design information will be placed in the following FTP site periodically.

Check this site for new information. Notices of new postings will not be sent out by the Engineer.

The data located in these files is for non-construction purposes only and can be found at

TxDOT's public FTP site at https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting Responses/.

Access is read-only.

All files in the FTP site are subject to the License Agreement shown on the FTP site.

To obtain a copy of the project plans free of charge, submit a request from the following site:
http://www.txdot.gov/business/letting-bids/plans-online.html

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

Area Engineer's Email: Daniel Poole, P.E. daniel.poole@txdot.gov
Assistant Area Engineer's Email: Peter Ross, P.E. peter.ross@txdot.gov
Design Manager's Email: Suchita Potta, P.E. suchita.potta@txdot.gov

Contractor questions will be accepted through email, phone, and in person by the above individuals.

For Q&A's on Proposals navigate to:
https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors.

Use 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.

All questions submitted that generate a response will be posted through this site. The site is organized by District, Project Type (Construction or Maintenance), Letting Date, CCSJ/Project Name.

Lane Closures:

Single lane closures, except as otherwise shown in the plans, will be restricted to off-peak hours as defined in the following table:

Peak Hours		Off-Peak Hours	
6 to 9 AM Monday through Friday	3 to 7 PM Monday through Friday	9 AM to 3 PM and 7 PM to 6 AM Monday through Friday	All day Saturday and Sunday

Work that requires closure of multiple travel lanes in the same direction, except as otherwise shown in the plans, are restricted to night hours between 9 PM and 6 AM.

Existing storm sewers and utilities are shown from the best available information. Verify the location of all underground facilities prior to starting work.

For dimensions of right-of-way not shown on the plans, see right-of-way map on file at the TxDOT District Office.

Modifications to Lane Closure / Work Restrictions:

Submit a request in writing for approval by the Engineer a minimum of 10 days in advance of implementing a change to lane closure restrictions.

When deemed necessary, the Engineer will lengthen, shorten, or otherwise modify lane closure restrictions as traffic conditions warrant.

When deemed necessary, the Engineer will modify the list of major events when new events develop, existing events are rescheduled, or when warranted.

Special Events/ Special Situations will be handled on a case-by-case basis. No work restricting lane closures is allowed from 3 PM a day before to 9 AM the day after the Special Event or Special Situation.

Provide all-weather surface for temporary ingress and egress to adjacent property, as directed. Materials, labor, equipment and incidentals necessary to provide temporary ingress and egress will not be paid for directly, but will be subsidiary to the various bid items.

Where necessary, the governing slopes indicated herein may be varied from the limits shown, to the extent approved.

On superelevated curves the shoulders will have the same cross-slope as the pavement, unless otherwise indicated.

On superelevated curves where the grade line is in a sag or on a flat grade, overlay the shoulders to the extent necessary to prevent trapping of water on the high side.

All driveway openings will be determined by the Engineer and will conform with Texas Department of Transportation "Regulations for Access Driveways to State Highways" adopted September 1953, and revised June 2004.
Locations and lengths of all private entrances are approximate only. The actual locations, lengths, lines and grades are to be determined by the Engineer and shall conform to the regulations of Johnson County.

Do not discolor or damage existing curb and curb and gutter during construction operations. In the event of discoloration or damage, clean or repair as directed.

Remove the grass from the crown of shoulders or pavement edges by blading or other approved methods. Payment for this work will not be made directly but will be subsidiary to the various items of the contract.

Locations shown for drainage structures refer to the control points of structures as follows:

1) Manholes, Inlets, and Junction Boxes—Locations are at the centroid of the structure; when two structure types are specified, location is at the centroid of the top structure. Bottom structure may be positioned as required to align with top structure, storm drain pipes and other adjacent structures.

2) Street Inlets—Locations are at the face of curb at a distance of L/2 from the end of the inlet.

3) Headwalls—Locations are to the outside face of the headwall at the centerline of the pipe or box structure. For pipe headwalls with Type "P" or "C" safety end treatment, locations are on the centerline of the pipe structure at the limit of payment for pipe.

Plugging of pipes or culverts will not be paid for directly, but will be subsidiary to the various bid items, unless otherwise shown on the plans.

Provide temporary drain openings at all low points or other drainage structures, as required, at the Contractor's expense.

Remove any obstructions to existing drainage due to the contractor's operations, as required, at the Contractor's expense.

Install all required concrete riprap flumes immediately following the construction of ditches in which they are to be placed. In addition, apply all erosion control measures as shown on the plans or as directed, immediately following construction of channels to their required line, grade, and section.

Saw cuts shown in these plans are not paid for directly but are subsidiary to the various bid items.

Perform no nighttime work on this project except when directed or allowed to do so by the Engineer in writing.

If nighttime work is allowed/required, provide Multi-Directional Lighting Device with the following quality requirements:

1) Provide a 2000 watt (minimum) SIROCCO lighting balloon, Airstar lighting or equivalent.
2) It is the intent of the MDLD lighting to supplement the Portable Road Light and Power Unit used to illuminate work hours.
3) Provide MDLD units which can self-inflate and capable of illuminating approximately 15,000 sq ft.
4) Provide MDLD units of 1.1 meter horizontal diameter and capable of withstanding 60 mph winds when fully inflated and operating.
5) Provide MDLD units with two (2) 1,000 watt halogen bulbs recommended by the manufacture.

Item 4 – Scope of Work

Reimbursement for project overhead will not be considered until project completion has extended beyond the original Contract Time.

Item 5. Control of the Work

Workers on foot who are exposed to traffic or construction equipment within the right-of-way shall wear Department approved safety hats and vests, high visibility 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 area or nighttime work. Except in emergency situations, flagger stations shall be illuminated when flagging is used at night.

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

Item 6. Control of Materials

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

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

The Buy America Material Classification Sheet is located at the below link.

https://www.txdot.gov/business/resources/materials/buy-america-material-classification-sheet.html for clarification on material categorization.

Item 7. Legal Relations and Responsibilities

No significant traffic generator events identified.

All contractor employees must always wear hard hats and safety vests when they are on site.

This contract requires work to be done on railroad property. Cooperate with the railroads and comply with all their requirements including obtaining any required training before performing work on railroad property.

Submit to the Engineer an original railroad liability insurance policy.

Do not initiate activities in a project specific location (PSL) associated with a U.S. Army Corps of Engineers (USACE) permit area that has not been previously evaluated by the USACE as part of the permit review of this project. Such activities include, but are not limited to haul roads, equipment staging areas, borrow and disposal sites. "Associated" as defined here means materials are delivered to or from the PSL. The permit area includes all waters of the U.S. or associated wetlands affected by activities associated with this project. Special restrictions may be required for such work. The contractor will be responsible for all consultations with the USACE regarding activities, including project specific locations (PSLs) that have not been previously evaluated by the USACE. Provide the Department with a copy of all consultations or approvals from the USACE prior to initiating activities.

The Contractor may proceed with activities in PSLs that do not affect a USACE permit area if a self-determination has been made that the PSL is non-jurisdictional or proper USACE clearances have been obtained in jurisdictional areas or have been previously evaluated by the USACE as part of the permit review of this project. The contractor is solely responsible for documenting any determinations that their activities do not affect a USACE permit area. Maintain copies of these determinations for review by the Department or any regulatory agency.

Document and coordinate with the USACE, if required, prior to any excavation hauled from or embankment hauled into a USACE permit area by either (1) or (2) below.

(1) Restricted Use of Materials for Previously Evaluated Permit Areas. Document both the project specific location (PSL) and its authorization. Maintain copies for review by the Department or any regulatory agency. When an area within the project limits has been evaluated by the USACE as part of the permit process for this project:
   a. Suitable excavation of required material in the areas shown on the plans and cross sections as specified in Item 110 is used for permanent or temporary fill (Item 132, Embankment) within a USACE permit area;
   b. Suitable embankment (Item 132) from within the USACE permit area is used as fill within a USACE evaluated area; and,
   c. Unsuitable excavation or excess excavation ["Waste"] (Item 110) that is disposed of at a location approved by the Engineer within a USACE evaluated area.

(2) Contractor Materials from Areas Other than Previously Evaluated Areas. Provide the Department with a copy of all USACE coordination or approvals prior to initiating any activities for an area within the project limits that has not been evaluated by the USACE or for any off right of way locations used for the following, but not limited to haul roads, equipment staging areas, borrow and disposal sites:
   a. Item 132, Embankment, used for temporary or permanent fill within a USACE permit area; and,
   b. Unsuitable excavation or excess excavation ["Waste"] (Item 110, Excavation) that is disposed of outside a USACE evaluated area.

The total area disturbed for this project is 70.13 acres. The disturbed area in this project, all project locations in the Contract, and the 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 required authorization from the TCEQ for Contractor PSLs for construction support activities on or off the right of way. When the total area disturbed 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 right of way to the Engineer and to the local government that operates a separate storm sewer system.

When a bridge deck is milled, seal coated and overlaid, remove excess material. Do not just broom to the sides of the bridge, under guardrail, etc. Cover or protect all sealed expansion joints and rails on bridges and all railroad tracks encountered as approved. Clean and repair all of these features if they weren't properly protected at contractor's expense. This work is subsidiary work to applicable bid items.

Holiday Lane Closure Restrictions	
New Year's Eve and New Year's Day (December 31 through January 1)	3 PM December 30 through 9 AM January 2
Easter Holiday Weekend (Friday through Sunday)	3PM Thursday through 9 AM Monday
Memorial Day Weekend (Friday through Monday)	3 PM Thursday through 9 AM Tuesday
Independence Day (July 3 through July 5)	3 PM July 2 through 9 AM July 6
Labor Day Weekend (Friday through Monday)	3 PM Thursday through 9 AM Tuesday
Thanksgiving Holiday (Wednesday through Sunday)	3 PM Tuesday through 9 AM Monday
Christmas Holiday (December 23 through December 26)	3 PM December 22 through 9 AM December 27

Plan work schedules around the appropriate dates above to ensure productive work is performed without lane closures.

Item 8. Prosecution and Progress

Working days will be computed and charged in accordance with Section 8.3.1.1, 'Five-Day Workweek.'

The road-user cost liquidated damages is $1124 per day.

Prepare the progress schedule as a CPM, include all planned work activities and sequences, and show Contract completion within the number of working days specified. Submit an updated hard copy when changes to the schedule occur or when requested.

Item 100. Preparing Right of Way

Measurement for this item will be along the centerline of the project with the limits of measurements as shown on the plans.

Removal of existing overhanging limbs along the existing roadway right-of-way (R.O.W.) will be in accordance with Item 752, "Tree and Brush Removal" as per Section 4.2 Tree Trimming, to include limbs extending beyond 3-feet from the R.O.W. line, except that this work will not be paid for directly, but will be subsidiary to Item 100, "Preparing Right of Way". The trimming limits have to be approved by the Engineer.

Burning of brush and trees will not be allowed on this project. Process all trees and brush requiring removal from the project by chipping and stockpiling in a location shown on the plans or as directed by the Engineer. Meet the requirements for the wood chips in accordance with Item 161.2B. Use this material in Item 161 as the wood chips to produce the Erosion Control Compost, or as directed. Any material that is not utilized on this project shall become the property of the contractor. Remove tree parts larger than 12 inches in diameter from the project. This will be considered subsidiary to Item 100.

Removal of existing concrete pavement will be in accordance with Item 104, "Removing Concrete" except that this work will not be paid for directly, but will be subsidiary to Item 100, "Preparing Right of Way."

Item 104. Removing Concrete

When associated with a structure to be removed, removal of riprap as required, approach slabs, and shoulder drains are to be included in the unit price bid for Item 496, "Removing Structures."

Item 105. Removing Treated and Untreated Base and Asphalt Pavement

Cement, lime, and/or lime fly-ash treated base material removed on this project will become the property of the Contractor.

Item 110. Excavation

Cross-sections for pay quantity determination of earthwork may be developed photogrammetrically.

Review proposed waste sites to determine if any site is located in a "Base Floodplain" or "Floodway" as defined by the Federal Emergency Management Agency (FEMA).

If waste material from this project is placed in a base floodplain as defined by FEMA, obtain a permit from the local community responsible for enforcing National Flood Insurance Program (NFIP) regulations. Ensure that the owner of the property receiving the waste has obtained the necessary permit.

Items 110, 112, and 132. Excavation, Subgrade Widening, and Embankment

Sulfate-laden subgrade material that is to be treated with either lime or cement, including material up to one foot outside the proposed treatment limits, is susceptible to sulfate heave. It has been determined that an excessive concentration of sulfate in the soils (>3,000 PPM by dry weight of the soil) exists for given areas of excavation and/or proposed treated subgrade within the project limits. The areas of moderate to high concentrations are as follows:

1. Areas of subgrade to be treated (3,001–7,000 PPM—moderate concentration)
    a. No areas identified
2. Areas of excavation (>7,000 PPM—high concentration)
    a. Station 160+40 to Station 165+00

Moderate sulfate levels are those defined from 3,001 PPM to 7,000 PPM. Treat these soils with lime at the full 150 lb./cu. yd. rate or cement at the full 125 lb./cu. yd. rate. Do not split the rates to ensure complete reaction and mitigation of sulfate heaves. Allow the mixture to mellow for 7 days to provide for complete reaction.

High sulfate levels are not allowed within the treatment and surrounding areas as defined above.

Test soils for soluble sulfates in accordance with Test Method Tex-145 and Tex-146-E.

Treat moderate sulfate or excavate high sulfate areas identified above and other subgrade areas that may be identified during construction as having moderate to high sulfate concentrations to a depth of one foot below and laterally to one foot outside the proposed treatment limits. Treatment of the moderate level material will be paid for under Item 260, "Lime Treatment (Road Mixed)" or Item 275, "Cement Treatment (Road Mixed)." Removal of the high level material will be measured and paid for in accordance with Item 110, "Excavation" and replacement with suitable material will be measured and paid for in accordance with Item 132, "Embankment."

Any excavated sulfate-laden material will be acceptable for use in fill areas. Do not place within previously specified section boundaries of subgrade to be treated with either lime or cement.

Off-Site Borrow Sources. In addition to meeting pertinent specification requirements, test off-site borrow sources for sulfate content. Test soils for soluble sulfates in accordance with Test Method Tex-145 and Tex-146-E and provide documentation that supports compliance with previously stated requirements. The Engineer will perform additional testing for sulfates of this material upon delivery to the project. Only material that is placed within one foot vertically or laterally of subgrade treatment will require testing for sulfates. Remove and replace failing material (sulfate concentrations >7,000 PPM by dry weight).

Provide Type B embankment material with a Plasticity Index (PI) no higher than 35 to replace sulfate material.

Item 132. Embankment

Do not provide Type D embankment material with a Plasticity Index (PI) higher than 35.

Furnish test results per Test Procedures Tex-104, 105, and 106-E (PIs), Tex-113 or 114-E (M-D Curves), and Tex-145 and/or Tex-146-E (Sulfates) for each material sample provided by the Engineer. Perform field density tests (Tex-115-E, Part I) at a frequency for each worked section to produce passing results prior to testing by the Engineer per Tex-115-E, Part I.

Density tests must be conducted by a department-certified independent testing laboratory. Results of tests will be furnished to TxDOT within 24 hours after testing; a final copy of all test reports must be signed and sealed by a Professional Engineer in the State of Texas and furnished within five (5) working days after testing. Areas which do not meet minimum density requirements will be removed, re-compacted, and re-tested for compliance at the contractor's entire expense. Testing and reporting of test results will not be paid for directly but will be subsidiary to this item.

At all locations where guardrail is shown to flare, widen the embankment as necessary to accommodate the guardrail.

Item 134. Backfilling Pavement Edge

Backfill the pavement edge with Type B material with salvaged asphaltic pavement from RAP, planning, or other material specified by the Engineer. Salvaged material must pass through a 2-inch sieve. Place material as shown on the plans and treat with CRS-2 or CRS-2H emulsified asphalt at the rate of 0.4 gal/SY.

Item 161. Compost

Place approximately 4" of compost manufactured topsoil (CMT) on all cut and fill slopes (except drainage channels where flexible channel liners are indicated), at other locations shown on the plans, or as directed.

The CMT for this project as specified shall be pre-blended, to produce a suitable soil material, as directed, with 25% compost and 75% topsoil, by volume, to produce the compost manufactured topsoil. The topsoil material shall be from an approved source outside the right-of-way and in accordance with Item 160.2. Place the pre-blended compost manufactured topsoil in a loose layer approximately 4" thick, as shown on the plans.

Item 164. Seeding for Erosion Control

Apply seeding required between December 1 and January 31 using seed types and mixtures as shown in Item 164.2.1, Table 3. If, in the opinion of the Engineer, this does not provide an effective vegetative cover, apply "straw or hay mulch" as specified in Article 164.3.2, "Straw or Hay Mulch Seeding" as soon as possible. After February 1, apply warm season seeding in order to establish a permanent protective vegetative cover.

Item 168. Vegetative Watering

Furnish and install an approved rain gauge at the project site, as directed. Furnishing and installation of the rain gauge will not be paid for directly but will be subsidiary to Item 168.

Apply vegetative watering for an establishment period of thirteen weeks following application of seed or installation of sod, at a rate of 1/2 inch of water depth per week (approximately 13,030 gallons per acre). During the first four weeks after seeding, apply water twice per week, on non-consecutive days, each at half the weekly application rate. For the remainder of the establishment period, apply vegetative watering once per week during the months of January through June or September through December, at the weekly application rate; apply watering twice per week, on non-consecutive days during the months of July and August, each at one-half the weekly application rate.

Average weekly rainfall rates for the District are:

January—0.39"	April—0.86"	July—0.48"	October—0.68"
February—0.46"	May—1.00"	August—0.47"	November—0.46"
March—0.48"	June—0.63"	September—0.74"	December—0.37"

Item 180. Wildflower Seeding

Provide wildflower seeding in addition to “seeding for erosion control” in the areas as shown on the plans. For this project, wildflower seeding will be:

"Wildflower Seeding"

Common Name	Botanical Name	Rate (lb/acre)	PLS
Indian Blanket	Gaillardia Pulchella	2	50
Texas Bluebonnet	Lupinus Texensis	15	70
Lance-Leaf Coreopsis	Coreopsis Lanceolata	2	70

Perform wildflower seeding between September 15 and October 15.

Item 247. Flexible Base

Place material in two or more equal lifts unless otherwise directed.

Do not add field sand to modify the final material to meet the requirements.

Build and maintain a 5,000 cu. yd. stockpile of approved material before and during hauling operations.

Cement treat in accordance with Item 275.

Item 260. Lime Treatment (Road-Mixed)

Apply lime by the “slurry placement” method. Allow the mixture to mellow for a minimum of 4 days after initial mixing. If moderate sulfates are present, or for other extenuating circumstances as determined by the Engineer, allow the mixture to mellow for 7 days after initial mixing. Provide rolling and proof rolling in accordance with Item 210 and Item 216 respectively.

Except as noted below, treat the raw subgrade to a depth of 8".

Treat the raw subgrade with lime to a depth of 18" for:

- Fills equal to or greater than 18"—soil PI > 39
- Fills <18"—soil PI >29
- All cuts—soil PI > 29
- Any location directed by the Engineer

Item 301. Asphalt Antistripping Agent
Furnish a liquid antistripping agent unless otherwise directed.

Item 310. Prime Coat
Provide an MC-30 or CBSMS-1S for this Item.

Item 314. Emulsified Asphalt Treatment

Provide MS-2 for this Item. Use between a 30%–50% asphalt residue mixed with 50%–70% heated water added at the plant.

Item 400. Excavation and Backfill for Structures

Class B bedding will be permitted in lieu of Class C bedding.

Recycled flex base and RAP are allowed individually or combined for use as granular material and backfill in Class B and C bedding at the discretion of the Engineer. These materials must meet the requirements of Table 1. The Engineer may require the mixing of one or both of these materials with the local soil to provide a cohesive material for compaction and stability of the backfill around the pipe or box culvert.

Item 432. Riprap

Provide weep holes as directed.

The quantities for riprap at the location indicated may be varied to the extent necessary to ensure functioning for the purpose intended.

All concrete riprap will be 5" (.42') in thickness, unless otherwise shown on the plans, and must be reinforced.

An 8 inch (.67 ft.) by 18 inch (1.5 ft.) toe wall is required at the exposed edges of all concrete riprap, unless otherwise directed.

Provide a toe wall at all exposed edges of all protection stone riprap, unless otherwise directed.

When synthetic fiber reinforcement concrete option is chosen, provide the following:

- At all construction joints (vertical or horizontal) provide #3 bars 24 in. long and placed on 18 in. centers along joint length. Bars should be centered in concrete cross section.

- At all toe wall locations #3 L-bars will be required on 18 in. centers with a length 2 times the depth of the toe wall. Place three #3 bars the length of the toe wall and equally spaced on the L-bars.

Welded Wire Reinforcement (WWR) may be used for construction joint and toe wall reinforcing with the approval of the Engineer.

Item 466. Headwalls and Wingwalls
Do not use precast headwalls/wingwalls.

Item 496. Removing Structures

When required by the plans, partial or complete removal of a structure for staged construction shall be accomplished in a manner which does not cause damage to the remainder of the structure or its supporting members. The Contractor shall submit a demolition plan for all structures to be replaced and/or removed in accordance with Item 496. Submit the procedure for removal of superstructure or substructure in writing or plan drawing for approval prior to implementation. Submitted plans need to be signed and sealed by a professional engineer with at least a 14-day notice.

Item 502. Barricades, Signs, and Traffic Handling

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 typically 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.

Permanent signs may be installed when construction in an area is complete, and they will not conflict with the traffic control plan for the remainder of the job.

Existing signs are to remain as long as they do not interfere with construction, and they do not conflict with the traffic control plan.

Any sign not detailed in the plans but called for in the layout will be as shown in the current "Standard Highway Sign Designs for Texas”.

When traffic is obstructed, arrange warning devices in accordance with the latest edition of the "Texas Manual on Uniform Traffic Control Devices".

Cover or remove any work zone signs when work or condition referenced is not occurring.

All TMAs must be counted and paid for directly. TMAs can no longer be subsidiary to Item 502. Make sure that all TMAs are accounted for per the TCP. This is not optional.

In addition to the shadow vehicles with truck mounted attenuator (TMA) that are specified as being required on the traffic control plan for this project, provide **116** additional shadow vehicle(s) with TMA for TCP (**2-2**)-**18** as detailed on General Note **6** of this standard sheet; provide **15** additional shadow vehicle(s) with TMA for TCP (**3-1**)-**13** as detailed on General Note **3** of this standard sheet.

Therefore, **131** total shadow vehicles with TMA will be required for this type of work. The contractor will be responsible for determining if one or more of these operations will be ongoing and at the same time determine the total number of TMAs needed for the project.

Do not place barricades, signs, or any other traffic control devices where they interfere with sight distance at driveways or side streets. Provide access to all driveways during all phases of construction unless otherwise noted in the plans or as directed.

Item 504. Field Office and Laboratory

Furnish the following structures for this project:

Type	No.
Field Lab (Ty. A)	1
Field Office (Ty. C)	1
Field Lab (Ty. D)	1

Field office will require at least a 3' by 3' landing on the outside of each exit door and a concrete landing at the bottom of exit stairs. The concrete landing will be the width of the stairs and extend at least 4’ in front of the bottom step.

Furnish the following for the Field Office structure:

1) Minimum of two desk with two chairs per desk
2) A meeting area with meeting table capable of seating 10 people with chairs
3) Two four drawer locking cabinets
4) Microwave oven
5) Water cooler with service or water bottles
6) Ice machine (minimum 100/LBS day)
7) Janitorial Service W/toiletries/paper towels, Contractor shall be responsible for all maintenance and supplies (both permanent and consumable)
8) Wireless Router
9) Provide and enclosed parking area minimum 10,000 SF with lighting Adjacent to the field office this area is sole exclusive use of the department.

10) Wireless Printer capable plain paper copier/Scanner/Fax machine (11x17 paper capable) with minimum of 2 GB of memory and capable of printing 30 ppm. Furnish all 8 1/2x 11 and 11x 17 paper and printing toners.
11) Internet Service with minimum of 30GB
12) Refrigerator at least 10 Cu Ft.
13) The parking lot needs acceptable base material or millings.

Provide Laptop computers with an Intel i5 (2.8 GHz) processor, or greater.

Integrated printer/copier/scanner/fax units will be permitted.

Item 506. Temporary Erosion, Sedimentation, and Environmental Controls

The SW3P for this project will consist of using the following items as directed:

- Temporary rock filter dams
- Temporary sediment control fence
- Construction exits
- Earthwork for erosion control
- Erosion control logs

Remove accumulated sediment or replace SW3P controls when the capacity has been reduced by 50% or when the depth of sediment at the control structure exceeds one foot.

Item 508. Constructing Temporary Detours

Construct temporary detours with temporary pavement of 10" HMA TY-C.

Item 510. One-way Traffic Control (Portable Traffic Signal)

Driveway Assistance Device Signals (DADS) will be use at driveway and street locations, as directed by the Engineer and will be considered subsidiary to this bid item.

Item 512. Portable Concrete Traffic Barrier

"*Furnish and Install*" barrier in compliance with Concrete Safety Barrier (CSB), Single-Slope Concrete Barrier (SSCB), or Low-Profile Concrete Barrier (LPCB) standards as shown on the plans.

Furnish Class H Concrete with a minimum 28-day compressive strength of 3,600 psi.

Provide the hardware assemblies to join barrier sections, including barrier from stockpile.

Provide welded tie bar assembly at the assembly joints when using slotted-end PCTB as shown on Fort Worth Standard PCTB(1)-03(FW) joint tie details.

For permanent installations, grout the joints with an approved non-shrink grout material when using slotted-end PCTB.

Provide (2) 1-1/4" x 2'2" threaded rods, (4) standard USS washers, grade 5, (4) 1-1/4" hex nuts, and (2) 5" x 10" x 3/8" plate washers for each section of LPCB.

Connection hardware will remain the property of the State upon completion of the project and will not be paid for directly but will be subsidiary to Item 512," Portable Concrete Traffic Barrier". Deliver hardware to the location specified by the Engineer.

Delineate all barriers in accordance with Barricade and Construction (BC) Standard sheets. Barrier delineation will not be paid for directly but will be subsidiary to Item 512," Portable Concrete Traffic Barrier".

Remove and replace traffic barriers damaged by the traveling public and no longer serviceable as directed. Replace traffic barrier with Department-furnished barrier from designated stockpile as directed. Additional payment will be provided as compensation to remove and replace the traffic barrier damaged by the traveling public in accordance with Item 512. Return the damaged traffic barrier to the stockpile site as directed.

Items 530. Intersections, Driveways and Turnouts

The furnishing and installation of the sand cushion in proposed driveways will not be paid for directly but will be subsidiary to this bid item.

Item 540. Metal Beam Guard Fence

The locations and lengths of guard fence shown on the plans are approximate. Actual lengths and locations are to be determined in the field.

The tops of timber posts will be domed. Beveled tops will not be permitted for timber or steel posts.

When holes for timber posts are drilled below bottom of proposed grade, backfill the excessive depth with an acceptable sand. The furnishing and installation of the sand backfill will not be paid for directly but will be subsidiary to this Item.

When guardrail posts are placed in a finished surface, backfill the top 4 inches with an asphaltic material, domed to carry water away from the posts or as shown on the plans. The furnishing and installation of the asphaltic material backfill will not be paid for directly but will be subsidiary to this Item.

Item 542. Removing Metal Beam Guard Fence

Remove existing metal beam guard fence only when authorized.

Item 560. Mailbox Assemblies

Provide Recycled Rubber Flexible Post (TYPE 4 SUPPORT/FOUNDATION) with the corresponding bracket and adapter plate for flexible post for all single and double mailbox assemblies in this project.

Item 585. Ride Quality for Pavement Surfaces

Use Surface Test Type B pay adjustment schedule 2 to evaluate ride quality of the travel lanes in accordance with Item 585, "Ride Quality for Pavement Surfaces."

Use Surface Test Type B pay adjustment schedule 2 to evaluate ride quality of the shoulders and ramps in accordance with Item 585, "Ride Quality for Pavement Surfaces."

Ride quality requirements are waived.

Item 644. Small Roadside Sign Supports and Assemblies

Supply shop drawings for all signs requiring fabrication in this contract. Fabricate and install signs only after approval of shop drawings by Fort Worth District Traffic Office. All signs shall meet the latest version of the TMUTCD & Sign Crew Field Book requirements. Removal of existing small sign assemblies includes removal of entire small sign foundation.

Items 662. Work Zone Pavement Markings

Paint and Beads may be used for Non-Removable Work Zone Pavement Markings, if TxDOT tested materials are used, paint and beads".

When buttons are used for Removable Markings on **finished** pavement surfaces, hot applied thermo-adhesive must be used on concrete and bituminous adhesive on asphalt. Buttons may **not** be used for stop-bar markings or symbols.

Item 666. Reflectorized Pavement Markings with Retroreflective Requirements

Collection of retro-reflectivity readings using a mobile retro-reflectometer is the preferred method. If retro-reflectivity readings are collected using a portable or handheld unit, then measurement is defined as a collective average of at least 20 readings taken along a 200-foot test section. A minimum of three measurements will be required per mile of roadway. Measurements collected on a centerline stripe will be averaged separately for stripe in each direction of travel. A TxDOT inspector must witness the calibration and collection of all retro-reflectivity data.

Item 3076. Dense-Graded Hot-Mix Asphalt

RAP aggregate must meet the requirements of Table 1.

Provide aggregate with a Surface Aggregate Classification (SAC) value of A for the travel lanes and shoulders.

Natural (field) sands are not allowed.

Provide a PG 64-22 asphalt for the base course.

Provide a PG 64-22 asphalt for the surface course and level-up course, if applicable.

Furnish a CSS-1P with greater than 50% asphalt residue for the tack coat on this project. A trackless tack can be used in lieu of CSS-1P tack coat or as directed by the Engineer. The Engineer will set the rate at time of application.

Warm Mix Asphalt (WMA) is not permitted in any mix type on this project.

RAP and RAS are not permitted in any surface and level-up mixes on this project.

Grade substitution per Table 5 is not allowed.

Use the Boil Test, Test Procedure Tex-530-C, and provide only mixes that produce zero percent (0%) stripping for design verification and during production.

Include the approved mix design number on each delivery ticket.

Use a Material Transfer Device (MTD) unless otherwise directed.

Stop production after Lot 1. Review all test data and confirm any changes with the Engineer. Do not start production and placement on subsequent Lots until approved by the Engineer.

Shoulders, crossovers, and other areas listed on the Plan sheets or as directed are not subject to in-place air void determination for this project.

Temporary detours are subject to in-place air void determination for this project.

Use Surface Test Type B for this project.

Ride quality is not required on this project.

Item 3077. Superpave Mixtures

RAP aggregate must meet the requirements of Table 1.

Provide aggregate with a Surface Aggregate Classification (SAC) value of A for the travel lanes and shoulders.

No blending of the material retained on the No. 4 sieve, to meet SAC A will be allowed for surface mixes.

Natural (field) sands are not allowed.

Provide a PG 70-28 asphalt for the surface course and level-up course, if applicable.

Furnish a CSS-1P with greater than 50% asphalt residue for the tack coat on this project. A trackless tack can be used in lieu of CSS-1P tack coat or as directed by the Engineer. The Engineer will set the rate at time of application.

Warm Mix Asphalt (WMA) is not permitted in any mix type on this project.

RAP and RAS are not permitted in any surface and level-up mixes on this project.

Grade substitution per Table 5 is not allowed.

Provide a mix design with the gradation curve below the restricted zone.

Use the Boil Test, Test Procedure Tex-530-C, and provide only mixes that produce zero percent (0%) stripping for design verification and during production.

Include the approved mix design number on each delivery ticket.

Use a Material Transfer Device (MTD) unless otherwise directed.

Stop production after Lot 1. Review all test data and confirm any changes with the Engineer. Do not start production and placement on subsequent Lots until approved by the Engineer.

Shoulders, crossovers, and other areas listed on the Plan sheets or as directed are not subject to in-place air void determination for this project.

Temporary detours are subject to in-place air void determination for this project.

Use Surface Test Type B for this project.

Ride quality is not required on this project.

Item 6001. Portable Changeable Message Signs

Provide all portable changeable message signs and arrow panels with a photoelectric device to allow for automatic dimming of operations to approximately 50% of their normal brightness when ambient light drops to approximately five footcandles, and then increase back again for daytime operations.

4 each electronic portable changeable message sign unit(s) will be required. Individual or collective use of signs will be required by the Engineer when deemed necessary to supplement the traffic control plan.

Each sign must have programmed in its permanent memory the following 15 messages:

1. Exit Closed Ahead
2. Use Other Routes
3. Right Lane
4. Left Lane
5. Closed Ahead
6. Two Lane
7. Detour Ahead
8. Thru Traffic
9. Prepare To Stop
10. Merging Traffic
11. Expect 15 Minute Delay
12. Max Speed ** MPH
13. Merge Right
14. Merge Left
15. No Exit Next ** Miles

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

In addition to the shadow vehicles with truck mounted attenuator (TMA) that are specified as being required on the traffic control plan for this project, provide **116** additional shadow vehicle(s) with TMA for TCP (**2-2**)-1**8** as detailed on General Note **6** of this standard sheet; provide **15** additional shadow vehicle(s) with TMA for TCP (**3-1**)-1**3** as detailed on General Note **3** of this standard sheet.

Therefore, **131** total shadow vehicles with TMA will be required for this type of work. The contractor will be responsible for determining if one or more of these operations will be ongoing and at the same time determine the total number of TMAs needed for the project.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1599-03-017 **DISTRICT** Fort Worth **COUNTY** Johnson
HIGHWAY FM 2258

			CONTROL SECTION JOB		**1599-03-017**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00178880**		
			COUNTY		**Johnson**		
			HIGHWAY		**FM 2258**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-6002	PREPARING ROW	STA	155.400		155.400	
	104-6017	REMOVING CONC (DRIVEWAYS)	SY	252.000		252.000	
	105-6026	REMOVE STAB BASE & ASPH PAV (13"-18")	SY	41,180.000		41,180.000	
	110-6001	EXCAVATION (ROADWAY)	CY	7,207.000		7,207.000	
	132-6008	EMBANKMENT (FINAL)(DENS CONT)(TY D)	CY	6,508.000		6,508.000	
	132-6020	EMBANKMENT (VEHICLE)(DENS CONT)(TY B)	CY	161.000		161.000	
	134-6002	BACKFILL (TY B)	STA	155.000		155.000	
	161-6017	COMPOST MANUF TOPSOIL (4")	SY	77,221.000		77,221.000	
	162-6002	BLOCK SODDING	SY	38.000		38.000	
	164-6003	BROADCAST SEED (PERM) (RURAL) (CLAY)	SY	77,221.000		77,221.000	
	164-6009	BROADCAST SEED (TEMP) (WARM)	SY	38,611.000		38,611.000	
	164-6011	BROADCAST SEED (TEMP) (COOL)	SY	38,611.000		38,611.000	
	164-6051	DRILL SEED (TEMP)(WARM OR COOL)	SY	77,221.000		77,221.000	
	164-6066	DRILL SEEDING (PERM)(WARM OR COOL)	SY	77,221.000		77,221.000	
	168-6001	VEGETATIVE WATERING	MG	5,404.690		5,404.690	
	180-6001	WILDFLOWER SEEDING	AC	16.100		16.100	
	247-6041	FL BS (CMP IN PLC)(TYA GR1-2)(FNAL POS)	CY	9,218.000		9,218.000	
	260-6012	LIME(HYD,COM OR QK)(SLRY)OR QK(DRY)	TON	3,433.000		3,433.000	
	260-6022	LIME TRT (EXIST MATL)(18")	SY	71,522.000		71,522.000	
	310-6001	PRIME COAT (MULTI OPTION)	GAL	20,440.000		20,440.000	
	314-6009	EMULS ASPH (EROSN CONT)(MULTI)	GAL	1,399.000		1,399.000	
	316-6011	ASPH (AC-10)	GAL	38,155.000		38,155.000	
	316-6224	AGGR(TY-PB GR-4 SAC-B)	CY	505.000		505.000	
	400-6005	CEM STABIL BKFL	CY	49.000		49.000	
	400-6006	CUT & RESTORING PAV	SY	120.000		120.000	
	402-6001	TRENCH EXCAVATION PROTECTION	LF	94.000		94.000	
	403-6001	TEMPORARY SPL SHORING	SF	2,569.000		2,569.000	
	420-6012	CL B CONC (MISC)	CY	5.000		5.000	
	432-6002	RIPRAP (CONC)(5 IN)	CY	15.000		15.000	
	432-6031	RIPRAP (STONE PROTECTION)(12 IN)	CY	221.000		221.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	35.000		35.000	
	462-6008	CONC BOX CULV (5 FT X 4 FT)	LF	86.000		86.000	
	462-6011	CONC BOX CULV (6 FT X 4 FT)	LF	70.000		70.000	
	464-6003	RC PIPE (CL III)(18 IN)	LF	319.000		319.000	
	464-6005	RC PIPE (CL III)(24 IN)	LF	35.000		35.000	
	464-6008	RC PIPE (CL III)(36 IN)	LF	32.000		32.000	
	464-6009	RC PIPE (CL III)(42 IN)	LF	120.000		120.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1599-03-017 **DISTRICT** Fort Worth **COUNTY** Johnson
HIGHWAY FM 2258

			CONTROL SECTION JOB		**1599-03-017**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00178880**		
			COUNTY		**Johnson**		
			HIGHWAY		**FM 2258**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	464-6059	RC PIPE (CL V)(30 IN)	LF	45.000		45.000	
	466-6005	HEADWALL (CH - FW - 0) (DIA= 24 IN)	EA	1.000		1.000	
	466-6040	HEADWALL (CH - FW - 30) (DIA= 42 IN)	EA	1.000		1.000	
	466-6135	HEADWALL (CH - PW - S) (DIA= 42 IN)	EA	1.000		1.000	
	466-6195	WINGWALL (PW - 2) (HW=6 FT)	EA	2.000		2.000	
	466-6196	WINGWALL (PW - 2) (HW=7 FT)	EA	1.000		1.000	
	466-6197	WINGWALL (PW - 2) (HW=8 FT)	EA	2.000		2.000	
	466-6198	WINGWALL (PW - 2) (HW=9 FT)	EA	1.000		1.000	
	467-6356	SET (TY II) (18 IN) (RCP) (3: 1) (C)	EA	1.000		1.000	
	467-6358	SET (TY II) (18 IN) (RCP) (4: 1) (C)	EA	3.000		3.000	
	467-6363	SET (TY II) (18 IN) (RCP) (6: 1) (P)	EA	18.000		18.000	
	467-6390	SET (TY II) (24 IN) (RCP) (4: 1) (C)	EA	1.000		1.000	
	467-6395	SET (TY II) (24 IN) (RCP) (6: 1) (P)	EA	8.000		8.000	
	467-6419	SET (TY II) (30 IN) (RCP) (4: 1) (C)	EA	2.000		2.000	
	467-6454	SET (TY II) (36 IN) (RCP) (6: 1) (P)	EA	2.000		2.000	
	480-6001	CLEAN EXIST CULVERTS	EA	16.000		16.000	
	496-6004	REMOV STR (SET)	EA	6.000		6.000	
	496-6005	REMOV STR (WINGWALL)	EA	4.000		4.000	
	496-6006	REMOV STR (HEADWALL)	EA	2.000		2.000	
	496-6007	REMOV STR (PIPE)	LF	494.000		494.000	
	496-6008	REMOV STR (BOX CULVERT)	LF	35.000		35.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	18.000		18.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	440.000		440.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	440.000		440.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	3,094.000		3,094.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	3,094.000		3,094.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	1,720.000		1,720.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	1,720.000		1,720.000	
	508-6001	CONSTRUCTING DETOURS	SY	3,893.000		3,893.000	
	510-6003	ONE-WAY TRAF CONT (PORT TRAF SIG)	MO	6.000		6.000	
	512-6009	PORT CTB (FUR & INST)(LOW PROF)(TY 1)	LF	4,900.000		4,900.000	
	512-6010	PORT CTB (FUR & INST)(LOW PROF)(TY 2)	LF	480.000		480.000	
	512-6033	PORT CTB (MOVE)(LOW PROF)(TY 1)	LF	31,360.000		31,360.000	
	512-6034	PORT CTB (MOVE)(LOW PROF)(TY 2)	LF	3,442.000		3,442.000	
	512-6057	PORT CTB (REMOVE)(LOW PROF)(TY 1)	LF	4,900.000		4,900.000	
	512-6058	PORT CTB (REMOVE)(LOW PROF)(TY 2)	LF	480.000		480.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1599-03-017 **DISTRICT** Fort Worth **COUNTY** Johnson
HIGHWAY FM 2258

			CONTROL SECTION JOB		**1599-03-017**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00178880**		
			COUNTY		**Johnson**		
			HIGHWAY		**FM 2258**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	530-6019	DRIVEWAYS (ACP)(TYPE 1)	SY	44.000		44.000	
	530-6020	DRIVEWAYS (CONC)(TYPE 1)	SY	297.000		297.000	
	530-6021	DRIVEWAYS (ACP) (TYPE 2)	SY	804.000		804.000	
	530-6023	INTERSECTIONS (ACP) (TYPE 2)	SY	447.000		447.000	
	533-6001	RUMBLE STRIPS (SHOULDER)	LF	30,259.000		30,259.000	
	533-6002	RUMBLE STRIPS (CENTERLINE)	LF	13,827.000		13,827.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	338.000		338.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	130.000		130.000	
	542-6002	REMOVE TERMINAL ANCHOR SECTION	EA	2.000		2.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	2.000		2.000	
	560-6011	MAILBOX INSTALL-S (TWW-POST) TY 4	EA	13.000		13.000	
	560-6012	MAILBOX INSTALL-D (TWW-POST) TY 4	EA	3.000		3.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	19.000		19.000	
	644-6002	IN SM RD SN SUP&AM TY10BWG(1)SA(P-BM)	EA	3.000		3.000	
	644-6033	IN SM RD SN SUP&AM TYS80(1)SA(U)	EA	4.000		4.000	
	644-6038	IN SM RD SN SUP&AM TYS80(1)SA(U-EXAL)	EA	1.000		1.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	22.000		22.000	
	658-6047	INSTL OM ASSM (OM-2Y)(WC)GND	EA	32.000		32.000	
	662-6008	WK ZN PAV MRK NON-REMOV (W)6"(SLD)	LF	990.000		990.000	
	662-6035	WK ZN PAV MRK NON-REMOV (Y)6"(BRK)	LF	2,952.000		2,952.000	
	662-6037	WK ZN PAV MRK NON-REMOV (Y)6"(SLD)	LF	6,778.000		6,778.000	
	662-6075	WK ZN PAV MRK REMOV (W)24"(SLD)	LF	576.000		576.000	
	662-6109	WK ZN PAV MRK SHT TERM (TAB)TY W	EA	1,562.000		1,562.000	
	662-6110	WK ZN PAV MRK SHT TERM (TAB)TY Y	EA	1,560.000		1,560.000	
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	EA	1,554.000		1,554.000	
	666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	31,164.000		31,164.000	
	666-6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	LF	1,500.000		1,500.000	
	666-6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	22,008.000		22,008.000	
	668-6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	57.000		57.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	353.000		353.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF	2,952.000		2,952.000	
	3076-6015	D-GR HMA TY-C PG64-22	TON	7,200.000		7,200.000	
	3077-6027	SP MIXES SP-C SAC-A PG70-28	TON	7,200.000		7,200.000	
	3077-6075	TACK COAT	GAL	12,521.000		12,521.000	
	5070-6001	STEEL FENCE (REMOVE)	LF	60.000		60.000	
	5070-6002	STEEL FENCE (INSTALL)	LF	60.000		60.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	4.000		4.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1599-03-017 **DISTRICT** Fort Worth **COUNTY** Johnson
HIGHWAY FM 2258

			CONTROL SECTION JOB		**1599-03-017**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00178880**		
			COUNTY		**Johnson**		
			HIGHWAY		**FM 2258**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	6185-6002	TMA (STATIONARY)	DAY	116.000		116.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	15.000		15.000	
	6227-6002	SOLAR POWERED LED ROADSIDE SIGN	EA	2.000		2.000	
	6509-6001	DRIVEWAY ASSISTANCE DEVICE(DAD) SYSTEM	MO	8.000		8.000	
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	

SUMMARY OF TRAFFIC CONTROL PLAN QUANTITIES

CSJ: 1599-03-017	502 6001 BARRICADES, SIGNS AND TRAFFIC HANDLING MO	508 6001 CONSTRUCTING DETOURS SY	510 6003 ONE-WAY TRAF CONT (PORT TRAF SIG) MO	512 6009 PORT CTB (FUR & INST) (LOW PROF) (TY 1) LF	512 6010 PORT CTB (FUR & INST) (LOW PROF) (TY 2) LF	512 6033 PORT CTB (MOVE) (LOW PROF) (TY 1) LF	512 6034 PORT CTB (MOVE) (LOW PROF) (TY 2) LF	512 6057 PORT CTB (REMOVE) (LOW PROF) (TY 1) LF	512 6058 PORT CTB (REMOVE) (LOW PROF) (TY 2) LF	662 6008 WK ZN PAV MRK NON-REMOV (W)6" (SLD) LF	662 6035 WK ZN PAV MRK NON-REMOV (Y)6" (BRK) LF	662 6037 WK ZN PAV MRK NON-REMOV (Y)6" (SLD) LF
PHASE I - CULVERT REPLACEMENTS NO. 3-8												
CULVERT #3 STEP 1		387		160	40							
CULVERT #3 STEP 2						160	40					
CULVERT #3 STEP 3						160	40					
CULVERT #3 STEP 4						160	40				960	960
CULVERT #4 STEP 1		399				160	40					
CULVERT #4 STEP 2						160	40					
CULVERT #4 STEP 3				20		160	40					
CULVERT #5 STEP 1		423			40	180	40					
CULVERT #5 STEP 2						100	80					
CULVERT #5 STEP 3						100	80					
CULVERT #5 STEP 4						160	80				972	972
CULVERT #8 STEP 1		364				160	40					
CULVERT #8 STEP 2						160	40					
CULVERT #8 STEP 3						160	40					
CULVERT #8 STEP 4						160	40				1020	1020
SUB-TOTAL - PHASE I:		**1573**	**0**	**180**	**80**	**2140**	**680**	**0**	**0**	**0**	**2952**	**2952**
PHASE II - CULVERT EXTENSIONS NO. 1-2, 6-8												
CULVERT #1 STEP 1			0.5	20		180	40					
CULVERT #1 STEP 2			0.5			200	40					
CULVERT #2 STEP 1			0.5			200	40					
CULVERT #2 STEP 2			0.5			160	40					
CULVERT #6 STEP 1			1	40		200	40					
CULVERT #6 STEP 2			1			240	40					
CULVERT #7 STEP 1			1	40	40	240	80					
SUB-TOTAL - PHASE II:		**0**	**5**	**100**	**40**	**1420**	**320**	**0**	**0**	**0**	**0**	**0**
PHASE III - TEMPORARY DETOUR WIDENING		229										
SUB-TOTAL - PHASE III:		**229**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHASE IV - ROADWAY RECONSTRUCTION												
STEP 1A - BEGIN PROJECT TO STA 13+35		1313										
STEP 1B - BEGIN PROJECT TO STA 13+35				160		280	120			630		1890
STEP 1C - BEGIN PROJECT TO STA 13+35		778				440	120			360		1936
STEP 1D - BEGIN PROJECT TO STA 13+35												
STEP 2A - STA 13+35 TO STA 45+00				2460	80	440	120					
STEP 2B - STA 13+35 TO STA 45+00						2900	200					
STEP 3A - STA 45+00 TO STA 58+00						2900	200					
STEP 3B - STA 45+00 TO STA 58+00						1300	120					
STEP 4A - STA 58+00 TO STA 103+11				760	280	2900	200					
STEP 4B - STA 58+00 TO STA 103+11						3660	480					
STEP 5A - STA 103+11 TO STA 112+20			0.5			3660	480					
STEP 5B - STA 103+11 TO STA 112+20			0.5			760	80					
STEP 6A - STA 112+20 TO STA 165+00				1240		3660	160					
STEP 6B - STA 112+20 TO STA 165+00						4900	160	4900	480			
SUB-TOTAL - PHASE IV:		**2091**	**1**	**4620**	**360**	**27800**	**2440**	**4900**	**480**	**990**	**0**	**3826**
PHASE V - FINAL OVERLAY/CLEAN UP												
SUB-TOTAL - PHASE V:		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PROJECT TOTALS:	**18**	**3893**	**6**	**4900**	**480**	**31360**	**3440**	**4900**	**480**	**990**	**2952**	**6778**

STATE OF TEXAS
JOHN HERNANDEZ
91831
PROFESSIONAL LICENSED ENGINEER
John Hernandez, P.E.
2/13/2024

CAMACHO-HERNANDEZ & ASSOCIATES, LLC
415 EMBASSY OAKS - SUITE 205 SAN ANTONIO, TX. 78216
OFFICE: (210) 341-6200 FAX: (210) 341-6300
FIRM NUMBER: F-8478

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

SUMMARY OF TRAFFIC CONTROL PLAN QUANTITIES

SHEET 1 OF 2

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		8
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

SUMMARY OF TRAFFIC CONTROL PLAN QUANTITIES

CSJ: 1599-03-017	662 6075 WK ZN PAV MRK REMOV (W)24" (SLD) LF	662 6110 WK ZN PAV MRK SHT TERM (TAB)TY Y EA	677 6001 ELIM EXT PAV MRK & MRKS (4") LF	6001 6002 PORTABLE CHANGEABLE MESSAGE SIGN EA	6185 6002 TMA (STATIONARY) DAY	6185 6005 TMA (MOBILE OPERATION) DAY	6509 6001 DRIVEWAY ASSISTANCE DEVICE (DAD) SYSTEM MO
PHASE I - CULVERT REPLACEMENTS NO. 3-8							
CULVERT #3 STEP 1	24						
CULVERT #3 STEP 2							
CULVERT #3 STEP 3	24						
CULVERT #3 STEP 4			960				
CULVERT #4 STEP 1	24						
CULVERT #4 STEP 2							
CULVERT #4 STEP 3	24						
CULVERT #5 STEP 1	24						
CULVERT #5 STEP 2							
CULVERT #5 STEP 3	24						
CULVERT #5 STEP 4			972				
CULVERT #8 STEP 1	24						
CULVERT #8 STEP 2							
CULVERT #8 STEP 3	24						
CULVERT #8 STEP 4			1020				
SUB-TOTAL - PHASE I:	**192**	**0**	**2952**	**0**	**14**	**0**	**0**
PHASE II - CULVERT EXTENSIONS NO. 1-2, 6-8							
CULVERT #1 STEP 1	24						
CULVERT #1 STEP 2	24						
CULVERT #2 STEP 1	24						
CULVERT #2 STEP 2	24						
CULVERT #6 STEP 1	24						
CULVERT #6 STEP 2	24						
CULVERT #7 STEP 1							
SUB-TOTAL - PHASE II:	**144**	**0**	**0**	**0**	**14**	**0**	**0**
PHASE III - TEMPORARY DETOUR WIDENING							
SUB-TOTAL - PHASE III:	**0**	**0**	**0**	**0**	**14**	**0**	**0**
PHASE IV - ROADWAY RECONSTRUCTION							
STEP 1A - BEGIN PROJECT TO STA 13+35							
STEP 1B - BEGIN PROJECT TO STA 13+35							
STEP 1C - BEGIN PROJECT TO STA 13+35							
STEP 1D - BEGIN PROJECT TO STA 13+35							
STEP 2A - STA 13+35 TO STA 45+00	24						1
STEP 2B - STA 13+35 TO STA 45+00	24						1
STEP 3A - STA 45+00 TO STA 58+00	24						0.5
STEP 3B - STA 45+00 TO STA 58+00	24						0.5
STEP 4A - STA 58+00 TO STA 103+11	24						1
STEP 4B - STA 58+00 TO STA 103+11	24						1
STEP 5A - STA 103+11 TO STA 112+20	24						
STEP 5B - STA 103+11 TO STA 112+20	24						
STEP 6A - STA 112+20 TO STA 165+00	24						1.5
STEP 6B - STA 112+20 TO STA 165+00	24						1.5
SUB-TOTAL - PHASE IV:	**240**	**0**	**0**		**62**	**0**	**8**
PHASE V - FINAL OVERLAY/CLEAN UP		1560					
SUB-TOTAL - PHASE V:	**0**	**1560**	**0**	**0**	**12**	**15**	**0**
PROJECT TOTALS:	**576**	**1560**	**2952**	**4**	**116**	**15**	**8**

DRIVEWAY ASSISTANCE DEVICES SUMMARY (FOR CONTRACTOR INFORMATION ONLY)

PHASE 4 STEP 2A/2B DADS LOCATIONS		
DRIVEWAY STA	DADS	PHASE/STEP DURATION (MONTHS)
STA 19+34.81 RT	1	2
STA 26+25.91 RT	1	
STA 35+89.39 RT	1	
STA 38+20.46 RT	1	
TOTAL STEP DADS	4	

PHASE 4 STEP 3A/3B DADS LOCATIONS		
DRIVEWAY STA	DADS	PHASE/STEP DURATION (MONTHS)
STA 49+83.47 RT	1	1
STA 54+42.28 LT	1	
TOTAL STEP DADS	2	

PHASE 4 STEP 6A/6B DADS LOCATIONS		
DRIVEWAY STA	DADS	PHASE/STEP DURATION (MONTHS)
STA 114+90.62 LT	1	3
STA 163+68.86 LT	1	
STA 165+42.56 LT	1	
STA 168+11.60 RT	1	
TOTAL STEP DADS	4	

PHASE 4 STEP 4A/4B DADS LOCATIONS		
DRIVEWAY STA	DADS	PHASE/STEP DURATION (MONTHS)
STA 62+75.63 RT	1	2
STA 68+96.94 LT	1	
STA 72+33.51 RT	1	
STA 73+92.17 LT	1	
STA 74+62.07 LT	1	
STA 76+39.15 LT	1	
STA 78+83.11 RT	1	
STA 80+63.59 LT	1	
STA 83+63.80 LT	1	
STA 88+20.80 LT	1	
STA 94+09.58 LT	1	
STA 100+63.88 LT	1	
TOTAL STEP DADS	12	

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FIRM NUMBER: F-8478

CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

SUMMARY OF TRAFFIC CONTROL PLAN QUANTITIES

SHEET 2 OF 2

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		9
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

SUMMARY OF ROADWAY QUANTITIES

RDWY P&P SHEET NO.	ITEM NO.	100	105	110	132	132	134	247	260	260	310	314	316	316	3076	3077	3077
	DESCRIPTION CODE	6002	6026	6001	6008	6020	6002	6041	6012	6022	6001	6009	6011	6224	6015	6027	6075
	STATION	PREPARING ROW	REMOVE STAB BASE AND ASPH PAVE (13"-18")	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY D)	EMBANKMENT (VEHICLE) (DENS CONT) (TY B)	BACKFILL (TY B)	FL BS (CMP IN PLC) (TYA GR 1-2) (FNAL POS)	LIME (HYD,COM OR QK)(SLRY)OR QK(DRY)	LIME TRT (EXIST MATL) (18")	PRIME COAT (MULTI OPTION)	EMULS ASPH (EROSN CONT) (MULTI) (9 GAL/STA)	ASPH (AC-10)	AGGR (TY-PB GR-4 SAC-B)	D-GR HMA TY C PG 64-22	SP MIXES SP-C SAC-A 70-28	TACK COAT
	CSJ: 1599-03-017	(STA)	(SY)	(CY)	(CY)	(CY)	STA	(CY)	(TON)	(SY)	(GAL)	(GAL)	(GAL)	(CY)	(TON)	(TON)	(GAL)
1 OF 14	STA 6+60 TO STA 13+00	6.4	1,790	198	107		6	376	153	3,189	836	58	1,561	21	295	295	512
2 OF 14	STA 13+00 TO STA 25+00	12	3,027	458	582		12	707	262	5,467	1,568	108	2,927	39	552	552	961
3 OF 14	STA 25+00 TO STA 37+00	12	3,148	359	533		12	705	262	5,467	1,568	108	2,926	39	552	552	960
4 OF 14	STA 37+00 TO STA 49+00	12	3,244	607	1058		12	705	262	5,467	1,568	108	2,927	39	552	552	961
5 OF 14	STA 49+00 TO STA 61+00	12	3,241	423	619		12	711	262	5,467	1,568	108	2,927	39	552	552	961
6 OF 14	STA 61+00 TO STA 73+00	12	3,270	308	365		12	708	262	5,467	1,568	108	2,926	39	552	552	960
7 OF 14	STA 73+00 TO STA 85+00	12	3,213	494	251		12	705	262	5,467	1,568	108	2,927	39	552	552	961
8 OF 14	STA 85+00 TO STA 97+00	12	3,270	413	877		12	710	262	5,467	1,570	108	2,930	39	552	552	962
9 OF 14	STA 97+00 TO STA 109+00	12	3,254	453	480		12	712	262	5,467	1,569	108	2,929	39	552	552	961
10 OF 14	STA 109+00 TO STA 121+00	12	3,069	874	346		12	712	262	5,467	1,570	108	2,930	39	552	552	962
11 OF 14	STA 121+00 TO STA 136+00	12	3,093	965	571		12	708	262	5,467	1,568	108	2,927	39	552	552	961
12 OF 14	STA 136+00 TO STA 148+00	12	3,005	865	341		12	705	262	5,467	1,568	108	2,927	39	552	552	961
13 OF 14	STA 148+00 TO STA 160+00	12	2,992	488	239		12	705	262	5,467	1,568	108	2,926	39	552	552	960
14 OF 14	STA 160+00 TO STA 165+00	5	1,565	300	140	161	5	352	131	2,733	784	45	1,463	19	276	276	480
TOTAL		155.4	41,180	7,207	6,508	161	155	9,218	3,433	71,522	20,440	1,399	38,155	505	7,200	7,200	12,521

SUMMARY OF MAILBOX QUANTITIES

RDWY P&P SHEET NO.	ITEM NO.	560	560
	DESCRIPTION CODE	6011	6012
	STATION	MAILBOX INSTALL - S (TWW-POST) TY4	MAILBOX INSTALL - D (TWW-POST) TY4
	CSJ: 1599-03-017	(EA)	(EA)
1 OF 14	STA 6+60 TO STA 13+00	1	1
2 OF 14	STA 13+00 TO STA 25+00	0	0
3 OF 14	STA 25+00 TO STA 37+00	2	0
4 OF 14	STA 37+00 TO STA 49+00	1	0
5 OF 14	STA 49+00 TO STA 61+00	1	0
6 OF 14	STA 61+00 TO STA 73+00	3	0
7 OF 14	STA 73+00 TO STA 85+00	1	1
8 OF 14	STA 85+00 TO STA 97+00	2	0
9 OF 14	STA 97+00 TO STA 109+00	1	0
10 OF 14	STA 109+00 TO STA 121+00	1	0
11 OF 14	STA 121+00 TO STA 136+00	0	0
12 OF 14	STA 136+00 TO STA 148+00	0	0
13 OF 14	STA 148+00 TO STA 160+00	0	0
14 OF 14	STA 160+00 TO STA 165+00	0	1
TOTAL		13	3

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

SUMMARY OF ROADWAY QUANTITIES

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

	110	132	132
	6001	6008	6020
STATION	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY D)	EMBANKMENT (VEHICLE) (DENS CONT) (TY B)
	CY	CY	CY
7+00	13.31	0.33	0.00
9+00	23.9	23.43	0.00
8+00	34.21	35.86	0.00
10+00	14.3	16.95	0.00
11+00	54.48	7.58	0.00
12+00	3.41	17.99	0.00
13+00	54.86	4.91	0.00
14+00	31.95	15.56	0.00
15+00	55.3	9.78	0.00
16+00	19.4	51.83	0.00
17+00	2.00	157.5	0.00
18+00	59.9	18.65	0.00
19+00	108.18	14.55	0.00
20+00	67.78	21.67	0.00
21+00	17.37	36.53	0.00
22+00	7.95	52.02	0.00
23+00	15.73	52.7	0.00
24+00	19.1	63.26	0.00
25+00	53.26	87.71	0.00
26+00	58.93	66.7	0.00
27+00	29.51	21.99	0.00
28+00	52.84	52.98	0.00
29+00	21.46	49.08	0.00
30+00	37.04	13.92	0.00
31+00	56.4	24.3	0.00
32+00	50.75	58.55	0.00
33+00	10.49	78.84	0.00
34+00	2.48	66.43	0.00
35+00	9.73	32.28	0.00
36+00	13.97	31.36	0.00
37+00	15.64	36.26	0.00
38+00	11.08	35.21	0.00
39+00	6.51	45.25	0.00
40+00	27.29	69.41	0.00
41+00	4.39	81.6	0.00
42+00	12.11	76.81	0.00
43+00	69.72	333.6	0.00
44+00	61.89	189.88	0.00
45+00	13.63	74.74	0.00
46+00	33.21	65.26	0.00
47+00	81.94	47.79	0.00
SUB-TOTAL	1337.40	2241.05	0.00

	110	132	132
	6001	6008	6020
STATION	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY D)	EMBANKMENT (VEHICLE) (DENS CONT) (TY B)
	CY	CY	CY
48+00	97.86	26.25	0.00
49+00	187.53	12.12	0.00
50+00	181.87	12.16	0.00
51+00	95.72	15.46	0.00
52+00	14.63	43.42	0.00
53+00	7.09	86.07	0.00
54+00	0.17	30.29	0.00
55+00	5.28	37.23	0.00
56+00	2.63	50.86	0.00
57+00	20.08	79.5	0.00
58+00	32.99	85.06	0.00
59+00	22.35	80.02	0.00
60+00	5.7	60.65	0.00
61+00	34.26	38.39	0.00
62+00	24.98	29.64	0.00
63+00	3.12	111.35	0.00
64+00	12.84	33	0.00
65+00	23.11	26.25	0.00
66+00	37.87	24.55	0.00
67+00	37.84	24.29	0.00
68+00	57.22	15.68	0.00
69+00	0.35	9.48	0.00
70+00	17.28	13.5	0.00
71+00	39.19	28.36	0.00
72+00	33.75	34.36	0.00
73+00	20.84	14.15	0.00
74+00	41.72	29.23	0.00
75+00	40.69	28.59	0.00
76+00	1.94	42.9	0.00
77+00	10.75	25.8	0.00
78+00	49.04	20.31	0.00
79+00	17.26	16.63	0.00
80+00	49.38	13.24	0.00
81+00	75.29	4.96	0.00
82+00	62.45	12.58	0.00
83+00	50.65	19.24	0.00
84+00	32.59	21.35	0.00
85+00	61.98	16.07	0.00
86+00	50.36	23.49	0.00
87+00	51.7	35.23	0.00
88+00	20.81	61.91	0.00
SUB-TOTAL	1633.16	1393.62	0.00

Texas Department of Transportation

SUMMARY OF EARTHWORK QUANTITIES

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

SHEET 1 OF 2

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	11

STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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	110	132	132
	6001	6008	6020
STATION	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY D)	EMBANKMENT (VEHICLE) (DENS CONT) (TY B)
	CY	CY	CY
89+00	18.63	66.68	0.00
90+00	2.85	55.38	0.00
91+00	8.05	91.19	0.00
92+00	13.66	255.52	0.00
93+00	16.49	107.52	0.00
94+00	12.65	76.25	0.00
95+00	78.68	33.64	0.00
96+00	84.38	36.74	0.00
97+00	55.04	33.65	0.00
98+00	84.81	23.92	0.00
99+00	62.82	30.45	0.00
100+00	52.7	45.58	0.00
101+00	9.63	57.52	0.00
102+00	21.83	62.46	0.00
103+00	6.37	53.56	0.00
104+00	47.16	42.79	0.00
105+00	69.64	47.61	0.00
106+00	7.03	24.28	0.00
107+00	32	15.35	0.00
108+00	22.55	36.03	0.00
109+00	36.9	40.47	0.00
110+00	66.32	42.68	0.00
111+00	71.54	34.95	0.00
112+00	84.68	20.79	0.00
113+00	92.43	21.93	0.00
114+00	79.58	27.18	0.00
115+00	55.19	20.9	0.00
116+00	60.31	32.36	0.00
117+00	82.89	31.04	0.00
118+00	81.12	29.55	0.00
119+00	112.22	16.66	0.00
120+00	70.73	25.33	0.00
121+00	16.81	42.16	0.00
122+00	42.56	77.40	0.00
123+00	27.48	87.13	0.00
124+00	35.55	97.07	0.00
128+00	36.11	120.11	0.00
129+00	40.76	90.01	0.00
130+00	99.82	33.74	0.00
131+00	28.61	24.86	0.00
SUB-TOTAL	1928.58	2112.44	0.00

	110	132	132
	6001	6008	6020
STATION	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY D)	EMBANKMENT (VEHICLE) (DENS CONT) (TY B)
	CY	CY	CY
132+00	24.23	15.38	0.00
133+00	109.42	10.05	0.00
134+00	122.8	7.67	0.00
135+00	206.284	3.462	0.00
136+00	191.551	3.946	0.00
137+00	162.805	6.495	0.00
138+00	131.079	7.074	0.00
139+00	30.09	24.98	0.00
140+00	80.95	24.62	0.00
141+00	124.92	15.34	0.00
142+00	109.27	14.1	0.00
143+00	84.57	16.53	0.00
144+00	42.52	39.43	0.00
145+00	5.52	60.11	0.00
146+00	1.11	58.07	0.00
147+00	33.83	43.94	0.00
148+00	58.61	30.68	0.00
149+00	61.32	28.47	0.00
150+00	53.51	23.03	0.00
151+00	43.21	26.83	0.00
152+00	30.73	20.23	0.00
153+00	46.16	12.08	0.00
154+00	54.54	12.4	0.00
155+00	30.47	11.91	0.00
156+00	32.2	13.21	0.00
157+00	49.3	12.11	0.00
158+00	30.62	23.79	0.00
159+00	27.67	25.27	0.00
160+00	27.8	29.85	0.00
161+00	35	27.08	7.92
162+00	44.17	23.28	20.89
163+00	54.39	22.33	32.06
164+00	55.64	22.84	32.8
165+00	81.17	23.06	58.11
166+00	30.09	21.36	8.73
SUB-TOTAL	2307.55	761.01	160.51
TOTAL:	7,207	6,508	161

SUMMARY OF EARTHWORK QUANTITIES

SHEET 2 OF 2

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		12
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

SUMMARY OF DRIVEWAY QUANTITIES

DESCRIPTION							PROP WIDTH (W)	PROP LENGTH (L)	RADIUS (RI)	RADIUS (R2)	ITEM 104	ITEM 530			
											6017	6019	6020	6021	6022
CENTERLINE STATION		EXISTING TYPE	AREA	AREA	EXISTING SURFACE	PROP. SURFACE					REMOVING CONC (DRIVEWAYS)	DRIVEWAYS (ACP) (TYPE I)	DRIVEWAYS (CONC) (TYPE I)	DRIVEWAYS (ACP) (TYPE 2)	INTER SECTIONS (ACP) (TYPE I)
			SF	SY			FT	FT	FT	FT	SY	(SY)	(SY)	(SY)	(SY)
9+57.53	RT	DRIVEWAY	404.668	45.0	GRAVEL	ASPHALT	16	22	10	10				45	
10+38.58	LT	DRIVEWAY	442.831	49.2	CONCRETE	CONCRETE	12	22	20	20	50		50		
10+42.22	RT	DRIVEWAY	404.6684	45.0	GRAVEL	ASPHALT	16	22	10	10				45	
10+78.66	RT	DRIVEWAY	404.6684	45.0	GRAVEL	ASPHALT	16	22	10	10				45	
12+36.02	LT	DRIVEWAY	404.6684	45.0	DIRT	ASPHALT	16	22	10	10			45		
19+34.81	RT	DRIVEWAY	618.25	68.7	GRAVEL	ASPHALT	20	22	20	20				69	
26+25.91	RT	DRIVEWAY	649.91791	72.2	CONCRETE	CONCRETE	25	22	15	15	73		73		
35+89.39	RT	DRIVEWAY	325.307	36.1	GRAVEL	ASPHALT	9	22	15	15				37	
38+20.46	RT	DRIVEWAY	381.09386	42.3	GRAVEL	ASPHALT	13	22	15	15				43	
49+83.47	RT	DRIVEWAY	272.03271	30.2	DIRT	ASPHALT	9	22	10	10				31	
51+60.95	LT	CR 203	1519.35266	168.8	ASPHALT	ASPHALT	15	72	30	30					169
54+42.28	LT	DRIVEWAY	284.3866	31.6	GRAVEL	ASPHALT	10	22	10	10				32	
62+75.63	RT	DRIVEWAY	410.09615	45.6	GRAVEL	ASPHALT	15	22	10	10				46	
68+96.94	LT	DRIVEWAY	310.19721	34.5	GRAVEL	ASPHALT	11	22	10	10				35	
72+33.51	RT	DRIVEWAY	248.30352	27.6	GRAVEL	ASPHALT	9	22	10	10				28	
73+92.17	LT	DRIVEWAY	388.40482	43.2	ASPHALT	ASPHALT	14	22	10	10		44			
74+62.07	LT	DRIVEWAY	287.69451	32.0	GRAVEL	ASPHALT	11	21	10	10				32	
76+39.15	LT	DRIVEWAY	470.07542	52.2	GRAVEL	ASPHALT	20	22	10	10				53	
78+83.11	RT	DRIVEWAY	455.73244	50.6	GRAVEL	ASPHALT	16	22	15	15				51	
80+63.59	LT	DRIVEWAY	661.38509	73.5	CONCRETE	CONCRETE	22	21	20	20	74		74		
88+20.80	LT	DRIVEWAY	280.75589	31.2	GRAVEL	ASPHALT	10	22	10	10				32	
94+09.58	LT	DRIVEWAY	279.10048	31.0	GRAVEL	ASPHALT	10	22	10	10				32	
100+63.86	LT	DRIVEWAY	492.327	54.7	CONCRETE	CONCRETE	24	22	31	17	55		55		
106+17.11	RT	CR 204	1629.32627	181.0	ASPHALT	ASPHALT	110	22	20	34					182
107+83.31	LT	CR 204	860.62185	95.6	ASPHALT	ASPHALT	70	22	50	15					96
114+90.62	LT	DRIVEWAY	319.697	35.5	GRAVEL	ASPHALT	15	22	10	10				36	
163+68.86	LT	DRIVEWAY	1006.477	111.8	GRAVEL	ASPHALT	23	32	20	20				112	
										TOTAL	252	44	297	804	447

** FOR CONTRACTOR'S INFORMATION. ITEM IS NON-PAY. THICKNESS OF DRIVEWAY IS AVERAGE 2" (230#/SY); THICKNESS OF INTERSECTION IS 2" (230#/SY)

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CSE **CIVIL SYSTEMS ENGINEERING, INC.**

TBPE REGISTRATION NO. F-5246

SUMMARY OF DRIVEWAY QUANTITIES

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	13

STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

SUMMARY OF SIDE ROAD & DRIVEWAY PIPE DRAINAGE STRUCTURES

DRWY NO.	STATION	SIDE	DRWY WIDTH (FT)	EXIST. DRWY MATERIAL	ITEM EXISTING	ITEM PROPOSED	NUMBER OF PIPES FOR REF ONLY	162 6002 BLOCK SODDING	168 6001 VEGETATIVE WATERING (5 GAL/SY)	400 6006 CUT & RESTORING PAVEMENT	464 6003 RC PIPE (CL III) 18 IN	464 6005 RC PIPE (CL III) 24 IN	464 6008 RC PIPE (CL III) 36 IN	467 6363 SET (TY II) 18 IN (RCP) (6:1)(P)	467 6395 SET (TY II) 24 IN (RCP) (6:1)(P)	467 6454 SET (TY II) 36 IN (RCP) (6:1)(P)	480 6001 CLEAN EXISITNG CULVERTS	496 6004 REMOV STR (SET)	496 6007 REMOV STR (PIPE)
								SY	MG	SY	LF	LF	LF	EA	EA	EA	EA	EA	LF
(CSJ: 1599-03-017)																			
1	9+57.53	RT	16	GRAVEL	18" X 21' RCP	PROP. SET (TYII)(18IN)(RCP)(6:1)(P) EA END	1							2			1		
2	10+38.58	LT	12	CONCRETE	NO PIPE	NO WORK													
3	10+42.22	RT	16	GRAVEL	NO PIPE	NO WORK													
4	10+78.66	RT	16	GRAVEL	NO PIPE	NO WORK													
5	12+36.02	LT	16	DIRT	24" X 20' RCP	PROP. 24' X 20' RCP RCP (CL III) & SET (TYII)(24IN)(RCP)(6:1)(P) EA END	1					20			2				20
6	19+34.81	RT	20	GRAVEL	24" X 51 ' CMP	PROP. SET (TYII)(24IN)(RCP)(6:1)(P) EA END	1								2		1		
7	26+25.91	RT	25	CONCRETE	18" X 59' CMP	NO WORK	1										1		
8	35+89.39	RT	9	GRAVEL	NO PIPE	PROP. 18' X 32' RCP RCP (CL III) & SET (TYII)(18IN)(RCP)(6:1)(P) EA END	1				32			2					
9	38+20.46	RT	13	GRAVEL	NO PIPE	PROP. 18" X 32' RCP RCP (CL III) & SET (TYII)(18IN)(RCP)(6:1)(P) EA END	1				32			2					
10	49+83.47	RT	9	DIRT	NO PIPE	NO WORK													
11	51+60.95	LT	20	ASPHALT	36" X 32' CMP	PROP. 36" X 32' RCP RCP (CL III) & SET (TYII)(36IN)(RCP)(6:1)(P) EA END	1	38	0.19	13			32			2			32
12	54+42.28	RT	10	GRAVEL	18" X 28' CMP	NO WORK	1										1		
13	62+75.63	RT	15	GRAVEL	24" X 33' CMP	PROP. SET (TYII)(24IN)(RCP)(6:1)(P) EA END	1								2		1		
14	68+96.94	LT	11	GRAVEL	18" X 21' CMP	PROP. SET (TYII)(18IN)(RCP)(6:1)(P) EA END	1							2			1		
15	72+33.51	RT	9	GRAVEL	18" X 33' CMP	PROP. 18' X 32' RCP (CL III) & SET (TYII)(18IN)(RCP)(6:1)(P) EA END	1				32			2				2	33
16	73+92.17	LT	14	ASPHALT	NO PIPE	NO WORK													
17	74+62.07	LT	11	GRAVEL	NO PIPE	NO WORK	1												
18	76+39.15	LT	20	GRAVEL	18"X 38' CMP	NO WORK	1										1		
19	78+83.11	RT	16	GRAVEL	18"X 51' CMP	PROP. 18' X 52' RCP (CL III) & SET (TYII)(18IN)(RCP)(6:1)(P) EA END	1				52			2				2	51
20	80+63.59	LT	22	CONCRETE	18"X48' CMP	NO WORK	1										1		
21	88+20.80	LT	10	GRAVEL	24" X 25' RCP	PROP. SET (TYII)(24IN)(RCP)(6:1)(P) EA END	1								2		1		
22	94+09.58	LT	10	GRAVEL	2-18" X 33' CMP	PROP. 2 - 18" X 32' RCP (CL III) & SET (TYII)(18IN)(RCP)(6:1)(P) EA END	2				64			4					66
23	100+63.86	LT	24	CONCRETE	18" X 34' CMP	NO WORK	1										1		
24	106+17.11	RT	110	ASPHALT	NO PIPE	NO WORK													
25	107+83.31	LT	70	ASPHALT	NO PIPE	NO WORK													
26	114+90.62	LT	15	GRAVEL	18" X 35' CMP	PROP. 18" X 32' RCP (CL III) & SET (TYII)(18IN)(RCP)(6:1)(P) EA END	1				32			2				2	35
27	163+68.86	LT	23	GRAVEL	18" X 38' CMP	NO WORK	1										1		
						PROJECT TOTAL		38.00	0.19	13.00	244.00	20.00	32.00	18.00	8.00	2.00	11.00	6.00	237.00

CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

SUMMARY OF DRIVEWAY CULVERT QUANTITIES

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	14

STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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CSJ: 1599-03-017								
METAL BEAM GUARD FENCE								
MBGF NO.	STATION	LT/RT	*EXISTING METAL BEAM GUARD FENCE	432 6045 RIPRAP (MOW STRIP) 4"	540 6001 MTL W-BEAM GD FEN (TIM POST)	542 6001 REMOVE METAL BEAM GUARD FENCE	542 6002 REMOVE TERMINAL ANCHOR SECTION	544 6001 GUARDRAIL END TREATMENTS (INSTALL)
			LF	CY	LF	LF	EA	EA
1	40+36.45	RT	0	35	338			2
2	60+85.67	LF	130			130	2	
TOTAL			130	35	338	130	2	2

* FOR CONTRACTORS REFERENCE ONLY.

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

SUMMARY OF MBGF QUANTITIES

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		15
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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SUMMARY OF DRAINAGE

LOCATION	400 6005 CEM STABIL BKFL	400 6006 CUT & RESTORING PAV	402 6001 TRENCH EXCAVATION PROTECTION	403 6001 TEMPORARY SPL SHORING	420 6012 CL B CONC (MISC)	432 6002 RIPRAP (CONC)(5 IN)	432 6031 RIPRAP (STONE PROTECTION)(12 IN)	462 6008 CONC BOX CULV (5 FT X 4 FT)	462 6011 CONC BOX CULV (6 FT X 4 FT)	464 6003 RC PIPE (CL III)(18 IN)	464 6005 RC PIPE (CL III)(24 IN)	464 6009 RC PIPE (CL III)(42 IN)	464 6059 RC PIPE (CL V)(30 IN)	466 6005 HEADWALL (CH - FW - O) (DIA= 24 IN)	466 6040 HEADWALL (CH - FW - 30) (DIA= 42 IN)	466 6135 HEADWALL (CH - PW - S) (DIA= 42 IN)
	CY	SY	LF	SF	CY	CY	CY	LF	LF	LF	LF	LF	LF	EA	EA	EA
CSJ: 1599-03-017																
CULVERT 6 (BRIDGE CLASS CULVERT)			6	906	1		62		70							
CULVERT 1			6	357		13	51	36	*	*	*	*	*			
CULVERT 2					1	2	8				15			1		
CULVERT 3	18	28	38	867	1		43	50								
CULVERT 4		18					4						45			
CULVERT 5	28	46	44	439	1		41					120			1	1
CULVERT 7					1		5			22						
CULVERT 8	3	15					7			53						
PROJECT TOTAL	**49**	**107**	**94**	**2569**	**5**	**15**	**221**	**86**	**70**	**75**	**15**	**120**	**45**	**1**	**1**	**1**

* ALL STRUCTURAL EXCAVATION IS SUBSIDIARY TO STRUCTURE PAY ITEM.

SUMMARY OF DRAINAGE CONT.

LOCATION	466 6195 WINGWALL (PW - 2) (HW=6 FT)	466 6196 WINGWALL (PW - 2) (HW=7 FT)	466 6197 WINGWALL (PW - 2) (HW=8 FT)	466 6198 WINGWALL (PW - 2) (HW=9 FT)	467 6356 SET (TY II) (18 IN) (RCP) (3: 1) (C)	467 6358 SET (TY II) (18 IN) (RCP) (4: 1) (C)	467 6390 SET (TY II) (24 IN) (RCP) (4: 1) (C)	467 6419 SET (TY II) (30 IN) (RCP) (4: 1) (C)	480 6001 CLEAN EXIST CULVERTS	496 6005 REMOV STR (WINGWALL)	496 6006 REMOV STR (HEADWALL)	496 6007 REMOV STR (PIPE)	496 6008 REMOV STR (BOX CULVERT)	5070 6001 STEEL FENCE (REMOVE)	5070 6002 STEEL FENCE (INSTALL)
	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	LF	LF	LF	LF
CSJ: 1599-03-017															
CULVERT 6 (BRIDGE CLASS CULVERT)			1	1					1	2			25		
CULVERT 1	2								1	2			10	60	60
CULVERT 2							1		1			5			
CULVERT 3		1	1									45			
CULVERT 4								2				44			
CULVERT 5											2	112			
CULVERT 7						2			1			9			
CULVERT 8					1	1			1			42			
PROJECT TOTAL	**2**	**1**	**2**	**1**	**1**	**3**	**1**	**2**	**5**	**4**	**2**	**257**	**35**	**60**	**60**

CAMACHO-HERNANDEZ & ASSOCIATES, LLC
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FIRM NUMBER: F-8478

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

DRAINAGE SUMMARY

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		16
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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SIGNING SUMMARY OF QUANTITIES

ITEM CODE	NOTES	DESCRIPTION	UNIT	TOTAL QTY	SHT 01 OF 07	SHT 02 OF 07	SHT 03 OF 07	SHT 04 OF 07	SHT 05 OF 07	SHT 06 OF 07	SHT 07 OF 07
0644-6001		IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	19	9	3	1	2	3	1	
0644-6002		IN SM RD SN SUP&AM TY10BWG(1)SA(P-BM)	EA	3			1		2		
0644-6033		IN SM RD SN SUP&AM TYS80(1)SA(U)	EA	4	4						
0644-6038		IN SM RD SN SUP&AM TYS80(1)SA(U-EXAL)	EA	1	1						
0644-6076		REMOVE SM RD SN SUP&AM	EA	22	9	1	3	1	5	1	2
XXX-XXXX		SOLAR POWERED LED ROADSIDE SIGN	EA	2	2						

PAVEMENT MARKINGS SUMMARY OF QUANTITIES

ITEM CODE	NOTES	DESCRIPTION	UNIT	TOTAL QTY	SHT 01 OF 07	SHT 02 OF 07	SHT 03 OF 07	SHT 04 OF 07	SHT 05 OF 07	SHT 06 OF 07	SHT 07 OF 07
0658-6047		INSTL OM ASSM (OM-2Y)(WC)GND	EA	32	4	8	8	4	4	4	
0666-6309		RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	31164	4008	4800	4743	4801	4610	4802	3400
0666-6318		RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	LF	1500	350	330	50			350	420
0666-6321		RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	22008	2326	3008	4490	4801	4480	2903	
0668-6076		PREFAB PAV MRK TY C (W) (24") (SLD)	LF	57	25		9		23		
0672-6009		REFL PAV MRKR TY II-A-A	EA	353	47	55	58	60	57	54	22
0533-6001		RUMBLE STRIPS (SHOULDER)	LF	30259	3681	4800	4592	4800	4180	4804	3402
0533-6002		RUMBLE STRIPS (CENTERLINE)	LF	13827	1841	2400	2194	1200	2090	2401	1701
0662-6109	1	WK ZN PAV MRK SHT TERM (TAB)TY W	EA	1562	201	240	238	241	231	241	170
0662-6111	2	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	EA	1554	222	250	240	241	224	251	126

NOTES: 1 4"(W)SLD TAB SPACING = 20' C-C
2 REFER TO WZ(STPM)-13

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TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

FM 2258

SUMMARY OF SIGNING AND PAVEMENT MARKING QUANTITIES

SHEET 01 OF 01

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		17
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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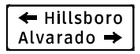
SUMMARY OF PROPOSED SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE: FRP = Fiberglass, TWT = Thin-Wall, 10BWG = 10, S80 = Sch 80	POST: 1 or 2	ANCHOR TYPE: UA = Univer-Conc, UB = Univer-Bolt, SA = Slip-Conc, SB = Slip-Bolt, WS = Wedge Steel, WP = Wedge Plastic	MOUNTING DESIGNATION: PREFABRICATED: P = "Plain", T = "T", U = "U"	MOUNTING DESIGNATION: 1 EXT or 2 EXT = # of Ext. BM = Extruded Wind Beam, WC = 1.12 #/ft Wing Channel, EXAL=Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE: TY N, TY S
1	1	M3-3B		24" X 12"	X		S80	1	SA	U		
OF		M1-1T		30" X 24"	X							
15		M6-3B		21" X 15"	X							
		M3-1B		24" X 12"	X							
		M1-1T		30" X 24"	X							
		M6-1B		21" X 15"	X							
	2	M3-2		24" X 12"	X		S80	1	SA	U		
		M1-6F		24" X 24"	X							
		M6-1		21" X 15"	X							
		M3-3B		24" X 12"	X							
		M1-1T		30" X 24"	X							
		M6-1B		21" X 15"	X							
			SOLAR POWERED LED EMBBEDED IN THE BORDER OF STOP SIGN									
	3	R1-1		36" X 36"	X		10BWG	1	SA	P		
		W4-4P		24" X 12"	X							
			SOLAR POWERED LED EMBBEDED IN THE BORDER OF STOP SIGN									
	4	R1-1		36" X 36"	X		10BWG	1	SA	P		
		W4-4P		24" X 12"	X							
	5	M3-1B		24" X 12"	X		S80	1	SA	U		
		M1-1T		30" X 24"	X							
		M6-1B		21" X 15"	X							
		M3-2		24" X 12"	X							
		M1-6F		24" X 24"	X							
		M6-3		21" X 15"	X							
	6	M3-3B		24" X 12"	X		S80	1	SA	U		
		M1-1T		30" X 24"	X							
		M6-1B		21" X 15"	X							
		M3-2		24" X 12"	X							
		M1-6F		24" X 24"	X							
		M6-1		21" X 15"	X							
	7	R12-1T		24" X 36"	X		10BWG	1	SA	P		
	8	M3-2		24" X 12"	X		10BWG	1	SA	P		
		M1-6F		24" X 24"	X							
	9	D1-2		84" X 30"		X	S80	1	SA	U	EXAL	
	10	W3-1		36" X 36"	X		10BWG	1	SA	P		
	11	M2-1B		21" X 15"	X		10BWG	1	SA	P		
		M1-1T		30" X 24"								

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/

http://www.txdot.gov/

NOTES:

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).

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CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

FM 2258

SUMMARY OF PROPOSED SMALL SIGNS

SHEET 01 OF 03

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		18
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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SUMMARY OF PROPOSED SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 S80 = Sch 80	POST 1 or 2	ANCHOR TYPE UA = Univer-Conc UB = Univer-Bolt SA = Slip-Conc SB = Slip-Bolt WS = Wedge Steel WP = Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	MOUNTING DESIGNATION 1 EXT or 2 EXT = # of Ext. BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL=Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
	12	R2-1		30" X 36"	X		10BWG	1	SA	P		
	13	W2-1aT		48" X 48"	X		10BWG	1	SA	T		
	13	W2-1aT		48" X 48"	X		10BWG	1	SA	T		
2 OF 15	1	W2-1		36" X 36"	X		10BWG	1	SA	P		
	2	W1-4R		36" X 36"	X		10BWG	1	SA	P		
	3	D20-1TL		24" X 24"	X		10BWG	1	SA	P		
3 OF 15	1	D3-4T R1-1		8" X 30" 36" X 36"	X X		10BWG	1	SA	P	BM	
	2	D20-1TR		24" X 24"	X		10BWG	1	SA	P		
4 OF 15	1	W1-4R		36" X 36"	X		10BWG	1	SA	P		
	2	W1-4L		36" X 36"	X		10BWG	1	SA	P		
5 OF 15	1	M3-4 M1-6F D10-7AT D10-7AT		24" X 12" 24" X 24" 3" X 10" 3" X 10"	X X X X		10BWG	1	SA	P		

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

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Texas Department of Transportation

FM 2258

SUMMARY OF PROPOSED SMALL SIGNS

SHEET 02 OF 03

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		19
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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SUMMARY OF PROPOSED SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 S80 = Sch 80	POST 1 or 2	ANCHOR TYPE UA = Univer-Conc UB = Univer-Bolt SA = Slip-Conc SB = Slip-Bolt WS = Wedge Steel WP = Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	MOUNTING DESIGNATION 1 EXT or 2 EXT = # of Ext. BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL=Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
	2	D3-4T		8" X 30"	X		10BWG	1	SA	P	BM	
		R1-1		36" X 36"	X							
	3	D20-2T		24" X 24"	X		10BWG	1	SA	P		
	4	D3-4T		8" X 30"	X		10BWG	1	SA	P	BM	
		R1-1		36" X 36"	X							
	5	D20-2T		24" X 24"	X		10BWG	1	SA	P		
6 OF 15	1	W1-4L		36" X 36"	X		10BWG	1	SA	P		

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

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3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

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Texas Department of Transportation

FM 2258

SUMMARY OF PROPOSED SMALL SIGNS

SHEET 03 OF 03

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		20
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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SUMMARY OF SW3P

SHEET	LOCATION	0161 6017 COMPOST MANUF TOPSOIL (4")	0164 6003 BROADCAST SEED (PERM) (RURAL) (CLAY)	0164 6009 BROADCAST SEED (TEMP) (WARM)	0164 6011 BROADCAST SEED (TEMP) (COOL)	0164 6051 DRILL SEED (TEMP) (WARM OR COOL)	0164 6066 DRILL SEEDING (PERM) (WARM OR COOL)	0168 6001 VEGETATIVE WATERING	0180 6001 WILDFLOWER SEEDING	0506 6002 * ROCK FILTER DAMS (INSTALL) (TY 2)	0506 6011 ROCK FILTER DAMS (REMOVE)	0506 6038 TEMP SEDMT CONT FENCE (INSTALL)	0506 6039 TEMP SEDMT CONT FENCE (REMOVE)	0506 6041 BIODEG EROSN CONT LOGS (INSTL) (12")	0506 6043 BIODEG EROSN CONT LOGS (REMOVE)
		SY	SY	SY	SY	SY	SY	MG	AC	LF	LF	LF	LF	LF	LF
	FM 2258														
1 of 7	BEGIN TO 25+00	8,712	8,712	4,356	4,356	8,712	8,712	609.9	1.8	90	90	655	655	240	240
2 of 7	25+00 TO 49+00	11,583	11,583	5,792	5,792	11,583	11,583	810.8	2.4	100	100	420	420	300	300
3 of 7	49+00 TO 73+00	11,614	11,614	5,807	5,807	11,614	11,614	813.0	2.4	100	100	485	485	320	320
4 of 7	73+00 TO 97+00	11,392	11,392	5,696	5,696	11,392	11,392	797.4	2.4	50	50	649	649	240	240
5 of 7	97+00 TO 121+00	11,363	11,363	5,682	5,682	11,363	11,363	795.4	2.4	50	50	203	203	240	240
6 of 7	121+00 TO 148+00	12,467	12,467	6,234	6,234	12,467	12,467	872.7	2.6	50	50	682	682	180	180
7 of 7	148+00 TO END	10,090	10,090	5,045	5,045	10,090	10,090	706.3	2.1	0	0	0	0	200	200
	PROJECT TOTAL	**77,221**	**77,221**	**38,611**	**38,611**	**77,221**	**77,221**	**5,405.5**	**16.1**	**440**	**440**	**3,094**	**3,094**	**1,720**	**1,720**

* ROCK FILTER DAMS TO BE PLACED AS DIRECTED AND APPROVED OF BY ENGINEER.

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OFFICE: (210) 341-6200 FAX: (210) 341-6300
FIRM NUMBER: F-8478

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

SW3P
SUMMARY

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		21
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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DETOURS, BARRICADES, WARNING SIGNS, SEQUENCE OF WORK, ETC.

THE CONTRACTOR'S ATTENTION IS DIRECTED TO THE REQUIREMENTS OF ITEM 7, "LEGAL RELATIONS AND RESPONSIBILITES TO THE PUBLIC" OF THE STANDARD SPECIFICATIONS. IN ADDITION TO THESE REQUIREMENTS, THE TMUTCD AND THE FOLOWING PROVISIONS SHALL ALSO GOVERN:

1. GENERAL

(1) TRAFFIC MUST BE HANDLED THROUGHOUT THE PROJECT DURING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING A SAFE AND COMFORTABLE PASSAGE FOR VEHICULAR AND PEDESTRIAN TRAFFIC WITH MINIMAL INCONVENIENCE TO THE PUBLIC, AS SHOWN IN THE PLANS OR AS DIRECTED/APPROVED BY THE ENGINEER.

(2) THE CONTRACTOR MAY PROPOSE/RECOMMEND MODIFICATIONS TO THE SEQUENCE OF WORK FOR CONSIDERATION BY THE ENGINEER. ANY MAJOR RECOMMENDED MODIFICATION BY THE CONTRACTOR SHALL INCLUDE ANY CHANGES TO THE VARIOUS BID ITEMS, IMPACT TO TRAFFIC, EFFECT OF OVERALL PROJECT IN TIME AND COST, ETC. IF THIS PROPOSAL IS IMPLEMENTED, THE CONTRACTOR WILL BE RESPONSIBLE FOR DEVELOPING DETAILED PLAN SHEETS TO BE SEALED BY A LICENSED PROFESSIONAL ENGINEER FOR INCLUSION WITH THE CHANGE ORDER. THE CONTRACTOR CANNOT PROCEED WITH ANY CONSTRUCTION OPERATIONS BASED ON A REVISED PHASE / SEQUENCE UNTIL WRITTEN APPROVAL IS OBTAINED FROM THE ENGINEER. IF AT ANY TIME DURING CONSTRUCTION THE CONTRACTOR'S PROPOSED PLAN OF OPERATION FOR HANDLING TRAFFIC DOES NOT PROVIDE FOR SAFE AND COMFORTABLE MOVEMENT, THE CONTRACTOR WILL IMMEDIATELY CHANGE THEIR OPERATION TO CORRECT THE UNSATISFACTORY CONDITION.

(3) DO NOT STORE ANY CONSTRUCTION MATERIAL OR EQUIPMENT AT ANY LOCATION THAT WILL CONSTITUTE A HAZARD AND WILL ENDANGER THE THROUGH TRAFFIC.

(4) THE CONTRACTOR WILL PROVIDE 10 DAYS ADVANCE NOTIFICATION TO THE ENGINEER OF IMPENDING / UPCOMING LANE CLOSURES FOR ALL TEMPORARY AND / OR PERMANENT LANE CLOSURES OR DETOURS.

(5) ACCESS TO ADJOINING PROPERTY MUST BE MAINTAINED AT ALL TIMES.

(6) TEMPORARY DRAINAGE IS THE RESPONSIBILITY OF THE CONTRACTOR.

(7) AT NO TIME SHALL TWO CONSECUTIVE INTERSECTING ROADWAYS BE CLOSED AT ONE TIME DURING CONSTRUCTION.

(8) REMOVAL AND DISPOSAL OF EXISTING ABANDONED UTILITIES (EITHER PREVIOUSLY ABANDONED OR ABANDONED DURING THIS PROJECT) REQUIRED TO SUPPORT THIS PROJECT'S CONSTRUCTION SHALL BE PERFORMED UNDER THE OVERALL PREPARE RIGHT-OF-WAY ITEM (ITEM 100).

(9) COORDINATE WITH ADJACENT PROJECTS.

(10) COVER PERMANENT SIGNS IF NOT USED. THIS IS SUBSIDIARY TO ITEM 502.

(11) CRANES WILL BE FULLY LOWERED/RETRACTED AT THE END OF EACH WORK DAY. AT NO TIME SHALL A CRANE BE LEFT UNATTENDED WHILE BEING EXTENDED.

(12) ALL LANE AND SHOULDER CLOSURES WILL USE PLASTIC DRUMS AS CHANNELIZING DEVICES UNLESS OTHERWISE SHOWN.

(13) CONTRACTOR MUST PROTECT ALL EXISTING STRUCTURES (DRAINAGE, BRIDGES, GUARDRAIL, ETC.) FROM DAMAGE DUE TO CONSTRUCTION ACTIVITIES. DAMAGE TO EXISITNG STRUCTURES WILL BE REPAIRED AND PAID FOR AT THE CONTRACTORS EXPENSE.

2. SAFETY

(1) THE CONTRACTOR WILL PROVIDE, CONSTRUCT AND MAINTAIN BARRICADES AND SIGNS IN ACCORDANCE WITH STATE STANDARDS BC (1 - 12)-14. ANY SIGNS REQUIRED THAT ARE NOT DETAILED IN THE STANDARD SHEETS SHALL BE IN CONFORMANCE WITH THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS" AND THE "STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS."

(2) BARRICADES AND WARNING SIGNS SHALL BE PLACED AS INDICATED ON THE PLANS. THIS SHALL BE CONSIDERED THE MINIMUM REQUIRED TO PROVIDE FOR THE SAFETY OF TRAFFIC DURING CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN OTHER SUCH BARRICADES AND SIGNS DEEMED NECESSARY BY THE ENGINEER OR AS DIRECTED BY FIELD CONDITIONS, TO PROVIDE FOR THE PASSAGE OF TRAFFIC IN SAFETY AT ALL TIMES.

(3) THE CONTRACTOR SHALL PROVIDE AND MAINTAIN FLAGGERS AS DIRECTED/APPROVED BY THE ENGINEER, AT SUCH POINTS, AND FOR SUCH PERIODS OF TIME AS MAY BE REQUIRED, TO PROVIDE FOR THE SAFETY OF THE TRAVELING PUBLIC AND THE CONTRACTOR'S PERSONNEL.

(4) THE CONTRACTOR SHALL KEEP THE ROADWAY CLEAN AND FREE OF DIRT OR OTHER MATERIALS DURING HAULING OPERATIONS. IF THE CONTRACTOR DOES NOT MAINTAIN A CLEAN ROADWAY, THEY SHALL CEASE ALL CONSTRUCTION OPERATIONS, WHEN DIRECTED BY THE ENGINEER, TO CLEAN THE ROADWAY TO THE SATISFACTION OF THE ENGINEER.

(5) THE CONTRACTOR SHALL USE DRIVEWAY ASSISTANCE DEVICES (DADS) IN ACCORDANCE WITH DRIVEWAY ASSISTANCE DEVICES DETAIL SHEET AND AS SHOWN ON THE PLANS. DADS MAY NOT BE SUBSTITUTED FOR FLAGGERS, UNLESS SPECIFIED IN THE PLANS.

3. HAULING EQUIPMENT

(1) THE USE OF RUBBER-TIRED EQUIPMENT WILL BE REQUIRED FOR MOVING DIRT OR OTHER MATERIALS ALONG OR ACROSS PAVEMENT SURFACES. WHERE THE CONTRACTOR DESIRES TO MOVE ANY EQUIPMENT NOT LICENSED FOR OPERATION ON PUBLIC HIGHWAYS, ON OR ACROSS PAVEMENT. THEY SHALL PROTECT THE PAVEMENT FROM DAMAGE AS DIRECTED / APPROVED BY THE ENGINEER.

(2) THROUGHOUT CONSTRUCTION OPERATIONS, THE CONTRACTOR WILL BE REQUIRED TO CONDUCT THEIR HAULING OPERATIONS IN A MANNER SUCH THAT VEHICLES WILL NOT HAUL OVER PREVIOUSLY RECOMPACTED SUBGRADE OR COMPACTED BASE MATERIAL, EXCEPT IN SHORT SECTIONS FOR DUMPING MANIPULATIONS.

4. FINAL CLEAN UP

(1) UPON COMPLETION OF THE WORK AND BEFORE FINAL ACCEPTANCE AND FINAL PAYMENT IS MADE, THE CONTRACTOR SHALL CLEAR AND REMOVE FROM THE SITE ALL SURPLUS AND DISCARDED MATERIALS AND DEBRIS OF EVERY KIND AND LEAVE THE ENTIRE PROJECT IN A SMOOTH, NEAT AND SIGHTLY CONDITION.

5. SEQUENCE OF WORK

(1) BEFORE THE COMMENCEMENT OF EACH PHASE, INSTALL ADVANCE WARNING SIGNS, DETOURS, TEMPORARY SIGNS AND BARRICADES AS SHOWN ON THE PLANS AND / OR AS DIRECTED / APPROVED BY THE ENGINEER. 7 DAY ADVANCED NOTICE SHALL BE PROVIDED TO TRAVELING PUBLIC PRIOR TO CHANGE IN TRAFFIC PATTERNS AND CLOSURES USING PORTABLE CHANGEABLE MESSAGE SIGNS.
DROP OFF CONDITIONS OF GREATER THAN 2" MUST HAVE A 3:1 SLOPE AT THE END OF EACH DAY, AS WELL AS THROUGHOUT THE PROJECT WHERE ACCESS TO ADJACENT PROPERTIES IS ALLOWED TO DRIVEWAYS AND SIDE ROADS.

(2) ALL BEGIN AND END PROJECT LIMITS SIGNS MUST BE INSTALLED AS PER THE STANDARD BC(2)-14 & TMUTCD PRIOR TO COMMENCEMENT OF EACH PHASE.

(3) PRIOR TO COMMENCING ANY WORK, CONTRACTOR MUST INSTALL TEMPORARY EROSION CONTROL DEVICES. SET UP SW3P ALONG THE WORK AREA OF FM 2258 AND MAINTAIN BMPS AT OUTFALLS.

(4) PREPARING ROW/REMOVAL OF EXISTING ITEMS TO BE COMPLETED ONLY IN AREAS WHERE WORK IS OCCURRING, AS PER THE NOTED SEQUENCE OF WORK.

(5) COVER ALL EXISTING SIGNS THAT ARE IN CONFLICT WITH TEMPORARY CONSTRUCTION SIGNING. FOR EXAMPLE, COVER EXISTING SPEED LIMIT SIGNS IN AREAS WHERE THERE ARE TEMPORARY SPEED REDUCTIONS. PLACE ALL RESPECTIVE SIGNS/BARRICADES AS REQUIRED FOR THE CONSTRUCTION OPERATIONS CALLED FOR IN THE RESPECTIVE PHASE PRIOR TO COMMENCING ANY WORK FOR THE PHASE.

(6) ONCE WORK HAS BEGUN AT A REFERENCED LOCATION, THE ENTIRE SEQUENCE MUST BE WORKED ON CONTINUOUSLY UP THROUGH THE COMPLETION OF THAT PHASE.

(7) CONSTRUCT INTERSECTIONS IN HALF SECTIONS USING THE DETAILS AS SHOWN ON THE PLANS.

(8) PROVIDE A SMOOTH TRANSITION AT WORK LIMIT ENDS BEFORE OPENING TO TRAFFIC. INSTALL WORK ZONE TABS AND / OR PAVEMENT MARKINGS AS REQUIRED BY THE TMUTCD, PLANS, AND STANDARDS TO SAFELY GUIDE TRAFFIC.

(9) A DESCRIPTION OF THE SEQUNCE OF CONSTRUCTION IS AS FOLLOWS:

PHASE I - CONSTRUCT CULVERT REPLACEMENTS NO. 3-5 AND 8 FOLLOWING BELOW STEPS:

STEP 1 - CULVERT REPLACEMENTS WILL BE CONSTRUCTED IN HALF SECTIONS DURING A CONTINUOUS WORKING WEEKEND OPERATION BEGINING FRIDAY 8PM TO MONDAY 5AM, USING ONE-LANE/TWO-WAY TRAFFIC CONTROL WITH FLAGGERS. CONTRACTOR SHALL INSTALL LPCB, REMOVE EXISTING CULVERT,RECONSTRUCT NEW CULVERT, CUT & RESTORE PAVEMENT, BACKFILL, CONSTRUCT TEMPORARY DETOUR PAVEMENT, MOVE LPCB AND OPEN LANES TO TRAFFIC.

STEP 2 - CONSTRUCT CULVERT HEADWALL/WINGWALLS, BACKFILL, REGRADE AND FULLY CONSTRUCT HALF SECTION OF CULVERT PRIOR TO MOVING TO SECOND HALF SECTION.

STEP 3 - SECOND HALF OF CULVERT REPLACEMENTS WILL BE CONSTRUCTED DURING A CONTINUOUS WORKING WEEKEND OPERATION BEGINING FRIDAY 8PM TO MONDAY 5AM, USING ONE-LANE/TWO-WAY TRAFFIC CONTROL WITH FLAGGERS. CONTRACTOR SHALL MOVE LPCB, REMOVE EXISTING CULVERT, RECONSTRUCT NEW CULVERT, CUT & RESTORE PAVEMENT, BACKFILL, MOVE LPCB, RESTRIPE AND OPEN LANES TO TRAFFIC

STEP 4 - CONSTRUCT CULVERT HEADWALL/WINGWALLS, BACKFILL, REGRADE AND FULLY CONSTRUCT HALF SECTION OF CULVERT PRIOR TO MOVING TO FOLLOWING PHASE/STEP.

FOR CULVERT NO. 4 REPLACEMENT,CR 203 SHALL BE FULLY CLOSED. REFER TO TCP PHASE I CULVERT NO. 4 REPLACEMENT LAYOUT AND CR 203 DETOUR DETAILS.

PHASE II - CONSTRUCT CULVERT EXTENSIONS NO. 1-2,6 AND 7 FOLLOWING STEPS BELOW:

STEP 1 - CLOSE THE WESTBOUND LANE UTILIZING LOW PROFILE CONCRETE BARRIER TO EXTEND WESTBOUND SIDE CULVERT. IMPLEMENT ONE-LANE/TWO-WAY TRAFFIC CONTROL WITH A TEMPORARY TRAFFIC SIGNAL AS SHOWN ON ONE-LANE/TWO-WAY TRAFFIC WITH TEMP SIGNAL DETAIL. CULVERT HEADWALL/WINGWALLS/SAFETY END TREATMENTS SHALL BE FULLY CONSTRUCTED PRIOR TO MOVING TO FOLLOWING EXTENSION. CUT AND RESTORE PAVEMENT AS PER PLANS AND DETAILS.

STEP 2 - ADJUST THE TEMPORARY TRAFFIC SIGNAL, SHIFT THE ONE-LANE/TWO-WAY TRAFFIC CONTROL TO THE OPPOSITE SIDE OF THE ROADWAY, RELOCATE THE LOW PROFILE CONCRETE BARRIER, AND CONSTRUCT THE REMAINING PORTION OF THE CULVERT EXTENSIONS. CULVERT HEADWALL/WINGWALLS/SAFETY END TREATMENTS SHALL BE FULLY CONSTRUCTED PRIOR TO MOVING TO FOLLOWING EXTENSION. CUT AND RESTORE PAVEMENT AS PER PLANS AND DETAILS.

FOR CULVERT NO. 7, BOTH EXTENSIONS WILL BE CONSTRUCTED CONCURRENTLY. REFER TO TCP PHASE II CULVERT NO. 7 EXTENSION LAYOUT.

PHASE III - CONSTRUCT TEMPORARY PAVEMENT WIDENING

CONSTRUCT TEMPORARY PAVEMENT ON THE WESTBOUND SIDE OF ROADWAY AS SPECIFIED IN TEMPORARY WIDENING TABLE. IMPLEMENT ONE-LANE/TWO-WAY TRAFFIC CONTROL WITH FLAGGER AS PER TXDOT STANDARD TCP(2-2)-18.

PHASE IV - RECONSTRUCT ROADWAY STA 6+60 TO 165+00

STEP 1A - CONSTRUCT EASTBOUND TEMPORARY PAVEMENT STA 6+48.86 TO 16+70.00. IMPLEMENT ONE-LANE/TWO-WAY TRAFFIC CONTROL WITH FLAGGERS AS PER TXDOT STANDARD TCP(2-2)-18.

STEP 1B - CONSTRUCT WESTBOUND ROADWAY HALF SECTION STA 6+60 TO 13+35. IMPLEMENT TWO-LANE TWO-WAY TRAFFIC WITH LPCB AS PER PHASE IV STEP 1B LAYOUT.

STEP 1C - CONSTRUCT WESTBOUND TEMPORARY PAVEMENT STA 6+42.98 TO 16+70. IMPLEMENT ONE-LANE TWO-WAY TRAFFIC WITH FLAGGERS.

STEP 1D - MOVE LPCB AND SHIFT TRAFFIC TO WESTBOUND SIDE AND CONSTRUCT EASTBOUND ROADWAY STA 6+60 TO 13+35. IMPLEMENT TWO-LANE TWO-WAY TRAFFIC WITH LPCB AS PER PHASE IV STEP 1D LAYOUT.

STEP 2A - CONSTRUCT EASTBOUND ROADWAY STA 13+35 TO STA 45+00. IMPLEMENT ONE-LANE/TWO-WAY TRAFFIC CONTROL WITH TRAFFIC SIGNALS AND DRIVEWAY ASSISTANCE DEVICES (DADS).

STEP 2B - CONSTRUCT WESTBOUND ROADWAY STA 13+35 TO STA 45+00. IMPLEMENT ONE-LANE/TWO-WAY TRAFFIC CONTROL WITH TRAFFIC SIGNALS AND DRIVEWAY ASSISTANCE DEVICES (DADS).

STEP 3A - CONSTRUCT EASTBOUND ROADWAY STA 45+00 TO STA 58+00 AND CR 203. IMPLEMENT ONE-LANE/TWO-WAY TRAFFIC CONTROL WITH TRAFFIC SIGNALS AND DRIVEWAY ASSISTANCE DEVICES (DADS).

STEP 3B - CONSTRUCT WESTBOUND ROADWAY STA 45+00 TO STA 58+00 AND CR 203. IMPLEMENT ONE-LANE/TWO-WAY TRAFFIC CONTROL WITH TRAFFIC SIGNALS AND DRIVEWAY ASSISTANCE DEVICES (DADS).

CR 203 UNDER FULL CLOSURE DURING STEP 3A AND 3B AND TO BE CONSTRUCTED WITHIN STEP 3B.
REFER TO CR 203 DETOUR DETAILS.

STEP 4A - CONSTRUCT EASTBOUND ROADWAY STA 58+00 TO STA 103+11. IMPLEMENT ONE-LANE/TWO-WAY TRAFFIC CONTROL WITH TRAFFIC SIGNALS AND DRIVEWAY ASSISTANCE DEVICES (DADS).

STEP 4B - CONSTRUCT WESTBOUND ROADWAY STA 58+00 TO STA 103+11. IMPLEMENT ONE-LANE/TWO-WAY TRAFFIC CONTROL WITH TRAFFIC SIGNALS AND DRIVEWAY ASSISTANCE DEVICES (DADS).

STEP 5A - CONSTRUCT EASTBOUND ROADWAY STA 103+11 TO STA 112+20. IMPLEMENT ONE-LANE/TWO-WAY TRAFFIC CONTROL WITH FOUR-LEG INTERSECTION APPROACH TEMPORARY TRAFFIC SIGNALS AT CR 204.

STEP 5B - CONSTRUCT WESTBOUND ROADWAY STA 103+11 TO STA 112+20. IMPLEMENT ONE-LANE/TWO-WAY TRAFFIC CONTROL WITH FOUR-LEG INTERSECTION APPROACH TEMPORARY TRAFFIC SIGNALS AT CR 204.

STEP 6A - CONSTRUCT EASTBOUND ROADWAY STA 112+20 TO STA 165+00. IMPLEMENT ONE-LANE/TWO-WAY TRAFFIC CONTROL WITH TRAFFIC SIGNALS AND DRIVEWAY ASSISTANCE DEVICES (DADS).

STEP 6B - CONSTRUCT WESTBOUND ROADWAY STA 112+20 TO STA 165+00. IMPLEMENT ONE-LANE/TWO-WAY TRAFFIC CONTROL WITH TRAFFIC SIGNALS AND DRIVEWAY ASSISTANCE DEVICES (DADS).

PHASE V

LAY THE FINAL 2" SP-C HMAC (2" MINIMUM LIFT) UTILIZING TCP (1-2)-18 & TCP (1-4)-18. INSTALL ALL NECESSARY WORKZONE SHORT TERM TEMPORARY TABS UTILIZING TXDOT STANDARD (STPM)-13. INSTALL ALL PERMANENT PAVEMENT MARKINGS AND OTHER FINAL ROADWAY ITEMS (GRADING, SIGNING, PERMANENT BMPS, ETC.) UTILIZING TCP (3-3)-14 AND AS SHOWN ON THE PLANS. OPEN ROADWAY TO TRAFFIC AND PERFORM FINAL CLEAN-UP.

6. PAYMENT

(1) ALL BARRICADES, SIGNS, AND FLAGGERS SHALL BE SUBSIDIARY TO ITEM 502 BARRICADES, SIGNS AND TRAFFIC HANDLING. ALL EROSION AND SEDIMENT CONTROL DEVICES WILL BE PAID FOR UNDER ITEM 506 TEMPORARY EROSION, SEDIMENTATION, AND ENVIRONMENTAL CONTROLS. ALL WORK ZONE PAVEMENT MARKINGS WILL BE PAID FOR UNDER ITEM 662 WORK ZONE PAVEMENT MARKINGS. ALL OTHER WORK AND MATERIALS WILL BE SUBSIDIARY TO THE VARIOUS BID ITEMS UNLESS OTHERWISE INDICATED IN THE PLANS.

STATE OF TEXAS
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PROFESSIONAL ENGINEER
John Hernandez, P.E.
2/13/2024

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CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

FM 2258

TRAFFIC CONTROL PLAN NARRATIVE

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		22
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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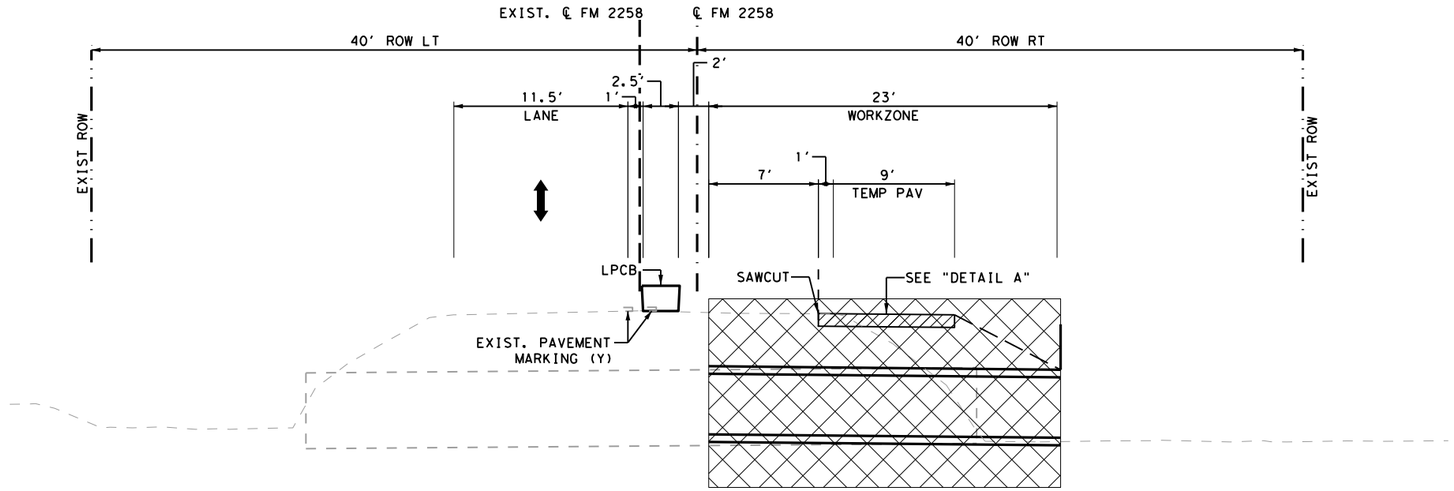
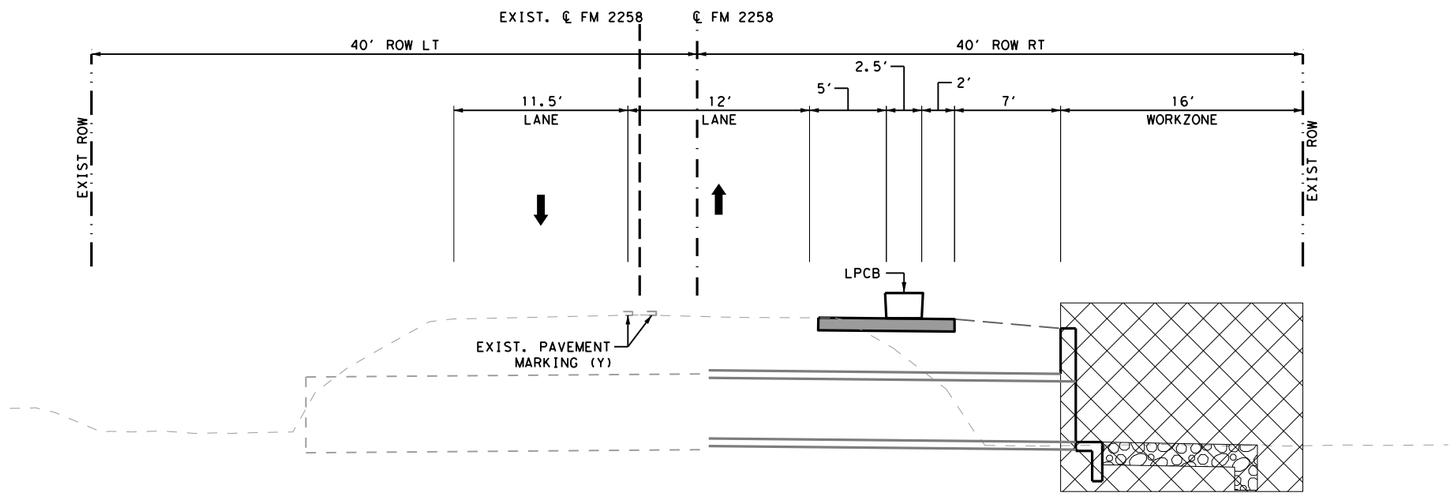


TCP TYPICAL PHASE I - CULVERT NO. 3 STEP 1

PROPOSED PLACEMENT OF TCP LOW PROFILE CONCRETE BARRIER SHALL BE CONTROLLED BY THE EXISTING CENTERLINE

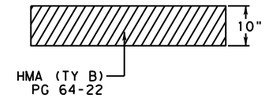


TCP TYPICAL PHASE I - CULVERT NO. 3 STEP 2

PROPOSED PLACEMENT OF TCP LOW PROFILE CONCRETE BARRIER SHALL BE CONTROLLED BY THE EXISTING CENTERLINE

LEGEND

- CONSTRUCTION THIS STEP/PHASE
- CONSTRUCTION COMPLETED PREVIOUS STEP/PHASE
- TEMPORARY MARKING THIS STEP/PHASE
- TEMPORARY MARKING INSTALLED PREVIOUS STEP/PHASE
- PROP TRAFFIC FLOW/DETOUR ARROW



"DETAIL A"

TEMPORARY PAVEMENT SECTION
(TEMPORARY PAVEMENT SHALL BE PAID FOR UNDER ITEM 508 6001-CONSTRUCTING DETOURS)

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TRAFFIC CONTROL PLAN TYPICAL SECTIONS (CULVERT NO. 3 REPLACEMENT)

NTS

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STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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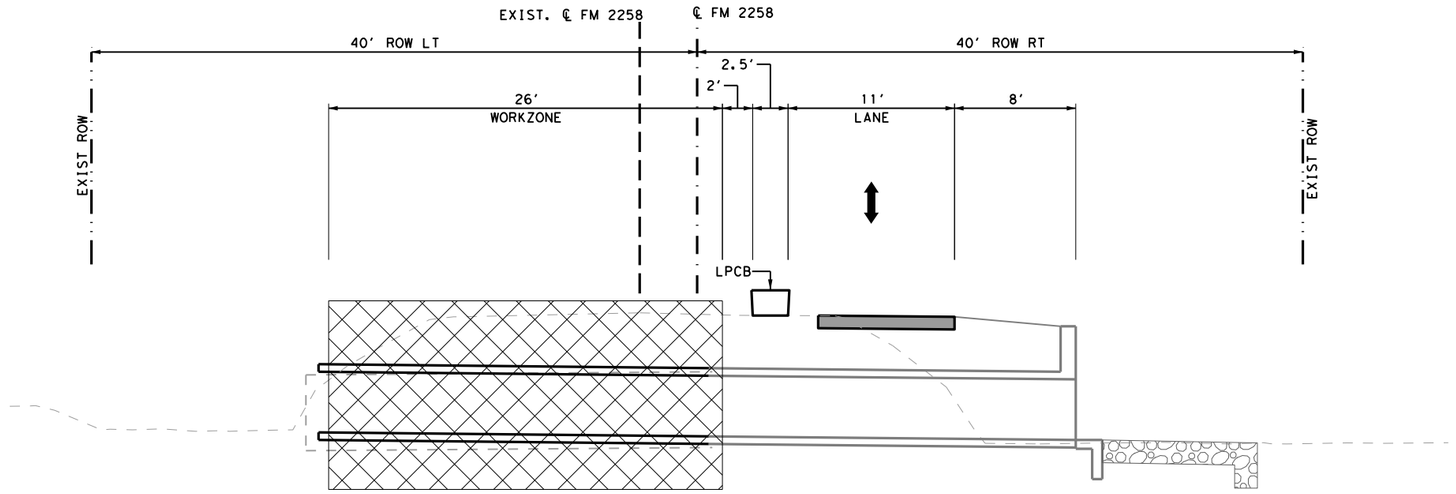

TCP TYPICAL PHASE I - CULVERT NO. 3 STEP 3

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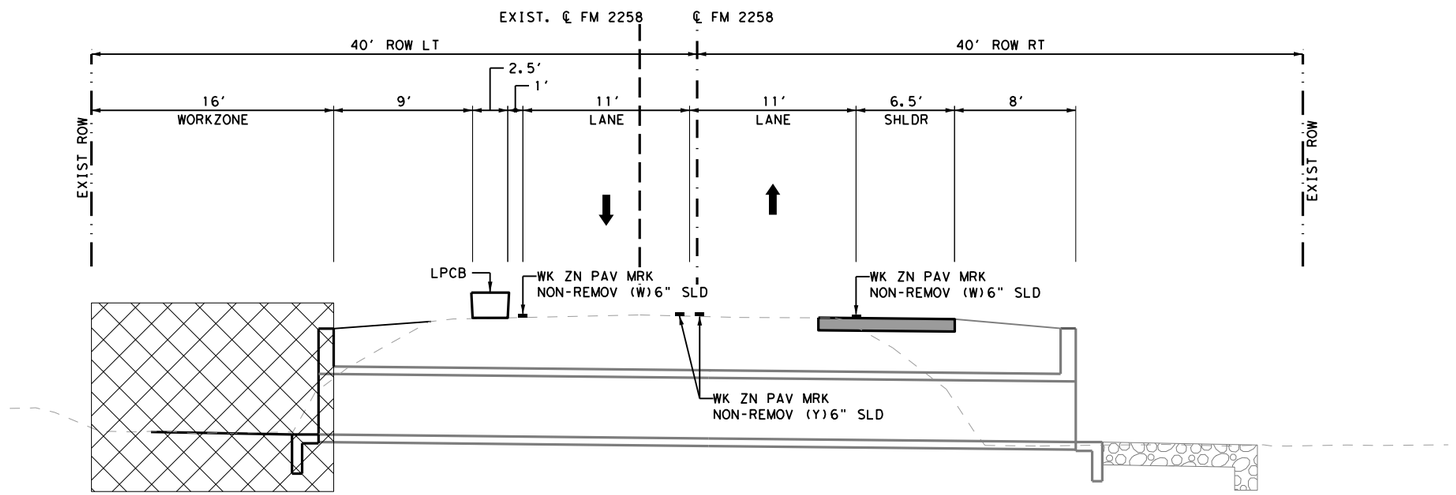
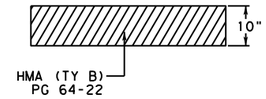


TCP TYPICAL PHASE I - CULVERT NO. 3 STEP 4

PROPOSED PLACEMENT OF TCP LOW PROFILE CONCRETE BARRIER SHALL BE CONTROLLED BY THE EXISTING CENTERLINE

LEGEND

- CONSTRUCTION THIS STEP/PHASE
- CONSTRUCTION COMPLETED PREVIOUS STEP/PHASE
- TEMPORARY MARKING THIS STEP/PHASE
- TEMPORARY MARKING INSTALLED PREVIOUS STEP/PHASE
- PROP TRAFFIC FLOW/DETOUR ARROW



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TRAFFIC CONTROL PLAN TYPICAL SECTIONS (CULVERT NO. 3 REPLACEMENT)

NTS

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06	SEE TITLE SHEET		24
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CONT.	SECT.	JOB	HIGHWAY NO.
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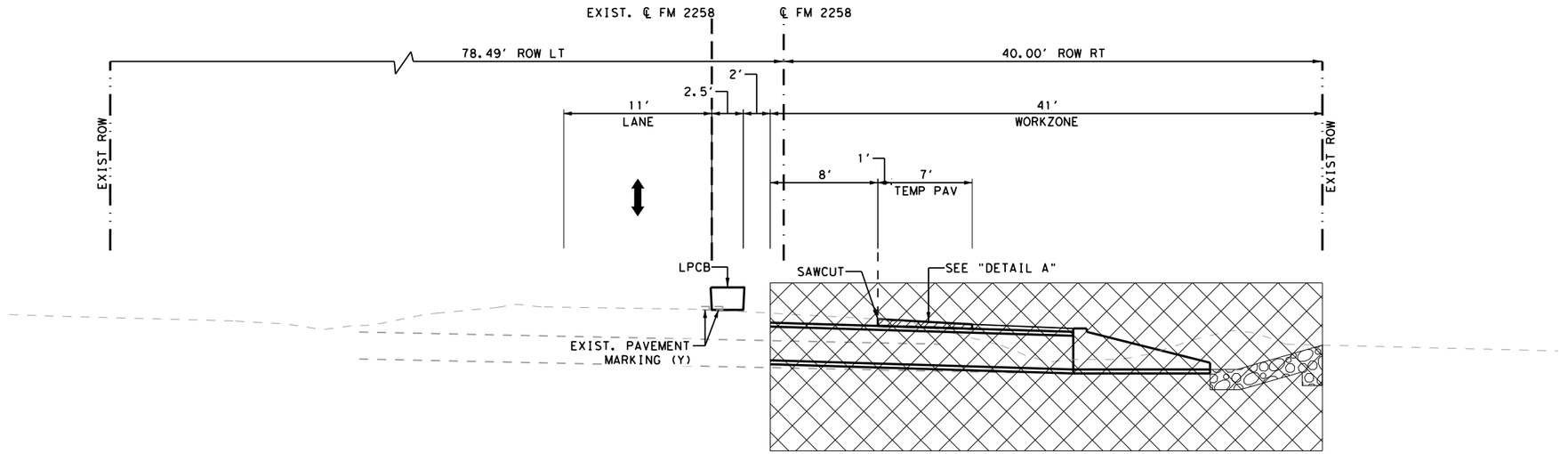

TCP TYPICAL PHASE I - CULVERT NO. 4 STEP 1

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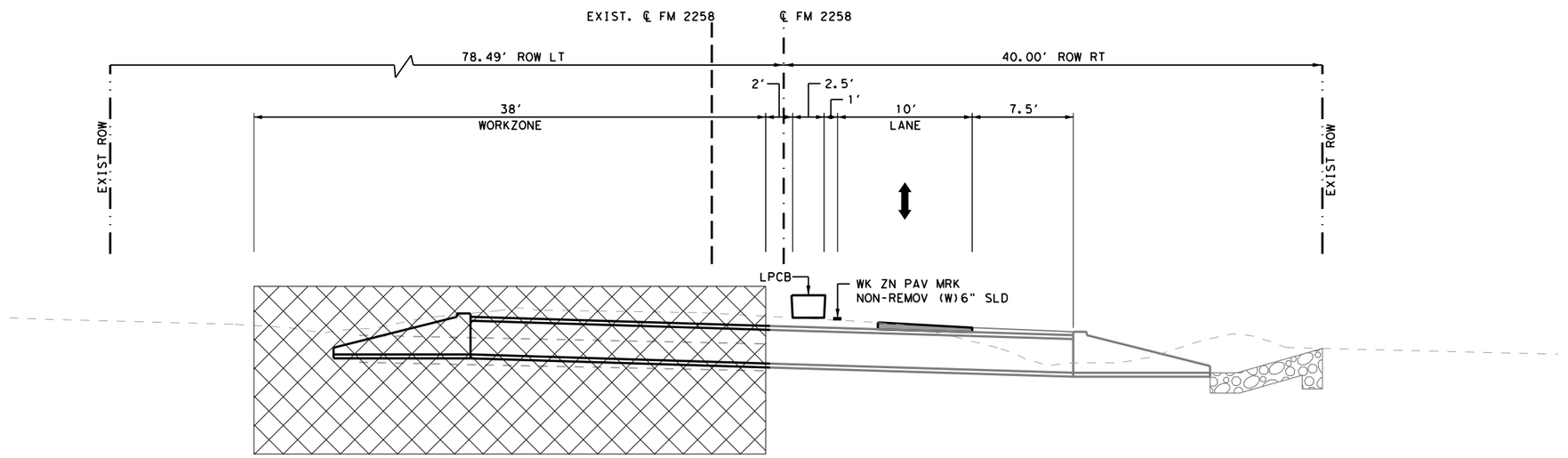
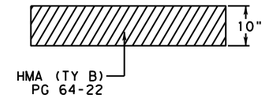


TCP TYPICAL PHASE I - CULVERT NO. 4 STEP 3

PROPOSED PLACEMENT OF TCP LOW PROFILE CONCRETE BARRIER SHALL BE CONTROLLED BY THE EXISTING CENTERLINE

LEGEND

- CONSTRUCTION THIS STEP/PHASE
- CONSTRUCTION COMPLETED PREVIOUS STEP/PHASE
- TEMPORARY MARKING THIS STEP/PHASE
- TEMPORARY MARKING INSTALLED PREVIOUS STEP/PHASE
- PROP TRAFFIC FLOW/DETOUR ARROW



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TRAFFIC CONTROL PLAN TYPICAL SECTIONS (CULVERT NO. 4 REPLACEMENT)

NTS

SHEET 1 OF 1

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STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
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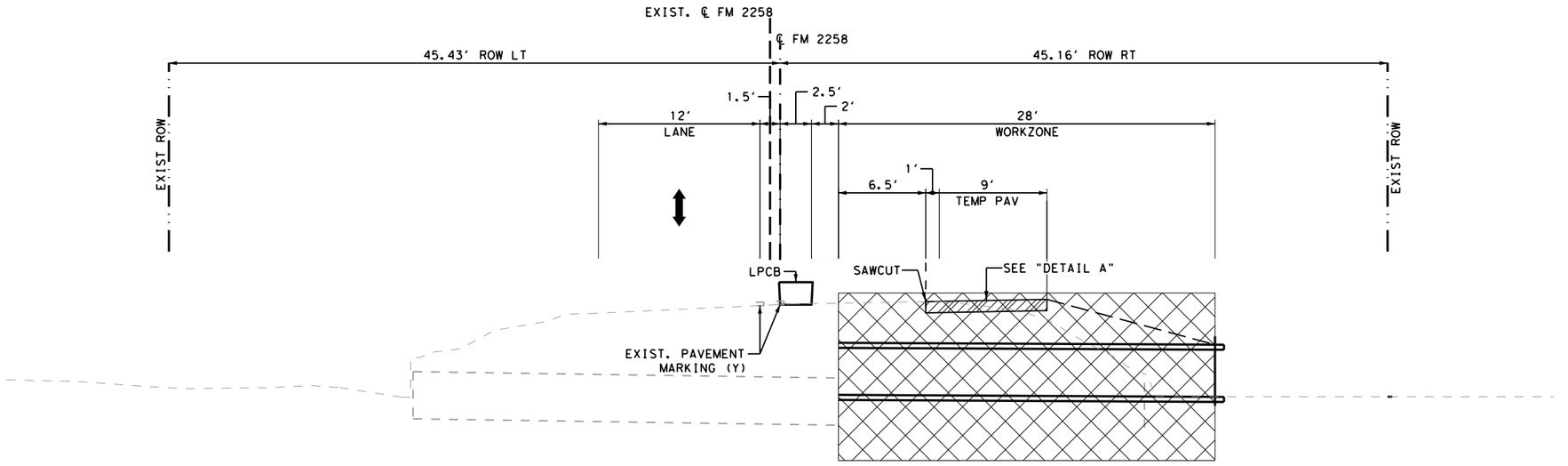

TCP TYPICAL PHASE I - CULVERT NO. 5 STEP 1

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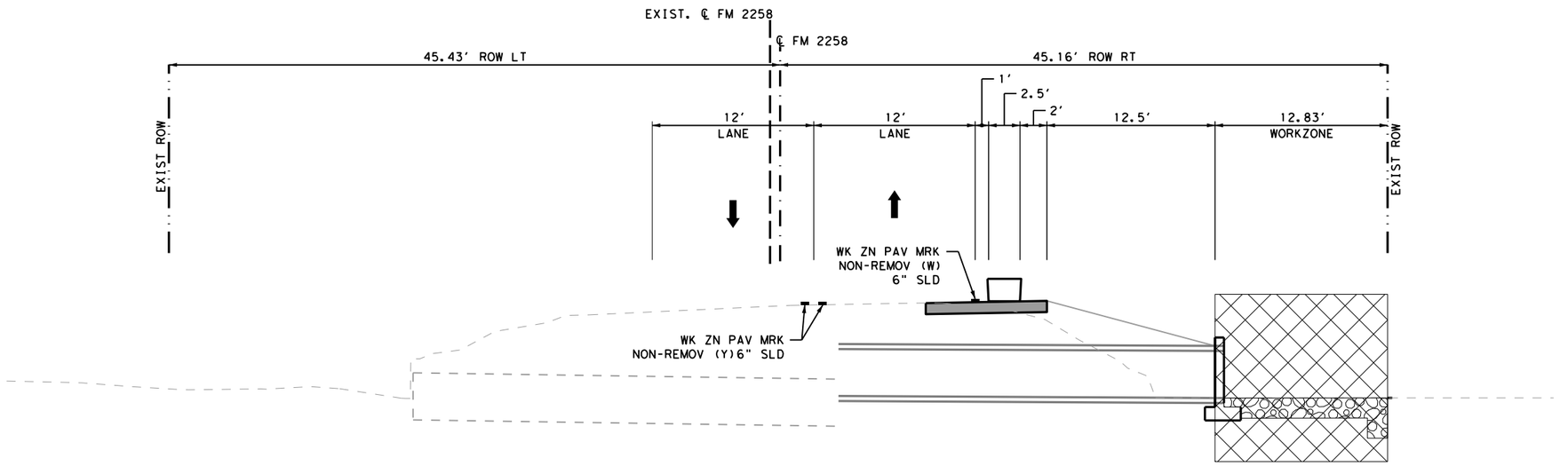
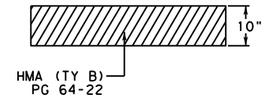


TCP TYPICAL PHASE I - CULVERT NO. 5 STEP 2

PROPOSED PLACEMENT OF TCP LOW PROFILE CONCRETE BARRIER SHALL BE CONTROLLED BY THE EXISTING CENTERLINE

LEGEND

- CONSTRUCTION THIS STEP/PHASE
- CONSTRUCTION COMPLETED PREVIOUS STEP/PHASE
- TEMPORARY MARKING THIS STEP/PHASE
- TEMPORARY MARKING INSTALLED PREVIOUS STEP/PHASE
- PROP TRAFFIC FLOW/DETOUR ARROW



"DETAIL A"

TEMPORARY PAVEMENT SECTION
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TRAFFIC CONTROL PLAN TYPICAL SECTIONS (CULVERT NO. 5 REPLACEMENT)

NTS

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		26
STATE	DIST.	COUNTY	
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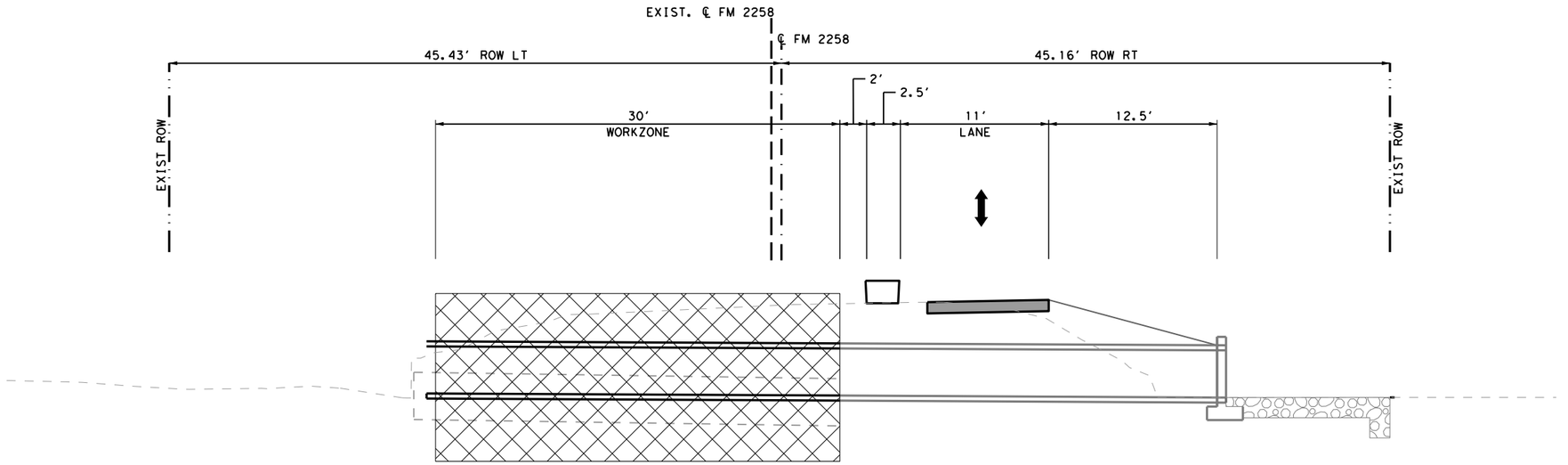

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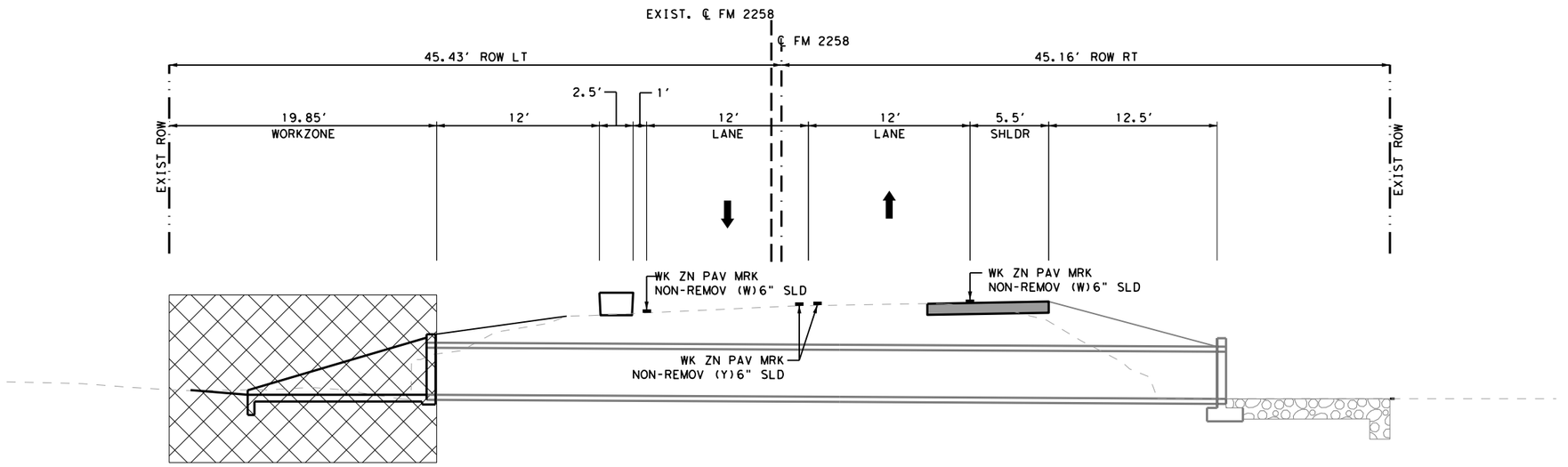
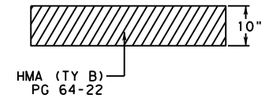


TCP TYPICAL PHASE I - CULVERT NO. 5 STEP 4

PROPOSED PLACEMENT OF TCP LOW PROFILE CONCRETE BARRIER SHALL BE CONTROLLED BY THE EXISTING CENTERLINE

LEGEND

- CONSTRUCTION THIS STEP/PHASE
- CONSTRUCTION COMPLETED PREVIOUS STEP/PHASE
- TEMPORARY MARKING THIS STEP/PHASE
- TEMPORARY MARKING INSTALLED PREVIOUS STEP/PHASE
- PROP TRAFFIC FLOW/DETOUR ARROW



"DETAIL A"

TEMPORARY PAVEMENT SECTION
(TEMPORARY PAVEMENT SHALL BE PAID FOR UNDER ITEM 508 6001-CONSTRUCTING DETOURS)

STATE OF TEXAS
JOHN HERNANDEZ
91831
LICENSED PROFESSIONAL ENGINEER
2/13/2024

CAMACHO-HERNANDEZ
& ASSOCIATES, LLC
415 EMBASSY OAKS - SUITE 205 SAN ANTONIO, TX. 78216
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FIRM NUMBER: F-8478

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

FM 2258

TRAFFIC CONTROL PLAN TYPICAL SECTIONS (CULVERT NO. 5 REPLACEMENT)

NTS

SHEET 2 OF 2

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		27
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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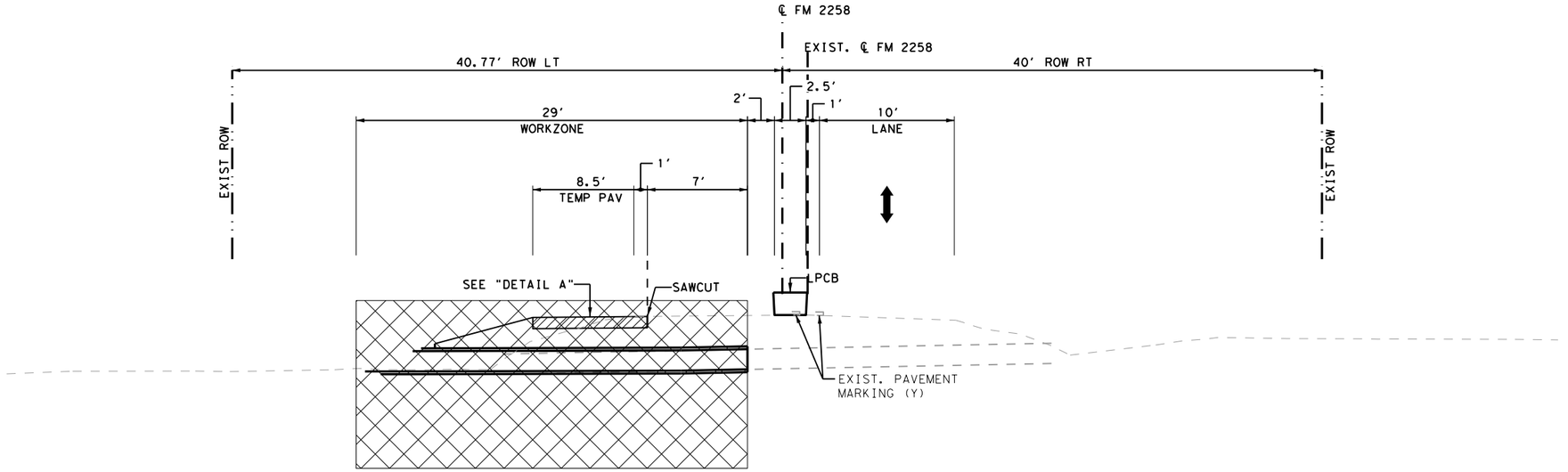
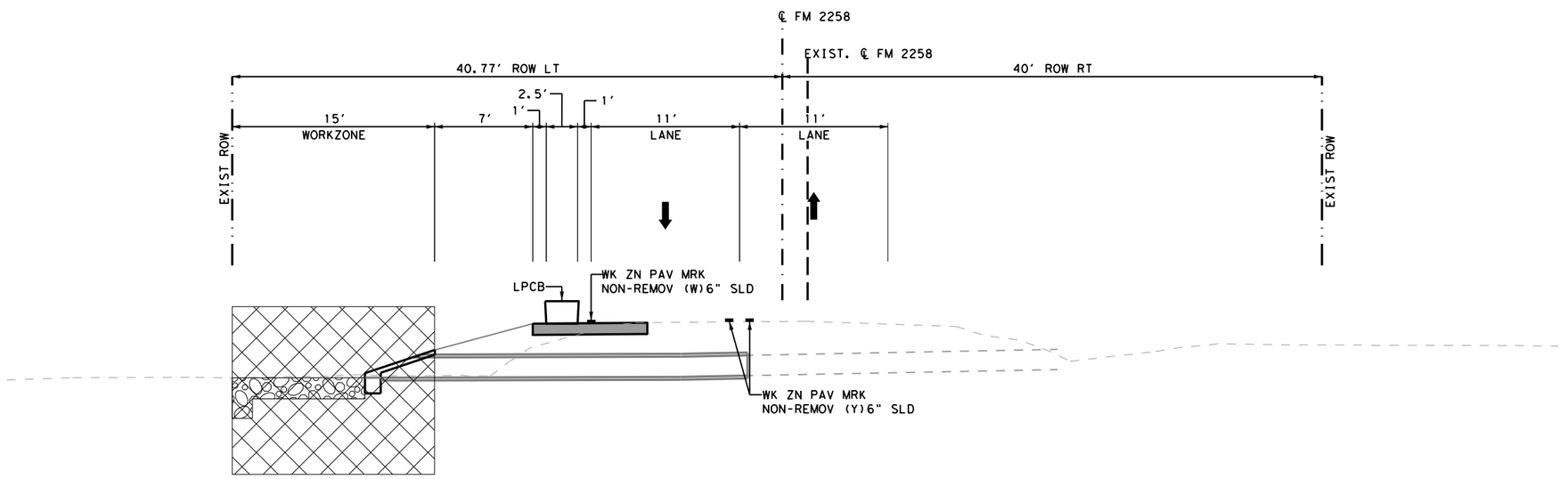


TCP TYPICAL PHASE I - CULVERT NO. 8 STEP 1

PROPOSED PLACEMENT OF TCP LOW PROFILE CONCRETE BARRIER SHALL BE CONTROLLED BY THE EXISTING CENTERLINE

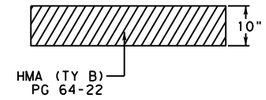


TCP TYPICAL PHASE I - CULVERT NO. 8 STEP 2

PROPOSED PLACEMENT OF TCP LOW PROFILE CONCRETE BARRIER SHALL BE CONTROLLED BY THE EXISTING CENTERLINE

LEGEND

- CONSTRUCTION THIS STEP/PHASE
- CONSTRUCTION COMPLETED PREVIOUS STEP/PHASE
- TEMPORARY MARKING THIS STEP/PHASE
- TEMPORARY MARKING INSTALLED PREVIOUS STEP/PHASE
- PROP TRAFFIC FLOW/DETOUR ARROW



"DETAIL A"

TEMPORARY PAVEMENT SECTION
(TEMPORARY PAVEMENT SHALL BE PAID FOR UNDER ITEM 508 6001-CONSTRUCTING DETOURS)

STATE OF TEXAS
JOHN HERNANDEZ
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2/13/2024

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Texas Department of Transportation

FM 2258

TRAFFIC CONTROL PLAN TYPICAL SECTIONS (CULVERT NO. 8 REPLACEMENT)

NTS

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		28
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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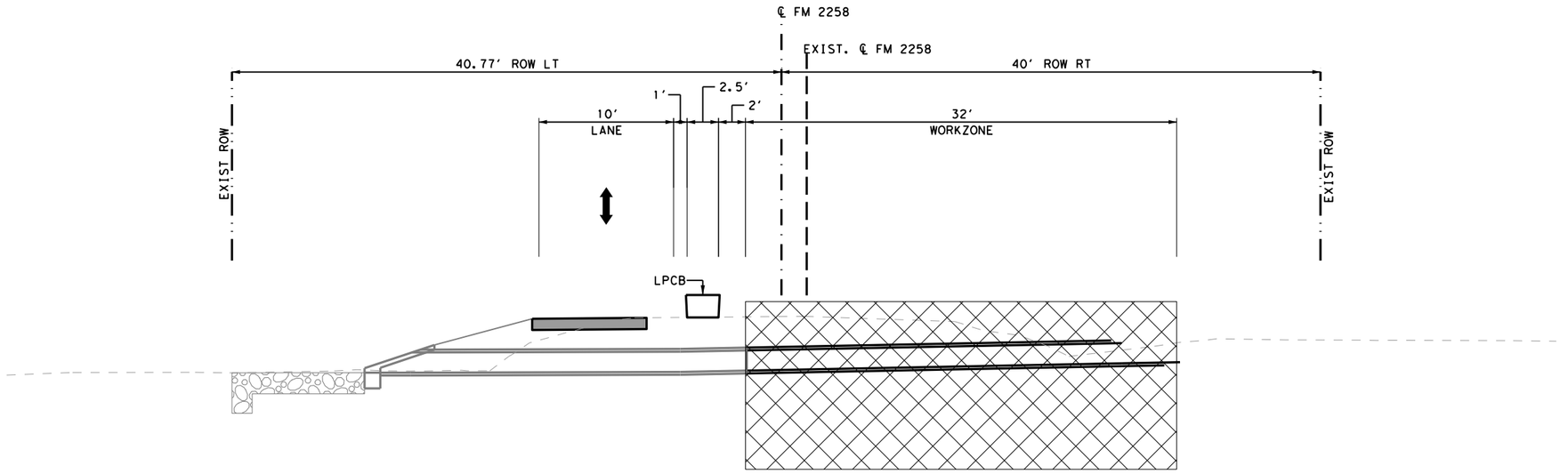
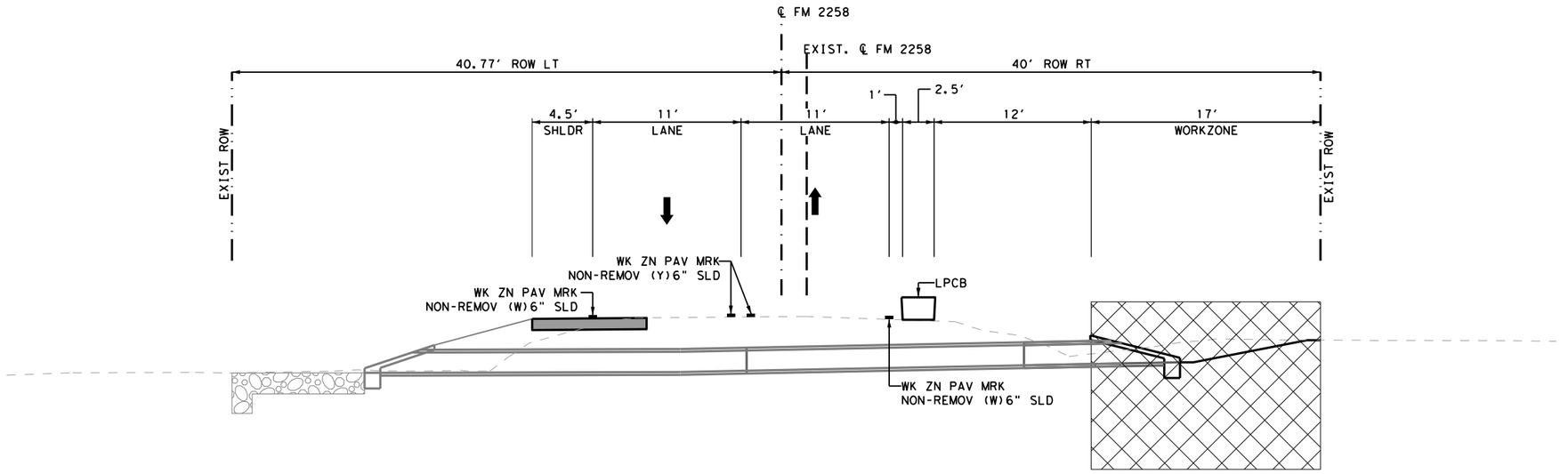


TCP TYPICAL PHASE I - CULVERT NO. 8 STEP 3

PROPOSED PLACEMENT OF TCP LOW PROFILE CONCRETE BARRIER SHALL BE CONTROLLED BY THE EXISTING CENTERLINE

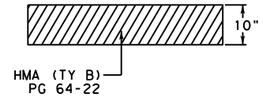


TCP TYPICAL PHASE I - CULVERT NO. 8 STEP 4

PROPOSED PLACEMENT OF TCP LOW PROFILE CONCRETE BARRIER SHALL BE CONTROLLED BY THE EXISTING CENTERLINE

LEGEND

- CONSTRUCTION THIS STEP/PHASE
- CONSTRUCTION COMPLETED PREVIOUS STEP/PHASE
- TEMPORARY MARKING THIS STEP/PHASE
- TEMPORARY MARKING INSTALLED PREVIOUS STEP/PHASE
- PROP TRAFFIC FLOW/DETOUR ARROW



"DETAIL A"

TEMPORARY PAVEMENT SECTION
(TEMPORARY PAVEMENT SHALL BE PAID FOR UNDER ITEM 508 6001-CONSTRUCTING DETOURS)

STATE OF TEXAS
JOHN HERNANDEZ
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John Hernandez, P.E.
2/13/2024

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Texas Department of Transportation

FM 2258

TRAFFIC CONTROL PLAN TYPICAL SECTIONS (CULVERT NO. 8 REPLACEMENT)

NTS

SHEET 2 OF 2

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		29
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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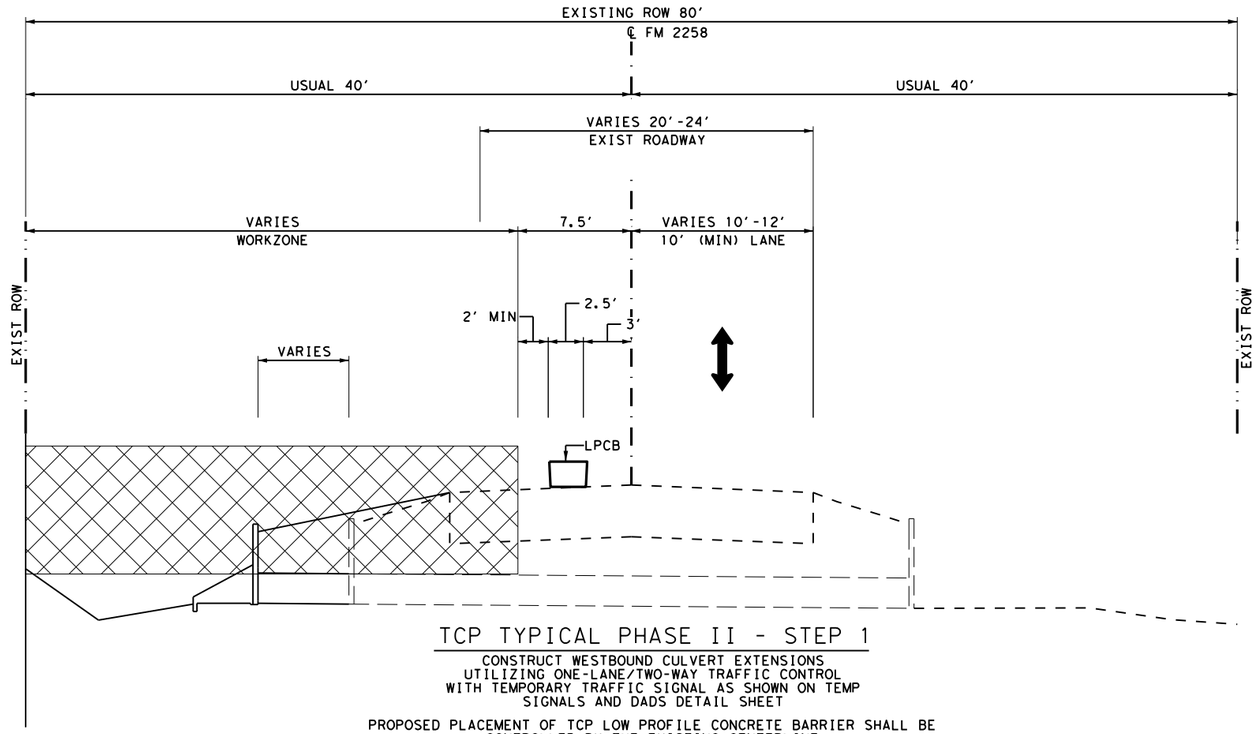
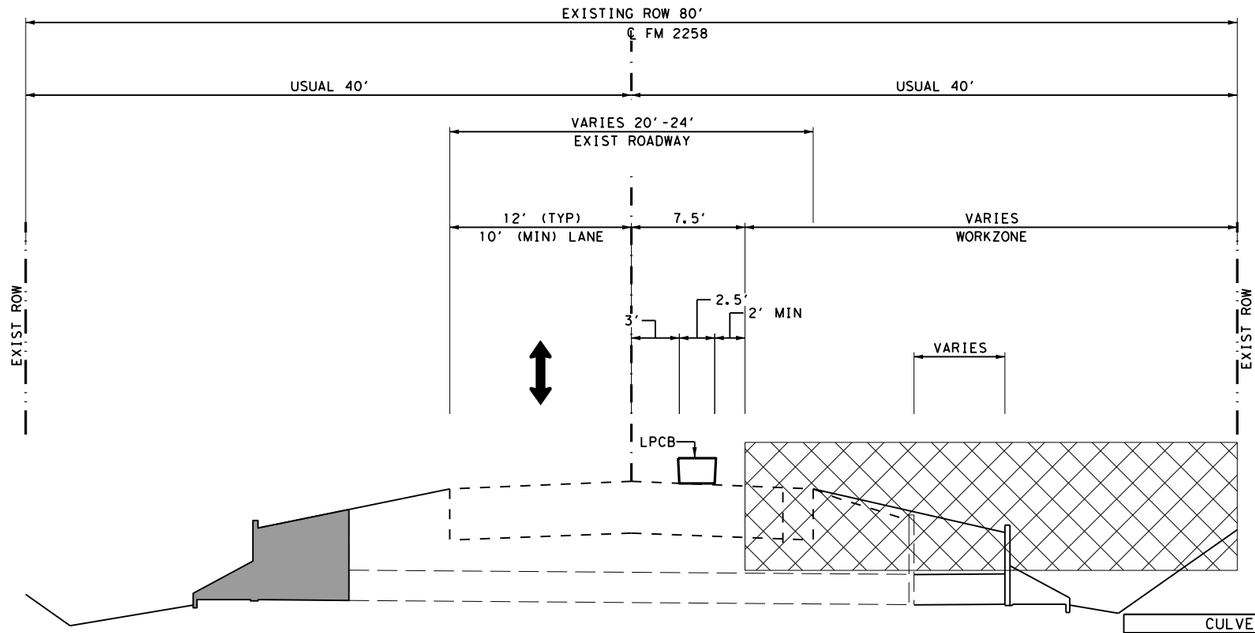
FM 2258 TRAFFIC CONTROL PLAN



TCP TYPICAL PHASE II - STEP 1

CONSTRUCT WESTBOUND CULVERT EXTENSIONS
UTILIZING ONE-LANE/TWO-WAY TRAFFIC CONTROL
WITH TEMPORARY TRAFFIC SIGNAL AS SHOWN ON TEMP
SIGNALS AND DADS DETAIL SHEET

PROPOSED PLACEMENT OF TCP LOW PROFILE CONCRETE BARRIER SHALL BE
CONTROLLED BY THE EXISTING CENTERLINE



TCP TYPICAL PHASE II - STEP 2

CONSTRUCT EASTBOUND CULVERT EXTENSIONS
UTILIZING ONE-LANE/TWO-WAY TRAFFIC CONTROL
WITH TEMPORARY TRAFFIC SIGNAL AS SHOWN ON TEMP
SIGNALS AND DADS DETAIL SHEET

PROPOSED PLACEMENT OF TCP LOW PROFILE CONCRETE BARRIER SHALL BE
CONTROLLED BY THE EXISTING CENTERLINE

CULVERT EXTENSIONS BARRIER TABLE			
CULVERT NUMBER	LENGTH OF PCTB	BEGIN PCTB STA	END PCTB STA
1A/1B	240	15+28.70	17+68.70
2A/2B	200	31+07.70	33+07.70
6A/6B	280	90+22.50	93+02.50
7	400	REFER TO CULVERT LAYOUT	

LEGEND

- CONSTRUCTION THIS STEP/PHASE
- CONSTRUCTION COMPLETED PREVIOUS STEP/PHASE
- TEMPORARY MARKING THIS STEP/PHASE
- TEMPORARY MARKING INSTALLED PREVIOUS STEP/PHASE
- PROP TRAFFIC FLOW/DETOUR ARROW

STATE OF TEXAS
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2/13/2024

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CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

FM 2258

TRAFFIC CONTROL PLAN TYPICAL SECTIONS (PHASE II CULVERT EXTENSIONS)

NTS SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		30
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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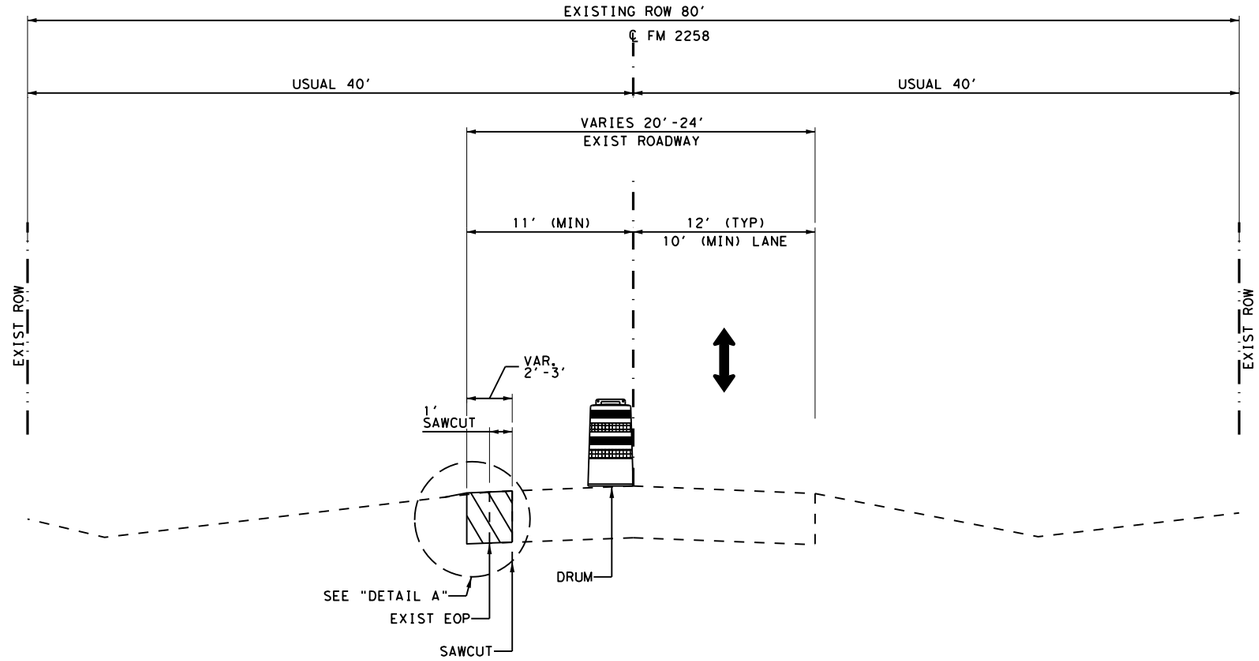


TCP TYPICAL PHASE III

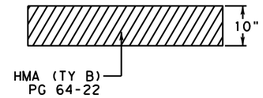
CONSTRUCT TEMPORARY PAVEMENT
UTILIZING ONE-LANE/TWO-WAY TRAFFIC CONTROL

PROPOSED PLACEMENT OF TCP LOW PROFILE CONCRETE BARRIER SHALL BE CONTROLLED BY THE PROPOSED CENTERLINE

TEMPORARY PAVEMENT WIDENING			
PHASE/STEP	LIMITS	WIDTH	QTY (SY)
STEP 5A/5B	109+54.00 11' LT TO 112+00 11' LT ; SAWCUT 1' INTO EXISTING EOP	VAR. 1.75' - 3'	39
STEP 6A/6B	112+00 11' LT TO 119+00 11' LT; SAWCUT 1' INTO EXISTING EOP	VAR. 2' - 3'	190

LEGEND

- CONSTRUCTION THIS STEP/PHASE
- CONSTRUCTION COMPLETED PREVIOUS STEP/PHASE
- TEMPORARY MARKING THIS STEP/PHASE
- TEMPORARY MARKING INSTALLED PREVIOUS STEP/PHASE
- PROP TRAFFIC FLOW/DETOUR ARROW



"DETAIL A"

TEMPORARY PAVEMENT SECTION
(TEMPORARY PAVEMENT SHALL BE PAID FOR UNDER ITEM 508 6001-CONSTRUCTING DETOURS)

CAMACHO-HERNANDEZ
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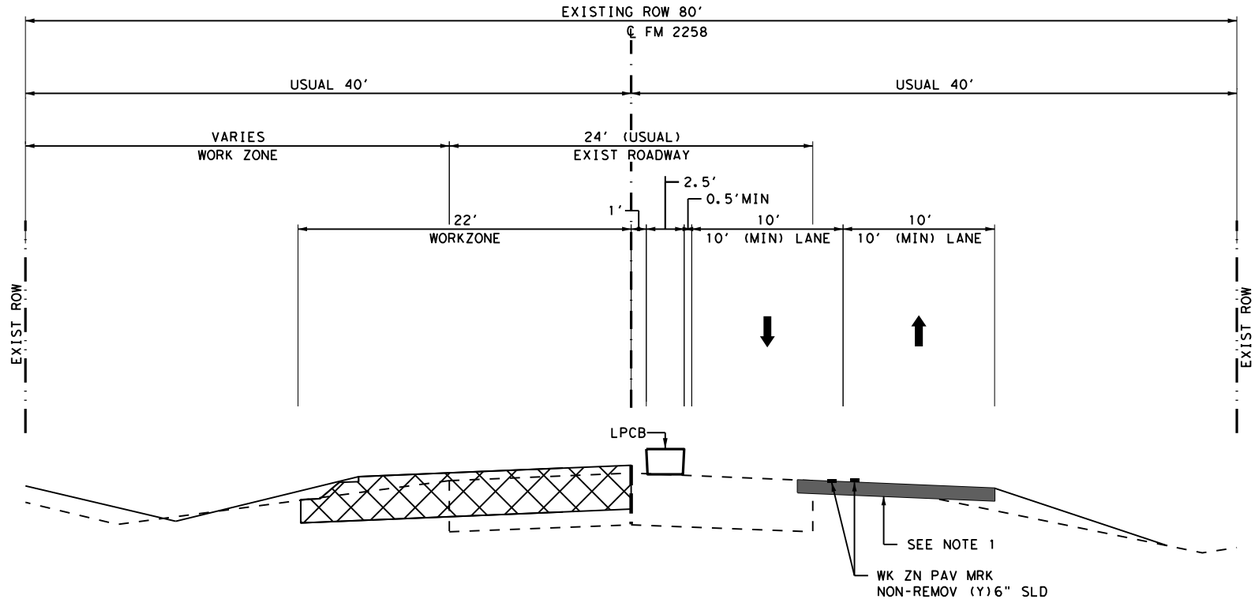
TRAFFIC CONTROL PLAN TYPICAL SECTIONS (PHASE III TEMPORARY PAVEMENT)

NTS SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	31

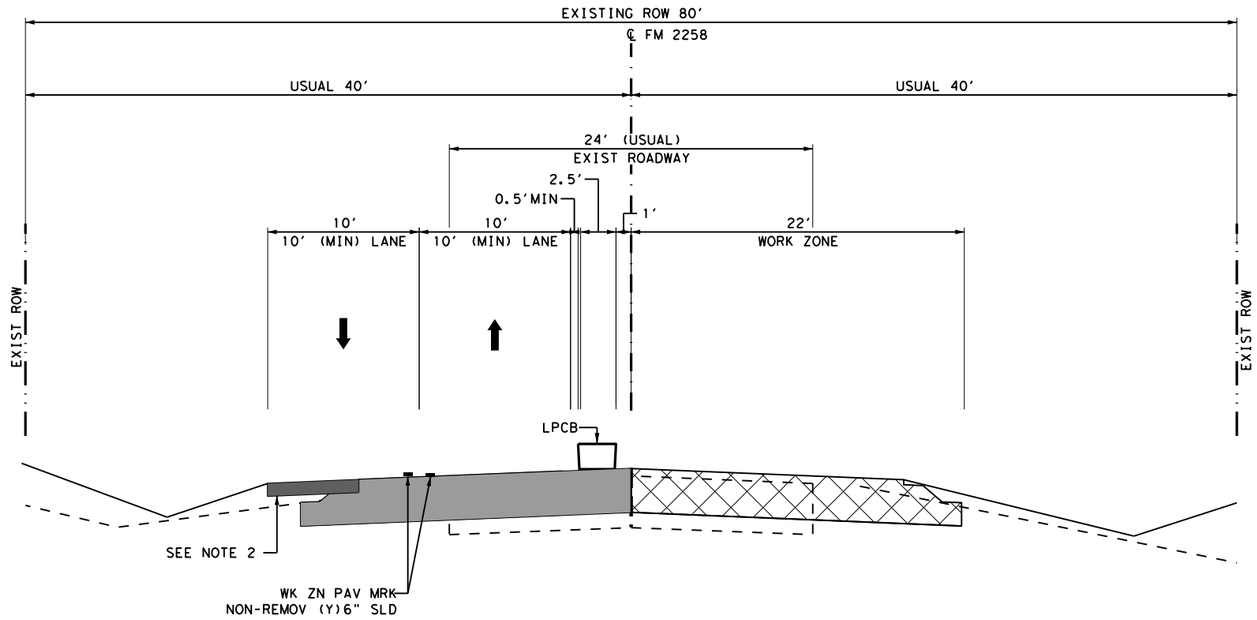
STATE	DIST.	COUNTY
TEXAS	FTW	JOHNSON

CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258



TCP TYPICAL PHASE IV - STEP 1B

PROPOSED PLACEMENT OF TCP LOW PROFILE CONCRETE BARRIER SHALL BE CONTROLLED BY THE PROPOSED CENTERLINE



TCP TYPICAL PHASE IV - STEP 1D

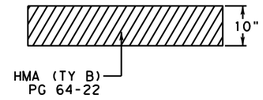
PROPOSED PLACEMENT OF TCP LOW PROFILE CONCRETE BARRIER SHALL BE CONTROLLED BY THE PROPOSED CENTERLINE

NOTES:

1. CONTRACTOR SHALL CONSTRUCT TEMPORARY DETOUR (PART 1A) PRIOR TO COMMENCING STEP 1B UTILIZING ONE LANE TRAFFIC CONTROL WITH FLAGGERS.
2. CONTRACTOR SHALL CONSTRUCT TEMPORARY DETOUR (PART 1C) AFTER ROADWAY RECONSTRUCTION FOR STEP B BUT PRIOR TO COMMENCING STEP 1D UTILIZING ONE LANE TRAFFIC CONTROL WITH FLAGGERS.

