FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	F 2023 (065)		1
STATE	STATE DIST.NO.	COUNTY	
TEXAS	LBB	CROSBY	
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILENAME	SH207_GEN_TITLE.dgn		

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

Design Speed: 35 MPH
2022 ADT: 600
2042 ADT: 900

Functional Class: Rural, Minor Arterial

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL PROJECT

F 2023(065)

NET LENGTH OF PROJECT:

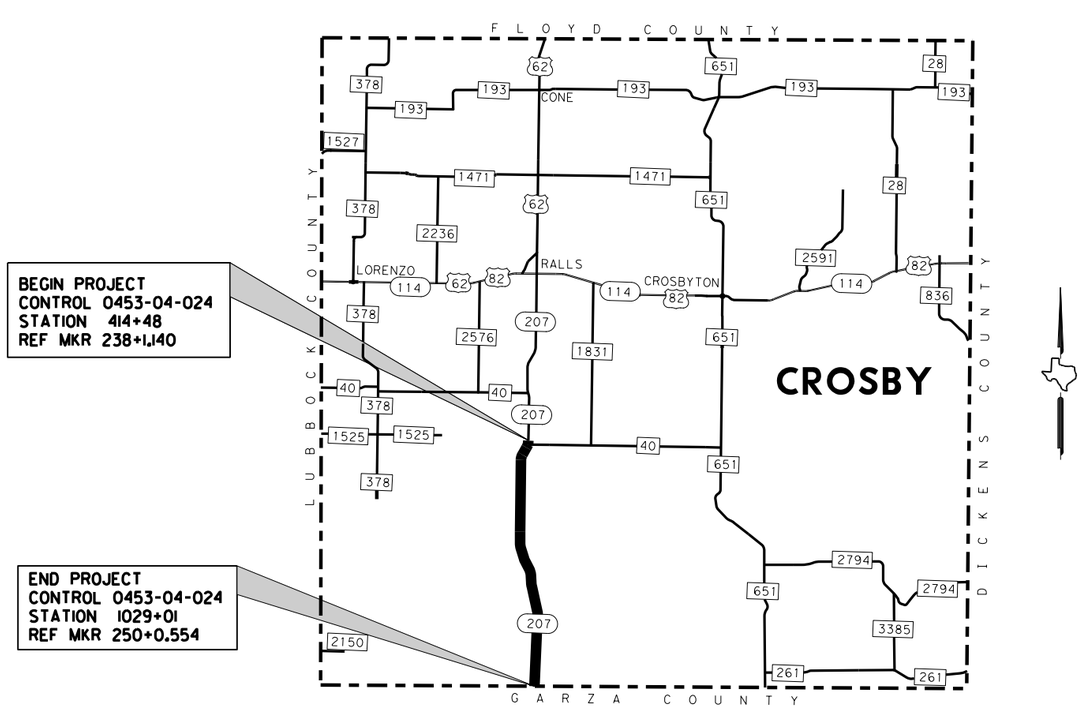
61,298.000 FT. = 11.609 MI. - CONTROL 0453-04-024 ROADWAY
90.000 FT. = 00.017 MI. - CONTROL 0453-04-024 BRIDGE - NBI NO. 05-054-0-0453-04-009
65.000 FT. = 00.012 MI. - CONTROL 0453-04-024 BRIDGE - NBI NO. 05-054-0-0453-04-010
61,453.000 FT. = 11.638 MI. - TOTAL

SH 207
CROSBY COUNTY

LIMITS: FROM FM 40 EAST TO GARZA COUNTY LINE

REHABILITATION OF EXISTING ROAD

CONSISTING OF PLANING, WIDENING, LIME TREATING SUBGRADE, FOAMED ASPHALT TREATMENT, SEAL COAT, HOT MIX, STRUCTURES, SIGNING, AND STRIPING



LAYOUT NO SCALE

NO EXCEPTIONS
NO EQUATIONS
NO RAILROAD CROSSINGS
NO TDLR REVIEW REQUIRED

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, Nov. 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, JULY, 2022).

STATE OF TEXAS
SHELLEY C. HARRIS
99197
LICENSED
PROFESSIONAL ENGINEER

Texas Department of Transportation

SUBMITTED FOR LETTING: 7/20/2022

DocuSigned by: Shelley C. Harris P.E.
F9984108931347C...

DISTRICT DESIGN ENGINEER

RECOMMENDED FOR LETTING: 7/20/2022

DocuSigned by: Heath C. Bozeman, P.E.
A84DC312E64C4E3...

AREA ENGINEER

APPROVED FOR LETTING: 7/20/2022

DocuSigned by: Billy P. Warren P.E.
642C665E4DDD46A...

DISTRICT ENGINEER

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STATE OF TEXAS
SHELLEY C. HARRIS
99197
LICENSED PROFESSIONAL ENGINEER

Shelley C. Harris, P.E.
6/29/2022

THE "TXDOT" STANDARD SHEETS INCLUDED HEREON HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

2022 ©
Texas Department of Transportation

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05	CROSBY		2
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_GEN_INDEX.dgn		

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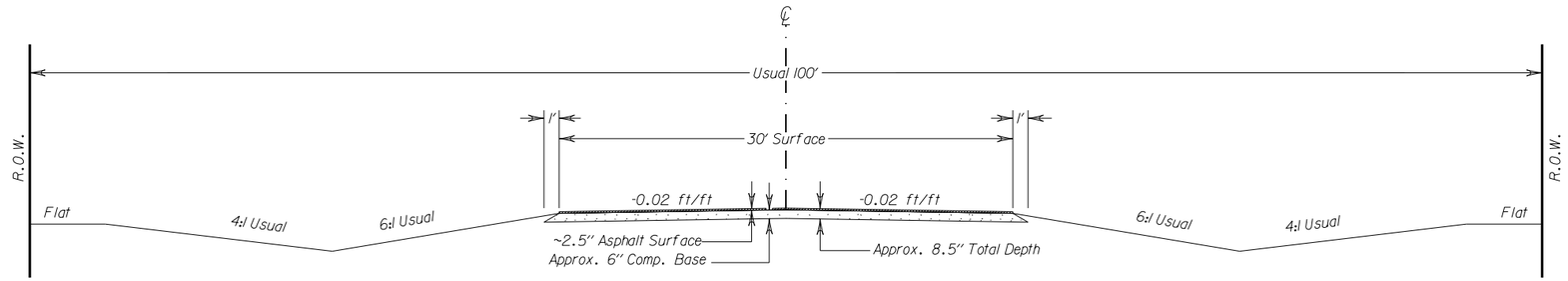
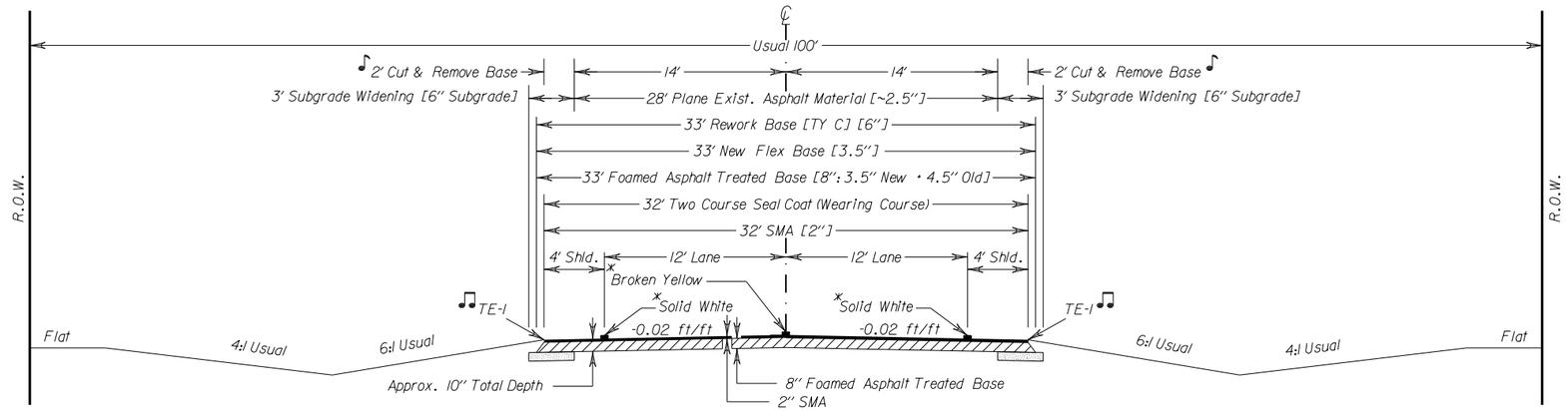
Asphalt Core Locations		
Station	Location	Depth (in)
557+00	Rt.	3.5



EXISTING SECTION

STA. 414+48 TO STA. 675+00



PROPOSED SECTION

STA. 414+48 TO STA. 675+00

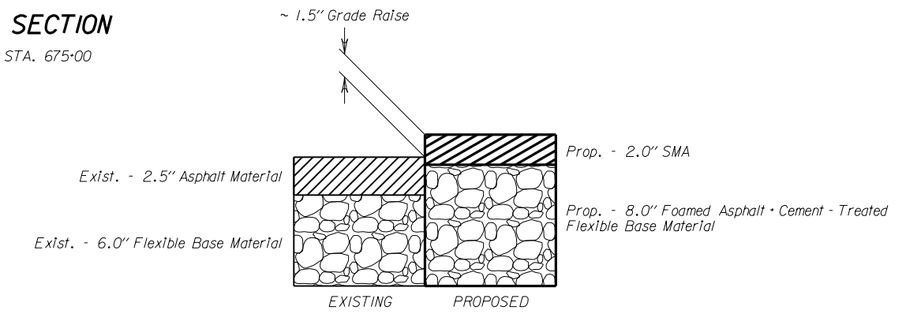
* Hot Sprayed Thermoplastic Striping

♪ This work is subsidiary to Item 112 Subgrade Widening. The removed material may be used in subgrade widening.

♫ Hotmix Tapered Edge Condition I

Edge & center milled rumble strips are to be milled into place from project beginning to project end.

Reworking of the base material shall be performed in half widths.



STATE OF TEXAS
SHELLEY C. HARRIS
99197
LICENSED
PROFESSIONAL ENGINEER

Shelley C. Harris, P.E.
6/29/2022

Texas Department of Transportation

Scale: 1" = 10' Sheet 1 of 3

TYPICAL SECTIONS

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CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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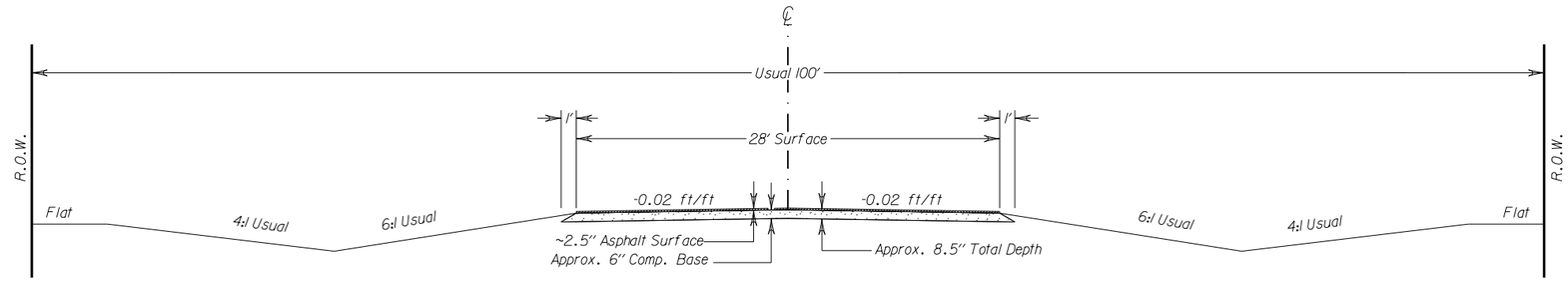
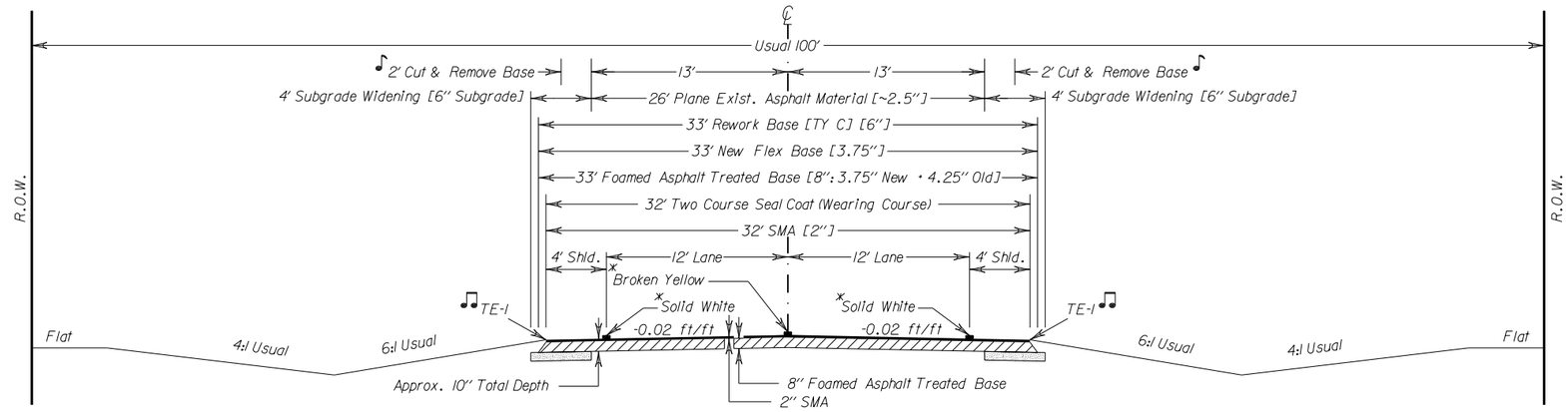


EXISTING SECTION

STA. 675+00 TO STA. 995+25

Asphalt Core Locations		
Station	Location	Depth (in)
815+00	Lt.	2.5
900+00	Rt.	2.5



PROPOSED SECTION

STA. 675+00 TO STA. 995+25

* Hot Sprayed Thermoplastic Striping

♪ This work is subsidiary to Item 112 Subgrade Widening. The removed material may be used in subgrade widening.

♫ Hotmix Tapered Edge Condition 1

Edge & center milled rumble strips are to be milled into place from project beginning to project end.

Reworking of the base material shall be performed in half widths.

STATE OF TEXAS
SHELLEY C. HARRIS
99197
LICENSED
PROFESSIONAL ENGINEER

Shelley C. Harris, P.E.
6/29/2022

Texas Department of Transportation

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CONT.	SECT.	JOB	HIGHWAY NO.
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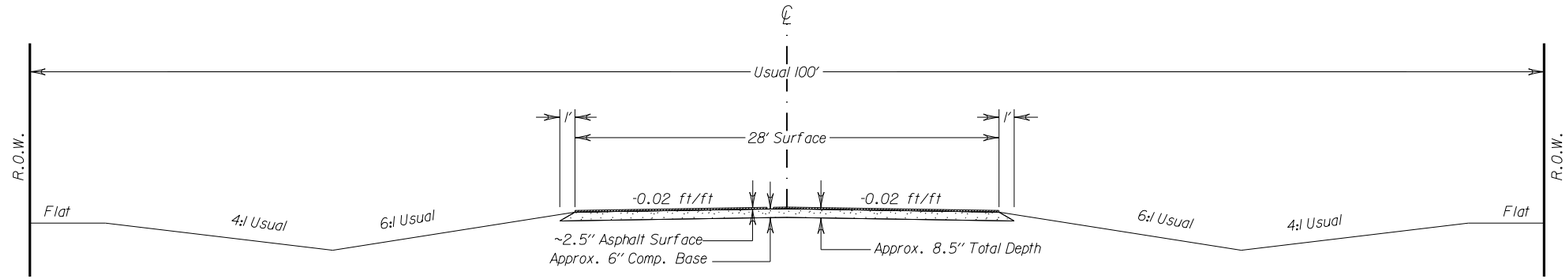
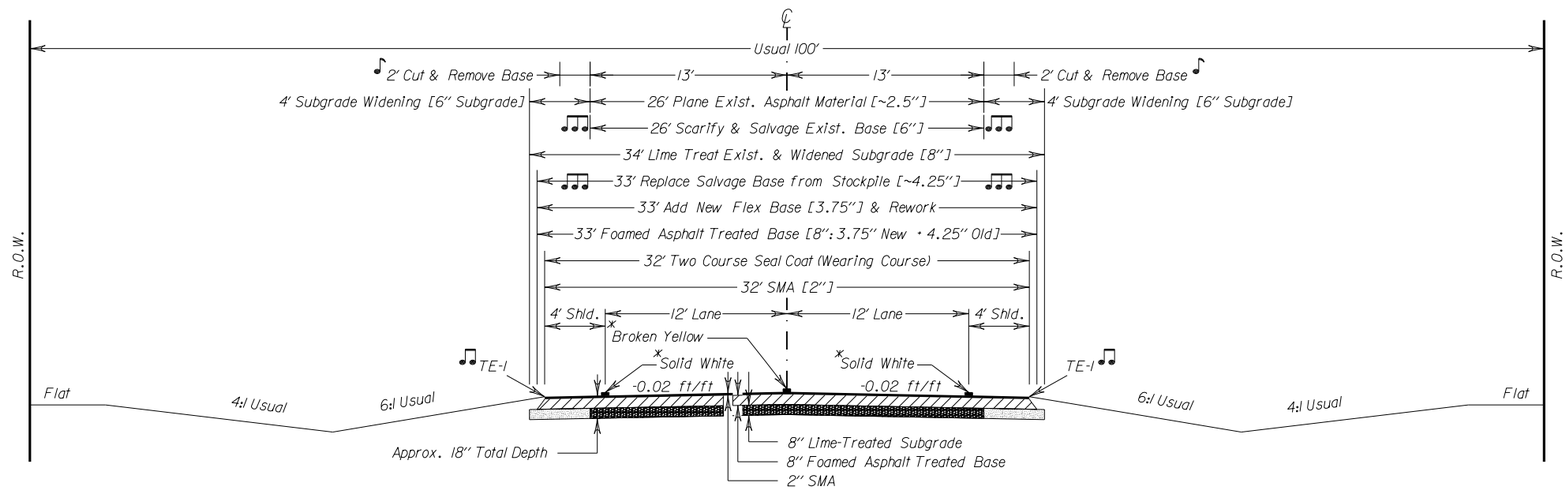


EXISTING SECTION

STA. 995+25 TO STA. 1,029+01



PROPOSED SECTION

STA. 995+25 TO STA. 1029+01

- Hot Sprayed Thermoplastic Striping
- This work is subsidiary to Item 112 Subgrade Widening. The removed material may be used in subgrade widening.
- Hotmix Tapered Edge Condition 1
- This work is paid for with Item 251 Reworking Base Courses (Type B). Additional flex. base will be paid for with Item 247 Flexible Base.

Edge & center milled rumble strips are to be milled into place from project beginning to project end.

Reworking of the base material shall be performed in half widths.

STATE OF TEXAS
SHELLEY C. HARRIS
99197
PROFESSIONAL ENGINEER
LICENSED

Shelley C. Harris, P.E.
6/29/2022

Texas Department of Transportation

Scale: 1" = 10' Sheet 3 of 3

TYPICAL SECTIONS

STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		5
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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GENERAL NOTES:

Hot Mix Basis of Estimate

ITEM	DESCRIPTION	*RATE (approx.)
3080	2 IN, SMA-D PG76-28 [Final surface]	236 LBS/SY
351	3 IN, TY C HMA [Partial depth repair]	345 LBS/SY
351	6 IN, TY C HMA [Full depth repair]	690 LBS/SY

*Actual rates will be determined by Engineer in Field

Hot Mix Area (SY)

MIX TYPE	SY
SMA-D PG76-28	219,824
D-GR TY C PG70-22	4,941

Surface Treatment Basis of Estimate

DESCRIPTION	EMUL (ERSN CONT)	TACK COAT	FIRST COURSE	SECOND COURSE	FOG SEAL
ASPH/EMULS. TYPE	*CSS-1H [EMULSION]*	PG 76-28	AC-20-5TR or *CSS-1H [EMULSION]*	AC-20-5TR or *CSS-1H [EMULSION]*	*CSS-1H [EMULSION]*
RESIDUAL ASPH. RATE (GAL/SY)	***0.13*	0.07	0.38 ****0.30*	0.38 ****0.30*	*****0.09*
AGGR TYPE	N/A	N/A	B	B	N/A
AGGR GRADE	N/A	N/A	5	5	N/A
AGGR RATE (CY/SY)	N/A	N/A	1/130	1/130	N/A

**Est. shot rate is 0.26 GAL/SY (50% Emulsified Asphalt/50% Water) or as directed.
***Est. shot rate is 0.50 GAL/SY (60% Emulsified Asphalt/40% Water) or as directed.
****Est. shot rate is 0.18 GAL/SY (50% Emulsified Asphalt/50% Water) or as directed.

Surface Treatment Area (SY)

EMUL (ERSN CONT)	TACK COAT	1st COURSE	2nd COURSE	FOG SEAL
464,312	Mat Edges	219,824	219,824	45,910

County: Crosby **Control:** 0453-04-024

Highway: S.H. 207 **Sheet 6**

W.W.A.R.P

Provide coarse aggregate for all surface hot-mix and overlays meeting a minimum class of **A** as published in the *AGGREGATE QUALITY MONITORING PROGRAM RATED SOURCE QUALITY CATALOGUE*.

Provide coarse aggregate for all base hot-mix and surface treatments meeting a minimum class of **B** as published in the *AGGREGATE QUALITY MONITORING PROGRAM RATED SOURCE QUALITY CATALOGUE*.

General Requirements and Covenants - Items 1 thru 9

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

Heath Bozeman, Plainview Area Engineer – Heath.Bozeman@txdot.gov (806) 293-5484

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

All contractor questions will be reviewed by the Engineer. Once a response is developed, it will be posted to TxDOT's Public FTP at the following Address:
https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20Responses/

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. Check the FTP site regularly for any updates.

Item 1 – Abbreviations and Definitions

Contract Prosecution – Each contract awarded by the Department stands on its own and as such, is separate from other contracts. A contractor awarded multiple contracts, must be capable and sufficiently staffed to concurrently process any and all contracts at the same time.

Item 2 – Instructions to Bidders

The construction time determination schedule will be posted on the Contractor Q&A FTP site.

View the plans on-line or download from the web at:
http://www.dot.state.tx.us/business/plansonline/agreement.htm
Choose "I Agree" then, "Click here", then "State-Let-Construction", pick the letting month, then "Plans" and then choose the plans set.

Order plans from any of the plan reproduction companies shown on the web at:
http://www.dot.state.tx.us/business/contractors_consultants/repro_companies.htm

High PI (15 < PI < 25) soils are present on this project from approximately Station 980+00 to project end at Station 1029+01. Caprock drop off starts at approximately Station 715+00 and levels out at approximately Station 760+00. Canyon cliff edge drop offs are present from Station 715+00 to Station 760+00.

Utilities

Overhead and underground utility installations exist within the project limits.

Call One Call to mark the locations of all utilities.

Item 5 – Control of the Work

Perform construction surveying in accordance with Article 5.9.3, "Method C."

When deviation from the plans is requested by the Contractor, but not required for installation, the Contractor will bear any additional costs associated with the deviation.

Alter the location of all foundations and structures shown on the plans only as approved by the Engineer in writing. Contact the Engineer prior to installing ground boxes, foundations and structures in order that the Inspector may verify and approve the location.

Restore all disturbed areas due to trenching or any construction activity to a condition equivalent to the original condition within 14 working days from the time work began in the area including all necessary stabilization.

The construction, operation, and maintenance of the proposed project will be consistent with the state implementation plan as prepared by the Texas Commission on Environmental Quality.

At the end of each day remove from the ROW, inside or outside the project limits, any excess material and debris resulting from construction.

Correct any deficiencies identified during the final inspection including required paperwork.

Submit all required paperwork within 60 days of project acceptance.

Item 6 – Control of Materials

Use materials from pre-qualified producers. A list of material producers pre-qualified by the Construction Division (CST) of the Texas Department of Transportation (TxDOT) can be found at the following website:
http://www.txdot.gov/business/resources/producer-list.html

In addition to the requirements of the plans and specifications, make all material and equipment furnished, installed, modified, tested, or otherwise used on this contract, and becoming the

County: Crosby **Control:** 0453-04-024

Highway: S.H. 207 **Sheet 6A**

property of TxDOT, fully functional within the manufacturer normal specifications, warranties, and guarantees. Make any additional functions of the material and equipment normally supplied by the manufacturer, but not specified by TxDOT, completely functional.

Item 7 – Legal Relations and Responsibilities

Coordinate street closures with the local fire, police, and other emergency personnel.

Maintain access to adjacent property at all times.

Notify, in writing, each residence and business 10 days prior to beginning construction of the phase/phases that are expected to affect their ingress and egress. This notice may be hand delivered or mailed.

When applicable, comply with all requirements of the Environmental Permits Issues and Commitments (EPIC) sheets.

Provide a lidded dumpster to be used by Contractor's personnel on the job site. The lid or covering to the dumpsters needs to be able to stay closed in high winds for preventing trash from being blown out. This shall be considered subsidiary to the various bid items.

Dispose of all waste materials in compliance with local, state, and federal regulations. Submit a list of all approved waste sites to the Engineer for review.

All vehicles in the work zone shall use flashing amber strobe lights visible 360 degrees.

No significant traffic generator events identified.

Tree removal shall be conducted outside of nesting season from March 1st to October 1st.

Item 8 - Prosecution and Progress

This project is to be complete in **492** days and **35** months of barricades in accordance with the contract documents.

Work must begin by **1/2/2023**.

Monthly schedule updates are a very important aspect of managing the progress of this project. The Engineer may withhold the monthly estimate if the schedule update has not been received.

A bar chart will be required on this project.

Do not begin work before sunrise or end work after sunset unless authorized by the Engineer, and remove all equipment from the roadway before sundown.

Perform any erosion control measures such as seeding or sodding before beginning the next phase, or land, unless otherwise authorized by the Engineer.

Working days will be computed and charged in accordance with Article 8.3.1.4 Standard Workweek.

Shut down operations the working day before the following major traffic generating holidays: January 1st (New Year's); Last Monday in May (Memorial Day); July 4th (Independence Day); First Monday in September (Labor Day); Fourth Thursday in November (Thanksgiving); and December 24th (Christmas Eve).

If the season for SMA is past, time and work on the project will not be suspended until all other work is complete. When this work is complete, the Engineer will suspend time and work until SMA season begins.

The work zone shall not exceed 2 miles unless otherwise directed by the Engineer.

Payment for final 3% mobilization will be made according to Article 500.3. Timeliness for submittal of required paperwork and correction of deficiencies is a consideration in developing the final contractor evaluation score.

Item 9 - Measurement and Payment

Submit material-on-hand payment requests by the monthly estimate cutoff date.

Items 110 And 132 - Excavation and Embankment

Provide Type C Embankment conforming to the following material specifications:

Liquid Limit (maximum)	45
Plasticity Index (maximum)	25
Bar Linear Shrinkage (minimum)	2

Consider all embankment to be Earth Embankment in accordance with Article 132.3.1.

Approval may be granted, as directed by the Engineer, to incorporate rock and/or broken concrete with a maximum dimension of four (4) inches, produced by the construction project, in the lower layers of the embankment, provided the quantity of rock and/or broken concrete does not affect the ability to achieve specified density, as directed by the Engineer.

Proof roll, as directed by the Engineer.

Item 112 – Subgrade Widening

Provide embankment material for subgrade widening that meets the requirements of Type C Embankment from approved sources.

County: Crosby **Control:** 0453-04-024

Highway: S.H. 207 **Sheet 6B**

Item 134 - Backfilling Pavement Edges & Item 150 - Blading

Salvage existing topsoil and grass in windrows along the edge of the grading operations, or as directed by the Engineer. As a land is finished, spread the adjacent topsoil and grass uniformly over the disturbed area. Perform this work in phases not to exceed three miles, unless otherwise authorized by the Engineer.

Some reshaping of the ditch back slope may be required.

Water will be required as directed by the Engineer to compact backfill around the pavement edges.

Item 216 – Proof Rolling

Provide a 25 ton roller, or other equipment approved by the Engineer for proof rolling.

Proof roll as directed.

Item 247 - Flexible Base

Provide Type A Grade 4 flexible base.

SPECIFICATION DATA

TEST TO BE IN ACCORDANCE WITH TEXAS DEPARTMENT OF TRANSPORTATION STANDARD TEST METHODS

FLEXIBLE BASE SPECIFICATION DATA

GRADING REQUIREMENTS PERCENT RETAINED – SIEVES SIEVE SIZES INCHES					**SOIL CONSTANTS**		**MAX WET BALL**	**MAX % INCREASE**	**MIN STRENGTH 15 PSI**
1 3/4	7/8	1/2	#4	#40	L.L. MAX	P.I. MAX			
0	10-30	30-55	50-75	70-90	40	15	50	25	150

The addition of field sand to reduce the plasticity index a maximum of three points below the original P.I. is permitted. Introduce field sand at the crusher on a feed belt prior to building the stockpile.

The addition of lime, or suitable material as approved by the Engineer, is permitted to reduce the plasticity index, if the mixture is mixed on the road or in a pugmill just prior to placement.

Proof roll as directed by the Engineer.

Provide the state at least 30 days to perform material testing on the flex base.

Item 251 - Reworking Base Courses

Before replacing salvaged material, construct and shape subgrade, using density control in accordance with Article 132.3.4.2.

A BOMAG or milling machine will not be allowed for scarifying existing material. Use rippers or other means to scarify.

Dispose of excess base material.

Use excess base material in other locations on the project.

Item 260 - Lime Treatment (Road-Mixed)

Use lime, at the target rate of **5** percent by weight, based on an estimated unit weight of 125 pounds per cubic foot, unless otherwise directed by the Engineer. Apply the lime in one application.

A minimum mellowing period of 48 hours shall be used. Keep soil moisture at an adequate level to sustain the pozzolanic reactions between the soil, lime, sulfates, and water. After the mellowing period ends, the soil can then be compacted.

Use a vane feeder system to distribute the lime.

Proof roll as directed by the Engineer.

A BOMAG or milling machine will not be allowed for initial scarifying of existing material. Use other means to scarify.

Allow 30 days for testing of material.

Item 302 - Aggregates for Surface Treatments

The Engineer reserves the right to waive flakiness index testing (Test Method TEX 224-F).

Aggregate will be subjected to five cycles of the magnesium sulfate soundness test in accordance with Test Method TEX-411-A. The loss shall not be greater than **20** percent.

The Contractor shall verify that stockpile locations do not interfere with any drainage channels.

The Contractor shall wet stockpiles to control dust as directed by the Engineer.

Allow 60 days for testing of material.

County: Crosby **Control:** 0453-04-024

Highway: S.H. 207 **Sheet 6C**

Item 314 - Emulsified Asphalt Treatment

Apply the emulsified asphalt and water mixture, as directed by the Engineer.

Item 315 - Fog Seal

Apply the emulsified asphalt and water mixture, as directed by the Engineer.

Item 316 – Seal Coat

AC-20-5TR will be used during warm weather placement. *CSS-1H* will be used for cool weather placement as directed by the Engineer.

Remove all excess aggregate by brooming after sufficient curing has occurred but no later than the end of the day, as directed by the Engineer. Remove all excess aggregate from the project in curb and gutter sections, and other areas as directed by the Engineer.

Schedule the placement width for all asphalt surfaces in a manner such that all joints will coincide with proposed lane lines (+/- 6 inches).

Cover or protect any sealed expansion joints or rail on bridges and any railroad tracks encountered on this project, as directed by the Engineer. Clean any of these items not properly protected. This work will not be paid for directly but will be considered subsidiary to Item 316.

Leave signs and barricades in place until all brooming and the application of the center stripe is completed, unless otherwise directed by the Engineer.

Set a string line for all surface treatment operations, unless otherwise directed by the Engineer. Remove the string line daily.

Use medium pneumatic tire rollers, as directed by the Engineer.

Do not use flat wheel rollers.

Asphalt storage tanks may be used.

Place a one course surface treatment full width upon completion of the work to seal and dress up the areas where temporary pavement markings have been placed for traffic relocation during construction. Use aggregate, asphalt type and rates as directed.

Apply lime water as directed, if in the opinion of the Engineer the pavement temperatures are becoming, or are expected to be, so elevated that the pavement surface could begin picking up under traffic or start bleeding. Failure to do so will be cause for the rejection and re-work of

sections of roadway damaged by traffic at the Contractor's expense. Payment will be made for the application of lime water under item 204 “Sprinkling”. The lime will be subsidiary to this item.

Remove pavement markers.

Use asphalt spray bar end nozzles (T nozzles), or a deflector shield on both ends of the distributor spray bar.

Submit all invoices, bills of lading, and/or asphalt tickets in electronic format to the project inspector and Area Office’s Records Keeper no later than 24 hours after receipt.

No more than 4-inch overlap will be allowed at all longitudinal joints.

Item 320 – Equipment for Asphalt Concrete Pavement

Provide waterproof tarpaulins on all hauling equipment.

Item 351 – Flexible Pavement Structure Repair

Saw cut at least two inches deep around the edges of concrete or asphaltic pavement to be removed, unless otherwise directed by the Engineer.

The type and grade of tack coat shall be AC or PG.

The type and grade of prime shall be MC-30.

A motor grader will be allowed only as directed by the Engineer.

Use a roadway structure of *3” Type C HMA* for partial depth repairs. Use a roadway structure of *6” Type C HMA* placed in two equal 3” lifts for full depth repairs. See Item 3076 for additional hotmix notes.

The minimum repair area shall be 10’ wide x 20’ long.

Item 354 – Planing and Texturing Pavement

Haul excess RAP to the pit just northwest of Ralls, Texas. Heading south on US 62, turn right on County Road 158. CR 158 should turn into West 11th St on the east side of US 62. Contact Ben Kautz at 806-252-0690 before hauling to this location.

Item 400 - Excavation and Backfill for Structures

Provide excavatable backfill material.

Furnish crushed caliche or sand and gravel as aggregate for cement stabilized backfill.

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Deliver the cement stabilized backfill in a mixer truck in a flowable state and capable of filling all the voids.

Construct fill over structures to plan grade before hauling with heavy equipment over structures.

Compact backfill used for structures, other than flowable backfill, to a minimum density of 95 percent.

Use a template in order to secure reasonably accurate Class C shaping of the foundation material outside of cement stabilized areas.

Contact the utility company and properly secure the utility poles prior to excavating next to the utility poles. The work and material used to secure the utility poles are subsidiary to the pertinent items.

Item 402 - Trench Excavation Protection

Maintain trench protection to protect State inspectors and Contractors during testing operations.

Item 403 – Temporary Special Shoring

The intent of this item is to provide a coffer dam for structures in playa lakes so the water may be pumped out and work resumed after a rain event.

Item 420 - Concrete Substructures

Furnish and place preformed fiber material, a minimum one-half (1/2)-inch thick, as shown on the plans or directed by the Engineer.

Furnish a temperature recorder with the minimum capabilities of a 7-day recording time, 2 degree F division, and 120 VAC with 9-volt backup, for each curing tank used on the project. Supply all charts, recording pins, and other equipment necessary for complete operation of the temperature recorder during the project. The temperature recorder and all associated equipment will not be paid directly, but will be subsidiary to the various bid items.

Use Grade 3 or Grade 4 coarse aggregate in all concrete structures.

Cold weather protection requirements within 72 hours of a concrete pour as per the following table:

PROJECTED LOW TEMP	PROTECTION REQUIRED
< 20 degrees	DO NOT POUR
20-27 degrees	cover with plastic, then a insulating blanket, and plastic on top
28-35 degrees	cover with plastic, then a insulating blanket

> 35 degrees	no protection required

All projected temperatures will be based on the NOAA website. None of the above actions releases the Contractor from the responsibility for freeze damaged concrete for whatever reason.

Coring of structural classes of concrete will not be allowed. All coring of miscellaneous concrete shall be at the Contractor's expense including all prep work. Coring must be completed within 3 days of notice of failing 28-day samples; otherwise pay deductions apply using 28-day compressive strength.

Provide TY II curing compound for all curb and gutter, sidewalks, driveways, curb ramps, riprap, and cast-in-place SET's.

When doweling into concrete, clean out the hole, fill completely with epoxy, then place the dowel. Do not dip the dowel into epoxy first and shove it into the hole.

Do not place concrete when the wind gusts get to over 25 miles per hour.

Paint the NBI number on the bridge as directed.

Place the evaporation retarder right after the finish float and before the curing compound.

Vibrate all concrete.

Item 421 - Hydraulic Cement Concrete

All Class C concrete will be designed using Option 3.

If fly ash is used, a maximum of 35% will be allowed.

Provide air entrainment in all concrete except for concrete used in drilled shafts and precast concrete members. Target an entrained air content of 4.0% +/- 1% for concrete pavement and 5.5% +/- 1% for all other concrete requiring air entrainment. Ensure the minimum entrained air content is at least 3.0% for all classes of concrete.

The Engineer will perform all concrete job control testing.

Supply 2 – 4' x 8' x ¾" sheets of plywood, in order to perform required testing procedures at the location of concrete placements.

Use 4-inch by 8-inch cylinder molds for concrete with Grade 3 or smaller coarse aggregate. Supply new cylinder molds and lids subsidiary to the various bid items.

Concrete plant must be capable of providing automated moisture content control for both coarse and fine aggregate.

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Item 427 - Surface Finishes For Concrete

Provide *Surface Area I* concrete surfaces with a rub finish as soon as forms are removed.

Item 429 – Concrete Structure Repair

Utilize latest TxDOT Concrete Repair Manual for repairs.

Item 432 - Riprap

Provide 4-inch thick concrete riprap, unless otherwise indicated in the plans.

Reinforce with #3 steel rebar 12" on center, or #4 steel rebar 18" on center. Welded wire will not be allowed.

In large areas of riprap, provide one-half (1/2)-inch thick expansion joint material at approximately 15-foot intervals, or as determined by the Engineer.

Place asphalt expansion joint material between proposed riprap and utility poles, guy wires, vent pipes, stand pipes and as directed.

Place felt or filter fabric at open joints as required by the Engineer. This will be considered subsidiary.

Excavation and embankment shall be subsidiary to all riprap items.

Follow cold weather protection requirements listed under Item 420.

Item 464 - Reinforced Concrete Pipe

Join all concrete culvert pipe with a cold-applied plastic asphalt sewer joint compound.

Joints must meet requirements of ASTM C443 (Standard Specifications for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets).

Item 466 – Headwalls and Wingwalls

Install reinforced concrete aprons on all headwalls and wingwalls, using reinforcing composed of #4 bars at 12-inch spacings, center-to-center, or as shown on the detail sheet.

Item 467 - Safety End Treatment

Install reinforced concrete aprons on all Type I SET, using reinforcing composed of #4 bars at 12-inch spacings, center-to-center, or as shown on the detail sheet.

Install riprap around all precast SETs. The riprap shall be Class B and reinforced in accordance with Item 432.3.1. Precast riprap will not be allowed.

Item 496 - Removing Structures

Dispose of removed structures.

Item 502 - Barricades, Signs And Traffic Handling

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

Additional signs and barricades as directed by the Engineer shall be considered subsidiary to Item 502.

Provide flashing portable arrow panels for all lane closures.

Wash the channelizing devices and barricades following each rainfall or snowfall event and at times deemed necessary by the Engineer.

To ensure the safety and convenience of traffic, flaggers may be required when construction machinery is being operated along, across, or adjacent to lanes carrying traffic. If considered necessary by the Engineer, supplemental signs and barricades may be required.

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

Barricades, Signs and Traffic Handling is a plan quantity item. If time is suspended, no additional compensation will be made.

Traffic switches will not be permitted on Fridays or any working day preceding a holiday unless authorized by the Engineer.

Cones or chevrons may be used in lieu of vertical panels at the discretion of the Engineer. Cones cannot be used to separate opposing traffic.

Construct temporary ramps to maintain access to driveways and city streets as directed by the Engineer. Temporary ramp construction is subsidiary to Item 502.

The Contractor shall bid the traffic control plan shown in the plans. Any proposed alterations to the TCP (combining work areas / phasing / etc.) shall be submitted to the Engineer at least 10 days prior to anticipated changes.

Even when not explicitly shown in the project TCP, vertical panels shall be used with an opposing lane divider every 5th panel in accordance with BC(9) for all opposing traffic conditions without a positive barrier.

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Square tubing sign supports may be used for temporary construction signs. Aluminum and wood signs may be mounted if the vertical supports are embedded into the ground. Square tubing supports on skids which are typically held in place with sand bags can only support signs made of light weight flutted plastic.

Any trench or drop off over 2” and less than 10” will require a safety slope of at least 1:1 if drop off is going to be existing for more than 2 nights. For drop-offs greater than 10”, a safety slope will be required at the end of operations for that day. This safety slope may be constructed with RAP, embankment, or other material approved by the Engineer. The placement, maintenance, and removal of this safety slope is the responsibility of the Contractor and will be considered subsidiary to the various bid items.

Provide an all-weather surface for all sections of the roadway prior to time suspension as directed by the Engineer. The all-weather surface shall be the original undisturbed asphalt pavement or a one course surface treatment on the constructed roadbed as shown in the typical sections.

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

Correct all noted deficiencies within 7 calendar days, otherwise, cease all operations until the noted deficiencies are corrected.

Stockpiles that meet the barricade requirements as shown on the BC(10) Standard are required to be erected at the time of material delivery in the Right-of-Way and maintained as long as the stockpile exists. Payment for Material-on-Hand will be withheld from the estimate for inadequate barricades or the failure to maintain barricades on a per stockpile basis as determined by the Engineer.

Like new traffic control devices will be required at the initial setup for all projects or as approved by the Engineer.

Provide flags and a CW8-15P “MOTORCYCLE WARNING” plaque on all CW20-1D “ROAD WORK AHEAD” signs except on side roads.

Use only the work zone speed limit and TCP signs that are relevant to the active work area and as directed. Reset signs for subsequent work phases as work progresses and approved by the Engineer. Reset normal speed limit signs at the ends of work zones.

Stop adjacent traffic using TCP(1-2) during the application of asphalts unless otherwise authorized by the Engineer.

Provide pilot cars as directed by the Engineer.

"No Passing" and "Pass With Care" signs shall be erected at the beginning and the end of each no passing zone until the permanent markings are in place.

All bid items and work requiring traffic control is the responsibility of the contractor, even when not explicitly detailed in the plans. Consider this work subsidiary to Item 502.

TMAs and Portable Changeable Message Boards will not be used as Arrow Boards.

The "ROAD WORK AHEAD" (CW20-1D) sign shall be mounted centered back-to-back with the "END ROAD WORK" (G20-2) sign. See Note 2 on BC (2).

Item 504 - Facilities for Field Office and Laboratory

Furnish one Type D structure. Use the Ralls TxDOT Maintenance Office as the field office. The laboratory shall be located adjacent to the project site.

Partition the floor of the Type D structure into a minimum of three interconnected rooms. Furnish each room with a door. Type D structure must have at least two windows and two exterior doors. Block and tie down portable structures.

Equip the Type D field lab with an eyewash facility capable of flushing the eyes for at least 15 minutes, connected to the main water supply or an approved stand-alone water supply.

Encompass the field office only with a fence enclosure providing a minimum 6.5-foot clearance around the perimeter of the field office.

Provide 2 tables and 1 meeting table. Provide 1 chair for each table and enough chairs for the meeting table. Provide 2 filing cabinets. Equip the field office and lab with window blinds.

Provide internet connectivity, a printer/fax/scanner/copier, and telephone service to field offices, including installation, monthly charges and the phones.

Equip all field offices and field labs with a surge protector at the circuit breaker panel.

Item 506 - Temporary Erosion, Sedimentation, and Environmental Controls

Place a weatherproof bulletin board containing the TCEQ required information on the project at a site directed by the Engineer. Post the following documents: (1) "TCEQ TPDES Storm Water Program" Construction Site Notice and (2) TCEQ "TPDES Permit." Place rain gauge(s) at locations designated by the Engineer. At the completion of the contract, the bulletin board will

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become the property of the State and will remain in place until 70 percent vegetation coverage has been obtained.

Silt fence, sandbags and other BMPs will be placed and relocated as directed by the Engineer in order to comply fully with the SW3P requirements.

The soil area disturbed by this project, including all disturbed areas within the limits of this project as described in the Contract and at Contractor project specific locations (PSLs) within one mile of the project limits, contributes to the establishment of the Texas Commission on Environmental Quality (TCEQ) Construction General Permit (CGP) requirements for storm water discharges. The Department will obtain an authorization from the TCEQ to discharge storm water for construction activities shown on the plans. The Contractor shall obtain the required authorization from the TCEQ for Contractor project specific locations (PSLs) for construction support activities off the right-of-way. As directed by the Engineer, the Contractor shall obtain any required authorization from the TCEQ for on-site PSLs. When the total area disturbed within the project limits and at PSLs within one mile of the project limits exceeds five acres, the Contractor shall provide a copy of the Contractor's Notice of Intent (NOI) submission and Construction General Permit for PSLs on the right-of-way to the Engineer (and submit a copy of NOIs to appropriate MS4 operators).

Sediments removed from BMPs shall be paid for by force account. The Contractor shall submit an invoice for the work.

Correct all noted deficiencies within 7 calendar days, otherwise, cease all operations until the noted deficiencies are corrected.

Maintain 100 feet of silt fence, 100 feet of erosion control logs, and 50 sandbags on site at all times for repairs/replacement as needed.

Item 512 - Portable Concrete Traffic Barrier

There is *690* feet of portable barrier currently on the project. If additional barrier is needed, the designated source stockpile is located off the frontage road on the east side of IH 27 between FM 1294 and CR 5800 approximately 1.5 miles south of New Deal, TX. This is approximately 35 miles from the extreme north end of the project near Station 414+48.

If hardware is missing from the barrier at the designated source then contractor will provide necessary components for installation.

Reimbursable repair or replacement will be paid at contract bid prices.

Item 530 – Intersections, Driveways, and Turnouts

Use Class A Concrete for all concrete driveways.

Reinforce concrete driveways with # 4 bars on 12”x12” grid spacing centered in the slab depth.

Item 533 – Rumble Strips

Use Option 1 for centerline rumble strips.

Use Option 04 for edgeline rumble strips.

Place fog seal on rumble strips within 14 days of milling and before placing final stripe.

Item 540 - Metal Beam Guard Fence

Mount an amber or white delineator on the guard fence post at 100-foot intervals. Use prismatic reflective sheeting. Place a minimum of three delineators at each metal beam guard fence placement.

All metal beam guard fence shall have steel posts.

Material-on-hand for metal beam guard fence rail will not be paid unless it is properly stored (out of the elements) to reduce white rust.

Existing metal beam guardfence posts may be set in concrete.

Reimbursable repair or replacement will be paid at contract bid prices.

Install the MBGF from the structure out to ensure proper post spacing and connection to the concrete rail.

Hammer drilling will not be allowed when attaching the MBGF transitions to the concrete rail.

Backfill existing post holes after removing existing metal beam guard fence prior to installing new posts.

Item 544 – Guardrail End Treatments

Reimbursable repair or replacement will be paid at contract bid prices.

All guardrail end treatments shall have steel posts.

Guardrail end treatments require object marker stickers in accordance with D&OM (VIA).

Item 545 - Crash Cushion Attenuators

Reimbursable repair or replacement will be paid at contract bid prices.

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Crash cushion attenuators require object marker stickers in accordance with D&OM (VIA).

Item 560 - Mailbox Assemblies

Move and replace all mailboxes within the project limits such that they may be served by the mail carrier from his car at all times during and after construction. This work will be considered subsidiary to the various bid items of this contract.

Final placement shall include new metal mailboxes of similar size to the original mailbox, unless the property owner wants to retain their old mailbox.

Item 585 - Ride Quality for Pavement Surfaces

Use Surface Test Type B.

“Pay Adjustment Schedule” number ***2*** will be used on this project.

Corrective action, when required, shall be diamond grinding, as approved and directed by the Engineer. Seal all concrete surfaces after grinding with linseed oil or as directed. This work is considered subsidiary.

Item 644 - Small Roadside Sign Assemblies

All signs on this project, new or relocated, will require a retroreflective wrap on the sign support. This wrap shall be 12 inches in height, visible in all directions and shall be placed 3 ft. below the bottom of the sign. The color for YIELD, STOP, WRONG WAY, and DO NOT ENTER signs shall be red. The color for all other signs shall be yellow. This retroreflective wrap will not be paid for directly but considered subsidiary to Item 644.

Stake all sign locations, and receive approval from the Engineer, prior to sign placement.

The triangular slip bases will be the two bolt clamp type (Southern Plains Fabrication or equivalent). For more information refer to the approved materials producers list:
http://www.txdot.gov/business/resources/producer-list.html

For all signs designated for removal:

- Salvage aluminum signs,
- Palletize and band salvaged aluminum signs,
- Stockpile signs at the following location: Crosby County Maintenance Office, in Ralls, TX. The office number is (806) 253-2575. Contact person is Ben Kautz.

Item 658 - Delineator and Object Marker Assemblies

Delineator and object marker assembly posts shall be driveable and composed of post-consumer recycled materials. Embedded stub shall be perforated square tubing.

Driveable posts shall be the three-piece Flexible Delineator Post System, utilizing a 2-3/8” round post with a square to round flexible joint. The Embedded Anchor shall be 2" x 12 gauge x 24" long steel perforated square tubing. The Posts shall be permanently sealed at the top and have a 3-1/2” wide x 13" flattened surface to accommodate up to a 3" x 12" reflective sheet on both sides.

Surface Mount posts shall be the three-piece Flexible Delineator Post System, utilizing a 2-3/8” round post with a square to round flexible joint. The Base shall have 6 mounting holes to accommodate for mounting on narrow headwalls as well as all surfaces. The Posts shall be permanently sealed at the top and have a 3-1/2” wide x 13" flattened surface to accommodate up to a 3" x 12" reflective sheet on both sides.

Guard Fence Delineator posts shall be 33” in length and permanently sealed at the top and have a 3-1/2” wide x 13" flattened surface to accommodate up to a 3" x 12" reflective sheet on both sides. They shall be flattened on both ends and transition to 2-3/8” round in the center for 360-degree visibility.

Item 662 - Work Zone Pavement Markings

Use short-term removable striping and tabs as directed by the Engineer.

Water base paint may be used for all non-removable striping if authorized by the Engineer.

The deviation rate in alignment shall not exceed one inch per 200 feet of roadway. The maximum deviation shall not exceed 2 inches nor shall any deviation be abrupt. Striping not in conformance shall be removed and replaced at the Contractor's expense.

Do not place guide markers on a finished surface unless they fall on a proposed lane line. Remove Stick-down markings prior to final marking. Remove tabs at the same time as the RPM placement.

Type I markings must be at least one twenty-fifth (1/25) of an inch thick.

Remove ceramic buttons, RPMs, and Adhesives as directed by the Engineer. Payment for this work is subsidiary to Item 662.

Item 666 - Reflectorized Pavement Markings

Reference the existing striping in order to stripe the roadway as it was prior to construction.

Mark the location of standard pavement markings, including barrier lines, no passing zones, gores, and transitions adjusting to meet latest standards or as directed by the Engineer.

Temporary or final stripe within 14 days of opening road surface to traffic.

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For seal coated surfaces, leave the final course in place for three days and broom the roadway directly ahead of the striping machine prior to placing standard pavement markings.

After completion of all work and removal of the barricades, time charges will be suspended. The performance period for the project will not begin until all the striping has been completed. Final acceptance will not be granted until the performance period for pavement markings is complete. If replacement markings are needed, traffic control for moving operations will be required. No payment will be made for traffic control during replacement striping work. All traffic control work shall be considered subsidiary to the project’s replacement striping work.

The yellow or white long-line striping for re-striping operations will not lag one another by more than four (4) working days. The performance period for a roadway will not begin for a section of roadway or a project until all required striping for that section or project has been completed.

Provide a schedule and notify the District Traffic Office a minimum of 3 days prior to any striping operation. Contact via email at LBB-TRFOPS@TxDOT.GOV. If not notified, the time frame for testing and meeting the Retroreflectivity requirements in article 4.4 will start the day the department is made aware of that the markings have been applied.

Item 668 - Prefabricated Pavement Markings

Reference the “Standard Highway Sign Designs for Texas” manual for dimensions to words and symbols.

Manufacturer’s sealer is subsidiary to this item. Surface preparation will be paid for separately under Item 678.

Item 677 - Eliminating Existing Pavement Markings and Markers

Eliminate existing pavement markings on asphalt surfaces by the Blasting Method at the project limits that get the work zone seal coat and as directed. Otherwise, use the Surface Treatment Method.

Item 678 - Pavement Surface Preparation for Markings

Use dry sandblasting for asphalt surfaces.

Item 730 - Roadside Mowing

Mow full-width from pavement edge to Right-of-Way line *6* times. The Engineer shall dictate the times to mow and the areas in the project to mow.

Each mowing cycle is for the entire project. Each cycle is approximately *100* acres.

Notify the Engineer by 9:00 am each day for work completed the previous day, including hand trimming and cleanup. The Engineer will then inspect the section(s) of roadway for acceptance, not more than two (2) working days after notification.

Truck mounted attenuators shall be used while mowing.

Item 734 – Litter Removal

Perform litter removal prior to mowing and as directed by the Engineer.

Items 3076, 3077, 3079, 3080, 3081, and 3082 – Hot Mix Asphalt Pavement

Provide a summary spreadsheet for each lot in accordance with Article 520.2 of the Standard Specifications.

Design the mixture with a Superpave Gyratory Compactor (SGC).

Aggregate will be subjected to five cycles of the magnesium sulfate soundness test in accordance with Test Method TEX-411-A. The loss shall not be greater than **20** percent.

The mix will be evaluated for stripping through the boil and hamburg wheel tests. If it is determined to be stripping then 1% lime, liquid anti-strip or a warm mix additive proven to prevent stripping will be required.

Schedule the placement width for the final hotmix surface in such a manner that all joints will coincide with proposed lane lines (+/- 6 inches).

Use a self-propelled, wheel-mounted material transfer vehicle (MTV) capable of receiving hot mix from the haul trucks separate from the paver on this project or provide the PaveIR. Minimum requirements for the MTV are a storage capacity of approximately 25 tons, a pivoting discharge conveyor, a means of completely remixing the ACP prior to placement, and a paver hopper equipped with a separate surge storage insert with a minimum capacity of approximately 20 tons.

Provide straight edges including the outside edge. Any edges not conforming to the typical sections will be cut and removed at the Contractor's expense.

No TxDOT RAP is available for this project.

Do not pave when temperatures get below 32 degrees F in a 12 hour period.

No substitute PG grade binders will be allowed.

Provide a square edge before laying the adjacent lane of hotmix as directed by the Engineer.

Item 3076 – Dense-Graded Hot-Mix Asphalt

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PG 70-22 is required for the TY C homix on this project.

Asphalt stabilized base will not be allowed as RAP.

Fractionate the RAP if used in the mixture design.

Post-consumer RAS will not be allowed.

No exempt production on driving lanes and shoulder.

The *TY C* hotmix is considered a surface layer and is subject to the Minimum Pavement Surface Temperature requirements in Tables 14A and 14B.

Provide emulsified trackless asphalt for tack coat at a rate of 0.10-0.14 gal/sy.

The Contractor will be required to tack 100% of the surfaces prior to the subsequent lift including all vertical joints.

Item 3080 – Stone-Matrix Asphalt

Place hot mix between *May 15th* and *September 30th*.

PG 76-28 is required for the SMA on this project.

Provide PG 76-28 asphalt for tack coat at an application rate of 0.04-0.10 gal/sy. Tack coat 100% of the vertical edges of the SMA only.

Cement and kiln dust will not be allowed to be used as mineral fillers.

The percent passing the #200 sieve will be 6.0% – 12.0% in Section 4.4.1, Table 7 Master Gradation Limits for SMA-D Medium.

RAP will not be allowed.

Beginning with Lot 2, if the Contractor's requested referee test results come back with a failing lab molded density, the Contractor may request performance tests on the laboratory tested material be used as a basis for acceptance of the sub lot at maximum production penalty.

The contractor will have one day after receiving the referee testing results to request in writing that TxDOT consider acceptance of the material using performance testing.

If SMA fails performance tests, then remove and replace the SMA at the Contractor's expense.

Item 3088 – Full Depth Reclamation Using Foamed Asphalt (Road-Mixed)

PG 64-22 asphalt is required for this project.

An anti-foaming agent will not be allowed.

Cure the foam treated base for 72 hours before placing the driving course unless otherwise directed by the Engineer.

Proof roll with available equipment, as directed by the Engineer.

Locate treatment overlaps in a way as to minimize the amount of treatment overlaps occurring under a future wheel path.

Item 6001 - Portable Changeable Message Sign

Provide messages as directed by the Engineer.

Provide ***2*** solar powered changeable message signs for the duration of this project.

Inform the public 2 weeks before construction begins.

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

Provide ***4*** TMAs for stationary use for the duration of the project. Stationary TMAs will be used during the various phases of work required for this project. Payment will be made by the day for each TMA used in stationary operations.

Provide ***3*** TMAs for mobile use. Mobile TMAs will be used for moving operations such as striping and RPM placement. Payment will be made by the day for each TMA used in mobile operations.

Item 6307 – Temporary Speed Monitoring System

Provide ***2*** speed monitoring trailers for this project.

Utilize the speed monitoring trailer on the project for the duration of this project as directed for the protection of the workers.

Change locations of speed monitoring trailer on a regular basis to improve driver attention.

ESTIMATE SUMMARY

CSJ: 0453-04-024 BRIDGE ITEMS NBI: 05-054-0453-04-009		CSJ: 0453-04-024 BRIDGE ITEMS NBI: 05-054-0453-04-010		CSJ: 0453-04-024 SH 207 CONSTRUCTION ROADWAY ALL BID ITEMS		ALT	ITEM CODE			DESCRIPTION	UNIT	COMPLETE PROJECT TOTALS	
EST	FINAL	EST	FINAL	EST	FINAL	EST	FINAL		ITEM CODE	DESC CODE	SP NO			EST.	FINAL
						1.000			100	6002		PREPARING ROW	STA	1.000	
						10.000			100	6007		PREPARING ROW (TREE)(GREATER THAN 24 IN DIA)	EA	10.000	
						20.000			100	6009		PREPARING ROW (TREE)(6 TO 24 IN DIA)	EA	20.000	
						495.000			104	6009		REMOVING CONC (RIPRAP)	SY	495.000	
						226.000			104	6017		REMOVING CONC (DRIVEWAYS)	SY	226.000	
						600.000			110	6001		EXCAVATION (ROADWAY)	CY	600.000	
						615.000			112	6002		SUBGRADE WIDENING (DENS CONT)	STA	615.000	
						615.000			134	6002		BACKFILL (TY B)	STA	615.000	
						615.000			150	6001		BLADING	STA	615.000	
						50.000			216	6001		PROOF ROLLING	HR	50.000	
						121,425.000			247	6513		FL BS (CMP IN PLC)(TY-A GR-4)(3.5")	SY	121,425.000	
						131,136.000			247	6514		FL BS (CMP IN PLC)(TY-A GR-4)(3.75")	SY	131,136.000	
						12,379.000			251	6027		REWORK BS MTL (TY B)(6")(DENS CONT)	SY	12,379.000	
						212,949.000			251	6035		REWORK BS MTL (TY C)(6")(DENS CONT)	SY	212,949.000	
						257.000			260	6001		LIME (HYDRATED LIME (DRY))	TON	257.000	
						13,692.000			260	6073		LIME TRT (SUBGRADE)	SY	13,692.000	
						60,360.000			314	6013		EMULS ASPH (EROSN CONT)(CSS-1H)	GAL	60,360.000	
						73,665.000			315	6004		FOG SEAL (CSS-1H)	GAL	73,665.000	
						88,638.000			316	6017		ASPH (AC-20-5TR)	GAL	88,638.000	
						3,486.000			316	6177		AGGR (TY-B GR-5 SAC-B)	CY	3,486.000	
						3,919.000			351	6002		FLEXIBLE PAVEMENT STRUCTURE REPAR (6")	SY	3,919.000	
						3,919.000			351	6019		FLEXIBLE PAVEMENT STRUCTURE REPAR (3")	SY	3,919.000	
						668.000			354	6022		PLANE ASPH CONC PAV (0" TO 3")	SY	668.000	
						183,321.000			354	6157		PLANE ASPH CONC PAV (2" TO 3")	SY	183,321.000	
		11.000				358.000			400	6005		CEM STABIL BKFL	CY	369.000	
						589.000			400	6008		CUT AND RESTORE ASPH PAVING	SY	589.000	
		35.000				427.000			402	6001		TRENCH EXCAVATION PROTECTION	LF	462.000	
		1,980.000							403	6006		TEMPORARY SPECIAL SHORING (COFFERDAM)	SF	1,980.000	
				10.000					429	6009		CONC STR REPAIR (STANDARD)	SF	10.000	
						365.000			432	6001		RIPRAP (CONC)(4 IN)	CY	365.000	
		71.000				157.000			432	6002		RIPRAP (CONC)(5 IN)	CY	228.000	
						65.000			432	6021		RIPRAP (STONE TY F)(GROUT)(8 IN)	CY	65.000	
						180.000			432	6045		RIPRAP (MOW STRIP)(4 IN)	CY	180.000	
		124.000							450	6006		RAIL (TY T223)	LF	124.000	
						29.000			459	6001		GABIONS (GALV)	CY	29.000	
						50.000			462	6001		CONC BOX CULV (3FT X 2FT)	LF	50.000	
						286.000			462	6002		CONC BOX CULV (3FT X 3FT)	LF	286.000	
						92.000			462	6003		CONC BOX CULV (4FT X 2FT)	LF	92.000	
						196.000			462	6004		CONC BOX CULV (4FT X 3FT)	LF	196.000	
						48.000			462	6005		CONC BOX CULV (4FT X 4FT)	LF	48.000	
						44.000			462	6006		CONC BOX CULV (5FT X 2FT)	LF	44.000	
						40.000			462	6007		CONC BOX CULV (5FT X 3FT)	LF	40.000	
						96.000			462	6013		CONC BOX CULV (6FT X 6FT)	LF	96.000	
						43.000			462	6045		CONC BOX CULV (3FT X 2FT)(EXTEND)	LF	43.000	
						27.000			462	6046		CONC BOX CULV (3FT X 3FT)(EXTEND)	LF	27.000	
						8.000			462	6051		CONC BOX CULV (5FT X 3FT)(EXTEND)	LF	8.000	
		52.000							462	6078		CONC BOX CULV (10FTX10FT)(EXTEND)	LF	52.000	
						64.000			464	6010		RC PIPE (CL III)(48 IN)	LF	64.000	
						88.000			464	6018		RC PIPE (CL IV)(24 IN)	LF	88.000	
						1.000			466	6152		WINGWALL (FW-0)(HW = 5 FT)	EA	1.000	
						1.000			466	6154		WINGWALL (FW-0)(HW = 7 FT)	EA	1.000	
						2.000			466	6155		WINGWALL (FW-0)(HW = 8 FT)	EA	2.000	
						3.000			466	6156		WINGWALL (FW-0)(HW = 9 FT)	EA	3.000	
		2.000							466	6158		WINGWALL (FW-S)(HW = 11 FT)	EA	2.000	
						1.000			466	6180		WINGWALL (PW-1)(HW = 5 FT)	EA	1.000	
				2.000					467	6003		SET (REPLACE PIPE RUNNER ASSEMBLY)	EA	2.000	
						2.000			467	6106		SET (TY 1)(S = 3FT)(HW = 3FT)(4:1)(C)	EA	2.000	
						8.000			467	6109		SET (TY 1)(S = 3FT)(HW = 3FT)(6:1)(C)	EA	8.000	

ESTIMATE & QUANTITY SHEET	STATE DIST. NO.	COUNTY	CONTROL-SECTION-JOB	SHEET
	5	CROSBY	0453-04-024	7

ESTIMATE SUMMARY

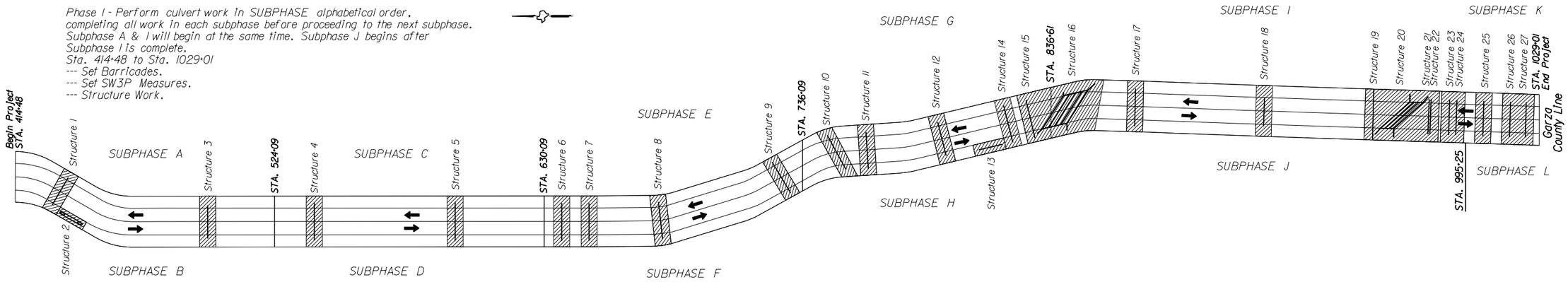
CSJ: 0453-04-024 BRIDGE ITEMS NBI: 05-054-0453-04-009		CSJ: 0453-04-024 BRIDGE ITEMS NBI: 05-054-0453-04-010		CSJ: 0453-04-024 SH 207 CONSTRUCTION ROADWAY ALL BID ITEMS		ALT	ITEM CODE			DESCRIPTION	UNIT	COMPLETE PROJECT TOTALS	
EST	FINAL	EST	FINAL	EST	FINAL	EST	FINAL		ITEM CODE	DESC CODE	SP NO			EST.	FINAL
						4.000			467	6112		SET (TY I) (S = 3FT) (HW = 4FT) (4:1) (C)	EA	4.000	
						14.000			467	6115		SET (TY I) (S = 3FT) (HW = 4FT) (6:1) (C)	EA	14.000	
						4.000			467	6141		SET (TY I) (S = 4FT) (HW = 3FT) (6:1) (C)	EA	4.000	
						4.000			467	6146		SET (TY I) (S = 4FT) (HW = 4FT) (6:1) (C)	EA	4.000	
						2.000			467	6173		SET (TY I) (S = 5FT) (HW = 3FT) (6:1) (C)	EA	2.000	
						4.000			467	6179		SET (TY I) (S = 5FT) (HW = 4FT) (6:1) (C)	EA	4.000	
						4.000			467	6395		SET (TY II) (24 IN) (RCP) (6:1) (P)	EA	4.000	
						2.000			467	6477		SET (TY II) (48 IN) (RCP) (4:1) (C)	EA	2.000	
						13.000			496	6016		REMOVE STR. (PIPE)	EA	13.000	
						1.000			500	6001		MOBILIZATION	LS	1.000	
						35.000			502	6001		BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	35.000	
						299.000			506	6003		ROCK FILTER DAMS (INSTALL) (TY 3)	LF	299.000	
						299.000			506	6011		ROCK FILTER DAMS (REMOVE)	LF	299.000	
						444.000			506	6020		CONSTRUCTION EXITS (INSTALL) (TY I)	SY	444.000	
						444.000			506	6024		CONSTRUCTION EXITS (REMOVE)	SY	444.000	
						800.000			506	6035		SANDBAGS FOR EROSION CONTROL	EA	800.000	
						10,000.000			506	6038		TEMP SEDMT CONT FENCE (INSTALL)	LF	10,000.000	
						5,000.000			506	6039		TEMP SEDMT CONT FENCE (REMOVE)	LF	5,000.000	
						12,360.000			506	6042		BIODEG EROSN CONT LOGS (INSTL) (18")	LF	12,360.000	
						6,180.000			506	6043		BIODEG EROSN CONT LOGS (REMOVE)	LF	6,180.000	
						390.000			512	6017		PORT CTB (DES SOURCE) (F-SHAPE) (TY I)	LF	390.000	
						4,110.000			512	6029		PORT CTB (MOVE) (F-SHAPE) (TY I)	LF	4,110.000	
						1,080.000			512	6041		PORT CTB (STKPL) (F-SHAPE) (TY I)	LF	1,080.000	
						1,612.000			530	6002		INTERSECTIONS (ACP)	SY	1,612.000	
						685.000			530	6004		DRIVEWAYS (CONC)	SY	685.000	
						3,202.000			530	6005		DRIVEWAYS (ACP)	SY	3,202.000	
						127.000			530	6008		TURNOUTS (ACP)	SY	127.000	
						122,906.000			533	6003		RUMBLE STRIPS (SHOULDER) (ASPHALT)	LF	122,906.000	
						61,453.000			533	6004		RUMBLE STRIPS (CENTERLINE) (ASPHALT)	LF	61,453.000	
						2,275.000			540	6002		MTL W-BEAM GD FEN (STEEL POST)	LF	2,275.000	
						4.000			540	6006		MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	4.000	
						1,400.000			542	6001		REMOVE METAL BEAM GUARD FENCE	LF	1,400.000	
						6.000			542	6002		REMOVE TERMINAL ANCHOR SECTION	EA	6.000	
						18.000			544	6001		GUARDRAIL END TREATMENT (INSTALL)	EA	18.000	
						8.000			544	6003		GUARDRAIL END TREATMENT (REMOVE)	EA	8.000	
						56.000			545	6003		CRASH CUSH ATTEN (MOVE & RESET)	EA	56.000	
						13.000			545	6005		CRASH CUSH ATTEN (REMOVE)	EA	13.000	
						13.000			545	6019		CRASH CUSH ATTEN (INSTL) (S) (N) (TL3)	EA	13.000	
						300.000			552	6003		WIRE FENCE (TY C)	LF	300.000	
						8.000			560	6011		MAILBOX INSTALL-S (TWW-POST) TY 4	EA	8.000	
						1.000			560	6012		MAILBOX INSTALL-D (TWW-POST) TY 4	EA	1.000	
						1.000			560	6013		MAILBOX INSTALL-M (TWW-POST) TY 4	EA	1.000	
						14.000			644	6001		IN SM RD SN SUP&AM TY10BWG (1) SA (P)	EA	14.000	
						12.000			644	6002		IN SM RD SN SUP&AM TY10BWG (1) SA (P-BM)	EA	12.000	
						26.000			644	6004		IN SM RD SN SUP&AM TY10BWG (1) SA (T)	EA	26.000	
						1.000			644	6007		IN SM RD SN SUP&AM TY10BWG (1) SA (U)	EA	1.000	
						1.000			644	6034		IN SM RD SN SUP&AM TY S80 (1) SA (U-1EXT)	EA	1.000	
						51.000			644	6076		REMOVE SM RD SN SUP & AM	EA	51.000	
						33.000			658	6062		INSTL DEL ASSM (D-SW) SZ 1 (BRF) GF2 (BI)	EA	33.000	
						50.000			658	6081		INSTL DEL ASSM (D-SW) SZ 1 (WFLX) GND (BI)	EA	50.000	
						8.000			658	6084		INSTL DEL ASSM (D-SW) SZ 1 (WFLX) SRF (BI)	EA	8.000	
						54.000			658	6100		INSTL OM ASSM (OM-2Z) (WFLX) GND (BI)	EA	54.000	
						289,156.000			662	6004		WK ZN PAV MRK NON-REMOV (W) 4" (SLD)	LF	289,156.000	
						930.000			662	6016		WK ZN PAV MRK NON-REMOV (W) 24" (SLD)	LF	930.000	
						192.000			662	6030		WK ZN PAV MRK NON-REMOV (W) 18" (YLD TRI)	EA	192.000	
						34,530.000			662	6032		WK ZN PAV MRK NON-REMOV (Y) 4" (BRK)	LF	34,530.000	
						301,090.000			662	6034		WK ZN PAV MRK NON-REMOV (Y) 4" (SLD)	LF	301,090.000	
						27,230.000			662	6111		WK ZN PAV MRK SHT TERM (TAB) TY Y-2	EA	27,230.000	

ESTIMATE & QUANTITY SHEET	STATE DIST. NO.	COUNTY	CONTROL-SECTION-JOB	SHEET
	5	CROSBY	0453-04-024	7A

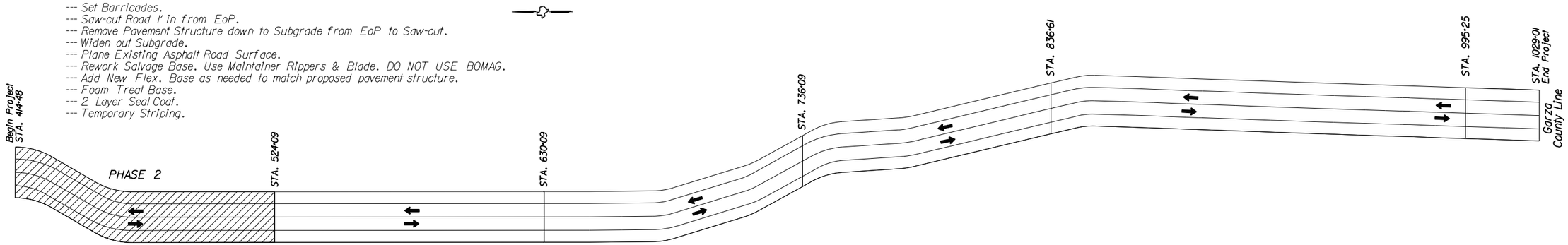
ESTIMATE SUMMARY

CSJ: 0453-04-024 BRIDGE ITEMS NBI: 05-054-0453-04-009		CSJ: 0453-04-024 BRIDGE ITEMS NBI: 05-054-0453-04-010		CSJ: 0453-04-024 SH 207 CONSTRUCTION ROADWAY ALL BID ITEMS		ALT	ITEM CODE			DESCRIPTION	UNIT	COMPLETE PROJECT TOTALS	
EST	FINAL	EST	FINAL	EST	FINAL	EST	FINAL		ITEM CODE	DESC CODE	SP NO			EST.	FINAL
						130,706.000			666	6309		RE PM W/RET REQ TY I(W)6"(SLDX100MIL)	LF	130,706.000	
						13,760.000			666	6318		RE PM W/RET REQ TY I(Y)6"(BRK)(100MIL)	LF	13,760.000	
						49,080.000			666	6321		RE PM W/RET REQ TY I(Y)6"(SLD)(100MIL)	LF	49,080.000	
						201.000			668	6076		PREFAB PAV MRK TY C (W)(24")(SLD)	LF	201.000	
						1,295.000			672	6009		REFL PAV MRKR TY II-A-A	EA	1,295.000	
						292,294.000			677	6001		ELIM EXT PAV MRK & MRKS (4")	LF	292,294.000	
						930.000			677	6007		ELIM EXT PAV MRK & MRKS (24")	LF	930.000	
						192.000			677	6018		ELIM EXT PAV MRK & MRKS (18")(YLD TRI)	EA	192.000	
						25,940.000			3080	6011		STONE-MTRX-ASPH SMA-D SAC-A PG76-28	TON	25,940.000	
						54.000			3080	6029		TACK COAT	GAL	54.000	
						894.000			3088	6001		CEMENT	TON	894.000	
						535,862.000			3088	6002		ASPHALT BINDER (PG 64-22)	GAL	535,862.000	
						226,641.000			3088	6007		FOAMED ASPHALT TREAT (8")(DC)	SY	226,641.000	
						2,100.000			6001	6001		PORTABLE CHANGEABLE MESSAGE SIGN	DAY	2,100.000	
						1,968.000			6185	6002		TMA (STATIONARY)	DAY	1,968.000	
						108.000			6185	6003		TMA (MOBILE OPERATION)	DAY	108.000	
						2.000			6307	6003		TEMP SPEED MONITOR SYS	EA	2.000	
												FEDERAL NON-PARTICIPATING ITEMS:			
						27.000			480	6001		CLEAN EXIST CULVERTS	EA	27.000	
						6.000			730	6107		FULL-WIDTH MOWING	CYC	6.000	
						6.000			734	6002		LITTER REMOVAL	CYC	6.000	
												18 - CONTRACTOR FORCE ACCOUNT (PARTICIPATING)			
						1.000						EROSION CONTROL MAINTENANCE	LS	1.000	
						1.000						SAFETY CONTINGENCY	LS	1.000	

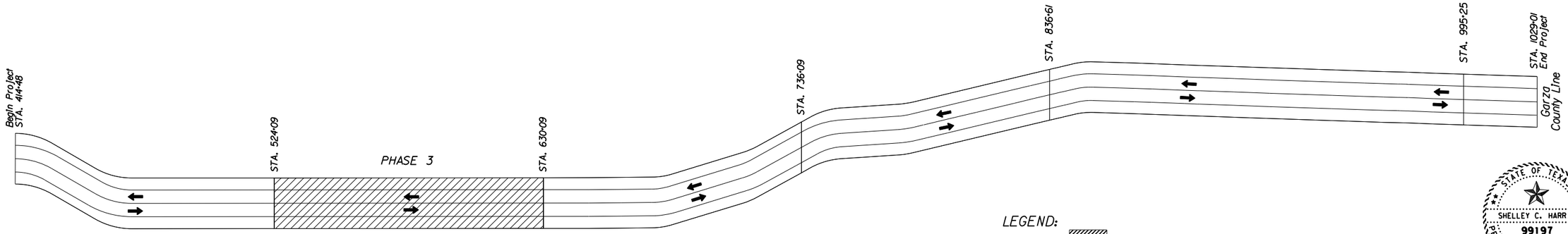
ESTIMATE & QUANTITY SHEET	STATE DIST. NO.	COUNTY	CONTROL-SECTION-JOB	SHEET
	5	CROSBY	0453-04-024	7B



Phase 1 - Perform culvert work in SUBPHASE alphabetical order, completing all work in each subphase before proceeding to the next subphase. Subphase A & I will begin at the same time. Subphase J begins after Subphase I is complete.
Sta. 414+48 to Sta. 1029+01
--- Set Barricades.
--- Set SW3P Measures.
--- Structure Work.



Phase 2 - DO NOT begin until Phase I SUBPHASES A through D have been completed.
Sta. 414+48 to Sta. 524+09
--- Set Barricades.
--- Saw-cut Road 1' in from EoP.
--- Remove Pavement Structure down to Subgrade from EoP to Saw-cut.
--- Widen out Subgrade.
--- Plane Existing Asphalt Road Surface.
--- Rework Salvage Base. Use Maintainer Rippers & Blade. DO NOT USE BOMAG.
--- Add New Flex. Base as needed to match proposed pavement structure.
--- Foam Treat Base.
--- 2 Layer Seal Coat.
--- Temporary Striping.



Phase 3 - DO NOT begin until Phase I SUBPHASES A through F have been completed.
Sta. 524+09 to Sta. 630+09
--- Set Barricades.
--- Saw-cut Road 1' in from EoP.
--- Remove Pavement Structure down to Subgrade from EoP to Saw-cut.
--- Widen out Subgrade.
--- Plane Existing Asphalt Road Surface.
--- Rework Salvage Base. Use Maintainer Rippers & Blade. DO NOT USE BOMAG.
--- Add New Flex. Base as needed to match proposed pavement structure.
--- Foam Treat Base.
--- 2 Layer Seal Coat.
--- Temporary Striping.

LEGEND:

Work Area

Traffic Flow

STATE OF TEXAS
SHELLEY C. HARRIS
99197
LICENSED PROFESSIONAL ENGINEER

Shelley C. Harris, P.E.
6/29/2022

Texas Department of Transportation

NO SCALE Sheet 1 of 4

PHASING & TCP NOTES

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		8
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_TCP_PH1.dgn		

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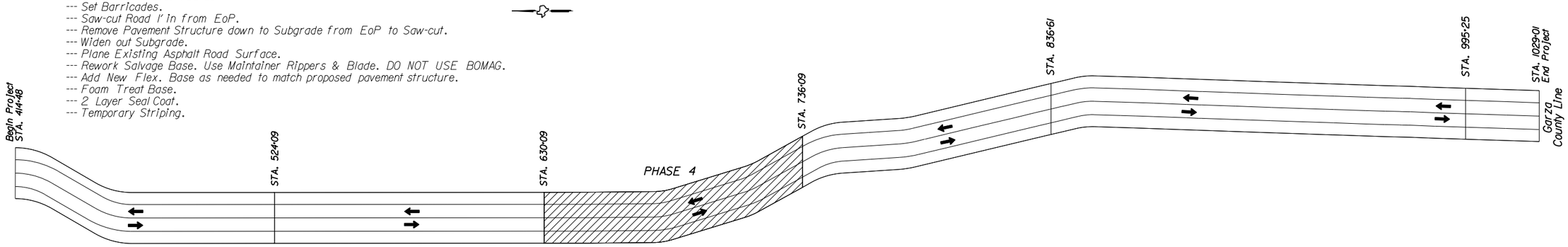
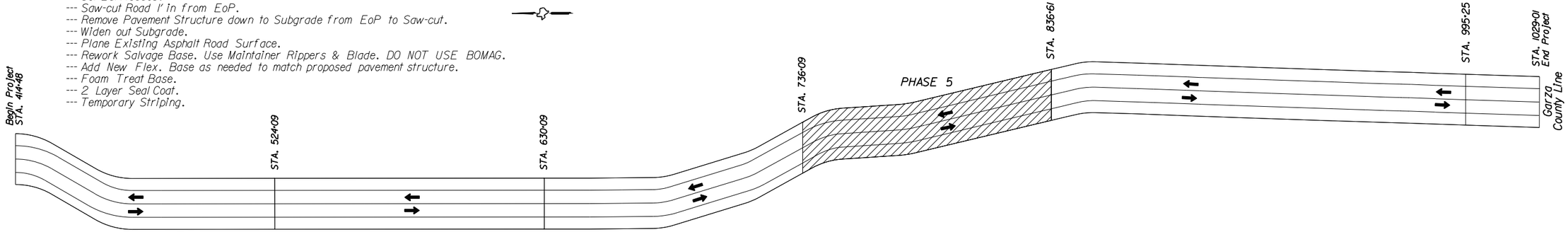
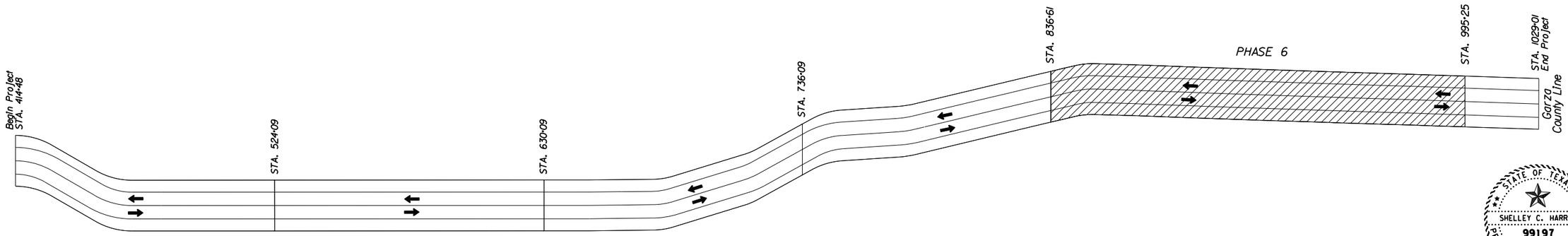
Phase 4 - DO NOT begin until Phase I SUBPHASES A through H have been completed.
Sta. 630+09 to Sta. 736+09
--- Set Barricades.
--- Saw-cut Road 1' in from EoP.
--- Remove Pavement Structure down to Subgrade from EoP to Saw-cut.
--- Widen out Subgrade.
--- Plane Existing Asphalt Road Surface.
--- Rework Salvage Base. Use Maintainer Rippers & Blade. DO NOT USE BOMAG.
--- Add New Flex. Base as needed to match proposed pavement structure.
--- Foam Treat Base.
--- 2 Layer Seal Coat.
--- Temporary Striping.



Phase 5 - DO NOT begin until Phase I SUBPHASES A through J have been completed.
Sta. 736+09 to Sta. 836+61
--- Set Barricades.
--- Saw-cut Road 1' in from EoP.
--- Remove Pavement Structure down to Subgrade from EoP to Saw-cut.
--- Widen out Subgrade.
--- Plane Existing Asphalt Road Surface.
--- Rework Salvage Base. Use Maintainer Rippers & Blade. DO NOT USE BOMAG.
--- Add New Flex. Base as needed to match proposed pavement structure.
--- Foam Treat Base.
--- 2 Layer Seal Coat.
--- Temporary Striping.





Phase 6 - DO NOT begin until Phase I SUBPHASES A through L have been completed.
Sta. 836+61 to Sta. 995+25
--- Set Barricades.
--- Saw-cut Road 1' in from EoP.
--- Remove Pavement Structure down to Subgrade from EoP to Saw-cut.
--- Widen out Subgrade.
--- Plane Existing Asphalt Road Surface.
--- Rework Salvage Base. Use Maintainer Rippers & Blade. DO NOT USE BOMAG.
--- Add New Flex. Base as needed to match proposed pavement structure.
--- Foam Treat Base.
--- 2 Layer Seal Coat.
--- Temporary Striping.

LEGEND:

Work Area

Traffic Flow

STATE OF TEXAS
SHELLY C. HARRIS
99197
LICENSED
PROFESSIONAL ENGINEER

Shelly C. Harris, P.E.
6/29/2022

Texas Department of Transportation

NO SCALE Sheet 2 of 4

PHASING & TCP NOTES

STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		9
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_TCP_PH1.dgn		

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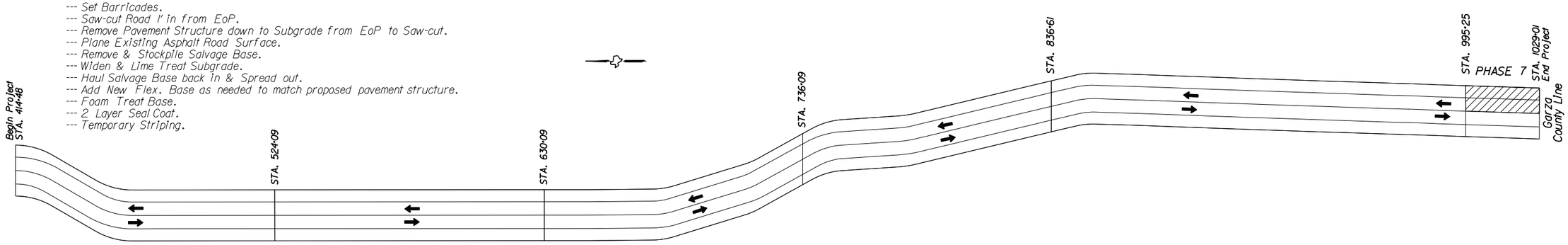
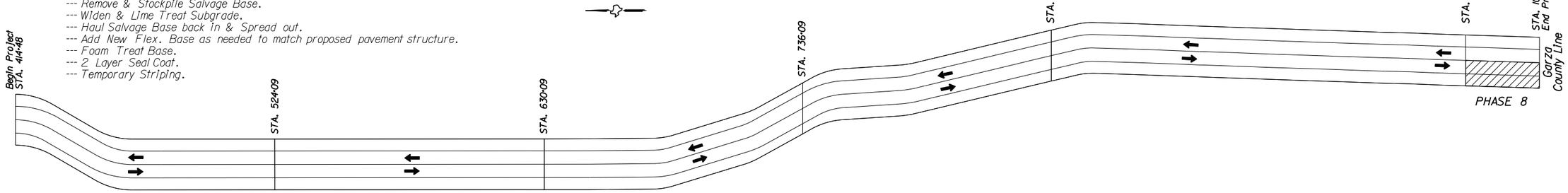
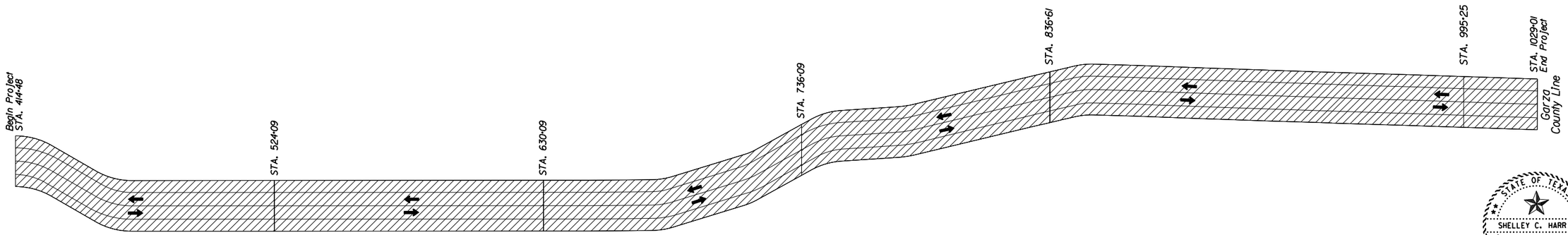
Phase 7 --> 8" Lime-Treated Subgrade Section. DO NOT begin until Phase I SUBPHASES A through L have been completed.
Sta. 995+25 to Sta. 1029+01
--- Set Barricades.
--- Saw-cut Road 1' in from EoP.
--- Remove Pavement Structure down to Subgrade from EoP to Saw-cut.
--- Plane Existing Asphalt Road Surface.
--- Remove & Stockpile Salvage Base.
--- Widen & Lime Treat Subgrade.
--- Haul Salvage Base back in & Spread out.
--- Add New Flex. Base as needed to match proposed pavement structure.
--- Foam Treat Base.
--- 2 Layer Seal Coat.
--- Temporary Striping.



Phase 8 --> 8" Lime-Treated Subgrade Section. DO NOT begin until Phase I SUBPHASES A through L have been completed.
Sta. 995+25 to Sta. 1029+01
--- Set Barricades.
--- Saw-cut Road 1' in from EoP.
--- Remove Pavement Structure down to Subgrade from EoP to Saw-cut.
--- Plane Existing Asphalt Road Surface.
--- Remove & Stockpile Salvage Base.
--- Widen & Lime Treat Subgrade.
--- Haul Salvage Base back in & Spread out.
--- Add New Flex. Base as needed to match proposed pavement structure.
--- Foam Treat Base.
--- 2 Layer Seal Coat.
--- Temporary Striping.





Phase 9
Sta. 414+48 to 1029+01
--- Set Barricades.
--- SMA.
--- Shoulder Up Entire Project.
--- MBGF & Riprap Work.
--- Driveway/ Intersection Work.
--- Type II Paint in Final Configuration.
--- Rumble Strips & Fog Seal.
--- Final Striping & Signs.
--- Clean Up & Punchlist.
--- Remove Barricades.

LEGEND:

Work Area

Traffic Flow

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6/29/2022

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NO SCALE Sheet 3 of 4

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		10
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_TCP_PH1.dgn		

PHASING & TCP NOTES

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PROJECT TRAFFIC CONTROL NOTES (ALL PHASES)

Sequence of work will be approved by the Engineer.

Standard regulatory and warning signs which are not shown on the TCP sheets shall be in accordance with the current TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES and Standards BC(1)-(12).

The Contractor may be required to furnish other barricades and other types of devices as directed by the Engineer or as indicated in the TMUTCD, BC, WZ, and TCP standards.

Pavement markings conforming to the TMUTCD and sheets BC(1)-(12) will be in place before any overnight traffic is allowed on any construction surface.

All pavement markings and signs that conflict with traffic movements will be removed. Removal of Item 662, "Work Zone Pavement Markings (Removable)" will not be paid for but considered subsidiary to Item 662.

Refer to TREATMENT FOR VARIOUS EDGE CONDITIONS sheet for edge dropoff treatment.

CW8-17 and CW8-11 signs shall be placed as directed by the Engineer.

Advisory speed limit signs shall be placed as directed by the Engineer.

CW8-17 48"X48" CW8-11 48"x48"

Barricades shall not be used as sign supports.

On any series of traffic control devices where reflectors may be used, lights will be required at the beginning and end of each series.

Signs, barricades, and cones not in use for 3 working days will be removed from the right-of-way.

Signs at the beginning and end of the project shall be in accordance with BC(2).

Signs G20-2 and G20-1aT, or CW20-1D signs shall be at each intersecting highway and county road.

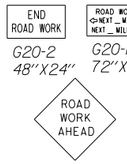
The Contractor will contact adjacent property owners concerning ingress and egress of their property during construction.

This roadway shall be considered a high speed roadway.

Unless otherwise stated in the plans, flags attached to signs are required.

If used, provide vertical panels mounted on fixed supports using an approved adhesive.

The speed limit in the project area shall be 45 mph unless existing speed limits are lower. Work Zone and Advisory speed limit signs shall be placed as directed.



G20-2 48"X24"

G20-1aT 72"X36"

CW20-1D 48"X48"

The following phases are to be worked concurrently:

Phase 2 & Phase 5
Phase 3 & Phase 6
Phase 4 & Phases 7/8

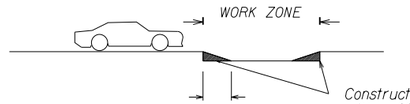
*** IMPORTANT ***

Traffic must be on a finished, seal-coated surface before time suspension.

All transverse edge hot mix tapers greater than one inch, intended to convey traffic, shall be constructed at a 100:1 slope and shall be considered subsidiary to Barricades, Signs and Traffic Handling.

Post trained flagmen as needed in special situations as deemed necessary by the Engineer.

The contractor shall construct salvage base, rap, hot mix ramps during construction at all intersections and driveways for the convenience of the traveling public. This work will be considered subsidiary to ITEM 502 - BARRICADES, SIGNS, AND TRAFFIC HANDLING. See Detail.



100:1 at Project Ends and at the end of each day's production run.

Construct ramp with sufficient length to prevent interference with small passenger vehicles.

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NO SCALE Sheet 4 of 4

PHASING & TCP NOTES

STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		11
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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PHASE 1 - SUBPHASES A THROUGH L: WORK ZONE STRIPING FOR CULVERT WORK

STR. NUMBER	ELIMINATE EXISTING 4" FROM STA.	TO STA.	DESCRIPTION	TOTAL EXIST. 4" REMOVAL LENGTH
1	416+55	457+05	Remove Existing 4" Stripes	7133
3	477+46	517+96	Remove Existing 4" Stripes	2108
4	519+39	559+89	Remove Existing 4" Stripes	1914
5	574+82	615+32	Remove Existing 4" Stripes	1914
6 & 7	616+75	667+99	Remove Existing 4" Stripes	5064
8	655+55	696+05	Remove Existing 4" Stripes	5843
9	706+19	746+69	Remove Existing 4" Stripes	8736
10 & 11	730+21	782+81	Remove Existing 4" Stripes	11456
12	772+14	812+64	Remove Existing 4" Stripes	5424
14	798+86	839+36	Remove Existing 4" Stripes	4675
B.C. 16	821+67	863+17	Remove Existing 4" Stripes	7412
17	849+71	890+21	Remove Existing 4" Stripes	5019
18	900+41	940+91	Remove Existing 4" Stripes	2789
19, 21, 23, 24, 25, 26, & 27	946+54	1043+93	Remove Existing 4" Stripes	13726

STR. NUMBER	PLACE WORK ZONE STRIPES FROM STA.	TO STA.	DESCRIPTION	4" SLD. WHITE [LF]	24" SLD. WHITE [LF]	18" YLD. TRI. WHITE [EA]	4" BRK. YELLOW [LF]	4" SLD. YELLOW [LF]	TABS TY Y-2 [EA]
1	416+55	457+05	4" SW Edgelines, 4" DBL. SY, TY Y-2 Tabs, & 24" SW	1700	60			7200	180
3	477+46	517+96	4" SW Edgelines, 4" DBL. SY, TY Y-2 Tabs, & Yield Triangles	1700		24		7200	180
4	519+39	559+89	4" SW Edgelines, 4" DBL. SY, TY Y-2 Tabs, & Yield Triangles	1700		24		7200	180
5	574+82	615+32	4" SW Edgelines, 4" DBL. SY, TY Y-2 Tabs, & Yield Triangles	1700		24		7200	180
6 & 7	616+75	667+99	4" SW Edgelines, 4" DBL. SY, TY Y-2 Tabs, & Yield Triangles	3400		48		14400	360
8	655+55	696+05	4" SW Edgelines, 4" DBL. SY, TY Y-2 Tabs, & 24" SW	1700	60			7200	180
9	706+19	746+69	4" SW Edgelines, 4" DBL. SY, TY Y-2 Tabs, & 24" SW	1700	60				180
10 & 11	730+21	782+81	4" SW Edgelines, 4" DBL. SY, TY Y-2 Tabs, & 24" SW	3400	120			10800	360
12	772+14	812+64	4" SW Edgelines, 4" DBL. SY, TY Y-2 Tabs, & 24" SW	1700	60			7200	180
14	798+86	839+36	4" SW Edgelines, 4" DBL. SY, TY Y-2 Tabs, & Yield Triangles	1700		24		7200	180
B.C. 16	821+67	863+17	4" SW Edgelines, 4" DBL. SY, TY Y-2 Tabs, & 24" SW	1700	60			7200	180
17	849+71	890+21	4" SW Edgelines, 4" DBL. SY, TY Y-2 Tabs, & 24" SW	1700	60			7200	180
18	900+41	940+91	4" SW Edgelines, 4" DBL. SY, TY Y-2 Tabs, & Yield Triangles	1700		24		7200	180
19, 21, 23, 24, 25, 26, & 27	946+54	1043+93	4" SW Edgelines, 4" DBL. SY, TY Y-2 Tabs, 24" SW, & Yield Triangles	8500	360	24		36000	1260

STR. NUMBER	ELIMINATE WORK ZONE 4" FROM STA.	TO STA.	DESCRIPTION	TOTAL WK. ZN. 4" REMOVAL LENGTH
1	416+55	457+05	Remove all 4" Work Zone	8900
3	477+46	517+96	Remove all 4" Work Zone	8900
4	519+39	559+89	Remove all 4" Work Zone	8900
5	574+82	615+32	Remove all 4" Work Zone	8900
6 & 7	616+75	667+99	Remove all 4" Work Zone	17800
8	655+55	696+05	Remove all 4" Work Zone	8900
9	706+19	746+69	Remove all 4" Work Zone	1700
10 & 11	730+21	782+81	Remove all 4" Work Zone	14200
12	772+14	812+64	Remove all 4" Work Zone	8900
14	798+86	839+36	Remove all 4" Work Zone	8900
B.C. 16	821+67	863+17	Remove all 4" Work Zone	8900
17	849+71	890+21	Remove all 4" Work Zone	8900
18	900+41	940+91	Remove all 4" Work Zone	8900
19, 21, 23, 24, 25, 26, & 27	946+54	1043+93	Remove all 4" Work Zone Stripes	44500

STR. NUMBER	RESTORE FINAL STRIPE FROM STA.	TO STA.	DESCRIPTION	4" SLD. W [LF]	24" SLD. W [LF]	18" YLD. TRI. W [EA]	4" BRK. Y [LF]	4" SLD. Y [LF]	TABS TY Y-2 [EA]
1	416+55	457+05	Restore all Existing 4" Stripes	900			638	5595	115
3	477+46	517+96	Restore all Existing 4" Stripes	900			1015	194	54
4	519+39	559+89	Restore all Existing 4" Stripes	900			1014		51
5	574+82	615+32	Restore all Existing 4" Stripes	900			1014		51
6 & 7	616+75	667+99	Restore all Existing 4" Stripes	1800			1287	729	72
8	655+55	696+05	Restore all Existing 4" Stripes	900			894	4399	95
9	706+19	746+69	Restore all Existing 4" Stripes	900			87	7737	101
10 & 11	730+21	782+81	Restore all Existing 4" Stripes	1800			810	7325	123
12	772+14	812+64	Restore all Existing 4" Stripes	900			1031	3491	95
14	798+86	839+36	Restore all Existing 4" Stripes	900			958	2817	83
B.C. 16	821+67	863+17	Restore all Existing 4" Stripes	1100			663	5649	104
17	849+71	890+21	Restore all Existing 4" Stripes	900			970	3157	90
18	900+41	940+91	Restore all Existing 4" Stripes	900			1021	867	61
19, 21, 23, 24, 25, 26, & 27	946+54	1043+93	Restore all Existing 4" Stripes	4250			2093	9822	226

All Phase 1 Work Zone Pay Item Subtotals:	Remove 24" SLD. WHITE (STOP BAR) [LF]	Remove 18" YIELD TRIANGLES [EA]	Remove 4" Stripes [LF]	Place 4" Solid White [LF]	Place 24" Solid White Stop Bars [LF]	Place 18" Yield Triangles [EA]	Place 4" Broken Yellow [LF]	Place 4" Solid Yellow [LF]	Place TY Y-2 Tabs [EA]
	840	192	250413	51950	840	192	13495	184982	5281

PHASE 2 - 6: Foamed Asphalt - Cement Treating Flexible Base

PHASE NUMBER	ELIMINATE EXISTING 4" FROM STA.	TO STA.	DESCRIPTION	TOTAL EXIST. 4" REMOVAL LENGTH
2	394+48	544+09	Phasing requires no removal	
3	544+09	630+09	Phasing requires no removal	
4	630+09	736+09	Phasing requires no removal	
5	736+09	836+61	Phasing requires no removal	
6	836+61	1015+25	Phasing requires no removal	

PHASE NUMBER	PLACE WORK ZONE STRIPES FROM STA.	TO STA.	DESCRIPTION	4" SLD. WHITE [LF]	24" SLD. WHITE [LF]	4" BRK. YELLOW [LF]	4" SLD. YELLOW [LF]	TABS TY Y-2 [EA]
2	394+48	544+09	Not feasible to remove and restore work zone pavement markings					
3	544+09	630+09	Not feasible to remove and restore work zone pavement markings					
4	630+09	736+09	Not feasible to remove and restore work zone pavement markings					
5	736+09	836+61	Not feasible to remove and restore work zone pavement markings					
6	836+61	1015+25	Not feasible to remove and restore work zone pavement markings					

PHASE NUMBER	ELIMINATE WORK ZONE 4" FROM STA.	TO STA.	DESCRIPTION	TOTAL WK. ZN. 4" REMOVAL LENGTH
2	394+48	544+09	No Work Zone Stripes to Remove	
3	544+09	630+09	No Work Zone Stripes to Remove	
4	630+09	736+09	No Work Zone Stripes to Remove	
5	736+09	836+61	No Work Zone Stripes to Remove	
6	836+61	1015+25	No Work Zone Stripes to Remove	

PHASE NUMBER	RESTORE FINAL STRIPE FROM STA.	TO STA.	DESCRIPTION	4" SLD. W [LF]	24" SLD. W [LF]	4" BRK. Y [LF]	4" SLD. Y [LF]	TABS TY Y-2 [EA]
2	394+48	544+09	Restore all Existing 4" Stripes in Final Config.	29922		3100	9835	277
3	544+09	630+09	Restore all Existing 4" Stripes in Final Config.	17200		2154		108
4	630+09	736+09	Restore all Existing 4" Stripes in Final Config.	21200		1876	10683	227
5	736+09	836+61	Restore all Existing 4" Stripes in Final Config.	20104		1800	10029	232
6	836+61	1015+25	Restore all Existing 4" Stripes in Final Config.	35728		3620	15126	368

All Phase 2 through 6 Work Zone Pay Item Subtotals:	Remove 24" SLD. WHITE (STOP BAR) [LF]	Remove 4" Stripes [LF]	Place 4" Solid White [LF]	Place 24" Solid White Stop Bars [LF]	Place Tabs TY Y-2 [EA]	Place 4" Broken Yellow [LF]	Place 4" Solid Yellow [LF]
			124154		1211	12550	45673

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6/29/2022

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WORK ZONE STRIPING

NO SCALE Sheet 1 of 2

STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		12
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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PHASES 7 & 8: Lime Treat Subgrade Followed by Foamed Asphalt - Cement Treating Flexible Base				
PHASE NUMBER	ELIMINATE EXISTING 4" FROM STA.	TO STA.	DESCRIPTION	TOTAL EXIST. 4" REMOVAL LENGTH
7 [NB]	975+25	1048+51	Rmv. 50% Exist. 4" SW Edgeline & 65% CL Stripe(s)	17882
8 [SB]	975+25	1048+51	Removed in Phase 7	
PHASE NUMBER	ELIMINATE WORK ZONE 4" FROM STA.	TO STA.	DESCRIPTION	TOTAL WK. ZN. 4" REMOVAL LENGTH
7 [NB]	975+25	1048+51	Remove 4" Work Zone Stripes	12000
8 [SB]	975+25	1048+51	Remove 4" Work Zone Stripes	12000

All Phase 7 and 8 Work Zone Pay Item Subtotals:	Remove 24" SLD. WHITE (STOP BAR)	Remove 4" Stripes
	[LF]	[LF]
	90	41882

PHASE NUMBER	PLACE WORK ZONE STRIPES FROM STA.	TO STA.	DESCRIPTION
7 [NB]	975+25	1048+51	4" SW Edgelines, 4" DBL. SY. TY Y-2 Tabs, & 24" SW Stop Bars
8 [SB]	975+25	1048+51	4" SW Edgelines, 4" DBL. SY. TY Y-2 Tabs, & 24" SW Stop Bars
PHASE NUMBER	RESTORE FINAL STRIPE FROM STA.	TO STA.	DESCRIPTION
7 [NB]	975+25	1048+51	Restore all Existing 4" Stripes
8 [SB]	975+25	1048+51	Restore all Existing 4" Stripes

Place 4" Solid White	Place 24" Solid White Stop Bars	Place Tabs TY Y-2	Place 4" Broken Yellow	Place 4" Solid Yellow
[LF]	[LF]	[EA]	[LF]	[LF]
33052	90	723	1485	30435

4" SLD. WHITE [LF]	24" SLD. WHITE [LF]	4" BRK. YELLOW [LF]	4" SLD. YELLOW [LF]	TABS TY Y-2 [EA]
9200	45		10800	270
9200	45		10800	270
4" SLD. W [LF]	24" SLD. W [LF]	4" BRK. Y [LF]	4" SLD. Y [LF]	TABS TY Y-2 [EA]
14652		1485	8835	183

PHASES 9: SMA Surface Course Paving				
PHASE NUMBER	ELIMINATE EXISTING 4" FROM STA.	TO STA.	DESCRIPTION	TOTAL EXIST. 4" REMOVAL LENGTH
9	394+48	1048+51	Phasing requires no removal	
PHASE NUMBER	ELIMINATE WORK ZONE 4" FROM STA.	TO STA.	DESCRIPTION	TOTAL WK. ZN. 4" REMOVAL LENGTH
9	394+48	1048+51	No Work Zone Stripes to Remove	

All Phase 9 Work Zone Pay Item Subtotals:	Remove 24" SLD. WHITE (STOP BAR)	Remove 4" Stripes
	[LF]	[LF]

PHASE NUMBER	PLACE WORK ZONE STRIPES FROM STA.	TO STA.	DESCRIPTION
9	394+48	1048+51	Not feasible to remove and restore work zone pavement markings
PHASE NUMBER	RESTORE FINAL STRIPE FROM STA.	TO STA.	DESCRIPTION
9	394+48	1048+51	!!!!! Restore all Existing 4" Stripes using Item 666 stripes. See Traffic Summary for Final Stripe Configuration Information. !!!!!

Place 4" Solid White	Place 24" Solid White Stop Bars	Place Tabs TY Y-2	Place 4" Broken Yellow	Place 4" Solid Yellow
[LF]	[LF]	[EA]	[LF]	[LF]
		6400		

4" SLD. WHITE [LF]	24" SLD. WHITE [LF]	4" BRK. YELLOW [LF]	4" SLD. YELLOW [LF]	TABS TY Y-2 [EA]

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NO SCALE Sheet 2 of 2

WORK ZONE STRIPING

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		13
CONT.	SECT.	JOB	HIGHWAY NO.
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PORTABLE CONCRETE TRAFFIC BARRIER & CRASH CUSHION ATTENUATOR SUMMARY					
PORTABLE CONCRETE TRAFFIC BARRIERS			CRASH CUSHION ATTENUATORS		
DES. SOURCE [LF]	MOVE [LF]	STOCKPILE [LF]	INSTALL [EA]	MOVE & RESET [EA]	REMOVE [EA]
390	4110	1080	13	56	13

WORK ZONE STRIPING SUMMARY										
PHASE NUMBER	REMOVAL ITEMS			PLACE ITEMS						
	4" Stripe [LF]	24" Sld. White [LF]	18" Yield Triangle [EA]	4" Sld. White [LF]	4" Sld. Yellow [LF]	4" Brk. Yellow [LF]	Tabs TY Y-2 [EA]	24" Sld. White [LF]	18" Yld. Tri. [EA]
1	250412	840	192	51950	184982	13495	5281	840	192
2				29922	9835	3100	276		
3				17200	0	2154	108		
4				21200	10683	1876	227		
5				20104	10029	1800	232		
6				35728	15126	3620	368		
7	29882	45		9200	10800		270	45	
8	12000	45		23852	19635	1485	453	45	
9							6400		
SUBTOTALS	292294	930	192	209156	261090	27530	13615	930	192
REFRESH QUANTITY				80000	40000	7000	13615		
PROJECT TOTALS:	292294	930	192	289156	301090	34530	27230	930	192

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NO SCALE Sheet 1 of 1

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		14
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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WORK ZONE SUMMARY

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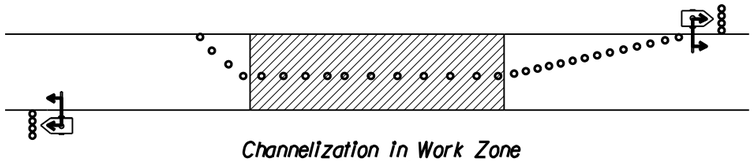
LEGEND

Type III Barricade | Channelizing Devices | Flag
Work Area | Temporary or Portable Traffic Signals | Sign Post
Traffic Direction



Channelization in Work Zone
Use channelizing devices, work zone stripe, and tabs to clearly delineate the traffic path through the work zone. Signals are automatically controlled.

NOTES:

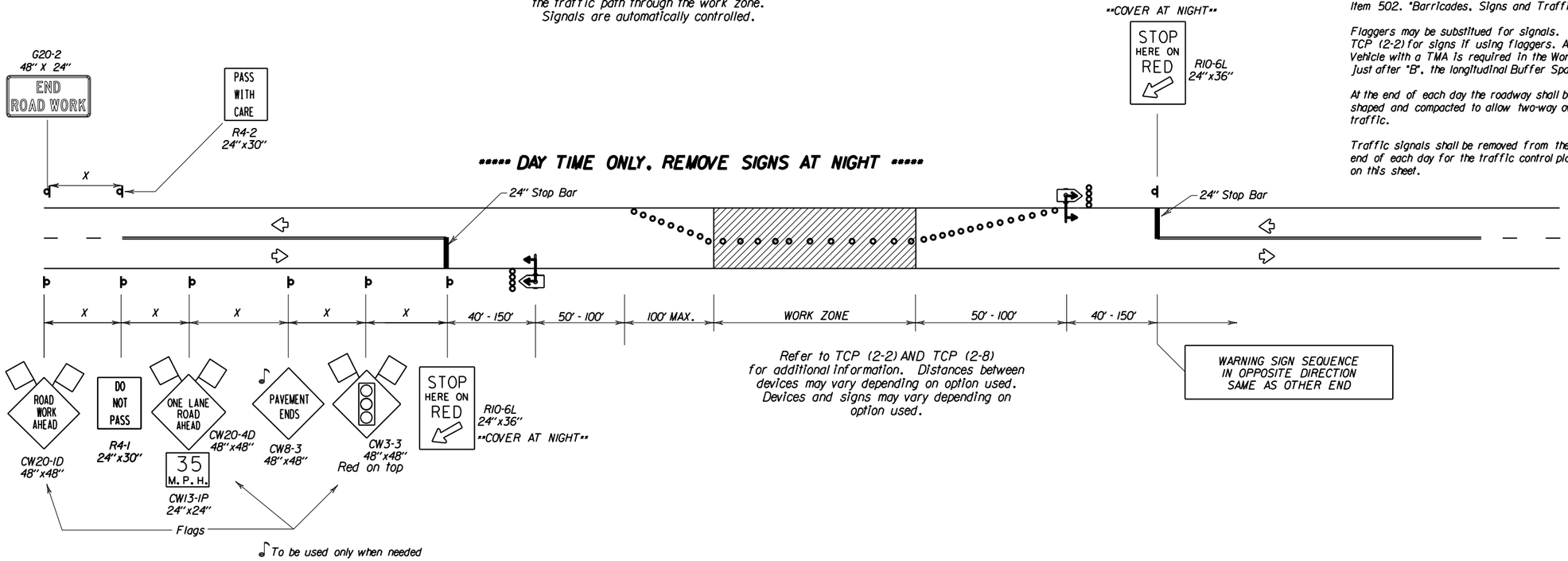
This Traffic Control Plan is to be used for the roadway work.

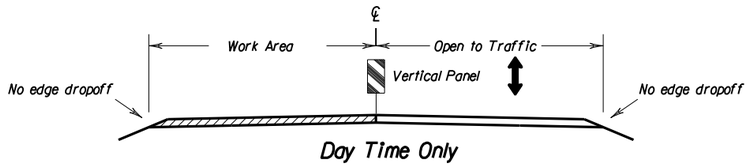
Traffic Signals are not paid for but considered part of the traffic control for this project and subsidiary to Item 502. "Barricades, Signs and Traffic Handling"

Flaggers may be substitued for signals. Reference TCP (2-2) for signs if using flaggers. A Shadow Vehicle with a TMA is required in the Work Space just after "B", the longitudinal Buffer Space.

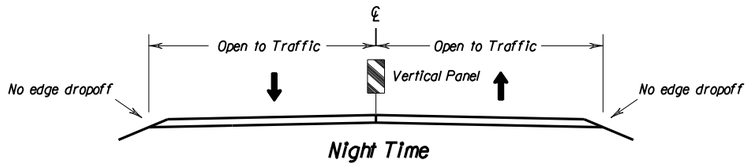
At the end of each day the roadway shall be shaped and compacted to allow two-way overnight traffic.

Traffic signals shall be removed from the project at the end of each day for the traffic control plan shown on this sheet.

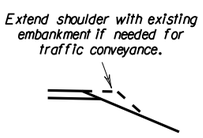




Day Time Only



Night Time



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LICENSED PROFESSIONAL ENGINEER

Shelley C. Harris, P.E.
6/29/2022

Texas Department of Transportation

NO SCALE Sheet 1 of 3

TRAFFIC CONTROL PLAN
(Roadway Work - Signal)

STATE DIST. NO.	COUNTY			SHEET NO.
05	CROSBY			15
CONT.	SECT.	JOB	HIGHWAY NO.	
0453	04	024	SH 207	
FILE	SH207_TCP_TrafficControlPlan.dgn			

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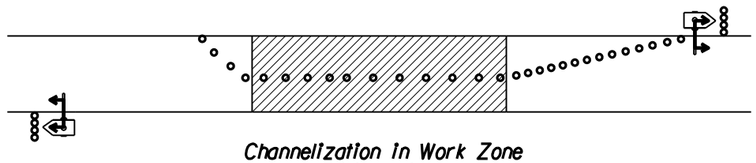
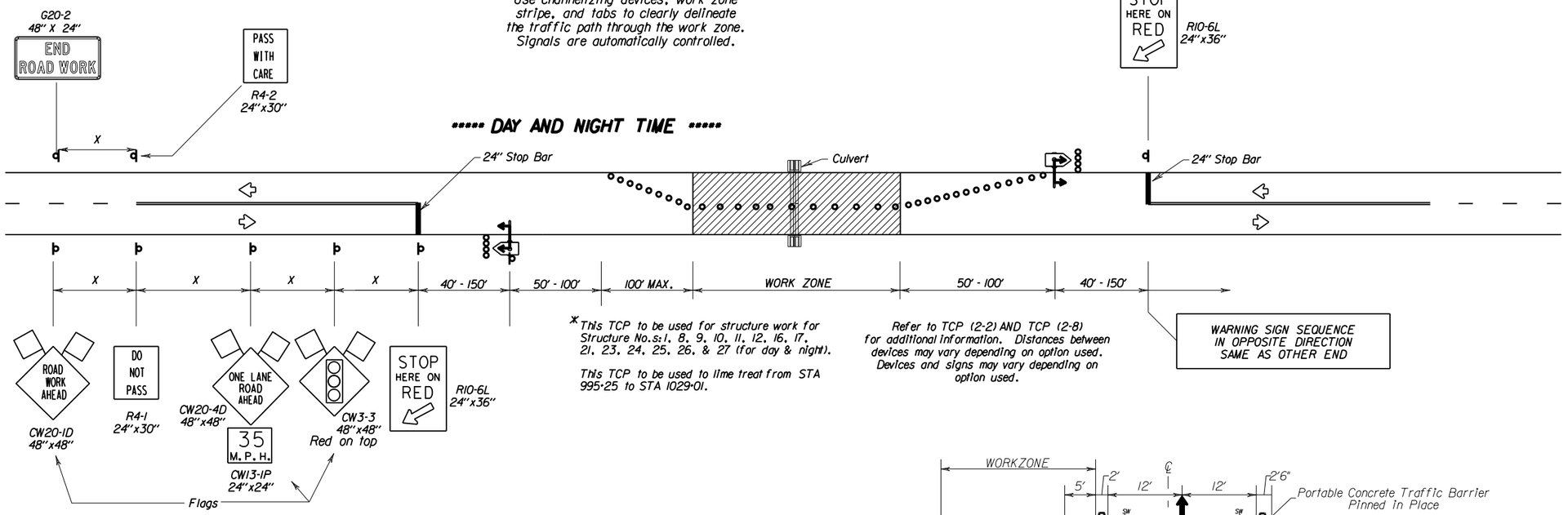
LEGEND

Type III Barricade | Channelizing Devices | Flag
Work Area | Temporary or Portable Traffic Signals | Sign Post
Traffic Direction



Channelization in Work Zone

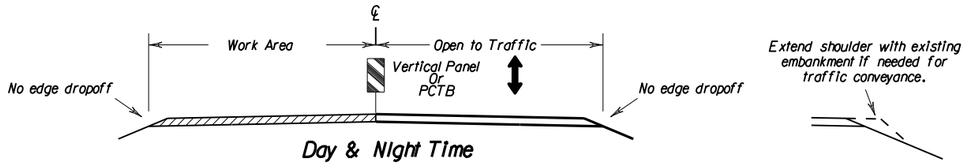
Use channelizing devices, work zone stripe, and tabs to clearly delineate the traffic path through the work zone. Signals are automatically controlled.



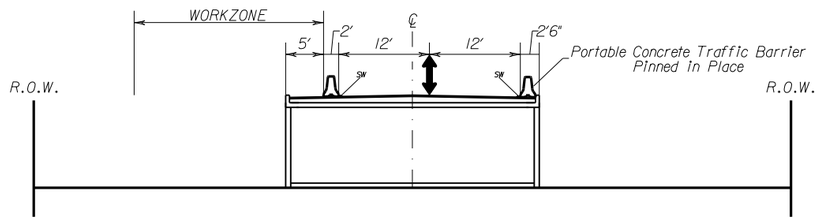
*This TCP to be used for structure work for Structure No.s: 1, 8, 9, 10, 11, 12, 16, 17, 21, 23, 24, 25, 26, & 27 (for day & night).

This TCP to be used to lime treat from STA 995+25 to STA 1029+01.

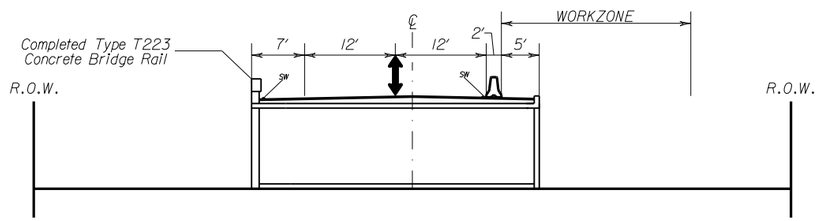
Refer to TCP (2-2) AND TCP (2-8) for additional information. Distances between devices may vary depending on option used. Devices and signs may vary depending on option used.



Day & Night Time



STR. No. 16 First Half Width



STR. 16 Second Half Width

NOTES:

This TCP is to be used for Culvert work where there is not adequate sight distance.

During the day, flaggers may be substitued for signals. Reference TCP (2-2) for signs if using flaggers. A Shadow Vehicle with a TMA is required in the Work Space just after "B", the longitudinal Buffer Space.

Traffic Signals are not paid for but considered part of the traffic control for this project and subsidiary to Item 502 "Barricades, Signs and Traffic Handling"

Portable Concrete Traffic Barrier to be used for all culvert work other than culvert break back and extensions with trench depth less than 6 feet. See the PCTB & CCA Schedule for more details. All barrier segments shall have at least one reflector. Reflectors are subsidiary to the various PCTB items.

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NO SCALE Sheet 2 of 3

TRAFFIC CONTROL PLAN
(Culvert Work - Signal)

STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		16
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_TCP_TrafficControlPlan.dgn		

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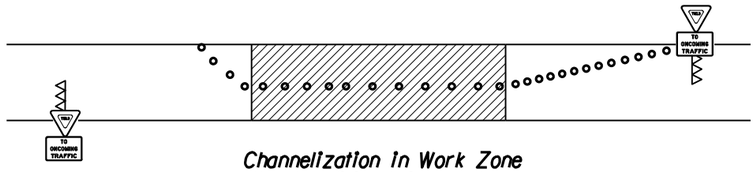
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\045304024\4 - Design\Plan Set\2. TCP\SH207_TCP_TrafficControlPlan.dgn

LEGEND

- Type III Barricade
- Channelizing Devices
- Flag
- Work Area
- Temporary or Portable Traffic Signals
- Sign Post
- Traffic Direction



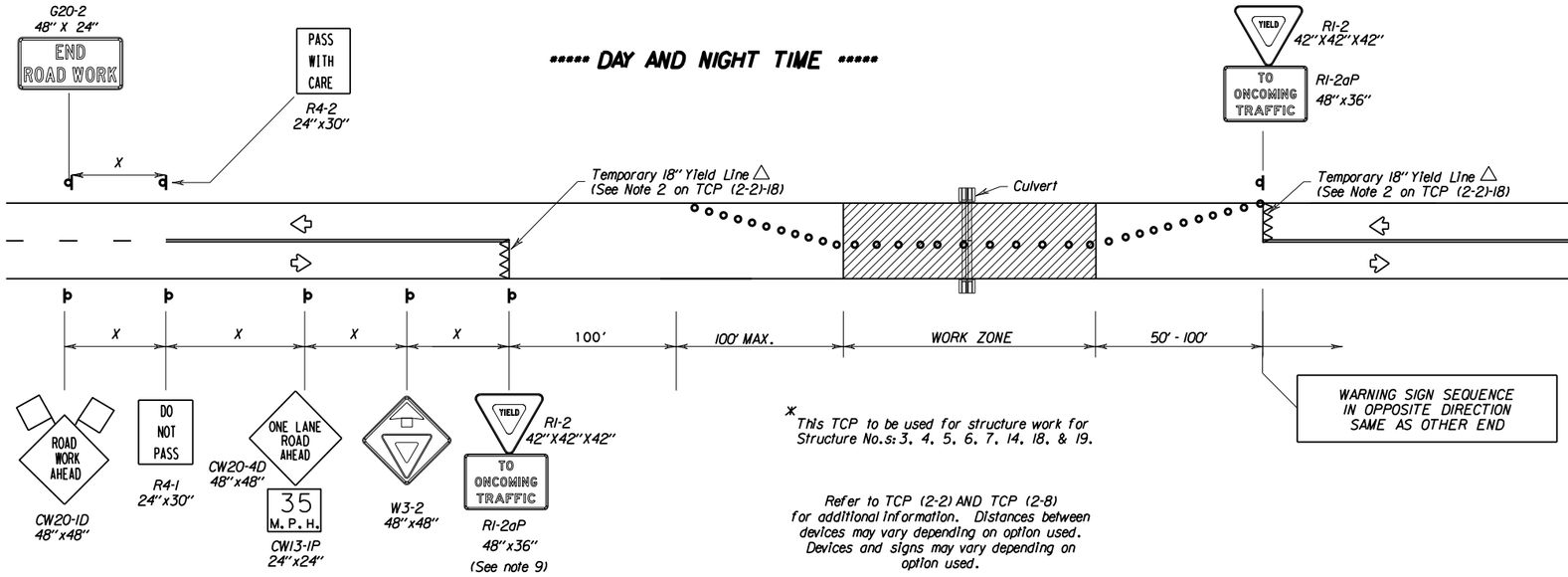
Channelization in Work Zone
Use channelizing devices, work zone stripe, and tabs to clearly delineate the traffic path through the work zone.

NOTE:

This TCP is to be used for Culvert work where there is adequate sight distance.

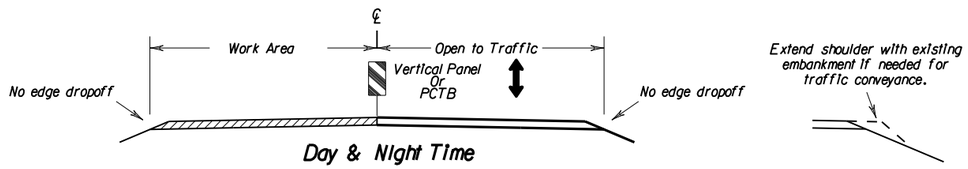
If one lane in each direction is not possible after dark, signals shall be used. Signals will not be paid for directly, but are subsidiary to Item 502 "Barricades, Signs and Traffic Handling".

Portable Concrete Traffic Barrier to be used for all culvert work other than culvert break back and extensions with trench depth less than 6 feet. See the PCTB & CCA Schedule for more details. All barrier segments shall have at least one reflector. Reflectors are subsidiary to the various PCTB Items.



* This TCP to be used for structure work for Structure No.s: 3, 4, 5, 6, 7, 14, 18, & 19.

Refer to TCP (2-2) AND TCP (2-8) for additional information. Distances between devices may vary depending on option used. Devices and signs may vary depending on option used.



Day & Night Time

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6/29/2022

Texas Department of Transportation

TRAFFIC CONTROL PLAN
(Culvert Work - Yield)

NO SCALE Sheet 3 of 3

STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		17
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_TCP_TrafficControlPlan.dgn		

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FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\045304024\4 - Design\Plan Set\2. TCP\SH207_TCP_TrafficControlPlan.dgn

LOC NO.	TCP PHASE	PLAN SHEET NUMBER	LOCATION	STA.	TEST LEVEL	DIRECTION OF TRAFFIC (UNI/BI)	FOUNDATION PAD		BACKUP SUPPORT			AVAILABLE SITE LENGTH	CRASH CUSHION									
															MOVE / RESET		L	L	R	R	S	S
							PROPOSED MATERIAL	PROPOSED THICKNESS	DESCRIPTION	WIDTH	HEIGHT		INSTALL	REMOVE	MOVE/ RESET	FROM LOC.#	N	W	N	W	N	W
1	1I	XX	B.C. STRUCTURE NO. 16 - LEFT	842+42 LEFT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint	3		2	1					3	
2	1C	XX	STRUCTURE NO. 4 - LEFT	539+64 LEFT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint	2								2	
3	1I	XX	STRUCTURE NO. 17 - LEFT	869+96 LEFT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint	2								2	
4	1I	XX	STRUCTURE NO. 18 - LEFT	920+66 LEFT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint	2								2	
5	1I	XX	STRUCTURE NO. 19 - LEFT	966+79 LEFT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint			2	3					2	
6	1I	XX	STRUCTURE NO. 21 - LEFT	986+01 LEFT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint			2	4					2	
7	1I	XX	STRUCTURE NO. 23 - LEFT	992+13 LEFT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint			2	2					2	
8	1I	XX	STRUCTURE NO. 24 - LEFT	992+97 LEFT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint	2								2	
9	1J	XX	B.C. STRUCTURE NO. 16 - RIGHT	842+42 RIGHT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint			4	5&9					4	
10	1D	XX	STRUCTURE NO. 4 - RIGHT	539+64 RIGHT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint			2	6					2	
11	1J	XX	STRUCTURE NO. 17 - RIGHT	869+96 RIGHT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint			2	7					2	
12	1J	XX	STRUCTURE NO. 18 - RIGHT	920+66 RIGHT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint			2	8					2	
13	1J	XX	STRUCTURE NO. 19 - RIGHT	966+79 RIGHT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint	2								2	
14	1J	XX	STRUCTURE NO. 21 - RIGHT	986+01 RIGHT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint			2	10					2	
15	1J	XX	STRUCTURE NO. 23 - RIGHT	992+13 RIGHT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint		2	2	11					2	
16	1J	XX	STRUCTURE NO. 24 - RIGHT	992+97 RIGHT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint		2	2	12					2	
17	1E	XX	STRUCTURE NO. 8 - LEFT	675+82 LEFT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint			2	13					2	
18	1E	XX	STRUCTURE NO. 9 - LEFT	726+44 LEFT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint			2	14					2	
19	1F	XX	STRUCTURE NO. 8 - RIGHT	675+82 RIGHT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint			2	17					2	
20	1F	XX	STRUCTURE NO. 9 - RIGHT	726+44 RIGHT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint			2	18					2	
21	1G	XX	STRUCTURE NO. 10 - LEFT	750+46 LEFT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint			2	19					2	
22	1G	XX	STRUCTURE NO. 11 - LEFT	762+56 LEFT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint			2	20					2	
23	1G	XX	STRUCTURE NO. 14 - LEFT	819+11 LEFT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint			2	Stor.					2	
24	1H	XX	STRUCTURE NO. 10 - RIGHT	750+46 RIGHT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint			2	21					2	
25	1H	XX	STRUCTURE NO. 11 - RIGHT	762+56 RIGHT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint			2	22					2	
26	1H	XX	STRUCTURE NO. 14 - RIGHT	819+11 RIGHT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint			2	23					2	
27	1K	XX	STRUCTURE NO. 25 - LEFT	1006+59 LEFT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint			2	24					2	
28	1K	XX	STRUCTURE NO. 26 - LEFT	1017+47 LEFT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint			2	25					2	
29	1K	XX	STRUCTURE NO. 27 - LEFT	1023+68 LEFT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint			2	26					2	
30	1L	XX	STRUCTURE NO. 25 - RIGHT	1006+59 RIGHT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint			2	27					2	
31	1L	XX	STRUCTURE NO. 26 - RIGHT	1017+47 RIGHT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint			2	28					2	
32	1L	XX	STRUCTURE NO. 27 - RIGHT	1023+68 RIGHT	TL3	BI	Exist. Road	N/A	Ty 1 F-SHAPE Concrete Barrier	2.0 FT	33 IN	No Constraint		9	2	29					2	
												TOTALS:	13	13	56							

FOR DEFINITIONS SEE THE "CRASH CUSHION CATEGORIZATION CHART.PDF" AT THE DESIGN DIVISION (ROADWAY STANDARDS) WEBSITE. USE QUICK LINKS TO ACCESS ATTENUATORS / CRASH CUSHIONS SECTION.
http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/rdwyise.htm

CRASH CUSHION SUMMARY SHEET

LEGEND:
L=LOW MAINTENANCE
R=REUSABLE
S=SACRIFICIAL
N=NARROW
W=WIDE

FILE: ccss.dgn	DN: TxDOT	CK:	CK:
© TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
	DIST	COUNTY	
	LUBBOCK	CROSBY	
	FEDERAL AID PROJECT		SHEET NO.
	F (2023) (065)		18

				PORTABLE CONCRETE TRAFFIC BARRIER				CRASH CUSHION ATTENUATOR			
LOCATION NO.	TCP PHASE	LOCATION DESCRIPTION	STA.	DES. SOURCE [LF]	MOVE [LF]	STOCKPILE [LF]	MOVE & RESET P.C.T.B. FROM LOCATION NO.	INSTALL [EA]	MOVE & RESET [EA]	REMOVE [EA]	MOVE & RESET C.C.A. FROM LOCATION NO.
1	II	Bridge Class. Struct. # 16	842+42		810		1 - Move existing P.C.T.B.	3	2		1
2	IC	Structure # 4 LEFT	539+64	90				2			
3	II	Structure # 17 LEFT	869+96	90				2			
4	II	Structure # 18 LEFT	920+66	90				2			
5	II	Structure # 19 LEFT	966+79		90		3		2		3
6	II	Structure # 21 LEFT	986+01		90		4		2		4
7	II	Structure # 23 LEFT	992+13		90		2		2		2
8	II	Structure # 24 LEFT	992+97		90		1	2			
9	IJ	Bridge Class. Struct. # 16	842+42	120	690		5 & 9		4		5 & 9
10	ID	Structure # 4 RIGHT	539+64		90		6		2		6
11	IJ	Structure # 17 RIGHT	869+96		90		7		2		7
12	IJ	Structure # 18 RIGHT	920+66		90		8		2		8
13	IJ	Structure # 19 RIGHT	966+79		90		9	2			
14	IJ	Structure # 21 RIGHT	986+01		90		10		2		10
15	IJ	Structure # 23 RIGHT	992+13		180		11		2	2	11
16	IJ	Structure # 24 RIGHT	992+97		180		12		2	2	12
17	IE	Structure # 8 LEFT	675+82		90		13		2		13
18	IE	Structure #9 LEFT	726+44		90		14		2		14
19	IF	Structure # 8 RIGHT	675+82		90		17		2		17
20	IF	Structure # 9 RIGHT	726+44		90		18		2		18
21	IG	Structure # 10 LEFT	750+46		90		19		2		19
22	IG	Structure # 11 LEFT	762+56		90		20		2		20
23	IG	Structure # 14 LEFT	819+11		90		On Proj. Temp. Store Area		2		On Proj. Temp. Store Area
24	IH	Structure #10 RIGHT	750+46		90		21		2		21
25	IH	Structure #11 RIGHT	762+56		90		22		2		22
26	IH	Structure # 14 RIGHT	819+11		90		23		2		23
27	IK	Structure # 25 LEFT	1006+59		90		24		2		24
28	IK	Structure # 26 LEFT	1017+47		90		25		2		25
29	IK	Structure # 27 LEFT	1023+68		90		26		2		26
30	IL	Structure # 25 RIGHT	1006+59		90		27		2		27
31	IL	Structure # 26 RIGHT	1017+47		90		28		2		28
32	IL	Structure # 27 RIGHT	1023+68		90	1080	29		2	9	29
		PROJECT TOTALS:		390	4110	1080		13	56	13	

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6/29/2022

Texas Department of Transportation

PCTB & CCA SCHEDULE

NO SCALE Sheet 1 of 1

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		19
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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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	0453	04	024	SH 207
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	LBB	CROSBY		20
5-10 5-21				

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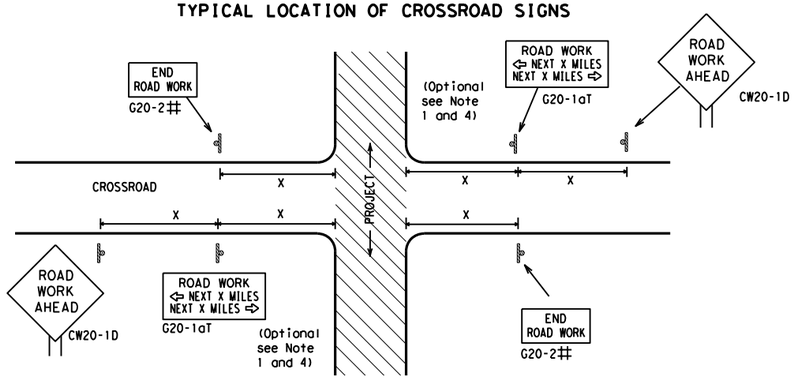
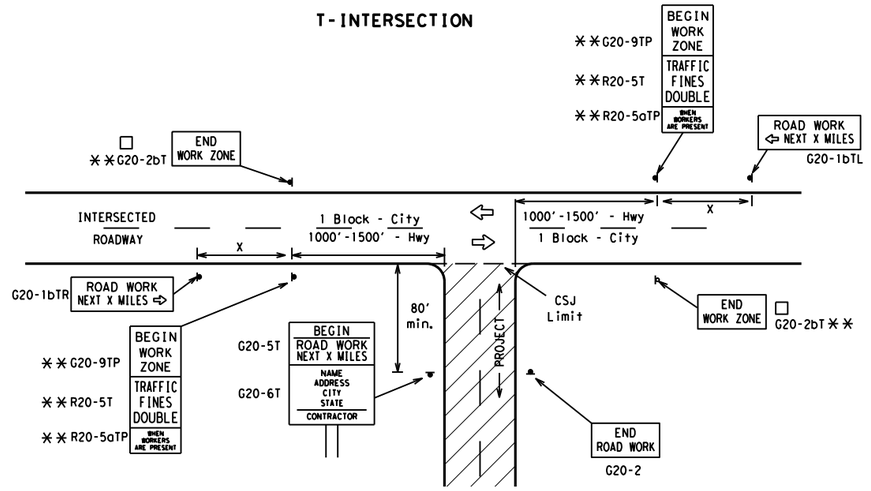
TYPICAL LOCATION OF CROSSROAD SIGNS



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]

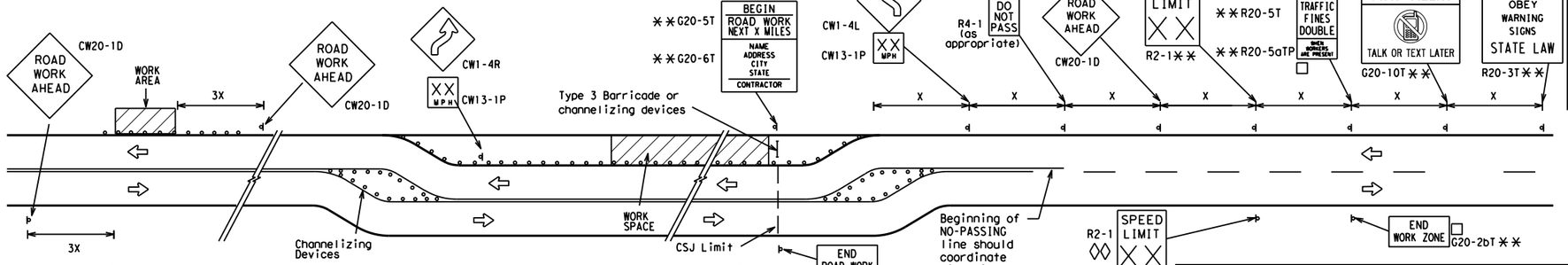
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

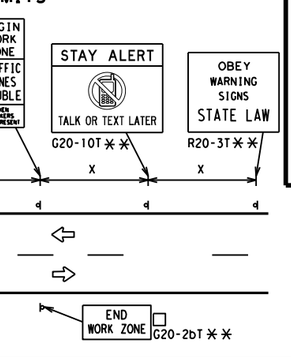
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

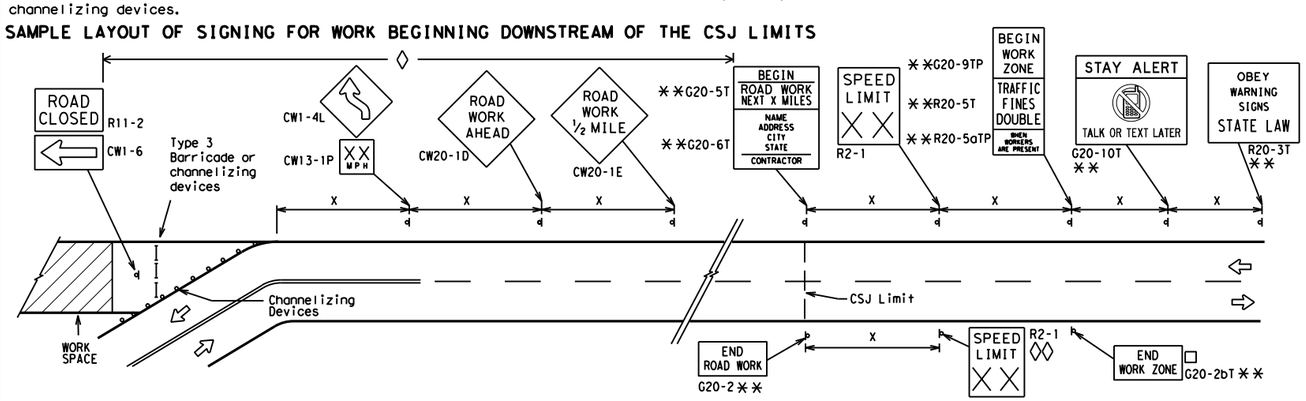


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



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



NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

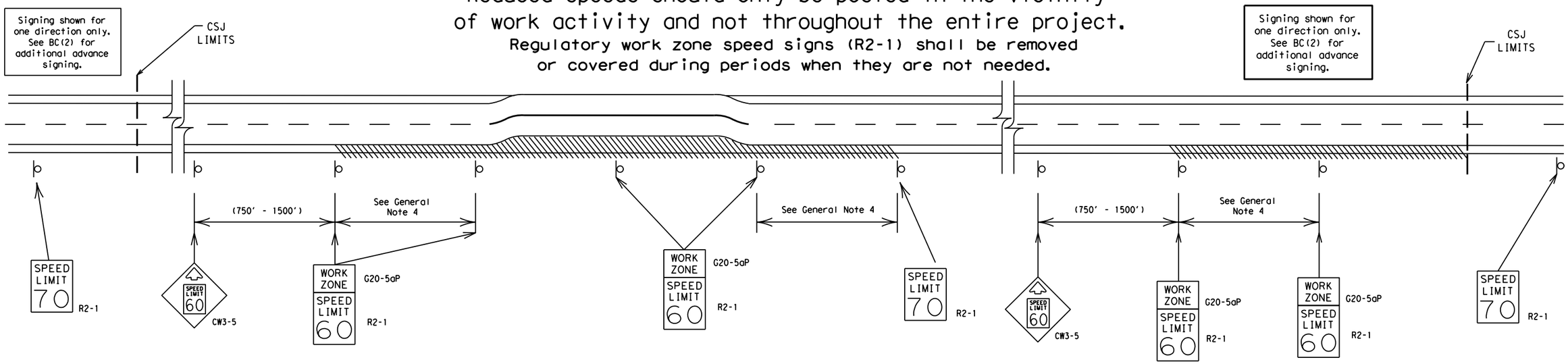
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LBB	CROSBY		21

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.

