

INDEX OF SHEETS

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STATE OF TEXAS  
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED  
STATE HIGHWAY IMPROVEMENT

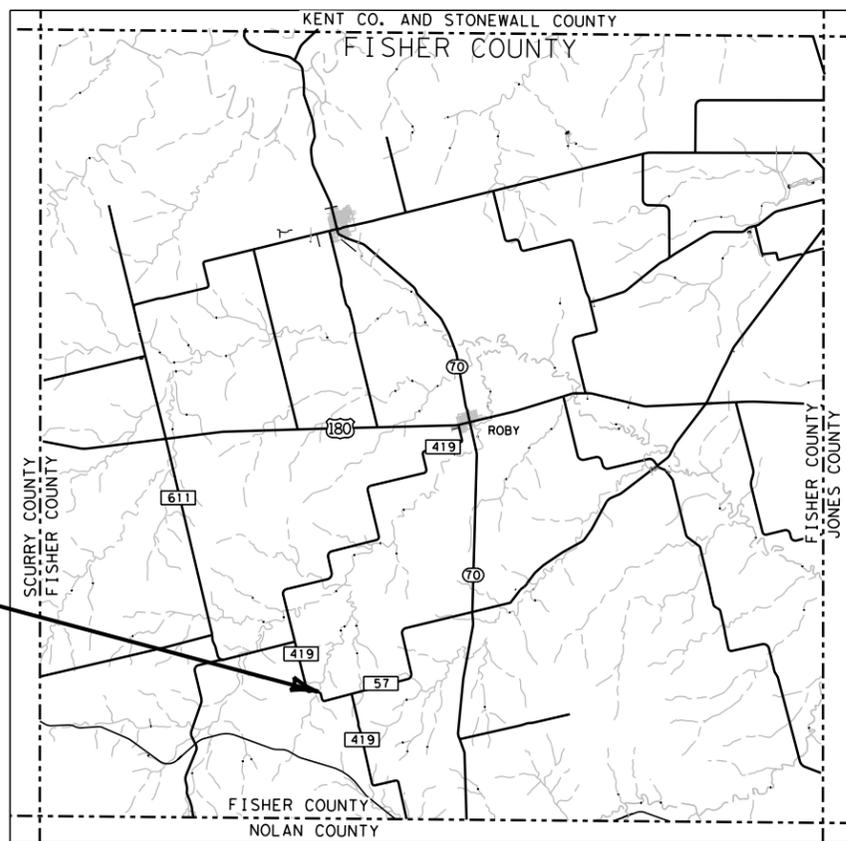
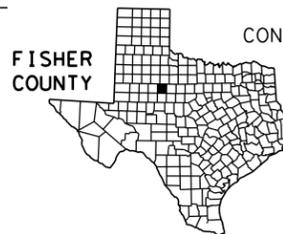
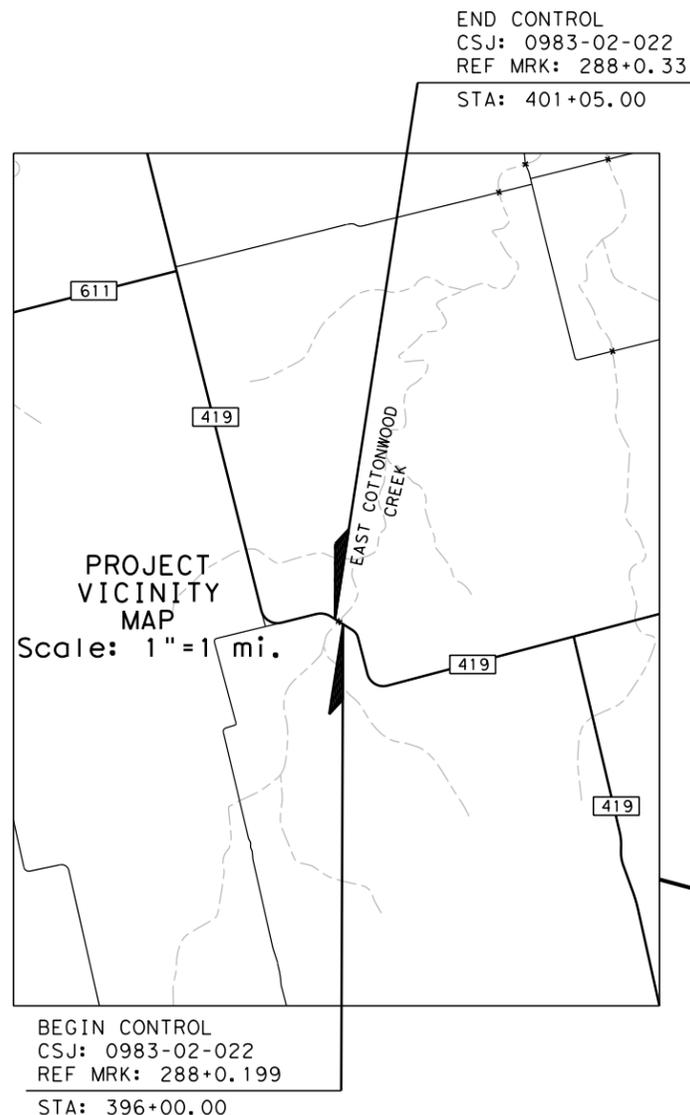
PROJECT NO. BR 2021 (580)

NET LENGTH OF ROADWAY= 440.00 ft = 0.083 mi  
NET LENGTH OF BRIDGE = 65.00 ft = 0.012 mi  
NET LENGTH OF PROJECT= 505.00 ft = 0.095 mi

FM 419  
FISHER COUNTY

LIMITS: AT EAST COTTONWOOD CREEK

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



VICINITY MAP  
(NOT TO SCALE)

EXCEPTIONS: N/A  
EQUATIONS: N/A  
RAILROAD CROSSINGS: N/A

DESIGN SPEED = 35 mph  
CURRENT A.D.T. (2019) = 510  
PROJECTED A.D.T. (2049) = 710  
FUNCTIONAL CLASS = MAJOR COLLECTOR  
EXISTING NBI# = 08-077-0-0983-02-007  
PROPOSED NBI# = 08-077-0-0983-02-019

PROJECT NO.		SHEET NO.	
BR 2021 (580)		1	
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONTROL	SECTION	JOB	HIGHWAY NO.
0983	02	022	FM 419

FINAL PLANS

LETTING DATE: JUNE 2021  
DATE CONTRACTOR BEGAN WORK: \_\_\_\_\_  
DATE WORK WAS COMPLETED: \_\_\_\_\_  
DATE WORK WAS ACCEPTED: \_\_\_\_\_  
FINAL CONTRACT COST: \$ \_\_\_\_\_  
CONTRACTOR : \_\_\_\_\_

CERTIFICATION FOR FINAL PLANS

THIS PROJECT WAS BUILT ACCORDING TO THE PLANS AND SPECIFICATIONS. THESE FINAL PLANS REFLECT THE WORK DONE AND THE QUANTITIES SHOWN THEREON AND ON THE FINAL ESTIMATE ARE FINAL QUANTITIES.

AREA ENGINEER DATE

THE DISTRICT TRAFFIC SAFETY COMMITTEE HAS REVIEWED THE TRAFFIC CONTROL PLAN FOR THIS PROJECT AND IT IS IN COMPLIANCE WITH TRAFFIC CONTROL STANDARDS.

DocuSigned by:  
*Casey L. McGee, P.E.* 3/30/2021  
2377E9857A804A6  
COMMITTEE CHAIRMAN DATE



*Kari Ward*  
3/29/2021



SUBMITTED FOR LETTING: 3/30/2021  
DocuSigned by:

*Kari Ward*  
KARI WARD, P.E.  
STANTEC CONSULTING SERVICES, INC.

RECOMMENDED FOR LETTING: 3/30/2021  
DocuSigned by:

*Eric Welch*  
ERIC WELCH, P.E.  
TXDOT PROJECT MANAGER

RECOMMENDED FOR LETTING: 3/30/2021  
DocuSigned by:

*Stewart J. Chapman, P.E.*  
STEWART J. CHAPMAN, P.E.  
AREA ENGINEER

RECOMMENDED FOR LETTING: 3/31/2021  
DocuSigned by:

*Michael Haithcock*  
MICHAEL D. HAITHCOCK, P.E.  
DIRECTOR OF TP&D

APPROVED FOR LETTING: 3/31/2021  
DocuSigned by:

*Thomas S. Allbritton, P.E.*  
THOMAS S. ALLBRITTON, P.E.  
DISTRICT ENGINEER

PENTABLET:  
DATE: 3/29/2021  
FILE: V:\21142\cct1\ve\214220136\06-CAD\6.1-Sheets\01-FM419+TS.dgn

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, MAY 1, 2012).

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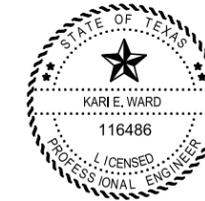
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THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ON THIS SHEET WITH A "A#" HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

Kari Ward, P.E. 3/28/2021  
(NAME) DATE



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

Lauren Brod, P.E. 3/28/2021  
(NAME) DATE

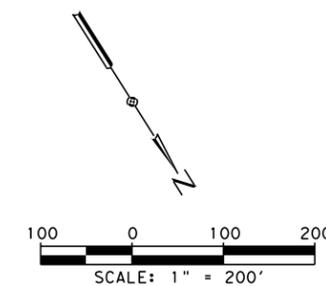
NO.	DATE	REVISION	APPROVED
			12222 Merit Dr Suite 400 Dallas, TEXAS 75251 P 972-991-0011 F 214-468-8266 Firm # F-6324
<b>INDEX OF SHEETS</b>			
FM 419 AT EAST COTTONWOOD CREEK			
SHEET 1 OF 1			
DESIGN KW	FED RD DIV NO 6	FEDERAL AID PROJECT NO. SEE TITLE SHEET	HIGHWAY NO FM 419
GRAPHICS JU	STATE	DISTRICT	COUNTY SHEET NO
CHECK JW	TEXAS	ABL	FISHER
CHECK KW	CONTROL	SECTION	JOB 2
	0983	02	022

3/28/2021

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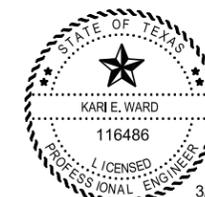
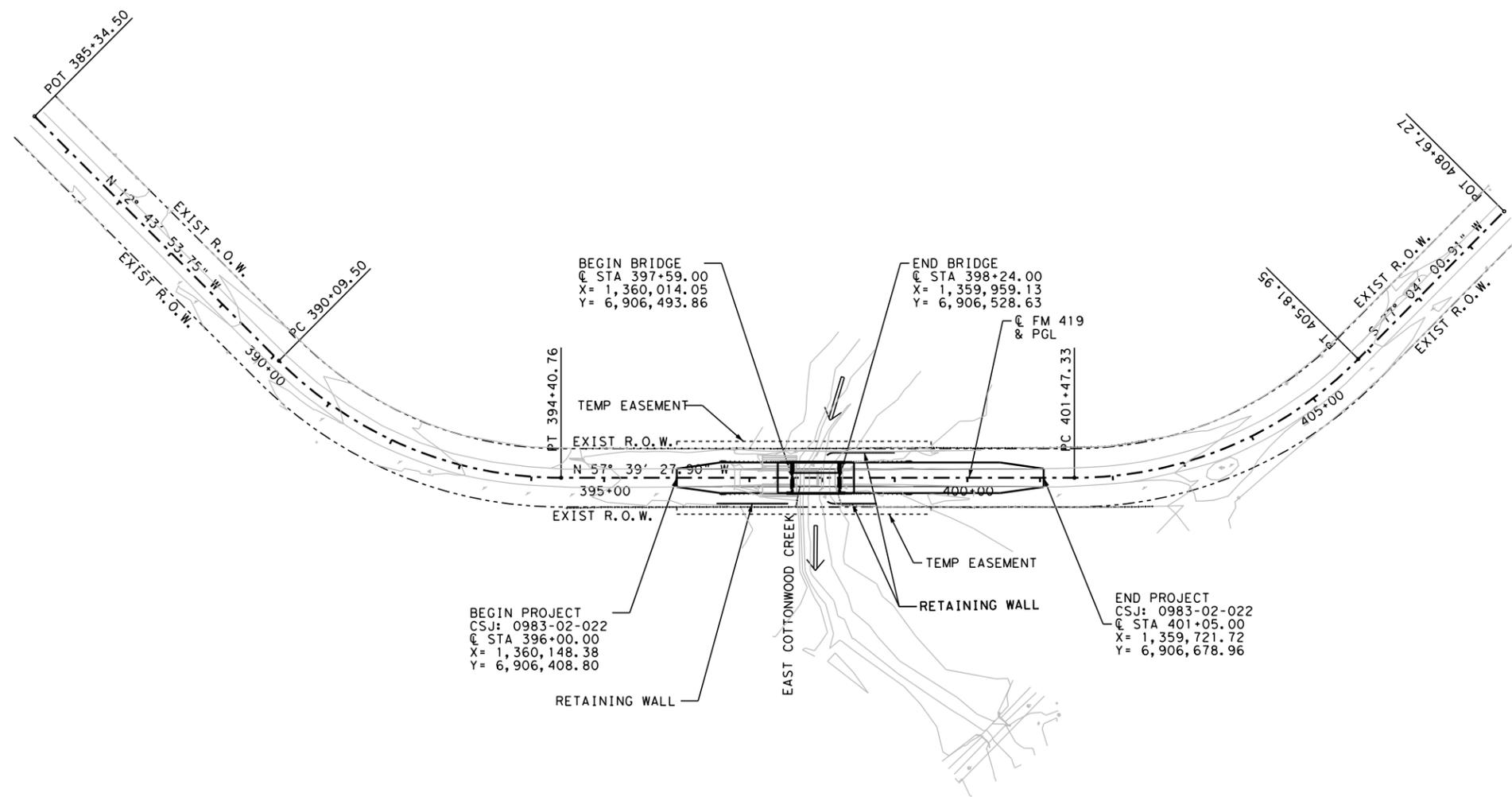
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**LEGEND**