LEGEND

- CONSTRUCTION THIS STEP/PHASE
- CONSTRUCTION COMPLETED PREVIOUS STEP/PHASE
- TEMPORARY DETOUR COMPLETED PREVIOUS STEP
- TEMPORARY MARKING THIS STEP/PHASE
- PROP TRAFFIC FLOW/DETOUR ARROW



"DETAIL A"

TEMPORARY PAVEMENT SECTION
(TEMPORARY PAVEMENT SHALL BE PAID FOR UNDER ITEM 508 6001-CONSTRUCTING DETOURS)

CAMACHO-HERNANDEZ
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TRAFFIC CONTROL PLAN TYPICAL SECTIONS (PHASE IV STEP 1B/1D)

NTS

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		32
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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FM 2258 TRAFFIC CONTROL PLAN
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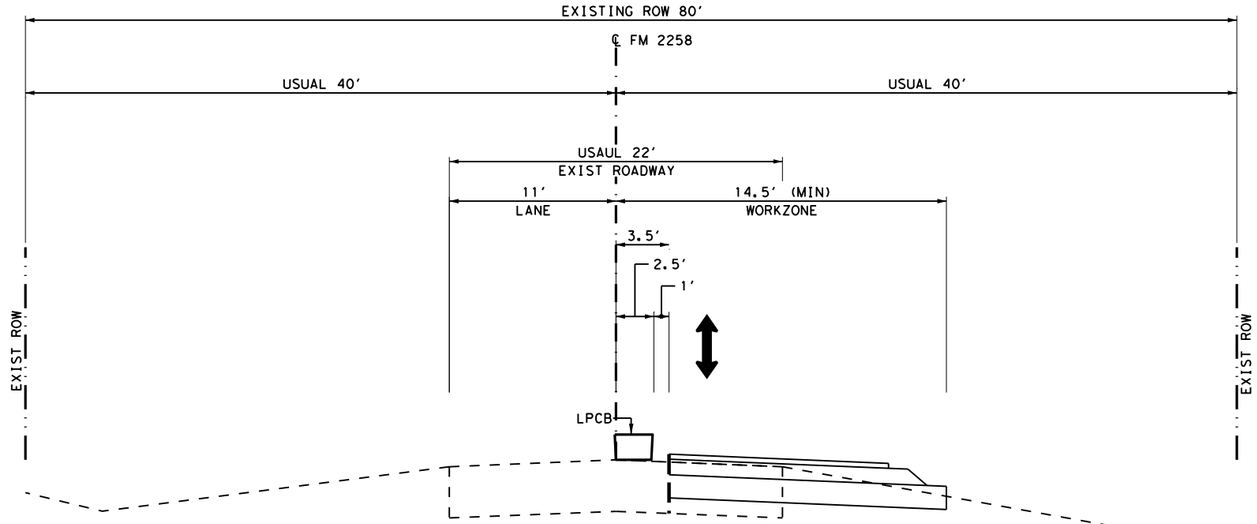
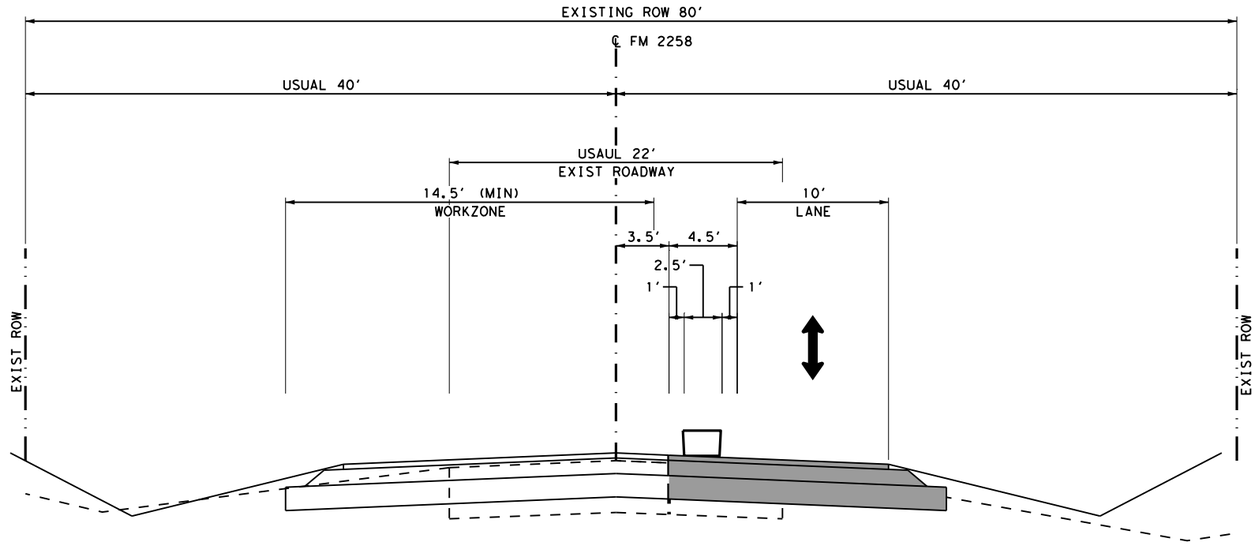


TCP TYPICAL PHASE IV - STEP A

CONSTRUCT EASTBOUND OUTSIDE 14.5 FT OF ROADWAY
UTILIZING ONE-LANE/TWO-WAY TRAFFIC CONTROL
WITH TEMPORARY TRAFFIC SIGNAL AND DADS. REFER
TO THE DRIVEWAY ASSISTANCE DEVICES DETAIL AND TCP
PHASE IV ROADWAY RECONSTRUCTION PHASING LAYOUT

PROPOSED PLACEMENT OF TCP LOW PROFILE CONCRETE BARRIER SHALL BE
CONTROLLED BY THE PROPOSED CENTERLINE



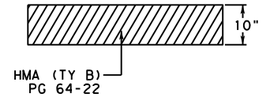
TCP TYPICAL PHASE IV - STEP B

CONSTRUCT REMAINING 21 FT OF ROADWAY
UTILIZING ONE-LANE/TWO-WAY TRAFFIC CONTROL
WITH TEMPORARY TRAFFIC SIGNAL AND DADS

PROPOSED PLACEMENT OF TCP LOW PROFILE CONCRETE BARRIER SHALL BE
CONTROLLED BY THE PROPOSED CENTERLINE

LEGEND

- CONSTRUCTION THIS STEP/PHASE
- CONSTRUCTION COMPLETED PREVIOUS STEP/PHASE
- TEMPORARY PAVEMENT PREVIOUS STEP
- TEMPORARY MARKING THIS STEP/PHASE
- PROP TRAFFIC FLOW/DETOUR ARROW



"DETAIL A"

TEMPORARY PAVEMENT SECTION
(TEMPORARY PAVEMENT SHALL BE PAID FOR
UNDER ITEM 508 6001-CONSTRUCTING DETOURS)

STATE OF TEXAS
JOHN HERNANDEZ
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2/13/2024

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FM 2258

TRAFFIC CONTROL PLAN TYPICAL SECTIONS

(PHASE IV ROADWAY RECONSTRUCTION)

NTS

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		33
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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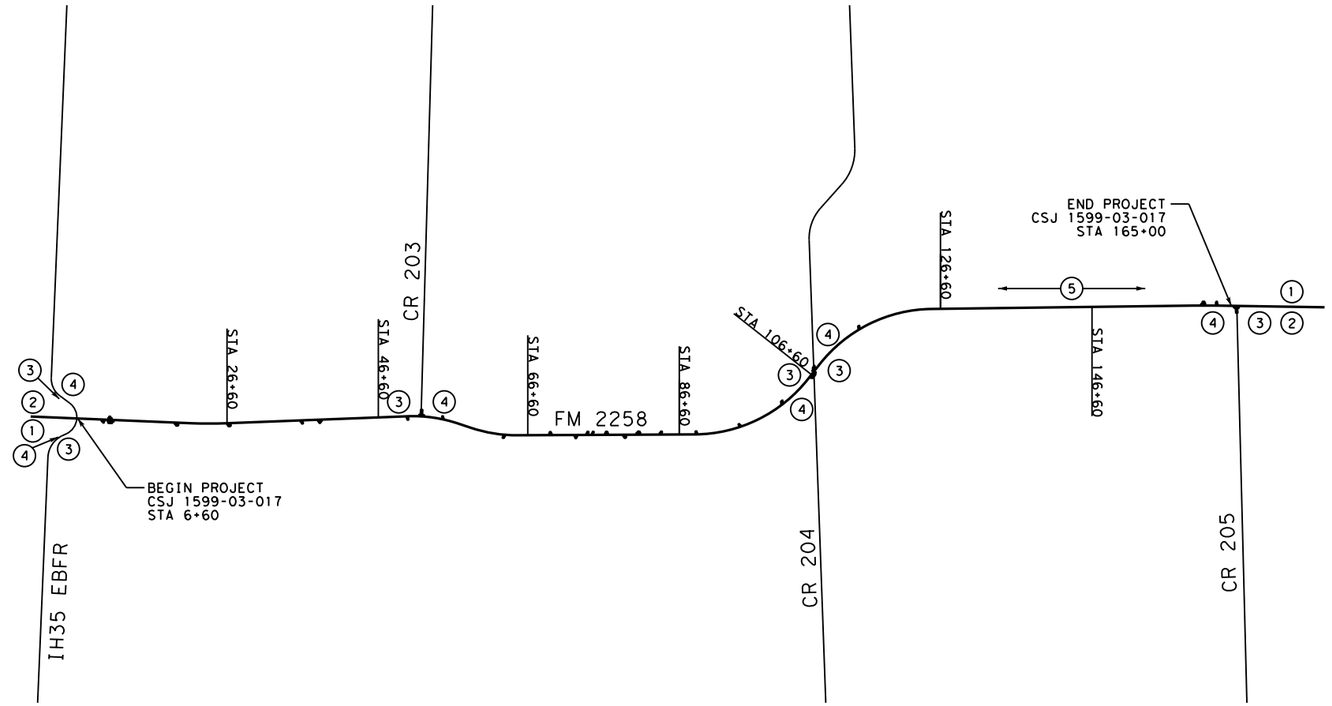
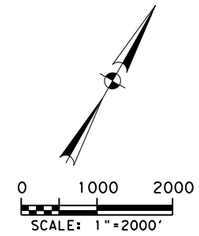
FM 2258 TRAFFIC CONTROL PLAN





NOTES:
1. CERTAIN SIGNS MUST BE USED IN CONJUNCTION WITH OTHER SIGNS.
   EXAMPLE: "FLAGGERS AHEAD" MUST HAVE A "BE PREPARED TO STOP" SIGN.
2. BARRICADES AND WARNING SIGNS ON THIS SHEET ARE MINIMAL CONSTRUCTION ZONE SIGNING. ADDITIONAL BARRICADES, WARNING SIGNS, ARROW PANELS, CONES, ETC. IN ACCORDANCE WITH CURRENT BC STANDARDS AND THE TEXAS MUTCD, MAY BE REQUIRED IN AREAS OF ACTUAL CONSTRUCTION.
3. A DISTANCE PLAQUE IN FEET OR MILES MAY BE REQUIRED FOR USE IN CONJUNCTION WITH WARNING SIGNS.
4. IMPLEMENT DETOURS IN ACCORDANCE WITH THE TEXAS MUTCD. USE CHANGEABLE MESSAGE BOARDS TO GUIDE MOTORISTS THROUGH THE DETOUR.
5. SEE PHASE DETOUR SHEETS FOR ADDITIONAL SIGN REQUIREMENTS.
6. UTILIZE EXPERIENCED FLAGGERS AT ALL TIMES.
7. TRUCK MOUNTED ATTENUATORS (TMA) WILL BE REQUIRED FOR THIS PROJECT.
8. SEE TCP (2-8)-18 FOR DETAILS

LOCATION NO. 1 TO BE PLACED AT THE BEGINNING OF PROJECT
LOCATION NO. 2 TO BE PLACED AT THE END OF THE PROJECT
LOCATION NO. 3 TO BE PLACED AT ENTERING SIDE STREETS OF THE PROJECT.
LOCATION NO. 4 TO BE PLACED AT EXITING SIDE STREETS OF THE PROJECT.
LOCATION NO. 5 TO BE USED THROUGHOUT THE COURSE OF THE PROJECT AS DIRECTED BY THE ENGINEER.

LOCATION	CW3-5	CW20-1D	G20-2	G20-1aT	G20-2bT	G20-5T	G20-6T	G20-9TP	G20-10T	R2-1	R20-3T	R20-5	R20-5aTP	G20-4	R4-1	CW8-12	CW20-4D	CW3-4	CW20-7	CW5-1	CW6-3
	36 X 36	36 X 36	36 X 18	72 X 36	36 X 18	48 X 24	48X 30	36 X 30	60 X 48	24 X 30	48 X 42	24 X 30	24 X 12	36x18	24 X 30	36 X 36	36 X 36	36 X 36	36 X 36	36 X 36	36 X 36
1	✓	✓				✓	✓	✓	✓	✓	✓	✓	✓								
2			✓		✓					✓											
3		✓		✓																	
4			✓																		
5		✓												✓	✓	✓	✓	✓	✓	✓	✓

LOCATION	CW8-1	CW8-6	CW8-7	CW8-11	RUMBLE STRIP ARRAY	CW13-1P	CW21-5aR	CW20-8T	CW21-1aT	CW17-2T	CW27-1T	M4-12T	P.C.M.S.	ARROW BOARD	TY 3 BARRICADE	DRUMS	G20-1bTL/R
	36 X 36	36 X 36	36 X 36	36 X 36		24 X 24	36 X 36	36 X 36	36 X 36	48 X 48	48 X 48	VAR X 12					72 X 24
1										✓							
2																	
3																	
4																	✓
5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

STATE OF TEXAS
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FM 2258

TRAFFIC CONTROL PLAN ADVANCE WARNING SIGNS

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	34

STATE	DIST.	COUNTY
TEXAS	FTW	JOHNSON

CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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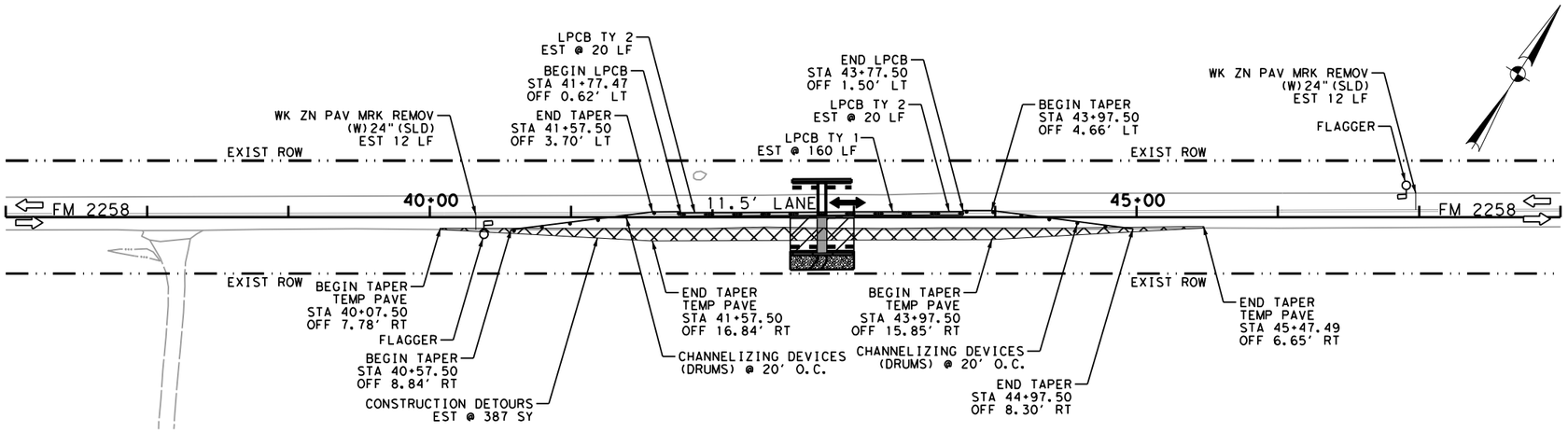
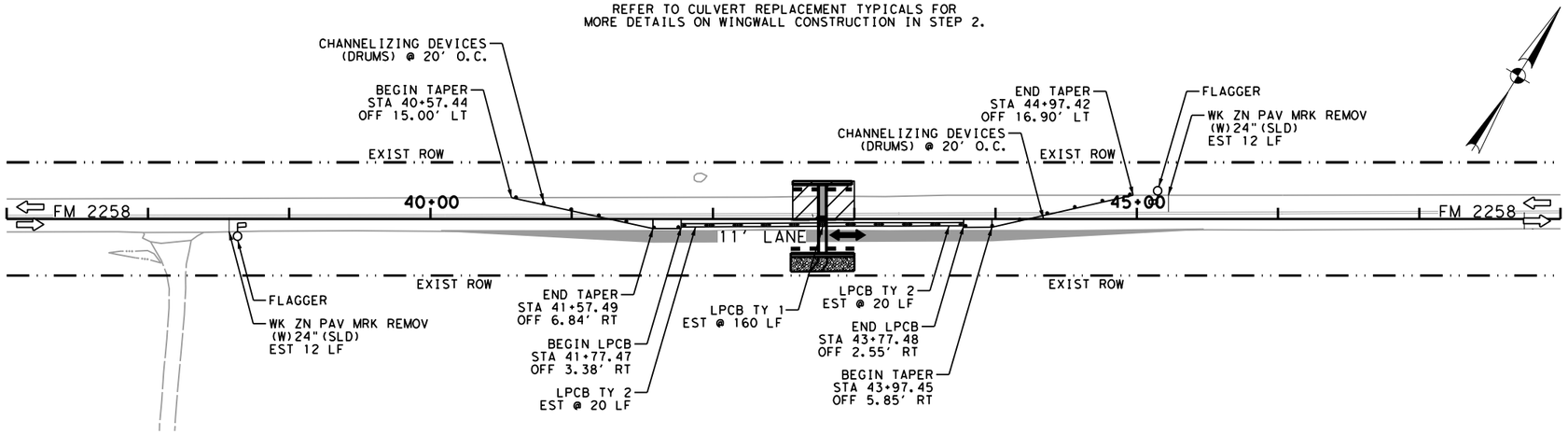
FM 2258 TRAFFIC CONTROL PLAN

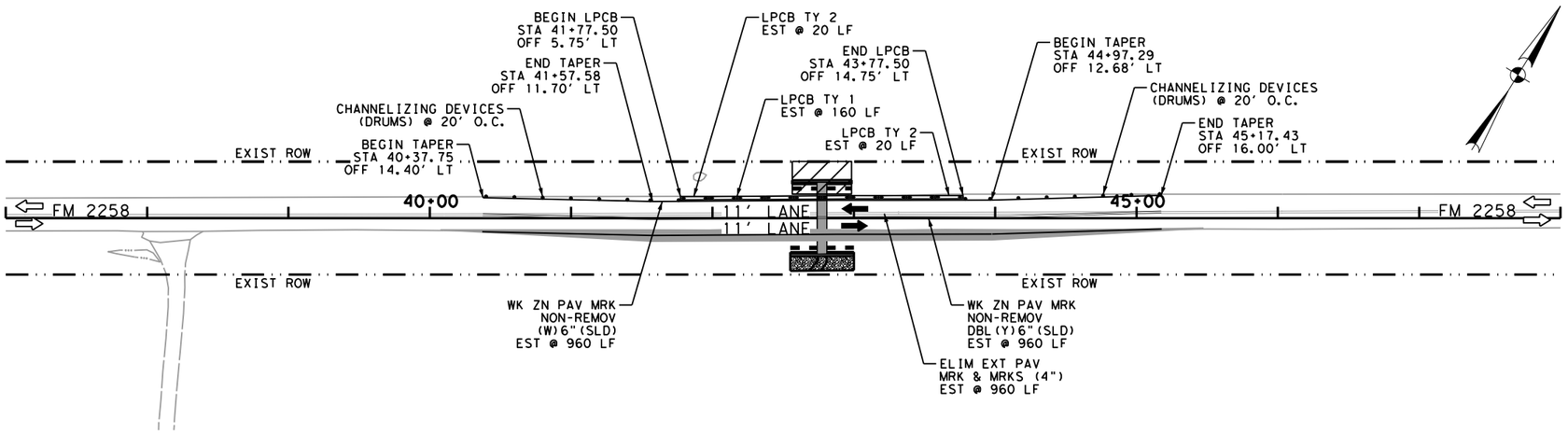


EASTBOUND REPLACEMENT DETAIL
PHASE I - STEP 1

REFER TO CULVERT REPLACEMENT TYPICALS FOR
MORE DETAILS ON WINGWALL CONSTRUCTION IN STEP 2.



WESTBOUND REPLACEMENT DETAIL
PHASE I - STEP 3



REPLACEMENT DETAIL
PHASE I - STEP 4

LEGEND

- CONSTRUCTION THIS STEP/PHASE
- CONSTRUCTING DETOURS
- CONSTRUCTION COMPLETED PREVIOUS STEP/PHASE
- PROP TRAFFIC FLOW/DETOUR ARROW
- EXIST TRAFFIC FLOW ARROW
- FLAGGER STATION

STATE OF TEXAS
JOHN HERNANDEZ
91831
LICENSED
PROFESSIONAL ENGINEER
John Hernandez, P.E.
2/13/2024

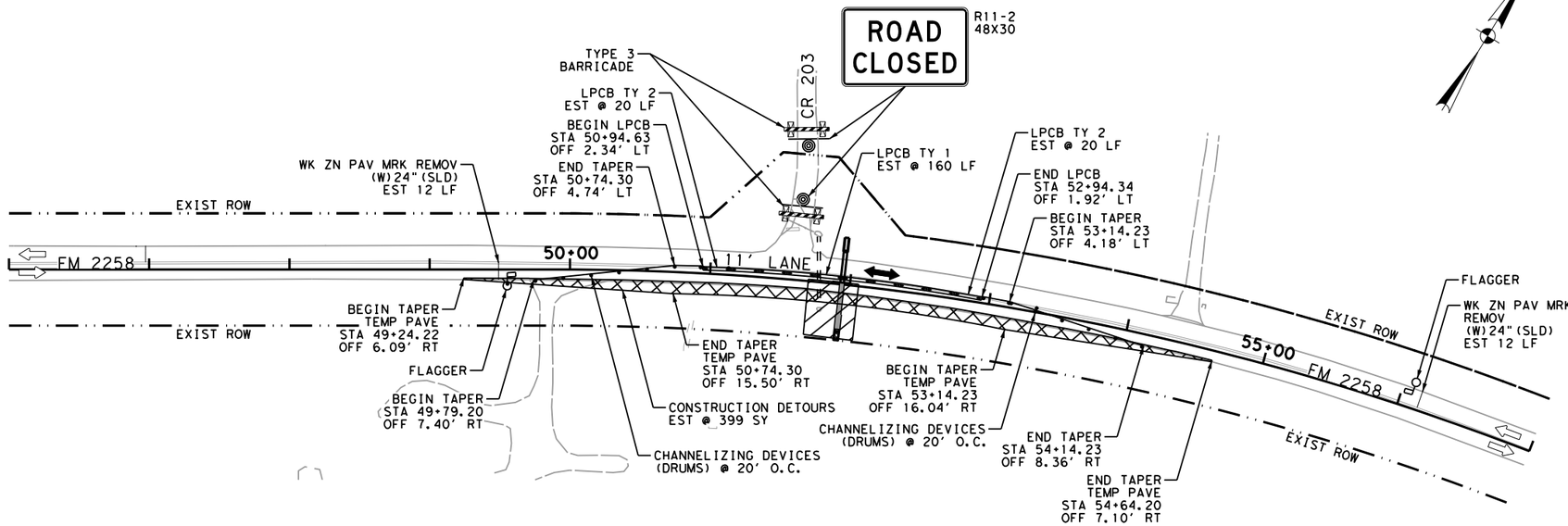
CAMACHO-HERNANDEZ
& ASSOCIATES, LLC
415 EMBASSY OAKS - SUITE 205 SAN ANTONIO, TX. 78216
OFFICE: (210) 341-6200 FAX: (210) 341-6300
FIRM NUMBER: F-8478

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

FM 2258
TCP PHASE I
CULVERT NO. 3
REPLACEMENT LAYOUT

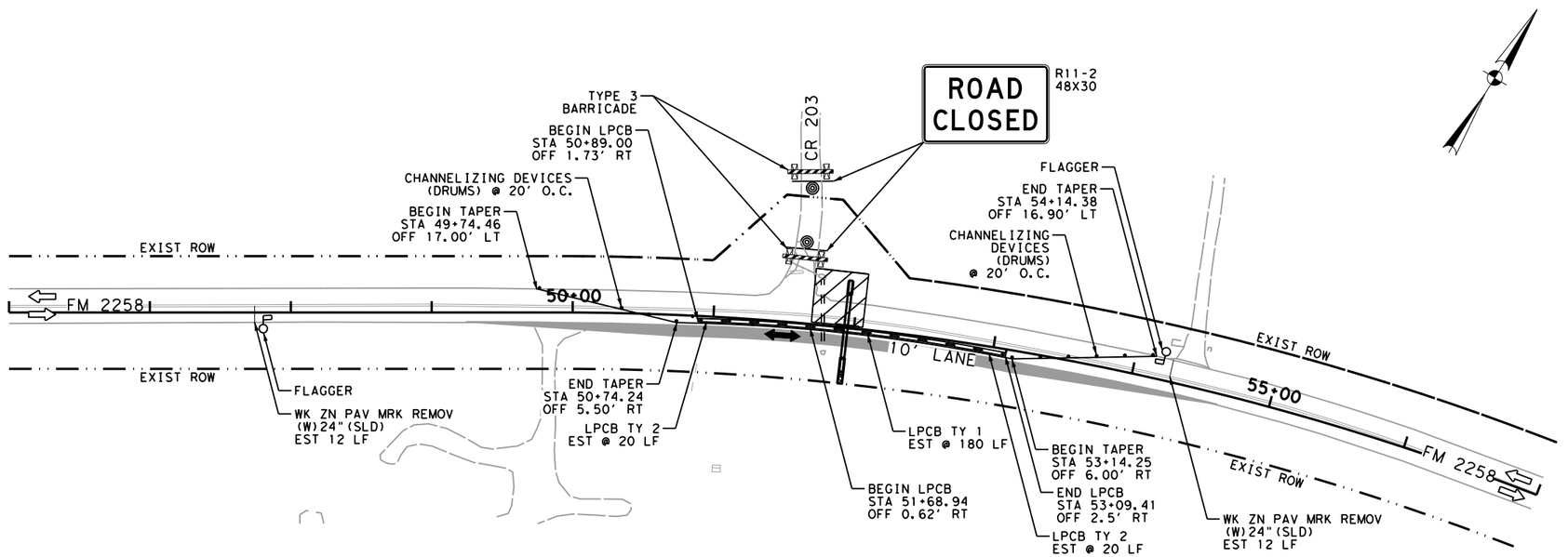
SCALE : 1"=100'

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		35
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258



EASTBOUND REPLACEMENT DETAIL
PHASE I - STEP 1

REFER TO CULVERT REPLACEMENT TYPICALS FOR MORE DETAILS ON CONSTRUCTION IN STEP 2.



WESTBOUND REPLACEMENT DETAIL
PHASE I - STEP 3

LEGEND

- CONSTRUCTION THIS STEP/PHASE
- CONSTRUCTING DETOURS
- CONSTRUCTION COMPLETED PREVIOUS STEP/PHASE
- PROP TRAFFIC FLOW/DETOUR ARROW
- EXIST TRAFFIC FLOW ARROW
- FLAGGER STATION

NOTE:

1. REFER TO TRAFFIC CONTROL PLAN DETOUR LAYOUT FOR MORE INFORMATION REGARDING COUNTY ROAD 203 DETOUR.

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CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

FM 2258
TCP PHASE I
CULVERT NO. 4
REPLACEMENT LAYOUT

SCALE : 1"=100'

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	36

STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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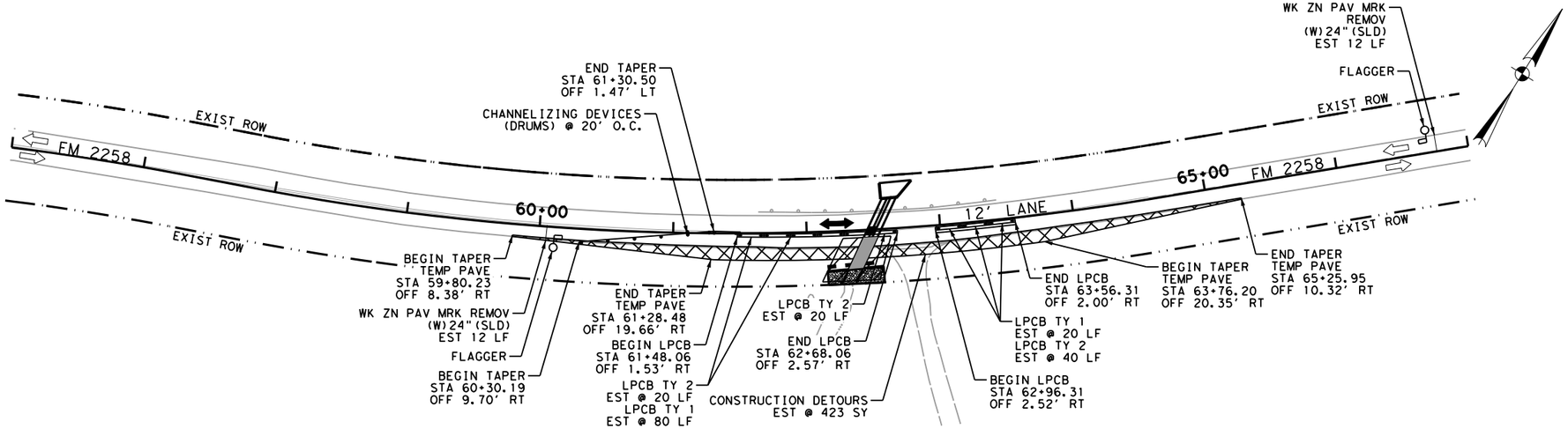
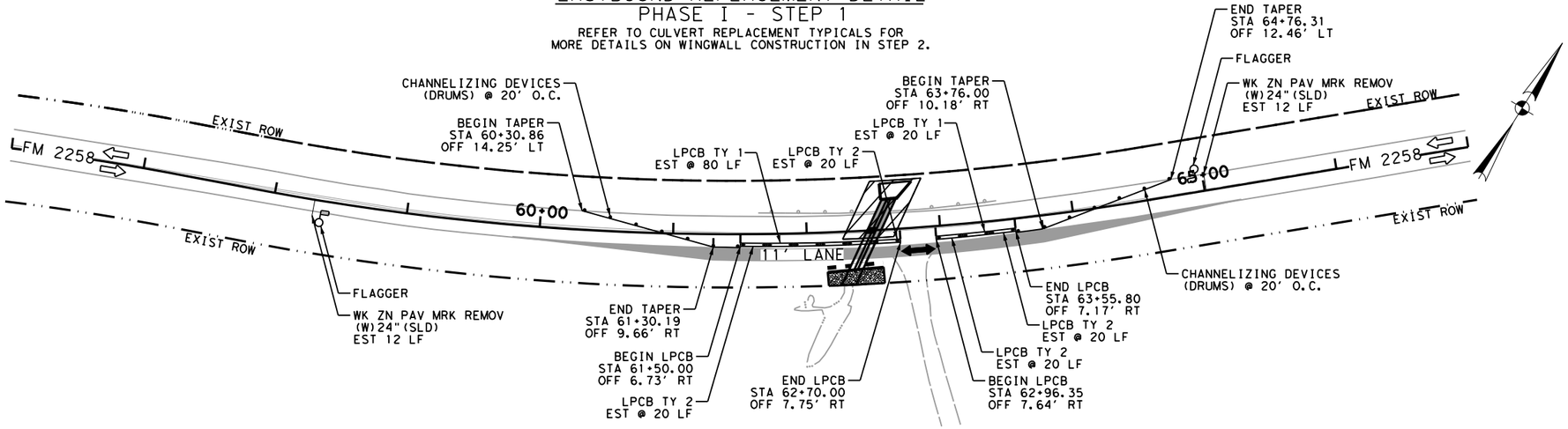
2/13/2024 12:25:27 AM
FM 2258 TRAFFIC CONTROL PLAN

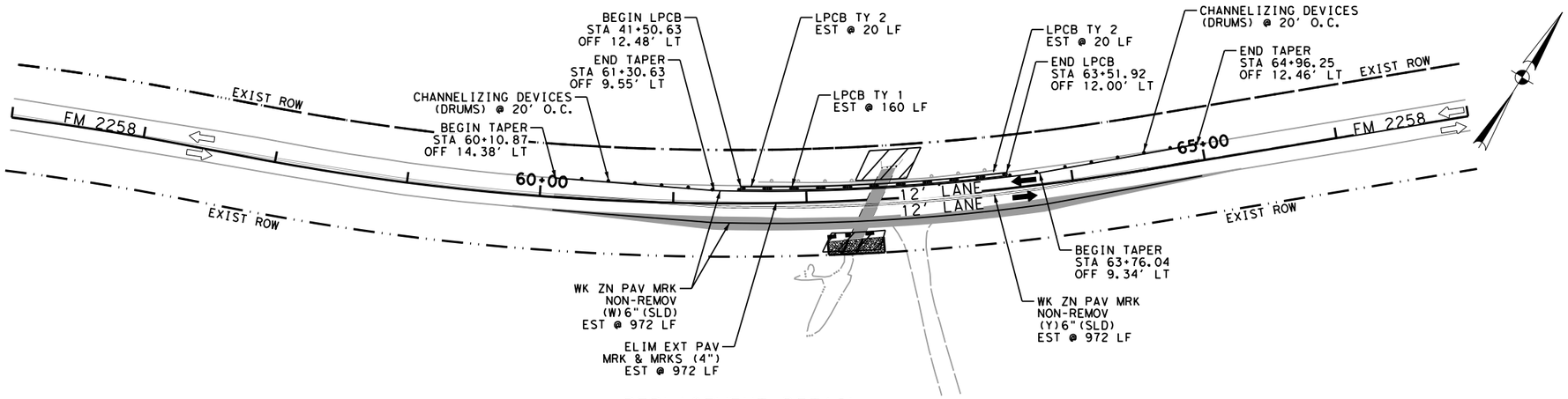


EASTBOUND REPLACEMENT DETAIL
PHASE I - STEP 1

REFER TO CULVERT REPLACEMENT TYPICALS FOR MORE DETAILS ON WINGWALL CONSTRUCTION IN STEP 2.



WESTBOUND REPLACEMENT DETAIL
PHASE I - STEP 3



REPLACEMENT DETAIL
PHASE I - STEP 4

LEGEND

- CONSTRUCTION THIS STEP/PHASE
- CONSTRUCTING DETOURS
- CONSTRUCTION COMPLETED PREVIOUS STEP/PHASE
- PROP TRAFFIC FLOW/DETOUR ARROW
- EXIST TRAFFIC FLOW ARROW
- FLAGGER STATION

STATE OF TEXAS
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CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

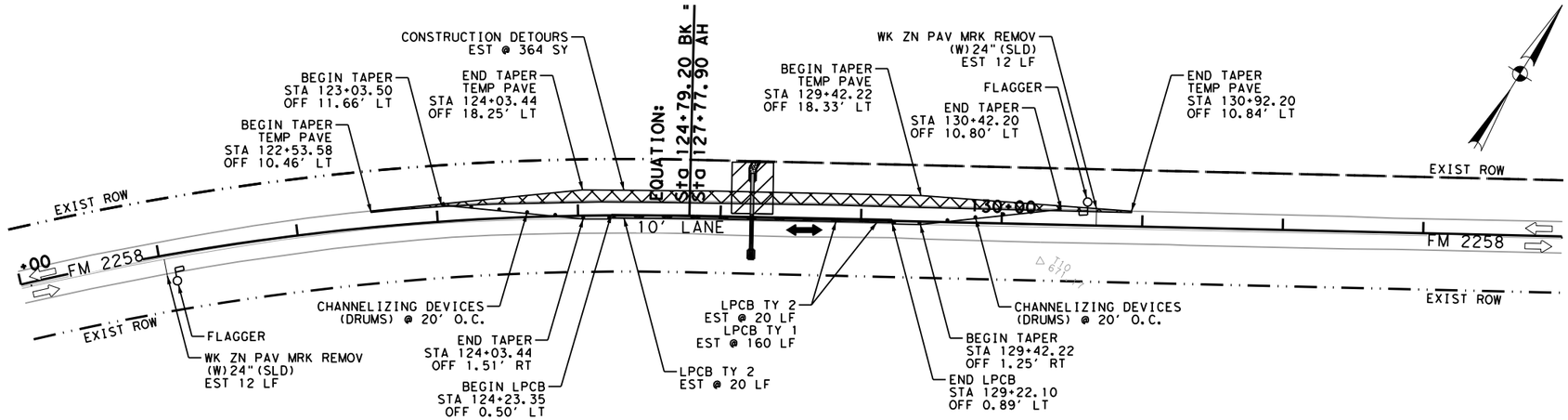
FM 2258
TCP PHASE I
CULVERT NO. 5
REPLACEMENT LAYOUT

SCALE : 1"=100'

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	37

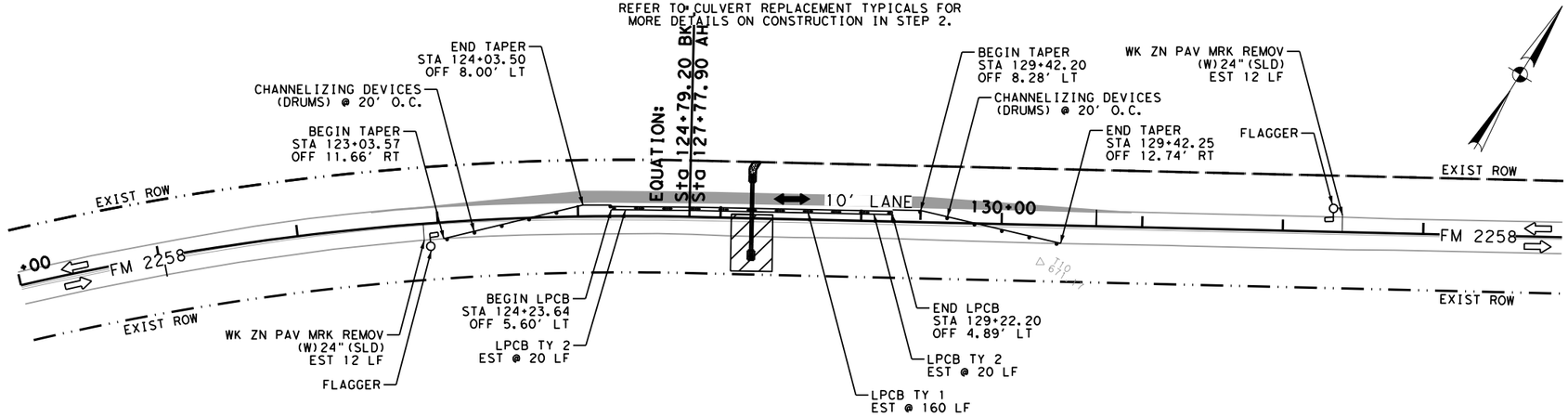
STATE	DIST.	COUNTY
TEXAS	FTW	JOHNSON

CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

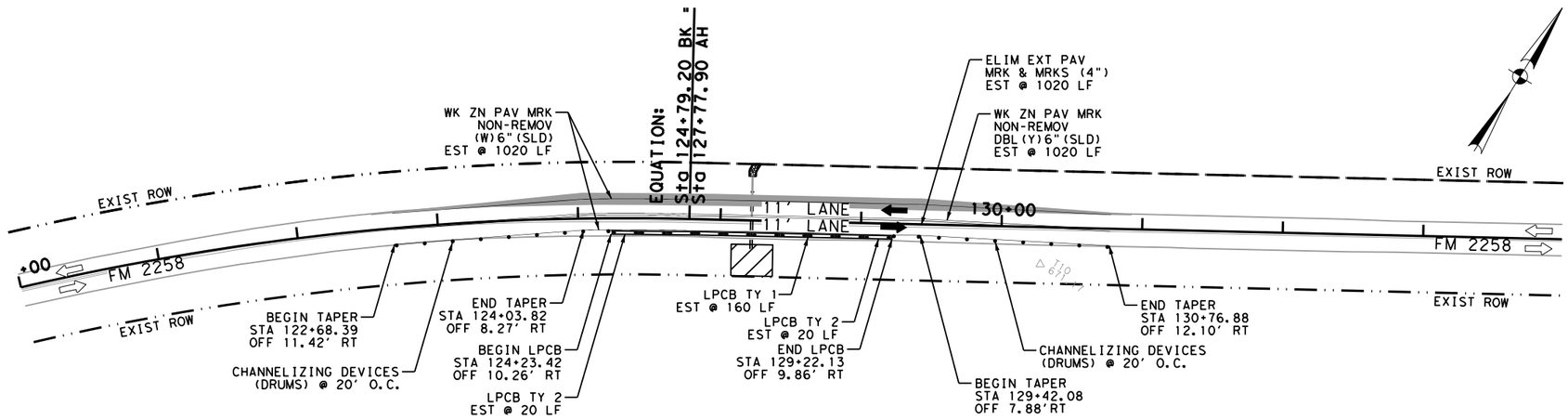


WESTBOUND REPLACEMENT DETAIL
PHASE I - STEP 1

REFER TO CULVERT REPLACEMENT TYPICALS FOR MORE DETAILS ON CONSTRUCTION IN STEP 2.



EASTBOUND REPLACEMENT DETAIL
PHASE I - STEP 3



REPLACEMENT DETAIL
PHASE I - STEP 4

LEGEND

- CONSTRUCTION THIS STEP/PHASE
- CONSTRUCTING DETOURS
- CONSTRUCTION COMPLETED PREVIOUS STEP/PHASE
- PROP TRAFFIC FLOW/DETOUR ARROW
- EXIST TRAFFIC FLOW ARROW
- FLAGGER STATION

STATE OF TEXAS
JOHN HERNANDEZ
91831
LICENSED PROFESSIONAL ENGINEER
John Hernandez, P.E.
2/13/2024

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CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

FM 2258
TCP PHASE I
CULVERT NO. 8
REPLACEMENT LAYOUT

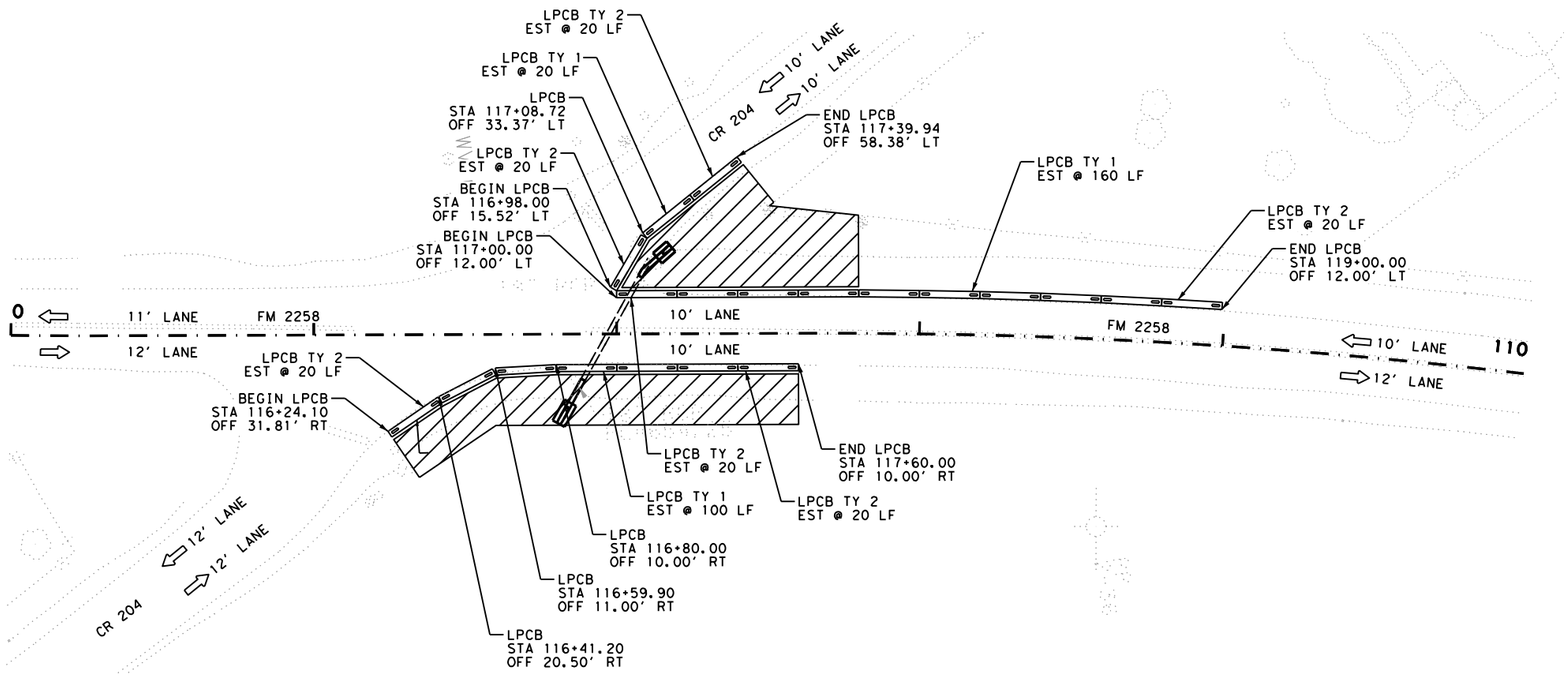
SCALE : 1"=100'

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		38
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

2/13/2024 12:25:38 AM
FM 2258 TRAFFIC CONTROL PLAN

LEGEND

- CONSTRUCTION THIS STEP/PHASE
- CONSTRUCTING DETOURS
- CONSTRUCTION COMPLETED PREVIOUS STEP/PHASE
- CONSTRUCTION COMPLETED PREVIOUS STEP/PHASE
- PROP TRAFFIC FLOW/DETOUR ARROW
- EXIST TRAFFIC FLOW ARROW



CULVERT NO. 7 EXTENSION DETAIL
PHASE II - STEP 4

NOTES:
1. CONTRACTOR TO TAPER DROP OFFS BETWEEN EXISTING AND PROPOSED PAVEMENT.
2. CONTRACTOR SHALL PROVIDE A LEVEL SURFACE OUTSIDE OF PAVEMENT EDGE PRIOR TO PLACING BARRIER. WORK PERFORMED TO PROVIDE A LEVEL SURFACE SHALL BE SUBSIDIARY TO THE LOW PROFILE CONCRETE BARRIER PLACEMENT ITEM 512.

STATE OF TEXAS
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2/13/2024

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FIRM NUMBER: F-8478

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

FM 2258
TCP PHASE II
CULVERT NO. 7
EXTENSION LAYOUT

NTS SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		39
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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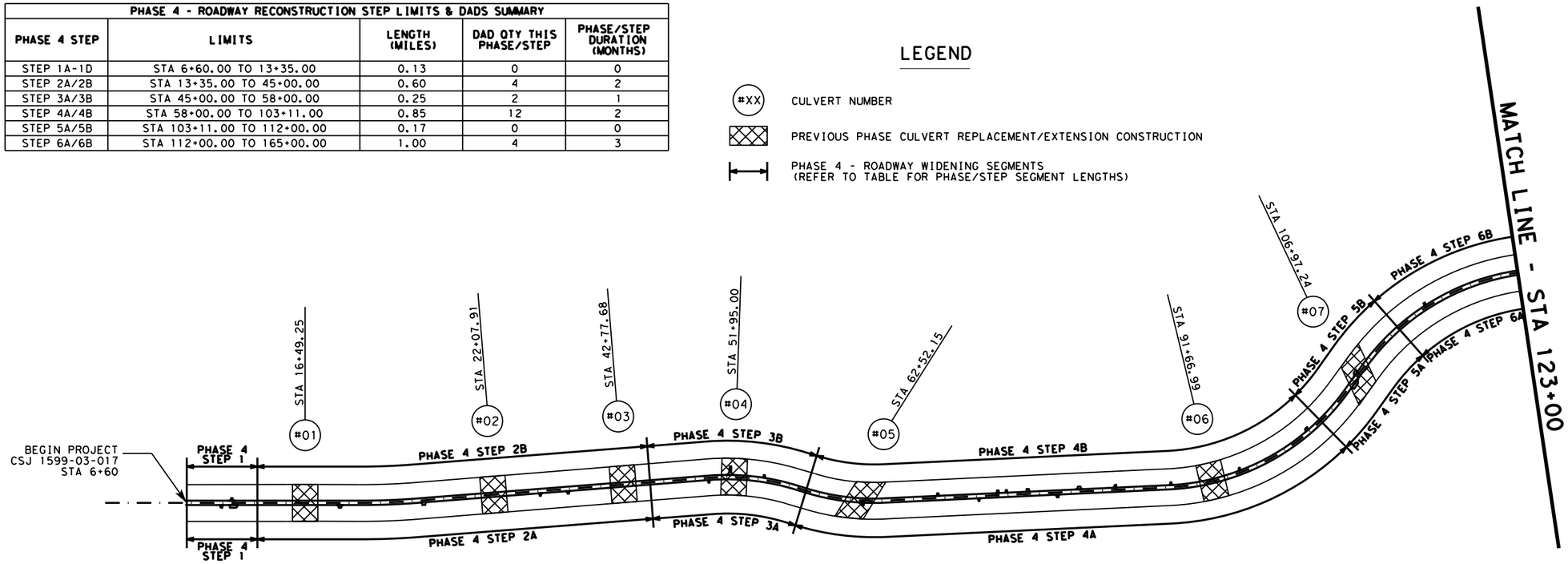
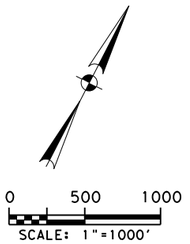
2/13/2024 12:25:44 AM
FM 2258 TRAFFIC CONTROL PLAN

PHASE 4 - ROADWAY RECONSTRUCTION STEP LIMITS & DADS SUMMARY				
PHASE 4 STEP	LIMITS	LENGTH (MILES)	DAD QTY THIS PHASE/STEP	PHASE/STEP DURATION (MONTHS)
STEP 1A-1D	STA 6+60.00 TO 13+35.00	0.13	0	0
STEP 2A/2B	STA 13+35.00 TO 45+00.00	0.60	4	2
STEP 3A/3B	STA 45+00.00 TO 58+00.00	0.25	2	1
STEP 4A/4B	STA 58+00.00 TO 103+11.00	0.85	12	2
STEP 5A/5B	STA 103+11.00 TO 112+00.00	0.17	0	0
STEP 6A/6B	STA 112+00.00 TO 165+00.00	1.00	4	3

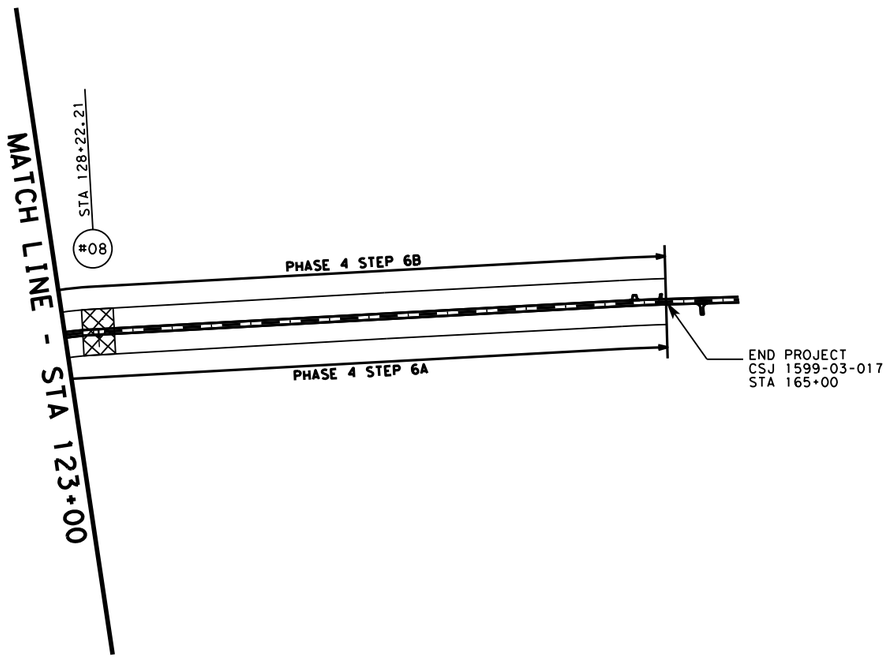
LEGEND

- (#XX) CULVERT NUMBER
- PREVIOUS PHASE CULVERT REPLACEMENT/EXTENSION CONSTRUCTION
- PHASE 4 - ROADWAY WIDENING SEGMENTS (REFER TO TABLE FOR PHASE/STEP SEGMENT LENGTHS)





PHASE 4 - ROADWAY RECONSTRUCTION PCTB BREAK LIMITS SUMMARY FOR DRIVEWAY ACCESS					
PHASE 4 STEPS	BEGIN STA OF BARRIER	END STA OF BARRIER	LENGTH OF BARRIER	TY I PCTB QTY	TY II PCTB QTY
STEP 2A/2B	12+95.00	18+95.00	600	560	40
	19+70.00	25+90.00	620	580	40
	26+50.00	35+70.00	920	880	40
	36+04.00	38+04.00	200	160	40
	38+40.00	46+00.00	760	720	40
STEP SUBTOTAL =			3100	2900	200
STEP 3A/3B	44+00.00	49+60.00	560	520	40
	50+04.00	54+24.00	420	380	40
	54+60.00	59+00.00	440	400	40
STEP SUBTOTAL =			1420	1300	120
STEP 4A/4B	57+00.00	62+60.00	560	520	40
	63+00.00	68+80.00	580	540	40
	69+14.00	72+14.00	300	260	40
	72+50.00	73+70.00	120	80	40
	74+78.00	76+18.00	140	100	40
	76+59.00	78+59.00	200	160	40
	79+00.00	80+40.00	140	100	40
	80+95.00	83+35.00	240	200	40
	83+80.00	88+00.00	420	380	40
	88+35.00	93+95.00	560	520	40
	94+20.00	100+40.00	620	580	40
	100+90.00	103+50.00	260	220	40
STEP SUBTOTAL =			4140	3660	480
STEP 5A/5B	102+70.00	105+50.00	280	240	40
	107+18.00	112+78.00	560	520	40
STEP SUBTOTAL =			840	760	80
STEP 6A/6B	110+95.00	114+75.00	380	340	40
	115+16.00	160+36.00	4520	4480	40
	164+05.00	165+25.00	120	80	40
	165+56.00	165+96.00	40	0	40
STEP SUBTOTAL =			5060	4900	160



CAMACHO-HERNANDEZ
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FIRM NUMBER: F-8478

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

FM 2258
TCP PHASE IV
ROADWAY RECONSTRUCTION
PHASING LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	40
STATE	DIST.	COUNTY
TEXAS	FTW	JOHNSON
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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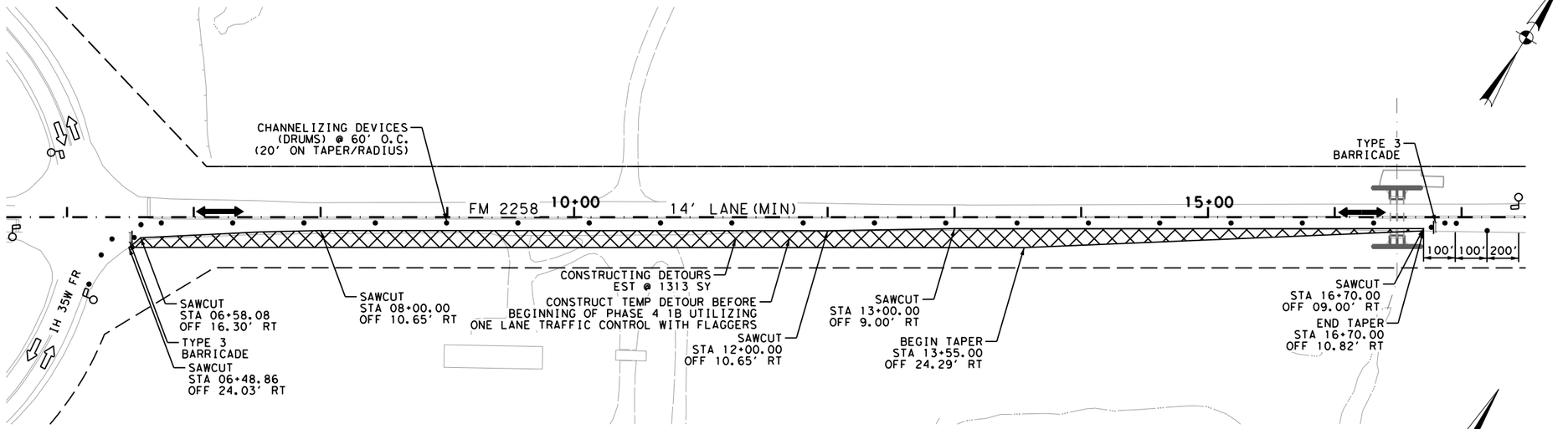
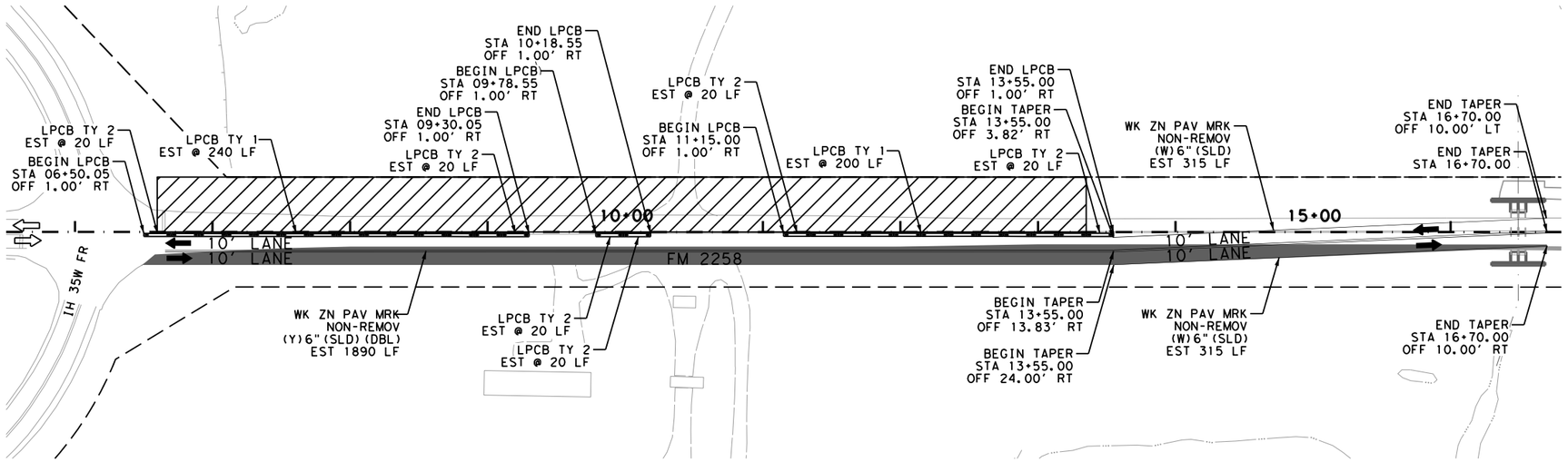
FM 2258 TRAFFIC CONTROL PLAN



PHASE IV STEP 1A



PHASE IV STEP 1B

NOTES:
1. CONTRACTOR TO TAPER DROP OFFS BETWEEN EXISTING AND PROPOSED PAVEMENT.
2. REFER TO PTS INSTALLATION LAYOUT (ONE-LANE/TWO-WAY) SHEET FOR ADDITIONAL INFORMATION.

LEGEND

- CONSTRUCTION THIS STEP/PHASE
- CONSTRUCTION TEMPORARY DETOUR THIS STEP/PHASE
- CONSTRUCTION COMPLETED PREVIOUS STEP/PHASE
- TEMPORARY DETOUR COMPLETED PREVIOUS STEP/PHASE
- CHANNELIZING DEVICES (DRUMS)
- FLAGGER
- PROP TRAFFIC FLOW/DETOUR ARROW
- EXIST TRAFFIC FLOW ARROW

STATE OF TEXAS
JOHN HERNANDEZ
91831
LICENSED PROFESSIONAL ENGINEER
2/13/2024

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TBPE REGISTRATION NO. F-5246

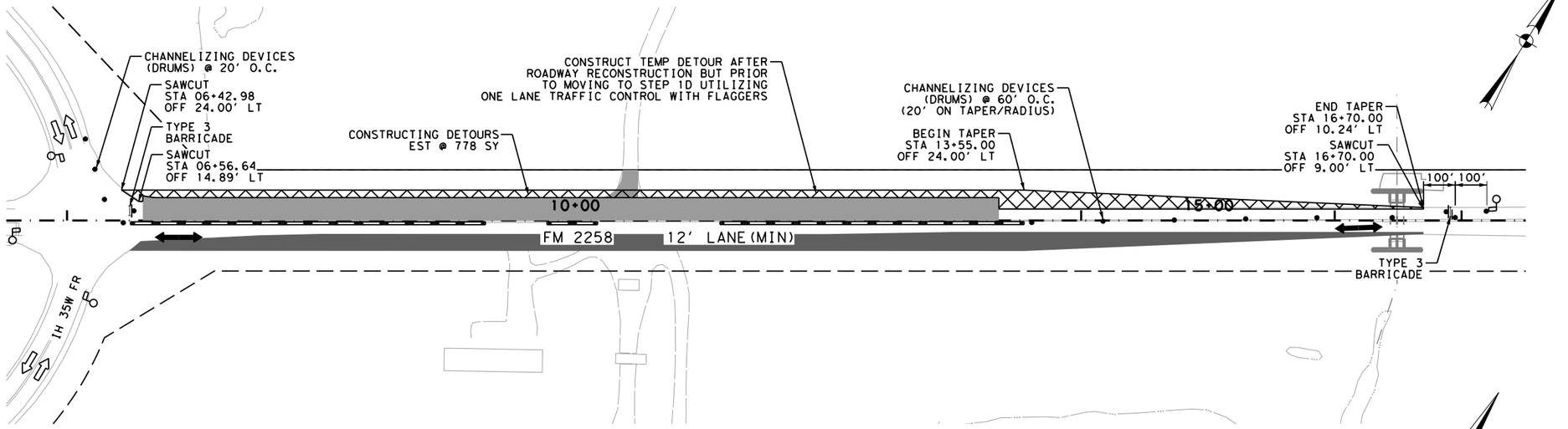
FM 2258

TCP PHASE IV STEP 1A/1B LAYOUT DETAILS

NTS

SHEET 1 OF 1

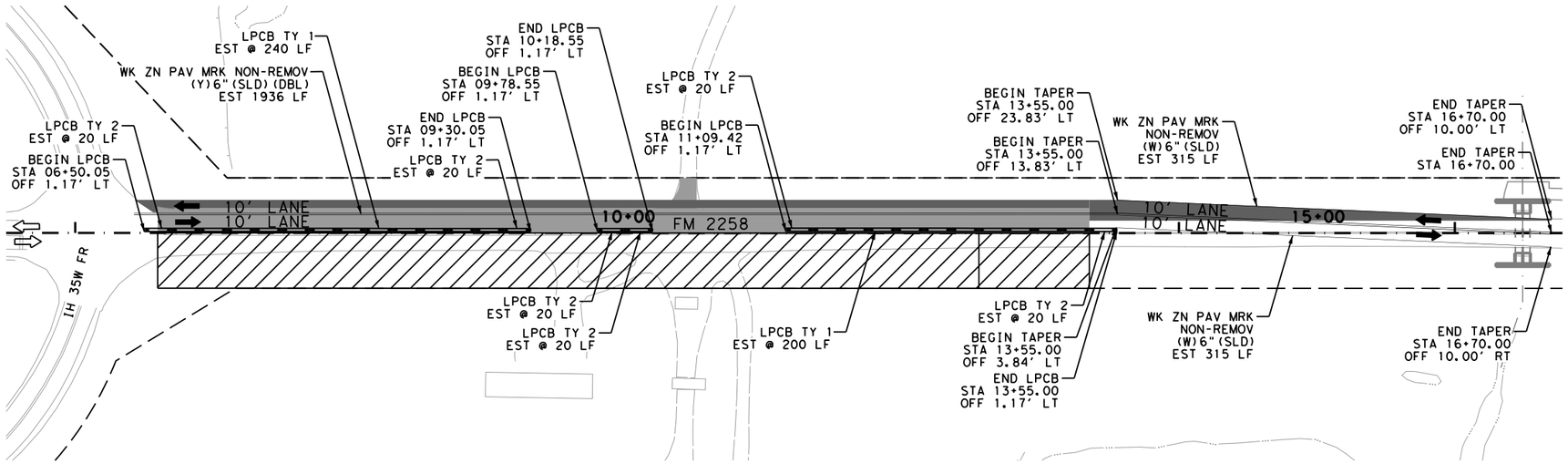
FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	41
STATE	DIST.	COUNTY
TEXAS	FTW	JOHNSON
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258



PHASE IV STEP 1C

LEGEND

- CONSTRUCTION THIS STEP/PHASE
- CONSTRUCTION TEMPORARY DETOUR THIS STEP/PHASE
- CONSTRUCTION COMPLETED PREVIOUS STEP/PHASE
- TEMPORARY DETOUR COMPLETED PREVIOUS STEP/PHASE
- CHANNELIZING DEVICES (DRUMS)
- FLAGGER
- PROP TRAFFIC FLOW/DETOUR ARROW
- EXIST TRAFFIC FLOW ARROW



PHASE IV - STEP 1D

NOTES:
1. CONTRACTOR TO TAPER DROP OFFS BETWEEN EXISTING AND PROPOSED PAVEMENT.
2. REFER TO PTS INSTALLATION LAYOUT (ONE-LANE/TWO-WAY) SHEET FOR ADDITIONAL INFORMATION.

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CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

FM 2258

TCP PHASE IV STEP 1C/1D LAYOUT DETAILS

NTS SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		42
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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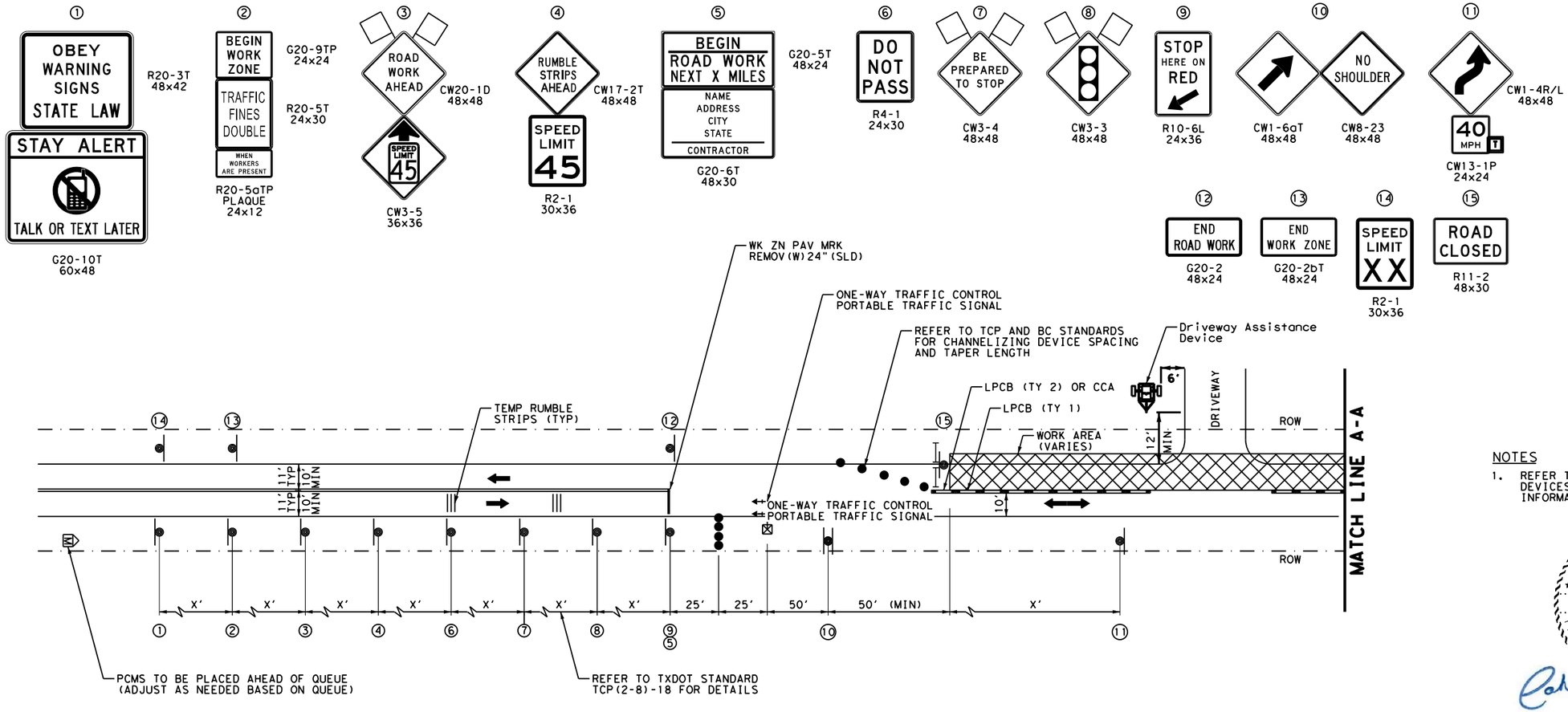

NOTES

1. REFER TO "DRIVEWAY ASSISTANCE DEVICES" PLAN SHEET FOR ADDITIONAL INFORMATION.

STATE OF TEXAS
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John Hernandez P.E.
2/13/2024

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CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

FM 2258
TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY TRAFFIC WITH TEMP SIGNALS AND DADS DETAIL

NTS SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		43
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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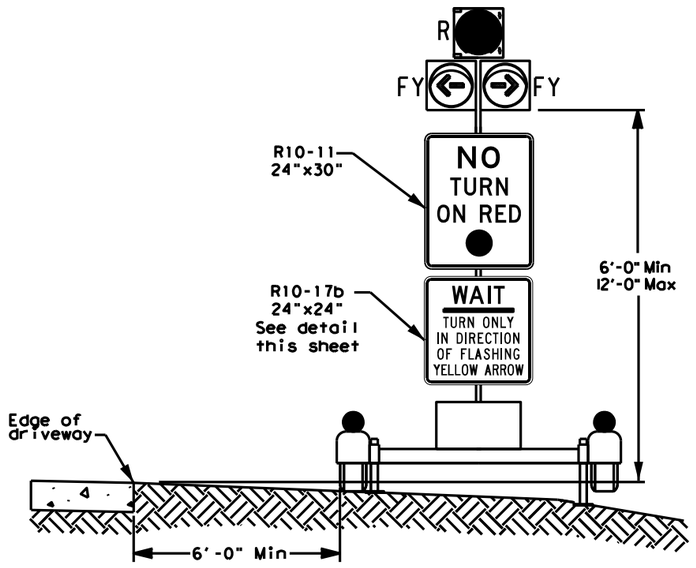
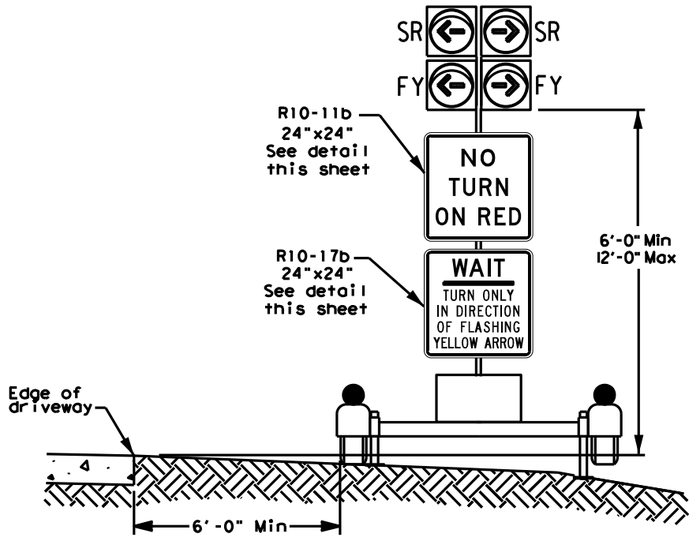
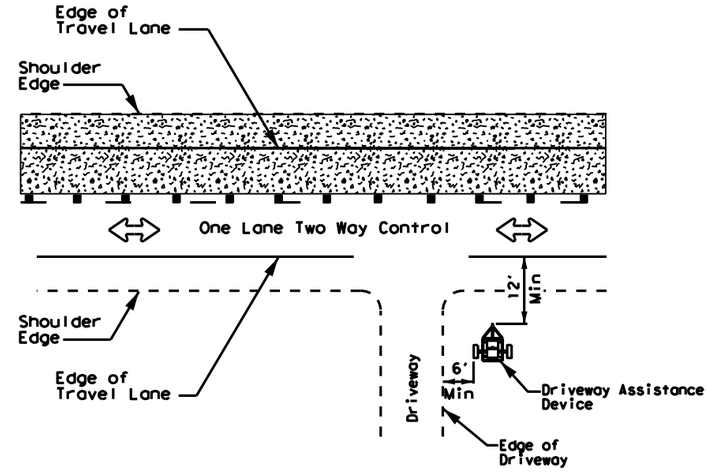


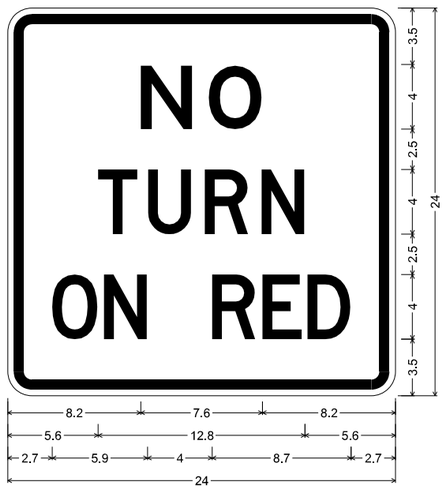
ELEVATION VIEW
DAD 3 HEAD DEVICE



ELEVATION VIEW
DAD 4 HEAD DEVICE

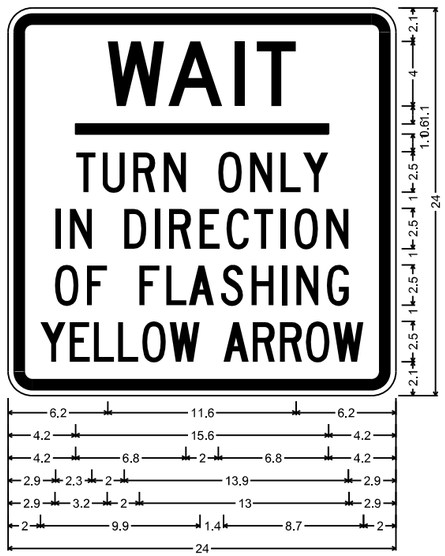


PLAN VIEW
TYPICAL DAD INSTALLATION



R10-11b_24x24;
1.5" Radius, 0.6" Border, 0.4" Indent, Black on White;
"NO", E; "TURN", D specified length;
"ON", D specified length; "RED", D specified length;

R10-11b



R10-17c;
1.5" Radius, 0.6" Border, 0.4" Indent, Black on White;
"WAIT", D; "TURN", C; "ONLY", C; "IN", C;
"DIRECTION", C; "OF", C; "FLASHING", C;
"YELLOW ARROW", C specified length;

R10-17b

SIGN DETAILS

GENERAL NOTES

1. Three Head Unit. Each DAD must have One signal head consisting of 3 LED indications as follows; one 12 in. diameter steady red ball indication centered over one 12 in. diameter yellow flashing left arrow and one 12 in. diameter yellow flashing right arrow.
2. Four head unit. One signal head consisting of 4 LED indications as follows; one 12 in. diameter steady red left arrow indication and one 12 in. diameter steady red right arrow indication, over one 12 in. diameter yellow flashing left arrow and one 12 in. diameter yellow flashing right arrow.
3. See Special Specification 6480 for details.

LEGEND	
⇨	Traffic Flow
SR	Steady Red
FY	Flashing Yellow

STATE OF TEXAS
JOHN HERNANDEZ
91831
LICENSED
PROFESSIONAL ENGINEER
John Hernandez P.E.
2/13/2024

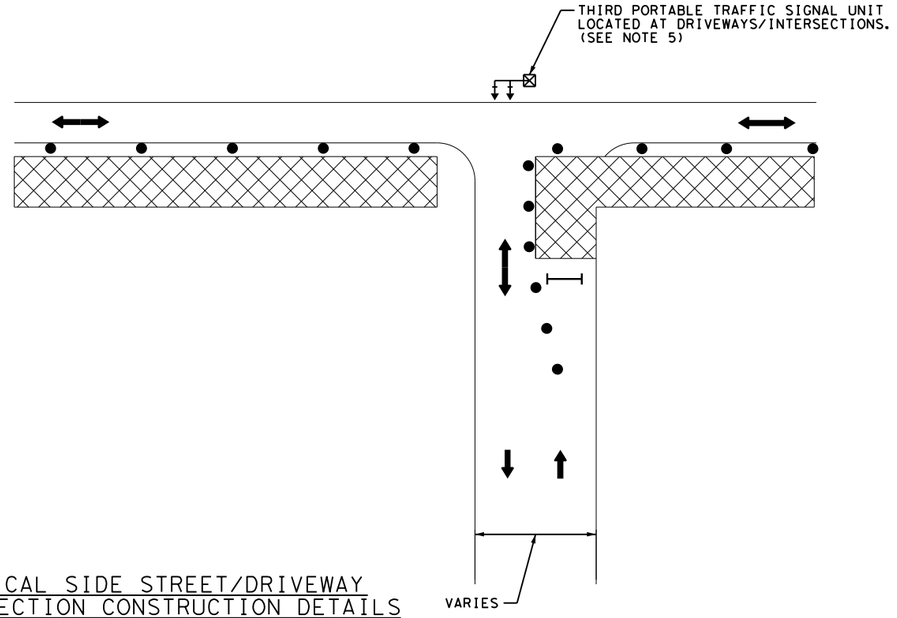
Texas Department of Transportation

DRIVEWAY ASSISTANCE DEVICES DETAIL

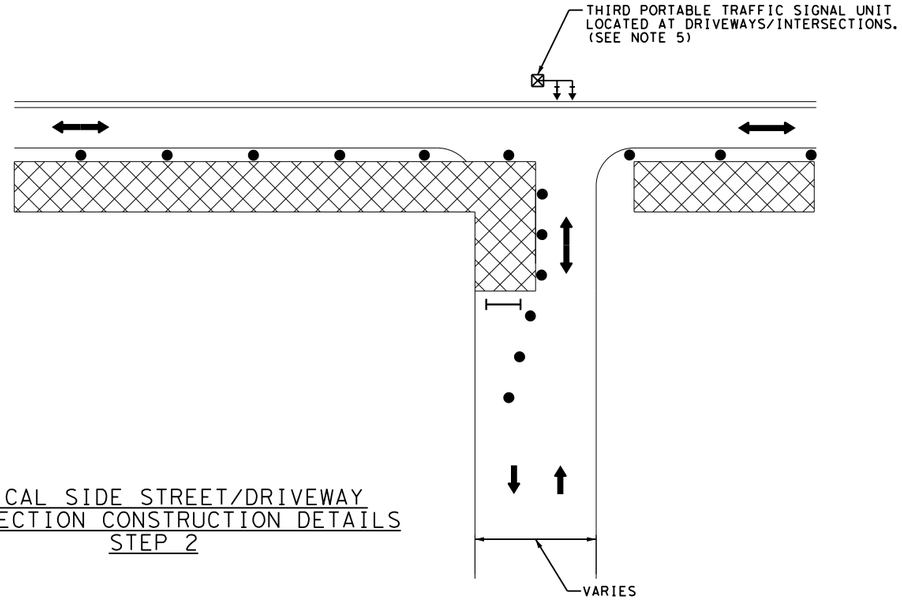
FILE:	DN:	CK:	DW:	CK:
© TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		44

LEGEND

- CHANNELIZING DEVICES
- TYPE 3 BARRICADE
- PORTABLE TRAFFIC SIGNAL



TYPICAL SIDE STREET/DRIVEWAY
HALF-SECTION CONSTRUCTION DETAILS
STEP 1



TYPICAL SIDE STREET/DRIVEWAY
HALF-SECTION CONSTRUCTION DETAILS
STEP 2

NOTES:

1. THE CONTRACTOR SHALL COORDINATE ALL STREET AND DRIVEWAY CLOSURES PRIOR TO COMMENCEMENT OF CONSTRUCTION. PROPERTIES WITH MORE THAN ONE DRIVEWAY SHALL BE RECONSTRUCTED ONE DRIVEWAY AT A TIME BEFORE PROCEDING TO THE SECOND DRIVEWAY. CROSS STREETS OR DRIVEWAYS WITH ONE DRIVEWAY ACCESS SHALL BE RECONSTRUCTED IN HALF WIDTHS UNLESS ARRANGEMENTS HAVE BEEN MADE WITH THE OWNER. SIDE STREET/DRIVEWAY HALF WIDTH CONSTRUCTION SHALL BE CONDUCTED DURING OFFPEAK, WEEKEND, NIGHT CLOSURES, OR AS APPROVED BY THE ENGINEER.
2. CHANNELIZING DEVICES SHALL BE SPACED PER BARRICADE CONSTRUCTION STANDARDS, UNLESS OTHERWISE SHOWN ON PLANS, REFER TO TCP 1-2.
3. SEE ADVANCED WARNING SIGNS LAYOUT FOR ADDITIONAL INFORMATION.
4. REFER TO BARRICADE CONSTRUCTION STANDARDS OR TCP 1-2 FOR MINIMUM SPACING OF CONSTRUCTION WARNING AND CROSS STREET SIGNS.
5. FOUR WAY INTERSECTION TEMPORARY SIGNALS SHALL BE PAID FOR UNDER ITEM 510-6003.

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FIRM NUMBER: F-8478

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

TRAFFIC CONTROL PLAN MISCELLANEOUS DETAILS

NTS

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		45
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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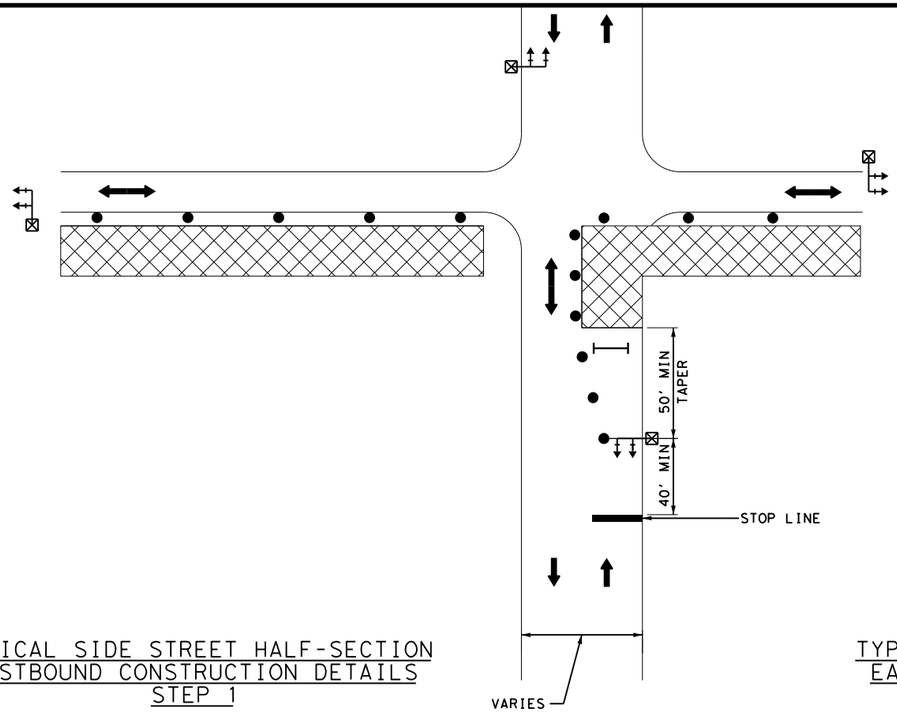
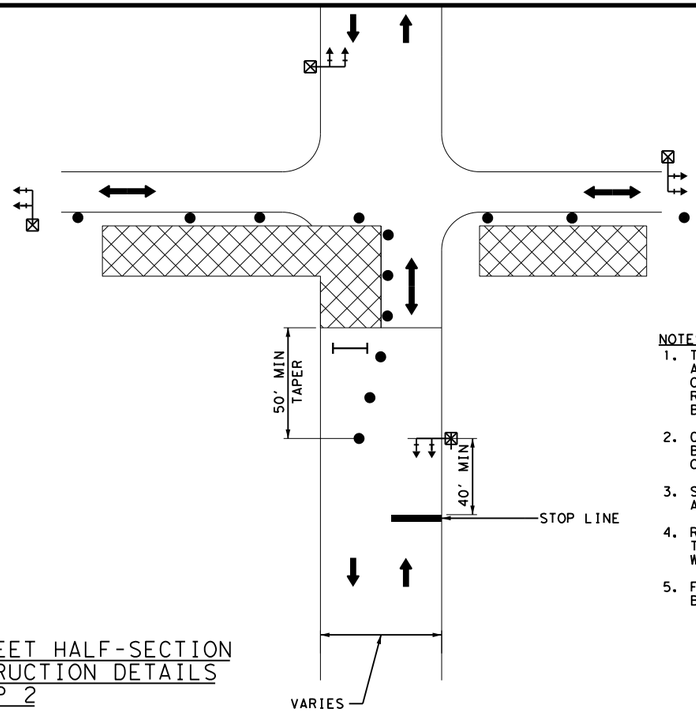
FM 2258 TRAFFIC CONTROL PLAN



TYPICAL SIDE STREET HALF-SECTION
EASTBOUND CONSTRUCTION DETAILS
STEP 1



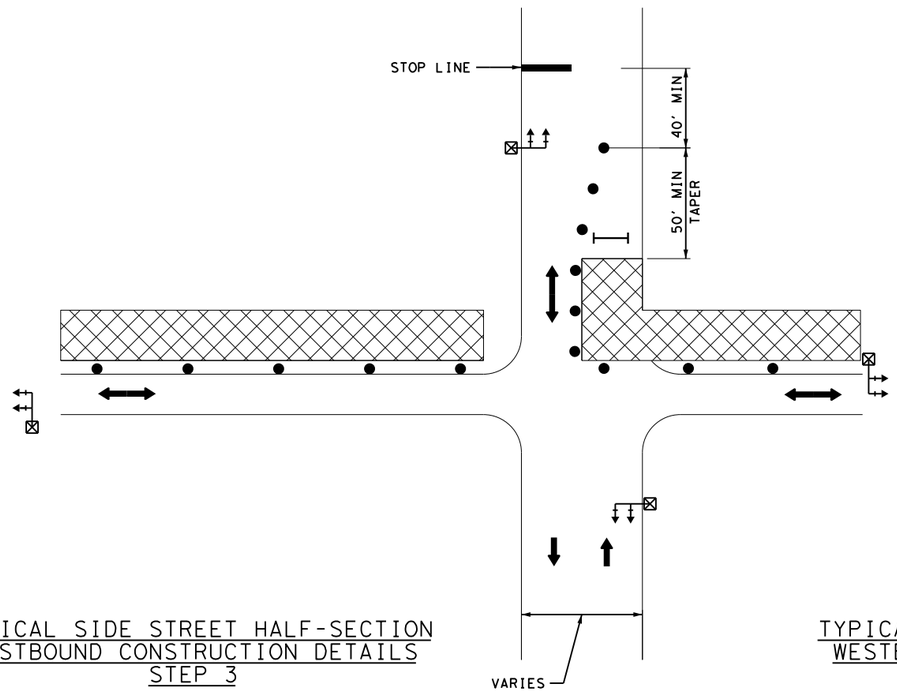
TYPICAL SIDE STREET HALF-SECTION
EASTBOUND CONSTRUCTION DETAILS
STEP 2

LEGEND

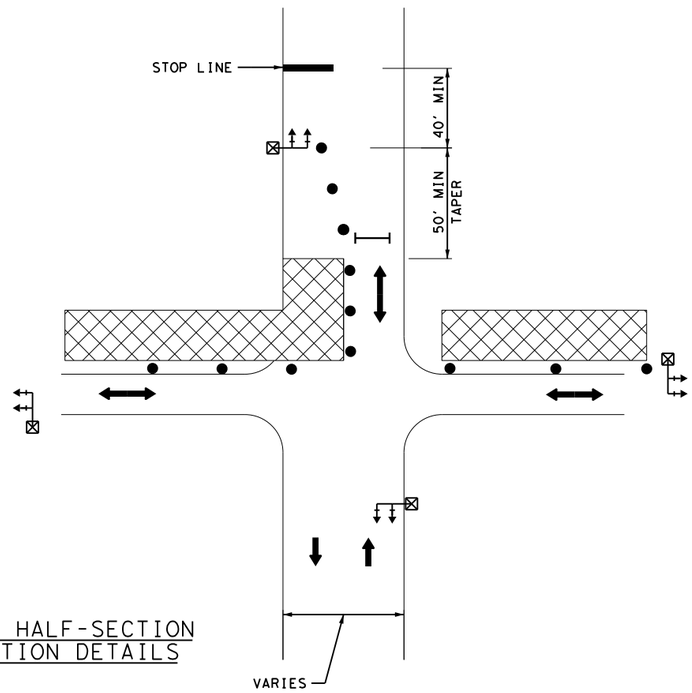
- CHANNELIZING DEVICES
- TYPE 3 BARRICADE
- PORTABLE TRAFFIC SIGNAL

NOTES:

1. THE CONTRACTOR SHALL COORDINATE ALL STREET AND DRIVEWAY CLOSURES PRIOR TO COMMENCEMENT OF CONSTRUCTION. CROSS STREETS SHALL BE RECONSTRUCTED IN HALF WIDTHS UNLESS APPROVED BY THE ENGINEER.
2. CHANNELIZING DEVICES SHALL BE SPACED PER BARRICADE CONSTRUCTION STANDARDS, UNLESS OTHERWISE SHOWN ON PLANS. REFER TO TCP 1-2
3. SEE ADVANCED WARNING SIGNS LAYOUT FOR ADDITIONAL INFORMATION.
4. REFER TO BARRICADE CONSTRUCTION STANDARDS OR TCP 1-2 FOR MINIMUM SPACING OF CONSTRUCTION WARNING AND CROSS STREET SIGNS.
5. FOUR WAY INTERSECTION TEMPORARY SIGNALS SHALL BE PAID FOR UNDER ITEM 510-6003.



TYPICAL SIDE STREET HALF-SECTION
WESTBOUND CONSTRUCTION DETAILS
STEP 3



TYPICAL SIDE STREET HALF-SECTION
WESTBOUND CONSTRUCTION DETAILS
STEP 4

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TRAFFIC CONTROL PLAN MISCELLANEOUS DETAILS

NTS

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		46
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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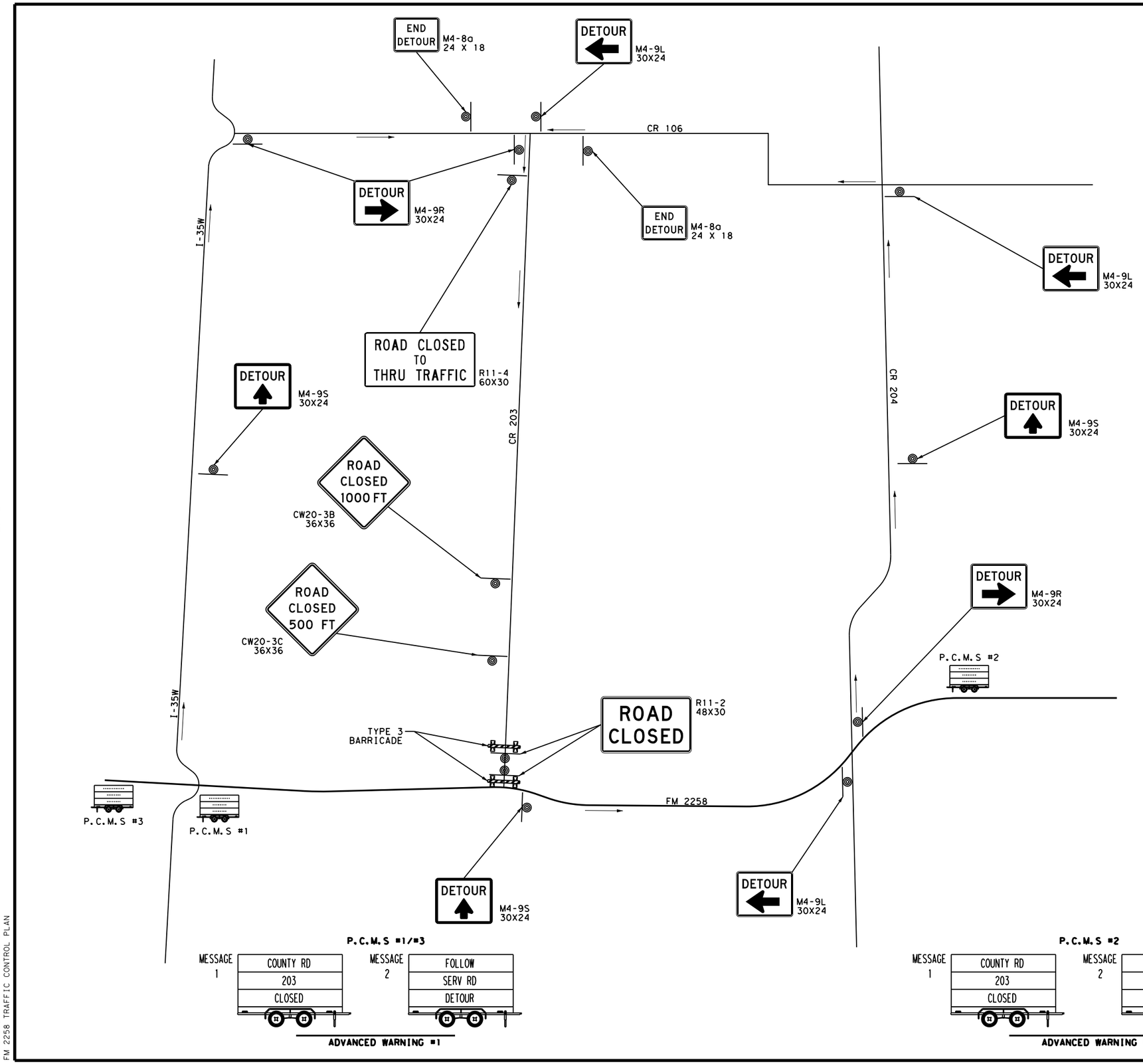
FM 2258 TRAFFIC CONTROL PLAN



LEGEND

- TRAFFIC FLOW ARROW
- CONSTRUCTION SIGN
- TYPE 3 BARRICADE
- PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

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FM 2258

TCP DETOUR LAYOUT
PHASE I-CULVERT NO. 4
PHASE IV-STEP 3A/3B

NTS — SHEET 1 OF 1

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	47
STATE	DIST.	COUNTY
TEXAS	FTW	JOHNSON
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1599	03	017	FM 2258
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	FTW	JOHNSON		48
5-10 5-21				

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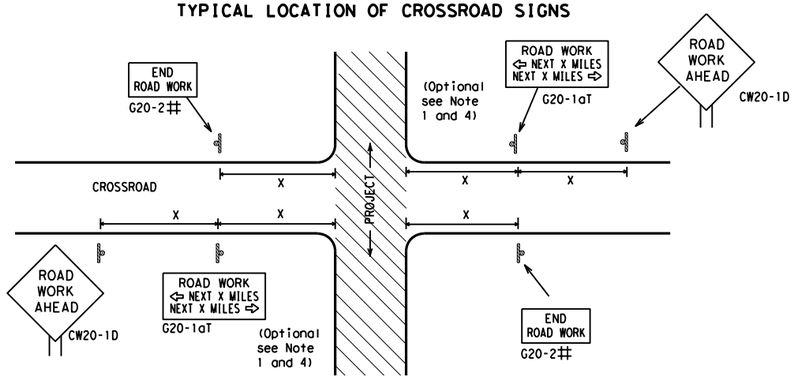
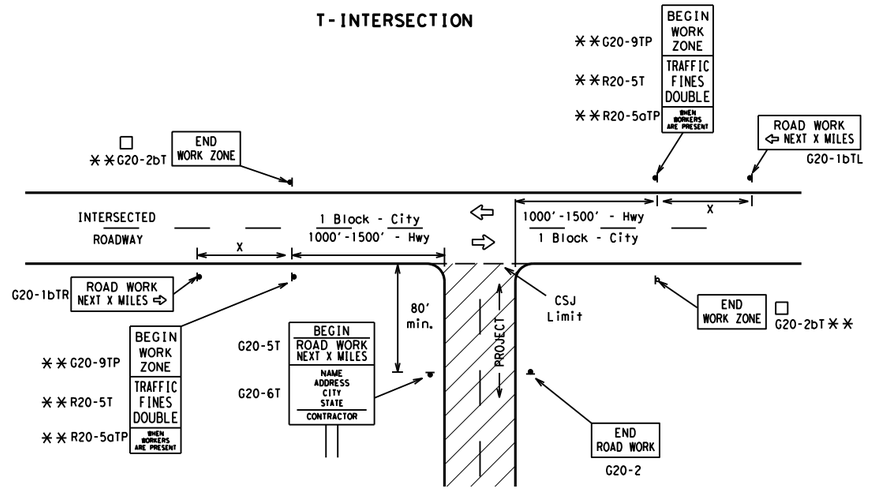
TYPICAL LOCATION OF CROSSROAD SIGNS



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]

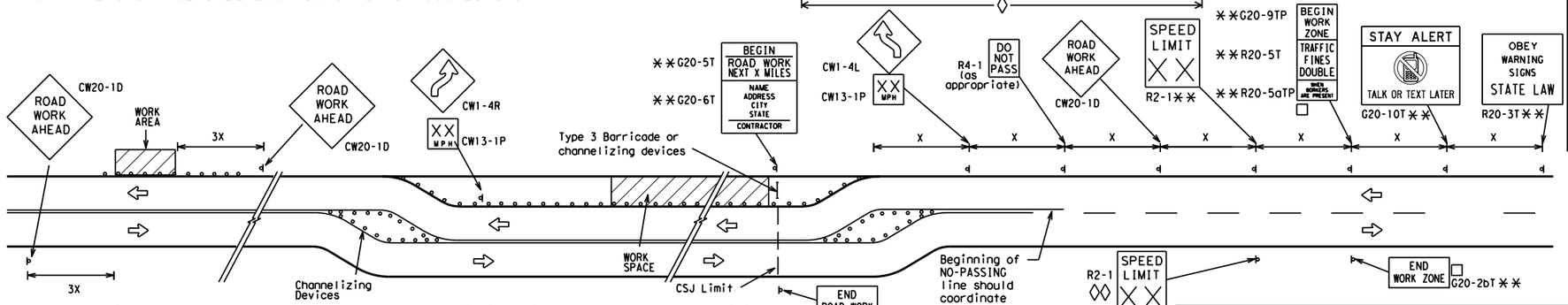
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

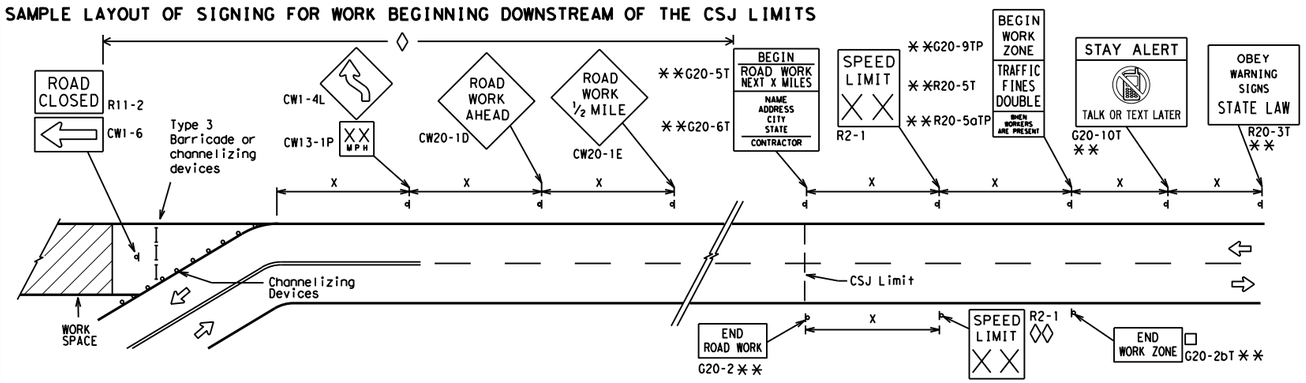
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may 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 DOWNSTREAM OF THE CSJ LIMITS



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1599	03	017	FM 2258
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	JOHNSON		49

DATE: 2/7/2024 4:54:43 AM
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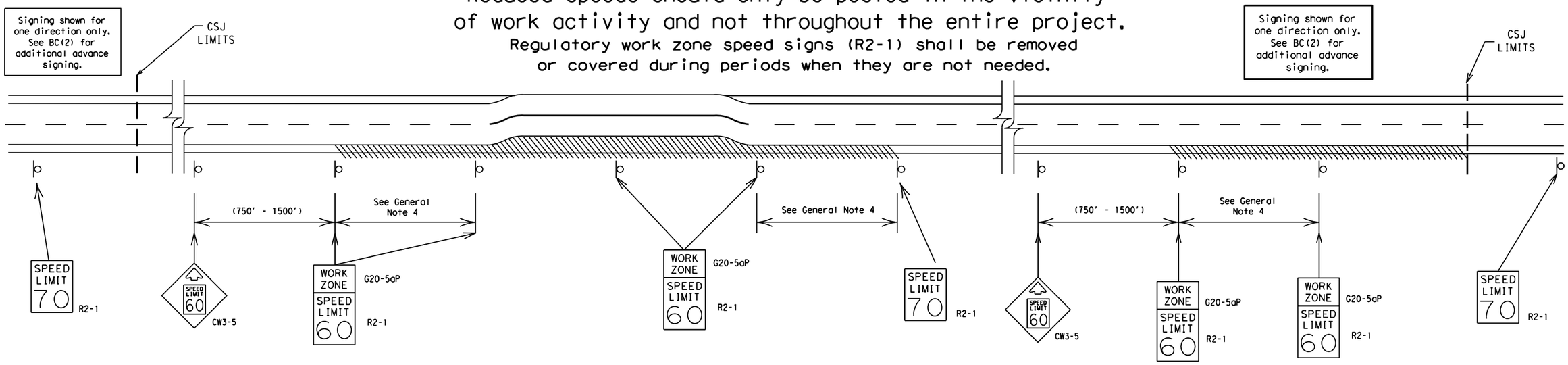
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1599	03	017	FM 2258
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	JOHNSON		50

DATE: 2/7/2024 4:54:43 AM
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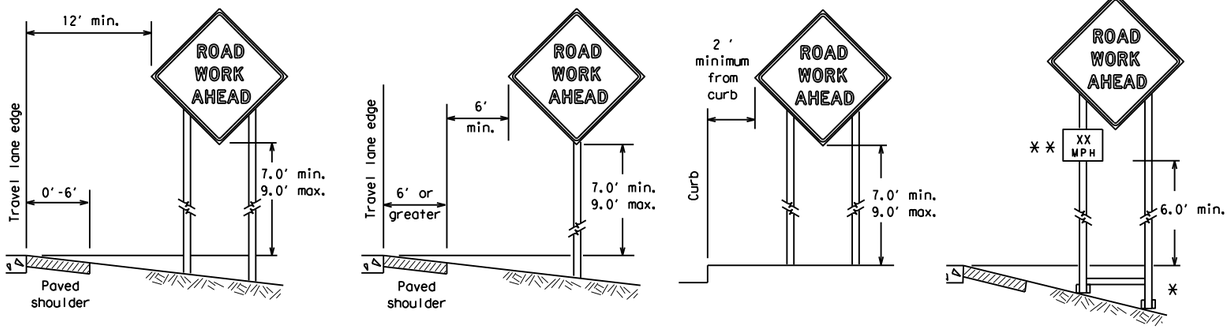
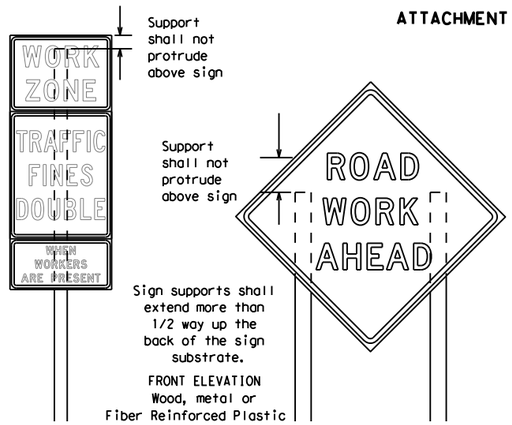
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

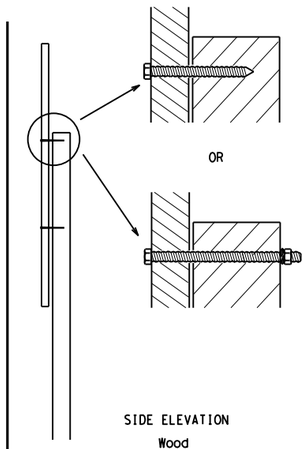


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

** 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





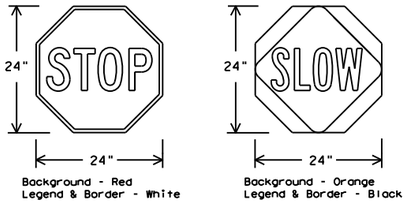
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1599	03	017	FM 2258
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	JOHNSON		51

DATE: 2/7/2024 4:54:43 AM
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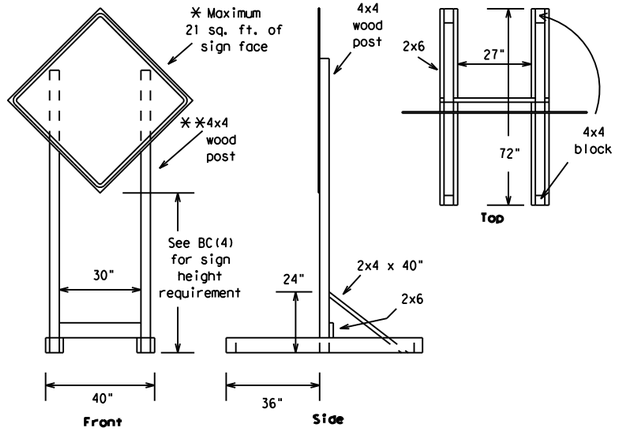
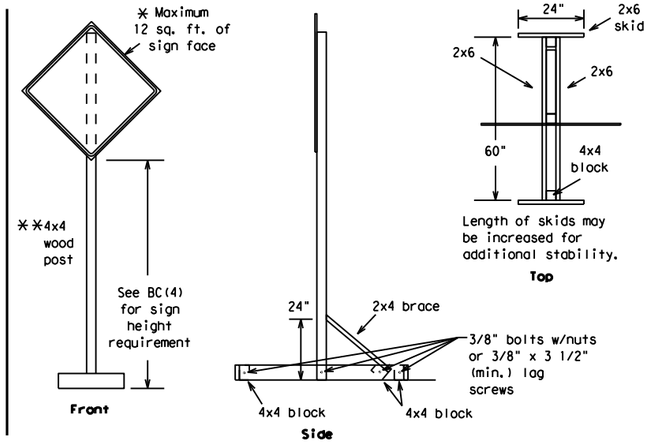
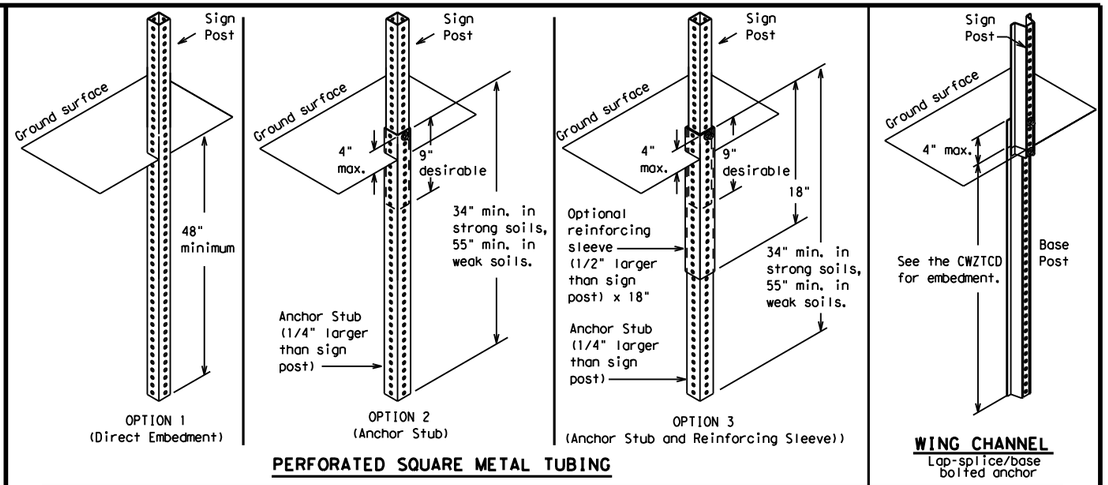




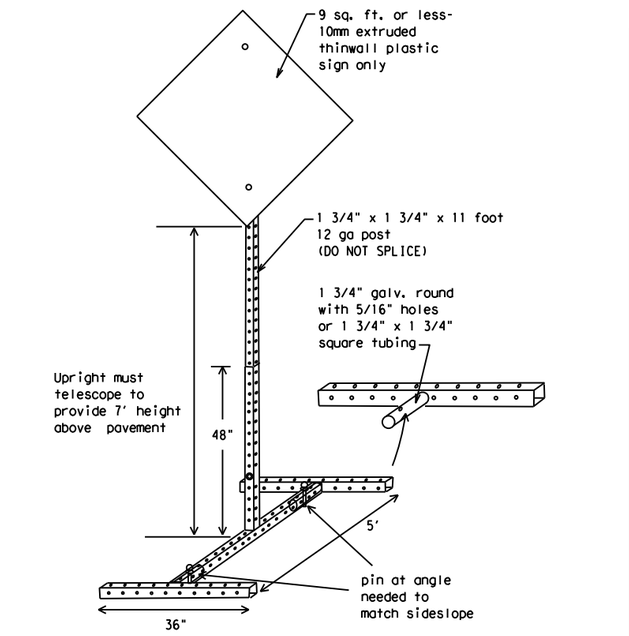
SKID MOUNTED WOOD SIGN SUPPORTS

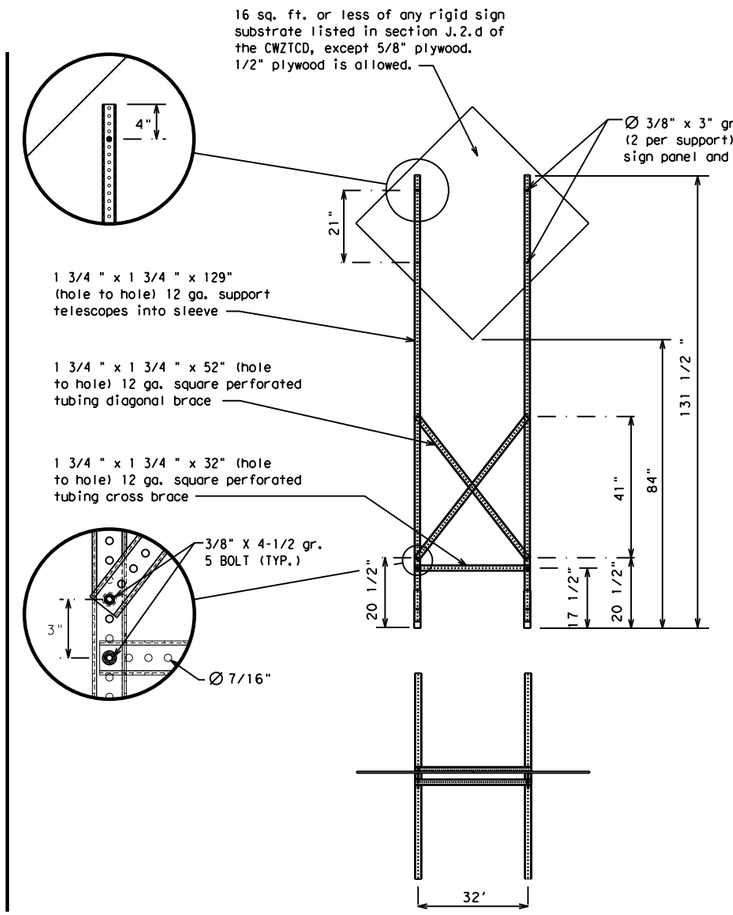
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

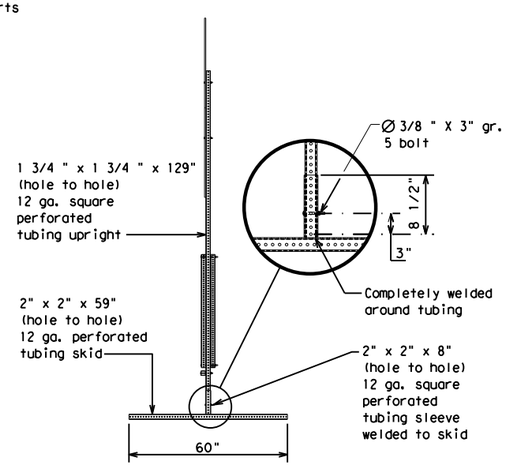


GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1599	03	017	FM 2258
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	JOHNSON		52

DATE: 2/7/2024 4:54:43 AM
FILE: $FILE$

DATE: 2/7/2024 4:54:44 AM
FILE: $FILE$

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

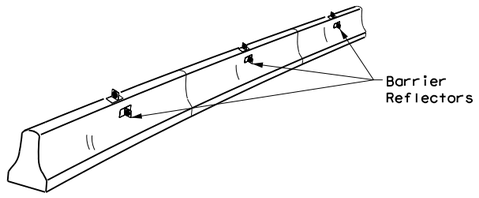
BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE:	bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS		1599	03	017	FM 2258
9-07 8-14		DIST	COUNTY		SHEET NO.
7-13 5-21		FTW	JOHNSON		53

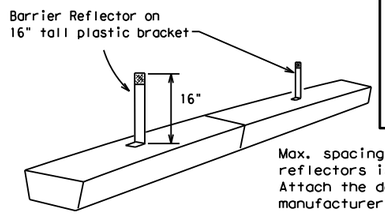
100

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.



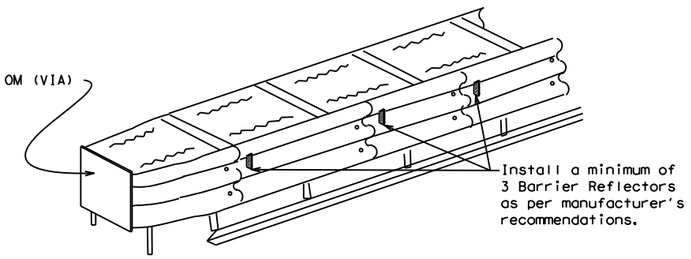
CONCRETE TRAFFIC BARRIER (CTB)

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)



DELINEATION OF END TREATMENTS

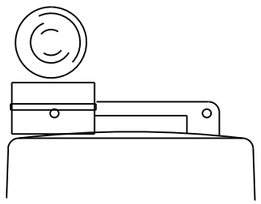
LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

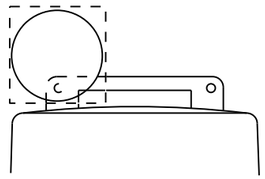
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

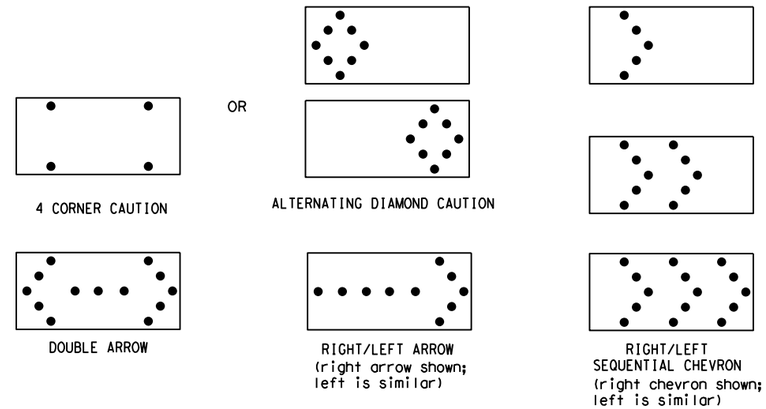
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

SHEET 7 OF 12

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	1599	03	017	FM 2258
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	JOHNSON		54

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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:

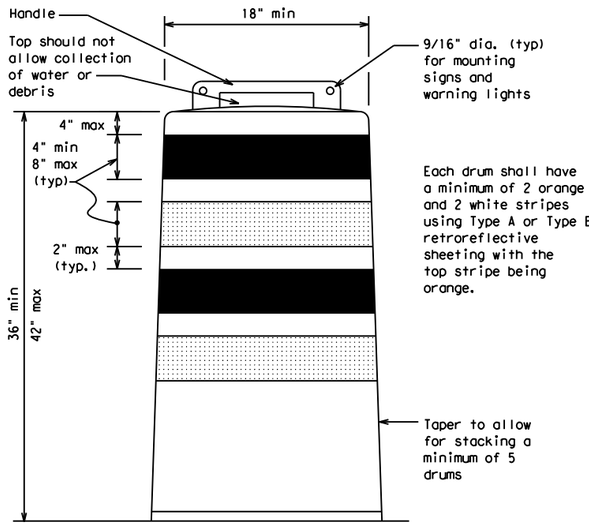
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

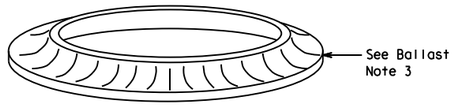
RETROREFLECTIVE SHEETING

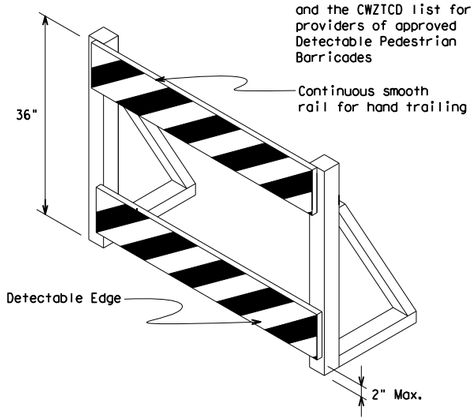
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

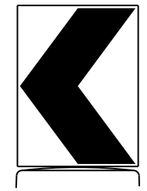




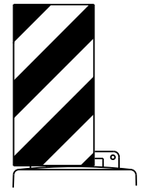


DETECTABLE PEDESTRIAN BARRICADES

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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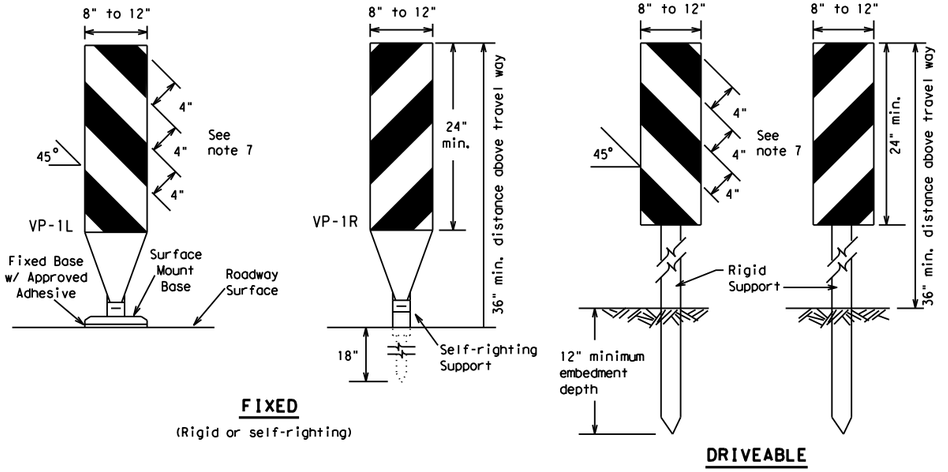
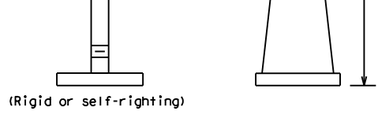


FIXED
(Rigid or self-righting)

DRIVEABLE

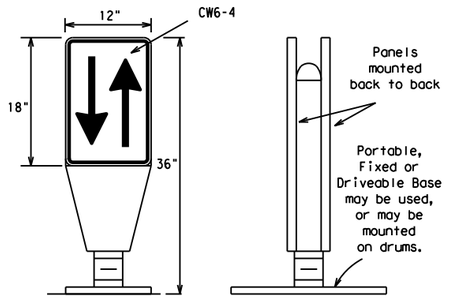


(Rigid or self-righting)

PORTABLE

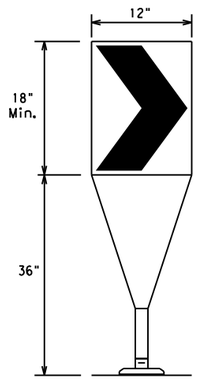
VERTICAL PANELS (VPs)

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



OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

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.



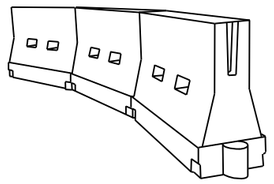
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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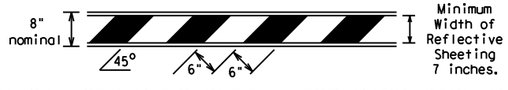
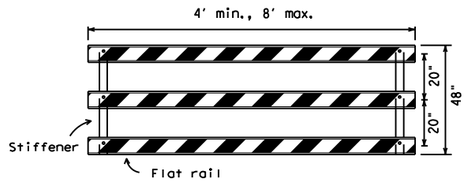
TYPE 3 BARRICADES

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.



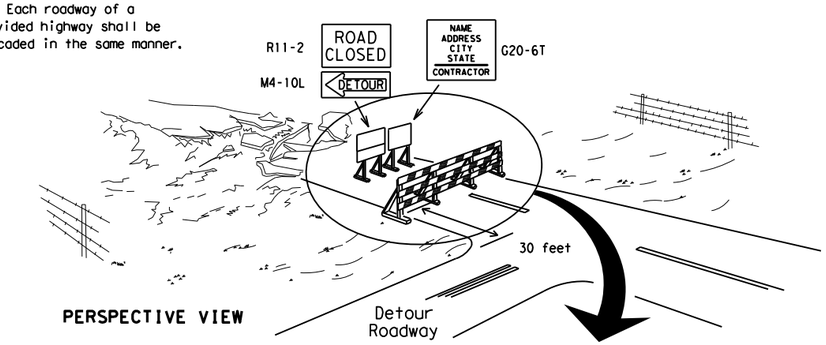
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

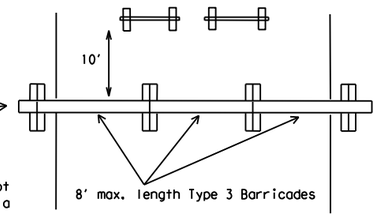
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

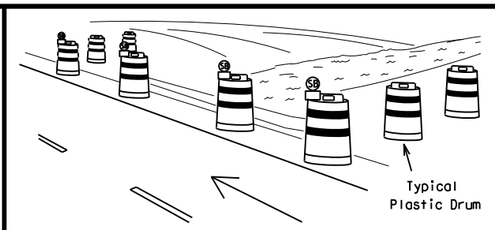
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

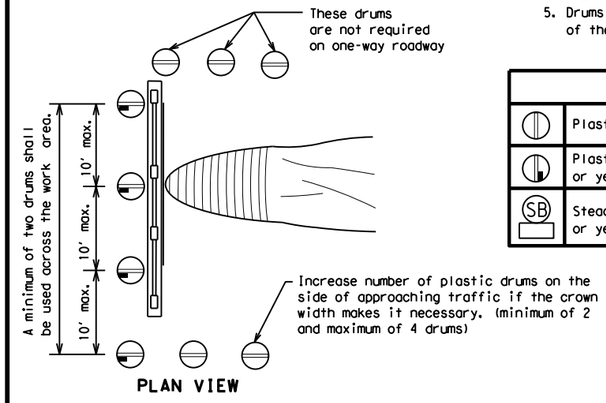
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

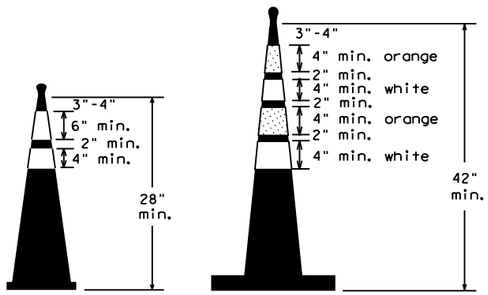
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



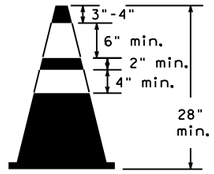
LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

PLAN VIEW

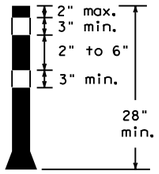
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

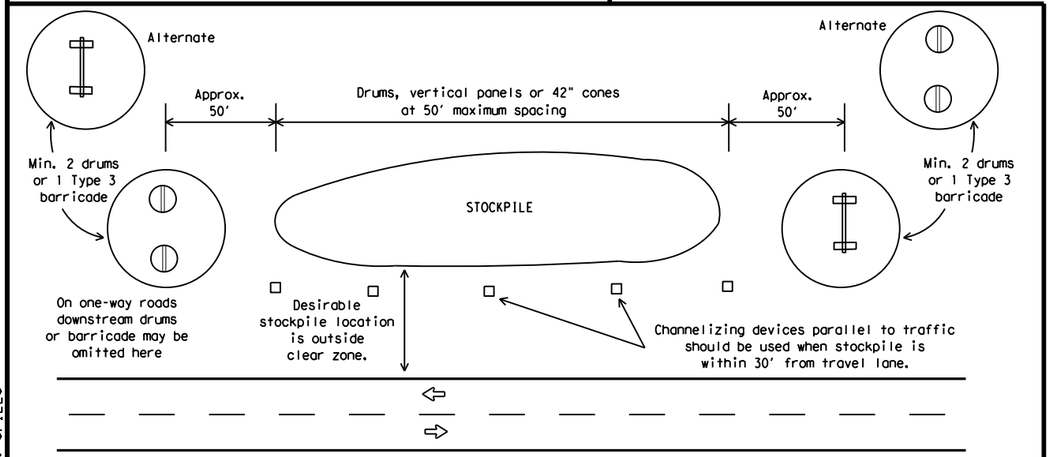


Tubular Marker

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

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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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.

