DATE OF LETTING: _____

DATE WORK BEGAN: _____

DATE WORK COMPLETED: _____

DATE WORK ACCEPTED: _____

FINAL CONTRACT COST: _____

CONTRACTOR: _____

LIST OF APPROVED FIELD CHANGES, CHANGE ORDERS & SUPPLEMENTAL AGREEMENTS:

THIS IS TO CERTIFY THAT ALL CONSTRUCTION SUBSTANTIAL WORK WAS PERFORMED IN ACCORDANCE WITH THE PLANS SPECIFICATIONS AND CONTRACT. ALL PROPOSED CONSTRUCTION WAS COMPLETED UNLESS OTHERWISE NOTED.

ANDRES ESPINOZA, PE
SAN BENITO AREA ENGINEER

DATE

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT:

STP 2B23(003)VRU, Etc.

CSJ: 1430-01-025, 1430-01-026

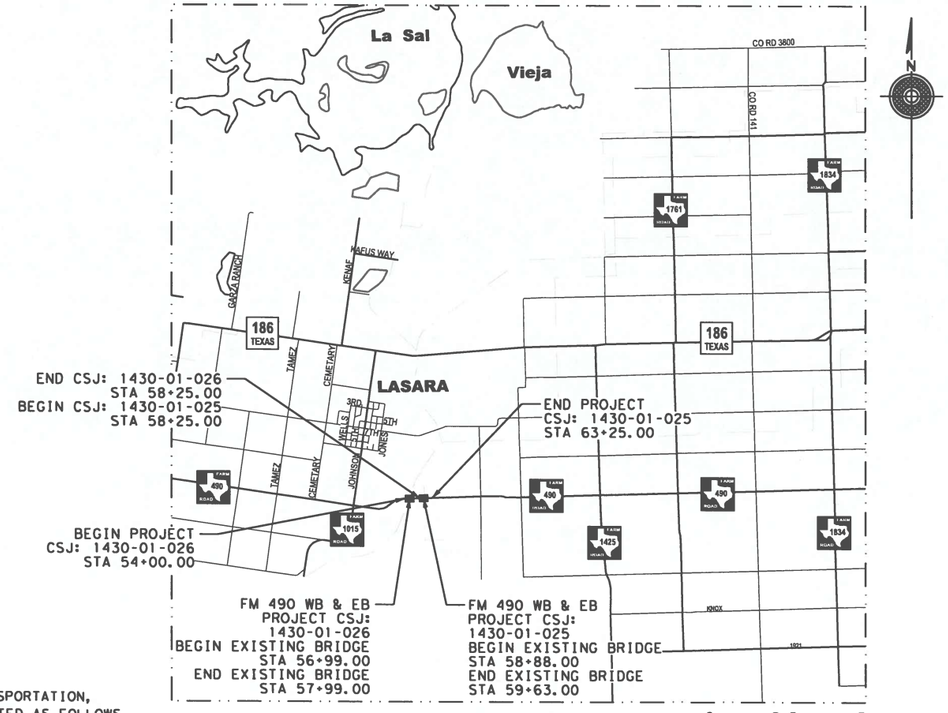
CSJ	ROAD/HWY	LIMITS	ROADWAY		BRIDGES		TOTAL LENGTH	
			FEET	MILES	FEET	MILES	FEET	MILES
1430-01-025	FM 490	FROM .74 MILES EAST OF FM 1015 IN WILLACY COUNTY	415	0.08	85	0.02	500	0.095
1430-01-026	FM 490	FROM .7 MILES EAST OF FM 1015 IN WILLACY COUNTY	315	0.06	110	0.02	425	0.080
			730	0.14	195	0.04	925	0.175

WILLACY COUNTY
FM 490

LIMITS: FROM FM 490 WEST OF DELTA LAKE DRAIN TO
0.74 MILES EAST OF WILLACY COUNTY MAIN CANAL

FOR THE CONSTRUCTION OF BRIDGE REPLACEMENT

CONSISTING OF REPLACEMENT OF BRIDGE AND APPROACHES



EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD CROSSINGS: NONE

TDLR INSPECTION NOT REQUIRED.

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

FED RD. DIV NO.	PROJECT NO.		SHEET NO.
6	STP 2B23(003)VRU, Etc.		1
STATE	STATE DIST.		COUNTY
TX	PHARR		WILLACY
CONT.	SECT.	JOB	HWY NO.
1430	01	031, ETC.	FM 490

FUNCTIONAL CLASS: RURAL MAJOR COLLECTOR
DESIGN SPEED = 65 MPH, AS-POSTED
ADT (2020): 2,702
ADT (2040): 4,323

HWY	YEAR	ADT
FM 490	2020	2,702

FUNCTIONAL CLASS: RURAL MAJOR COLLECTOR

SUBMITTED FOR LETTING 04/28/2023

Craig Hutson

DESIGN ENGINEER/PROJECT MANAGER
AGUIRRE & FIELDS, LP

SUBMITTED FOR LETTING 04/28/2023

SEAN P. LAZY

DESIGN ENGINEER/PROJECT MANAGER
BURNS & McDONNELL ENGINEERING CO, INC

TEXAS DEPARTMENT OF TRANSPORTATION

RECOMMENDED FOR LETTING DATE: 5/19/2023

DocuSigned by:
Pedro R. Alvarez
EABA335C2DAA48C...

DISTRICT ENGINEER

SUBMITTED FOR LETTING: DATE: 5/19/2023

DocuSigned by:
Romualdo Mena Jr
8D395A95CF7044D...

CENTRAL DESIGN SUPERVISOR

DATE: 4/25/2023
TIME: 4:53 PM
USER: lmartin
FILE NAME: ...\01_GENERAL\2302301GT01.dgn

LEGEND

(D): DISTRICT STANDARD
(S): STATEWIDE STANDARD

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

GEOFFREY SCHIED (NO. 122792), PE 4/25/2023 DATE

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

CRAIG HUTSON (NO. 91845), PE 4/25/2023 DATE

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

SEAN CLARY (NO. 122134), PE 4/25/2023 DATE

STATE OF TEXAS
CRAIG HUTSON
91845
LICENSED
PROFESSIONAL ENGINEER
4/25/2023

NO.	DATE	REVISION	APPROVED

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739
5320 N. TARRANT PKWY, SUITE 260
FORT WORTH, TX, 76244
ENGINEERING FIRM F-739

FM 490
INDEX OF SHEETS

DESIGN CAH	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
DRAWN KCW	6	SEE TITLE SHEET	FM 490
CHECK CAH	STATE	DISTRICT	COUNTY	SHEET NO.
	TEXAS	PHR	WILLACY	2
CHECK EJL	CONTROL	SECTION	JOB	
	1430	01	031, ETC	

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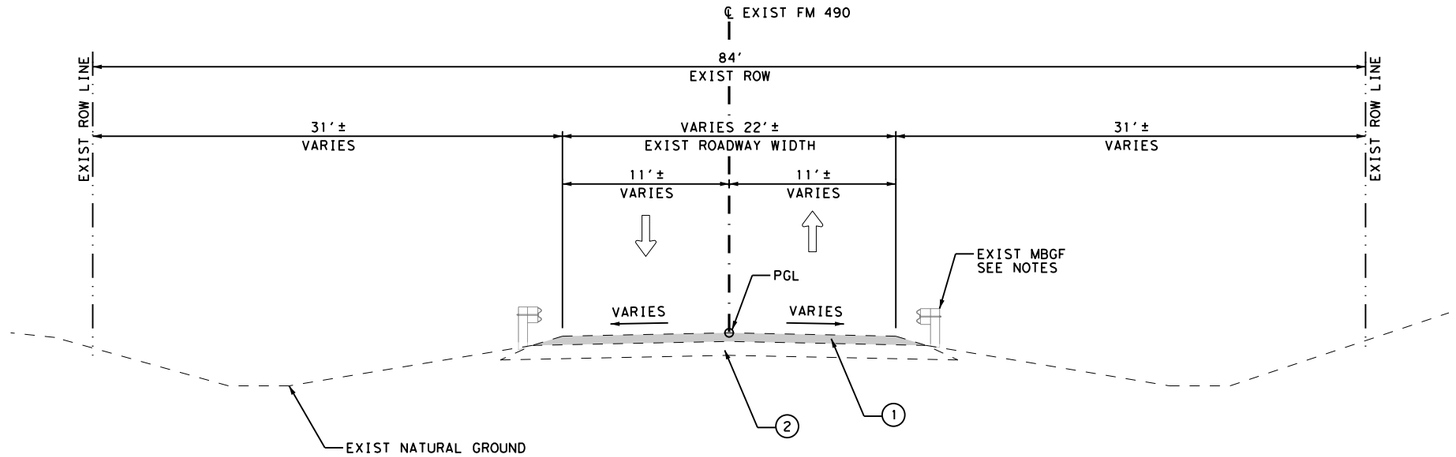

EXIST ROADWAY TYPICAL SECTION
STA 54+00.00 - STA 63+25.00

EXCEPTION BRIDGE
STA 56+99.00 - STA 57+99.00
STA 58+88.00 - STA 59+63.00

LEGEND

(1) EXISTING ASPHALT PAVEMENT (2" SURFACE COURSE 6" FLEXIBLE BASE) PER TXDOT AS-BUILT PLAN SET FOR PROJECT NO. S-395(2). PLANS DATED 1957

(2) EXISTING 6"LIME STABILIZED SUBGRADE PER TXDOT AS-BUILT PLAN SET FOR PROJECT NO. S-395(2). PLANS DATED 1957

NOTES:

1. EXISTING MBGF, MBGF & SGT ARE LOCATED APPROXIMATELY FROM STA 54+07.50 RT TO STA 60+82.65 RT AND FROM STA 56+14.85 LT TO STA 62+40.00 LT.

0 5' 10'
SCALE: 1"=10'

STATE OF TEXAS
CRAIG HUTSON
91845
LICENSED
PROFESSIONAL ENGINEER
Craig Hutson
4/25/2023

NO.	DATE	REVISION	APPROVED

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739
5320 N. TARRANT PKWY, SUITE 260
FORT WORTH, TX, 76244
ENGINEERING FIRM F-739

FM 490
EXISTING ROADWAY TYPICAL SECTION

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAH	6	SEE TITLE SHEET		FM 490
DRAWN KCW	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CAH	TEXAS	PHR	WILLACY	3
CHECK EJL	CONTROL	SECTION	JOB	
	1430	01	031, ETC	

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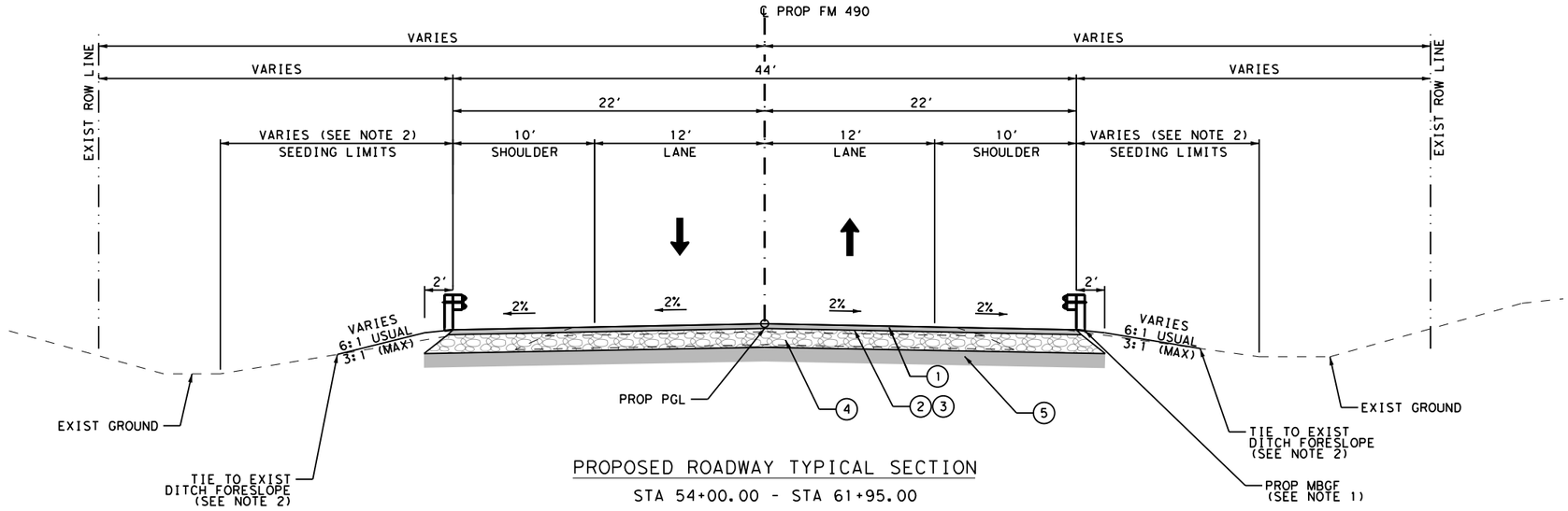
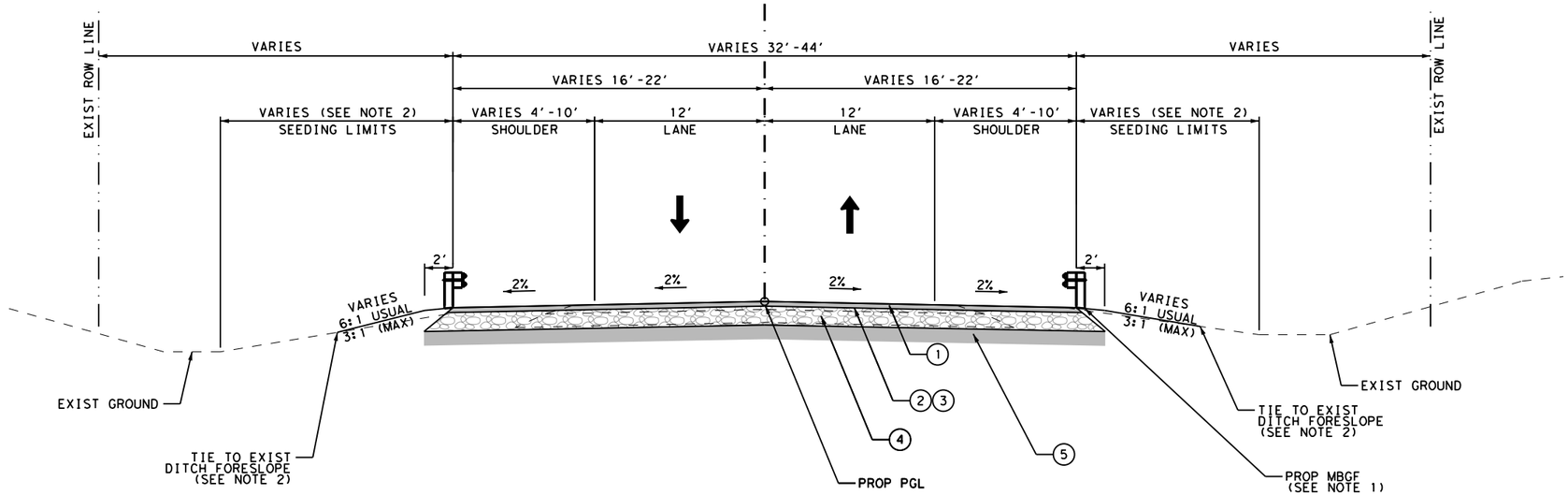


PROPOSED ROADWAY TYPICAL SECTION

STA 54+00.00 - STA 61+95.00

ROADWAY TRANSITION
STA 54+00.00 - STA 56+94.00
STA 58+04.00 - STA 58+25.00
STA 58+25.00 - STA 58+83.00
STA 59+68.00 - STA 61+95.00

EXCEPTION BRIDGE
STA 56+94.00 - STA 58+04.00
STA 58+83.00 - STA 59+68.00



PROPOSED ROADWAY TYPICAL SECTION

STA 61+95.00 - STA 63+25.00

LEGEND

1. 3" HMA TY-D SAC A (PG 76-22)
2. UNDERSEAL COURSE ASPHALT (TIER II)
3. PRIME COAT (MC-30)
4. 10" FLEXIBLE BASE (TY E GR 4) W/ 2% CEMENT BY WT.
5. 12" STABILIZED SUBGRADE W/ 4% LIME BY WT.

NOTES:

1. PROPOSED MBGF, MBGF & SGT ARE LOCATED APPROXIMATELY FROM STA 54+07.50 RT TO STA 60+82.65 RT AND FROM STA 56+14.85 LT TO STA 62+40.00 LT.
2. CONTRACTOR TO TIE TO EXIST DITCH FORESLOPE AND MAINTAIN POSITIVE DRAINAGE. PROPOSED SEEDING LIMITS TO MATCH LIMITS OF DITCH FLOW LINE AND DITCH FORESLOPE.

0 5' 10'
SCALE: 1"=10'

STATE OF TEXAS
CRAIG HUTSON
91845
LICENSED
PROFESSIONAL ENGINEER
Craig Hutson
4/25/2023

NO.	DATE	REVISION	APPROVED

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739
5320 N. TARRANT PKWY, SUITE 260
FORT WORTH, TX, 76244
ENGINEERING FIRM F-739

FM 490
PROPOSED ROADWAY TYPICAL SECTION

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
CAH	6	SEE TITLE SHEET	FM 490
DRAWN KCW	STATE	DISTRICT	COUNTY
CHECK CAH	TEXAS	PHR	WILLACY
CHECK EJL	CONTROL	SECTION	JOB
	1430	01	031, ETC

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Project Number:

County: Willacy **Control:** 1430-01-031, Etc.

Highway: FM 490

2014 SPECS GENERAL NOTES:

****

General Requirements and Covenants to ITEMS 1 thru 9:

For all pits or quarries, comply with the "Texas Aggregate Quarry and Pit Safety Act."

Provide on a weekly basis a list of equipment, including idle equipment, utilized on the project that week.

The 1-800 call services for utility locations do not include TxDOT facilities. Contact the Pharr District Signal Section (956-702-6225) for coordination regarding TxDOT underground lines.

ITEM 2: Instructions to Bidders

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

Andres Espinoza, P.E., San Benito Area Engineer; Andres.Espinoza@txdot.gov
Gabriel Villareal, P.E., Assist. Area Engineer; Gabriel.Villarreal@txdot.gov

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

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

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

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

ITEM 5: Control of the Work

The responsibility for the construction surveying on this contract will be in accordance with Article 5.9.3., "Method C."

Project Number:

County: Willacy **Control:** 1430-01-031, Etc.

Highway: FM 490

Prior to contract letting, bidders may obtain a free computerized transfer of files (from the Engineer's office) that contains the earthwork information. If copies of the actual cross-sections in additional to, or instead of the electronic files are requested, they will be available at the Engineer's office for borrowing by copying companies for the purpose of making copies for the bidder at the bidder's expense.

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

ITEM 6: Control of Materials

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

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

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

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

ITEM 7: Legal Relations and Responsibilities

No significant traffic generator events identified.

Roadway or Lane closures during the following key dates and/or special events are prohibited:

- National Holidays
- The day before a National Holiday
- During emergency events such as natural disasters or as directed by the Engineer

ITEM 8: Prosecution and Progress

Working days will be computed and charged in accordance with Article 8.3.1.6. defined as

follows:

Work and time charges will continue until the start of the bird nesting season. Upon the start of the bird nesting season, work and time charges will stop for a maximum period of 120-Working days for the bird nesting season delay to be completed. Time charges in accordance with Article 8.3.1.4. will resume at the end of the 120-day bird nesting season delay or earlier if mutually agreed in writing by the Engineer and Contractor.

Where road closures or detours around structures are necessary to accomplish proposed work, the removal of existing structures and/or cutting of existing pavement will not be permitted until all precast members for the proposed structure have been cast, tested, and approved for use.

TxDOT is required to provide 10 working days advanced written notice of all proposed bridge widening, rehabilitation, or demolition work to the Texas Department of State Health Services (TDSHS) to allow them the opportunity to both verify information provided regarding asbestos containing materials and abatement and observe the demolition/renovation work. Considering that this notice will be provided TDSHS at the beginning of the project for all affected bridge work based on start and finish dates included in the Contractor's original submitted work schedule, any schedule changes proposed by the Contractor shall be submitted to TxDOT at least 15 days prior to the revised or original start date to accommodate the required coordination with TDSHS.

Prepare progress schedules using the Critical Path Method (CPM).

Working within the vicinity of known utility conflicts prior to the respective dates listed on Special Provision 000-1431 is solely the risk of the Contractor. The Department will not consider either monetary or time relief for inefficient work or any other impacts prior to the respective utility dates.

Early commencement of construction, or working out of phase, does not alter the utility relocation schedule proposed through this contract. All utility relocation dates will be incorporated into the Contractor’s baseline and progress schedule.

ITEM 100: Preparing Right of Way

Preparation of right of way will be done in accordance with the construction phasing shown on the Traffic Control Plans. Performance of this item will not be allowed outside of the project’s current construction phase without prior approval by the Engineer.

Removal of all existing vegetation and trees within the ROW will be subsidiary to prep ROW.

Project Number:

County: Willacy **Control:** 1430-01-031, Etc.

Highway: FM 490

ITEM 132: Embankment

Embankment (DENS CONT) shall be Type C with a max. PI of 40. Material used as embankment material in the top two feet below the bottom of Flexible Base shall meet the following requirements based on preliminary tests and such other tests found necessary by the Engineer.

1. The material shall be such as to produce a well-bonded embankment and shall have a minimum PI of 8 and a maximum PI of 30.

It is the Contractor's responsibility to advise the Engineer of the location of the source sufficiently in advance to avoid delay.

ITEM 160: Topsoil

Use topsoil as needed and directed by the Project Engineer for select problem areas. Unless otherwise approved by the Project Engineer, use topsoil from approved sources outside the right of way as per standard specifications. Existing topsoil is to be salvaged and retained for re-use on the project as topsoil.

ITEM 164: Seeding for Erosion Control

During drill seeding operations, application methods shall be in accordance with the method shown in the Standard Specification Book.

SS-1 Tacking Agent shall be a ratio of 2:1, two (Emulsion) to one (water) and applied at a rate of 0.05 gallons per square yard. The SS-1 Tacking Agent required for Drill Seed operations, will not be paid for directly, but will be subsidiary to Item 164 “Drill Seeding.” Watering shall not be used with the Drill Seed Method. A biodegradable tacking agent may be used in lieu of the SS-1 tacking agent in accordance with the manufacturer’s recommendations when approved by the Engineer.

Cool Season or Warm Season Grasses shall be included as part of Item 164 (See Table 3 and/or Table 4 in the Standard Specification Book or dates and seed type).

Seed mixture shall be as specified under Item 164.

ITEM 166: Fertilizer

Fertilizer rate is based on a rate of 100 Lbs. of Nitrogen per acre. The Nitrogen-Phosphorous Potassium (NPK) ratio shall include a minimum of 5% Phosphorous and 5% Potassium.

Fertilizer shall be homogenized.

ITEM 247: Flexible Base

Flexible Base Type E will be composed of caliche (argillaceous Limestone, calcareous or calcareous clay particles) and may contain stone, conglomerate, gravel, sand, or granular materials when these materials are in situ with the caliche.

Flexible Base (TY E GR 4) caliche shall conform to the following requirements:

Retained on Sq. Sieve:	Percent Retained
2”	0
½”	20-60
No. 4	40-75
No. 40	70-90
Max. PI	15
Max. Wet Ball PI	15
Wet Ball Mill Max. Amount	50
Min. Comp. Strength PSI	150 at 15 PSI lateral pressure
Triaxial Test	Tex-117-E

The Wet Ball Test (Tex-116-E) shall be run and the Plasticity Index of the material passing the No.40 sieve shall be determined (Wet Ball PI).

The percent of density as determined by Compaction Ratio (Tex-113-E) for the new Flexible Base shall be a minimum of 98%.

The Contractor's attention is called to the fact that certain existing and/or proposed structures may be within the limits of the Flexible Base. It shall be the Contractor's responsibility to perform construction operations without damage to these structures.

For water added under Item 247, the sulfate content will not exceed 3000-ppm and the chloride content will not exceed 3000-ppm.

Perform base ride quality testing for all base with only one lift of ACP or a seal coat as the final surface in accordance with Item 247. Perform base ride quality testing before placing the ACP or seal coat.

Project Number:

County: Willacy **Control:** 1430-01-031, Etc.

Highway: FM 490

Proof roll constructed flexible base in accordance with Item 216, “Proof Rolling.” Correct soft spots as directed.

ITEM 251: Reworking Base Courses

Quantities of Flexible Base to be salvaged, shown on the typical sections, are for estimating purposes only. All acceptable base material encountered in existing base is to be salvaged as directed by the Engineer regardless of the quantities involved.

Salvaged base shall be used in the bottom course on any of the proposed roadway and/or turnout sections.

Salvaged base may be used on any of the proposed driveway sections.

Proof roll the roadbed in accordance with Item 216, “Proof Rolling.” Correct soft spots as directed.

ITEM 260: Lime Treatment (Road-Mixed)

The Contractor's attention is called to the fact that certain existing and/or proposed structures are within the limits of the lime-treated Subgrade. Unless otherwise directed by the Engineer, these structures shall be installed before the final rolling of this Subgrade. It shall be the Contractor's responsibility to perform the proper lime treating operation without damage to these structures.

The slurry method of applying lime will be required, except when the lime is to be added to naturally wet materials as directed by the Engineer.

For this project, the Engineer will direct a random number of lime trucks to be check weighed.

The percent of density as determined by Tex-121-E for the new and salvage Flexible Base shall be a minimum of 98% for all courses.

Proof roll all constructed lime treated subgrade and bases courses in accordance with Item 216, “Proof Rolling.” Correct soft spots as directed. Correction of soft spots in the subgrade or base courses will be at the Contractor’s expense.

Contractor is to place an underseal and/or pavement course as indicated on plans within 14 calendar days of initial prime coat application. Otherwise, reapply prime coat as directed by the Engineer. Reapplication of the prime coat will be at the Contractor’s expense.

Allow the mixture to mellow for a minimum period of 48 hours for all types of lime utilized. Additional time might be required due to sulfate and organic testing requirements, as directed by Engineer.

ITEM 275: Cement Treatment (Road-Mixed)

The Contractor's attention is called to the fact that certain existing and/or proposed structures are within the limits of the cement-treated Subgrade. Unless otherwise directed by the Engineer, these structures shall be installed before the final rolling of this Subgrade. It shall be the Contractor's responsibility to perform the proper cement treating operation without damage to these structures.

The percent of density as determined by Tex-120-E for the new and salvage Flexible Base shall be a minimum of 98% for all courses.

Proof roll all constructed cement treated subgrade and bases courses in accordance with Item 216, “Proof Rolling.” Correct soft spots as directed. Correction of soft spots in the subgrade or base courses will be at the Contractor’s expense.

Contractor is to place an underseal and/or pavement course as indicated on plans within 14 calendar days of initial prime coat application. Otherwise, reapply prime coat as directed by the Engineer. Reapplication of the prime coat will be at the Contractor’s expense.

ITEM 3096: Asphalts, Oils, and Emulsions

Temporary ramps/detours and driveways may use Performance Grade Binder 64-22.

ITEM 302: Aggregates for Surface Treatments

Loc.	County	CSJ	Highway	Binder	SAC
1	Willacy	1430-01-031, Etc	FM 490	SPG 76-22	A

The aggregate for the surface treatment shall be surface dry before application unless otherwise directed by the Engineer.

Project Number:

County: Willacy **Control:** 1430-01-031, Etc.

Highway: FM 490

ITEM 310: Prime Coat

The Contractor shall exercise diligence in the application of asphalt by the use of flagging and rolling procedures to keep from spraying or splattering the traveling public with asphaltic material.

Do not apply subsequent courses over the initial prime coat no earlier than 12 hours after the prime coat was applied, unless otherwise authorized or directed by the Engineer.

ITEM 316: Seal Coat

In addition to cleaning by brooming of paved surfaces to be sealed as required by this Item, blading may also be necessary to clean dirt and grass from edges of the pavement and/or turnout areas. The cost of this blading will not be paid for directly but will be considered subsidiary to the various bid Items of the project.

The type and grade of asphalt as shown on the plans and/or as directed by the Engineer, shall be used on these projects. Asphalt cement will be used during the warm season. An emulsified asphalt will be used during the cooler season if permitted in writing by the Engineer. The emulsified asphalt, if used, shall be HFRS 2P. Estimated quantities shown for the bid Item is based on an average of the estimated rates of application for asphaltic cement and emulsified asphalt. These rates should be used for estimating and comparison purposes only.

The one or two-course surface treatment shall be in place for a sufficient period of time in the opinion of the Engineer, for the surface treatment to properly dry and cure before placing the Asphaltic Concrete Pavement.

Traffic will not be permitted on the surface treatment unless authorized by the Engineer.

When emulsified asphalt is used, do not apply subsequent courses over the surface treatment any earlier than the day after the surface treatment was applied, unless otherwise authorized or directed by the Engineer.

Contractor is to place ACP layer(s) as indicated on plans within 14-calendar days of seal coat placement unless otherwise directed by the Engineer.

ITEM 3077: Superpave Mixtures

The Contractor shall exercise diligence in the application of "Bonding Course" by the use of flagging and rolling procedures to keep from spraying or splattering the traveling public with asphaltic material.

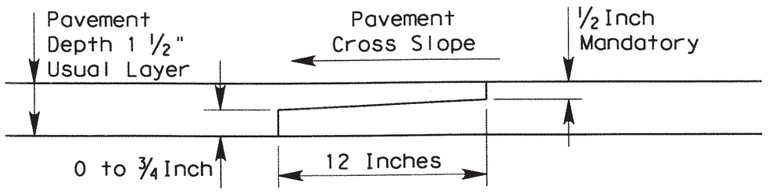
Blading (not to exceed more than 3-ft from the pavement edge) may also be necessary to clean dirt and grass from pavement edges and turnout areas as work under this bid Item. The cost of this blading will not be paid for directly but shall be considered subsidiary to this bid Item.

All surplus RAP from this project will remain the property of the Contractor.

Level-up will be placed before the surface course. An asphaltic concrete spreading and finishing machine and/or motor graders; when approved by the Engineer may be used to place the ACP level-up.

Aggregates used on shoulders and ramps are required to meet SAC requirements.

All unconfined longitudinal joints shall be constructed with a joint maker providing a maximum ½-inch vertical edge and a minimum 6:1 edge taper or as approved by the Engineer. The Engineer may waive this requirement when no impacts to the traveling public are foreseen.



NOTCHED WEDGE JOINT

The engineer may allow for variances to the dimensions shown.

Public and private driveways need to have a smooth vertical transition between the edge of pavement and the existing driveways. The Contractor is to add a vertical taper if needed which will be subsidiary to Item 3077.

The use of RAP and RAS (recycled asphalt shingles) will not be allowed as part of the mix design for the final riding surface.

Use a release agent from the Department's MPL to clean and to coat the inside of truck beds for hauling equipment. Hauling equipment shall be cleaned prior to hauling material to job site. Submit a copy of the bill of lading to the Engineer as part of the QCP. Ensure the pavement is free from any spillage of hydraulic oil or diesel from construction equipment. The Department may reject trucks that contain any foreign material and suspend production if the pavement is contaminated by any pollutants mentioned above.

Project Number:

County: Willacy **Control:** 1430-01-031, Etc.

Highway: FM 490

SAC B aggregate must have material properties that require 10 or less on the magnesium sulfate soundness test and 20 or less on the Micro-Deval test.

ITEM 400: Excavation and Backfill for Structures

If the Contractor elects to cut pavement (existing/detour) for structural work beyond that required by the construction phasing shown in the plans and approved by the Engineer, it shall be restored at his expense and backfilled to its original condition or better in accordance with Item 400.

Unless shown otherwise in the plans, use a 1-ft depth for Item 400 Structural Excavation (Special) for gravel bedding needed below drainage structures with unstable material.

Structural Excavation Special (Gravel):

Use durable natural stone when tested in accordance with Tex-411-A, has weight loss of no more than 18% after 5 cycles of magnesium sulfate solution. Provide gravel conforming to an aggregate Grade No. 1 as shown on Table 4 of Article 421.2.

ITEM 416: Drilled Shaft Foundations

Payment for furnishing and installing anchor bolts mounted in drill shafts will be included in the unit price bid for the various diameter drill shafts.

The Contractor shall coordinate with the utility companies to verify utility locations before drilling foundations.

The Contractor shall form, or provide a smooth finish, the portions of drilled shaft that project above the ground line. Place a ¾ inch chamfer on the top edge of each pole foundation. This work will not be paid for directly but will be considered subsidiary to this bid Item.

All drilled shaft foundations will be based on the lengths shown on the plans or those established in writing. Adequate calculations for measurements of foundations have been made in accordance with Article 9.1. of the Standard Specifications. Increases or decreases in the quantities required by change in design will be measured as specified and the revised quantities will be the basis for payment.

In the presence of excess ground water and/or unstable conditions in sub-grade soils prevents excavation to the line and depths indicated on the plans for "Drilled Shaft Foundation", other proposed methods of foundation installation such as casing, etc. shall be submitted for review and approved by the Engineer.

ITEM 420: Concrete Substructures

Pay bent concrete as plan quantity.

ITEM 421: Hydraulic Cement Concrete

Provide Sulfate Resistant Concrete for all concrete piling and drilled shafts.

Provide equipment at the batch plant for determining the free moisture and/or absorption of aggregates in accordance with applicable TXDOT Test.

Provide the following items for concrete batch inspection in accordance with specifications outlined in DMS-10101, "Computer Equipment":

(1) One Desktop Microcomputer or One Laptop Microcomputer
(2) One Integrated Printer/Scanner/Copier/Fax Unit
(3) Contractor-Furnished Software
(4) Hardware

Submit to the Engineer for approval the project locations for all Portland Cement concrete washout areas prior to starting any concrete work.

Fiber Reinforced Concrete is not permitted.

ITEM 427: Surface Finishes for Concrete

Provide surface finishes for concrete as follows:

(1) Bridge overpass and underpass structures – surface area I, opaque sealer coating (color to be determined by the Engineer).
(2) Bridge waterway crossings and bridge class box culvert structures – surface area II, opaque sealer coating (color to be determined by the Engineer).

Concrete traffic barrier/railing (roadway and bridge) and retaining wall coping - opaque sealer coating (color to be determined by the Engineer) to all exposed surfaces.

ITEM 432: Riprap

Provide Class "A" concrete minimum for riprap aprons placed around all box culvert and pipe safety end treatments. Provide ¼-inch thick dummy joints at least every 15-ft for riprap aprons placed around box and pipe culverts.

Project Number:

County: Willacy **Control:** 1430-01-031, Etc.

Highway: FM 490

Do not use fiber reinforced concrete RIPRAP on side slopes equal to or steeper than 6:1 unless approved by the Engineer.

ITEM 462: Concrete Box Culverts and Drains

Provide joints in pre-cast concrete box culverts using any of the methods specified in Item 464, except mortar joints.

Provide pre-cast concrete boxes to expedite traffic handling unless otherwise shown on the plans.

Provide the Area Engineer with the casting schedule of all pre-cast concrete boxes prior to beginning any fabrication.

ITEM 464: Reinforced Concrete Pipe

Use tongue and groove pipe where the RCP extends into the lime treated subgrade. The 4-foot depth restriction for heavy equipment passage over pipe structures is voided. The Contractor will be responsible for any construction damage to these facilities.

Do not use mortar joints.

All reinforced concrete pipe shall include rubber gaskets unless shown otherwise on the plans or directed by the Engineer.

ITEM 466: Headwalls and Wingwalls

Do not use pre-cast headwalls/wingwalls.

ITEM 467: Safety End Treatment

All Type II SET's shall have riprap, Class "A" minimum, aprons as shown on the plans. The Contractor may submit an alternate precast SET design for approval by the Engineer.

ITEM 496: Removing Structures

Submit a demolition plan in accordance with Item 496 and the plans for bridge structures identified for removal.

ITEM 502: Barricades, Signs, and Traffic Handling

Replace/relocate all regulatory signs removed due to construction operations with the same sign on fixed support(s) immediately upon its removal. First obtain Project Engineer approval before removing any regulatory roadway sign. Required flaggers are to be available to direct traffic during sign intermediate down time.

Relocate any Directional Sign Assemblies removed during construction operations immediately upon their removal.

These signs shall be relocated to a location in accordance with the Latest Version of the "Texas Manual on Uniform Traffic Control Devices". In no case will a sign be removed without a replacement sign and support(s) being readily available and a location established. Removal and relocation of these signs required for traffic control will not be paid for directly but shall be considered subsidiary to Item 502.

From the beginning to the end of the project, all traffic control devices need to be in acceptable condition as per the Texas Quality Guidelines for Work Zone Traffic Control Devices.

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 "Safety Contingency" is not intended to be used in lieu of bid Items established by the contract.

Remove and dispose of all litter, debris, objectionable material, excess materials that accumulate at the base of all traffic control devices as directed by the Engineer.

ITEM 504: Field Office and Laboratory

For this project a field office will not be required at the project site.

The Contractor will furnish a Type D Structure (Asphalt Mix Laboratory) modified by the following.

Laboratory room:

The other room of this building will be used as a laboratory and will include access to a bathroom facility from the interior. The laboratory and bathroom facility will have the walls, ceiling and floor insulated such that the air temperature can always be maintained at 76 degrees Fahrenheit.

Project Number:

County: Willacy **Control:** 1430-01-031, Etc.

Highway: FM 490

Furnish for the Department's use in the asphalt laboratory one (1) desktop computer.

ITEM 506: Temporary Erosion, Sedimentation, and Environmental Controls

Before starting each phase of construction, review with the Engineer the SW3P used for temporary erosion control as outlined on the plans. Before construction, place the temporary erosion and sedimentation control features as shown on the SW3P. Location of Construction Exits are to be approved by the Engineer. After completing earthwork operations, restore and reseed the disturbed areas in accordance with the Department's specifications for permanent or temporary erosion control. Before starting grading operations and during the project duration, place the temporary or permanent erosion control measures to prevent sediment from leaving the right of way.

The Contractor Force Account "Erosion Control Maintenance" that has been established for this project is intended to be utilized for work zone Best Management Practice (BMP) maintenance, to improve the effectiveness of the Environmental Controls that may need maintenance attention and/or require replacement while the project is still under the construction stage. These procedures will be mutually agreed upon by the Engineer and the Contractor's Responsible Person based on weekly or more frequent BMP management reviews on the project. The "Erosion Control Maintenance" is not intended to be used in lieu of bid Items established by the contract.

ITEM 530: Intersections, Driveways, and Turnouts

Prime coat shall meet the requirements of Item 310.

Public and private driveways need to have a smooth vertical transition tie-in between the proposed driveway and the existing driveway. The Contractor is to add a vertical taper if needed which will be subsidiary to Item 530.

ITEM 540: Metal Beam Guard Fence

The optional terminal anchor post with the terminal connector will be required as shown on the Metal Beam Guard Fence Standard.

Galvanize the rail elements supplied for this project using a Type II Zinc Coating.

ITEM 542: Removing Metal Beam Guard Fence

Dispose all metal beam guard fence materials unless shown otherwise in the plans.

ITEM 544: Guardrail End Treatments

Label “end treatment type” on backside of unit at time of installation.

ITEM 552: Wire Fence

Contractor is to repair any wire fence that is damaged by the Contractor’s construction operations to insure the retention of livestock, if any, in their respective pastures along the project.

ITEM 560: Mailbox Assemblies

Coordinate and verify final mailbox locations with TxDOT and the US Postmaster.

ITEM 585: Ride Quality for Pavement Surfaces

Use Surface Test Type "B" for service roads and ramps.

Quality control results shall be submitted to TxDOT the next working day after each day’s paving.

Pavement areas with public turnout intersections that carry major traffic volumes will not be subjected to inertial profiler testing. These areas shall be evaluated using the 10-ft. straightedge.

Diamond grinding shall be used to remove localized roughness.

Use Surface Test Type B pay adjustment schedule 3 to evaluate ride quality of the travel lanes in accordance with Item 585, “Ride Quality for Pavement Surfaces.” This includes ramps and service road travel lanes.

ITEMS 636: Signs

Complete sign blanks and panels shall be handled and stored at the job site in such a manner that corners, edges and faces are not damaged. Finished sign blanks shall be stored in either a

Project Number:

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weatherproof warehouse or outside and off the ground in a vertical position. All paper, cardboard and chemically treated separators and packaging shall be removed prior to outside storage.

ITEM 644: Small Roadside Sign Assemblies

All signs shall be installed as shown in the plans and in accordance with the current edition of the "Texas Manual on Uniform Traffic Control Devices" and the “Sign Crew Field Book” (SCFB).

All signs shall be erected according to the locations shown on the signing layout sheets except that a sign may be shifted in order to secure a more desirable location. All sign locations will be staked as shown in the plans and as approved. It is the intent of the plans to erect all roadside traffic signs with the sign edge a minimum of 6 feet from the edge of the shoulder, or if none, 12 feet from the edge of the travel lane. In curb and gutter sections, the sign edge shall be a minimum of 2 feet from the face of the curb.

For this project, aluminum type sign blanks as provided for under Item 636 will be required for all proposed signing installed under Item 644. Aluminum sign blanks less than 7.5 square feet shall be 0.08-inch-thick, sign blanks 7.5 to 15 square feet shall be 0.100-inch-thick and sign blanks greater than 15 square feet shall be 0.125 inch thick.

All excess excavation shall be spread uniformly inside the right of way as directed and shall be included in the price of these Items.

Sign types which design details are not shown on the plans shall conform with the latest edition of the Department's "Standard Highway Sign Design for Texas" Manual.

Signs shown to be removed shall include the complete sign installation and separate the sign post at the concrete foundation. The concrete foundation shall be disposed in accordance with this bid Item. Except for concrete foundations, all removed sign panels, sign posts, and hardware shall remain then property of the Department. All removed sign installations shall be completely disassembled. All salvageable sections of sign panels shall be recycled by TxDOT. The removed sign material will be required to be hauled to the maintenance yard closest to the project. No signs shall be removed without prior approval.

ITEM 658: Delineator and Object Marker Assemblies

Delineator assemblies shall be installed 8 feet from the edge of the shoulder unless restricted by some obstruction, in which case, the delineator assembly shall be placed between 2 and 8 feet from the edge of the shoulder.

Bi-directional object markers shall be in accordance with the D&OM standard sheets. The Contractor is directed to the standards when instructed where and how to install the object markers.

ITEMS 662 and 666: Work Zone Pavement Markings and Retroreflectorized Pavement Markings

All permanent pavement markings and work zone pavement markings for this project under these Items shall be 0.100 inches (100 mil) thick thermoplastic.

Any permanent pavement markings or non-removal work zone pavement markings lacking reflectivity in accordance with the requirements of Tex 828-B, or that fail to meet minimum retro reflectivity requirements for longitudinal pavement markings when required, will be addressed per the requirements of the specification. The roadway will be re-striped at no additional compensation.

Pavement surface preparation for markings and markers will not be paid for directly but shall be considered subsidiary to Item 666.

Prior to any striping operations, an on-site coordination meeting between all the parties involved will be required to review striping details and requirements to ensure quality work.

The beads used on this project shall meet the requirements of Departmental Materials Specification DMS-8290, Glass Traffic Beads Texas Type II & III. Use a 50% Type II/ 50% Type III mix utilizing a double drop system with Type III beads dropped first.

ITEM 677: Eliminating Existing Pavement Markings and Markers

Asphalt and aggregate types and grades shall be as approved in writing when a surface treatment is used to eliminate existing pavement markings.

Project Number:

County: Willacy **Control:** 1430-01-031, Etc.

Highway: FM 490

Summary of Roadway Items

LOCATION	100 6002	110 6001	110 6002	132 6006	247 6225	260 6002	260 6011	275 6001	275 6031	310 6009	316 6005	316 6531	432 6045	467 6363	530 6005
	PREPARING ROW	EXCAVATION (ROADWAY)	EXCAVATION (CHANNEL)	EMBANKMENT (FINAL) (DENS CONT) (TY C)	FL BS (CMP IN PLACE) (TY E GR 4) (10")	LIME (HYDRATED LIME (SLURRY))	LIME TRT (EXST MAIL) (12")	CEMENT	CEMENT TREAT (NEW BASE) (10")	PRIME COAT (MC-30)	ASPH (TIER II)	AGGR (TY-B GR-4P) (SAC -B)	RIPRAP (MOW STRIP) (4 IN)	SET (TY II) (18 IN) RCP (6:1) (P)	DRIVEWAYS (ACP) 1.5"
	STA	CY	CY	CY	CY	TON	SY	TON	SY	GAL	GAL	CY	CY	EA	SY
FM 490 CSJ: 1430-01-026	4.25	704	191	57	436	30	1,657	17	1,575	551	551	23	18	1	0
FM 490 CSJ: 1430-01-025	5	387	41	248	194	13	740	7	700	245	245	24	20	0	112
PROJECT TOTAL	9.25	1,091	232	305	630	43	2,397	24	2,275	796	796	47	38	1	112

Summary of Roadway Items

LOCATION	530 6016	540 6002	540 6006	544 6001	545 6026	3077 6065
	DRIVEWAYS (4" FLEX BASE)	METAL W-BEAM GD FEN (STEEL POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	GUARDRAIL END TREATMENT (INSTALL)	CRASH CUSHION ATTEN (INSTALL) (QUAD) (N)	SP MIXES SP-D SAC-A PG76-22
	SY	LF	EA	EA	EA	TON
FM 490 CSJ: 1430-01-026	0	187.5	2	2	2	173
FM 490 CSJ: 1430-01-025	112	187.5	2	2	2	77
PROJECT TOTAL	112	375	4	4	4	250

Summary of TCP Items

LOCATION	6001 6001	502 6001
	PORTABLE CHANGEABLE MESSAGE SIGN	BARRICADES, SIGNS AND TRAFFIC HANDLING
	Day	MO
FM 490 CSJ: 1430-01-026	14	4
FM 490 CSJ: 1430-01-025	14	4
PROJECT TOTAL	28	8

Summary of Erosion Control Items

Sheet No.	160 6003	164 6023	164 6029	168 6001	506 6020	506 6024	506 6038	506 6039	506 6041	506 6043
	FURNISHING AND PLACING TOPSOIL (4")	CELL FBR MLCH SEED (PERM) (RURAL) (CLAY)	CELL FBR MLCH SEED (TEMP) (WARM)	VEGETATIVE WATERING	CONSTRUCTION EXIT (INSTL)	CONSTRUCTION EXIT (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (12")	BIODEG EROSN CONT LOGS (REMOVE)
	SY	SY	SY	MG	EA	EA	LF	LF	LF	LF
FM 490 CSJ: 1430-01-026	1,977	989	989	32	78	78	809	809	87	87
FM 490 CSJ: 1430-01-025	2,668	1,334	1,334	43	78	78	1,210	1,210	78	78
CSJ: 1430-01-025, ETC Total	4,645	2,323	2,323	75	156	156	2,019	2,019	165	165

Summary of Removal Items

LOCATION	105 6045	542 6001	542 6002	544 6003
	REMOVING STAB BASE & ASPH PAV (2"-8")	REMOVE METAL BEAM GUARD FENCE	REMOVE TERMINAL ANCHOR SECTION	GUARDRAIL END TREATMENT (REMOVE)
	SY	LF	EA	EA
FM 490 CSJ: 1430-01-026	850	470	0	2
FM 490 CSJ: 1430-01-025	1,083	400	2	2
Project Total:	1,933	870	2	4

Summary of Pavement Marking Items

LOCATION	658 6014	658 6062	666 6343	666 6321	672 6009	672 6017
	INSTL DEL ASSM (D-SW) SZ (BRF) CTB (BI)	INSTL DEL ASSM (D-SW) SZ 1 (BRF) GF2 (BI)	REF PROF PAV MRK TY I (W) 6" (SLD) (100 MIL)	RE PM W/RETREQ TY I (Y) 6" (SLD) (100 MIL)	REFL PAV MRKR TY II A-A	TRAFFIC BUTTON TY Y
	EA	EA	LF	LF	EA	EA
FM 490 CSJ: 1430-01-026	8	12	850	850	11	170
FM 490 CSJ: 1430-01-025	6	9	1,000	1,000	13	200
PROJECT TOTAL	14	21	1,850	1,850	24	370

STATE OF TEXAS
CRAIG HUTSON
91845
LICENSED
PROFESSIONAL ENGINEER
Craig Hutson
4/25/2023

NO.	DATE	REVISION	APPROVED

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739
5320 N. TARRANT PKWY, SUITE 260
FORT WORTH, TX, 76244
ENGINEERING FIRM F-739

FM 490
SUMMARY OF QUANTITIES

DESIGN CAH	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
	6	SEE TITLE SHEET	FM 490
DRAWN KCW	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CAH	TEXAS	PHR	WILLACY	6
CHECK EJL	CONTROL	SECTION	JOB	
	1430	01	031, ETC	

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TIME: 8:35:52 AM
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FILE NAME: ...\01_GENERAL\29302\03SR01.dgn

ITEM			110	132
BID CODE			6001	6006
DESCRIPTION			EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY C)
CSJ 1430-01-026			CY	CY
STATION	TO	STATION		
53+50.00	TO	54+00.00	0	0
54+00.00	TO	54+50.00	53	3
54+50.00	TO	55+00.00	125	7
55+00.00	TO	55+50.00	138	8
55+50.00	TO	56+00.00	120	8
56+00.00	TO	56+50.00	102	5
56+50.00	TO	56+86.50	80	9
56+86.50	TO	57+10.50	45	11
57+10.50	TO	57+86.50	14	6
57+86.50	TO	58+11.00	0	0
58+11.00	TO	58+25.00	28	0
CSJ 1430-01-026 SUBTOTAL			**705**	**57**
CSJ 1430-01-025			CY	CY
58+25.00	TO	58+50.00	25	0
58+50.00	TO	58+75.50	74	0
58+75.50	TO	58+98.50	67	0
58+98.50	TO	59+54.50	31	2
59+54.50	TO	59+75.00	0	0
59+75.00	TO	60+00.00	19	0
60+00.00	TO	60+50.00	36	4
60+50.00	TO	61+00.00	45	14
61+00.00	TO	61+50.00	32	26
61+50.00	TO	62+00.00	24	52
62+00.00	TO	62+50.00	18	72
62+50.00	TO	63+00.00	10	57
63+00.00	TO	63+25.00	6	22
CSJ 1430-01-025 SUBTOTAL			**388**	**248**
PROJECT TOTALS			**1093**	**305**

DATE: 4/25/2023
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STATE OF TEXAS
CRAIG HUTSON
91845
LICENSED
PROFESSIONAL ENGINEER

Craig Hutson 4/25/2023

NO.	DATE	REVISION	APPROVED

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739
5320 N. TARRANT PKWY,
SUITE 260
FORT WORTH, TX, 76244
ENGINEERING FIRM F-739

FM 490
EARTHWORK CALCULATIONS

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
CAH	6	SEE TITLE SHEET	FM 490
DRAWN KCW	STATE	DISTRICT	COUNTY
CHECK CAH	TEXAS	PHR	WILLACY
CHECK EJL	CONTROL	SECTION	JOB
	1430	01	031, ETC

SHEET NO. 7

SEAL COAT MATERIAL SELECTION TABLE

Contractor:
1) Provide materials according to the alternates selected for the roadway tier designations specified at various roadway locations shown on the plans;
2) Alternately supply selected binders from a higher tier, but only if the type of material is allowed for the designated tier; payment will only be made for the tier designated for the pavement;
3) Supply the aggregate type, grade and surface aggregate class that is shown to be allowed with the binder used; and
4) Adhere to the application season selected.

☐ Tier 1: Heavy Use (>5,000 ADT) Use only the selected materials.

Type	Asphalt Rubber (A-R) ☐ A-R Only	Asphalt Cement (A-C) ☐ A-C Only
Asphalt	☐ A-R Ty II ☐ SP 300-016&039 ☐ A-R Ty III	☐ AC-20-5TR ☐ AC-20XP ☐ AC-15P
Aggregate Type	☐ Ty PA ☐ Ty PB ☐ Ty PC ☐ Ty PD ☐ Ty PE ☐ Ty PL	☐ Ty PA ☐ Ty PB ☐ Ty PC ☐ Ty PD ☐ Ty PE ☐ Ty PL
Aggregate Grade	☐ 3S ☐ 3non-1w ☐ 3 1w ☐ 4S ☐ 4P ☐ SP 302-013	☐ 3S ☐ 4S ☐ 5 ☐ 3non-1w ☐ 4P ☐ 5S ☐ 3 1w ☐ SP 302-1
Aggregate SAC	☐ *A* ☐ *B*	☐ *A* ☐ *B*

☒ Tier 2: Moderate Use (500-5,000 ADT)

Use this materials or any selected Tier 1 materials combinations of the allowed types

Type	Asphalt Cement (A-C) ☒ A-C Only	Asphalt Emulsion ☐ Emulsion Only
Asphalt	☒ AC-10-2TR ☒ AC-5 W/2% SBR ☒ AC-10 ☒ AC-10 W/2% SBR ☐ AC-15P	☐ CHFRS-2P ☐ CRS-2P ☐ HFRS-2P ☐ SP 300-016&039
Aggregate Type	☐ Ty PA ☐ Ty PB ☐ Ty PC ☐ Ty PD ☐ Ty PE ☐ Ty PL ☒ Allow uncoated aggregate	☐ Ty A ☐ Ty B ☐ Ty C ☐ Ty D ☐ Ty E ☐ Ty L
Aggregate Grade	☐ 3S ☐ 4S ☐ 5 ☐ 3non-1w ☒ 4P ☐ 5S ☐ 3 1w ☒ SP 302-008	☐ 3S ☐ 4S ☐ 5S ☐ 3non-1w ☐ 4P ☐ 5 ☐ 3 1w ☐ SP 302-013
Aggregate SAC	☐ *A* ☒ *B*	☐ *A* ☐ *B*

☐ Tier 3: Moderate Use (<500 ADT) Use this materials or any selected Tier 1 or Tier 2 materials combinations of the allowed types

Type	Asphalt Cement (A-C) ☐ A-C Only	Asphalt Emulsion ☐ Emulsion Only
Asphalt	☐ AC-10-2TR ☐ AC-5 W/2% SBR ☐ AC-20XP ☐ SP 300-016&039 ☐ AC-10 W/2% SBR ☐ AC-15P	☐ CRS-2 ☐ CRS-2H ☐ HFRS-2 ☐ SP 300-016&039
Aggregate Type	☐ Ty PA ☐ Ty PB ☐ Ty PC ☐ Ty PD ☐ Ty PE ☐ Ty PL	☐ Ty A ☐ Ty B ☐ Ty C ☐ Ty D ☐ Ty E ☐ Ty L
Aggregate Grade	☐ 3S ☐ 4S ☐ 5 ☐ 3non-1w ☐ 4P ☐ 5S ☐ 3 1w ☐ SP 302-013	☐ 3S ☐ 4S ☐ ☐ 3non-1w ☐ 4P ☐ 5 ☐ 3 1w ☐ SP 302-013
Aggregate SAC	☐ *A* ☐ *B*	☐ *A* ☐ *B*

Seasonal Alternates: Use these materials for work in cooler conditions as directed.

☒ CRS-2 ☒ HFRS-2 ☐ CRS-1P ☐ RS-1P ☐ RC-250 ☐ MC-800 ☐ AC-12-5-TR ☐ SP 300-016&032

Seal Coat Seasons: Refer to Item 316 for temperature and weather restrictions.

☒ Season 4: CRP, LRD, PHR	Apr 1 to Sept 30

Texas Department of Transportation
Design Division (Roadway)

SEAL COAT MATERIAL SELECTION TABLE "UNDERSEAL"

FILE: sctable.dgn	DN: TxDOT	CK: AM	DW: BGD	CK:		
©TxDOT June 2011	DIST	FEDERAL AID PROJECT				SHEET
REVISIONS	PHR					8
September 2020	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	WILLACY		1430	01	031, ETC	FM 490

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1430-01-031 **DISTRICT** Pharr **COUNTY** Willacy
HIGHWAY FM 490

			CONTROL SECTION JOB	**1430-01-025**		**1430-01-026**		**1430-01-031**		TOTAL EST.	TOTAL FINAL
			PROJECT ID	**A00122621**		**A00122622**		**A00176867**			
			COUNTY	**Willacy**		**Willacy**		**Willacy**			
			HIGHWAY	**FM 490**		**FM 490**		**FM 490**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	100-6002	PREPARING ROW	STA	5.000		4.250		161.000		170.250	
	104-6017	REMOVING CONC (DRIVEWAYS)	SY					98.000		98.000	
	105-6021	REMOVING STAB BASE AND ASPH PAV (0-4")	SY					1,086.000		1,086.000	
	105-6043	REMOVING STAB BASE & ASPH PAV (0-6")	SY					44,890.000		44,890.000	
	105-6045	REMOVING STAB BASE AND ASPH PAV (2"-8")	SY	1,083.000		850.000				1,933.000	
	106-6001	OBLITERATING ABANDONED ROAD	STA					21.000		21.000	
	110-6001	EXCAVATION (ROADWAY)	CY	387.000		704.000		28,164.000		29,255.000	
	110-6002	EXCAVATION (CHANNEL)	CY	41.000		191.000				232.000	
	132-6006	EMBANKMENT (FINAL)(DENS CONT)(TY C)	CY	248.000		57.000		4,991.000		5,296.000	
	160-6003	FURNISHING AND PLACING TOPSOIL (4")	SY	2,668.000		1,977.000		96,109.000		100,754.000	
	164-6023	CELL FBR MLCH SEED(PERM)(RURAL)(CLAY)	SY	1,334.000		989.000		96,109.000		98,432.000	
	164-6029	CELL FBR MLCH SEED(TEMP)(WARM)	SY	1,334.000		989.000		96,109.000		98,432.000	
	168-6001	VEGETATIVE WATERING	MG	43.000		32.000		1,562.000		1,637.000	
	216-6001	PROOF ROLLING	HR					8.000		8.000	
	247-6225	FL BS (RDWY DEL)(TY E GR 4)(FNAL POS)	CY	194.000		436.000		18,212.000		18,842.000	
	260-6002	LIME (HYDRATED LIME (SLURRY))	TON	13.000		30.000		1,088.000		1,131.000	
	260-6011	LIME TRT (EXST MATL) (12")	SY	740.000		1,657.000		61,643.000		64,040.000	
	275-6001	CEMENT	TON	7.000		17.000		664.000		688.000	
	275-6031	CEMENT TREAT (NEW BASE) (10")	SY	700.000		1,575.000		65,226.000		67,501.000	
	310-6009	PRIME COAT (MC-30)	GAL	245.000		551.000		12,456.000		13,252.000	
	316-6005	ASPH (TIER II)	GAL	245.000		551.000		18,683.000		19,479.000	
	316-6531	AGGR (TY-B GR-4P SAC-B)	CY	24.000		23.000		524.000		571.000	
	400-6002	STRUCT EXCAV (BOX)	CY					116.000		116.000	
	400-6005	CEM STABIL BKFL	CY	41.000		41.000		167.000		249.000	
	400-6010	STRUCT EXCAV (SPECIAL)	CY					59.000		59.000	
	402-6001	TRENCH EXCAVATION PROTECTION	LF					515.000		515.000	
	403-6001	TEMPORARY SPL SHORING	SF	2,600.000		3,750.000				6,350.000	
	416-6002	DRILL SHAFT (24 IN)	LF	660.000		590.000				1,250.000	
	420-6013	CL C CONC (ABUT)	CY	32.200		32.200				64.400	
	420-6029	CL C CONC (CAP)	CY	23.400		23.400				46.800	
	420-6037	CL C CONC (COLUMN)	CY	4.600		17.400				22.000	
	422-6007	REINF CONC SLAB (SLAB BEAM)	SF	3,910.000		5,060.000				8,970.000	
	425-6010	PRESTR CONC SLAB BEAM (5SB12)	LF	751.340		976.340				1,727.680	
	432-6031	RIPRAP (STONE PROTECTION)(12 IN)	CY	66.000		74.000				140.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	20.000		18.000		69.000		107.000	
	450-6023	RAIL (TY SSTR)	LF	194.000		244.000				438.000	
	454-6020	SEALED EXPANSION JOINT (4 IN) (SEJ - B)	LF	93.000		93.000				186.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1430-01-031 **DISTRICT** Pharr **COUNTY** Willacy
HIGHWAY FM 490

			CONTROL SECTION JOB	**1430-01-025**		**1430-01-026**		**1430-01-031**		TOTAL EST.	TOTAL FINAL
			PROJECT ID	**A00122621**		**A00122622**		**A00176867**			
			COUNTY	**Willacy**		**Willacy**		**Willacy**			
			HIGHWAY	**FM 490**		**FM 490**		**FM 490**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	462-6006	CONC BOX CULV (5 FT X 2 FT)	LF					68.000		68.000	
	464-6003	RC PIPE (CL III)(18 IN)	LF					432.000		432.000	
	464-6005	RC PIPE (CL III)(24 IN)	LF					805.000		805.000	
	464-6008	RC PIPE (CL III)(36 IN)	LF					102.000		102.000	
	466-6178	WINGWALL (PW - 1) (HW=3 FT)	EA					2.000		2.000	
	467-6356	SET (TY II) (18 IN) (RCP) (3: 1) (C)	EA					2.000		2.000	
	467-6358	SET (TY II) (18 IN) (RCP) (4: 1) (C)	EA					4.000		4.000	
	467-6363	SET (TY II) (18 IN) (RCP) (6: 1) (P)	EA			1.000		22.000		23.000	
	467-6388	SET (TY II) (24 IN) (RCP) (3: 1) (C)	EA					10.000		10.000	
	467-6390	SET (TY II) (24 IN) (RCP) (4: 1) (C)	EA					2.000		2.000	
	467-6395	SET (TY II) (24 IN) (RCP) (6: 1) (P)	EA					4.000		4.000	
	496-6004	REMOV STR (SET)	EA					12.000		12.000	
	496-6007	REMOV STR (PIPE)	LF					1,380.000		1,380.000	
	496-6009	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	EA	1.000		1.000				2.000	
	500-6001	MOBILIZATION	LS	0.250		0.250		0.500		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	2.000		2.000		4.000		8.000	
	506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	78.000		78.000				156.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	78.000		78.000				156.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	1,210.000		809.000		32,166.000		34,185.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	1,210.000		809.000		32,166.000		34,185.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	78.000		87.000		606.000		771.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	78.000		87.000		606.000		771.000	
	510-6003	ONE-WAY TRAF CONT (PORT TRAF SIG)	MO					1.000		1.000	
	530-6004	DRIVEWAYS (CONC)	SY					98.000		98.000	
	530-6005	DRIVEWAYS (ACP)	SY	112.000				1,110.000		1,222.000	
	530-6016	DRIVEWAYS (BASE)	SY	112.000				1,187.000		1,299.000	
	540-6002	MTL W-BEAM GD FEN (STEEL POST)	LF	187.500		187.500		700.000		1,075.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	2.000		2.000				4.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	400.000		470.000		92.000		962.000	
	542-6002	REMOVE TERMINAL ANCHOR SECTION	EA	2.000				4.000		6.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	2.000		2.000		8.000		12.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	2.000		2.000				4.000	
	545-6026	CRASH CUSHION ATTEN (INSTALL) (QUAD)(N)	EA	2.000		2.000				4.000	
	560-6025	RELOCATE EXISTING MAILBOX	EA					5.000		5.000	
	644-6027	IN SM RD SN SUP&AM TYS80(1)SA(P)	EA					14.000		14.000	
	644-6028	IN SM RD SN SUP&AM TYS80(1)SA(P-BM)	EA					6.000		6.000	
	644-6030	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA					7.000		7.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1430-01-031 **DISTRICT** Pharr **COUNTY** Willacy
HIGHWAY FM 490

			CONTROL SECTION JOB	**1430-01-025**		**1430-01-026**		**1430-01-031**		TOTAL EST.	TOTAL FINAL
			PROJECT ID	**A00122621**		**A00122622**		**A00176867**			
			COUNTY	**Willacy**		**Willacy**		**Willacy**			
			HIGHWAY	**FM 490**		**FM 490**		**FM 490**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	644-6033	IN SM RD SN SUP&AM TYS80(1)SA(U)	EA					2.000		2.000	
	644-6078	REMOVE SM RD SN SUP&AM (SIGN ONLY)	EA					33.000		33.000	
	658-6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	EA	6.000		8.000				14.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	9.000		12.000				21.000	
	662-6050	WK ZN PAV MRK REMOV (REFL) TY II-A-A	EA					285.000		285.000	
	662-6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF					4,785.000		4,785.000	
	662-6075	WK ZN PAV MRK REMOV (W)24"(SLD)	LF					36.000		36.000	
	662-6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF					11,400.000		11,400.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF					58.000		58.000	
	666-6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	LF					12,995.000		12,995.000	
	666-6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	1,000.000		850.000		7,727.000		9,577.000	
	666-6343	REF PROF PAV MRK TY I(W)6"(SLD)(100MIL)	LF	1,000.000		850.000		32,370.000		34,220.000	
	668-6077	PREFAB PAV MRK TY C (W) (ARROW)	EA					1.000		1.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	13.000		11.000		263.000		287.000	
	672-6017	TRAFFIC BUTTON TY Y	EA	200.000		170.000		1,933.000		2,303.000	
	672-6018	TRAFFIC BUTTON TY B	EA					3,536.000		3,536.000	
	690-6017	REPLACE OF SPAN CABLE ASSM	LF					150.000		150.000	
	1008-6001	PRSSR IRRIG PVC PIPE (18")	LF					335.000		335.000	
	1008-6002	PRSSR IRRIG PVC PIPE (24")	LF					102.000		102.000	
	3077-6065	SP MIXESSP-DSAC-A PG76-22	TON	77.000		173.000		5,435.000		5,685.000	
	3077-6075	TACK COAT	GAL					244.000		244.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	14.000		14.000				28.000	
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS					1.000		1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS					1.000		1.000	

GENERAL NOTES AND SPECIFICATIONS DATA:

USE A POWER-BROOM WHEN CLEANING THE ROADWAY AS NEEDED.

REMOVE & DISPOSE ALL MATERIAL NOT DEEMED SALVAGEABLE BY THE ENGINEER, UNLESS OTHERWISE SHOWN ON THE PLANS.

ON EXISTING PAVEMENT THAT WILL REMAIN IN PLACE, SAND BLAST OR SURFACE TREAT IN ORDER TO REMOVE EXISTING STRIPING.

DO NOT BLOCK DRAINAGE WHEN HANDLING & STOCKPILING EXCAVATED MATERIAL.

MAINTAIN ACCESS TO DRIVEWAYS AND INTERSECTIONS THROUGH ALL PHASES OF CONSTRUCTION.

MAINTAIN POSITIVE DRAINAGE DURING ALL PHASES OF CONSTRUCTION.

TRAFFIC CONTROL DEVICES:

AT THE COMMENCEMENT OF THE PROJECT, ALL TRAFFIC CONTROL DEVICES SHALL BE IN ACCEPTABLE CONDITION, AND MAINTAINED THROUGHOUT THE DURATION OF THE PROJECT, AS PER GUIDELINES FOR TEMPORARY TRAFFIC CONTROL DEVICES AND FEATURES.

NOTIFY THE AREA ENGINEER(AE) IN WRITING(E-MAIL IS ACCEPTABLE) ONCE THE TRAFFIC CONTROL PLAN(TCP) AND ALL TRAFFIC CONTROL DEVICES HAVE BEEN INSTALLED AS PER PLANS ON THE PROJECT SO THAT THE DEPARTMENT'S RESPONSIBLE PERSON ACCOMPANIED BY THE CONTRACTOR'S RESPONSIBLE PERSON CAN CONDUCT A NIGHT INSPECTION ON THE SAID TCP AND TRAFFIC CONTROL DEVICES. COMMENCEMENT OF WORK WILL NOT BE AUTHORIZED NOR ALLOWED UNTIL THE AE NOTIFIES THE CONTRACTOR IN WRITING(E-MAIL IS ACCEPTABLE) TO PROCEED WITH THE WORK.

CONTRACTOR SHALL HAVE A SUFFICIENT AMOUNT OF TRAFFIC CONTROL DEVICES IN ACCEPTABLE CONDITION TO REPLACE ANY DAMAGED TRAFFIC CONTROL DEVICE WITHIN 24 HOURS OF NOTIFICATION.

PROVIDE ADDITIONAL SIGNS AND BARRICADES AS NECESSARY TO ADDRESS FIELD CONSTRUCTIBILITY & VISIBILITY. THESE ADDITIONAL SIGNS WILL BE CONSIDERED SUBSIDIARY TO ITEM 502.

REMOVE OR COMPLETELY COVER ALL EXISTING SIGNS WHICH ARE IN CONFLICT WITH THE TRAFFIC CONTROL PLAN.

ADJUST STOP SIGNS AS NEEDED ON INTERSECTING STREETS DURING THE VARIOUS CONSTRUCTION PHASES. DO NOT REMOVE ANY EXISTING STOP SIGNS UNTIL TEMPORARY SIGNS ARE IN PLACE.

COORDINATE THE TRAFFIC CONTROL PLAN AND THE VARIOUS SEQUENCES OF CONSTRUCTION WITH ADJACENT CONSTRUCTION PROJECTS IF APPLICABLE, TO ENSURE THE UNINTERRUPTED AND SAFE FLOW OF TRAFFIC.

NOTIFY THE ENGINEER IN WRITING WHEN MAJOR TRAFFIC CHANGES ARE TO BE MADE. NOTIFICATIONS MUST BE GIVEN A MINIMUM OF THREE WORKING DAYS PRIOR TO THE CHANGE.

ALL WORK ZONE PAVEMENT MARKINGS FOR THIS PROJECT SHALL BE 0.100 INCHES (100 MIL) THICK THERMOPLASTIC.

SAFETY:

PROTECT EXPOSED PITS THAT MUST REMAIN OPEN DURING NON-WORKING HOURS AS PER OSHA REQUIREMENTS.

TRAFFIC CONTROL PLAN NOTES

SHEET 1 OF 1 SHEETS

PHARR DISTRICT STANDARD

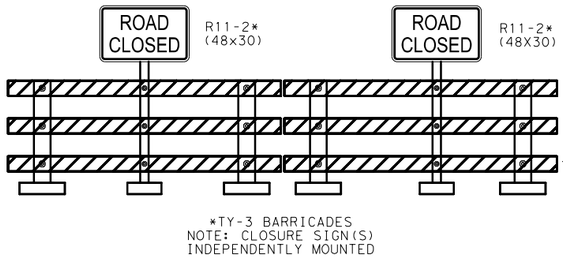
Texas Department of Transportation

Rev 03/22/2017

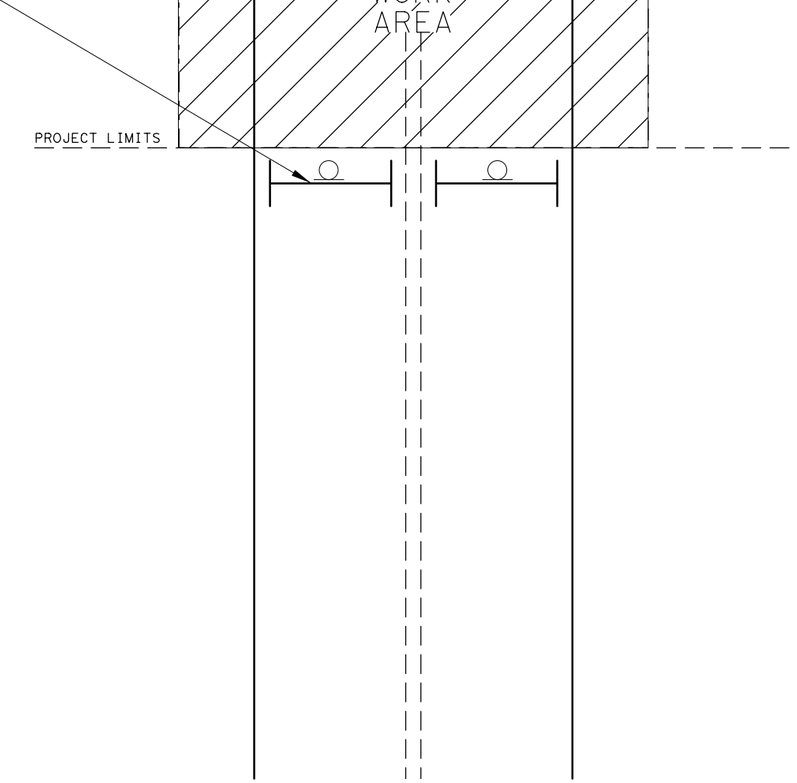
STATE	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.			SHEET NO.
TEXAS	6				10
DIST.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
PHR	WILLACY	1430	01	031, ETC	FM 490

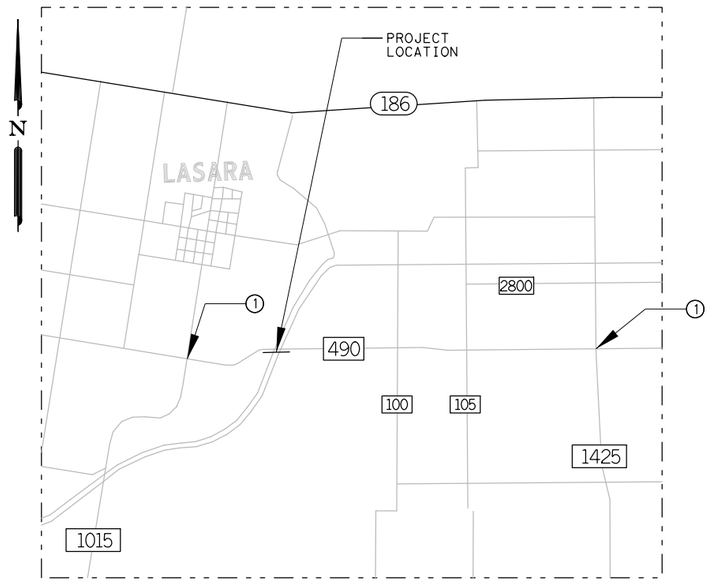
NOTES:

1. FM 490 FROM FM 1015 TO FM 1425 SHALL BE FULL ROADWAY CLOSURE. SEE TCP DETOUR ROUTE SHEET AND WZ(RCD)-13 FOR DETAILS OF CLOSURE AND DETOURING. USE WZ(RCD)-13 AT LOCATION CIRCLE NOTE 1 BELOW.
2. COORDINATION WITH FM 490 PAVEMENT RECONSTRUCTION CONTRACTOR IS REQUIRED TO MAINTAIN TRAFFIC CONTROL AS OUTLINED IN THE PLANS.
3. A PORTABLE CHANGEABLE MESSAGE SIGN WILL BE PLACED FOR ADVANCED NOTIFICATIONS SEVEN (7) DAYS BEFORE ROADS ARE CLOSED. SIGNS WILL REMAIN IN PLACE FOR SEVEN (7) DAYS AFTER CLOSURE. LOCATIONS ARE SHOWN ON PROJECT LIMITS SIGNAGE MAPS OR PLACEMENT WILL BE DIRECTED.



*TY-3 BARRICADES
NOTE: CLOSURE SIGN(S) INDEPENDENTLY MOUNTED





PROJECT LIMIT SIGNAGE
FM 490 @ WILLACY CO MAIN CANAL & DELTA LAKE DRAIN

① M PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

TRAFFIC CONTROL PLAN

A. INSTALL ALL SIGNS AND TRAFFIC CONTROL DEVICES AS SHOWN AND IN ACCORDANCE WITH THE TRAFFIC CONTROL PLAN AND STANDARD BC SHEETS AS DIRECTED.

B. ADDITIONAL SIGNS, BARRICADES, AND TRAFFIC CONTROL DEVICES OTHER THAN THOSE SPECIFIED MAY BE REQUIRED FOR THE SAFE MOVEMENT OF TRAFFIC THROUGH THE PROJECT. PAYMENT FOR ALL SUCH SIGNS, BARRICADES, OR TRAFFIC CONTROL DEVICES SHALL BE CONSIDERED SUBSIDIARY TO THE ITEM 502-6001, "BARRICADES, SIGNS, AND TRAFFIC HANDLING".

C. WORK SITES SHOULD BE CAREFULLY MONITORED TO ENSURE THAT TRAFFIC CONTROL MEASURES ARE OPERATING EFFECTIVELY AND THAT ALL DEVICES USED ARE CLEARLY VISIBLE, CLEAN, AND IN GOOD REPAIR.

D. THE CONTRACTOR WILL PROVIDE SAFE ACCESS TO AND FROM ALL PRIVATE PROPERTY AT ALL TIMES AND IN ALL WEATHER CONDITIONS.

E. THE CONTRACTOR WILL BE REQUIRED TO SUBMIT A DETAILED SCHEDULE OF WORK TO THE PROJECT ENGINEER PRIOR TO THE BEGINNING OF CONSTRUCTION WHICH GENERALLY CONFORMS TO THE SEQUENCE SHOWN IN THE SEQUENCE OF CONSTRUCTION.

F. COMPLETE ALL WORK ON THE PROJECT AS SHOWN ON THE VARIOUS PLAN SHEETS AND IN COMPLIANCE WITH THE GENERAL NOTES OF THIS CONTRACT.

G. ANY REQUEST TO ALTER THE SEQUENCE OF CONSTRUCTION OR TRAFFIC CONTROL PLAN WILL BE SUBMITTED TO THE ENGINEER FOR WRITTEN APPROVAL.