- EXIST R.O.W.
- TEMP EASEMENT
- ⇐ DIRECTION OF RIVER FLOW



*Kari Ward*

NO.	DATE	REVISION	APPROVED

**Stantec**  
 12222 Merit Dr Suite 400  
 Dallas, TEXAS 75251  
 P 972-991-0011  
 F 214-468-8266  
 Firm # F-6324



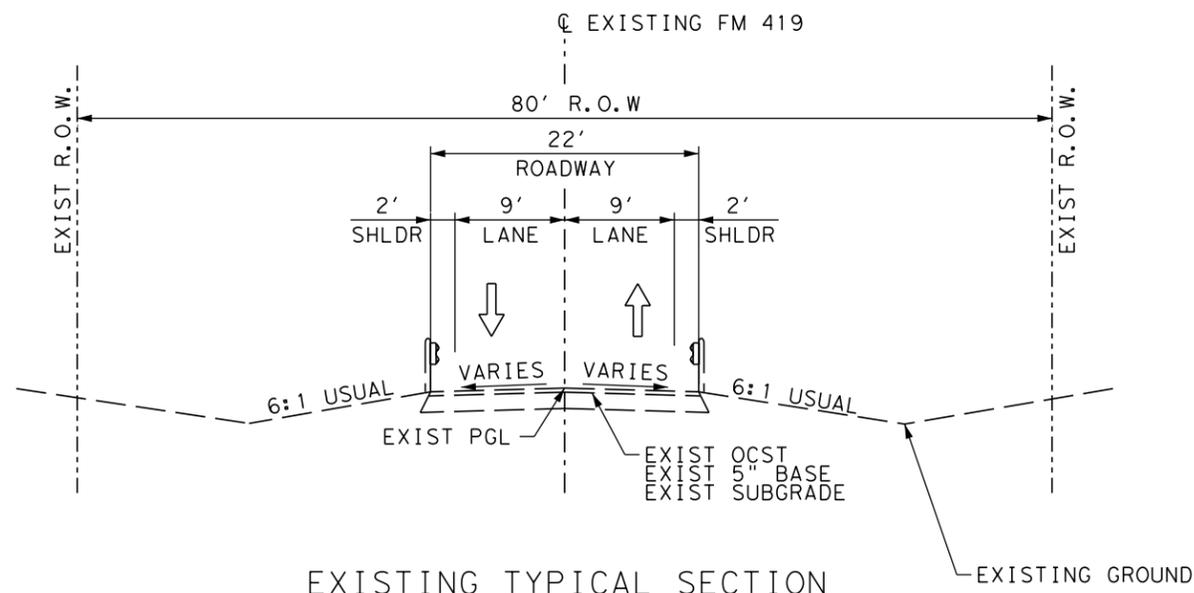
**PROJECT LAYOUT**

FM 419 AT EAST COTTONWOOD CREEK

SCALE: 1"=200' SHEET 1 OF 1

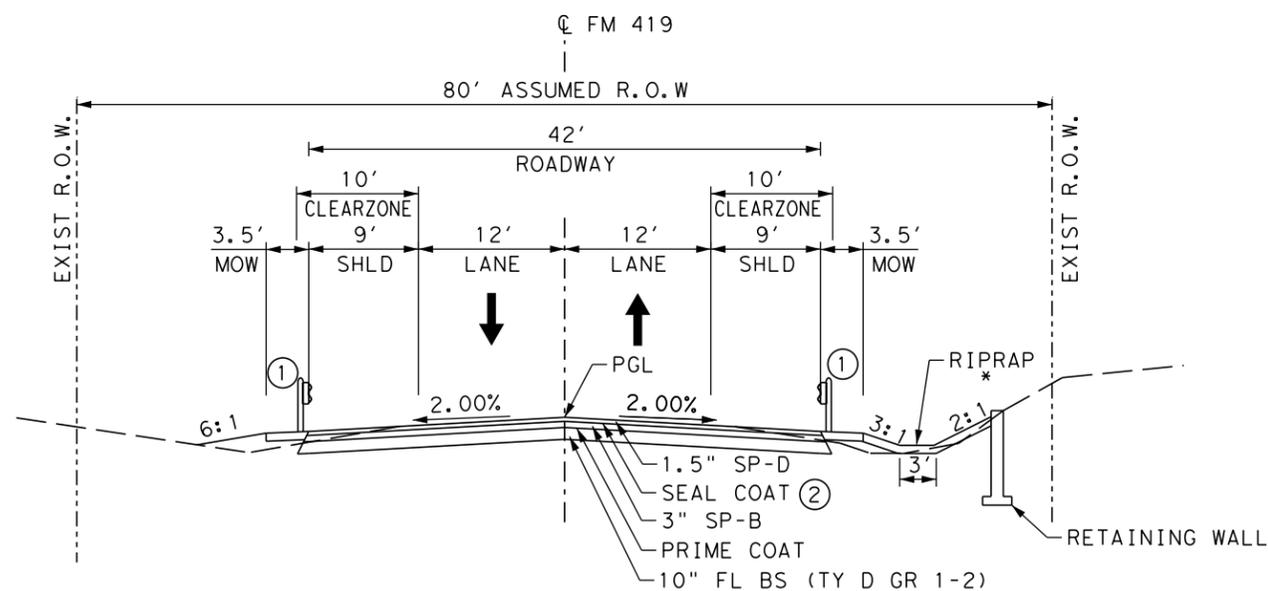
DESIGN	FED RD	FEDERAL AID PROJECT NO.		HIGHWAY
KW	DIV NO			NO
	6	SEE TITLE SHEET		FM 419
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET
JU	TEXAS	ABL	FISHER	NO
CHECK	CONTROL	SECTION	JOB	3
JW	0983	02	022	

3/28/2021



**EXISTING TYPICAL SECTION**

STA 396+00 TO STA 397+69  
 BRIDGE STA 397+69 TO STA 398+19  
 STA 398+19 TO STA 401+05



**PROPOSED TYPICAL SECTION**

STA 396+00 TO STA 397+59  
 BRIDGE STA 397+59 TO STA 398+24  
 STA 398+24 TO STA 401+05

- NOTE:
- ① SEE PLAN & PROFILE FOR MBGF, MOW STRIP AND RIPRAP LOCATIONS
  - ② CONTRACTOR SHALL TACK ALL SURFACES WITH UNIFORM COVERAGE PRIOR TO THE SUBSEQUENT LIFT. TACK ALL VERTICAL JOINTS AS DIRECTED BY THE ENGINEER.



*Kari Ward*

NO.	DATE	REVISION	APPROVED
			12222 Merit Dr Suite 400 Dallas, TEXAS 75251 P 972-991-0011 F 214-468-8266 Firm # F-6324
<p><b>TYPICAL SECTIONS</b></p> <p>FM 419 AT EAST COTTONWOOD CREEK</p>			
SHEET 1 OF 1			
DESIGN KW	FED RD DIV NO 6	FEDERAL AID PROJECT NO. SEE TITLE SHEET	HIGHWAY NO FM 419
GRAPHICS JU	STATE TEXAS	DISTRICT ABL	COUNTY FISHER
CHECK JW	CONTROL 0983	SECTION 02	JOB 022
CHECK KW			4

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**Project Number:** See Title Sheet  
**Control:** 0983-02-022  
**County:** FISHER  
**Highway:** FM 419

### ABILENE DISTRICT GENERAL NOTES 2014 SPECIFICATIONS

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

Stewart Chapman, P.E.: [Stewart.Chapman@txdot.gov](mailto:Stewart.Chapman@txdot.gov)  
Maxie Allen, P.E.: [Maxie.Allen@txdot.gov](mailto:Maxie.Allen@txdot.gov)  
(Snyder Area Office)

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

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

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

Failure to make necessary corrections to SW3P based on SW3P inspections will be cause for withholding the monthly estimate until such corrections have been made.

Failure to make necessary corrections to traffic control items based on barricade inspections will be cause for withholding the monthly estimate until such corrections have been made.

Provide ingress/egress to the adjacent properties in areas under construction. Phased construction of driveways and streets shall be required to provide uninterrupted access to adjacent properties. Coordinate work with the property owners before beginning any construction in the vicinity of the drive.

Cut neat, straight lines with vertical faces along pavement edges or along joints between existing asphalt or concrete pavement and new pavement perpendicular or parallel to the direction of traffic by methods described in applicable bid items, or as directed. Provide clean edges or joints without jagged appearance or chunks broken out. This work is considered subsidiary to various bid items.

**Project Number:** See Title Sheet  
**Control:** 0983-02-022  
**County:** FISHER  
**Highway:** FM 419

### Environmental

#### Endangered and Protected Species

1. Migratory Birds
  - a. **Bird nesting season is typically 15Feb through 15Sep annually.**
  - b. The Contractor will avoid disturbing, destroying, removing, or relocating migratory birds and active nests found in trees, culverts, bridges, on the ground, or anywhere they are encountered.
  - c. Perform all tree trimming and other vegetation clearing activities during the non-breeding season (typically 15Sep-15Feb annually). Perform any inactive nest removal and bird exclusion methods to prevent birds from establishing nests. Phasing of work during construction may be necessary to stay in compliance.
  - d. When active nests are unexpectedly encountered on-site during construction, the Contractor will stop work and immediately notify the Engineer. Take measures to avoid disturbance of these birds, their occupied nest, eggs, and/or young, in accordance with the Migratory Bird Treaty Act, Texas Parks and Wildlife Code, and TxDOT policy.
  - e. The Engineer will notify the Contractor when work may resume.
  - f. The Contractor should be prepared to prevent migratory birds from building nests by utilizing nest prevention methods, such as bird-deterrent netting and bird-repelling sprays and/or gels, between 15Feb and 15Sep. The Contractor can discuss other preventative measures with the Engineer and/or District Environmental Staff.

#### Best Management Practices

1. Bird BMPs
  - a. Not disturbing, destroying, or removing active nests, including ground nesting birds, during the nesting season;
  - b. Avoiding the removal of unoccupied, inactive nests, as practicable;
  - c. Preventing the establishment of active nests during the nesting season on TxDOT owned and operated facilities and structures proposed for replacement or repair;
  - d. Not collecting, capturing, relocating, or transporting birds, eggs, young, or active nests without a permit.

#### Item 5, "Control of Work"

Use Method C for construction surveying.

All known utilities are identified in the plans, including the crossing of power lines. Use this information to identify potential issues with power poles and power lines prior to bidding. Make necessary arrangements with utility owners regarding temporary protections such as bracing power poles, and de-energizing power lines. The Department will not reimburse the cost of such temporary protections to the Contractor, unless the Engineer determines that inadequate information was available at the time the project was bid. **"Call Before You Dig" "Call 811"**

**Project Number:** See Title Sheet  
**Control:** 0983-02-022  
**County:** FISHER  
**Highway:** FM 419

“Provide notification to the District Signal Shop by telephone at 325-676-6974 and by email at [Juan.Salgado@txdot.gov](mailto:Juan.Salgado@txdot.gov) when planning drilling or excavation work in areas where existing TxDOT underground utilities exist.” Visual evidence of TxDOT underground utilities in the area include illumination poles, ground boxes, flashing beacons, traffic signals, etc. This notification must be provided 48 hours in advance of performing the work.

Drilled shaft locations or excavation areas must be staked prior to the notification so that the underground utilities can be located in relationship to the proposed work. Preserve and document the marked utility locations to prevent unnecessary secondary notifications. Notify the Engineer of conflicts between proposed work and underground utilities.

#### **Precast Alternate Proposals.**

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 7, “Legal Relations and Responsibilities”**

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

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

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

##### **(1) Restricted Use of Materials for the Previously Evaluated Permit Areas.**

Document both the project specific location (PSL) and their authorization. Maintain copies for review by the department or any regulatory agency. When an area within the project limits has been evaluated by the USACE as part of the permit process for this project:

**Project Number:** See Title Sheet  
**Control:** 0983-02-022  
**County:** FISHER  
**Highway:** FM 419

**Sheet 5A**

- a. Suitable excavation of required material in the areas shown on the plans and cross sections as specified in Item 110 is used for permanent or temporary fill (Item 132, Embankment) within a USACE permit area;
- b. Suitable embankment (Item 132) from within the USACE permit area is used as fill within a USACE evaluated area; and,
- c. Unsuitable excavation or excess excavation [“Waste”] (Item 110) that is disposed of at a location approved by the Engineer within a USACE evaluated area.

##### **(2) Contractor Materials from Areas Other than Previously Evaluated Areas.**

Provide the department with a copy of all USACE coordination or approval(s) prior to initiating any activities for an area within the project limits that has not been evaluated by the USACE or for any off right of way locations used for the following, but not limited to, haul roads, equipment staging areas, borrow and disposal sites:

- a. Item 132, Embankment, used for temporary or permanent fill within a USACE permit area; and,
- b. Unsuitable excavation or excess excavation [“Waste”] (Item 110, Excavation) that is disposed of outside a USACE evaluated area.

The total area disturbed for this project is **0.5** acres. The disturbed area in this project, all project locations in the Contract, and the Contractor project specific locations (PSLs), within 1 mile of the project limits, for the Contract will further establish the authorization requirements for storm water discharges. The Department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. The Contractor is to obtain required authorization from the TCEQ for Contractor PSLs for construction support activities on or off the ROW. When the total area disturbed in the Contract and PSLs within 1 mile of the project limits exceeds 5 acres, provide a copy of the Contractor NOI for PSLs on the ROW to the Engineer and to the government that operates a separate storm sewer system.

Provide one SW3P Notification Board for this project. Notification Boards are to be placed at locations within the right-of-way but outside the clear zone as directed by the Engineer.

Consider this work to be subsidiary to the various bid items of the contract.

The Contractor's attention is directed to the Texas Aggregate Quarry Pit Safety Act. Any pit or quarry meeting the definition of an unacceptable unsafe location as defined in the Act is subject to regulations set forth in this Act. A copy of the Texas Administrative Code, Title 43, Part, 1, Chapter 21, Subchapter M may be viewed at

[http://info.sos.state.tx.us/pls/pub/readtac\\$ext.ViewTAC](http://info.sos.state.tx.us/pls/pub/readtac$ext.ViewTAC).

No significant traffic generator events identified.

**Hard hats are required at all times during construction when construction personnel are in TxDOT Right-of-Way.**

**Project Number:** See Title Sheet  
**Control:** 0983-02-022  
**County:** FISHER  
**Highway:** FM 419

**Item 8 “Prosecution and Progress”**

Each contract awarded by the Department stands on its own and as such, is separate from other contracts. A Contractor awarded multiple contracts must be capable and sufficiently staffed to concurrently process and/or execute all contracts at the same time.

The Contractor is hereby authorized to begin work prior to the expiration of the number of calendar days provided in the Special Provision to Item 8, Article 8.1. Notify the Engineer in writing of the date to begin work. Time charges will commence when work begins or on the expiration of the number of calendar days provided, whichever occurs first.

Maintain and submit a project schedule monthly. Submit to the Engineer the updated project schedule no later than the 25th calendar day of the following month.

Coordinate and update the work schedule with the project inspector daily. Give a minimum of 24 hours of notice to project inspector if work requiring inspection or testing is to be performed. Failure to do so may cause that work to be delayed or postponed if TxDOT personnel are not available. Work performed without suitable inspection, as determined by the Engineer, may be ordered removed and replaced at Contractor’s expense.

Begin work 90 calendar days after the authorization date to begin work. Do not begin work before or after this period unless authorized in writing by the Engineer. The delay is needed to allow for purchasing bridge items and crushed aggregate. Prepare the progress schedule as a Critical Path Method (CPM).

**Item 9, “Measurement and Payment”**

The progress payment period shall end on the 25<sup>th</sup> of each month, unless directed by the Area Office Engineer. Material on Hand (MOH) is due two business days before estimate cut off.

**Item 100, “Preparing Right of Way”**

The Contractor's attention is directed to potential regulations against burning within the project limits. Abide by all local ordinances and county imposed burn bans. When burning is prohibited, dispose of material in accordance with regulations set forth by other regulatory agencies including the Texas Commission for Environmental Quality. The cost of burning or disposal of any product is subsidiary to various bid items.

**Item 164, “Seed for Erosion Control”**

Quantities shown are approximate; limits of the temporary and permanent seeding will be determined during construction.

Temporary seeding will be required in several small areas as work progresses to comply with the storm water pollution prevention plan and may require multiple mobilizations of seeding crew.

**Item 168, “Vegetation Watering”**

Water rate for this project shall be ¼” of water per acre every two weeks for a 3-month period.