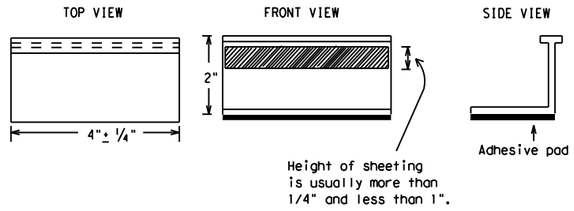
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

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11-02 8-14				

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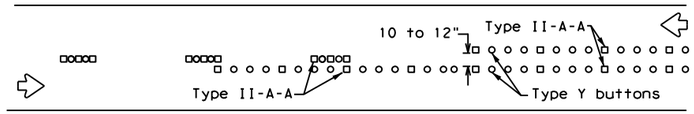
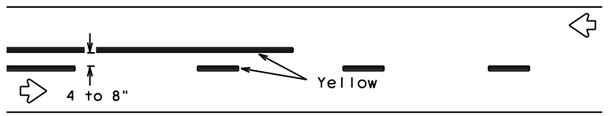
PAVEMENT MARKING PATTERNS

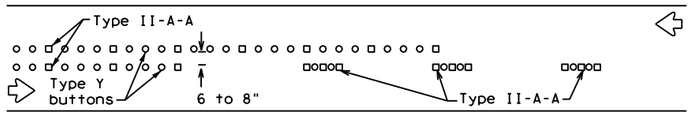
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



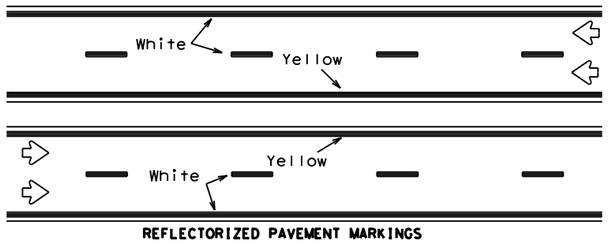
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



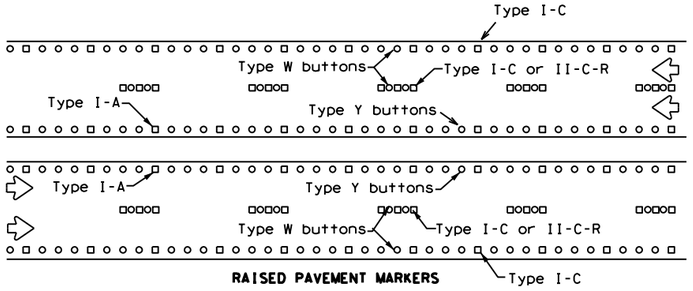
RAISED PAVEMENT MARKERS - PATTERN B

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



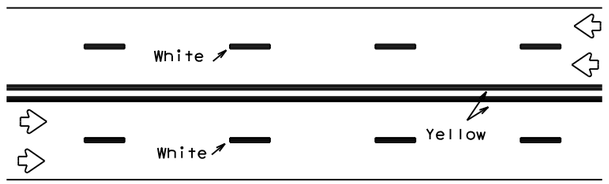
REFLECTORIZED PAVEMENT MARKINGS



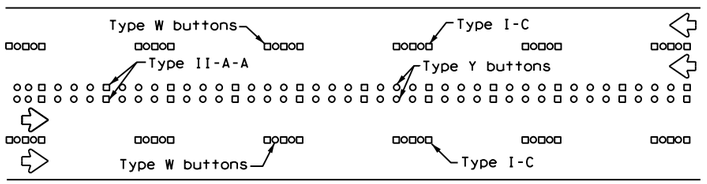
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



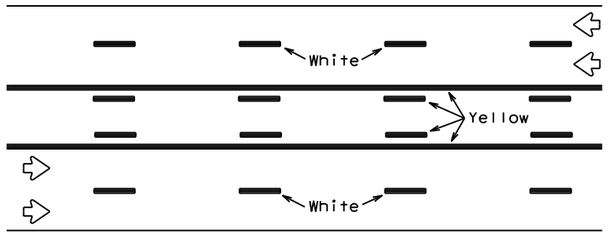
REFLECTORIZED PAVEMENT MARKINGS



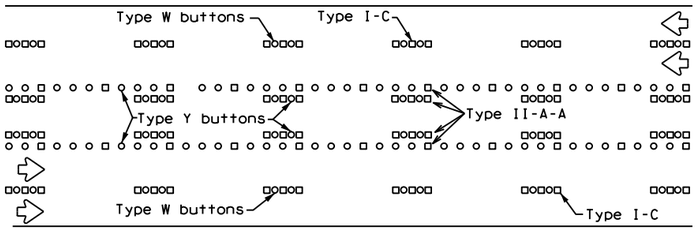
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

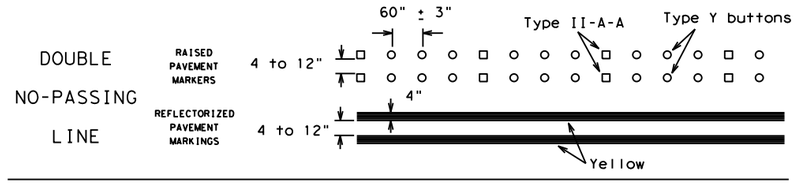
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

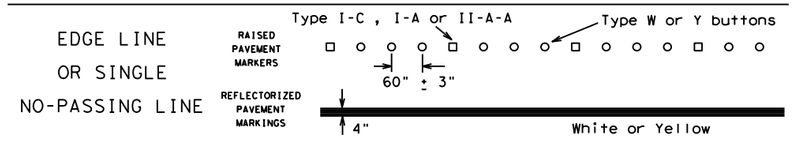
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

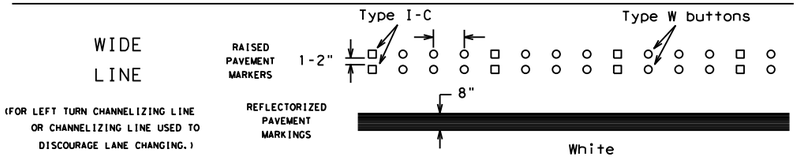


EDGE LINE OR SINGLE NO-PASSING LINE



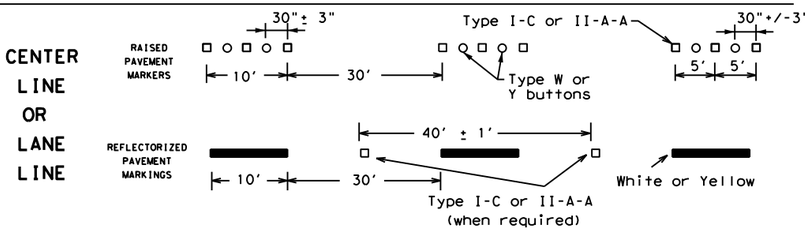
WIDE LINE

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

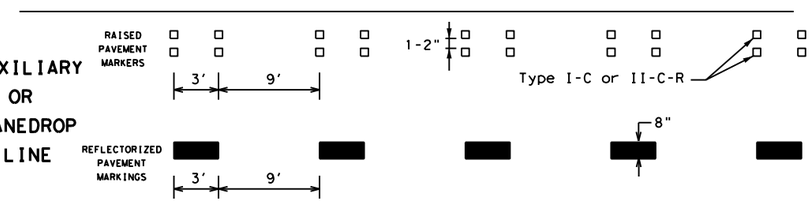


BROKEN LINES

CENTER LINE OR LANE LINE

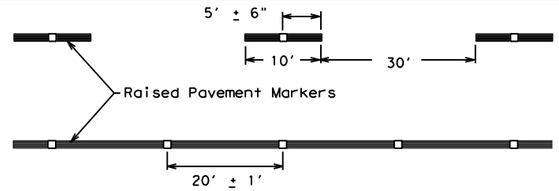


AUXILIARY OR LANEDROP LINE



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 2-98 7-13 11-02 8-14	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		59

106

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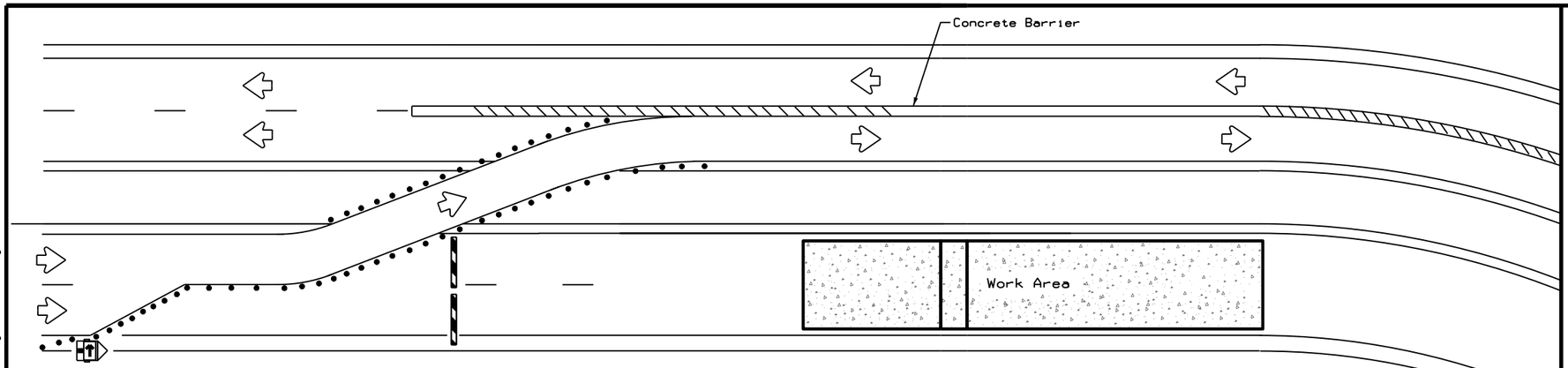


NOTES:

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

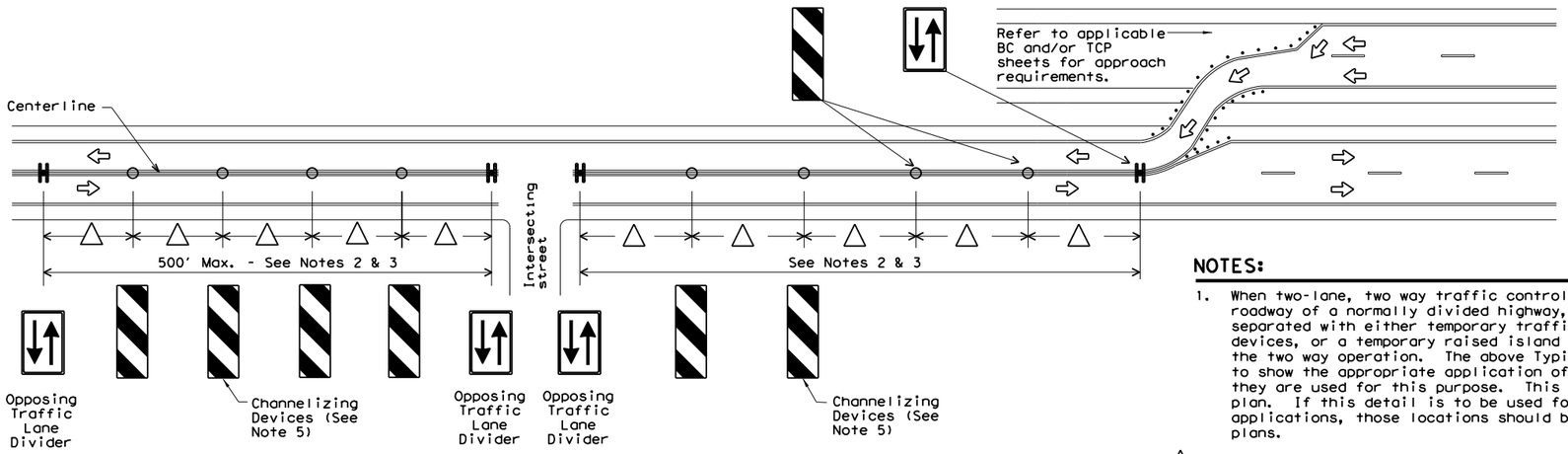
BARRIER DELINEATION WITH MODULAR GLARE SCREENS

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

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

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

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



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

NOTES:

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN TYPICAL DETAILS

WZ(TD)-17

FILE: wztd-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		6

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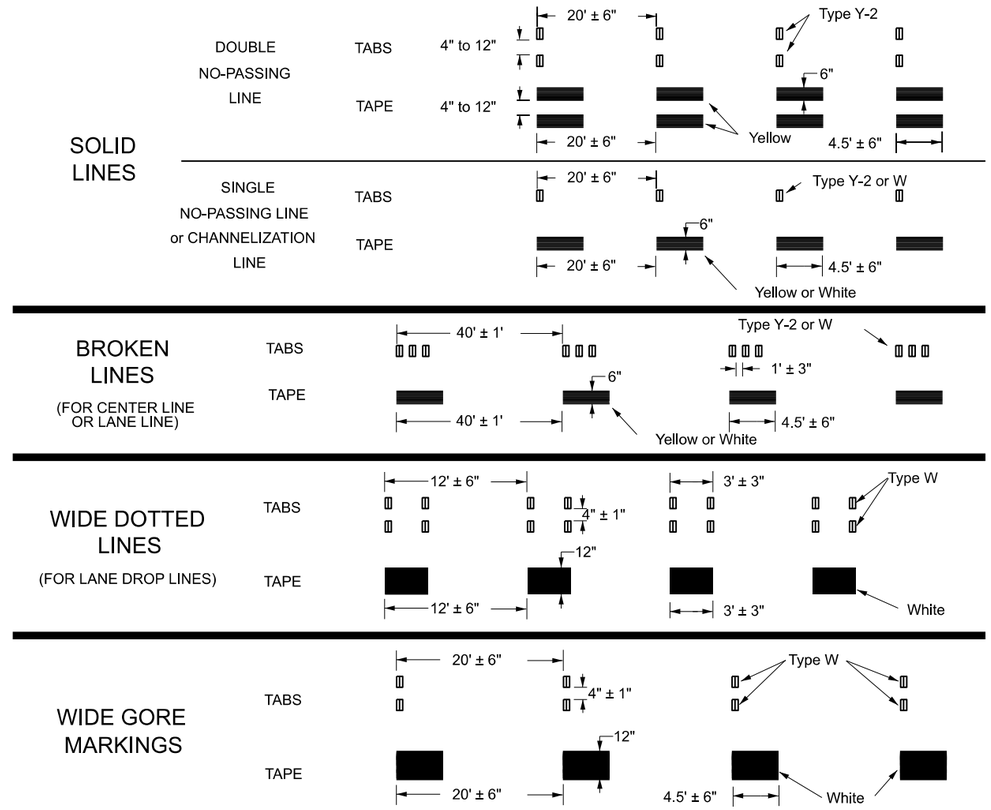
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



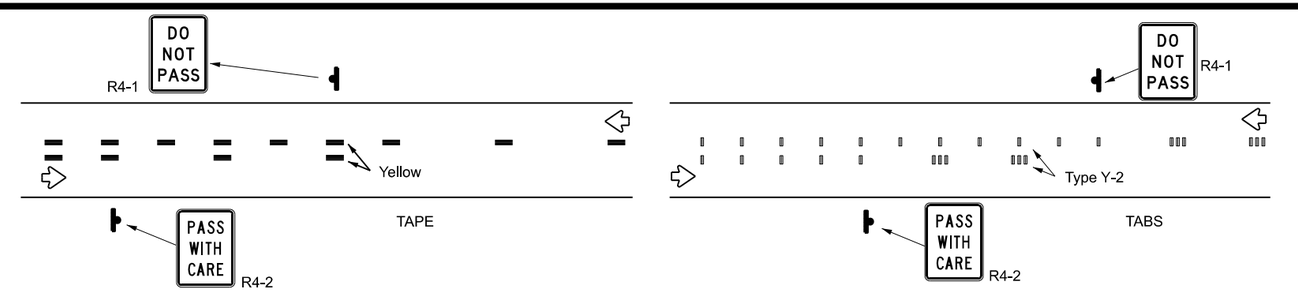
NOTES:

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.

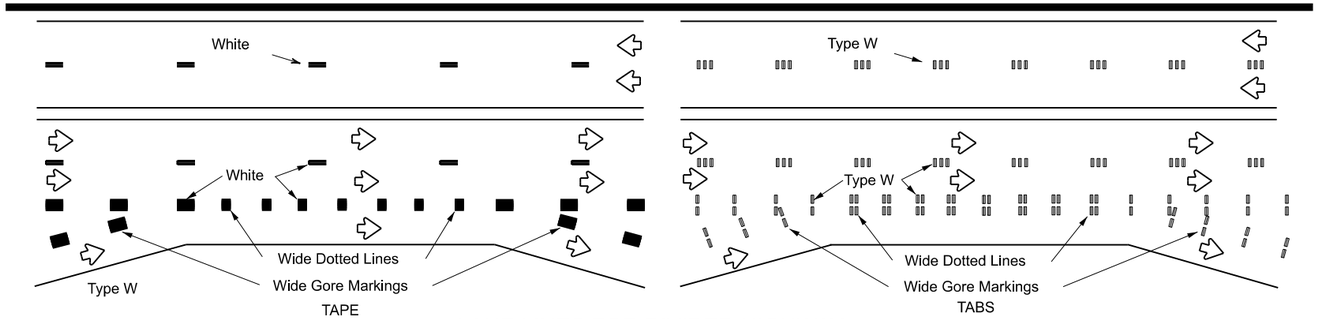
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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.

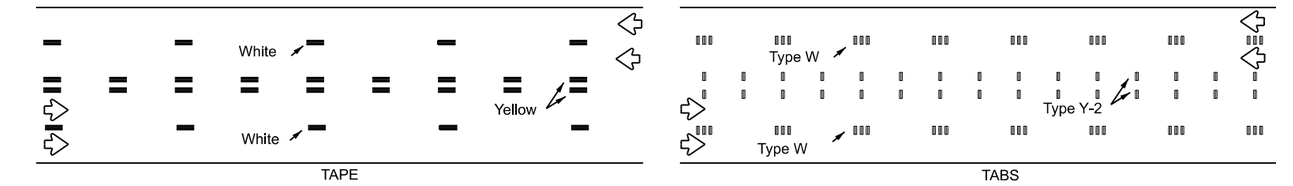
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



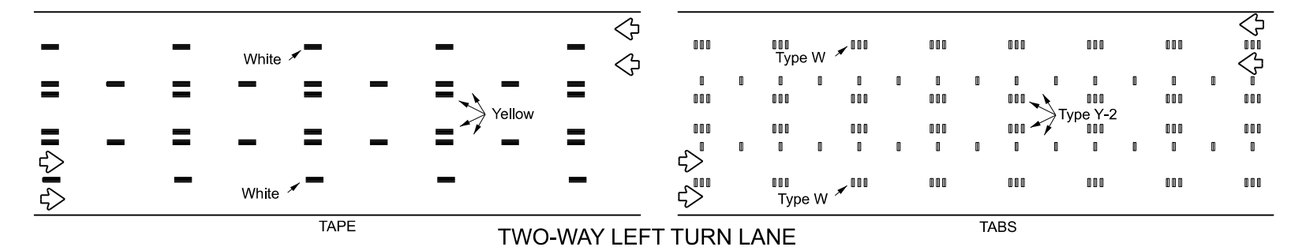
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



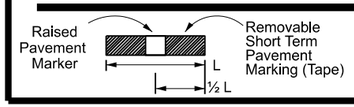
LANE LINES FOR DIVIDED HIGHWAY



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	1599	03	017	FM 2258
4-92 7-13 1-97 2-23 3-03	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		61

111

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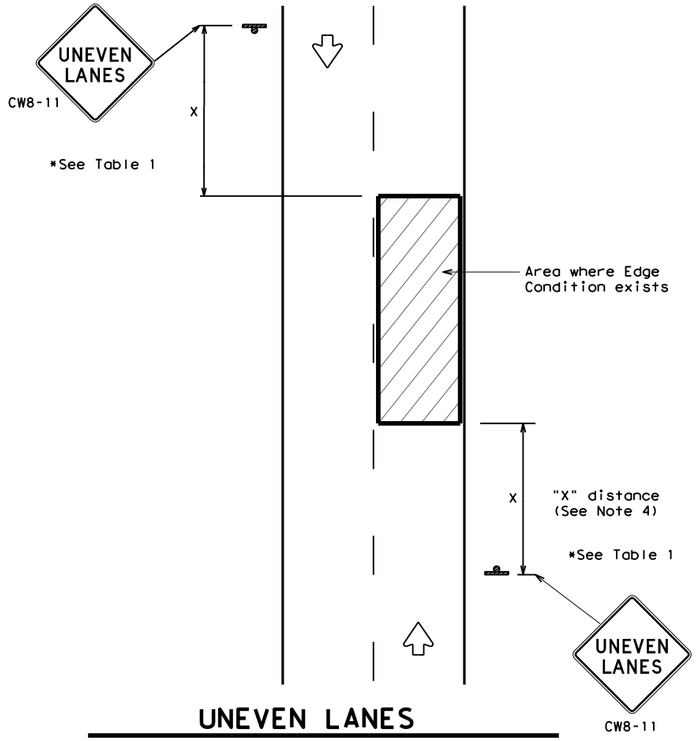
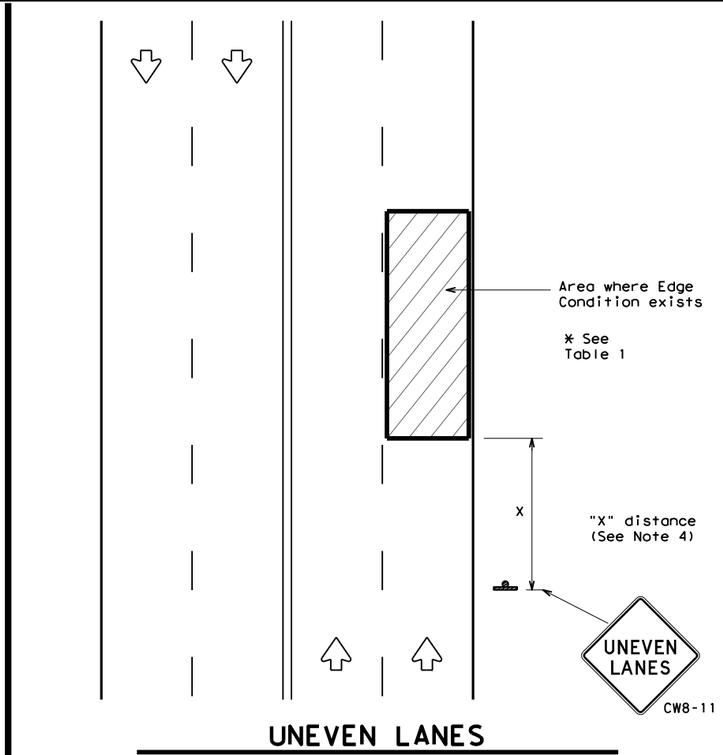
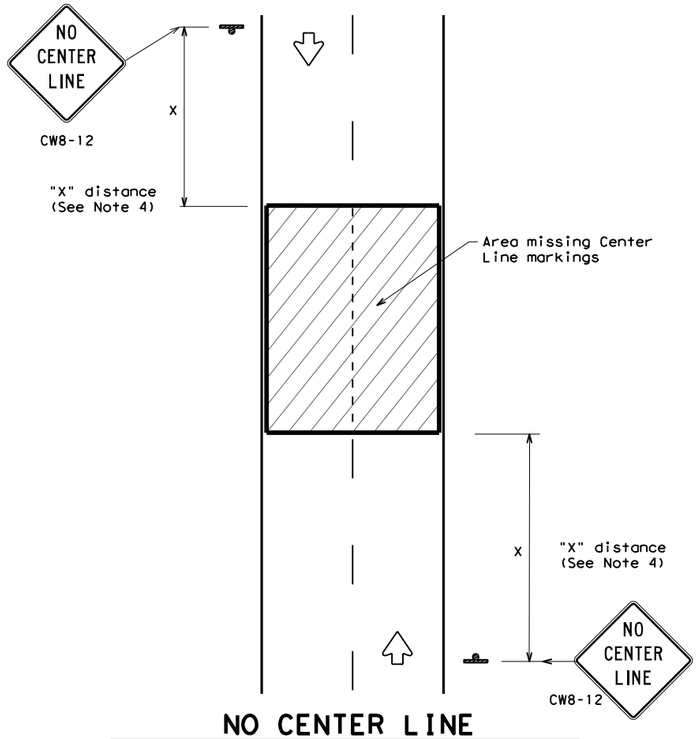


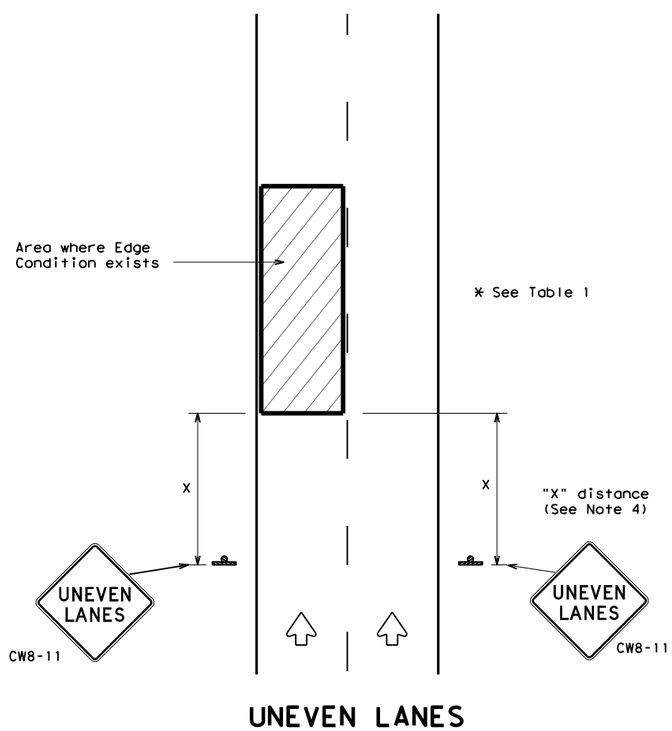
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

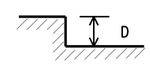
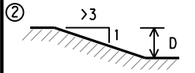
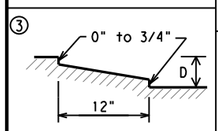
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

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

TABLE 1

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

WZ(UL)-13

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
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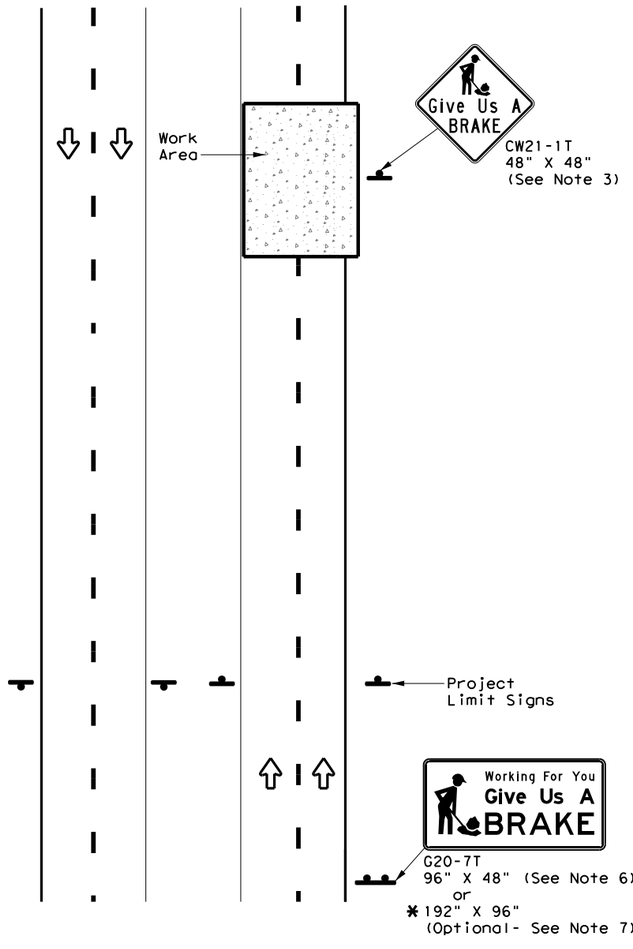
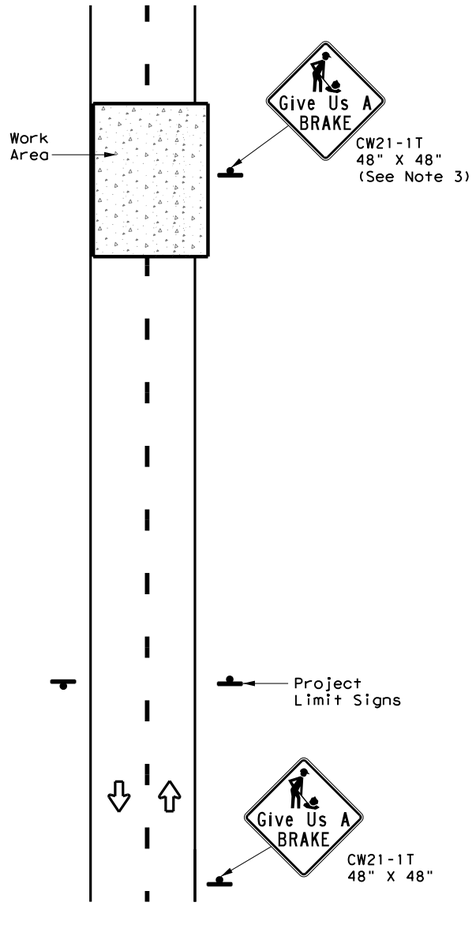
8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03	FTW	JOHNSON		62



DIVIDED HIGHWAY



UNDIVIDED HIGHWAY

SIGNS ARE SHOWN FOR ONE DIRECTION OF TRAVEL

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

SUMMARY OF LARGE SIGNS

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

▲ See Note 6 Below

LEGEND	
	Sign
	Large Sign
	Traffic Flow

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE "GIVE US A BRAKE" SIGNS

WZ(BRK)-13

FILE: wzbrk-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
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6-96 5-98 7-13	DIST	COUNTY		SHEET NO.
8-96 3-03	FTW	JOHNSON		63

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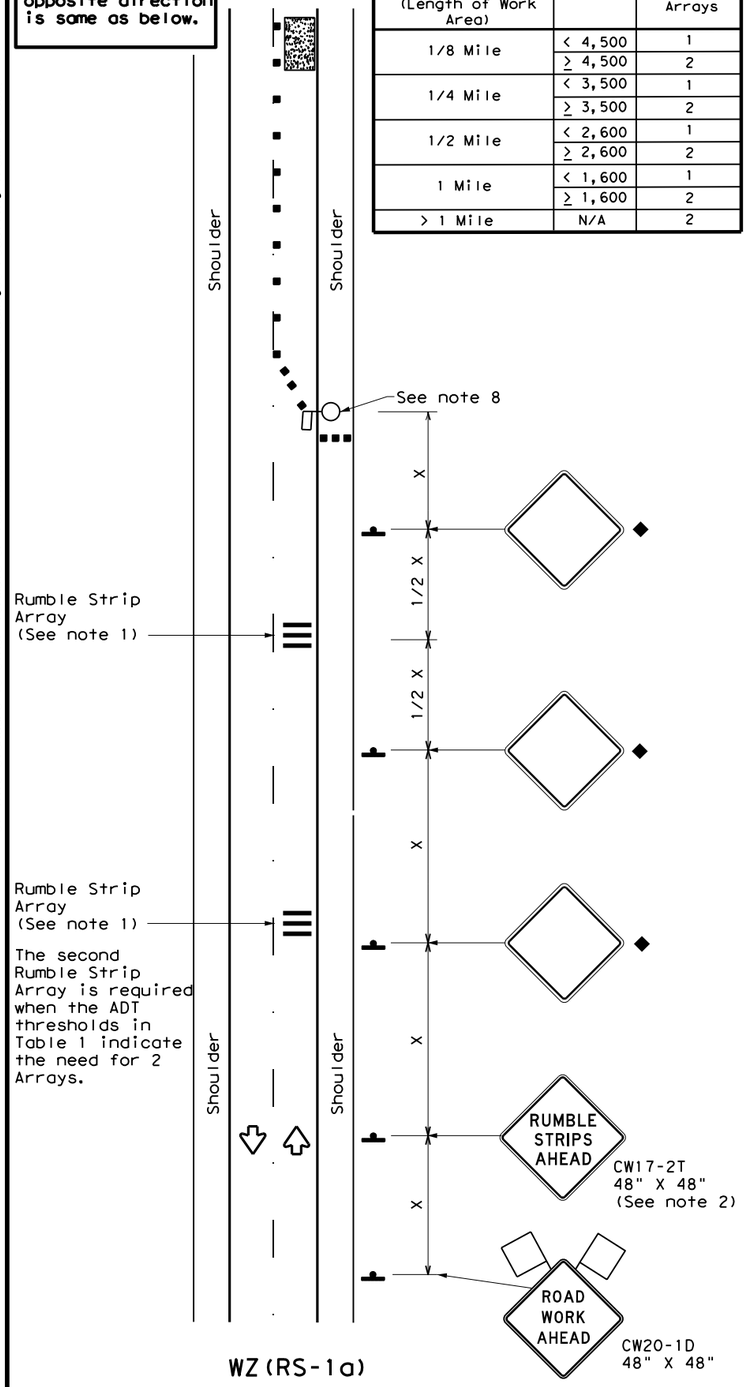
Warning sign and rumble strip sequence in opposite direction is same as below.

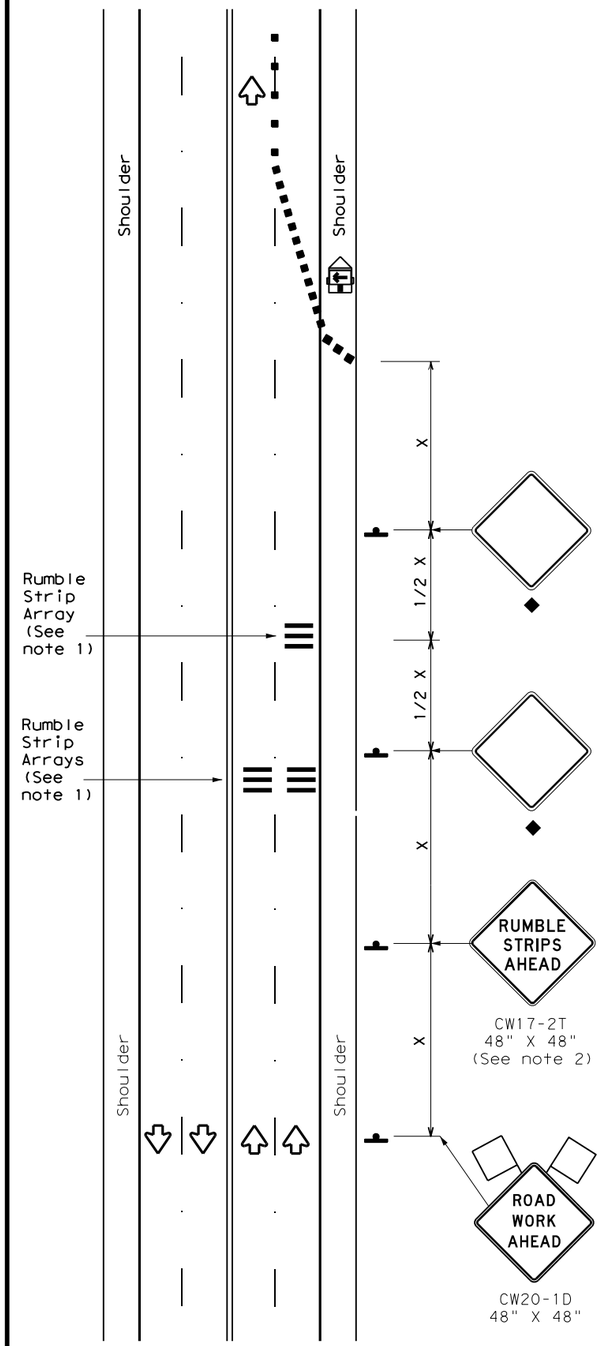


WZ(RS-1a)

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION

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-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
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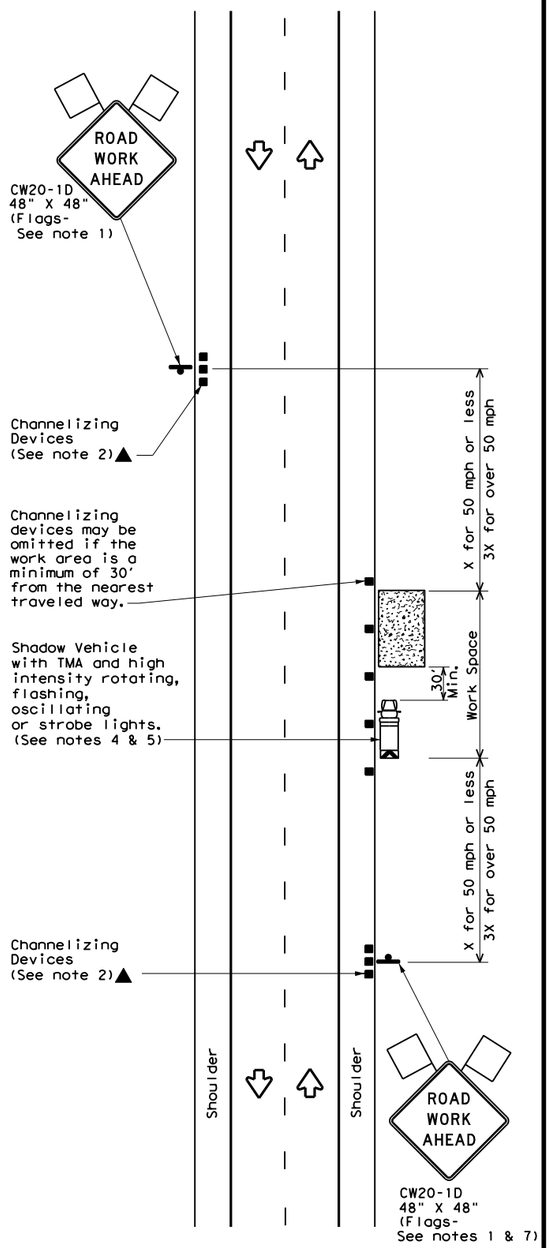
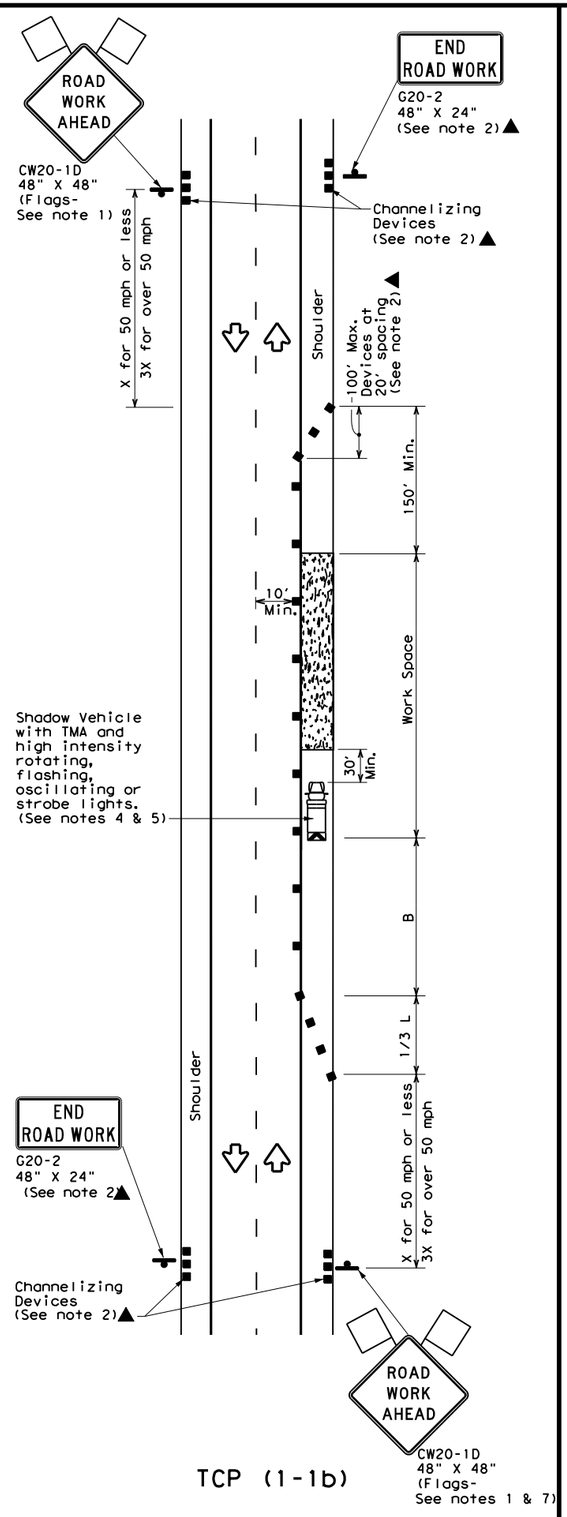
REVISIONS 2-14 1-22 4-16	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		64



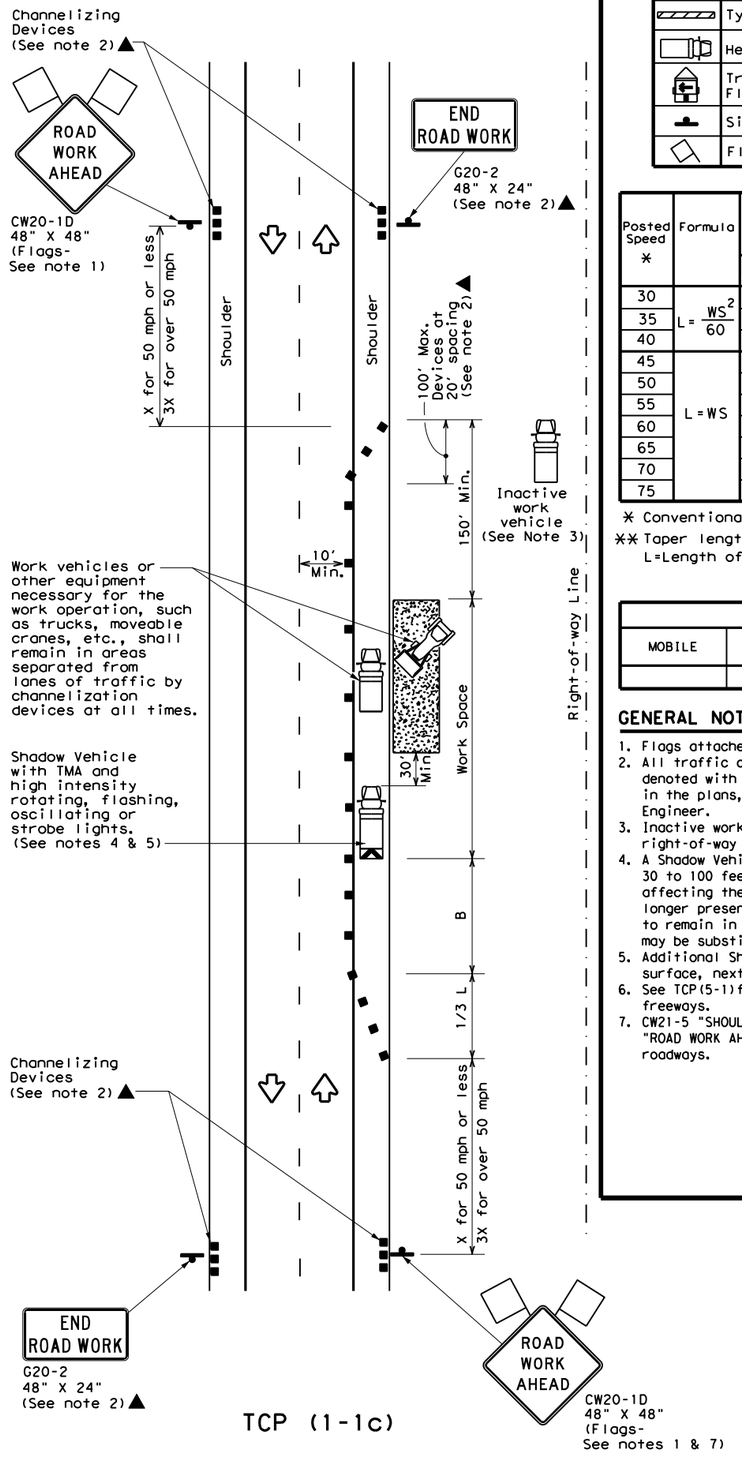
TCP (1-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (1-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (1-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
4. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
6. See TCP(5-1)for shoulder work on divided highways, expressways and freeways.
7. 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(1-1)-18

FILE: tcp1-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98	1599	03	017	FM 2258
8-95 2-12	DIST	COUNTY		SHEET NO.
1-97 2-18	FTW	JOHNSON		65

151

DATE: 2/7/2024 4:54:58 AM
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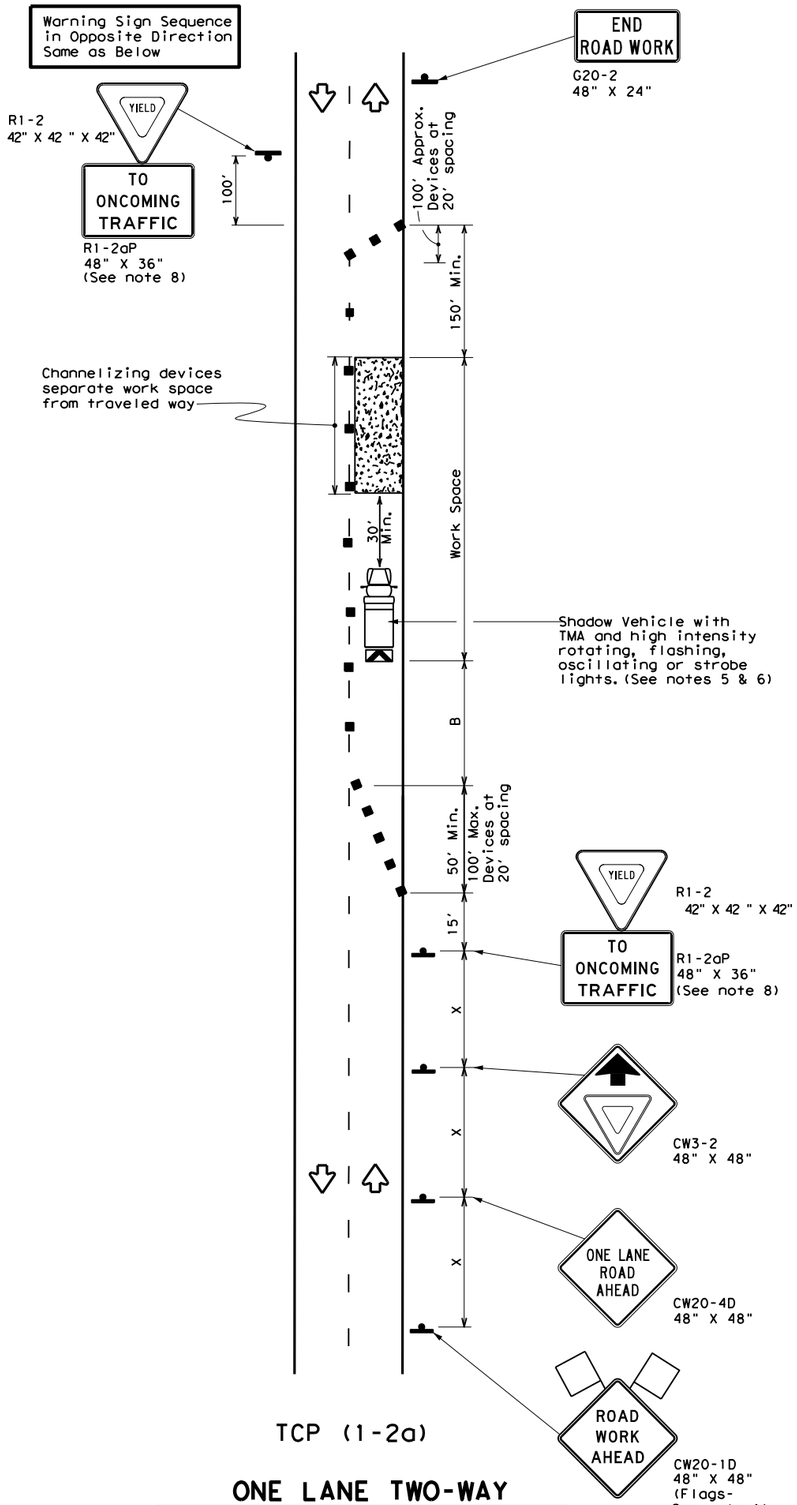
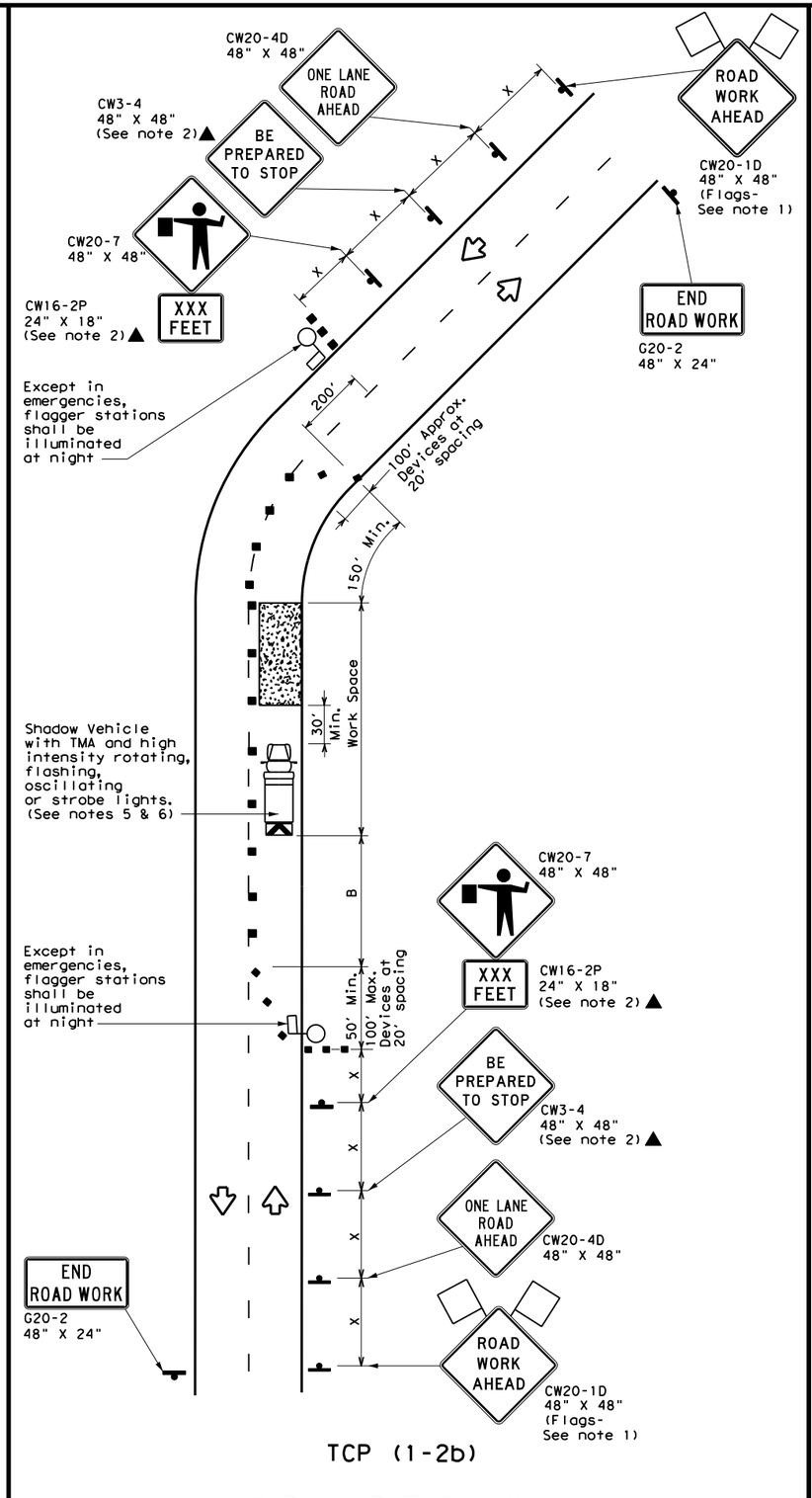
DATE: 2/7/2024 4:54:58 AM
FILE: $FILE$



TCP (1-2a)

ONE LANE TWO-WAY CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See note 7)



TCP (1-2b)

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 CW20-4D "ONE LANE ROAD AHEAD" sign, but proper sign spacing shall be maintained.
4. Sign spacing may be increased or an additional CW20-1D "ROAD WORK AHEAD" sign may be used if advance warning ahead of the flagger or R1-2 "YIELD" sign is less than 1500 feet.
5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
6. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-2a)

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

TCP (1-2b)

9. Flaggers should use two-way radios or other methods of communication to control traffic.
10. Length of work space should be based on the ability of flaggers to communicate.
11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
12. Channelizing devices on the center-line may be omitted when a pilot car is leading traffic and approved by the Engineer.
13. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.

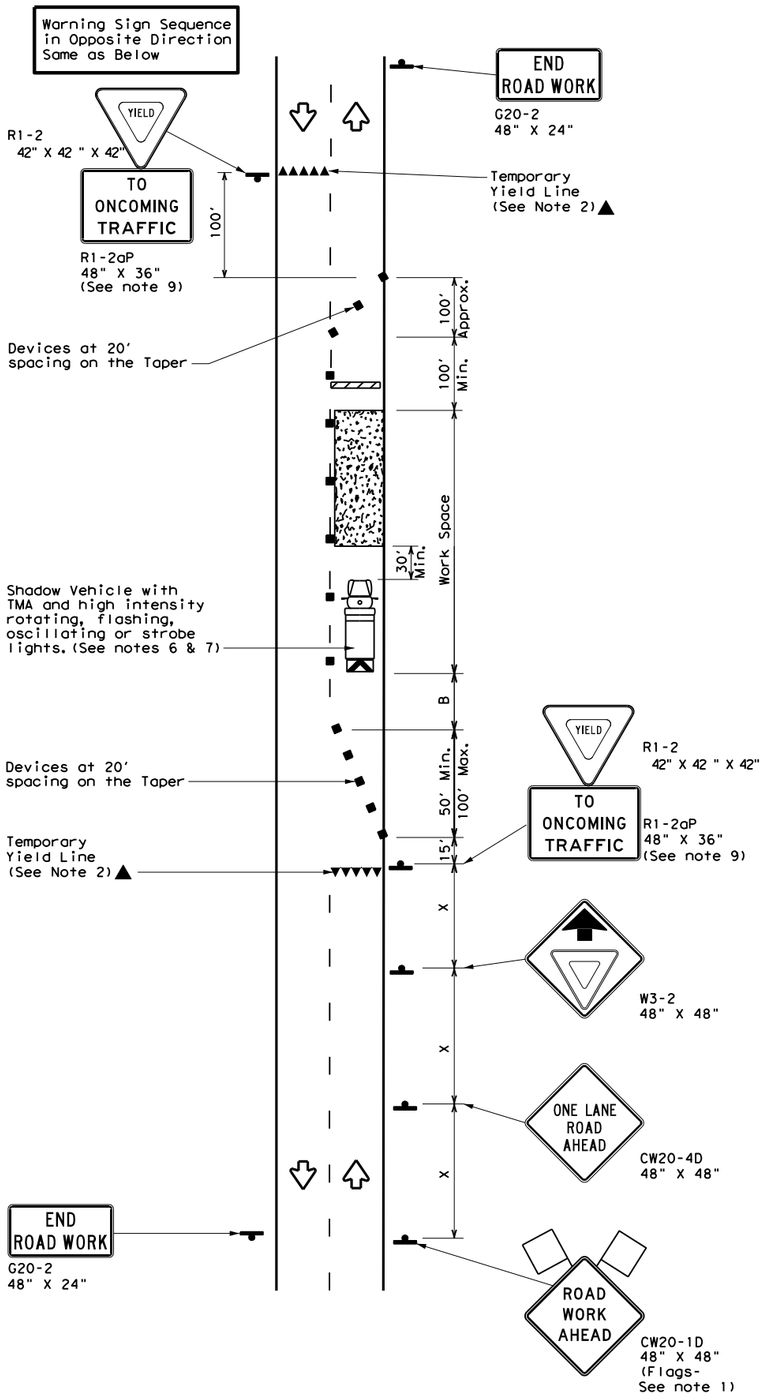
Texas Department of Transportation

Traffic Operations Division Standard

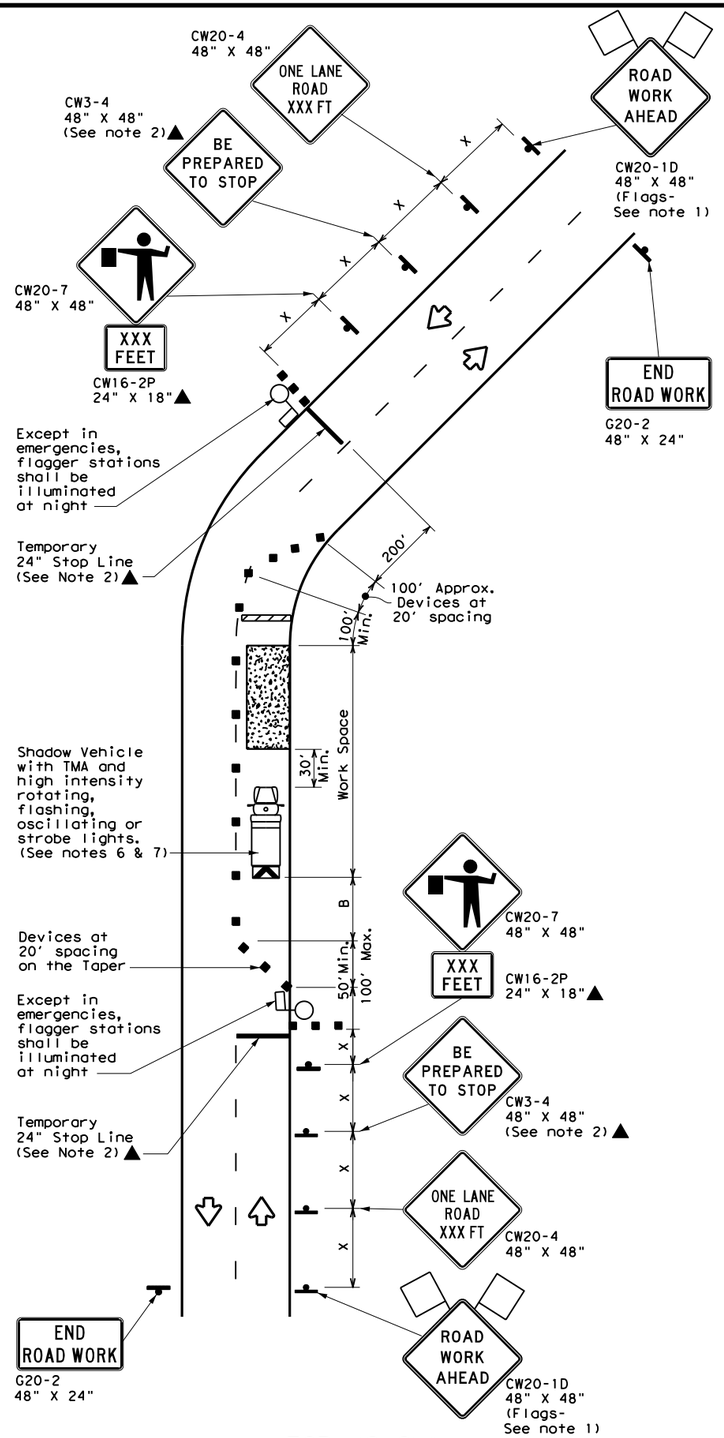
TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(1-2)-18

FILE: tcp1-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-90 4-98 2-94 2-12 1-97 2-18	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		66



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

DATE: 2/7/2024 4:54:59 AM
FILE: $FILE$

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:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03 1-97 2-12 4-98 2-18	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		67

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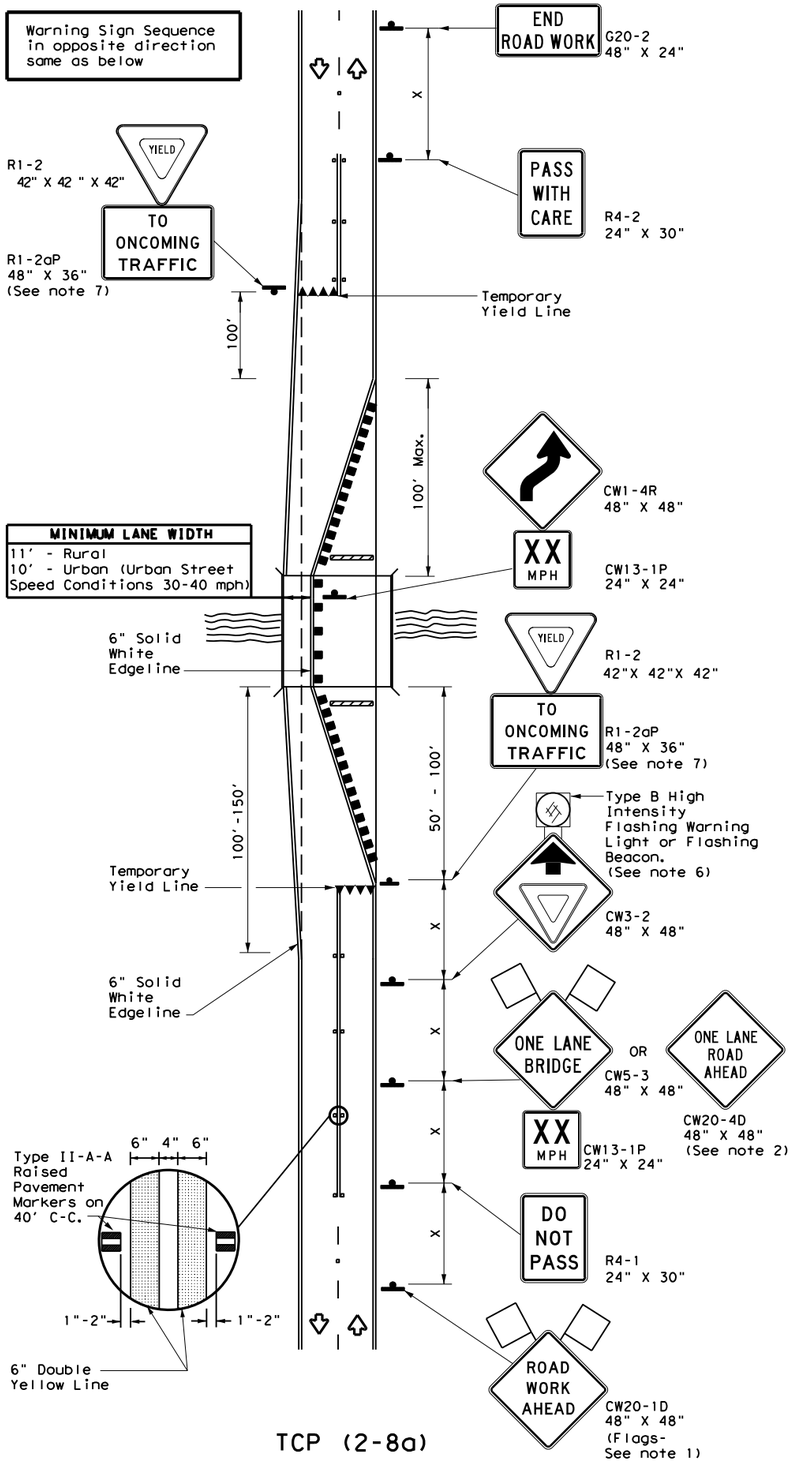
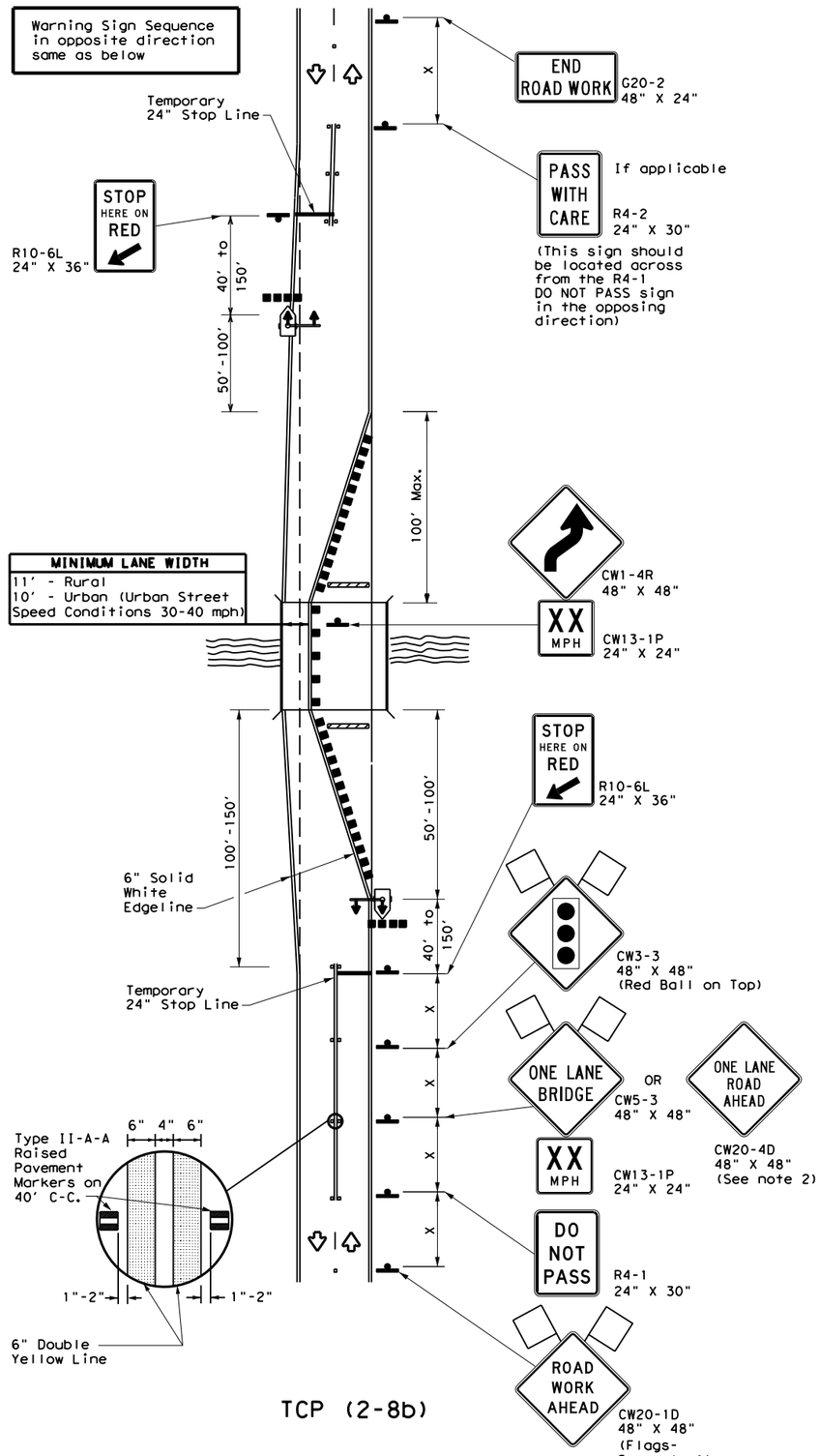


TCP (2-8a)

ONE LANE TWO-WAY
TRAFFIC CONTROL WITH YIELD SIGNS
(Less Than 2000 ADT-See Note 5)



TCP (2-8b)

ONE LANE TWO-WAY
TRAFFIC CONTROL WITH TRAFFIC SIGNAL

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Sign		Traffic Flow
	Flag		Flagger
	Raised Pavement Markers Ty II-AA		Temporary or Portable Traffic Signal

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. When this TCP is used at a location which does not involve a bridge, a 48" x 48" CW20-4D "ONE LANE ROAD AHEAD" signs should be used in lieu of the CW5-3 "ONE LANE BRIDGE" signs. The CW13-1P Advisory Speed Plaque is required with either warning sign.
3. Raised pavement markers shall be placed 40 feet c-c on centerline between DO NOT PASS signs and stop or yield lines.
4. For intermediate term situations, when it is not feasible to remove and restore pavement markings, the channelization must be made dominant by using a very close spacing. This is especially important in locations of conflicting information, such as where traffic is directed over a double yellow centerline. In such locations a maximum channelizing device spacing of 20 feet is recommended. The 20 foot channelizing device spacing recommendation is intended for the area of conflicting information and not the entire work zone.

TCP (2-8a)

5. Traffic control by CW3-2 "YIELD AHEAD" symbol signs for one lane two-way traffic control operations should be limited to work spaces less than 400 feet long and roadways with less than 2000 ADT. Otherwise, portable traffic signals should be used.
6. If power is available, a flashing beacon should be attached to the CW3-2 "YIELD AHEAD" symbol sign for emphasis.
7. The R1-2 "YIELD" and R1-2aP "TO ONCOMING TRAFFIC" signs and other regulatory signs shall be installed at 7 foot minimum mounting height.

TCP (2-8b)

8. A list of approved Portable Traffic Signals can be found in the "Compliant Work Zone Traffic Control Devices" list.
9. Portable traffic signals should be located to provide adequate stopping sight distance for approaching motorist (See table above).

Texas Department of Transportation | Traffic Safety Division Standard

TRAFFIC CONTROL PLAN LONG TERM ONE-LANE TWO-WAY CONTROL

TCP(2-8)-23

FILE: tcp2-8-23.dgn	DN:	CK:	DW:	CK:
© TxDOT April 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-85 4-98 2-18 8-95 3-03 4-23 1-97 2-12	1599	03	017	FM 2258
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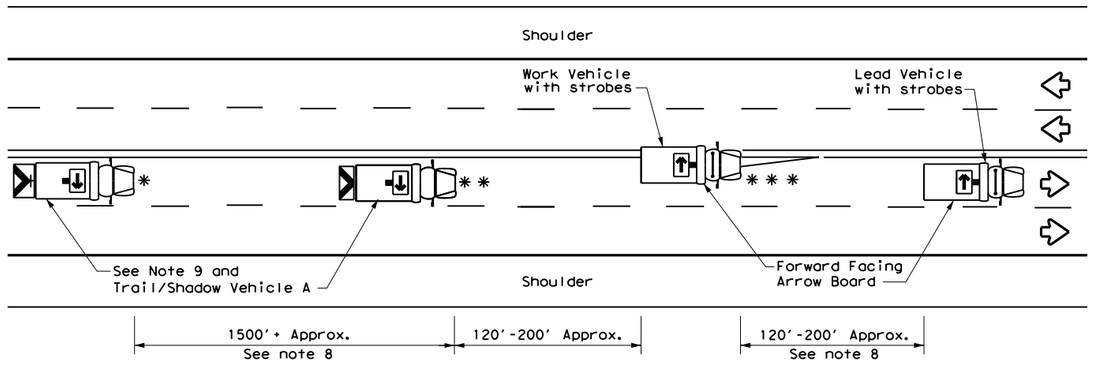
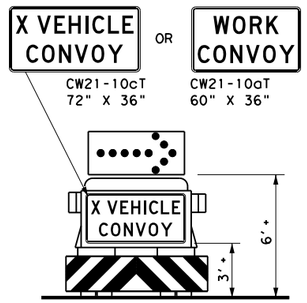
	FTW	JOHNSON		68



TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

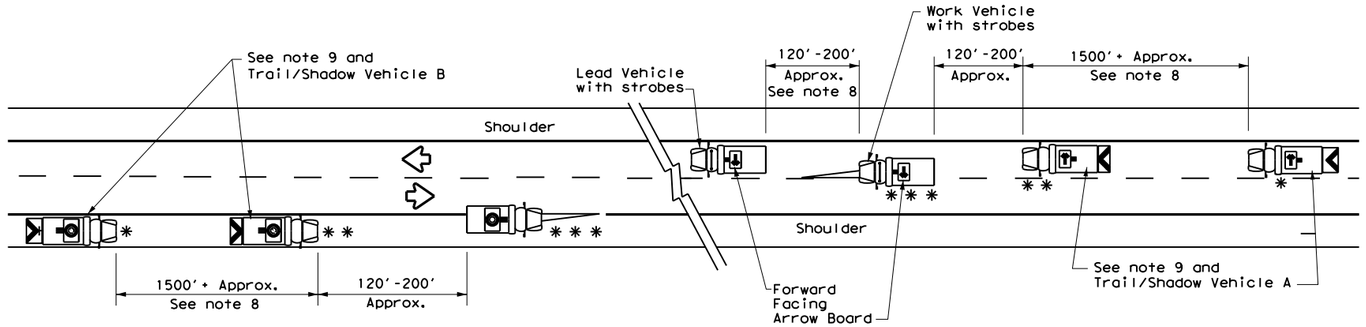
with RIGHT Directional display Flashing Arrow Board

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

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

GENERAL NOTES

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

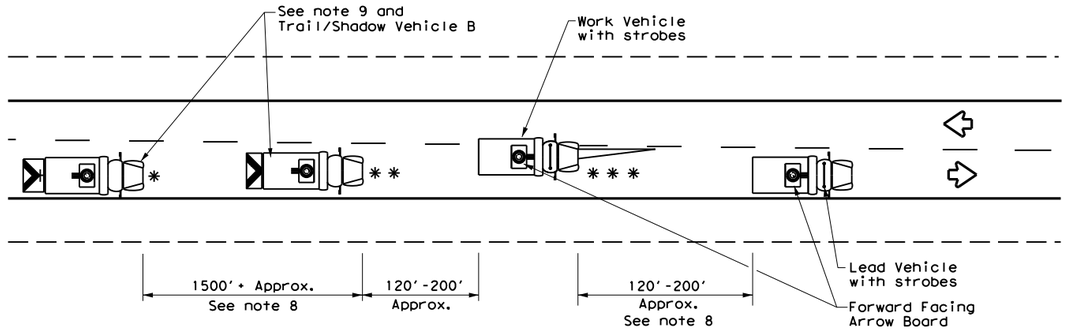


WORK ON SHOULDER

WORK ON TRAVEL LANE

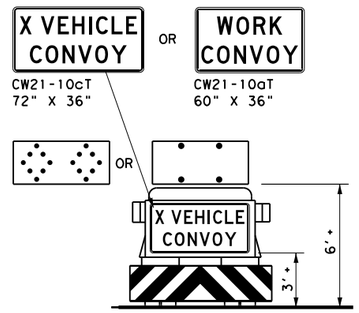
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



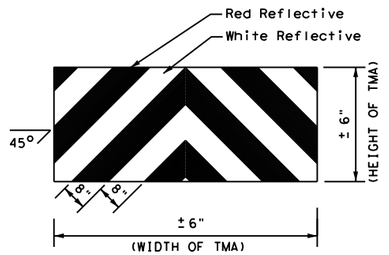
TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board in CAUTION display



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		69

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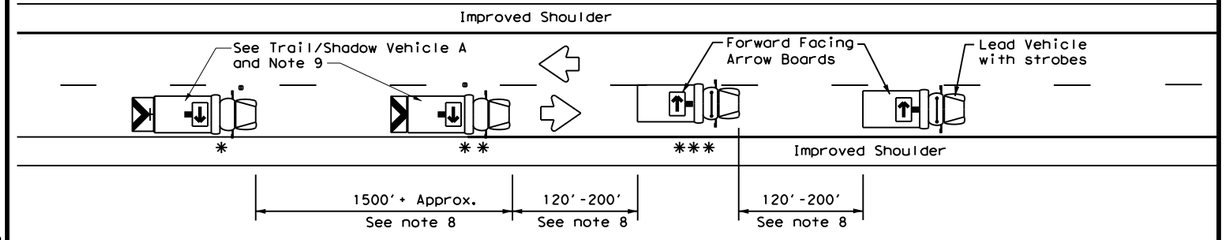
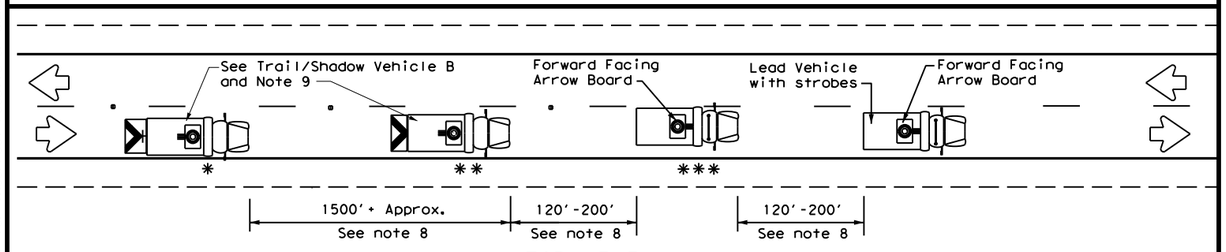


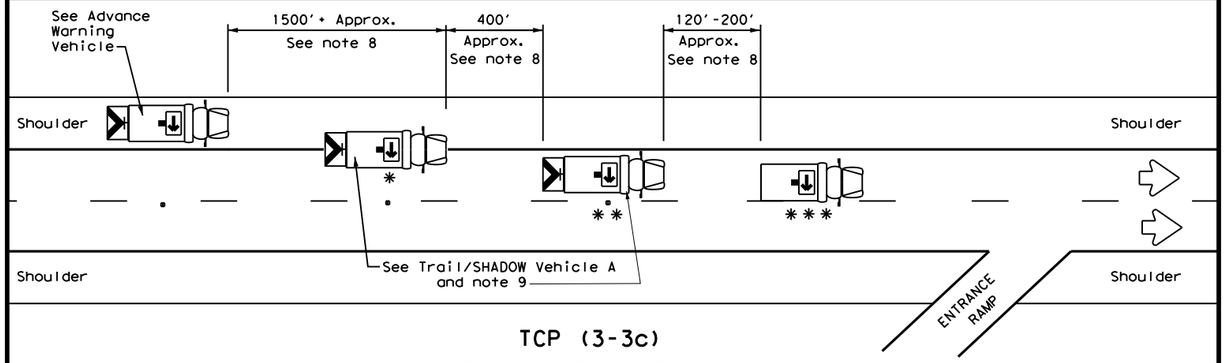
TCP (3-3a)

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



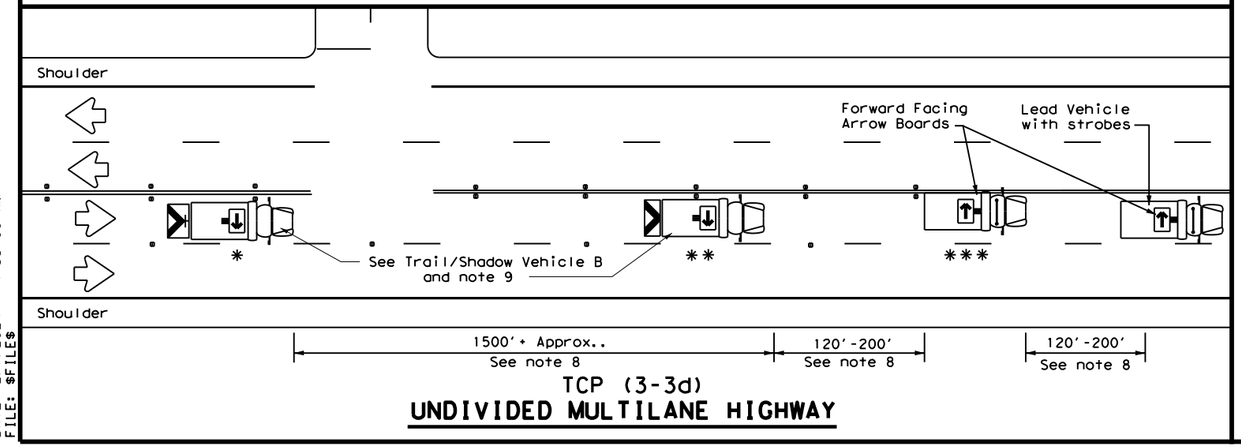
TCP (3-3b)

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



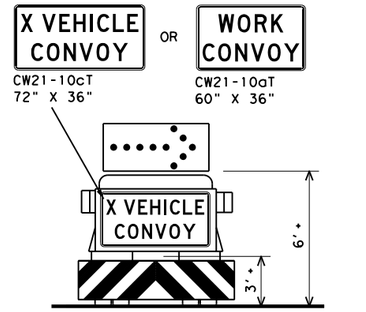
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



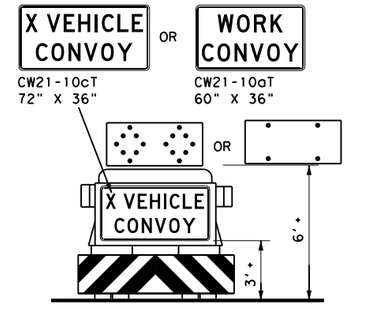
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



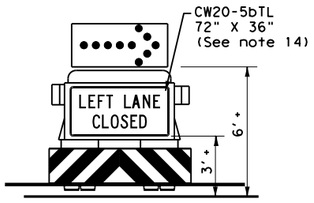
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

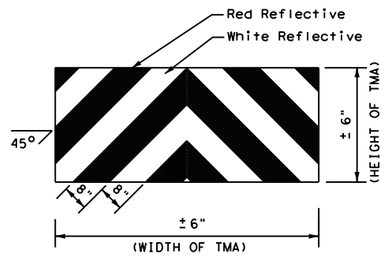


TRAIL/SHADOW VEHICLE B

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	FTW	JOHNSON		70
1-97 7-14				

177

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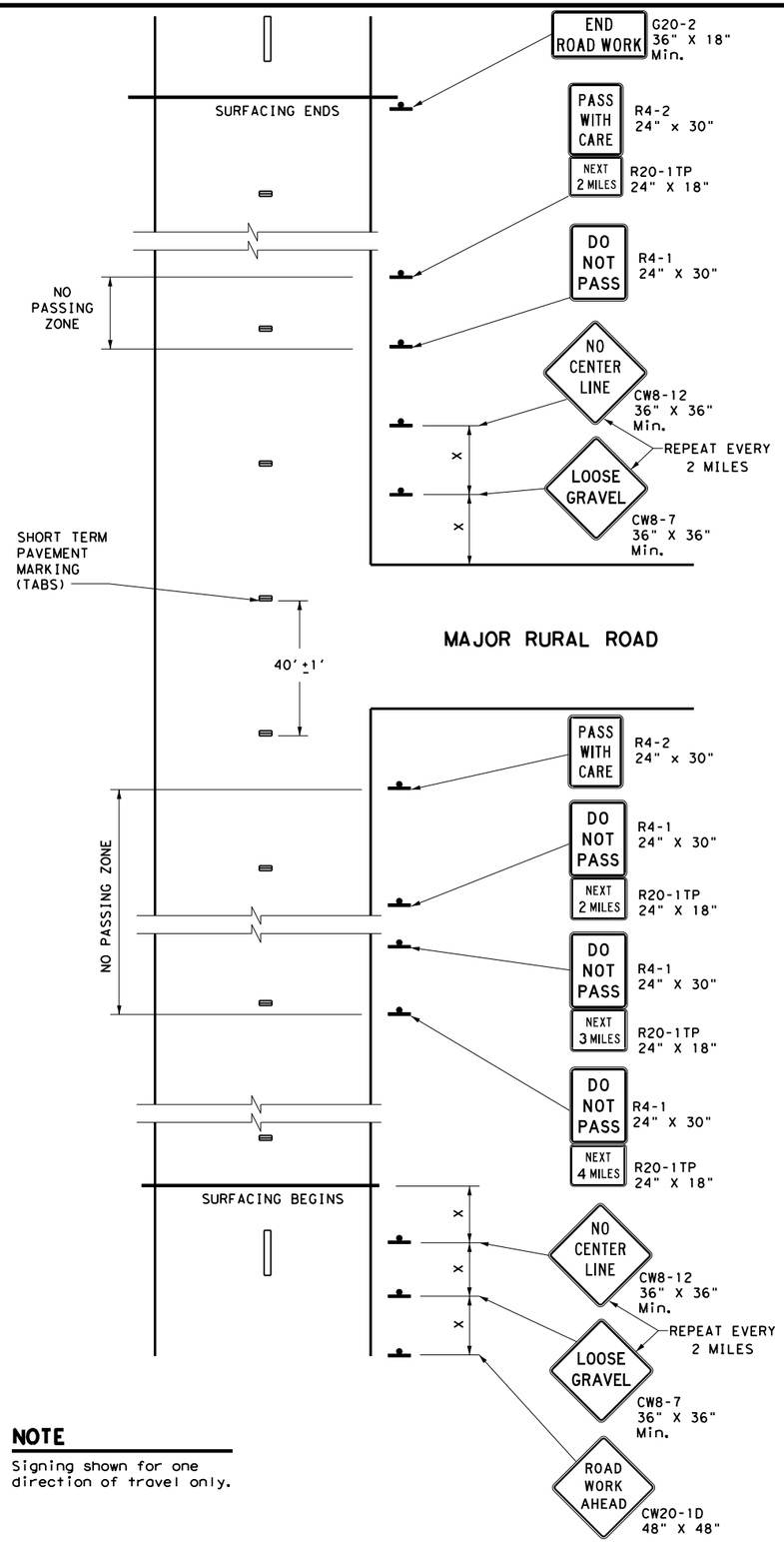
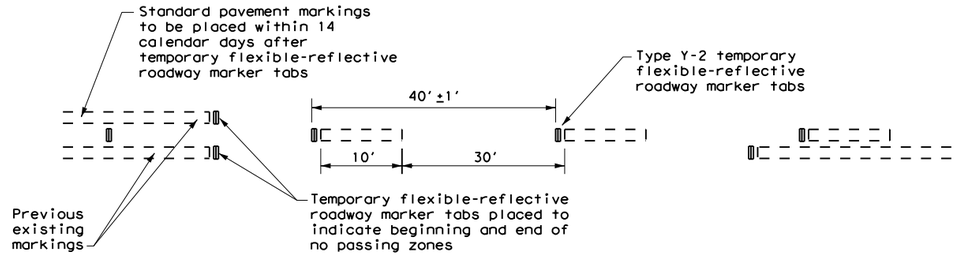


NOTE

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	SECT	JOB	HIGHWAY
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4-92 4-98	DIST	COUNTY		SHEET NO.
1-97 7-13	FTW	JOHNSON		71

210

DATE: 2/7/2024 4:55:00 AM
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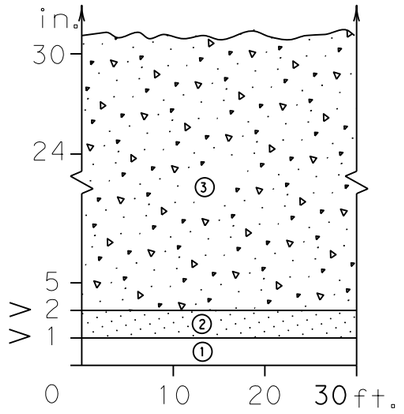
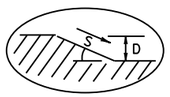
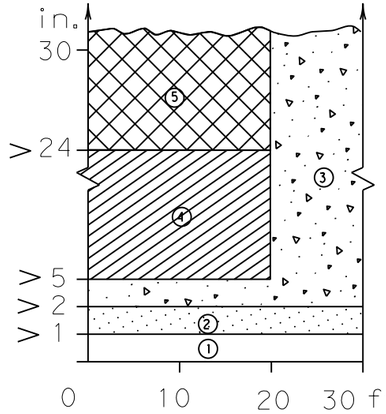
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

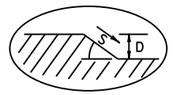


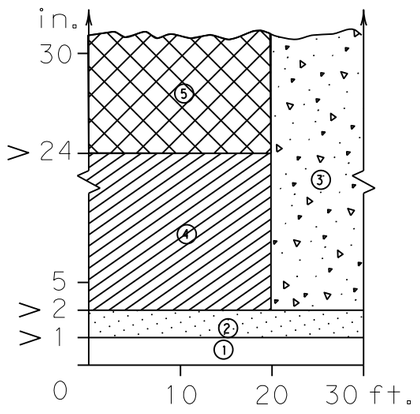
Edge Condition I
S = (3:1) (or flatter)



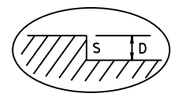


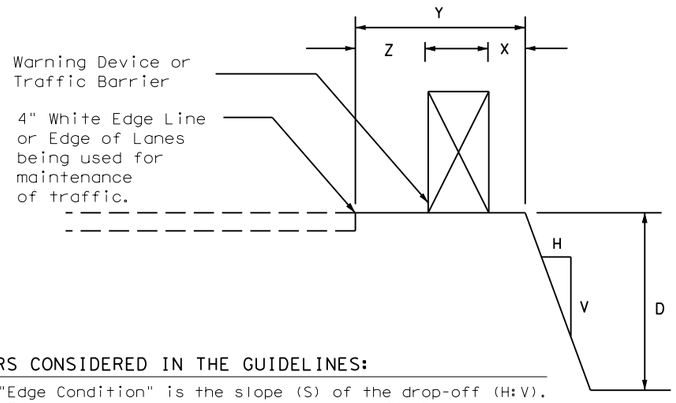
Edge Condition II
S = ((2.99):1) to (1:1)





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





FACTORS CONSIDERED IN THE GUIDELINES:

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

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

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

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

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

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

Edge Condition Notes:

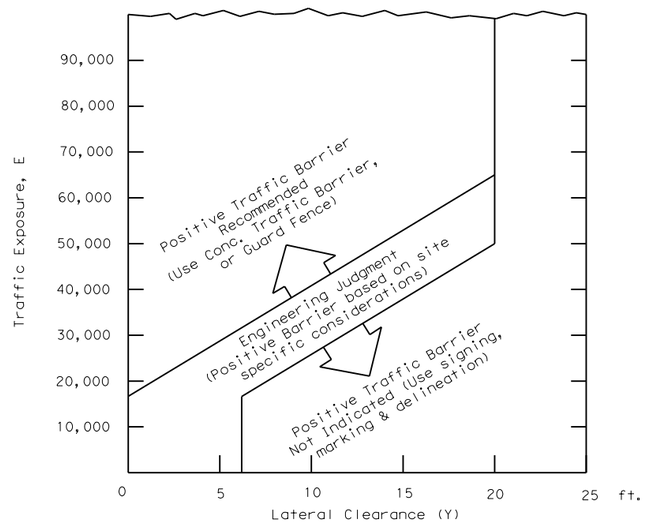
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

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

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

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

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



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

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

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

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

Engineer's Seal

STATE OF TEXAS
JOHN HERNANDEZ
91831
LICENSED
PROFESSIONAL ENGINEER

John Hernandez, P.E.
2/7/2024

Texas Department of Transportation

Traffic Safety Division Standard

TREATMENT FOR VARIOUS EDGE CONDITIONS

FILE: edgecon.dgn	DN:	CK:	DW:	CK:
©TxDOT August 2000	CONT	SECT	JOB	HIGHWAY
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	FTW	JOHNSON		72

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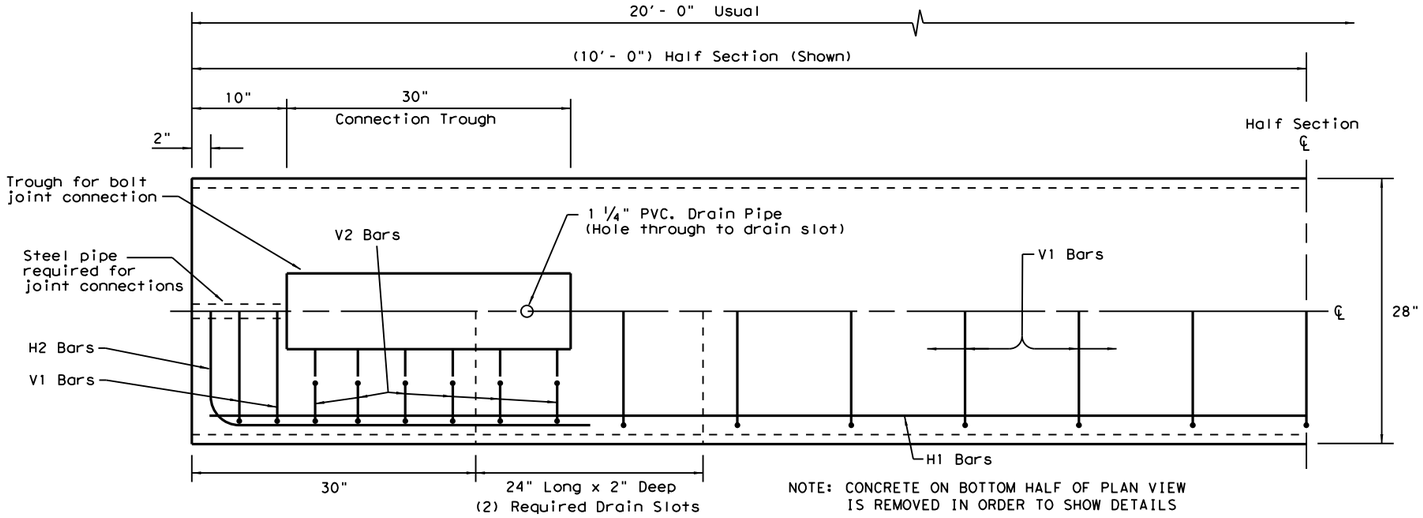
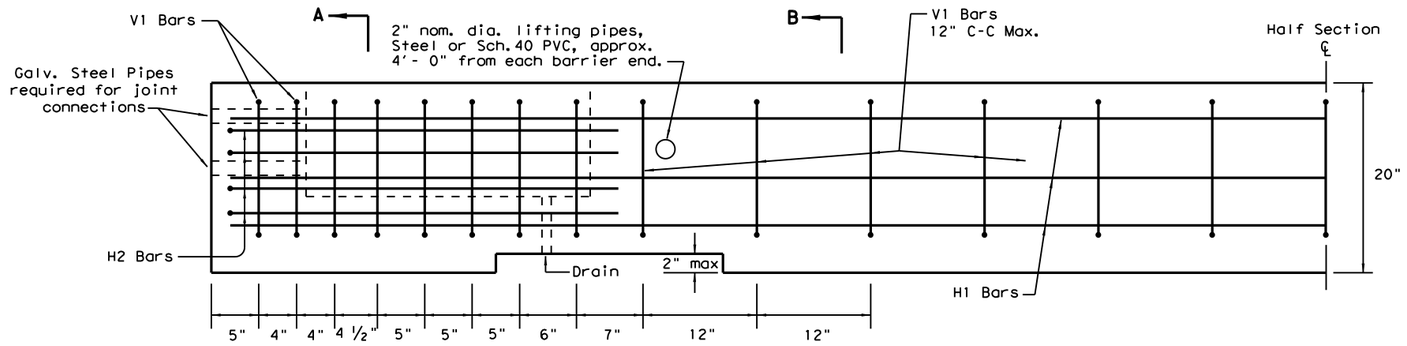
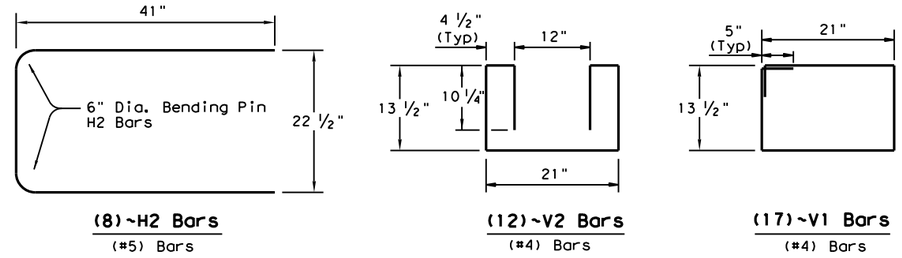


PLAN
(TYPE 1) BARRIER SEGMENT
(SYMMETRICAL ABOUT CENTER LINES)



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



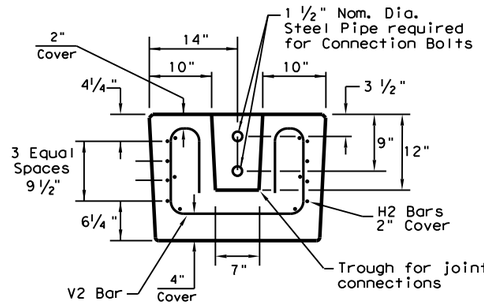
(8)~H2 Bars (#5) Bars

(12)~V2 Bars (#4) Bars

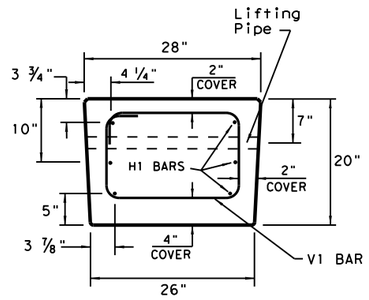
(17)~V1 Bars (#4) Bars

REINFORCING STEEL DETAILS
TYPE 1 - BARRIER SEGMENT

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



SECTION A-A



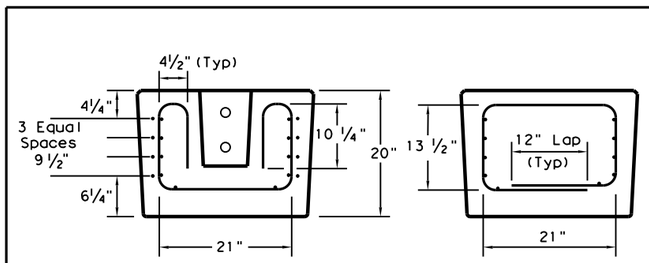
SECTION B-B

GENERAL NOTES

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

FOR CONTRACTORS INFORMATION ONLY

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



SECTION A-A SECTION B-B

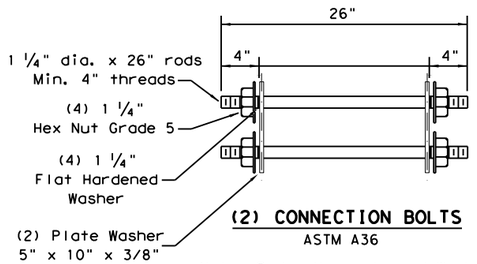
(WWR) GENERAL NOTES

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

REQUIRED (WWR) WIRE DESIGN

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

WELDED WIRE REINFORCEMENT (WWR)- OPTIONAL REINFORCING



(2) CONNECTION BOLTS
ASTM A36

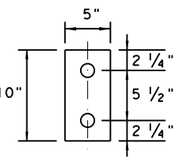


PLATE WASHER
5" x 10" x ⅜"

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

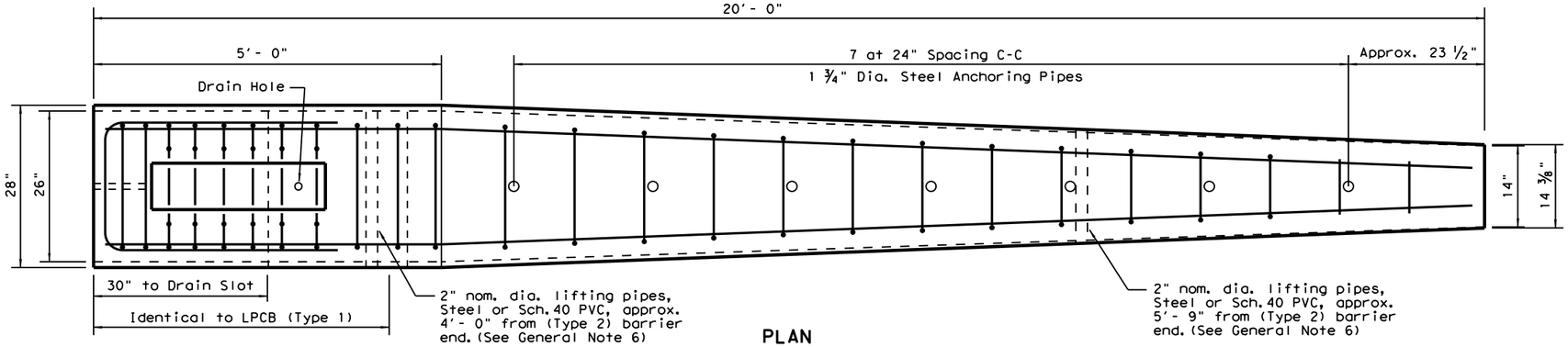
SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

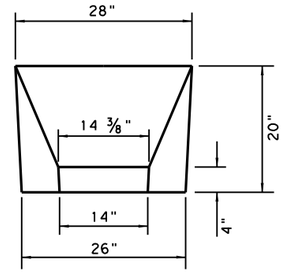
LOW PROFILE CONCRETE BARRIER
PRECAST BARRIER (TYPE 1)
LPCB-13

FILE: lpcb13.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		73

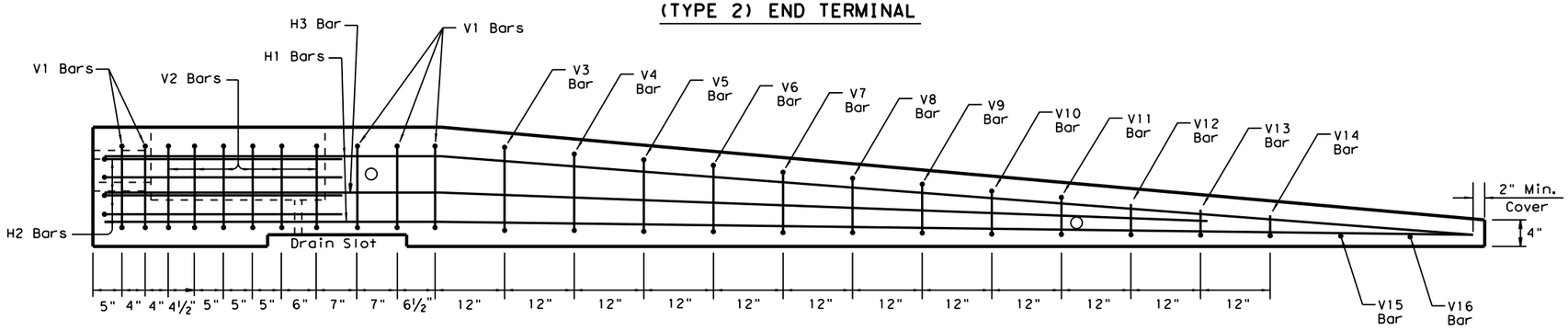
DATE: 2/7/2024
FILE: $FILE$



PLAN
(TYPE 2) END TERMINAL



APPROACH VIEW

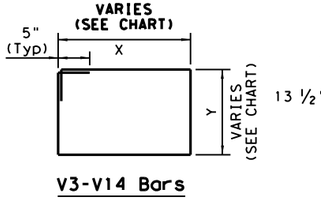


ELEVATION
(TYPE 2) END TERMINAL

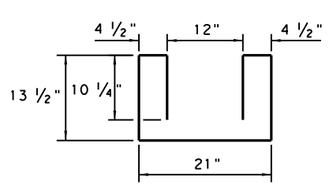
Note:
Anchoring pipes not shown in Elevation View

TYPE 2 - NOTES

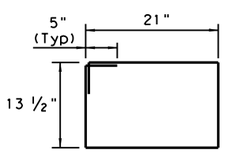
1. Welded wire reinforcment (WWR) is "not" an option for Type 2 Barrier.
2. Type 2 Barrier shall be used as an end treatment for the Type 1 barrier segments, when applicable.
3. The end treatment can be used without the anchor pins in locations that can accommodate approximately 4 ft. of lateral displacement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



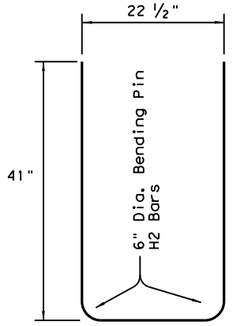
V3-V14 Bars



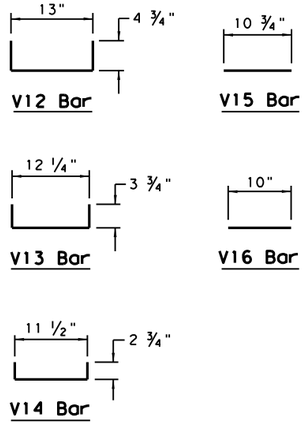
(6)~V2 Bars



(5)~V1 Bars



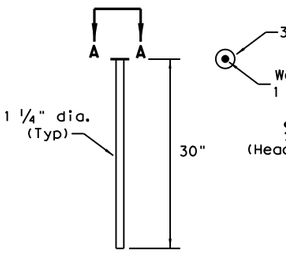
(4)~H2 Bars
(#5) Bars



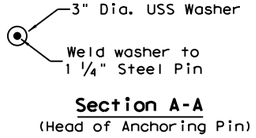
Note: All V Bars are (#4)

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

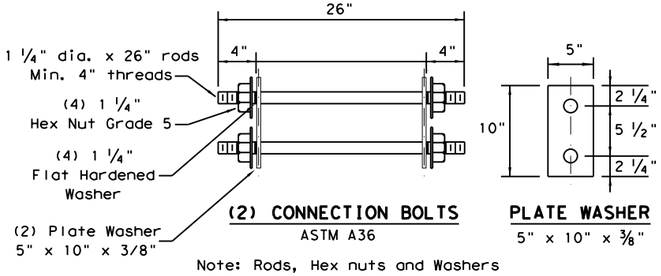
REINFORCING STEEL DETAILS
TYPE 2 - END TERMINAL



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



Section A-A
(Head of Anchoring Pin)

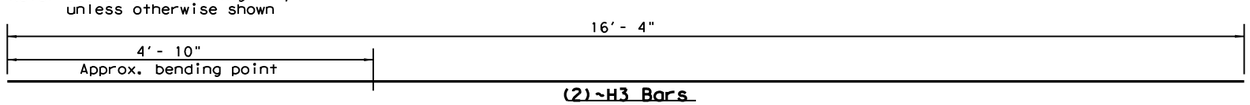


(2) CONNECTION BOLTS
ASTM A36

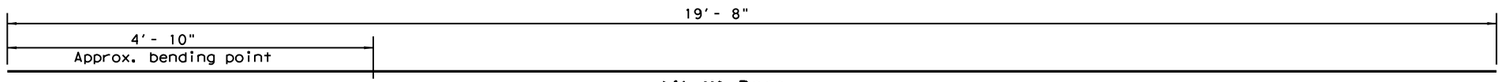
PLATE WASHER
5" x 10" x ⅜"

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

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



(2)~H3 Bars
(#5) Bar



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

(4)~H1 Bars
(#5) Bar

FOR CONTRACTORS INFORMATION ONLY

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

SHEET 2 OF 2

Texas Department of Transportation

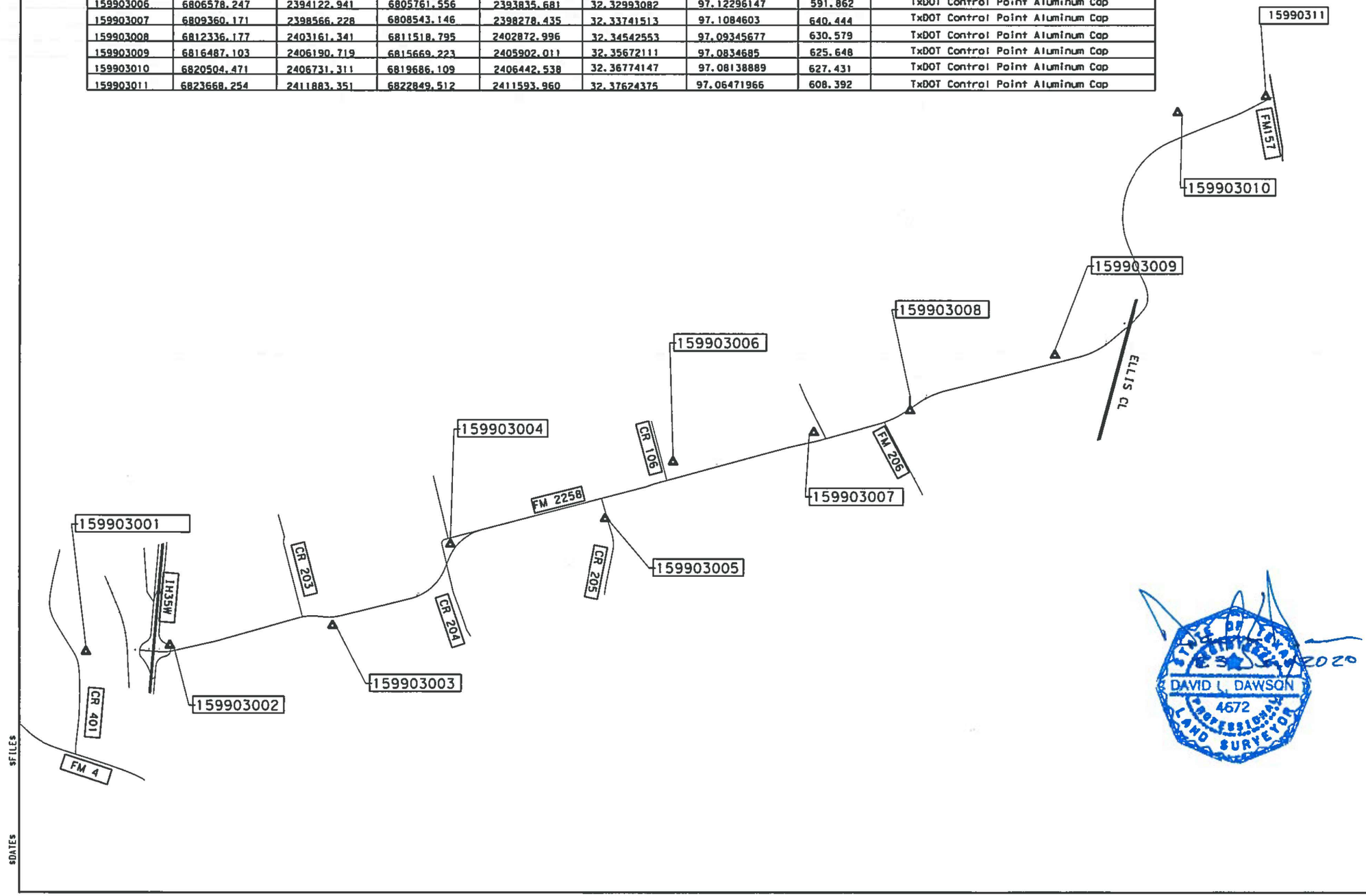
Design Division Standard

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

FILE: lpcb13.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
© TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		74

DATE: 2/7/2024
FILE: $FILE$

PRIMARY CONTROL POINT								
CONTROL POINT	SURFACE COORDINATES		GRID COORDINATES		LATITUDE	LONGITUDE	ELEVATION	DESCRIPTION
	NORTHING	EASTING	NORTHING	EASTING				
159903001	6794070.877	2372060.247	6793255.686	2371775.634	32.29633227	97.19487703	670.637	TxDOT Control Point Aluminum Cap
159903002	6795039.340	2377078.519	6794224.033	2376793.304	32.29882138	97.1786006	647.854	TxDOT Control Point Aluminum Cap
159903003	6797455.057	2381839.490	6796639.460	2381553.704	32.30529468	97.16309623	669.457	TxDOT Control Point Aluminum Cap
159903004	6800961.579	2385318.586	6800145.562	2385032.382	32.31480906	97.15169262	672.291	TxDOT Control Point Aluminum Cap
159903005	6803729.008	2389679.180	6802912.658	2389392.453	32.32225984	97.13746456	623.554	TxDOT Control Point Aluminum Cap
159903006	6806578.247	2394122.941	6805761.556	2393835.681	32.32993082	97.12296147	591.862	TxDOT Control Point Aluminum Cap
159903007	6809360.171	2398566.228	6808543.146	2398278.435	32.33741513	97.1084603	640.444	TxDOT Control Point Aluminum Cap
159903008	6812336.177	2403161.341	6811518.795	2402872.996	32.34542553	97.09345677	630.579	TxDOT Control Point Aluminum Cap
159903009	6816487.103	2406190.719	6815669.223	2405902.011	32.35672111	97.0834685	625.648	TxDOT Control Point Aluminum Cap
159903010	6820504.471	2406731.311	6819686.109	2406442.538	32.36774147	97.08138889	627.431	TxDOT Control Point Aluminum Cap
159903011	6823668.254	2411883.351	6822849.512	2411593.960	32.37624375	97.06471966	608.392	TxDOT Control Point Aluminum Cap



N

LEGEND

PRIMARY — 159903001

NOTES:

1. ALL BEARINGS AND COORDINATES ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983 TEXAS NORTH CENTRAL ZONE (4202), NORTH AMERICAN DATUM OF 1983 (NAD83) 2011 ADJUSTMENT, EPOCH 2010 (GEOID 12A). ALL DISTANCES AND COORDINATES ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 1.00012
2. ALL HORIZONTAL CONTROL OF THIS PROJECT WAS ESTABLISHED BY TxDOT VIRTUAL REFERENCE SYSTEM NETWORK , BASED ON THREE AVERAGED 180 EPOCH OBSERVATIONS
3. UNIT OF MEASURE IS U.S. SURVEY FOOT
4. VERTICAL DATUM IS NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), BASED ON THREE 180 EPOCH OBSERVATIONS UTILIZING THE TxDOT VIRTUAL REFERENCE SYSTEM NETWORK
5. FIELD SURVEYS WERE PERFORMED DURING AUGUST 2019

NO.	DATE	REVISION	APPROVAL

STATE OF TEXAS
DAVID L. DAWSON
4572
PROFESSIONAL
LAND SURVEYOR
2020

FM 2258

SURVEY CONTROL INDEX SHEET

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	SHEET NO.
		75

STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

$FILES

$DATES

CONTROL POINT: 159903001

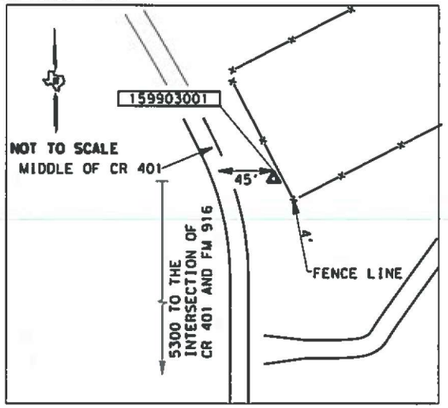
SURFACE COORDINATES:
NORTHING: 6794070.877
EASTING: 2372060.247

GRID COORDINATES:
NORTHING: 6793255.686
EASTING: 2371775.634

ELEVATION: 670.637

LATITUDE: 32.29633227
LONGITUDE: 97.19487703

Point 159903001 is a TxDOT Control Point Aluminum Cap set on the east right of way of County Road 401 . The point is located approx. 5,300 ft +/- North of the intersection of FM 916 and County Road 401. The point is approx. 45 ft +/- from center of County Road 401.The point is 4 ft +/- West from fence line.



CONTROL POINT: 159903002

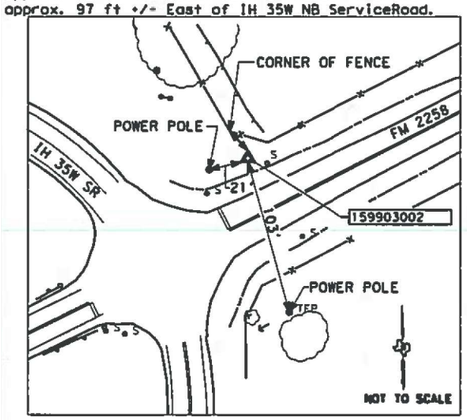
SURFACE COORDINATES:
NORTHING: 6795039.340
EASTING: 2377078.519

GRID COORDINATES:
NORTHING: 6794224.033
EASTING: 2376793.304

ELEVATION: 647.854

LATITUDE: 32.29882138
LONGITUDE: 97.1786006

Point 159903002 is a TxDOT Control Point Aluminum Cap set on the North right of way of FM 2258 . The point is located on the North East Corner of the intersection of IH 35W Northbound Service Road and FM 2258. The Point is located approx. 35 ft +/- North of the center of FM 2258 and approx. 12 ft +/- South West of fence line and approx. 97 ft +/- East of IH 35W NB ServiceRoad.



CONTROL POINT: 159903003

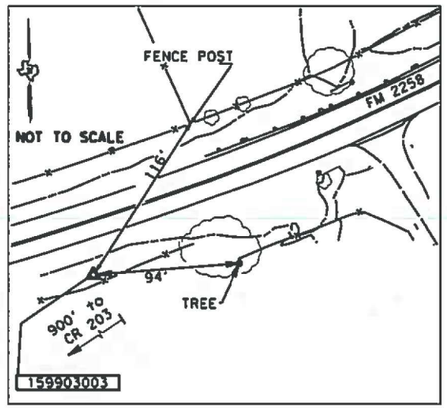
SURFACE COORDINATES:
NORTHING: 6797455.057
EASTING: 2381839.490

GRID COORDINATES:
NORTHING: 6796639.460
EASTING: 2381553.704

ELEVATION: 669.457

LATITUDE: 32.30529468
LONGITUDE: 97.16309623

Point 159903003 is a TxDOT Control Point Aluminum Cap set on the Southern right of way of Fm 2258. The point is located approximately 900 ft +/- East of the intersection of County Road 203 and FM 2258 and 35 ft +/- South from the center of FM 2258 and 3 ft +/- North from the fence line.



CONTROL POINT: 159903004

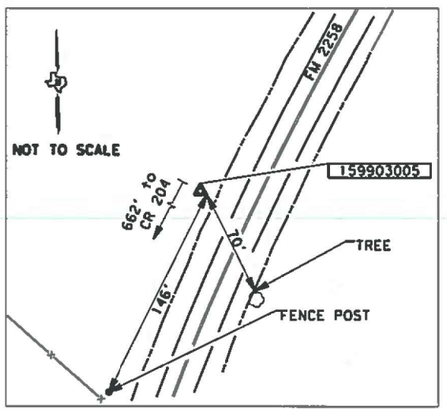
SURFACE COORDINATES:
NORTHING: 6800961.579
EASTING: 2385318.586

GRID COORDINATES:
NORTHING: 6800145.562
EASTING: 2385032.382

ELEVATION: 672.291

LATITUDE: 32.31480906
LONGITUDE: 97.15169262

Point 159903004 is a TxDOT Control Point Aluminum Cap set on the West right of way of FM 2258. The Point is located approx. 662 ft +/- North of the intersection of County Road 204 and FM 2258 and is approx. 28 ft +/- West from the center of FM 2258



NOTES:

1. ALL BEARINGS AND COORDINATES ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983 TEXAS NORTH CENTRAL ZONE (4202), NORTH AMERICAN DATUM OF 1983 (NAD83) 2011 ADJUSTMENT, EPOCH 2010 (GEOID 12A). ALL DISTANCES AND COORDINATES ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 1.00012
2. ALL HORIZONTAL CONTROL OF THIS PROJECT WAS ESTABLISHED BY TxDOT VIRTUAL REFERENCE SYSTEM NETWORK , BASED ON THREE AVERAGED 180 EPOCH OBSERVATIONS
3. UNIT OF MEASURE IS U.S. SURVEY FOOT
4. VERTICAL DATUM IS NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), BASED ON THREE 180 EPOCH OBSERVATIONS UTILIZING THE TxDOT VIRTUAL REFERENCE SYSTEM NETWORK
5. FIELD SURVEYS WERE PERFORMED DURING AUGUST 2019

STATE OF TEXAS
8/31/2020
DAVID L. DAWSON
4672
REGISTERED PROFESSIONAL LAND SURVEYOR

CONTROL POINT: 159903005

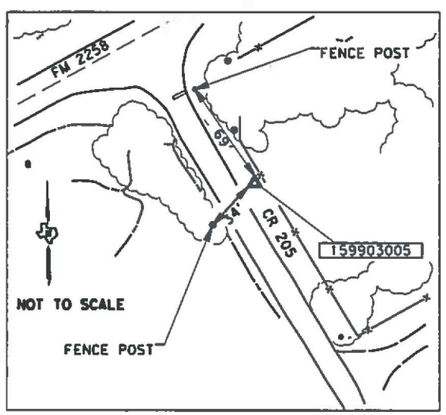
SURFACE COORDINATES:
NORTHING: 6803729.008
EASTING: 2389679.180

GRID COORDINATES:
NORTHING: 6802912.658
EASTING: 2389392.453

ELEVATION: 623.554

LATITUDE: 32.32225984
LONGITUDE: 97.13746456

Point 159903005 is a TxDOT Control Point Aluminum Cap set on the East right of way of County Road 205. The point is approx. 115 ft +/- South of the intersection of FM 2258 and County Road 205 and is approx. 20 ft +/- East of County road 205 and approx. 5 ft +/- from East fence line.



CONTROL POINT: 159903006

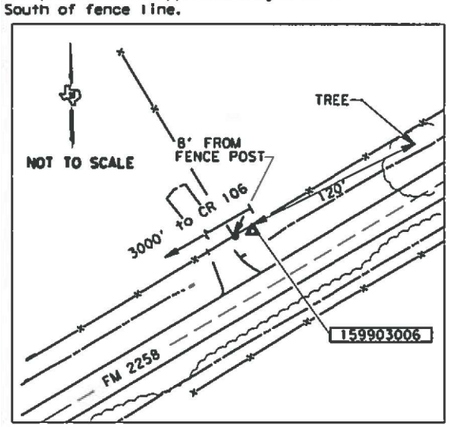
SURFACE COORDINATES:
NORTHING: 6806578.247
EASTING: 2394122.941

GRID COORDINATES:
NORTHING: 6805761.556
EASTING: 2393835.681

ELEVATION: 591.862

LATITUDE: 32.32993082
LONGITUDE: 97.12296147

Point 159903006 is a TxDOT Control Point Aluminum Cap set on the North right of way of FM 2258. The point is approx 3,000 ft +/- Northeast of the intersection of County Road 106 and FM 2258 and approx. 35 ft +/- North of FM 2258. The point is set approximately 4 ft +/- South of fence line.

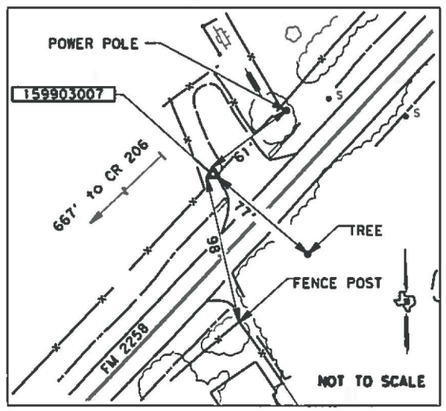


CONTROL POINT: 159903007

SURFACE COORDINATES:
NORTHING: 6809360.171
EASTING: 2398566.228

GRID COORDINATES:
NORTHING: 6808543.146
EASTING: 2398278.435
ELEVATION: 640.444
LATITUDE: 32.33741513
LONGITUDE: 97.1084603

Point 159903007 is a TxDOT Control Point Aluminum set on the North right of way FM 2258, in concrete driveway. The point is located appro. 667 ft +/- Northeast of the intersection of County Road 206 and FM 2258 and is approx. 35 ft +/- Northwest of the center of FM 2258 and is set in the Northwest corner of concrete driveway.



CONTROL POINT: 159903008

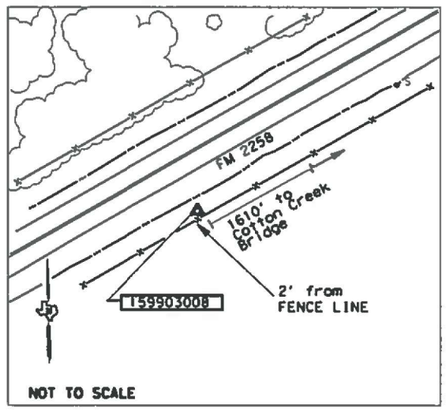
SURFACE COORDINATES:
NORTHING: 6812336.177
EASTING: 2403161.341

GRID COORDINATES:
NORTHING: 6811518.795
EASTING: 2402872.996

ELEVATION: 630.579

LATITUDE: 32.34542553
LONGITUDE: 97.09345677

Point 159903008 is a TxDOT Control Point Aluminum Cap set on the South right of way FM 2258. The point is located approximately 1610 ft +/- Southwest of Cottonwood Creek Bridge and approximately 38 ft +/- South of the center of FM 2258 and approximately 2 ft North of the fence line.



NO.	DATE	REVISION	APPROV.

Texas Department of Transportation®
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FM 2258

SURVEY CONTROL LAYOUT SHEET

SHEET 1 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
		76

STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

$FILES
$DATES

CONTROL POINT: 159903009

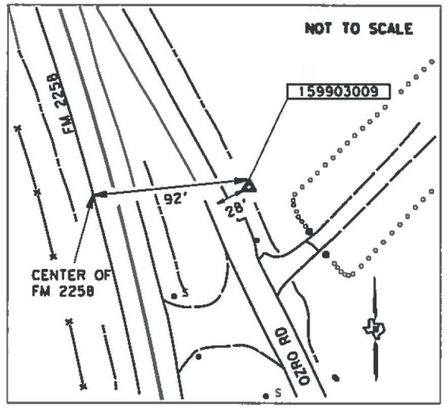
SURFACE COORDINATES:
NORTHING: 6816487.103
EASTING: 2406190.719

GRID COORDINATES:
NORTHING: 6815669.223
EASTING: 2405902.011

ELEVATION: 625.648

LATITUDE: 32.35672111
LONGITUDE: 97.0834685

Point 159903009 is a TxDOT Control Point Aluminum Cap set on the East right of way of Ozro Road. The point is located approximately 28 ft +/- East of the center of Ozro Rd and approximately 92 ft +/- East of the center of FM 2258.



CONTROL POINT: 159903010

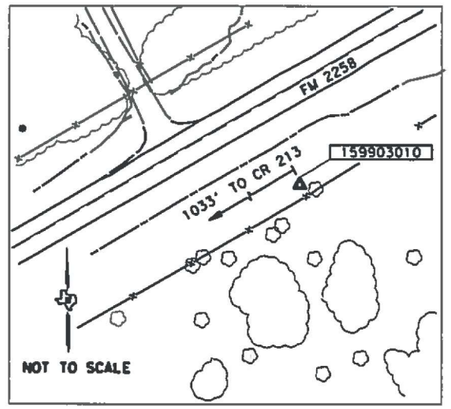
SURFACE COORDINATES:
NORTHING: 6820504.471
EASTING: 2406731.311

GRID COORDINATES:
NORTHING: 6819686.109
EASTING: 2406442.538

ELEVATION: 627.431

LATITUDE: 32.36774147
LONGITUDE: 97.08138889

Point 159903010 is a TxDOT Control Point Aluminum Cap set on the South of the right of way of FM 2258. The point is located approximately 1,033 ft +/- Northeast of County Road 213 and approximately 61 ft +/- Southeast of the center of FM 2258 and approx. 2ft +/- Northwest of fence line.



CONTROL POINT: 159903011

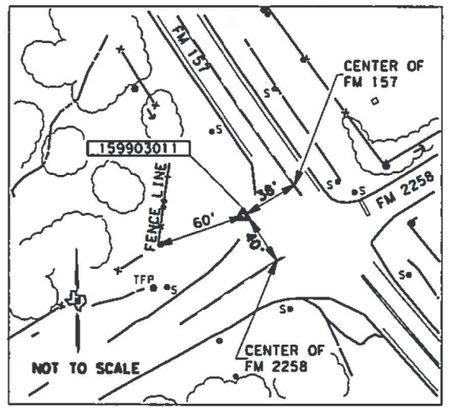
SURFACE COORDINATES:
NORTHING: 6823668.254
EASTING: 2411883.351

GRID COORDINATES:
NORTHING: 6822849.512
EASTING: 2411593.960

ELEVATION: 608.392

LATITUDE: 32.37624375
LONGITUDE: 97.06471966

Point 159903011 is a TxDOT Control Point Aluminum Cap set in the North west corner of the intersection of FM 2258 and FM 157. The point is approximately 40 ft +/- Northwest from the center of FM 2258 and approx 82 ft +/- Southwest of FM 157. The point is located 20 ft +/- Southeast of the fence line.



NOTES:

1. ALL BEARINGS AND COORDINATES ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983 TEXAS NORTH CENTRAL ZONE (4202), NORTH AMERICAN DATUM OF 1983 (NAD83) 2011 ADJUSTMENT, EPOCH 2010 (GEOID 12A). ALL DISTANCES AND COORDINATES ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 1.00012
2. ALL HORIZONTAL CONTROL OF THIS PROJECT WAS ESTABLISHED BY TxDOT VIRTUAL REFERENCE SYSTEM NETWORK , BASED ON THREE AVERAGED 180 EPOCH OBSERVATIONS
3. UNIT OF MEASURE IS U.S. SURVEY FOOT
4. VERTICAL DATUM IS NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), BASED ON THREE 180 EPOCH OBSERVATIONS UTILIZING THE TxDOT VIRTUAL REFERENCE SYSTEM NETWORK
5. FIELD SURVEYS WERE PERFORMED DURING AUGUST 2019

STATE OF TEXAS
DAVID L. DAWSON
4672
PROFESSIONAL
LAND SURVEYOR
23 Jul 2020

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

FM 2258

SURVEY CONTROL LAYOUT SHEET

SHEET 2 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
		77

STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

$FILES
$DATES

<* 1 DESCRIBE CHAIN ALIGN_ROW
Beginning chain ALIGN_ROW description
==========
Point 300 N 6,794,687.5821 E 2,376,475.3680 Sta 0+00.00
Course from 300 to PC ALIGN_ROW1 N 62° 47' 24.40" E Dist 2,110.0160
Curve ALIGN_ROW1
P.I. Station 23+33.56 N 6,795,754.6074 E 2,378,550.6934
Delta = 4° 28' 07.25" (LT)
Degree = 1° 00' 00.00"
Tangent = 223.5475
Length = 446.8683
Radius = 5,729.5800
External = 4.3593
Long Chord = 446.7550
Mid. Ord. = 4.3560
P.C. Station 21+10.02 N 6,795,652.3900 E 2,378,351.8843
P.T. Station 25+56.88 N 6,795,872.0041 E 2,378,740.9340
C.C. N 6,800,747.9202 E 2,375,732.0257
Back = N 62° 47' 24.40" E
Ahead = N 58° 19' 17.15" E
Chord Bear = N 60° 33' 20.78" E
Course from PT ALIGN_ROW1 to PC ALIGN_ROW2 N 58° 19' 17.15" E Dist 2,435.6617
Curve ALIGN_ROW2
P.I. Station 53+64.41 N 6,797,346.3861 E 2,381,130.1603
Delta = 22° 02' 10.20" (RT)
Degree = 3° 00' 00.00"
Tangent = 371.8648
Length = 734.5391
Radius = 1,909.8600
External = 35.8657
Long Chord = 730.0203
Mid. Ord. = 35.2046
P.C. Station 49+92.55 N 6,797,151.1000 E 2,380,813.7006
P.T. Station 57+27.09 N 6,797,408.6728 E 2,381,496.7715
C.C. N 6,795,525.7947 E 2,381,816.6700
Back = N 58° 19' 17.15" E
Ahead = N 80° 21' 27.35" E
Chord Bear = N 69° 20' 22.25" E
Course from PT ALIGN_ROW2 to PC ALIGN_ROW3 N 80° 21' 27.35" E Dist 56.8608
Curve ALIGN_ROW3
P.I. Station 61+24.88 N 6,797,475.3036 E 2,381,888.9509
Delta = 20° 14' 35.06" (LT)
Degree = 3° 00' 00.00"
Tangent = 340.9386
Length = 674.7693
Radius = 1,909.8600
External = 30.1927
Long Chord = 671.2652
Mid. Ord. = 29.7228
P.C. Station 57+83.95 N 6,797,418.1969 E 2,381,552.8290
P.T. Station 64+58.72 N 6,797,645.1824 E 2,382,184.5525
C.C. N 6,799,301.0751 E 2,381,232.9305
Back = N 80° 21' 27.35" E
Ahead = N 60° 06' 52.29" E
Chord Bear = N 70° 14' 09.82" E
Course from PT ALIGN_ROW3 to PC ALIGN_ROW4 N 60° 06' 52.29" E Dist 2,346.9970
Curve ALIGN_ROW4
P.I. Station 97+33.15 N 6,799,276.7284 E 2,385,023.5632
Delta = 51° 48' 10.44" (LT)
Degree = 3° 00' 00.00"
Tangent = 927.4379
Length = 1,726.7640
Radius = 1,909.8600
External = 213.2760
Long Chord = 1,668.5475
Mid. Ord. = 191.8517
P.C. Station 88+05.71 N 6,798,814.6158 E 2,384,219.4531
P.T. Station 105+32.48 N 6,800,194.4250 E 2,385,157.6308
C.C. N 6,800,470.5085 E 2,383,267.8311
Back = N 60° 06' 52.29" E
Ahead = N 8° 18' 41.85" E
Chord Bear = N 34° 12' 47.07" E
Course from PT ALIGN_ROW4 to PC ALIGN_ROW5 N 8° 18' 41.85" E Dist 234.8862
Curve ALIGN_ROW5
P.I. Station 116+85.59 N 6,801,335.4316 E 2,385,324.3221
Delta = 51° 21' 18.40" (RT)
Degree = 3° 00' 00.00"
Tangent = 918.2323
Length = 1,711.8377
Radius = 1,909.8600
External = 209.2709
Long Chord = 1,655.1079
Mid. Ord. = 188.6047
P.C. Station 107+67.36 N 6,800,426.8440 E 2,385,191.5853
P.T. Station 124+79.20 N 6,801,799.1654 E 2,386,116.8507
C.C. N 6,800,150.7605 E 2,387,081.3850
Back = N 8° 18' 41.85" E
Ahead = N 59° 40' 00.25" E
Chord Bear = N 33° 59' 21.05" E
End Region 1
Equation: Sta 124+79.20 (BK) = Sta 127+77.90 (AH) ----------
Begin Region 2
Point 303 N 6,801,799.1654 E 2,386,116.8507 Sta 127+77.90
Course from 303 to PC ALIGN_ROW6 N 59° 40' 00.25" E Dist 3,456.0064
Curve ALIGN_ROW6
P.I. Station 163+87.25 N 6,803,621.9903 E 2,389,232.0883
Delta = 1° 31' 59.98" (RT)
Degree = 0° 30' 00.00"
Tangent = 153.3420
Length = 306.6656
Radius = 11,459.1600
External = 1.0259
Long Chord = 306.6565
Mid. Ord. = 1.0258
P.C. Station 162+33.91 N 6,803,544.5482 E 2,389,099.7384
P.T. Station 165+40.57 N 6,803,695.8632 E 2,389,366.4629
C.C. N 6,793,654.1187 E 2,394,886.9443
Back = N 59° 40' 00.25" E
Ahead = N 61° 12' 00.23" E
Chord Bear = N 60° 26' 00.24" E
Course from PT ALIGN_ROW6 to PC ALIGN_ROW7 N 61° 12' 00.23" E Dist 1,557.7012

STATE OF TEXAS
HOMERO LUIS GUTIERREZ
36639
LICENSED PROFESSIONAL ENGINEER

HOMERO L. GUTIERREZ, P.E.
P.E. 36639
1/22/2024
DATE

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

FM 2258
HORIZONTAL ALIGNMENT DATA

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		78
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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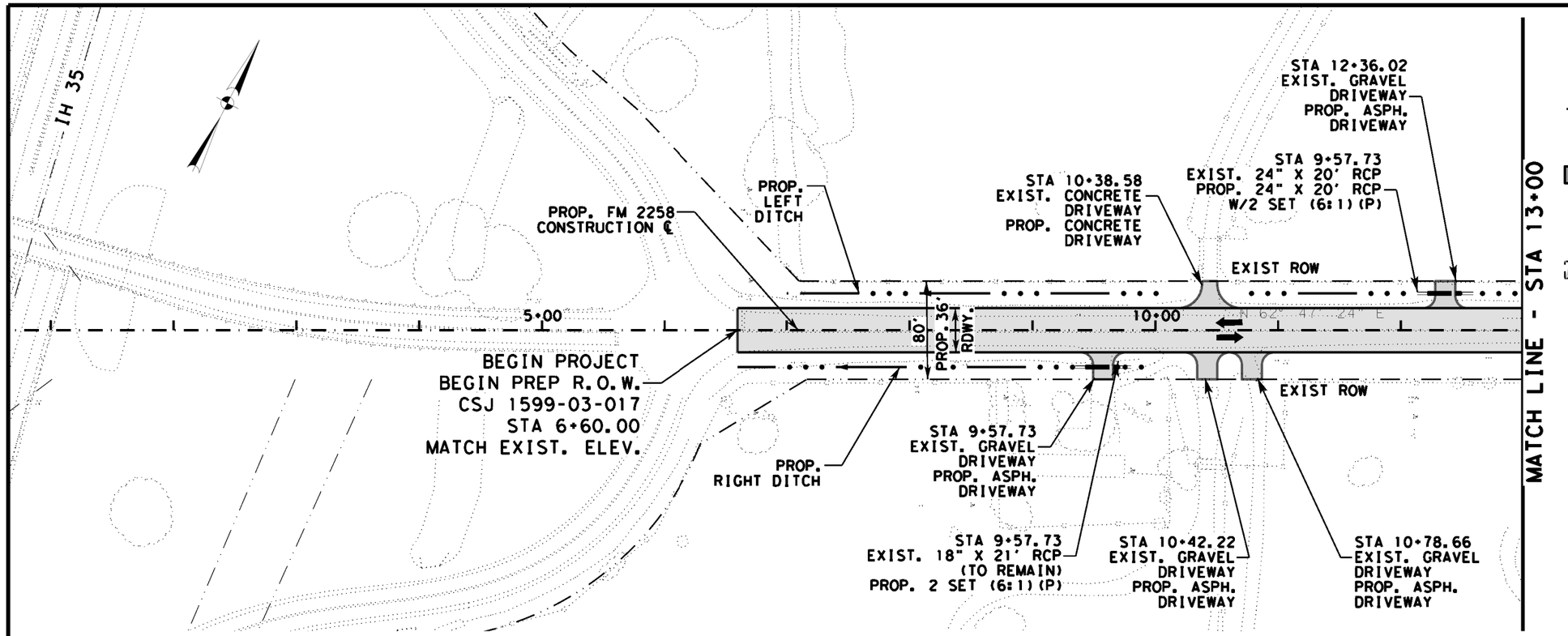
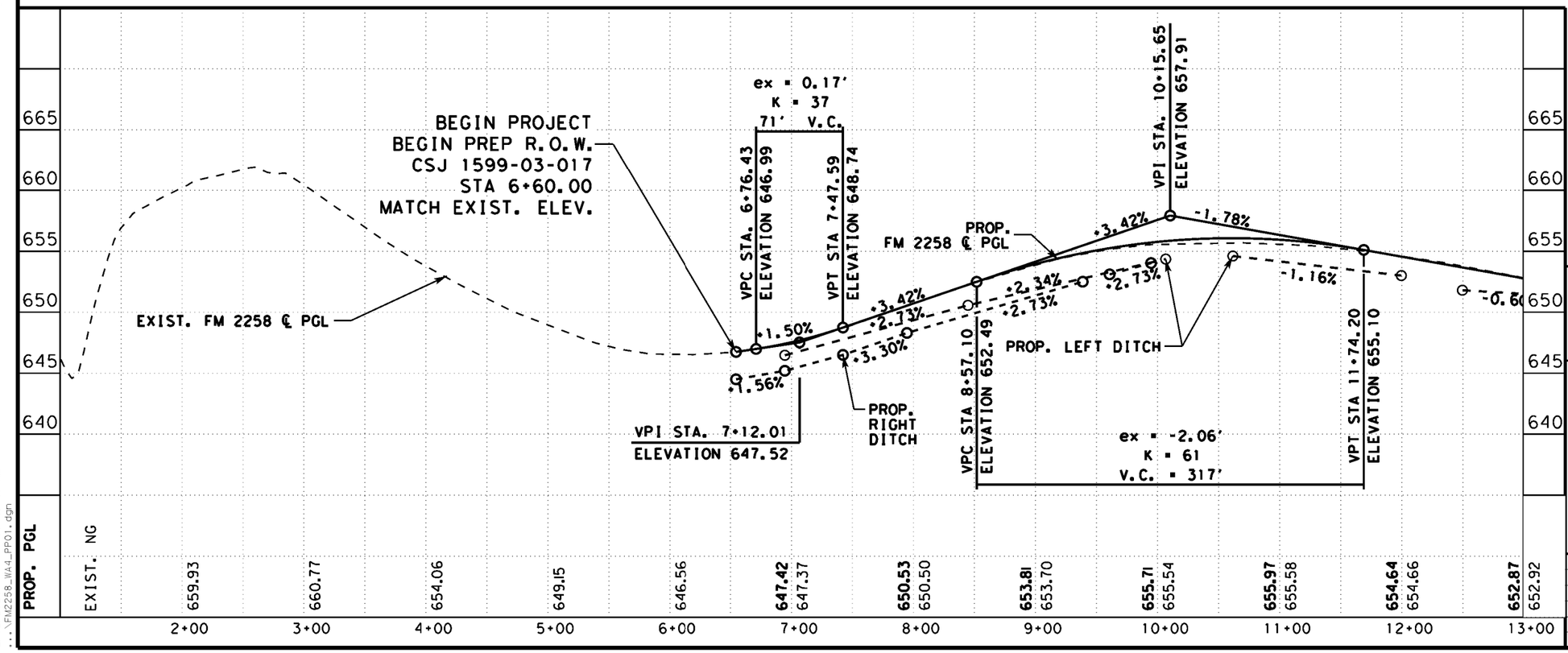
1/22/2024 4:44:00 PM ...\FM2258 ALIGNMENT DATA 01.dgn





HOMERO LUIS GUTIERREZ
36639
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

HOMERO L. GUTIERREZ, P.E.
P.E. 36639
2/12/2024
DATE

CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

PLAN & PROFILE
BEGIN PROJECT TO STA 13+00

HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 1 OF 14

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	79
STATE	DIST.	COUNTY
TEXAS	FTW	JOHNSON
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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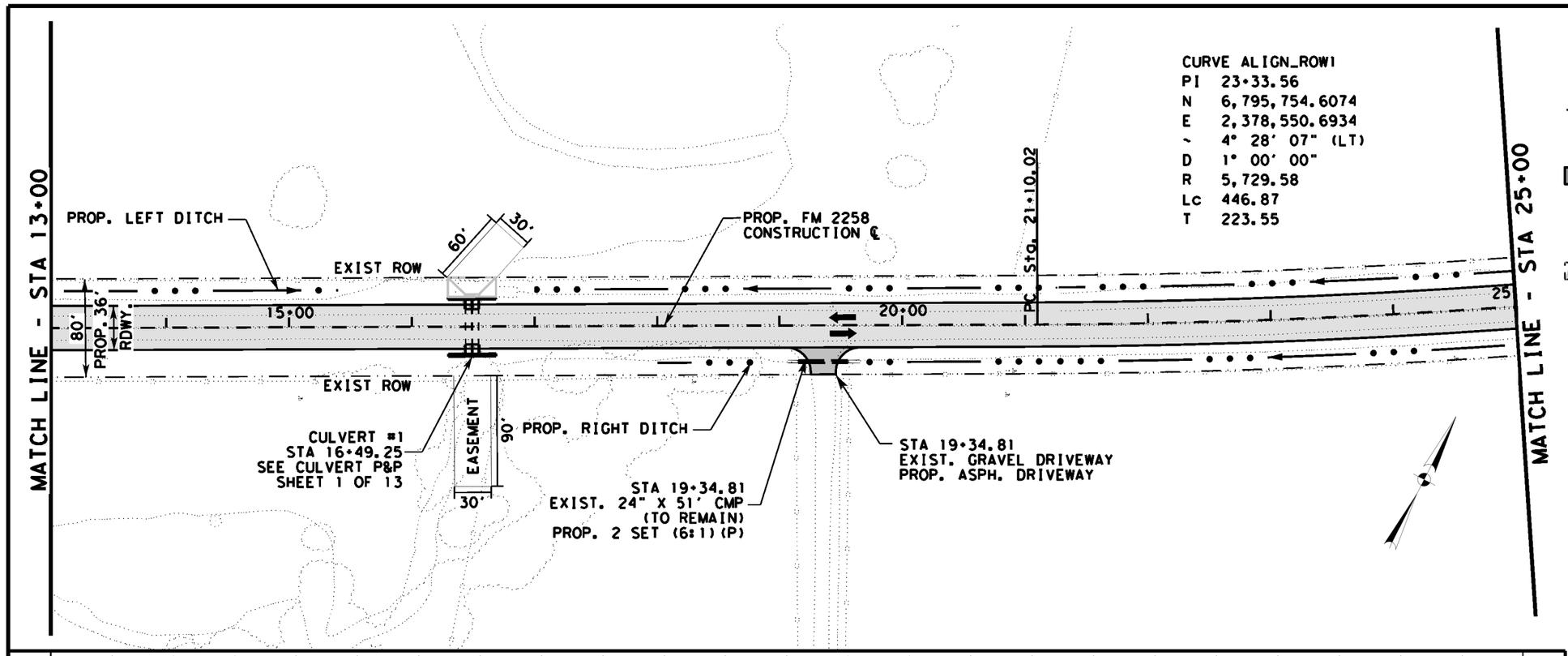

HOMERO LUIS GUTIERREZ
36639
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

HOMERO L. GUTIERREZ, P.E.
P.E. 36639
2/12/2024
DATE

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

PLAN & PROFILE
STA 13+00
TO
STA 25+00

HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 2 OF 14

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	80
STATE	DIST.	COUNTY
TEXAS	FTW	JOHNSON
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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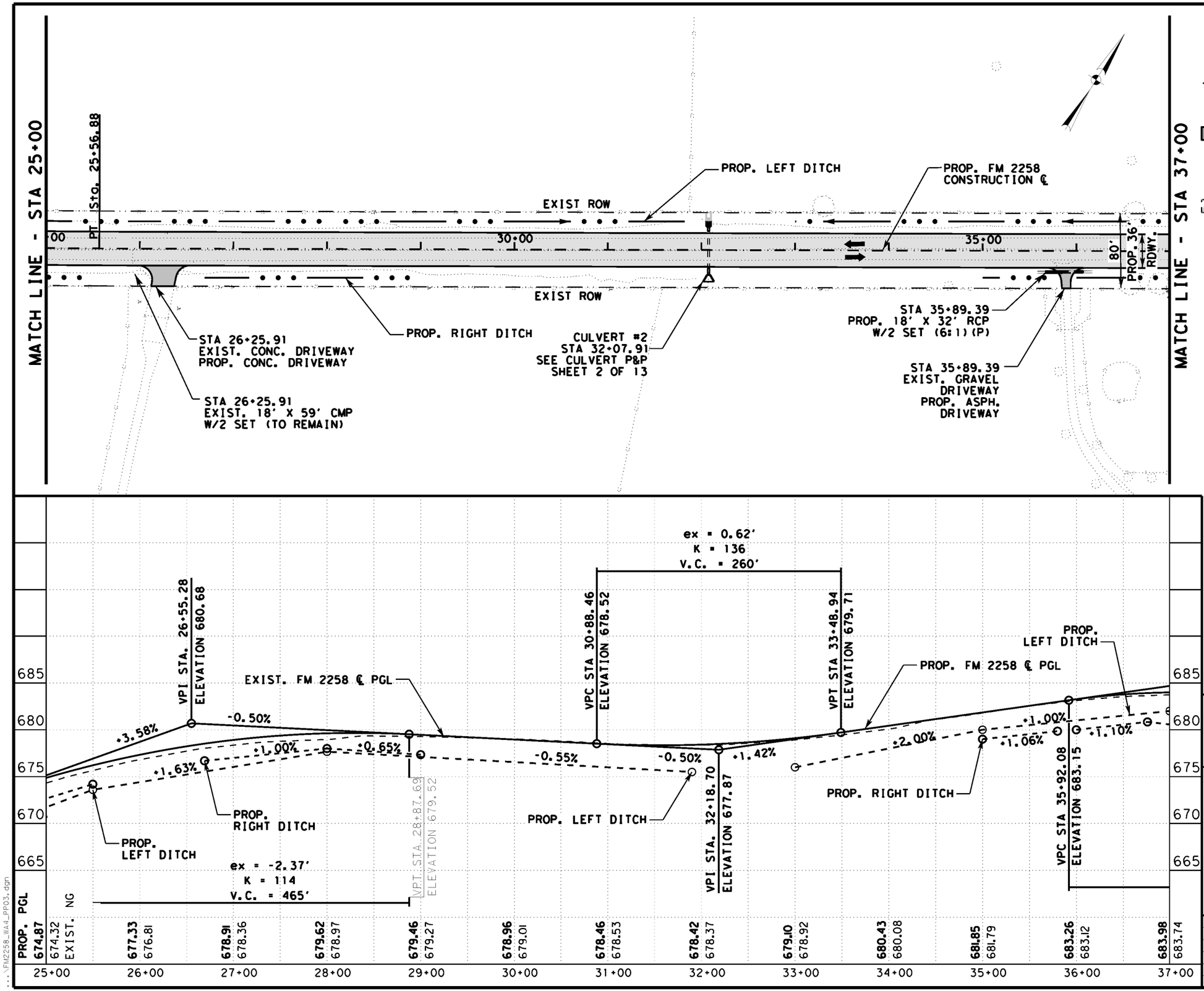

0 25 50 100
SCALE: 1"=100'

LEGEND:

- PROPOSED DITCH FLOW LINE
- EXISTING UTILITY POLE
- PROPOSED PAVEMENT RECONSTRUCTION OR AS LABELED
- TRAVEL LANE
- PGL PROFILE GRADE LINE
- EXIST. DRAINAGE EASTMENT

NOTES:

1. SEE INTERSECTION DETAILS FOR ADDITIONAL INFORMATION.
2. ALL OFFSETS AND DIMENSIONS ARE RELATIVE TO EDGE OF PAVEMENT UNLESS OTHERWISE NOTED.
3. SEE PROP. ROADWAY CROSS SLOPE (LEFT & RIGHT) TABLE SHEET FOR ADDITIONAL INFORMATION.