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SHEET 3 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13 5-21	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		22

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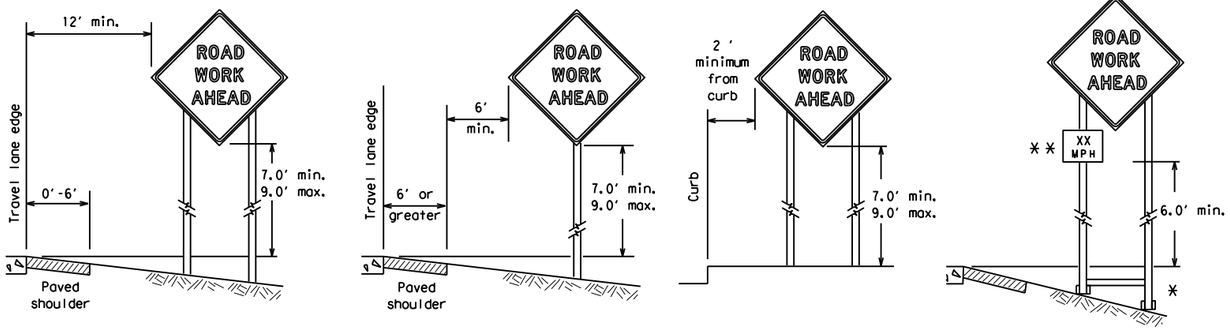
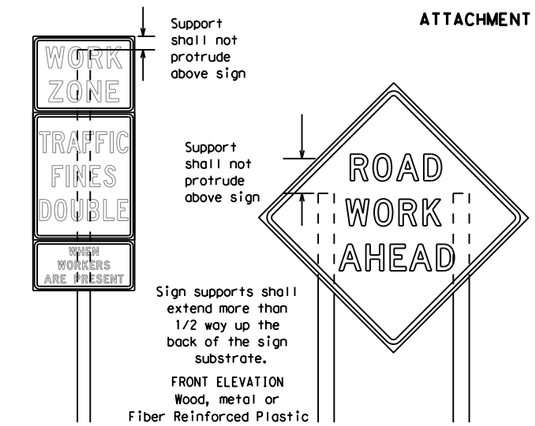
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

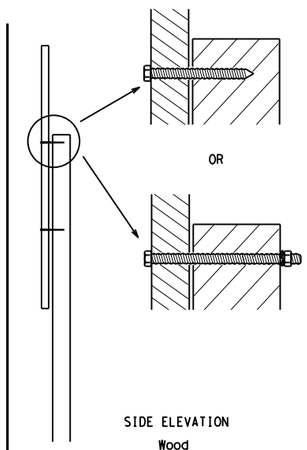


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





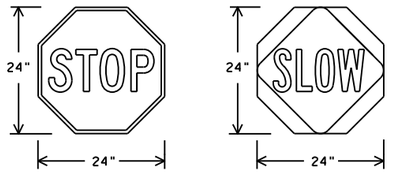
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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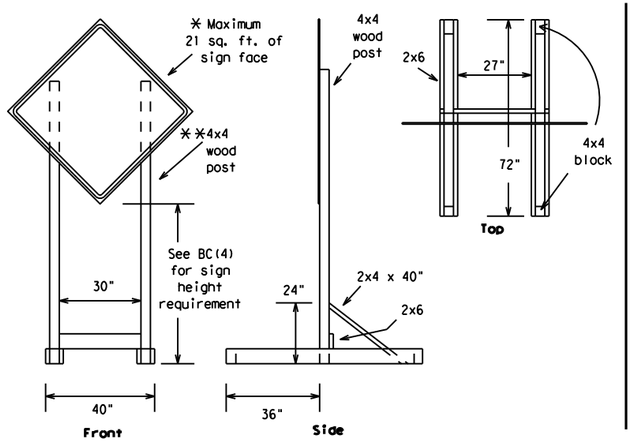
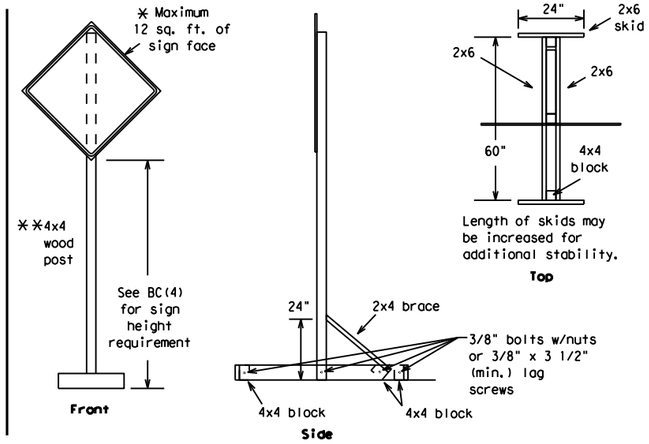
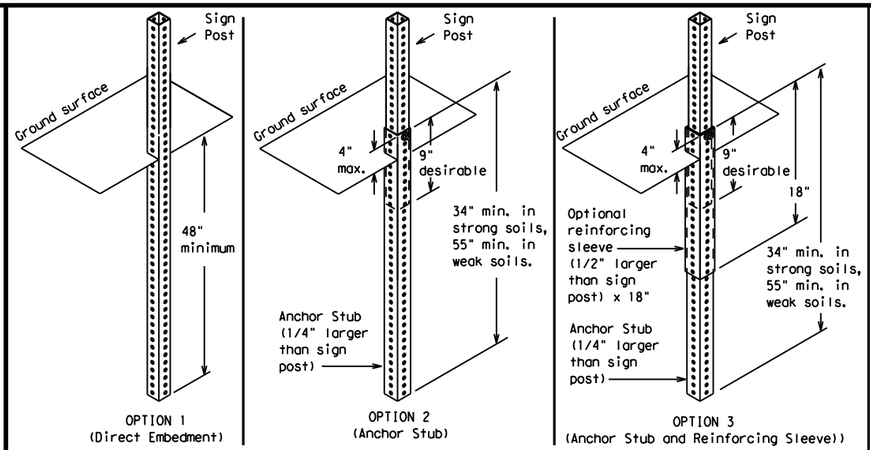




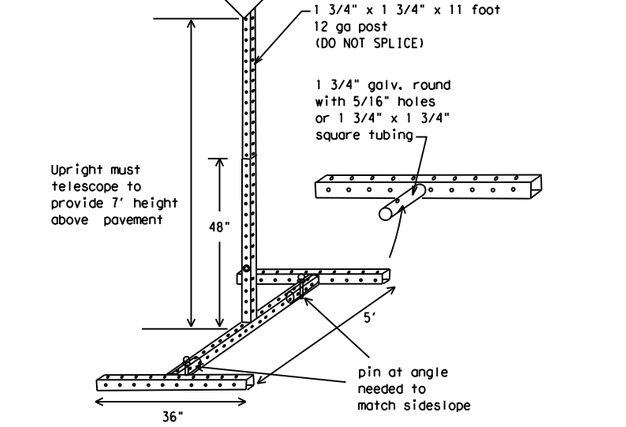
SKID MOUNTED WOOD SIGN SUPPORTS

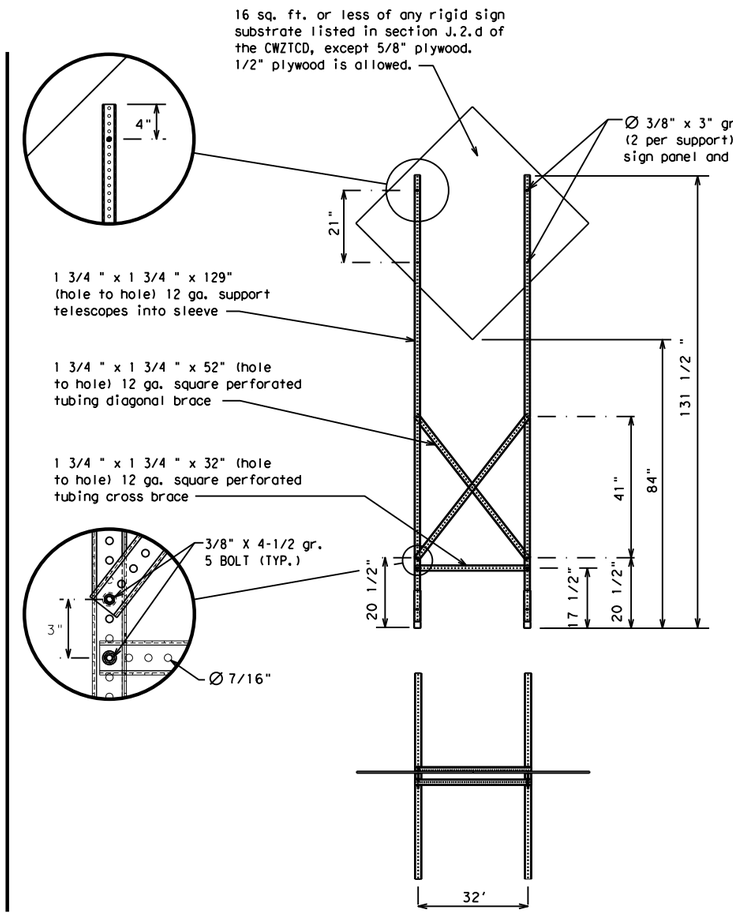
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

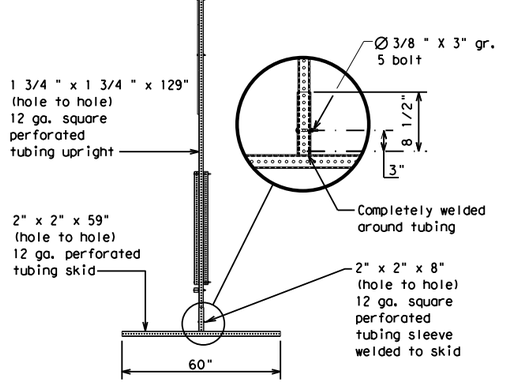


GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

SHEET 5 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LBB	CROSBY		24

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

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

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

Phase 2: Possible Component Lists

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LBB	CROSBY		25

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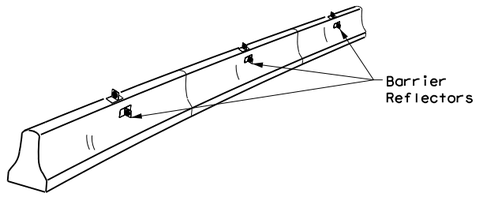
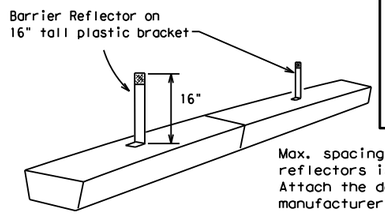
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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



CONCRETE TRAFFIC BARRIER (CTB)

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

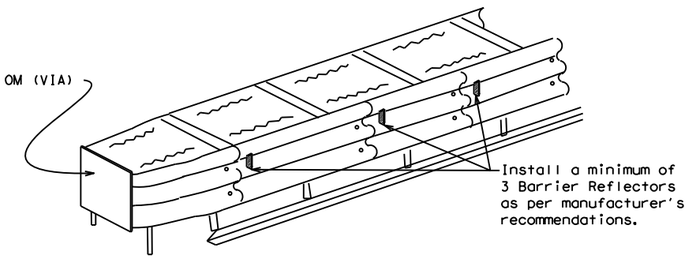


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

LOW PROFILE CONCRETE BARRIER (LPCB)

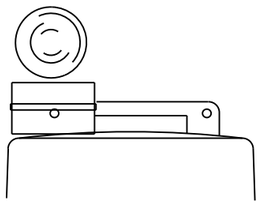


DELINEATION OF END TREATMENTS

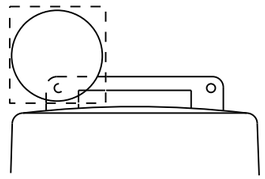
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

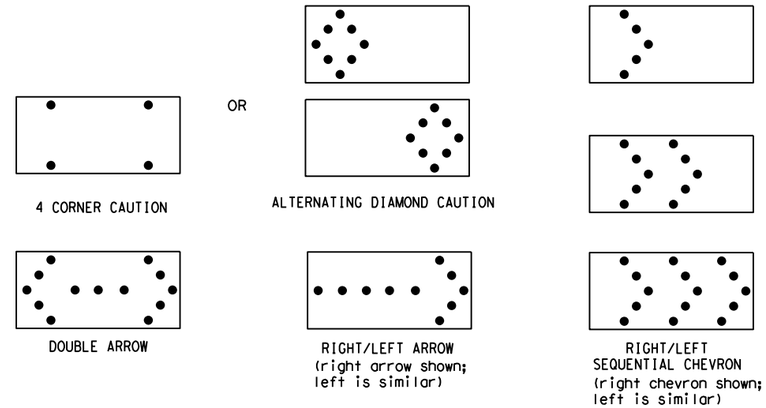
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0453	04	024	SH 207
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LBB	CROSBY		26

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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:

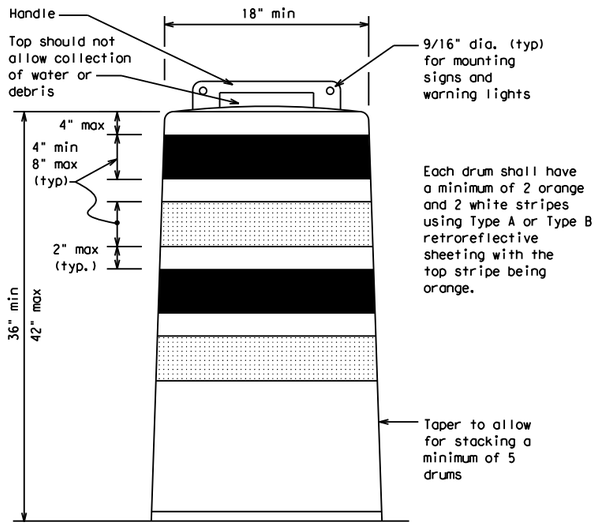
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

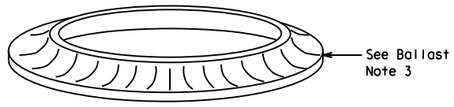
RETROREFLECTIVE SHEETING

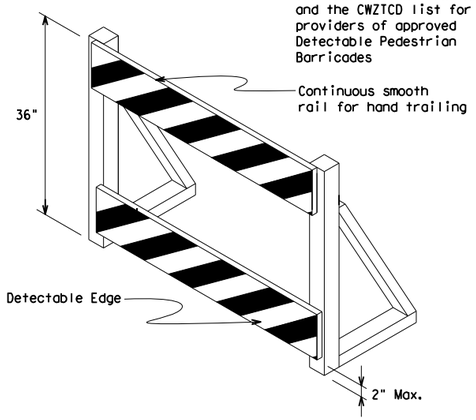
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

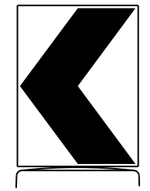




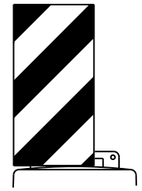


DETECTABLE PEDESTRIAN BARRICADES

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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0453	04	024	SH 207
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	LBB	CROSBY		27
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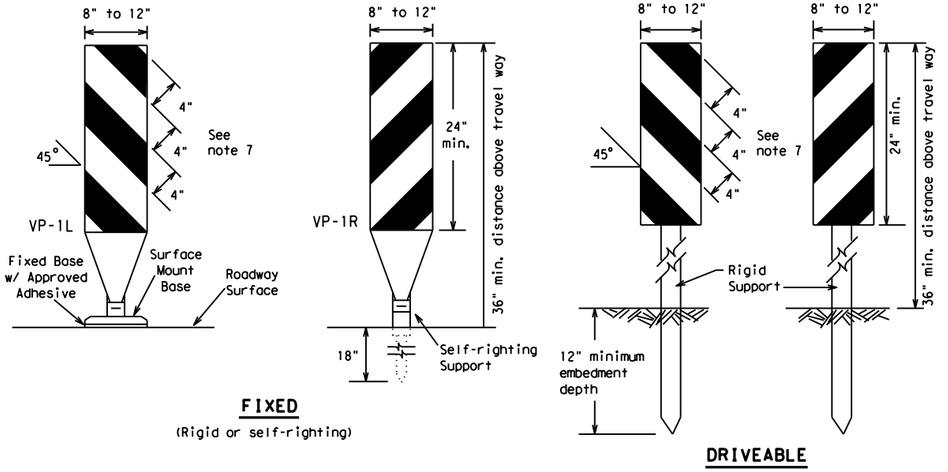
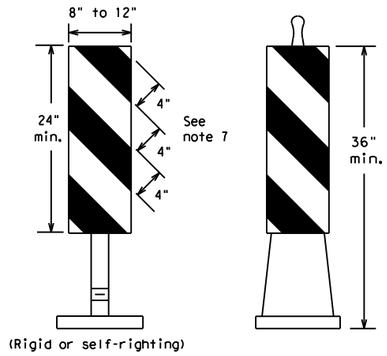


FIXED
(Rigid or self-righting)

DRIVEABLE

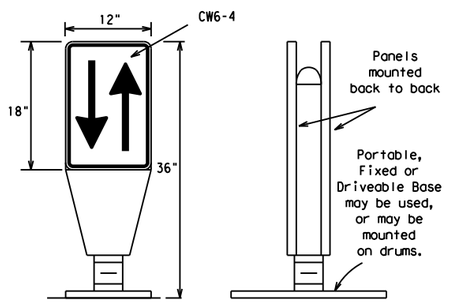


(Rigid or self-righting)

PORTABLE

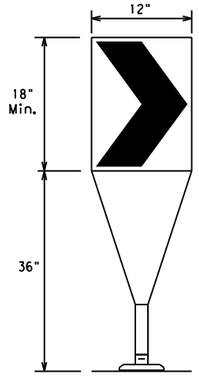
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



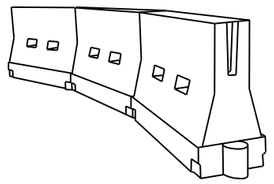
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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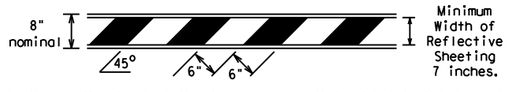
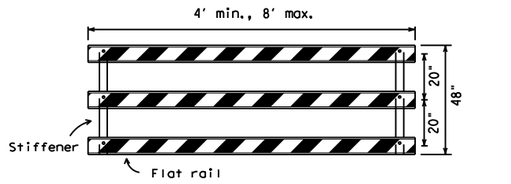
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



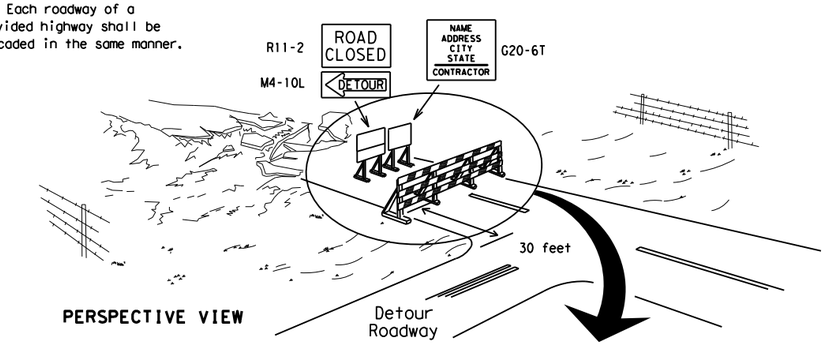
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

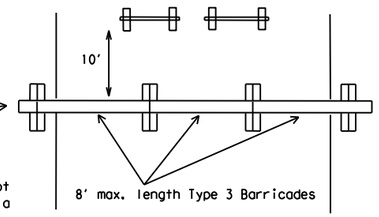
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

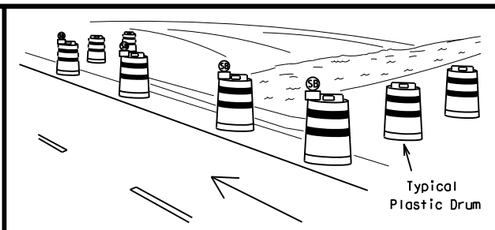
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

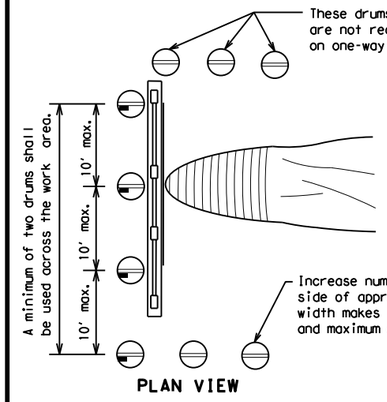
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

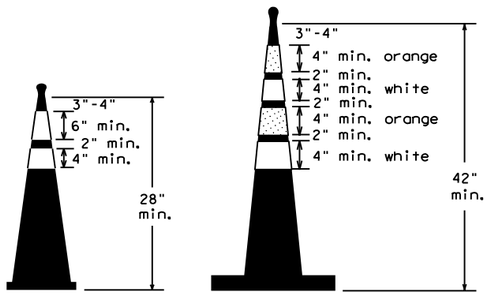
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



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

PLAN VIEW

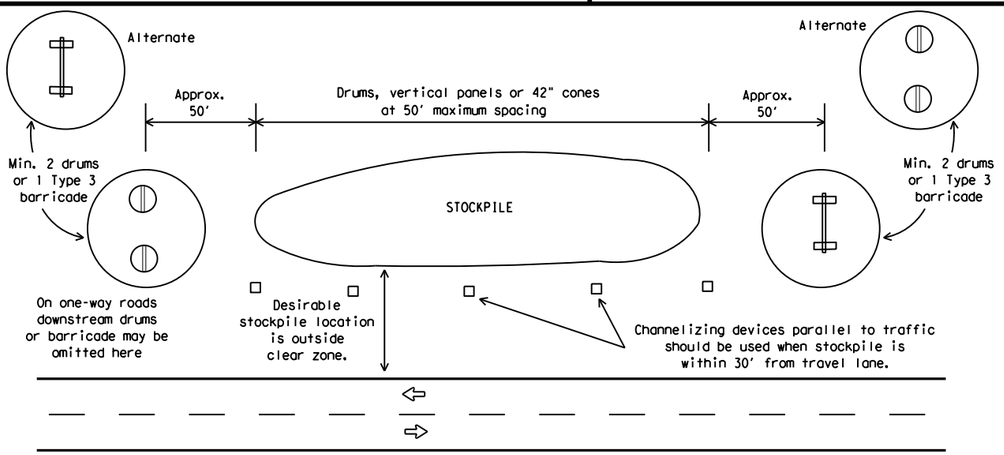
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LBB	CROSBY		29

WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

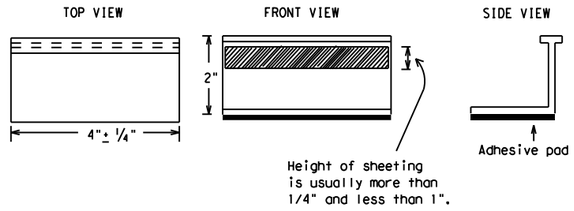
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
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1-02 7-13	LBB	CROSBY		30
11-02 8-14				

TCP

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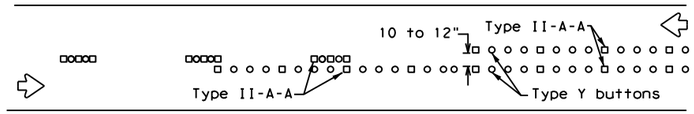
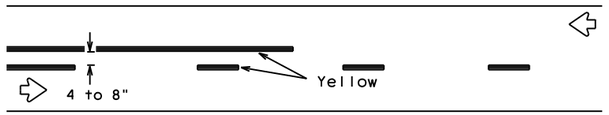
PAVEMENT MARKING PATTERNS

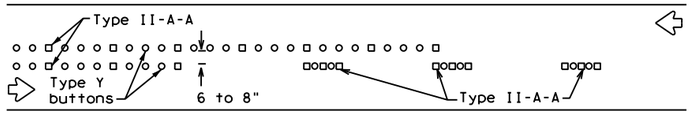
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



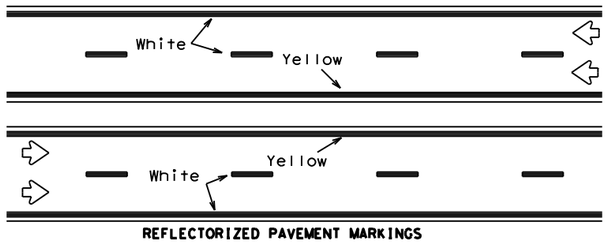
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



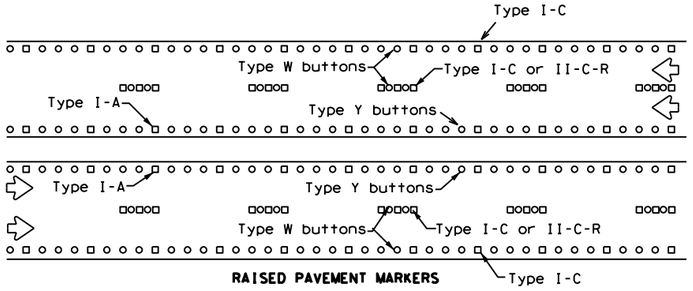
RAISED PAVEMENT MARKERS - PATTERN B

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



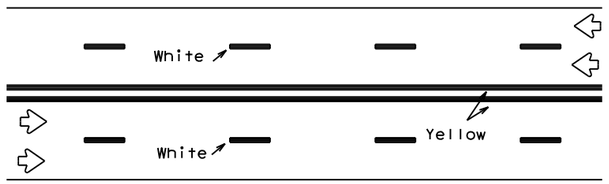
REFLECTORIZED PAVEMENT MARKINGS



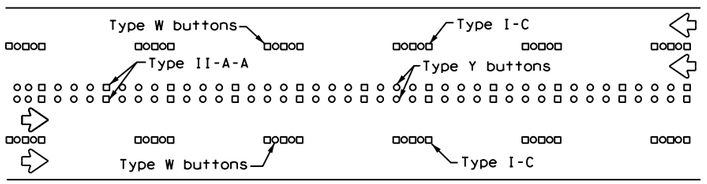
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



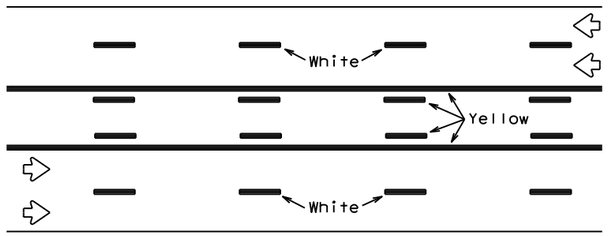
REFLECTORIZED PAVEMENT MARKINGS



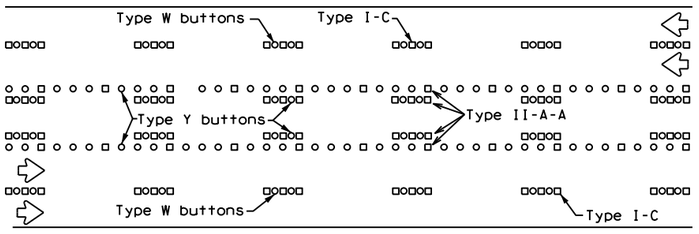
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

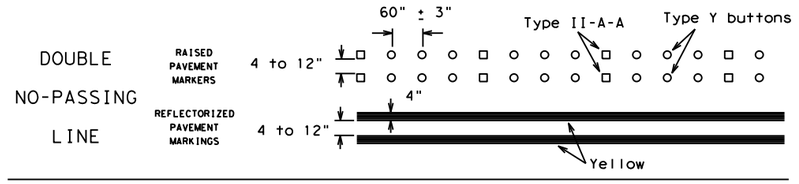
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

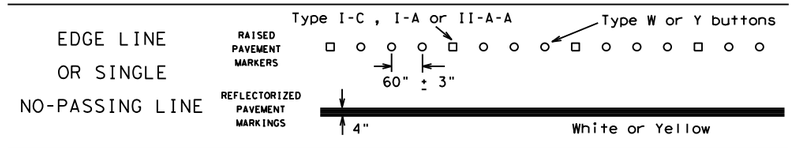
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

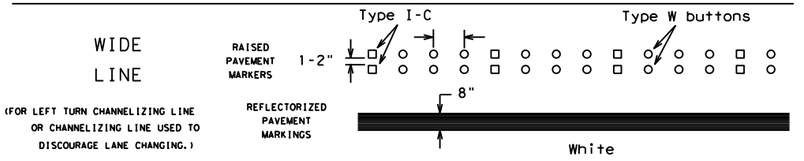


EDGE LINE OR SINGLE NO-PASSING LINE



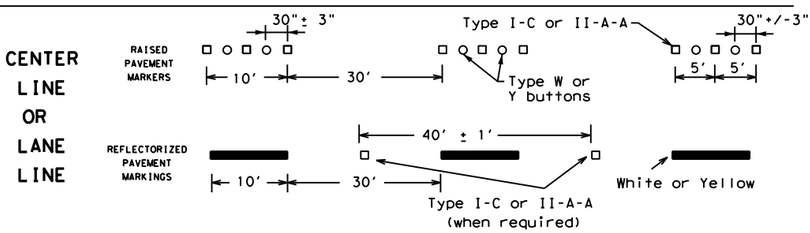
WIDE LINE

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

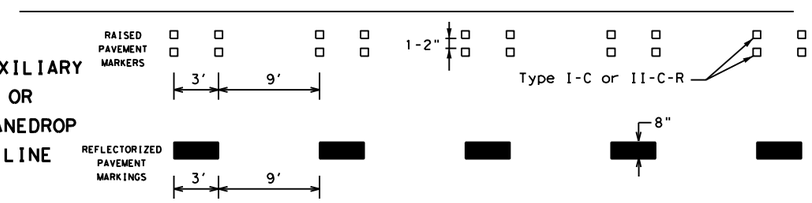


BROKEN LINES

CENTER LINE OR LANE LINE

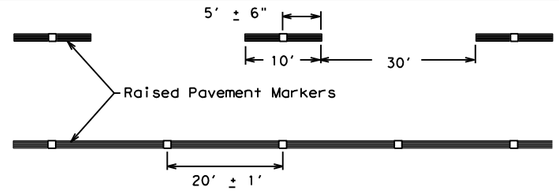


AUXILIARY OR LANEDROP LINE



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."

SHEET 12 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		31

106

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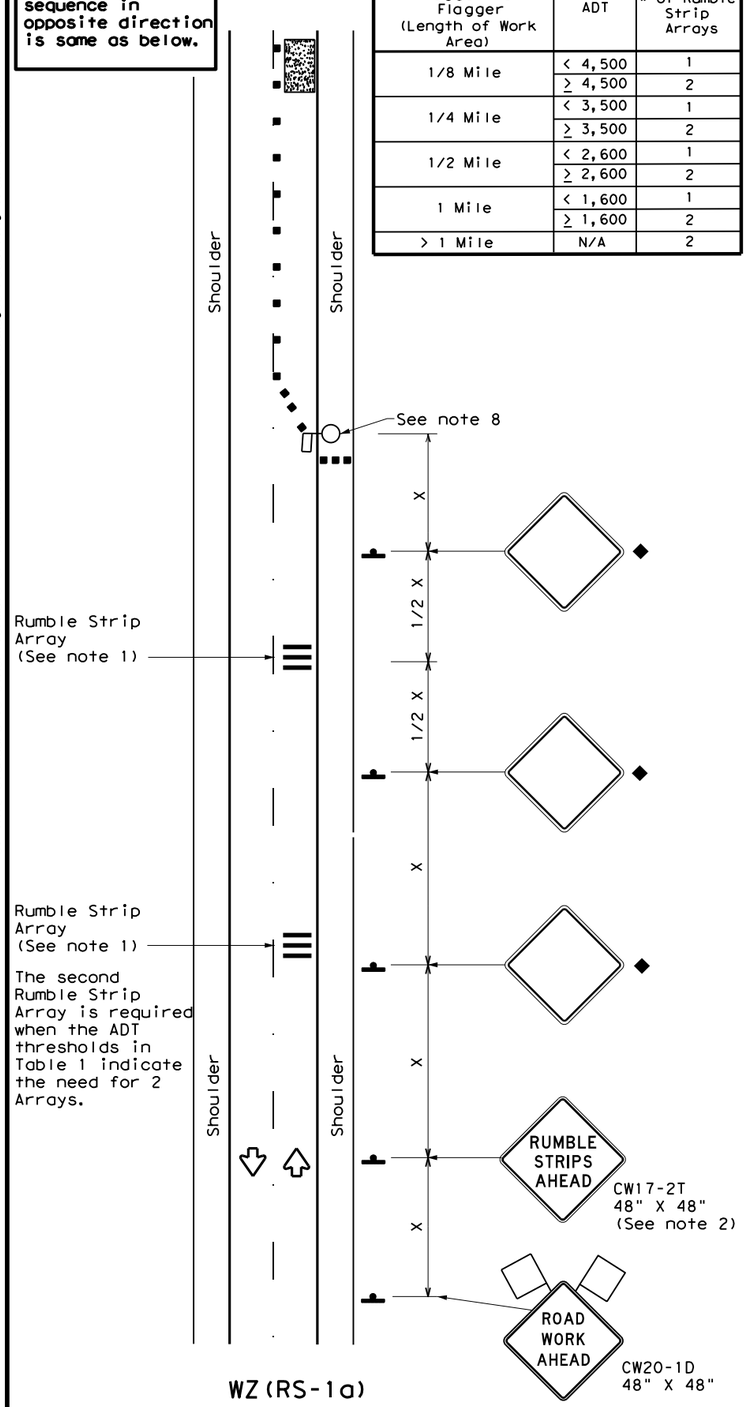
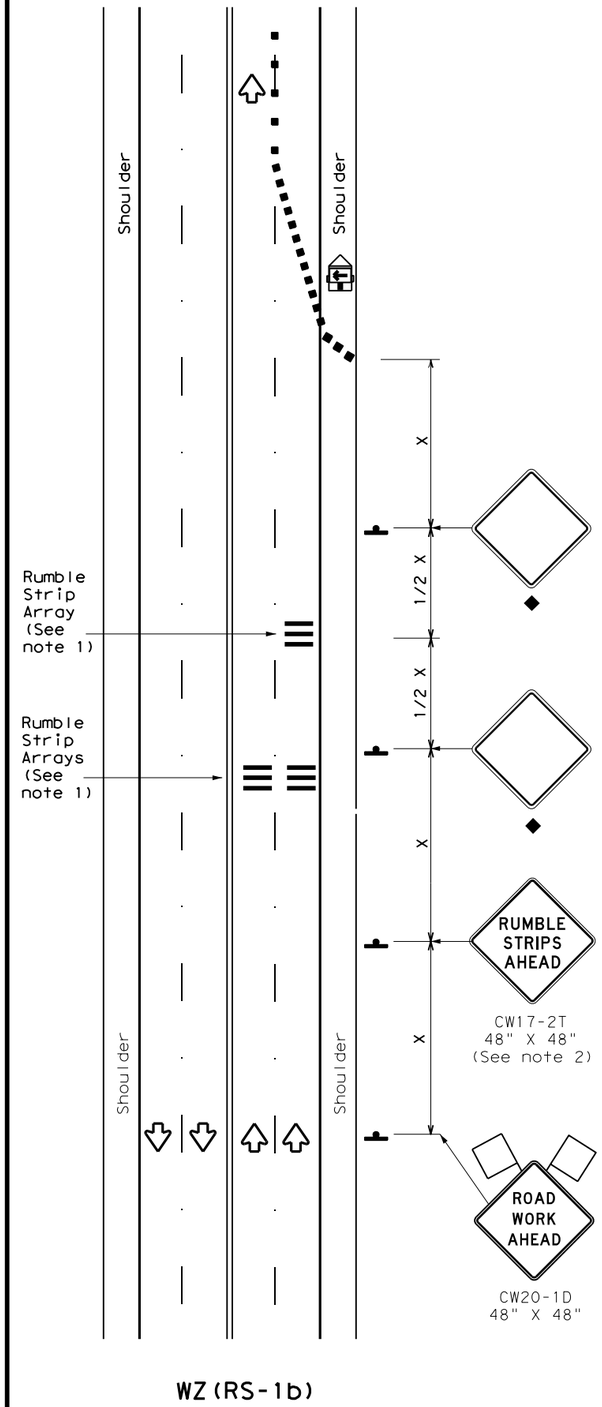
Warning sign and rumble strip sequence in opposite direction is same as below.

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



WZ(RS-1a)

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

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

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

* Conventional Roads Only

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-22

FILE: wzrs22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
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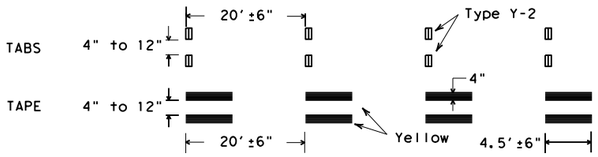
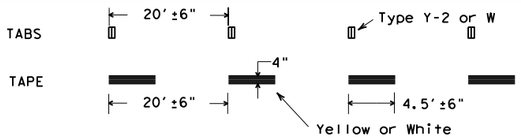
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

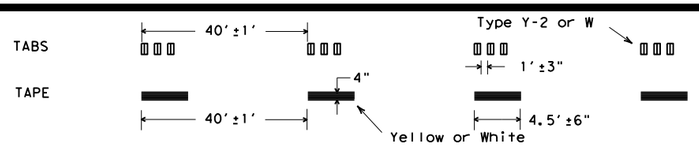


SINGLE NO-PASSING LINE or CHANNELIZATION LINE



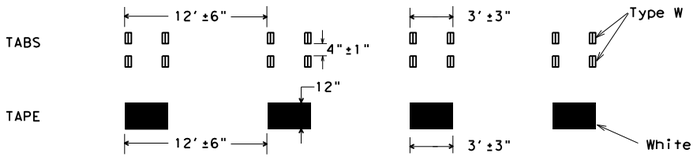
BROKEN LINES

(FOR CENTER LINE OR LANE LINE)

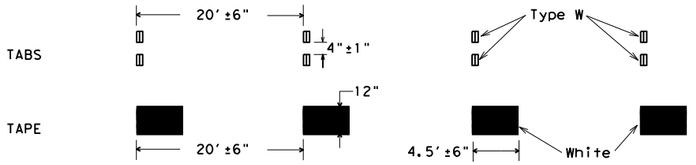


WIDE DOTTED LINES

(FOR LANE DROP LINES)



WIDE GORE MARKINGS



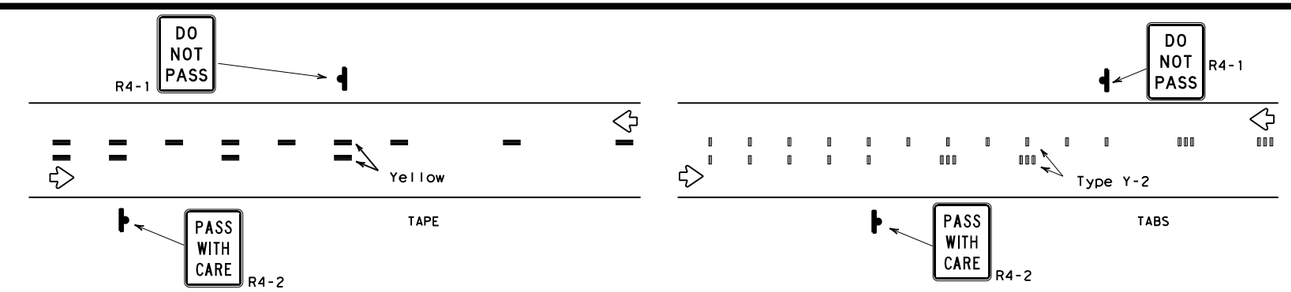
NOTES:

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.

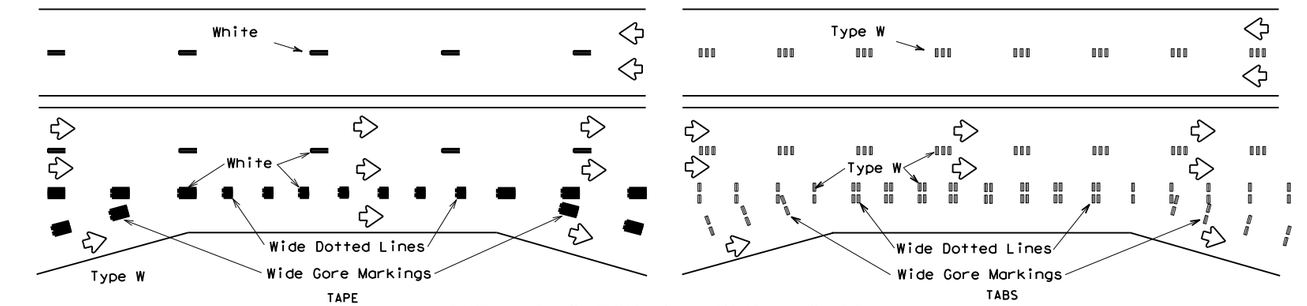
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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.

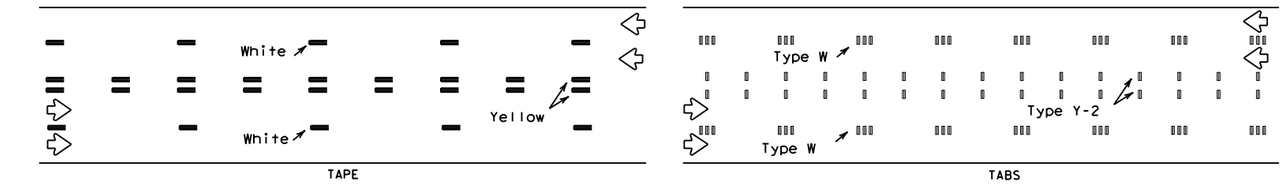
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



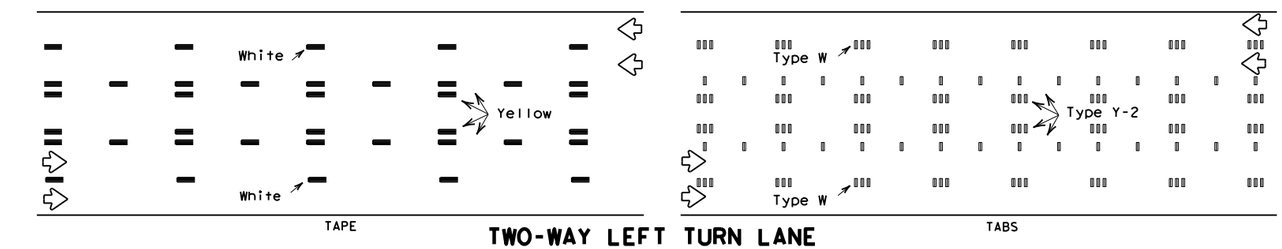
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



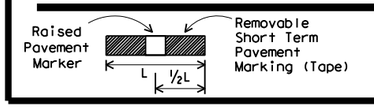
LANE LINES FOR DIVIDED HIGHWAY



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 Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

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1-97		DIST	COUNTY		SHEET NO.
3-03		LBB	CROSBY		33
7-13					

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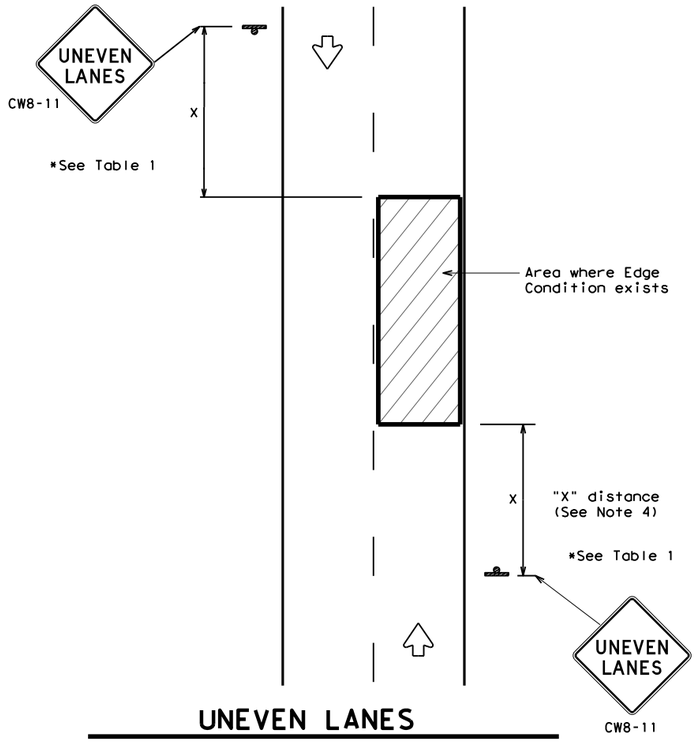
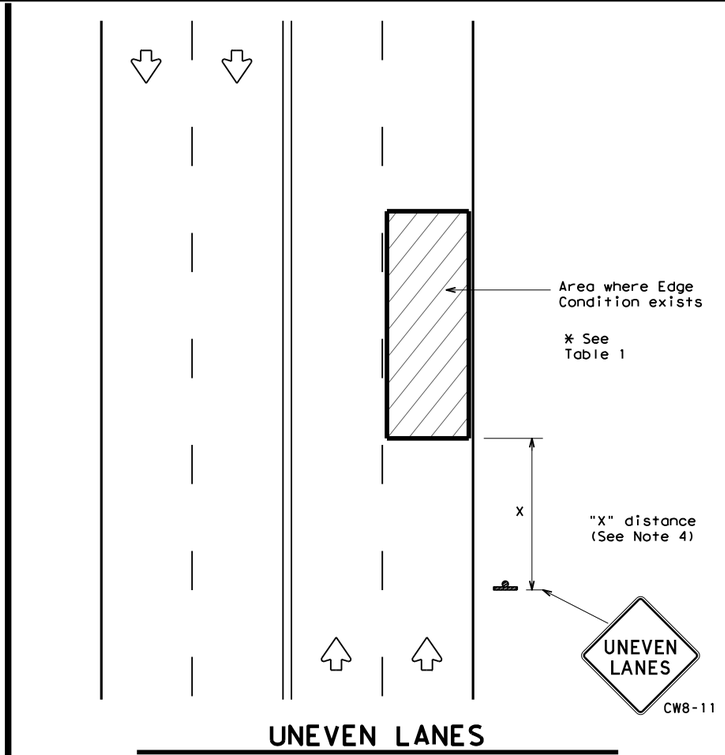
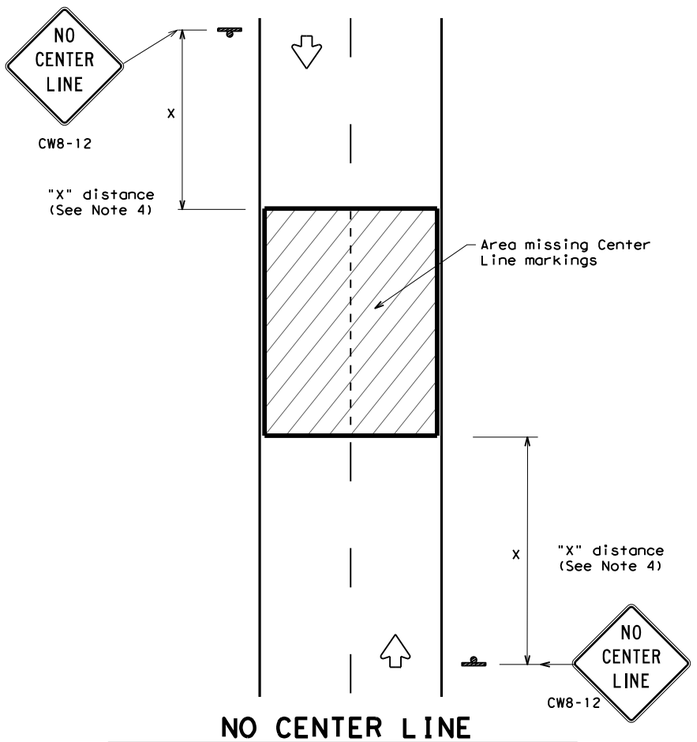


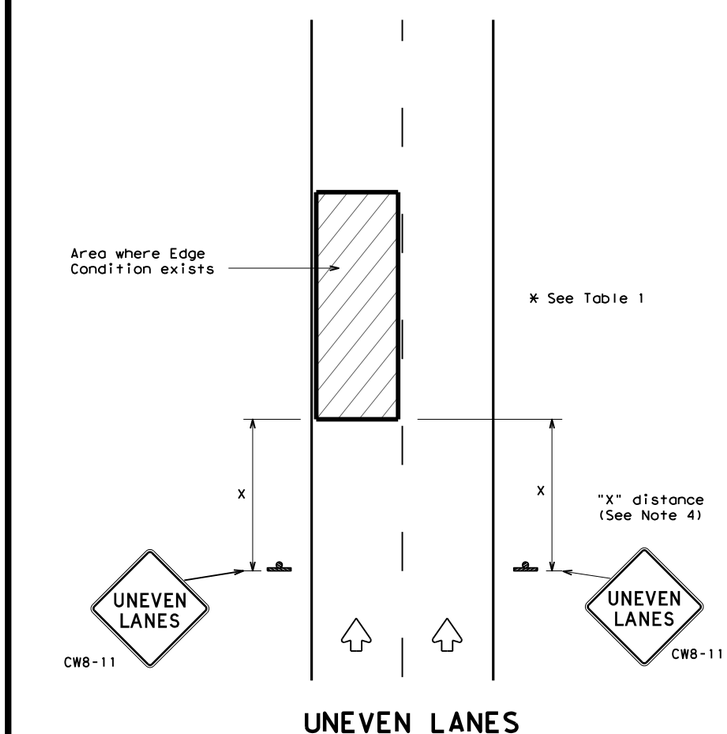
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

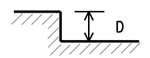
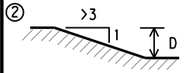
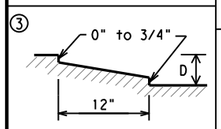
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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	LBB	CROSBY		34

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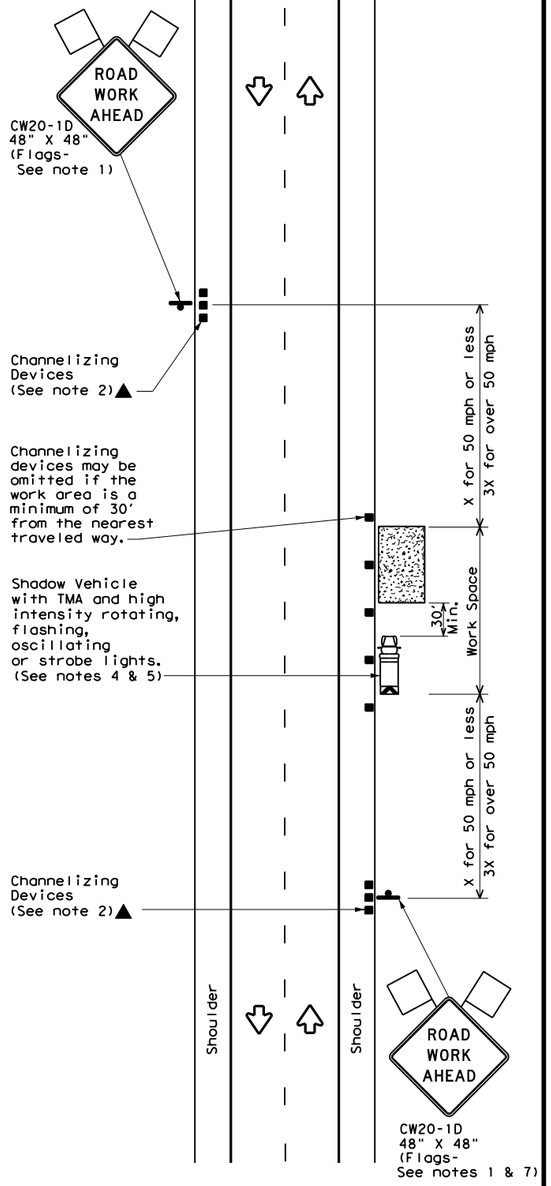
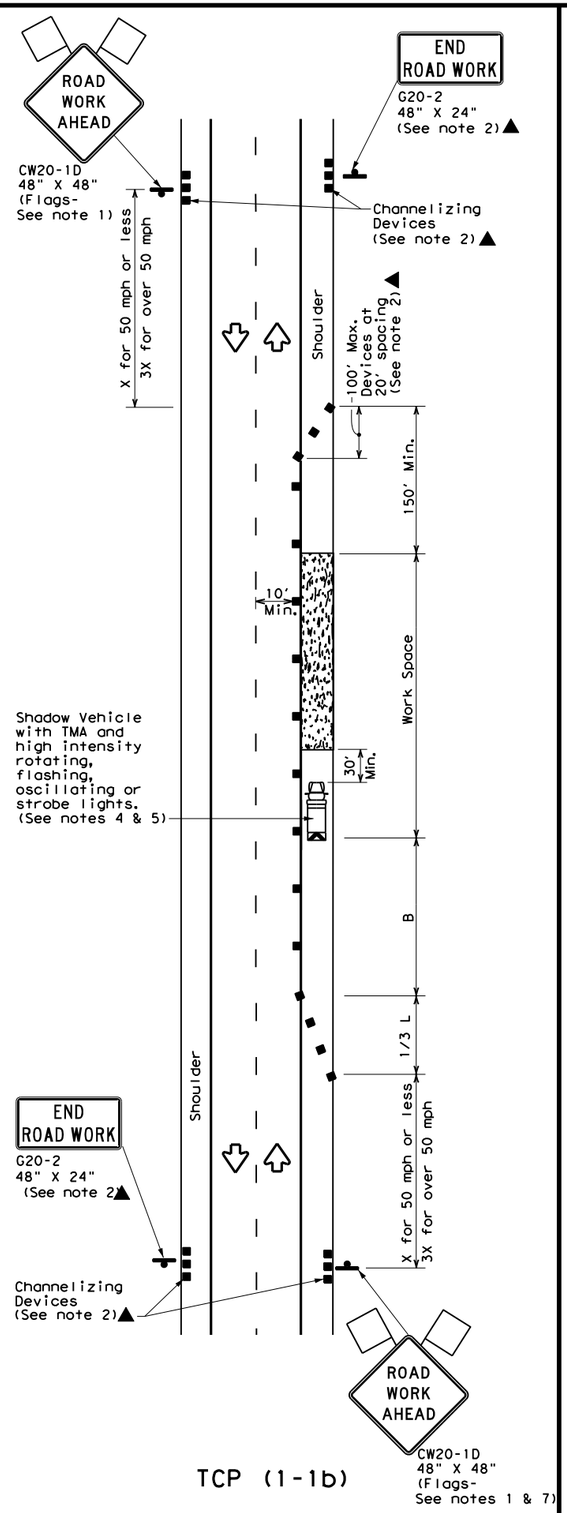


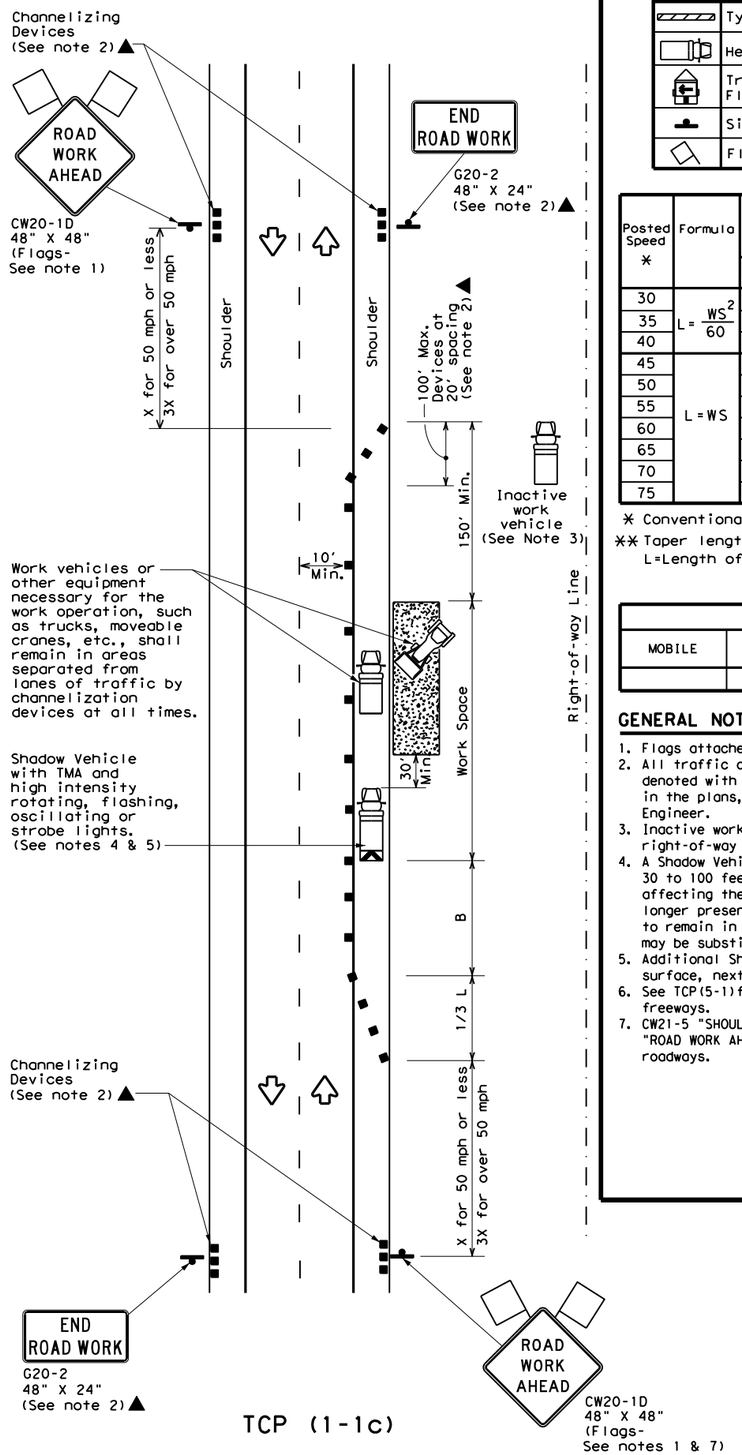
TCP (1-1a)

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

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	LBB	CROSBY		35
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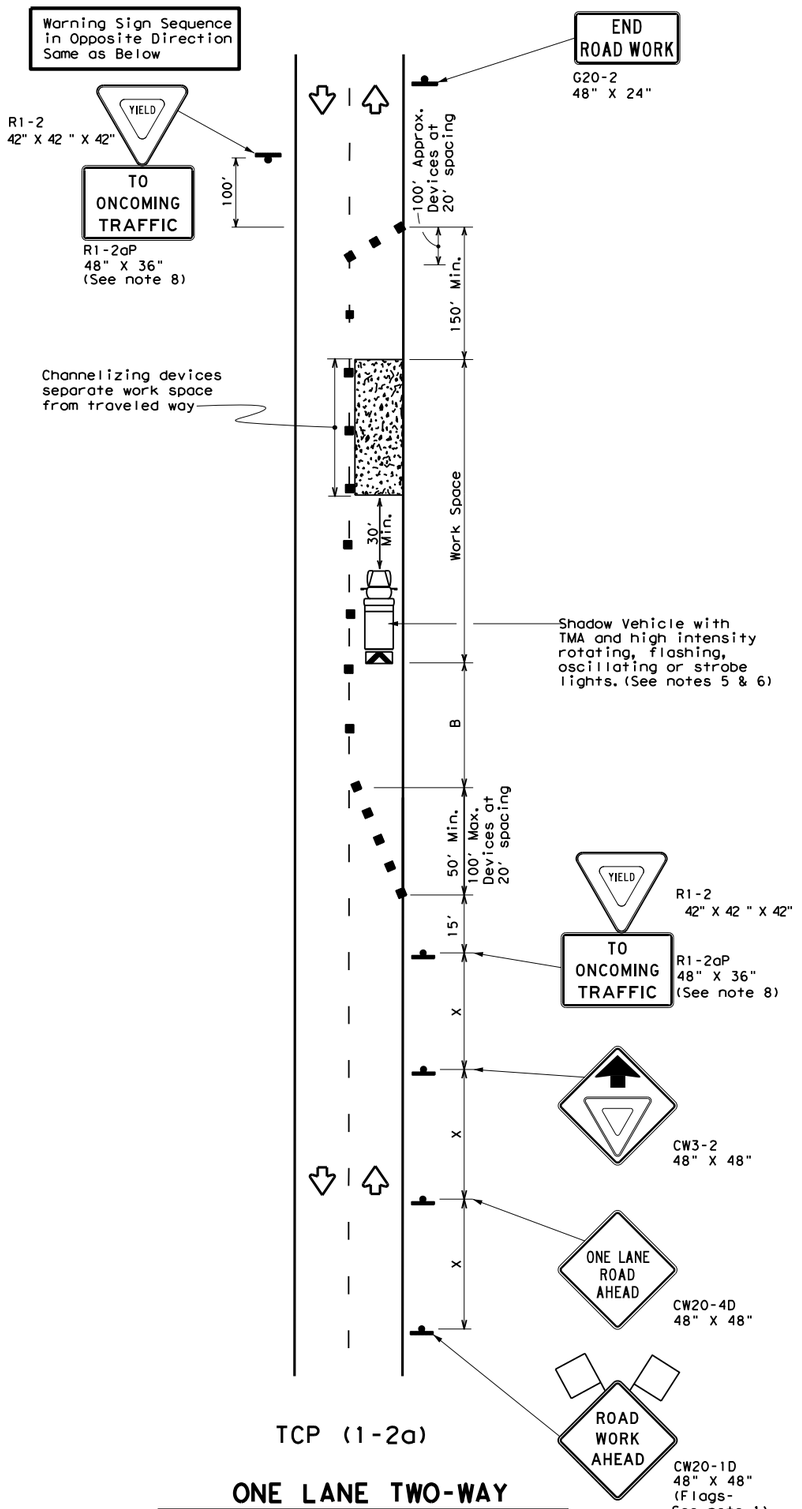
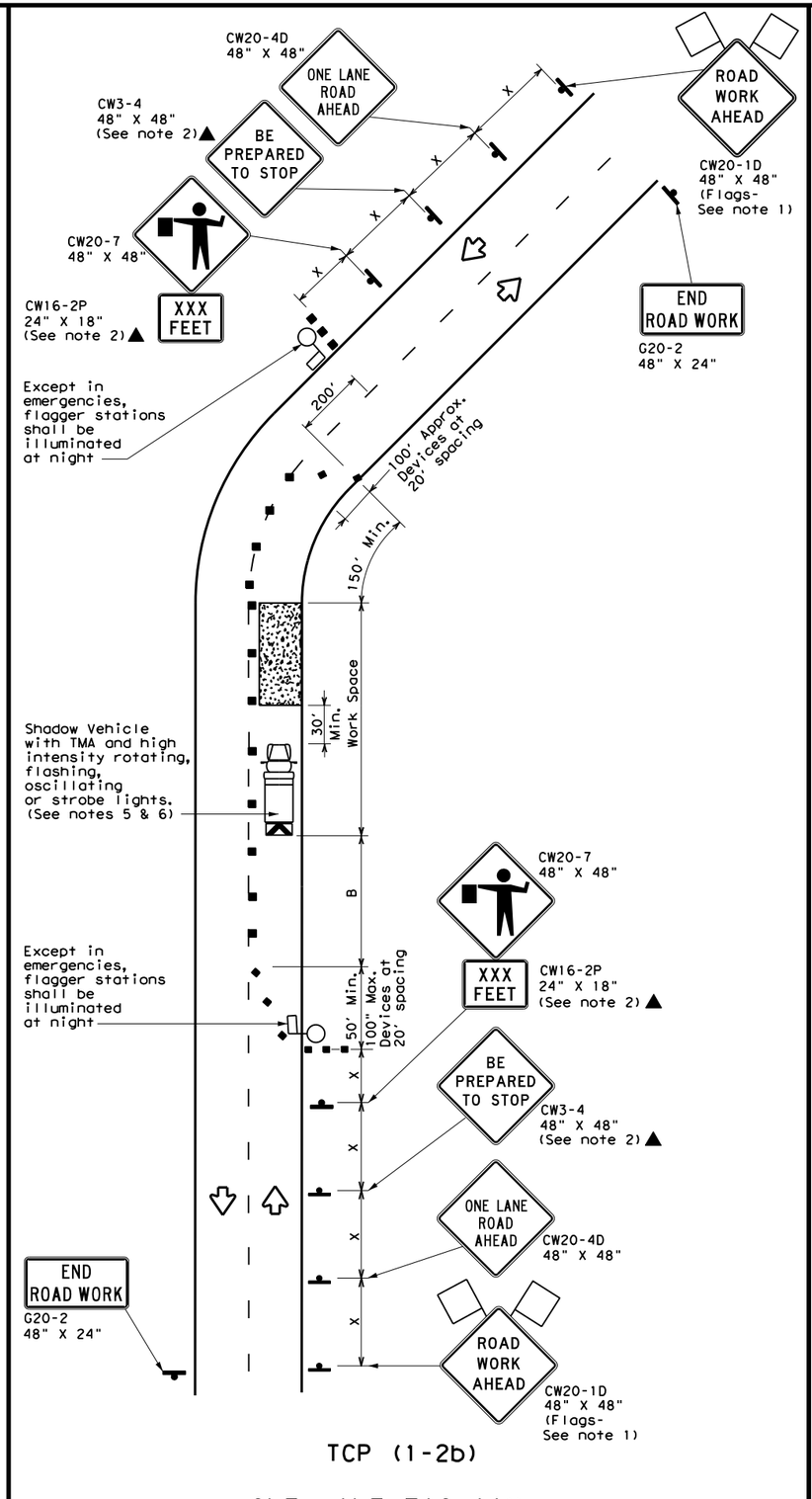


TCP (1-2a)

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

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-90 4-98 2-94 2-12 1-97 2-18	0453	04	024	SH 207
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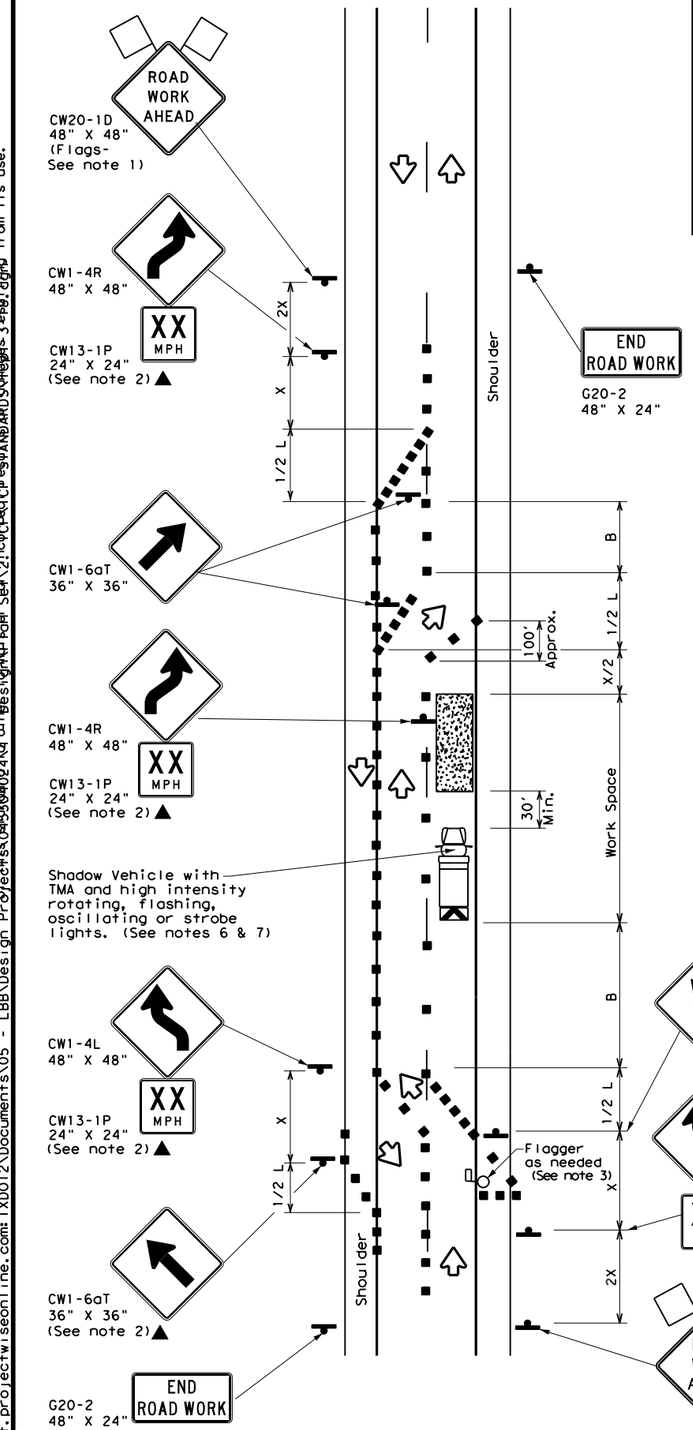
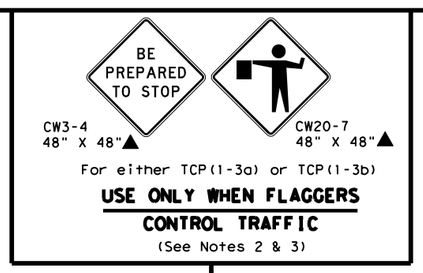
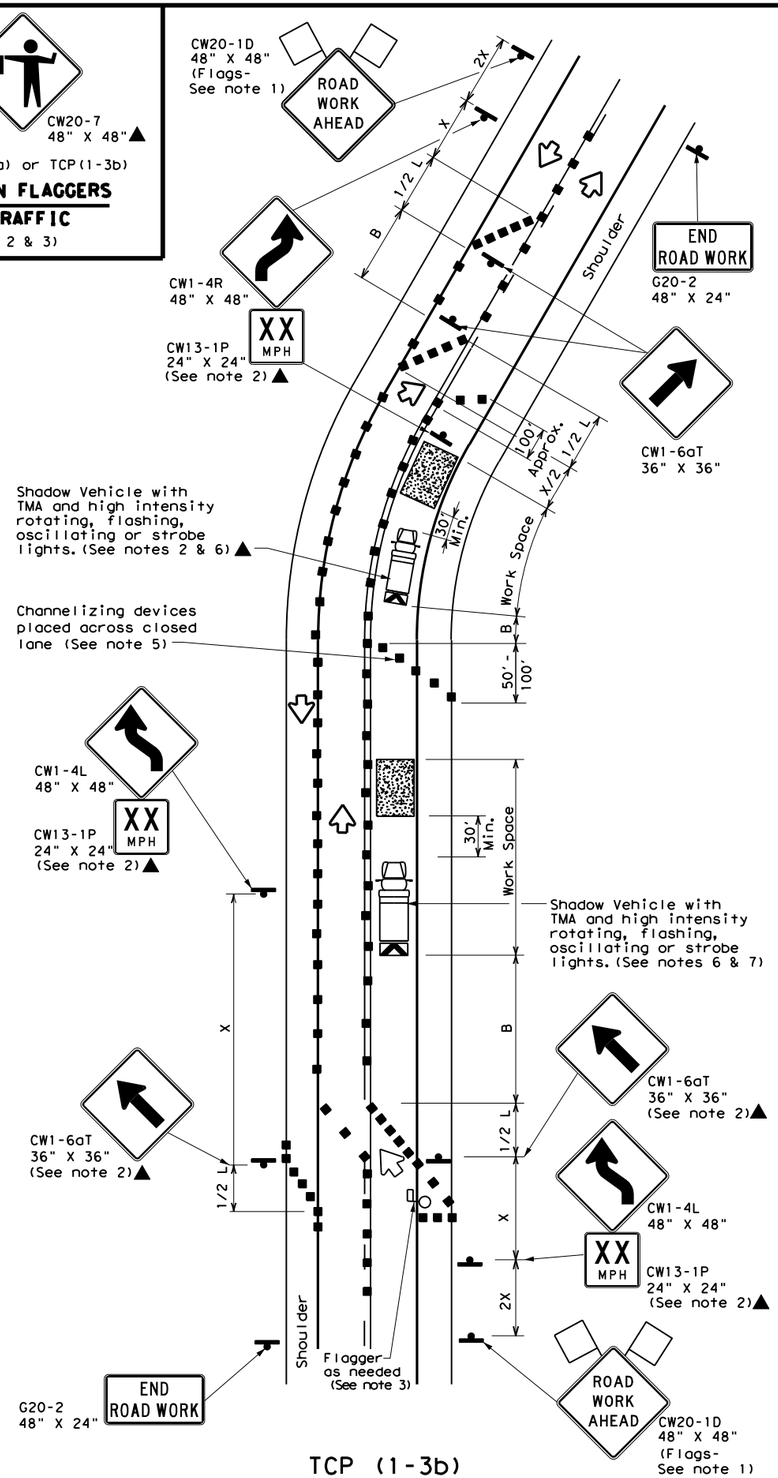


TCP (1-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
ADEQUATE FIELD OF VIEW





TCP (1-3b)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

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. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Additional flaggers may be positioned in advance of traffic queues to alert traffic to reduce speed.
4. DO NOT PASS, PASS WITH CARE and construction regulatory speed zone signs may be installed downstream of the ROAD WORK AHEAD signs.
5. When the work zone is made up of several work spaces, channelizing devices should be placed laterally across the closed lane to re-emphasize closure. Laterally placed channelizing devices should be repeated every 500 to 1000 feet in urban areas and every 1/4 to 1/2 mile in rural areas.
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 wider work spaces.
8. Where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20', or 15' if posted speed are 35 mph or slower, and for tangent sections, at 1/2S where S is the speed in mph. This tighter device spacing is intended for the area of conflicting markings not the entire work zone.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN TRAFFIC SHIFTS ON TWO LANE ROADS

TCP(1-3)-18

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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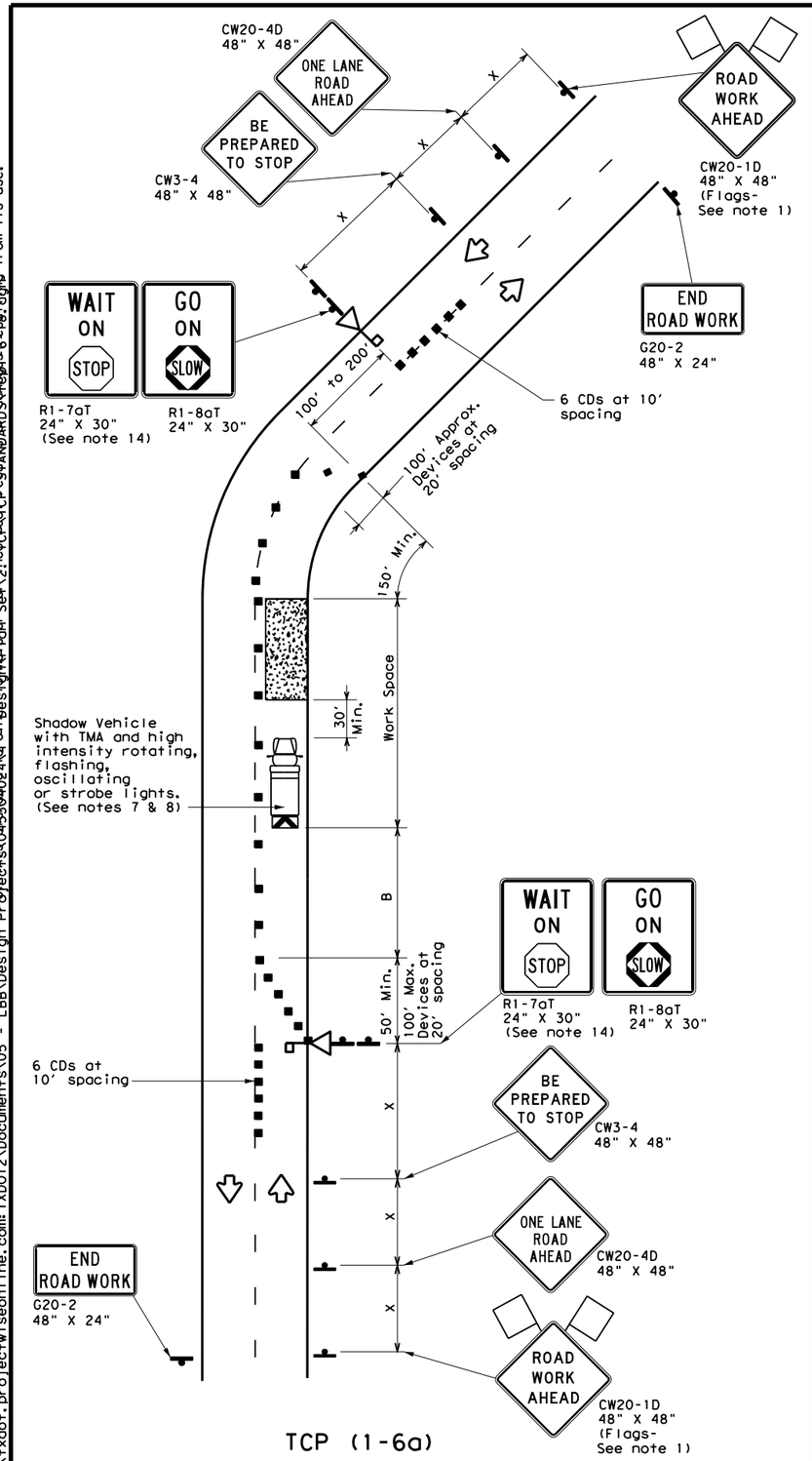
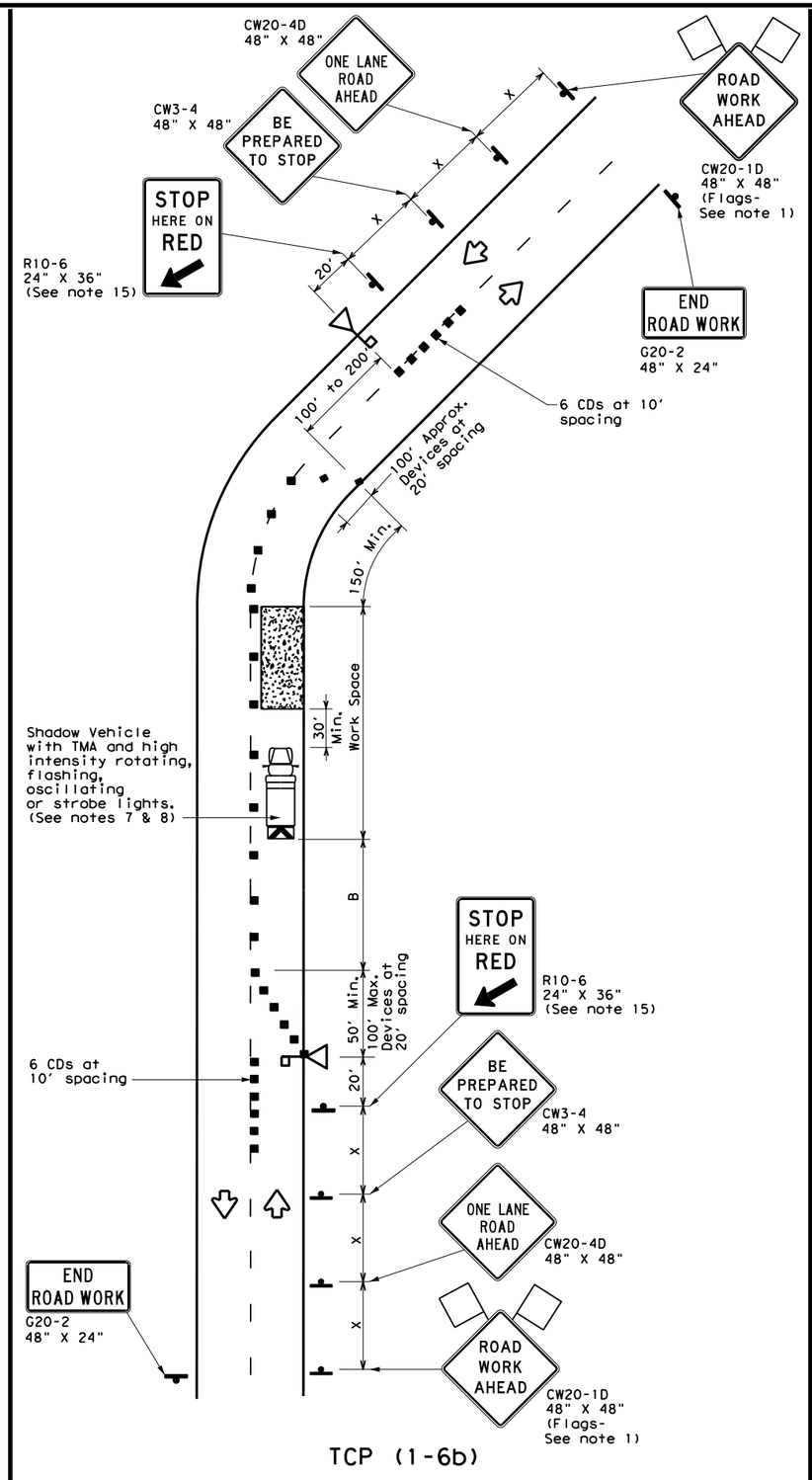


TCP (1-6a)

ONE LANE TWO-WAY CONTROL WITH STOP/SLOW AFADs



TCP (1-6b)

ONE LANE TWO-WAY CONTROL WITH RED/YELLOW LENS AFADs

LEGEND			
	Type 3 Barricade		Channelizing Devices (CDs)
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Automated Flagger Assistance Device (AFAD)	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. AFADs shall only be used in situations where there is one lane of approaching traffic in the direction to be controlled.
3. Adequate stopping sight distance must be provided to each AFAD location for approaching traffic. (See table above).
4. Each AFAD shall be operated by a qualified/certified flagger. Flaggers operating AFADs shall not leave them unattended while they are in use.
5. One flagger may operate two AFADs only when the flagger has an unobstructed view of both AFADs and of the approaching traffic in both directions.
6. When pilot cars are used, a flagger controlling traffic shall be located on each approach. AFADs shall not be operated by the pilot car operator.
7. All AFADs shall be equipped with gate arms with an orange or fluorescent red-orange flag attached to the end of the gate arm. The flag shall be a minimum of 16" square.
8. 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.
9. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
10. Flaggers should use two-way radios or other methods of communication to control traffic.
11. Length of work space should be based on the ability of flaggers to communicate.
12. 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 AFAD.
13. Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
14. The R1-7aT "WAIT ON STOP" sign and the R1-8aT "GO ON SLOW" sign shall be installed at the AFAD location on separate supports or they may be fabricated as one 48" x 30" sign. They shall not obscure the face of the STOP/SLOW AFAD.
15. The R10-6 "STOP HERE ON RED" arrow sign shall be offset so as not to obscure the lenses of the AFAD.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN AUTOMATED FLAGGER ASSISTANCE DEVICES (AFADS)

TCP(1-6)-18

FILE: tcp1-6-18.dgn	DN:	CK:	DW:	CK:
© TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
2-18	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		38

DATE: 05/29/2022 10:21:10 AM
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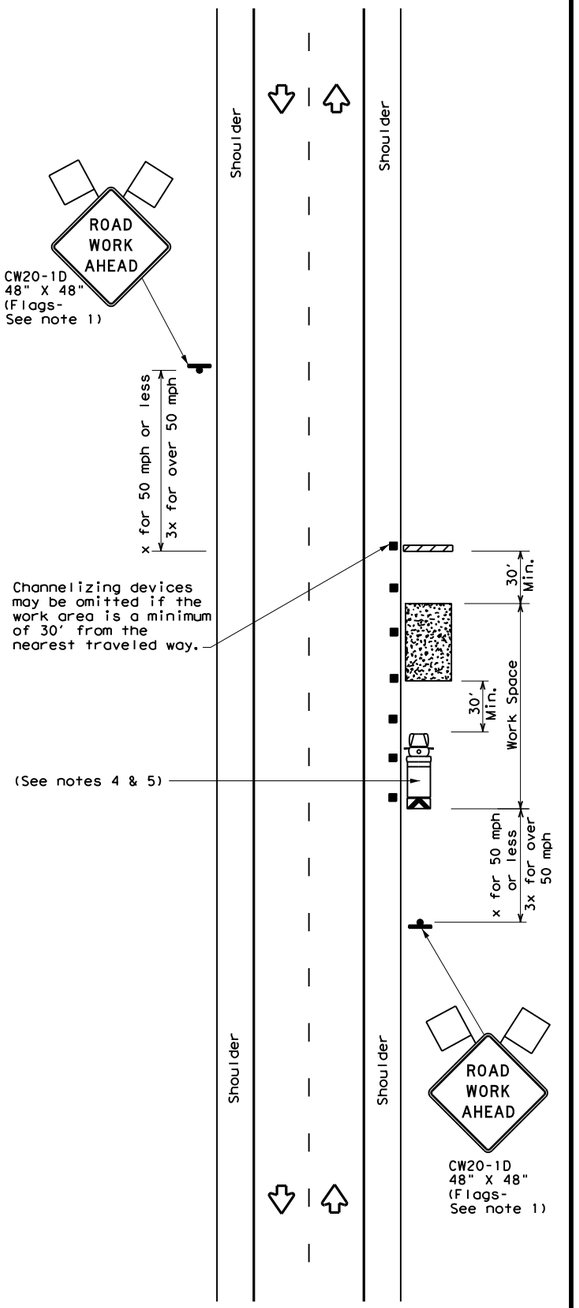
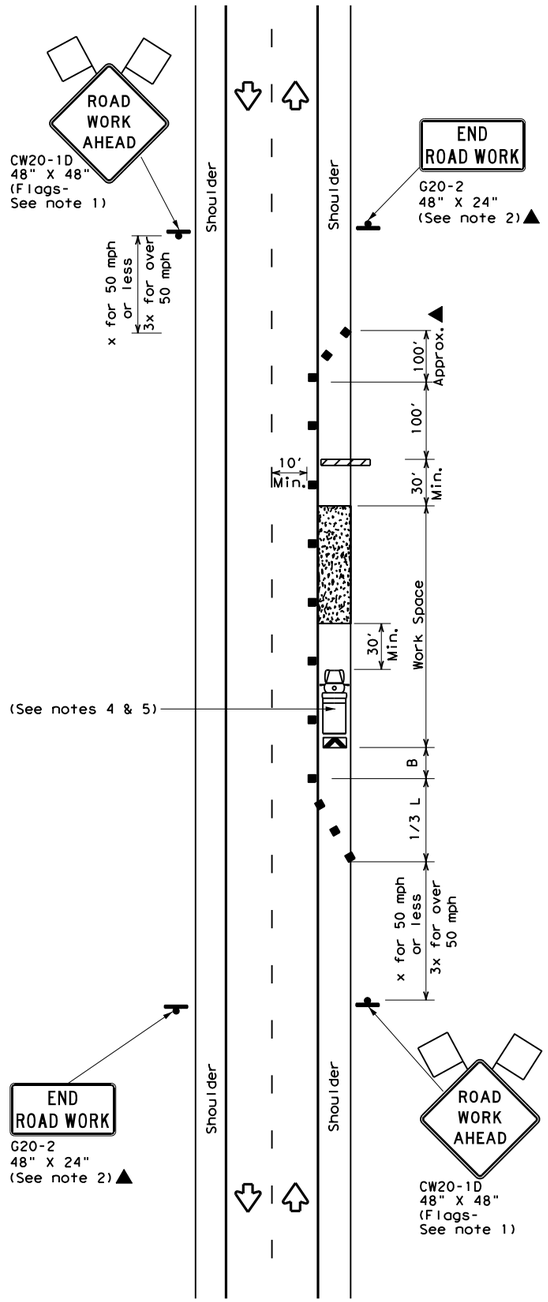


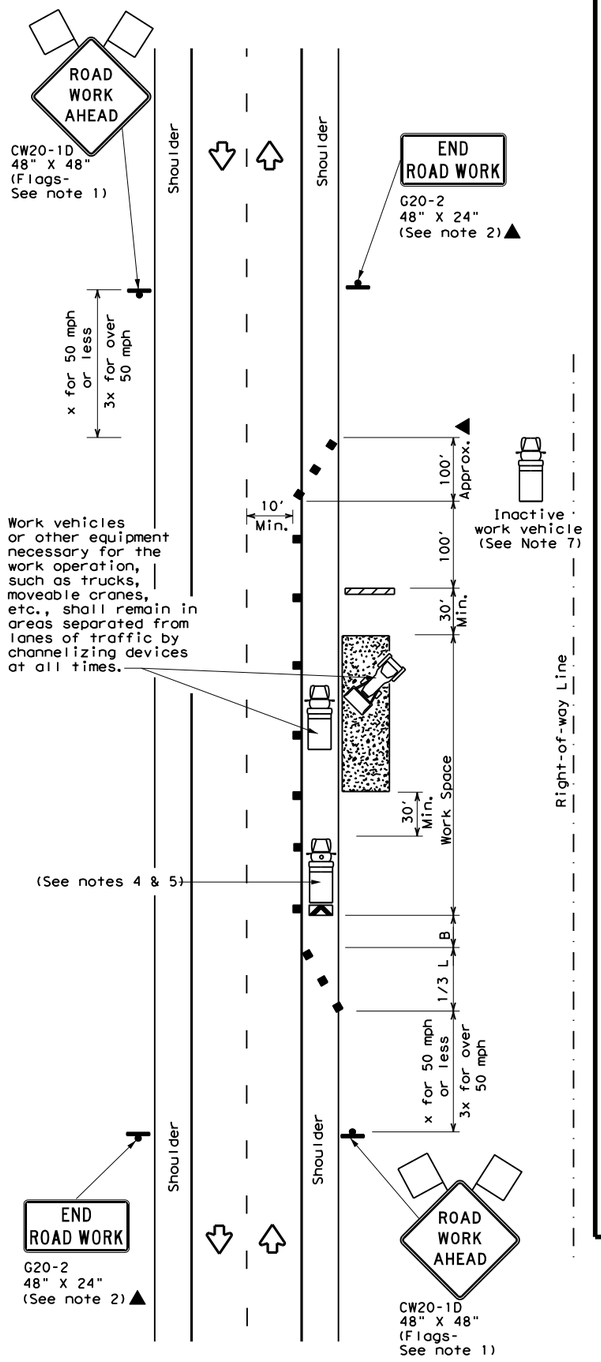
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	LBB	CROSBY		39
1-97 2-18				

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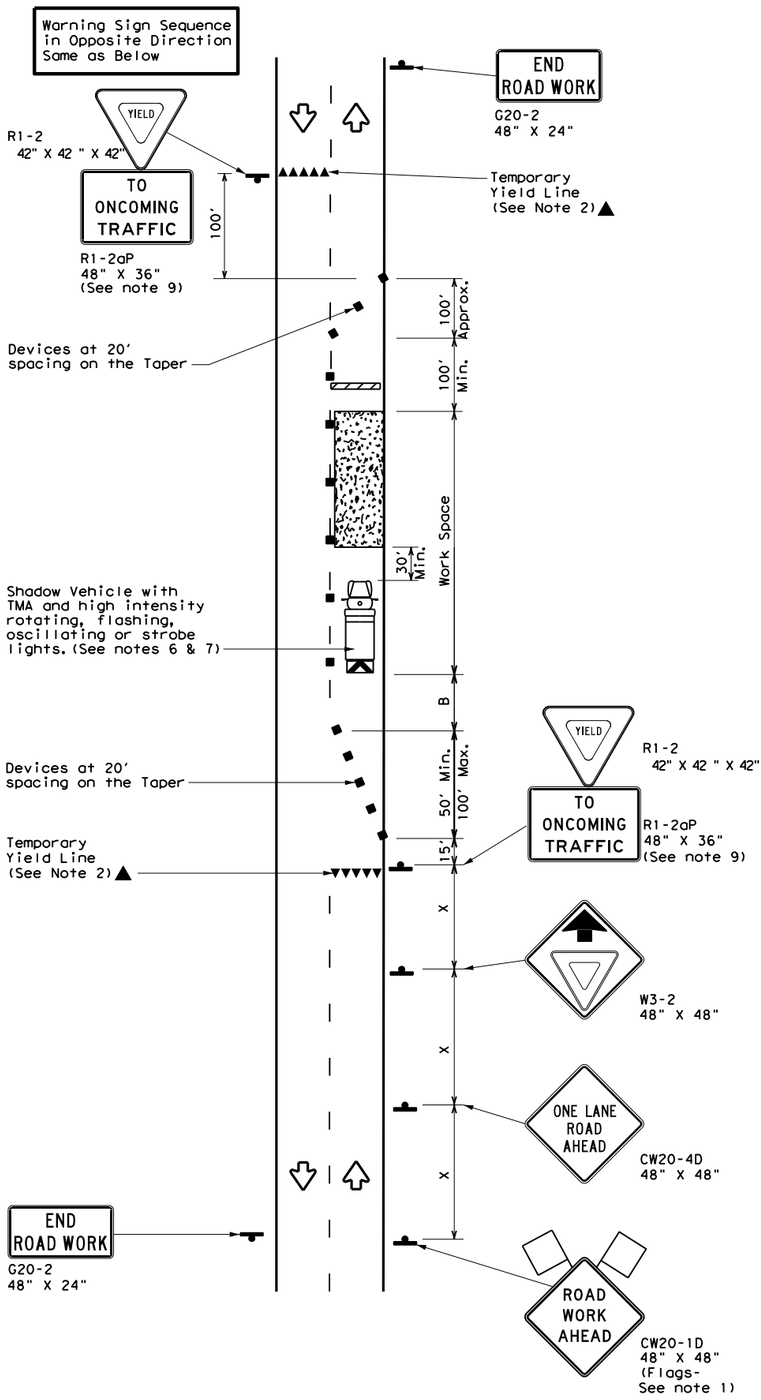
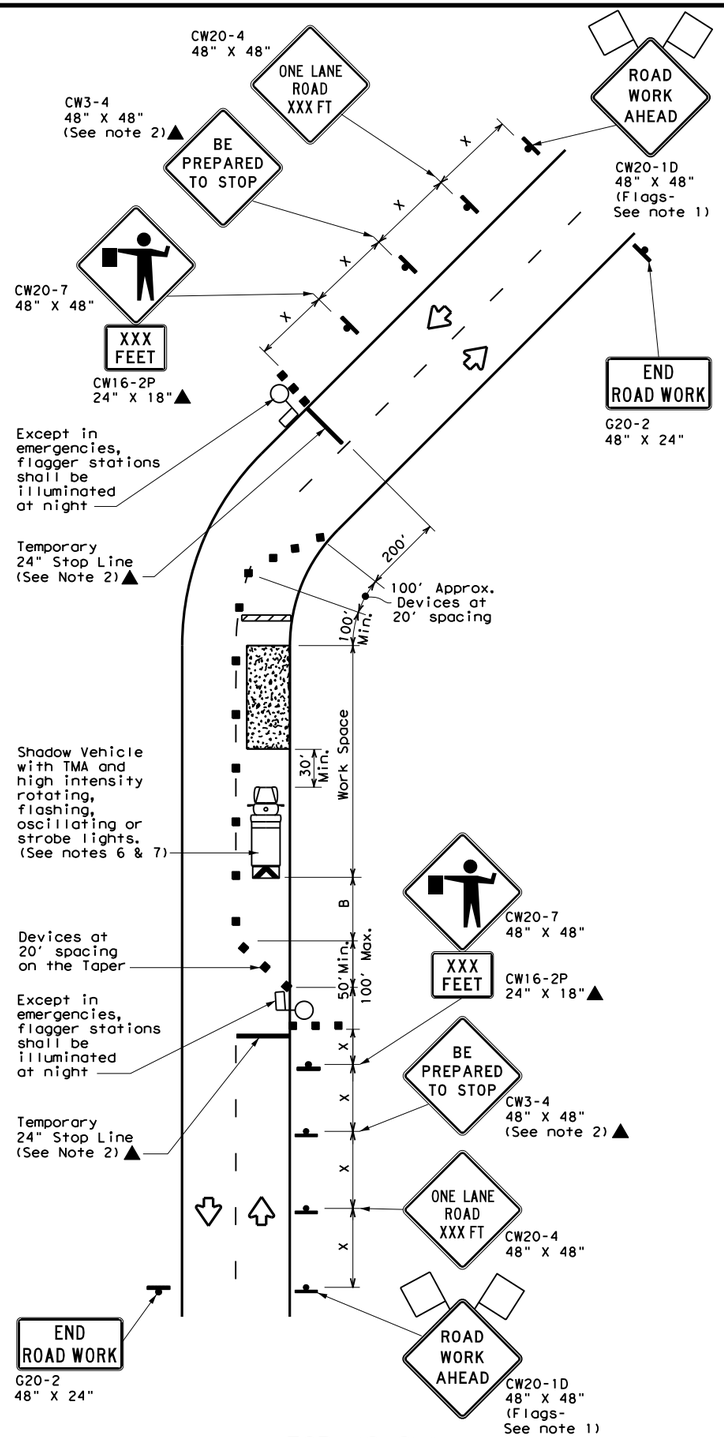


TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



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

LEGEND

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

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

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

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

GENERAL NOTES

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

TCP (2-2a)

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

TCP (2-2b)

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(2-2)-18

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©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12	LBB	CROSBY		40
4-98 2-18				

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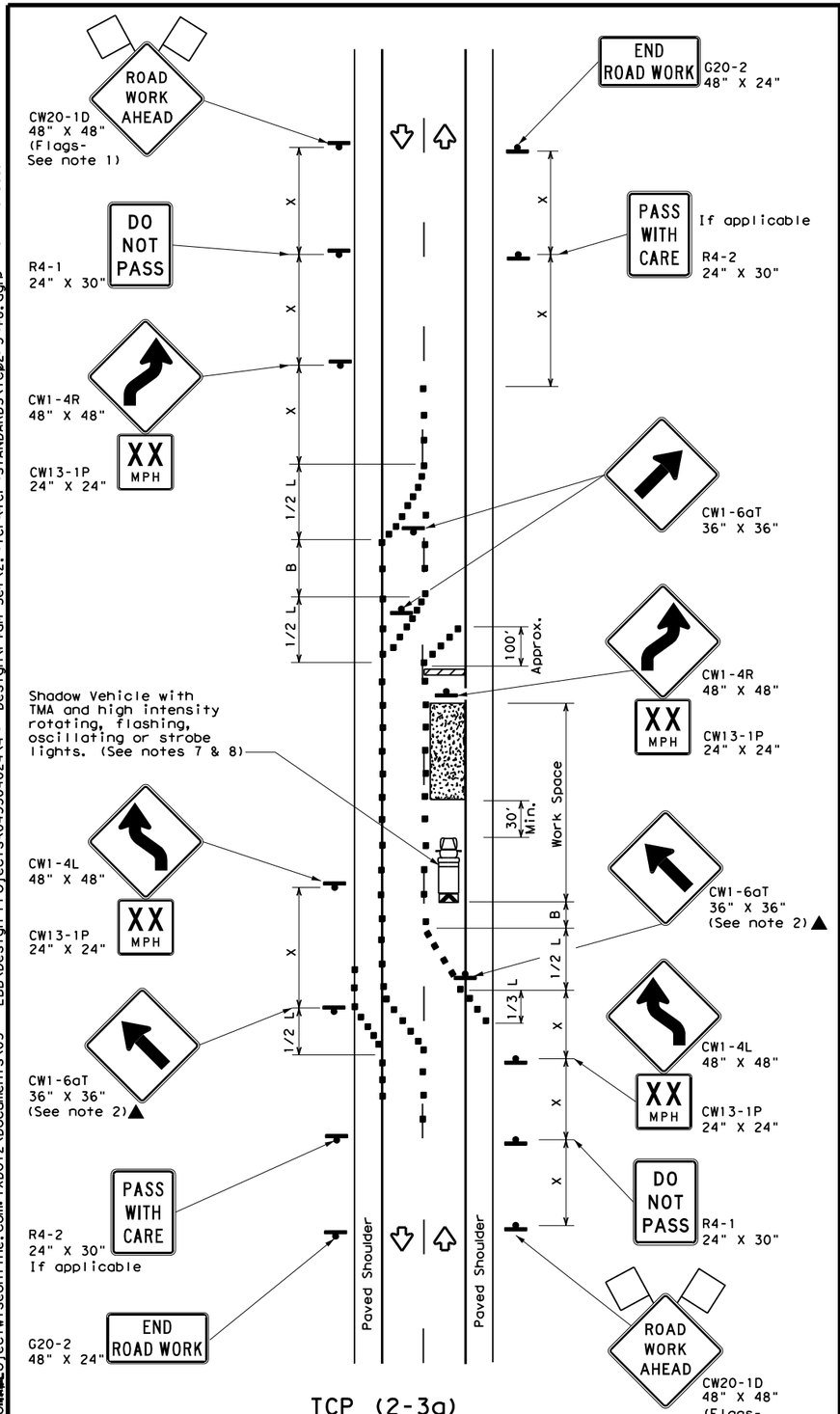
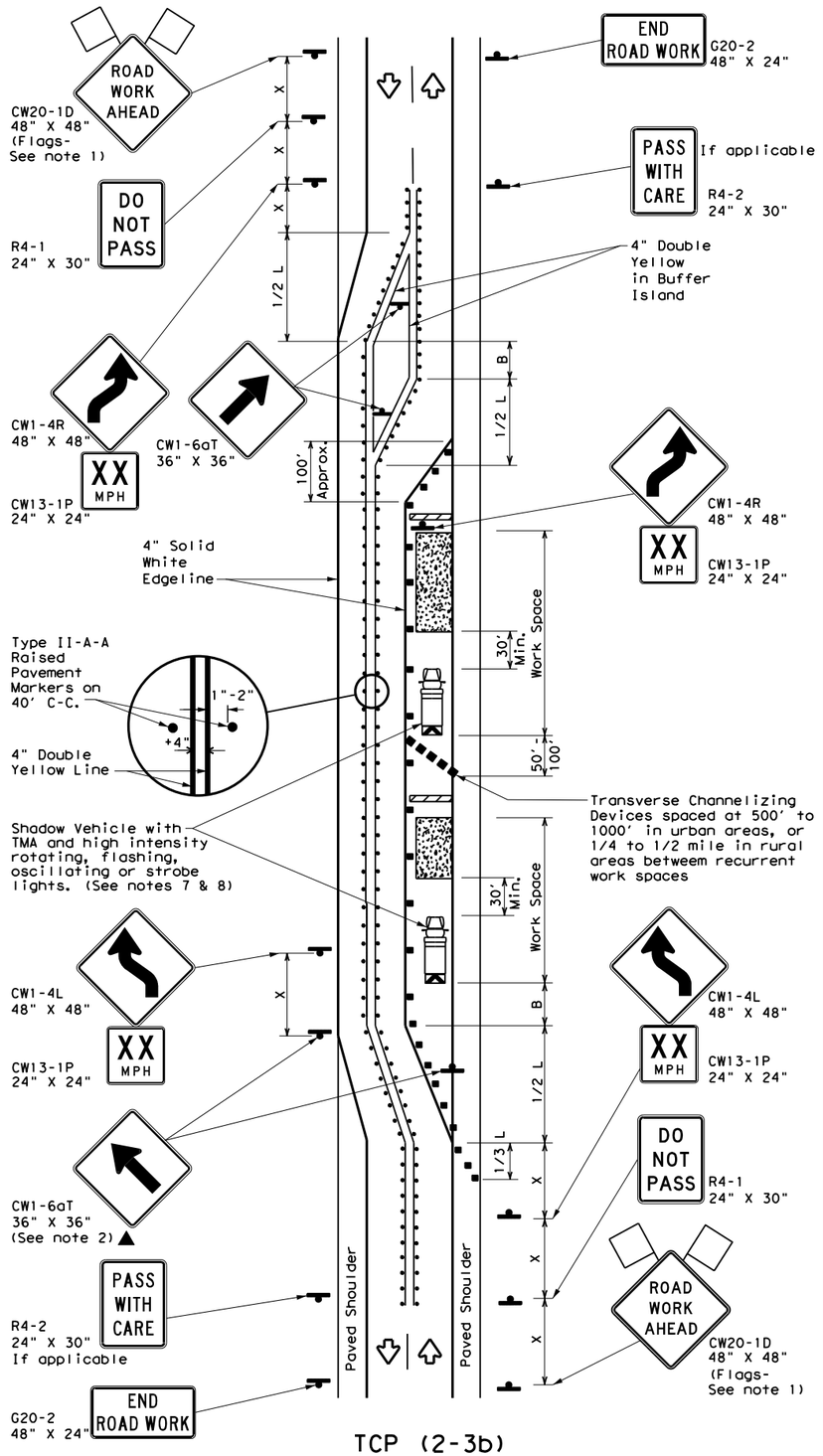


TCP (2-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
ADEQUATE FIELD OF VIEW



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

ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 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
				TCP(2-3b)ONLY
			✓	✓

GENERAL NOTES

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

TCP (2-3a)

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

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN TRAFFIC SHIFTS ON TWO-LANE ROADS

TCP(2-3)-18

FILE: tcp(2-3)-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12	LBB	CROSBY		41
4-98 2-18				

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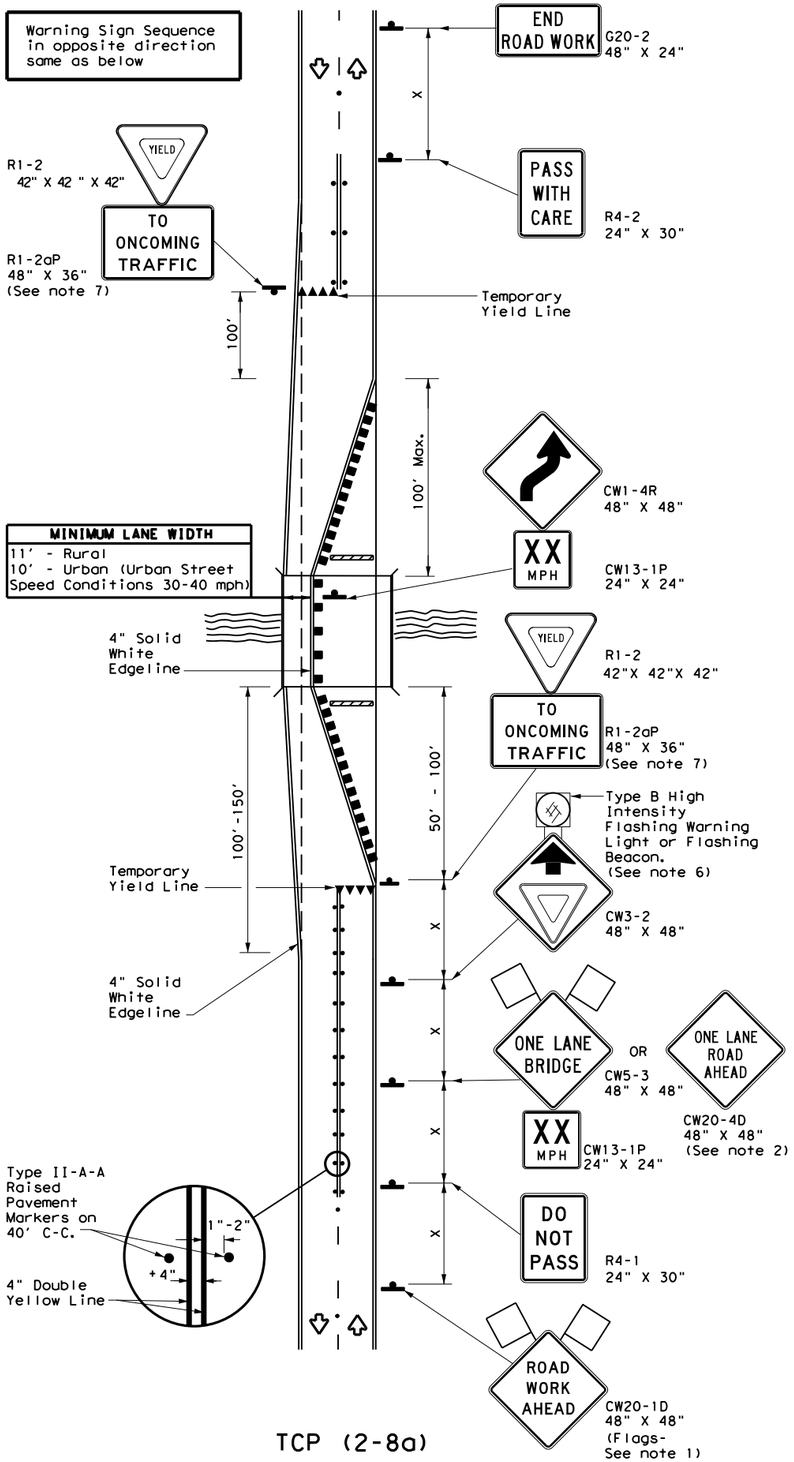
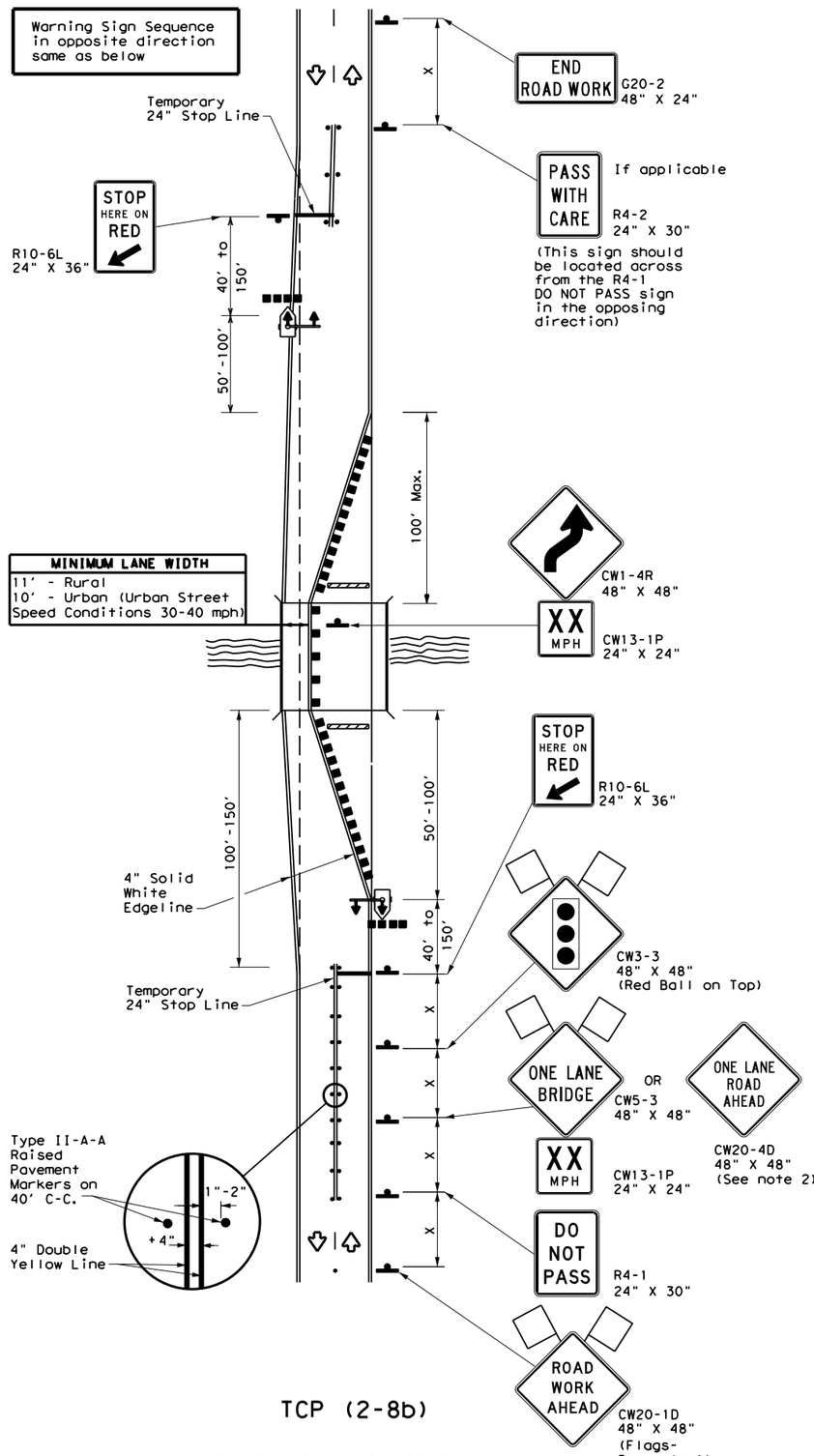


TCP (2-8a)

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 Operations Division Standard

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

TCP(2-8)-18

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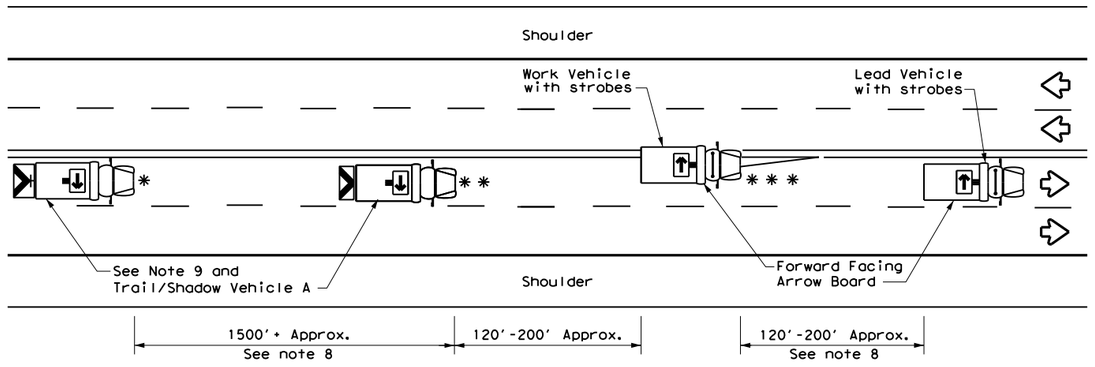
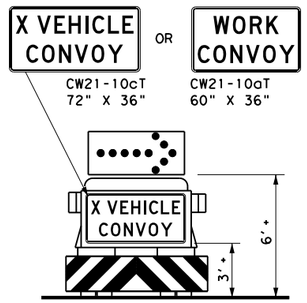


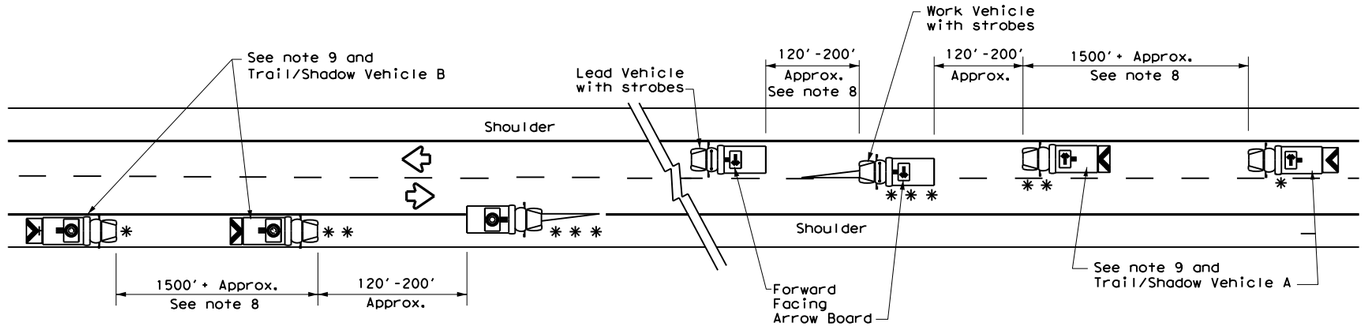
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

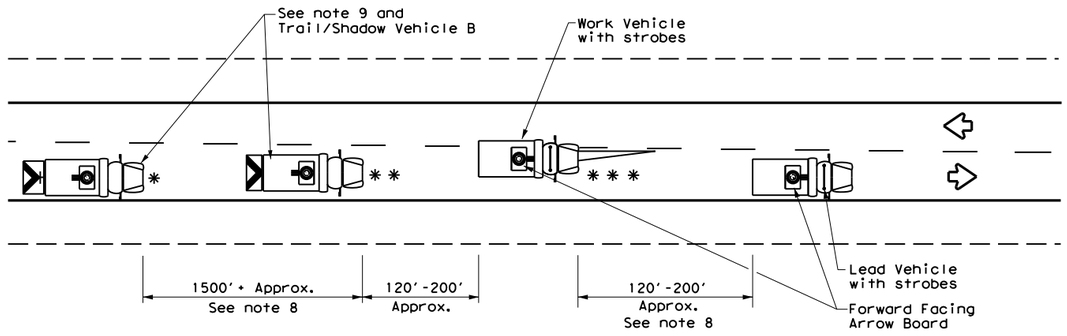


WORK ON SHOULDER

WORK ON TRAVEL LANE

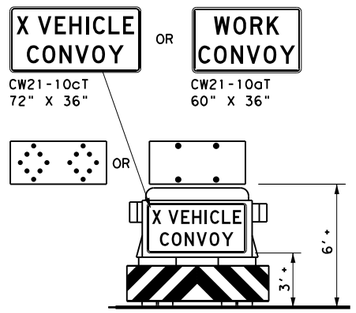
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

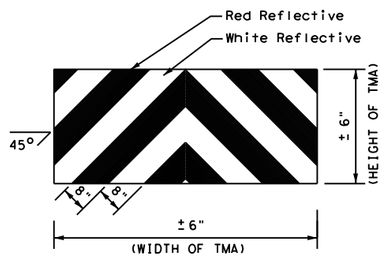
with Flashing Arrow Board in CAUTION display

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

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

GENERAL NOTES

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



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		43

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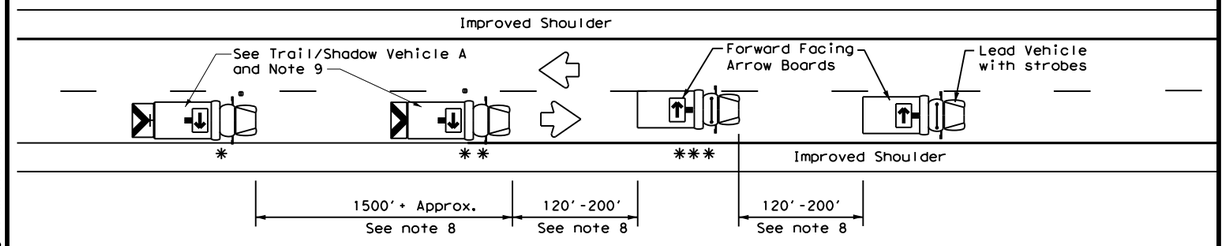
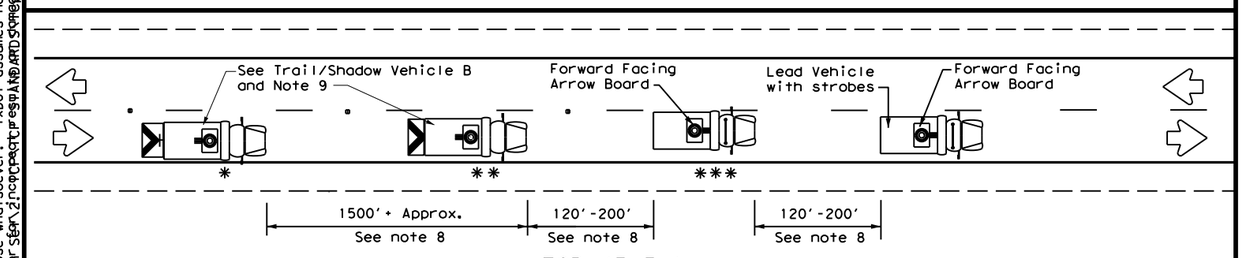


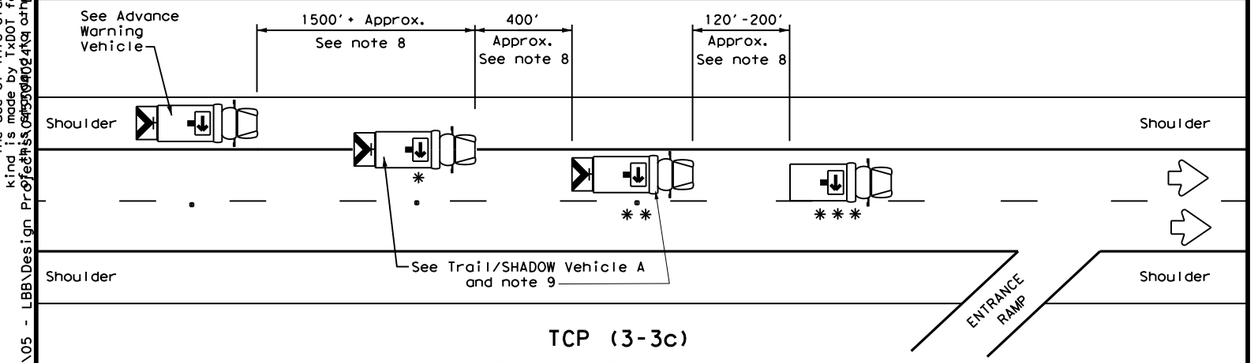
TCP (3-3a)

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



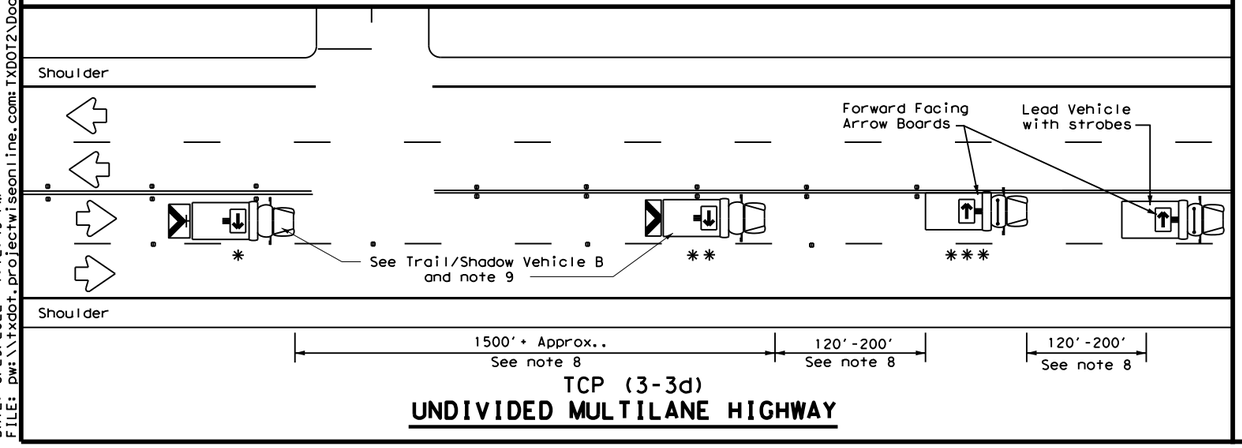
TCP (3-3b)

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



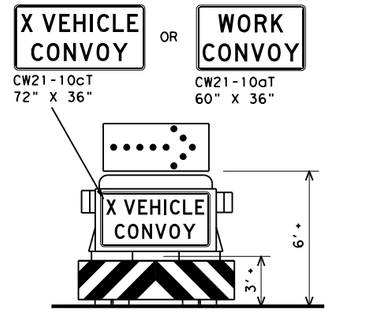
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



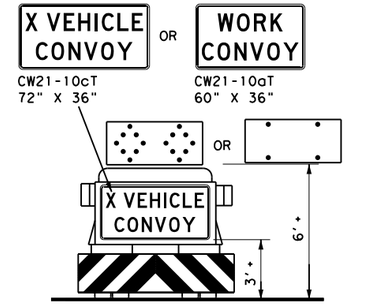
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



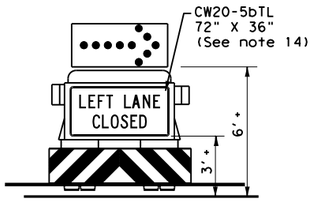
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

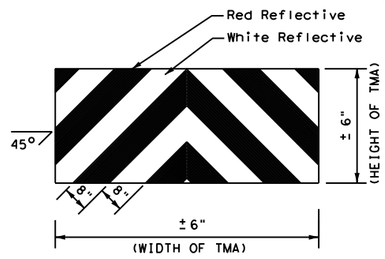


TRAIL/SHADOW VEHICLE B

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

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©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
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2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	LBB	CROSBY		44
1-97 7-14				

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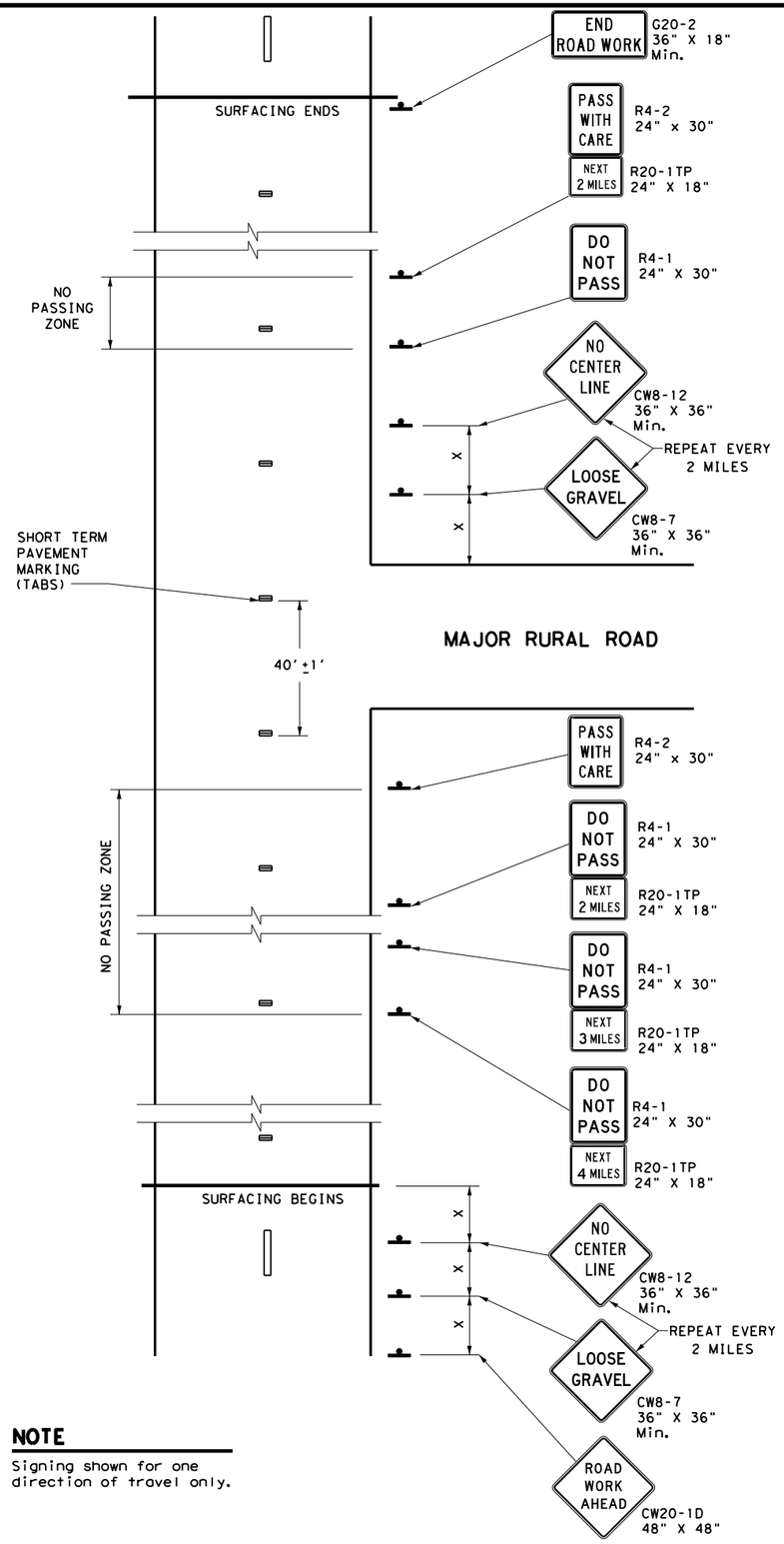
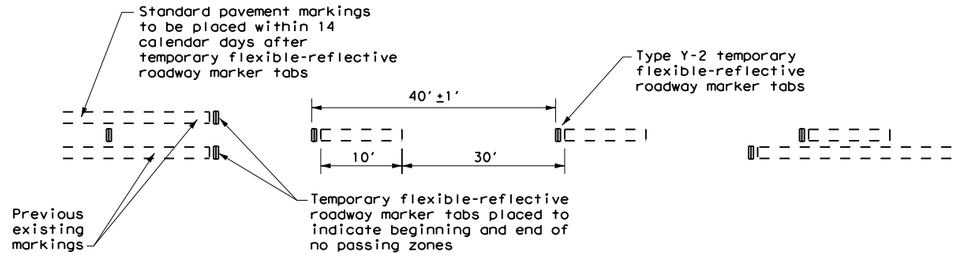


NOTE

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

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© TxDOT March 1991	CONT	SECT	JOB	HIGHWAY
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4-92 4-98	DIST	COUNTY		SHEET NO.
1-97 7-13	LBB	CROSBY		45

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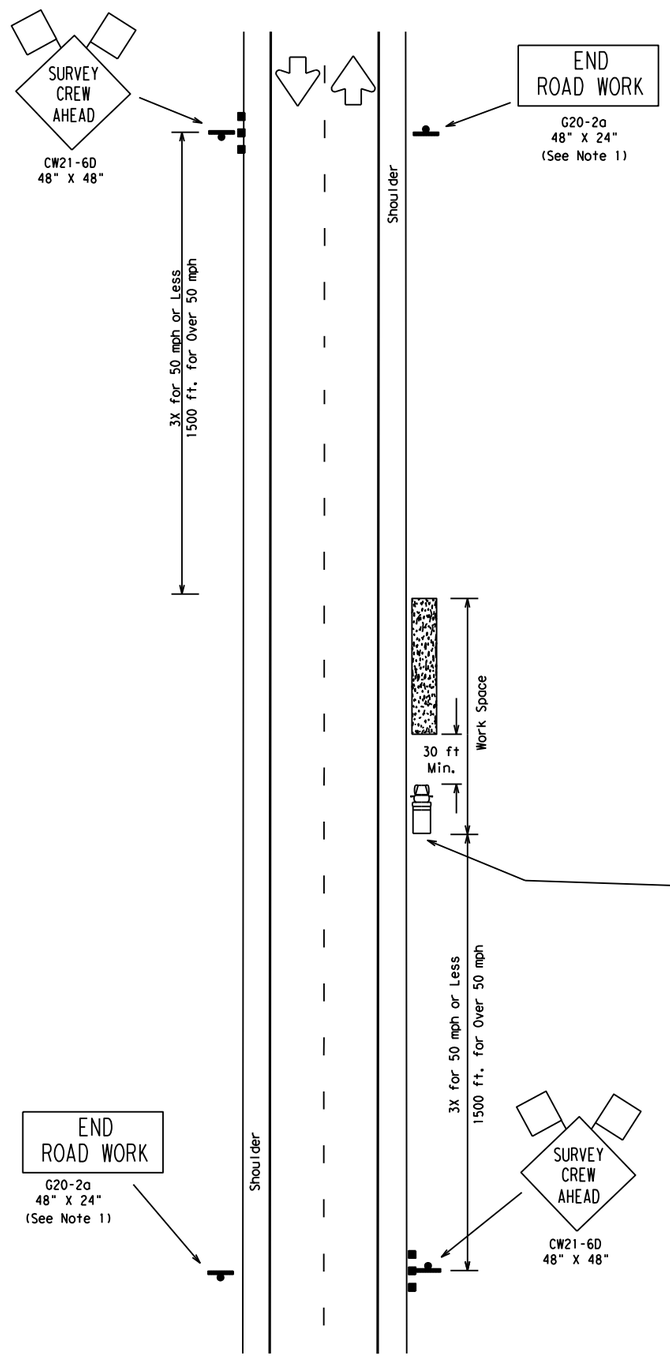
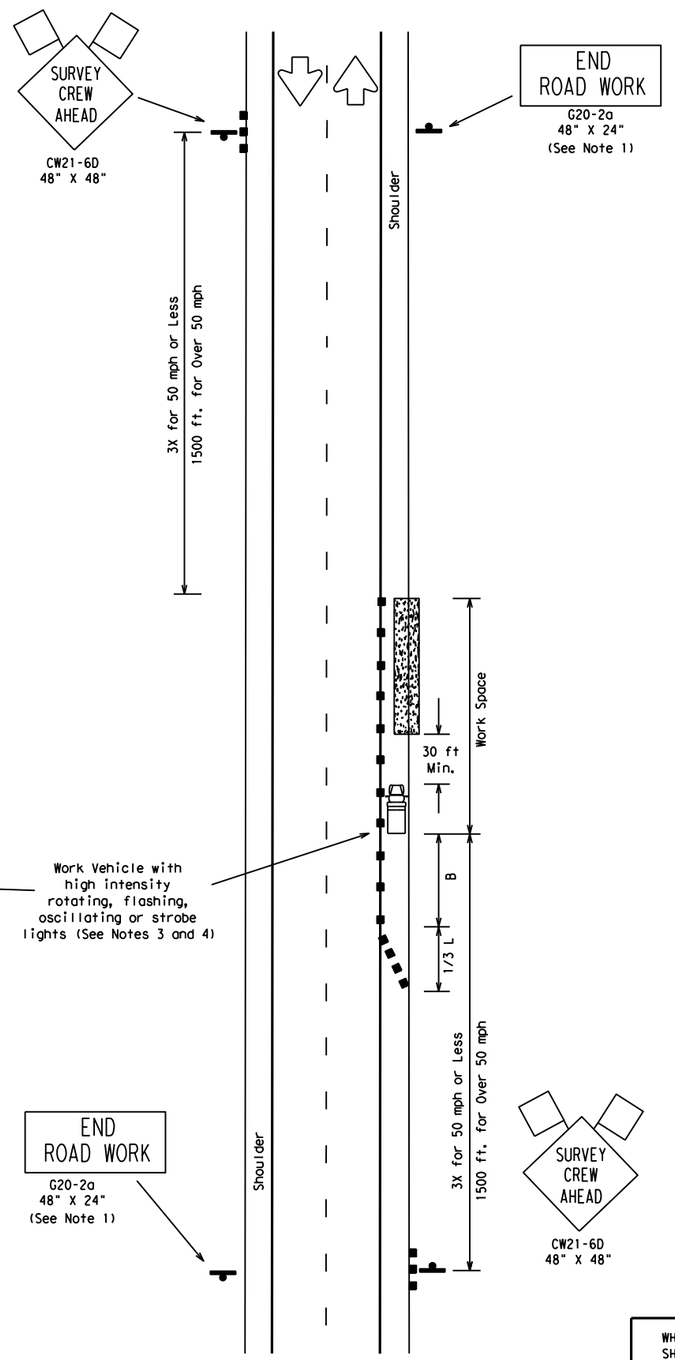


TCP (S-1a)
WORK OFF SHOULDER
OR PAVED SURFACE



TCP (S-1b)
WORK ON SHOULDER

LEGEND

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

Posted Speed ✳	Formula	Minimum Desirable Taper Lengths ✳✳ 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent	Min. Sign Spacing "X" Distance	Longitudinal Buffer Space "B"
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'	120'	90'
35		205'	225'	245'	35'	70'-90'	160'	120'
40		265'	295'	320'	40'	80'-100'	240'	155'
45	L=WS	450'	495'	540'	45'	90'-110'	320'	195'
50		500'	550'	600'	50'	100'-125'	400'	240'
55		550'	605'	660'	55'	110'-140'	500'	295'
60		600'	660'	720'	60'	120'-150'	600'	350'
65		650'	715'	780'	65'	130'-165'	700'	410'
70		700'	770'	840'	70'	140'-175'	800'	475'
75		750'	825'	900'	75'	150'-185'	900'	540'

✳ Conventional Roads Only

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

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

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

GENERAL NOTES:

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

TCP(S-1a)

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

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

8-18-08 Revision
⚠ Corrected misspelling.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP(S-1)-08A

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

REVISIONS
8-08

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0453	04	024	SH 207

DIST	COUNTY	SHEET NO.
LBB	CROSBY	46

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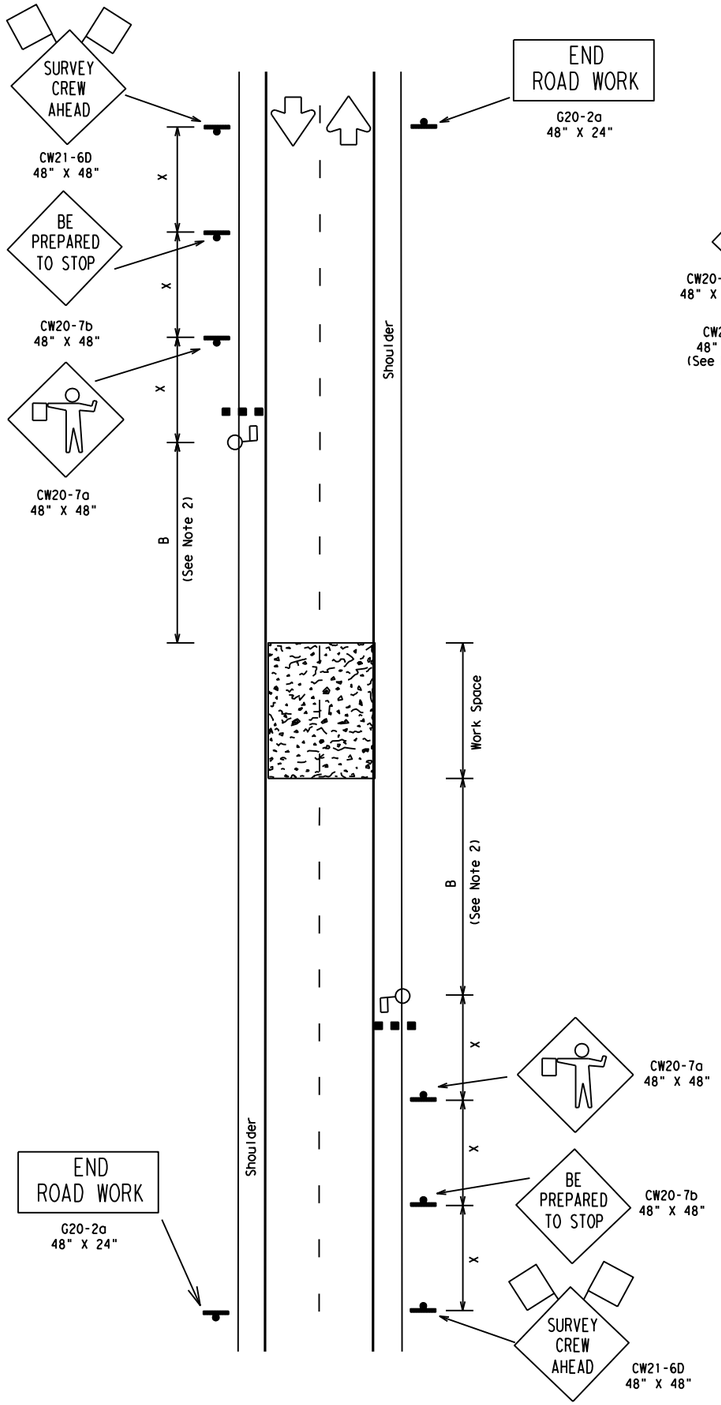
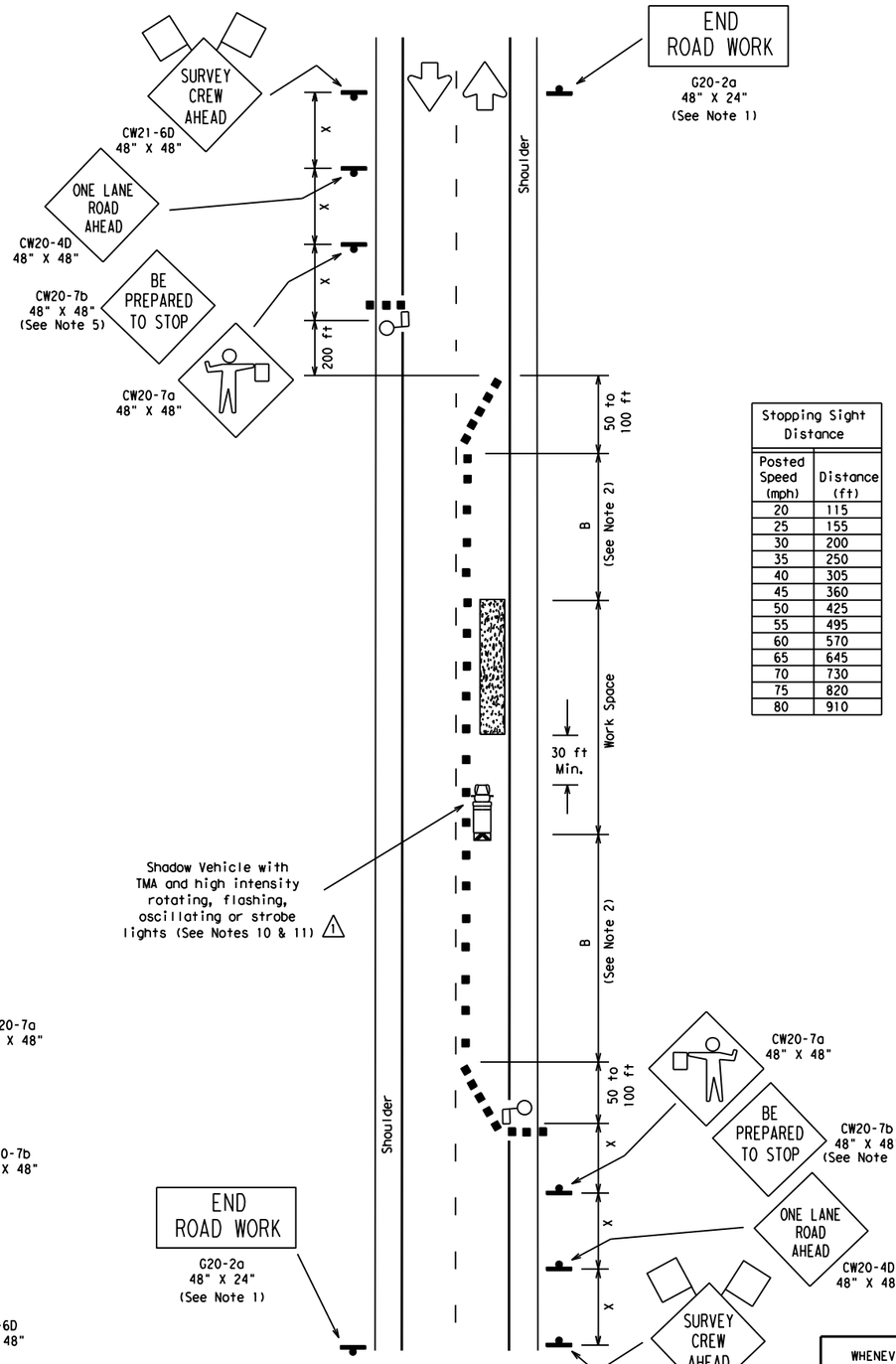


TCP (S-2a)
ROAD CLOSED FOR LESS THAN 20 MINUTES -
OFF PEAK TRAFFIC HOURS
WITH OR WITHOUT SHOULDERS



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

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

LEGEND

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

Posted Speed ✳	Formula	Minimum Desirable Taper Lengths ✳✳ 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent	Min. Sign Spacing "X" Distance	Longitudinal Buffer Space "B"
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'	120'	90'
35		205'	225'	245'	35'	70'-90'	160'	120'
40		265'	295'	320'	40'	80'-100'	240'	155'
45	L=WS	450'	495'	540'	45'	90'-110'	320'	195'
50		500'	550'	600'	50'	100'-125'	400'	240'
55		550'	605'	660'	55'	110'-140'	500'	295'
60		600'	660'	720'	60'	120'-150'	600'	350'
65		650'	715'	780'	65'	130'-165'	700'	410'
70		700'	770'	840'	70'	140'-175'	800'	475'
75		750'	825'	900'	75'	150'-185'	900'	540'

✳ Conventional Roads Only

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

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

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

GENERAL NOTES:

1. The G20-2a "END ROAD WORK" sign may be placed on the back of the CW21-6D "SURVEY CREW AHEAD" sign or may be omitted for short duration (less than 1 hour) work.
2. Adequate Stopping Sight Distance (see Stopping Sight Distance table) should be maintained from approaching traffic to the flagger or a queue of stopped vehicles. The Buffer Space "B" should be extended around curves or other obstacles, when necessary, to have adequate Stopping Sight Distance to the flagger station.
3. Flaggers should use two-way radios or other means of communication while flagging.
4. The length of the work space should be based on the ability of the flaggers to communicate.
5. CW20-1D "ROAD WORK AHEAD" signs may be substituted for CW21-6D "SURVEY CREW AHEAD" signs.
6. The CW21-6D "SURVEY CREW AHEAD" sign for low volume intersecting side roads is desirable, but is not required when working less than 15 minutes in area of the side road, as determined by the Engineer.

TCP(S-2a)

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

TCP (S-2B)

10. For short duration work the Shadow Vehicle with a TMA may be replaced by another Work Vehicle with high intensity rotating, flashing or strobe lights.
11. Shadow Vehicles with a TMA are desirable when workers or equipment are in the work space. When approved by the engineer, Type III barricades or other channelizing devices may be substituted for the Shadow Vehicle.
12. The CW20-7b "BE PREPARED TO STOP" sign is optional. When used, it should be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign.

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

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

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP(S-2)-08A

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

REVISIONS
8-08

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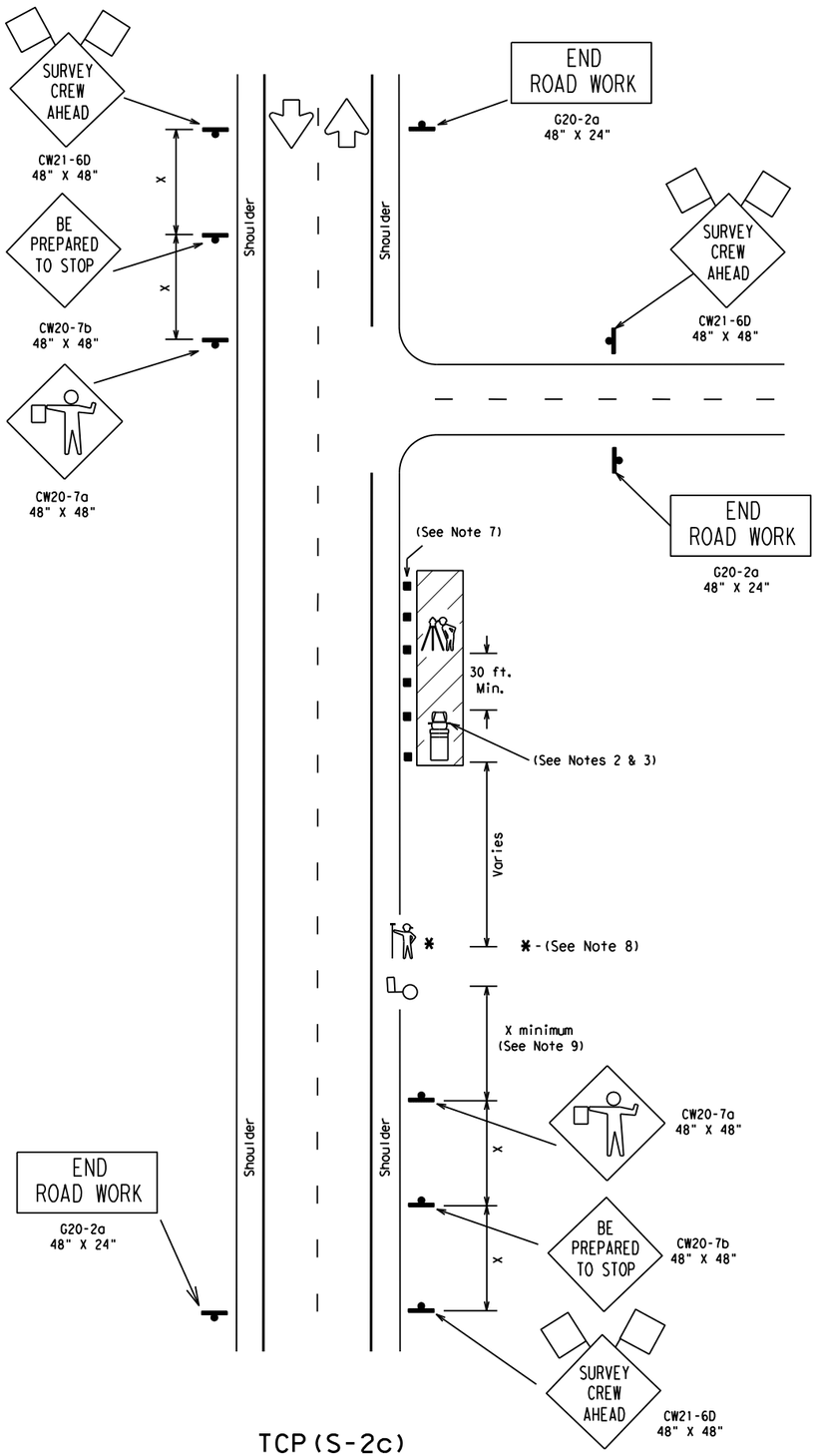


TCP(S-2c)

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

LEGEND

Type III Barricade ■ ■ Channelizing Devices Flag
Work Vehicle Truck Mounted Attenuator (TMA)
Flagger Sign Post Survey Rodman Instrument Person

Posted Speed ✳	Formula	Minimum Desirable Taper Lengths ✳✳ 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent	Min. Sign Spacing "X" Distance	Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'	120'	90'
35		205'	225'	245'	35'	70'-90'	160'	120'
40		265'	295'	320'	40'	80'-100'	240'	155'
45	L=WS	450'	495'	540'	45'	90'-110'	320'	195'
50		500'	550'	600'	50'	100'-125'	400'	240'
55		550'	605'	660'	55'	110'-140'	500'	295'
60		600'	660'	720'	60'	120'-150'	600'	350'
65		650'	715'	780'	65'	130'-165'	700'	410'
70		700'	770'	840'	70'	140'-175'	800'	475'
75		750'	825'	900'	75'	150'-185'	900'	540'

✳ Conventional Roads Only

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

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

DEFINITIONS:

MOBILE - work that moves continously or intermittently (stopping up to approximately 15 minutes).

SHORT DURATION - work that occupies a location up to 1 hour.

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

GENERAL NOTES:

1. The G20-2a "END ROAD WORK" sign may be placed on the back of the CW21-6D "SURVEY CREW AHEAD" sign or may be omitted for short duration (less than 1 hour) work.
2. Work Vehicle with high intensity rotating, flashing, oscillating or strobe lights should be used to protect work space.
3. When approved by the engineer, Type III barricades or other channelizing devices may be substituted for the Heavy Work Vehicle.
4. CW20-1D "ROAD WORK AHEAD" signs may be substituted for CW21-6D "SURVEY CREW AHEAD" SIGNS.
5. The CW21-6D "SURVEY CREW AHEAD" sign for low volume intersecting side roads may be omitted when approved by the Engineer.
6. The Surveying Instrument shall not be located on the paved surface.
7. Cones at edge of pavement adjacent to instrument person may be omitted when approved by the Engineer.
8. Rodman may only enter roadway when accompanied by flagger and as traffic allows.
9. The distance between the advance warning signs and the work should not exceed a two mile maximum.
10. Flaggers and Survey Crew should use two-way radios or other means of communication.
11. Survey Crew and Flaggers shall wear high-visibility apparel meeting the ANSI 107-2007 standard performance for Class 2 or Class 3 risk exposure.
12. Additional traffic control devices may be required to address local site conditions.
13. Stopping Sight Distance shall be maintained from approaching traffic to the flagger. See "Stopping Sight Distance" table.

SURVEY PARTIES SHOULD AVOID ANY UNNECCESSARY PERIODS OF TIME ON THE ROAD SURFACE.

This TCP is to cover two lane rural type roadways as determined by the Engineer. All other type roadways will be covered by other established Survey TCP'S.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP(S-2c)-10

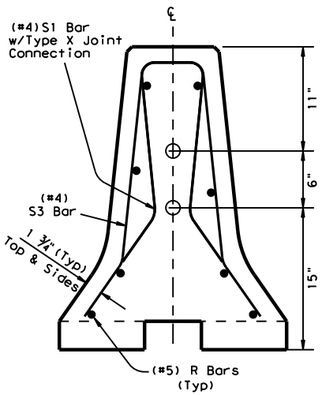
REVISIONS

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

CONT	SECT	JOB	HIGHWAY
0453	04	024	SH 207

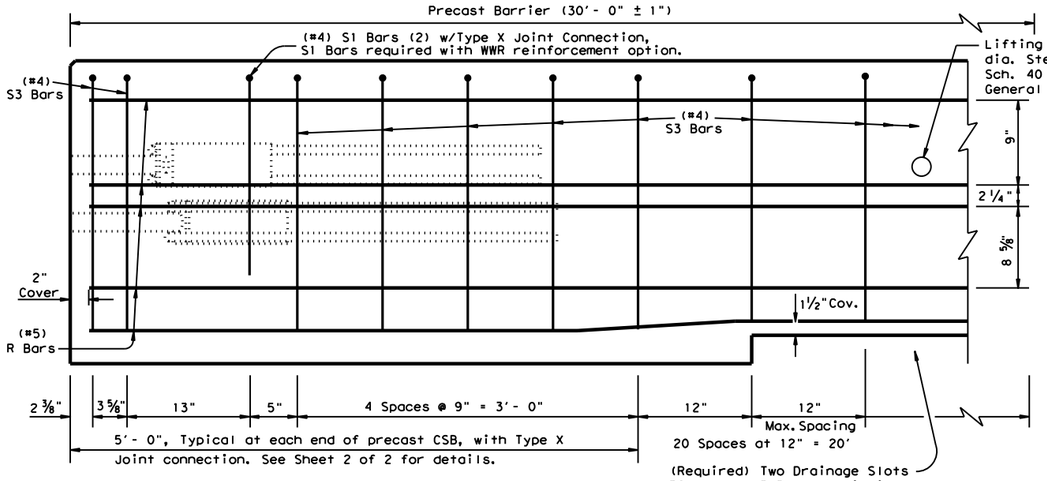
DIST	COUNTY	SHEET NO.
LBB	CROSBY	48

DATE:
FILE:



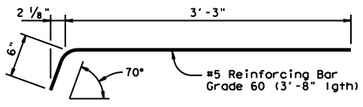
End View Precast Barrier

See sheet 2 of 3 for Joint connection Type X



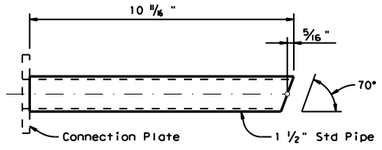
Reinforcement for Precast (CSB) Concrete Safety Barrier (Type 1)

Showing reinforcement for Joint Type X



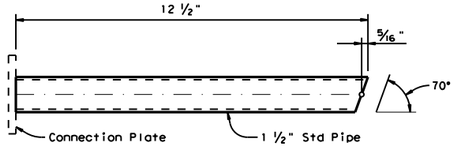
DEFORMED BAR ANCHOR DETAILS

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



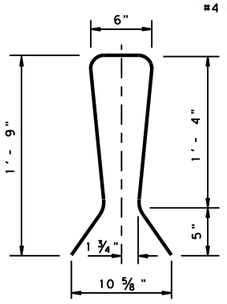
UPPER CONNECTION PIPE DETAILS

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



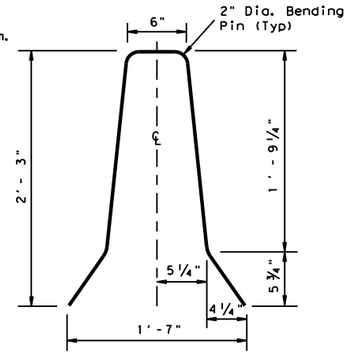
LOWER CONNECTION PIPE DETAILS

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



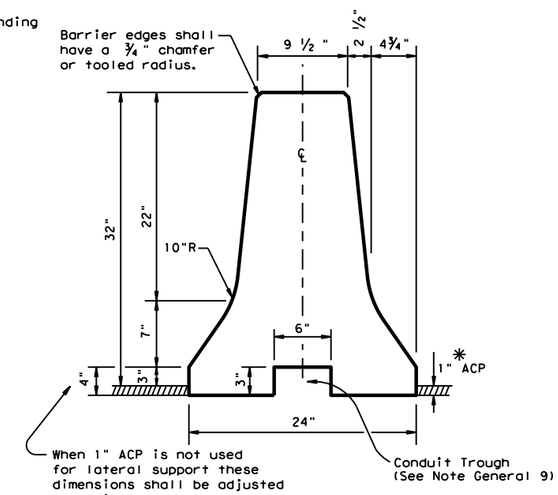
S1 Bar

#4 Bar (2)
(Joint Type X)



S3 Bar

#4 Bar

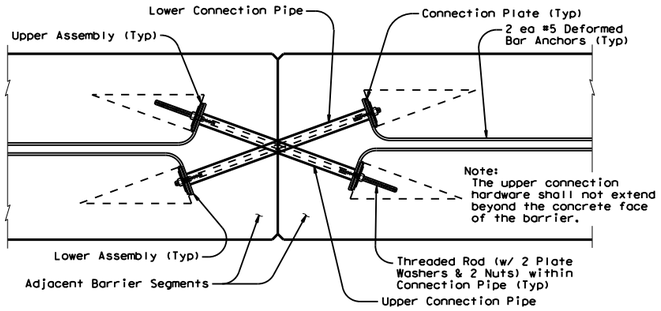


Concrete Safety Barrier

✱ When 1" ACP is "not" used as lateral support for permanent barrier placement. A permissible method of attaining the equivalent lateral support may be used, See CSB(6) sheet.

GENERAL NOTES

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



TYPE X JOINT INSTALLATION DETAIL

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

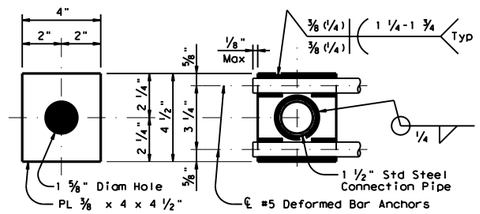
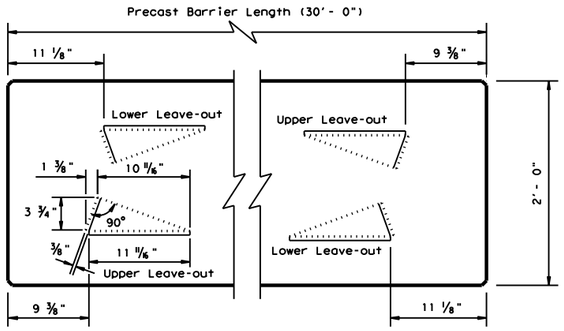


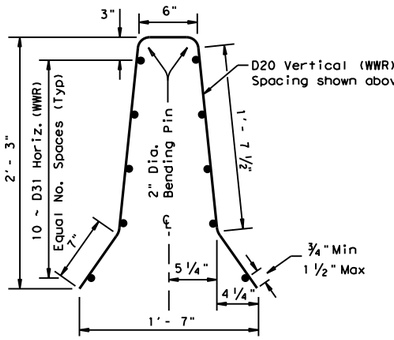
PLATE DIMENSIONS WELDING DETAILS

CONNECTION PLATE DETAILS

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



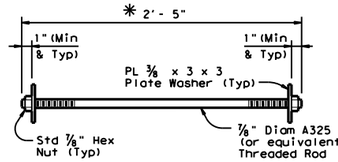
BARRIER PLAN AT END JOINTS



Welded Wire Reinforcement (WWR) Option for Bars R and S3

(WWR) General Notes

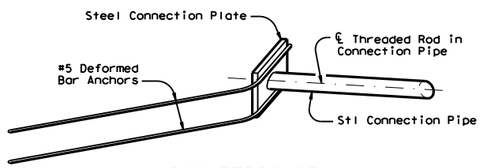
1. Deformed Welded Wire Reinforcement (WWR) shall conform to ASTM A497.
2. Welded wire cage may be cut or bent to accommodate the Type X joint connection and drainage slots, as directed by the Engineer.
3. All reinforcement shall comply with Item 440, "Reinforcing Steel."
4. Combinations of reinforcing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



CONNECTION BOLT OR THREADED ROD DETAIL

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

✱ The connection hardware shall not extend beyond the concrete face of the barrier. Hex head bolts may be provided. The proper length of all hardware should be verified.



ISOMETRIC OF TYPICAL WELDED ASSEMBLY

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

Weight of one Precast 30 ft. (CSB) segment = Approx. 6.5 Tons or 440 lbs per ft.