**Project Number:** See Title Sheet  
**Control:** 0983-02-022  
**County:** FISHER  
**Highway:** FM 419

**Item 247, “Flexible Base”**

Provide flexible base (TY D GR 1- 2) with a minimum Plasticity index of 4. Ride quality is waved for this project.

**Item 316, “Surface Treatments”**

The Engineer must authorize work if the wind exceeds 20 mph. Provide pre-coat aggregate with **PG 64-22** or as approved by the Engineer. Cover or protect any sealed expansion joints or rail on bridges and any railroad tracks encountered on this project, as directed by the Engineer. Clean any of these items not properly protected. This work will not be paid for directly but will be considered subsidiary to Item 316.

For items of work that include both summer and winter materials or the Asphalt (Multi Option), the Engineer will determine which asphalt to apply based on timing and prevailing weather conditions. The Asphalt (Multi Option) shall consist of the following choices and rates.

ASPH (AC-20-5TR) @ .40 GAL/SY  
ASPH (AC-20-XP) @ .40 GAL/SY  
ASPH (CRS-2P) @ .42 GAL/SY\*

**AGGREGATES**

AGGR (TY-PB GR-3 SAC –B) – 1 CY/125 SY  
AGGR (TY-PB GR-4 SAC –B) – 1 CY/140 SY  
AGGR (TY-PB GR-4 (MOD) SAC –B) – 1 CY/135 SY

The rates shown are for estimating purposes and the engineer can dictate higher or lower rates based on roadway conditions.

**Item 416, “Drilled Shaft Foundations”**

Riprap will be paid for under item 432.

All soil, water, and slurry removed from drilled shafts shall be captured and disposed of properly. No discharge of these materials into, or in close proximity to, the surrounding water will be allowed.

**Item 420, “Concrete Substructures”**

In addition to the elements shown in table 1, the following elements are Plans Quantity Elements.

- Bent Concrete

**Item 422, “Concrete Superstructures”**

Saw-cut groves are required. Provide either a carpet drag or broom finish for micro-texture to deck and approach slabs.

**Project Number:** See Title Sheet  
**Control:** 0983-02-022  
**County:** FISHER  
**Highway:** FM 419

**Item 432, “Riprap”**

Provide structural fiber reinforced or conventionally reinforced concrete for formed M.B.G.F. concrete mow strip.

Meet the following requirements when using structural fiber reinforcement:

- If slip forming, use an approved method that ensures adequate concrete consolidation. Sprinkle and consolidate the subgrade before the concrete is placed. Finish the surface with a wood float or broom finish as approved. Immediately after finishing operation, cure the riprap according to Item 420, “Concrete Structures”.

**Item 440, “Reinforcement for Concrete”**

Provide epoxy coated reinforcement for all reinforcement in abutment caps, wingwalls, and backwalls (drilled shaft reinforcement excluded); interior bent caps (column and drilled shaft reinforcement excluded); cast-in-place portions of bridge deck (PCP reinforcement and bridge girder reinforcement excluded); bridge railing; and approach slab.

**Item 496, “Removing Structures”**

The Contractor must submit a demolition plan.

**Item 502, “Barricades, Signs and Traffic Handling”**

Mobile traffic control in accordance with TPC 3 series will be required for placement of short duration, short term, intermediate term, and long-term traffic control.

Provide the Engineer with written notification seven (7) days in advance of major traffic changes. A major traffic change is defined as the temporary (greater than one day) or permanent relocation of traffic lanes typically in an urban setting. The notice will, at a minimum, include the expected date, time and scope of the traffic change. The Department will utilize the information provided to inform the traveling public of the changes. Failure to provide advance notice, or to provide accurate information, will result in delaying the work until such time that the public has been notified.

Additional signs, barricades and traffic handling may be necessary to complete the work shown herein and will be provided by the contractor as required and will be considered subsidiary to this item.

In sections where traffic is restricted to one lane, two-way traffic, flaggers stationed at each end of that section will control operations with two-way communication devices.

Relocate existing roadside signs to temporary supports as approved by the engineer.

All safety appurtenances such as signs, delineators, object markers and route markers will be in place prior to opening each phase of the construction to traffic, unless otherwise directed.

**Project Number:** See Title Sheet  
**Control:** 0983-02-022  
**County:** FISHER  
**Highway:** FM 419

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

The Contractor's person responsible for TCP compliance must be available by local telephone and have a response time within 45 minutes.

Work will not be allowed on both sides of the roadbed at the same time.

Equip all work vehicles within 30 feet of the traveled way with a functioning amber strobe light or rotating beacon visible from all directions.

Repair barricades within the timeline shown on the barricade inspection report. Failure to comply will cease all work until barricades are repaired to the satisfaction of the Department.

Replace all damaged traffic control devices immediately. Remove any damaged traffic control devices from the project within 24 hours.

Conflicting guide signs shall be covered as approved by the Engineer.

Pilot car is subsidiary to item 502.

Reduced regulatory speed limit signs should only be posted in the vicinity of ongoing work activity as shown on BC (3)-14 and not throughout the entire project. Removing, relocating or covering speed limit signs shall be considered subsidiary to item 502.

**Item 504, “Field Office for Laboratory”**

**Field Laboratory:**

Furnish a “Type D” structure for the asphalt mix control laboratory for the Engineer’s exclusive use. In addition to the requirements of Item 504, furniture and equipment to be furnished by the Contractor shall include:

- eye wash station
- first-aid kit
- two fire extinguishers
- Provide internet connectivity for use by TxDOT lab testing personnel at all laboratory structures on this project.

**Project Number:** See Title Sheet  
**Control:** 0983-02-022  
**County:** FISHER  
**Highway:** FM 419

**Item 510, “One-way Traffic Control”**

The contractor shall use ADDCO PTS-2000 or equivalent, capable of showing wait time, as temporary traffic signals. two (2) temporary traffic signals will be required for this project.

**Item 512, “Portable Concrete Traffic Barrier**

The state will furnish the portable concrete traffic barrier (PCTB) sections stockpiled at 2342 Business Highway 84 South, East of Snyder approx 30 miles NW of the project limits. All PCTB sections will be hauled by the Contractor to the project site. Upon completion, all PCTB sections will be returned to their original location. Make arrangements at the storage sites for the loading and unloading of the PCTB.

The contractor shall furnish new single slope portable concrete traffic barrier (PCTB) sections using SSCB(2)-10 standard.

Type X Joint installation shall be used. Contractor shall supply Type X Joint hardware.

Upon completion of the project, PCTB and Type X Joint Hardware will become the property of the TxDOT and will be stockpiled as approved by the Engineer at 2342 Business Highway 84 South, East of Snyder approx. 30 miles NW of the project limits.

**Item 540, “Metal Beam Guard Fence”**

Steel posts for metal beam guard fence may be field cut to proper rail height with a power saw when approved by the engineer.

Core drill 1 ¼ diameter holes through existing slab. Percussion or impact drilling is not permitted. Patch spalls, when directed by the engineer, in accordance with item 429, “Concrete Structure Repair”, at the contractor’s expense.

**Item 644, “Small Roadside Sign Supports and Assemblies”**

Use the latest edition of the “Standard Highway Sign Designs for Texas” for Sign types for which design details are not shown on the plans.

Sign placement shall be in accordance with the latest edition of the TMUTCD & TxDOT’s Sign Crew Field Book located at the following addresses.

TMUTCD - <https://www.txdot.gov/business/resources/signage/tmutcd.html>

TxDOT’s Sign Crew Field Book - <http://onlinemanuals.txdot.gov/txdotmanuals/sfb/index.htm>

Before final sign installation, stake all sign locations for approval by the engineer.

All triangle slip base small sign mounts installed under this item shall utilize clamp type bases.

Remove entire small sign foundation.

**Item 658, “Delineator and Object Marker Assemblies”**

All MBSG delineation shall be GF2 mounted on posts.

**Project Number:** See Title Sheet  
**Control:** 0983-02-022  
**County:** FISHER  
**Highway:** FM 419

Use a minimum 2 inch long lag screws with washers to attach flexible GF2 barrier reflectors to wooden post. For steel posts, use an approved adhesive, or other method approved by Engineer.

Concrete Barrier Reflectors shall be equivalent to Shure-tite CTB “Cup Mount” Delineator (8”). Attach delineators to concrete rail with concrete anchors as approved by the Engineer.

**Item 662, “Work Zone Pavement Markings”**

Place work zone pavement markings (flexible tabs) prior to the seal coat operation.

Dispose of tabs and paper in an approved trash receptacle. (Reference Standard **SW3P**, waste material)

Use traffic paint for non-removable work zone pavement markings.

**Item 666, “Retro reflectorized Pavement Markings”**

Provide a complete system of thermoplastic pavement markings at locations indicated on the plans and as directed by the engineer. The plans are intended to show typical conditions, which can be extended to similar conditions throughout this project as approved or directed.

Establish a true and correct alignment with a method approved by the Engineer. This work will be considered subsidiary.

Contractor is responsible for re-establishing location and alignment for new pavement markings matching pavement marking alignment prior to construction activities. This work will be considered subsidiary.

**Item 672, “Raised Pavement Markers”**

Provide a complete system of raised pavement markers at locations indicated on the plans and as directed by the engineer. The plans are intended to show typical conditions, which can be extended to similar conditions throughout this project as approved or directed.

Bituminous adhesive shall be used on this project.

**Item 677, “Eliminating Existing Pavement Markings and Markers”**

Remove the existing raised pavement markings (RPMs) and profile pavement markings as the work progresses, or as directed by the Engineer. Removal methods shall be approved by the Engineer. Properly dispose of materials removed. Removal of existing profile pavement markings will be paid for directly. Removal of RPMs will not be paid for directly but will be subsidiary to the pertinent bid items.

**Item 3077, “Superpave Mixtures”**

Furnish aggregate for final surfaces with a minimum surface aggregate classification of “B”.

**Project Number:** See Title Sheet  
**Control:** 0983-02-022  
**County:** FISHER  
**Highway:** FM 419

Provide an SP-D Fine Mixture with a minimum design VMA of 17.0% and a minimum plant-produced VMA of 16.5%.

Provide an SP-C Fine Mixture with a minimum design VMA of 16.0% and a minimum plant-produced VMA of 15.5%.

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

Provide the testing lab samples to calibrate the ignition oven no later than five (5) working days prior to mix design verification.

Meet the minimum Hamburg Wheel Test requirements shown below:

- PG 64 or lower – 5,000 passes
- PG 70 – 10,000 passes
- PG 76 – 20,000 passes

Paving operations will not be allowed to begin until TxDOT has tested and obtained passing Hamburg results on the trial batch.

A maximum of 0.50% anti-stripping agent will be allowed for each specified mix type.

Dilution of tack coat is not allowed.

Do not exceed a laydown width of 16' per pass.  
 Substitute Binders will not be allowed unless RAP or RAS is used in the production of the mixture.  
 RAS will not be allowed in surface mixes.

A warm mix additive will be required for hotmix hauls over 50 miles.

Unless otherwise directed by the engineer, a warm mix additive will be required when paving during November 1<sup>st</sup> through March 15<sup>th</sup>.  
 The maximum allowable dust / asphalt ratio that will be allowed is 0.6 to 1.2.

The use of a tapered longitudinal joint will be required for pavement thicker than 2 inches.

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

Provide PG 64-22 tack coat at a rate of 0.10 gal/sy.

**Project Number:** See Title Sheet  
**Control:** 0983-02-022  
**County:** FISHER  
**Highway:** FM 419

The Contractor will be required to tack 100% of the surfaces with uniform coverage prior to the subsequent lift. The type and grade of tack will be approved by the Engineer prior to use.

Tack all vertical joints unless otherwise directed.

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

Shoulders shall not be placed prior to adjoining main lanes.  
 Final surface of driveway shall not be placed prior to adjoining surface.

**Item 6185, “Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)”**

BASIS OF ESTIMATE FOR STATIONARY TMAs				
		TMA (Stationary)		
Phase	Standard	Required	Additional	TOTAL
	TCP(1-2)-18	1		1
Basis of Estimate for Mobile TMAs				
		TMA (Mobile)		
Phase	Standard	Required	Additional	TOTAL
	TCP(3-1)13	1		1
	TCP(3-3)-14			

The contractor will be responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMAs needed for the project. The Contractor must get approval from the Engineer for any changes in the number of TMA as shown in the plans.

If a TMA is used for both mobile and stationary traffic control on the same day, it will be paid for as stationary for that day.



CONTROLLING PROJECT ID 0983-02-022

DISTRICT Abilene  
HIGHWAY FM 419

# QUANTITY SHEET

COUNTY Fisher

CONTROL SECTION JOB				0983-02-022		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00045610			
COUNTY				Fisher			
HIGHWAY				FM 419			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	100-6002	PREPARING ROW	STA	5.000		5.000	
	104-6009	REMOVING CONC (RIPRAP)	SY	180.000		180.000	
	105-6075	REMOV STAB BASE AND ASPH PAV (10"-18")	SY	1,144.000		1,144.000	
	110-6004	EXCAVATION (ROADWAY AND CHANNEL)	CY	347.000		347.000	
	132-6004	EMBANKMENT (FINAL)(DENS CONT)(TY B)	CY	397.000		397.000	
	164-6023	CELL FBR MLCH SEED(PERM)(RURAL)(CLAY)	SY	355.000		355.000	
	168-6001	VEGETATIVE WATERING	MG	9.000		9.000	
	169-6002	SOIL RETENTION BLANKETS (CL 1) (TY B)	SY	355.000		355.000	
	247-6304	FL BS (CMP IN PLACE) (TY D GR 1-2)(10")	SY	1,753.000		1,753.000	
	310-6009	PRIME COAT (MC-30)	GAL	351.000		351.000	
	316-6001	ASPH (MULTI OPTION)	GAL	736.000		736.000	
	316-6222	AGGR(TY-PB GR-3 SAC-B)	CY	14.000		14.000	
	400-6005	CEM STABIL BKFL	CY	120.000		120.000	
	403-6001	TEMPORARY SPL SHORING	SF	682.000		682.000	
	416-6004	DRILL SHAFT (36 IN)	LF	290.000		290.000	
	420-6014	CL C CONC (ABUT)(HPC)	CY	46.200		46.200	
	422-6002	REINF CONC SLAB (HPC)	SF	2,860.000		2,860.000	
	422-6016	APPROACH SLAB (HPC)	CY	67.400		67.400	
	423-6003	RETAINING WALL (TEMP WALL)	SF	508.000		508.000	
	423-6005	RETAINING WALL (SPREAD FOOTING)	SF	1,342.000		1,342.000	
	425-6035	PRESTR CONC GIRDER (TX28)	LF	451.500		451.500	
	427-6004	SILICONE RESIN PAINT FINISH	SF	382.000		382.000	
	432-6010	RIPRAP (CONC)(CL B)(5 IN)	CY	146.600		146.600	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	35.000		35.000	
	450-6007	RAIL (TY T223)(HPC)	LF	162.000		162.000	
	454-6004	ARMOR JOINT (SEALED)	LF	80.000		80.000	
	496-6009	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	EA	1.000		1.000	
	496-6043	REMOV STR (SMALL FENCE)	LF	467.000		467.000	
	500-6001	MOBILIZATION	LS	100.00%		100.00%	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	11.000		11.000	
	506-6001	ROCK FILTER DAMS (INSTALL) (TY 1)	LF	80.000		80.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	80.000		80.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	162.000		162.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	162.000		162.000	
	508-6001	CONSTRUCTING DETOURS	SY	75.000		75.000	
	510-6003	ONE-WAY TRAF CONT (PORT TRAF SIG)	MO	11.000		11.000	
	512-6001	PORT CTB (FUR & INST)(SGL SLOPE)(TY 1)	LF	1,120.000		1,120.000	