STATE OF TEXAS
HOMERO LUIS GUTIERREZ
36639
LICENSED PROFESSIONAL ENGINEER

HOMERO L. GUTIERREZ, P.E.
P.E. 36639
2/12/2024
DATE

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

PLAN & PROFILE
STA 25+00
TO
STA 37+00

HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 3 OF 14

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		81
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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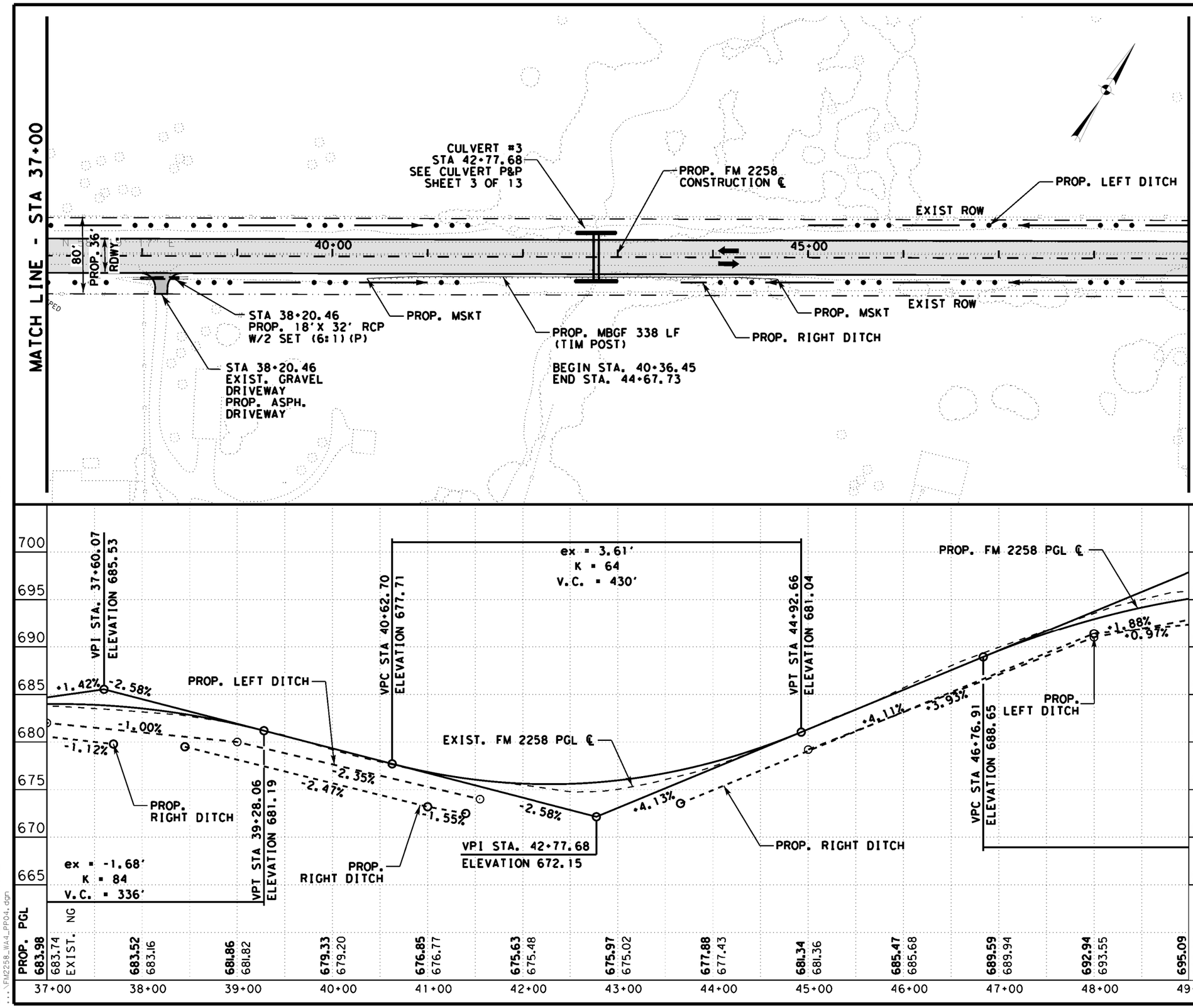


HOMERO LUIS GUTIERREZ
36639
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

HOMERO L. GUTIERREZ, P.E.
P.E. 36639
2/12/2024
DATE

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

PLAN & PROFILE
STA 37+00
TO
STA 49+00

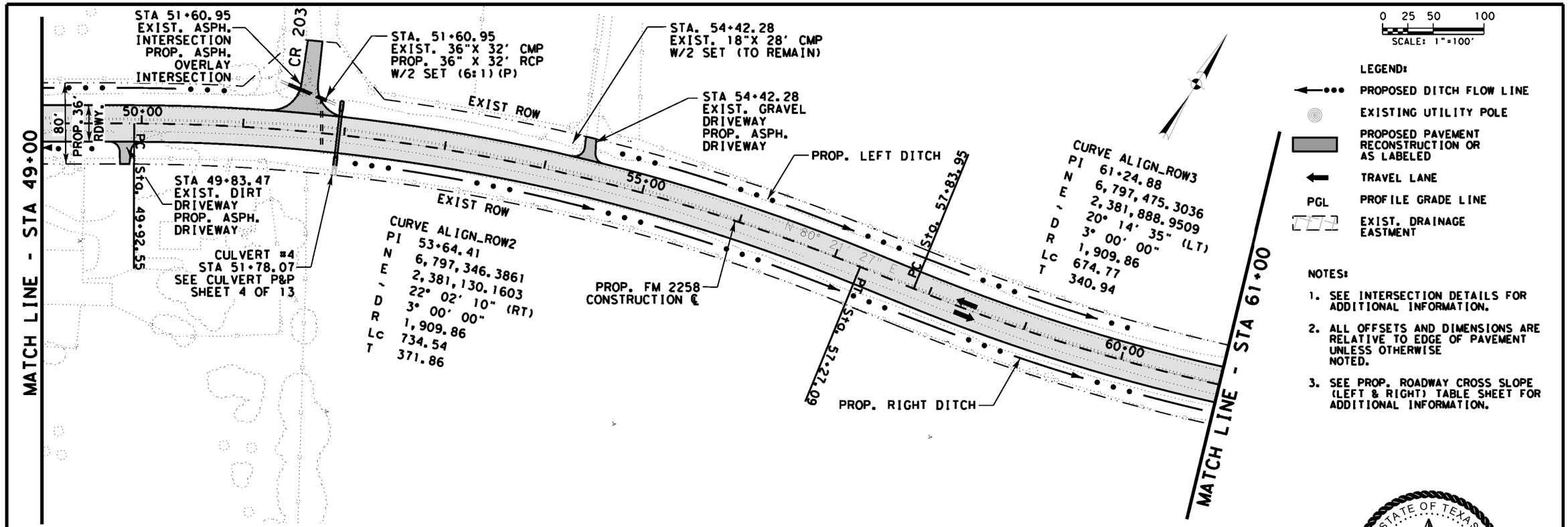
HORZ: 1" = 100'
VERT: 1" = 10'

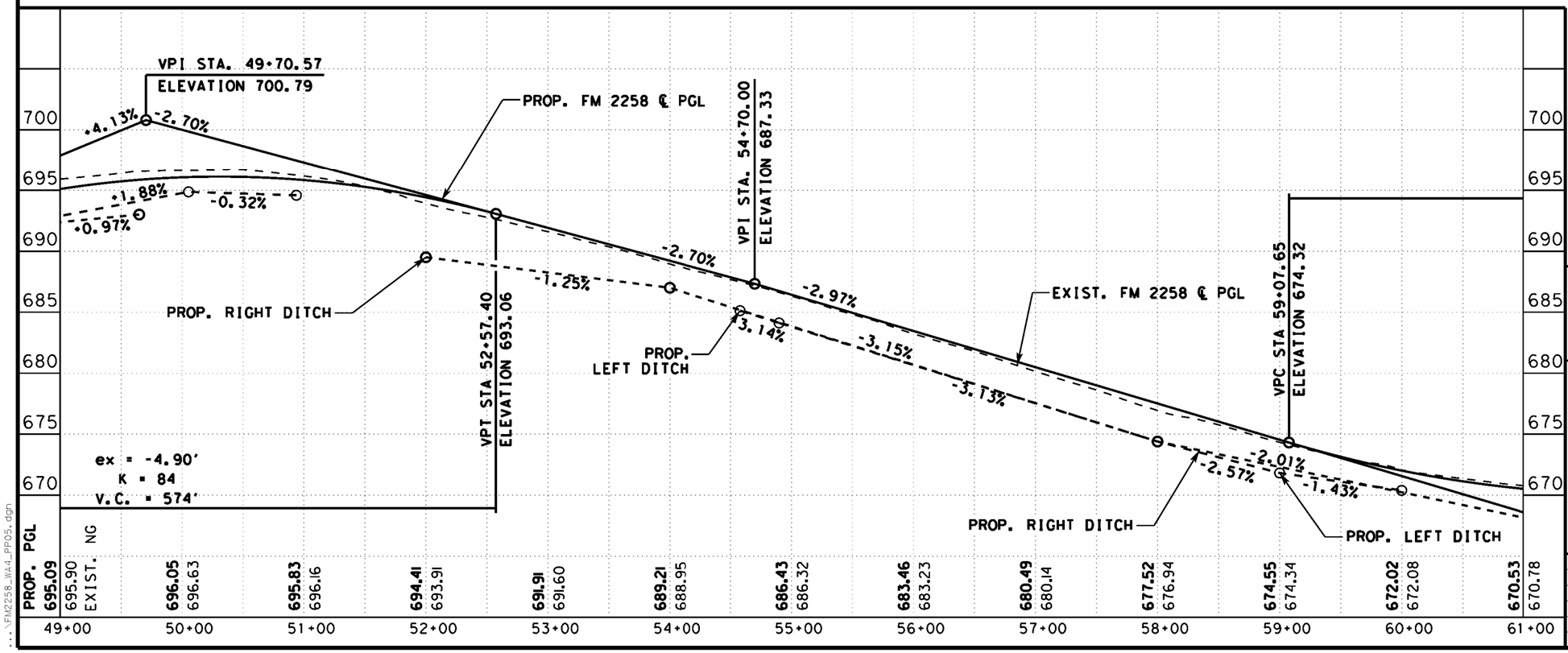
SHEET 4 OF 14

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	82

STATE	DIST.	COUNTY
TEXAS	FTW	JOHNSON

CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258





STATE OF TEXAS
HOMERO LUIS GUTIERREZ
36639
LICENSED PROFESSIONAL ENGINEER

HOMERO L. GUTIERREZ, P.E.
P.E. 36639
2/12/2024
DATE

CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

PLAN & PROFILE
STA 49+00
TO
STA 61+00

HORZ: 1" = 100'
VERT: 1" = 10'
SHEET 5 OF 14

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	83
STATE	DIST.	COUNTY
TEXAS	FTW	JOHNSON
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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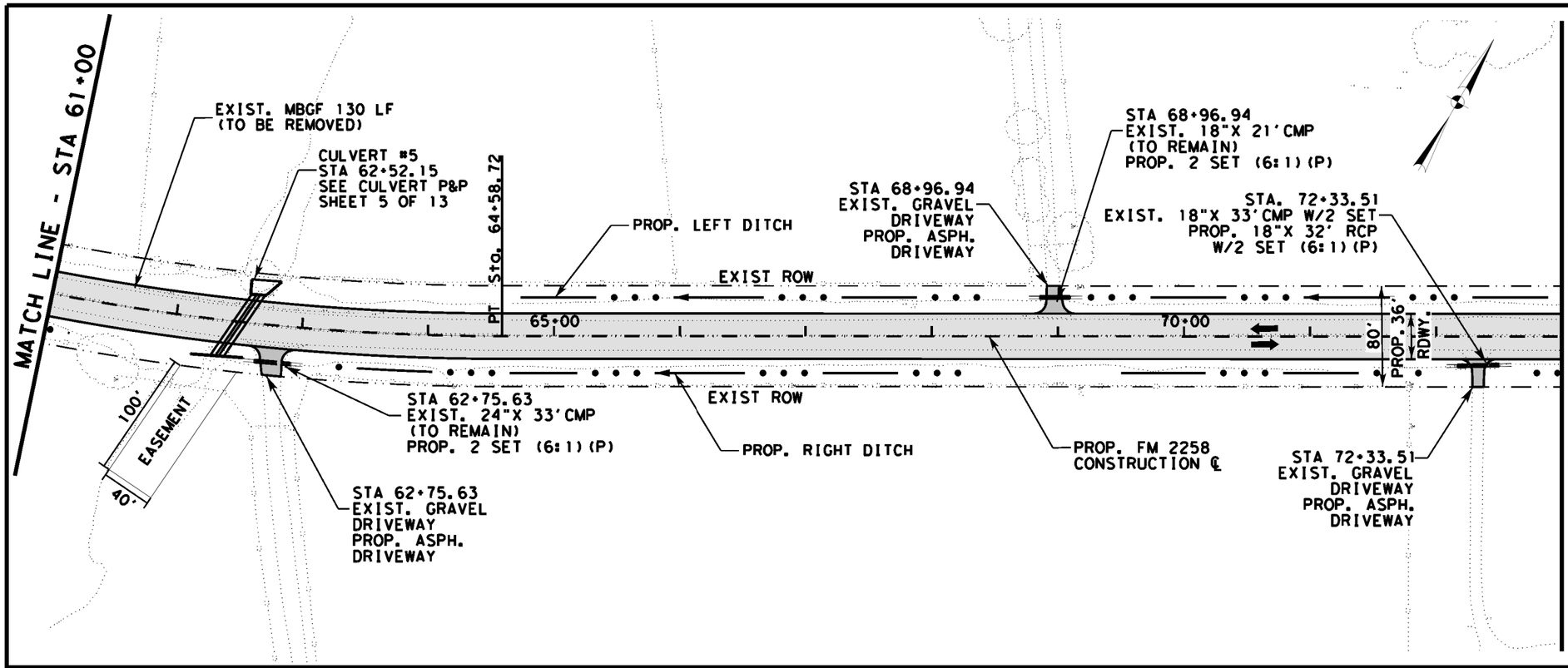

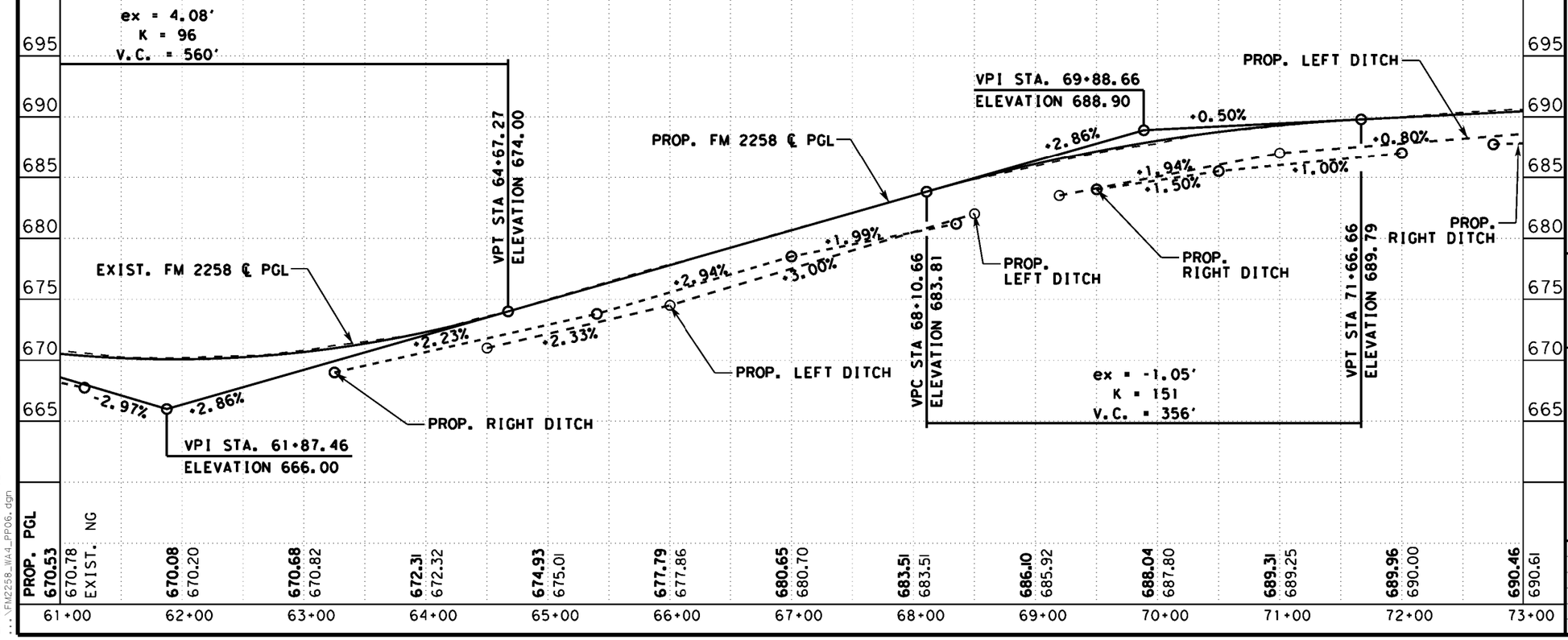

0 25 50 100
SCALE: 1"=100'

LEGEND:

- PROPOSED DITCH FLOW LINE
- EXISTING UTILITY POLE
- PROPOSED PAVEMENT RECONSTRUCTION OR AS LABELED
- TRAVEL LANE
- PGL PROFILE GRADE LINE
- EXIST. DRAINAGE EASTMENT

NOTES:

1. SEE INTERSECTION DETAILS FOR ADDITIONAL INFORMATION.
2. ALL OFFSETS AND DIMENSIONS ARE RELATIVE TO EDGE OF PAVEMENT UNLESS OTHERWISE NOTED.
3. SEE PROP. ROADWAY CROSS SLOPE (LEFT & RIGHT) TABLE SHEET FOR ADDITIONAL INFORMATION.

STATE OF TEXAS
HOMERO LUIS GUTIERREZ
36639
LICENSED PROFESSIONAL ENGINEER

HOMERO L. GUTIERREZ, P.E.
P.E. 36639
2/12/2024
DATE

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

PLAN & PROFILE
STA 61+00
TO
STA 73+00

HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 6 OF 14

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		84
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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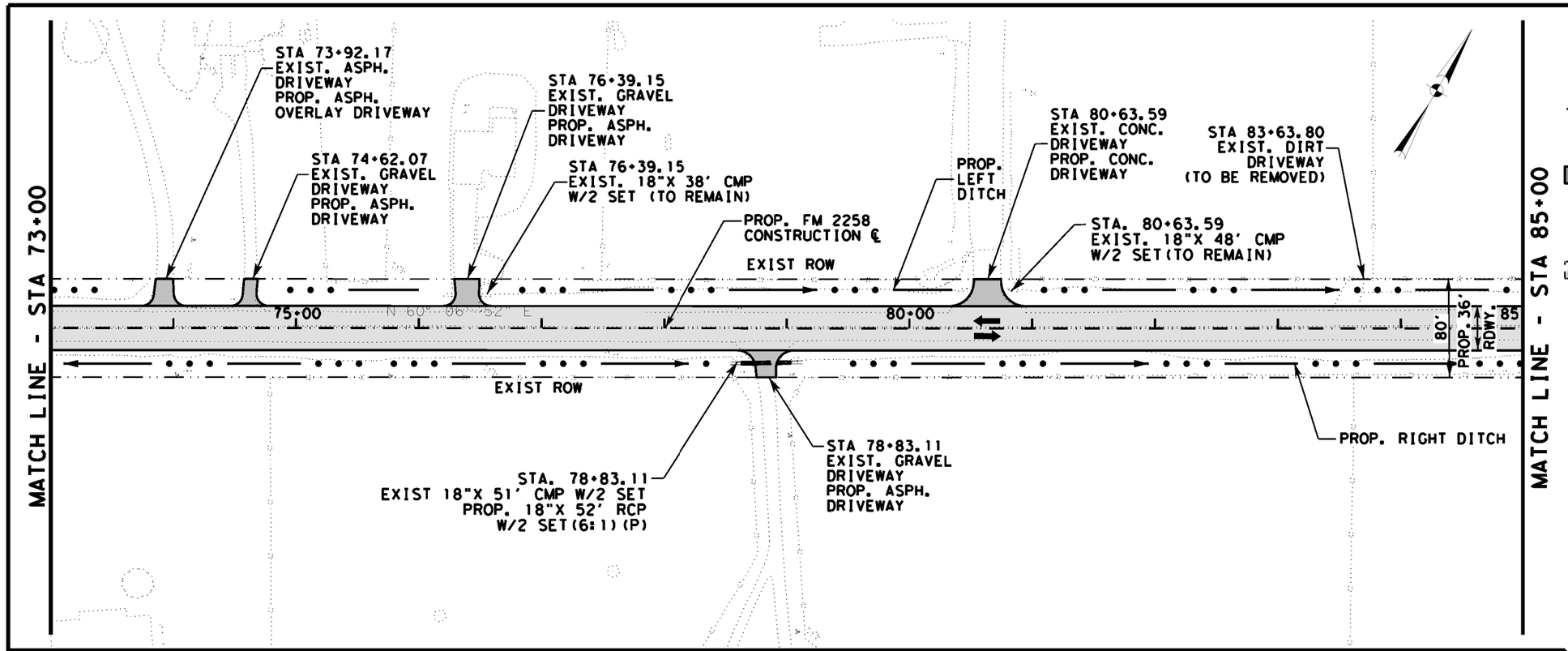

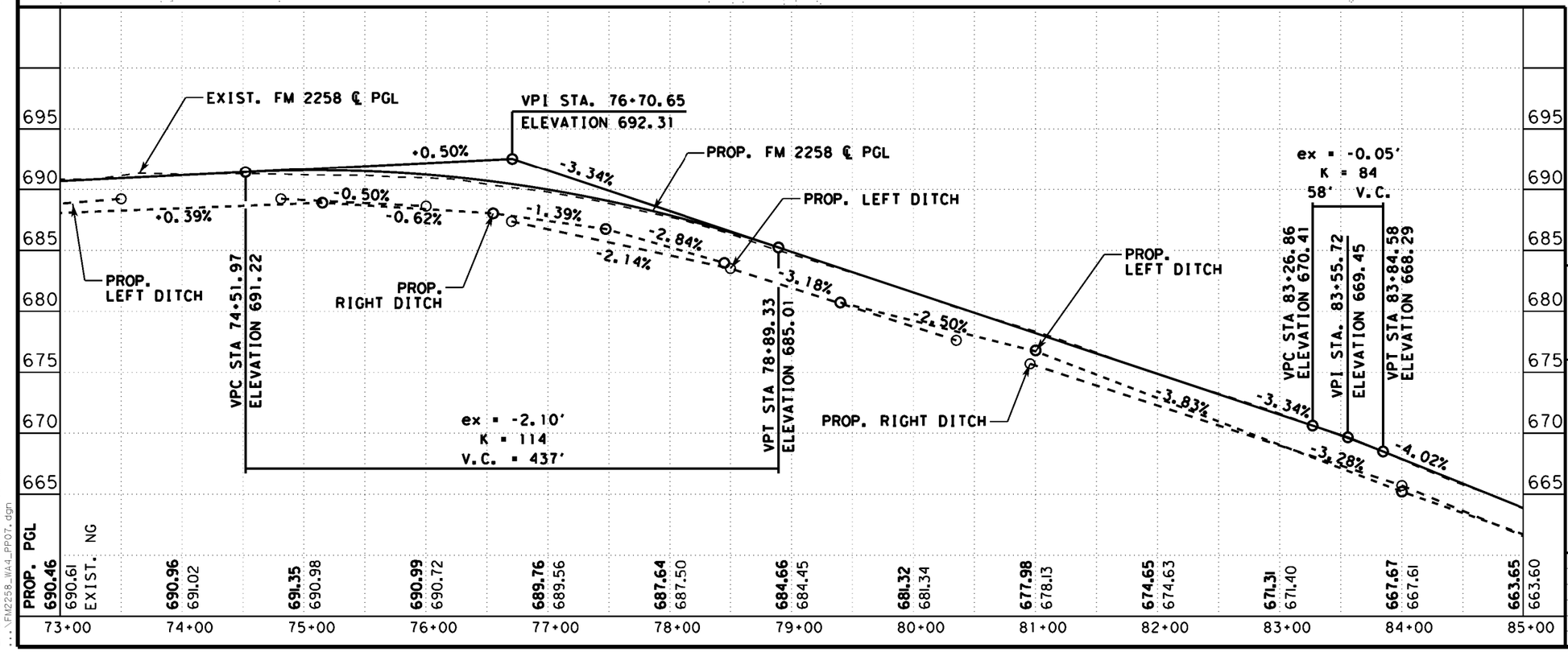

STATE OF TEXAS
HOMERO LUIS GUTIERREZ
36639
LICENSED PROFESSIONAL ENGINEER

HOMERO L. GUTIERREZ, P.E.
P.E. 36639
2/12/2024
DATE

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

PLAN & PROFILE
STA 73+00 TO STA 85+00

HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 7 OF 14

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		85
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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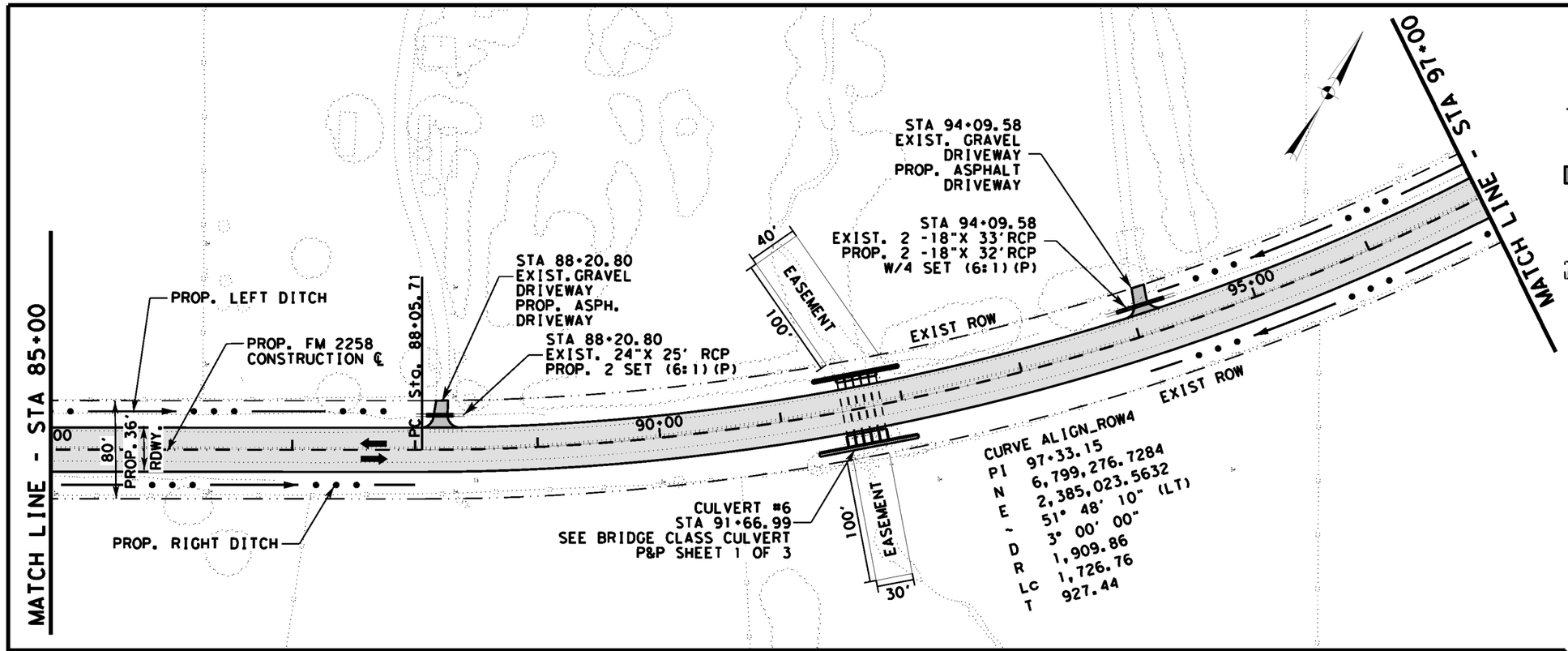

HOMERO LUIS GUTIERREZ
36639
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

HOMERO L. GUTIERREZ, P.E.
P.E. 36639
2/12/2024
DATE

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

PLAN & PROFILE STA 85+00 TO STA 97+00

HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 8 OF 14

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	86
STATE	DIST.	COUNTY
TEXAS	FTW	JOHNSON
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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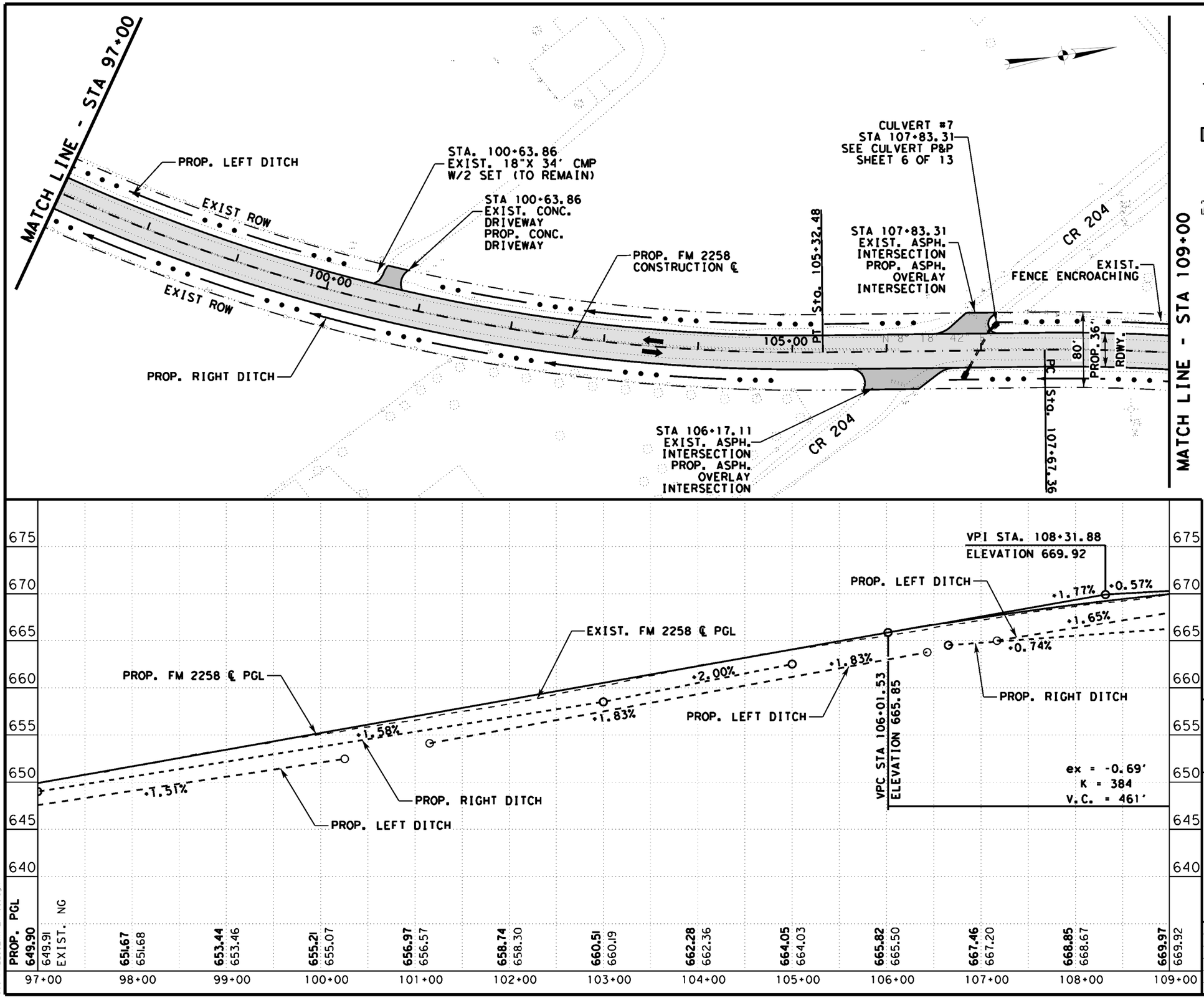

0 25 50 100
SCALE: 1"=100'

LEGEND:

- PROPOSED DITCH FLOW LINE
- EXISTING UTILITY POLE
- PROPOSED PAVEMENT RECONSTRUCTION OR AS LABELED
- TRAVEL LANE
- PGL PROFILE GRADE LINE
- EXIST. DRAINAGE EASTMENT

NOTES:

1. SEE INTERSECTION DETAILS FOR ADDITIONAL INFORMATION.
2. ALL OFFSETS AND DIMENSIONS ARE RELATIVE TO EDGE OF PAVEMENT UNLESS OTHERWISE NOTED.
3. SEE PROP. ROADWAY CROSS SLOPE (LEFT & RIGHT) TABLE SHEET FOR ADDITIONAL INFORMATION.

STATE OF TEXAS
HOMERO LUIS GUTIERREZ
36639
LICENSED PROFESSIONAL ENGINEER

HOMERO L. GUTIERREZ, P.E.
P.E. 36639
2/12/2024
DATE

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

PLAN & PROFILE
STA 97+00
TO
STA 109+00

HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 9 OF 14

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		87
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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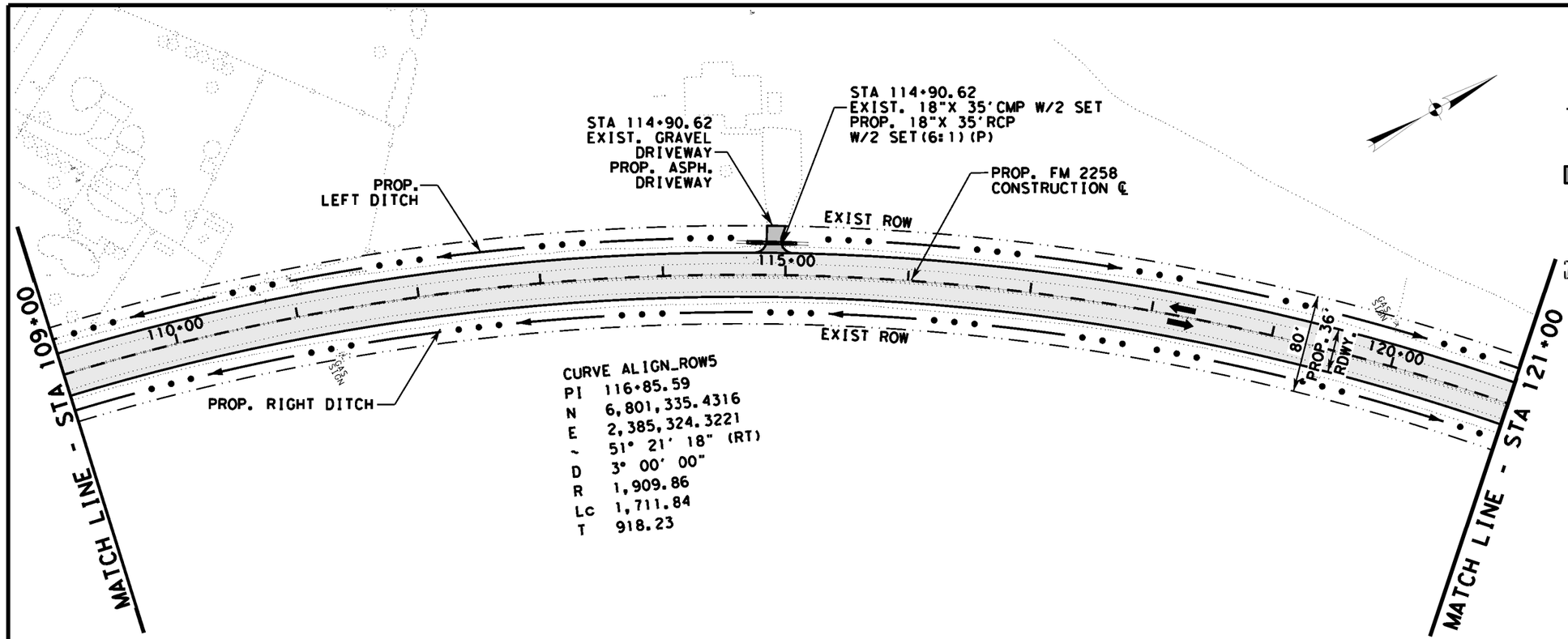


STATE OF TEXAS
HOMERO LUIS GUTIERREZ
36639
LICENSED PROFESSIONAL ENGINEER

HOMERO L. GUTIERREZ, P.E.
P.E. 36639
2/12/2024
DATE

CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

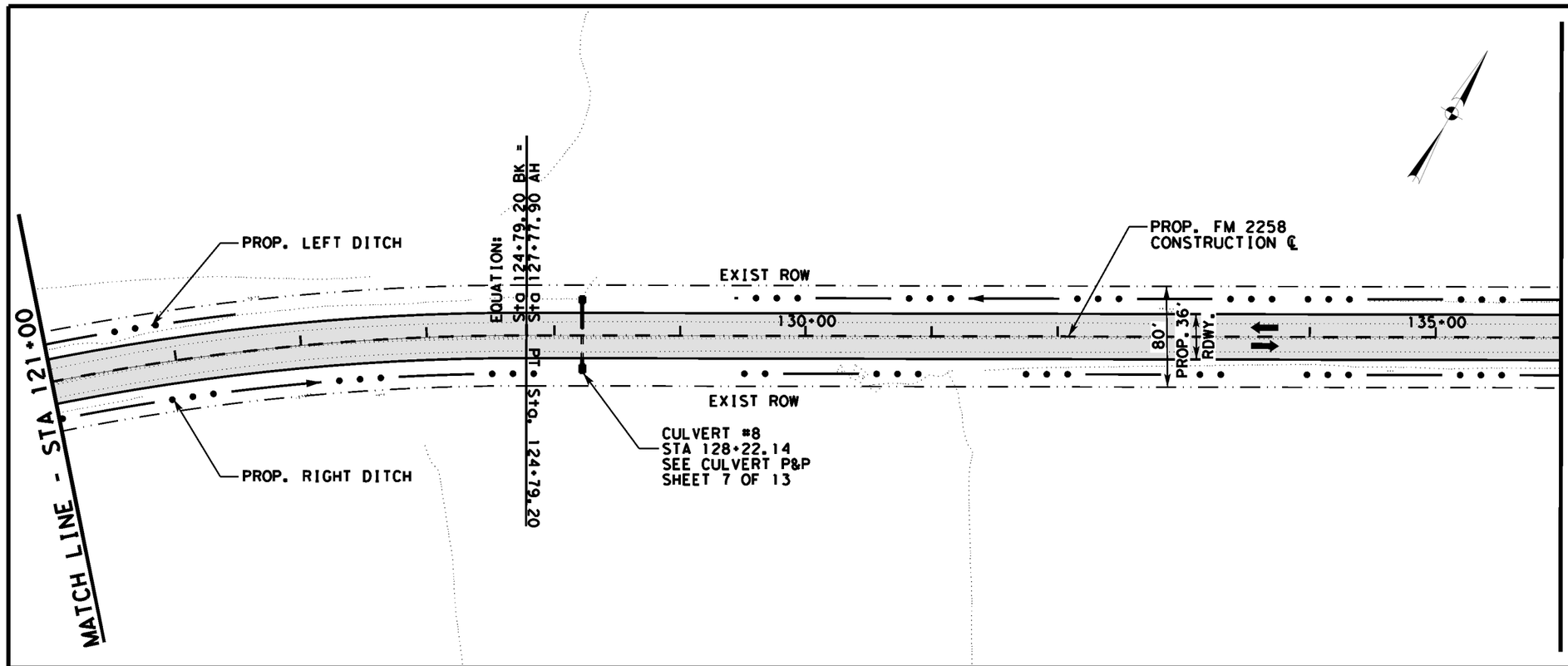
Texas Department of Transportation

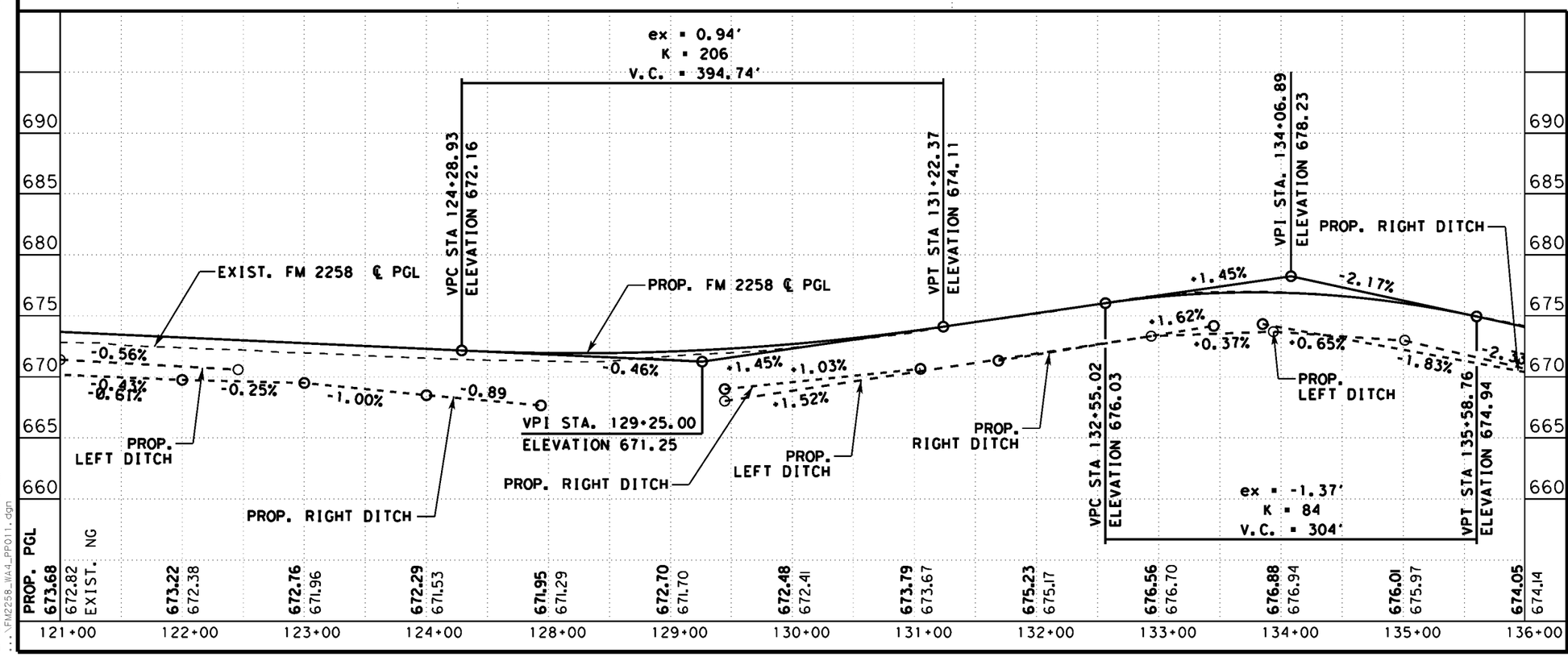
PLAN & PROFILE
STA 109+00 TO STA 121+00

HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 10 OF 14

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	88
STATE	DIST.	COUNTY
TEXAS	FTW	JOHNSON
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258





0 25 50 100
SCALE: 1"=100'

LEGEND:

- PROPOSED DITCH FLOW LINE
- EXISTING UTILITY POLE
- PROPOSED PAVEMENT RECONSTRUCTION OR AS LABELED
- TRAVEL LANE
- PGL PROFILE GRADE LINE
- EXIST. DRAINAGE EASTMENT

NOTES:

1. SEE INTERSECTION DETAILS FOR ADDITIONAL INFORMATION.
2. ALL OFFSETS AND DIMENSIONS ARE RELATIVE TO EDGE OF PAVEMENT UNLESS OTHERWISE NOTED.
3. SEE PROP. ROADWAY CROSS SLOPE (LEFT & RIGHT) TABLE SHEET FOR ADDITIONAL INFORMATION.

STATE OF TEXAS
HOMERO LUIS GUTIERREZ
36639
LICENSED
PROFESSIONAL ENGINEER

HOMERO L. GUTIERREZ, P.E.
P.E. 36639
2/12/2024
DATE

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

PLAN & PROFILE
STA 121+00 TO STA 136+00

HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 11 OF 14

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		89
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

jsaenz
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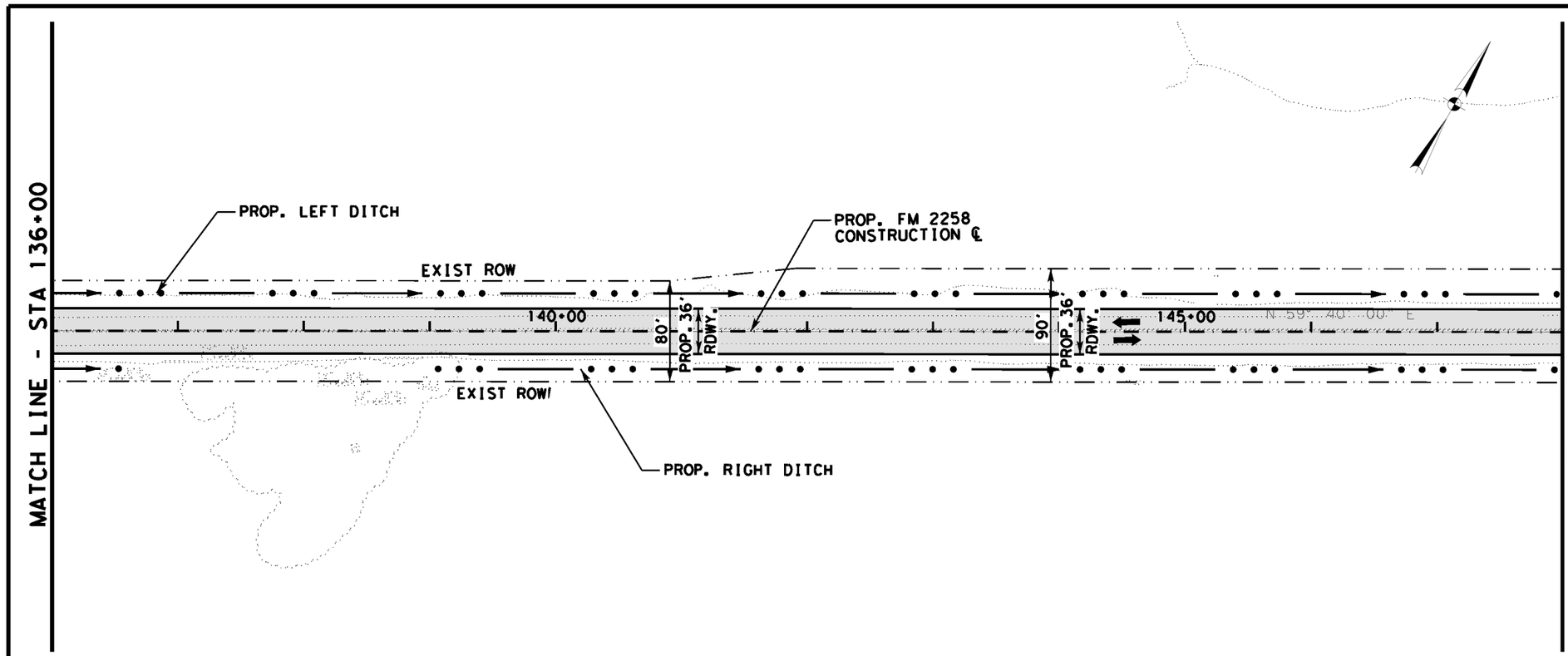

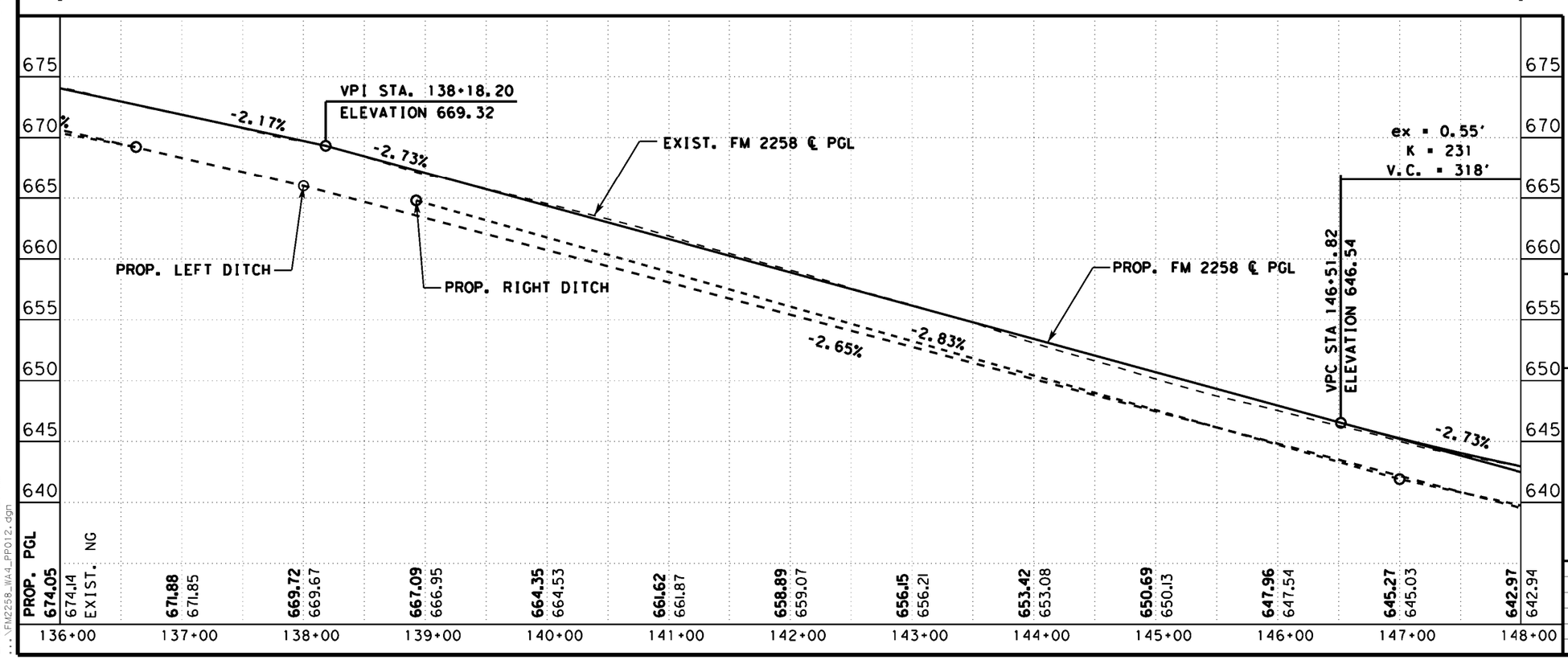

0 25 50 100
SCALE: 1"=100'

LEGEND:

- PROPOSED DITCH FLOW LINE
- EXISTING UTILITY POLE
- PROPOSED PAVEMENT RECONSTRUCTION OR AS LABELED
- TRAVEL LANE
- PGL — PROFILE GRADE LINE
- EXIST. DRAINAGE EASTMENT

NOTES:

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2. ALL OFFSETS AND DIMENSIONS ARE RELATIVE TO EDGE OF PAVEMENT UNLESS OTHERWISE NOTED.
3. SEE PROP. ROADWAY CROSS SLOPE (LEFT & RIGHT) TABLE SHEET FOR ADDITIONAL INFORMATION.

STATE OF TEXAS
HOMERO LUIS GUTIERREZ
36639
LICENSED PROFESSIONAL ENGINEER

HOMERO L. GUTIERREZ, P.E.
P.E. 36639
2/12/2024
DATE

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

PLAN & PROFILE
STA 136+00
TO
STA 148+00

HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 12 OF 14

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	90
STATE	DIST.	COUNTY
TEXAS	FTW	JOHNSON
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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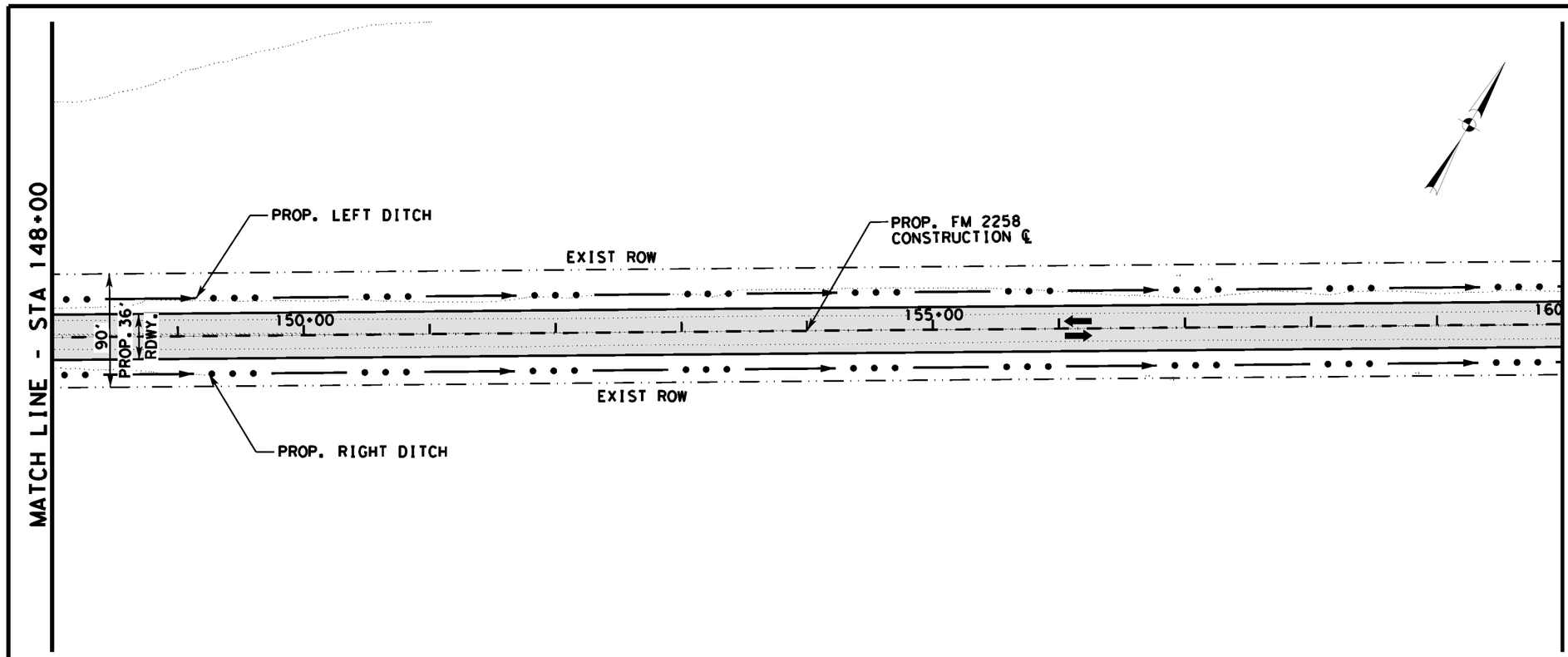

0 25 50 100
SCALE: 1"=100'

LEGEND:

- PROPOSED DITCH FLOW LINE
- EXISTING UTILITY POLE
- PROPOSED PAVEMENT RECONSTRUCTION OR AS LABELED
- TRAVEL LANE
- PGL — PROFILE GRADE LINE
- EXIST. DRAINAGE EASTMENT

NOTES:

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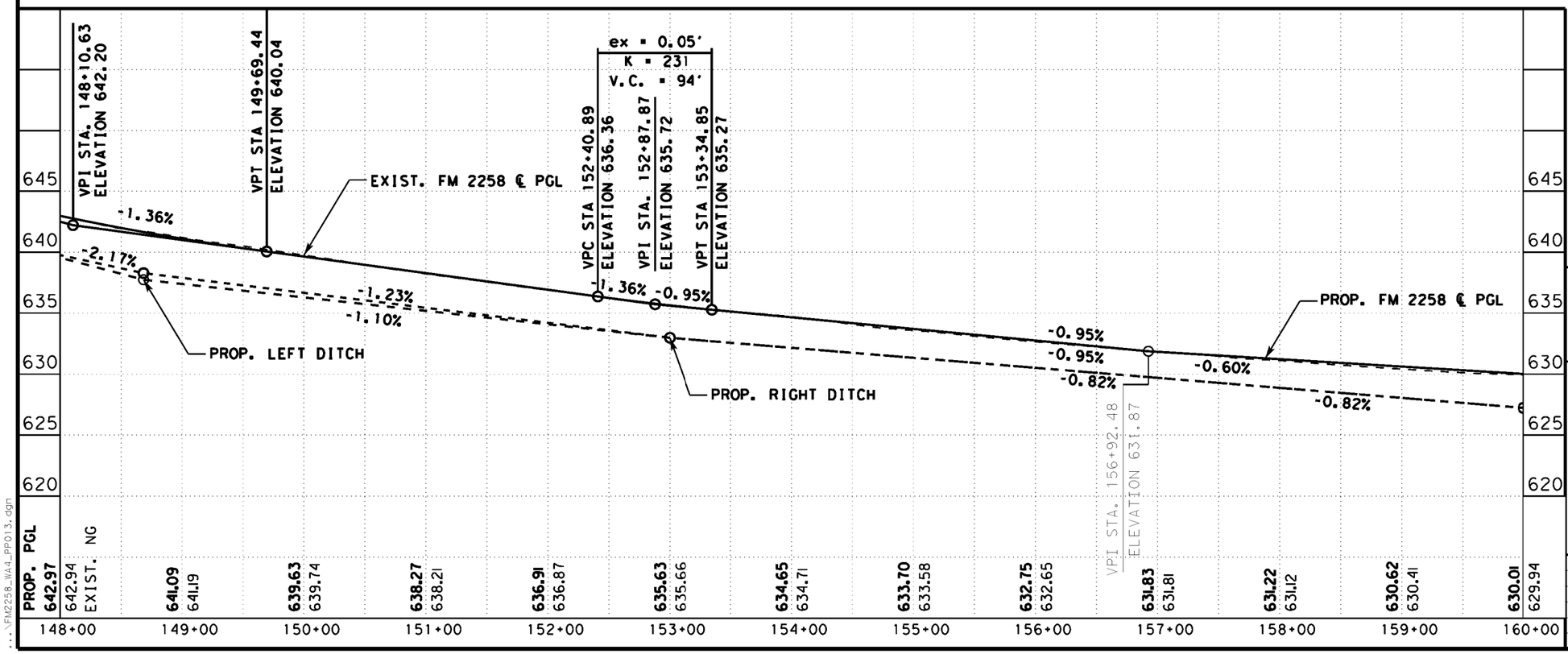

STATE OF TEXAS
HOMERO LUIS GUTIERREZ
36639
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HOMERO L. GUTIERREZ, P.E.
P.E. 36639
2/12/2024
DATE

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TBPE REGISTRATION NO. F-5246

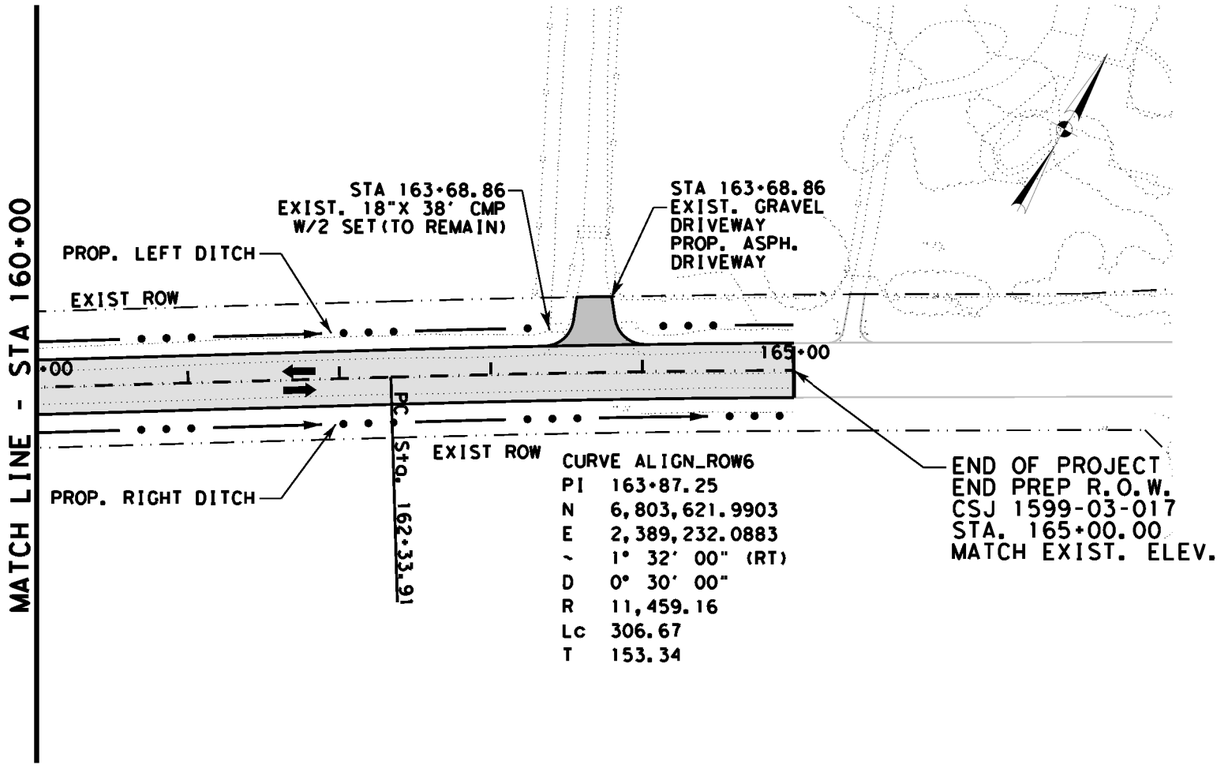
Texas Department of Transportation

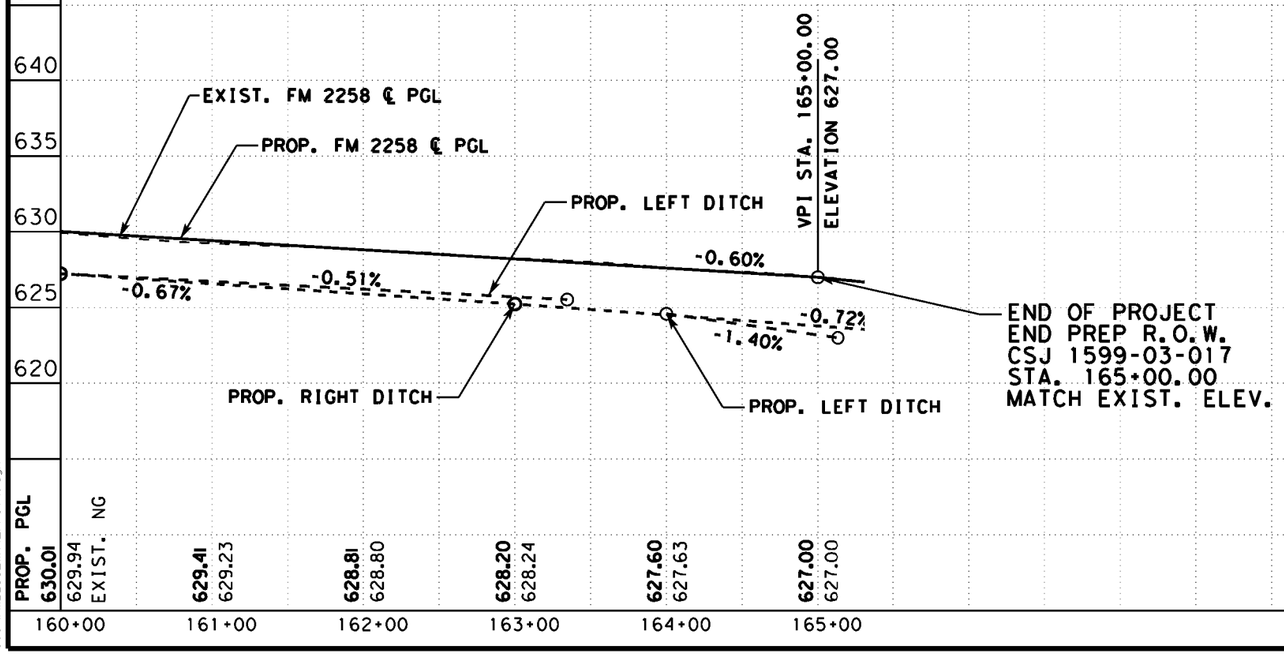
PLAN & PROFILE STA 148+00 TO STA 160+00

HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 13 OF 14

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	91
STATE	DIST.	COUNTY
TEXAS	FTW	JOHNSON
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258





0 25 50 100
SCALE: 1"=100'

LEGEND:

- PROPOSED DITCH FLOW LINE
- EXISTING UTILITY POLE
- PROPOSED PAVEMENT RECONSTRUCTION OR AS LABELED
- TRAVEL LANE
- PGL — PROFILE GRADE LINE
- EXIST. DRAINAGE EASTMENT

NOTES:

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STATE OF TEXAS
HOMERO LUIS GUTIERREZ
36639
LICENSED PROFESSIONAL ENGINEER

HOMERO L. GUTIERREZ, P.E.
P.E. 36639
2/12/2024
DATE

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

PLAN & PROFILE STA 160+00 TO END PROJECT

HORZ: 1" = 100'
VERT: 1" = 10'
SHEET 14 OF 14

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		92
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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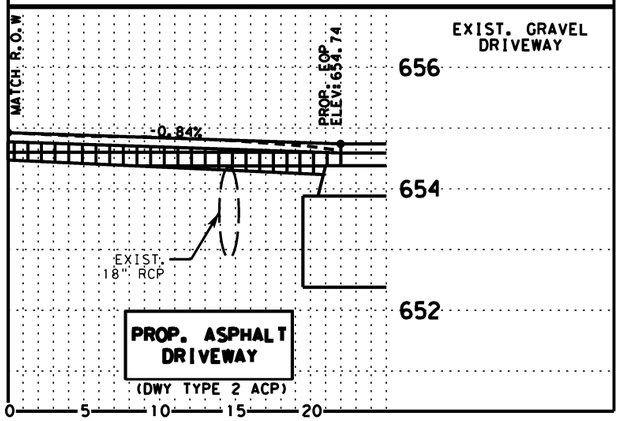
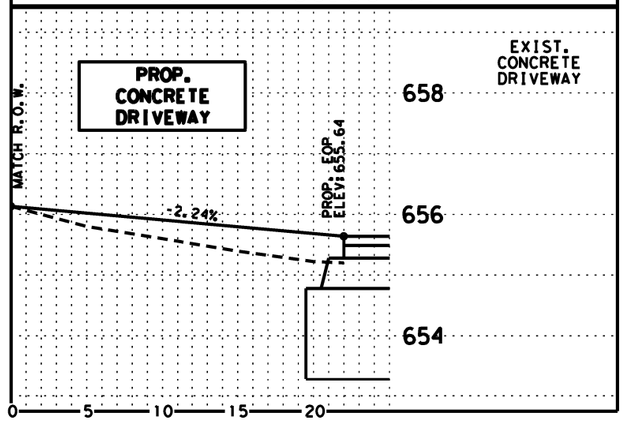
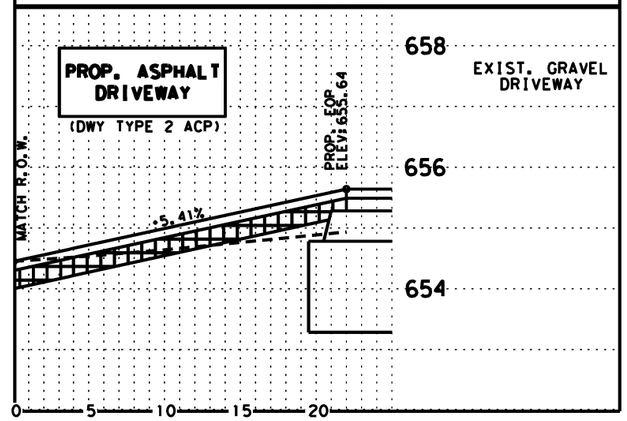
STA 9+57.53 (RT)



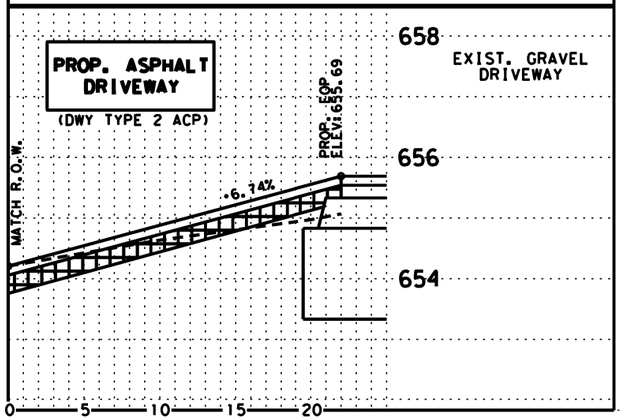
STA 10+38.58 (LT)



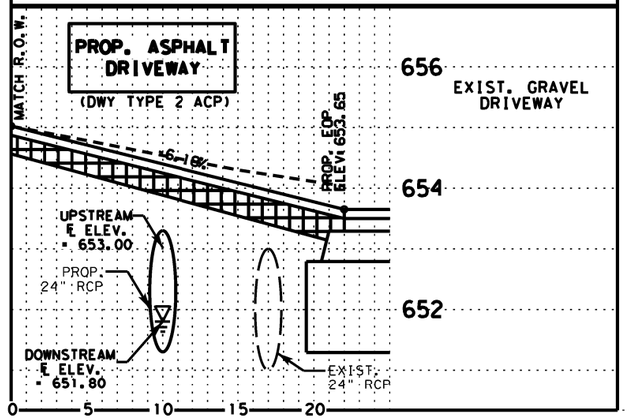
STA 10+42.22 (RT)



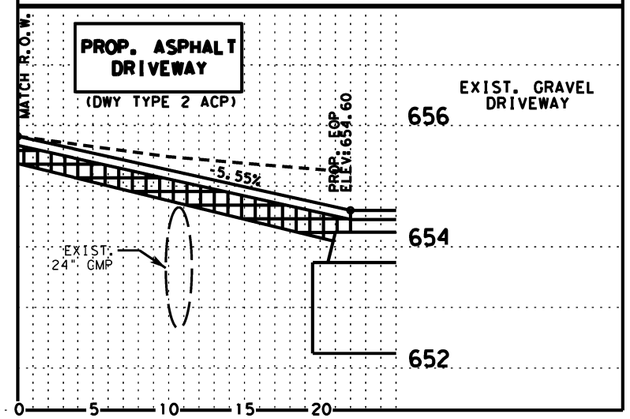
STA 10+78.66 (RT)



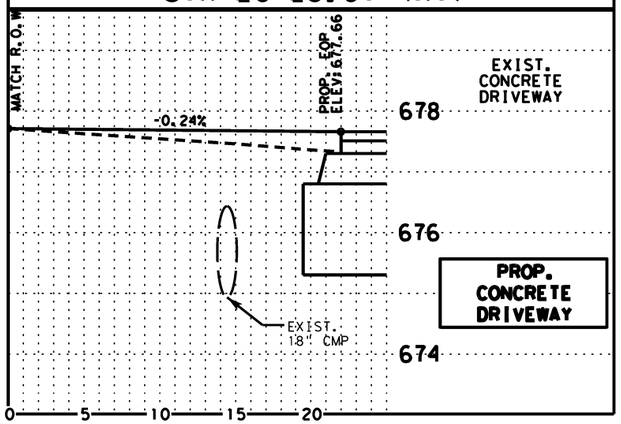
STA 12+36.02 (LT)



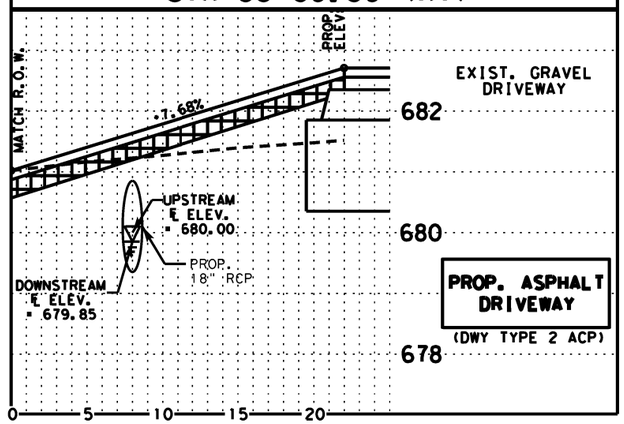
STA 19+34.81 (RT)



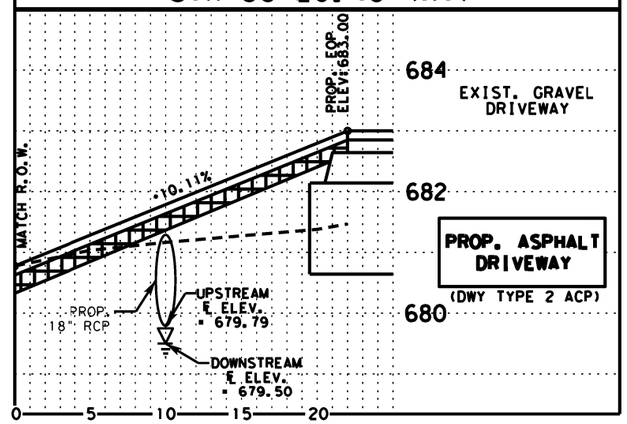
STA 26+25.91 (RT)



STA 35+89.39 (RT)



STA 38+20.46 (RT)



LEGEND:

——— PROPOSED DRIVEWAY PROFILE

- - - - EXISTING DRIVEWAY PROFILE

NOTES:

1. SEE QUANTITY TABLES, PLAN & PROFILE SHEETS AND DRIVEWAY DETAIL SHEETS FOR ADDITIONAL DETAILS AND LIMITS INFORMATION.
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STATE OF TEXAS
HOMERO LUIS GUTIERREZ
36639
LICENSED PROFESSIONAL ENGINEER

Homero Luis Gutierrez

HOMERO L. GUTIERREZ, P.E.
P.E. 36639
2/1/2024
DATE

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

PROPOSED DRIVEWAY PROFILE DRIVEWAYS 1-9

SHEET 1 OF 3

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		93
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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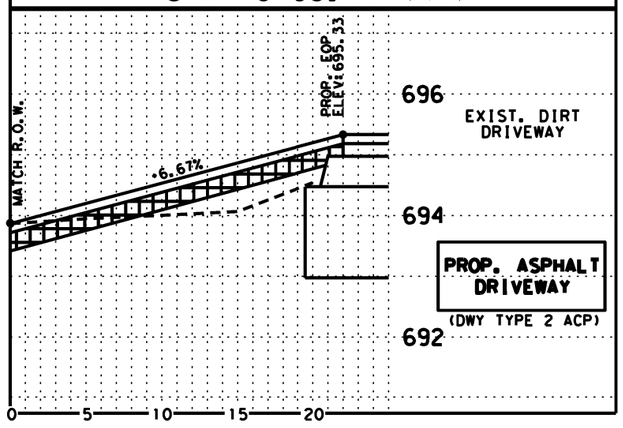
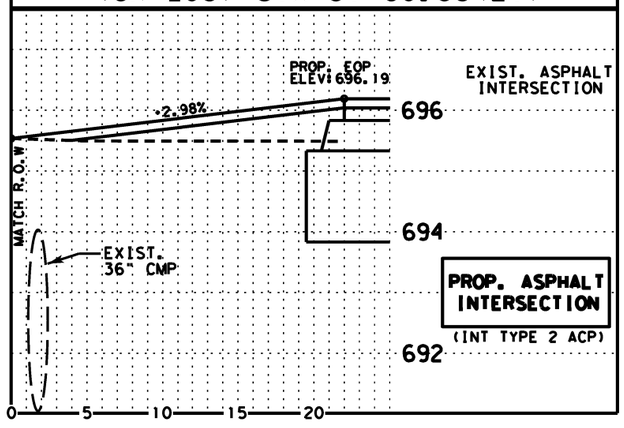
STA 49+83.47 (RT)



(CR 203)-STA 51+60.95(LT)



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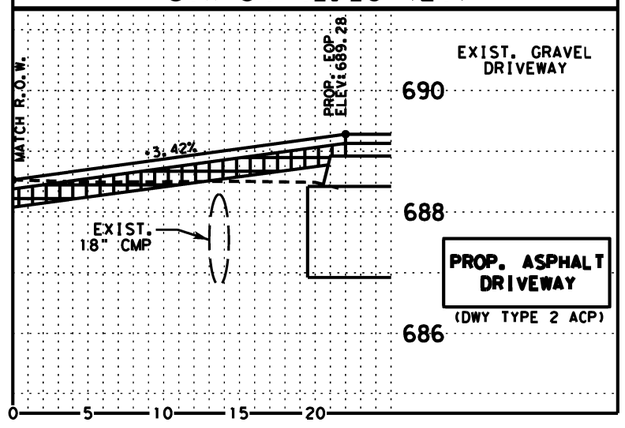

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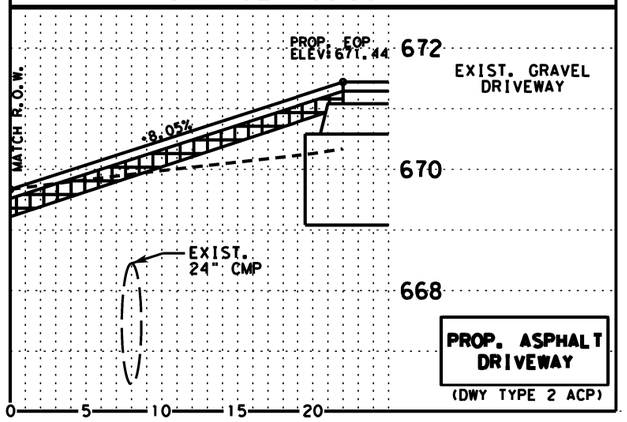
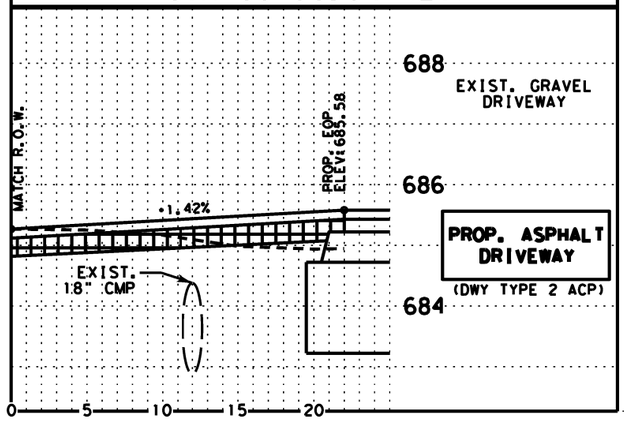
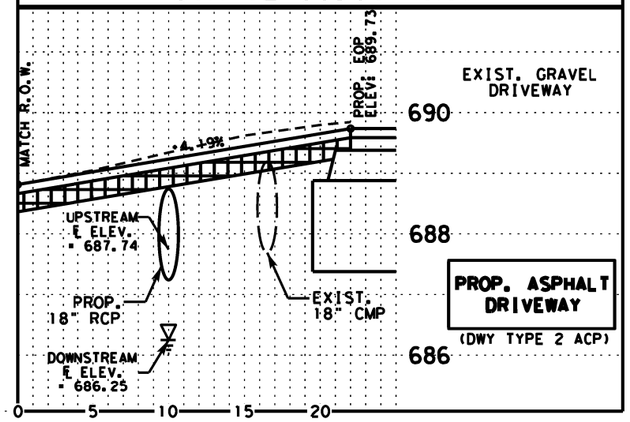


STA 68+96.94 (LT)



STA 72+33.51 (RT)



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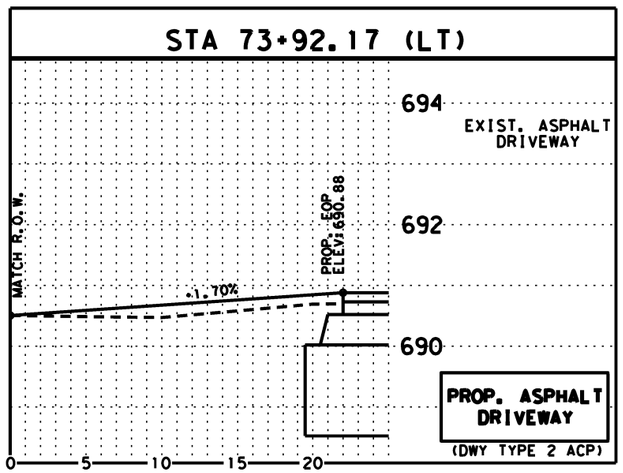
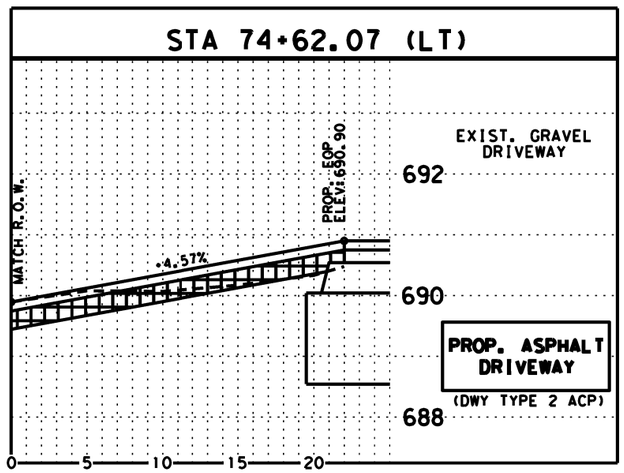
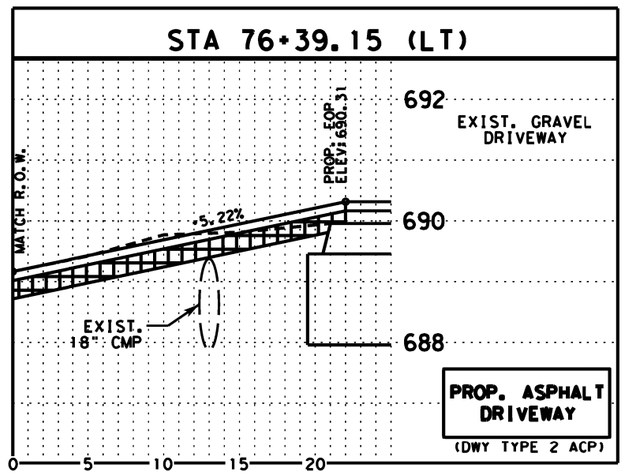


STA 74+62.07 (LT)



STA 76+39.15 (LT)



LEGEND:

——— PROPOSED DRIVEWAY PROFILE

- - - - EXISTING DRIVEWAY PROFILE

NOTES:

1. SEE QUANTITY TABLES, PLAN & PROFILE SHEETS AND DRIVEWAY DETAIL SHEETS FOR ADDITIONAL DETAILS AND LIMITS INFORMATION.
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STATE OF TEXAS
HOMERO LUIS GUTIERREZ
36639
LICENSED PROFESSIONAL ENGINEER

HOMERO L. GUTIERREZ, P.E.
P.E. 36639
2/1/2024
DATE

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

PROPOSED DRIVEWAY PROFILE DRIVEWAYS 10-18

SHEET 2 OF 3

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		94
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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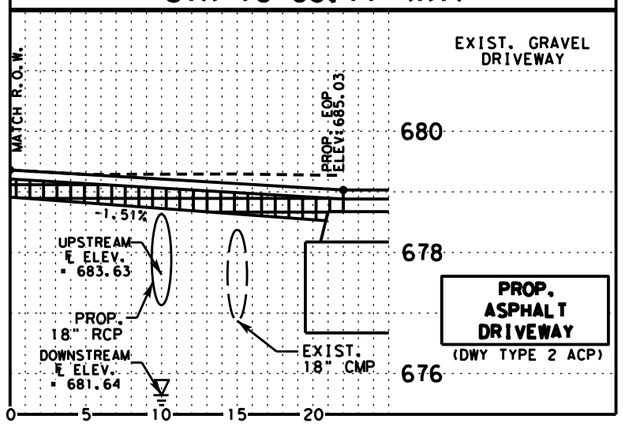
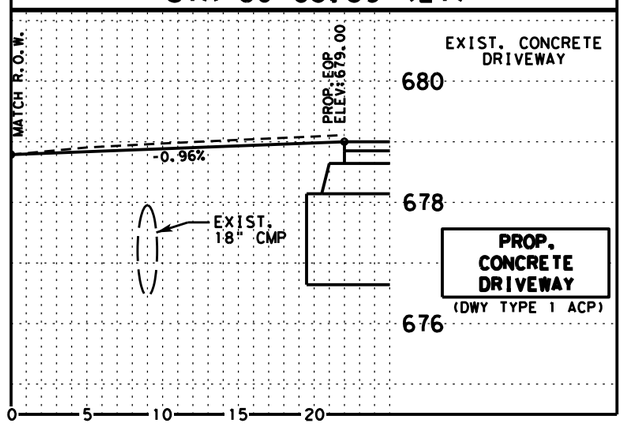
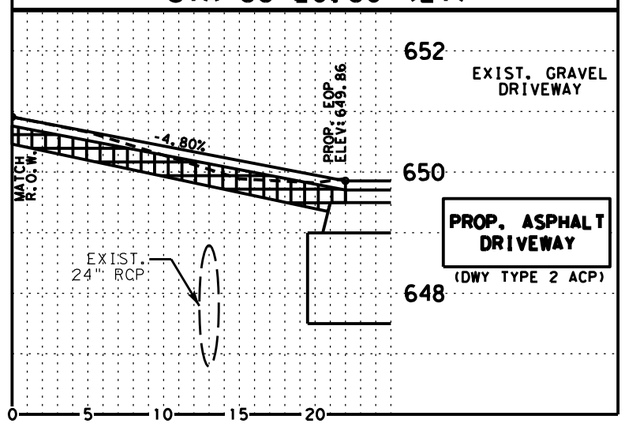
STA 78+83.11 (RT)



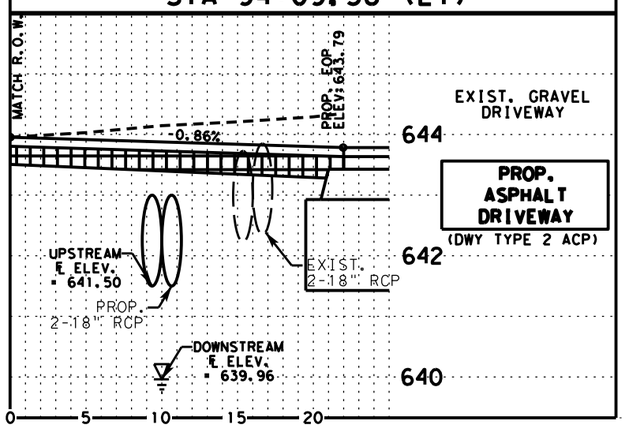
STA 80+63.59 (LT)



STA 88+20.80 (LT)



STA 94+09.58 (LT)



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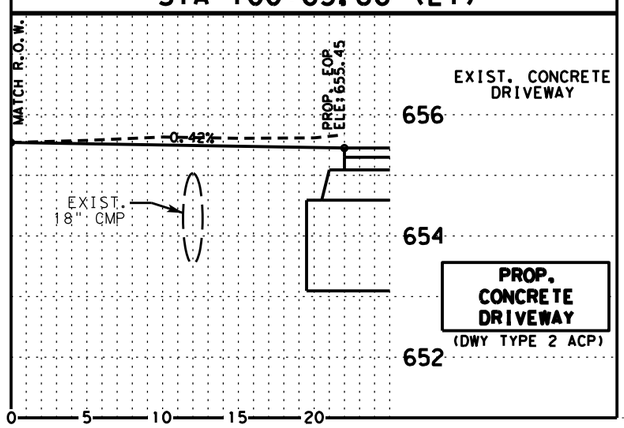
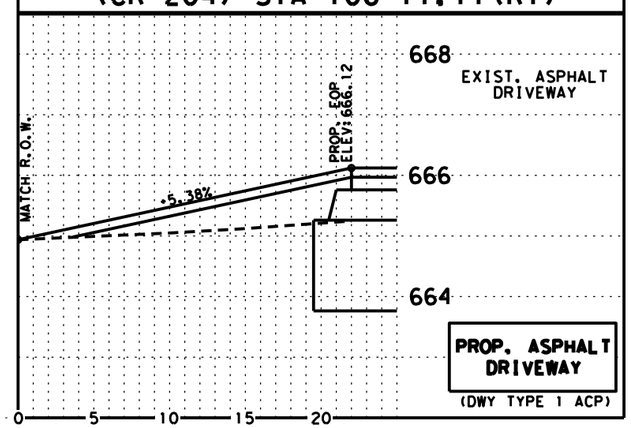


(CR 204)-STA 106+17.11(RT)



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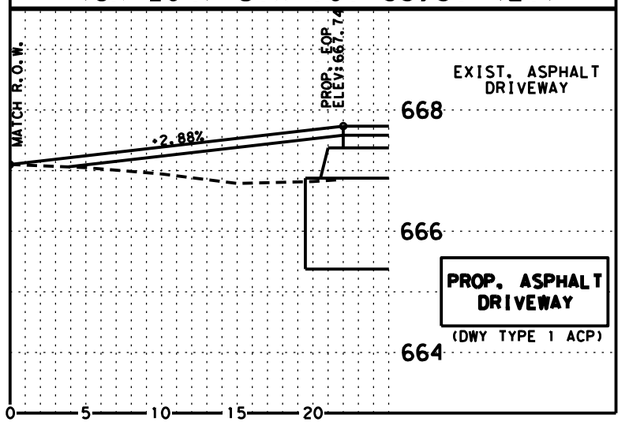
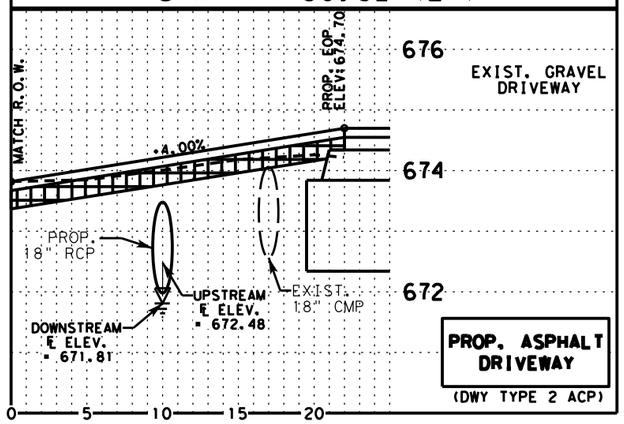
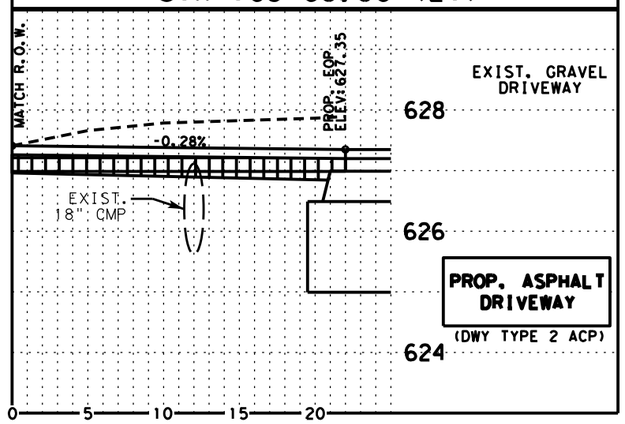


STA 114+90.62 (LT)



STA 163+68.86 (LT)



LEGEND:

——— PROPOSED DRIVEWAY PROFILE

- - - - EXISTING DRIVEWAY PROFILE

NOTES:

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STATE OF TEXAS
HOMERO LUIS GUTIERREZ
36639
LICENSED PROFESSIONAL ENGINEER

HOMERO L. GUTIERREZ, P.E.
P.E. 36639
2/1/2024
DATE

CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

PROPOSED DRIVEWAY PROFILE DRIVEWAYS 19-27

SHEET 3 OF 3

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		95
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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SUPERELEVATION	LEFT LANE
STATION	CROSS SLOPE
6+60.000 RI	-2.00%
21+27.143 RI	-2.00%
21+35.000 RI	-2.80%
25+35.000 RI	-2.80%
25+56.430 RI	-2.00%
37+74.720 RI	-2.00%
49+03.820 RI	-2.00%
50+13.520 RI	0.00%
51+23.210 RI	2.00%
52+00.000 RI	3.40%
55+00.000 RI	5.00%
56+00.000 RI	3.00%
57+00.000 RI	1.00%
57+40.000 RI	0.00%
57+55.520 RI	-1.00%
57+76.180 RI	-2.00%
58+00.000 RI	-1.00%
59+00.000 RI	-3.00%
64+02.940 RI	-2.00%
64+40.000 RI	-1.00%
76+32.210 RI	-2.00%
87+54.210 RI	-2.00%
88+50.000 RI	-5.60%
104+90.000 RI	-5.60%
105+85.790 RI	-2.00%
106+49.920 RI	0.41%
106+50.800 RI	0.42%
106+61.000 RI	0.00%
107+14.210 RI	2.00%
108+10.000 RI	5.60%
124+35.000 RI	5.60%
128+29.490 R2	2.00%
128+82.700 R2	0.00%
129+35.910 R2	-2.00%
145+05.903 R2	-2.00%
145+05.903 R2	-2.00%
162+33.700 R2	-2.00%

SUPERELEVATION	RIGHT LANE
STATION	CROSS SLOPE
6+60.000 RI	-2.00%
20+12.857 RI	-2.00%
20+70.000 RI	0.00%
21+27.143 RI	2.00%
21+35.000 RI	2.80%
25+35.000 RI	2.80%
25+56.430 RI	2.00%
26+10.000 RI	0.00%
26+63.570 RI	-2.00%
37+74.720 RI	-2.00%
51+23.210 RI	-2.00%
52+00.000 RI	-3.40%
55+00.000 RI	-5.00%
56+00.000 RI	-3.00%
57+00.000 RI	-1.00%
57+40.000 RI	0.00%
57+55.520 RI	1.00%
57+76.180 RI	2.00%
58+00.000 RI	1.00%
59+00.000 RI	3.00%
64+02.940 RI	2.00%
64+40.000 RI	1.00%
64+77.060 RI	0.00%
65+51.180 RI	-2.00%
76+32.210 RI	-2.00%
86+47.790 RI	-2.00%
87+01.000 RI	0.00%
87+54.210 RI	2.00%
88+50.000 RI	5.60%
104+90.000 RI	5.60%
105+85.790 RI	2.00%
106+39.000 RI	0.00%
106+49.920 RI	-0.41%
106+50.800 RI	-0.42%
107+15.357 RI	-2.00%
108+15.000 RI	-5.60%
124+35.000 RI	-5.60%
128+33.343 R2	-2.00%
145+05.903 R2	-2.00%
145+05.903 R2	-2.00%
162+33.700 R2	-2.00%

STATE OF TEXAS
HOMERO LUIS GUTIERREZ
36639
LICENSED PROFESSIONAL ENGINEER

HOMERO L. GUTIERREZ, P.E.
P.E. 36639
1/30/2024
DATE

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

SUPERELEVATION DATA

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		96
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

Description: PROP ADJUSTED LEFT DITCH

		STATION	ELEV	GRADE
VPI	1	7+00.00	646.4700	
VPI	2	8+50.00	650.5622	2.7281
VPI	3	10+12.00	654.3513	2.3390
VPI	4	10+67.00	654.6000	
VPI	5	12+05.00	653.0000	-1.1594
VPI	6	12+55.00	651.8000	
VPI	7	13+50.00	651.2300	-0.6000
VPI	8	15+40.00	647.0000	-2.2263
VPI	9	17+00.00	647.3577	
VPI	10	19+00.00	652.0000	2.3211
VPI	11	24+00.00	668.0000	3.2000
VPI	12	25+50.00	673.6000	3.7333
VPI	13	28+00.00	677.6612	1.6245
VPI	14	31+90.00	675.5000	-0.5542
VPI	15	33+00.00	676.0000	
VPI	16	35+00.00	680.0000	2.0000
VPI	17	37+00.00	682.0000	1.0000
VPI	18	39+00.00	680.0000	-1.0000
VPI	19	41+55.00	674.0000	-2.3529
VPI	20	45+00.00	679.2000	
VPI	21	48+00.00	691.0000	3.9333
VPI	22	50+05.42	694.8601	1.8791
VPI	23	50+93.78	694.5798	-0.3173
VPI	24	54+58.00	685.1215	
VPI	25	54+90.00	684.1165	-3.1405
VPI	26	58+00.00	674.4000	-3.1344
VPI	27	59+00.00	671.8250	-2.5750
VPI	28	60+00.00	670.4000	-1.4250
VPI	29	64+50.00	671.0000	
VPI	30	66+00.00	674.5000	2.3333
VPI	31	68+50.00	682.0000	3.0000
VPI	32	69+19.42	683.5000	
VPI	33	71+00.00	687.0000	1.9382
VPI	34	73+50.00	689.0000	0.8000
VPI	35	74+81.00	689.0000	
VPI	36	76+00.00	688.4000	-0.5042
VPI	37	76+70.00	687.1430	
VPI	38	78+50.00	683.2875	-2.1419
VPI	39	80+35.00	677.4000	-3.1824
VPI	40	80+95.42	675.4772	
VPI	41	84+00.00	665.5000	-3.2757
VPI	42	87+85.00	649.5106	-4.1531
VPI	43	94+25.16	645.2070	0.4268
VPI	44	94+25.76	641.5030	
VPI	45	96+50.00	646.8155	2.3691
VPI	46	100+25.42	652.4647	1.5048
VPI	47	101+15.42	654.1099	
VPI	48	106+43.06	663.7551	1.8280
VPI	49	107+17.00	664.9805	
VPI	50	109+17.00	668.2805	1.6500
VPI	51	114+70.00	671.8105	0.6383
VPI	52	115+20.00	672.4807	
VPI	53	117+05.42	673.5307	0.5663
VPI	54	121+00.00	671.4076	-0.5381
VPI	55	122+45.82	670.5900	-0.5600

End Region 1

Equation: Sta 124+79.20 (BK) = Sta 127+77.90 (AH)

Begin Region 2

VPI	56	129+43.48	668.0225	
VPI	57	132+92.48	673.3334	1.5217
VPI	58	133+92.48	673.7008	0.3674
VPI	59	135+00.00	672.9601	-0.6518
VPI	60	138+00.00	666.0000	-2.3333
VPI	61	148+68.48	637.7310	-2.6457
VPI	62	153+00.00	632.9777	-1.1015
VPI	63	160+00.00	627.2325	-0.8207
VPI	64	163+34.48	625.5225	-0.5112
VPI	65	164+00.00	624.5847	
VPI	66	165+13.48	623.0000	-1.3965

STATE OF TEXAS
HOMERO LUIS GUTIERREZ
36639
LICENSED PROFESSIONAL ENGINEER

Homero Luis Gutierrez

HOMERO L. GUTIERREZ, P.E.
P.E. 36639
2/1/2024
DATE

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

PROPOSED LEFT DITCH VERTICAL ALIGNMENT

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		97
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

Description: PROP ADJUSTED RIGHT DITCH

		STATION	ELEV	GRADE
VPI	1	6+60.00	644.5000	
VPI	2	7+00.00	645.1989	1.7472
VPI	3	7+47.60	646.5000	2.7334
VPI	4	8+00.00	648.3000	3.4351
VPI	5	9+44.00	652.4952	2.9133
VPI	6	9+66.00	653.0957	
VPI	7	10+00.00	654.0238	2.7296
VPI	8	18+00.00	649.3712	
VPI	9	18+90.00	651.8217	2.7228
VPI	10	19+70.00	654.0000	
VPI	11	22+00.00	663.4000	4.0870
VPI	12	25+50.00	674.2000	3.0857
VPI	13	26+69.28	676.6928	
VPI	14	28+00.00	678.0000	1.0000
VPI	15	29+00.00	677.3466	-0.6534
VPI	16	35+00.00	679.0000	
VPI	17	35+80.00	679.8513	1.0641
VPI	18	36+00.00	680.0000	
VPI	19	36+75.98	680.8363	1.1007
VPI	20	37+70.00	679.7855	-1.1177
VPI	21	38+45.00	679.5000	
VPI	22	41+00.00	673.2000	-2.4706
VPI	23	41+40.00	672.5000	-1.7500
VPI	24	43+66.00	673.5500	
VPI	25	48+00.00	691.4000	4.1129
VPI	26	49+65.00	693.0000	0.9697
VPI	27	52+00.00	689.5000	
VPI	28	54+00.00	687.0000	-1.2500
VPI	29	58+00.00	674.4000	-3.1500
VPI	30	61+20.00	667.7500	-2.0781
VPI	31	63+24.90	669.0000	
VPI	32	65+40.00	673.8000	2.2315
VPI	33	67+00.00	678.5000	2.9375
VPI	34	68+35.00	681.1807	1.9857
VPI	35	69+50.00	684.0000	
VPI	36	70+50.00	685.5000	1.5000
VPI	37	72+00.00	687.0000	1.0000
VPI	38	72+75.00	687.7400	
VPI	39	75+15.00	688.6792	0.3913
VPI	40	76+55.00	687.8076	-0.6226
VPI	41	77+47.22	686.5239	-1.3920
VPI	42	78+45.00	683.7452	-2.8418
VPI	43	79+40.00	680.5000	
VPI	44	81+00.00	676.5000	-2.5000
VPI	45	84+00.00	665.0000	-3.8333
VPI	46	86+00.00	658.0000	-3.5000
VPI	47	88+00.00	649.6361	-4.1820
VPI	48	94+00.00	642.2000	
VPI	49	97+00.00	649.0000	2.2667
VPI	50	103+00.00	658.5000	1.5833
VPI	51	105+00.00	662.5000	2.0000
VPI	52	106+65.42	664.5000	
VPI	53	113+00.00	669.2000	0.7406
VPI	54	117+88.99	671.5000	0.4704
VPI	55	122+00.00	669.0000	-0.6100
VPI	56	123+00.00	669.0000	0.0000
VPI	57	124+00.00	668.5000	-0.5000

End Region 1

Equation: Sta 124+79.20 (BK) = Sta 127+77.90 (AH)

Begin Region 2

VPI	58	127+92.48	667.6625	-0.5445
VPI	59	129+43.48	669.0000	
VPI	60	131+03.70	670.6529	1.0317
VPI	61	131+67.48	671.3212	
VPI	62	133+43.70	674.1712	1.6173
VPI	63	133+83.70	674.3212	
VPI	64	136+62.48	669.2283	-1.8268
VPI	65	138+92.48	664.7923	
VPI	66	147+00.00	641.9188	-2.8326
VPI	67	148+68.48	638.2708	-2.1652
VPI	68	153+00.00	632.9777	-1.2266
VPI	69	160+00.00	627.2325	-0.8207
VPI	70	163+00.00	625.2287	-0.6679
VPI	71	165+50.00	623.4209	-0.7231

STATE OF TEXAS
HOMERO LUIS GUTIERREZ
36639
LICENSED PROFESSIONAL ENGINEER

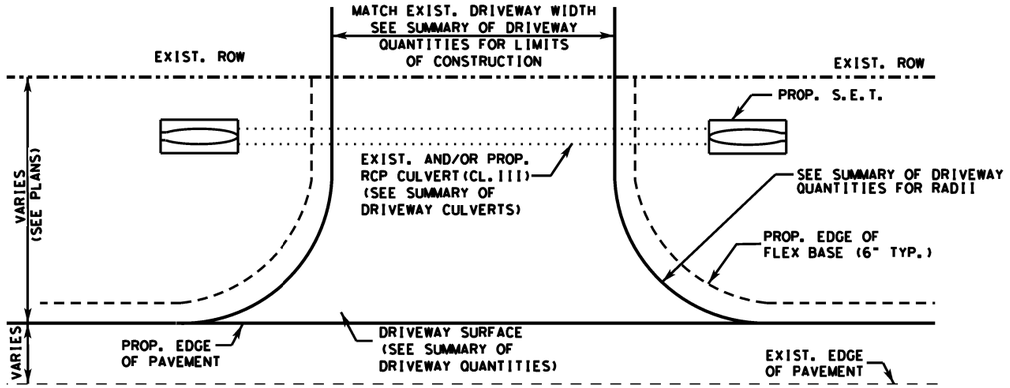
HOMERO L. GUTIERREZ, P.E.
P.E. 36639
2/1/2024
DATE

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

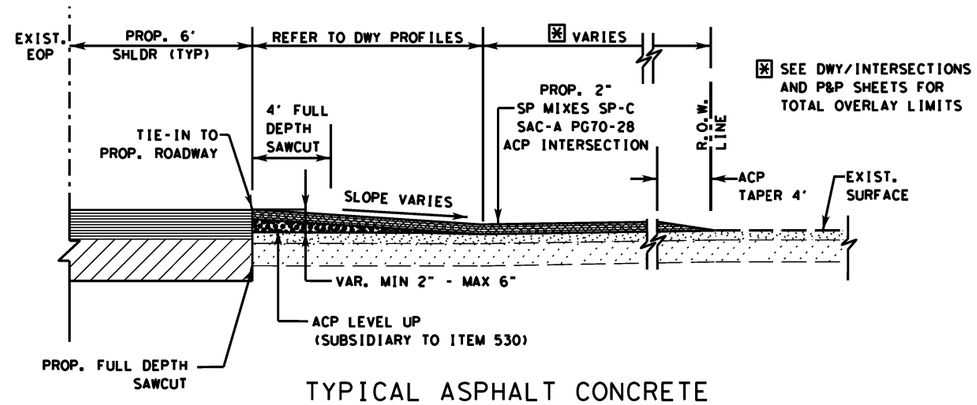
Texas Department of Transportation

PROPOSED RIGHT DITCH VERTICAL ALIGNMENT

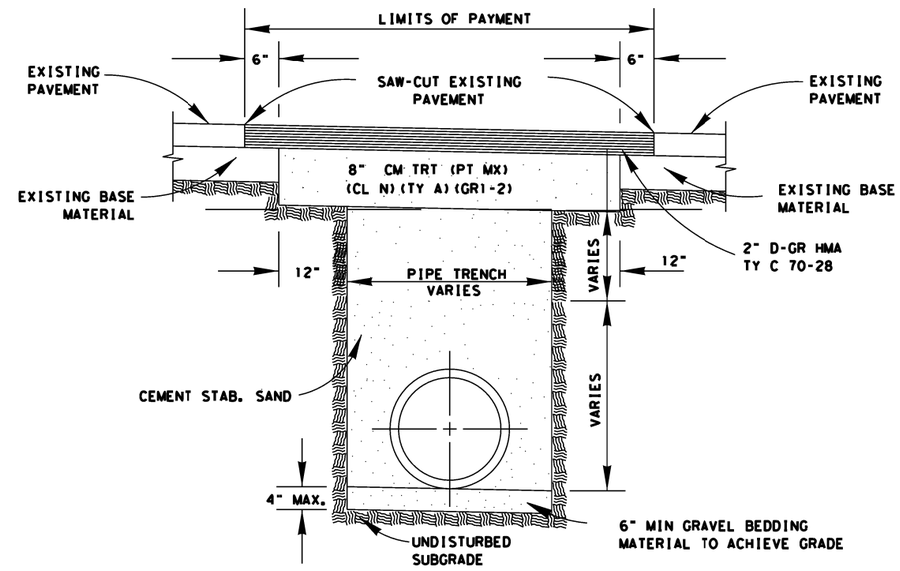
FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		98
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258



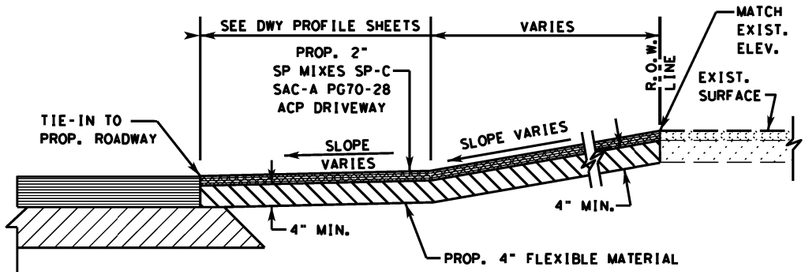
TYPICAL DRIVEWAY DETAIL



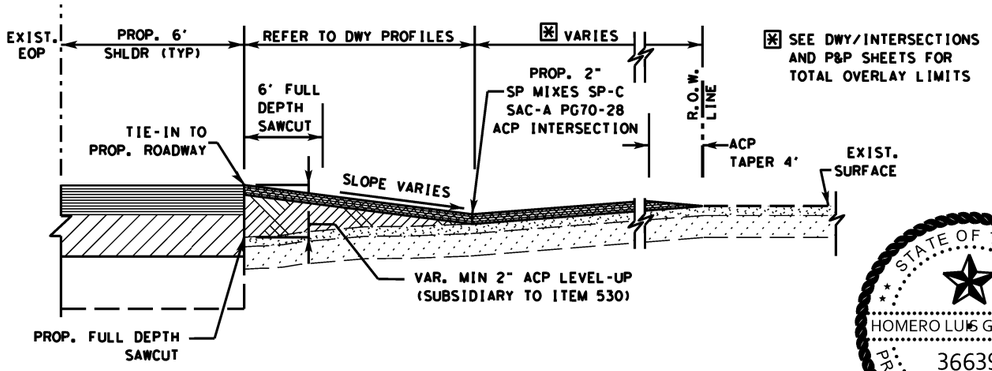
TYPICAL ASPHALT CONCRETE PAVEMENT DRIVEWAY SECTION (2" OVERLAY) (TYP 1)



CUT AND RESTORE PAVEMENT DETAIL AT INTERSECTIONS (NTS)



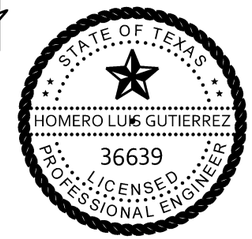
TYPICAL ASPHALT CONCRETE PAVEMENT DRIVEWAY SECTION (TYP 2)



TYPICAL ASPHALT CONCRETE PAVEMENT INTERSECTION (2" OVERLAY) (TY 1)

NOTES:

1. CONTRACTOR SHALL SAW CUT EXISTING DRIVEWAYS/INTERSECTIONS 6' FROM EXISITNG EDGE OF PAVEMENT.
2. INTERSECTIONS SHALL BE SAW CUT AN ADDITIONAL 6' FROM PROP. EDGE OF PAVEMENT. SEE PROP. DRIVEWAY PROFILE SHEETS FOR INTERSECTIONS REQUIRING SAW CUT.
3. DRIVEWAYS SHALL BE SAW CUT AN ADDITIONAL 4' FROM PROP. EDGE OF PAVEMENT. SEE PROP. DRIVEWAY PROFILE SHEETS FOR DRIVEWAYS REQUIRING SAW CUT.
4. ALL SAW CUTS SHALL BE SUBSIDIARY TO ITEM 530.
5. ALL ACP LEVEL-UP SHALL BE SUBSIDIARY TO ITEM 530.



HOMERO L. GUTIERREZ, P.E.
P.E. 36639
1/30/2024
DATE

CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

DRIVEWAY DETAILS

SCALE: NTS

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		99
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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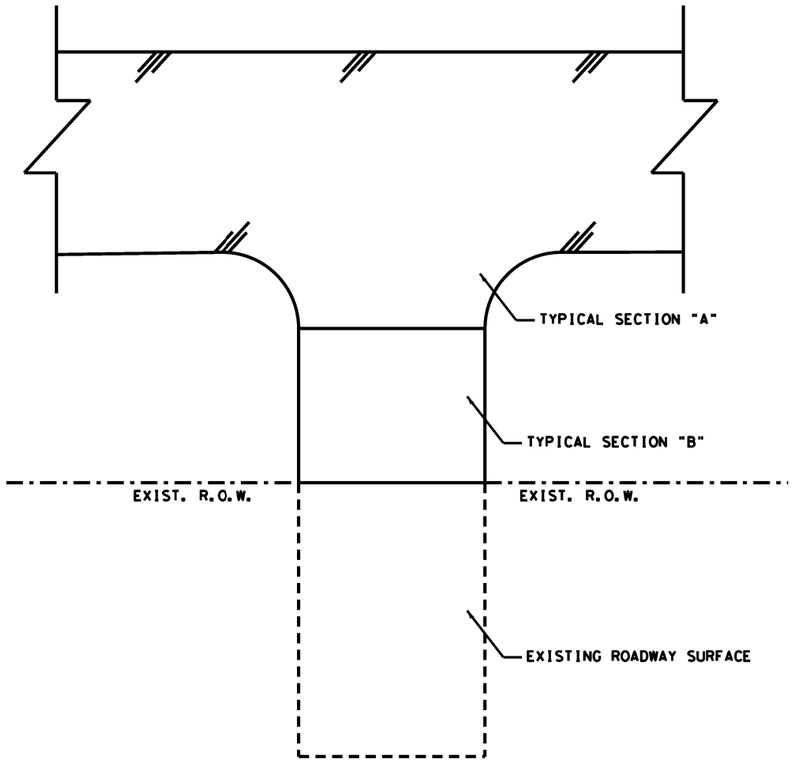
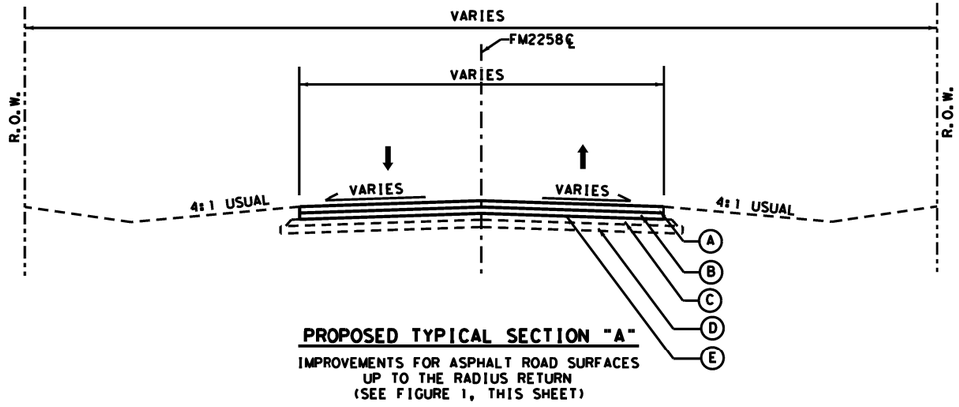


FIGURE 1

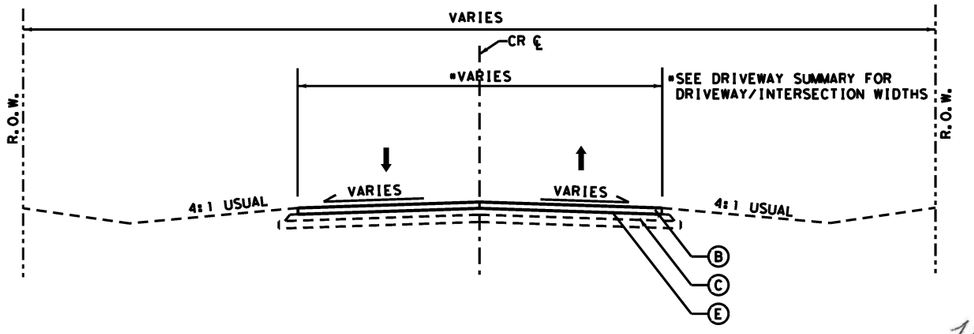
EXISTING SURFACE CONDITIONS

NAME	LOCATION	SURFACE
CR 203	NORTH	ASPHALT
CR 204	SOUTH	ASPHALT
CR 204	NORTH	ASPHALT



PROPOSED TYPICAL SECTION "A"

IMPROVEMENTS FOR ASPHALT ROAD SURFACES
UP TO THE RADIUS RETURN
(SEE FIGURE 1, THIS SHEET)



PROPOSED TYPICAL SECTION "B"

IMPROVEMENTS FOR EXISTING ROAD SURFACES
BEYOND RADIUS RETURN TO END OF CONSTRUCTION
(SEE FIGURE 1, THIS SHEET)

SPECIFICATIONS

- (A) 2" SUPERPAV HOT MIX
- (B) 2" HMA-TYC
- (C) 5" FLEX BASE
- (D) 18" LIME TREATED SUBGRADE
- (E) PRIME COAT

HOMERO L. GUTIERREZ, P.E.
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1/30/2024
DATE

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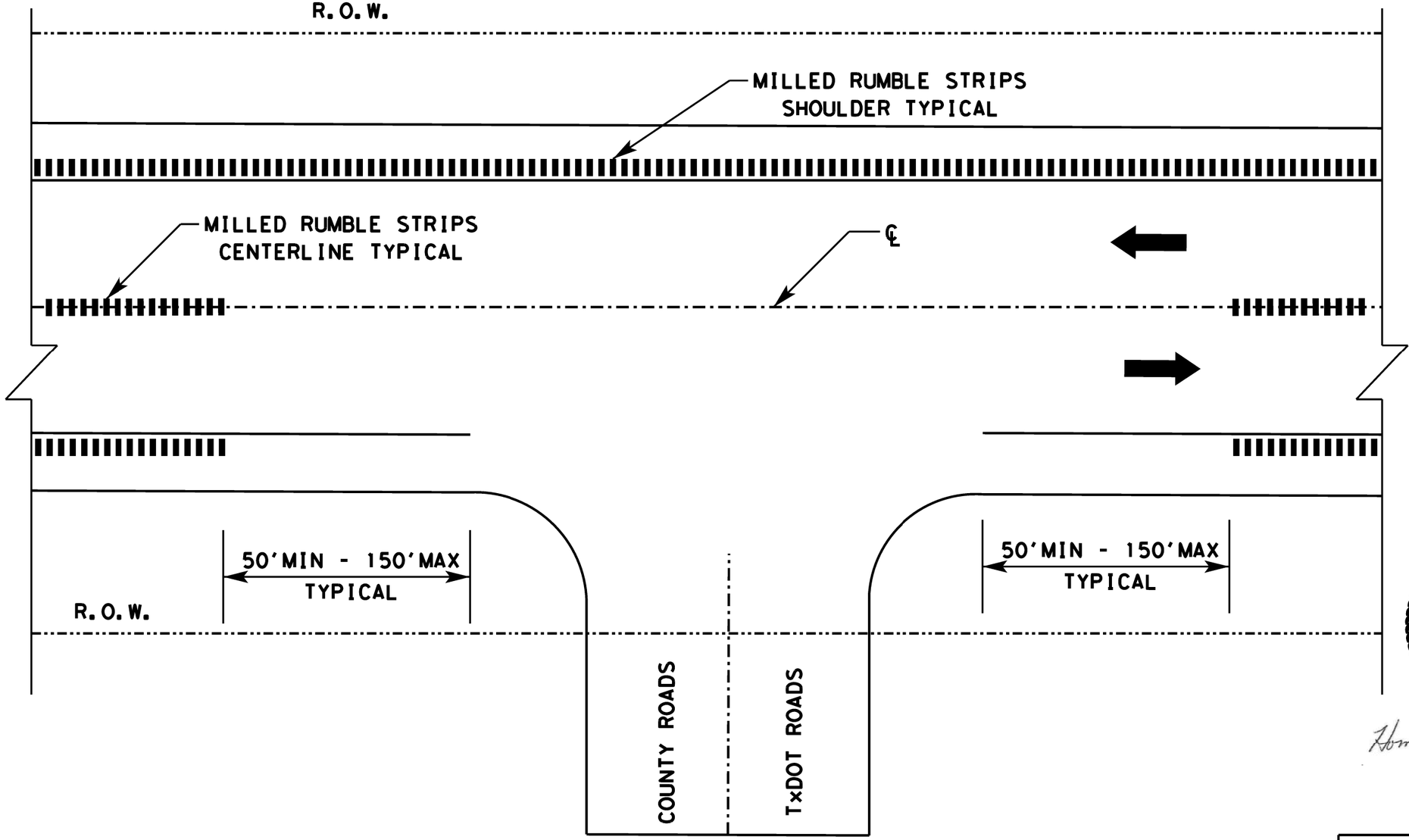
Texas Department of Transportation

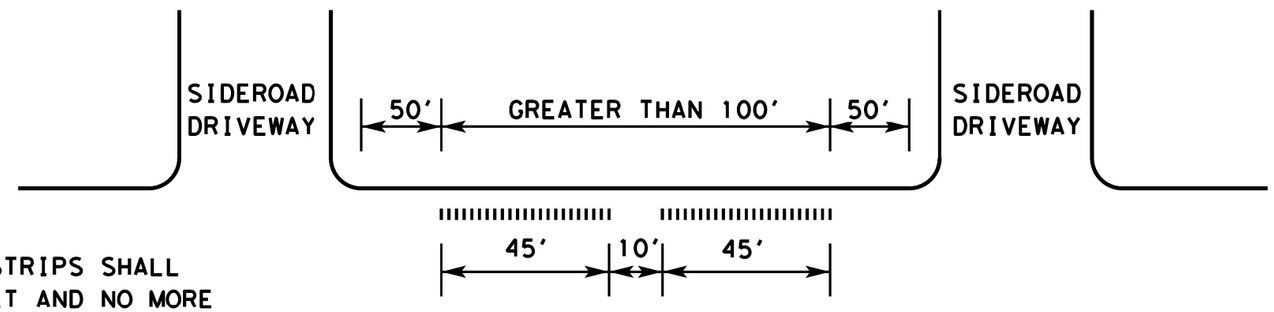
PROPOSED SIDE STREET TYPICAL ROADWAY SECTIONS

SCALE: NTS

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		100
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258



RUMBLE STRIP DETAIL
ACCORDING TO STANDARD RS(3)-13 AND RS(4)-13



BICYCLE GAP DETAIL*

*BREAKS IN EDGELINE RUMBLE STRIPS SHALL OCCUR AT LEAST EVERY 40 FEET AND NO MORE THAN 60 FEET WITH A GAP OF 10 TO 12 FEET

STATE OF TEXAS
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LICENSED PROFESSIONAL ENGINEER

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DATE

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TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

RUMBLE STRIP DETAILS

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		101
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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DATE:
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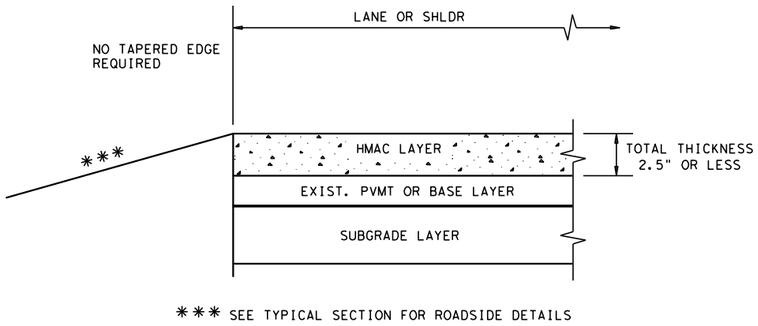
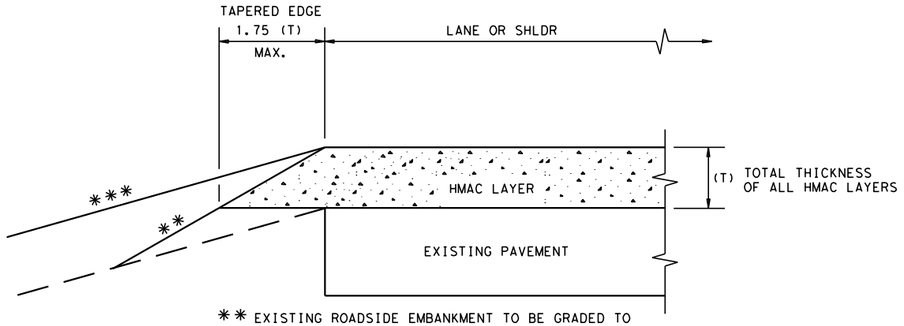


*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

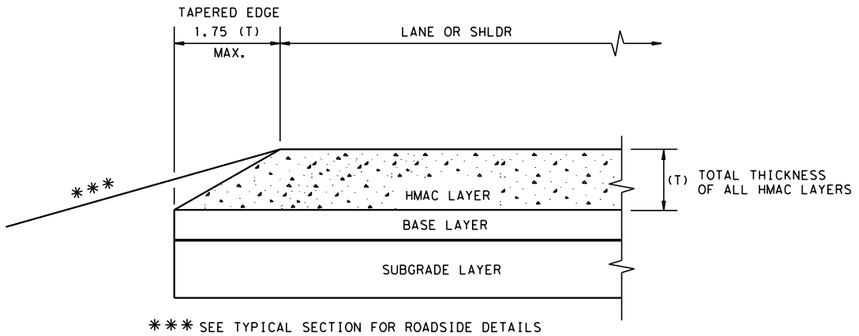
CONDITION - 1
THIN HMAC SURFACES OR HMAC OVERLAY
WITH THICKNESS OF 2.5" OR LESS



** 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.

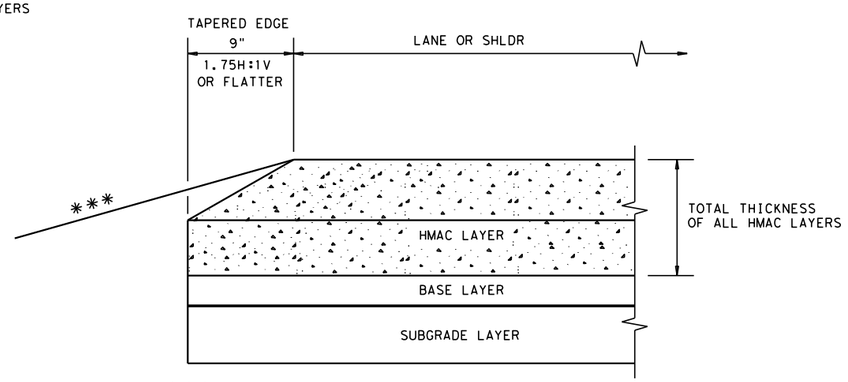
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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.

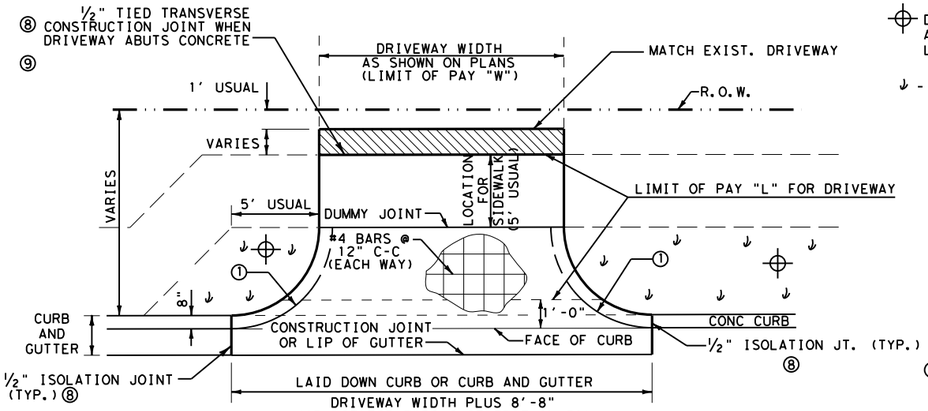
Texas Department of Transportation

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	1599	03	017			FM 2258	
	DIST	COUNTY				SHEET NO.	
	FTW	JOHNSON				102	



SHOWING SIDEWALK ADJACENT TO CURB

SHOWING SIDEWALK REMOTE FROM CURB

PLAN VIEW

⊕ DO NOT PAVE AREA BETWEEN SIDEWALK AND DRIVEWAY CURB. SEED, SOD, OR LANDSCAPE AS DIRECTED.

↓ - SEEDING OR OTHER SURFACE NOT SUITABLE AS PEDESTRIAN WALKWAY.

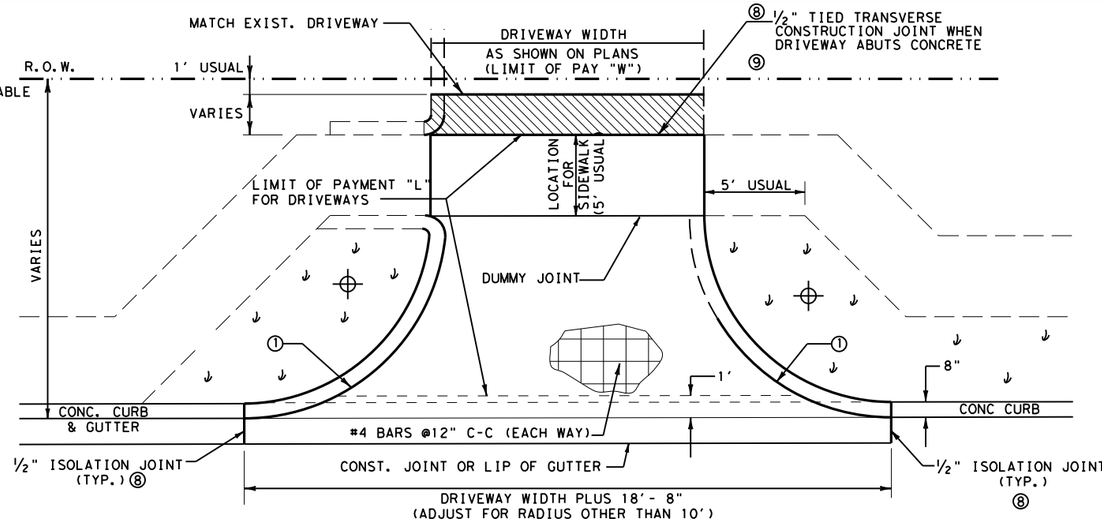
PAY AREA FOR DRIVEWAY SHALL BE THE PRODUCT OF "L" x "W"

S.Y. NON-PAY CONCRETE IN DRIVEWAY RADIUS	
2-90° RADII (FT)	NON-PAY CONC. (S.Y.)
5	0.42
10	3.04
15	10.73
20	15.36
25	29.81
30	37.19

① RADII AS SHOWN ON PLANS

SEE ROADWAY DESIGN MANUAL, APPENDIX C FOR RECOMMENDED RADII.

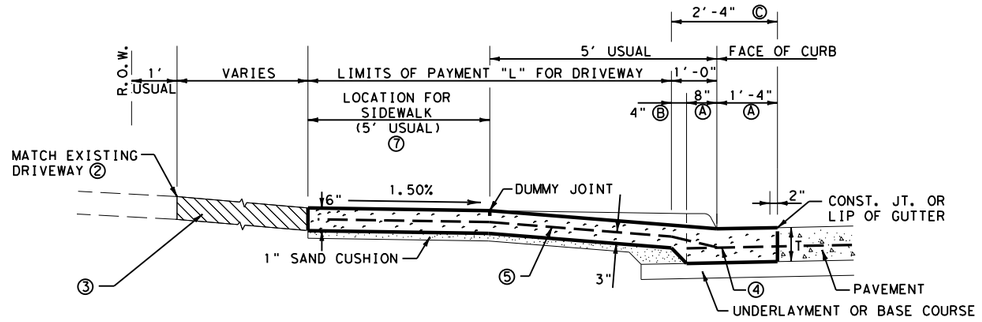
② FULL DEPTH SAW CUT IF CONCRETE

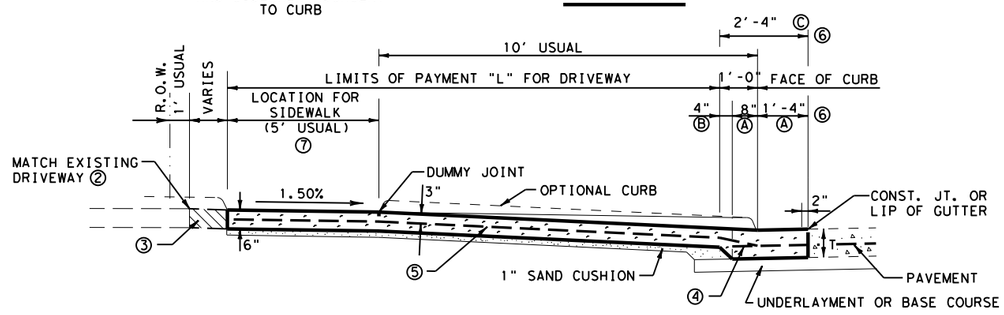


SHOWING OPTIONAL CURB AND SIDEWALK ADJACENT TO CURB

SHOWING SIDEWALK REMOTE FROM CURB

PLAN VIEW





SECTION VIEW
CONCRETE RESIDENTIAL DRIVEWAY

SECTION VIEW
CONCRETE COMMERCIAL DRIVEWAY

③ REPLACE EXISTING DRIVEWAY WITH EQUAL OR BETTER MATERIAL:

IF CONCRETE, PAY FOR AS CONCRETE DRIVEWAY.

IF HOT MIX OR OTHER MATERIAL, PAY FOR IN ACCORDANCE WITH APPROPRIATE BID ITEMS.

④ WHERE DRIVEWAY IS ADJACENT TO CONCRETE PAVEMENT, 36" - #4 TIE BAR, 12" EMBEDMENT INTO PAVEMENT (CAST-IN-PLACE OR DRILLED AND GROUTED). SPACING TO MATCH TRANSVERSE STEEL IN CONCRETE PAVEMENT.

MULTIPLE-PIECE TIE BARS OR 24" EXTENSION OF TRANSVERSE PAVING STEEL MAY BE USED IN LIEU OF TIE BARS.

LONGITUDINAL STEEL IN GUTTER PORTION TO MATCH CONCRETE PAVEMENT OR CONCRETE CURB AND GUTTER DETAILS.

⑤ #4 BARS @ 12" C-C EACH WAY (EXTEND TO FACE OF CURB) BEND AS REQ'D TO TIE TO PAVING STEEL OR TIE BARS.

⑥ IF ADJACENT TO CONCRETE PAVEMENT:
Ⓐ PAID FOR AS CONCRETE PAVEMENT,
Ⓑ PAID FOR AS CONCRETE CURB.

IF ADJACENT TO HOT MIX OR FLEXIBLE PAVEMENT:
Ⓒ PAID FOR AS CONCRETE CURB AND GUTTER.

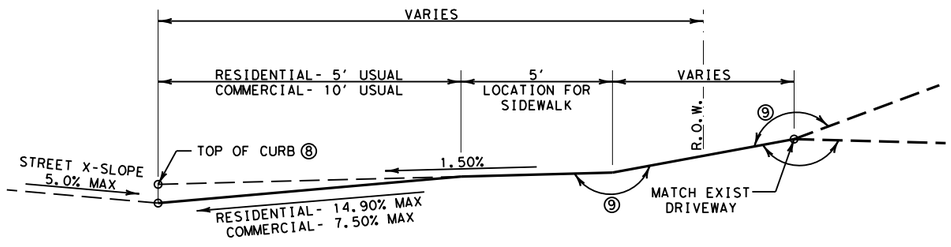
T = THICKNESS OF CONCRETE PAVEMENT OR CONCRETE CURB AND GUTTER

⑦ LOCATION FOR SIDEWALK TO BE PROVIDED ON ALL DRIVEWAYS

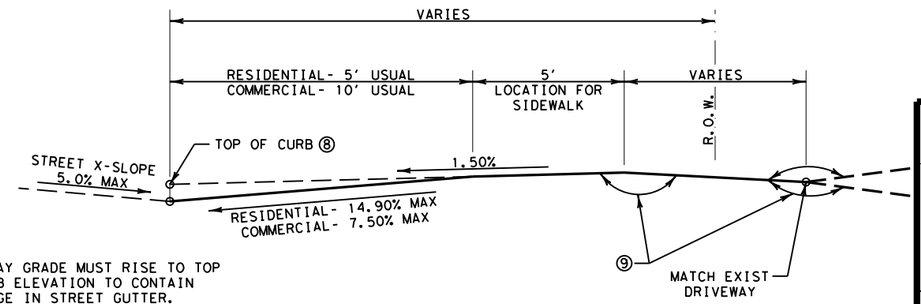
FOR SIDEWALK DETAILS, SEE STANDARD CSWD(FTW)

⑧ SEE STANDARD JS (FTW) FOR JOINT DETAILS.

⑨ IF, IN THE OPINION OF THE ENGINEER, ADJACENT CONCRETE IS NOT SOUND, 1/2" ISOLATION JOINT MAY BE USED IN LIEU OF TIED JOINT.



SAG CONDITION



CREST CONDITION

⑧ DRIVEWAY GRADE MUST RISE TO TOP OF CURB ELEVATION TO CONTAIN DRAINAGE IN STREET GUTTER.

⑨ 8% MAX CHANGE IN GRADE

ALLOWABLE DRIVEWAY GRADES

Texas Department of Transportation

Fort Worth District Standard

CONCRETE DRIVEWAY DETAILS CDD (FTW)

ORIGINAL DRAWING: 05/2019	cdd-ftw.dgn	PROJECT NO.			SHEET NO.
DATE	REVISIONS	SEE TITLE SHEET			103
05/2019	NEW STANDARD	STATE	STATE DIST. NO.	COUNTY	
11/2020	REVISED JOINT NOMENCLATURE REVISED NOTE 4 ADD NOTE 9	TEXAS	FTW	JOHNSON	
07/2022	ELIMINATE 1" RISE AT GUTTER LINE	CONT.	SECT.	JOB	HIGHWAY NO.
		1599	03	017	FM 2258

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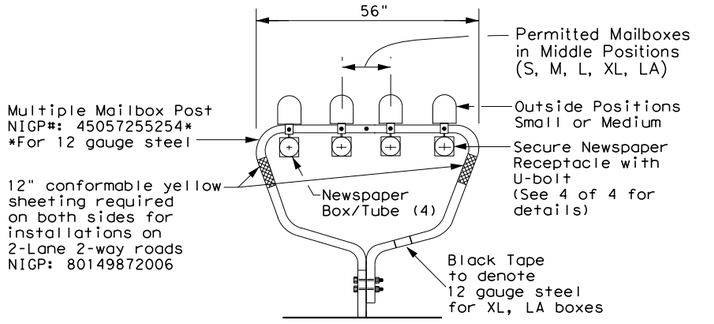
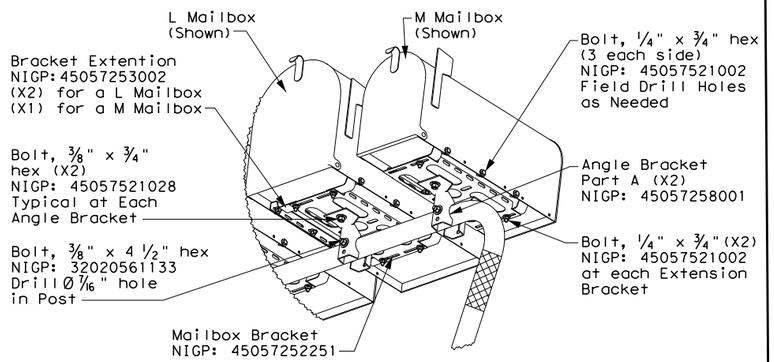
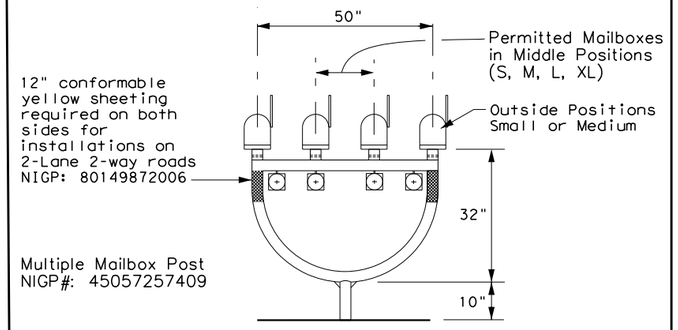
DATE:
FILE:

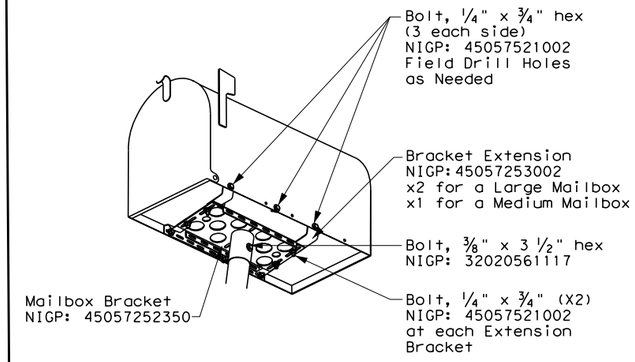
TYPE 1 - MULTIPLE





TYPE 4 - MULTIPLE





MAILBOX SIZES

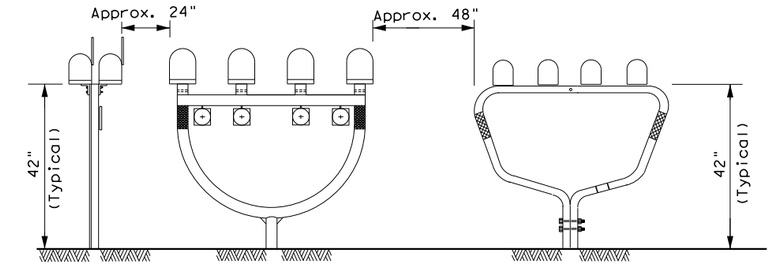
MAILBOX SIZE	TYPICAL DIMENSIONS			MAX **
	LENGTH	WIDTH	HEIGHT	WEIGHT
SMALL	19 1/2"	6"	7"	6 LBS
MEDIUM	22 1/2" *	8" *	11 1/2" *	8 LBS
LARGE	23 1/2"	11 1/2"	13 1/2"	11 LBS
EXTRA LARGE	18"	14"	12"	13 LBS
LOCKABLE	18"	11 1/2"	15"	23 LBS

* See Note 1.
** Excluding Molded Plastic on 4 X 4 Post

GENERAL NOTES:

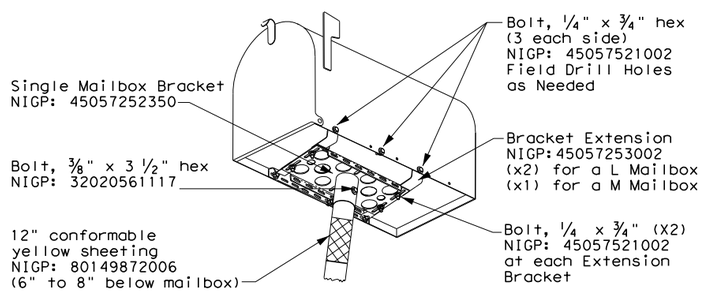
1. Dimensions shown (length, width, and height) are typical, not maximums. However, anytime a medium size mailbox is mounted on a single/double mount or on the outside position on a multi mount, the dimensions shown are maximums.
2. Mailboxes shall be made of light weight sheet metal or light weight plastic. Heavy steel, cast iron or decorative mailboxes shall not be used on the state highway system.

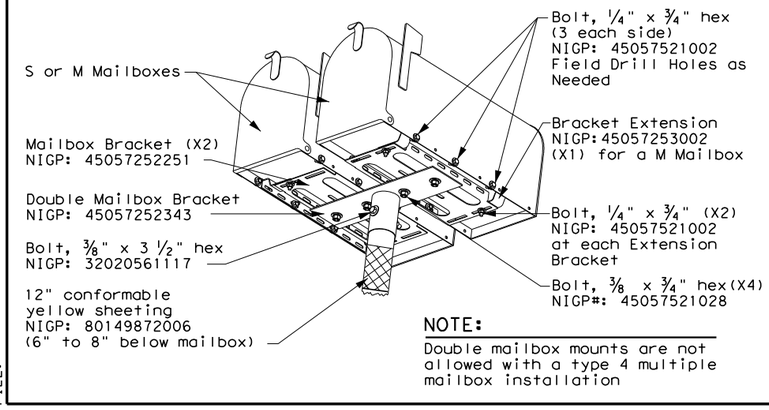
TYPICAL INSTALLATION MEASUREMENTS



NOTE:
Mailbox installations in sidewalk areas shall be in accordance with the latest TxDOT Design Standard sheets PED-Pedestrian Facilities Curb Ramps.

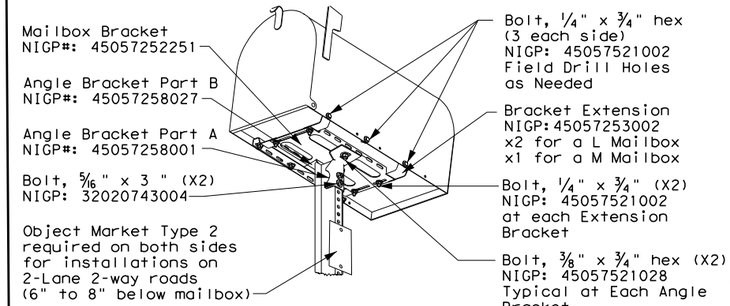
TYPE 2 and 4 - SINGLE/DOUBLE

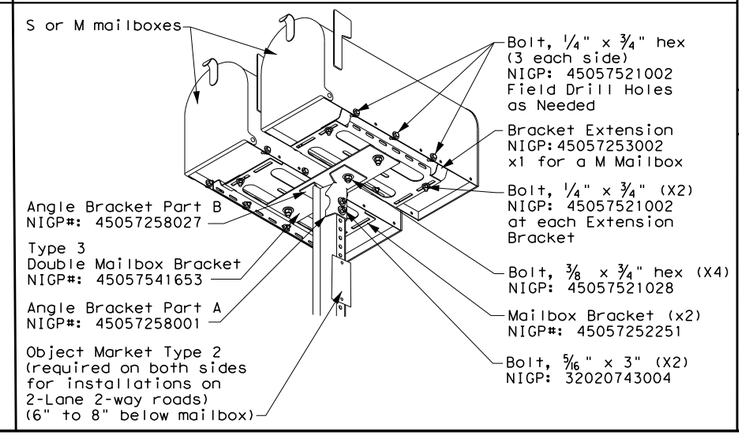




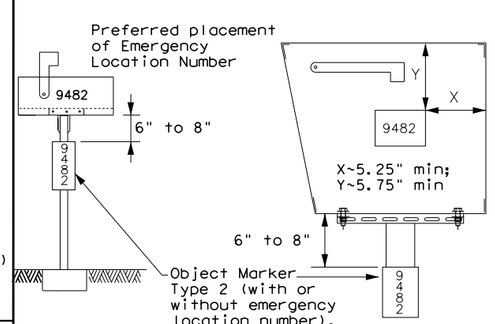
NOTE:
Double mailbox mounts are not allowed with a type 4 multiple mailbox installation

TYPE 3 - SINGLE/DOUBLE





PLACEMENT OF EMERGENCY LOCATION NUMBER

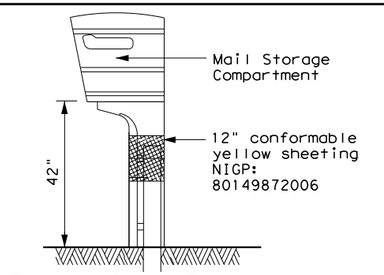


NOTES:

1. Location numbers are provided by homeowner. Minimum size 1" height.
2. Location number is typically placed on the mailbox in a contrasting color.
3. Black numbers may be placed on the Type 2 object marker if the numbers cannot be placed on the mailbox.
4. Alternatively, a green or blue plate with white numbers attached may be mounted below the object marker. Other contrasting color configuration, as approved, may be used.
5. See 3 of 4 for Foundation details.
6. See 4 of 4 for Hardware details.

SHEET 1 OF 4

TYPE 5



Typical Molded Plastic Mailbox

Texas Department of Transportation
Maintenance Division Standard

MAILBOX MOUNTING AND ASSEMBLY

MB(1)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		104

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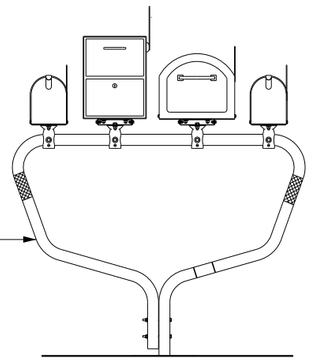
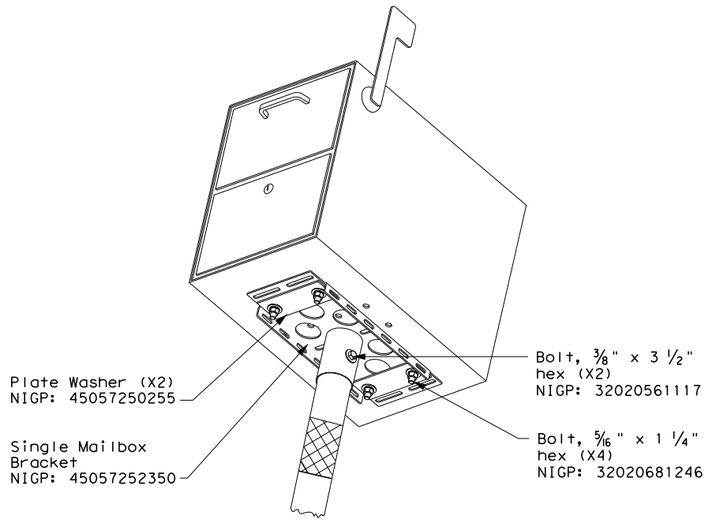
DATE:
FILE:

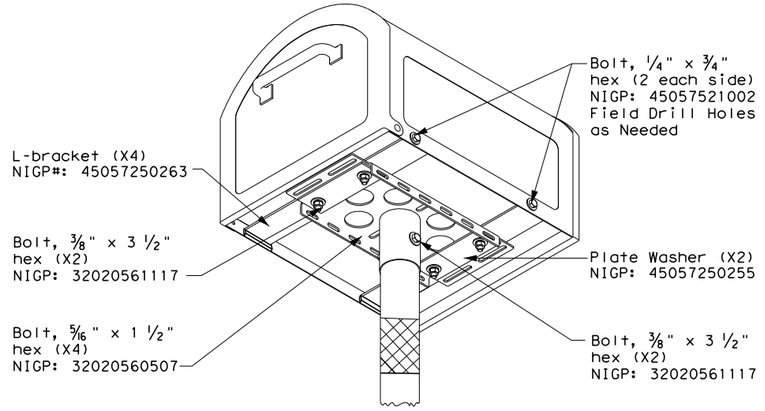
TYPE 1- MULTI LOCKABLE AND XL MAILBOX



TYPE 2/4 - SINGLE LOCKABLE MAILBOX

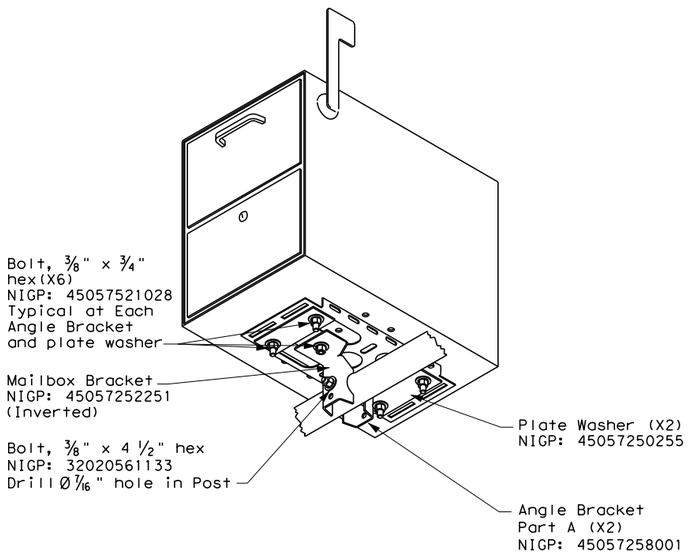


TYPE 2/4 - SINGLE XL MAILBOX

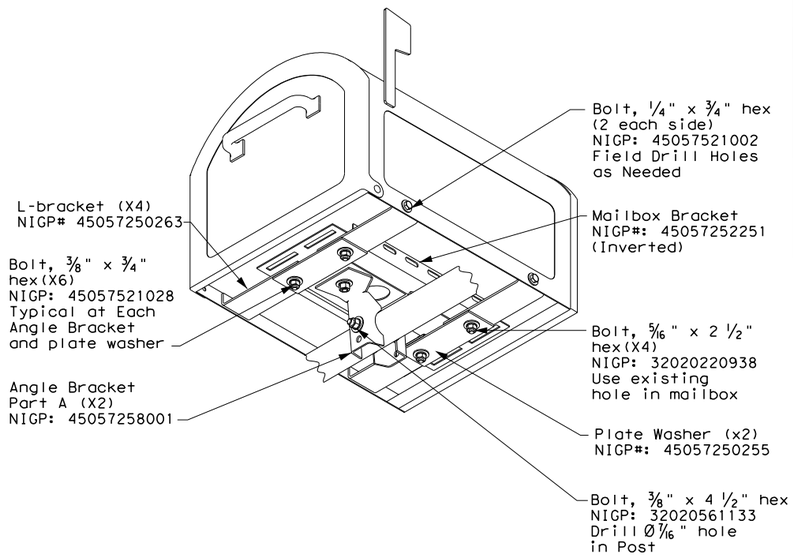


NOTE:
Follow same configuration when mounting an XL mailbox on a Type 4 multi post.

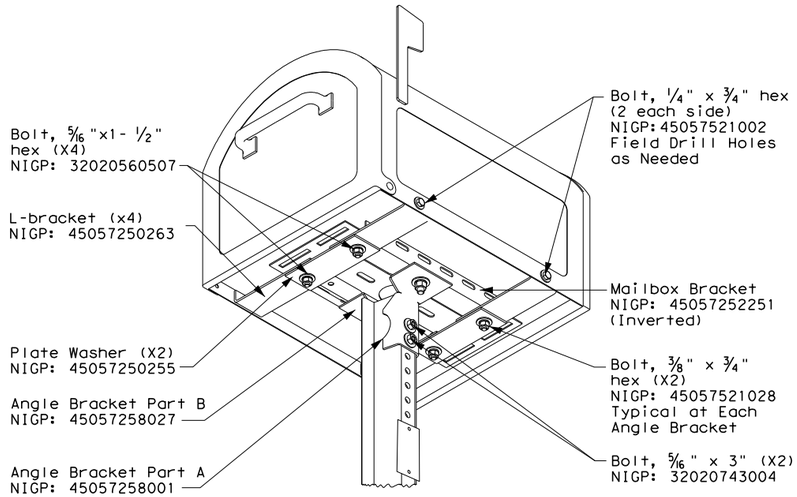
TYPE 1 MULTI – LOCKABLE ARCHITECTURAL (LA)



TYPE 1 MULTI – XL MAILBOX



TYPE 3 - XL MAILBOX MOUNTING



Texas Department of Transportation

Maintenance Division Standard

XL AND LOCKABLE ARCHITECTURAL MAILBOX ASSEMBLY

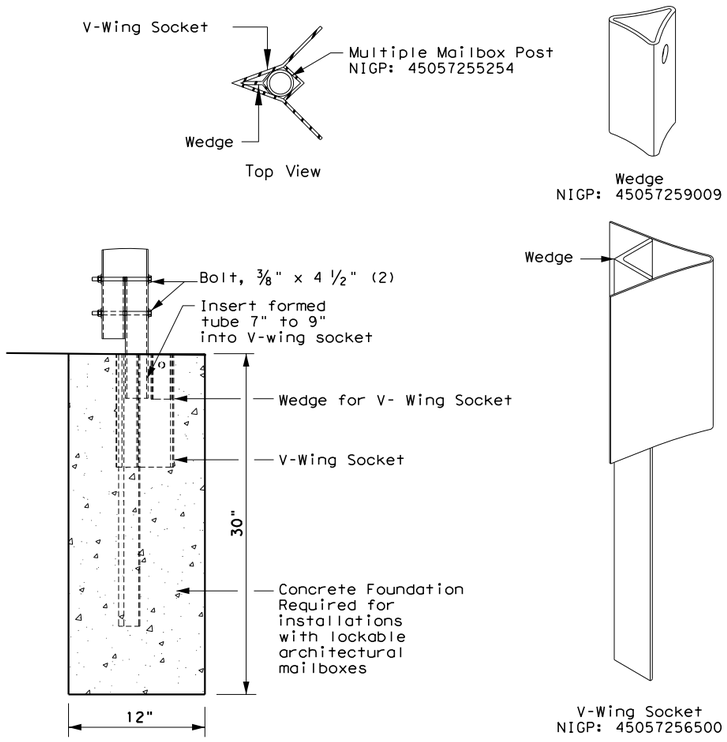
MB(2)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		105

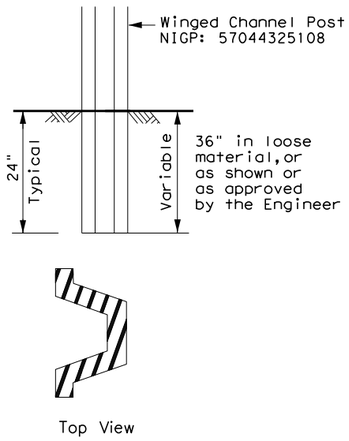
DATE:
FILE:

TYPE 1 - SUPPORT/FOUNDATION

Thin Wall Tube w/ V-LOC Anchorage



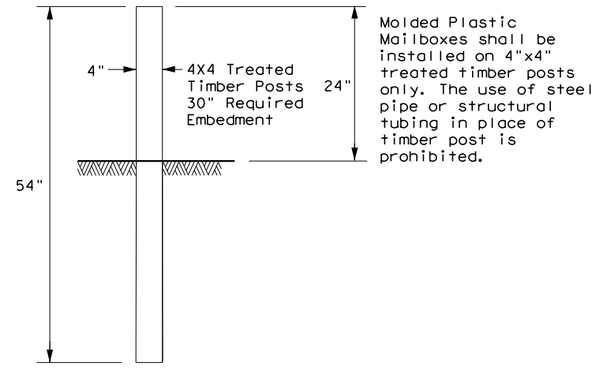
TYPE 3 - SUPPORT/FOUNDATION



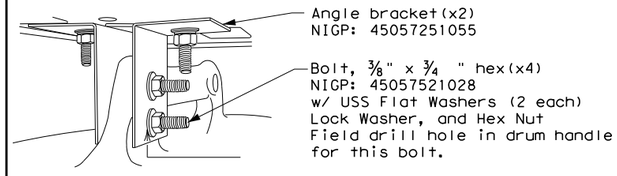
NOTES:

1. Attach Object Marker (OM) facing direction of traffic.
2. OM will also be required on opposite side if installed on a 2-Lane, 2-Way roadway.