H. CONTRACTOR SHALL COORDINATE TRAFFIC CONTROL WITH ADJACENT ROADWAY PROJECT CONTRACTOR.

SEQUENCE OF CONSTRUCTION

CONTRACTOR SHALL RECONSTRUCT BRIDGES IN THE FOLLOWING ORDER AND AS SEQUENCED BELOW:

1. RECONSTRUCT EAST BRIDGE OVER WILLACY CO MAIN CANAL.
2. RECONSTRUCT WEST BRIDGE OVER DELTA LAKE DRAIN.

WEST BRIDGE CONSTRUCTION SHALL BEGIN AFTER COMPLETION OF EAST BRIDGE. IRRIGATION DISTRIC LEVEE ACCESS SHALL BE MAINTAINED.

THE CONTRACTOR WILL PROVIDE A WRITTEN NOTICE TO TxDOT AREA OFFICE AT LEAST 2 WEEKS PRIOR TO CLOSURE OF ANY ROADS.

1. SET DETOUR SIGNAGE IN ACCORDANCE TO THE TRAFFIC CONTROL PLAN AND PROJECT BARRICADES AS SHOWN AND IN ACCORDANCE WITH STANDARD BC SHEETS.
2. INSTALL REQUIRED TEMPORARY EROSION CONTROL DEVICES AS DIRECTED.
3. CLOSE ROAD TO ALL TRAFFIC. THE MINIMUM SIGNING FOR CLOSURE WILL CONSIST OF TYPE 3 BARRICADES AND ADVANCED SIGNING AS APPROVED.
4. RECONSTRUCT ROADWAY.
5. COMPLETE ALL OTHER WORK AS SHOWN ON THE PLANS.
6. CLEAN UP PROJECT AND REMOVE TEMPORARY EROSION CONTROL DEVICES AND PROJECT BARRICADES.

A PORTABLE CHANGEABLE MESSAGE SIGN WILL BE PLACED FOR ADVANCED NOTIFICATIONS SEVEN (7) DAYS BEFORE ROAD AND BRIDGE ARE CLOSED. SIGNS WILL REMAIN IN PLACE FOR SEVEN (7) DAYS AFTER CLOSURE. LOCATIONS ARE SHOWN ON PROJECT LIMITS SIGNAGE MAPS OR PLACEMENT WILL BE DIRECTED.

MAINTENANCE FOR LOCAL ACCESS IS REQUIRED.

STATE OF TEXAS
SEAN CLARY
122134
LICENSED
PROFESSIONAL ENGINEER
04/25/2023

NO.	DATE	REVISION	APPROVED

BURNS McDONNELL
13737 NOEL RD
SUITE 700
DALLAS, TX. 75240
ENGINEERING FIRM F-845

FM 490

TCP NARRATIVE

SHEET 1 OF 1

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
SPC	6	SEE TITLE SHEET	FM 490
DRAWN SPC	STATE	DISTRICT	COUNTY / SHEET NO.
	TEXAS	PHR	WILLACY
CHECK MAW	CONTROL	SECTION	JOB / 11
CHECK MAW	1430	01	031,Etc

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USER: lebernandez
FILE NAME: ...\FM490-BMCD-TCPNAR.dgn

(1)

CW20-2D
48x48

(2)

M4-8
24x12

M1-6F
24x24

M6-1R
21x15

(3)

M4-8
24x12

M1-6F
24x24

M6-1L
21x15

(4)

M4-8
24x12

M1-6F
24x24

M5-1
21X15

(5)

M4-8
24x12

M1-6F
24x24

M5-1
21X15

(6)

M4-8
24x12

M1-6F
24x24

M6-3
21x15

(7)

M4-8a
24x18

M1-6F
24x24

(8)

R11-4
60"X30"

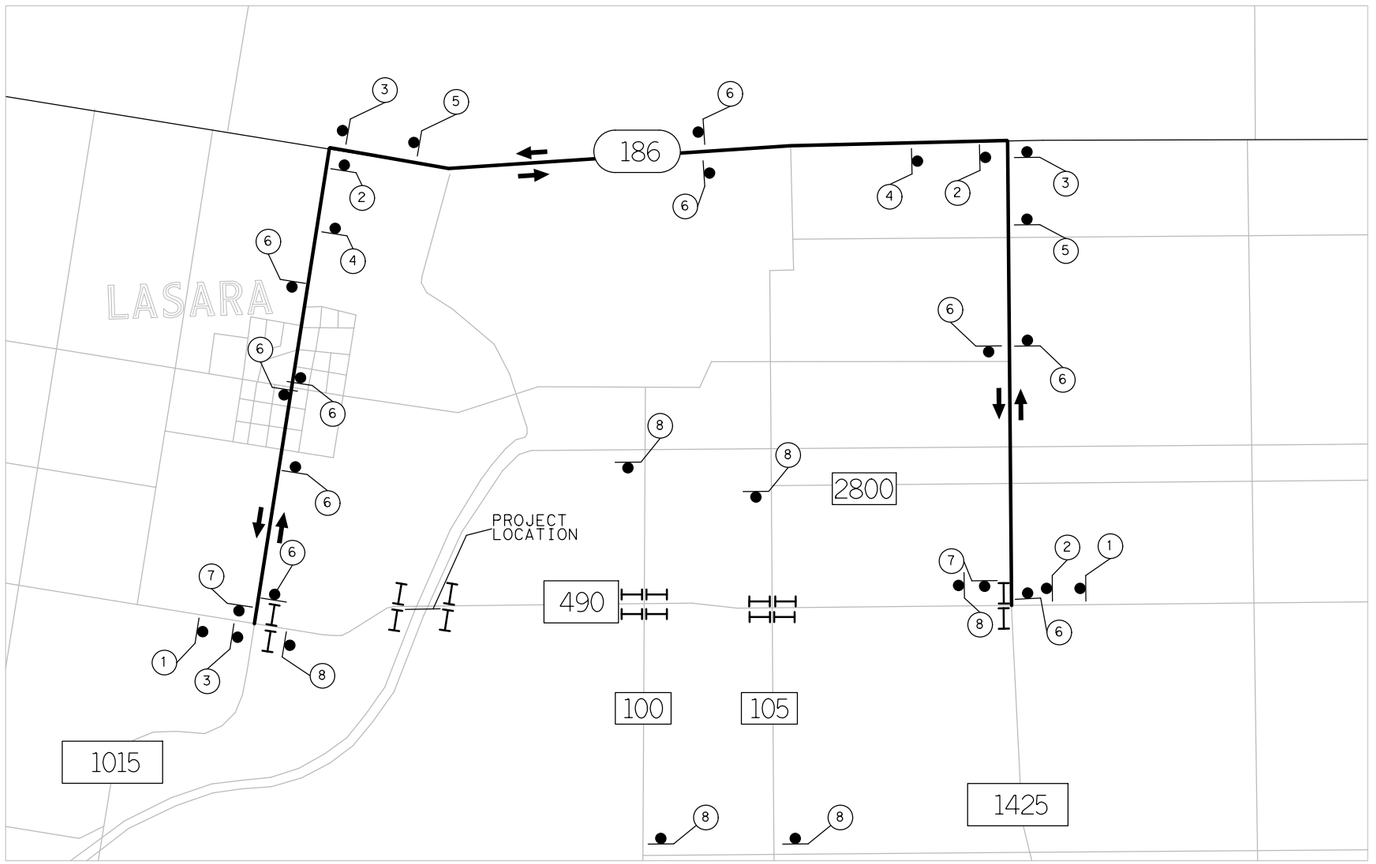
M4-10R OR M4-10L
48"X18"

LEGEND

- DIRECTION OF TRAFFIC
- TYPE 3 BARRICADE
- SIGN

NOTES:

1. ALL SIGNS, DEVICES, LOCATIONS AND SPACING SHALL CONFORM TO THE TMUTCD, THE BC, WZ, AND TCP STANDARD DRAWINGS.
2. SEE "FM 490 TCP NARRATIVE" SHEET FOR DETAILS.



04/25/2023

NO.	DATE	REVISION	APPROVED

BURNS McDONNELL
13737 NOEL RD
SUITE 700
DALLAS, TX. 75240
ENGINEERING FIRM F-845

Texas Department of Transportation
© 2023

FM 490

TCP DETOUR ROUTE

SHEET 1 OF 1

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
SPC	6	SEE TITLE SHEET	FM 490
DRAWN SPC	STATE	DISTRICT	COUNTY / SHEET NO.
CHECK MAW	TEXAS	PHR	WILLACY / 12
CHECK MAW	CONTROL	SECTION / JOB	
	1430	01	031, Etc

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FILE: c:\pw-af\pw-af-prodtyler.martin@aguirre-fields.com\dms18267\bc-21.dgn

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

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	PHR	WILLACY		13

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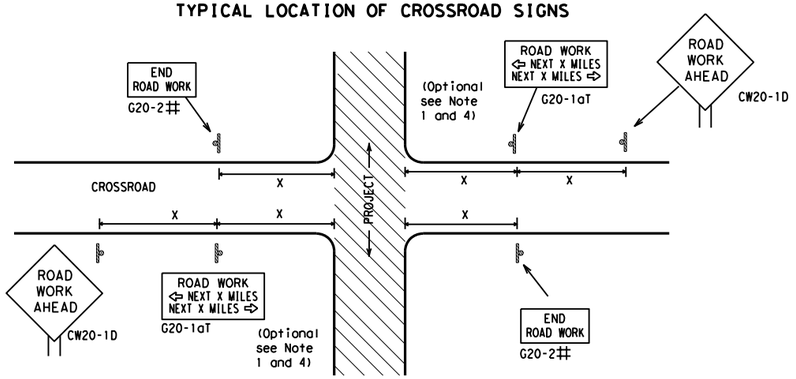
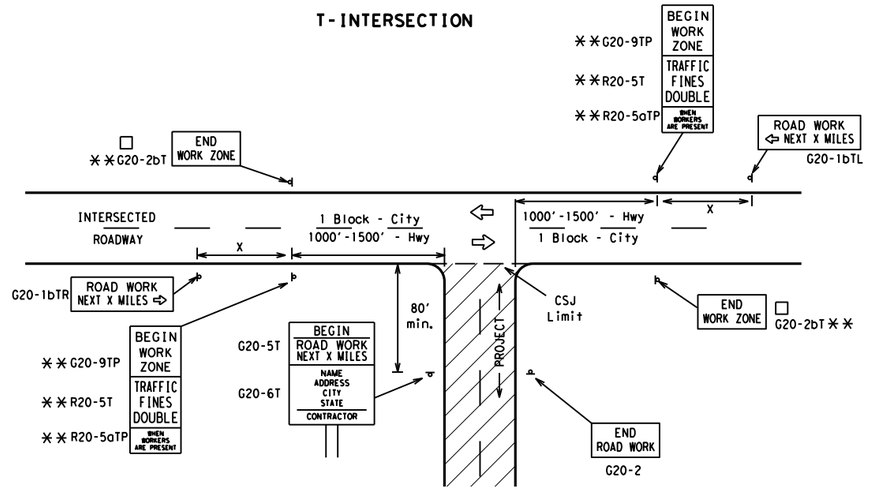
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

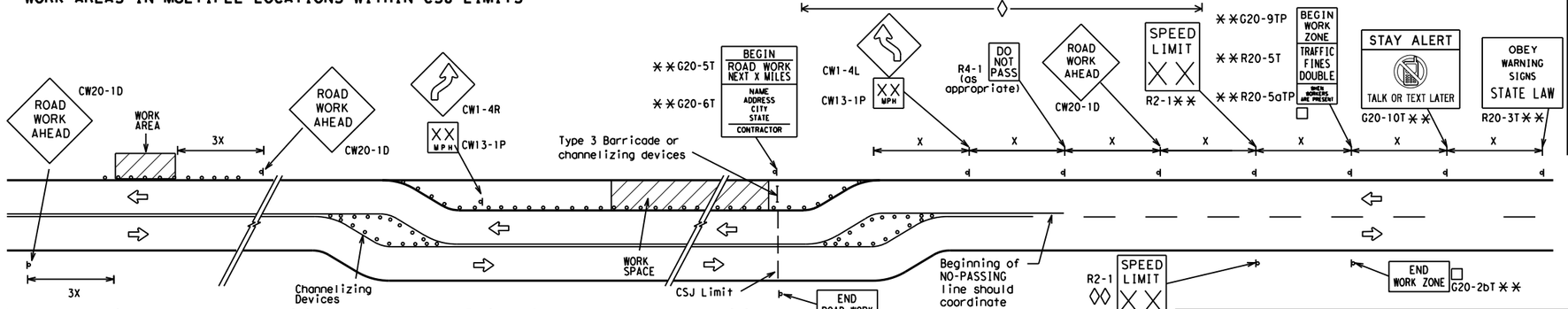
✱ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

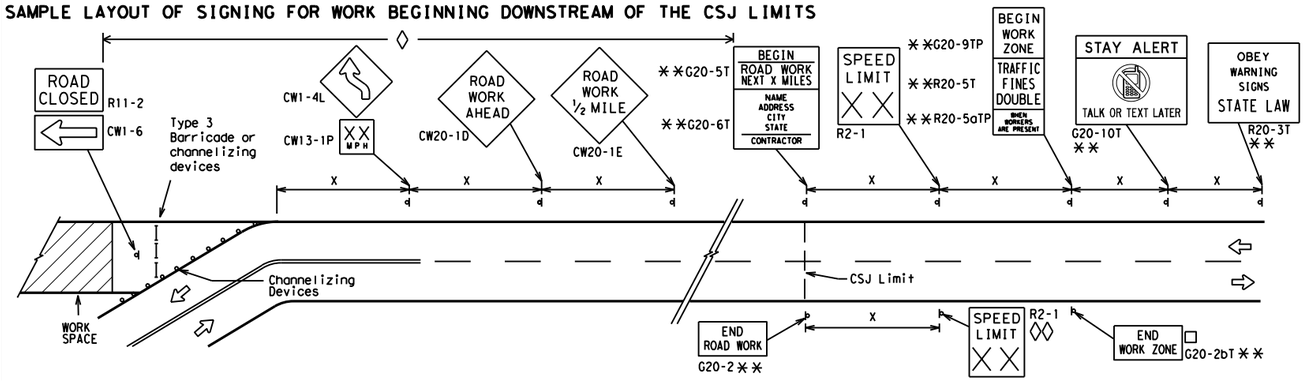
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

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



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

NOTES

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

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

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

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

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

LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	PHR	WILLACY		14

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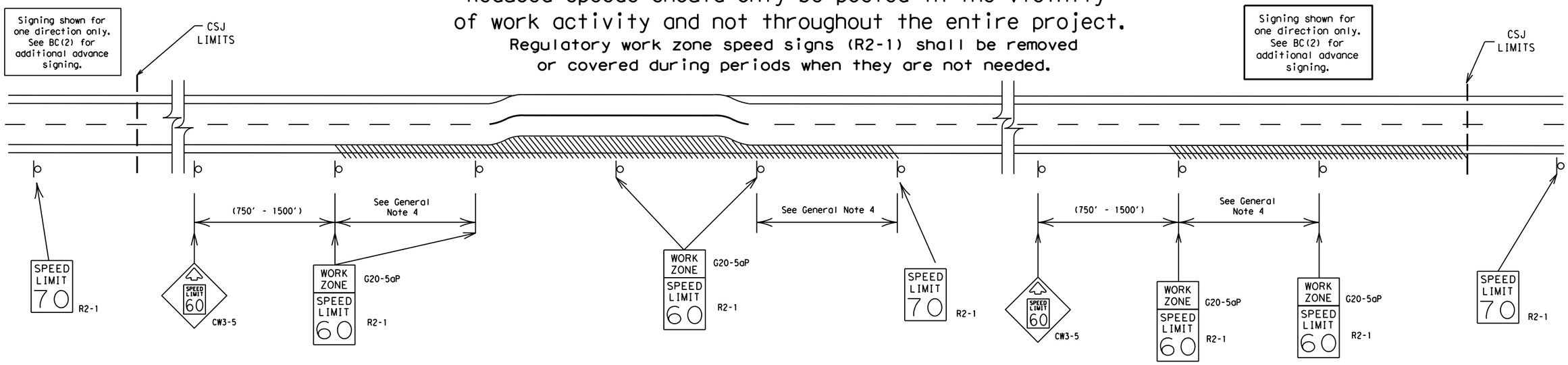
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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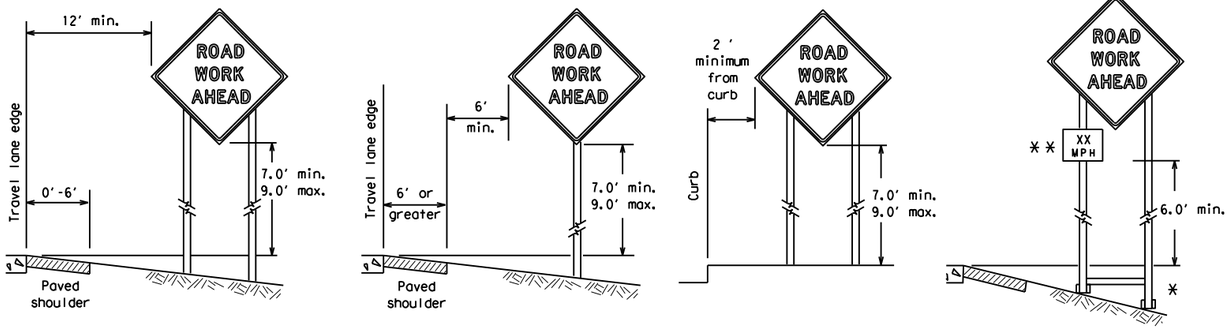
	DIST	COUNTY		SHEET NO.
	PHR	WILLACY		15

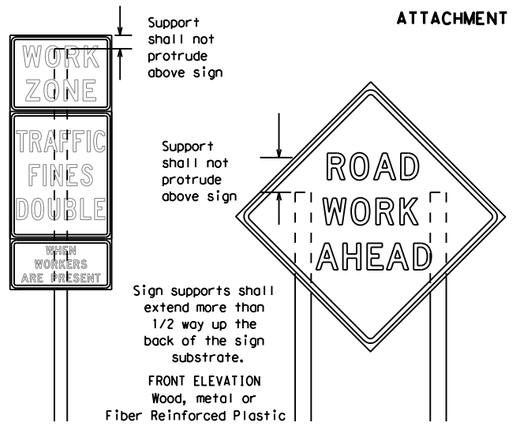
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

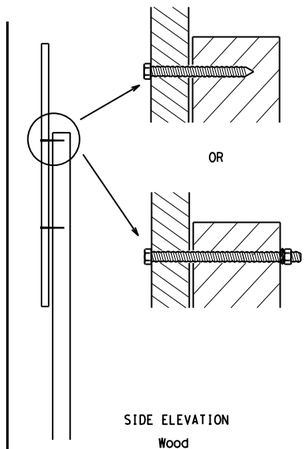


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





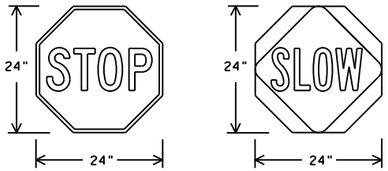
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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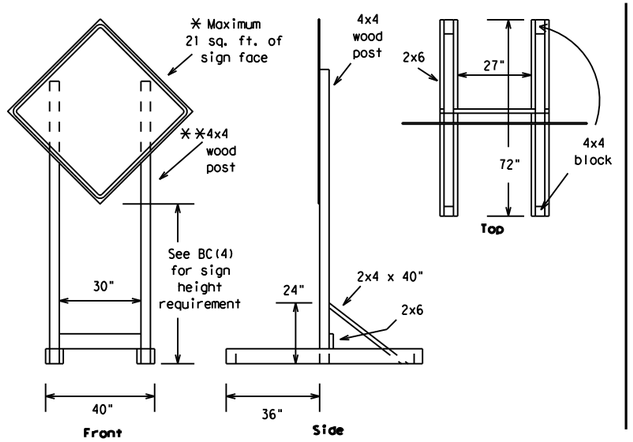
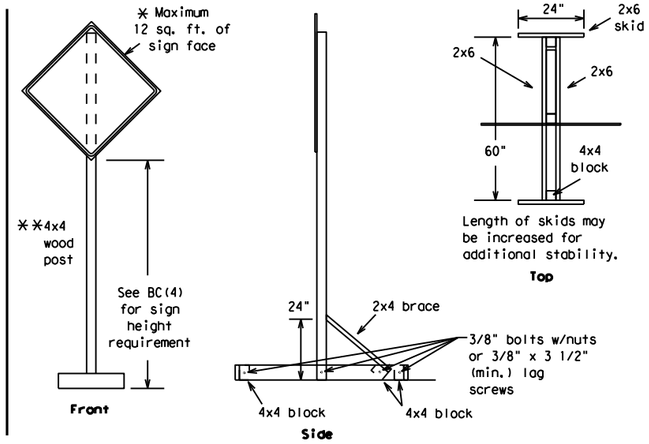
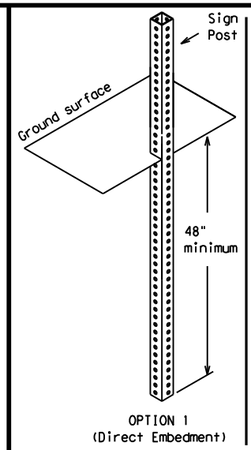
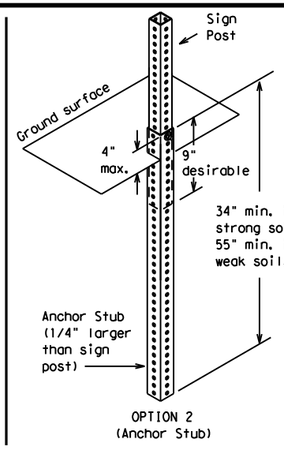


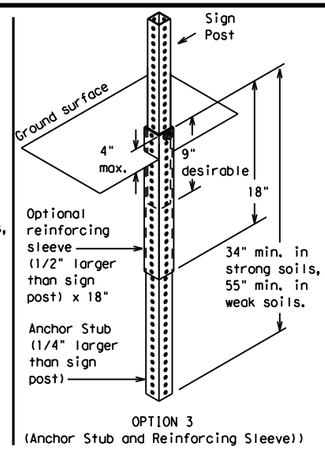


SKID MOUNTED WOOD SIGN SUPPORTS

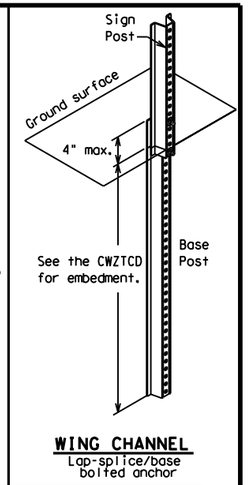
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS







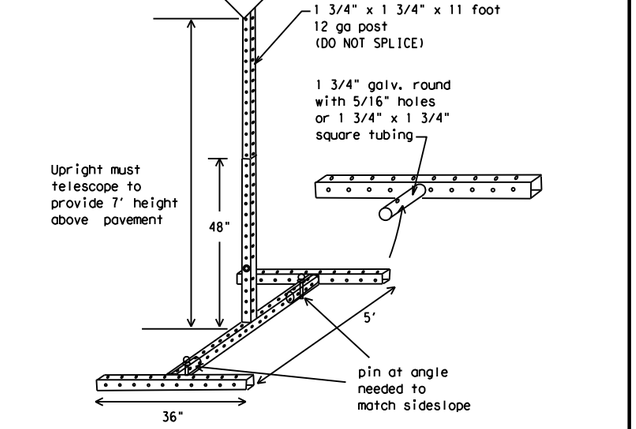
PERFORATED SQUARE METAL TUBING

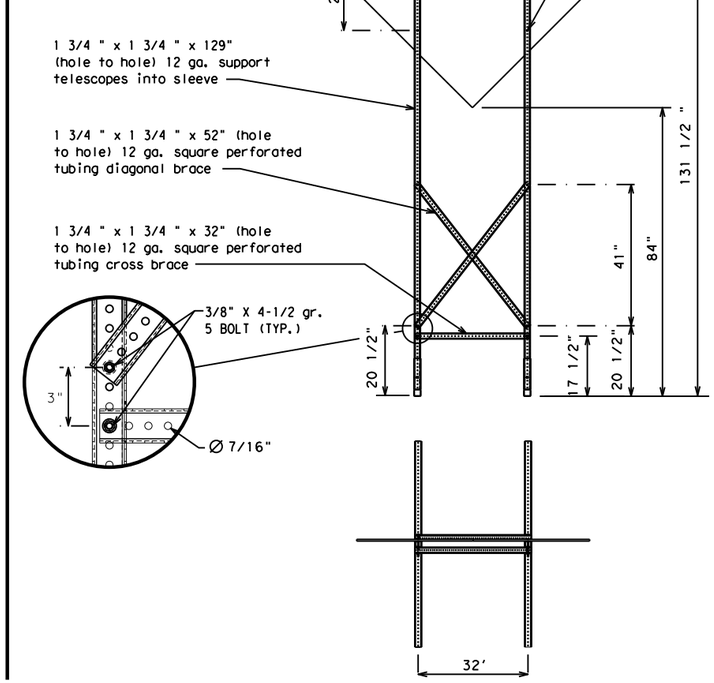


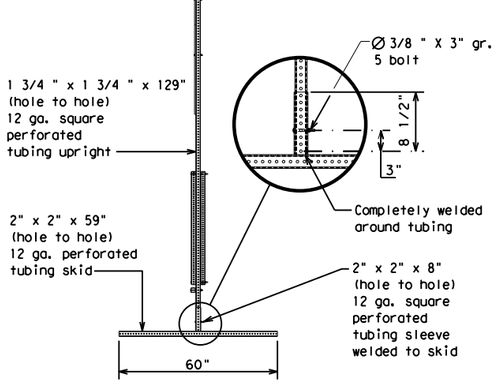
WING CHANNEL
Lap-splice/base bolted anchor

GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

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	1430	01	031, ETC	FM 490
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	PHR	WILLACY		17

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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

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

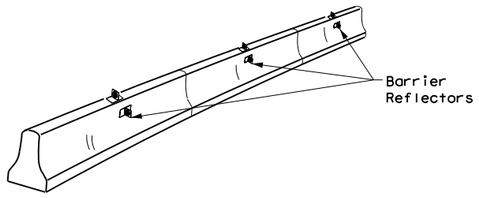
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

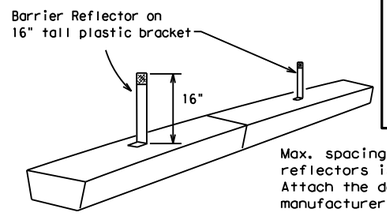
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1430	01	031, ETC	FM 490
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	PHR	WILLACY		18

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



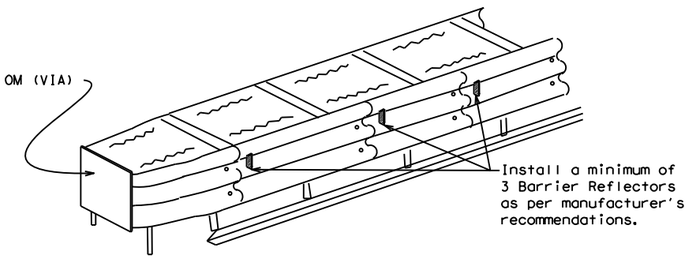
CONCRETE TRAFFIC BARRIER (CTB)

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



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

LOW PROFILE CONCRETE BARRIER (LPCB)



DELINEATION OF END TREATMENTS

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

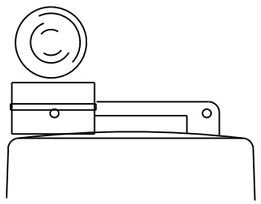
LPCB is approved for use in work zone locations, where the posted speed is 45mph, or less. See Roadway Standard Sheet LPCB.

END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS

WARNING LIGHTS

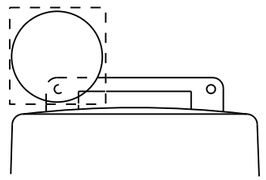


Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.

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.



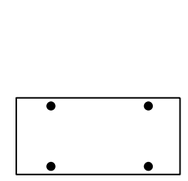
Warning reflector may be round or square. Must have a yellow reflective surface area of at least 30 square inches

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.

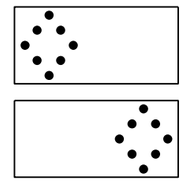
Arrow Boards may be located behind channelizing devices in place for a shoulder taper or merging taper, otherwise they shall be delineated with four (4) channelizing devices placed perpendicular to traffic on the upstream side of traffic.

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:

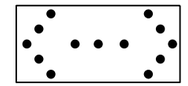


4 CORNER CAUTION

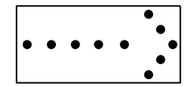
OR



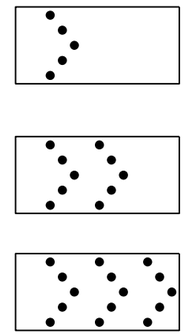
ALTERNATING DIAMOND CAUTION



DOUBLE ARROW



RIGHT/LEFT ARROW
(right arrow shown; left is similar)



RIGHT/LEFT SEQUENTIAL CHEVRON
(right chevron shown; left is similar)

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	1430	01	031, ETC	FM 490
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	PHR	WILLACY		19

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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:

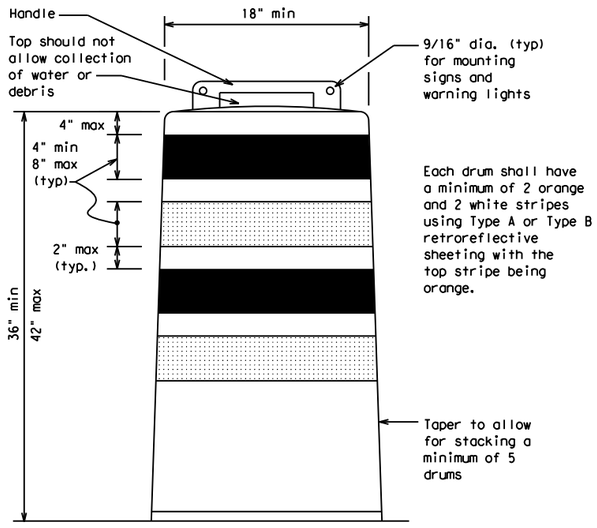
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

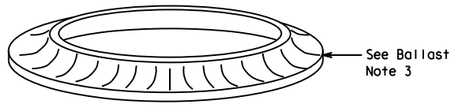
RETROREFLECTIVE SHEETING

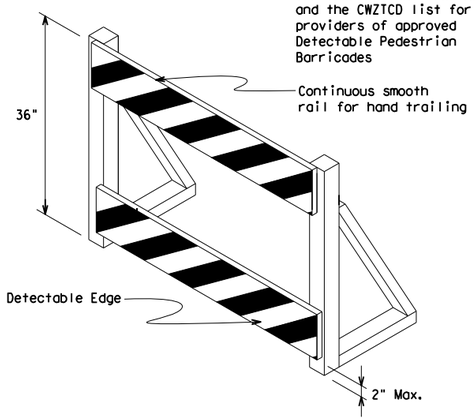
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

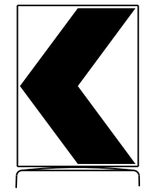




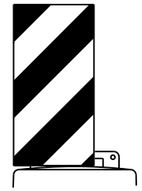


DETECTABLE PEDESTRIAN BARRICADES

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.

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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	1430	01	031, ETC	FM 490
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	PHR	WILLACY		20
7-13				

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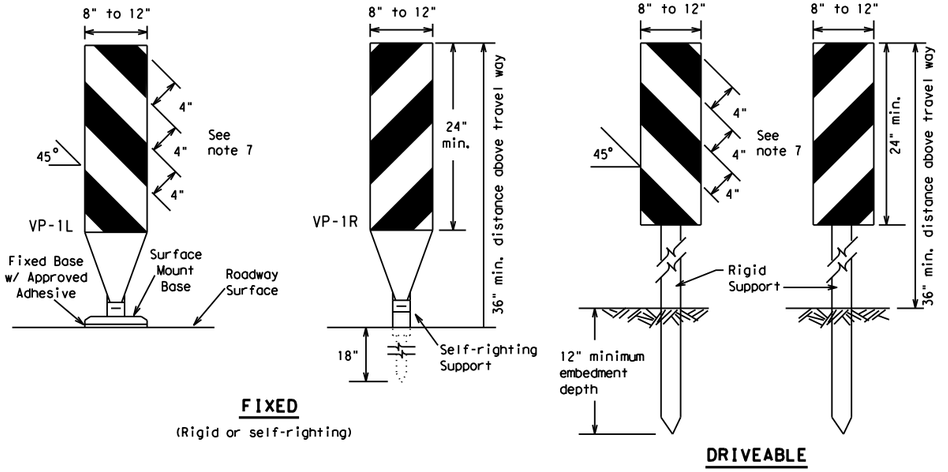
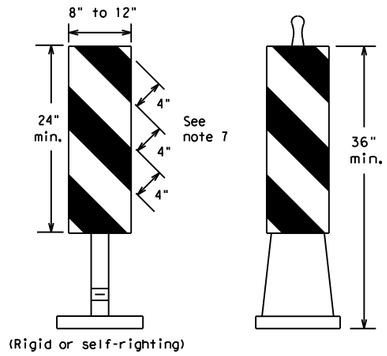


FIXED
(Rigid or self-righting)

DRIVEABLE

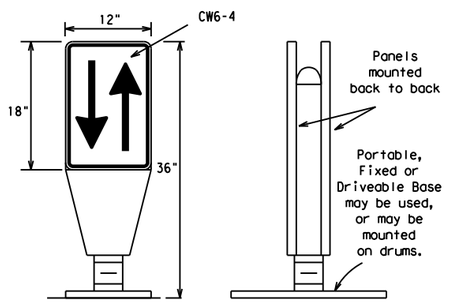


(Rigid or self-righting)

PORTABLE

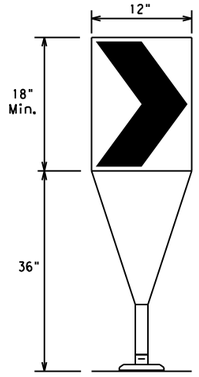
VERTICAL PANELS (VPs)

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



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)



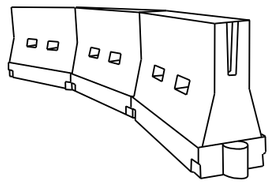
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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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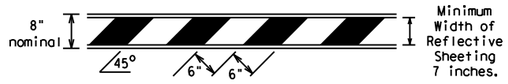
REVISIONS	1430	01	031, ETC	FM 490
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	PHR	WILLACY		21

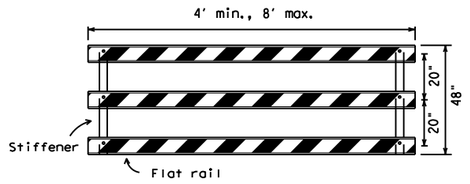
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



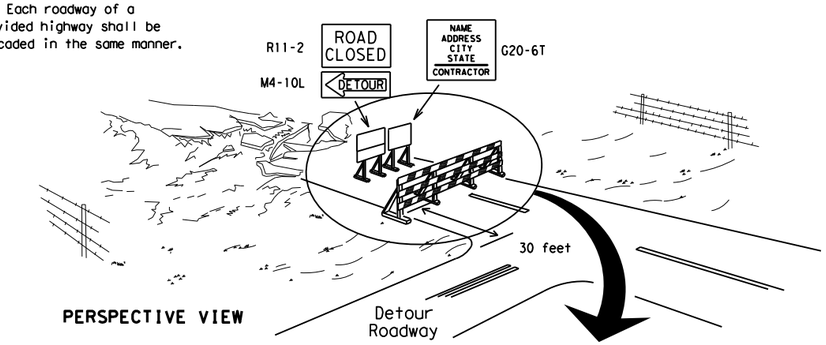
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

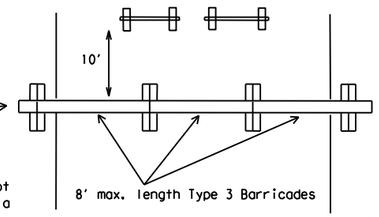
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

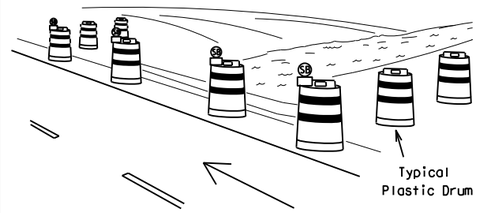
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

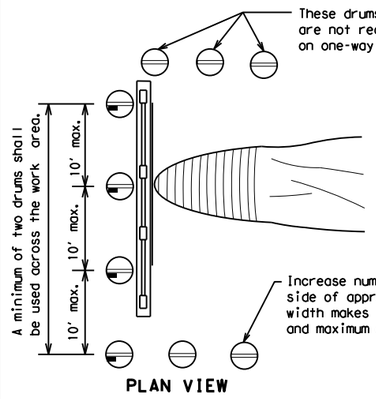
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

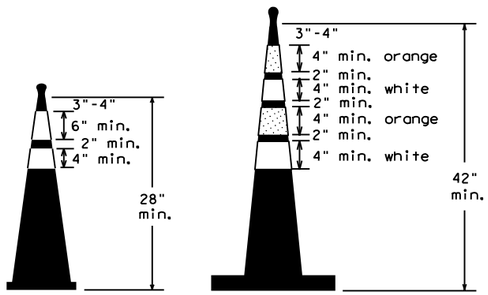
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



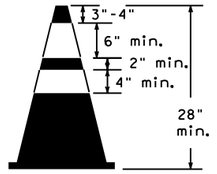
LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

PLAN VIEW

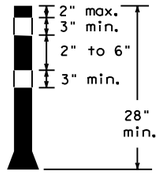
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

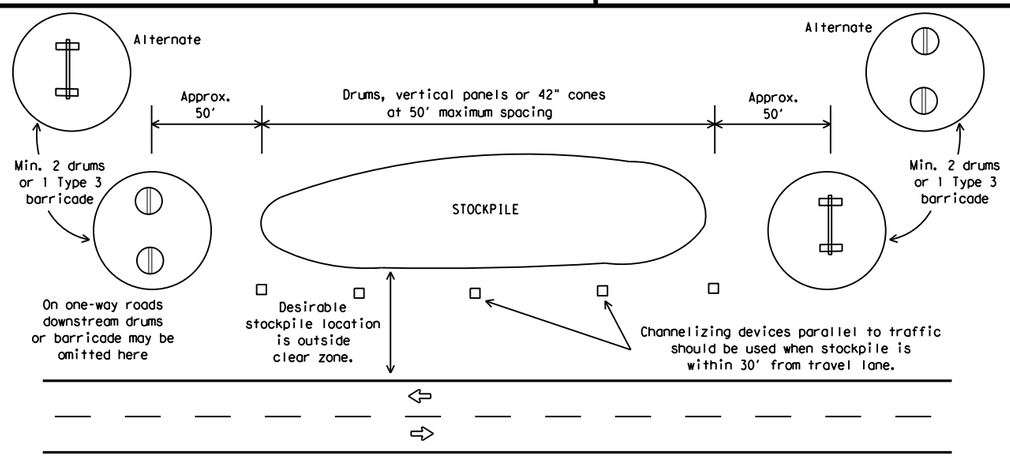


Tubular Marker

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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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	1430	01	031, ETC	FM 490
	DIST	COUNTY		SHEET NO.
	PHR	WILLACY		22

104

DATE: 4/25/2023 1:13:59 PM
FILE: c:\pw-of\pw-of-prod\tyler.martin@aguirre-fields.com\dms18267\bc-21.dgn

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.

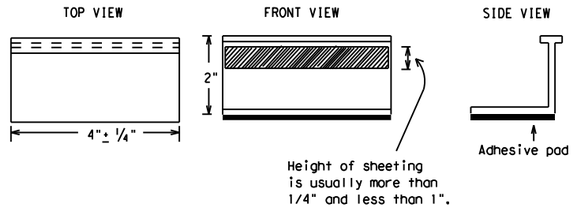
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

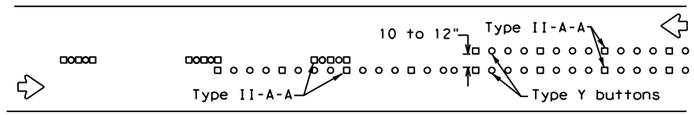
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	1430	01	031, ETC	FM 490
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	PHR	WILLACY		23
11-02 8-14				

105

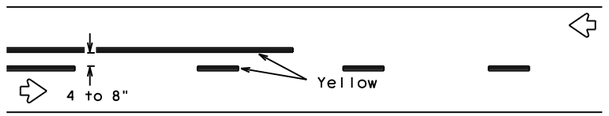
DATE: 4/25/2023 1:14:00 PM
FILE: c:\pw-af\pw-af-prod\tyler.martin@aguirre-fields.com\dms18267\bc-21.dgn

PAVEMENT MARKING PATTERNS

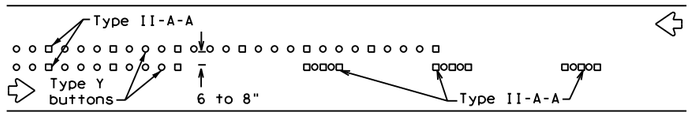
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



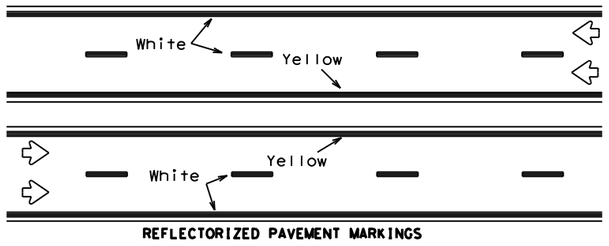
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



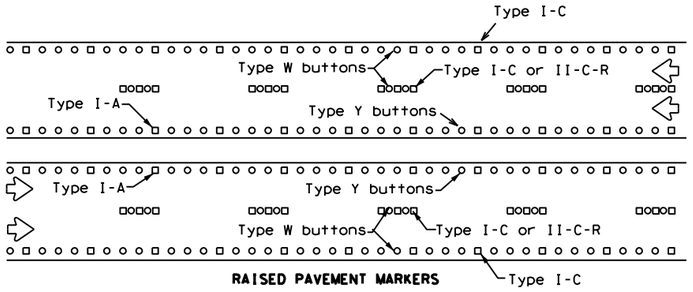
RAISED PAVEMENT MARKERS - PATTERN B

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

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



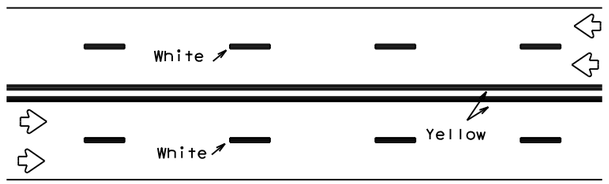
REFLECTORIZED PAVEMENT MARKINGS



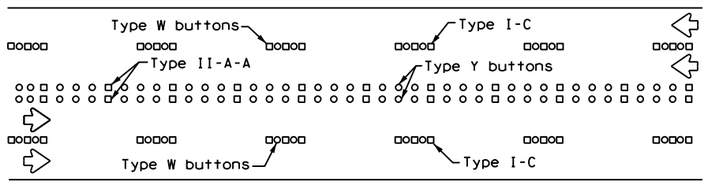
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



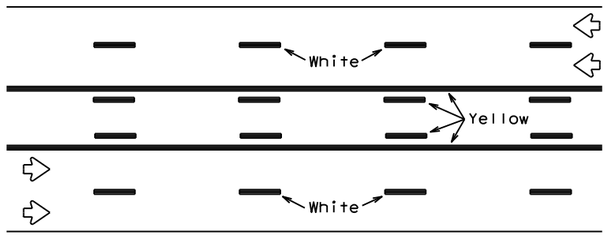
REFLECTORIZED PAVEMENT MARKINGS



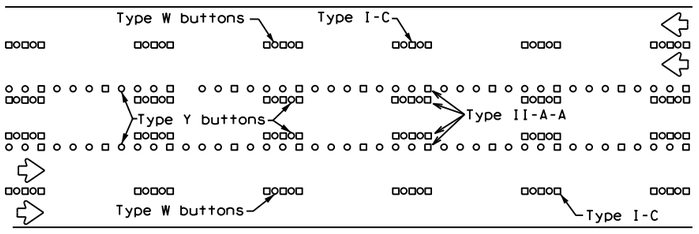
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

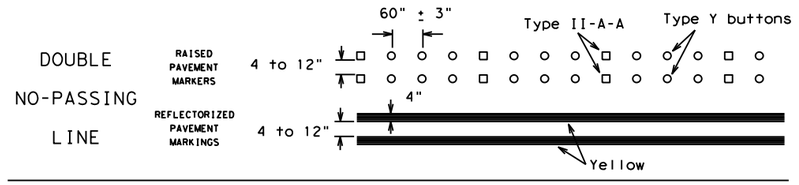
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

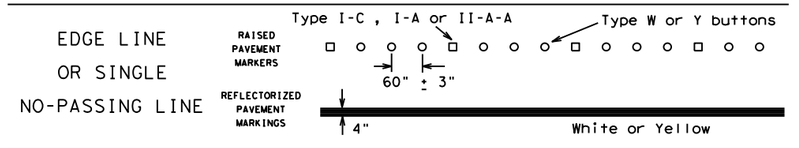
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

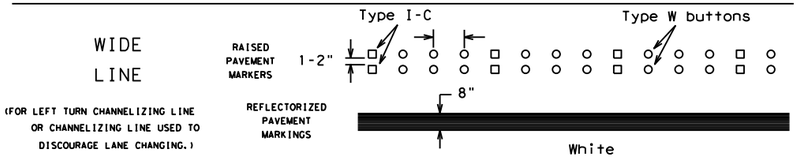


EDGE LINE OR SINGLE NO-PASSING LINE



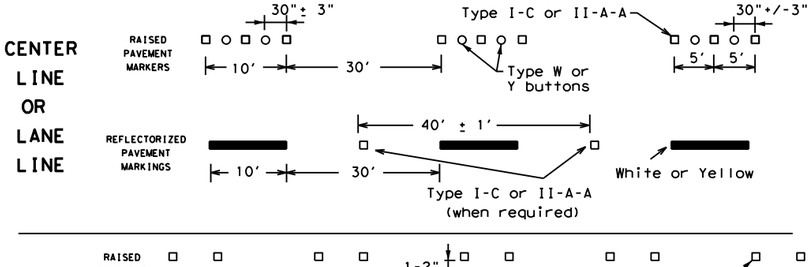
WIDE LINE

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

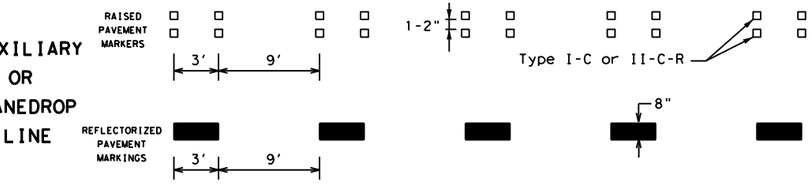


BROKEN LINES

CENTER LINE OR LANE LINE

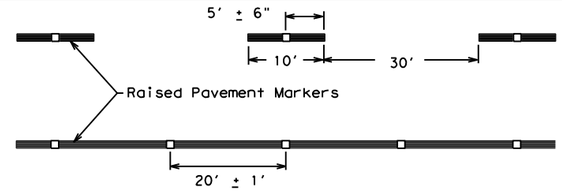


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

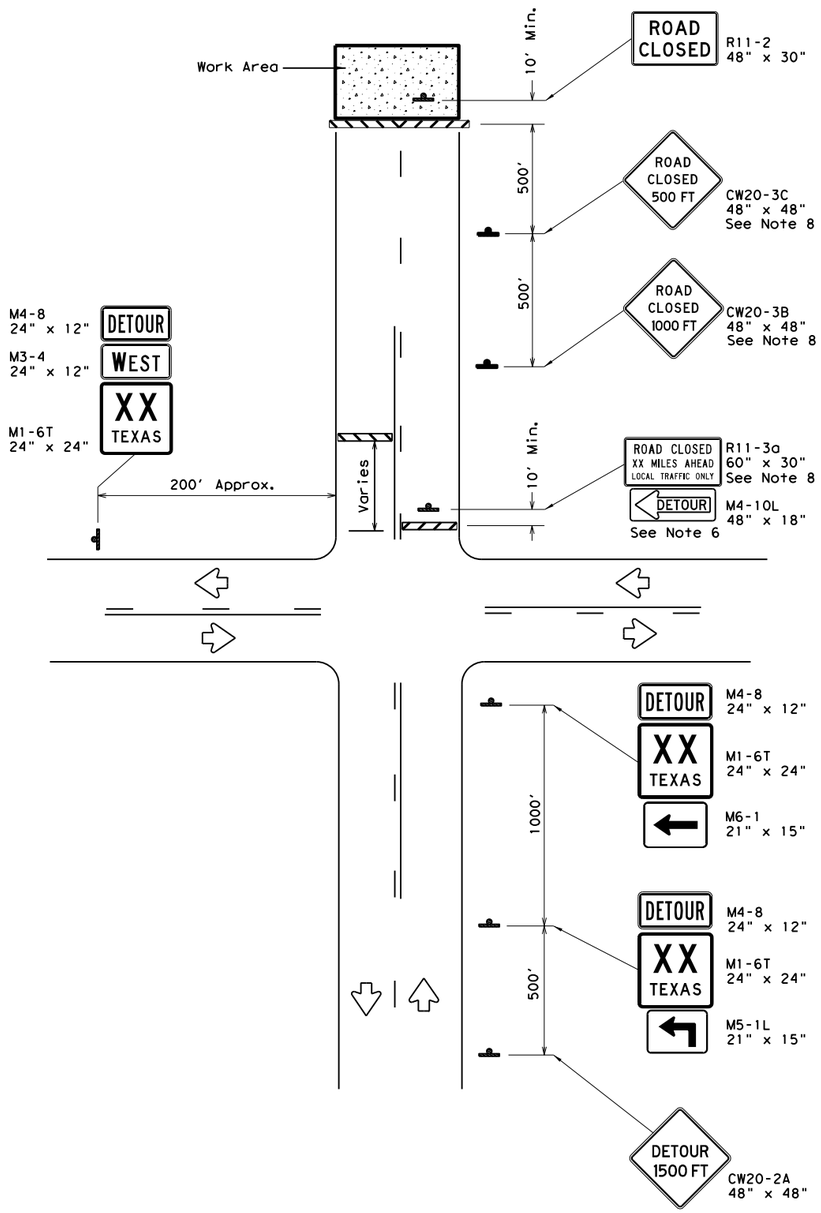
Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

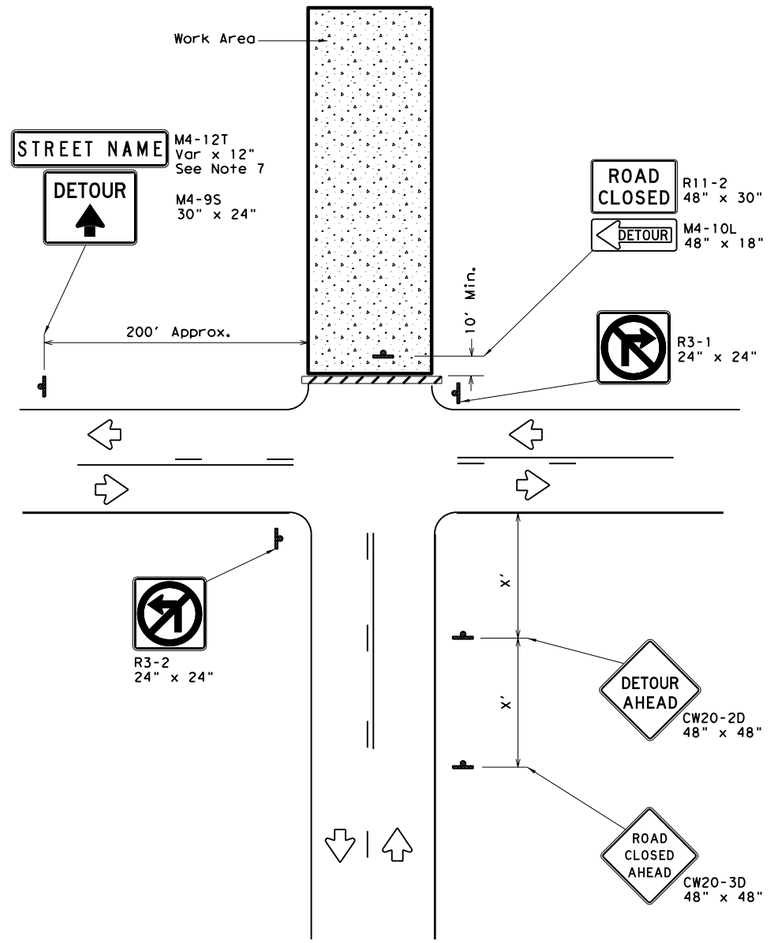
BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	1430	01	031, ETC	FM 490
1-97 9-07 5-21	DIST	COUNTY		SHEET NO.
2-98 7-13	PHR	WILLACY		24
11-02 8-14				



ROAD CLOSURE BEYOND THE INTERSECTION

Signing for a Numbered Route with an Off-Site Detour



ROAD CLOSURE AT THE INTERSECTION

Signing for an Un-numbered Route with an Off-Site Detour

LEGEND	
	Type 3 Barricade
	Sign

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

* Conventional Roads Only

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE ROAD CLOSURE DETAILS

WZ(RCD)-13

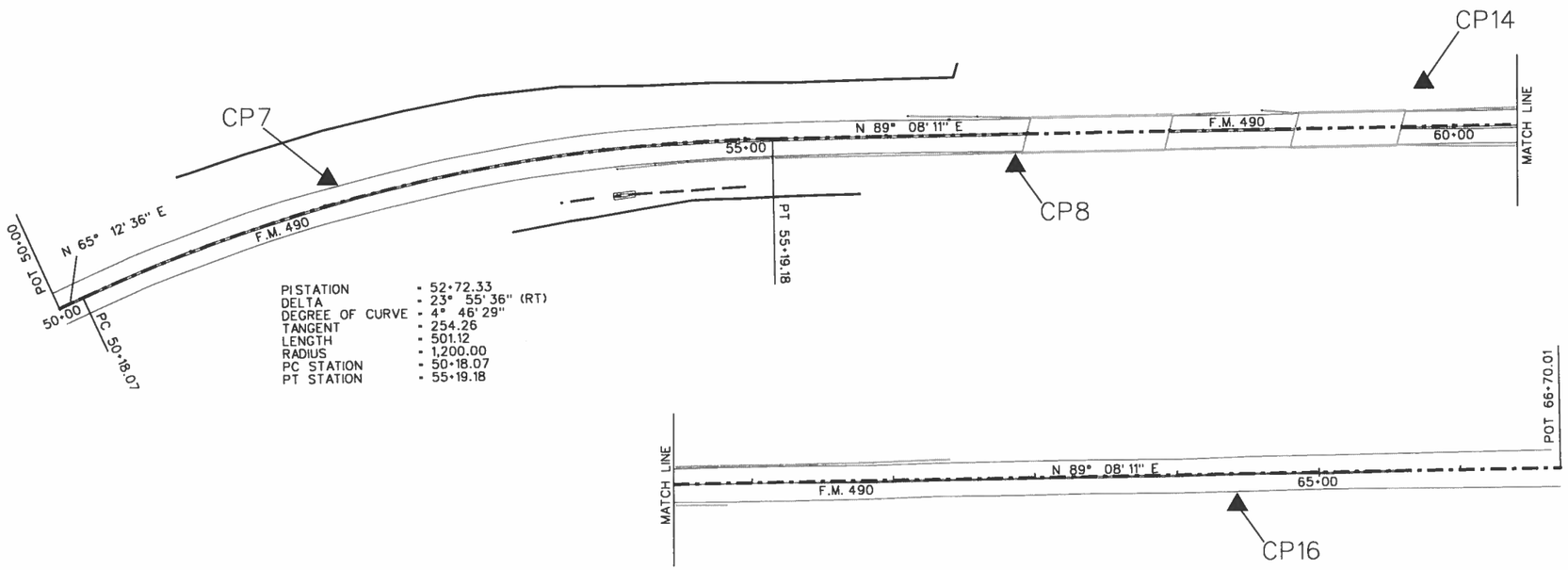
FILE: wzrcd-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	1430	01	031, ETC	FM 490
1-97 4-98 7-13	DIST	COUNTY		SHEET NO.
2-98 3-03	PHR	WILLACY		25

DATE: 4/25/2023
FILE: ...\STANDARDS\WZ(RCD)-13

GRAPHIC SCALE

0' 50' 100' 200'

1" = 100'



POINT	NORTHING	EASTING	ELEVATION	STATION	ALIGN	OFFSET	RT/LT	DESCRIPTION
CP7	16,690,555.18	1,179,033.82	46.66	52+06.49	FM 490	18.12'	RT.	5/8" CIRS Stamped "TNP RANDOM" set approximately 3150 feet east of the intersection of FM 490 & FM 1015, being approximately 6.7 feet north of the edge of pavement, being 27.5 feet south of a a 4' hog wire fence.
CP8	16,690,562.98	1,179,519.03	44.32	56+90.62	FM 490	22.33'	RT.	5/8" CIRS Stamped "TNP RANDOM" set approximately 3620 feet east of the centerline of the intersection of F.M. 490 & F.M. 1015, being 10 feet south of the south edge of pavement of F.M. 490, being 27 feet northeast of a 18" RCP and being 10.1 feet southwest of the southwest bridge corner.
CP14	16,690,620.94	1,179,807.13	47.27	59+79.57	FM 490	31.28'	LT.	5/8" CIRS Stamped "TNP RANDOM" set approximately 3900 feet east of the intersection of F.M. 490 & F.M. 1015, being 20.5 feet north of the north edge of pavement of F.M. 490 and being 20.3 feet northeast of the northeast corner of bridge.
CP16	16,690,574.76	1,180,270.02	39.81	64+41.71	FM 490	21.87'	RT.	5/8" CIRS Stamped "TNP RANDOM" set approximately 4365 feet east of the intersection of F.M. 490 & F.M. 1015, being 9.5 feet south of the south edge of pavement of F.M. 490 and being 414 feet east of a 72 inch RCP on the south side of F.M. 490.

▲ 5/8" IRON ROD WITH CAP STAMPED "TNP RANDOM"

DRAWING DATE: 02/07/2020

STATE OF TEXAS REGISTERED MARVIN KING 5581 PROFESSIONAL LAND SURVEYOR

08/25/2020

MARVIN KING, DATE
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 5581

NOTES:

1. BEARINGS OF LINES SHOWN HEREON REFER TO GRID NORTH OF THE TEXAS COORDINATE SYSTEM OF 1983 (SOUTH ZONE 4205; NAD83(2011) EPOCH 2010) AS DERIVED LOCALLY FROM TXDOT'S CONTINUOUSLY OPERATING REFERENCE STATIONS (CORS) VIA REAL TIME KINEMATIC (RTK) METHODS. AN AVERAGE COMBINATION FACTOR OF 1.00004 WAS USED TO SCALE GRID COORDINATES AND DISTANCES TO SURFACE. ALL COORDINATES SHOWN ARE SURFACE.

2. THE ELEVATIONS SHOWN ARE NAVD88 AND WERE DERIVED FROM THE ABOVE RTK OBSERVATIONS. ORTHOMETRIC HEIGHTS WERE CALCULATED BY APPLYING THE GEOID12B MODEL TO THE ELLIPSOID HEIGHTS.

3. FIELD SURVEYS WERE CONDUCTED BY TEAGUE NALL & PERKINS, INC., DECEMBER 2019

Texas Department of Transportation

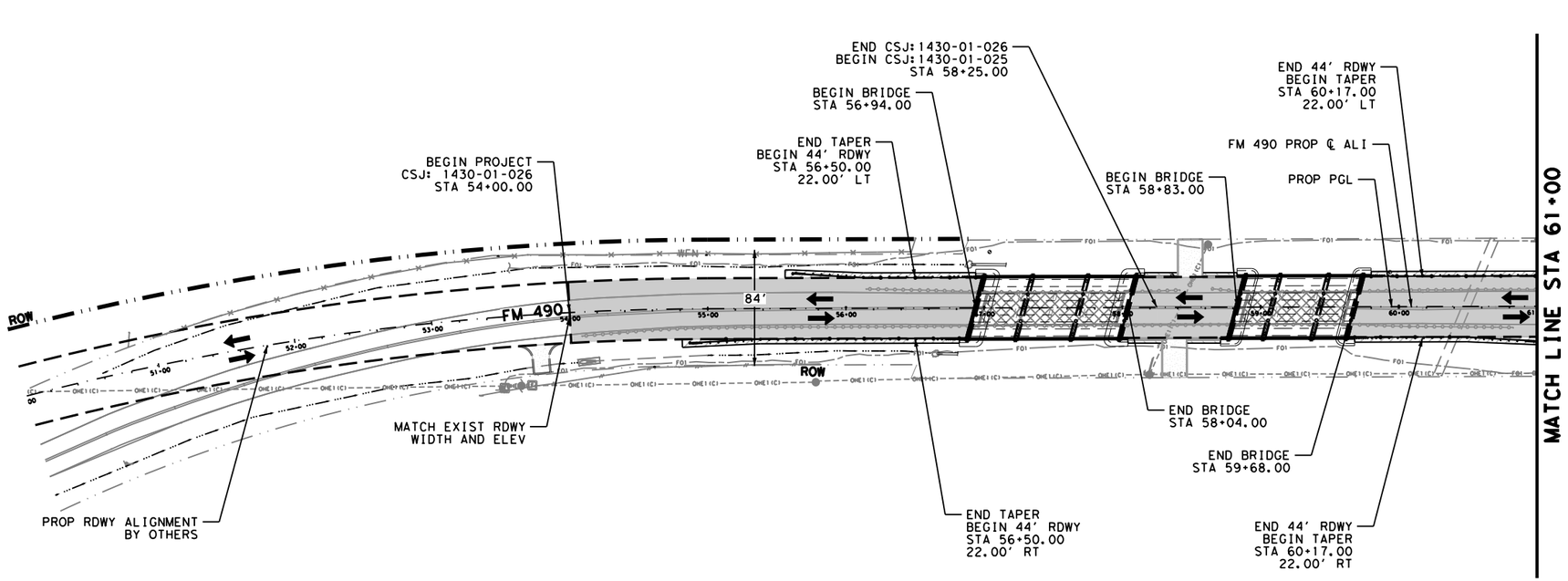
TBPELS FIRM No. 10016-00

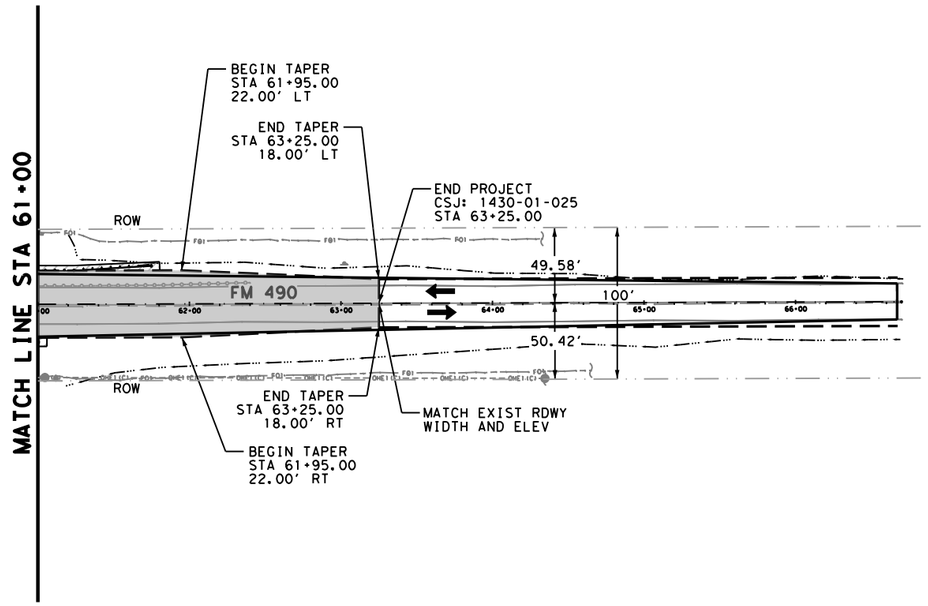
tnp teague nall & perkins

FM 490
HORIZONTAL & VERTICAL SURVEY CONTROL

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 490
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	WILLACY	26
CONTROL	SECTION	JOB	
1430	01	031, ETC.	





FM 490 ROADWAY ℄ ALIGNMENT

FM01 CUR FM490CL1 CUR FM490CL2 FM02

Beginning chain FM490CL description

Point FM01 N 16,690,131.1169 E 1,176,235.0923 Sta 22+90.00

Course from FM01 to PC FM490CL1 S 81° 00′ 36.00" E Dist 717.0000

Curve Data

Curve FM490CL2					
P.I. Station		50+33.61	N 16,690,575.1248	E	1,178,843.4110
Delta	= 27° 14′ 52.05"	(RT)			
Degree	= 2° 51′ 53.24"				
Tangent	= 484.7340				
Length	= 951.1274				
Radius	= 2,000.0000				
External	= 57.9036				
Long Chord	= 942.1899				
Mid. Ord.	= 56.2743				
P.C. Station		45+48.87	N 16,690,346.7251	E	1,178,415.8591
P.T. Station		55+00.00	N 16,690,582.4298	E	1,179,328.0899
C.C.			N 16,688,582.6569	E	1,179,358.2303
Back	= N 61° 53′ 19.39" E				
Ahead	= N 89° 08′ 11.44" E				
Chord Bear	= N 75° 30′ 45.41" E				

Course from PT FM490CL2 to FM02 N 89° 08′ 11.44" E Dist 1,170.0064

Point FM02 N 16,690,600.0620 E 1,180,497.9635 Sta 66+70.01

LEGEND

- TRAFFIC FLOW
- EXIST FENCE
- ROW
- EXIST BRIDGE
- PROP PVMT
- PROP EDGE OF PVMT
- PROP MOW STRIP
- PROP DRAIN DITCH

0 50′ 100′
SCALE: 1"=100′

HL93 LOADING

STATE OF TEXAS
CRAIG HUTSON
91845
LICENSED
PROFESSIONAL ENGINEER
Craig Hutson
4/25/2023

NO.	DATE	REVISION	APPROVED

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739
5320 N. TARRANT PKWY,
SUITE 260
FORT WORTH, TX, 76244
ENGINEERING FIRM F-739

Texas Department of Transportation

FM 490
PROJECT LAYOUT AND HORIZONTAL ALIGNMENT DATA

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
CAH	6	SEE TITLE SHEET	FM 490
DRAWN KCW	STATE	DISTRICT	COUNTY
CHECK CAH	TEXAS	PHR	WILLACY
CHECK EJL	CONTROL	SECTION	JOB
	1430	01	031, ETC

SHEET NO. 27

DATE: 4/25/2023
TIME: 14:05 PM
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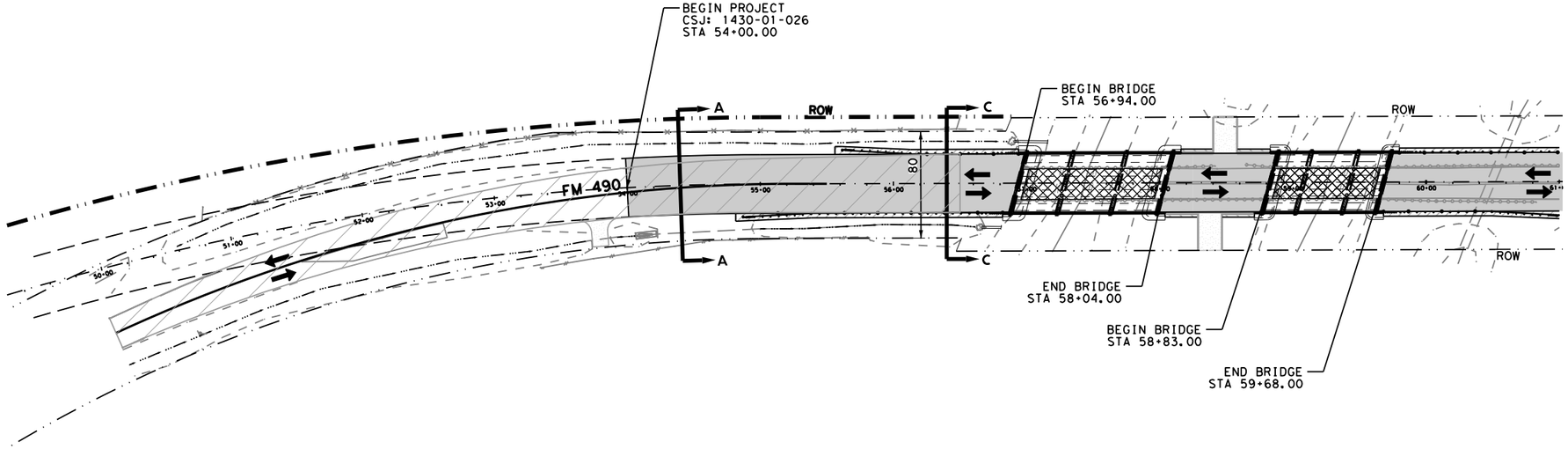


LEGEND

- TRAFFIC FLOW
- ROW
- PROP RDWY PVMT
- PROP MOW STRIP
- PROP RDWY SUPER
- EXIST BRIDGE

N

0 50' 100'

SCALE: 1"=100'

HL93 LOADING

E + F = V2/15R (US CUSTOMARY)

WHERE:

E = SUPERELEVATION RATE, IN DECIMAL FORMAT
F = SIDE FRICTION FACTOR
V = VEHICLE SPEED, MPH
R = CURVE RADIUS, FEET

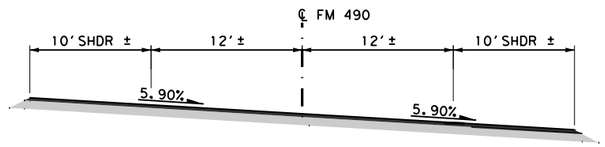
SUPERELEVATION: WB LN

STATION	WIDTH	DROP/RISE	CROSS SLOPE	ROC%
54+00.00	24	1.44	5.90%	
56+40.00	24	-0.48	-2.00%	-0.012

SUPERELEVATION: EB LN

STATION	WIDTH	DROP/RISE	CROSS SLOPE	ROC%
54+00.00	24	-1.44	-5.90%	-0.018
56+40.00	24	-0.48	-2.00%	0.012

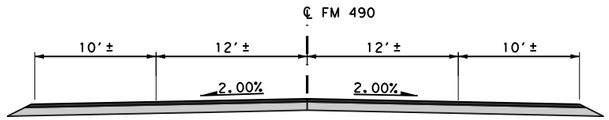
SECTION A-A



NOTES

PROPOSED SUPER ELEVATION AT
STA 54+40 PRIOR TO PROPOSED BRIDGE.

SECTION C-C



NOTES

END PROJECT PROPOSED SUPER ELEVATION AT
STA 56+40.00 PRIOR TO PROPOSED BRIDGE.