DISTRICT	COUNTY	CCSJ	SHEET
Abilene	Fisher	0983-02-022	6



CONTROLLING PROJECT ID 0983-02-022

DISTRICT Abilene  
HIGHWAY FM 419

COUNTY Fisher

# QUANTITY SHEET

CONTROL SECTION JOB				0983-02-022		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00045610			
COUNTY				Fisher			
HIGHWAY				FM 419			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	512-6037	PORT CTB (STKPL)(SGL SLP)(TY 1)	LF	1,120.000		1,120.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	100.000		100.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	4.000		4.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	100.000		100.000	
	542-6004	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	EA	4.000		4.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	4.000		4.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	4.000		4.000	
	545-6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	2.000		2.000	
	545-6004	CRASH CUSH ATTEN (STKPL)	EA	2.000		2.000	
	545-6018	CRASH CUSH ATTEN (INSTL)(S)(N)(TL2)	EA	2.000		2.000	
	552-6003	WIRE FENCE (TY C)	LF	963.000		963.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	1.000		1.000	
	644-6030	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA	2.000		2.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	4.000		4.000	
	658-6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	EA	18.000		18.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	8.000		8.000	
	662-6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	2,424.000		2,424.000	
	662-6050	WK ZN PAV MRK REMOV (REFL) TY II-A-A	EA	52.000		52.000	
	662-6075	WK ZN PAV MRK REMOV (W)24"(SLD)	LF	24.000		24.000	
	662-6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	1,920.000		1,920.000	
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	EA	244.000		244.000	
	666-6303	RE PM W/RET REQ TY I (W)4"(SLD)(100MIL)	LF	1,010.000		1,010.000	
	666-6315	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)	LF	1,010.000		1,010.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	27.000		27.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF	3,248.000		3,248.000	
	740-6005	ANTI - GRAFFITI COATNG(PERMNENT-TY III)	SF	821.000		821.000	
	3077-6003	SP MIXESSP-BSAC-B PG64-22	TON	289.000		289.000	
	3077-6053	SP MIXESSP-DSAC-B PG70-22	TON	145.000		145.000	
	3077-6075	TACK COAT	GAL	175.000		175.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2.000		2.000	
	6185-6002	TMA (STATIONARY)	DAY	10.000		10.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	10.000		10.000	
08		EROSION CONTROL MAINTENANCE (NON-PART)	LS	1.000		1.000	
		SAFETY CONTINGENCY (NON-PART)	LS	1.000		1.000	

DISTRICT	COUNTY	CCSJ	SHEET
Abilene	Fisher	0983-02-022	6A

3/29/2021

SUMMARY OF REMOVAL ITEMS								
LOCATION	104 6009	105 6075	496 6009	496 6043	542 6001	542 6004	544 6003	644 6076
	REMOVING CONC (RIPRAP)	REMOV STAB BASE AND ASPH PAV (10"-18")	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	REMOV STR (SMALL FENCE)	REMOVE METAL BEAM GUARD FENCE	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	GUARDRAIL END TREATMENT (REMOVE)	REMOVE SM RD SN SUP&AM
	SY	SY	EA	LF	LF	EA	EA	EA
0983-02-022 (FM 419)	180	1144	1	467	100	4	4	4
PROJECT TOTALS	180	1144	1	467	100	4	4	4

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS								
LOCATION	423 6003	508 6001	510 6003	512 6001	512 6037	545 6018	545 6003	545 6004
	RETAINING WALL (TEMP WALL)	CONSTRUCTING DETOURS	ONE-WAY TRAF CONT (PORT TRAF SIG) (COUNTDOWN DISPLAY)	PORT CTB (FUR & INST) (SGL SLOPE) (TY 1)	PORT CTB (STKPL) (SGL SLP) (TY 1)	CRASH CUSH ATTEN (INSL) (S) (N) (TL2)	CRASH CUSH ATTEN (MOVE & RESET)	CRASH CUSH ATTEN (STKPL)
	SF	SY	MO	LF	LF	EA	EA	EA
0983-02-022 (FM 419)			11					
PHASE 1	508			560	560	2		
PHASE 2		75		560	560		2	2
PROJECT TOTALS	508	75	11	1120	1120	2	2	2

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS										
LOCATION	658 6014 ①	662 6050	662 6004	662 6075	662 6095	662 6111	677 6001	6001 6002	6185 6002	6185 6005
	INSL DEL ASSM (D-SW) SZ (BRF) CTB (BI)	WK ZN PAV MRK REMOV (REFL) TY II-A-A	WK ZN PAV MRK NON-REMOV (W) 4" (SLD)	WK ZN PAV MRK REMOV (W) 24" (SLD)	WK ZN PAV MRK REMOV (Y) 4" (SLD)	WK ZN PAV MRK SHT TERM (TAB) TY Y-2	ELIM EXT PAV MRK & MRKS (4")	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
	EA	EA	LF	LF	LF	EA	LF	EA	DAY	DAY
0983-02-022 (FM 419)								2	10	10
PHASE 1	6	52	1210	24	1920	122	1810			
PHASE 2	6		1214			122	1438			
PROJECT TOTALS	12	52	2424	24	1920	244	3248	2	10	10

① SEE SUMMARY OF SIGNING ITEMS FOR ADDITIONAL QUANTITIES.

SUMMARY OF RETAINING WALL ITEMS		
LOCATION	423 6005	740 6005
	RETAINING WALL (SPREAD FOOTING)	ANTI - GRAFFITI COATNG (PERMNT-TY III)
	SF	SF
0983-02-022 (FM 419)		
RW01	508	313
RW02	507	318
RW03	327	190
PROJECT TOTALS	1342	821

NO.	DATE	REVISION	APPROVED
		12222 Merit Dr Suite 400 Dallas, TEXAS 75251 P 972-991-0011 F 214-468-8266 Firm # F-6324	
			
SUMMARY OF QUANTITIES  FM 419 AT EAST COTTONWOOD CREEK			
SHEET 1 OF 3			
DESIGN KW	FED RD DIV NO 6	FEDERAL AID PROJECT NO.	HIGHWAY NO
GRAPHICS KW	STATE	SEE TITLE SHEET	FM 419
CHECK BP	TEXAS	ABL	FISHER
CHECK KW	CONTROL	SECTION	JOB
	0983	02	022
			7

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3/28/2021

SUMMARY OF ROADWAY ITEMS							
LOCATION	100 6002	247 6304	432 6045	540 6001	540 6006	544 6001	552 6003
	PREPARING ROW	FL BS (CMP IN PLACE) (TY D GR 1-2) (10")	RIPRAP (MOW STRIP) (4 IN)	MTL W-BEAM GD FEN (TIM POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	GUARDRAIL END TREATMENT (INSTALL)	WIRE FENCE (TY C)
	STA	SY	CY	LF	EA	EA	LF
0983-02-022 (FM 419)	5	1753	35	100	4	4	963
PROJECT TOTALS	5	1753	35	100	4	4	963

SUMMARY OF ASPHALT SURFACE AREAS												
LOCATION	STATION	TO	STATION	LENGTH	WIDTH	AREA	310 *	316 *	316 *	3077*	3077*	3077*
							PRIME COAT (MC-30)	ASPH (MUL TI OPTION)	AGGR (TY-PB GR-3 SAC-B)	SP MIXES SP-B SAC-B PG 64-22	SP MIXES SP-D SAC-B PG 70-22	TACK COAT
				FT	FT	SY	SY	SY	SY	SY	SY	SY
FM 419	396+00.00		396+60.00	60	33.5	223	223	223	223	223	223	223
	396+60.00		397+39.00	79	42	369	369	369	369	369	369	369
	BRIDGE											
	398+44.00		400+45.00	201	42	938	938	938	938	938	938	938
	400+45.00		401+05.00	60	33.5	223	223	223	223	223	223	223
PROJECT TOTAL						1753	1753	1753	1753	1753	1753	1753

BASIS OF ESTIMATE					
ITEM	DESCRIPTION	RATE	AREA	QUANTITY	UNIT
310-6009	PRIME COAT (MC-30)	0.20 GAL/SY	1753	351	GAL
316-6001	ASPH (MULTI OPTION)	0.42 GAL/SY	1753	736	GAL
316-6222	AGGR (TY-PB GR-3 SAC-B)	1 CY/125 SY	1753	14	CY
3077-6003	SP MIXES SP-B SAC-B PG 64-22	330 LB/SY/2000	1753	289	TON
3077-6053	SP MIXES SP-D SAC-B PG 70-22	165 LB/SY/2000	1753	145	TON
3077-6075	TACK COAT	0.10 GAL/SY	1753	175	GAL

\* FOR CONTRACTOR INFORMATION ONLY. SEE BASIS OF ESTIMATES FOR BID ITEMS

SUMMARY OF SIGNING ITEMS				
LOCATION	644 6004	644 6030	658 6014 ①	658 6062
	IN SM RD SN SUP&AM TY10BWG (1) SA (T)	IN SM RD SN SUP&AM TYS80 (1) SA (T)	IN STL DEL ASSM (D-SW) SZ (BRF) CTB (BI)	IN STL DEL ASSM (D-SW) SZ 1 (BRF) GF2 (BI)
	EA	EA	EA	EA
0983-02-022 (FM 419)	1	2	6	8
PROJECT TOTALS	1	2	6	8

① SEE SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS FOR ADDITIONAL QUANTITIES.

SUMMARY OF EARTHWORK QUANTITIES				
STATION	110-6004		132-6004	
	EXCAVATION (ROADWAY AND CHANNEL)		EMBANKMENT (FINAL) (DENS CONT) (TY B)	
	END AREA	VOLUME	END AREA	VOLUME
	SY	CY	SY	CY
396+00.00	0		4.9	
396+25.00	0.6	3	8	54
396+50.00	1.4	8	7.8	66
396+75.00	2	14	2.6	43
397+00.00	2.2	18	1.4	17
397+25.00	1.9	17	2.1	15
397+50.00	1.9	16	2.8	20
397+59.00	1.5	5	4.8	11
BRIDGE		190		
398+24.00	0.6		15.3	
398+50.00	1	7	7.6	99
398+75.00	1.3	10	3.2	45
399+00.00	1.3	11	0.3	15
399+25.00	1.3	11	0.4	3
399+50.00	1.6	12	0.2	3
399+75.00	1.7	14	0.4	3
400+00.00	0.9	11	0.2	3
CSJ 0983-02-022 (FM 419) TOTAL		347		397

SUMMARY OF PAVEMENT MARKING ITEMS			
LOCATION	666 6303	666 6315	672 6009
	RE PM W/RET REQ TY I (W) 4" (SLD) (100MIL)	RE PM W/RET REQ TY I (Y) 4" (SLD) (100MIL)	REFL PAV MRKR TY II-A-A
	LF	LF	EA
0983-02-022 (FM 419)	1010	1010	27
PROJECT TOTALS	1010	1010	27

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			12222 Merit Dr Suite 400 Dallas, TEXAS 75251 P 972-991-0011 F 214-468-8266 Firm # F-6324
			
SUMMARY OF QUANTITIES  FM 419 AT EAST COTTONWOOD CREEK			
SHEET 2 OF 3			
DESIGN KW	FED RD DIV NO 6	FEDERAL AID PROJECT NO. SEE TITLE SHEET	HIGHWAY NO FM 419
GRAPHICS KW	STATE TEXAS	DISTRICT ABL	COUNTY FISHER
CHECK BP	CONTROL 0983	SECTION 02	JOB 022
CHECK KW			8

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SUMMARY OF BRIDGES

CSJ	PLAN PROFILE SHEET	BRIDGE NBI #		DESIGN		BRIDGE LOCATION	STATION		LENGTH	CLEAR RDWY WIDTH	LOADING	0400 6005	0403 6001	0416 6004	0420 6014
		EXISTING	PROPOSED	EXISTING	PROPOSED		BEGIN	END				FT	FT	CY	SF
0983-02-022	67	08-077-0-0983-02-007	08-077-0-0983-02-019	H-10	HL-93	FM 419 AT EAST COTTONWOOD CREEK	397+59	398+24	65'	42'	HL-93	120	682	290	46.2
														①	②

- ① PROVIDE SULFATE RESISTANT CONCRETE
- ② INCLUDES SHEAR KEY QUANTITY
- ③ USE RR8 RIPRAP, SEE STANDARD DRAWING CRR

SUMMARY OF BRIDGES CONTINUED

0422 6002 REINF CONC SLAB (HPC)	0422 6016 APPROACH SLAB (HPC)	0425 6035 PRESTR CONC GIRDER (TX28)	0427 6004 SILICONE RESIN PAINT FINISH	0432 6010 RIPRAP (CONC) (CL B) (5 IN)	0450 6007 RAIL (TY T223) (HPC)	0454 6004 ARMOR JOINT (SEALED)
SF	CY	LF	SF	CY	LF	LF
2860	67.4	451.50	382	146.6	162	80
				③		

SUMMARY OF EROSION CONTROL ITEMS

LOCATION	164	168	169	506	506	506	506
	6023	6001	6002	6001	6011	6038	6039
	CELL FBR MLCH SEED (PERM) (RURAL) (CLAY)	VEGETATIVE WATERING	SOIL RETENTION BLANKETS (CL 1) (TY B)	ROCK FILTER DAMS (INSTALL) (TY 1)	ROCK FILTER DAMS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)
	SY	MG	SY	LF	LF	LF	LF
0983-02-022 (FM 419)	355	9	355	80	80	162	162
PROJECT TOTALS	355	9	355	80	80	162	162

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		12222 Merit Dr Suite 400 Dallas, TEXAS 75251 P 972-991-0011 F 214-468-8266 Firm # F-6324	
			
SUMMARY OF QUANTITIES  FM 419 AT EAST COTTONWOOD CREEK			
SHEET 3 OF 3			
DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.	HIGHWAY NO
GRAPHICS	6	SEE TITLE SHEET	FM 419
CHECK	STATE	DISTRICT	COUNTY
CHECK	TEXAS	ABL	FISHER
CHECK	CONTROL	SECTION	JOB
	0983	02	022
			9

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# FM 419 TRAFFIC CONTROL NARRATIVE

## GENERAL NOTES

1. ACCESS TO ALL DRIVEWAYS AND INTERSECTIONS SHALL BE MAINTAINED AT ALL TIMES.
2. CONTRACTOR SHALL HAVE A SUFFICIENT AMOUNT OF TRAFFIC CONTROL DEVICES IN CLEAN AND ACCEPTABLE CONDITION TO REPLACE ANY DAMAGED TRAFFIC CONTROL DEVICE WITHIN 24 HOURS OF NOTIFICATION.
3. PROVIDE ADDITIONAL SIGNS AND BARRICADES AS NECESSARY TO ADDRESS FIELD CONSTRUCTIBILITY & VISIBILITY. THESE ADDITIONAL SIGNS AND BARRICADES WILL BE CONSIDERED SUBSIDIARY TO ITEM 502.
4. TWO (2) TOTAL SHADOW VEHICLES WITH TMA WILL BE REQUIRED FOR THIS PROJECT. THE CONTRACTOR MUST GET APPROVAL FROM THE ENGINEER FOR ANY CHANGES IN THE NUMBER OF TMA AS SHOWN IN THE PLANS.