SHEET 1 OF 2

Texas Department of Transportation

Design Division Standard

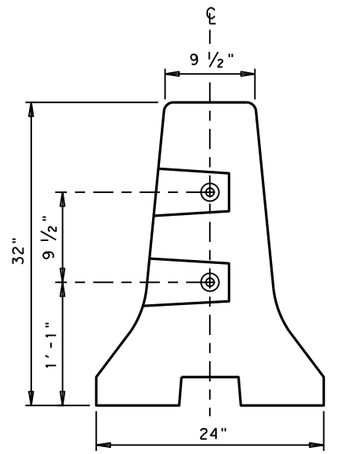
CONCRETE SAFETY BARRIER (F-SHAPE)

PRECAST BARRIER (TYPE 1)

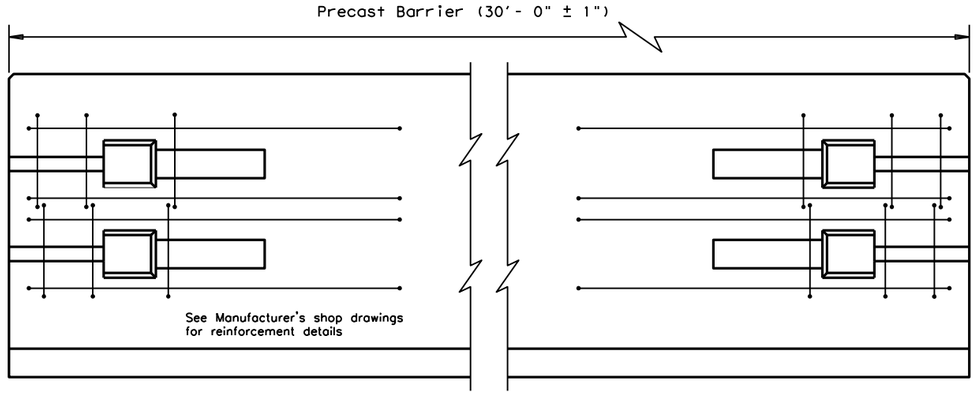
CSB(1)-10

FILE: csb110.dgn	DN: TxDOT	CK: MB	DW: MB	CK: MB
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		49

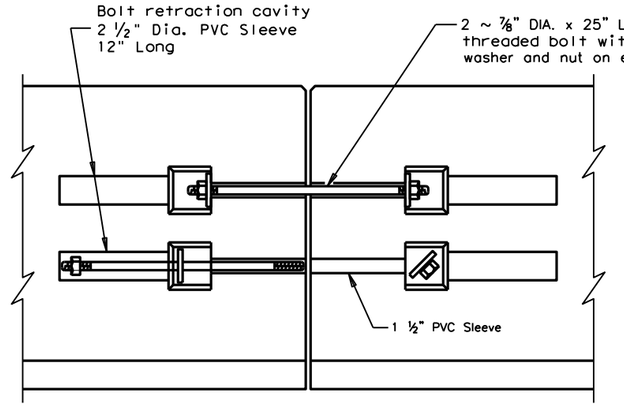
DATE:
FILE:



END VIEW (CSB) QUICK-BOLT
QUICK-BOLT POCKET LOCATIONS

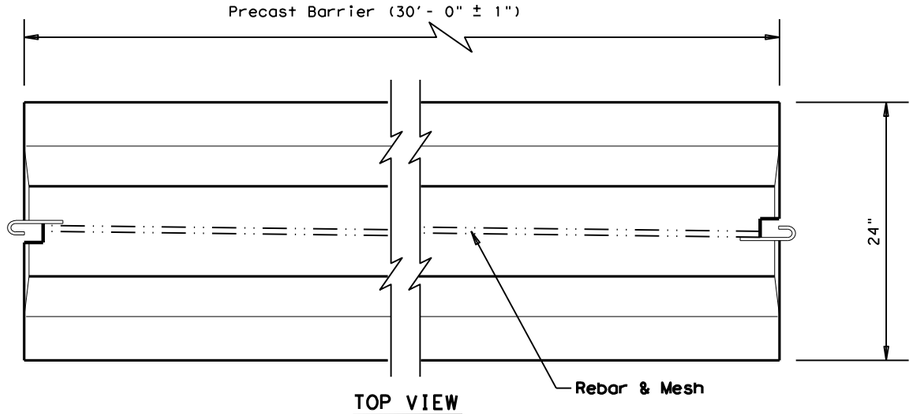


ELEVATION (CSB) QUICK-BOLT
See Manufacturer's shop drawing for additional details

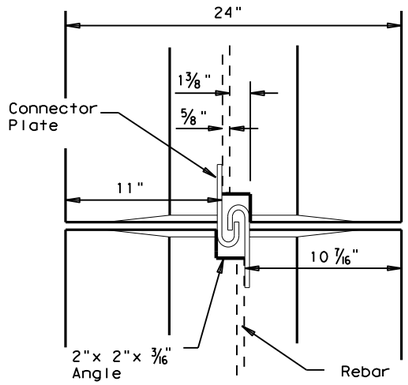


ELEVATION VIEW SHOWING JOINT CONNECTION
"QUICK-BOLT"

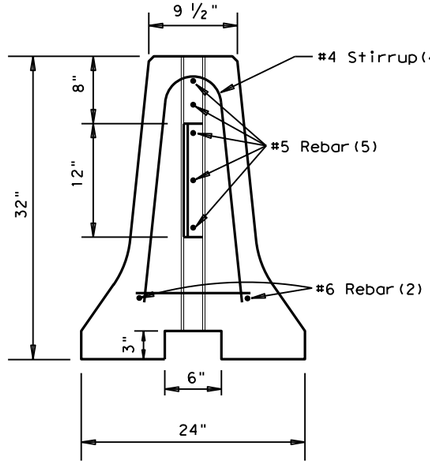
Joint Connection (Type Q)



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



VIEW FROM ABOVE
J-J HOOK CONNECTION



END VIEW
J-J HOOK CONNECTION

Joint Connection (Type J)

Proprietary Joint Connections (CSB)

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

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

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

SHEET 2 OF 2

Texas Department of Transportation | Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)

PRECAST BARRIER
(TYPE 1)

CSB(1)-10

FILE: csb110.dgn	DN: TxDOT	CK: MB	DW: MB	CK: MB
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
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	LBB	CROSBY		50

DATE:
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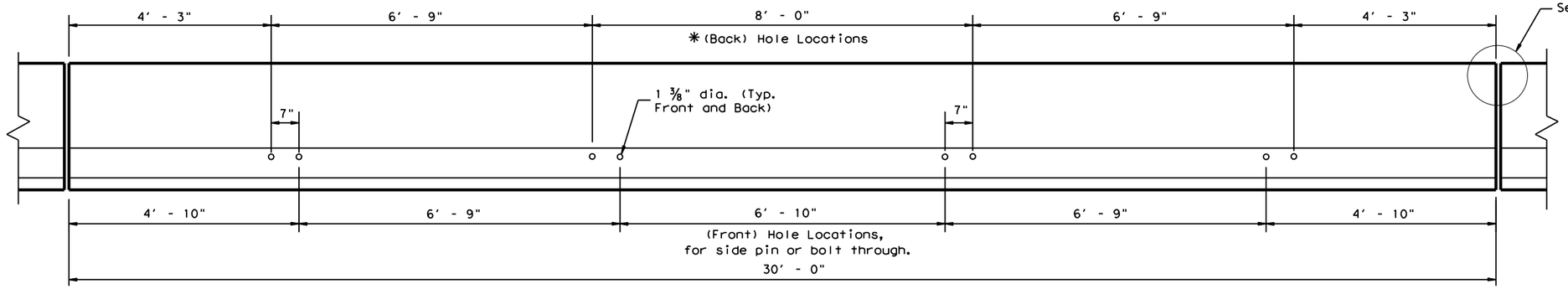
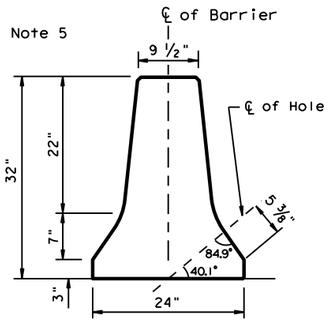
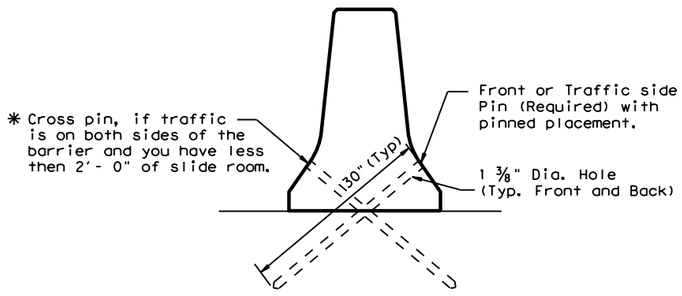


DETAIL 1

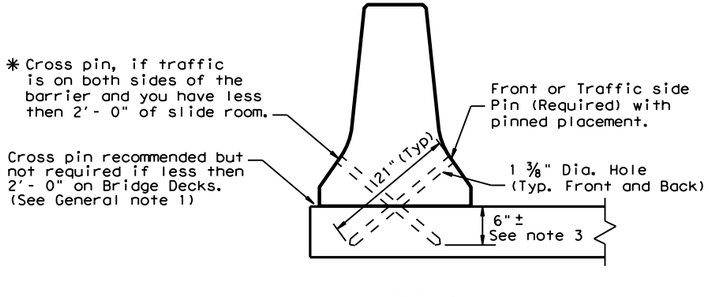


HOLE LOCATION DETAIL



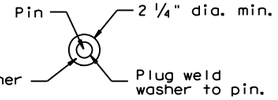
DETAIL 2

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

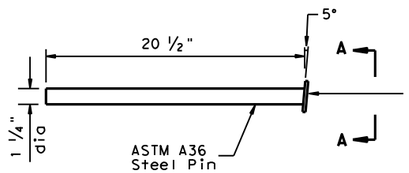


DETAIL 3

Bridge Deck or CRCP
(21" pin required)



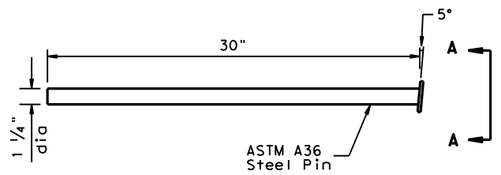
VIEW A-A



Steel washer welded to pin at 5° angle so that the washer is flush to the barrier surface. (See View A-A)

(21") PIN DETAIL

See Detail 3

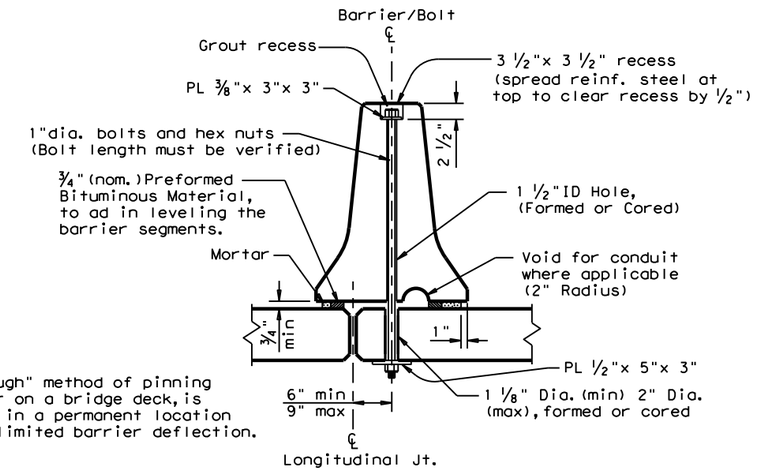


(30") PIN DETAIL

See Detail 2

CORE DRILLING EXISTING BARRIER

Core drilling existing concrete barrier is permitted. Holes shall be drilled with coring or masonry drilling type equipment. Percussion (star) drilling shall not be used. A special drill bit (to cut through existing reinforcing) will likely be required. Spalls in the concrete exceeding 1/2" shall be patched.



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

PRECAST CSB (BOLT THROUGH) PLACEMENT OVER LONGITUDINAL EXPANSION JOINT

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

GENERAL NOTES

1. These details provide a method of laterally restraining precast concrete barrier to limit deflections under normally expected passenger vehicle impacts. These details are intended for use in work zones, primarily on bridge decks, or pavement where temporary barrier must be placed less then 2 ft. from the longitudinal edge of the deck or dropoff and parallel to the direction of travel. Other applications of these details are acceptable as directed by the Engineer.
2. Each precast concrete barrier section shall have a minimum of four or total of eight 1 3/8" ID, holes formed or cored through the barrier. The center lines of the holes are shown in the hole location detail. If rebar is encountered, the entry point may be shifted 2" plus or minus longitudinally along the barrier. The eight holes are spaced along the length of the barrier as shown in Detail 1.
3. The drilling of the travel surface is accomplished by placing the pre-drilled barrier section on the travel surface in the desired position. Then the hole is drilled with the bit passing though the hole in the barrier. The bit is to be inserted into the hole in the barrier so that the travel surface is drilled to a point which is slightly more than the pin length.
4. Note that steel washers have been welded to the top of the steel pins to aid in the removal of the pins, when the barrier is removed.
5. See CSB(1) standard sheets for reinforcement requirements and joint connection types.
6. The forming or coring of holes in the barrier, drilling of holes in bridge deck or pavement, fabrication and materials for the 1 1/4" pins, installation of pins, and any repair to the barrier shall be considered as subsidiary to the barrier bid items.
7. The barrier and travel surface will be repaired as directed by the Engineer in accordance with Item 429, "Concrete Structure Repair."
8. Provide galvanized bolts, nuts, and plate washers. All steel pins shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."
9. Weight of barrier is approx. 440 lbs per foot.

Texas Department of Transportation

Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)

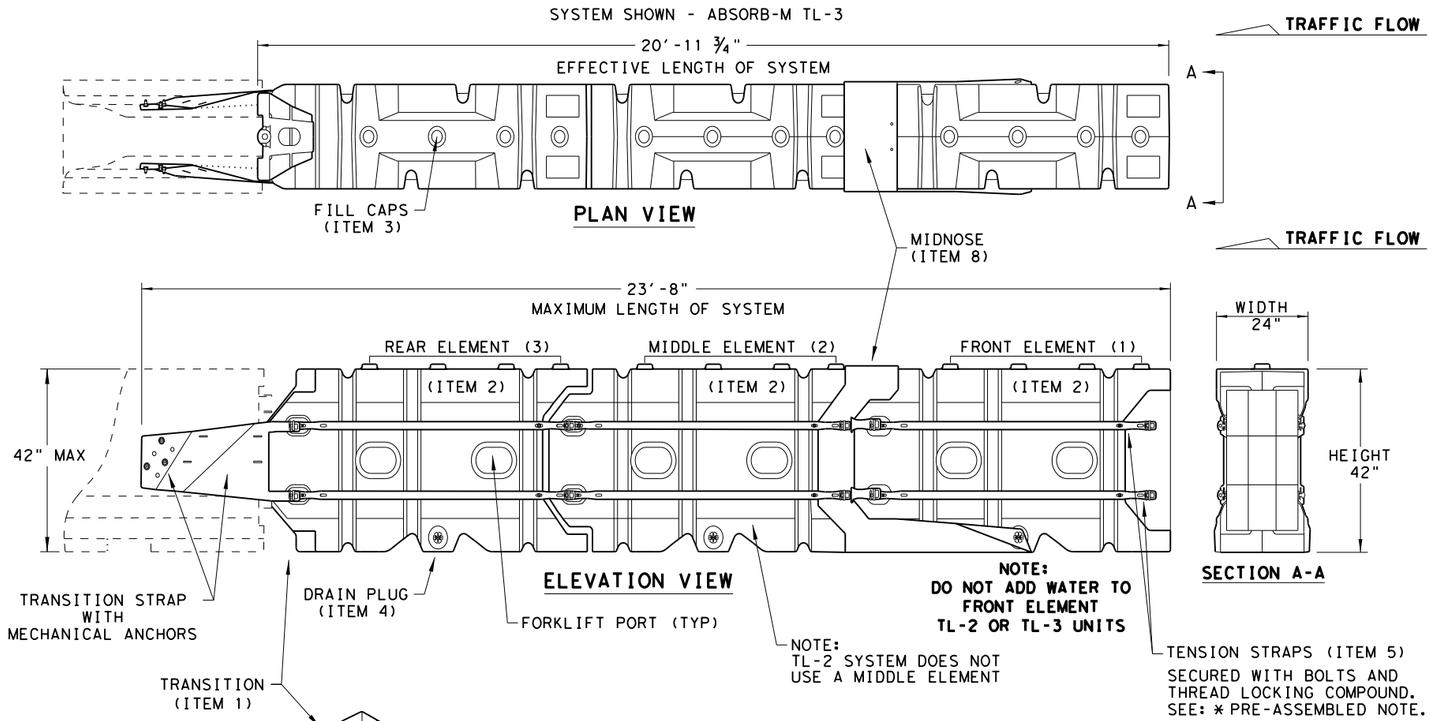
PRECAST BARRIER
(TYPE 1)
PINNED PLACEMENT

CSB(7)-10

FILE: csb710.dgn	DN: TxDOT	CK: MB	DW: MB	CK: MB
© TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		51

DATE:
FILE:

SYSTEM SHOWN - ABSORB-M TL-3



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

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

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

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

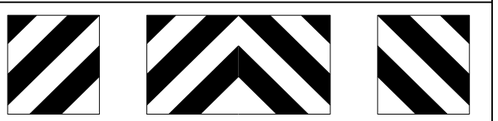
GENERAL NOTES

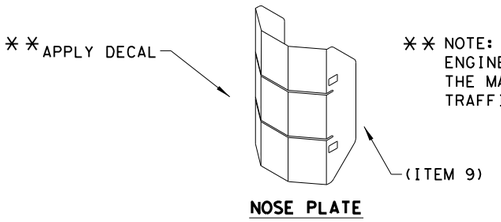
1. FOR SPECIFIC INFORMATION REGARDING THE INSTALLATION AND TECHNICAL GUIDANCE, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800. 180 RIVER ROAD, RIO VISTA, CA 94571
2. THE ABSORB-M SYSTEM IS ONLY APPROVED FOR USE IN (TEMPORARY WORK ZONE) LOCATIONS.
3. THE ABSORB-M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

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

*COMPONENTS PRE-ASSEMBLED WITH ELEMENT ASSEMBLY

DELINEATION DECAL PLACEMENT GUIDE





NOSE PLATE

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

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

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

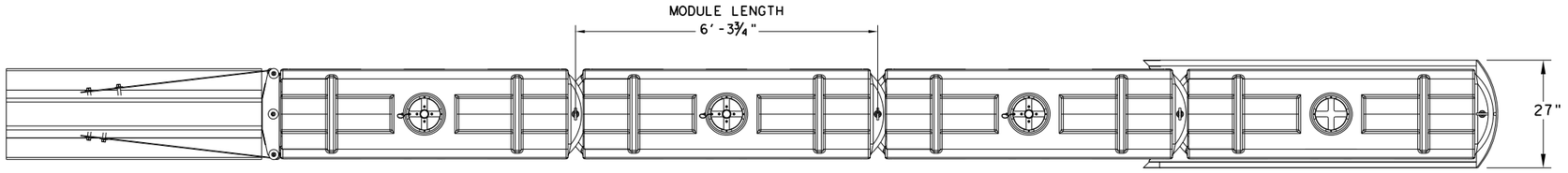
SACRIFICIAL

Texas Department of Transportation — Design Division Standard

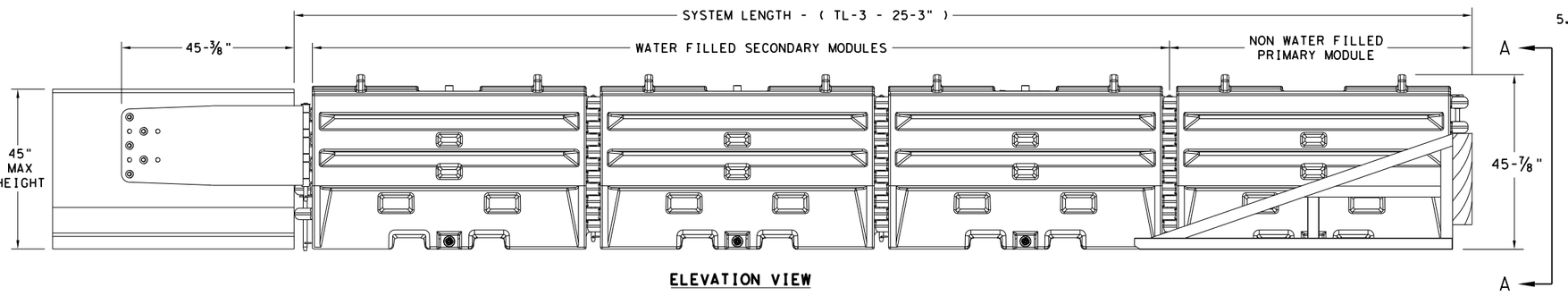
LINDSAY TRANSPORTATION SOLUTIONS
CRASH CUSHION
(MASH TL-3 & TL-2)
TEMPORARY - WORK ZONE
ABSORB(M)-19

FILE: absorbm19	DN: TxDOT	CK: MB	DW: MB	CK: MB
REVISIONS	CONT	SECT	JOB	HIGHWAY
	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		52

DATE:
FILE:



PLAN VIEW



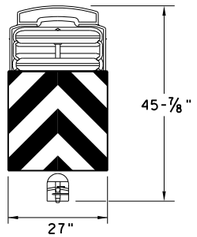
ELEVATION VIEW

GENERAL NOTES

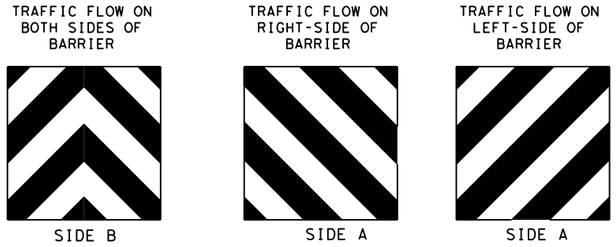
1. REFER TO THE INSTALLATION MANUAL FOR SPECIFIC SYSTEM ASSEMBLY AND MODULE ORIENTATION. FOR ADDITIONAL INFORMATION, CONTACT TRAFFIX, INC. AT (949) 361-5663.
2. THE SLED SYSTEM IS A MASH APPROVED TEST LEVEL 3 (TL-3) CRASH CUSHION APPROVED FOR USE IN TEMPORARY WORK ZONES. THE SLED SYSTEM IS A NON-REDIRECTIVE,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

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

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

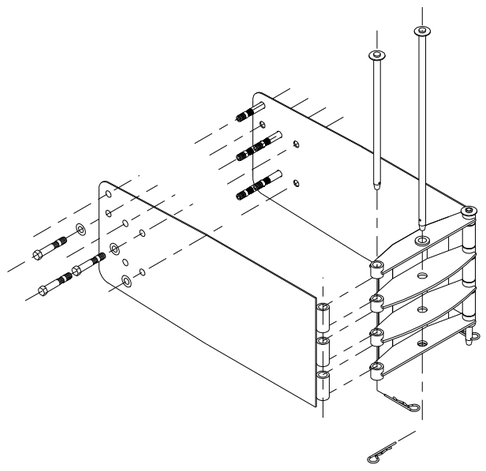


SECTION A-A



NOSE SHEETING PANEL DELINEATION

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



SLED TRANSITION COMPONENTS FOR ATTACHMENT TO CMB

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

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

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

SACRIFICIAL

BILL OF MATERIAL

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

Texas Department of Transportation

Design Division Standard

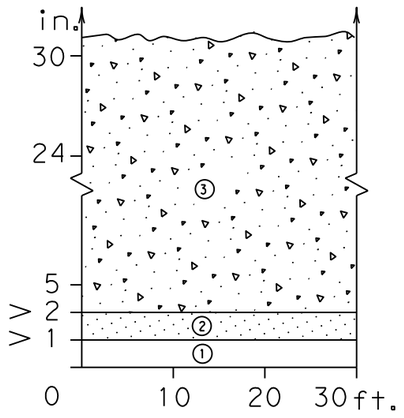
SLED
CRASH CUSHION
TL-3 MASH COMPLIANT
(TEMPORARY, WORK ZONE)
SLED-19

FILE: sled19.dgn	DN: TxDOT	CK: MB	DW: MB	CK: MB
©TxDOT: DECEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		53

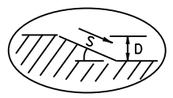
DATE:
FILE:

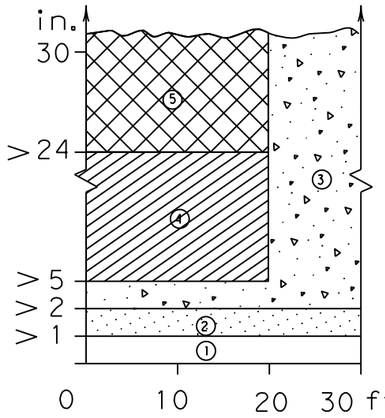
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

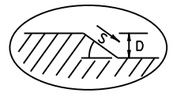


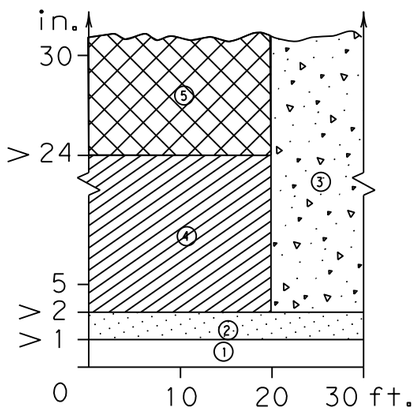
Edge Condition I
S = (3:1) (or flatter)



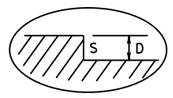


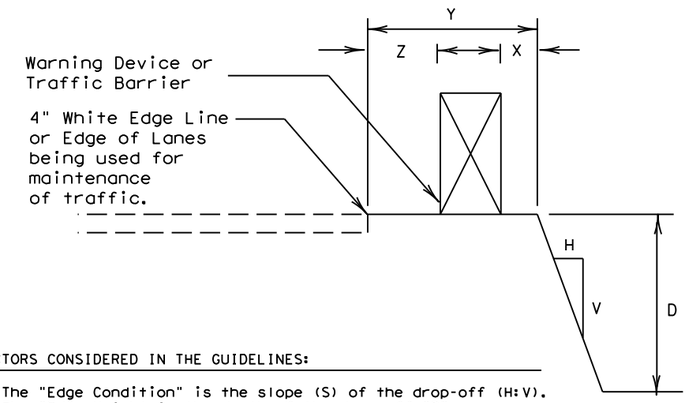
Edge Condition II
S = ((2.99):1) to (1:1)





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





FACTORS CONSIDERED IN THE GUIDELINES:

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

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

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

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

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

Zone	Treatment Types Guidelines:
①	No treatment.
②	CW 8-11 "Uneven Lanes" signs.
③	CW 8-9a "Shoulder Drop-Off" or CW 8-11 signs plus vertical panels.
④	CW 8-9a or CW 8-11, signs plus drums. Where restricted space precludes the use of drums, use vertical panels. An edge fill may be provided to change the edge slope to that of the preferable Edge Condition I.
⑤	Check indications (Figure-1) for positive 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:

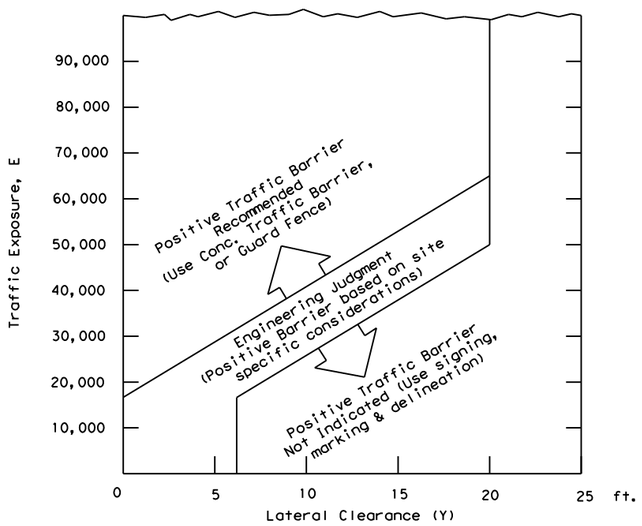
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

2. Edge Condition II: Most vehicles are able to traverse an edge condition with a slope between (2.99 to 1) and (1to 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 differen-tial 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 dura-tion 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 a lateral offset of 20 feet from the edge of the travel lane.

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
SHELLEY C. HARRIS
99197
LICENSED PROFESSIONAL ENGINEER

Shelley C. Harris, P.E.
6/29/2022

Texas Department of Transportation
Traffic Operations Division

TREATMENT FOR VARIOUS EDGE CONDITIONS

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

REVISIONS	CONT	SECT	JOB	HIGHWAY
03-01	0453	04	024	SH 207
08-01 correct typos	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		54

Horizontal Alignment Review Report

Report Created: 8/19/2019
Time: 10:24am

Project: Default
File Name: c:\txdot\pw_online\txdot2\kaylee.wiley\d0343774\SH 207_MDF_ALIGN.dgn
Last Revised: 8/19/2019 9:17

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

Alignment Name: RdCL
Alignment Style: Road_Centerline

			Station	Northing	Easting
Element: Linear					
POB		( )	311+80.8000	2143111.588	2156596.685
PC		( )	418+09.6000	2132482.792	2156587.409
	Tangential Direction:		S 0°03'00.00" W		
	Tangential Length:		10628.8		
Element: Circular					
PC		( )	418+09.6000	2132482.792	2156587.409
PI		( )	425+77.2179	2131715.175	2156586.74
CC		( )		2132485.292	2153722.622
PT		( )	433+09.6000	2131050.733	2156202.351
	Radius:		2864.789		
	Delta:		30°00'00.00"	Right	
	Degree of Curvature (Arc):		2°00'00.00"		
	Length:		1500		
	Tangent:		767.6179		
	Chord:		1482.9239		
	Middle Ordinate:		97.6153		
	External:		101.0588		
	Tangent Direction:		S 0°03'00.00" W		
	Radial Direction:		N 89°57'00.00" W		
	Chord Direction:		S 15°03'00.00" W		
	Radial Direction:		N 59°57'00.00" W		
	Tangent Direction:		S 30°03'00.00" W		
Element: Linear					
PT		( )	433+09.6000	2131050.733	2156202.351
PC		( )	452+90.1000	2129336.435	2155210.604
	Tangential Direction:		S 30°03'00.00" W		
	Tangential Length:		1980.5		
Element: Circular					
PC		( )	452+90.1000	2129336.435	2155210.604
PI		( )	460+59.9155	2128670.091	2154825.115
CC		( )		2127901.876	2157690.333
PT		( )	467+94.2000	2127900.276	2154825.545
	Radius:		2864.789		
	Delta:		30°04'55.20"	Left	
	Degree of Curvature (Arc):		2°00'00.00"		
	Length:		1504.1		
	Tangent:		769.8155		
	Chord:		1486.8838		
	Middle Ordinate:		98.1466		
	External:		101.6284		
	Tangent Direction:		S 30°03'00.00" W		
	Radial Direction:		N 59°57'00.00" W		
	Chord Direction:		S 15°00'32.40" W		
	Radial Direction:		S 89°58'04.80" W		
	Tangent Direction:		S 0°01'55.20" E		
Element: Linear					
PT		( )	467+94.2000	2127900.276	2154825.545
PI		( )	648+00.0000	2109894.479	2154835.601
	Tangential Direction:		S 0°01'55.20" E		
	Tangential Length:		18005.8		
Element: Linear					
PI		( )	648+00.0000	2109894.479	2154835.601
PC		( )	672+85.1000	2107409.5	2154860.121
	Tangential Direction:		S 0°33'55.20" E		
	Tangential Length:		2485.1		
Element: Circular					
PC		( )	672+85.1000	2107409.5	2154860.121
PI		( )	676+99.9641	2106994.656	2154864.214
CC		( )		2107437.766	2157724.771
PT		( )	681+09.1000	2106598.015	2154985.823
	Radius:		2864.789		
	Delta:		16°28'48.00"	Left	
	Degree of Curvature (Arc):		2°00'00.00"		
	Length:		824		
	Tangent:		414.8641		
	Chord:		821.1625		
	Middle Ordinate:		29.5749		
	External:		29.8834		
	Tangent Direction:		S 0°33'55.20" E		
	Radial Direction:		S 89°26'04.80" W		
	Chord Direction:		S 8°48'19.20" E		
	Radial Direction:		S 72°57'16.80" W		
	Tangent Direction:		S 17°02'43.20" E		
Element: Linear					
PT		( )	681+09.1000	2106598.015	2154985.823
PC		( )	710+21.7000	2103813.357	2155839.588
	Tangential Direction:		S 17°02'43.20" E		
	Tangential Length:		2912.6		
Element: Circular					
PC		( )	710+21.7000	2103813.357	2155839.588
PI		( )	713+18.5557	2103529.541	2155926.605
CC		( )		2104653.107	2158578.536
PT		( )	716+13.3000	2103269.597	2156069.967
	Radius:		2864.789		
	Delta:		11°49'55.20"	Left	
	Degree of Curvature (Arc):		2°00'00.00"		
	Length:		591.6		
	Tangent:		296.8557		
	Chord:		590.5494		
	Middle Ordinate:		15.2577		
	External:		15.3394		
	Tangent Direction:		S 17°02'43.20" E		
	Radial Direction:		S 72°57'16.80" W		
	Chord Direction:		S 22°57'40.80" E		
	Radial Direction:		S 61°07'21.60" W		
	Tangent Direction:		S 28°52'38.40" E		
Element: Linear					
PT		( )	716+13.3000	2103269.597	2156069.967
PC		( )	740+31.0000	2101152.525	2157237.562
	Tangential Direction:		S 28°52'38.40" E		
	Tangential Length:		2417.7		
Element: Circular					
PC		( )	740+31.0000	2101152.525	2157237.562
PI		( )	746+69.1516	2100593.724	2157545.748
CC		( )		2099769.015	2154728.993
PT		( )	752+86.8000	2099956.947	2157587.611
	Radius:		2864.789		
	Delta:		25°06'57.60"	Right	
	Degree of Curvature (Arc):		2°00'00.00"		
	Length:		1255.8		
	Tangent:		638.1516		
	Chord:		1245.7695		
	Middle Ordinate:		68.536		
	External:		70.2159		
	Tangent Direction:		S 28°52'38.40" E		
	Radial Direction:		S 61°07'21.60" W		
	Chord Direction:		S 16°19'09.60" E		
	Radial Direction:		S 86°14'19.20" W		
	Tangent Direction:		S 3°45'40.80" E		
Element: Linear					
PT		( )	752+86.8000	2099956.947	2157587.611
PC		( )	775+16.8000	2097731.75	2157733.9
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	Tangential Length:		2230		
Element: Circular					
PC		( )	775+16.8000	2097731.75	2157733.9
PI		( )	778+40.8742	2097408.374	2157755.16
CC		( )		2097982.326	2161545.391
PT		( )	781+63.4000	2097093.202	2157830.595
	Radius:		3819.7187		
	Delta:		9°41'56.40"	Left	
	Degree of Curvature (Arc):		1°30'00.00"		
	Length:		646.6		
	Tangent:		324.0742		
	Chord:		645.8282		
	Middle Ordinate:		13.6738		
	External:		13.723		
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	Radial Direction:		S 86°14'19.20" W		
	Chord Direction:		S 8°36'39.00" E		
	Radial Direction:		S 76°32'22.80" W		
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PT		( )	781+63.4000	2097093.202	2157830.595
PI		( )	829+99.9000	2092389.554	2158956.398
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	Tangential Length:		4836.5		
Element: Linear					
PI		( )	829+99.9000	2092389.554	2158956.398
PC		( )	846+57.3400	2090776.139	2159335.87
	Tangential Direction:		S 13°14'07.20" E		
	Tangential Length:		1657.44		
Element: Circular					
PC		( )	846+57.3400	2090776.139	2159335.87
PI		( )	850+32.7978	2090410.654	2159421.832
CC		( )		2090120.242	2156547.176
PT		( )	854+04.0000	2090035.361	2159410.708
	Radius:		2864.789		
	Delta:		14°55'59.52"	Right	
	Degree of Curvature (Arc):		2°00'00.00"		
	Length:		746.66		
	Tangent:		375.4578		
	Chord:		744.5484		
	Middle Ordinate:		24.2912		
	External:		24.4989		
	Tangent Direction:		S 13°14'07.20" E		
	Radial Direction:		S 76°45'52.80" W		
	Chord Direction:		S 5°46'07.44" E		
	Radial Direction:		N 88°18'07.68" W		
	Tangent Direction:		S 1°41'52.32" W		
Element: Linear					
PT		( )	854+04.0000	2090035.361	2159410.708
PI		( )	870+39.2000	2088400.879	2159362.258
	Tangential Direction:		S 1°41'52.32" W		
	Tangential Length:		1635.2		
Element: Linear					
PI		( )	870+39.2000	2088400.879	2159362.258
PI		( )	895+22.2000	20859.57	2159270.642
	Tangential Direction:		S 2°06'52.32" W		
	Tangential Length:		2483		
Element: Linear					
PI		( )	895+22.2000	208591.57	2159270.642
PI		( )	923+61.7000	2083081.796	2159171.651
	Tangential Direction:		S 1°59'52.32" W		
	Tangential Length:		2839.5		
Element: Linear					
PI		( )	923+61.7000	2083081.796	2159171.651
PI		( )	948+22.3500	2080622.508	2159089.802
	Tangential Direction:		S 1°54'22.32" W		
	Tangential Length:		2460.65		
Element: Linear					
PI		( )	948+22.3500	2080622.508	2159089.802
PI		( )	968+39.2000	2078606.754	2159023.301
	Tangential Direction:		S 1°53'22.32" W		
	Tangential Length:		2016.85		
Element: Linear					
PI		( )	968+39.2000	2078606.754	2159023.301
PI		( )	978+39.2000	2077607.104	2158996.87
	Tangential Direction:		S 1°30'52.32" W		
	Tangential Length:		1000		
Element: Linear					
PI		( )	978+39.2000	2077607.104	2158996.87
PI		( )	988+39.2000	2076607.828	2158958.81
	Tangential Direction:		S 2°10'52.32" W		
	Tangential Length:		1000		
Element: Linear					
PI		( )	988+39.2000	2076607.828	2158958.81
POE		( )	1029+01.0000	2072548.16	2158827.244
	Tangential Direction:		S 1°51'22.32" W		
	Tangential Length:		4061.8		

Note: The above alignment data was taken from as-built plan sets 0453-04-001 and 0453-04-003.

STATE OF TEXAS
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PROFESSIONAL ENGINEER

Shelley C. Harris, P.E.
6/29/2022

Texas Department of Transportation

Sheet 1 of 1

HORIZONTAL ALIGNMENT DATA

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		55
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_RDW_HORALIGN.dgn		

SH 207 VERTICAL ALIGNMENT

CSJ: 0453-04-024

PVI Station	Ver. Length (ft)	Grade G1 (%)	Grade G2 (%)	K - Value Check Crest or Sag?	K - Value Check Min.	K - Value Check Calc.	K - Value Check Meets? Yes/No	Grade Check Max Grade (%)	Grade Check Meets? Yes/No
Station 414+48 to 675+00 - No data available									
683+00	300	0	0.7111	S	49	422	YES	6	YES
692+00	300	0.7111	0.3750	C	29	893	YES	6	YES
696+00	200	0.3750	0.0412	C	29	599	YES	6	YES
715+00	600	0.0412	-4.0000	C	29	149	YES	6	YES
727+25	300	-4.0000	-6.0450	C	29	147	YES	6	NO ♪
743+00	300	-6.0450	-3.2100	S	49	106	YES	6	NO ♪
748+00	300	-3.2100	-2.1866	S	49	293	YES	6	YES
755+25	300	-2.1866	-3.5160	C	29	226	YES	6	YES
760+00	500	-3.5160	-1.4500	S	49	242	YES	6	YES
766+00	400	-1.4500	-2.3925	C	29	424	YES	6	YES
774+00	300	-2.3925	-3.1540	C	29	394	YES	6	YES
782+50	400	-3.1540	-1.5846	S	49	255	YES	6	YES
789+00	300	-1.5846	-0.6300	S	49	314	YES	6	YES
794+00	300	-0.6300	-2.0400	C	29	213	YES	6	YES
800+00	200	-2.0400	-1.8085	S	49	864	YES	6	YES
807+00	300	-1.8085	-1.3700	S	49	684	YES	6	YES
812+00	200	-1.3700	-1.7190	C	29	573	YES	6	YES
820+00		-1.7190	-1.9080	NO VERTICAL CURVE, G2-G1 < 0.5				6	YES
826+00		-1.9080	-1.7920	NO VERTICAL CURVE, G2-G1 < 0.5				6	YES
832+50	300	-1.7920	-2.7545	C	29	312	YES	6	YES
838+00	400	-2.7545	-4.8000	C	29	196	YES	6	YES
843+00	550	-4.8000	3.4080	S	49	67	YES	6	YES
849+75	400	3.4080	0.0430	C	29	119	YES	6	YES
856+00	300	0.0430	-0.5830	C	29	479	YES	6	YES
867+50	300	-0.5830	0.0000	S	49	515	YES	6	YES
877+70	400	0.0000	1.3333	S	49	300	YES	6	YES
882+00	300	1.3333	2.3000	S	49	310	YES	6	YES
894+85	1050	2.3000	-2.5380	C	29	217	YES	6	YES
903+50	300	-2.5380	-2.0580	S	49	625	YES	6	YES
911+75	400	-2.0580	-2.8680	C	29	494	YES	6	YES
920+00	500	-2.8680	-0.4180	S	49	204	YES	6	YES
925+75	300	-0.4180	-1.1675	C	29	400	YES	6	YES
934+00	300	-1.1675	-1.4470	C	29	1,073	YES	6	YES
947+50	300	-1.4470	-1.0279	S	49	716	YES	6	YES
954+00	300	-1.0279	-1.3500	C	29	931	YES	6	YES
963+00	400	-1.3500	-0.4620	S	49	450	YES	6	YES
975+50	400	-0.4620	-2.0575	C	29	251	YES	6	YES
979+50	300	-2.0575	0.0000	S	49	146	YES	6	YES
989+50	300	0.0000	-1.3454	C	29	223	YES	6	YES
995+00	400	-1.3454	1.9200	S	49	123	YES	6	YES
1002+50	400	1.9200	-3.0000	C	29	81	YES	6	YES
1008+50	400	-3.0000	3.5710	S	49	61	YES	6	YES
1015+50	400	3.5710	-1.0333	C	29	87	YES	6	YES
1027+50	300	-1.0333	-1.2916	C	29	1,161	YES	6	YES
Station 1029+01 + End of Project									

♪ Requires design waiver.

The highest design speed at which all proposed curves meet is 35 mph.

3R - HORIZONTAL ALIGNMENT CHECK

PROPOSED DESIGN: ELEMENT TYPE	POB STATION	PC STATION	PI STATION	PI UPSTATION	PT STATION	CURVE LENGTH (FT)	P.I. DEFL. ANGLE (DEG)	CURVE RADIUS (FT)	SUPER. TRANS. LENGTH, L plans (FT)	E PROP. (%)	LANE WIDTH (FT)	RADIUS & SUPERELEVATION TRANSITION LENGTH CHECK: R.D.M. DESIGN SPEED (MPH)	MIN. RADIUS (FT)	E MAX R.D.M. (%)	REQUIRED E VALUE (%)	PROPOSED CHANGE IN CROSS SLOPE (%)	MAX. RELATIVE GRADIENT, G (%)	L CALC. TRANS. (FT)	MEETS OR EXCEED S?	DEFLECTION CHECK: MAX DEFL. (DEG)	MEETS?
LINEAR	311+80.8	418+09.60									12								0.50	
CIRCULAR		418+09.60	425+77.22		433+09.6	1500		2864.789	331	5.8	12	75	2500	6	5.8	7.8	0.38	246	YES	0.50	
LINEAR		452+90.10			433+09.6						12									0.50	
CIRCULAR		452+90.10	460+59.92		467+94.2	1504.1		2864.789	331	5.8	12	75	2500	6	5.8	7.8	0.38	246	YES	0.50	
LINEAR			648+00		467+94.2						12									0.50	
LINEAR		672+85.10	648+00				0.5333				12									0.50	NO ♪
CIRCULAR		672+85.10	676+99.96		681+09.1	824		2864.789	331	5.8	12	75	2500	6	5.8	7.8	0.38	246	YES	0.50	
LINEAR		710+21.70			681+09.1						12									0.50	
CIRCULAR		710+21.70	713+18.56		716+13.3	591.6		2864.789	331	5.8	12	75	2500	6	5.8	7.8	0.38	246	YES	0.50	
LINEAR		740+31			716+13.3						12									0.50	
CIRCULAR		740+31	746+69.15		752+86.8	1255.8		2864.789	331	5.8	12	75	2500	6	5.8	7.8	0.38	246	YES	0.50	
LINEAR		775+16.80			752+86.8						12									0.50	
CIRCULAR		775+16.80	778+40.87		781+63.4	646.6		3819.719	312	5.1	12	75	2500	6	5.1	7.1	0.38	224	YES	0.50	
LINEAR			829+99.90		781+63.4						12									0.50	
LINEAR		846+57.34	829+99.90				0.225				12									0.50	YES
CIRCULAR		846+57.34	850+32.80		854+04	746.66		2864.789	331	5.8	12	75	2500	6	5.8	7.8	0.38	246	YES	0.50	
LINEAR			870+39.20		854+04						12									0.50	
LINEAR			870+39.20	895+22.2			0.4167				12									0.50	YES
LINEAR			895+22.20	923+61.7			0.11667				12									0.50	YES
LINEAR			923+61.70	948+22.35			0.09167				12									0.50	YES
LINEAR			948+22.35	968+39.2			0.0167				12									0.50	YES
LINEAR			968+39.20	978+39.2			0.375				12									0.50	YES
LINEAR			978+39.20	988+39.2			0.667				12									0.50	NO ♪
LINEAR			988+39.20	1029+01			0.325				12									0.50	YES

♪ Requires design waiver.

R.D.M. = Roadway Design Manual

This project meets all basic safety requirements & 3R design criteria for all horizontal and vertical curves at a design speed of 35 mph. Guard fence (including connections to structures, post spacing, and end treatments), signing, and pavement markings meet current standards. Cross drainage box and pipe culverts, driveway culverts, mailbox supports, and sign supports within the obstruction clearance of 30 feet have been treated or upgraded to standard.

The above table checks proposed Superelevation Rate as a function of proposed Curve Radius values at the speed limit that will be posted (75 mph). The table also checks to make sure the Minimum Superelevation Transition Length (Length required to transition from a 2% Normal Crown to Full Proposed Superelevation) is met or exceeded by the Proposed Superelevation Transition Length. Lastly, the table checks the Proposed PI Deflection Angles in areas with no horizontal curves. Checks that are not met require a design waiver.

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Shelley C. Harris, P.E.
6/29/2022

Texas Department of Transportation

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ALIGNMENT CHECKS

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		56
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_RDW_ALIGN_CHK.dgn		

DATE: 6/29/2022 11:13:22 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\045304024\4 - Design\Plan Set\3. Roadway\SH207_RDW_ALIGN_CHK.dgn

PLANING, FLEX BASE, FOAMED ASPHALT TREATMENT, AND TWO-COURSE SUMMARY

From STA	To STA	Description	Length (FT)	Proof Rolling (HR)	2"-3" Planing Width (FT)	2"-3" Planing Area (SY)	Average Flex Base Width (FT)	3.5" Flex Base Comp In Place (SY)	3.75" Flex Base Comp In Place (SY)	2% Flex. Pave Repair 3" (SY)	2% Flex. Pave Repair 6" (SY)	FOAM TREAT: Foam Treat Base (SY)	FOAM TREAT: Foamed Asph Binder [2.25Gal/SY] (GAL)	FOAM TREAT: Cement 1% (TONS)	DRIVING 2 COURSE SURFACE TREATMENT (1 COURSE FOR PROJECT ENDS): Width (FT)	Area (SY)	Aggr B Gr 5 [1 CY/130 SY] (CY)	Asphalt Warm: AC-20-5TR [0.38 gal/SY] (GAL)	Emulsion Cold: CSS-1H [0.50 gal/SY] (GAL)
394+98	414+48	Project End Seal coat	1950.00												30.00	6500.00	50.00	2470.00	1950.00
414+48	415+61	Project Start Taper 29' to 32'	113.00		28	351.56	31.50	395.50		7.53	7.53	395.50	889.88	1.48	30.50	382.94	5.89 *	145.52	114.88
415+61	838+91	Constant Width	42330.00		26' to 28'	128050.89	33.00	95109.67	60100.33	2727.93	2727.93	155210.00	349222.50	582.04	32.00	150506.67	2315.49	57192.53	45152.00
838+91	841+91	Taper out to Structure 16	300.00		26	866.67	37.00		1233.33	18.67	18.67	1233.33	2775.00	4.63	36.00	1200.00	18.46	456.00	360.00
841+91	842+92	Bridge Class Culvert 16	101.00		26	291.78	40.00		448.89	6.28	6.28	448.89	1010.00	1.68	40.00	448.89	6.91	170.58	134.67
842+92	845+92	Taper back from Structure 16	300.00		26	866.67	37.00		1233.33	18.67	18.67	1233.33	2775.00	4.63	36.00	1200.00	18.46	456.00	360.00
845+92	988+10	Constant Width	14218.00		26	41074.22	33.00		52132.67	884.68	884.68	52132.67	117298.50	195.50	32.00	50552.89	777.74	19210.10	15165.87
988+10	991+10	Taper out to Str. 23 & 24	300.00		26	866.67	37.00		1233.33	18.67	18.67	1233.33	2775.00	4.63	36.00	1200.00	18.46	456.00	360.00
991+10	993+85	Structure 23 & 24	275.00		26	794.44	41.00		1252.78	17.11	17.11	1252.78	2818.75	4.70	40.00	1222.22	18.80	464.44	366.67
993+85	996+85	Taper back from Str. 23 & 24	300.00		26	866.67	37.00		1233.33	18.67	18.67	1233.33	2775.00	4.63	36.00	1200.00	18.46	456.00	360.00
996+85	1002+45	Constant Width	560.00		26	1617.78	33.00		2053.33	34.84	34.84	2053.33	4620.00	7.70	32.00	1991.11	30.63	756.62	597.33
1002+45	1005+45	Taper out to Structure 25	300.00		26	866.67	37.00		1233.33	18.67	18.67	1233.33	2775.00	4.63	36.00	1200.00	18.46	456.00	360.00
1005+45	1007+80	Structure 25	235.00		26	678.89	41.00		1070.56	14.62	14.62	1070.56	2408.75	4.01	40.00	1044.44	16.07	396.89	313.33
1007+80	1010+80	Taper back from Structure 25	300.00		26	866.67	37.00		1233.33	18.67	18.67	1233.33	2775.00	4.63	36.00	1200.00	18.46	456.00	360.00
1010+80	1029+01	Constant Width	1821.00		26	5260.67	33.00		6677.00	113.31	113.31	6677.00	15023.25	25.04	32.00	6474.67	99.61	2460.37	1942.40
1029+01	1048+51	Project End Seal coat	1950.00												32.00	6933.33	53.33	2634.67	2080.00
All 7 Horiz. Curves		Superelevation Adjust. Items	7069.00				33.00	25919.67					25920.00	43.32					
PROJECT TOTALS				50.00		183321.00		121425.00	131136.00	3919.00	3919.00	226641.00	535862.00	894.00		233258.00	3486.00	88638.00	69978.00

* Quantity doubled for 2 course surface treatment.

SMA SUMMARY

From Station	To Station	Length (FT)	Description	Average Width (FT)	Area (SY)	2" SMA [236lbs/SY] (TON)	Tack Coat Vert. Surf. [0.07 GAL/SY] (GAL)
414+48	415+61	113	Project Start Taper 29' to 32'	30.5	382.94	45.19	
415+61	838+91	42330	Constant Width	32	150506.67	17759.79	
838+91	841+91	300	Taper out to Structure 16	36	1200.00	141.60	
841+91	842+92	101	Bridge Class Culvert 16	40	448.89	52.97	
842+92	845+92	300	Taper back from Structure 16	36	1200.00	141.60	
845+92	988+10	14218	Constant Width	32	50552.89	5965.24	
988+10	991+10	300	Taper out to Str. 23 & 24	36	1200.00	141.60	
991+10	993+85	275	Structure 23 & 24	40	1222.22	144.22	
993+85	996+85	300	Taper back from Str. 23 & 24	36	1200.00	141.60	
996+85	1002+45	560	Constant Width	32	1991.11	234.95	
1002+45	1005+45	300	Taper out to Structure 25	36	1200.00	141.60	
1005+45	1007+80	235	Structure 25	40	1044.44	123.24	
1007+80	1010+80	300	Taper back from Structure 25	36	1200.00	141.60	
1010+80	1029+01	1821	Constant Width	32	6474.67	764.01	
PROJECT TOTALS				219824	25940	54	

DITCH WORK SUMMARY

From Station	To Station	Length (FT)	Prep. ROW (TREE) (6"-24" DIA.) (EA)	Prep. ROW (TREE) (Greater than 24" DIA.) (EA)	Blading (STA)	Backfill (STA)	Subgrade Widening (STA)
414+48	415+61	113			1.1	1.1	1.1
415+61	838+91	42330			423.3	423.3	423.30
838+91	841+91	300			3.0	3.0	3
841+91	842+92	101			1.0	1.0	1
842+92	845+92	300			3.0	3.0	3
845+92	974+59	12867			128.7	128.7	128.7
974+59	977+59	300			3.0	3.0	3
977+59	978+34	75			0.8	0.8	0.80
978+34	981+34	300			3.0	3.0	3
981+34	1,029+01	4767			47.7	47.7	47.7
PROJECT TOTALS			20	10	615	615	615

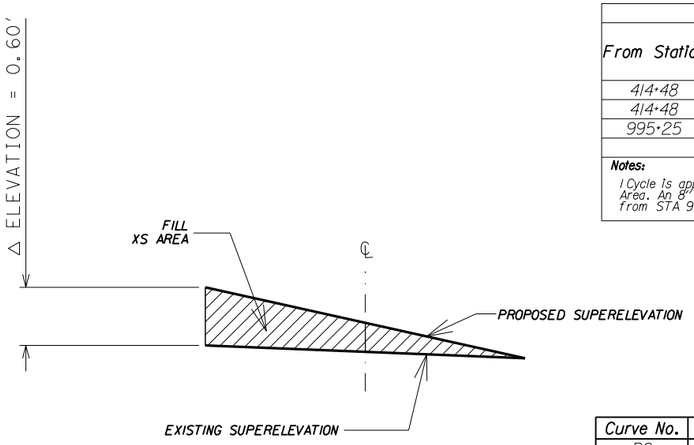
LIME-TREATED SUBGRADE & MISCELLANEOUS ITEMS SUMMARY

From Station	To Station	Length (FT)	0"-3" Project Ends Planing (SY)	Rework Base [6"] Type B (SY)	Rework Base [6"] Type C (SY)	8" Lime Treat (SY)	Lime 5% (TONS)	Centerline Rumble Strips (FT)	Shoulder Rumble Strips (FT)	Fog Seal for Milled Rumble (0.09 gal/SY) (GAL)	Full-Width Mowing (CYC)	Litter Removal (CYC)	Cut & Restore Asph Paving (for Culvert) (SY)
414+48	1,029+01	61453	334					61453	122906	3687	6	6	589
414+48	995+25	58077			212949								
995+25	1,029+01	3376	334	12379		13692	257						
PROJECT TOTALS			668	12379	212949	13692	257	61453	122906	3687	6	6	589

Notes:
1 Cycle is approximately 100 Acres for Mowing and Litter Area. An 8" lime treatment of the subgrade is proposed from STA 995+25 to STA 1029+01 to treat high PI soils.

MISCELLANEOUS ITEMS CONTINUED

From Station	To Station	Length (FT)	Riprap (Mow Strip) (4 IN) (CY)	Riprap (Conc.) (4 IN) (CY)	Excavation (Roadway) (CY)	Removing Concrete Riprap (SY)
414+48	1,029+01	61453	180	365	600	495
PROJECT TOTALS			180	365	600	495

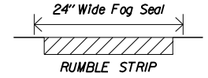


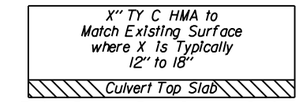
SUPERELEVATION PAVEMENT STRUCTURE
PAY ITEM ADJUSTMENT DETAIL

Curve No.	1	2	3	4	5	6	7
PC	418+09.6	452+90.1	672+85.1	710+21.7	740+31	775+16.8	846+57.34
PT	433+09.6	467+94.2	681+09.1	716+13.3	752+86.8	781+63.4	854+04
LENGTH	1500 FT	1504.1 FT	824 FT	591.6 FT	1255.8 FT	646.6 FT	746.7 FT
XS AREA	~ 9.8 SQ. FT	~ 9.8 SQ. FT	~ 9.8 SQ. FT	~ 9.8 SQ. FT	~ 9.8 SQ. FT	~ 9.8 SQ. FT	~ 9.8 SQ. FT
Adjustment Volumes	~ 545 CY	~ 546 CY	~ 299 CY	~ 215 CY	~ 456 CY	~ 235 CY	~ 271 CY
TOTAL	2567 CUBIC YARDS						

2567 Cubic Yards x 27 Cubic Feet/1 Cubic Yard = 69309 Cubic Feet.
Assume a density of 125 Pounds/1 Cubic Foot of Foamed Asphalt & Cement-treated Base.
69309 CF X 125 LBS/CF = 8,663,625 LBS = 4,331.81 TONS.
Assume cement is 1% by weight. 0.01 x 4331.81 TONS = 43.32 TONS of additional cement needed to adjust superelevations.
Approximately 25,920 additional gallons of foamed asphalt will be needed to adjust superelevations.
The 43.32 TONS of Cement and 25,920 Gallons of foamed asphalt have been included in the above Project Totals.

NOTE: ADJUSTMENT VOLUMES ARE CALCULATED ASSUMING EXISTING 4% SUPERELEVATIONS ON ALL HORIZONTAL CURVES WITH PROPOSED SUPERELEVATIONS OF 5.8% ON ALL HORIZONTAL CURVES. THE FILL AREA BETWEEN THE TWO CROSS SLOPES IS THEN PROJECTED ALONG THE LENGTH OF THE CURVE FROM PC TO PT TO CALCULATE VOLUME. THIS METHOD AND THESE QUANTITIES ARE NOT EXACT, BUT ARE SIMPLIFIED AND ENSURE ENOUGH QUANTITY IS INCLUDED IN THE PLANS.





Typical Restored Pave. Structure Section
To be used at all new or replaced structures
as directed by the engineer.

STATE OF TEXAS
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NO SCALE Sheet 1 of 1

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		57
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_RDW_SUMMARY.dgn		

ROADWAY SUMMARY

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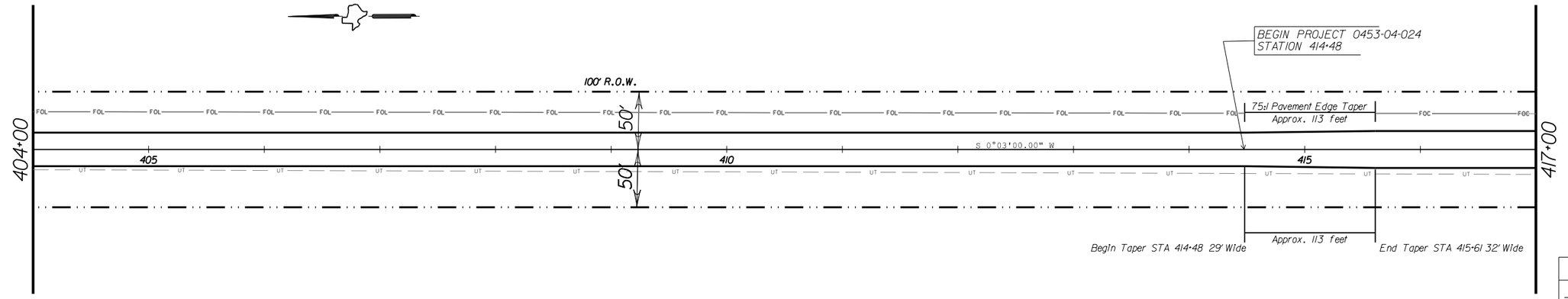
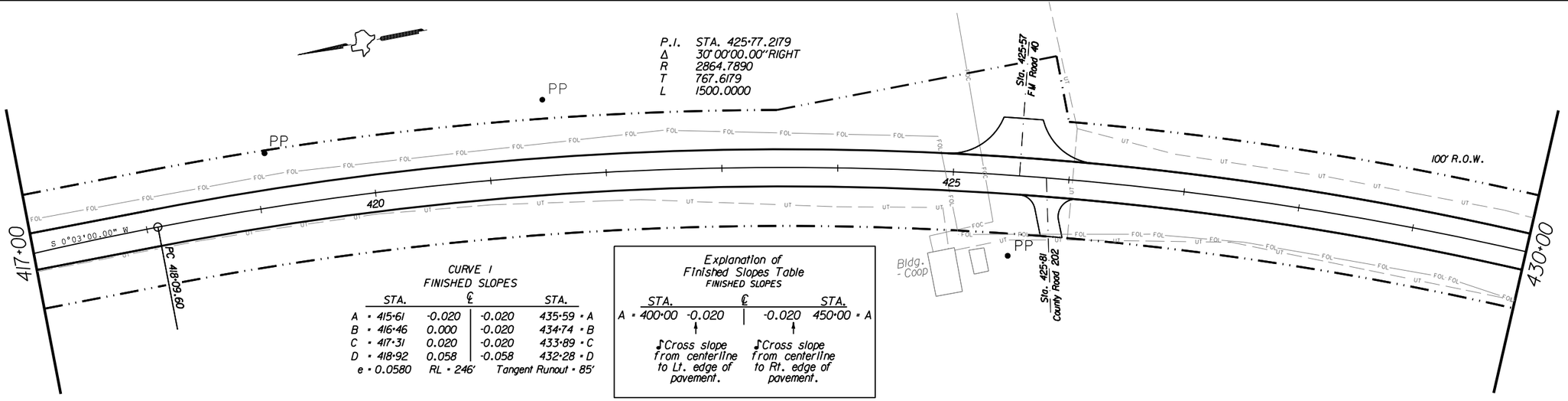


LEGEND

UT	Underground Telephone
FOC	Buried Fiber Optic Cable
GP	Underground Gas



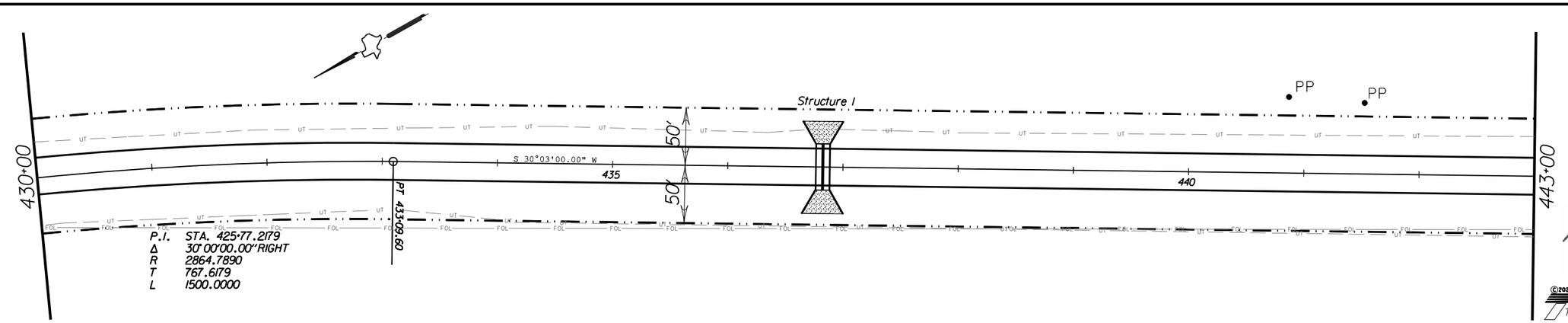
CURVE 1
FINISHED SLOPES

STA.	℄		STA.
A = 415+61	-0.020	-0.020	435+59 = A
B = 416+46	0.000	-0.020	434+74 = B
C = 417+31	0.020	-0.020	433+89 = C
D = 418+92	0.058	-0.058	432+28 = D

e = 0.0580 RL = 246' Tangent Runout = 85'

Explanation of
FInished Slopes Table
FINISHED SLOPES

STA.	℄		STA.
A = 400+00	-0.020	-0.020	450+00 = A
	↑ Cross slope from centerline to Lt. edge of pavement.	↑ Cross slope from centerline to Rt. edge of pavement.	



P.I. STA. 425+77.2179
Δ 30°00'00.00" RIGHT
R 2864.7890
T 767.6179
L 1500.0000

PLAN

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SCALE: 1" = 100' Sheet 1 of 24

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		58
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_RDW_PLANSHEETS.dgn		

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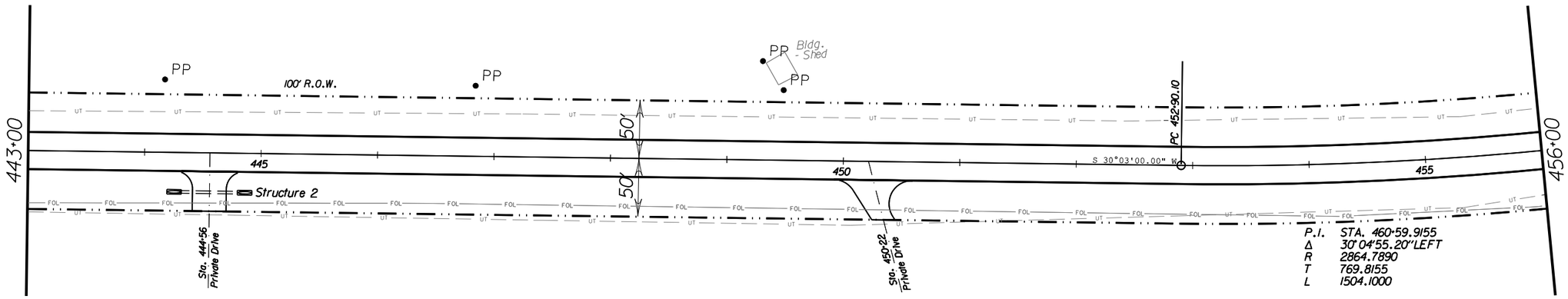
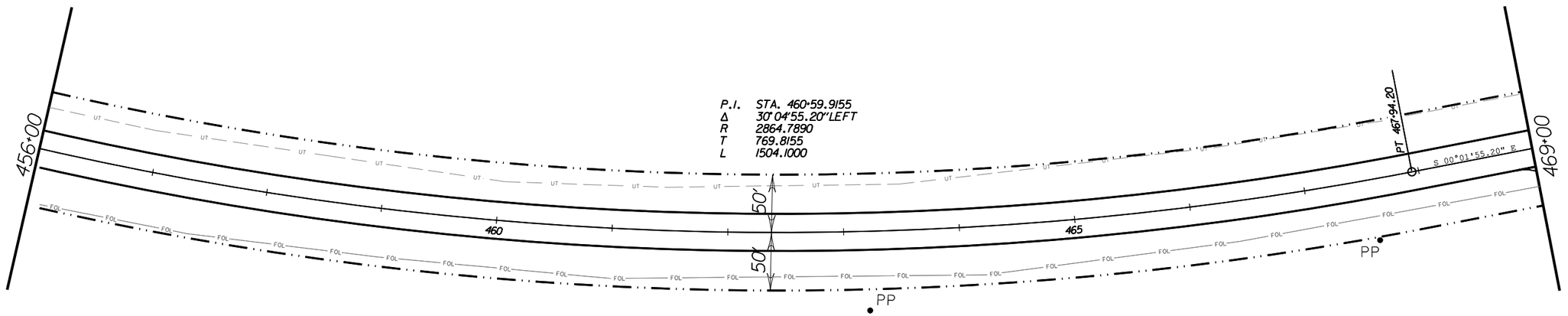
CURVE 2
FINISHED SLOPES

STA.	℄	℄	STA.
A = 450+41	-0.020	-0.020	470+43 = A
B = 451+26	-0.020	0.000	469+58 = B
C = 452+11	-0.020	0.020	468+73 = C
D = 453+72	-0.058	0.058	467+12 = D
e = 0.0580	RL = 246'	Tangent Runout = 85'	



LEGEND

UT	Underground Telephone
FOC	Buried Fiber Optic Cable
GP	Underground Gas



PLAN

STATE OF TEXAS
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Shelley C. Harris, P.E.
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Texas Department of Transportation

SCALE: 1" = 100' Sheet 2 of 24

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		59
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_RDW_PLANSHEETS.dgn		

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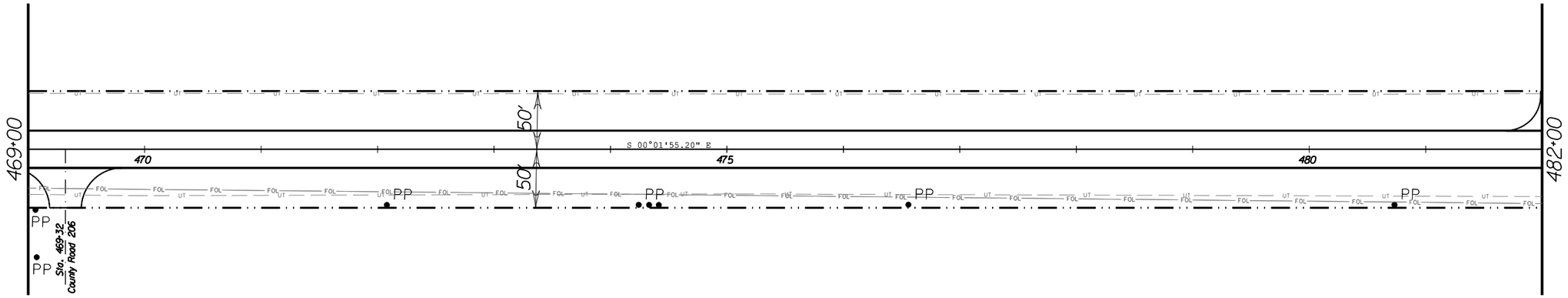

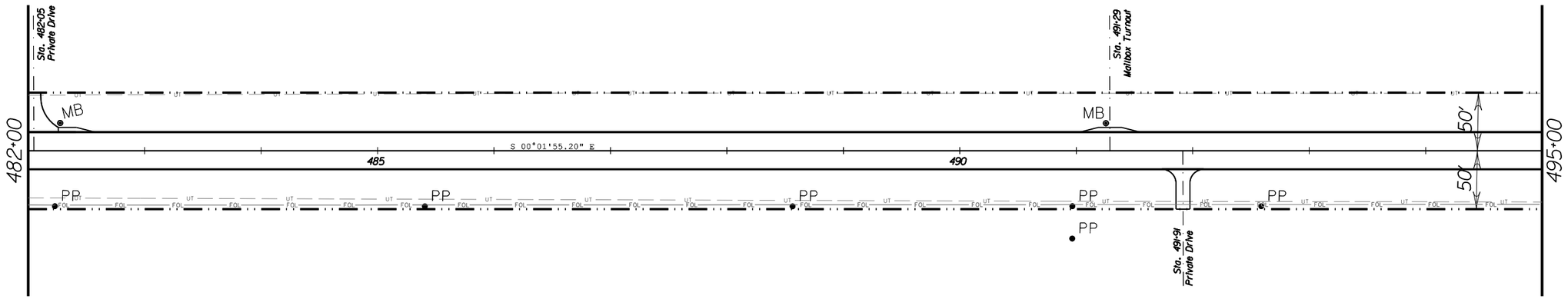

LEGEND	
UT	Underground Telephone
FOC	Buried Fiber Optic Cable
GP	Underground Gas

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SCALE: 1" = 100' Sheet 3 of 24

STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		60
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_RDW_PLANSHEETS.dgn		

PLAN

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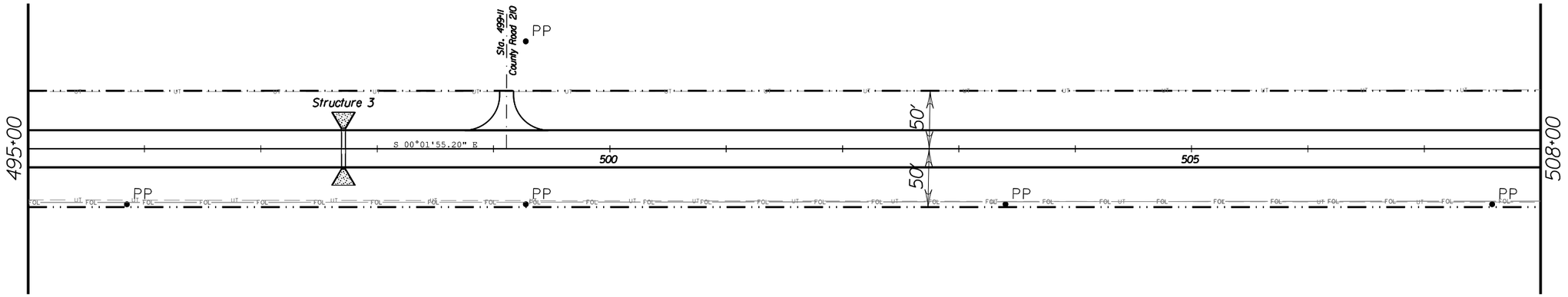

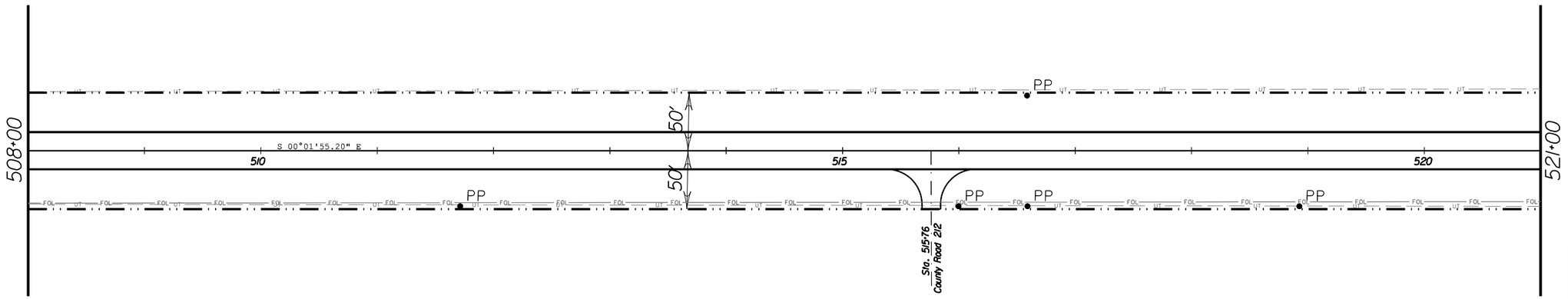

LEGEND	
UT	Underground Telephone
FOC	Buried Fiber Optic Cable
GP	Underground Gas

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SCALE: 1" = 100' Sheet 4 of 24

PLAN

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		61
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_RDW_PLANSHEETS.dgn		

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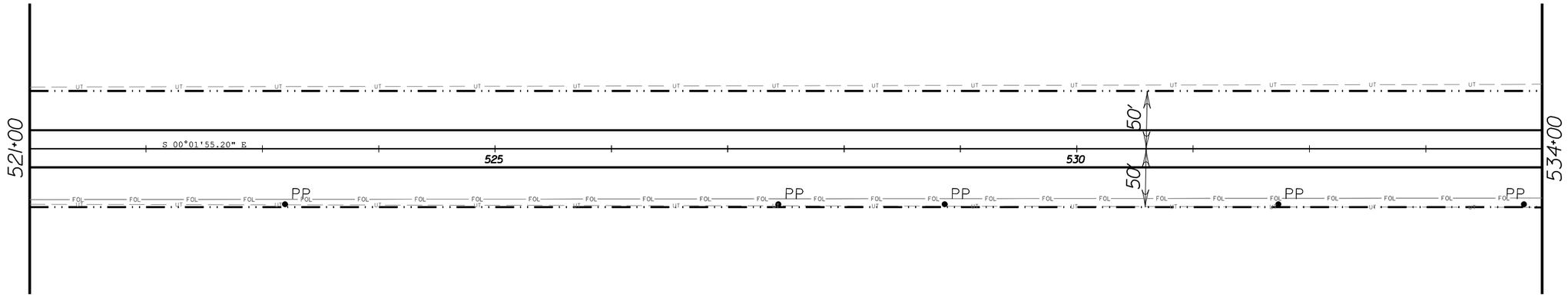
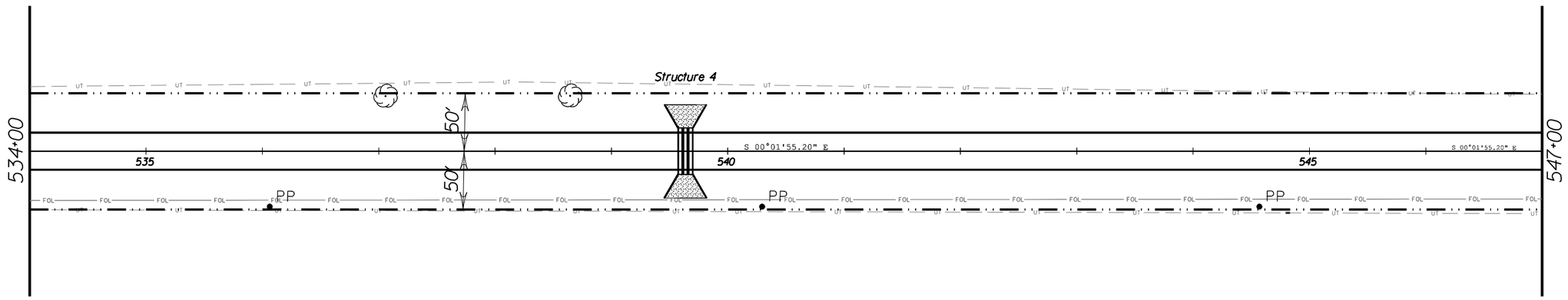


LEGEND	
UT	Underground Telephone
FOC	Buried Fiber Optic Cable
GP	Underground Gas



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SCALE: 1" = 100' Sheet 5 of 24

STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		62
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_RDW_PLANSHEETS.dgn		

PLAN

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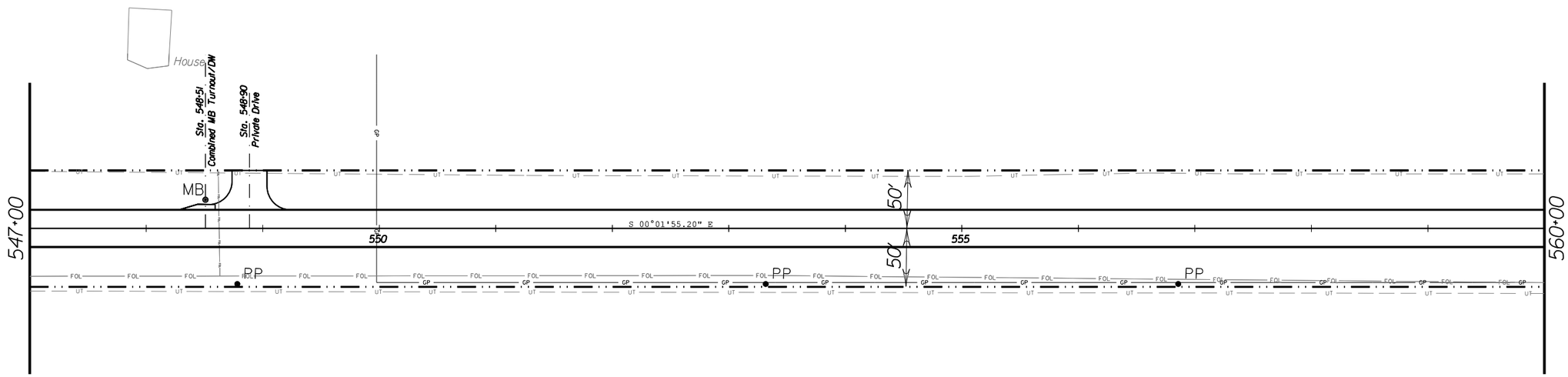

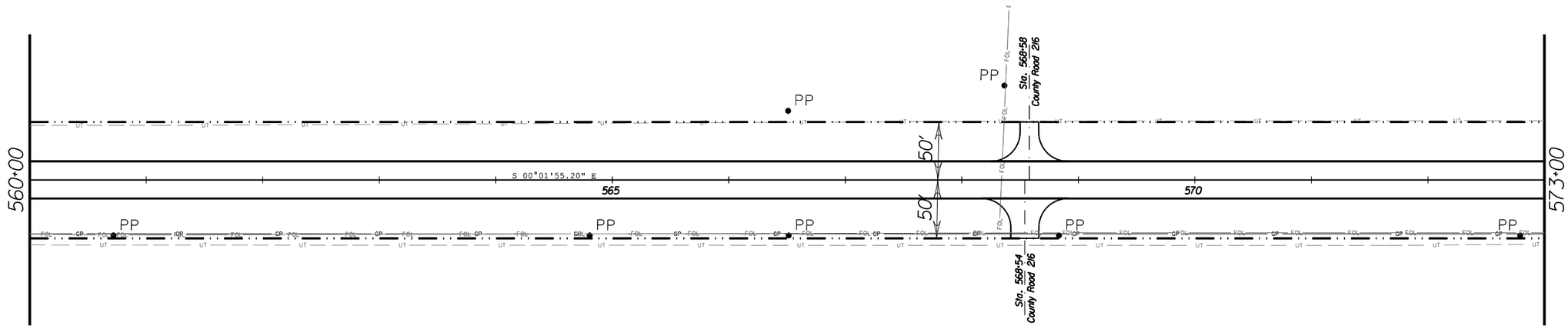

LEGEND	
UT	Underground Telephone
FOC	Buried Fiber Optic Cable
GP	Underground Gas

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SCALE: 1" = 100' Sheet 6 of 24

STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		63
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_RDW_PLANSHEETS.dgn		

PLAN

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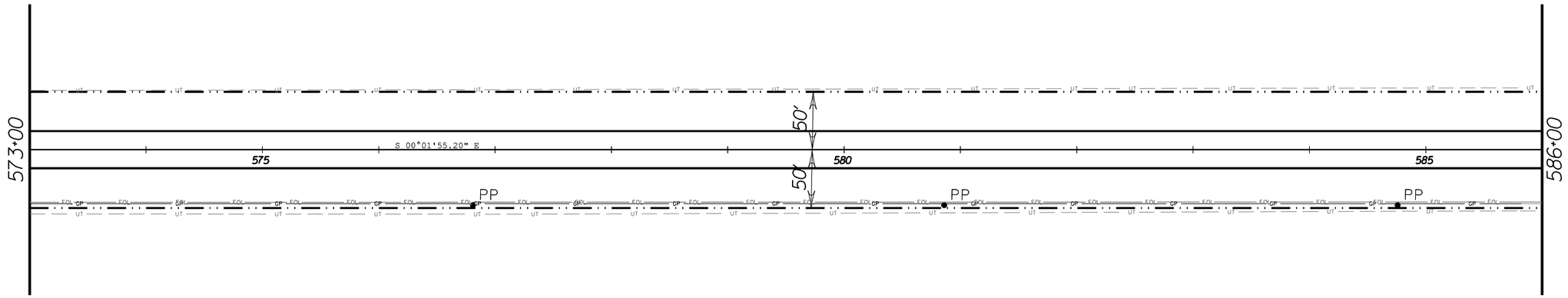
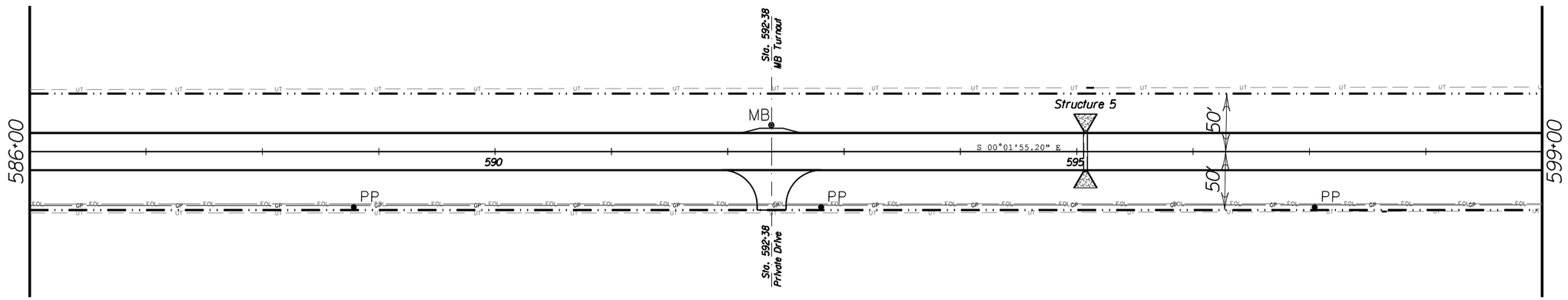


LEGEND

- UT — Underground Telephone
- FOC — Buried Fiber Optic Cable
- GP — Underground Gas



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SCALE: 1" = 100' Sheet 7 of 24

STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		64
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_RDW_PLANSHEETS.dgn		

PLAN

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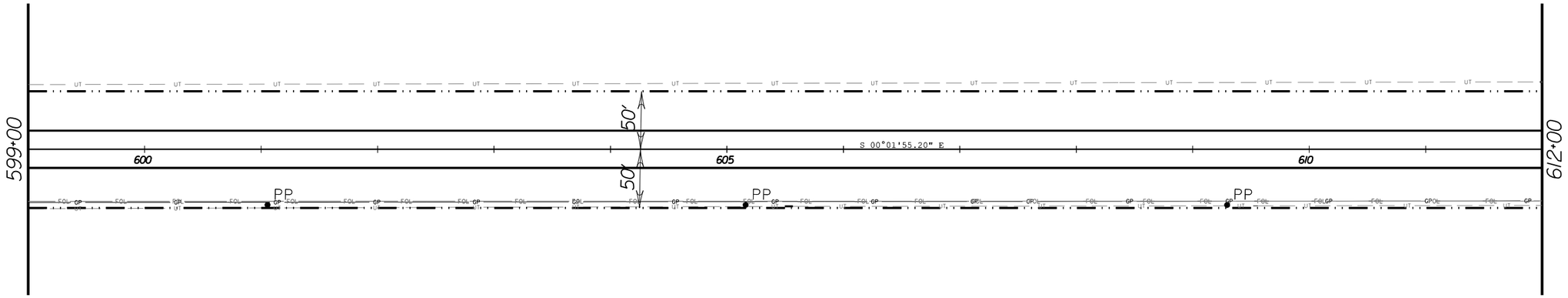
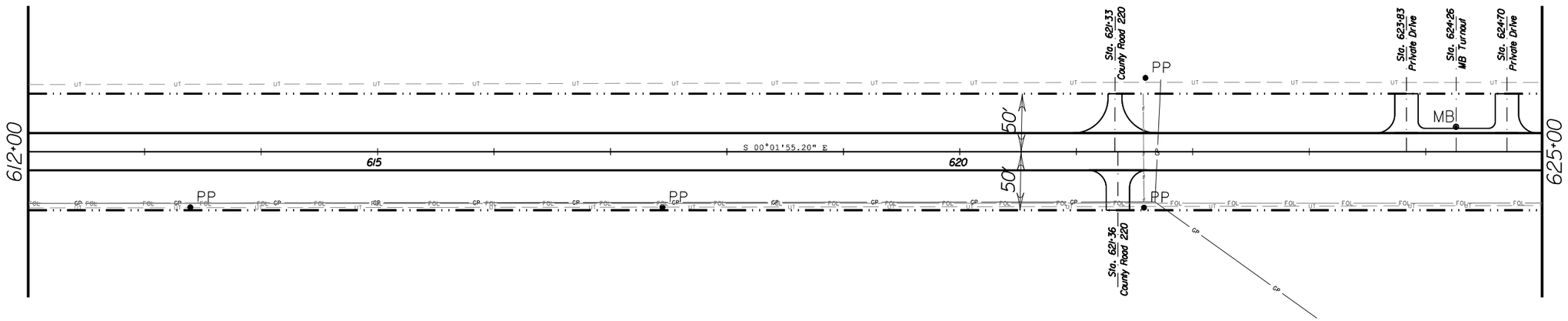


LEGEND	
UT	Underground Telephone
FOC	Buried Fiber Optic Cable
GP	Underground Gas



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SCALE: 1" = 100' Sheet 8 of 24

PLAN

STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		65
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_RDW_PLANSHEETS.dgn		

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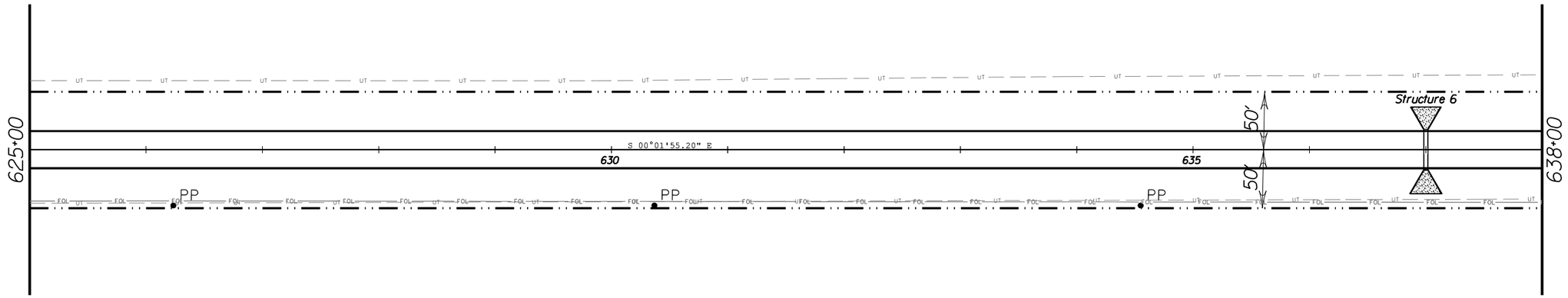
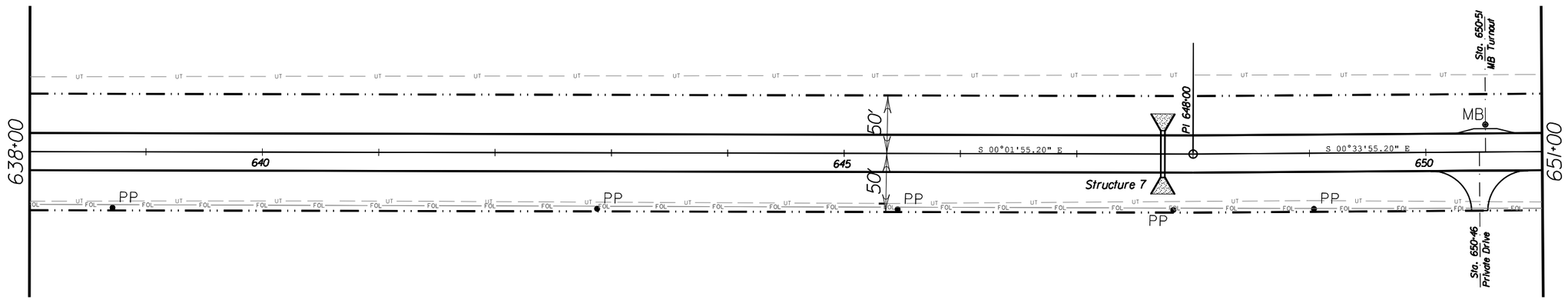


LEGEND

UT	Underground Telephone
FOC	Buried Fiber Optic Cable
GP	Underground Gas



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SCALE: 1" = 100' Sheet 9 of 24

STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		66
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_RDW_PLANSHEETS.dgn		

PLAN

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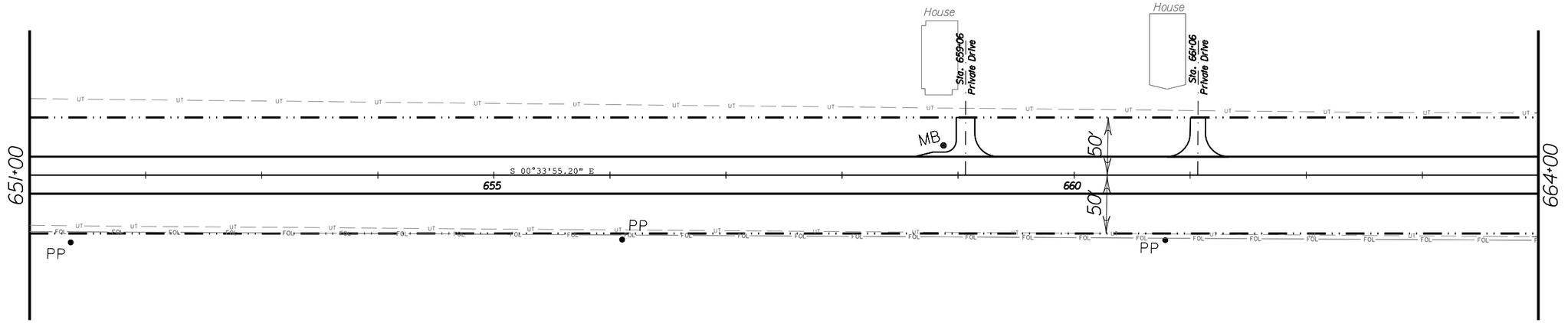


LEGEND

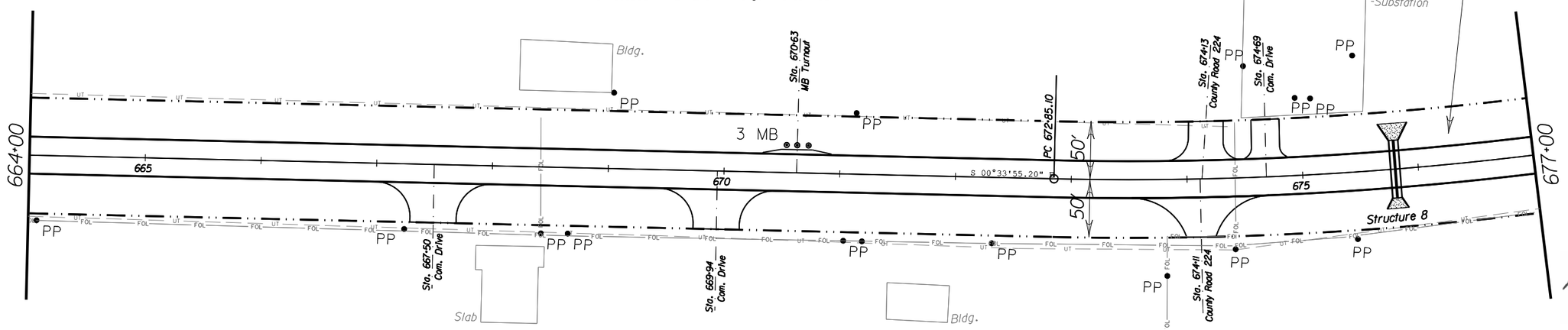
UT	Underground Telephone
FOC	Buried Fiber Optic Cable
GP	Underground Gas

CURVE 3
FINISHED SLOPES

	STA.	℄	℄	STA.	
A	670+36	-0.020	-0.020	683+58	A
B	671+21	-0.020	0.000	682+73	B
C	672+06	-0.020	0.020	681+88	C
D	673+67	-0.058	0.058	680+27	D

e = 0.0580 RL = 246' Tangent Runout = 85'

600 CY of Excavation (Roadway) included to lower the ditch flowline approx. 12 inches from STA. 675+00 LEFT to STA. 684+00 LEFT



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SCALE: 1" = 100' Sheet 10 of 24

PLAN

STATE DIST. NO.	COUNTY			SHEET NO.
05	CROSBY			67
CONT.	SECT.	JOB	HIGHWAY NO.	
0453	04	024	SH 207	
FILE	SH207_RDW_PLANSHEETS.dgn			

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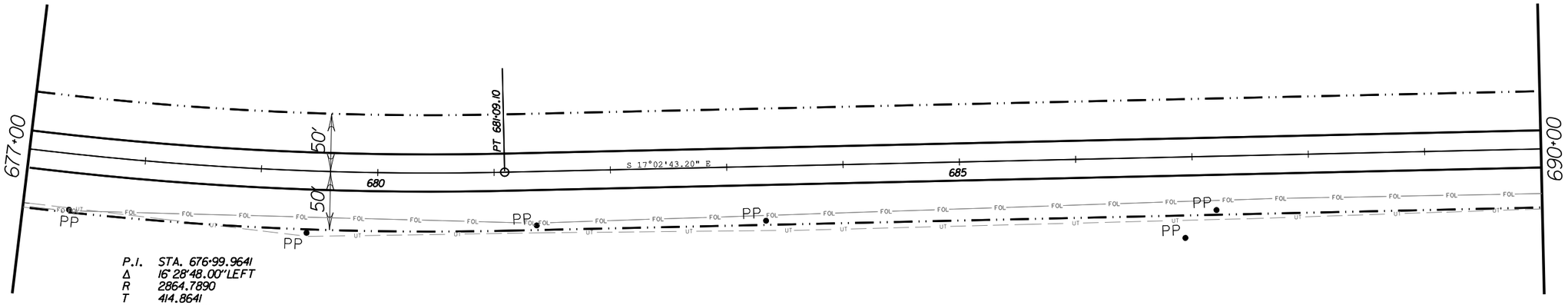
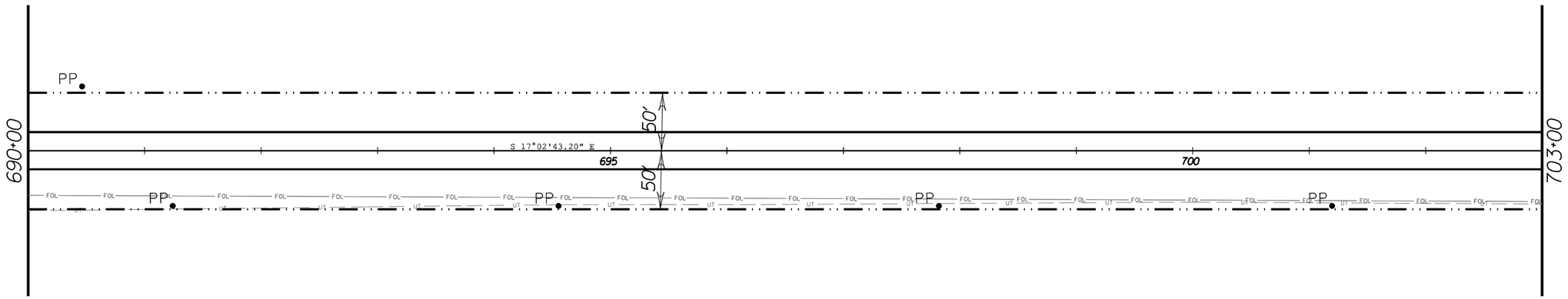


P.I. STA. 676+99.9641
Δ 16°28'48.00"LEFT
R 2864.7890
T 414.8641
L 824.0000

LEGEND

- UT — Underground Telephone
- FOC — Buried Fiber Optic Cable
- GP — Underground Gas



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Texas Department of Transportation

SCALE: 1" = 100' Sheet 11 of 24

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		68
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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PLAN

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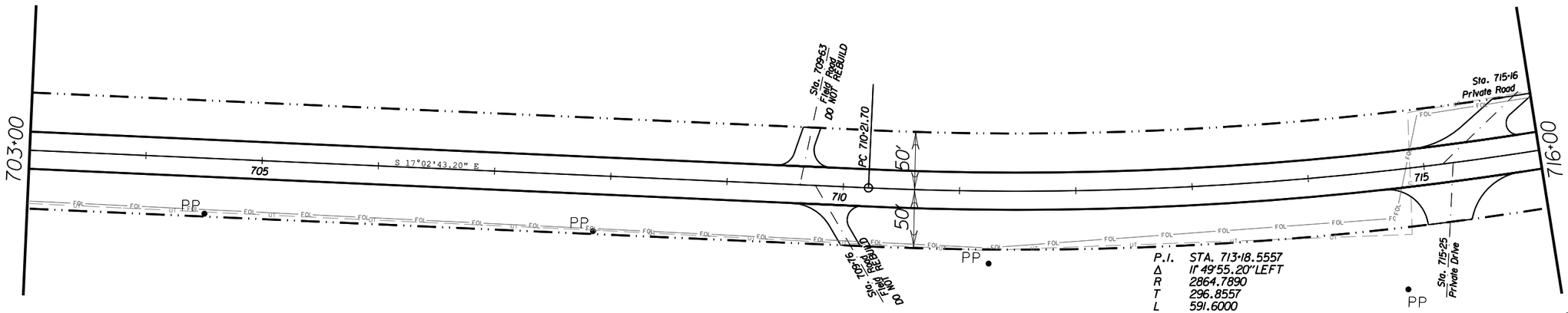
CURVE 4
FINISHED SLOPES

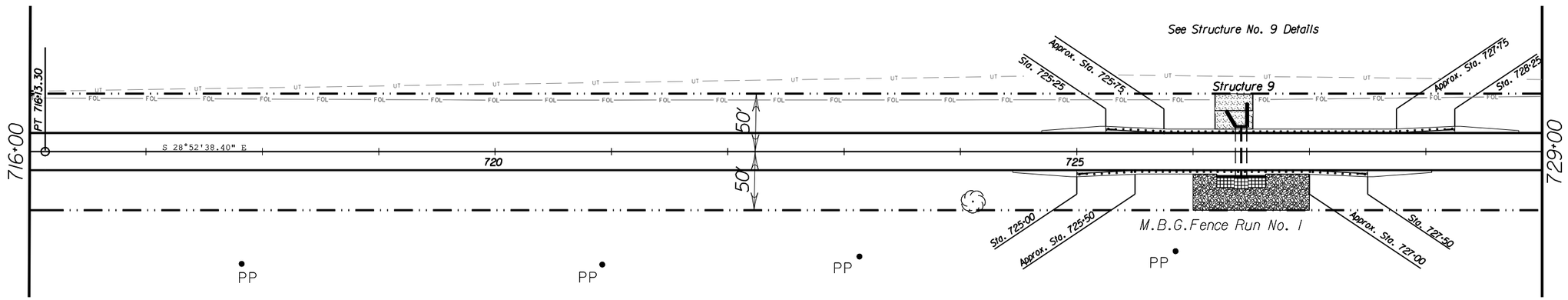
	STA.	℄		STA.	
A	707+73	-0.020	-0.020	718+62	A
B	708+58	-0.020	0.000	717+77	B
C	709+43	-0.020	0.020	716+92	C
D	711+04	-0.058	0.058	715+31	D

e = 0.0580 RL = 246' Tangent Runout = 85'



LEGEND

UT	Underground Telephone
FOC	Buried Fiber Optic Cable
GP	Underground Gas



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SCALE: 1" = 100' Sheet 12 of 24

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		69
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_RDW_PLANSHEETS.dgn		

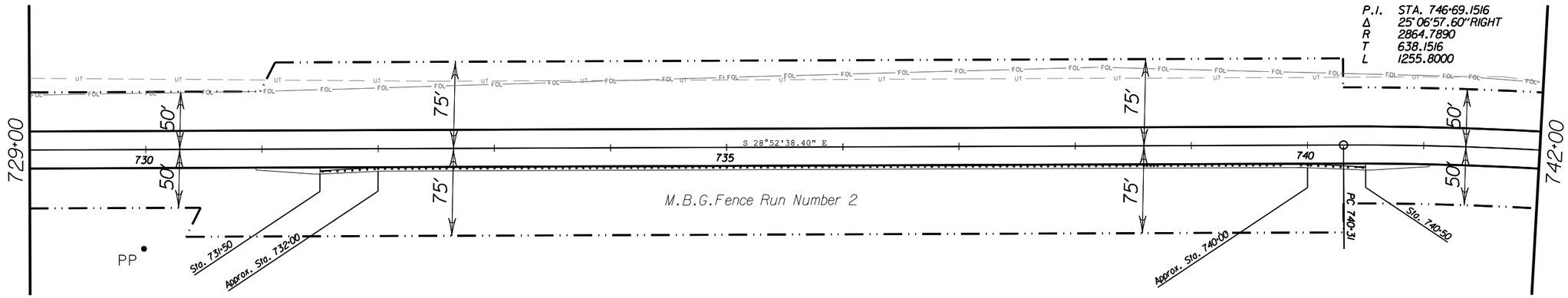
PLAN

DATE: 6/29/2022 11:14:22 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0453040241\4 - Design\Plan Set\3. Roadway\SH207_RDW_PLANSHEETS.dgn

CURVE 5
FINISHED SLOPES

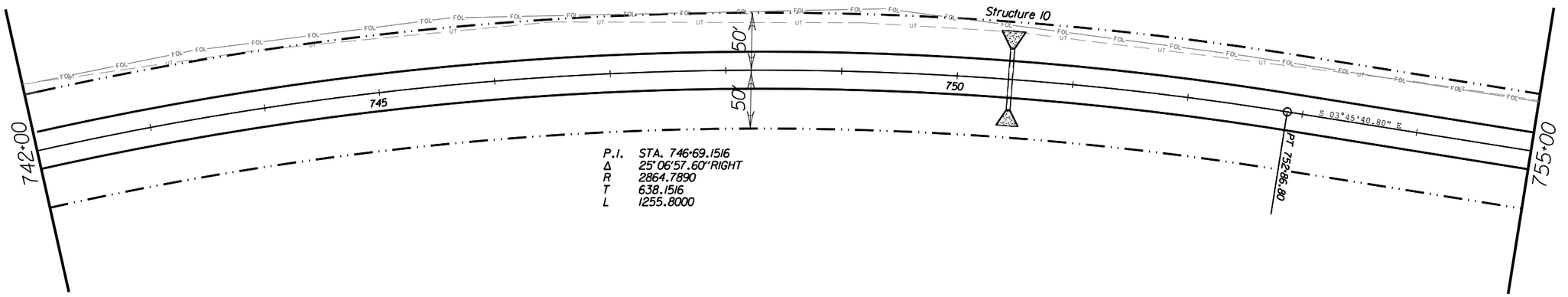
	STA.	℄	℄	STA.
A	737+82	-0.020	-0.020	755+36 • A
B	738+67	0.000	-0.020	754+51 • B
C	739+52	0.020	-0.020	753+66 • C
D	741+13	0.058	-0.058	752+05 • D

e • 0.0580 RL • 246' Tangent Runout • 85'



LEGEND

UT	Underground Telephone
FOC	Buried Fiber Optic Cable
GP	Underground Gas



STATE OF TEXAS
SHELLEY C. HARRIS
99197
LICENSED
PROFESSIONAL ENGINEER

Shelley C. Harris, P.E.
6/29/2022

Texas Department of Transportation

SCALE: 1" • 100' Sheet 13 of 24

STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		70
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_RDW_PLANSHEETS.dgn		

PLAN

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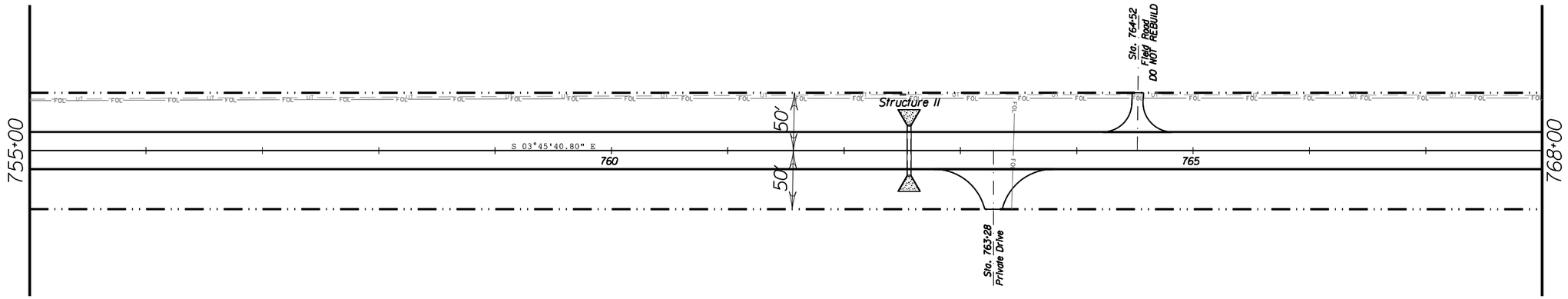
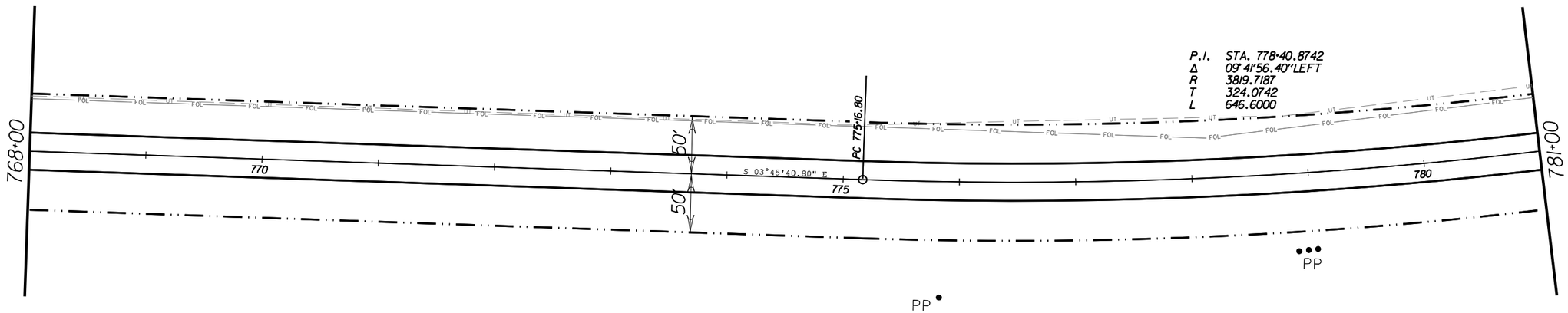


LEGEND	
UT	Underground Telephone
FOC	Buried Fiber Optic Cable
GP	Underground Gas

CURVE 6
FINISHED SLOPES

	STA.	℄		STA.	
A	772+79	-0.020	-0.020	784+01	A
B	773+67	-0.020	0.000	783+13	B
C	774+55	-0.020	0.020	782+25	C
D	775+91	-0.051	0.051	780+89	D
e = 0.0510		RL = 224'		Tangent Runout = 88'	



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SCALE: 1" = 100'

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PLAN

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		71
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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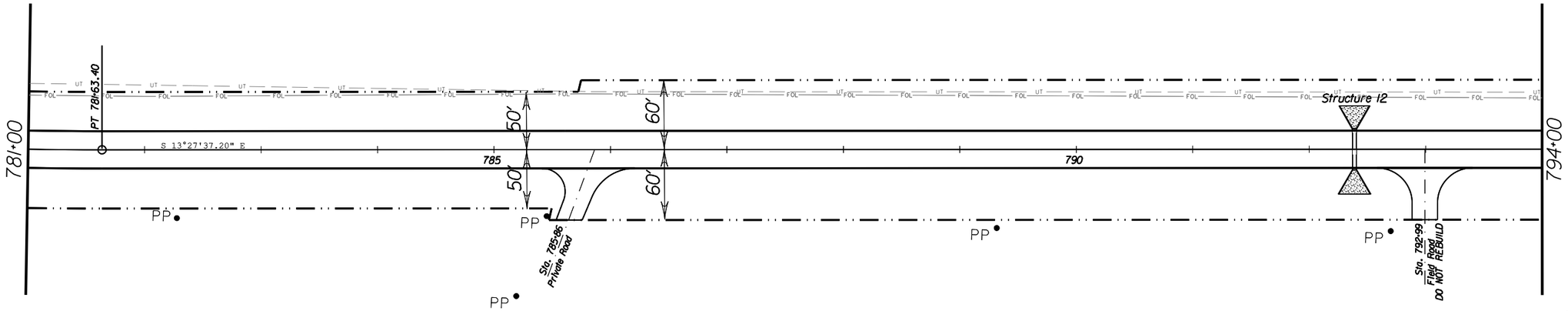
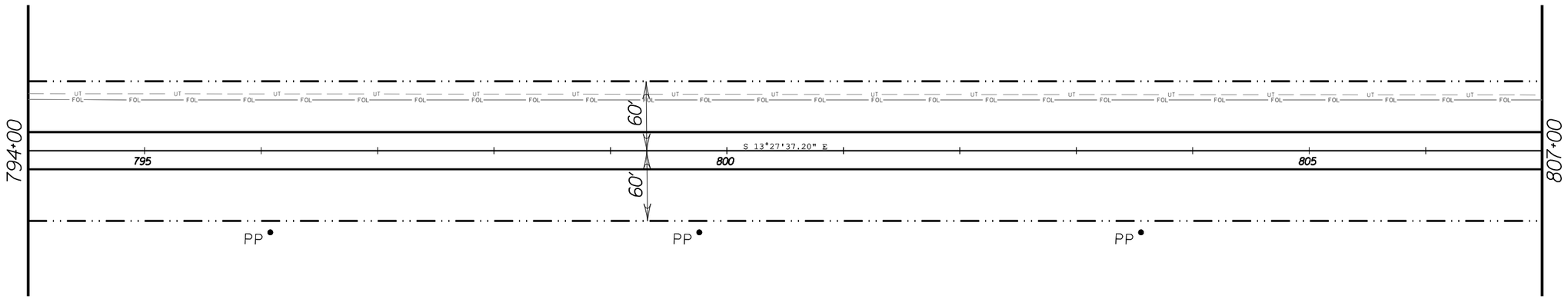


LEGEND

UT	Underground Telephone
FOC	Buried Fiber Optic Cable
GP	Underground Gas



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SCALE: 1" = 100'

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STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		72
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_RDW_PLANSHEETS.dgn		

PLAN

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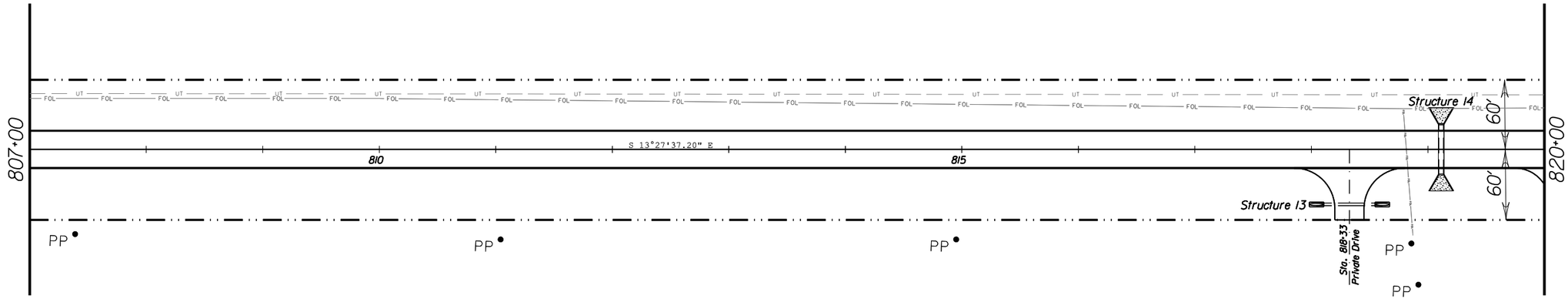
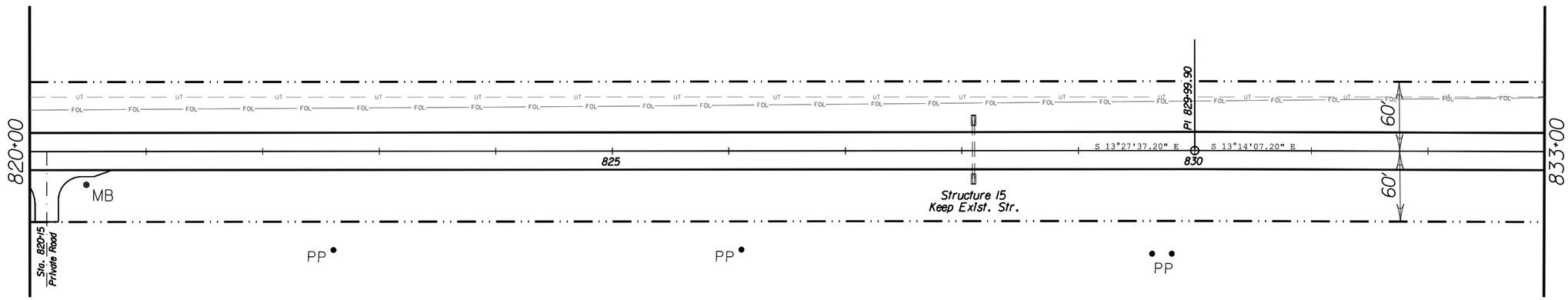


LEGEND	
UT	Underground Telephone
FOC	Buried Fiber Optic Cable
GP	Underground Gas



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SCALE: 1" = 100'

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STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		73
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_RDW_PLANSHEETS.dgn		

PLAN

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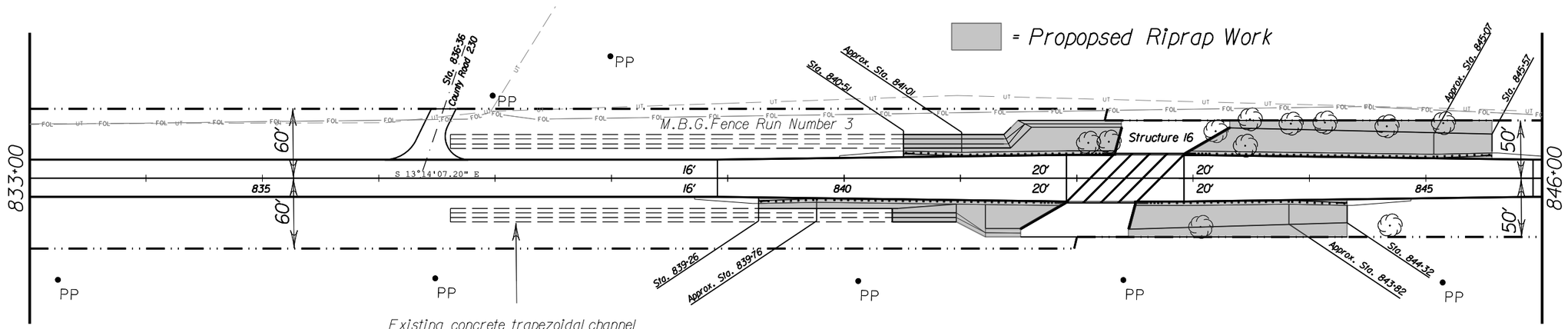


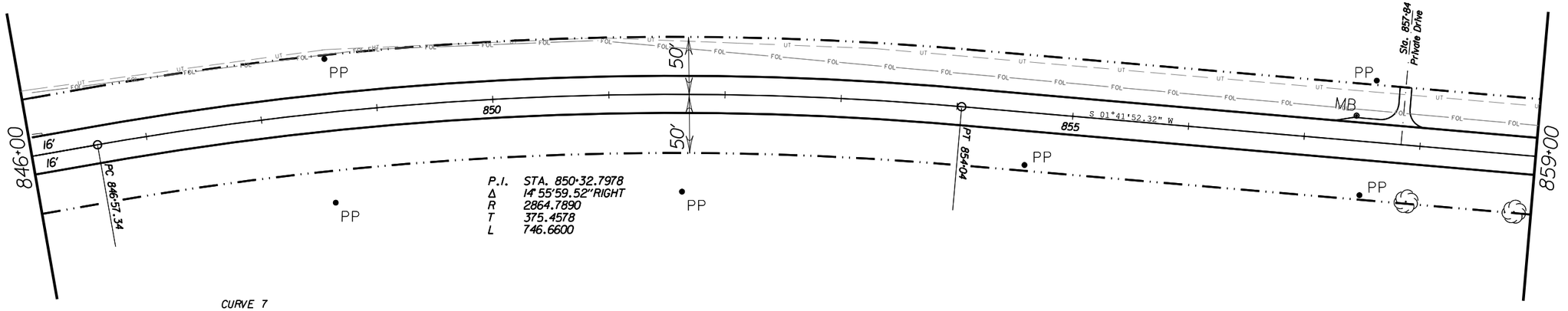
Existing concrete trapezoidal channel (both sides of road)

Note: Begin 75:1 Edge-of-Pavement Taper at STA. 838+91. Taper road width from 32 feet wide to 40 feet wide at STA 841+91.

Note: Begin 75:1 Edge-of-Pavement Taper at STA. 842+92. Taper road width from 40 feet wide back down to 32 feet wide at STA 845+92.

LEGEND

UT	Underground Telephone
FOC	Buried Fiber Optic Cable
GP	Underground Gas



P.I. STA. 850+32.7978
Δ 14° 55'59.52" RIGHT
R 2864.7890
T 375.4578
L 746.6600

CURVE 7
FINISHED SLOPES

	STA.	℄		STA.
A	844+08	-0.020	-0.020	856+53 A
B	844+93	0.000	-0.020	855+68 B
C	845+78	0.020	-0.020	854+83 C
D	847+39	0.058	-0.058	853+22 D

e = 0.0580 RL = 246' Tangent Runout = 85'

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SCALE: 1" = 100' Sheet 17 of 24

PLAN

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		74
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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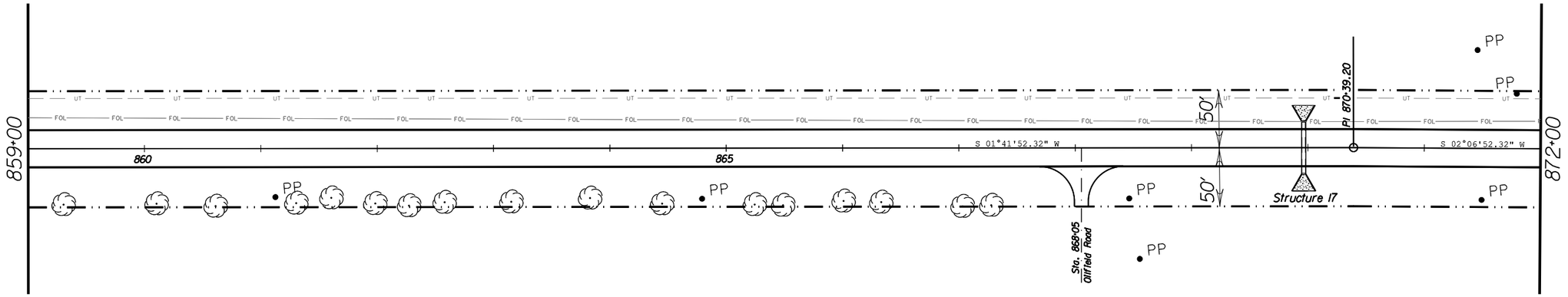

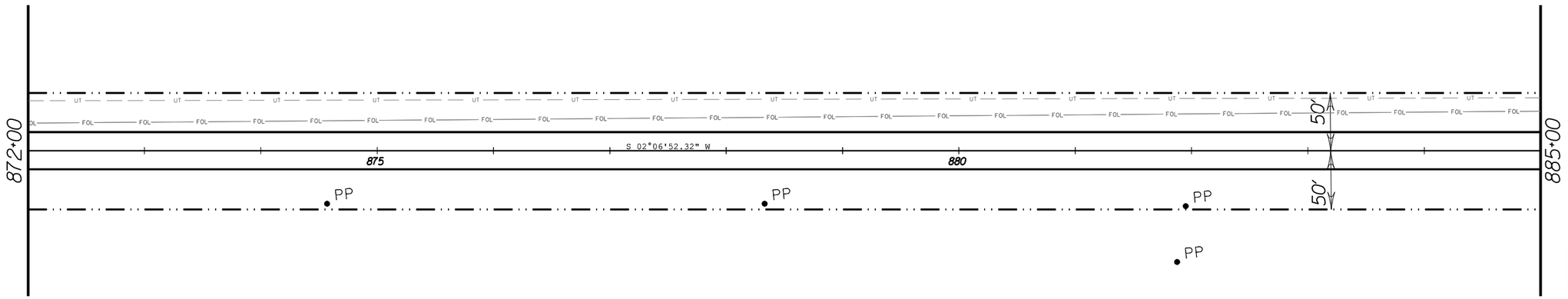

LEGEND	
UT	Underground Telephone
FOC	Buried Fiber Optic Cable
GP	Underground Gas

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SCALE: 1" = 100'

Sheet 18 of 24

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		75
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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PLAN

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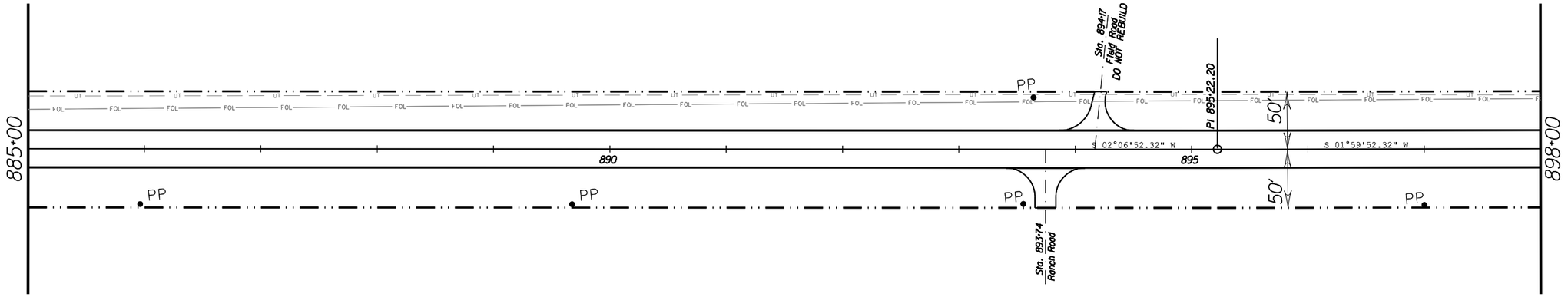

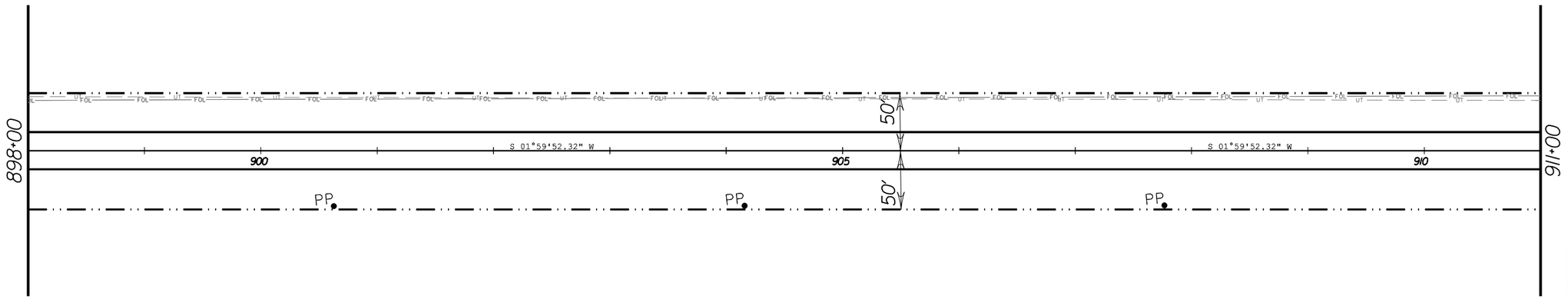

LEGEND

UT	Underground Telephone
FOC	Buried Fiber Optic Cable
GP	Underground Gas

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STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		76
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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PLAN

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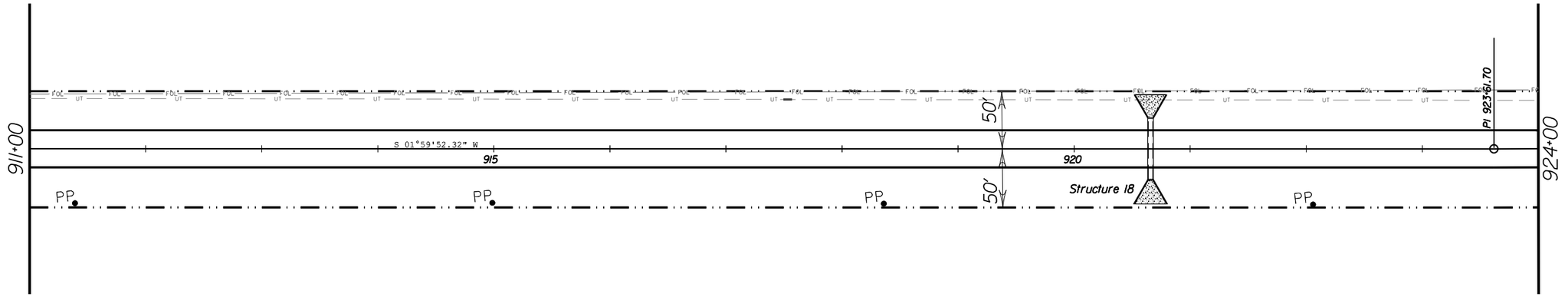
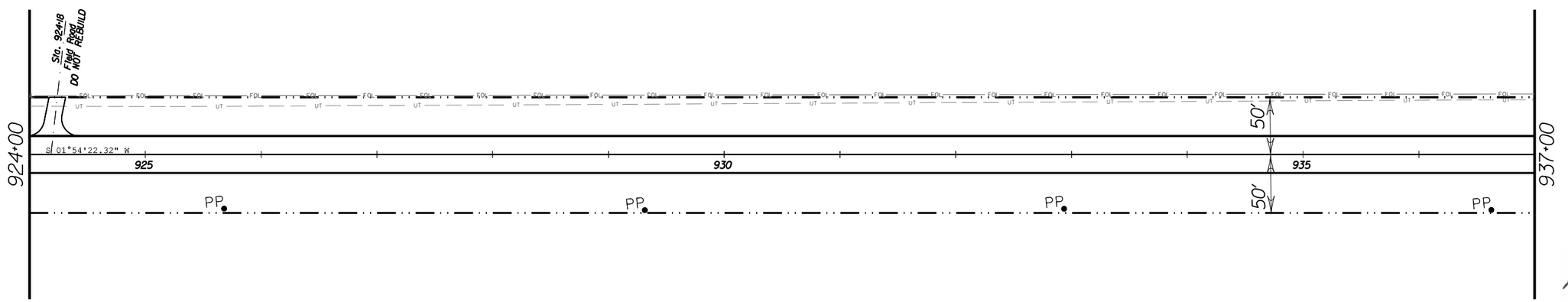


LEGEND	
UT	Underground Telephone
FOC	Buried Fiber Optic Cable
GP	Underground Gas



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SCALE: 1" = 100' Sheet 20 of 24

PLAN

STATE DIST. NO.	COUNTY			SHEET NO.
05	CROSBY			77
CONT.	SECT.	JOB	HIGHWAY NO.	
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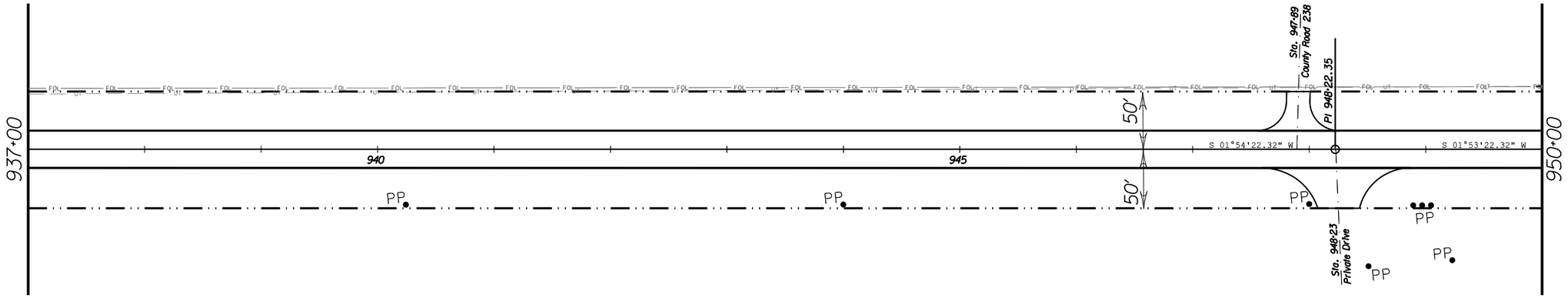
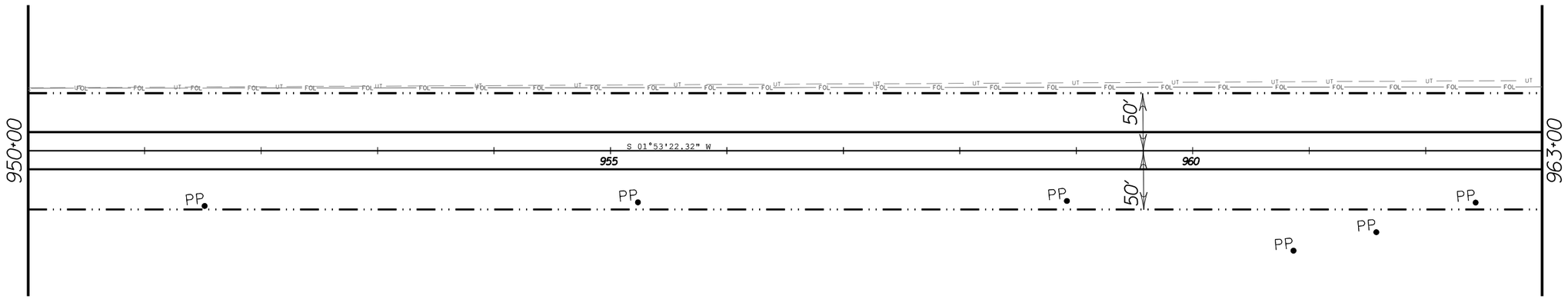


LEGEND

UT	Underground Telephone
FOC	Buried Fiber Optic Cable
GP	Underground Gas



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SCALE: 1" = 100'

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PLAN

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		78
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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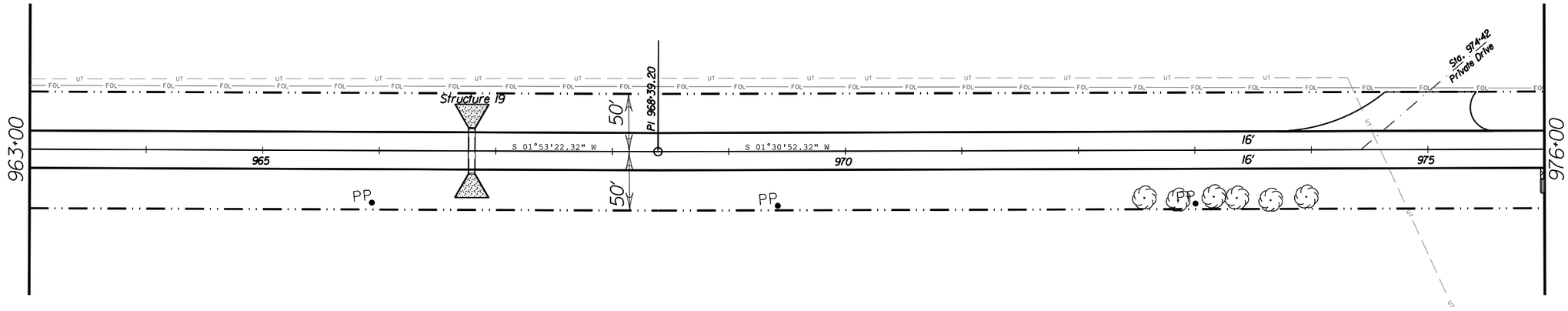
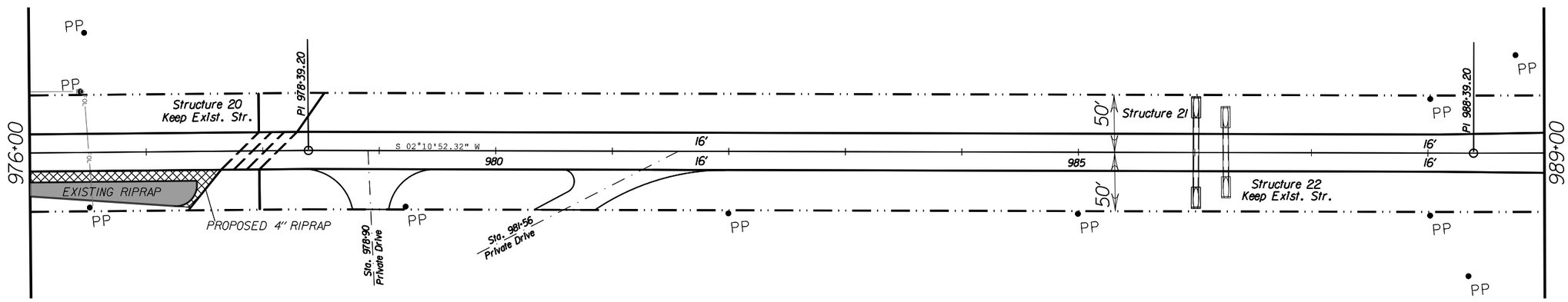


LEGEND

UT	Underground Telephone
FOC	Buried Fiber Optic Cable
GP	Underground Gas



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SCALE: 1" = 100' Sheet 22 of 24

PLAN

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		79
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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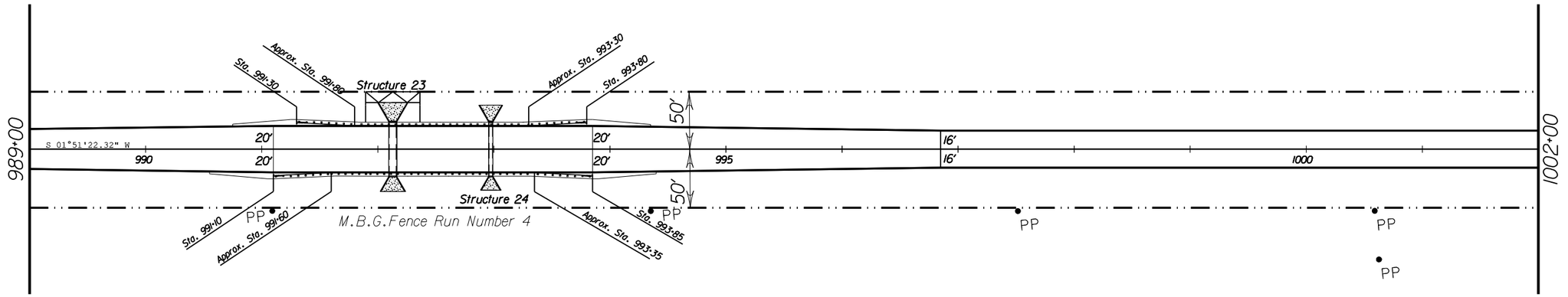

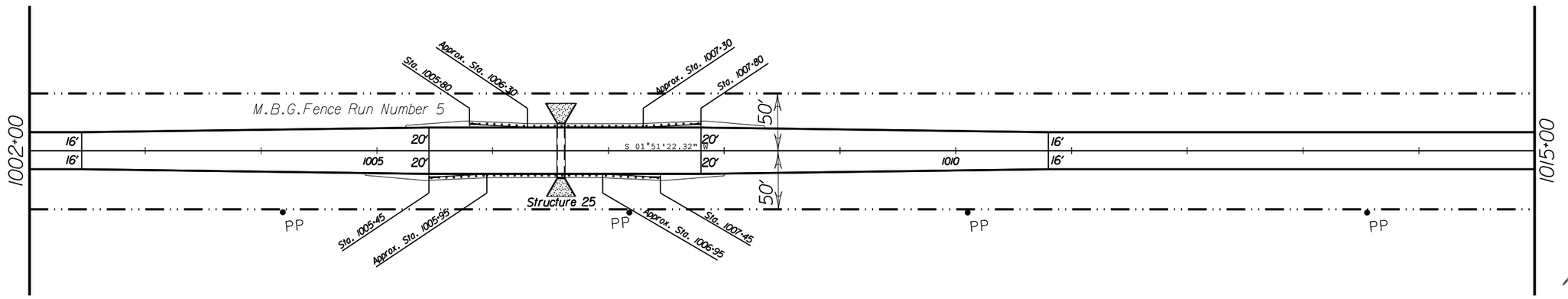

LEGEND	
UT	Underground Telephone
FOC	Buried Fiber Optic Cable
GP	Underground Gas

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SCALE: 1" = 100' Sheet 23 of 24

PLAN

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		80
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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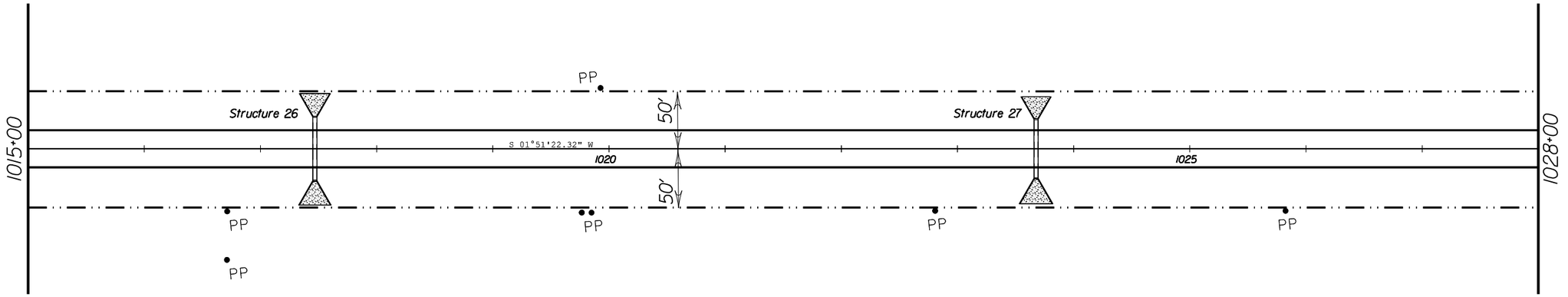

LEGEND	
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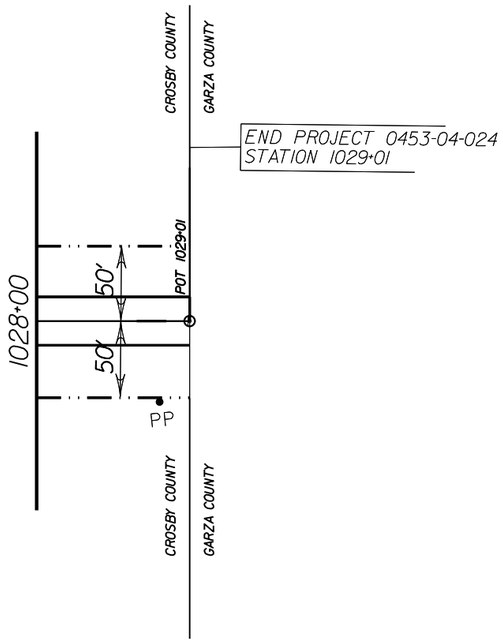
FOC	Buried Fiber Optic Cable
GP	Underground Gas



PLAN

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SCALE: 1" = 100' Sheet 24 of 24

STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		81
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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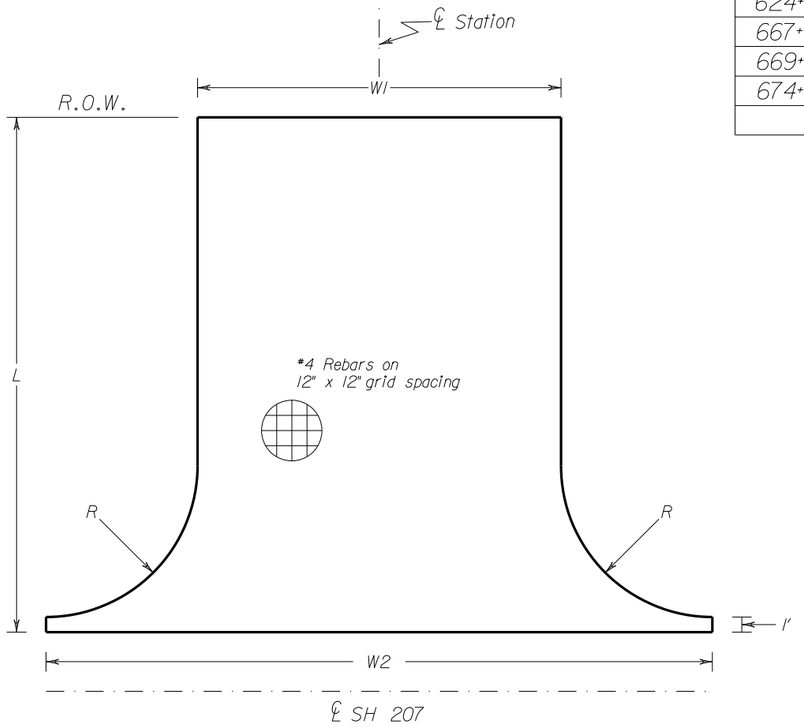
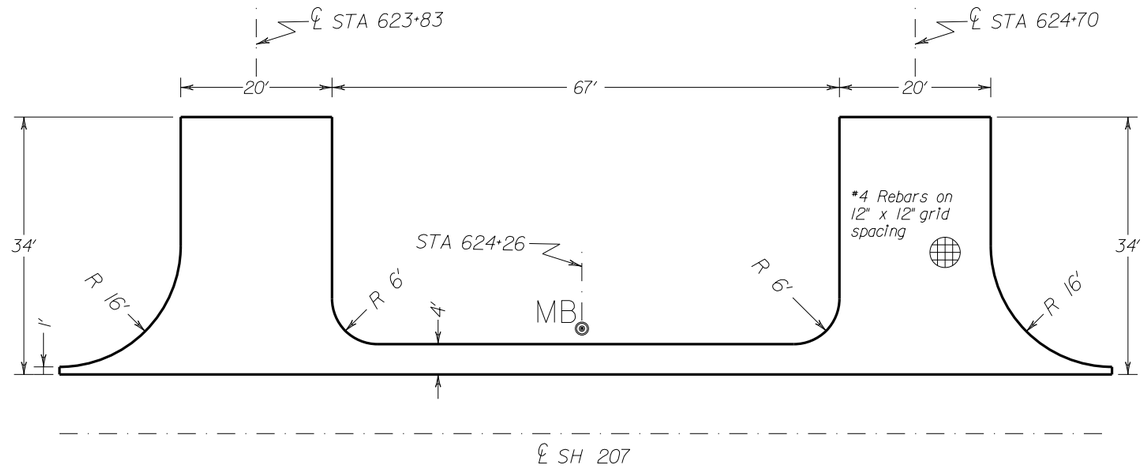
Driveways (Concrete)								
Station	Lt or Rt	W1 (FT)	W2 (FT)	L (FT)	R (FT)	Thickness (IN)	Pay Area (SY)	Rmvl. Area (SY)
624+26	Lt	20	20	34	16	6	199	130
667+50	Rt	40	100	34	30	6	195	
669+94	Rt	40	100	34	30	6	195	
674+69	Lt	24	36	34	10	6	96	96
						Project Total	685	226



RURAL CONCRETE DRIVEWAY



COMBINED CONCRETE DRIVEWAY WITH MAILBOX TURNOUT

STA 623+83 to STA 624+70
Proposed 6" Conc. Driveway Area = 199 SY

GENERAL NOTES:

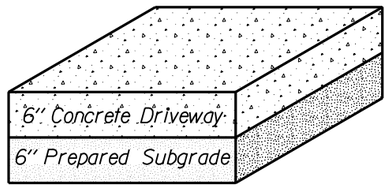
Use Class A concrete.

Some minor excavation & embankment may be required. This work is considered subsidiary.

Saw cut asphalt or other types of pavement for removal when placing driveways. This work is considered subsidiary.

All driveways are dip driveways except for driveways with culverts.

A straight form board shall be used when placing concrete driveways adjacent to the edge of pavement - the vertical edge of pavement structure shall not be used as a form for concrete driveways. Any patching or sealing between proposed concrete driveways and the edge of pavement must be performed using an approved material and in a way that is approved by the engineer. This work shall be considered subsidiary to payment for driveways.



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NO SCALE Sheet 1 of 2

DRIVEWAY & INTERSECTION DETAILS

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		82
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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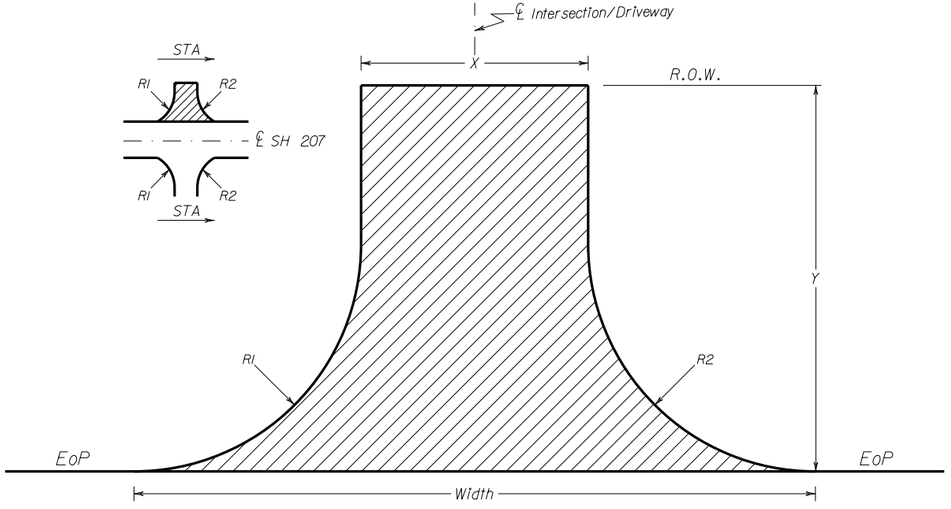
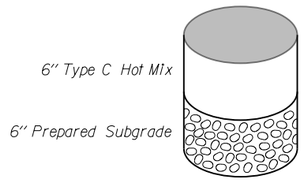
Intersections (Hot Mix)									
Dimensions and Item 530 (Intersections) Pay Area									Contractor's Info.
Station	Description	Lt or Rt	Width (FT)	X (FT)	Y (FT)	RI (FT)	R2 (FT)	Area (SY)	Hot-Mix [920LBS/SY] (TONS)
425+57	FM 40	Lt	127	34	34	50	50	222	102
425+81	CR 202	Rt	50	19	34	15	15	85	39
469+32	CR 206	Rt	97	27	34	35	35	162	75
499+11	CR 210	Lt	72	12	34	30	30	89	41
515+76	CR 212	Rt	76	16	34	30	30	104	48
568+54	CR 216	Rt	74	24	34	25	25	122	56
568+58	CR 216	Lt	66	16	34	25	25	90	41
621+33	CR 220	Lt	72	12	34	30	30	88	40
621+36	CR 220	Rt	50	20	34	15	15	87	40
674+11	CR 224	Rt	119	26	34	50	50	192	88
674+13	CR 224	Lt	66	30	34	20	15	128	59
836+36	CR 230	Lt	72	21	44	30	20	136	63
947+89	CR 238	Lt	70	20	34	25	25	107	49
Project Total								1612	742



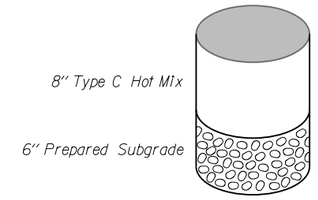
SH 207

HOT MIX DRIVEWAY & INTERSECTIONS

Driveways (Hot Mix)								
Dimensions and Item 530 (Driveways) Pay Area								Contractor's Info
Station	Lt or Rt	Width (FT)	X (FT)	Y (FT)	RI (FT)	R2 (FT)	Area (SY)	Hot Mix [690LBS/SY] (TONS)
444+56	Rt	59	29	34	15	15	121	42
450+22	Rt	68	20	34	20	20	112	39
482+05	Lt	72	12	34	30	30	89	31
491+91	Rt	36	12	34	12	12	53	18
548+90	Lt	70	30	34	20	20	125	43
592+38	Rt	85	25	34	30	30	139	48
650+46	Rt	85	14	34	35	35	111	38
659+06	Lt	56	16	34	20	20	79	27
661+06	Lt	54	13	34	20	20	69	24
715+16	Lt	95	37	34	80	10	166	57
715+25	Rt	117	38	34	35	50	221	76
763+28	Rt	103	15	34	45	45	144	50
785+86	Rt	80	23	44	20	40	151	52
818+33	Rt	95	25	44	35	35	182	63
820+15	Rt	80	20	44	30	30	142	49
857+84	Lt	40	10	44	15	15	48	17
868+05	Rt	72	12	34	30	30	89	31
893+74	Rt	68	18	34	25	25	99	34
948+23	Rt	124	36	34	50	45	230	79
974+42	Lt	187	78	34	150	20	391	135
978+90	Rt	113	31	34	43	40	196	68
981+56	Rt	140	52	34	10	200	245	85
Project Total							3202	1105



HOT-MIX DRIVEWAY/MAILBOX TURNOUT DETAIL



HOT-MIX INTERSECTION DETAIL

NOTES: Removal of Existing Intersection & Driveway Material, Subgrade Preparation, Hot Mix, and Fog Seal are subsidiary to Item 530.

Existing Concrete Driveway removals shall be paid for under Item 104-6017: REMOVING CONC. (DRIVEWAYS).

Provide an Item 3076 D-GR HMA TY-C SAC-B PG70-22

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DRIVEWAY & INTERSECTION DETAILS

STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		83
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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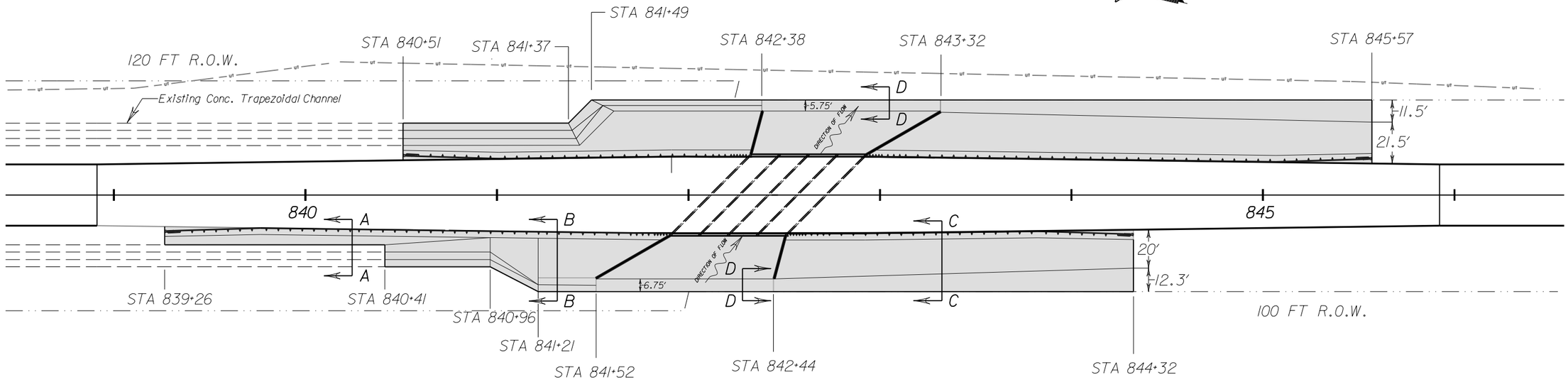
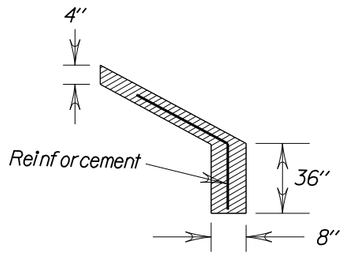
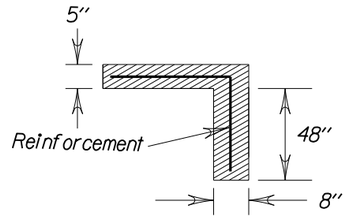
= Proposed concrete riprap

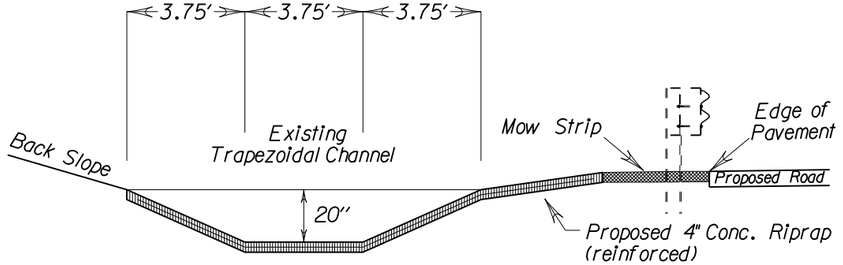




Riprap Toewall Detail



Bridge Riprap Section D-D Toewall Detail



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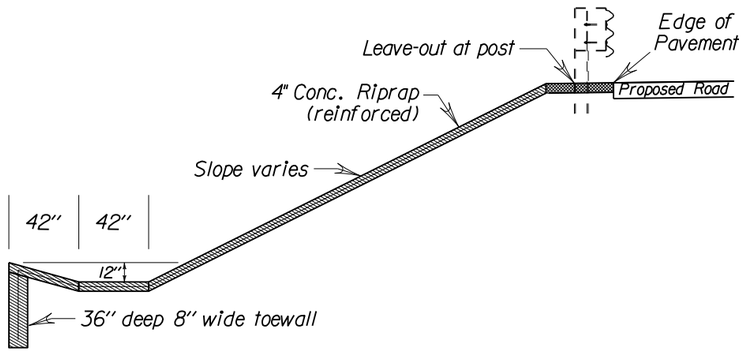

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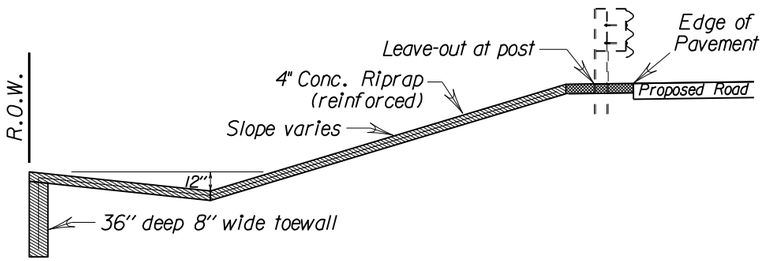

Section C-C

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6/29/2022

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RIPRAP DETAILS (Bridge)

STATE DIST. NO.	COUNTY			SHEET NO.
05	CROSBY			84
CONT.	SECT.	JOB	HIGHWAY NO.	
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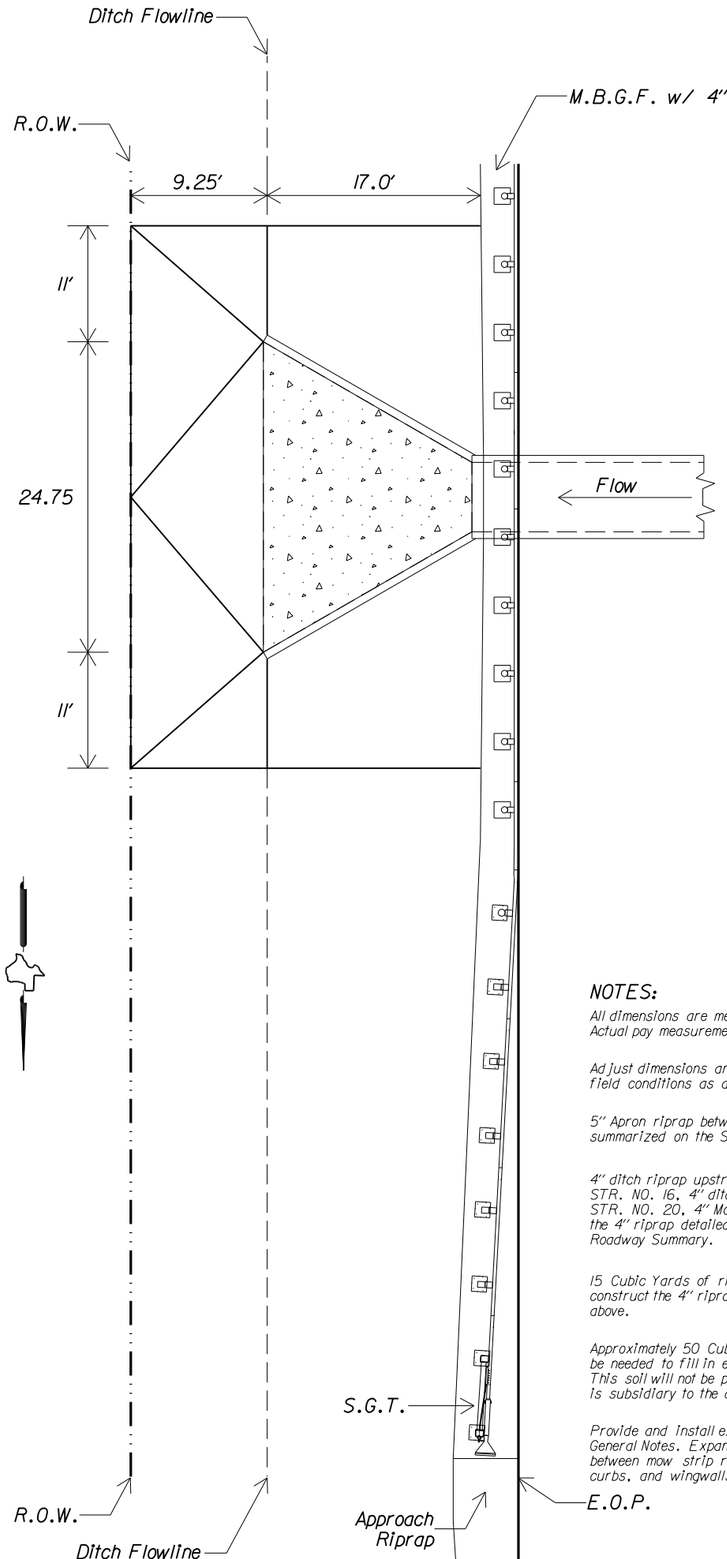
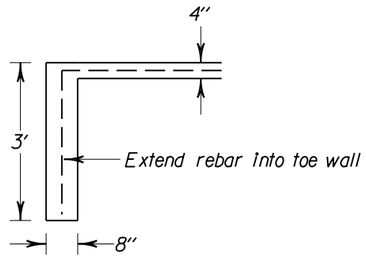
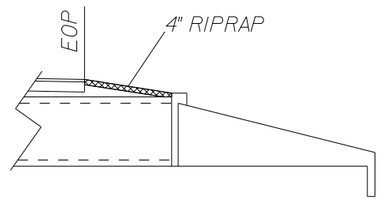
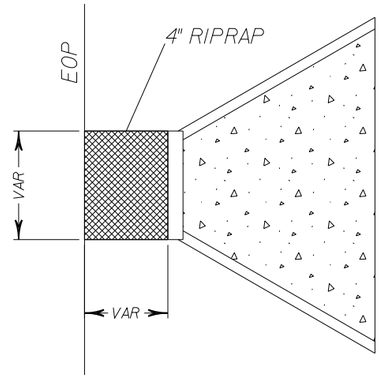




TOE WALL





TYPICAL ROAD TO CURB RIPRAP DETAL

ROAD TO CURB RIPRAP QTYS.		
Structure No.	Station	4" Riprap (CY)
1	436+83	0.4
3	497+71	0.2
4	539+64	0.9
5	595+07	0.3
6	637+00	0.2
7	647+74	0.3
8	675+80	1.5
9	726+44	0.4
10	750+46	0.9
11	762+56	0.4
12	792+39	0.3
14	816+11	0.7
15	828+10	0.4
17	869+96	1.4
18	920+66	2.3
19	966+79	0.4
21	986+01	0.9
22	986+27	1.3
23	992+13	1.2
24	992+97	0.8
25	1006+59	1.2
26	1017+47	1.0
27	1023+68	0.8

NOTES:

All dimensions are measured in the horizontal plane. Actual pay measurements will be made in the field.