TYPE 5 - SUPPORT/FOUNDATION



TYPE 6 - TEMPORARY MAILBOX SUPPORT



Plastic Drum NIGP: 55093383655
Rubber Collar NIGP: 55093387102

NOTES:

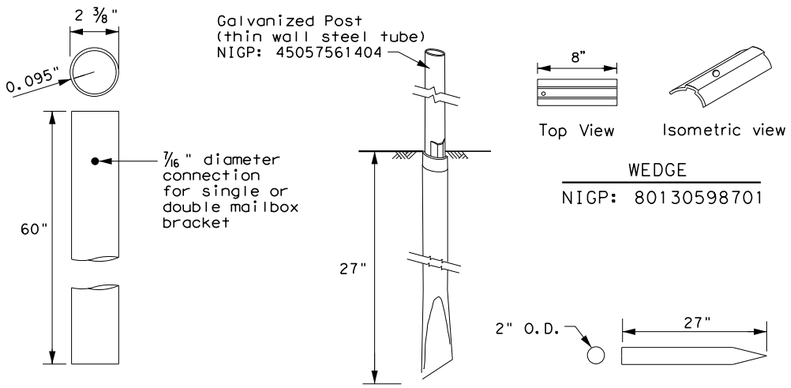
1. Place on approved plastic drum as shown in the Compliant Work Zone Traffic Control Devices (CWZTCD).
2. Existing attachment hardware shall be used unless damaged. Damaged hardware shall be replaced.

GENERAL NOTES:

1. Erect post plumb or vertical.
2. When galvanized part is required galvanize in accordance with Item 445.
3. Use a concrete footing as shown or when directed. Concrete footing will be required when soils do not hold the support/foundations in a stable condition, only on Type 1, Type 2, and Type 4

TYPE 2 - SUPPORT/FOUNDATION

Thin Wall Steel Tube w/Wedge Anchor System

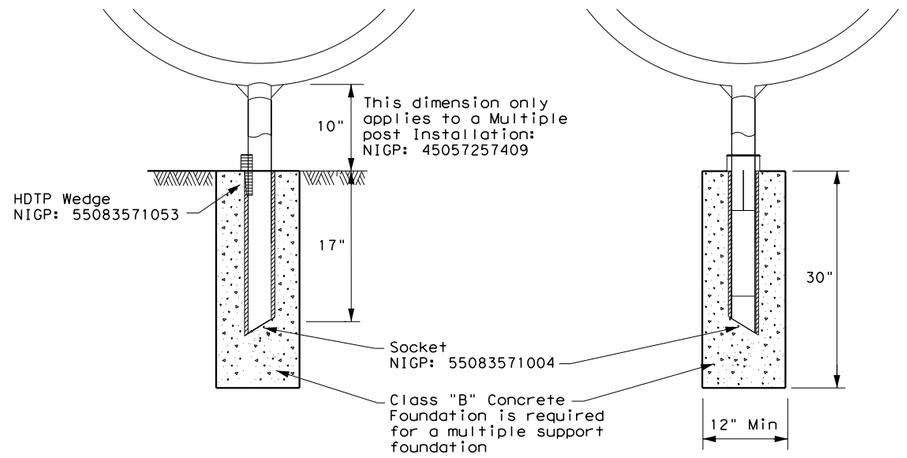


MAILBOX POST

WEDGE ANCHOR
NIGP: 80130238407

TYPE 4 - SUPPORT/FOUNDATION

Whitecoated steel post NIGP: 45057561107
Multiple post NIGP: 45057257409
Recycled Rubber post (RR) NIGP: 45057561057



SHEET 3 OF 4

Texas Department of Transportation

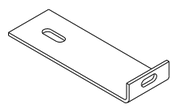
Maintenance Division Standard

MAILBOX SUPPORT AND FOUNDATION

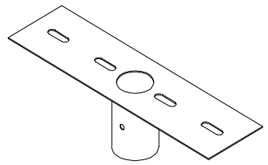
MB(3)-21

FILE: MB-21.dgn	DN:	CK:	DW:	CK:
© TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		106

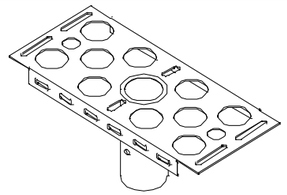
TYPE	TYPE 1	TYPE 2	TYPE 3	TYPE 4			TYPE 5	TYPE 6
Configuration	Multiple	Single or Double	Single or Double	Single	Double	Multiple	Single	Single
Mailbox Size NIGP #	Outside Position: S or M Inside Position: S, M, L, XL, or LA	Single: S, M, L, XL, or LA Double: SS, SM, MM	Single: S, M, L, or XL Double: SS, SM, MM	S, M, L, XL, or LA	SS, SM, or MM	Outside Position: S or M Inside Position: S, M, L, or XL	Molded Plastic	S, or M
Mailbox Post NIGP #	45057255254 (Galvanized Multiple)	45057561404 (Thin Walled Gavanize)	57044325108 (Wing Channel Post)	45057561107 (Thin walled white powder coated) 45057561057 (Recycled Rubber Post: S or M only)	45057561107 (Thin Walled White Powder Coated)	45057257409 (White Powder Coated Multiple)	4x4 Timber	Construction Barrel
Post and Mailbox Hardware NIGP #	45057259009 (Wedge) 45057256500 (V-Wing Socket) 45057253002 (Bracket Extension) 45057252251 (Mailbox Bracket) 45057258001 (Part A Angle Bracket x2) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	80130598701 (Wedge) 80130238407 (Wedge Anchor) 45057253002 (Bracket Extension) 45057252343 (Double MB Bracket) 45057252350 (S. Mailbox Bracket) 45057252251 (Mailbox Bracket) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket forXL x4)	45057541653 (Type 3 Double Mailbox Bracket) 45057252251 (Mailbox Bracket) 45057253002 (Bracket Extension) 45057258001 (Part A Angle Bracket) 45057258027 (Part B Angle Bracket) 45057250255 (Plate Washer for XL x2) 45057250263 (L-Bracket for XL x4)	55083571053 (Wedge) 55083571004 (Socket) 45057252350 (Single Mailbox Bracket) 45057253002 (Bracket Extension) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	55083571053 (Wedge) 55083571004 (Socket) 45057253002 (Bracket Extension) 45057252343 (Double Mount Bracket) 45057252251 (Mailbox Bracket x2)	55083571053 (Wedge) 55083571004 (Socket) 45057253002 (Bracket Extension) 45057252350 (Single Mount Bracket) 45057250255 (Plate Washer for XL x2) 45057250263 (L-Bracket for XL x4)	None	45057251055 Angle Bracket (x2)
Foundation Used	Class B Concrete (Required for LA Mailboxes)	Class B Concrete (Required for LA Mailboxes)	None	Class B Concrete (not used with recycled rubber post, required for LA Mailboxes)	Class B Concrete (not required)	Class B Concrete	None	None



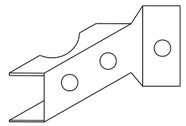
NIGP: 45057250263
L-Bracket x4 for
XL sized mailboxes



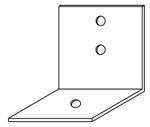
NIGP: 45057252343
Double Mailbox Bracket
For Type 2 and Type 4
double mount



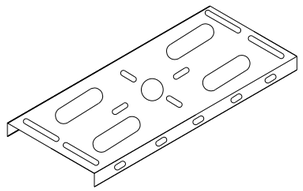
NIGP: 45057252350
Single Mailbox Bracket
For Type 2 single and for
Type 4 single and multi mount



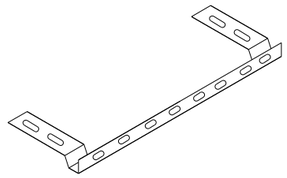
NIGP: 45057258001
Part "A" Angle Bracket
For Type 1 multi (2 per mailbox)
and Type 3 single and double



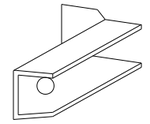
NIGP: 45057251055
Type 6 Angle Bracket
(2 per mailbox)



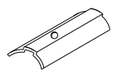
NIGP: 45057252251
Mailbox Bracket
For Type 1 multi and
any double mount (use 2)



NIGP: 45057253002
Bracket Extension
Use 1 for a medium Mailbox
Use 2 for a Large Mailbox



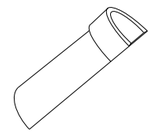
NIGP: 45057258027
Part "B" Angle Bracket
For Type 3 single
and double



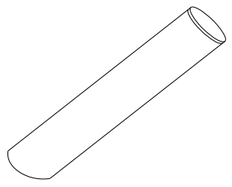
NIGP: 80130598701
Wedge for Type 2

NIGP: 45057250255
Plate Washer for Architecural
and XL Mailboxes

NIGP: 45057541653
Type 3 double mailbox bracket

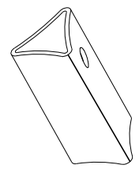


NIGP: 55083571053
Type 4 Mailbox Wedge

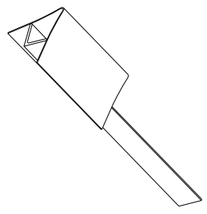


NIGP: 55083571004
Type 4 Mailbox Socket

NIGP: 80130238407
Type 2 Wedge Anchor



NIGP: 45057259009
Wedge for Type 1 V-wing Socket



NIGP: 45057256500
V-wing Socket for
Type 1 Foundation

NIGP #	OBJECT MARKERS AND CONFORMABLE SHEETING
55008311759	Type 2 OM 4"x4" (3 Needed) for Type 3 Wing Channel Post
55008312906	Type 2 OM 6"x12" (1 needed) for Type 3 Wing Channel Post
80149872006	12" Conformable Reflective Yellow Sheeting for Flexible Posts

NOTES:

1. Type 2 object marker in accordance with Traffic Engineering Standard Delineators & Object Markers.
2. A light weight receptacle for newspaper delivery can be attached to mailbox posts if the receptacle does not touch the mailbox, present a hazard to traffic or delivery of the mail, extend beyond the front of the mailbox, or display advertising, except the publication title.

BID CODES FOR CONTRACTS

MB-(X) ASSM TY (XXX) (X)

Type of Mailbox
- S = Single
- D = Double
- M = Multiple
- MP = Molded Plastic

Type of Post
- WC = Winged Channel Post
- RR = Recycled Rubber
- TWW = Thin Walled White Tubing
- TWG = Thin Walled Galvanized Tubing
- TIM = Timber

Type of Foundation
- Ty 1 = V-Loc
- Ty 2 = Wedge Anchor Steel System
- Ty 3 = Winged Channel post
- Ty 4 = Wedge Anchor Plastic System
- Ty 5 = 4 X 4 Post

DATE:
FILE:

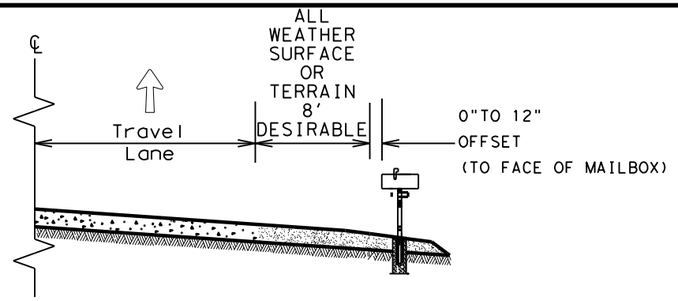
SHEET 4 OF 4

Texas Department of Transportation — Maintenance Division Standard

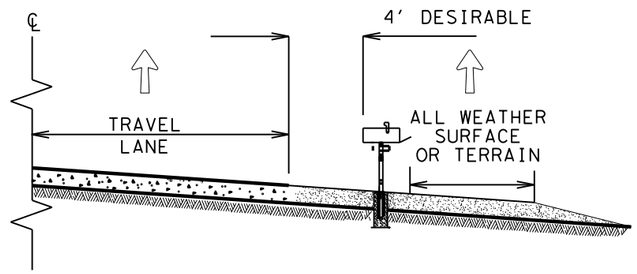
NIGP PARTS LIST AND COMPATIBILITY

MB(4)-21

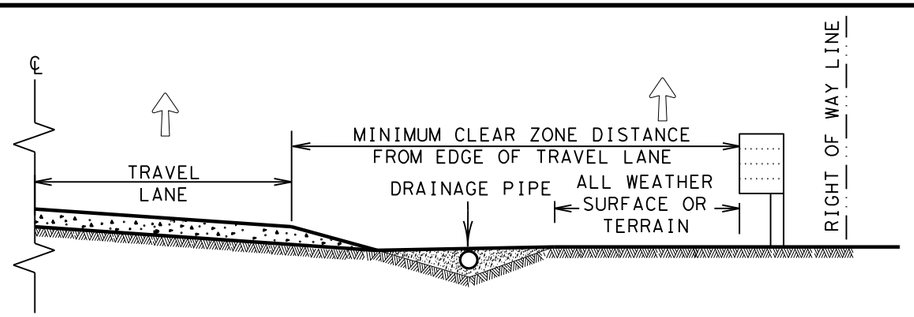
FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		107



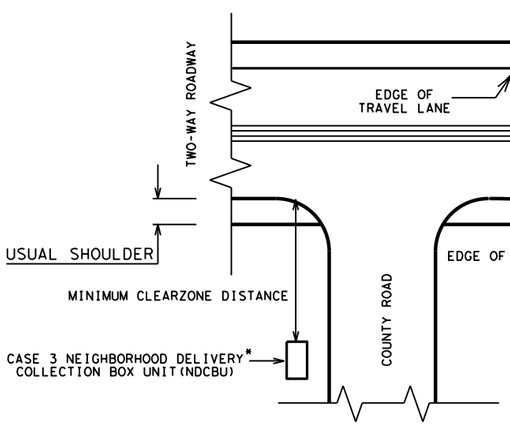
CASE 1. OFF TRAVEL WAY DELIVERY

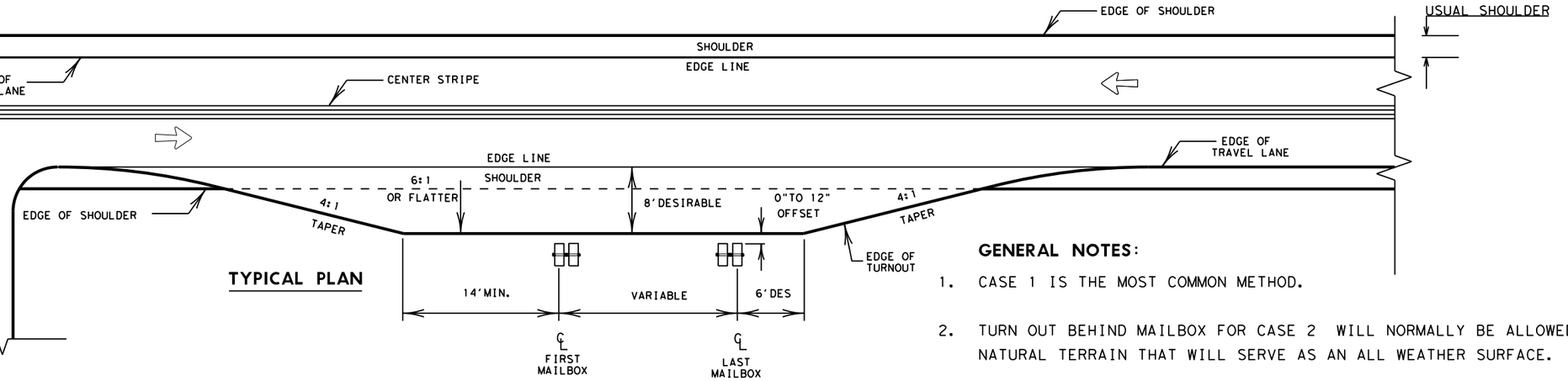


CASE 2. BACK SIDE DELIVERY

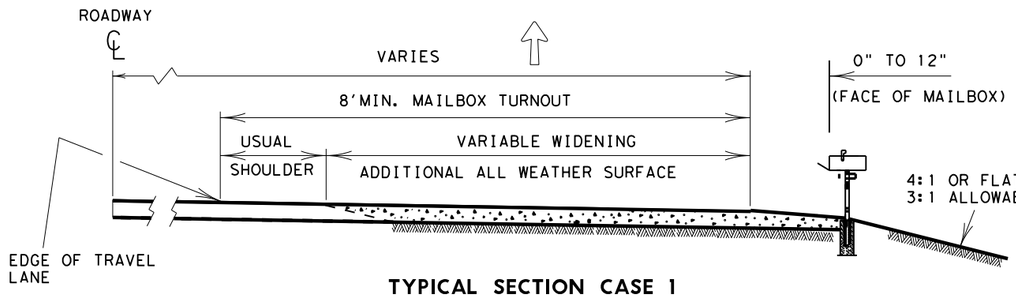


CASE 3. DELIVERY NEAR RIGHT OF WAY LINE





TYPICAL PLAN



TYPICAL SECTION CASE 1

GENERAL NOTES:

1. CASE 1 IS THE MOST COMMON METHOD.
2. TURN OUT BEHIND MAILBOX FOR CASE 2 WILL NORMALLY BE ALLOWED FOR NATURAL TERRAIN THAT WILL SERVE AS AN ALL WEATHER SURFACE.
3. ALL WEATHER DRIVEWAYS FOR CASE 3 MAILBOXES LOCATED AT THE RIGHT OF WAY LINE SHOULD NORMALLY BE PLACED IN CONJUNCTION WITH COUNTY ROADS OR OTHER CONNECTING COMMUNITY ROADS OR STREETS. WHEN 3 OR MORE MULTI-RACKS ARE ANTICIPATED, THE USE OF AN NDCBU IS RECOMMENDED. ONLY RURAL PATRONS LOCATED ON STATE MAINTAINED HIGHWAYS MAY HAVE A MAILBOX OR NDCBU SLOT ON TXDOT RIGHT OF WAY.

*NDCBU MAY BE INSTALLED ON COUNTY ROAD ROW WITH APPROVAL OF COUNTY.

MAIL DELIVERY VEHICLE TRAVEL DIRECTION

DATE:
FILE:

Texas Department of Transportation | Maintenance Division Standard

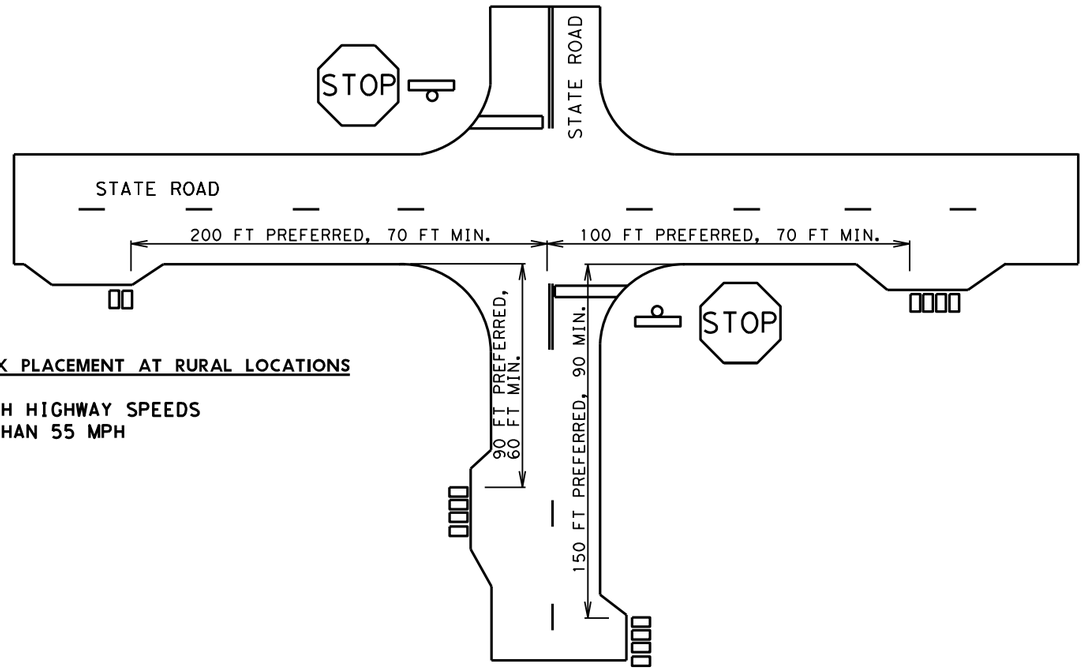
Guideline

MAILBOX SIDE ROAD PLACEMENT AND TURNOUTS

MBP(1)-22

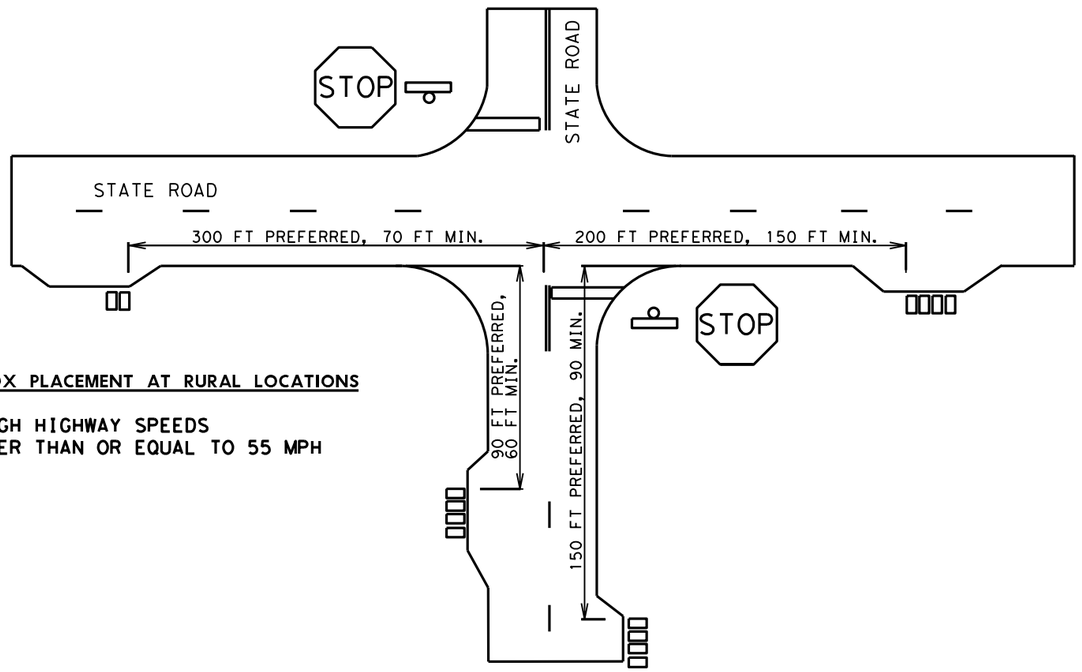
FILE: MBP-22.DGN	DN: VS	CK:	DW: VS	CK:
© TxDOT OCTOBER 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 12/2012 5/2014	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		108

DATE:
FILE:



MAILBOX PLACEMENT AT RURAL LOCATIONS

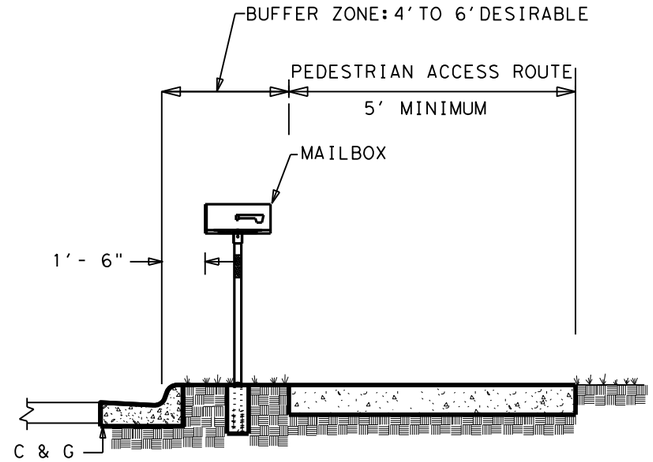
THROUGH HIGHWAY SPEEDS
LESS THAN 55 MPH



MAILBOX PLACEMENT AT RURAL LOCATIONS

THROUGH HIGHWAY SPEEDS
GREATER THAN OR EQUAL TO 55 MPH

CURB AND GUTTER MAILBOX INSTALLATION



NOTES:
1. A NON-TRAVERSABLE SURFACE MUST BE INSTALLED NEAR THE MAILBOX (NATURAL VEGETATION OR OTHER) IN THE BUFFER ZONE. ALTERNATIVELY, A BASE WITH A MINIMUM HEIGHT OF 2.5 INCHES MAY BE INSTALLED SO THAT THE EDGE OF THE MAILBOX DOES NOT EXTEND OUT MORE THAN 4 INCHES HORIZONTALLY BEYOND THE BASE.

2. THE SIDEWALK WIDTH MAY BE REDUCED TO 4 FOOT FOR SHORT DISTANCES AROUND THE MAILBOX IF NEEDED.

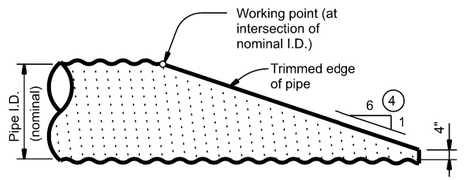
3. MAINTAIN A MINIMUM OF 5 FEET BETWEEN OBSTRUCTIONS IN THE PEDESTRIAN ACCESS ROUTE.

Texas Department of Transportation | Maintenance Division Standard

MAILBOX PLACEMENT CURBS & INTERSECTIONS

MBP(2)-22

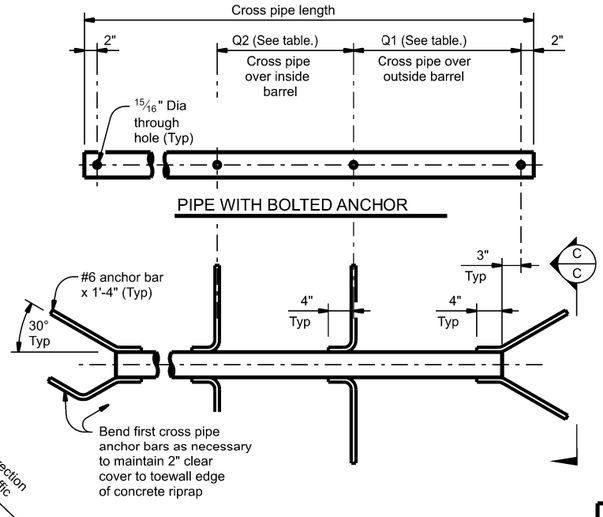
FILE: MBP-22.DGN	DN: VS		CK:	DW: VS		CK:
© TxDOT OCTOBER 2022	CONT	SECT	JOB		HIGHWAY	
REVISIONS 12/2012 5/2014	1599	03	017		FM 2258	
	DIST	COUNTY			SHEET NO.	
	FTW	JOHNSON			109	



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.

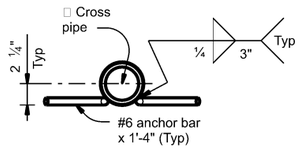
SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

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



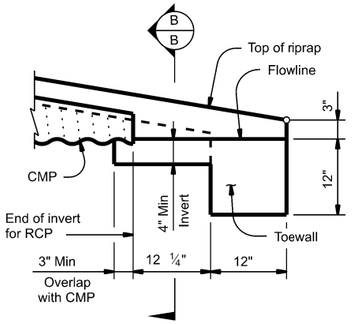
PIPE WITH BOLTED ANCHOR

PIPE WITH ANCHOR BARS



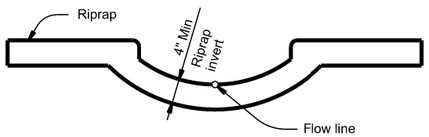
SECTION C-C

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.

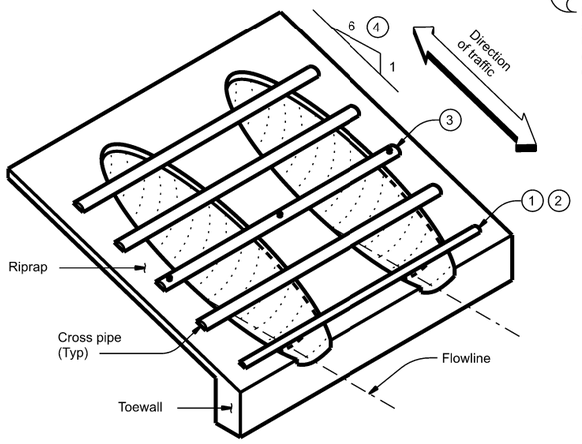
GENERAL NOTES:

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.

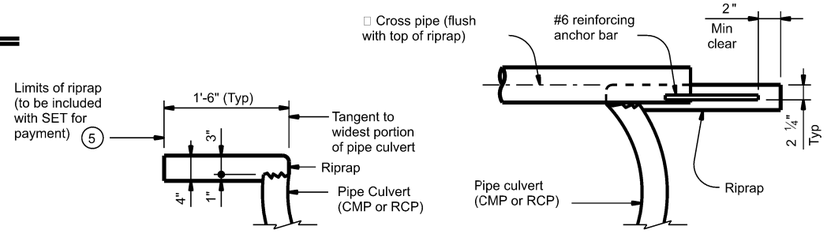
Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the operings approximately perpendicular to the cross pipes.

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.

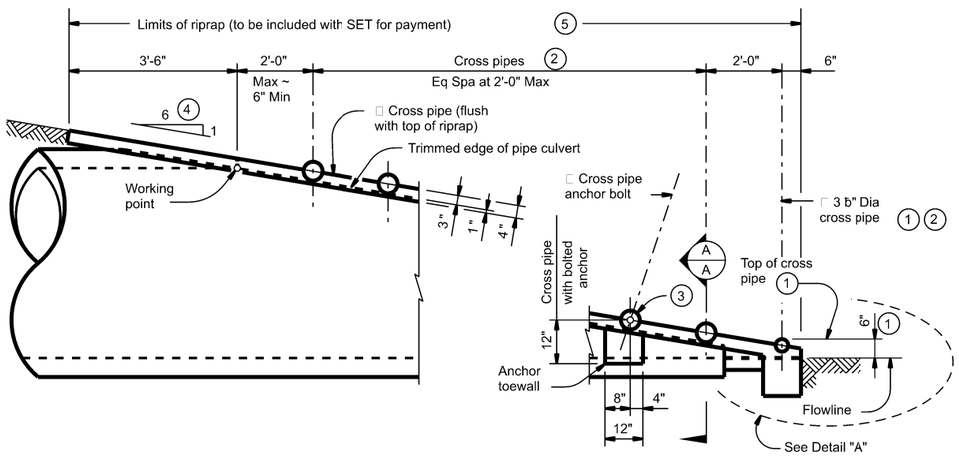


ISOMETRIC VIEW OF TYPICAL INSTALLATION



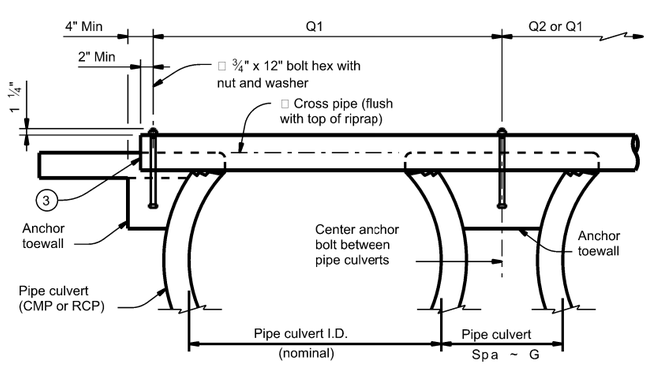
SHOWING TYPICAL PIPE CULVERT AND RIPRAP

SHOWING CROSS PIPE WITH ANCHOR BAR



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 BOLTED ANCHOR

SECTION A-A

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

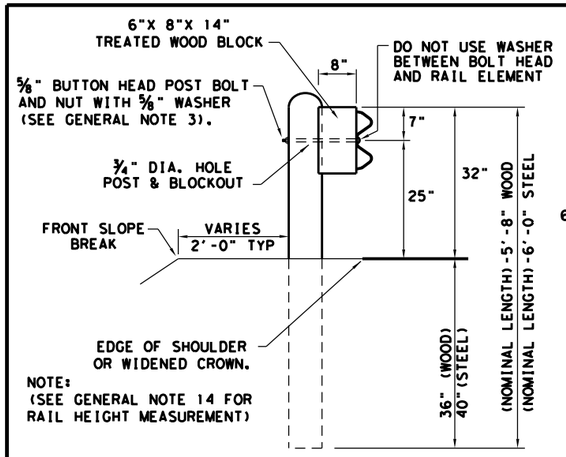
FOR 12" DIA TO 72" DIA
PIPE CULVERTS
TYPE II ~ PARALLEL DRAINAGE

SETP-PD

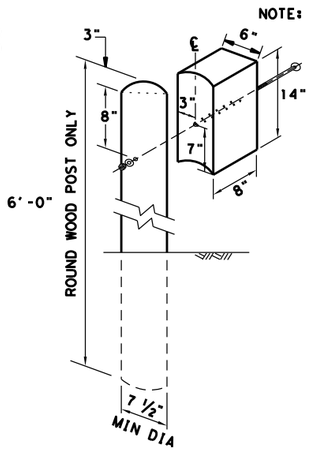
FILE: setppdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		110

DATE:
FILE:

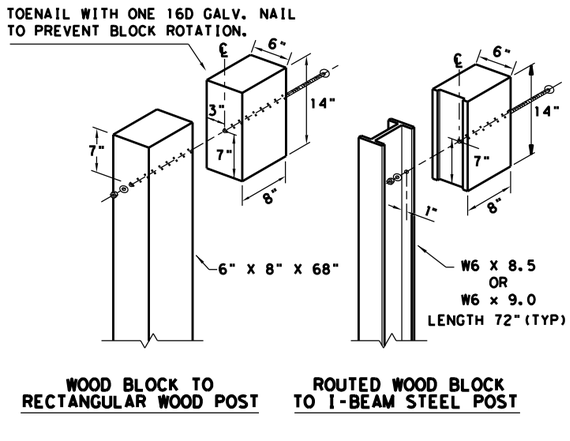
DATE:
FILE:



TYPICAL POST PLACEMENT



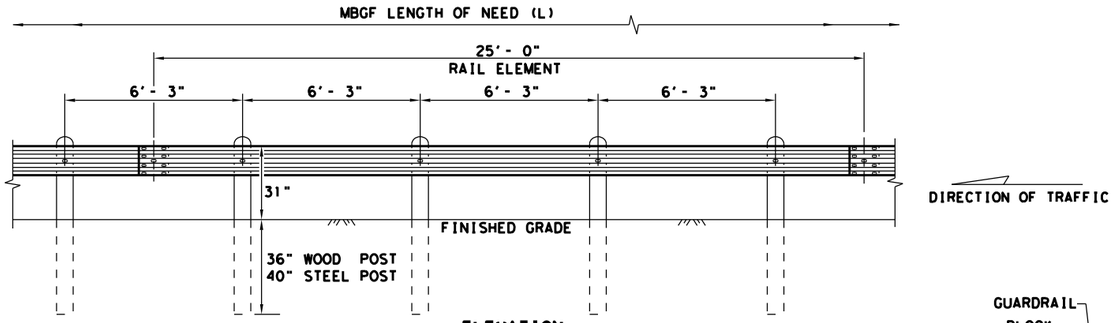
WOOD BLOCK TO ROUND WOOD POST



WOOD BLOCK TO RECTANGULAR WOOD POST

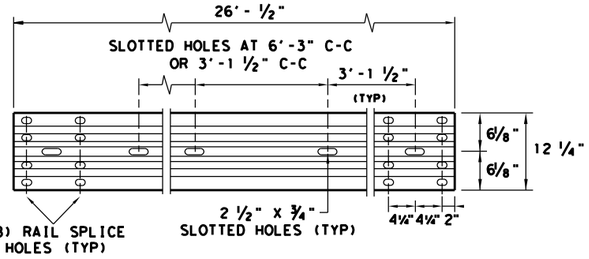
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



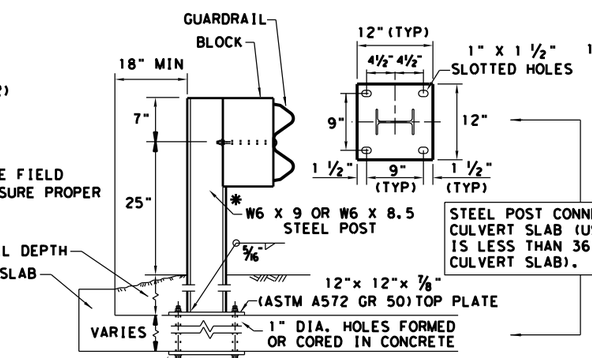
ELEVATION
MID-SPAN RAIL SPLICE

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.



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

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

12" X 12" X ¼" (ASTM A36) STEEL BOTTOM PLATE WITH 1" DIA. HOLES REQUIRED WITH BOLT-THROUGH INSTALLATION.

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. ⅞" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS.
NOTE: BOLT LENGTH = SLAB PLUS 2 ¼" MIN.

2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE ⅞" 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 ¼" 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.

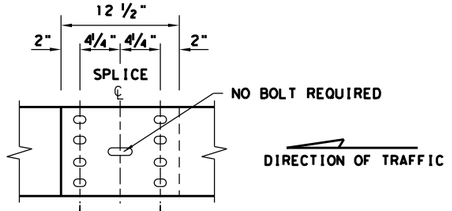
NOTE:
FOUR TYPES OF BUTTON-HEAD GUARD RAIL BOLTS COME WITH A RECCESSED NUT.

SPLICE BOLT LENGTH — VARIES
FBB01 = 1 ¼"
FBB02 = 2"
⅝"

POST & BLOCK LENGTH
FBB03 = 10"
FBB04 = 18"

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.

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 ½" 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 ⅝" 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	
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	1599	03	017	FM 2258	
	DIST	COUNTY		SHEET NO.	
	FTW	JOHNSON		111	

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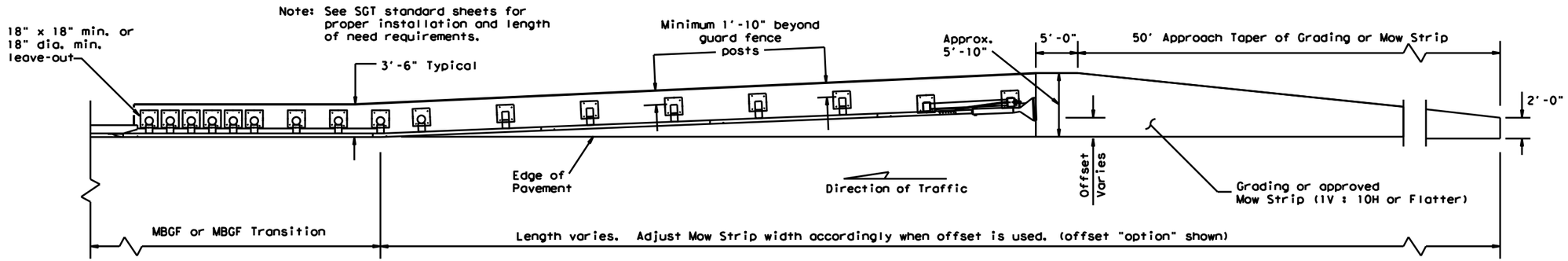
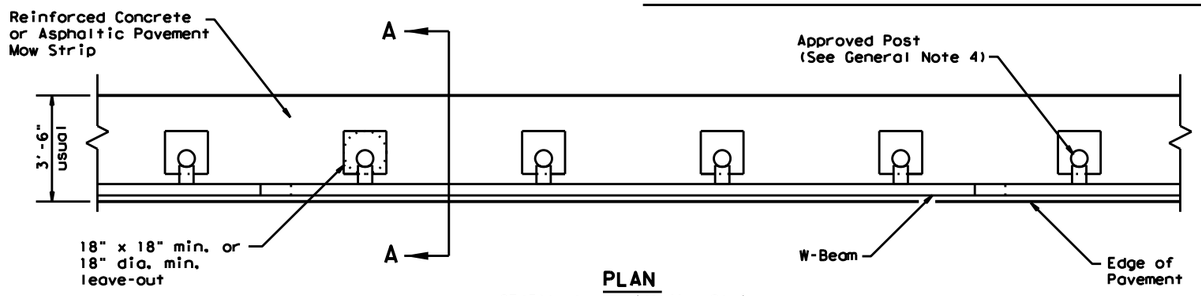
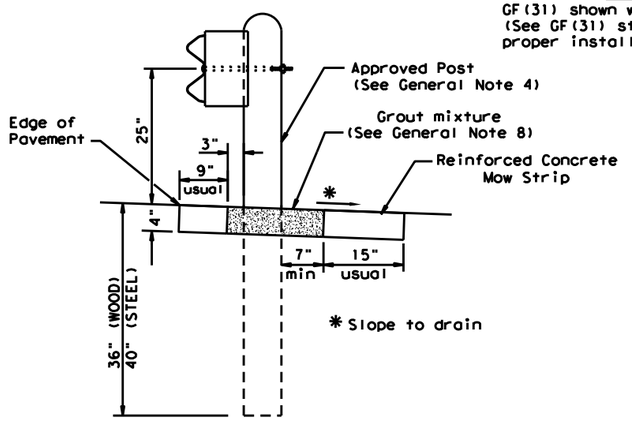


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



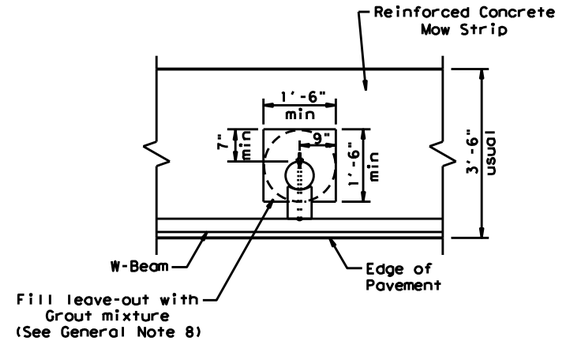
PLAN

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



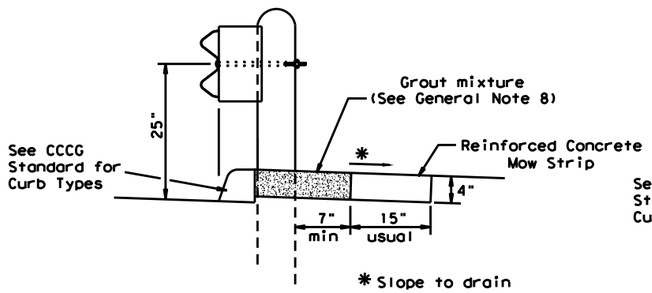
SECTION A-A

Typical



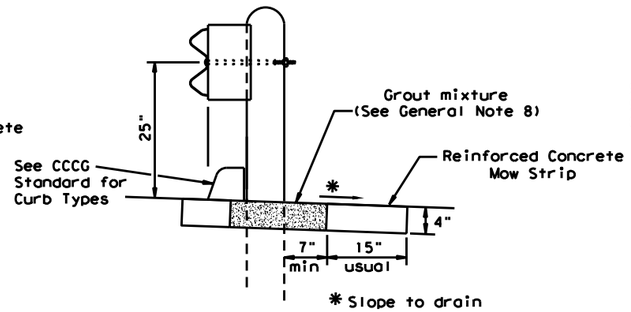
MOW STRIP DETAIL

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



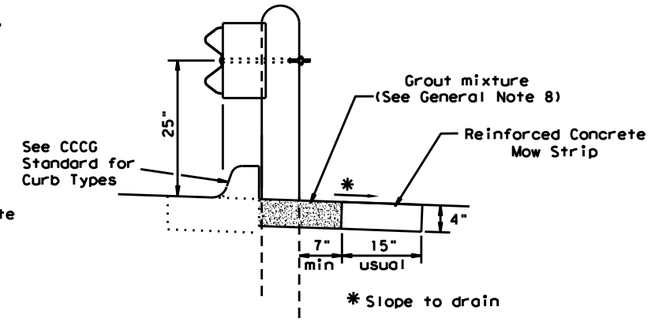
CURB OPTION (1)

This option will increase the post embedment throughout 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 reinforced concrete with (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item. 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 reinforced concrete will include leave-outs for the posts.
8. The leave-outs shall be filled with a Grout mixture consisting of: 2719 pounds sand, 188 pounds Type I or II cement, and 550 pounds of water per cubic yard, with a 28-day compressive strength of approximately 230 psi or less. Provide grout with a consistency that will flow into and completely fill all voids. Due to auger size, larger leave-out dimensions are acceptable from both an impact performance and maintenance repair standpoint (Suggested Maximum leave-out of 20"). Payment for furnishing and placing the grout mixture will be subsidiary to the pay item of riprap mow strip.

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE (MOW STRIP) TL-3 MASH COMPLIANT

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG		
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB		HIGHWAY	
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	FTW	JOHNSON			112	

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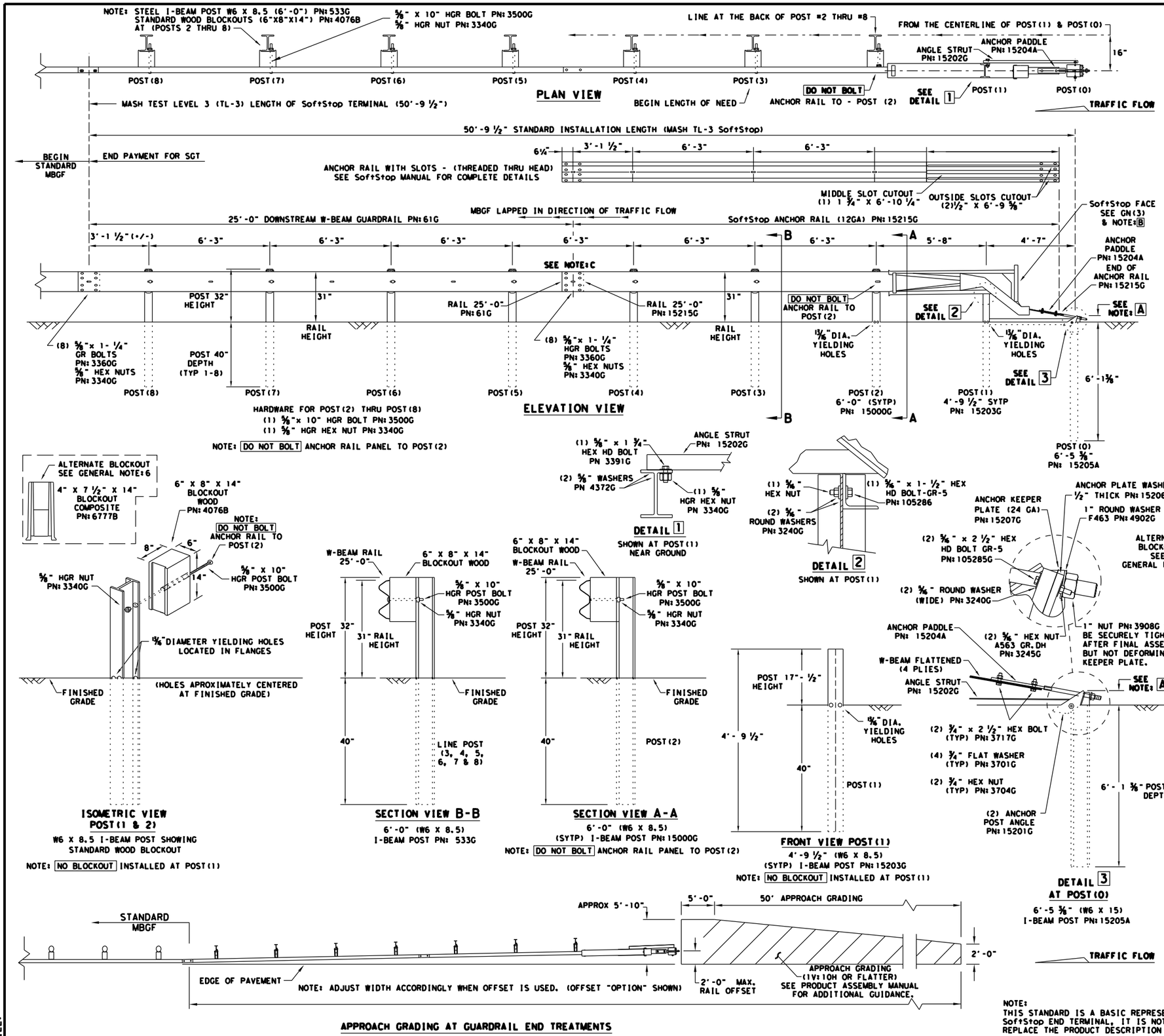

GENERAL NOTES

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	
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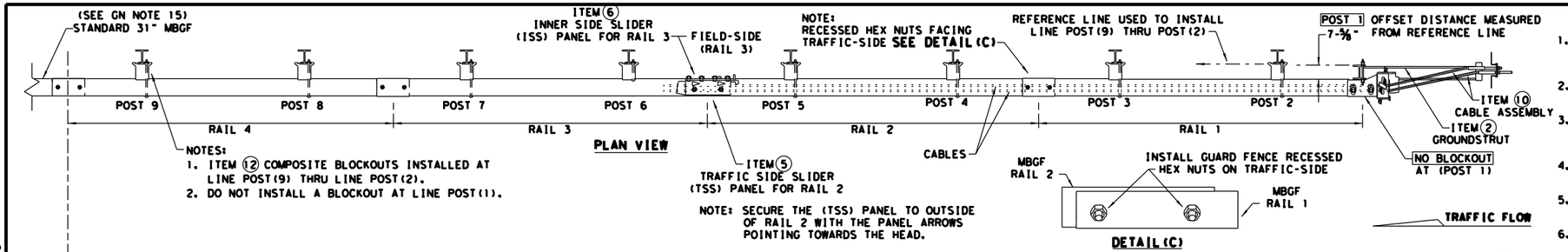
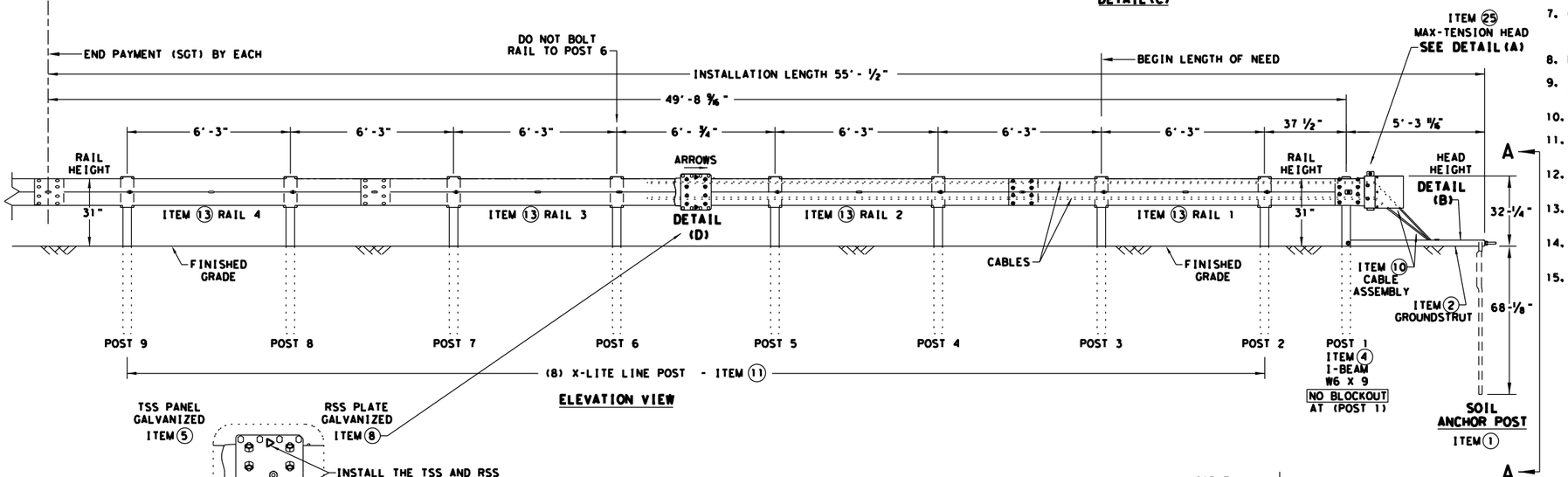
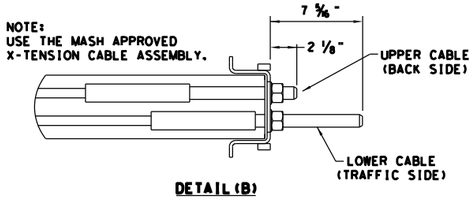
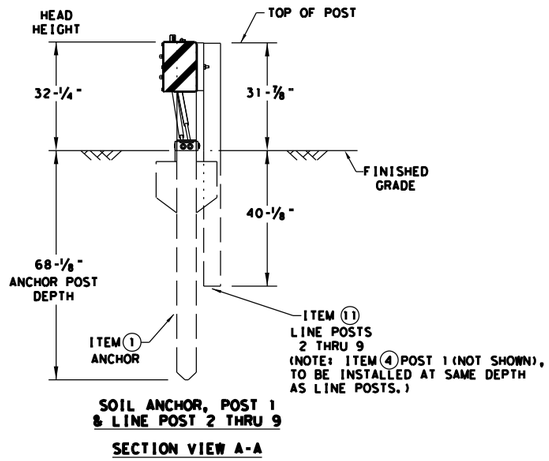
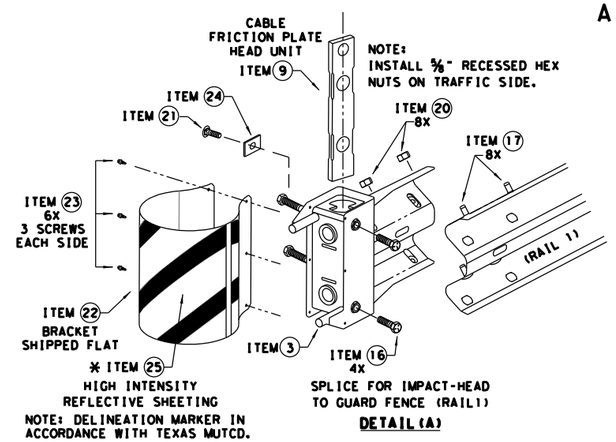






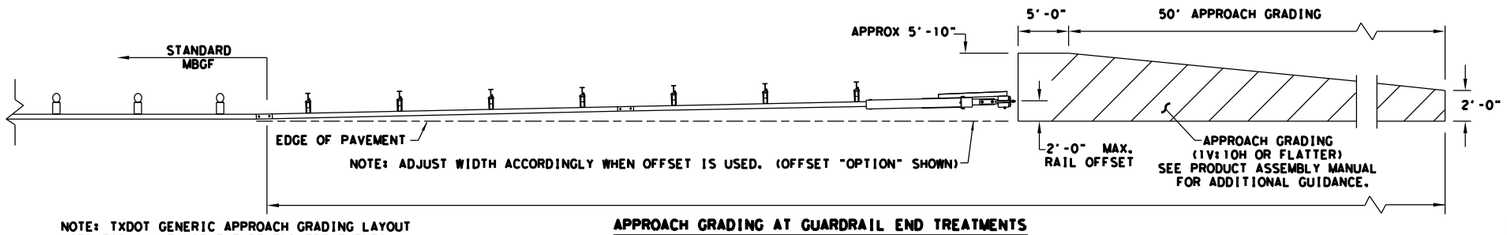




GENERAL NOTES

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	5/8" X 7" THREAD BOLT HH (GR.5)GEOMET	1
	16	BSI-2001885	3/4" X 3" ALL-THREAD BOLT HH (GR.5)GEOMET	4
	17	4001115	5/8" X 1 1/4" GUARD FENCE BOLTS (GR.2)MGAL	48
	18	2001840	5/8" X 10" GUARD FENCE BOLTS MGAL	8
	19	2001636	5/8" WASHER F436 STRUCTURAL MGAL	2
	20	4001116	5/8" RECESSED GUARD FENCE NUT (GR.2)MGAL	59
	21	BSI-2001888	5/8" X 2" ALL THREAD BOLT (GR.5)GEOMET	1
	22	BSI-1701063-00	DELINEATION MOUNTING (BRACKET)	1
	23	BSI-2001887	1/4" X 3/4" SCREW SD HH 410SS	7
	24	4002051	GUARDRAIL WASHER RECT AASHTO 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

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

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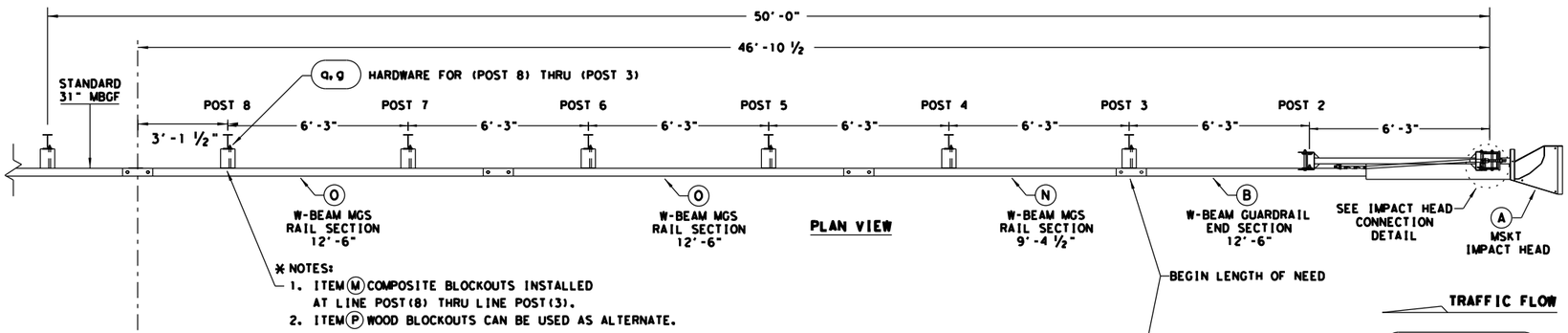
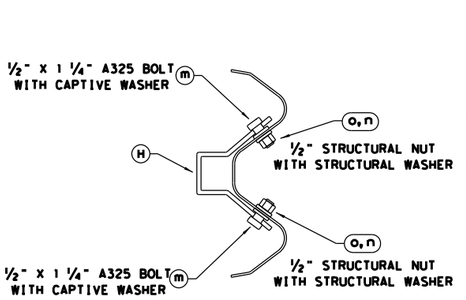
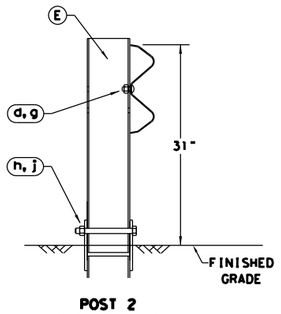


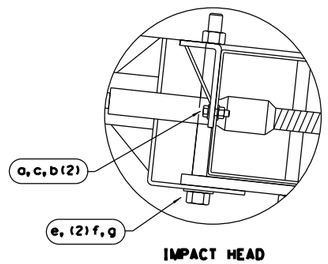
NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.



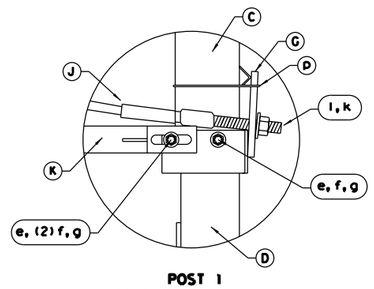
SECTION B-B
ANCHOR BRACKET



POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL

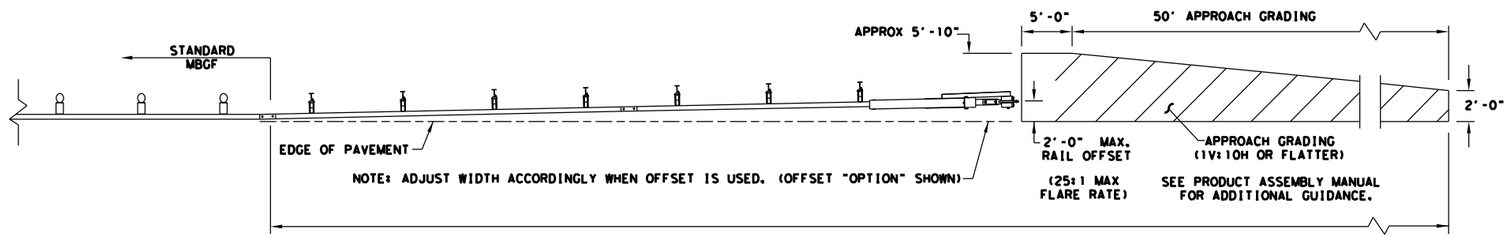
SEE NOTES: *

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 ⅛" 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 ½")	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	⅝" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	⅝" WASHER	W0516
c	2	⅝" HEX NUT	N0516
d	25	⅝" Dia. x 1 ¼" SPLICE BOLT (POST 2)	B580122
e	2	⅝" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	⅝" WASHER	W050
g	33	⅝" Dia. H.G.R NUT	N050
h	1	¾" Dia. x 8 ½" HEX BOLT (GRD A449)	B340854A
j	1	¾" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	½" x 1 ¼" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	½" STRUCTURAL NUTS	N012A
o	8	1 ⅛" O.D. x ⅝" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	⅝" 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

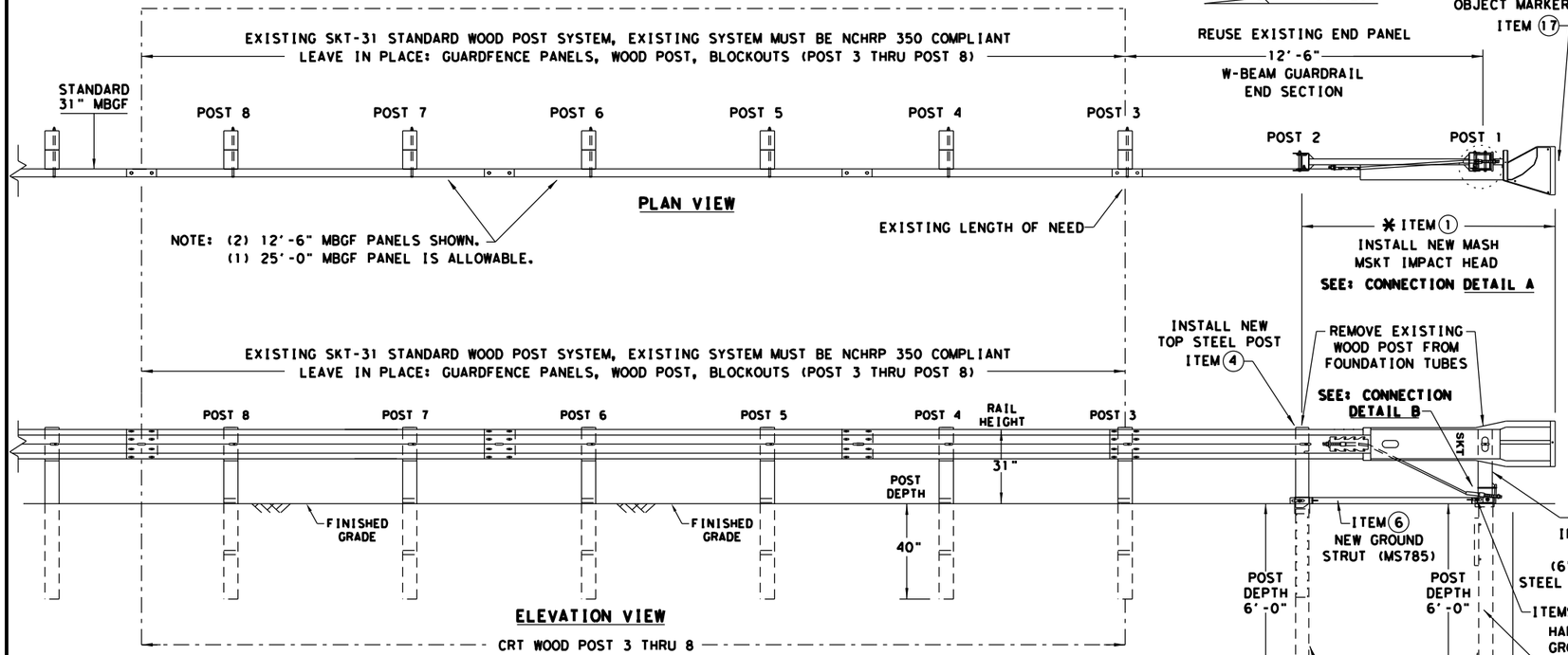
SINGLE GUARDRAIL TERMINAL

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	1599	03	017	FM 2258	
	DIST	COUNTY		SHEET NO.	
	FT#	JOHNSON		115	

DATE:
FILE:

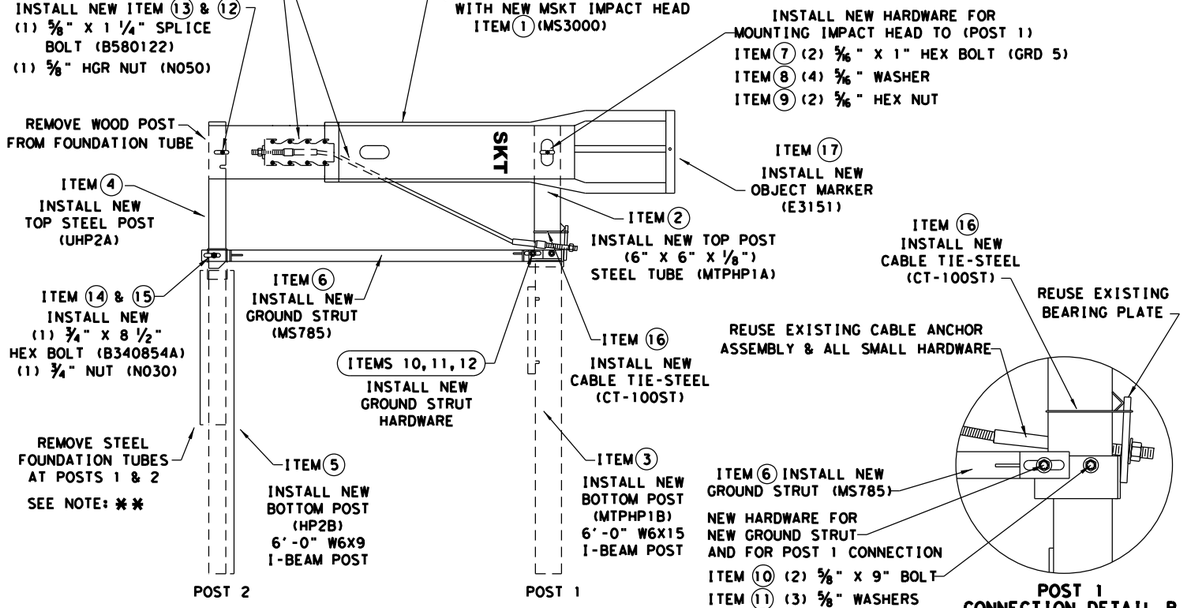


** NOTE: EXTRA SOIL COMPACTION WILL BE NEEDED AROUND NEW (POSTS 1 & 2) DUE TO THE REMOVAL OF THE STEEL FOUNDATION TUBES.

GENERAL NOTES

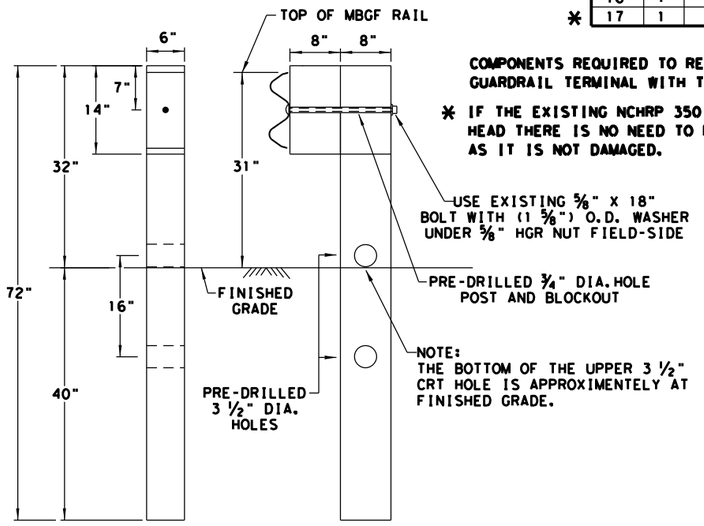
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: ROAD SYSTEMS, INC. (432)263-2435. 3616 OLD HOWARD COUNTY AIRPORT, BIG SPRING, TX 79720
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO; MSKT END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL (PUBLICATION-062717).
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. IF SOLID ROCK IS ENCOUNTERED IN THE AREA OF (POST 1) AND / OR (POST 2) CONTACT THE MANUFACTURER, AND REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
7. POSTS SHALL NOT BE SET IN CONCRETE.
8. THE EXISTING SKT 31" STANDARD WOOD POST SYSTEM MUST BE THOROUGHLY INSPECTED, AND DETERMINED TO BE INTACT, AND FREE OF ANY DAMAGE OR DEFECTS BEFORE RETROFITTING. THIS INSPECTION INCLUDES COMPLETING THE MSKT RETROFIT INSPECTION CHECKLIST FOR THE EXISTING SKT 31" WOOD POST NCHRP 350 SYSTEM. ALL EXISTING, AND REUSABLE PARTS MUST BE FREE OF ANY DAMAGE FOR A MASH COMPLIANT RETROFIT.
9. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE MSKT SYSTEM BE CURVED.
10. 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.
11. SPECIAL DRIVING CAP TO BE USED WHEN DRIVING (LOWER POSTS 1 & 2) TO PREVENT DAMAGE TO THE WELDED PLATES.

ITEMS	QTY	MAIN SYSTEM COMPONENTS	PART NUMBERS
1	1	MSKT IMPACT HEAD	MS3000
2	1	POST 1 - TOP (6" X 6" X 1/8" TUBE)	MTPHP1A
3	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
4	1	POST 2 - ASSEMBLY TOP	UHP2A
5	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
6	1	GROUND STRUT	MS785
7	2	5/8" X 1" HEX BOLT (GRD 5)	B516014A
8	4	5/8" WASHERS	W0516
9	2	5/8" HEX NUT	N0516
10	2	5/8" X 9" HEX BOLT (GRD A449)	B580904A
11	3	5/8" WASHERS	W050
12	3	5/8" H.G.R NUT	N050
13	1	5/8" X 1 1/4" SPLICE BOLT	B580122
14	1	3/4" X 8 1/2" HEX BOLT (GRD 5)	B340854A
15	1	3/4" HEX NUT	N030
16	1	CABLE TIE-STEEL	CT-100ST
* 17	1	OBJECT MARKER 18" X 18"	E3151



CONNECTION DETAIL A
IMPACT HEAD (POST 1 & POST 2)

POST 1
CONNECTION DETAIL B



FRONT VIEW SIDE VIEW
EXISTING WOOD POSTS 3-8
CONTROLLED RELEASE TERMINAL (CRT)

COMPONENTS REQUIRED TO RETROFIT: EXISTING 31" WOOD POST (NCHRP 350 SKT) GUARDRAIL TERMINAL WITH THE NEW 31" (MASH COMPLIANT MSKT IMPACT HEAD).

* IF THE EXISTING NCHRP 350 (31" WOOD POST SKT) ALREADY HAS THE MSKT IMPACT HEAD THERE IS NO NEED TO REPLACE THE IMPACT HEAD OR OBJECT MARKER AS LONG AS IT IS NOT DAMAGED.

NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE EXISTING; SKT END TERMINAL RETROFITED TO THE MSKT MASH COMPLIANT TERMINAL, IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

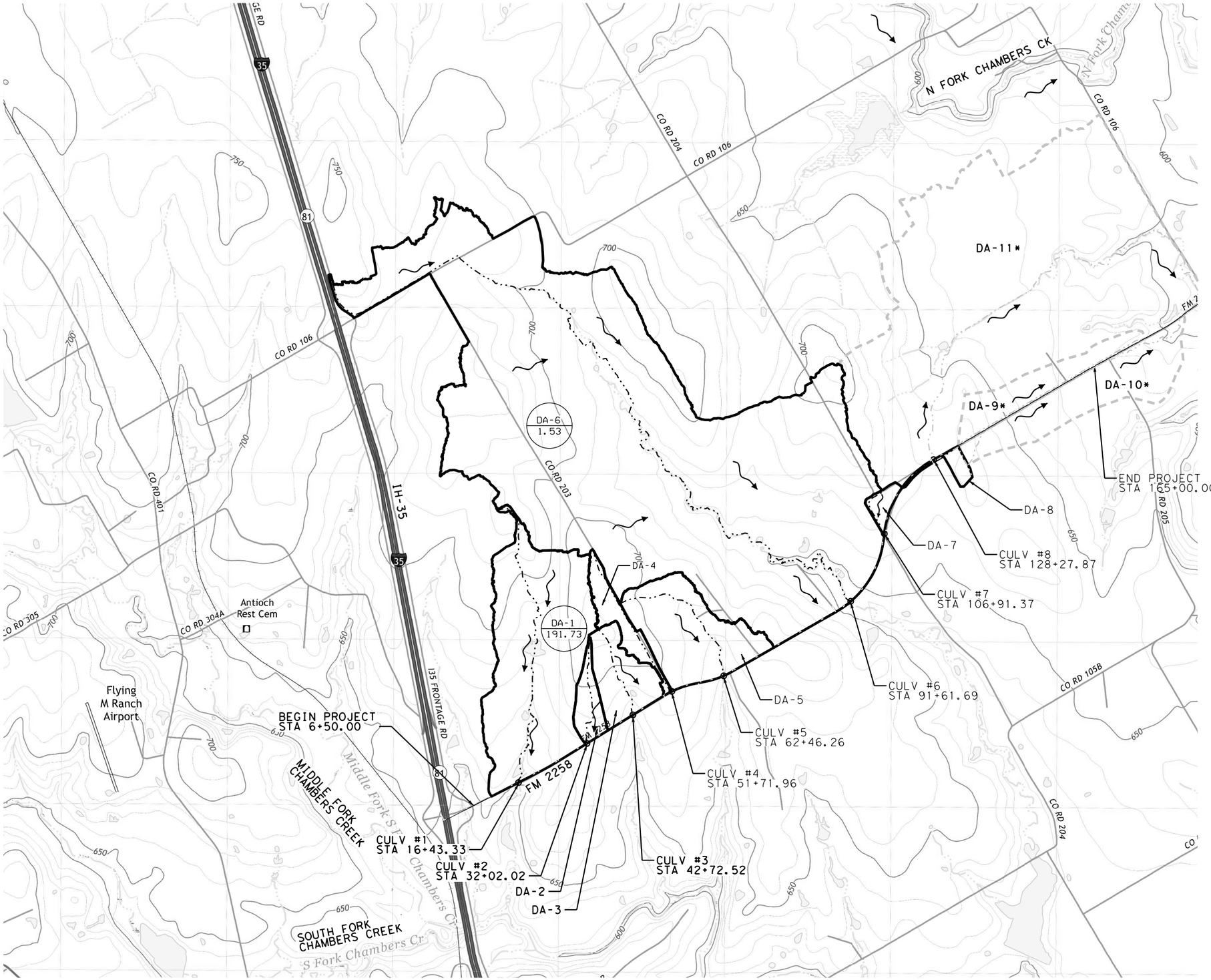
Texas Department of Transportation

Design Division Standard

RETROFIT STANDARD SKT 31" WOOD POST SYSTEM TO MASH MSKT

SGT(14W)31-18

FILE: sgt14w3118.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CL
©TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		116



LEGEND

- DA-XX / 00.0 — DRAINAGE AREA ID / DRAINAGE AREA (ACRES) (LARGER AREAS = SQ.MI.)
- C## STA 0+00 — CROSS-DRAINAGE ID
- DRAINAGE AREA BOUNDARY
- FLOW ARROW

NOTES

1. FOR DETAIL DRAINAGE AREA DELINEATION, SEE "CULVERT DRAINAGE AREA MAP" SHEETS.
2. FOR DRAINAGE AREA ACREAGE SEE "HYDROLOGY COMPUTATION" SHEET.
3. DRAINAGE AREA AND CROSS-DRAINAGE STRUCTURE NUMBERING IS CONTINUOUS ACROSS CSJ 1599-03-017 (BEGIN) AND 016 (END).

* DA-9, DA-10 AND DA-11 SHOWN FOR INFORMATIONAL PURPOSES ONLY. SEE CSJ-1599-03-016 FOR DETAILS.

STATE OF TEXAS
KURT E KILLIAN
95742
LICENSED
PROFESSIONAL ENGINEER

Civil Systems Engineering, Inc.
TBPE# F-5246

02/06/2024

CSE CIVIL SYSTEMS ENGINEERING, INC.

TPBE REGISTRATION NO. F-5246

Texas Department of Transportation

FM 2258
OVERALL
DRAINAGE AREA MAP

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		117
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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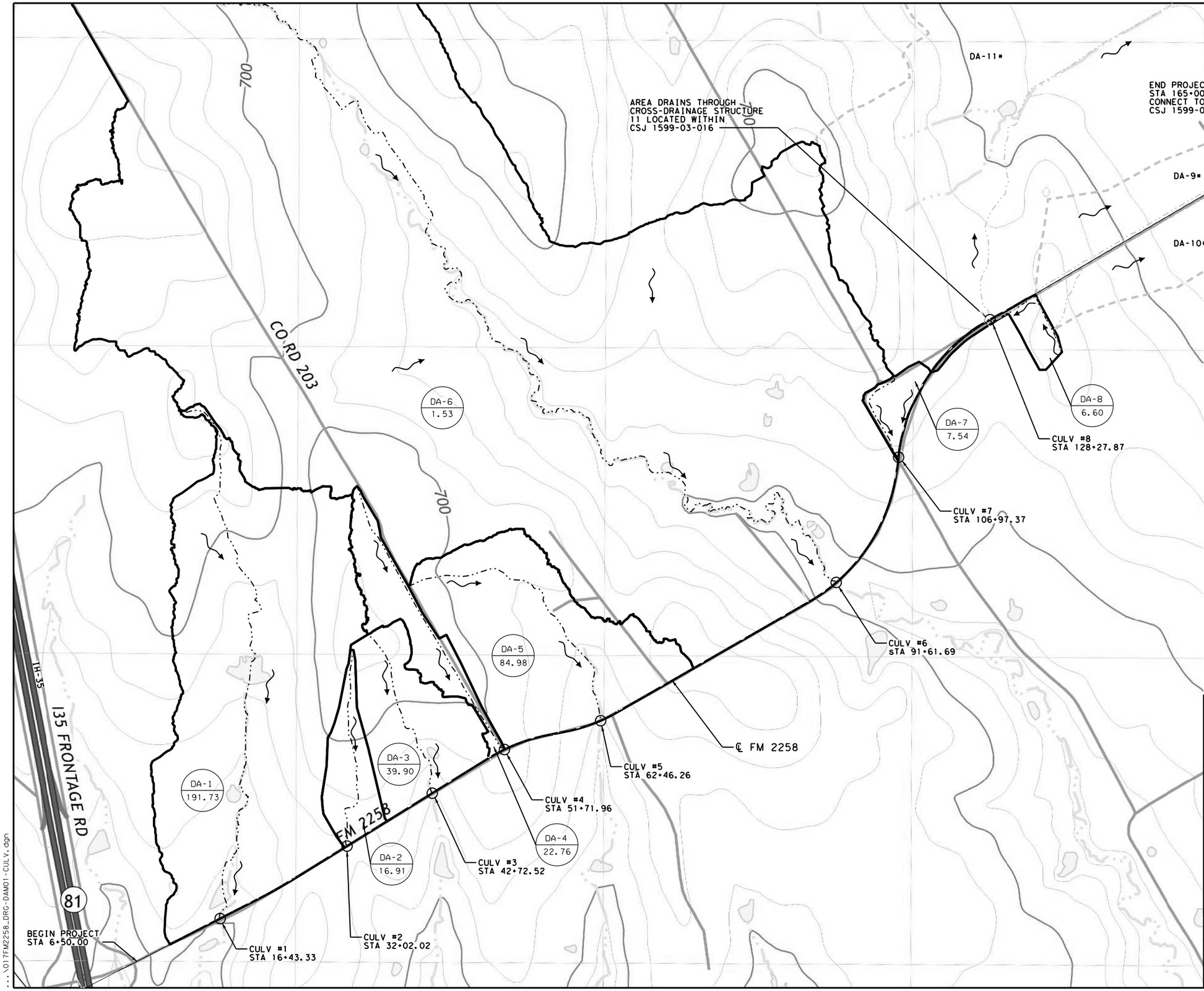

LEGEND

(DA-XX / 00.0) DRAINAGE AREA ID / DRAINAGE AREA (ACRES) (LARGER AREAS = SQ.MI.)

C## STA 0+00 CROSS-DRAINAGE ID

DRAINAGE AREA BOUNDARY

FLOW ARROW

NOTES

1. FOR DRAINAGE AREA FLOW COMPUTATIONS SEE "HYDROLOGY COMPUTATION" SHEET.
2. DRAINAGE AREA AND CROSS-DRAINAGE STRUCTURE NUMBERING IS CONTINUOUS ACROSS CSJ 1599-03-017 (BEGIN) AND 016 (END).

* DA-9, DA-10 AND DA-11 SHOWN FOR INFORMATIONAL PURPOSES ONLY. SEE CSJ-1599-03-016 FOR DETAILS.

STATE OF TEXAS
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02/06/2024

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TPBE REGISTRATION NO. F-5246

Texas Department of Transportation

FM 2258
CROSS-DRAINAGE DRAINAGE AREA MAP

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		118
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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DRAINAGE AREA HYDROLOGIC PARAMETER AND COMPUTED FLOWS - RATIONAL METHOD

DA ID	NODE STA	CROSSING ID	DRAINAGE AREA PARAMETERS				INTENSITY						COMPUTED FLOW					
			AREA (AC)	AREA (SQ.MI.)	Tc (MIN)	RATIONAL C	I_2 (IN/HR)	I_5 (IN/HR)	I_{10} (IN/HR)	I_{25} (IN/HR)	I_{50} (IN/HR)	I_{100} (IN/HR)	Q_2 (CFS)	Q_5 (CFS)	Q_{10} (CFS)	Q_{25} (CFS	Q_{50} (CFS)	Q_{100} (CFS)
DA01	16+43.33	1	191.73	0.30	58	0.30	1.64	2.17	2.58	3.14	3.57	4.02	94	125	148	180	205	231
DA02	32+02.02	2	16.91	0.03	40	0.31	2.08	2.75	3.27	3.97	4.51	5.07	11	14	17	21	24	27
DA03	42+72.52	3	39.90	0.06	34	0.29	2.30	3.04	3.61	4.38	4.97	5.59	27	35	42	51	58	65
DA04	51+71.96	4	22.76	0.04	46	0.32	1.90	2.52	3.00	3.64	4.14	4.66	14	18	22	27	30	34
DA05	62+46.26	5	84.98	0.13	52	0.31	1.76	2.33	2.77	3.37	3.83	4.31	46	61	73	89	101	114
DA07	106+91.37	7	7.54	0.01	41	0.31	2.05	2.71	3.22	3.91	4.44	5.00	5	6	8	9	10	12
DA08	128+27.87	8	6.60	0.01	35	0.31	2.26	2.99	3.55	4.30	4.89	5.49	5	6	7	9	10	11

DRAINAGE AREA PARAMETERS AND COMPUTED FLOWS - NRCS HYDROLOGIC METHOD

DA ID	NODE STA	CROSSING ID	DRAINAGE AREA PARAMETERS						COMPUTED FLOW					
			AREA (AC)	AREA (SQ.MI.)	Tc (MIN)	LAG (MIN)	CN BASE	CN ADJ	Q_2 (CFS)	Q_5 (CFS)	Q_{10} (CFS)	Q_{25} (CFS)	Q_{50} (CFS)	Q_{100} (CFS)
DA06	91+61.69	6	981.91	1.53	140	84	76	66	215	453	669	968	1206	1465

TIME OF CONCENTRATION CALCULATIONS - KIRBY KERPICH METHOD

DA ID	NODE STA	CROSSING ID	AREA (AC)	OVERLAND FLOWPATH SEGMENT				CHANNEL FLOWPATH SEGMENT			OVERALL TOTAL		
				LENGTH (FT)	SLOPE (FT/FT)	ROUGHNESS (N)	TRAVEL TIME (MIN)	LENGTH (FT)	SLOPE (FT/FT)	TRAVEL TIME (MIN)	FLOWPATH LENGTH (FT)	TOTAL T_c (MIN)	LAG TIME (MIN)
DA01	16+43.33	1	191.73	424	0.0284	0.40	21.0	6573	0.0123	36.9	6997	57.9	59
DA02	32+02.02	2	16.91	550	0.0202	0.40	25.7	2231	0.0176	14.0	2781	39.7	40
DA03	42+72.52	3	39.90	558	0.0338	0.40	22.9	1950	0.0238	11.2	2508	34.2	35
DA04	51+71.96	4	22.76	185	0.0098	0.40	18.3	3253	0.0062	27.9	3438	46.3	47
DA05	62+46.26	5	84.98	820	0.0170	0.40	32.3	3143	0.0150	19.4	3963	51.7	52
DA06	91+61.69	6	981.91	1000	0.0170	0.40	35.4	17914	0.0062	104.2	18914	139.6	140
DA07	106+91.37	7	7.54	545	0.0108	0.40	29.7	1190	0.0095	10.9	1735	40.6	41
DA08	128+27.87	8	6.60	558	0.0139	0.40	28.3	792	0.0123	7.2	1350	35.5	36

Rainfall Intensity Coefficients - Johnson County

COEFF	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
e	0.785	0.780	0.777	0.775	0.773	0.772
b	45	59	69	83	94	105
d (mins)	10.3	10.4	10.5	10.6	10.8	11.0

Rainfall 24-HR Depths

2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
3.98	5.07	6.02	7.37	8.46	9.63

NOTES

1. FLOWS COMPUTED USING NRCS HYDROGRAPH METHOD WITHIN HEC-HMS (V.4.2.1)

2. CN VALUE COMPUTED WITHIN ARCGIS USING USDA WEB SOIL SURVEY (WSS) DATA, AERIALS, AND TXDOT HYDRAULIC MANUAL.

3. NRCS UNIT HYDROGRAPH PEAK RATING FACTOR (PRF) WAS SET TO PRF=484 FOR ALL DRAINAGE AREAS.

4. RAINFALL FOR HEC-HMS MODELING WAS TAKEN FROM NOAA ATLAS 14, VOL.11, V.2 "PRECIPITATION FREQUENCY DATA SERVER" AT GRANDVIEW, TX.

5. CN VALUES FOR NRCS LOSS METHOD WERE ADJUSTED FOR CLIMATIC CONDITIONS BASED ON TXDOT HYDRAULIC MANUAL. (CN ADJ=CN-10).

6. TIME OF CONCENTRATIONS WERE CALCULATED USING KERBY-KIRPICH METHOD BASED ON TXDOT HYDRAULIC MANUAL.

7. RATIONAL METHOD E,B,D COEFF. FOR JOHNSON COUNTY WERE TAKEN FROM TXDOT'S "EBDLKUP-2019-vC6.2.10.XLSX" UPDATED 2019.

8. DRAINAGE AREA AND CROSS-DRAINAGE STRUCTURE NUMBERING IS CONTINUOUS ACROSS CSJ 1599-03-017 (BEGIN) AND 016 (END).

STATE OF TEXAS
KURT E KILLIAN
95742
LICENSED PROFESSIONAL ENGINEER

Civil Systems Engineering, Inc.
TBPE# F-5246

02/06/2024

CSE **CIVIL SYSTEMS ENGINEERING, INC.**

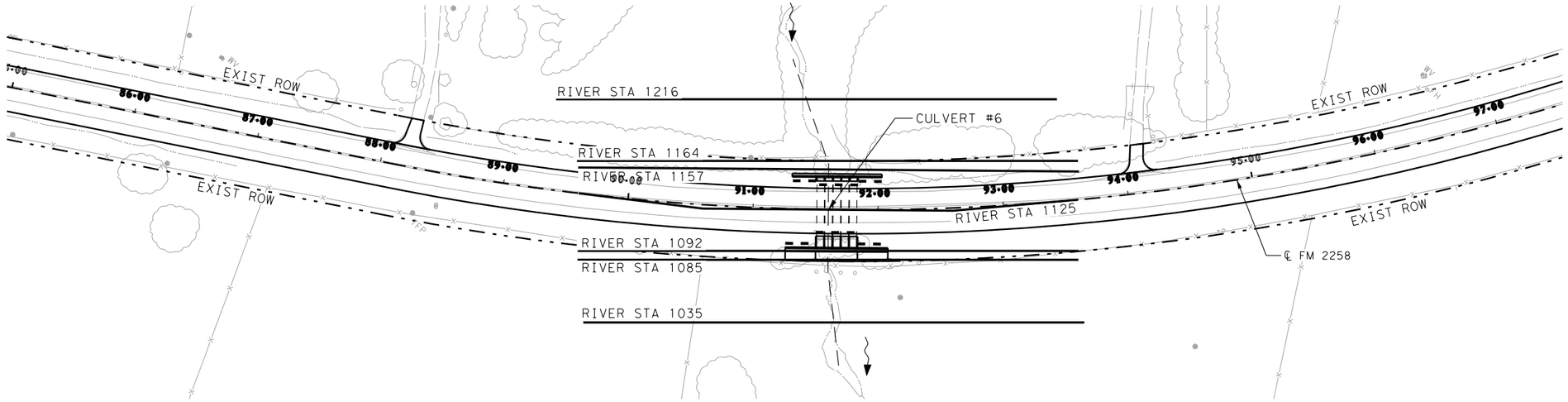
TPBE REGISTRATION NO. F-5246

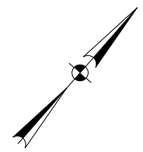
Texas Department of Transportation

FM 2258 HYDROLOGIC COMPUTATIONS

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		119
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

SECTION LAYOUT





0′ 100′ 200′
SCALE IN FEET

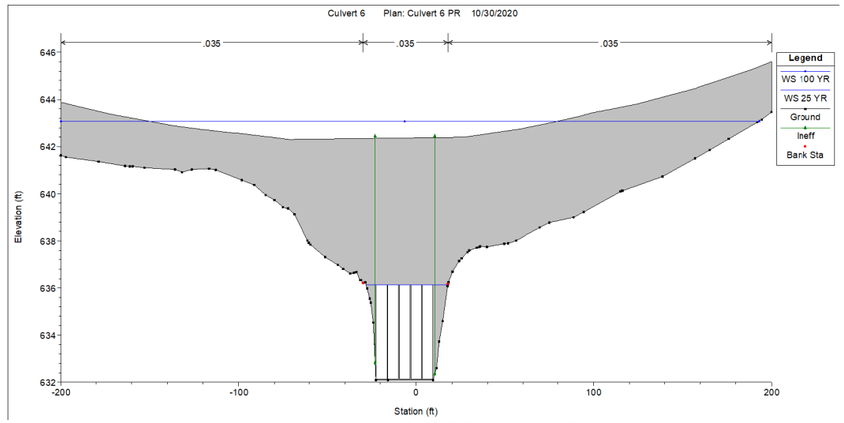
NOTES:

1. HYDRAULIC ANALYSIS CALCULATED USING US ARMY CORPS OF ENGINEERS HEC-RAS PROGRAM VERSION 5.0.7.
2. A DOWNSTREAM BOUNDARY CONDITION OF NORMAL DEPTH, S=.005 WAS USED FOR HYDAULIC ANALYSIS.
3. REFER TO EACH CROSSING'S CULVERT LAYOUT SHEET FOR CULVERT DETAILS.
4. DECK ELEVATION SHOWN IN HEC-RAS CROSS SECTION REPRESENTS ROADWAY CREST ELEVATION.

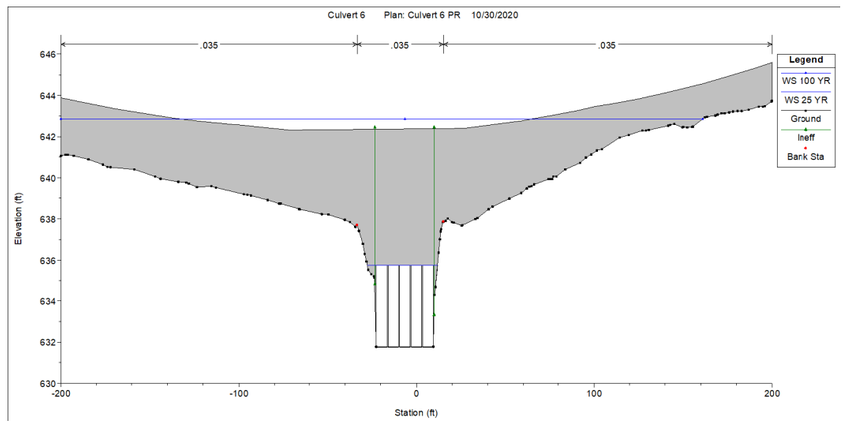
SIX XS CULVERT OUTPUT

River Sta	Profile	Plan	Q Total	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Vel Total	Top Width
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft/s)	(ft)
1216	25 YR	EXIST	968.0	641.14	640.96	0.18	0.05	0.01	426.95	394.88	146.17	3.38	391.72
1216	25 YR	PROP	968.0	641.22	641.04	0.19	0.05	0.01	435.16	400.46	132.38	3.41	393.41
1216	100 YR	EXIST	1465.0	643.15	643.14	0.01	0.00	0.00	768.88	151.38	544.74	0.82	400.00
1216	100 YR	PROP	1465.0	643.10	643.09	0.01	0.00	0.00	769.44	152.71	542.85	0.83	400.00
1164	25 YR	EXIST	968.0	641.08	640.81	0.28	0.00	0.04	178.09	789.91		4.20	256.45
1164	25 YR	PROP	968.0	641.16	640.85	0.31	0.00	0.04	190.00	778.00		4.45	258.64
1164	100 YR	EXIST	1465.0	643.15	643.13	0.02	0.00	0.00	473.98	392.84	598.18	0.96	400.00
1164	100 YR	PROP	1465.0	643.09	643.08	0.02	0.00	0.00	470.90	397.44	596.66	0.98	400.00
1157	25 YR	EXIST	968.0	641.04	640.89	0.15				968.00		3.09	251.97
1157	25 YR	PROP	968.0	641.11	640.94	0.17				968.00		3.28	257.67
1157	100 YR	EXIST	1465.0	643.15	643.13	0.02			346.23	703.14	415.64	0.92	394.14
1157	100 YR	PROP	1465.0	643.09	643.07	0.02			342.08	709.55	413.37	0.93	393.03
1125			Culvert										
1092	25 YR	EXIST	968.0	639.55	639.34	0.22	0.01	0.03		968.00		3.74	163.53
1092	25 YR	PROP	968.0	639.59	639.36	0.23	0.01	0.04		968.00		3.87	165.17
1092	100 YR	EXIST	1465.0	640.69	640.30	0.39	0.01	0.05		1465.00		5.00	237.86
1092	100 YR	PROP	1465.0	640.78	640.37	0.42	0.01	0.06		1465.00		5.17	240.90
1085	25 YR	EXIST	968.0	639.51	638.96	0.55	0.20	0.01		968.00		5.95	178.50
1085	25 YR	PROP	968.0	639.55	638.95	0.59	0.20	0.01		968.00		6.18	178.22
1085	100 YR	EXIST	1465.0	640.63	639.71	0.92	0.23	0.03		1465.00		7.67	227.52
1085	100 YR	PROP	1465.0	640.71	639.73	0.98	0.24	0.04		1465.00		7.96	229.74
1035	25 YR	EXIST	968.0	639.31	638.67	0.64			211.56	482.68	273.76	6.11	240.67
1035	25 YR	PROP	968.0	639.34	638.70	0.65			204.57	486.82	276.61	6.18	241.48
1035	100 YR	EXIST	1465.0	640.37	639.55	0.82			393.63	636.25	435.12	7.11	266.99
1035	100 YR	PROP	1465.0	640.43	639.59	0.84			378.73	644.64	441.62	7.21	267.95

TYPICAL CROSS SECTION



UPSTREAM CROSS SECTION



DOWNSTREAM CROSS SECTION

CAMACHO-HERNANDEZ & ASSOCIATES, LLC
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FIRM NUMBER: F-8478

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

HYDRAULIC DATA
CULVERT 6
BRIDGE CLASS CULVERT

HORZ: 1" = 10′
VERT: 1" = 10′
SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	120

STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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EXISTING CULVERT

Site Data - EX Culvert 1

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 643.16 ft
Outlet Station: 32.83 ft
Outlet Elevation: 643.09 ft
Number of Barrels: 2

Culvert Data Summary - EX Culvert 1

Barrel Shape: Concrete Box
Barrel Span: 5.00 ft
Barrel Rise: 4.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0130
Culvert Type: Straight
Inlet Configuration: Square Edge (30-75º flare) Wingwall
Inlet Depression: None

Table 1 - Culvert Summary Table: EX Culvert 1

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
25 YR	180.00	180.00	646.78	3.337	3.625	3-M2t	2.821	2.159	2.311	2.371	7.789	6.405
100 YR	231.00	231.00	647.44	3.976	4.279	7-M2c	3.419	2.550	2.550	2.603	9.061	6.817

****

Straight Culvert

Inlet Elevation (invert): 643.16 ft, Outlet Elevation (invert): 643.09 ft

Culvert Length: 32.83 ft, Culvert Slope: 0.0021

****

Table 3 - Downstream Channel Rating Curve (Crossing: EX Culvert 1)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
180.00	645.40	2.37	6.40	5.62	1.04
231.00	645.63	2.60	6.82	6.17	1.05

Table 2 - Summary of Culvert Flows at Crossing: EX Culvert 1

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	EX Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
646.78	25 YR	180.00	180.00	0.00	1
647.44	100 YR	231.00	231.00	0.00	1
649.47	Overtopping	388.70	388.70	0.00	Overtopping

Tailwater Channel Data - EX Culvert 1

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 5.00 (_:1)
Channel Slope: 0.0380
Channel Manning's n: 0.0500
Channel Invert Elevation: 643.03 ft

Roadway Data for Crossing: EX Culvert 1

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 100.00 ft
Crest Elevation: 649.47 ft
Roadway Surface: Paved
Roadway Top Width: 20.85 ft

PROPOSED CULVERT

Site Data - PR Culvert 1

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 643.17 ft
Outlet Station: 46.00 ft
Outlet Elevation: 643.08 ft
Number of Barrels: 2

Culvert Data Summary - PR Culvert 1

Barrel Shape: Concrete Box
Barrel Span: 5.00 ft
Barrel Rise: 4.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0130
Culvert Type: Straight
Inlet Configuration: Square Edge (90º) Headwall
Inlet Depression: None

Table 1 - Culvert Summary Table: PR Culvert 1

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
25 YR	180.00	180.00	646.88	3.650	3.710	3-M2t	2.915	2.159	2.371	2.371	7.592	6.405
100 YR	231.00	231.00	647.55	4.350	4.379	3-M2t	3.536	2.550	2.603	2.603	8.873	6.817

****

Straight Culvert

Inlet Elevation (invert): 643.17 ft, Outlet Elevation (invert): 643.08 ft

Culvert Length: 46.00 ft, Culvert Slope: 0.0020

****

Table 3 - Downstream Channel Rating Curve (Crossing: PR Culvert 1)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
180.00	645.45	2.37	6.40	5.62	1.04
231.00	645.68	2.60	6.82	6.17	1.05

Table 2 - Summary of Culvert Flows at Crossing: PR Culvert 1

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	PR Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
646.88	25 YR	180.00	180.00	0.00	1
647.55	100 YR	231.00	231.00	0.00	1
649.86	Overtopping	376.97	376.97	0.00	Overtopping

Tailwater Channel Data - PR Culvert 1

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 5.00 (_:1)
Channel Slope: 0.0380
Channel Manning's n: 0.0500
Channel Invert Elevation: 643.08 ft

Roadway Data for Crossing: PR Culvert 1

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 100.00 ft
Crest Elevation: 649.86 ft
Roadway Surface: Paved
Roadway Top Width: 36.00 ft

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CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

HYDRAULIC DATA CULVERT 1

SHEET 1 OF 7

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		121
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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EXISTING CULVERT

Site Data - EX Culvert 2

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 673.54 ft
Outlet Station: 43.97 ft
Outlet Elevation: 672.98 ft
Number of Barrels: 1

Culvert Data Summary - EX Culvert 2

Barrel Shape: Circular
Barrel Diameter: 2.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0130
Culvert Type: Straight
Inlet Configuration: Mitered to Conform to Slope
Inlet Depression: None

Table 4 - Culvert Summary Table: EX Culvert 2

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
25 YR	21.00	21.00	677.04	3.501	2.817	5-S2n	1.379	1.642	1.422	0.177	8.793	2.703
100 YR	27.00	27.00	678.50	4.959	3.917	5-S2n	1.766	1.808	1.772	0.204	9.176	2.929

****

Straight Culvert

Inlet Elevation (invert): 673.54 ft, Outlet Elevation (invert): 672.98 ft

Culvert Length: 43.97 ft, Culvert Slope: 0.0127

****

Table 6 - Downstream Channel Rating Curve (Crossing: EX Culvert 2)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
21.00	673.00	0.18	2.70	0.57	1.24
27.00	673.02	0.20	2.93	0.66	1.27

Table 5 - Summary of Culvert Flows at Crossing: EX Culvert 2

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	EX Culvert 2 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
677.04	25 YR	21.00	21.00	0.00	1
678.50	100 YR	27.00	27.00	0.00	1
678.51	Overtopping	27.04	27.04	0.00	Overtopping

Tailwater Channel Data - EX Culvert 2

Tailwater Channel Option: Trapezoidal Channel
Bottom Width: 35.00 ft
Side Slope (H:V): 50.00 (_:1)
Channel Slope: 0.0520
Channel Manning's n: 0.0350
Channel Invert Elevation: 672.82 ft

Roadway Data for Crossing: EX Culvert 2

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 100.00 ft
Crest Elevation: 678.51 ft
Roadway Surface: Paved
Roadway Top Width: 23.39 ft

PROPOSED CULVERT

Site Data - PR Culvert 2

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 673.92 ft
Break Station: 4.00 ft
Break Elevation: 673.55 ft
Outlet Station: 53.75 ft
Outlet Elevation: 672.89 ft
Number of Barrels: 1

Culvert Data Summary - PR Culvert 2

Barrel Shape: Circular
Barrel Diameter: 2.00 ft
Upper Section Material: Concrete
Lower Section Material:
Embedment: 0.00 in
Upper Section Manning's n: 0.0130
Lower Section Manning's n: 0.0130
Culvert Type: Single Broken-back
Inlet Configuration: Mitered to Conform to Slope
Inlet Depression: None

Table 4 - Culvert Summary Table: PR Culvert 2

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
25 YR	21.00	21.00	677.43	3.510	1.462	5-S2n	0.000	0.000	1.315	0.177	9.587	2.703
100 YR	27.00	25.46	678.49	4.569	2.032	5-S2n	0.000	0.000	1.500	0.204	10.075	2.929

****

Single Broken-back Culvert

Inlet Elevation (invert): 673.92 ft,

Break Elevation (invert): 673.55 ft,

Culvert Length: 53.76 ft,

Upper Culvert Section Slope: 0.0925

Steep Culvert Section Slope: 0.0133

****

Table 6 - Downstream Channel Rating Curve (Crossing: PR Culvert 2)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
21.00	673.07	0.18	2.70	0.57	1.24
27.00	673.09	0.20	2.93	0.66	1.27

Table 5 - Summary of Culvert Flows at Crossing: PR Culvert 2

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	PR Culvert 2 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
677.43	25 YR	21.00	21.00	0.00	1
678.49	100 YR	27.00	25.46	1.44	9
678.46	Overtopping	25.34	25.34	0.00	Overtopping

Tailwater Channel Data - PR Culvert 2

Tailwater Channel Option: Trapezoidal Channel
Bottom Width: 35.00 ft
Side Slope (H:V): 50.00 (_:1)
Channel Slope: 0.0520
Channel Manning's n: 0.0350
Channel Invert Elevation: 672.89 ft

Roadway Data for Crossing: PR Culvert 2

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 100.00 ft
Crest Elevation: 678.46 ft
Roadway Surface: Paved
Roadway Top Width: 36.00 ft

STATE OF TEXAS
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TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

HYDRAULIC DATA CULVERT 2

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		122
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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EXISTING CULVERT

Site Data - EX Culvert 3

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 665.80 ft
Outlet Station: 44.63 ft
Outlet Elevation: 666.14 ft
Number of Barrels: 1

Culvert Data Summary - EX Culvert 3

Barrel Shape: Circular
Barrel Diameter: 5.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0130
Culvert Type: Straight
Inlet Configuration: Grooved End Projecting
Inlet Depression: None

Table 7 - Culvert Summary Table: EX Culvert 3

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
25 YR	51.00	51.00	669.02	2.813	3.220	7-A2c	-1.000	2.002	2.002	1.029	6.946	2.729
100 YR	65.00	65.00	669.44	3.240	3.635	7-A2c	-1.000	2.272	2.272	1.168	7.491	2.927

****

Straight Culvert

Inlet Elevation (invert): 665.80 ft, Outlet Elevation (invert): 666.14 ft

Culvert Length: 44.63 ft, Culvert Slope: -0.0076

****

Table 9 - Downstream Channel Rating Curve (Crossing: EX Culvert 3)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
51.00	667.17	1.03	2.73	0.78	0.55
65.00	667.31	1.17	2.93	0.88	0.56

Table 8 - Summary of Culvert Flows at Crossing: EX Culvert 3

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	EX Culvert 3 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
669.02	25 YR	51.00	51.00	0.00	1
669.44	100 YR	65.00	65.00	0.00	1
674.63	Overtopping	255.71	255.71	0.00	Overtopping

Tailwater Channel Data - EX Culvert 3

Tailwater Channel Option: Trapezoidal Channel
Bottom Width: 12.00 ft
Side Slope (H:V): 6.00 (_:1)
Channel Slope: 0.0121
Channel Manning's n: 0.0500
Channel Invert Elevation: 666.14 ft

Roadway Data for Crossing: EX Culvert 3

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 100.00 ft
Crest Elevation: 674.63 ft
Roadway Surface: Paved
Roadway Top Width: 24.68 ft

PROPOSED CULVERT

Site Data - PR Culvert 3

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 667.00 ft
Outlet Station: 50.00 ft
Outlet Elevation: 666.50 ft
Number of Barrels: 1

Culvert Data Summary - PR Culvert 3

Barrel Shape: Concrete Box
Barrel Span: 5.00 ft
Barrel Rise: 4.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge (90º) Headwall
Inlet Depression: None

Table 7 - Culvert Summary Table: PR Culvert 3

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
25 YR	51.00	51.00	669.50	2.499	1.148	1-S2n	1.019	1.478	1.122	1.029	9.093	2.729
100 YR	65.00	65.00	669.93	2.927	1.514	1-S2n	1.203	1.738	1.340	1.168	9.700	2.927

****

Straight Culvert

Inlet Elevation (invert): 667.00 ft, Outlet Elevation (invert): 666.50 ft

Culvert Length: 50.00 ft, Culvert Slope: 0.0100

****

Table 9 - Downstream Channel Rating Curve (Crossing: PR Culvert 3)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
51.00	667.53	1.03	2.73	0.78	0.55
65.00	667.67	1.17	2.93	0.88	0.56

Table 8 - Summary of Culvert Flows at Crossing: PR Culvert 3

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	PR Culvert 3 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
669.50	25 YR	51.00	51.00	0.00	1
669.93	100 YR	65.00	65.00	0.00	1
675.76	Overtopping	236.98	236.98	0.00	Overtopping

Tailwater Channel Data - PR Culvert 3

Tailwater Channel Option: Trapezoidal Channel
Bottom Width: 12.00 ft
Side Slope (H:V): 6.00 (_:1)
Channel Slope: 0.0121
Channel Manning's n: 0.0500
Channel Invert Elevation: 666.50 ft

Roadway Data for Crossing: PR Culvert 3

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 100.00 ft
Crest Elevation: 675.76 ft
Roadway Surface: Paved
Roadway Top Width: 38.00 ft

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Texas Department of Transportation

HYDRAULIC DATA
CULVERT 3

SHEET 3 OF 7

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		123
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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EXISTING CULVERT

Site Data - EX Culvert 4

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 690.72 ft
Outlet Station: 44.00 ft
Outlet Elevation: 689.69 ft
Number of Barrels: 1

Culvert Data Summary - EX Culvert 4

Barrel Shape: Circular
Barrel Diameter: 2.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge with Headwall
Inlet Depression: None

Table 10 - Culvert Summary Table: EX Culvert 4

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
25 YR	27.00	25.74	694.69	3.965	2.906	5-S2n	1.215	1.780	1.358	1.242	11.329	4.378
100 YR	34.00	26.05	694.75	4.030	2.959	5-S2n	1.225	1.787	1.369	1.354	11.369	4.637

****

Straight Culvert

Inlet Elevation (invert): 690.72 ft, Outlet Elevation (invert): 689.69 ft

Culvert Length: 44.01 ft, Culvert Slope: 0.0234

****

Table 12 - Downstream Channel Rating Curve (Crossing: EX Culvert 4)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
27.00	690.93	1.24	4.38	1.62	0.98
34.00	691.04	1.35	4.64	1.77	0.99

Table 11 - Summary of Culvert Flows at Crossing: EX Culvert 4

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	EX Culvert 4 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
694.69	25 YR	27.00	25.74	1.17	29
694.75	100 YR	34.00	26.05	7.90	5
694.66	Overtopping	25.62	25.62	0.00	Overtopping

Tailwater Channel Data - EX Culvert 4

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 4.00 (_:1)
Channel Slope: 0.0209
Channel Manning's n: 0.0350
Channel Invert Elevation: 689.69 ft

Roadway Data for Crossing: EX Culvert 4

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 100.00 ft
Crest Elevation: 694.66 ft
Roadway Surface: Paved
Roadway Top Width: 27.75 ft

PROPOSED CULVERT

Site Data - PR Culvert 4

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 691.30 ft
Outlet Station: 47.25 ft
Outlet Elevation: 689.93 ft
Number of Barrels: 1

Culvert Data Summary - PR Culvert 4

Barrel Shape: Circular
Barrel Diameter: 2.50 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Mitered to Conform to Slope
Inlet Depression: None

Table 10 - Culvert Summary Table: PR Culvert 4

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
25 YR	27.00	27.00	694.39	3.095	1.374	5-S2n	1.031	1.771	1.185	1.160	11.779	5.013
100 YR	34.00	28.65	694.59	3.288	1.549	5-S2n	1.065	1.825	1.227	1.265	11.950	5.311

****

Straight Culvert

Inlet Elevation (invert): 691.30 ft, Outlet Elevation (invert): 689.93 ft

Culvert Length: 47.27 ft, Culvert Slope: 0.0290

****

Table 12 - Downstream Channel Rating Curve (Crossing: PR Culvert 4)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
27.00	691.09	1.16	5.01	2.17	1.16
34.00	691.20	1.27	5.31	2.37	1.18

Table 11 - Summary of Culvert Flows at Crossing: PR Culvert 4

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	PR Culvert 4 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
694.39	25 YR	27.00	27.00	0.00	1
694.59	100 YR	34.00	28.65	5.19	7
694.52	Overtopping	28.08	28.08	0.00	Overtopping

Tailwater Channel Data - PR Culvert 4

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 4.00 (_:1)
Channel Slope: 0.0300
Channel Manning's n: 0.0350
Channel Invert Elevation: 689.93 ft

Roadway Data for Crossing: PR Culvert 4

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 100.00 ft
Crest Elevation: 694.52 ft
Roadway Surface: Paved
Roadway Top Width: 36.00 ft

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Texas Department of Transportation

HYDRAULIC DATA
CULVERT 4

SHEET 4 OF 7

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		124
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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EXISTING CULVERT

Site Data - EX Culvert 5

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 661.72 ft
Outlet Station: 54.36 ft
Outlet Elevation: 660.56 ft
Number of Barrels: 2

Culvert Data Summary - EX Culvert 5

Barrel Shape: Circular
Barrel Diameter: 3.50 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge with Headwall
Inlet Depression: None

Table 13 - Culvert Summary Table: EX Culvert 5

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
25 YR	89.00	89.00	664.85	3.132	1.508	1-S2n	1.264	2.079	1.459	0.719	11.716	3.845
100 YR	114.00	114.00	665.44	3.725	2.170	5-S2n	1.446	2.364	1.692	0.825	12.370	4.157

****

Straight Culvert

Inlet Elevation (invert): 661.72 ft, Outlet Elevation (invert): 660.56 ft

Culvert Length: 54.37 ft, Culvert Slope: 0.0213

****

Table 15 - Downstream Channel Rating Curve (Crossing: EX Culvert 5)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
89.00	661.28	0.72	3.84	0.75	0.88
114.00	661.38	0.82	4.16	0.86	0.90

Table 14 - Summary of Culvert Flows at Crossing: EX Culvert 5

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	EX Culvert 5 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
664.85	25 YR	89.00	89.00	0.00	1
665.44	100 YR	114.00	114.00	0.00	1
670.75	Overtopping	250.51	250.51	0.00	Overtopping

Tailwater Channel Data - EX Culvert 5

Tailwater Channel Option: Trapezoidal Channel
Bottom Width: 25.00 ft
Side Slope (H:V): 10.00 (_:1)
Channel Slope: 0.0167
Channel Manning's n: 0.0350
Channel Invert Elevation: 660.56 ft

Roadway Data for Crossing: EX Culvert 5

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 100.00 ft
Crest Elevation: 670.75 ft
Roadway Surface: Paved
Roadway Top Width: 28.88 ft

PROPOSED CULVERT

Site Data - PR Culvert 5

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 663.84 ft
Outlet Station: 59.33 ft
Outlet Elevation: 663.54 ft
Number of Barrels: 2

Culvert Data Summary - PR Culvert 5

Barrel Shape: Circular
Barrel Diameter: 3.50 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0130
Culvert Type: Straight
Inlet Configuration: Square Edge with Headwall
Inlet Depression: None

Table 13 - Culvert Summary Table: PR Culvert 5

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
25 YR	89.00	89.00	667.00	3.161	2.393	1-S2n	1.996	2.079	2.001	0.719	7.828	3.845
100 YR	114.00	114.00	667.59	3.753	3.071	5-S2n	2.358	2.364	2.358	0.825	8.268	4.157

****

Straight Culvert

Inlet Elevation (invert): 663.84 ft, Outlet Elevation (invert): 663.54 ft

Culvert Length: 59.33 ft, Culvert Slope: 0.0051

****

Table 15 - Downstream Channel Rating Curve (Crossing: PR Culvert 5)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
89.00	664.26	0.72	3.84	0.75	0.88
114.00	664.36	0.82	4.16	0.86	0.90

Table 14 - Summary of Culvert Flows at Crossing: PR Culvert 5

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	PR Culvert 5 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
667.00	25 YR	89.00	89.00	0.00	1
667.59	100 YR	114.00	114.00	0.00	1
670.25	Overtopping	195.61	195.61	0.00	Overtopping

Tailwater Channel Data - PR Culvert 5

Tailwater Channel Option: Trapezoidal Channel
Bottom Width: 25.00 ft
Side Slope (H:V): 10.00 (_:1)
Channel Slope: 0.0167
Channel Manning's n: 0.0350
Channel Invert Elevation: 663.54 ft

Roadway Data for Crossing: PR Culvert 5

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 100.00 ft
Crest Elevation: 670.25 ft
Roadway Surface: Paved
Roadway Top Width: 40.77 ft

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HYDRAULIC DATA
CULVERT 5

SHEET 5 OF 7

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		125
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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EXISTING CULVERT

Site Data - EX Culvert 7

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 664.66 ft
Outlet Station: 47.83 ft
Outlet Elevation: 664.26 ft
Number of Barrels: 1

Culvert Data Summary - EX Culvert 7

Barrel Shape: Circular
Barrel Diameter: 1.50 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0130
Culvert Type: Straight
Inlet Configuration: Grooved End Projecting
Inlet Depression: None

Table 16 - Culvert Summary Table: EX Culvert 7

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
25 YR	9.00	9.00	666.51	1.852	1.763	5-S2n	1.150	1.161	1.150	0.595	6.190	3.182
100 YR	12.00	12.00	667.14	2.485	2.482	7-M2c	1.500	1.314	1.314	0.662	7.312	3.419

****

Straight Culvert

Inlet Elevation (invert): 664.66 ft, Outlet Elevation (invert): 664.26 ft

Culvert Length: 47.83 ft, Culvert Slope: 0.0084

****

Table 18 - Downstream Channel Rating Curve (Crossing: EX Culvert 7)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
9.00	664.84	0.59	3.18	1.06	1.03
12.00	664.91	0.66	3.42	1.18	1.05

Table 17 - Summary of Culvert Flows at Crossing: EX Culvert 7

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	EX Culvert 7 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
666.51	25 YR	9.00	9.00	0.00	1
667.14	100 YR	12.00	12.00	0.00	1
667.15	Overtopping	12.02	12.02	0.00	Overtopping

Tailwater Channel Data - EX Culvert 7

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 8.00 (_:1)
Channel Slope: 0.0286
Channel Manning's n: 0.0350
Channel Invert Elevation: 664.25 ft

Roadway Data for Crossing: EX Culvert 7

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 100.00 ft
Crest Elevation: 667.15 ft
Roadway Surface: Paved
Roadway Top Width: 32.75 ft

PROPOSED CULVERT

Site Data - PR Culvert 7

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 664.97 ft
Break Station: 8.75 ft
Break Elevation: 664.62 ft
Outlet Station: 60.00 ft
Outlet Elevation: 664.19 ft
Number of Barrels: 1

Culvert Data Summary - PR Culvert 7

Barrel Shape: Circular
Barrel Diameter: 1.50 ft
Upper Section Material: Concrete
Lower Section Material:
Embedment: 0.00 in
Upper Section Manning's n: 0.0130
Lower Section Manning's n: 0.0130
Culvert Type: Single Broken-back
Inlet Configuration: Mitered to Conform to Slope
Inlet Depression: None

Table 16 - Culvert Summary Table: PR Culvert 7

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
25 YR	9.00	9.00	667.21	2.237	0.896	5-S2n	0.000	0.000	1.098	0.595	6.495	3.182
100 YR	12.00	9.81	667.46	2.488	1.037	5-S2n	0.000	0.000	1.224	0.662	6.354	3.419

****

Single Broken-back Culvert

Inlet Elevation (invert): 664.97 ft,

Break Elevation (invert): 664.62 ft,

Culvert Length: 60.01 ft,

Upper Culvert Section Slope: 0.0400

Steep Culvert Section Slope: 0.0084

****

Table 18 - Downstream Channel Rating Curve (Crossing: PR Culvert 7)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
9.00	664.78	0.59	3.18	1.06	1.03
12.00	664.85	0.66	3.42	1.18	1.05

Table 17 - Summary of Culvert Flows at Crossing: PR Culvert 7

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	PR Culvert 7 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
667.21	25 YR	9.00	9.00	0.00	1
667.46	100 YR	12.00	9.81	2.12	9
667.42	Overtopping	9.69	9.69	0.00	Overtopping

Tailwater Channel Data - PR Culvert 7

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 8.00 (_:1)
Channel Slope: 0.0286
Channel Manning's n: 0.0350
Channel Invert Elevation: 664.19 ft

Roadway Data for Crossing: PR Culvert 7

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 100.00 ft
Crest Elevation: 667.42 ft
Roadway Surface: Paved
Roadway Top Width: 40.00 ft

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HYDRAULIC DATA
CULVERT 7

SHEET 6 OF 7

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		126
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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EXISTING CULVERT

Site Data - EX Culvert 8

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 667.66 ft
Outlet Station: 41.12 ft
Outlet Elevation: 666.86 ft
Number of Barrels: 1

Culvert Data Summary - EX Culvert 8

Barrel Shape: Circular
Barrel Diameter: 1.50 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0130
Culvert Type: Straight
Inlet Configuration: Mitered to Conform to Slope
Inlet Depression: None

Table 19 - Culvert Summary Table: EX Culvert 8

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
25 YR	9.00	9.00	669.90	2.244	1.515	5-S2n	0.849	1.161	0.885	0.251	8.291	5.724
100 YR	11.00	11.00	670.56	2.900	2.056	5-S2n	0.969	1.270	1.010	0.270	8.693	6.019

****

Straight Culvert

Inlet Elevation (invert): 667.66 ft, Outlet Elevation (invert): 666.86 ft

Culvert Length: 41.13 ft, Culvert Slope: 0.0195

****

Table 21 - Downstream Channel Rating Curve (Crossing: EX Culvert 8)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
9.00	667.11	0.25	5.72	0.63	2.85
11.00	667.13	0.27	6.02	0.67	2.88

Table 20 - Summary of Culvert Flows at Crossing: EX Culvert 8

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	EX Culvert 8 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
669.90	25 YR	9.00	9.00	0.00	1
670.56	100 YR	11.00	11.00	0.00	1
671.15	Overtopping	12.56	12.56	0.00	Overtopping

Tailwater Channel Data - EX Culvert 8

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 25.00 (_:1)
Channel Slope: 0.0400
Channel Manning's n: 0.0130
Channel Invert Elevation: 666.86 ft

Roadway Data for Crossing: EX Culvert 8

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 100.00 ft
Crest Elevation: 671.15 ft
Roadway Surface: Paved
Roadway Top Width: 23.78 ft

PROPOSED CULVERT

Site Data - PR Culvert 8

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 667.75 ft
Outlet Station: 52.75 ft
Outlet Elevation: 667.07 ft
Number of Barrels: 1

Culvert Data Summary - PR Culvert 8

Barrel Shape: Circular
Barrel Diameter: 1.50 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0130
Culvert Type: Straight
Inlet Configuration: Mitered to Conform to Slope (Ke=0.7)
Inlet Depression: None

Table 19 - Culvert Summary Table: PR Culvert 8

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
25 YR	9.00	9.00	669.99	2.237	0.805	5-S2n	0.000	0.000	1.086	0.251	6.569	5.724
100 YR	11.00	11.00	670.64	2.894	2.303	5-S2n	1.130	1.270	1.140	0.270	7.620	6.019

****

Straight Culvert

Inlet Elevation (invert): 667.75 ft,

Outlet Elevation (invert): 667.07 ft,

Culvert Length: 52.75 ft,

Culvert Slope: 0.0129

****

Table 21 - Downstream Channel Rating Curve (Crossing: PR Culvert 8)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
9.00	667.32	0.25	5.72	0.63	2.85
11.00	667.34	0.27	6.02	0.67	2.88

Table 20 - Summary of Culvert Flows at Crossing: PR Culvert 8

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	PR Culvert 8 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
669.99	25 YR	9.00	9.00	0.00	1
670.64	100 YR	11.00	11.00	0.00	1
671.34	Overtopping	12.83	12.83	0.00	Overtopping

Tailwater Channel Data - PR Culvert 8

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 25.00 (_:1)
Channel Slope: 0.0400
Channel Manning's n: 0.0130
Channel Invert Elevation: 667.07 ft

Roadway Data for Crossing: PR Culvert 8

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 100.00 ft
Crest Elevation: 671.34 ft
Roadway Surface: Paved
Roadway Top Width: 36.00 ft

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HYDRAULIC DATA
CULVERT 8

SHEET 7 OF 7

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		127
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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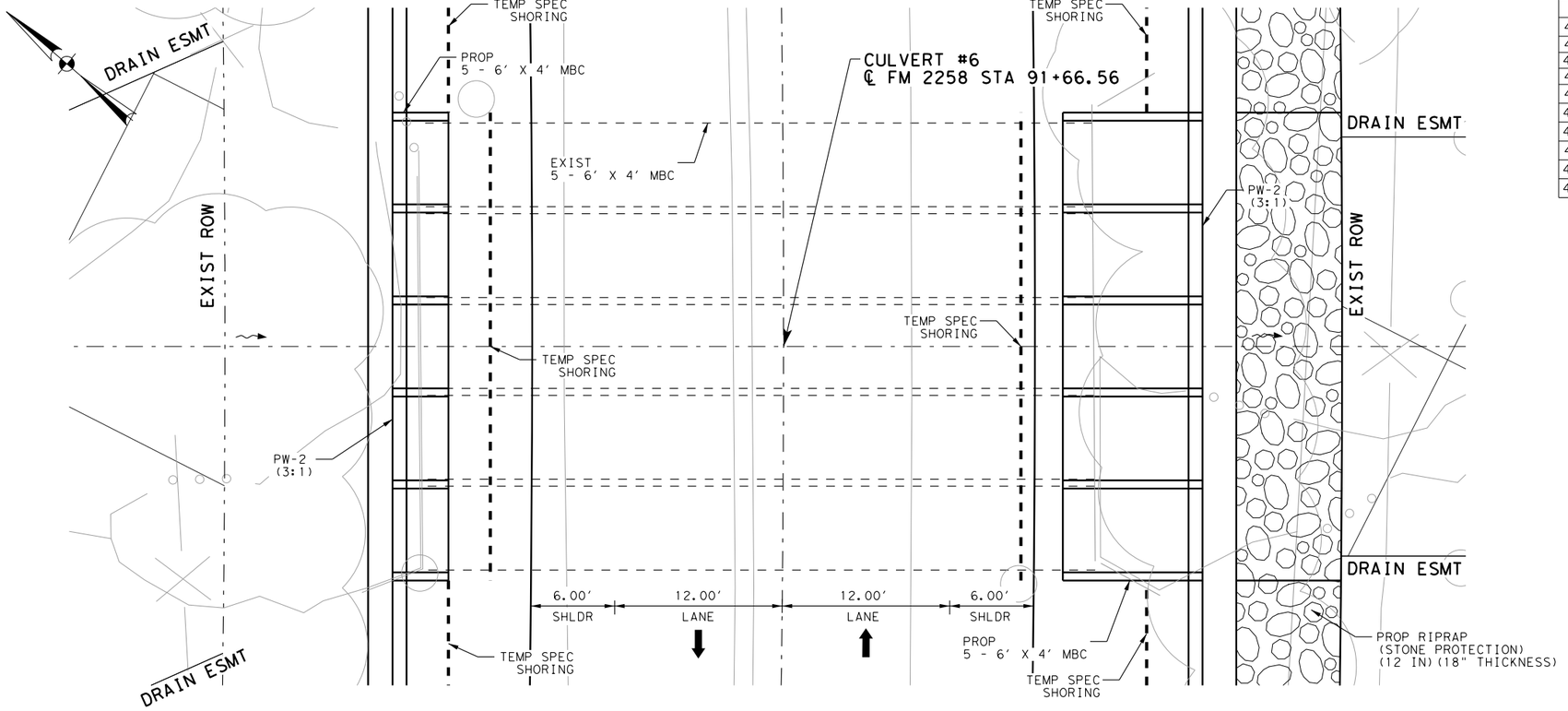


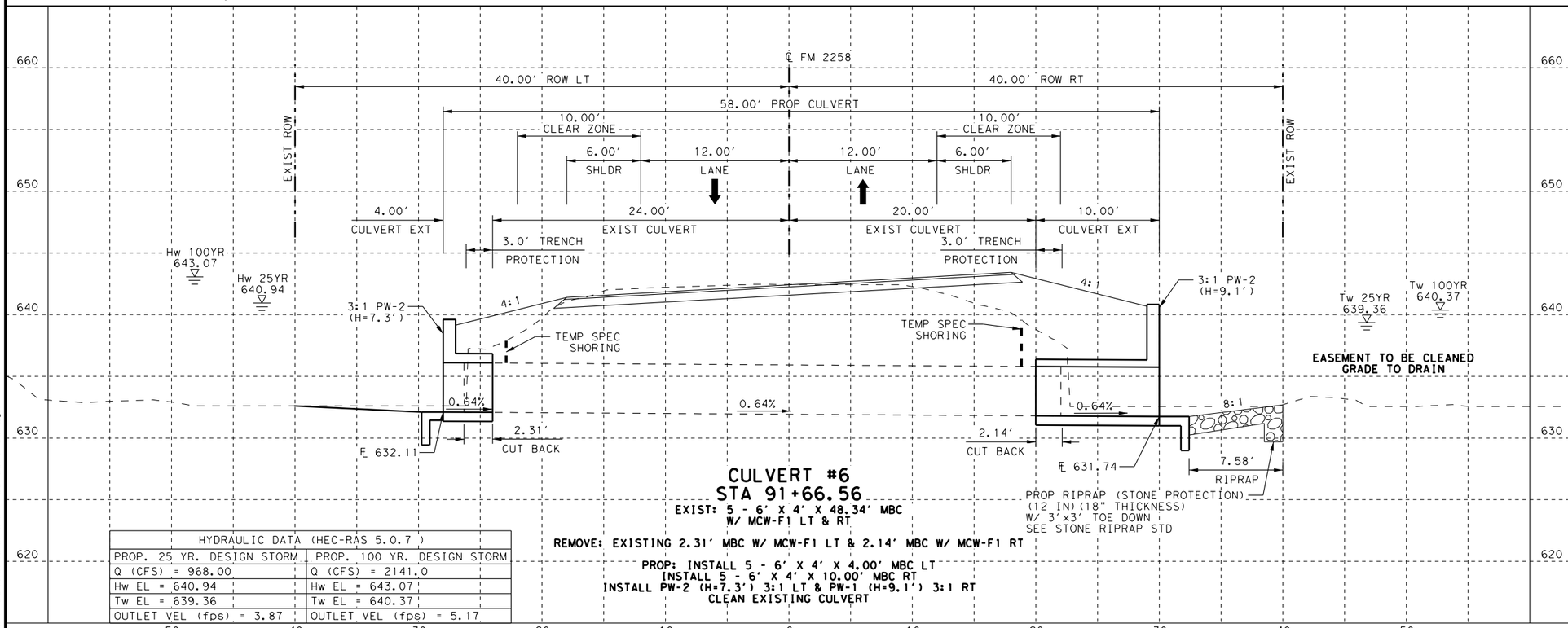
QUANTITY SUMMARY			
ITEM	DESCRIPTION	UNIT	QTY
402-6001	TRENCH EXCAVATION PROTECTION	LF	6
403-6001	TEMPORARY SPL SHORING	SF	906
420-6012	CL B CONC (MISC)	CY	1
432-6031	RIPRAP (STONE PROTECTION) (12 IN)	CY	62
462-6011	CONC BOX CULV (6 FT X 4 FT)	LF	70
466-6197	WINGWALL (PW - 2) (HW=8 FT)	EA	1
466-6198	WINGWALL (PW - 2) (HW=9 FT)	EA	1
480-6001	CLEAN EXIST CULVERTS	EA	1
496-6005	REMOV STR (WINGWALL)	EA	2
496-6008	REMOV STR (BOX CULVERT)	LF	25

LEGEND

- EXIST ROW
- DIRECTION OF TRAFFIC
- DIRECTION OF FLOW
- RIPRAP (STONE PROTECTION) (12 IN)
- RIPRAP (CONCRETE) (5 IN)

NOTES:

1. SEE HYDRAULIC DATA SHEETS FOR ADDITIONAL INFORMATION.
2. EXISTING UTILITIES SHOWN ARE APPROXIMATE, CONTRACTOR TO FIELDVERIFY DEPTH AND LOCATIONS PRIOR TO START OF CONSTRUCTION.
3. EXISTING STRUCTURE ALIGNMENT, GRADES, AND ELEVATIONS SHALL BE VERIFIED PRIOR TO BEGINNING CONSTRUCTION.
4. UNLESS OTHERWISE NOTED, FLOWLINE OF SET SHALL BE PLACED AT THE SAME SLOPE AS THE ADJACENT PIPE OR BOX CULVERT.
5. ALL CONCRETE RIPRAP SHALL BE 5" THICK WITH 9"X24" TOE DOWN ALL AROUND WITH #3 BARS AT 18" O.C. UNLESS OTHERWISE NOTED.
6. SEE MISCELLANEOUS DRAINAGE DETAILS SHEET FOR MORE INFORMATION.
7. TEMPORARY SHORING MUST HAVE AN ENGINEER STAMP AND MUST BE SUBMITTED TO TXDOT FOR REVIEW.



CULVERT #6
STA 91+66.56

EXIST: 5 - 6' X 4' X 48.34' MBC W/ MCW-F1 LT & RT

REMOVE: EXISTING 2.31' MBC W/ MCW-F1 LT & 2.14' MBC W/ MCW-F1 RT

PROP: INSTALL 5 - 6' X 4' X 4.00' MBC LT
INSTALL 5 - 6' X 4' X 10.00' MBC RT
INSTALL PW-2 (H=7.3') 3:1 LT & PW-1 (H=9.1') 3:1 RT
CLEAN EXISTING CULVERT

HYDRAULIC DATA (HEC-RAS 5.0.7)	
PROP. 25 YR. DESIGN STORM	PROP. 100 YR. DESIGN STORM
Q (CFS) = 968.00	Q (CFS) = 2141.0
Hw EL = 640.94	Hw EL = 643.07
Tw EL = 639.36	Tw EL = 640.37
OUTLET VEL (fps) = 3.87	OUTLET VEL (fps) = 5.17

STATE OF TEXAS
MICHAEL G. RAMIREZ
133983
LICENSED PROFESSIONAL ENGINEER
2/6/2024

CAMACHO-HERNANDEZ & ASSOCIATES, LLC
415 EMBASSY OAKS - SUITE 205 SAN ANTONIO, TX. 78216
OFFICE: (210) 341-6200 FAX: (210) 341-6300
FIRM NUMBER: F-8478

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

BRIDGE CLASS CULVERT PLAN AND PROFILE

(CULV #6 @ STA 91+66.56)

HORZ: 1" = 10'
VERT: 1" = 10'
SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		128
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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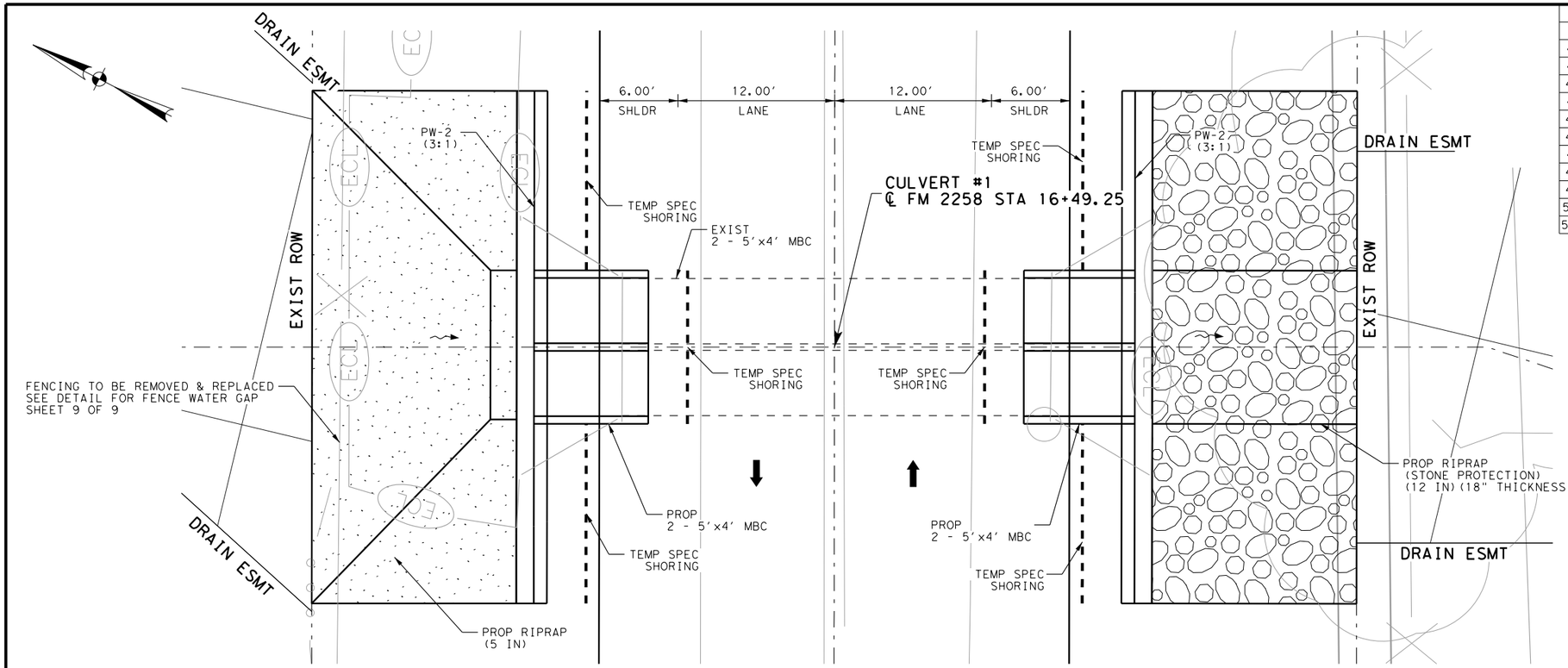


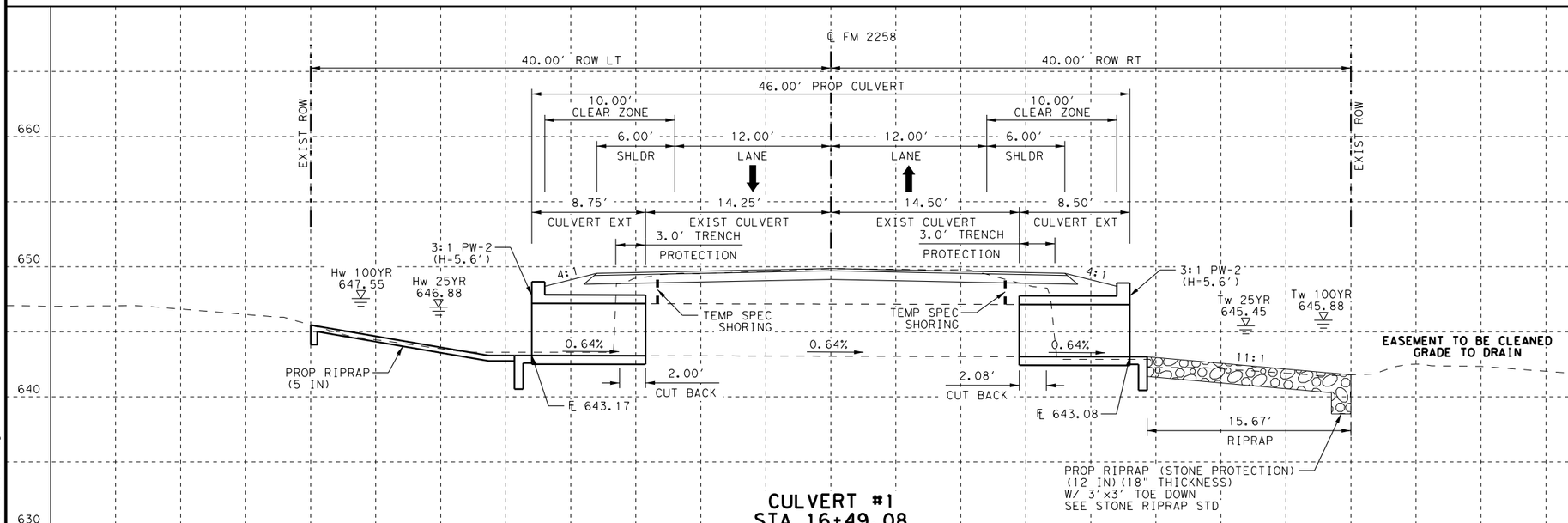
QUANTITY SUMMARY			
ITEM	DESCRIPTION	UNIT	QTY
402-6001	TRENCH EXCAVATION PROTECTION	LF	6
403-6001	TEMPORARY SPL SHORING	SF	357
432-6002	RIPRAP (CONC)(5 IN)	CY	13
432-6031	RIPRAP (STONE PROTECTION)(12 IN)	CY	51
462-6008	CONC BOX CULV (5 FT X 4 FT)	LF	36
466-6195	WINGWALL (PW - 2) (HW=6 FT)	EA	2
480-6001	CLEAN EXIST CULVERTS	EA	1
496-6005	REMOV STR (WINGWALL)	EA	2
496-6008	REMOV STR (BOX CULVERT)	LF	10
5070-6001	STEEL FENCE (REMOVE)	LF	60
5070-6002	STEEL FENCE (INSTALL)	LF	60

LEGEND

- EXIST ROW
- DIRECTION OF TRAFFIC
- DIRECTION OF FLOW
- RIPRAP (STONE PROTECTION)(12 IN)
- RIPRAP (CONCRETE)(5 IN)

NOTES:

1. SEE HYDRAULIC DATA SHEETS FOR ADDITIONAL INFORMATION.
2. EXISTING UTILITIES SHOWN ARE APPROXIMATE, CONTRACTOR TO FIELDVERIFY DEPTH AND LOCATIONS PRIOR TO START OF CONSTRUCTION.
3. EXISTING STRUCTURE ALIGNMENT, GRADES, AND ELEVATIONS SHALL BE VERIFIED PRIOR TO BEGINNING CONSTRUCTION.
4. UNLESS OTHERWISE NOTED, FLOWLINE OF SET SHALL BE PLACED AT THE SAME SLOPE AS THE ADJACENT PIPE OR BOX CULVERT.
5. ALL CONCRETE RIPRAP SHALL BE 5" THICK WITH 9"X24" TOE DOWN ALL AROUND WITH #3 BARS AT 18" O.C. UNLESS OTHERWISE NOTED.
6. SEE MISCELLANEOUS DRAINAGE DETAILS SHEET FOR MORE INFORMATION.
7. TEMPORARY SHORING MUST HAVE AN ENGINEER STAMP AND MUST BE SUBMITTED TO TXDOT FOR REVIEW.



CULVERT #1
STA 16+49.08

EXIST: 2 - 5' X 4' X 32.83' MBC W/ MCW-F1 LT & RT

REMOVE: EXISTING 2.00' MBC W/ MCW-F1 LT & 2.08' MBC W/ MCW-F1 RT

PROP: INSTALL 2 - 5' X 4' X 8.75' MBC LT
INSTALL 2 - 5' X 4' X 8.50' MBC RT
INSTALL PW-2 (H=5.6') 3:1 LT & RT
CLEAN EXISTING CULVERT

HYDRAULIC DATA (HY-8 7.6)	
PROP. 25 YR. DESIGN STORM	PROP. 100 YR. DESIGN STORM
Q (CFS) = 180.00	Q (CFS) = 231.00
Hw EL = 646.88	Hw EL = 647.55
Tw EL = 645.45	Tw EL = 645.68
OUTLET VEL (fps) = 6.40	OUTLET VEL (fps) = 6.82

STATE OF TEXAS
MICHAEL G. RAMIREZ
133983
LICENSED PROFESSIONAL ENGINEER
2/6/2024

CAMACHO-HERNANDEZ & ASSOCIATES, LLC
415 EMBASSY OAKS - SUITE 205 SAN ANTONIO, TX. 78216
OFFICE: (210) 341-6200 FAX: (210) 341-6300
FIRM NUMBER: F-8478

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

CULVERT PLAN AND PROFILE

(CULV #1 @ STA 16+49.08)

HORZ: 1" = 10'
VERT: 1" = 10'

SHEET 1 OF 7

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	129
STATE	DIST.	COUNTY
TEXAS	FTW	JOHNSON
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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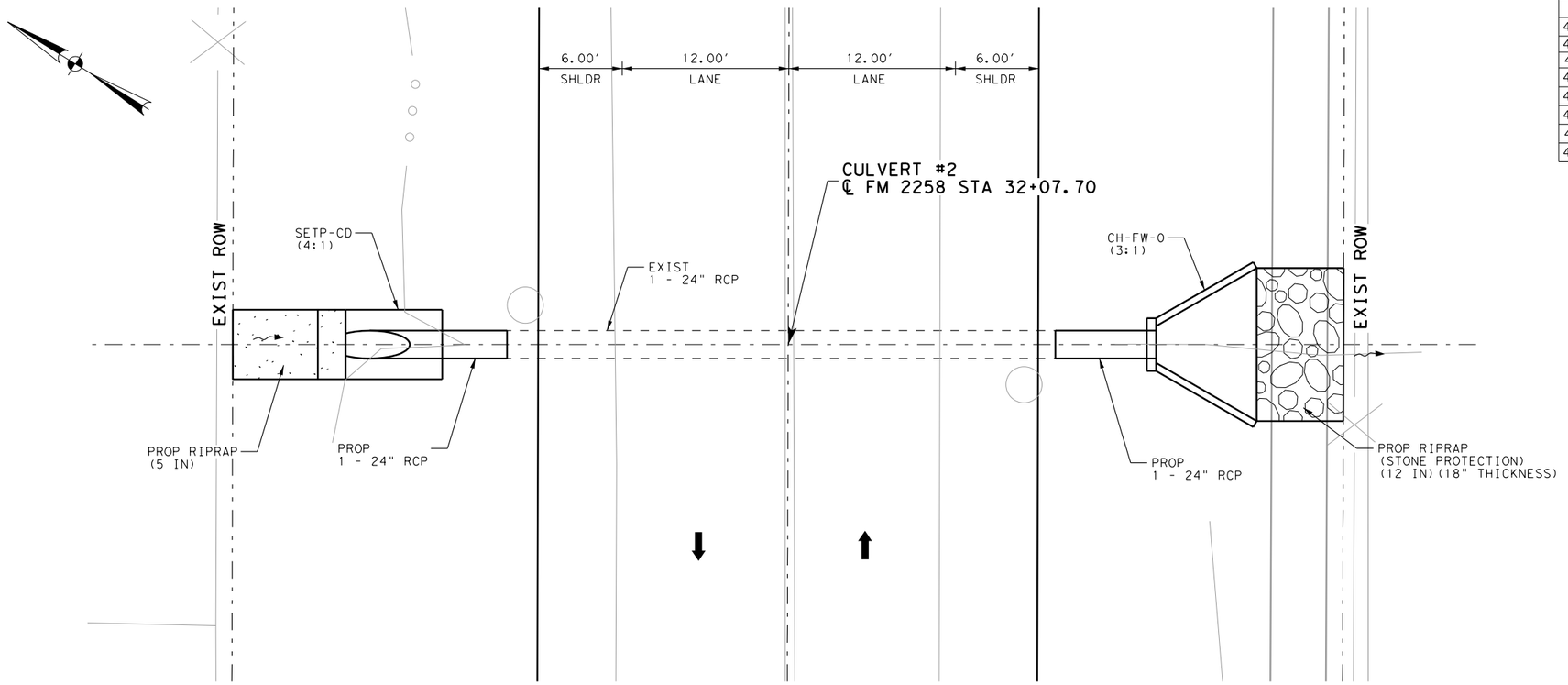
QUANTITY SUMMARY			
ITEM	DESCRIPTION	UNIT	QTY
420-6012	CL B CONC (MISC)	CY	1
432-6002	RIPRAP (CONC)(5 IN)	CY	2
432-6031	RIPRAP (STONE PROTECTION)(12 IN)	CY	8
464-6005	RC PIPE (CL III)(24 IN)	LF	15
466-6005	HEADWALL (CH - FW - O) (DIA= 24 IN)	EA	1
467-6390	SET (TY II) (24 IN) (RCP) (4: 1) (C)	EA	1
480-6001	CLEAN EXIST CULVERTS	EA	1
496-6007	REMOV STR (PIPE)	LF	5



LEGEND

- EXIST ROW
- DIRECTION OF TRAFFIC
- DIRECTION OF FLOW
- RIPRAP (STONE PROTECTION)(12 IN)
- RIPRAP (CONCRETE)(5 IN)

NOTES:

1. SEE HYDRAULIC DATA SHEETS FOR ADDITIONAL INFORMATION.
2. EXISTING UTILITIES SHOWN ARE APPROXIMATE, CONTRACTOR TO FIELDVERIFY DEPTH AND LOCATIONS PRIOR TO START OF CONSTRUCTION.
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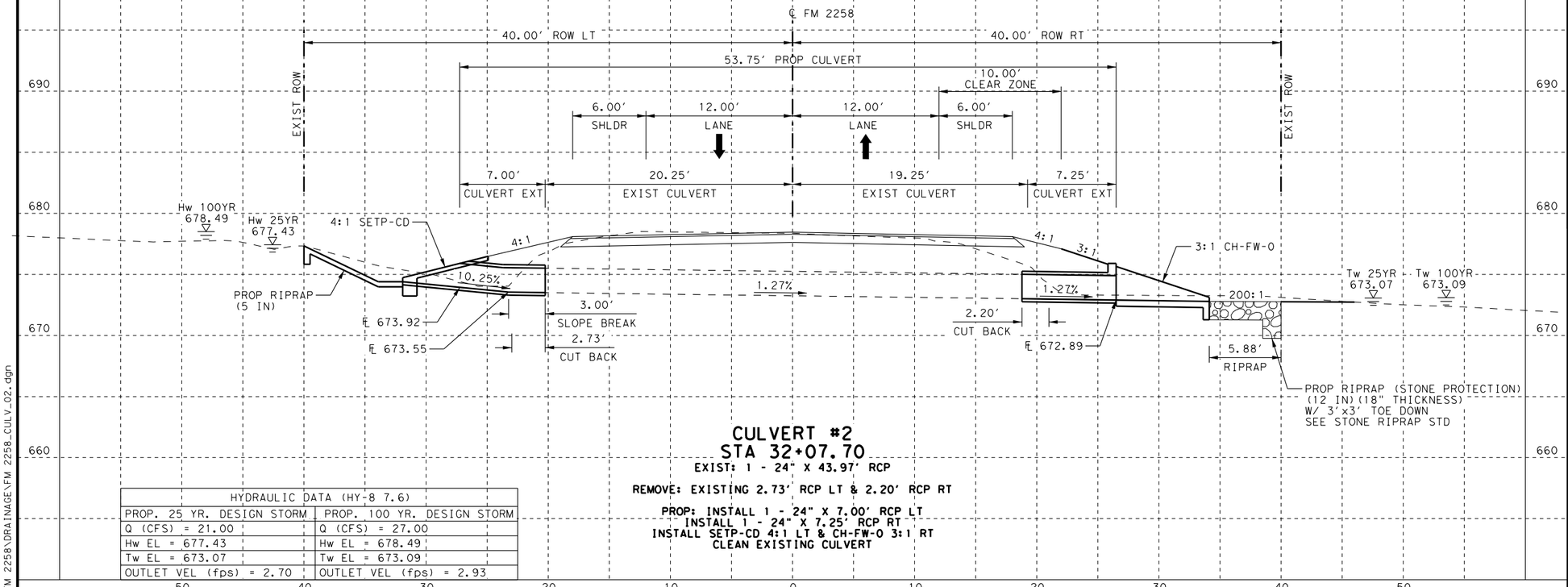
6. SEE MISCELLANEOUS DRAINAGE DETAILS SHEET FOR MORE INFORMATION.
7. TEMPORARY SHORING MUST HAVE AN ENGINEER STAMP AND MUST BE SUBMITTED TO TXDOT FOR REVIEW.