## SEQUENCE OF CONSTRUCTION (UNLESS OTHERWISE APPROVED)

### PHASE 1:

1. INSTALL BARRICADES WITH REFLECTORS AND ADVANCED WARNING SIGNS, PCMS, PORTABLE TRAFFIC SIGNALS AND OTHER TRAFFIC CONTROL APPURTENANCES AS SHOWN ON THE PLANS. INSTALL SEDIMENT CONTROL DEVICES IN ACCORDANCE WITH SW3P PLANS.
2. SHIFT TRAFFIC TO ONE-LANE, TWO WAY TRAFFIC OPERATIONS ON NORTHBOUND TRAVEL LANE USING A TEMPORARY TRAFFIC SIGNAL.
3. CONSTRUCT SOUTHBOUND PORTION OF BRIDGE AND ROADWAY.  
PLACE 10" FLEX BASE, PRIME COAT AND 3" SP-B PAVEMENT SURFACE.
4. CONSTRUCT TEMPORARY PAVEMENT.

### PHASE 2:

1. INSTALL BARRICADES WITH REFLECTORS AND ADVANCED WARNING SIGNS, PCMS, PORTABLE TRAFFIC SIGNALS AND OTHER TRAFFIC CONTROL APPURTENANCES AS SHOWN ON THE PLANS. NEW CSB AND CRASH CUSHIONS WILL NEED TO BE PLACED BEFORE OLD CSB CAN BE SAFELY REMOVED.
2. SHIFT TRAFFIC TO THE NEWLY CONSTRUCTED SOUTHBOUND PAVEMENT AND BRIDGE WITH ONE-LANE, TWO WAY TRAFFIC OPERATIONS USING A TEMPORARY TRAFFIC SIGNAL.
3. CONSTRUCT NORTHBOUND PORTION OF BRIDGE AND ROADWAY.  
PLACE 10" FLEX BASE, PRIME COAT AND 3" SP-B PAVEMENT SURFACE.

### PHASE 3:

1. PLACE FINAL 1.5" SP-D PAVEMENT SURFACE OVER ENTIRE ROADWAY.
2. REMOVE BARRICADES, PCMS AND PORTABLE TRAFFIC SIGNALS. REMOVE TEMP WIRE FENCE.
3. PLACE PERMANENT PAVEMENT MARKINGS ACCORDING TO THE PLANS.
4. OPEN ROADWAY AND BRIDGE TO TRAFFIC.



*Kari Ward*

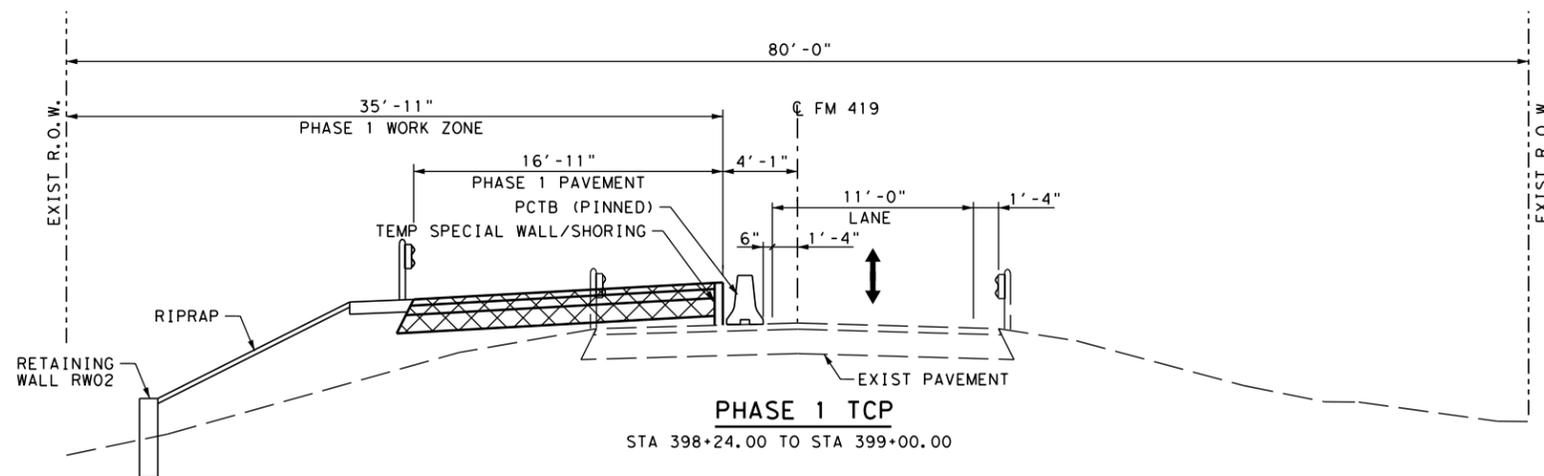
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<b>TRAFFIC CONTROL PLAN NARRATIVE</b>			
FM 419 AT EAST COTTONWOOD CREEK			
SHEET 1 OF 1			
DESIGN KW	FED RD DIV NO 6	FEDERAL AID PROJECT NO.	
GRAPHICS JU	STATE	DISTRICT	HIGHWAY NO FM 419
CHECK JW	TEXAS	ABL	COUNTY SHEET NO
CHECK KW	0983	CONTROL SECTION 02	FISHER JOB 022
			10

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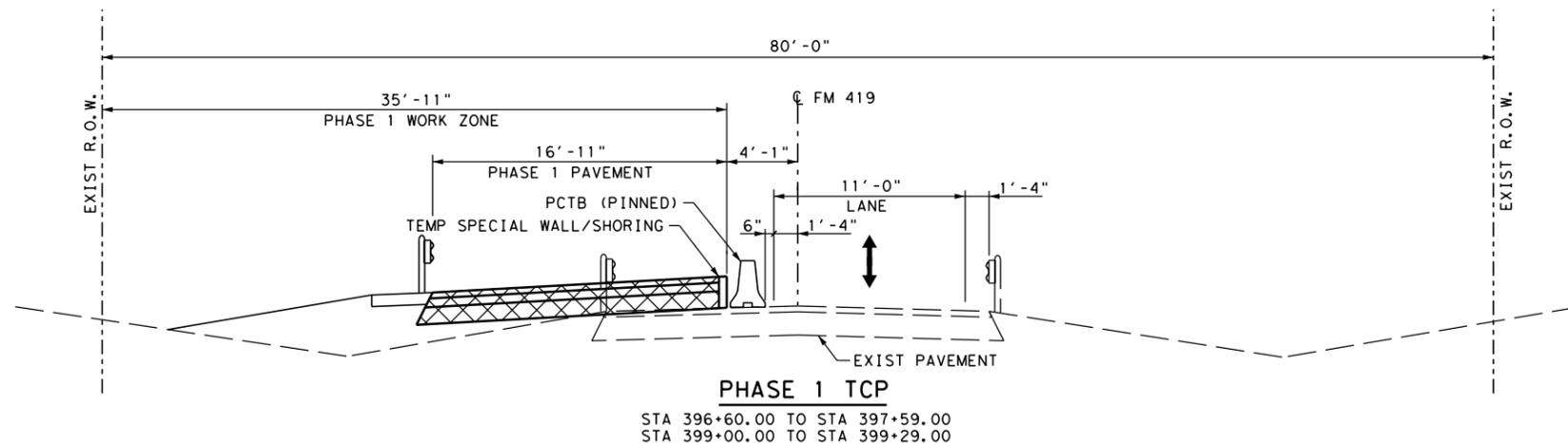
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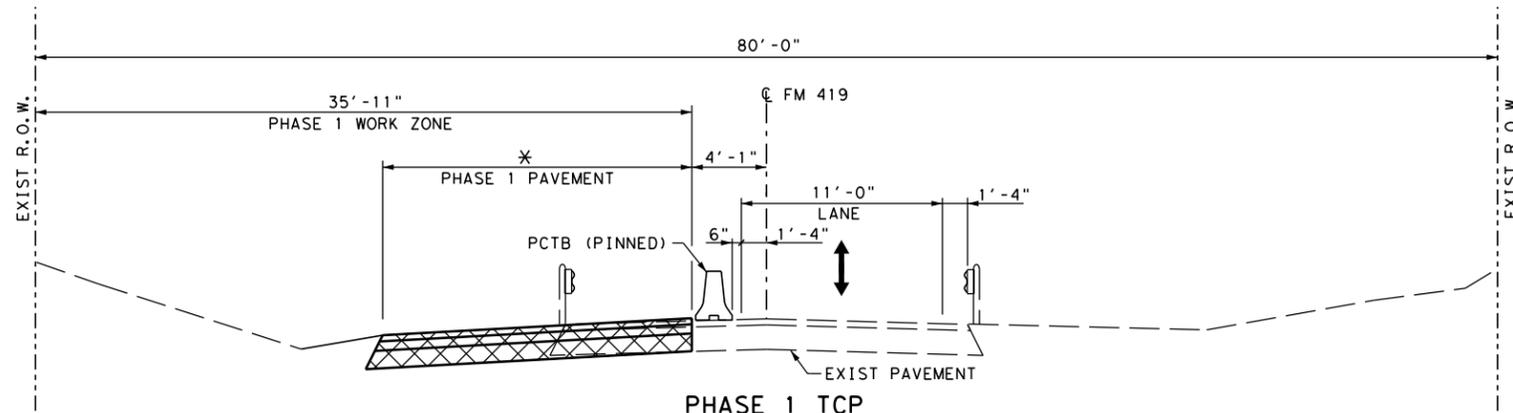


**PHASE 1 TCP**  
STA 398+24.00 TO STA 399+00.00

**PHASE 1 TCP AT BRIDGE**  
STA 397+59.00 TO STA 398+24.00  
SEE BRIDGE CONSTRUCTION STAGING AND TYPICAL SECTIONS



**PHASE 1 TCP**  
STA 396+60.00 TO STA 397+59.00  
STA 399+00.00 TO STA 399+29.00



**PHASE 1 TCP**  
STA 400+45.00 TO STA 401+05.00

- \* VARIES 6'-11" TO 16'-11"  
STA 396+00.00 TO STA 396+60.00
- \* USUAL 16'-11"  
STA 399+29.00 TO STA 400+45.00
- \* VARIES 16'-11" TO 6'-11"  
STA 400+45.00 TO STA 401+05.00

**TRAFFIC CONTROL PLAN LEGEND**

-  PAVEMENT BUILT THIS PHASE
-  PAVEMENT BUILT PREVIOUS PHASE
-  PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)
-  TRAFFIC ARROW

- NOTES:
1. REFER TO ROADWAYS PLANS FOR ROADWAY DETAILS.
  2. REFER TO BRIDGE PLANS FOR BRIDGE DETAILS.
  3. REFER TO SIGNING AND PAVEMENT MARKINGS PLANS. FOR FINAL SIGNING AND PAVEMENT MARKINGS
  4. REFER TO RETAINING WALL PLANS FOR RETAINING WALLS.

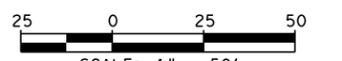
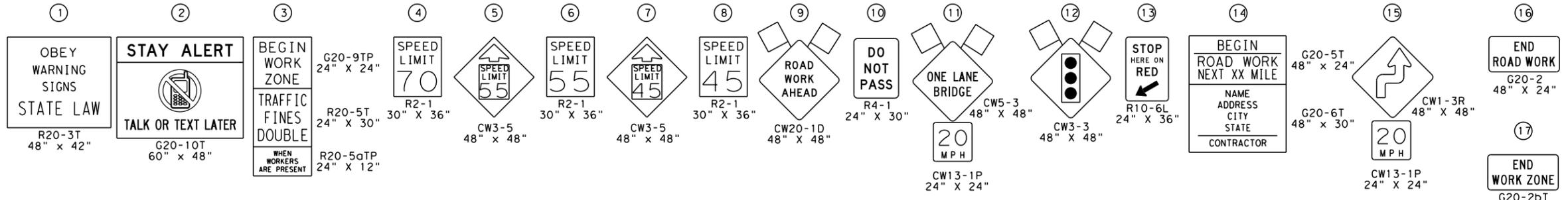


*Kari Ward*

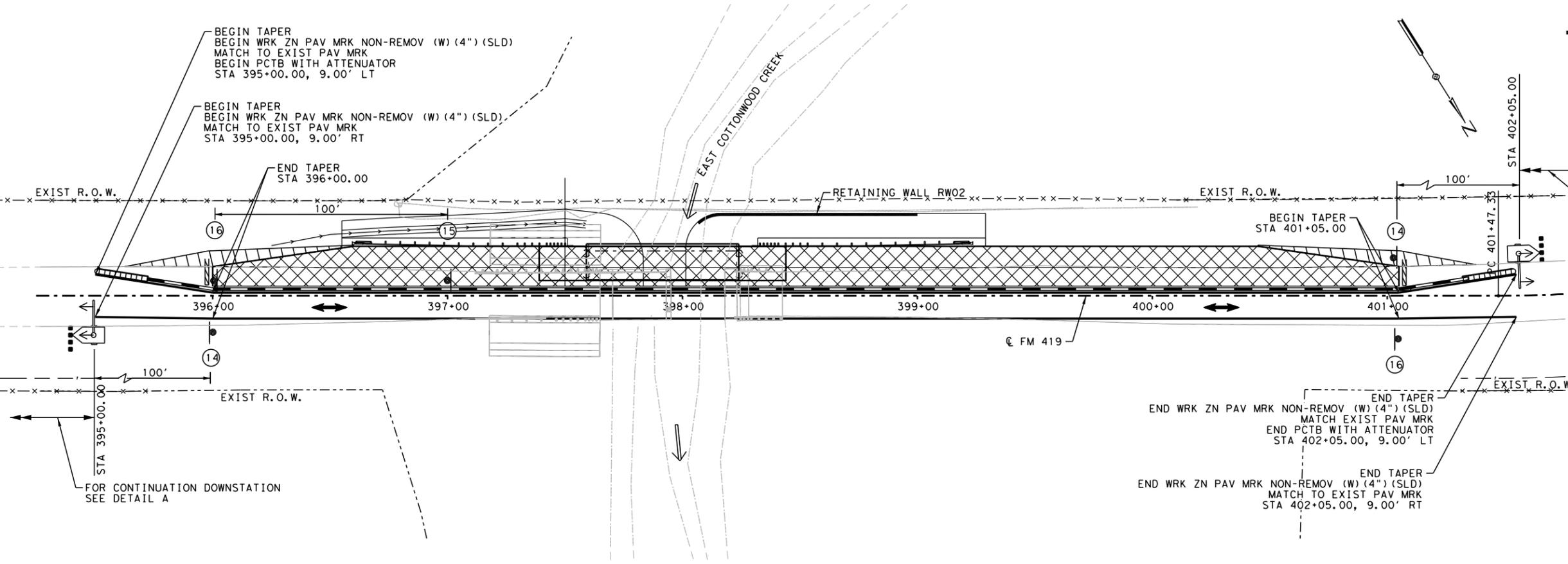
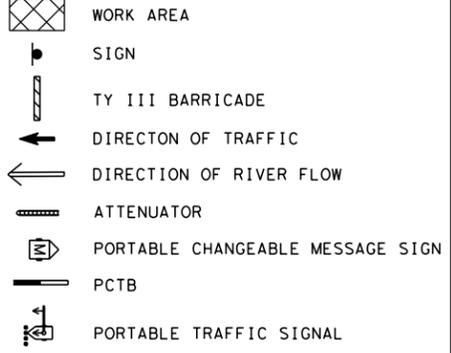
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<b>TRAFFIC CONTROL PLAN</b> <b>TYPICAL SECTIONS PHASE 1</b> FM 419 AT EAST COTTONWOOD CREEK			
SHEET 1 OF 1			
DESIGN KW	FED RD DIV NO 6	FEDERAL AID PROJECT NO. SEE TITLE SHEET	HIGHWAY NO FM 419
GRAPHICS JU	STATE TEXAS	DISTRICT ABL	COUNTY FISHER
CHECK JW	CONTROL	SECTION 02	JOB 022
CHECK KW	0983	02	022
			<b>11</b>