Adjust dimensions and elevations to match field conditions as directed.

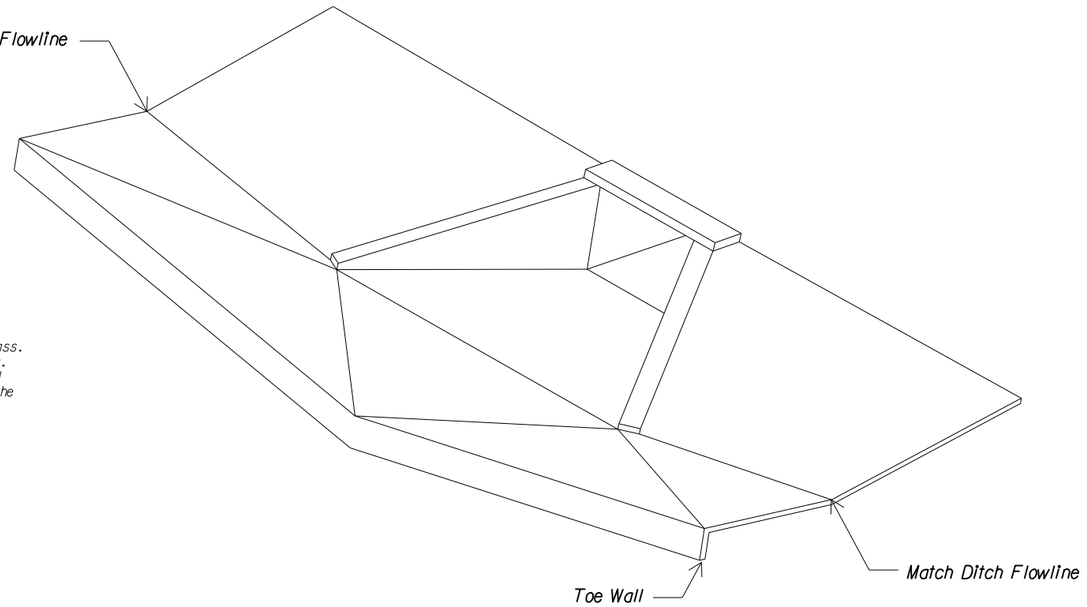
5" Apron riprap between culvert wingwalls is summarized on the Structure Summary.

4" ditch riprap upstream and downstream of Bridge Class. STR. NO. 16, 4" ditch riprap upstream of Bridge Class. STR. NO. 20, 4" Mow Strip riprap for M.B.G.F., and the 4" riprap detailed on this sheet are summarized on the Roadway Summary.

15 Cubic Yards of riprap is needed to construct the 4" riprap culvert outfall detailed above.

Approximately 50 Cubic Yards of soil will be needed to fill in existing scour spots. This soil will not be paid for directly, but is subsidiary to the apron riprap.

Provide and install expansion joint material per the General Notes. Expansion boards shall be required between mow strip riprap, 4" riprap, 5" apron riprap, curbs, and wingwalls.



RIPRAP DETAILS (STR. NO. 23 Outfall)

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6/29/2022

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STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		85
CONT.	SECT.	JOB	HIGHWAY NO.
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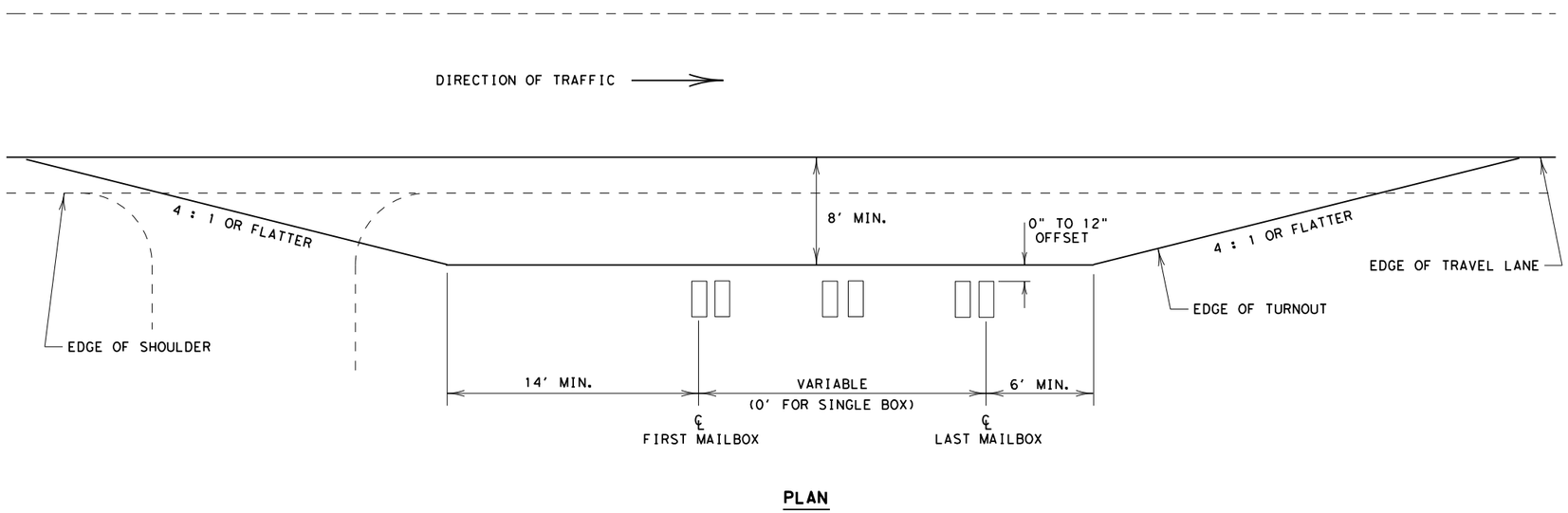
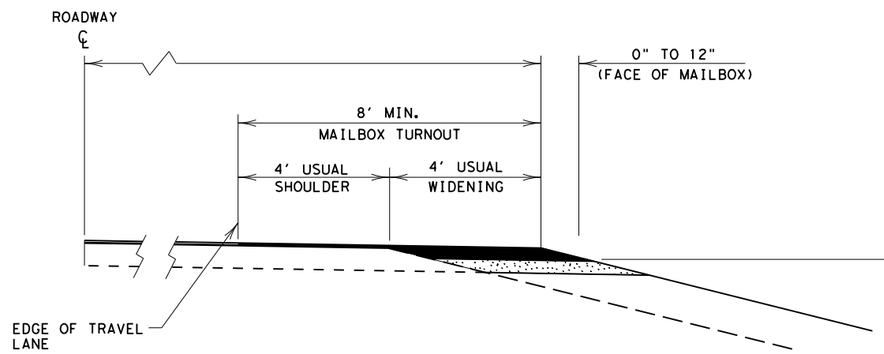


PLAN



TYPICAL SECTION

SUMMARY OF MAILBOX TURNOUTS

Mailbox Station	Lt/Rt	No. Mailboxes	Description	Area (SY)	HMA♪ (TONS)
482+27	Lt	1	Hot Mix	11	3.8
491+29	Lt	1	Hot Mix	16	5.5
548+51	Lt	1	Hot Mix	11	3.8
592+50	Lt	1	Hot Mix	16	5.5
♪624+20	Lt	1	Concrete		
650+50	Lt	1	Hot Mix	16	5.5
658+80	Lt	1	Hot Mix	11	3.8
670+60	Lt	3	Hot Mix	21	7.3
820+48	Rt	2	Hot Mix	11	3.8
857+50	Lt	1	Hot Mix	14	4.8
			Project Total - Hot Mix	**127**	43.8

♪ The concrete mailbox turnout at STA 624+20L falls between 2 concrete driveways that lead to the same house and will be paid for as Concrete Driveway. The above HMA tonnage is for Contractor's Info. only.

PROPOSED PAVEMENT STRUCTURE:

6'' PREPARED SUBGRADE + 6'' TY C HOTMIX + FOG SEAL

NOTE: Provide Item 3076 D-GR HMA TY-C SAC-B PG70-22.
Any required embankment is subsidiary to Item 530.

All work and material shall be considered subsidiary to Item 530 Turnouts (ACP).

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DESIGN DETAILS FOR TYPICAL MAILBOX TURNOUTS

MBTRNOUT

FILE: mbtrnout.dgn	DN: TxDOT	CK:	DW:	CK:
©TxDOT 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	05	CROSBY		86

	STATION RANGES					
	725+70 to 727+15	732+05 to 740+55	840+65 to 846+20	991+10 to 993+80	1005+50 to 1007+60	
REMOVAL ITEMS	MBGF RUN NO. 1	MBGF RUN NO. 2	MBGF RUN NO. 3	MBGF RUN NO. 4	MBGF RUN NO. 5	PROJECT TOTALS:
Remove T.A.S. [EA]	1	1		2	2	6
Remove MBGF [LF]	75	775		350	200	1400
Remove SGT [EA]	1	1	2	2	2	8

EXIST. M.B.G.F. REMOVAL INFO

PROP. M.B.G.F. INSTALL INFO

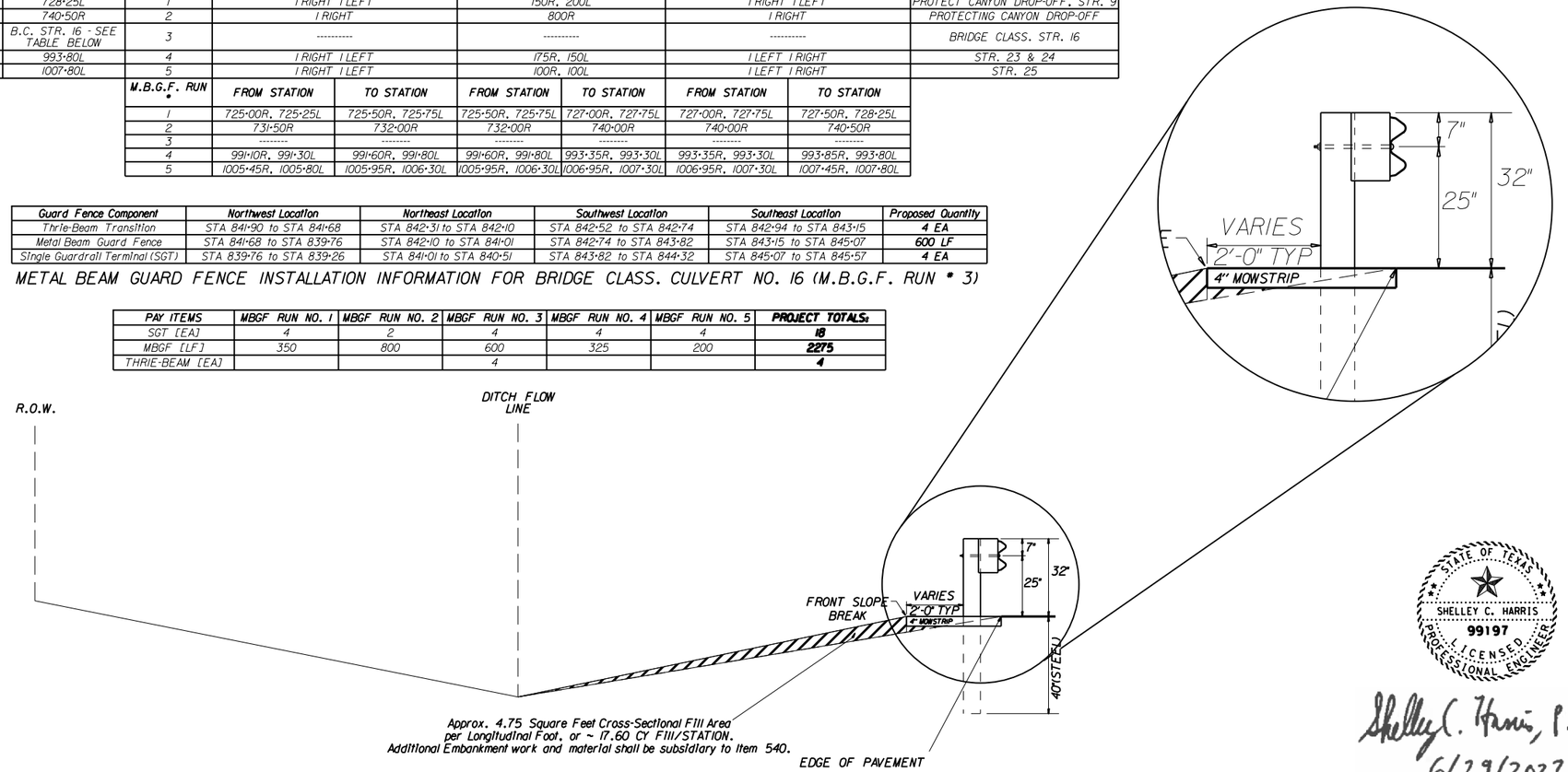
FROM STATION	TO STATION	M.B.G.F. RUN #	INSTALL PROPOSED SINGLE GUARDRAIL TERMINAL (SGT) [EA]	INSTALL PROPOSED METAL BEAM GUARD FENCE [LF]	INSTALL PROPOSED SINGLE GUARDRAIL TERMINAL (SGT) [EA]	DESCRIPTION
725+00R	728+25L	1	1 RIGHT 1 LEFT	150R, 200L	1 RIGHT 1 LEFT	PROTECT CANYON DROP-OFF, STR. 9
731+50R	740+50R	2	1 RIGHT	800R	1 RIGHT	PROTECTING CANYON DROP-OFF
B.C. STR. 16 - SEE TABLE BELOW	B.C. STR. 16 - SEE TABLE BELOW	3	----------	----------	----------	BRIDGE CLASS. STR. 16
991+10R	993+80L	4	1 RIGHT 1 LEFT	175R, 150L	1 LEFT 1 RIGHT	STR. 23 & 24
1005+45R	1007+80L	5	1 RIGHT 1 LEFT	100R, 100L	1 LEFT 1 RIGHT	STR. 25

M.B.G.F. RUN #	FROM STATION	TO STATION	FROM STATION	TO STATION	FROM STATION	TO STATION
1	725+00R, 725+25L	725+50R, 725+75L	725+50R, 725+75L	727+00R, 727+75L	727+00R, 727+75L	727+50R, 728+25L
2	731+50R	732+00R	732+00R	740+00R	740+00R	740+50R
3	--------	--------	--------	--------	--------	--------
4	991+10R, 991+30L	991+60R, 991+80L	991+60R, 991+80L	993+35R, 993+30L	993+35R, 993+30L	993+85R, 993+80L
5	1005+45R, 1005+80L	1005+95R, 1006+30L	1005+95R, 1006+30L	1006+95R, 1007+30L	1006+95R, 1007+30L	1007+45R, 1007+80L

Guard Fence Component	Northwest Location	Northeast Location	Southwest Location	Southeast Location	Proposed Quantity
Thrie-Beam Transition	STA 841+90 to STA 841+68	STA 842+31 to STA 842+10	STA 842+52 to STA 842+74	STA 842+94 to STA 843+15	4 EA
Metal Beam Guard Fence	STA 841+68 to STA 839+76	STA 842+10 to STA 841+01	STA 842+74 to STA 843+82	STA 843+15 to STA 845+07	600 LF
Single Guardrail Terminal (SGT)	STA 839+76 to STA 839+26	STA 841+01 to STA 840+51	STA 843+82 to STA 844+32	STA 845+07 to STA 845+57	4 EA

METAL BEAM GUARD FENCE INSTALLATION INFORMATION FOR BRIDGE CLASS. CULVERT NO. 16 (M.B.G.F. RUN # 3)

PAY ITEMS	MBGF RUN NO. 1	MBGF RUN NO. 2	MBGF RUN NO. 3	MBGF RUN NO. 4	MBGF RUN NO. 5	PROJECT TOTALS:
SGT [EA]	4	2	4	4	4	18
MBGF [LF]	350	800	600	325	200	2275
THRIE-BEAM [EA]			4			4



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6/29/2022

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NO SCALE Sheet 1 of 2

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		87
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_RDW_MBGFDETAILS.dgn		

METAL BEAM GUARD FENCE DETAILS

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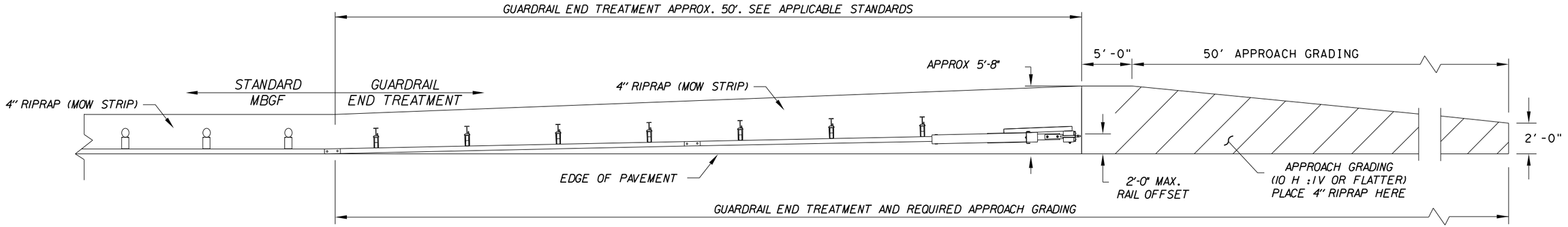

APPROACH GRADING AT GUARDRAIL END TREATMENTS

NOTES:

Approach grading & embankment is subsidiary to 4" approach riprap.

Starting at the transition from MBGF to the GET, taper the rail away from the edge-of-pavement at 25:1 taper rate.

Because of the width of the roadway, guardrail end treatments shall be installed at the upstream and downstream end.

Guardfence posts may not be set in concrete of any depth. Post block outs shall be formed.

Contractor shall complete and cure to acceptable strength the Type T223 Concrete Bridge Rail before starting metal beam guard fence work for bridge class. structure No. 16. (M.B.G.F. Run #3). The contractor shall begin the proposed metal beam guard fence work by attaching the thrie beams to the Type T223 Concrete Bridge Rail and then proceeding to the SGTs.

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METAL BEAM GUARD FENCE DETAILS

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		88
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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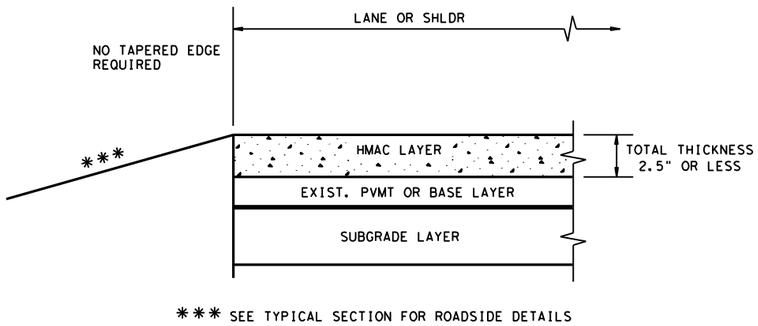
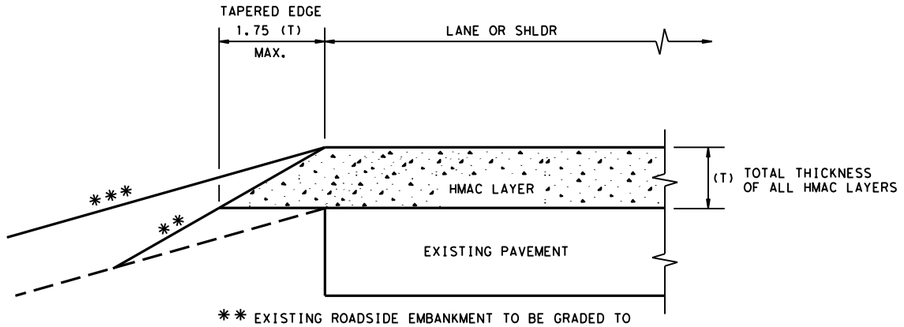


*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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



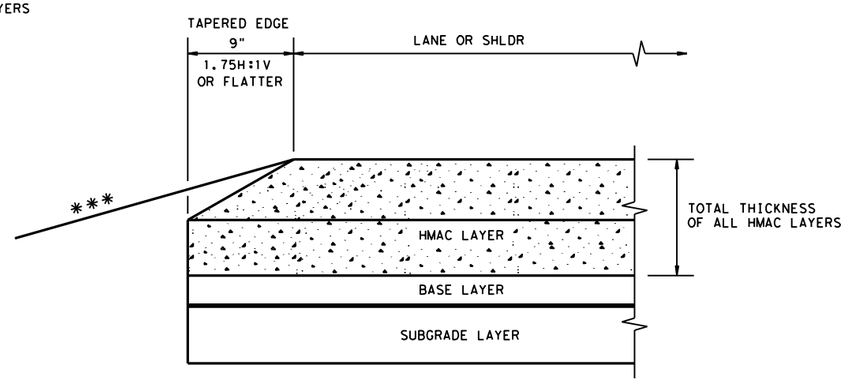
** EXISTING ROADSIDE EMBANKMENT TO BE GRADED TO PRODUCE A SMOOTH LEVEL SURFACE FOR PLACEMENT OF TAPERED EDGE. THIS WORK IS SUBSIDIARY TO THE VARIOUS BID ITEMS.

*** 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.

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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	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		89

DATE: 6/29/2022
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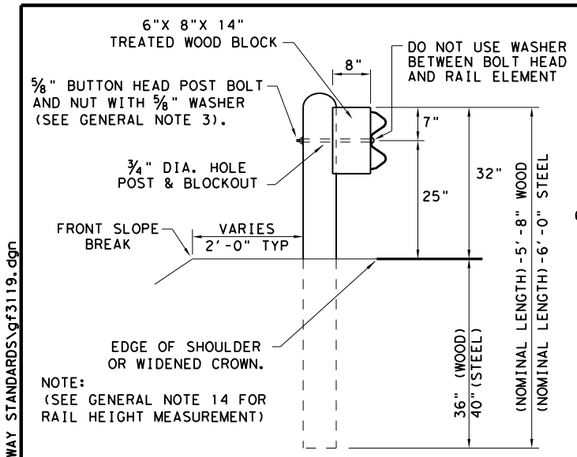
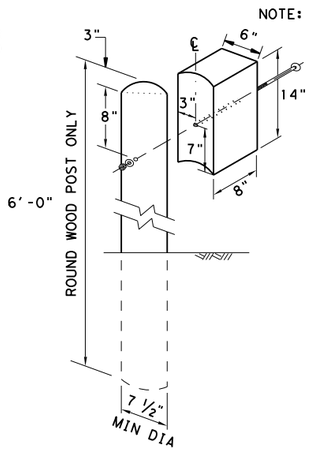


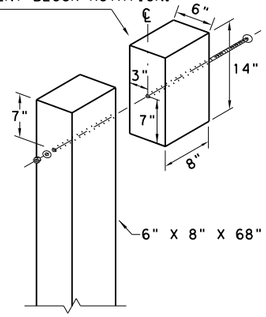
NOTE:
(SEE GENERAL NOTE 14 FOR
RAIL HEIGHT MEASUREMENT)

TYPICAL POST PLACEMENT

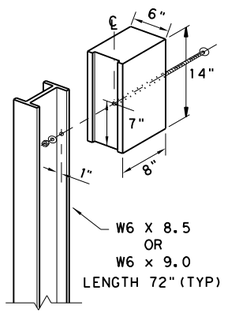


**WOOD BLOCK TO
ROUND WOOD POST**

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

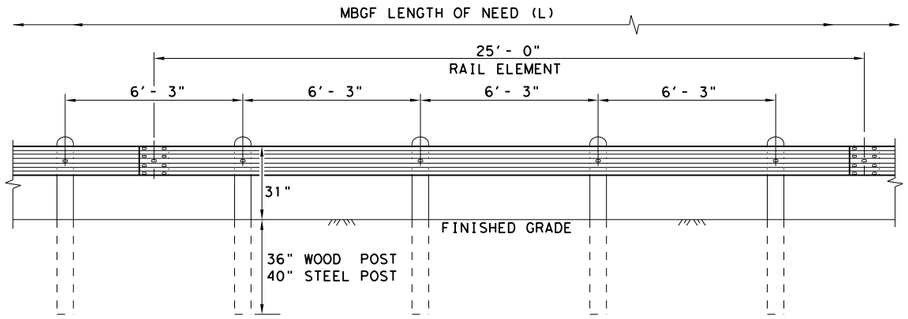


**WOOD BLOCK TO
RECTANGULAR WOOD POST**



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

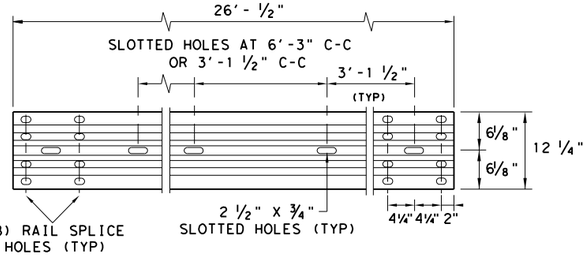
NOTE: ** "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.



DIRECTION OF TRAFFIC

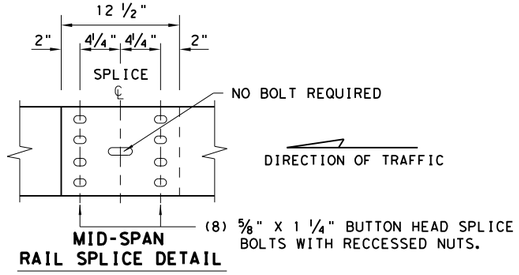
**ELEVATION
MID-SPAN RAIL SPLICE**

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.

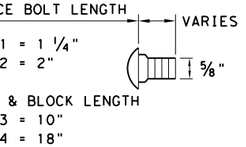


DIRECTION OF TRAFFIC

**MID-SPAN
RAIL SPLICE DETAIL**

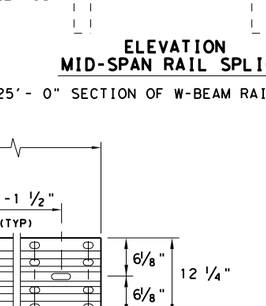
NOTE: GF(31), MID-SPAN RAIL SPLICES ARE
REQUIRED WITH 6'-3" POST SPACINGS.

NOTE:
FOUR TYPES OF BUTTON-HEAD GUARD RAIL
BOLTS COME WITH A RECCESSED NUT.



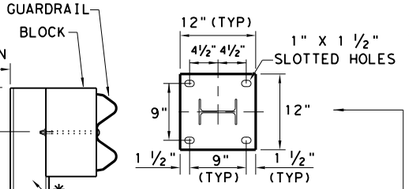
BUTTON HEAD BOLT

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



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

LOW FILL CULVERT POST



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

NOTE: TWO INSTALLATION OPTIONS.

1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. 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.

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.

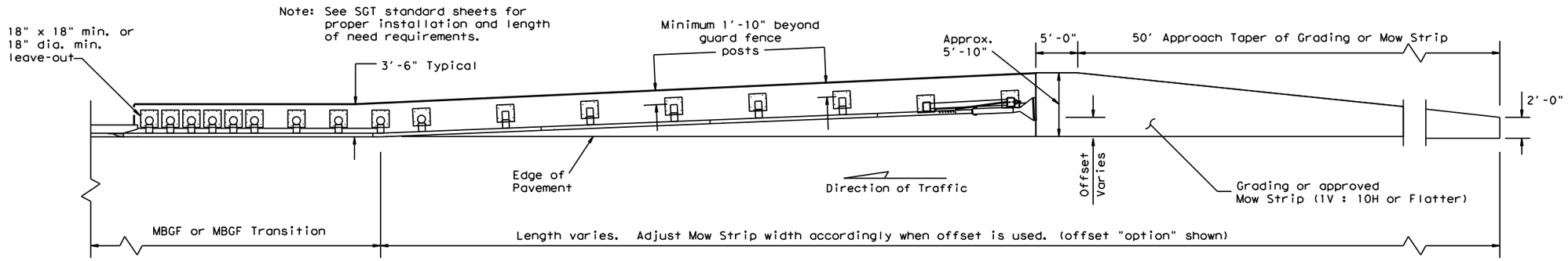
Texas Department of Transportation

Design Division Standard

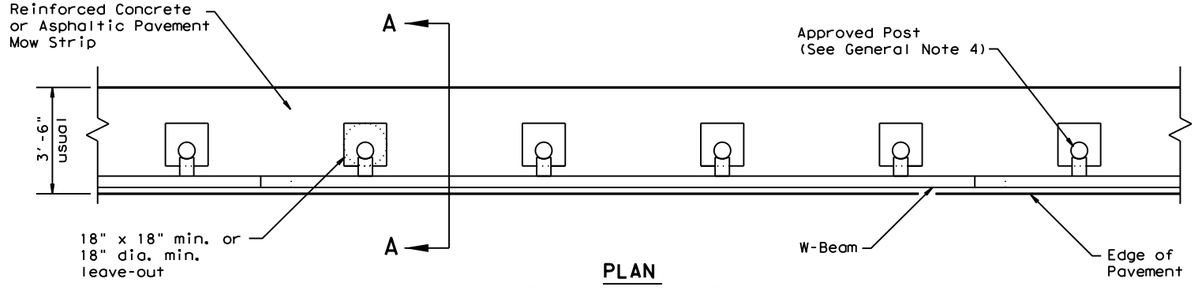
METAL BEAM GUARD FENCE
TL-3 MASH COMPLIANT
GF(31)-19

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		90

DATE: 6/29/2022
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\045304024\4 - Design\Plan Set\3. Roadway\ROADWAY STANDARDS\gf31ms19.dgn

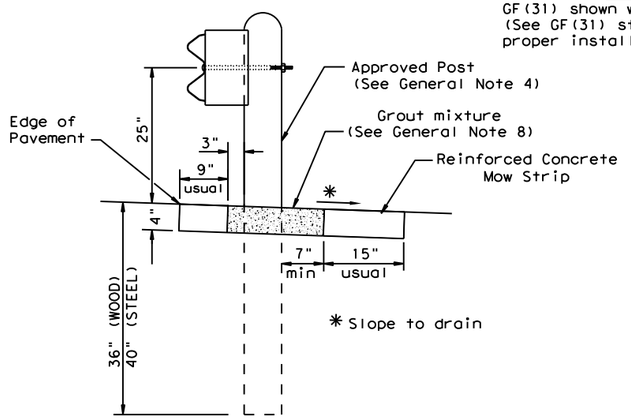


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



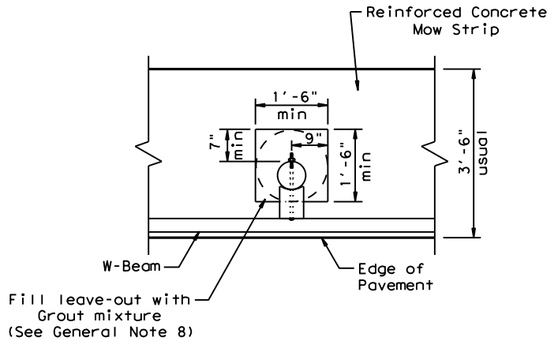
PLAN

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



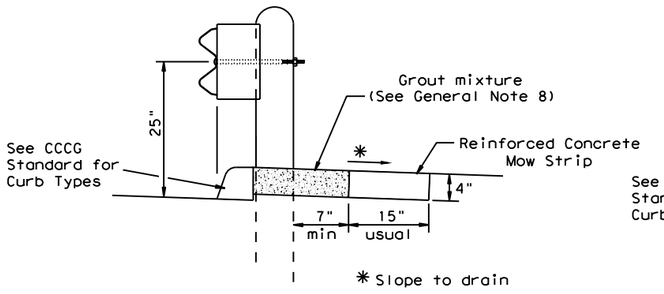
SECTION A-A

Typical



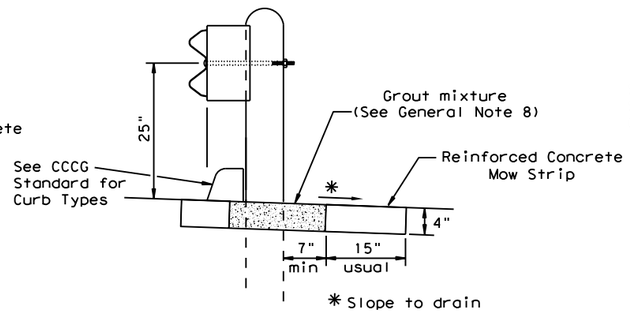
MOW STRIP DETAIL

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



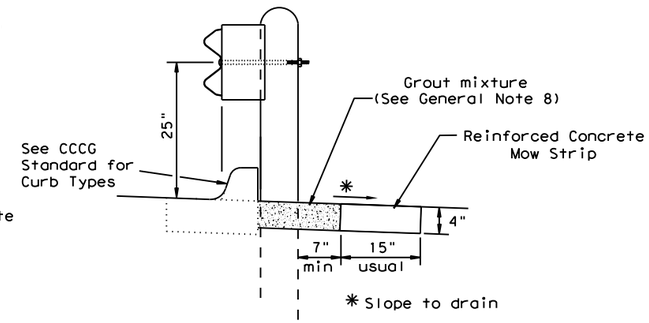
CURB OPTION (1)

This option will increase the post embedment 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 1 or II cement, and 550 pounds of water per cubic yard, with a 28-day compressive strength of approximately 230 psi or less. Provide grout with a consistency that will flow into and completely fill all voids. Due to auger size, larger leave-out dimensions are acceptable from both an impact performance and maintenance repair standpoint (Suggested Maximum leave-out of 20"). Payment for furnishing and placing the grout mixture will be subsidiary to the pay item of riprap mow strip.

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
REVISIONS	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		91

DATE: 6/29/2022
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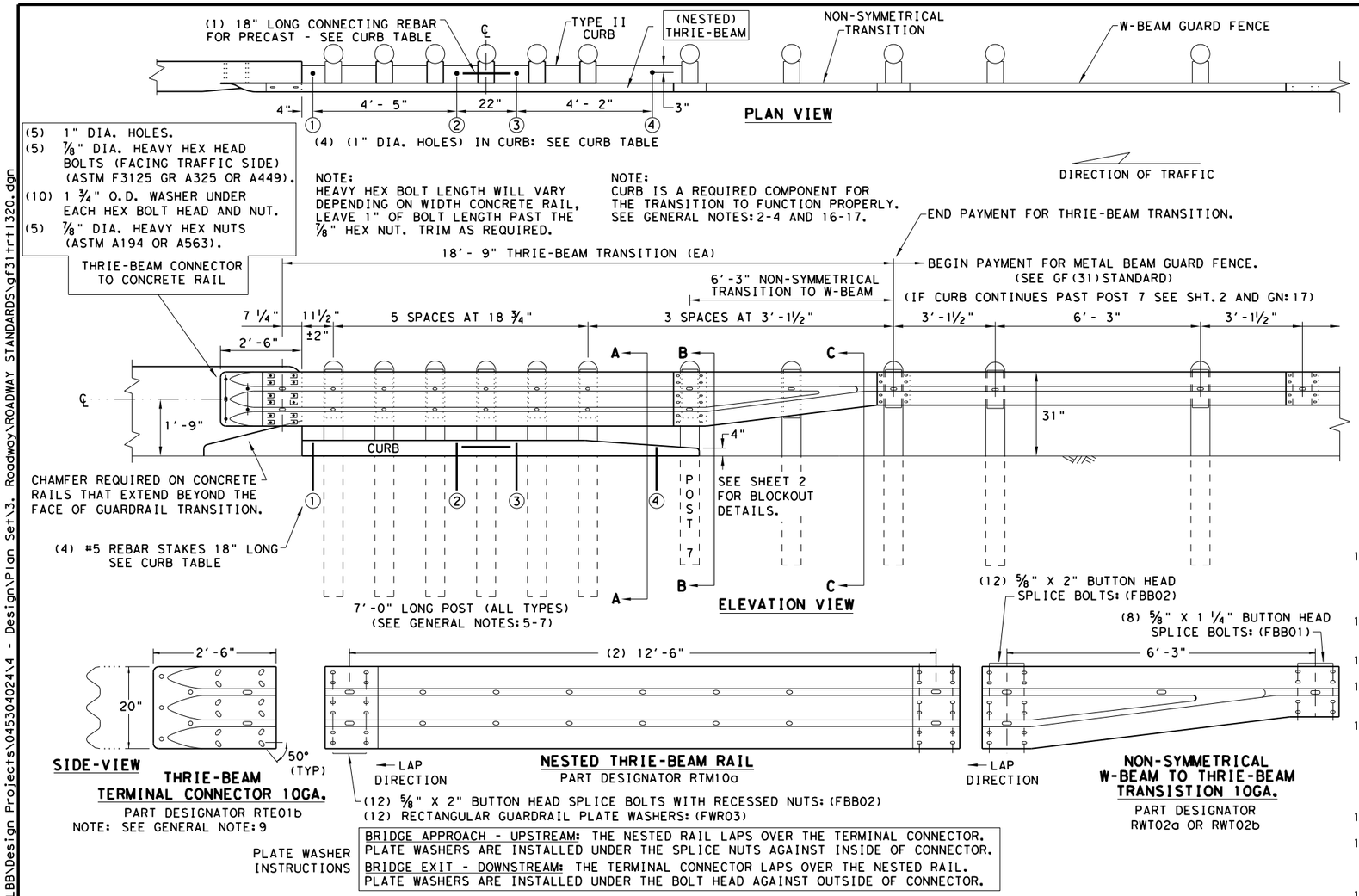
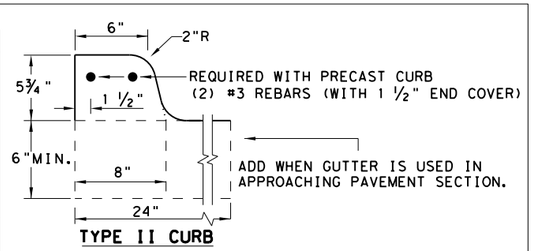


THRIE-BEAM TERMINAL - CURB TABLE
PRECAST CURB FULL LENGTH EQUALS 12'- 2" THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.
CURB (1) LENGTH 5'- 8"
CURB (2) LENGTH 6'- 6"
TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7
CONNECTING PRECAST CURB SECTIONS (1) & (2):
FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB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



TYPE II CURB

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

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

TYPE II CURB DETAILS

GENERAL NOTES

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

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation | Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31tr1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
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	LBB	CROSBY		92	

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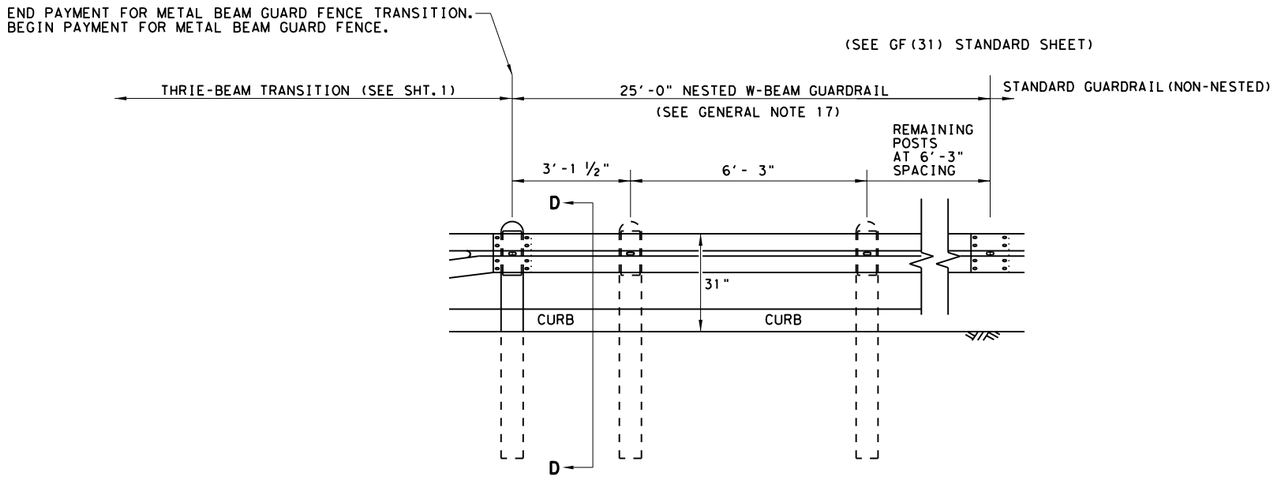
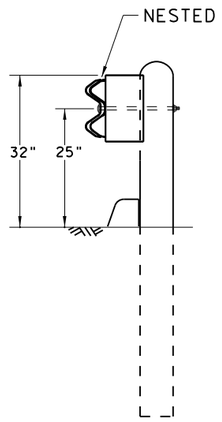
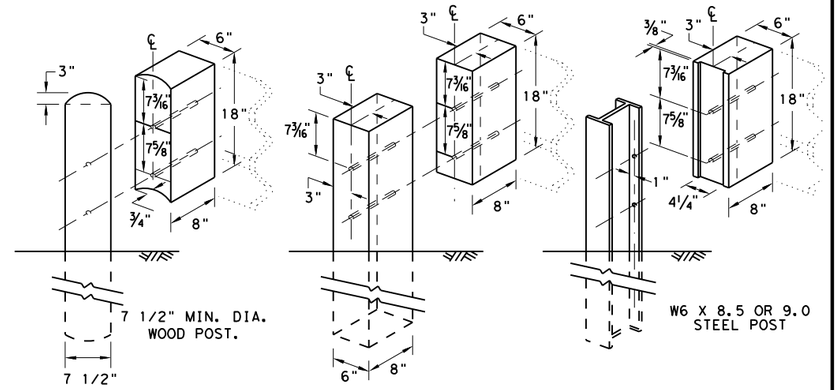
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

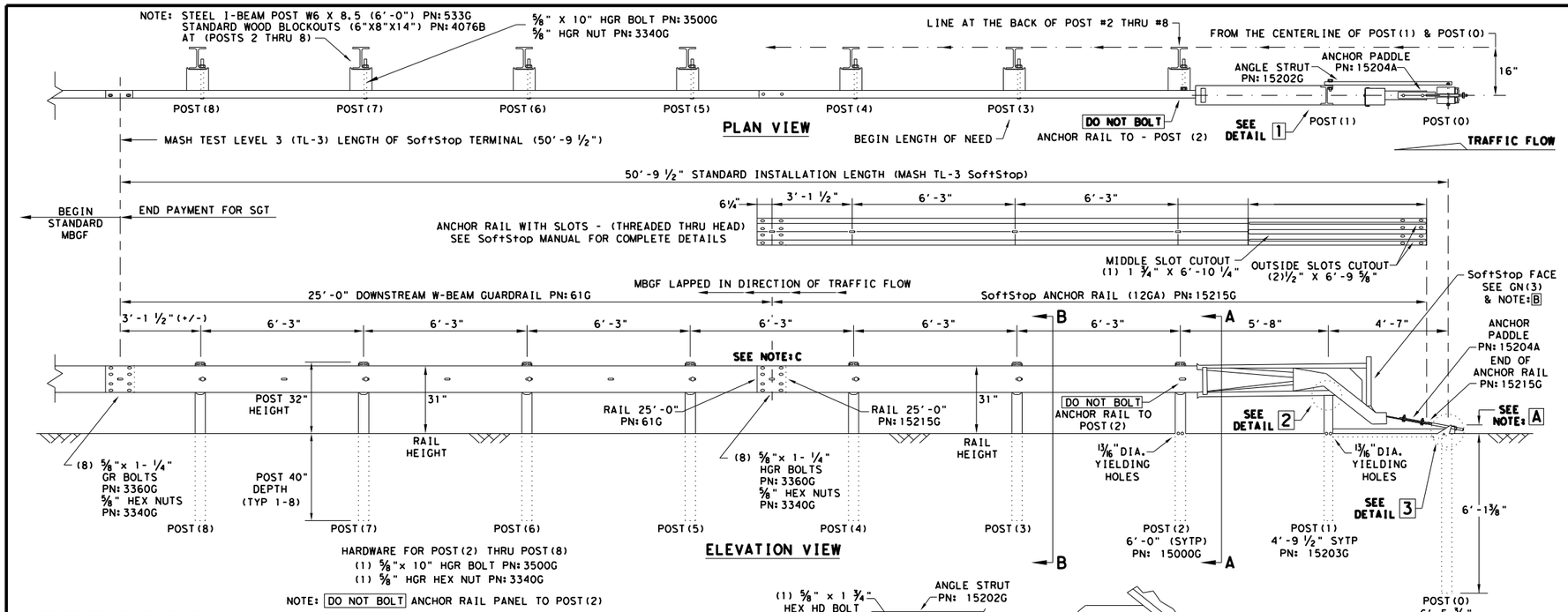
SHEET 2 OF 2

Texas Department of Transportation | Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG	
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0453	04	024	SH 207	
	DIST	COUNTY		SHEET NO.	
	LBB	CROSBY		93	



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: MB	DW: MB		CK: MB
©TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0453	04	024		SH 207	
	DIST	COUNTY			SHEET NO.	
	LBB	CROSBY			94	

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(SEE GN NOTE 15)
STANDARD 31" MBGF

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

FIELD-SIDE
(RAIL 3)

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

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

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

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

RAIL 4 RAIL 3 RAIL 2 RAIL 1

ITEM (10)
CABLE ASSEMBLY

ITEM (2)
GROUNDSTRUT

NO BLOCKOUT
AT (POST 1)

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

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

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

CABLES

PLAN VIEW

INSTALL GUARD FENCE RECESSED
HEX NUTS ON TRAFFIC-SIDE

MBGF
RAIL 2

MBGF
RAIL 1

DETAIL (C)

TRAFFIC FLOW

END PAYMENT (SGT) BY EACH

DO NOT BOLT
RAIL TO POST 6

BEGIN LENGTH OF NEED

INSTALLATION LENGTH 55'- ½"

49'-8 ⅝"

6'-3" 6'-3" 6'-3" 6'- ¾" 6'-3" 6'-3" 6'-3" 37 ½" 5'-3 ⅜"

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

RAIL
HEIGHT
31"

ARROWS

DETAIL (D)

RAIL
HEIGHT
31"

HEAD
HEIGHT

DETAIL (B)

32-¼"

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

FINISHED GRADE

CABLES

FINISHED GRADE

ITEM (10)
CABLE ASSEMBLY

ITEM (2)
GROUNDSTRUT

68-⅛"

POST 9 POST 8 POST 7 POST 6 POST 5 POST 4 POST 3 POST 2 POST 1

ITEM (4)
I-BEAM
W6 X 9

NO BLOCKOUT
AT (POST 1)

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

ELEVATION VIEW

**SOIL
ANCHOR POST**
ITEM (1)

A

A

TSS PANEL
GALVANIZED
ITEM (5)

RSS PLATE
GALVANIZED
ITEM (8)

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

TSS PANEL AND RSS PLATE

DETAIL (D)

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

7 ⅝"

2 ⅛"

UPPER CABLE
(BACK SIDE)

LOWER CABLE
(TRAFFIC SIDE)

DETAIL (B)

HEAD
HEIGHT
32-¼"

TOP OF POST

31-⅞"

FINISHED
GRADE

40-⅛"

68-⅛"
ANCHOR POST
DEPTH

ITEM (1)
ANCHOR

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

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

SECTION VIEW A-A

CABLE
FRICTION PLATE
HEAD UNIT
ITEM (9)

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

ITEM (24)

ITEM (21)

ITEM (20)
8X

ITEM (17)
8X

ITEM (23)
6X
3 SCREWS
EACH SIDE

(RAIL 1)

ITEM (22)
BRACKET
SHIPPED FLAT

ITEM (3)

ITEM (16)
4X

* ITEM (25)
HIGH INTENSITY
REFLECTIVE SHEETING

NOTE: DELINEATION MARKER IN
ACCORDANCE WITH TEXAS MUTCD.

SPLICE FOR IMPACT-HEAD
TO GUARD FENCE (RAIL1)

DETAIL (A)

GENERAL NOTES

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

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

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

STANDARD
MBGF

2'-0"

EDGE OF PAVEMENT

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

2'-0" MAX.
RAIL OFFSET

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

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
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	LBB	CROSBY		95

DATE: 6/29/2022
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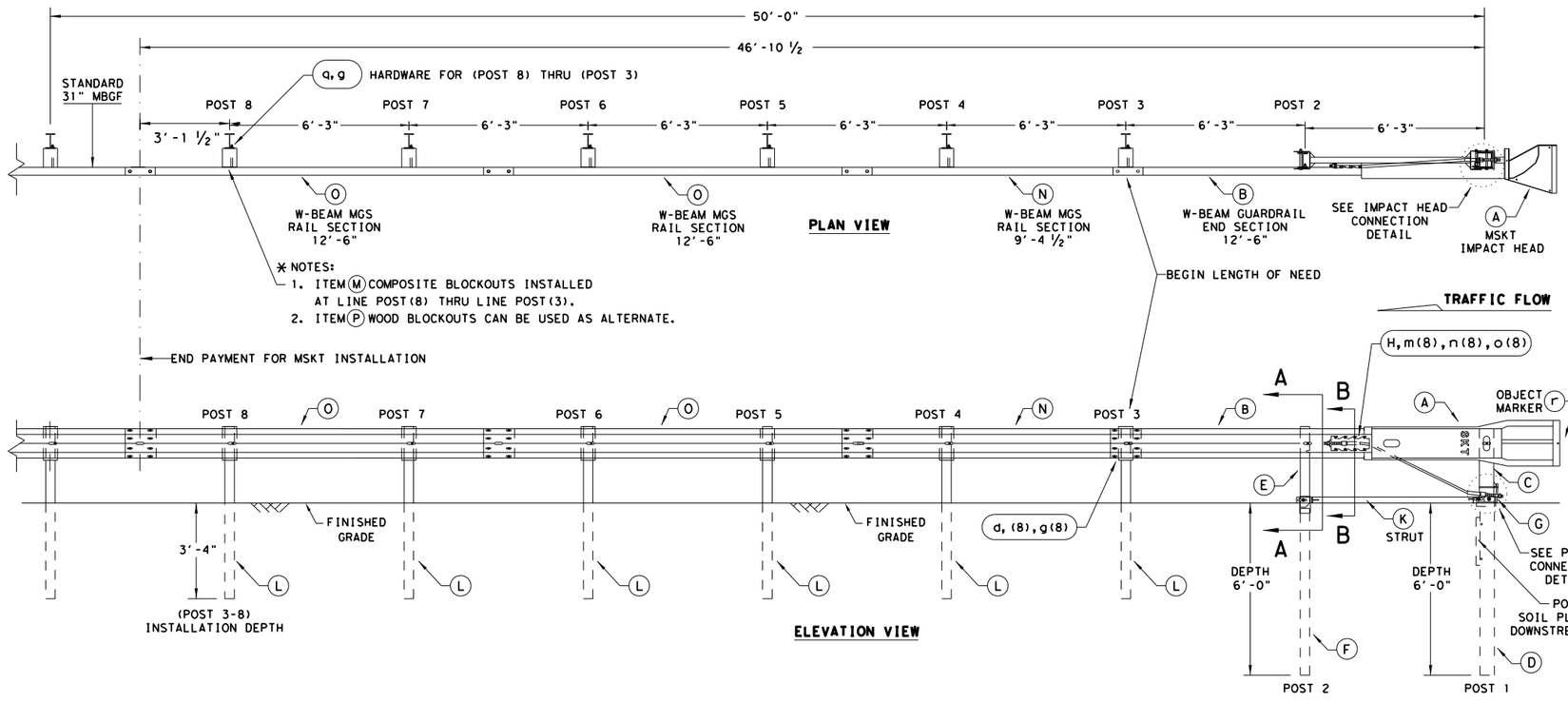
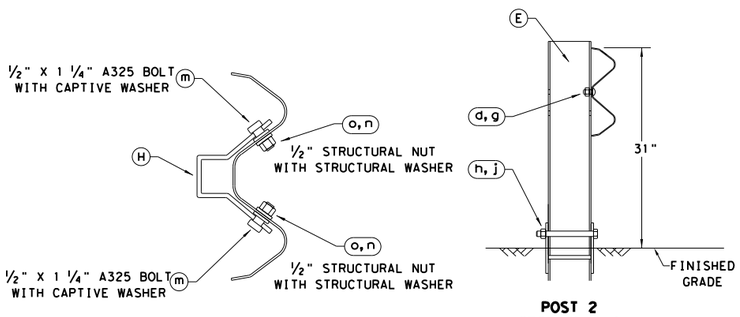
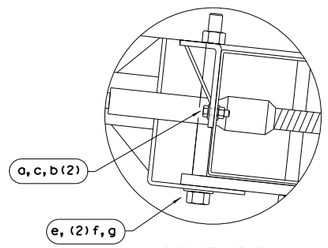
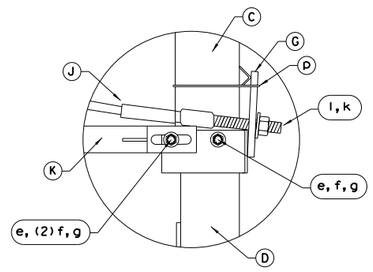
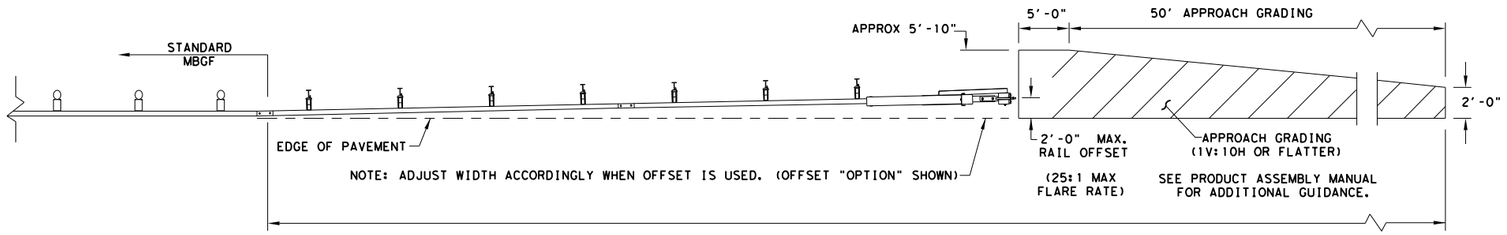


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.









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.

GENERAL NOTES

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

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

SEE NOTES: *

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

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
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REVISIONS	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		96

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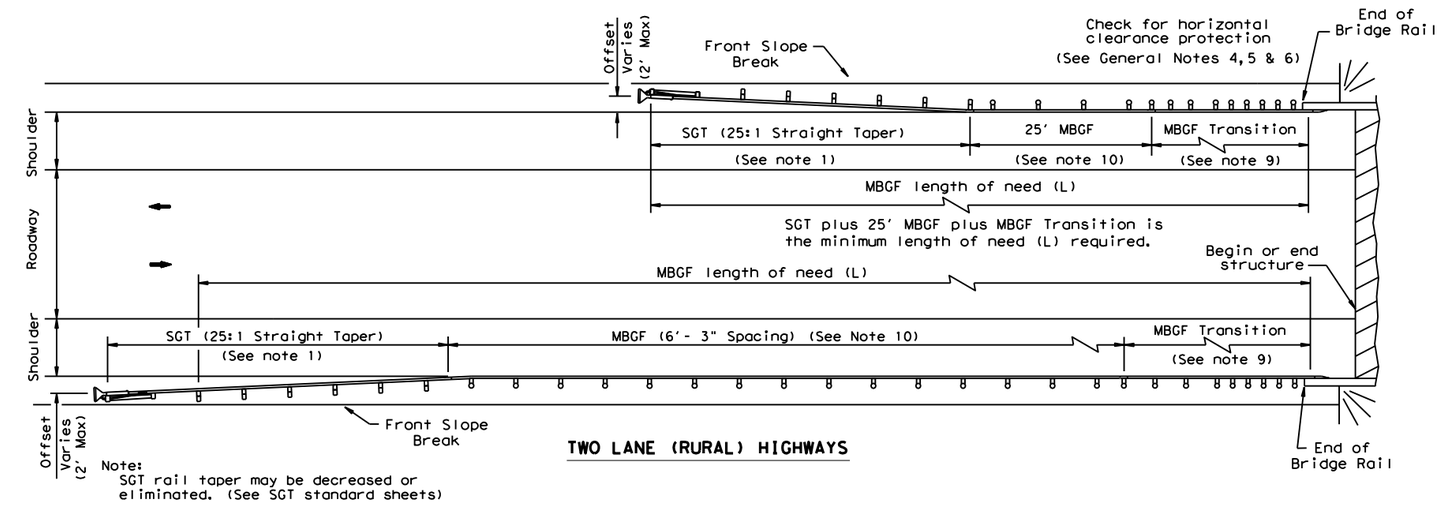
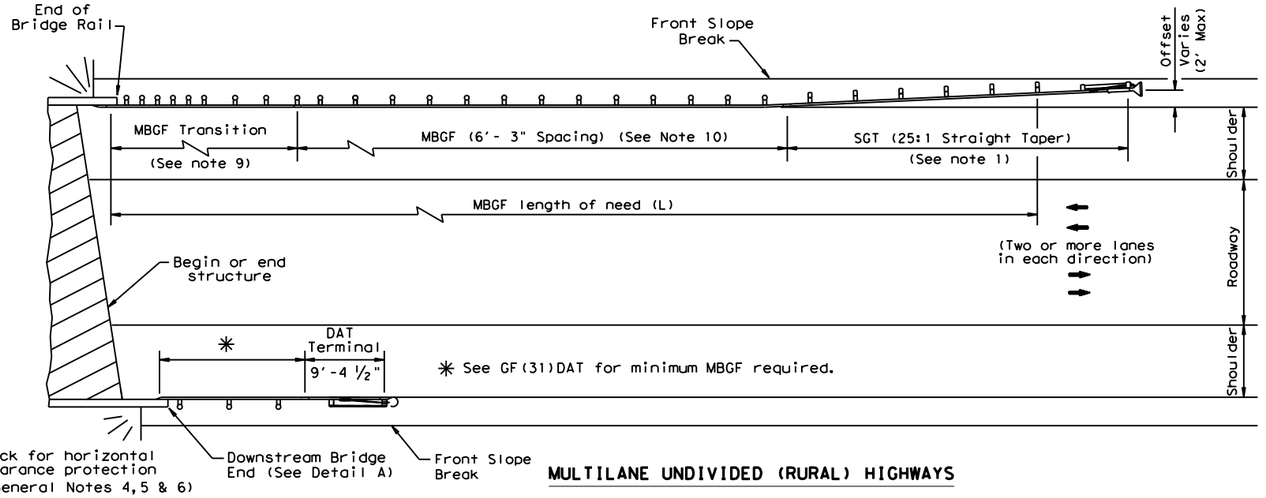
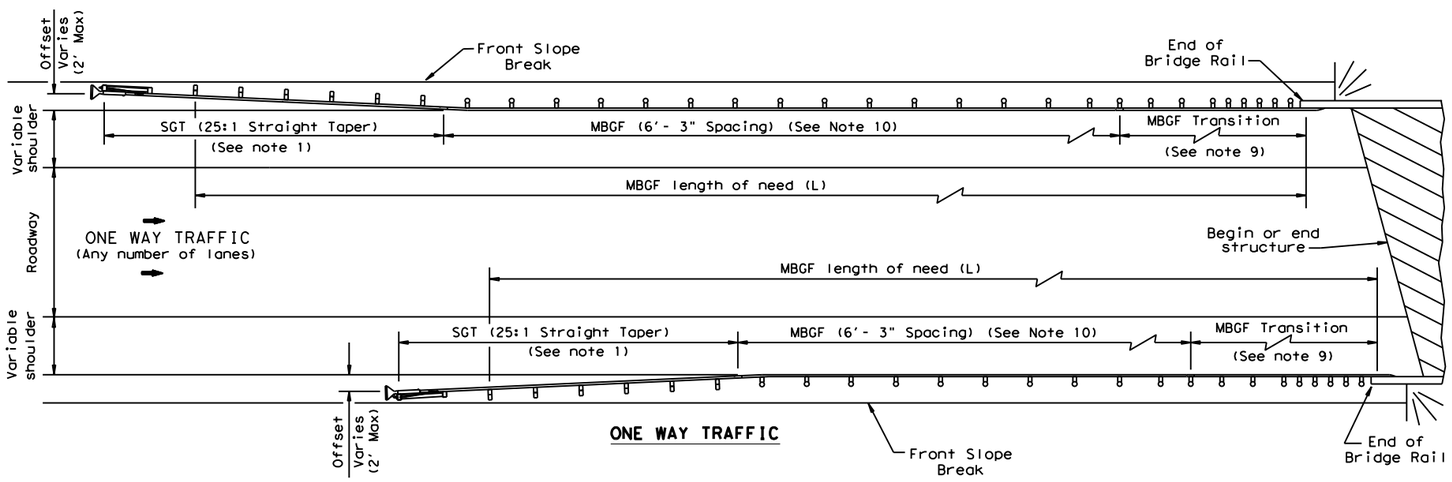


TWO LANE (RURAL) HIGHWAYS

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



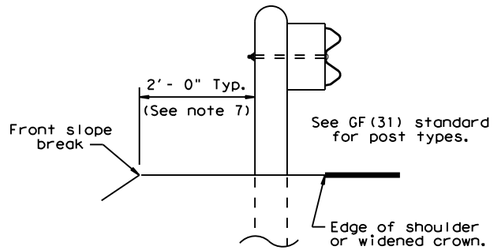
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



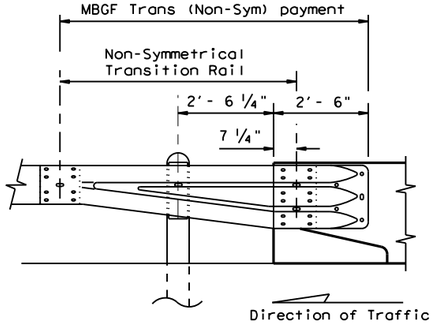
ONE WAY TRAFFIC

GENERAL NOTES

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



TYPICAL CROSS SECTION AT MBGF



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

DETAIL A

Showing Downstream Rail Attachment

Texas Department of Transportation

Design Division Standard

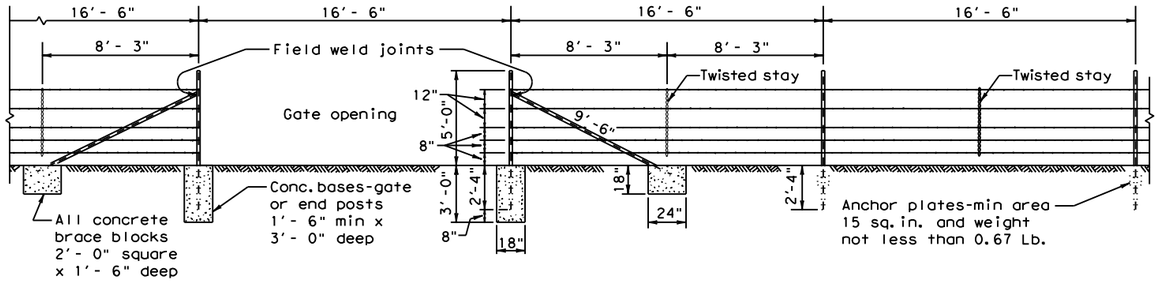
BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

BED-14

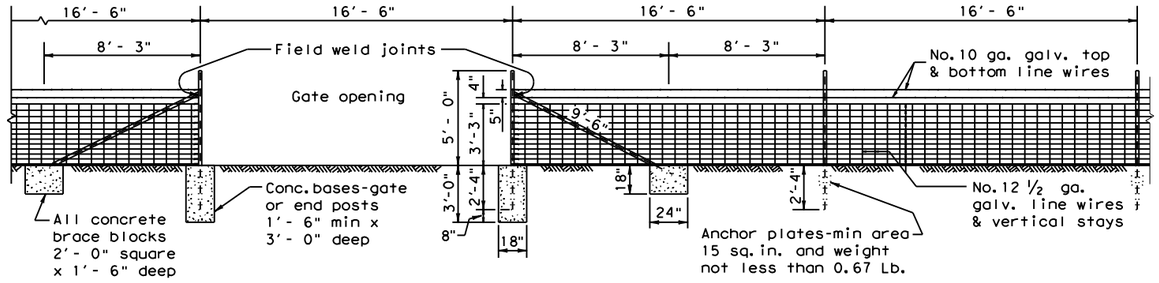
FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
REVISED APRIL 2014 SEE (MEMO 0414)	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		97

DATE:
FILE:

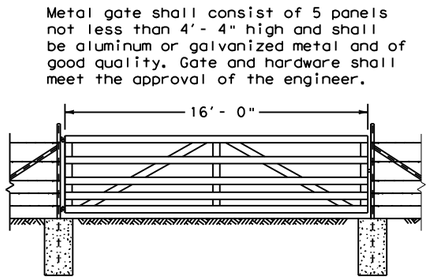


SECTION GALVANIZED BARBED WIRE FENCE WITH METAL POSTS
BRACING DETAIL USED AT ENDS AND GATES
TYPE "C" FENCE
(See General Note 8)

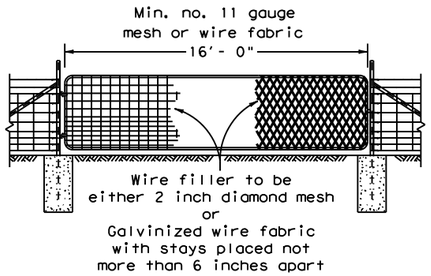
Note:
For Steel pipe and T-Post requirements. (See General Notes 6 & 7)



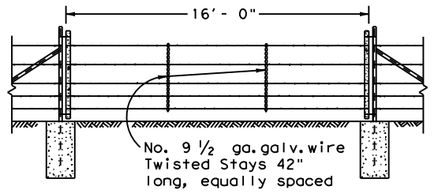
SECTION GALVANIZED WOVEN WIRE FENCE WITH METAL POSTS
BRACING DETAIL USED AT ENDS AND GATES
TYPE "D" FENCE
(See General Note 8)



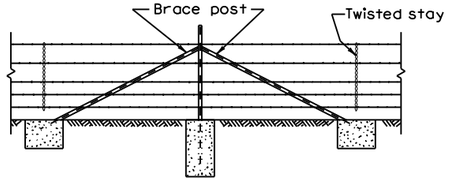
DETAIL TYPE 1 GATE



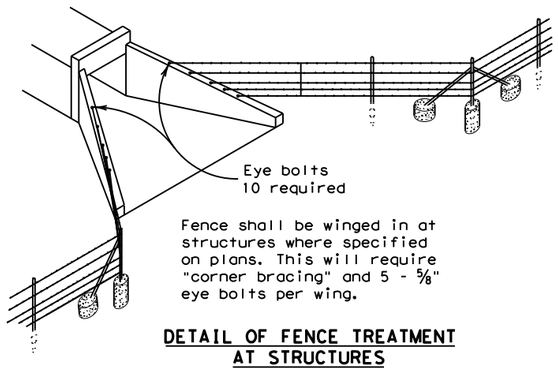
DETAIL TYPE 2 GATE



DETAIL TYPE 3 GATE

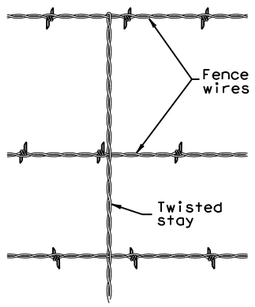


CORNER OR PULL POST ASSEMBLY

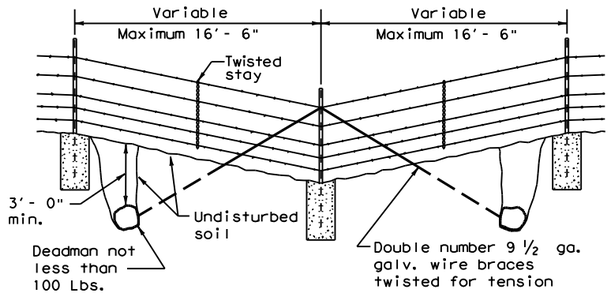


Fence shall be winged in at structures where specified on plans. This will require "corner bracing" and 5 - ⅝" eye bolts per wing.

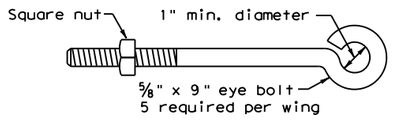
DETAIL OF FENCE TREATMENT AT STRUCTURES



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.

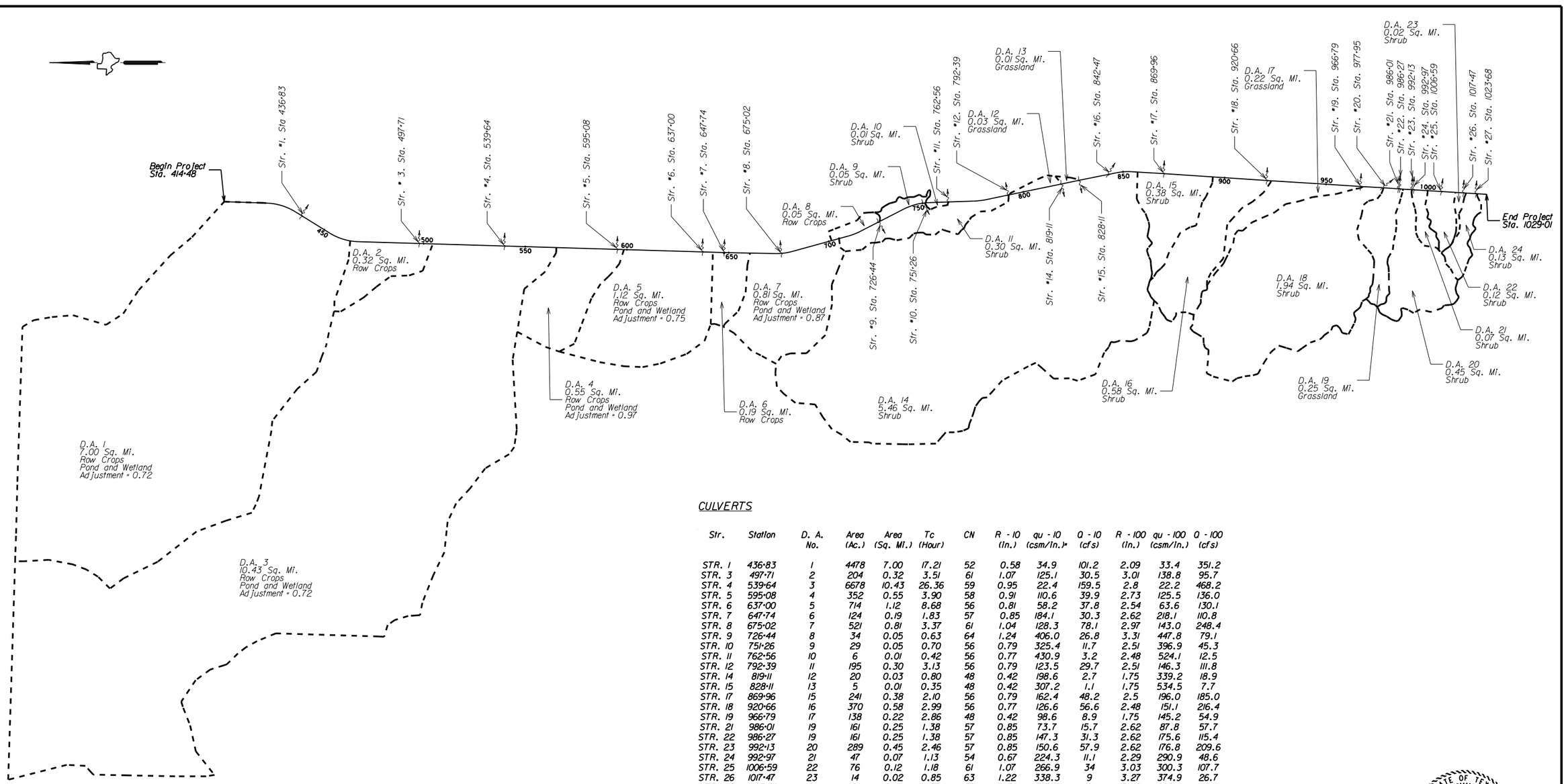
Texas Department of Transportation

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	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		98



CULVERTS

Str.	Station	D. A. No.	Area (Ac.)	Area (Sq. Mi.)	Tc (Hour)	CN	R - 10 (In.)	qu - 10 (csm/In.)*	Q - 10 (cfs)	R - 100 (In.)	qu - 100 (csm/In.)	Q - 100 (cfs)
STR. 1	436+83	1	4478	7.00	17.21	52	0.58	34.9	101.2	2.09	33.4	351.2
STR. 3	497+71	2	204	0.32	3.51	61	1.07	125.1	30.5	3.01	138.8	95.7
STR. 4	539+64	3	6678	10.43	26.36	59	0.95	22.4	159.5	2.8	22.2	468.2
STR. 5	595+08	4	352	0.55	3.90	58	0.91	110.6	39.9	2.73	125.5	136.0
STR. 6	637+00	5	714	1.12	8.68	56	0.81	58.2	37.8	2.54	63.6	130.1
STR. 7	647+74	6	124	0.19	1.83	57	0.85	184.1	30.3	2.62	218.1	110.8
STR. 8	675+02	7	521	0.81	3.37	61	1.04	128.3	78.1	2.97	143.0	248.4
STR. 9	726+44	8	34	0.05	0.63	64	1.24	406.0	26.8	3.31	447.8	79.1
STR. 10	751+26	9	29	0.05	0.70	56	0.79	325.4	11.7	2.51	396.9	45.3
STR. 11	762+56	10	6	0.01	0.42	56	0.77	430.9	3.2	2.48	524.1	12.5
STR. 12	792+39	11	195	0.30	3.13	56	0.79	123.5	29.7	2.51	146.3	111.8
STR. 14	819+11	12	20	0.03	0.80	48	0.42	198.6	2.7	1.75	339.2	18.9
STR. 15	828+11	13	5	0.01	0.35	48	0.42	307.2	1.1	1.75	534.5	7.7
STR. 17	869+96	15	241	0.38	2.10	56	0.79	162.4	48.2	2.5	196.0	185.0
STR. 18	920+66	16	370	0.58	2.99	56	0.77	126.6	56.6	2.48	151.1	216.4
STR. 19	966+79	17	138	0.22	2.86	48	0.42	98.6	8.9	1.75	145.2	54.9
STR. 21	986+01	19	161	0.25	1.38	57	0.85	73.7	15.7	2.62	87.8	57.7
STR. 22	986+27	19	161	0.25	1.38	57	0.85	147.3	31.3	2.62	175.6	115.4
STR. 23	992+13	20	289	0.45	2.46	57	0.85	150.6	57.9	2.62	176.8	209.6
STR. 24	992+97	21	47	0.07	1.13	54	0.67	224.3	11.1	2.29	290.9	48.6
STR. 25	1006+59	22	76	0.12	1.18	61	1.07	266.9	34	3.03	300.3	107.7
STR. 26	1017+47	23	14	0.02	0.85	63	1.22	338.3	9	3.27	374.9	26.7
STR. 27	1023+68	24	81	0.13	1.37	56	0.78	213.6	21	2.48	262.0	82.5

*(ft3/s/mi2/In)

BRIDGE CLASS. CULVERTS

Str.	Station	D. A. No.	Area (Ac.)	Area (Sq. Mi.)	Tc (Hour)	CN	R - 25 (In.)	qu - 25 (csm/In.)*	Q - 25 (cfs)	R - 100 (In.)	qu - 100 (csm/In.)	Q - 100 (cfs)
STR. 16	842+47	14	3492	5.46	14.79	57	1.41	38.2	293.4	2.58	39.1	550.7
STR. 20	977+95	18	1243	1.94	5.06	49	0.9	85.4	149.2	1.84	95.0	340.2

*(ft3/s/mi2/In)

STATE OF TEXAS
SHELLEY C. HARRIS
99197
LICENSED
PROFESSIONAL ENGINEER

Shelley C. Harris, P.E.
6/29/2022

Texas Department of Transportation

SCALE: 1" = 5000' Sheet 1 of 1

DRAINAGE AREA LAYOUT

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		99
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_DRAINAGEMAP.dgn		

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FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\045304024\4 - Design\Plan Set\5. Drainage\SH207_DRG_DRGMAP

STRUCTURE NO. 1 - Existing

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	3047.50	0.00	0.00	0.00	0.00	0.00	0.00
	35.12	35.12	3049.37	1.10	1.15	1.56	1.65	4.52	1.62
	70.24	70.24	3050.42	1.78	1.83	2.04	2.13	6.87	1.93
	101.22	101.22	3051.16	2.33	2.33	2.36	2.45	8.59	2.11
10 Year	140.48	126.16	3051.86	3.00	2.70	2.70	2.77	9.33	2.29
	175.60	135.01	3052.13	3.00	2.83	2.92	3.01	9.25	2.42
	210.73	140.80	3052.36	3.00	2.91	3.00	3.22	9.39	2.54
	245.85	142.27	3052.59	3.00	2.93	3.00	3.41	9.48	2.64
	280.97	143.51	3052.80	3.00	2.95	3.00	3.59	9.57	2.73
	316.09	144.62	3052.99	3.00	2.96	3.00	3.75	9.64	2.81
100 Year	351.21	145.68	3053.17	3.00	2.98	3.00	3.90	9.71	2.88

Inlet Elevation (invert): 3047.50 ft, Outlet Elevation (invert): 3047.36 ft
Culvert Length: 36.7 ft, Culvert Slope: 0.0038

STRUCTURE NO. 1 - Proposed

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	3047.58	0.00	0.00	0.00	0.00	0.00	0.00
	35.12	35.12	3049.37	0.86	1.15	1.65	1.65	4.27	1.62
	70.24	70.24	3050.42	1.39	1.83	1.52	2.13	9.24	1.93
	101.22	101.22	3051.23	1.80	2.33	1.98	2.45	10.21	2.11
10 Year	140.48	128.00	3051.99	2.13	2.73	2.35	2.77	10.88	2.29
	175.60	136.48	3052.25	2.24	2.85	2.47	3.01	11.07	2.42
	210.73	143.13	3052.46	2.32	2.94	3.00	3.22	9.54	2.54
	245.85	144.59	3052.68	2.33	2.96	3.00	3.41	9.64	2.64
	280.97	145.38	3052.87	2.34	2.97	3.00	3.59	9.69	2.73
	316.09	146.08	3053.06	2.35	2.98	3.00	3.75	9.74	2.81
100 Year	351.21	146.75	3053.23	2.36	2.99	3.00	3.90	9.78	2.88

Inlet Elevation (invert): 3047.58 ft, Outlet Elevation (invert): 3047.27 ft
Culvert Length: 40.0 ft, Culvert Slope: 0.0038

Site Data - Str. No. 1 Existing
Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 3047.50 ft
Outlet Station: 36.70 ft
Outlet Elevation: 3047.36 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 1 Existing
Barrel Shape: Concrete Box
Barrel Span: 5.00 ft
Barrel Rise: 3.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1.5:1 Bevel (18-34° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing
Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 63.90 ft
Crest Elevation: 3051.59 ft
Roadway Surface: Paved
Roadway Top Width: 28.00 ft

Site Data - Str. No. 1 Proposed
Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 3047.58 ft
Outlet Station: 40.00 ft
Outlet Elevation: 3047.27 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 1 Proposed
Barrel Shape: Concrete Box
Barrel Span: 5.00 ft
Barrel Rise: 3.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1.5:1 Bevel (18-34° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing
Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 66.69 ft
Crest Elevation: 3051.76 ft
Roadway Surface: Paved
Roadway Top Width: 32.00 ft

STATE OF TEXAS
SHELLEY C. HARRIS
99197
LICENSED PROFESSIONAL ENGINEER

Shelley C. Harris, P.E.
6/29/2022

Texas Department of Transportation

NO SCALE Sheet 1 of 22

HY-8 DATA

STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		100
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_HY8DATA.dgn		

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STRUCTURE NO. 3 - Existing

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	3047.24	0.00	0.00	0.00	0.00	0.00	0.00
	9.57	9.57	3048.62	0.82	0.68	1.33	1.33	2.40	0.68
	19.14	19.14	3049.19	1.35	1.08	1.73	1.73	3.70	0.80
	28.71	28.71	3049.70	2.00	1.42	2.00	2.01	4.79	0.89
10 Year	30.50	30.50	3049.81	2.00	1.48	2.00	2.05	5.08	0.90
	47.85	39.41	3050.59	2.00	1.75	2.00	2.43	6.57	1.01
	57.42	38.62	3050.72	2.00	1.73	2.00	2.60	6.44	1.06
	66.99	37.68	3050.83	2.00	1.70	2.00	2.76	6.28	1.10
	76.56	36.77	3050.93	2.00	1.67	2.00	2.90	6.13	1.14
	86.13	35.88	3051.02	2.00	1.64	2.00	3.03	5.98	1.17
100 Year	95.70	35.02	3051.10	2.00	1.62	2.00	3.15	5.84	1.20

Inlet Elevation (invert): 3047.24 ft, Outlet Elevation (invert): 3047.16 ft
Culvert Length: 35.30 ft, Culvert Slope: 0.0023

Site Data - Str. No. 3 Existing

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 3047.24 ft
Outlet Station: 35.30 ft
Outlet Elevation: 3047.16 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 3 Existing

Barrel Shape: Concrete Box
Barrel Span: 3.00 ft
Barrel Rise: 2.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1.5:1 Bevel (18-34° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 54.32 ft
Crest Elevation: 3050.40 ft
Roadway Surface: Paved
Roadway Top Width: 28.00 ft

STRUCTURE NO. 3 - Proposed

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	3047.27	0.00	0.00	0.00	0.00	0.00	0.00
	9.57	9.57	3048.67	0.95	0.68	1.33	1.33	2.40	0.68
	19.14	19.14	3049.24	1.57	1.08	1.73	1.73	3.70	0.80
	28.71	28.71	3049.76	2.00	1.42	2.00	2.01	4.79	0.89
10 Year	30.50	30.50	3049.88	2.00	1.48	2.00	2.05	5.08	0.90
	47.85	40.67	3050.73	2.00	1.79	2.00	2.43	6.78	1.01
	57.42	39.83	3050.86	2.00	1.76	2.00	2.60	6.64	1.06
	66.99	38.85	3050.96	2.00	1.73	2.00	2.76	6.47	1.10
	76.56	37.87	3051.05	2.00	1.70	2.00	2.90	6.31	1.14
	86.13	36.92	3051.14	2.00	1.68	2.00	3.03	6.15	1.17
100 Year	95.70	35.97	3051.21	2.00	1.65	2.00	3.15	5.99	1.20

Inlet Elevation (invert): 3047.27 ft, Outlet Elevation (invert): 3047.21 ft
Culvert Length: 39.30 ft, Culvert Slope: 0.0009

Site Data - Str. No. 3 Proposed

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 3047.27 ft
Outlet Station: 39.30 ft
Outlet Elevation: 3047.21 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 3 Proposed

Barrel Shape: Concrete Box
Barrel Span: 3.00 ft
Barrel Rise: 2.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1.5:1 Bevel (18-34° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 57.12 ft
Crest Elevation: 3050.57 ft
Roadway Surface: Paved
Roadway Top Width: 32.00 ft

STATE OF TEXAS
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STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		101
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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STRUCTURE NO. 4 - Existing

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	3033.32	0.00	0.00	0.00	0.00	0.00	0.00
	46.82	46.82	3036.51	2.29	1.96	2.42	2.42	6.44	1.93
	93.64	59.76	3038.13	3.00	2.31	3.00	3.96	6.64	2.36
	140.46	25.93	3038.73	1.45	1.32	3.00	5.35	2.88	2.63
10 Year	159.50	16.50	3039.16	1.04	0.98	3.00	5.89	1.83	2.71
	234.10	14.09	3041.18	0.93	0.88	3.00	7.95	1.57	2.94
	280.92	14.92	3042.43	0.97	0.92	3.00	9.20	1.66	3.05
	327.74	15.72	3043.67	1.01	0.95	3.00	10.44	1.75	3.14
	374.56	16.48	3044.89	1.04	0.98	3.00	11.66	1.83	3.21
	421.38	17.21	3046.10	1.08	1.01	3.00	12.87	1.91	3.27
100 Year	468.20	17.90	3047.30	1.11	1.03	3.00	14.07	1.99	3.33

Inlet Elevation (invert): 3033.32 ft, Outlet Elevation (invert): 3033.20 ft
Culvert Length: 35.00 ft, Culvert Slope: 0.0034

STRUCTURE NO. 4 - Proposed

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	3033.31	0.00	0.00	0.00	0.00	0.00	0.00
	46.82	46.82	3034.99	0.91	0.94	1.61	1.61	3.23	1.71
	93.64	93.64	3036.04	1.51	1.50	2.53	2.53	4.11	2.18
	140.46	140.46	3037.06	2.06	1.96	3.00	3.32	5.20	2.49
10 Year	159.50	159.50	3037.53	2.28	2.14	3.00	3.62	5.91	2.59
	234.10	156.00	3038.59	2.24	2.11	3.00	4.71	5.78	2.92
	280.92	130.51	3039.01	1.95	1.87	3.00	5.36	4.83	3.08
	327.74	97.64	3039.41	1.56	1.54	3.00	5.99	3.62	3.22
	374.56	75.39	3039.88	1.28	1.30	3.00	6.59	2.79	3.34
	421.38	68.25	3040.42	1.19	1.21	3.00	7.18	2.53	3.45
100 Year	468.20	65.06	3040.97	1.15	1.18	3.00	7.77	2.41	3.55

Inlet Elevation (invert): 3033.31 ft, Outlet Elevation (invert): 3033.13 ft
Culvert Length: 40.00 ft, Culvert Slope: 0.0022

Site Data - Str. No. 4 Existing

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 3033.32 ft
Outlet Station: 35.00 ft
Outlet Elevation: 3033.20 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 4 Existing

Barrel Shape: Concrete Box
Barrel Span: 3.00 ft
Barrel Rise: 3.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1.5:1 Bevel (18-34° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 61.74 ft
Crest Elevation: 3037.65 ft
Roadway Surface: Paved
Roadway Top Width: 28.00 ft

Site Data - Str. No. 4 Proposed

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 3033.31 ft
Outlet Station: 40.00 ft
Outlet Elevation: 3033.13 ft
Number of Barrels: 3

Culvert Data Summary - Str. No. 4 Proposed

Barrel Shape: Concrete Box
Barrel Span: 3.00 ft
Barrel Rise: 3.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1.5:1 Bevel (18-34° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 66.31 ft
Crest Elevation: 3037.82 ft
Roadway Surface: Paved
Roadway Top Width: 32.00 ft

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STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		102
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STRUCTURE NO. 5 - Existing

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	3035.13	0.00	0.00	0.00	0.00	0.00	0.00
	13.60	13.60	3036.59	0.87	0.86	1.32	1.32	3.44	0.98
	27.20	27.20	3037.33	1.43	1.37	1.71	1.71	5.30	1.16
10 Year	39.90	39.90	3038.00	2.00	1.76	1.98	1.98	6.73	1.28
	54.40	48.06	3038.70	2.00	2.00	2.00	2.22	8.01	1.38
	68.00	47.86	3038.88	2.00	1.99	2.00	2.41	7.98	1.46
	81.60	47.38	3039.02	2.00	1.98	2.00	2.58	7.90	1.53
	95.20	46.88	3039.14	2.00	1.96	2.00	2.74	7.81	1.59
	108.80	46.40	3039.26	2.00	1.95	2.00	2.88	7.73	1.64
	122.40	45.97	3039.36	2.00	1.94	2.00	3.01	7.66	1.69
100 Year	136.00	45.55	3039.46	2.00	1.93	2.00	3.13	7.59	1.74

Inlet Elevation (invert): 3035.13 ft, Outlet Elevation (invert): 3034.99 ft
Culvert Length: 35.70 ft, Culvert Slope: 0.0039

STRUCTURE NO. 5 - Proposed

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	3035.17	0.00	0.00	0.00	0.00	0.00	0.00
	13.60	13.60	3036.64	0.93	0.86	1.32	1.32	3.44	0.98
	27.20	27.20	3037.38	1.53	1.37	1.71	1.71	5.30	1.16
10 Year	39.90	39.90	3038.04	2.00	1.76	1.98	1.98	6.73	1.28
	54.40	49.02	3038.84	2.00	2.00	1.98	2.22	6.73	1.38
	68.00	48.88	3039.03	2.00	2.00	1.98	2.41	6.73	1.46
	81.60	48.45	3039.17	2.00	2.00	1.98	2.58	6.73	1.53
	95.20	47.98	3039.29	2.00	2.00	2.00	2.74	8.00	1.59
	108.80	47.55	3039.41	2.00	1.98	2.00	2.88	7.93	1.64
	122.40	47.13	3039.51	2.00	1.97	2.00	3.01	7.86	1.69
100 Year	136.00	46.75	3039.61	2.00	1.96	2.00	3.13	7.79	1.74

Inlet Elevation (invert): 3035.17 ft, Outlet Elevation (invert): 3035.04 ft
Culvert Length: 39.70 ft, Culvert Slope: 0.0019

Site Data - Str. No. 5 Existing
Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 3035.13 ft
Outlet Station: 35.70 ft
Outlet Elevation: 3034.99 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 5 Existing
Barrel Shape: Concrete Box
Barrel Span: 3.00 ft
Barrel Rise: 2.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1.5:1 Bevel (18-34° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing
Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 54.28 ft
Crest Elevation: 3038.54 ft
Roadway Surface: Paved
Roadway Top Width: 28.00 ft

Site Data - Str. No. 5 Proposed
Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 3035.17 ft
Outlet Station: 39.70 ft
Outlet Elevation: 3035.04 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 5 Proposed
Barrel Shape: Concrete Box
Barrel Span: 3.00 ft
Barrel Rise: 2.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1.5:1 Bevel (18-34° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing
Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 59.28 ft
Crest Elevation: 3038.71 ft
Roadway Surface: Paved
Roadway Top Width: 32.00 ft

HY-8 DATA

STATE OF TEXAS
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6/29/2022

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STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		103
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0453	04	024	SH 207
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STRUCTURE NO. 6 - Existing

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	3023.51	0.00	0.00	0.00	0.00	0.00	0.00
	13.01	13.01	3024.81	0.75	0.84	1.06	1.06	4.08	1.44
	26.02	26.02	3025.58	1.23	1.33	1.24	1.38	6.99	1.71
10 Year	37.80	37.80	3026.15	1.63	1.70	1.63	1.59	7.71	1.88
	52.04	52.04	3026.79	2.08	2.11	2.08	1.79	8.33	2.03
	65.05	65.05	3027.42	2.48	2.44	2.44	1.94	8.87	2.15
	78.06	75.48	3027.86	3.00	2.70	2.70	2.08	9.32	2.25
	91.07	78.67	3028.02	3.00	2.77	2.77	2.21	9.45	2.34
	104.08	81.09	3028.14	3.00	2.83	2.83	2.32	9.55	2.42
	117.09	83.14	3028.25	3.00	2.88	2.88	2.42	9.63	2.49
100 Year	130.10	85.02	3028.35	3.00	2.92	2.92	2.52	9.70	2.56

Inlet Elevation (invert): 3023.51 ft, Outlet Elevation (invert): 3023.32 ft
Culvert Length: 35.10 ft, Culvert Slope: 0.0054

STRUCTURE NO. 6 - Proposed

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	3023.98	0.00	0.00	0.00	0.00	0.00	0.00
	13.01	13.01	3025.26	0.49	0.84	0.54	1.06	8.07	1.44
	26.02	26.02	3026.03	0.79	1.33	0.91	1.38	9.56	1.71
10 Year	37.80	37.80	3026.60	1.03	1.70	1.20	1.59	10.47	1.88
	52.04	52.04	3027.24	1.30	2.11	1.54	1.79	11.26	2.03
	65.05	65.05	3027.81	1.54	2.44	1.83	1.94	11.86	2.15
	78.06	70.29	3028.06	1.63	2.57	1.94	2.08	12.08	2.25
	91.07	72.26	3028.15	1.66	2.62	1.98	2.21	12.16	2.34
	104.08	73.86	3028.23	1.69	2.66	2.01	2.32	12.22	2.42
	117.09	75.27	3028.30	1.72	2.69	2.04	2.42	12.28	2.49
100 Year	130.10	76.55	3028.36	1.74	2.72	2.07	2.52	12.32	2.56

Inlet Elevation (invert): 3023.68 ft, Outlet Elevation (invert): 3023.25 ft
Culvert Length: 39.10 ft, Culvert Slope: 0.0055

Site Data - Str. No. 6 Existing
Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 3023.51 ft
Outlet Station: 35.10 ft
Outlet Elevation: 3023.32 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 6 Existing
Barrel Shape: Concrete Box
Barrel Span: 3.00 ft
Barrel Rise: 3.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1.5:1 Bevel (18-34° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing
Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 60.66 ft
Crest Elevation: 3027.77 ft
Roadway Surface: Paved
Roadway Top Width: 28.00 ft

Site Data - Str. No. 6 Proposed
Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 3023.68 ft
Outlet Station: 39.10 ft
Outlet Elevation: 3023.25 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 6 Proposed
Barrel Shape: Concrete Box
Barrel Span: 3.00 ft
Barrel Rise: 3.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1.5:1 Bevel (18-34° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing
Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 65.66 ft
Crest Elevation: 3027.94 ft
Roadway Surface: Paved
Roadway Top Width: 32.00 ft

STATE OF TEXAS
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STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		104
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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STRUCTURE NO. 7 - Existing

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	3023.55	0.00	0.00	0.00	0.00	0.00	0.00
	11.08	11.08	3024.81	0.70	0.75	1.19	1.19	3.11	0.98
	22.16	22.16	3025.46	1.14	1.19	1.54	1.54	4.79	1.17
	30.28	30.28	3025.89	1.43	1.47	1.73	1.73	5.82	1.26
10 Year	44.31	44.31	3026.65	2.00	1.89	2.00	2.00	7.39	1.39
	55.39	46.33	3026.93	2.00	1.95	2.00	2.17	7.72	1.47
	66.47	46.12	3027.07	2.00	1.94	2.00	2.33	7.69	1.53
	77.55	45.75	3027.19	2.00	1.93	2.00	2.47	7.63	1.59
	88.62	45.35	3027.29	2.00	1.92	2.00	2.59	7.56	1.65
	99.70	44.97	3027.39	2.00	1.91	2.00	2.71	7.50	1.70
100 Year	110.78	44.61	3027.47	2.00	1.90	2.00	2.82	7.43	1.74

Inlet Elevation (invert): 3023.55 ft, Outlet Elevation (invert): 3023.38 ft
Culvert Length: 34.80 ft, Culvert Slope: 0.0049

STRUCTURE NO. 7 - Proposed

Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
0.00	0.00	3023.46	0.00	0.00	0.00	0.00	0.00	0.00
11.08	11.08	3024.74	0.76	0.75	1.19	1.19	3.11	0.98
22.16	22.16	3025.39	1.25	1.19	1.54	1.54	4.79	1.17
30.28	30.28	3025.81	1.58	1.47	1.73	1.73	5.82	1.26
44.31	44.31	3026.61	2.00	1.89	2.00	2.00	7.39	1.39
55.39	48.75	3027.05	2.00	2.00	2.00	2.17	7.39	1.47
66.47	48.53	3027.19	2.00	2.00	2.00	2.33	7.39	1.53
77.55	48.14	3027.30	2.00	2.00	2.00	2.47	8.02	1.59
88.62	47.68	3027.40	2.00	1.99	2.00	2.59	7.95	1.65
99.70	47.25	3027.49	2.00	1.97	2.00	2.71	7.87	1.70
110.78	46.84	3027.58	2.00	1.96	2.00	2.82	7.81	1.74

Inlet Elevation (invert): 3023.46 ft, Outlet Elevation (invert): 3023.31 ft
Culvert Length: 40.00 ft, Culvert Slope: 0.0022

Site Data - Str. No. 7 Existing

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 3023.55 ft
Outlet Station: 34.80 ft
Outlet Elevation: 3023.38 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 7 Existing

Barrel Shape: Concrete Box
Barrel Span: 3.00 ft
Barrel Rise: 2.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1.5:1 Bevel (18-34° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 54.98 ft
Crest Elevation: 3026.73 ft
Roadway Surface: Paved
Roadway Top Width: 28.00 ft

Site Data - Str. No. 7 Proposed

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 3023.46 ft
Outlet Station: 40.00 ft
Outlet Elevation: 3023.31 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 7 Proposed

Barrel Shape: Concrete Box
Barrel Span: 3.00 ft
Barrel Rise: 2.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1.5:1 Bevel (18-34° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 59.98 ft
Crest Elevation: 3026.90 ft
Roadway Surface: Paved
Roadway Top Width: 32.00 ft

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STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		105
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HY-8 DATA

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STRUCTURE NO. 8 - Existing

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	3021.69	0.00	0.00	0.00	0.00	0.00	0.00
	24.84	24.84	3023.81	1.43	1.29	1.73	1.73	4.79	1.04
	49.68	49.68	3025.41	2.00	2.00	2.00	2.24	8.28	1.24
	74.52	54.48	3026.10	2.00	2.00	2.00	2.61	9.08	1.37
10 Year	78.10	54.36	3026.14	2.00	2.00	2.00	2.66	9.06	1.38
	124.20	52.94	3026.54	2.00	2.00	2.00	3.16	8.82	1.55
	149.04	52.24	3026.72	2.00	2.00	2.00	3.38	8.71	1.63
	173.88	51.65	3026.88	2.00	2.00	2.00	3.59	8.61	1.69
	198.72	51.14	3027.03	2.00	2.00	2.00	3.77	8.52	1.75
	223.56	50.71	3027.17	2.00	2.00	2.00	3.94	8.45	1.80
100 Year	248.40	50.37	3027.30	2.00	2.00	2.00	4.10	8.40	1.85

Inlet Elevation (Invert): 3021.69 ft, Outlet Elevation (Invert): 3021.57 ft
Culvert Length: 36.00 ft, Culvert Slope: 0.0033

STRUCTURE NO. 8 - Proposed

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	3019.71	0.00	0.00	0.00	0.00	0.00	0.00
	24.84	24.84	3021.46	1.00	0.81	1.73	1.73	2.39	1.04
	49.68	49.68	3022.27	1.67	1.29	2.00	2.24	4.14	1.24
	74.52	74.52	3023.18	2.00	1.69	2.00	2.61	6.21	1.37
10 Year	78.10	78.10	3023.32	2.00	1.74	2.00	2.66	6.51	1.38
	124.20	124.20	3025.44	2.00	2.00	2.00	3.16	10.35	1.55
	149.04	140.68	3026.43	2.00	2.00	2.00	3.38	11.72	1.63
	173.88	141.71	3026.68	2.00	2.00	2.00	3.59	11.81	1.69
	198.72	141.96	3026.87	2.00	2.00	2.00	3.77	11.83	1.75
	223.56	141.97	3027.04	2.00	2.00	2.00	3.94	11.83	1.80
100 Year	248.40	141.88	3027.20	2.00	2.00	2.00	4.10	11.82	1.85

Inlet Elevation (Invert): 3019.71 ft, Outlet Elevation (Invert): 3019.60 ft
Culvert Length: 50.00 ft, Culvert Slope: 0.0015

Site Data - Str. No. 8 Existing

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 3021.69 ft
Outlet Station: 36.00 ft
Outlet Elevation: 3021.57 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 8 Existing

Barrel Shape: Concrete Box
Barrel Span: 3.00 ft
Barrel Rise: 2.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1.5:1 Bevel (18-34° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 61.54 ft
Crest Elevation: 3025.76 ft
Roadway Surface: Paved
Roadway Top Width: 28.00 ft

Site Data - Str. No. 8 Proposed

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 3019.71 ft
Outlet Station: 50.00 ft
Outlet Elevation: 3019.60 ft
Number of Barrels: 2

Culvert Data Summary - Str. No. 8 Proposed

Barrel Shape: Concrete Box
Barrel Span: 3.00 ft
Barrel Rise: 2.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1.5:1 Bevel (18-34° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 66.54 ft
Crest Elevation: 3025.93 ft
Roadway Surface: Paved
Roadway Top Width: 32.00 ft

HY-8 DATA

STATE OF TEXAS
SHELLEY C. HARRIS
99197
LICENSED PROFESSIONAL ENGINEER

Shelley C. Harris, P.E.
6/29/2022

Texas Department of Transportation

NO SCALE Sheet 7 of 22

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		106
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_HY8DATA.dgn		

STRUCTURE NO. 9 - Existing

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2980.53	0.00	0.00	0.00	0.00	0.00	0.00
	7.91	7.91	2981.83	0.75	0.88	0.75	0.03	5.70	2.46
	15.82	15.82	2982.43	1.08	1.27	1.09	0.05	6.85	3.24
	23.73	23.73	2982.92	1.35	1.57	1.35	0.06	7.67	3.82
10 Year	26.80	26.80	2983.10	1.45	1.67	1.45	0.07	7.92	4.00
	39.55	39.55	2983.98	1.85	2.05	1.85	0.08	8.67	4.68
	47.46	47.46	2984.68	2.10	2.24	2.11	0.09	8.96	5.03
	55.37	49.14	2984.85	2.16	2.28	2.16	0.10	9.03	5.35
	63.28	49.90	2984.93	2.18	2.30	2.18	0.11	9.05	5.65
	71.19	50.53	2984.99	2.21	2.31	2.21	0.12	9.05	5.92
100 Year	79.10	51.09	2985.05	2.23	2.32	2.23	0.13	9.07	6.17

Inlet Elevation (invert): 2980.53 ft, Outlet Elevation (invert): 2979.46 ft
Culvert Length: 43.59 ft, Culvert Slope: 0.0246

STRUCTURE NO. 9 - Proposed

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2980.86	0.00	0.00	0.00	0.00	0.00	0.00
	7.91	7.91	2981.34	0.13	0.31	0.13	0.03	7.51	2.46
	15.82	15.82	2981.62	0.26	0.50	0.28	0.05	7.17	3.24
	23.73	23.73	2981.85	0.34	0.65	0.36	0.06	8.13	3.82
10 Year	26.80	26.80	2981.93	0.36	0.70	0.40	0.07	8.42	4.00
	39.55	39.55	2982.25	0.47	0.91	0.53	0.08	9.33	4.68
	47.46	47.46	2982.44	0.54	1.03	0.61	0.09	9.69	5.03
	55.37	55.37	2982.61	0.59	1.14	0.69	0.10	10.10	5.35
	63.28	63.28	2982.78	0.65	1.25	0.76	0.11	10.43	5.65
	71.19	71.19	2982.93	0.70	1.35	0.83	0.12	10.71	5.92
100 Year	79.10	79.10	2983.08	0.75	1.45	0.90	0.13	11.01	6.17

Inlet Elevation (invert): 2980.86 ft, Outlet Elevation (invert): 2979.78 ft
Culvert Length: 44.00 ft, Culvert Slope: 0.0246

Site Data - Str. No. 9 Existing

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2980.53 ft
Outlet Station: 43.59 ft
Outlet Elevation: 2979.46 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 9 Existing

Barrel Shape: Circular
Barrel Diameter: 3.00 ft
Barrel Material: Corrugated Steel
Embedment: 0.00 in
Barrel Manning's n: 0.0240
Culvert Type: Straight
Inlet Configuration: Mitered to Conform to Slope
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 42.30 ft
Crest Elevation: 2984.73 ft
Roadway Surface: Paved
Roadway Top Width: 30.00 ft

Site Data - Str. No. 9 Proposed

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2980.86 ft
Outlet Station: 44.00 ft
Outlet Elevation: 2979.17 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 9 Proposed

Barrel Shape: Concrete Box
Barrel Span: 3.00 ft
Barrel Rise: 3.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1.5:1 Bevel (18-34° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 47.30 ft
Crest Elevation: 2984.90 ft
Roadway Surface: Paved
Roadway Top Width: 32.00 ft

STATE OF TEXAS
SHELLEY C. HARRIS
99197
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Shelley C. Harris, P.E.
6/29/2022

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HY-8 DATA

NO SCALE Sheet 8 of 22

STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		107
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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STRUCTURE NO. 10 - Existing

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2863.65	0.00	0.00	0.00	0.00	0.00	0.00
	4.53	4.53	2864.61	0.62	0.66	0.63	0.58	4.19	1.69
	9.06	9.06	2865.04	0.88	0.95	0.88	0.75	5.20	2.01
10 Year	11.70	11.70	2865.24	1.01	1.08	1.02	0.83	5.53	2.14
	18.12	18.12	2865.68	1.28	1.36	1.28	0.97	6.28	2.39
	22.65	22.65	2865.96	1.46	1.53	1.46	1.06	6.62	2.52
	27.18	27.18	2866.23	1.63	1.68	1.63	1.13	6.94	2.64
	31.71	31.71	2866.52	1.79	1.82	1.79	1.20	7.19	2.74
	36.24	36.24	2867.06	1.97	1.95	1.95	1.26	7.44	2.84
	40.77	40.77	2867.30	2.15	2.08	2.08	1.32	7.81	2.92
100 Year	45.30	45.30	2867.58	2.36	2.19	2.19	1.37	8.19	3.00

Inlet Elevation (invert): 2863.65.XX ft, Outlet Elevation (invert): 2862.88 ft
Culvert Length: 44.85 ft, Culvert Slope: 0.0172

STRUCTURE NO. 10 - Proposed

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2863.99	0.00	0.00	0.00	0.00	0.00	0.00
	4.53	4.53	2864.62	0.20	0.41	0.23	0.58	6.61	1.69
	9.06	9.06	2864.99	0.34	0.66	0.36	0.75	8.29	2.01
10 Year	11.70	11.70	2865.18	0.40	0.78	0.44	0.83	8.93	2.14
	18.12	18.12	2865.58	0.55	1.04	0.61	0.97	9.98	2.39
	22.65	22.65	2865.84	0.64	1.21	0.71	1.06	10.58	2.52
	27.18	27.18	2866.09	0.73	1.37	0.82	1.13	11.03	2.64
	31.71	31.71	2866.31	0.81	1.51	0.93	1.20	11.40	2.74
	36.24	36.24	2866.53	0.89	1.65	1.03	1.26	11.74	2.84
	40.77	40.77	2866.74	0.97	1.79	1.13	1.32	12.05	2.92
100 Year	45.30	45.30	2866.94	1.05	1.92	1.22	1.37	12.35	3.00

Inlet Elevation (invert): 2863.99 ft, Outlet Elevation (invert): 2862.60 ft
Culvert Length: 54.00 ft, Culvert Slope: 0.0170

Site Data - Str. No. 10 Existing
Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2863.65 ft
Outlet Station: 44.84 ft
Outlet Elevation: 2862.88 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 10 Existing
Barrel Shape: Circular
Barrel Diameter: 3.00 ft
Barrel Material: Corrugated Steel
Embedment: 0.00 in
Barrel Manning's n: 0.0240
Culvert Type: Straight
Inlet Configuration: Mitered to Conform to Slope
Inlet Depression: NONE

Roadway Data for Crossing
Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 65.70 ft
Crest Elevation: 2868.54 ft
Roadway Surface: Paved
Roadway Top Width: 28.00 ft

Site Data - Str. No. 10 Proposed
Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2863.99 ft
Outlet Station: 54.00 ft
Outlet Elevation: 2862.60 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 10 Proposed
Barrel Shape: Concrete Box
Barrel Span: 3.00 ft
Barrel Rise: 3.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1.5:1 Bevel (18-34° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing
Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 70.70 ft
Crest Elevation: 2868.61 ft
Roadway Surface: Paved
Roadway Top Width: 32.00 ft

HY-8 DATA

STATE OF TEXAS
SHELLEY C. HARRIS
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Shelley C. Harris, P.E.
6/29/2022

Texas Department of Transportation
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STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		108
CONT.	SECT.	JOB	HIGHWAY NO.
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STRUCTURE NO. 11 - Existing

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2833.51	0.00	0.00	0.00	0.00	0.00	0.00
	1.25	1.25	2834.05	0.45	0.34	0.46	0.46	1.82	0.74
	2.50	2.50	2834.29	0.64	0.49	0.60	0.60	2.50	0.88
10 Year	3.20	3.20	2834.39	0.73	0.56	0.66	0.66	2.80	0.93
	5.00	5.00	2834.62	0.92	0.70	0.77	0.77	3.46	1.04
	6.25	6.25	2834.76	1.04	0.78	0.84	0.84	3.84	1.10
	7.50	7.50	2834.88	1.15	0.86	0.90	0.90	4.19	1.15
	8.75	8.75	2835.00	1.25	0.93	0.96	0.96	4.52	1.20
	10.00	10.00	2835.11	1.35	1.00	1.00	1.00	4.82	1.24
	11.25	11.25	2835.21	1.45	1.06	1.06	1.05	5.05	1.28
100 Year	12.50	12.50	2835.32	1.54	1.12	1.12	1.09	5.20	1.31

Inlet Elevation (invert): 2833.51 ft, Outlet Elevation (invert): 2833.32 ft
Culvert Length: 43.68 ft, Culvert Slope: 0.0043

STRUCTURE NO. 11 - Proposed

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2833.56	0.00	0.00	0.00	0.00	0.00	0.00
	1.25	1.25	2833.83	0.11	0.18	0.46	0.46	0.90	0.74
	2.50	2.50	2833.99	0.21	0.28	0.60	0.60	1.40	0.88
10 Year	3.20	3.20	2834.07	0.27	0.33	0.66	0.66	1.63	0.93
	5.00	5.00	2834.25	0.35	0.44	0.77	0.77	2.15	1.04
	6.25	6.25	2834.36	0.41	0.51	0.84	0.84	2.47	1.10
	7.50	7.50	2834.46	0.47	0.58	0.90	0.90	2.77	1.15
	8.75	8.75	2834.56	0.52	0.64	0.96	0.96	3.05	1.20
	10.00	10.00	2834.65	0.57	0.70	1.00	1.00	3.32	1.24
	11.25	11.25	2834.74	0.62	0.76	1.05	1.05	3.57	1.28
100 Year	12.50	12.50	2834.82	0.66	0.81	1.09	1.09	3.82	1.31

Inlet Elevation (invert): 2833.56 ft, Outlet Elevation (invert): 2833.25 ft
Culvert Length: 44.00 ft, Culvert Slope: 0.0044

Site Data - Str. No. 11 Existing

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2833.51 ft
Outlet Station: 43.68 ft
Outlet Elevation: 2833.32 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 11 Existing

Barrel Shape: Circular
Barrel Diameter: 3.00 ft
Barrel Material: Corrugated Steel
Embedment: 0.00 in
Barrel Manning's n: 0.0240
Culvert Type: Straight
Inlet Configuration: Mitered to Conform to Slope
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 62.87 ft
Crest Elevation: 2838.00 ft
Roadway Surface: Paved
Roadway Top Width: 28.00 ft

Site Data - Str. No. 11 Proposed

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2833.56 ft
Outlet Station: 44.00 ft
Outlet Elevation: 2833.25 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 11 Proposed

Barrel Shape: Concrete Box
Barrel Span: 3.00 ft
Barrel Rise: 3.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1.5:1 Bevel (18-34° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 67.87 ft
Crest Elevation: 2838.17 ft
Roadway Surface: Paved
Roadway Top Width: 32.00 ft

STATE OF TEXAS
SHELLEY C. HARRIS
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Shelley C. Harris, P.E.
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HY-8 DATA

STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		109
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_HY8DATA.dgn		

STRUCTURE NO. 12 - Existing

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2770.34	0.00	0.00	0.00	0.00	0.00	0.00
	11.18	11.18	2771.55	0.70	0.76	1.03	1.03	3.62	1.32
	22.36	22.36	2772.21	1.16	1.20	1.34	1.34	5.58	1.57
10 Year	29.70	29.70	2772.60	1.42	1.45	1.49	1.49	6.66	1.68
	44.72	44.72	2773.38	1.95	1.90	1.90	1.73	7.83	1.86
	55.90	55.90	2773.86	2.32	2.21	2.21	1.88	8.43	1.97
	67.08	67.08	2774.32	2.68	2.49	2.49	2.02	8.96	2.06
	78.26	77.58	2774.79	3.00	2.75	2.75	2.14	9.41	2.14
	89.44	80.65	2774.95	3.00	2.82	2.82	2.25	9.53	2.21
	100.62	82.82	2775.06	3.00	2.87	2.87	2.35	9.62	2.28
100 Year	111.80	84.63	2775.16	3.00	2.91	2.91	2.44	9.68	2.34

Inlet Elevation (invert): 2770.34 ft, Outlet Elevation (invert): 2770.17 ft
Culvert Length: 35.73 ft, Culvert Slope: 0.0048

STRUCTURE NO. 12 - Proposed

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2770.45	0.00	0.00	0.00	0.00	0.00	0.00
	11.18	11.18	2771.59	0.56	0.76	1.03	1.03	3.62	1.32
	22.36	22.36	2772.28	0.91	1.20	0.96	1.34	7.78	1.57
10 Year	29.70	29.70	2772.68	1.11	1.45	1.18	1.49	8.39	1.68
	44.72	44.72	2773.45	1.50	1.90	1.60	1.73	9.33	1.86
	55.90	55.90	2774.03	1.78	2.21	1.89	1.88	9.87	1.97
	67.08	67.08	2774.64	2.05	2.49	2.17	2.02	10.33	2.06
	78.26	73.48	2775.02	2.20	2.65	2.32	2.14	10.56	2.14
	89.44	75.06	2775.12	2.24	2.69	2.36	2.25	10.62	2.21
	100.62	76.33	2775.19	2.27	2.72	2.39	2.35	10.66	2.28
100 Year	111.80	77.41	2775.26	2.29	2.74	2.41	2.44	10.70	2.34

Inlet Elevation (invert): 2770.45 ft, Outlet Elevation (invert): 2770.06 ft
Culvert Length: 41.70 ft, Culvert Slope: 0.0048

Site Data - Str. No. 12 Existing

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2770.34 ft
Outlet Station: 35.73 ft
Outlet Elevation: 2770.17 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 12 Existing

Barrel Shape: Concrete Box
Barrel Span: 3.00 ft
Barrel Rise: 3.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1:1 Bevel (45° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 63.01 ft
Crest Elevation: 2774.76 ft
Roadway Surface: Paved
Roadway Top Width: 29.00 ft

Site Data - Str. No. 12 Proposed

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2770.45 ft
Outlet Station: 41.70 ft
Outlet Elevation: 2770.06 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 12 Proposed

Barrel Shape: Concrete Box
Barrel Span: 3.00 ft
Barrel Rise: 3.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1.5:1 Bevel (18-34° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 68.01 ft
Crest Elevation: 2774.93 ft
Roadway Surface: Paved
Roadway Top Width: 32.00 ft

STATE OF TEXAS
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6/29/2022

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STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		110
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_HY8DATA.dgn		

HY-8 DATA

STRUCTURE NO. 14 - Existing

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2725.84	0.00	0.00	0.00	0.00	0.00	0.00
	1.89	1.89	2726.49	0.56	0.33	0.64	0.64	1.08	0.57
10 Year	2.70	2.70	2726.60	0.68	0.40	0.73	0.73	1.29	0.63
	5.67	5.67	2726.91	1.03	0.58	0.97	0.97	1.88	0.75
	7.56	7.56	2727.07	1.23	0.68	1.08	1.08	2.18	0.81
	9.45	9.45	2727.22	1.45	0.76	1.18	1.18	2.46	0.86
	11.34	11.34	2727.35	1.76	0.84	1.26	1.26	2.72	0.90
	13.23	13.23	2727.48	2.00	0.91	1.33	1.33	2.97	0.93
	15.12	15.12	2727.60	2.00	0.98	1.40	1.40	3.21	0.96
	17.01	17.01	2727.72	2.00	1.04	1.47	1.47	3.45	0.99
100 Year	18.90	18.90	2727.84	2.00	1.10	1.52	1.52	3.68	1.02

Inlet Elevation (invert): 2725.84 ft, Outlet Elevation (invert): 2725.77 ft
Culvert Length: 38.00 ft, Culvert Slope: 0.0019

STRUCTURE NO. 14 - Proposed

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2725.93	0.00	0.00	0.00	0.00	0.00	0.00
	1.89	1.89	2726.46	0.19	0.16	0.64	0.64	0.59	0.57
10 Year	2.70	2.70	2726.56	0.23	0.21	0.73	0.73	0.74	0.63
	5.67	5.67	2726.81	0.37	0.34	0.97	0.97	1.17	0.75
	7.56	7.56	2726.94	0.44	0.41	1.08	1.08	1.40	0.81
	9.45	9.45	2727.05	0.51	0.48	1.18	1.18	1.61	0.86
	11.34	11.34	2727.14	0.58	0.54	1.26	1.26	1.80	0.90
	13.23	13.23	2727.23	0.64	0.60	1.33	1.33	1.98	0.93
	15.12	15.12	2727.32	0.70	0.66	1.40	1.40	2.16	0.96
	17.01	17.01	2727.40	0.75	0.71	1.47	1.47	2.32	0.99
100 Year	18.90	18.90	2727.47	0.81	0.76	1.52	1.52	2.48	1.02

Inlet Elevation (invert): 2725.93 ft, Outlet Elevation (invert): 2725.81 ft
Culvert Length: 44.00 ft, Culvert Slope: 0.0017

Site Data - Str. No. 14 Existing
Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2725.84 ft
Outlet Station: 38.00 ft
Outlet Elevation: 2725.77 ft
Number of Barrels: 2

Culvert Data Summary - Str. No. 14 Existing
Barrel Shape: Circular
Barrel Diameter: 2.00 ft
Barrel Material: Corrugated Steel
Embedment: 0.00 in
Barrel Manning's n: 0.0240
Culvert Type: Straight
Inlet Configuration: Mitered to Conform to Slope
Inlet Depression: NONE

Roadway Data for Crossing
Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 55.30 ft
Crest Elevation: 2729.58 ft
Roadway Surface: Paved
Roadway Top Width: 28.00 ft

Site Data - Str. No. 14 Proposed
Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2725.93 ft
Outlet Station: 44.00 ft
Outlet Elevation: 2725.81 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 14 Proposed
Barrel Shape: Concrete Box
Barrel Span: 5.00 ft
Barrel Rise: 2.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1.5:1 Bevel (18-34° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing
Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 60.30 ft
Crest Elevation: 2729.75 ft
Roadway Surface: Paved
Roadway Top Width: 32.00 ft

STATE OF TEXAS
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6/29/2022

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STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		III
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_HY8DATA.dgn		

STRUCTURE NO. 16 - Existing

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2656.55	0.00	0.00	0.00	0.00	0.00	0.00
	55.10	55.10	2657.48	0.66	0.57	2.26	1.01	0.96	3.65
	110.20	110.20	2658.06	1.21	0.82	3.07	1.57	1.22	4.69
	165.30	165.30	2658.55	1.74	1.04	3.84	2.04	1.41	5.41
	220.40	220.40	2658.99	2.04	1.18	4.32	2.46	1.55	5.96
	275.50	275.50	2659.40	2.33	1.32	4.74	2.86	1.73	6.42
25 Year	293.43	293.43	2659.53	2.60	1.34	4.72	2.99	1.85	6.55
	385.70	385.70	2660.17	3.13	1.47	5.17	3.6	1.99	7.14
	440.80	440.80	2660.53	3.11	1.48	5.13	3.95	2.02	7.44
	495.90	495.90	2660.88	3.10	1.48	5.11	4.29	2.05	7.71
100 Year	551.00	551.00	2661.22	3.08	1.50	5.09	4.62	2.08	7.95

Inlet Elevation (invert): 2656.08 ft, Outlet Elevation (invert): 2655.83 ft
Culvert Length: 47.30 ft, Culvert Slope: 0.0039

STRUCTURE NO. 16 - Proposed

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2656.02	0.00	0.00	0.00	0.00	0.00	0.00
	55.10	55.10	2656.95	0.28	0.39	1.01	1.01	1.37	3.65
	110.20	110.20	2657.53	0.57	0.62	1.57	1.57	1.76	4.69
	165.30	165.30	2658.02	0.85	0.81	2.04	2.04	2.03	5.41
	220.40	220.40	2658.46	1.03	0.98	2.46	2.46	2.24	5.96
	275.50	275.50	2658.87	1.18	1.14	2.86	2.86	2.41	6.42
25 Year	293.43	293.43	2659.00	1.23	1.19	2.99	2.99	2.46	6.55
	385.70	385.70	2659.64	1.48	1.42	3.6	3.6	2.68	7.14
	440.80	440.80	2660.00	1.63	1.56	3.95	3.95	2.79	7.44
	495.90	495.90	2660.35	1.78	1.68	4.29	4.29	2.89	7.71
100 Year	551.00	551.00	2660.69	1.91	1.81	4.62	4.62	2.98	7.95

Inlet Elevation (invert): 2656.11 ft, Outlet Elevation (invert): 2655.80 ft
Culvert Length: 60.13 ft, Culvert Slope: 0.0039

Site Data - Str. No. 16 Existing
Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2656.08 ft
Outlet Station: 47.30 ft
Outlet Elevation: 2655.83 ft
Number of Barrels: 4

Culvert Data Summary - Str. No. 16 Existing
Barrel Shape: Concrete Box
Barrel Span: 10.00 ft
Barrel Rise: 10.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1:1 Bevel (45° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing
Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 37.61 ft
Crest Elevation: 2667.58 ft
Roadway Surface: Paved
Roadway Top Width: 29.00 ft

Site Data - Str. No. 16 Proposed
Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2656.11 ft
Outlet Station: 60.13 ft
Outlet Elevation: 2655.80 ft
Number of Barrels: 4

Culvert Data Summary - Str. No. 16 Proposed
Barrel Shape: Concrete Box
Barrel Span: 10.00 ft
Barrel Rise: 10.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1:1 Bevel (45° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing
Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 42.60 ft
Crest Elevation: 2667.75 ft
Roadway Surface: Paved
Roadway Top Width: 32.00 ft

STATE OF TEXAS
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STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		112
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_HY8DATA.dgn		

STRUCTURE NO. 17 - Existing

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2674.83	0.00	0.00	0.00	0.00	0.00	0.00
	18.50	18.50	2676.57	2.00	1.08	1.08	0.37	5.32	1.01
	37.00	37.00	2678.00	2.00	1.55	1.55	0.56	7.10	1.33
10 Year	48.20	45.29	2678.88	2.00	1.69	1.69	0.65	7.98	1.48
	74.00	47.85	2679.18	2.00	1.73	1.73	0.85	8.27	1.75
	92.50	49.12	2679.34	2.00	1.75	1.75	0.97	8.43	1.91
	111.00	50.25	2679.48	2.00	1.76	1.76	1.08	8.56	2.05
	129.50	51.31	2679.61	2.00	1.78	1.78	1.19	8.69	2.17
	148.00	52.24	2679.72	2.00	1.79	1.79	1.29	8.81	2.29
	166.50	53.10	2679.83	2.00	1.80	1.80	1.39	8.92	2.40
100 Year	185.00	53.89	2679.94	2.00	1.81	1.81	1.48	9.02	2.49

Inlet Elevation (invert): 2725.84 ft, Outlet Elevation (invert): 2725.77 ft
Culvert Length: 36.00 ft, Culvert Slope: 0.0019

STRUCTURE NO. 17 - Proposed

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2674.93	0.00	0.00	0.00	0.00	0.00	0.00
	18.50	18.50	2675.78	0.43	0.55	0.44	0.37	5.25	1.01
	37.00	37.00	2676.29	0.69	0.87	0.71	0.56	6.54	1.33
10 Year	48.20	48.20	2676.55	0.82	1.04	0.85	0.65	7.08	1.48
	74.00	74.00	2677.08	1.10	1.39	1.16	0.85	8.00	1.75
	92.50	92.50	2677.46	1.29	1.61	1.36	0.97	8.51	1.91
	111.00	111.00	2677.86	1.47	1.81	1.55	1.08	8.95	2.05
	129.50	129.50	2678.31	1.65	2.00	1.74	1.19	9.33	2.17
	148.00	148.00	2678.81	2.00	2.00	2.00	1.29	9.25	2.29
	166.50	157.36	2679.09	2.00	2.00	2.00	1.39	9.83	2.40
100 Year	185.00	161.14	2679.21	2.00	2.00	2.00	1.48	10.07	2.49

Inlet Elevation (invert): 2674.93 ft, Outlet Elevation (invert): 2674.60 ft
Culvert Length: 46.00 ft, Culvert Slope: 0.0045

Site Data - Str. No. 17 Existing

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2725.84 ft
Outlet Station: 36.00 ft
Outlet Elevation: 2725.77 ft
Number of Barrels: 2

Culvert Data Summary - Str. No. 17 Existing

Barrel Shape: Circular
Barrel Diameter: 2.00 ft
Barrel Material: Corrugated Steel
Embedment: 0.00 in
Barrel Manning's n: 0.0240
Culvert Type: Straight
Inlet Configuration: Beveled Edge (1.5:1)
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 35.00 ft
Crest Elevation: 2678.79 ft
Roadway Surface: Paved
Roadway Top Width: 29.00 ft

Site Data - Str. No. 17 Proposed

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2674.93 ft
Outlet Station: 46.00 ft
Outlet Elevation: 2674.60 ft
Number of Barrels: 2

Culvert Data Summary - Str. No. 17 Proposed

Barrel Shape: Concrete Box
Barrel Span: 4.00 ft
Barrel Rise: 2.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1.5:1 Bevel (18-34° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 40.00 ft
Crest Elevation: 2678.96 ft
Roadway Surface: Paved
Roadway Top Width: 32.00 ft

STATE OF TEXAS
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HY-8 DATA

STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		113
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_HY8DATA.dgn		

STRUCTURE NO. 18 - Existing

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2644.49	0.00	0.00	0.00	0.00	0.00	0.00
	21.64	21.64	2645.87	1.14	0.84	1.35	1.35	2.34	1.49
	43.28	43.28	2646.44	1.70	1.20	1.75	1.75	3.38	1.77
10 Year	56.60	56.60	2646.73	2.03	1.39	1.93	1.93	3.92	1.89
	86.56	86.56	2647.34	3.00	1.73	2.27	2.27	5.04	2.11
	108.20	108.20	2647.78	3.00	1.95	2.46	2.46	5.81	2.23
	129.84	129.84	2648.32	3.00	2.14	2.64	2.64	6.57	2.33
	151.48	151.48	2648.94	3.00	2.31	2.80	2.80	7.36	2.42
	173.12	173.12	2649.62	3.00	2.46	2.94	2.94	8.20	2.51
	194.76	194.76	2650.38	3.00	2.58	3.00	3.07	9.18	2.58
100 Year	216.40	202.71	2650.76	3.00	2.62	3.00	3.20	9.56	2.65

Inlet Elevation (invert): 2644.49 ft, Outlet Elevation (invert): 2644.30 ft
Culvert Length: 44.84 ft, Culvert Slope: 0.0042

STRUCTURE NO. 18 - Proposed

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2644.59	0.00	0.00	0.00	0.00	0.00	0.00
	21.64	21.64	2645.66	0.47	0.61	1.35	1.35	2.01	1.49
	43.28	43.28	2646.20	0.75	0.97	1.75	1.75	3.10	1.77
10 Year	56.60	56.60	2646.48	0.90	1.16	1.93	1.93	3.66	1.89
	86.56	86.56	2647.04	1.22	1.54	2.27	2.27	4.77	2.11
	108.20	108.20	2647.36	1.43	1.78	2.46	2.46	5.49	2.23
	129.84	129.84	2647.72	1.63	2.01	2.64	2.64	6.15	2.33
	151.48	151.48	2648.07	1.83	2.23	2.80	2.80	6.77	2.42
	173.12	173.12	2648.43	2.02	2.44	2.94	2.94	7.36	2.51
	194.76	194.76	2648.81	2.21	2.64	3.00	3.07	8.12	2.58
100 Year	216.40	216.40	2649.22	2.39	2.83	3.00	3.20	9.02	2.65

Inlet Elevation (invert): 2644.59 ft, Outlet Elevation (invert): 2644.19 ft
Culvert Length: 54.00 ft, Culvert Slope: 0.0043

Site Data - Str. No. 18 Existing

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2644.49 ft
Outlet Station: 44.84 ft
Outlet Elevation: 2664.30 ft
Number of Barrels: 3

Culvert Data Summary - Str. No. 18 Existing

Barrel Shape: Circular
Barrel Diameter: 3.00 ft
Barrel Material: Corrugated Steel
Embedment: 0.00 in
Barrel Manning's n: 0.0240
Culvert Type: Straight
Inlet Configuration: Beveled Edge (1.5:1)
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 69.38 ft
Crest Elevation: 2650.50 ft
Roadway Surface: Paved
Roadway Top Width: 29.00 ft

Site Data - Str. No. 18 Proposed

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2644.59 ft
Outlet Station: 54.00 ft
Outlet Elevation: 2644.19 ft
Number of Barrels: 2

Culvert Data Summary - Str. No. 18 Proposed

Barrel Shape: Concrete Box
Barrel Span: 4.00 ft
Barrel Rise: 3.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1.5:1 Bevel (18-34° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 74.38 ft
Crest Elevation: 2650.67 ft
Roadway Surface: Paved
Roadway Top Width: 32.00 ft

STATE OF TEXAS
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6/29/2022

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HY-8 DATA

STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		114
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_HY8DATA.dgn		

STRUCTURE NO. 19 - Existing

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2594.64	0.00	0.00	0.00	0.00	0.00	0.00
	5.49	5.49	2595.89	0.92	0.44	1.26	1.26	0.74	0.43
10 Year	8.90	8.90	2596.15	1.20	0.56	1.51	1.51	0.96	0.49
	16.47	16.47	2596.57	1.79	0.77	1.90	1.90	1.37	0.57
	21.96	21.96	2596.81	2.50	0.89	2.11	2.11	1.65	0.61
	27.45	27.45	2597.03	2.50	1.00	2.30	2.30	1.94	0.65
	32.94	32.94	2597.25	2.50	1.11	2.46	2.46	2.24	0.68
	38.43	38.43	2597.47	2.50	1.20	2.50	2.61	2.61	0.71
	43.92	43.92	2597.68	2.50	1.29	2.50	2.74	2.98	0.73
	49.41	49.41	2597.89	2.50	1.37	2.50	2.87	3.36	0.75
100 Year	54.90	54.90	2598.10	2.50	1.45	2.50	2.98	3.73	0.77

Inlet Elevation (invert): 2594.64 ft, Outlet Elevation (invert): 2594.61 ft
Culvert Length: 37.60 ft, Culvert Slope: 0.0008

STRUCTURE NO. 19 - Proposed

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2594.62	0.00	0.00	0.00	0.00	0.00	0.00
	5.49	5.49	2595.86	0.55	0.33	1.26	1.26	0.87	0.43
10 Year	8.90	8.90	2596.13	0.75	0.46	1.51	1.51	1.18	0.49
	16.47	16.47	2596.55	1.14	0.70	1.90	1.90	1.74	0.57
	21.96	21.96	2596.80	1.39	0.84	2.11	2.11	2.08	0.61
	27.45	27.45	2597.01	1.63	0.98	2.30	2.30	2.39	0.65
	32.94	32.94	2597.20	1.86	1.10	2.46	2.46	2.68	0.68
	38.43	38.43	2597.38	2.08	1.22	2.61	2.61	2.95	0.71
	43.92	43.92	2597.54	2.29	1.34	2.74	2.74	3.20	0.73
	49.41	49.41	2597.70	2.50	1.45	2.87	2.87	3.45	0.75
100 Year	54.90	54.90	2597.85	2.71	1.55	2.98	2.98	3.68	0.77

Inlet Elevation (invert): 2594.62 ft, Outlet Elevation (invert): 2594.59 ft
Culvert Length: 40.00 ft, Culvert Slope: 0.0004

Site Data - Str. No. 19 Existing

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2594.64 ft
Outlet Station: 37.60 ft
Outlet Elevation: 2594.61 ft
Number of Barrels: 3

Culvert Data Summary - Str. No. 19 Existing

Barrel Shape: Circular
Barrel Diameter: 2.50 ft
Barrel Material: Corrugated Steel
Embedment: 0.00 in
Barrel Manning's n: 0.0240
Culvert Type: Straight
Inlet Configuration: Beveled Edge (1.5:1)
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 55.16 ft
Crest Elevation: 2598.90 ft
Roadway Surface: Paved
Roadway Top Width: 29.00 ft

Site Data - Str. No. 19 Proposed

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2594.62 ft
Outlet Station: 40.00 ft
Outlet Elevation: 2594.59 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 19 Proposed

Barrel Shape: Concrete Box
Barrel Span: 5.00 ft
Barrel Rise: 3.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1.5:1 Bevel (18-34° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 60.16 ft
Crest Elevation: 2599.07 ft
Roadway Surface: Paved
Roadway Top Width: 32.00 ft

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STRUCTURE NO. 21 - Existing

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2582.81	0.00	0.00	0.00	0.00	0.00	0.00
	5.77	5.77	2584.17	1.68	0.69	1.28	1.28	1.66	0.44
	11.54	11.54	2584.63	2.56	0.99	1.66	1.66	2.34	0.52
10 Year	15.70	15.70	2584.89	3.32	1.16	1.86	1.86	2.73	0.56
	23.08	23.08	2585.27	4.00	1.41	2.15	2.15	3.34	0.62
	28.85	28.85	2585.54	4.00	1.59	2.34	2.34	3.77	0.66
	34.62	34.62	2585.79	4.00	1.75	2.51	2.51	4.17	0.69
	40.39	40.39	2586.02	4.00	1.90	2.66	2.66	4.56	0.71
	46.16	46.16	2586.25	4.00	2.03	2.79	2.79	4.92	0.74
	51.93	51.93	2586.47	4.00	2.16	2.92	2.92	5.28	0.76
100 Year	57.70	57.70	2586.69	4.00	2.28	3.04	3.04	5.63	0.78

Inlet Elevation (invert): 2582.81 ft, Outlet Elevation (invert): 2582.79 ft
Culvert Length: 50.00 ft, Culvert Slope: 0.0004

Site Data - Str. No. 21 Existing

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2582.81 ft
Outlet Station: 50.00 ft
Outlet Elevation: 2582.79 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 21 Existing

Barrel Shape: Circular
Barrel Diameter: 4.00 ft
Barrel Material: Corrugated Steel
Embedment: 0.00 in
Barrel Manning's n: 0.0240
Culvert Type: Straight
Inlet Configuration: Beveled Edge (1.5:1)
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 33.00 ft
Crest Elevation: 2591.09 ft
Roadway Surface: Paved
Roadway Top Width: 27.00 ft

STRUCTURE NO. 21 - Proposed

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2582.85	0.00	0.00	0.00	0.00	0.00	0.00
	5.77	5.77	2584.18	1.03	0.69	1.28	1.28	1.66	0.44
	11.54	11.54	2584.64	1.49	0.99	1.66	1.66	2.34	0.52
10 Year	15.70	15.70	2584.91	1.76	1.16	1.86	1.86	2.73	0.56
	23.08	23.08	2585.30	2.21	1.41	2.15	2.15	3.34	0.62
	28.85	28.85	2585.58	2.56	1.59	2.34	2.34	3.77	0.66
	34.62	34.62	2585.83	2.94	1.75	2.51	2.51	4.17	0.69
	40.39	40.39	2586.08	3.46	1.90	2.66	2.66	4.56	0.71
	46.16	46.16	2586.31	4.00	2.03	2.79	2.79	4.92	0.74
	51.93	51.93	2586.54	4.00	2.16	2.92	2.92	5.28	0.76
100 Year	57.70	57.70	2586.77	4.00	2.28	3.04	3.04	5.63	0.78

Inlet Elevation (invert): 2582.85 ft, Outlet Elevation (invert): 2582.81 ft
Culvert Length: 64.00 ft, Culvert Slope: 0.0004

Site Data - Str. No. 21 Existing

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2582.85 ft
Outlet Station: 64.00 ft
Outlet Elevation: 2582.81 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 21 Existing

Barrel Shape: Circular
Barrel Diameter: 4.00 ft
Barrel Material: Reinforced Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Mitered to Conform to Slope
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 38.00 ft
Crest Elevation: 2591.26 ft
Roadway Surface: Paved
Roadway Top Width: 32.00 ft

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STRUCTURE NO. 23 - Existing

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2578.06	0.00	0.00	0.00	0.00	0.00	0.00
	20.96	20.96	2579.15	0.32	0.72	0.41	0.50	8.44	2.81
	41.92	41.92	2579.78	0.57	1.15	0.70	0.76	10.01	3.66
10 Year	57.90	57.90	2580.20	0.70	1.42	0.90	0.93	10.76	4.13
	83.84	83.84	2580.80	0.90	1.82	1.19	1.18	11.71	4.73
	104.80	104.80	2581.26	1.05	2.12	1.42	1.36	12.33	5.13
	125.76	125.76	2581.69	1.19	2.39	1.63	1.53	12.85	5.48
	146.72	146.72	2582.09	1.32	2.65	1.84	1.69	13.31	5.79
	167.68	167.68	2582.47	1.46	2.89	2.04	1.84	13.72	6.06
	188.64	188.64	2582.85	1.58	3.13	2.23	1.99	14.10	6.32
100 Year	209.60	209.60	2583.23	1.70	3.36	2.42	2.13	14.45	6.55

Inlet Elevation (invert): 2578.06 ft, Outlet Elevation (invert): 2577.18 ft
Culvert Length: 35.86 ft, Culvert Slope: 0.0245

STRUCTURE NO. 23 - Proposed

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2,578.51	0.00	0.00	0.30	0.00	0.00	0.00
	20.96	20.96	2,579.59	0.22	0.72	0.33	0.50	10.51	2.81
	41.92	41.92	2,580.23	0.45	1.15	0.56	0.76	12.50	3.66
10 Year	57.90	57.90	2,580.64	0.58	1.42	0.72	0.93	13.42	4.13
	83.84	83.84	2,581.24	0.73	1.82	0.97	1.18	14.47	4.73
	104.80	104.80	2,581.69	0.85	2.12	1.16	1.36	15.11	5.13
	125.76	125.76	2,582.12	0.97	2.39	1.34	1.53	15.66	5.48
	146.72	146.72	2,582.52	1.09	2.65	1.52	1.69	16.13	5.79
	167.68	167.68	2,582.90	1.18	2.89	1.69	1.84	16.55	6.06
	188.64	188.64	2,583.26	1.28	3.13	1.86	1.99	16.93	6.32
100 Year	209.60	209.60	2,583.61	1.38	3.36	2.02	2.13	17.28	6.55

Inlet Elevation (invert): 2578.51 ft, Outlet Elevation (invert): 2576.38 ft
Culvert Length: 48.00 ft, Culvert Slope: 0.0246

Site Data - Str. No. 23 Existing
Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2578.06 ft
Outlet Station: 35.85 ft
Outlet Elevation: 2577.18 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 23 Existing
Barrel Shape: Concrete Box
Barrel Span: 6.00 ft
Barrel Rise: 5.37 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge (30-75° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing
Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 33.00 ft
Crest Elevation: 2586.14 ft
Roadway Surface: Paved
Roadway Top Width: 27.00 ft

Site Data - Str. No. 23 Proposed
Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2578.51 ft
Outlet Station: 48.00 ft
Outlet Elevation: 2576.38 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 23 Proposed
Barrel Shape: Concrete Box
Barrel Span: 6.00 ft
Barrel Rise: 6.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1.5:1 Bevel (18-34° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing
Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 38.00 ft
Crest Elevation: 2586.31 ft
Roadway Surface: Paved
Roadway Top Width: 32.00 ft

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STRUCTURE NO. 24 - Existing

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2578.16	0.00	0.00	0.00	0.00	0.00	0.00
	4.86	4.86	2578.99	0.40	0.63	0.43	0.59	6.41	1.77
	9.72	9.72	2579.35	0.55	0.90	0.62	0.76	7.60	2.11
10 Year	11.10	11.10	2579.44	0.60	0.97	0.67	0.80	7.88	2.18
	19.44	19.44	2579.88	0.81	1.29	0.92	0.98	8.88	2.51
	24.30	24.30	2580.10	0.90	1.45	1.04	1.07	9.32	2.65
	29.16	29.16	2580.33	0.99	1.60	1.15	1.15	9.72	2.77
	34.02	34.02	2580.55	1.08	1.73	1.26	1.21	9.99	2.88
	38.88	38.88	2580.75	1.16	1.86	1.36	1.28	10.31	2.98
	43.74	43.74	2580.94	1.23	1.98	1.46	1.33	10.58	3.07
100 Year	48.60	48.60	2581.12	1.30	2.09	1.55	1.39	10.82	3.15

Inlet Elevation (invert): 2578.16 ft, Outlet Elevation (invert): 2577.41 ft
Culvert Length: 40.86 ft, Culvert Slope: 0.0184

STRUCTURE NO. 24 - Proposed

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2578.46	0.00	0.00	0.00	0.00	0.00	0.00
	4.86	4.86	2579.00	0.13	0.36	0.19	0.59	6.36	1.77
	9.72	9.72	2579.32	0.26	0.57	0.30	0.76	8.02	2.11
10 Year	11.10	11.10	2579.40	0.29	0.62	0.33	0.80	8.40	2.18
	19.44	19.44	2579.83	0.44	0.90	0.50	0.98	9.74	2.51
	24.30	24.30	2580.05	0.51	1.05	0.59	1.07	10.30	2.65
	29.16	29.16	2580.26	0.58	1.18	0.68	1.15	10.78	2.77
	34.02	34.02	2580.45	0.65	1.31	0.76	1.21	11.20	2.88
	38.88	38.88	2580.64	0.71	1.43	0.84	1.28	11.52	2.98
	43.74	43.74	2580.83	0.77	1.55	0.93	1.33	11.81	3.07
100 Year	48.60	48.60	2581.00	0.83	1.66	1.00	1.39	12.10	3.15

Inlet Elevation (invert): 2578.46 ft, Outlet Elevation (invert): 2577.11 ft
Culvert Length: 48.00 ft, Culvert Slope: 0.0185

Site Data - Str. No. 24 Existing

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2578.16 ft
Outlet Station: 40.85 ft
Outlet Elevation: 2577.41 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 24 Existing

Barrel Shape: Circular
Barrel Diameter: 4.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Beveled Edge (1.5:1)
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 34.00 ft
Crest Elevation: 2585.49 ft
Roadway Surface: Paved
Roadway Top Width: 27.50 ft

Site Data - Str. No. 24 Proposed

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2578.46 ft
Outlet Station: 48.00 ft
Outlet Elevation: 2577.11 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 24 Proposed

Barrel Shape: Concrete Box
Barrel Span: 4.00 ft
Barrel Rise: 4.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1.5:1 Bevel (18-34° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 39.00 ft
Crest Elevation: 2585.66 ft
Roadway Surface: Paved
Roadway Top Width: 32.00 ft

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STRUCTURE NO. 25 - Existing

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2572.34	0.00	0.00	0.00	0.00	0.00	0.00
	10.77	10.77	2573.05	0.28	0.46	0.35	0.38	5.14	1.41
	21.54	21.54	2573.46	0.52	0.74	0.56	0.58	6.43	1.84
	32.31	32.31	2573.81	0.67	0.97	0.74	0.75	7.26	2.15
10 Year	34.00	34.00	2573.86	0.69	1.00	0.77	0.77	7.37	2.20
	53.85	53.85	2574.41	0.96	1.36	1.07	1.03	8.39	2.62
	64.62	64.62	2574.68	1.08	1.53	1.22	1.15	8.82	2.80
	75.39	75.39	2574.93	1.19	1.70	1.36	1.27	9.21	2.97
	86.16	86.16	2575.18	1.31	1.86	1.50	1.38	9.55	3.12
	96.93	96.93	2575.42	1.43	2.01	1.64	1.49	9.86	3.26
100 Year	107.70	107.70	2575.65	1.53	2.15	1.77	1.59	10.15	3.38

Inlet Elevation (invert): 2572.34 ft, Outlet Elevation (invert): 2572.02 ft
Culvert Length: 36.84 ft, Culvert Slope: 0.0087

STRUCTURE NO. 25 - Proposed

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2572.51	0.00	0.00	0.02	0.00	0.00	0.00
	10.77	10.77	2573.21	0.20	0.46	0.30	0.38	6.01	1.41
	21.54	21.54	2573.63	0.41	0.74	0.48	0.58	7.49	1.84
	32.31	32.31	2573.97	0.58	0.97	0.64	0.75	8.40	2.15
10 Year	34.00	34.00	2574.02	0.60	1.00	0.67	0.77	8.52	2.20
	53.85	53.85	2574.57	0.80	1.36	0.94	1.03	9.59	2.62
	64.62	64.62	2574.83	0.90	1.53	1.07	1.15	10.06	2.80
	75.39	75.39	2575.09	1.01	1.70	1.20	1.27	10.47	2.97
	86.16	86.16	2575.33	1.11	1.86	1.33	1.38	10.81	3.12
	96.93	96.93	2575.56	1.20	2.01	1.45	1.49	11.14	3.26
100 Year	107.70	107.70	2575.79	1.29	2.15	1.57	1.59	11.43	3.38

Inlet Elevation (invert): 2572.51 ft, Outlet Elevation (invert): 2571.83 ft
Culvert Length: 48.00 ft, Culvert Slope: 0.0085

Site Data - Str. No. 25 Existing

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2572.34 ft
Outlet Station: 36.84 ft
Outlet Elevation: 2572.02 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 25 Existing

Barrel Shape: Concrete Box
Barrel Span: 6.00 ft
Barrel Rise: 5.37 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge (30-75° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 33.00 ft
Crest Elevation: 2581.66 ft
Roadway Surface: Paved
Roadway Top Width: 27.00 ft

Site Data - Str. No. 25 Proposed

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2572.51 ft
Outlet Station: 48.00 ft
Outlet Elevation: 2571.83 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 25 Proposed

Barrel Shape: Concrete Box
Barrel Span: 6.00 ft
Barrel Rise: 6.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1.5:1 Bevel (18-34° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 38.00 ft
Crest Elevation: 2581.83 ft
Roadway Surface: Paved
Roadway Top Width: 32.00 ft

HY-8 DATA

STATE OF TEXAS
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STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		119
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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STRUCTURE NO. 26 - Existing

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2594.02	0.00	0.00	0.00	0.00	0.00	0.00
	2.67	2.67	2594.90	0.82	0.53	0.63	0.63	2.76	0.84
	5.34	5.34	2595.28	1.21	0.76	0.82	0.82	3.84	1.00
	8.01	8.01	2595.58	1.56	0.94	0.95	0.95	4.68	1.11
10 Year	9.00	9.00	2595.68	1.69	1.00	1.00	0.99	4.94	1.14
	13.35	13.35	2596.10	2.50	1.23	1.23	1.15	5.56	1.26
	16.02	16.02	2596.34	2.50	1.35	1.35	1.23	5.93	1.32
	18.69	18.69	2596.58	2.50	1.46	1.46	1.31	6.27	1.37
	21.36	21.36	2596.83	2.50	1.57	1.57	1.37	6.59	1.42
	24.03	24.03	2597.10	2.50	1.67	1.67	1.43	6.92	1.46
100 Year	26.70	26.70	2597.43	2.50	1.76	1.76	1.49	7.23	1.50

Inlet Elevation (invert): 2594.02 ft, Outlet Elevation (invert): 2593.90 ft

Culvert Length: 46.63 ft, Culvert Slope: 0.0026

STRUCTURE NO. 26 - Proposed

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2594.16	0.00	0.00	0.00	0.00	0.00	0.00
	2.67	2.67	2594.61	0.24	0.29	0.63	0.63	1.41	0.84
	5.34	5.34	2594.88	0.38	0.46	0.82	0.82	2.18	1.00
	8.01	8.01	2595.10	0.51	0.60	0.95	0.95	2.81	1.11
10 Year	9.00	9.00	2595.18	0.55	0.65	0.99	0.99	3.02	1.14
	13.35	13.35	2595.48	0.72	0.85	1.15	1.15	3.87	1.26
	16.02	16.02	2595.65	0.82	0.96	1.23	1.23	4.33	1.32
	18.69	18.69	2595.82	0.91	1.06	1.31	1.31	4.77	1.37
	21.36	21.36	2595.97	1.00	1.16	1.37	1.37	5.19	1.42
	24.03	24.03	2596.12	1.09	1.26	1.11	1.43	7.25	1.46
100 Year	26.70	26.70	2596.26	1.18	1.35	1.19	1.49	7.45	1.50

Inlet Elevation (invert): 2594.16 ft, Outlet Elevation (invert): 2593.80 ft

Culvert Length: 56.00 ft, Culvert Slope: 0.0038

Site Data - Str. No. 26 Existing

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2594.02 ft
Outlet Station: 46.63 ft
Outlet Elevation: 2593.90 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 26 Existing

Barrel Shape: Circular
Barrel Diameter: 2.50 ft
Barrel Material: Corrugated Steel
Embedment: 0.00 in
Barrel Manning's n: 0.0240
Culvert Type: Straight
Inlet Configuration: Mitered to Conform to Slope
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 63.00 ft
Crest Elevation: 2599.58 ft
Roadway Surface: Paved
Roadway Top Width: 30.00 ft

Site Data - Str. No. 26 Proposed

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2594.16 ft
Outlet Station: 56.00 ft
Outlet Elevation: 2593.80 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 26 Proposed

Barrel Shape: Concrete Box
Barrel Span: 3.00 ft
Barrel Rise: 3.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1.5:1 Bevel (18-34° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 68.00 ft
Crest Elevation: 2599.75 ft
Roadway Surface: Paved
Roadway Top Width: 32.00 ft

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STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		120
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_HY8DATA.dgn		

STRUCTURE NO. 27 - Existing

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2588.60	0.00	0.00	0.00	0.00	0.00	0.00
	8.25	8.25	2589.92	0.85	0.90	0.85	0.80	5.03	1.62
	16.50	16.50	2590.53	1.23	1.30	1.23	1.04	6.07	1.92
10 Year	21.00	21.00	2590.81	1.41	1.47	1.41	1.13	6.45	2.04
	33.00	33.00	2591.55	1.86	1.86	1.86	1.34	7.18	2.29
	41.25	41.25	2592.26	2.19	2.09	2.09	1.46	7.85	2.42
	49.50	49.50	2592.94	2.68	2.29	2.29	1.56	8.56	2.53
	57.75	51.75	2593.17	3.00	2.34	2.34	1.66	8.76	2.63
	66.00	52.44	2593.25	3.00	2.35	2.35	1.74	8.82	2.72
	74.25	53.00	2593.31	3.00	2.36	2.36	1.82	8.87	2.80
100 Year	82.50	53.49	2593.36	3.00	2.37	2.37	1.89	8.92	2.88

Inlet Elevation (invert): 2588.60 ft, Outlet Elevation (invert): 2587.93 ft
Culvert Length: 40.07 ft, Culvert Slope: 0.0167

STRUCTURE NO. 27 - Proposed

	Total Discharge [CFS]	Culvert Discharge [CFS]	Headwater Elevation [FT]	Normal Depth [FT]	Critical Depth [FT]	Outlet Depth [FT]	Tailwater Depth [FT]	Outlet Velocity [FT/S]	Tailwater Velocity [FT/S]
	0.00	0.00	2588.34	0.00	0.00	0.00	0.00	0.00	0.00
	8.25	8.25	2589.29	0.36	0.62	0.38	0.80	7.20	1.62
	16.50	16.50	2589.85	0.58	0.98	0.63	1.04	8.75	1.92
10 Year	21.00	21.00	2590.11	0.69	1.15	0.75	1.13	9.30	2.04
	33.00	33.00	2590.74	0.94	1.55	1.06	1.34	10.38	2.29
	41.25	41.25	2591.12	1.11	1.80	1.26	1.46	10.94	2.42
	49.50	49.50	2591.49	1.27	2.04	1.45	1.56	11.40	2.53
	57.75	57.75	2591.85	1.42	2.26	1.63	1.66	11.80	2.63
	66.00	66.00	2592.22	1.57	2.47	1.81	1.74	12.17	2.72
	74.25	74.25	2592.61	1.72	2.67	1.98	1.82	12.50	2.80
100 Year	82.50	82.50	2593.02	1.86	2.86	2.15	1.89	12.79	2.88

Inlet Elevation (invert): 2588.34 ft, Outlet Elevation (invert): 2587.40 ft
Culvert Length: 52.00 ft, Culvert Slope: 0.0102

Site Data - Str. No. 27 Existing

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2588.60 ft
Outlet Station: 40.06 ft
Outlet Elevation: 2587.93 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 27 Existing

Barrel Shape: Circular
Barrel Diameter: 3.00 ft
Barrel Material: Corrugated Steel
Embedment: 0.00 in
Barrel Manning's n: 0.0240
Culvert Type: Straight
Inlet Configuration: Mitered to Conform to Slope
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 62.00 ft
Crest Elevation: 2593.07 ft
Roadway Surface: Paved
Roadway Top Width: 30.00 ft

Site Data - Str. No. 27 Proposed

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 2588.34 ft
Outlet Station: 52.00 ft
Outlet Elevation: 2587.40 ft
Number of Barrels: 1

Culvert Data Summary - Str. No. 27 Proposed

Barrel Shape: Concrete Box
Barrel Span: 3.00 ft
Barrel Rise: 3.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: 1.5:1 Bevel (18-34° flare) Wingwall
Inlet Depression: NONE

Roadway Data for Crossing

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 67.00 ft
Crest Elevation: 2593.24 ft
Roadway Surface: Paved
Roadway Top Width: 32.00 ft

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STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		121
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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CROSBY COUNTY

STR. NO.	STRUCTURE			WORK DESCRIPTION			SUMMARY OF STRUCTURE WORK PAY ITEMS																	
							RIPRAP APRON 5 INCH THICK	CEM. STABIL. BKFL.	TEMP. SPECIAL SHORING DEPTH 11' - 5'	TY T223 CONC. BRIDGE RAIL	TRENCH EXCAV. PROT.	REMOVE STR.	CONC. STR. REPAIR (STD.)	SET RPLC. PIPE RUNNER ASSEM.	R.C. Pipe		New Concrete Box Culvert							
				Extension	SAFETY END TREATMENT (SET)										CL IV	CL III								
	STA.	Description	Location	LF	Existing	Proposed	CY	CY	SF	LF	LF	EA	SF	EA	24"	48"	3 FT X 2 FT	3 FT X 3 FT	4 FT X 2 FT	4 FT X 3 FT	4 FT X 4 FT	5 FT X 2 FT	5 FT X 3 FT	6 FT X 6 FT
		BRIDGE CLASSIFICATION CULVERT WORK SUMMARY FOR STR. NO. 16 (NBI: 05-054-0453-04-009) & NO. 20 (NBI: 05-054-0453-04-010)																						
16	842+42	Exist: 4- 10' X 10' X 33.5' Box Culv.	Left	4.5			35	11	990	124	35													
		Proposed: 4- 10' X 10' X 42.58' Box Culv.	Right	4.5			36		990															
20	977+97	Exist: 3- 7' X 7' X 33.5' Box Culv.	Left		WINGWALL WITH PIPE RUNNERS								10	2										
		Proposed: Keep Existing	Right																					
		BRIDGE CLASSIFICATION TOTALS:					71	11	1980	124	35	0	10	2	0	0	0	0	0	0	0	0	0	0
		CULVERT WORK SUMMARY																						
1	436+80	Exist: 1- 5' X 3' X 36.7' Box Culv.	Left	1.7	Ty I SET w/ Pipe Runner(s)	6:1 SETB-FW-0	4.91	18																
		Proposed: 1- 5' X 3' X 40' Box Culvert	Right	1.6		6:1 SETB-FW-0	5.31																	
2	444+56	Exist: Parallel 1- 32" Des 4 C.M.P. Arch, 31' Right.	Front		Ty II Mitered SET	6:1 PSET-SP		10							44									
		Proposed: 1-24" X 44' R.C. Pipe (Driveway)	Back			6:1 PSET-SP																		
3	497+71	Exist: 1- 3' X 2' X 35.3' Box Culv.	Left	2.0	Ty I SET w/ Pipe Runner(s)	6:1 SETB-FW-0	2.34	2																
		Proposed: 1- 3' X 2' X 39.3' Box Culv.	Right	2.0		6:1 SETB-FW-0	2.34																	
4	539+64	Exist: 1- 3' X 3' X 35' Box Culv.	Left	2.0	Ty I SET w/ Pipe Runner(s)	6:1 SETB-FW-0	7.26	24										80						
		Proposed: 2- 3' X 3' X 40' Box Culverts - See Sections	Right	3.0		6:1 SETB-FW-0	7.47																	
5	595+07	Exist: 1- 3' X 2' X 35.7' Box Culv.	Left	2.0	Ty I SET w/ Pipe Runner(s)	6:1 SETB-FW-0	2.34	2																
		Proposed: 1-3' X 2' X 39.7' Box Culv.	Right	2.0		6:1 SETB-FW-0	2.34																	
6	637+00	Exist: 1- 3' X 3' X 35.1' Box Culv.	Left	2.0	Ty I SET w/ Pipe Runner(s)	6:1 SETB-FW-0	4.14	3																
		Proposed: 1- 3' X 3' X 39.1' Box	Right	2.0		6:1 SETB-FW-0	4.64																	
7	647+72	Exist: 1- 3' X 2' X 34.8' Box Culv.	Left	2.6	Ty I SET w/ Pipe Runner(s)	6:1 SETB-FW-0	2.50	14																
		Proposed: 1- 3' X 2' X 40' Box Culvert	Right	2.6		6:1 SETB-FW-0	2.50																	
8	675+80	Exist: 1- 3' X 2' X 36.2' Box Culv.	Left	1.8	Ty I SET w/ Pipe Runner(s)	6:1 SETB-FW-0	3.62	17									50							
		Proposed: 1-3' X 2' X 50' Box Culvert - See Sections	Right	12.05		4:1 SETB-FW-0	1.74																	
9	726+42	Exist: 1- 36" X 43.6' C.M.P.	Left		Ty II Mitered SET		20	13			45	1								88				
		Proposed: 2- 4' X 3' X 44' Box Culvert - See STR. No. 9 Detail	Right																					
10	750+46	Exist: 1- 36" X 44.8' C.M.P.	Left		Ty II Mitered SET	4:1 SETB-FW-0	2.59	16			55	1						54						
		Proposed: 1- 3' X 3' X 54' Box Culv.	Right			4:1 SETB-FW-0	2.17																	
11	762+56	Exist: 1- 36" X 43.7' C.M.P.	Left		Ty II Mitered SET	4:1 SETB-FW-0	2.16	13			45	1						44						
		Proposed: 1- 3' X 3' X 44' Box Culv.	Right			4:1 SETB-FW-0	2.15																	
12	792+39	Exist: 1- 3' X 3' X 35.7' Box Culv.	Left	2.0	Ty I SET w/ Pipe Runner(s)	6:1 SETB-FW-0	4.26	3																
		Proposed: 1- 3' X 3' X 41.7' Box Culv.	Right	4.0		6:1 SETB-FW-0	4.73																	
13	818+33	Exist: Parallel 1- 18" Poly x 25'	Front			6:1 PSET-SP		10							44									
		Proposed: 1- 24" X 44' R.C. Pipe (Driveway)	Back			6:1 PSET-SP																		
14	819+11	Exist: 1- 24" X 38' C.M.P. & 1- 36' Des 5 C.M.P. Arch	Left		Ty II Mitered SET	6:1 SETB-FW-0	2.57	10				1										44		
		Proposed: 1- 5' X 2' X 44' Box Culv.	Right			6:1 SETB-FW-0	2.50																	
15	828+10	Exist: 1- 24" X 41.2' C.M.P.	Left		PRECAST SET																			
		Proposed: Keep Existing	Right																					
17	869+96	Exist: 1- 24" X 42' C.M.P. & 2- 30" X 37.6' C.M.P.	Left		PRECAST SETs	6:1 SETB-FW-0	2.23	16				1							92					
		Proposed: 2- 4' X 2' X 46' Box Culv.	Right			6:1 SETB-FW-0	2.46																	
18	920+66	Exist: 3- 36" X 44.8' C.M.P.	Left		Ty II Mitered SET	6:1 SETB-FW-0	4.61	24			55	1								108				
		Proposed: 2- 4' X 3' X 54' Box Culv.	Right			6:1 SETB-FW-0	5.04																	
19	966+79	Exist: 3- 30" X 37.6' C.M.P.	Left		Ty II precast SET	6:1 SETB-FW-0	5.19	12				1											40	
		Proposed: 1- 5' X 3' X 40' Box Culv.	Right			6:1 SETB-FW-0	5.19																	
21	986+01	Exist: 1- 48" X 50' C.M.P.	Left		Ty II Mitered SET	4:1 SETP-CD		58			55	1				64								
		Proposed: 1- 48" X 64' R.C. Pipe	Right			4:1 SETP-CD																		
22	986+27	Exist: 1- 48" X 49' R.C.P.	Left		Ty II Mitered SET																			
		Proposed: Keep Existing	Right																					
23	992+13	Exist: 1- 7.5' X 5.1' X 35.8' C.M.P. Multiplate Arch	Left				3.83	22			40	1												48
		Proposed: 1- 6' X 6' X 48' Box Culv.	Right				2.55																	
24	992+97	Exist: 1- 48" X 40.8' R.C.P.	Left				2.36	16			42	1									48			
		Proposed: 1- 4' X 4' X 48' Box Culv.	Right				1.68																	
25	1006+59	Exist: 1- 7.5' X 5.1' X 36.8' C.M.P. Multiplate Arch	Left				4.07	22			40	1												48
		Proposed: 1- 6' X 6' X 48' Box Culv.	Right				3.59																	
26	1017+47	Exist: 1- 30" X 46.6' C.M.P.	Left		Ty II precast SET	6:1 SETB-FW-0	4.30	17			50	1						56						
		Proposed: 1- 3' X 3' X 56' Box Culv.	Right			6:1 SETB-FW-0	4.68																	
27	1023+68	Exist: 1- 36" X 40' C.M.P.	Left		Ty II Mitered SET	6:1 SETB-FW-0	3.99	16				1						52						
		Proposed: 1- 3' X 3' X 52' Box Culv.	Right			6:1 SETB-FW-0	5.04																	
		CULVERT TOTALS:					157.39	358	0	0	427	13			88	64	50	286	92	196	48	44	40	96
		PROJECT TOTALS:					228.39	369	1980	124	462	13	10	2	88	64	50	286	92	196	48	44	40	96

NOTE:

The Concrete Structure Repair item and the S.E.T. Replace Pipe Runner Assembly item are to be used as directed by the engineer. The concrete repair item is intended to correct cracked, spalled, or otherwise damaged concrete in areas where the pipe runner assembly bolts into the apron riprap and curb.