STATE OF TEXAS
CRAIG HUTSON
91845
LICENSED
PROFESSIONAL ENGINEER

Craig Hutson 4/25/2023

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AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739
5320 N. TARRANT PKWY,
SUITE 260
FORT WORTH, TX, 76244
ENGINEERING FIRM F-739

FM 490
ROADWAY SUPER ELEVATION LAYOUT & DATA

DESIGN CAH	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
DRAWN KCW	6	SEE TITLE SHEET		FM 490
CHECK CAH	STATE	DISTRICT	COUNTY	SHEET NO.
	TEXAS	PHR	WILLACY	28
CHECK EJL	CONTROL	SECTION	JOB	
	1430	01	031, ETC	

DATE: 4/25/2023
TIME: 11:40:07 PM
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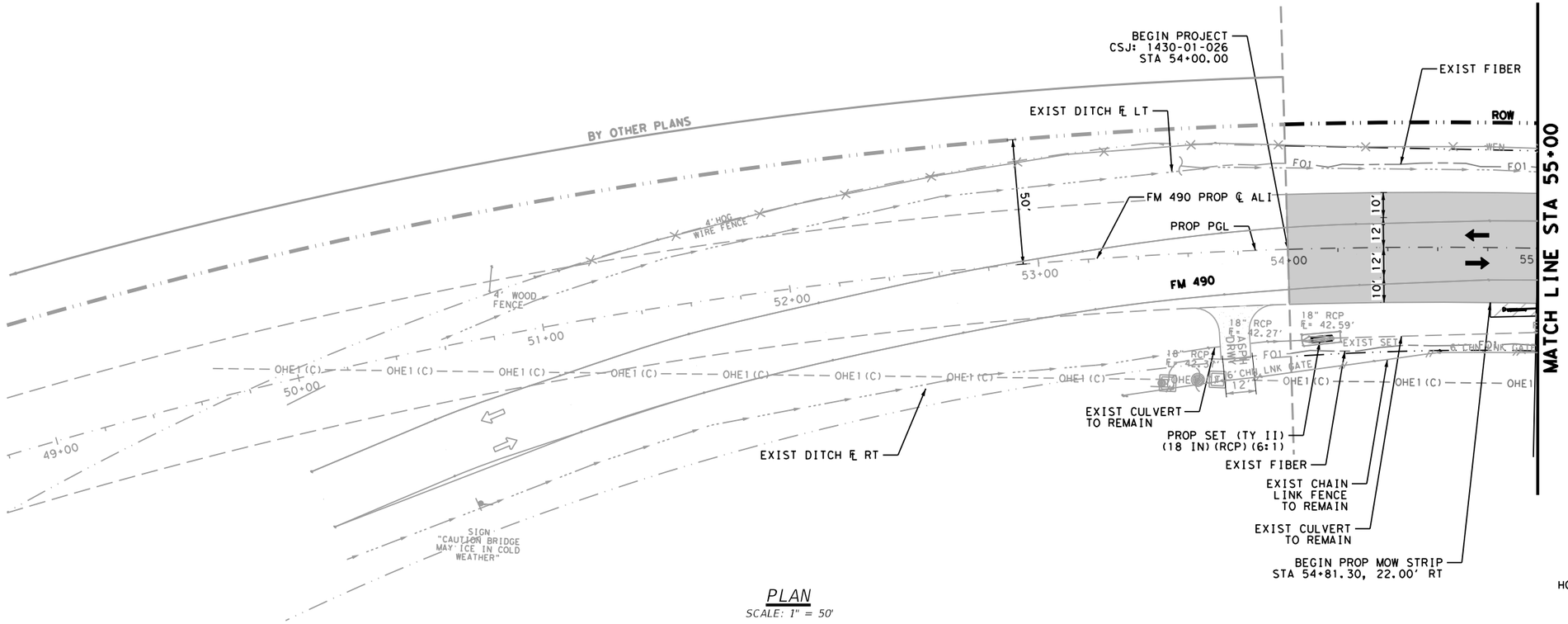
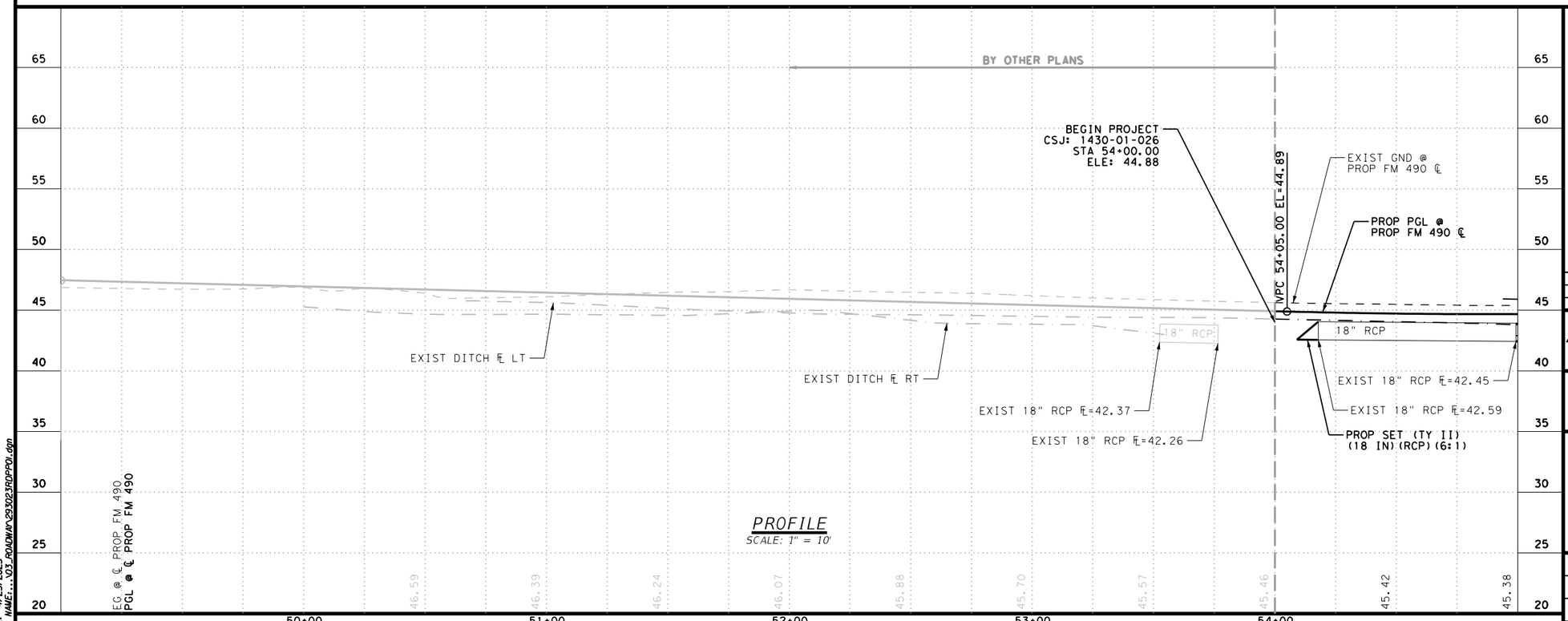


PLAN
SCALE: 1" = 50'



PROFILE
SCALE: 1" = 10'

DATE: 4/25/2023
FILE NAME: ...V03_ROADWAY\29302_3RDPP01.dgn

STATE OF TEXAS
CRAIG HUTSON
91845
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Craig Hutson
4/25/2023

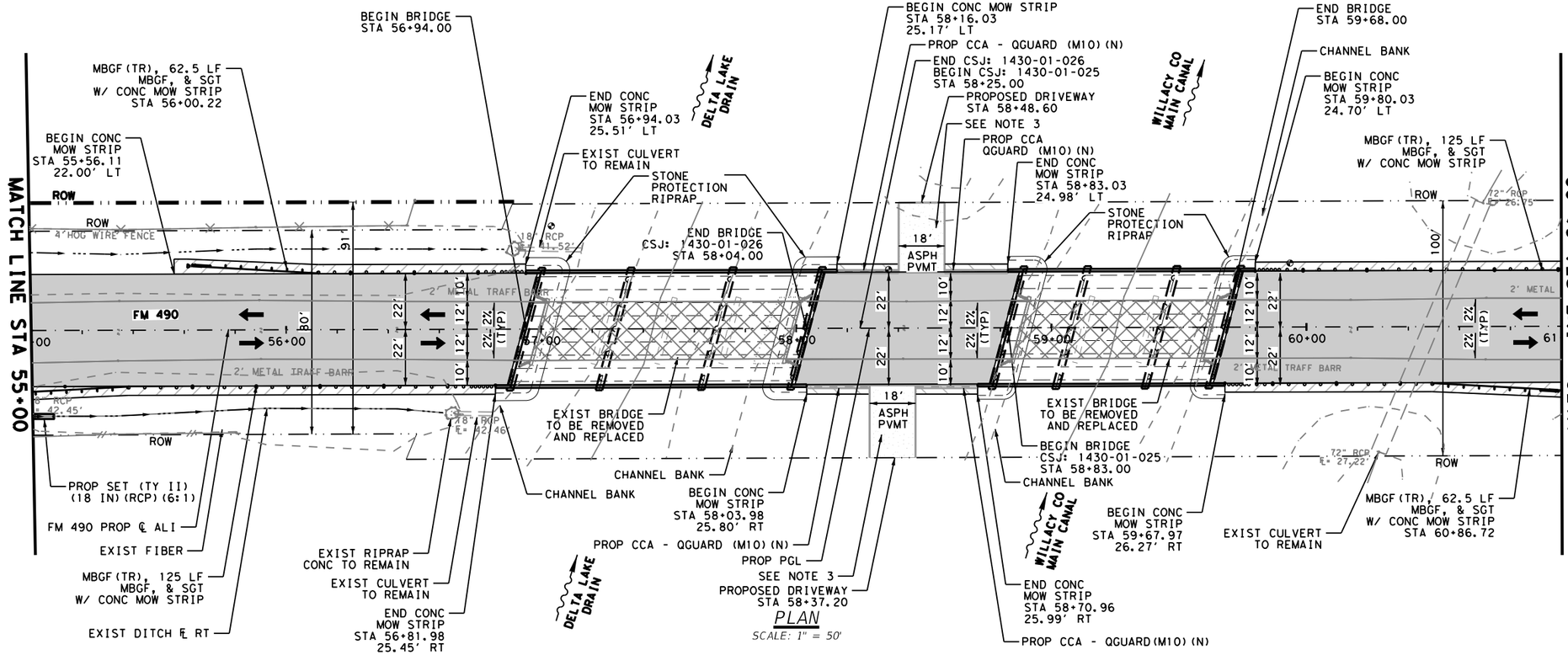
NO.	DATE	REVISION	APPROVED

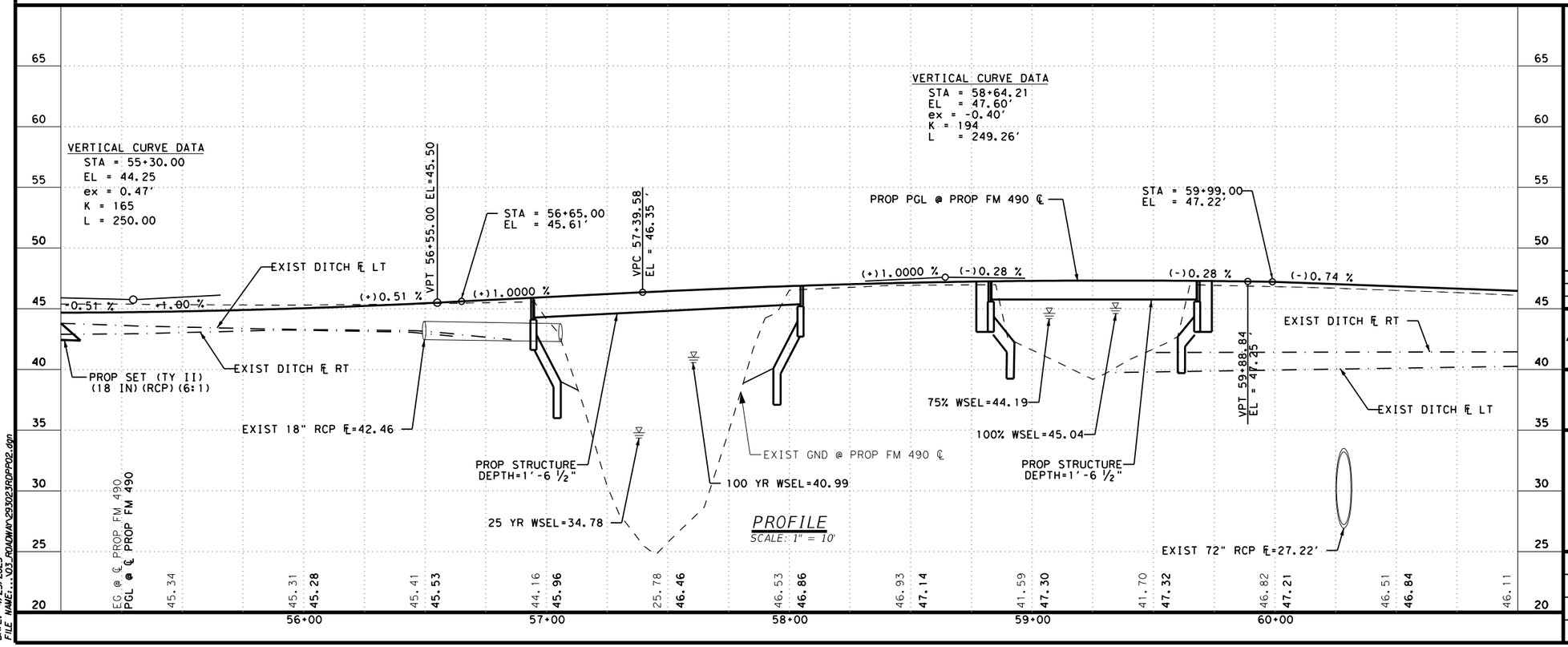
AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739
5320 N. TARRANT PKWY,
SUITE 260
FORT WORTH, TX, 76244
ENGINEERING FIRM F-739

FM 490
ROADWAY
PLAN AND PROFILE
BEGIN PROJECT - STA 55+00.00

SHEET 1 OF 3

DESIGN CAH	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
DRAWN KCW	6	SEE TITLE SHEET	FM 490
CHECK CAH	STATE	DISTRICT	COUNTY	SHEET NO.
	TEXAS	PHR	WILLACY	29
CHECK EJL	CONTROL	SECTION	JOB	
	1430	01	031, ETC	





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FILE NAME: ..\03_ROADWAY\29302_3RDPP02.dgn

NO.	DATE	REVISION	APPROVED

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739
5320 N. TARRANT PKWY, SUITE 260
FORT WORTH, TX, 76244
ENGINEERING FIRM F-739

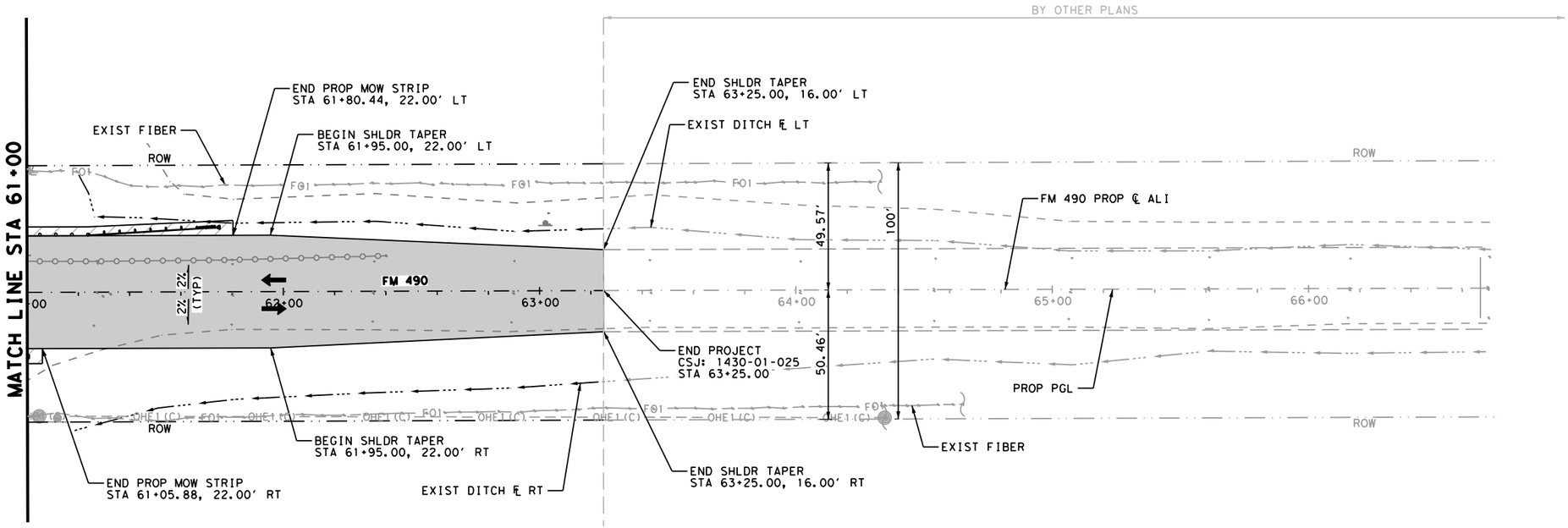
Texas Department of Transportation

FM 490
ROADWAY
PLAN AND PROFILE
STA 55+00.00 - STA 61+00.00

SHEET 2 OF 3

DESIGN CAH	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
DRAWN KCW	6	SEE TITLE SHEET	FM 490
CHECK CAH	STATE	DISTRICT	COUNTY
CHECK EJL	TEXAS	PHR	WILLACY
	CONTROL	SECTION	JOB
	1430	01	031, ETC

SHEET NO. 30



PLAN
SCALE: 1" = 50'

LEGEND

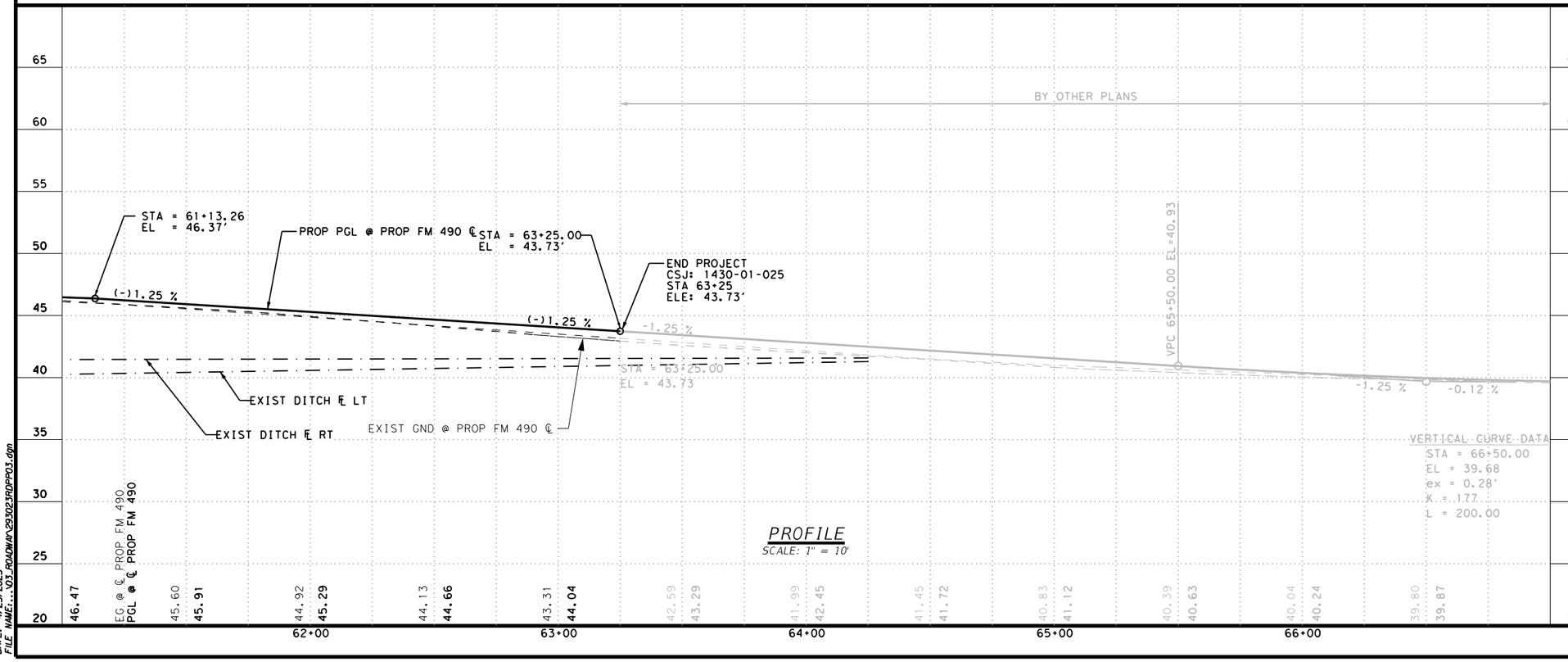
- EXIST TRAFFIC FLOW
- PROP TRAFFIC FLOW
- DRAINAGE FLOW
- EXIST DITCH ℄
- EXIST FENCE
- ROW
- ROW
- PROP PVMT
- PROP MOW STRIP

NOTES

1. REFER TO SIGNING AND PAVEMENT MARKING SHEETS FOR MORE DETAILED INFORMATION.
2. CONTRACTOR TO CREATE AND MAINTAIN EXISTING/POSITIVE DRAINAGE FLOWLINES AND CONDITIONS UNLESS NOTED OTHERWISE.
3. ASPHALT DRIVEWAY CONSISTS OF 1" ACP W/ 4" FLEX BASE. SEE TXDOT PHARR DISTRICT STANDARD DRIVEWAY PROFILE DETAILS, DRIVEWAY DETAILS PRIVATE (RESID-COMM.), DRIVEWAY DETAILS PUBLIC (COUNTY ROAD) FOR MORE INFO.

0 25 50
HORIZ SCALE IN FT

0 5 10
VERT SCALE IN FT



PROFILE
SCALE: 1" = 10'

DATE: 4/25/2023
FILE NAME: ...\03_ROADWAY\29302_3RDPP03.dgn

STATE OF TEXAS
CRAIG HUTSON
91845
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PROFESSIONAL ENGINEER
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AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739
5320 N. TARRANT PKWY,
SUITE 260
FORT WORTH, TX, 76244
ENGINEERING FIRM F-739

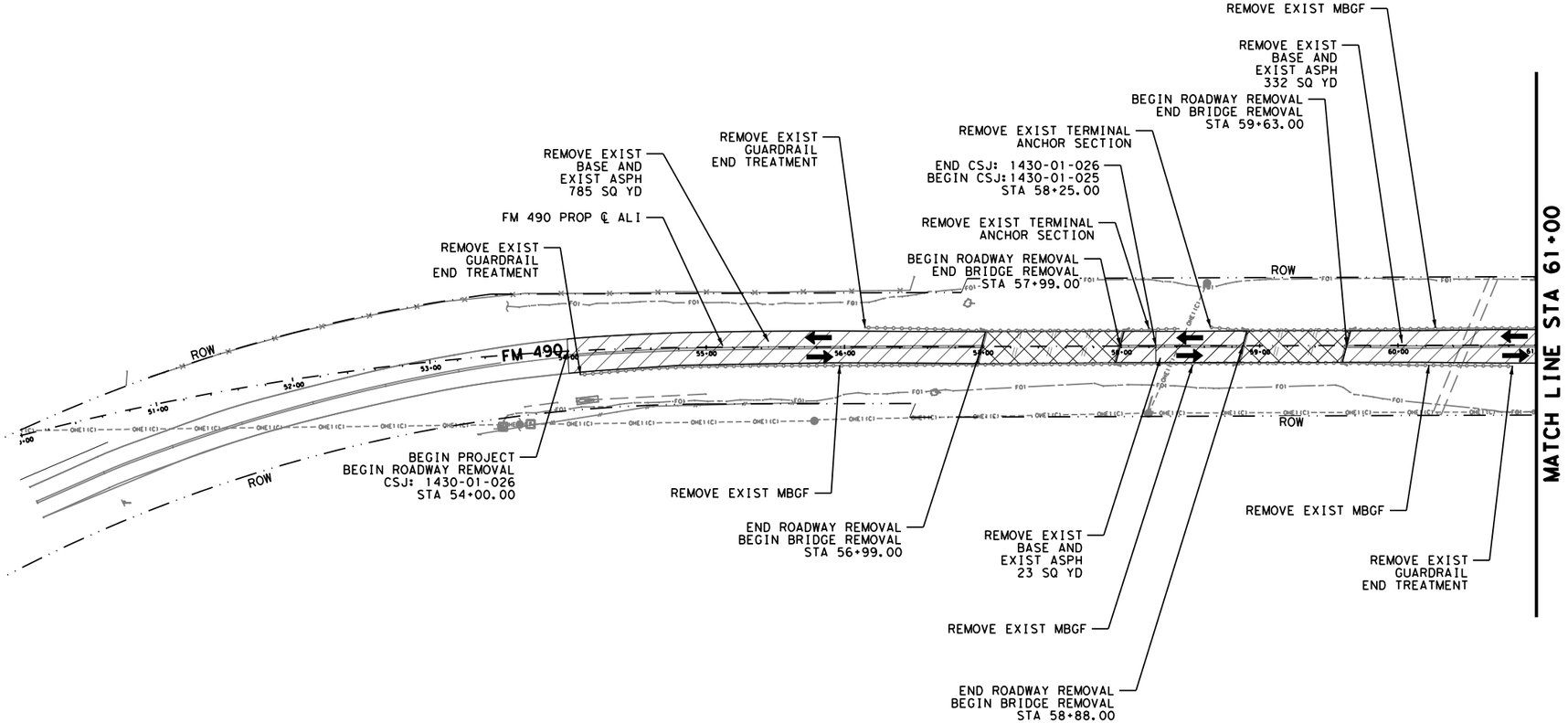
Texas Department of Transportation

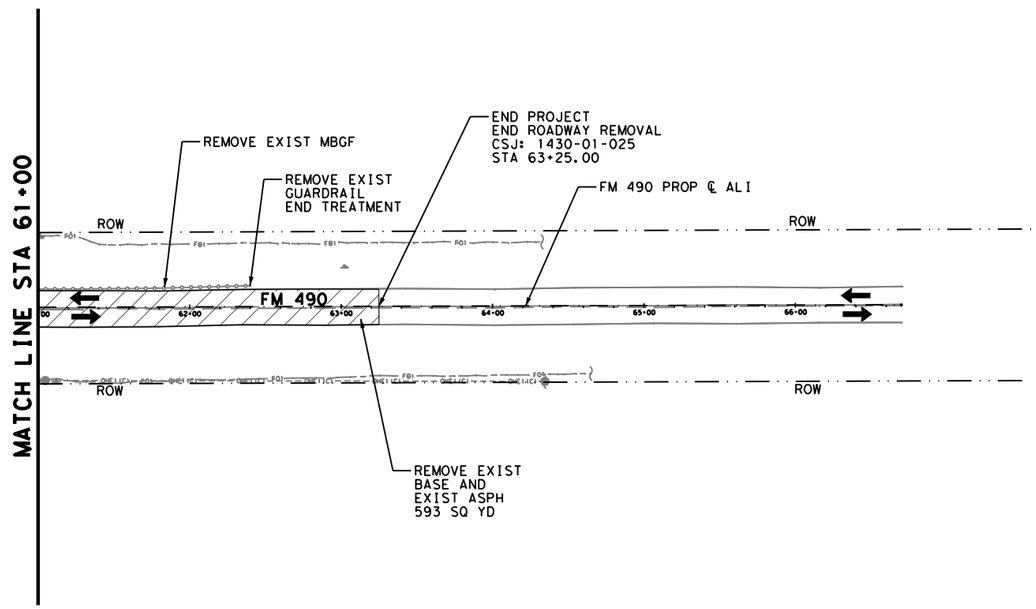
FM 490
ROADWAY
PLAN AND PROFILE
STA 61+00.00 - END OF PROJECT

SHEET 3 OF 3

DESIGN CAH	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
DRAWN KCW	6	SEE TITLE SHEET	FM 490
CHECK CAH	STATE	DISTRICT	COUNTY
CHECK EJL	TEXAS	PHR	WILLACY
	CONTROL	SECTION	JOB
	1430	01	031, ETC

SHEET NO. 31





STATE OF TEXAS
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NO.	DATE	REVISION	APPROVED

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739
5320 N. TARRANT PKWY, SUITE 260
FORT WORTH, TX, 76244
ENGINEERING FIRM F-739

FM 490
REMOVAL PLAN

DESIGN CAH	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
DRAWN KCW	6	SEE TITLE SHEET		FM 490
CHECK CAH	STATE	DISTRICT	COUNTY	SHEET NO.
	TEXAS	PHR	WILLACY	32
CHECK EJL	CONTROL	SECTION	JOB	
	1430	01	031, ETC	

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DATE: 4/25/2023
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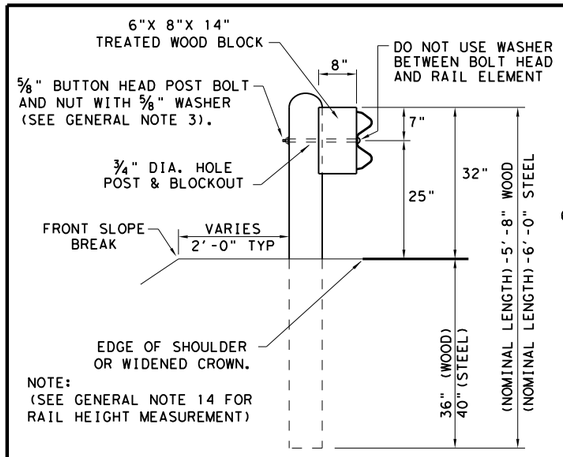
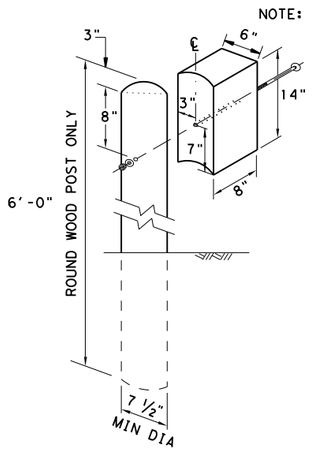
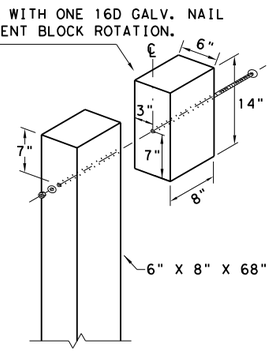


TYPICAL POST PLACEMENT

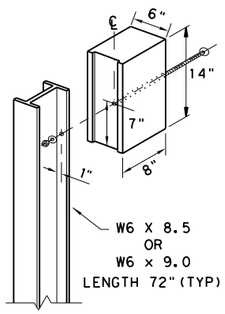


WOOD BLOCK TO ROUND WOOD POST

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

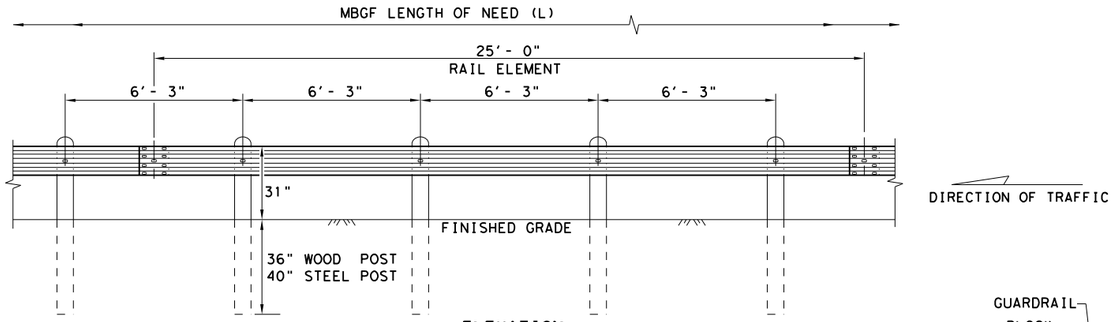


WOOD BLOCK TO RECTANGULAR WOOD POST



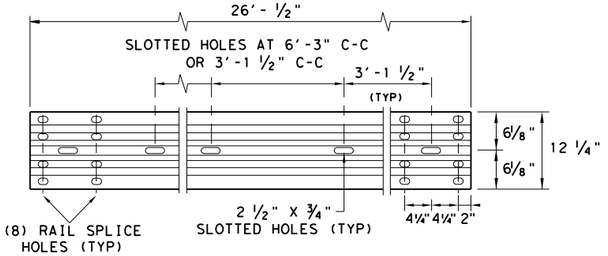
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



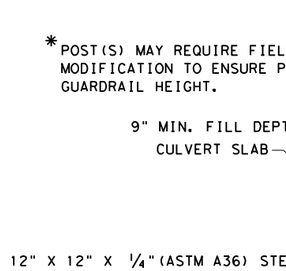
ELEVATION
MID-SPAN RAIL SPLICE

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



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

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



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

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

12" X 12" X ¼" (ASTM A36) STEEL BOTTOM PLATE WITH 1" DIA. HOLES REQUIRED WITH BOLT-THROUGH INSTALLATION.

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. ⅞" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS.
   NOTE: BOLT LENGTH = SLAB PLUS 2 ¼" MIN.

2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE ⅞" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTI HIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH OF HILTI HIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS ¼" MIN. BEYOND NUT.

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

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

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

SPLICE BOLT LENGTH — VARIES

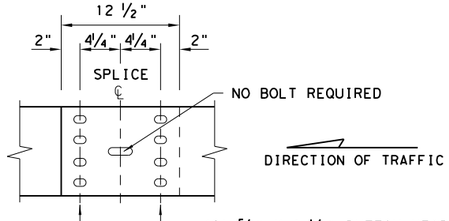
FBB01 = 1 ¼"
FBB02 = 2"

⅝"

POST & BLOCK LENGTH
FBB03 = 10"
FBB04 = 18"

BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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

GENERAL NOTES

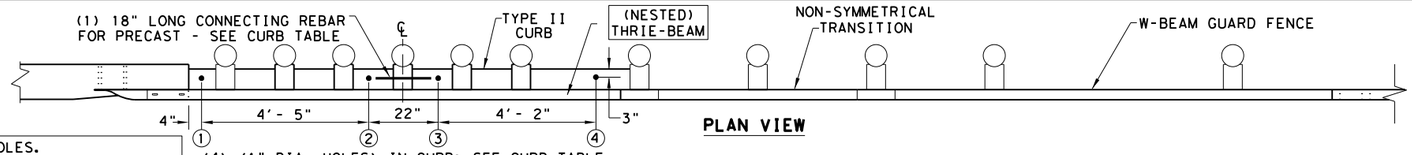
1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'- 0", OR 12'- 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 ½" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE DOWNSTREAM ANCHOR TERMINAL (DAT) AND THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED AT A RATE OF 25:1 OR FLATTER.
8. UNLESS OTHERWISE SHOWN IN THE PLANS, GUARD FENCE PLACED IN THE VICINITY OF CURBS SHALL BE POSITIONED SO THAT THE FACE OF CURB IS LOCATED DIRECTLY BELOW OR BEHIND THE FACE OF THE RAIL. RAIL PLACED OVER CURBS SHALL BE INSTALLED SO THAT THE POST BOLT IS LOCATED APPROXIMATELY 25 INCHES ABOVE THE GUTTER PAN OR EDGE OF SHOULDER.
9. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. IF SOLID ROCK IS ENCOUNTERED WITHIN 0 TO 18" OF THE FINISHED GRADE, DRILL A 24" DIA. HOLE, 24" INTO THE ROCK. IF SOLID ROCK IS ENCOUNTERED BELOW 18", DRILL A 12" DIA. HOLE, 12" INTO THE ROCK OR TO THE STANDARD EMBEDMENT DEPTH, WHICHEVER MAYBE LESS. ANY EXCESS POST LENGTH, AFTER MEETING THESE DEPTHS, MAY BE FIELD CUT TO ENSURE PROPER GUARDRAIL MOUNTING HEIGHT. BACKFILL WITH COARSE AGGREGATE MATERIAL.
10. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
11. SPECIAL FABRICATION WILL BE REQUIRED AT INSTALLATION LOCATIONS HAVING A CURVATURE OF LESS THAN 150 FT. RADIUS.
12. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210 ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
13. FOR THE LOW FILL CULVERT OPTION, POSTS LOCATED PARTIALLY OR WHOLLY BETWEEN PRECAST BOX CULVERT UNITS, THE USE OF A CAST-IN-PLACE CONCRETE CLOSURE BETWEEN BOXES IS REQUIRED. THE LENGTH OF THE CAST-IN-PLACE CONCRETE CLOSURE SHALL ACCOMMODATE THE PLACEMENT OF THE LOW FILL CULVERT OPTION. SEE CONCRETE CLOSURE DETAILS ON BRIDGE STANDARD SCP-MD.
14. GUARDRAIL HEIGHT MEASUREMENT: WHEN THE GUARDRAIL IS LOCATED ABOVE PAVEMENT, MEASURE THE HEIGHT FROM THE PAVEMENT TO THE TOP OF THE W-BEAM RAIL. WHEN THE GUARDRAIL IS LOCATED UP TO 2 FT. OFF OF THE EDGE OF PAVEMENT OR FOR A PAVEMENT OVERLAY, USE A 10-FOOT STRAIGHTEDGE TO EXTEND THE PAVEMENT/SHOULDER SLOPE TO THE BACK OF RAIL, MEASURE FROM THE BOTTOM OF STRAIGHTEDGE TO THE TOP OF RAIL. FOR GUARDRAIL LOCATED DOWN A 10:1 SLOPE, MEASURE FROM THE NOMINAL TERRAIN.

Texas Department of Transportation

Design Division Standard

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

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1430	01	031, ETC	FM 490
	DIST	COUNTY		SHEET NO.
	PHR	WILLACY		33



PLAN VIEW

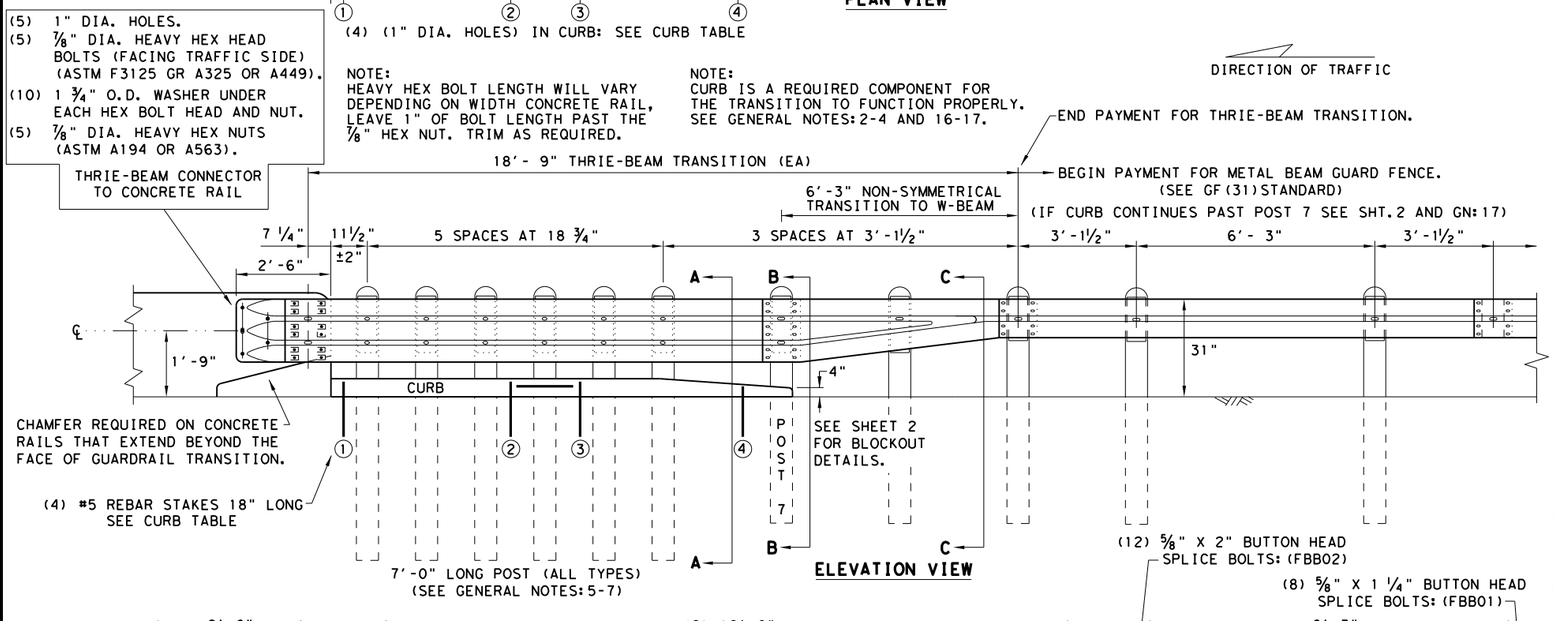
(4) (1" DIA. HOLES) IN CURB: SEE CURB TABLE

(5) 1" DIA. HOLES.
(5) ⅞" DIA. HEAVY HEX HEAD BOLTS (FACING TRAFFIC SIDE) (ASTM F3125 GR A325 OR A449).
(10) 1 ¾" O.D. WASHER UNDER EACH HEX BOLT HEAD AND NUT.
(5) ⅞" DIA. HEAVY HEX NUTS (ASTM A194 OR A563).

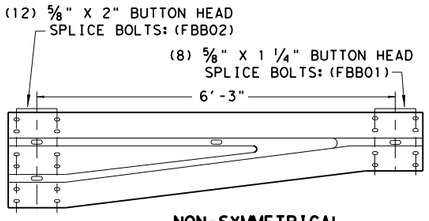
NOTE:
HEAVY HEX BOLT LENGTH WILL VARY DEPENDING ON WIDTH CONCRETE RAIL, LEAVE 1" OF BOLT LENGTH PAST THE ⅞" HEX NUT. TRIM AS REQUIRED.

NOTE:
CURB IS A REQUIRED COMPONENT FOR THE TRANSITION TO FUNCTION PROPERLY. SEE GENERAL NOTES: 2-4 AND 16-17.

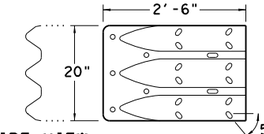
DIRECTION OF TRAFFIC



ELEVATION VIEW

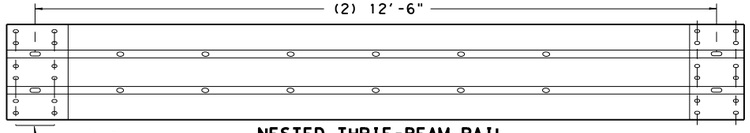


NON-SYMMETRICAL W-BEAM TO THRIE-BEAM TRANSITION 10GA.
PART DESIGNATOR RWT02a OR RWT02b



SIDE-VIEW

THRIE-BEAM TERMINAL CONNECTOR 10GA.
PART DESIGNATOR RTE01b
NOTE: SEE GENERAL NOTE: 9

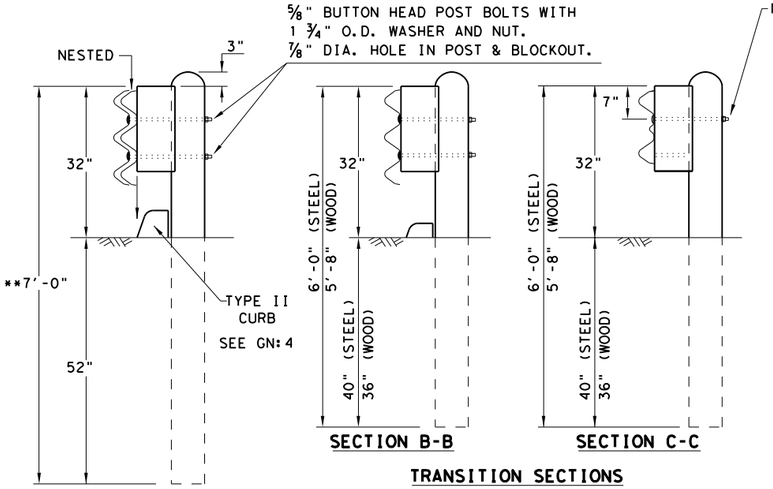


NESTED THRIE-BEAM RAIL
PART DESIGNATOR RTM10a

(12) ⅝" X 2" BUTTON HEAD SPLICE BOLTS WITH RECESSED NUTS: (FBB02)
(12) RECTANGULAR GUARDRAIL PLATE WASHERS: (FWR03)

PLATE WASHER INSTRUCTIONS

BRIDGE APPROACH - UPSTREAM: THE NESTED RAIL LAPS OVER THE TERMINAL CONNECTOR. PLATE WASHERS ARE INSTALLED UNDER THE SPLICE NUTS AGAINST INSIDE OF CONNECTOR.
BRIDGE EXIT - DOWNSTREAM: THE TERMINAL CONNECTOR LAPS OVER THE NESTED RAIL. PLATE WASHERS ARE INSTALLED UNDER THE BOLT HEAD AGAINST OUTSIDE OF CONNECTOR.



SECTION A-A

SECTION B-B

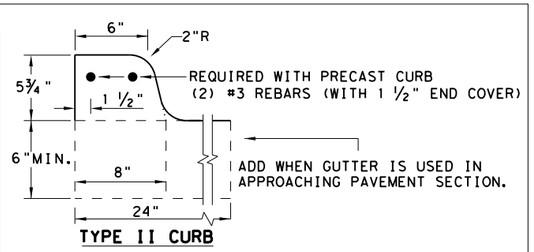
SECTION C-C

TRANSITION SECTIONS

NOTE: ALL POST TYPES, SEE GENERAL NOTE: 5 & 6

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

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 (FWC16g) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
11. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
12. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
13. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
14. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. TXDOT'S MATERIALS AND TESTS DIVISION MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
15. REFER TO GF(31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
16. THE INSTALLATION OF THE TYPE II CURB IS CRITICAL FOR THE PERFORMANCE OF THE THRIE-BEAM TRANSITION SYSTEM. THE CURB PREVENTS (VEHICLE WHEEL SNAGGING) AT THE CONCRETE RAIL AND IS REQUIRED TO MEET MASH CRASH TEST CRITERIA.
17. IF CURB EXTENDS BEYOND POST 7, 25' OF NESTED W-BEAM GUARDRAIL SHALL BE INSTALLED BEYOND THE PAY LIMITS OF THRIE-BEAM TRANSITION SECTION, (SEE SHT.2). PAYMENT FOR THIS 25' SECTION WILL BE BY LINEAR FOOT, PAY ITEM "0540 6XXX MTL W-BEAM GD FEN (NESTED)(TIM POST)" OR "540 6XXX MTL W-BEAM GD FEN (NESTED)(STEEL POST)" AS APPLICABLE FOR POST TYPE. SEE SHT.2 FOR ADDITIONAL INFORMATION.

HIGH-SPEED TRANSITION

Texas Department of Transportation — Design Division Standard

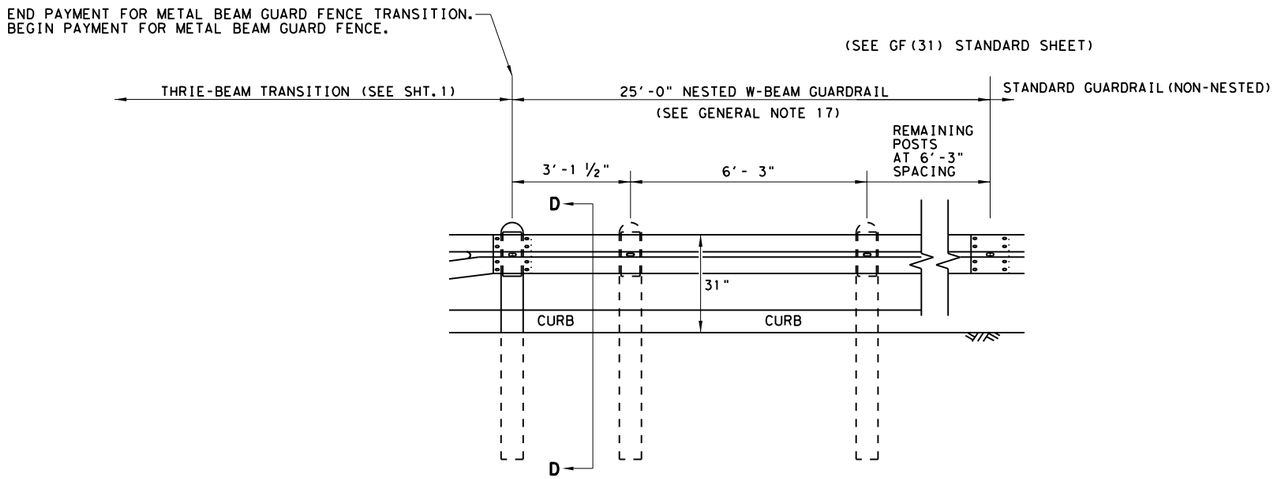
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

GF(31)TR TL3-20

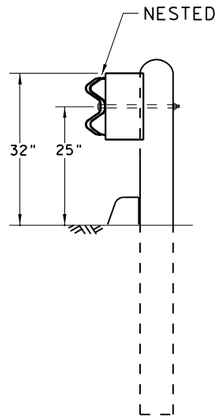
FILE: gf31trtl320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	1430	01	031, ETC	FM 490	
	DIST	COUNTY		SHEET NO.	
	PHR	WILLACY		34	

DATE: 4/25/2023
FILE: ...\GF(31)TR TL3-20_01.dgn

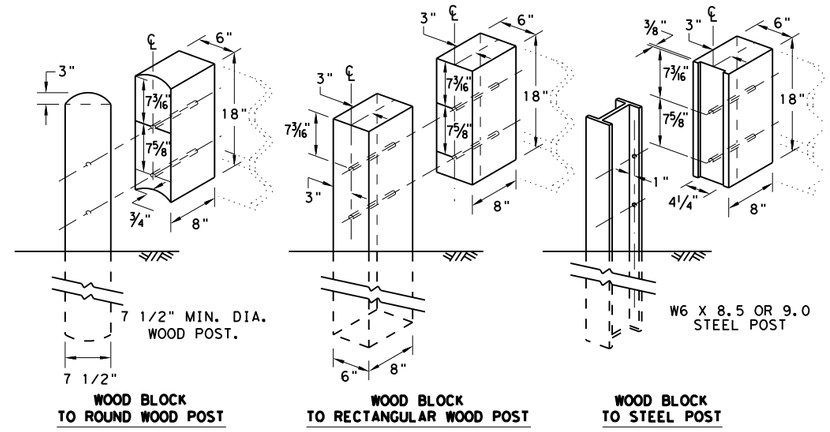
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation | Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31tr1320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG		
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB		HIGHWAY	
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	PHR	WILLACY			35	

DATE: 4/25/2023
FILE: ...\GF(31)TR TL3-20_02.dgn

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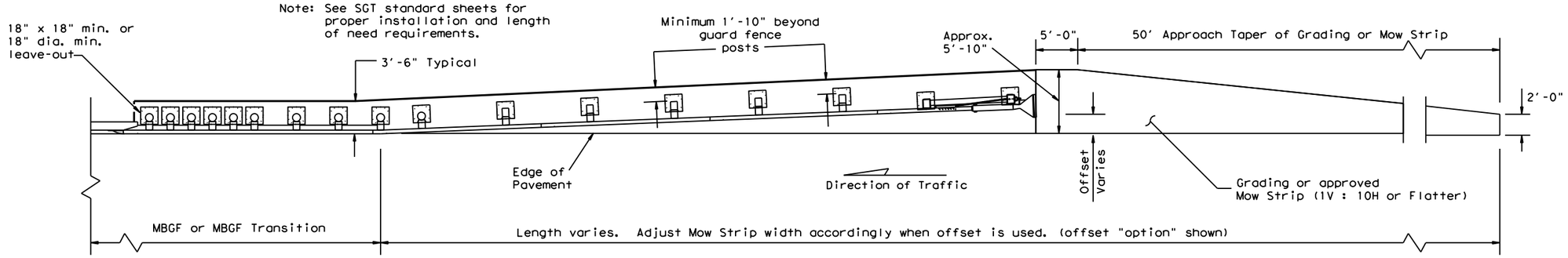
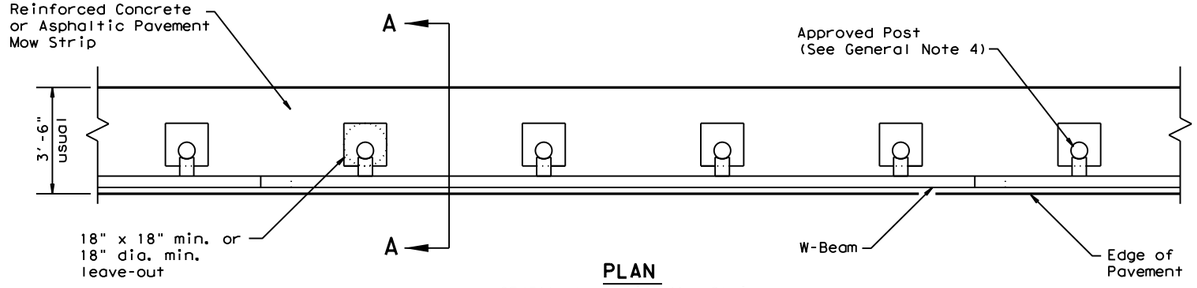
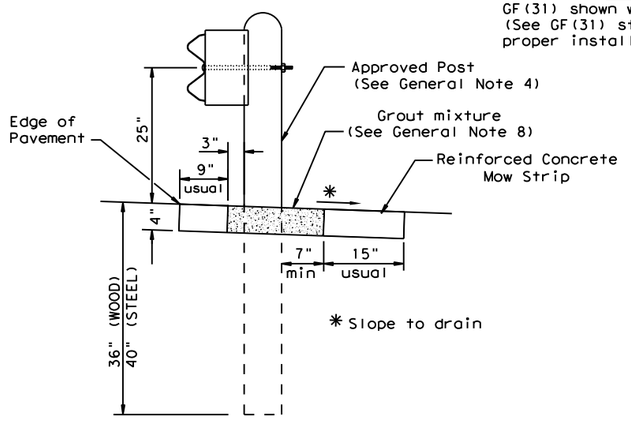


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



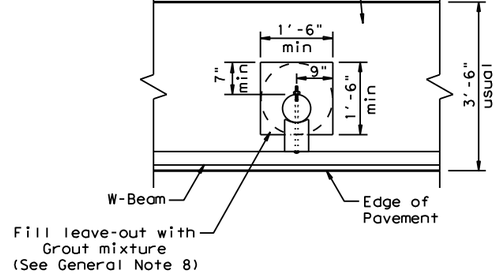
PLAN

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



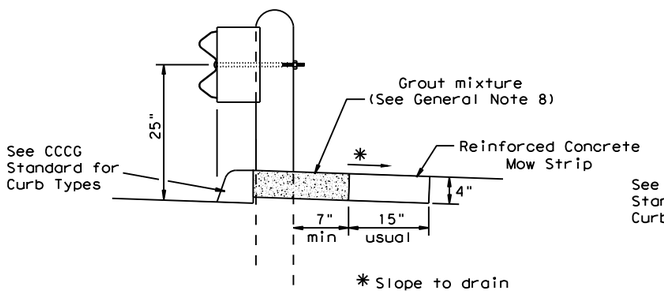
SECTION A-A

Typical



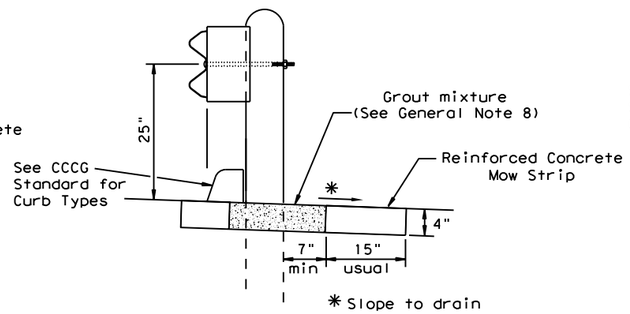
MOW STRIP DETAIL

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



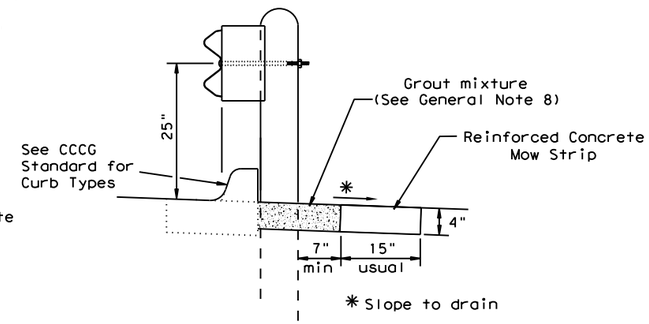
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

Site conditions may exist where grading is required for the proper installation of metal guard fence and end treatments.

Approach grading or mow strip may be decreased or eliminated, as directed by the Engineer.

GENERAL NOTES

1. This mow strip design is for use with metal beam guard fence, guard fence transitions, and guard fence end treatments. See applicable GF(31) MBGF or GF(31) Transition Standard sheet for additional information.
2. Mow strips shall be reinforced concrete with (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item. Reinforced concrete shall be placed in accordance with Item 432, "Riprap." The use of the synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Material Producer List (MPL), maintained by TxDOT, Construction Division.
3. The leave-out behind the post shall be a minimum of 7".
4. Only steel (W6 x 8.5 or W6 x 9.0), or 7 ½" Dia. round wood posts are acceptable for use in the mow strip. See GF(31) Standard for additional details.
5. Other curb placement options may be used. Curbs are not considered part of the mow strip and will be paid for under other pertinent bid item.
6. Thickness of the mow strip will be 4".
7. The limits of payment for reinforced concrete will include leave-outs for the posts.
8. The leave-outs shall be filled with a Grout mixture consisting of: 2719 pounds sand, 188 pounds Type 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
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	DIST	COUNTY		SHEET NO.
	PHR	WILLACY		36

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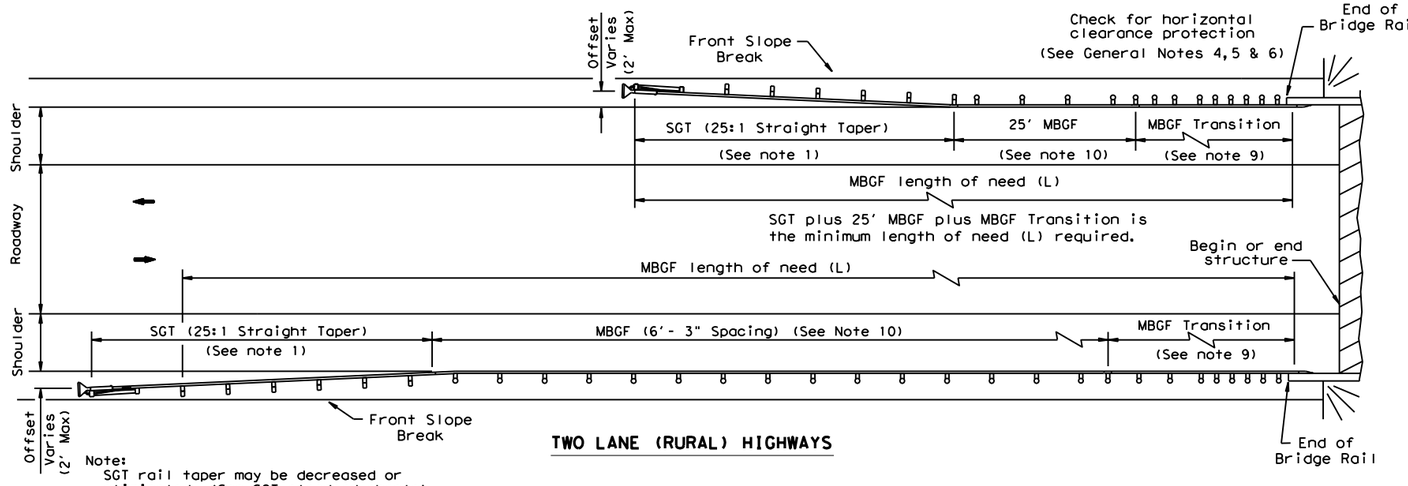
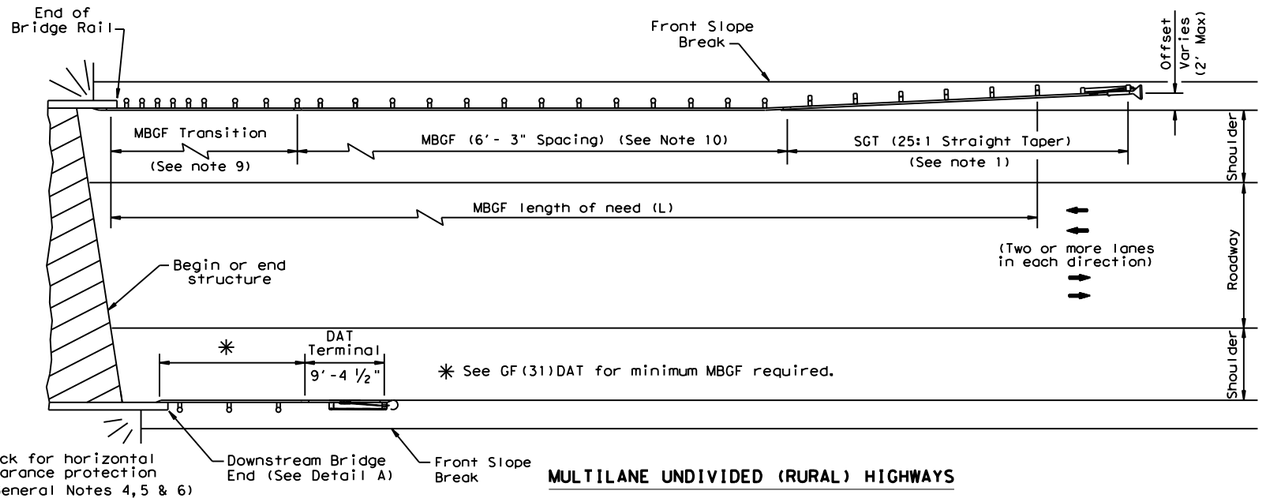
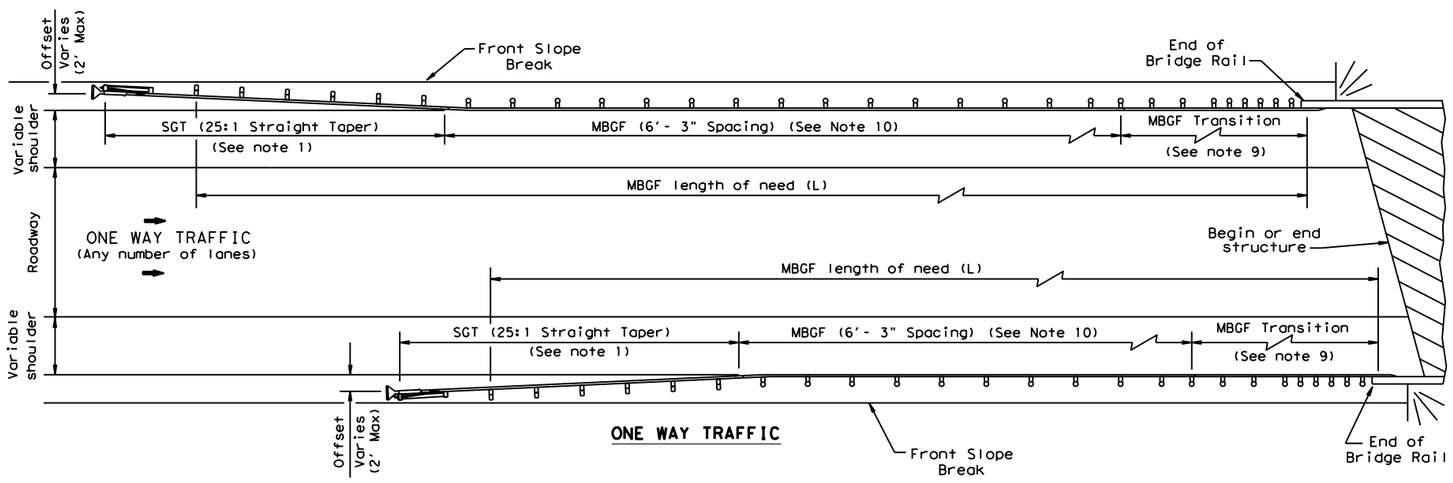


TWO LANE (RURAL) HIGHWAYS

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



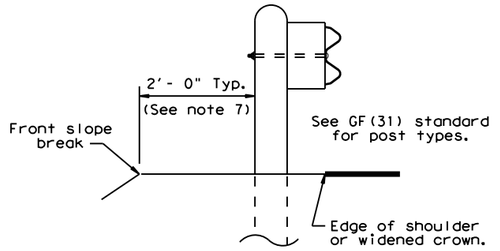
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



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)

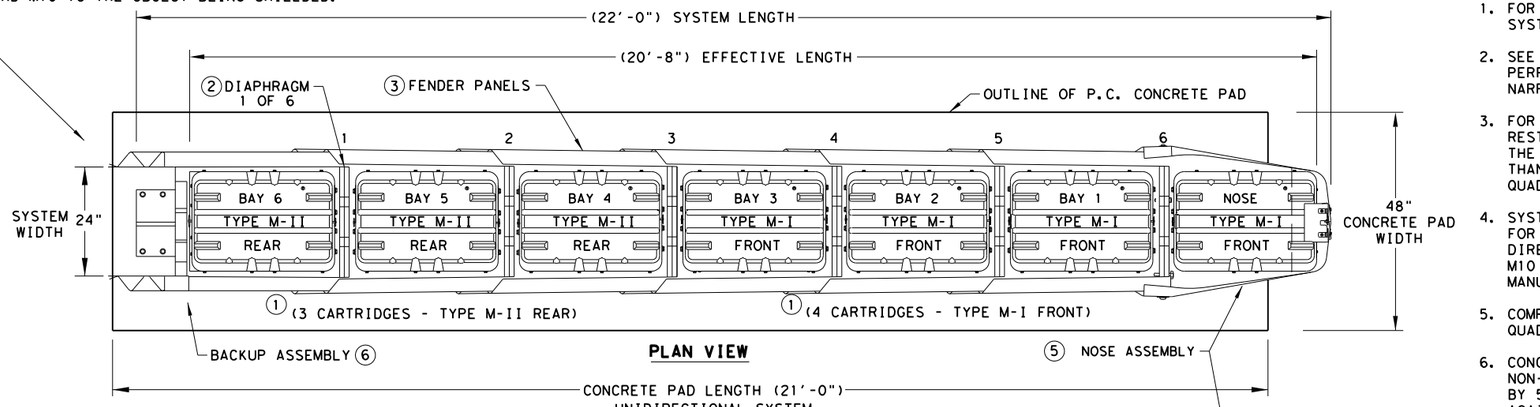
BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	1430	01	031, ETC	FM 490
REVISED APRIL 2014 SEE (MEMO 0414)	DIST	COUNTY		SHEET NO.
	PHR	WILLACY		37

DATE: 4/25/2023
FILE: c:\pw-df\pw-of-prod\tyler.martineaguirre-fields.com\dms18269\qguardm10n20.dgn

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

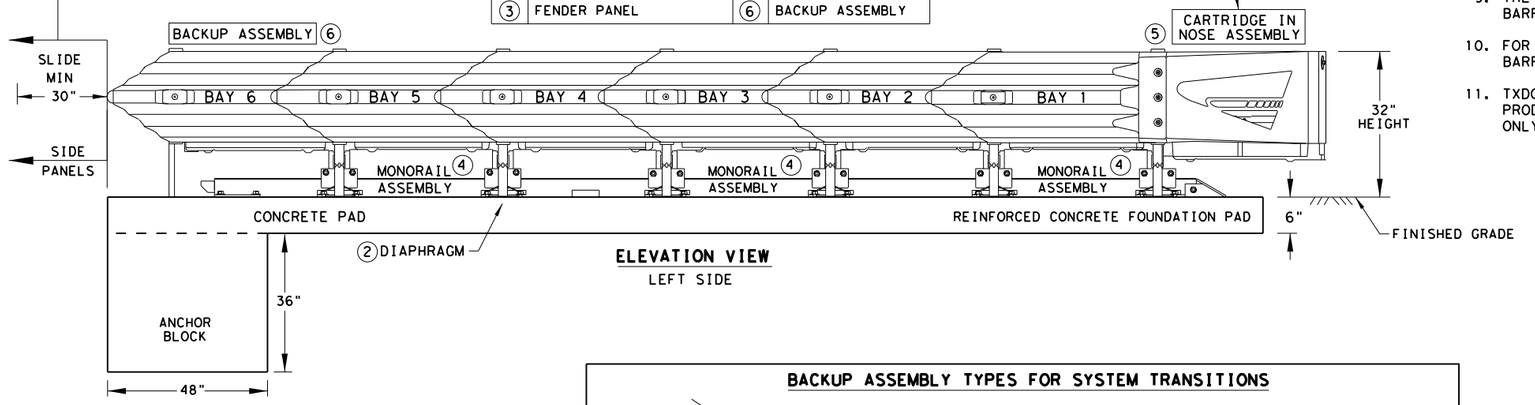
QUADGUARD M10 24" WIDE 6-BAY SYSTEM



PLAN VIEW

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

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



ELEVATION VIEW
LEFT SIDE

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

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

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

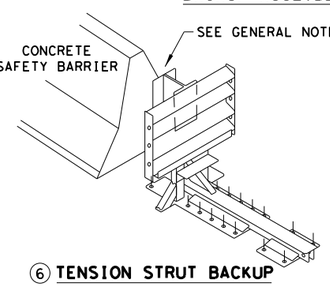
8" NON-REINFORCED CONCRETE PAD MAY NOT REQUIRE AN ANCHOR BLOCK, IF THE PAD IS INSTALLED AGAINST AN IMMOVABLE CONCRETE BACKUP.

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

NOTE:
THE QUADGUARD M10 24" WIDE 6-BAY - NARROW SYSTEM HAS BEEN TESTED TO MASH TEST LEVEL 3.

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

BACKUP ASSEMBLY TYPES FOR SYSTEM TRANSITIONS

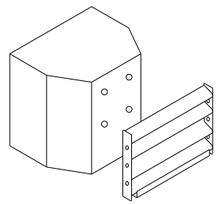


(6) TENSION STRUT BACKUP

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

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

10 (W6X9) I-BEAM POSTS.
POST 1 THRU 4 (84" LONG)
POST 5 THRU 10 (72" LONG)



(6) CONCRETE BACKUP

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

GENERAL NOTES

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

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

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

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

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

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

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

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

REUSABLE

Texas Department of Transportation

Design Division Standard

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

QGUARD(M10)(N)-20

FILE: qguardm10n20.dgn	DN: TxDOT	CK: KM	DW: VP	CK: AG		
	CONT	SECT	JOB	HIGHWAY		
REVISIONS	1430	01	031, ETC	FM 490		
	DIST	COUNTY		SHEET NO.		
	PHR	WILLACY		38		

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		27	FM 490	58+16, LT	3	UNI	ASPH	TYPE C	QUADGUARD (M10) (N)	24"	2'-8"	67'	X						X			
2		27	FM 490	58+04, RT	3	UNI	ASPH	TYPE C	QUADGUARD (M10) (N)	24"	2'-8"	67'	X						X			
3		27	FM 490	58+83, LT	3	UNI	ASPH	TYPE C	QUADGUARD (M10) (N)	24"	2'-8"	67'	X						X			
4		27	FM 490	58+71, RT	3	UNI	ASPH	TYPE C	QUADGUARD (M10) (N)	24"	2'-8"	67'	X						X			
												TOTALS	4									

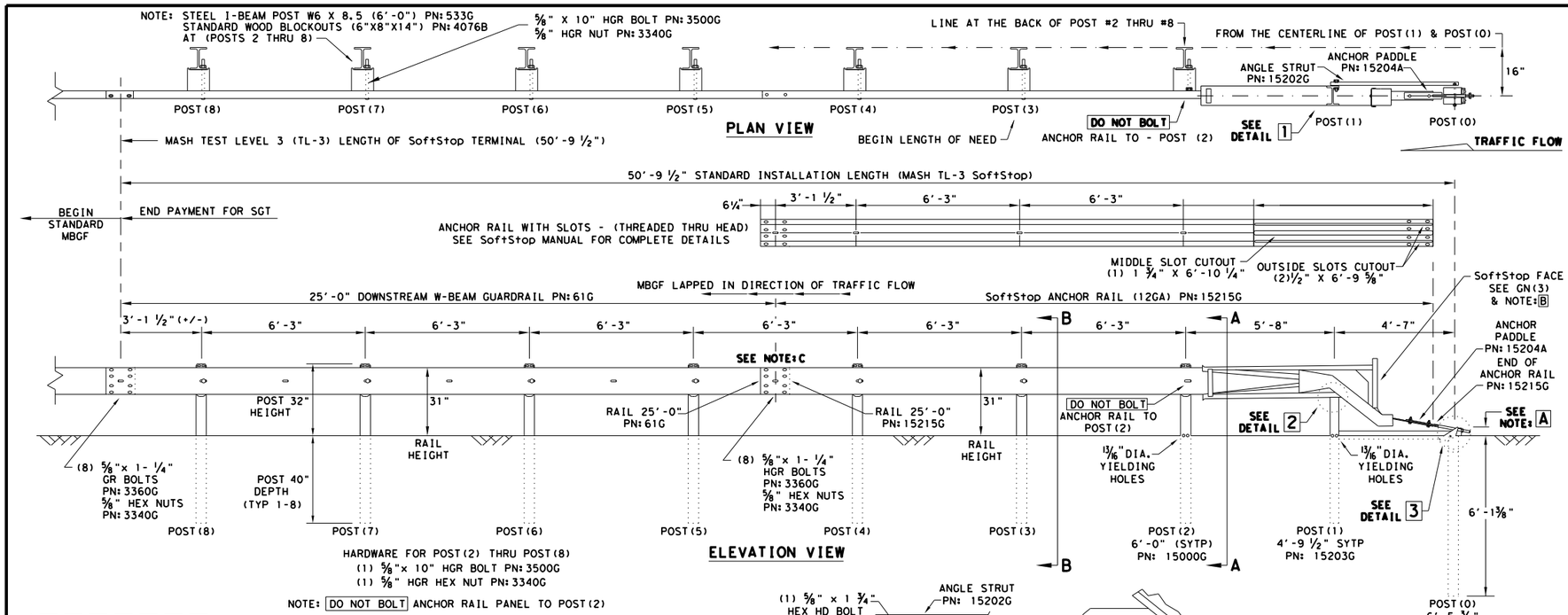
LEGEND:
L=LOW MAINTENANCE
R=REUSABLE
S=SACRIFICIAL
N=NARROW
W=WIDE

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

FILE: ccss.dgn	DN: TxDOT	CK:		CK:
© TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	1430	01	031, ETC	FM 490
	DIST	COUNTY		
	PHR	WILLACY		
	FEDERAL AID PROJECT			SHEET NO.
				39

DATE:
FILE:



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

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

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP	
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	1430	01	031, ETC	FM 490	
	DIST	COUNTY		SHEET NO.	
	PHR	WILLACY		40	

DATE: 4/25/2023
FILE: c:\pw-of\pw-of-prod\tyler.martin@aguirre-fields.com\dms18269\sgt11s3118.dgn

(SEE GN NOTE 15)
STANDARD 31" MBGF

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

FIELD-SIDE
(RAIL 3)

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

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

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

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

ITEM (10)
CABLE ASSEMBLY

ITEM (2)
GROUNDSTRUT

NO BLOCKOUT
AT (POST 1)

RAIL 4 RAIL 3 RAIL 2 RAIL 1

CABLES

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.

PLAN VIEW

INSTALL GUARD FENCE RECESSED
HEX NUTS ON TRAFFIC-SIDE

MBGF
RAIL 2

MBGF
RAIL 1

DETAIL (C)

TRAFFIC FLOW

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

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"

RAIL
HEIGHT
31"

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

ARROWS

DETAIL (D)

RAIL
HEIGHT
31"

HEAD
HEIGHT

DETAIL (B)

A

32-¼"

68-⅛"

FINISHED GRADE

CABLES

FINISHED GRADE

ITEM (10)
CABLE ASSEMBLY

ITEM (2)
GROUNDSTRUT

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

POST 1
ITEM (4)
I-BEAM
W6 X 9

NO BLOCKOUT
AT (POST 1)

SOIL
ANCHOR POST
ITEM (1)

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

ELEVATION VIEW

A

TSS PANEL
GALVANIZED
ITEM (5)

RSS PLATE
GALVANIZED
ITEM (8)

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

TSS PANEL AND RSS PLATE
DETAIL (D)

HEAD
HEIGHT
32-¼"

TOP OF POST

31-⅞"

FINISHED
GRADE

40-⅛"

68-⅛"
ANCHOR POST
DEPTH

ITEM (1)
ANCHOR

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

SOIL ANCHOR, POST 1
& LINE POST 2 THRU 9

SECTION VIEW A-A

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

7 ⅝"
2 ⅛"

UPPER CABLE
(BACK SIDE)

LOWER CABLE
(TRAFFIC SIDE)

DETAIL (B)

CABLE
FRICTION PLATE
HEAD UNIT
ITEM (9)

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

ITEM (24)
ITEM (21)

ITEM (20)
8X

ITEM (17)
8X

ITEM (23)
6X
3 SCREWS
EACH SIDE

(RAIL 1)

ITEM (22)
BRACKET
SHIPPED FLAT

ITEM (3)

ITEM (16)
4X

* ITEM (25)
HIGH INTENSITY
REFLECTIVE SHEETING

NOTE: DELINEATION MARKER IN
ACCORDANCE WITH TEXAS MUTCD.

SPLICE FOR IMPACT-HEAD
TO GUARD FENCE (RAIL1)

DETAIL (A)

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.

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.

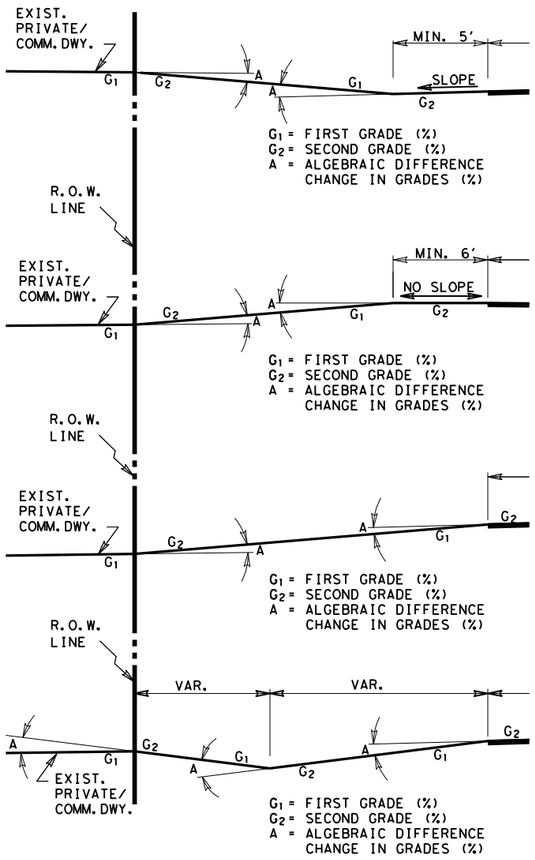
** ALTERNATIVE ITEMS NOT SHOWN.
ITEM(26) 8" WOOD-BLOCKOUTS
ITEM(27) 25'GUARD FENCE PANELS

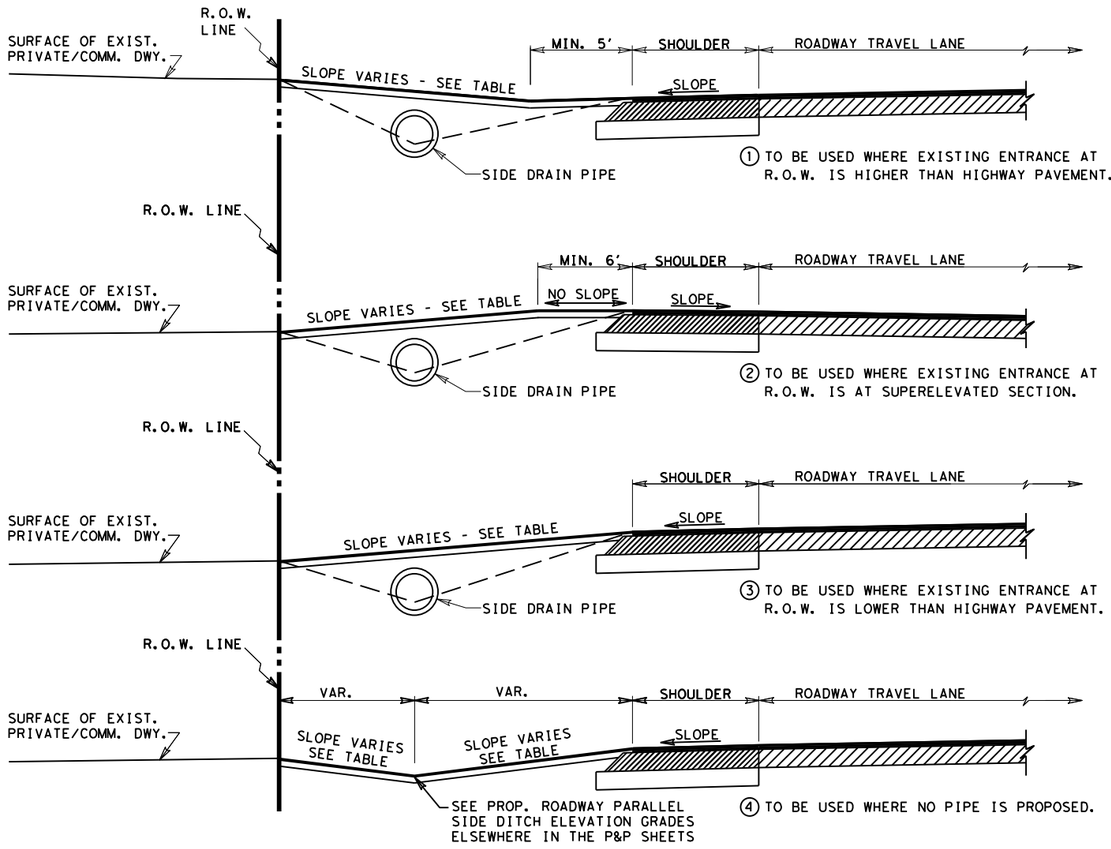
Texas Department of Transportation

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	1430	01	031, ETC	FM 490
	DIST	COUNTY		SHEET NO.
	PHR	WILLACY		41





NOTES:

ALL ENTRANCES CONSTRUCTED ON THIS PROJECT ARE SUBJECT TO CONCURRENCE WITH EXISTING GOVERNING REGULATIONS AS SET OUT BY THE STATE - TEXAS TRANSPORTATION COMMISSION.

ENTRANCE'S BASE AND SURFACING MAY BE EXTENDED BEYOND R.O.W. LINE AS REQUIRED TO MEET EXISTING DRIVEWAY GRADE IN A SATISFACTORY MANNER OF WHICH NO STEEPER THAN 12:1 FOR COMMERCIAL DRIVEWAY AND 8:1 FOR RESIDENTIAL DRIVEWAY SLOPE WILL BE CONSTRUCTED.

ALL FLEXIBLE BASE USED FOR PRIVATE DRIVES & COMMERCIAL DRIVES WILL NOT REQUIRE LIME TREATMENT.

EXACT LOCATIONS, DIMENSIONS, AND TYPE TO BE ESTABLISHED DURING CONSTRUCTION BY THE ENGINEER.