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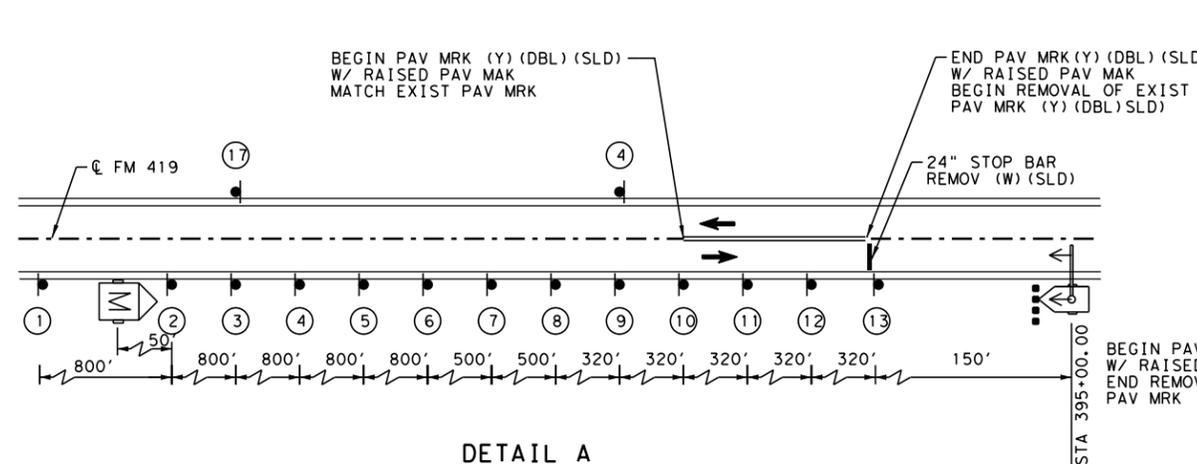
TRAFFIC CONTROL PLAN LEGEND



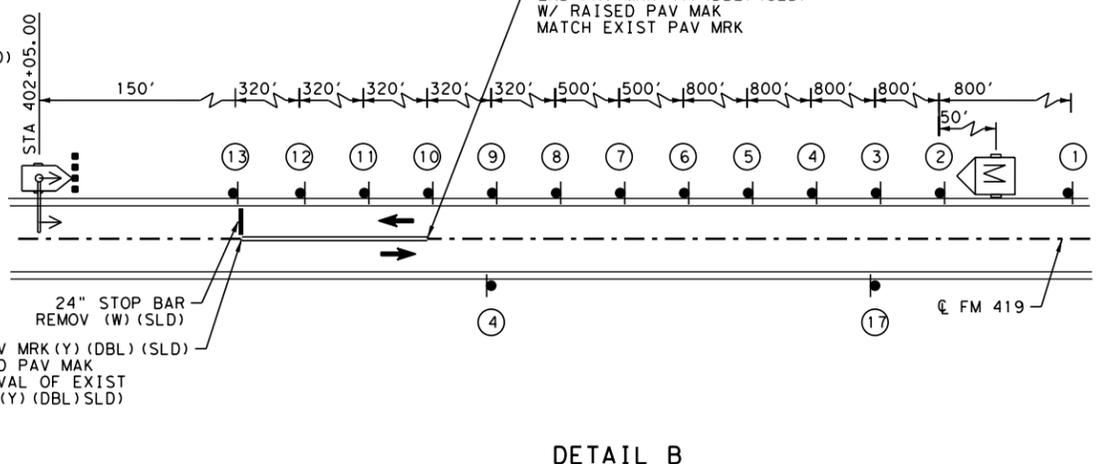
- NOTE:
1. TCP DEVICES AND SIGNS SHALL BE PLACED IN ACCORDANCE WITH APPLICABLE BC AND TCP STANDARDS.
  2. EXISTING UTILITIES ARE BASED ON THE BEST AVAILABLE INFORMATION. CONTRACTOR TO FIELD VERIFY UTILITY LOCATIONS PRIOR TO CONSTRUCTION.
  3. TMA LOCATION SHALL BE APPROVED BY THE ENGINEER.



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DETAIL A  
NTS



DETAIL B  
NTS

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Firm # F-6324

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TRAFFIC CONTROL PLAN  
PHASE 1

FM 419 AT EAST COTTONWOOD CREEK

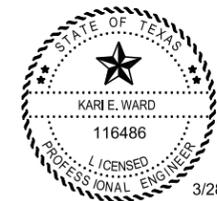
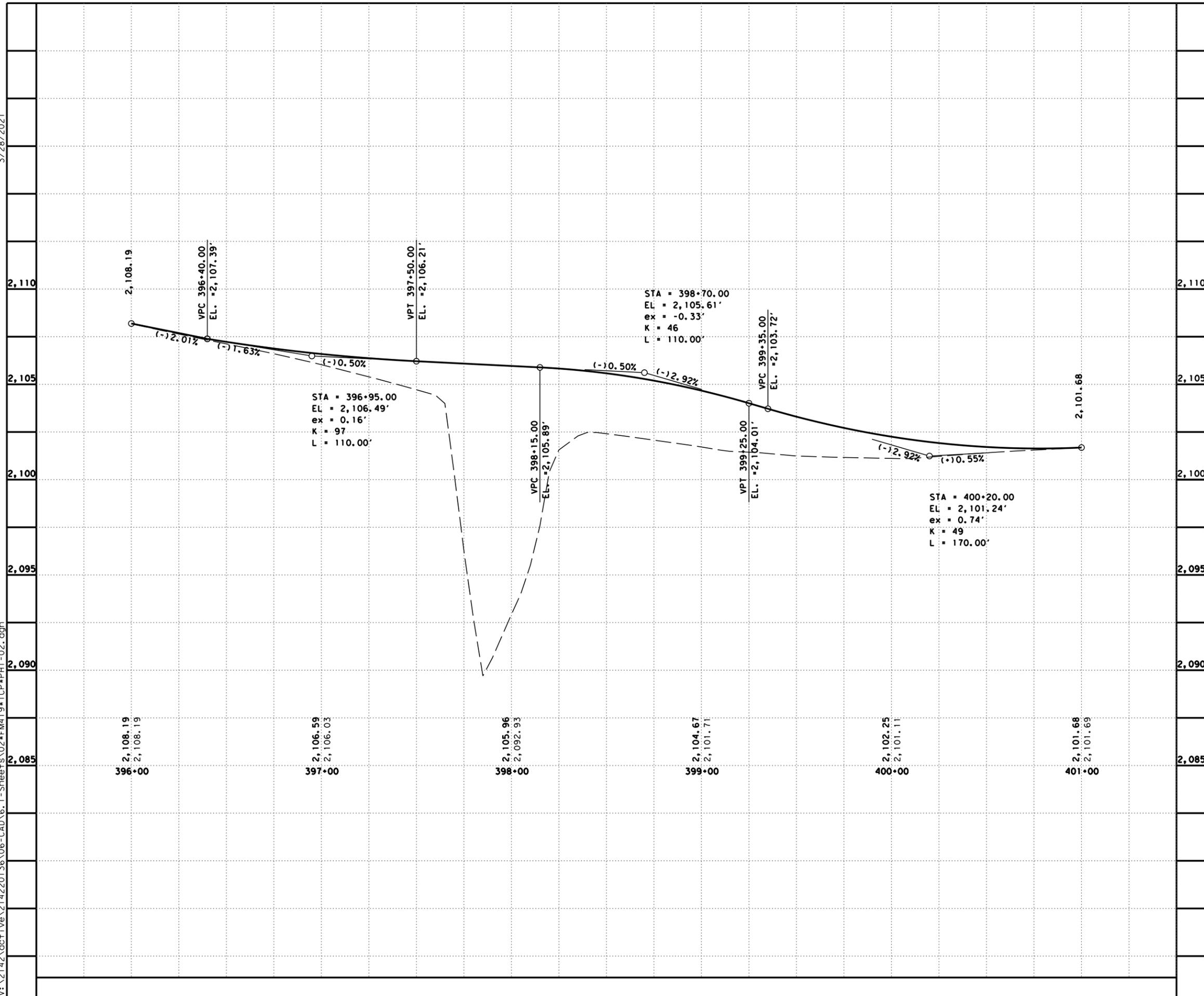
SCALE: 1"=50' SHEET 1 OF 1

DESIGN KW	FED RD DIV NO 6	FEDERAL AID PROJECT NO. SEE TITLE SHEET	HIGHWAY NO FM 419
GRAPHICS JU	STATE TEXAS	DISTRICT ABL	COUNTY FISHER
CHECK JW	CONTROL	SECTION	JOB
CHECK KW	0983	02	022

12

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**TRAFFIC CONTROL PLAN  
 PHASE 1 TEMP PROFILE**

FM 419 AT EAST COTTONWOOD CREEK

SCALE: 1"=50' SHEET 1 OF 1

DESIGN KW	FED RD DIV NO 6	FEDERAL AID PROJECT NO.		HIGHWAY NO FM 419
GRAPHICS JU	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JW	TEXAS	ABL	FISHER	13
CHECK KW	CONTROL	SECTION	JOB	
	0983	02	022	

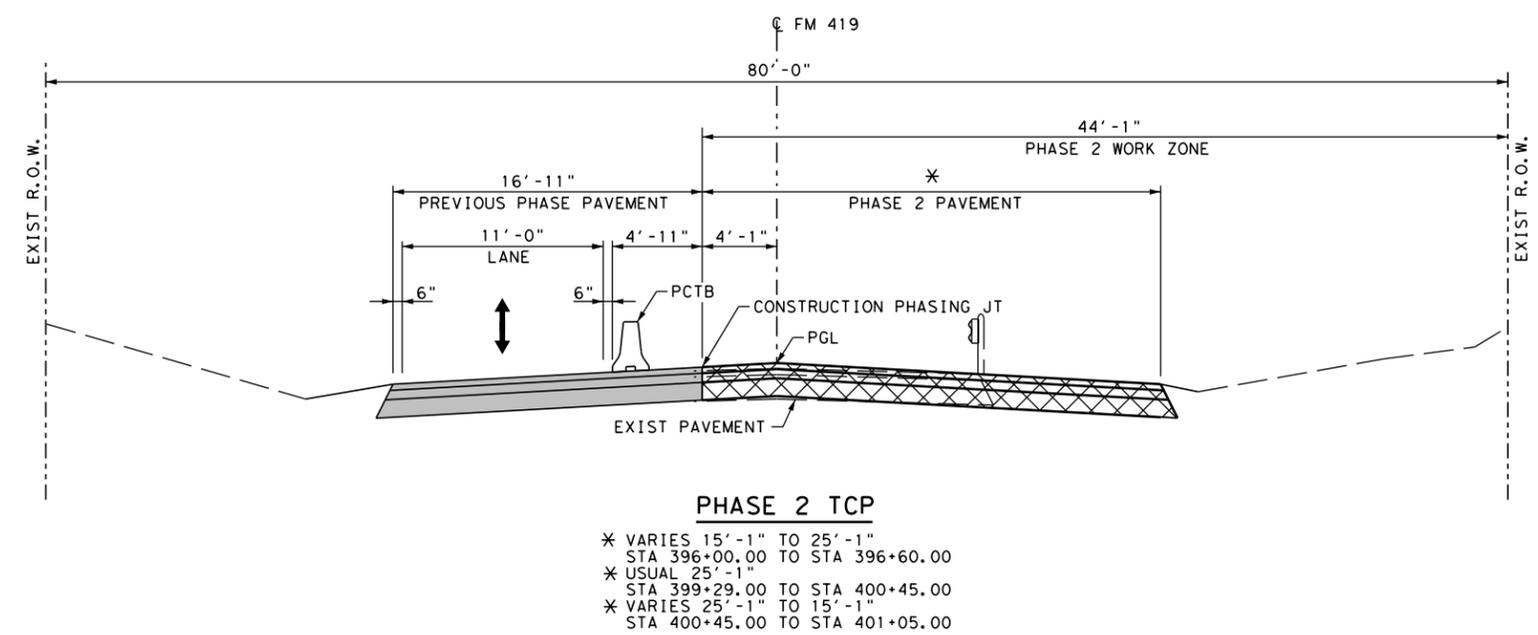
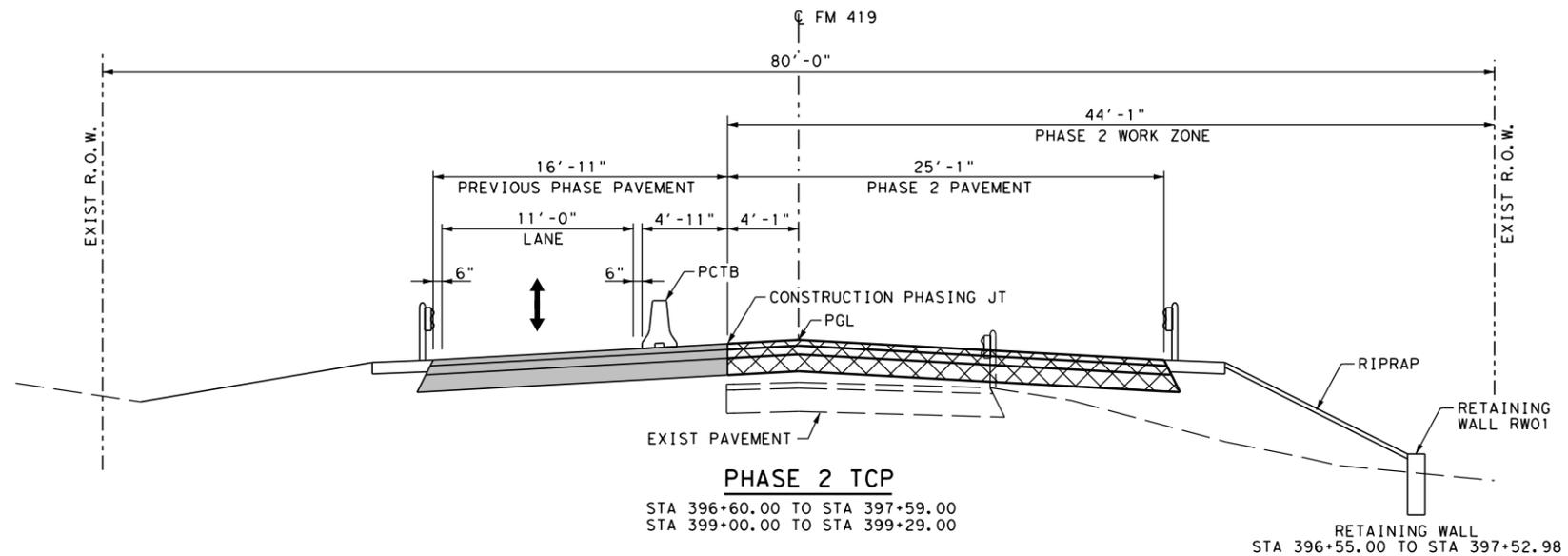
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**TRAFFIC CONTROL PLAN LEGEND**

-  PAVEMENT BUILT THIS PHASE
-  PAVEMENT BUILT PREVIOUS PHASE
-  PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)
-  TRAFFIC ARROW

- NOTES:
1. REFER TO ROADWAYS PLANS FOR ROADWAY DETAILS.
  2. REFER TO BRIDGE PLANS FOR BRIDGE DETAILS.
  3. REFER TO SIGNING AND PAVEMENT MARKINGS PLANS. FOR FINAL SIGNING AND PAVEMENT MARKINGS
  4. REFER TO RETAINING WALL PLANS FOR RETAINING WALLS.