CULVERT #2
STA 32+07.70

EXIST: 1 - 24" X 43.97' RCP

REMOVE: EXISTING 2.73' RCP LT & 2.20' RCP RT

PROP: INSTALL 1 - 24" X 7.00' RCP LT
INSTALL 1 - 24" X 7.25' RCP RT
INSTALL SETP-CD 4:1 LT & CH-FW-O 3:1 RT
CLEAN EXISTING CULVERT

HYDRAULIC DATA (HY-8 7.6)	
PROP. 25 YR. DESIGN STORM	PROP. 100 YR. DESIGN STORM
Q (CFS) = 21.00	Q (CFS) = 27.00
Hw EL = 677.43	Hw EL = 678.49
Tw EL = 673.07	Tw EL = 673.09
OUTLET VEL (fps) = 2.70	OUTLET VEL (fps) = 2.93

STATE OF TEXAS
MICHAEL G. RAMIREZ
133983
LICENSED
PROFESSIONAL ENGINEER
2/6/2024

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OFFICE: (210) 341-6200 FAX: (210) 341-6300
FIRM NUMBER: F-8478

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

CULVERT PLAN AND PROFILE

(CULV #2 @ STA 32+07.70)

HORZ: 1" = 10'
VERT: 1" = 10'

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	130
STATE	DIST.	COUNTY
TEXAS	FTW	JOHNSON
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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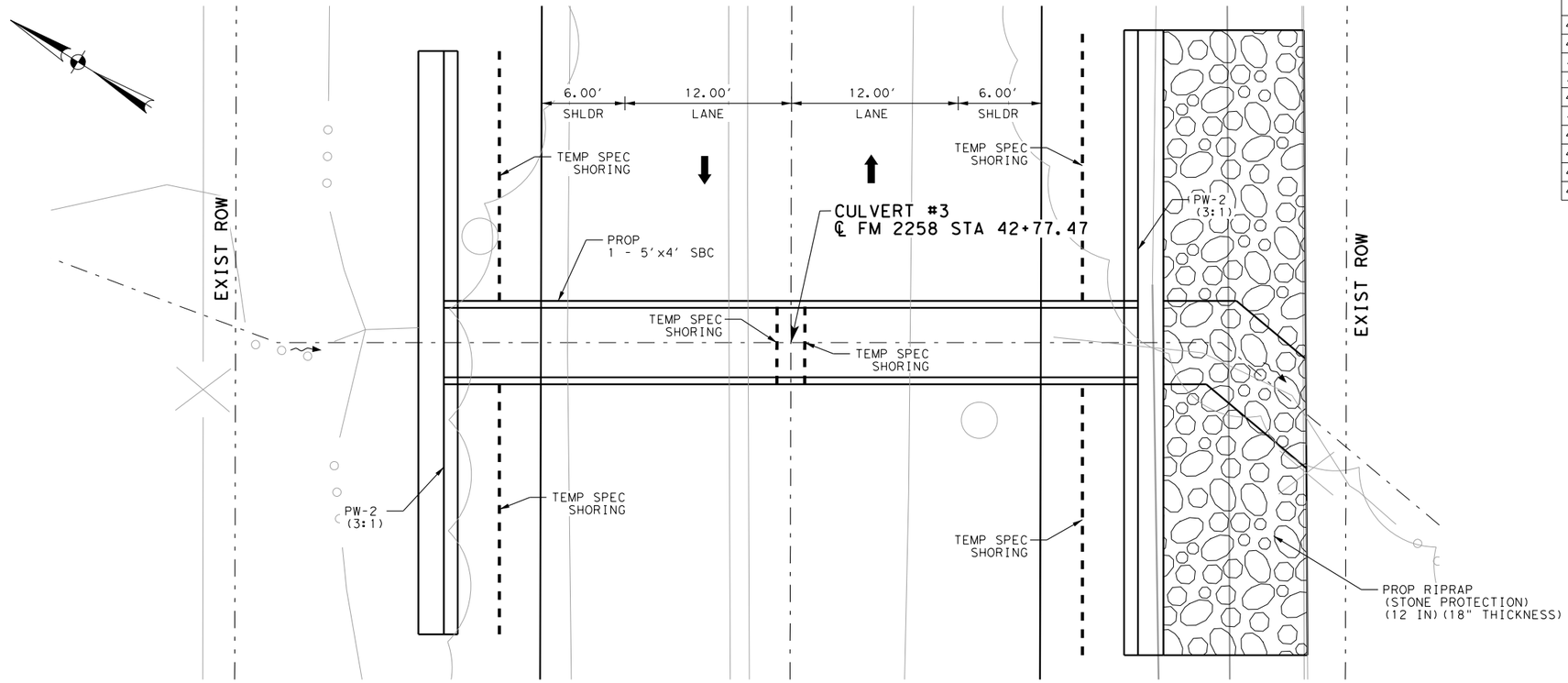

QUANTITY SUMMARY			
ITEM	DESCRIPTION	UNIT	QTY
400-6005	CEM STABIL BKFL	CY	18
400-6006	CUT & RESTORING PAV	SY	28
402-6001	TRENCH EXCAVATION PROTECTION	LF	38
403-6001	TEMPORARY SPL SHORING	SF	867
420-6012	CL B CONC (MISC)	CY	1
432-6031	RIPRAP (STONE PROTECTION)(12 IN)	CY	43
462-6008	CONC BOX CULV (5 FT X 4 FT)	LF	50
466-6196	WINGWALL (PW - 2) (HW=7 FT)	EA	1
466-6197	WINGWALL (PW - 2) (HW=8 FT)	EA	1
496-6007	REMOV STR (PIPE)	LF	45

LEGEND

- EXIST ROW
- DIRECTION OF TRAFFIC
- DIRECTION OF FLOW
- RIPRAP (STONE PROTECTION)(12 IN)
- RIPRAP (CONCRETE)(5 IN)

NOTES:

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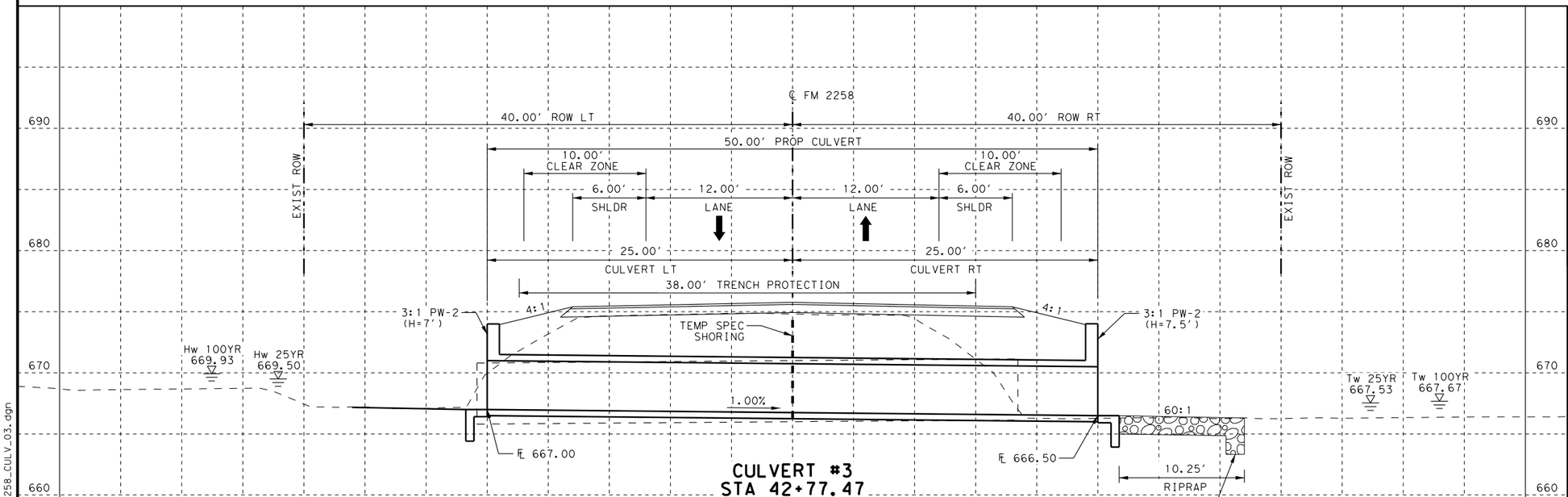
7. TEMPORARY SHORING MUST HAVE AN ENGINEER STAMP AND MUST BE SUBMITTED TO TXDOT FOR REVIEW.



CULVERT #3
STA 42+77.47
EXIST: 1 - 60" X 44.29' RCP

REMOVE: EXISTING RCP

PROP: INSTALL 1 - 5' X 4' X 50.00' SBC
INSTALL PW-2 (H=7.0') 3:1 LT & PW-2 (H=7.5') 3:1 RT

HYDRAULIC DATA (HY-8 7.6)	
PROP. 25 YR. DESIGN STORM	PROP. 100 YR. DESIGN STORM
Q (CFS) = 51.00	Q (CFS) = 65.00
Hw EL = 669.50	Hw EL = 669.93
Tw EL = 667.53	Tw EL = 667.67
OUTLET VEL (fps) = 2.73	OUTLET VEL (fps) = 2.93

STATE OF TEXAS
MICHAEL G. RAMIREZ
133983
LICENSED
PROFESSIONAL ENGINEER
2/6/2024

CAMACHO-HERNANDEZ & ASSOCIATES, LLC
415 EMBASSY OAKS - SUITE 205 SAN ANTONIO, TX. 78216
OFFICE: (210) 341-6200 FAX: (210) 341-6300
FIRM NUMBER: F-8478

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

CULVERT PLAN AND PROFILE

(CULV #3 @ STA 42+77.47)

HORZ: 1" = 10'
VERT: 1" = 10'

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	131
STATE	DIST.	COUNTY
TEXAS	FTW	JOHNSON
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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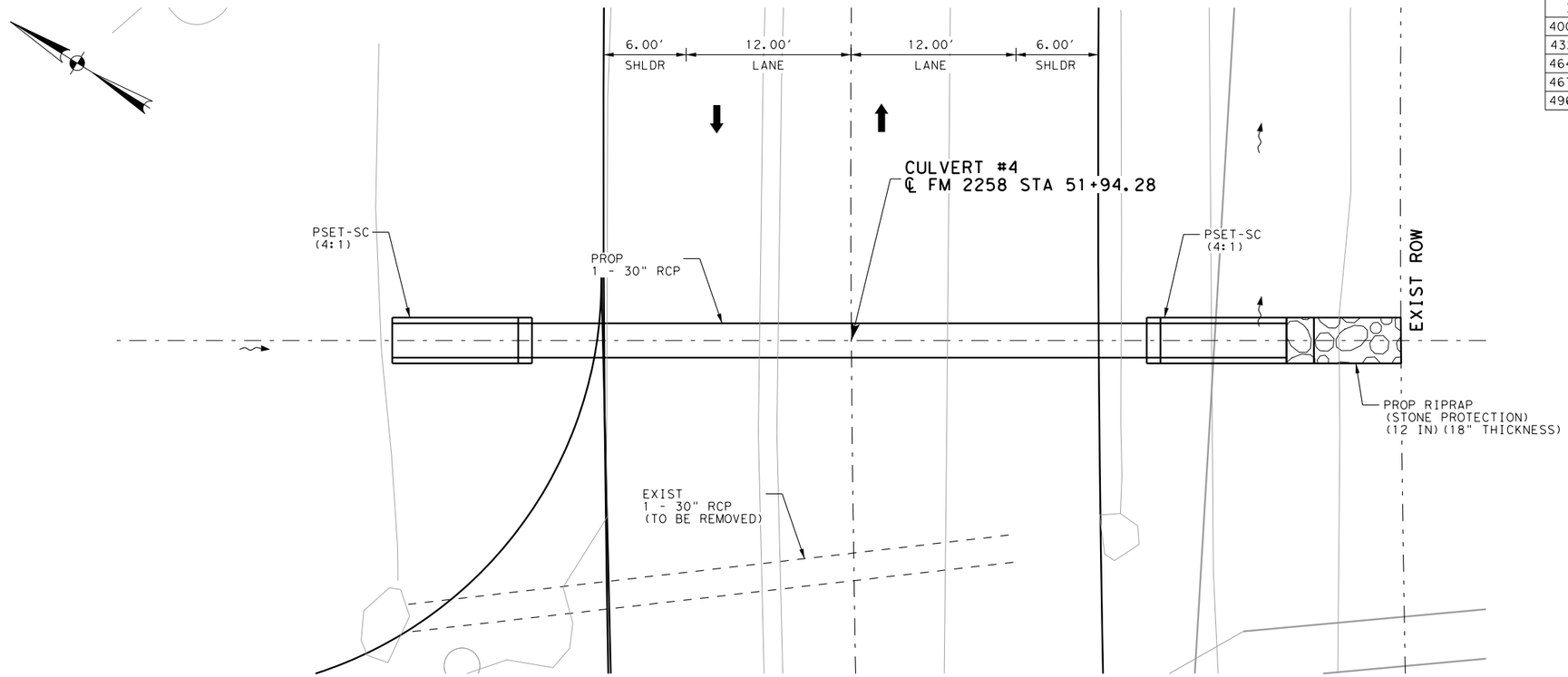
QUANTITY SUMMARY			
ITEM	DESCRIPTION	UNIT	QTY
400-6006	CUT & RESTORING PAV	SY	18
432-6031	RIPRAP (STONE PROTECTION)(12 IN)	CY	4
464-6059	RC PIPE (CL V)(30 IN)	LF	45
467-6419	SET (TY II) (30 IN) (RCP) (4: 1) (C)	EA	2
496-6007	REMOV STR (PIPE)	LF	44



LEGEND

- EXIST ROW
- DIRECTION OF TRAFFIC
- DIRECTION OF FLOW
- RIPRAP (STONE PROTECTION)(12 IN)
- RIPRAP (CONCRETE)(5 IN)

NOTES:

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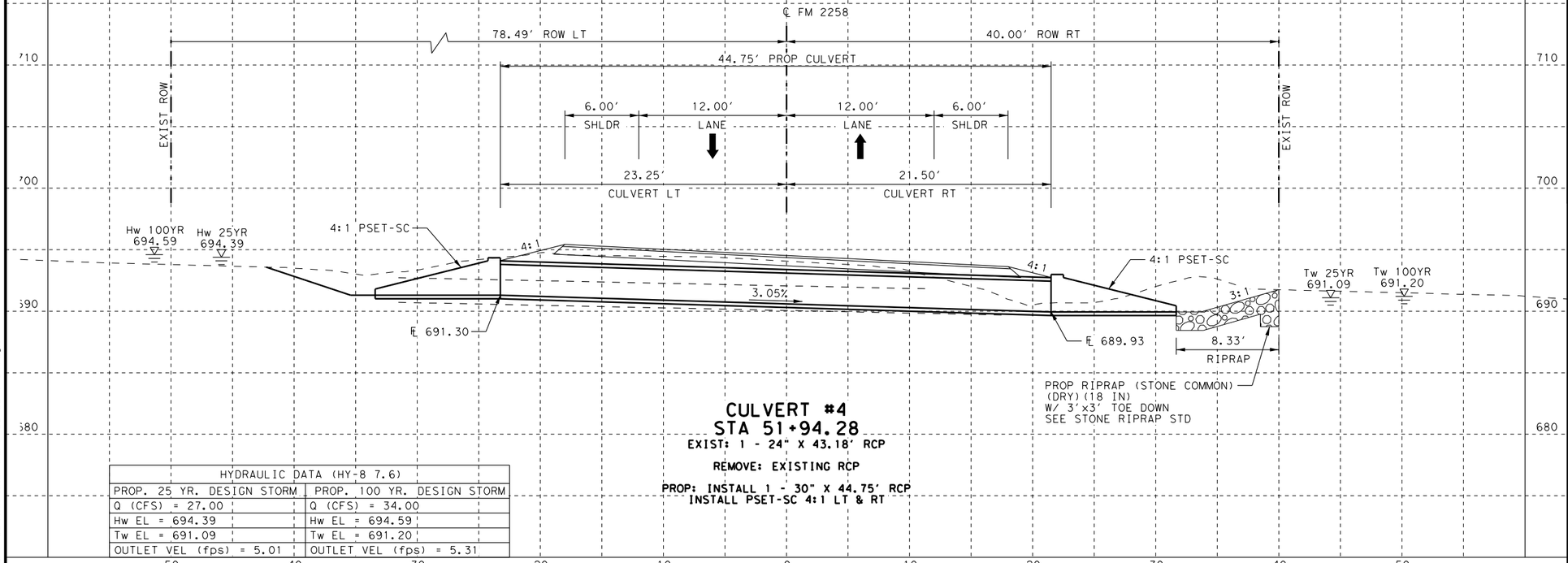

CULVERT #4
STA 51+94.28
EXIST: 1 - 24" X 43.18' RCP

REMOVE: EXISTING RCP

PROP: INSTALL 1 - 30" X 44.75' RCP
INSTALL PSET-SC 4:1 LT & RT

HYDRAULIC DATA (HY-8 7.6)	
PROP. 25 YR. DESIGN STORM	PROP. 100 YR. DESIGN STORM
Q (CFS) = 27.00	Q (CFS) = 34.00
Hw EL = 694.39	Hw EL = 694.59
Tw EL = 691.09	Tw EL = 691.20
OUTLET VEL (fps) = 5.01	OUTLET VEL (fps) = 5.31

STATE OF TEXAS
MICHAEL G. RAMIREZ
133983
LICENSED
PROFESSIONAL ENGINEER
2/6/2024

CAMACHO-HERNANDEZ & ASSOCIATES, LLC
415 EMBASSY OAKS - SUITE 205 SAN ANTONIO, TX. 78216
OFFICE: (210) 341-6200 FAX: (210) 341-6300
FIRM NUMBER: F-8478

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

CULVERT PLAN AND PROFILE

(CULV #4 @ STA 51+94.28)

HORZ: 1" = 10'
VERT: 1" = 10'

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		132
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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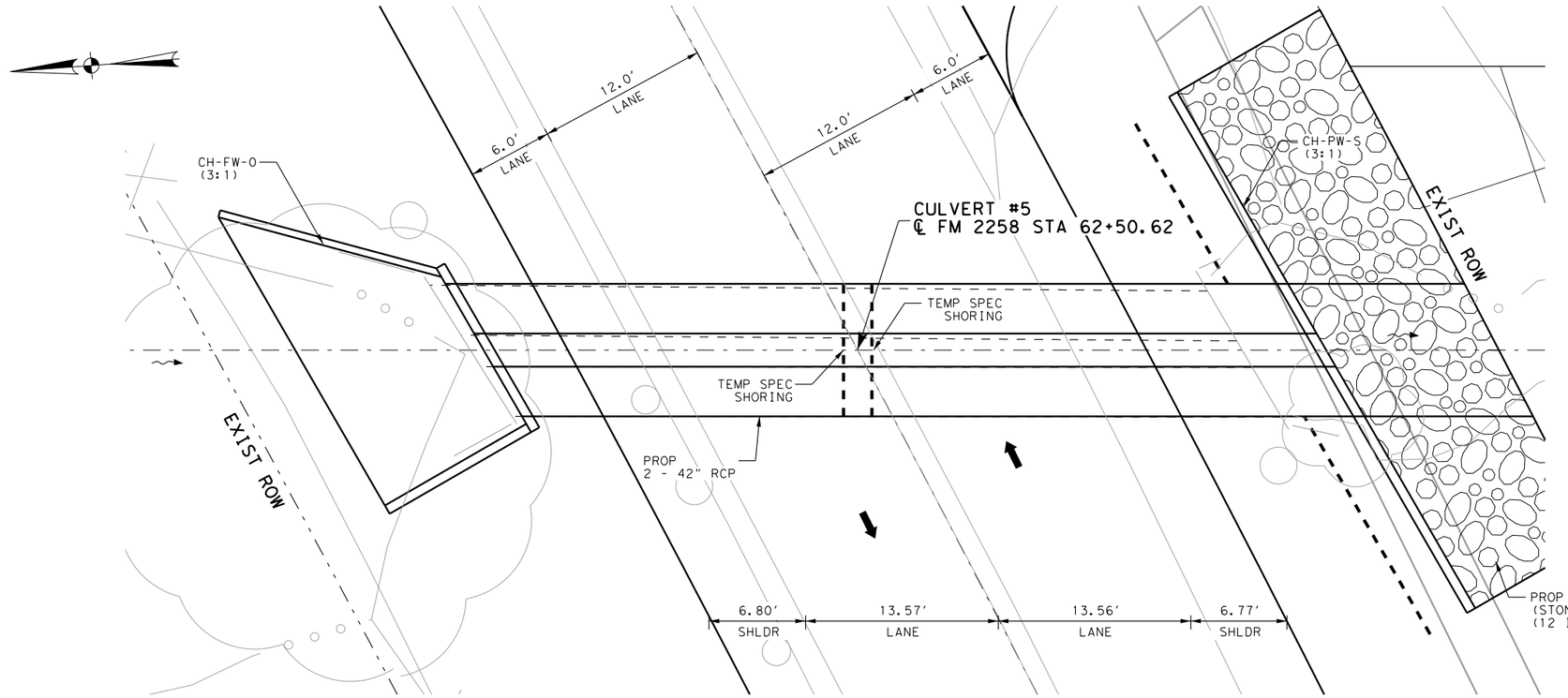

QUANTITY SUMMARY			
ITEM	DESCRIPTION	UNIT	QTY
400-6005	CEM STABIL BKFL	CY	28
400-6006	CUT & RESTORING PAV	SY	46
402-6001	TRENCH EXCAVATION PROTECTION	LF	44
420-6012	CL B CONC (MISC)	CY	1
403-6001	TEMPORARY SPL SHORING	SF	439
432-6031	RIPRAP (STONE PROTECTION) (12 IN)	CY	41
464-6009	RC PIPE (CL III) (42 IN)	LF	120
466-6040	HEADWALL (CH - FW - 30) (DIA= 42 IN)	EA	1
466-6135	HEADWALL (CH - PW - S) (DIA= 42 IN)	EA	1
496-6006	REMOV STR (HEADWALL)	EA	2
496-6007	REMOV STR (PIPE)	LF	112

LEGEND

- EXIST ROW
- DIRECTION OF TRAFFIC
- DIRECTION OF FLOW
- RIPRAP (STONE PROTECTION) (12 IN)
- RIPRAP (CONCRETE) (5 IN)

NOTES:

1. SEE HYDRAULIC DATA SHEETS FOR ADDITIONAL INFORMATION.
2. EXISTING UTILITIES SHOWN ARE APPROXIMATE, CONTRACTOR TO FIELDVERIFY DEPTH AND LOCATIONS PRIOR TO START OF CONSTRUCTION.
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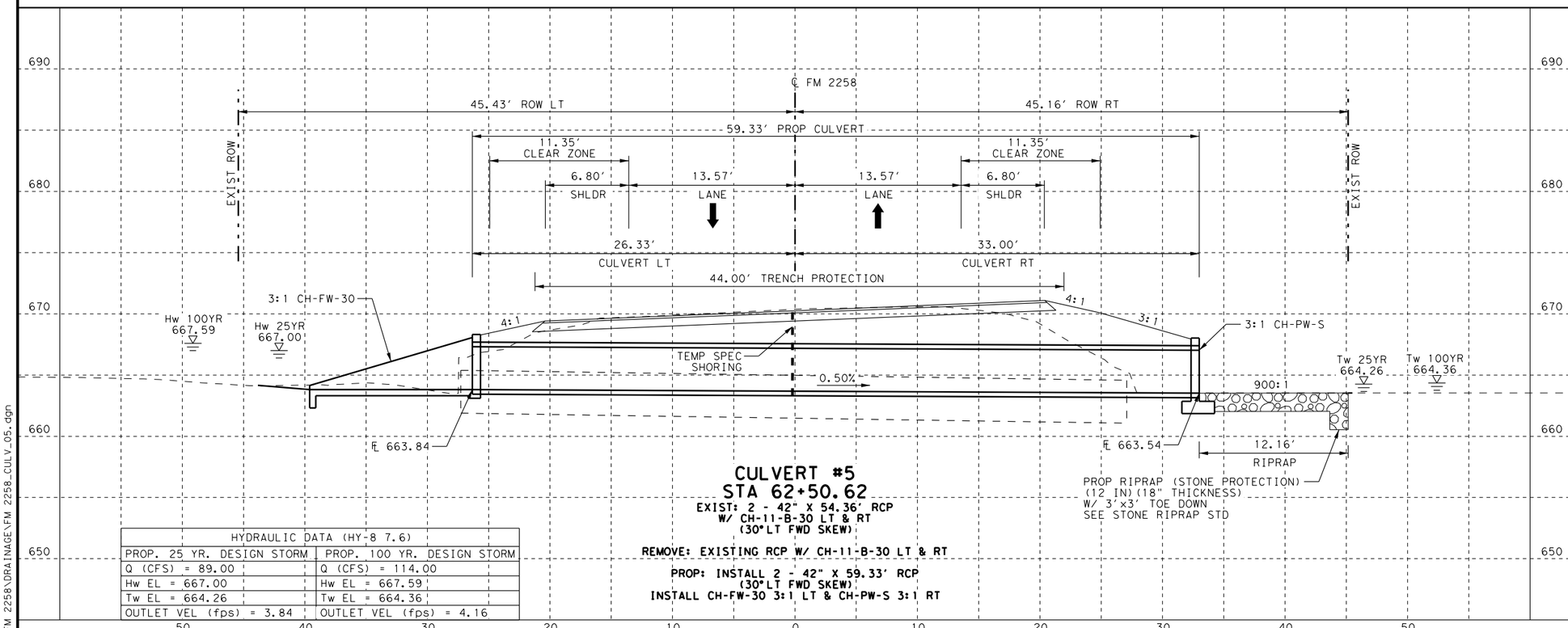
6. SEE MISCELLANEOUS DRAINAGE DETAILS SHEET FOR MORE INFORMATION.
7. TEMPORARY SHORING MUST HAVE AN ENGINEER STAMP AND MUST BE SUBMITTED TO TXDOT FOR REVIEW.



HYDRAULIC DATA (HY-8 7.6)	
PROP. 25 YR. DESIGN STORM	PROP. 100 YR. DESIGN STORM
Q (CFS) = 89.00	Q (CFS) = 114.00
Hw EL = 667.00	Hw EL = 667.59
Tw EL = 664.26	Tw EL = 664.36
OUTLET VEL (fps) = 3.84	OUTLET VEL (fps) = 4.16

CULVERT #5
STA 62+50.62

EXIST: 2 - 42" X 54.36' RCP
W/ CH-11-B-30 LT & RT
(30°LT FWD SKEW)

REMOVE: EXISTING RCP W/ CH-11-B-30 LT & RT

PROP: INSTALL 2 - 42" X 59.33' RCP
(30°LT FWD SKEW)
INSTALL CH-FW-30 3:1 LT & CH-PW-S 3:1 RT

STATE OF TEXAS
MICHAEL G. RAMIREZ
133983
LICENSED PROFESSIONAL ENGINEER
2/6/2024

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FIRM NUMBER: F-8478

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

CULVERT PLAN AND PROFILE

(CULV #5 @ STA 62+50.62)

HORZ: 1" = 10'
VERT: 1" = 10'

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		133
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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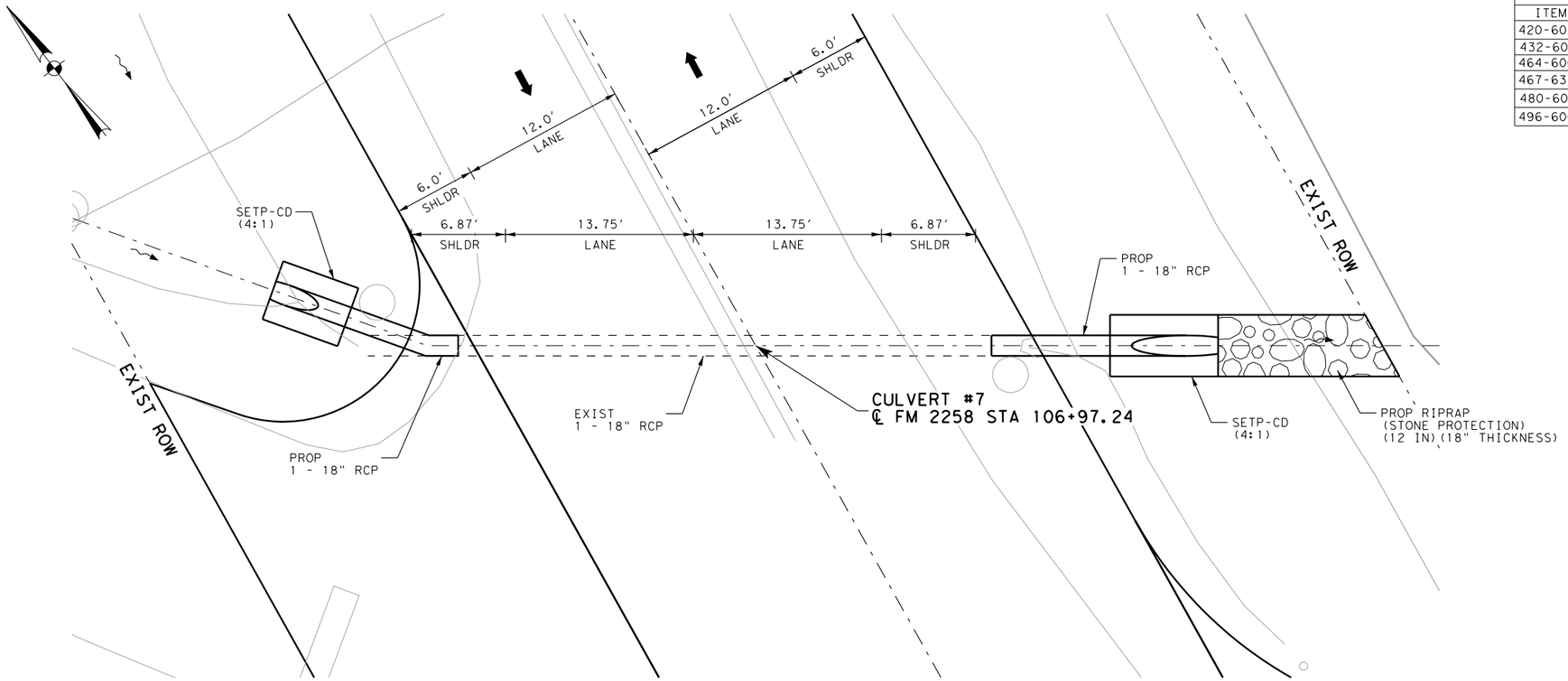
QUANTITY SUMMARY			
ITEM	DESCRIPTION	UNIT	QTY
420-6012	CL B CONC (MISC)	CY	1
432-6031	RIPRAP (STONE PROTECTION)(12 IN)	CY	5
464-6003	RC PIPE (CL III)(18 IN)	LF	22
467-6358	SET (TY II) (18 IN) (RCP) (4: 1) (C)	EA	2
480-6001	CLEAN EXIST CULVERTS	EA	1
496-6007	REMOV STR (PIPE)	LF	9

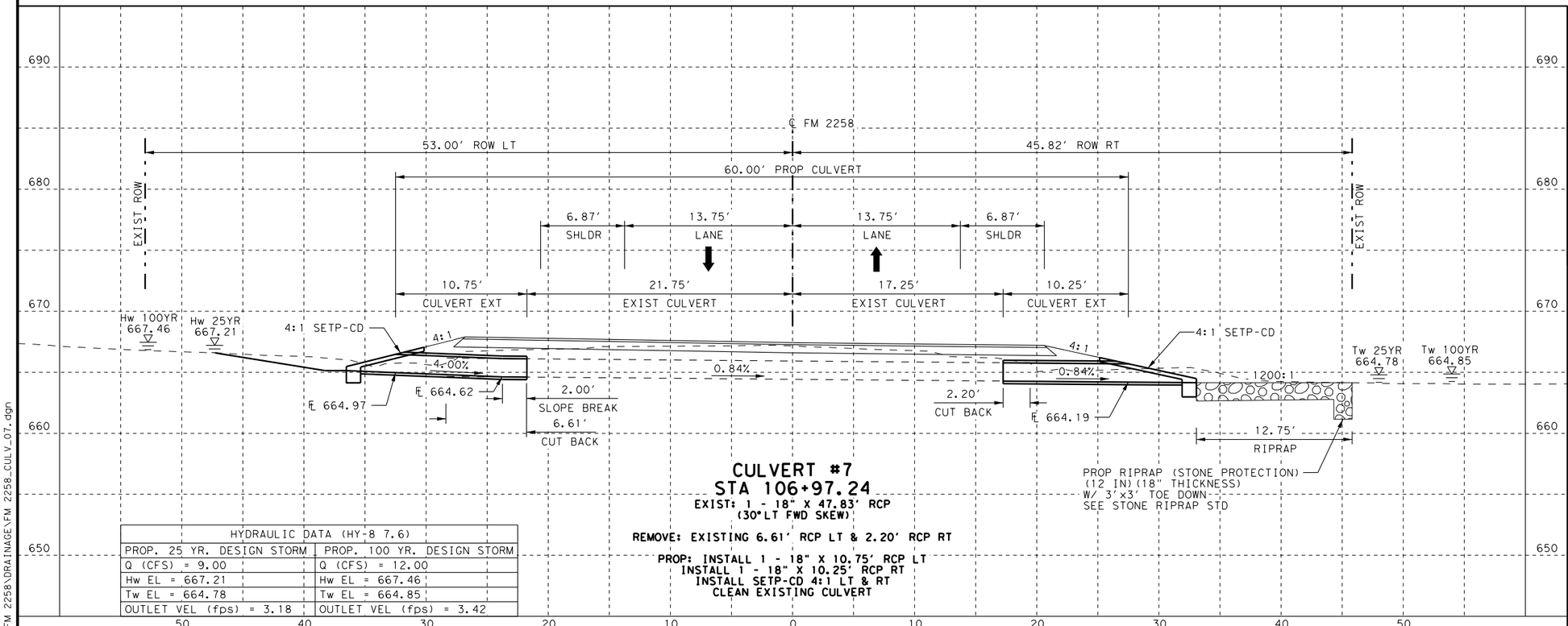


LEGEND

- EXIST ROW
- DIRECTION OF TRAFFIC
- DIRECTION OF FLOW
- RIPRAP (STONE PROTECTION)(12 IN)
- RIPRAP (CONCRETE)(5 IN)

NOTES:

1. SEE HYDRAULIC DATA SHEETS FOR ADDITIONAL INFORMATION.
2. EXISTING UTILITIES SHOWN ARE APPROXIMATE, CONTRACTOR TO FIELDVERIFY DEPTH AND LOCATIONS PRIOR TO START OF CONSTRUCTION.
3. EXISTING STRUCTURE ALIGNMENT, GRADES, AND ELEVATIONS SHALL BE VERIIFIED PRIOR TO BEGINNING CONSTRUCTION.
4. UNLESS OTHERWISE NOTED, FLOWLINE OF SET SHALL BE PLACED AT THE SAME SLOPE AS THE ADJACENT PIPE OR BOX CULVERT.
5. ALL CONCRETE RIPRAP SHALL BE 5" THICK WITH 9"X24" TOE DOWN ALL AROUND WITH #3 BARS AT 18" O.C. UNLESS OTHERWISE NOTED.
6. SEE MISCELLANEOUS DRAINAGE DETAILS SHEET FOR MORE INFORMATION.
7. TEMPORARY SHORING MUST HAVE AN ENGINEER STAMP AND MUST BE SUBMITTED TO TXDOT FOR REVIEW.



CULVERT #7
STA 106+97.24

EXIST: 1 - 18" X 47.83' RCP (30°LT FWD SKEW)

REMOVE: EXISTING 6.61' RCP LT & 2.20' RCP RT

PROP: INSTALL 1 - 18" X 10.75' RCP LT
INSTALL 1 - 18" X 10.25' RCP RT
INSTALL SETP-CD 4:1 LT & RT
CLEAN EXISTING CULVERT

HYDRAULIC DATA (HY-8 7.6)	
PROP. 25 YR. DESIGN STORM	PROP. 100 YR. DESIGN STORM
Q (CFS) = 9.00	Q (CFS) = 12.00
Hw EL = 667.21	Hw EL = 667.46
Tw EL = 664.78	Tw EL = 664.85
OUTLET VEL (fps) = 3.18	OUTLET VEL (fps) = 3.42

STATE OF TEXAS
MICHAEL G. RAMIREZ
133983
LICENSED PROFESSIONAL ENGINEER
2/6/2024

CAMACHO-HERNANDEZ & ASSOCIATES, LLC
415 EMBASSY OAKS - SUITE 205 SAN ANTONIO, TX. 78216
OFFICE: (210) 341-6200 FAX: (210) 341-6300
FIRM NUMBER: F-8478

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

CULVERT PLAN AND PROFILE

(CULV #7 @ STA 106+97.24)

HORZ: 1" = 10'
VERT: 1" = 10'

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	134
STATE	DIST.	COUNTY
TEXAS	FTW	JOHNSON
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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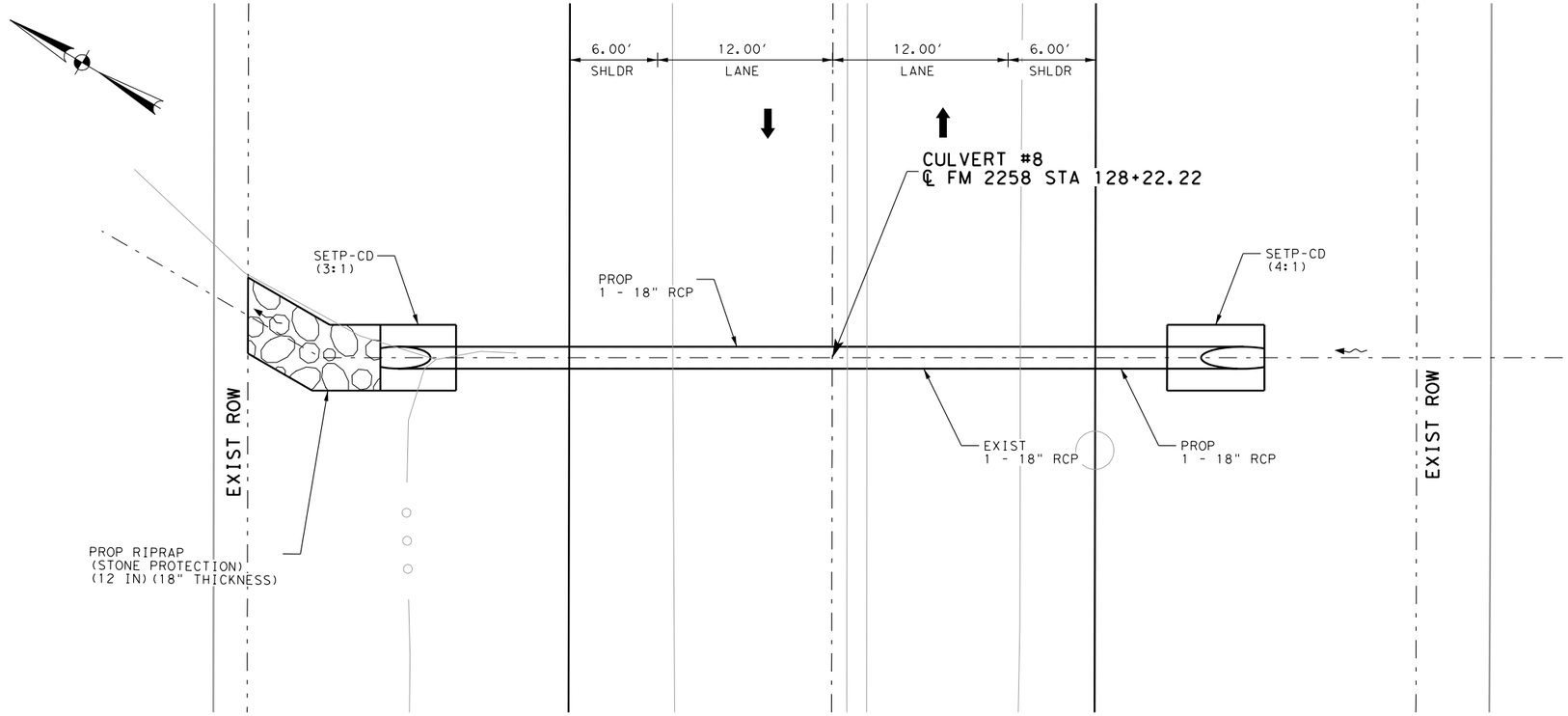
QUANTITY SUMMARY			
ITEM	DESCRIPTION	UNIT	QTY
400-6005	CEM STABIL BKFL	CY	3
400-6006	CUT & RESTORING PAV	SY	15
432-6031	RIPRAP (STONE PROTECTION)(12 IN)	CY	7
464-6003	RC PIPE (CL III)(18 IN)	LF	53
467-6356	SET (TY II) (18 IN) (RCP) (3: 1) (C)	EA	1
467-6358	SET (TY II) (18 IN) (RCP) (4: 1) (C)	EA	1
480-6001	CLEAN EXIST CULVERTS	EA	1
496-6007	REMOV STR (PIPE)	LF	42



LEGEND

- EXIST ROW
- DIRECTION OF TRAFFIC
- DIRECTION OF FLOW
- RIPRAP (STONE PROTECTION)(12 IN)
- RIPRAP (CONCRETE)(5 IN)

NOTES:

1. SEE HYDRAULIC DATA SHEETS FOR ADDITIONAL INFORMATION.
2. EXISTING UTILITIES SHOWN ARE APPROXIMATE, CONTRACTOR TO FIELDVERIFY DEPTH AND LOCATIONS PRIOR TO START OF CONSTRUCTION.
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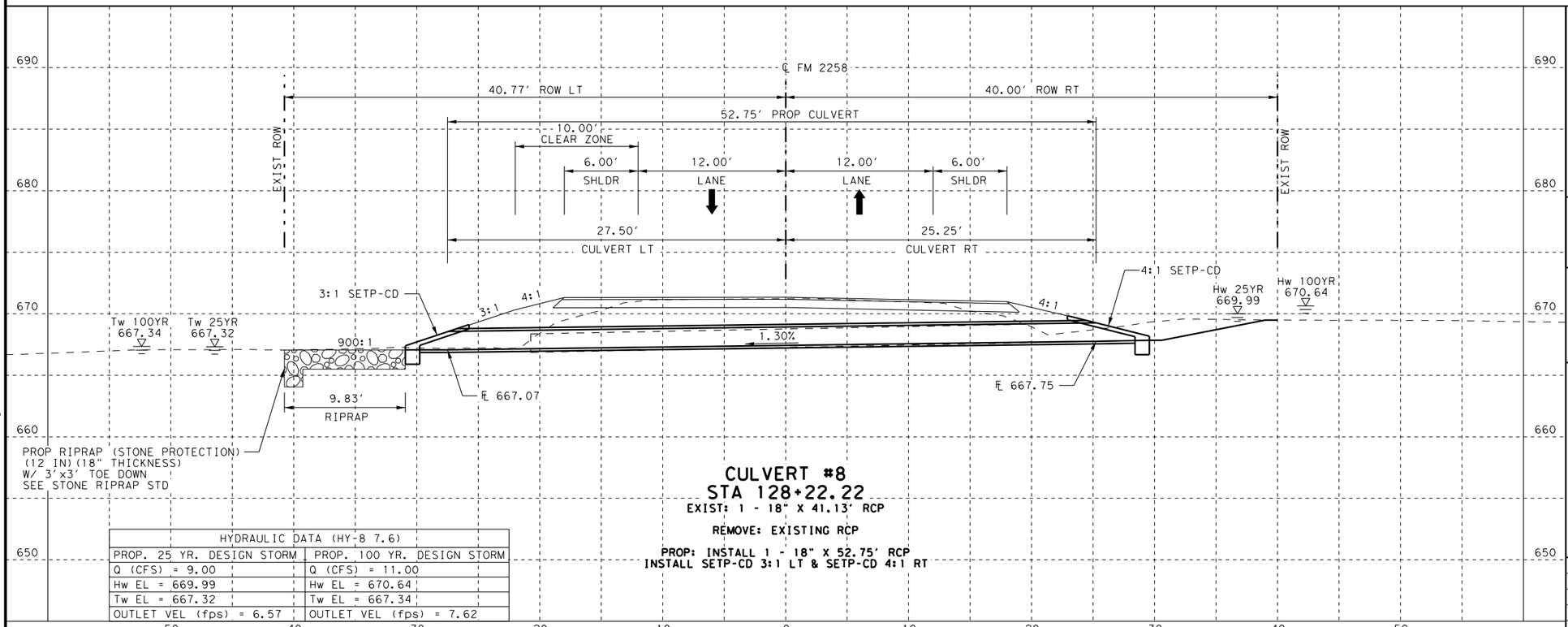

HYDRAULIC DATA (HY-8 7.6)	
PROP. 25 YR. DESIGN STORM	PROP. 100 YR. DESIGN STORM
Q (CFS) = 9.00	Q (CFS) = 11.00
Hw EL = 669.99	Hw EL = 670.64
Tw EL = 667.32	Tw EL = 667.34
OUTLET VEL (fps) = 6.57	OUTLET VEL (fps) = 7.62

CULVERT #8
STA 128+22.22
EXIST: 1 - 18" X 41.13' RCP

REMOVE: EXISTING RCP

PROP: INSTALL 1 - 18" X 52.75' RCP
INSTALL SETP-CD 3:1 LT & SETP-CD 4:1 RT

STATE OF TEXAS
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CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

CULVERT PLAN AND PROFILE

(CULV #8 @ STA 128+22.22)

HORZ: 1" = 10'
VERT: 1" = 10'

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		135
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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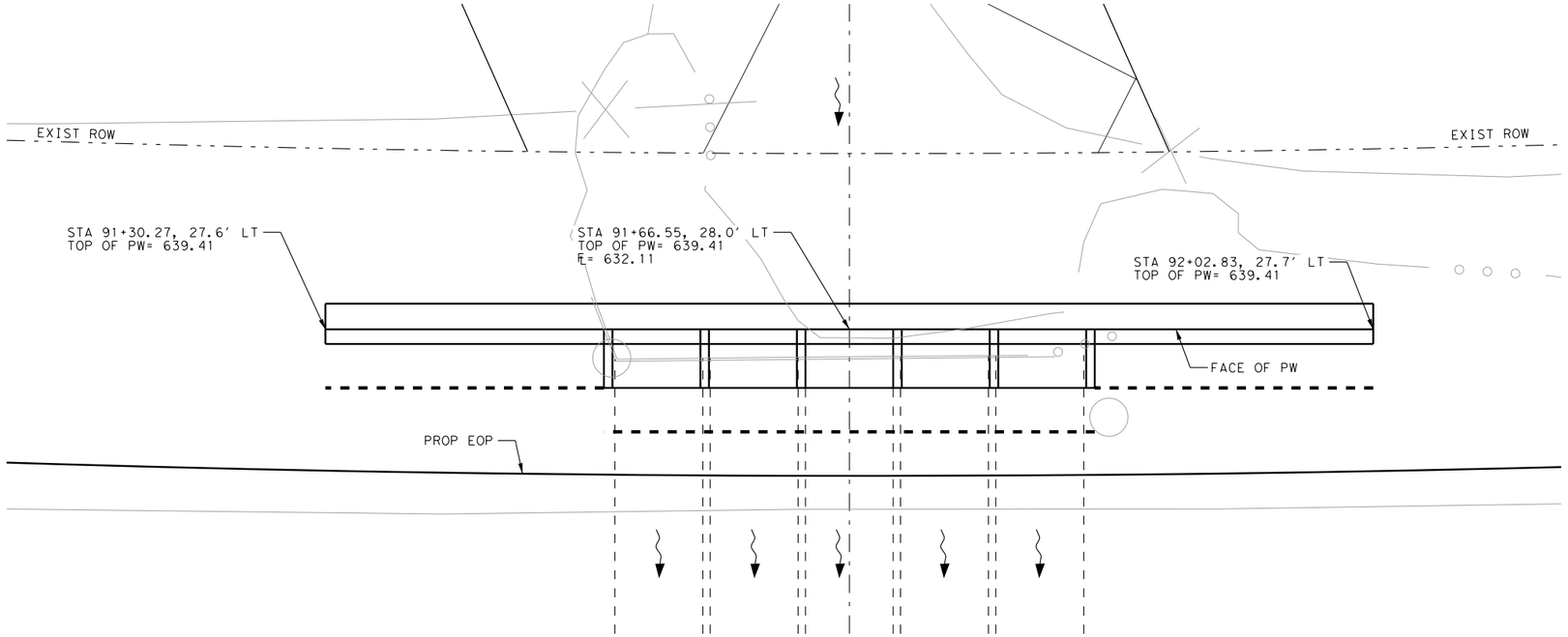
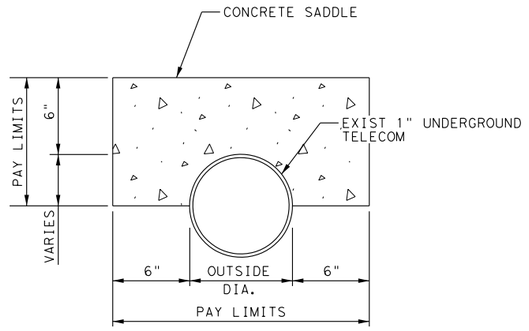


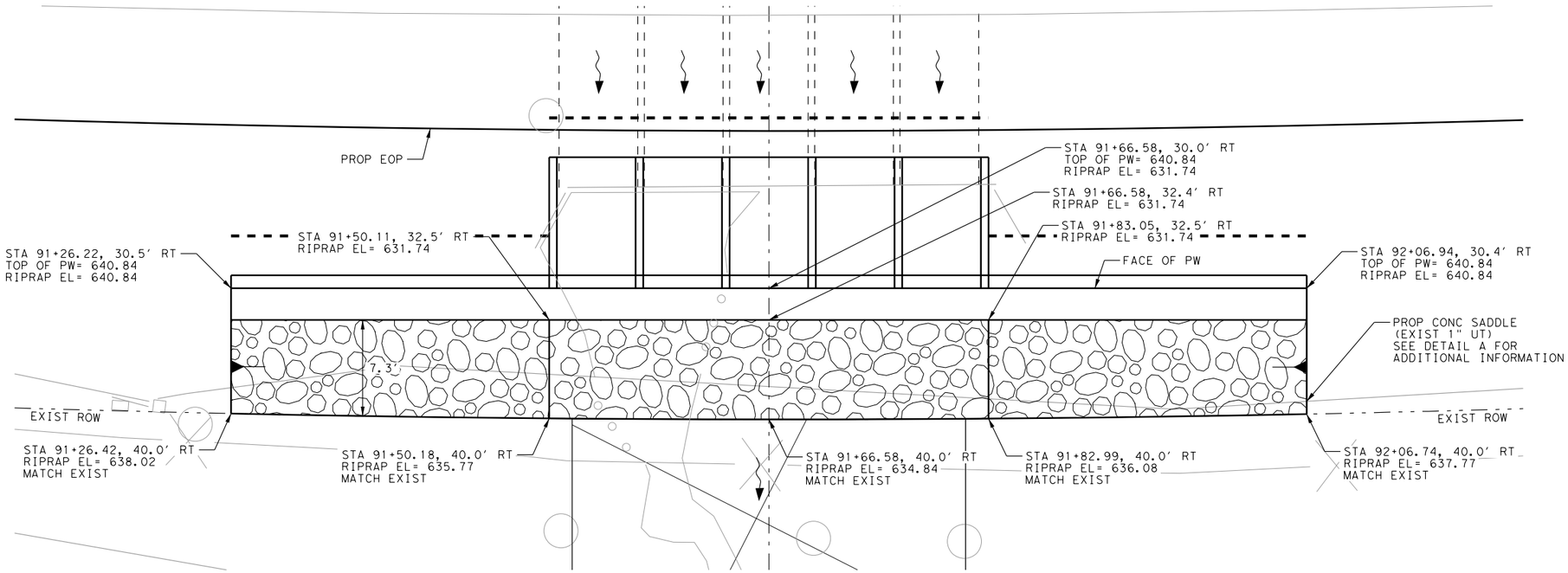
RIPRAP DETAIL
CULVERT #6 UPSTREAM



DETAIL A
CONCRETE SADDLE

NOTES:
1. CONCRETE SADDLE SHALL BE PAID FOR AS 420-6012 CL B CONC (MISC).

2. CONCRETE SADDLE TO BE PLACED WHERE EXIST UT CROSSES UNDER PROPOSED ROCK RIPRAP. ESTIMATED AT 1 CY.



RIPRAP DETAIL
CULVERT #6 DOWNSTREAM

STATE OF TEXAS
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DRAINAGE DETAILS

CULVERT #6

SHEET 1 OF 9

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		136
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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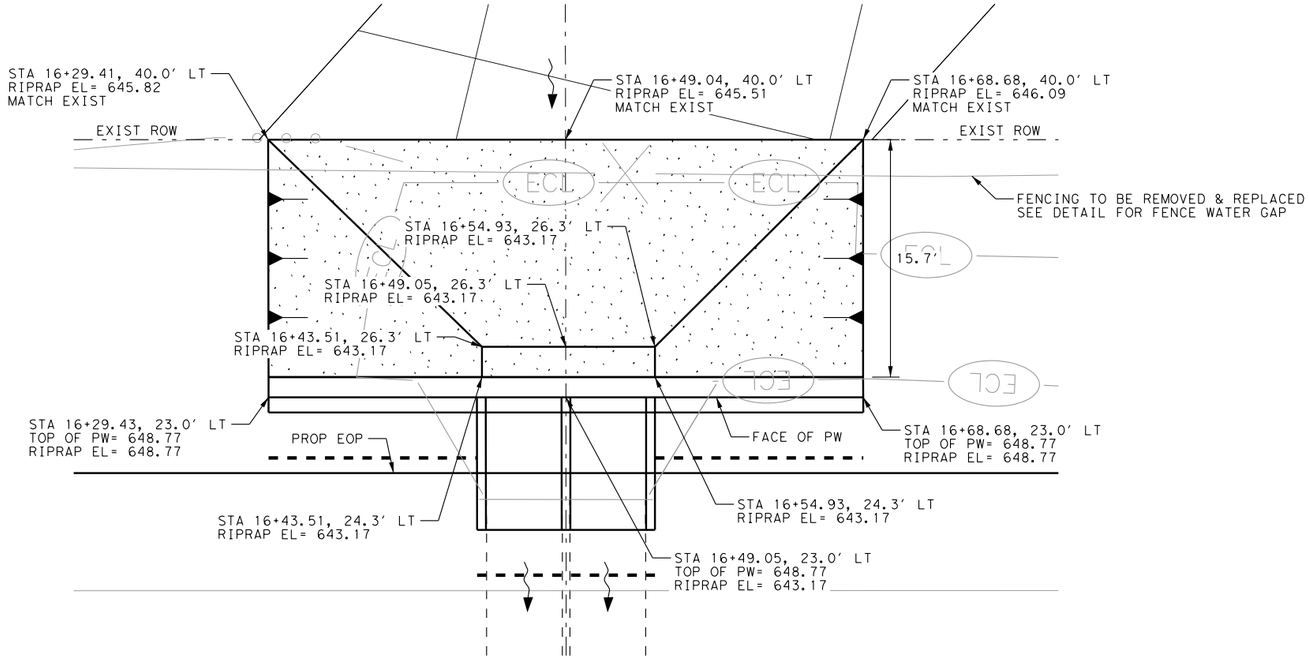
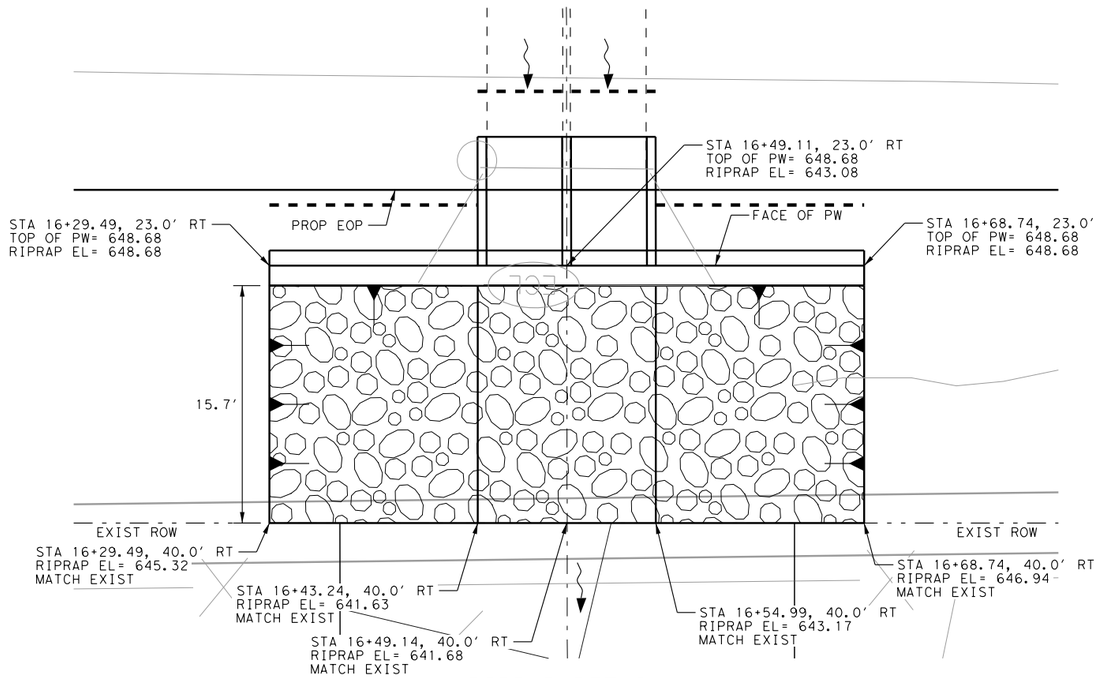


RIPRAP DETAIL

CULVERT #1 UPSTREAM



RIPRAP DETAIL

CULVERT #1 DOWNSTREAM

STATE OF TEXAS
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Texas Department of Transportation

DRAINAGE DETAILS

CULVERT #1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		137
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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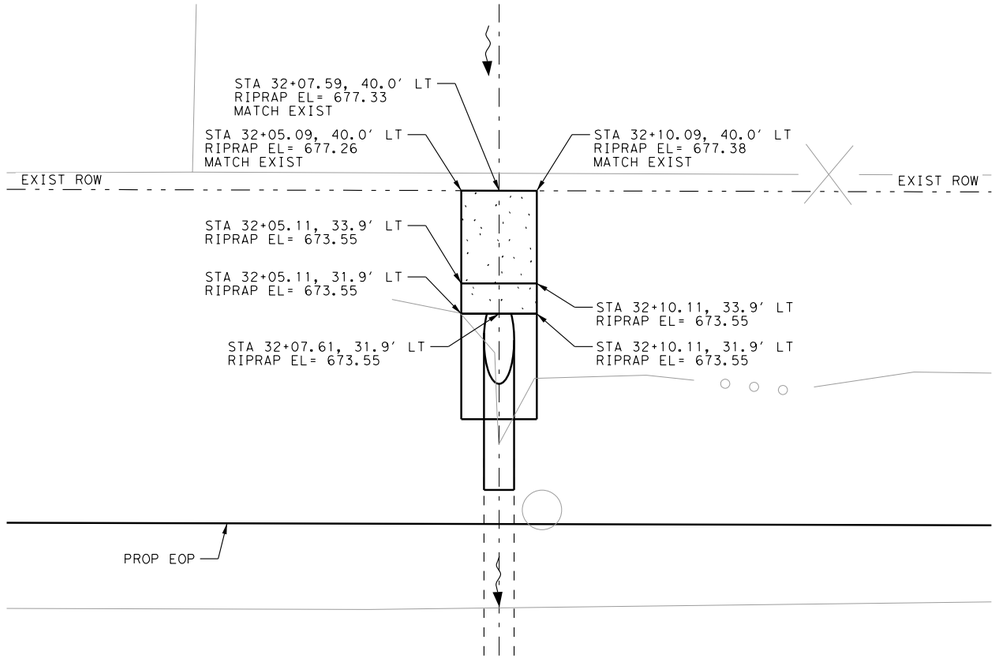
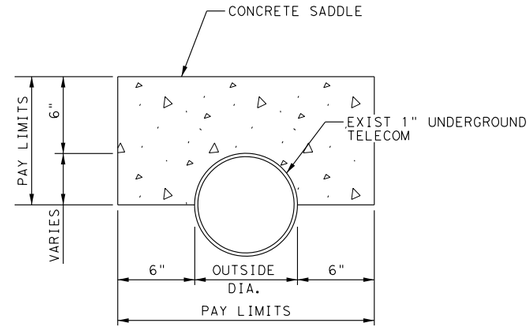


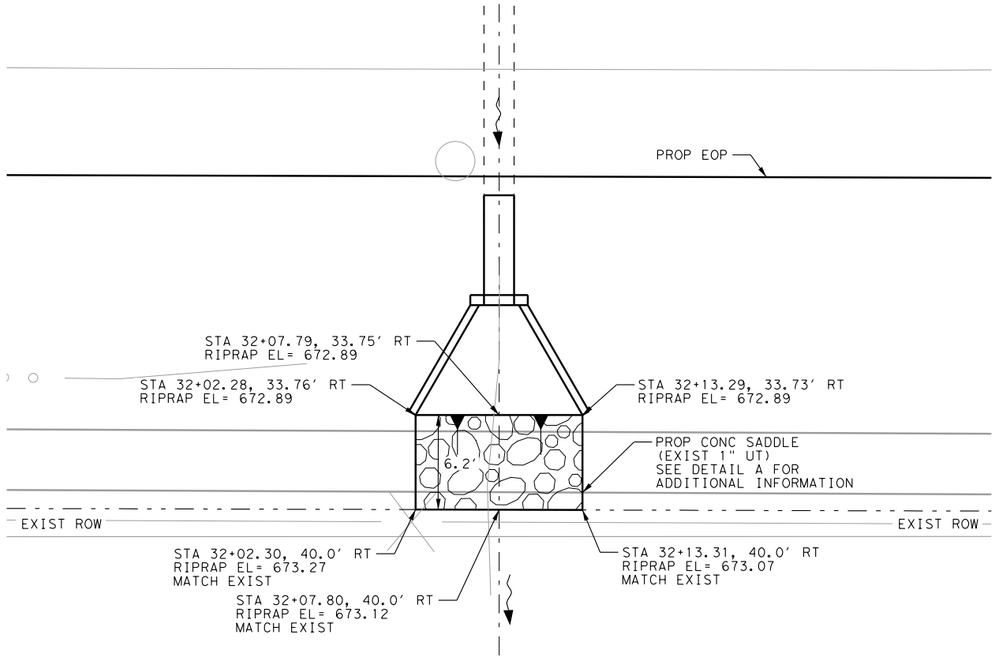
RIPRAP DETAIL
CULVERT #2 UPSTREAM



DETAIL A
CONCRETE SADDLE

NOTES:
1. CONCRETE SADDLE SHALL BE PAID FOR AS 420-6012 CL B CONC (MISC).

2. CONCRETE SADDLE TO BE PLACED WHERE EXIST UT CROSSES UNDER PROPOSED ROCK RIPRAP. ESTIMATED AT 1 CY.



RIPRAP DETAIL
CULVERT #2 DOWNSTREAM

STATE OF TEXAS
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2/6/2024

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Texas Department of Transportation

DRAINAGE DETAILS

CULVERT #2

SHEET 3 OF 9

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		138
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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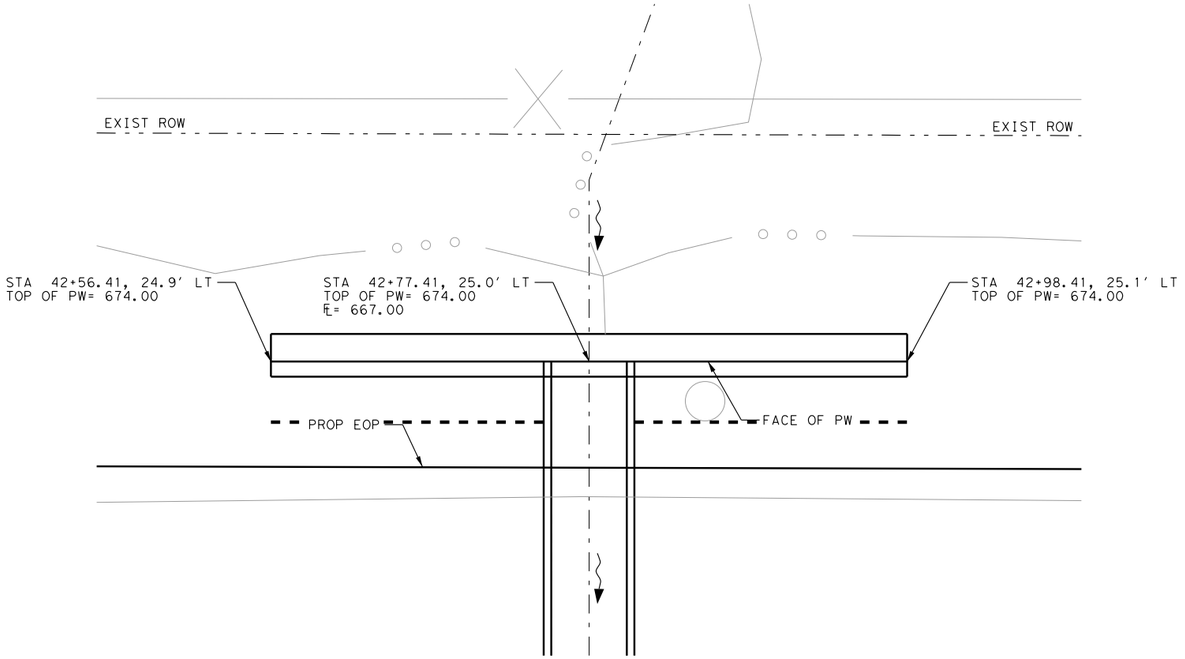
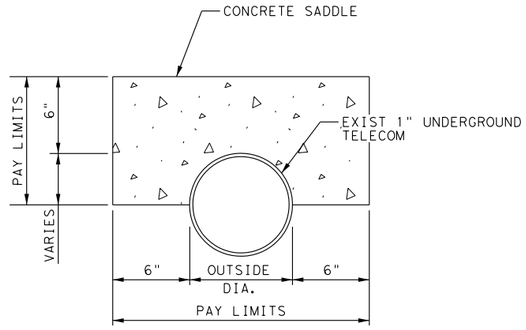


RIPRAP DETAIL
CULVERT #3 UPSTREAM



DETAIL A
CONCRETE SADDLE

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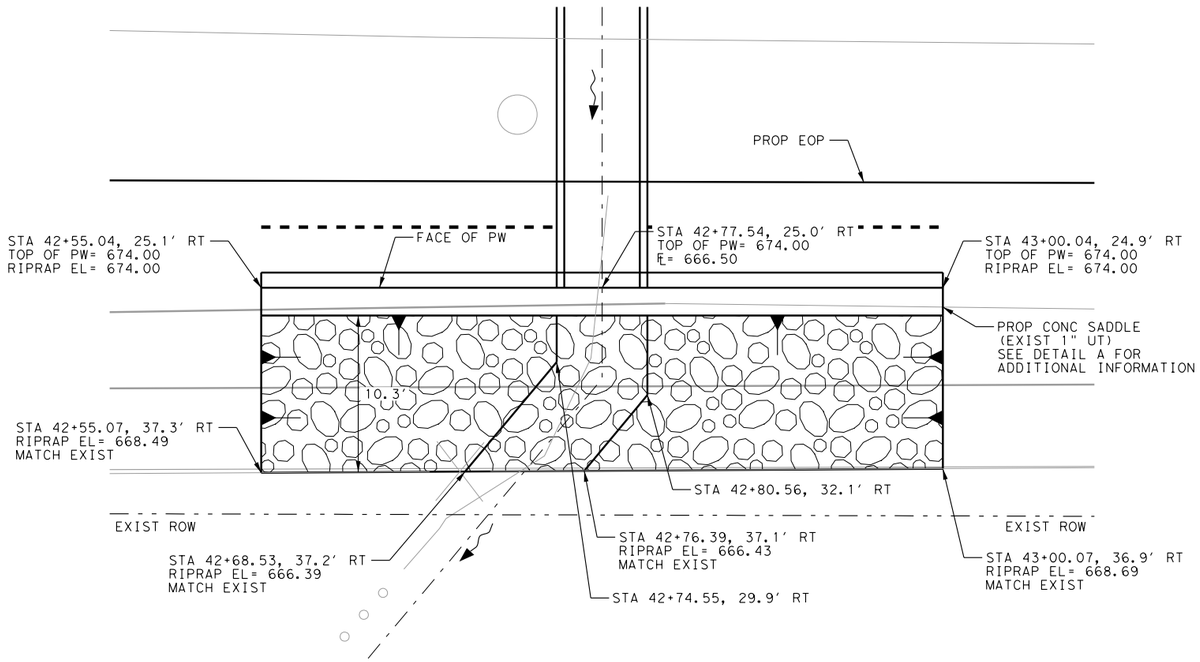
2. CONCRETE SADDLE TO BE PLACED WHERE EXIST UT CROSSES UNDER PROPOSED ROCK RIPRAP. ESTIMATED AT 1 CY.



RIPRAP DETAIL
CULVERT #3 DOWNSTREAM

STATE OF TEXAS
MICHAEL G. RAMIREZ
133983
LICENSED PROFESSIONAL ENGINEER
2/6/2024

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TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

DRAINAGE DETAILS

CULVERT #3

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		139
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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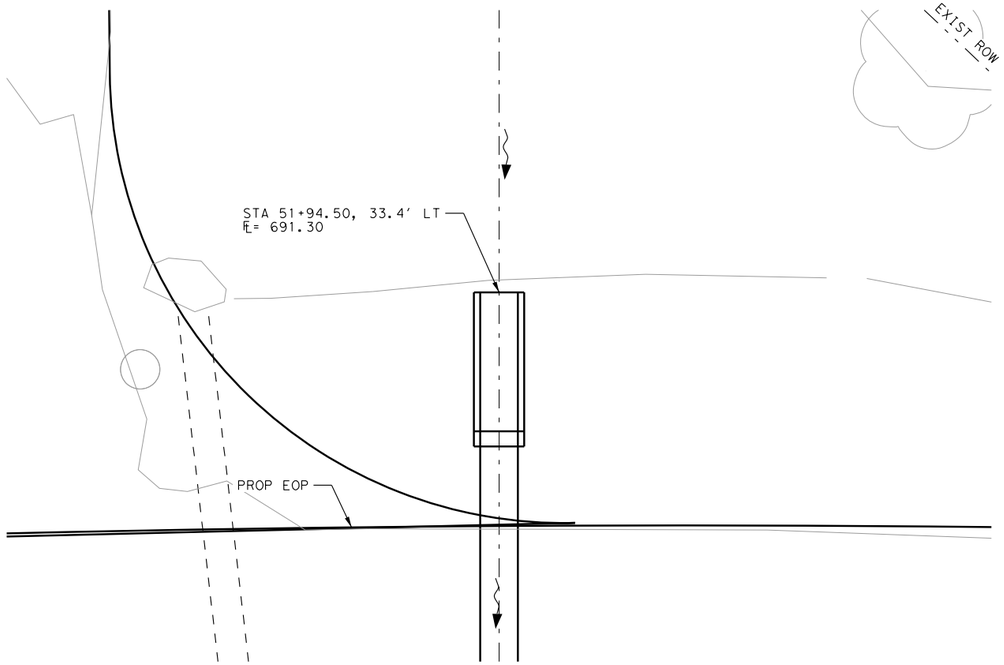

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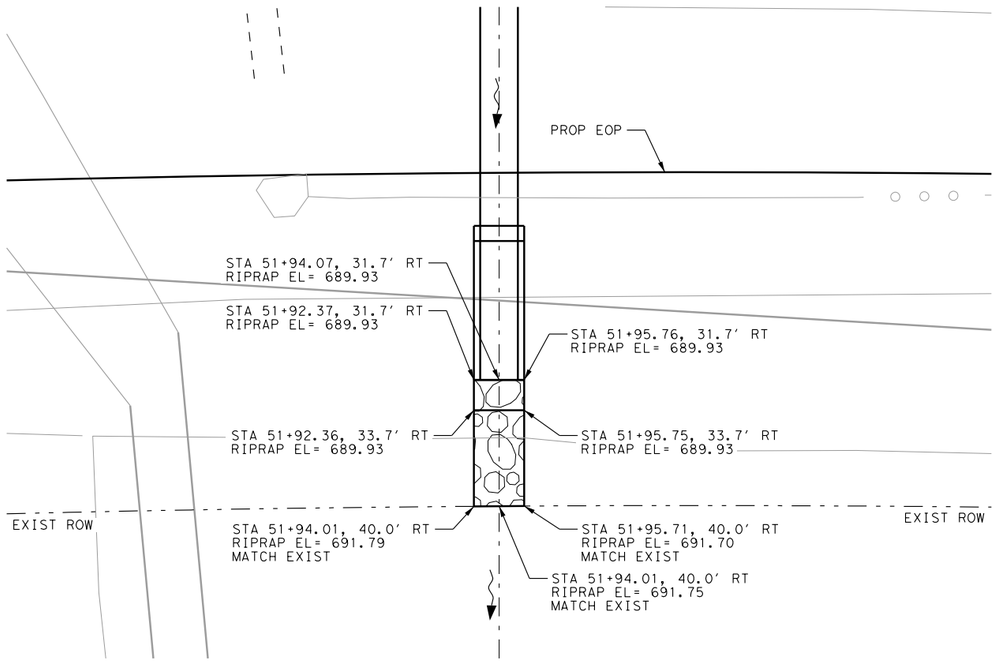

RIPRAP DETAIL
CULVERT #4 DOWNSTREAM

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STATE OF TEXAS
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FIRM NUMBER: F-8478

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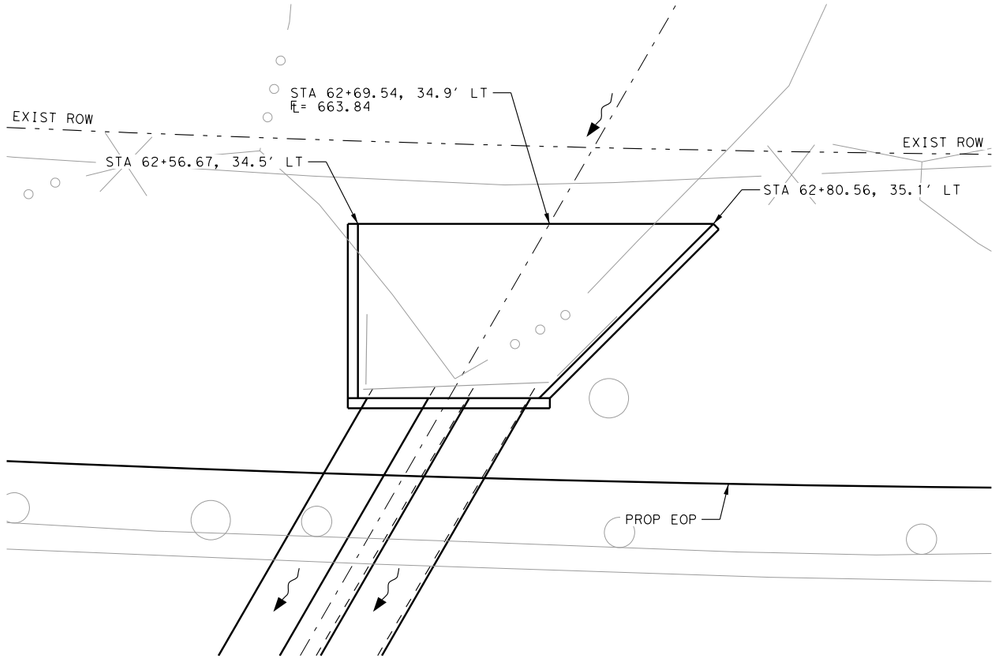
Texas Department of Transportation

DRAINAGE DETAILS

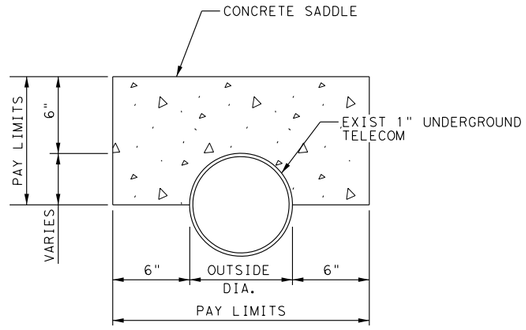
CULVERT #4

SHEET 5 OF 9

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		139
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258



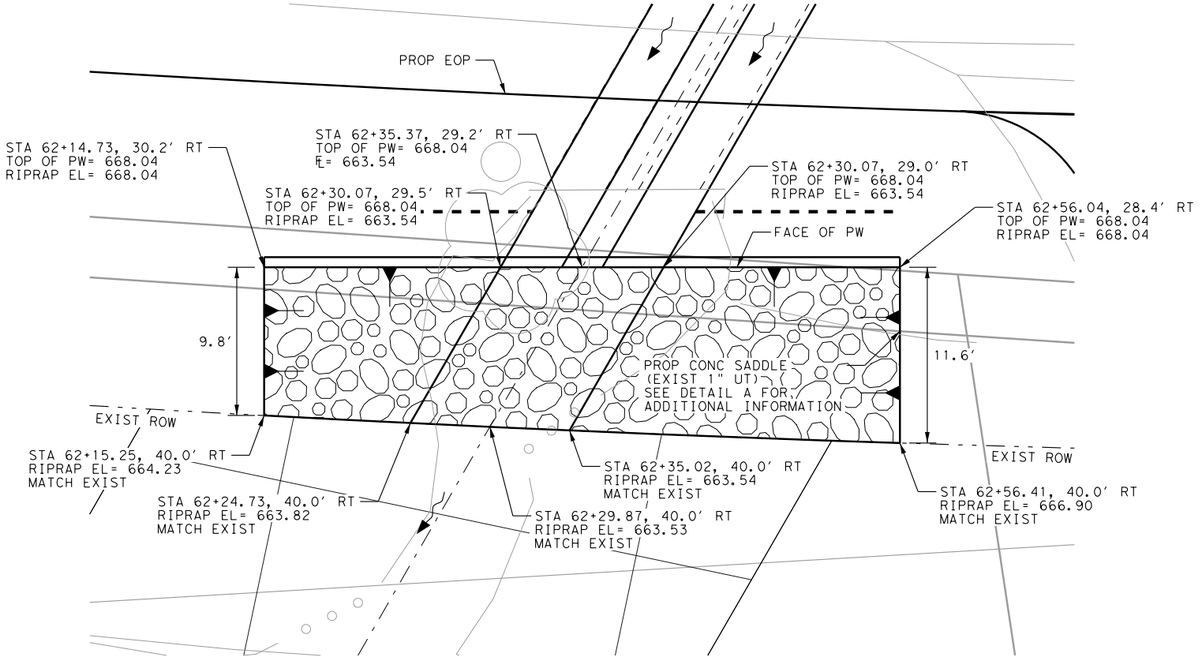
RIPRAP DETAIL
CULVERT #5 UPSTREAM



DETAIL A
CONCRETE SADDLE

NOTES:
1. CONCRETE SADDLE SHALL BE PAID FOR AS 420-6012 CL B CONC (MISC).

2. CONCRETE SADDLE TO BE PLACED WHERE EXIST UT CROSSES UNDER PROPOSED ROCK RIPRAP. ESTIMATED AT 1 CY.



RIPRAP DETAIL
CULVERT #5 DOWNSTREAM

STATE OF TEXAS
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133983
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2/6/2024

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Texas Department of Transportation

DRAINAGE DETAILS

CULVERT #5

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		142
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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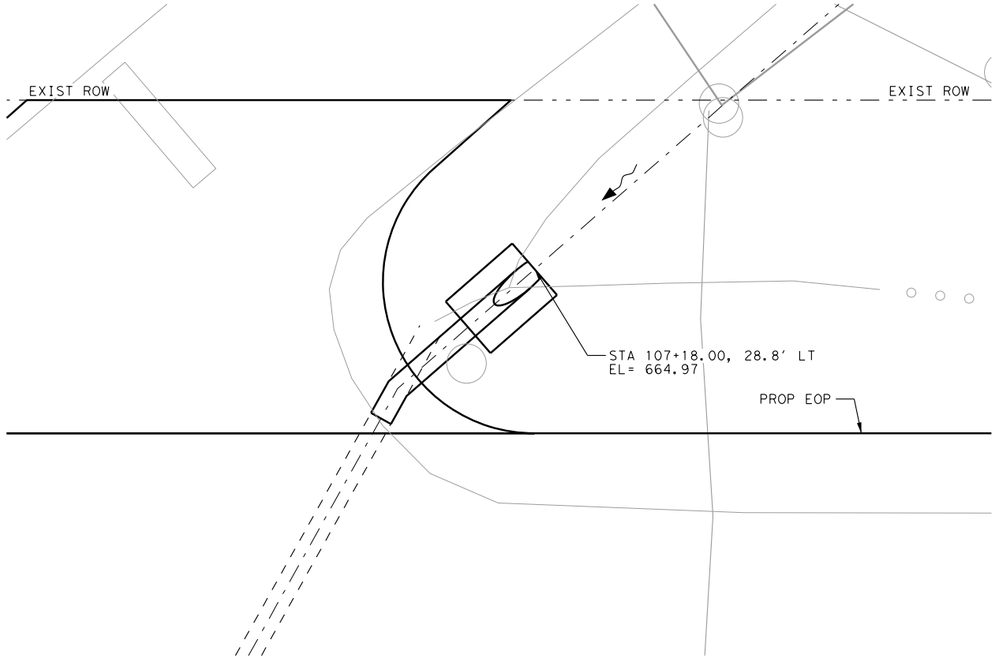
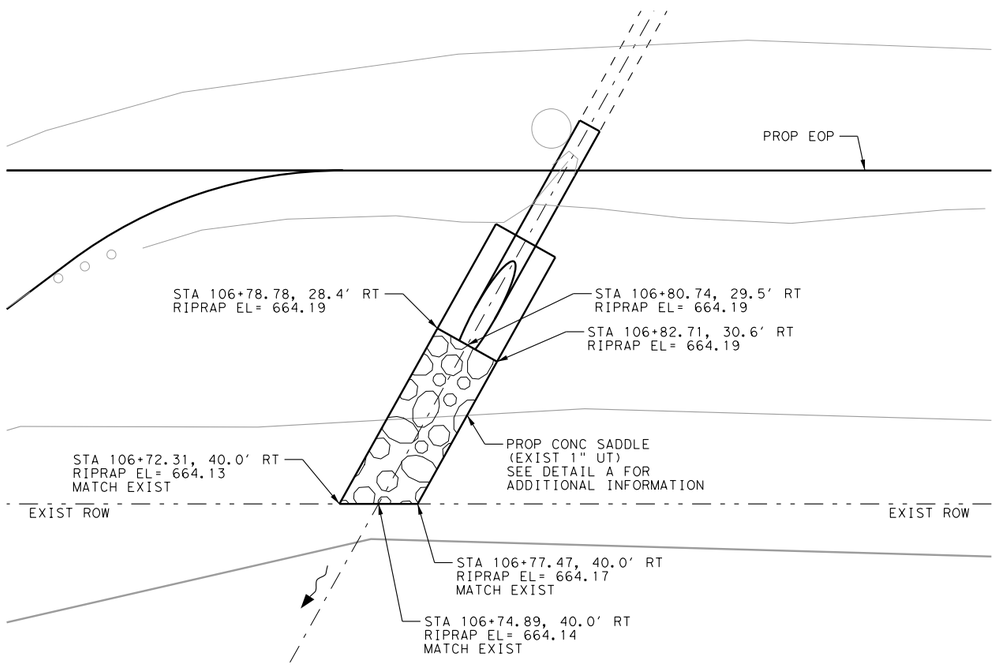
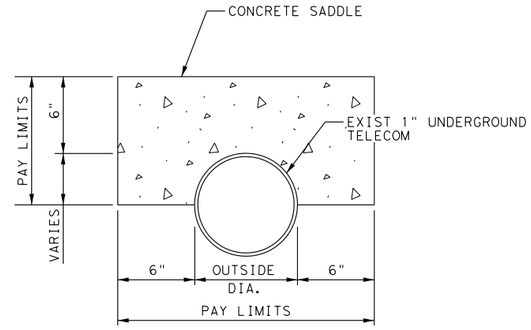


RIPRAP DETAIL
CULVERT #7 UPSTREAM



RIPRAP DETAIL
CULVERT #7 DOWNSTREAM



DETAIL A
CONCRETE SADDLE

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2. CONCRETE SADDLE TO BE PLACED WHERE EXIST UT CROSSES UNDER PROPOSED ROCK RIPRAP. ESTIMATED AT 1 CY.

STATE OF TEXAS
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Texas Department of Transportation

DRAINAGE DETAILS

CULVERT #7

SHEET 7 OF 9

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		142
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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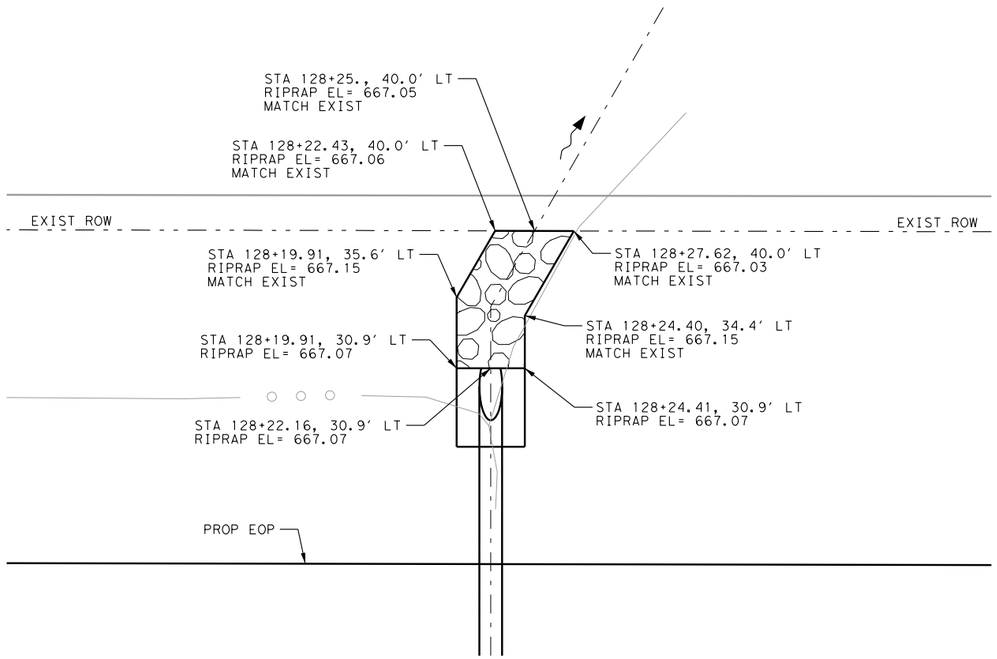
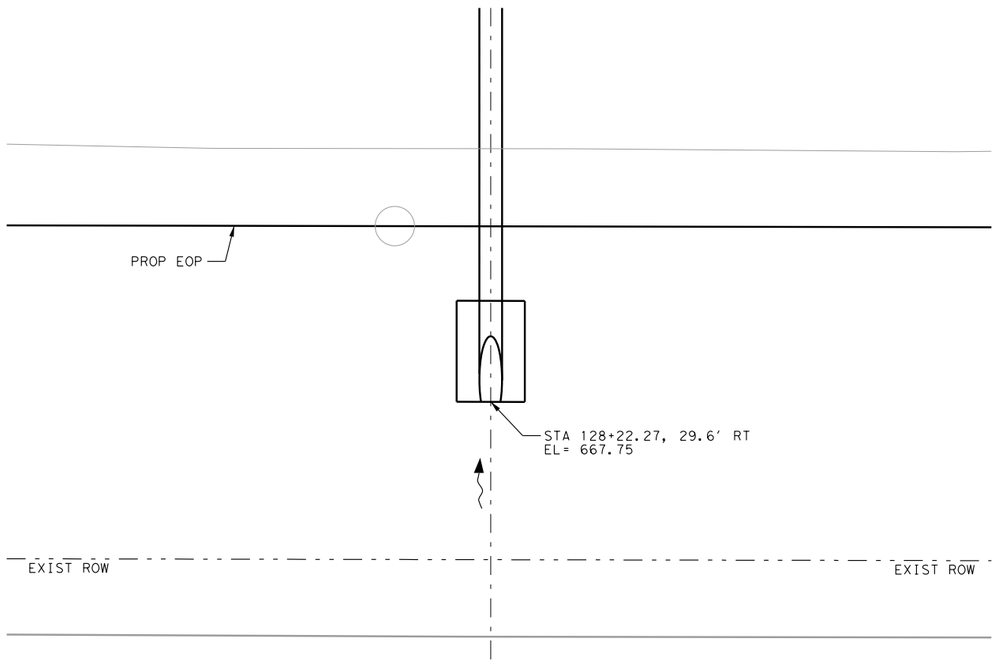


RIPRAP DETAIL

CULVERT #8 DOWNSTREAM



RIPRAP DETAIL

CULVERT #8 UPSTREAM

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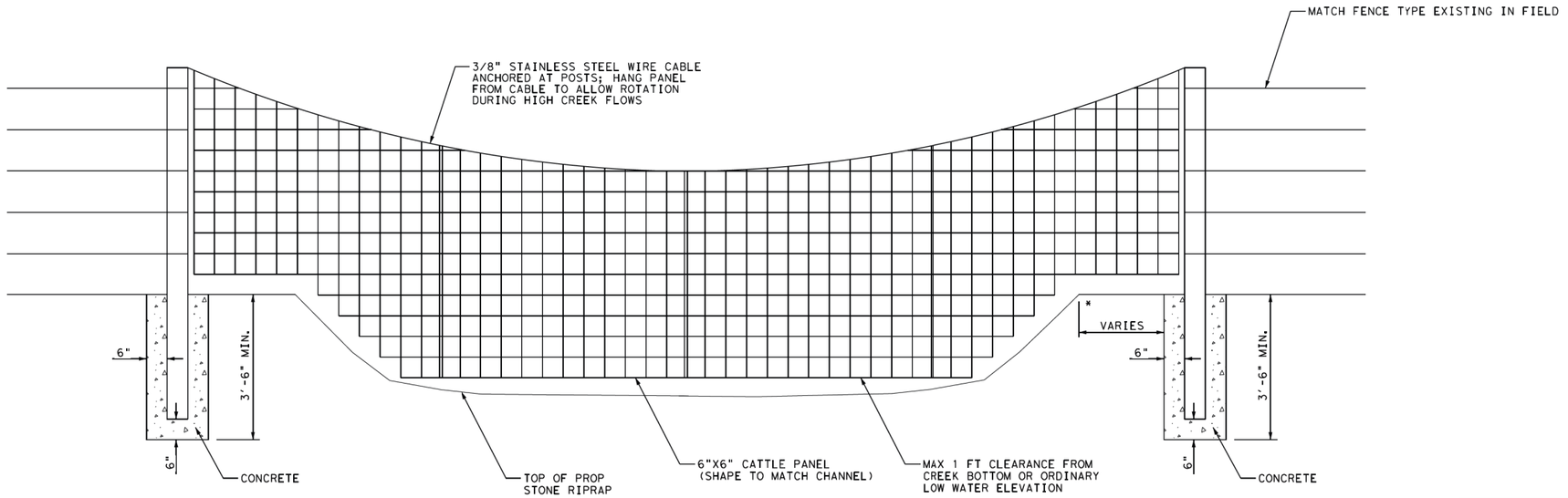
DRAINAGE DETAILS

CULVERT #8

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		143
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258



*TO BE DETERMINED IN THE FIELD BASED ON SLOPE STABILITY

NOTES:

1. NUMBER OF CATTLE PANELS VARY WITH CHANNEL WIDTH.
2. WIRE TWISTED STAYS TO BE PLACED @ CENTER OF CATTLE PANELS.
3. EACH VERTICAL STRAND OF CATTLE PANEL SHALL BE ATTACHED TO WIRE ROPE.
4. CATTLE PANELS SHALL OVERLAP A MINIMUM OF 8".
5. CATTLE PANELS SHALL BE CUT TO CONFORM TO THE SHAPE OF THE CHANNEL AND MAINTAIN A 12" GAP BETWEEN CHANNEL BOTTOM.
6. CONCRETE SHALL BE OF THE DESIGN AND CONSISITENCY APPROVED BY THE ENGINEER AND SHALL CONTAIN NO LESS THAN 4 SACKS OF CEMENT PER CUBIC YARD.

STATE OF TEXAS
MICHAEL G. RAMIREZ
133983
LICENSED
PROFESSIONAL ENGINEER
2/6/2024

CAMACHO-HERNANDEZ & ASSOCIATES, LLC
415 EMBASSY OAKS - SUITE 205 SAN ANTONIO, TX. 78216
OFFICE: (210) 341-6200 FAX: (210) 341-6300
FIRM NUMBER: F-8478

CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

DETAIL FOR FENCE WATER GAP

SHEET 9 OF 9

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		144
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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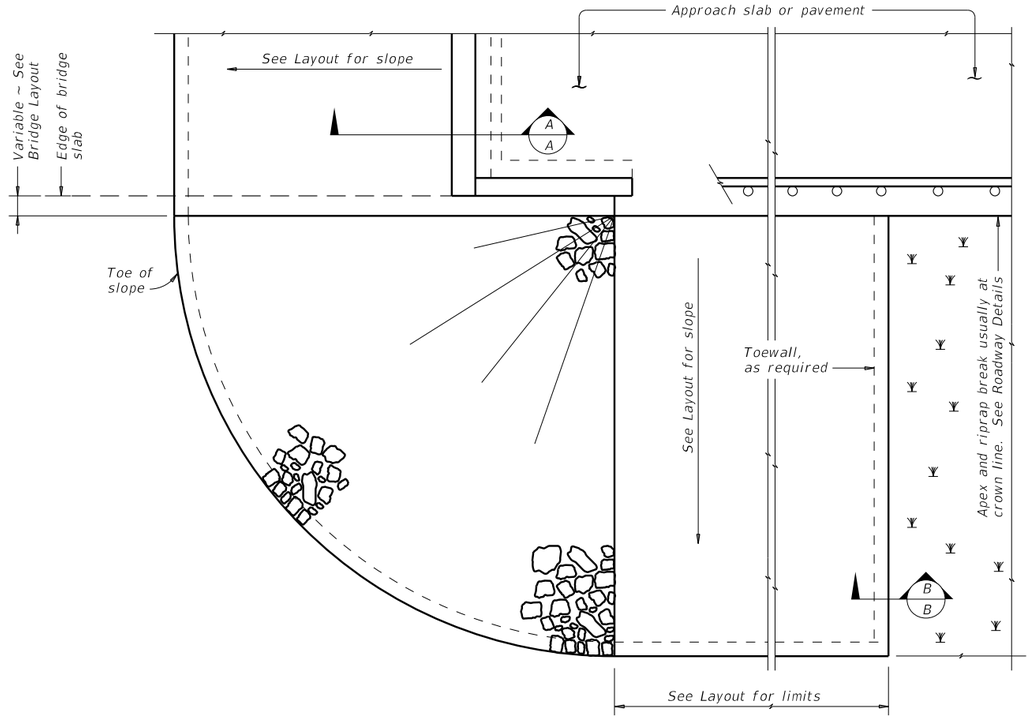
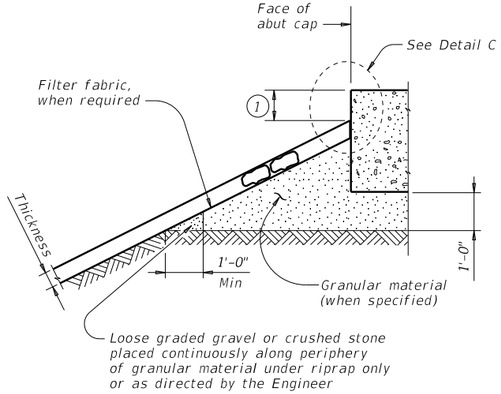
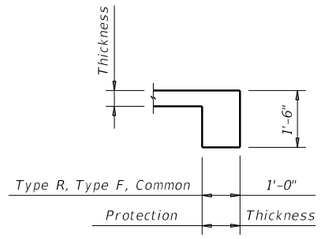


PLAN

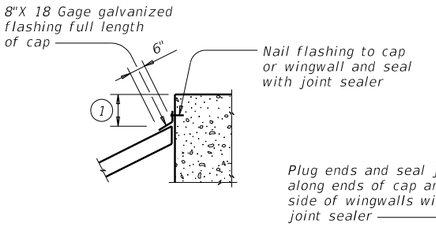


SECTION A-A AT CAP

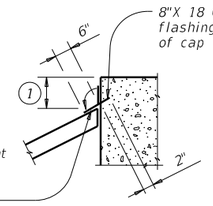


SECTION B-B

Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".

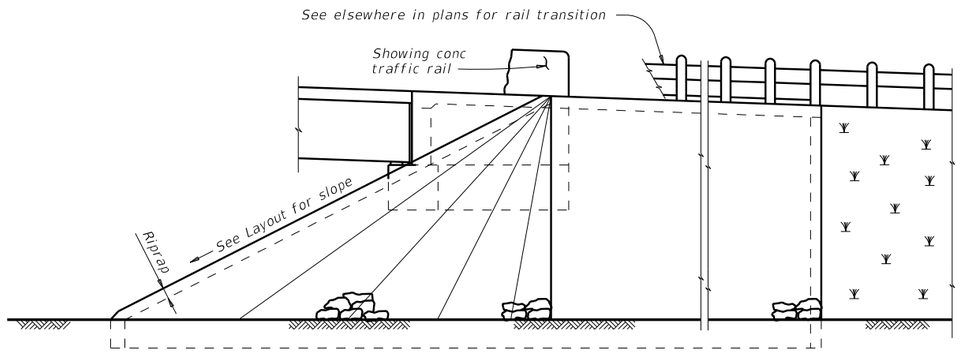


CAP OPTION A



CAP OPTION B

DETAIL C



ELEVATION

GENERAL NOTES:
Refer to Item 432, "Riprap" for stone size and gradation, and construction details. See Layout for limits and thickness of riprap specified.
See elsewhere in plans for locations and details of shoulder drains.

(1) Top of cap to top of riprap dimension varies as directed by the Engineer. Provide 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY		
REVISIONS	1599	03	017	FM 2258		
	DIST	COUNTY		SHEET NO.		
	FTW	JOHNSON		145		

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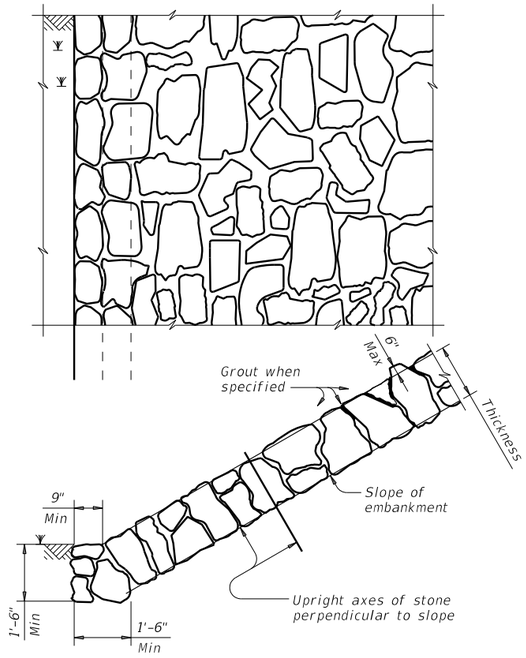


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

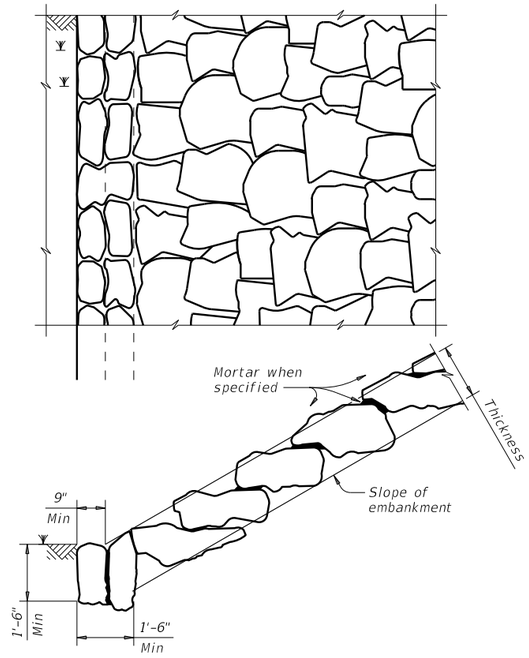


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

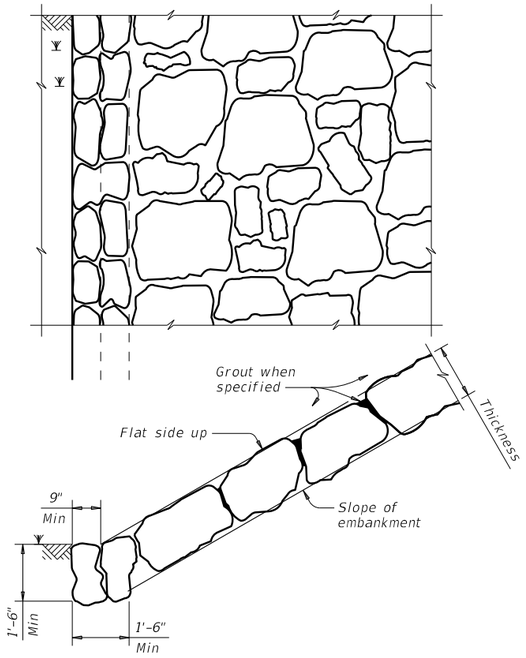


FIGURE 3 ~ TYPE F STONE RIPRAP

grouted

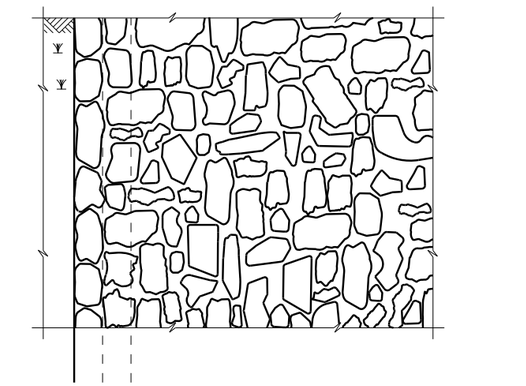


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

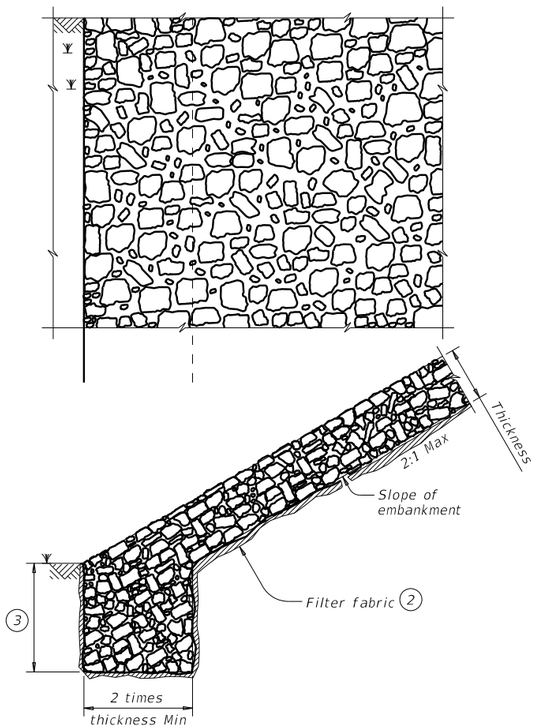


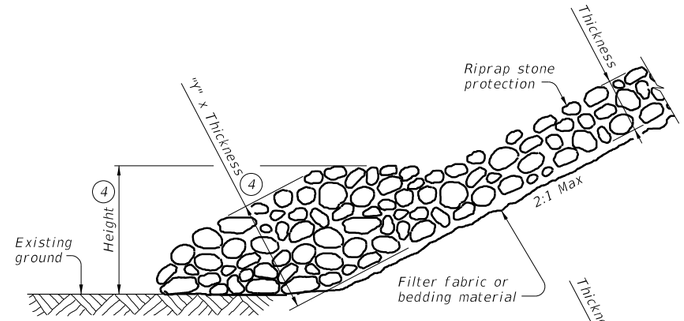
FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

(2) Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.

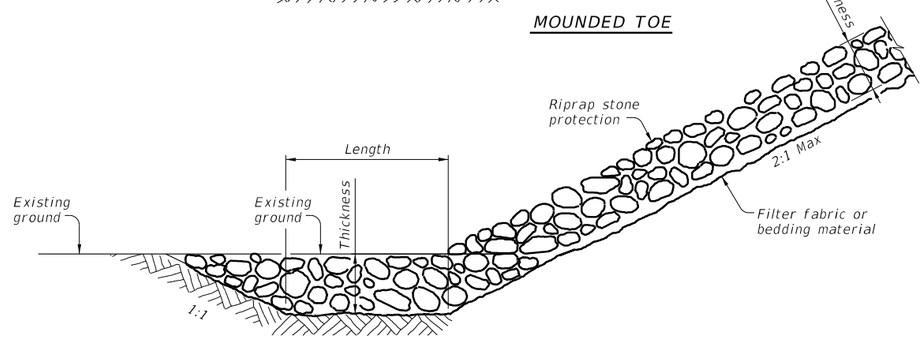
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

(4) "Y" and Height need to be defined. See layout or detail sheet for values if this option is used.

(5) List Stone Protection as size (XX inch) and thickness (YY inch) on the layout.
Example: Riprap (Stone Protection) XX inch, Thickness = YY inch.



MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS (5)

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1599	03	017	FM 2258
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	FTW	JOHNSON		146

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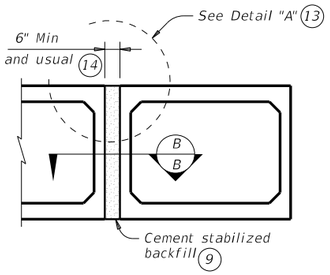
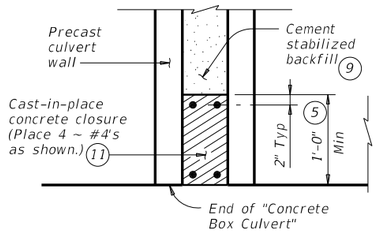
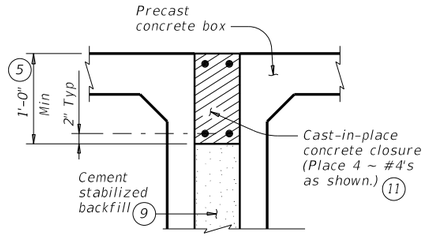


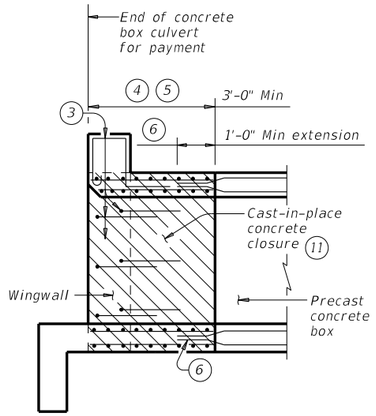
MULTIPLE UNIT PLACEMENT



SECTION B-B

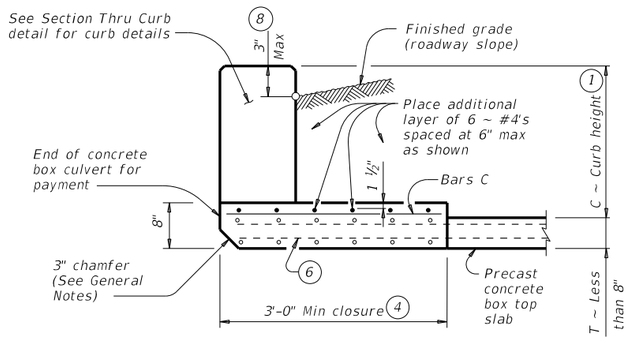


DETAIL "A" (13)

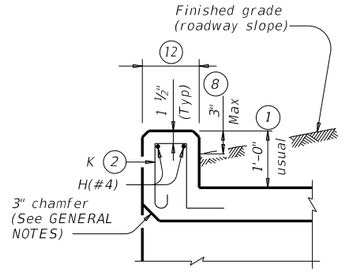


WINGWALL CONNECTION

(Also applies to safety end treatment.)

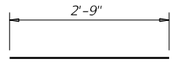


SECTION THRU TOP SLABS LESS THAN 8"

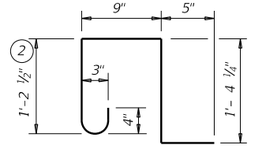


SECTION THRU CURB

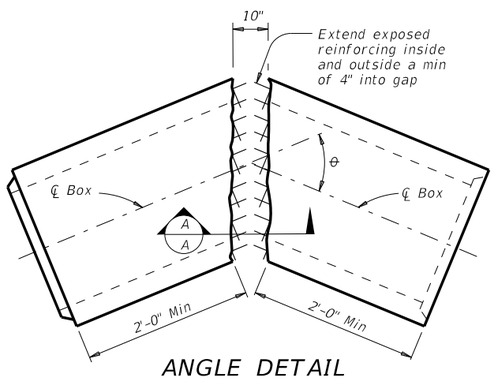
QUANTITIES PER FOOT OF CURB (10)	
Reinforcing Steel	4.12 Lb
Concrete	0.037 CY



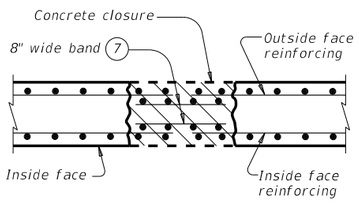
BARS C (#4)
(Spa = 1'-0" Max)



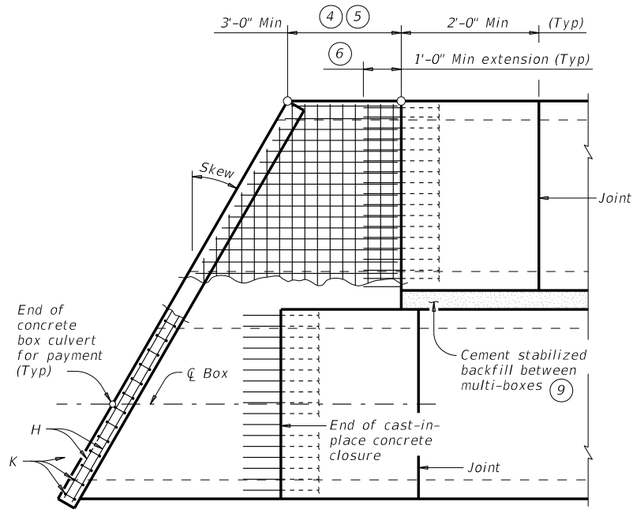
BARS K (#4)
(Spa = 1'-0" Max)
(Length = 4'-2")



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

FILE: scpmdsts-20.dgn	DN: GAF	CK: LMW	DW: BWH/TxDOT	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		147

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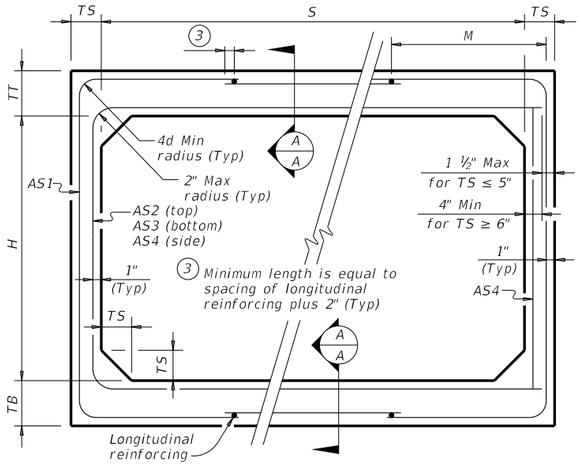
BOX DATA

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)
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

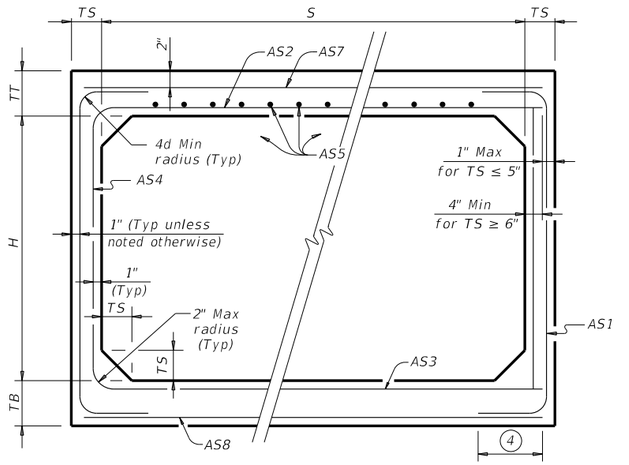
(1) For box length = 8'-0"

(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

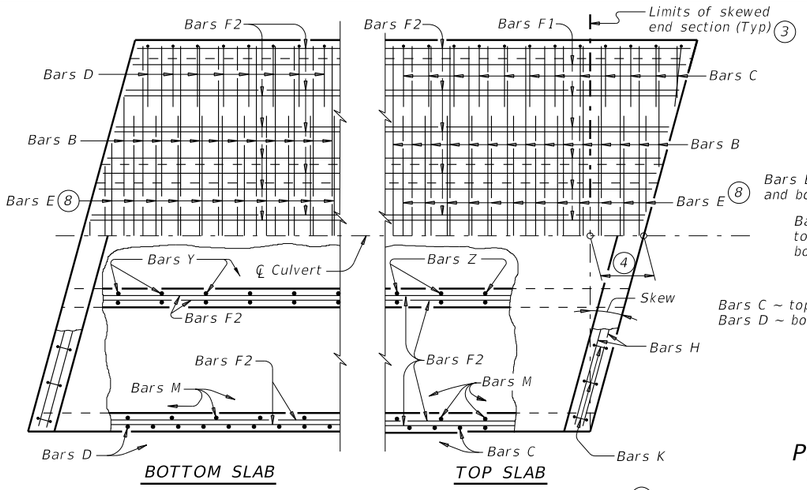
Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

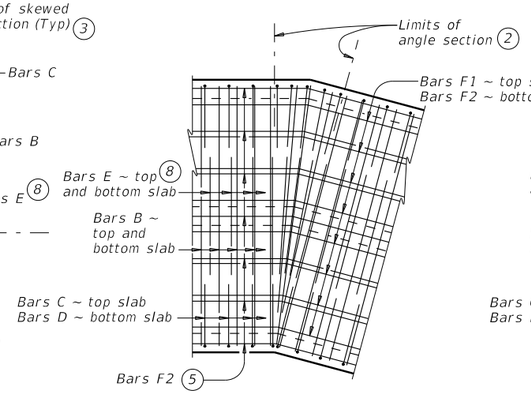
5'-0" SPAN

SCP-5

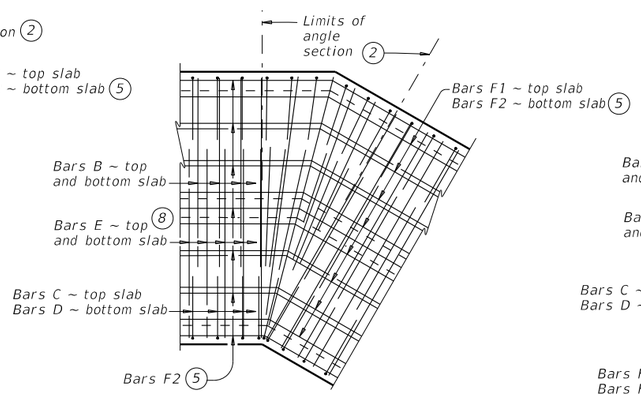
FILE: scp05sts-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		148



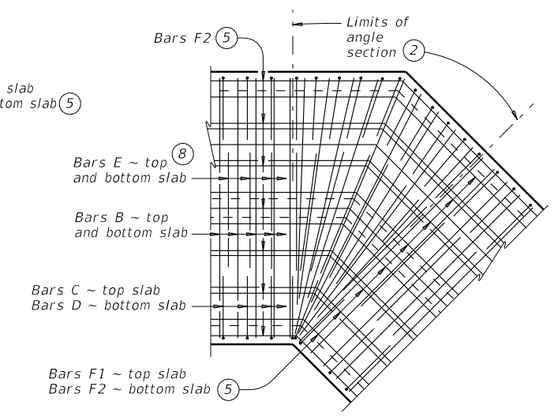
PLAN OF SKEWED ENDS ~ FROM 0° TO 15° 7



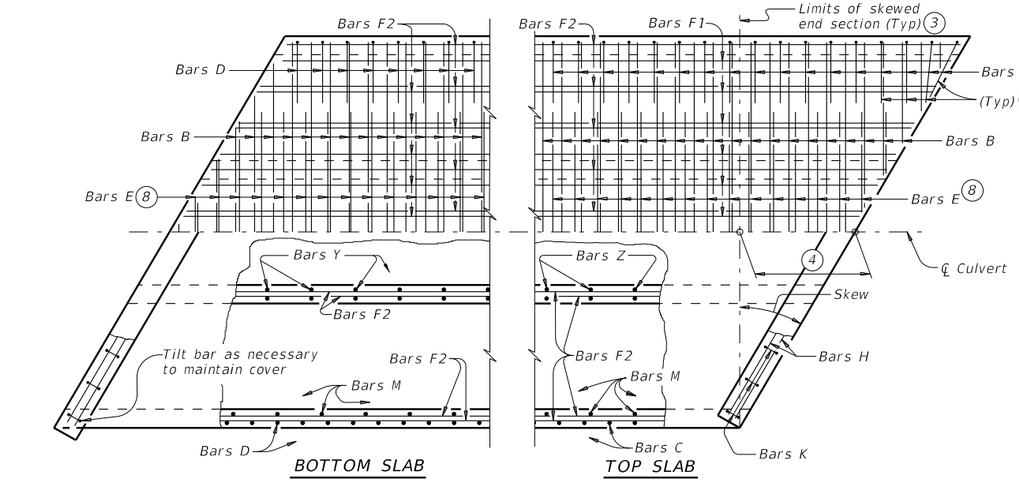
PLAN OF ANGLE SECTION ~ FROM 0° TO 15°



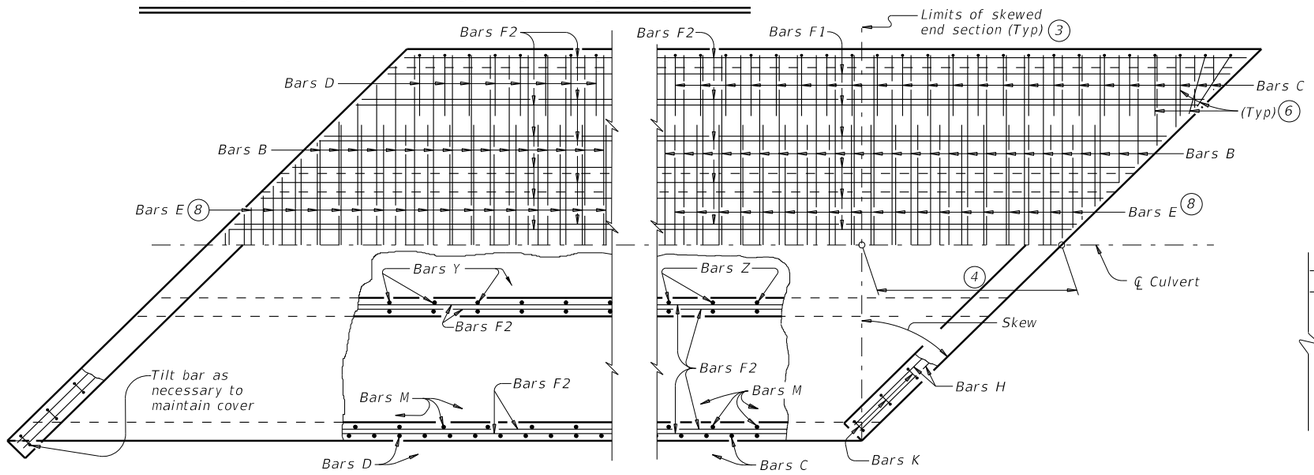
PLAN OF ANGLE SECTION ~ OVER 15° TO 30°



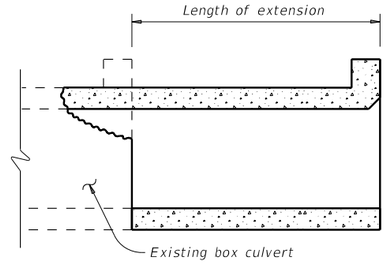
PLAN OF ANGLE SECTION ~ OVER 30° TO 45°



PLAN OF SKEWED ENDS ~ OVER 15° TO 30°



PLAN OF SKEWED ENDS ~ OVER 30° TO 45°



LENGTHENING DETAIL 1

1. For skewed box culverts with less than 2'-0" of fill, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension.
   For non-skewed box culverts with less than 2'-0" of fill and for skewed or non-skewed culverts with a fill depth of 2'-0" or greater, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension. Alternatively, if the box is non-skewed, embed #6 anchor bars with a Type III, Class C, D, E, or F anchor adhesive into the existing walls, top and bottom slab at 1'-6" center-to-center spacing. Minimum embedment depth is 8". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 26.4 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing." Test adhesive anchors in accordance with Item 450.3.3, "Tests." Test 3 anchors per 100 anchors installed.
   Break back wings and apron as necessary to install the extension. Clean and extend the exposed wingwall and apron reinforcing into the extension. When lengthening existing box culverts with dimensions different than current standard dimensions, form horizontal and vertical transitions as directed by the Engineer. Match bottom slabs to maintain an uninterrupted flow line. Field bend existing and new reinforcing into transitions and maintain specified cover requirements. For top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface, adjust the "H" dimension to provide a smooth riding surface.
2. When the spacing between Bars B or Bars E becomes less than half of the normal spacing, cut bars to avoid conflict.
3. The length of Bars B and Bars E will vary in the skewed end sections.
4. [One half of overall width] x [tangent of the skew angle]
5. Place Bars F1 and F2 continuously through the angle section. Bend Bars F1 and F2 to remain parallel to the walls of the box culvert.
6. When necessary to avoid conflict in acute corners, shorten the slab extension leg of Bars C and Bars D to a minimum of 1'-6" for skews of 30° thru 45°.
7. At the Contractor's option, for skews of 15° or less, place Bars B, C, D, and E parallel to the skewed end while maintaining spacing along centerline of box. Increase lengths of Bars B and Bars E shown on the Multiple Box Culverts Cast-In-Place (MC) standard sheets to accommodate the skew.
8. Extend Bars E as shown on the MC standard sheet for direct traffic culverts.

CONSTRUCTION NOTES:

Do not use permanent forms.
When required, lap Bars H 1'-8" for uncoated or galvanized bars.
Provide a minimum of 1 ½" clear cover.

MATERIAL NOTES:

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

GENERAL NOTES:

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

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE MISCELLANEOUS DETAILS

MC-MD

FILE: mc-mdste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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	FTW	JOHNSON		149

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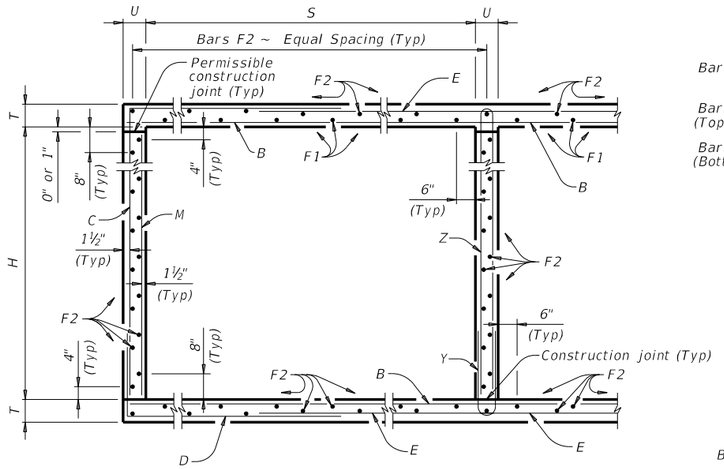
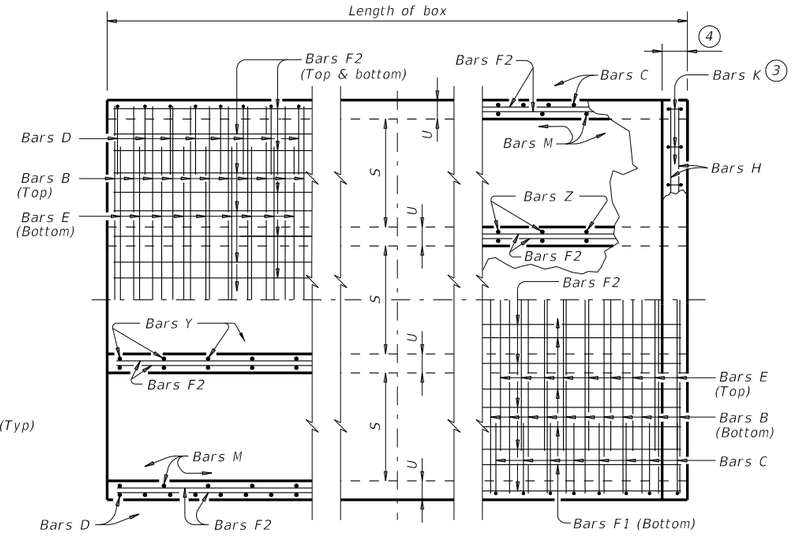
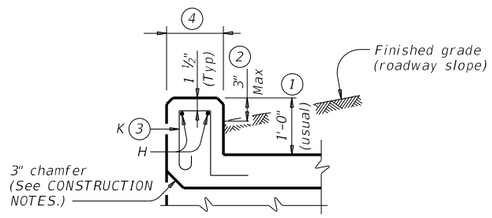


TYPICAL SECTION



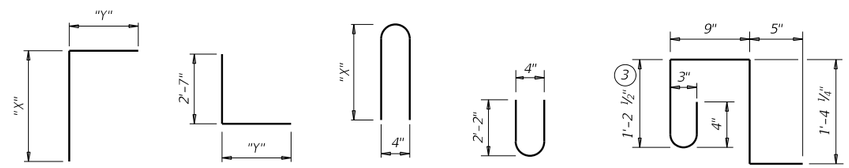
BOTTOM SLAB TOP SLAB

PART PLANS



SECTION THRU CURB

TABLE OF BAR DIMENSIONS		
H	"X"	"Y"
2'-0"	2'-6 ½"	3'-8 ½"
3'-0"	3'-6 ½"	3'-8 ½"
4'-0"	4'-6 ½"	3'-8 ½"
5'-0"	5'-6 ½"	3'-8 ½"



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

1. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Rail Anchorage Curb (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

2. For vehicle safety, the following requirements must be met:
   - For structures without bridge rail, construct curbs no more than 3" above finished grade.
   - For structures with bridge rail, construct curbs flush with finished grade.

   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

3. For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.

4. 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

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

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

CONSTRUCTION NOTES:

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

MATERIAL NOTES:

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

Provide bar laps, where required, as follows:
- Uncoated or galvanized ~ #4 = 1'-8" Min
- Uncoated or galvanized ~ #5 = 2'-1" Min
- Uncoated or galvanized ~ #6 = 2'-6" Min

GENERAL NOTES:

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

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

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation — Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE
5'-0" SPAN
0' TO 20' FILL

MC-5-20

FILE: mc520ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		150

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NUMBER OF SPANS	SECTION DIMENSIONS				BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																																QUANTITIES					
					Bars B					Bars C & D								Bars E					Bars F1 ~ #4				Bars F2 ~ #4				Bars M ~ #4				Bars Y & Z ~ #4								Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total	
												Bars C		Bars D																				Bars Y		Bars Z											
	S	H	T	U	No.	Size	Spa	Length	Wt	No.	Size	Spa	Length	Wt	Length	Wt	No.	Size	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	Length	Wt	No.	Wt	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)
2	5'-0"	2'-0"	8"	7"	108	#5	9"	11'-6"	1,295	108	#5	9"	6'-3"	704	6'-4"	713	108	#5	9"	8'-8"	976	8	18"	39'-9"	212	38	18"	39'-9"	1,009	108	9"	2'-0"	144	54	9"	4'-7"	165	5'-3"	189	11'-6"	31	26	72	0.710	135.2	0.9	103	29.3	5,510
3	5'-0"	2'-0"	8"	7"	108	#5	9"	17'-1"	1,924	108	#5	9"	6'-3"	704	6'-4"	713	108	#5	9"	14'-3"	1,605	12	18"	39'-9"	319	54	18"	39'-9"	1,434	108	9"	2'-0"	144	108	9"	4'-7"	331	5'-3"	379	17'-1"	46	38	106	1.029	188.8	1.3	152	42.4	7,705
4	5'-0"	2'-0"	8"	7"	108	#5	9"	22'-8"	2,553	108	#5	9"	6'-3"	704	6'-4"	713	108	#5	9"	19'-10"	2,234	16	18"	39'-9"	425	70	18"	39'-9"	1,859	108	9"	2'-0"	144	162	9"	4'-7"	496	5'-3"	568	22'-8"	61	48	134	1.348	242.4	1.7	195	55.6	9,891
5	5'-0"	2'-0"	8"	7"	108	#5	9"	28'-3"	3,182	108	#5	9"	6'-3"	704	6'-4"	713	108	#5	9"	25'-5"	2,863	20	18"	39'-9"	531	86	18"	39'-9"	2,284	108	9"	2'-0"	144	216	9"	4'-7"	661	5'-3"	758	28'-3"	75	60	167	1.667	296.0	2.1	242	68.8	12,082
6	5'-0"	2'-0"	8"	7"	108	#5	9"	33'-10"	3,811	108	#5	9"	6'-3"	704	6'-4"	713	108	#5	9"	31'-0"	3,492	24	18"	39'-9"	637	102	18"	39'-9"	2,708	108	9"	2'-0"	144	270	9"	4'-7"	827	5'-3"	947	33'-10"	90	70	195	1.986	349.6	2.5	285	82.0	14,268
2	5'-0"	3'-0"	8"	7"	108	#6	9"	11'-6"	1,865	108	#5	9"	7'-3"	817	6'-4"	713	108	#5	9"	8'-8"	976	8	18"	39'-9"	212	44	18"	39'-9"	1,168	108	9"	3'-0"	216	54	9"	4'-7"	165	7'-3"	262	11'-6"	31	26	72	0.775	159.9	0.9	103	31.9	6,497
3	5'-0"	3'-0"	8"	7"	108	#6	9"	17'-1"	2,771	108	#5	9"	7'-3"	817	6'-4"	713	108	#5	9"	14'-3"	1,605	12	18"	39'-9"	319	62	18"	39'-9"	1,646	108	9"	3'-0"	216	108	9"	4'-7"	331	7'-3"	523	17'-1"	46	38	106	1.115	223.5	1.3	152	45.9	9,093
4	5'-0"	3'-0"	8"	7"	108	#6	9"	22'-8"	3,677	108	#5	9"	7'-3"	817	6'-4"	713	108	#5	9"	19'-10"	2,234	16	18"	39'-9"	425	80	18"	39'-9"	2,124	108	9"	3'-0"	216	162	9"	4'-7"	496	7'-3"	785	22'-8"	61	48	134	1.456	287.2	1.7	195	59.9	11,682
5	5'-0"	3'-0"	8"	7"	108	#6	9"	28'-3"	4,583	108	#5	9"	7'-3"	817	6'-4"	713	108	#5	9"	25'-5"	2,863	20	18"	39'-9"	531	98	18"	39'-9"	2,602	108	9"	3'-0"	216	216	9"	4'-7"	661	7'-3"	1,046	28'-3"	75	60	167	1.796	350.8	2.1	242	73.9	14,274
6	5'-0"	3'-0"	8"	7"	108	#6	9"	33'-10"	5,488	108	#5	9"	7'-3"	817	6'-4"	713	108	#5	9"	31'-0"	3,492	24	18"	39'-9"	637	116	18"	39'-9"	3,080	108	9"	3'-0"	216	270	9"	4'-7"	827	7'-3"	1,308	33'-10"	90	70	195	2.137	414.5	2.5	285	88.0	16,863
2	5'-0"	4'-0"	8"	7"	108	#6	9"	11'-6"	1,865	108	#5	9"	8'-3"	929	6'-4"	713	108	#5	9"	8'-8"	976	8	18"	39'-9"	212	44	18"	39'-9"	1,168	108	9"	4'-0"	289	54	9"	4'-7"	165	9'-3"	334	11'-6"	31	26	72	0.840	166.3	0.9	103	34.5	6,754
3	5'-0"	4'-0"	8"	7"	108	#6	9"	17'-1"	2,771	108	#5	9"	8'-3"	929	6'-4"	713	108	#5	9"	14'-3"	1,605	12	18"	39'-9"	319	62	18"	39'-9"	1,646	108	9"	4'-0"	289	108	9"	4'-7"	331	9'-3"	667	17'-1"	46	38	106	1.202	231.8	1.3	152	49.4	9,422
4	5'-0"	4'-0"	8"	7"	108	#6	9"	22'-8"	3,677	108	#5	9"	8'-3"	929	6'-4"	713	108	#5	9"	19'-10"	2,234	16	18"	39'-9"	425	80	18"	39'-9"	2,124	108	9"	4'-0"	289	162	9"	4'-7"	496	9'-3"	1,001	22'-8"	61	48	134	1.564	297.2	1.7	195	64.3	12,083
5	5'-0"	4'-0"	8"	7"	108	#6	9"	28'-3"	4,583	108	#5	9"	8'-3"	929	6'-4"	713	108	#5	9"	25'-5"	2,863	20	18"	39'-9"	531	98	18"	39'-9"	2,602	108	9"	4'-0"	289	216	9"	4'-7"	661	9'-3"	1,335	28'-3"	75	60	167	1.926	362.7	2.1	242	79.1	14,748
6	5'-0"	4'-0"	8"	7"	108	#6	9"	33'-10"	5,488	108	#5	9"	8'-3"	929	6'-4"	713	108	#5	9"	31'-0"	3,492	24	18"	39'-9"	637	116	18"	39'-9"	3,080	108	9"	4'-0"	289	270	9"	4'-7"	827	9'-3"	1,668	33'-10"	90	70	195	2.288	428.1	2.5	285	94.0	17,408
2	5'-0"	5'-0"	8"	7"	108	#6	9"	11'-6"	1,865	108	#5	9"	9'-3"	1,042	6'-4"	713	108	#5	9"	8'-8"	976	8	18"	39'-9"	212	50	18"	39'-9"	1,328	108	9"	5'-0"	361	54	9"	4'-7"	165	11'-3"	406	11'-6"	31	26	72	0.904	176.7	0.9	103	37.0	7,171
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4	5'-0"	5'-0"	8"	7"	108	#6	9"	22'-8"	3,677	108	#5	9"	9'-3"	1,042	6'-4"	713	108	#5	9"	19'-10"	2,234	16	18"	39'-9"	425	90	18"	39'-9"	2,390	108	9"	5'-0"	361	162	9"	4'-7"	496	11'-3"	1,217	22'-8"	61	48	134	1.672	313.9	1.7	195	68.6	12,750
5	5'-0"	5'-0"	8"	7"	108	#6	9"	28'-3"	4,583	108	#5	9"	9'-3"	1,042	6'-4"	713	108	#5	9"	25'-5"	2,863	20	18"	39'-9"	531	110	18"	39'-9"	2,921	108	9"	5'-0"	361	216	9"	4'-7"	661	11'-3"	1,623	28'-3"	75	60	167	2.056	382.5	2.1	242	84.3	15,540
6	5'-0"	5'-0"	8"	7"	108	#6	9"	33'-10"	5,488	108	#5	9"	9'-3"	1,042	6'-4"	713	108	#5	9"	31'-0"	3,492	24	18"	39'-9"	637	130	18"	39'-9"	3,452	108	9"	5'-0"	361	270	9"	4'-7"	827	11'-3"	2,029	33'-10"	90	70	195	2.439	451.0	2.5	285	100.1	18,326

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE
5'-0" SPAN
0' TO 20' FILL

MC-5-20

FILE: mc520ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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	FTW	JOHNSON		151

DATE: 2/6/2024 4:05:44 PM
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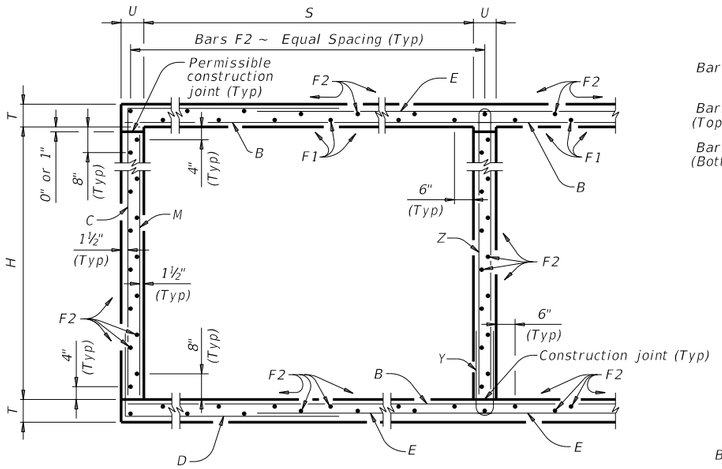
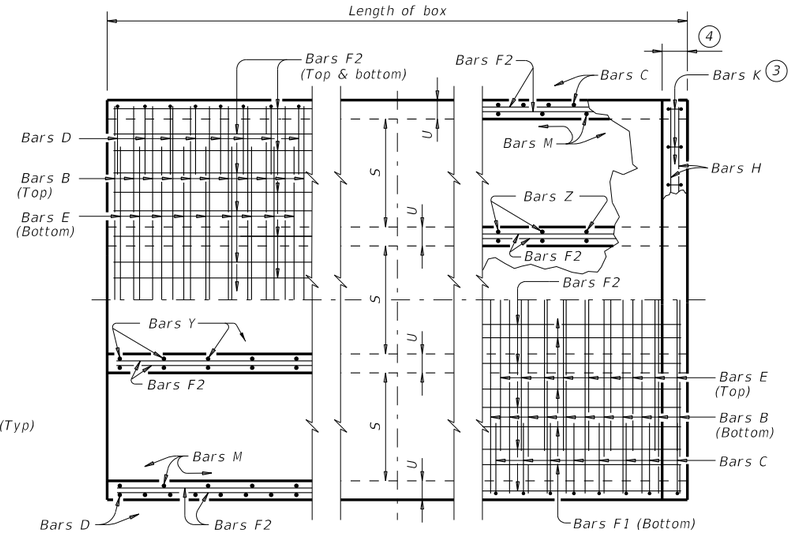
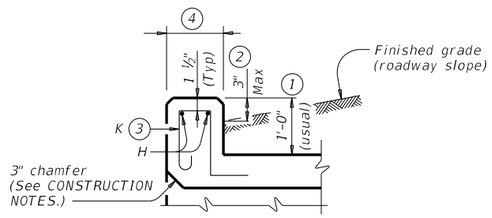


TYPICAL SECTION



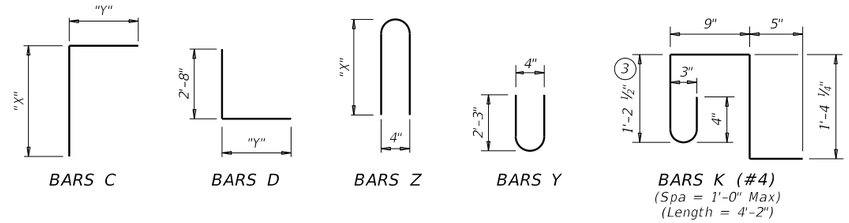
BOTTOM SLAB TOP SLAB

PART PLANS



SECTION THRU CURB

TABLE OF BAR DIMENSIONS		
H	"X"	"Y"
2'-0"	2'-7 ½"	4'-1"
3'-0"	3'-7 ½"	4'-1"
4'-0"	4'-7 ½"	4'-1"
5'-0"	5'-7 ½"	4'-1"
6'-0"	6'-7 ½"	4'-1"



1. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Rail Anchorage Curb (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

2. For vehicle safety, the following requirements must be met:
   - For structures without bridge rail, construct curbs no more than 3" above finished grade.
   - For structures with bridge rail, construct curbs flush with finished grade.

   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

3. For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.

4. 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

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

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

CONSTRUCTION NOTES:

Do not use permanent forms.

Chamfer the bottom edge of the top slab 3" at the entrance.

Optionally, raise construction joints shown at the flow line by a maximum of 6". If this option is taken, Bars M may be cut off or raised, Bars C and D may be reversed, and Bars Y and Z may be reversed.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.

Provide galvanized reinforcing steel if required elsewhere in the plans.

Provide Class C concrete (f'c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of:

- culverts with overlay,
- culverts with 1-to-2 course surface treatment, or
- culverts with the top slab as the final riding surface.

Provide bar laps, where required, as follows:

- Uncoated or galvanized ~ #4 = 1'-8" Min
- Uncoated or galvanized ~ #5 = 2'-1" Min
- Uncoated or galvanized ~ #6 = 2'-6" Min

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications for the range of fill heights shown.

See the Multiple Box Culverts Cast-In-Place Miscellaneous Detail (MC-MD) standard sheet for details pertaining to skewed ends, angle sections, and lengthening.

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

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE 6'-0" SPAN 0' TO 16' FILL

MC-6-16

FILE: mc616ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
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REVISIONS	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		152

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BILLS OF REINFORCING STEEL (For Box Length = 40 feet)

NUMBER OF SPANS	SECTION DIMENSIONS				Bars B					Bars C & D							Bars E					Bars F1 ~ #4				Bars F2 ~ #4				Bars M ~ #4				Bars Y & Z ~ #4								Bars H 4 ~ #4		Bars K		QUANTITIES: Per Foot of Barrel		QUANTITIES: Curb		QUANTITIES: Total	
													Bars C		Bars D																						Bars Y		Bars Z													
	S	H	T	U	No.	Size	Spa	Length	Wt	No.	Size	Spa	Length	Wt	Length	Wt	No.	Size	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	Length	Wt	No.	Wt	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)
2	6' – 0"	2' – 0"	9"	7"	108	#6	9"	13' – 6"	2,190	108	#5	9"	6' – 8"	751	6' – 9"	760	108	#6	9"	10' – 2"	1,649	10	18"	39' – 9"	266	44	18"	39' – 9"	1,168	108	9"	2' – 0"	144	54	9"	4' – 9"	171	5' – 5"	195	13' – 6"	36	30	84	0.894	182.4	1.0	120	36.8	7,414
3	6' – 0"	2' – 0"	9"	7"	108	#6	9"	20' – 1"	3,258	108	#5	9"	6' – 8"	751	6' – 9"	760	108	#6	9"	16' – 9"	2,717	15	18"	39' – 9"	398	63	18"	39' – 9"	1,673	108	9"	2' – 0"	144	108	9"	4' – 9"	343	5' – 5"	391	20' – 1"	54	44	122	1.302	260.9	1.5	176	53.6	10,611
4	6' – 0"	2' – 0"	9"	7"	108	#6	9"	26' – 8"	4,326	108	#5	9"	6' – 8"	751	6' – 9"	760	108	#6	9"	23' – 4"	3,785	20	18"	39' – 9"	531	82	18"	39' – 9"	2,177	108	9"	2' – 0"	144	162	9"	4' – 9"	514	5' – 5"	586	26' – 8"	71	56	156	1.711	339.4	2.0	227	70.4	13,801
5	6' – 0"	2' – 0"	9"	7"	108	#6	9"	33' – 3"	5,394	108	#5	9"	6' – 8"	751	6' – 9"	760	108	#6	9"	29' – 11"	4,853	25	18"	39' – 9"	664	101	18"	39' – 9"	2,682	108	9"	2' – 0"	144	216	9"	4' – 9"	685	5' – 5"	782	33' – 3"	89	70	195	2.120	417.9	2.5	284	87.3	16,999
6	6' – 0"	2' – 0"	9"	7"	108	#6	9"	39' – 10"	6,462	108	#5	9"	6' – 8"	751	6' – 9"	760	108	#6	9"	36' – 6"	5,921	30	18"	39' – 9"	797	120	18"	39' – 9"	3,186	108	9"	2' – 0"	144	270	9"	4' – 9"	857	5' – 5"	977	39' – 10"	106	82	228	2.529	496.4	3.0	334	104.1	20,189
2	6' – 0"	3' – 0"	9"	7"	108	#6	9"	13' – 6"	2,190	108	#5	9"	7' – 8"	864	6' – 9"	760	108	#6	9"	10' – 2"	1,649	10	18"	39' – 9"	266	50	18"	39' – 9"	1,328	108	9"	3' – 0"	216	54	9"	4' – 9"	171	7' – 5"	268	13' – 6"	36	30	84	0.958	192.8	1.0	120	39.3	7,832
3	6' – 0"	3' – 0"	9"	7"	108	#6	9"	20' – 1"	3,258	108	#5	9"	7' – 8"	864	6' – 9"	760	108	#6	9"	16' – 9"	2,717	15	18"	39' – 9"	398	71	18"	39' – 9"	1,885	108	9"	3' – 0"	216	108	9"	4' – 9"	343	7' – 5"	535	20' – 1"	54	44	122	1.389	274.4	1.5	176	57.1	11,152
4	6' – 0"	3' – 0"	9"	7"	108	#6	9"	26' – 8"	4,326	108	#5	9"	7' – 8"	864	6' – 9"	760	108	#6	9"	23' – 4"	3,785	20	18"	39' – 9"	531	92	18"	39' – 9"	2,443	108	9"	3' – 0"	216	162	9"	4' – 9"	514	7' – 5"	803	26' – 8"	71	56	156	1.819	356.1	2.0	227	74.7	14,469
5	6' – 0"	3' – 0"	9"	7"	108	#6	9"	33' – 3"	5,394	108	#5	9"	7' – 8"	864	6' – 9"	760	108	#6	9"	29' – 11"	4,853	25	18"	39' – 9"	664	113	18"	39' – 9"	3,000	108	9"	3' – 0"	216	216	9"	4' – 9"	685	7' – 5"	1,070	33' – 3"	89	70	195	2.250	437.7	2.5	284	92.5	17,790
6	6' – 0"	3' – 0"	9"	7"	108	#6	9"	39' – 10"	6,462	108	#5	9"	7' – 8"	864	6' – 9"	760	108	#6	9"	36' – 6"	5,921	30	18"	39' – 9"	797	134	18"	39' – 9"	3,558	108	9"	3' – 0"	216	270	9"	4' – 9"	857	7' – 5"	1,338	39' – 10"	106	82	228	2.681	519.3	3.0	334	110.2	21,107
2	6' – 0"	4' – 0"	9"	7"	108	#6	9"	13' – 6"	2,190	108	#5	9"	8' – 8"	976	6' – 9"	760	108	#6	9"	10' – 2"	1,649	10	18"	39' – 9"	266	50	18"	39' – 9"	1,328	108	9"	4' – 0"	289	54	9"	4' – 9"	171	9' – 5"	340	13' – 6"	36	30	84	1.023	199.2	1.0	120	41.9	8,089
3	6' – 0"	4' – 0"	9"	7"	108	#6	9"	20' – 1"	3,258	108	#5	9"	8' – 8"	976	6' – 9"	760	108	#6	9"	16' – 9"	2,717	15	18"	39' – 9"	398	71	18"	39' – 9"	1,885	108	9"	4' – 0"	289	108	9"	4' – 9"	343	9' – 5"	679	20' – 1"	54	44	122	1.475	282.6	1.5	176	60.5	11,481
4	6' – 0"	4' – 0"	9"	7"	108	#6	9"	26' – 8"	4,326	108	#5	9"	8' – 8"	976	6' – 9"	760	108	#6	9"	23' – 4"	3,785	20	18"	39' – 9"	531	92	18"	39' – 9"	2,443	108	9"	4' – 0"	289	162	9"	4' – 9"	514	9' – 5"	1,019	26' – 8"	71	56	156	1.927	366.1	2.0	227	79.1	14,870
5	6' – 0"	4' – 0"	9"	7"	108	#6	9"	33' – 3"	5,394	108	#5	9"	8' – 8"	976	6' – 9"	760	108	#6	9"	29' – 11"	4,853	25	18"	39' – 9"	664	113	18"	39' – 9"	3,000	108	9"	4' – 0"	289	216	9"	4' – 9"	685	9' – 5"	1,359	33' – 3"	89	70	195	2.380	449.5	2.5	284	97.7	18,264
6	6' – 0"	4' – 0"	9"	7"	108	#6	9"	39' – 10"	6,462	108	#5	9"	8' – 8"	976	6' – 9"	760	108	#6	9"	36' – 6"	5,921	30	18"	39' – 9"	797	134	18"	39' – 9"	3,558	108	9"	4' – 0"	289	270	9"	4' – 9"	857	9' – 5"	1,698	39' – 10"	106	82	228	2.832	533.0	3.0	334	116.2	21,652
2	6' – 0"	5' – 0"	9"	7"	108	#6	9"	13' – 6"	2,190	108	#5	9"	9' – 8"	1,089	6' – 9"	760	108	#6	9"	10' – 2"	1,649	10	18"	39' – 9"	266	56	18"	39' – 9"	1,487	108	9"	5' – 0"	361	54	9"	4' – 9"	171	11' – 5"	412	13' – 6"	36	30	84	1.088	209.6	1.0	120	44.5	8,505
3	6' – 0"	5' – 0"	9"	7"	108	#6	9"	20' – 1"	3,258	108	#5	9"	9' – 8"	1,089	6' – 9"	760	108	#6	9"	16' – 9"	2,717	15	18"	39' – 9"	398	79	18"	39' – 9"	2,098	108	9"	5' – 0"	361	108	9"	4' – 9"	343	11' – 5"	824	20' – 1"	54	44	122	1.562	296.2	1.5	176	64.0	12,024
4	6' – 0"	5' – 0"	9"	7"	108	#6	9"	26' – 8"	4,326	108	#5	9"	9' – 8"	1,089	6' – 9"	760	108	#6	9"	23' – 4"	3,785	20	18"	39' – 9"	531	102	18"	39' – 9"	2,708	108	9"	5' – 0"	361	162	9"	4' – 9"	514	11' – 5"	1,235	26' – 8"	71	56	156	2.035	382.7	2.0	227	83.4	15,536
5	6' – 0"	5' – 0"	9"	7"	108	#6	9"	33' – 3"	5,394	108	#5	9"	9' – 8"	1,089	6' – 9"	760	108	#6	9"	29' – 11"	4,853	25	18"	39' – 9"	664	125	18"	39' – 9"	3,319	108	9"	5' – 0"	361	216	9"	4' – 9"	685	11' – 5"	1,647	33' – 3"	89	70	195	2.509	469.3	2.5	284	102.8	19,056
6	6' – 0"	5' – 0"	9"	7"	108	#6	9"	39' – 10"	6,462	108	#5	9"	9' – 8"	1,089	6' – 9"	760	108	#6	9"	36' – 6"	5,921	30	18"	39' – 9"	797	148	18"	39' – 9"	3,930	108	9"	5' – 0"	361	270	9"	4' – 9"	857	11' – 5"	2,059	39' – 10"	106	82	228	2.983	555.9	3.0	334	122.3	22,570
2	6' – 0"	6' – 0"	9"	7"	108	#6	9"	13' – 6"	2,190	108	#5	9"	10' – 8"	1,202	6' – 9"	760	108	#6	9"	10' – 2"	1,649	10	18"	39' – 9"	266	62	18"	39' – 9"	1,646	108	9"	6' – 0"	433	54	9"	4' – 9"	171	13' – 5"	484	13' – 6"	36	30	84	1.153	220.0	1.0	120	47.1	8,921
3	6' – 0"	6' – 0"	9"	7"	108	#6	9"	20' – 1"	3,258	108	#5	9"	10' – 8"	1,202	6' – 9"	760	108	#6	9"	16' – 9"	2,717	15	18"	39' – 9"	398	87	18"	39' – 9"	2,310	108	9"	6' – 0"	433	108	9"	4' – 9"	343	13' – 5"	968	20' – 1"	54	44	122	1.648	309.7	1.5	176	67.4	12,565
4	6' – 0"	6' – 0"	9"	7"	108	#6	9"	26' – 8"	4,326	108	#5	9"	10' – 8"	1,202	6' – 9"	760	108	#6	9"	23' – 4"	3,785	20	18"	39' – 9"	531	112	18"	39' – 9"	2,974	108	9"	6' – 0"	433	162	9"	4' – 9"	514	13' – 5"	1,452	26' – 8"	71	56	156	2.144	399.4	2.0	227	87.7	16,204
5	6' – 0"	6' – 0"	9"	7"	108	#6	9"	33' – 3"	5,394	108	#5	9"	10' – 8"	1,202	6' – 9"	760	108	#6	9"	29' – 11"	4,853	25	18"	39' – 9"	664	137	18"	39' – 9"	3,638	108	9"	6' – 0"	433	216	9"	4' – 9"	685	13' – 5"	1,936	33' – 3"	89	70	195	2.639	489.1	2.5	284	108.0	19,849
6	6' – 0"	6' – 0"	9"	7"	108	#6	9"	39' – 10"	6,462	108	#5	9"	10' – 8"	1,202	6' – 9"	760	108	#6	9"	36' – 6"	5,921	30	18"	39' – 9"	797	162	18"	39' – 9"	4,302	108	9"	6' – 0"	433	270	9"	4' – 9"	857	13' – 5"	2,420	39' – 10"	106	82	228	3.134	578.9	3.0	334	128.3	23,488

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE
6'-0" SPAN
0' TO 16' FILL

MC-6-16

FILE: mc616ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
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REVISIONS	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		153

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)
CULVERT 1 (Both)	2 ~ 5'x 4'	1.5'	MC-5-20	PW-2	0°	3:1	7"	7"	1.000'	5.583'	N/A	N/A	13.750'	11.750'	N/A	0.0	0.8	21.4	296
CULVERT 3 (Lt)	1 ~ 5'x 4'	5.25'	SCP-5	PW-2	0°	3:1	6"	6"	2.500'	7.000'	N/A	N/A	18.000'	6.000'	N/A	0.0	0.6	15.9	246
CULVERT 3 (Rt)	1 ~ 5'x 4'	5.25'	SCP-5	PW-2	0°	3:1	6"	6"	3.000'	7.500'	N/A	N/A	19.500'	6.000'	N/A	0.0	0.7	17.9	287
CULVERT 6 (Lt)	5 ~ 6'x 4'	4.66'	MC-6-16	PW-2	0°	3:1	7"	7"	2.750'	7.333'	N/A	N/A	19.000'	33.500'	N/A	0.0	3.4	20.0	273
CULVERT 6 (Rt)	5 ~ 6'x 4'	6.85'	MC-6-16	PW-2	0°	3:1	7"	7"	4.500'	9.083'	N/A	N/A	24.250'	33.500'	N/A	0.0	5.6	31.0	435

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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.