Existing National Bridge Inventory (NBI) Number(s) shall be removed from the existing wingwall(s), saved in a location where they will not be damaged, and ultimately replaced on the proposed wingwall(s). This work shall not be paid for directly, but shall be considered subsidiary to the removal and replacement of the wingwalls.

STATE OF TEXAS
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6/29/2022

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Sheet 1 of 2

STRUCTURE SUMMARY

STATE DIST. NO.	COUNTY	SHEET NO.
05	CROSBY	122

CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207

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CROSBY COUNTY

STR. NO.	STRUCTURE			SUMMARY OF PAY ITEMS																					
				Extend Exist. Conc. Box Culvert				Wingwalls						Type I Safety End Treatments (SETs)								Type II SETs		CLEAN FINAL STR.
				3 FT X 2 FT	3 FT X 3 FT	5 FT X 3 FT	10 FT X 10 FT (Bridge Class.)	FW-S (HW = 11 FT)	FW-0 (HW = 5 FT)	FW-0 (HW = 7 FT)	FW-0 (HW = 8 FT)	FW-0 (HW = 9 FT)	PW-1 (HW = 5 FT)	S = 3 FT, HW = 3 FT, 4:1 [C]	S = 3 FT, HW = 3 FT, 6:1 [C]	S = 3 FT, HW = 4 FT, 4:1 [C]	S = 3 FT, HW = 4 FT, 6:1 [C]	S = 4 FT, HW = 3 FT, 6:1 [C]	S = 4 FT, HW = 4 FT, 6:1 [C]	S = 5 FT, HW = 3 FT, 6:1 [C]	S = 5 FT, HW = 4 FT, 6:1 [C]	(24 IN) (RCP) (6:1) (P)	(48 IN) (RCP) (4:1) (C)	
	STA.	Description	Location	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
BRIDGE CLASSIFICATION CULVERT WORK SUMMARY FOR STR. NO. 16 (NBI: 05-054-0453-04-009) & NO. 20 (NBI: 05-054-0453-04-010)																									
16	842+42	Exist: 4- 10' X 10' X 33.5' Box Culv.	Left				26	1																	1
		Proposed: 4- 10' X 10' X 42.58' Box Culv.	Right				26	1																	
20	977+97	Exist: 3- 7' X 7' X 33.5' Box Culv.	Left																						1
		Proposed: Keep Existing	Right																						
BRIDGE CLASSIFICATION TOTALS:				0	0	0	52	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
CULVERT WORK SUMMARY																									
1	436+80	Exist: 1- 5' X 3' X 36.7' Box Culv.	Left			4															1				1
		Proposed: 1- 5' X 3' X 40' Box Culvert - See Sections	Right			4															1				
2	444+56	Exist: Parallel 1- 32' Des 4 C.M.P. Arch. 31' Right.	Front																				1		1
		Proposed: 1-24" X 44' R.C. Pipe (Driveway)	Back																				1		
3	497+71	Exist: 1- 3' X 2' X 35.3' Box Culv.	Left	4												1									1
		Proposed: 1- 3' X 2' X 39.3' Box Culv.	Right	4												1									
4	539+64	Exist: 1- 3' X 3' X 35' Box Culv.	Left		4														3						1
		Proposed: 2- 3' X 3' X 40' Box Culverts - See Sections	Right		5														3						
5	595+07	Exist: 1- 3' X 2' X 35.7' Box Culv.	Left	4												1									1
		Proposed: 1-3' X 2' X 39.7' Box Culv.	Right	4												1									
6	637+00	Exist: 1- 3' X 3' X 35.1' Box Culv.	Left		4														1						1
		Proposed: 1- 3' X 3' X 39.1' Box	Right		4														1						
7	647+72	Exist: 1- 3' X 2' X 34.8' Box Culv.	Left	4.6												1									1
		Proposed: 1- 3' X 2' X 40' Box Culvert - See Sections	Right	4.6												1									
8	675+80	Exist: 1- 3' X 2' X 36.2' Box Culv.	Left	3.8												2									1
		Proposed: 1-3' X 2' X 50' Box Culvert - See Sections	Right	14.05										2											
9	726+42	Exist: 1- 36" X 43.6' C.M.P.	Left						1																1
		Proposed: 2- 4' X 3' X 44' Box Culvert - See STR. No. 9 Detail	Right										1												
10	750+46	Exist: 1- 36" X 44.8' C.M.P.	Left														1								1
		Proposed: 1- 3' X 3' X 54' Box Culv.	Right														1								
11	762+56	Exist: 1- 36" X 43.7' C.M.P.	Left														1								1
		Proposed: 1- 3' X 3' X 44' Box Culv.	Right														1								
12	792+39	Exist: 1- 3' X 3' X 35.7' Box Culv.	Left		4														1						1
		Proposed: 1- 3' X 3' X 41.7' Box Culv.	Right		6														1						
13	818+33	Exist: Parallel 1- 18" Poly x 25'	Front																				1		1
		Proposed: 1- 24" X 44' R.C. Pipe (Driveway)	Back																				1		
14	819+11	Exist: 1- 24" X 38' C.M.P. & 1- 36' Des 5 C.M.P. Arch	Left																		1				1
		Proposed: 1- 5' X 2' X 44' Box Culv.	Right																		1				
15	828+10	Exist: 1- 24" X 41.2' C.M.P.	Left																						1
		Proposed: Keep Existing	Right																						
17	869+96	Exist: 1- 24" X 42' C.M.P. & 2- 30" X 37.6' C.M.P.	Left																2						1
		Proposed: 2- 4' X 2' X 46' Box Culv.	Right																2						
18	920+66	Exist: 3- 36" X 44.8' C.M.P.	Left																	2					1
		Proposed: 2- 4' X 3' X 54' Box Culv.	Right																	2					
19	966+79	Exist: 3- 30" X 37.6' C.M.P.	Left																			1			1
		Proposed: 1- 5' X 3' X 40' Box Culv.	Right																			1			
21	986+01	Exist: 1- 48" X 50' C.M.P.	Left																					1	1
		Proposed: 1- 48" X 64' R.C. Pipe	Right																					1	
22	986+27	Exist: 1- 48" X 49' R.C.P.	Left																						1
		Proposed: Keep Existing	Right																						
23	992+13	Exist: 1- 7.5' X 5.1' X 35.8' C.M.P. Multiplate Arch	Left									1													1
		Proposed: 1- 6' X 6' X 40' Box Culv.	Right								1														
24	992+97	Exist: 1- 48" X 40.8' R.C.P.	Left								1														1
		Proposed: 1- 4' X 4' X 42' Box Culv.	Right							1															
25	1006+59	Exist: 1- 7.5' X 5.1' X 36.8' C.M.P. Multiplate Arch	Left									1													1
		Proposed: 1- 6' X 6' X 40' Box Culv.	Right									1													
26	1017+47	Exist: 1- 30" X 46.6' C.M.P.	Left															1							1
		Proposed: 1- 3' X 3' X 56' Box Culv.	Right															1							
27	1023+68	Exist: 1- 36" X 40' C.M.P.	Left															1							1
		Proposed: 1- 3' X 3' X 52' Box Culv.	Right															1							
CULVERT TOTALS:				43	27	8	0	0	1	1	2	3	1	2	8	4	14	4	4	2	4	4	2	25	
PROJECT TOTALS:				43	27	8	52	2	1	1	2	3	1	2	8	4	14	4	4	2	4	4	2	27	

STATE OF TEXAS
SHELLEY C. HARRIS
99197
LICENSED
PROFESSIONAL ENGINEER

Shelley C. Harris, P.E.
6/29/2022

Texas Department of Transportation

STRUCTURE SUMMARY

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		123
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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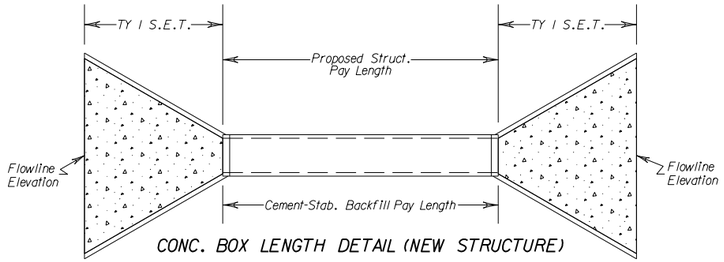
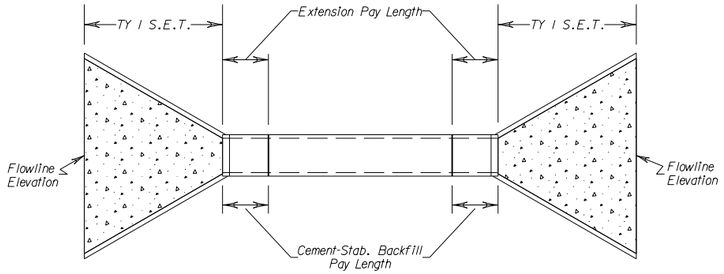
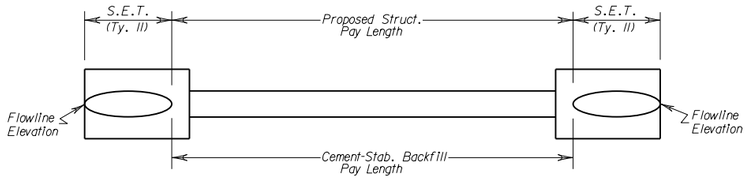


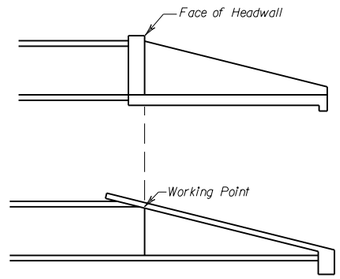
CONC. BOX LENGTH DETAIL (NEW STRUCTURE)



CONC. BOX LENGTH DETAIL (EXTENDING STRUCTURE)



PIPE LENGTH DETAIL (NEW STRUCTURE)



PRECAST OR CAST-IN-PLACE SET OPTION DETAIL

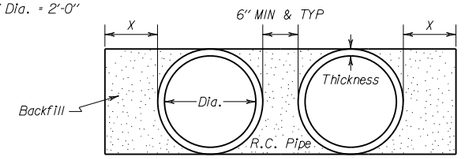
The contractor has the option of using Precast or Cast-in-Place Type II SETs except on skewed ends. If using the option not shown in the plans, the face of the Precast SET shall line up with the working point on the Cast-in-Place SET.

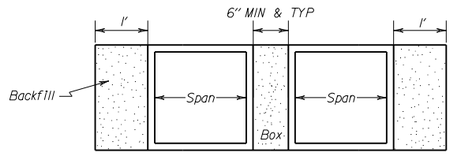
X:

≤ 42" Dia. = 1'-0"

> 42" Dia. = 2'-0"

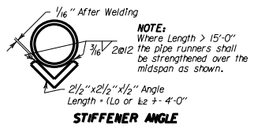
See Pipe Length Detail for limits of Stabilized Backfill.

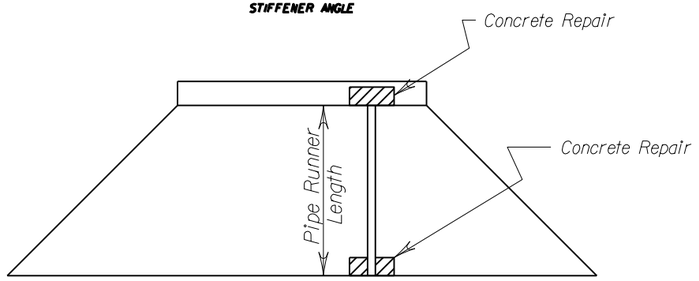




CEMENT-STABILIZED BACKFILL

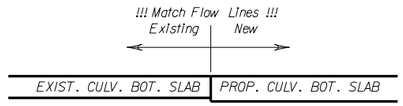
See Structure Summary for locations.



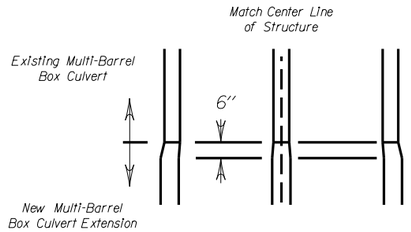


PIPE RUNNER & CONCRETE REPAIR DETAIL

Pay length is measured along pipe runner.



BOX CULVERT EXTENSION DETAIL SIDE VIEW



2 BARREL EXTENSIONS

GENERAL NOTES:

All headwall, wingwall, and SET removals shall be subsidiary to Items 462, 464, 466, and 467.

C.M.P., R.C.P., Multiplate Corrugated Arch Pipe removals shall be paid for by the EA.

All exposed steel shall be galvanized unless otherwise shown on plans. Galvanizing damaged during transport and construction shall be repaired in accordance with the specifications.

Existing structures may have cement-stabilized backfill around pipe. Removal is subsidiary to culvert work.

An object marker shall be placed at each SET. Removal and disposal of old object markers is subsidiary to various bid items.

All pipe-to-pipe and pipe-to-SET connections shall be sealed with jointing material in accordance with Item 464.

All box-to-box and box-to-SET connections shall be sealed with jointing material in accordance with Item 462.

Match existing grade for proposed structure and extensions unless otherwise shown in the plans.

Compact backfill around SETs to the satisfaction of the Engineer.

Concrete Stabilized Base between boxes is subsidiary to Item 462.

Reinforcing shall be Grade 60.

Extension pay length includes 2 ft cut back.

In areas of conflict between reinforcing steel, the reinforcement shall be bent or adjusted to clear as directed by the Engineer.

When connecting to an existing box with different dimensions than the current standards, match the inside edges of walls and match flow lines unless otherwise directed by the Engineer.

STATE OF TEXAS
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Sheet 1 of 1

STRUCTURE DETAILS & NOTES

STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		124
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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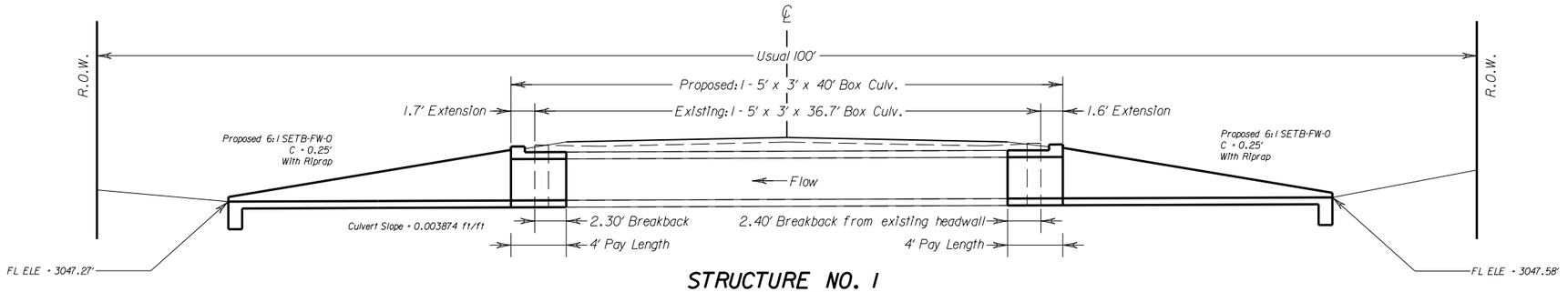
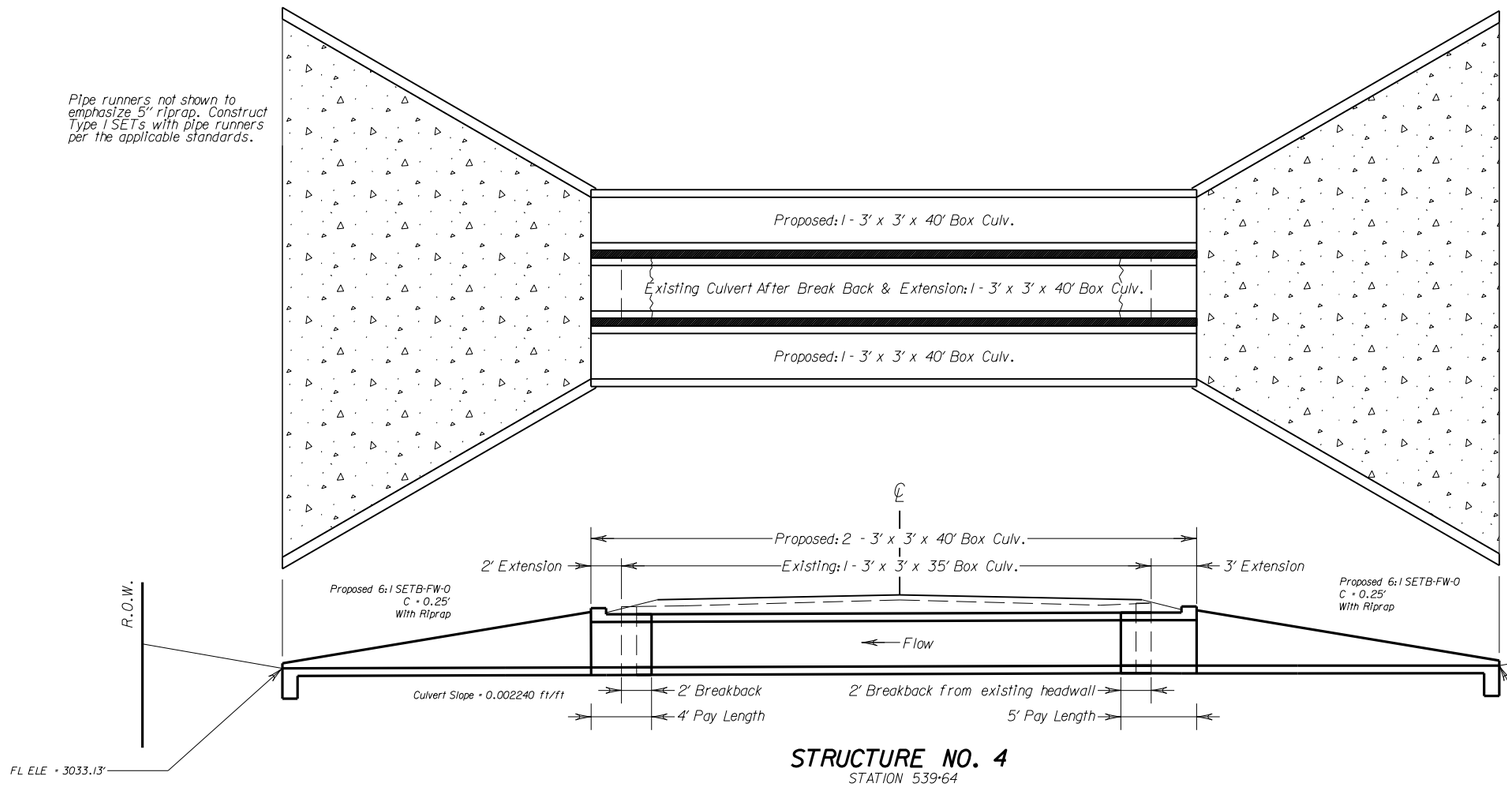


STRUCTURE NO. 1
STATION 436+83

Pipe runners not shown to emphasize 5" riprap. Construct Type I SETs with pipe runners per the applicable standards.

Pipe runners not shown to emphasize 5" riprap. Construct Type I SETs with pipe runners per the applicable standards.



STRUCTURE NO. 4
STATION 539+64

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SCALE: 1" = 10' Sheet 1 of 8

CULVERT SECTIONS

STATE DIST. NO.	COUNTY		SHEET NO.
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CONT.	SECT.	JOB	HIGHWAY NO.
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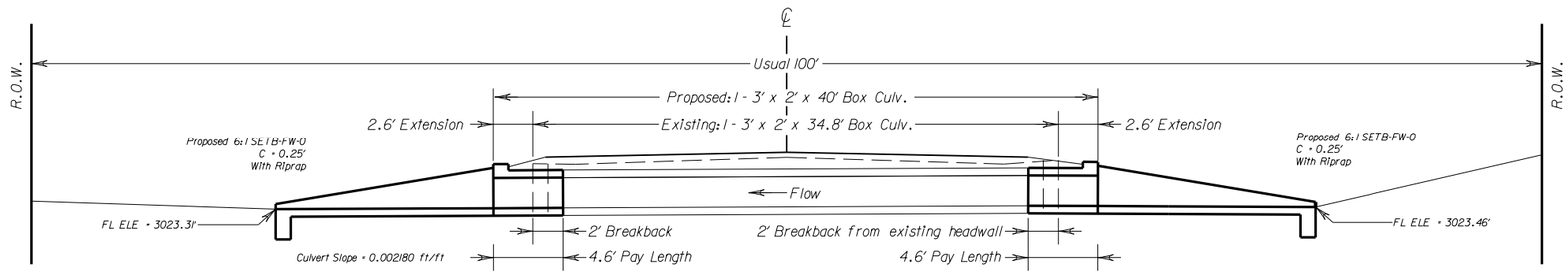
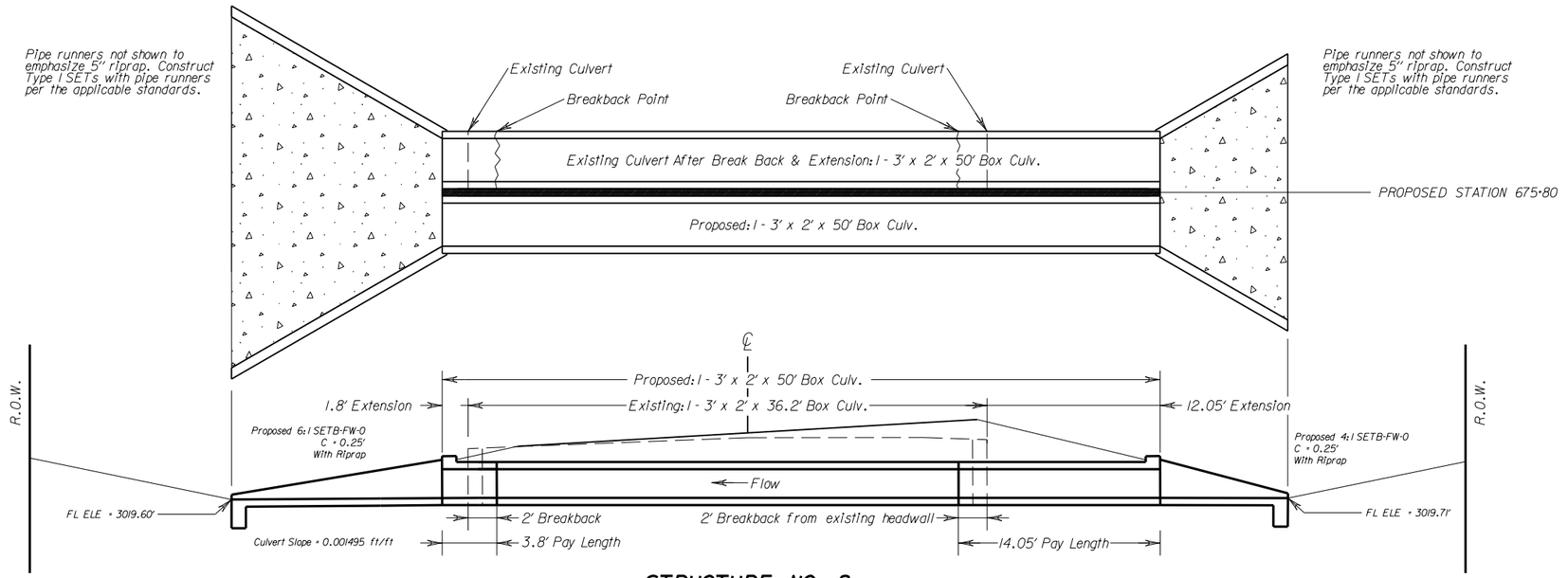


STRUCTURE NO. 7

STATION 647+74



STRUCTURE NO. 8

EXISTING STATION 675+82
PROPOSED STATION 675+80

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SCALE: 1" = 10' Sheet 2 of 8

CULVERT SECTIONS

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		126
CONT.	SECT.	JOB	HIGHWAY NO.
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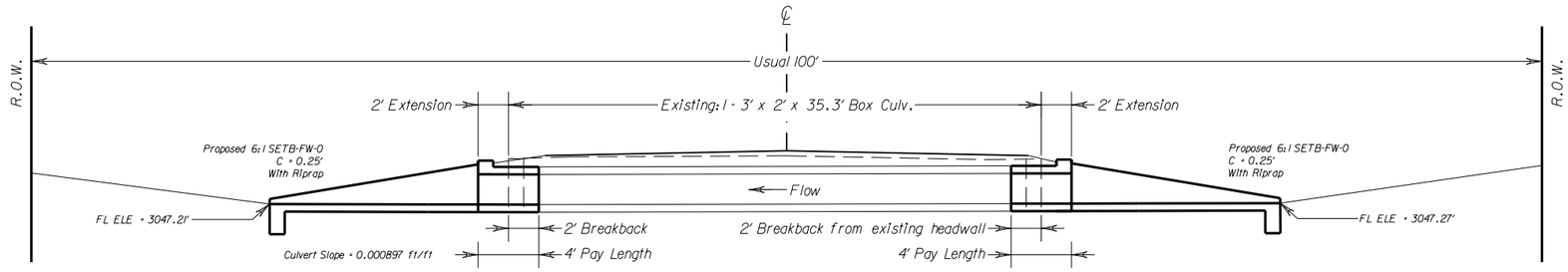
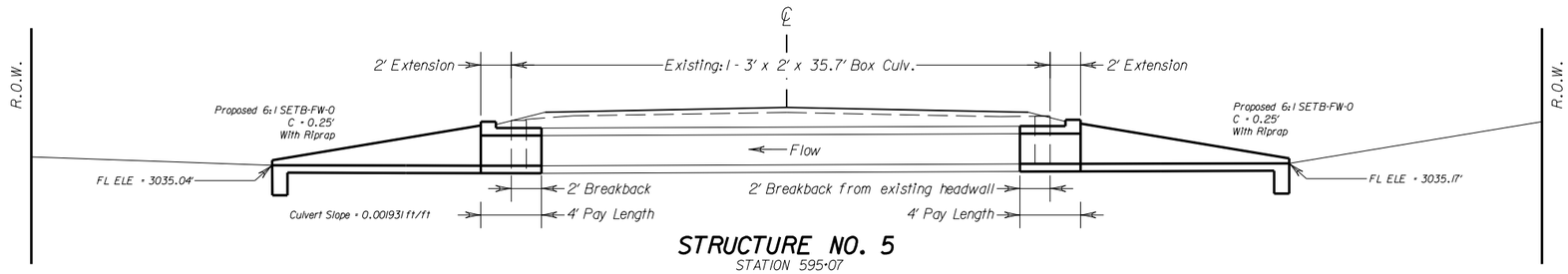
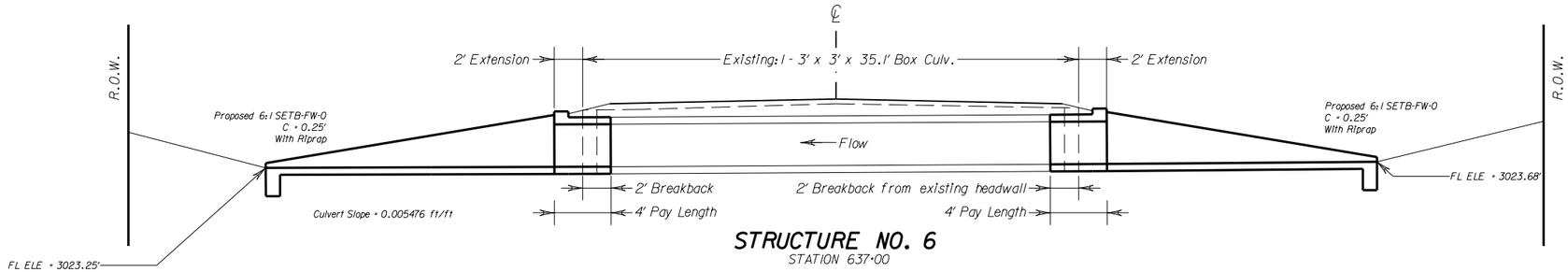


STRUCTURE NO. 3
STATION 497+71



STRUCTURE NO. 5
STATION 595+07



STRUCTURE NO. 6
STATION 637+00

CULVERT SECTIONS

STATE OF TEXAS
SHELLEY C. HARRIS
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Shelley C. Harris, P.E.
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SCALE: 1" = 10' Sheet 3 of 8

STATE DIST. NO.	COUNTY		SHEET NO.
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CONT.	SECT.	JOB	HIGHWAY NO.
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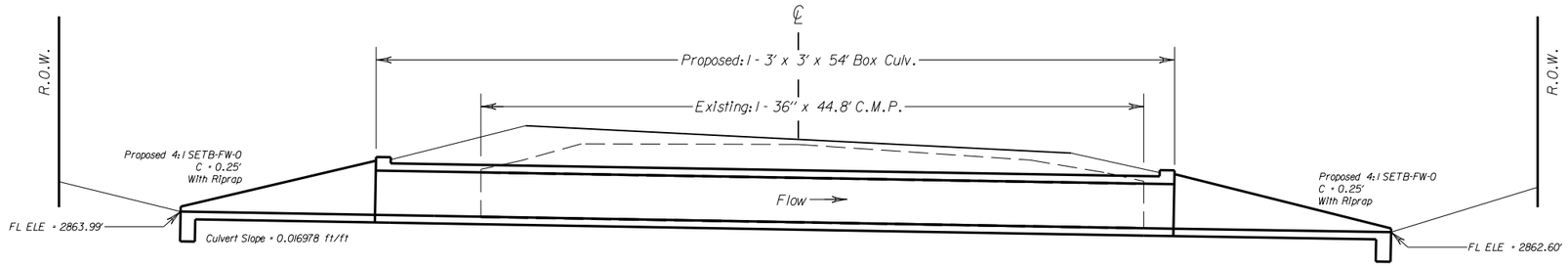
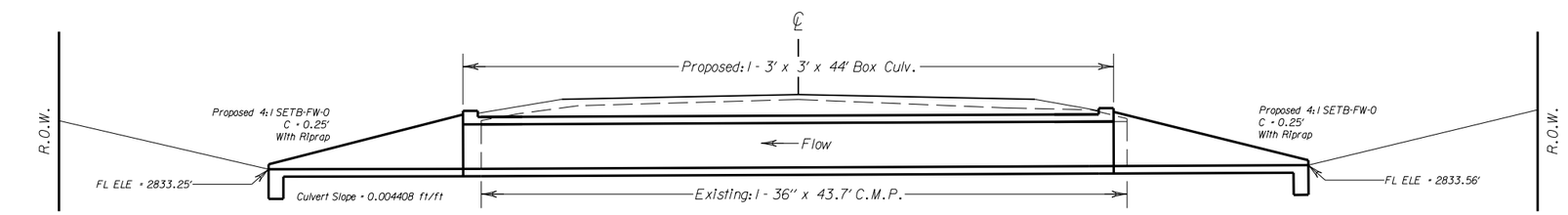


STRUCTURE NO. 10
STATION 750+46



STRUCTURE NO. 11
STATION 762+56

CULVERT SECTIONS

STATE OF TEXAS
SHELLEY C. HARRIS
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Shelley C. Harris, P.E.
6/29/2022

Texas Department of Transportation

SCALE: 1" = 10' Sheet 4 of 8

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		128
CONT.	SECT.	JOB	HIGHWAY NO.
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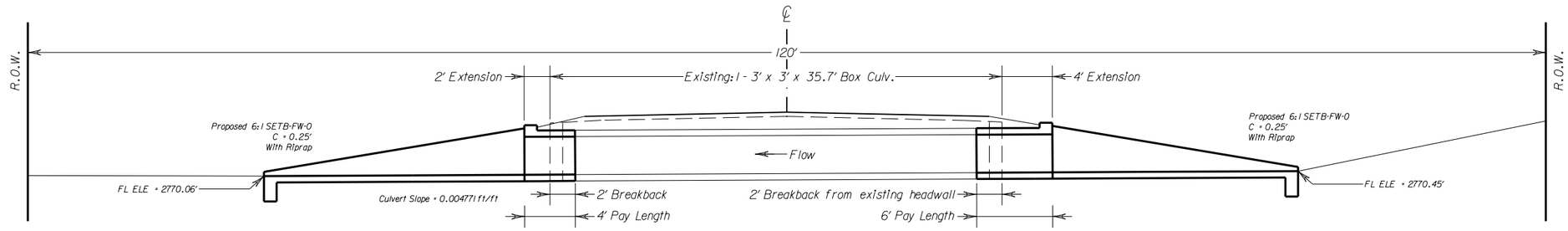
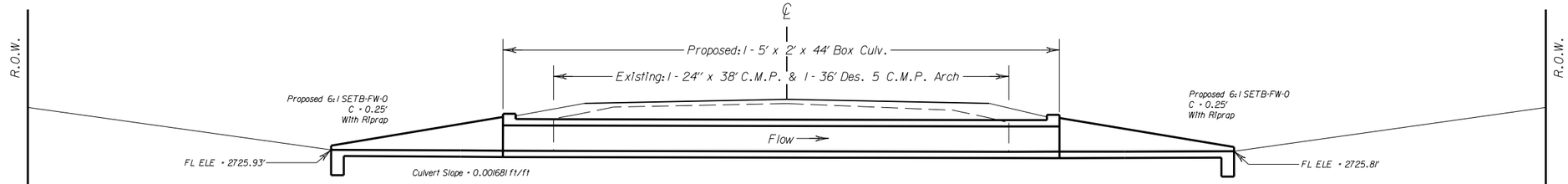
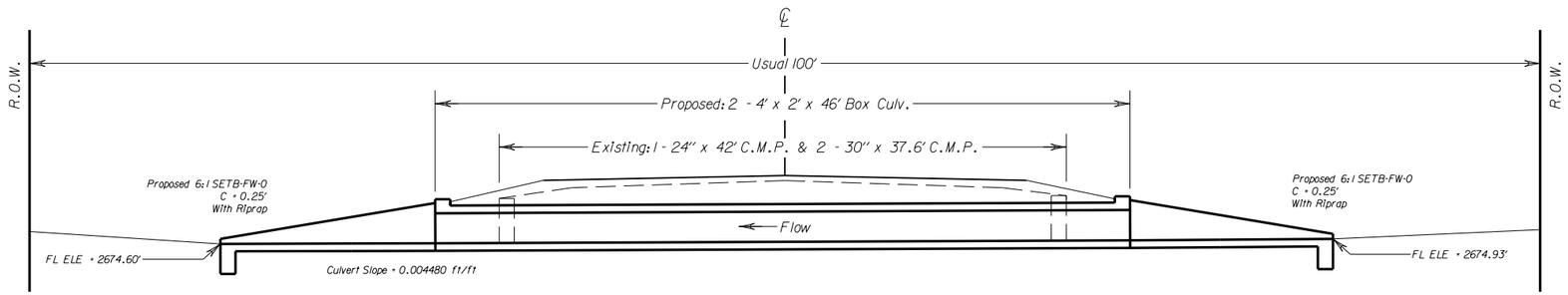


STRUCTURE NO. 12
STATION 792+39



STRUCTURE NO. 14
STATION 819+11



STRUCTURE NO. 17
STATION 869+96

CULVERT SECTIONS

STATE OF TEXAS
SHELLEY C. HARRIS
99197
LICENSED PROFESSIONAL ENGINEER

Shelley C. Harris, P.E.
6/29/2022

Texas Department of Transportation

SCALE: 1" = 10' Sheet 5 of 8

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		129
CONT.	SECT.	JOB	HIGHWAY NO.
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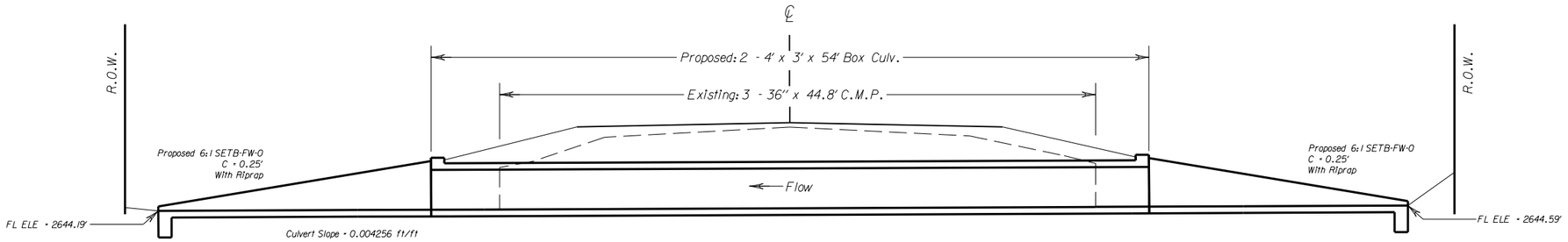
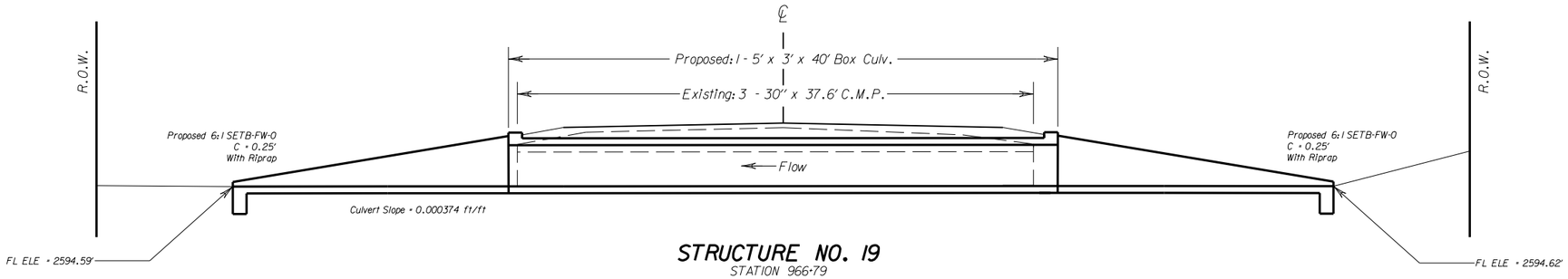
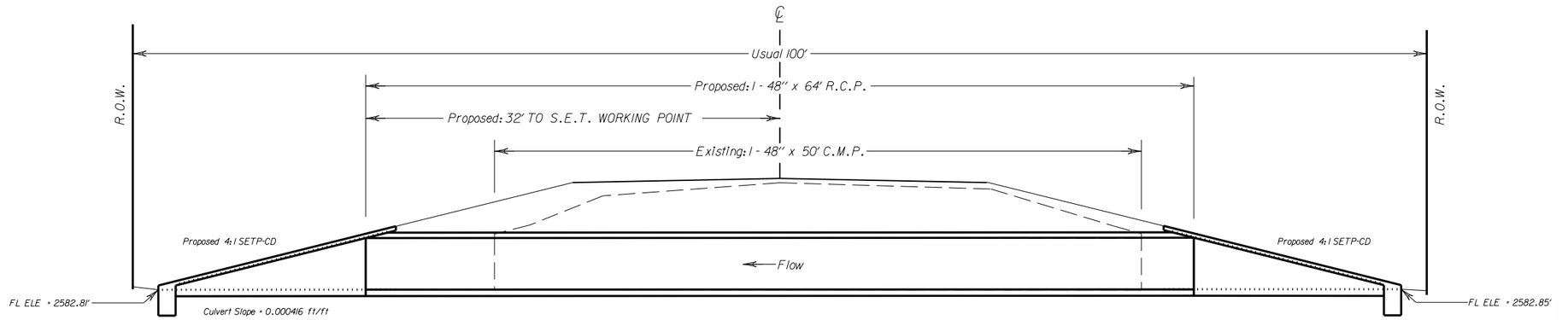


STRUCTURE NO. 18
STATION 920+66



STRUCTURE NO. 19
STATION 966+79



STRUCTURE NO. 21
STATION 986+01

CULVERT SECTIONS

STATE OF TEXAS
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99197
LICENSED
PROFESSIONAL ENGINEER

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Texas Department of Transportation

SCALE: 1" = 10' Sheet 6 of 8

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		130
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_DRG_CULVERT_XSECTIONS.dgn		

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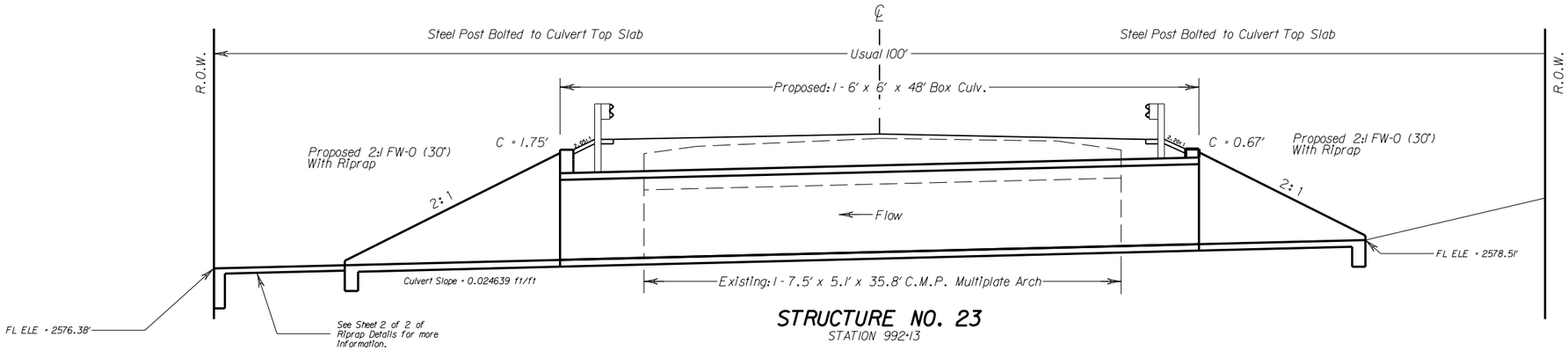
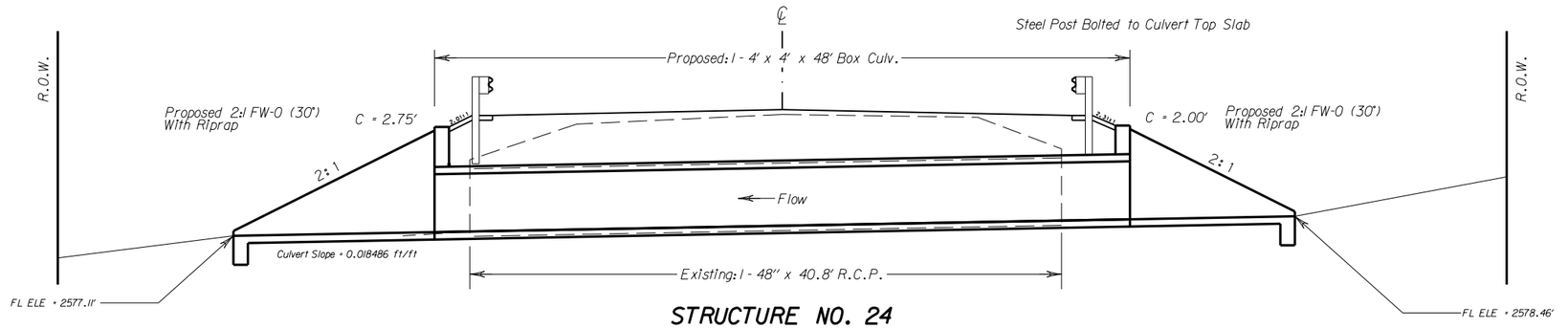


STRUCTURE NO. 23
STATION 992+13



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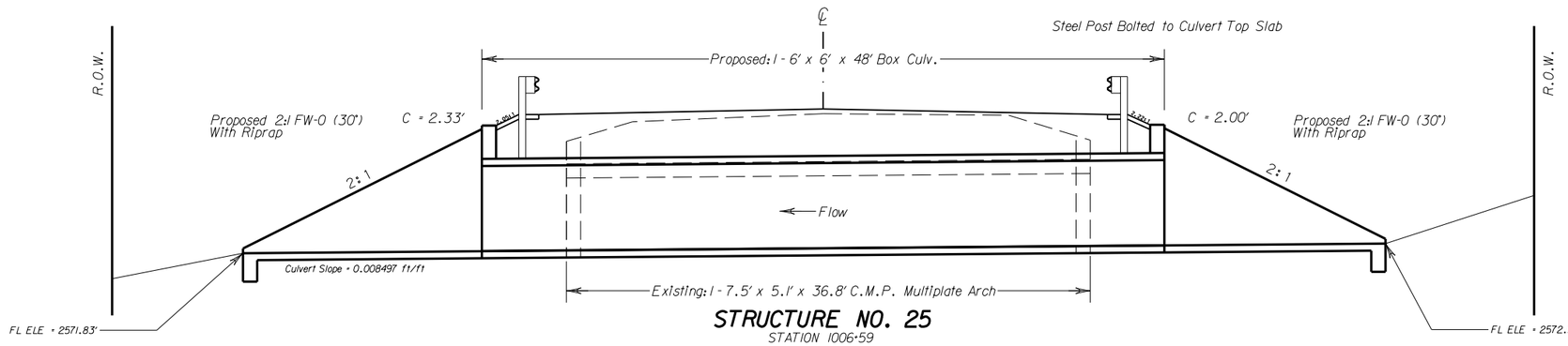
STATION 992+97



STRUCTURE NO. 25
STATION 1006+59

STATE OF TEXAS
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SCALE: 1" = 10' Sheet 7 of 8

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		131
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_DRG_CULVERT_XSECTIONS.dgn		

CULVERT SECTIONS

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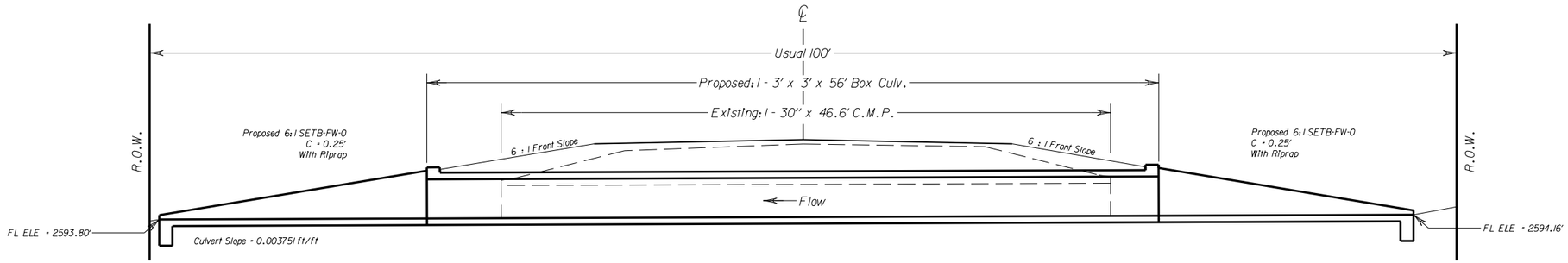
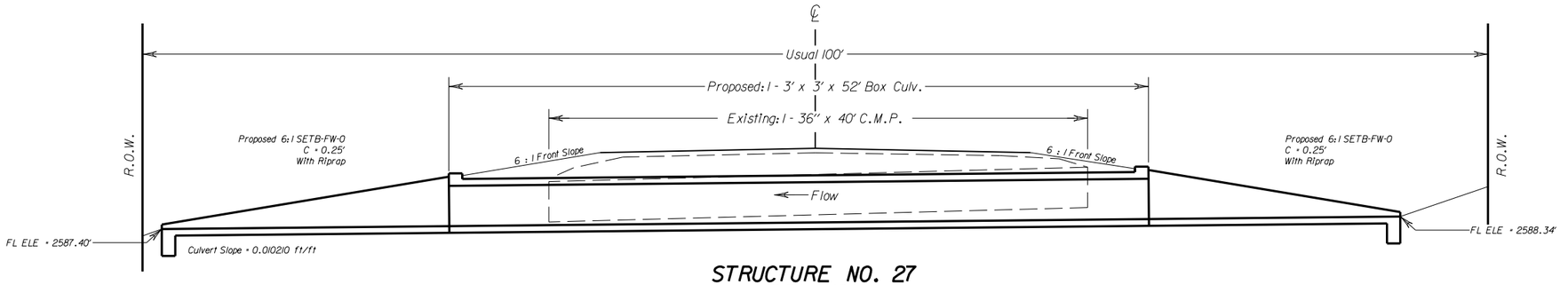


STRUCTURE NO. 26
STATION 1017+47



STRUCTURE NO. 27
STATION 1023+68

STATE OF TEXAS
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SCALE: 1" = 10' Sheet 8 of 8

CULVERT SECTIONS

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		132
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_DRG_CULVERT_XSECTIONS.dgn		

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R.O.W.

R.O.W.

Ditch Flow

Ditch Flow

50'

℄ STRUCTURE
Approx. STA. 726+42

726

727

50'

STA. 726+00 Right to STA. 727+00 Right:
Armor natural ground to R.O.W. with 8" thick Type F Grouted Stone Riprap.

Approximate Surface Area = 290 SY.
Approximate Volume = 65 Cubic Yards.

ITEM 432-6021
RIPRAP (STONE TY F)(GROUT)(8 IN)
by the [CY].

One Station of Preparing Right of Way is proposed from STA. 726+00 to STA. 727+00. This pay item is intended to pay for the removal of existing debris in areas of proposed grouted stone riprap work (especially off of the canyon rim). Do not remove the tree at the beginning of the canyon slope near Str. No. 9's outfall.

300 LF of Item 552-6003 WIRE FENCE (TY C) have been included in the quantites in case the existing fence from approx. STA. 727+00 Right to STA. 724+00 Right needs to be removed to construct proposed work. The engineer shall approve the removal before the fence is removed.

Parallel Wingwall

PW FOOTING

Parallel Wingwall

Grouted Stone Riprap

Canyon Rim Drop Off

R.O.W.

STRUCTURE NO. 9 DETAILS (PLAN)

STATE OF TEXAS
SHELLEY C. HARRIS
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LICENSED
PROFESSIONAL ENGINEER

Shelley C. Harris, P.E.
6/29/2022

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Scale: 1" = 10'

Sheet 1 of 6

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		133
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_DRG_CULVERT_XSECTIONS.dgn		

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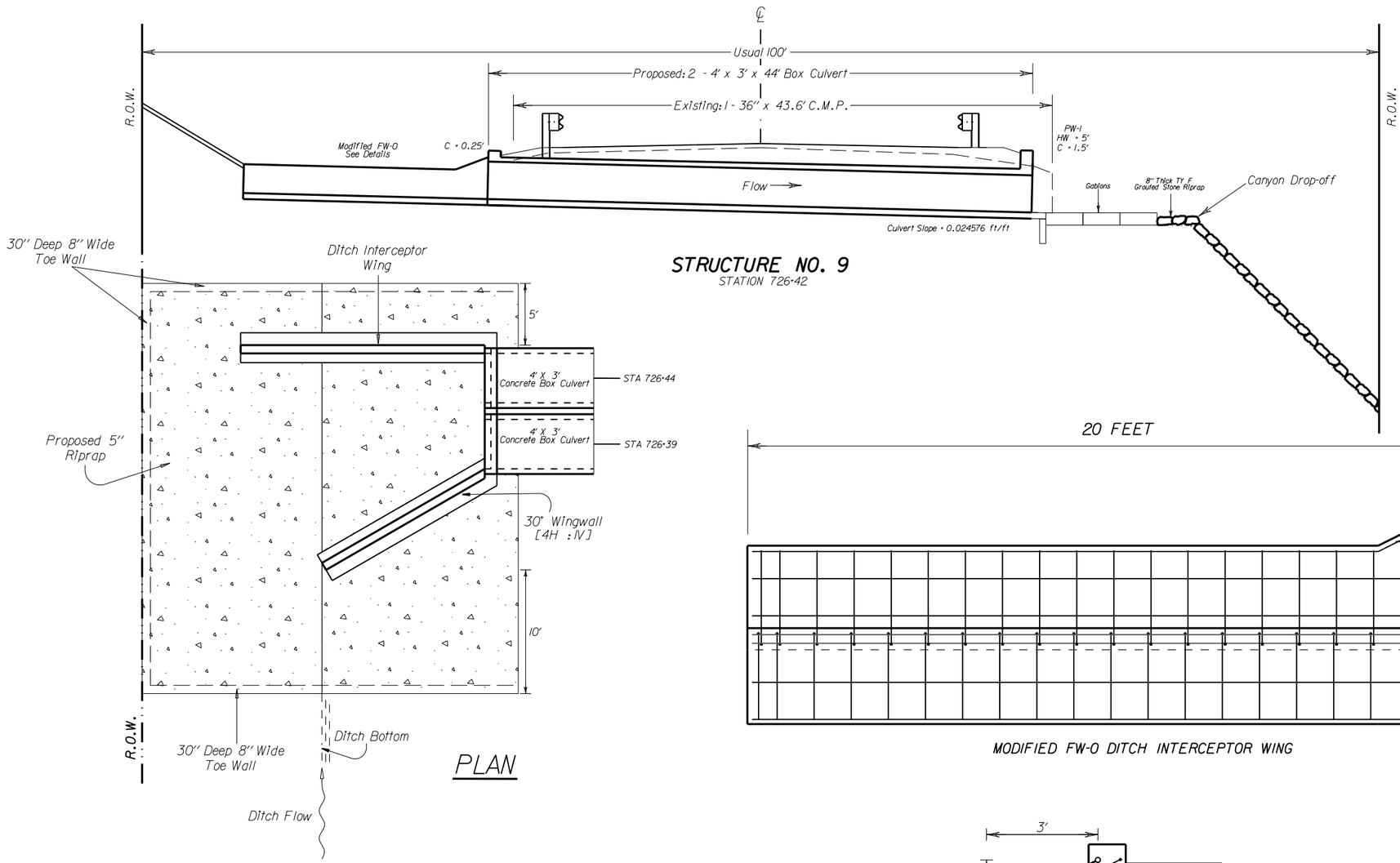
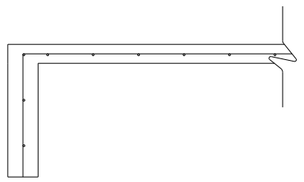
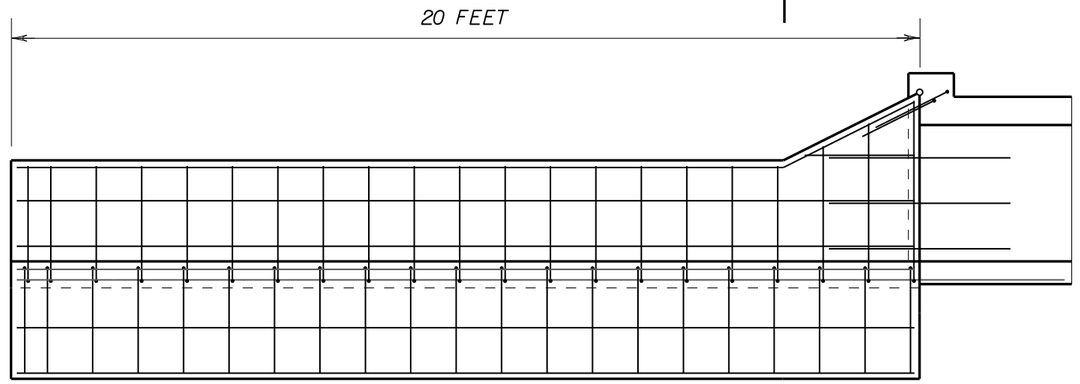


STRUCTURE NO. 9
STATION 726+42

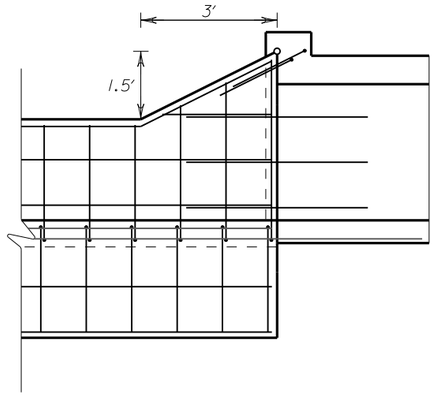
PLAN



5" Riprap Toe Wall



MODIFIED FW-0 DITCH INTERCEPTOR WING



NOTES:

Provide a 30" deep by 8" wide reinforced concrete toe wall along all edges of the riprap adjacent to natural ground; reinforce the toe walls by extending typical riprap reinforcing into the toe wall.

Reinforce the apron riprap with No. 4 rebar 12" on center.

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N.T.S. Sheet 2 of 6

STRUCTURE NO. 9 DETAILS (LEFT)

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		134
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_DRG_CULVERT_XSECTIONS.dgn		

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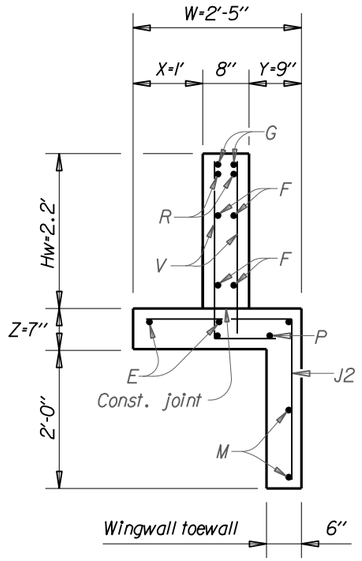
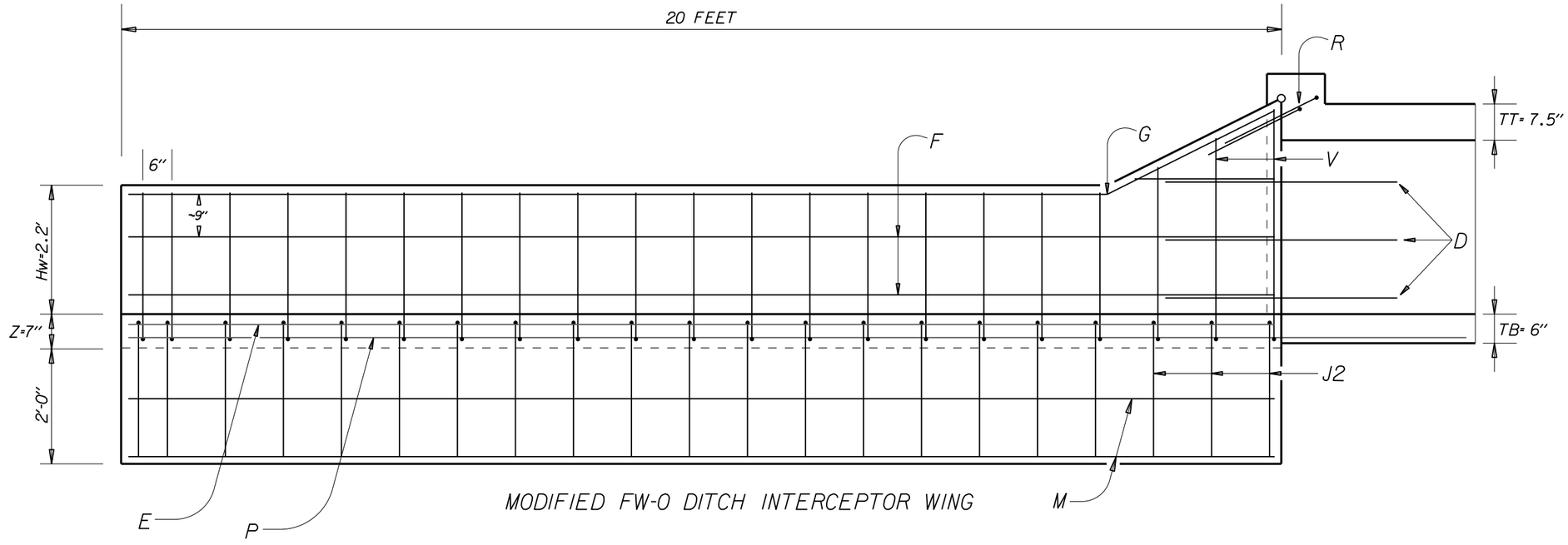


SECTION A-A



MODIFIED FW-0 DITCH INTERCEPTOR WING

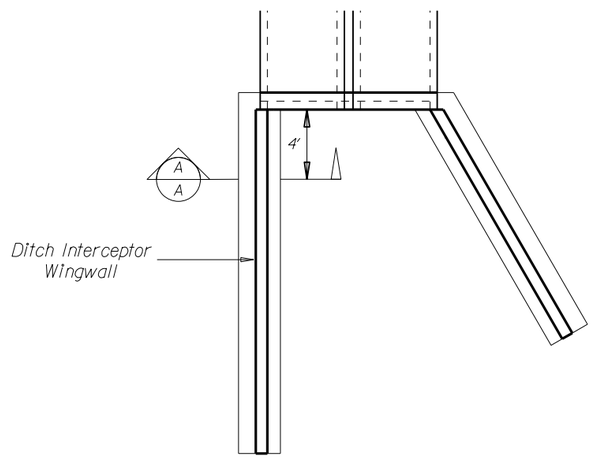


TABLE OF INTERCEPTOR WING REINFORCING					FOR CONTRACTOR'S INFO ONLY	
Bar	Size	No.	Spac.	Required Length [FT]	Grade 60 Steel Weight [LBS]	Concrete Volume [CY]
P	#5	2	1'-0"	43	45	
V	#4	42	1'-0"	130	87	
F	#4	6	1'-0"	85	57	
G	#6	4	~	40	60	
R	#4	2	~	4	3	
D	#4	3	1'-0"	12	8	
J2	#4	21	1'-0"	93	62	
E	#4	3	1'-0"	60	40	
M	#4	2	1'-0"	40	27	
				MODIFIED WING TOTALS:	389	3.0

NOTES:

The above table quantifies only the reinforcing steel in the interceptor wing and footing. See the FW-0 standard for additional information.

Maintain at least 1.5" clear cover between outside surface of concrete and reinforcing.

Rebar is spaced as shown in the table unless otherwise detailed on this sheet. Double mat (vertical mats) reinforcing in the wing shall be spaced at 3" out-to-out between the mat bars.

STATE OF TEXAS
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Shelley C. Harris, P.E.
6/29/2022

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N.T.S. Sheet 3 of 6

STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		135
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_DRG_CULVERT_XSECTIONS.dgn		

STRUCTURE NO. 9 DETAILS (LEFT)

DATE: 6/29/2022 11:16:56 PM
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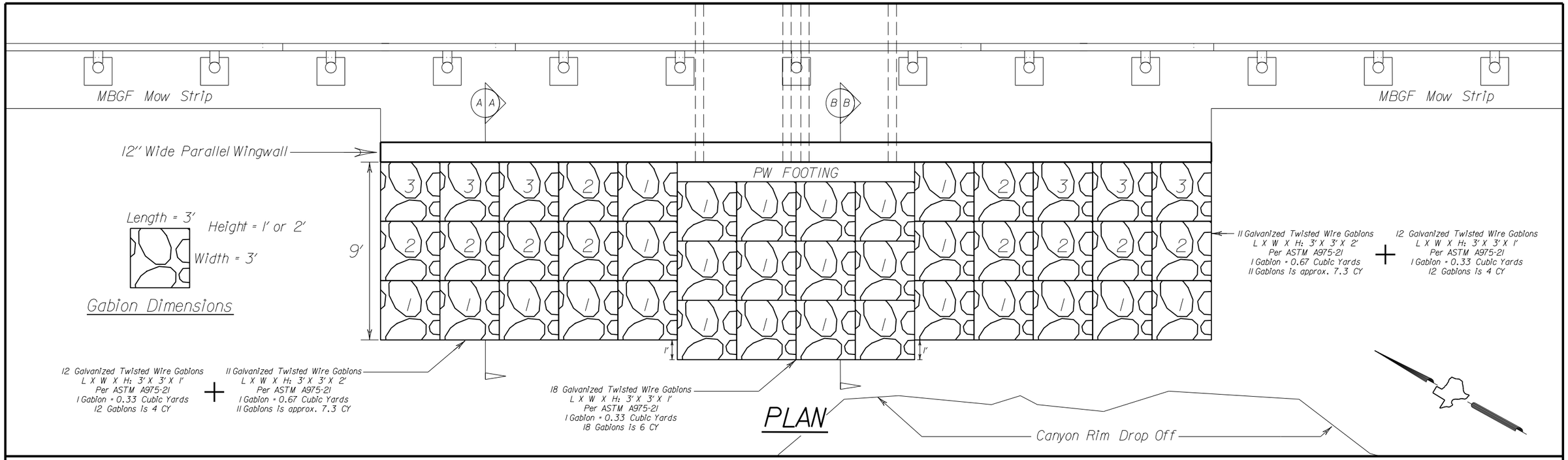

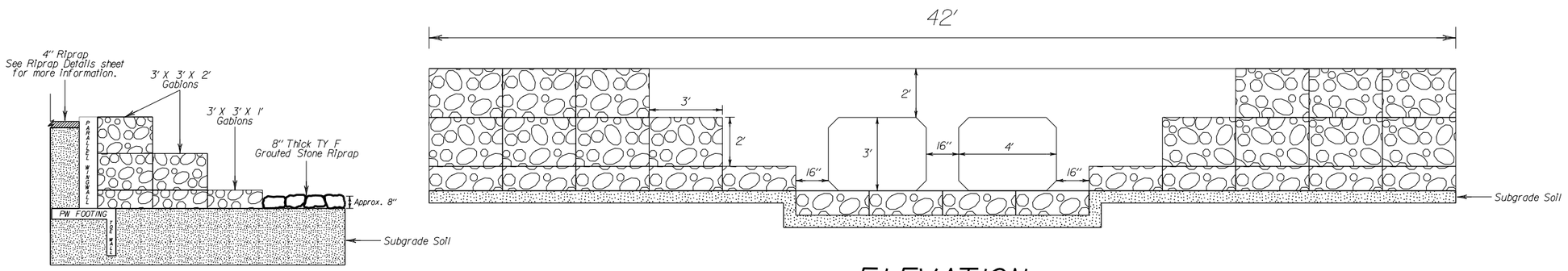

GABION SUMMARY

42 Galvanized Twisted Wire Gabions		22 Galvanized Twisted Wire Gabions
L X W X H: 3' X 3' X 1'		L X W X H: 3' X 3' X 2'
Per ASTM A975-21		Per ASTM A975-21
1 Gabion = 0.33 Cubic Yards	+	1 Gabion = 0.67 Cubic Yards
42 Gabions Is 14 CY		22 Gabions Is approx. 14.7 CY

ITEM 459-6001
GABIONS (GALV) [CY]
Project Total: 29 CY

NOTES:

Excavation and embankment work and materials shall be considered subsidiary to the gabions and parallel wingwall.

Gabions are paid for by the cubic yard.

When approved by the engineer, the dimensions of the gabions and gabion mattresses may be altered from what is detailed above as long as the overall proposed design is unchanged.

The proposed grouted stone riprap from STA. 726+00 to STA. 727+00 Is not shown in the above Plan view.

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N.T.S. Sheet 4 of 6

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		136
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_DRG_CULVERT_XSECTIONS.dgn		

STRUCTURE NO. 9 DETAILS (RIGHT)

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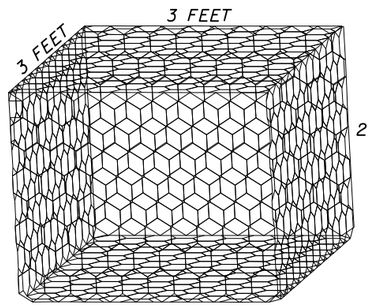
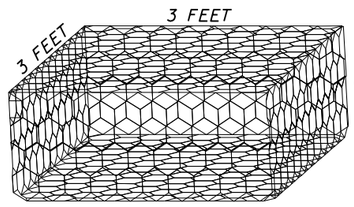
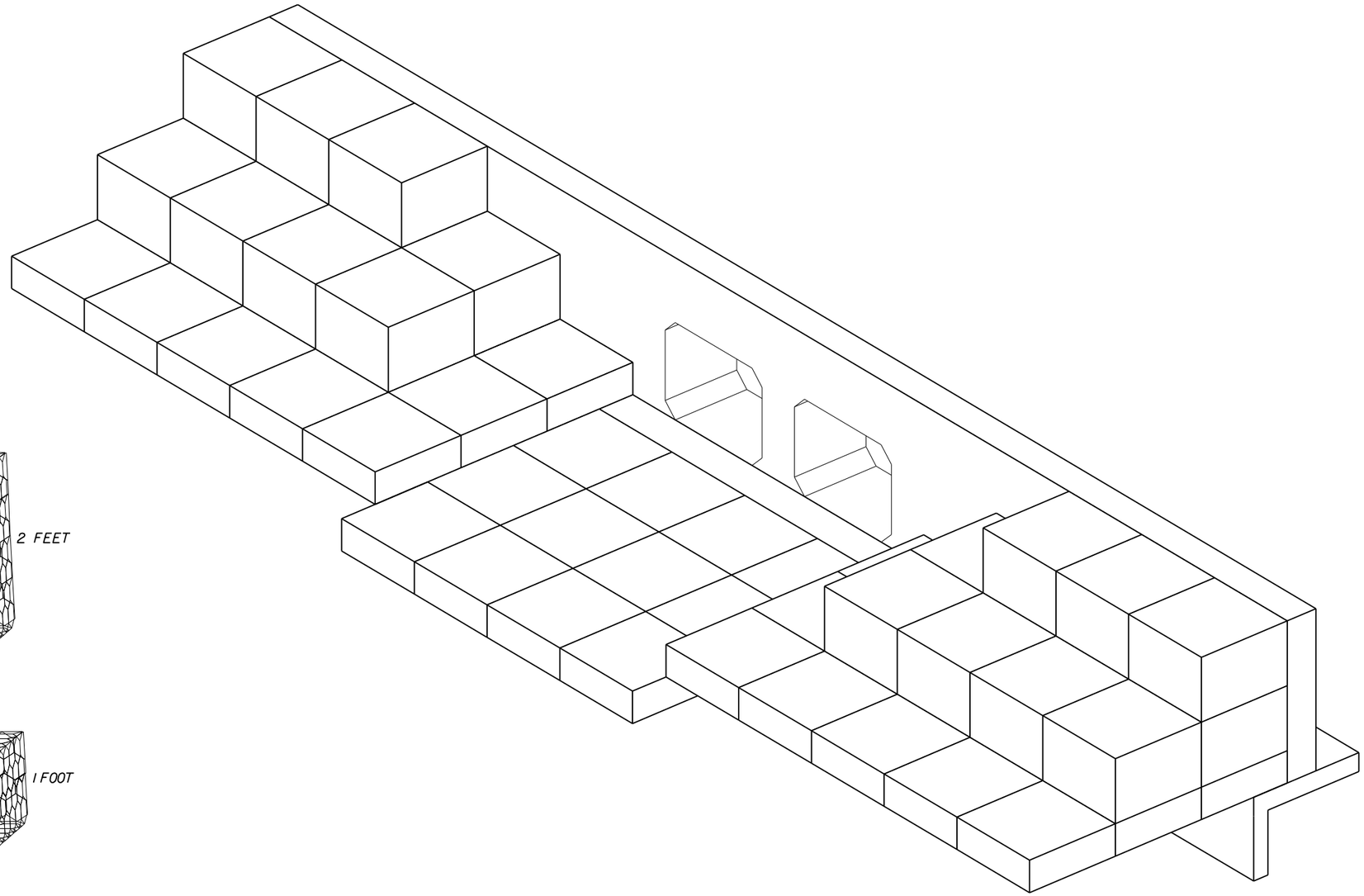




Double-Twisted Hexagonal Mesh Gabions
Per ASTM A975-21
[Metallic-Coated Steel]



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6/29/2022

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N.T.S. Sheet 5 of 6

STRUCTURE NO. 9 DETAILS (ISOMETRIC)

STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		137
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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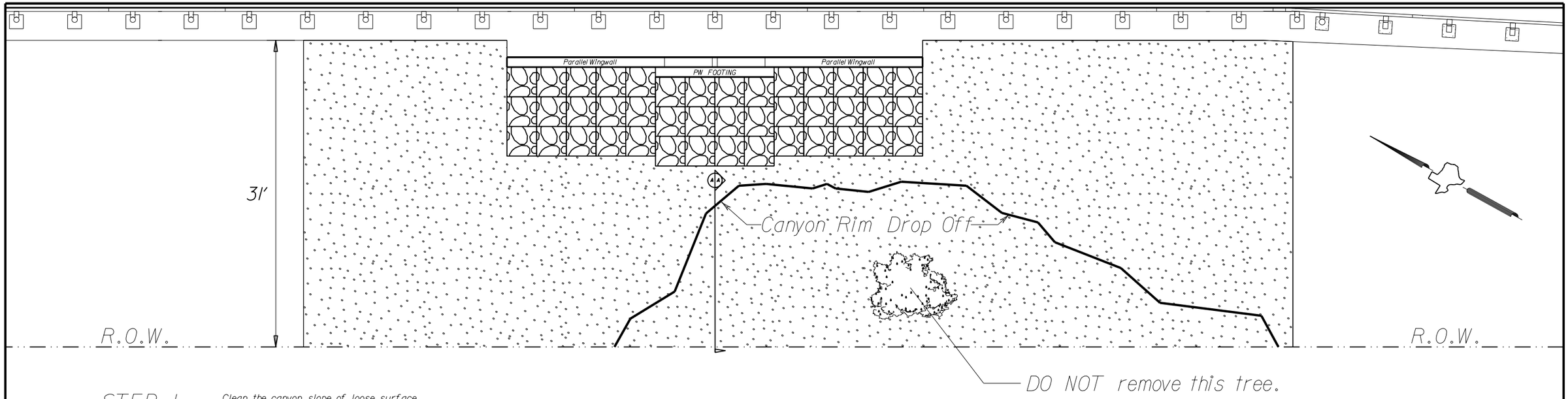
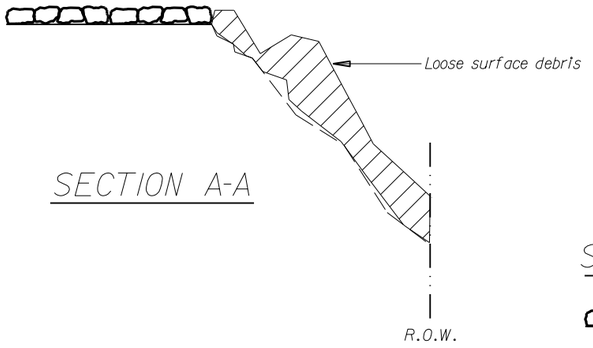
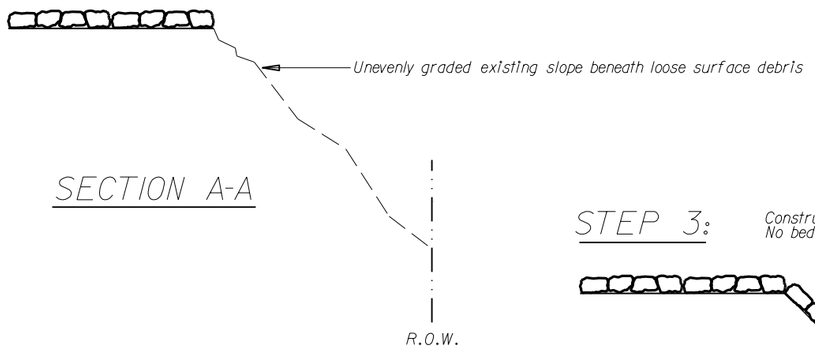


STEP 1: Clean the canyon slope of loose surface debris to get down to a stable subgrade soil.



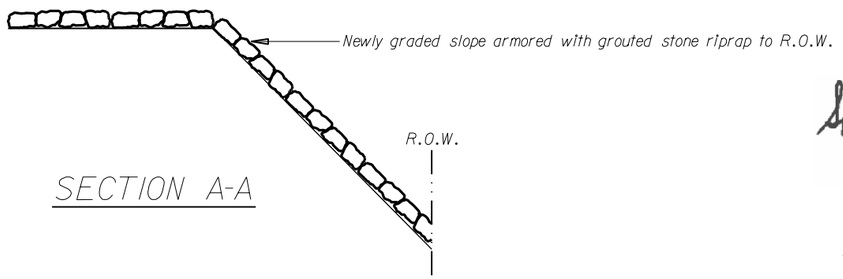
SECTION A-A

STEP 2: Grade existing slope to a constant grade to R.O.W. and prepare the soil for stone riprap placement.



SECTION A-A

STEP 3: Construct the 8" thick TY F Grouted Stone Riprap. No bedding material or filter fabric is proposed.



SECTION A-A

STRUCTURE NO. 9 DETAILS (SLOPE)

STATE OF TEXAS
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LICENSED PROFESSIONAL ENGINEER

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6/29/2022

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N.T.S. Sheet 6 of 6

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		138
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_DRG_CULVERT_XSECTIONS.dgn		

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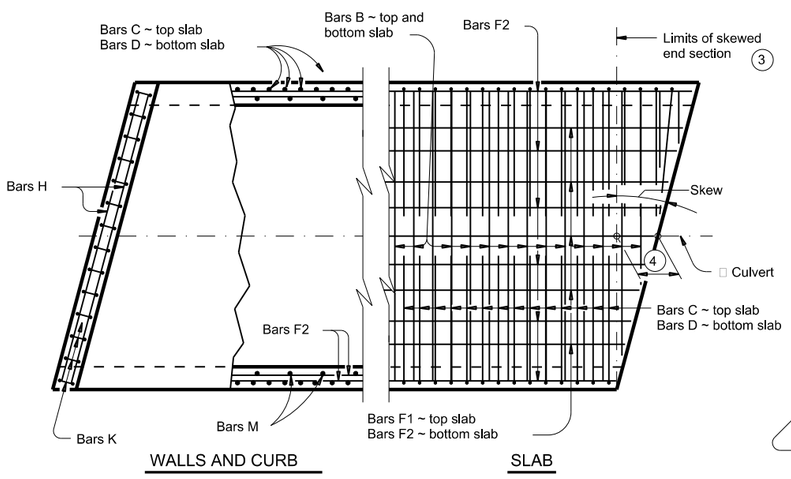
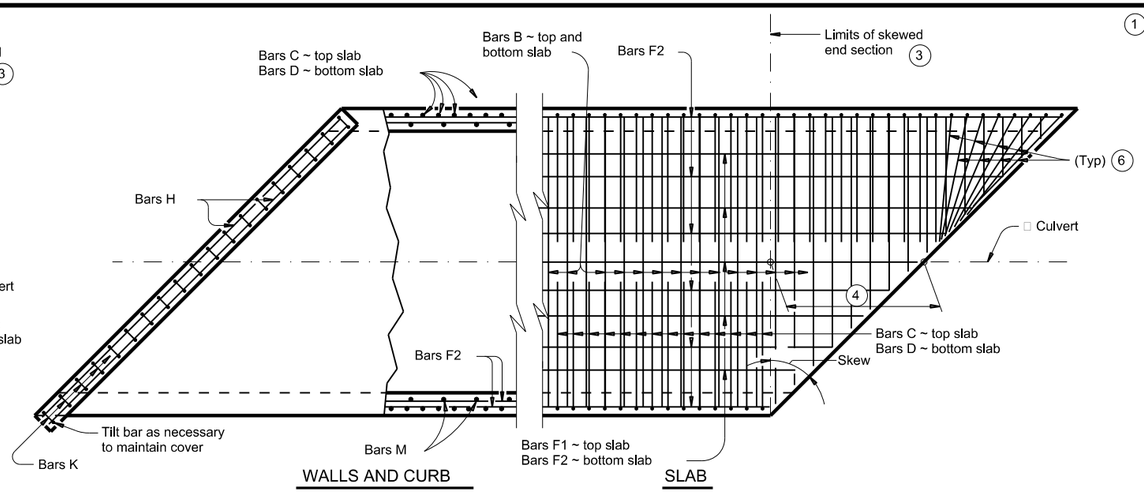
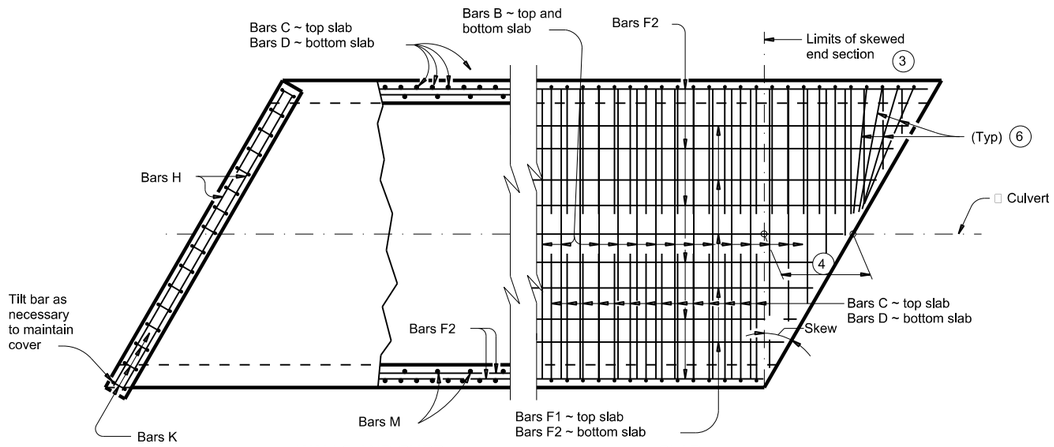


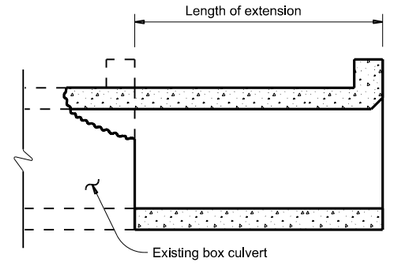
PLAN OF SKEWED ENDS ~ FROM 0° TO 15° (7)



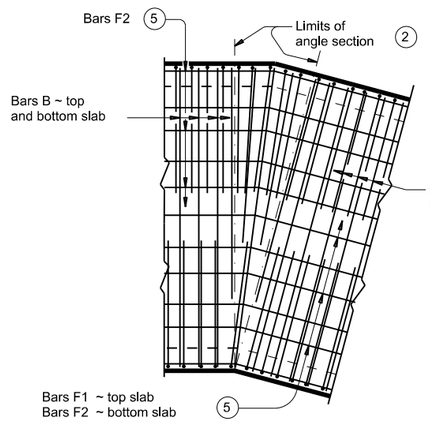
PLAN OF SKEWED ENDS ~ OVER 30° TO 45°



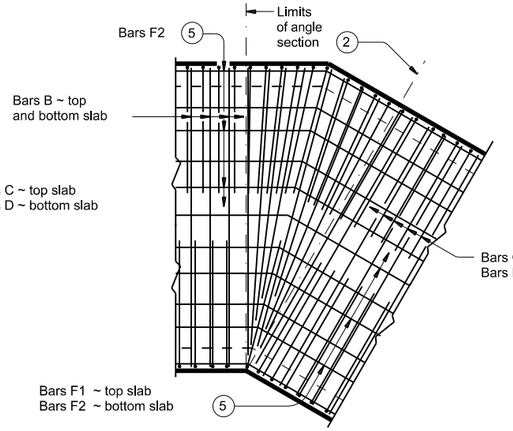
PLAN OF SKEWED ENDS ~ OVER 15° TO 30°



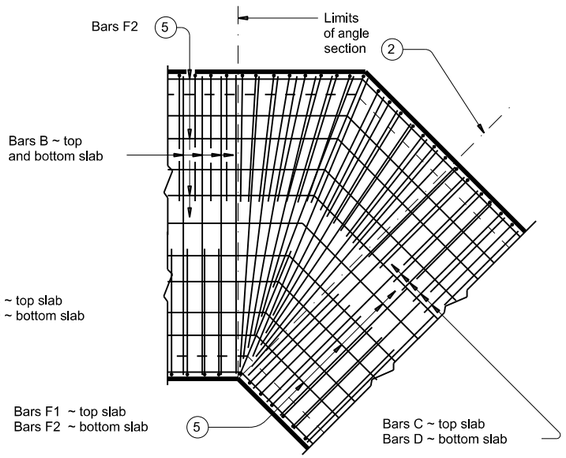
LENGTHENING DETAIL (1)



PLAN OF ANGLE SECTION ~ FROM 0° TO 15°



PLAN OF ANGLE SECTION ~ OVER 15° TO 30°



PLAN OF ANGLE SECTION ~ OVER 30° TO 45°

(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, 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 becomes less than half of the normal spacing, cut bars to avoid conflict.

(3) The length of Bars B 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, and D parallel to the skewed end while maintaining spacing along centerline of box. Increase lengths of Bars B shown on the Single Box Culverts Cast-In-Place (SCC) standards sheets to accommodate the skew.

CONSTRUCTION NOTES:

Do not use permanent forms.
When required, lap Bars H 1'-8" for uncoated or galvanized bars.
Provide a minimum of 1 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 Single Box Culverts Cast-in-Place (SCC) standard sheets for details of straight sections of culvert.

For skewed sections and angle sections, refer to Single Box Culverts Cast-in-Place (SCC) standard sheets for slab and wall dimensions, bar sizes, maximum bar spacing, and any other details not shown.

For skewed ends with curbs, adjust length of Bars H, number of Bars K, curb concrete volume, and reinforcing steel weight by dividing the values shown on the culvert Single Box Culverts Cast-In-Place (SCC) standard sheets by the cosine of the skew angle.

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE MISCELLANEOUS DETAILS

SCC-MD

FILE: sccmdste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		139

DATE: 6/29/2022 1:17:02 PM
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DATE: 6/29/2022 1:17:05 PM
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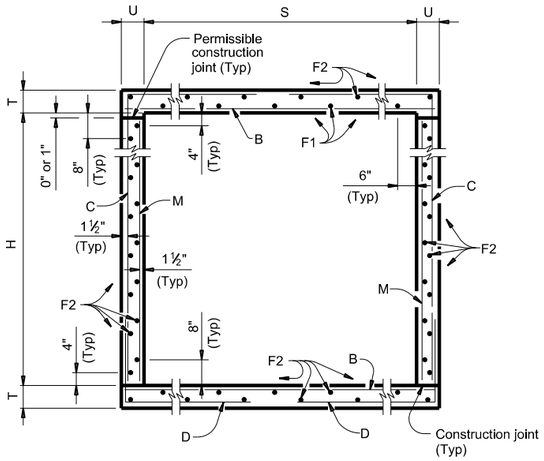
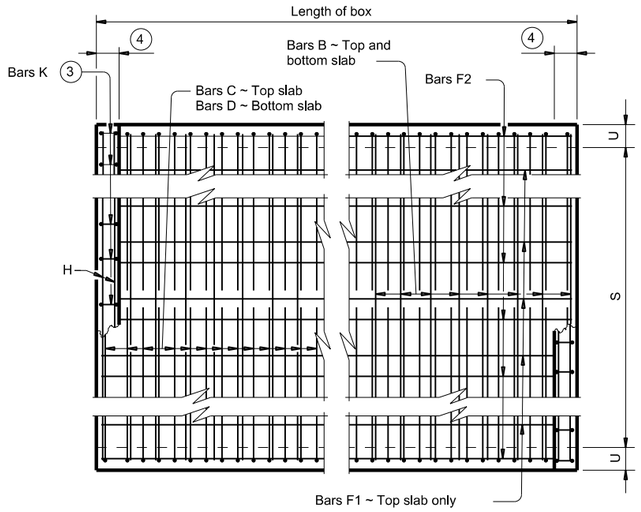
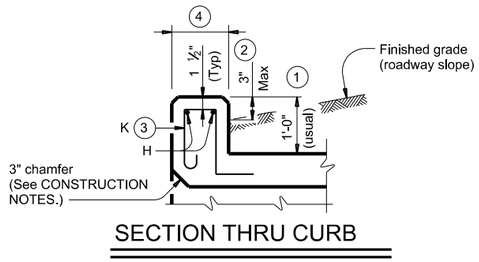


TYPICAL SECTION



PLAN OF REINF STEEL



SECTION THRU CURB

1. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Rail Anchorage Curb (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

2. For vehicle safety, the following requirements must be met:
   · For structures without bridge rail, construct curbs no more than 3" above finished grade.
   · For structures with bridge rail, construct curbs flush with finished grade.
   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

3. For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.

4. 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

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

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

CONSTRUCTION NOTES:

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

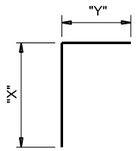
MATERIAL NOTES:

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

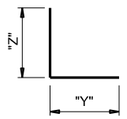
GENERAL NOTES:

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

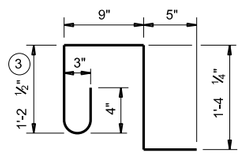
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



BARS C



BARS D



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

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation — Bridge Division Standard

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

SCC-3 & 4

FILE: scc34ste-21.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		140

SECTION DIMENSIONS				⑤ FILL HEIGHT	BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																												QUANTITIES					
					Bars B					Bars C							Bars D							Bars M ~ #4				Bars F1 ~ #4 at 18" Spa			Bars F2 ~ #4 at 18" Spa			Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total	
S	H	T	U		No.	Size	Spa	Length	Weight	No.	Size	Spa	Length	Weight	" X "	" Y "	No.	Size	Spa	Length	Weight	" Y "	" Z "	No.	Spa	Length	Weight	No.	Length	Wt	No.	Length	Weight	Length	Wt	No.	Wt	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)
3' - 0"	2' - 0"	8"	7"	30'	108	#5	9"	3' - 11"	441	108	#4	9"	5' - 4"	385	2' - 6"	2' - 10"	108	#4	9"	5' - 1"	367	2' - 10"	2' - 3"	108	9"	2' - 0"	144	3	39' - 9"	80	19	39' - 9"	505	3' - 11"	10	10	28	0.292	48.1	0.3	38	12.0	1,960
3' - 0"	3' - 0"	8"	7"	30'	108	#5	9"	3' - 11"	441	108	#4	9"	6' - 4"	457	3' - 6"	2' - 10"	108	#4	9"	5' - 1"	367	2' - 10"	2' - 3"	108	9"	3' - 0"	216	3	39' - 9"	80	23	39' - 9"	611	3' - 11"	10	10	28	0.335	54.3	0.3	38	13.7	2,210
4' - 0"	2' - 0"	8"	7"	30'	108	#5	9"	4' - 11"	554	162	#4	6"	5' - 8"	613	2' - 6"	3' - 2"	162	#4	6"	5' - 5"	586	3' - 2"	2' - 3"	108	9"	2' - 0"	144	3	39' - 9"	80	21	39' - 9"	558	4' - 11"	13	12	33	0.342	63.4	0.4	46	14.1	2,581
4' - 0"	3' - 0"	8"	7"	30'	108	#5	9"	4' - 11"	554	162	#4	6"	6' - 8"	721	3' - 6"	3' - 2"	162	#4	6"	5' - 5"	586	3' - 2"	2' - 3"	108	9"	3' - 0"	216	3	39' - 9"	80	25	39' - 9"	664	4' - 11"	13	12	33	0.385	70.5	0.4	46	15.8	2,867
4' - 0"	4' - 0"	8"	7"	30'	108	#5	9"	4' - 11"	554	162	#4	6"	7' - 8"	830	4' - 6"	3' - 2"	162	#4	6"	5' - 5"	586	3' - 2"	2' - 3"	108	9"	4' - 0"	289	3	39' - 9"	80	25	39' - 9"	664	4' - 11"	13	12	33	0.428	75.1	0.4	46	17.5	3,049

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

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE

0' TO 30' FILL

SCC-3 & 4

FILE: scc34ste-21.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		141

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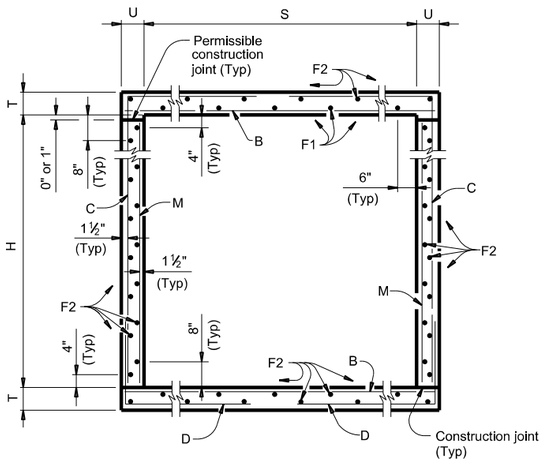
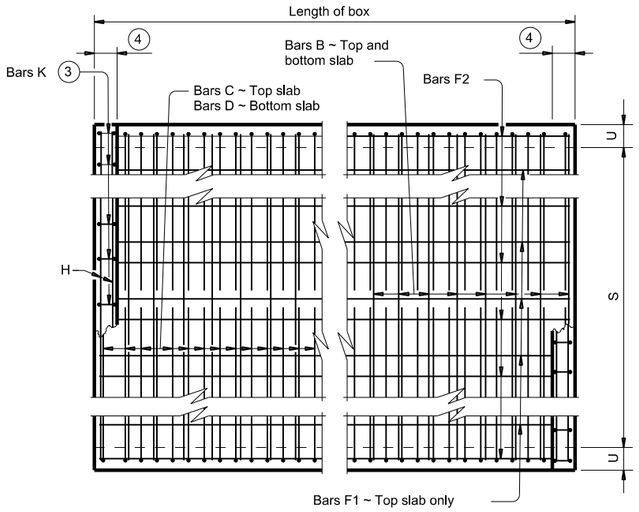
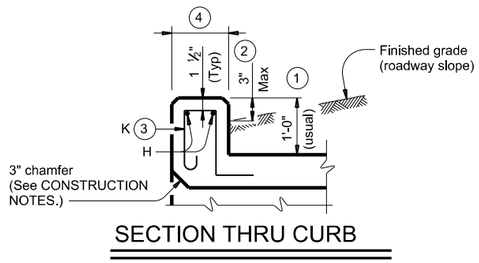


TYPICAL SECTION



PLAN OF REINF STEEL



SECTION THRU CURB

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:
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   · For structures with bridge rail, construct curbs flush with finished grade.
   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

3. For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.

4. 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

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

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

CONSTRUCTION NOTES:

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

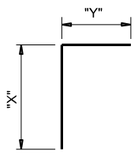
MATERIAL NOTES:

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

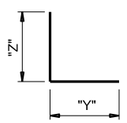
GENERAL NOTES:

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

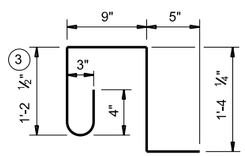
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



BARS C



BARS D



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

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

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

SCC-5 & 6

FILE: scc56ste-21.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
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REVISIONS	0453	04	024	SH 207
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		142

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

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

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE

0' TO 30' FILL

SCC-5 & 6

FILE: scc56ste-21.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		143

DATE: 6/29/2022 1:17:10 PM
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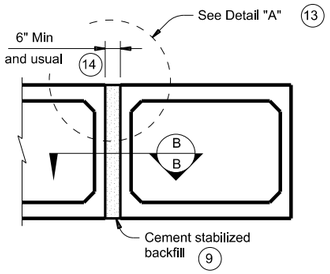
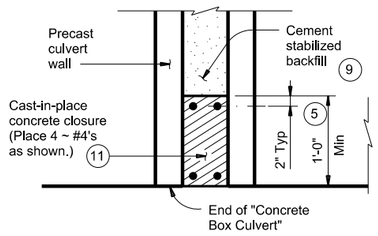
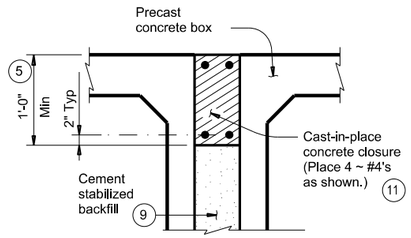


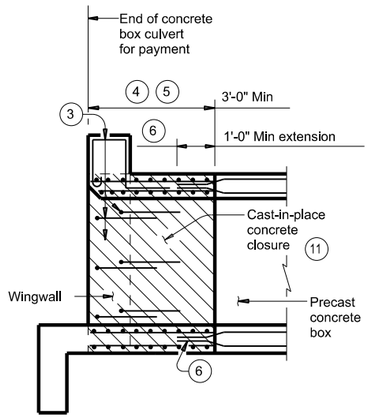
MULTIPLE UNIT PLACEMENT



SECTION B-B

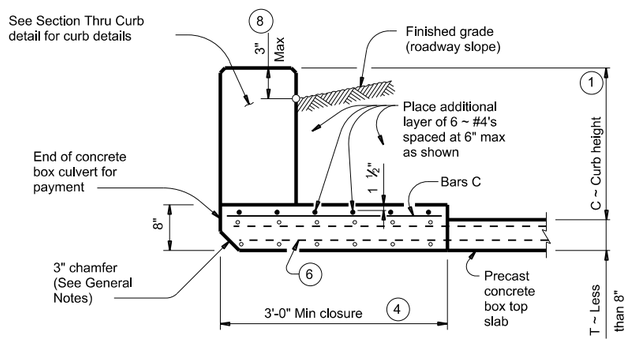


DETAIL "A" (13)

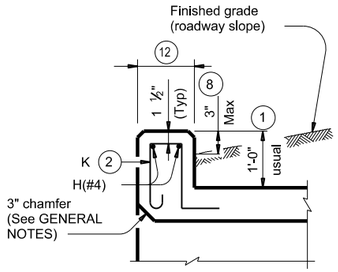


WINGWALL CONNECTION

(Also applies to safety end treatment.)

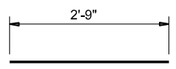


SECTION THRU TOP SLABS LESS THAN 8"

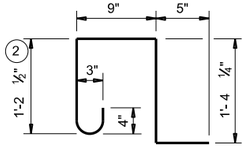


SECTION THRU CURB

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



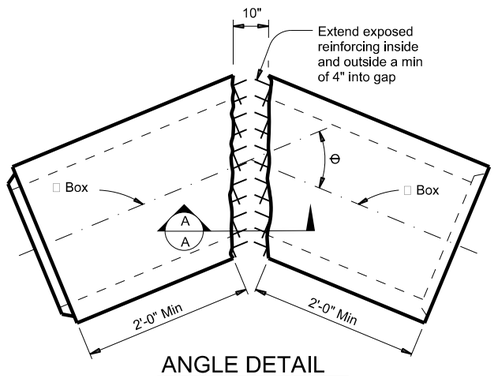
BARS C (#4)
(Spa = 1'-0" Max)



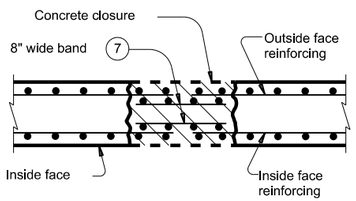
BARS K (#4)
(Spa = 1'-0" Max)
(Length = 4'-2")

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.

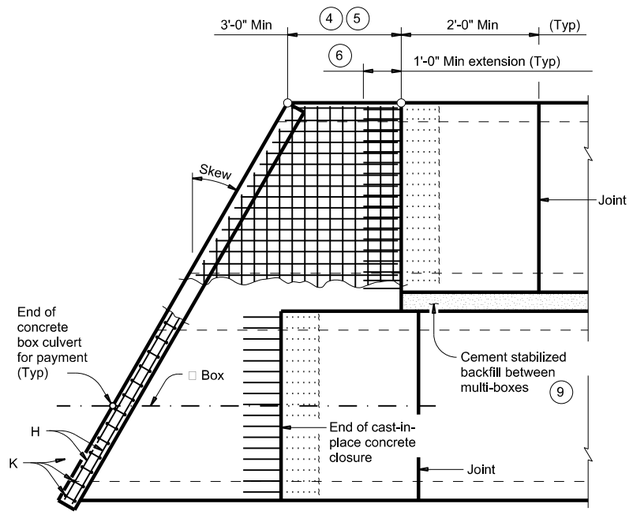
   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
9. Cement stabilized backfill between boxes is considered part of the box culvert for payment.
10. All curb concrete and reinforcing is 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.



ANGLE DETAIL



SECTION A-A



PLAN OF SKEWED ENDS

(Showing multi-box placement.)

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	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		144

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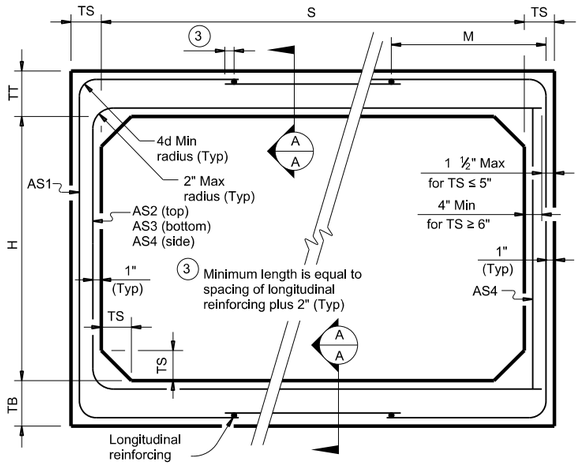
BOX DATA

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)
3	2	7	6	4	< 2	-	0.17	0.25	0.16	0.10	0.17	0.17	0.14	3.3
3	2	4	4	4	2 < 3	31	0.13	0.19	0.18	0.10	-	-	-	2.4
3	2	4	4	4	3 - 5	31	0.10	0.11	0.12	0.10	-	-	-	2.4
3	2	4	4	4	10	31	0.10	0.10	0.10	0.10	-	-	-	2.4
3	2	4	4	4	15	31	0.10	0.13	0.13	0.10	-	-	-	2.4
3	2	4	4	4	20	31	0.11	0.17	0.17	0.10	-	-	-	2.4
3	2	4	4	4	25	31	0.14	0.21	0.21	0.10	-	-	-	2.4
3	2	4	4	4	30	31	0.17	0.25	0.25	0.10	-	-	-	2.4
3	2	4	4	4	35	31	0.20	0.29	0.30	0.10	-	-	-	2.4
3	3	7	6	4	< 2	-	0.17	0.27	0.17	0.10	0.17	0.17	0.14	3.7
3	3	4	4	4	2 < 3	31	0.10	0.22	0.21	0.10	-	-	-	2.8
3	3	4	4	4	3 - 5	31	0.10	0.14	0.14	0.10	-	-	-	2.8
3	3	4	4	4	10	31	0.10	0.11	0.11	0.10	-	-	-	2.8
3	3	4	4	4	15	31	0.10	0.14	0.15	0.10	-	-	-	2.8
3	3	4	4	4	20	31	0.10	0.18	0.19	0.10	-	-	-	2.8
3	3	4	4	4	25	31	0.10	0.23	0.23	0.10	-	-	-	2.8
3	3	4	4	4	30	31	0.12	0.27	0.28	0.10	-	-	-	2.8
3	3	4	4	4	35	31	0.14	0.32	0.32	0.10	-	-	-	2.8

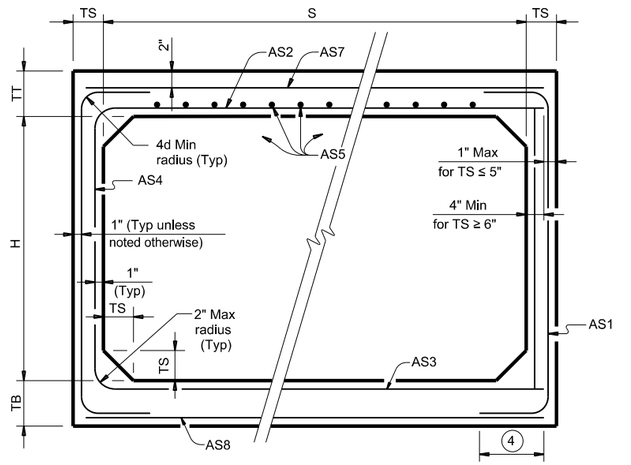
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

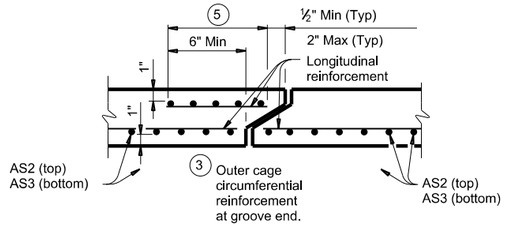
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

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



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete ($f'c$ = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

3'-0" SPAN

SCP-3

FILE: scp03sts-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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	LBB	CROSBY		145

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DATE: 6/29/2022 1:17:18 PM
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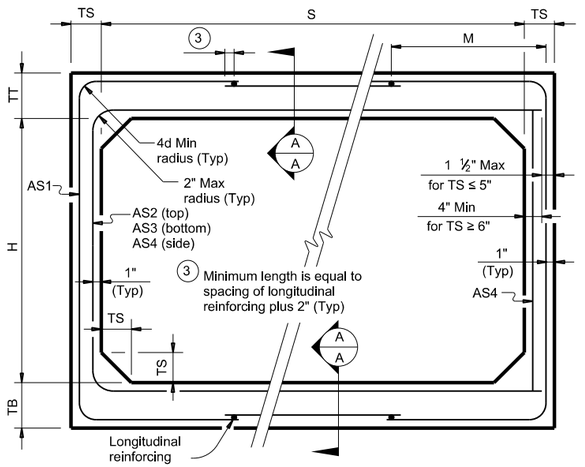
BOX DATA

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)
4	2	7.5	6	5	< 2	-	0.18	0.27	0.15	0.12	0.18	0.18	0.14	4.5
4	2	5	5	5	2 < 3	38	0.18	0.19	0.17	0.12	-	-	-	3.6
4	2	5	5	5	3 - 5	38	0.13	0.13	0.13	0.12	-	-	-	3.6
4	2	5	5	5	10	38	0.12	0.12	0.12	0.12	-	-	-	3.6
4	2	5	5	5	15	38	0.14	0.16	0.16	0.12	-	-	-	3.6
4	2	5	5	5	20	38	0.18	0.20	0.21	0.12	-	-	-	3.6
4	2	5	5	5	25	38	0.23	0.25	0.25	0.12	-	-	-	3.6
4	2	5	5	5	30	38	0.28	0.30	0.30	0.12	-	-	-	3.6
4	3	7.5	6	5	< 2	-	0.18	0.31	0.18	0.12	0.18	0.18	0.14	5.0
4	3	5	5	5	2 < 3	38	0.15	0.23	0.20	0.12	-	-	-	4.1
4	3	5	5	5	3 - 5	38	0.12	0.16	0.16	0.12	-	-	-	4.1
4	3	5	5	5	10	38	0.12	0.14	0.14	0.12	-	-	-	4.1
4	3	5	5	5	15	38	0.12	0.18	0.18	0.12	-	-	-	4.1
4	3	5	5	5	20	38	0.14	0.23	0.24	0.12	-	-	-	4.1
4	3	5	5	5	25	38	0.17	0.29	0.29	0.12	-	-	-	4.1
4	3	5	5	5	30	38	0.21	0.35	0.35	0.12	-	-	-	4.1
4	4	7.5	6	5	< 2	-	0.18	0.33	0.20	0.12	0.18	0.18	0.14	5.5
4	4	5	5	5	2 < 3	38	0.12	0.26	0.23	0.12	-	-	-	4.6
4	4	5	5	5	3 - 5	38	0.12	0.18	0.18	0.12	-	-	-	4.6
4	4	5	5	5	10	38	0.12	0.15	0.15	0.12	-	-	-	4.6
4	4	5	5	5	15	38	0.12	0.19	0.20	0.12	-	-	-	4.6
4	4	5	5	5	20	38	0.12	0.25	0.25	0.12	-	-	-	4.6
4	4	5	5	5	25	38	0.14	0.31	0.31	0.12	-	-	-	4.6
4	4	5	5	5	30	38	0.17	0.37	0.37	0.12	-	-	-	4.6

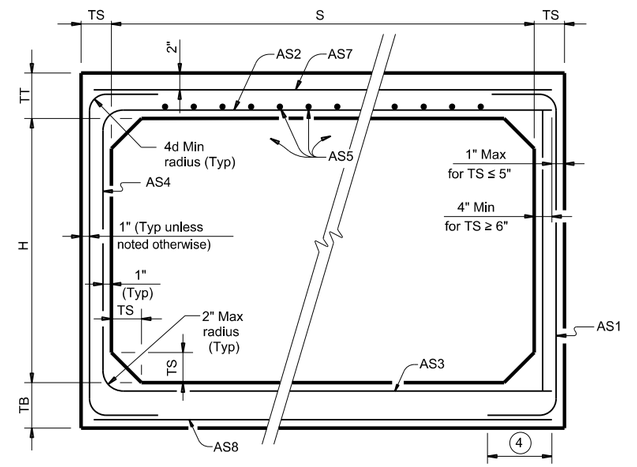
① For box length = 8'-0"

② AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

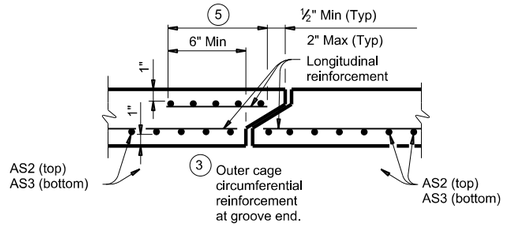
FILL HEIGHT 2 FT AND GREATER



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

4'-0" SPAN

SCP-4

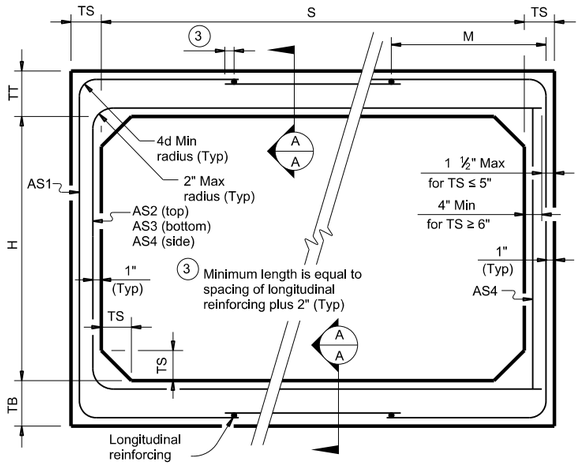
FILE: scp04sts-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		146

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

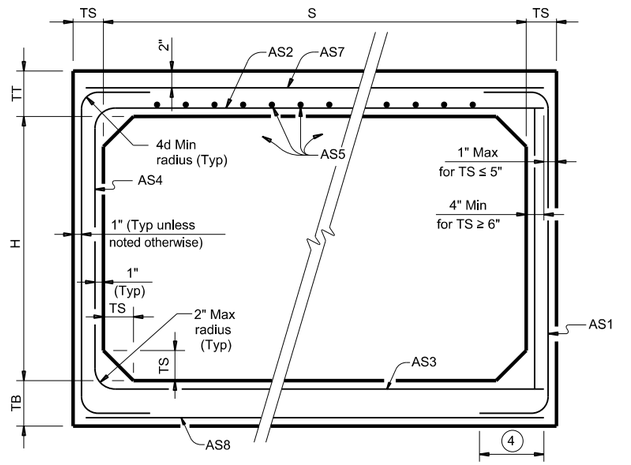
(1) For box length = 8'-0"

(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"

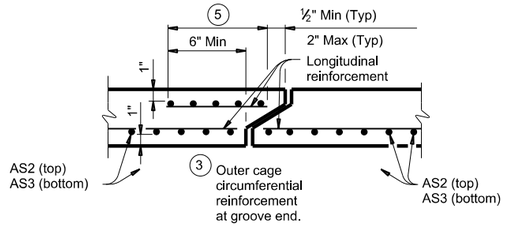
FILL HEIGHT 2 FT AND GREATER



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 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		147

DATE: 6/29/2022 1:17:20 PM
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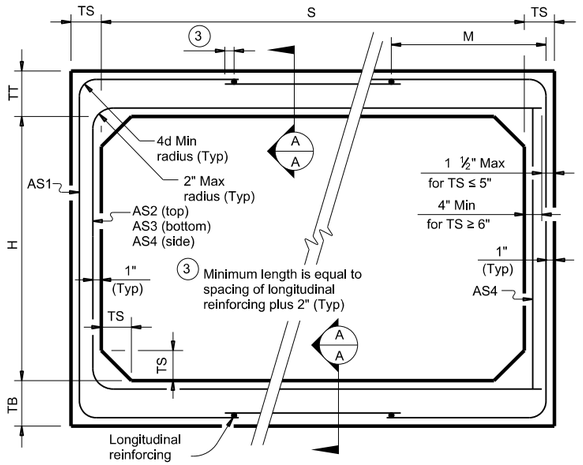
BOX DATA

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)
6	2	8	7	7	< 2	-	0.23	0.27	0.19	0.17	0.19	0.19	0.17	7.2
6	2	7	7	7	2 < 3	43	0.25	0.21	0.17	0.17	-	-	-	6.8
6	2	7	7	7	3 - 5	43	0.20	0.17	0.17	0.17	-	-	-	6.8
6	2	7	7	7	10	39	0.20	0.17	0.17	0.17	-	-	-	6.8
6	2	7	7	7	15	39	0.26	0.20	0.20	0.17	-	-	-	6.8
6	2	7	7	7	20	39	0.34	0.26	0.26	0.17	-	-	-	6.8
6	2	7	7	7	25	39	0.43	0.32	0.32	0.17	-	-	-	6.8
6	2	7	7	7	30	39	0.52	0.38	0.39	0.17	-	-	-	6.8
6	3	8	7	7	< 2	-	0.20	0.31	0.22	0.17	0.19	0.19	0.17	7.9
6	3	7	7	7	2 < 3	43	0.21	0.24	0.19	0.17	-	-	-	7.5
6	3	7	7	7	3 - 5	39	0.17	0.18	0.17	0.17	-	-	-	7.5
6	3	7	7	7	10	39	0.17	0.18	0.19	0.17	-	-	-	7.5
6	3	7	7	7	15	38	0.22	0.24	0.24	0.17	-	-	-	7.5
6	3	7	7	7	20	38	0.28	0.31	0.31	0.17	-	-	-	7.5
6	3	7	7	7	25	38	0.35	0.38	0.39	0.17	-	-	-	7.5
6	3	7	7	7	30	38	0.42	0.46	0.46	0.17	-	-	-	7.5
6	4	8	7	7	< 2	-	0.19	0.34	0.25	0.17	0.19	0.19	0.17	8.6
6	4	7	7	7	2 < 3	43	0.19	0.27	0.21	0.17	-	-	-	8.2
6	4	7	7	7	3 - 5	39	0.17	0.21	0.19	0.17	-	-	-	8.2
6	4	7	7	7	10	39	0.17	0.20	0.21	0.17	-	-	-	8.2
6	4	7	7	7	15	38	0.18	0.27	0.27	0.17	-	-	-	8.2
6	4	7	7	7	20	38	0.24	0.34	0.35	0.17	-	-	-	8.2
6	4	7	7	7	25	38	0.29	0.43	0.42	0.17	-	-	-	8.2
6	4	7	7	7	30	38	0.35	0.51	0.52	0.17	-	-	-	8.2
6	5	8	7	7	< 2	-	0.19	0.37	0.28	0.17	0.19	0.19	0.17	9.3
6	5	7	7	7	2 < 3	43	0.17	0.30	0.24	0.17	-	-	-	8.9
6	5	7	7	7	3 - 5	43	0.17	0.23	0.21	0.17	-	-	-	8.9
6	5	7	7	7	10	39	0.17	0.22	0.23	0.17	-	-	-	8.9
6	5	7	7	7	15	38	0.17	0.28	0.29	0.17	-	-	-	8.9
6	5	7	7	7	20	38	0.20	0.37	0.38	0.17	-	-	-	8.9
6	5	7	7	7	25	38	0.25	0.45	0.46	0.17	-	-	-	8.9
6	5	7	7	7	30	38	0.30	0.54	0.55	0.17	-	-	-	8.9
6	6	8	7	7	< 2	-	0.19	0.38	0.30	0.17	0.19	0.19	0.17	10
6	6	7	7	7	2 < 3	52	0.17	0.32	0.26	0.17	-	-	-	9.6
6	6	7	7	7	3 - 5	52	0.17	0.24	0.22	0.17	-	-	-	9.6
6	6	7	7	7	10	43	0.17	0.23	0.24	0.17	-	-	-	9.6
6	6	7	7	7	15	39	0.17	0.29	0.31	0.17	-	-	-	9.6
6	6	7	7	7	20	39	0.18	0.38	0.39	0.17	-	-	-	9.6
6	6	7	7	7	25	38	0.23	0.46	0.48	0.17	-	-	-	9.6
6	6	7	7	7	30	38	0.27	0.55	0.57	0.17	-	-	-	9.6

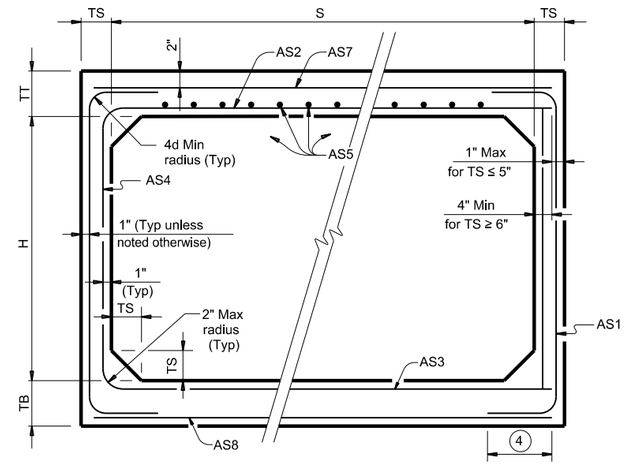
(1) For box length = 8'-0"

(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"

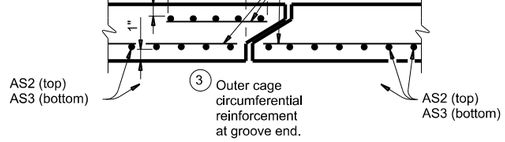
FILL HEIGHT 2 FT AND GREATER



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

6'-0" SPAN

SCP-6

FILE: scp06sts-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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	LBB	CROSBY		148

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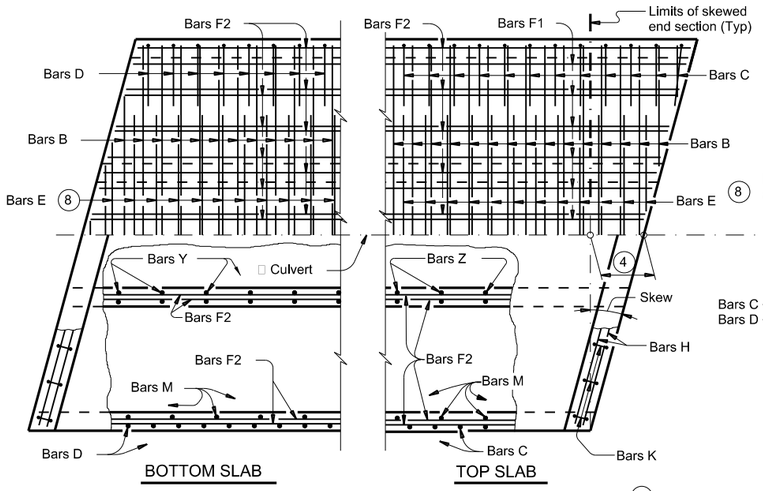
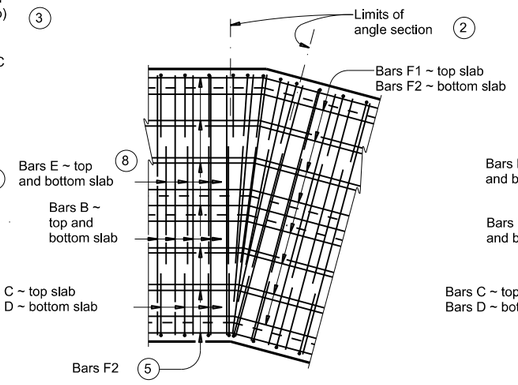
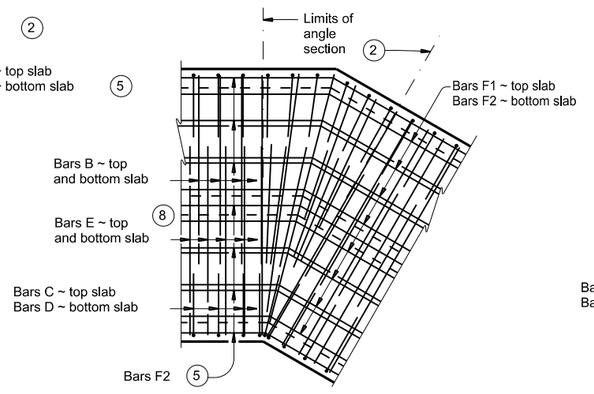


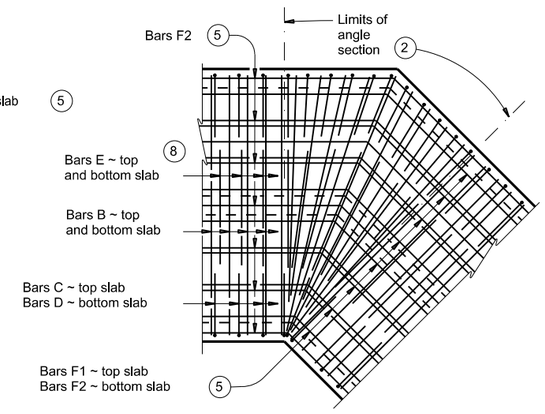
PLAN OF SKEWED ENDS ~ FROM 0° TO 15° (7)



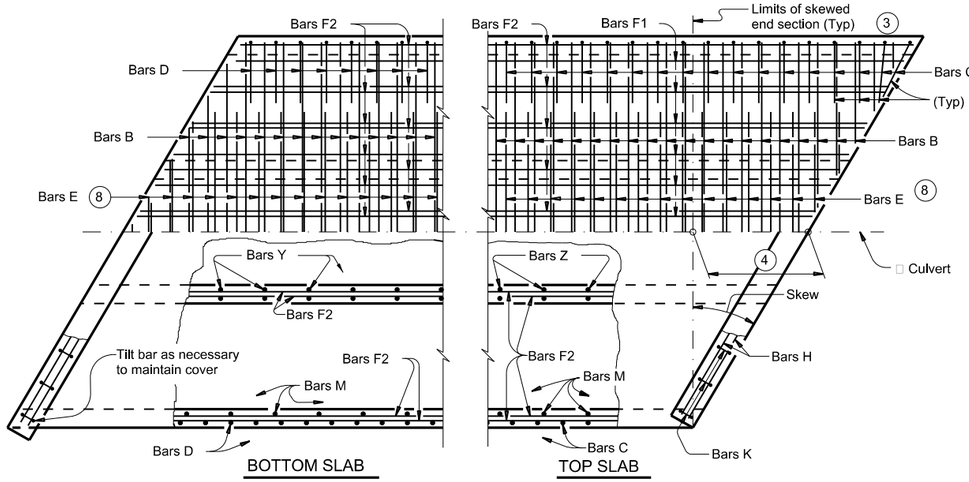
PLAN OF ANGLE SECTION ~ FROM 0° TO 15°



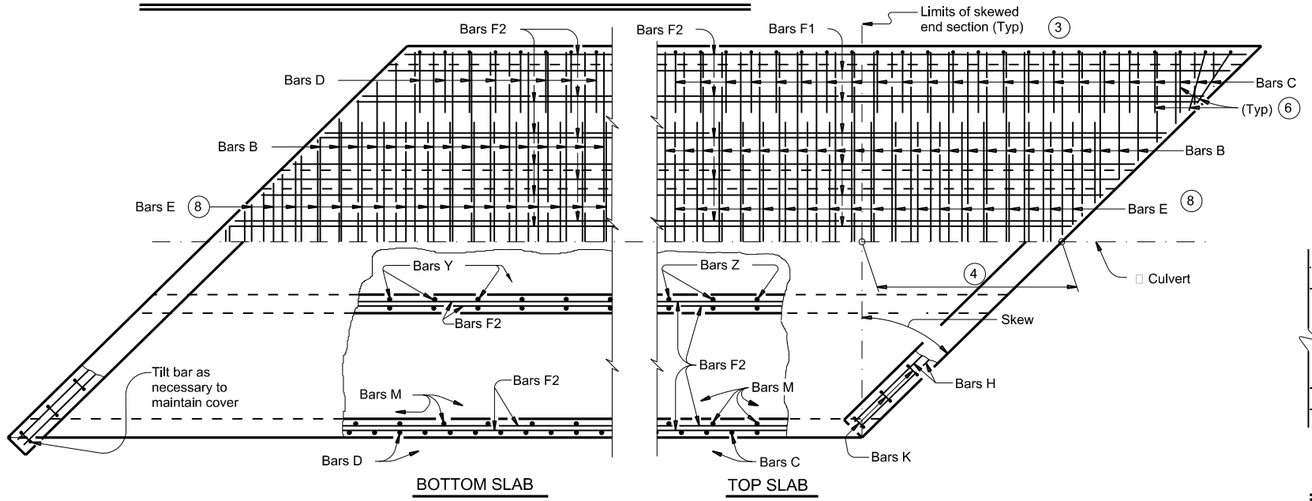
PLAN OF ANGLE SECTION ~ OVER 15° TO 30°



PLAN OF ANGLE SECTION ~ OVER 30° TO 45°



PLAN OF SKEWED ENDS ~ OVER 15° TO 30°



PLAN OF SKEWED ENDS ~ OVER 30° TO 45°

(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.

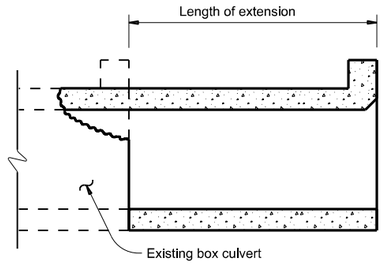
(4) [One half of overall width] x [tangent of the skew angle]

(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.



LENGTHENING DETAIL (1)

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
REVISIONS	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		149

DATE: 6/29/2022 1:17:26 PM
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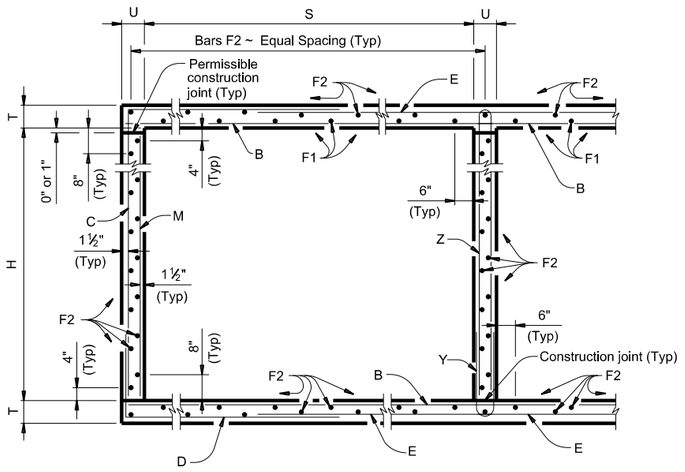
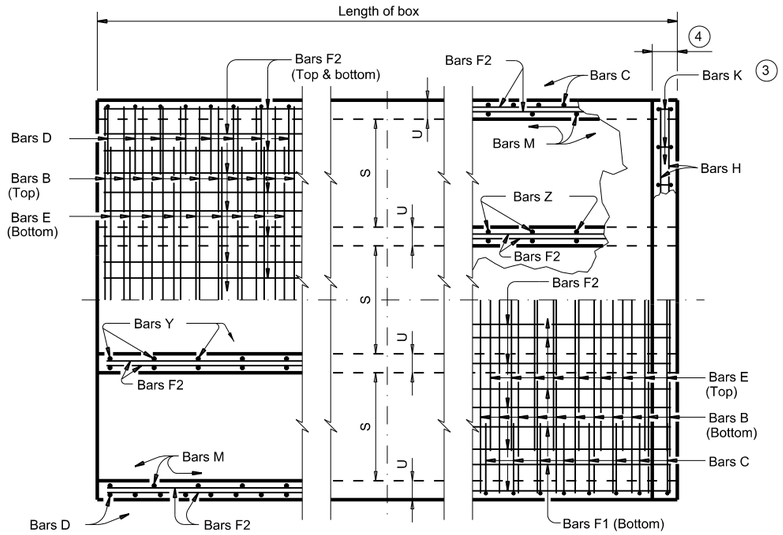
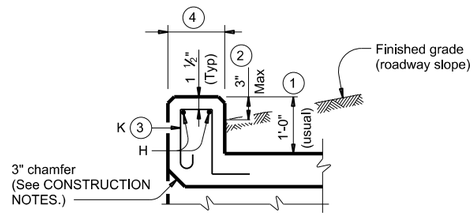


TYPICAL SECTION

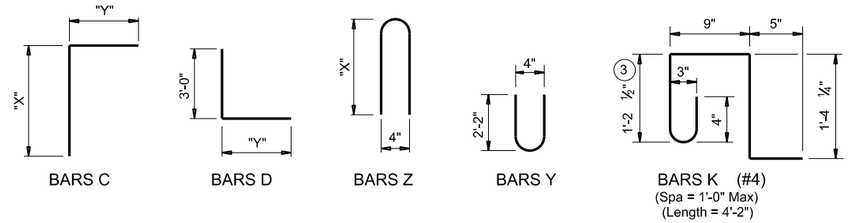


PART PLANS



SECTION THRU CURB

TABLE OF BAR DIMENSIONS		
H	"X"	"Y"
4'-0"	4'-6 ½"	5'-9"
5'-0"	5'-6 ½"	5'-9"
6'-0"	6'-6 ½"	5'-9"
7'-0"	7'-6 ½"	5'-9"
8'-0"	8'-6 ½"	5'-9"
9'-0"	9'-6 ½"	5'-9"
10'-0"	10'-6 ½"	5'-9"



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

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE
10'-0" SPAN
0' TO 7' FILL

MC-10-7

FILE: mc107ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		150

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BILLS OF REINFORCING STEEL (For Box Length = 40 feet)

NUMBER OF SPANS	SECTION DIMENSIONS				Bars B (5)					Bars C & D							Bars E					Bars F1 ~ #4				Bars F2 ~ #4				Bars M ~ #4				Bars Y & Z ~ #4								Bars H 4 ~ #4 (5)		Bars K		QUANTITIES					
													Bars C		Bars D																					Bars Y		Bars Z								Per Foot of Barrel		Curb		Total	
	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	Length	Wt	Length	Wt	Length	Wt	No.	Wt	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)
2	10' - 0"	4' - 0"	8"	7"	162	#6	6"	21' - 6"	5,231	108	#6	9"	10' - 4"	1,676	8' - 10"	1,433	162	#6	6"	15' - 4"	3,731	14	18"	39' - 9"	372	66	18"	39' - 9"	1,752	108	9"	4' - 0"	289	54	9"	4' - 7"	165	9' - 3"	334	21' - 6"	57	46	128	1.333	374.6	1.6	185	54.9	15,168
3	10' - 0"	4' - 0"	8"	7"	162	#6	6"	32' - 1"	7,807	108	#6	9"	10' - 4"	1,676	8' - 10"	1,433	162	#6	6"	25' - 11"	6,306	21	18"	39' - 9"	558	95	18"	39' - 9"	2,523	108	9"	4' - 0"	289	108	9"	4' - 7"	331	9' - 3"	667	32' - 1"	86	68	189	1.942	539.8	2.4	275	80.1	21,865
4	10' - 0"	4' - 0"	8"	7"	162	#6	6"	42' - 8"	10,382	108	#6	9"	10' - 4"	1,676	8' - 10"	1,433	162	#6	6"	36' - 6"	8,881	28	18"	39' - 9"	743	124	18"	39' - 9"	3,293	108	9"	4' - 0"	289	162	9"	4' - 7"	496	9' - 3"	1,001	42' - 8"	114	88	245	2.551	704.9	3.2	359	105.2	28,553
5	10' - 0"	4' - 0"	8"	7"	162	#6	6"	53' - 3"	12,957	108	#6	9"	10' - 4"	1,676	8' - 10"	1,433	162	#6	6"	47' - 1"	11,457	35	18"	39' - 9"	929	153	18"	39' - 9"	4,063	108	9"	4' - 0"	289	216	9"	4' - 7"	661	9' - 3"	1,335	53' - 3"	142	110	306	3.160	870.0	3.9	448	130.3	35,248
6	10' - 0"	4' - 0"	8"	7"	162	#6	6"	66' - 4"	16,140	108	#6	9"	10' - 4"	1,676	8' - 10"	1,433	162	#6	6"	57' - 8"	14,032	42	18"	39' - 9"	1,115	182	18"	39' - 9"	4,833	108	9"	4' - 0"	289	270	9"	4' - 7"	827	9' - 3"	1,668	65' - 6"	175	130	362	3.770	1,050.3	4.7	537	155.5	42,550
2	10' - 0"	5' - 0"	8"	7"	162	#6	6"	21' - 6"	5,231	108	#6	9"	11' - 4"	1,838	8' - 10"	1,433	162	#6	6"	15' - 4"	3,731	14	18"	39' - 9"	372	72	18"	39' - 9"	1,912	108	9"	5' - 0"	361	54	9"	4' - 7"	165	11' - 3"	406	21' - 6"	57	46	128	1.398	386.2	1.6	185	57.5	15,634
3	10' - 0"	5' - 0"	8"	7"	162	#6	6"	32' - 1"	7,807	108	#6	9"	11' - 4"	1,838	8' - 10"	1,433	162	#6	6"	25' - 11"	6,306	21	18"	39' - 9"	558	103	18"	39' - 9"	2,735	108	9"	5' - 0"	361	108	9"	4' - 7"	331	11' - 3"	812	32' - 1"	86	68	189	2.029	554.5	2.4	275	83.5	22,456
4	10' - 0"	5' - 0"	8"	7"	162	#6	6"	42' - 8"	10,382	108	#6	9"	11' - 4"	1,838	8' - 10"	1,433	162	#6	6"	36' - 6"	8,881	28	18"	39' - 9"	743	134	18"	39' - 9"	3,558	108	9"	5' - 0"	361	162	9"	4' - 7"	496	11' - 3"	1,217	42' - 8"	114	88	245	2.659	722.7	3.2	359	109.5	29,268
5	10' - 0"	5' - 0"	8"	7"	162	#6	6"	53' - 3"	12,957	108	#6	9"	11' - 4"	1,838	8' - 10"	1,433	162	#6	6"	47' - 1"	11,457	35	18"	39' - 9"	929	165	18"	39' - 9"	4,381	108	9"	5' - 0"	361	216	9"	4' - 7"	661	11' - 3"	1,623	53' - 3"	142	110	306	3.290	891.0	3.9	448	135.5	36,088
6	10' - 0"	5' - 0"	8"	7"	162	#6	6"	66' - 4"	16,140	108	#6	9"	11' - 4"	1,838	8' - 10"	1,433	162	#6	6"	57' - 8"	14,032	42	18"	39' - 9"	1,115	196	18"	39' - 9"	5,204	108	9"	5' - 0"	361	270	9"	4' - 7"	827	11' - 3"	2,029	65' - 6"	175	130	362	3.921	1,074.5	4.7	537	161.6	43,516
2	10' - 0"	6' - 0"	8"	7"	162	#6	6"	21' - 6"	5,231	108	#6	9"	12' - 4"	2,001	8' - 10"	1,433	162	#6	6"	15' - 4"	3,731	14	18"	39' - 9"	372	78	18"	39' - 9"	2,071	108	9"	6' - 0"	433	54	9"	4' - 7"	165	13' - 3"	478	21' - 6"	57	46	128	1.463	397.9	1.6	185	60.1	16,100
3	10' - 0"	6' - 0"	8"	7"	162	#6	6"	32' - 1"	7,807	108	#6	9"	12' - 4"	2,001	8' - 10"	1,433	162	#6	6"	25' - 11"	6,306	21	18"	39' - 9"	558	111	18"	39' - 9"	2,947	108	9"	6' - 0"	433	108	9"	4' - 7"	331	13' - 3"	956	32' - 1"	86	68	189	2.115	569.3	2.4	275	87.0	23,047
4	10' - 0"	6' - 0"	8"	7"	162	#6	6"	42' - 8"	10,382	108	#6	9"	12' - 4"	2,001	8' - 10"	1,433	162	#6	6"	36' - 6"	8,881	28	18"	39' - 9"	743	144	18"	39' - 9"	3,824	108	9"	6' - 0"	433	162	9"	4' - 7"	496	13' - 3"	1,434	42' - 8"	114	88	245	2.767	740.7	3.2	359	113.8	29,986
5	10' - 0"	6' - 0"	8"	7"	162	#6	6"	53' - 3"	12,957	108	#6	9"	12' - 4"	2,001	8' - 10"	1,433	162	#6	6"	47' - 1"	11,457	35	18"	39' - 9"	929	177	18"	39' - 9"	4,700	108	9"	6' - 0"	433	216	9"	4' - 7"	661	13' - 3"	1,912	53' - 3"	142	110	306	3.420	912.1	3.9	448	140.7	36,931
6	10' - 0"	6' - 0"	8"	7"	162	#6	6"	66' - 4"	16,140	108	#6	9"	12' - 4"	2,001	8' - 10"	1,433	162	#6	6"	57' - 8"	14,032	42	18"	39' - 9"	1,115	210	18"	39' - 9"	5,576	108	9"	6' - 0"	433	270	9"	4' - 7"	827	13' - 3"	2,390	65' - 6"	175	130	362	4.072	1,098.7	4.7	537	167.6	44,484
2	10' - 0"	7' - 0"	8"	7"	162	#6	6"	21' - 6"	5,231	108	#6	9"	13' - 4"	2,163	8' - 10"	1,433	162	#6	6"	15' - 4"	3,731	14	18"	39' - 9"	372	78	18"	39' - 9"	2,071	108	9"	7' - 0"	505	54	9"	4' - 7"	165	15' - 3"	550	21' - 6"	57	46	128	1.528	405.5	1.6	185	62.7	16,406
3	10' - 0"	7' - 0"	8"	7"	162	#6	6"	32' - 1"	7,807	108	#6	9"	13' - 4"	2,163	8' - 10"	1,433	162	#6	6"	25' - 11"	6,306	21	18"	39' - 9"	558	111	18"	39' - 9"	2,947	108	9"	7' - 0"	505	108	9"	4' - 7"	331	15' - 3"	1,100	32' - 1"	86	68	189	2.202	578.8	2.4	275	90.5	23,425
4	10' - 0"	7' - 0"	8"	7"	162	#6	6"	42' - 8"	10,382	108	#6	9"	13' - 4"	2,163	8' - 10"	1,433	162	#6	6"	36' - 6"	8,881	28	18"	39' - 9"	743	144	18"	39' - 9"	3,824	108	9"	7' - 0"	505	162	9"	4' - 7"	496	15' - 3"	1,650	42' - 8"	114	88	245	2.876	751.9	3.2	359	118.2	30,436
5	10' - 0"	7' - 0"	8"	7"	162	#6	6"	53' - 3"	12,957	108	#6	9"	13' - 4"	2,163	8' - 10"	1,433	162	#6	6"	47' - 1"	11,457	35	18"	39' - 9"	929	177	18"	39' - 9"	4,700	108	9"	7' - 0"	505	216	9"	4' - 7"	661	15' - 3"	2,200	53' - 3"	142	110	306	3.549	925.1	3.9	448	145.9	37,453
6	10' - 0"	7' - 0"	8"	7"	162	#6	6"	66' - 4"	16,140	108	#6	9"	13' - 4"	2,163	8' - 10"	1,433	162	#6	6"	57' - 8"	14,032	42	18"	39' - 9"	1,115	210	18"	39' - 9"	5,576	108	9"	7' - 0"	505	270	9"	4' - 7"	827	15' - 3"	2,750	65' - 6"	175	130	362	4.223	1,113.5	4.7	537	173.7	45,078
2	10' - 0"	8' - 0"	8"	7"	162	#6	6"	21' - 6"	5,231	108	#6	9"	14' - 4"	2,325	8' - 10"	1,433	162	#6	6"	15' - 4"	3,731	14	18"	39' - 9"	372	84	18"	39' - 9"	2,230	108	9"	8' - 0"	577	54	9"	4' - 7"	165	17' - 3"	622	21' - 6"	57	46	128	1.593	417.2	1.6	185	65.3	16,871
3	10' - 0"	8' - 0"	8"	7"	162	#6	6"	32' - 1"	7,807	108	#6	9"	14' - 4"	2,325	8' - 10"	1,433	162	#6	6"	25' - 11"	6,306	21	18"	39' - 9"	558	119	18"	39' - 9"	3,160	108	9"	8' - 0"	577	108	9"	4' - 7"	331	17' - 3"	1,244	32' - 1"	86	68	189	2.288	593.5	2.4	275	93.9	24,016
4	10' - 0"	8' - 0"	8"	7"	162	#6	6"	42' - 8"	10,382	108	#6	9"	14' - 4"	2,325	8' - 10"	1,433	162	#6	6"	36' - 6"	8,881	28	18"	39' - 9"	743	154	18"	39' - 9"	4,089	108	9"	8' - 0"	577	162	9"	4' - 7"	496	17' - 3"	1,867	42' - 8"	114	88	245	2.984	769.8	3.2	359	122.5	31,152
5	10' - 0"	8' - 0"	8"	7"	162	#6	6"	53' - 3"	12,957	108	#6	9"	14' - 4"	2,325	8' - 10"	1,433	162	#6	6"	47' - 1"	11,457	35	18"	39' - 9"	929	189	18"	39' - 9"	5,019	108	9"	8' - 0"	577	216	9"	4' - 7"	661	17' - 3"	2,489	53' - 3"	142	110	306	3.679	946.2	3.9	448	151.1	38,295
6	10' - 0"	8' - 0"	8"	7"	162	#6	6"	66' - 4"	16,140	108	#6	9"	14' - 4"	2,325	8' - 10"	1,433	162	#6	6"	57' - 8"	14,032	42	18"	39' - 9"	1,115	224	18"	39' - 9"	5,948	108	9"	8' - 0"	577	270	9"	4' - 7"	827	17' - 3"	3,111	65' - 6"	175	130	362	4.374	1,137.7	4.7	537	179.7	46,045
2	10' - 0"	9' - 0"	8"	7"	162	#6	6"	21' - 6"	5,231	162	#6	6"	15' - 4"	3,731	8' - 10"	2,149	162	#6	6"	15' - 4"	3,731	14	18"	39' - 9"	372	90	18"	39' - 9"	2,390	108	9"	9' - 0"	649	54	9"	4' - 7"	165	19' - 3"	694	21' - 6"	57	46	128	1.657	477.8	1.6	185	67.9	19,297
3	10' - 0"	9' - 0"	8"	7"	162	#6	6"	32' - 1"	7,807	162	#6	6"	15' - 4"	3,731	8' - 10"	2,149	162	#6	6"	25' - 11"	6,306	21	18"	39' - 9"	558	127	18"	39' - 9"	3,372	108	9"	9' - 0"	649	108	9"	4' - 7"	331	19' - 3"	1,389	32' - 1"	86	68	189	2.374	657.3	2.4	275	97.3	26,567
4	10' - 0"	9' - 0"	8"	7"	162	#6	6"	42' - 8"	10,382	162	#6	6"	15' - 4"	3,731	8' - 10"	2,149	162	#6	6"	36' - 6"	8,881	28	18"	39' - 9"	743	164	18"	39' - 9"	4,355	108	9"	9' - 0"	649	162	9"	4' - 7"	496	19' - 3"	2,083	42' - 8"	114	88	245	3.092	836.7	3.2	359	126.8	33,828
5	10' - 0"	9' - 0"	8"	7"	162	#6	6"	53' - 3"	12,957	162	#6	6"	15' - 4"	3,731	8' - 10"	2,149	162	#6	6"	47' - 1"	11,457	35	18"	39' - 9"	929	201	18"	39' - 9"	5,337	108	9"	9' - 0"	649	216	9"	4' - 7"	661	19' - 3"	2,778	53' - 3"	142	110	306	3.809	1,016.2	3.9	448	156.3	41,096
6	10' - 0"	9' - 0"	8"	7"	162	#6	6"	66' - 4"	16,140	162	#6	6"	15' - 4"	3,731	8' - 10"	2,149	162	#6	6"	57' - 8"	14,032	42	18"	39' - 9"	1,115	238	18"	39' - 9"	6,320	108	9"	9' - 0"	649	270	9"	4' - 7"	827	19' - 3"	3,472	65' - 6"	175	130	362	4.526	1,210.9	4.7	537	185.8	48,972
2	10' - 0"	10' - 0"	8"	7"	162	#6	6"	21' - 6"	5,231	162	#6	6"	16' - 4"	3,974	8' - 10"	2,149	162	#6	6"	15' - 4"	3,731	14	18"	39' - 9"	372	90	18"	39' - 9"	2,390	108	9"	10' - 0"	721	54	9"	4' - 7"	165	21' - 3"	767	21' - 6"	57	46	128	1.722	487.5	1.6	185	70.5	19,685
3	10' - 0"	10' - 0"	8"	7"	162	#6	6"	32' - 1"	7,807	162	#6	6"	16' - 4"	3,974	8' - 10"	2,149	162	#6	6"	25' - 11"	6,306	21	18"	39' - 9"	558	127	18"	39' - 9"	3,372	108	9"	10' - 0"	721	108	9"	4' - 7"	331	21' - 3"	1,533	32' - 1"	86	68	189	2.461	668.8	2.4	275	100.8	27,026
4	10' - 0"	10' - 0"	8"	7"	162	#6	6"	42' - 8"	10,382	162	#6	6"	16' - 4"	3,974	8' - 10"	2,149	162	#6	6"	36' - 6"	8,881	28	18"	39' - 9"	743	164	18"	39' - 9"	4,355	108	9"	10' - 0"	721	162	9"	4' - 7"	496	21' - 3"	2,300	42' - 8"	114	88	245	3.200	850.0	3.2	359	131.2	34,360
5	10' - 0"	10' - 0"	8"	7"	162	#6	6"	53' - 3"	12,957	162	#6	6"	16' - 4"	3,974	8' - 10"	2,149	162	#6	6"	47' - 1"	11,457	35	18"	39' - 9"	929	201	18"	39' - 9"	5,337	108	9"	10' - 0"	721	216	9"	4' - 7"	661	21' - 3"	3,066	53' - 3"	142	110	306	3.938	1,031.3	3.9	448	161.5	41,699
6	10' - 0"	10' - 0"	8"	7"	162	#6	6"	66' - 4"	16,140	162	#6	6"	16' - 4"	3,974	8' - 10"	2,149	162	#6	6"	57' - 8"	14,032	42	18"	39' - 9"	1,115	238	18"	39' - 9"	6,320	108	9"	10' - 0"	721	270	9"	4' - 7"	827	21' - 3"	3,833	65' - 6"	175	130	362	4.677	1,227.8	4.7	537	191.8	49,648

(5) Bar lengths over 60' include one bar lap; refer to MATERIAL NOTES for minimum lap lengths.