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<b>TRAFFIC CONTROL PLAN</b> <b>TYPICAL SECTIONS PHASE 2</b> FM 419 AT EAST COTTONWOOD CREEK			
SHEET 1 OF 2			
DESIGN KW	FED RD DIV NO 6	FEDERAL AID PROJECT NO. SEE TITLE SHEET	HIGHWAY NO FM 419
GRAPHICS JU	STATE	DISTRICT	COUNTY
CHECK JW	TEXAS	ABL	FISHER
CHECK KW	CONTROL	SECTION	JOB
	0983	02	022
			<b>14</b>

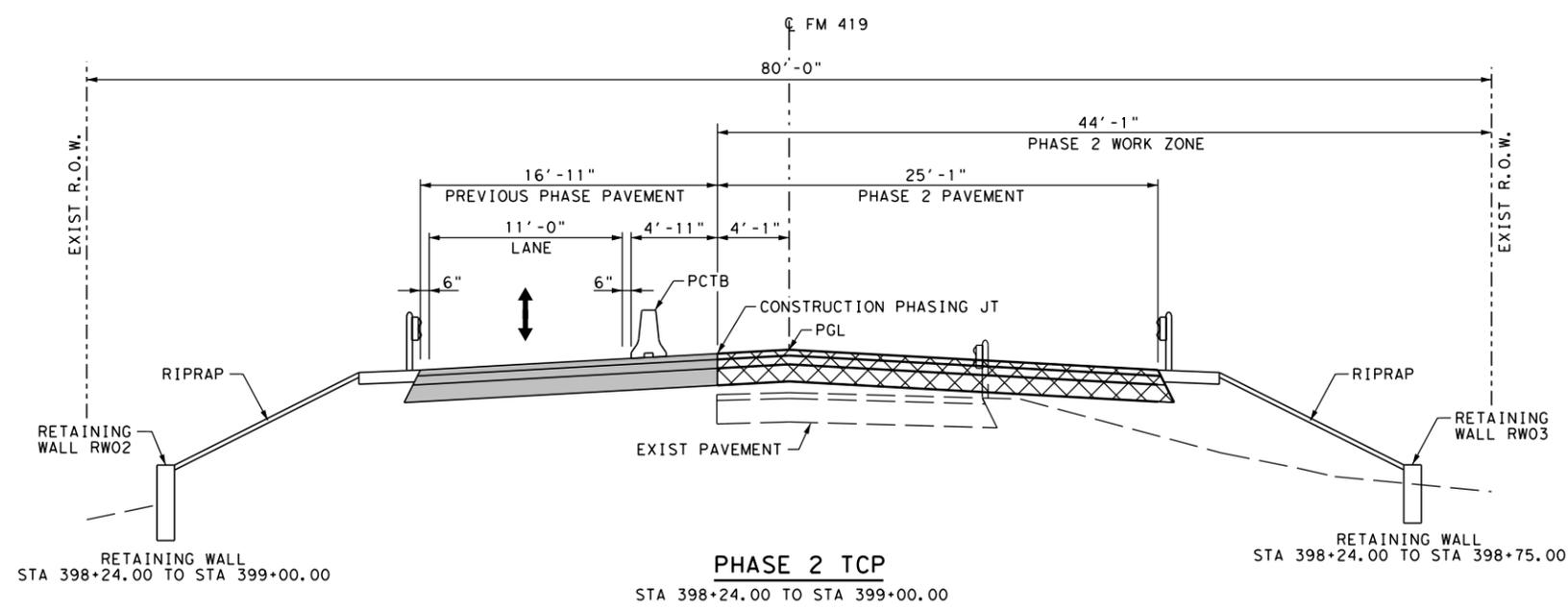
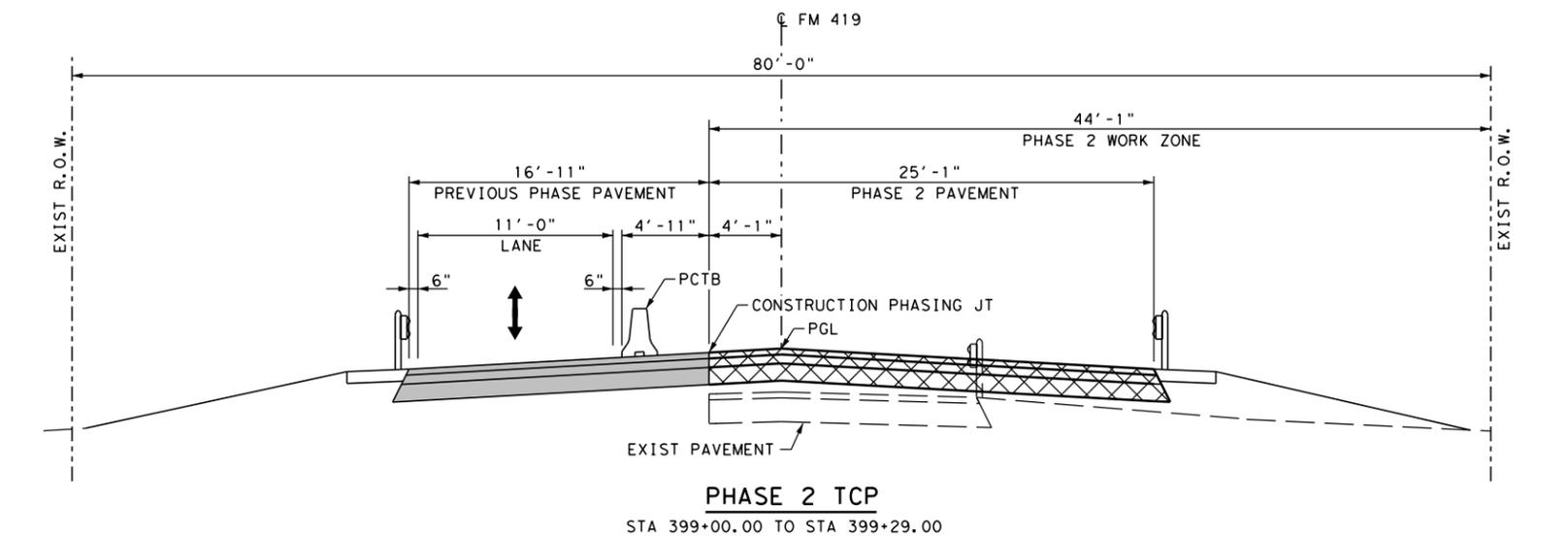
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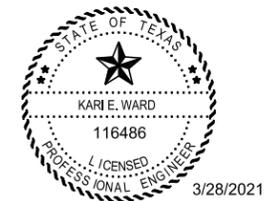
**TRAFFIC CONTROL PLAN LEGEND**

-  PAVEMENT BUILT THIS PHASE
-  PAVEMENT BUILT PREVIOUS PHASE
-  PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)
-  TRAFFIC ARROW

- NOTES:
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  2. REFER TO BRIDGE PLANS FOR BRIDGE DETAILS.
  3. REFER TO SIGNING AND PAVEMENT MARKINGS PLANS FOR FINAL SIGNING AND PAVEMENT MARKINGS
  4. REFER TO RETAINING WALL PLANS FOR RETAINING WALLS.



**PHASE 2 TCP AT BRIDGE**  
STA 397+59.00 TO STA 398+24.00  
SEE BRIDGE CONSTRUCTION STAGING AND TYPICAL SECTIONS



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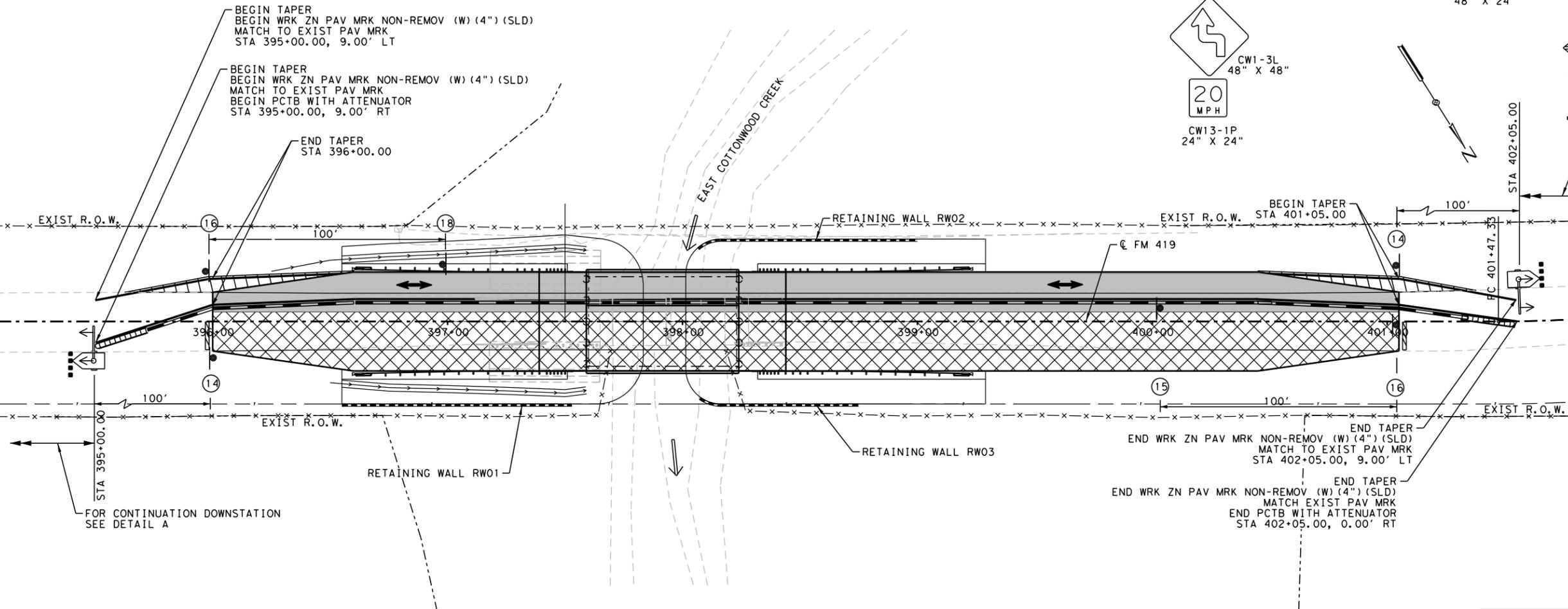
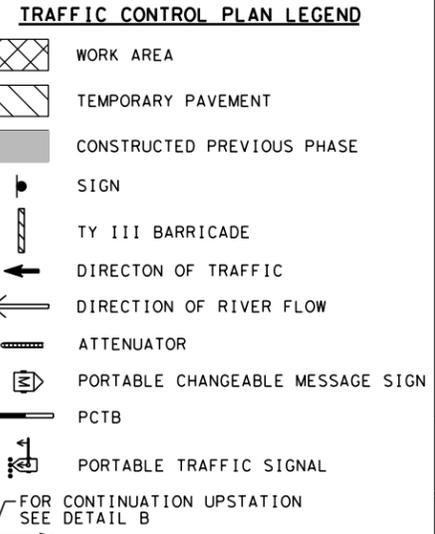
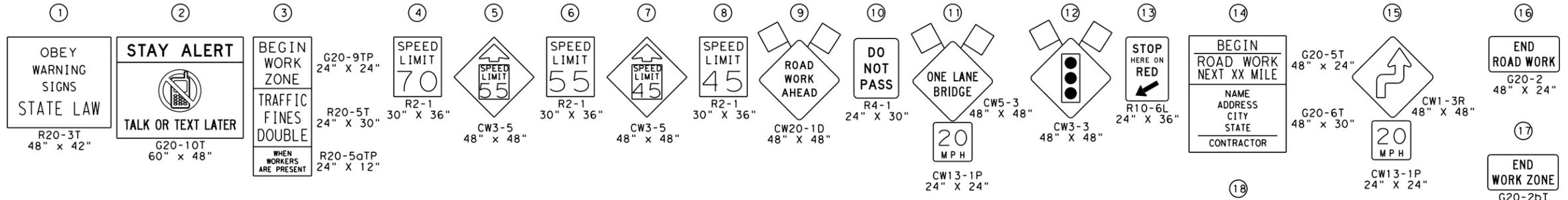
**TRAFFIC CONTROL PLAN**  
**TYPICAL SECTIONS PHASE 2**  
FM 419 AT EAST COTTONWOOD CREEK

SHEET 2 OF 2

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
KW	6	SEE TITLE SHEET		FM 419
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO
JU	TEXAS	ABL	FISHER	15
CHECK	CONTROL	SECTION	JOB	
JW	0983	02	022	