PROP. WIDTH OF DRIVEWAYS TO MATCH EXISTING WIDTH AT R.O.W. LINE.

114 #/SY ACP (COMPACTED) IS EQUAL TO 1 IN. DEPTH,
171 #/SY ACP (COMPACTED) IS EQUAL TO 1½ IN. DEPTH.

SIDE DRAIN PIPES TO BE INSTALLED WHERE ROADWAY DITCH DRAINAGE IS NECESSARY, AS INDICATED ON PLANS AND/OR AS DIRECTED BY THE ENGINEER.

SIDE DRAIN PIPES TO BE INSTALLED WITH A MINIMUM OF 12" COVER WITH PROPOSED RESIDENTIAL & COMMERCIAL DRIVEWAY MATERIAL OR 15" COVER WITH PROPOSED COUNTY ROAD & CITY STREET ROADWAY MATERIAL.

AVERAGE DRIVEWAY DIMENSIONS SHOWN ON TABLE OF DRIVEWAYS (ELSEWHERE IN PLANS) ARE FOR ESTIMATING PURPOSES ONLY. ACTUAL DRIVEWAY DIMENSIONS MAY BE CHANGED BY THE ENGINEER BASED ON EXISTING FIELD CONDITIONS.

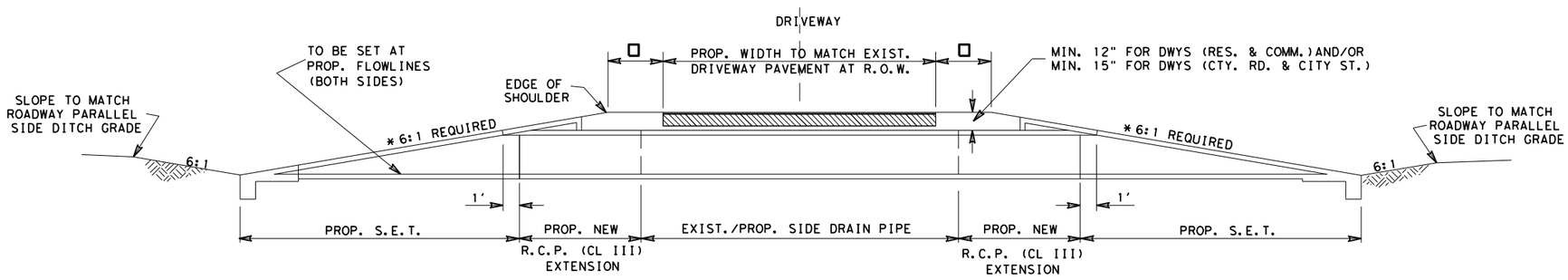
THE RATE OF PRIME COAT SHALL BE 0.10 GAL/SY FOR PRIVATE AND/OR COMMERCIAL DRIVEWAYS AND 0.20 GAL/SY FOR PUBLIC DRIVEWAYS (COUNTY ROADS AND/OR CITY STREETS).

TYPICALLY A CHANGE IN GRADE OF THREE PERCENT (3%) OR LESS AND A DISTANCE BETWEEN CHANGES IN GRADE OF AT LEAST ELEVEN FEET (11') ACCOMMODATES MOST VEHICLES. HOWEVER, LITERATURE SUGGESTS THAT A SIX PERCENT (6%) TO EIGHT PERCENT (8%) CHANGE IN GRADE MAY OPERATE EFFECTIVELY. INDIVIDUAL SITE CONDITIONS SHOULD BE EVALUATED TO ACCOMMODATE THE VEHICLE FLEET USING THE DRIVEWAY.

TYPICAL ENTRANCE PROFILE FOR DRIVEWAYS W/OUT C&G

PROPOSED DRIVEWAY SLOPE TABLE
COMMERCIAL DRIVEWAYS @ 12:1 MAX.
RESIDENTIAL DRIVEWAYS @ 8:1 MAX.

PROP. DWY ALGEBRAIC DIFFERENCE TABLE
COMMERCIAL DRIVEWAYS @ A = 6% DESIRABLE
RESIDENTIAL DRIVEWAYS @ A = 8% DESIRABLE
FORMULA, A=G2-G1



□ - 1' MIN. ON DRIVEWAYS (RES. & COMM.)
2' MIN. ON DRIVEWAYS (COUNTY RD. & CITY ST.)

* - 6:1 SLOPE REQUIRED

PHARR DISTRICT STANDARD

TEXAS DEPARTMENT OF TRANSPORTATION

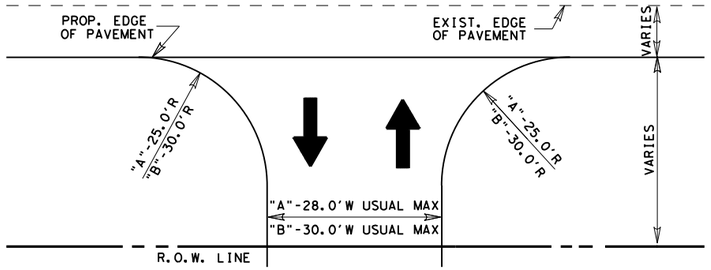
DRIVEWAY PROFILE DETAILS

REV. 3/2020

DRIVEWAY1.DGN

FED. RD. DIV. NO.	STATE AID PROJECT NO.			FILE NO.			SHEET NO.
6							42
STATE	STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB		HIGHWAY NO.
TEXAS	21	WILLACY	1430	01	031, ETC		FM 490

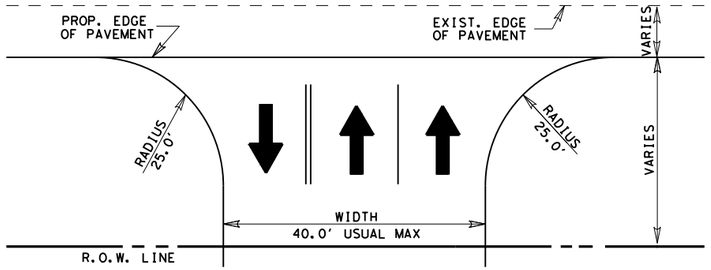
DESIGNS FOR TWO-WAY COMMERCIAL DRIVEWAYS



"A"- ONE ENTRY LANE AND ONE EXIT LANE, FEWER THAN 4 LARGE VEHICLES PER HOUR

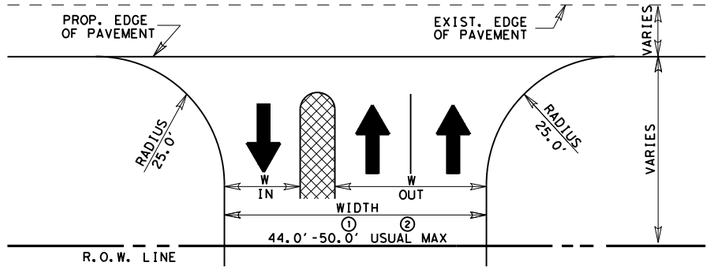
"B"- ONE ENTRY LANE AND ONE EXIT LANE, 4 OR MORE SINGLE UNIT VEHICLES① PER HOUR

① - *DRIVEWAY DESIGNS FOR LARGER VEHICLES WILL BE CONSIDERED ON A CASE BY CASE BASIS*



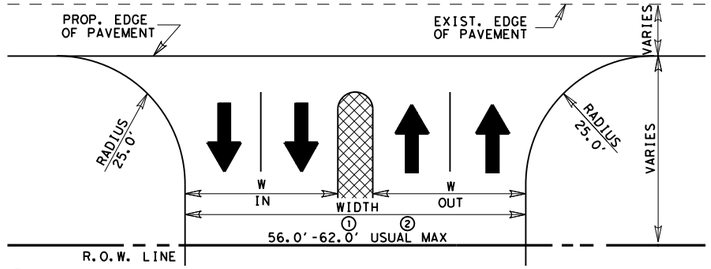
ONE ENTRY LANE AND TWO EXIT LANES (WITHOUT DIVIDERS)

DESIGNS FOR TWO-WAY COMMERCIAL DRIVEWAYS



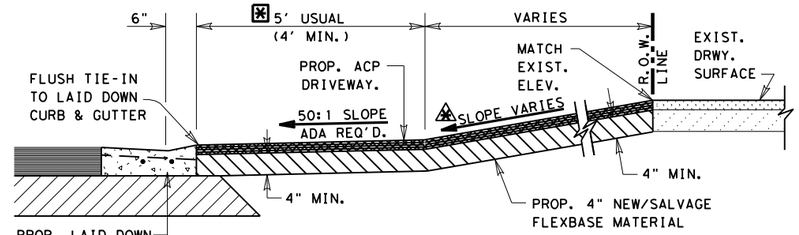
① - *4.0' WIDE DIVIDER, FACE-TO-FACE CURBS*
② - *10.0' WIDE DIVIDER, FACE-TO-FACE-CURBS*

ONE ENTRY LANE AND TWO EXIT LANES (WITH A DIVIDER)



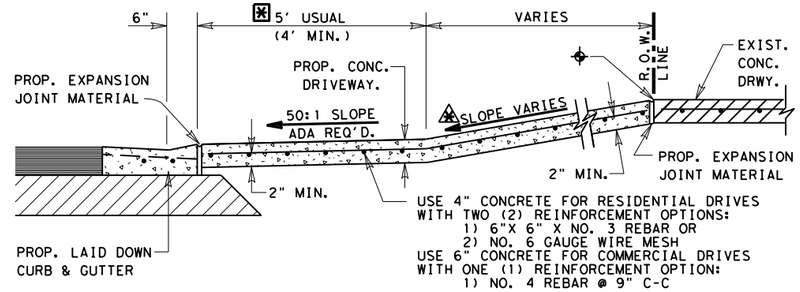
① - *4.0' WIDE DIVIDER, FACE-TO-FACE CURBS*
② - *10.0' WIDE DIVIDER, FACE-TO-FACE-CURBS*

TWO ENTRY LANES AND TWO EXIT LANES (WITH A DIVIDER)



TYPICAL ASPH. CONC. PVM'T. DRIVEWAY SECTION

N.T.S.



TYPICAL CONCRETE DRIVEWAY SECTION

N.T.S.

⊕ CONCRETE SHALL BE SAW CUT TO THE LIMITS OF REMOVAL WHERE APPLICABLE.

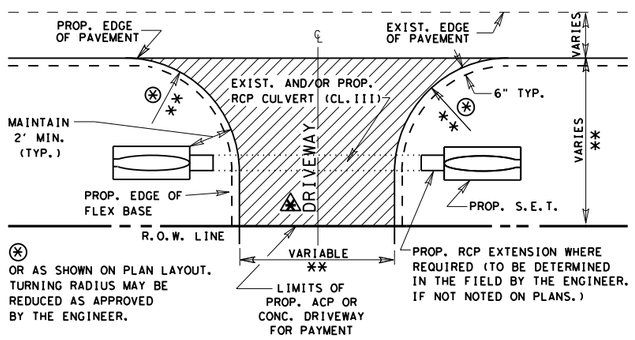
⊠ PROP./FUTURE SIDEWALK CROSSING LOCATION UNLESS SHOWN ELSEWHERE ON P&P SHEETS. SEE P&P SHEETS FOR PROP. SIDEWALK LOCATION IF SIDEWALKS ARE INCLUDED AS PART OF PROJECT. REFER TO STATE STANDARDS - PEDESTRIAN FACILITIES - FOR ADDITIONAL REQUIREMENTS.

⚠ ENTRANCE'S BASE AND SURFACING MAY BE EXTENDED BEYOND R.O.W. LINE AS REQUIRED TO MEET EXISTING GRADE IN A SATISFACTORY MANNER OF WHICH NO STEEPER THAN 12:1 FOR COMMERCIAL DRIVEWAY AND 8:1 FOR RESIDENTIAL DRIVEWAY SLOPE WILL BE CONSTRUCTED.

PROP. DWY ALGEBRAIC DIFFERENCE TABLE
COMMERCIAL DRIVEWAYS @ A = 6% MAX. RESIDENTIAL DRIVEWAYS @ A = 8% MAX.

PROPOSED DRIVEWAY SLOPE TABLE
COMMERCIAL DRIVEWAYS @ 12:1 MAX. RESIDENTIAL DRIVEWAYS @ 8:1 MAX.

PRIVATE AND COMMERCIAL DRIVES WITHOUT CURB & GUTTER



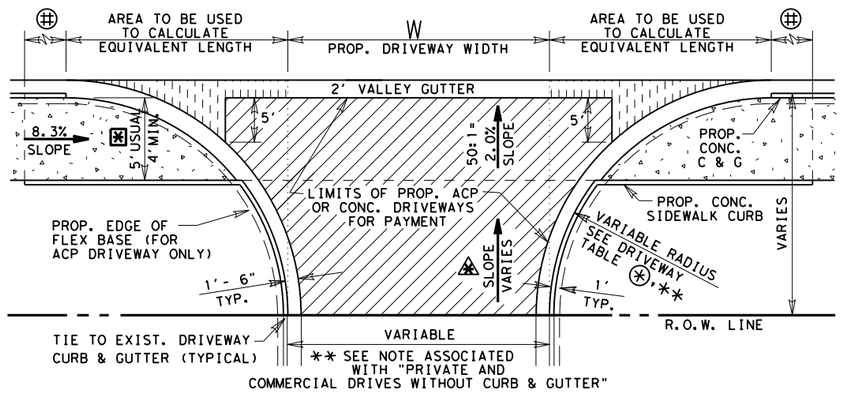
⊛ OR AS SHOWN ON PLAN LAYOUT. TURNING RADIUS MAY BE REDUCED AS APPROVED BY THE ENGINEER.

PLAN OF PRIVATE AND COMMERCIAL DRIVES

** FOR PRIVATE RESIDENTIAL DRIVES, TRY TO MATCH EXISTING WITH A MINIMUM WIDTH OF 12 FT. AND A MAXIMUM WIDTH OF 24 FT. WITH 15 FT. USUAL RADIUS. FOR COMMERCIAL DRIVES, USE ABOVE COMMERCIAL DRIVEWAY DETAILS.

⚠ SEE TYPICAL DRIVEWAY SECTIONS NOTES FOR DRIVEWAY SLOPE CRITERIA.

PRIVATE AND COMMERCIAL DRIVES WITH CURB & GUTTER



PLAN OF PRIVATE AND COMMERCIAL DRIVES

SEE P&P SHEETS FOR LOCATIONS OF DRIVES
N.T.S.

⊠ PROP./FUTURE CONC. SIDEWALK LOCATION UNLESS SHOWN ELSEWHERE ON P&P SHEETS. REFER TO STATE STANDARDS - PEDESTRIAN FACILITIES - FOR ADDITIONAL REQUIREMENTS.

⊕ LIMITS OF SLOPE FOR PROP. CONC. CURB BASED ON 8.3% SLOPE FOR SIDEWALK.

⚠ SEE TYPICAL DRIVEWAY SECTIONS NOTES FOR DRIVEWAY SLOPE CRITERIA.

LF EQUIVALENT TABLE FOR PAYMENT LIMITS OF 2' VALLEY GUTTER

LF OF VALLEY GUTTER= W + X1 + X2

WHERE X1 AND X2 MAY VARY DEPENDING ON RADIUS

Prop. Driveway Radius	X1 or X2 (Sq Ft Area / 2') Equivalent LF Length
5'	1
8'	2
10'	4
12'	6
15'	9
18'	12
20'	15
22'	18
25'	24
28'	30
30'	34

SEE DRIVEWAY TABLE FOR LIMITS OF LAID DOWN CURB TO BE PAID FOR AS CURB AND GUTTER

DRIVEWAY TYPES

TY PB-1
EXIST. PRIVATE OR COMMERCIAL DRIVEWAYS TO BE CONSTRUCTED AS SHOWN WITH 4" NEW AND/OR SALVAGE FLEX. BASE, PRIMED AND SURFACED WITH 171#/SY ACP. (HMA-D PG 64-22 SAC B MEETING ITEM 340)

CONCRETE (RESIDENTIAL)
EXIST. PRIVATE DRIVEWAYS TO BE CONSTRUCTED AS SHOWN WITH 4" CONCRETE. TO BE PAID FOR BY THE SQ.YD.

CONCRETE (COMMERCIAL)
EXIST. BUSINESS DRIVEWAYS TO BE CONSTRUCTED AS SHOWN WITH 6" CONCRETE. TO BE PAID FOR BY THE SQ.YD.

PHARR DISTRICT STANDARD

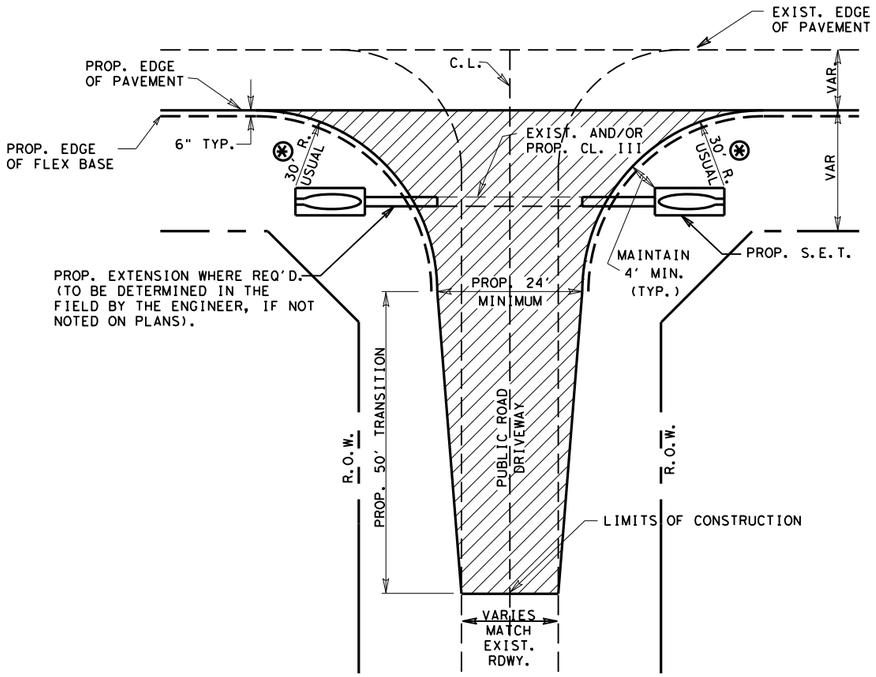
TEXAS DEPARTMENT OF TRANSPORTATION

DRIVEWAY DETAILS PRIVATE (RESIDENTIAL-COMMERCIAL)

REV. 08/22

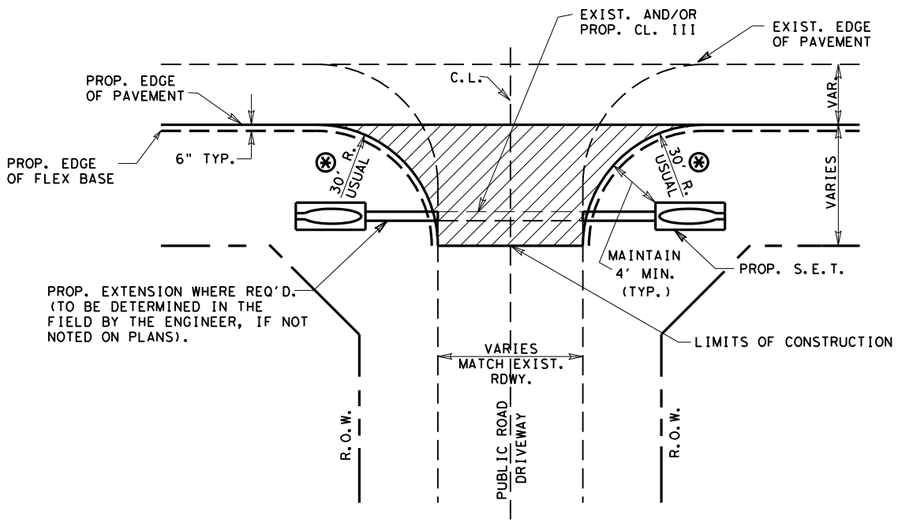
DRIVEWAY2.DGN

FED. RD. DIV. NO.	PROJECT NO.		FILE NO.			SHEET NO.
6	SEE TITLE SHEET					43
STATE	STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
TEXAS	21	WILLACY	1430	01	031, ETC	FM 490



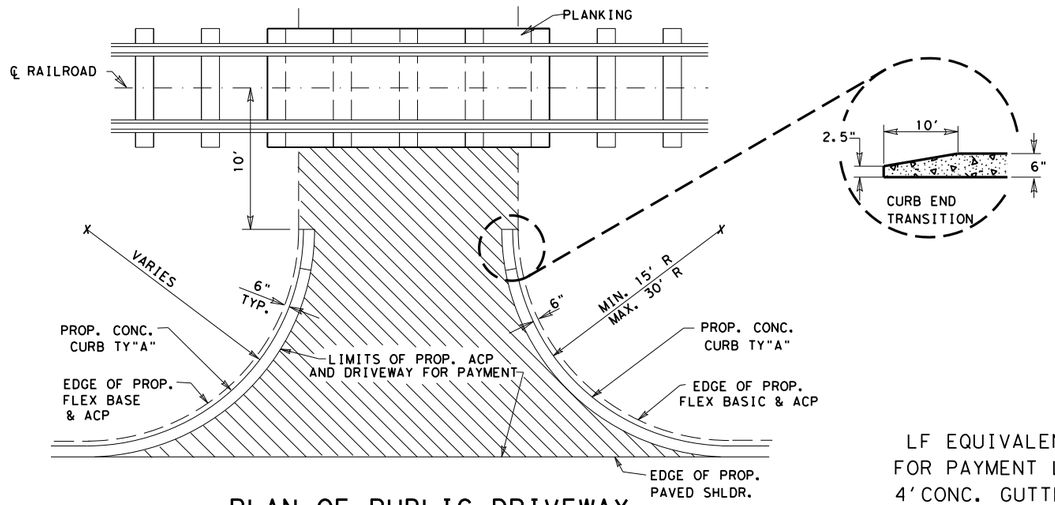
TYPICAL DETAIL

(WHEN EXIST. ROADWAY WIDTH LESS THAN 24'.)

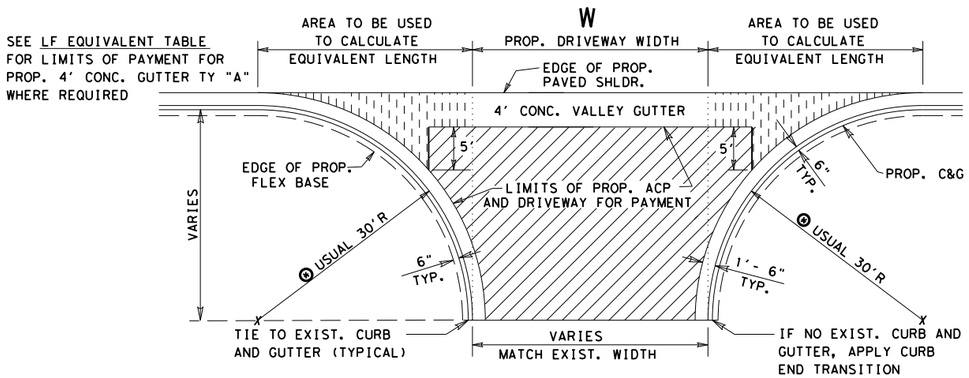


TYPICAL DETAIL

(WHEN EXIST. ROADWAY WIDTH EQUAL TO OR GREATER THAN 24'.)



PLAN OF PUBLIC DRIVEWAY ADJACENT TO R.R. CROSSING



PLAN OF PUBLIC DRIVEWAY

LF EQUIVALENT TABLE FOR PAYMENT LIMITS OF 4'CONC. GUTTER TY."A"

LF OF VALLEY GUTTER= W + X1 + X2	
WHERE X1 AND X2 MAY VARY DEPENDING ON RADIUS	
Prop. Driveway Radius	X1 or X2 (Sq Ft Area / 4') Equivalent LF Length
10	3
15	7
20	12
25	19
30	27
35	37
40	48
45	61
50	75
55	91
60	109
65	127
70	148
75	170

TY PBS1

EXIST. UNPAVED PUBLIC DRIVEWAYS TO BE CONSTRUCTED AS SHOWN WITH 12" LIME TREAT. SUBGRADE, 8" FLEX. BASE 1% LIME, THEN PRIMED AND SURFACED WITH 171#/SY ACP. (HMA-D PG 64-22 SAC B MEETING ITEM 340)

TY PBS2

EXIST. DRIVEWAY TO BE CONSTRUCTED SAME AS PROPOSED ROADWAY.

GENERAL NOTES:

AVERAGE DIMENSIONS SHOWN ON TABLE OF DRIVEWAYS ARE FOR ESTIMATING PURPOSES ONLY.

LOCATIONS LISTED ON THE TABLE ARE APPROXIMATE, EXACT LOCATIONS, DIMENSIONS, AND TYPE TO BE ESTABLISHED DURING CONSTRUCTION BY THE ENGINEER AS REQUIRED.

⊛ SEE DRIVEWAY TABLE, TURNING RADIUS MAY BE REDUCED AS APPROVED BY THE ENGINEER.

SEE TABLE OF DRIVEWAYS FOR TOTAL LENGTH OF PROP. 4' CONC. VALLEY GUTTER FOR EACH LOCATION.

PHARR DISTRICT STANDARD

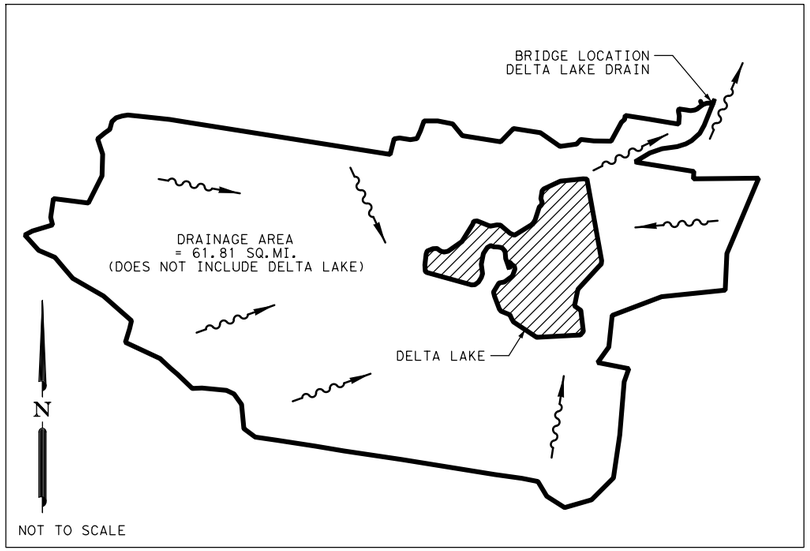
TEXAS DEPARTMENT OF TRANSPORTATION

DRIVEWAY DETAILS PUBLIC (COUNTY ROAD-CITY STREET)

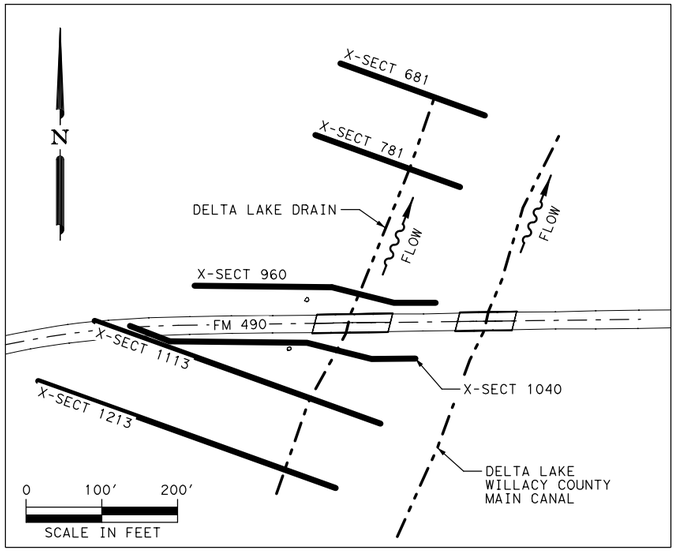
REV. 8/22

DRIVEWAY3.DGN

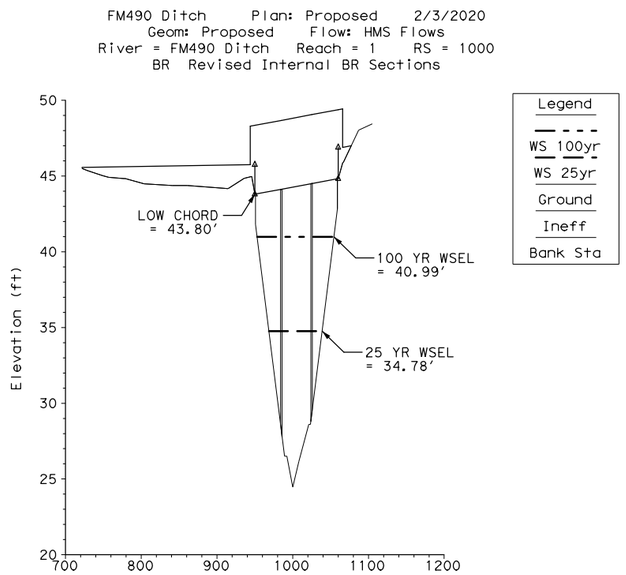
FED.RD. DIV.NO.	STATE AID PROJECT NO.		FILE NO.			SHEET NO.
6						44
STATE	STATE DIST.NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
TEXAS	21	WILLACY	1430	01	031, ETC	FM 490



DRAINAGE AREA FOR DELTA LAKE DRAIN



HECRAS X-SECTION MAP



FM 490 AT DELTA LAKE DRAIN

RUNOFF COMPUTATIONS FOR FM 490 DELTA LAKE DRAIN (NRCS METHOD)

DA ID	ROADWAY	AREA	Tc	LAG TIME	LAG TIME	RCN	24-HOUR PRECIPITATION (IN)							PEAK DISCHARGE (CFS)						
		(Sq Mi)	(Hr)	(Hr)	(min)		2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
DELTA LAKE DRAIN	FM 490	61.81	11.97	7.18	430.80	38	3.9	5.2	6.4	8.1	9.7	11.4	16.4	31	310	775	1786	2882	4361	9257

NRCS METHOD MODELED IN HEC-HMS VERSION 4.3
PRECIPITATION DATA DERIVED FROM "NOAA ATLAS 14 PRECIPITATION - FREQUENCY ATLAS OF THE UNITED STATES VOLUME 11 VERSION 2.0: TEXAS".
HYDROGRAPH PEAK SHAPE FACTOR = 300 PER NATIONAL ENGINEERING HANDBOOK (NEH-4), CHAPTER 16
SOILS DATA OBTAINED FROM NRCS WEB SOIL SURVEY UTILITY
LAND USE DATA OBTAINED FROM AERIAL PHOTOGRAMMETRY AND/OR NLCD DATABASE
RCN BASED ON AMC I

FM 490 AT DELTA LAKE DRAIN

X-SECTION ID	HEC-RAS X-SECTION	LOCATION	25 YEAR (4% AEP)						100 YEAR (1% AEP)					
			EXISTING CONDITION			PROPOSED CONDITION			EXISTING CONDITION			PROPOSED CONDITION		
			Q TOTAL (CFS)	V CHNL (FT/S)	WSEL (FT)	Q TOTAL (CFS)	V CHNL (FT/S)	WSEL (FT)	Q TOTAL (CFS)	V CHNL (FT/S)	WSEL (FT)	Q TOTAL (CFS)	V CHNL (FT/S)	WSEL (FT)
4	1113	APPROACH	1786	3.87	34.99	1786	3.89	34.94	4361	4.92	41.07	4361	4.93	41.05
3	1040	CONTRACTION	1786	4.16	34.90	1786	4.19	34.85	4361	5.12	41.00	4361	5.13	40.97
-	1000 BR U	US BRIDGE	1786	5.22	34.67	1786	4.54	34.78	4361	6.08	40.76	4361	4.84	40.99
-	1000 BR D	DS BRIDGE	1786	5.26	34.62	1786	4.59	34.71	4361	6.11	40.71	4361	4.86	40.94
2	960	EXPANSION	1786	5.01	34.61	1786	5.01	34.61	4361	5.93	40.69	4361	5.93	40.69
1	781	EXIT	1786	3.94	34.56	1786	3.94	34.56	4361	4.87	40.68	4361	4.87	40.68

ADAM F. FAULKNER
129607
REGISTERED
PROFESSIONAL ENGINEER
STATE OF TEXAS

August 25th, 2020

FIRM REGISTRATION NO. F-230

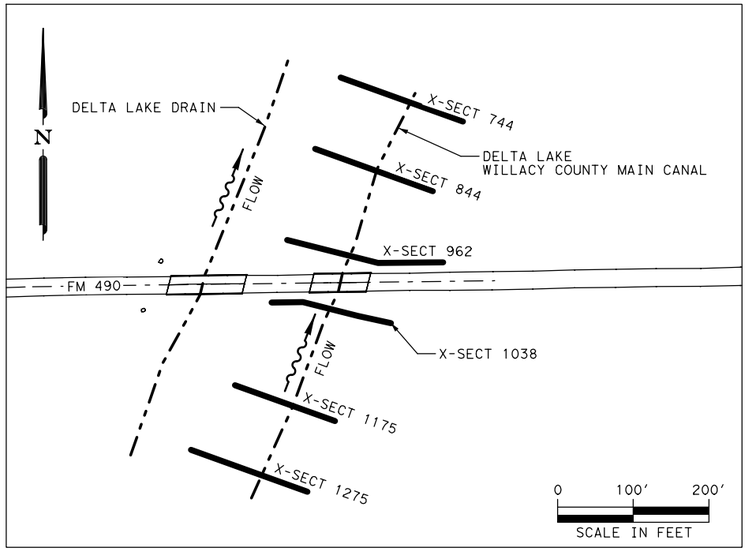
tnp

Texas Department of Transportation
© 2023

FM 490

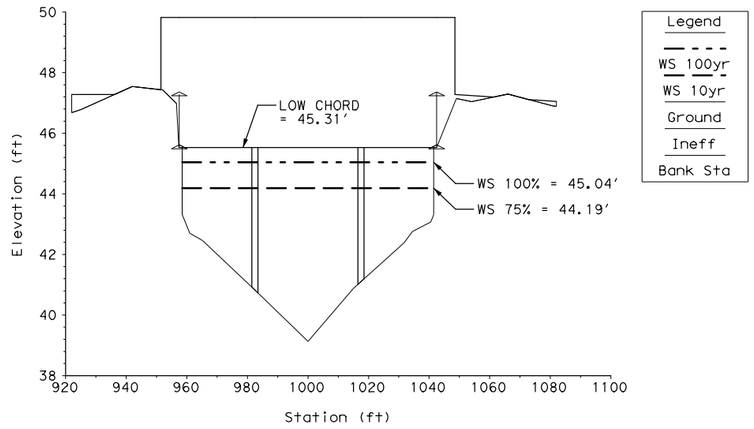
HYDRAULIC DATA SHEET
DELTA LAKE DRAIN

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
DRAWN	6	SEE TITLE SHEET	FM 490
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
	TEXAS	PHR	WILLACY	45
CHECK	CONTROL	SECTION	JOB	
	1430	01	031,Etc	



HECRAS X-SECTION MAP

FM490 Canal Plan: Proposed 2/3/2020
Geom: Proposed Flow: CanalFlows
River = FM490 Canal Reach = 1 RS = 1000 BR Revised Internal BR sections



FM 490 AT WILLACY COUNTY MAIN CANAL

NOTE:

1. HYDRAULIC ANALYSIS COMPLETED USING HEC-RAS VERSION 5.0.7.

2. ALL SECTIONS ARE NORMAL TO STREAM FLOW.

3. ELEVATIONS BASED UPON NORTH AMERICAN VERTICAL DATUM 88 (NAVD88).

4. NORMAL DEPTH COMPUTATIONS USED FOR DOWNSTREAM BOUNDARY CONDITION SLOPE = 0.001 FT/FT* (*FOR BOTH PROPOSED AND EXISTING CONDITIONS).

5. PROJECT OUTSIDE OF ANY FEMA MAPPED FLOODPLAIN.

6. EXISTING LOW CHORD = 45.53'.

7. MAXIMUM CANAL PUMPING RATE IS 450 CFS PER DELTA LAKE IRRIGATION DISTRICT.

FLOW DATA FOR FM 490 AT WILLACY COUNTY MAIN CANAL	
STUDY POINT	Q TOTAL (CFS)
25%	175
50%	350
75%	525
100%	700

FM 490 AT WILLACY COUNTY MAIN CANAL													
X-SECTION ID	HEC-RAS X-SECTION	LOCATION	75% FULL CHANNEL						100% FULL CHANNEL					
			EXISTING CONDITION			PROPOSED CONDITION			EXISTING CONDITION			PROPOSED CONDITION		
			Q TOTAL (CFS)	V CHNL (FT/S)	WSEL (FT)	Q TOTAL (CFS)	V CHNL (FT/S)	WSEL (FT)	Q TOTAL (CFS)	V CHNL (FT/S)	WSEL (FT)	Q TOTAL (CFS)	V CHNL (FT/S)	WSEL (FT)
4	1175	APPROACH	525	2.00	44.36	525	2.00	44.36	700	2.18	45.18	700	2.18	45.19
3	1038	CONTRACTION	525	2.94	44.17	525	2.94	44.18	700	2.99	45.02	700	2.99	45.02
-	1000 BR U	US BRIDGE	525	2.37	44.17	525	2.25	44.19	700	2.50	45.02	700	2.33	45.04
-	1000 BR D	DS BRIDGE	525	2.39	44.15	525	2.28	44.15	700	2.51	45.00	700	2.35	45.00
2	962	EXPANSION	525	2.45	44.12	525	2.45	44.12	700	2.62	44.97	700	2.62	44.97
1	844	EXIT	525	2.09	44.07	525	2.09	44.07	700	2.32	44.92	700	2.32	44.92

ADAM F. FAULKNER
129607
REGISTERED
PROFESSIONAL ENGINEER
STATE OF TEXAS

August 25th, 2020

FIRM REGISTRATION NO. F-230

tnp

Texas Department of Transportation

FM 490

HYDRAULIC DATA SHEET
WILLACY COUNTY MAIN CANAL

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
DRAWN	6	SEE TITLE SHEET	FM 490
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
	TEXAS	PHR	WILLACY	46
CHECK	CONTROL	SECTION	JOB	
	1430	01	031,Etc	

PENTABLE: I:\8984 (FM 490)\Pentable_PSE.tbl
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DATE: 8/25/2020

DATE: 4/19/2023 12:07:40 PM
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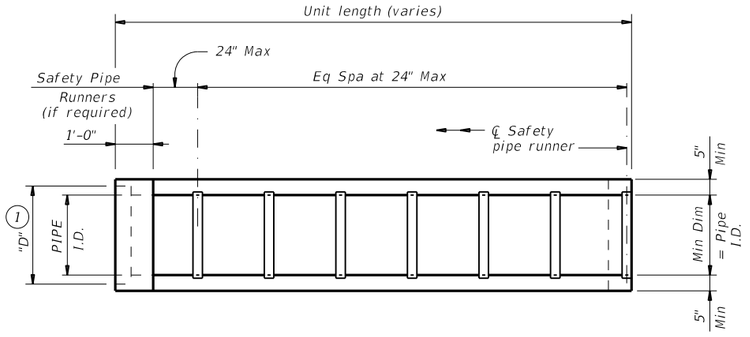
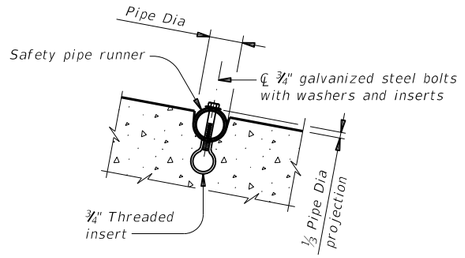


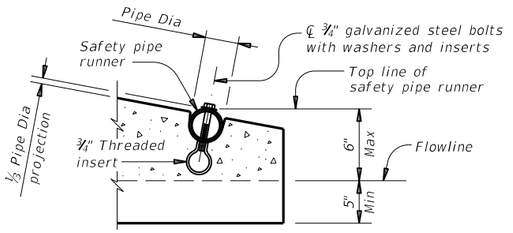
PLAN

(Showing bell end connection.)

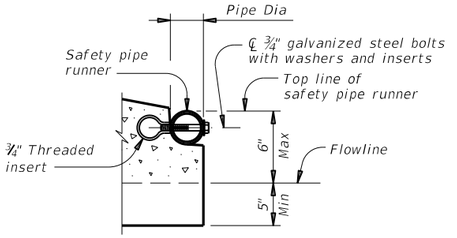


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



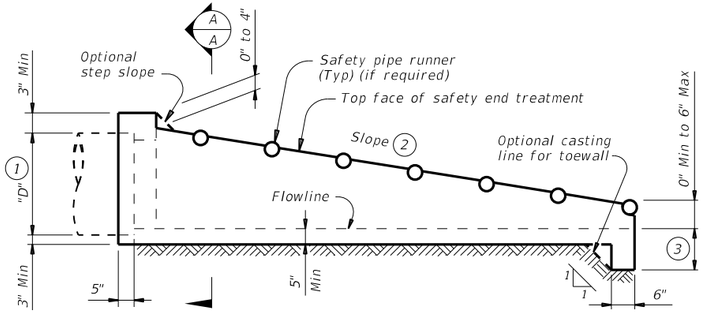
OPTION A



OPTION B

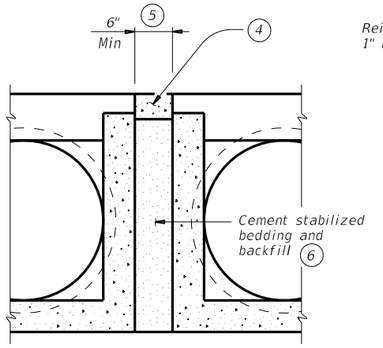
END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

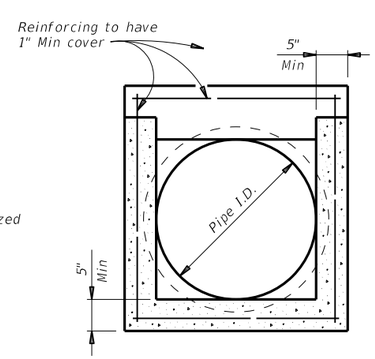


LONGITUDINAL ELEVATION

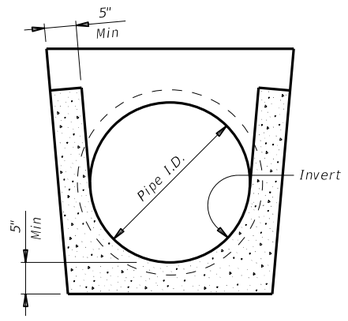
(Showing bell end connection.)



MULTIPLE PIPE INSTALLATION

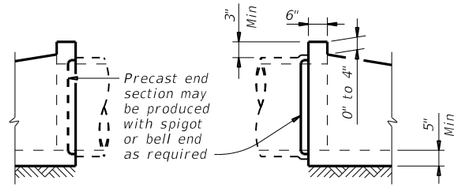


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



OPTIONAL JOINT FOR RCP

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

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (7)	"D" (1)	Slope	Min Length	Pipe Runners Required		Required Pipe Runner Size		
						Single Pipe	Multiple Pipe	Nominal Dia.	O.D.	I.D.
12"	2"	1.15"	17.00"	6:1	4' – 9"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
15"	2 ¼"	1.30"	20.50"	6:1	6' – 5"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
18"	2 ½"	1.60"	24.00"	6:1	8' – 0"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
24"	3"	1.95"	31.00"	6:1	11' – 3"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
30"	3 ½"	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 ½"	2.7"	52.50"	6:1	21' – 2"	Yes	Yes	4" STD	4.500"	4.026"

(1) Dimension "D" is based on reinforced concrete pipe (RCP) meeting the requirements of ASTM C-76, Class III, (RCP Wall "B" thickness). Adjust "D" for any other wall thickness used. For thermoplastic pipe (TP) take into account the annular space requirements for grouted connections.

(2) Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.

(3) Toewall to be used only when dimension is shown elsewhere in the plans.

(4) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment".

(5) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

(6) Provide cement stabilized bedding and backfill in accordance with the Item 400, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

(7) Thermoplastic pipe wall thickness may vary. Adjust accordingly. Thermoplastic pipe requires the safety end treatments to have a bell end for grouted connections.

GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

Connect RCP using the Optional Joint for RCP detail shown or in accordance with Item 464, "Reinforced Concrete Pipe". Connect TP by grouting. See Pipe and Box Grouted Connections (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 ~ PARALLEL DRAINAGE

PSET-SP

FILE: psetspss-21.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-21: Added 42" TP	1430	01	031, ETC	FM 490
	DIST	COUNTY		SHEET NO.
	PHR	WILLACY		47

SUMMARY OF ESTIMATED BRIDGE QUANTITIES

BRIDGE	ITEM	400	403	416	420	420	420	422	425	432	450	454	496
	BID CODE	6005	6001	6002	6013	6029	6037	6007	6010	6031	6023	6020	6009
	DESCRIPTION	CEM STABIL BKFL	TEMPORARY SPL SHORING	DRILL SHAFT (24 IN)	CL C CONC (ABUT)	CL C CONC (CAP)	CL C CONC (COLUMN)	REINF CONC SLAB (SLAB BEAM)	PRESTR CONC SLAB BEAM (5SB12)	RIPRAP (STONE PROTECTION)(12 IN)	RAIL (TY SSTR)	SEALED EXPANSION JOINT (4 IN)(SEJ-B)	REMOV STR (BRIDGE 0 - 99 FT LENGTH)
	UNIT	CY	SF	LF	CY	CY	CY	SF	LF	CY	LF	LF	EA
FM 490 OVER DELTA LAKE DRAIN	2 - ABUTMENTS	41		370	32.2					74	24.0	93	
	2 - BENTS		3,750	220		23.4	17.4						
	1 - 110.00' PRESTRESSED CONCRETE SLAB BEAM UNIT							5,060.00	976.34		220.0		1
	SUBTOTAL CSJ 1430-01-026	41	3,750	590	32.2	23.4	17.4	5,060.00	976.34	74	244.0	93	1
FM 490 OVER WILLACY CO MAIN CANAL													
	2 - ABUTMENTS	41	1,600	350	32.2					66	24.0	93	
	2 - BENTS		1,000	310		23.4	4.6						
	1 - 85.00' PRESTRESSED CONCRETE SLAB BEAM UNIT							3,910.00	751.34		170.0		1
	SUBTOTAL CSJ 1430-01-025	41	2,600	660	32.2	23.4	4.6	3,910.00	751.34	66	194.0	93	1
TOTAL		82	6,350	1,250	64.4	46.8	22.0	8,970.00	1,727.68	140	438.0	186	2

HL93 LOADING

8/26/20

STATE OF TEXAS
GEOFFREY SCHEID
122792
LICENSED PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROVED

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739
5320 N. TARRANT PKWY,
SUITE 260
FORT WORTH, TX, 76244
ENGINEERING FIRM F-739

FM 490
BRIDGE QUANTITIES

SHEET 01 OF 01

DESIGN AIQ	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
DRAWN AIQ	6	SEE TITLE SHEET	FM 490
CHECK EJL	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK GRS	TEXAS	PHR	WILLACY	48
	CONTROL	SECTION	JOB	
	1430	01	031, ETC	

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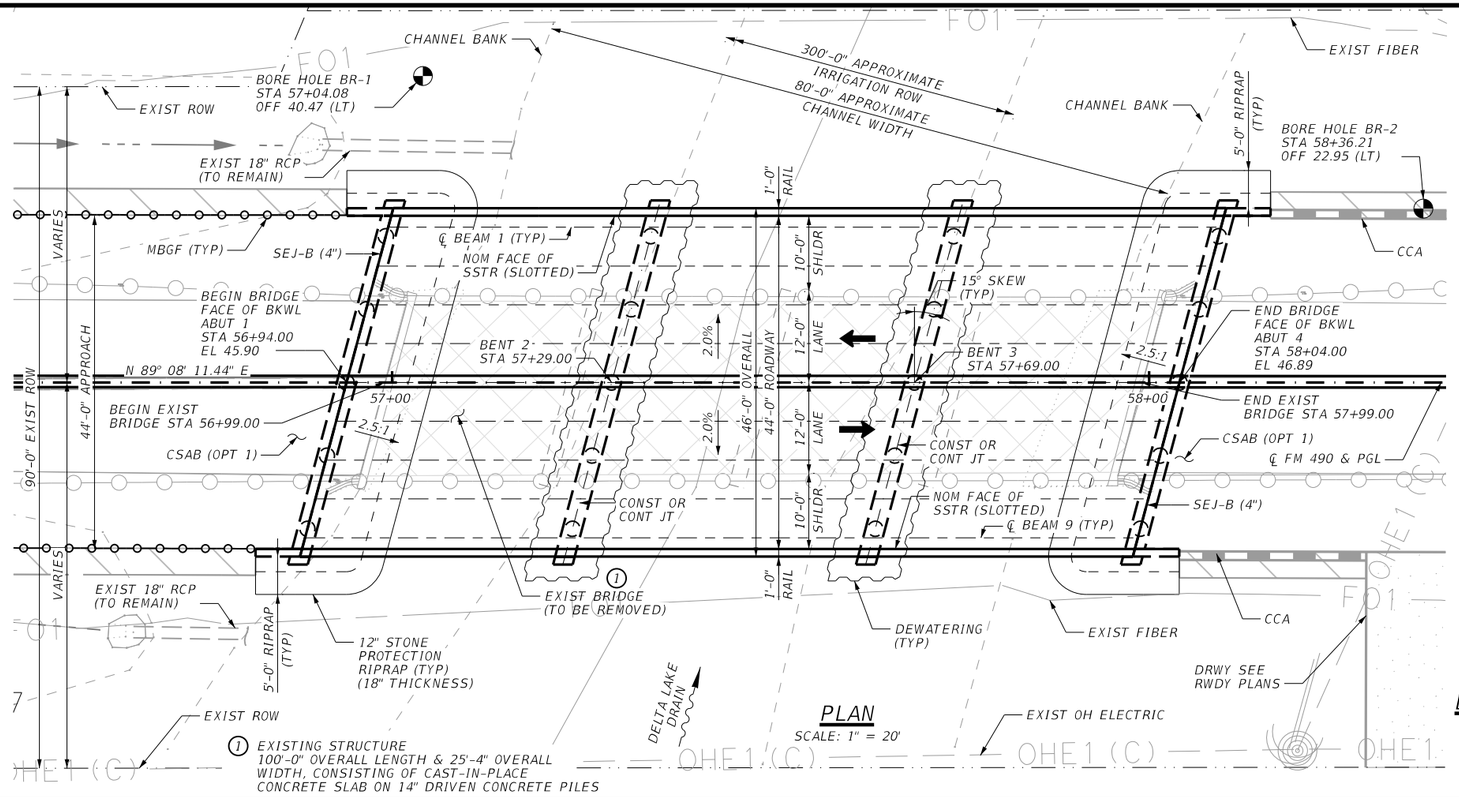
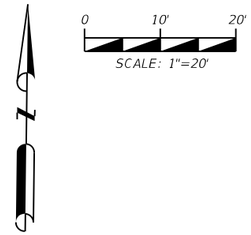


PLAN

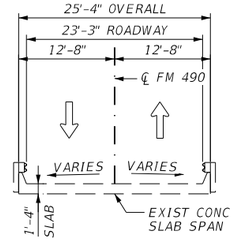
SCALE: 1" = 20'

① EXISTING STRUCTURE
100'-0" OVERALL LENGTH & 25'-4" OVERALL WIDTH, CONSISTING OF CAST-IN-PLACE CONCRETE SLAB ON 14" DRIVEN CONCRETE PILES



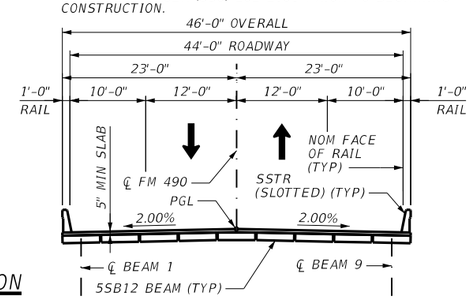
GENERAL NOTES:

1. DESIGNED IN ACCORDANCE WITH AASHTO LRFD SPECIFICATIONS AND INTERIM REVISION THERETO FOR HL93 LOADING, 8TH EDITION (2017).
2. CONTRACTOR SHALL FIELD VERIFY LOCATIONS OF ALL STRUCTURES AND UTILITIES PRIOR TO ORDERING MATERIALS AND NOTIFY ENGINEERS IN WRITING OF ANY CONFLICTS OR DISCREPANCIES.
3. SAW-CUT GROOVING OF THE BRIDGE DECK AND APPROACH SLAB IS REQUIRED.
4. RIPRAP SLOPES SHOWN ARE A MAXIMUM. CONTRACTOR SHALL FIELD VERIFY.
5. SEE CSAB STANDARD FOR CEMENT STABILIZED ABUTMENT BACKFILL DETAILS.
6. SEE SSTR STANDARD FOR SIDE SLOT DRAIN DETAIL.
7. THE "H" VALUES SHOWN ARE ESTIMATED COLUMN HEIGHTS. CONTRACTOR IS RESPONSIBLE FOR CALCULATION OF ACTUAL COLUMN HEIGHTS BASED ON FIELD CONDITIONS.
8. DRAIN DITCH OWNED BY DELTA LAKE IRRIGATION DISTRICT. CONTRACTOR SHALL CONTACT TROY ALLEN – GENERAL MANAGER (956) 262-2101 PRIOR TO BEGINNING CONSTRUCTION.



EXIST TYPICAL SECTION

SCALE: 1" = 20'



PROP TYPICAL SECTION

SCALE: 1" = 20'

ALL ABUTMENTS & BENTS ON BEARING N 14°08'11.44" E

HL93 LOADING

EXISTING NBI: 21-245-0-1430-01-002
PROPOSED NBI: 21-245-0-1430-01-054

FUNCTIONAL CLASS: RURAL MAJOR COLLECTOR
DESIGN SPEED: 65 MPH
ADT (2018): 2,156

END BRIDGE RAIL FOR PAYMENT — OVERALL LENGTH OF SSTR = 122.00' (LT & RT) — END BRIDGE RAIL FOR PAYMENT

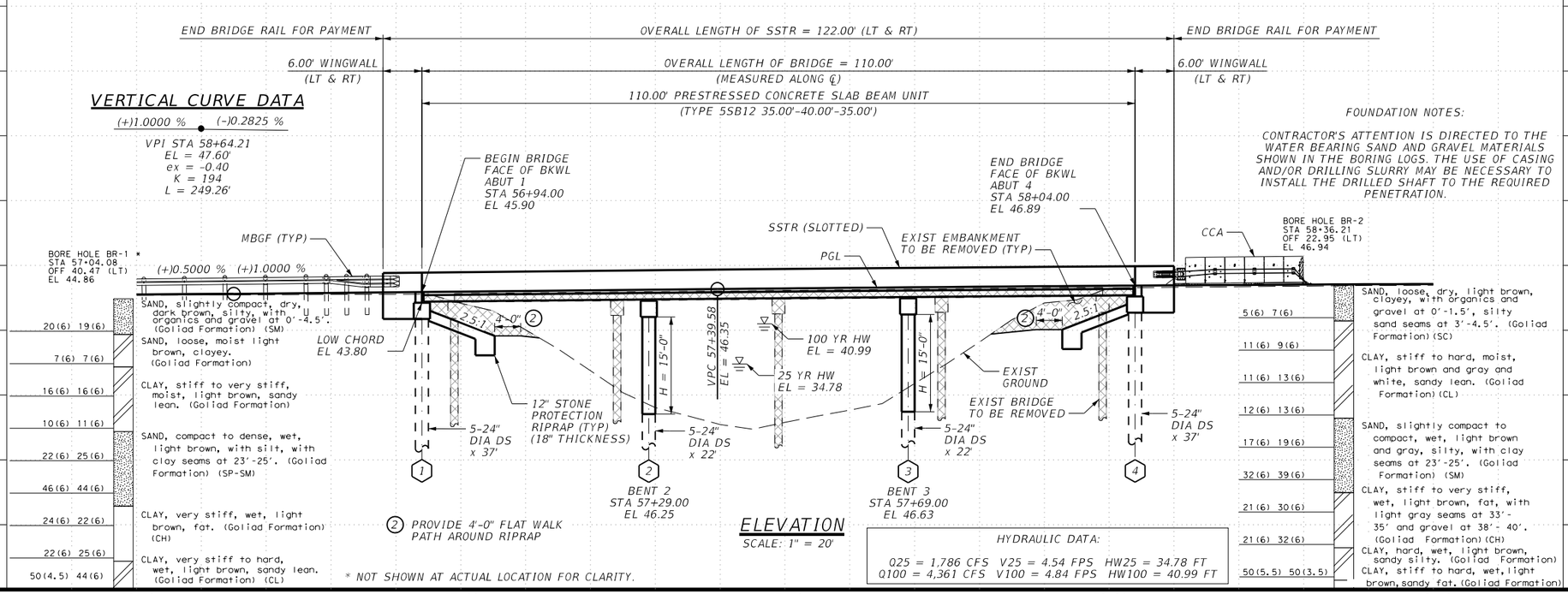
6.00' WINGWALL (LT & RT) — OVERALL LENGTH OF BRIDGE = 110.00' (MEASURED ALONG ℄) — 6.00' WINGWALL (LT & RT)

110.00' PRESTRESSED CONCRETE SLAB BEAM UNIT
(TYPE 5SB12 35.00'-40.00'-35.00')

VERTICAL CURVE DATA

(+)1.0000 % (-)0.2825 %

VPI STA 58+64.21
EL = 47.60'
ex = -0.40
K = 194
L = 249.26'



② PROVIDE 4'-0" FLAT WALK PATH AROUND RIPRAP

* NOT SHOWN AT ACTUAL LOCATION FOR CLARITY.

ELEVATION

SCALE: 1" = 20'

HYDRAULIC DATA:
Q25 = 1,786 CFS V25 = 4.54 FPS HW25 = 34.78 FT
Q100 = 4,361 CFS V100 = 4.84 FPS HW100 = 40.99 FT

FOUNDATION NOTES:

CONTRACTOR'S ATTENTION IS DIRECTED TO THE WATER BEARING SAND AND GRAVEL MATERIALS SHOWN IN THE BORING LOGS. THE USE OF CASING AND/OR DRILLING SLURRY MAY BE NECESSARY TO INSTALL THE DRILLED SHAFT TO THE REQUIRED PENETRATION.

8/26/20

STATE OF TEXAS
GEOFFREY SCHEID
122792
LICENSED PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROVED

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739
5320 N. TARRANT PKWY, SUITE 260
FORT WORTH, TX, 76244
ENGINEERING FIRM F-739

FM 490 OVER DELTA LAKE DRAIN BRIDGE LAYOUT

SCALE: 1" = 20' SHEET 01 OF 01

DESIGN AIQ	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
	6	SEE TITLE SHEET	FM 490
DRAWN AIQ	STATE	DISTRICT	COUNTY
	TEXAS	PHR	WILLACY
CHECK EJL	CONTROL	SECTION	JOB
	1430	01	031, ETC
CHECK GRS			SHEET NO. 49

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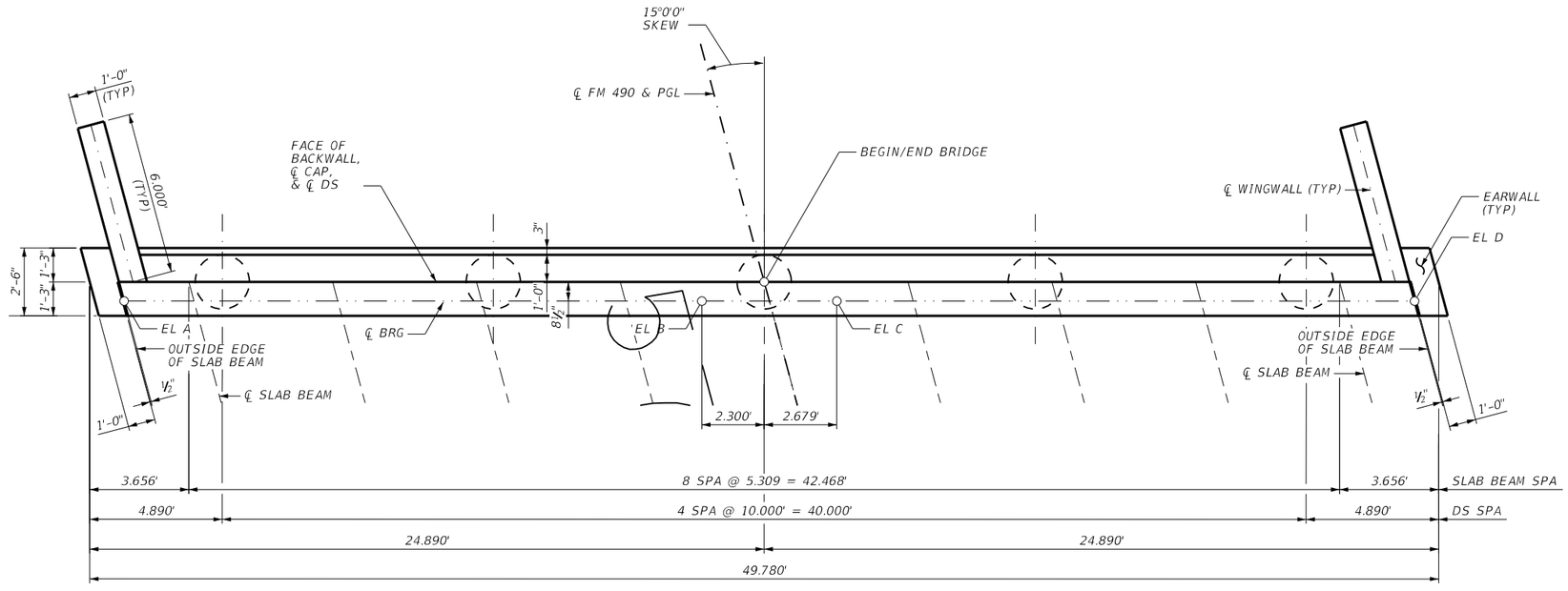
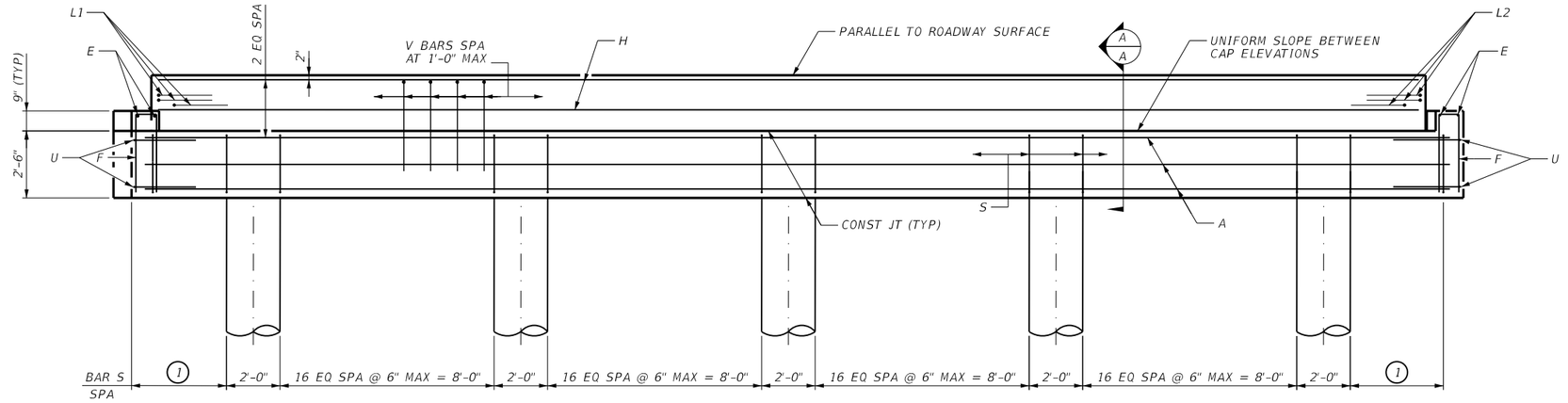


PLAN

SCALE: 3/16" = 1'-0"



ELEVATION

SCALE: 3/16" = 1'-0"

(1) 7 EQ SPA @ 6" MAX = 3'-2"

TABLE OF CAP ELEVATIONS				
ABUT	EL A	EL B	EL C	EL D
1	43.714	44.198	44.191	43.838
4	44.797	45.176	45.160	44.714

GENERAL NOTES:

1. DESIGNED IN ACCORDANCE TO AASHTO LRFD SPECIFICATIONS FOR HL93 LOADING, 8TH EDITION (2017)
2. SEE COMMON FOUNDATION DETAILS (FD) STANDARD FOR ALL FOUNDATION DETAILS AND NOTES.
3. SEE SSTR STANDARDS FOR RAIL ANCHORAGE CAST IN WINGWALLS.
4. COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.
5. REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.
6. FOUNDATION LOAD:
   = 55 TONS/SHAFT (SERVICE 1)
   = 75 TONS/SHAFT (STRENGTH 1)

MATERIAL NOTES:

1. PROVIDE CLASS C CONCRETE (f'c = 3,600 PSI).
2. PROVIDE GRADE 60 REINFORCING STEEL.

HL93 LOADING

8/26/20

STATE OF TEXAS
GEOFFREY SCHEID
122792
PROFESSIONAL LICENSED ENGINEER

NO.	DATE	REVISION	APPROVED

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739
5320 N. TARRANT PKWY, SUITE 260
FORT WORTH, TX, 76244
ENGINEERING FIRM F-739

FM 490 OVER DELTA LAKE DRAIN ABUTMENT DETAILS

SCALE: 3/16" = 1'-0" SHEET 01 OF 02

DESIGN AIQ	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
DRAWN AIQ	6	SEE TITLE SHEET	FM 490
CHECK EJL	STATE	DISTRICT	COUNTY
CHECK GRS	TEXAS	PHR	WILLACY
	CONTROL	SECTION	JOB
	1430	01	031, ETC

SHEET NO. 50

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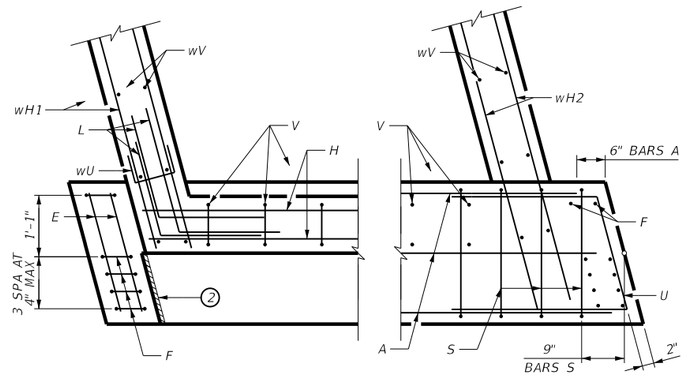
TABLE OF ESTIMATED QUANTITIES

ABUTMENT 1					ABUTMENT 4				
Bar	No.	Size	Length	Weight	Bar	No.	Size	Length	Weight
A	6	#11	48'-9"	1,554	A	6	#11	48'-9"	1,554
E	4	#4	2'-2"	6	E	4	#4	2'-2"	6
F	10	#4	6'-4"	42	F	10	#4	6'-4"	42
H	2	#5	45'-8"	98	H	2	#5	45'-8"	98
L1	3	#6	4'-0"	18	L1	3	#6	4'-0"	18
L2	3	#6	4'-0"	18	L2	3	#6	4'-0"	18
S	90	#4	9'-4"	561	S	90	#4	9'-4"	561
U	4	#6	7'-1	43	U	4	#6	7'-1	43
V	48	#5	7'-4"	367	V	48	#5	7'-4"	367
wH1	8	#6	5'-8"	68	wH1	8	#6	5'-8"	68
wH2	8	#6	6'-11"	83	wH2	8	#6	6'-11"	83
wU	12	#4	1'-8"	13	wU	12	#4	1'-8"	13
wV	28	#5	3'-10"	112	wV	28	#5	3'-10"	112
Reinforcing Steel			LBS	2,983	Reinforcing Steel			LBS	2,983
Class "C" Concrete (HPC)			CY	16.1	Class "C" Concrete (HPC)			CY	16.1



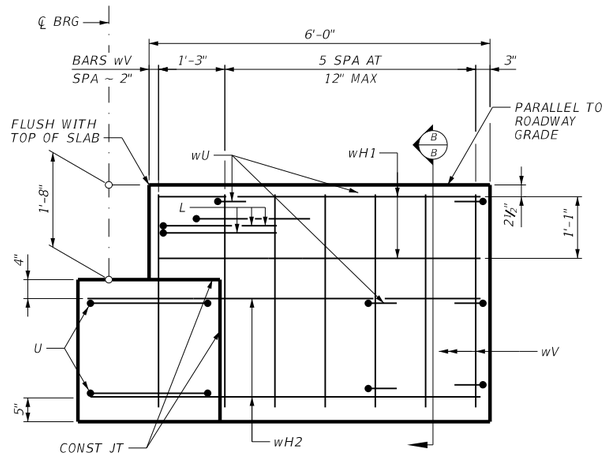
BACKWALL CAP

CORNER DETAILS
(NOT TO SCALE)

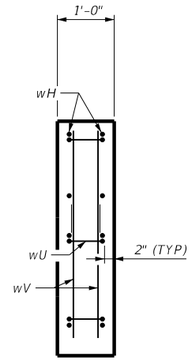
GENERAL NOTES:

1. SEE SHEET 01 OF 02 FOR GENERAL NOTES AND MATERIAL NOTES.

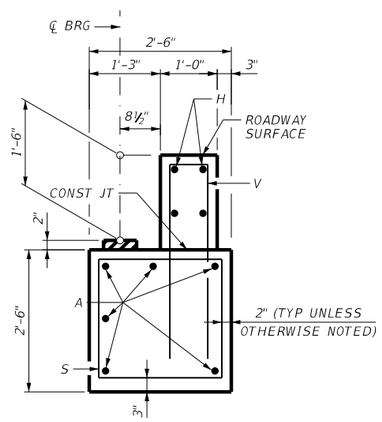
(2) ½" PREFORMED BITUMINOUS FIBER MATERIAL BETWEEN SLAB BEAM AND EARWALL. BOND TO BEAM WITH AN APPROVED ADHESIVE. INSIDE FACE OF EARWALL TO BE CAST WITH VERTICAL SIDE OF BEAM. DO NOT CAST EARWALLS UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION.



WINGWALL ELEVATION
(EARWALL NOT SHOWN FOR CLARITY)
(NOT TO SCALE)



SECTION B-B
(NOT TO SCALE)



SECTION A-A
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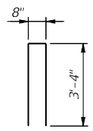

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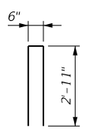
(NOT TO SCALE)



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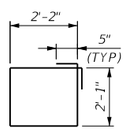

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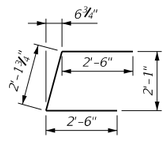
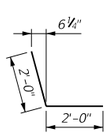


BARS U
(NOT TO SCALE)



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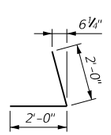

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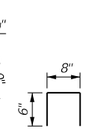

BARS wU
(NOT TO SCALE)

HL93 LOADING

8/26/20

STATE OF TEXAS
GEOFFREY SCHEID
122792
LICENSED PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROVED

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739
5320 N. TARRANT PKWY, SUITE 260
FORT WORTH, TX, 76244
ENGINEERING FIRM F-739

FM 490 OVER DELTA LAKE DRAIN ABUTMENT DETAILS

SHEET 02 OF 02

DESIGN AIQ	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
DRAWN AIQ	6	SEE TITLE SHEET		FM 490
CHECK EJL	STATE	DISTRICT	COUNTY	SHEET NO.
	TEXAS	PHR	WILLACY	51
CHECK GRS	CONTROL	SECTION	JOB	
	1430	01	031, ETC	

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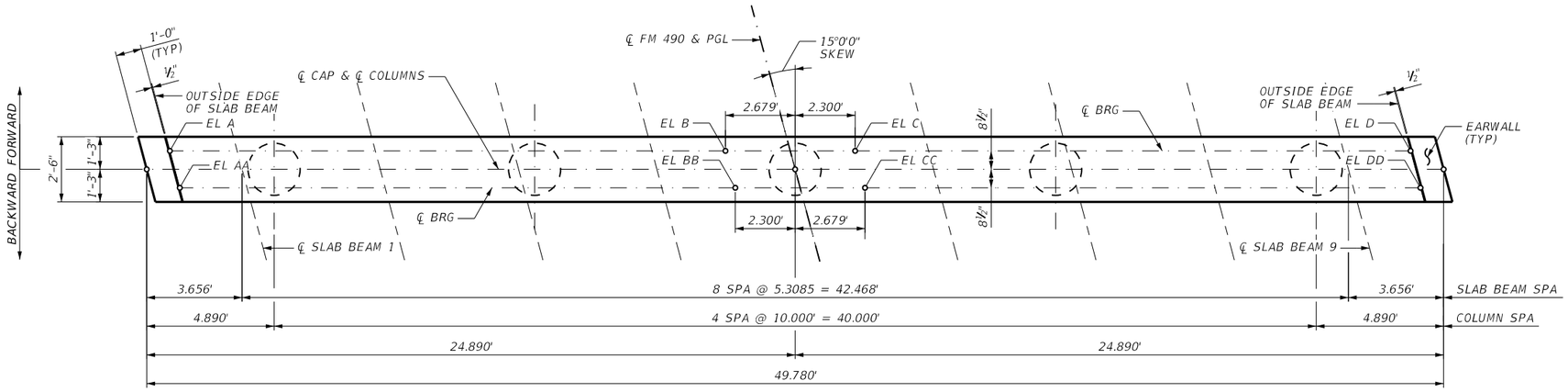
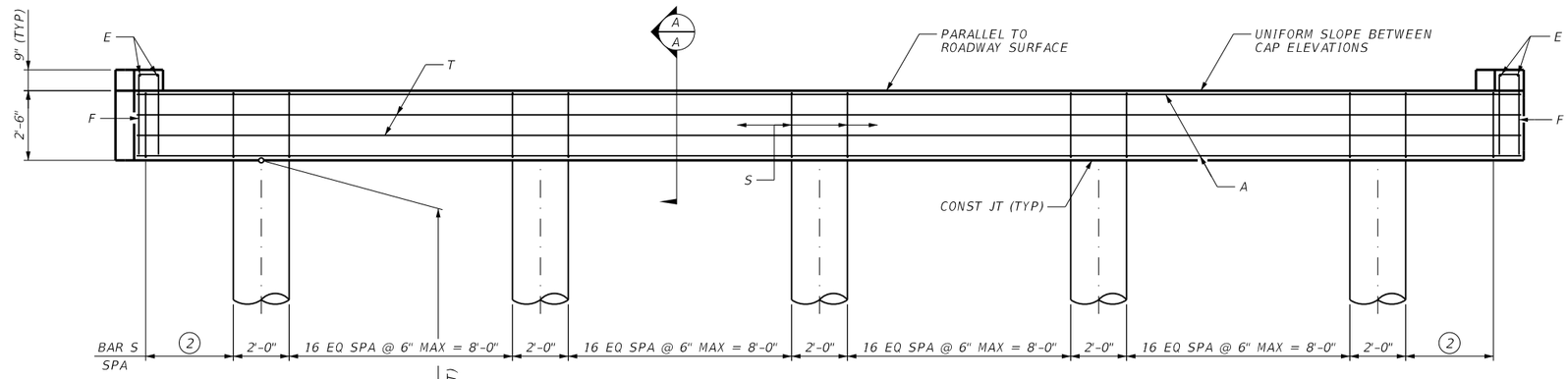


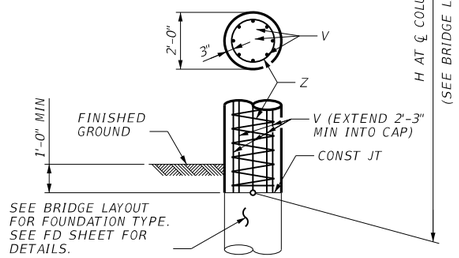
PLAN

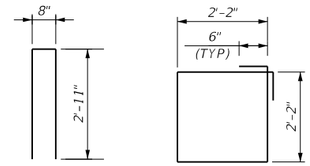
SCALE: 3/16" = 1'-0"



ELEVATION

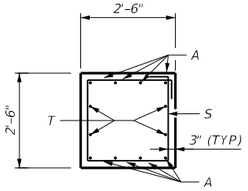
SCALE: 3/16" = 1'-0"





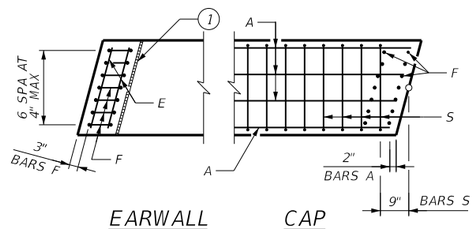
BARS F (NOT TO SCALE)

BARS S (NOT TO SCALE)



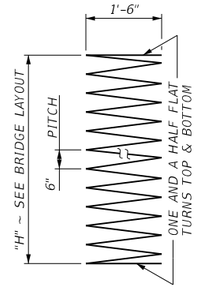
SECTION A-A

(NOT TO SCALE)



EARWALL CAP END DETAIL

(NOT TO SCALE)



BARS Z (NOT TO SCALE)

TABLE OF CAP ELEVATIONS

BENT	EL A	EL AA	EL B	EL BB	EL C	EL CC	EL D	EL DD
2	44.188	44.173	44.541	44.533	44.535	44.512	44.064	44.050
3	44.554	44.542	44.917	44.911	44.913	44.892	44.449	44.437

TABLE OF ESTIMATED QUANTITIES

BENT 2					BENT 3				
Bar	No.	Size	Length	Weight	Bar	No.	Size	Length	Weight
A	8	#11	49'-7"	2,107	A	8	#11	49'-7"	2,107
E	4	#4	2'-3"	6	B	4	#4	2'-3"	6
F	14	#4	6'-4"	59	D	14	#4	6'-4"	59
S	90	#5	3'-1"	289	S	90	#5	3'-1"	289
T	4	#5	19'-9"	82	T	4	#5	19'-9"	82
V	1	#7	17'-3"	1,410	U	1	#7	17'-3"	1,410
Z	2	#3	297'-4"	559	Z	2	#3	297'-4"	559
Reinforcing Steel		LBS	4,512		Reinforcing Steel		LBS	4,512	
Class "C" Concrete (Cap)		CY	11.7		Class "C" Concrete (Cap)		CY	11.7	
Class "C" Concrete (Column)		CY	8.7		Class "C" Concrete (Column)		CY	8.7	

GENERAL NOTES:

1. DESIGNED IN ACCORDANCE TO AASHTO LRFD SPECIFICATIONS FOR HL93 LOADING, 8TH EDITION (2017)
2. SEE COMMON FOUNDATION (FD) STANDARD FOR ALL FOUNDATION DETAILS AND NOTES.
3. COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.
4. REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.
5. FOUNDATION LOAD
   SERVICE 1 = 90 TONS/SHAFT
   STRENGTH 1 = 125 TONS/SHAFT

MATERIAL NOTES:

1. PROVIDE CLASS C CONCRETE (f'c = 3,600 PSI).
2. PROVIDE GRADE 60 REINFORCING STEEL.

(1) ½" PREFORMED BITUMINOUS FIBER MATERIAL BETWEEN SLAB BEAM AND EARWALL. BOND TO EARWALL WITH AN APPROVED ADHESIVE. CAST INSIDE FACE OF EARWALL PERPENDICULAR TO CAP. DO NOT CAST EARWALLS UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION.