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: bcsstde1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		154

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TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

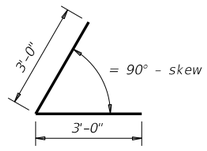
Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing (2~wings) (4)		Estimated Quantities per ft of Toewall (1~toewall)	
					Bars J1		Bars J2					
Maximum Wingwall Height Hw	W	X	Y	Z	Size	Spa	Size	Spa	Reinf (Lb/Ft)	Conc (CY/Ft)	Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	48.64	0.406	6.85	0.071
2'-9"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	49.31	0.424	6.85	0.071
3'-0"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	49.98	0.444	6.85	0.071
3'-3"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	53.32	0.462	6.85	0.071
3'-6"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	53.98	0.480	6.85	0.071
4'-0"	3'-2"	1'-2"	1'-0"	7"	#4	1'-0"	#4	1'-0"	55.77	0.532	6.85	0.071
4'-6"	3'-2"	1'-2"	1'-0"	7"	#4	1'-0"	#4	1'-0"	59.77	0.568	6.85	0.071
5'-0"	3'-9"	1'-7"	1'-2"	7"	#4	1'-0"	#4	1'-0"	63.45	0.632	6.96	0.075
5'-6"	3'-9"	1'-7"	1'-2"	7"	#4	1'-0"	#4	1'-0"	67.46	0.668	6.96	0.075
6'-0"	4'-4"	2'-0"	1'-4"	7"	#5	1'-0"	#5	1'-0"	80.67	0.730	7.07	0.078
6'-6"	4'-4"	2'-0"	1'-4"	7"	#5	1'-0"	#5	1'-0"	85.05	0.768	7.07	0.078
7'-0"	5'-0"	2'-3"	1'-9"	8"	#5	1'-0"	#5	1'-0"	92.15	0.864	8.07	0.093
7'-6"	5'-0"	2'-3"	1'-9"	8"	#5	1'-0"	#5	1'-0"	96.54	0.902	8.07	0.093
8'-0"	5'-6"	2'-8"	1'-10"	8"	#5	6"	#5	6"	139.04	0.962	8.13	0.095
8'-6"	5'-6"	2'-8"	1'-10"	8"	#5	6"	#5	6"	144.47	1.000	8.13	0.095
9'-6"	6'-0"	2'-10"	2'-2"	9"	#5	6"	#5	6"	156.93	1.136	8.41	0.110
10'-6"	6'-5"	3'-0"	2'-5"	9"	#6	6"	#5	6"	196.27	1.234	8.57	0.117
11'-6"	7'-2"	3'-6"	2'-8"	11"	#6	6"	#6	6"	230.13	1.438	9.52	0.140
12'-6"	7'-8"	3'-9"	2'-11"	1'-0"	#7	6"	#6	6"	283.41	1.592	9.74	0.157
13'-6"	8'-2"	4'-0"	3'-2"	1'-2"	#8	6"	#6	6"	348.72	1.804	10.02	0.186
14'-6"	8'-10"	4'-5"	3'-5"	1'-4"	#9	6"	#6	6"	432.94	2.046	10.30	0.218
15'-6"	9'-6"	4'-10"	3'-8"	1'-6"	#9	6"	#7	6"	489.52	2.302	11.24	0.253
16'-0"	9'-11"	5'-0"	3'-11"	1'-7"	#9	6"	#7	6"	505.72	2.448	11.47	0.279

TABLE OF WINGWALL REINFORCING
(2~wings)

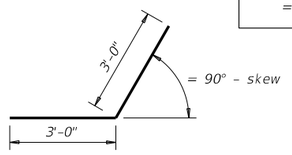
Bar	Size	No.	Spa
D1	#6	~	1'-0"
D2	#6	~	1'-0"
E1	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	~	8"
M1	#4	4	~
P	#4	~	1'-0"
V	#4	~	1'-0"

TABLE OF TOEWALL REINFORCING

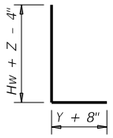
Bar	Size	No.	Spa
J3	#4	~	1'-0"
M2	#4	2	~
E2	#4	~	1'-0"



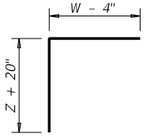
BARS D1



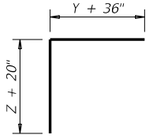
BARS D2



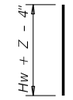
BARS J1



BARS J2



BARS J3



BARS V

WING DIMENSION FORMULAS:
(All values are in feet.)

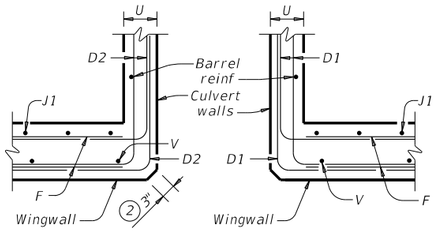
Hw = H + T + C
Lw = (Hw) (SL) ÷ cosine (θ) for Type PW-1
= (Hw - 1') (SL) ÷ cosine (θ) for Type PW-2 and Hw ≥ 4'
= (Hw - 0.5') (SL) ÷ cosine (θ) for Type PW-2 and Hw < 4'

For cast-in-place culverts:
Ltw = [(N) (S) + (N + 1) (U)] ÷ cosine (θ)

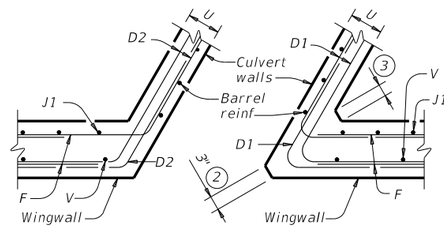
For precast culverts:
Ltw = [(N) (2 U + S) + (N - 1) (0.5')] ÷ cosine (θ)
Total Wingwall Area (two wings ~ SF)
= (2)(Hw)(Lw) for Type PW-1
= (2)(Hw)(Lw) - 6 SF for Type PW-2 and Hw ≥ 4'
= (2)(Hw)(Lw) - 1.5 SF for Type PW-2 and Hw < 4'

Hw = Height of wingwall
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans
SL:1 = Channel slope ratio. (horizontal: 1 vertical, usual value is 2:1)
θ = Culvert skew

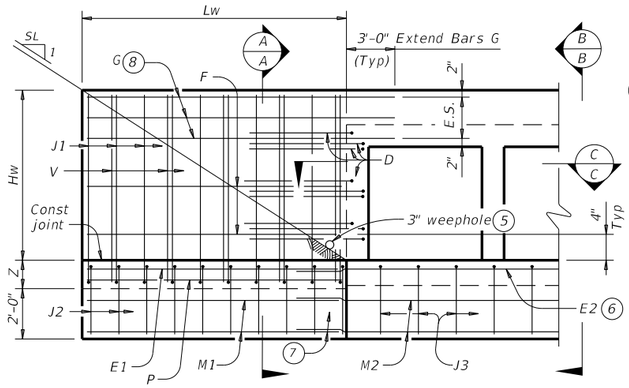
See applicable box culvert standard sheet for S, H, T, and U values.



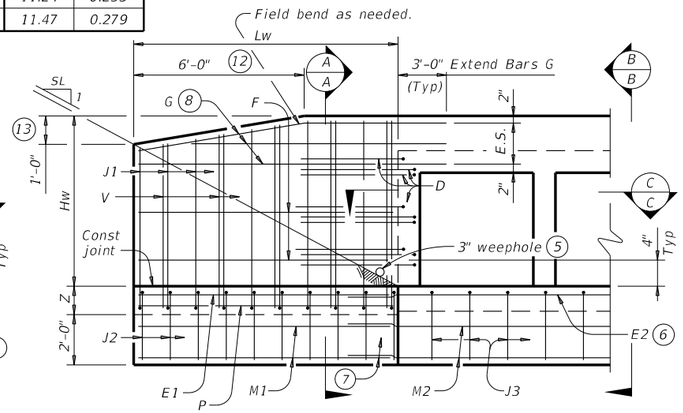
SECTION C-C - PW-1



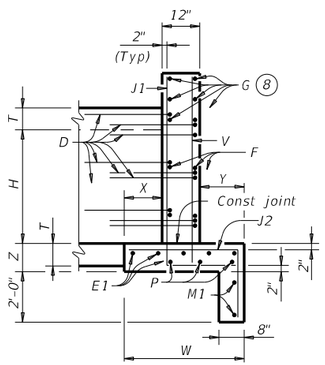
SECTION C-C - PW-2



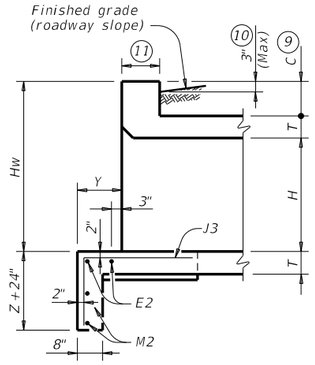
PARTIAL ELEVATION - PW-1



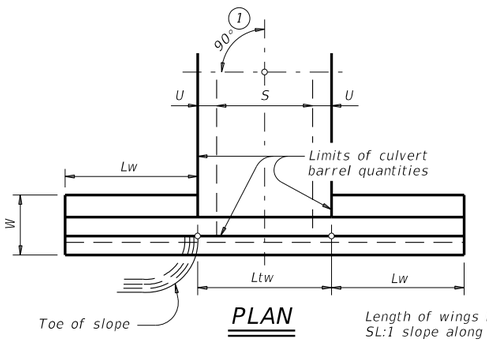
PARTIAL ELEVATION - PW-2



SECTION A-A
(Showing wing reinforcement.)

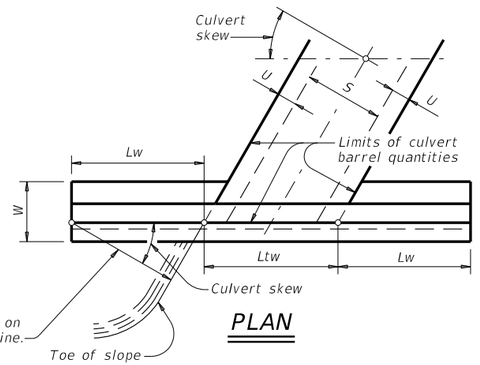


SECTION B-B
(Showing wing reinforcement.)



PLAN

DETAILS FOR NON-SKEWED BOX CULVERTS



PLAN

DETAILS FOR SKEWED BOX CULVERTS
(Showing 30° skew.)

1. Skew = 0°
2. At discharge end, chamfer may be ¾" minimum.
3. For 15° skew ~ 1"
   For 30° skew ~ 2"
   For 45° skew ~ 3"
4. Quantities shown are for two Type PW-1 wings. Adjust concrete volume for Type PW-2 wings. To determine estimated quantities for two wings, multiply the tabulated values by Lw. Quantities shown do not include weight of Bars D.
5. Provide weepholes for Hw = 5'-0" and greater. Fill around weepholes with coarse gravel.
6. Extend Bars E2 1'-6" minimum into the wingwall footing.
7. Lap Bars M1 1'-6" minimum with Bars M2.
8. Place Bars G as shown, equally spaced at 8" maximum. Provide at least two pairs of Bars G per wing.
9. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
10. 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.
11. 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elswhere in the plans.
12. 3'-0" for Hw < 4'.
13. 6" for Hw < 4'.

DESIGNER NOTES:
Type PW-1 can be used for all applications and must be used if railing is to be mounted to the wingwall.
Type PW-2 can only be used for applications without a railing mounted to the wingwall.

MATERIAL NOTES:
Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforing steel if required elsewhere in the plans.

GENERAL NOTES:
Designed in accordance with AASHTO LRFD Bridge Design Specifications.
Depth of toewalls for wingwalls and culverts may be reduced or eliminated when founded on solid rock, when directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for wingwall type and additional dimensions and information.
Quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for the Contractor's information only.

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

Texas Department of Transportation
Bridge Division Standard

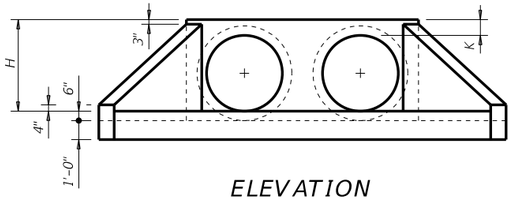
CONCRETE WINGWALLS
WITH PARALLEL WINGS FOR BOX CULVERTS
TYPES PW-1 AND PW-2

PW

FILE: pwstde01-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		155

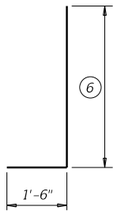
TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL (5)

Slope	Dia of Pipe (D)	Values for One Pipe						Values to be Added for Each Addt'l Pipe		
		W	X	Y	L	Reinf (Lbs)	Conc (CY) (1)	X and W	Reinf (Lbs)	Conc (CY) (1)
2:1	12"	4' – 7 ½"	2' – 6"	2' – 10"	3' – 3 ¼"	88	0.6	1' – 9"	20	0.2
	15"	5' – 5 ¾"	2' – 9 ½"	3' – 4"	3' – 10 ¼"	103	0.7	2' – 2"	24	0.3
	18"	6' – 4 ¼"	3' – 1"	3' – 10"	4' – 5"	124	0.9	2' – 8"	32	0.3
	21"	7' – 2 ¾"	3' – 4 ½"	4' – 4"	5' – 0"	143	1.1	3' – 1"	43	0.4
	24"	8' – 2 ½"	3' – 9 ½"	4' – 10"	5' – 7"	164	1.3	3' – 7"	50	0.5
	27"	9' – 1"	4' – 1"	5' – 4"	6' – 2"	179	1.5	3' – 11"	56	0.6
	30"	9' – 11 ½"	4' – 4 ½"	5' – 10"	6' – 8 ¾"	203	1.7	4' – 4"	65	0.8
	33"	10' – 10"	4' – 8"	6' – 4"	7' – 3 ¾"	224	2.0	4' – 8"	71	0.9
	36"	11' – 8 ¼"	4' – 11 ½"	6' – 10"	7' – 10 ¾"	249	2.2	5' – 1"	81	1.0
	42"	13' – 5 ¼"	5' – 6 ½"	7' – 10"	9' – 0 ½"	298	2.8	5' – 10"	97	1.3
	48"	15' – 9"	6' – 1 ½"	9' – 4"	10' – 9 ¼"	360	3.8	6' – 7"	117	1.7
	54"	17' – 5 ¾"	6' – 8 ½"	10' – 4"	11' – 11 ¼"	427	4.5	7' – 6"	151	2.1
	60"	19' – 2 ¾"	7' – 3 ½"	11' – 4"	13' – 1"	481	5.3	8' – 3"	174	2.5
	66"	20' – 11 ½"	7' – 10 ½"	12' – 4"	14' – 3"	544	6.2	8' – 9"	194	2.9
	72"	22' – 8 ½"	8' – 5 ½"	13' – 4"	15' – 4 ¾"	601	7.1	9' – 4"	213	3.3
3:1	12"	6' – 3"	2' – 6"	4' – 3"	4' – 11"	118	0.8	1' – 9"	22	0.2
	15"	7' – 5"	2' – 9 ½"	5' – 0"	5' – 9 ¼"	137	1.1	2' – 2"	28	0.3
	18"	8' – 6 ¾"	3' – 1"	5' – 9"	6' – 7 ¾"	170	1.3	2' – 8"	37	0.5
	21"	9' – 8 ¾"	3' – 4 ½"	6' – 6"	7' – 6"	195	1.6	3' – 1"	48	0.6
	24"	11' – 0"	3' – 9 ½"	7' – 3"	8' – 4 ½"	227	2.0	3' – 7"	58	0.7
	27"	12' – 2"	4' – 1"	8' – 0"	9' – 2 ¾"	251	2.3	3' – 11"	67	0.8
	30"	13' – 4"	4' – 4 ½"	8' – 9"	10' – 1 ¼"	293	2.7	4' – 4"	77	1.0
	33"	14' – 5 ¾"	4' – 8"	9' – 6"	10' – 11 ¾"	318	3.1	4' – 8"	84	1.2
	36"	15' – 7 ¾"	4' – 11 ½"	10' – 3"	11' – 10"	351	3.5	5' – 1"	96	1.4
	42"	17' – 11 ½"	5' – 6 ½"	11' – 9"	13' – 6 ¾"	432	4.5	5' – 10"	119	1.7
	48"	21' – 1 ¾"	6' – 1 ½"	14' – 0"	16' – 2"	537	6.1	6' – 7"	146	2.3
	54"	23' – 5 ½"	6' – 8 ½"	15' – 6"	17' – 10 ¾"	630	7.3	7' – 6"	186	2.9
	60"	25' – 9 ¼"	7' – 3 ½"	17' – 0"	19' – 7 ½"	719	8.7	8' – 3"	219	3.4
	66"	28' – 1"	7' – 10 ½"	18' – 6"	21' – 4 ¼"	811	10.1	8' – 9"	242	3.9
	72"	30' – 4 ¾"	8' – 5 ½"	20' – 0"	23' – 1 ¼"	924	11.7	9' – 4"	272	4.4
4:1	12"	7' – 10 ¾"	2' – 6"	5' – 8"	6' – 6 ½"	148	1.1	1' – 9"	24	0.3
	15"	9' – 4"	2' – 9 ½"	6' – 8"	7' – 8 ½"	181	1.5	2' – 2"	32	0.4
	18"	10' – 9 ½"	3' – 1"	7' – 8"	8' – 10 ¼"	221	1.9	2' – 8"	42	0.5
	21"	12' – 2 ¾"	3' – 4 ½"	8' – 8"	10' – 0"	260	2.3	3' – 1"	57	0.7
	24"	13' – 9 ½"	3' – 9 ½"	9' – 8"	11' – 2"	301	2.8	3' – 7"	67	0.9
	27"	15' – 3"	4' – 1"	10' – 8"	12' – 3 ¾"	334	3.3	3' – 11"	77	1.0
	30"	16' – 8 ¼"	4' – 4 ½"	11' – 8"	13' – 5 ¾"	385	3.8	4' – 4"	89	1.3
	33"	18' – 1 ¾"	4' – 8"	12' – 8"	14' – 7 ½"	425	4.5	4' – 8"	101	1.4
	36"	19' – 7"	4' – 11 ½"	13' – 8"	15' – 9 ¼"	472	5.1	5' – 1"	115	1.7
	42"	22' – 5 ¾"	5' – 6 ½"	15' – 8"	18' – 1"	583	6.5	5' – 10"	141	2.1
	48"	26' – 6 ¼"	6' – 1 ½"	18' – 8"	21' – 6 ¾"	730	8.9	6' – 7"	175	2.8
	54"	29' – 5"	6' – 8 ½"	20' – 8"	23' – 10 ¼"	875	10.7	7' – 6"	226	3.6
	60"	32' – 3 ¾"	7' – 3 ½"	22' – 8"	26' – 2"	996	12.7	8' – 3"	264	4.3
	66"	35' – 2 ½"	7' – 10 ½"	24' – 8"	28' – 5 ¾"	1,140	14.9	8' – 9"	300	4.9
	72"	38' – 1 ¼"	8' – 5 ½"	26' – 8"	30' – 9 ½"	1,297	17.3	9' – 4"	334	5.6
6:1	12"	11' – 2"	2' – 6"	8' – 6"	9' – 9 ¾"	224	1.9	1' – 9"	28	0.4
	15"	13' – 2 ¼"	2' – 9 ½"	10' – 0"	11' – 6 ½"	268	2.5	2' – 2"	37	0.5
	18"	15' – 2 ½"	3' – 1"	11' – 6"	13' – 3 ¼"	330	3.2	2' – 8"	50	0.7
	21"	17' – 2 ¾"	3' – 4 ½"	13' – 0"	15' – 0 ¼"	387	3.9	3' – 1"	69	0.9
	24"	19' – 4 ½"	3' – 9 ½"	14' – 6"	16' – 9"	453	4.8	3' – 7"	80	1.2
	27"	21' – 4 ¾"	4' – 1"	16' – 0"	18' – 5 ¾"	512	5.7	3' – 11"	96	1.4
	30"	23' – 5 ¼"	4' – 4 ½"	17' – 6"	20' – 2 ½"	593	6.7	4' – 4"	110	1.7
	33"	25' – 5 ½"	4' – 8"	19' – 0"	21' – 11 ¼"	675	7.8	4' – 8"	127	2.0
	36"	27' – 5 ¾"	4' – 11 ½"	20' – 6"	23' – 8"	735	9.0	5' – 1"	144	2.3
	42"	31' – 6 ¼"	5' – 6 ½"	23' – 6"	27' – 1 ½"	922	11.5	5' – 10"	179	3.0
	48"	37' – 3 ½"	6' – 1 ½"	28' – 0"	32' – 4"	1,191	15.9	6' – 7"	231	4.0
	54"	41' – 4 ¼"	6' – 8 ½"	31' – 0"	35' – 9 ½"	1,424	19.2	7' – 6"	300	5.0
	60"	45' – 4 ¾"	7' – 3 ½"	34' – 0"	39' – 3"	1,631	22.9	8' – 3"	353	6.0

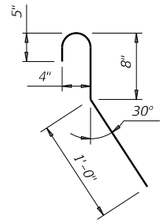


ELEVATION

(Showing dimensions.)



BARS V



BARS CL

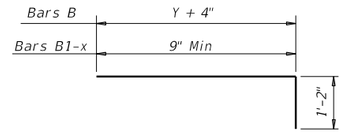
(Length = 2'-5")

TABLE OF (5) REINFORCING STEEL

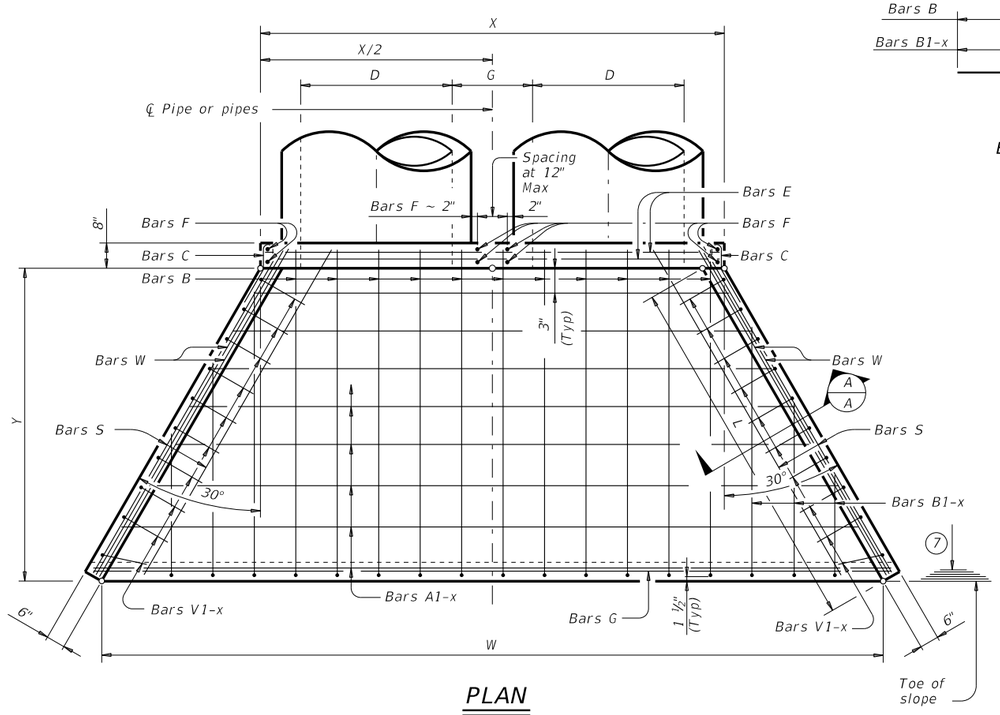
Bar	Size	Spa	No.
A	#4	1' – 0"	~
B	#3	1' – 6"	~
C	#4	1' – 0"	~
D	#3	1' – 0"	~
E	#5	~	4
F	#5	~	~
G	#3	~	2
S	#4	~	6
V	#4	1' – 0"	~
W	#5	~	4

TABLE OF CONSTANT DIMENSIONS

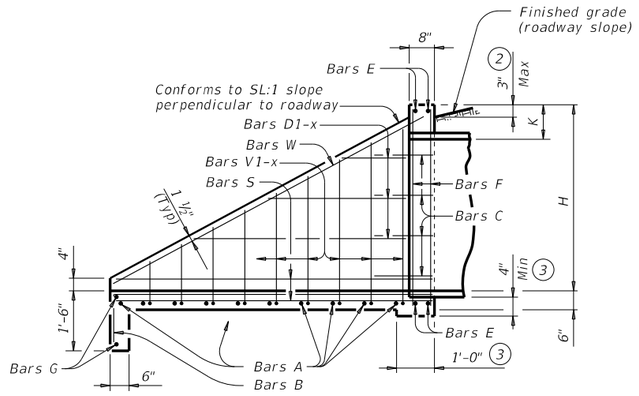
Dia of Pipe (D)	G	K (4)	H
12"	0' – 9"	1' – 0"	2' – 0"
15"	0' – 11"	1' – 0"	2' – 3"
18"	1' – 2"	1' – 0"	2' – 6"
21"	1' – 4"	1' – 0"	2' – 9"
24"	1' – 7"	1' – 0"	3' – 0"
27"	1' – 8"	1' – 0"	3' – 3"
30"	1' – 10"	1' – 0"	3' – 6"
33"	1' – 11"	1' – 0"	3' – 9"
36"	2' – 1"	1' – 0"	4' – 0"
42"	2' – 4"	1' – 0"	4' – 6"
48"	2' – 7"	1' – 3"	5' – 3"
54"	3' – 0"	1' – 3"	5' – 9"
60"	3' – 3"	1' – 3"	6' – 3"
66"	3' – 3"	1' – 3"	6' – 9"
72"	3' – 4"	1' – 3"	7' – 3"



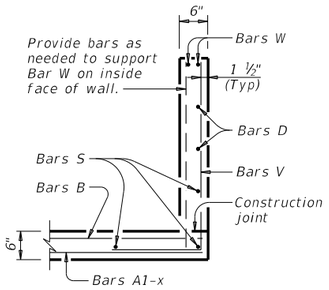
BARS B and B1-x



PLAN



TYPICAL WING ELEVATION



SECTION A-A

(1) Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.

(2) For vehicle safety, construct curbs no more than 3" above finished grade. Reduce curb heights, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

(3) Provide a 1'-0" footing as shown where required to maintain 4" minimum cover for pipes.

(4) Dimensions shown are usual and maximum.

(5) Quantities shown are for one structure end only (one headwall).

(6) Min Length = $6" + 3" \times \left(\frac{12 \times H - 7}{12 \times L}\right)$

Max Length = $12 \times H - 3" \times \left(\frac{12 \times H - 7}{12 \times L}\right) - 1"$

(7) Lengths of wings based on SL:1 slope along this line.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide Class C concrete (f'c = 3,600 psi).

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Do not mount bridge rails of any type directly to these culvert headwalls.

This standard may not be used for wall heights, H, exceeding the values shown.

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

Texas Department of Transportation

Bridge Division Standard

CONCRETE HEADWALLS WITH FLARED WINGS FOR 0° SKEW PIPE CULVERTS

CH-FW-0

FILE:	chfw00se-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS		1599	03	017	FM 2258
		DIST	COUNTY		SHEET NO.
		FTW	JOHNSON		156

DATE: 2/6/2024 4:05:55 PM
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TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL (5)

Slope	Dia of Pipe (D)	Values for One Pipe						Values to be Added for Each Addt'l Pipe		
		W	X	Y	L	Reinf (Lbs)	Conc (CY) (1)	X and W	Reinf (Lbs)	Conc (CY) (1)
2:1	12"	4' – 9"	3' – 1 ½"	2' – 10"	4' – 0"	94	0.6	2' – 0 ¼"	22	0.2
	15"	5' – 6 ¾"	3' – 5 ¼"	3' – 4"	4' – 8 ½"	106	0.8	2' – 6"	28	0.3
	18"	6' – 4 ¾"	3' – 9 ¼"	3' – 10"	5' – 5"	133	0.9	3' – 1"	41	0.4
	21"	7' – 2 ¾"	4' – 1 ¼"	4' – 4"	6' – 1 ½"	150	1.1	3' – 6 ¾"	47	0.5
	24"	8' – 2 ½"	4' – 7"	4' – 10"	6' – 10"	170	1.4	4' – 1 ¾"	57	0.6
	27"	9' – 0 ½"	4' – 11"	5' – 4"	7' – 6 ½"	184	1.6	4' – 6 ¼"	62	0.7
	30"	9' – 10 ½"	5' – 3"	5' – 10"	8' – 3"	218	1.8	5' – 0"	72	0.9
	33"	10' – 8 ¾"	5' – 7"	6' – 4"	8' – 11 ½"	233	2.1	5' – 4 ¾"	79	1.0
	36"	11' – 6 ¾"	5' – 11 ¼"	6' – 10"	9' – 8"	258	2.4	5' – 10 ½"	90	1.2
	42"	13' – 2 ¾"	6' – 7 ¼"	7' – 10"	11' – 1"	312	3.0	6' – 8 ¾"	109	1.5
	48"	15' – 4 ¾"	7' – 3 ¼"	9' – 4"	13' – 2 ½"	379	4.0	7' – 7 ¼"	142	2.0
	54"	17' – 1"	7' – 11 ½"	10' – 4"	14' – 7 ¼"	441	4.7	8' – 8"	170	2.5
	60"	18' – 9"	8' – 7 ½"	11' – 4"	16' – 0 ¼"	496	5.6	9' – 6 ¼"	194	2.9
	66"	20' – 5"	9' – 3 ½"	12' – 4"	17' – 5 ¼"	564	6.5	10' – 1 ¼"	217	3.3
	72"	22' – 1 ¼"	9' – 11 ¾"	13' – 4"	18' – 10 ¼"	628	7.5	10' – 9 ¼"	239	3.7
3:1	12"	6' – 2"	3' – 1 ½"	4' – 3"	6' – 0"	122	0.9	2' – 0 ¼"	24	0.3
	15"	7' – 2 ¾"	3' – 5 ¼"	5' – 0"	7' – 0 ¾"	146	1.1	2' – 6"	31	0.4
	18"	8' – 3 ¾"	3' – 9 ¼"	5' – 9"	8' – 1 ½"	183	1.4	3' – 1"	46	0.5
	21"	9' – 4 ¾"	4' – 1 ¼"	6' – 6"	9' – 2 ¼"	203	1.7	3' – 6 ¾"	53	0.7
	24"	10' – 7 ½"	4' – 7"	7' – 3"	10' – 3"	233	2.1	4' – 1 ¾"	65	0.8
	27"	11' – 8 ½"	4' – 11"	8' – 0"	11' – 3 ¾"	261	2.4	4' – 6 ¼"	75	1.0
	30"	12' – 9 ½"	5' – 3"	8' – 9"	12' – 4 ½"	304	2.8	5' – 0"	86	1.2
	33"	13' – 10 ¾"	5' – 7"	9' – 6"	13' – 5 ¼"	330	3.2	5' – 4 ¾"	94	1.3
	36"	14' – 11 ¾"	5' – 11 ¼"	10' – 3"	14' – 6"	363	3.7	5' – 10 ½"	108	1.5
	42"	17' – 1 ¾"	6' – 7 ¼"	11' – 9"	16' – 7 ½"	449	4.6	6' – 8 ¾"	133	2.0
	48"	20' – 0 ¾"	7' – 3 ¼"	14' – 0"	19' – 9 ½"	552	6.2	7' – 7 ¼"	176	2.7
	54"	22' – 3"	7' – 11 ½"	15' – 6"	21' – 11"	638	7.5	8' – 8"	211	3.3
	60"	24' – 5"	8' – 7 ½"	17' – 0"	24' – 0 ½"	737	8.9	9' – 6 ¼"	246	3.9
	66"	26' – 7"	9' – 3 ½"	18' – 6"	26' – 2"	835	10.4	10' – 1 ¼"	274	4.5
	72"	28' – 9 ¼"	9' – 11 ¾"	20' – 0"	28' – 3 ½"	944	12.0	10' – 9 ¼"	309	5.1
4:1	12"	7' – 7"	3' – 1 ½"	5' – 8"	8' – 0 ¼"	160	1.2	2' – 0 ¼"	28	0.3
	15"	8' – 10 ¾"	3' – 5 ¼"	6' – 8"	9' – 5 ¼"	187	1.5	2' – 6"	36	0.5
	18"	10' – 2 ¾"	3' – 9 ¼"	7' – 8"	10' – 10"	232	1.9	3' – 1"	52	0.6
	21"	11' – 6 ¾"	4' – 1 ¼"	8' – 8"	12' – 3"	270	2.3	3' – 6 ¾"	63	0.8
	24"	13' – 0 ½"	4' – 7"	9' – 8"	13' – 8"	307	2.8	4' – 1 ¾"	75	1.0
	27"	14' – 4 ½"	4' – 11"	10' – 8"	15' – 1"	345	3.4	4' – 6 ¼"	87	1.2
	30"	15' – 8 ½"	5' – 3"	11' – 8"	16' – 6"	400	3.9	5' – 0"	99	1.4
	33"	17' – 0 ¾"	5' – 7"	12' – 8"	17' – 11"	440	4.5	5' – 4 ¾"	112	1.7
	36"	18' – 4 ¾"	5' – 11 ¼"	13' – 8"	19' – 4"	487	5.2	5' – 10 ½"	128	1.9
	42"	21' – 0 ¾"	6' – 7 ¼"	15' – 8"	22' – 1 ¾"	595	6.6	6' – 8 ¾"	158	2.5
	48"	24' – 8 ¾"	7' – 3 ¼"	18' – 8"	26' – 4 ¾"	748	8.9	7' – 7 ¼"	211	3.3
	54"	27' – 5"	7' – 11 ½"	20' – 8"	29' – 2 ¾"	883	10.8	8' – 8"	257	4.1
	60"	30' – 1"	8' – 7 ½"	22' – 8"	32' – 0 ¾"	1,011	12.8	9' – 6 ¼"	297	4.9
	66"	32' – 9"	9' – 3 ½"	24' – 8"	34' – 10 ½"	1,153	14.9	10' – 1 ¼"	340	5.6
	72"	35' – 5 ¼"	9' – 11 ¾"	26' – 8"	37' – 8 ½"	1,304	17.3	10' – 9 ¼"	378	6.4
6:1	12"	10' – 5"	3' – 1 ½"	8' – 6"	12' – 0 ¼"	227	1.9	2' – 0 ¼"	32	0.4
	15"	12' – 2 ¾"	3' – 5 ¼"	10' – 0"	14' – 1 ¾"	277	2.5	2' – 6"	43	0.6
	18"	14' – 0 ¾"	3' – 9 ¼"	11' – 6"	16' – 3 ¼"	340	3.2	3' – 1"	61	0.8
	21"	15' – 10 ¾"	4' – 1 ¼"	13' – 0"	18' – 4 ½"	402	3.9	3' – 6 ¾"	76	1.1
	24"	17' – 10 ½"	4' – 7"	14' – 6"	20' – 6"	456	4.8	4' – 1 ¾"	91	1.4
	27"	19' – 8 ½"	4' – 11"	16' – 0"	22' – 7 ½"	525	5.7	4' – 6 ¼"	108	1.6
	30"	21' – 6 ½"	5' – 3"	17' – 6"	24' – 9"	601	6.6	5' – 0"	124	2.0
	33"	23' – 4 ¾"	5' – 7"	19' – 0"	26' – 10 ½"	682	7.7	5' – 4 ¾"	143	2.3
	36"	25' – 2 ¾"	5' – 11 ¼"	20' – 6"	29' – 0"	745	8.8	5' – 10 ½"	162	2.7
	42"	28' – 10 ¾"	6' – 7 ¼"	23' – 6"	33' – 2 ¾"	928	11.3	6' – 8 ¾"	202	3.5
	48"	34' – 0 ¾"	7' – 3 ¼"	28' – 0"	39' – 7 ¼"	1,199	15.5	7' – 7 ¼"	274	4.6

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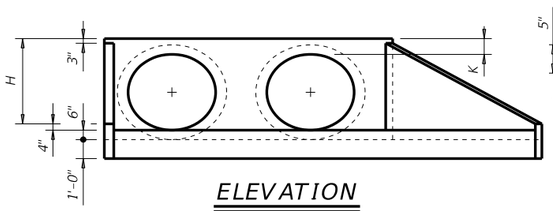
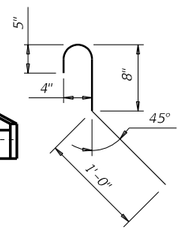


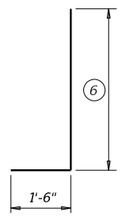
ELEVATION

(Showing dimensions.)



BARS CL

(Length = 2'-5')



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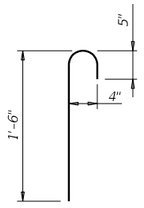
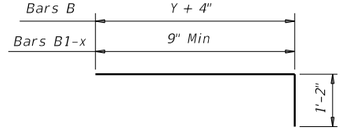


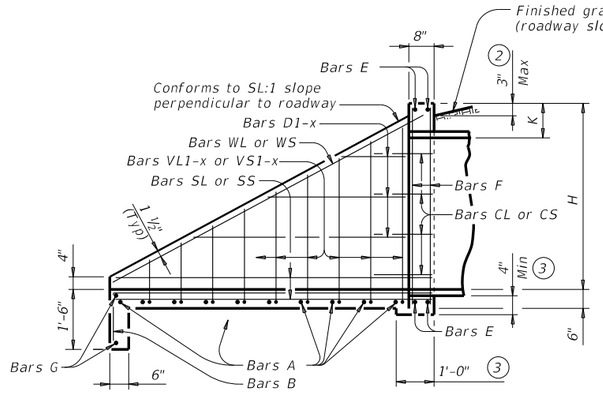
BARS CS

(Length = 2'-3")

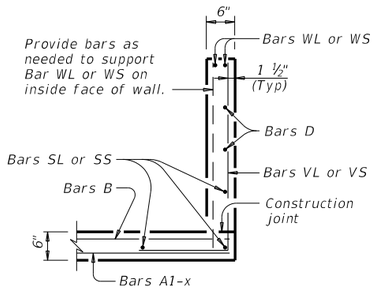


BARS B and B1-x

PLAN



TYPICAL WING ELEVATION



SECTION A-A

TABLE OF (5) REINFORCING STEEL

Bar	Size	Spa	No.
A	#4	1' – 0"	~
B	#3	1' – 6"	~
CL & CS	#4	1' – 0"	~
D	#3	1' – 0"	~
E	#5	~	4
F	#5	~	~
G	#3	~	2
SL & SS	#4	~	6
VL & VS	#4	1' – 0"	~
WL & WS	#5	~	4

TABLE OF CONSTANT DIMENSIONS

Dia of Pipe (D)	G	K (4)	H
12"	0' – 9"	1' – 0"	2' – 0"
15"	0' – 11"	1' – 0"	2' – 3"
18"	1' – 2"	1' – 0"	2' – 6"
21"	1' – 4"	1' – 0"	2' – 9"
24"	1' – 7"	1' – 0"	3' – 0"
27"	1' – 8"	1' – 0"	3' – 3"
30"	1' – 10"	1' – 0"	3' – 6"
33"	1' – 11"	1' – 0"	3' – 9"
36"	2' – 1"	1' – 0"	4' – 0"
42"	2' – 4"	1' – 0"	4' – 6"
48"	2' – 7"	1' – 3"	5' – 3"
54"	3' – 0"	1' – 3"	5' – 9"
60"	3' – 3"	1' – 3"	6' – 3"
66"	3' – 3"	1' – 3"	6' – 9"
72"	3' – 4"	1' – 3"	7' – 3"

(1) Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.

(2) For vehicle safety, construct curbs no more than 3" above finished grade. Reduce curb heights, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

(3) Provide a 1'-0" footing as shown where required to maintain 4" minimum cover for pipes.

(4) Dimensions shown are usual and maximum.

(5) Quantities shown are for one structure end only (one headwall).

(6) Min Length = $6" + 3" \times \left(\frac{12 \times H - 7}{12 \times L}\right)$

Max Length = $12 \times H - 3" \times \left(\frac{12 \times H - 7}{12 \times L}\right) - 1"$

(7) Lengths of wings based on SL:1 slope along this line.

MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide Class C concrete (f'c = 3,600 psi).

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
Do not mount bridge rails of any type directly to these culvert headwalls.
This standard may not be used for wall heights, H, exceeding the values shown.

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

Texas Department of Transportation

Bridge Division Standard

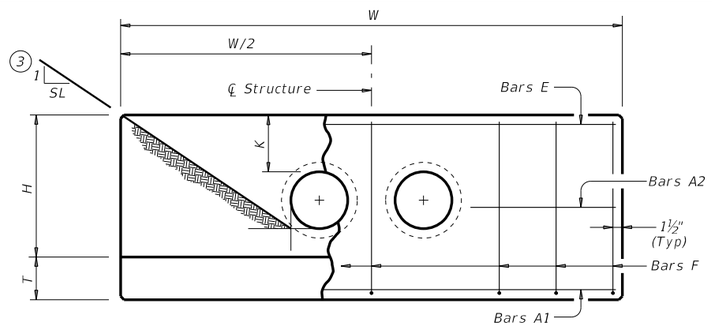
CONCRETE HEADWALLS WITH FLARED WINGS FOR 30° SKEW PIPE CULVERTS

CH-FW-30

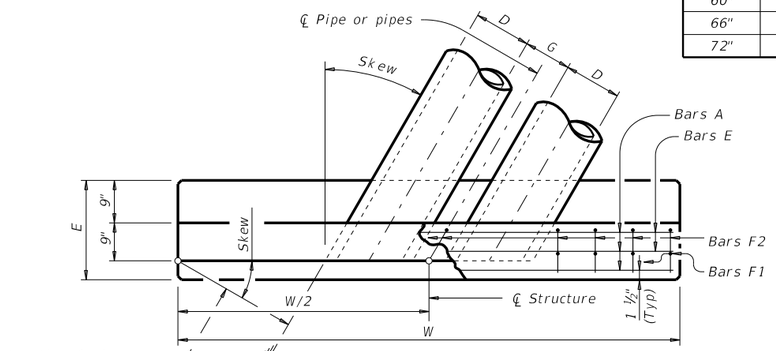
FILE: chfw30se-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		157

TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL (5)

Slope	Dia of Pipe (D)	15° Skew						30° Skew						45° Skew					
		Values for One Pipe			Values To Be Added for Each Addt'l Pipe			Values for One Pipe			Values To Be Added for Each Addt'l Pipe			Values for One Pipe			Values To Be Added for Each Addt'l Pipe		
		W	Reinf (Lbs) (1)	Conc (CY) (2)	W	Reinf (Lbs) (1)	Conc (CY) (2)	W	Reinf (Lbs) (1)	Conc (CY) (2)	W	Reinf (Lbs) (1)	Conc (CY) (2)	W	Reinf (Lbs) (1)	Conc (CY) (2)	W	Reinf (Lbs) (1)	Conc (CY) (2)
2:1	12"	9' – 4"	124	1.1	1' – 9 3/4"	15	0.2	10' – 5"	130	1.2	2' – 0"	16	0.2	12' – 9"	159	1.5	2' – 5 3/4"	17	0.3
	15"	10' – 7"	136	1.3	2' – 3"	17	0.2	11' – 10"	159	1.5	2' – 6"	18	0.2	14' – 6"	191	1.8	3' – 0 3/4"	20	0.3
	18"	11' – 11"	165	1.5	2' – 9"	19	0.3	13' – 3"	174	1.7	3' – 1"	29	0.3	16' – 3"	207	2.1	3' – 9 1/4"	33	0.4
	21"	13' – 2"	203	1.9	3' – 2 1/4"	31	0.4	14' – 9"	233	2.1	3' – 6 3/4"	33	0.4	18' – 0"	276	2.6	4' – 4 1/4"	36	0.5
	24"	14' – 6"	240	2.1	3' – 8 1/4"	34	0.4	16' – 2"	251	2.4	4' – 1 3/4"	36	0.5	19' – 10"	318	2.9	5' – 0 3/4"	39	0.6
	27"	15' – 9"	258	2.5	4' – 0 3/4"	38	0.5	17' – 7"	292	2.8	4' – 6 1/4"	39	0.6	21' – 7"	342	3.4	5' – 6 1/4"	44	0.7
	30"	17' – 1"	297	2.8	4' – 5 3/4"	40	0.6	19' – 1"	311	3.1	5' – 0"	42	0.6	23' – 4"	388	3.8	6' – 1 3/4"	47	0.8
	33"	18' – 5"	320	3.3	4' – 9 3/4"	43	0.6	20' – 6"	358	3.6	5' – 4 3/4"	46	0.7	25' – 1"	439	4.4	6' – 7 1/4"	51	0.9
	36"	19' – 8"	401	4.0	5' – 3"	47	0.9	21' – 11"	422	4.5	5' – 10 3/4"	50	0.9	26' – 10"	517	5.5	7' – 2 1/4"	55	1.2
	42"	22' – 3"	476	5.0	6' – 0 3/4"	53	1.1	24' – 10"	528	5.6	6' – 8 3/4"	56	1.2	30' – 5"	634	6.9	8' – 3"	76	1.4
	48"	25' – 11"	577	6.6	6' – 9 3/4"	60	1.3	28' – 10"	637	7.3	7' – 7 1/4"	79	1.5	35' – 4"	791	9.0	9' – 3 3/4"	88	1.8
	54"	28' – 6"	711	7.8	7' – 9"	83	1.6	31' – 9"	781	8.7	8' – 8"	81	1.8	38' – 11"	958	10.7	10' – 7 1/4"	97	2.2
	60"	31' – 1"	805	9.2	8' – 6 1/4"	91	1.9	34' – 8"	881	10.2	9' – 6 1/4"	97	2.1	42' – 5"	1,113	12.5	11' – 8"	124	2.6
	66"	33' – 8"	907	10.6	9' – 0 3/4"	98	2.1	37' – 6"	1,028	11.8	10' – 1 1/4"	102	2.4	46' – 0"	1,235	14.5	12' – 4 1/4"	132	2.9
	72"	36' – 3"	1,071	12.1	9' – 8"	105	2.4	40' – 5"	1,207	13.5	10' – 9 1/4"	110	2.6	49' – 6"	1,446	16.6	13' – 2 1/2"	141	3.2
3:1	12"	13' – 6"	178	1.6	1' – 9 3/4"	15	0.2	15' – 0"	189	1.8	2' – 0"	15	0.2	18' – 5"	237	2.2	2' – 5 3/4"	17	0.2
	15"	15' – 3"	212	1.9	2' – 3"	17	0.2	17' – 0"	223	2.1	2' – 6"	17	0.3	20' – 10"	276	2.6	3' – 0 3/4"	20	0.3
	18"	17' – 1"	231	2.3	2' – 9"	19	0.3	19' – 1"	259	2.5	3' – 1"	29	0.3	23' – 4"	318	3.1	3' – 9 1/4"	32	0.4
	21"	18' – 11"	306	2.7	3' – 2 1/4"	31	0.4	21' – 1"	339	3.0	3' – 6 3/4"	33	0.4	25' – 10"	413	3.7	4' – 4 1/4"	36	0.5
	24"	20' – 8"	345	3.1	3' – 8 3/4"	35	0.4	23' – 1"	384	3.5	4' – 1 3/4"	36	0.5	28' – 3"	462	4.2	5' – 0 3/4"	40	0.6
	27"	22' – 6"	376	3.7	4' – 0 3/4"	38	0.5	25' – 1"	438	4.1	4' – 6 1/4"	39	0.6	30' – 9"	522	5.0	5' – 6 1/4"	44	0.7
	30"	24' – 4"	422	4.1	4' – 5 3/4"	40	0.6	27' – 2"	466	4.6	5' – 0"	42	0.6	33' – 3"	578	5.6	6' – 1 3/4"	47	0.8
	33"	26' – 2"	476	4.8	4' – 10"	43	0.6	29' – 2"	522	5.3	5' – 4 3/4"	46	0.7	35' – 9"	644	6.5	6' – 7 1/4"	51	0.9
	36"	27' – 11"	590	5.9	5' – 3"	47	0.8	31' – 2"	645	6.6	5' – 10 3/4"	50	0.9	38' – 2"	787	8.0	7' – 2 1/4"	56	1.2
	42"	31' – 7"	684	7.3	6' – 0 1/4"	53	1.1	35' – 3"	776	8.2	6' – 8 3/4"	56	1.2	43' – 2"	933	10.0	8' – 3"	79	1.4
	48"	36' – 9"	880	9.6	6' – 9 3/4"	61	1.3	41' – 0"	953	10.7	7' – 7 1/4"	81	1.5	50' – 2"	1,166	13.1	9' – 3 3/4"	88	1.8
	54"	40' – 5"	1,065	11.4	7' – 9"	85	1.6	45' – 0"	1,185	12.7	8' – 8"	89	1.8	55' – 2"	1,435	15.5	10' – 7 1/4"	97	2.2
	60"	44' – 0"	1,224	13.3	8' – 6 1/4"	93	1.9	49' – 1"	1,356	14.8	9' – 6 1/4"	96	2.1	60' – 1"	1,635	18.2	11' – 8"	124	2.6
	66"	47' – 7"	1,357	15.4	9' – 1"	98	2.1	53' – 1"	1,497	17.2	10' – 1 1/4"	103	2.3	65' – 1"	1,892	21.1	12' – 4 1/4"	130	2.9
	72"	51' – 3"	1,624	17.7	9' – 8"	105	2.3	57' – 2"	1,787	19.7	10' – 9 1/4"	109	2.6	70' – 0"	2,218	24.1	13' – 2 1/4"	139	3.2
4:1	12"	17' – 7"	232	2.1	1' – 9 3/4"	15	0.2	19' – 8"	259	2.4	2' – 0"	16	0.2	24' – 0"	314	2.9	2' – 5 3/4"	18	0.2
	15"	19' – 11"	272	2.5	2' – 3"	17	0.2	22' – 3"	301	2.8	2' – 6"	18	0.3	27' – 3"	361	3.5	3' – 0 3/4"	21	0.3
	18"	22' – 3"	313	3.0	2' – 9"	19	0.3	24' – 10"	344	3.3	3' – 1"	29	0.3	30' – 5"	427	4.0	3' – 9 1/4"	32	0.4
	21"	24' – 7"	407	3.6	3' – 2 1/4"	31	0.4	27' – 5"	446	4.0	3' – 6 3/4"	33	0.4	33' – 7"	549	4.9	4' – 4 1/4"	36	0.5
	24"	26' – 11"	455	4.1	3' – 8 3/4"	35	0.4	30' – 0"	499	4.5	4' – 1 3/4"	36	0.5	36' – 9"	609	5.6	5' – 0 3/4"	40	0.6
	27"	29' – 3"	514	4.8	4' – 0 3/4"	38	0.5	32' – 7"	562	5.4	4' – 6 1/4"	40	0.6	39' – 11"	703	6.6	5' – 6 1/4"	43	0.7
	30"	31' – 7"	568	5.4	4' – 5 3/4"	40	0.6	35' – 3"	620	6.0	5' – 0"	42	0.6	43' – 2"	768	7.4	6' – 1 3/4"	49	0.8
	33"	33' – 11"	634	6.2	4' – 10"	43	0.7	37' – 10"	710	7.0	5' – 4 3/4"	46	0.7	46' – 4"	848	8.5	6' – 7 1/4"	52	0.9
	36"	36' – 3"	776	7.7	5' – 3"	48	0.9	40' – 5"	868	8.6	5' – 10 3/4"	49	0.9	49' – 6"	1,058	10.6	7' – 2 1/4"	56	1.1
	42"	40' – 11"	921	9.6	6' – 0 1/4"	53	1.0	45' – 7"	1,022	10.7	6' – 8 3/4"	57	1.2	55' – 10"	1,262	13.1	8' – 3"	78	1.4
	48"	47' – 7"	1,152	12.6	6' – 10"	61	1.3	53' – 1"	1,268	14.0	7' – 7 1/4"	80	1.5	65' – 1"	1,587	17.2	9' – 3 3/4"	86	1.8
	54"	52' – 3"	1,416	14.9	7' – 9 1/4"	86	1.6	58' – 4"	1,589	16.6	8' – 8"	89	1.8	71' – 5"	1,924	20.4	10' – 7 1/4"	95	2.2
	60"	56' – 11"	1,606	17.5	8' – 6 3/4"	92	1.9	63' – 6"	1,806	19.5	9' – 6 1/4"	95	2.1	77' – 9"	2,192	23.9	11' – 8"	122	2.6
	66"	61' – 7"	1,819	20.2	9' – 0 3/4"	97	2.1	68' – 8"	2,019	22.5	10' – 1 1/4"	101	2.4	84' – 2"	2,472	27.6	12' – 4 1/4"	131	2.9
	72"	66' – 3"	2,150	23.2	9' – 8"	104	2.4	73' – 11"	2,379	25.9	10' – 9 1/4"	108	2.6	90' – 6"	2,937	31.7	13' – 2 1/2"	138	3.2
6:1	12"	25' – 11"	342	3.1	1' – 9 3/4"	15	0.2	28' – 10"	374	3.5	2' – 0"	16	0.2	35' – 4"	456	4.3	2' – 5 3/4"	17	0.2
	15"	29' – 3"	390	3.7	2' – 3"	17	0.2	32' – 7"	442	4.2	2' – 6"	18	0.2	39' – 11"	549	5.1	3' – 0 3/4"	20	0.3
	18"	32' – 7"	459	4.4	2' – 9"	20	0.3	36' – 4"	515	4.9	3' – 1"	29	0.3	44' – 7"	629	6.0	3' – 9 1/4"	33	0.4
	21"	36' – 0"	608	5.3	3' – 2 1/4"	31	0.4	40' – 2"	660	5.9	3' – 6 3/4"	33	0.4	49' – 2"	823	7.2	4' – 4 1/4"	38	0.5
	24"	39' – 4"	672	6.0	3' – 8 3/4"	35	0.4	43' – 11"	748	6.7	4' – 1 3/4"	36	0.5	53' – 9"	920	8.2	5' – 0 3/4"	42	0.6
	27"	42' – 8"	770	7.1	4' – 0 3/4"	38	0.5	47' – 8"	852	8.0	4' – 6 1/4"	41	0.5	58' – 4"	1,039	9.7	5' – 6 1/4"	45	0.7
	30"	46' – 1"	839	8.0	4' – 5 3/4"	40	0.6	51' – 5"	949	8.9	5' – 0"	44	0.6	62' – 11"	1,162	10.9	6' – 1 3/4"	48	0.8
	33"	49' – 5"	947	9.2	4' – 10"	45	0.7	55' – 2"	1,040	10.3	5' – 4 3/4"	48	0.7	67' – 6"	1,292	12.6	6' – 7 1/4"	50	0.9
	36"	52' – 10"	1,151	11.4	5' – 3"	49	0.8	58' – 11"	1,287	12.7	5' – 10 3/4"	51	1.0	72' – 1"	1,583	15.6	7' – 2 1/4"	55	1.1
	42"	59' – 6"	1,365	14.2	6' – 0 1/4"	55	1.0	66' – 5"	1,530	15.8	6' – 8 3/4"	57	1.2	81' – 4"	1,875	19.4	8' – 3"	76	1.4
	48"	69' – 4"	1,737	18.5	6' – 10"	59	1.3	77' – 4"	1,942	20.7	7' – 7 1/4"	79	1.5	94' – 9"	2,368	25.3	9' – 3 3/4"	86	1.8
	54"	76' – 1"	2,138	22.0	7' – 9 1/4"	83	1.6	84' – 10"	2,378	24.6	8' – 8"	87	1.8	103' – 11"	2,912	30.1	10' – 7 1/4"	95	2.2
	60"	82' – 10"	2,426	25.8	8' – 6 3/4"	90	1.9	92' – 5"	2,681	28.8	9' – 6 1/4"	94	2.1	113' – 2"	3,294	35.3	11' – 8"	122	2.6
	66"	89' – 7"	2,730	29.9	9' – 0 3/4"	96	2.1	99' – 11"	3,038	33.3	10' – 1 1/4"	101	2.4	122' – 4"	3,697	40.8	12' – 4 1/4"	130	2.9
	72"	96' – 3"	3,218	34.2	9' – 8"	102	2.4	107' – 5"	3,580	38.2	10' – 9 1/4"	108	2.6	131' – 6"	4,372	46.8	13' – 2 1/4"	139	3.2

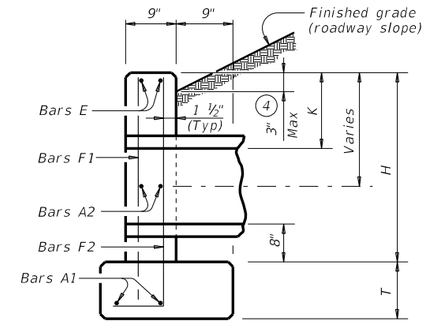


ELEVATION



PLAN OF SKEWED PIPES

Showing 30° skew.



SECTION AT CENTER OF PIPE

BARS F2

TABLE OF CONSTANT DIMENSIONS

Dia of Pipe (D)	G	K (5)	H	T	E
12"	0' – 9"	1' – 0"	2' – 8"	0' – 9"	1' – 9"
15"	0' – 11"	1' – 0"	2' – 11"	0' – 9"	1' – 9"
18"	1' – 2"	1' – 0"	3' – 2"	0' – 9"	1' – 9"
21"	1' – 4"	1' – 0"	3' – 5"	0' – 9"	2' – 0"
24"	1' – 7"	1' – 0"	3' – 8"	0' – 9"	2' – 0"
27"	1' – 8"	1' – 0"	3' – 11"	0' – 9"	2' – 3"
30"	1' – 10"	1' – 0"	4' – 2"	0' – 9"	2' – 3"
33"	1' – 11"	1' – 0"	4' – 5"	0' – 9"	2' – 6"
36"	2' – 1"	1' – 0"	4' – 8"	1' – 0"	2' – 6"
42"	2' – 4"	1' – 0"	5' – 2"	1' – 0"	2' – 9"
48"	2' – 7"	1' – 3"	5' – 11"	1' – 0"	3' – 0"
54"	3' – 0"	1' – 3"	6' – 5"	1' – 0"	3' – 3"
60"	3' – 3"	1' – 3"	6' – 11"	1' – 0"	3' – 6"
66"	3' – 3"	1' – 3"	7' – 5"	1' – 0"	3' – 9"
72"	3' – 4"	1' – 3"	7' – 11"	1' – 0"	4' – 0"

TABLE OF (6) REINFORCING STEEL

Bar	Size	Spa	No.
A1	#5	~	2
A2	#5	1' – 6"	~
E	#5	~	2
F	#5	1' – 0"	~

MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide Class C concrete (f'c = 3,600 psi).

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
Do not mount bridge rails of any type directly to these culvert headwalls.
This standard may not be used for wall heights, H, exceeding the values shown.

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

(1) Total quantites include one 3'–1" lap for bars over 60' in length.

(2) Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.

(3) Indicated slope is perpendicular to centerline pipe or pipes.

(4) For vehicle safety, construct curbs no more than 3" above finished grade. Reduce curb heights, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

(5) Dimensions shown are usual and maximum.

(6) Quantities shown are for one structure end only (one headwall).

Texas Department of Transportation

Bridge Division Standard

CONCRETE HEADWALLS WITH PARALLEL WINGS FOR SKEWED PIPE CULVERTS

CH-PW-S

FILE: chpwsste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		158

DATE: 2/6/2024 4:06:02 PM
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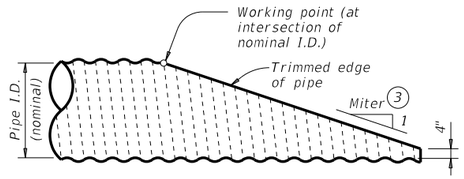
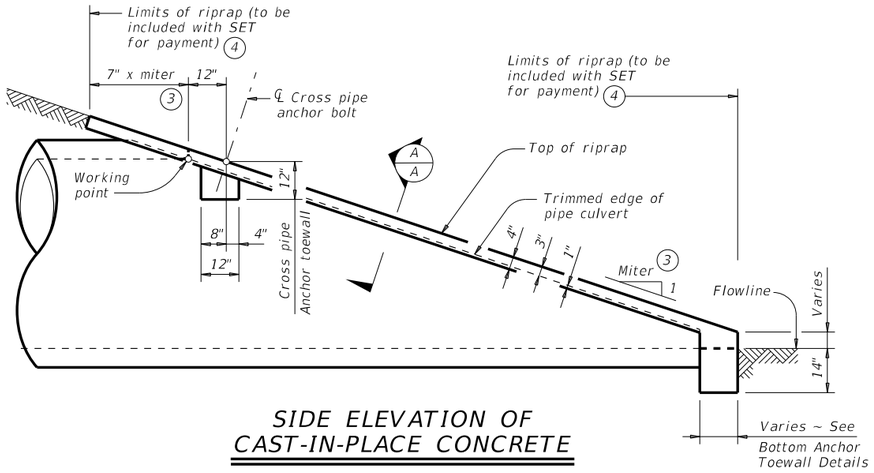


NOTE: All pipe runners, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

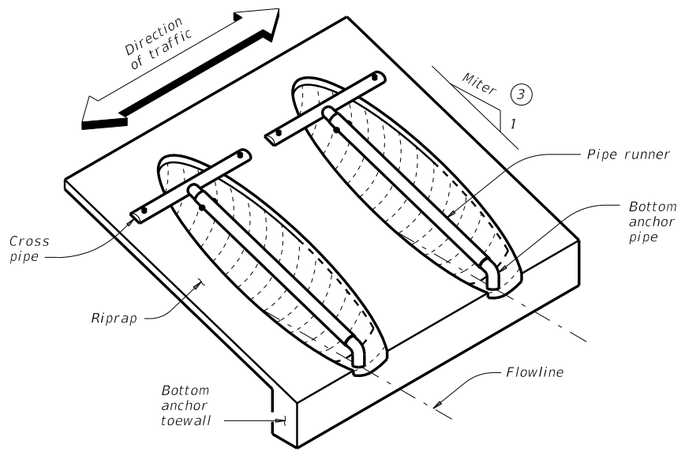
SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

(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.

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

FOR 12" DIA TO 60" DIA
PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

SETP-CD

FILE:	setpcdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT	February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS		1599	03	017	FM 2258
		DIST	COUNTY		SHEET NO.
		FTW	JOHNSON		159

DATE: 2/6/2024 4:06:06 PM
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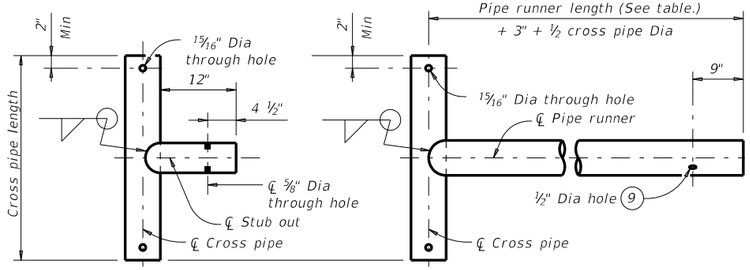
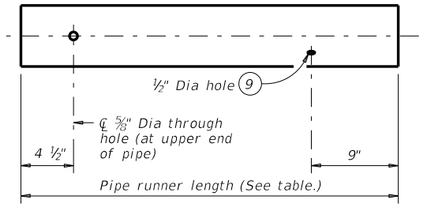


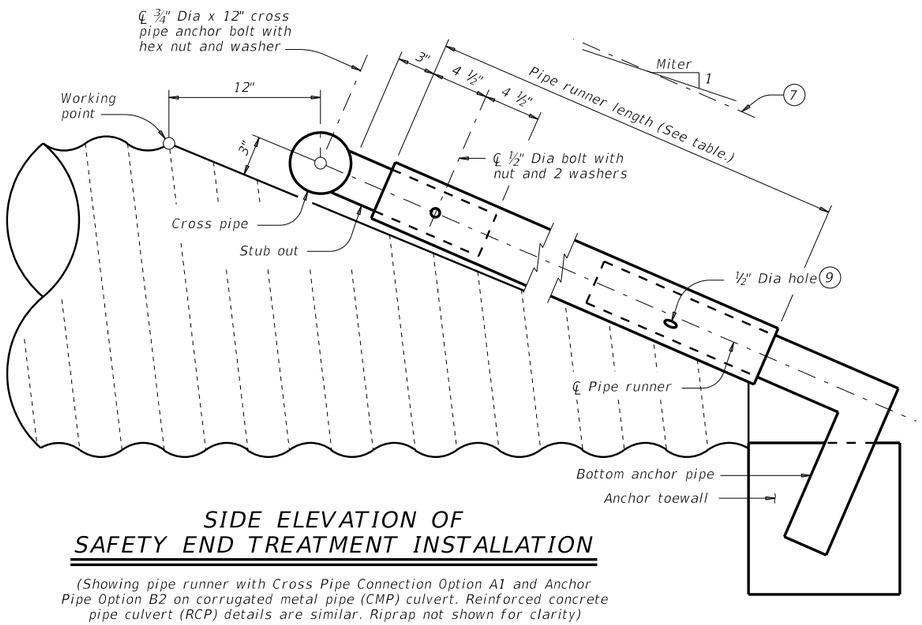
OPTION A1 OPTION A2

CROSS PIPE AND CONNECTIONS DETAILS



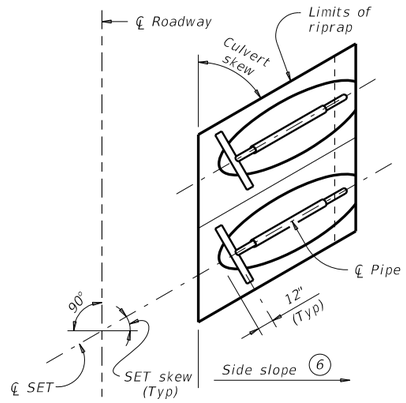
NOTE: The separate pipe runner shown is required when Cross Pipe Connection Option A1 is used.

PIPE RUNNER DETAILS

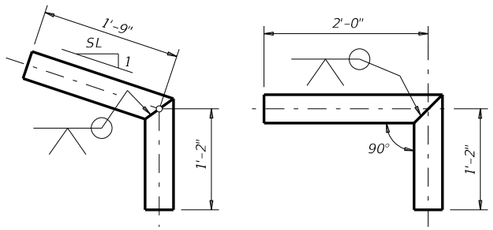


SIDE ELEVATION OF SAFETY END TREATMENT INSTALLATION

(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)

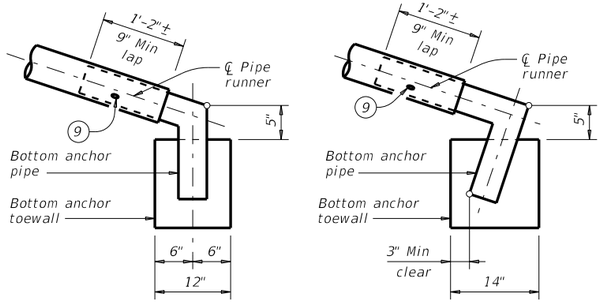


PLAN OF SKEWED INSTALLATION



OPTION B1 OPTION B2

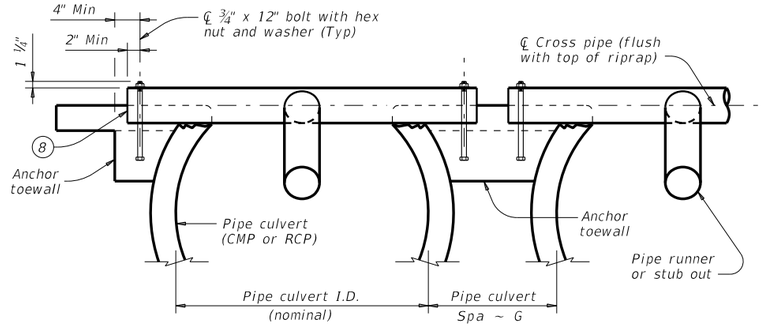
BOTTOM ANCHOR PIPE DETAILS (10)



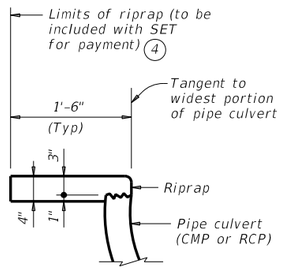
OPTION B1 OPTION B2

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".

SHEET 2 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

FILE: setpcdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		160

DATE: 2/6/2024 4:06:09 PM
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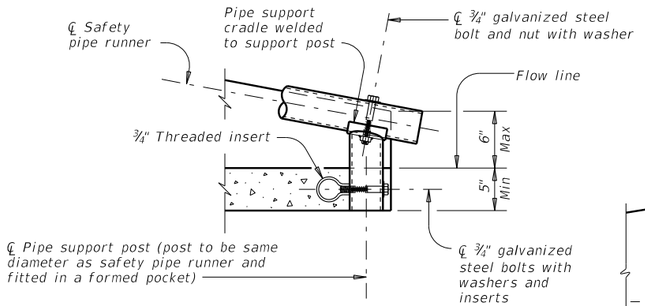
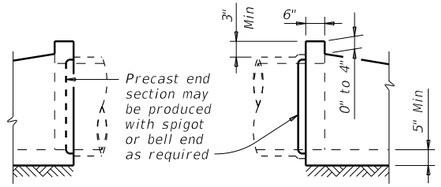
REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (8)	"D" (1)	Slope	Min Length of Unit	Single Pipe Skew	Single Pipe Pipe Runners Required	Multiple Pipes Skew	Multiple Pipes Pipe Runners Required
12"	2"	1.15"	17.00"	3:1	2' – 11"	≤ 45°	No	≤ 45°	No
				4:1	3' – 6"				
				6:1	4' – 9"				
15"	2 ¼"	1.30"	20.50"	3:1	3' – 8"	≤ 45°	No	≤ 45°	No
				4:1	4' – 7"				
				6:1	6' – 5"				
18"	2 ½"	1.60"	24.00"	3:1	4' – 6"	≤ 45°	No	≤ 45°	No
				4:1	5' – 8"				
				6:1	8' – 0"				
24"	3"	1.95"	31.00"	3:1	6' – 2"	≤ 45°	No	= 30°	No
				4:1	7' – 10"			> 30°	Yes
				6:1	11' – 3"				
30"	3 ½"	2.65"	38.50"	3:1	7' – 10"	= 15°	No	= 15°	No
				4:1	10' – 1"	> 15°	Yes	> 15°	Yes
				6:1	14' – 8"				
36"	4"	2.75"	45.50"	3:1	9' – 5"	= 0°	No	≥ 0°	Yes
				4:1	12' – 3"	> 0°	Yes		
				6:1	17' – 11"				
42"	4 ½"	N/A	52.50"	3:1	11' – 1"	≥ 0°	Yes	≥ 0°	Yes
				4:1	14' – 5"				
				6:1	21' – 2"				



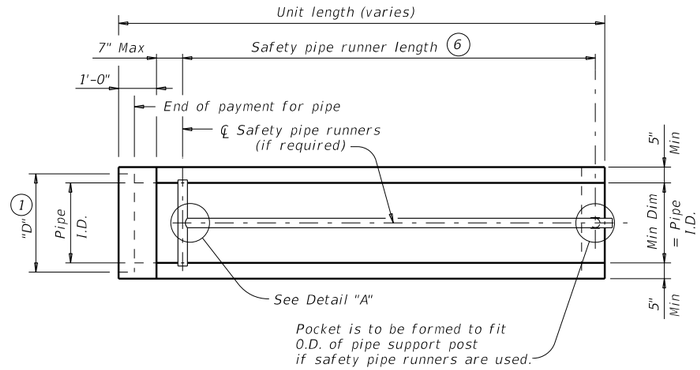
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)



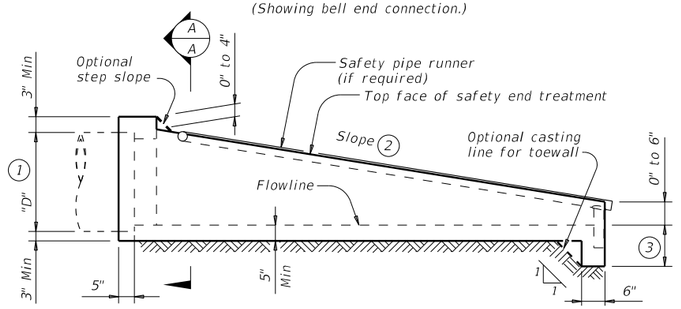
OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment)



PLAN

(Showing bell end connection.)

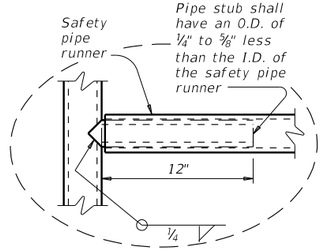


LONGITUDINAL ELEVATION

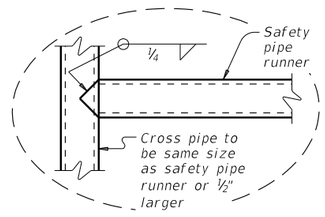
(Showing bell end connection.)

OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment)



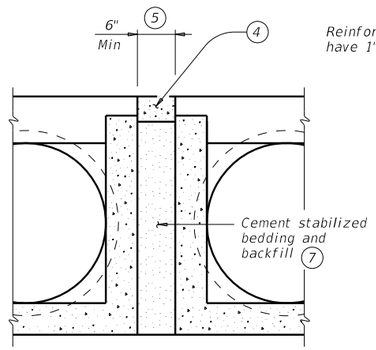
OPTION A



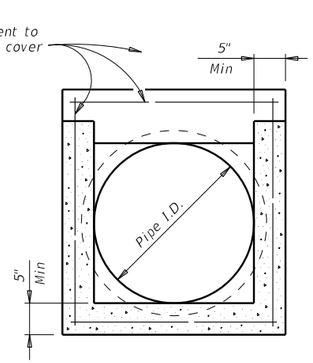
OPTION B

DETAIL A

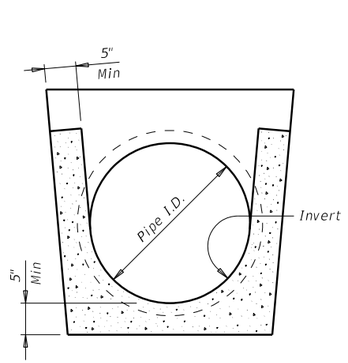
(If required)



MULTIPLE PIPE INSTALLATION

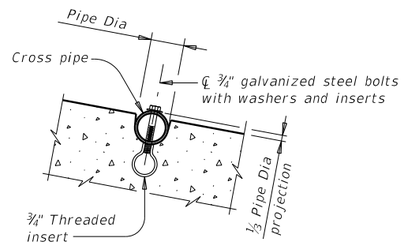


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)

SAFETY PIPE RUNNER DIMENSIONS

Max Safety Pipe Runner Length	Required Pipe Runner Size: Pipe Size	Pipe O.D.	Pipe I.D.
11' – 2"	3" STD	3.500"	3.068"
15' – 6"	3 ½" STD	4.000"	3.548"
20' – 10"	4" STD	4.500"	4.026"
35' – 4"	5" STD	5.563"	5.047"

(1) Dimension "D" is based on reinforced concrete pipe (RCP) meeting the requirements of ASTM C-76, Class III, (RCP Wall "B" thickness). Adjust "D" for any other wall thickness used. For thermoplastic pipe (TP) take into account the annular space requirements for grouted connections.

(2) Slope as shown elsewhere in plans. Slope of 3:1 or flatter is required for vehicle safety.

(3) Toewall to be used only when dimension is shown elsewhere in the plans.

(4) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment".

(5) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

(6) Measured along slope.

(7) Provide cement stabilized bedding and backfill in accordance with the Item 400, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

(8) Thermoplastic pipe wall thickness may vary. Adjust accordingly. Thermoplastic pipe requires the safety end treatments to have a bell end for grouted connections.

GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

Texas Department of Transportation

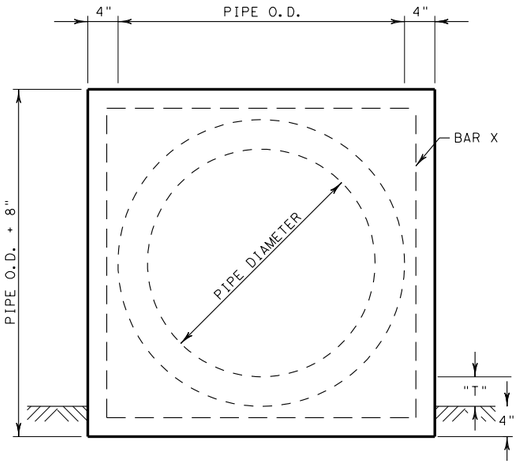
Bridge Division Standard

PRECAST SAFETY END TREATMENT

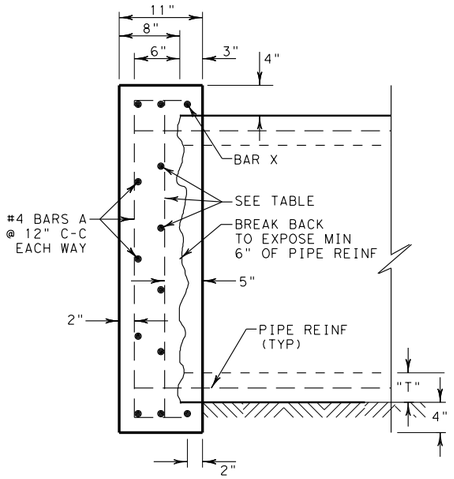
TYPE II ~ CROSS DRAINAGE

PSET-SC

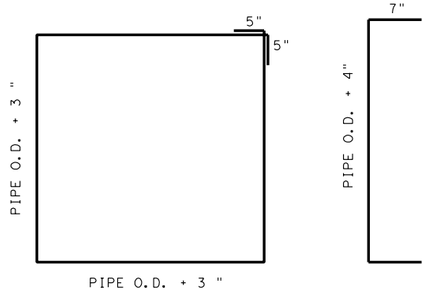
FILE: psetscss-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		161



FRONT ELEVATION



SIDE ELEVATION



#4 BAR X #4 BAR A

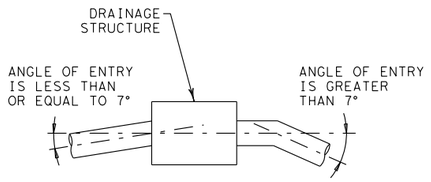
INNER REINFORCING SIZE/SPACING		
PIPE DIA(IN)	MAXIMUM DEPTH	
	15'	30'
<48	#4 @ 12" C-C	#4 @ 12" C-C
60	#4 @ 12" C-C	#4 @ 10" C-C
72	#4 @ 12" C-C	#5 @ 10" C-C
84	#4 @ 10" C-C	#5 @ 8" C-C

PIPE END CAP GENERAL NOTES

1. "T" = PIPE WALL THICKNESS.
2. ALL CONCRETE SHALL BE CLASS "C".
3. ALL REINFORCING STEEL SHALL BE GRADE 60.
4. OCTAGONAL PLUG MAY BE USED IN LIEU OF SQUARE. PROVIDE 4" MINIMUM COVER OVER OUTSIDE OF PIPE. DIMENSIONS OF PIPE PLUG AND REINFORCING TO BE AS APPROVED.

DRAINAGE PIPE END CAP OR PLUG DETAILS

N.T.S.

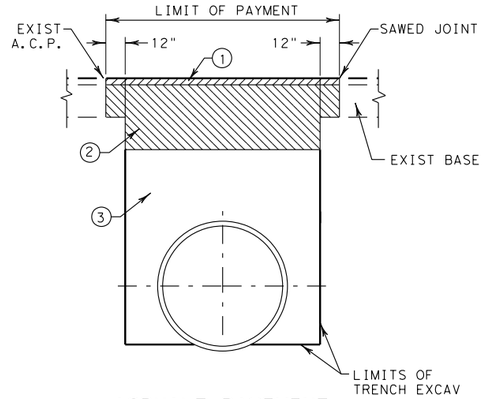


CONNECT PIPES WITHIN 7° OF NORMAL TO INLET OR MANHOLE. IF NECESSARY, USE PIPE ELBOW OR CURVED APPROACH ALIGNMENT TO STAY WITHIN THIS LIMIT.

PIPE CONNECTION

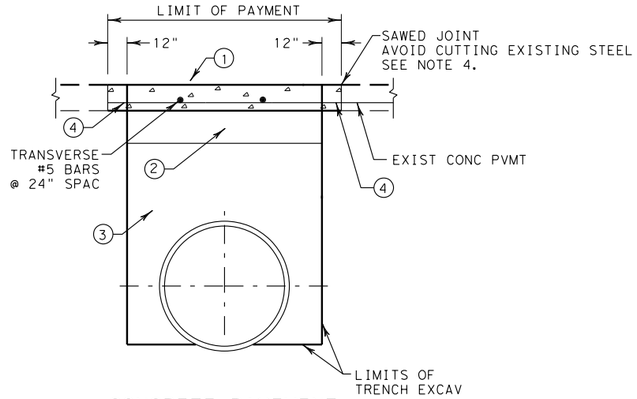
N.T.S.

1. APPROX 2" HOT MIX, TYPE C, OR AS DIRECTED.
2. APPROX 10" HOT MIX BASE, TYPE B, OR AS DIRECTED.
3. CEMENT STABILIZED BACKFILL IN ACCORDANCE WITH ITEM 400.3.3.1, 400.3.3.2, 400.3.3.3., AND 400.3.3.4.



ASPHALT PAVEMENT

1. CLASS "A", "P", OR "HES" CONCRETE PAVEMENT. MATCH EXISTING PAVEMENT DEPTH. USE CLASS "HES" IF OPENING TO TRAFFIC LESS THAN 72 HOURS AFTER PLACEMENT.
2. 4" COLD MIX ASPHALT BASE. PLACE BASE MATERIAL IN ACCORDANCE WITH ITEM 361.2.2.2.
3. CEMENT STABILIZED BACKFILL IN ACCORDANCE WITH ITEM 400.3.3.1, 400.3.3.2, 400.3.3.3., AND 400.3.3.4.
4. AT CONTRACTOR'S OPTION, USE FULL-DEPTH SAW CUT AND TIE TO EXISTING PAVEMENT IN ACCORDANCE WITH ITEM 361.4.2. FOR PARTIAL DEPTH SAW CUT, EXPOSE MINIMUM 8" OF LONGITUDINAL REINFORCING AND CONSTRUCT 8" WELDED LAP (MATCH LONGITUDINAL PAVEMENT REINFORCEMENT).



CONCRETE PAVEMENT

CUTTING AND RESTORING PAVEMENT DETAILS

N.T.S.

CUTTING AND RESTORING PAVEMENT GENERAL NOTES

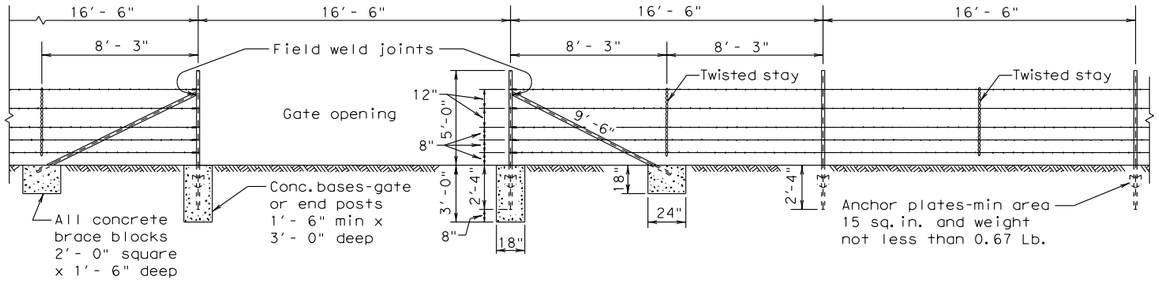
1. HOT MIX OR CONCRETE PAVEMENT WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE SUBSIDIARY TO CUTTING AND RESTORING PAVEMENT.
2. CONCRETE CURB OR CURB AND GUTTER WILL BE INCLUDED IN AREA OF "CUTTING AND RESTORING PAVEMENT". CONSTRUCT CURB OR CURB AND GUTTER ACCORDING TO PLAN DETAILS, OR AS DIRECTED. REMOVAL AND REPLACMENT OF CONCRETE CURB OR CURB AND GUTTER WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE SUBSIDIARY TO CUTTING AND RESTORING PAVEMENT.
3. CEMENT STABILIZED BACKFILL WILL BE MEASURED AND PAID FOR IN ACCORDANCE WITH ITEM 400.
4. SEE STANDARD JS (FTW) FOR JOINT SEALING DETAILS.
5. "NON-EXCAVATABLE" FLOWABLE BACKFILL, AS DEFINED BY ITEM 401, TABLE 2, MAY BE USED AS A SUBSITITUTE FOR CEMENT STABILIZED BACKFILL, WITH THE FOLLOWING CONSTRAINTS:
   a). PLACE FLOWABLE FILL IN LIFTS NOT EXCEEDING 2 FEET IN DEPTH; PLACE EACH SUCCESSIVE LIFT WHEN THE PREVIOUS LIFT HAS STIFFENED/HARDENED (HAS LOST ITS FLOWABILITY).
   b). NO ADJUSTMENT IN PAYMENT WILL BE MADE FOR SUBSTITUTION OF FLOWABLE FILL IN LIEU OF CEMENT STABILIZED BACKFILL.

Texas Department of Transportation

Fort Worth District Standard

MISCELLANEOUS DRAINAGE DETAILS
MDD(FTW)

ORIGINAL DRAWING: 05/2019	mdd-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
DATE	REVISIONS	6		162
05/2019	NEW STANDARD	STATE	STATE DIST.NO.	COUNTY
07/2020	REVISE CUT & RESTORE PAVEMENTS FOR CSB & FLOWABLE FILL; ALLOW OCTAGONAL PIPE PLUG; EDIT GENERAL NOTES	TEXAS	FTW	JOHNSON
		CONT.	SECT.	JOB / HIGHWAY NO.
		1599	03	017 / FM 2258

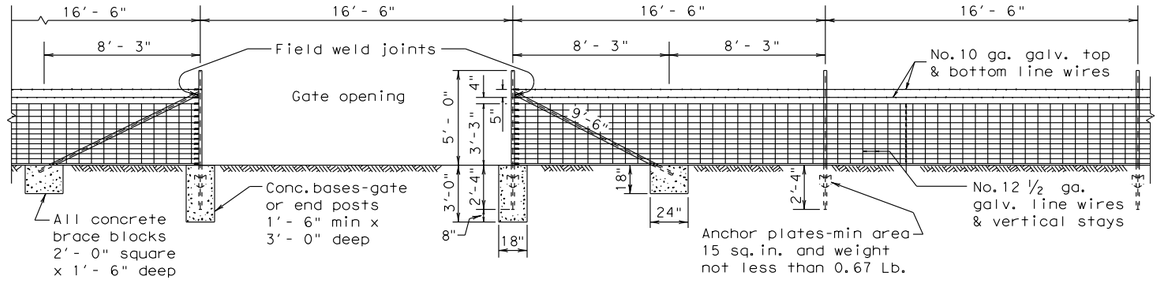


SECTION GALVANIZED BARBED WIRE FENCE WITH METAL POSTS

BRACING DETAIL USED AT ENDS AND GATES

TYPE "C" FENCE

(See General Note 8)



SECTION GALVANIZED WOVEN WIRE FENCE WITH METAL POSTS

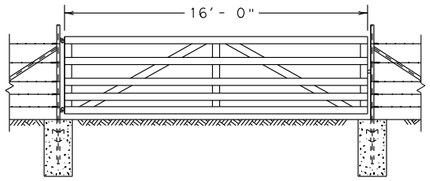
BRACING DETAIL USED AT ENDS AND GATES

TYPE "D" FENCE

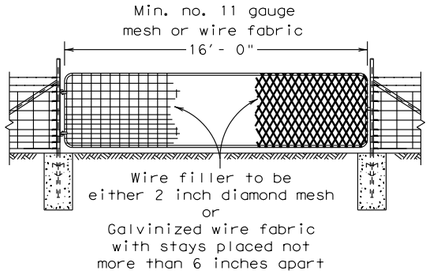
(See General Note 8)

Note:
For Steel pipe and T-Post requirements. (See General Notes 6 & 7)

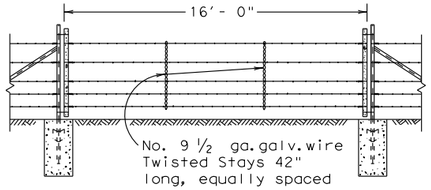
Metal gate shall consist of 5 panels not less than 4'- 4" high and shall be aluminum or galvanized metal and of good quality. Gate and hardware shall meet the approval of the engineer.



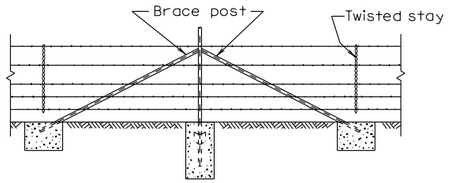
DETAIL TYPE 1 GATE



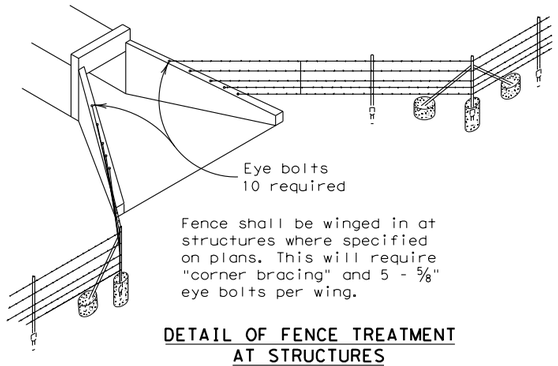
DETAIL TYPE 2 GATE



DETAIL TYPE 3 GATE

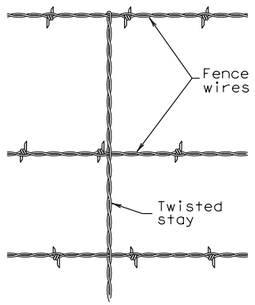


CORNER OR PULL POST ASSEMBLY



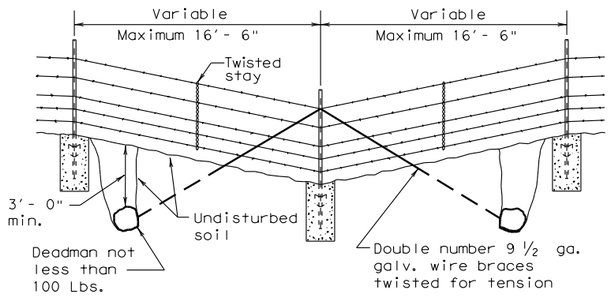
Fence shall be winged in at structures where specified on plans. This will require "corner bracing" and 5 - ⅝" eye bolts per wing.

DETAIL OF FENCE TREATMENT AT STRUCTURES

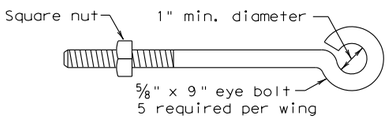


DETAIL OF STAY

(Barbed Wire Fence)



DETAIL OF FENCE SAG



DETAIL OF EYE BOLT

GENERAL NOTES

1. Any high point which interferes with the placing of wire mesh shall be excavated to provide a 2 inch clearance.
2. Latches for Type 1 and Type 2 gates shall be good commercial quality and design latch of the spring, fork or chain type. All latches shall be suitable to the gate and shall be approved by the Engineer.
3. Hinges for Type 2 gates shall be a commercial design approved by the Engineer suitable for post and gate.
4. Concrete shall be of the design and consistency approved by the Engineer and shall contain not less than 4 sacks of cement per cubic yard. Concrete footings are to be crowned at the top to shed water.
5. Steel anchor plates shall be of a design and thickness sufficient to prevent turning of the post in firm soil.
6. Steel pipe end posts, corner and pull posts shall be a minimum of 2" Std. pipe (2.375" O.D., 0.154" wall thickness) with a 1¼" Std. pipe brace (1.660" O.D., 0.140" wall thickness), with a 2"x2"x1/4" angle, or other as approved by the Engineer. Fasteners for securing barbed wire or woven wire fence to metal posts shall be a minimum of 11 gauge galvanized steel wire. Tubular posts shall be fitted with water malleable iron caps.
7. If Steel pipe is used for posts and braces, use standard pipe in accordance with ASTM A 53, Class B or A 501. For T-Posts use steel that meets ASTM A 702. Metal line posts shall be not less than 6'-6" in length and shall weigh not less than (1.33 lbs./lin.ft.). These Items shall be in accordance with Item 552, "Wire Fence."
8. Barbed Wire shall be in accordance with ASTM A 121, Class 1 Design designation 12-2-4-1 4R or 12-2-5-1 4R, or as approved by the Engineer.

   Woven Wire Fence (Type D) shall be in accordance with ASTM A 116, Class 1 No. 12-1/2 Grade 60 (See Table 1 ASTM A 116) to the height and design shown on the plans, or as approved by the Engineer.
9. The location of gates and corner posts will be as indicated elsewhere in these plans.

Texas Department of Transportation

Design Division Standard

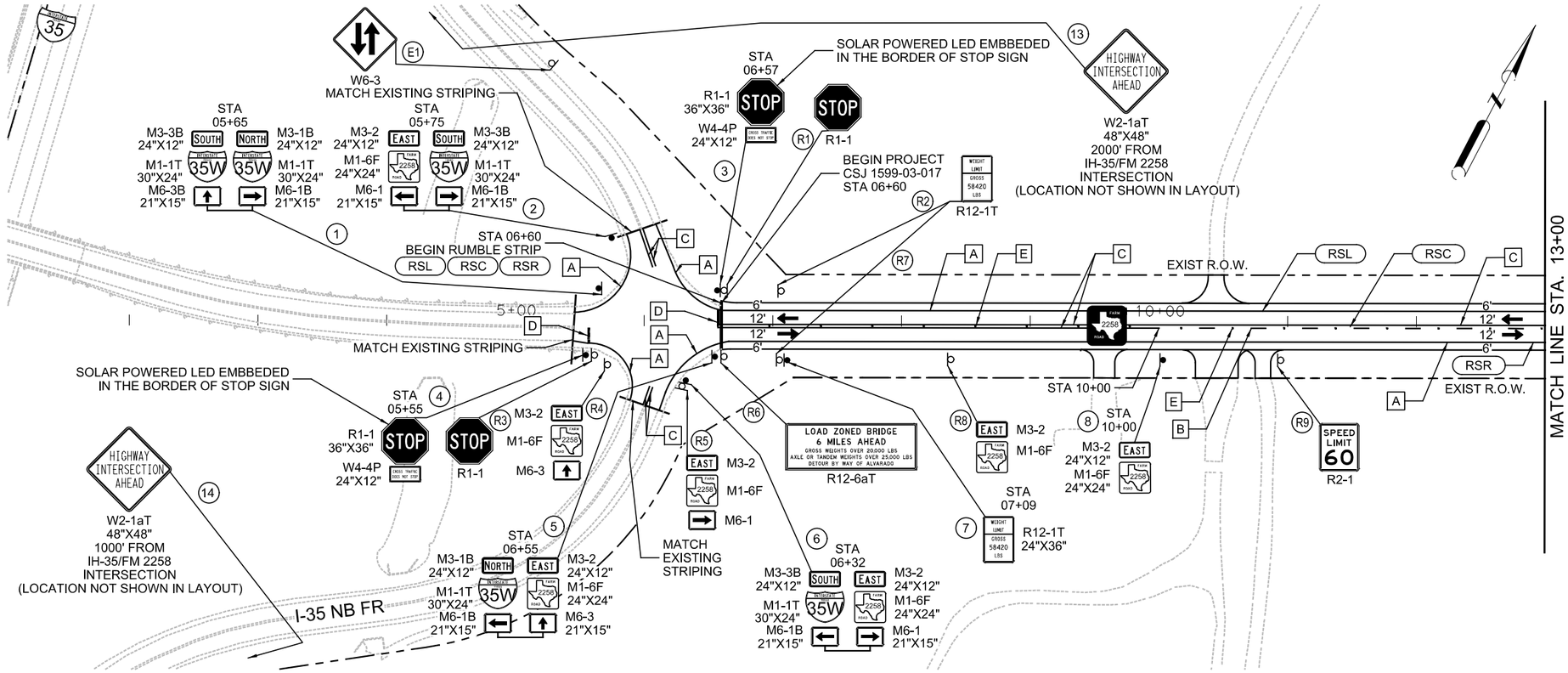
BARBED WIRE AND WOVEN WIRE FENCE

(STEEL POSTS)

WF(2)-10

FILE: wf210.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT 1996	CONT	SECT	JOB	HIGHWAY
REVISIONS	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		163

DATE: 2/6/2024
FILE: $FILE$



PAVEMENT MARKINGS LEGEND

- A — RE PM W/RET REQ TY I (W)(06")(SLD)(100MIL)
- B — RE PM W/RET REQ TY I (Y)(06")(BRK)(100MIL)
- C — RE PM W/RET REQ TY I (Y)(06")(SLD)(100MIL)
- D — PREFAB PAV MRK TY C (W)(24")(SLD)
- E — REFL PAV MRKR TY II-A-A
- OM ASSM (OM-2Y)(WC)GND
- DIRECTION OF TRAFFIC FLOW
- RSL — RUMBLE STRIP SHLDR LT
- RSR — RUMBLE STRIP SHLDR RT
- RSC — RUMBLE STRIP CENTERLINE

SIGNING LEGEND

- (1) PROP SMALL SIGN
- (R1) EXIST SMALL SIGN TO BE REMOVED
- (E1) EXIST SMALL SIGN TO REMAIN IN PLACE

NOTES:

LEFT SHOULDER RUMBLE STRIP PER STD RS(4)-13 OPT (4)

RIGHT SHOULDER RUMBLE STRIP PER STD RS(4)-13 OPT (4)

CENTERLINE RUMBLE STRIP PER STD RS(3)-13 OPT (1)

		A	B	C	D	E	RSL RSR	RSC
	UNIT	LF	LF	LF	LF	EA	LF	LF
6+60 TO STA 25+00	QTY	4008	350	2326	25	47	3681	1841

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TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

FM 2258

SIGNING AND PAVEMENT MARKINGS

STA. 6+60 TO STA. 25+00

SCALE 1" = 100' 0 20 40 60 80 100 SHEET 01 OF 07

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	164

STATE	DIST.	COUNTY
TEXAS	FTW	JOHNSON

CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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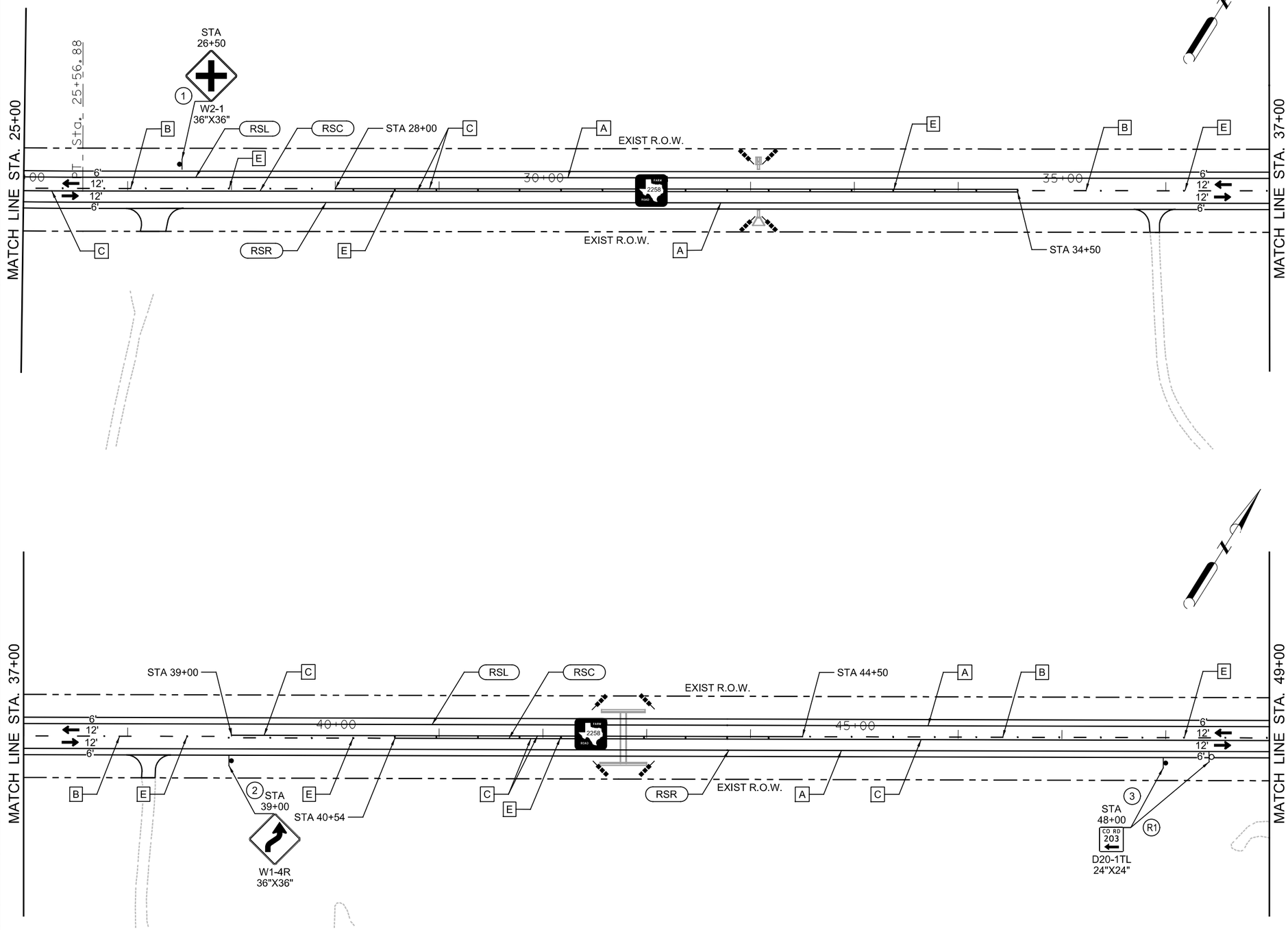

PAVEMENT MARKINGS LEGEND

- A — RE PM W/RET REQ TY I (W)(06")(SLD)(100MIL)
- B — RE PM W/RET REQ TY I (Y)(06")(BRK)(100MIL)
- C — RE PM W/RET REQ TY I (Y)(06")(SLD)(100MIL)
- D — PREFAB PAV MRK TY C (W)(24")(SLD)
- E — REFL PAV MRKR TY II-A-A
- OM ASSM (OM-2Y)(WC)GND
- DIRECTION OF TRAFFIC FLOW
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SIGNING LEGEND

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NOTES:

LEFT SHOULDER RUMBLE STRIP PER STD RS(4)-13 OPT (4)

RIGHT SHOULDER RUMBLE STRIP PER STD RS(4)-13 OPT (4)

CENTERLINE RUMBLE STRIP PER STD RS(3)-13 OPT (1)

		A	B	C	D	E	RSL RSR	RSC
	UNIT	LF	LF	LF	LF	EA	LF	LF
STA 25+00 TO STA 49+00	QTY	4800	330	3008		55	4800	2400

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SIGNING AND PAVEMENT MARKINGS

STA. 25+00 TO STA. 49+00

SCALE 1" = 100' 0 20 40 60 80 100 SHEET 02 OF 07

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	165
STATE	DIST.	COUNTY
TEXAS	FTW	JOHNSON
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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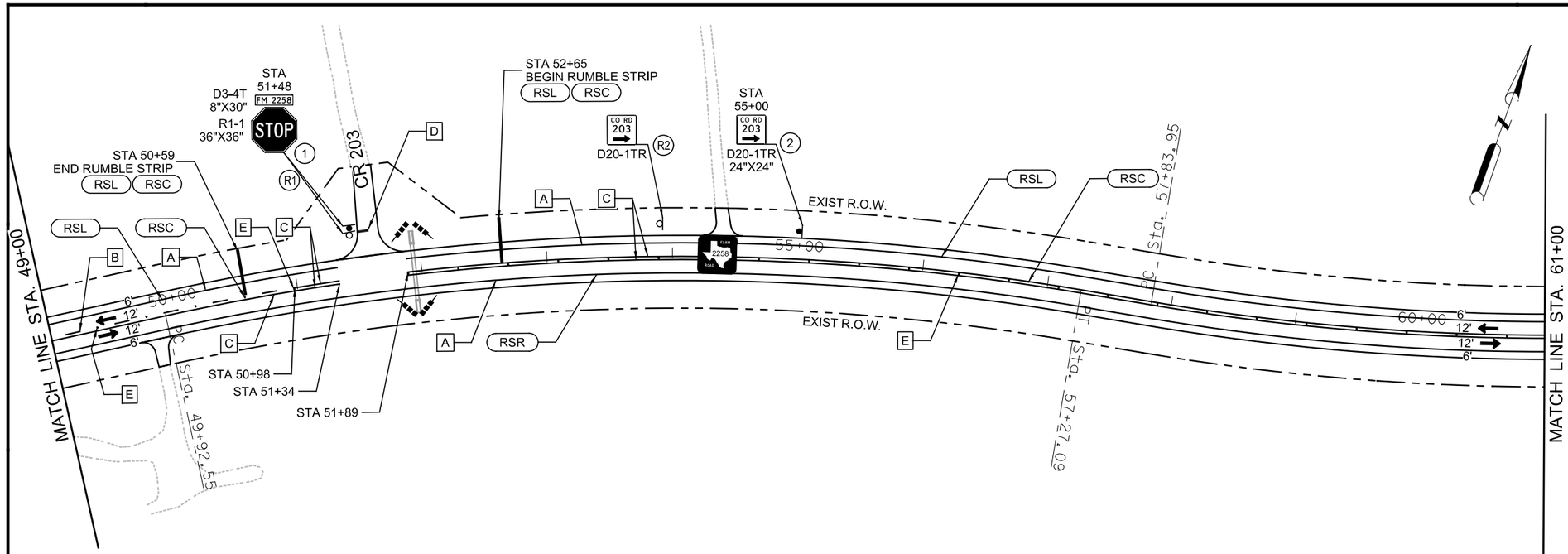

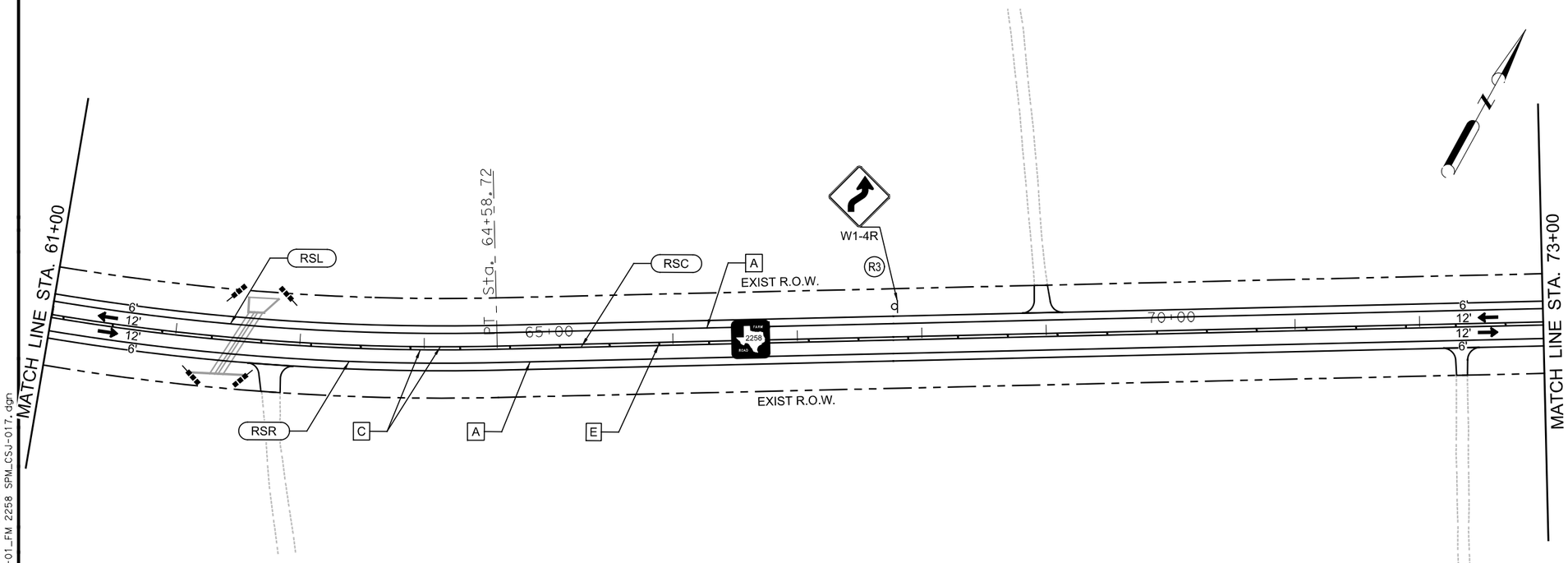

PAVEMENT MARKINGS LEGEND

- A — RE PM W/RET REQ TY I (W)(06")(SLD)(100MIL)
- B — RE PM W/RET REQ TY I (Y)(06")(BRK)(100MIL)
- C — RE PM W/RET REQ TY I (Y)(06")(SLD)(100MIL)
- D — PREFAB PAV MRK TY C (W)(24")(SLD)
- E — REFL PAV MRKR TY II-A-A
- OM ASSM (OM-2Y)(WC)GND
- DIRECTION OF TRAFFIC FLOW
- RSL — RUMBLE STRIP SHLDR LT
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SIGNING LEGEND

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NOTES:

LEFT SHOULDER RUMBLE STRIP PER STD RS(4)-13 OPT (4)

RIGHT SHOULDER RUMBLE STRIP PER STD RS(4)-13 OPT (4)

CENTERLINE RUMBLE STRIP PER STD RS(3)-13 OPT (1)

		A	B	C	D	E	RSL RSR	RSC
	UNIT	LF	LF	LF	LF	EA	LF	LF
STA 49+00 TO STA 73+00	QTY	4743	50	4490	9	58	4592	2194

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SIGNING AND PAVEMENT MARKINGS

STA. 49+00 TO STA. 73+00

SCALE 1" = 100' 0 20 40 60 80 100 SHEET 03 OF 07

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	166

STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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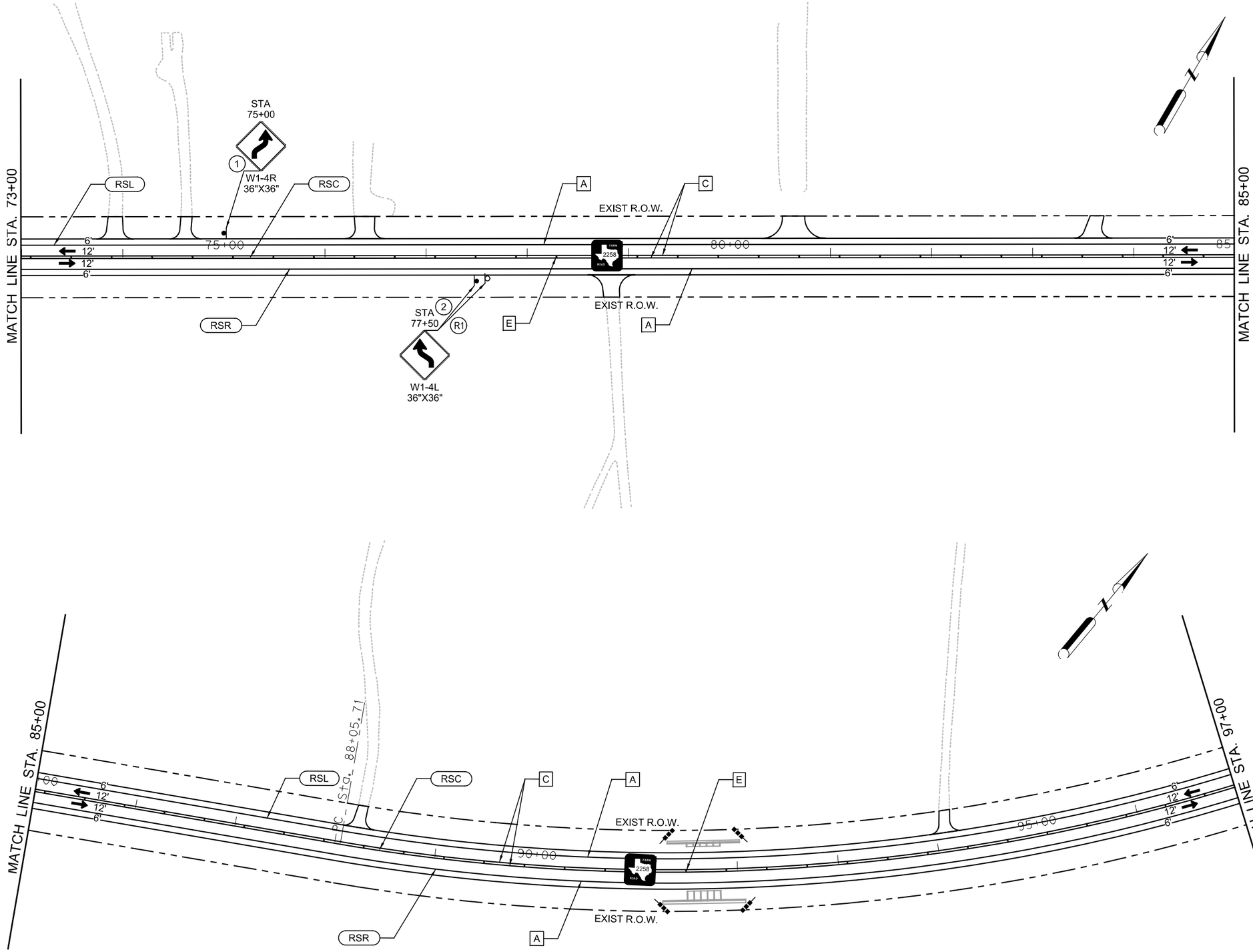

PAVEMENT MARKINGS LEGEND

- A — RE PM W/RET REQ TY I (W)(06")(SLD)(100MIL)
- B — RE PM W/RET REQ TY I (Y)(06")(BRK)(100MIL)
- C — RE PM W/RET REQ TY I (Y)(06")(SLD)(100MIL)
- D — PREFAB PAV MRK TY C (W)(24")(SLD)
- E — REFL PAV MRKR TY II-A-A
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- DIRECTION OF TRAFFIC FLOW
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RIGHT SHOULDER RUMBLE STRIP PER STD RS(4)-13 OPT (4)

CENTERLINE RUMBLE STRIP PER STD RS(3)-13 OPT (1)

		A	B	C	D	E	RSL RSR	RSC
	UNIT	LF	LF	LF	LF	EA	LF	LF
STA 73+00 TO STA 97+00	QTY	4801		4801		60	4800	1200

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SIGNING AND PAVEMENT MARKINGS

STA. 73+00 TO STA. 97+00

SCALE 1" = 100' 0 20 40 60 80 100

SHEET 04 OF 07

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	167

STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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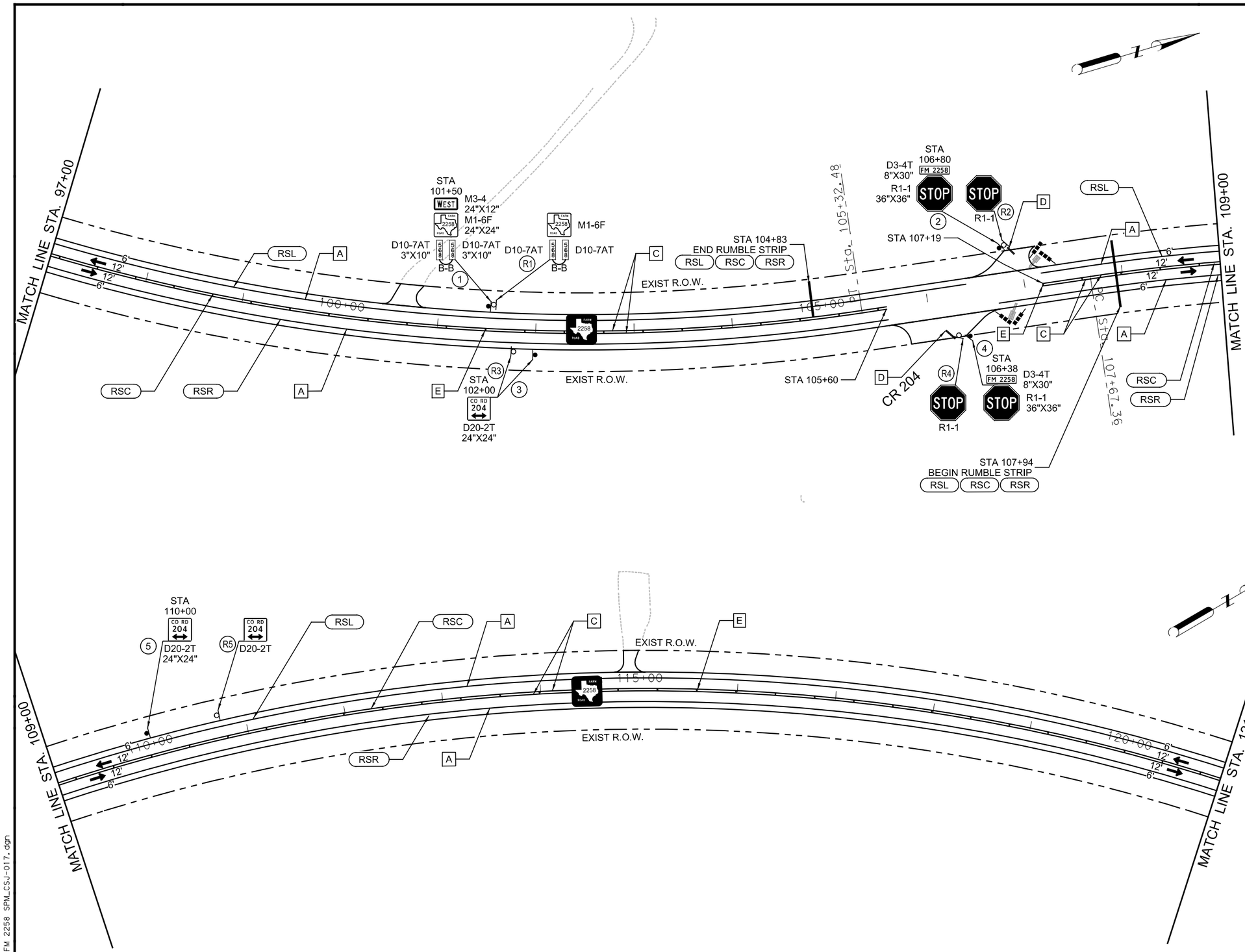

PAVEMENT MARKINGS LEGEND

- A — RE PM W/RET REQ TY I (W)(06")(SLD)(100MIL)
- B — RE PM W/RET REQ TY I (Y)(06")(BRK)(100MIL)
- C — RE PM W/RET REQ TY I (Y)(06")(SLD)(100MIL)
- D — PREFAB PAV MRK TY C (W)(24")(SLD)
- E — REFL PAV MRKR TY II-A-A
- OM ASSM (OM-2Y)(WC)GND
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NOTES:

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RIGHT SHOULDER RUMBLE STRIP PER STD RS(4)-13 OPT (4)

CENTERLINE RUMBLE STRIP PER STD RS(3)-13 OPT (1)

		A	B	C	D	E	RSL RSR	RSC
	UNIT	LF	LF	LF	LF	EA	LF	LF
STA 97+00 TO STA 121+00	QTY	4610		4480	23	57	4180	2090

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SIGNING AND PAVEMENT MARKINGS

STA. 97+00 TO STA. 121+00

SCALE 1" = 100' 0 20 40 60 80 100 SHEET 05 OF 07

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	168

STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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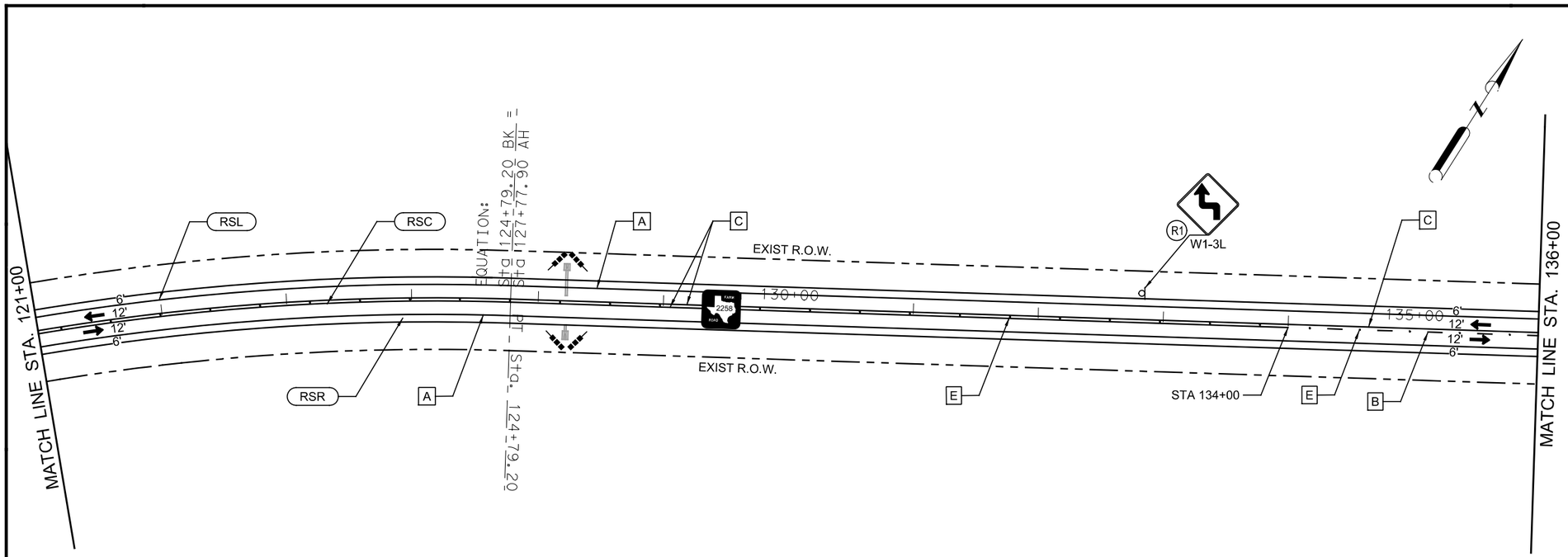

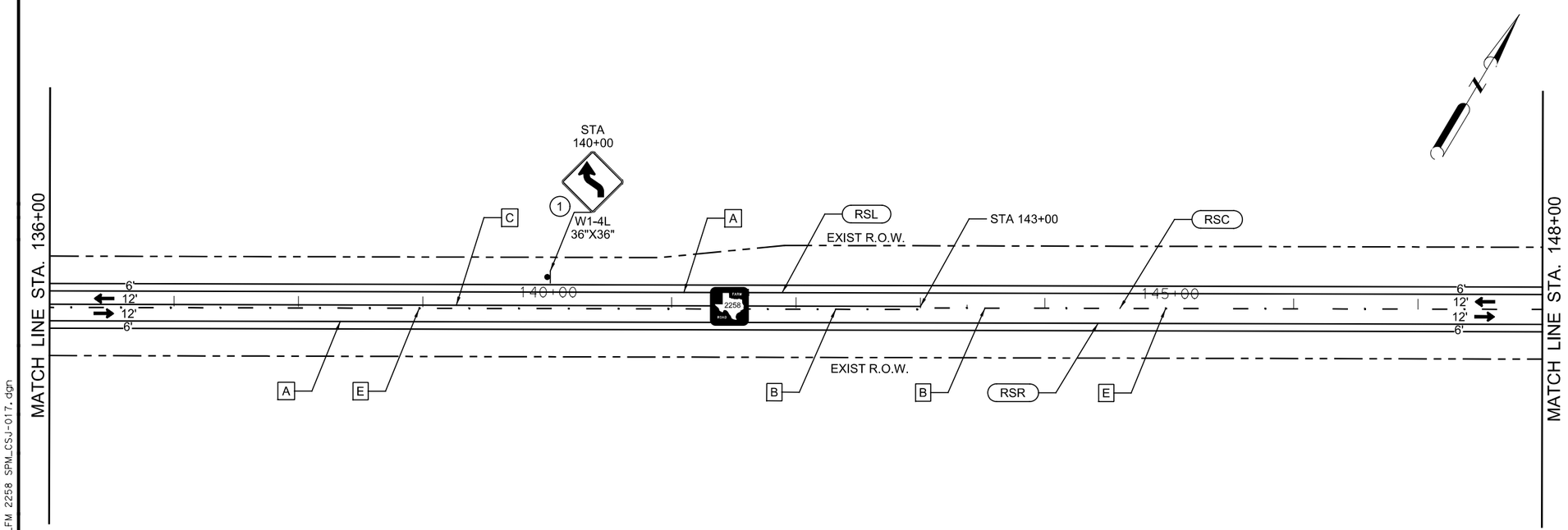

PAVEMENT MARKINGS LEGEND

- A — RE PM W/RET REQ TY I (W)(06")(SLD)(100MIL)
- B — RE PM W/RET REQ TY I (Y)(06")(BRK)(100MIL)
- C — RE PM W/RET REQ TY I (Y)(06")(SLD)(100MIL)
- D — PREFAB PAV MRK TY C (W)(24")(SLD)
- E — REFL PAV MRKR TY II-A-A
- OM ASSM (OM-2Y)(WC)GND
- DIRECTION OF TRAFFIC FLOW
- RSL — RUMBLE STRIP SHLDR LT
- RSR — RUMBLE STRIP SHLDR RT
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SIGNING LEGEND

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- (R1) EXIST SMALL SIGN TO BE REMOVED
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NOTES:

LEFT SHOULDER RUMBLE STRIP PER STD RS(4)-13 OPT (4)

RIGHT SHOULDER RUMBLE STRIP PER STD RS(4)-13 OPT (4)

CENTERLINE RUMBLE STRIP PER STD RS(3)-13 OPT (1)

		A	B	C	D	E	RSL RSR	RSC
	UNIT	LF	LF	LF	LF	EA	LF	LF
STA 121+00 TO STA 148+00	QTY	4802	350	2903		54	4804	2401

STATE OF TEXAS
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AUTHORIZED 02-03-2024

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SIGNING AND PAVEMENT MARKINGS

STA. 121+00 TO STA. 148+00

SCALE 1" = 100' 0 20 40 60 80 100 SHEET 06 OF 07

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	169

STATE	DIST.	COUNTY
TEXAS	FTW	JOHNSON

CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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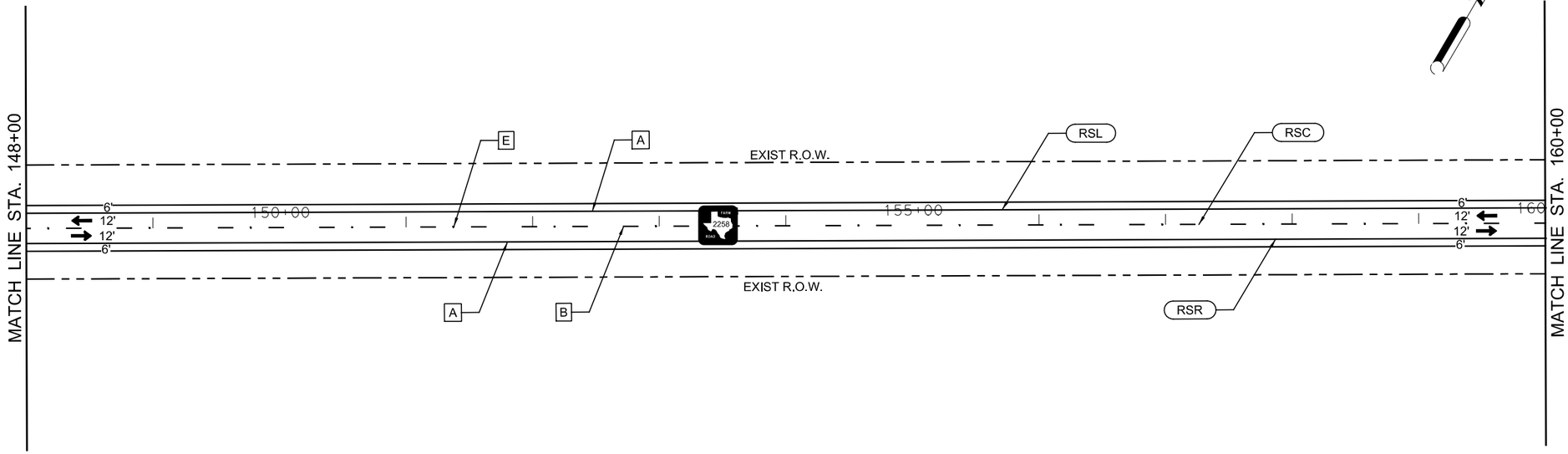

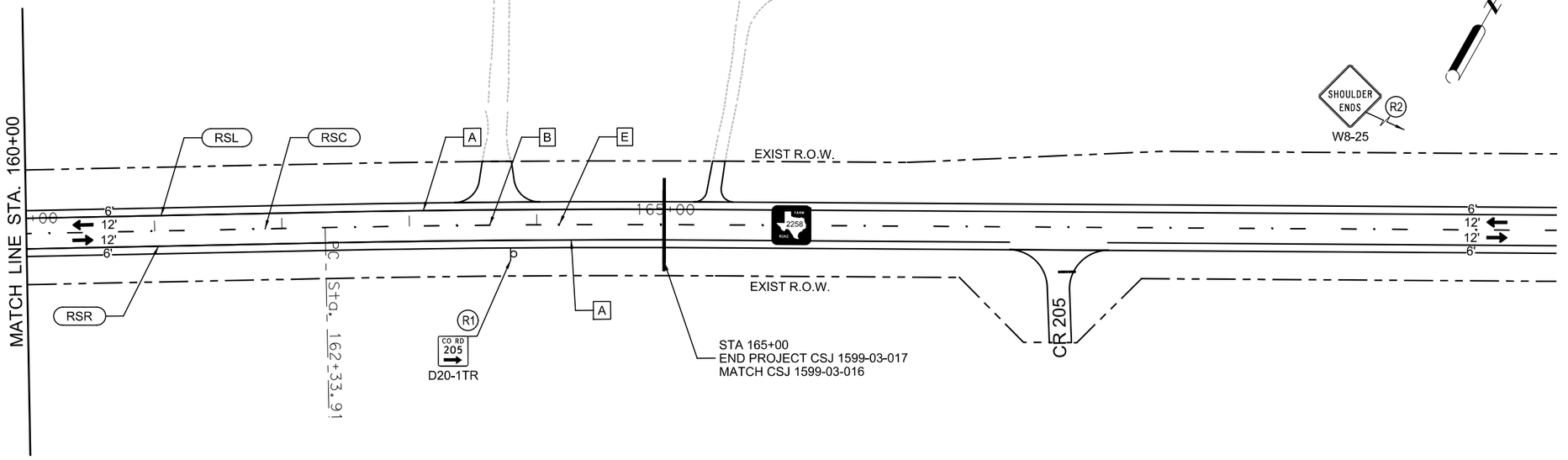

PAVEMENT MARKINGS LEGEND

- A — RE PM W/RET REQ TY I (W)(06")(SLD)(100MIL)
- B — RE PM W/RET REQ TY I (Y)(06")(BRK)(100MIL)
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- OM ASSM (OM-2Y)(WC)GND
- DIRECTION OF TRAFFIC FLOW
- RSL — RUMBLE STRIP SHLDR LT
- RSR — RUMBLE STRIP SHLDR RT
- RSC — RUMBLE STRIP CENTERLINE

SIGNING LEGEND

- (1) PROP SMALL SIGN
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NOTES:

LEFT SHOULDER RUMBLE STRIP PER STD RS(4)-13 OPT (4)

RIGHT SHOULDER RUMBLE STRIP PER STD RS(4)-13 OPT (4)

CENTERLINE RUMBLE STRIP PER STD RS(3)-13 OPT (1)

		A	B	C	D	E	RSL RSR	RSC
	UNIT	LF	LF	LF	LF	EA	LF	LF
STA 148+00 TO STA 165+00	QTY	3400	420			22	3402	1701

STATE OF TEXAS
JOSE A. SANCHEZ
87890
LICENSED
PROFESSIONAL ENGINEER

AUTHORIZED 02-03-2024

TEDSI INFRASTRUCTURE GROUP
TEDSI
TBPE F-1640
Consulting Engineers
1201 E. Interstate Highway 2
Mission, Texas 78572
(956) 424-7898

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

FM 2258

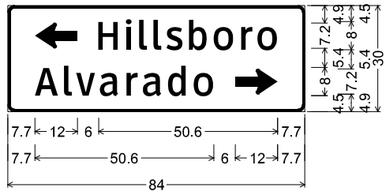
SIGNING AND PAVEMENT MARKINGS

STA. 148+00 TO STA. 165+00

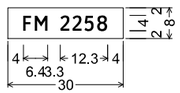
SCALE 1" = 100' 0 20 40 60 80 100 SHEET 07 OF 07

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		170
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

2/3/2024 1:54:23 PM
...\2019-2085-01_FM 2258 SPM_CSJ-017.dgn



D1-2;
1.9" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 12.0" X 7.1" 180';
"Hillsboro", ClearviewHwy-3-W;
"Alvarado", ClearviewHwy-3-W;
Standard Arrow Custom 12.0" X 7.1" 0';



D3-4T;
No border, White on, Green;
"FM 2258", ClearviewHwy-3-W;

1.50" Radius, 0.75" Border, White on Green;
"CO RD", ClearviewHwy-3-W;
"203", ClearviewHwy-3-W;
Standard Arrow Custom 12.00" X 6.13" 0°;

1.50" Radius, 0.75" Border, White on Green;
"CO RD", ClearviewHwy-3-W;
"203", ClearviewHwy-3-W;
Standard Arrow Custom 12.00" X 6.13" 180°;

1.5" Radius, 0.8" Border, White on Green;
"CO RD", ClearviewHwy-3-W;
"204", ClearviewHwy-3-W;
Double Headed Arrow 1 - 12.0" 0°;

AUTHORIZED 02-03-2024

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Mission, Texas 78572
(956) 424-7898

TEDSI
TBPE F-1640

CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

FM 2258

SMALL SIGN PANEL DETAILS

SHEET 01 OF

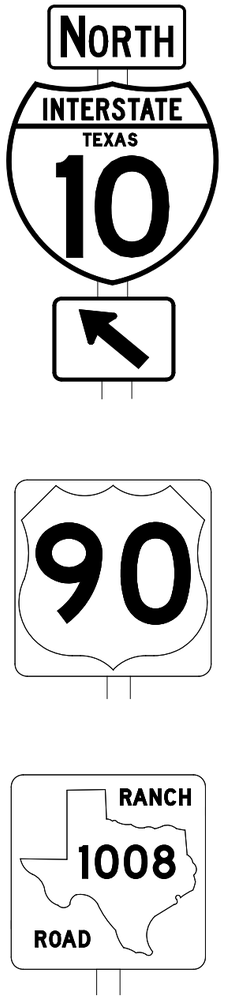
FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		171
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

2/3/2024 1:54:24 PM
...\2019-2085-01_FM 2258 SPM_CSJ-017.dgn

DATE: 2/3/2024 1:54:28 PM
FILE: c:\pw-tedsi-connect\dms88915\2019-2085-01_FM 2258 STD.dgn

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

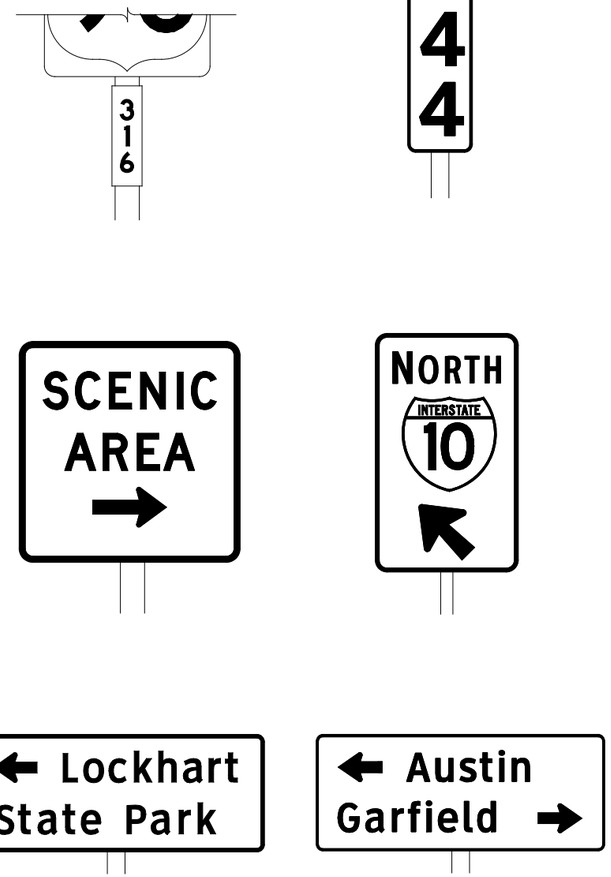
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



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

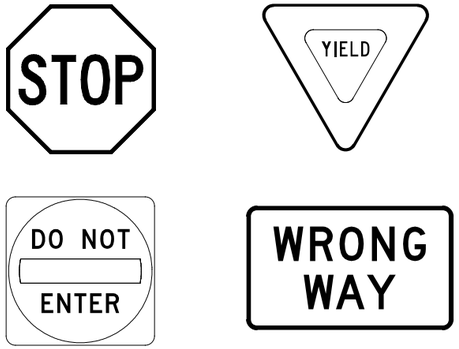
TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	1599	03	017	FM 2258
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	FTW	JOHNSON		172

DATE: 2/3/2024 1:54:28 PM
FILE: c:\pw-tedsi-connect\dms88915\2019-2085-01_FM 2258 STD.dgn

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

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.

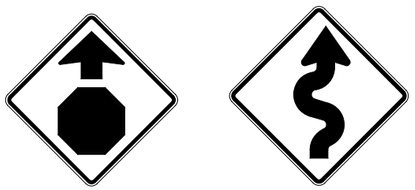
ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

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/

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

Texas Department of Transportation

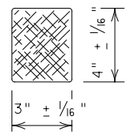
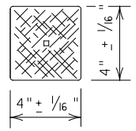
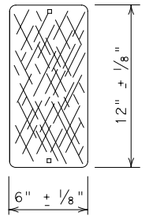
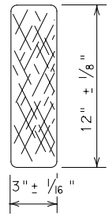
Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

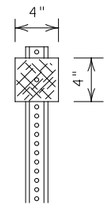
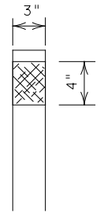
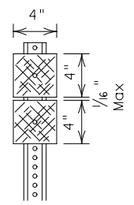
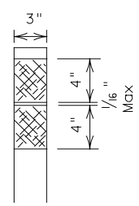
TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	1599	03	017	FM 2258
12-03 7-13 9-08	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		173

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

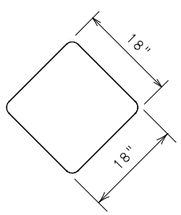
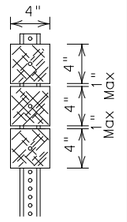
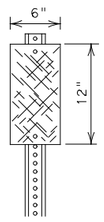
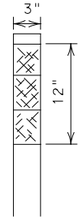
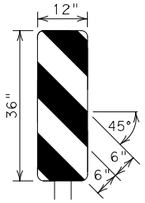
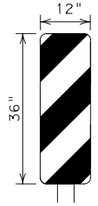
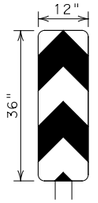
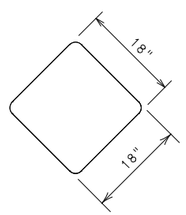
INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

- NUMBER OF REFLECTORS
  - S = Single
  - D = Double
- COLOR OF REFLECTORS
  - W = White
  - Y = Yellow
  - R = Red
- REFLECTOR UNIT SIZE
  - 1 or 2
- TYPE OF POST OR DELINEATOR
  - WC = Wing Channel Post
  - YFLX = Yellow Flexible Post
  - WFLX = White Flexible Post
  - BRF = Barrier Reflector
- TYPE OF MOUNT
  - GND = Embedded (drivable or set in concrete)
  - CTB = Concrete Barrier Mount
  - GF1 or GF2 = Guard Fence Attachment
  - SRF = Surface Mount
- DIRECTION
  - If Required
  - BI = Bi-Directional
  - BR = Bi-Directional with red on back

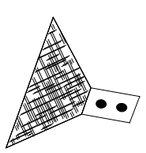
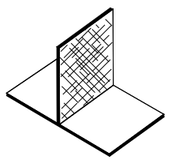
INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

- TYPE OF OBJECT MARKER
  - 1, 2, 3, or 4
- NUMBER OF REFLECTORS OR DIRECTION
  - X = 3-Size 2 reflector units (Type 2 only)
  - Y = 1-Size 3 reflector unit (Type 2 only)
  - Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
  - L = Left Side (Type 3 Object Marker only)
  - R = Right Side (Type 3 Object Marker only)
  - C = Center (Type 3 Object Marker only)
- TYPE OF POST
  - WC = Wing Channel Post
  - WFLX = White Flexible Post
  - TWT = Thin Walled Tubing
- TYPE OF MOUNT
  - GND = Embedded (drivable)
  - SRF = Surface Mount
  - WAS = Wedge Anchor Steel
  - WAP = Wedge Anchor Plastic
- DIRECTION
  - If Required
  - BI = Bi-Directional

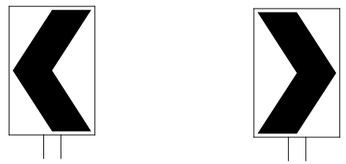
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

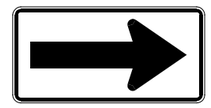
BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		

CHEVRONS

DEVICE	 W1-8			
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	
NOTE	1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies). 2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).			

ONE DIRECTION LARGE ARROW

DEVICE	 W1-6	
SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

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

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	1599	03	017	FM 2258
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	FTW	JOHNSON		174

20A

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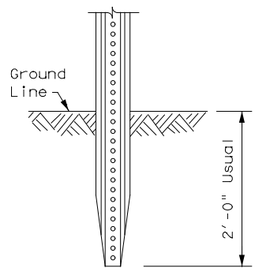
POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

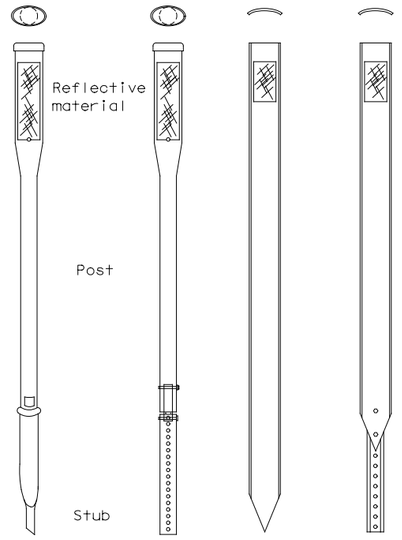


NOTES

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.

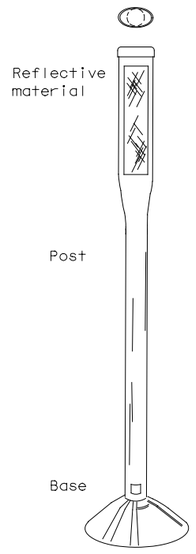
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



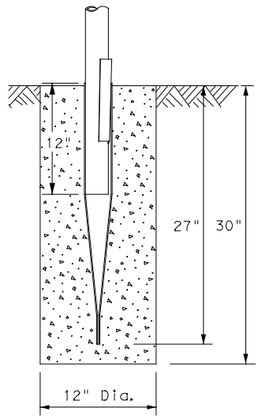
SURFACE MOUNT

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.

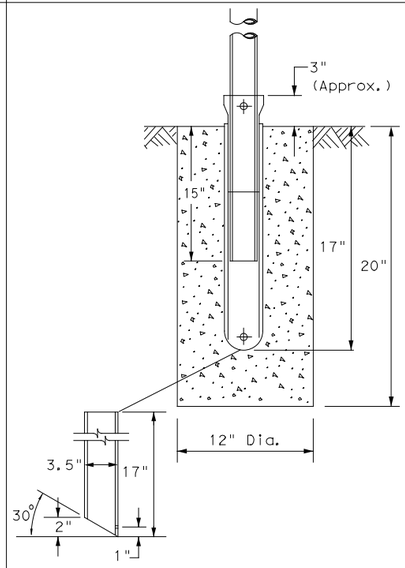
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

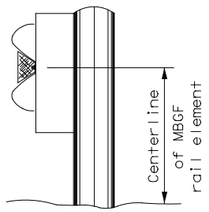
NOTE

1. Install per manufacturer's recommendations.

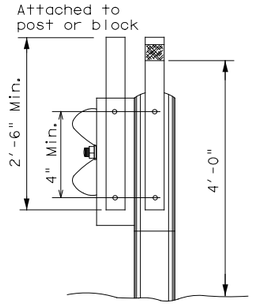
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

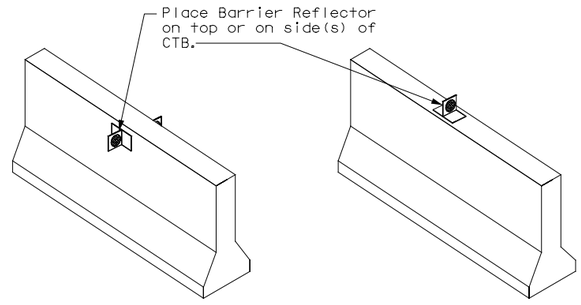
GF1



GF2



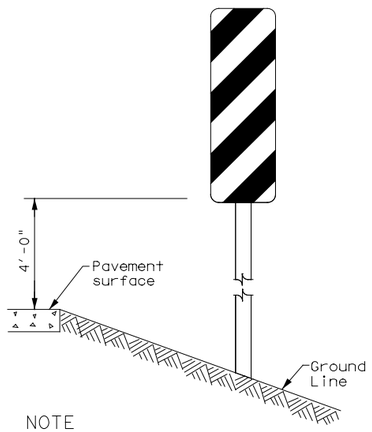
CONCRETE TRAFFIC BARRIER (CTB)



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.