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation — Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE
10'-0" SPAN
0' TO 7' FILL

MC-10-7

FILE: mc107ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		151

Structure Number and Station	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 (SL:1)	T Culvert Top Slab Thickness (In)	U Culvert Wall Thickness (In)	C Estimated Curb Height (ft)	Hw Height of Wingwall (ft) (1)	A Curb to End of Wingwall (ft)	B Offset of End of Wingwall (ft)	Lw Length of Longest Wingwall (ft)	Ltw Culvert Toewall Length (ft)	Atw Anchor Toewall Length (ft)	Riprap Apron (CY)	Class "C" Conc. (Curb) (CY) (2)	Class "C" Conc. (Wing.) (CY) (3)	Total Wingwall Area (SF)
STRUCTURE NO 1 - STA 436+83 (Both)	1 ~ 5' X 3'	1'	SCC-5&6	SETB-FW-0	0	6:1	8"	7"	0.250	4	20.000	11.547	23.094	N/A	28.104	10.2	0.1	4.6	185.6
STRUCTURE NO 3 - STA 497+71 (Both)	1 ~ 3' X 2'	1.25'	SCC-3&4	SETB-FW-0	0	6:1	8"	7"	0.250	3	14.000	8.083	16.166	N/A	19.166	4.7	0.1	2.4	97.2
STRUCTURE NO 4 - STA 539+64 (Both)	3 ~ 3' X 3'	1.25'	MC-3-23	SETB-FW-0	0	6:1	8"	7"	0.250	4	20.000	11.547	23.094	N/A	33.261	14.7	0.1	4.6	187.1
STRUCTURE NO 5 - STA 595+07 (Both)	1 ~ 3' X 2'	1.5'	SCC-3&4	SETB-FW-0	0	6:1	8"	7"	0.250	3	14.000	8.083	16.166	N/A	19.166	4.7	0.1	2.4	97.2
STRUCTURE NO 6 - STA 637+00 (Both)	1 ~ 3' X 3'	1.25'	SCC-3&4	SETB-FW-0	0	6:1	8"	7"	0.250	4	20.000	11.547	23.094	N/A	26.094	8.8	0.1	4.6	184.3
STRUCTURE NO 7 - STA 647+74 (Both)	1 ~ 3' X 2'	1.25'	SCC-3&4	SETB-FW-0	0	6:1	8"	7"	0.250	3	14.000	8.083	16.166	N/A	19.59	5.0	0.1	2.5	100.0
STRUCTURE NO 8 - STA 675+80 (Left)	2 ~ 3' X 2'	3'	MC-3-23	SETB-FW-0	0	6:1	8"	7"	0.250	3	14.000	8.083	16.956	N/A	24.456	3.6	0.1	3.3	50.9
STRUCTURE NO 8 - STA 675+80 (Right)	2 ~ 3' X 2'	3'	MC-3-23	SETB-FW-0	0	4:1	8"	7"	0.250	3	9.000	5.137	10.274	N/A	17.774	1.7	0.1	1.8	30.8
STRUCTURE NO 9 - STA 726+42 (Lt) - See STRUCTURE NO. 9 DETAILS	2 ~ 4' X 3'	1.75'	SCP-MD	FW-0 (Interceptor)	0	4:1 - See Details	7.5"	5"	0.250	3	20.00	N/A & 7.6	20.000	N/A	See Details	3.9	0.1	2.8	114.0
STRUCTURE NO 9 - STA 726+42 (Rt) - See STRUCTURE NO. 9 DETAILS	2 ~ 4' X 3'	1.75'	SCP-MD	PW	0	3:1 - See Details	7.5"	5"	1.500	5	N/A	N/A	15.917	N/A	N/A	N/A	0.1	12.50	186
STRUCTURE NO 10 - STA 750+46 (Both	1 ~ 3' X 3'	2.75'	SCP-3	SETB-FW-0	0	4:1	4"	4"	0.250	3	18.000	10.392	20.785	N/A	23.785	4.8	0.1	3.0	119.8
STRUCTURE NO 11 - STA 762+56 (Both)	1 ~ 3' X 3'	1.5'	SCP-3	SETB-FW-0	0	4:1	7"	4"	0.250	4	19.500	11.258	22.517	N/A	25.517	4.3	0.1	3.0	121.0
STRUCTURE NO 12 - STA 792+39 (Both)	1 ~ 3' X 3'	1.5'	SCC-3&4	SETB-FW-0	0	6:1	8"	7"	0.250	4	20.000	11.547	23.094	N/A	26.094	9.0	0.1	4.6	186.7
STRUCTURE NO 14 - STA 819+11 (Both)	1 ~ 5' X 2'	1.75'	SCP-5	SETB-FW-0	0	6:1	8"	6"	0.250	3	14.000	8.083	16.166	N/A	21.166	5.1	0.1	2.4	96.1
B.C. STRUCTURE NO. 16 - STA 842+42 (Both)	4 ~ 10' X 10'	1.5'	MC-MD	FW-S	45	6:1	10"	10"	~1.00	11	22.500	See X-Section	See X-Section	N/A	93.000	71.0	1.2	112.0	751.4
STRUCTURE NO 17 - STA 869+96 (Both)	2 ~ 4' X 2'	2'	SCP-4	SETB-FW-0	0	6:1	5"	5"	0.250	2	12.500	7.217	14.434	N/A	23.767	4.7	0.1	2.4	95.9
STRUCTURE NO 18 - STA 920+66 (Both)	2 ~ 4' X 3'	3'	SCP-4	SETB-FW-0	0	6:1	5"	5"	0.250	3	18.500	10.681	21.362	N/A	30.695	9.6	0.1	4.3	175.0
STRUCTURE NO 19 - STA 966+79 (Both)	1 ~ 5' X 3'	1.25'	SCP-5	SETB-FW-0	0	6:1	8"	6"	0.250	4	20.000	11.547	23.094	N/A	28.094	10.4	0.1	4.6	187.4
STRUCTURE NO 23 - STA 992+13 (Both)	1 ~ 6' X 6'	2.5'	SCP-6	FW-0	0	2:1	7"	7"	1.208	7	25.000	14.434	28.868	N/A	22.563	6.4	0.6	6.3	256.8
STRUCTURE NO 24 - STA 992+97 (Both)	1 ~ 4' X 4'	3.75'	SCP-4	FW-0	0	2:1	5"	5"	2.375	4	24.000	14.145	28.290	N/A	17.585	4.0	0.9	5.9	237.9
STRUCTURE NO 25 - STA 1006+59 (Both	1 ~ 6' X 6'	3.5'	SCP-6	FW-0	0	2:1	7"	7"	2.167	7	25.000	14.434	28.868	N/A	24.677	7.7	1.1	7.1	285.8
STRUCTURE NO 26 - STA 1017+47 (Both)	1 ~ 3' X 3'	2.5'	SCP-3	SETB-FW-0	0	6:1	4"	4"	0.250	3	18.000	10.392	20.785	N/A	23.785	9.0	0.1	4.2	171.0
STRUCTURE NO 27 - STA 1023+68 (Both	1 ~ 3' X 3'	2.25'	SCP-3	SETB-FW-0	0	6:1	4"	4"	0.250	3	18.000	10.392	20.785	N/A	23.785	9.0	0.1	4.2	171.4

NOTES:

Skew Angle = 0° for SW-0, FW-0, SETB-CD, SETB-SW-0, and SETB-FW-0 standards.
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 shall 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.

U = Box Culvert Wall Thickness. Dimension can be found on the applicable Box Culvert Standard.

C = Curb Height.

See applicable wing or end treatment standards 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 S.F. for two wingwalls (one structure end) if Lt or Rt.
Area for four wingwalls (two structure ends) if Both.

(1) The wall heights shown will be rounded to the nearest Foot for bidding purposes.

(2) Concrete volume shown is for box culvert curb only. For curbs using the RAC standard, quantities shown must be increased by a factor of 2. If Class "S" concrete is required for the top slab of the culvert, the curb concrete shall also be Class "S". Curb concrete is considered part of the Box Culvert for payment.

(3) Concrete volume shown is total of wing, footing, culvert toewall (if any), anchor toewall (if any) and wingwall toewall. Riprap apron, culvert and curb quantities are not included.

(4) Regardless of the type of culvert shown on this sheet, the Contractor shall have 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 shall be the Contractor's responsibility to make the necessary adjustments to the dimensions and quantities shown.

STATE OF TEXAS
SHELLEY C. HARRIS
99197
LICENSED
PROFESSIONAL ENGINEER

Shelley C. Harris, P.E.
6/29/2022

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 97 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 shall 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.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: GAF
©TxDOT February 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		152

DATE: 6/29/2022 1:17:33 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\04530402\Design\bcsstde1.dgn

DATE:
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TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing length (2~wings) ③	
					Bars J1		Bars J2			
Maximum Wingwall Height Hw	W	X	Y	Z	Size	Spa	Size	Spa	Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	33.73	0.248
3'-0"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	37.07	0.261
3'-6"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	37.74	0.273
4'-0"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	38.41	0.285
4'-6"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	41.75	0.330
5'-0"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	45.09	0.343
5'-6"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	45.75	0.355
6'-0"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	46.42	0.367
7'-0"	3'-8"	1'-9"	1'-3"	7"	#4	1'-0"	#4	1'-0"	52.77	0.414
8'-0"	4'-2"	2'-0"	1'-6"	8"	#5	1'-0"	#4	1'-0"	60.19	0.486
9'-0"	4'-8"	2'-3"	1'-9"	8"	#4	6"	#4	6"	81.49	0.535
10'-0"	5'-2"	2'-6"	2'-0"	8"	#5	6"	#4	6"	97.25	0.584
11'-0"	5'-8"	2'-9"	2'-3"	8"	#6	6"	#5	6"	133.65	0.634
12'-0"	6'-2"	3'-0"	2'-6"	9"	#7	6"	#5	6"	162.29	0.721
13'-0"	6'-8"	3'-3"	2'-9"	11"	#7	6"	#5	6"	178.80	0.856
14'-0"	7'-2"	3'-6"	3'-0"	1'-0"	#8	6"	#5	6"	216.78	0.959
15'-0"	7'-8"	4'-0"	3'-0"	1'-1"	#9	6"	#6	6"	283.06	1.068
16'-0"	8'-2"	4'-6"	3'-0"	1'-3"	#9	6"	#6	6"	297.02	1.234

TABLE OF WINGWALL REINFORCING
(2~wings)

Bar	Size	No.	Spa
D	#5	~	1'-0"
E	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	4	~
M	#4	4	~
P	#4	~	1'-0"
R	#5	6	~
V	#4	~	1'-0"

TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES

Bar	Size	No.	Spa
L	#4	~	1'-6"
Q	#4	1	~
Reinf (Lb/Ft)			2.45
Conc (CY/Ft)			0.037

WING DIMENSION FORMULAS:
(All values are in feet.)

Hw = H + T + C - 0.250'
A = (Hw - 0.333') (SL)
B = (A) tangent (30°)
Lw = (A) ÷ cosine (30°)

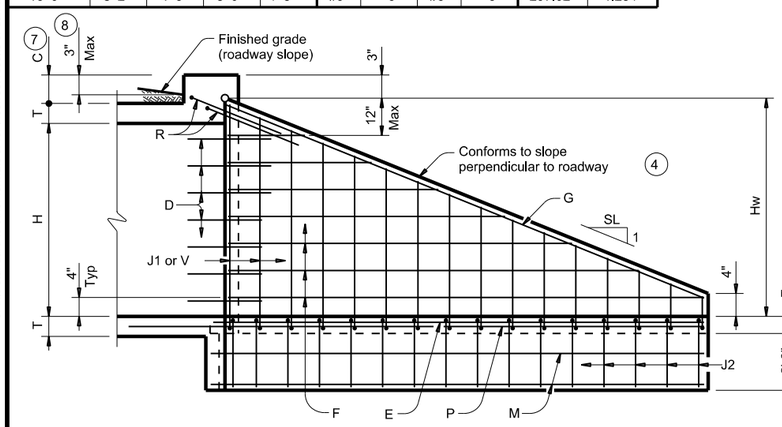
For cast-in-place culverts:
Ltw = (N) (S) + (N + 1) (U)

For precast culverts:
Ltw = (N) (2U + S) + (N - 1) (0.5')

Total wingwall area (two wings ~ SF) = (Hw + 0.333') (Lw)

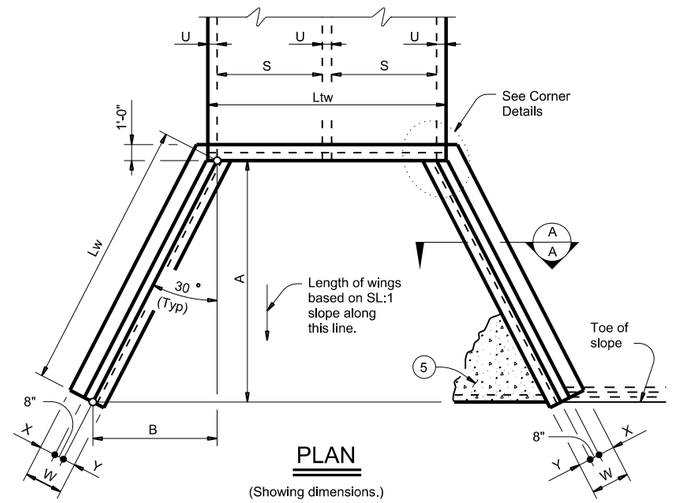
Hw = Height of wingwall
SL:1 = Side slope ratio (horizontal:1 vertical)
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans

See applicable box culvert standard sheet for H, S, T, and U values.



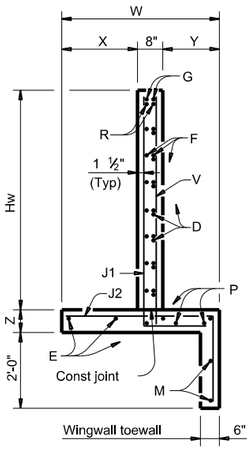
INSIDE ELEVATION

(Showing reinforcing. Culvert and culvert toewall reinforcing not shown for clarity.)

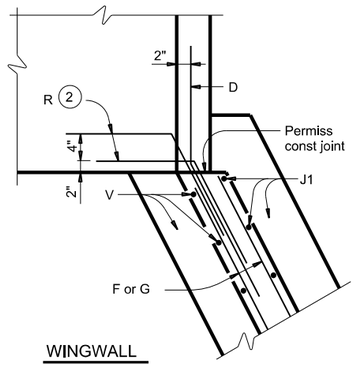


PLAN

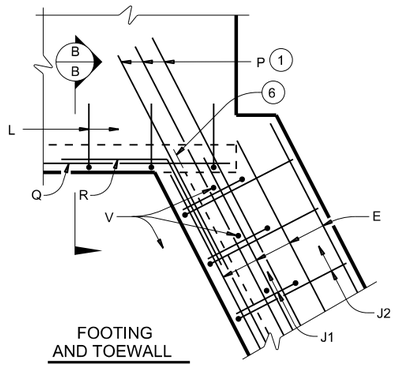
(Showing dimensions.)



SECTION A-A



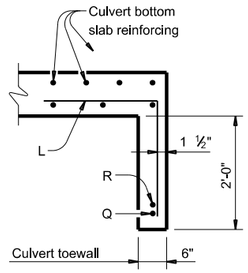
WINGWALL



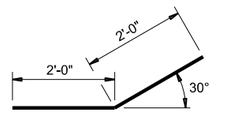
FOOTING AND TOEWALL

CORNER DETAILS

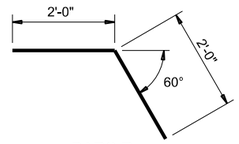
(Culvert and culvert toewall reinforcing not shown for clarity.)



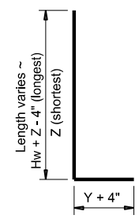
SECTION B-B ⑤



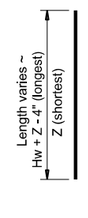
BARS D



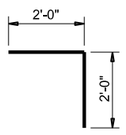
BARS R



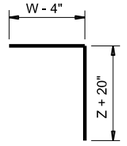
BARS J1



BARS V



BARS L



BARS J2

1. Extend Bars P 3'-0" minimum into bottom slab of box culvert.
2. Adjust as necessary to maintain 1 1#2" clear cover and 4" minimum between bars.
3. Quantities shown are based on an average wing height for two wings (one structure end). To determine total quantities for two wings, multiply the tabulated values by Lw.
4. Recommended values of side slope are: 2:1, 3:1, 4:1, and 6:1.
5. When shown elsewhere on the plans, construct 5" deep concrete riprap. Payment for riprap is as required by Item 432, "Riprap". Unless otherwise shown on the plans or directed by the Engineer, provide a 6" wide by 1'-6" deep reinforced concrete toewall along all edges of the riprap adjacent to natural ground; reinforce the toewall by extending typical riprap reinforcing into the toewall; and extend construction joints or grooved joints oriented in the direction of flow across the full distance of the riprap at intervals of approximately 20'. When such riprap is provided, the culvert toewall shown in SECTION B-B will not be required.
6. At Contractor's option, culvert toewall may be ended flush with wingwall toewall. Adjust reinforcing as needed.
7. 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.
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.

MATERIAL NOTES:
Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
In riprap concrete synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing unless noted otherwise.

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
When structure is founded on solid rock, depth of toewalls for culverts and wingwalls may be reduced or eliminated as directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.
The quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for 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 FLARED WINGS FOR 0° SKEW BOX CULVERTS

FW-0

FILE: fw-0stde-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
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REVISIONS	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		153

DATE:
FILE:

TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

Maximum Wingwall Height Hw	W	X	Y	Z	Variable Reinforcing Bars J1 Size	Bars J1 Spa	Bars J2 Size	Bars J2 Spa	Estimated Quantities per ft of wing length (2~wings) ③ Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	33.73	0.248
3'-0"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	37.07	0.261
3'-6"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	37.74	0.273
4'-0"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	38.41	0.285
4'-6"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	41.75	0.330
5'-0"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	45.09	0.343
5'-6"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	45.75	0.355
6'-0"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	46.42	0.367
7'-0"	3'-8"	1'-9"	1'-3"	7"	#4	1'-0"	#4	1'-0"	52.77	0.414
8'-0"	4'-2"	2'-0"	1'-6"	8"	#5	1'-0"	#4	1'-0"	60.19	0.486
9'-0"	4'-8"	2'-3"	1'-9"	8"	#4	6"	#4	6"	81.49	0.535
10'-0"	5'-2"	2'-6"	2'-0"	8"	#5	6"	#4	6"	97.25	0.584
11'-0"	5'-8"	2'-9"	2'-3"	8"	#6	6"	#5	6"	133.65	0.634
12'-0"	6'-2"	3'-0"	2'-6"	9"	#7	6"	#5	6"	162.29	0.721
13'-0"	6'-8"	3'-3"	2'-9"	11"	#7	6"	#5	6"	178.80	0.856
14'-0"	7'-2"	3'-6"	3'-0"	1'-0"	#8	6"	#5	6"	216.78	0.959
15'-0"	7'-8"	4'-0"	3'-0"	1'-1"	#9	6"	#6	6"	283.06	1.068
16'-0"	8'-2"	4'-6"	3'-0"	1'-3"	#9	6"	#6	6"	297.02	1.234

TABLE OF WINGWALL REINFORCING
(2~wings)

Bar	Size	No.	Spa
DL	#5	~	1'-0"
DS	#5	~	1'-0"
E	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	4	~
M	#4	4	~
P	#4	~	1'-0"
RS	#5	3	~
RL	#5	3	~
V	#4	~	1'-0"

TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES

Bar	Size	No.	Spa
L	#4	~	1'-6"
Q	#4	1	~
Reinf (Lb/Ft)			2.45
Conc (CY/Ft)			0.037

WING DIMENSION FORMULAS:
(All values are in feet.)

Hw = H + T + C - 0.250'
A = (Hw - 0.333')(Sc)
B = (A) [tanget (θ + 15°)]
Lw = (A) ÷ [cosine (θ + 15°)]

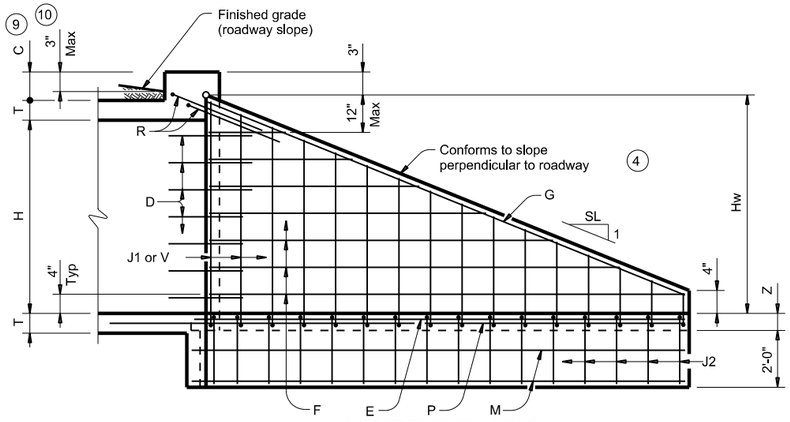
For cast-in-place culverts:
Ltw = [(N) (S) + (N + 1) (U)] ÷ cosine θ

For precast culverts:
Ltw = [(N) (2U + S) + (N - 1) (0.5')] ÷ cosine θ

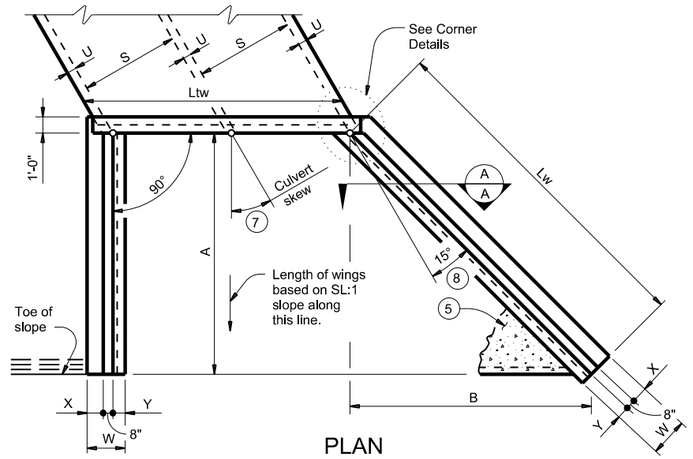
Total wingwall area (two wings ~ SF) = 0.5 (Hw + 0.333') (Lw + A)

Hw = Height of wingwall
SL:1 = Side slope ratio (horizontal:1 vertical)
A = Length of short wingwalls
Lw = Length of long wingwall
Ltw = Culvert toewall length
N = Number of culvert spans
θ = Culvert skew

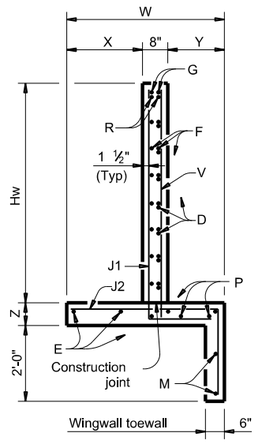
See applicable box culvert standard sheet for H, S, T, and U values.



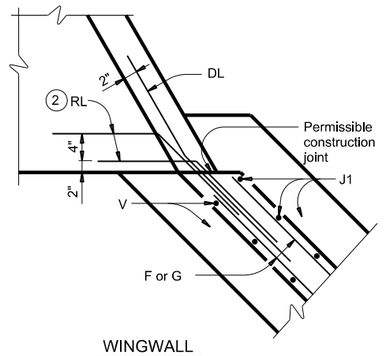
INSIDE ELEVATION
(Showing reinforcing. Culvert and culvert toewall reinforcing not shown for clarity.)



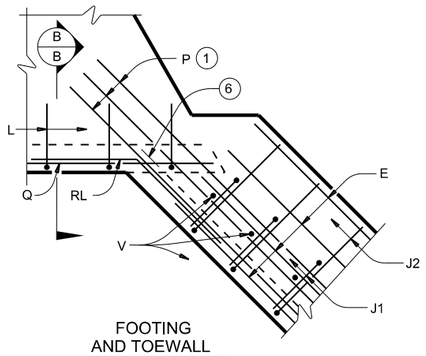
PLAN
(Showing dimensions and 30° skew.)



SECTION A-A

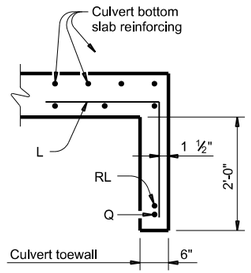


WINGWALL

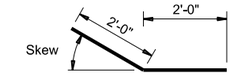


FOOTING AND TOEWALL

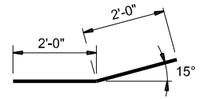
CORNER DETAILS
(Culvert and culvert toewall reinforcing not shown for clarity.)



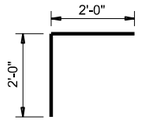
SECTION B-B ⑤



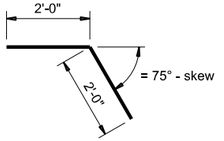
BARS DS
(Short wing)



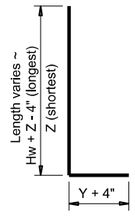
BARS DL
(Long wing)



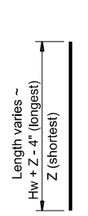
BARS RS
(Short wing)



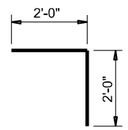
BARS RL
(Long wing)



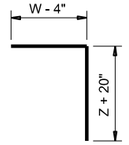
BARS J 1



BARS V



BARS L



BARS J2

1. Extend Bars P 3'-0" minimum into bottom slab of box culvert.
2. Adjust as necessary to maintain 1 1#2" clear cover and 4" minimum between bars.
3. Quantities shown are based on an average wing height for two wings (one structure end). To determine total quantities for two wings, multiply the tabulated values by 0.5 x (A + Lw).
4. Recommended values of side slope are: 2:1, 3:1, 4:1, and 6:1.
5. When shown elsewhere on the plans, construct 5" deep concrete riprap. Payment for riprap is as required by Item 432, "Riprap". Unless otherwise shown on the plans or directed by the Engineer, provide a 6" wide by 1'-6" deep reinforced concrete toewall along all edges of the riprap adjacent to natural ground; reinforce the toewall by extending typical riprap reinforcing into the toewall; and extend construction joints or grooved joints oriented in the direction of flow across the full distance of the riprap at intervals of approximately 20'. When such riprap is provided, the culvert toewall shown in SECTION B-B will not be required.
6. At Contractor's option, culvert toewall may be ended flush with wingwall toewall. Adjust reinforcing as needed.
7. Applicable values of skew are: 15°, 30°, and 45°.
8. Typical wingwall angle for all skews.
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.

MATERIAL NOTES:
Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
In riprap concrete, 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.

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
When structure is founded on solid rock, depth of toewalls for culverts and wingwalls may be reduced or eliminated as directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.
The quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for 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 FLARED WINGS FOR SKEWED BOX CULVERTS

FW-S

FILE: fw-sside-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
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REVISIONS	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		154

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TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

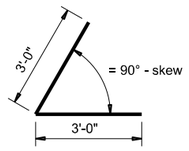
Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing (2~wings) (4)		Estimated Quantities per ft of Toewall (1~toewall)	
Maximum Wingwall Height Hw	W	X	Y	Z	Bars J1		Bars J2					
					Size	Spa	Size	Spa	Reinf (Lb/Ft)	Conc (CY/Ft)	Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-10"	10"	1'-0"	7"	#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)

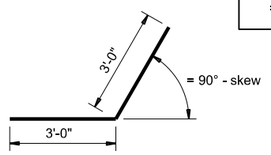
Bar	Size	No.	Spa
D1	#6	~	1'-0"
D2	#6	~	1'-0"
E1	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	~	8"
M1	#4	4	~
P	#4	~	1'-0"
V	#4	~	1'-0"

TABLE OF TOEWALL REINFORCING

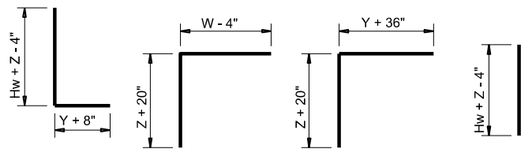
Bar	Size	No.	Spa
J3	#4	~	1'-0"
M2	#4	2	~
E2	#4	~	1'-0"



BARS D1



BARS D2



BARS J1 BARS J2 BARS J3 BARS V

WING DIMENSION FORMULAS:

(All values are in feet.)

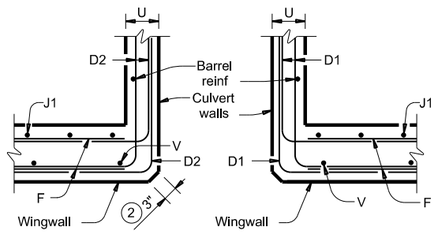
Hw = H + T + C
Lw = (Hw) (SL) ÷ cosine (θ) for Type PW-1
= (Hw - 1') (SL) ÷ cosine (θ) for Type PW-2 and Hw 4' ≤
= (Hw - 0.5') (SL) ÷ cosine (θ) for Type PW-2 and Hw 4' <

For cast-in-place culverts:
Ltw = [(N) (S) + (N + 1) (U)] ÷ cosine (θ)

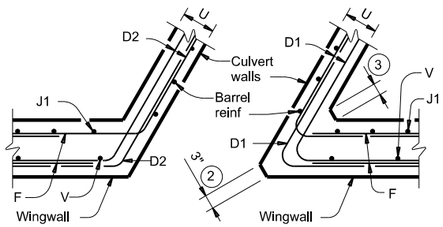
For precast culverts:
Ltw = [(N) (2 U + S) + (N - 1) (0.5')] ÷ cosine (θ)
Total Wingwall Area (two wings ~ SF)
= (2)(Hw)(Lw) for Type PW-1
= (2)(Hw)(Lw) - 6 SF for Type PW-2 and Hw 4' ≤
= (2)(Hw)(Lw) - 1.5 SF for Type PW-2 and Hw 4' <

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.



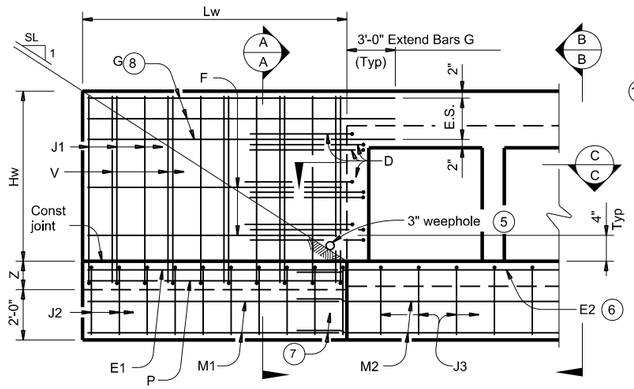
SECTION C-C - PW-1



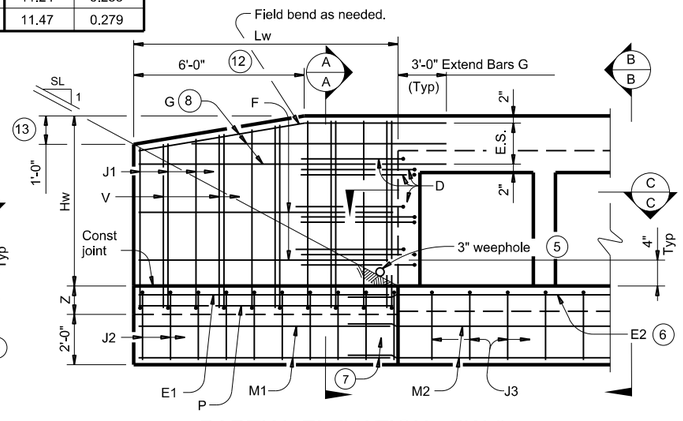
SECTION C-C - PW-2

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.

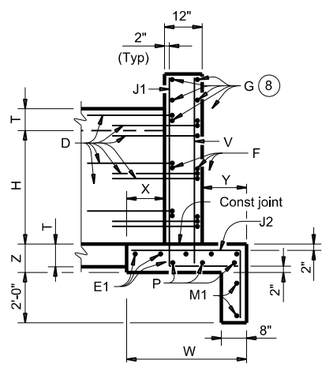
    Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
11. 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elswhere in the plans.
12. 3'-0" for Hw < 4'.
13. 6" for Hw < 4'.



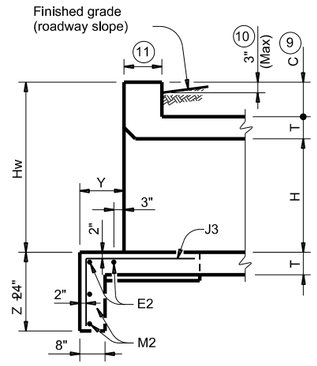
PARTIAL ELEVATION - PW-1



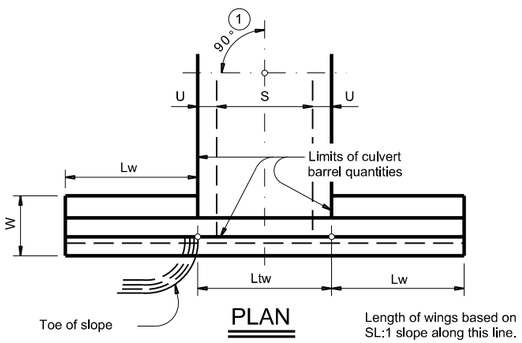
PARTIAL ELEVATION - PW-2



SECTION A-A
(Showing wing reinforcement.)



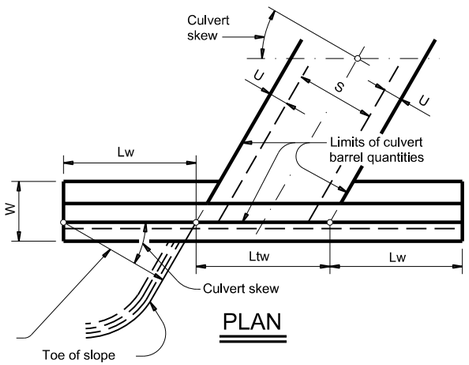
SECTION B-B
(Showing wing reinforcement.)



PLAN

Length of wings based on SL:1 slope along this line.

DETAILS FOR NON-SKEWED BOX CULVERTS



PLAN

DETAILS FOR SKEWED BOX CULVERTS
(Showing 30° skew.)

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	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		155

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TABLE OF DIMENSIONS & REINFORCING STEEL
(Wings for One Structure End)

Maximum Wingwall Height Hw (9)	W	X	Y	Z	Variable Reinforcing Bars J1 Size	Bars J1 Spa	Bars J2 Size	Bars J2 Spa	Estimated Quantities (3) per ft of wing length (2~Wings) Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	33.73	0.248
3'-0"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	37.07	0.261
3'-6"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	37.74	0.273
4'-0"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	38.41	0.285
4'-6"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	41.75	0.330
5'-0"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	45.09	0.343
5'-6"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	45.75	0.355
6'-0"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	46.42	0.367
7'-0"	3'- 8"	1'- 9"	1'- 3"	7"	#4	1'-0"	#4	1'-0"	52.77	0.414
8'-0"	4'- 2"	2'- 0"	1'- 6"	8"	#5	1'-0"	#4	1'-0"	60.19	0.486
9'-0"	4'- 8"	2'- 3"	1'- 9"	8"	#4	6"	#4	6"	81.49	0.535
10'-0"	5'- 2"	2'- 6"	2'- 0"	8"	#5	6"	#4	6"	97.25	0.584
11'-0"	5'- 8"	2'- 9"	2'- 3"	8"	#6	6"	#5	6"	133.65	0.634
12'-0"	6'- 2"	3'- 0"	2'- 6"	9"	#7	6"	#5	6"	162.29	0.721

TABLE OF WING WALL REINFORCING (2~Wings)

Bar	Size	No.	Spa
D	#5	~	1'-0"
E	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	4	~
M	#4	4	~
P	#4	~	1'-0"
R	#5	6	~
V	#4	~	1'-0"

TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES

Bar	Size	No.	Spa
L	#4	~	1'-6"
Q	#4	1	~
Reinf (Lb/Ft)			2.45
Conc (CY/Ft)			0.037

TABLE OF ESTIMATED ANCHOR TOEWALL QUANTITIES

Bar	Size	No.	Spa
K	#4	~	1'-0"
N	#5	6	~
OL	#4	6	~
Reinf (Lb/Ft)			9.82
Conc (CY/Ft)			0.074

(1) Extend Bars P 3'-0" minimum into bottom slab of Box Culvert.

(2) Adjust to fit as necessary to maintain 1 ¼" clear cover and 4" minimum between bars.

(3) Quantities shown are based on an average wing height for two wings (one structure end). To determine total quantities for two wings multiply the tabulated values by Lw.

(4) Recommended values of Slope are: 3:1, 4:1, & 6:1. Slope shall be 3:1 or flatter.

(5) When shown elsewhere on the plans, a 5" deep concrete riprap shall be constructed. Payment for riprap shall be as required by Item 432, "Riprap". Unless otherwise shown on the plans or directed by the Engineer, construction joints or grooved joints, oriented in the direction of flow, and shall extend across the full distance of the riprap, at intervals of approximately 20'. When such riprap is provided, the culvert toewall shown in SECTION B-B will not be required.

(6) At Contractor's option, Culvert Toewall may be ended flush with Wingwall Toewall. Adjust reinforcing from that shown as necessary.

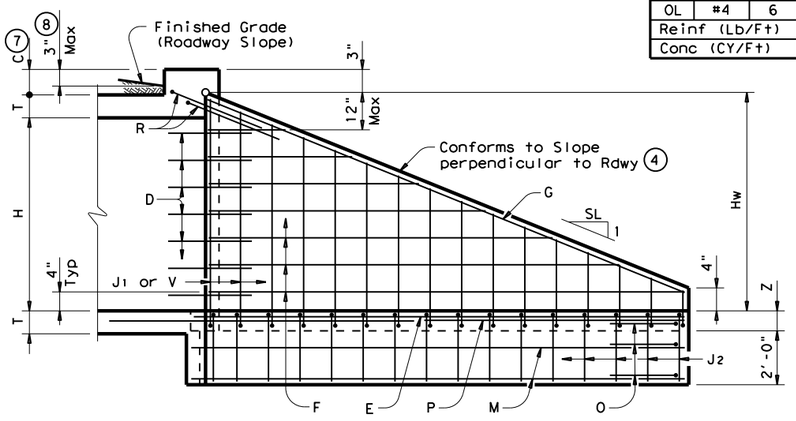
(7) 3" min to 5'-0" max. Estimated curb heights are shown elsewhere in the plans. For structures without railing and curbs taller than 1'-0", refer to ECD standard.

(8) For vehicle safety, curbs shall project no more than 3" above finished grade. Curb heights shall be reduced, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

(9) See "Table Of Maximum Wing Heights" for various slopes. Height is limited based on a 33'-6" maximum safety pipe runner length.

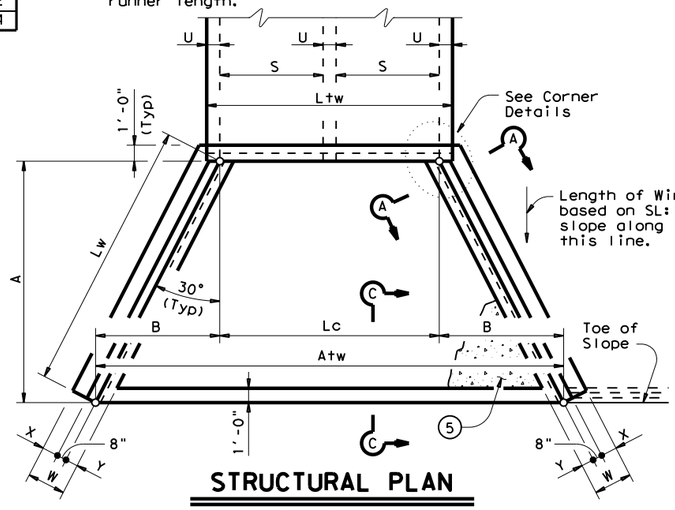
TABLE OF MAXIMUM (9) WING HEIGHTS (Hw max)

Side Slope	Hw max
3:1	11'- 5"
4:1	8'-10"
6:1	6'- 1"



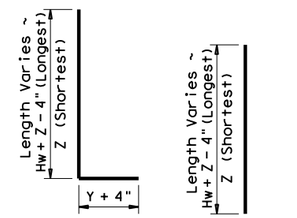
INSIDE ELEVATION OF WINGWALL

(Showing reinforcing. Culvert and Culvert Toewall reinforcing not shown for clarity.)



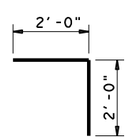
STRUCTURAL PLAN

(Showing dimensions.)

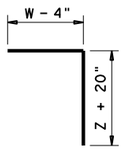


BARS J1

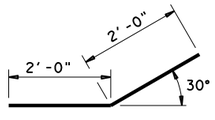
BARS V



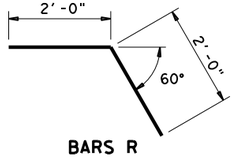
BARS L



BARS J2



BARS D



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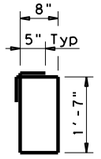
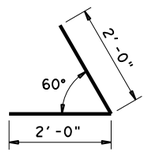
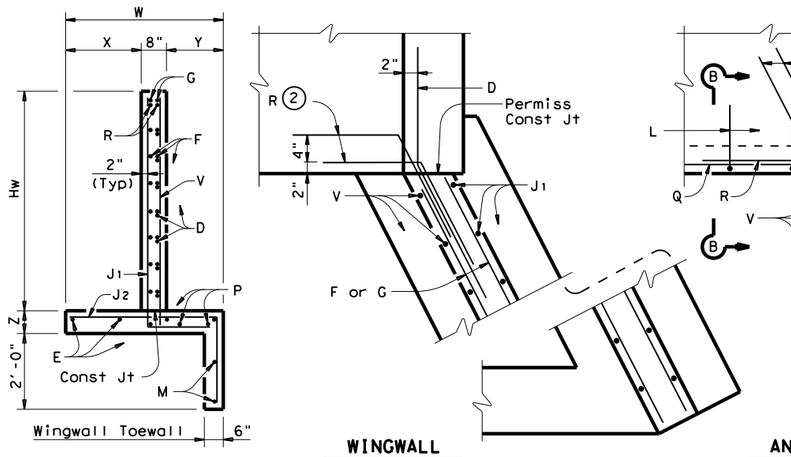


BARS K
(Length = 5'-4")



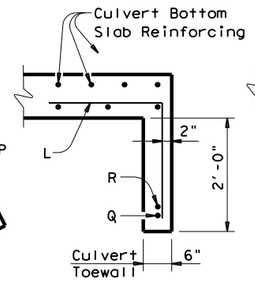
BARS OL



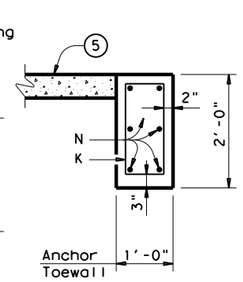
SECTION A-A

CORNER DETAILS

(Culvert and Culvert Toewall reinforcing not shown for clarity.)



SECTION B-B (5)



SECTION C-C

WING DIMENSION CALCULATIONS:

Formulas: (All values are in Feet)
Hw = H + T + C - 0.250' (9)
A = (Hw - 0.333') (SL)
B = (A) (Tangent 30°)
Lw = (A) ÷ (Cosine 30°)

For Cast-in-place culverts:
Ltw = (N) (S) + (N + 1) (U)
For Precast culverts:
Ltw = (N) (2U + S) + (N - 1) (0.500')

Lc = (Ltw) - (2U)
Atw = (Lc) + (2B)
Total Wingwall Area (Two Wings ~ S.F.) = (Hw + 0.333') (Lw)

Hw = Height of Wingwall
SL:1 = Side Slope Ratio (Horizontal : 1 Vertical)
Lw = Length of Wingwall
Ltw = Culvert Toewall Length
Lc = Culvert Curb between Wings
Atw = Anchor Toewall Length
N = Number of Culvert Spans

See applicable box culvert standard for H, S, T, and U values. See Table of Maximum Wall Heights for limits on Hw.

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

The Safety End Treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the Pipe Runners.

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

All reinforcing steel shall be Grade 60.

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.

All concrete shall be Class "C" and shall have a minimum compressive strength of 3600 psi.

All reinforcing bars shall be adjusted to provide a minimum of 1 ¼" clear cover.

When structure is founded on solid rock, depth of toewalls for culverts and wingwalls may be reduced or eliminated as directed by the Engineer.

See BCS sheet for additional dimensions and information.

All bolts, nuts, washers, brackets, angles, and pipe runners are considered parts of the Safety End Treatment for payment.

Pipe Runners shall conform to the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Bolts and nuts shall conform to ASTM A307. Steel plates shall conform to ASTM A36. All steel components, except reinforcing, shall be galvanized. Galvanizing damaged during transport or construction shall be repaired in accordance with the specifications.

The quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for Contractor's information only.

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT WITH FLARED WINGS

FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

SETB-FW-0

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©TxDOT February 2010	CONT	SECT	JOB	HIGHWAY
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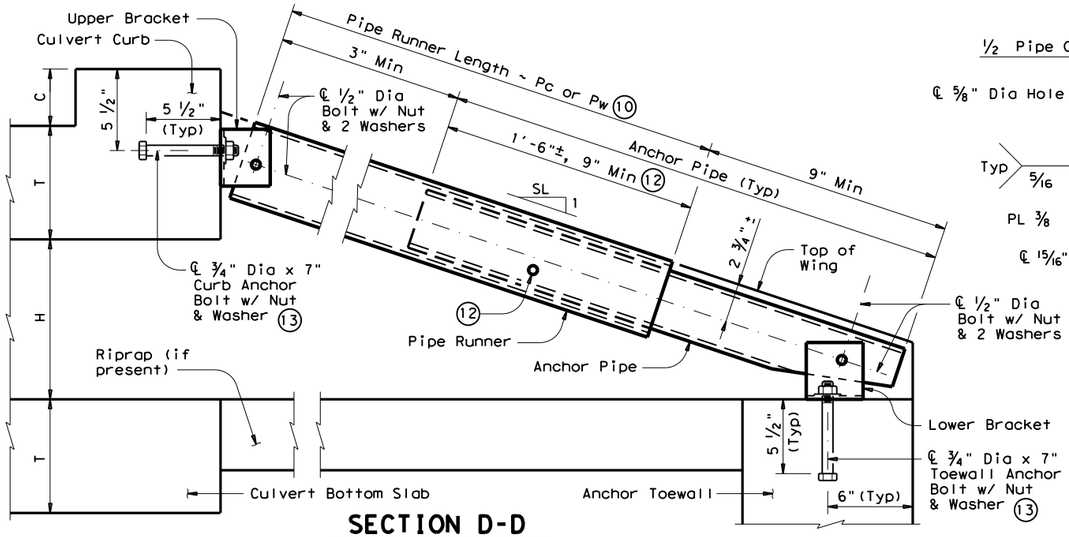
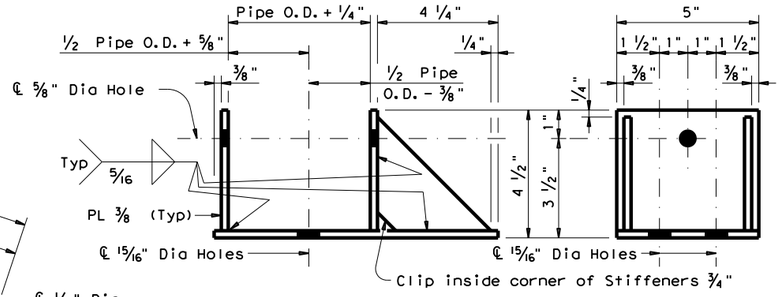
	LBB	CROSBY		156



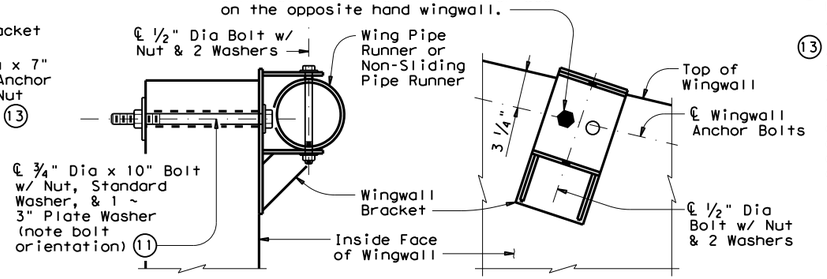
SECTION D-D

(Showing Curb Pipe Runner. Except for upper bracket, Wingwall Pipe Runners are similar.)



ELEVATION SIDE VIEW

¾" Anchor Bolt shall be installed in hole nearest to the culvert curb. Other bolt hole is intended for use on the opposite hand wingwall.

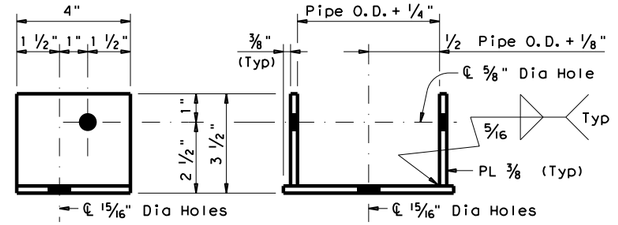


SECTION E-E (Showing installed bracket.)

ELEVATION (Showing installed bracket normal to Wall. Pipe not shown for clarity.)

Note: Wingwall Bracket shall match the Upper Curb Bracket size.

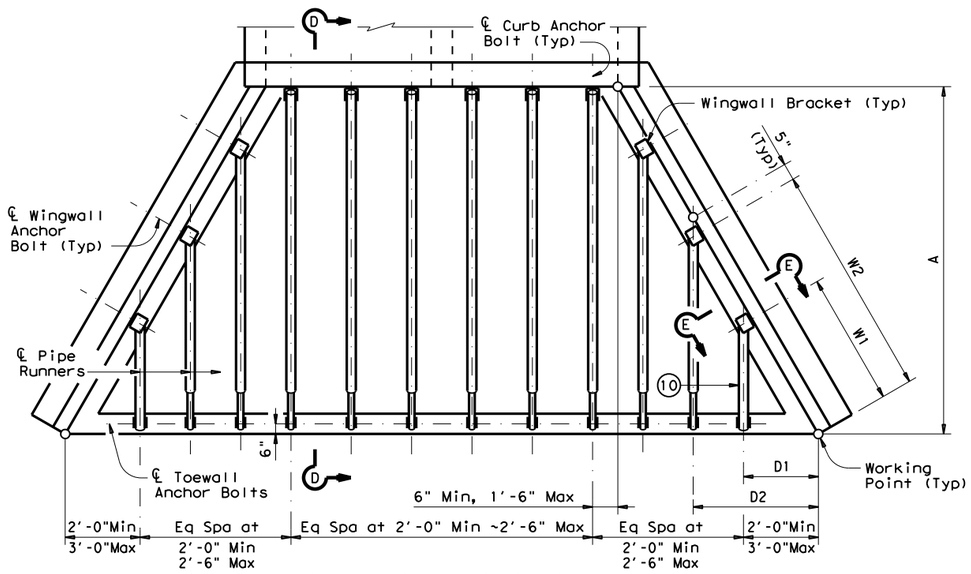
WINGWALL BRACKET DETAILS



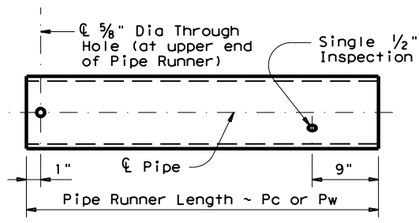
SIDE VIEW ELEVATION

Note: Upper and Lower Brackets shall, except for the brackets used with Non-Sliding Pipe Runners, match the required pipe diameters as shown in the table.

UPPER & LOWER BRACKET DETAILS

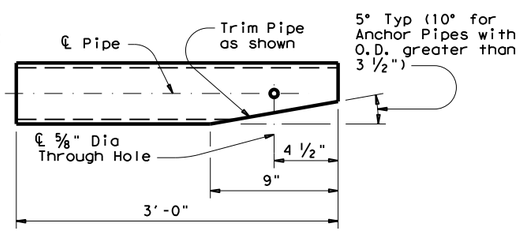


PIPE RUNNER PLAN

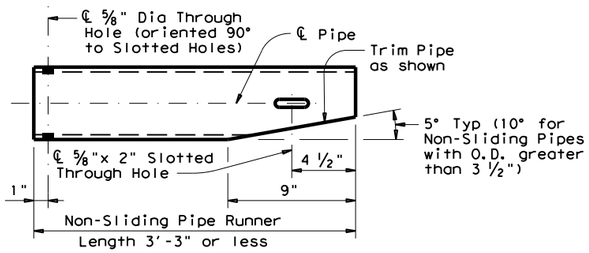


Note: Pipe diameter required for curb pipe runner shall also be used for wingwall pipe runner.

PIPE RUNNER DETAILS



ANCHOR PIPE DETAILS



Note: Pipe size shall be same as required for curb pipe runner. Adjust the corresponding Lower Bracket accordingly.

NON-SLIDING PIPE RUNNER DETAILS

MAXIMUM PIPE RUNNER LENGTHS & REQUIRED PIPE RUNNER SIZES

Maximum Pipe Runner Length (Pc or Pw)	Required Pipe Runner Size			Required Anchor Pipe Size		
	Pipe Size	Pipe O.D.	Pipe I.D.	Pipe Size	Pipe O.D.	Pipe I.D.
9'-4"	3" STD	3.500"	3.068"	2" STD	2.375"	2.067"
19'-0"	4" STD	4.500"	4.026"	3" STD	3.500"	3.068"
33'-6"	5" STD	5.563"	5.047"	4" STD	4.500"	4.026"

(10) If Pipe Runner Length Pw is 1'-9" or less, a single Non-Sliding Pipe Runner shall replace the normal Pipe Runner and Anchor Pipe. See NON-SLIDING PIPE RUNNER DETAILS for additional information.

(11) At Contractor's option, ⅞" diameter hole may be formed or cored drilled. Percussion drilling is not permitted. Adjust placement of reinforcing steel as necessary to avoid bolt holes.

(12) After installation of Pipe Runner, the ½" inspection hole shall be utilized to ensure that the lap of the Anchor Pipe with the Pipe Runner is adequate.

(13) At Contractor's option, an epoxy anchorage system may be used. Anchorage system chosen must be able to achieve an ultimate tensile resistance of 20 kips. Anchor diameter shall be ¾". The Contractor must provide evidence to the Engineer that this can be achieved. Evidence of adequate tensile resistance can be based on the manufacturer's published values of ultimate tensile strength (anchor spacing and edge distance must be accounted for). Anchor installation, including hole size, drilling, and clean-out, must be in accordance with the manufacturer's recommendations.

PIPE RUNNER DIMENSION CALCULATIONS:

Formulas: (All values are in Feet)

W"n" = (2.000) (D"n") - (0.416)

Pw"n" = (D"n") (K2) - (2.063)

Pw1 Non-Sliding Pipe Runner (If required) = (D1) (K2) - (0.563)

Pc = (A) (K1) - (1.688)

W"n"= Distance from Working Point to centerline Anchor Bolt measured along bottom inside face of Wing

D"n"= Distance from Working Point to centerline Pipe Runner measured along outside face of Anchor Toewall

Pw = Wingwall Pipe Runner Length

Pc = Curb Pipe Runner Length

K = Constant Values for use in formulas

Slope SL:1	K1	K2
3:1	1.054	1.826
4:1	1.031	1.785
6:1	1.014	1.756

"n" = Wing Pipe Runner Number

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SHEET 2 OF 3

Texas Department of Transportation — Bridge Division Standard

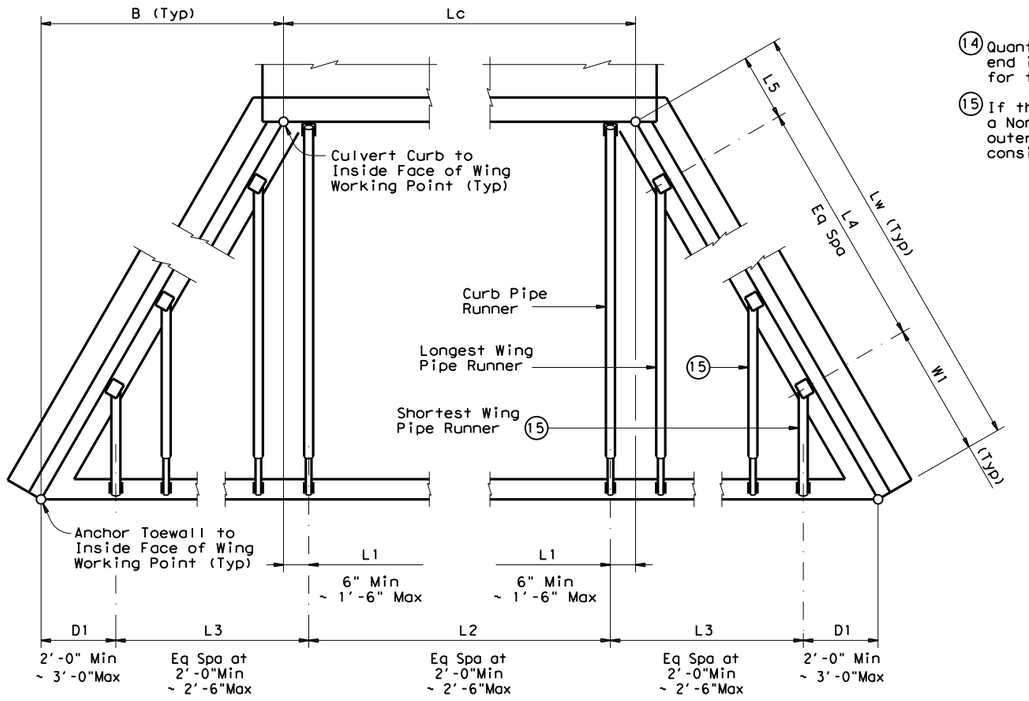
SAFETY END TREATMENT WITH FLARED WINGS

FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

SETB-FW-0

FILE: setbf0se.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: GAF
©TxDOT February 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
11-10: Add note for synthetic fibers.	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		157

Culvert Station and/or Creek name followed by applicable end (Lt, Rt or Both) (14)	Lc	L1	L2			D1	L3			W1	L4			L5	Curb Pipe Runner (Pc)		Longest Wing Pipe Runner (Pw)	Shortest Wing Pipe Runner (Pw)	Non-Sliding Wing Pipe Runner (if applicable)	Curb, Wing, and/or Non-Sliding Pipe Runners		3'-0" Anchor Pipe	
			No. Spa	Spa at	Overall Length		No. Spa	Spa at	Overall Length		No. Spa	Spa at	Overall Length		No.	Length				Size (3",4" or 5")	Total (14) Length	Size (2",3" or 4")	Total (14) Length
	(Ft)	(Ft)		(Ft)	(Ft)	(Ft)		(Ft)	(Ft)	(Ft)		(Ft)	(Ft)	(Ft)		(Ft)	(Ft)	(Ft)	(Ft)				
STRUCTURE NO 1(Both)	10' 7"	6"	2	2' 0"	4' 0"	2' 0.56"	4	2' 6"	10' 0"	4' 1.13"	3	5' 0"	15' 0"	4' 0"	3	18' 7.1"	14' 8.24"	1' 6.38"	N/A	4"	233' 11.76"	3"	66' 0"
STRUCTURE NO 3 (Both)	3' 0"	6"	1	2' 0"	2' 0"	2' 7"	3	2' 0"	6' 0"	5' 2"	2	4' 0"	8' 0"	3' 0"	2	12' 6.1"	9' 5.96"	2' 5.67"	N/A	4"	119' 4.2"	3"	48' 0"
STRUCTURE NO 4 (Both)	10' 2"	6"	4	2' 3.5"	9' 2"	2' 10.56"	4	2' 3.5"	9' 2"	5' 9.13"	3	4' 7"	13' 9"	3' 7"	5	18' 7.1"	15' 0.8"	2' 11.9"	N/A	4"	335' 0.84"	3"	78' 0"
STRUCTURE NO 5 (Both)	3' 0"	6"	1	2' 0"	2' 0"	2' 7"	3	2' 0"	6' 0"	5' 2"	2	4' 0"	8' 0"	3' 0"	2	12' 6.1"	9' 5.96"	2' 5.67"	N/A	4"	119' 4.2"	3"	48' 0"
STRUCTURE NO 6 (Both)	3' 0"	6"	1	2' 0"	2' 0"	2' 8.58"	4	2' 4"	9' 4"	5' 5.16"	3	4' 8"	14' 0"	3' 8"	2	18' 7.1"	14' 11.9"	2' 8.45"	N/A	4"	212' 2.88"	3"	60' 0"
STRUCTURE NO 7 (Both)	6' 7"	1' 0"	1	2' 0"	2' 0"	2' 7"	3	2' 0"	6' 0"	5' 2"	2	4' 0"	8' 0"	3' 0"	3	12' 6.1"	9' 5.96"	2' 5.68"	N/A	4"	121' 10.2"	3"	48' 0"
STRUCTURE NO 8 (Both)	6' 7"	1' 0"	2	2' 3.5"	4' 7"	2' 2.5"	3	2' 3.5"	4' 6"	4' 5"	2	4' 7"	9' 2"	2' 7"	3	12' 6.1"	9' 10.34"	1' 9.77"	N/A	4"	145' 1.32"	3"	54' 0"
STRUCTURE NO 10 (Both)	3' 0"	6"	1	2' 0"	2' 0"	2' 11.14	2	2' 3"	9' 3.98"	5' 10.27"	1	4' 6"	4' 6"	3' 6"	2	10' 8.21"	7' 2.16"	3' 0.19"	N/A	4"	81' 11.76"	3"	36' 0"
STRUCTURE NO 11 (Both)	3' 0"	6"	1	2' 0"	2' 0"	2' 0.07"	3	2' 0"	9' 0"	4' 0.13"	2	4' 0"	8' 0"	3' 0"	2	11' 8.58"	8' 7.88"	2' 9.37"	N/A	4"	105' 6.72"	3"	48' 0"
STRUCTURE NO 12 (Both)	3' 0"	6"	1	2' 0"	2' 0"	2' 8.58"	4	2' 4"	9' 4"	5' 5.16"	3	4' 8"	14' 0"	3' 8"	2	18' 7.1"	14' 11.9"	2' 8.45"	N/A	4"	212' 2.88"	3"	60' 0"
STRUCTURE NO 14 (Both)	5' 0"	6"	2	2' 0"	4' 0"	2' 7"	3	2' 0"	6' 0"	5' 2"	2	4' 0"	8' 0"	3' 0"	3	12' 6.1"	9' 5.56"	2' 5.67"	N/A	4"	141' 10.32"	3"	54' 0"
STRUCTURE NO 17 (Both)	9' 4"	6"	4	2' 1"	8' 3"	3' 0"	2	2' 6"	5' 0"	6' 0"	1	5' 0"	5' 0"	4' 0"	5	11' 7.45"	7' 7.14"	3' 2.46"	N/A	4"	153' 7.2"	3"	54' 0"
STRUCTURE NO 18 (Both)	9' 4"	6"	4	2' 1"	8' 3"	2' 6.16"	4	2' 2"	8' 8"	5' 0.31"	3	4' 4"	13' 0"	3' 4"	5	17' 0.85"	13' 9.19"	2' 4.2"	N/A	4"	291' 1.2"	3"	78' 0"
STRUCTURE NO 19 (Both)	5' 0"	6"	2	2' 0"	4' 0"	2' 8.58"	4	2' 4"	9' 4"	5' 5.16"	3	4' 8"	14' 0"	3' 8"	3	18' 7.1"	14' 11.9"	2' 8.45"	N/A	4"	245' 8.52"	3"	66' 0"
STRUCTURE NO 26 (Both)	3' 0"	6"	1	2' 0"	2' 0"	2' 10.7"	4	2' 1.5"	8' 6"	4' 9.42"	3	4' 3"	12' 9"	3' 3"	2	16' 6.77"	13' 4"	3' 0.19"	N/A	4"	186' 8.52"	3"	60' 0"
STRUCTURE NO 27 (Both)	3' 0"	6"	1	2' 0"	2' 0"	2' 10.7"	4	2' 1.5"	8' 6"		3	4' 3"	12' 9"	3' 3"	2	16' 6.77"	13' 4"	3' 0.19"	N/A	4"	186' 8.52"	3"	60' 0"



PIPE RUNNER LAYOUT

(14) Quantities shown are for one structure end if Lt or Rt. Quantities shown are for two structure ends if Both.

(15) If the outermost Wing Pipe Runner is a Non-Sliding Pipe Runner, the next outermost Wing Pipe Runner shall be considered the Shortest.

SPECIAL NOTE:
This tabular sheet is to be filled out by the culvert specifier and provides information for the construction details and quantities of Pipe Runners.

An Excel 97 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 shall be signed, sealed, and dated by a licensed Professional Engineer.

Note that the tabular quantities are given for estimating purposes only. It is likely that these quantities will change due to field conditions. Therefore, all dimensions shall be verified by the Contractor in the field prior to fabrication of the Safety End Treatment components.

STATE OF TEXAS
SHELLEY C. HARRIS
99197
LICENSED PROFESSIONAL ENGINEER

Shelley C. Harris, P.E.
6/29/2022

SHEET 3 OF 3

Texas Department of Transportation — Bridge Division Standard

SAFETY END TREATMENT WITH FLARED WINGS

FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

SETB-FW-0

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REVISIONS	0453	04	024	SH 207
11-10: Add note for synthetic fibers.	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		158

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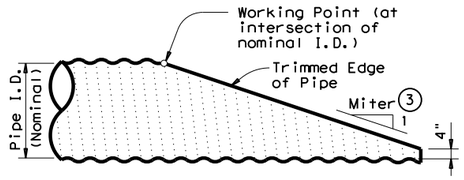
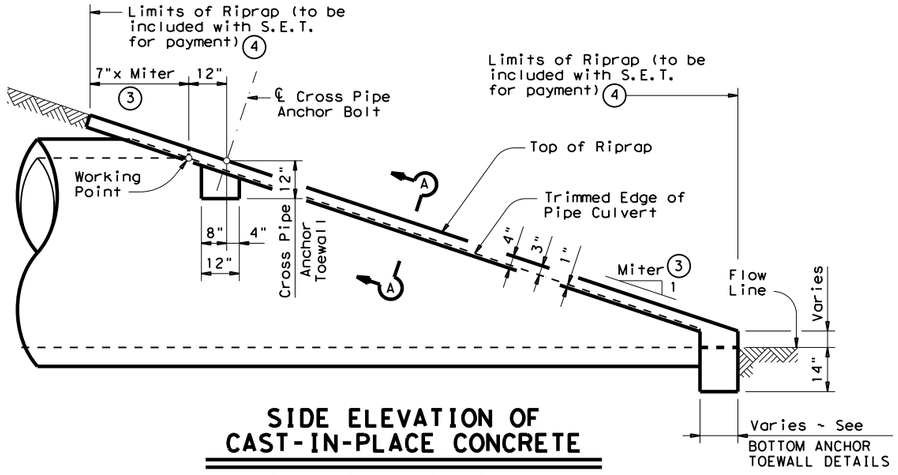


NOTE: All Pipe Runners, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

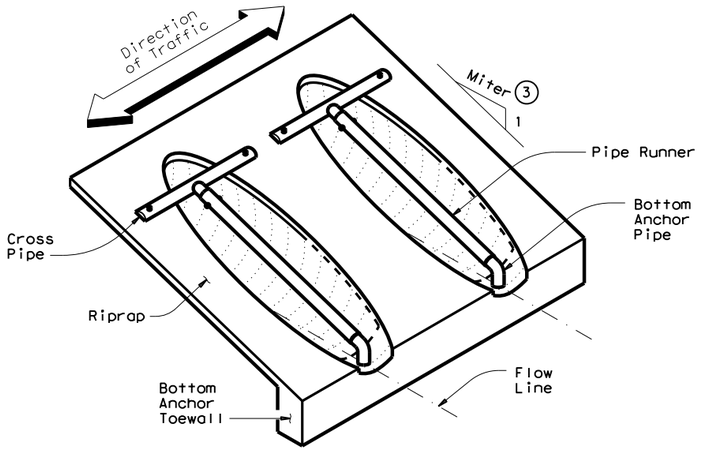
SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

(Showing Corrugated Metal Pipe Culvert.
Details of Concrete Pipe Culvert are similar.)



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing Concrete Pipe Culvert.
Details of Corrugated Metal Pipe Culvert are similar.
Pipe Runners not shown for clarity)



ISOMETRIC VIEW OF TYPICAL INSTALLATION

(Showing installation with no skew.)

CROSS PIPE LENGTHS & 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" to 60"	Always required	Always required

STANDARD PIPE SIZES & 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) Size of Pipe Runner shall be as shown in the tables. Cross Pipe shall be the same size as the Pipe Runner. Cross Pipe Stub Out and Bottom Anchor Pipe shall be the next smaller size pipe as shown in the STANDARD PIPE SIZES 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 Pipe Culvert End

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

(5) Quantities shown are for one end of one reinforced Concrete Pipe Culvert. For multiple Pipe Culverts or for Corrugated Metal Pipe 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

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	LBB	CROSBY		159

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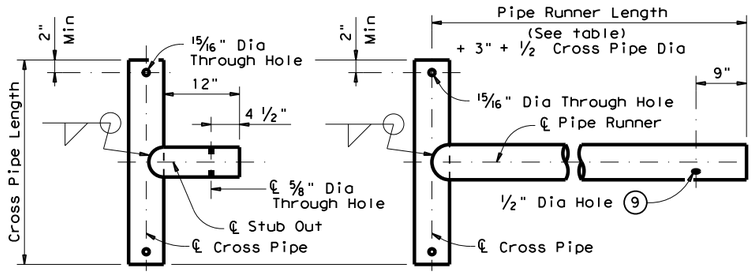
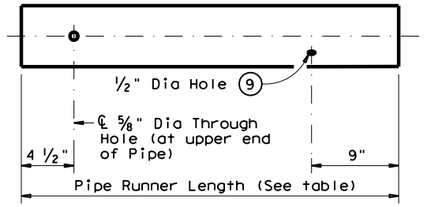


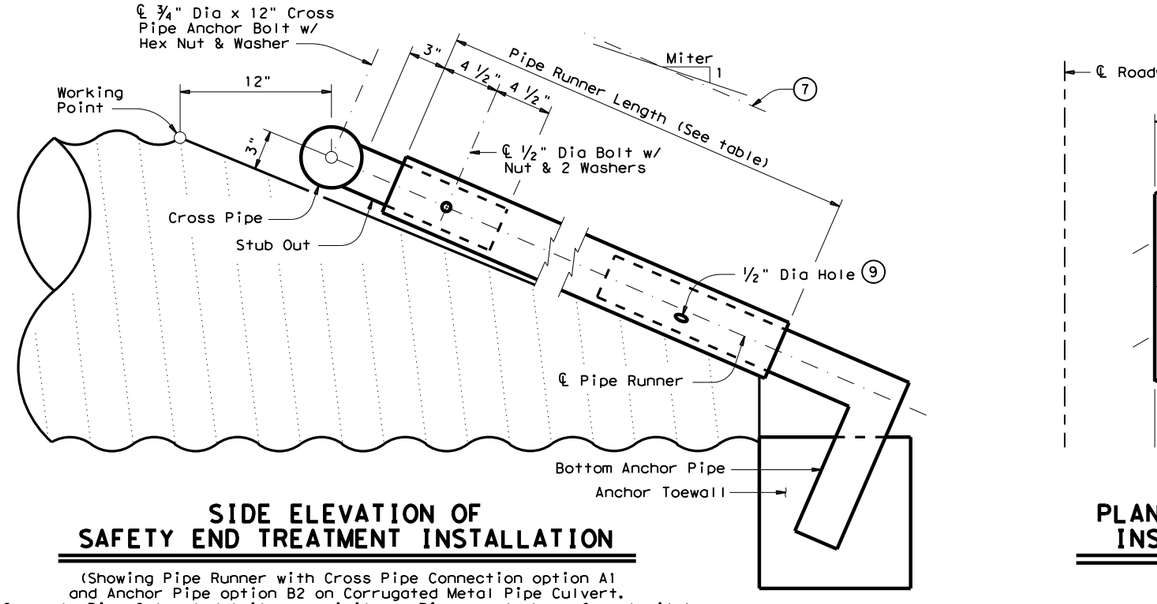
OPTION A1 OPTION A2

CROSS PIPE AND CONNECTIONS DETAILS



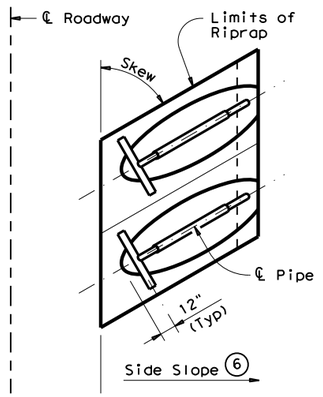
NOTE: The separate Pipe Runner shown is required when Cross Pipe Connection Option A1 is used.

PIPE RUNNER DETAILS

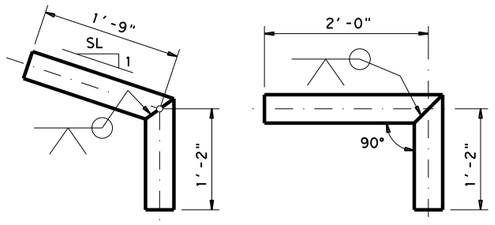


SIDE ELEVATION OF SAFETY END TREATMENT INSTALLATION

(Showing Pipe Runner with Cross Pipe Connection option A1 and Anchor Pipe option B2 on Corrugated Metal Pipe Culvert. Concrete Pipe Culvert details are similar. Riprap not shown for clarity)

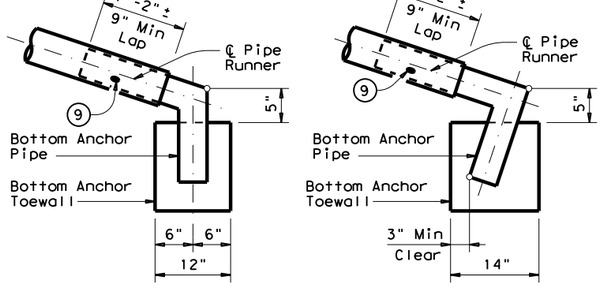


PLAN OF SKEWED INSTALLATION



OPTION B1 OPTION B2

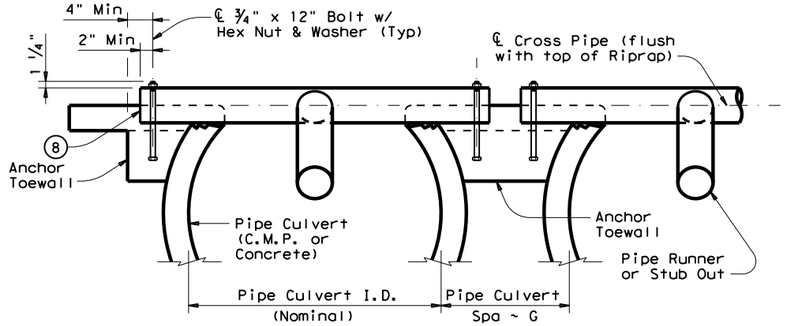
BOTTOM ANCHOR PIPE DETAILS (10)



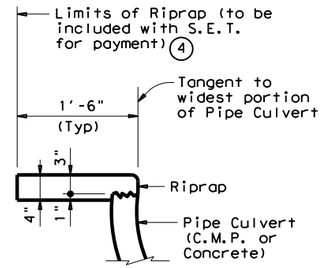
OPTION B1 OPTION B2

BOTTOM ANCHOR TOEWALL DETAILS

(Culvert & Riprap not shown for clarity)



SHOWING CROSS PIPE & ANCHOR TOEWALL



SHOWING TYPICAL PIPE CULVERT & RIPRAP

SECTION A-A

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

(6) Recommended values of side slope are 3:1, 4:1, & 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) Care shall be taken to ensure that Riprap concrete does not flow into the Cross Pipe so as to permit disassembly of the bolted connection to allow cleanout access.

(9) After installation, the 1/2" hole shall be inspected 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.

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.

The Safety End Treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the Pipe Runners.

Riprap and all necessary inverts shall be Concrete Riprap conforming to the requirements of Item 432, "Riprap".

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

Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.

Pipe Runners, Cross Pipes, and Anchor Pipes shall conform to the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Bolts and nuts shall conform to ASTM A307.

All steel components, except concrete reinforcing, shall be galvanized after fabrication. Galvanizing damaged during transport or construction shall be repaired in accordance with the specifications.

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.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
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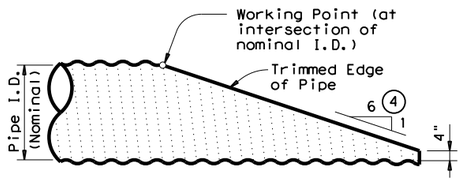
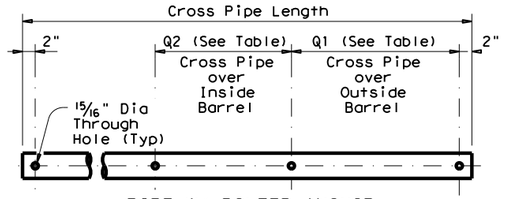
REVISIONS	0453	04	024	SH 207
11-10: Add note for synthetic fibers.	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		160



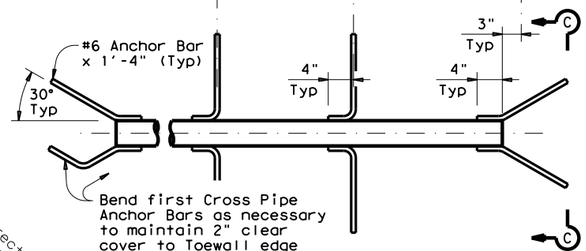
NOTE: All Cross Pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

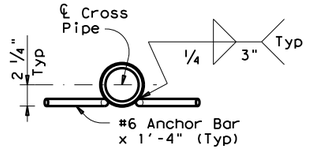
(Showing Corrugated Metal Pipe Culvert.)
(Details at Concrete Pipe Culvert are similar.)



PIPE W/ BOLTED ANCHOR

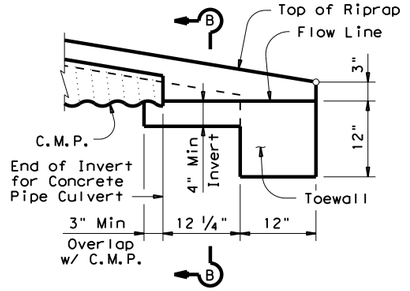


PIPE W/ ANCHOR BARS



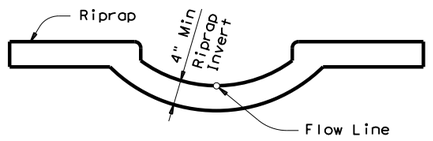
SECTION C-C

CROSS PIPE DETAILS



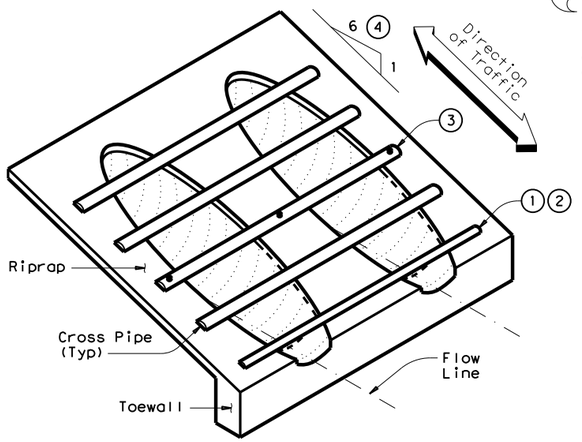
DETAIL "A"

(Showing Invert with Corrugated Metal Pipe Culvert. Concrete Pipe Culvert details are similar. Cross Pipes not shown for clarity.)



SECTION B-B

(Cross Pipes not shown for clarity.)



ISOMETRIC VIEW OF TYPICAL INSTALLATION

CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, & 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 Size
12"	0.6	9"	N/A	2'- 1"	1'- 9"	3 or more Pipe Culverts	3" Std (3.500" O.D.)
15"	0.7	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 ½" 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. The top of the first Cross Pipe must be placed at no more than 6" above the flow line.

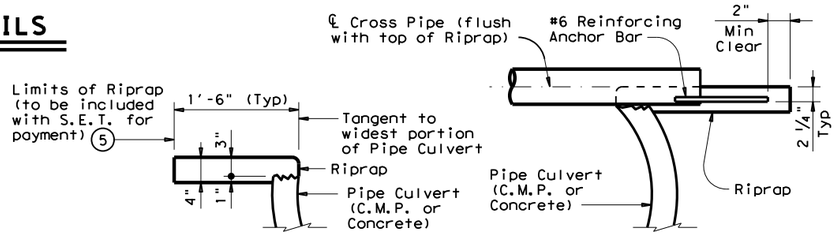
(2) Size of Cross Pipes, except the first bottom pipe, shall be as shown in the PIPE SIZE table. The first bottom pipe shall be 3 ½" Standard Pipe (4" O.D.).

(3) The third Cross Pipe from the bottom of the Culvert shall always be installed using a bolted connection. Care shall be taken to ensure that Riprap concrete does not flow into the Cross Pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, all other Cross Pipes may also be installed 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.

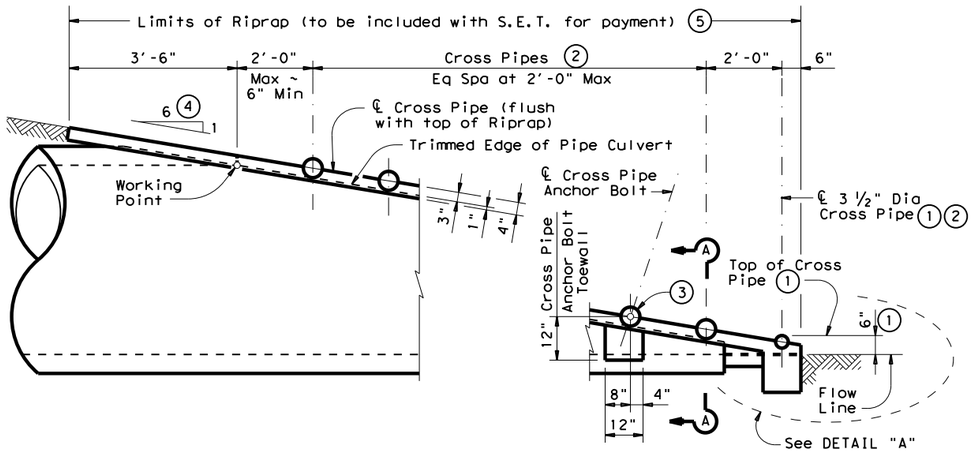
(5) Riprap placed beyond the limits shown will be paid as Concrete Riprap in accordance with Item 432, "Riprap".

(6) Quantities shown are for one end of one reinforced Concrete Pipe Culvert. For multiple pipe culverts or for Corrugated Metal Pipe Culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.



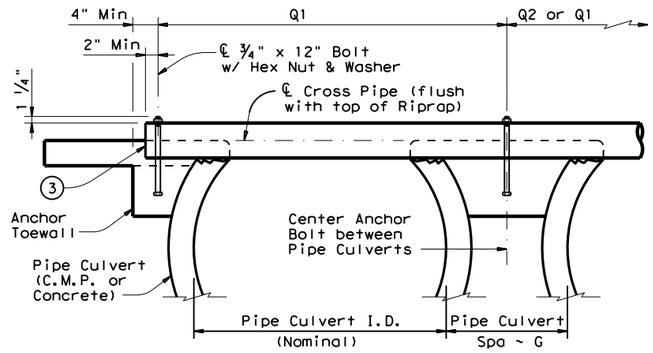
SHOWING TYPICAL PIPE CULVERT & RIPRAP

SHOWING CROSS PIPE WITH ANCHOR BAR



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing Concrete Pipe Culvert.)
(Details at Corrugated Metal Pipe Culvert are similar.)



SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

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 shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the Cross Pipes.

Riprap and all necessary inverts shall be Concrete Riprap conforming to the requirements of Item 432, "Riprap".

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

Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.

Cross Pipes shall conform to the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Bolts and nuts shall conform to ASTM A307.

All steel components, except concrete reinforcing, shall be galvanized after fabrication. Galvanizing damaged during transport or construction shall be repaired in accordance with the specifications.

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.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2010	CONT	SECT	JOB	HIGHWAY
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11-10: Add note for synthetic fibers.	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		161

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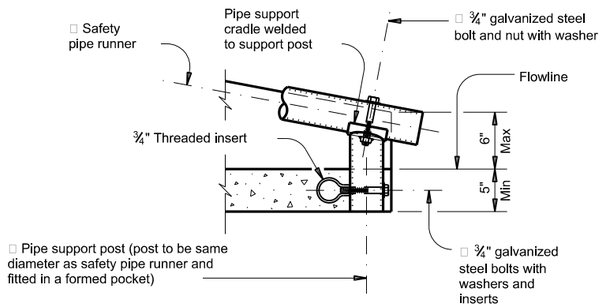
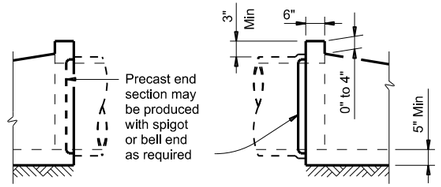
REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (8)	"D" (1)	Slope	Min Length of Unit	Single Pipe		Multiple Pipes	
						Skew	Pipe Runners Required	Skew	Pipe Runners Required
12"	2"	1.15"	17.00"	3:1	2' - 11"	≤ 45°	No	≤ 45°	No
				4:1	3' - 6"				
				6:1	4' - 9"				
15"	2 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"	2.7"	52.50"	3:1	11' - 1"	≥ 0°	Yes	≥ 0°	Yes
				4:1	14' - 5"				
				6:1	21' - 2"				



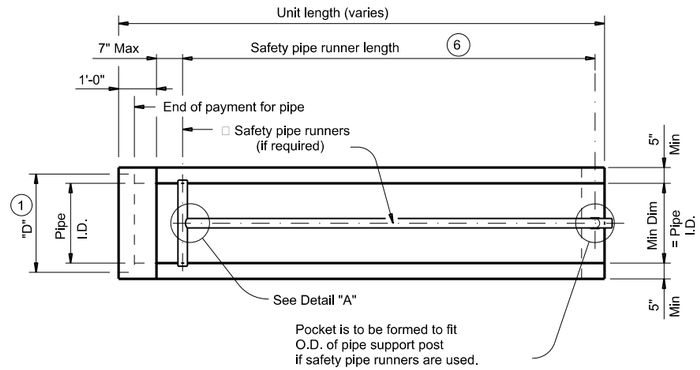
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)



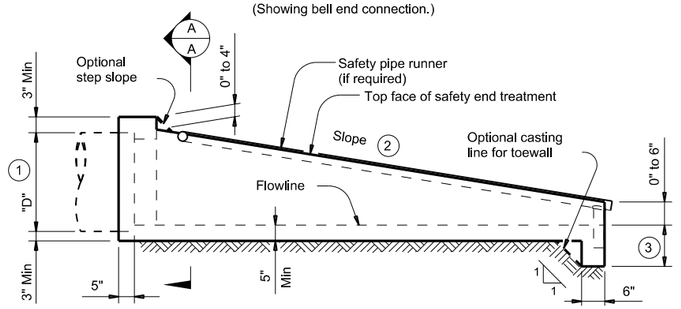
OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment)



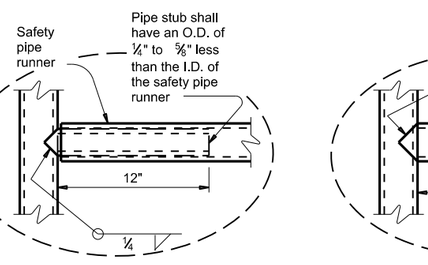
PLAN

(Showing bell end connection.)



LONGITUDINAL ELEVATION

(Showing bell end connection.)

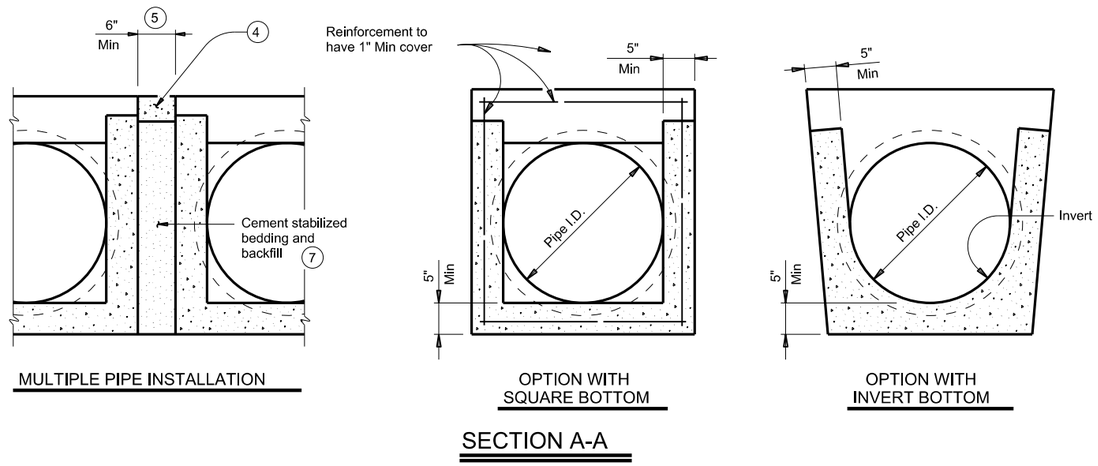


OPTION A

DETAIL A

(If required)

OPTION B

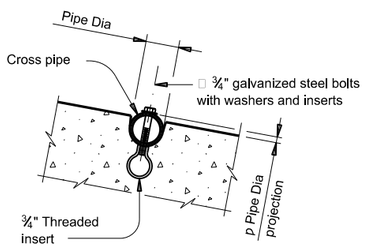


MULTIPLE PIPE INSTALLATION

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 Pipe and Box Grouted Connections (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

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	LBB	CROSBY		162

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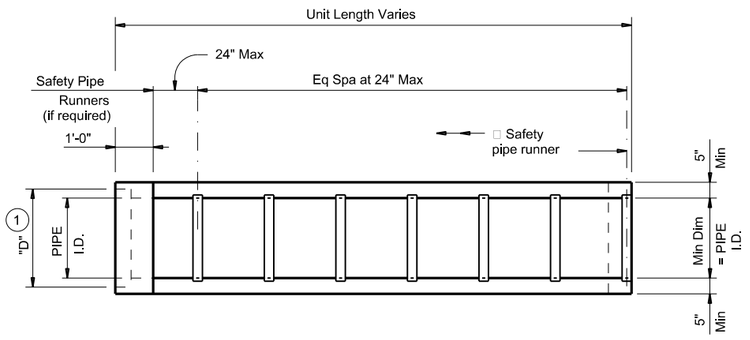
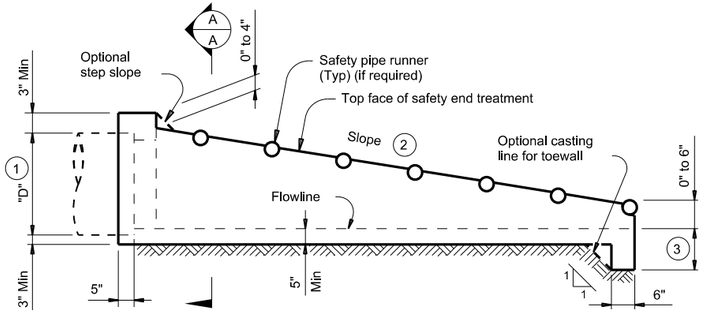
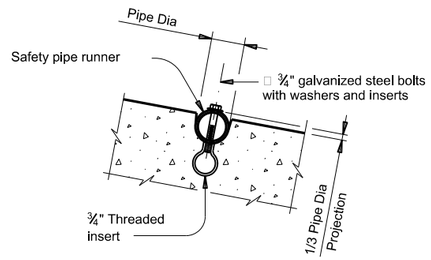


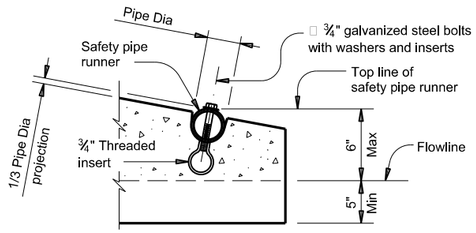
PLAN
(Showing bell end connection)



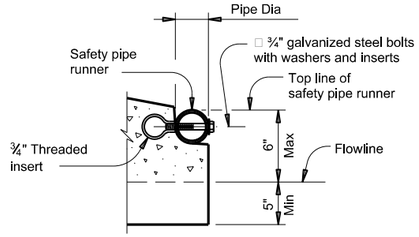
LONGITUDINAL ELEVATION
(Showing bell end connection)



INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS
(If required)



OPTION A



OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS
(If required)

PIPE I.D.	RCP WALL "B" THICKNESS	TP WALL THICKNESS (7)	"D" (1)	MAXIMUM SLOPE	MINIMUM LENGTH OF UNIT	PIPE RUNNERS REQUIRED		REQUIRED PIPE RUNNER SIZES		
						SINGLE PIPE	MULTIPLE PIPE	NOMINAL DIA.	O.D.	I.D.
12"	2"	1.15"	17"	6:1	4'-9"	No	Yes, for >2 pipes	3" STD	3.500"	3.068"
15"	2.25"	1.30"	20.50"	6:1	6'-5"	No	Yes, for >2 pipes	3" STD	3.500"	3.068"
18"	2.50"	1.60"	24"	6:1	8'-0"	No	Yes, for >2 pipes	3" STD	3.500"	3.068"
24"	3"	1.95"	31"	6:1	11'-3"	No	Yes, for >2 pipes	3" STD	3.500"	3.068"
30"	3.50"	2.65"	38.50"	6:1	14'-8"	No	Yes	4" STD	4.500"	4.026"
36"	4"	2.75"	45.50"	6:1	17'-11"	Yes	Yes	4" STD	4.500"	4.026"
42"	4.50"	N/A	52.50"	6:1	21'-2"	Yes	Yes	4" STD	4.500"	4.026"

(1) Dimension "D" is based on Reinforced Concrete Pipe (RCP) meeting the requirements of ASTM C-76, Class III, (RCP Wall "B" thickness). Adjust "D" for any other wall thickness used. For Thermoplastic Pipe (TP) take into account the annular space requirements for grouted connections.

(2) Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.

(3) Toewall to be used only when dimension is shown elsewhere in the plans.

(4) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item "Safety End Treatment".

(5) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

(6) Provide cement stabilized bedding and backfill in accordance with the Item, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

(7) Thermoplastic pipe wall thickness may vary. Adjust accordingly. Thermoplastic pipe requires the safety end treatments to have a bell end for grouted connections.

GENERAL NOTES:

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

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

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

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

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

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

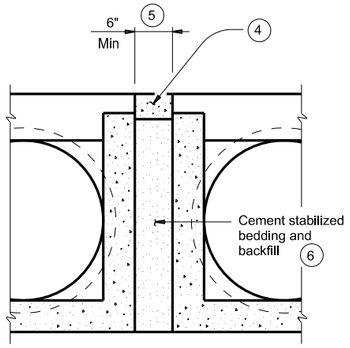
At the option and expense of the Contractor the next larger size of safety end treatment may be furnished; as long as the "D" dimension cast is that of the required size of pipe.

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

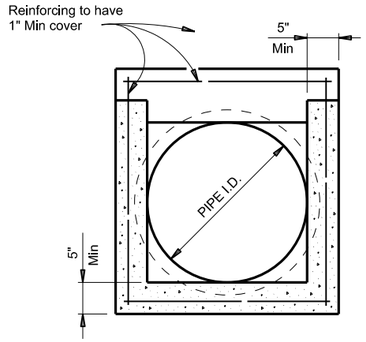
Provide pipe runners meeting the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

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

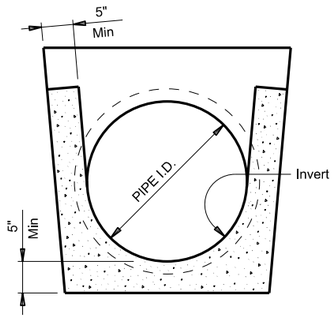
Connect RCP using the Optional Joint for RCP detail shown or in accordance with Item 464 "Reinforced Concrete Pipe". Connect TP by grouting. See PBGC standard for grouted connections with TP and precast safety end treatment.



MULTIPLE PIPE INSTALLATION

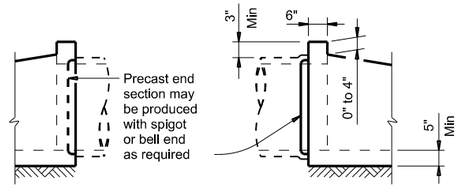


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



OPTIONAL JOINT FOR RCP
(Showing joint between RCP and precast safety end treatment)

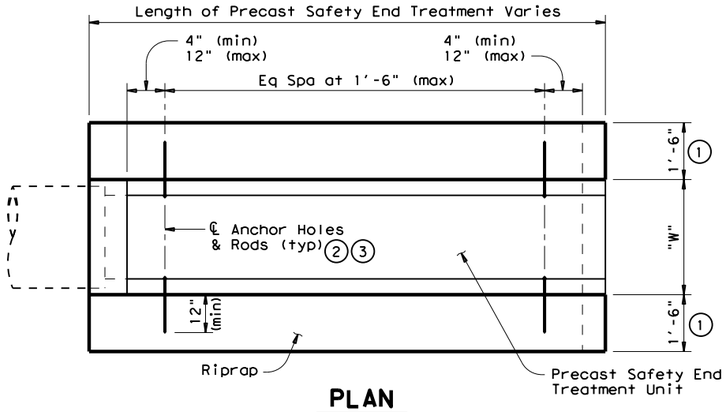
Texas Department of Transportation — Bridge Division Standard

PRECAST SAFETY END TREATMENT
TYPE II ~ PARALLEL DRAINAGE

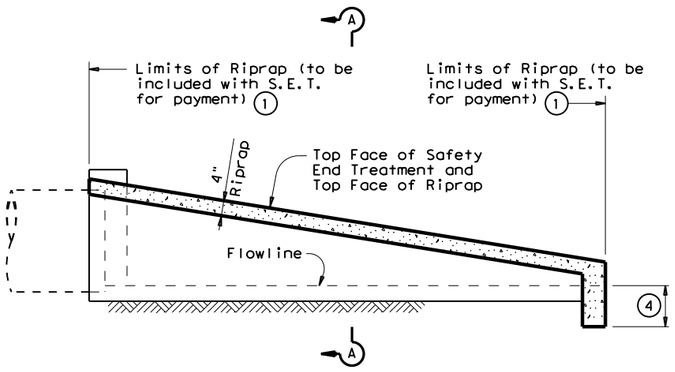
PSET-SP

FILE: psetspss-18.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
11-10: Add note for synthetic fibers.	DIST	COUNTY		SHEET NO.
09-18: Added Thermoplastic Pipe in table.	LBB	CROSBY		163

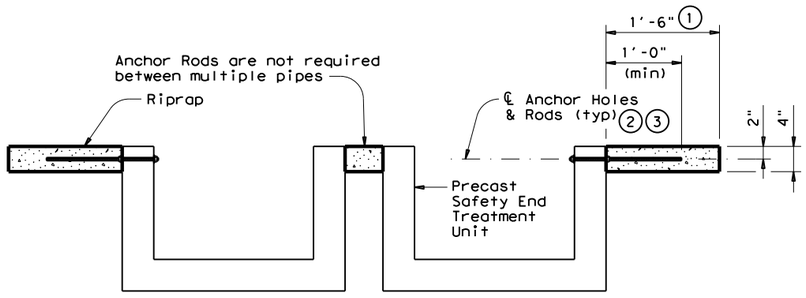
DATE: 6/29/2022 1:18:00 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0453-04-024 - SH 207 DRAINAGE STANDARDS\pset-rr.dgn



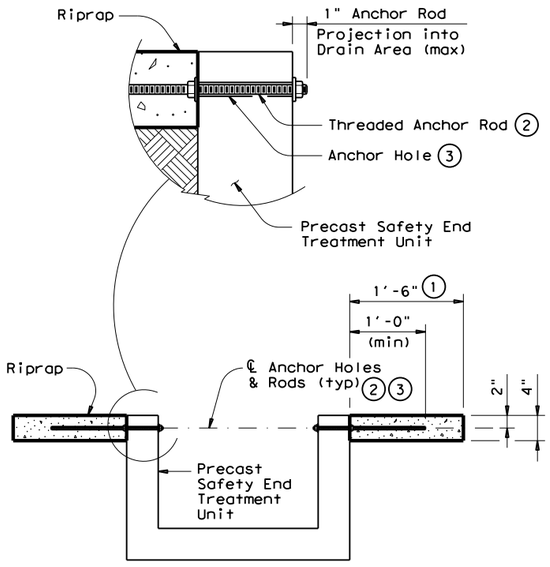
PLAN



LONGITUDINAL ELEVATION



MULTIPLE PIPE INSTALLATION



SINGLE PIPE INSTALLATION

SECTION A-A

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) 5

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

(1) Riprap placed beyond the limits shown will be paid as Concrete Riprap in accordance with Item 432, "Riprap". When Riprap is cast integrally with the Precast Safety End Treatment, this dimension shall be 1'-0" minimum.

(2) ½" Diam A307 Gr.A threaded Anchor Rod w/ 2 nuts & 2 washers. All components shall be galvanized in accordance with Item 445, "Galvanizing". Galvanizing that is damaged during transport or construction shall be repaired in accordance with the specifications.

(3) ¾" through holes in walls of Safety End Treatment for Riprap Anchor Rods may be drilled with rotary (coring or masonry) type drilling equipment or may be formed. Percussive (star) type drilling equipment shall not be used. If holes are drilled, spalls in the inside face of the wall exceeding ½" from the holes shall be patched.

(4) Provide Riprap Toe Wall when dimension is shown elsewhere in the plans or when field conditions require a Toe Wall.

(5) Quantities shown are for one end of one reinforced concrete pipe culvert. For multiple pipe culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only. Quantities are based on the minimum unit lengths shown on the Precast S.E.T. standards.

GENERAL NOTES:

Precast Safety End Treatment for reinforced concrete pipe may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment".

Riprap shall be Class "B" Riprap in accordance with Item 432, "Riprap".

Payment for Riprap and Toewalls is included in the Price Bid for each Safety End Treatment.

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

Refer to PSET-SC or PSET-SP standard sheets for details of square Safety End Treatments not shown. Refer to PSET-RC or PSET-RP standard sheets for details of round Safety End Treatments not shown.

For precast units with integrally cast Riprap, reinforcing steel in the amount on 0.26 sq in/ft minimum shall be substituted for the threaded anchor rods shown. When requested, sealed engineering drawings shall be submitted for approval prior to construction. Shop drawings will not be required. Note that a proprietary precast unit with integral Riprap is available from L&R Precast Concrete Works, Inc. (956) 583-6293 or www.lrprecast.com.

These Riprap details are only applicable when notes that require placement of Riprap with Precast Safety End Treatments are shown elsewhere in the plans.

Precast units with integrally cast Riprap shall be permitted unless noted otherwise on the plans.

Texas Department of Transportation

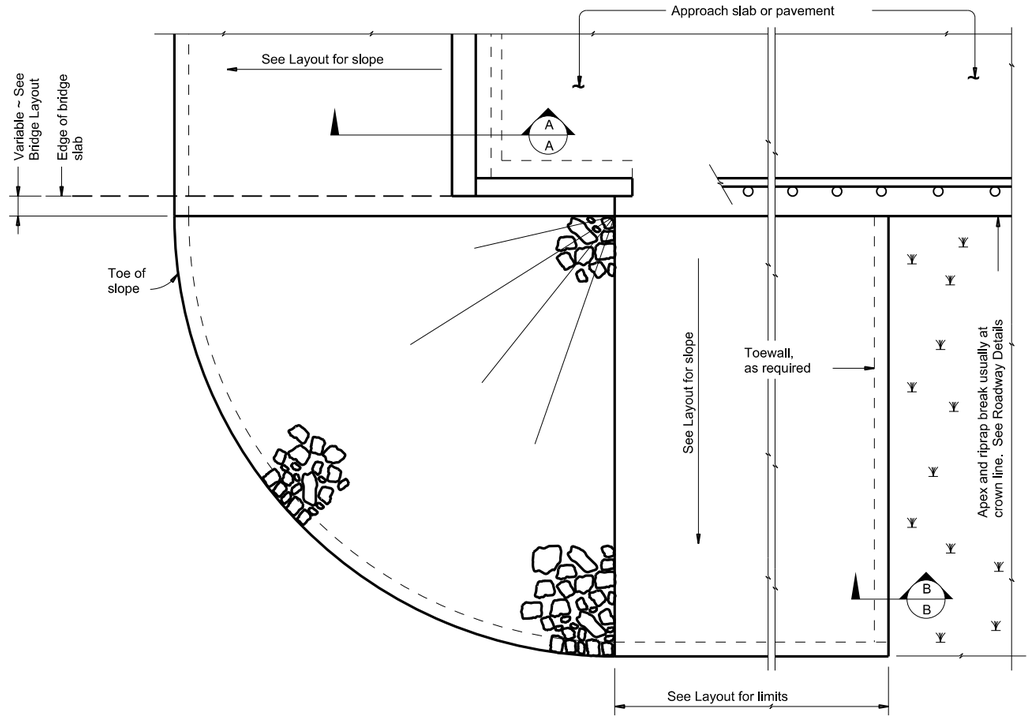
Bridge Division Standard

PRECAST SAFETY END TREATMENT
TYPE II
RIPRAP DETAILS

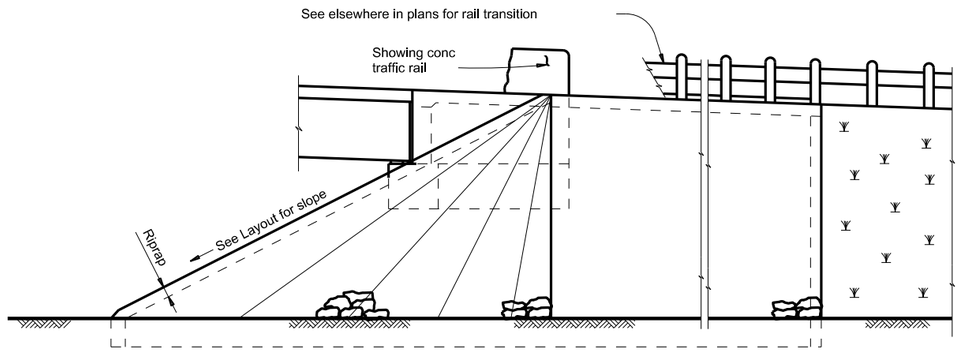
PSET-RR

FILE: psetrrse.dgn	DN: GAF	CK: TxDOT	DW: JRP	CK: GAF
©TxDOT February 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
11-10: Add note for synthetic fibers.	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		164

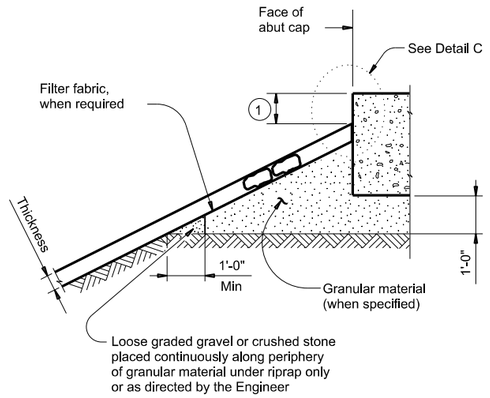
DATE:
FILE:



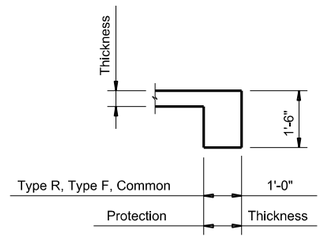
PLAN



ELEVATION

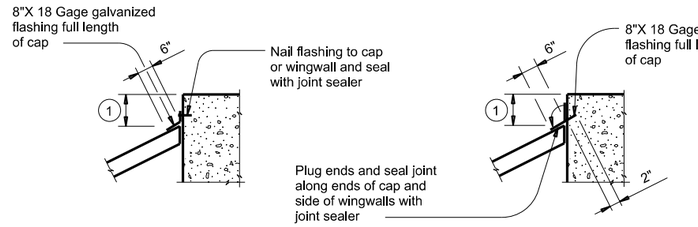


SECTION A-A AT CAP



SECTION B-B

Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".



CAP OPTION A

CAP OPTION B

DETAIL C

(1) Top of cap to top of riprap dimension varies as directed by the Engineer. Provide 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.

GENERAL NOTES:
Refer to Item 432, "Riprap" for stone size and gradation, and construction details. See Layout for limits and thickness of riprap specified.
See elsewhere in plans for locations and details of shoulder drains.

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		165

DATE:
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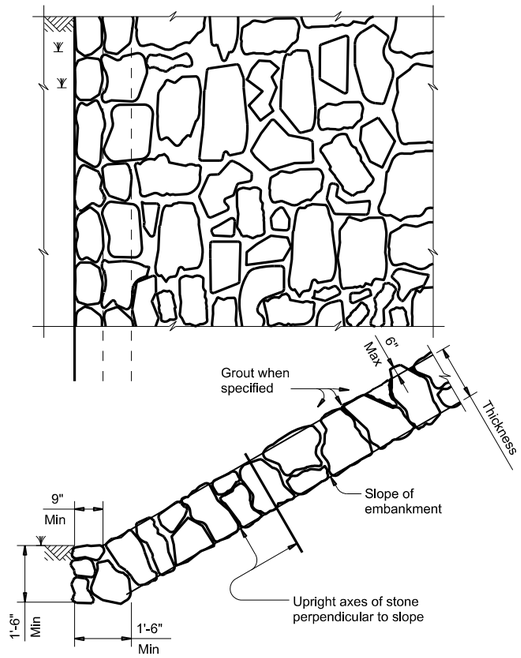


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

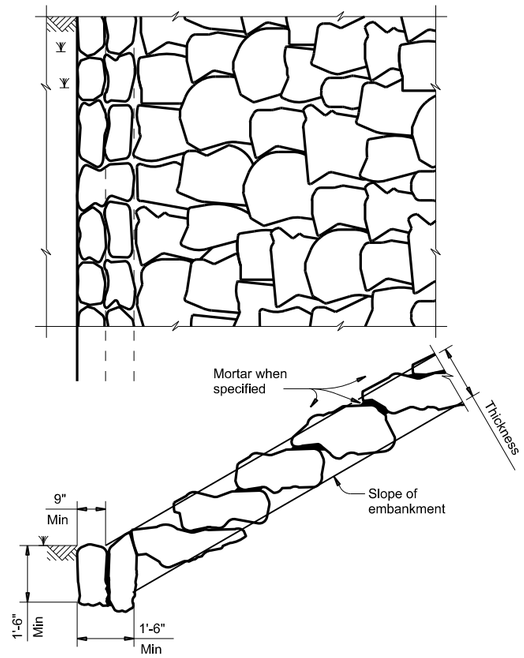


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

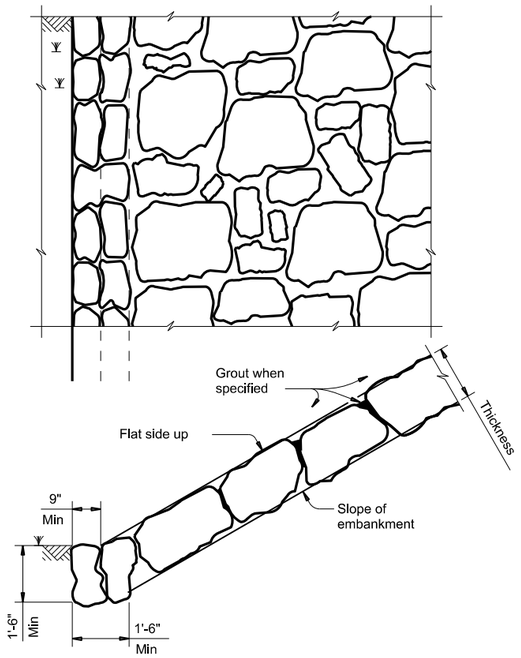


FIGURE 3 ~ TYPE F STONE RIPRAP

grouted

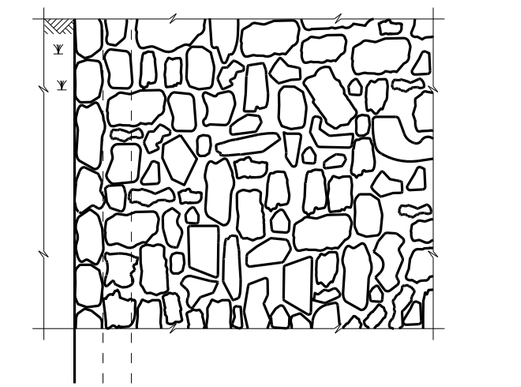


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

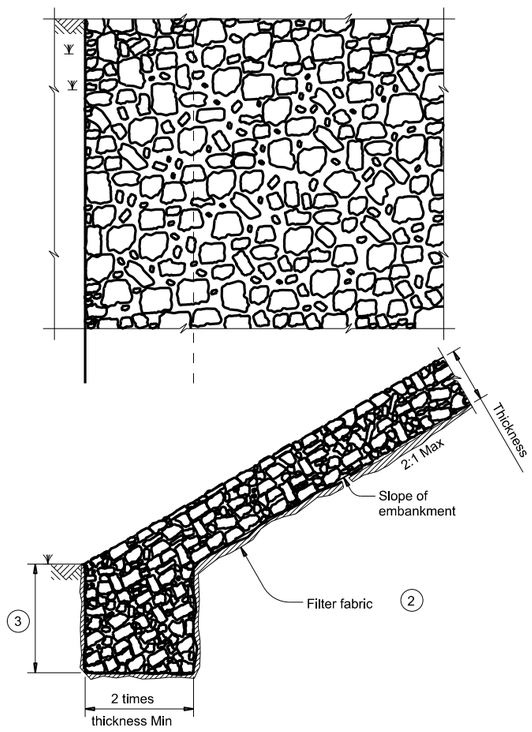


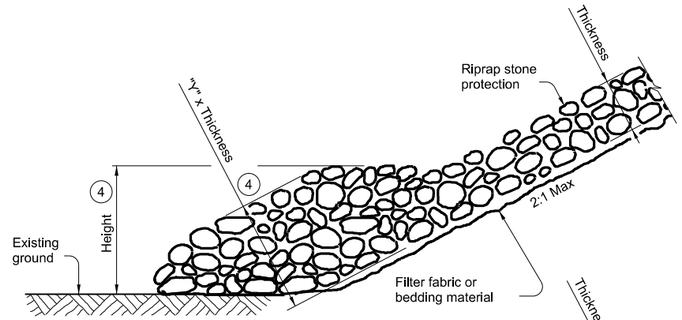
FIGURE 5 ~ PROTECTION STONE RIPRAP 5

2 Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.

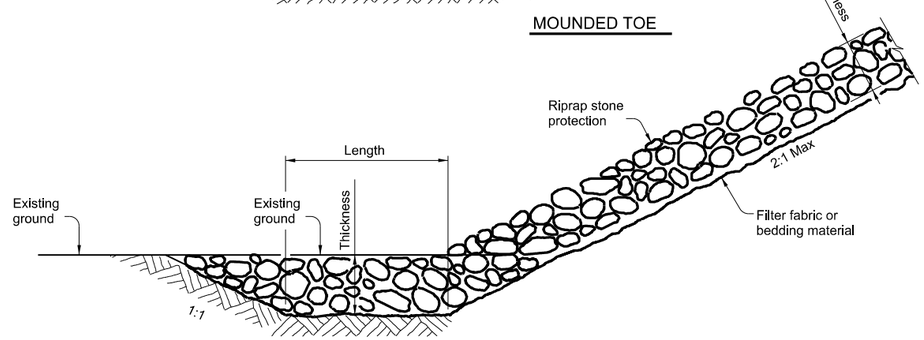
3 Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

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

SHEET 2 OF 2

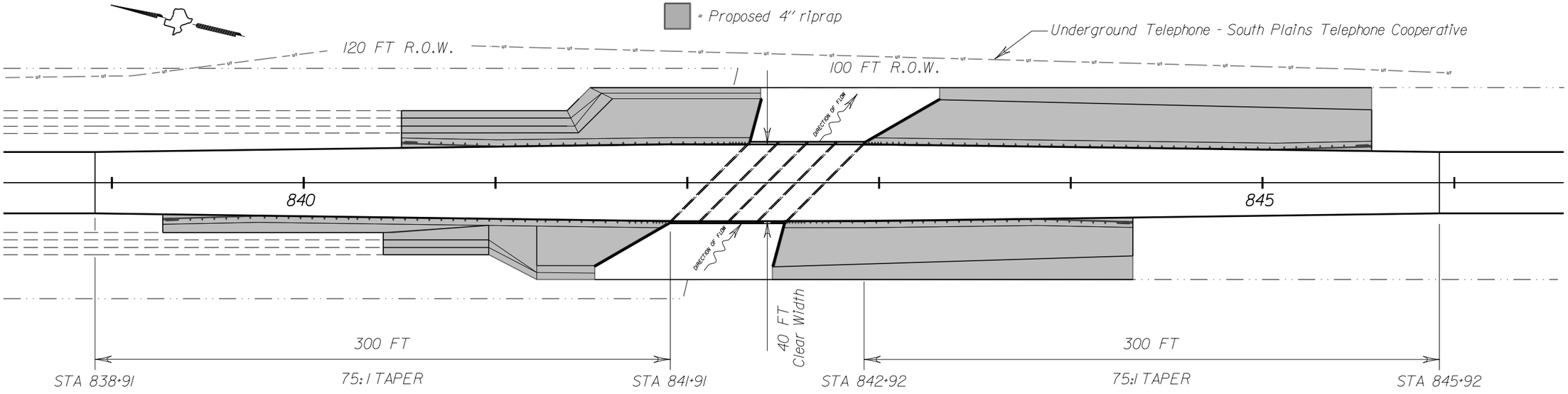
Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

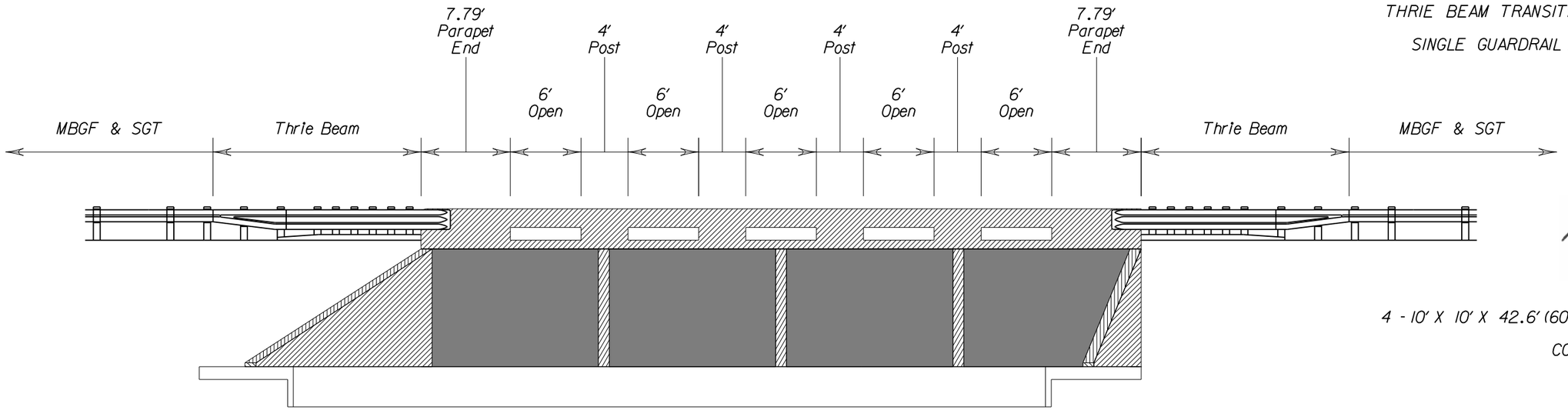
SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		166



PLAN VIEW

ELEVATION VIEW



TYPE T223 CONCRETE BRIDGE RAIL = 123.16 LF

METAL BEAM GUARD FENCE (STEEL POST) = 600 LF

THRIE BEAM TRANSITION (STEEL POST) = 4 EA

SINGLE GUARDRAIL END TREATMENT = 4 EA

STATE OF TEXAS
SHELLEY C. HARRIS
99197
LICENSED PROFESSIONAL ENGINEER

Shelley C. Harris, P.E.
6/29/2022

4 - 10' X 10' X 42.6' (60.1' SKEWED LENGTH) MBC CONCRETE BOX CULVERTS

NBI: 05-054-0453-04-009

BRIDGE CLASS. CULVERT LAYOUT

Texas Department of Transportation

N. T. S. Sheet 1 of 1

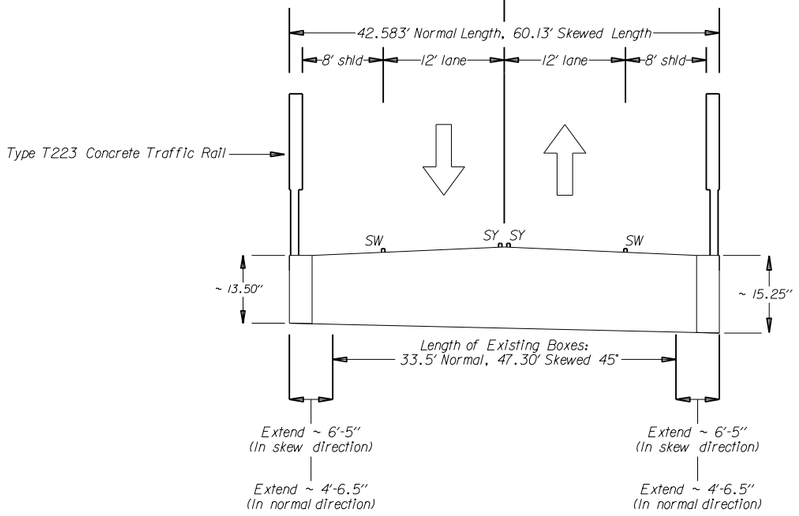
STATE DIST. NO.	COUNTY	SHEET NO.
05	CROSBY	167

CSJ	HIGHWAY NO.
0453 04 024	SH 207
FILE	SH207_DRG_BRIDGELAYOUT.dgn

DATE: 6/29/2022 11:18:07 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0453040241\4 - Design\Plan Set\5. Drainage\SH207_DRG_BRIDGELAYOUT_CONSTRUCTION

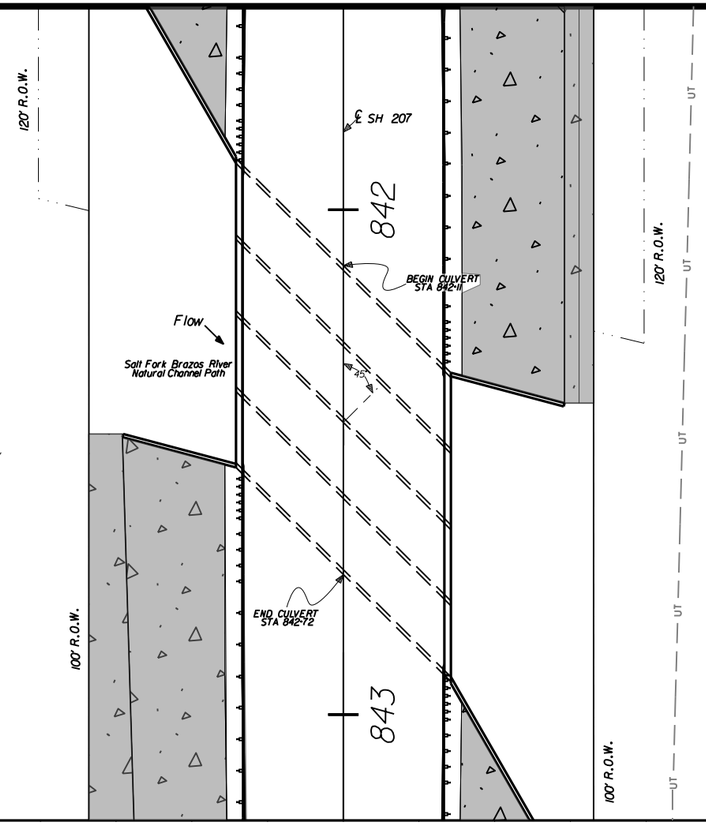
DETAIL A

℄ SH 207



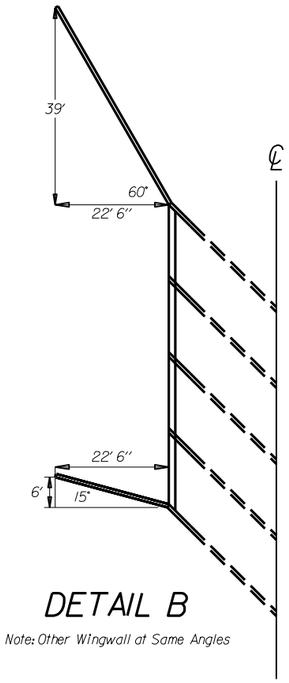
Detail Not to Sheet Scale

Note: Culvert extension is paid for in the skewed direction. See MC-MD lengthening detail and Note 1 for break back & culvert extension information.



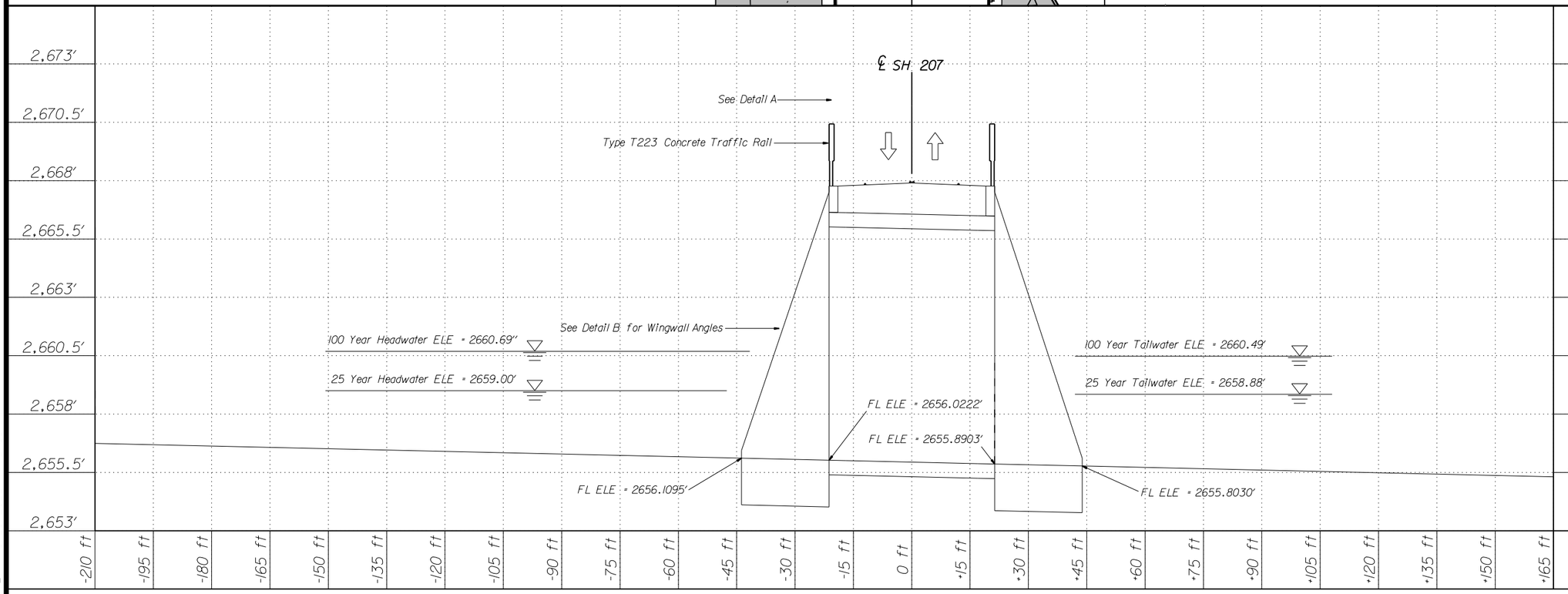
4 - 10' X 10' X 42.58' (60.13' SKEWED LENGTH) MBC
45° LEFT FORWARD SKEW
CONCRETE BOX CULVERTS
NBI: 05-054-0453-04-009

Top/Bottom Slab Thickness = 7.5"
Barrel Slope = 0.003882 ft/ft
Side Wall Thickness = 8"
Proposed Apron Riprap Thickness = 5"



DETAIL B

Note: Other Wingwall at Same Angles



SH 207

STRUCTURE NO. 16:

BRIDGE CROSS SECTION

H: 1" = 30'

V: 1" = 5'

STATE OF TEXAS
SHELLEY C. HARRIS
99197
LICENSED
PROFESSIONAL ENGINEER

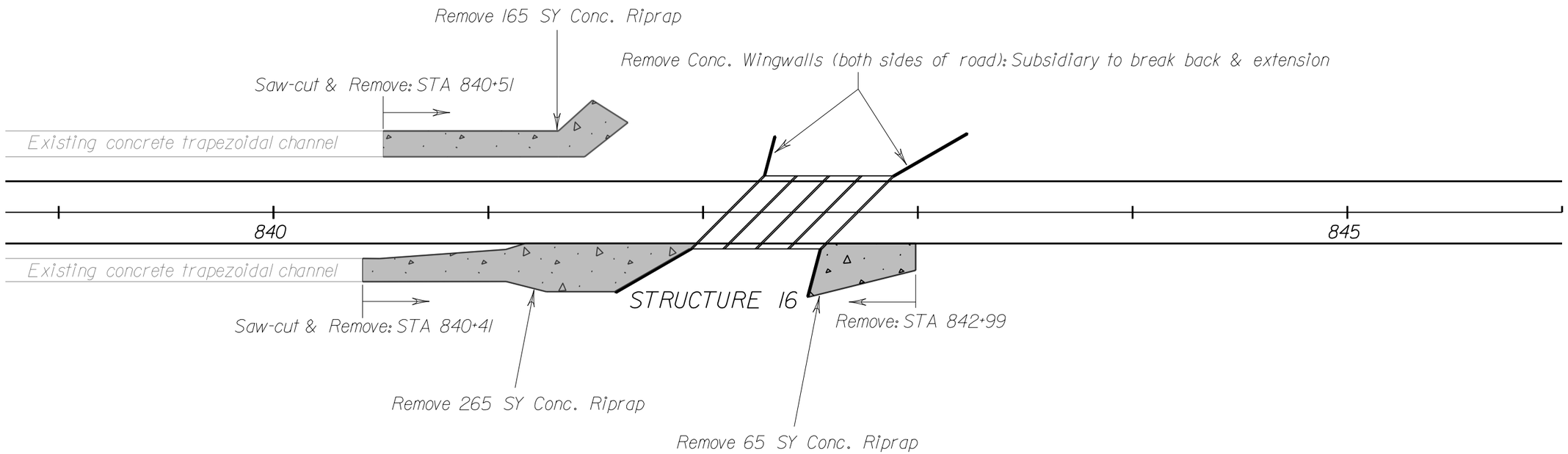
Shelley C. Harris, P.E.
6/29/2022

SHEET 1 OF 1

FHWA TEXAS DIVISION		SHEET NO.
		168

STATE	DISTRICT	COUNTY
TEXAS	05	CROSBY

CSJ	HIGHWAY NO.
0453 04 024	SH 207



NOTE:

Existing National Bridge Inventory (NBI) Number(s) shall be removed from the existing wingwall(s), saved in a location where they will not be damaged, and ultimately replaced on the proposed wingwall(s). This work shall not be paid for directly, but shall be considered subsidiary to the removal and replacement of the wingwalls.

STATE OF TEXAS
SHELLEY C. HARRIS
99197
LICENSED
PROFESSIONAL ENGINEER

Shelley C. Harris, P.E.
6/29/2022

Texas Department of Transportation

N. T. S. Sheet 1 of 1

STATE DIST. NO.	COUNTY	SHEET NO.
05	CROSBY	169
CSJ		HIGHWAY NO.
0453 04 024		SH 207
FILE	SH207_DRG_BRIDGELAYOUT.dgn	

BRIDGE REMOVALS

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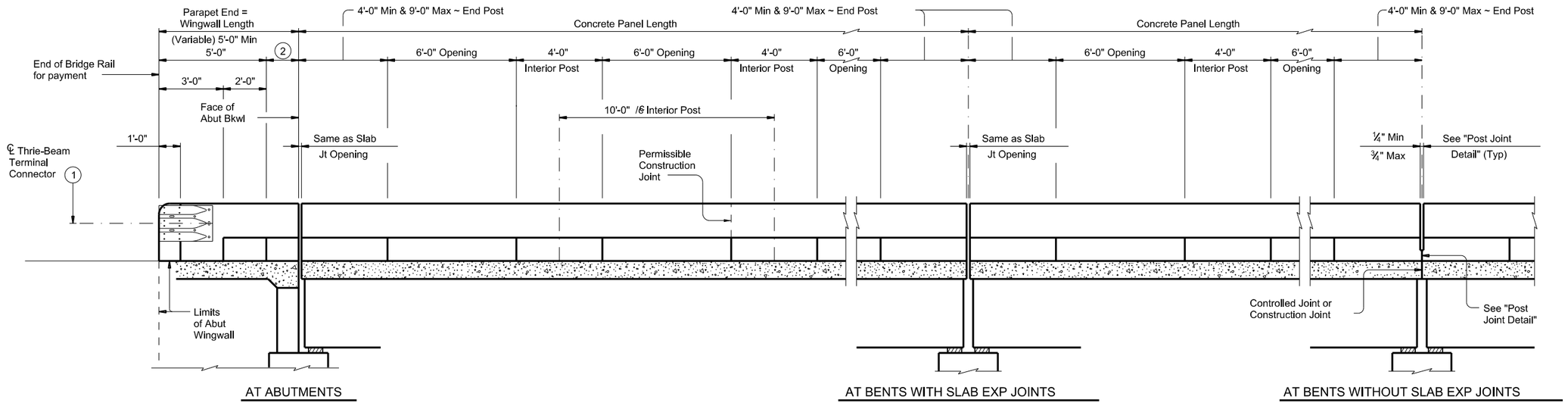
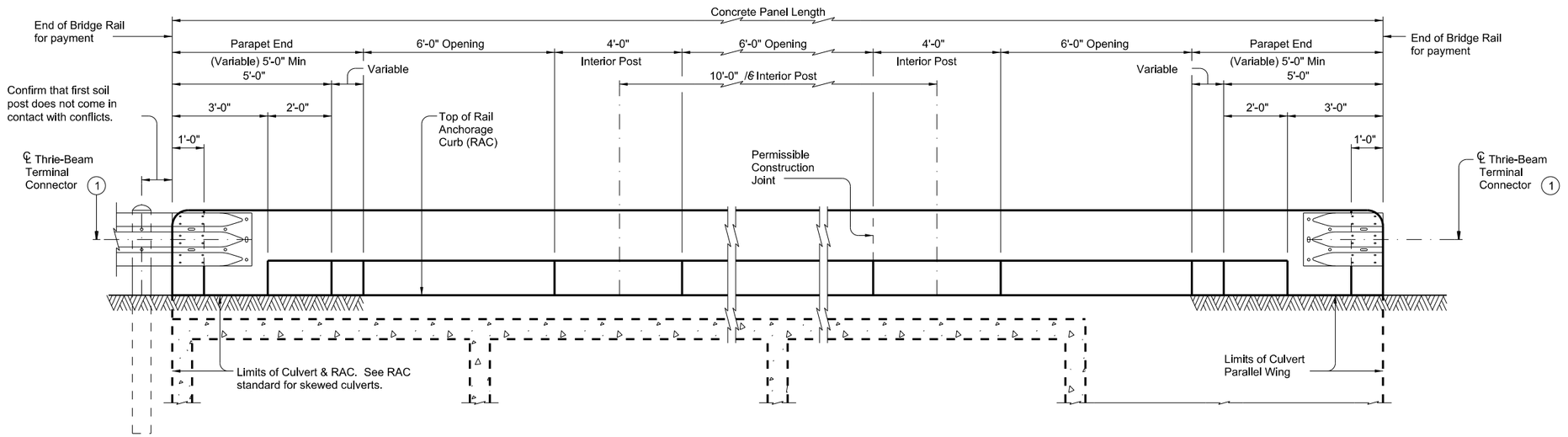


ROADWAY ELEVATION OF RAIL ON BRIDGE



ROADWAY ELEVATION OF RAIL ON BOX CULVERTS

Showing 0° skew culvert. Skewed culverts similar. See RAC standard for details not shown.
Vertical joints in concrete rail are not required, unless shown elsewhere.

(1) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.

(2) Wingwall Length minus 5'-0" (Varies)

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T223

FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		170

DATE: 6/29/2022 1:18:12 PM
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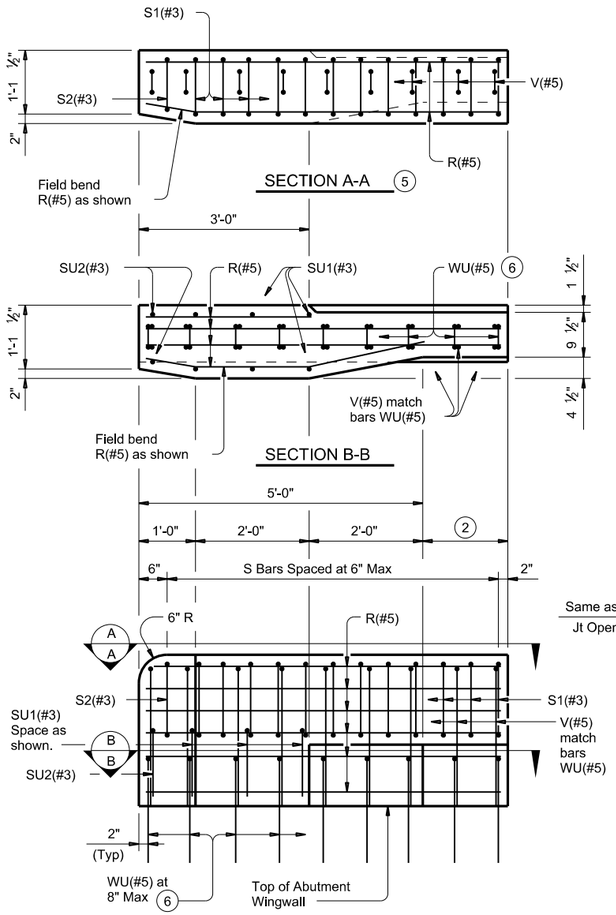
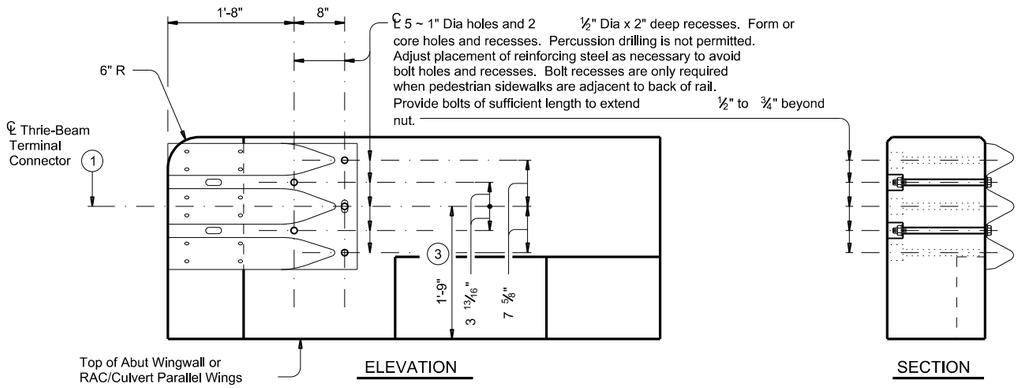
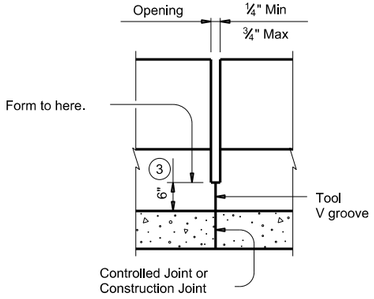


PARAPET END AT ABUT WINGWALL (6)

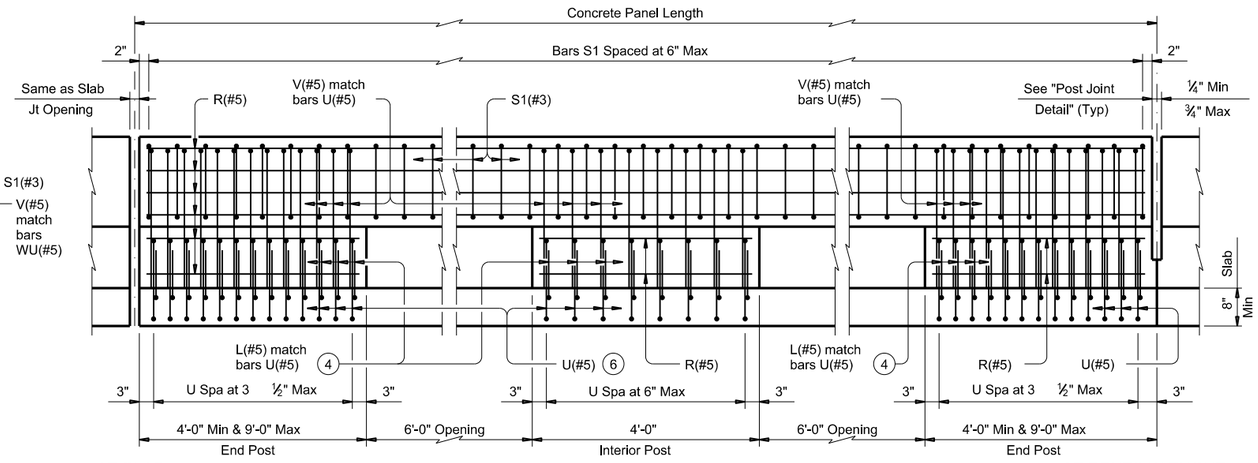


TERMINAL CONNECTION DETAILS



POST JOINT DETAIL

Provide at all interior bents without slab expansion joints.



AT SLAB EXPANSION JOINTS

AT 4' INTERIOR POST

AT BENTS WITHOUT SLAB EXPANSION JOINTS

ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

Showing rail on slab. Rail on box culvert similar.

(1) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.

(2) Wingwall Length minus 5'-0" (Varies)

(3) Increase 2" for structures with overlay.

(4) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.

(5) Bars SU1(#3), SU2(#3) and WU(#5) not shown for clarity.

(6) Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on achorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T223

FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		171

DATE: 6/29/2022 1:18:14 PM
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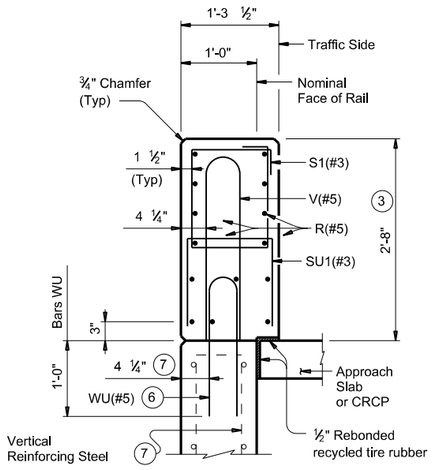
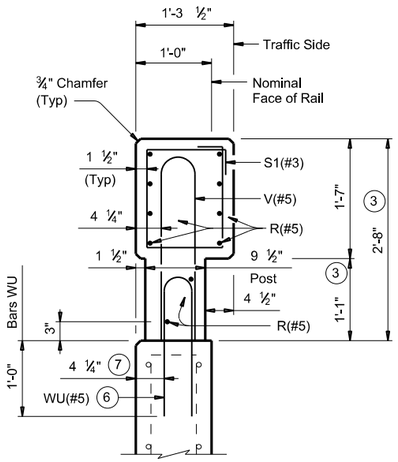
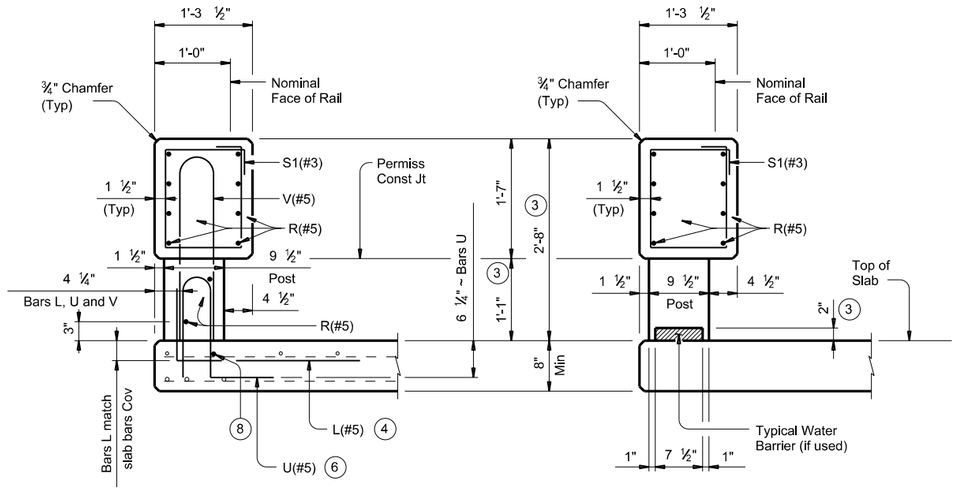


SECTION C-C
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



SECTION D-D
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS

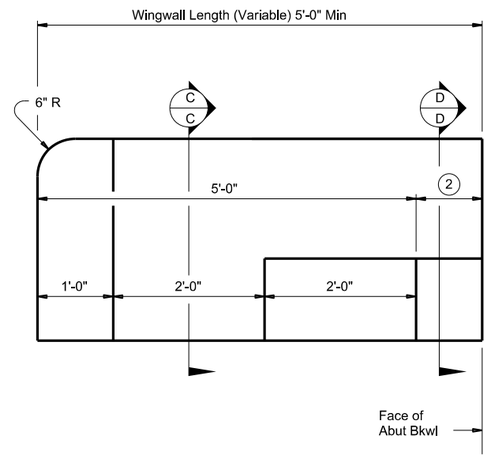


AT POST
ON BRIDGE SLAB

AT OPENING
ON BRIDGE SLAB

SECTIONS THRU RAIL

Sections on box culverts similar.



ELEVATION AT ABUTMENT WINGWALL

Box culvert parallel wings or rail anchorage curb similar.

(2) Wingwall Length minus 5'-0" (Varies)

(3) Increase 2" for structures with overlay.

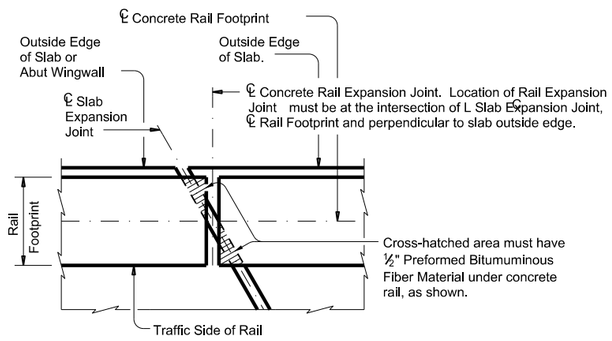
(4) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.

(6) Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

(7) When vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls on traffic side of wall, move the horizontal wingwall/retaining wall reinforcing to the inside of Bars WU where bars conflict.

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

(9) At the Contractor's option, Bars V may be replaced by extending Bars U to 2'-5 ¼" above the roadway surface without overlay.



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

CONSTRUCTION NOTES:

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

Provide water barriers at openings draining onto undercrossing roadways and sidewalks. They may be cast-in-place or precast in convenient lengths and bonded to the bridge deck with an approved epoxy cement.

Chamfer all exposed corners.

MATERIAL NOTES:

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

Provide Grade 60 reinforcing steel.

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

Deformed Welded Wire Reinforcing (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U, V, and WU unless noted otherwise. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #5 = 2'-0"

Epoxy coated ~ #5 = 3'-0"

GENERAL NOTES:

This rail has been evaluated by full-scale crash test to meet MASH TL-3 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

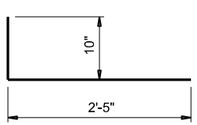
Do not use this railing on bridges with expansion joints providing more than 5" movement.

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

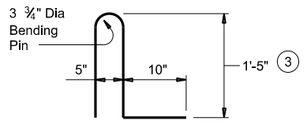
Shop drawings are not required for this rail.

Average weight of railing with no overlay is 358 plf.