(2) 7 EQ SPA @ 6" MAX = 3'-2"

HL93 LOADING

8/26/20

STATE OF TEXAS
GEOFFREY SCHEID
122792
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROVED

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739
5320 N. TARRANT PKWY, SUITE 260
FORT WORTH, TX, 76244
ENGINEERING FIRM F-739

Texas Department of Transportation

FM 490 OVER DELTA LAKE DRAIN BENT DETAILS

SCALE: 3/16" = 1'-0" SHEET 01 OF 01

DESIGN AIQ	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
	6	SEE TITLE SHEET	FM 490
DRAWN AIQ	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK EJL	TEXAS	PHR	WILLACY	52
CHECK GRS	CONTROL	SECTION	JOB	
	1430	01	031, ETC	

PENTABLE: 29302-3gen.tbl
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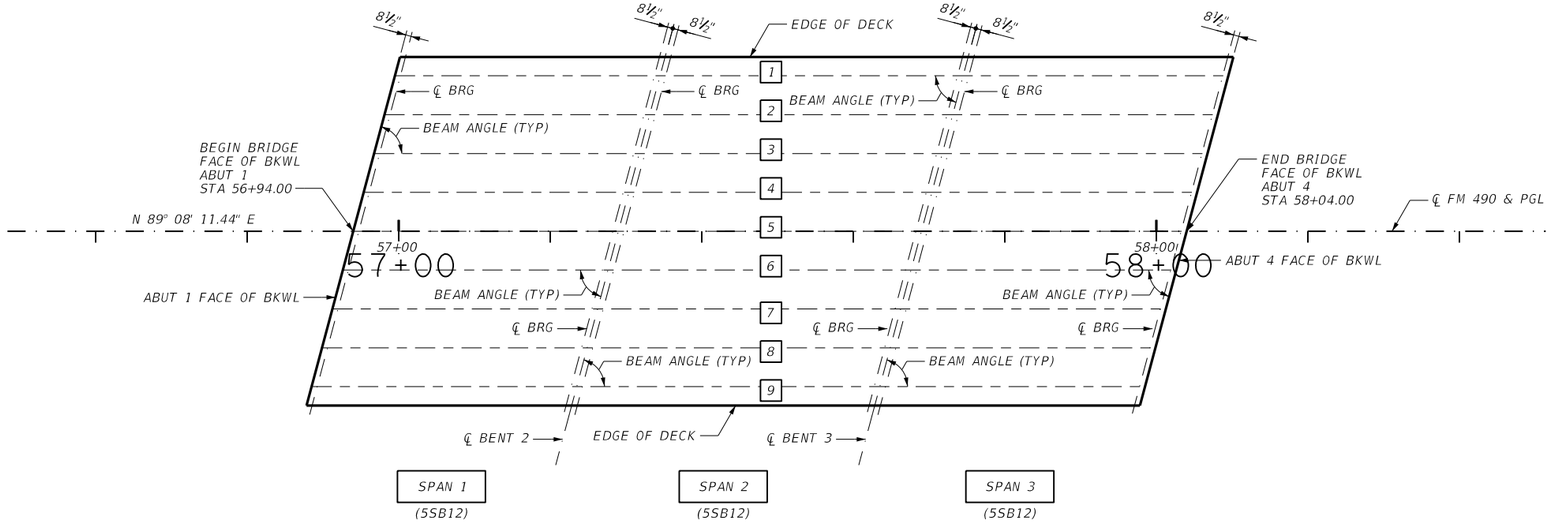

FRAMING PLAN

GENERAL NOTES:

1. DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN.
2. SEE PSBEB FOR ADDITIONAL INFORMATION NOT SHOWN.
3. TRUE DISTANCE BOTTOM GIRDER FLANGE LENGTHS SHOWN INCLUDE GIRDER SLOPE ADJUSTMENTS.

BENT REPORT

ABUT NO. 1 (N 14° 8' 11.44" E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 21.234 L

			BEAM SPAC. (CL BENT)	BEAM ANGLE D	M	S
SPAN 1	BEAM	1	0.000	75	0	0.00
	BEAM	2	5.308	75	0	0.00
	BEAM	3	5.308	75	0	0.00
	BEAM	4	5.308	75	0	0.00
	BEAM	5	5.308	75	0	0.00
	BEAM	6	5.308	75	0	0.00
	BEAM	7	5.308	75	0	0.00
	BEAM	8	5.308	75	0	0.00
	BEAM	9	5.308	75	0	0.00
	TOTAL		42.468			

BENT NO. 2 (N 14° 8' 11.44" E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 21.234 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 2	BEAM	1	0.000	75	0	0.00
	BEAM	2	5.308	75	0	0.00
	BEAM	3	5.308	75	0	0.00
	BEAM	4	5.308	75	0	0.00
	BEAM	5	5.308	75	0	0.00
	BEAM	6	5.308	75	0	0.00
	BEAM	7	5.308	75	0	0.00
	BEAM	8	5.308	75	0	0.00
	BEAM	9	5.308	75	0	0.00
	TOTAL		42.468			

BENT NO. 3 (N 14° 8' 11.44" E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 21.234 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 3	BEAM	1	0.000	75	0	0.00
	BEAM	2	5.308	75	0	0.00
	BEAM	3	5.308	75	0	0.00
	BEAM	4	5.308	75	0	0.00
	BEAM	5	5.308	75	0	0.00
	BEAM	6	5.308	75	0	0.00
	BEAM	7	5.308	75	0	0.00
	BEAM	8	5.308	75	0	0.00
	BEAM	9	5.308	75	0	0.00
	TOTAL		42.468			

BENT NO. 2 (N 14° 8' 11.44" E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 21.234 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 1	BEAM	1	0.000	75	0	0.00
	BEAM	2	5.308	75	0	0.00
	BEAM	3	5.308	75	0	0.00
	BEAM	4	5.308	75	0	0.00
	BEAM	5	5.308	75	0	0.00
	BEAM	6	5.308	75	0	0.00
	BEAM	7	5.308	75	0	0.00
	BEAM	8	5.308	75	0	0.00
	BEAM	9	5.308	75	0	0.00
	TOTAL		42.468			

BENT NO. 3 (N 14° 8' 11.44" E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 21.234 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 2	BEAM	1	0.000	75	0	0.00
	BEAM	2	5.308	75	0	0.00
	BEAM	3	5.308	75	0	0.00
	BEAM	4	5.308	75	0	0.00
	BEAM	5	5.308	75	0	0.00
	BEAM	6	5.308	75	0	0.00
	BEAM	7	5.308	75	0	0.00
	BEAM	8	5.308	75	0	0.00
	BEAM	9	5.308	75	0	0.00
	TOTAL		42.468			

ABUT NO. 4 (N 14° 8' 11.44" E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 21.234 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 3	BEAM	1	0.000	75	0	0.00
	BEAM	2	5.308	75	0	0.00
	BEAM	3	5.308	75	0	0.00
	BEAM	4	5.308	75	0	0.00
	BEAM	5	5.308	75	0	0.00
	BEAM	6	5.308	75	0	0.00
	BEAM	7	5.308	75	0	0.00
	BEAM	8	5.308	75	0	0.00
	BEAM	9	5.308	75	0	0.00
	TOTAL		42.468			

GIRDER REPORT

BEAM REPORT AT CENTER OF SLAB BEAM, SPAN 1

		HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE
BEAM	1	35.000	33.533	34.493	0.010
BEAM	2	35.000	33.533	34.493	0.010
BEAM	3	35.000	33.533	34.493	0.010
BEAM	4	35.000	33.533	34.493	0.010
BEAM	5	35.000	33.533	34.493	0.010
BEAM	6	35.000	33.533	34.493	0.010
BEAM	7	35.000	33.533	34.493	0.010
BEAM	8	35.000	33.533	34.493	0.010
BEAM	9	35.000	33.533	34.493	0.010

BEAM REPORT AT CENTER OF SLAB BEAM, SPAN 2

		HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE
BEAM	1	40.000	38.533	39.502	0.009
BEAM	2	40.000	38.533	39.502	0.009
BEAM	3	40.000	38.533	39.502	0.009
BEAM	4	40.000	38.533	39.502	0.010
BEAM	5	40.000	38.533	39.502	0.010
BEAM	6	40.000	38.533	39.502	0.010
BEAM	7	40.000	38.533	39.502	0.010
BEAM	8	40.000	38.533	39.502	0.010
BEAM	9	40.000	38.533	39.502	0.010

BEAM REPORT AT CENTER OF SLAB BEAM, SPAN 3

		HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE
BEAM	1	35.000	33.533	34.492	0.007
BEAM	2	35.000	33.533	34.492	0.007
BEAM	3	35.000	33.533	34.492	0.007
BEAM	4	35.000	33.533	34.492	0.008
BEAM	5	35.000	33.533	34.492	0.008
BEAM	6	35.000	33.533	34.492	0.008
BEAM	7	35.000	33.533	34.492	0.008
BEAM	8	35.000	33.533	34.492	0.008
BEAM	9	35.000	33.533	34.492	0.008

HL93 LOADING

8/26/20

STATE OF TEXAS
GEOFFREY SCHEID
122792
LICENSED PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROVED

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739
5320 N. TARRANT PKWY,
SUITE 260
FORT WORTH, TX, 76244
ENGINEERING FIRM F-739

FM 490 OVER DELTA LAKE DRAIN FRAMING PLAN

SCALE: 1" = 20' SHEET 01 OF 01

DESIGN AIQ	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
	6	SEE TITLE SHEET	FM 490
DRAWN AIQ	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK EJL	TEXAS	PHR	WILLACY	53
CHECK GRS	CONTROL	SECTION	JOB	
	1430	01	031, ETC	

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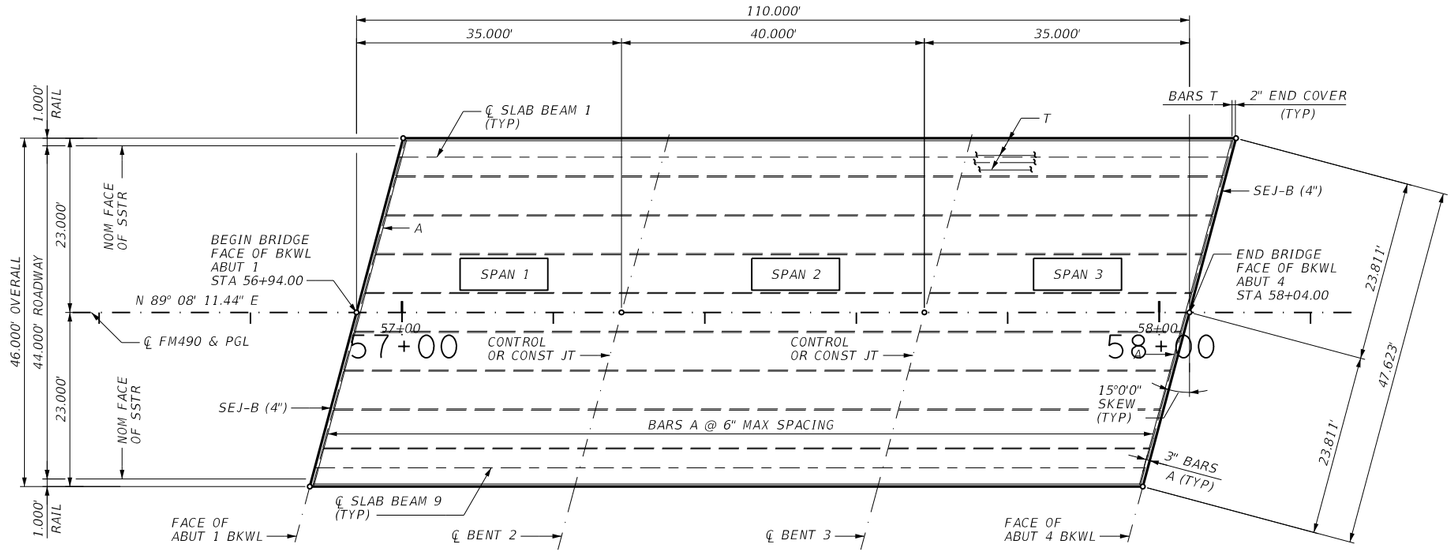
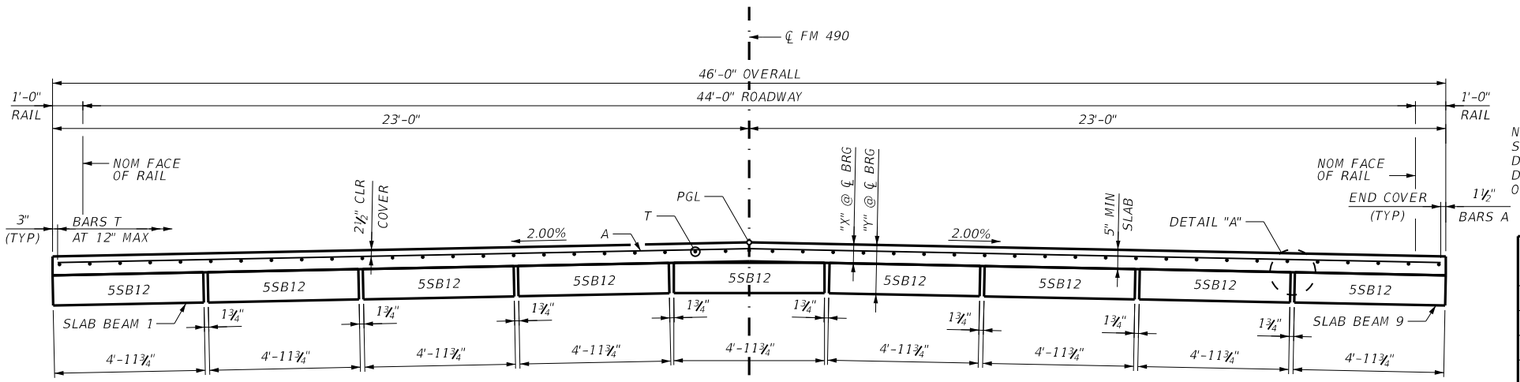


PLAN



TRANSVERSE SECTION

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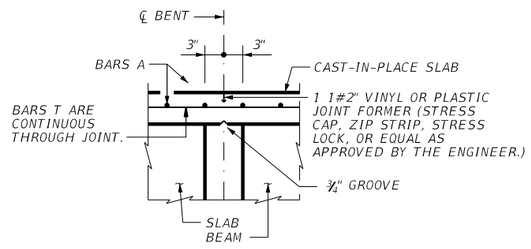
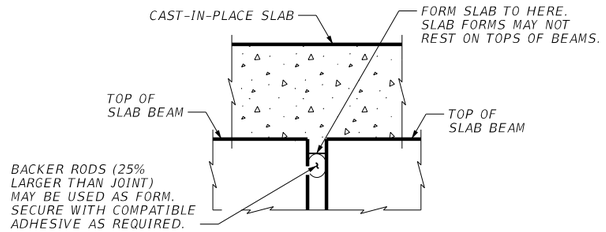


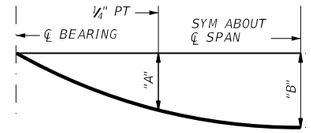
CONTINUOUS SLAB DETAIL

(NOT TO SCALE)



DETAIL "A"

(NOT TO SCALE)



DEAD LOAD DEFLECTION DIAGRAM

NOTE: DEFLECTIONS SHOWN ARE DUE TO CONCRETE SLAB ONLY (E_C = 5,000 KSI). CALCULATED DEFLECTIONS SHOWN ARE THEORETICAL AND ACTUAL DIMENSIONS MAY VARY. ADJUST BASED ON FIELD OBSERVATION.

TABLE OF DEAD LOAD DEFLECTIONS

SPAN	BEAM	"A" (FT)	"B" (FT)
1	1-9	-0.012	-0.018
2	1-9	-0.022	-0.031
3	1-9	-0.012	-0.018

TABLE OF SECTION DEPTHS

SPAN NO.	BEAM NO.	"X" AT CL BRG	"Y" AT CL BRG
1	1-9	7"	1'-7"
2	1-9	7"	1'-7"
3	1-9	7"	1'-7"

BAR TABLE

BAR	SIZE
A	#5
T	#4

TABLE OF ESTIMATED QUANTITIES

SPAN	REINF CONC SLAB	PRESTR CONC SLAB BEAM (2)	REINF STEEL (1)
	SF	LF	LB
1	1,610	310.42	4,508
2	1,840	355.50	5,152
3	1,610	310.42	4,508

GENERAL NOTES:

1. DESIGNED IN ACCORDANCE WITH AASHTO LRFD SPECIFICATIONS FOR HL93 LOADING, 8TH EDITION (2017).
2. SEE SSTR RAIL DETAILS AND PSBRA STANDARD FOR RAIL ANCHORAGE IN SLAB.
3. COVER DIMENSIONS ARE CLEAR DIMENSIONS UNLESS NOTED OTHERWISE.

MATERIAL NOTES:

1. PROVIDE CLASS S CONCRETE (f'c = 4,000 PSI)
2. PROVIDE GRADE 60 REINFORCING STEEL.
3. PROVIDE BAR LAPS, WHERE REQUIRED, AS FOLLOWS:

UNCOATED ~#4 = 1'-7"
~#5 = 2'-0"

4. DEFORMED WELDED WIRE REINFORCEMENT (WWR) (ASTM A1064) OF EQUAL SIZE AND SPACING MAY BE SUBSTITUTED FOR BARS A OR T UNLESS NOTED OTHERWISE.

(1) REINFORCING STEEL WEIGHT IS CALCULATED USING AN APPROXIMATE FACTOR OF 2.8 LBS/SF.

(2) FABRICATOR WILL ADJUST BEAM LENGTHS FOR BEAM SLOPES AS REQUIRED.

HL93 LOADING

8/26/20

STATE OF TEXAS
GEOFFREY SCHEID
122792
PROFESSIONAL ENGINEER
LICENSED

NO.	DATE	REVISION	APPROVED

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739
5320 N. TARRANT PKWY, SUITE 260
FORT WORTH, TX, 76244
ENGINEERING FIRM F-739

FM 490 OVER DELTA LAKE DRAIN PRESTRESSED CONC SLAB BEAM UNIT 1

SCALE: 1" = 20' SHEET 01 OF 01

DESIGN AIQ	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
	6	SEE TITLE SHEET	FM 490
DRAWN AIQ	STATE	DISTRICT	COUNTY
CHECK EJL	TEXAS	PHR	WILLACY
CHECK GRS	CONTROL	SECTION	JOB
	1430	01	031, ETC

SHEET NO. 54

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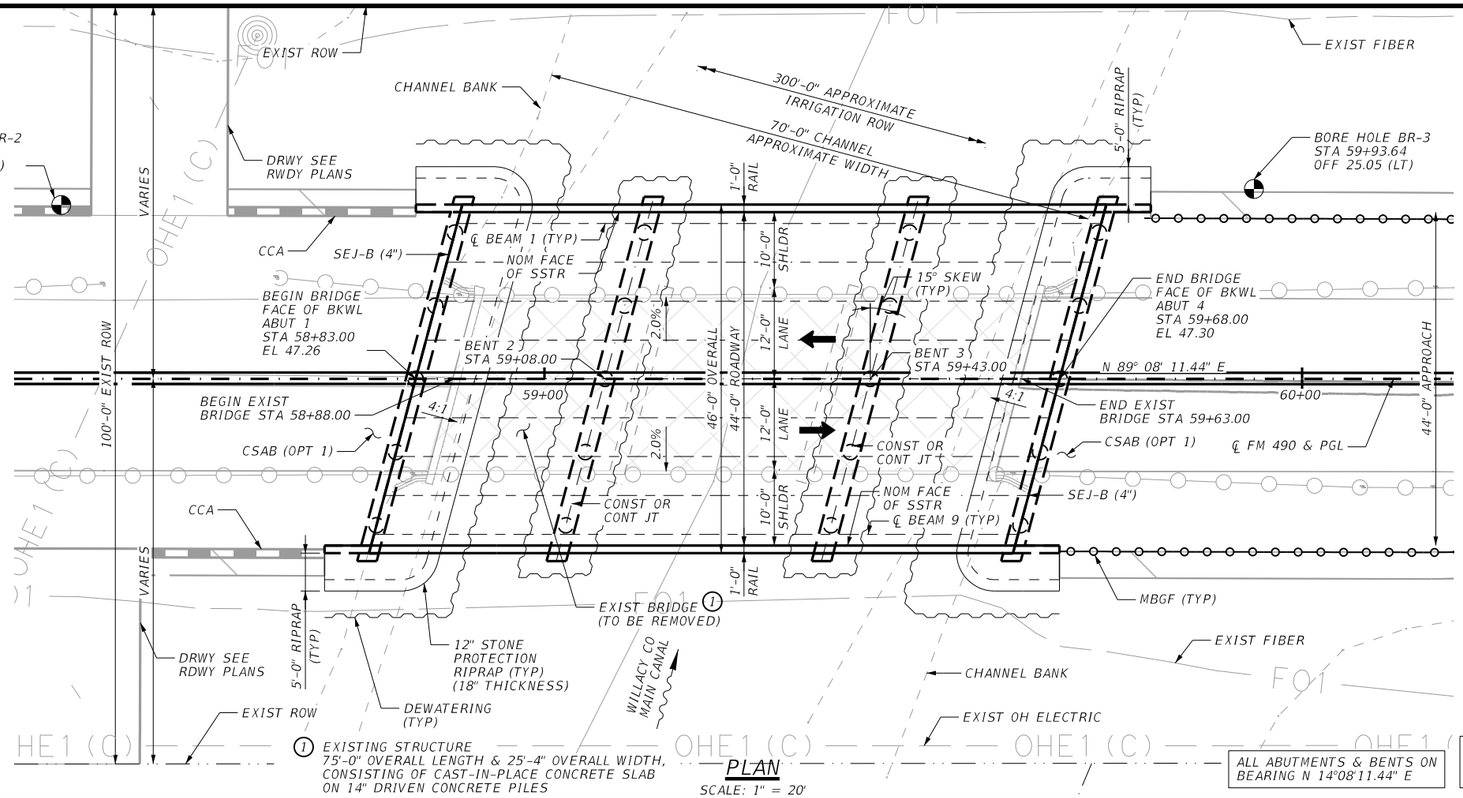


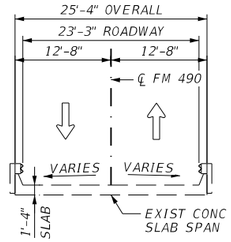
① EXISTING STRUCTURE
75'-0" OVERALL LENGTH & 25'-4" OVERALL WIDTH, CONSISTING OF CAST-IN-PLACE CONCRETE SLAB ON 14" DRIVEN CONCRETE PILES

PLAN
SCALE: 1" = 20'

ALL ABUTMENTS & BENTS ON BEARING N 14°08'11.44" E

FUNCTIONAL CLASS: RURAL MAJOR COLLECTOR
DESIGN SPEED: 65 MPH
ADT (2018): 2,156

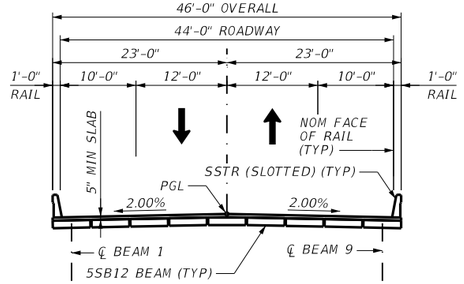
0 10' 20'
SCALE: 1"=20'



EXIST TYPICAL SECTION
SCALE: 1" = 20'

GENERAL NOTES:

1. DESIGNED IN ACCORDANCE WITH AASHTO LRFD SPECIFICATIONS AND INTERIM REVISION THERETO FOR HL93 LOADING, 8TH EDITION (2017).
2. CONTRACTOR SHALL FIELD VERIFY LOCATIONS OF ALL STRUCTURES AND UTILITIES PRIOR TO ORDERING MATERIALS AND NOTIFY ENGINEERS IN WRITING OF ANY CONFLICTS OR DISCREPANCIES.
3. SAW-CUT GROOVING OF THE BRIDGE DECK AND APPROACH SLAB IS REQUIRED.
4. RIPRAP SLOPES SHOWN ARE A MAXIMUM. CONTRACTOR SHALL FIELD VERIFY.
5. SEE CSAB STANDARD FOR CEMENT STABILIZED ABUTMENT BACKFILL DETAILS.
6. THE "H" VALUES SHOWN ARE ESTIMATED COLUMN HEIGHTS. CONTRACTOR IS RESPONSIBLE FOR CALCULATION OF ACTUAL COLUMN HEIGHTS BASED ON FIELD CONDITIONS.
7. IRRIGATION CANAL OWNED BY DELTA LAKE IRRIGATION DISTRICT. CONTRACTOR SHALL CONTACT TROY ALLEN – GENERAL MANAGER (956) 262-2101 PRIOR TO BEGINNING CONSTRUCTION.



TYPICAL SECTION
SCALE: 1" = 20'

HL93 LOADING

EXISTING NBI: 21-245-0-1430-01-003
PROPOSED NBI: 21-245-0-1430-01-055

HYDRAULIC DATA:
Q(75%) = 525 CFS V(75%) = 2.25 FPS HW(75%) = 44.19 FT
Q(100%) = 700 CFS V(100%) = 2.33 FPS HW(100%) = 45.04 FT

VERTICAL CURVE DATA
(+)1.0000 % (-)0.2825 %
VPI STA 58+64.21
EL = 47.60'
ex = -0.40
K = 194
L = 249.26'

END BRIDGE RAIL FOR PAYMENT
6.00' WINGWALL (LT & RT)
OVERALL LENGTH OF SSTR = 97.00' (LT & RT)
OVERALL LENGTH OF BRIDGE = 85.00' (MEASURED ALONG ℄)
85.00' PRESTRESSED CONCRETE SLAB BEAM UNIT (TYPE 5SB12 25.00'-35.00'-25.00')

BEGIN BRIDGE FACE OF BKWL ABUT 1 STA 58+83.00 EL 47.26
END BRIDGE FACE OF BKWL ABUT 4 STA 59+68.00 EL 47.30
VPT 59+88.84 EL = 47.25
(-)0.2825 % (-)0.7462 %
CCA
SSTR (SLOTTED)
PGL
MBGF (TYP)
BORE HOLE BR-2 STA 58+36.21 OFF 22.95 (LT) EL 46.94
BORE HOLE BR-3 STA 59+93.63 OFF 25.05 (LT) EL 47.03
4:1
4'-0"
H = 4'-0"
12" STONE PROTECTION RIPRAP (TYP) (18" THICKNESS)
REMOVE EXIST BRIDGE
5-24" DIA DS x 35'
5-24" DIA DS x 31'
75% HW EL = 44.19
100% HW EL = 45.04
EXIST GROUND
LOW CHORD EL 45.31
5-24" DIA DS x 35'
BENT 2 STA 59+08.00 EL 47.31
BENT 2 STA 59+43.00 EL 47.32
② PROVIDE 4'-0" FLAT WALK PATH AROUND RIPRAP

5(6) 7(6)	SAND, loose, dry, light brown, clayey, with organics and gravel at 0'-1.5', silty sand seams at 3'-4.5'. (Goliad Formation)
11(6) 9(6)	
11(6) 13(6)	CLAY, stiff to hard, moist, light brown and gray and white, sandy lean. (Goliad Formation)
12(6) 13(6)	
17(6) 19(6)	SAND, slightly compact to compact, wet, light brown and gray, silty, with clay seams at 23'-25'. (Goliad Formation) (SM)
32(6) 39(6)	
21(6) 30(6)	CLAY, stiff to very stiff, wet, light brown, fat, with light gray seams at 33'-35' and gravel at 38'-40'. (Goliad Formation)
21(6) 32(6)	
50(5.5) 50(3.5)	CLAY, hard, wet, light brown, sandy silty. (Goliad Formation) CLAY, stiff to hard, wet, light brown, sandy fat. (Goliad Formation)
4(6) 3(6)	CLAY, very soft, dry, brown and light brown, sandy lean, with organics at 0'-1.5' and gravel at 1.5'-3'. (Lissie Formation)
7(6) 9(6)	SAND, loose, moist to wet, dark brown and light brown, clayey. (Lissie Formation)
9(6) 11(6)	
8(6) 10(6)	SAND, slightly compact, wet, light brown, silty, clayey. (Lissie Formation) (SC-SM)
15(6) 17(6)	
50(4.25) 50(3.5)	CLAY, stiff to hard, wet, light brown, lean. (Lissie Formation)
20(6) 24(6)	
18(6) 21(6)	SAND, slightly compact to dense, wet, light brown, silty, with clay seams. (Lissie Formation) (SM)
49(6) 50(5.25)	

58+50 59+00 59+50 60+00

ELEVATION
SCALE: 1" = 20'

FOUNDATION NOTES:

CONTRACTOR'S ATTENTION IS DIRECTED TO THE WATER BEARING SAND AND GRAVEL MATERIALS SHOWN IN THE BORING LOGS. THE USE OF CASING AND/OR DRILLING SLURRY MAY BE NECESSARY TO INSTALL THE DRILLED SHAFT TO THE REQUIRED PENETRATION.

8/26/20

STATE OF TEXAS
GEOFFREY SCHEID
122792
LICENSED PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROVED

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739
5320 N. TARRANT PKWY, SUITE 260
FORT WORTH, TX, 76244
ENGINEERING FIRM F-739

FM 490 OVER WILLACY CO MAIN CANAL BRIDGE LAYOUT

SCALE: 1" = 20' SHEET 01 OF 01

DESIGN AIQ	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
DRAWN AIQ	6	SEE TITLE SHEET	FM 490
CHECK EJL	STATE: TEXAS	DISTRICT: PHR	COUNTY: WILLACY
CHECK GRS	CONTROL: 1430	SECTION: 01	JOB: 031, ETC

SHEET NO. 55

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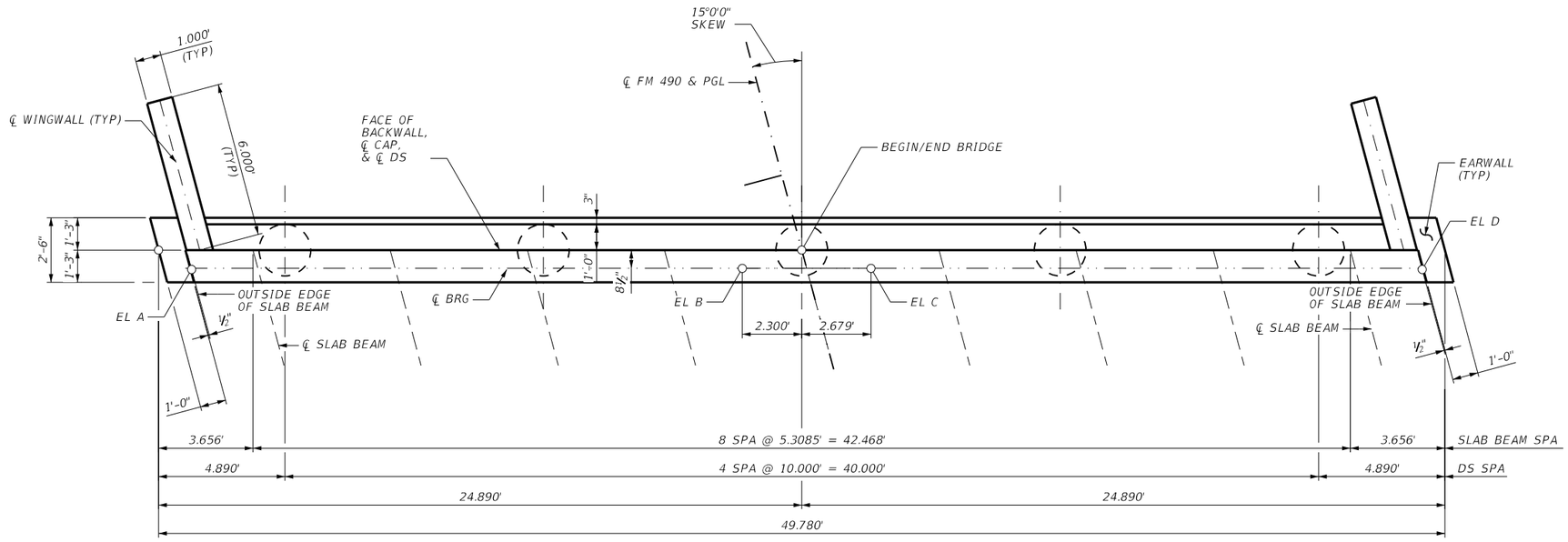
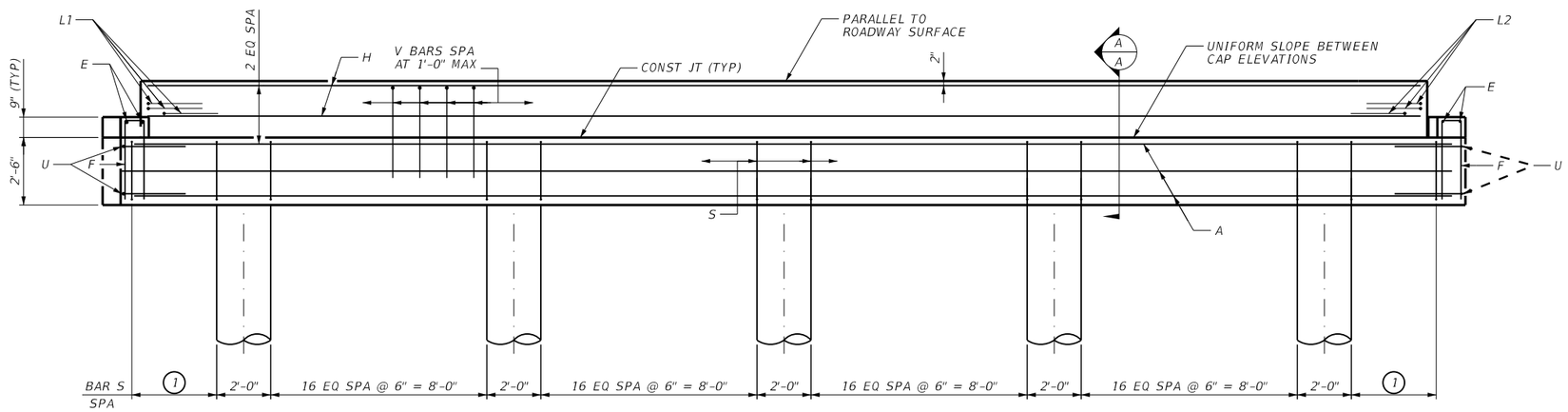


PLAN

SCALE: 3/16" = 1'-0"



ELEVATION

SCALE: 3/16" = 1'-0"

(1) 7 EQ SPA @ 6" MAX = 3'-2"

TABLE OF CAP ELEVATIONS				
ABUT	EL A	EL B	EL C	EL D
1	45.114	45.545	45.541	45.146
4	45.156	45.582	45.577	45.177

GENERAL NOTES:

1. DESIGNED IN ACCORDANCE TO AASHTO LRFD SPECIFICATIONS FOR HL93 LOADING, 8TH EDITION (2017)
2. SEE COMMON FOUNDATION (FD) STANDARD FOR ALL FOUNDATION DETAILS AND NOTES.
3. SEE SSTR STANDARD FOR RAIL ANCHORAGE CAST IN WINGWALLS.
4. COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.
5. REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.
6. FOUNDATION LOAD
   SERVICE 1 = 45 TONS/SHAFT
   STRENGTH 1 = 65 TONS/SHAFT

MATERIAL NOTES:

1. PROVIDE CLASS C CONCRETE (f'c = 3,600 PSI).
2. PROVIDE GRADE 60 REINFORCING STEEL.

HL93 LOADING

8/26/20

STATE OF TEXAS
GEOFFREY SCHEID
122792
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROVED

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739
5320 N. TARRANT PKWY, SUITE 260
FORT WORTH, TX, 76244
ENGINEERING FIRM F-739

FM 490 OVER WILLACY CO MAIN CANAL ABUTMENT DETAILS

SCALE: 3/16" = 1'-0" SHEET 01 OF 02

DESIGN AIQ	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
DRAWN AIQ	6	SEE TITLE SHEET	FM 490
CHECK EJL	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK GRS	TEXAS	PHR	WILLACY	56
	CONTROL	SECTION	JOB	
	1430	01	031, ETC	

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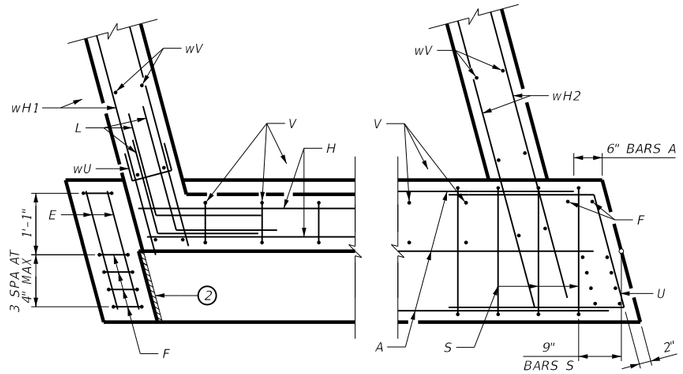
TABLE OF ESTIMATED QUANTITIES

ABUTMENT 1					ABUTMENT 4				
Bar	No.	Size	Length	Weight	Bar	No.	Size	Length	Weight
A	6	#11	48'-9"	1,554	A	6	#11	48'-9"	1,554
E	4	#4	2'-2"	6	E	4	#4	2'-2"	6
F	10	#4	6'-4"	42	F	10	#4	6'-4"	42
H	2	#5	45'-8"	98	H	2	#5	45'-8"	98
L1	3	#6	4'-0"	18	L1	3	#6	4'-0"	18
L2	3	#6	4'-0"	18	L2	3	#6	4'-0"	18
S	90	#4	9'-4"	561	S	90	#4	9'-4"	561
U	4	#6	7'-1	43	U	4	#6	7'-1	43
V	48	#5	7'-4"	367	V	48	#5	7'-4"	367
wH1	8	#6	5'-8"	68	wH1	8	#6	5'-8"	68
wH2	8	#6	6'-11"	83	wH2	8	#6	6'-11"	83
wU	12	#4	1'-8"	13	wU	12	#4	1'-8"	13
wV	28	#5	3'-10"	112	wV	28	#5	3'-10"	112
Reinforcing Steel			LBS	2,983	Reinforcing Steel			LBS	2,983
Class "C" Concrete (HPC)			CY	16.1	Class "C" Concrete (HPC)			CY	16.1



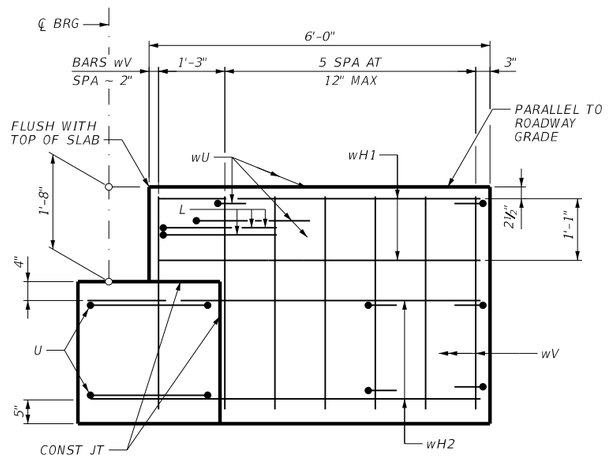
BACKWALL CAP

CORNER DETAILS
(NOT TO SCALE)

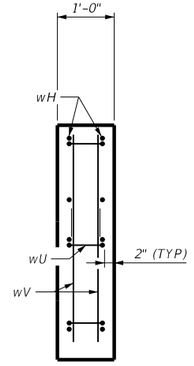
GENERAL NOTES:

1. SEE SHEET 01 OF 02 FOR GENERAL NOTES AND MATERIAL NOTES.

(2) ½" PREFORMED BITUMINOUS FIBER MATERIAL BETWEEN BOX BEAM AND EARWALL. BOND TO BEAM WITH AN APPROVED ADHESIVE. INSIDE FACE OF EARWALL TO BE CAST WITH VERTICAL SIDE OF BEAM. DO NOT CAST EARWALLS UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION.



WINGWALL ELEVATION
(EARWALL NOT SHOWN FOR CLARITY)
(NOT TO SCALE)



SECTION B-B
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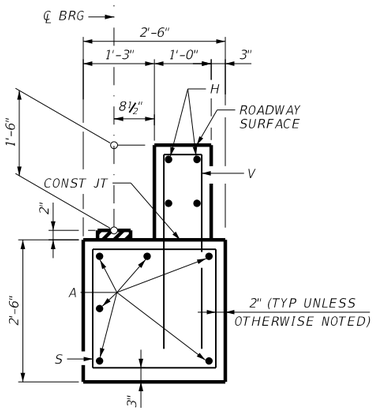

SECTION A-A
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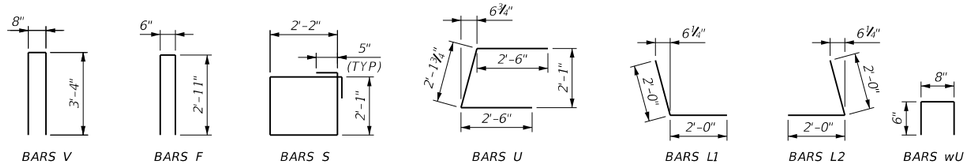

HL93 LOADING

8/26/20

STATE OF TEXAS
GEOFFREY SCHEID
122792
LICENSED PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROVED

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739
5320 N. TARRANT PKWY, SUITE 260
FORT WORTH, TX, 76244
ENGINEERING FIRM F-739

Texas Department of Transportation

FM 490 OVER WILLACY CO MAIN CANAL ABUTMENT DETAILS

SHEET 02 OF 02

DESIGN AIQ	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
DRAWN AIQ	6	SEE TITLE SHEET		FM 490
CHECK EJL	STATE	DISTRICT	COUNTY	SHEET NO.
	TEXAS	PHR	WILLACY	57
CHECK GRS	CONTROL	SECTION	JOB	
	1430	01	031, ETC	

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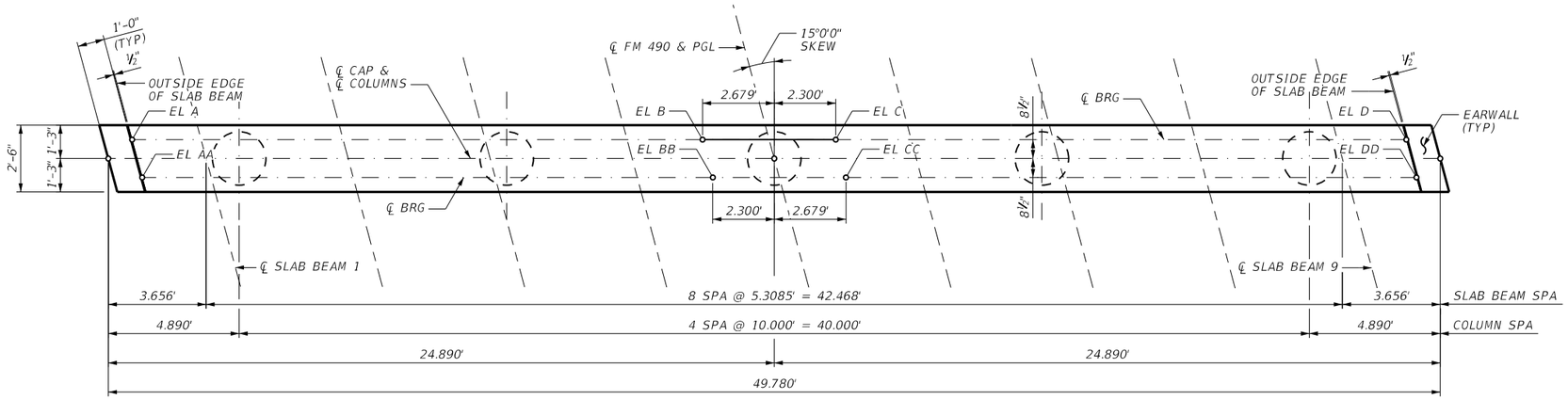
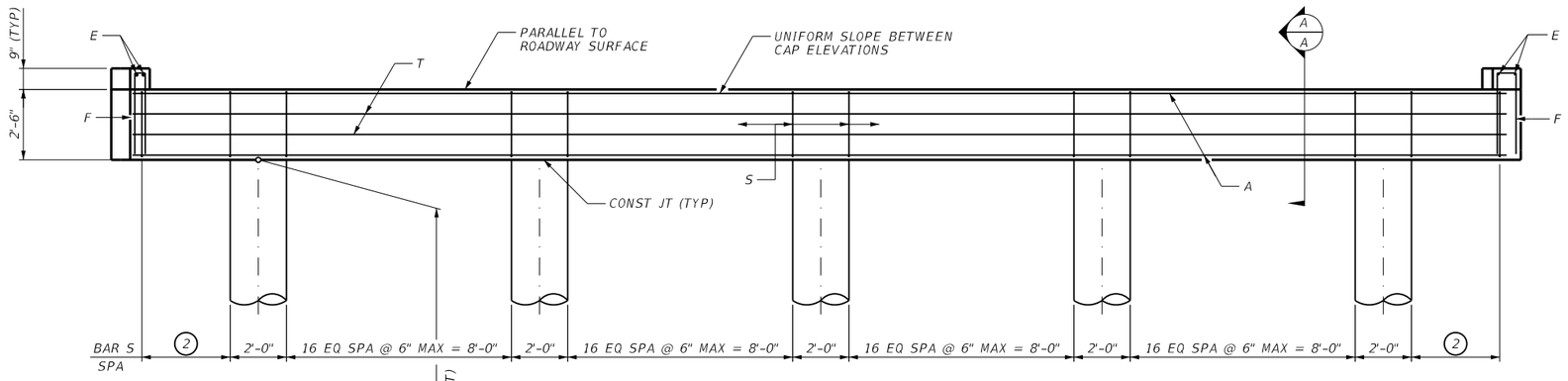


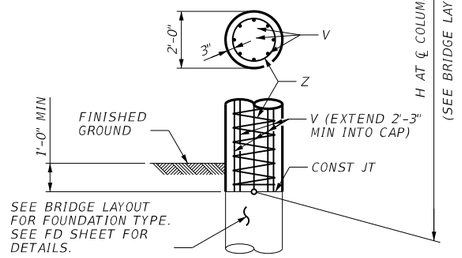
PLAN

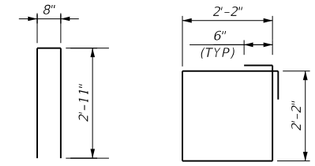
SCALE: 3/16" = 1'-0"



ELEVATION

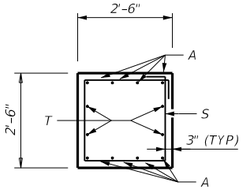
SCALE: 3/16" = 1'-0"





BARS F
(NOT TO SCALE)

BARS S
(NOT TO SCALE)



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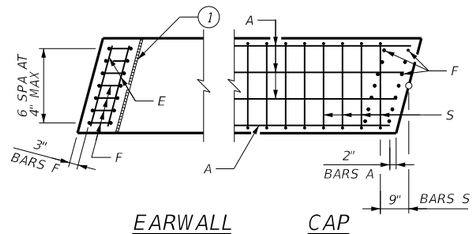
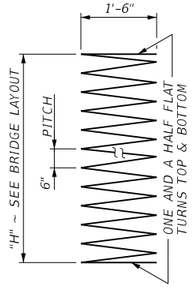


EARWALL CAP END DETAIL
(NOT TO SCALE)



BARS Z
(NOT TO SCALE)

GENERAL NOTES:

1. DESIGNED IN ACCORDANCE TO AASHTO LRFD SPECIFICATIONS FOR HL93 LOADING, 8TH EDITION (2017)
2. SEE COMMON FOUNDATION DETAILS (FD) STANDARD FOR ALL FOUNDATION DETAILS AND NOTES.
3. COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.
4. REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.
5. FOUNDATION LOAD
   SERVICE 1 = 80 TONS/SHAFT
   STRENGTH 1 = 110 TONS/SHAFT

MATERIAL NOTES:

1. PROVIDE CLASS C CONCRETE (f'c = 3,600 PSI).
2. PROVIDE GRADE 60 REINFORCING STEEL.

(1) ½" PREFORMED BITUMINOUS FIBER MATERIAL BETWEEN SLAB BEAM AND EARWALL. BOND TO EARWALL WITH AN APPROVED ADHESIVE. CAST INSIDE FACE OF EARWALL PERPENDICULAR TO CAP.

(2) 7 EQ SPA @ 6" MAX = 3'-2"

HL93 LOADING

8/26/20

STATE OF TEXAS
GEOFFREY SCHEID
122792
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROVED

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739
5320 N. TARRANT PKWY, SUITE 260
FORT WORTH, TX, 76244
ENGINEERING FIRM F-739

TABLE OF CAP ELEVATIONS

BENT	EL A	EL AA	EL B	EL BB	EL C	EL CC	EL D	EL DD
2	45.187	45.185	45.589	45.594	45.595	45.585	45.171	45.168
3	45.190	45.191	45.601	45.610	45.609	45.603	45.196	45.196

TABLE OF ESTIMATED QUANTITIES

BENT 2					BENT 3				
Bar	No.	Size	Length	Weight	Bar	No.	Size	Length	Weight
A	8	#11	49'-7"	2,107	A	8	#11	49'-7"	2,107
E	4	#4	2'-3"	6	B	4	#4	2'-3"	6
F	14	#4	6'-4"	59	D	14	#4	6'-4"	59
S	90	#5	3'-1"	289	S	90	#5	3'-1"	289
T	4	#5	19'-9"	82	T	4	#5	19'-9"	82
V	1	#7	6'-3"	511	U	1	#7	6'-3"	511
Z	2	#3	89'-8"	169	Z	2	#3	89'-8"	169
Reinforcing Steel		LBS	3,223		Reinforcing Steel		LBS	3,223	
Class "C" Concrete (Cap)		CY	11.7		Class "C" Concrete (Cap)		CY	11.7	
Class "C" Concrete (Column)		CY	2.3		Class "C" Concrete (Column)		CY	2.3	

FM 490 OVER WILLACY CO MAIN CANAL BENT DETAILS

SCALE: 3/16" = 1'-0" SHEET 01 OF 01

DESIGN AIQ	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
DRAWN AIQ	6	SEE TITLE SHEET	FM 490
CHECK EJL	STATE	DISTRICT	COUNTY / SHEET NO.
CHECK GRS	TEXAS	PHR	WILLACY / 58
	CONTROL	SECTION	JOB
	1430	01	031, ETC

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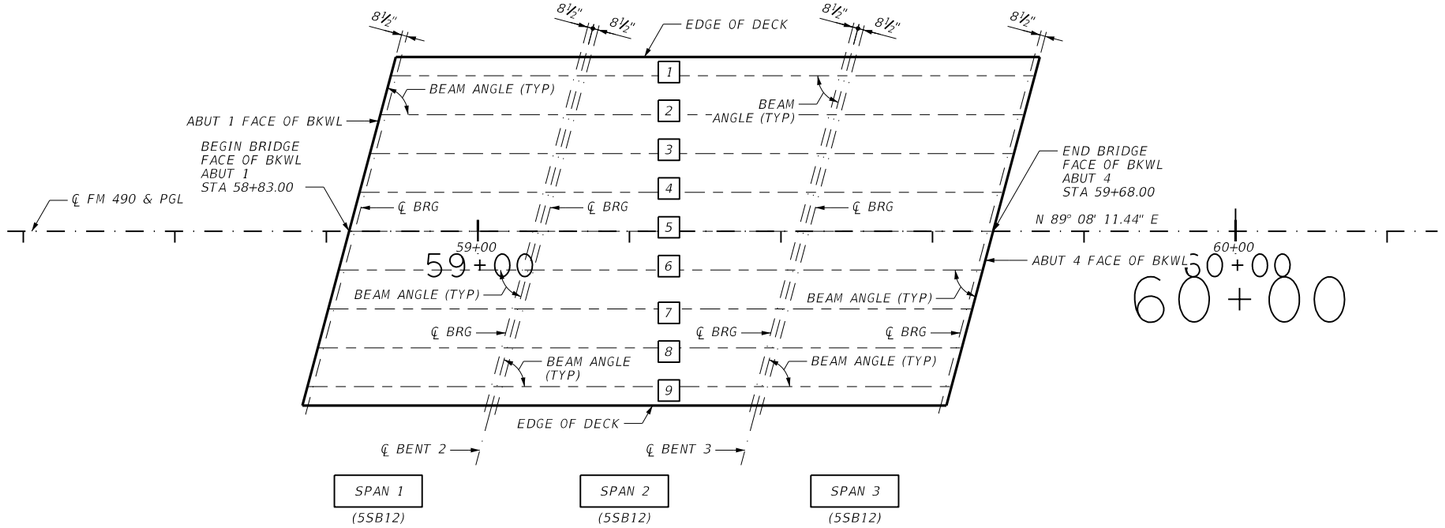

FRAMING PLAN

GENERAL NOTES:

1. DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN.
2. SEE PSBEB FOR ADDITIONAL INFORMATION NOT SHOWN.
3. TRUE DISTANCE BOTTOM GIRDER FLANGE LENGTHS SHOWN INCLUDE GIRDER SLOPE ADJUSTMENTS.

BENT REPORT

ABUT NO. 1 (N 14° 8' 11.44" E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 21.234 L

			BEAM SPAC. (CL BENT)	BEAM ANGLE D	M	S
SPAN 1	BEAM	1	0.000	75	0	0.00
	BEAM	2	5.308	75	0	0.00
	BEAM	3	5.308	75	0	0.00
	BEAM	4	5.308	75	0	0.00
	BEAM	5	5.308	75	0	0.00
	BEAM	6	5.308	75	0	0.00
	BEAM	7	5.308	75	0	0.00
	BEAM	8	5.308	75	0	0.00
	BEAM	9	5.308	75	0	0.00
	TOTAL		42.468			

BENT NO. 2 (N 14° 8' 11.44" E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 21.234 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 2	BEAM	1	0.000	75	0	0.00
	BEAM	2	5.308	75	0	0.00
	BEAM	3	5.308	75	0	0.00
	BEAM	4	5.308	75	0	0.00
	BEAM	5	5.308	75	0	0.00
	BEAM	6	5.308	75	0	0.00
	BEAM	7	5.308	75	0	0.00
	BEAM	8	5.308	75	0	0.00
	BEAM	9	5.308	75	0	0.00
	TOTAL		42.468			

BENT NO. 3 (N 14° 8' 11.44" E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 21.234 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 3	BEAM	1	0.000	75	0	0.00
	BEAM	2	5.308	75	0	0.00
	BEAM	3	5.308	75	0	0.00
	BEAM	4	5.308	75	0	0.00
	BEAM	5	5.308	75	0	0.00
	BEAM	6	5.308	75	0	0.00
	BEAM	7	5.308	75	0	0.00
	BEAM	8	5.308	75	0	0.00
	BEAM	9	5.308	75	0	0.00
	TOTAL		42.468			

BENT NO. 2 (N 14° 8' 11.44" E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 21.234 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 1	BEAM	1	0.000	75	0	0.00
	BEAM	2	5.308	75	0	0.00
	BEAM	3	5.308	75	0	0.00
	BEAM	4	5.308	75	0	0.00
	BEAM	5	5.308	75	0	0.00
	BEAM	6	5.308	75	0	0.00
	BEAM	7	5.308	75	0	0.00
	BEAM	8	5.308	75	0	0.00
	BEAM	9	5.308	75	0	0.00
	TOTAL		42.468			

BENT NO. 3 (N 14° 8' 11.44" E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 21.234 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 2	BEAM	1	0.000	75	0	0.00
	BEAM	2	5.308	75	0	0.00
	BEAM	3	5.308	75	0	0.00
	BEAM	4	5.308	75	0	0.00
	BEAM	5	5.308	75	0	0.00
	BEAM	6	5.308	75	0	0.00
	BEAM	7	5.308	75	0	0.00
	BEAM	8	5.308	75	0	0.00
	BEAM	9	5.308	75	0	0.00
	TOTAL		42.468			

ABUT NO. 4 (N 14° 8' 11.44" E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 21.234 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 3	BEAM	1	0.000	75	0	0.00
	BEAM	2	5.308	75	0	0.00
	BEAM	3	5.308	75	0	0.00
	BEAM	4	5.308	75	0	0.00
	BEAM	5	5.308	75	0	0.00
	BEAM	6	5.308	75	0	0.00
	BEAM	7	5.308	75	0	0.00
	BEAM	8	5.308	75	0	0.00
	BEAM	9	5.308	75	0	0.00
	TOTAL		42.468			

GIRDER REPORT

BEAM REPORT AT CENTER OF SLAB BEAM, SPAN 1

		HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE
BEAM	1	25.000	23.533	24.491	0.002
BEAM	2	25.000	23.533	24.491	0.002
BEAM	3	25.000	23.533	24.491	0.002
BEAM	4	25.000	23.533	24.491	0.002
BEAM	5	25.000	23.533	24.491	0.002
BEAM	6	25.000	23.533	24.491	0.002
BEAM	7	25.000	23.533	24.491	0.002
BEAM	8	25.000	23.533	24.491	0.002
BEAM	9	25.000	23.533	24.491	0.002

BEAM REPORT AT CENTER OF SLAB BEAM, SPAN 2

		HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE
BEAM	1	35.000	33.533	35.500	0.000
BEAM	2	35.000	33.533	35.500	0.000
BEAM	3	35.000	33.533	35.500	0.000
BEAM	4	35.000	33.533	35.500	0.000
BEAM	5	35.000	33.533	35.500	0.000
BEAM	6	35.000	33.533	35.500	0.001
BEAM	7	35.000	33.533	35.500	0.001
BEAM	8	35.000	33.533	35.500	0.001
BEAM	9	35.000	33.533	35.500	0.001

BEAM REPORT AT CENTER OF SLAB BEAM, SPAN 3

		HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE
BEAM	1	25.000	23.533	24.491	-0.001
BEAM	2	25.000	23.533	24.491	-0.001
BEAM	3	25.000	23.533	24.491	-0.001
BEAM	4	25.000	23.533	24.491	-0.001
BEAM	5	25.000	23.533	24.491	-0.001
BEAM	6	25.000	23.533	24.491	-0.001
BEAM	7	25.000	23.533	24.491	-0.001
BEAM	8	25.000	23.533	24.491	-0.001
BEAM	9	25.000	23.533	24.491	-0.001

HL93 LOADING

8/26/20

STATE OF TEXAS
GEOFFREY SCHEID
122792
PROFESSIONAL ENGINEER
LICENSED

NO.	DATE	REVISION	APPROVED

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739
5320 N. TARRANT PKWY, SUITE 260
FORT WORTH, TX, 76244
ENGINEERING FIRM F-739

FM 490 OVER WILLACY CO MAIN CANAL FRAMING PLAN

SCALE: 1" = 20' SHEET 01 OF 01

DESIGN AIQ	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
DRAWN AIQ	6	SEE TITLE SHEET	FM 490
CHECK EJL	STATE	DISTRICT	COUNTY	SHEET NO.
	TEXAS	PHR	WILLACY	59
CHECK GRS	CONTROL	SECTION	JOB	
	1430	01	031, ETC	

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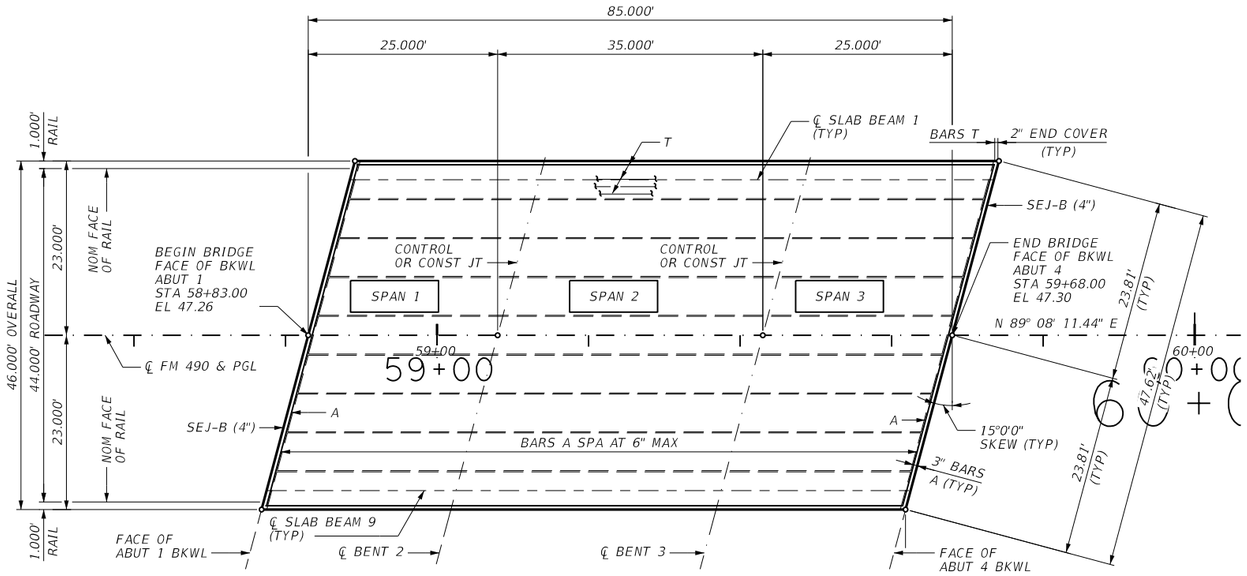
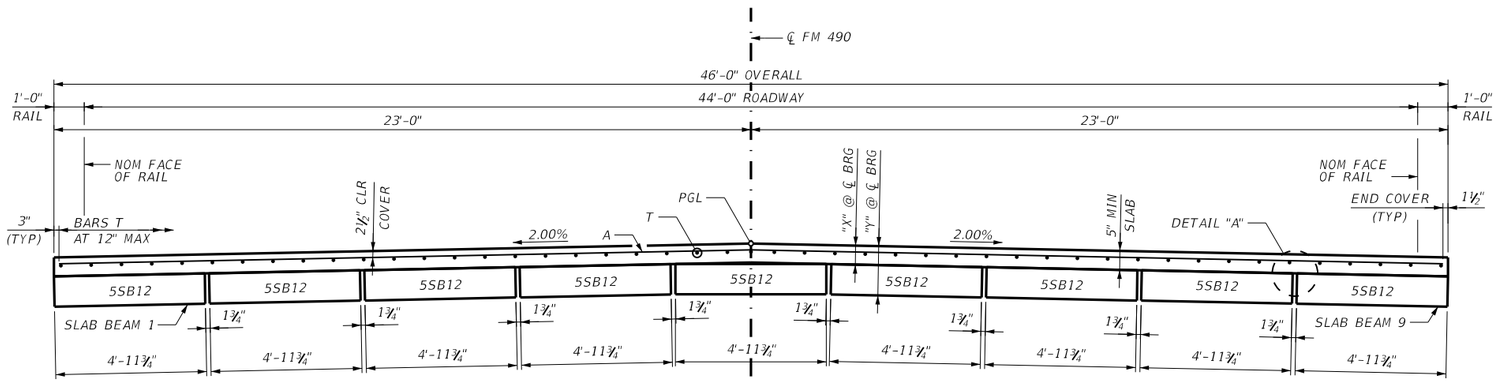
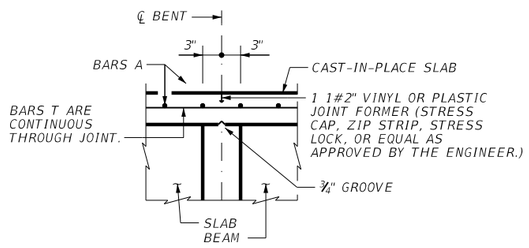


PLAN

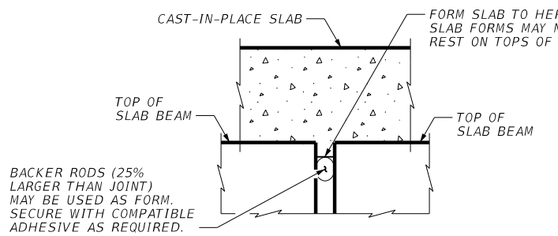


TRANSVERSE SECTION

(NOT TO SCALE)

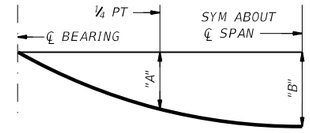


CONTINUOUS SLAB DETAIL



DETAIL "A"

BAR TABLE	
BAR	SIZE
A	#5
T	#4



DEAD LOAD DEFLECTION DIAGRAM

NOTE: DEFLECTIONS SHOWN ARE DUE TO CONCRETE SLAB ONLY (E_C = 5,000 KSI). CALCULATED DEFLECTIONS SHOWN ARE THEORETICAL AND ACTUAL DIMENSIONS MAY VARY. ADJUST BASED ON FIELD OBSERVATION.

TABLE OF DEAD LOAD DEFLECTIONS			
SPAN	BEAM	"A" (FT)	"B" (FT)
1	1-9	-0.003	-0.004
2	1-9	-0.012	-0.018
3	1-9	-0.003	-0.004

TABLE OF SECTION DEPTHS			
SPAN NO.	BEAM NO.	"X" AT CL BRG	"Y" AT CL BRG
1	1-9	6 1/4"	1'-6 1/4"
2	1-9	6 1/4"	1'-6 1/4"
3	1-9	6 1/4"	1'-6 1/4"

TABLE OF ESTIMATED QUANTITIES			
SPAN	REINF CONC SLAB	PRESTR CONC SLAB BEAM (2)	REINF STEEL (1)
	SF	LF	LB
1	1,150	220.42	3,220
2	1,610	310.50	4,508
3	1,150	220.42	3,220

GENERAL NOTES:

1. DESIGNED IN ACCORDANCE WITH AASHTO LRFD SPECIFICATIONS FOR HL93 LOADING, 8TH EDITION (2017).
2. SEE SSTR RAIL DETAILS AND PSBRA STANDARD FOR RAIL ANCHORAGE IN SLAB.
3. COVER DIMENSIONS ARE CLEAR DIMENSIONS UNLESS NOTED OTHERWISE.

MATERIAL NOTES:

1. PROVIDE CLASS S CONCRETE (f'c = 4,000 PSI)
2. PROVIDE GRADE 60 REINFORCING STEEL.
3. PROVIDE BAR LAPS, WHERE REQUIRED, AS FOLLOWS:

UNCOATED ~#4 = 1'-7"
~#5 = 2'-0"

4. DEFORMED WELDED WIRE REINFORCEMENT (WWR) (ASTM A1064) OF EQUAL SIZE AND SPACING MAY BE SUBSTITUTED FOR BARS A OR T UNLESS NOTED OTHERWISE.

(1) REINFORCING STEEL WEIGHT IS CALCULATED USING AN APPROXIMATE FACTOR OF 2.8 LBS/SF.

(2) FABRICATOR WILL ADJUST BEAM LENGTHS FOR BEAM SLOPES AS REQUIRED.

HL93 LOADING

8/26/20

STATE OF TEXAS
GEOFFREY SCHEID
122792
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROVED

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739
5320 N. TARRANT PKWY, SUITE 260
FORT WORTH, TX, 76244
ENGINEERING FIRM F-739

FM 490 OVER WILLACY CO MAIN CANAL PRESTRESSED CONC SLAB BEAM UNIT 1

SCALE: 1" = 20' SHEET 01 OF 01

DESIGN AIQ	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
DRAWN AIQ	6	SEE TITLE SHEET	FM 490
CHECK EJL	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK GRS	TEXAS	PHR	WILLACY	60
	CONTROL	SECTION	JOB	
	1430	01	031, ETC	

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DESIGNED BEAMS (STRAIGHT STRANDS)

STRUCTURE	SPAN NO.	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS: NON-STD STRAND PATTERN	PRESTRESSING STRANDS: TOTAL NO.	PRESTRESSING STRANDS: SIZE (in)	PRESTRESSING STRANDS: STRGTH fpu (ksi)	PRESTRESSING STRANDS: "e" ℄ (in)	PRESTRESSING STRANDS: "e" END (in)	TOT NO. DEB	DEBONDED STRANDS PER ROW: DIST FROM BOTTOM (in)	DEBONDED STRANDS PER ROW: NO. OF STRANDS: TOTAL	DEBONDED STRANDS PER ROW: NO. OF STRANDS: DE-BONDED	DEBONDED STRANDS PER ROW: NUMBER OF STRANDS DEBONDED TO (ft from end): 3	6	9	12	15	CONCRETE: RELEASE STRGTH ① f'ci (ksi)	CONCRETE: MINIMUM 28 DAY COMP STRGTH f'c (ksi)
FM 490 OVER DELTA LAKE DRAIN	1	1-9	5SB12		14	0.6	270	3.50	3.50										4.000	5.000
	2	1-9	5SB12		18	0.6	270	3.50	3.50										4.000	5.000
	3	1-9	5SB12		14	0.6	270	3.50	3.50										4.000	5.000
FM 490 OVER WILLACY CO MAIN CANAL	1	1-9	5SB12		8	0.6	270	3.50	3.50										4.000	5.000
	2	1-9	5SB12		14	0.6	270	3.50	3.50										4.000	5.000
	3	1-9	5SB12		8	0.6	270	3.50	3.50										4.000	5.000

OPTIONAL DESIGN

STRUCTURE	SPAN NO.	BEAM NO.	BEAM TYPE	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct (ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb (ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR ② Moment	LIVE LOAD DISTRIBUTION FACTOR ② Shear
FM 490 OVER DELTA LAKE DRAIN	1	1-9	5SB12	1.798	-2.257	666	0.436	0.436
	2	1-9	5SB12	2.882	-2.861	824	0.436	0.436
	3	1-9	5SB12	1.804	-2.262	667	0.436	0.436
FM 490 OVER WILLACY CO MAIN CANAL	1	1-9	5SB12	0.936	-1.221	442	0.436	0.436
	2	1-9	5SB12	1.779	-2.238	663	0.436	0.436
	3	1-9	5SB12	0.936	-1.220	442	0.436	0.436

NON-STANDARD STRAND PATTERNS

PATTERN	STRAND ARRANGEMENT AT ℄ OF BEAM

① Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

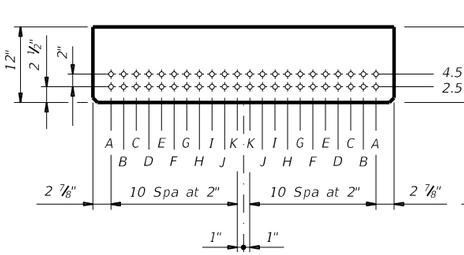
② Portion of full HL93.

DESIGN NOTES:

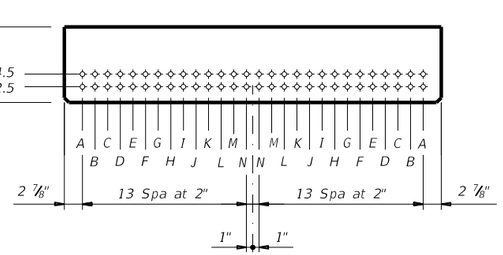
Designed according to AASHTO LRFD Bridge Design Specifications.
Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

FABRICATION NOTES:

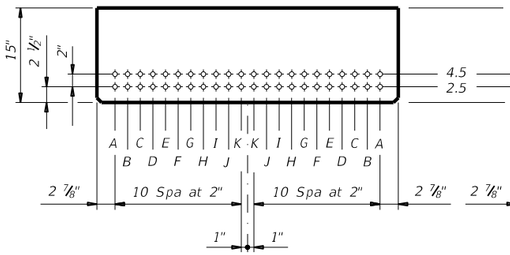
Provide Class H concrete.
Provide Grade 60 reinforcing steel.
Use low relaxation strands, each pretensioned to 75 percent of fpu.
Full-length debonded strands are not permitted in positions "A" and "B".
Strand debonding must comply with Item 424.4.2.2.2.4.
When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.
Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5". Place strands within a row as follows:
1) Locate a strand in each "A" position.
2) Place strand symmetrically about vertical centerline of beam.
3) Space strands as equally as possible across the entire width.
Do not debond strands in position "A". Distribute debonded strands symmetrically about the vertical centerline. Increase debonded lengths working outward, with debonding staggered in each row.