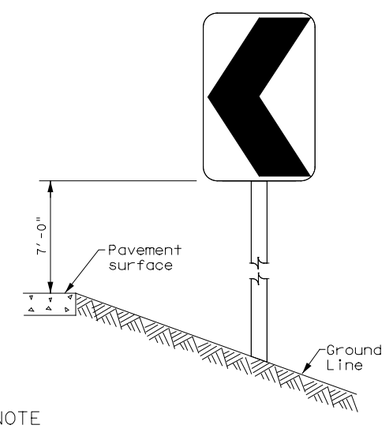
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

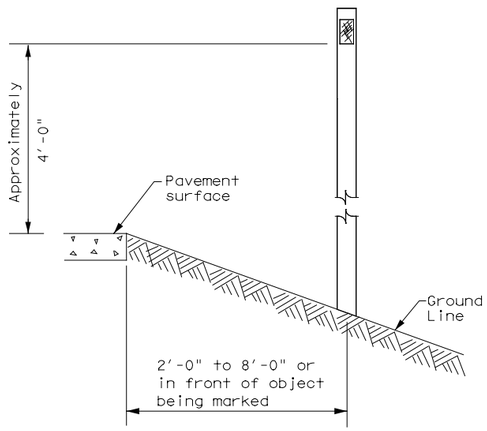
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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

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©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	1599	03	017	FM 2258
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	FTW	JOHNSON		175

20B

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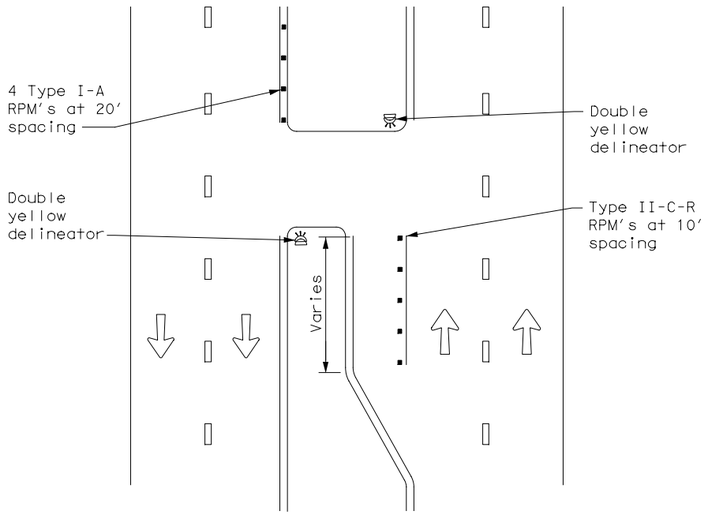
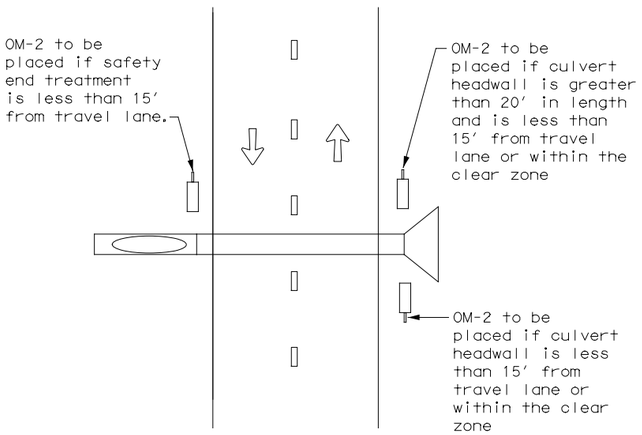
CROSSOVERS



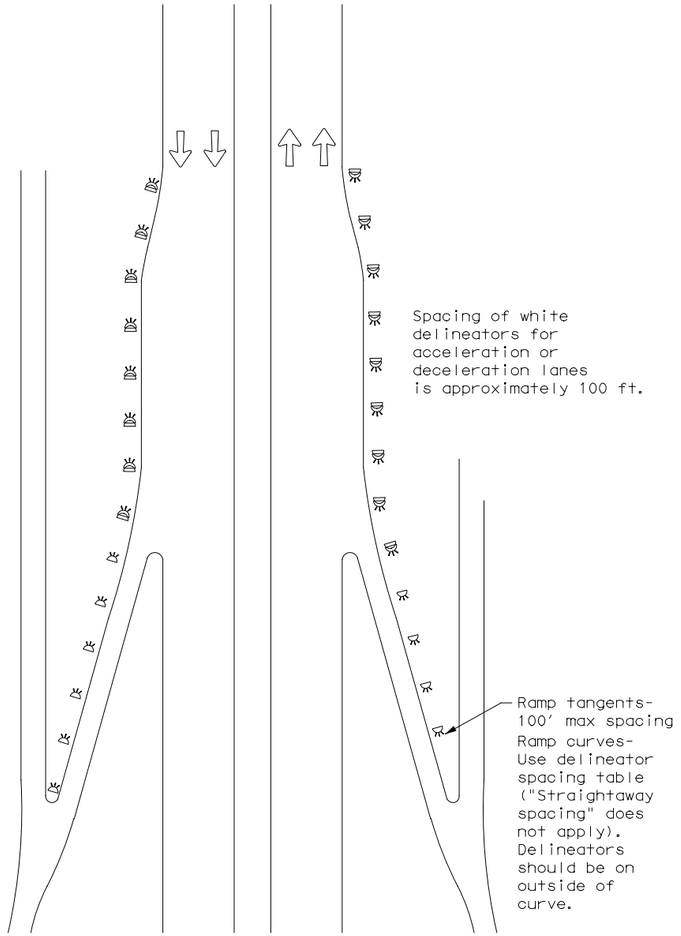
DETAIL 1

FOR CULVERTS WITHOUT MBGF



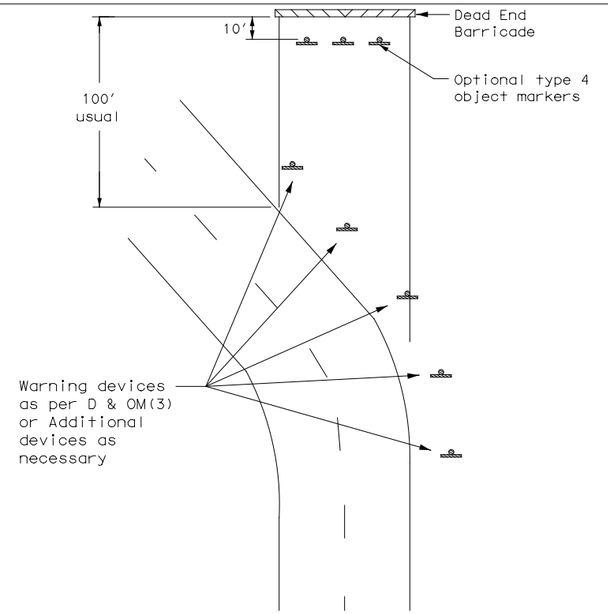
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



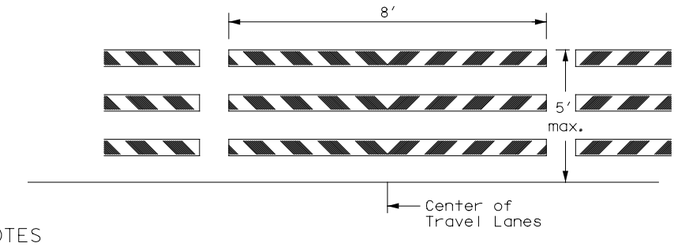
DETAIL 3

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
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3-15 7-20	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		176

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SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

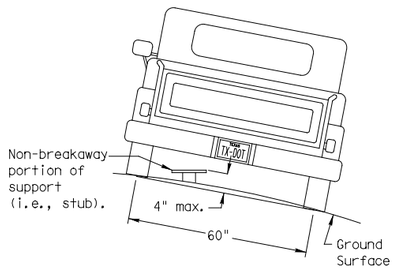
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

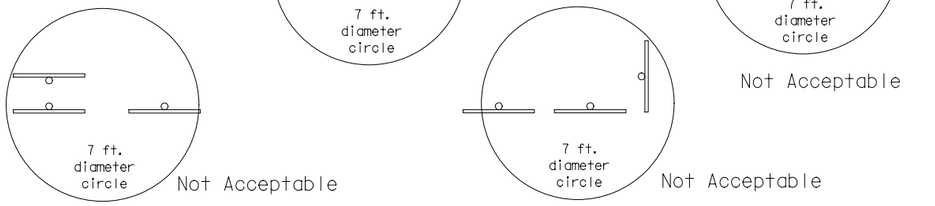
P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1))

REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



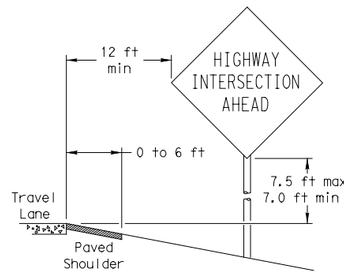
To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

No more than 2 sign posts should be located within a 7 ft. circle.



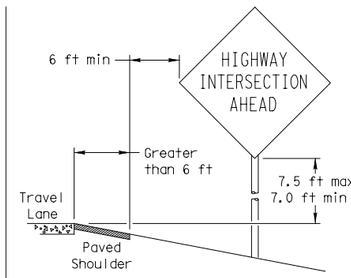
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

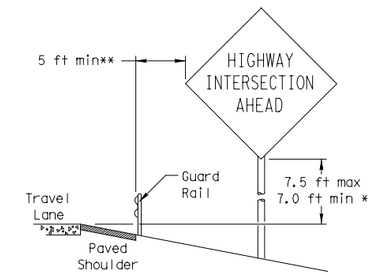
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



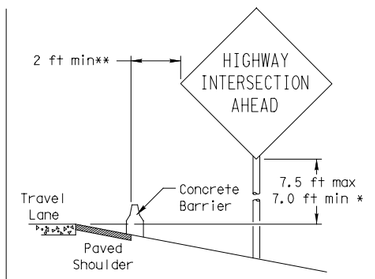
GREATER THAN 6 FT. WIDE

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.

BEHIND BARRIER



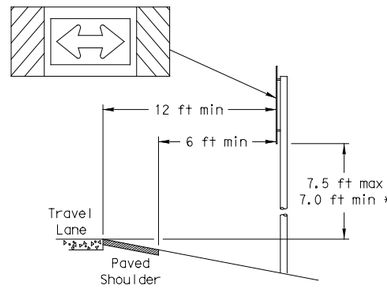
BEHIND GUARDRAIL



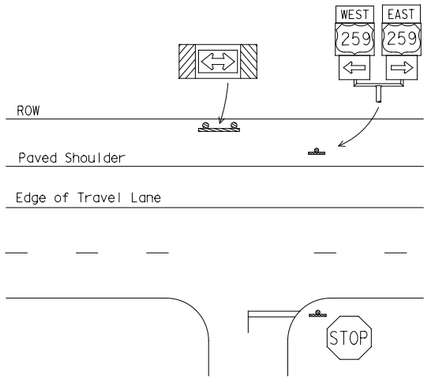
BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

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.



* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

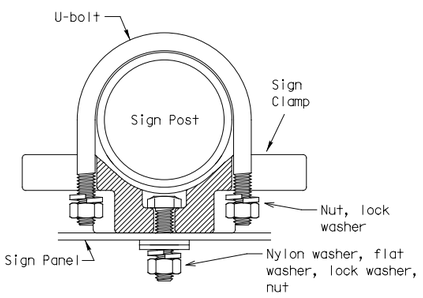
The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

The website address is:
http://www.txdot.gov/publications/traffic.htm

TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

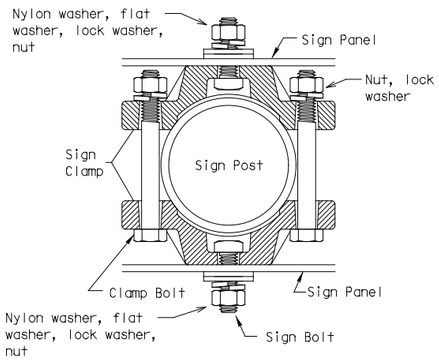


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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.

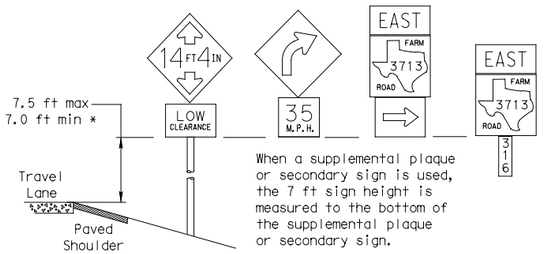
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



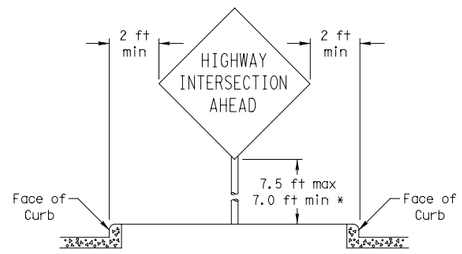
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



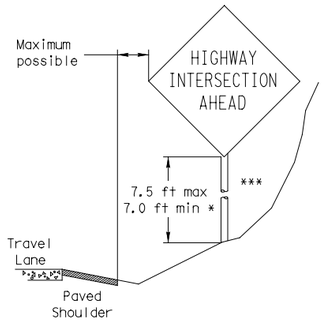
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

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.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

REVISIONS
9-08

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

CONT	SECT	JOB	HIGHWAY
1599	03	017	FM 2258

DIST	COUNTY	SHEET NO.
FTW	JOHNSON	177

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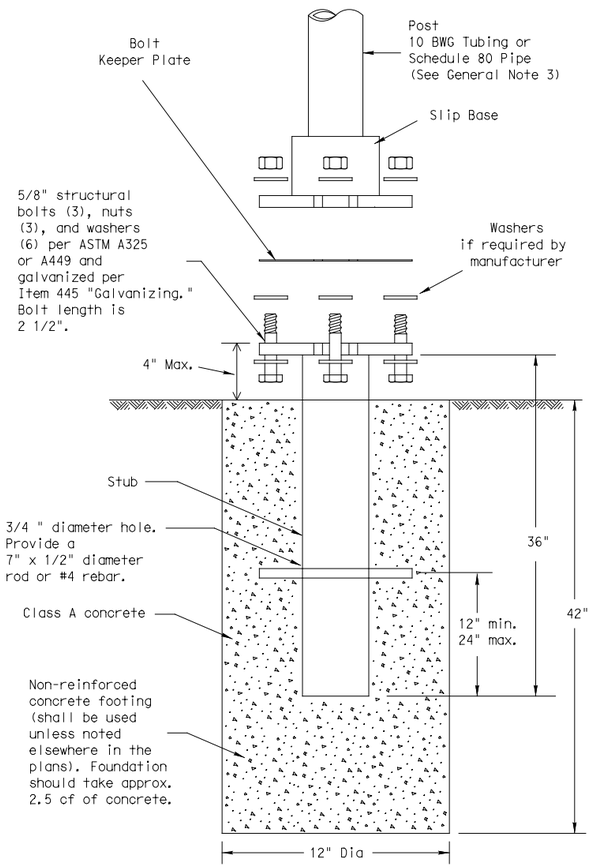
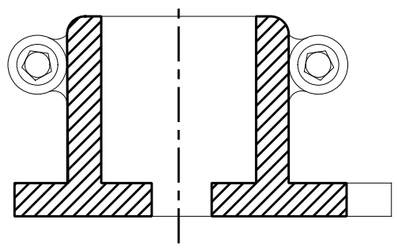
TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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.



SLIPBASE SECTION

BOLT CLAMP TYPE
(SEE APPLICABLE FABRICATION DRAWINGS FOR FURTHER DETAIL)
https://ftp.txdot.gov/pub/txdot-info/cmd/cserve/standard/traffic/slipdetail.pdf

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

3A. Slipbases utilizing the "Set Screw type Section" will not be allowed. Use Slipbases matching the "Bolt Clamp type Section." THe acceptable section has been added to this Standard for Contractor's information only. ★

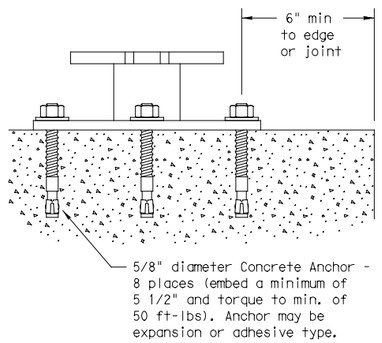
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

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.

AUTHORIZED 02-03-2024

THIS SEAL SUBSTANTIATIES THE ITEMS IDENTIFIED WITH AN ★ ONLY AND DOES NOT CONFIRM THE DESIGN STANDARDS (BY OTHERS) PRESENTED HERON

Texas Department of Transportation
Traffic Operations Division

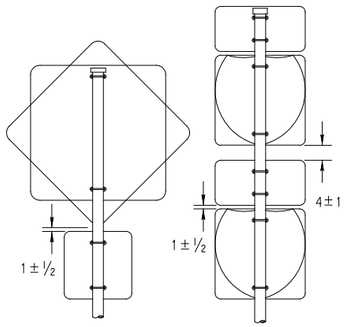
SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08(MOD)

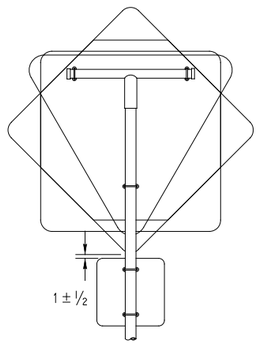
©TxDOT July 2002	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		178

26B

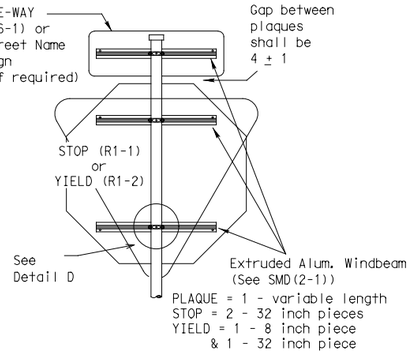
DATE: 2/3/2024 1:54:30 PM
FILE: c:\pw-tedsl-connect\dms88915\2019-2085-01#FM 2258 STD.dgn



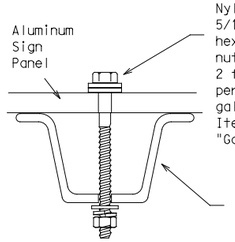
SM RD SGN ASSM TY XXXXX(1)XX(P)



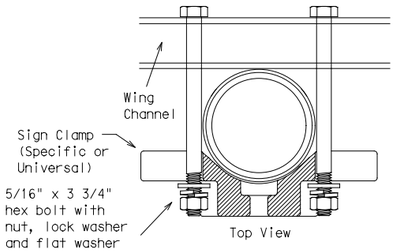
SM RD SGN ASSM TY XXXXX(1)XX(T)



SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



Detail A



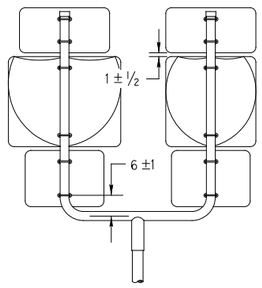
Detail B

GENERAL NOTES:

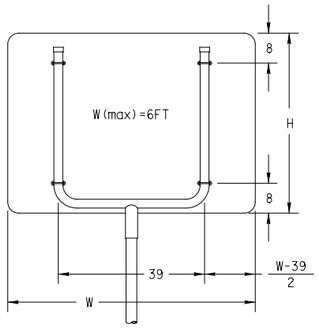
1.

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

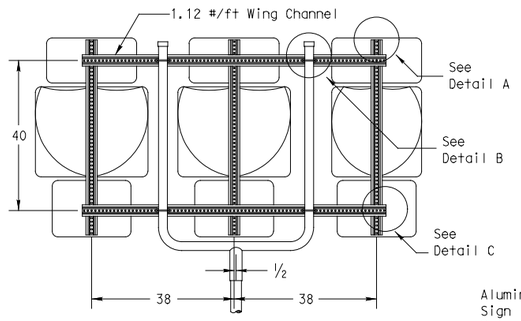
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material 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.



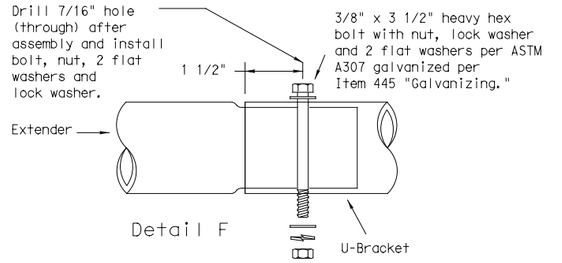
SM RD SGN ASSM TY XXXXX(1)XX(U)



SM RD SGN ASSM TY XXXXX(1)XX(U)

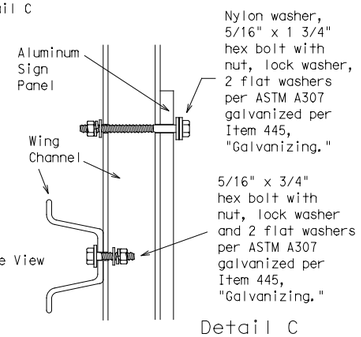


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)



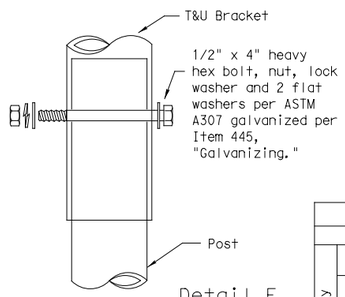
Detail F

Splices shall only be allowed behind the sign substrate.

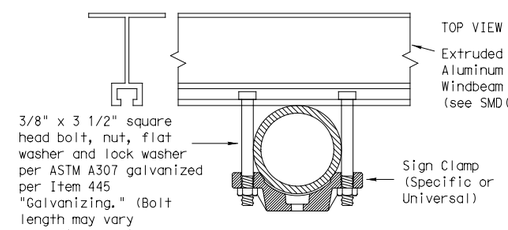


SIDE VIEW

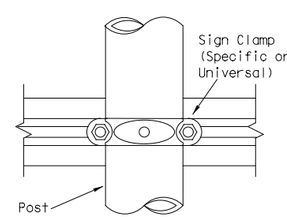
Detail C



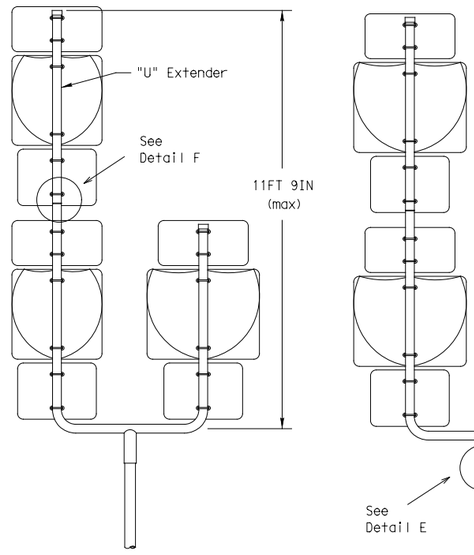
Detail E



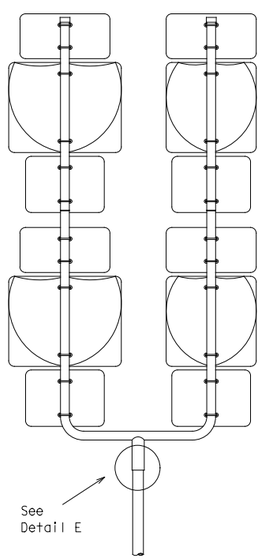
Detail D



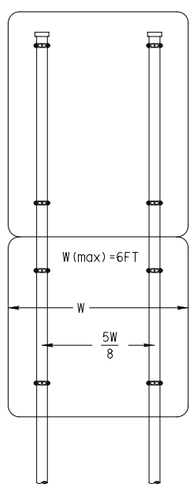
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	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)



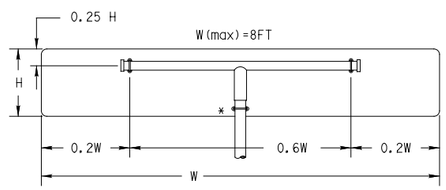
SM RD SGN ASSM TY S80(1)XX(U-1EXT)



SM RD SGN ASSM TY S80(1)XX(U-2EXT)



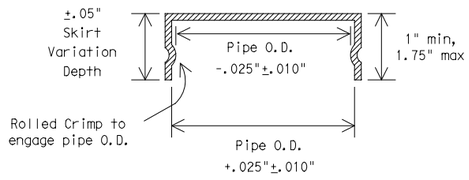
SM RD SGN ASSYM TY XXXXX(2)XX(P)



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.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		179

26C

DATE: 2/3/2024 1:54:31 PM
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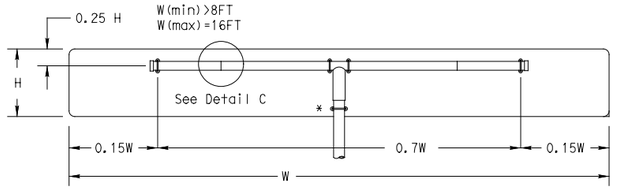
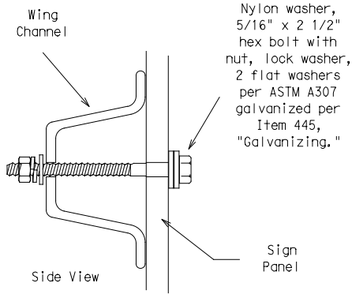
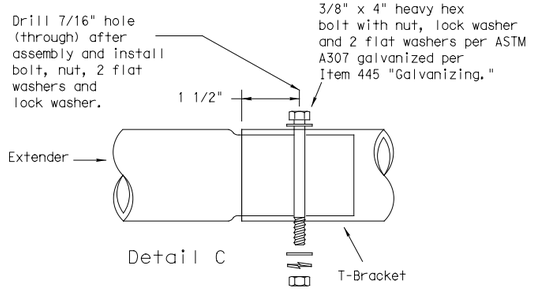


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)

(* - See Note 12)



Detail B



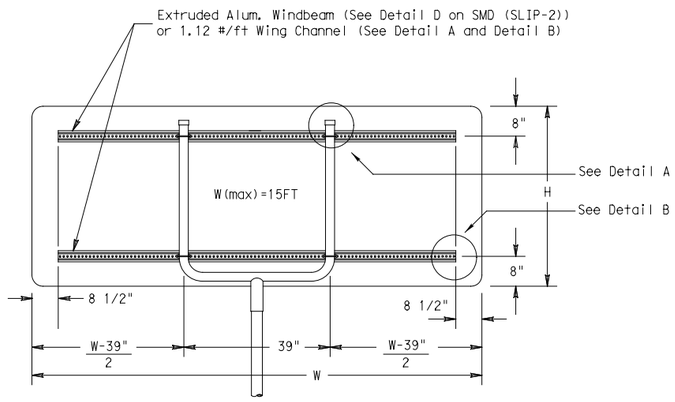
Detail C

Splices shall only be allowed behind the sign substrate.

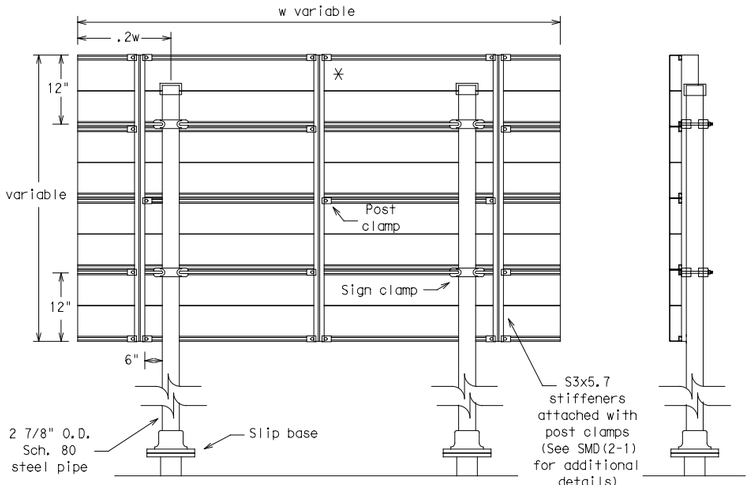
GENERAL NOTES:

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

1. 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.
2. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
3. 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.
4. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
5. 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.
6. 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.
7. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
8. 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."
9. Sign blanks shall be the sizes and shapes shown on the plans.
10. 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.
11. Post open ends shall be fitted with Friction Caps.



SM RD SGN ASSM TY XXXXX(1)XX(U-XX)

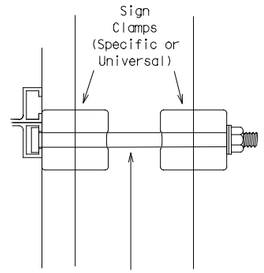


Typical Sign Mount

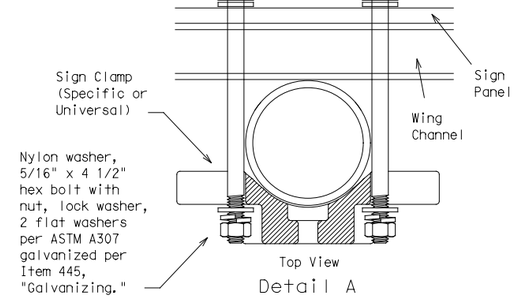
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

See Detail E for clamp installation

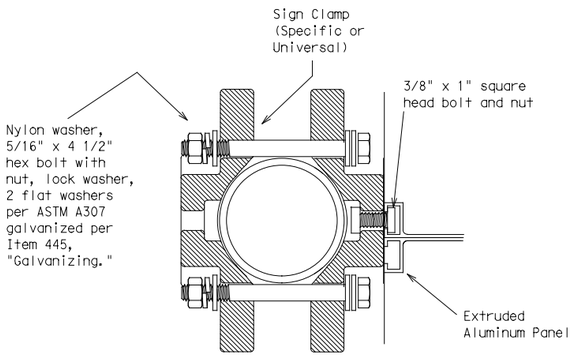


Detail E



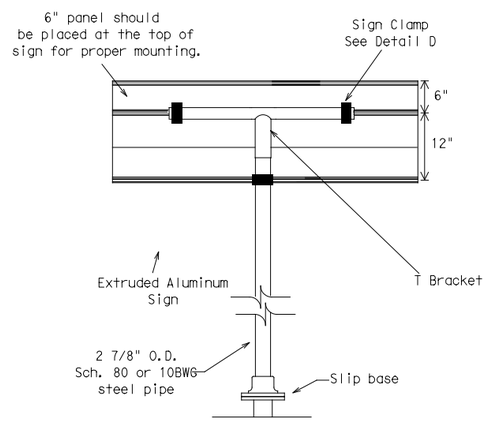
Top View

Detail A

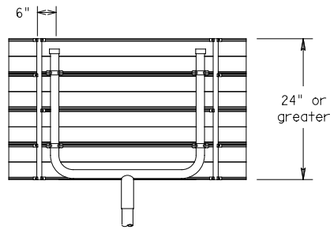


Detail D

EXTRUDED ALUMINUM SIGN WITH T BRACKET



Extruded Aluminum Sign With T Bracket



Use Extruded Alum. Windbeam as stiffeners See SMD (2-1) for additional details

See Detail E for clamp installation

REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS
9-08

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

CONT	SECT	JOB	HIGHWAY
1599	03	017	FM 2258

DIST	COUNTY	SHEET NO.
FTW	JOHNSON	180

26D

DATE: 2/3/2024 1:54:31 PM
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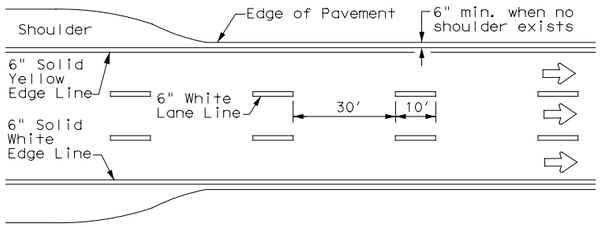
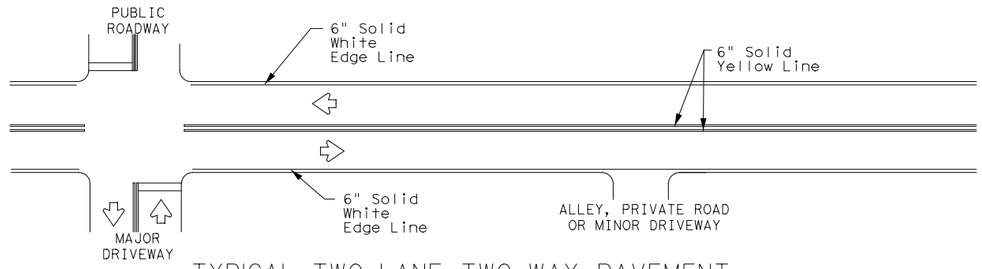
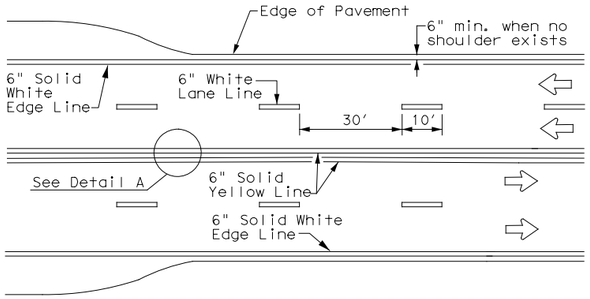
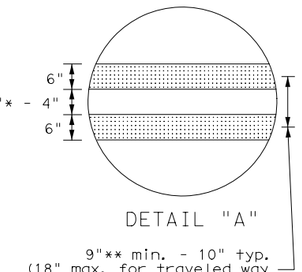


EDGE LINE AND LANE LINES
ONE-WAY ROADWAY
WITH OR WITHOUT SHOULDERS



TYPICAL TWO-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS

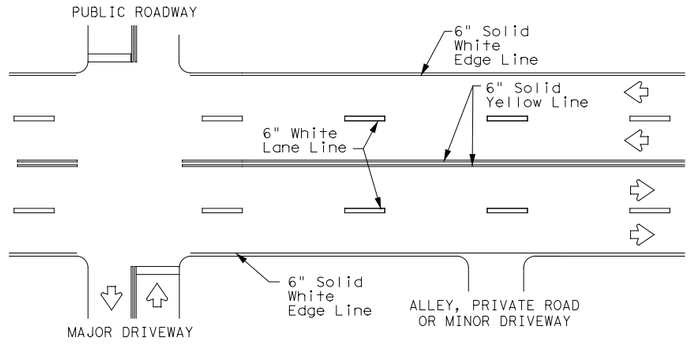




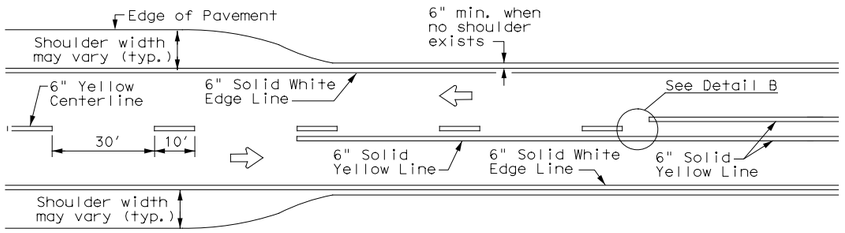
CENTERLINE AND LANE LINES
FOUR LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS

* 2" minimum for restripe projects when approved by the Engineer.

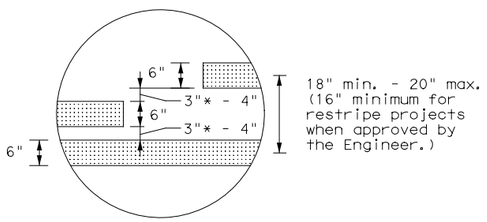
** 8" minimum for restripe projects when approved by the Engineer.



TYPICAL MULTI-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS

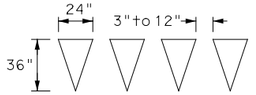


TWO LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS



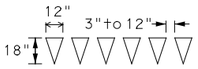
DETAIL "B"

* 2" minimum for restripe projects when approved by the Engineer.

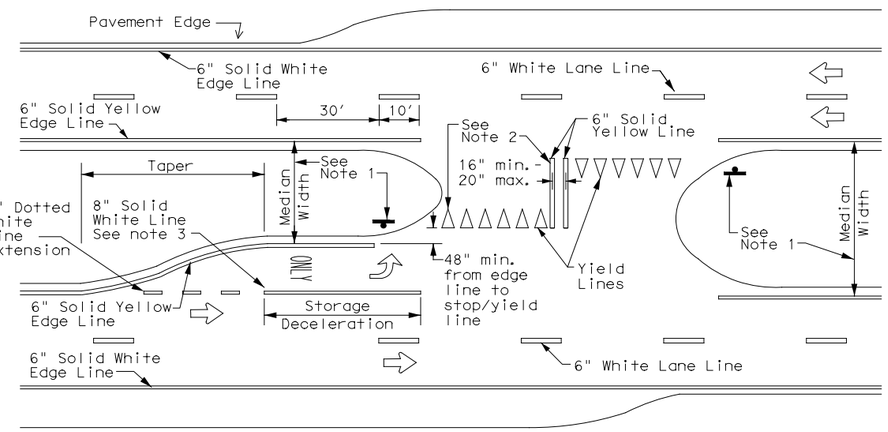


For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



For posted speed on road being marked equal to or less than 40 MPH.



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

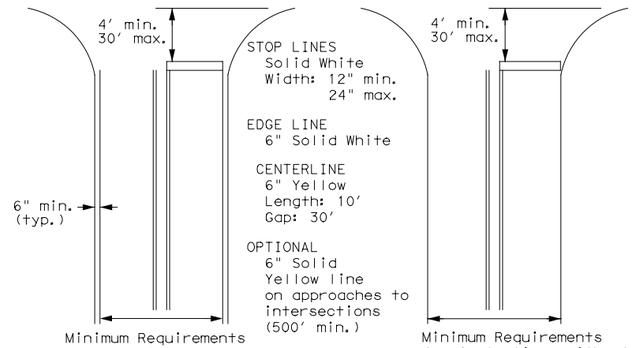
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections.
   Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling 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
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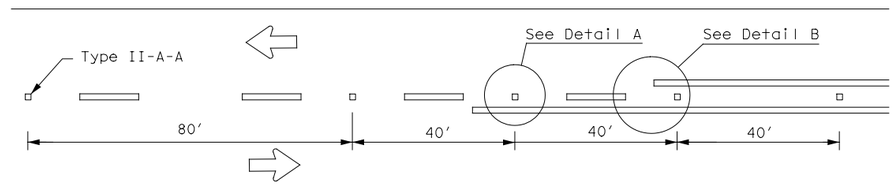
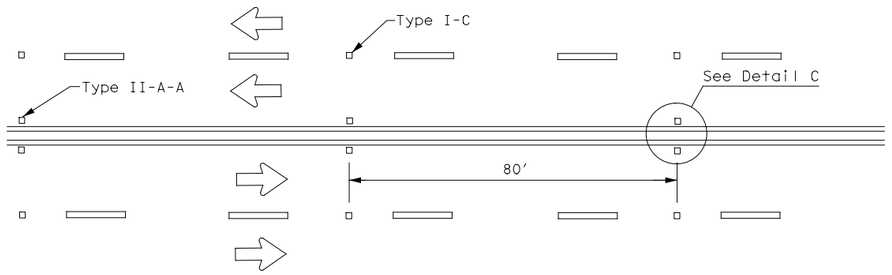
11-78 8-00 6-20	DIST	COUNTY		SHEET NO.
8-95 3-03 12-22	FTW	JOHNSON		181
5-00 2-12				

22A

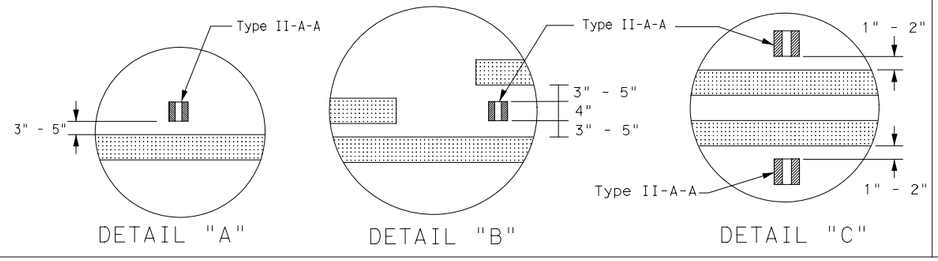
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



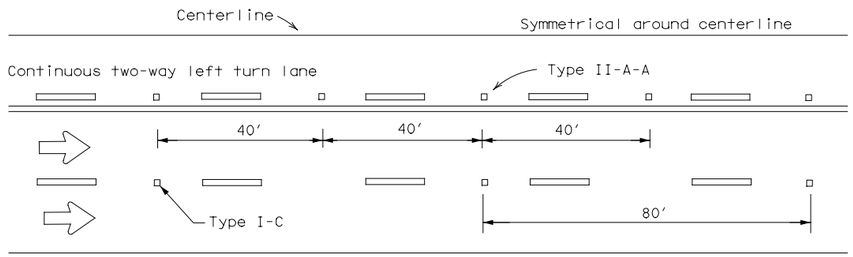
CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS



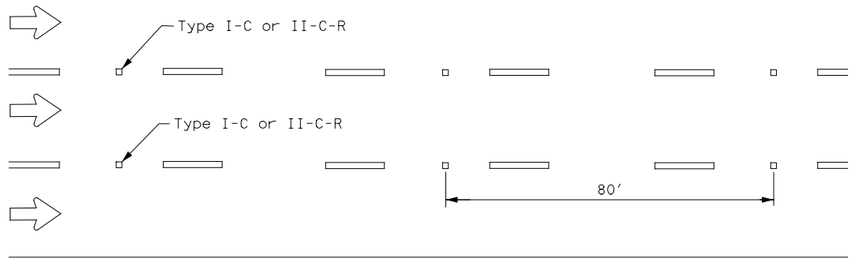
CENTERLINE & LANE LINES
FOR FOUR LANE TWO-WAY ROADWAYS



DETAIL "A" DETAIL "B" DETAIL "C"



CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



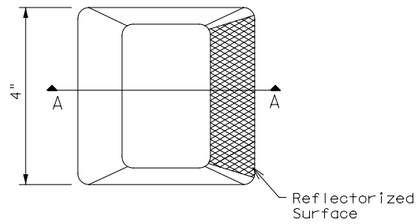
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

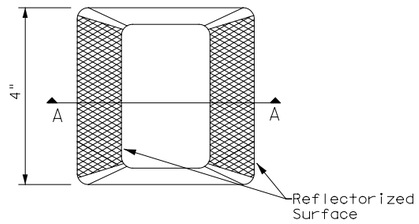
See Note 3.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

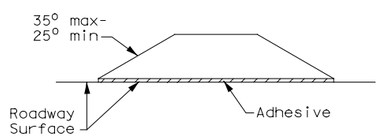
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

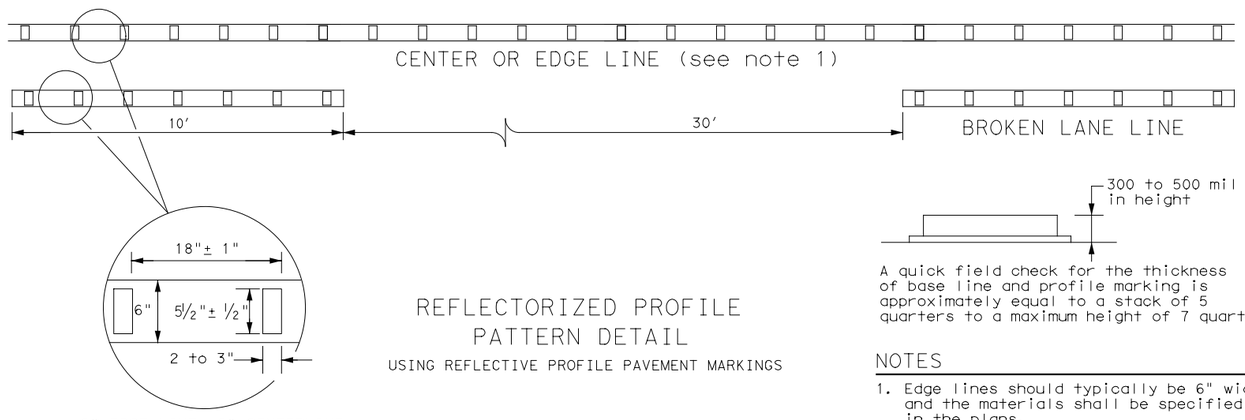


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



6" EDGE LINE, 6" CENTERLINE
OR 6" LANE LINE

REFLECTORIZED PROFILE
PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTES

1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-22

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
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4-92 2-10 12-22	FTW	JOHNSON		182
5-00 2-12				

22B

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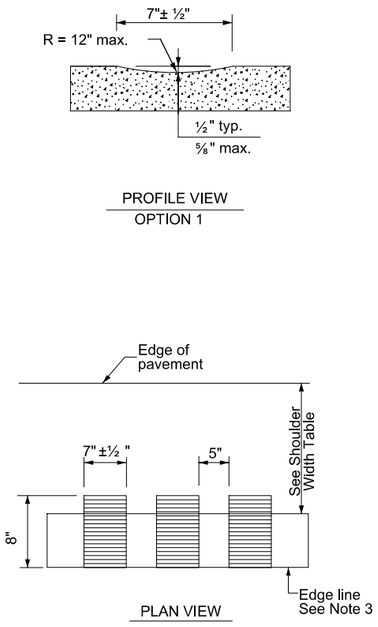
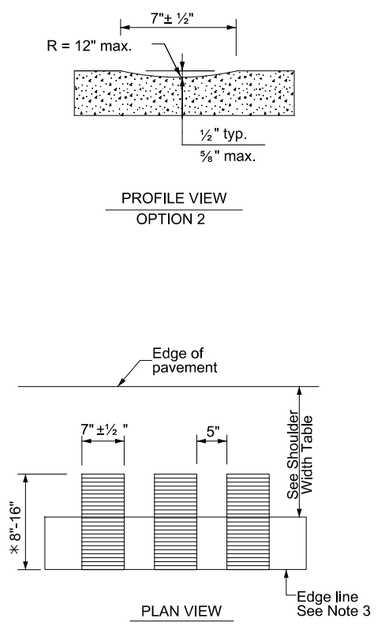
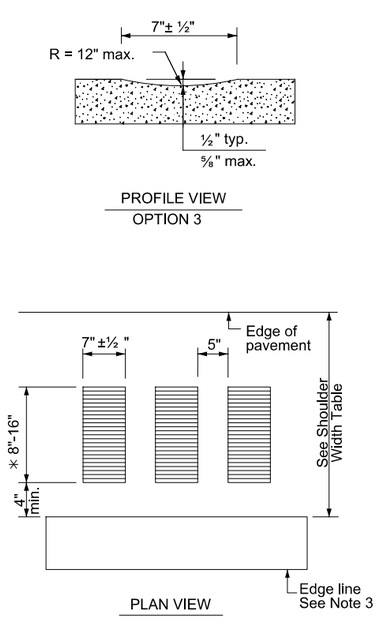


CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



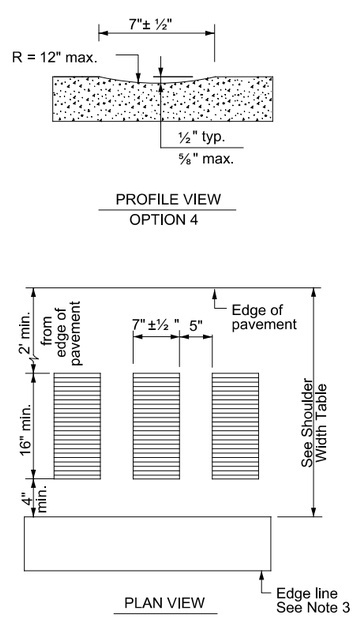
∗ This distance may vary based on width of shoulder

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)

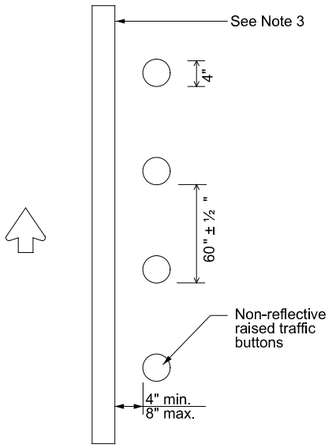


∗ This distance may vary based on width of shoulder

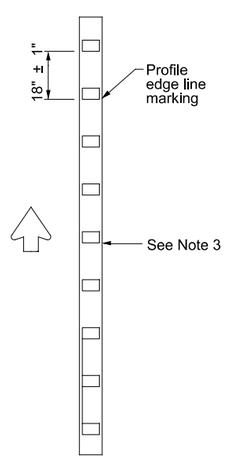
CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



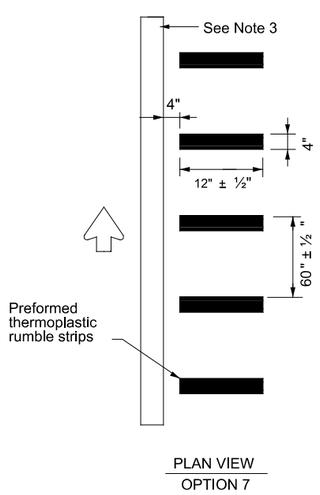
CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



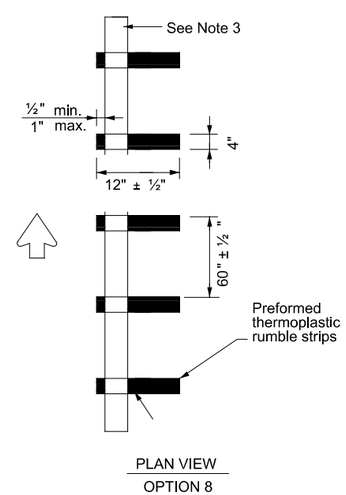
RAISED EDGE LINE (Rumble Strips)



PROFILE EDGE LINE MARKINGS (Rumble Strips)



PREFORMED THERMOPLASTIC EDGE LINE (Rumble Strips)



PREFORMED THERMOPLASTIC EDGE LINE (Rumble Strips)

SHOULDER WIDTH TABLE		
EQUAL TO OR LESS THAN 2 FEET	GREATER THAN 2 FEET LESS THAN 4 FEET	EQUAL TO OR GREATER THAN 4 FEET
Option 1, 5, 6 or 8	Option 1, 2, 3 5, 6 or 7	Option 2, 4, 5 6 or 7

GENERAL NOTES

1. Rumble strips and profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
2. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
3. Use Standard Sheet PM(2) and FPM(1) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
4. See the Shoulder Width Table below for determining what options may be used for edge line rumble strips.
5. Breaks in edge line rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections, or driveways with high usage of large trucks when installed on conventional highways.
6. Rumble strips shall not be placed across exit or entrance ramps, acceleration or deceleration lanes, crossovers, gore areas, or intersections with other roadways.
7. Consideration should be given to noise levels when edgeline rumble strips are to be installed near residential areas, schools, churches, etc. A 3/8 inch deep (minimum) milled rumble strip may be considered in these areas.
8. Consideration shall be given to bicyclists. See RS(6).

WHEN INSTALLING MILLED DEPRESSION EDGE LINE RUMBLE STRIPS:

9. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Safety Division.
10. Pavement markings can be applied over milled shoulder rumble strips to create an edge line rumble strip.

WHEN INSTALLING RAISED OR PROFILE EDGE LINE RUMBLE STRIPS:

11. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per the manufacturer's recommendations.
12. Non-reflective traffic buttons shall be placed adjacent to the pavement marking delineating the edge line when used as a rumble strip. The color of the button should match the color of the adjacent edge line marking (white or yellow). The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
13. Non-reflective traffic buttons shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
14. The minimum distance between the edge line and the buttons should be used if the shoulder is less than 8 feet in width.
15. Raised profile thermoplastic markings used as edge lines may substitute for buttons.

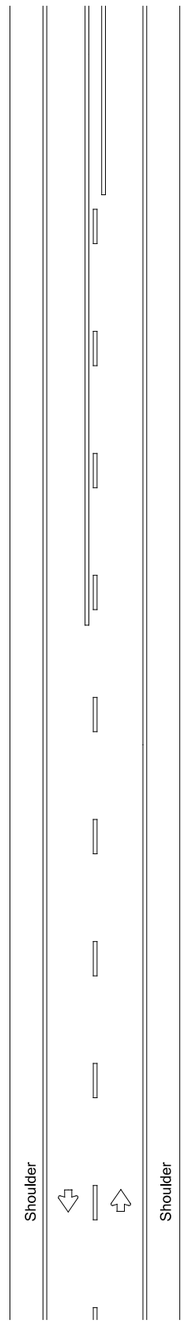
Texas Department of Transportation

Traffic Safety Division Standard

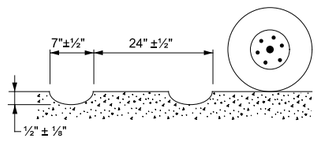
EDGE LINE RUMBLE STRIPS ON UNDIVIDED OR TWO LANE HIGHWAYS RS(2)-23

FILE: rs(2)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	1599	03	017	FM 2258
10-13 1-23	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		183

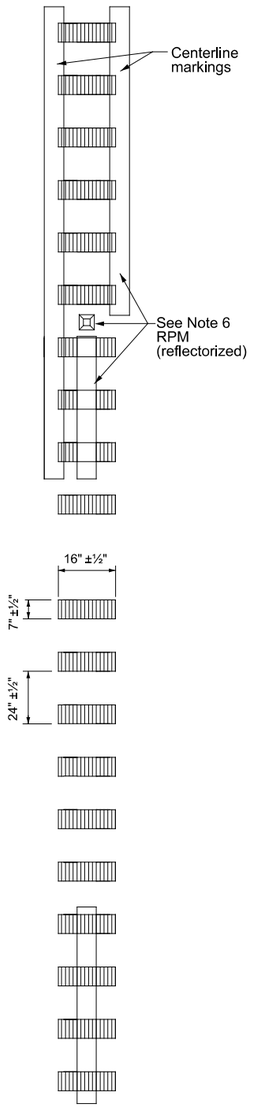
CENTERLINE RUMBLE STRIPS



TWO LANE TWO-WAY HIGHWAYS

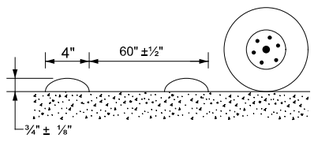


PROFILE VIEW

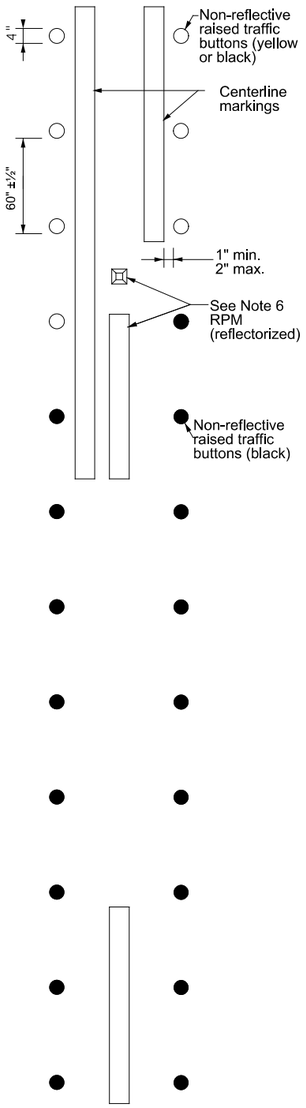


PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS

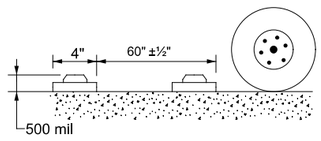


PROFILE VIEW

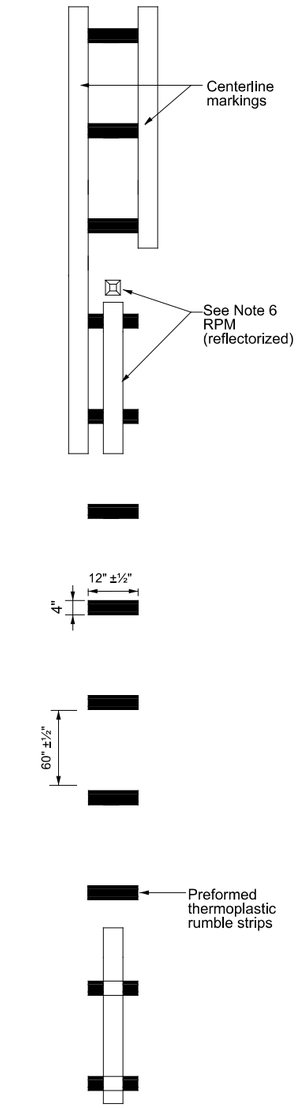


PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS

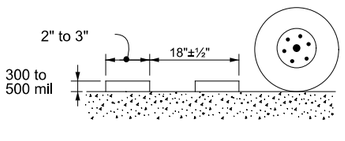


PROFILE VIEW

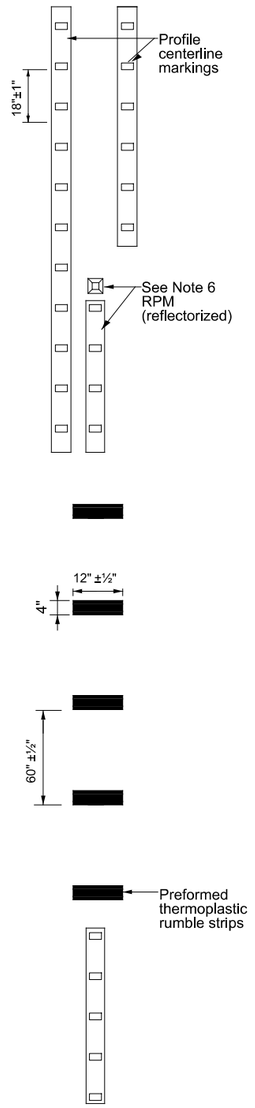


PLAN VIEW
OPTION 3

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).

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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
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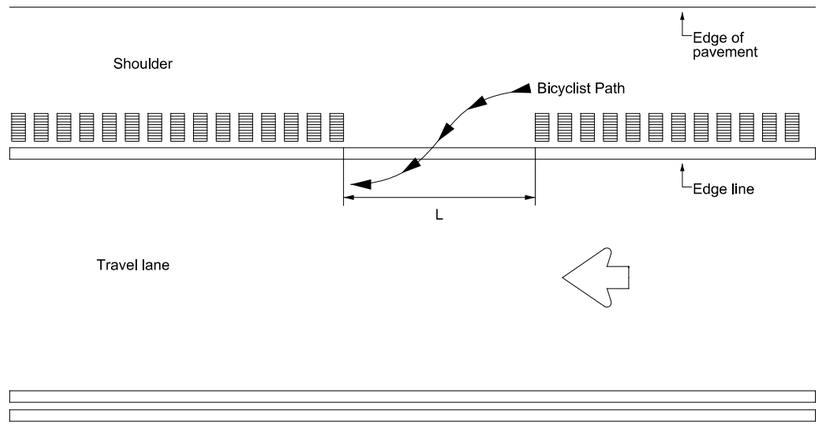
10-13	DIST	COUNTY		SHEET NO.
1-23	FTW	JOHNSON		184

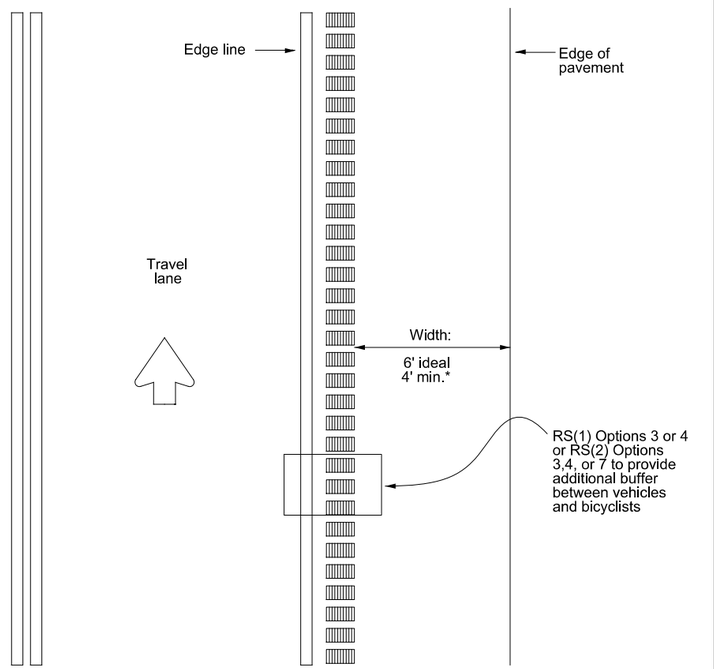


GAP LENGTH TABLE (L)	
BICYCLISTS OPERATING <= 20 MPH	>= 15 FEET
BICYCLISTS OPERATING > 20 MPH	>= 20 FEET*

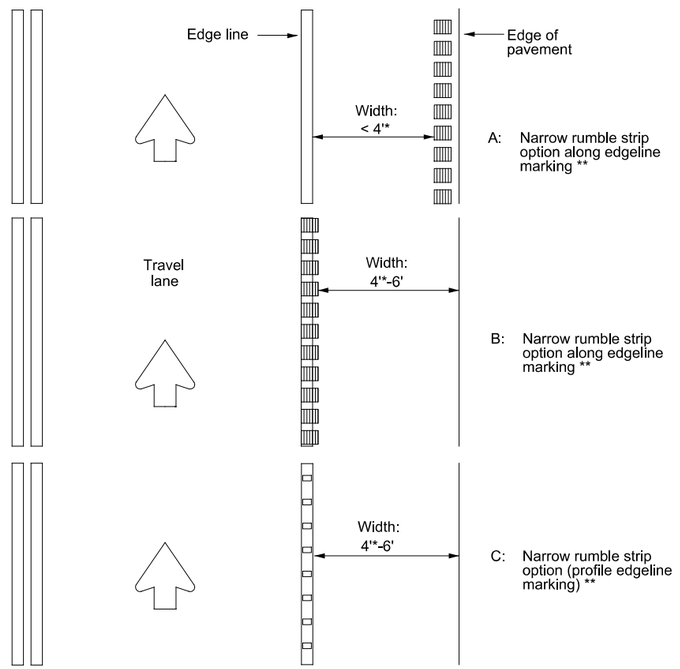
* Or the rumble strips should be located on the right side of the shoulder to allow bicyclists to avoid them if they encounter a need to enter the travel lane (e.g. a downhill location).

RUMBLE STRIP GAP SPACING

IDEAL



CONSTRAINED**



* 5' minimum if adjacent to curb, guardrail, vertical element, or obstacle.
** Options A-C for consideration of horizontal placement using engineering judgment. See RS(1) and RS(2) for rumble strip device options. Care should be taken to consider bicycles in applying the tables by shoulder width. Narrow rumble strip options include RS(1) Options 1, 2, and 6 and RS(2) Options 1, 2, 6, and 8.

RUMBLE STRIP HORIZONTAL PLACEMENT

GENERAL NOTES

1. The Engineer must consider accomodating bicycles during the planning and implementation of all construction and rehabilitation projects. See the TxDOT Roadway Design Manual (RDM) Bicycle Facilities section for applicable policies, references, and guidance; including additional detail regarding rumble strip gap and horizontal placement, as well as explanation of desirable, minimum, and constrained values.
2. For non-freeway facilities with bike lanes, buffered bike lanes, or bike-accessible shoulders, the Engineer shall place rumble strips considering the safety of and crash risk for bicyclists. The Engineer shall include a detail of rumble strip gap spacing, horizontal spacing from the edge line, and material / installation method in the plans.
3. See RS(5) General Note 8 regarding bicycle safety with transverse (in-line rumble strips.

GAPS

4. Rumble strip gaps to allow bicyclists to safely enter or exit a shoulder, as needed. In addition to gaps provided for vehicles (e.g. at cross-streets), the Engineer shall ensure gaps are available every 40 to 60 feet. See Gap Spacing detail. The Engineer should consider significant grades as they affect bicycle speeds in applying the Gap Length Table, for example downhill versus uphill bicycle speeds.

HORIZONTAL SPACING

5. Rumble strip horizontal spacing considerations affect bicyclist safety and mobility. The Engineer shall consider desirable, minimum, and constrained widths, as shown in the horizonal placement detail. The Engineer shall apply engineering judgment to choose placement and material options in the Shoulder Width Tables on each RS sheet to optimize safety for all users. Horizontal width for bikes does not include standard drainage inlets, rumble strips, or raised pavement markers (RPMs).

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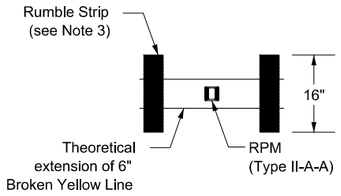
Texas Department of Transportation

Traffic Safety Division Standard

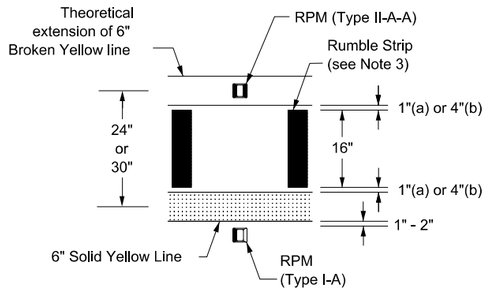
RUMBLE STRIP BICYCLE CONSIDERATIONS FOR NON-FREEWAY FACILITIES RS(6)-23

FILE: rs(6)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	1599	03	017	FM 2258
1-23	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		185

94A



DETAIL "A"



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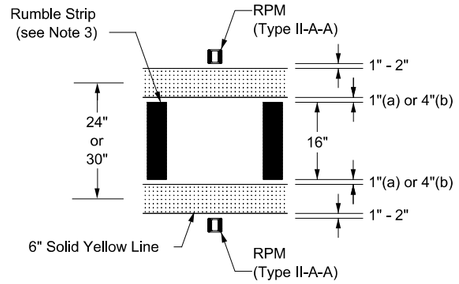
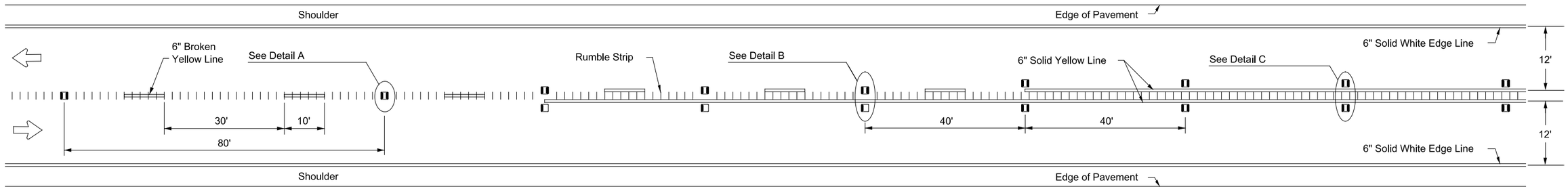


DETAIL "C"

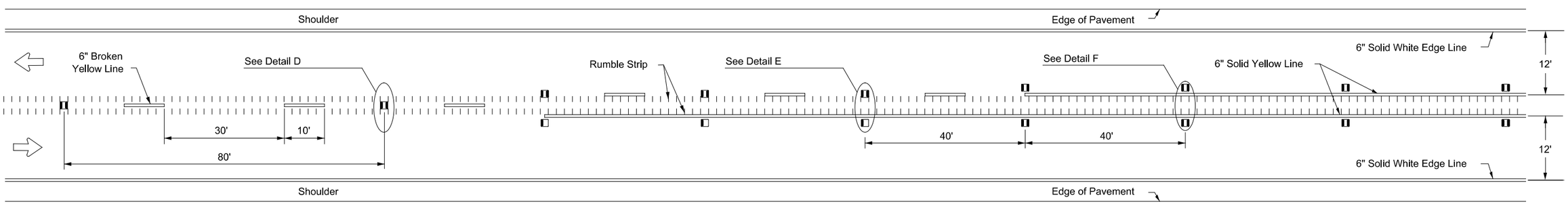
GENERAL NOTES:

1. A buffer shall not be implemented if it will require the width of travel lanes to be less than 12 feet.
2. See standard sheet PM(2) for additional details regarding retroreflectorized raised pavement markers (RPMs).
3. This sheet shows the application of milled rumble strips, though other types may be used. See the Rumble Strips (RS) standard for installation details.
4. Dimension notations (a) through (e) correspond to the following buffer widths: a = 24 inches; b = 30 inches; c = 36 inches; d = 42 inches; and e = 48 inches.
5. The Engineer must consider bicycle accomodation during the planning and implementation of all construction and rehabilitation projects. See standard sheet RS(6) and the TxDOT Roadway Design Manual (RDM) Bicycle Facilities section for applicable policies, references and guidance.



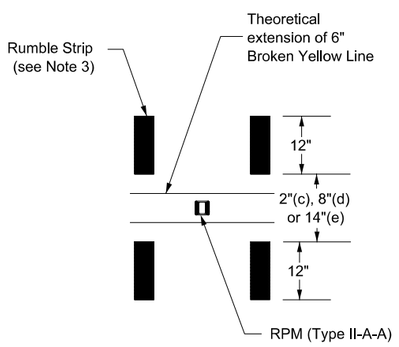
CENTERLINE BUFFER FOR TWO-LANE UNDIVIDED ROADWAYS

FOR BUFFER WIDTHS OF 24 INCHES(a) or 30 INCHES(b)

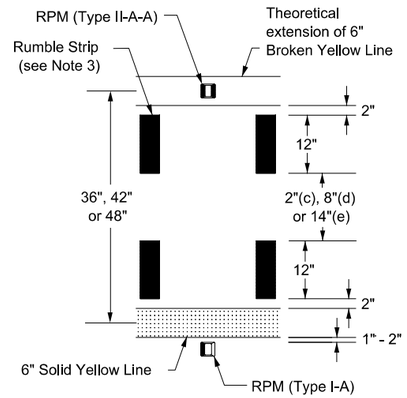


WIDE CENTERLINE BUFFER FOR TWO-LANE UNDIVIDED ROADWAYS

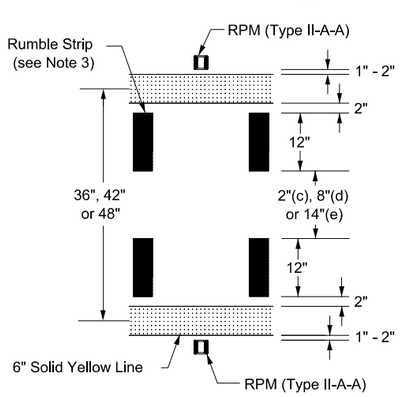
FOR BUFFER WIDTHS OF 36 INCHES(c), 42 INCHES(d) OR 48 INCHES(e)



DETAIL "D"



DETAIL "E"



DETAIL "F"

MATERIAL SPECIFICATIONS	
Pavement Markers (Reflectorized)	DMS-4200
Epoxies 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.

Texas Department of Transportation

Traffic Safety Division Standard

CENTERLINE BUFFER TWO-LANE ROADWAYS

CLB(2)-23

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REVISIONS		1599	03	017	FM 2258
		DIST	COUNTY		SHEET NO.
		FTW	JOHNSON		186

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

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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.

☐ 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.
5. "This project would include five or more acres of earth disturbance. TxDOT would comply with TCEQ's Texas Pollutant Discharge Elimination System (TPDES) Construction General Permit (CGP). A Storm Water Pollution Prevention Plan (SW3P) would be implemented, and a construction site notice would be posted on the construction site. A Notice of Intent (NOI) would be required."

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# 25

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.

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

Action No.

1. Areas within the existing ROW, but outside the limits of construction, would not be disturbed. Every effort would be made to preserve trees where they would neither compromise safety nor substantially interfere with the proposed projects.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

☐ No Action Required ☒ Required Action

Action No.

1. Between October 1 and February 15, the contractor would remove all old migratory bird nests from any structure that would be affected by the proposed project, and complete any bridge work/demolition and /or vegetation clearing. In addition, the contractor would be prepared to prevent migratory birds from building nests by utilizing nest prevention methods, such as bird-deterrent netting and bird-repelling sprays and/or gels, between February 15 and October 1. In the event that migratory birds are encountered on-site during project construction, adverse impacts on protected birds, active nests, eggs, and/or young would be avoided.
2. The Eagle Protection Act prohibits the taking or possession of and commerce in eagles, parts, feathers, nests, or eggs with limited exceptions. The definition of take includes pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb. Eagles may not be taken for any purpose unless a permit is issued prior to the taking.
3. The contractor and/or TxDOT personnel would be advised of potential for Whooping Cranes to occur within the project limits. Construction personnel will be advised to avoid adverse impacts to this species and to report any sightings to TxDOT District Environmental staff. Drainage modifications will be limited to the extent practical to accommodate the additional paved surface needed to bring the roadway up to current TxDOT safety standards. The construction personnel will report all sightings to TxDOT Fort Worth District Environmental staff. Reports should include the time, date and location and any available photos.

CONTINUED ON EPIC SHEET 2

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

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.

VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.
1.
2.
3.

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

STATE OF TEXAS
HOMERO LUIS GUTIERREZ
36639
LICENSED PROFESSIONAL ENGINEER

Homero Luis Gutierrez
3/19/2024

Texas Department of Transportation
Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS EPIC

SHEET 1 of 2 SHEETS

FILE: epic.dgn	DN: TxDOT	CK:	DW:	CK:
© TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		187

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS, CONTINUED.

4. Be advised of potential occurrence of the Western burrowing owl. The contractor would be prepared to take appropriate measures to avoid disturbing, destroying, or removing active nests, including ground nesting birds, during the nesting season. Avoid the removal of unoccupied, inactive nests, as preactivable. As necessary, take appropriate measures to prevent the establishment of active nests during the nesting season on TxDOT owned and operated facilities and structures proposed for replacement or repair.

5. Be advised of potential occurrence of the Texas garter snake and the Plains spotted skunk in the project area, and to avoid harming the species if encountered.

6. Collecting, capturing, relocation, or transporting birds, eggs, young, or active nests without a permit is prohibited.

7. The use of equipment in streams and riparian areas during construction shall be minimized to the extent necessary to complete the construction activities. When possible, equipment access within streams shall be from banks, bridge decks, or barges.

8. Remove all temporary stream crossings once they are no longer needed and stabilize banks and soils around the crossing.

9. When work in the water; the project footprints will be surveyed for state listed and SGCN species where appropriate habitat exists. State listed and SGCN mussels discovered during surveys shall be relocated under Texas Parks and Wildlife Department permit.

10. Prior to conducting dewatering activities, TxDOT and/or the contractor would coordinate with the Texas Parks and Wildlife Department Kills and Spills Team to obtain any necessary permits.

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CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

STATE OF TEXAS
HOMERO LUIS GUTIERREZ
36639
LICENSED
PROFESSIONAL ENGINEER

3/19/2024

Texas Department of Transportation | Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS EPIC

SHEET 2 of 2 SHEETS

FILE: epic.dgn	DN: TxDOT	CK:	DW:		CK:
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REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	1599	03	017		FM 2258
	DIST		COUNTY		SHEET NO.
	FTW		JOHNSON		188

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 soil disturbing activity and for projects that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

This SWP3 is consistent with requirements specified in applicable stormwater plans and the 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):
1599-03-017

1.2 PROJECT LIMITS:
From: I-35 W

To: FM 205 W

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 32°17'55.10N ,(Long) 97°10'43.50W

END: (Lat) 32°19'20.93"N ,(Long) 97°08'15.70"W

1.4 TOTAL PROJECT AREA (Acres): 29.18

1.5 TOTAL AREA TO BE DISTURBED (Acres): 23.34

1.6 NATURE OF CONSTRUCTION ACTIVITY:
CONSISTING OF WIDENING, REHAB, GRADING, BASE, STRUCTURES AND PAVEMENT

1.7 MAJOR SOIL TYPES:

Soil Type	Description
HEIDEN CLAY, 1 TO 3% SLOPES	WELL DRAINED
HEIDEN CLAY, 3 TO 8% SLOPES	WELL DRAINED
NAVO CLAY LOAM, 2 TO 5% SLOPES	MODERATELY WELL DRAINED

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):
PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

X PSLs determined during preconstruction meeting
☐ PSLs determined during construction
☐ No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:
(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.5.)

X Mobilization
X Install sediment and erosion controls
X Blade existing topsoil into windrows, prep ROW, clear and grub
X Remove existing pavement
X Grading operations, excavation, and embankment
X Excavate and prepare subgrade for proposed pavement widening
X Remove existing culverts, safety end treatments (SETs)
X Remove existing metal beam guard fence (MBGF), bridge rail
X Install proposed pavement per plans
X Install culverts, culvert extensions, SETs
X Install mow strip, MBGF, bridge rail
X Place flex base
X Rework slopes, grade ditches
☐ Blade windrowed material back across slopes
X Revegetation of unpaved areas
X Achieve site stabilization and remove sediment and erosion control measures
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

X Sediment laden stormwater from stormwater conveyance over disturbed area
X Fuels, oils, and lubricants from construction vehicles, equipment, and storage
☐ Solvents, paints, adhesives, etc. from various construction activities
X Transported soils from offsite vehicle tracking
X Construction debris and waste from various construction activities
☐ Contaminated water from excavation or dewatering pump-out water
X Sanitary waste from onsite restroom facilities
X Trash from various construction activities/receptacles
X Long-term stockpiles of material and waste
X Discharges from concrete washout activities, runoff from concrete cutting activities, and other concrete related activities.
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.11 RECEIVING WATERS:
Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
CHAMBERS CREEK	
COTTONWOOD CREEK	

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

X Development of plans and specifications
X Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
X Post Construction Site Notice
X Submit NOI/CSN to local MS4
X Perform SWP3 inspections
X Maintain SWP3 records and update to reflect daily operations
X Complete and submit Notice of Termination to TCEQ
X Maintain SWP3 records for 3 years
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

X Day To Day Operational Control
X Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
X Post Construction Site Notice
X Submit NOI/CSN to local MS4
X Maintain schedule of major construction activities
X Install, maintain and modify BMPs
X Complete and submit Notice of Termination to TCEQ
X Maintain SWP3 records for 3 years
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:

MS4 Entity

STATE OF TEXAS
MICHAEL G. RAMIREZ
133983
LICENSED PROFESSIONAL ENGINEER
3/20/2024

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

July 2023 Sheet 1 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		189
STATE	STATE DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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
COMPOST MANUFACTURED TOPSOIL	BEGIN	END
SEEDING (BROADCAST,WILDFLOWER)	BEGIN	END

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- ☒ Excess dirt/mud on road removed daily
- ☐ Haul roads dampened for dust control
- ☒ Loaded haul trucks to be covered with tarpaulin
- ☒ Stabilized construction exit
- ☐ Daily street sweeping
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

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 DEWATERING:

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

2.9 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

When dewatering activities are present, a daily inspection will be conducted once per day during those activities and documented in accordance with CGP and TxDOT requirements.

2.10 MAINTENANCE:

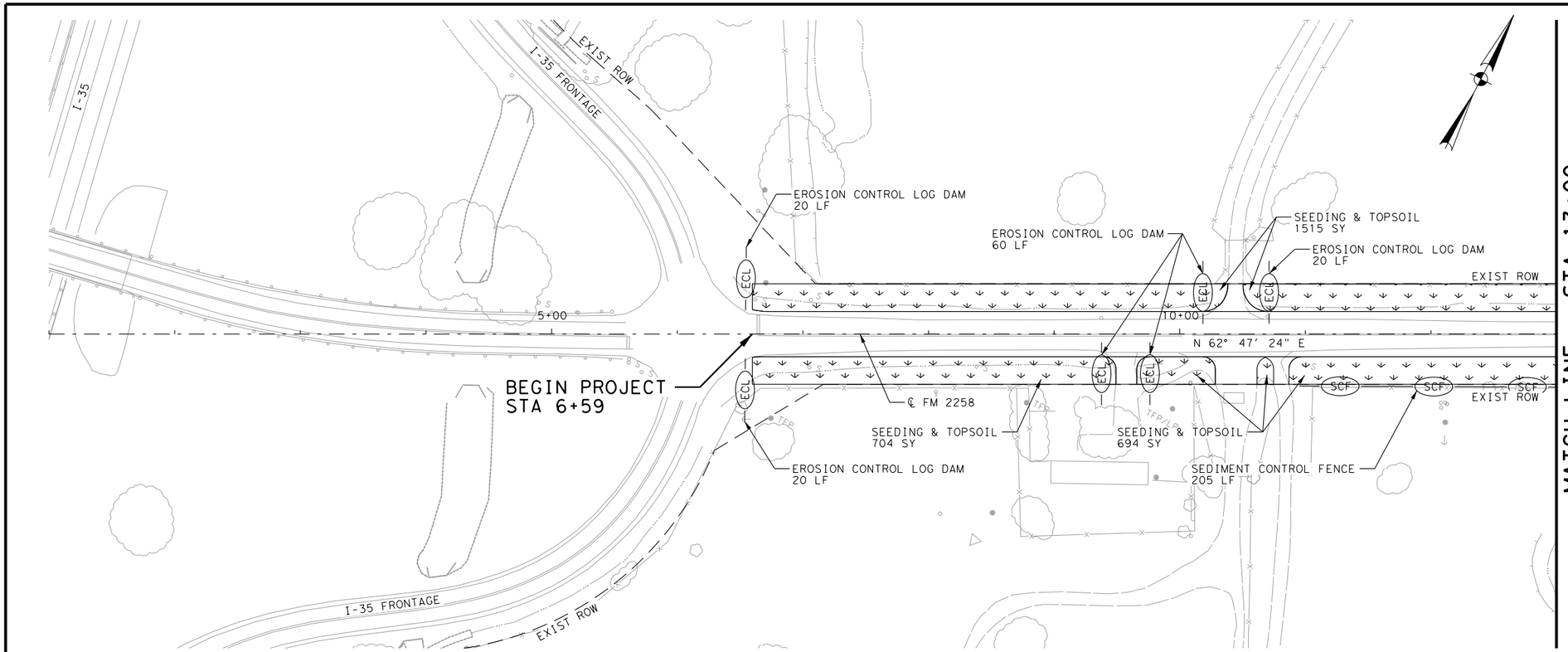
Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

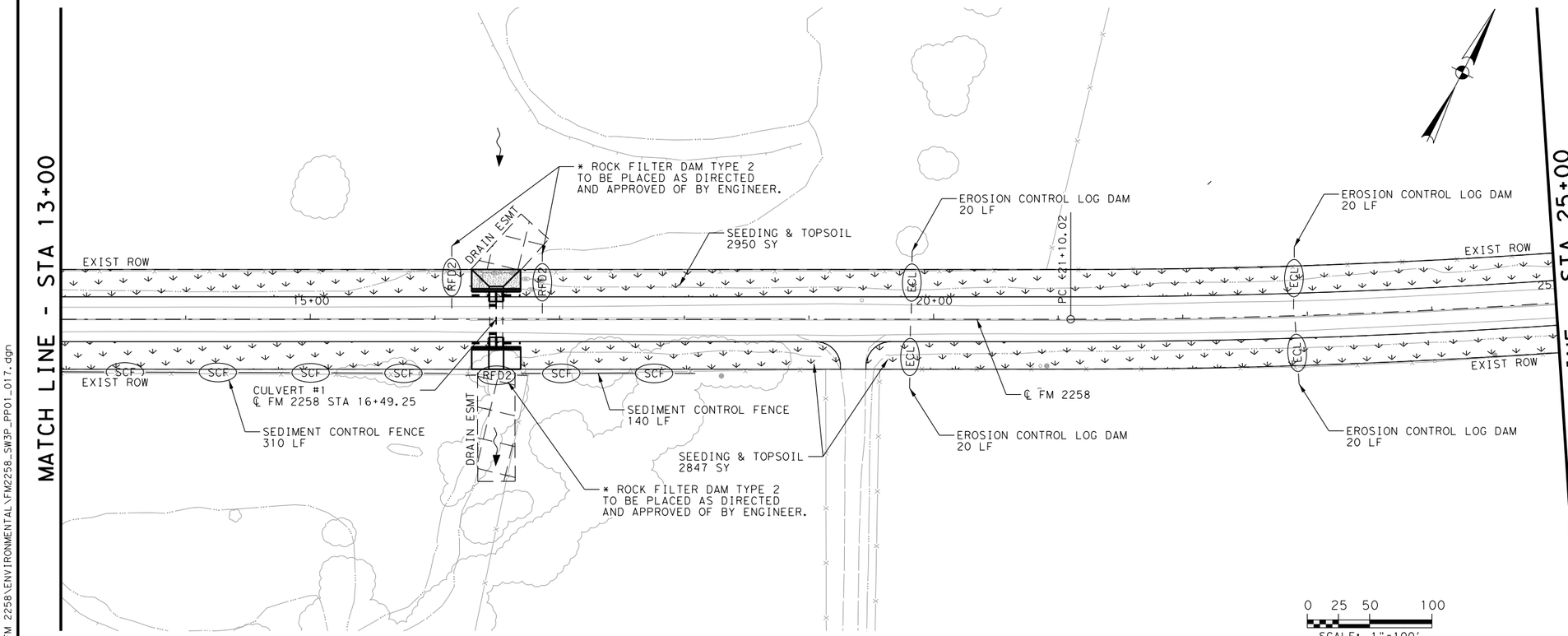
STORMWATER POLLUTION PREVENTION PLAN (SWP3)

July 2023 Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		190
STATE	STATE DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258





QUANTITY SUMMARY			
ITEM	DESCRIPTION	UNIT	QTY
161-6017	COMPOST MANUF TOPSOIL (4")	SY	8712
164-6003	BRDCST SEED (PERM) (RURAL)(CLAY)	SY	8712
164-6009	BROADCAST SEED (TEMP) (WARM)	SY	4356
164-6011	BROADCAST SEED (TEMP) (COOL)	SY	4356
164-6051	DRILL SEED (TEMP)(WARM OR COOL)	SY	8712
164-6066	DRILL SEED (PERM)(WARM OR COOL)	SY	8712
168-6001	VEGETATIVE WATERING	MG	609.9
180-6001	WILDFLOWER SEEDING	AC	1.8
506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	90
506-6011	ROCK FILTER DAMS (REMOVE)	LF	90
506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	655
506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	655
506-6041	BIODEG EROSN CONT LOG (INSTL) (12")	LF	240
506-6043	BIODEG EROSN CONT LOG (REMOVE)	LF	240

LEGEND

- EXIST ROW
- DIRECTION OF FLOW
- SEEDING / TOP SOIL
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM TYPE 2
- ECL — EROSION CONTROL LOG

NOTES:
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3. THE QUANTITIES SHOWN ARE APPROXIMATE AND MAY BE ADJUSTED TO MEET FIELD CONDITIONS.
4. ALL EROSION CONTROL DEVICES TO BE INSTALLED AS DIRECTED BY THE ENGINEER.
5. ECL SHOWN OUTSIDE ROW FOR CLARIFICATION PURPOSES. ECL SHALL BE INSTALLED ON OR INSIDE ROW AS DICTATED BY CURRENT FIELD CONDITIONS.
6. APPROVAL REQUIRED PRIOR TO PLACEMENT OF ROCK FILTER DAMS.

STATE OF TEXAS
MICHAEL G. RAMIREZ
133983
LICENSED PROFESSIONAL ENGINEER
2/6/2024

CAMACHO-HERNANDEZ & ASSOCIATES, LLC
415 EMBASSY OAKS - SUITE 205 SAN ANTONIO, TX. 78216
OFFICE: (210) 341-6200 FAX: (210) 341-6300
FIRM NUMBER: F-8478

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

SW3P LAYOUTS

BEGIN TO STA 25+00

HORZ: 1" = 100' SHEET 1 OF 7

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		191
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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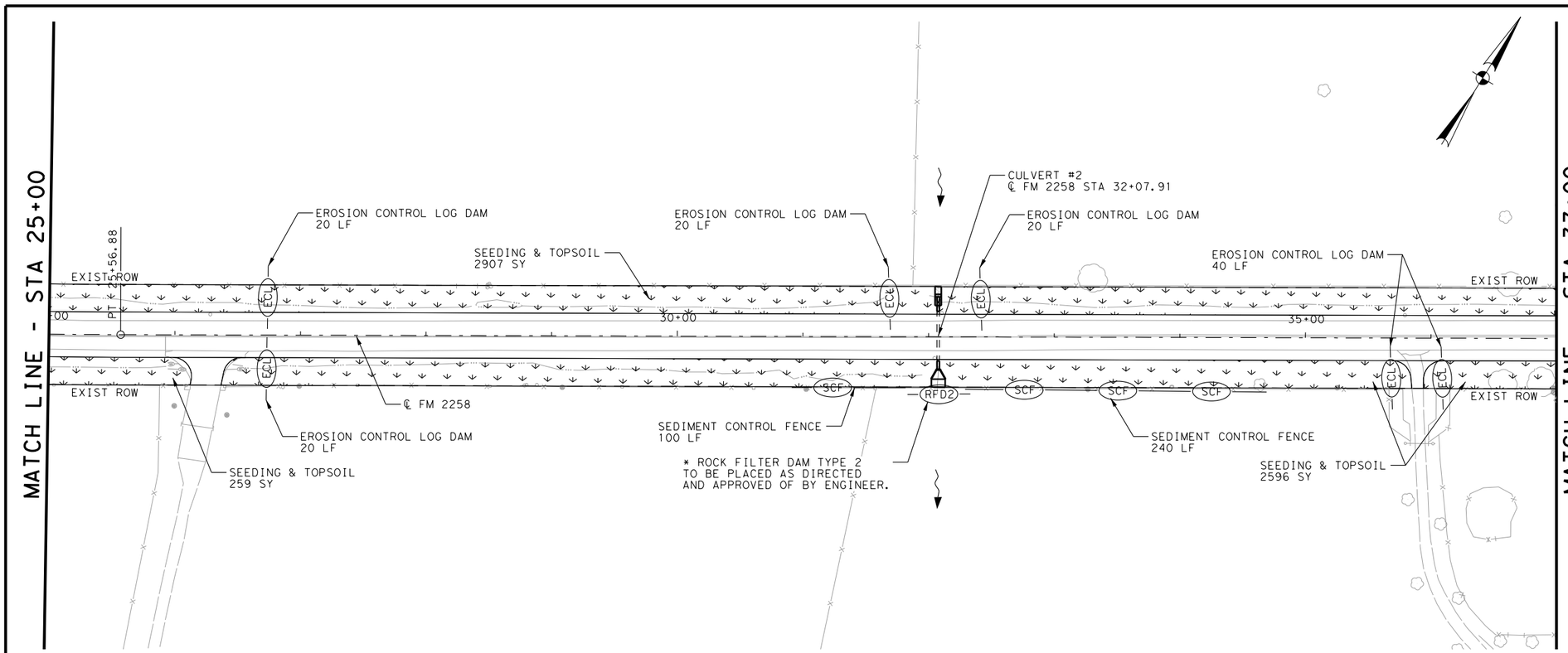

QUANTITY SUMMARY			
ITEM	DESCRIPTION	UNIT	QTY
161-6017	COMPOST MANUF TOPSOIL (4")	SY	11583
164-6003	BRDCST SEED (PERM) (RURAL)(CLAY)	SY	11583
164-6009	BROADCAST SEED (TEMP) (WARM)	SY	5792
164-6011	BROADCAST SEED (TEMP) (COOL)	SY	5792
164-6051	DRILL SEED (TEMP)(WARM OR COOL)	SY	11583
164-6066	DRILL SEED (PERM)(WARM OR COOL)	SY	11583
168-6001	VEGETATIVE WATERING	MG	810.8
180-6001	WILDFLOWER SEEDING	AC	2.4
506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	100
506-6011	ROCK FILTER DAMS (REMOVE)	LF	100
506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	420
506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	420
506-6041	BIODEG EROSN CONT LOG (INSTL) (12")	LF	300
506-6043	BIODEG EROSN CONT LOG (REMOVE)	LF	300

LEGEND

- EXIST ROW
- DIRECTION OF FLOW
- SEEDING / TOP SOIL
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM TYPE 2
- ECL — EROSION CONTROL LOG

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Texas Department of Transportation

SW3P LAYOUTS

STA 25+00 TO STA 49+00

HORZ: 1" = 100' SHEET 2 OF 7

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		192
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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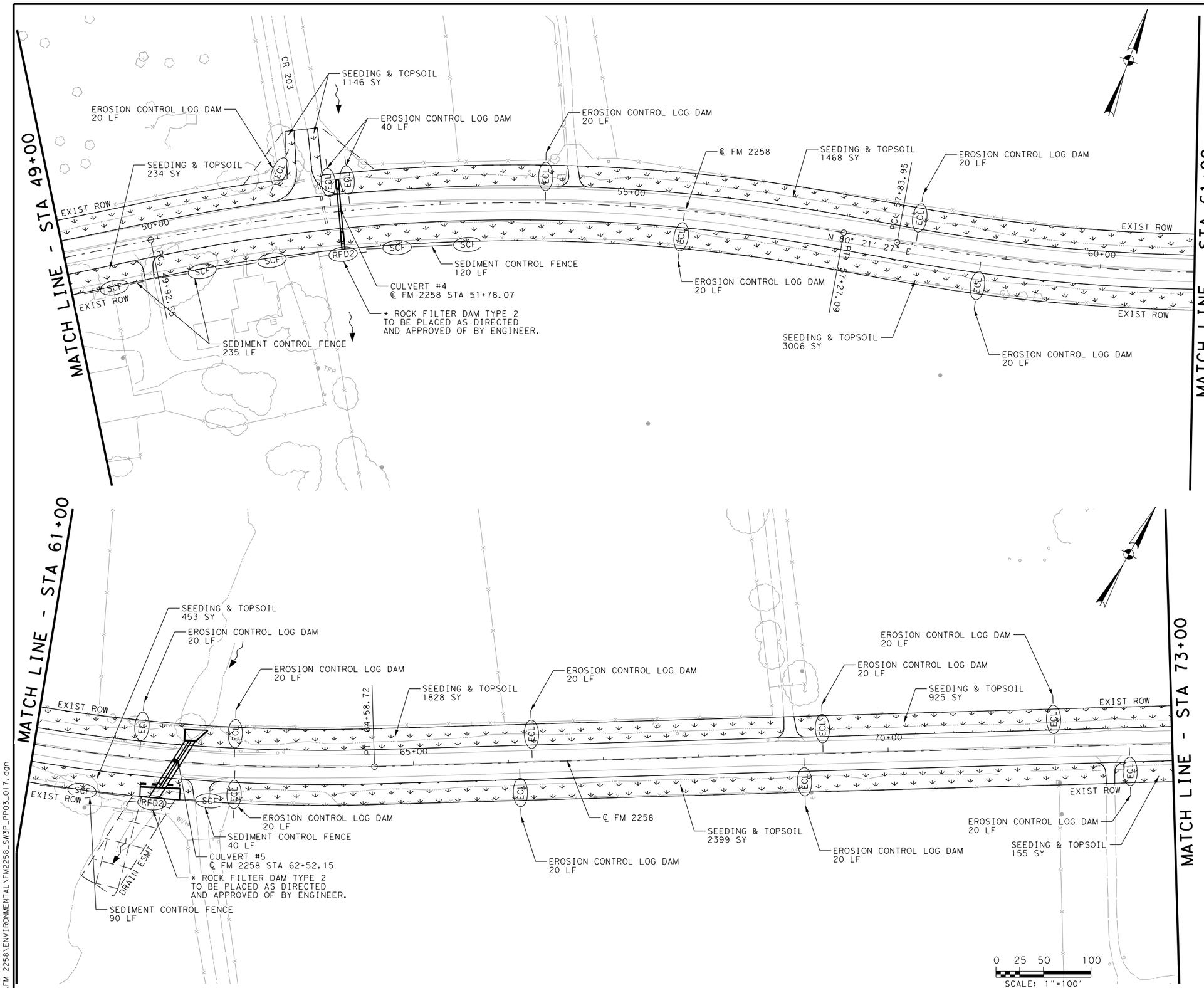

QUANTITY SUMMARY			
ITEM	DESCRIPTION	UNIT	QTY
161-6017	COMPOST MANUF TOPSOIL (4")	SY	11614
164-6003	BRDCST SEED (PERM) (RURAL) (CLAY)	SY	11614
164-6009	BROADCAST SEED (TEMP) (WARM)	SY	5807
164-6011	BROADCAST SEED (TEMP) (COOL)	SY	5807
164-6051	DRILL SEED (TEMP) (WARM OR COOL)	SY	11614
164-6066	DRILL SEED (PERM) (WARM OR COOL)	SY	11614
168-6001	VEGETATIVE WATERING	MG	813.0
180-6001	WILDFLOWER SEEDING	AC	2.4
506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	100
506-6011	ROCK FILTER DAMS (REMOVE)	LF	100
506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	485
506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	485
506-6041	BIODEG EROSN CONT LOG (INSTL) (12")	LF	320
506-6043	BIODEG EROSN CONT LOG (REMOVE)	LF	320

LEGEND

- EXIST ROW
- DIRECTION OF FLOW
- SEEDING / TOP SOIL
- (SCF) SEDIMENT CONTROL FENCE
- (RFD2) ROCK FILTER DAM TYPE 2
- (ECL) EROSION CONTROL LOG

NOTES:
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SW3P LAYOUTS

STA 49+00 STA 73+00

HORZ: 1" = 100' SHEET 3 OF 7

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	193

STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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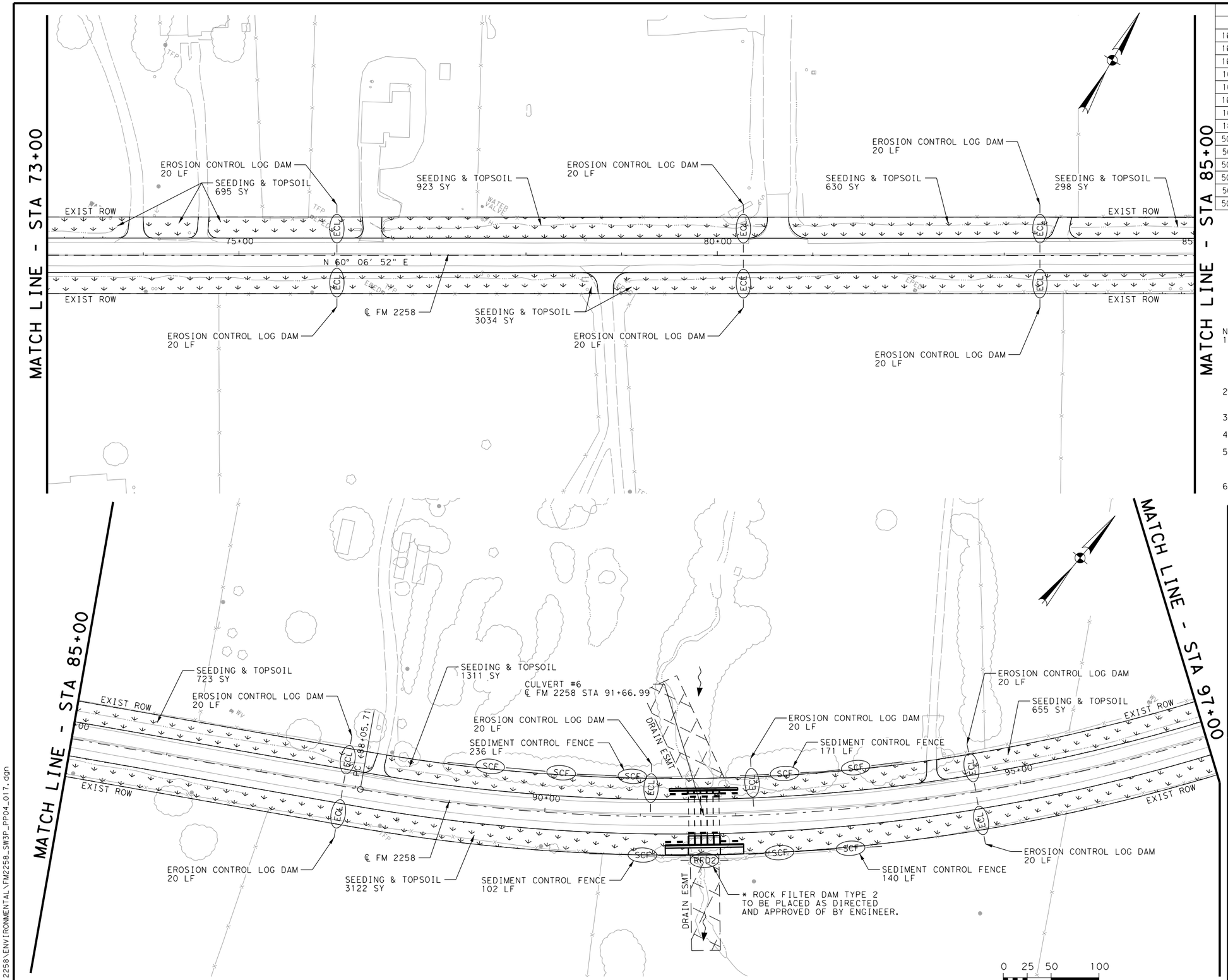

QUANTITY SUMMARY			
ITEM	DESCRIPTION	UNIT	QTY
161-6017	COMPOST MANUF TOPSOIL (4")	SY	11392
164-6003	BRDCST SEED (PERM) (RURAL)(CLAY)	SY	11392
164-6009	BROADCAST SEED (TEMP) (WARM)	SY	5696
164-6011	BROADCAST SEED (TEMP) (COOL)	SY	5696
164-6051	DRILL SEED (TEMP)(WARM OR COOL)	SY	11392
164-6066	DRILL SEED (PERM)(WARM OR COOL)	SY	11392
168-6001	VEGETATIVE WATERING	MG	797.4
180-6001	WILDFLOWER SEEDING	AC	2.4
506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	50
506-6011	ROCK FILTER DAMS (REMOVE)	LF	50
506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	649
506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	649
506-6041	BIODEG EROSN CONT LOG (INSTL) (12")	LF	240
506-6043	BIODEG EROSN CONT LOG (REMOVE)	LF	240

LEGEND

- EXIST ROW
- DIRECTION OF FLOW
- SEEDING / TOP SOIL
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM TYPE 2
- ECL — EROSION CONTROL LOG

NOTES:
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Texas Department of Transportation

SW3P LAYOUTS

STA 73+00 TO STA 97+00

HORZ: 1" = 100' SHEET 4 OF 7

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
06	SEE TITLE SHEET	194

STATE	DIST.	COUNTY
TEXAS	FTW	JOHNSON

CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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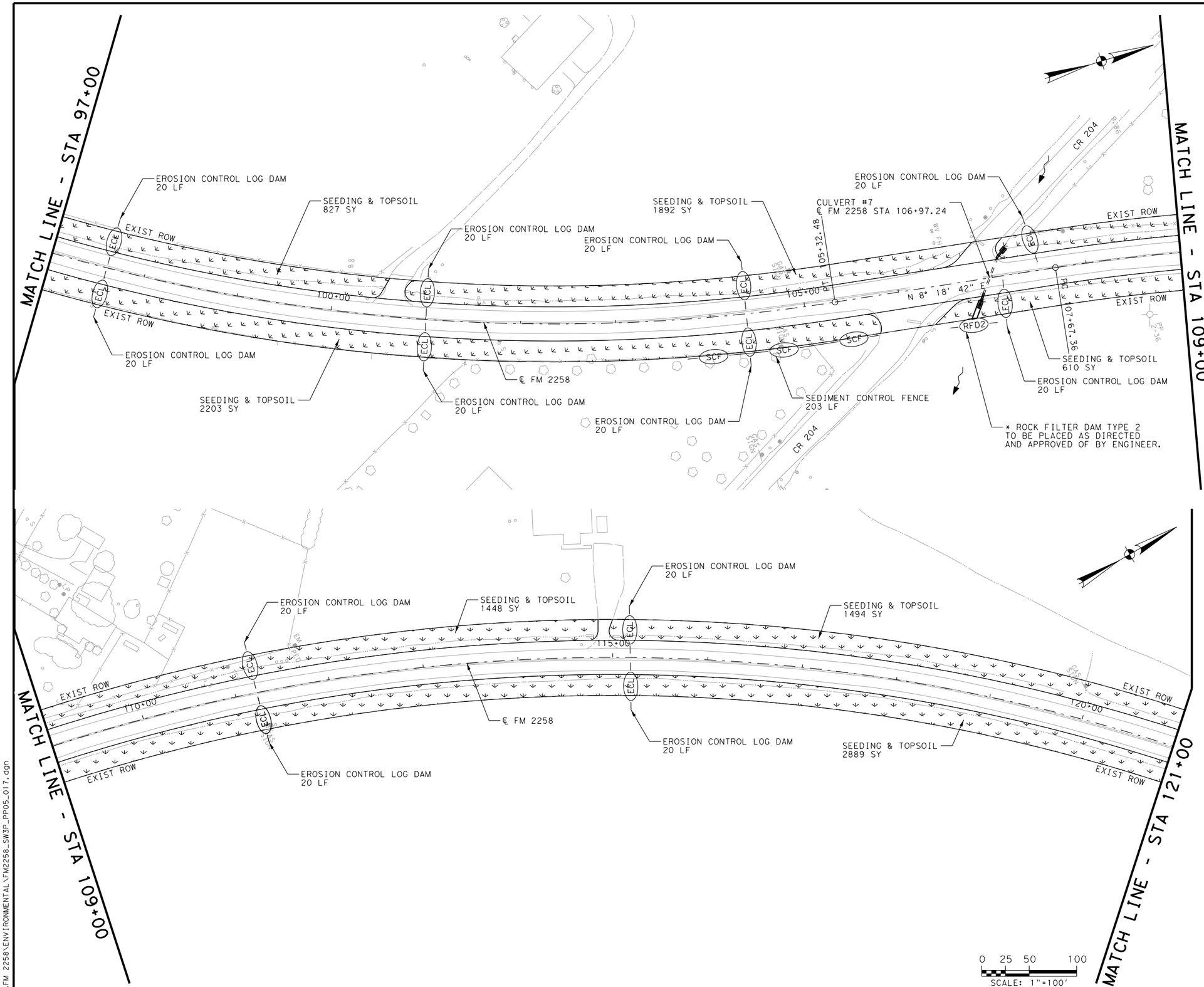

QUANTITY SUMMARY			
ITEM	DESCRIPTION	UNIT	QTY
161-6017	COMPOST MANUF TOPSOIL (4")	SY	11363
164-6003	BRDCST SEED (PERM) (RURAL)(CLAY)	SY	11363
164-6009	BROADCAST SEED (TEMP) (WARM)	SY	5682
164-6011	BROADCAST SEED (TEMP) (COOL)	SY	5682
164-6051	DRILL SEED (TEMP)(WARM OR COOL)	SY	11363
164-6066	DRILL SEED (PERM)(WARM OR COOL)	SY	11363
168-6001	VEGETATIVE WATERING	MG	795.4
180-6001	WILDFLOWER SEEDING	AC	2.4
506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	50
506-6011	ROCK FILTER DAMS (REMOVE)	LF	50
506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	203
506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	203
506-6041	BIODEG EROSN CONT LOG (INSTL) (12")	LF	240
506-6043	BIODEG EROSN CONT LOG (REMOVE)	LF	240

LEGEND

- EXIST ROW
- DIRECTION OF FLOW
- SEEDING / TOP SOIL
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM TYPE 2
- ECL — EROSION CONTROL LOG

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Texas Department of Transportation

SW3P LAYOUTS

STA 97+00 TO STA 121+00

HORZ: 1" = 100' SHEET 5 OF 7

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		195
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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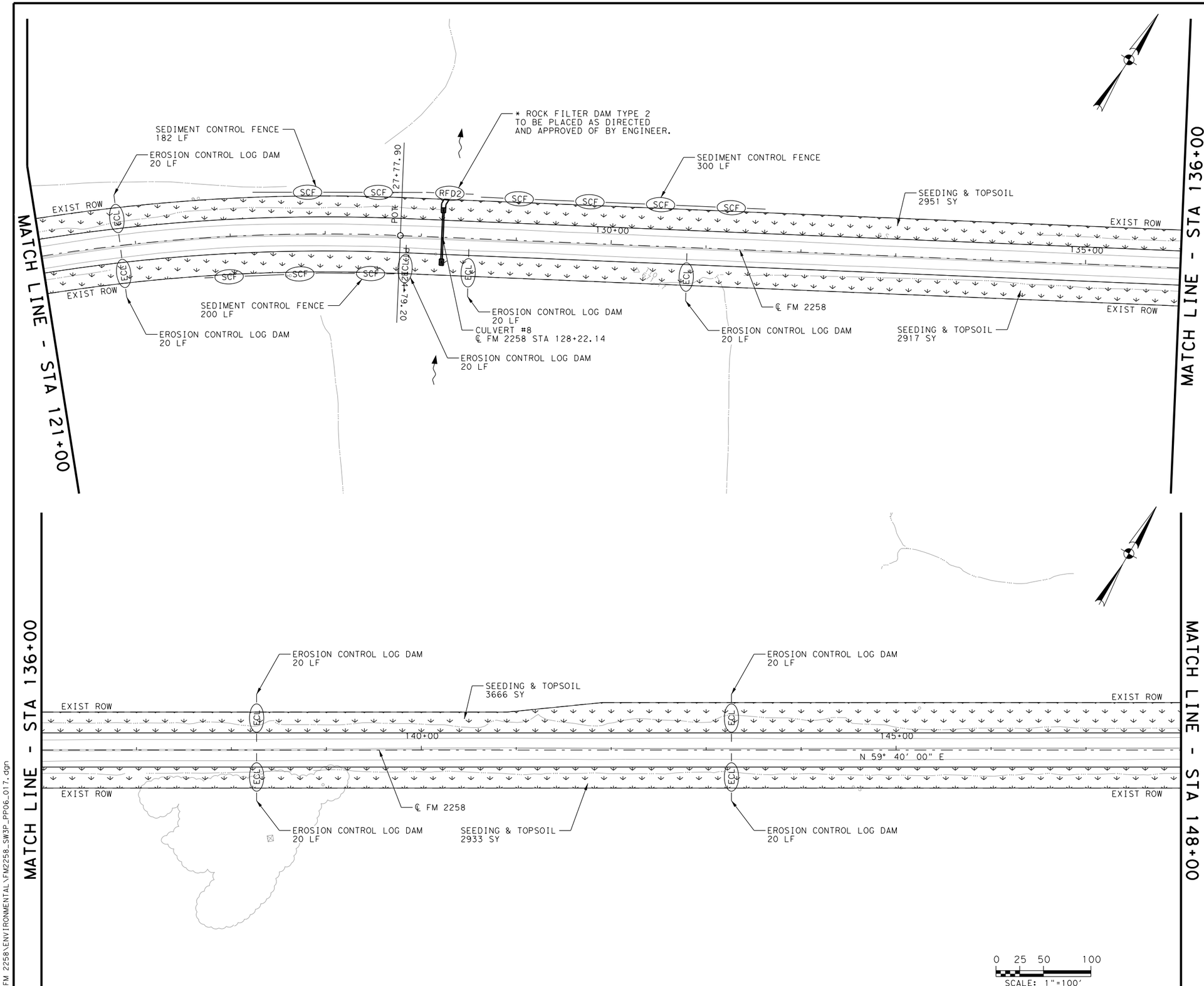

QUANTITY SUMMARY			
ITEM	DESCRIPTION	UNIT	QTY
161-6017	COMPOST MANUF TOPSOIL (4")	SY	12467
164-6003	BRDCST SEED (PERM) (RURAL) (CLAY)	SY	12467
164-6009	BROADCAST SEED (TEMP) (WARM)	SY	6234
164-6011	BROADCAST SEED (TEMP) (COOL)	SY	6234
164-6051	DRILL SEED (TEMP) (WARM OR COOL)	SY	12467
164-6066	DRILL SEED (PERM) (WARM OR COOL)	SY	12467
168-6001	VEGETATIVE WATERING	MG	872.7
180-6001	WILDFLOWER SEEDING	AC	2.6
506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	50
506-6011	ROCK FILTER DAMS (REMOVE)	LF	50
506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	682
506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	682
506-6041	BIODEG EROSN CONT LOG (INSTL) (12")	LF	180
506-6043	BIODEG EROSN CONT LOG (REMOVE)	LF	180

LEGEND

- EXIST ROW
- DIRECTION OF FLOW
- SEEDING / TOP SOIL
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- ECL — EROSION CONTROL LOG

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Texas Department of Transportation

SW3P LAYOUTS

STA 121+00 TO STA 148+00

HORZ: 1" = 100'

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		196
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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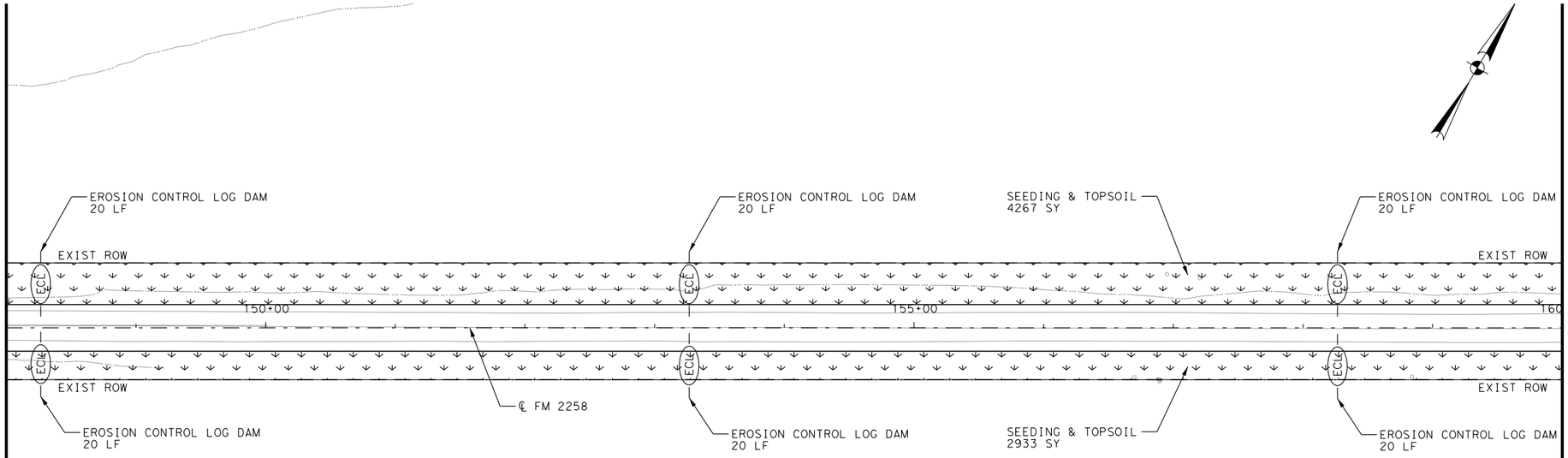
MATCH LINE - STA 148+00



MATCH LINE - STA 160+00

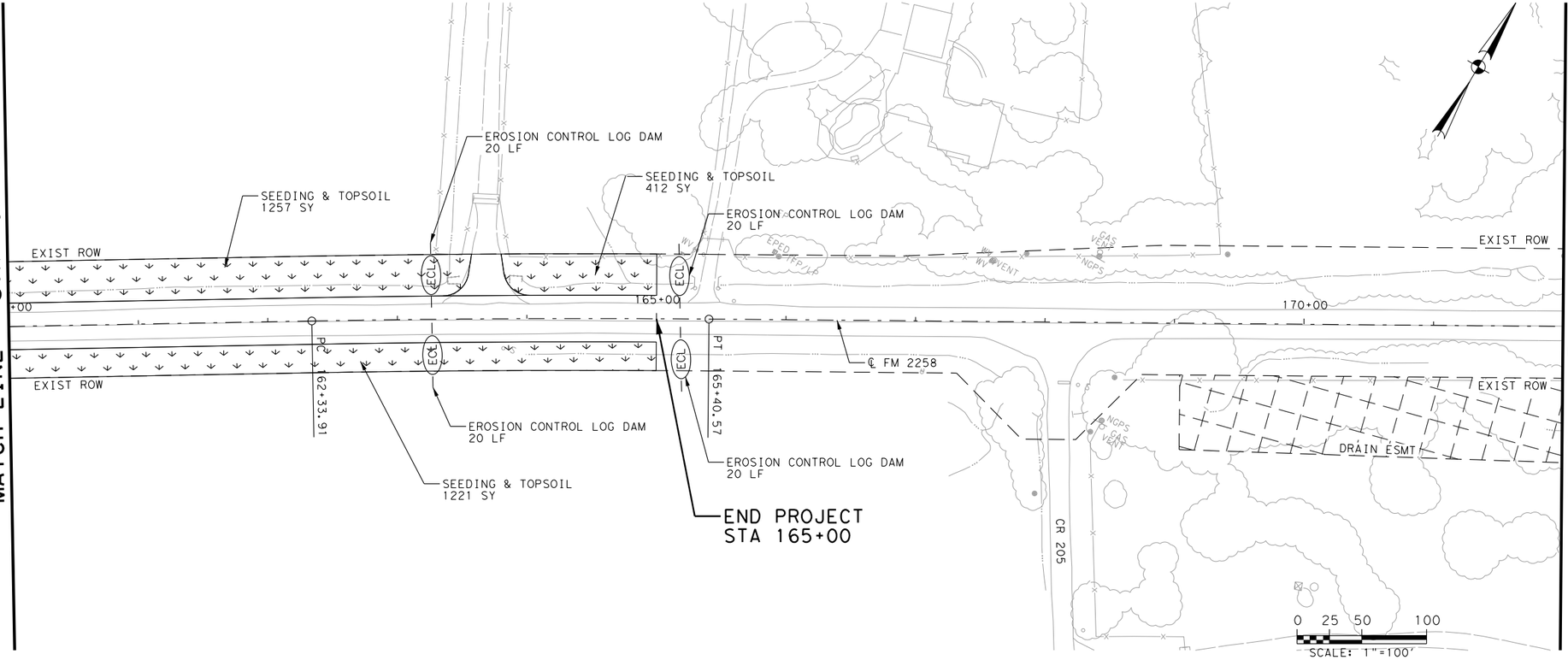
QUANTITY SUMMARY			
ITEM	DESCRIPTION	UNIT	QTY
161-6017	COMPOST MANUF TOPSOIL (4")	SY	10090
164-6003	BRDCST SEED (PERM) (RURAL)(CLAY)	SY	10090
164-6009	BROADCAST SEED (TEMP) (WARM)	SY	5045
164-6011	BROADCAST SEED (TEMP) (COOL)	SY	5045
164-6051	DRILL SEED (TEMP)(WARM OR COOL)	SY	10090
164-6066	DRILL SEED (PERM)(WARM OR COOL)	SY	10090
168-6001	VEGETATIVE WATERING	MG	706.3
180-6001	WILDFLOWER SEEDING	AC	2.1
506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	0
506-6011	ROCK FILTER DAMS (REMOVE)	LF	0
506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	0
506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	0
506-6041	BIODEG EROSN CONT LOG (INSTL) (12")	LF	200
506-6043	BIODEG EROSN CONT LOG (REMOVE)	LF	200

LEGEND

- EXIST ROW
- DIRECTION OF FLOW
- SEEDING / TOP SOIL
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM TYPE 2
- ECL — EROSION CONTROL LOG

NOTES:
1. ALL EROSION CONTROL ELEMENTS SHALL BE IN PLACE PRIOR TO COMMENCING ANY SOIL DISTURBING ACTIVITIES. ALL EROSION CONTROL ELEMENTS TO BE PLACED AS SHOWN IN THE STANDARDS, EXCEPT AS DIRECTED BY THE ENGINEER.
2. LOCATIONS OF CONSTRUCTION EXITS TO BE DETERMINED BY THE CONTRACTOR AND AS APPROVED BY THE ENGINEER.
3. THE QUANTITIES SHOWN ARE APPROXIMATE AND MAY BE ADJUSTED TO MEET FIELD CONDITIONS.
4. ALL EROSION CONTROL DEVICES TO BE INSTALLED AS DIRECTED BY THE ENGINEER.
5. ECL SHOWN OUTSIDE ROW FOR CLARIFICATION PURPOSES. ECL SHALL BE INSTALLED ON OR INSIDE ROW AS DICTATED BY CURRENT FIELD CONDITIONS.
6. APPROVAL REQUIRED PRIOR TO PLACEMENT OF ROCK FILTER DAMS.

MATCH LINE - STA 160+00



MATCH LINE - STA 172+00

STATE OF TEXAS
MICHAEL G. RAMIREZ
133983
LICENSED PROFESSIONAL ENGINEER
2/6/2024

CAMACHO-HERNANDEZ & ASSOCIATES, LLC
415 EMBASSY OAKS - SUITE 205 SAN ANTONIO, TX. 78216
OFFICE: (210) 341-6200 FAX: (210) 341-6300
FIRM NUMBER: F-8478

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246

Texas Department of Transportation

SW3P LAYOUTS

STA 148+00 TO END

HORZ: 1" = 100' SHEET 7 OF 7

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		197
STATE	DIST.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
1599	03	017	FM 2258

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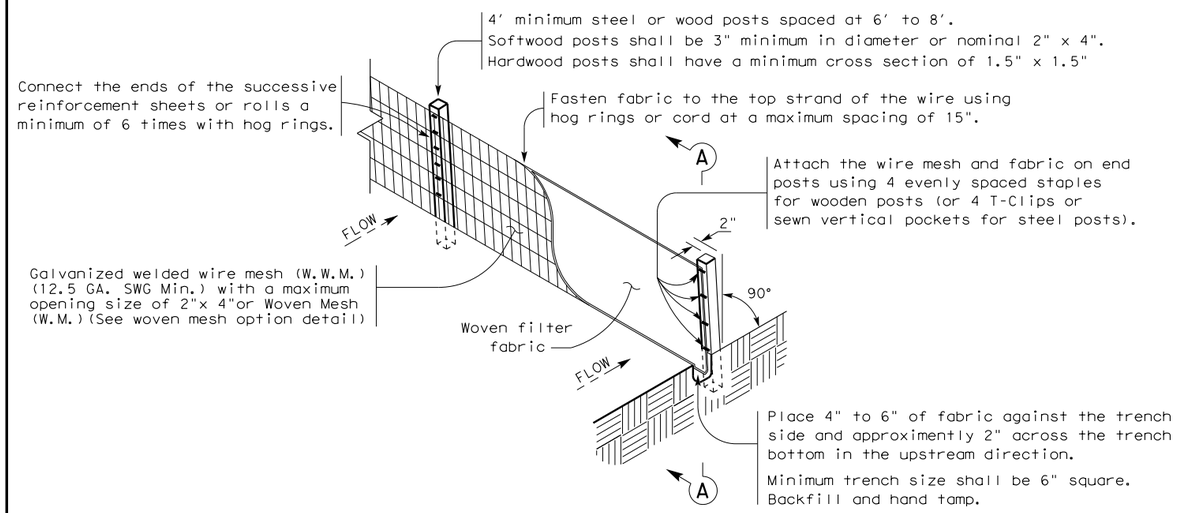
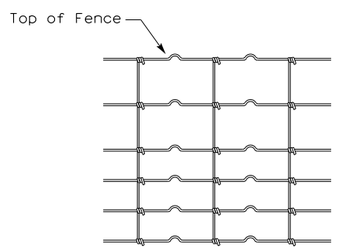
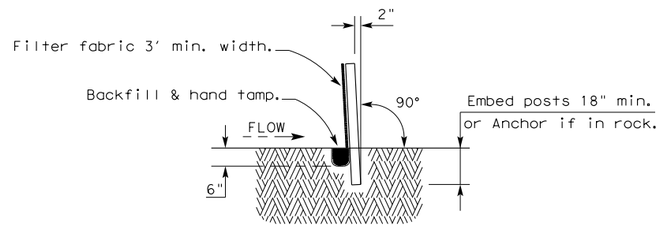


TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

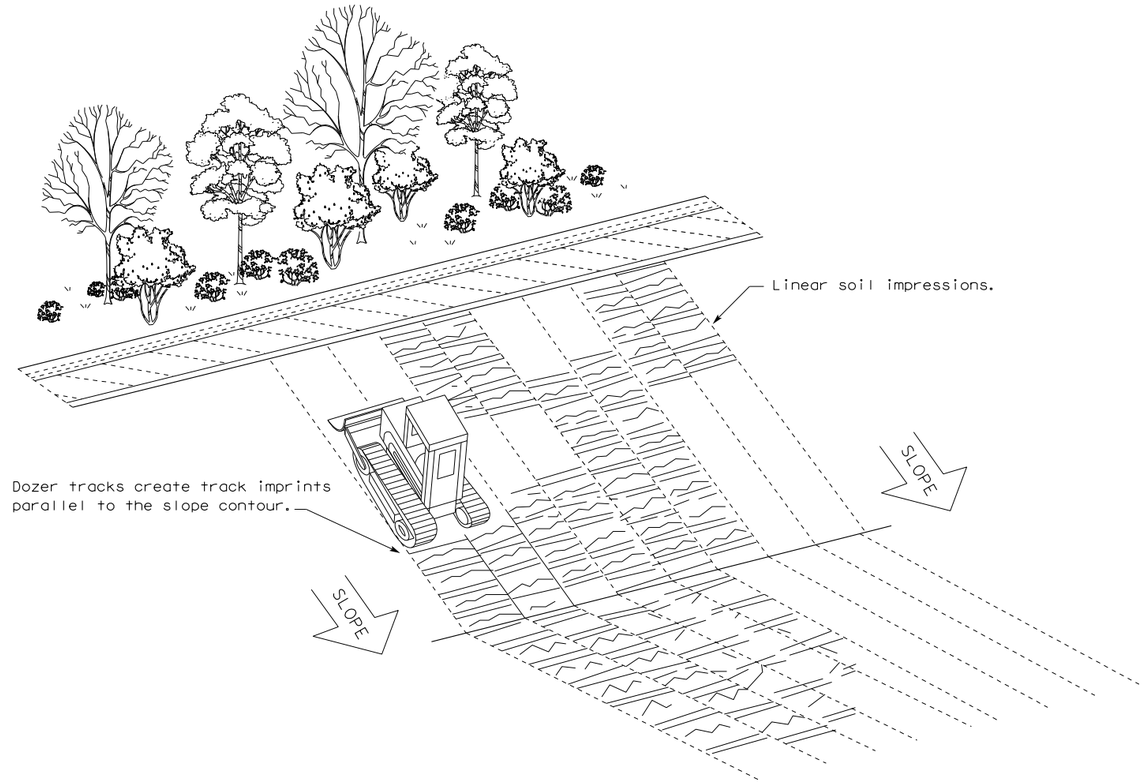
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS		
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	1599	03	017		FM 2258	
	DIST	COUNTY			SHEET NO.	
	FTW	JOHNSON			198	

2017
2024
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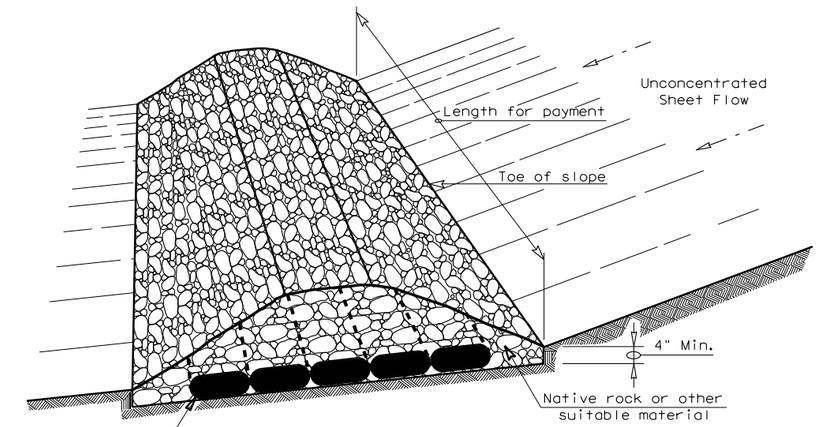
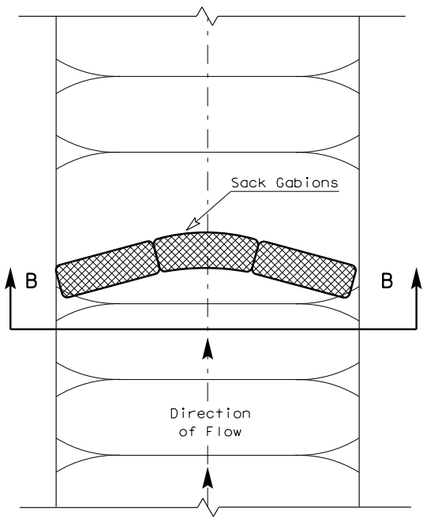
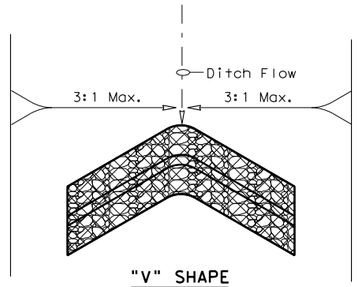


FILTER DAM AT TOE OF SLOPE

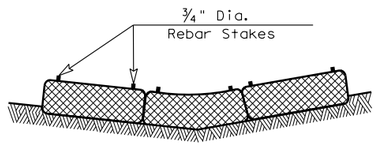
RFD1



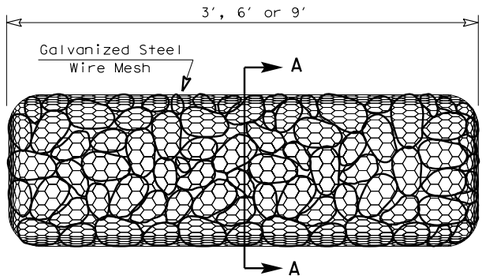
PLAN VIEW



"V" SHAPE PLAN VIEW

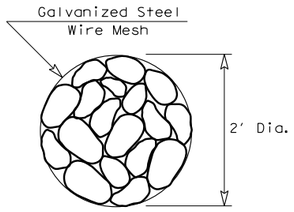


SECTION B-B

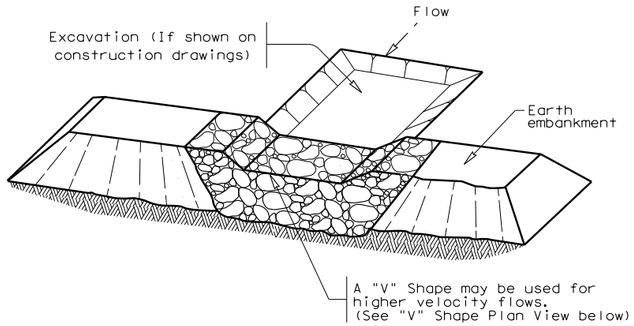


TYPE 4 (SACK GABIONS)

RFD4

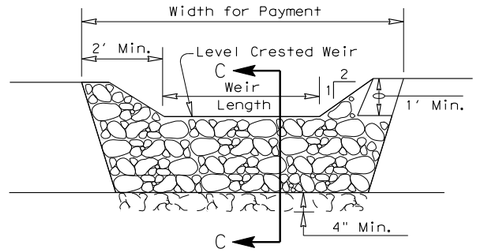


SECTION A-A

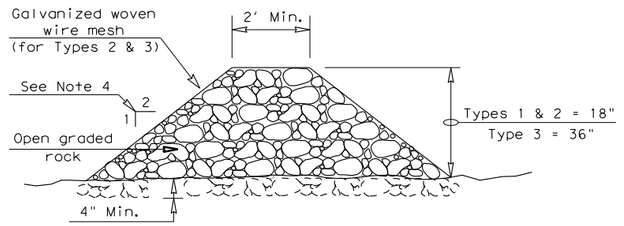


FILTER DAM AT SEDIMENT TRAP

RFD1 OR RFD2



PROFILE



SECTION C-C

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

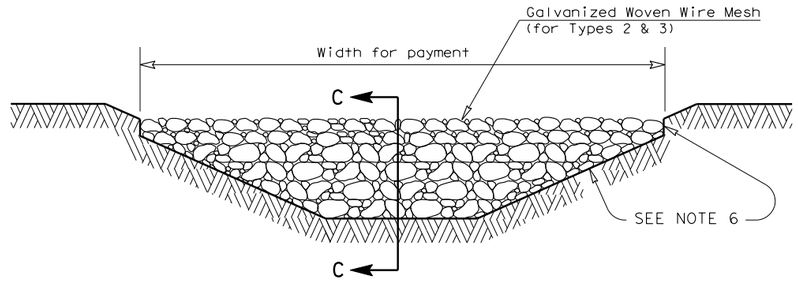
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.



FILTER DAM AT CHANNEL SECTIONS

RFD1 OR RFD2 OR RFD3

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam	RFD1
Type 2 Rock Filter Dam	RFD2
Type 3 Rock Filter Dam	RFD3
Type 4 Rock Filter Dam	RFD4

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS			
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY			
REVISIONS	1599	03	017	FM 2258			
	DIST	COUNTY		SHEET NO.			
	FTW	JOHNSON		199			

DATE: 2/6/2024
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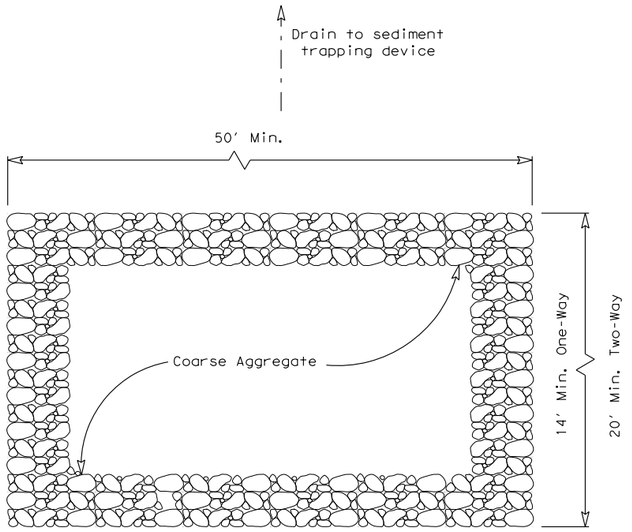
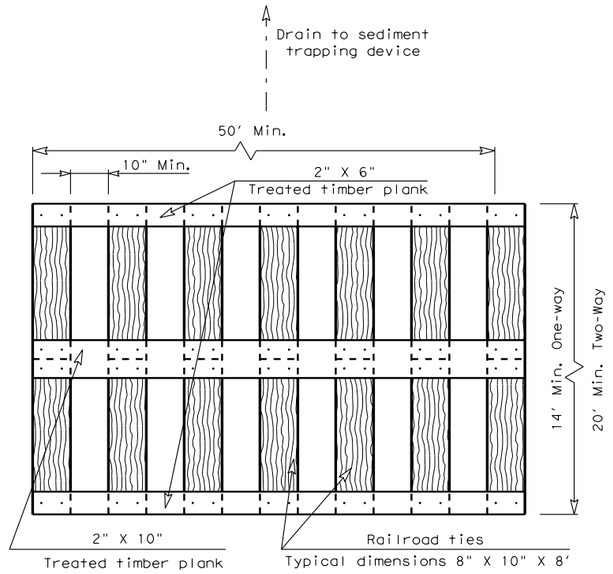


PLAN VIEW



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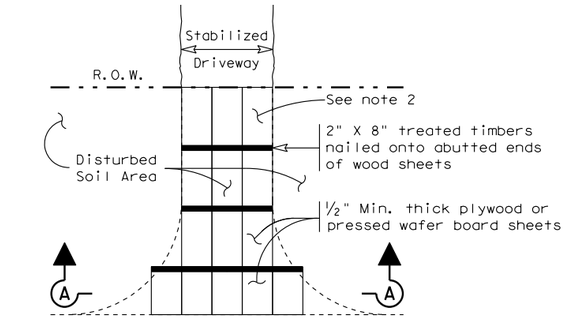
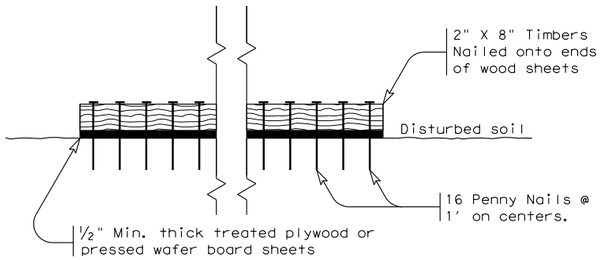


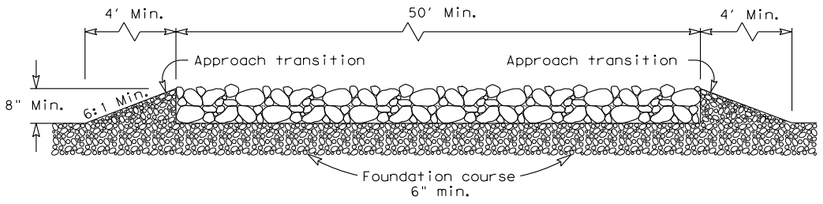
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

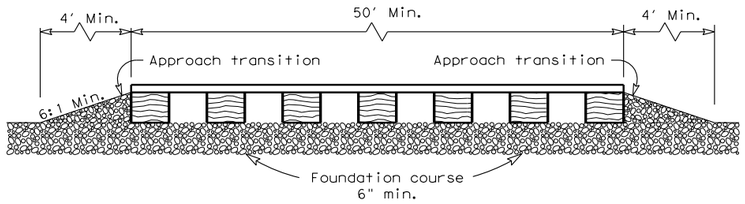
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50′.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50′.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	1599	03	017	FM 2258
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		200

DATE: 2/6/2024
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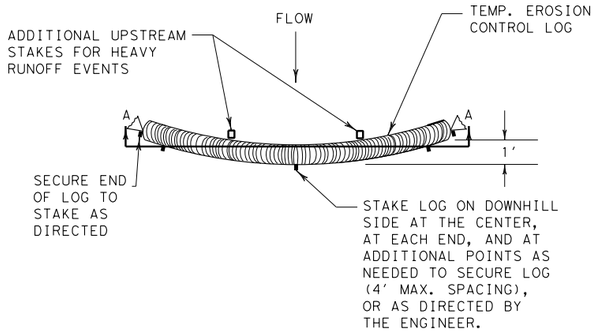
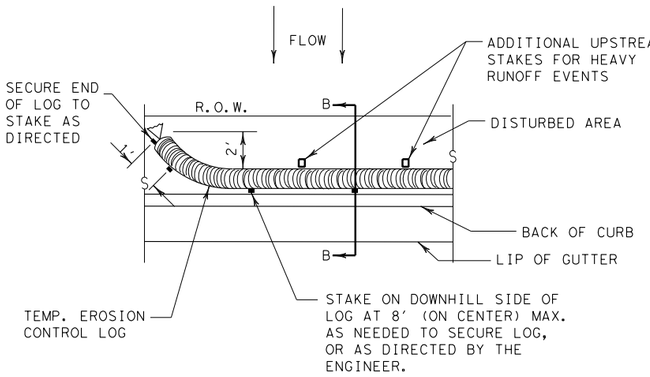


PLAN VIEW



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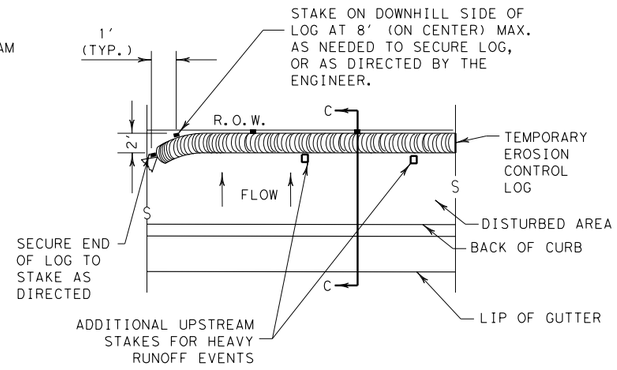

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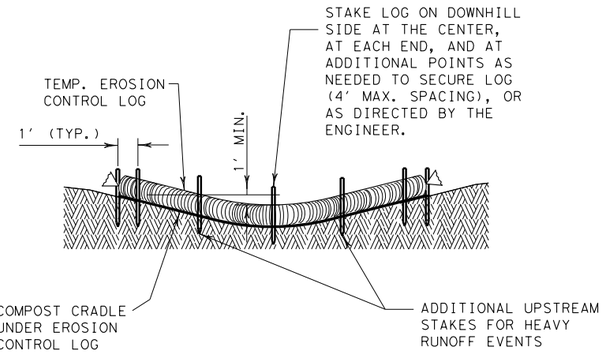
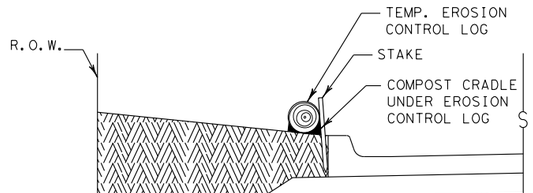


SECTION A-A

EROSION CONTROL LOG DAM

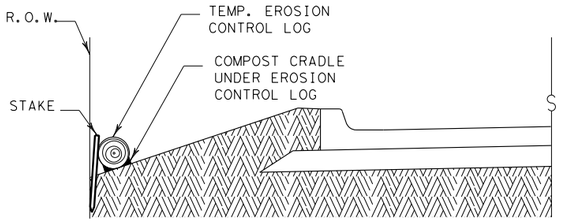
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

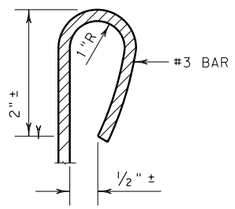
CL-BOC



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.

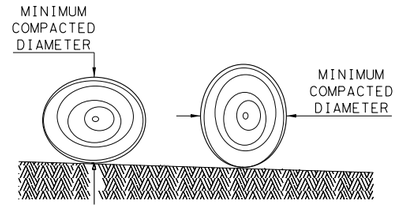
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

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

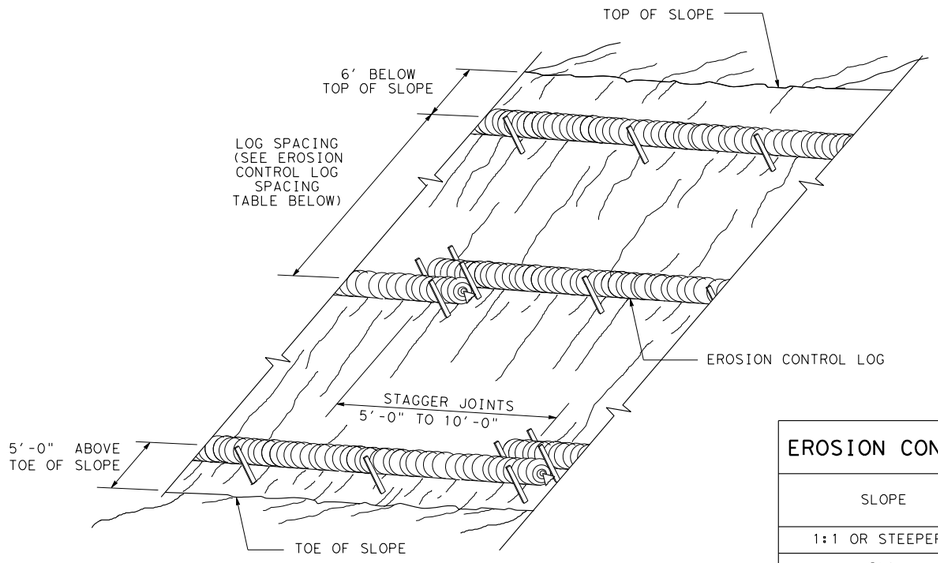
EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT		CK: KM		DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
REVISIONS	1599	03	017		FM 2258		
	DIST	COUNTY			SHEET NO.		
	FTW	JOHNSON			201		

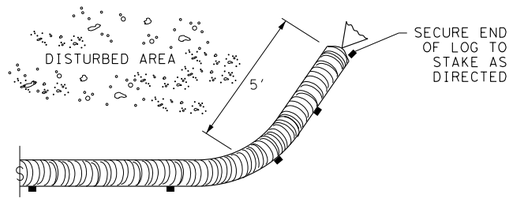
DATE: 2/6/2024
FILE: $FILE$

DATE: 2/6/2024
FILE: $FILE$



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

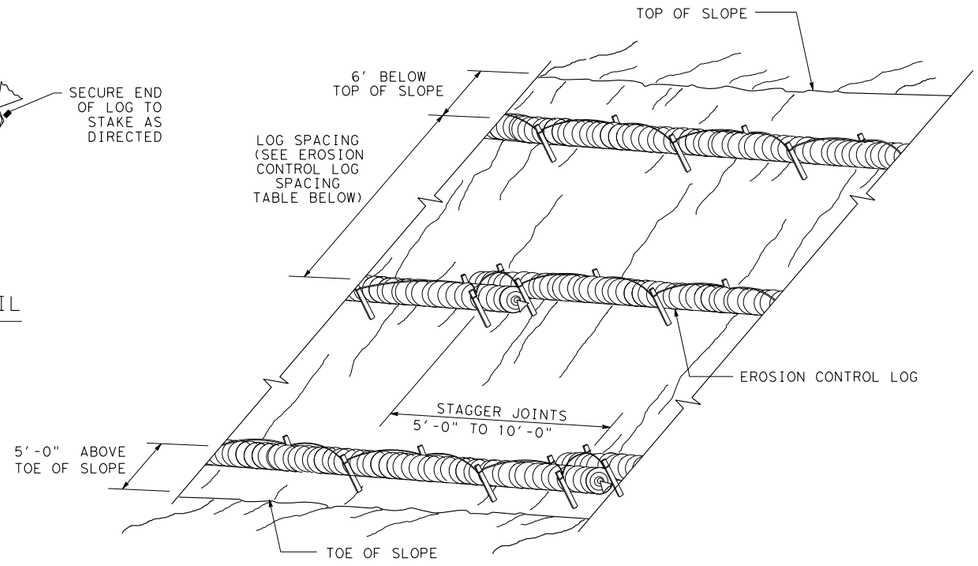
CL-SST



END SECTION RAP DETAIL

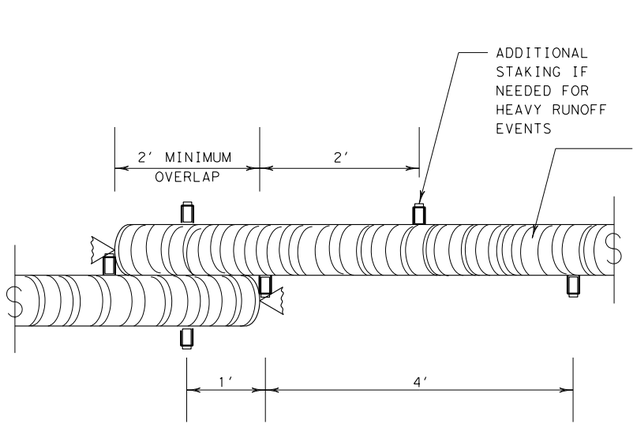
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5′	10′	15′	20′
2:1	10′	20′	30′	40′
3:1	15′	30′	45′	60′
4:1 OR FLATTER	20′	40′	60′	80′

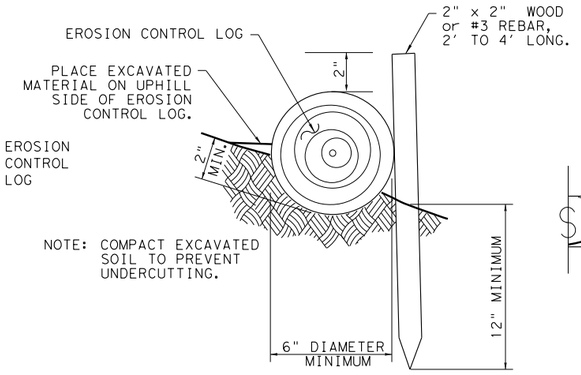
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

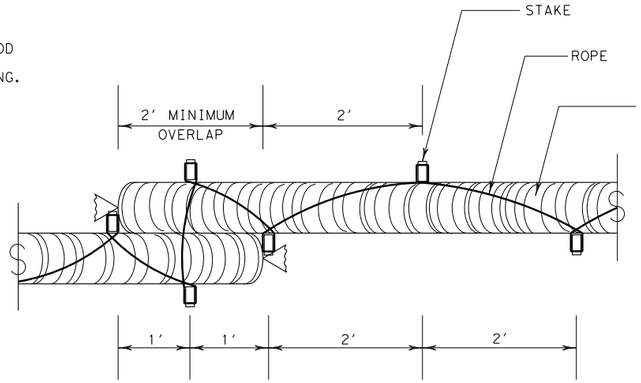


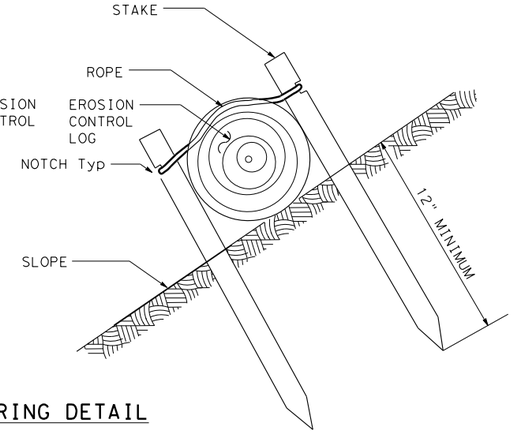


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

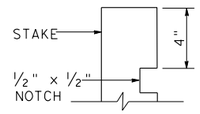
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL

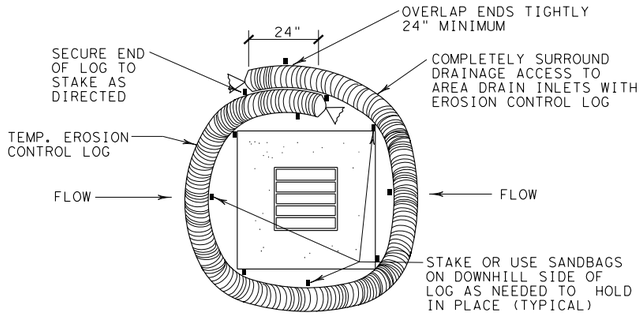


STAKE NOTCH DETAIL

Texas Department of Transportation | Design Division Standard

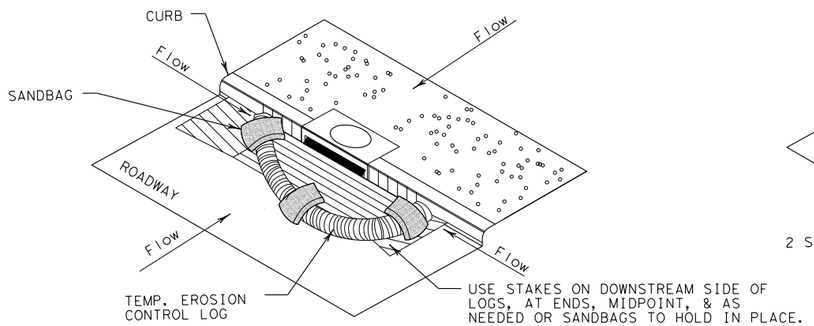
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS	
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	1599	03	017	FM 2258	
	DIST	COUNTY		SHEET NO.	
	FTW	JOHNSON		202	



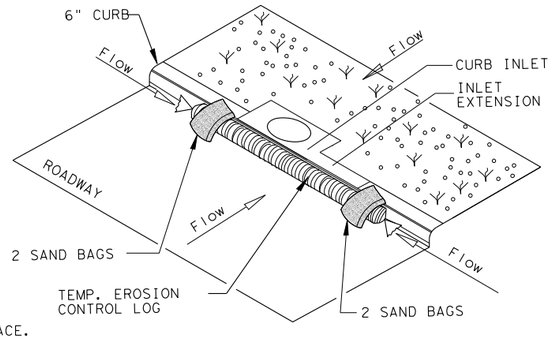
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

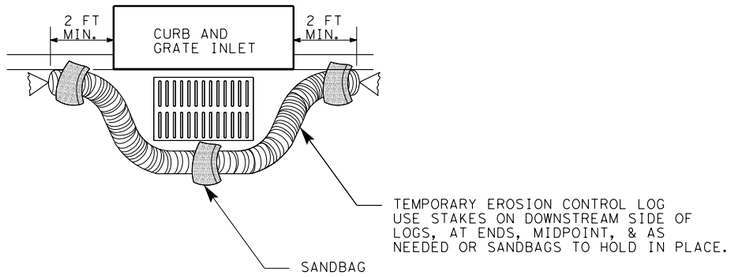
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

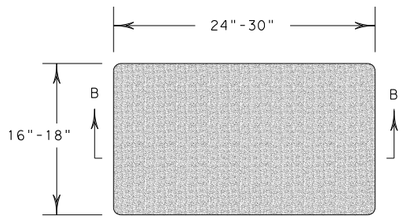
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT		CK: KM		DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
REVISIONS	1599	03	017		FM 2258		
	DIST	COUNTY					SHEET NO.
	FTW	JOHNSON					203

DATE: 2/6/2024
FILE: $FILE$