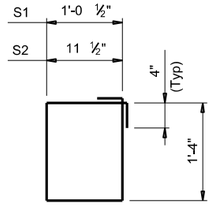
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



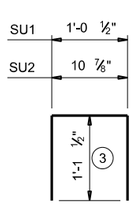
BARS L (#5)



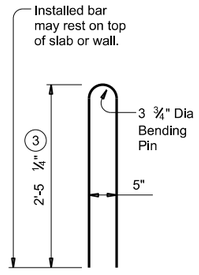
BARS U (#5) (9)



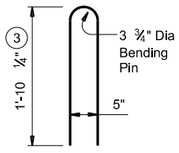
BARS S (#3)



BARS SU (#3)



BARS V (#5) (9)



BARS WU (#5)

SHEET 3 OF 3

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T223

FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		172

DATE: 6/29/2022 1:18:16 PM
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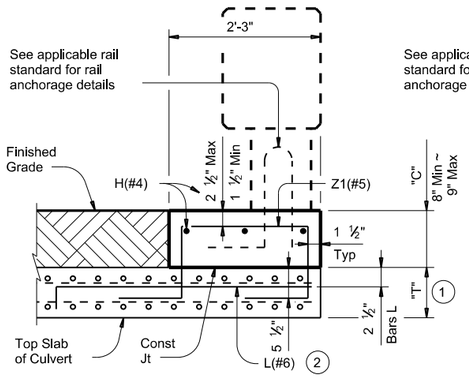
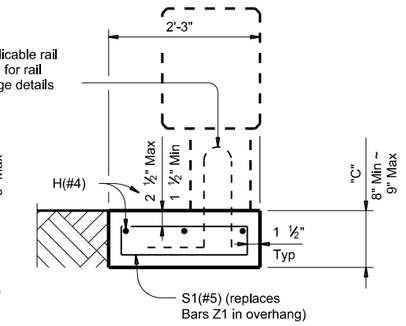


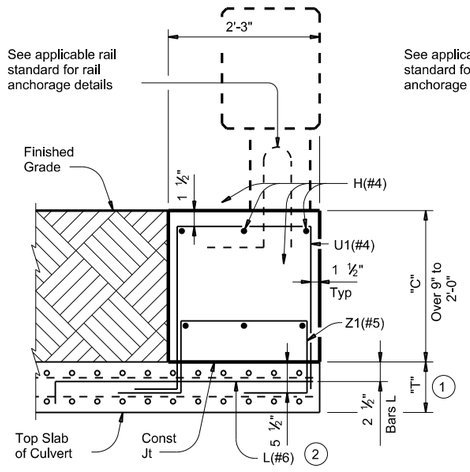
SECTION A-A



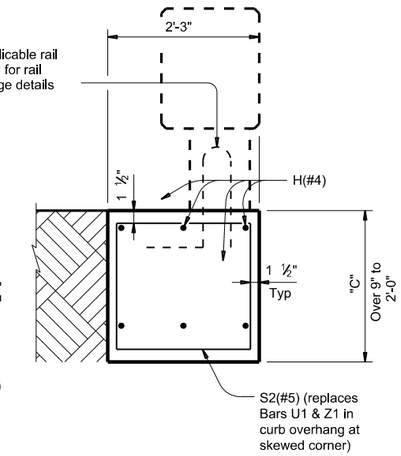
SECTION B-B

TYPE 1 CURB

Used for curbs from 8" to 9" (Showing "C" = 9"). Showing T223 Rail, other rails similar. (Bars L(#5) on T223 and C223 Rails are not used for this structure). Bars RH(#5) required on standards T80HT, T80SS and T224 are not required when used with the RAC standard.



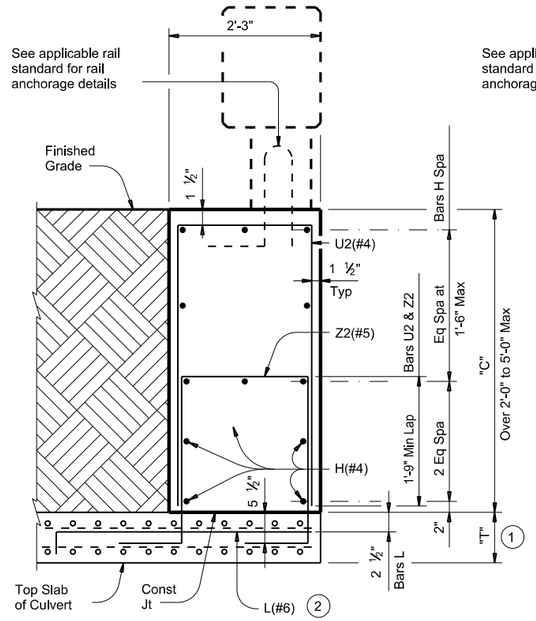
SECTION A-A



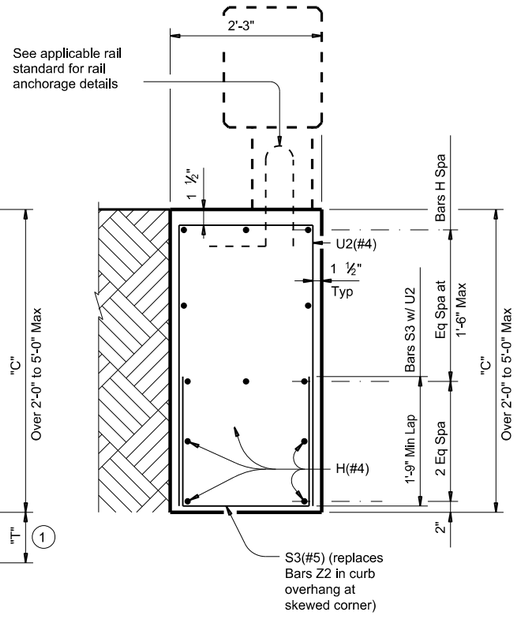
SECTION B-B

TYPE 2 CURB

Used for curbs over 9" to 2'-0" (Showing "C" = 2'-0"). Showing T223 Rail, other rails similar. (Bars L(#5) on T223 and C223 Rails are not used for this structure). Bars RH(#5) required on standards T80HT, T80SS and T224 are not required when used with the RAC standard.



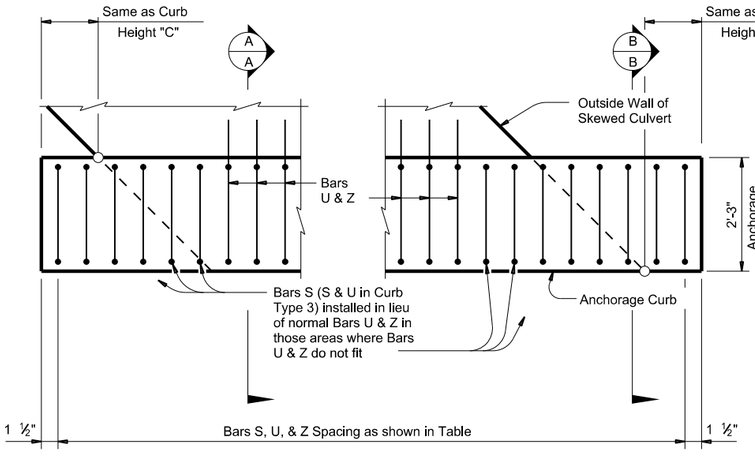
SECTION A-A

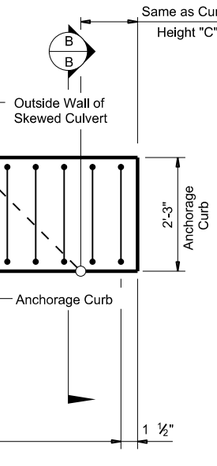


SECTION B-B

TYPE 3 CURB

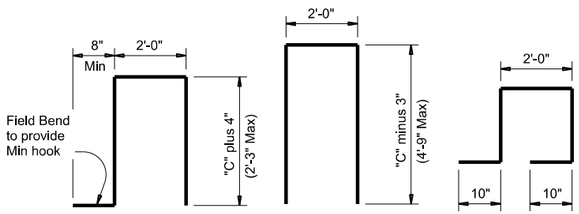
Used for curbs over 2'-0" to 5'-0" (Showing "C" = 4'-0"). Showing T223 Rail, other rails similar. (Bars L(#5) on T223 and C223 Rails are not used for this structure). Bars RH(#5) required on standards T80HT, T80SS and T224 are not required when used with the RAC standard.





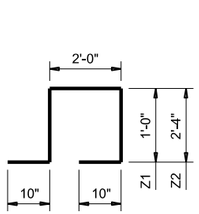
TYPICAL CURB PLAN

Showing typical installation on skewed culvert. (Bars L(#5) on T223 and C223 Rails are not used for this structure). Bars RH(#5) required on standards T80HT, T80SS and T224 are not required when used with the RAC standard.

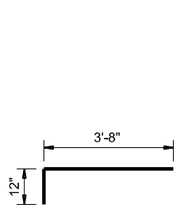


BARS U1 (#4)

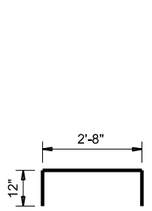
BARS U2 (#4)



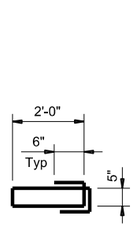
BARS Z (#5)



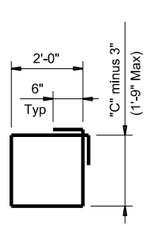
BARS L (#6) (2)
Spaced at 6" Max



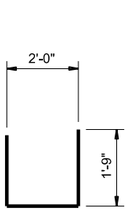
OPTIONAL BARS L (#6) (3) (2)
Spaced at 6" Max



BARS S1 (#5)



BARS S2 (#5)



BARS S3 (#5)

TABLE OF REINFORCING SPACING

Curb Height "C"	Section Type	Bars S, U, & Z Spa
8" to 9"	1	12"
Over 9" to 2'-0"	2	9"
Over 2'-0" to 3'-0"	3	7"
Over 3'-0" to 5'-0"	3	5"

TABLE OF ESTIMATED QUANTITIES (4)

Curb Height "C"	Section Type	Reinf Steel (Lb/LF)	Class "C" Concrete (CY/LF)
8"	1	21.5	0.056
9"	1	21.5	0.063
1'-0"	2	29.7	0.083
1'-6"	2	30.6	0.125
2'-0"	2	31.5	0.167
3'-0"	3	44.6	0.250
4'-0"	3	56.8	0.333
5'-0"	3	60.0	0.417

(1) "T" is equal to the culvert top slab thickness. For Precast Boxes with slabs less than 8" thick, see SCP-MD Standard for additional details.

(2) Tilt Bars L hook as necessary to maintain cover.

(3) Optional Bars L are to be used only for Precast Box Culverts with 3'-0" closure pours.

(4) Quantities shown are for Contractor's information only. Quantities are per Linear Foot of curb length. The values for each section type in table can be interpolated for intermediate values of Curb Height, "C".

CONSTRUCTION NOTES:

When using this anchorage curb, omit normal culvert curb reinforcing bars K and H shown on the culvert standard sheets.

For vehicle safety, the top of the curb must be flush with the finished grade.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.

Galvanize all reinforcing steel if required elsewhere.

Provide bar laps, where required, as follows:
Uncoated or galvanized ~ #4 = 1'-11"

Provide Class "C" concrete (f'c=3,600 psi). Provide Class "C" (HPC) concrete if shown elsewhere in the plans.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

The rail anchorage curb details have sufficient strength for use with all standard rail types.

See appropriate rail standard for approved design speed restrictions, notes and details not shown.

This anchorage curb is considered part of the Box Culvert for payment.

These details are for use with curbs that are 8" to 5'-0" tall only. Curb heights that are less than or greater than those shown will require special design.

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

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

RAIL ANCHORAGE CURB

BOX CULVERT RAIL MOUNTING DETAILS

(CURBS 8" TO 5'-0" TALL ONLY)

RAC

FILE: racste01-20.dgn	DN: GAF	CK: TxDOT	DW: TxDOT	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		173

DATE: 6/29/2022 1:18:18 PM
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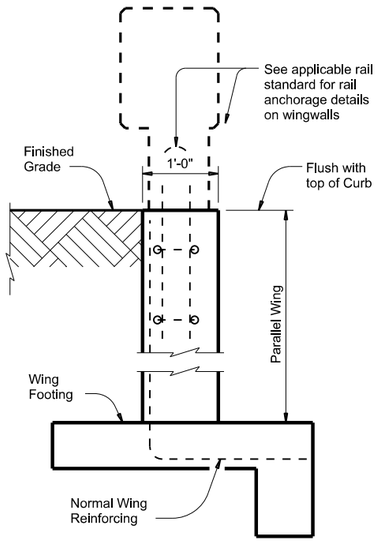
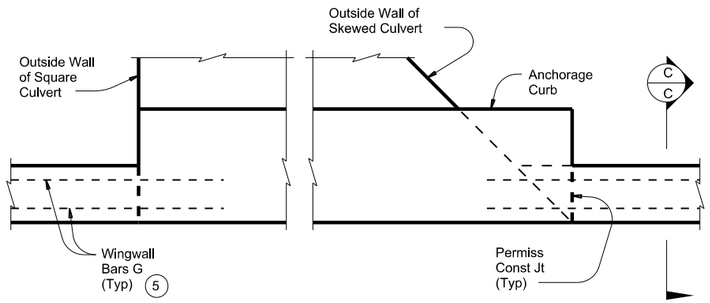


SECTION C-C



TYPICAL CURB PLAN
Curb reinforcing and footings not shown for clarity

INSTALLATION AT PARALLEL CULVERT WINGWALLS

See culvert wingwall standard for bars and details not shown.

(5) Bars G (#5), as identified on the PARALLEL WINGS PW standard sheet, must extend 1'-6" into the Anchorage Curb similar to that shown for a normal culvert curb.

Texas Department of Transportation

Bridge Division Standard

RAIL ANCHORAGE CURB

BOX CULVERT
RAIL MOUNTING DETAILS
(CURBS 8" TO 5'-0" TALL ONLY)

RAC

FILE: racste01-20.dgn	DN: GAF	CK: TxDOT	DW: TxDOT	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		174

FINAL STRIPING QUANTITIES: Notes: SW = Solid White. SY = Solid Yellow. BY = Broken Yellow. Stripe from STA 394+98+414+48 & STA 1029+01+1048+51 is placed on project ends seal coat.											
LENGTH [FT]	STATION RANGE FROM	TO	6" SW [LF]	6" SY Northbound [LF]	6" SY Southbound [LF]	6" BY Northbound [LF]	6" BY Southbound [LF]	6" BY [LF]	RPM TY II-A-A [EA]	24" SW [LF]	CENTERLINE STRIPE(S) DESCRIPTION
1197	394+98	406+95	2394					300	15		Only 6" Broken Yellow
753	406+95	414+48	1506		753	190			19		Broken Yellow Northbound, Solid Yellow Southbound.
752	414+48	422+00	1504		752	190			19		Broken Yellow Northbound, Solid Yellow Southbound.
1070	422+00	432+70	2140	1070	1070				27	28	Double Solid Yellow
1020	432+70	442+90	2040	1020			260		26		Broken Yellow Southbound, Solid Yellow Northbound
940	442+90	452+30	1880		940	240			24		Broken Yellow Northbound, Solid Yellow Southbound.
1520	452+30	467+50	3040	1520	1520				38		Double Solid Yellow
1190	467+50	479+40	2380	1190			300		30	21	Broken Yellow Southbound, Solid Yellow Northbound.
18130	479+40	660+70	36260					4540	227	89	Only 6" Broken Yellow
1370	660+70	674+40	2740		1370	350			34	33	Broken Yellow Northbound, Solid Yellow Southbound.
514	674+40	679+54	1028	514	514				13		Double Solid Yellow
1510	679+54	694+64	3020	1510			380		38		Broken Yellow Southbound, Solid Yellow Northbound
1508	694+64	709+72	3016		1508	380			38		Broken Yellow Northbound, Solid Yellow Southbound.
4115	709+72	750+87	8230	4115	4115				103		Double Solid Yellow
1271	750+87	763+58	2542	1271			320		32		Broken Yellow Southbound, Solid Yellow Northbound
1290	763+58	776+48	2580		1290	330			32		Broken Yellow Northbound, Solid Yellow Southbound.
908	776+48	785+56	1816	908			230		23		Broken Yellow Southbound, Solid Yellow Northbound
846	785+56	794+02	1692		846	220			21		Broken Yellow Northbound, Solid Yellow Southbound.
1304	794+02	807+06	2608	1304			330		33		Broken Yellow Southbound, Solid Yellow Northbound
1508	807+06	822+14	3016					380	19		Only 6" Broken Yellow
1447	822+14	836+61	2894		1447	370			36	14	Broken Yellow Northbound, Solid Yellow Southbound.
1546	836+61	852+07	3092	1546	1546				39		Double Solid Yellow
1384	852+07	865+91	2768	1384			350		35		Broken Yellow Southbound, Solid Yellow Northbound.
1133	865+91	877+24	2266					290	14		Only 6" Broken Yellow
1301	877+24	890+25	2602		1301	330			33		Broken Yellow Northbound, Solid Yellow Southbound.
593	890+25	896+18	1186	593	593				15		Double Solid Yellow
1290	896+18	909+08	2580	1290			330		32		Broken Yellow Southbound, Solid Yellow Northbound.
5172	909+08	960+80	10344					1300	65	16	Only 6" Broken Yellow
1307	960+80	973+87	2614		1307	330			33		Broken Yellow Northbound, Solid Yellow Southbound.
1403	973+87	987+90	2806	1403			360		35		Broken Yellow Southbound, Solid Yellow Northbound
1307	987+90	1000+97	2614		1307	330			33		Broken Yellow Northbound, Solid Yellow Southbound.
1509	1000+97	1016+06	3018	1509	1509				38		Double Solid Yellow
1295	1016+06	1029+01	2590	1295			330		32		Broken Yellow Southbound, Solid Yellow Northbound
524	1029+01	1034+25	1048	524			140		13		Broken Yellow Southbound, Solid Yellow Northbound
1426	1034+25	1048+51	2852		1426	360			36		Broken Yellow Northbound, Solid Yellow Southbound.
6" SW PROJECT TOTAL:			130706	23966	25114	3620	3330	6810	1295	201	
6" SY PROJECT TOTAL:				49080							
6" BY PROJECT TOTAL:						13760					
RPM TY II-A-A PROJECT TOTAL:									1295		
24" SW PROJECT TOTAL:										201	

DELINEATION SUMMARY				
	INSTL DEL ASSM (D-SW)SZ I (WFLX) GND (BI)	INSTL DEL ASSM (D-SW)SZ I (BRF) GF2 (BI)	INSTL DEL ASSM (D-SW)SZ I (WFLX) SRF (BI)	INSTL OM ASSM (OM-2Z) (WFLX) GND(BI)
	[EA]	[EA]	[EA]	[EA]
PROJECT TOTAL	50	33	8	54

SUMMARY OF SMALL SIGN QUANTITIES						
BID ITEM	644	644	644	644	644	644
DESC. CODE	6001	6002	6004	6007	6034	6076
DESCRIP.	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	IN SM RD SN SUP&AM TY10BWG(1)SA(P-BM)	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	IN SM RD SN SUP&AM TY10BWG(1)SA(U)	IN SM RD SN SUP&AM TYS80(1)SA(U-IEXT)	REMOVE SM RD SN SUP&AM
	[EA]	[EA]	[EA]	[EA]	[EA]	[EA]
PROJECT TOTAL	14	12	26	1	1	51

MAILBOX SUMMARY			
	MAILBOX INSTALL-S (TWW-POST) TY 4	MAILBOX INSTALL-D (TWW-POST) TY 4	MAILBOX INSTALL-M (TWW-POST)TY 4
	[EA]	[EA]	[EA]
PROJECT TOTAL	8	1	1

NOTE: Existing National Bridge Inventory (NBI) Number(s) shall be removed from the existing wingwall(s), saved in a location where they will not be damaged, and ultimately replaced on the proposed wingwall(s). This work shall not be paid for directly, but shall be considered subsidiary to the removal and replacement of the wingwalls.

Removal of existing delineators and object markers is considered subsidiary.

STATE OF TEXAS
MICHAEL D. BOYD
142962
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PROFESSIONAL ENGINEER

Michael D. Boyd, P.E.
6/29/2022

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No Scale Sheet 1 of 1

STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		175
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_TRF_SUMMARY.dgn		

SIGNS, STRIPING, MAILBOXES, & DELINEATORS SUMMARY

DATE: 6/29/2022 11:18:21 PM
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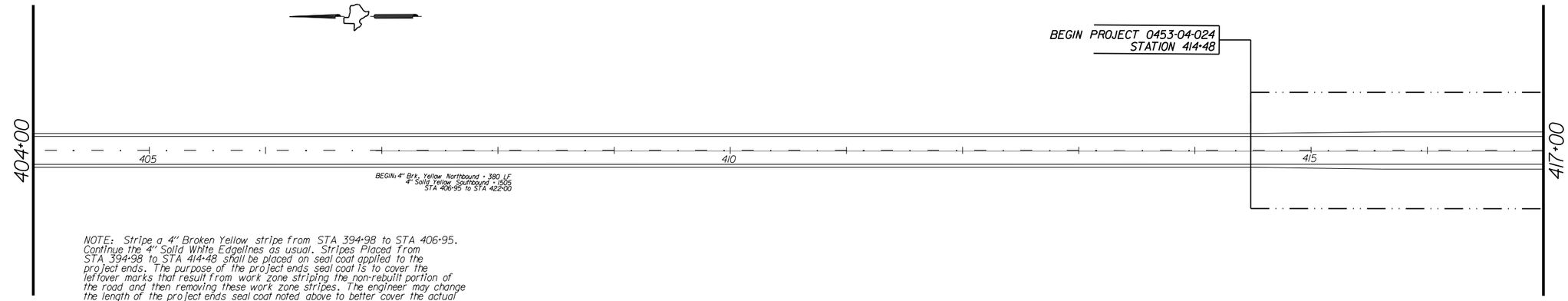
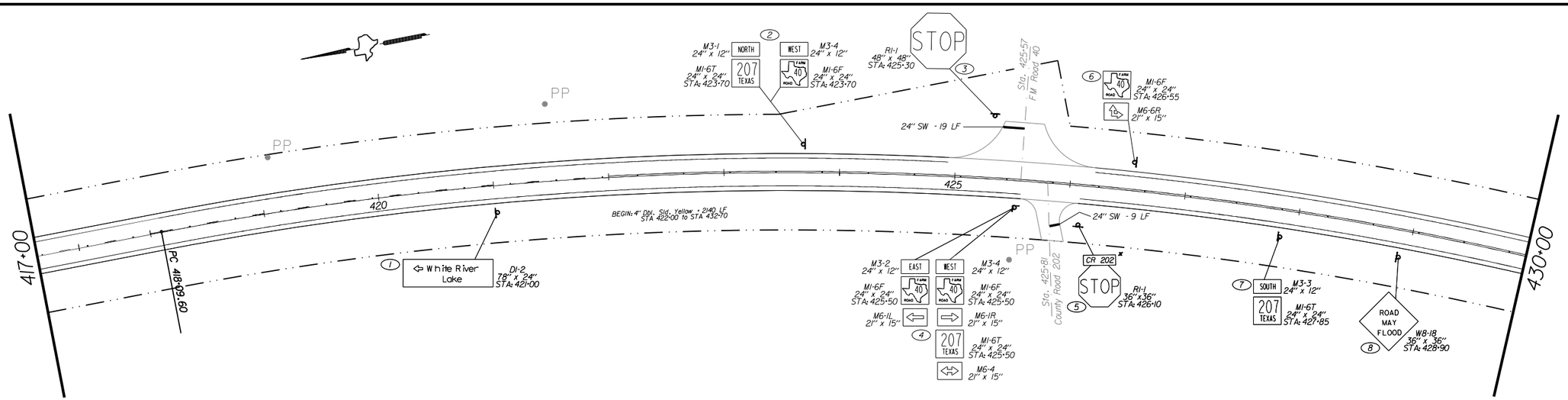
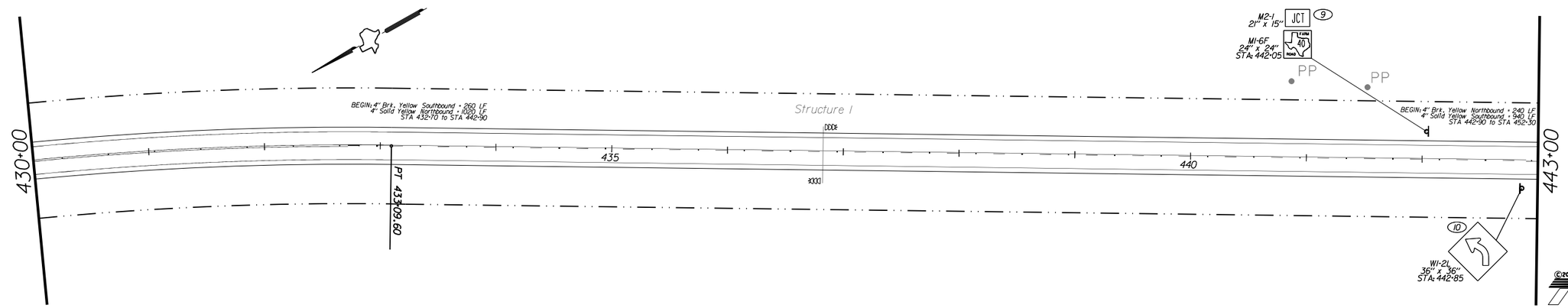


NOTE: Stripe a 4" Broken Yellow stripe from STA 394+98 to STA 406+95. Continue the 4" Solid White Edgelines as usual. Stripes Placed from STA 394+98 to STA 414+48 shall be placed on seal coat applied to the project ends. The purpose of the project ends seal coat is to cover the leftover marks that result from work zone striping the non-rebuilt portion of the road and then removing these work zone stripes. The engineer may change the length of the project ends seal coat noted above to better cover the actual work zones stripes placed during construction. The above station range is an estimate. See the Roadway Summary for more details.

LEGEND	
BDE	Bi-Directional Delineator
DDOE	Type 2 Object Marker
	Single Sign Post





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SIGN AND STRIPING LAYOUT

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SCALE: 1" = 100' Sheet 1 of 24

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		176
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_TRF_SIGNS_STRIPING.dgn		

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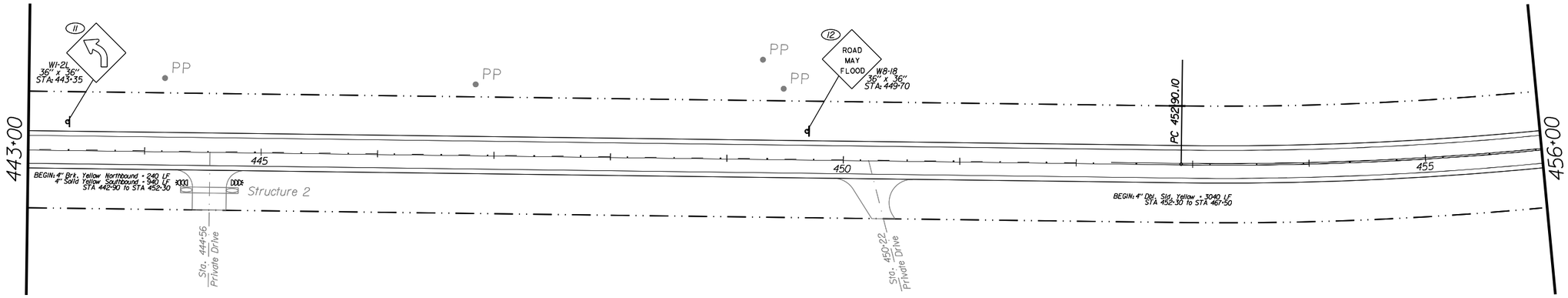

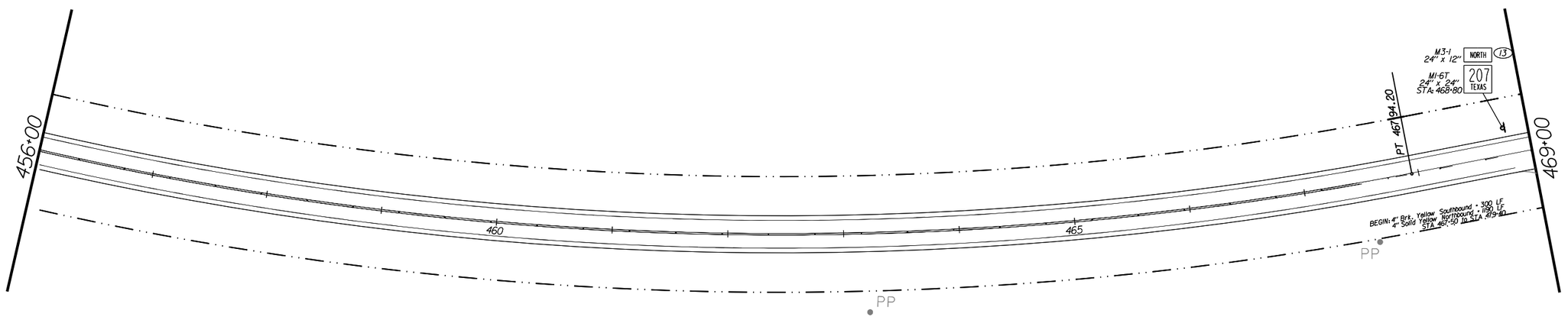

LEGEND	
	Bi-Directional Delineator
	Type 2 Object Marker
	Single Sign Post

* Contractor to save and remount county road signs.

SIGN AND STRIPING LAYOUT

STATE OF TEXAS
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SCALE: 1" = 100' Sheet 2 of 24

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		177
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_TRF_SIGNS_STRIPING.dgn		

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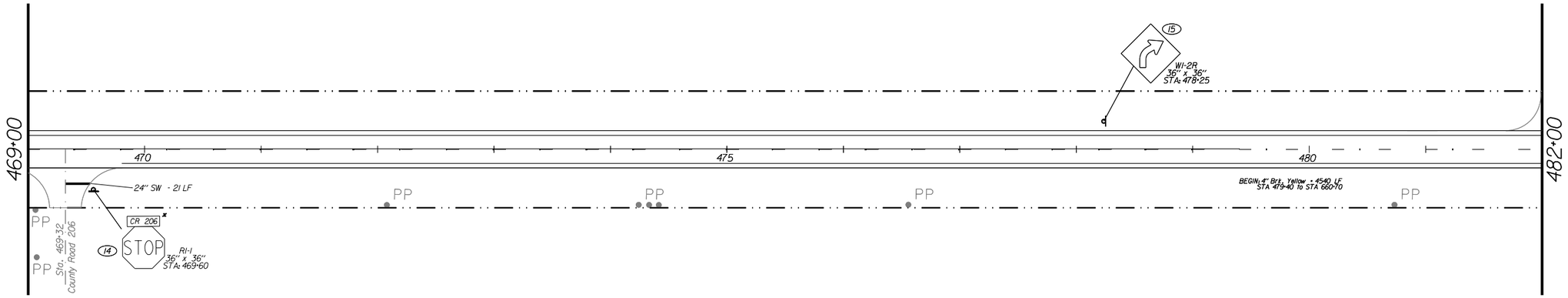

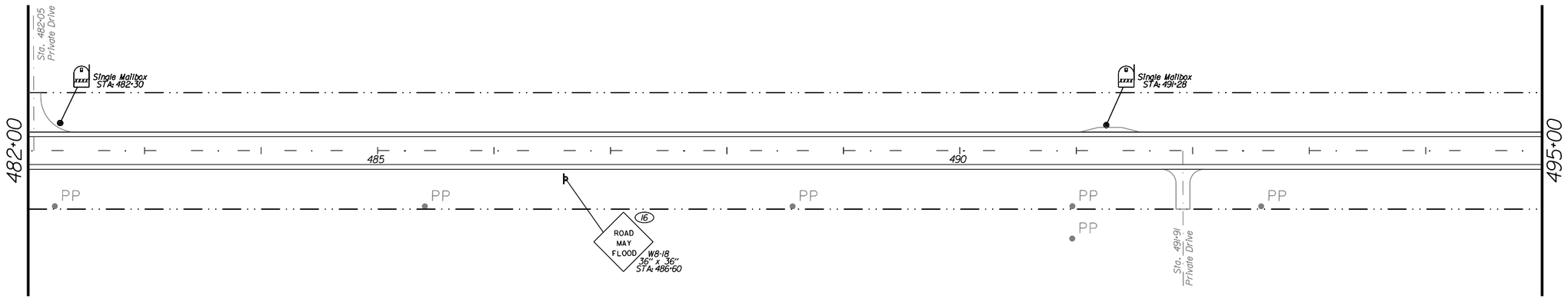

LEGEND	
	Bi-Directional Delineator
	Type 2 Object Marker
	Single Sign Post

SIGN AND STRIPING LAYOUT

* Contractor to save and remount county road signs.

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SCALE: 1" = 100' Sheet 3 of 24

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		178
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_TRF_SIGNS_STRIPING.dgn		

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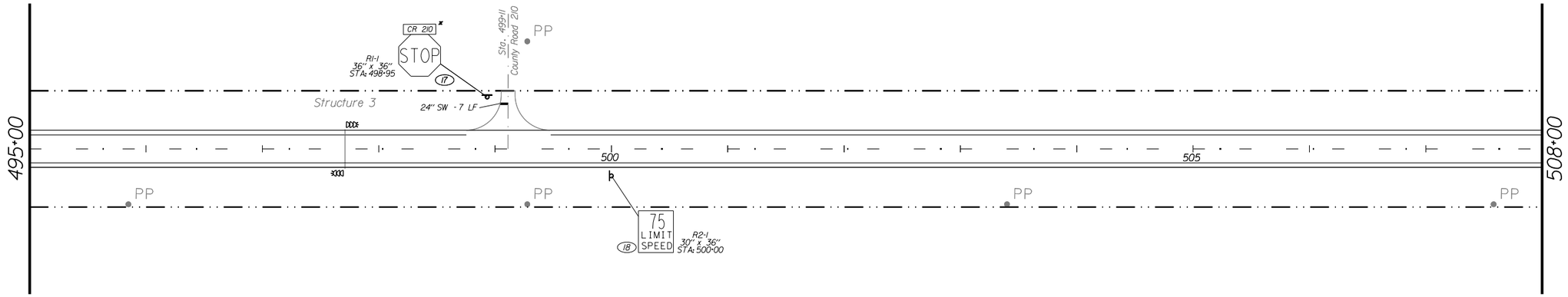

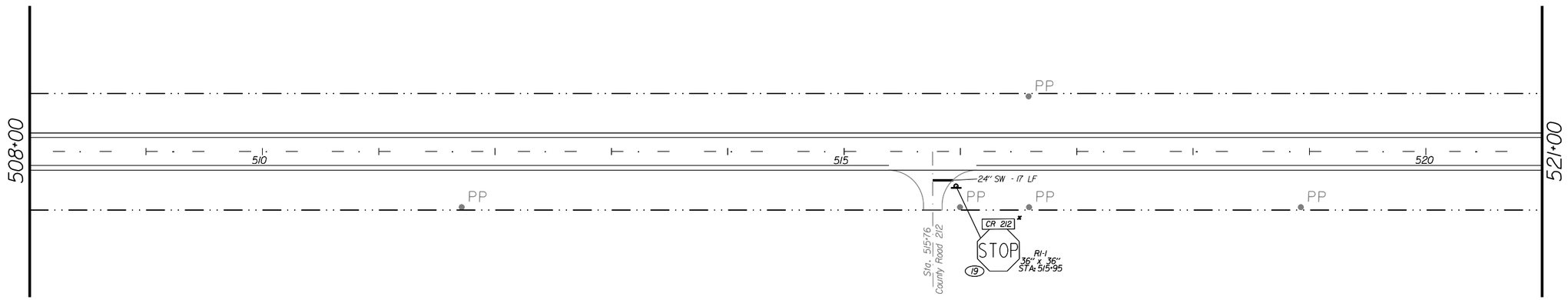

LEGEND	
	Bi-Directional Delineator
	Type 2 Object Marker
	Single Sign Post

* Contractor to save and remount county road signs.

SIGN AND STRIPING LAYOUT

STATE OF TEXAS
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SCALE: 1" = 100' Sheet 4 of 24

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		179
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_TRF_SIGNS_STRIPING.dgn		

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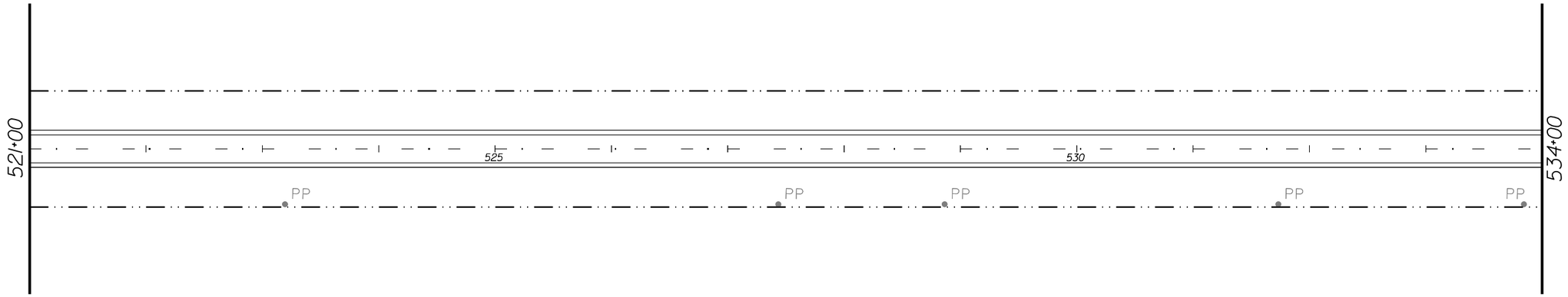
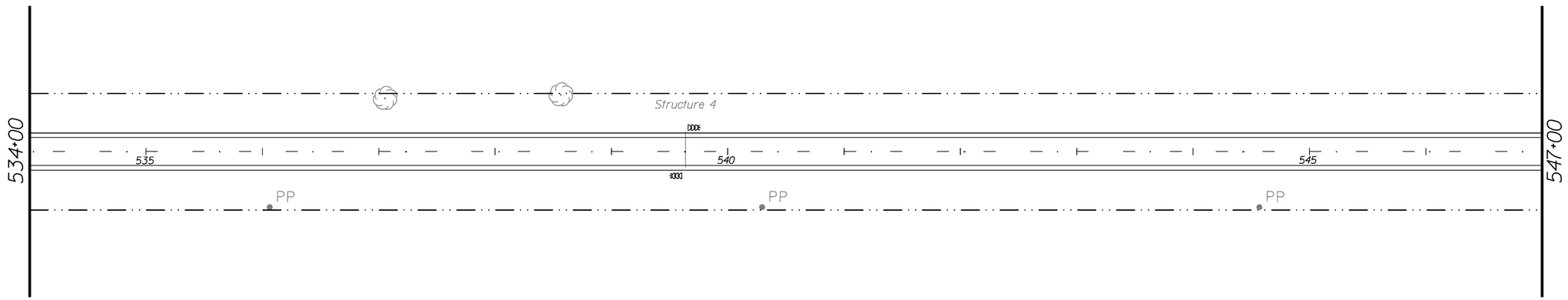


LEGEND

	Bi-Directional Delineator
	Type 2 Object Marker
	Single Sign Post



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SIGN AND STRIPING LAYOUT

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SCALE: 1" = 100' Sheet 5 of 24

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		180
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_TRF_SIGNS_STRIPING.dgn		

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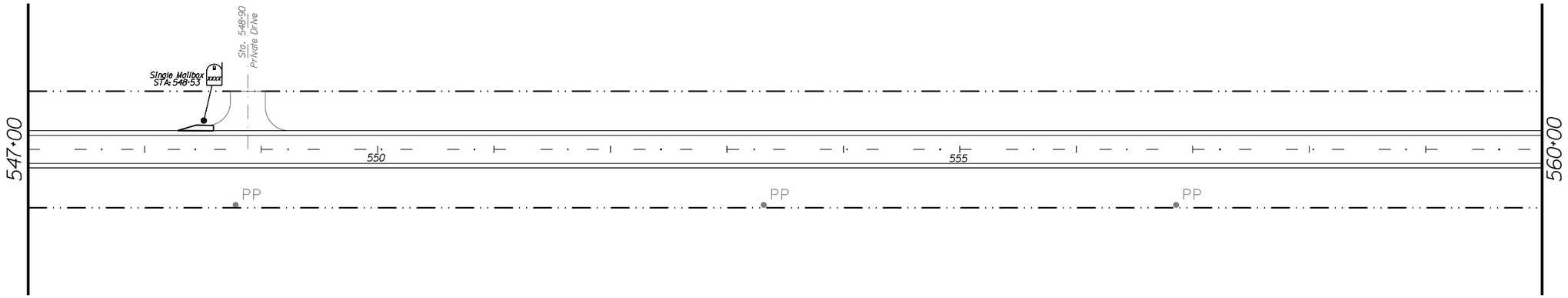

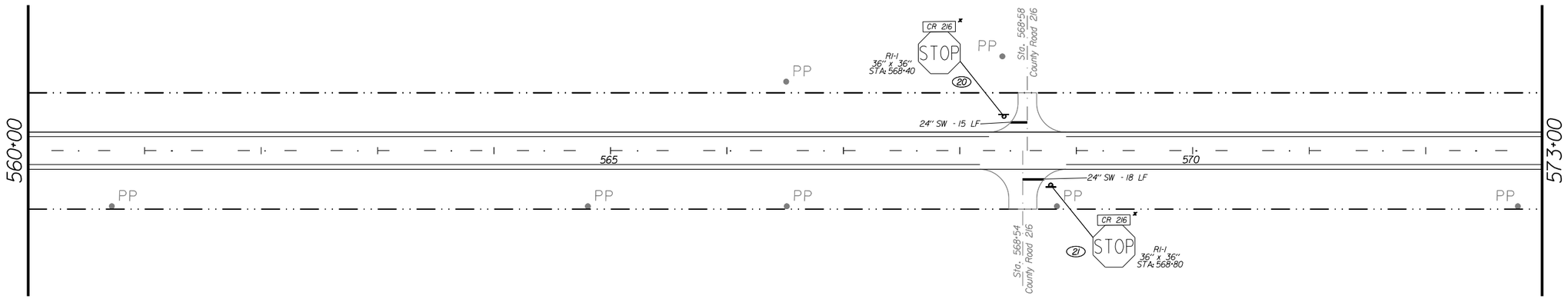

LEGEND

	Bi-Directional Delineator
	Type 2 Object Marker
	Single Sign Post

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SIGN AND STRIPING LAYOUT

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SCALE: 1" = 100' Sheet 6 of 24

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		181
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_TRF_SIGNS_STRIPING.dgn		

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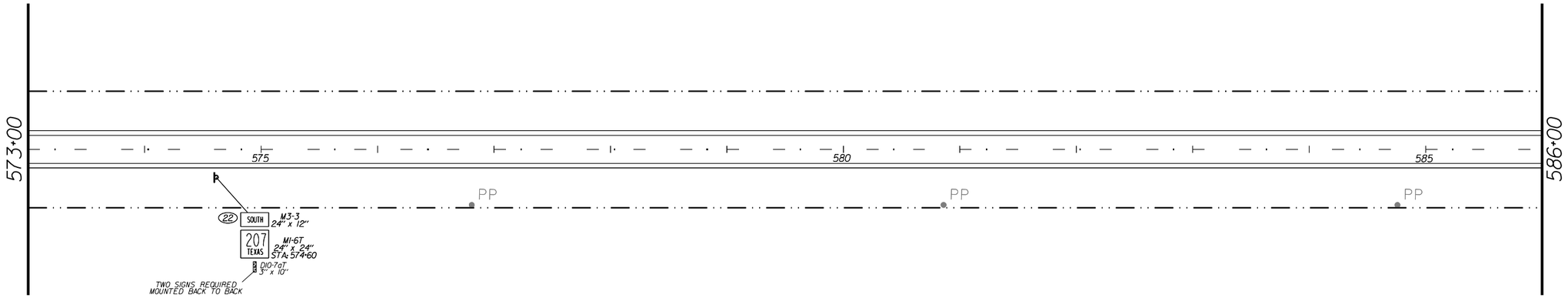
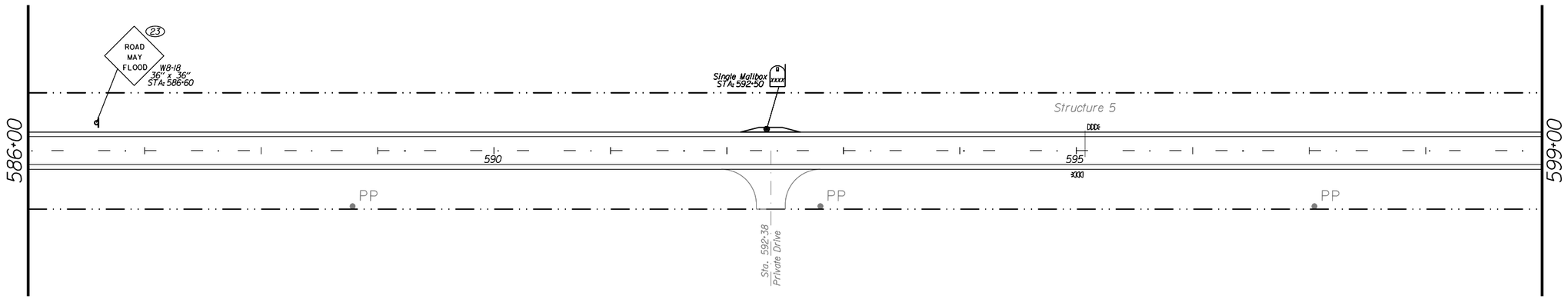


LEGEND	
BDE	Bi-Directional Delineator
DDE	Type 2 Object Marker
	Single Sign Post



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SCALE: 1" = 100' Sheet 7 of 24

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		182
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_TRF_SIGNS_STRIPING.dgn		

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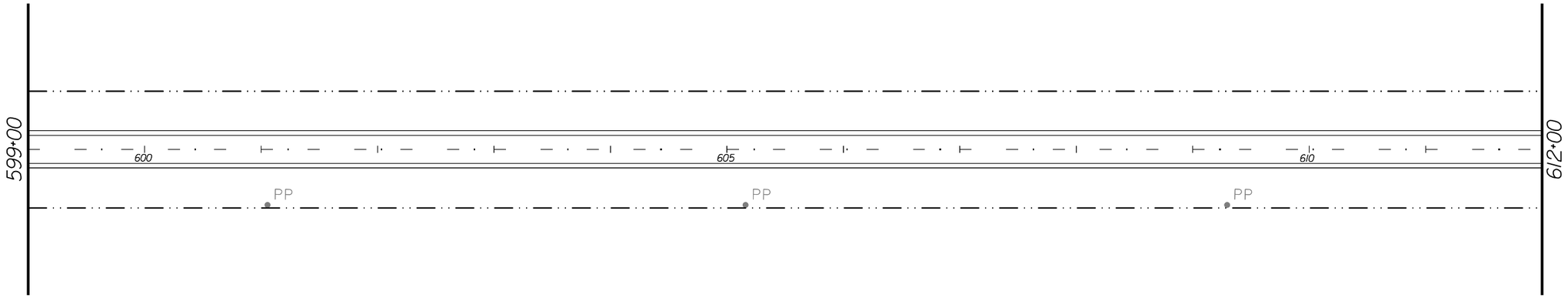
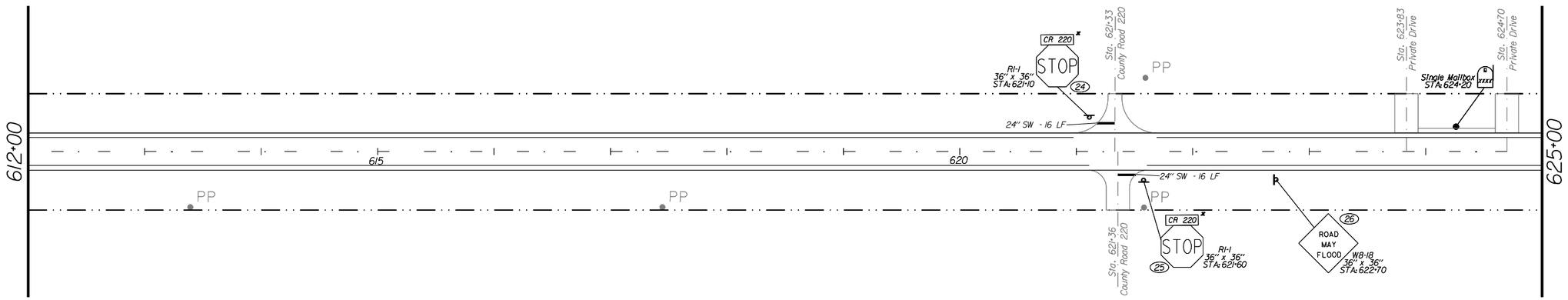


LEGEND

BDE	Bi-Directional Delineator
OMT	Type 2 Object Marker
⊙	Single Sign Post



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SIGN AND STRIPING LAYOUT

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STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		183
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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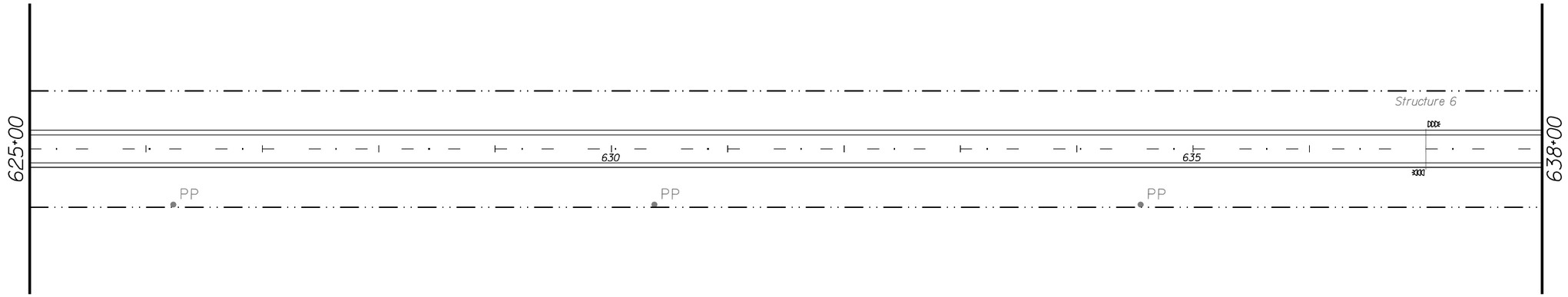

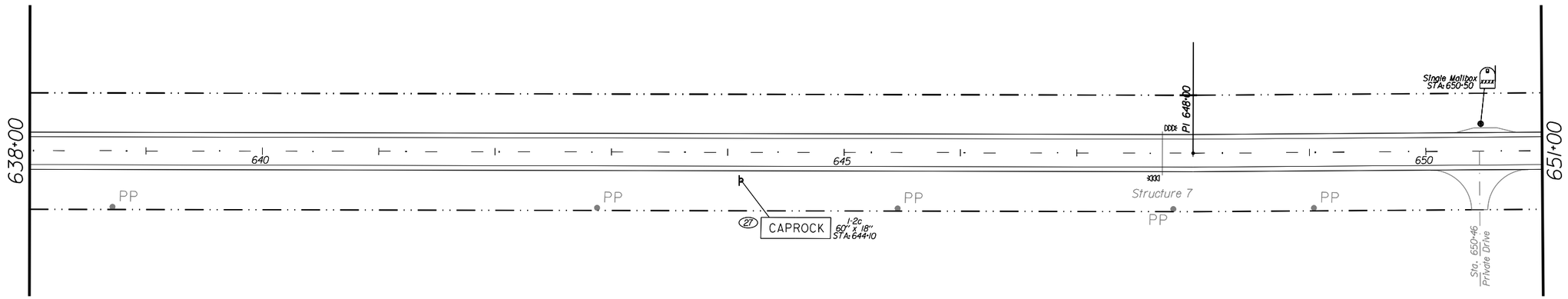

LEGEND	
BDE	Bi-Directional Delineator
DDE	Type 2 Object Marker
○	Single Sign Post

* Contractor to save and remount county road signs.

SIGN AND STRIPING LAYOUT

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SCALE: 1" = 100' Sheet 9 of 24

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		184
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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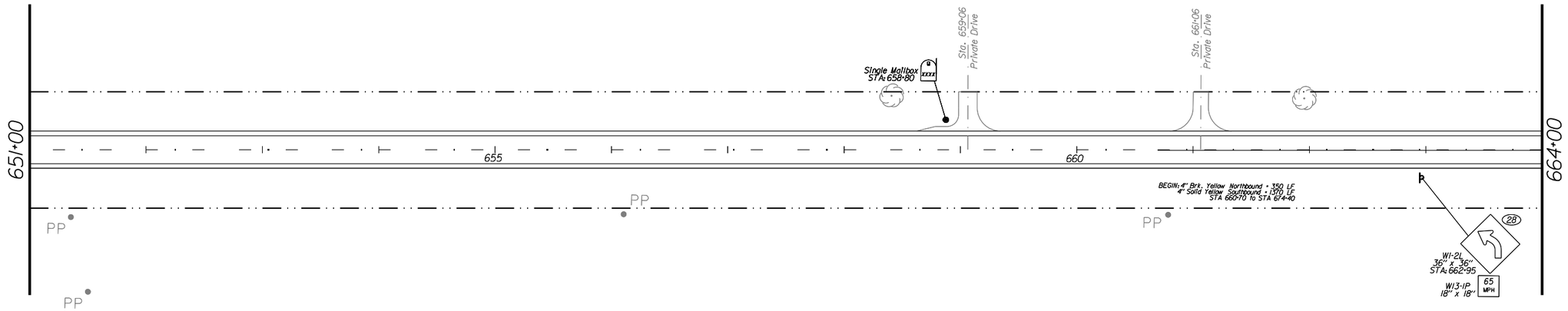

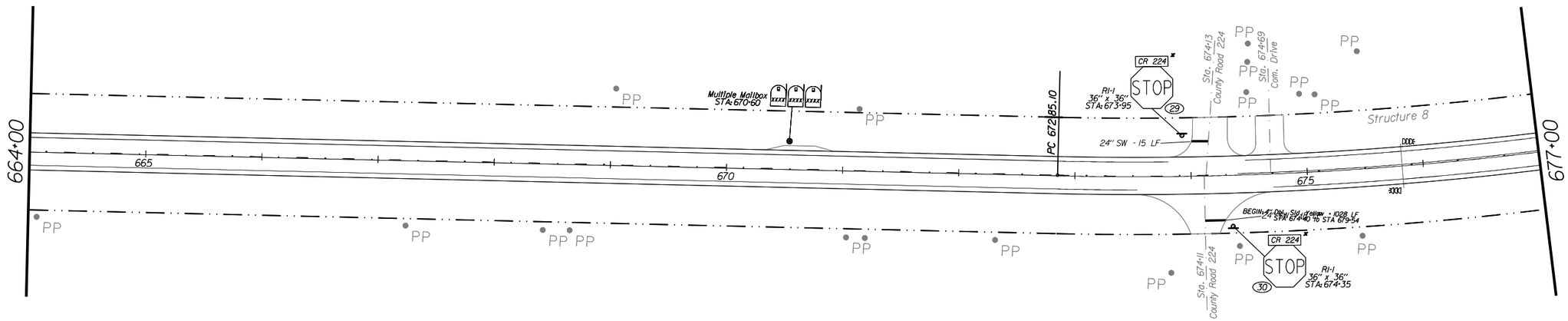

LEGEND	
BDE	Bi-Directional Delineator
DDE	Type 2 Object Marker
	Single Sign Post

* Contractor to save and remount county road signs.

SIGN AND STRIPING LAYOUT

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SCALE: 1" = 100' Sheet 10 of 24

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		185
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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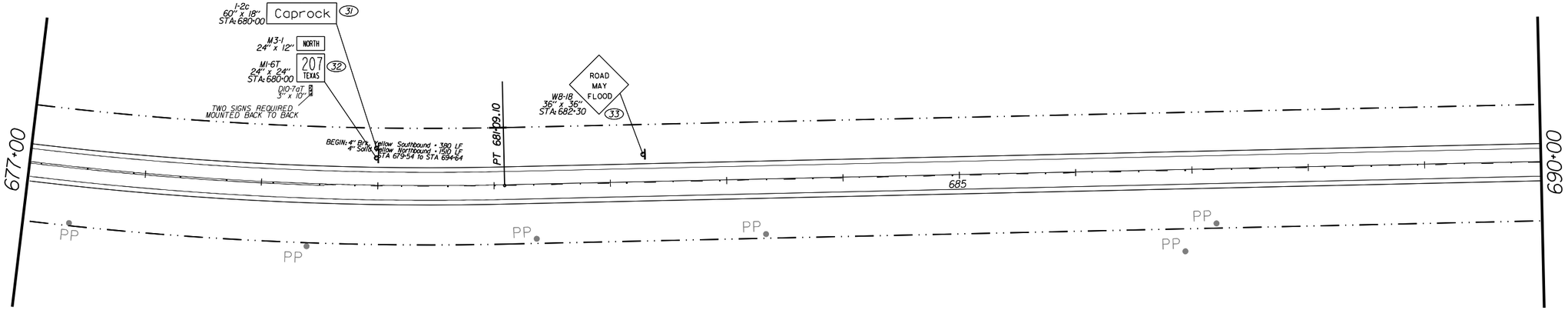
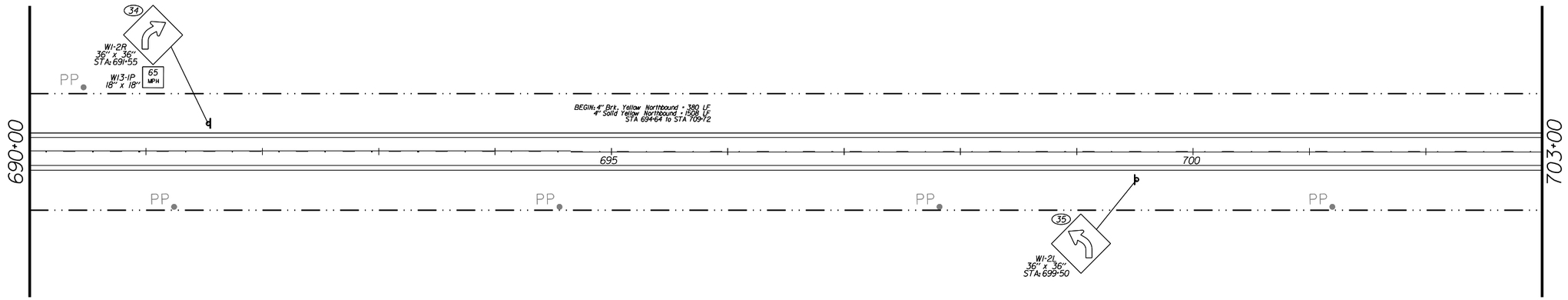


LEGEND

	Bi-Directional Delineator
	Type 2 Object Marker
	Single Sign Post



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SIGN AND STRIPING LAYOUT

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SCALE: 1" = 100' Sheet 11 of 24

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		186
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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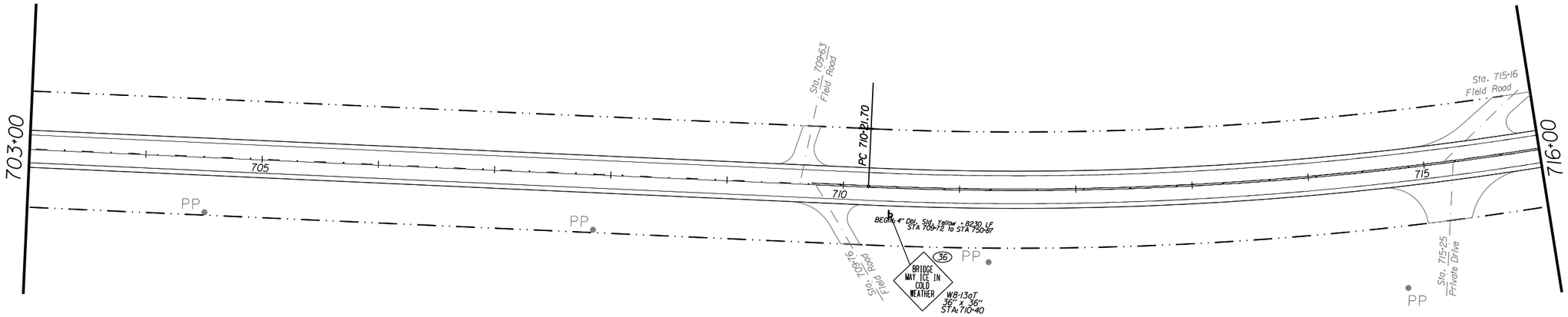

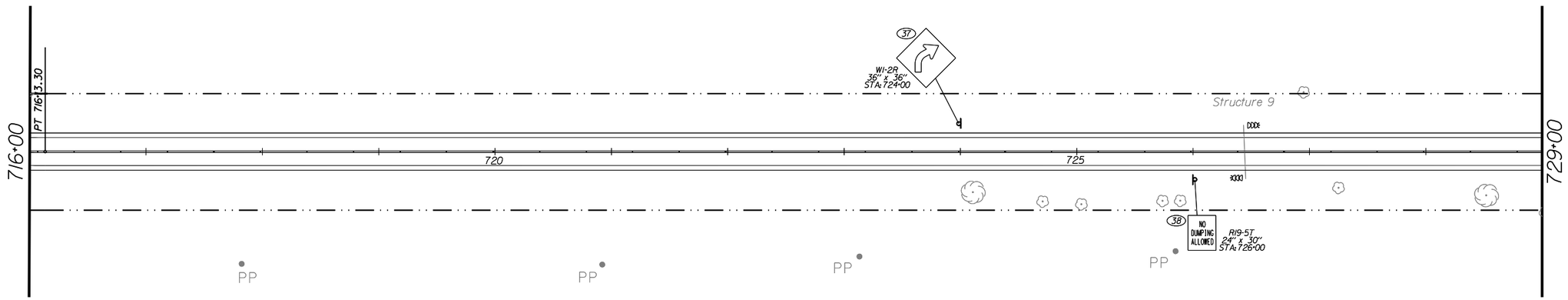

LEGEND

BDE	Bi-Directional Delineator
DDE	Type 2 Object Marker
⊙	Single Sign Post

* Contractor to save and remount county road signs.

SIGN AND STRIPING LAYOUT

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SCALE: 1" = 100' Sheet 12 of 24

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		187
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_TRF_SIGNS_STRIPING.dgn		

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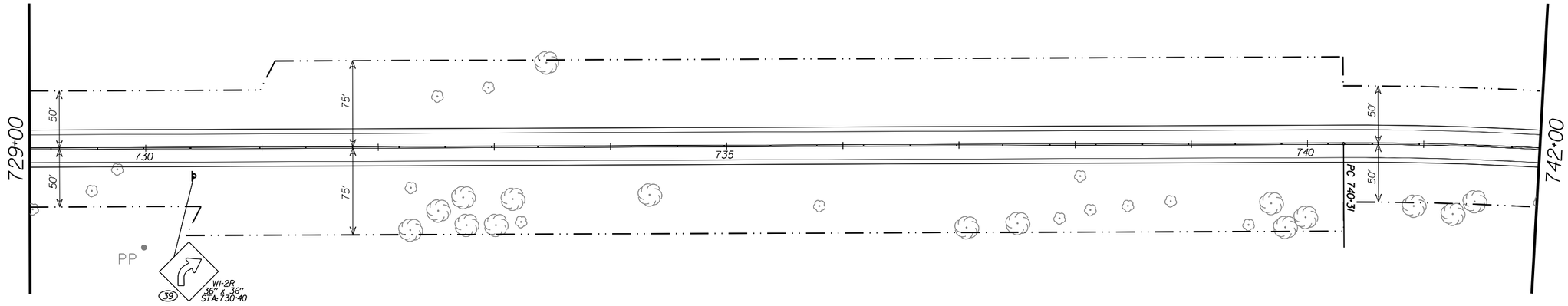

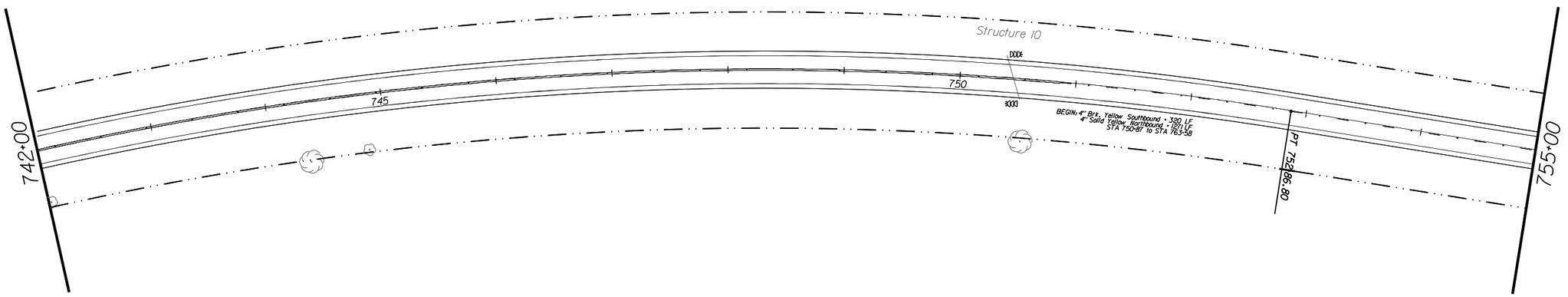

LEGEND

DDDE	Bi-Directional Delineator
DDDE	Type 2 Object Marker
○	Single Sign Post

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SIGN AND STRIPING LAYOUT

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SCALE: 1" = 100' Sheet 13 of 24

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		188
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_TRF_SIGNS_STRIPING.dgn		

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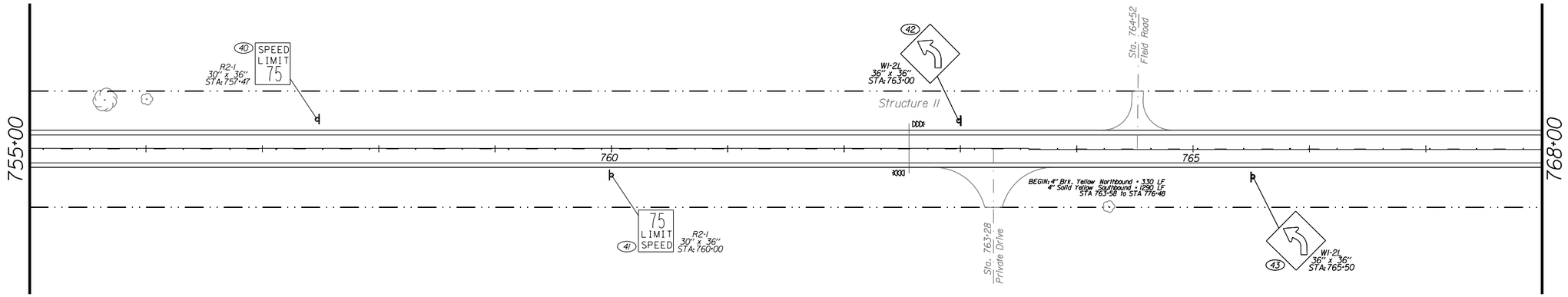

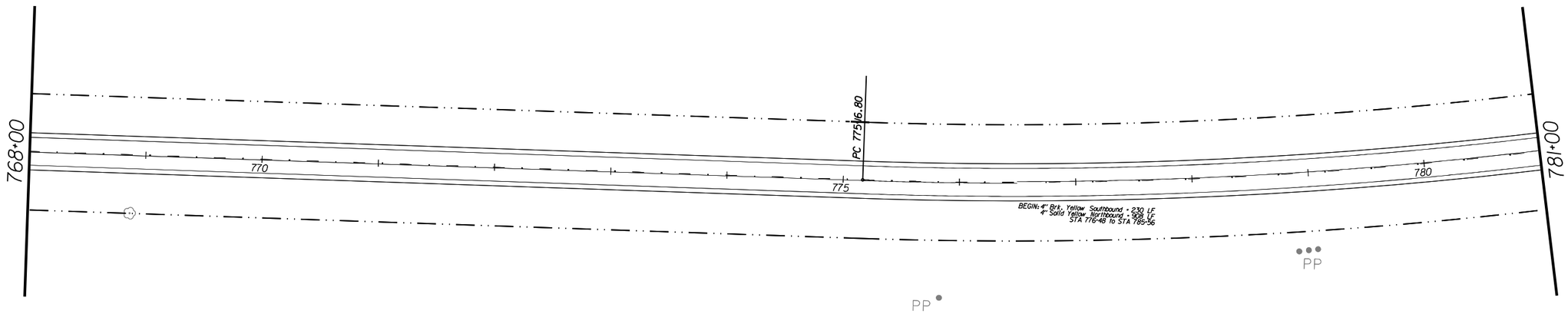

LEGEND

XXX	Bi-Directional Delineator
XXXX	Type 2 Object Marker
○	Single Sign Post

SIGN AND STRIPING LAYOUT

* Contractor to save and remount county road signs.

STATE OF TEXAS
MICHAEL D. BOYD
142962
LICENSED
PROFESSIONAL ENGINEER

Michael D. Boyd, P.E.
6/29/2022

Texas Department of Transportation

SCALE: 1" = 100' Sheet 14 of 24

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		189
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_TRF_SIGNS_STRIPING.dgn		

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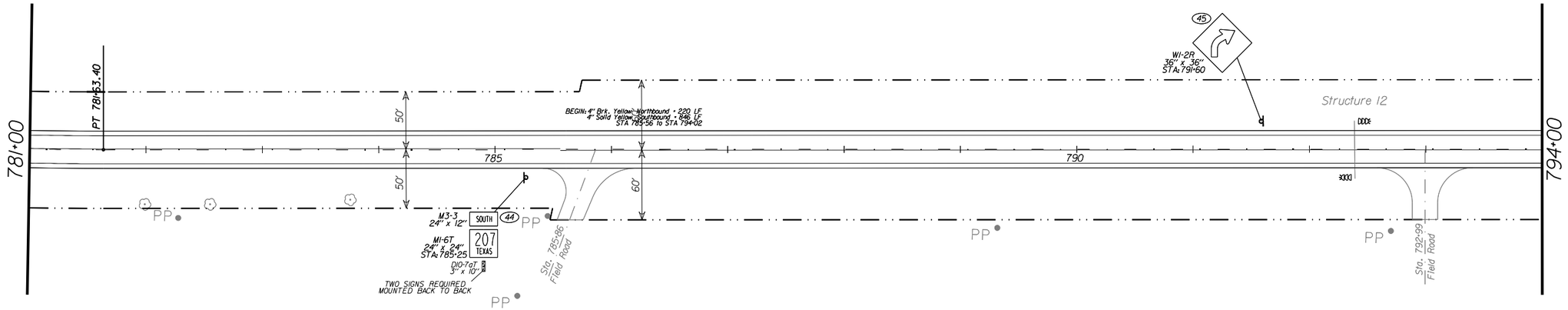

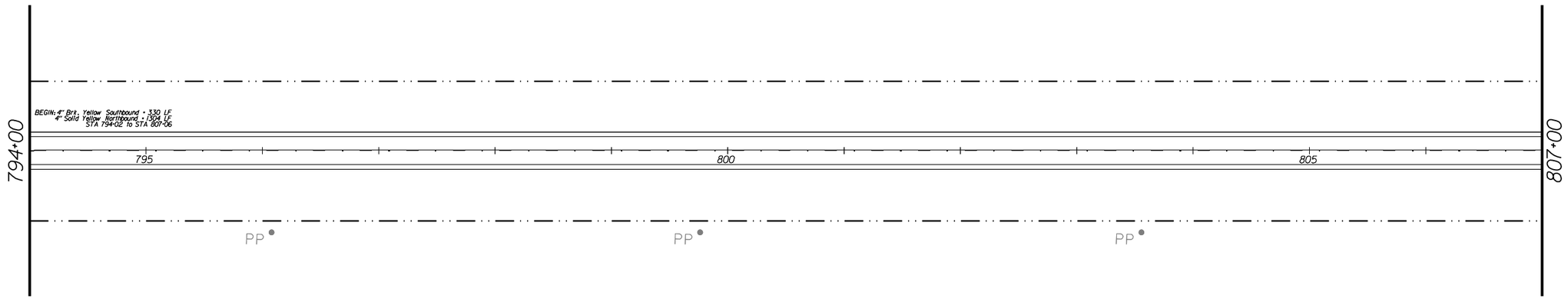

LEGEND	
BDE	Bi-Directional Delineator
DDDE	Type 2 Object Marker
○	Single Sign Post

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SCALE: 1" = 100'

Sheet 15 of 24

STATE DIST. NO.	COUNTY			SHEET NO.
05	CROSBY			190
CONT.	SECT.	JOB	HIGHWAY NO.	
0453	04	024	SH 207	
FILE	SH207_TRF_SIGNS_STRIPING.dgn			

SIGN AND STRIPING LAYOUT

* Contractor to save and remount county road signs.

DATE: 6/29/2022 11:19:21 PM
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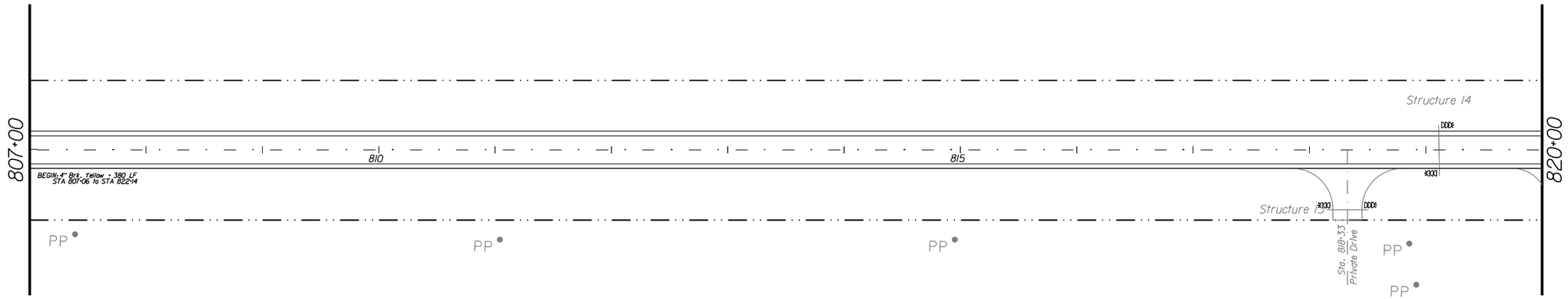
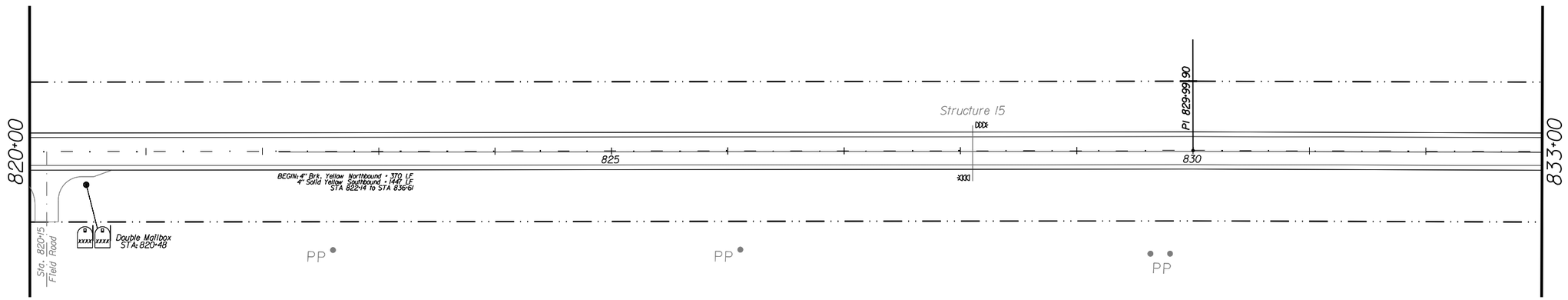


LEGEND

	Bi-Directional Delineator
	Type 2 Object Marker
	Single Sign Post



* Contractor to save and remount county road signs.

SIGN AND STRIPING LAYOUT

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6/29/2022

Texas Department of Transportation

SCALE: 1" = 100' Sheet 16 of 24

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		191
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_TRF_SIGNS_STRIPING.dgn		

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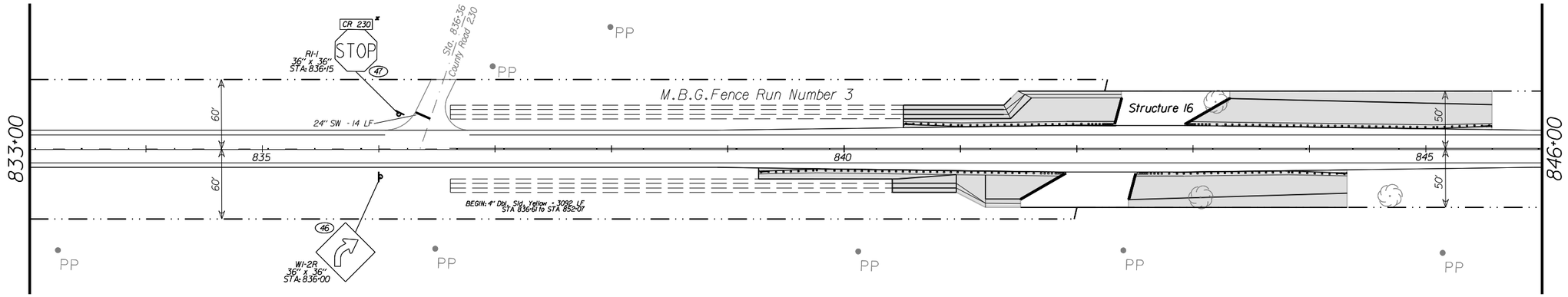
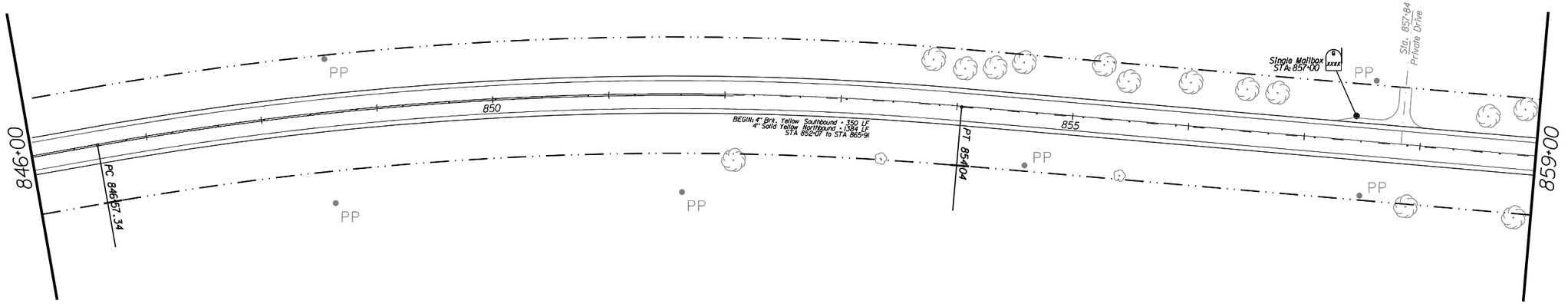


LEGEND	
	Bi-Directional Delineator
	Type 2 Object Marker
	Single Sign Post



* Contractor to save and remount county road signs.

SIGN AND STRIPING LAYOUT

STATE OF TEXAS
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SCALE: 1" = 100' Sheet 17 of 24

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		192
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_TRF_SIGNS_STRIPING.dgn		

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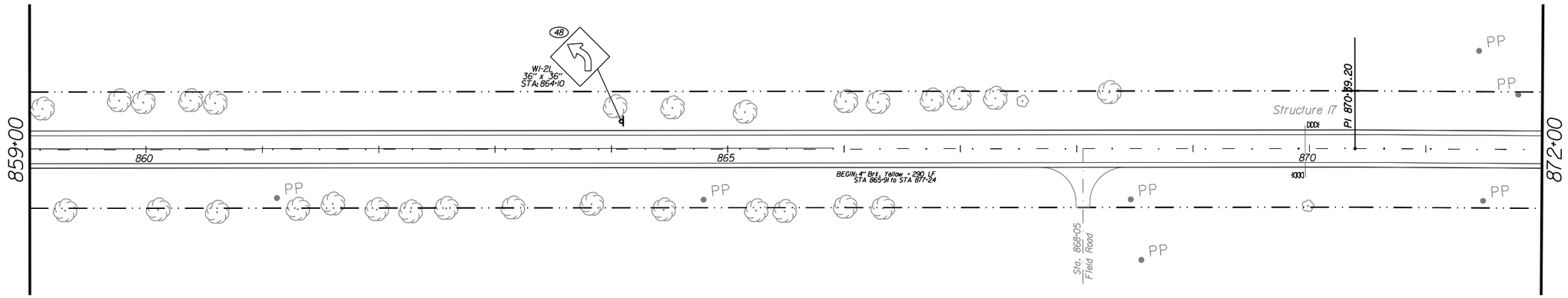

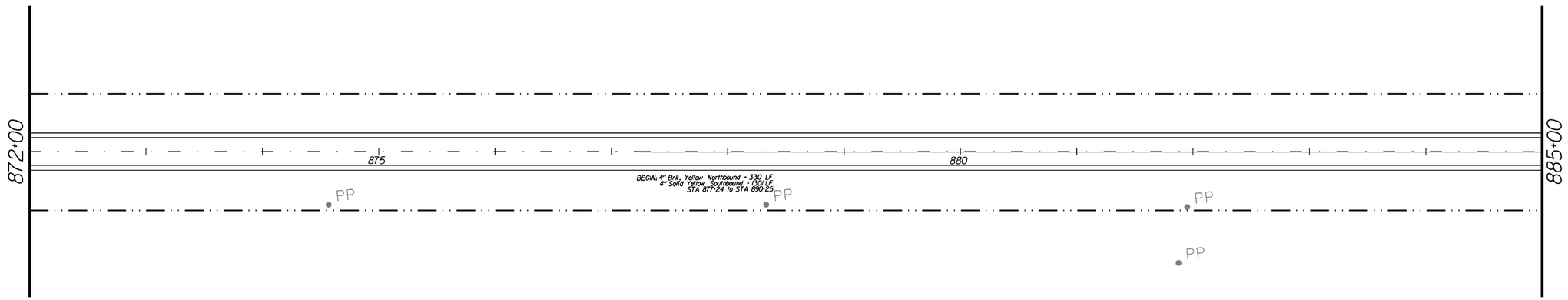

LEGEND	
	Bi-Directional Delineator
	Type 2 Object Marker
	Single Sign Post

* Contractor to save and remount county road signs.

SIGN AND STRIPING LAYOUT

MICHAEL D. BOYD
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6/29/2022

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SCALE: 1" = 100' Sheet 18 of 24

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		193
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_TRF_SIGNS_STRIPING.dgn		

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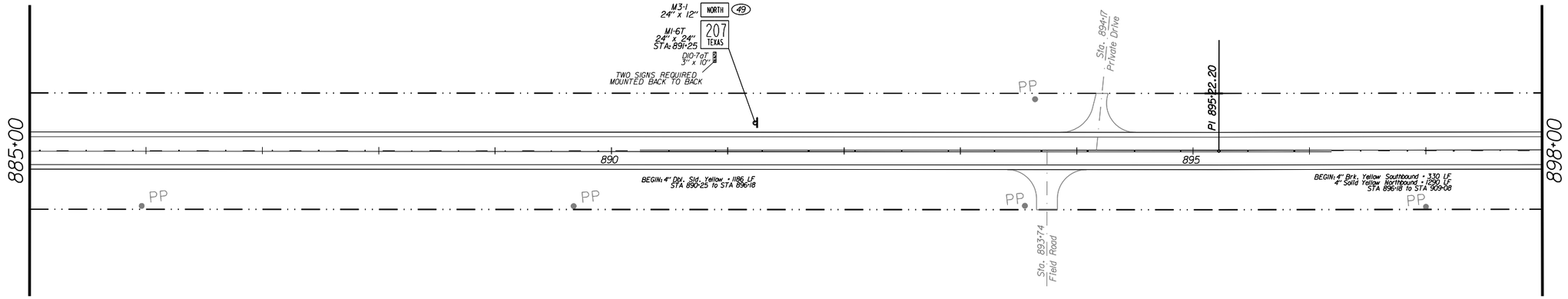
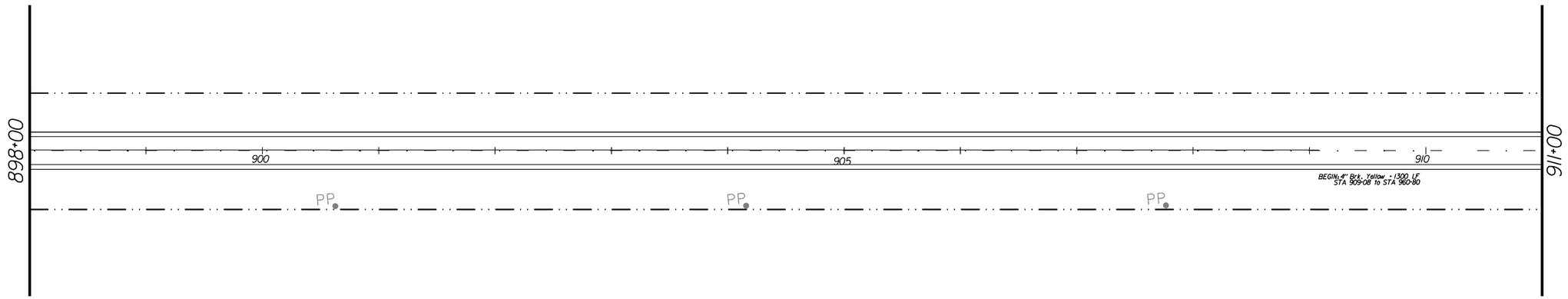


LEGEND	
	Bi-Directional Delineator
	Type 2 Object Marker
	Single Sign Post



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SIGN AND STRIPING LAYOUT

STATE OF TEXAS
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SCALE: 1" = 100' Sheet 19 of 24

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		194
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_TRF_SIGNS_STRIPING.dgn		

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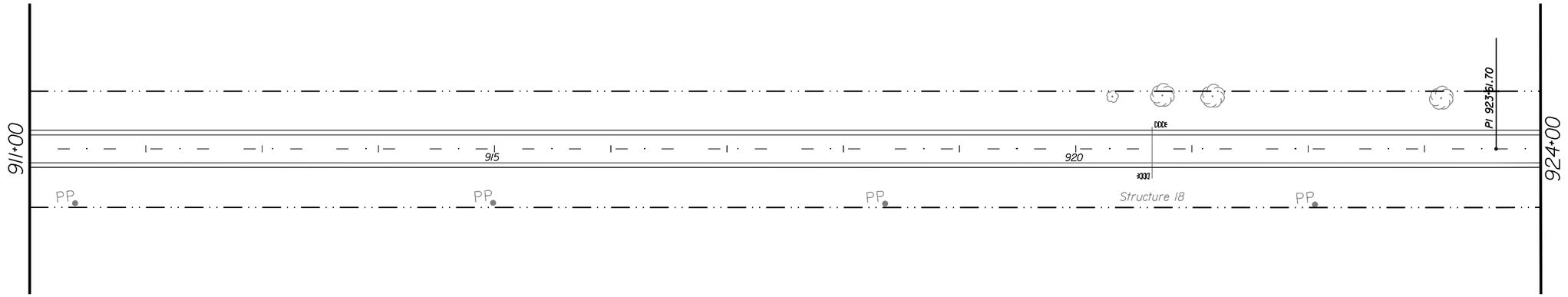

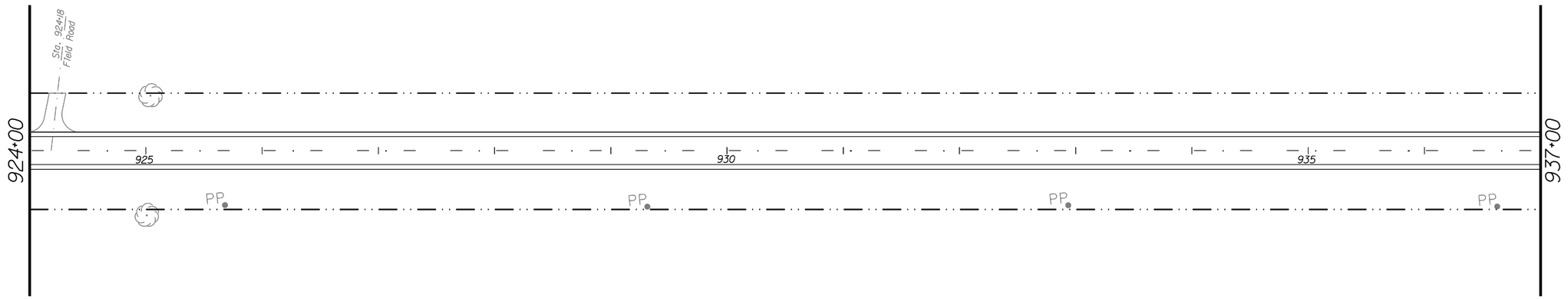

LEGEND

	Bi-Directional Delineator
	Type 2 Object Marker
	Single Sign Post

* Contractor to save and remount county road signs.

SIGN AND STRIPING LAYOUT

STATE OF TEXAS
MICHAEL D. BOYD
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6/29/2022

Texas Department of Transportation

SCALE: 1" = 100' Sheet 20 of 24

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		195
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_TRF_SIGNS_STRIPING.dgn		

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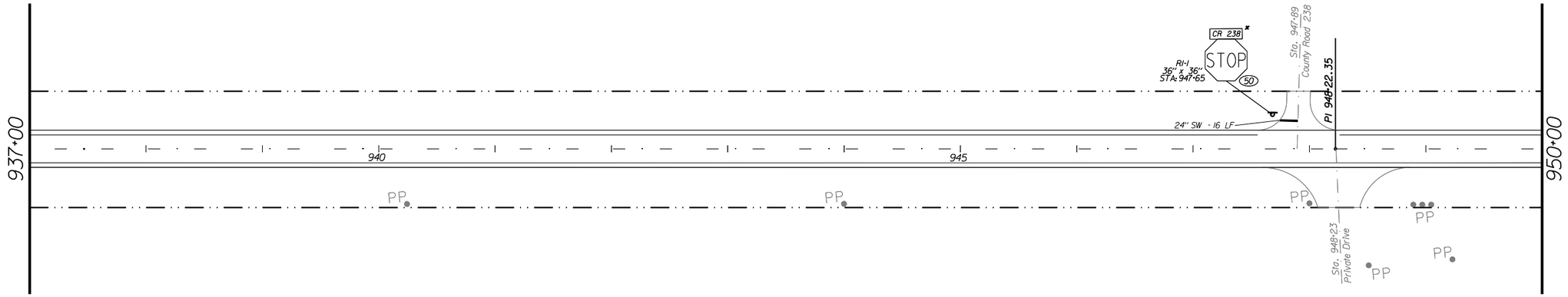

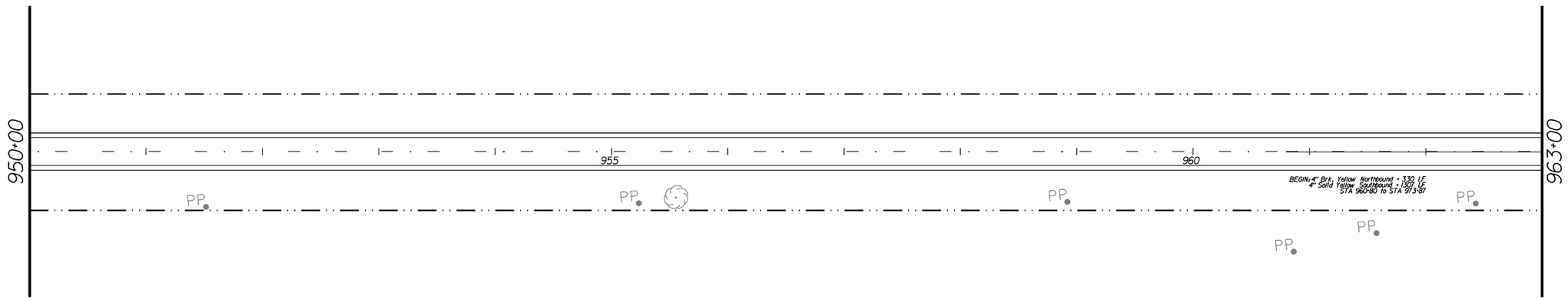

LEGEND	
	Bi-Directional Delineator
	Type 2 Object Marker
	Single Sign Post

* Contractor to save and remount county road signs.

SIGN AND STRIPING LAYOUT

STATE OF TEXAS
MICHAEL D. BOYD
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Michael D. Boyd, P.E.
6/29/2022

Texas Department of Transportation

SCALE: 1" = 100' Sheet 21 of 24

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		196
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_TRF_SIGNS_STRIPING.dgn		

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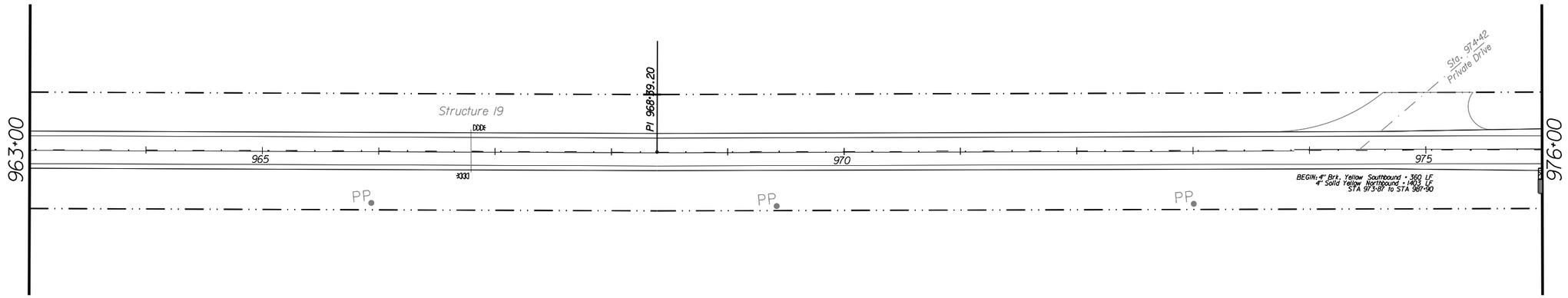

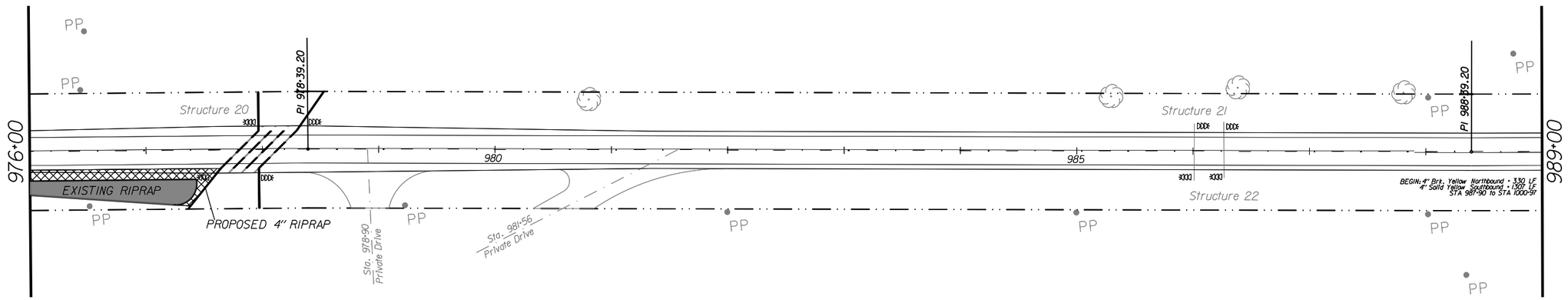

LEGEND

	Bi-Directional Delineator
	Type 2 Object Marker
	Single Sign Post

* Contractor to save and remount county road signs.

SIGN AND STRIPING LAYOUT

STATE OF TEXAS
MICHAEL D. BOYD
142962
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6/29/2022

Texas Department of Transportation

SCALE: 1" = 100' Sheet 22 of 24

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		197
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_TRF_SIGNS_STRIPING.dgn		

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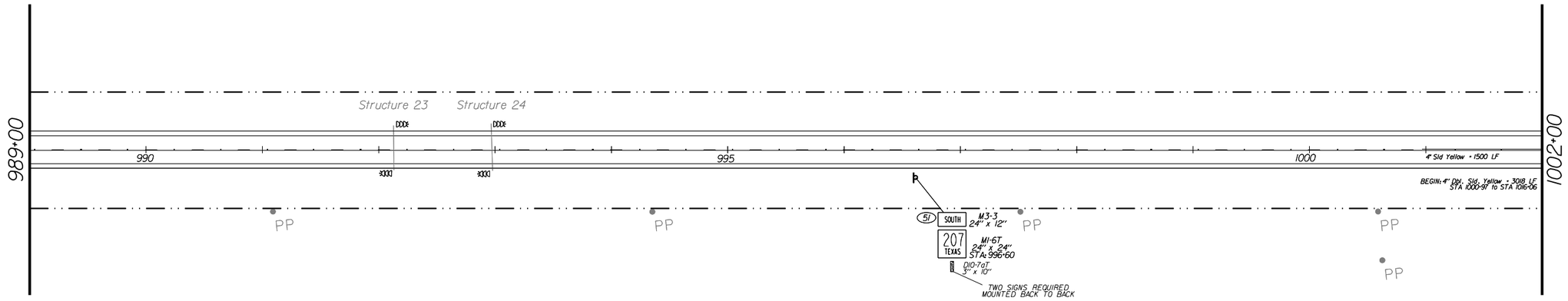
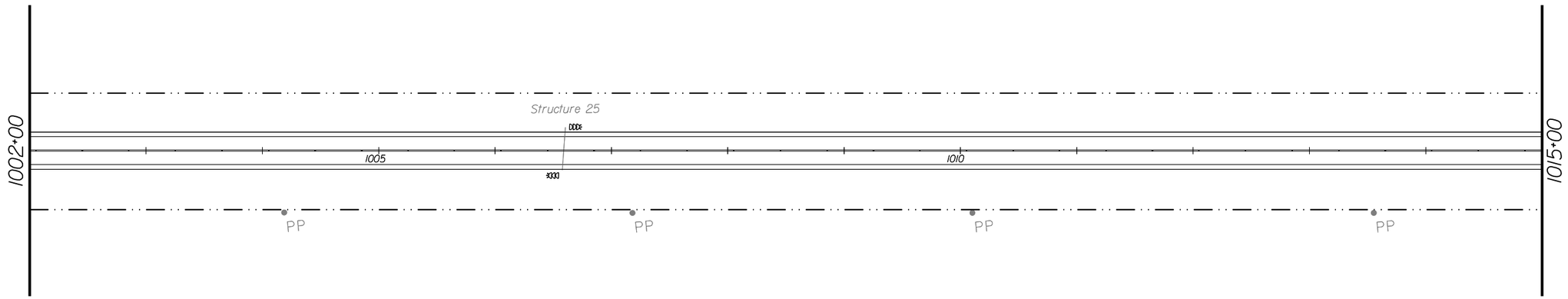


LEGEND	
DDS	Bi-Directional Delineator
DDS	Type 2 Object Marker
O	Single Sign Post



* Contractor to save and remount county road signs.

SIGN AND STRIPING LAYOUT

STATE OF TEXAS
MICHAEL D. BOYD
142962
LICENSED
PROFESSIONAL ENGINEER

Michael D. Boyd, P.E.
6/29/2022

Texas Department of Transportation

SCALE: 1" = 100' Sheet 23 of 24

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		198
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_TRF_SIGNS_STRIPING.dgn		

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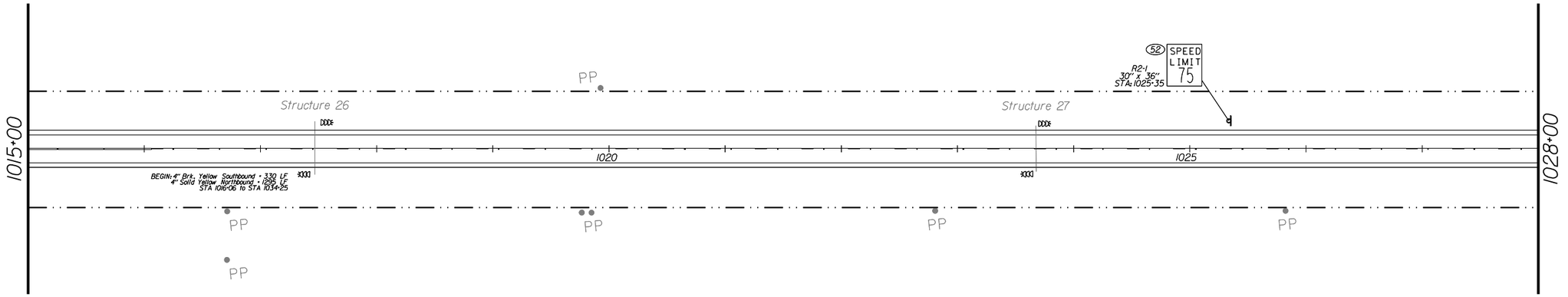

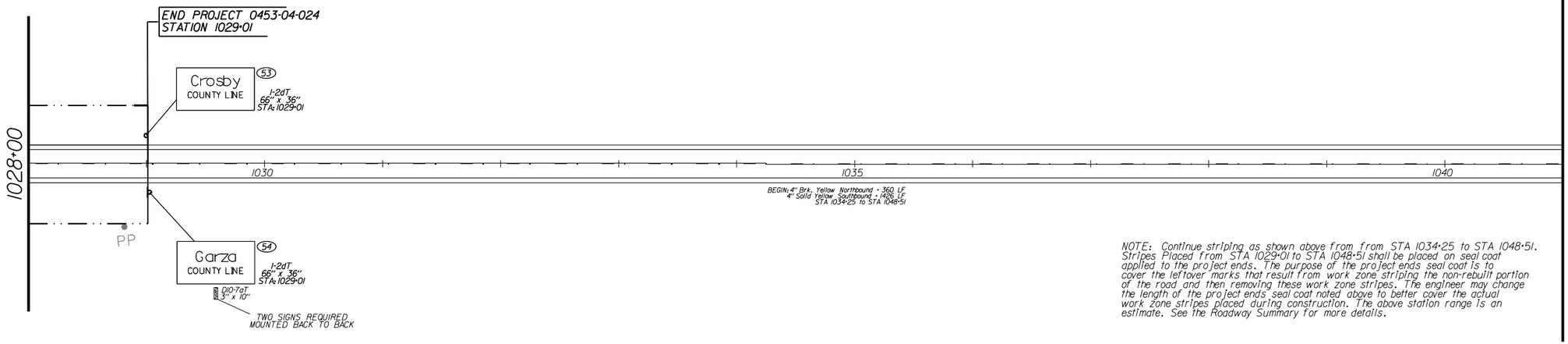

LEGEND

	Bi-Directional Delineator
	Type 2 Object Marker
	Single Sign Post

NOTE: Continue striping as shown above from from STA 1034+25 to STA 1048+51. Stripes Placed from STA 1029+01 to STA 1048+51 shall be placed on seal coat applied to the project ends. The purpose of the project ends seal coat is to cover the leftover marks that result from work zone striping the non-rebuilt portion of the road and then removing these work zone stripes. The engineer may change the length of the project ends seal coat noted above to better cover the actual work zone stripes placed during construction. The above station range is an estimate. See the Roadway Summary for more details.

STATE OF TEXAS
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142962
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6/29/2022

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SCALE: 1" = 100' Sheet 24 of 24

SIGN AND STRIPING LAYOUT

* Contractor to save and remount county road signs.

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		199
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_TRF_SIGNS_STRIPING.dgn		

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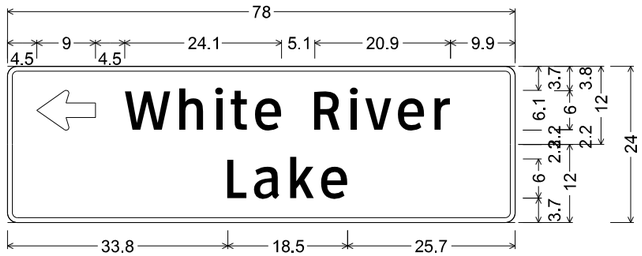
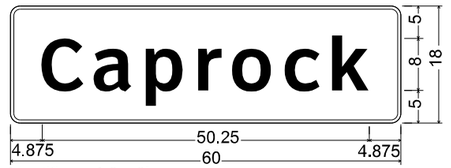


Identifier : D1-2 6in LT-RT;
1.5" Radius, 0.8" Border, White on Green;
Standard Arrow Custom 9.0" X 6.1" 180°;
[White River] ClearviewHwy-3-W;
1.5" Radius, 0.8" Border, White on Green;
[Lake] ClearviewHwy-3-W;



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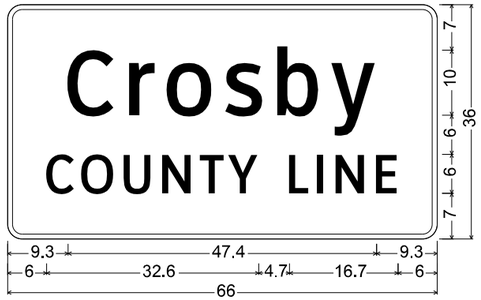
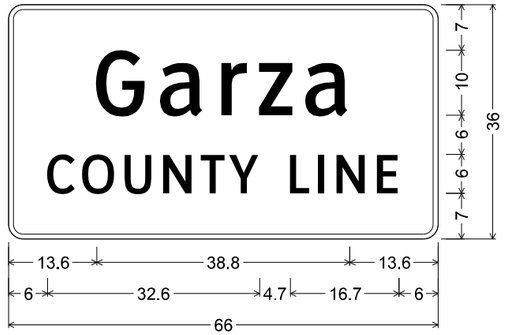
1.500" Radius, 0.500" Border, White on Green;
[Caprock] ClearviewHwy-5-W-R;



Identifier : I-2dT 10in;
2.3" Radius, 0.8" Border, White on Green;
[Crosby] ClearviewHwy-3-W; [COUNTY LINE] ClearviewHwy-3-W;



Identifier : I-2dT 10in;
2.3" Radius, 0.8" Border, White on Green;
[Garza] ClearviewHwy-3-W;
[COUNTY LINE] ClearviewHwy-3-W;

NOTE: ALL DIMENSIONS ARE IN INCHES
UNLESS OTHERWISE NOTED.

D-SERIES SIGN DETAILS

STATE OF TEXAS
SHELLEY C. HARRIS
99197
LICENSED
PROFESSIONAL ENGINEER

Shelley C. Harris, P.E.
6/29/2022

Texas Department of Transportation

Sheet 1 of 1

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		200
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_TRF_SIGNDETAILS.dgn		

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FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\045304024\4 - Design\Plan Set\8. Traffic\SH207_TRF_SIGNDETAIL.dgn

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
1	1	D1-2	DESTINATION - WHITE RIVER LAKE	78 x 24	1		10BWG	1	SA	T		
1	2	M3-1	NORTH <AUXILIARY SIGN>	24 x 12	1		10BWG	1	SA	U		
		M1-6T	207 TEXAS	24 x 24	1							
		M3-4	WEST <AUXILIARY SIGN>	24 x 12	1							
		M1-6F	<FM SHIELD> FARM ROAD 40	24 x 24	1							
1	3	R1-1	STOP	48 x 48	1		10BWG	1	SA	T		
1	4	M3-2	EAST <AUXILIARY SIGN>	24 x 12	1		S80	1	SA	U	1EXT	
		M1-6F	<FM SHIELD> FARM ROAD 40	24 x 24	1							
		M6-1	<ARROW - HORIZ. STRGHT> <AUXILIARY SIGN>	21 x 15	1							
		M3-4	WEST <AUXILIARY SIGN>	24 x 12	1							
		M1-6F	<FM SHIELD> FARM ROAD 40	24 x 24	1							
		M6-1	<ARROW - HORIZ. STRGHT> <AUXILIARY SIGN>	21 x 15	1							
		M1-6T	207 TEXAS	24 x 24	1							
		M6-4	<ARROW - DUAL LEFT & RIGHT> <AUX. SIGN>	21 x 15								
1	5	R1-1	STOP	36 x 36	1		10BWG	1	SA	P	BM	
1	6	M1-6F	<FM SHIELD> FARM ROAD 40	24 x 24	1		10BWG	1	SA	P		
		M6-6R	<ARROWS - STRGHT & RIGHT> <AUXILIARY SIGN>	21 x 15	1							
1	7	M3-3	SOUTH <AUXILIARY SIGN>	24 x 12	1		10BWG	1	SA	P		
		M1-6T	207 TEXAS	24 x 24	1							
1	8	W8-18	ROAD MAY FLOOD	36 x 36	1		10BWG	1	SA	T		
1	9	M2-1	JCT <AUXILIARY SIGN>	21 x 15	1		10BWG	1	SA	P		
		M1-6F	<FM SHIELD> FARM ROAD 40	24 x 24	1							
1	10	W1-2L	SYMBOL - HORIZ CURVE LEFT	36 x 36	1		10BWG	1	SA	T		
2	11	W1-2L	SYMBOL - HORIZ CURVE LEFT	36 x 36	1		10BWG	1	SA	T		
2	12	W8-18	ROAD MAY FLOOD	36 x 36	1		10BWG	1	SA	T		
2	13	M3-1	NORTH <AUXILIARY SIGN>	24 x 12	1		10BWG	1	SA	P		
		M1-6T	207 TEXAS	24 x 24								
3	14	R1-1	STOP	36 x 36	1		10BWG	1	SA	P	BM	
3	15	W1-2R	SYMBOL - HORIZ CURVE RIGHT	36 x 36	1		10BWG	1	SA	T		
3	16	W8-18	ROAD MAY FLOOD	36 x 36	1		10BWG	1	SA	T		
4	17	R1-1	STOP	36 x 36	1		10BWG	1	SA	P	BM	
4	18	R2-1	SPEED LIMIT 75	30 x 36	1		10BWG	1	SA	P		
4	19	R1-1	STOP	36 x 36	1		10BWG	1	SA	P	BM	
6	20	R1-1	STOP	36 x 36	1		10BWG	1	SA	P	BM	
6	21	R1-1	STOP	36 x 36	1		10BWG	1	SA	P	BM	
7	22	M3-3	SOUTH <AUXILIARY SIGN>	24 x 12	1		10BWG	1	SA	P		
		M1-6T	207 TEXAS	24 x 24	1							
		D10-7aT	<3 DIGIT VERTICAL NUMBER> 242	3 x 10								
7	23	W8-18	ROAD MAY FLOOD	36 x 36	1		10BWG	1	SA	T		

DATE:
FILE:

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

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

http://www.txdot.gov/

NOTE:

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

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0453	04	024	SH 207
4-16		DIST	COUNTY		SHEET NO.
8-16		05	CROSBY		201

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE: FRP = Fiberglass, TWT = Thin-Wall, 10BWG = 10 BWG, S80 = Sch 80	POSTS: 1 or 2	ANCHOR TYPE: UA=Universal Conc, UB=Universal Bolt, SA=Slipbase-Conc, SB=Slipbase-Bolt, WS=Wedge Steel, WP=Wedge Plastic	MOUNTING DESIGNATION: PREFABRICATED: P = "Plain", T = "T", U = "U"	MOUNTING DESIGNATION: 1EXT or 2EXT = # of Ext, BM = Extruded Wind Beam, WC = 1.12 #/ft Wing Channel, EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE: TY N, TY S
8	24	RI-1	STOP	36 x 36	1		10BWG	1	SA	P	BM	
8	25	RI-1	STOP	36 x 36	1		10BWG	1	SA	P	BM	
8	26	W8-18	ROAD MAY FLOOD	36 x 36	1		10BWG	1	SA	T		
9	27	I-2C	CAPROCK	60 X 18	1		10BWG	1	SA	T		
10	28	WI-2L	SYMBOL - HORIZ CURVE LEFT	36 x 36	1		10BWG	1	SA	T		
		WI3-1P	65 MPH <ADVISORY SPEED PLAQUE>	18 x 18	1							
10	29	RI-1	STOP	36 x 36	1		10BWG	1	SA	P	BM	
10	30	RI-1	STOP	36 x 36	1		10BWG	1	SA	P	BM	
11	31	I-2C	CAPROCK	60 X 18	1		10BWG	1	SA	T		
11	32	M3-1	NORTH <AUXILIARY SIGN>	24 x 12	1		10BWG	1	SA	P		
		MI-6T	207 TEXAS	24 x 24	1							
		DI0-7aT	<3 DIGIT VERTICAL NUMBER> 244	3 x 10	1							
11	33	W8-18	ROAD MAY FLOOD	36 x 36	1		10BWG	1	SA	T		
11	34	WI-2R	SYMBOL - HORIZ CURVE RIGHT	36 x 36	1		10BWG	1	SA	T		
		WI3-1P	65 MPH <ADVISORY SPEED PLAQUE>	18 x 18	1							
11	35	WI-2L	SYMBOL - HORIZ CURVE LEFT	36 x 36	1		10BWG	1	SA	T		
12	36	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36 x 36	1		10BWG	1	SA	T		
12	37	WI-2R	SYMBOL - HORIZ CURVE RIGHT	36 x 36	1		10BWG	1	SA	T		
12	38	RI9-5T	NO DUMPING ALLOWED	24 x 30	1		10BWG	1	SA	P		
13	39	WI-2R	SYMBOL - HORIZ CURVE RIGHT	36 x 36	1		10BWG	1	SA	T		
14	40	R2-1	SPEED LIMIT 75	30 x 36	1		10BWG	1	SA	P		
14	41	R2-1	SPEED LIMIT 75	30 x 36	1		10BWG	1	SA	P		
14	42	WI-2L	SYMBOL - HORIZ CURVE LEFT	36 x 36	1		10BWG	1	SA	T		
14	43	WI-2L	SYMBOL - HORIZ CURVE LEFT	36 x 36	1		10BWG	1	SA	T		
15	44	M3-3	SOUTH <AUXILIARY SIGN>	24 x 12	1		10BWG	1	SA	P		
		MI-6T	207 TEXAS	24 x 24	1							
		DI0-7aT	<3 DIGIT VERTICAL NUMBER> 246	3 x 10	1							
15	45	WI-2R	SYMBOL - HORIZ CURVE RIGHT	36 x 36	1		10BWG	1	SA	T		
17	46	WI-2R	SYMBOL - HORIZ CURVE RIGHT	36 x 36	1		10BWG	1	SA	T		
17	47	RI-1	STOP	36 x 36	1		10BWG	1	SA	P	BM	
18	48	WI-2L	SYMBOL - HORIZ CURVE LEFT	36 x 36	1		10BWG	1	SA	T		
19	49	M3-1	NORTH <AUXILIARY SIGN>	24 x 12	1		10BWG	1	SA	P		
		MI-6T	207 TEXAS	24 x 24	1							
		DI0-7aT	<3 DIGIT VERTICAL NUMBER> 248	3 x 10	1							

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

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

http://www.txdot.gov/

NOTE:

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

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
4-16	DIST	COUNTY		SHEET NO.
8-16	05	CROSBY		202

T8

DATE:
FILE:

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
21	50	R1-1	STOP	36 x 36	1		10BWG	1	SA	P	BM	
23	51	M3-3	SOUTH <AUXILIARY SIGN>	24 x 12	1		10BWG	1	SA	P		
		M1-6T	207 TEXAS	24 x 24	1							
		D10-7aT	<3 DIGIT VERTICAL NUMBER> 250	3 x 10	1							
24	52	R2-1	SPEED LIMIT 75	30 x 36	1		10BWG	1	SA	P		
24	53	I-2dT	CROSBY COUNTY LINE	66 x 36	1		10BWG	1	SA	T		
24	54	I-2dT	GARZA COUNTY LINE	66 x 36	1		10BWG	1	SA	T		
		D10-7aT	<3 DIGIT VERTICAL NUMBER> 252	3 x 10	1							

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

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

http://www.txdot.gov/

NOTE:

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

DATE:
FILE:

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

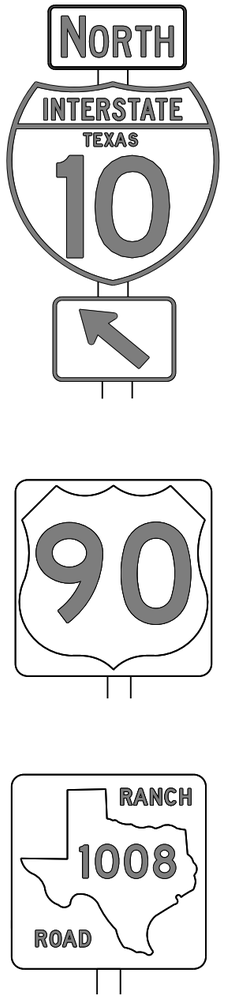
FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0453	04	024	SH 207
4-16		DIST	COUNTY		SHEET NO.
8-16		05	CROSBY		203

18

DATE:
FILE:

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

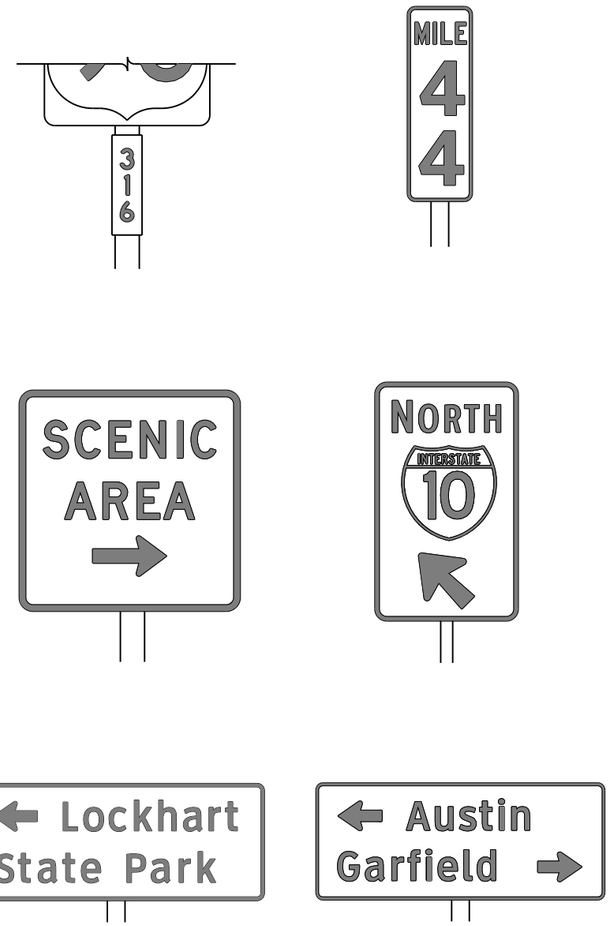
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

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

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

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

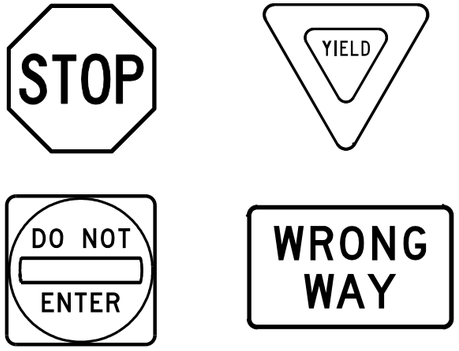
TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	LBB	CROSBY		204

DATE:
FILE:

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

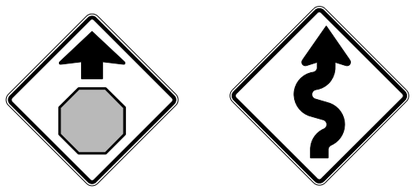
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

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

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

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(4)-13

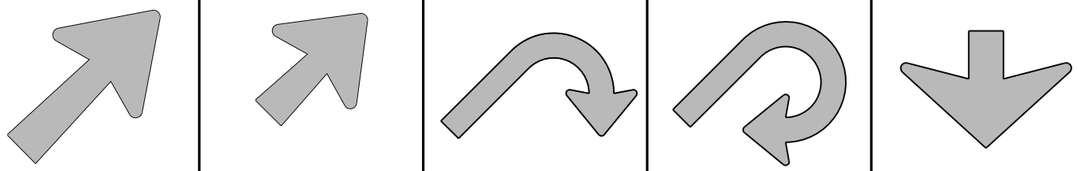
FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	LBB	CROSBY		205

4

DATE:
FILE:

ARROW DETAILS

for Large Ground-Mounted and Overhead Guide Signs



TYPE	LETTER SIZE	USE
A-1	10.67" U/L and 10" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 20" U/L	
B-1	10.67" U/L and 10" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 20" U/L	

CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

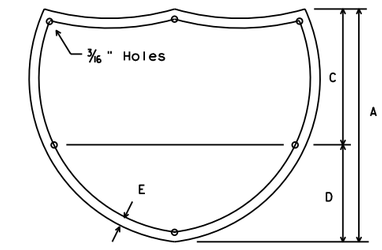
NOTE

Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

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

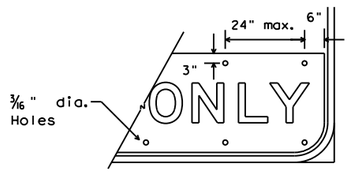
http://www.txdot.gov/

SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)

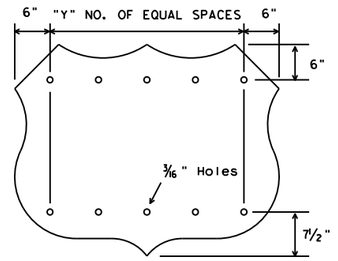


INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1 1/2
48	28	20	1 3/4

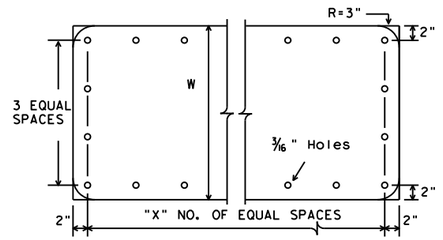


EXIT ONLY PANEL



U.S. ROUTE MARKERS

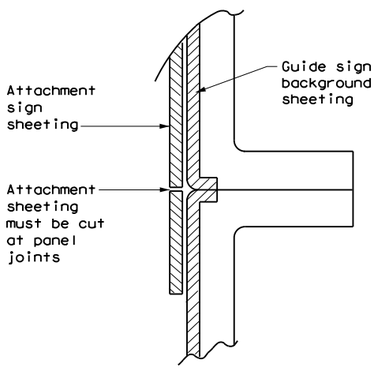
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



STATE ROUTE MARKERS

No. of Digits	W	X
4	24	4
4	36	5
4	48	6
3	24	3
3	36	4
3	48	5

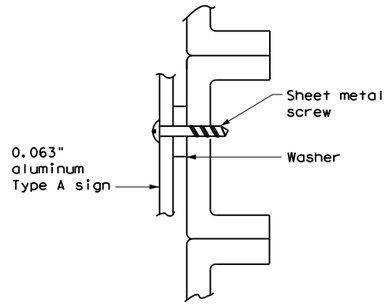
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



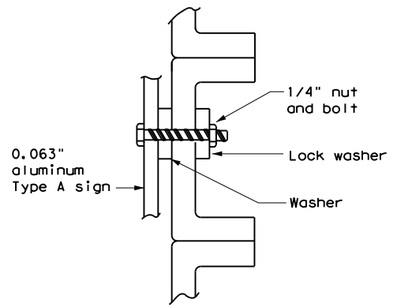
DIRECT APPLIED ATTACHMENT

NOTE:

1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".



SCREW ATTACHMENT



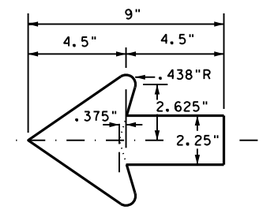
NUT/BOLT ATTACHMENT

NOTE:

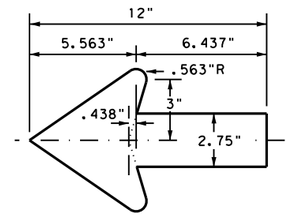
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(5)-13

FILE:	tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS		0453	04	024	SH 207
12-03 7-13		DIST	COUNTY		SHEET NO.
9-08		LBB	CROSBY		206

DATE: 6/29/2022 1:20:28 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\045304024\4 - Design\Plan Set\8. Traffic\TRAFFIC STANDARDS\smdgen.dgn

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

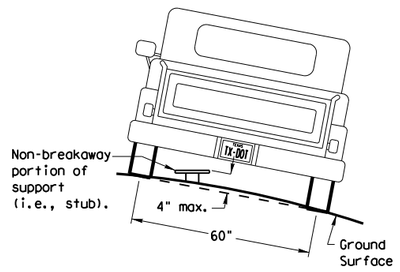
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-3))

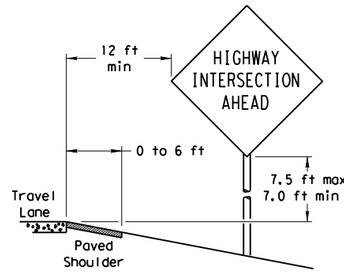
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

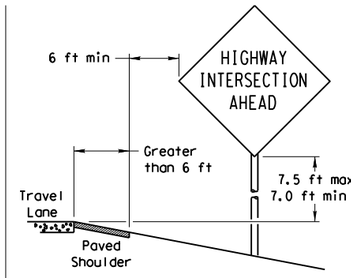
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

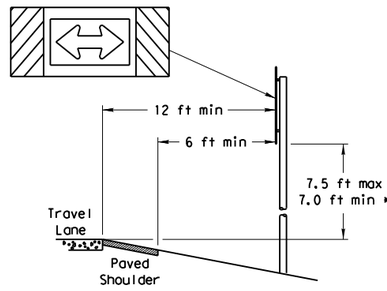
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



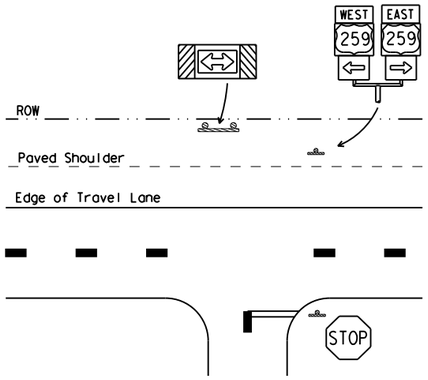
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

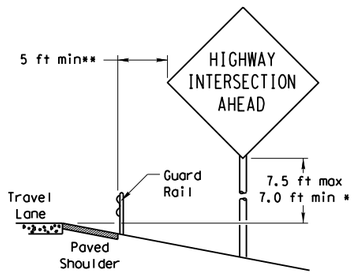
T-INTERSECTION



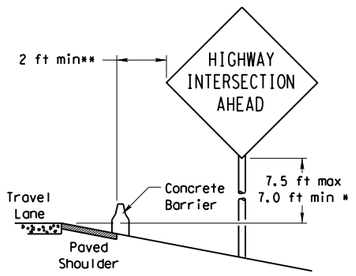
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

**When 6 ft min. is not possible.)

**Maximum possible

**HIGHWAY INTERSECTION AHEAD

**7.5 ft max

**7.0 ft min *

***

**Travel Lane

**Paved Shoulder

**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.

BEHIND GUARDRAIL

BEHIND CONCRETE BARRIER

**Nylon washer, flat washer, lock washer, nut

**Sign Panel

**Nut, lock washer

**Sign Clamp

**Sign Post

**Clamp Bolt

**Sign Panel

**Nylon washer, flat washer, lock washer, nut

**Sign Bolt

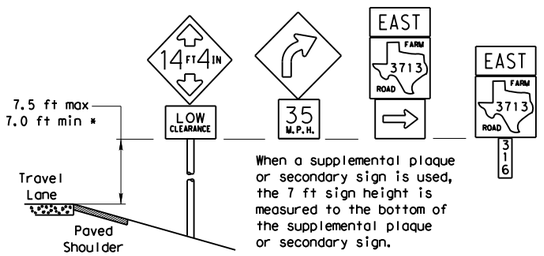
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

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.

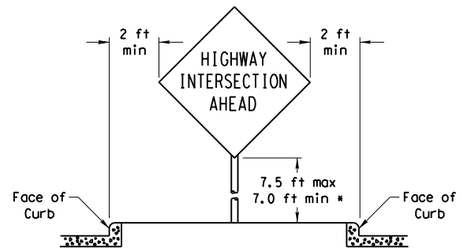
Sign clamps may be either the specific size clamp or the universal clamp.

SIGNS WITH PLAQUES



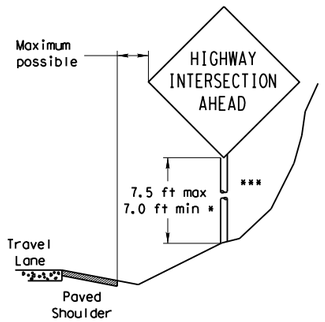
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

The website address is:
http://www.txdot.gov/publications/traffic.htm

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

REVISIONS
9-08

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

CONT	SECT	JOB	HIGHWAY
0453	04	024	SH 207

DIST	COUNTY	SHEET NO.
LBB	CROSBY	207

DATE: 6/29/2022 1:20:31 PM
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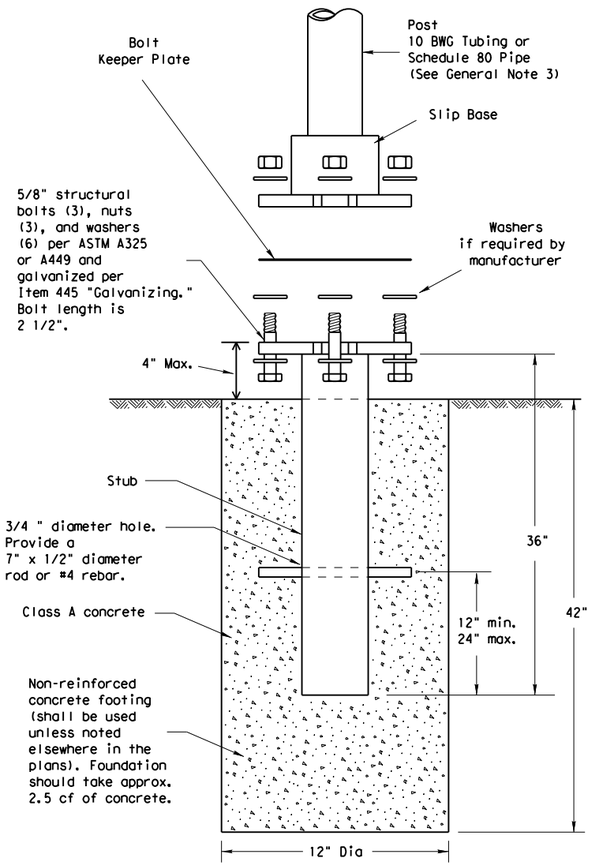
TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

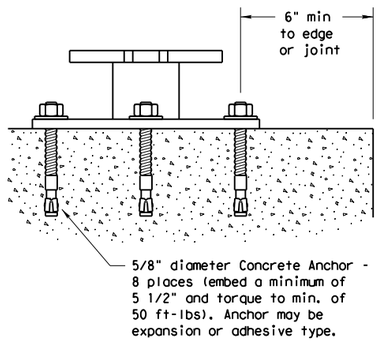
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

Foundation
1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



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

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
0453	04	024	SH 207
DIST	COUNTY		SHEET NO.
LBB	CROSBY		208

9-08 REVISIONS

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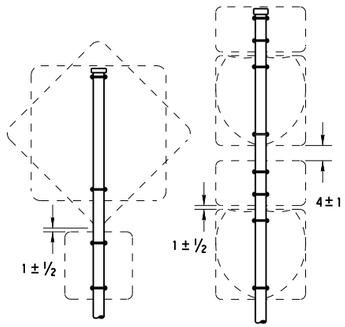

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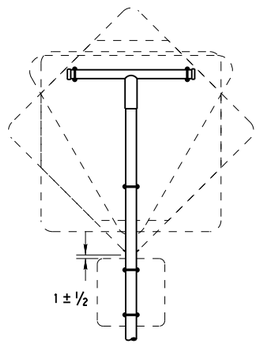

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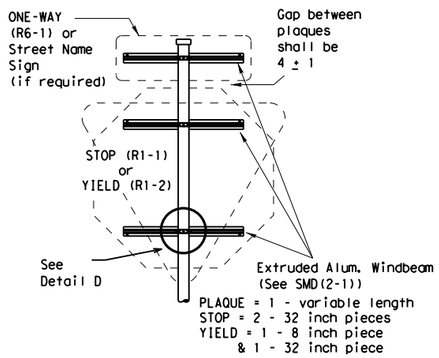

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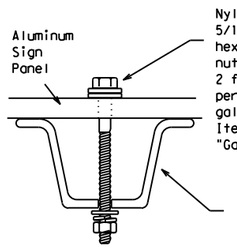
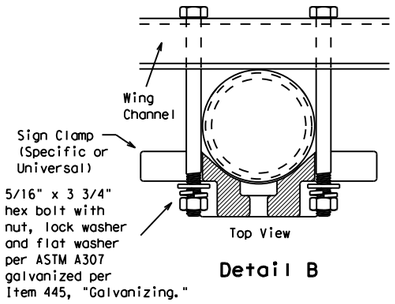
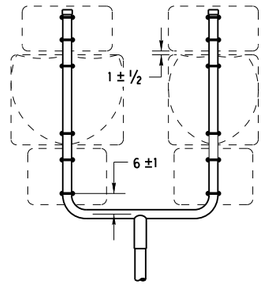


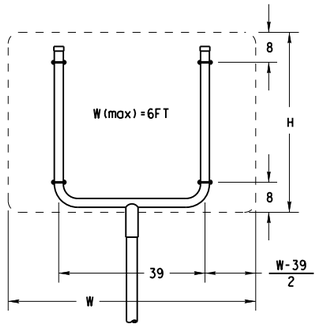
Detail A



Detail B



SM RD SGN ASSM TY XXXXX(1)XX(U)



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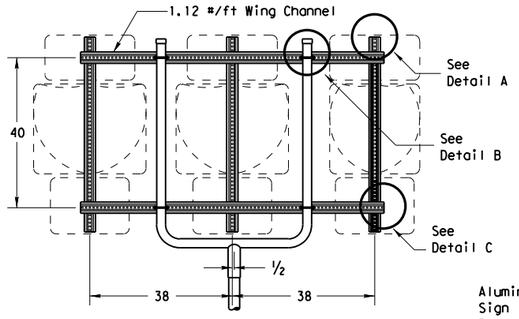
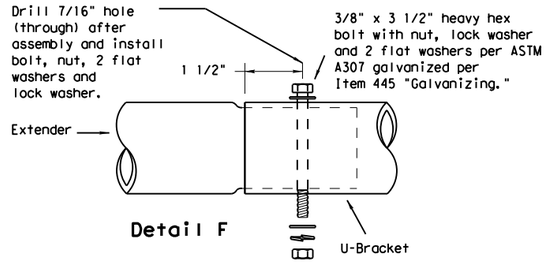
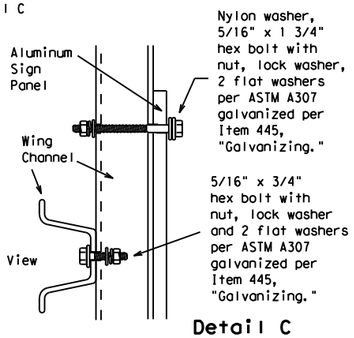


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

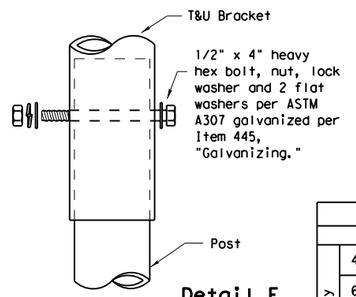


Detail F

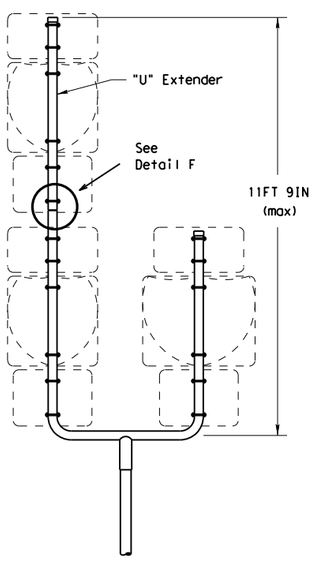
Splices shall only be allowed behind the sign substrate.



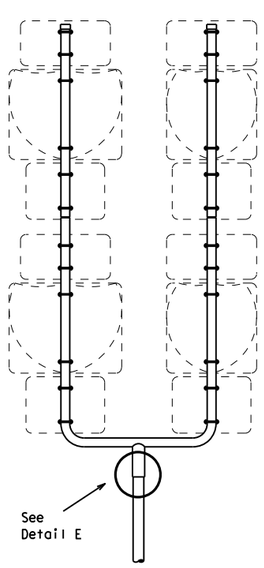
Detail C



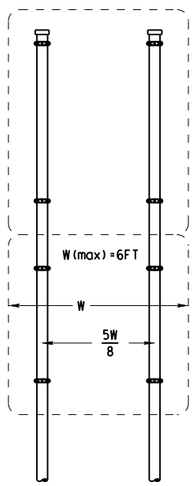
Detail E



SM RD SGN ASSM TY S80(1)XX(U-1EXT)

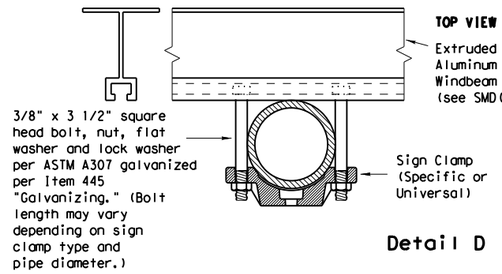


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

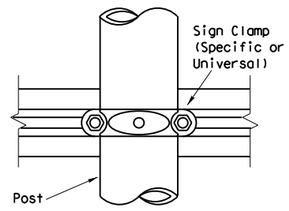


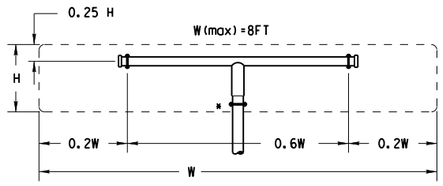
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

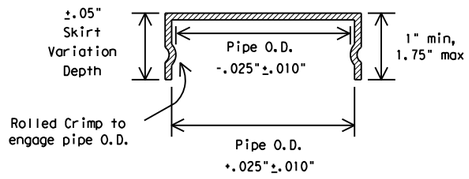




SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

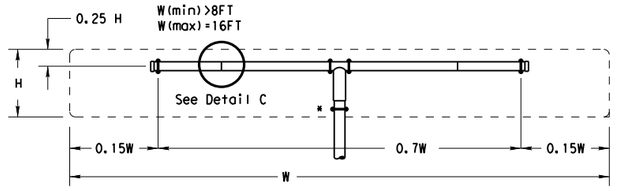
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0453	04	024	SH 207

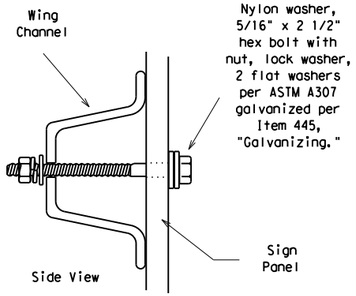
DIST	COUNTY	SHEET NO.
LBB	CROSBY	209

9-08 REVISIONS

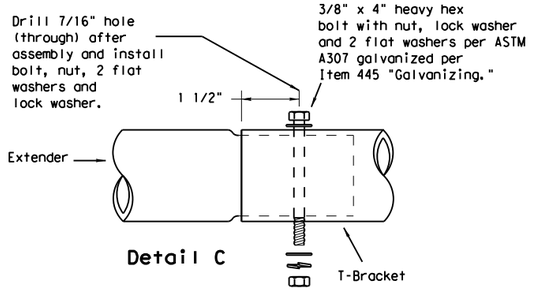
DATE: 6/29/2022 1:20:37 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\04530402A4 - Design\Plan Set\8. Traffic\TRAFFIC STANDARDS\smds3.dgn



SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



Detail B



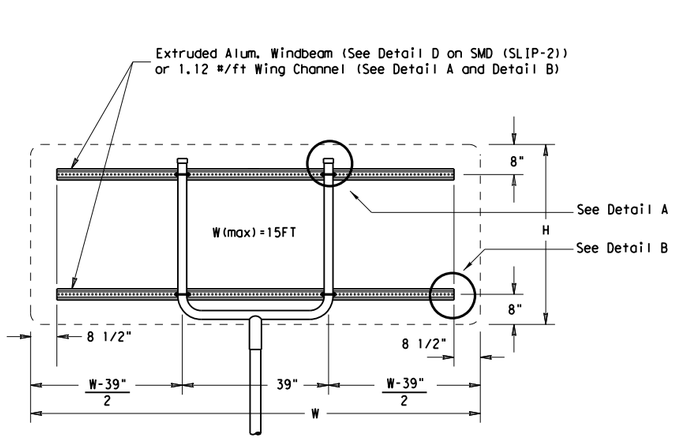
Detail C

Splices shall only be allowed behind the sign substrate.

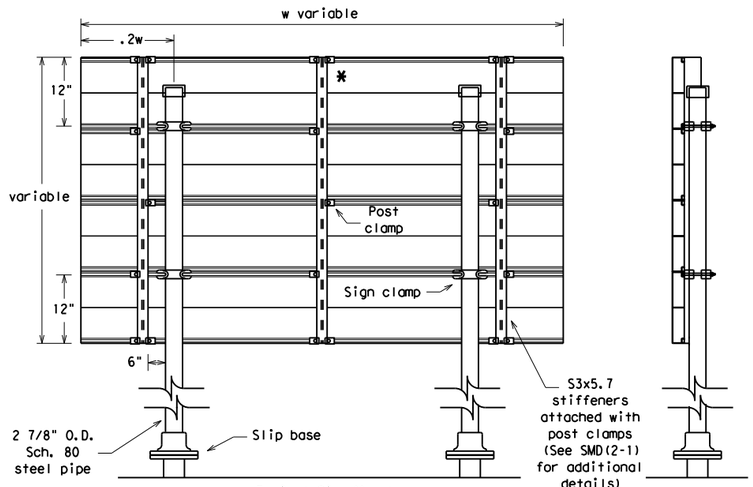
GENERAL NOTES:

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.



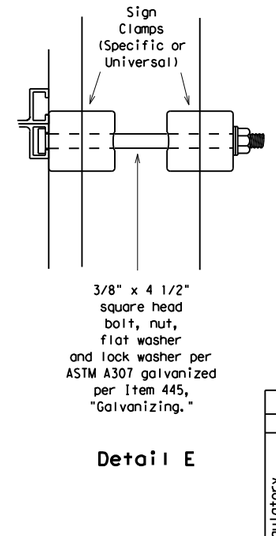
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



Typical Sign Mount

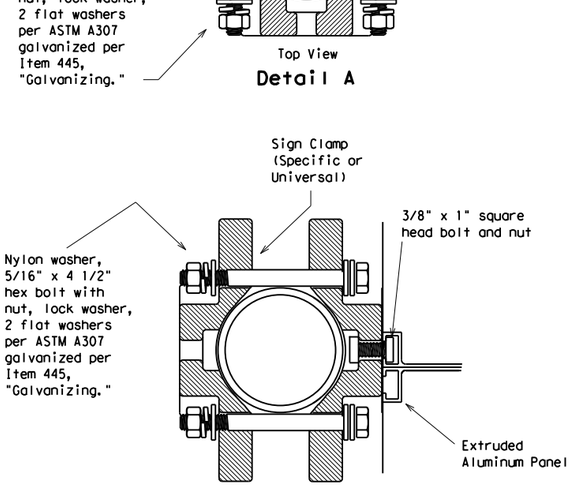
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.



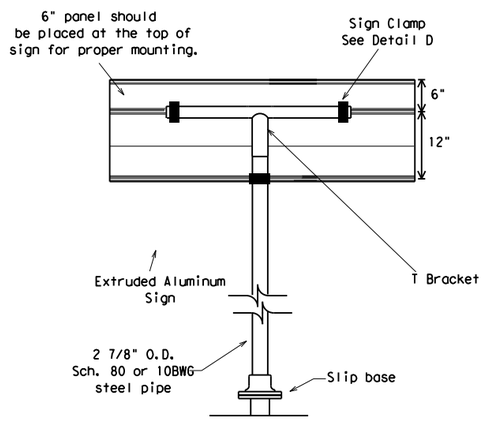
Detail E

See Detail E for clamp installation

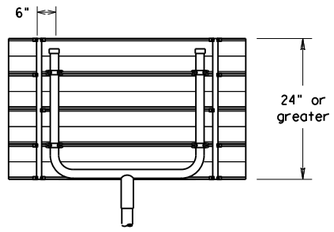


Detail A

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

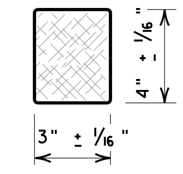
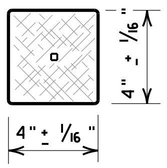
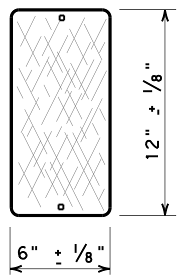
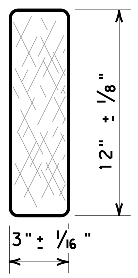
REVISIONS
9-08

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

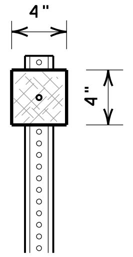
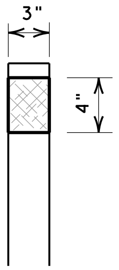
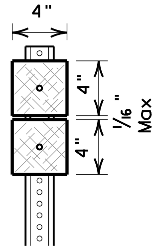
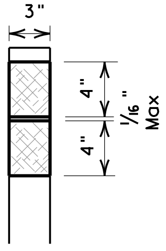
CONT	SECT	JOB	HIGHWAY
0453	04	024	SH 207

DIST	COUNTY	SHEET NO.
LBB	CROSBY	210

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS

	SINGLE		DOUBLE	
DEVICE	 1-Size 2 reflector unit	 1-Size 1 reflector unit	 2-Size 2 reflector units	 2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

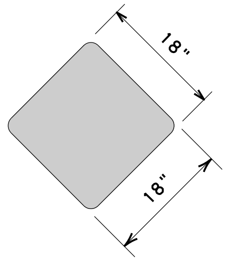
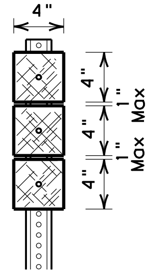
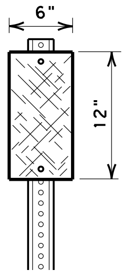
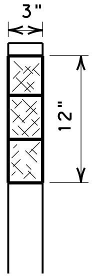
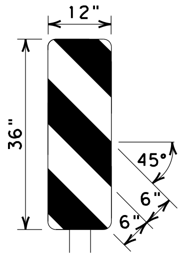
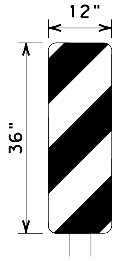
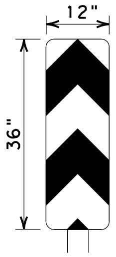
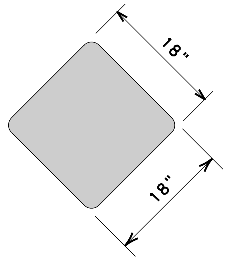
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

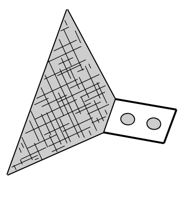
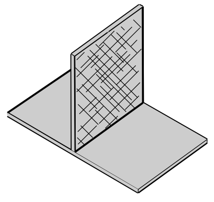
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE		 3-Size 2 reflector units	 1-Size 3 reflector unit	 3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

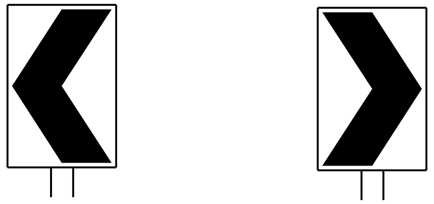
DEPARTMENTAL MATERIAL SPECIFICATIONS

FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

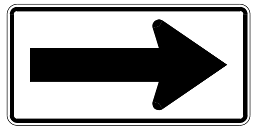
BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		

CHEVRONS

DEVICE	 W1-8			
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

ONE DIRECTION LARGE ARROW

DEVICE	 W1-6	
SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE

1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	LBB	CROSBY		211

20A

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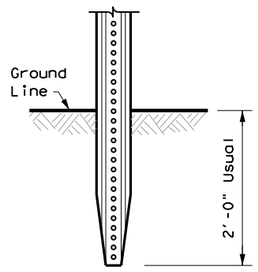
POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

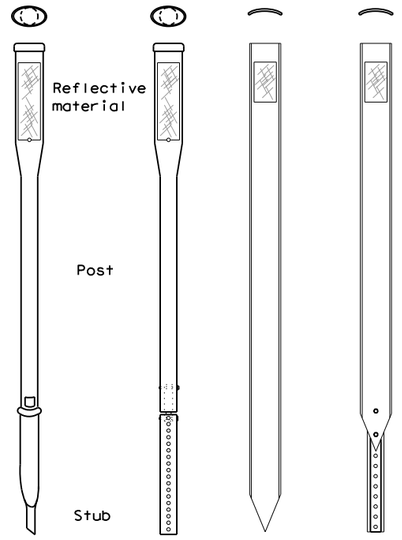


NOTES

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.

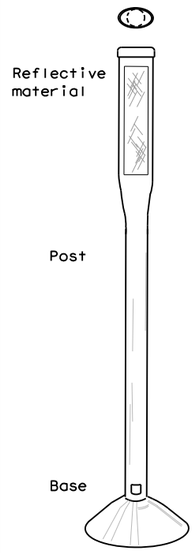
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



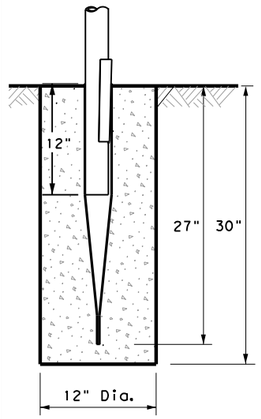
SURFACE MOUNT

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.

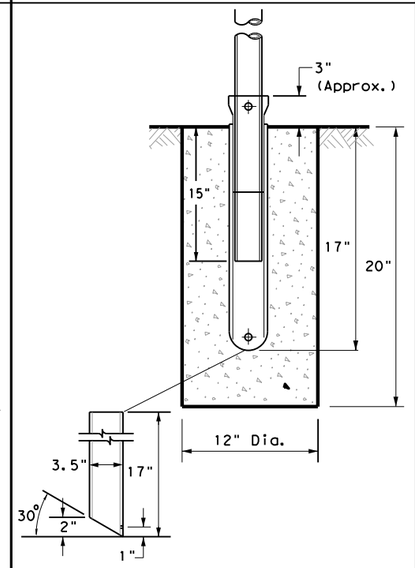
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

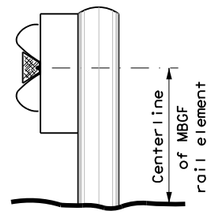
NOTE

1. Install per manufacturer's recommendations.

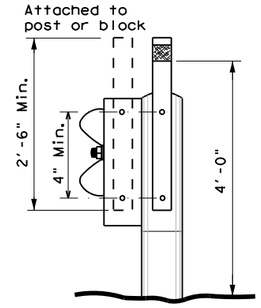
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

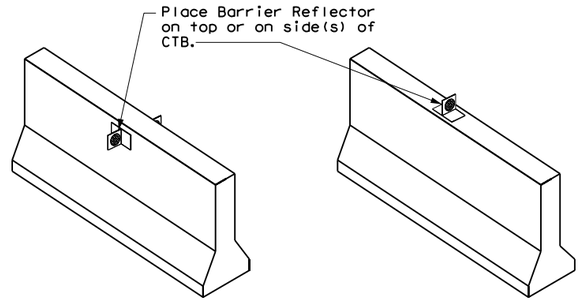
GF1



GF2



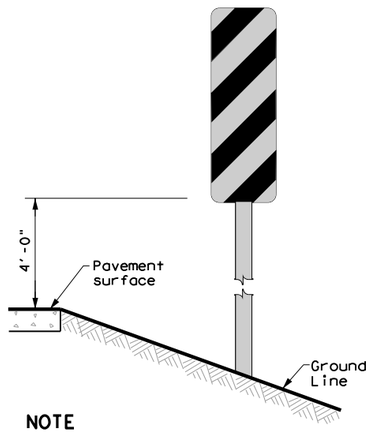
CONCRETE TRAFFIC BARRIER (CTB)



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.