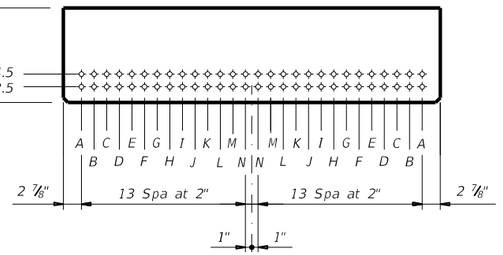
TxDOT 4SB12 SLAB BEAM



TxDOT 5SB12 SLAB BEAM



TxDOT 4SB15 SLAB BEAM



TxDOT 5SB15 SLAB BEAM

8/14/20

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAMS (NON-STANDARD SPANS)

PSBND

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©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
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	PHR	WILLACY		61

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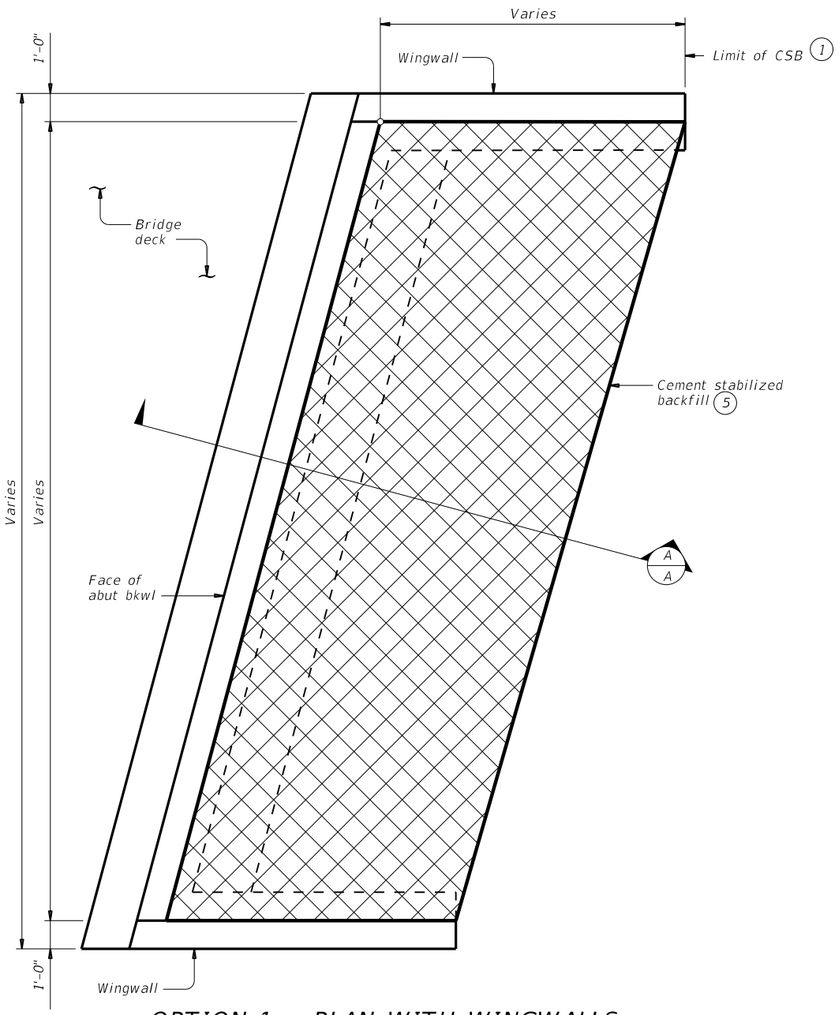
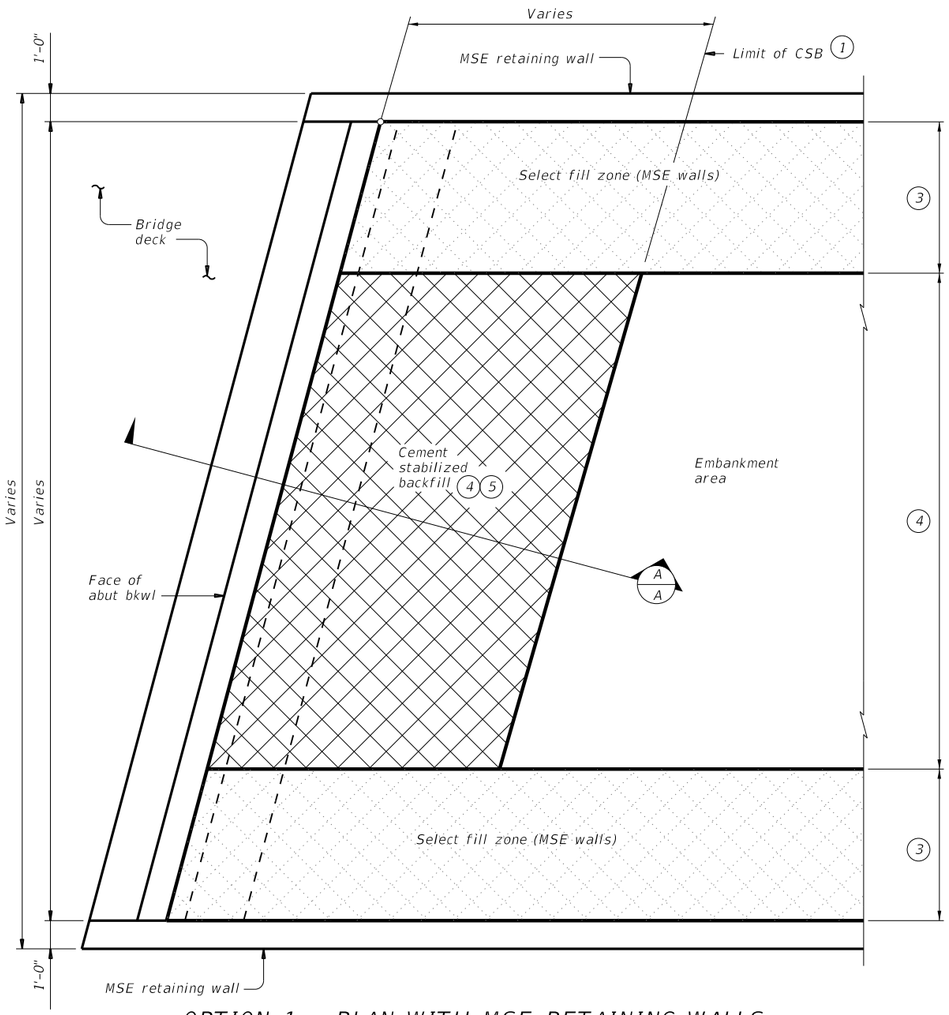
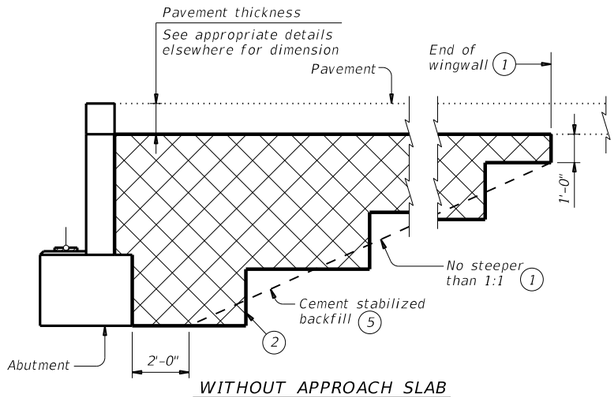


OPTION 1 ~ PLAN WITH WINGWALLS

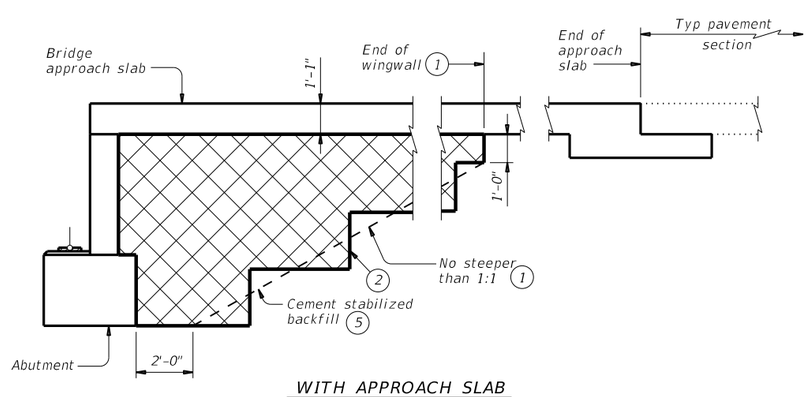
Cast-in-place retaining walls similar.



OPTION 1 ~ PLAN WITH MSE RETAINING WALLS



WITHOUT APPROACH SLAB



WITH APPROACH SLAB

(Showing BAS-C, BAS-A similar.)

SECTION A-A

(1) Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.

(2) Bench backfill as shown with 12" (approximate) bench depths.

(3) Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.

(4) When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.

(5) If shown in the plans flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
a). If flowable backfill is to be placed over MSE backfill then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
b). Place flowable fill in lifts not exceeding 2 feet in height, place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).

GENERAL NOTES:

See the Bridge Layout for selected Option. Option 2 is intended for new construction requiring high plasticity embankment fill with a plasticity index (PI) greater than 30 or pavement built in poor native soil. Poor soils are defined as high plasticity clays or expansive clays. Option 1 is intended for construction only requiring PI controlled embankment fill or excavation in competent soils/rocks in order to construct the abutment.

Provide Cement Stabilized Backfill (CSB) meeting the requirements of Item 400, "Excavation and Backfill for Structures", to the limits shown at bridge abutments.

If required elsewhere in the plans, provide Flowable Backfill meeting the requirements of Item 401, "Flowable Backfill", to the limits shown at bridge abutments.

Details are drawn showing left forward skew. See Bridge Layout for actual skew direction.

These details do not apply when Concrete Block retaining walls are used in lieu of wingwalls.

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1430	01	031, ETC	FM 490
02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
	PHR	WILLACY		62

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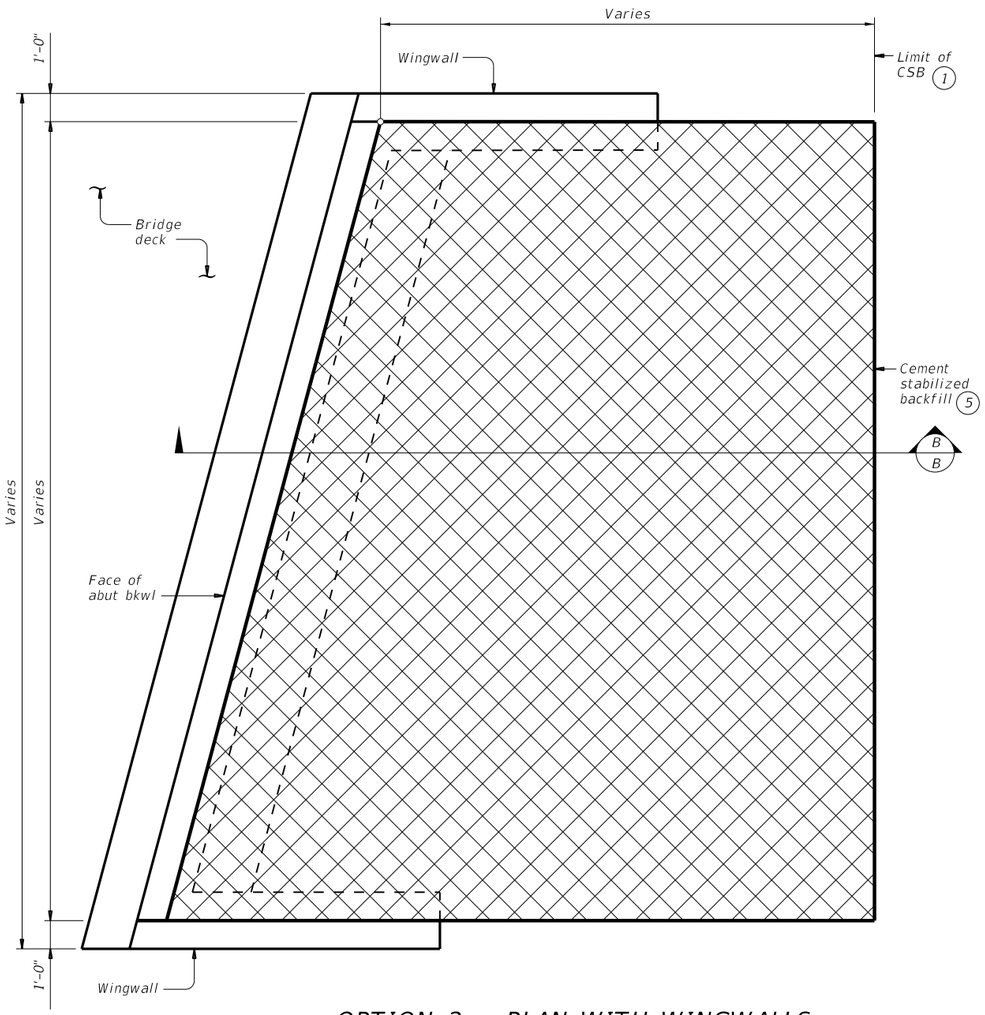
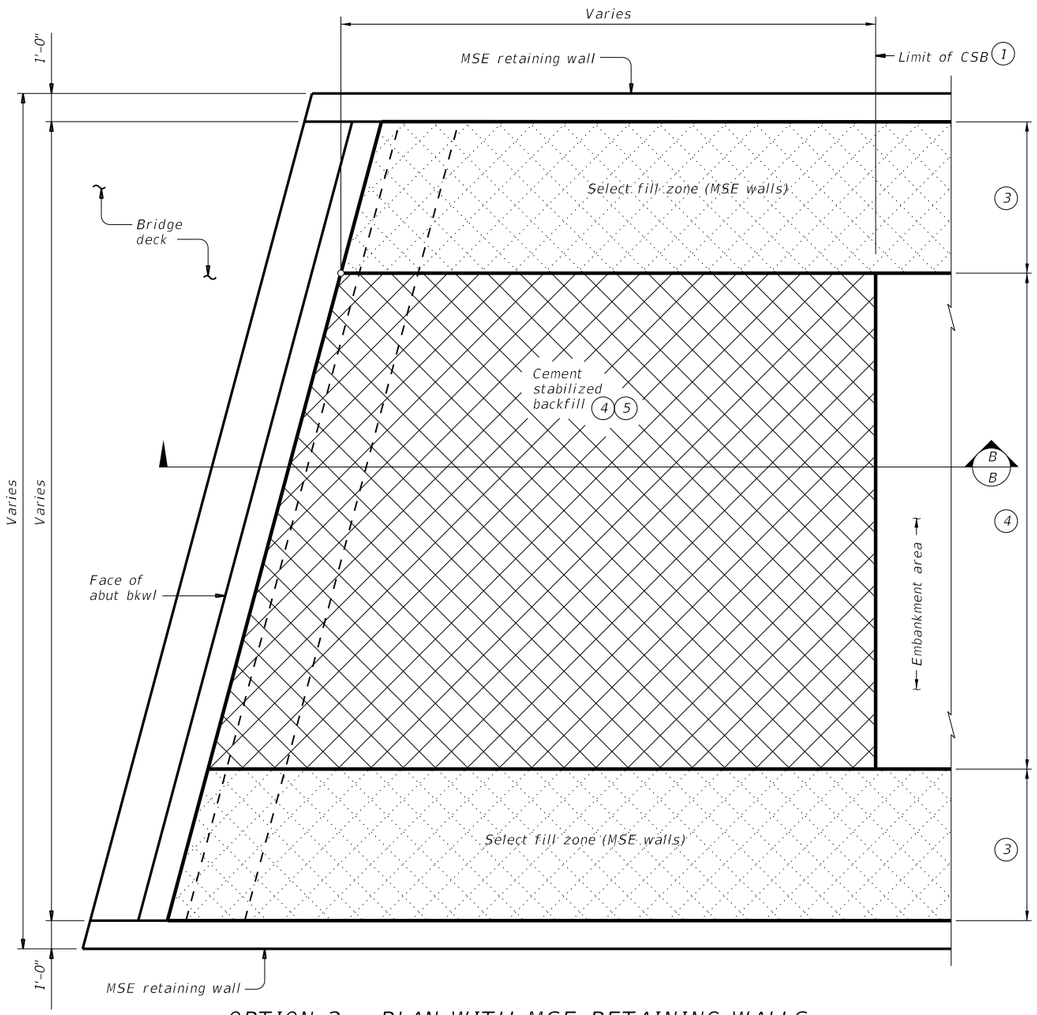


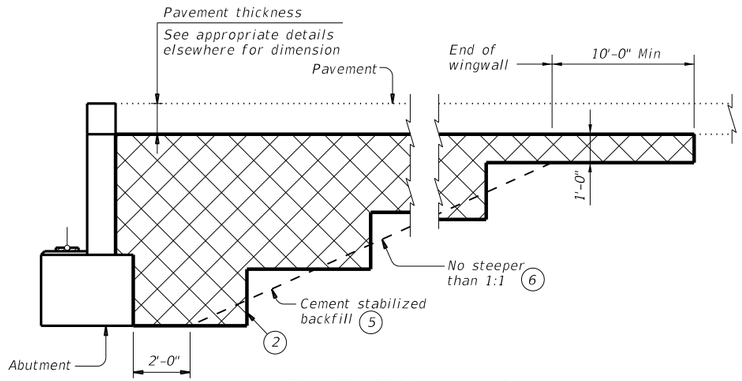
OPTION 2 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 2 ~ PLAN WITH MSE RETAINING WALLS

1. Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.
2. Bench backfill as shown with 12" (approximate) bench depths.
3. Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.
4. When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.
5. If shown in the plans flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
   a). If flowable backfill is to be placed over MSE backfill then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
   b). Place flowable fill in lifts not exceeding 2 feet in height, place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).



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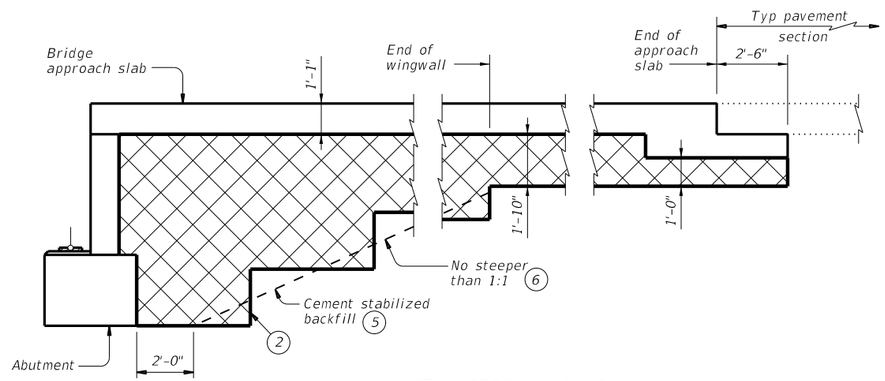

WITH APPROACH SLAB
(Showing BAS-C, BAS-A similar.)

SECTION B-B

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
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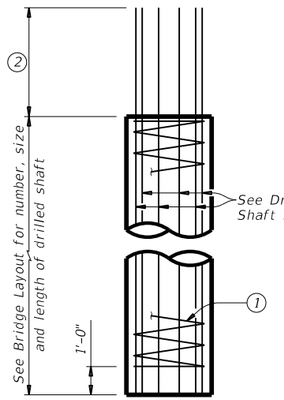
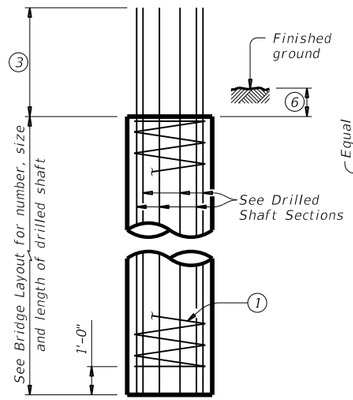
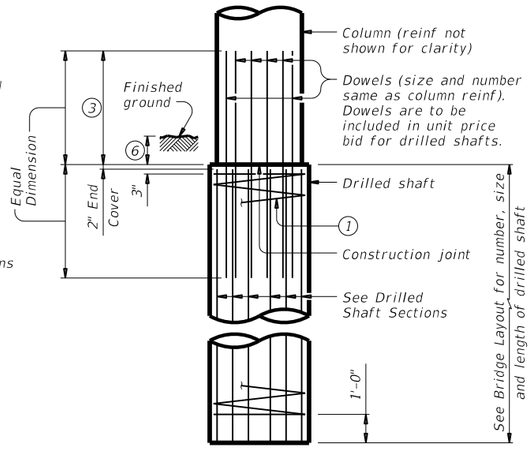


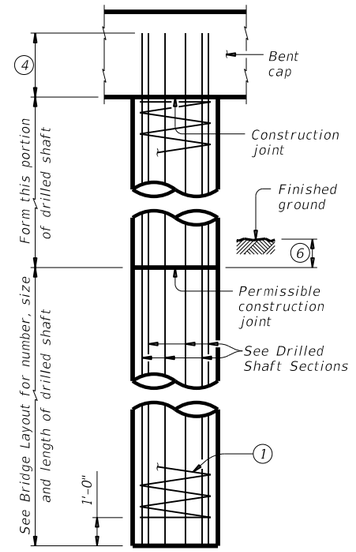
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



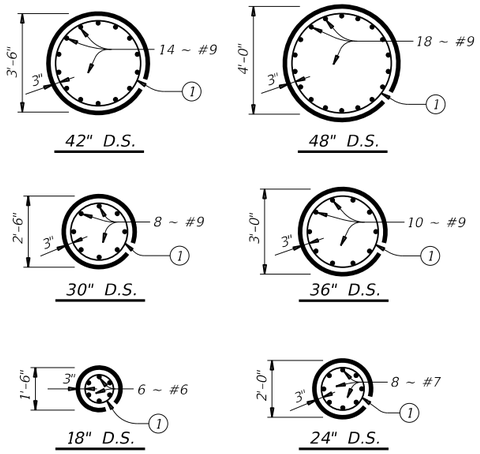
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

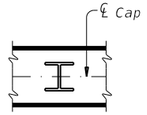


DRILLED SHAFT SECTIONS

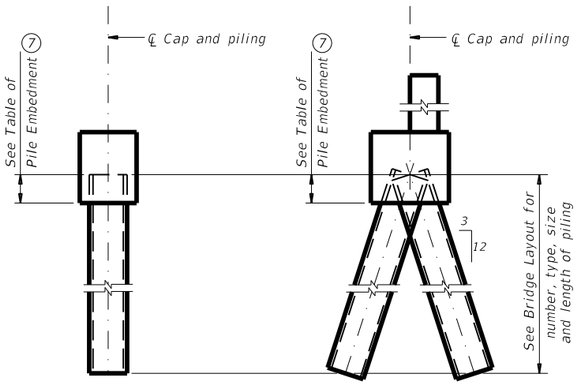
DRILLED SHAFT DETAILS

TABLE OF PILE EMBEDMENT	
Pile Type	Embedment Depth (Ft)
16" Sq Concrete 18" Sq Concrete HP14 Steel HP16 Steel	1'-0"
20" Sq Concrete 24" Sq Concrete HP18 Steel	1'-6"

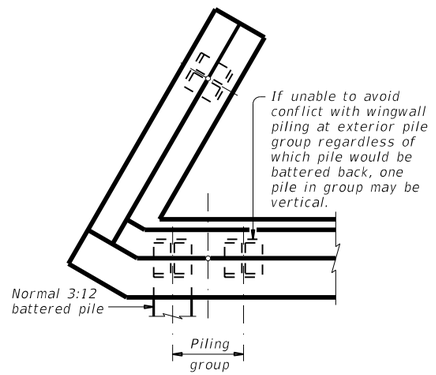
See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.



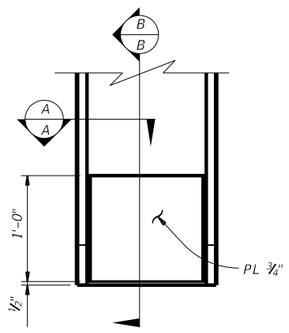
ORIENTATION OF STEEL H-PILING

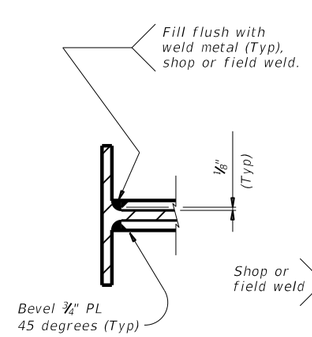


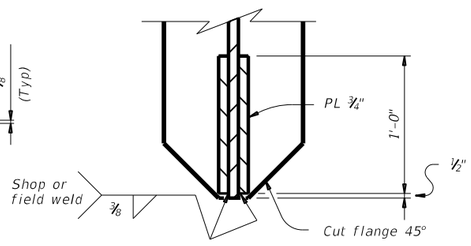
PILING DETAILS
(Concrete or steel H)



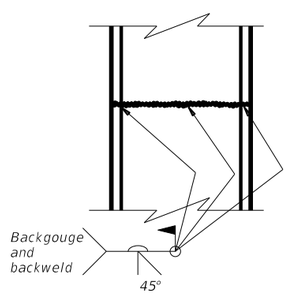
DETAIL "A"
(Showing plan view of a 30° skewed abutment)

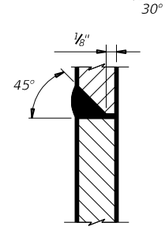






STEEL H-PILE TIP REINFORCEMENT
See Item 407 "Steel Piling" to determine when tip reinforcement is required and for options to the details shown.





STEEL H-PILE SPLICE DETAIL
Use when required.

(1) #3 spiral at 6" pitch (one and a half flat turns top and bottom).

(2) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-0"
#9 Bars = 2'-3"

(3) Min lap with column reinf:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(4) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-3"
#9 Bars = 2'-9"

(5) Drilled shafts may extend to the bottom of bent caps for "H" heights of 6 ft and less (as shown on the Bridge Layout), if approved. This option can only be used when the drilled shaft diameter equals the column diameter. Obtain approval of the forming method above the ground line prior to construction. No adjustments in payment will be made if this option is used.

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS 01-20: Added #11 bars to the FD bars.	1430	01	031, ETC	FM 490
	DIST	COUNTY		SHEET NO.
	PHR	WILLACY		64

DATE: 4/25/2023 1:15:41 PM
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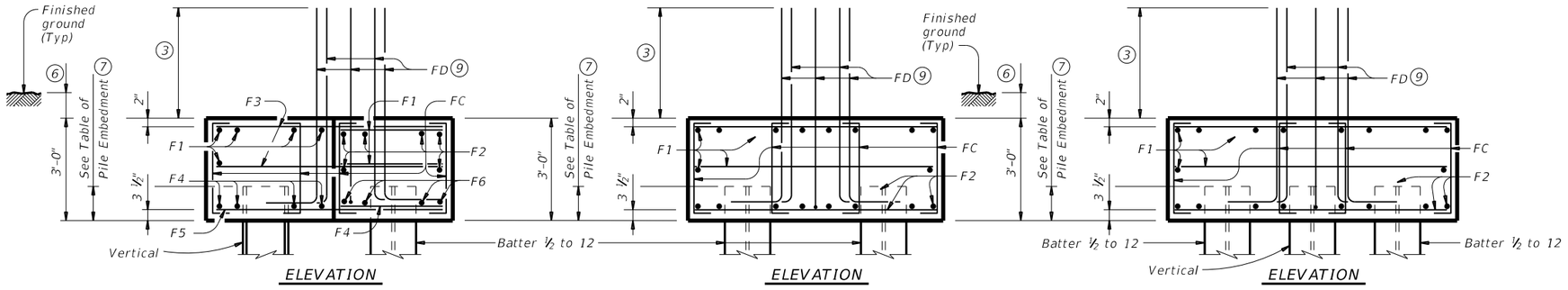
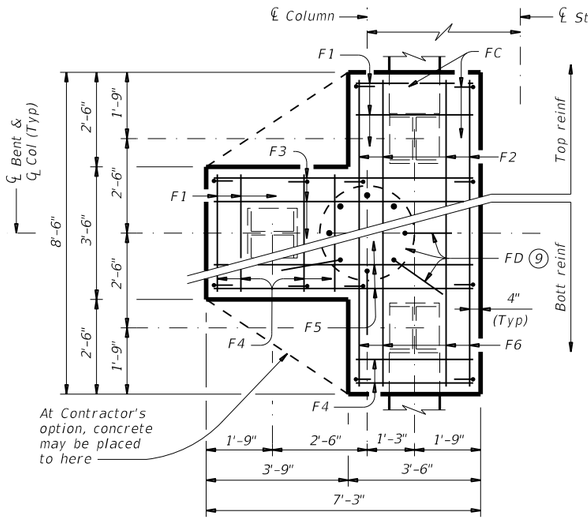
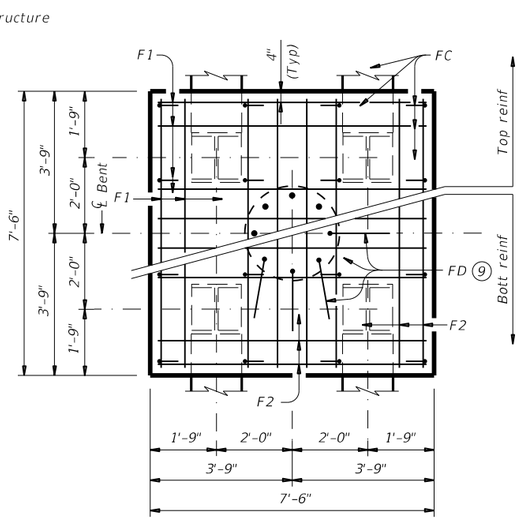




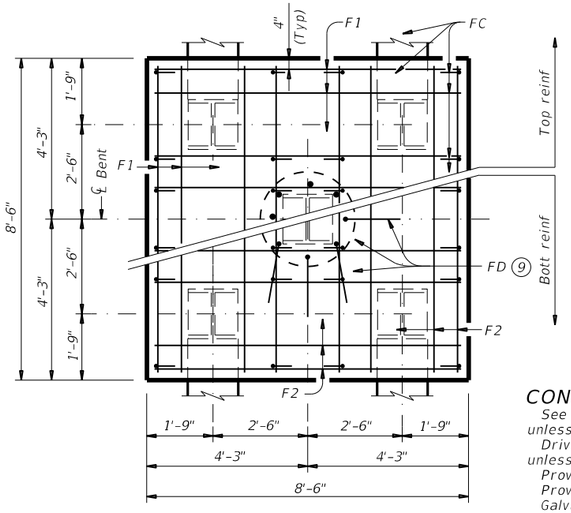
THREE PILE FOOTING (8)

For 36" Dia and smaller columns.



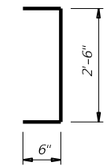
FOUR PILE FOOTING (8)

For 42" Dia and smaller columns.

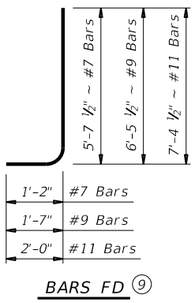


FIVE PILE FOOTING (8)

For 42" Dia and smaller columns.



BARS FC



BARS FD (9)

(3) Min lap with column reinforcing:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

(8) See Bridge Layout for type, size and length of piling.

(9) Number and size of FD bars must match column reinforcing. Tie FD bars to the top of the bottom reinforcing mat.

(10) Adjust FD quantity, size and weight as needed to match column reinforcing.

TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

ONE 3 PILE FOOTING				
Bar	No.	Size	Length	Weight
F1	11	#4	3'- 2"	23
F2	6	#4	8'- 2"	33
F3	6	#4	6'- 11"	28
F4	8	#9	3'- 2"	86
F5	4	#9	6'- 11"	94
F6	4	#9	8'- 2"	111
FC	12	#4	3'- 6"	28
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	623
Class "C" Concrete			CY	4.8

ONE 4 PILE FOOTING				
Bar	No.	Size	Length	Weight
F1	20	#4	7'- 2"	96
F2	16	#8	7'- 2"	306
FC	16	#4	3'- 6"	37
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	659
Class "C" Concrete			CY	6.3

ONE 5 PILE FOOTING				
Bar	No.	Size	Length	Weight
F1	20	#4	8'- 2"	109
F2	16	#9	8'- 2"	444
FC	24	#4	3'- 6"	56
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	829
Class "C" Concrete			CY	8.0

CONSTRUCTION NOTES:

See Bridge Layout for foundation type required. Use these foundation details unless shown otherwise.

Drive piling under abutment wingwalls to a minimum resistance of 10 Tons/Pile unless shown otherwise.

Provide Class C Concrete (f'c = 3,600 psi), unless shown otherwise.

Provide Grade 60 reinforcing steel.

Galvanize reinforcing if shown elsewhere in the plans.

Provide bar laps for drilled shaft reinforcing, where required, as follows:

Uncoated or galvanized (#6) ~ 2'-6"
Uncoated or galvanized (#7) ~ 2'-11"
Uncoated or galvanized (#9) ~ 3'-9"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

DESIGNER NOTES:

Do not use the drilled shaft details shown on this standard for retaining wall, noise wall, barrier, or sign foundations without structural evaluation.

Do not use the footings shown on this standard in direct contact with salt water or exposed to salt water spray.

Maximum allowable pile loads for the footings shown are:

72 Tons/Pile with 24" Dia Columns
80 Tons/Pile with 30" Dia Columns
100 Tons/Pile with 36" Dia Columns
120 Tons/Pile with 42" Dia Columns

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS 01-20: Added #11 bars to the FD bars.	1430	01	031, ETC	FM 490
	DIST	COUNTY		SHEET NO.
	PHR	WILLACY		65

DATE: 4/25/2023 1:15:43 PM
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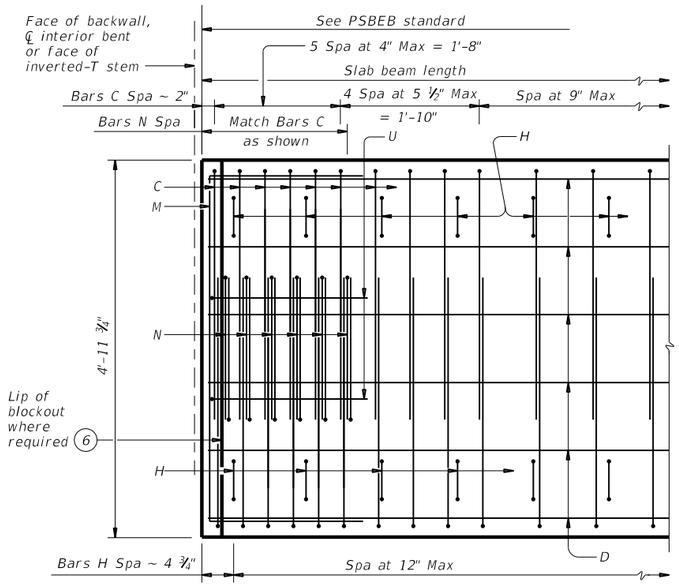
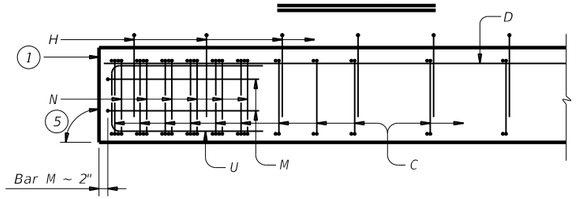
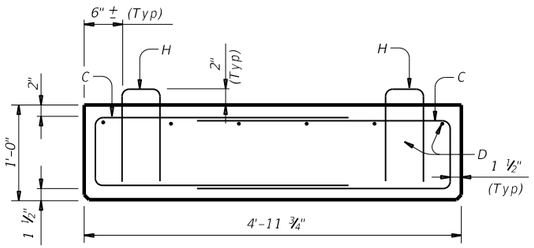


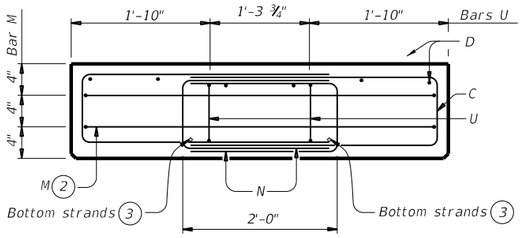
PART PLAN



ELEVATION

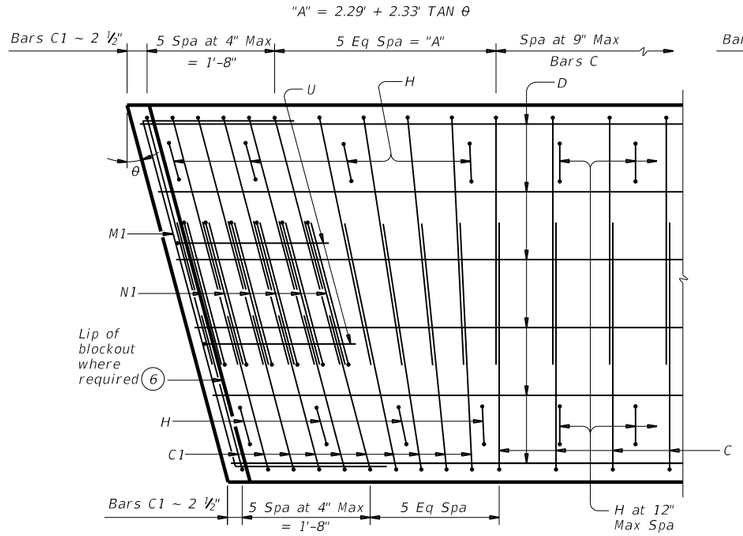


SECTION



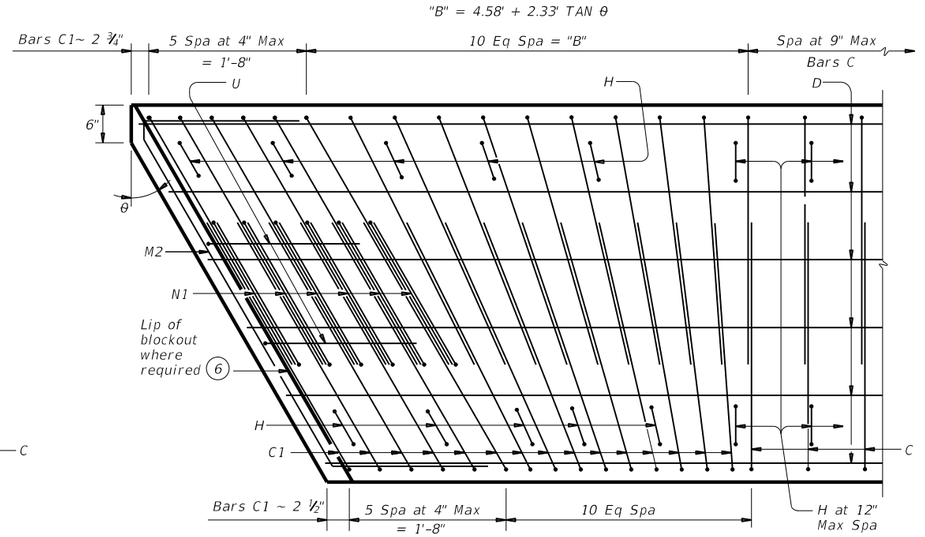
END MAT REINFORCING

Bars H not shown for clarity.



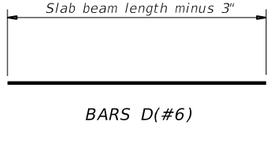
PART SKEW PLAN

(Showing θ over 0° to 15° Skew)

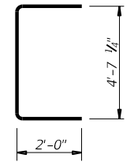


PART SKEW PLAN

(Showing θ over 15° to 30° Skew)



BARS D(#6)



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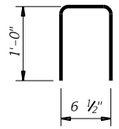

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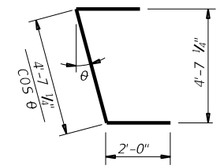

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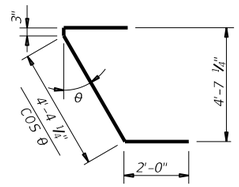
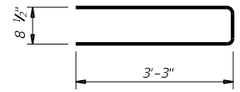
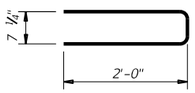


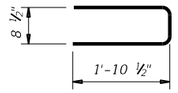
BARS M2(#4)



BARS C(#4)



BARS U(#5)



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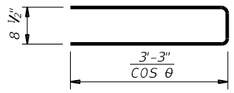

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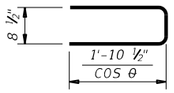
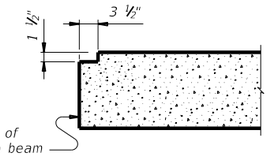


BARS N1(#4)



ELEVATION OF BLOCKOUT (6)

BEAM PROPERTIES		
Area	in^2	717.0
Y top	in	6.00
Y bott	in	6.00
I	in^4	8,604
Weight (4)	lb/ft	747

(1) See End Mat Reinforcing detail.

(2) Adjust bars M vertically to avoid strands.

(3) See sheet PSBND or PSBSD for strand locations.

(4) Assumes 150 pcf weight density of concrete.

(5) 90° at conventional interior bents. End of beam must be vertical at abutment backwall and inverted-T stem.

(6) Blockout required at armor joint (AJ) and sealed expansion joint (SEJ) locations to accommodate joint anchorage.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Provide Class H concrete. Provide Class H (HPC) if shown elsewhere in the plans.

Provide Grade 60 reinforcing steel.

An equal area of welded wire reinforcement (WWR) (ASTM 1064) may be substituted for bars C and D if approved by the Engineer.

These details can be used for any skew angle up to a maximum of 30 degrees.

Chamfer all exposed corners ¾" or round to a ¾" radius.

Details are drawn showing right forward skew. See Bridge Layout for actual direction.

Cover dimensions are clear dimensions, unless noted otherwise.

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

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM DETAILS

(TYPE 5SB12)

PSB-5SB12

FILE: psbsts03-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	1430	01	031, ETC	FM 490
	DIST	COUNTY		SHEET NO.
	PHR	WILLACY		66

DATE: 4/25/2023 1:15:45 PM
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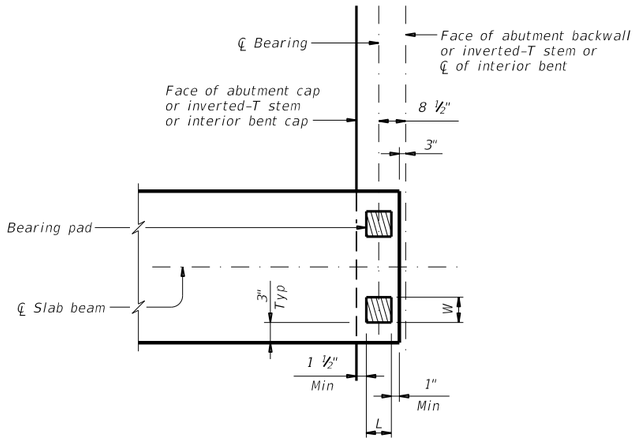
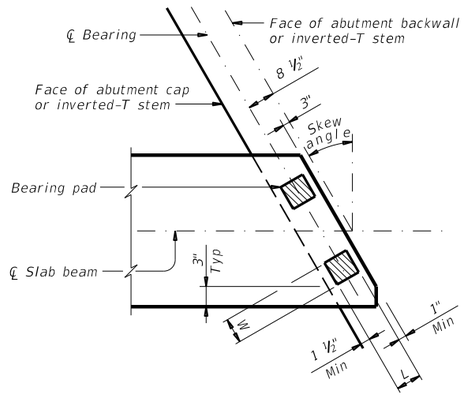
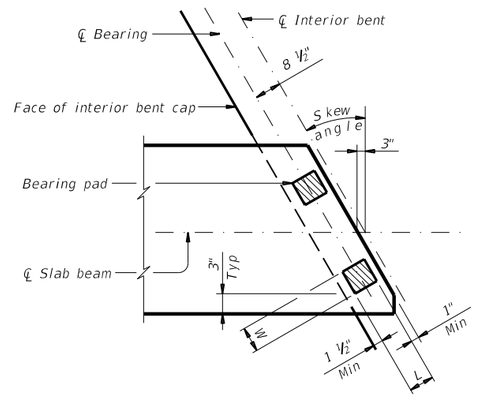


TWO-PAD DETAIL PLAN
(At abutment or inverted-T cap or at interior bent)



TWO-PAD DETAIL SKEW PLAN
(At abutment or inverted-T cap)



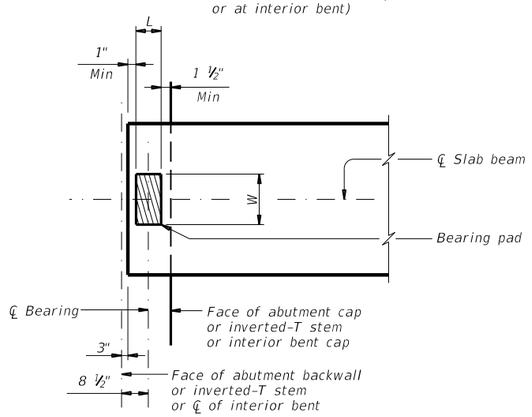
TWO-PAD DETAIL SKEW PLAN
(At interior bent)

TABLE OF BEARING PAD DIMENSIONS (ALL PRESTR CONC SLAB BM TYPES)

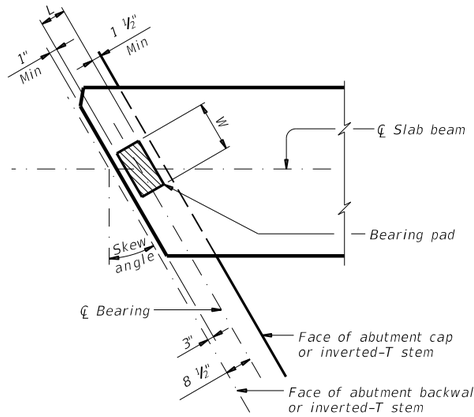
One-Pad (Ty SB1-"N") (2)			Two-Pad (Ty SB2-"N") (2)		
W	L	T	W	L	T
14"	7"	2"	7"	7"	2"

Pad sizes shown are applicable for the following conditions:

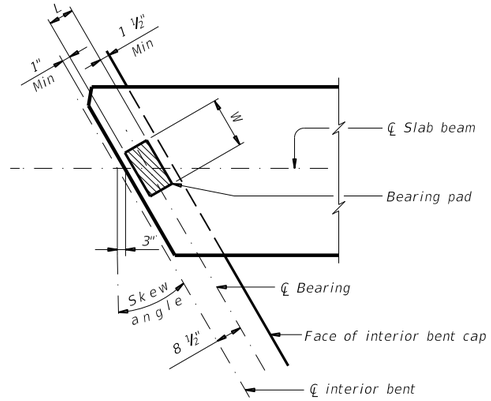
(1) All one, two and three span units where the minimum span length is not less than 25' and the maximum span is not more than 50'.
(2) Skews less than or equal to 30°.



ONE-PAD DETAIL PLAN
(At abutment or inverted-T cap or at interior bent)



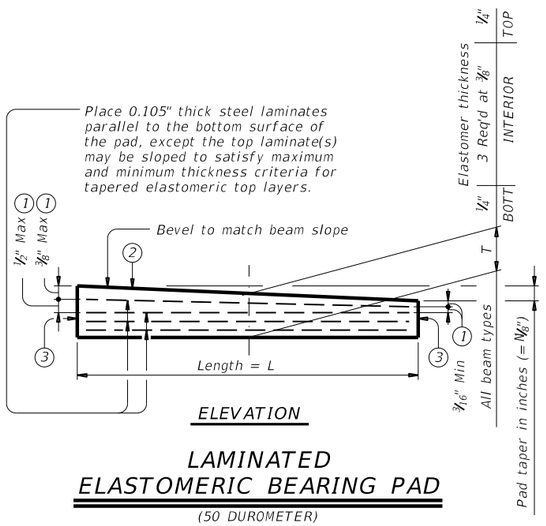
ONE-PAD DETAIL SKEW PLAN
(At abutment or inverted-T cap)



ONE-PAD DETAIL SKEW PLAN
(At interior bent)

ELASTOMERIC BEARING PAD PLACEMENT AND BEAM END DIAGRAMS

Place one bearing pad at forward station beam end.
Place two bearing pads at back station beam end.



ELEVATION

LAMINATED ELASTOMERIC BEARING PAD

(50 DUROMETER)

(1) Maximum and minimum layer thicknesses shown are for elastomer only, on tapered layers.

(2) Indicate BEARING TYPE on all pads. For tapered pads, locate BEARING TYPE on the high side. The Fabricator must include the value of "N" (amount of taper in ⅛" increments) in this mark.
Examples: N=0, (for 0" taper)
N=1, (for ⅛" taper)
N=2, (for ¼" taper)
(etc.)
Fabricated pad top surface slope must not vary from plan beam slope by more than $\left(\frac{0.0625"}{Length}\right)$ IN/IN.

(3) Locate permanent mark here.

GENERAL NOTES:

These details accommodate skew angles up to 30°.

Shop drawings for approval are required.

A bearing layout which identifies location and orientation of all bearings must be developed by the bearing fabricator. Permanently mark each bearing in accordance with the bearing layout. A copy of the bearing layout is to be provided to the Engineer.

Cost of furnishing and installing elastomeric bearings must be included in unit price bid for "Prestressed Concrete Slab Beams".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

ELASTOMERIC BEARING AND BEAM END DETAILS

PRESTR CONCRETE SLAB BEAM

PSBEB

FILE: psbste06-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	1430	01	031, ETC	FM 490
	DIST	COUNTY		SHEET NO.
	PHR	WILLACY		67

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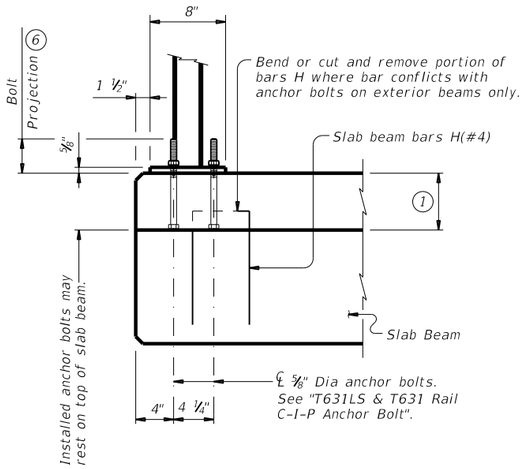
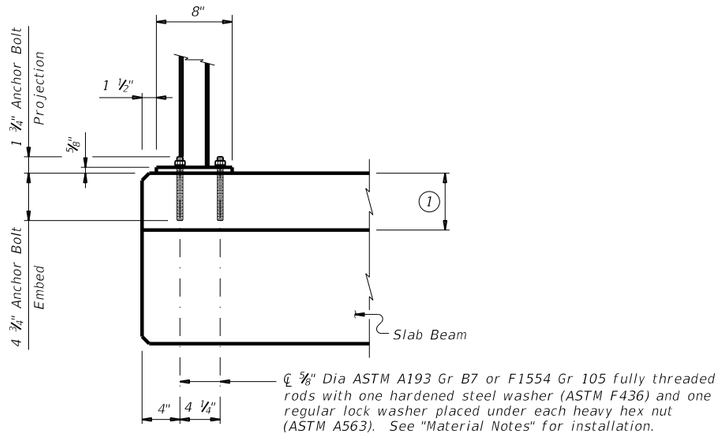


CAST-IN-PLACE ANCHORAGE OPTION



ADHESIVE ANCHORAGE OPTION

T631LS & T631 RAIL ANCHORAGE PLACEMENT (2)(7)

PART SPAN ELEVATION

SECTION

TYPICAL CONCRETE RAIL ANCHORAGE

(Showing typical concrete rail anchorage)

T631LS & T631 RAIL C-I-P ANCHOR BOLT

PLAN OF CONCRETE RAILS AT EXPANSION JOINTS

(1) Cast-in-place slab thickness varies due to beam camber (5" minimum).

(2) Replace cast-in-place anchor bolts shown on T631LS and T631 Rail standard with an adhesive anchor system or cast-in-place anchor bolts shown on this sheet.

(3) Bar length shown on rail standard, minus 1 ¼". Adjust bar length for a raised sidewalk.

(4) See rail standard for projection from finished grade or top of sidewalk.

(5) Place additional (#5) longitudinal bar.

(6) Excess bolt length has been provided to accommodate a variable slab thickness due to beam camber. If slab thickness on span details exceed 7", bolt length must be increased accordingly. After posts have been set and bolts tightened, bolt projection above nuts of more than ½" must be cut off and painted with two coats of zinc-rich paint conforming to the Item 445 "Galvanizing".

(7) Distance from end of top outside edge of slab to center of first bolt group can not be less than 9", except: 15° Skew: 1'-0" (acute corner only)
30° Skew: 1'-3" (acute corner only)

(8) Location of rail expansion joint must be at the intersection of ℄ slab expansion joint, ℄ rail footprint and perpendicular to slab outside edge.

(9) Cross-hatched area must have ½" preformed bitumuminous fiber material under concrete rail, as shown.

CONSTRUCTION NOTES:

Rail anchorage bars may be field bent as required to clear rail reinforcing or provide minimum cover shown on standard rail detail sheets.

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

MATERIAL NOTES:

Galvanize all steel components of steel rail system.

Provide Grade 60 reinforcing steel.

Cast-in-place anchorage system for T631LS and T631 Rail must be ⅝" Dia heavy hex head anchor bolts (ASTM F3125 Gr 325 or A449) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed anchor bolts 4 ½" minimum.

Adhesive anchors for T631LS and T631 Rail must be ⅝" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed fully threaded rod into slab and/or abutment wingwall using a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4 ¾". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 8 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing."

Epoxy coat or galvanize reinforcing steel shown on this standard if rail reinforcement is epoxy coated or galvanized.

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

This standard is for use with structures with a 5" minimum cast-in-place concrete slab.

This standard may require modification for interior rails. This standard does not apply to median barriers.

This standard does not provide details for Type T221P, T224, T80HT, T80SS, C412, PR11, PR22 and PR3 rails on slab beam bridges.

See rail standards for approved speed restrictions, notes and details not shown.

Cover dimensions are clear dimensions, unless noted otherwise.

Texas Department of Transportation

Bridge Division Standard

RAIL ANCHORAGE DETAILS

PRESTR CONCRETE SLAB BEAMS

PSBRA

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©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
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03-18: Updated adhesive anchor notes.	DIST	COUNTY		SHEET NO.
	PHR	WILLACY		68

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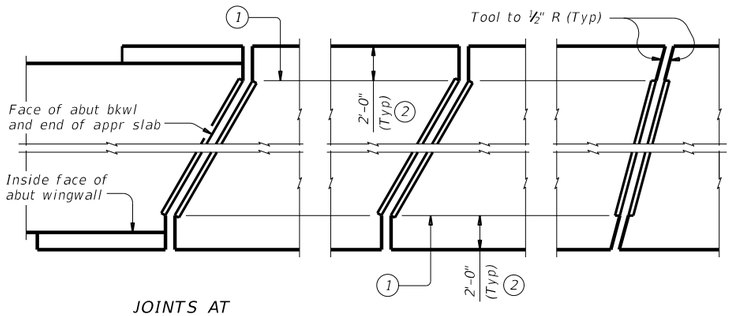
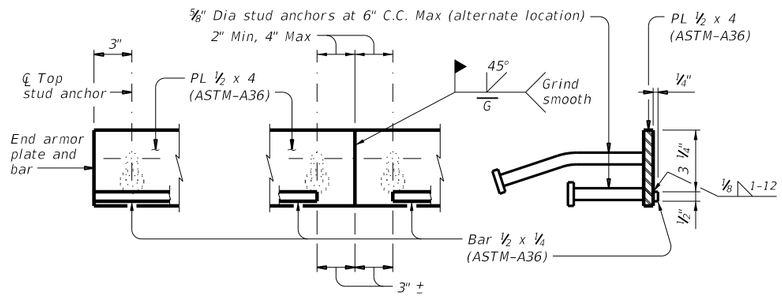


JOINTS AT ABUTMENTS — SKEWS OVER 15° — SKEWS THRU 15°

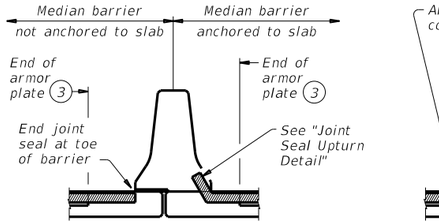
PLANS OF ARMOR PLATES



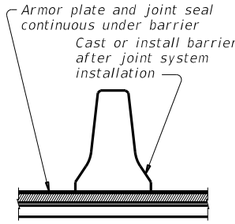
END VIEW — FIELD SPLICE — SECTION

(Studs are not shown for clarity.)

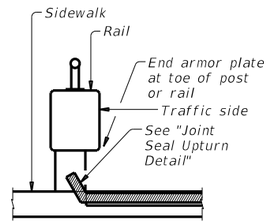
ELEVATION OF ARMOR PLATE



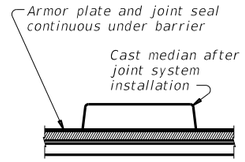
WITH OPEN DECK JOINT BELOW MEDIAN BARRIER



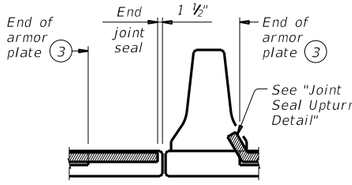
AT MEDIAN BARRIER



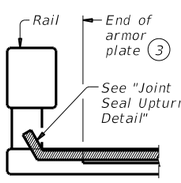
AT SIDEWALK BEHIND BRIDGE RAIL



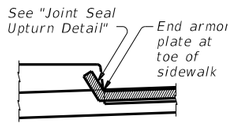
AT RAISED MEDIAN



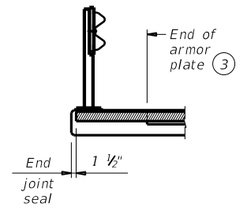
WITH OPEN DECK JOINT ADJACENT TO MEDIAN BARRIER



AT CONCRETE BRIDGE RAIL

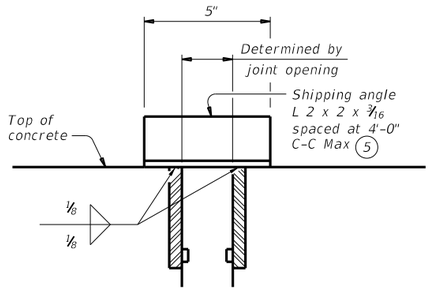


AT SIDEWALK



AT STEEL POST BRIDGE RAIL

TYPICAL SECTIONS OF ARMOR PLATES AND SEALS (4)

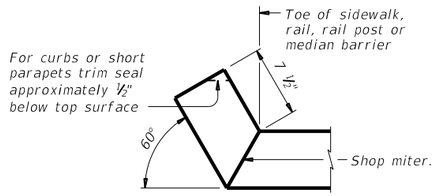


SHOWING ARMOR PLATE

(Studs not shown for clarity)

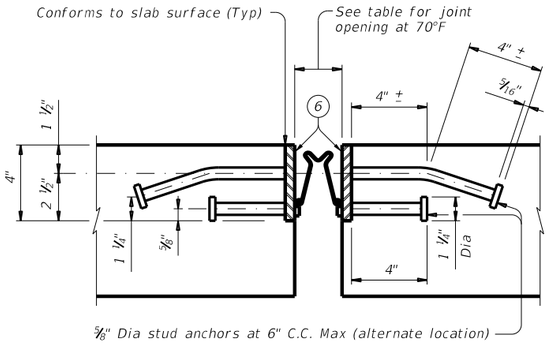
SHIPPING ANGLE

An alternate method of securing joint sections may be used if approved by the Bridge Division. Erection bolts are not allowed.



JOINT SEAL UPTURN DETAIL

Upturn seal only. Terminate armor plates as shown in "Plans of Armor Plates" and "Typical Sections of Armor Plates & Seals."



JOINT SECTION

Showing R J Watson strip seal. Other strip seals are similar.

TABLE OF SEALED EXPANSION JOINT INFORMATION

MANUFACTURER	STEEL SECTION (7)	STRIP SEAL 4" JOINT	
		Seal Type	Joint Opening (8)
D.S. Brown	As shown	V-400	2 ¼"
R.J. Watson	As shown	SF-400	2 ½"
SSI	As shown	SSS-400	2 ½"
Watson Bowman Acme	As shown	SPS-400	2"

REDUCED LONGITUDINAL MOVEMENT RANGE

SKEW (deg)	JOINT SIZE 4"
0	4.0"
15	4.0"
30	3.5"
45	2.8"

DESIGN NOTES:

Joints installed on a skew have reduced ability to accommodate longitudinal movement. Use table values to determine the correct joint size for skewed installations.

For other skews over 25 degrees, calculate reduced movement range by multiplying joint size by cosine (skew).

(1) At Fabricator's option, armor plate may extend up to 6" beyond this point for skews through 15°.

(2) Unless shown otherwise, terminate armor plate at slab break point if break is more than 2'-0" from slab edge.

(3) See "Plans of Armor Plates".

(4) Other conditions affecting the joint profile should be noted elsewhere.

(5) Align shipping angle perpendicular to joint.

(6) Coat with Manufacturer's supplied epoxy primer above bar before installing sealant.

(7) Shape of steel section shown is typical. Variations in sections must be approved by the Engineer.

(8) These openings are also the recommended minimum installation openings.

FABRICATION NOTES:

Temporarily shop assemble corresponding sections of sealed expansion joints (SEJ), check for fit, and match mark for shipment. Secure corresponding sections together for shipment with shipping angle. Do not use erection bolts.

The seal must be continuous and included in the price bid for sealed expansion joint.

Ship steel sections in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for staged construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and sufficient studs are added to limit the stud to shop splice distance to 2" Min and 4" Max.

Weld studs in accordance with AWS D1.1.

Butt weld all shop and field splices and grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop.

Paint the entire steel section with System II or IV primer in accordance with Item 446, "Feild Cleaning and Painting Steel." Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Item 446.4.7.3 and 446.4.7.4.

Shop drawings for the fabrication of sealed expansion joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

CONSTRUCTION NOTES:

Secure the sealed expansion joint in position and place to the proper grade and alignment by welding braces to adjacent reinforcing steel, to prestressed beam stirrups, or to anchors cast in concrete diaphragms. Include cost of temporary bracing in the price bid for sealed expansion joint.

Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

Clean and prepare seal cavity for seal installation as per the Manufacturer's installation procedures.

Splice and install seal in accordance with the Manufacturer's directions and with the adhesive provided by the Manufacturer.

Splice in joint seal may be performed in the field.

GENERAL NOTES:

Provide sealed expansion joints in the size and at locations shown on the plans.

Minimum slab and overhang thickness required for the use of SEJ-B is 6 ½".

Texas Department of Transportation

Bridge Division Standard

SEALED EXPANSION JOINT TYPE B WITHOUT OVERLAY

SEJ-B

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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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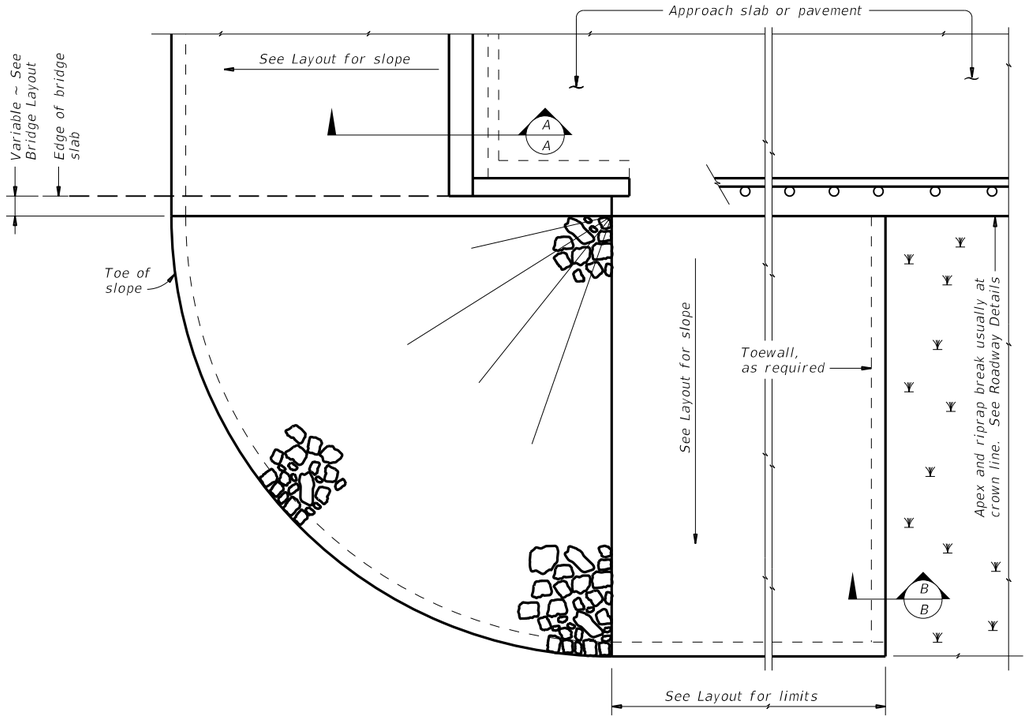
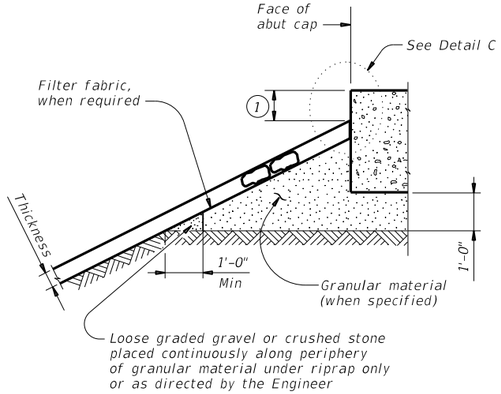
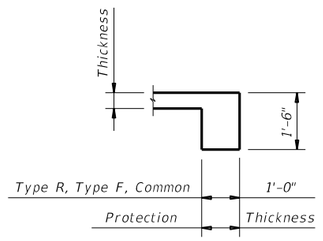


PLAN

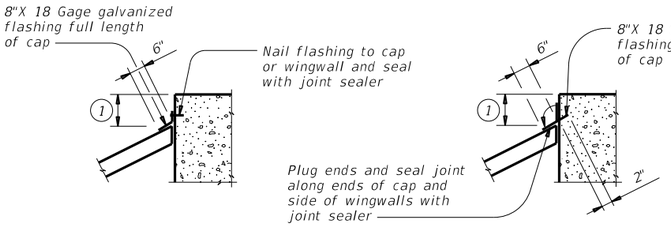


SECTION A-A AT CAP



SECTION B-B

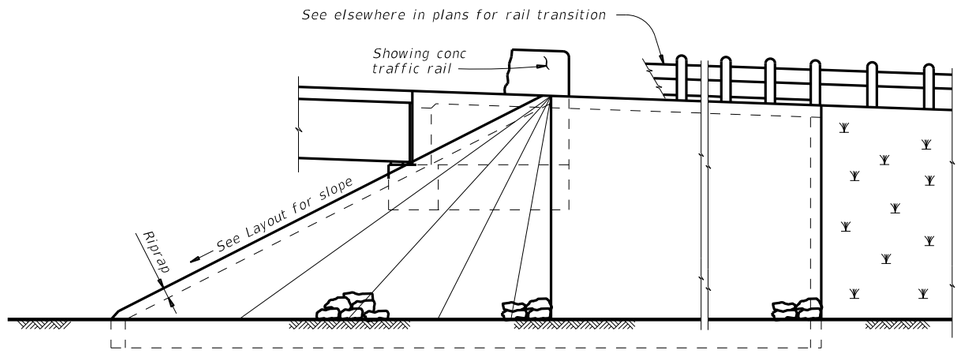
Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".



CAP OPTION A

CAP OPTION B

DETAIL C



ELEVATION

(1) Top of cap to top of riprap dimension varies as directed by the Engineer. Provide 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.

GENERAL NOTES:
Refer to Item 432, "Riprap" for stone size and gradation, and construction details. See Layout for limits and thickness of riprap specified.
See elsewhere in plans for locations and details of shoulder drains.

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

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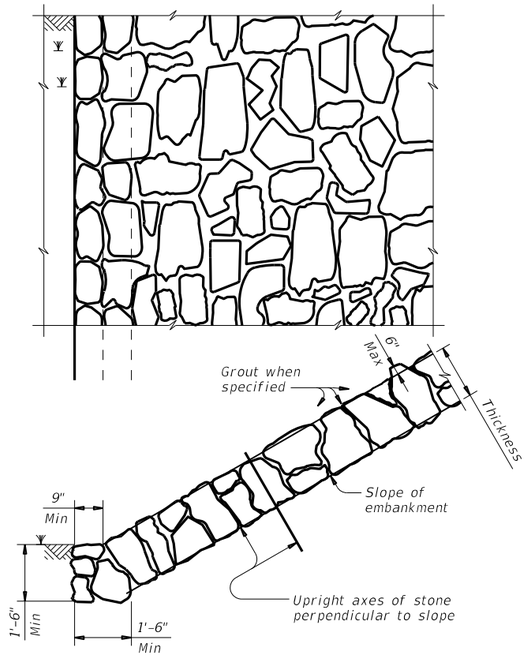


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

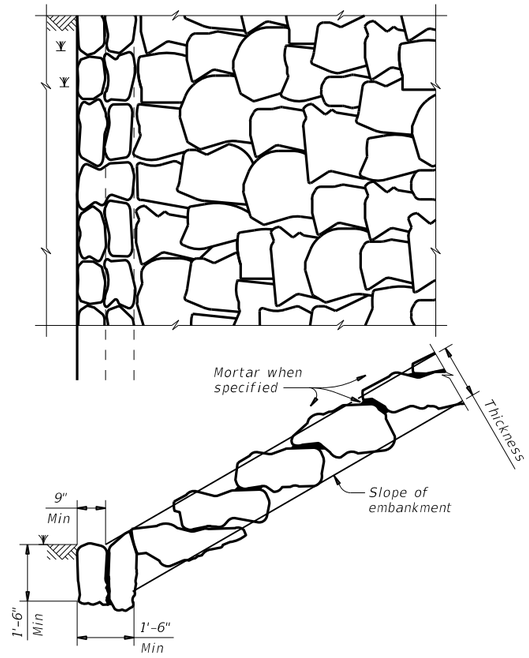


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

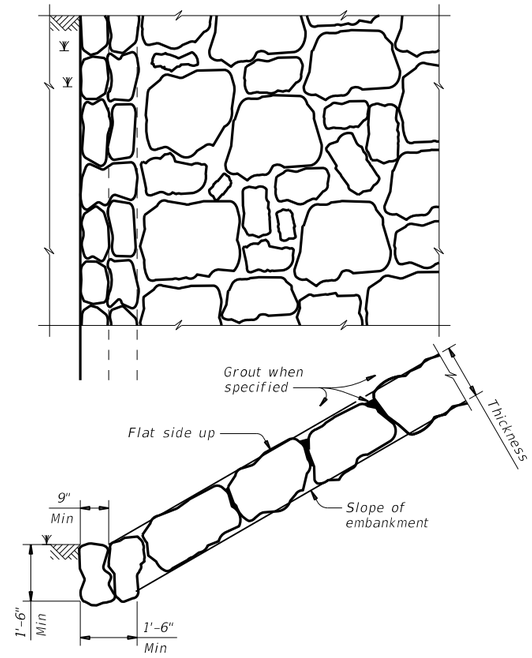


FIGURE 3 ~ TYPE F STONE RIPRAP

grouted

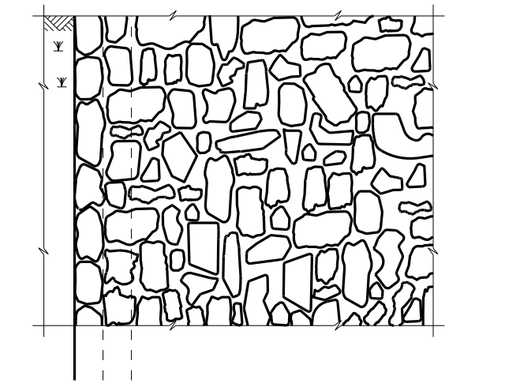


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

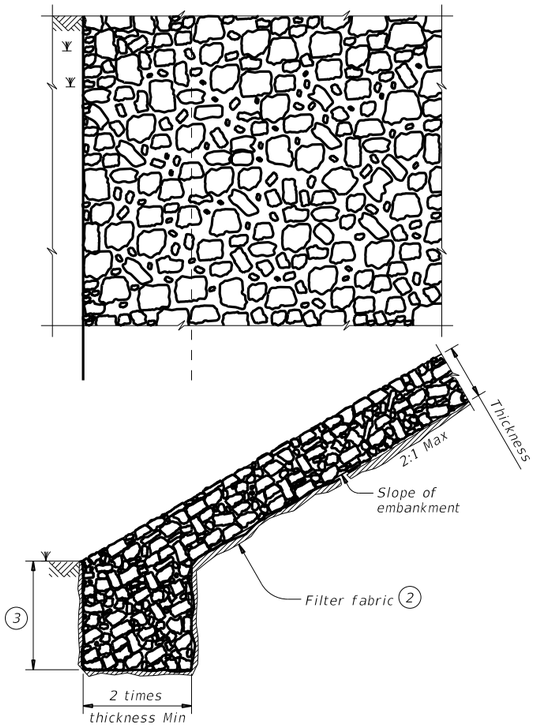


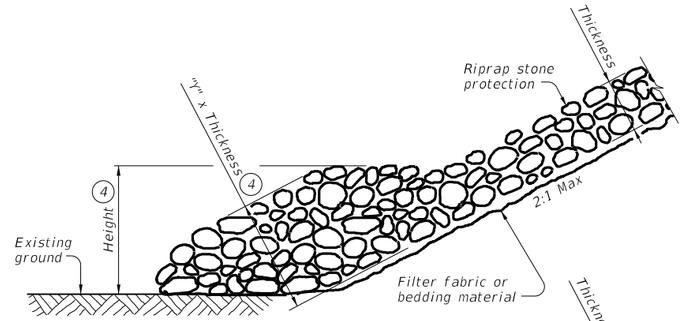
FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

(2) Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.

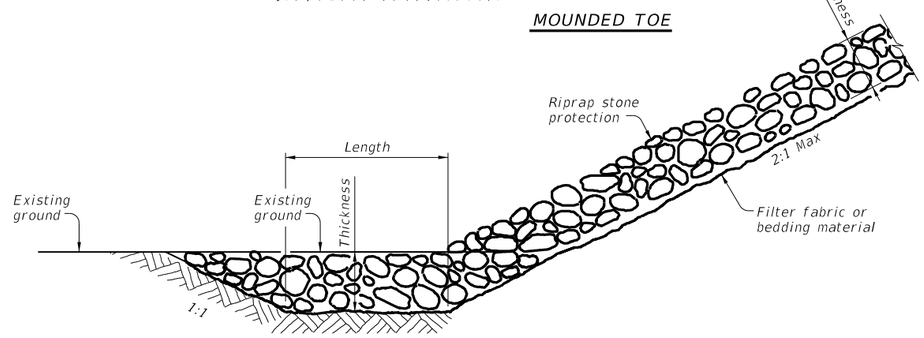
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

(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

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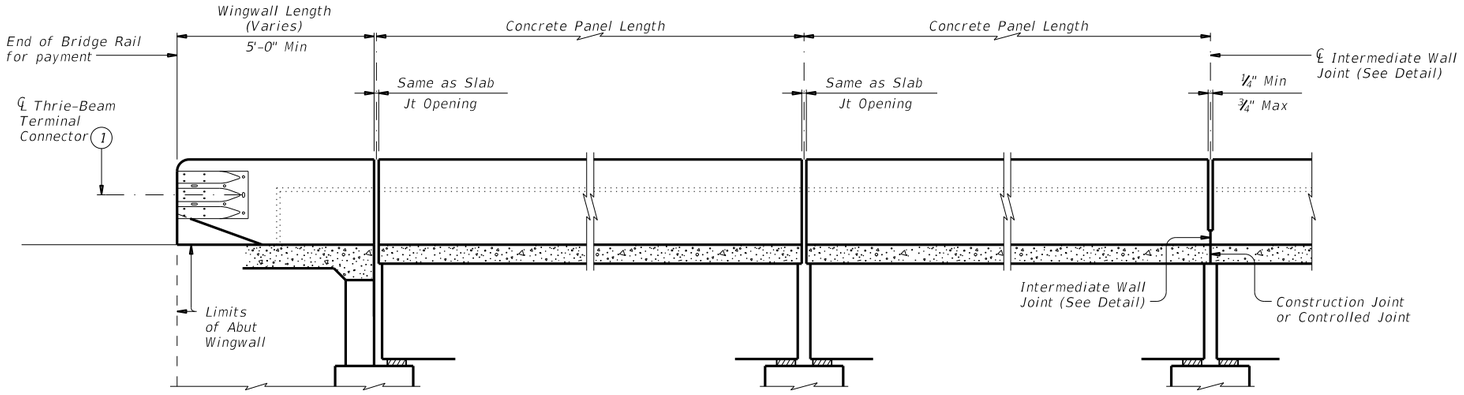
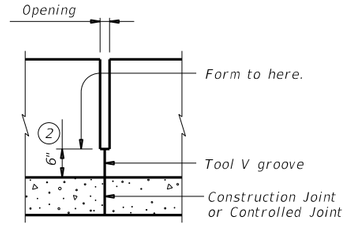


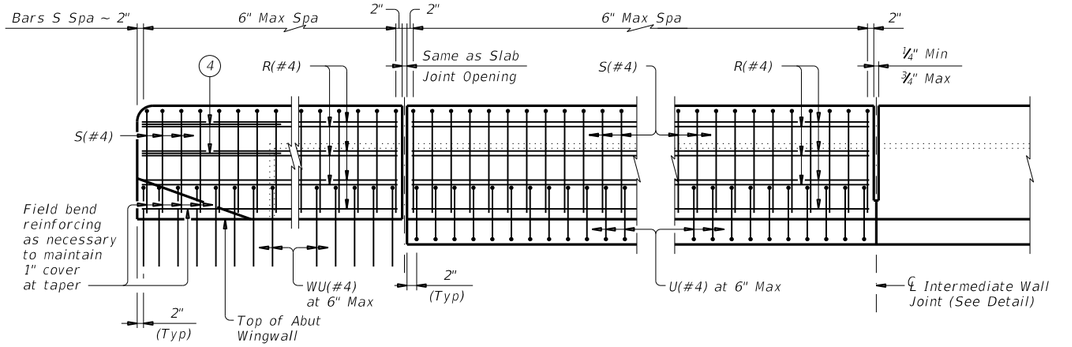
AT ABUTMENTS | AT BENTS WITH SLAB EXP JOINTS | AT BENTS WITHOUT SLAB EXP JOINTS

ROADWAY ELEVATION OF RAIL

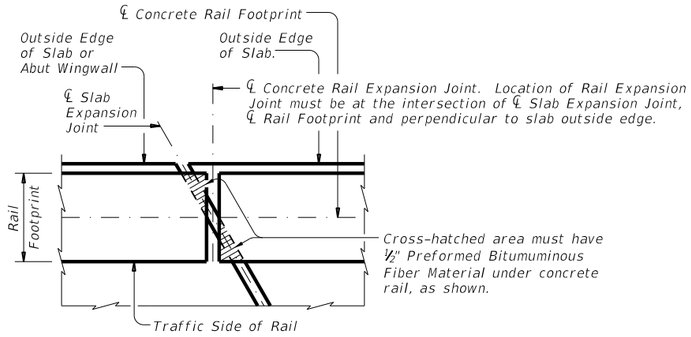


INTERMEDIATE WALL JOINT DETAIL

Provide at all interior bents without slab expansion joints.



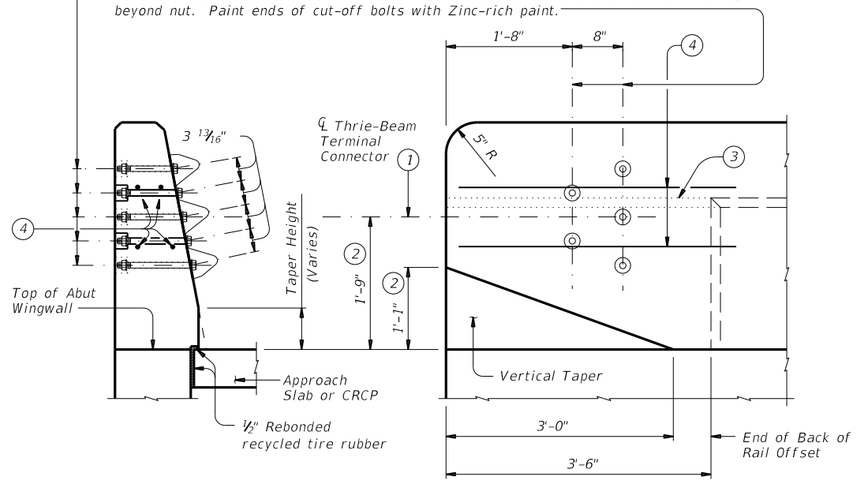
ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

℄ 5 ~ 1" Dia holes and 2 ½" Dia x 2" deep recesses. Form or core holes and recesses. Percussion drilling is not permitted. Adjust placement of reinforcing steel as necessary to avoid bolt holes and recesses. Bolt recesses are only required when pedestrian sidewalks are adjacent to back of rail. Tighten the 5 Terminal Connection Bolts in a well distributed pattern so to prevent damage or distortion of the Thrie-Beam Connection and the MBGF Transition. Cut bolts off after installation so as to extend no more than ¾" beyond nut. Paint ends of cut-off bolts with Zinc-rich paint.



SECTION | ELEVATION

TERMINAL CONNECTION DETAILS

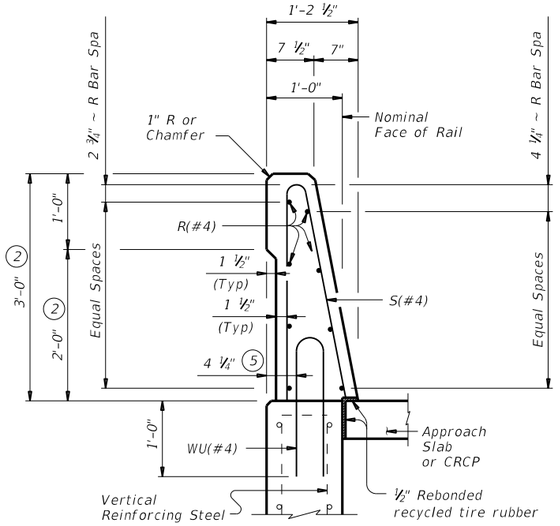
1. Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.
2. Increase 2" for structures with Overlay.
3. Back of rail offset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

Texas Department of Transportation | Bridge Division Standard

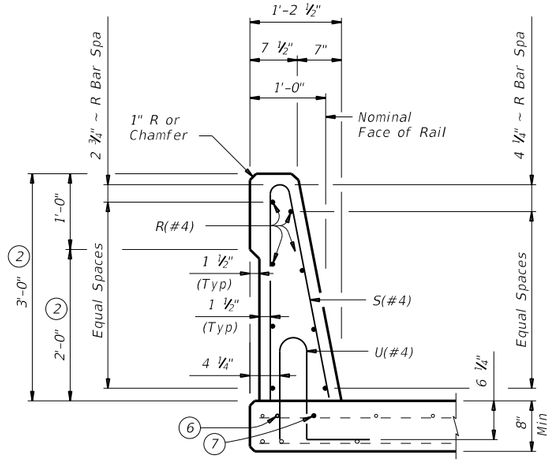
TRAFFIC RAIL SINGLE SLOPE

TYPE SSTR

FILE: rlstd014-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1430	01	031, ETC	FM 490
	DIST	COUNTY		SHEET NO.
	PHR	WILLACY		72

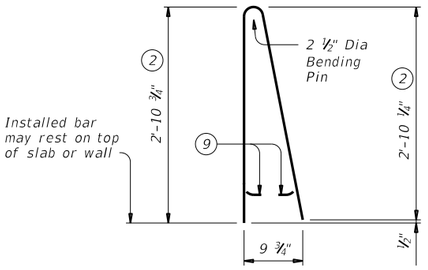


ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS

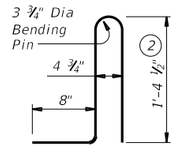


ON BRIDGE SLAB

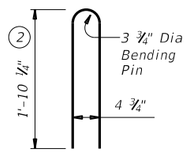
SECTIONS THRU RAIL



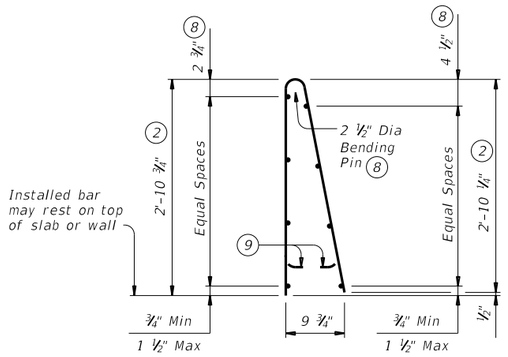
BARS S (#4)



BARS U (#4)

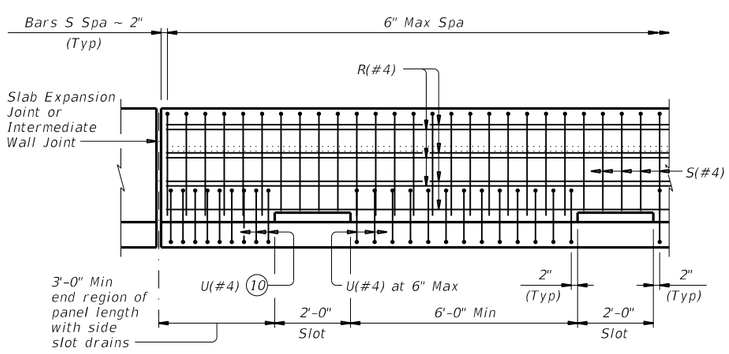


BARS WU (#4)



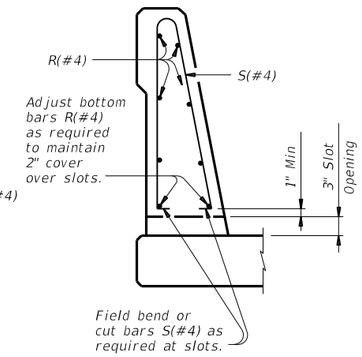
OPTIONAL WELDED WIRE REINFORCEMENT (WWR)

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



OPTIONAL SIDE SLOT DRAIN DETAIL

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



SECTION THRU OPTIONAL SIDE SLOT DRAIN

(2) Increase 2" for structures with Overlay.

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

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

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

(8) No longitudinal wires may be within upper bend.

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

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

CONSTRUCTION NOTES:

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

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

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

MATERIAL NOTES:

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

Provide Grade 60 reinforcing steel.

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

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

Provide bar laps, where required, as follows:

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

Epoxy coated ~ #4 = 2'-5"

GENERAL NOTES:

This rail has been successfully evaluated by full-scale crash test to meet MASH TL-4 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 will not be required for this rail.

Average weight of railing with no overlay is 376 plf.

Cover dimensions are clear dimensions, unless noted otherwise.

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

DATE: 4/25/2023 1:15:58 PM
FILE: c:\pw-of\pw-of-prod\tyler.martin@aguirre-fields.com\dms18277\SSTR2.dgn

SHEET 2 OF 2

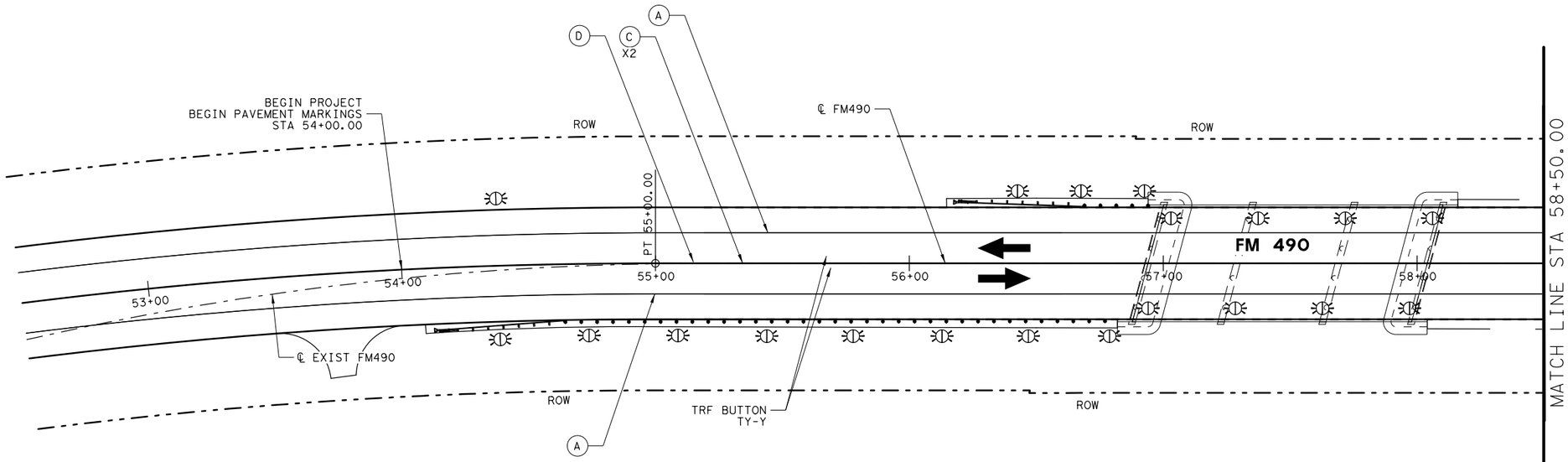
Texas Department of Transportation

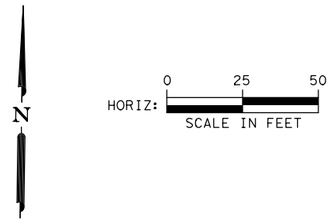
Bridge Division Standard

TRAFFIC RAIL SINGLE SLOPE

TYPE SSTR

FILE: rlstd014-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1430	01	031, ETC	FM 490
	DIST	COUNTY		SHEET NO.
	PHR	WILLACY		73



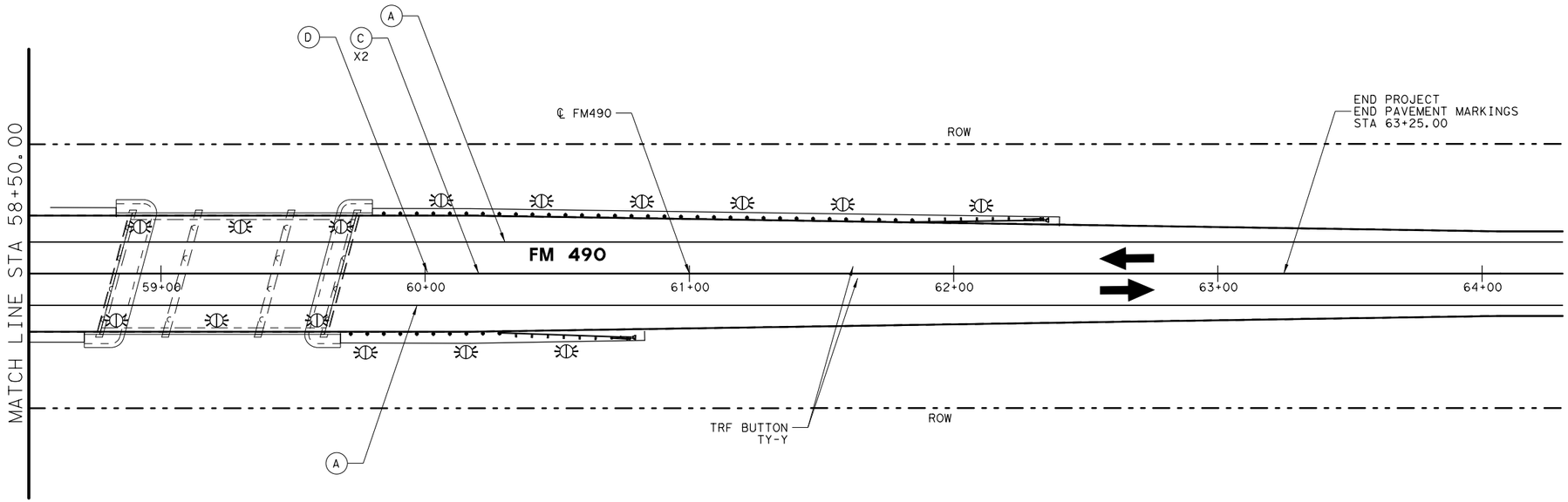


LEGEND

- ROW
- PROPOSED ROADWAY
- PROPOSED PROJECT BY OTHERS
- PROPOSED TRAFFIC FLOW
- EXISTING TRAFFIC FLOW
- (A) REF PROF PAV MRK TY I W 6" (SLD)
- (B) RE PM W/RET REQ TY I Y 6" (BRK)
- (C) RE PM W/RET REQ TY I Y 6" (SLD)
- (D) RAISED PAV MARK (TY II-A-A) @ 40' C-C
- INSTL DEL ASSM (BI-DIRECTIONAL)
- ROAD SIGN
- OM-2Z CULVERT MARKER
- REMOVE SIGN
- INSTALL SIGN

NOTES:

1. SEE HORIZONTAL ALIGNMENT DATA SHEET FOR MORE INFORMATION.
2. SEE TRAFFIC STANDARDS FOR MORE INFORMATION AND DETAILS.
3. TRAFFIC BUTTONS SHALL BE PLACED IN COMPLIANCE WITH TXDOT AND PHARR DISTRICT STANDARDS.



NO.	DATE	REVISION	APPROVED

BURNS McDONNELL
13737 NOEL RD
SUITE 700
DALLAS, TX. 75240
ENGINEERING FIRM F-845

Texas Department of Transportation

FM 490

SIGNING AND PAVEMENT MARKINGS LAYOUT

SCALE = 1"=50' SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
MAW	6	SEE TITLE SHEET	FM 490
DRAWN MAW	STATE	DISTRICT	COUNTY
CHECK SPC	TEXAS	PHR	WILLACY
CHECK SPC	CONTROL	SECTION	JOB
	1430	01	031,Etc

SHEET NO. 74

PENTABLE: FM490 025-ETC Pentable.tbl
SCALE: 1:50
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DATE: 4/20/2023
TIME: 7:07:35 PM
USER: dsh1jones
FILE NAME: ...\Traffic\FM490-BMCD-PM-01.dgn

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

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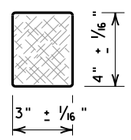
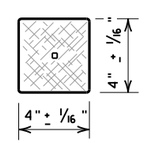
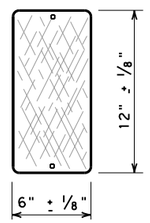
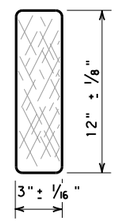
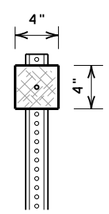
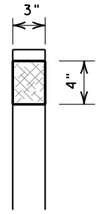
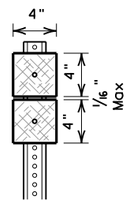
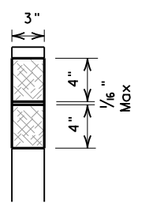
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

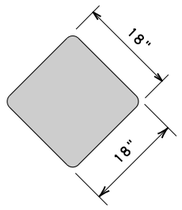
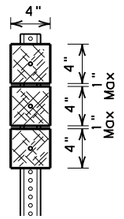
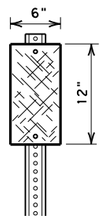
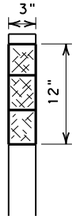
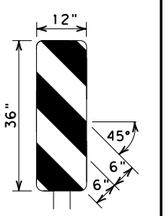
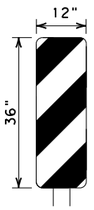
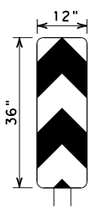
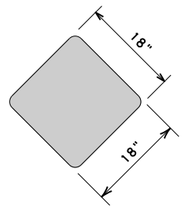
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

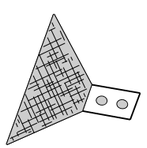
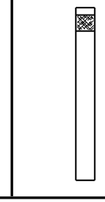
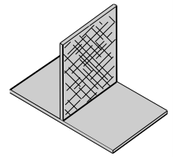
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

DEPARTMENTAL MATERIAL SPECIFICATIONS

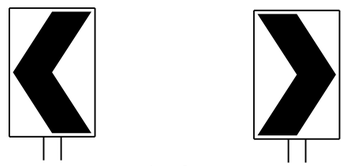
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		

CHEVRONS

DEVICE



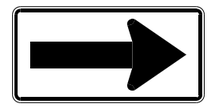
W1-8

SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

NOTE
1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

ONE DIRECTION LARGE ARROW

DEVICE



W1-6

SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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4-10 7-20	PHR	WILLACY		75

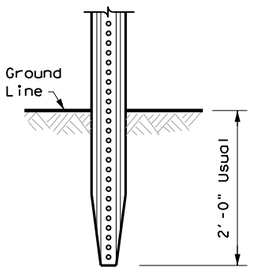
20A

DATE: 4/25/2023
FILE: ...\STANDARDS\D&OM(1)-20.dgn

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

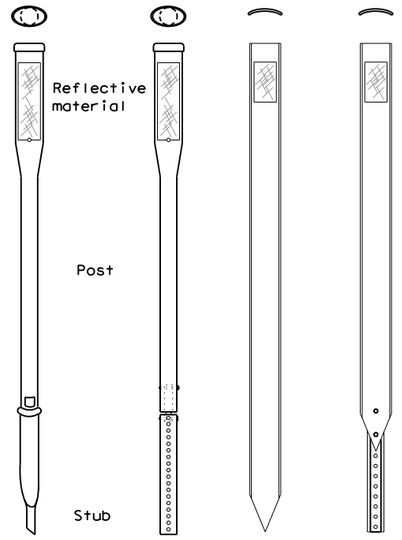


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

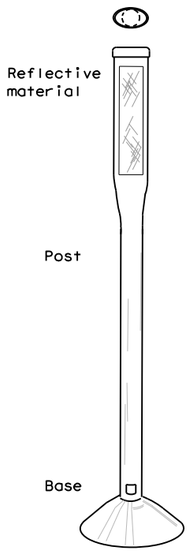
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



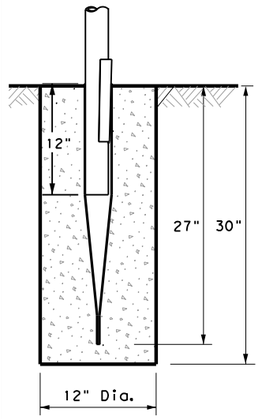
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

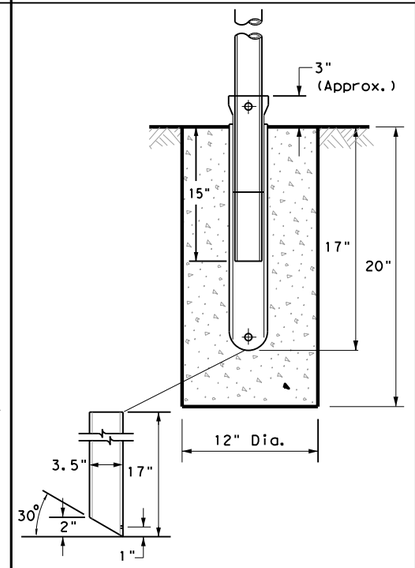
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

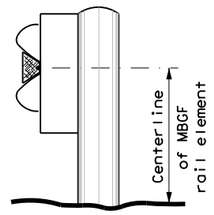
NOTE

1. Install per manufacturer's recommendations.

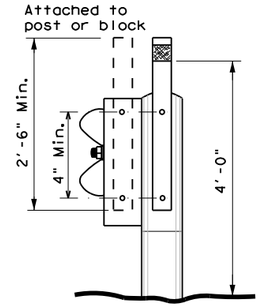
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

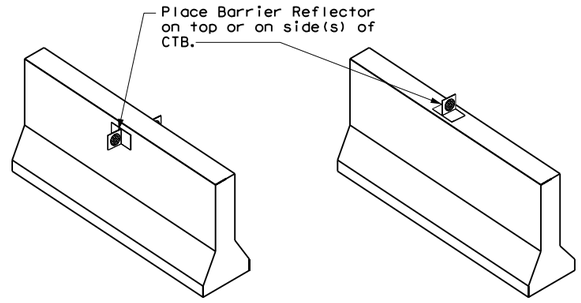
GF1



GF2



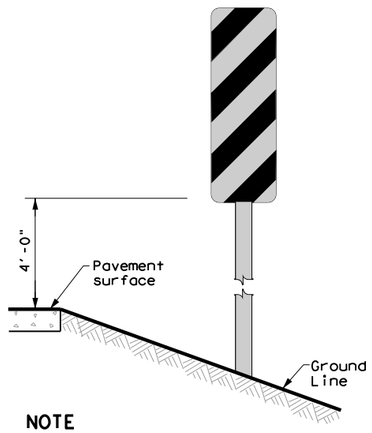
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

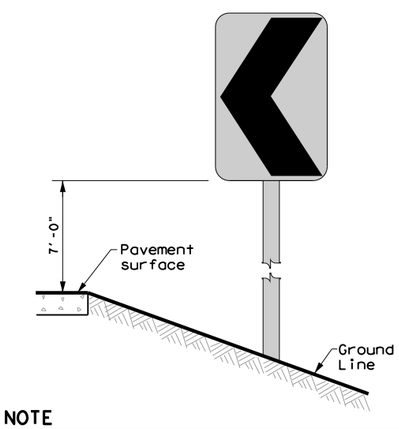
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

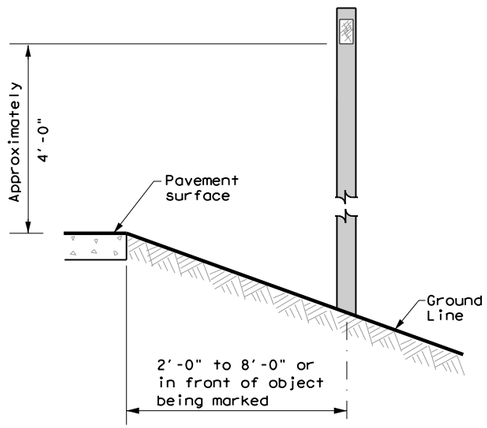
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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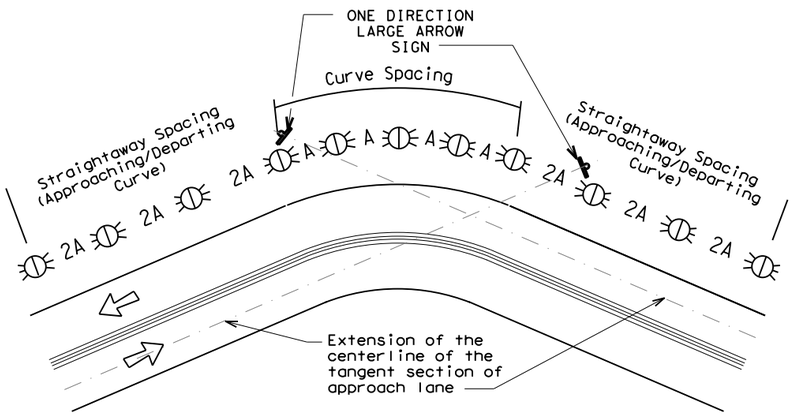
MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

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

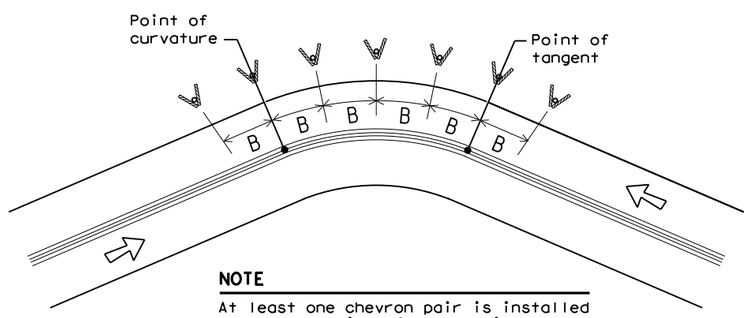
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



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
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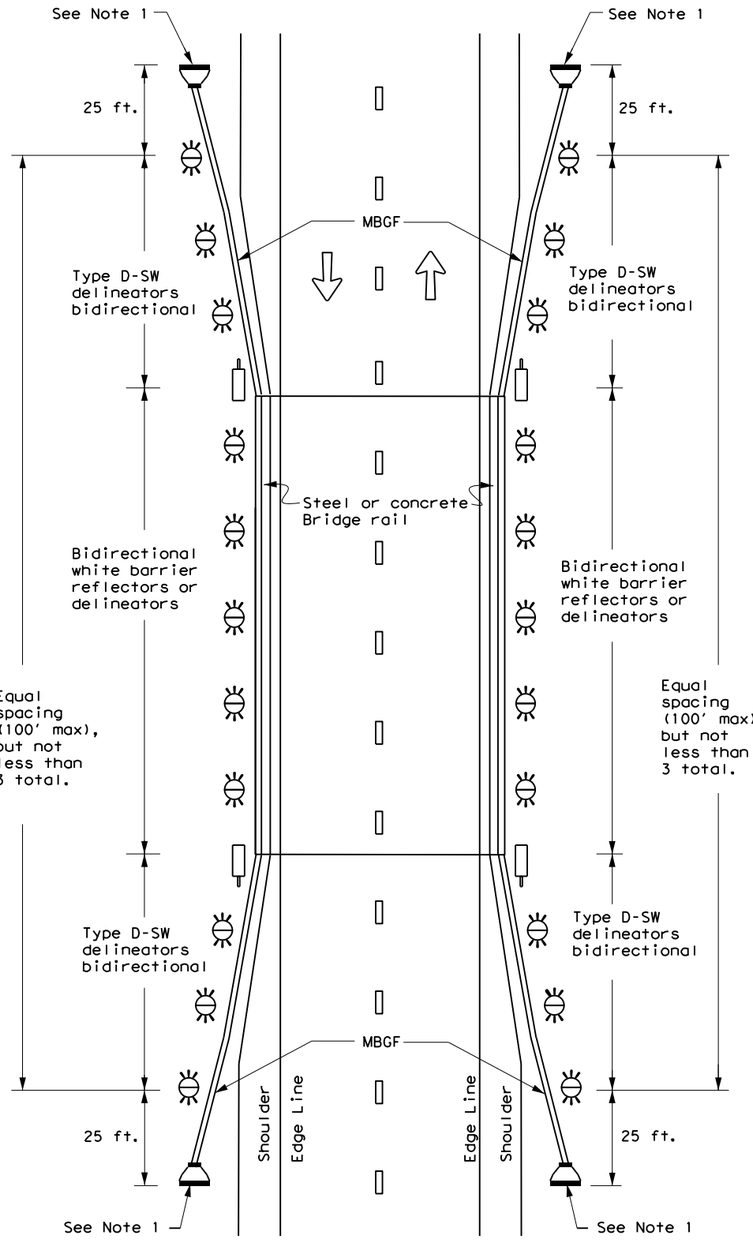
FILE: ...\STANDARDS\D&OM(3)-20.dgn

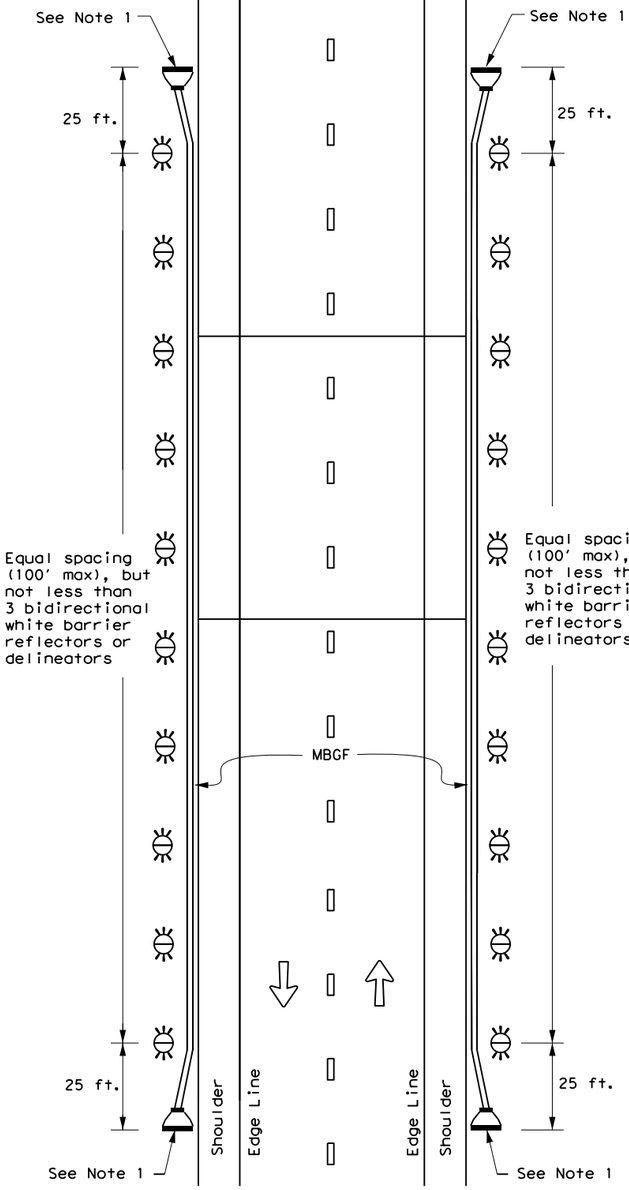
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

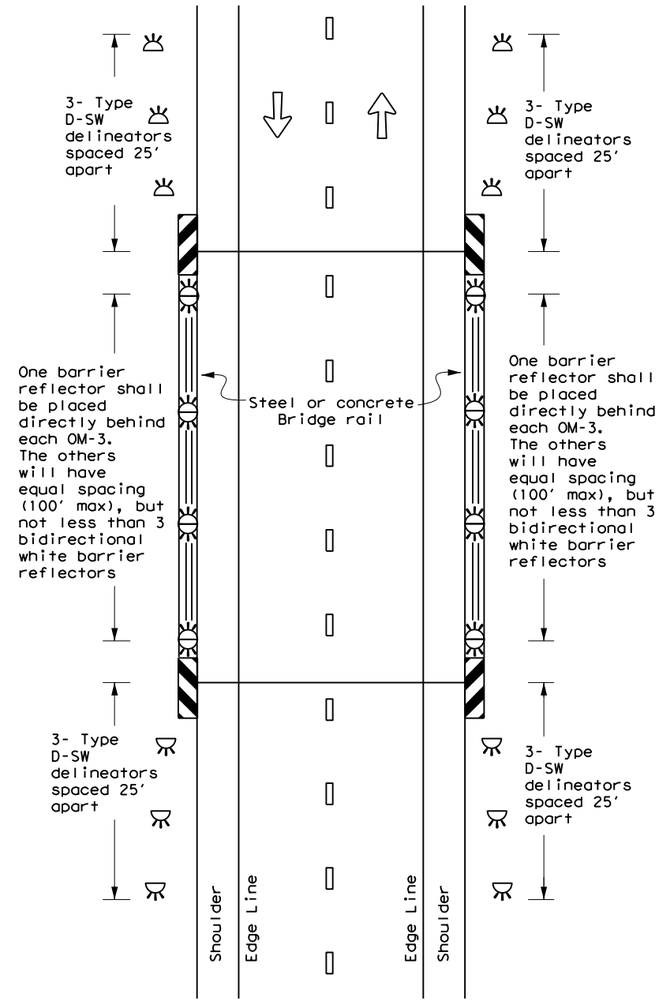
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(5)-20

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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DATE: 4/25/2023
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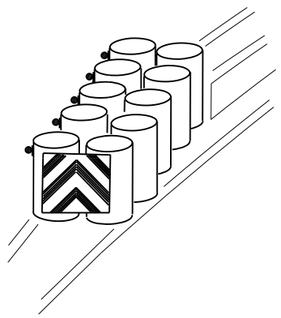
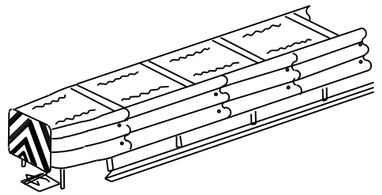
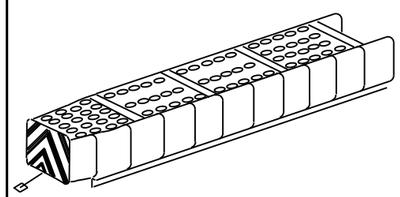
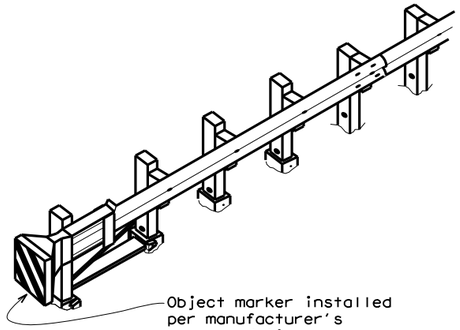
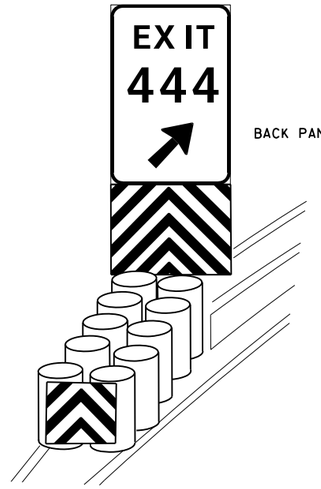
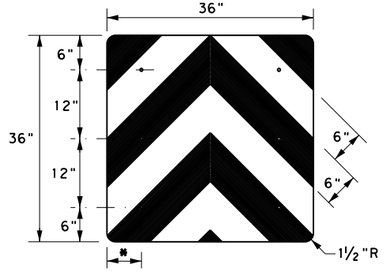


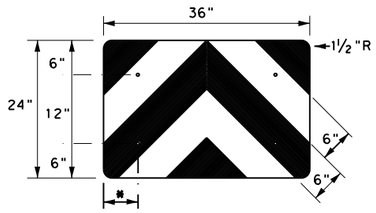




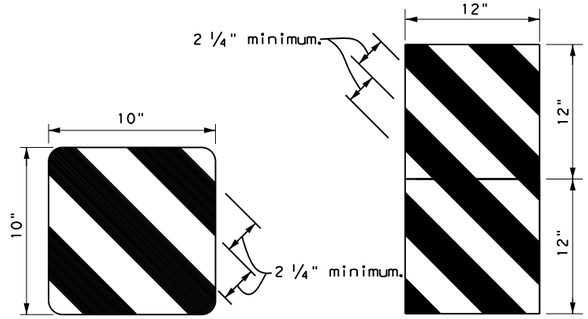




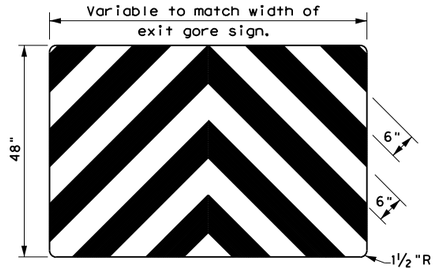


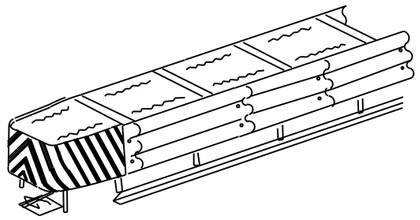


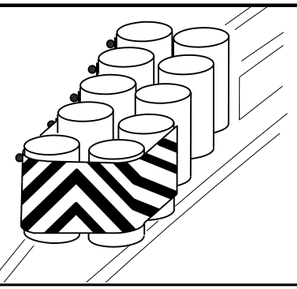
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

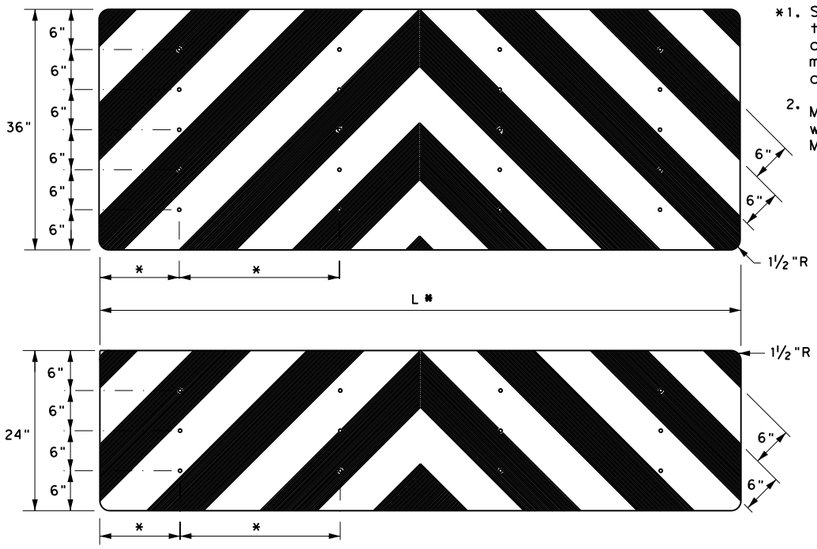


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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REVISIONS	1430	01	031, ETC	FM 490
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	PHR	WILLACY		79
4-98 7-20				

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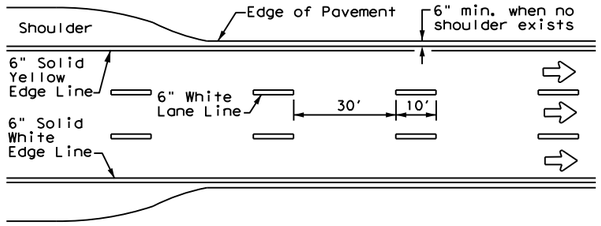
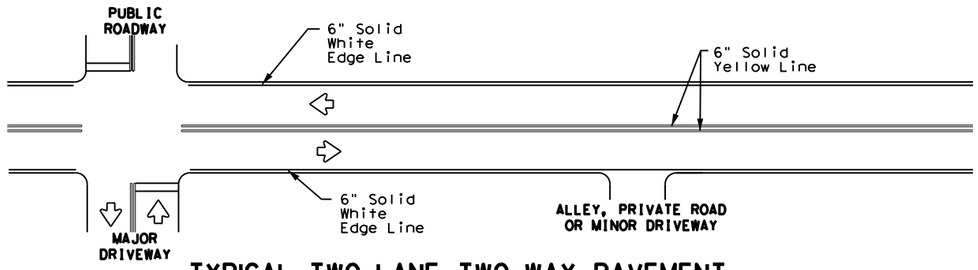
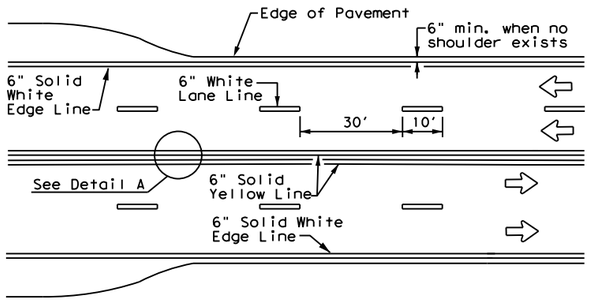
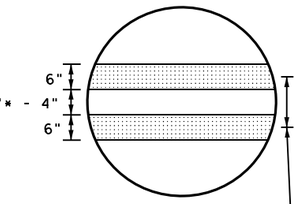


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

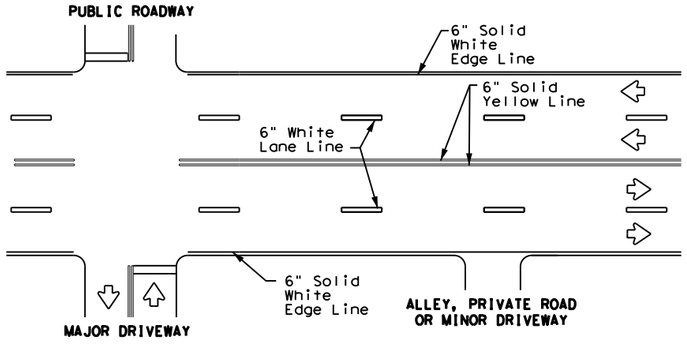




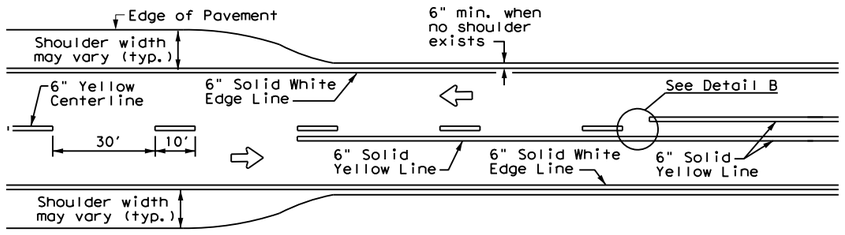
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

* 2" minimum for restripe projects when approved by the Engineer.

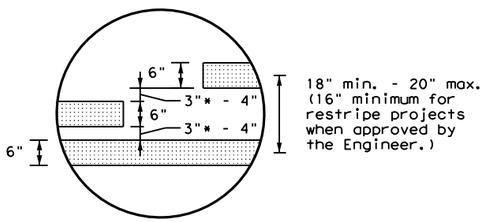
** 8" minimum for restripe projects when approved by the Engineer.



TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

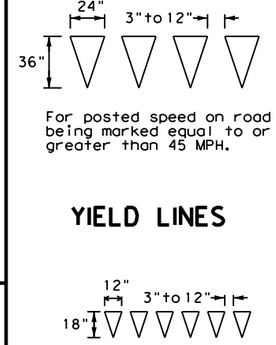


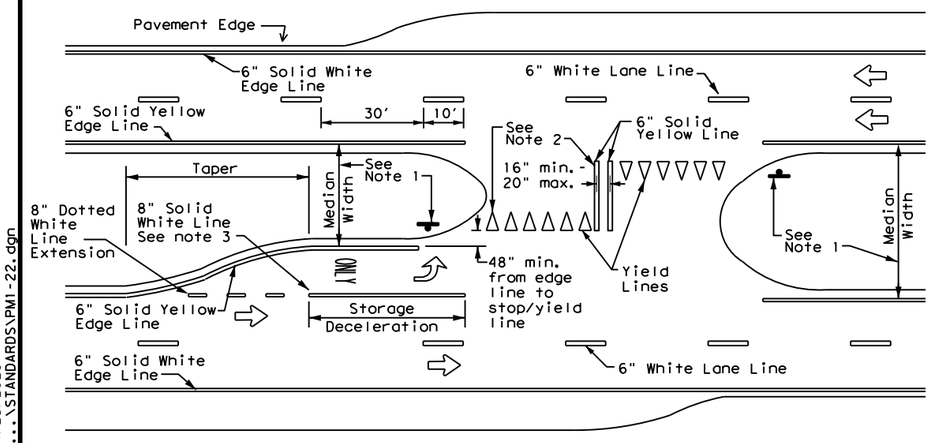
TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



DETAIL "B"

* 2" minimum for restripe projects when approved by the Engineer.





FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

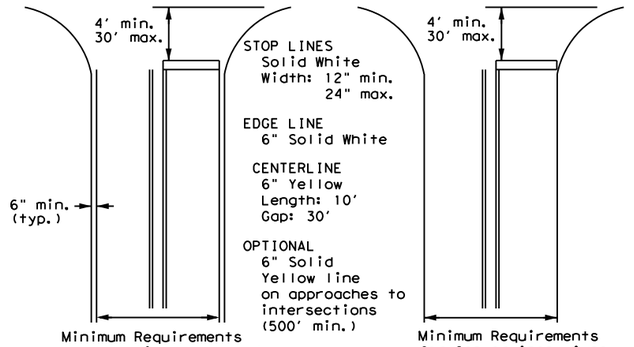
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

GENERAL NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

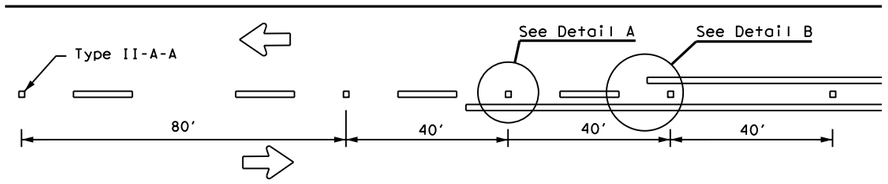
PM(1)-22

FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 11-78 8-00 6-20	1430	01	031, ETC	FM 490
8-95 3-03 12-22	DIST	COUNTY		SHEET NO.
5-00 2-12	PHR	WILLACY		80

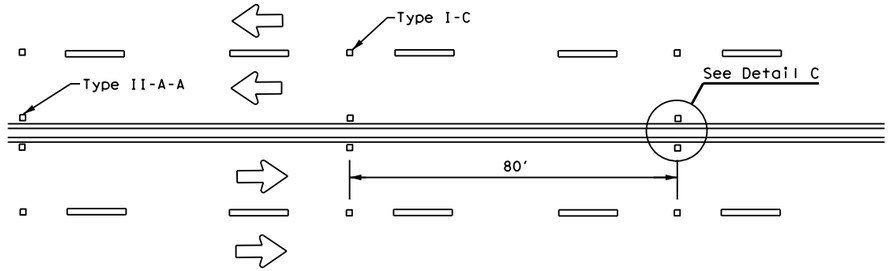
22A

DATE: 4/25/2023
FILE: ...\STANDARDS\PM1-22.dgn

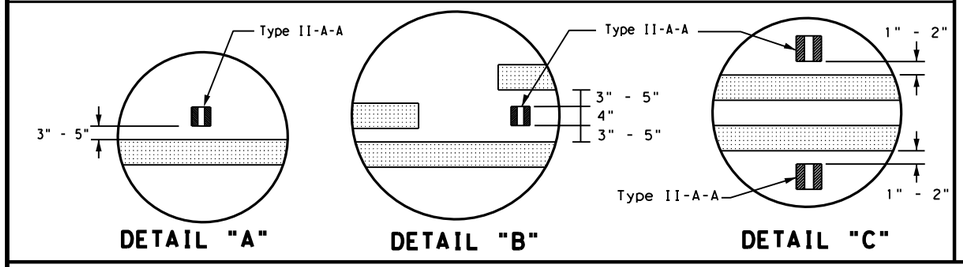
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

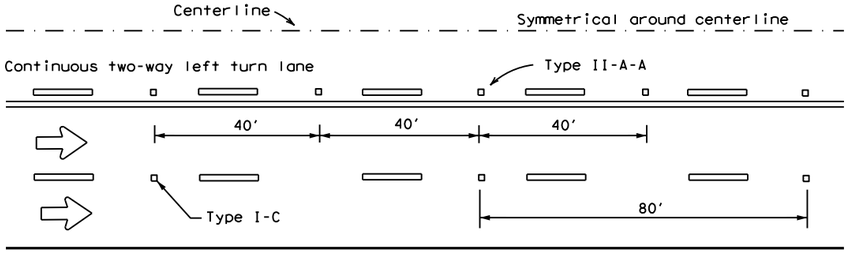


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

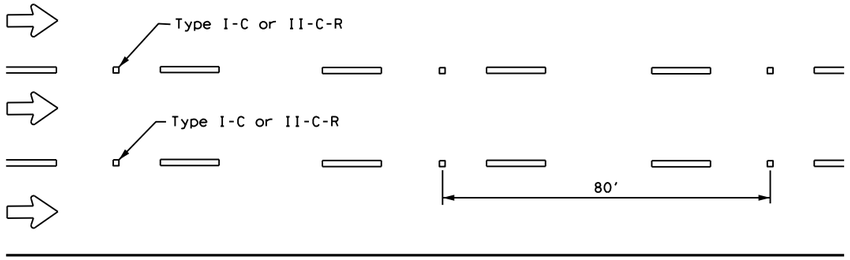


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS





CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



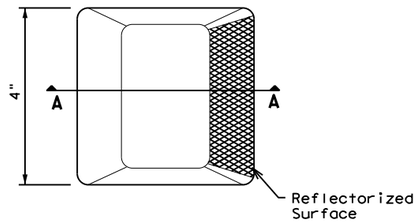
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

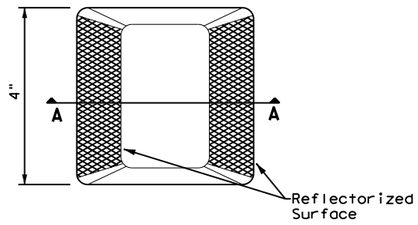
See Note 3.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

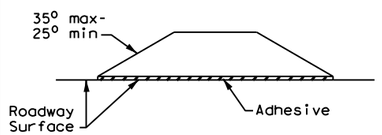
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

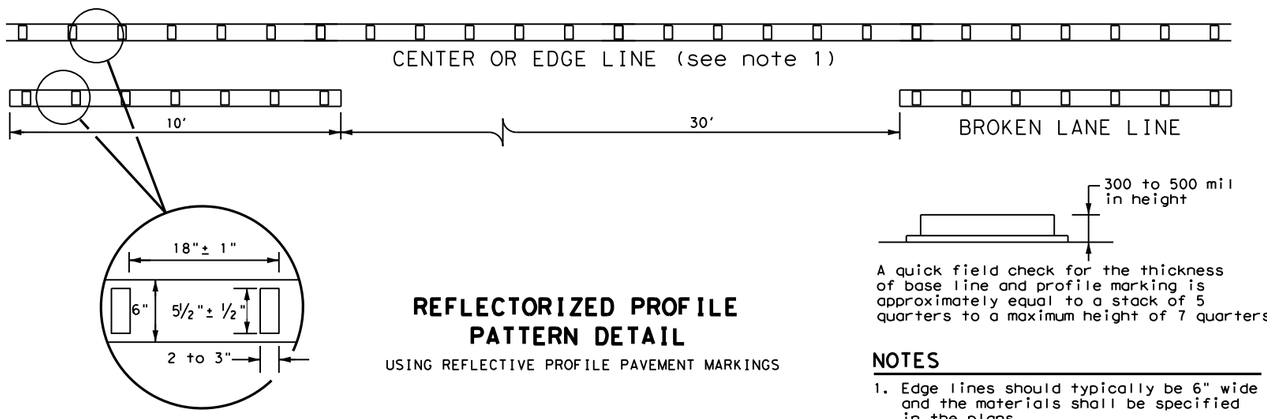


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



6" EDGE LINE, 6" CENTERLINE OR 6" LANE LINE

REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTES

1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-22

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-77 8-00 6-20 4-92 2-10 12-22 5-00 2-12	1430	01	031, ETC	FM 490
	DIST	COUNTY		SHEET NO.
	PHR	WILLACY		81

22B

DATE: 4/25/2023
FILE: ...\STANDARDS\PM2-22.dgn

DATE: 4/25/2023 1:16:17 PM
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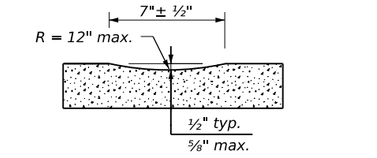
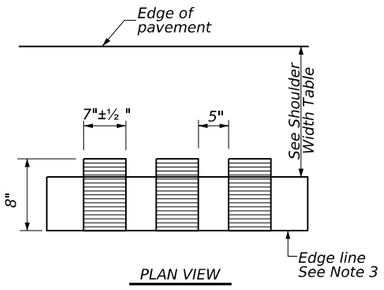
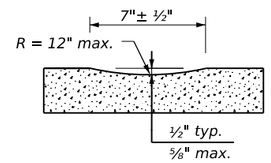


PROFILE VIEW
OPTION 1

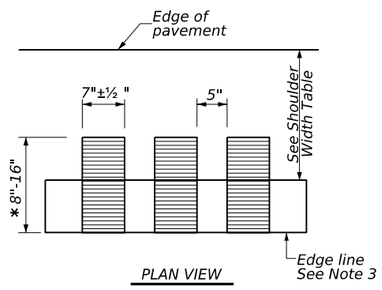


PLAN VIEW

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



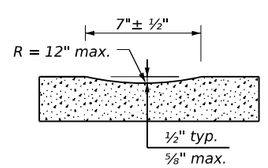
PROFILE VIEW
OPTION 2



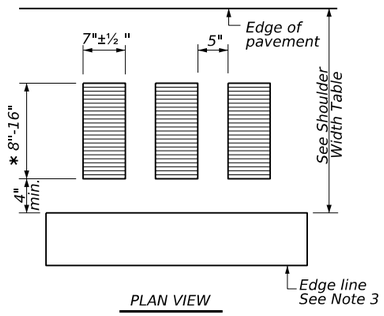
PLAN VIEW

∗ This distance may vary based on width of shoulder

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



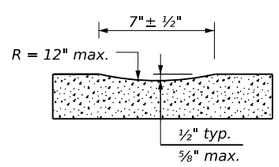
PROFILE VIEW
OPTION 3



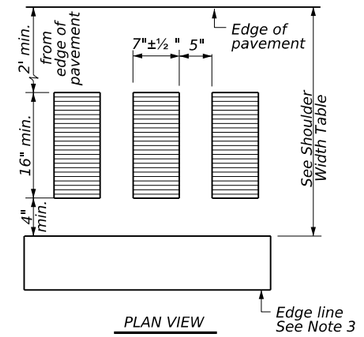
PLAN VIEW

∗ This distance may vary based on width of shoulder

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)

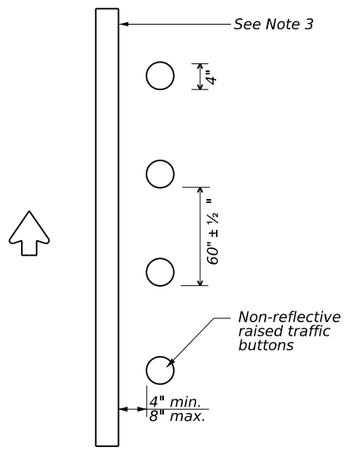


PROFILE VIEW
OPTION 4



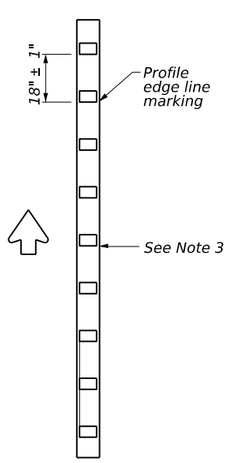
PLAN VIEW

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



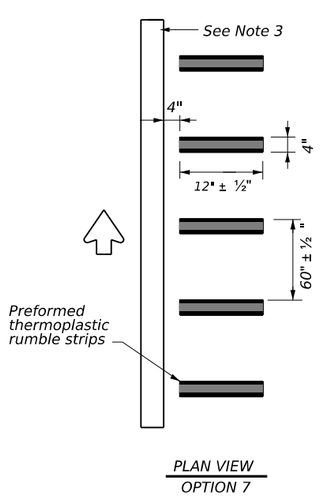
PLAN VIEW
OPTION 5

RAISED EDGE LINE (Rumble Strips)



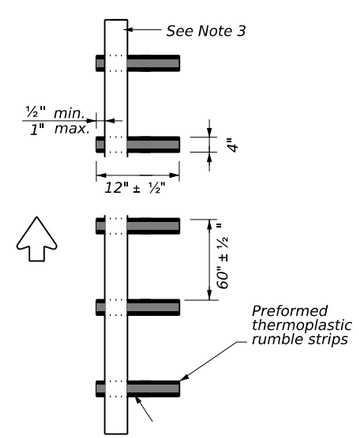
PLAN VIEW
OPTION 6

PROFILE EDGE LINE MARKINGS (Rumble Strips)



PLAN VIEW
OPTION 7

PREFORMED THERMOPLASTIC EDGE LINE (Rumble Strips)



PLAN VIEW
OPTION 8

PREFORMED THERMOPLASTIC EDGE LINE (Rumble Strips)

SHOULDER WIDTH TABLE		
EQUAL TO OR LESS THAN 2 FEET	GREATER THAN 2 FEET LESS THAN 4 FEET	EQUAL TO OR GREATER THAN 4 FEET
Option 1, 5, 6 or 8	Option 1, 2, 3 5, 6 or 7	Option 2, 4, 5 6 or 7

GENERAL NOTES

1. Rumble strips and profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
2. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
3. Use Standard Sheet PM(2) and FPM(1) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
4. See the Shoulder Width Table below for determining what options may be used for edge line rumble strips.
5. Breaks in edge line rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections, or driveways with high usage of large trucks when installed on conventional highways.
6. Rumble strips shall not be placed across exit or entrance ramps, acceleration or deceleration lanes, crossovers, gore areas, or intersections with other roadways.
7. Consideration should be given to noise levels when edgeline rumble strips are to be installed near residential areas, schools, churches, etc. A 3/8 inch deep (minimum) milled rumble strip may be considered in these areas.
8. Consideration shall be given to bicyclists. See RS(6).

WHEN INSTALLING MILLED DEPRESSION EDGE LINE RUMBLE STRIPS:

9. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Safety Division.
10. Pavement markings can be applied over milled shoulder rumble strips to create an edge line rumble strip.

WHEN INSTALLING RAISED OR PROFILE EDGE LINE RUMBLE STRIPS:

11. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per the manufacturer's recommendations.
12. Non-reflective traffic buttons shall be placed adjacent to the pavement marking delineating the edge line when used as a rumble strip. The color of the button should match the color of the adjacent edge line marking (white or yellow). The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
13. Non-reflective traffic buttons shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
14. The minimum distance between the edge line and the buttons should be used if the shoulder is less than 8 feet in width.
15. Raised profile thermoplastic markings used as edge lines may substitute for buttons.

Texas Department of Transportation

Traffic Safety Division Standard

EDGE LINE RUMBLE STRIPS ON UNDIVIDED OR TWO LANE HIGHWAYS
RS(2)-23

FILE: rs(2)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	1430	01	031, ETC	FM 490
10-13 1-23	DIST	COUNTY		SHEET NO.
	PHR	WILLACY		82

DATE: 4/25/2023 1:16:20 PM
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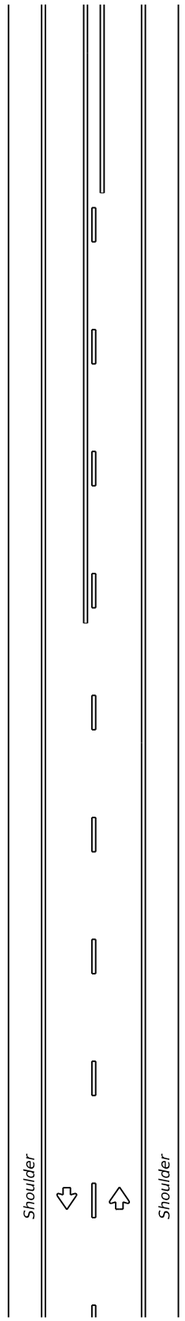
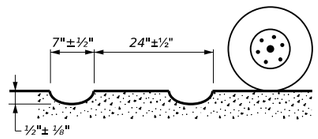
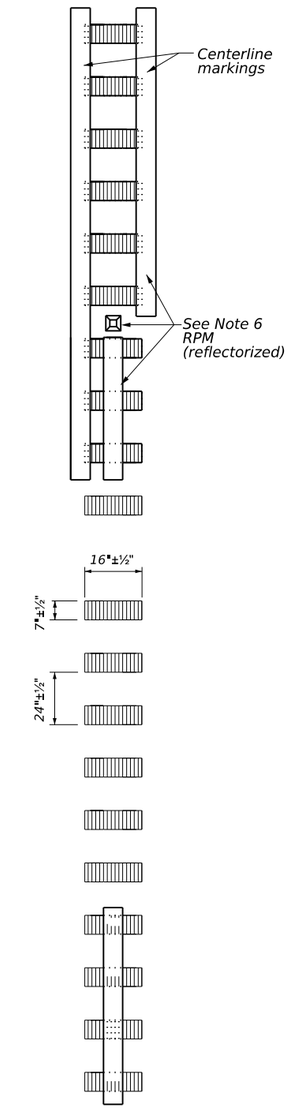
CENTERLINE RUMBLE STRIPS



TWO LANE TWO-WAY HIGHWAYS

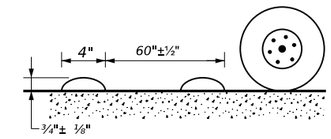


PROFILE VIEW

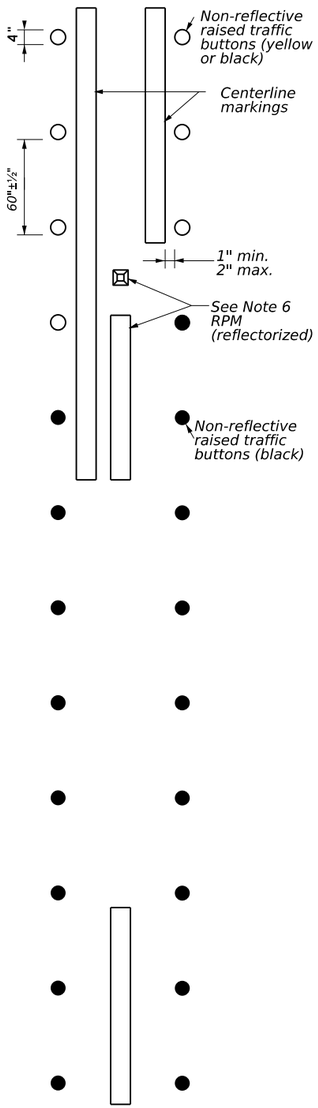


PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS

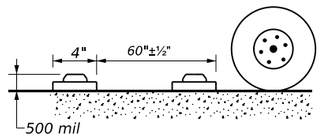


PROFILE VIEW

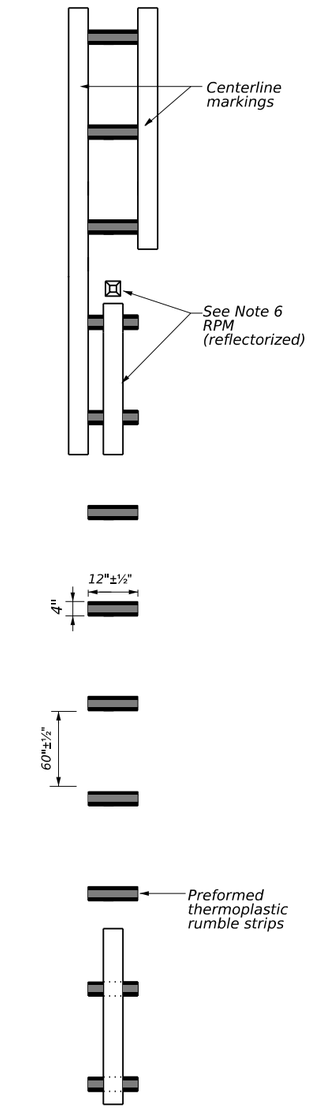


PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS

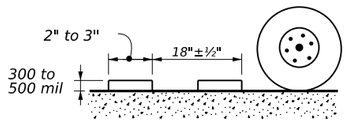


PROFILE VIEW

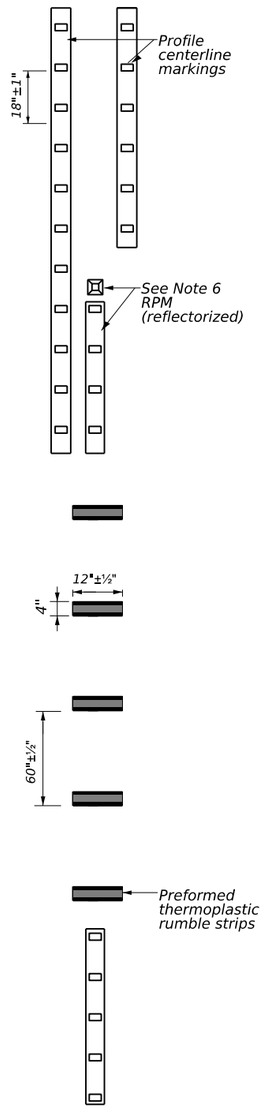


PLAN VIEW
OPTION 3

PREFORMED THERMOPLASTIC RUMBLE STRIPS



PROFILE VIEW



PLAN VIEW
OPTION 4

PROFILE CENTERLINE MARKINGS AND PREFORMED THERMOPLASTIC RUMBLE STRIPS

GENERAL NOTES

1. This standard sheet provides guidelines for installing centerline rumble strips on two-lane highways with or without shoulders.
2. Centerline and edge line rumble strips or profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
3. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
4. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Safety Division.
5. Breaks in milled centerline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections or driveways with high usage of large trucks.
6. Use standard sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings and profile markings.
7. Consideration should be given to noise levels when centerline rumble strips are to be installed near residential areas, schools, churches, etc. A 3/8 inch deep (minimum) milled rumble strip may be considered in these areas.
8. Pavement markings must be applied over milled centerline rumble strips.

WHEN INSTALLING CENTERLINE RUMBLE STRIPS:

9. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per manufacturer's recommendations.
10. When using non-reflective raised traffic buttons as a centerline rumble strip, the button shall be placed adjacent to the pavement marking delineating the centerline. The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
11. The color of the button should be yellow for a continuous no passing roadway. Black buttons should be used in areas where passing is allowed.
12. Consideration shall be given to bicyclists. See RS(6).

WHEN INSTALLING EDGE LINE RUMBLE STRIPS WITH OR WITHOUT CENTERLINE RUMBLE STRIPS ON UNDIVIDED HIGHWAYS:

13. See standard sheet RS(2).

Texas Department of Transportation

Traffic Safety Division Standard

CENTERLINE RUMBLE STRIPS ON TWO LANE TWO-WAY HIGHWAYS RS(4)-23

FILE: rs(4)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	1430	01	031, ETC	FM 490
10-13 1-23	DIST	COUNTY		SHEET NO.
	PHR	WILLACY		83

During the planning phase of project development, the following Environmental Permits, Issues and Commitments have been developed during coordination with resource agencies, local governmental entities and the general public. Any change orders and/or deviations from the final design must be reported to the Engineer prior to the commencement of construction activities as additional environmental clearances may be required.

I. Clean Water Act, Section 402; Stormwater Pollution Prevention

Action Items Required : ☐ No Action Required

1. ☒ The contractor must implement the SW3P by installing Best Management Practices (BMPs) as indicated in the construction plans and maintained appropriately throughout construction. BMPs must be in place prior to the start of construction. The SW3P may need to be revised as necessary as construction progresses.

2. ☒ For all construction PSL's off the ROW, the contractor must certify compliance with all applicable laws, rules and regulations pertaining to the preservation of cultural resources, natural resources and the environment.

3. ☒ Based on the acreage of impact, select the appropriate box below:

   ☐ This project will disturb less than 1 acre of soil and is not part of a larger common plan of development; therefore, a NOI and TPDES Site Notice are not required for this project.

   or

   ☒ This project will disturb equal to or more than 1 acre of soil but less than 5 acres; therefore a NOI is not required but a TPDES Site Notice is required. The Construction Site Notice (CSN) is required to be posted at the construction site in a publicly accessible location for review by the public, TCEQ, EPA and other Inspectors.

   or

   ☐ This project will disturb equal to or more than 5 acres of soil and will require a NOI and TPDES Site Notice. The NOI and Site Notice are required to be posted at the construction site in a publicly accessible location.

4. ☐ Need to address MS4 requirements (Cameron & Hidalgo Counties only) ☐ MS4 requirements not needed

II. Clean Water Act, Sections 401 and 404 Compliance

Action Items Rquired : ☐ No Action Required

1. ☒ Filling, dredging or excavating in any water bodies, rivers, creeks, streams, wetlands or wet areas is prohibited unless specified in the USACE permit and approved by the Engineer. The contractor shall adhere to all agreements, mitigation plans, and BMPs required by the NWP as regulated by the USACE.

   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 (1/10th to <1/2 acre, 1/3 in tidal waters)

   ☐ Individual 404 Permit Required

   ☐ Other Nationwide Permit Required: NWP#_____

2. ☒ The contractor is responsible for obtaining new or revised Section 404 permit(s) for Contractor initiated changes in construction methods that change Impacts To Waters Of The U.S., including wetlands. The Contractor will ensure that the water quality of the State will be maintained and not degraded.

3. ☒ Best Management Practices for applicable Section 401 General Conditions:

General Condition 12 - Categories I and II BMPs required

Category I (Erosion Control)

☒ Temporary Vegetation	☐ Interceptor Swale	☐ Mulch Filter Berms and/or Socks
☐ Blankets, Matting	☐ Diversion Dike	☐ Compost Filter Berms and/or Socks
☒ Mulch	☐ Erosion Control Compost	☐ Compost Blankets
☐ Sodding		

Category II (Sedimentation Control)

☒ Silt Fence	☒ Hay (Straw) Bale Dike	☐ Mulch Filter Berms and/or Socks
☐ Rock Berm	☐ Brush Berms	☐ Compost Filter Berms and/or Socks
☐ Triangular Filter Dike	☐ Sediment Basins	☐ Stone Outlet Sediment Traps
☐ Sand Bag Berm	☒ Erosion Control Compost	

General Condition 21 - Category III BMPs required

Category III (Post-Construction TSS Control)

☐ Vegetative Filter Strips	☐ Wet Basins	☐ Mulch Filter Berms and/or Socks
☐ Retention/Irrigation	☐ Grassy Swales	☐ Compost Filter Berms and/or Socks
☐ Extended Detention Basin	☐ Vegetation-Lined Ditches	☐ Sand Filter Systems
☐ Constructed Wetlands	☐ Erosion Control Compost	☐ Sedimentation Chambers

II. Clean Water Act, Sections 401 and 404 Compliance - Continued:

4. ☒ The Contractor's designated and qualified Contractor Responsible Person Environmental (CRPe) will monitor the project site daily to ensue compliance with SW3P and TPDES General Permit TXR 150000. Daily Monitoring Reports shall be provided to TxDOT within 48 hours, in accordance with Item 506.3.1.

5. ☒ Other Project Specific Actions:

   1. Contractor must sweep roadway and remove loose aggregate upon completed daily operations.
   2. Contractor shall not place removed aggregate along adjacent grass areas.
   3. The project locations and limits are near a storm crossing. No PSL's are allowed in the stream areas.
   4. Project shall have erosion control logs and/or silt fence placed to prevent soils from reaching stream areas.

III. Cultural Resources

Action Items Required : ☐ No Action Required

1. ☒ Refer to the 2014 TxDOT Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges, Item 7.7.1., 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.

2. ☐ Other Project Specific Actions:

IV. Vegetation Resources

Action Items Required : ☐ No Action Required

1. ☒ In accordance with the 2014 TxDOT Standard Specifications; Item 164 - Seeding For Erosion Control; provide and install temporary or permanent seeding for erosion control as shown on the plans or as directed by the Engineer for all seeding and replanting of right of way where possible. (Required for Rural Settings)

2. ☒ In accordance with Executive Order 13112 on invasive species and the Executive Memorandum on Beneficial Landscaping, native species of plants shall be used for all seeding and replanting of right of way where possible for rural roadways. (Required for Rural Settings)

3. ☒ Preserve vegetation where possible throughout the project and minimize clearing, grubbing and excavation within stream banks, bed and approach sections.

4. ☐ Other Project Specific Actions:

Pharr District Contact No. 956-702-6100 Revised 01/30/2017

List of Abbreviations

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

Texas Department of Transportation

PHARR DISTRICT

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC)

SHEET 1 OF 2

FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 490
STATE	DISTRICT	COUNTY	
TEXAS	PHR	WILLACY	
CONTROL	SECTION	JOB	SHEET NO.
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Date Printed: X-X-XX

V. Federal Listed, and Proposed Threatened and Endangered Species, Critical Habitat, State Listed Species, Candidate Species and Migratory Birds

Action Items Required : ☐ No Action Required

1.☒ Under the Migratory Bird Treaty Act (MBTA) of 1918, codified at 16 U.S.C. § 703-712 and as enforced by the USFWS, the proposed construction work will not remove active nests from bridges, trees, ground and other structures during migratory bird nesting season, (February 1st. through October 1st.). If the Contractor needs to perform work within the right of way during nesting season, a qualified Biologist shall conduct a survey to determine if active nests are present. If present, the Contractor shall maintain a buffer zone around the nest(s) as directed by the Biologist. The buffer zone will be protected from clearing and disturbance until such time as the Biologist has determined that the nest(s) is no longer active. Prior to the nesting season, existing bridges and culverts should be treated against migratory bird nesting by utilizing Bird Exclusion Methods. Bird Exclusion Methods should be monitored and maintained throughout the nesting season. Refer to Standard Bird Exclusion Details.

2.☒ There is the potential for the presence of state-listed species & species of concern in the project area and state law prohibits the taking (incidental or otherwise) of state-listed species. Taking is defined as the collection, hooking, hunting, netting, shooting, or share by any means or devices. If any listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately.

3.☒ Other Project Specific Actions:

1. Federal & State Listed Species:

Black-Spotted Newt	(Notophthalmus meridionalis)
Mexican Burrowing Toad	(Rhinophrynus dorsalis)
Mexican Treefrog	(Smilisca baudinii)
Sheep Frog	(Hypopachus variolosus)
South Texas Siren	(Siren sp.)
White-Lipped Frog	(Leptodactylus fragilis)
Mexican Goby	(Ctenogobius claytonii)
Texas Horned Lizard	(Phrynosoma cornutum)
Ocelot	(Leopardus pardalis)
Jaguarundi	(Puma yagouaroundi)
Plains Spotted Skunk	(Spilogale putorius interrupta)
Texas Indigo Snake	(Drymarchon melanurus erebennus)
Texas Tortoise	(Gopherus berlandieri)
Mexican Mud-Plantain	(Heteranthera mexicana)
Vasey's Adelia	(Adelia vaseyi)
Saint Joseph's Staff	(Hippeastrum johnsonii)
Falfurrias Milkvine	(Matelea radiata)

2. No work shall occur from dusk to dawn. Construction and maintenance activiities will occur only during daylight hours.
3. See EPIC sheet supplemental for TPWD BMP's.

VI. Hazardous Materials on Contamination Issues

Action Items Required : ☐ No Action Required

General (applies to all projects):

Comply with the Hazard Communication Act (HCA) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the HCA.

Maintain an adequate supply of on-site spill response materials as indicated in the MSDS. In the event of a spill, take immediate action to mitigate the spill as indicated in the MSDS and in accordance with safe work practices. Contact the TxDOT Pharr District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

- Dead or distressed vegetation (identified as not normal)
- Trash piles, drums, canisters, barrels, etc.
- Undesirable smells or odors
- Evidence of leaching or seepage of contaminant substances

Any other evidence indicating possible hazardous materials or contamination discovered on site.

1.☒ If potentially hazardous material and/or contaminated media (i.e.: soil, groundwater, surface water, sediment, building materials) are unexpectedly encountered during construction, assure that such materials and contamination are handled according to applicable federal and state regulations, cease work in the immediate area and contact the Engineer immediately.

VI. Hazardous Materials on Contamination Issues - Continued:

2. 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 required.
If "Yes", then TxDOT is responsible for completing an asbestos assessment/inspection.

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

☐ Yes ☐ No

If "Yes", then TxDOT must retain a Texas Department of State Health Services (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 abatement activities and/or demolition.

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

4.☐ The Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and an Asbestos Consultant in order to minimize construction delays and subsequent claims.

VII. Other Environmental Issues

Action Items Required : ☐ No Action Required

1. ☒ Noise

Contractor shall make every reasonable effort to minimize construction noise through abatement measures such as work hour controls and proper maintenance of equipment mufflers.

2. ☒ Air

Contractor shall practice common dust control techniques such as surface chemical treatment or watering of unpaved road surfaces and vehicle speed reduction shall be implemented to minimize and prevent airborne dust during construction.

Contractor should minimize MSAT by utilizing measures to encourage use of EPA required cleaner diesel fuels, limits on idling, increase use of cleaner burning diesel engines, and other emission limitation techniques, as appropriate.

Pharr District Contact No. 956-702-6100 Revised 01/30/2017

List of Abbreviations

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MBTA: Migratory Bird Treaty Act	T&E: Threatened and Endangered Species
NOI: Notice of Intent	USACE: U.S. Army Corp of Engineers
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Texas Department of Transportation

PHARR DISTRICT

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC)

FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 490
STATE	DISTRICT	COUNTY	
TEXAS	PHR	WILLACY	SHEET NO.
CONTROL	SECTION	JOB	
1430	01	031, Etc	85

Date Printed: X-X-XX

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with the TPDES Construction General Permit TXR150000 (CGP). The Texas Department of Transportation (TxDOT) ensures that project specifications include adequate best management practices (BMPs) for this project.

For all projects with any soil disturbing activities, TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office. If no field office is available, then this SWP3 shall be kept in the appropriate TxDOT Area Office.

This SWP3 is consistent with requirements specified in applicable stormwater plans and the projects environmental permits, issues, and commitments (EPICs). A copy of the CGP is included in Attachment 2.12 of the SWP3 binder.

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
1430-01-026, 1430-01-025

1.2 PROJECT LIMITS:
From: WEST OF DELTA LAKE DRAIN

To: EAST OF WILLACY COUNTY MAIN CANAL

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 97°54'17.6" ,(Long) 26°27'05.0"

END: (Lat) 97°54'04.9" ,(Long) 26°27'05.6"

1.4 TOTAL PROJECT AREA (Acres): 1.78

1.5 TOTAL AREA TO BE DISTURBED (Acres): 0.86

1.6 NATURE OF CONSTRUCTION ACTIVITY:
ROADWAY WIDENING AND BRIDGE REPLACEMENT CONSISTING OF EXCAVATION, EMBANKMENT AND GRADING.