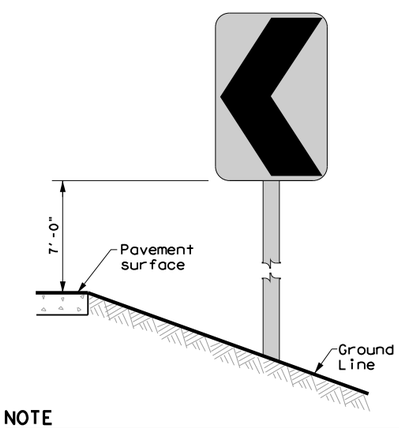
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

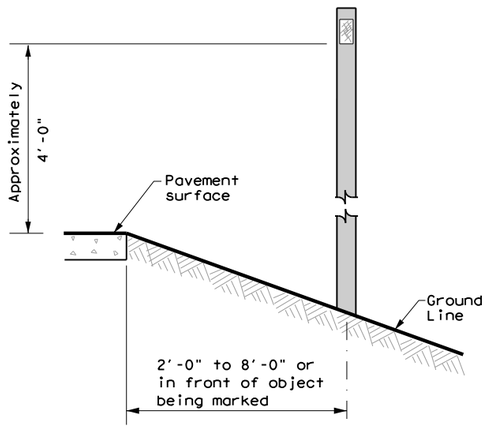
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
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4-10 7-20	LBB	CROSBY		212

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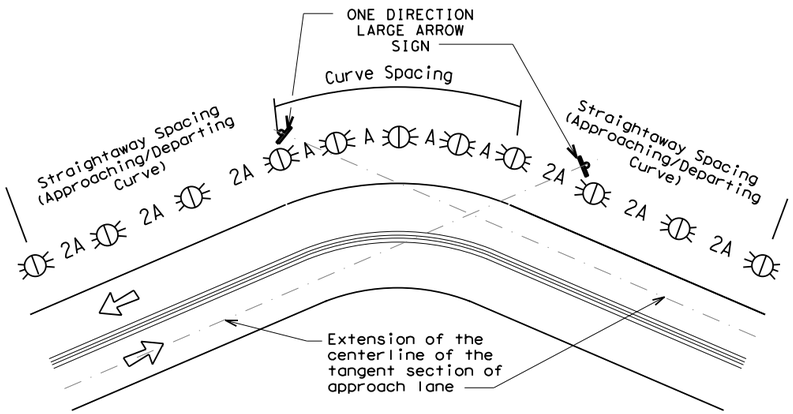
MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

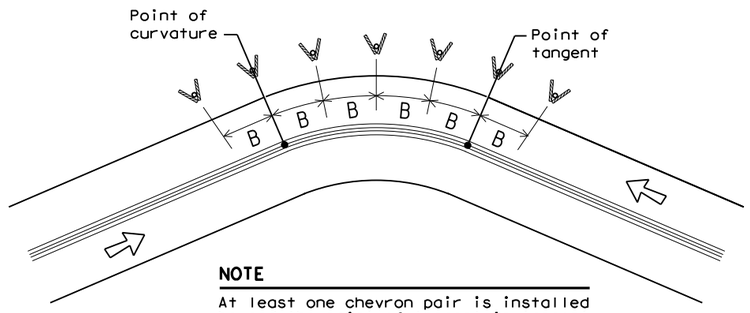
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
		A	2A	B
1	5730	225	450	—
2	2865	160	320	—
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp.Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete)and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100'max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100'max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND

	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
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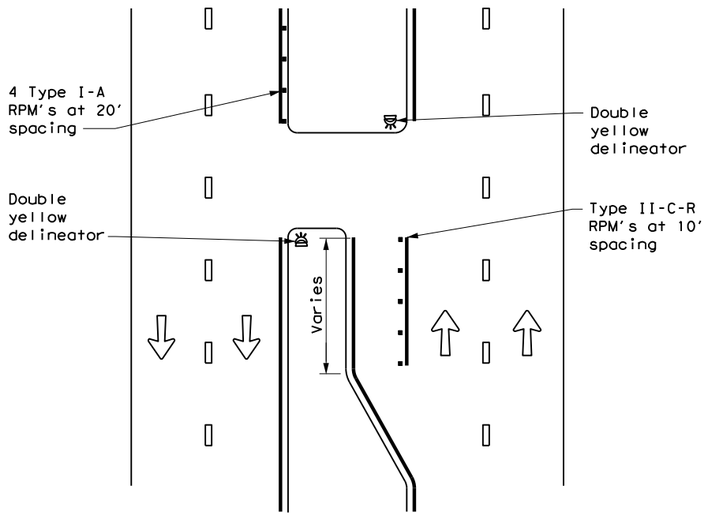
3-15 8-15 8-15 7-20	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		213

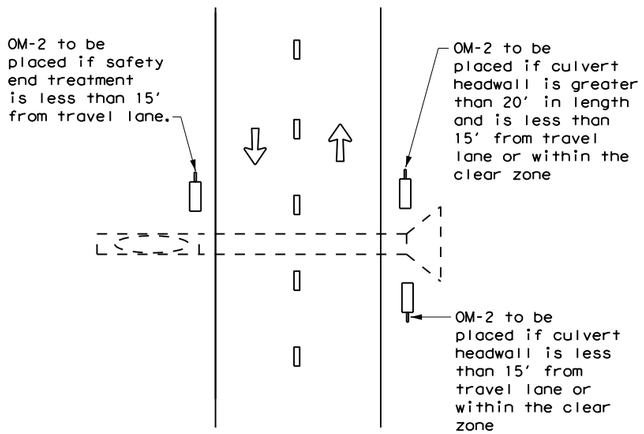
20C

CROSSOVERS



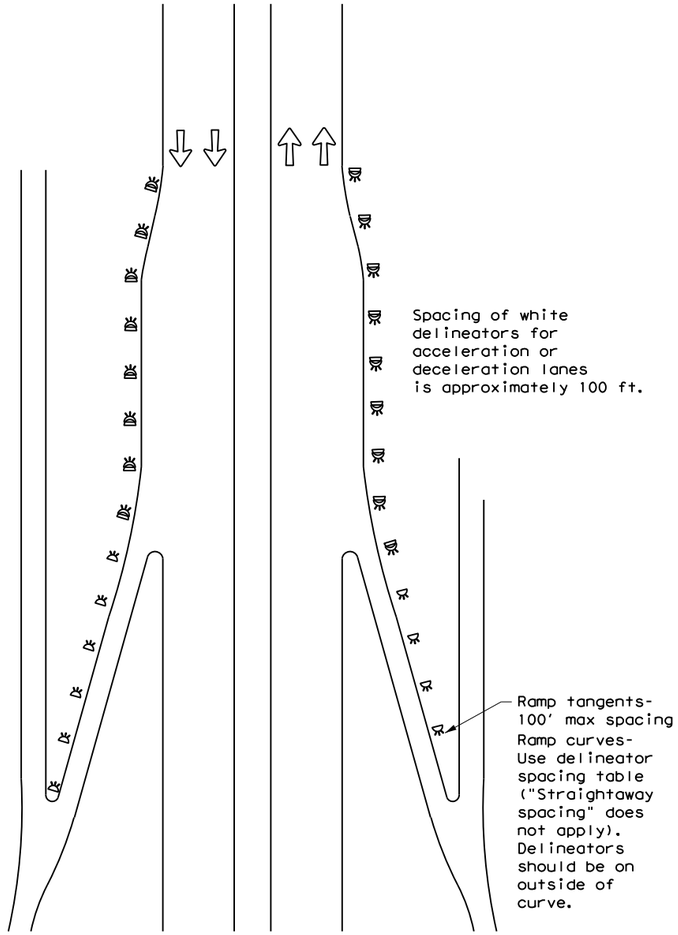
DETAIL 1

FOR CULVERTS WITHOUT MBGF



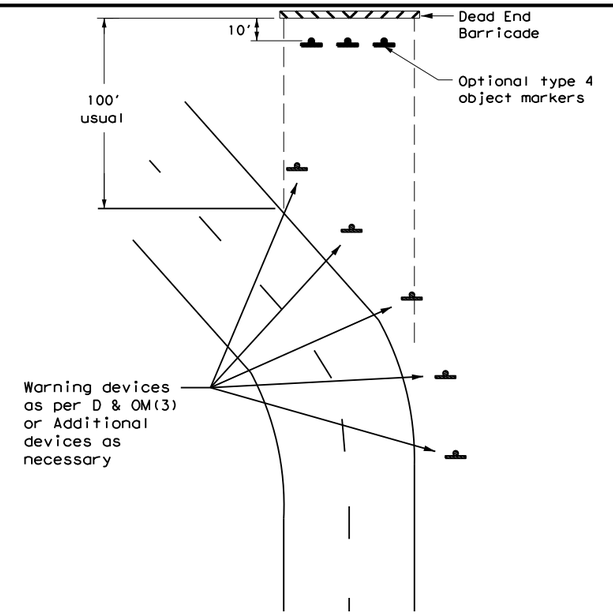
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



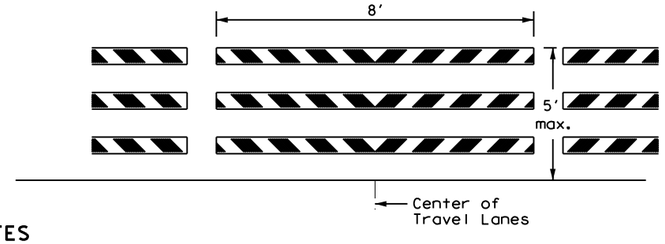
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

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© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
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7-20	LBB	CROSBY		214

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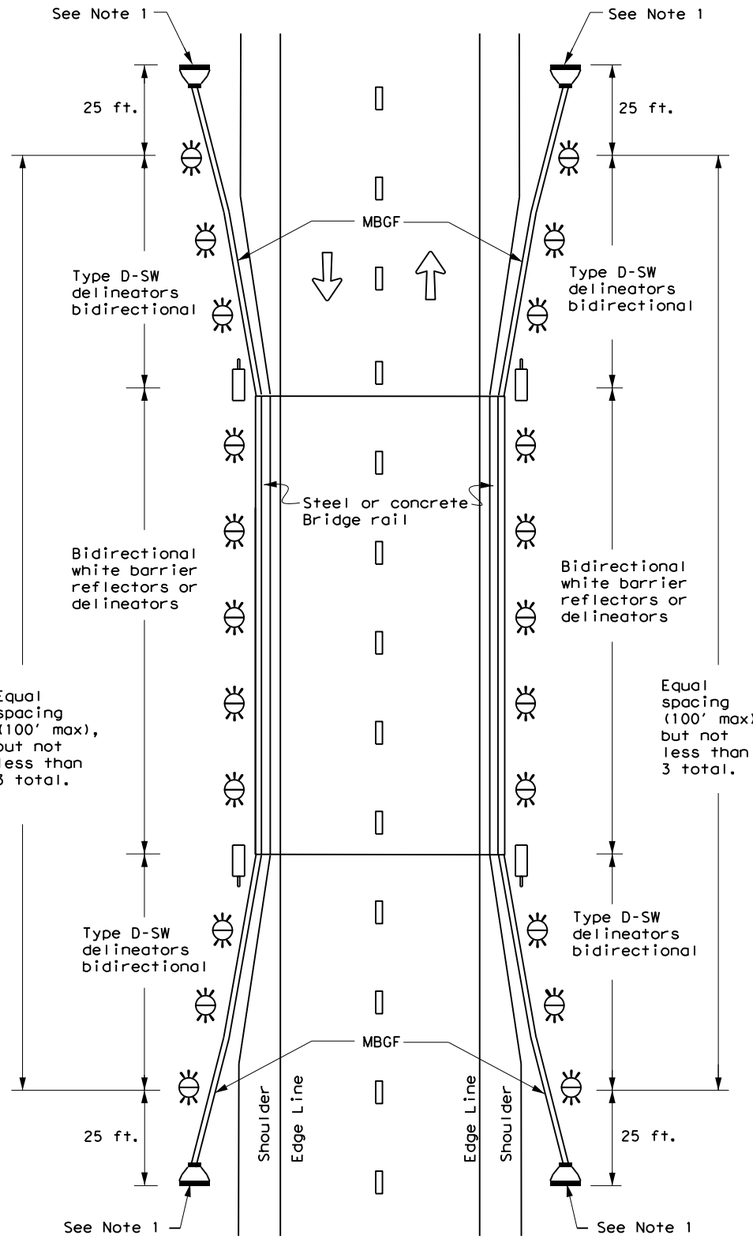
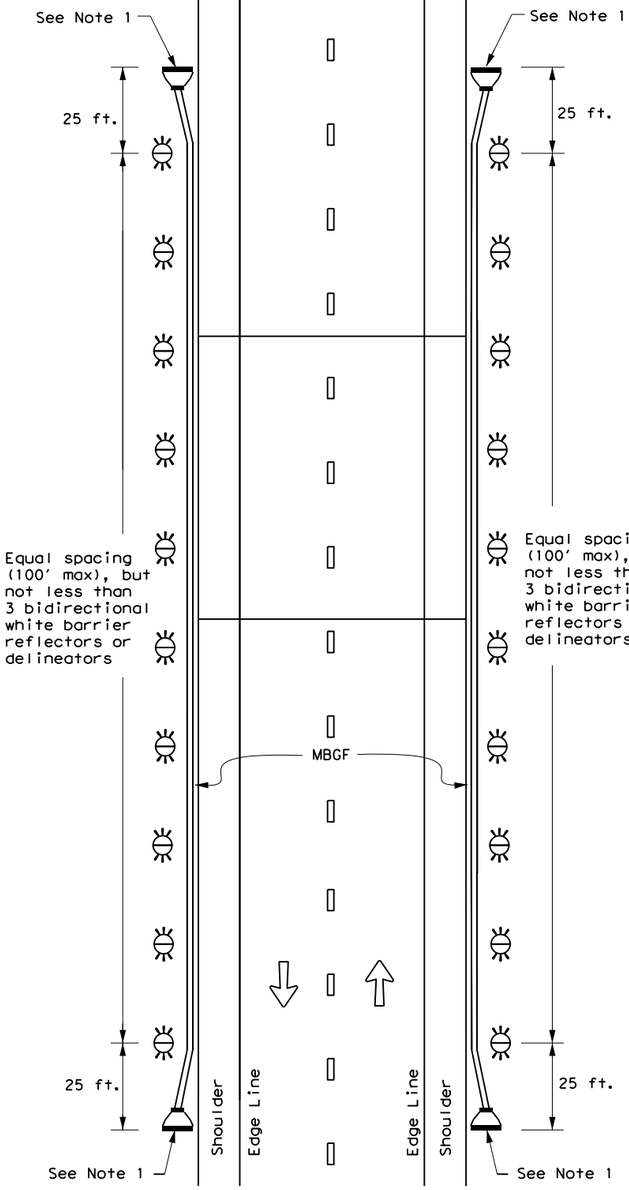
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

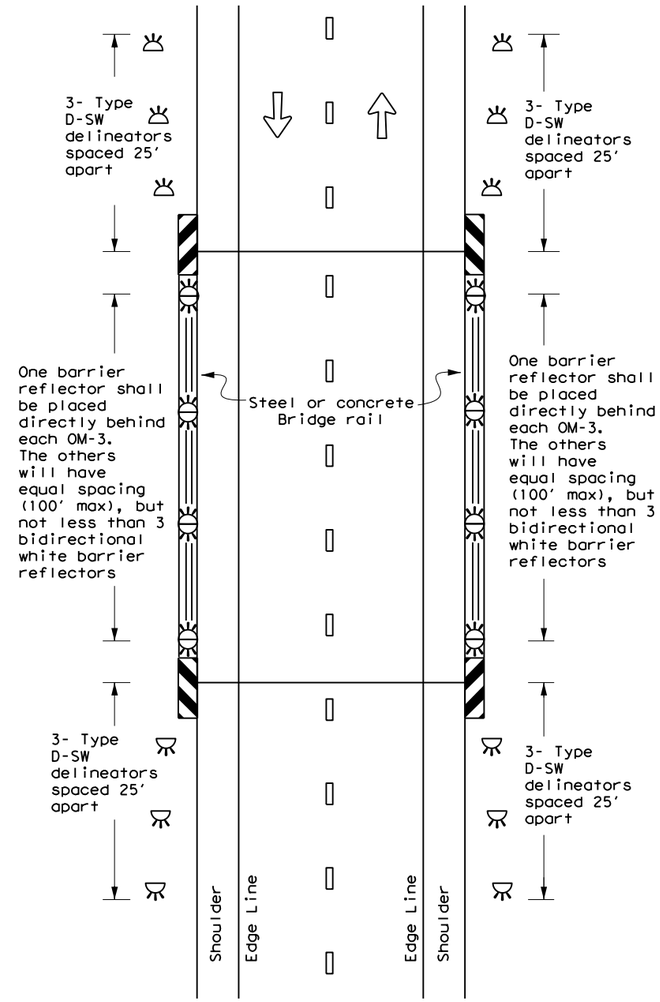
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(5)-20

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© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
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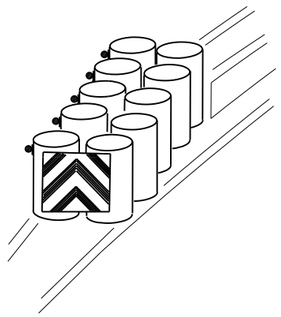
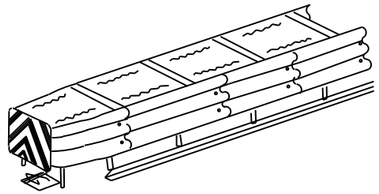
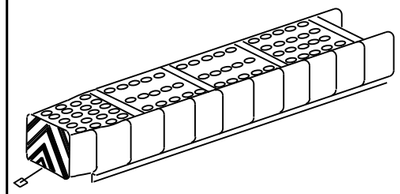
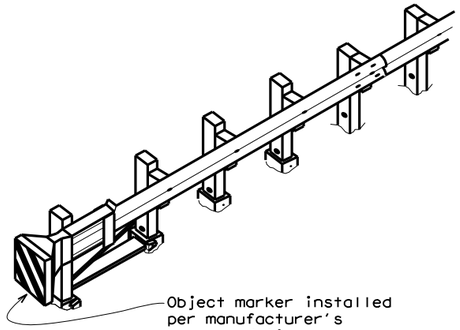
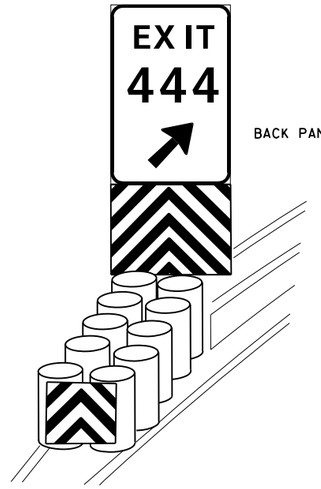
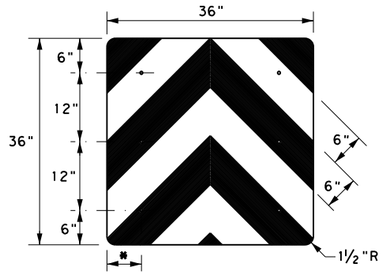


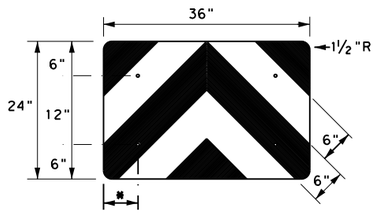




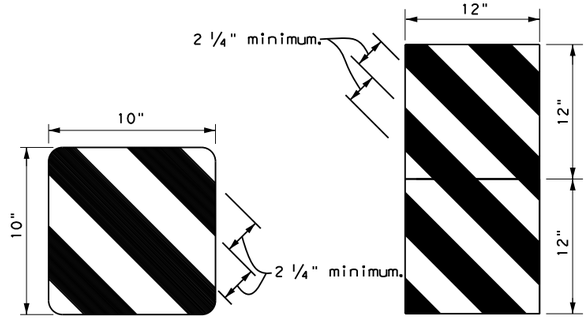




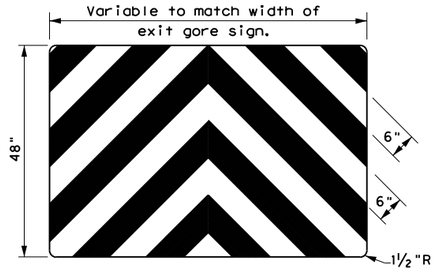


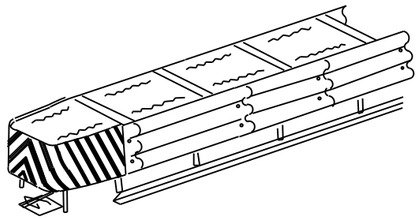


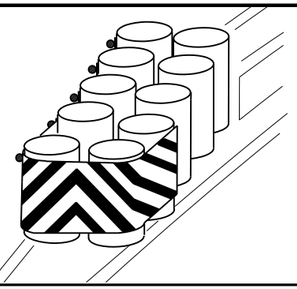
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

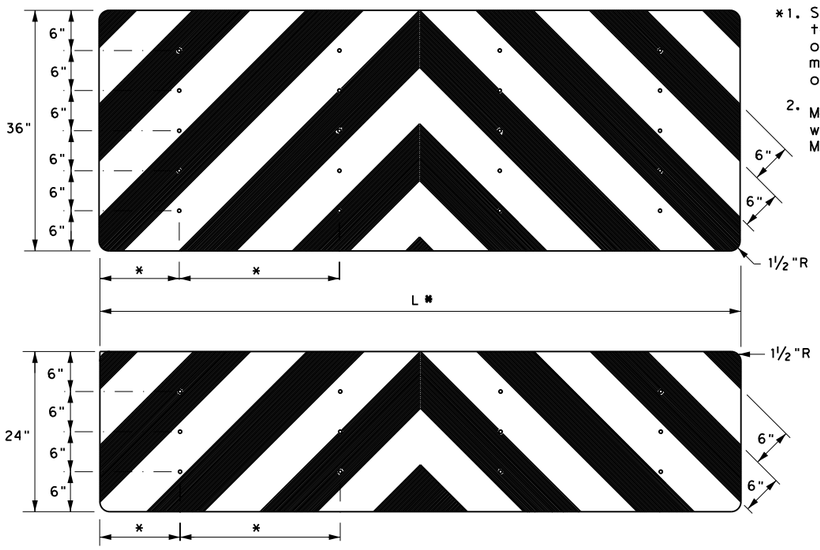


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

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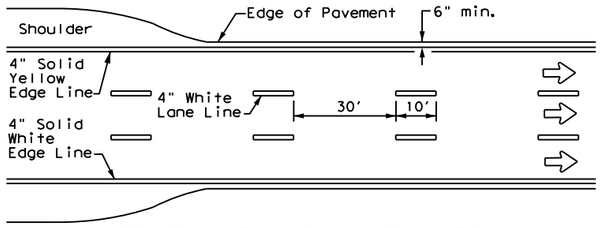
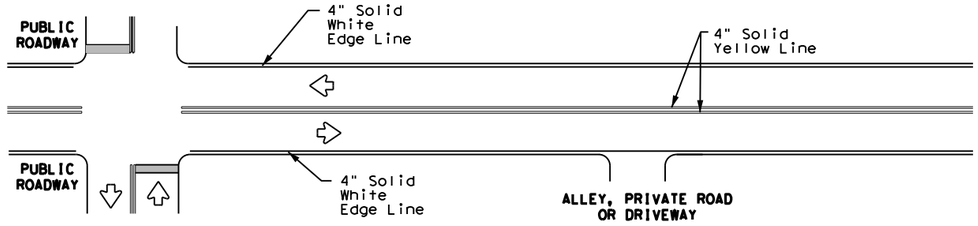
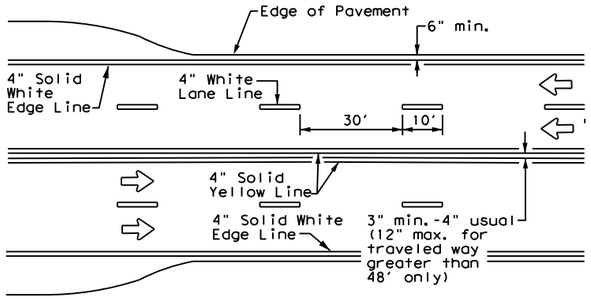


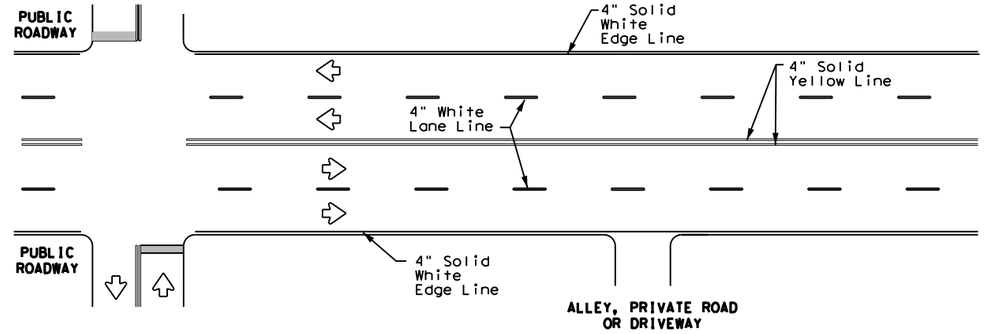
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



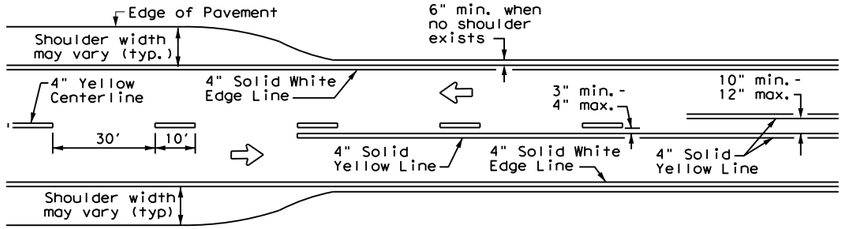
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



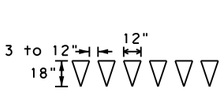
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



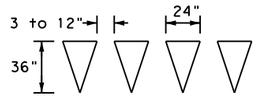
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

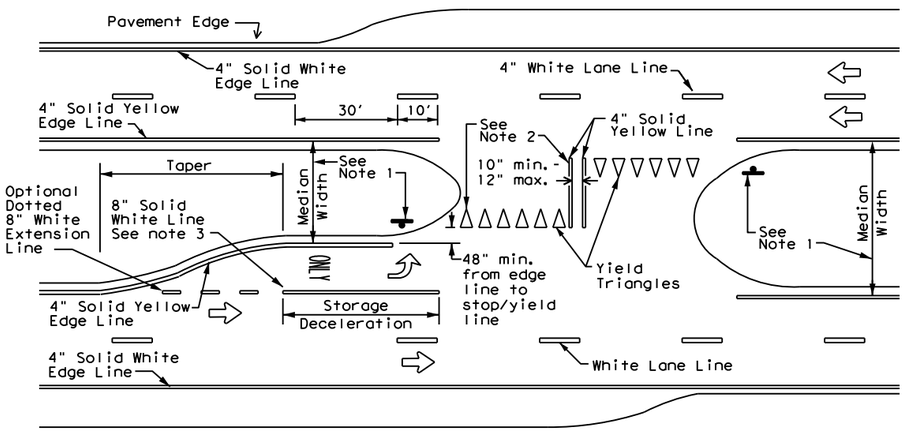


For posted speed on road being marked equal to or less than 40 MPH.



For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



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 are optional as determined by the Engineer.

2. Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield traingles 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.

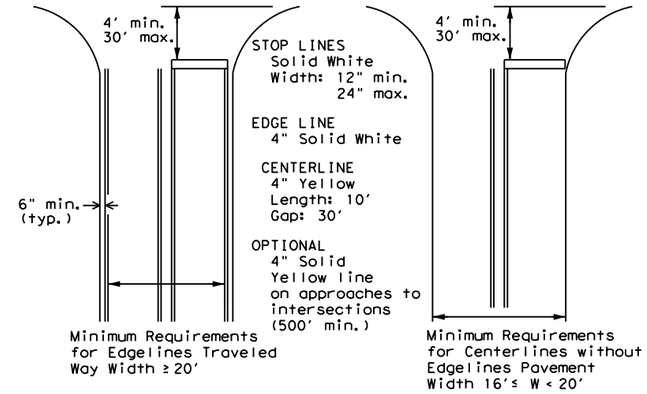
GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines 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 inside of edgeline to the inside of edgeline 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.



GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways

Texas Department of Transportation

Traffic Safety Division Standard

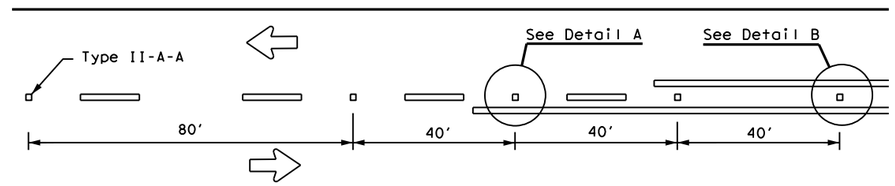
TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-20

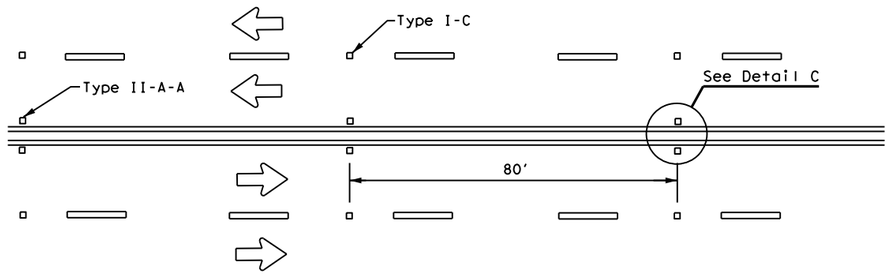
FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
© TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0453	04	024	SH 207
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	LBB	CROSBY		217

22A

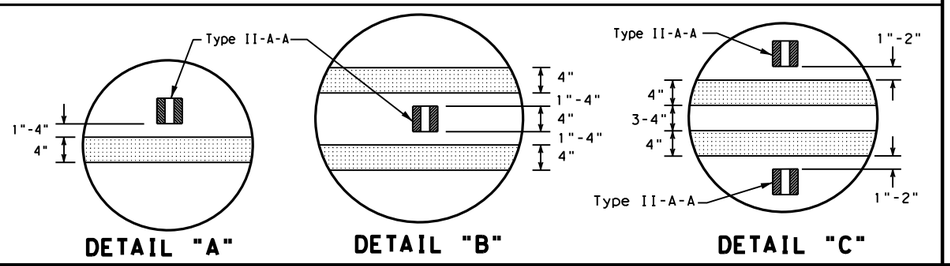
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



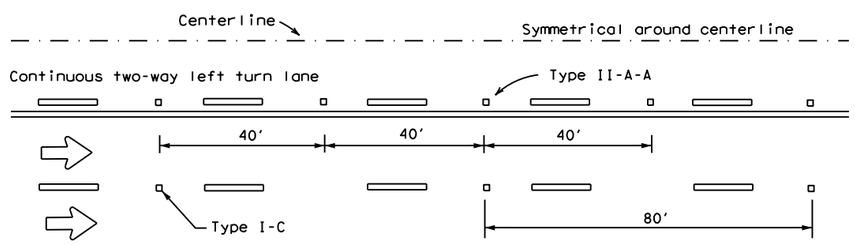
CENTERLINE FOR ALL TWO LANE ROADWAYS



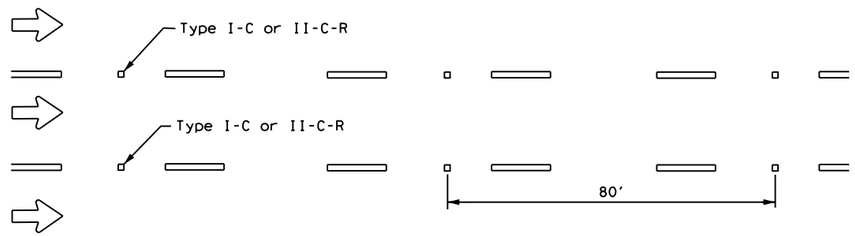
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



DETAIL "A" **DETAIL "B"** **DETAIL "C"**

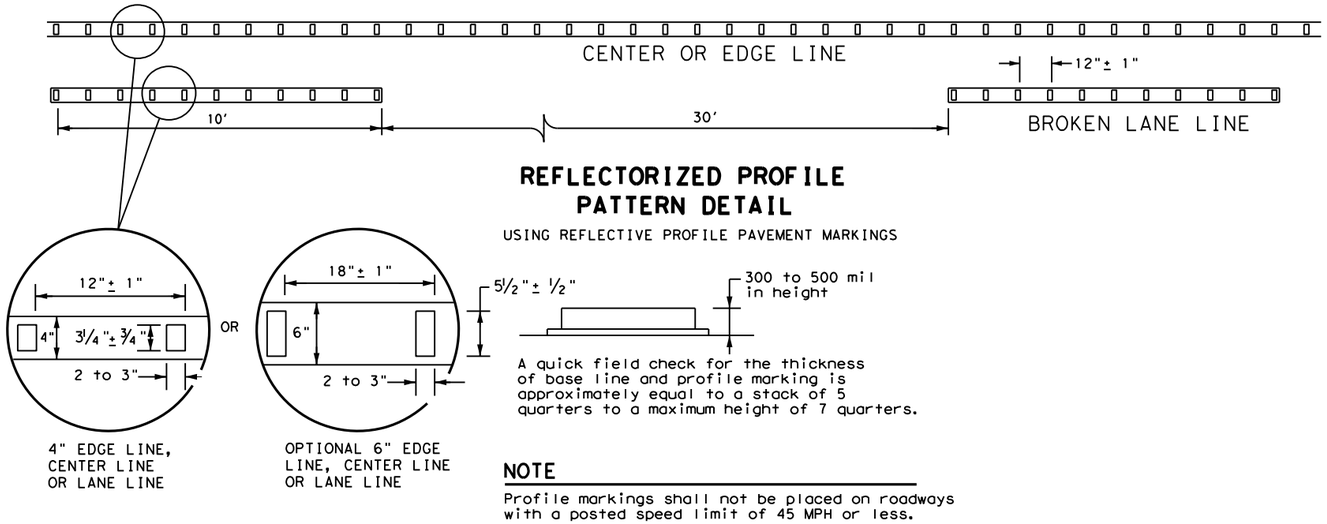


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



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.



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.

4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

NOTE

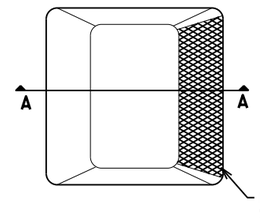
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

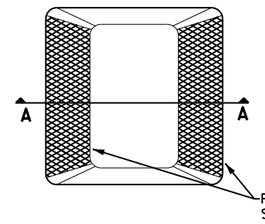
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

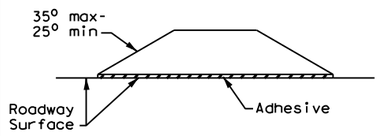
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-20

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
© TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10 5-00 2-12 8-00 6-20	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		218

22B

DATE: 6/29/2022 1:21:03 PM
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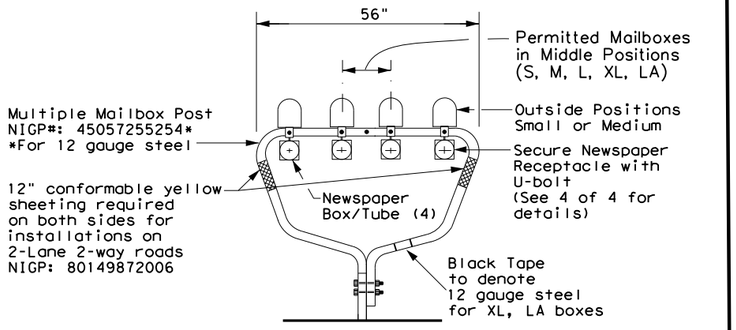
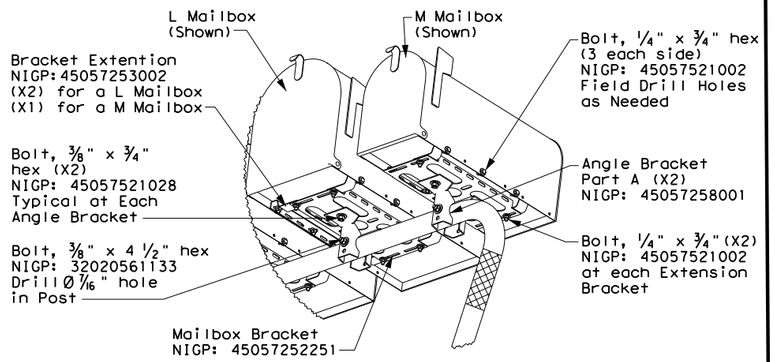
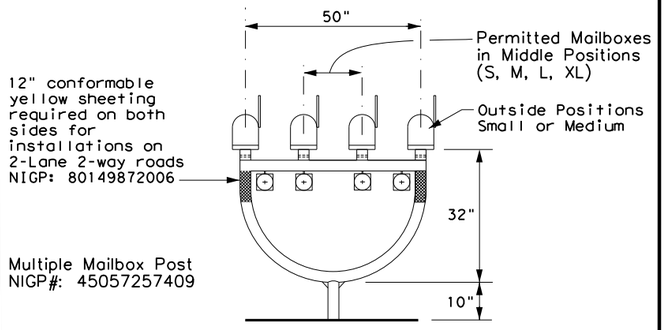
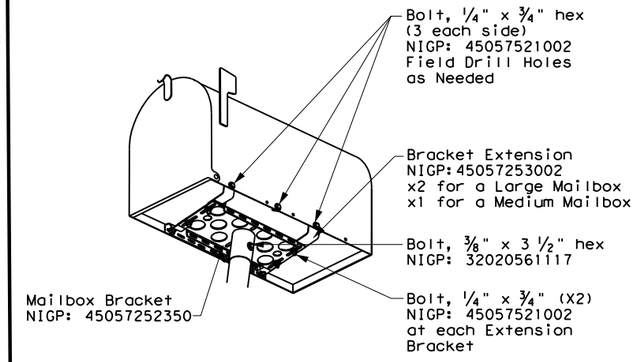
TYPE 1 - MULTIPLE





TYPE 4 - MULTIPLE





MAILBOX SIZES

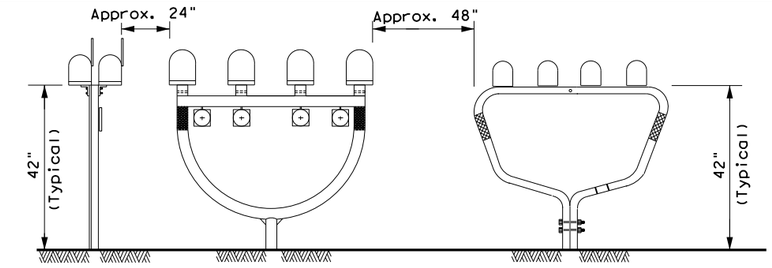
MAILBOX SIZE	TYPICAL DIMENSIONS			MAX **
	LENGTH	WIDTH	HEIGHT	WEIGHT
SMALL	19 1/2"	6"	7"	6 LBS
MEDIUM	22 1/2" *	8" *	11 1/2" *	8 LBS
LARGE	23 1/2"	11 1/2"	13 1/2"	11 LBS
EXTRA LARGE	18"	14"	12"	13 LBS
LOCKABLE	18"	11 1/2"	15"	23 LBS

* 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.

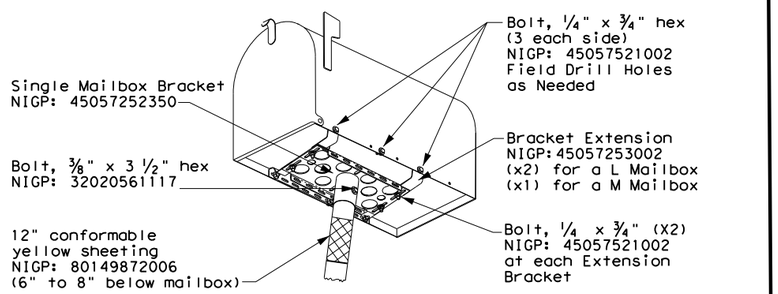
TYPICAL INSTALLATION MEASUREMENTS

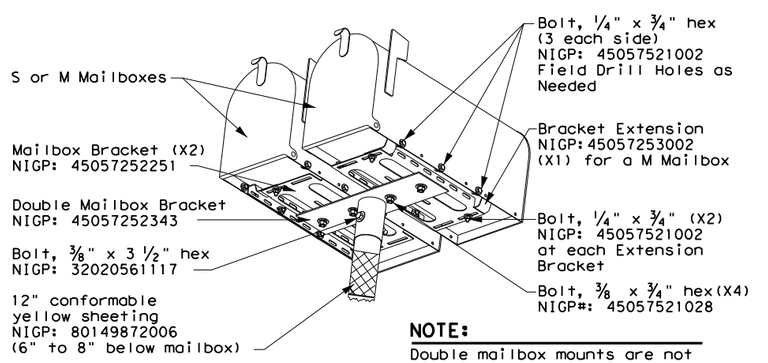


NOTE:

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

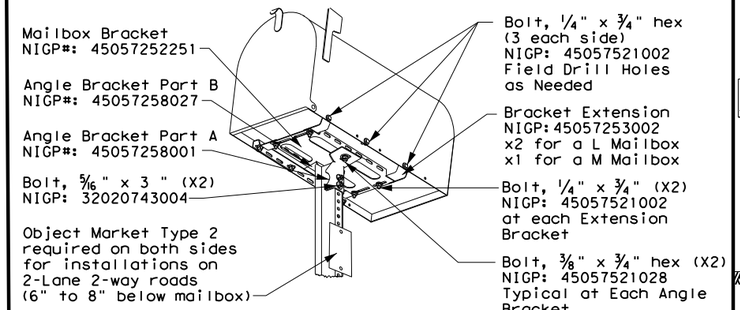


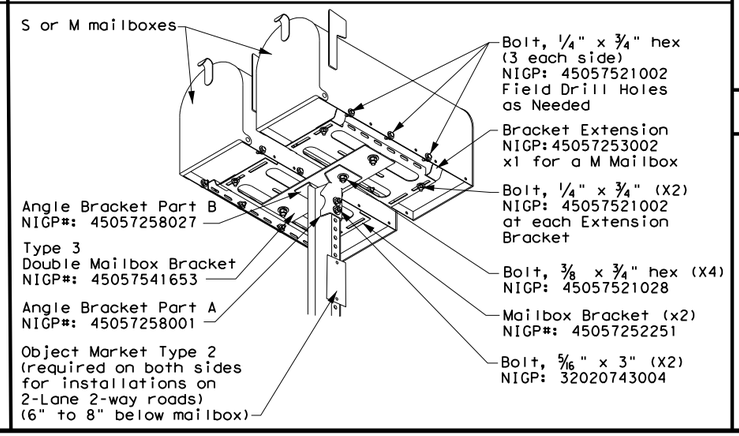


NOTE:

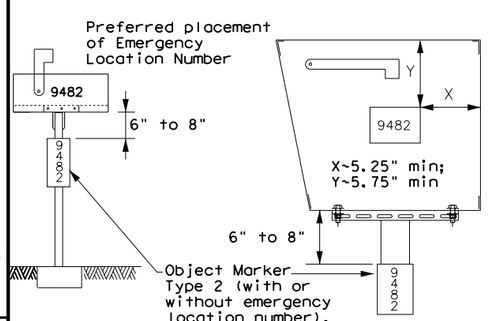
Double mailbox mounts are not allowed with a type 4 multiple mailbox installation

TYPE 3 - SINGLE/DOUBLE





PLACEMENT OF EMERGENCY LOCATION NUMBER

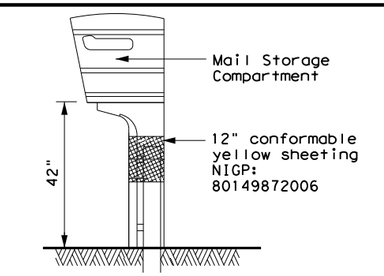


NOTES:

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	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		219

DATE: 6/29/2022 1:21:05 PM
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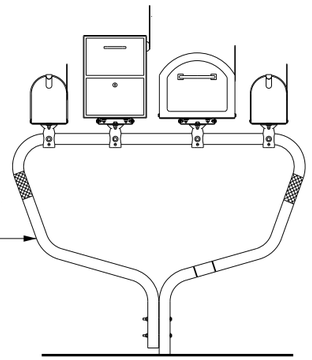
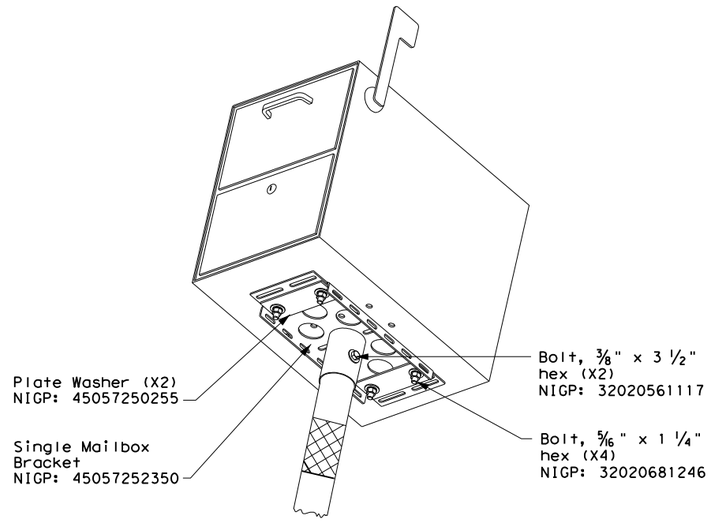
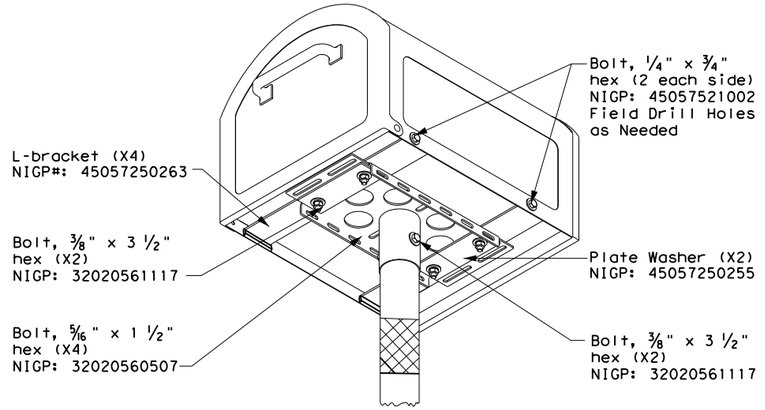
TYPE 1- MULTI LOCKABLE AND XL MAILBOX



TYPE 2/4 - SINGLE LOCKABLE MAILBOX

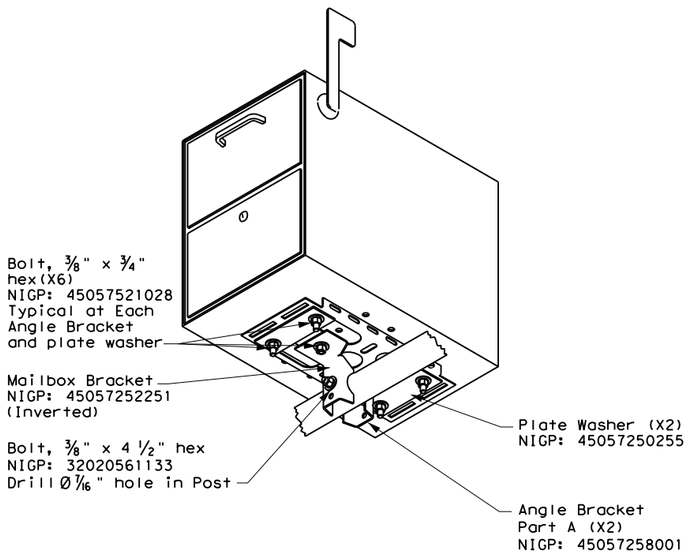


TYPE 2/4 - SINGLE XL MAILBOX

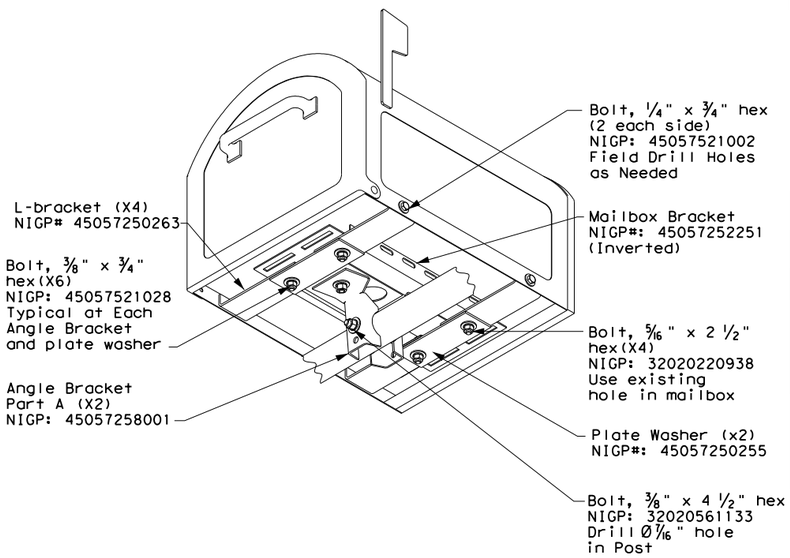


NOTE:
Follow same configuration when mounting an XL mailbox on a Type 4 multi post.

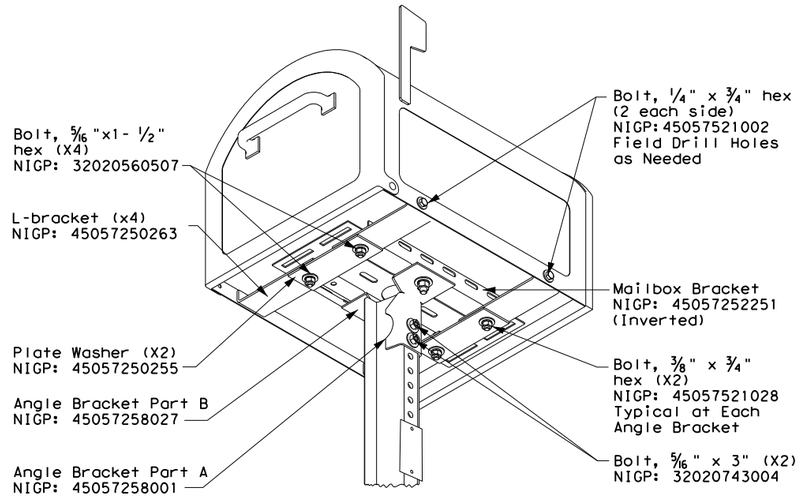
TYPE 1 MULTI – LOCKABLE ARCHITECTURAL (LA)



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	0453	04	024	SH 207
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	LBB	CROSBY		220

DATE: 6/29/2022 11:21:16 AM
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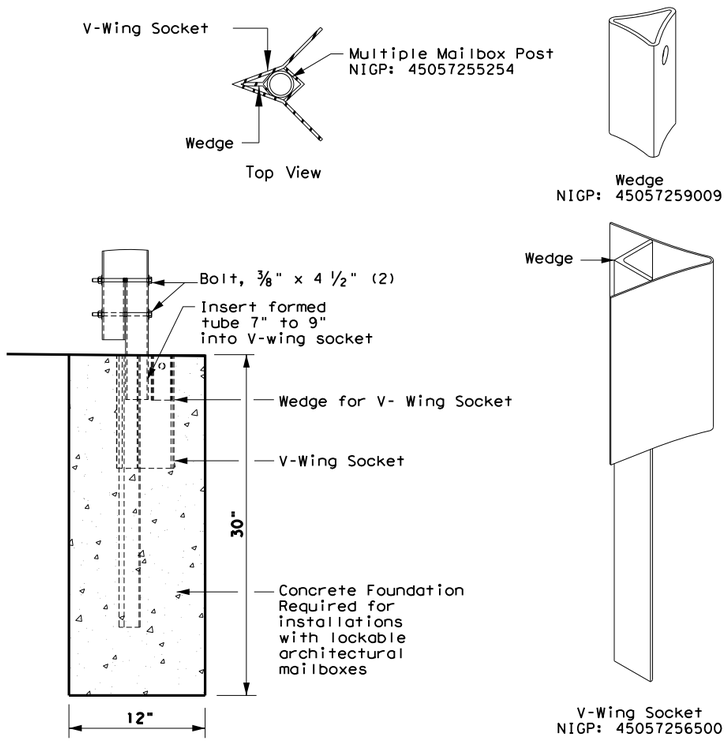
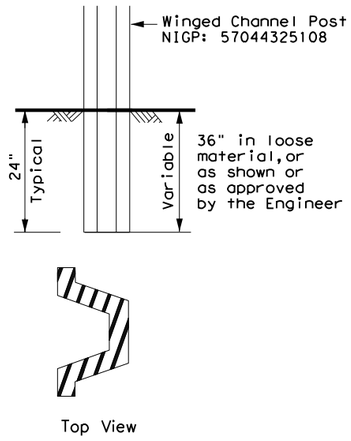
TYPE 1 - SUPPORT/FOUNDATION
Thin Wall Tube w/ V-LOC Anchorage

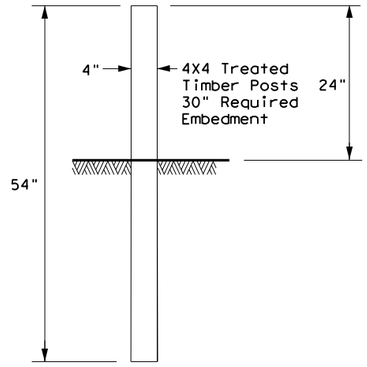


TYPE 3 - SUPPORT/FOUNDATION

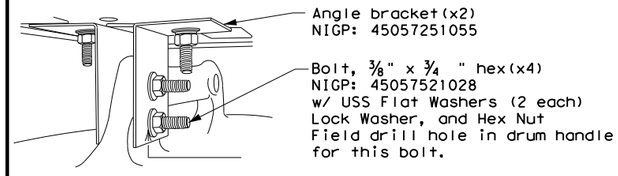


NOTES:
1. Attach Object Marker (OM) facing direction of traffic.
2. OM will also be required on opposite side if installed on a 2-Lane, 2-Way roadway.

TYPE 5 - SUPPORT/FOUNDATION



TYPE 6 - TEMPORARY MAILBOX SUPPORT

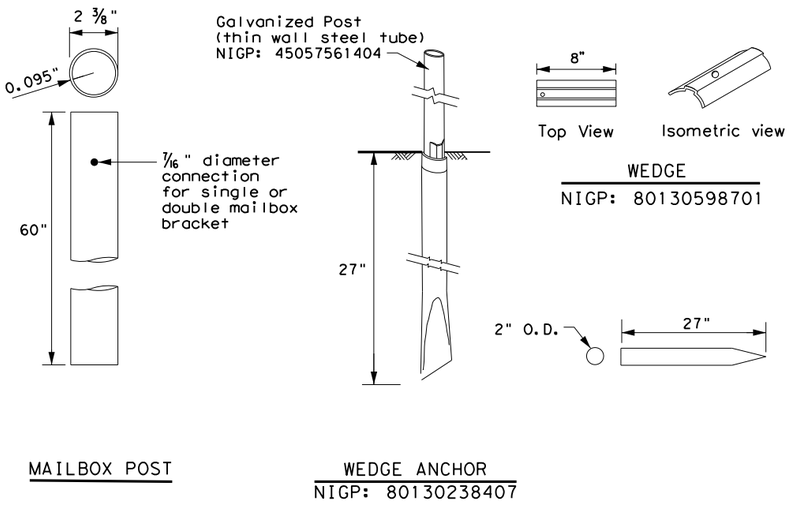


Plastic Drum NIGP: 55093383655
Rubber Collar NIGP: 55093387102

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

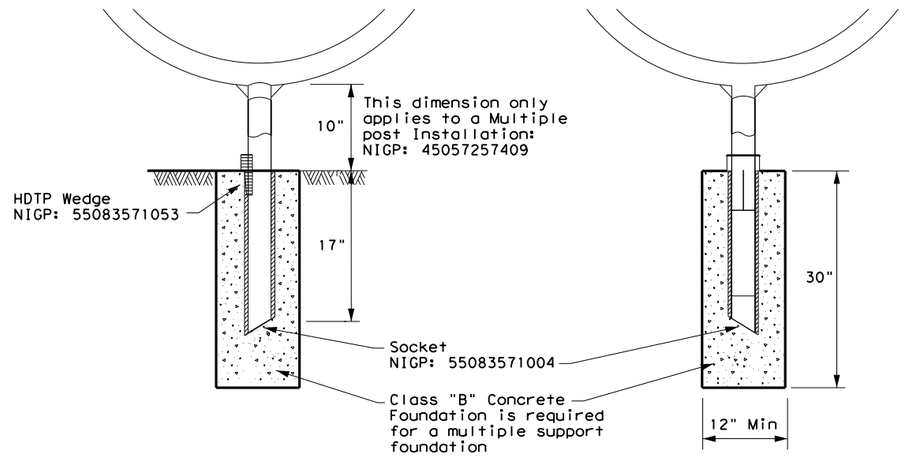
TYPE 2 - SUPPORT/FOUNDATION
Thin Wall Steel Tube w/Wedge Anchor System



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:
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REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0453	04	024	SH 207
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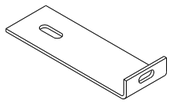
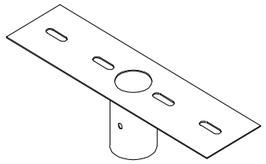
DATE: 6/29/2022 1:21:07 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\4053940 MB-21 NIGP PARTS LIST AND COMPATIBILITY.dgn

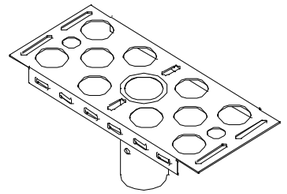
TYPE	TYPE 1	TYPE 2	TYPE 3	TYPE 4			TYPE 5	TYPE 6
Configuration	Multiple	Single or Double	Single or Double	Single	Double	Multiple	Single	Single
Mailbox Size NIGP #	Outside Position: S or M Inside Position: S, M, L, XL, or LA	Single: S, M, L, XL, or LA Double: SS, SM, MM	Single: S, M, L, or XL Double: SS, SM, MM	S, M, L, XL, or LA	SS, SM, or MM	Outside Position: S or M Inside Position: S, M, L, or XL	Molded Plastic	S, or M
Mailbox Post NIGP #	45057255254 (Galvanized Multiple)	45057561404 (Thin Walled Gavanize)	57044325108 (Wing Channel Post)	45057561107 (Thin walled white powder coated) 45057561057 (Recycled Rubber Post: S or M only)	45057561107 (Thin Walled White Powder Coated)	45057257409 (White Powder Coated Multiple)	4x4 Timber	Construction Barrel
Post and Mailbox Hardware NIGP #	45057259009 (Wedge) 45057256500 (V-Wing Socket) 45057253002 (Bracket Extension) 45057252251 (Mailbox Bracket) 45057258001 (Part A Angle Bracket x2) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	80130598701 (Wedge) 80130238407 (Wedge Anchor) 45057253002 (Bracket Extension) 45057252343 (Double MB Bracket) 45057252350 (S. Mailbox Bracket) 45057252251 (Mailbox Bracket) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket forXL x4)	45057541653 (Type 3 Double Mailbox Bracket) 45057252251 (Mailbox Bracket) 45057253002 (Bracket Extension) 45057258001 (Part A Angle Bracket) 45057258027 (Part B Angle Bracket) 45057250255 (Plate Washer for XL x2) 45057250263 (L-Bracket for XL x4)	55083571053 (Wedge) 55083571004 (Socket) 45057252350 (Single Mailbox Bracket) 45057253002 (Bracket Extension) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	55083571053 (Wedge) 55083571004 (Socket) 45057253002 (Bracket Extension) 45057252343 (Double Mount Bracket) 45057252251 (Mailbox Bracket x2)	55083571053 (Wedge) 55083571004 (Socket) 45057253002 (Bracket Extension) 45057252350 (Single Mount Bracket) 45057250255 (Plate Washer for XL x2) 45057250263 (L-Bracket for XL x4)	None	45057251055 Angle Bracket (x2)
Foundation Used	Class B Concrete (Required for LA Mailboxes)	Class B Concrete (Required for LA Mailboxes)	None	Class B Concrete (not used with recycled rubber post, required for LA Mailboxes)	Class B Concrete (not required)	Class B Concrete	None	None



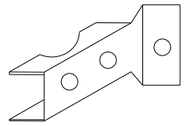
NIGP: 45057250263
L-Bracket x4 for
XL sized mailboxes



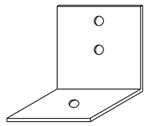
NIGP: 45057252343
Double Mailbox Bracket
For Type 2 and Type 4
double mount



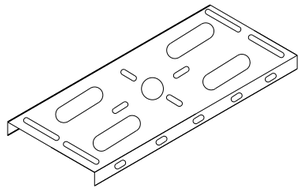
NIGP: 45057252350
Single Mailbox Bracket
For Type 2 single and for
Type 4 single and multi mount



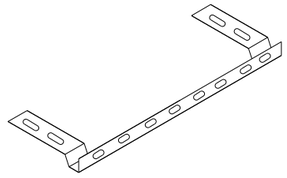
NIGP: 45057258001
Part "A" Angle Bracket
For Type 1 multi (2 per mailbox)
and Type 3 single and double



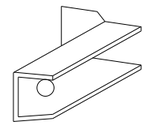
NIGP: 45057251055
Type 6 Angle Bracket
(2 per mailbox)



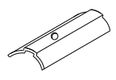
NIGP: 45057252251
Mailbox Bracket
For Type 1 multi and
any double mount (use 2)



NIGP: 45057253002
Bracket Extension
Use 1 for a medium Mailbox
Use 2 for a Large Mailbox



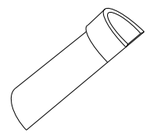
NIGP: 45057258027
Part "B" Angle Bracket
For Type 3 single
and double



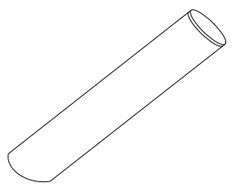
NIGP: 80130598701
Wedge for Type 2

NIGP: 45057250255
Plate Washer for Architecural
and XL Mailboxes

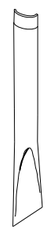
NIGP: 45057541653
Type 3 double mailbox bracket



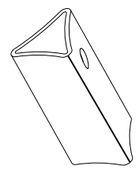
NIGP: 55083571053
Type 4 Mailbox Wedge



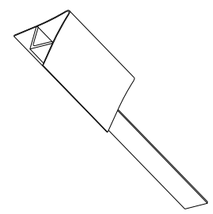
NIGP: 55083571004
Type 4 Mailbox Socket



NIGP: 80130238407
Type 2 Wedge Anchor



NIGP: 45057259009
Wedge for Type 1 V-wing Socket



NIGP: 45057256500
V-wing Socket for
Type 1 Foundation

NIGP #	OBJECT MARKERS AND CONFORMABLE SHEETING
55008311759	Type 2 OM 4"x4" (3 Needed) for Type 3 Wing Channel Post
55008312906	Type 2 OM 6"x12" (1 needed) for Type 3 Wing Channel Post
80149872006	12" Conformable Reflective Yellow Sheeting for Flexible Posts

NOTES:

1. Type 2 object marker in accordance with Traffic Engineering Standard Delineators & Object Markers.
2. A light weight receptacle for newspaper delivery can be attached to mailbox posts if the receptacle does not touch the mailbox, present a hazard to traffic or delivery of the mail, extend beyond the front of the mailbox, or display advertising, except the publication title.

BID CODES FOR CONTRACTS

MB-(X) ASSM TY (XXX) (X)

Type of Mailbox
- S = Single
- D = Double
- M = Multiple
- MP = Molded Plastic

Type of Post
- WC = Winged Channel Post
- RR = Recycled Rubber
- TWW = Thin Walled White Tubing
- TWG = Thin Walled Galvanized Tubing
- TIM = Timber

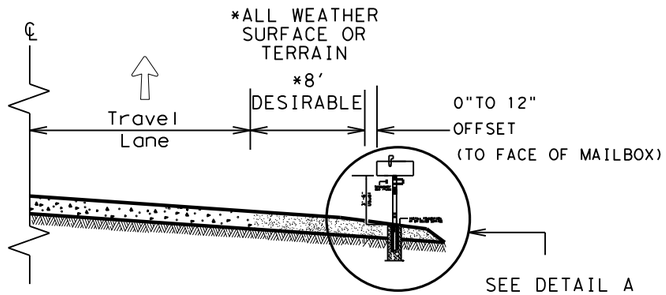
Type of Foundation
- Ty 1 = V-Loc
- Ty 2 = Wedge Anchor Steel System
- Ty 3 = Winged Channel post
- Ty 4 = Wedge Anchor Plastic System
- Ty 5 = 4 X 4 Post

Texas Department of Transportation — Maintenance Division Standard

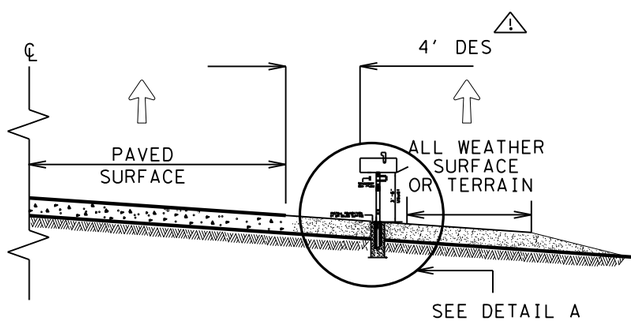
NIGP PARTS LIST AND COMPATIBILITY

MB(4)-21

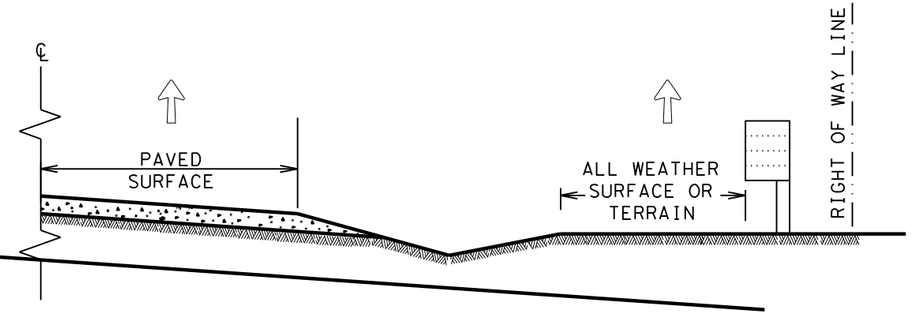
FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		222



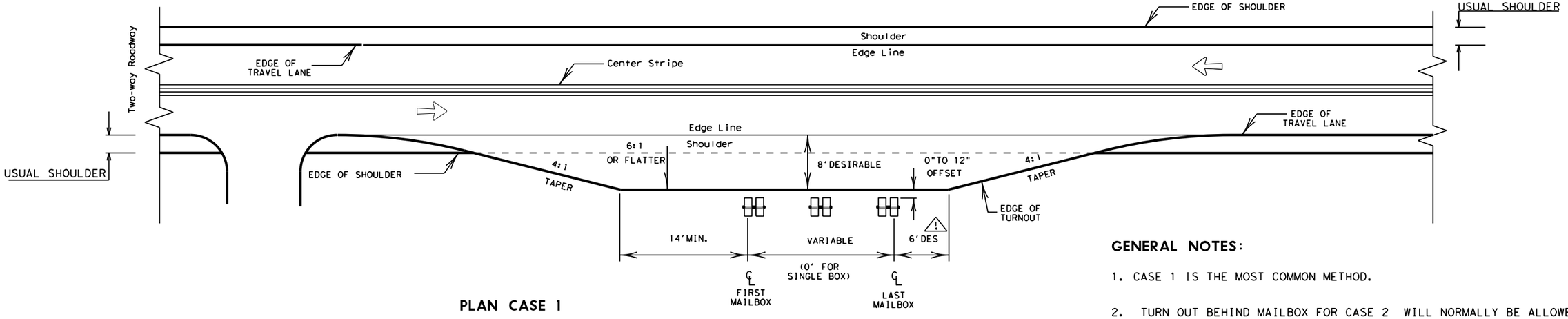
CASE 1. OFF TRAVEL WAY DELIVERY



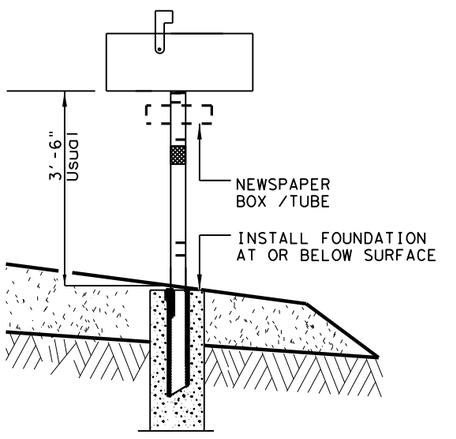
CASE 2. BACK SIDE DELIVERY



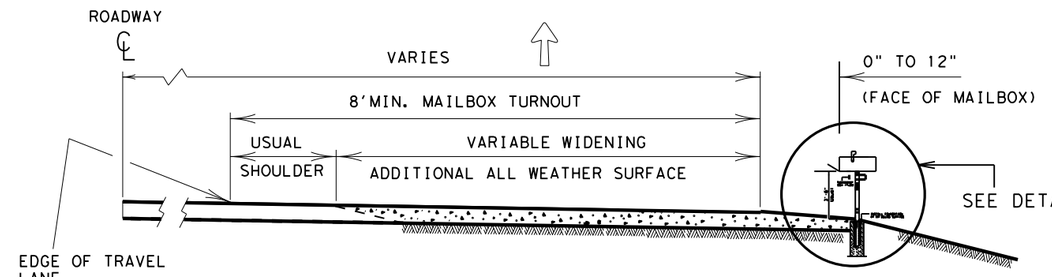
CASE 3. DELIVERY NEAR RIGHT OF WAY LINE



PLAN CASE 1



DETAIL A



TYPICAL SECTION CASE 1

MAIL DELIVERY VEHICLE TRAVEL DIRECTION

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. IF THE NUMBER OF MAILBOXES EXCEEDS FOUR, A COMMUNITY MAIL BOX SHOULD BE ENCOURAGED AT THESE LOCATIONS.

Texas Department of Transportation

Maintenance Division Standard

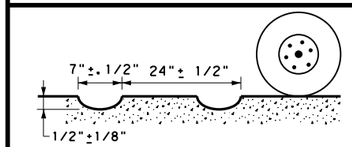
Guideline

MAILBOX SIDE ROAD PLACEMENT AND TURNOUTS
MB-14(2)

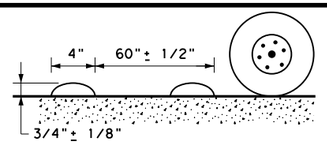
FILE: MB14(2).DGN	DN: JEO		CK:	DW: JEO		CK:
© TxDOT MAY 2014	CONT	SECT	JOB		HIGHWAY	
REVISIONS DECEMBER 2012-NEW TXDOT TITLE BLOCK	0453	04	024		SH 207	
	DIST	COUNTY			SHEET NO.	
	LBB	CROSBY			223	

DATE:
FILE:

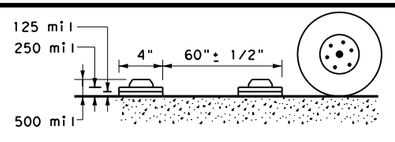
CENTERLINE RUMBLE STRIPS



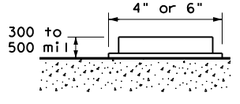
MILLED RUMBLE STRIPS



RAISED TRAFFIC BUTTONS

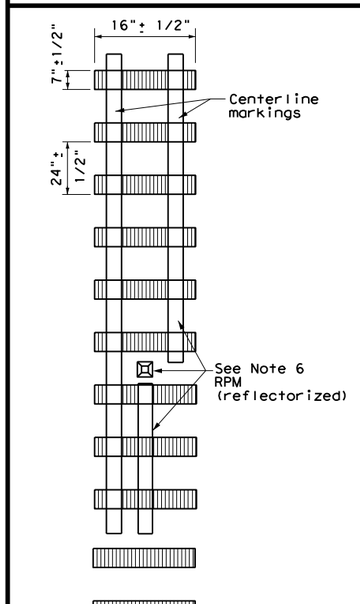


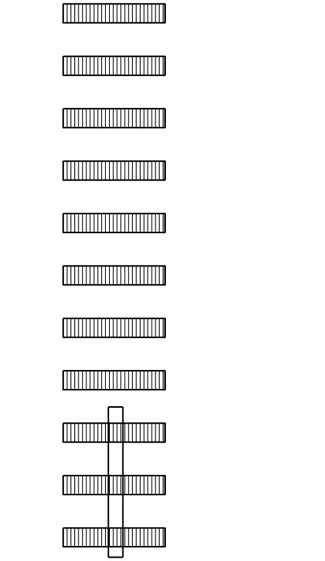
PREFORMED THERMOPLASTIC STRIPS



PROFILE MARKINGS

PROFILE VIEW

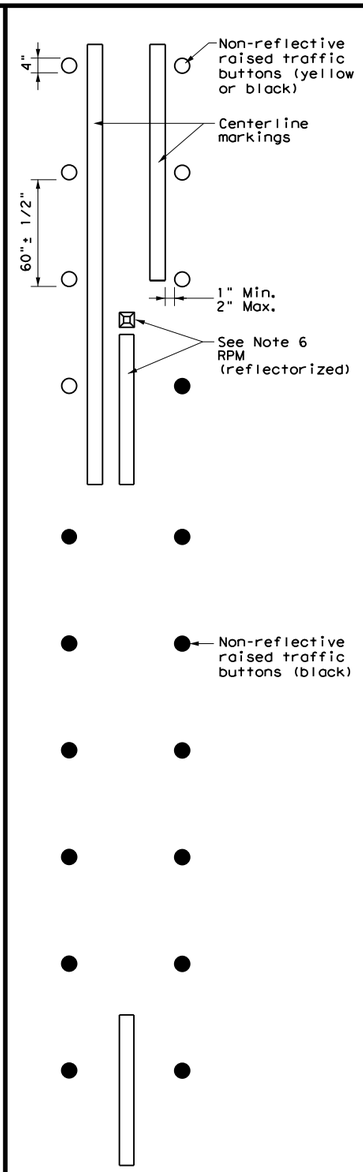




PLAN VIEW
OPTION 1

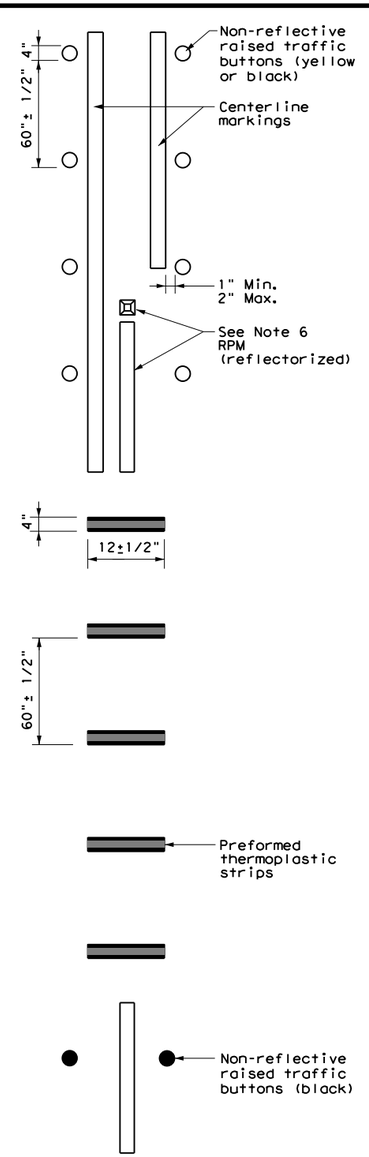
TWO LANE TWO-WAY ROADWAYS

MILLED CENTERLINE RUMBLE STRIPS



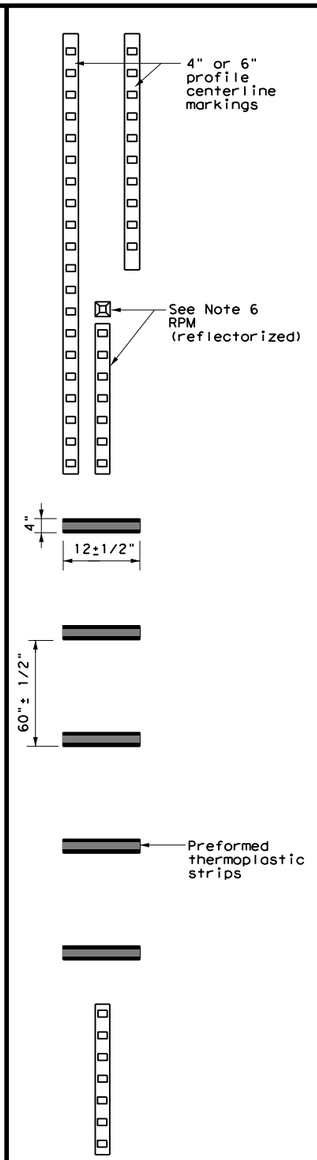
PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS



PLAN VIEW
OPTION 3

RAISED CENTERLINE RUMBLE STRIPS AND PREFORMED THERMOPLASTIC STRIPS



PLAN VIEW
OPTION 4

PROFILE CENTERLINE MARKINGS AND PREFORMED THERMOPLASTIC 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 edgeline 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 Operations 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 and driveways with high usage of large trucks.
6. Use Standard Sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, and dimensions pavement markings and profile markings.
7. Consideration should be given to noise levels when centerline rumble strips are installed near residential areas, schools, churches, etc. A minimum of 3/8 inch depth of 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.

WHEN INSTALLING EDGELINE RUMBLE STRIPS WITH OR WITHOUT CENTERLINE RUMBLE STRIPS ON UNDIVIDED HIGHWAYS:

12. See standard sheet RS(4).

Texas Department of Transportation®

Traffic Operations Division Standard

CENTERLINE RUMBLE STRIPS ON TWO LANE TWO-WAY HIGHWAYS

RS(3)-13

FILE: rs(3)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2013	CONT	SECT	JOB	HIGHWAY
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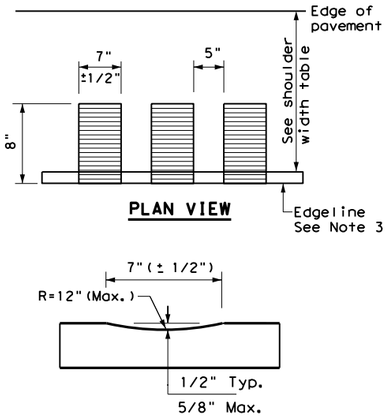
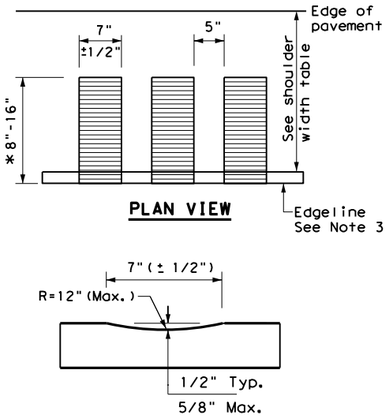
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		224



OPTION 1

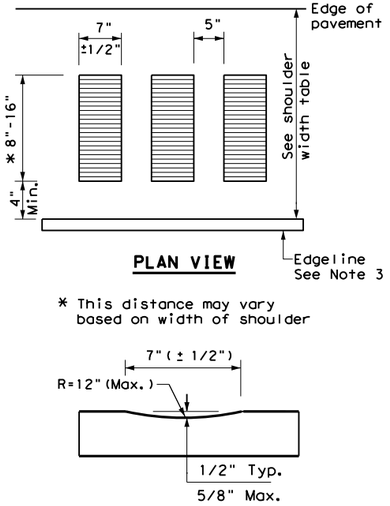
CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



* This distance may vary based on width of shoulder

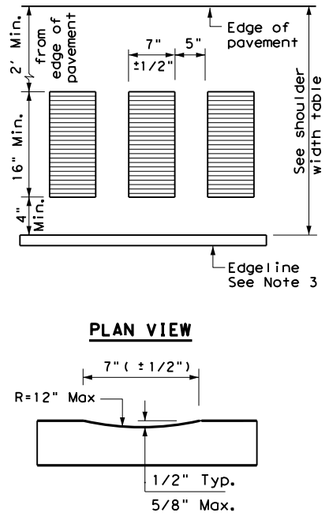
OPTION 2

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



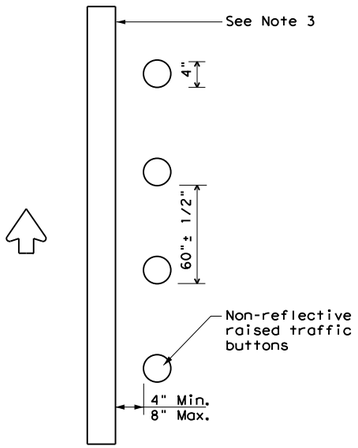
OPTION 3

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



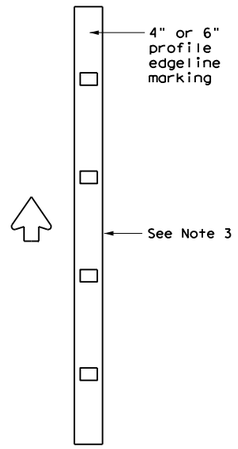
OPTION 4

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



OPTION 5

RAISED EDGELINE RUMBLE STRIPS



OPTION 6

PROFILE EDGELINE MARKINGS

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 OR 6	Option 1, 2, 3 5 OR 6	Option 2, 4, 5 OR 6

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) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
4. See the table below for determining what options may be used for edgeline rumble strips.

WHEN INSTALLING MILLED DEPRESSION EDGELINE RUMBLE STRIPS:

5. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Operations Division.
6. Pavement markings can be applied over milled shoulder rumble strips to create an edgeline rumble stripe.
7. Breaks in edgeline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections and driveways with high usage of large trucks when installed on conventional highways.
8. Rumble strips shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
9. Consideration should be given to noise levels when edgeline rumble strips are installed near residential areas, schools, churches, etc. A minimum of 3/8 inches depth of milled rumble strip may be considered in these areas.
10. On roadways with high bicycle activity, consideration should be given before the installation of edgeline rumble strips. Things to consider include size of rumble strips, rumble strip material and location of rumble strips on the shoulder. If the designer determines that gaps are needed in the rumble strips due to bicycle use of the road, then follow the requirement shown in FHWA Technical Advisory T5040.39, or latest version. A detail of the spacing shall be included in the plans.

WHEN INSTALLING RAISED OR PROFILE EDGELINE 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 edgeline when used as a rumble strip. The color of the button should match the color of the adjacent edgeline 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. Breaks in edgeline rumble strips using raised traffic buttons shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossing, intersections and driveways with high usage of large trucks when installed on conventional highways.
15. The minimum distance between the edgeline and the buttons should be used if the shoulder is less than 8 feet in width.
16. Raised profile thermoplastic markings used as edgelines may substitute for buttons.

Texas Department of Transportation

Traffic Operations Division Standard

EDGELINE RUMBLE STRIPS ON UNDIVIDED OR TWO LANE HIGHWAYS
RS(4)-13

FILE:	rs(4)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	October 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS		0453	04	024	SH 207
		DIST	COUNTY		SHEET NO.
		LBB	CROSBY		225

DATE:
FILE:

STORM WATER POLLUTION PREVENTION PLAN (SW3P):

This SW3P has been developed in accordance with TPDES General Permit TXR150000. The operator, the Texas Department of Transportation, provides project specifications for the development of adequate BMPs. The contractor shares responsibility for implementing the BMPs described herein. The contactor shall implement changes approved by the Project Engineer to the SW3P within the time specified in the SW3P or in the TPDES Construction General Permit. See EPIC sheet for a list of the MS4 Operators.

1. SITE OR PROJECT DESCRIPTION:

a. NATURE OF THE CONSTRUCTION ACTIVITY:
TxDOT (Lubbock District) Widening of SH 207 from 1109 LF north of FM 40 East to the Garza county line

b. POTENTIAL POLLUTANTS AND SOURCES:

Sediment laden storm water	Storm water conveyance over disturbed areas
Fuels, oils, and lubricants	Construction vehicles and storage areas
Construction debris and waste	Various construction activities
Sanitary waste	Restroom facilities
Trash	Construction site and receptacles
Concrete Washout Water	Concrete Trucks, Concrete Pump Trucks, Paving Equipment

Potential pollutants will primarily be from sediments leaving the right-of-way and petroleum products. Principle sources of pollutants will be: disturbed soil from grading, excavation, embankment, and other roadway construction activities; litter and debris from construction activities; gasoline, oil, and grease from asphalt distributor vehicles, scrappers, trucks, rollers, compactors, and fuel trucks during daily, routine operations.

c. SEQUENCE OF ACTIVITIES THAT WILL DISTURB SOILS:
1. Culvert Work 2. Subgrade Widening 3. Reshaping Ditch 4. Lime Treating Subgrade

d. AREAS:
TOTAL AREA OF PROJECT: 145 ACRES
TOTAL AREA OF SOIL DISTURBANCE: 100 ACRES
TOTAL AREA OF OFF-SITE PSL: To be determined when construction begins.

e. DATA DESCRIBING THE SOIL:
The area's predominate soil type is Amarillo fine sandy loam. Pre-construction soils are covered 60 to 70% with various grass, brush, and weeds. The soils are friable and in dry weather condtions may be picked up by regional winds. The local climate is semi-arid (21.01" average annual rain).

WATER QUALITY ASSESSMENT: A site (visual & odor) assessment of water quality will be performed once construction begins.

f. GENERAL LOCATION MAP: SEE TITLE SHEET TO PROJECT PLANS.

g. DETAILED SITE MAP: SEE SW3P PLAN SHEET AND/OR TYPICAL SECTIONS, PLAN SHEETS, AND DRAINAGE AREA MAP

h. THE LOCATION AND DESCRIPTIONS OF SUPPORT ACTIVITIES AUTHORIZED UNDER THE PERMITEE'S NOI: There are no asphalt or concrete batch plants providing support to the project authorized under the Lubbock District's (TxDOT) NOI.

I. NAME OF RECEIVING WATERS: Various playa lakes along the project and Salt Fork of the Brazos.

j. A COPY OF TPDES CGP TXR150000 IS INCLUDED IN THE SW3P FILE.

k. A COPY OF THE NOI, ACKNOWLEDGEMENT CERTIFICATE AND/OR CONSTRUCTION SITE NOTICE IS IN THE PROJECT SW3P FILE

2. DESCRIPTION OF BMPs USED TO MINIMIZE POLLUTION IN RUNOFF:

EROSION AND SEDIMENT CONTROLS: If it is necessary to pump water, BMP's shall be used to reduce the off-site transport of sediment. BMP's shall be installed per the manufacturer specifications or as directed by the Engineer.

GENERAL SCHEDULE FOR IMPLEMENTATION OF SW3P CONTROLS

CONTROL	IMPLEMENTATION SCHEDULE AND DESCRIPTION	REMOVAL SCHEDULE
general, various controls	control measures are to be provided at a time and in a manner that will minimize impacts to receiving waters	at final stabilization; at the resumption of construction (temporary measures); at the direction of the SW3P plan; at the direction of the project manager
rock filter dams	to be installed prior to soil disturbing activities in the surrounding areas	at final stabilization or as directed by the project engineer
sandbag berms	to be installed prior to the start of construction; sandbag berms are to serve as water velocity dissipaters, as ditch blocks, as sedimentation basins, in support of other control devices, and as a final multiple control for water leaving the construction zone	at final stabilization or as directed by the project engineer
silt fence	silt fence will be installed prior to the start of construction along right-of-way lines silt fence will be installed as quickly as feasible (where it is reasonable to do so) at the toe of header bank and other slopes silt fence may be installed at the start of construction, during construction as appropriate, and during construction to support other controls as needed	at final stabilization or as directed by the project engineer at final stabilization or as directed by the project engineer at the removal of the construction exit, at final stabilization, or as directed by the project engineer
tackifiers	soil tackifiers may be used to control dust	erosion controls that are designed to remain in-place for a indefinite period, such as mulches and fiber mats, are not required to be removed or scheduled for removal (CGP, page 23)
water	to be used to suppress dust and compact dirt on an as needed schedule	erosion controls that are designed to remain in-place for a indefinite period, such as mulches and fiber mats, are not required to be removed or scheduled for removal (CGP, page 23)
seed, temporary	to be installed, when apprpropriate, in disturbed areas where construction has temporarily ceased for 21 days	erosion controls that are designed to remain in-place for a indefinite period, such as mulches and fiber mats, are not required to be removed or scheduled for removal (CGP, page 23)
seed, permanent	to be installed as a final stabilization measure where construction is complete or as directed by the Engineer	erosion controls that are designed to remain in-place for a indefinite period, such as mulches and fiber mats, are not required to be removed or scheduled for removal (CGP, page 23)
construction exits	to be installed at all construction vehicle exit points to publicly traveled ways prior to the use of these exits by construction vehicles	as directed by construction conditions or by the Engineer
erosion control logs	to be installed prior to the start of construction; erosion control logs are to serve as water velocity dissipaters, as ditchblocks, as sedimentation basins, and in support of other control devices.	as directed by construction conditions or by the Engineer
soil retention blankets	to be installed as a final stabilization measure where construction is complete or as directed by the Engineer	erosion controls that are designed to remain in-place for a indefinite period, such as mulches and fiber mats, are not required to be removed or scheduled for removal (CGP, page 23)
inlet protectors	to be installed to cover curb inlets with support from sandbags or as directed by the Engineer	as directed by construction conditions or by the Engineer
compost socks	to be installed as channel blocks, inlet protectors, and to support sandbag berms, silt fences or as directed by the Engineer	as directed by construction conditions or by the Engineer

Note: this is a general schedule for the installation of and removal of SW3P best management practice controls, the final determination of the implementation and removal of controls is at the discretion of the project engineer.

Note: control measures must be properly selected, installed, and maintained according to the manufacturer's or designer's specifications. If periodic inspections or other information indicates control has been used incorrectly, or that the control is performing inadequately, the operator must replace or modify the control as soon as practicable after the discovery that the control has been used incorrectly, is performing inadequately, or is damaged.

Note: sediment must be removed from traps and sedimentation ponds no later than the time that design capacity has been reduced by 50 percent.

Note: if sediment escapes the site, accumulations must be removed at a frequency to minimize further negative effects, and whenever feasible, prior to the next rain event.

Note: controls must be developed to limit, to the extent practicable, the off-site transport of litter, construction debris, and construction materials.

Note: erosion and sediment controls must be designed to retain sediment on-site to the extent practicable with consideration for local topography, soil type, and rainfall. Controls must also be designed and utilized to reduce the off-site transport of suspended sediments and other pollutants if it is necessary to pump or channel standing water.

STABILIZATION PRACTICES: The SW3P must include a description of interim and permanent stabilization practices, including a schedule describing when these practices will be implemented.
1. Water: water will be used to temporarily suppress dust and compact dirt.
2. Tackifiers: tackifiers such as asphalt emulsion, guar, (and other natural tackifiers), and synthetic tackifiers will be used to control air (dust) & water erosion.
3. Existing Vegetation & Vegetative Buffers: to the extent practicable, existing vegetation will not be disturbed by construction activities; where feasible (especially at storm water discharge sites) existing vegetation will remain undisturbed to form a vegetative buffer between construction areas and areas undisturbed by construction.
4. Riprap: concrete riprap can be installed as a permanent stabilization measure at locations where construction is complete and permanent stabilization is required.

Site Manager and CPM Sheet incorporation into the SW3P

The Lubbock District of the Texas Department of Transportation uses Site Manager, a computer based construction record-keeping system. Documentation describing major grading activities, temporary or permanent cessation of construction, and temporary and permanent stabilization measures is a part of this system and is incorporated by reference into this SW3P.

Storm Water Pollution Plans (SW3P) are a part of a highway project's construction plans, and construction plans contain information that supplement a project's SW3P. Project plans provide information on changes in elevations, on the locations where dirt has been removed and the locations where dirt has been added; on construction sequencing and scheduling and other data that might be important to a full understanding of TCEQ storm water pollution prevention requirements and a project's SW3P.

Contactor's Critical Path Model (CPM) schedule is incorporated into the project's SW3P by reference.

Erosion control and stabilization measures must be initiated immediately in portions of the site where construcion activities have ceased and will not resume for a period exceeding 14 calendar days. Stabilization measures that provide a protective cover must be initiated immediately in portions of the site where construction activities have permanently ceased (CGP Part III Sect. F2(b)III page 33)

SEDIMENT CONTROL PRACTICES:
1. Sandbags: the purpose of a sandbag is to intercept sediment laden storm water from disturbed areas, create a detention pond, detain sediment and release water in a sheet flow. Sandbag berms are a general purpose sediment control device and will be used throughout the project to detain sediment on site. Sandbags will be placed in ditches and channels to form sedimentation basins. Sandbags will also be used where runoff exits the construction site to enter receiving waters and to support other storm water controls.
2. Silt fence: silt fence is to be installed with construction near the perimeter of a disturbed area to intercept sediment while allowing water to percolate through. This is a general use control that will be used to create detention basins that retain sediment on-site; they will also be used in support of other controls such as construction exits and rock filter dams.
Silt fence will be used along playa lakes to reduce the loss of sediment from roadway front slopes; it may be used in ditches, channels, discharge points to support sandbag berms; may be used to support stabilized construction exits.
3. Rock Filter Dams: the purpose of a rock filter dam is to intercept and slow sediment laden water runoff from disturbed areas, retain the sediment and release the water in sheet flow. Rock filter dams will generally be used in high water velocity flow channels.
4. Stabilized Construction Exit: the purpose of the stabilized exit is to reduce the tracking of sediment and dirt onto public roadways beyond the construction zone. Stabilized Construction Exits are to be in-place at exit points to streets and thoroughfares in urban areas and are to be used by all construction vehicles regardless of size. They are to be supported where appropriate with silt fence and mechanized brooms.

Sediment basins are required where feasible for common drainage locations that serve an area with 10 or more acres disturbed at one time. Temporary or permanent sediment basins that provide water storage capacity are located on the project; the following controls provide, where feasible, structural controls / sediment basins:
1. Sandbag Berm as a Sediment Basin: a temporary basin designed to intercept sediment-laden storm water runoff and to trap sediment on-site.
2. Vegetative Buffer Strip: vegetative buffer strips reduce water velocity which reduces the potential of water erosion and allows sediments to fall out of the storm water.
3. Silt Fence will be used to reduce the loss of sediment from roadway front slopes adjacent to playa lakes by filtering out silt laden storm water from construction area.

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Sheet 1 of 2

SW3P NARRATIVE

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			226
STATE	STATE DIST.NO.	COUNTY	
TEXAS	LBB	CROSBY	
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILENAME	SW3Pnarrative.dgn		

3. DESCRIPTION OF PERMANENT STORM WATER CONTROLS

PERMANENT STORM WATER CONTROLS: A description of controls that will stay in-place after construction is completed must be included in the SW3P.

1. Riprap: concrete riprap can be installed as a permanent stabilization measure at locations where construction is completed must be included in SW3P.
2. Existing Vegetation & Vegetative Buffers: to the extent practicable, existing vegetation will not be disturbed by construction activities; and, where feasible (especially at storm water discharge sites), existing vegetation will remain undisturbed to form a vegetative buffer between construction areas and areas undisturbed by construction.
3. Permanent Sodding/Seeding & Plantings: this is the establishment of permanent perennial vegetation. Permanent vegetation stabilizes soil by holding soil particles in-place. Vegetation filters sediments, helps soil absorb water, improves wildlife habitat, and enhances aesthetics of the site. Permanent vegetation will remain in vegetated channels.

4. OTHER REQUIRED CONTROLS AND BMPs

(a) Tracking and Dust: Off-site tracking and generation of dust must be minimized.
1. Stabilized Construction Exit: a stabilized pad of stone, timber, or other stabilized surface located at points where construction traffic will leave the construction zone to enter a public roadway. The purpose of the stabilized exit is to reduce the tracking of sediment and dirt onto public roadways beyond the construction zone. Stabilized Construction Exits will be placed as needed.
2. Water: water will be used to temporarily suppress dust and compact dirt.
3. Tackifiers: tackifiers such as asphalt emulsion, guar, (and other natural tackifiers), and synthetic tackifiers will be used to control air (dust) & water erosion.
4. Existing Vegetation & Vegetative Buffers: to the extent practicable, existing vegetation will not be disturbed by construction activities; where feasible (especially at storm water discharge sites), existing vegetation will remain undisturbed to form a vegetative buffer between construction areas and areas undisturbed by construction.
5. Cleaning and Sweeping: clean and sweep curb and gutter sections twice a month to reduce dirt and trash or as directed.

(b) On-Site Storage of Construction and Waste Materials:
Storage of construction and waste materials on-site shall be temporary; the contractor shall maintain a clean and orderly construction site; and construction waste such as trash, rubble, litter, scrap, and vegetation shall be stored / disposed of in a lidded dumpster(s) or in a manner approved by the project engineer. Disposal methods must meet federal, state, and local waste management requirements. No construction waste shall be buried or burned on-site. Spoils of disposal, material storage, and waste materials from the demolition of existing roads and structures shall be stored in areas designated by the project engineer, and prevented from becoming a pollutant source with appropriate BMPs. Construction and waste materials that might be temporarily stored on-site include concrete and steel pipe; steel reinforcing bar, forms and frames; sand and gravel; wire, concrete and steel beams; wood and steel building units; and controls, construction signs and barricades. A list of construction and waste materials stored on site and controls will be presented to the Project Engineer.

Contractor shall design and utilize appropriate controls to minimize the offsite transport of suspended sediments and other pollutants, if it is necessary to pump or channel standing water from the site.

Litter, construction debris, and construction material exposed to stormwater shall be managed in a manner that prevents this material from becoming a pollutant. A regular sweep of the project shall be made to pick up litter. No construction material of any kind (including dirt) shall be discharged to a water of the United States (ephemeral streams and playa lakes) without a permit from the Corps of Engineers.

Oil, gasoline, grease, solvents, and other petroleum products are not to be stored on-site. Major vehicle maintenance shall occur on-site only under emergency conditions, and when this maintenance type is necessary, a plastic cover shall be used (and properly disposed of) to prevent petroleum products from contaminating the surrounding soil.

(c) Potential Pollutant Sources from Areas Other than Construction:

oil, grease, and other petroleum fluids construction traffic at concrete plant and field office
sediment laden stormwater disturbed soil from concrete batch plant and field office
litter, motorists driving through the project

All best management practices available to this construction project are available to control non-construction generated pollutants including sand bag berms, silt fence, stabilized construction exits, sedimentation basins, and litter management programs among other controls listed in this document.

Storage tanks that are above ground, regardless of whether they are used to store petroleum products, hazardous waste, or other hazardous material must follow the Summary of Federal Requirements.

Aboveground storage tanks (ASTs) used for the storage of petroleum products is regulated primarily under 40 CFR 112. These containers are used for purposes including, but not limited to, the storage of oil prior to use, while being used, or prior to further distribution in commerce.

A bulk storage container is 55 gal. or greater and may be aboveground, partially buried, bunkered, or completely buried. AST's include mobile storage containers such as trailers and tanked vehicles. Oil-filled electrical, operating, or manufacturing equipment is not a bulk storage container.

All bulk storage container installations must be constructed so a secondary means of containment is provided for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. Diked areas must be sufficiently impervious to contain discharged oil.

Mobile/Portable AST:

Mobile or portable oil bulk storage containers must be positioned or located to prevent a discharge and furnished with a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation.

5. DOCUMENTATION OF COMPLIANCE WITH APPROVED STATE AND LOCAL PLANS:

SW3P must comply with Part III.F.5 of Construction General Permit.

6. MAINTENANCE REQUIREMENTS

Control measures shall be properly installed and maintained according to the manufacturer's specifications. Sediment must be removed from BMP's as directed by the SW3P plan requirements, and as directed by the manufacturer's recommendations, but no later than the time at which the capacity of the BMP has been reduced by 50 percent. If sediment or other pollutants escape the site, accumulations will be removed to reduce further negative effects. If inspections or other information indicates a control has been installed, used, or is performing inadequately, the contractor must modify or replace the control as soon as practicable after the problem is discovered. Controls shall be maintained in effective operating condition. If inspections determine that BMPs are not operating effectively, maintenance shall be performed as necessary to continue the effectiveness of the controls. Controls that have been intentionally disabled, run over, removed, or otherwise made ineffective, must be corrected or replaced at discovery.

7. INSPECTION OF CONTROLS

Lubbock District: an informal inspection of controls shall occur every work day; a formal inspection of controls accompanied by an inspection report using Form 2118 shall occur every seven calendar days.

Inspectors must inspect disturbed areas that have not been finally stabilized, areas that are used for storage of materials and that are exposed to rain, discharge locations and structural controls for evidence of, or the potential for, pollutants entering the drainage system.

The SW3P must be modified based on the results of inspections to better control pollutants in runoff. Revisions to the SW3P must be completed within seven calendar days following inspection. If existing BMPs are modified or if additional BMPs are necessary, an implementation schedule must be described in the SW3P and wherever possible those changes implemented before the next storm event.

Determination of Reportable Quantities

A list of each substance designated as hazardous in 40 CFR Part 116 is found in the project's SW3P folder. The 40 CFR 116 registration applies to quantities, when discharged into or upon the Waters of the United States, adjoining shorelines, into or upon the contiguous zone, or beyond the contiguous zone as provided in the Act.

Litter and Construction Debris

The project contractor shall establish a schedule for the regular removal of litter and construction debris; this schedule shall be approved by the project engineer; and, once approved, implemented by the contractor. As needed, the project engineer shall direct the contractor to establish good housekeeping measures consistent with the TCEQ's Construction General Permit.

Concrete Truck Wash-Outs

Concrete truck wash-out is allowed provided:
(a) wash-out of concrete trucks to surface waters in the state, including storm sewer drains and inlets, is prohibited;
(b) wash-out shall be to a structural control;
(c) the direct discharge of wash-out water is prohibited at all times;
(d) the discharge shall not contribute to groundwater contamination;
(e) wash-out areas must be shown on the site map.
(f) wash-out pits shall be bermed and lined with plastic.

404 PERMIT REQUIRED: _X_YES ___NO
401 WATER QUALITY CERTIFICATION AND BMPs REQUIRED: _X_YES ___NO
401 (401) BMPs - INTERIM (ITM) BMPs - PERMANENT (PER) BMPs

EROSION CONTROLS	401	ITM	PER
* temporary vegetation	____	____	____
* blankets / matting	____	____	____
* mulch	____	____	____
* sod	____	____	____
* interceptor swales	____	____	____
* diversion dikes	____	____	____
* erosion control compost	____	____	____
* mulch filter berms & socks	_X__	____	____
* compost filter berms & socks	____	____	____
* 401 BMP not required	____	____	____

SEDIMENT CONTROLS	401	ITM	PER
* sandbag berm	_X__	_X__	____
* silt fence	_X__	_X__	____
* triangular filter dikes	____	____	____
* rock berms	_X__	_X__	____
* hay bale dikes	____	____	____
* brush berms	____	____	____
* stone outlet sediment trap	____	____	____
* sediment basins	____	____	____
* erosion control compost	____	____	____
* mulch filter berms & socks	_X__	_X__	_X__
* compost filter berms & socks	____	____	____
* 401 BMP not required	____	____	____

POST - CONTSTRUCTION TOTAL SUSPENDED SOLIDS (TSS)

	401	ITM	PER
* retention / irrigation	____	____	____
* vegetation filter strips	_X__	_X__	_X__
* wet basin	____	____	____
* grassy swale	____	____	____
* extended detention basin	____	____	____
* erosion control compost	____	____	____
* 401 BMP not required	____	____	____

	401	ITM	PER
* detention basin	____	____	____
* constructed wetland	____	____	____
* vegetation lined drainage ditch	____	____	_X__
* sand filter system	____	____	____
* mulch filter berms & socks	_X__	_X__	_X__
* compost filter berms & socks	____	____	____

Note: The best management practices listed in the SW3P may or may not be incorporated into the project design depending on the demands placed by weather and project construction. Should any best management practice not currently listed above be incorporated into the project SW3P design, a description of that best best management practice will be added to the Project SW3P File.

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6/29/2022

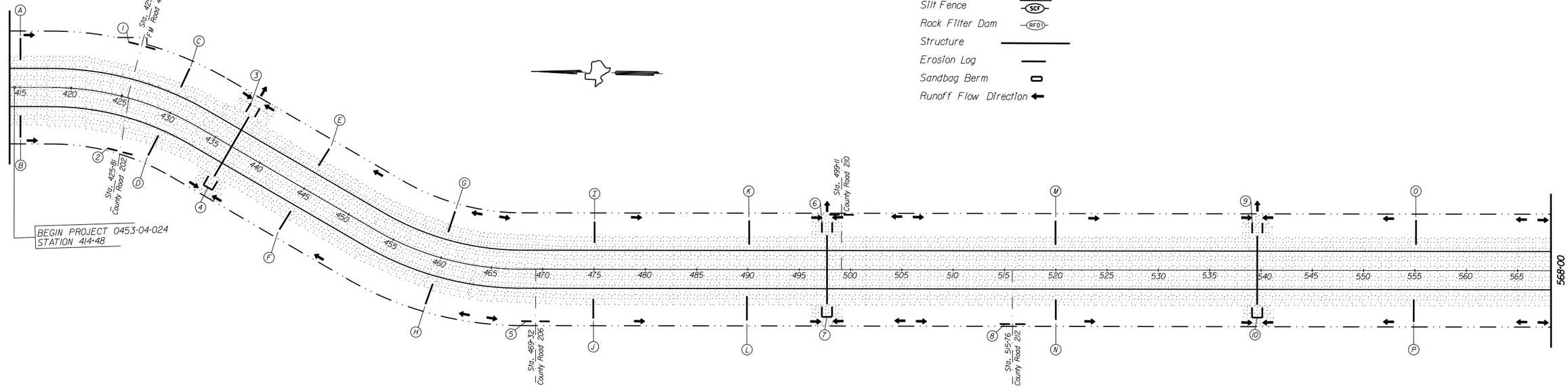
Sheet 2 of 2

SW3P NARRATIVE

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			227
STATE	STATE DIST.NO.	COUNTY	
TEXAS	LBB	CROSBY	
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILENAME	SW3Pnarrative.dgn		

LEGEND

- Disturbed Area
- Silt Fence (SCF)
- Rock Filter Dam (RFD)
- Structure
- Erosion Log
- Sandbag Berm
- Runoff Flow Direction



SW3P LAYOUT

STATE OF TEXAS
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6/29/2022

Texas Department of Transportation

No Scale Sheet 1 of 2

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		228
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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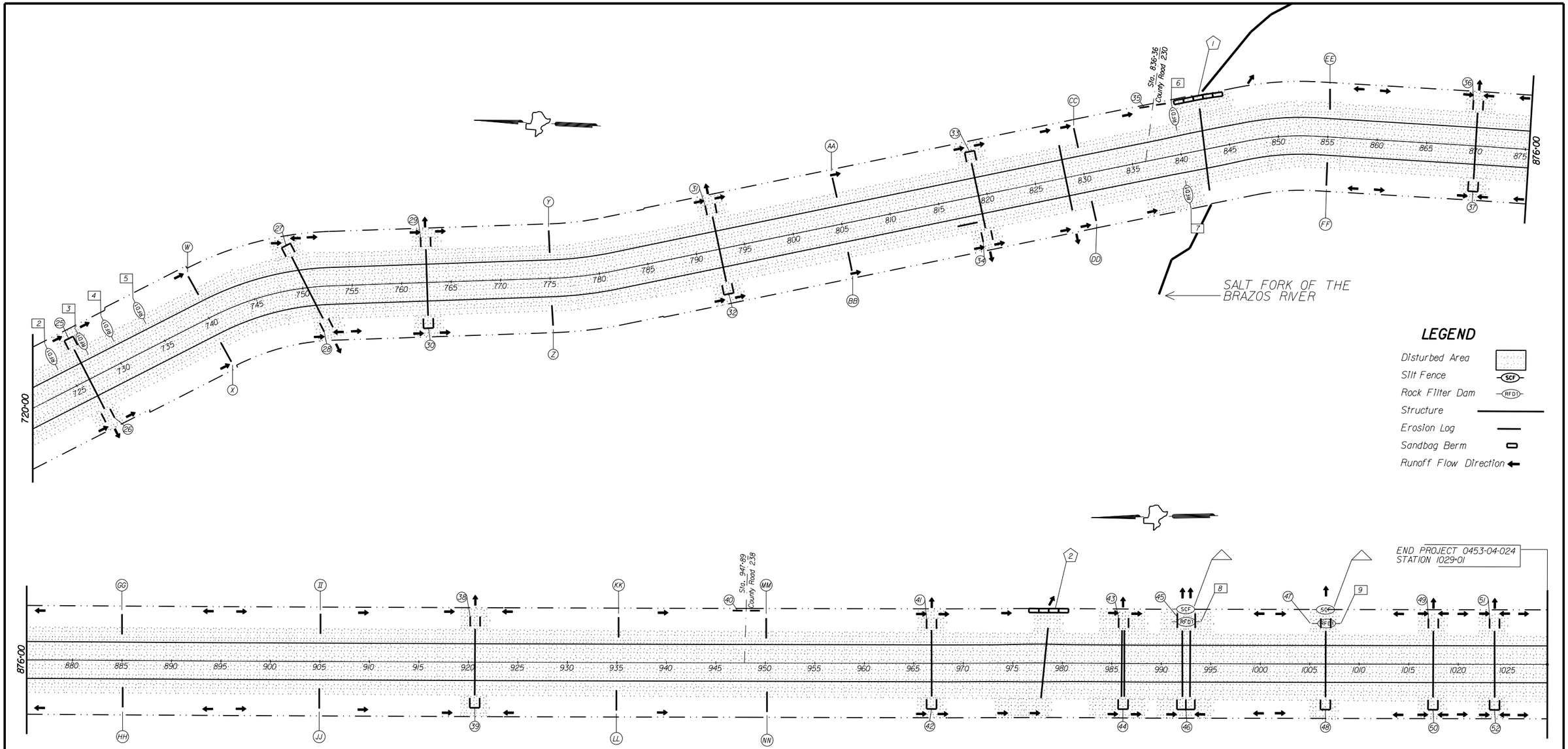

LEGEND

- Disturbed Area
- Silt Fence (SCF)
- Rock Filter Dam (RFD1)
- Structure
- Erosion Log
- Sandbag Berm
- Runoff Flow Direction

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6/29/2022

Texas Department of Transportation

No Scale Sheet 2 of 2

SW3P LAYOUT

STATE DIST.NO.	COUNTY		SHEET NO.
05	CROSBY		229
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
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DITCH EROSION CONTROL LOGS

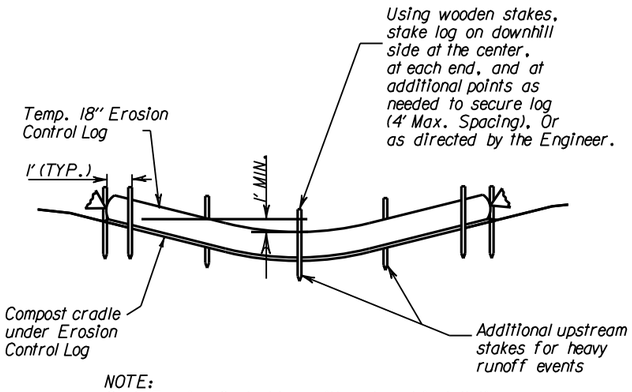
ECL ID	Approx. Station	LT or RT	Description	Pay Unit	Date Installed	Date Replaced	Date Replaced	Date Removed
A	415+00	LT	Centered In Ditch	20				
B	415+00	RT	Centered In Ditch	20				
C	430+00	LT	Centered In Ditch	20				
D	430+00	RT	Centered In Ditch	20				
E	445+00	LT	Centered In Ditch	20				
F	445+00	RT	Centered In Ditch	20				
G	460+00	LT	Centered In Ditch	20				
H	460+00	RT	Centered In Ditch	20				
I	475+00	LT	Centered In Ditch	20				
J	475+00	RT	Centered In Ditch	20				
K	490+00	LT	Centered In Ditch	20				
L	490+00	RT	Centered In Ditch	20				
M	520+00	LT	Centered In Ditch	20				
N	520+00	RT	Centered In Ditch	20				
O	555+00	LT	Centered In Ditch	20				
P	555+00	RT	Centered In Ditch	20				
Q	580+00	LT	Centered In Ditch	20				
R	580+00	RT	Centered In Ditch	20				
S	610+00	LT	Centered In Ditch	20				
T	610+00	RT	Centered In Ditch	20				
U	690+00	LT	Centered In Ditch	20				
V	690+00	RT	Centered In Ditch	20				
W	740+00	LT	Centered In Ditch	20				
X	740+00	RT	Centered In Ditch	20				
Y	775+00	LT	Centered In Ditch	20				
Z	775+00	RT	Centered In Ditch	20				
AA	805+00	LT	Centered In Ditch	20				
BB	805+00	RT	Centered In Ditch	20				
CC	830+00	LT	Centered In Ditch	20				
DD	830+00	RT	Centered In Ditch	20				
EE	855+00	LT	Centered In Ditch	20				
FF	855+00	RT	Centered In Ditch	20				
GG	885+00	LT	Centered In Ditch	20				
HH	885+00	RT	Centered In Ditch	20				
II	905+00	LT	Centered In Ditch	20				
JJ	905+00	RT	Centered In Ditch	20				
KK	935+00	LT	Centered In Ditch	20				
LL	935+00	RT	Centered In Ditch	20				
MM	950+00	LT	Centered In Ditch	20				
NN	950+00	RT	Centered In Ditch	20				

Install Subtotal:	800
Replacement Install:	1600
InstallProject Total	2400
Remove Project Total (1/2 Install):	1200

CULVERT AND INTERSECTION EROSION CONTROL LOGS

ECL No.	Approx. Station	Lt or Rt	Description	Pay Unit [LF]	Date Installed	Date Replaced	Date Replaced	Date Removed
1	425+57	Lt	At FM Road 40	20				
2	425+81	Rt	At CR 202	20				
3	436+83	Lt	At culvert	60				
4	436+83	Rt	At culvert	80				
5	469+32	Rt	At CR 206	20				
6	497+71	Lt	At culvert	60				
7	497+71	Rt	At culvert	80				
8	515+76	Rt	At CR 212	20				
9	539+64	Lt	At culvert	60				
10	539+64	Rt	At culvert	80				
11	568+58	Lt	At CR 216	20				
12	568+54	Rt	At CR 216	20				
13	595+08	Lt	At culvert	60				
14	595+08	Rt	At culvert	80				
15	621+33	Lt	At CR 220	20				
16	621+36	Rt	At CR 220	20				
17	637+00	Lt	At culvert	60				
18	637+00	Rt	At culvert	80				
19	647+74	Lt	At culvert	60				
20	647+74	Rt	At culvert	80				
21	674+11	Rt	At CR 224	20				
22	674+13	Lt	At CR 224	20				
23	675+02	Lt	At culvert	80				
24	675+02	Rt	At culvert	60				
25	726+44	Lt	At culvert	80				
26	726+44	Rt	At culvert	60				
27	751+26	Lt	At culvert	80				
28	751+26	Rt	At culvert	60				
29	762+56	Lt	At culvert	60				
30	762+56	Rt	At culvert	80				
31	792+39	Lt	At culvert	60				
32	792+39	Rt	At culvert	80				
33	819+11	Lt	At culvert	80				
34	819+11	Rt	At culvert	60				
35	836+36	Lt	At CR 230	20				
36	869+96	Lt	At culvert	60				
37	869+96	Rt	At culvert	80				
38	920+66	Lt	At culvert	60				
39	920+66	Rt	At culvert	80				
40	947+89	Lt	At CR 238	20				
41	966+79	Lt	At culvert	60				
42	966+79	Rt	At culvert	80				
43	986+01	Lt	At culvert	120				
44	986+01	Rt	At culvert	160				
45	992+13	Lt	At culvert	120				
46	992+13	Rt	At culvert	160				
47	1006+59	Lt	At culvert	60				
48	1006+59	Rt	At culvert	80				
49	1017+47	Lt	At culvert	60				
50	1017+47	Rt	At culvert	80				
51	1023+68	Lt	At culvert	60				
52	1023+68	Rt	At culvert	80				

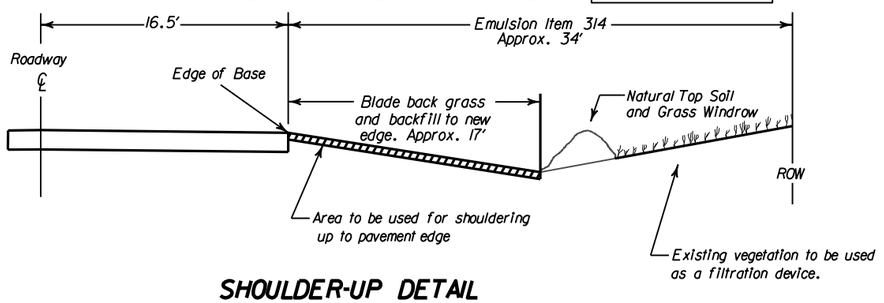
CULVERT & INTERSECTION Install Subtotal:	3320
CULVERT & INTERSECTION Replacement Install:	6640
CULVERT & INTERSECTION Install Total	9960
CULVERT & INTERSECTION Remove Total	4980
ENTIRE PROJECT Install Total	12360
ENTIRE PROJECT Remove Total	6180



NOTE:
Soak Erosion Control Log with water at installation to help hold log in place. Rebar shall not be used as stakes.

EROSION CONTROL LOG DAM

CSS-IH Emulsion Item 314 Volume (GALS) = [68 ft x Job length in ft]/9 x 0.13 GALS/SY
Job Length = 61453 ft.
CSS-IH Emulsion Item 314 Volume (GALS) = [68 ft x 61453 ft]/9 x 0.13 GALS/SY = 60360 GALLONS CSS-IH



SHOULDER-UP DETAIL

NOTE:
Sediment basins are not feasible on the project because right-of-way is limited and the construction of a sedimentation basin would be within the boundaries of the roadway's clear zone and for the safety of motorists, sedimentation basins cannot be constructed within the clear zone. Since sediment basins are not feasible due to the lack of right-of-way, mathematical calculations have not been developed.

10000 LF of Temporary Sediment Control Fence Install and 5000 LF of Temporary Sediment Control Fence Removal have been included in the quantities. Install Temporary Sediment Control Fence as directed by the Engineer.

Construction exits are estimated at 50' long by 20' wide. 4 EA construction exits have been included in the pay quantities.

Fill erosion control logs with mulched tree bark or compost. Do not fill the erosion control logs with straw or hay as cattle may eat the logs in the project area.

STATE OF TEXAS
MICHAEL D. BOYD
142962
LICENSED
PROFESSIONAL ENGINEER

Michael D. Boyd, P.E.
6/29/2022

Texas Department of Transportation

Sheet 1 of 2

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		230
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_ENV_SW3P_SUMMARY.dgn		

SW3P SUMMARY

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SILT FENCE

Silt Fence No.	Approx. Center Station	Lt or Rt	Length of Silt Fence [LF]	Date Installed	Date Replaced	Date Removed
1	436+80					
2	497+71					
3	539+64					
4	595+07					
5	637+00					
6	647+72					
7	675+80					
8	726+44					
9	750+46					
10	762+56					
11	792+39					
12	819+11					
13	869+96					
14	920+66					
15	966+79					
16	986+01					
17	992+13					
18	992+97					
19	1006+59					
20	1017+47					
21	1023+68					
22						
23						
24						
25						

Install Subtotal:	
Replacement Install:	
Install Project Total:	10000
Remove Project Total:	5000

ROCK FILTER DAM

Rock Filter Dam	Approx. Station	Lt or Rt	Length of Rock Filter Dam [LF]	Date Installed	Date Replaced	Date Removed
1	720+00	Lt	25			
2	723+50	Lt	25			
3	727+00	Lt	25			
4	730+50	Lt	25			
5	734+00	Lt	25			
6	840+00	Lt	12			
7	840+00	Rt	12			
8	992+13	Lt	25			
9	1006+59	Lt	25			
		Subtotal:	199	Subtotal:	199	199
				Replacement:	100	100
				Project Total:	299	299

SANDBAGS

S.B Berm	Approx. Station	Lt or Rt	Description	No. of Bags	Date Installed	Date Replaced	Date Removed
1	842+50	Lt	At bridge class culvert	200			
2	978+00	Lt	At bridge class culvert	200			
			Subtotal	400			
			Replacement	400			
			Project Total	800			

STATE OF TEXAS
MICHAEL D. BOYD
142962
LICENSED PROFESSIONAL ENGINEER

Michael D. Boyd, P.E.
6/29/2022

Texas Department of Transportation

Sheet 2 of 2

SW3P SUMMARY

STATE DIST. NO.	COUNTY		SHEET NO.
05	CROSBY		231
CONT.	SECT.	JOB	HIGHWAY NO.
0453	04	024	SH 207
FILE	SH207_ENV_SW3P_SUMMARY.dgn		

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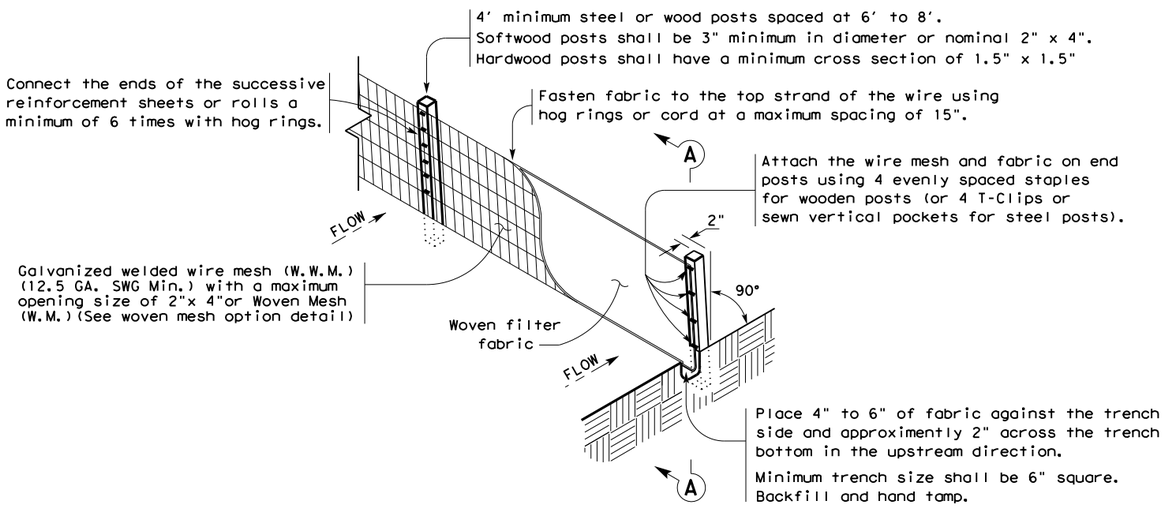
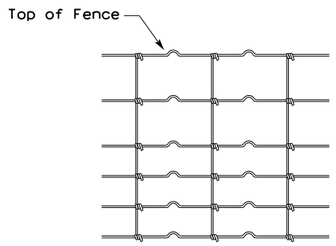
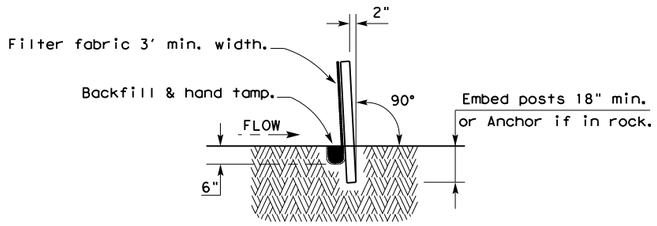
6/29/2022
DW: \\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\045304024\4 - Design\Plan Set\9. Environmental\ENVIRONMENTAL STANDARDS\ec116.dgn



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.

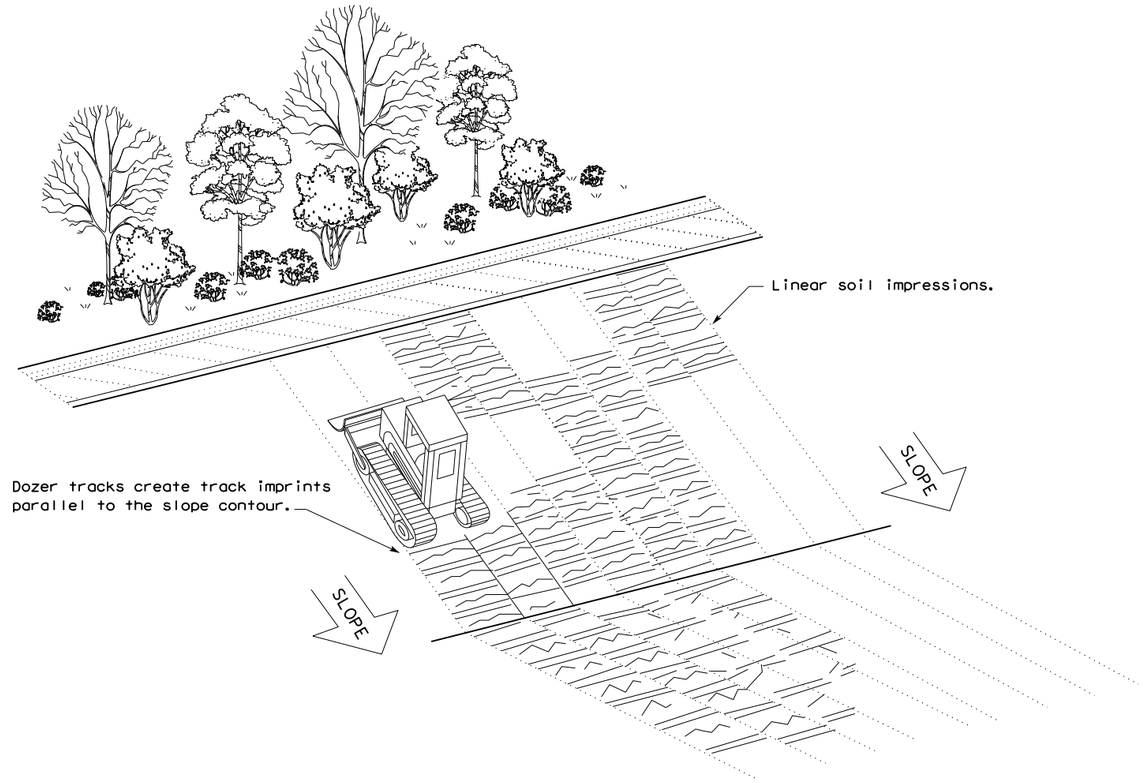
LEGEND

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

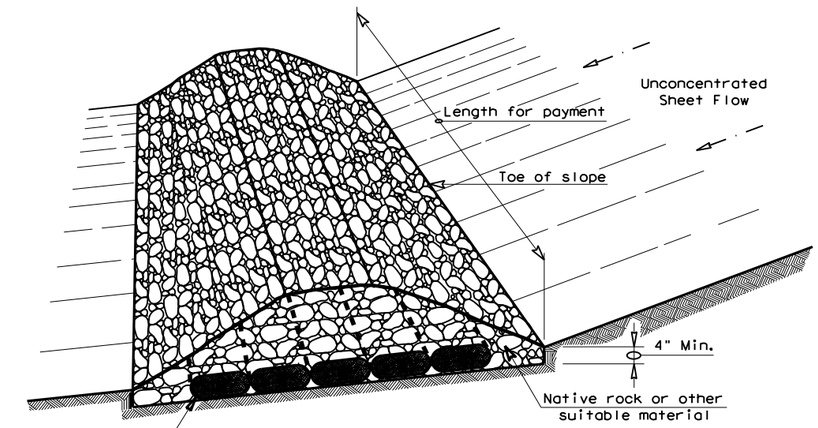
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

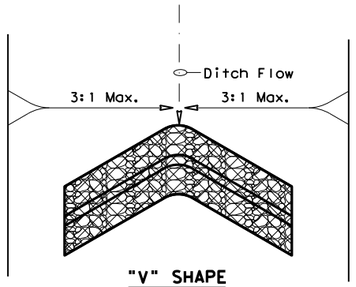
FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		232

DATE:
FILE:

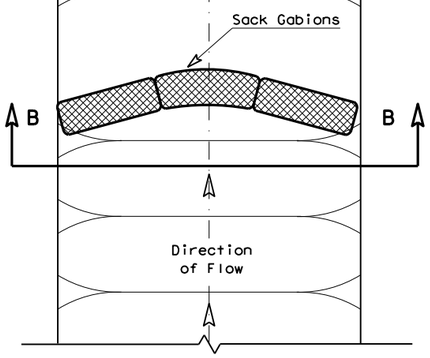


FILTER DAM AT TOE OF SLOPE

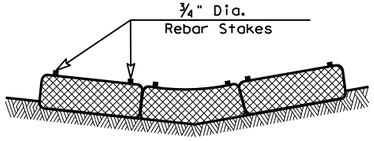
RFD1



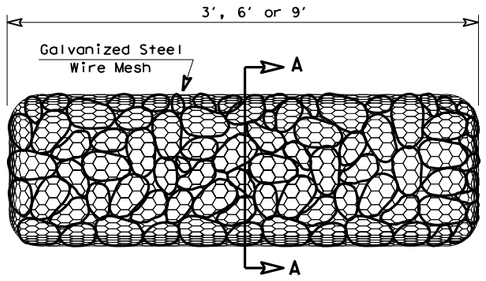
"V" SHAPE PLAN VIEW



PLAN VIEW

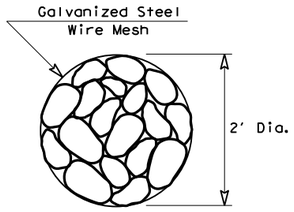


SECTION B-B

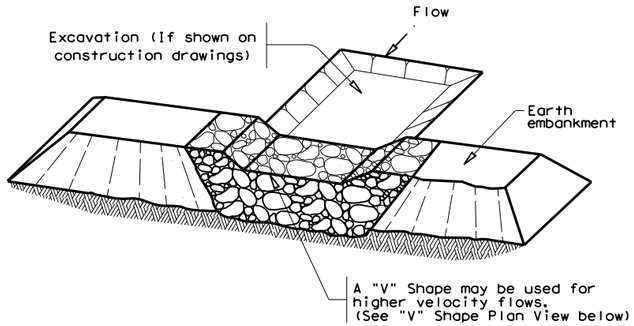


TYPE 4 (SACK GABIONS)

RFD4

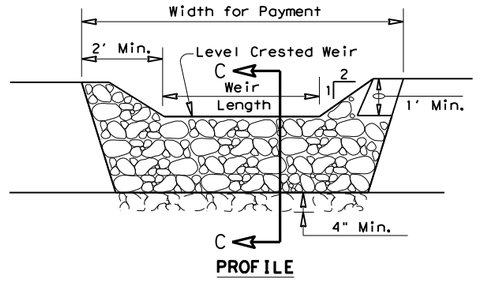


SECTION A-A

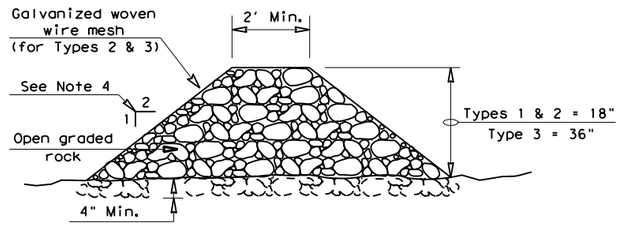


FILTER DAM AT SEDIMENT TRAP

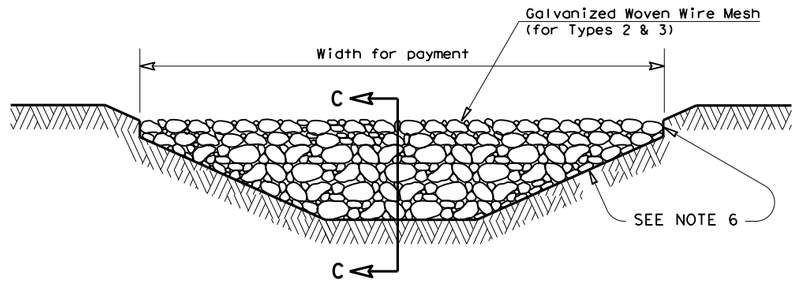
RFD1 — OR — RFD2



PROFILE



SECTION C-C



FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

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.

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

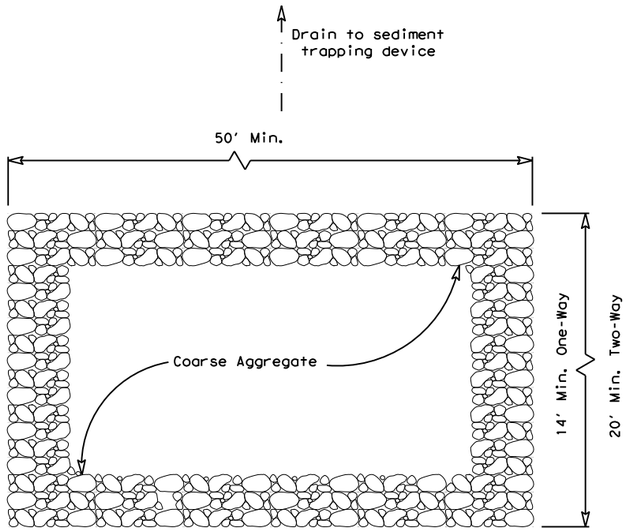
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

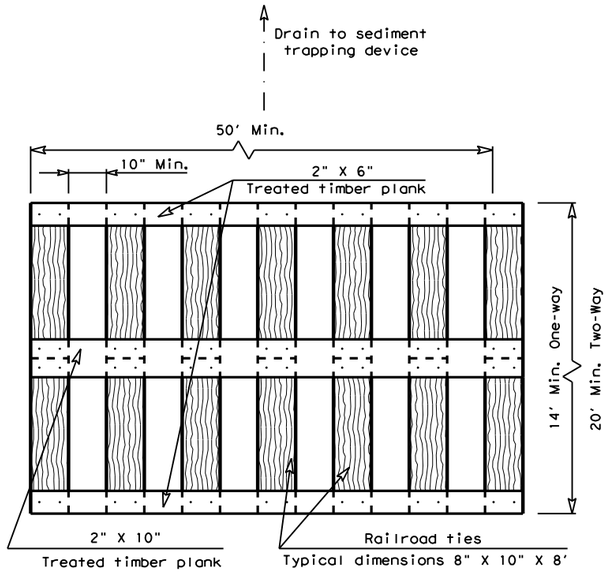
EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		233

6/29/2022
pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\045304024\4 - Design\Plan Set\9. Environmental\ENVIRONMENTAL STANDARDS\ec316.dgn



PLAN VIEW



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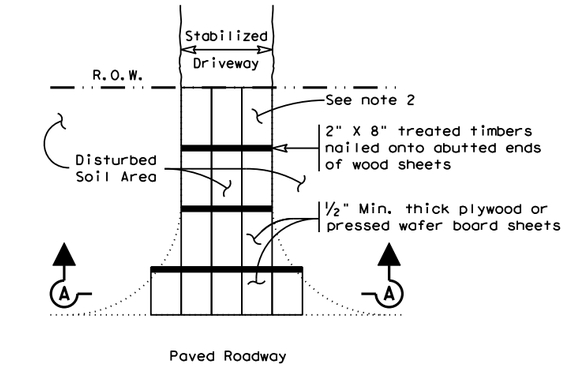
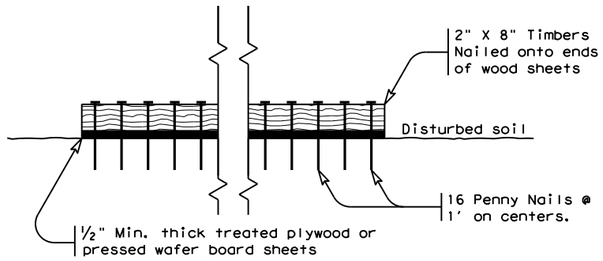


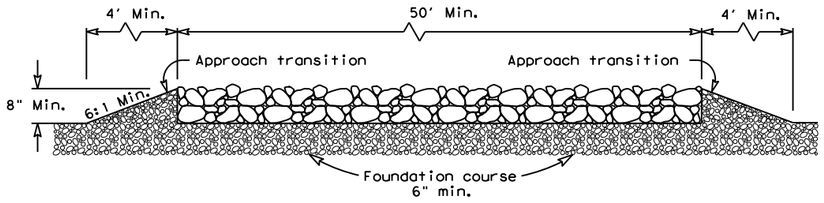
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

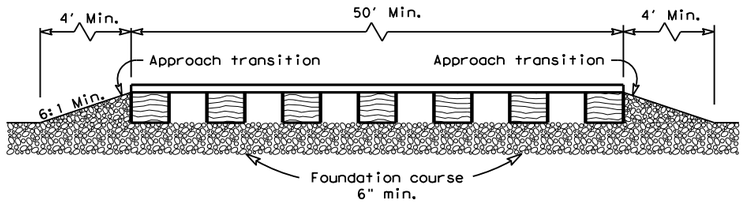
SHORT TERM



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

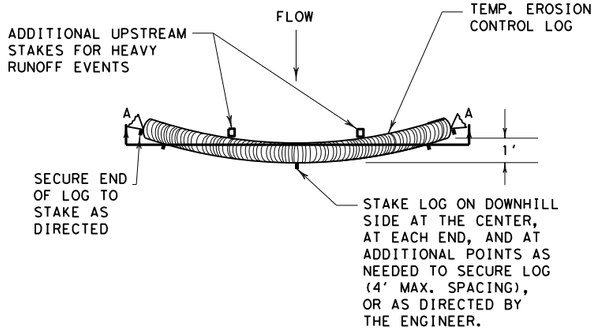
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

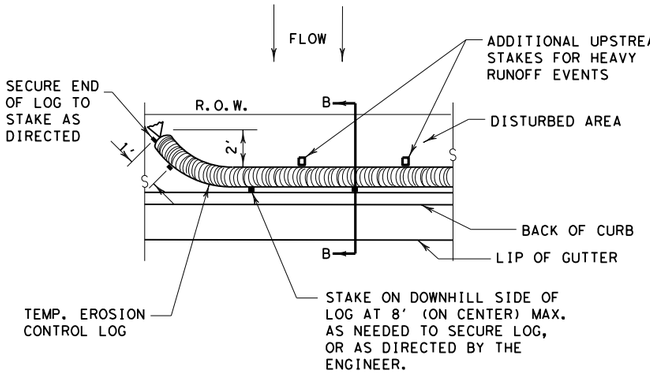
EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		234

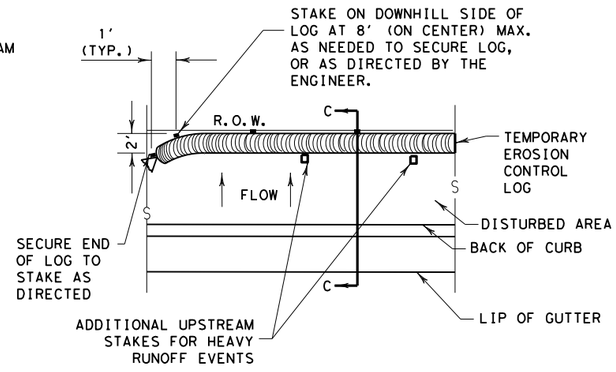
6/29/2022
pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\045304024\4 - Design\Plan Set\9. Environmental\ENVIRONMENTAL STANDARDS\ec916.dgn



PLAN VIEW



PLAN VIEW



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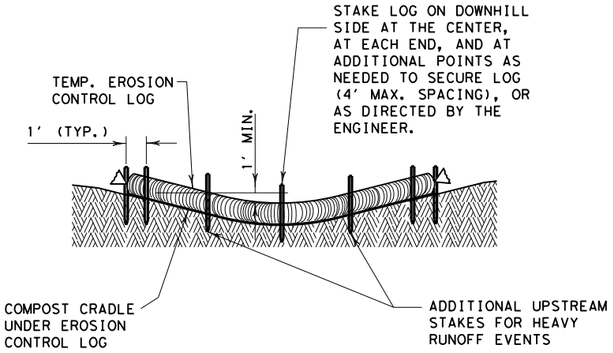
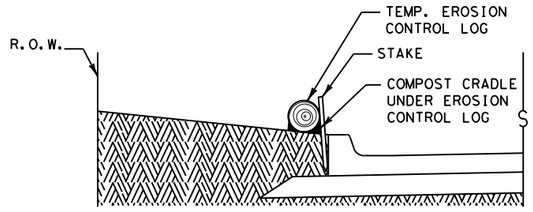


SECTION A-A

EROSION CONTROL LOG DAM

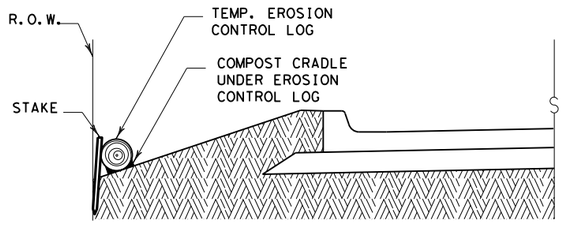
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

CL-BOC



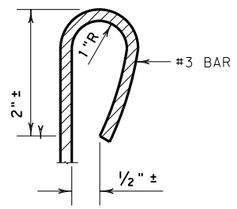
SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW

LEGEND

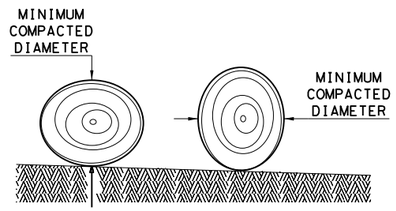
- CL-D — EROSION CONTROL LOG DAM
- CL-BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW — EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI — EROSION CONTROL LOG AT DROP INLET
- CL-CI — EROSION CONTROL LOG AT CURB INLET
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET



REBAR STAKE DETAIL

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.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

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.

Texas Department of Transportation

Design Division Standard

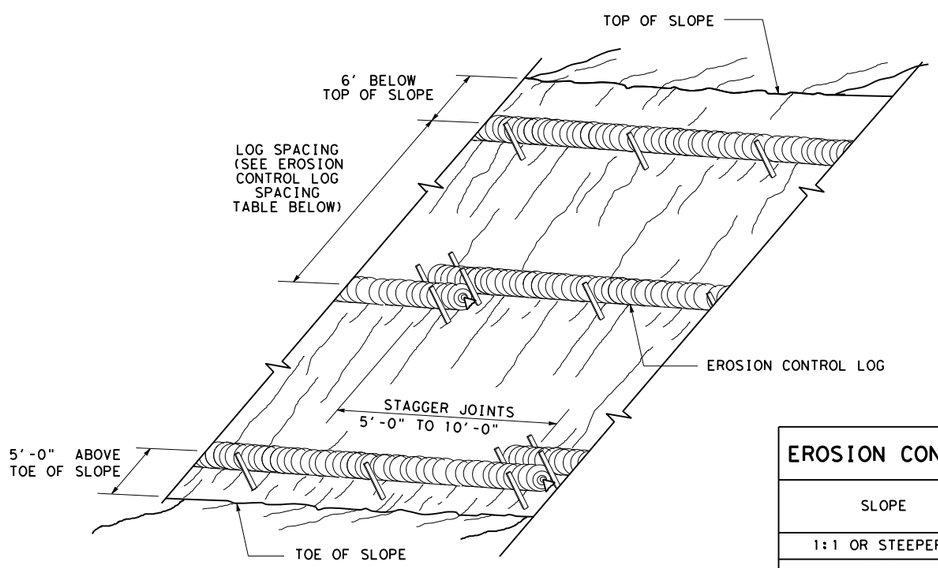
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

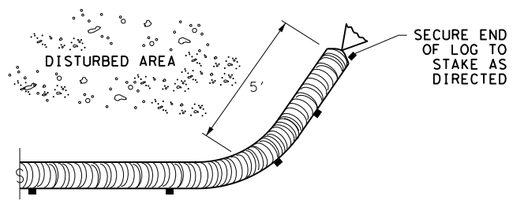
FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		235

6/29/2022
pw:\\txdot.projectwiseonline.com:TxDOT2\Documents\05 - LBB\Design Projects\045304024\4 - Design\Plan Set\9. Environmental\ENVIRONMENTAL STANDARDS\ec916.dgn



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

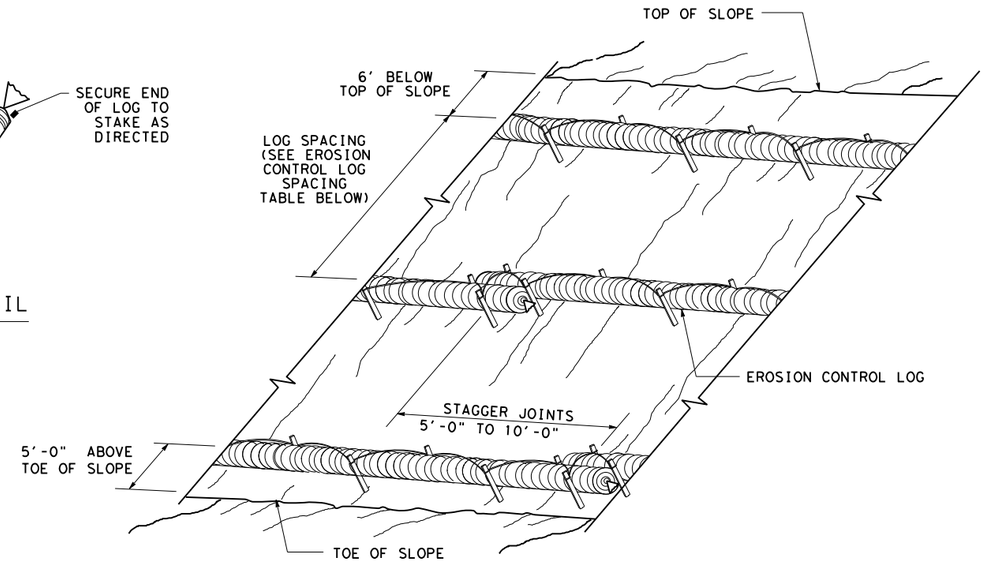
CL-SST



END SECTION RAP DETAIL

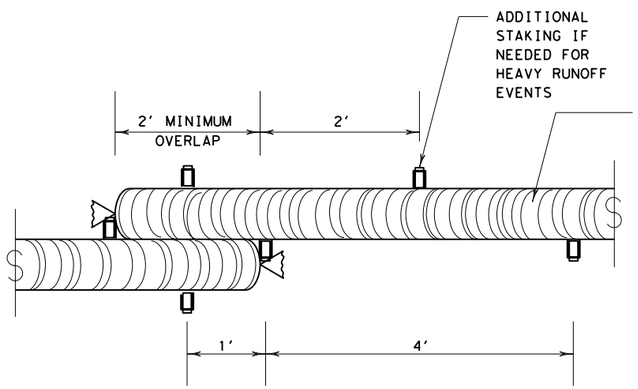
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

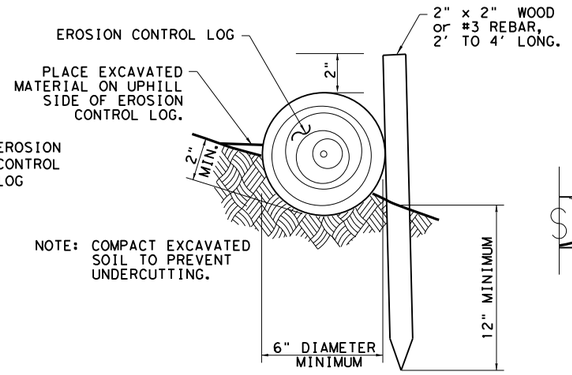
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

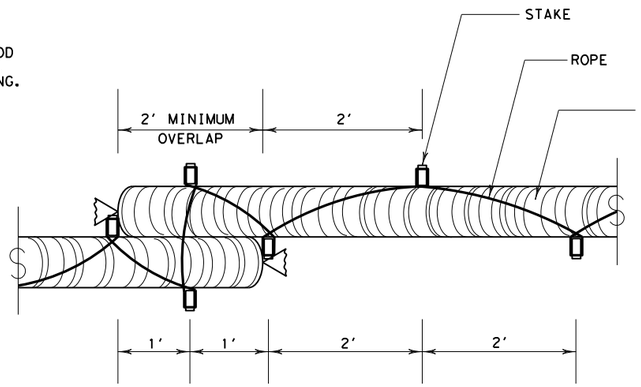


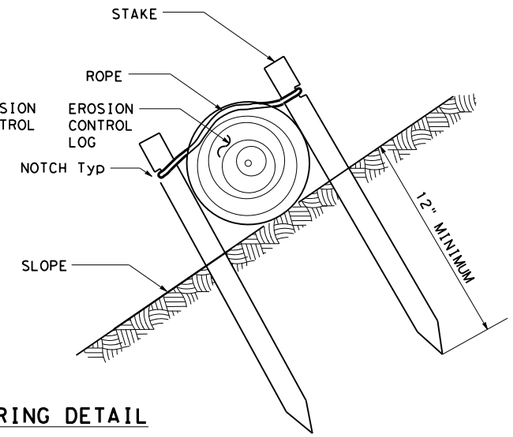


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

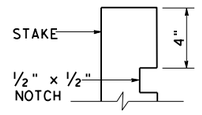
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

Texas Department of Transportation

Design Division Standard

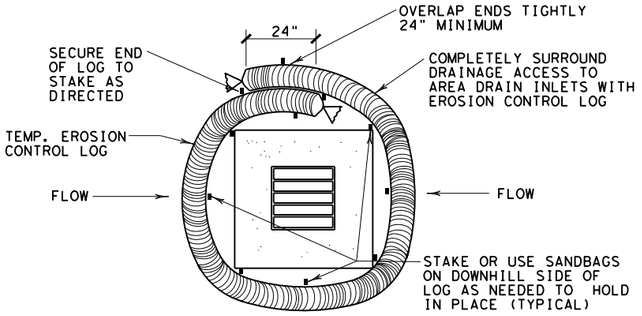
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

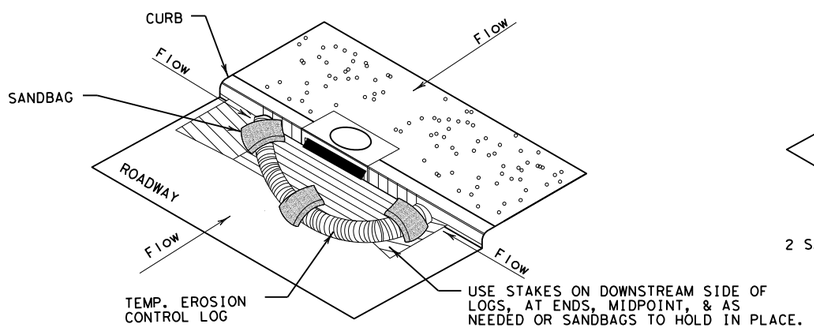
FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0453	04	024	SH 207
	DIST	COUNTY		SHEET NO.
	LBB	CROSBY		236

6/29/2022
pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0453040241\4 - Design\Plan Set\9. Environmental\ENVIRONMENTAL STANDARDS\ec916.dgn



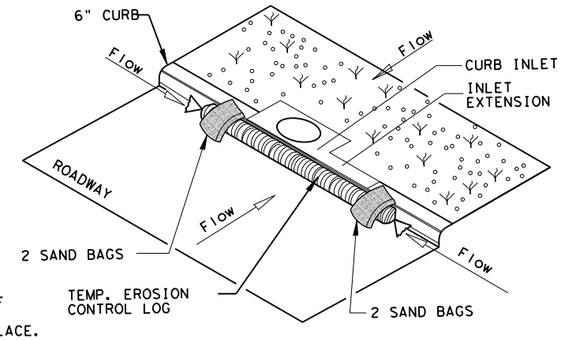
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

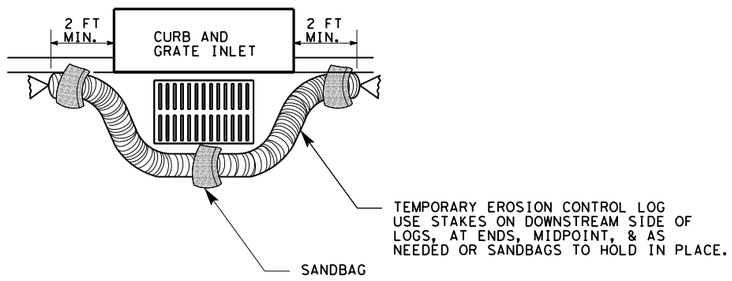
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

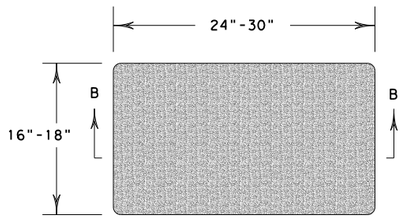
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



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	0453	04	024		SH 207	
	DIST	COUNTY				SHEET NO.
	LBB	CROSBY				237

DATE:
FILE:

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

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

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

1.

2.

☐ No Action Required ☒ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000.
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notices (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

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

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

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

☐ No Permit Required

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

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

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1. Salt Fork of the Brazos River

2.

3.

4.

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

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☐ Temporary Vegetation	☒ Silt Fence	☒ Vegetative Filter Strips
☐ Blankets/Matting	☒ Rock Berm	☐ Retention/Irrigation Systems
☐ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☐ Sodding	☒ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☒ Mulch Filter Berm and Socks
☒ Mulch Filter Berm and Socks	☒ Mulch Filter Berm and Socks	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☒ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☐ Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☒ No Action Required ☐ Required Action

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical. Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☐ No Action Required ☒ Required Action

Action No.

1. Comply with Executive Order 13112 on Invasive Plant Species.
2. Comply with TxDOT Executive Memorandum on beneficial landscaping.
3. Comply with temporary and permanent vegetation stabilization protocols of the SW3P.
4. A site survey prior to construction will be necessary to ensure that the sticky tansy aster plant species is not present in the work area.

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. Do not handle or harm Texas horned lizards, prairie dogs, barn swallows or burrowing owls.
2. No prairie dog towns can be damaged or crossed with equipment without approval of the Engineer.
3. No nests of burrowing owls (in prairie dog holes) can be disturbed or damaged (See General Notes).
4. No nests of barn swallows (likely on structures such as bridges) can be disturbed or damaged (See General Notes).
5. No nests of Lark Buntings (likely at the base of a shrub, cactus, or large grass clump) can be disturbed, damaged, or removed during breeding/nesting (May through August).
6. In compliance with the MBTA, beginning February 15th through October 1st, contractors must take precautions and be aware of the possibility that migratory birds may be nesting in the project area or vicinity.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediated area, and contact the Engineer immediately.

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropiate 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.

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 Corp of Engineers
NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

Contact the Engineer if any of the follwing are detected:

* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

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 notifiy 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 discoverd on site. Hazardous Materials or Contamination Issues Specific to this Project:

☒ No Action Required ☐ Required Action

VII. OTHER ENVIRONMENTAL ISSUES

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

☐ No Action Required ☒ Required Action

Action No.

1. Maintain equipment muffler systems and work hour restrictions to reduce traffic noise.
2. No PSL's may be located in the prairie dog towns, playa lakes (wet or dry) or stream beds (wet or dry).
3. No dumping of construction material in playa lakes or stream beds regardless of property owner requests.
4. Contractor must obtain historical and archaeological clearances for off-site PSL's.
5. Contractor is responsible for air quality permits for concrete and asphalt batch and similar plants.
6. Contractor is responsible for water appropriation or impoundment TCEQ permits.
7. Contractor will protect environmentally sensitive areas with fencing, work sequencing or scheduling as directed.
8. PSL's beyond the project right-of-way have "individual operator" status under the TPDES Construction General Permit and the Contractor is responsible for the SW3P and any TCEQ permits.
9. No waste material of any type may be placed at any location where it could be washed into a water of the U.S. or a surface water of Texas.
10. Flood elevations will not be increased to a level that would violate flood plain regulations or ordinances.
11. Contractor not to remove trees during MBTA without nest survey. Contact Ayssa Trevino at 806-748-4417 seven calandar days prior to tree removal.

Texas Department of Transportation
Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: AM	DW: VP	CK: AR	
©TxDOT February 2015	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0453	04	024	SH 207	
12-12-2011 (DS)	DIST	COUNTY		SHEET NO.	
05-07-14 ADDED NOTE SECTION IV.	LBB	CROSBY		238	
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.					