1.7 MAJOR SOIL TYPES:

Soil Type	Description
DELFINA FINE SANDY LOAM	MOD WELL DRAINED, MOD WATER TRANSMITION
HIDALGO SANDY CLAY LOAM	WELL DRAINED, MOD HIGH WATER TRANSMITION
RAYMONDVILLE CLAY LOAM	MOD WELL DRAINED, MOD WATER TRANSMITION

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):
PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

☐ PSLs determined during preconstruction meeting
☐ PSLs determined during construction
☒ No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:
(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.5.)

☒ Mobilization
☒ Install sediment and erosion controls
☐ Blade existing topsoil into windrows, prep ROW, clear and grub
☒ Remove existing pavement
☒ Grading operations, excavation, and embankment
☒ Excavate and prepare subgrade for proposed pavement widening
☒ Remove existing culverts, safety end treatments (SETs)
☒ Remove existing metal beam guard fence (MBGF), bridge rail
☒ Install proposed pavement per plans
☒ Install culverts, culvert extensions, SETs
☒ Install mow strip, MBGF, bridge rail
☒ Place flex base
☒ Rework slopes, grade ditches
☐ Blade windrowed material back across slopes
☒ Revegetation of unpaved areas
☒ Achieve site stabilization and remove sediment and erosion control measures
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

☒ Sediment laden stormwater from stormwater conveyance over disturbed area
☒ Fuels, oils, and lubricants from construction vehicles, equipment, and storage
☐ Solvents, paints, adhesives, etc. from various construction activities
☐ Transported soils from offsite vehicle tracking
☒ Construction debris and waste from various construction activities
☐ Contaminated water from excavation or dewatering pump-out water
☐ Sanitary waste from onsite restroom facilities
☐ Trash from various construction activities/receptacles
☐ Long-term stockpiles of material and waste
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.11 RECEIVING WATERS:
Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
NONE	NONE, DITCHES

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

☒ Development of plans and specifications
☒ Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
☒ Post Construction Site Notice
☒ Submit NOI/CSN to local MS4
☒ Perform SWP3 inspections
☒ Maintain SWP3 records and update to reflect daily operations
☒ Complete and submit Notice of Termination to TCEQ
☒ Maintain SWP3 records for 3 years
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

☒ Day To Day Operational Control
☒ Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
☒ Post Construction Site Notice
☒ Submit NOI/CSN to local MS4
☒ Maintain schedule of major construction activities
☒ Install, maintain and modify BMPs
☒ Complete and submit Notice of Termination to TCEQ
☒ Maintain SWP3 records for 3 years
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:

MS4 Entity

STATE OF TEXAS
SEAN CLARY
122134
LICENSED
PROFESSIONAL ENGINEER
04/25/2023

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Sheet 1 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
	SEE TITLE SHEET		86
STATE	STATE DIST.	COUNTY	
TEXAS	PHR	WILLACY	
CONT.	SECT.	JOB	HIGHWAY NO.
1430	01	031,Etc	FM 490

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- ☐ ☐ Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Soil Retention Blankets
- ☐ ☐ Geotextiles
- ☐ ☐ Mulching/ Hydromulching
- ☐ ☐ Soil Surface Treatments
- X ☐ Temporary Seeding
- ☐ X Permanent Planting, Sodding or Seeding
- X ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Vertical Tracking
- ☐ ☐ Interceptor Swale
- ☐ ☐ Riprap
- ☐ ☐ Diversion Dike
- ☐ ☐ Temporary Pipe Slope Drain
- ☐ ☐ Embankment for Erosion Control
- ☐ ☐ Paved Flumes
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- X ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Dewatering Controls
- ☐ ☐ Inlet Protection
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- X ☐ Sediment Control Fence
- ☐ ☐ Stabilized Construction Exit
- ☐ ☐ Floating Turbidity Barrier
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Vegetated Filter Strips
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

T / P

- ☐ ☐ Sediment Trap
  - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
  - ☐ 3,600 cubic feet of storage per acre drained
- ☐ ☐ Sedimentation Basin
  - X Not required (<10 acres disturbed)
  - ☐ Required (>10 acres) and implemented.
    - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
    - ☐ 3,600 cubic feet of storage per acre drained
  - ☐ Required (>10 acres), but not feasible due to:
    - ☐ Available area/Site geometry
    - ☐ Site slope/Drainage patterns
    - ☐ Site soils/Geotechnical factors
    - ☐ Public safety
    - ☐ Other: _____

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To
PERMANENT SEEDING	PROJECT LIMITS	PROJECT LIMITS

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- ☐ Excess dirt/mud on road removed daily
- ☐ Haul roads dampened for dust control
- ☐ Loaded haul trucks to be covered with tarpaulin
- ☐ Stabilized construction exit
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- ☐ Chemical Management
- ☐ Concrete and Materials Waste Management
- ☐ Debris and Trash Management
- ☐ Dust Control
- ☐ Sanitary Facilities
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- X Fire hydrant flushings
- X Irrigation drainage
- X Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- X Potable water sources
- X Springs
- X Uncontaminated groundwater
- X Water used to wash vehicles or control dust
- X Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3 .

2.9 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

STATE OF TEXAS
SEAN CLARY
122134
LICENSED
PROFESSIONAL ENGINEER

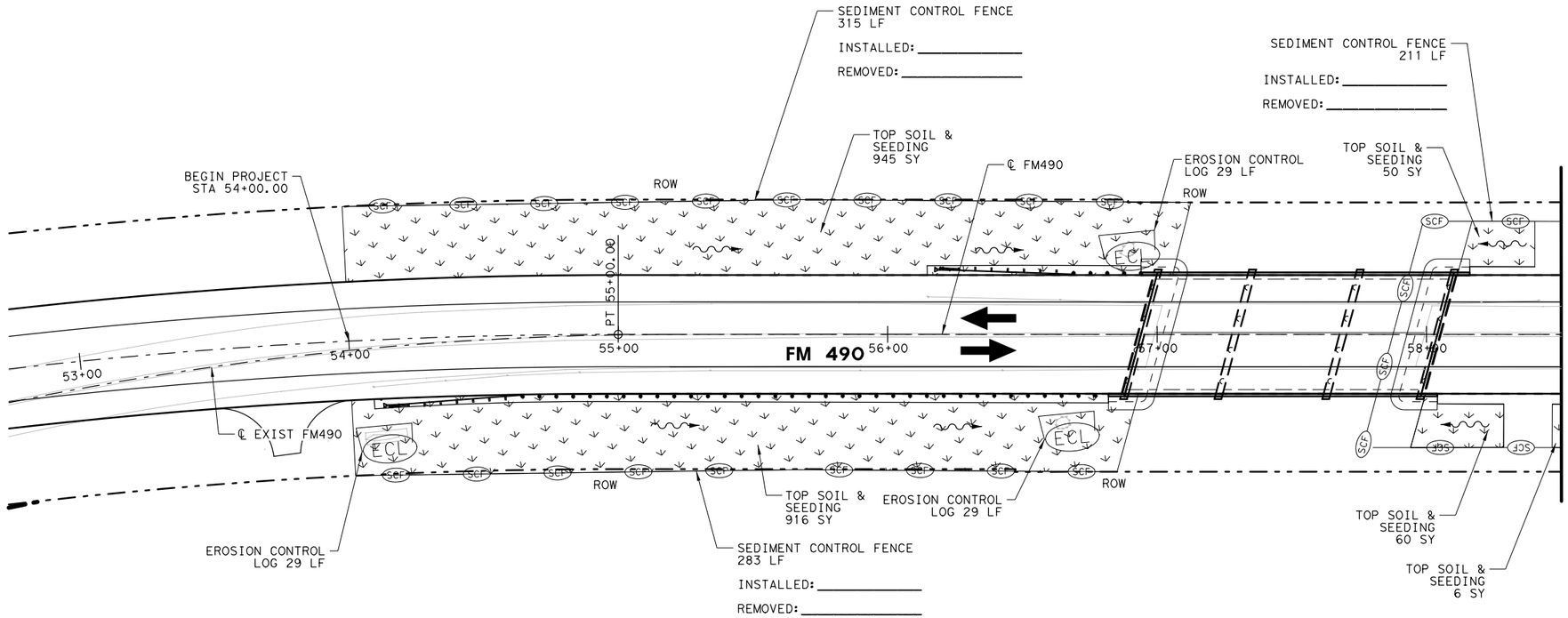
04/25/2023

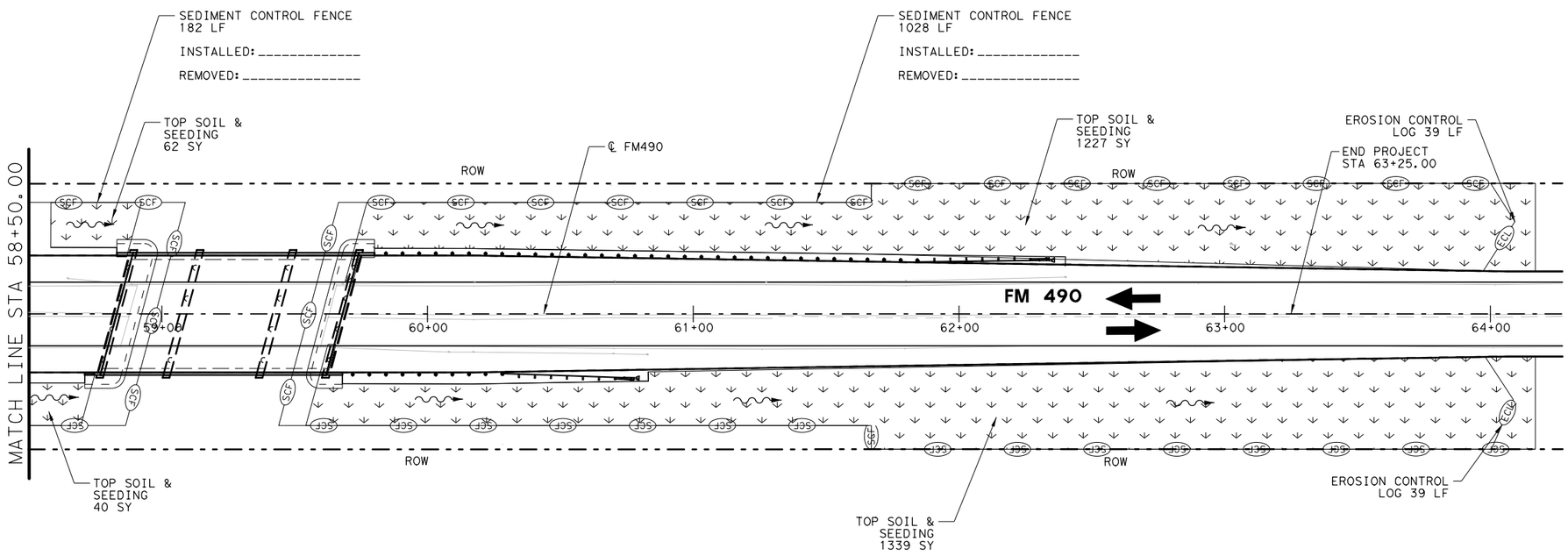
STORMWATER POLLUTION PREVENTION PLAN (SWP3)

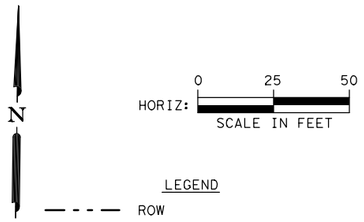
Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
	SEE TITLE SHEET		87
STATE	STATE DIST.	COUNTY	
TEXAS	PHR	WILLACY	
CONT.	SECT.	JOB	HIGHWAY NO.
1430	Ø1	031, ETC	FM 490

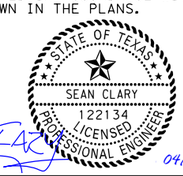






NOTES:

1. EROSION CONTROL DEVICES SHALL BE INSTALLED PRIOR TO THE START OF CONSTRUCTION ACTIVITY AND SHALL REMAIN IN PLACE UNTIL CONSTRUCTION IS COMPLETE.
2. SEDIMENT CONTROL FENCE AND ROCK FILTER DAMS TO BE LOCATED AT DOWNSTREAM ROW LINE OR AT PROPOSED GRADING LIMITS OR AS PER DIRECTION OF THE ENGINEER.
3. PLACEMENT OF SEDIMENT CONTROL FENCE IN AREAS OTHER THAN AS SHOWN ON THESE SHEETS SHALL BE PER THE DIRECTION OF THE ENGINEER.
4. THE LOCATION OF EC AND OTHER SOIL STABILIZATION PRACTICES WILL BE BASED ON SITE SPECIFIC FIELD CONDITIONS AS NEEDED. QUANTITIES SHOWN ARE APPROXIMATE AND MAY BE ADJUSTED TO MEET FIELD CONDITIONS.
5. BEFORE CONSTRUCTION BEGINS, OUTFALL AREAS WILL BE PROTECTED IN ACCORDANCE WITH ITEM 506 AND AS SHOWN IN THE PLANS.



NO.	DATE	REVISION	APPROVED

BURNS McDONNELL
13737 NOEL RD
SUITE 700
DALLAS, TX. 75240
ENGINEERING FIRM F-845

Texas Department of Transportation

FM 490

SW3P LAYOUT

SCALE = 1"=50' SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
SPC	6	SEE TITLE SHEET	FM 490
DRAWN SPC	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK MAW	TEXAS	PHR	WILLACY	
CHECK MAW	CONTROL	SECTION	JOB	88
	1430	01	031,Etc	

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TIME: 6:57:02 PM
DATE: 4/20/2023

TPWD BMPs

The Programmatic Agreement defines Best Management Practices (BMPs) to be implemented by Texas Department of Transportation (TxDOT) per §2.213 (Programmatic Agreements) of the 2017 Memorandum of Understanding (MOU) between TxDOT and Texas Parks and Wildlife Department (TPWD). These BMPs are measures that TxDOT and TPWD agree will result in avoidance and minimization of potential impacts to natural resources and in some cases apply to particular types of TxDOT projects.

The purpose of this section is to provide BMPs to minimize impacts to species or groups of species. Implementation of these BMPs by TxDOT eliminates the need for coordination under §2.206(1)of the MOU, except as noted.

Due diligence should be used to avoid killing or harming any wildlife species in the implementation of TxDOT projects.

☒ Bird BMPs (Required)

In addition to complying with the Migratory Bird Treaty Act (MBTA) perform the following BMPs:

- ☒ Prior to construction, perform daytime surveys for nests including under bridges and in culverts to determine if they are active before removal. Nests that are active should not be disturbed.
- ☒ Do not disturb, destroy, or remove active nests, including ground nesting birds, during the nesting season.
- ☒ Avoid the removal of unoccupied, inactive nests, as practicable.
- ☒ Prevent the establishment of active nests during the nesting season on TxDOT owned and operated facilities and structures proposed for replacement or repair.
- ☒ Do not collect, capture, relocate, or transport birds, eggs, young, or active nests without a permit.

☐ Bald Eagle *(Haliaeetus leucocephalus)*

- ☐ Bird BMPs and Bald and Golden Eagle Protection Act compliance

☐ Reddish Egret *(Egretta rufescens)* or
☐ White-faced Ibis *(Plegadis chihi)*

- ☐ Bird BMPs unless project is within 300 meters (984 feet)of a known colonial water bird rookery then coordinate with TPWD.

☐ Rookeries (Recommendations)

In general, nesting dates for herons and egrets range from early February to late August in Texas, depending on the species. Great Blue Herons (GBHE) are usually the first to nest. When GBHE get disrupted from the nest and abandon nesting, then the other species of herons and egrets may not attempt to nest at the colony that year. Breeding dates for rookery species are approximately as follows:

Species	Dates
Cattle Egret	Early April to late October
Little Blue Heron	Late March to late July
Snowy Egret	Late March to early August
Great Egret	Early March to early August
Black-crowned Night Heron	Early February to late July
Great Blue Heron	February to late August

☐ Rookeries (Recommendations) (Continued)

- ☐ Vegetation clearing in a primary buffer area of 300 meters (984 feet) from a heronry periphery should be avoided. Utilizing areas that have already been cleared within this buffer area may be acceptable depending on site-specific characteristics. Additionally, human foot-traffic or machinery use should not occur within this buffer area during the nesting season.
- ☐ Clearing activities or construction using heavy machinery in a secondary buffer area of 1,000 meters (3,281 feet) from the heronry periphery should be avoided during the breeding season (courting and nesting).

☒ Bat BMPs (Required)

To determine the appropriate BMP to avoid or minimize impacts to bats, review the habitat description for the species of interest on the TPWD Rare, Threatened, and Endangered Species of Texas by County List or other trusted resources. All bat surveys and other activities that include direct contact with bats shall comply with TPWD' recommended white-nose syndrome protocols located on the TPWD Wildlife Habitat Assessment Program website under "Project Design and Construction".

The following survey and exclusion protocols should be followed prior to commencement of construction activities. For the purposes of this document, structures are defined as bridges, culverts (concrete or metal), wells, and buildings.

- ☒ For activities that have the potential to impact structures, cliffs or caves, or trees; a qualified biologist will perform a habitat assessment and occupancy survey of the feature(s) with roost potential as early in the planning process as possible or within one year before project letting.
- ☐ For roosts where occupancy is strongly suspected but unconfirmed during the initial survey, revisit feature(s) at most four weeks prior to scheduled disturbance to confirm absence of bats.
- ☒ If bats are present or recent signs of occupation (i.e., piles of guano, distinct musky odor, or staining and rub marks at potential entry points) are observed, take appropriate measures to ensure that bats are not harmed, such as implementing non-lethal exclusion activities or timing or phasing of construction.
- ☐ Exclusion devices can be installed by a qualified individual between September 1 and March 31. Exclusion devices should be used for a minimum of seven days when minimum nighttime temperatures are above 50°F and minimum daytime temperatures are above 70°F. Prior to exclusion, ensure that alternate roosting habitat is available in the immediate area. If no suitable roosting habitat is available, installation of alternate roosts is recommended to replace the loss of an occupied roost. If alternate roost sites are not provided, bats may seek shelter in other inappropriate sites, such as buildings, in the surrounding area. See Additional Bat BMPs (Recommendations) for recommended acceptable methods for excluding bats from structures.
- ☐ If feature(s) used by bats are removed as a result of construction, replacement structures should incorporate bat-friendly design or artificial roosts should be constructed to replace these features, as practicable.
- ☐ Conversion of property containing cave or cliff features to transportation purposes should be avoided where feasible.

☒ Bat BMPs (Required)(Continued)

- ☐ Avoid unnecessary removal of dead fronds on native and ornamental palm trees in south Texas (Cameron, Hidalgo, Willacy, Kenedy, Brooks, Kleberg, Nueces, and San Patricio counties) from April 1st through October 31st. If removal of dead fronds is necessary at other times of the year, limit frond removal to extended warm periods (nighttime temperatures: 55°F for at least two consecutive nights), so bats can move away from the disturbance and find new roosts.
- ☐ Large hollow trees, snags (dead standing trees), and trees with shaggy bark should be surveyed for colonies and, if found, should not be disturbed until the bats are no longer occupying these features. Post-occupancy surveys should be conducted by a qualified biologist prior to tree removal from the landscape.
- ☐ Retain mature, large diameter hardwood forest species and native/ornamental palm trees where feasible.
- ☒ In all instances, avoid harm or death to bats. Bats should only be handled as a last resort and after communication with TPWD.

☐ Mexican Long-tongues Bat *(Choeronycteris mexicana)*

- ☐ Avoid unnecessary impacts to cacti and agave species.
- ☐ Bat BMPs.

☒ Additional Bat BMPs (Recommendations)

- ☒ Bat surveys of structures should include visual inspections of structural fissures (cracked or spalled concrete, damaged or split beams, split or damaged timber railings), crevices (expansion joints, space between parallel beams, spaces above supports piers), and alternative structures (drainage pipes, bolt cavities, open sections between support beams, swallow nests) for the presence of bats.
- ☐ Before excluding bats from any occupied structure, bat species, weather, temperature, season, and geographic location must be incorporated into any exclusion plans to avoid unnecessary harm or death to bats. Winter exclusion must entail a survey to confirm either, 1) bats are absent or 2) present but active (i.e. continuously active - not intermittently active due to arousals from hibernation).
- ☐ Avoid using materials that degrade quickly, like paper, steel wool or rags, to close holes.
- ☐ Avoid using products or making structural modifications that may block natural ventilation, like hanging plastic sheeting over an active roost entrance, thereby altering roost microclimate.
- ☐ Avoid using chemical and ultrasonic repellents.
- ☐ Avoid use of silicone, polyurethane or similar non-water-based caulk products.
- ☐ Avoid use of expandable foam products at occupied sites.
- ☐ Avoid the use of flexible netting attached with duct tape.

Pharr District Contact No. 956-702-6100

Revised 07/12/2017

List of Abbreviations

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Texas Department of Transportation
PHARR DISTRICT

EPIC SHEET SUPPLEMENTALS

TPWD BMPs

FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 490
STATE	DISTRICT	COUNTY	
TEXAS	PHR	WILLACY	SHEET NO.
CONTROL	SECTION	JOB	
1430	01	031,Etc	89

Date Printed: X-X-XX

☐ Additional Bat BMPs (Recommendations) (Continued)

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

- Experience in bat exclusion (the individual, not just the company).
- Proof of rabies pre-exposure vaccinations.
- Demonstrated knowledge of the relevant bat species, including maternity season date range and habitat requirements.
- Demonstrated knowledge of rabies and histoplasmosis in relation to bat roosts.

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

☐ Fossorial Mammal BMPs (Required)

☐ If black-tailed prairie dog (BTPD) burrows or pocket gopher mounds are to be excavated/directly impacted coordinate with TPWD WHAB.
☐ When a construction zone is adjacent to active BTPD burrows or pocket gopher mounds, erect barriers to discourage individuals moving through or into the construction area.
☐ When seeding or revegetation is planned in an area adjacent to BTPD burrows or pocket gopher mounds, a vegetative barrier should be considered in the planting to discourage dispersal into the ROW.

☐ Coues' Rice Rat *(Oryzomys couesi)*

☐ Minimize impacts to wetland, Resaca, oxbow lakes, and marsh habitats.
☐ Contractors will be advised of potential occurrence in the project area and to avoid harming the species if encountered.
☐ Water Quality BMPs.

☒ Plains Spotted Skunk *(Spilogale putorius interrupta)* or
☐ Swift Fox *(Vulpes velox)*

☒ Contractor will be advised of potential occurrence in the project area and to avoid harming the species if encountered and to avoid unnecessary impacts to dens.

☐ White nosed Coati *(Nasua narica)*/
☐ Yellow nosed Cotton Rat *(Sigmodon ochrognathus)*

☐ Contractors will be advised of potential occurrence in the project area and to avoid harming the species if encountered.

☒ Terrestrial Reptile BMPs (Required)

☒ Apply hydro mulching and/or hydro seeding in areas for soil stabilization and/or revegetation of disturbed areas where feasible. If hydro mulching and/or hydro seeding are not feasible due to site conditions, utilize erosion control blankets or mats that contain no netting or contain loosely woven, natural fiber netting is preferred. Plastic netting should be avoided to the extent practicable.
☒ For open trenches and excavated pits, install escape ramps at an angle of less than 45 degrees (1 :1) in areas left uncovered. Visually inspect excavation areas for trapped wildlife prior to backfilling.
☒ Inform contractors that if reptiles are found on project site allow species to safely leave the project area.
☒ Avoid or minimize disturbing or removing downed trees, rotting stumps, and leaf litter where feasible.
☒ Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered.

☒ Texas Tortoise *(Gopherus berlandieri)*

☒ Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered.
☒ Utility trenches should be covered overnight or visually inspected before filling to avoid burial of the species.
☒ Terrestrial Reptile BMPs.

☒ Texas Horned Lizard *(Phrynosoma cornutum)*

☒ Avoid harvester ant mounds in the selection of Project Specific Locations (PSLs) where feasible.
☒ Terrestrial Reptile BMPs.

☐ Additional Reptile BMPs (Recommendations)

☐ Due to increased activity (mating) of reptiles during the spring, construction activities like clearing or grading should attempt to be scheduled outside of the spring (April-May) season. Also, timing ground disturbing activities before October when reptiles become less active and may be using burrows in the project area is also encouraged.
☐ When designing roadways with curbs, consider using Type I or Type III curbs to provide a gentle slope to enable turtles and small animals to get out of roadways.
☐ If Texas Tortoises are present in a project area, they should be removed from the area. After removal of the tortoises, the area that will be disturbed during active construction and project specific locations should be fenced off to exclude tortoises and other reptiles. The exclusion fence should be constructed and maintained as follows:

a. The exclusion fence should be constructed with metal flashing or drift fence material.
b. Rolled erosion control mesh material should not be used.
c. The exclusion fence should be buried at least 6 inches deep and be at least 24 inches high.
d. The exclusion fence should be maintained for the life of the project and only removed after the construction is completed and the disturbed site has been revegetated.

☒ Amphibian and Aquatic Reptile BMPs (Required)

Unless absence of the species can be demonstrated, assume presence in suitable habitat and implement the following BMPs. Absence can only be demonstrated using TPWD-approved survey efforts (contact TPWD for minimum survey protocols for species and project site conditions).

☒ For projects within one mile of a known occupied location or observation of the species recorded from 1980 until the current year and suitable habitat is present, coordinate with TPWD.
☐ For new location roadway projects, coordinate with TPWD.
☒ For projects within existing right-of-way (ROW) when work is in water or will permanently impact a water feature and potential habitat exists for the target species complete the following:

a) Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered.
b) Minimize impacts to wetland, temporary and permanent open water features, including depressions, and riverine habitats.
c) Maintain hydrologic regime and connections between wetlands and other aquatic features.

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☒ Amphibian and Aquatic Reptile BMPs (Continued)

d) Use barrier fencing to direct animal movements away from construction activities and areas of potential wildlife-vehicle collisions in construction areas directly adjacent, or that may directly impact, potential habitat for the target species.
e) Apply hydromulching and/or hydroseeding in areas for soil stabilization and/or revegetation of disturbed areas where feasible. If hydromulching and/or hydroseeding are not feasible due to site conditions, using erosion control blankets or mats that contain no netting, or only contain loosely woven natural fiber netting is preferred. Plastic netting should be avoided to the extent practicable.
f) Project specific locations (PSLs) proposed within state-owned ROW should be located in uplands away from aquatic features.
g) When work is directly adjacent to the water, minimize impacts to shoreline basking sites (e.g., downed trees, sand bars, exposed bedrock) and overwinter sites (e.g., brush and debris piles, crayfish burrows) where feasible.
h) Avoid or minimize disturbing or removing downed trees, rotting stumps, and leaf litter, which may be refugia for terrestrial amphibians, where feasible.
i) If gutters and curbs are part of the roadway design, where feasible install gutters that do not include the side box inlet and include sloped (i.e. mountable) curbs to allow small animals to leave roadway. If this modification to the entire curb system is not possible, install sections of sloped curb on either side of the storm water drain for several feet to allow small animals to leave the roadway. Priority areas for these design recommendations are those with nearby wetlands or other aquatic features.

☐ For projects that require acquisition of additional ROW and work within that new ROW is in water or will permanently impact a water feature, implement a) - i) above plus j) -l) below, where applicable:

j) For sections of roadway adjacent to wetlands or other aquatic features, install wildlife barriers that prevent climbing. Barriers should terminate at culvert openings in order to funnel animals under the road. The barriers should be of the same length as the adjacent feature or 80 feet long in each direction, or whichever is the lesser of the two.
k) For culvert extensions and culvert replacement/installation, incorporate measures to funnel animals toward culverts such as concrete wingwalls and barrier walls with overhangs.
l) When riprap or other bank stabilization devices are necessary, their placement should not impede the movement of terrestrial or aquatic wildlife through the water feature. Where feasible, biotechnical streambank stabilization methods using live native vegetation or a combination of vegetative and structural materials should be used.

Revised 07/12/2017

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Texas Department of Transportation

PHARR DISTRICT

EPIC SHEET SUPPLEMENTALS

TPWD BMPs

SHEET 2 OF 3

FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 490
STATE	DISTRICT	COUNTY	
TEXAS	PHR	WILLACY	
CONTROL	SECTION	JOB	SHEET NO.
1430	01	031, Etc	90

Date Printed: X-X-XX

☒ Sheep Frog *(Hypopachus variolosus)*

- ☒ Minimize disturbance to burrows or downed woody debris.
- ☒ Water Quality BMPs.
- ☒ Amphibian BMPs.

☒ South Texas Siren (Large Form) *(Siren sp 1)*

- ☒ Minimize impacts to warm, shallow waters with vegetative cover such as ponds and ditches.
- ☒ Water Quality BMPs.
- ☒ Amphibian BMPs.

☒ Freshwater Mussel BMPs (Required)

- ☒ When work is in the water; survey project footprints for state listed species where appropriate habitat exists.
- ☒ When work is in the water and mussels are discovered during surveys; relocate state listed and SGCN mussels under TPWD authorization and implement Water Quality BMPs.
- ☐ When work is adjacent to the water; Water Quality BMPs implemented as part of the SWPPP for a construction general permit or any conditions of the Section 401 water quality certification for the project will be implemented.

☒ Fish BMPs (Required)

- ☐ For projects within the range of a SGCN or State-Listed fish and work is adjacent to water: Use Water Quality BMPs. No TPWD Coordination required.
- ☒ For projects within the range of a SGCN or State-Listed fish, and work is in the water: TPWD coordination is required.

☒ Water Quality BMPs (Required)

In addition to BMPs required for a TCEQ Storm Water Pollution Prevention Plan and/or Section 401 water quality permit:

- ☒ Minimize the use of equipment in streams and riparian areas during construction. When possible, equipment access should be from banks, bridge decks, or barges.
- ☒ When temporary stream crossings are unavoidable, remove stream crossings once they are no longer needed and stabilize banks and soils around the crossing.

☒ Additional Water Quality BMPs (Recommendations)

- ☐ Wet-Bottomed detention ponds are recommended to benefit wildlife and downstream water quality. Consider potential wildlife-vehicle interactions when siting detention ponds.
- ☒ Rubbish found near bridges on TxDOT ROW should be removed and disposed of properly to minimize the risk of pollution. Rubbish does not include brush piles or snags.

☐ Aquatic Mitigation (Recommendations)

- ☐ In-kind compensatory mitigation should be considered for all unavoidable impacts to aquatic resources including, but not limited to streams, wetlands, oysters, seagrass and mudflats, regardless of their jurisdictional status.
- ☐ Compensatory mitigation plans should be developed in consultation with TPWD Transportation Conservation Coordinator.

☒ Stream Crossings (Recommendations)

- ☐ Use spanning bridges rather than culverts when feasible.
- ☐ If using a culvert, staggered culverts that concentrate low flows but provide conveyance of higher flows through staggered culverts placed at higher elevations is recommended.
- ☐ Bottomless culverts are recommended to allow for fish and other aquatic wildlife passage in the low flow channel. If bottomless culverts are not feasible, making a low flow channel for fish passage is recommended.
- ☐ Avoid placing riprap across stream channels and instead use alternative stabilization such as biotechnical stream bank stabilization methods including live native vegetation or a combination of vegetative and structural materials. When riprap or other bank stabilization devices are necessary, their placement should not impede the movement of aquatic and terrestrial wildlife underneath the bridge. In some instances, riprap may be buried, back-filled with topsoil and planted with native vegetation.
- ☐ Incorporate bat-friendly design into bridges and culverts.
- ☒ Design bridges for adequate vertical and horizontal clearances under the roadway to allow for terrestrial wildlife to safely pass under the road.
- ☒ A span wide enough to cross the stream and allow for dry ground and a natural surface path under the roadway is encouraged. For culverts, incorporation of an artificial ledge inside the culvert on one or both sides for use by terrestrial wildlife is recommended.
- ☒ Riparian buffer zones should remain undisturbed where possible.

☒ Vegetation BMPs (Recommendations)

- ☒ Minimize the amount of vegetation cleared. Removal of native vegetation, particularly mature native trees and shrubs should be avoided to the greatest extent practicable. Wherever practicable, impacted vegetation should be replaced with in-kind on-site replacement/restoration of native vegetation.
- ☐ To minimize adverse effects, activities should be planned to preserve mature trees, particularly acorn, nut or berry producing varieties. These types of vegetation have high value to wildlife as food and cover.
- ☐ It is strongly recommended that trees greater than 12 inches in diameter at breast height (dbh) that are removed be replaced. TPWD's experience indicates that for ecologically effective replacement, a ratio of three trees for every one (3:1) lost should be provided to the extent practicable either on-site or off-site. Trees less than 12 inches dbh should be replaced at a 1:1 ratio.
- ☐ Replacement trees should be of equal or better wildlife quality than those removed and be regionally adapted native species.
- ☐ When trees are planted, a maintenance plan that ensures at least an 85 percent survival rate after three (3) years should be developed for the replacement trees.
- ☒ The use of any non-native vegetation in landscaping and revegetation is discouraged. Locally adapted native species should be used.
- ☒ The use of seed mix that contains seeds from only locally adapted native species is recommended.
- ☒ Avoid vegetation clearing activities during the general bird nesting season, March through August, to minimize adverse impacts to birds.

☒ Invasive Species BMPs (Recommendations)

- ☐ For all work in waters listed in the distribution of Zebra mussels on http://texasinvasives .org/ as well as those waters specified in 31 TAC §57.972 and any TPWD emergency orders regarding prevention of the spread of Zebra mussels all machinery, equipment, or vehicles coming in contact with such waters should follow clean/drain/dry protocols to prevent the potential spread of invasive Zebra mussels.
- ☒ Care should be taken to avoid the spread of aquatic invasive plants (such as Giant Salvinia, Hydrilla, Hyacinth, Watermilfoil, Water Lettuce, and Alligatorweed) from infested water bodies into areas not currently infested. All machinery/equipment/vehicles coming in contact with waters containing aquatic invasive plant species should follow clean/drain/dry protocols to prevent the potential spread of invasive plants.
- ☒ Colonization by invasive plants should be actively prevented on disturbed sites in terrestrial habitats. Vegetation management should include removing invasive species as soon as practical while allowing the existing native plants to revegetate the disturbed areas. If using hay bales for sediment control, use locally grown weed-free hay to prevent the spread of invasive species. Leave the hay bales in place and allow them to break down, as this acts as mulch assisting in revegetation.

☐ Wildlife Crossings (Recommendations)

- ☐ Design roadways on new location to incorporate wildlife crossings, particularly in areas that bisect wildlife travel corridors or seasonal movement routes.
- ☐ Consider using cable median barrier instead of concrete traffic barrier when feasible to increase permeability for animals encountering barriers.

Pharr District Contact No. 956-702-6100

Revised 07/12/2017

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Texas Department of Transportation

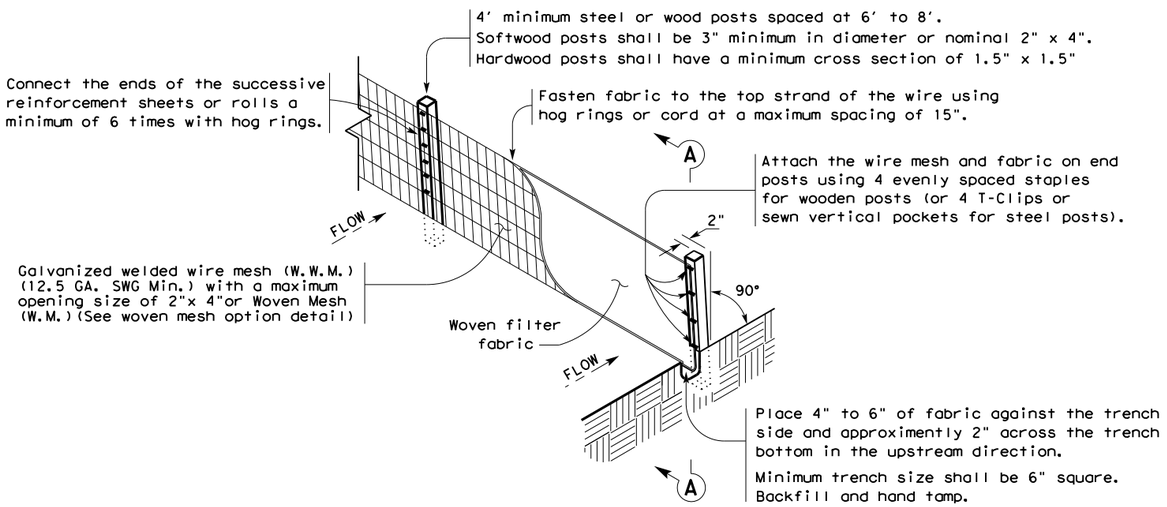
PHARR DISTRICT

EPIC SHEET SUPPLEMENTALS

TPWD BMPs

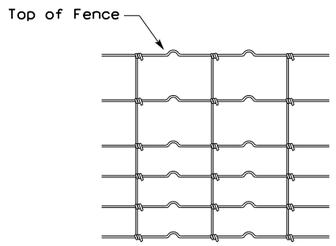
FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 490
STATE	DISTRICT	COUNTY	
TEXAS	PHR	WILLACY	SHEET NO.
CONTROL	SECTION	JOB	
1430	01	031,Etc	91

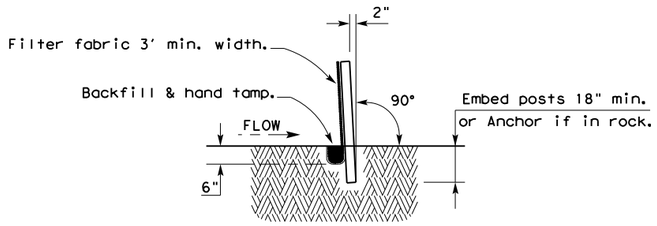
Date Printed: X-X-XX



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.

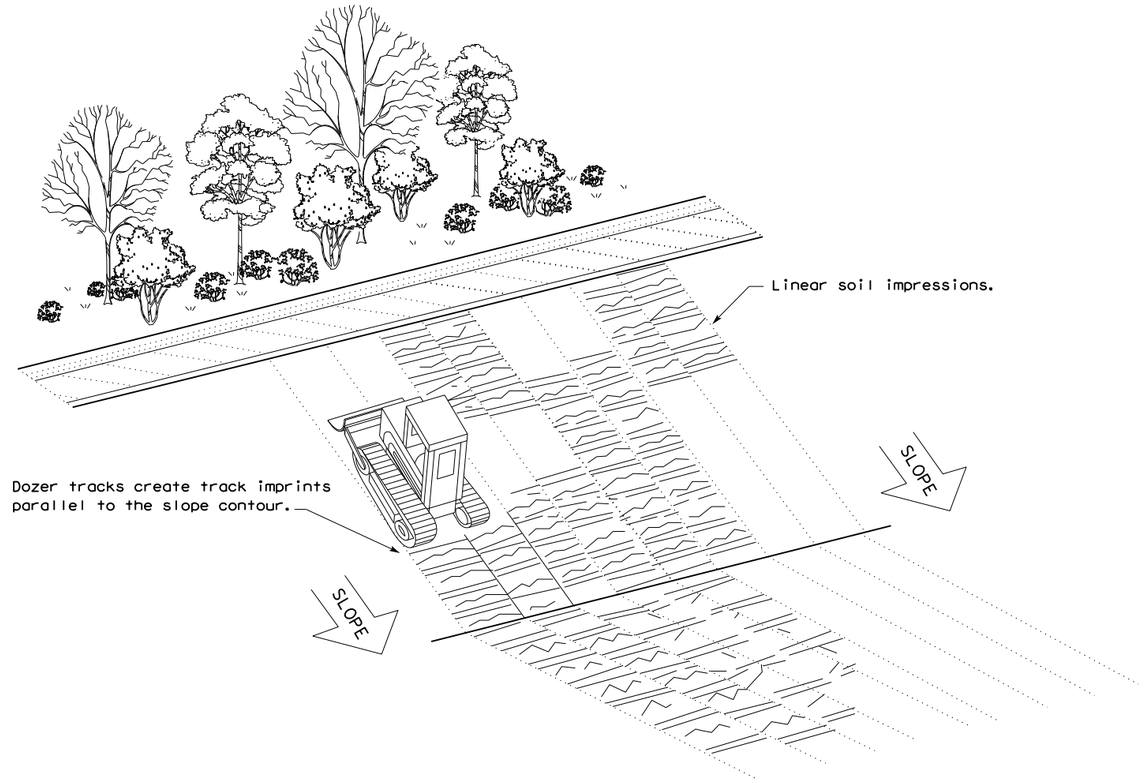
LEGEND

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	1430	01	031, ETC		FM 490		
	DIST	COUNTY			SHEET NO.		
	PHR	WILLACY			92		

DATE: 4/25/2023
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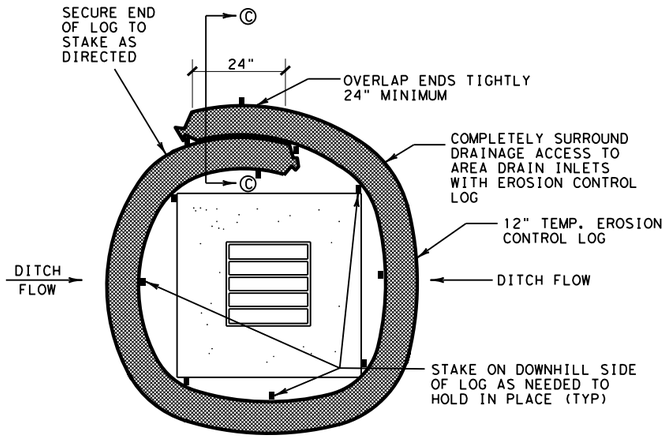
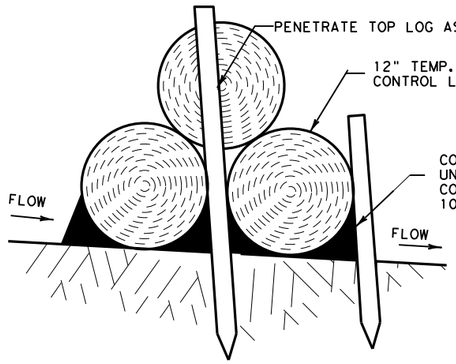


DROP INLET SEDIMENT TRAP

NTS

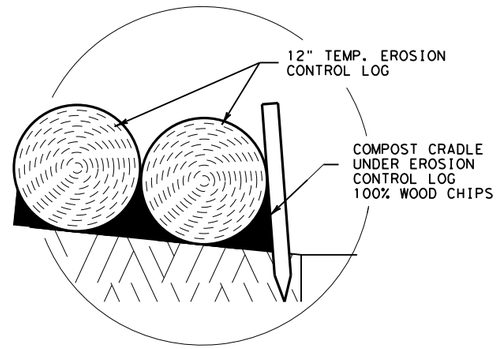
DI-ST



SECTION A-A

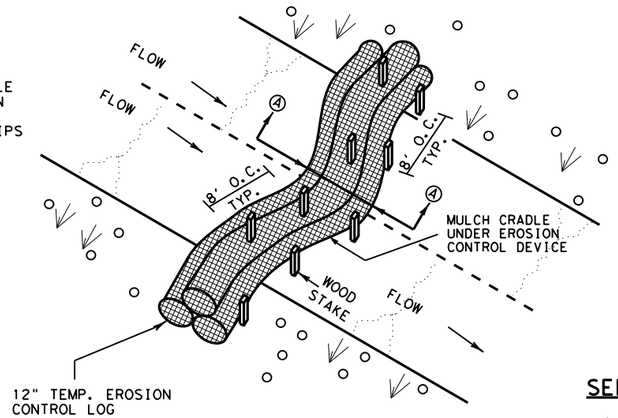
DITCH LINE SEDIMENT TRAP A-A

DL-ST



SECTION C-C

OVERLAP WITH COMPOST CRADLE



DITCH LINE SEDIMENT TRAP

DL-ST

PLANS SHEET LEGEND

DI-ST — DROP INLET SEDIMENT TRAP

DL-ST — DITCH LINE SEDIMENT TRAP

BOCI-ST — BACK OF CURB INLET SEDIMENT TRAP

ROW-ST — RIGHT OF WAY SEDIMENT TRAP

CI-ST — CURB INLET SEDIMENT TRAP

SEDIMENT BASIN & TRAP USAGE GUIDELINES

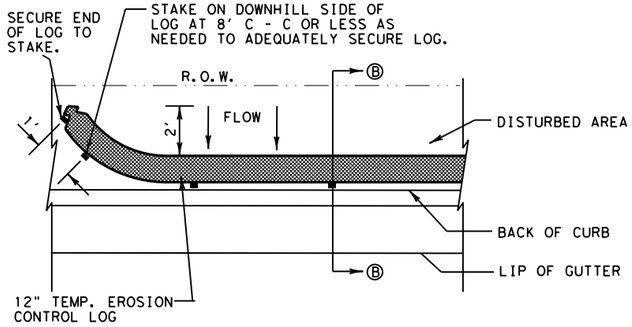
A sediment trap may be used to precipitate sediment out of runoff draining from an unstabilized area.

Traps: the drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Sediment traps should be placed in the following locations:

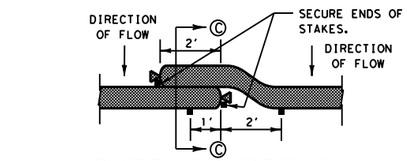
1. Immediately preceding drain inlets
2. Just before the drainage enters a water course
3. Just before the drainage leaves the right of way
4. Just before the drainage leaves the construction limits where drainage flows away from the project

The trap should be cleaned when the capacity has been reduced by ½ or the sediment has accumulated to a depth of 1', whichever is less. Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for seperately.



PLAN VIEW

NTS



OVERLAP DETAIL PLAN VIEW

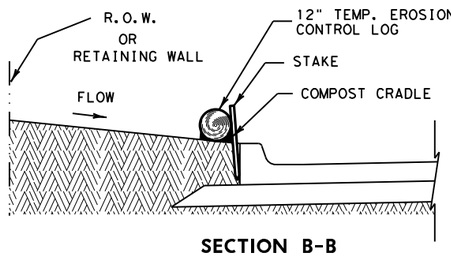
NTS

PLAN VIEW

NTS

GENERAL NOTES

1. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED. MAXIMUM LENGTH OF LOGS SHALL BE 30' FOR 12" DIAMETER LOGS.
2. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
3. STUFF LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE DENSITY THAT WILL HOLD SHAPE WITHOUT EXCESSIVE DEFORMATION.
4. STAKES SHALL BE 2" X 2" WOOD 4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG.
5. COMPOST CRADLE MATERIAL IS INCIDENTAL AND WILL NOT BE PAID FOR SEPARATELY.

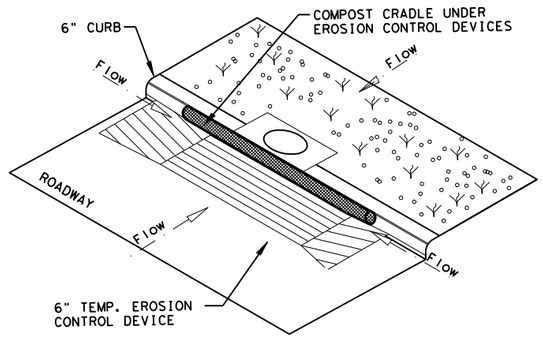


SECTION B-B

BACK OF CURB INLET SEDIMENT TRAP

NTS

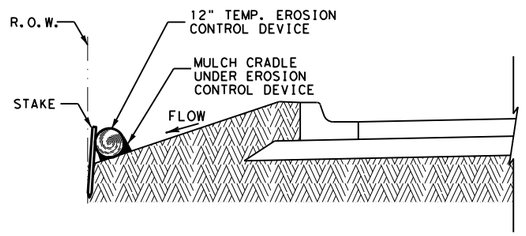
BOCI-ST



CURB INLET SEDIMENT TRAP

NTS

CI-ST



SECTION D-D

RIGHT-OF-WAY SEDIMENT TRAP

NTS

ROW-ST

PHARR DISTRICT STANDARD

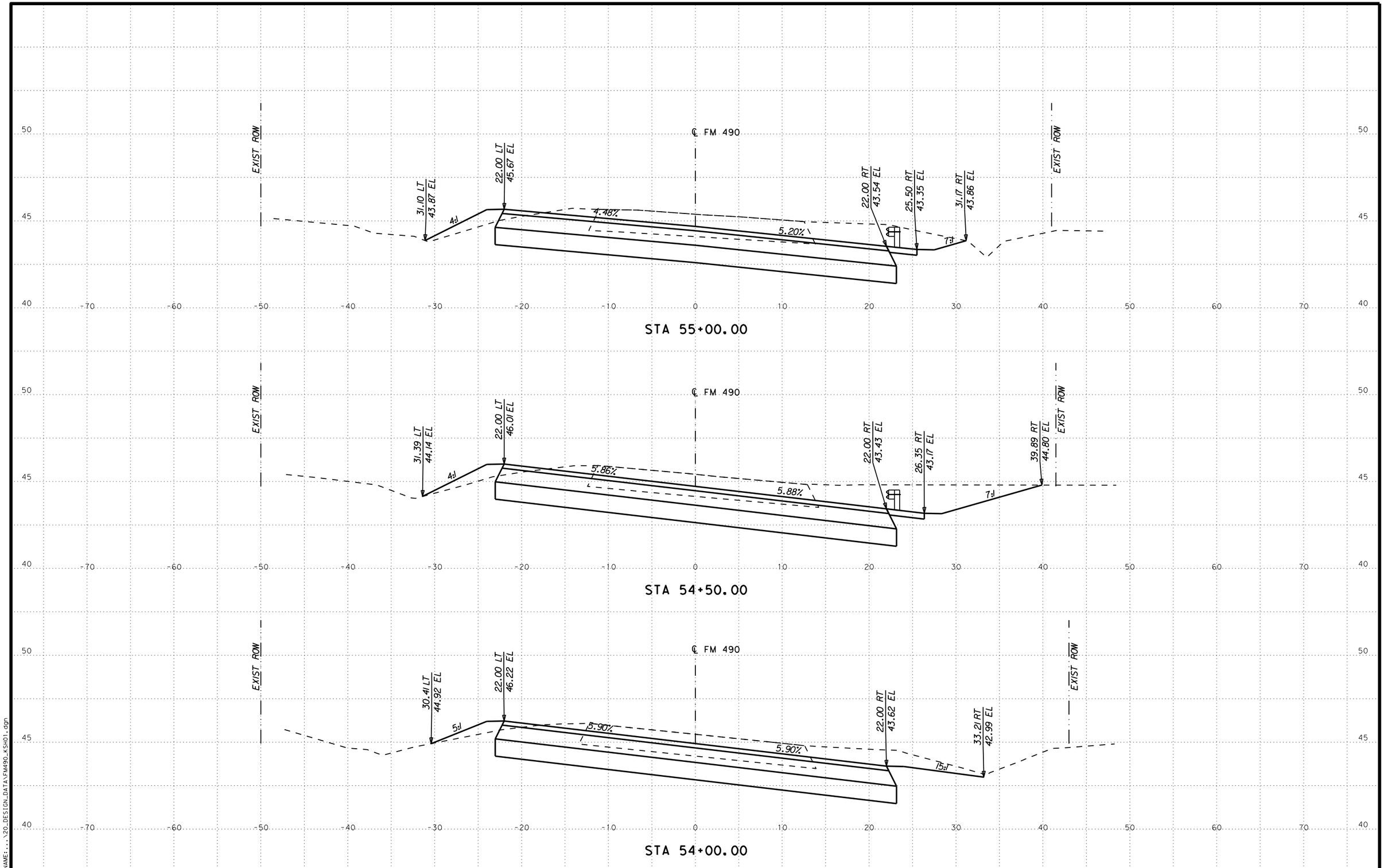
Texas Department of Transportation

TEMPORARY EROSION CONTROL LOGS TECL-17 (PHR)

FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
6			FM 490
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	WILLACY	93
CONTROL	SECTION	JOB	
1430	01	031, ETC	

LEVELS DISPLAYED

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	



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STA 54+50.00

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SHEET 1 OF 7

SCALE: 1"=10'HORZ (0, 5', 10')

SCALE: 1"=5'VERT (0, 2.5', 5')

PHARR District

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739
5320 N. TARRANT PKWY, SUITE 260
FORT WORTH, TX, 76244
ENGINEERING FIRM F-739

FM 490
PROPOSED CROSS SECTIONS

CONTROL	SECTION	JOB	HIGHWAY
1430	01	031, ETC	FM 490, ETC
DISTRICT	COUNTY		SHEET NO
PHR	WILLACY		94

2/8/2023

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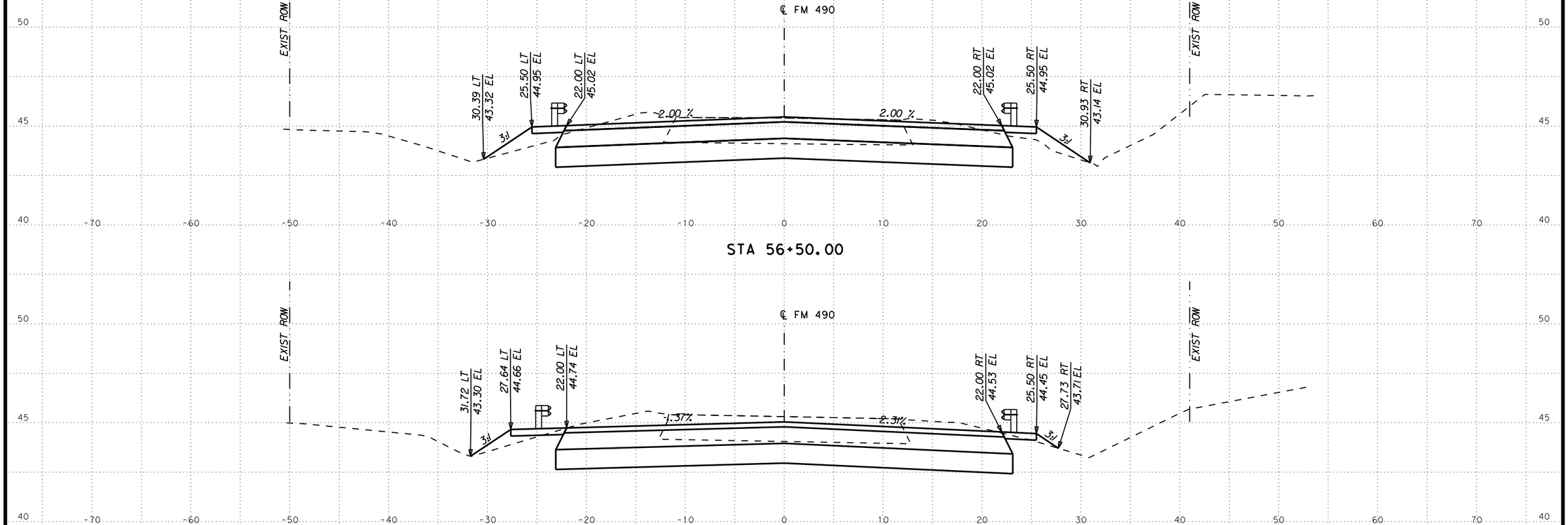

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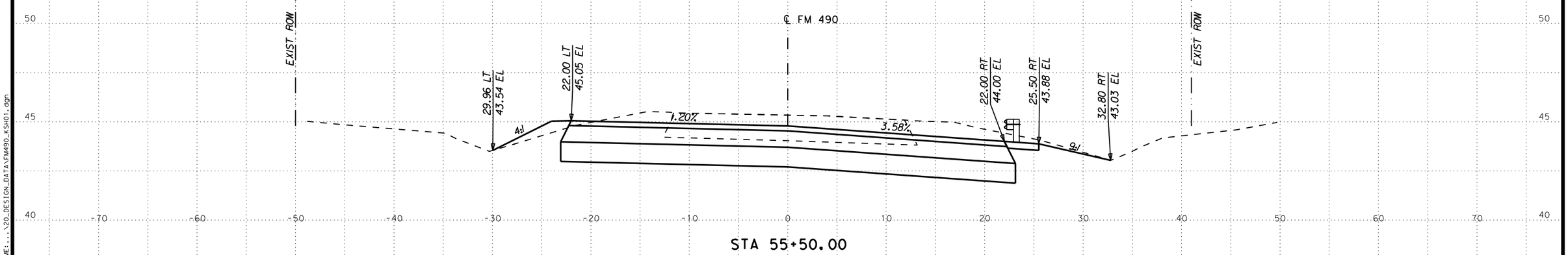

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SHEET 2 OF 7

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SCALE: 1"=5'VERT (0, 2.5', 5')

PHARR District

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TBPE FIRM REGISTRATION # 739
5320 N. TARRANT PKWY,
SUITE 260
FORT WORTH, TX, 76244
ENGINEERING FIRM F-739

2/8/2023

FM 490
PROPOSED CROSS SECTIONS

CONTROL	SECTION	JOB	HIGHWAY
1430	01	031, ETC	FM 490, ETC
DISTRICT	COUNTY		SHEET NO
PHR	WILLACY		95

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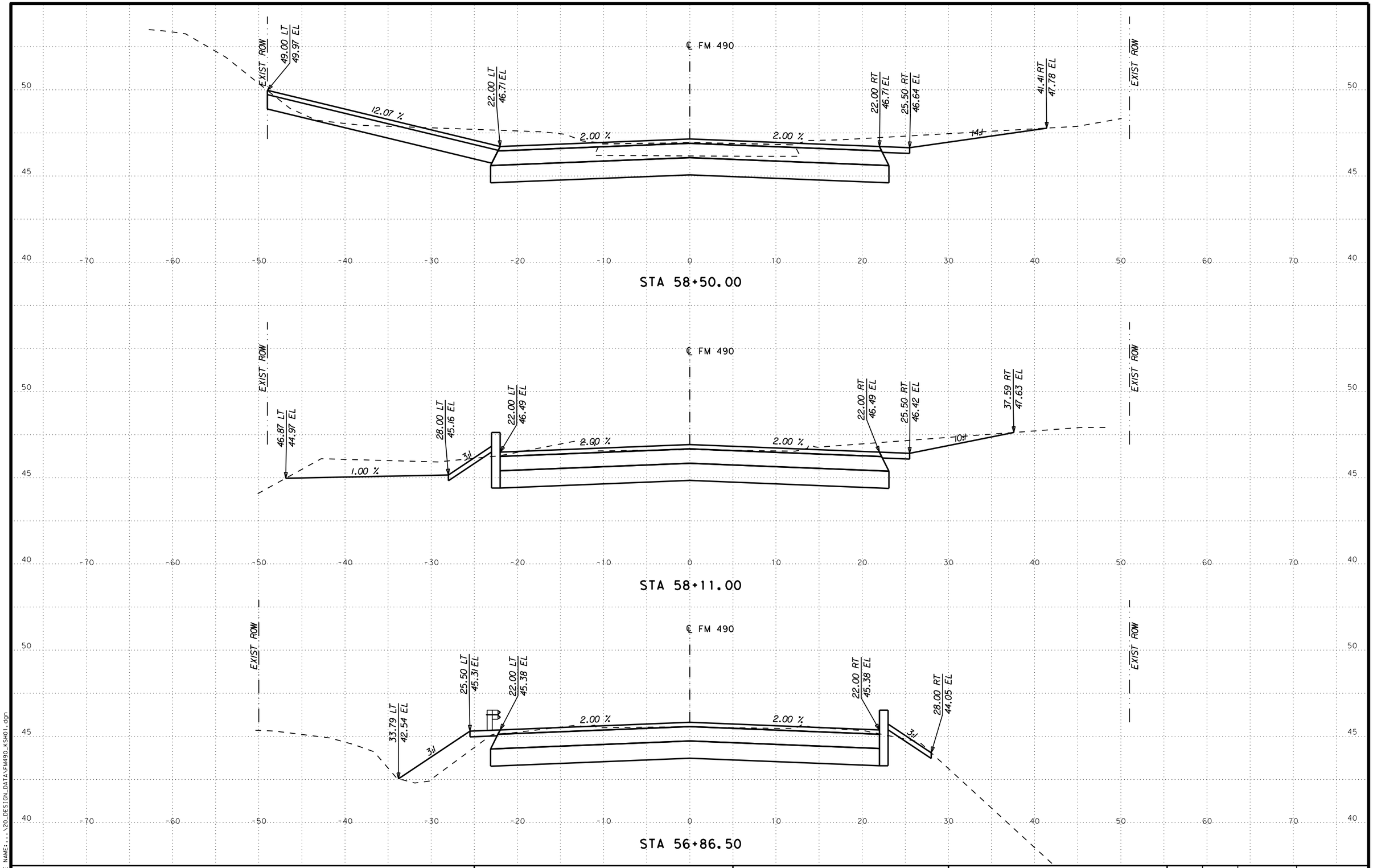

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SHEET 3 OF 7

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5320 N. TARRANT PKWY, SUITE 260
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2/8/2023

FM 490
PROPOSED CROSS SECTIONS

CONTROL	SECTION	JOB	HIGHWAY
1430	01	031, ETC	FM 490, ETC
DISTRICT	COUNTY		SHEET NO
PHR	WILLACY		96

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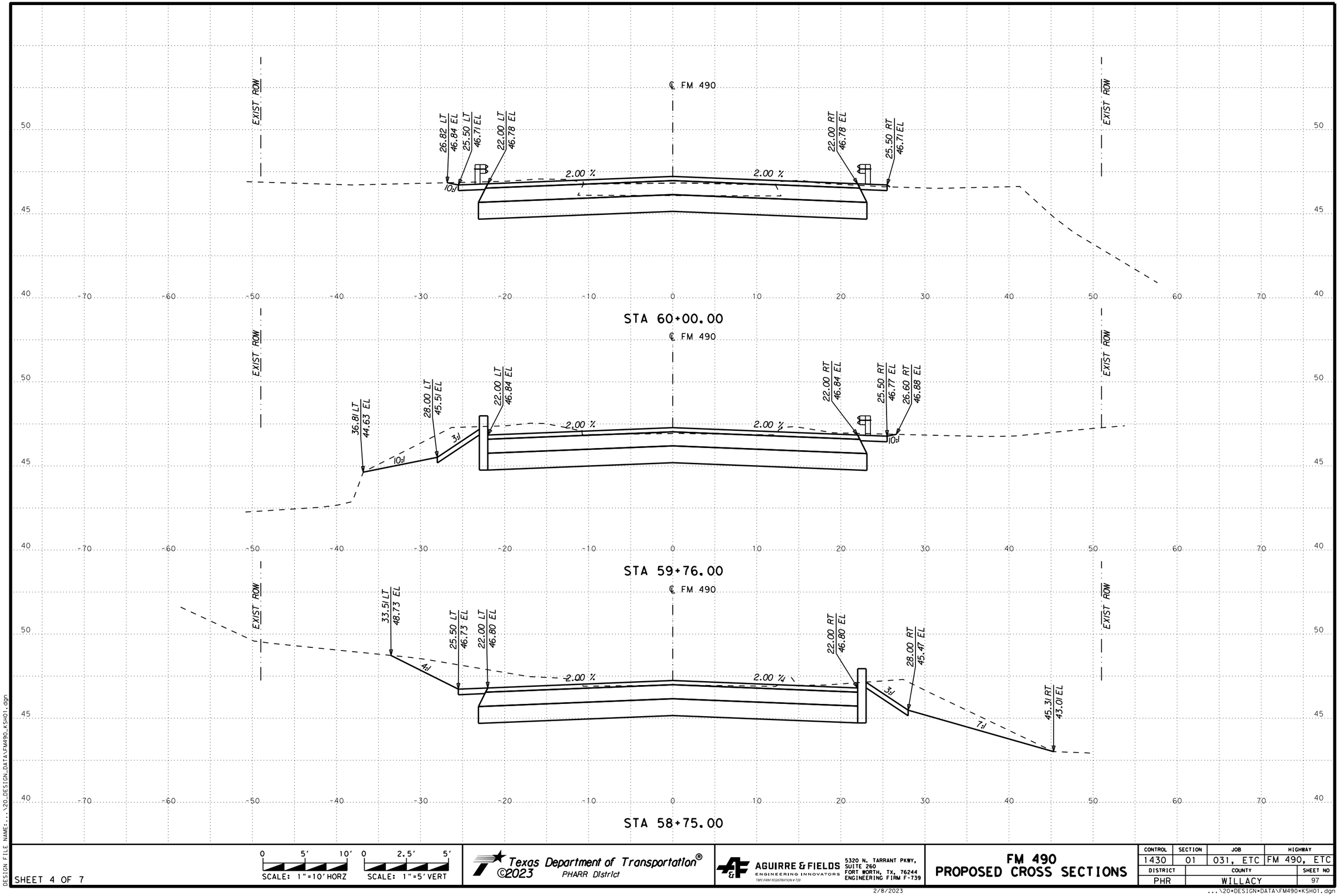

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SHEET 4 OF 7

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2/8/2023

FM 490
PROPOSED CROSS SECTIONS

CONTROL	SECTION	JOB	HIGHWAY
1430	01	031, ETC	FM 490, ETC
DISTRICT	COUNTY		SHEET NO
PHR	WILLACY		97

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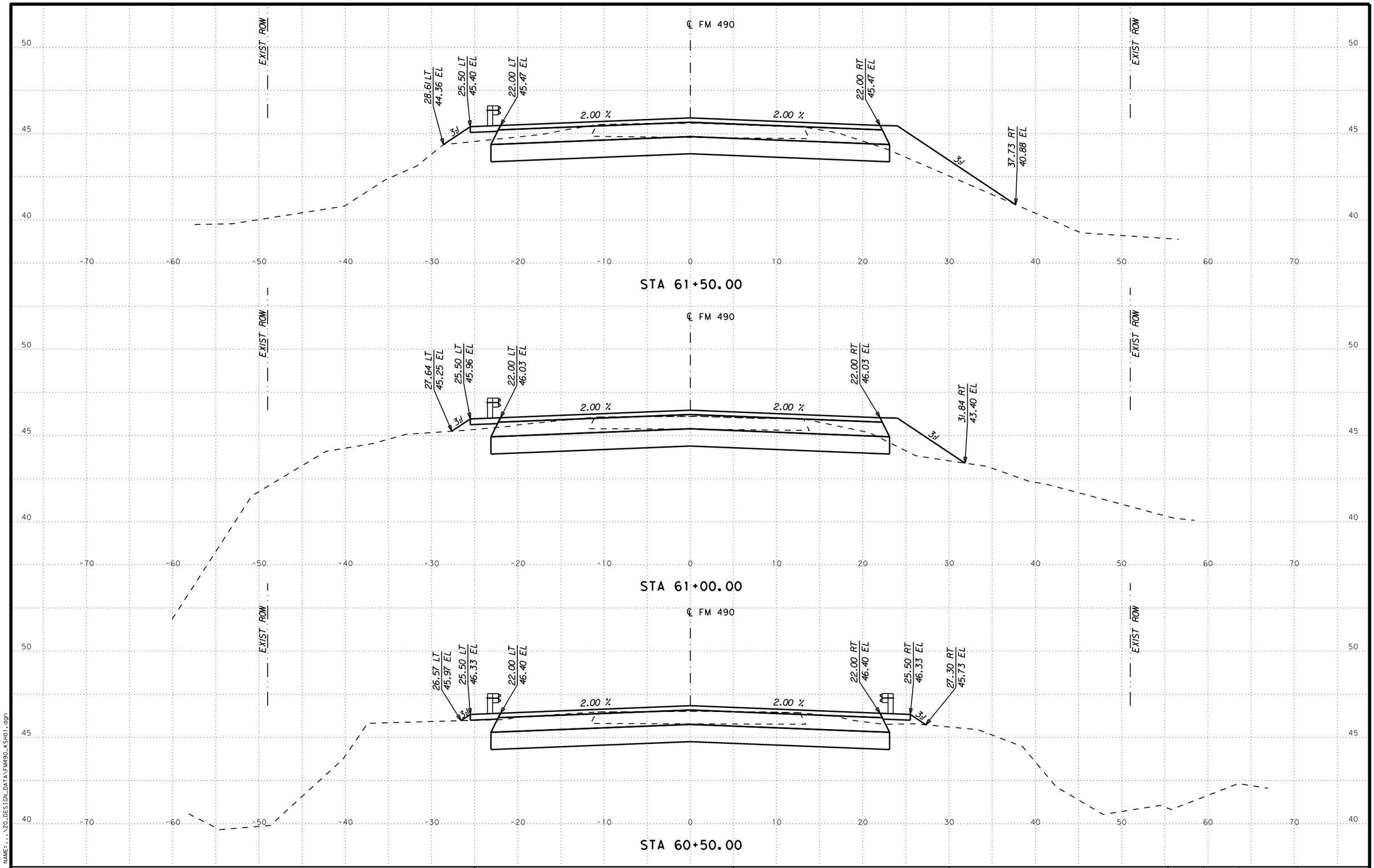

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SHEET 5 OF 7

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SCALE: 1"=5'VERT (0, 2.5', 5')

PHARR District

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739
5320 N. TARRANT PKWY, SUITE 260
FORT WORTH, TX, 76244
ENGINEERING FIRM F-739

2/8/2023

FM 490
PROPOSED CROSS SECTIONS

CONTROL	SECTION	JOB	HIGHWAY
1430	01	031, ETC	FM 490, ETC
DISTRICT	COUNTY		SHEET NO
PHR	WILLACY		98

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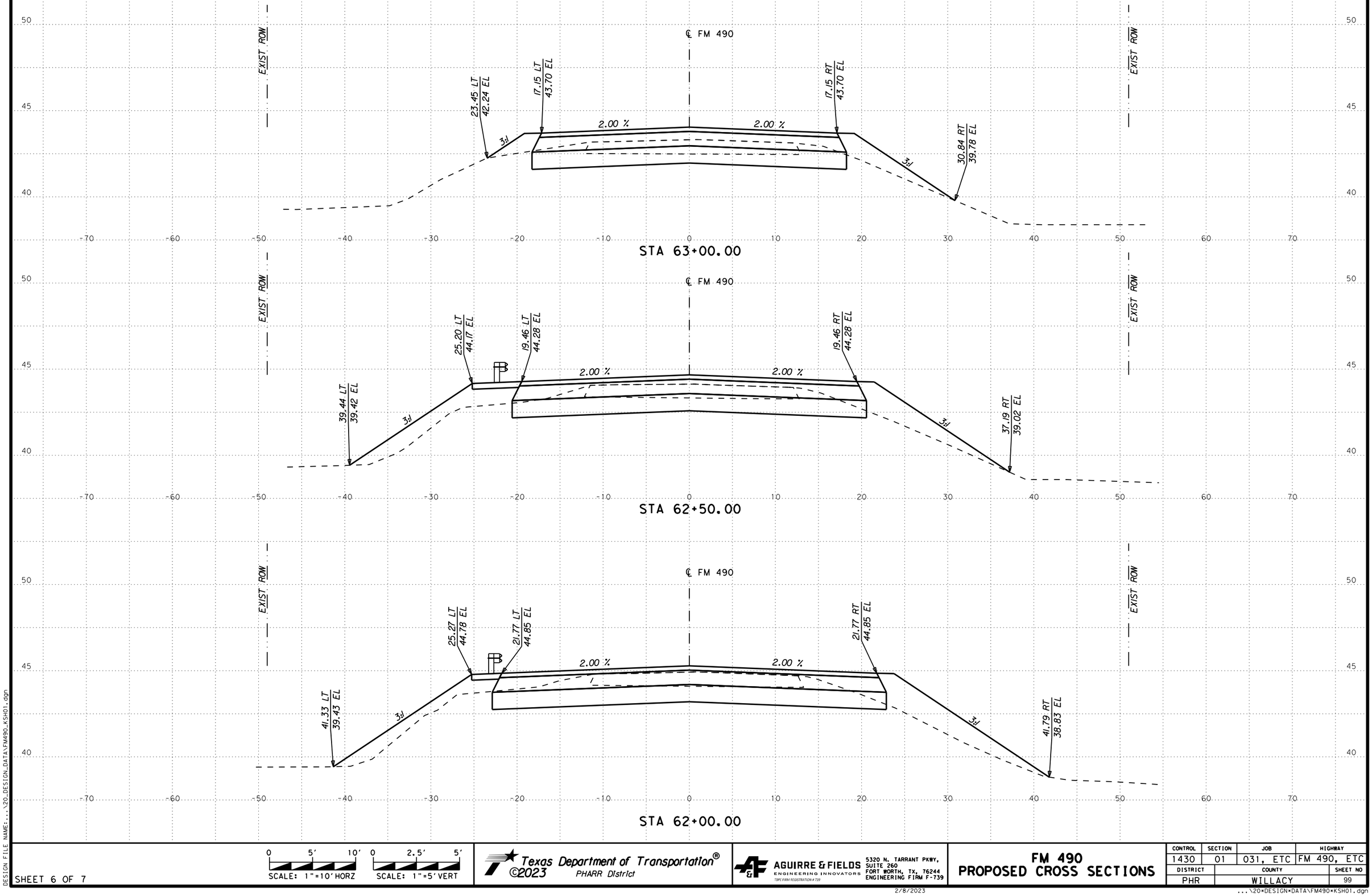

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SHEET 6 OF 7

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AGUIRRE & FIELDS ENGINEERING INNOVATORS TBPE FIRM REGISTRATION # 739
5320 N. TARRANT PKWY, SUITE 260 FORT WORTH, TX, 76244 ENGINEERING FIRM F-739

2/8/2023

FM 490
PROPOSED CROSS SECTIONS

CONTROL	SECTION	JOB	HIGHWAY
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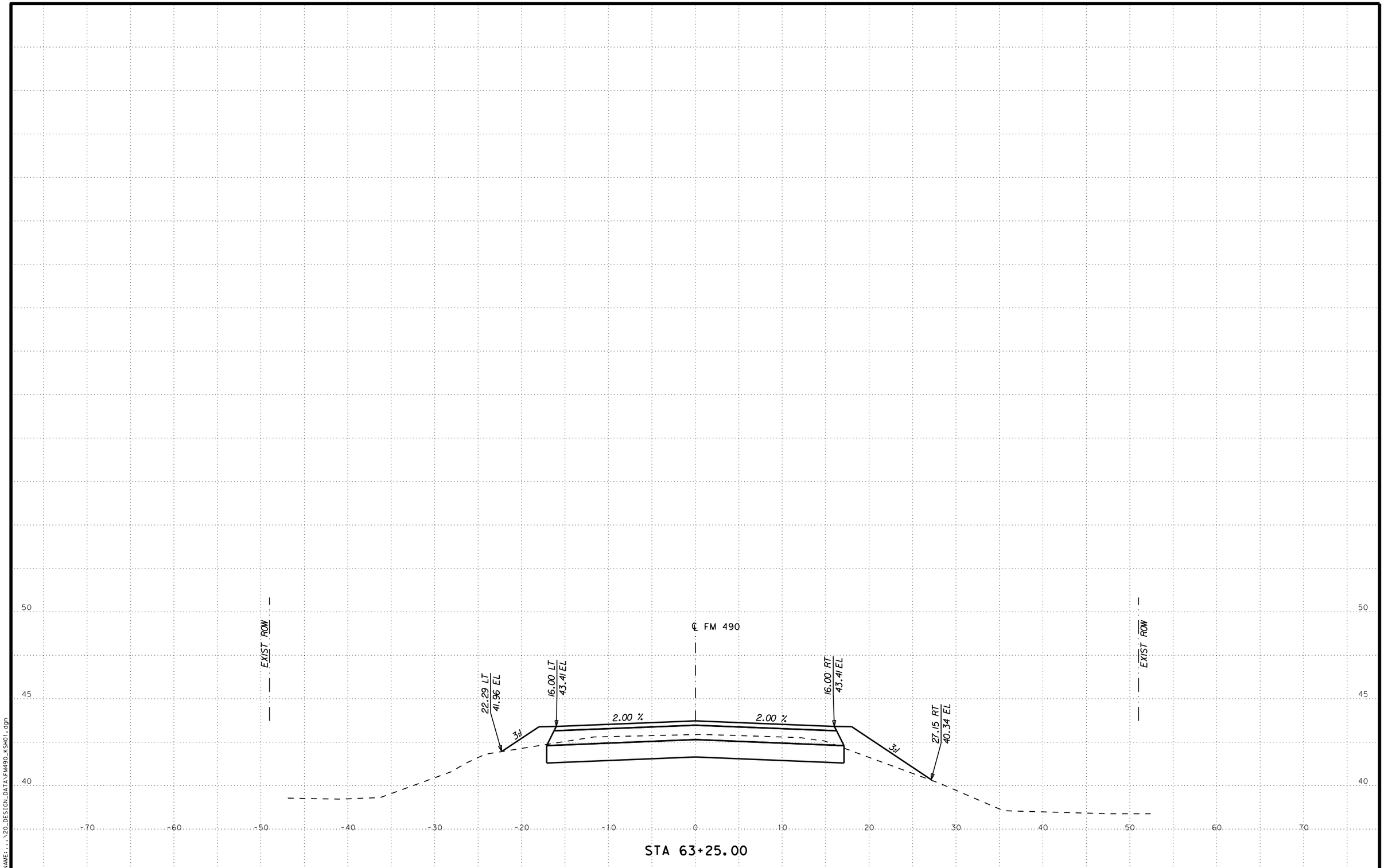

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SHEET 7 OF 7

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TBPE FIRM REGISTRATION # 739
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2/8/2023

FM 490
PROPOSED CROSS SECTIONS

CONTROL	SECTION	JOB	HIGHWAY
1430	01	031, ETC	FM 490, ETC
DISTRICT	COUNTY		SHEET NO
PHR	WILLACY		100

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