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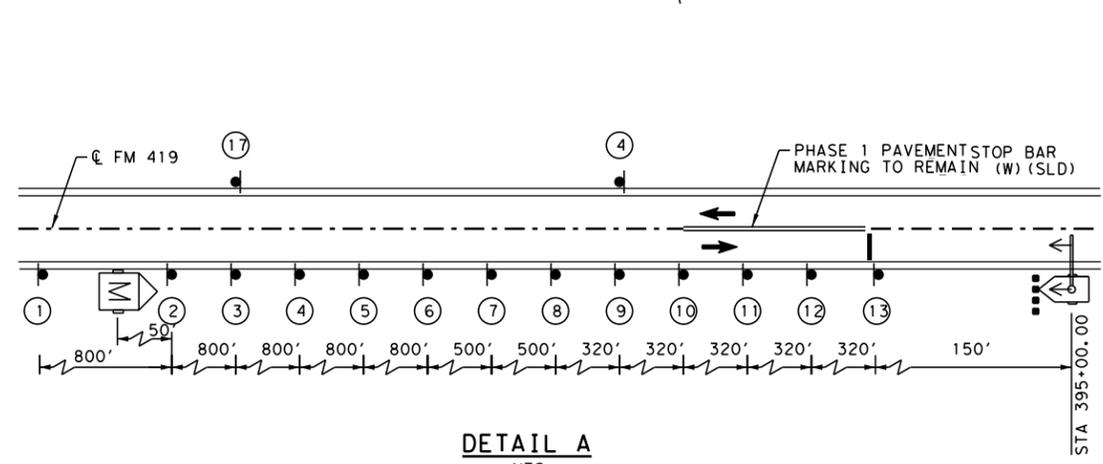
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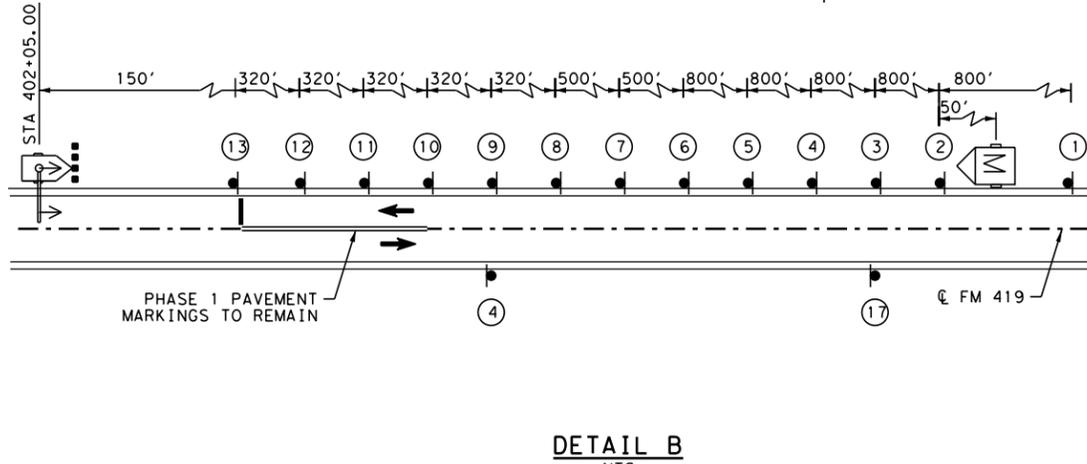
- NOTE:
1. TCP DEVICES AND SIGNS SHALL BE PLACED IN ACCORDANCE WITH APPLICABLE BC AND TCP STANDARDS.
  2. EXISTING UTILITIES ARE BASED ON THE BEST AVAILABLE INFORMATION. CONTRACTOR TO FIELD VERIFY UTILITY LOCATIONS PRIOR TO CONSTRUCTION.
  3. TMA LOCATION SHALL BE APPROVED BY THE ENGINEER.



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DETAIL A  
NTS



DETAIL B  
NTS

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TRAFFIC CONTROL PLAN  
PHASE 2  
FM 419 AT EAST COTTONWOOD CREEK

SCALE: 1"=50' SHEET 1 OF 1

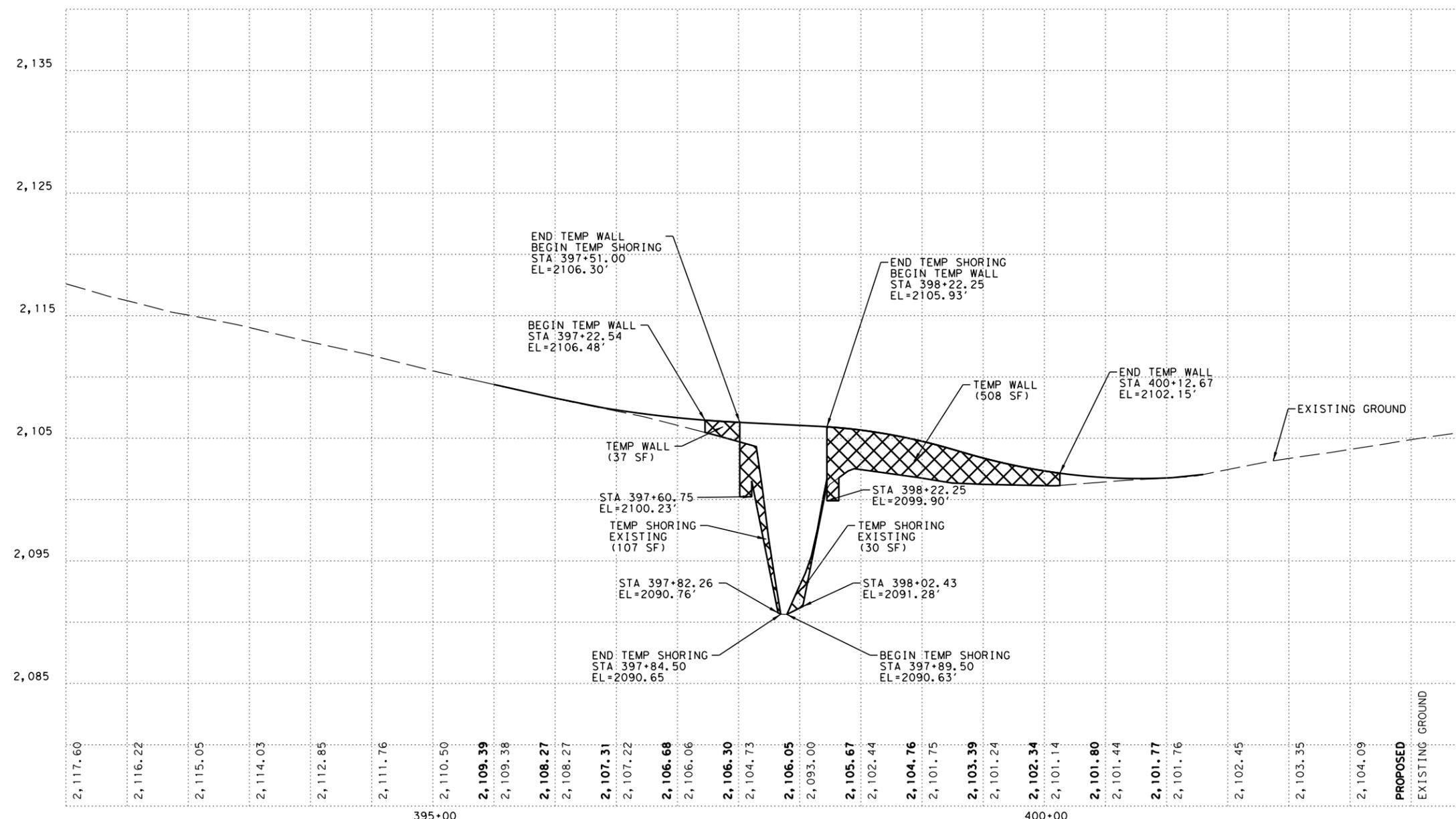
DESIGN KW	FED RD DIV NO 6	FEDERAL AID PROJECT NO. SEE TITLE SHEET	HIGHWAY NO FM 419
GRAPHICS JU	STATE TEXAS	DISTRICT ABL	COUNTY FISHER
CHECK JW	CONTROL 0983	SECTION 02	JOB 022
CHECK KW			16



NOTE: SEE BRIDGE LAYOUT FOR HORIZONTAL LOCATION.

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**TRAFFIC CONTROL PLAN**  
**TEMP SPCL WALL/SHORING**  
FM 419 AT EAST COTTONWOOD CREEK

SCALE: HORZ 1"=100'  
VERT 1"=10' SHEET 1 OF 1

DESIGN KW	FED RD DIV NO 6	FEDERAL AID PROJECT NO. SEE TITLE SHEET		HIGHWAY NO FM 419
GRAPHICS JU	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JW	TEXAS	ABL	FISHER	18
CHECK KW	CONTROL	SECTION	JOB	
	0983	02	022	

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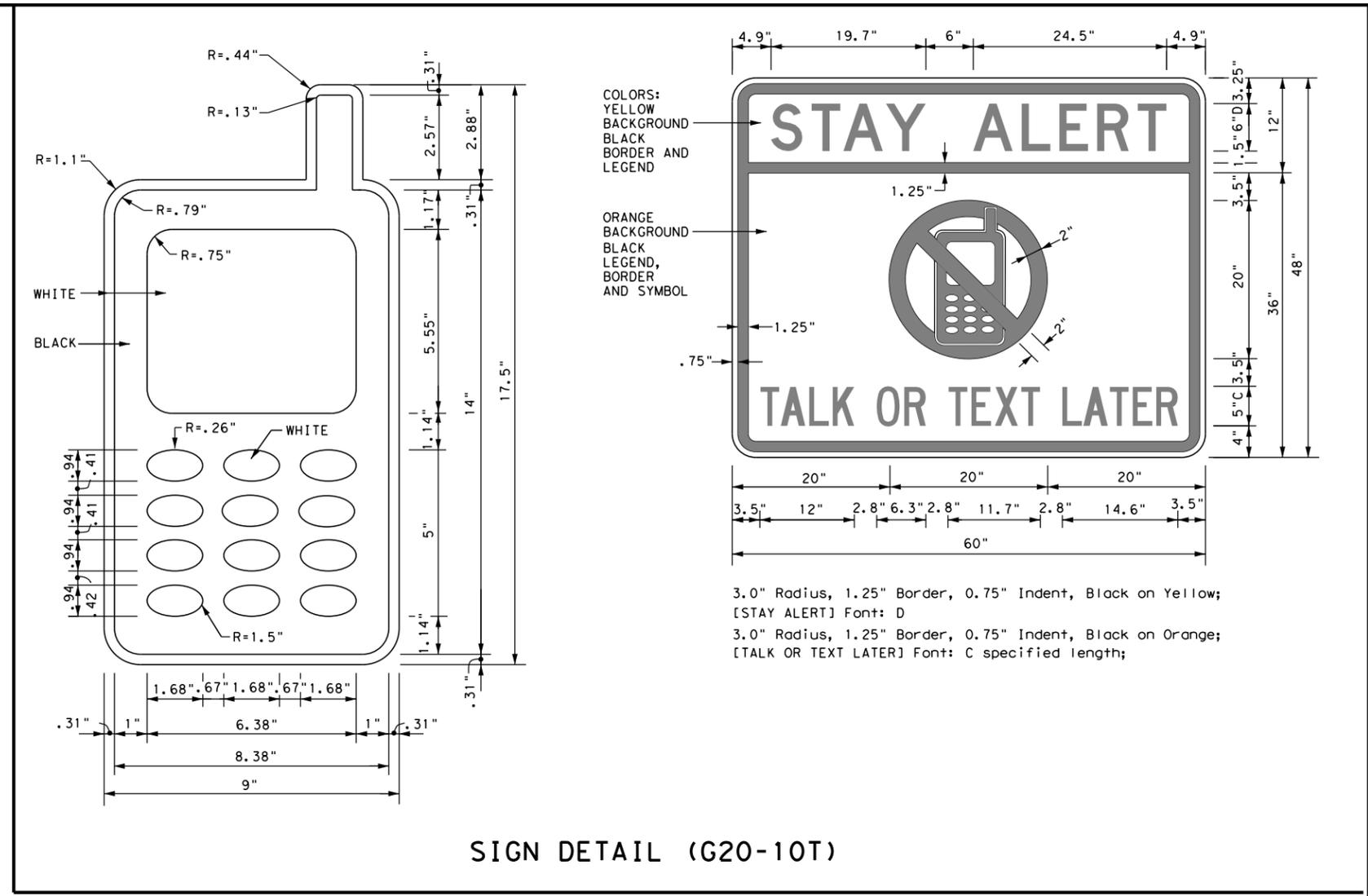
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**BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:**

- 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).
- The development and design of the Traffic Control Plan (TCP) is the responsibility of the Engineer.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- As shown on BC(2), the OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER (see Sign Detail G20-10T) and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. However, the TRAFFIC FINES DOUBLE sign will not be required on projects consisting solely of mobile operation work, such as striping or milling edgeline rumble strips. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits.
- Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.
- The Engineer has the final decision on the location of all traffic control devices.
- 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 APPAREL NOTES:**

- 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.



**SIGN DETAIL (G20-10T)**

Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found on-line at the web address given below or by contacting:

Texas Department of Transportation  
 Traffic Operations Division - TE  
 Phone (512) 416-3118

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

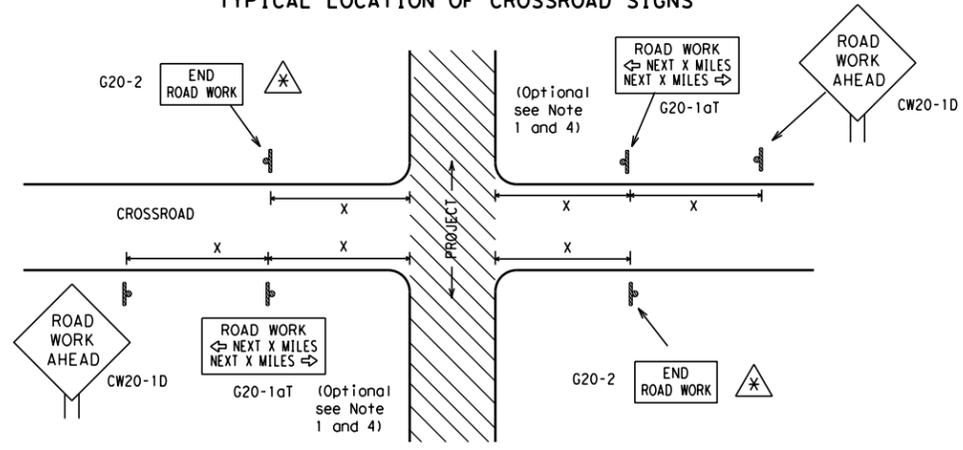
SHEET 1 OF 12

		<i>Traffic Operations Division Standard</i>
<b>BARRICADE AND CONSTRUCTION          GENERAL NOTES          AND REQUIREMENTS</b>		
<b>BC (1) - 14</b>		
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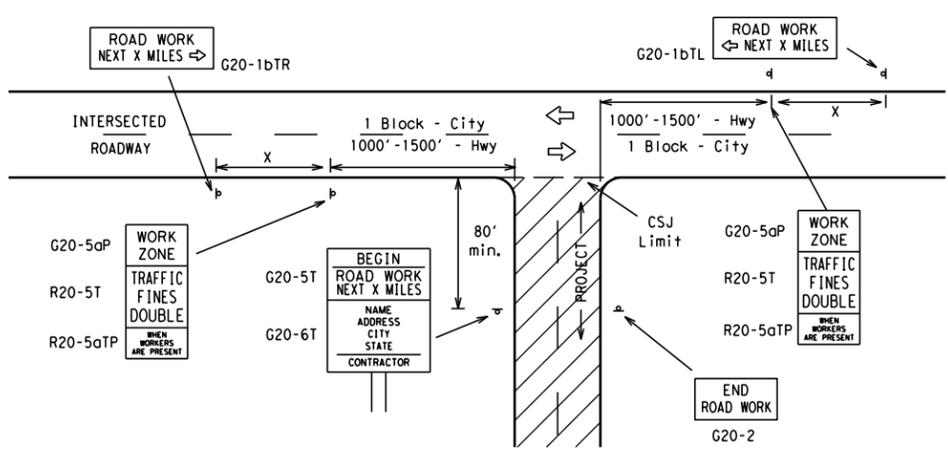
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**TYPICAL LOCATION OF CROSSROAD SIGNS**



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

**T-INTERSECTION**



**CSJ LIMITS AT T-INTERSECTION**

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

**TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING<sup>1,5,6</sup>**

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

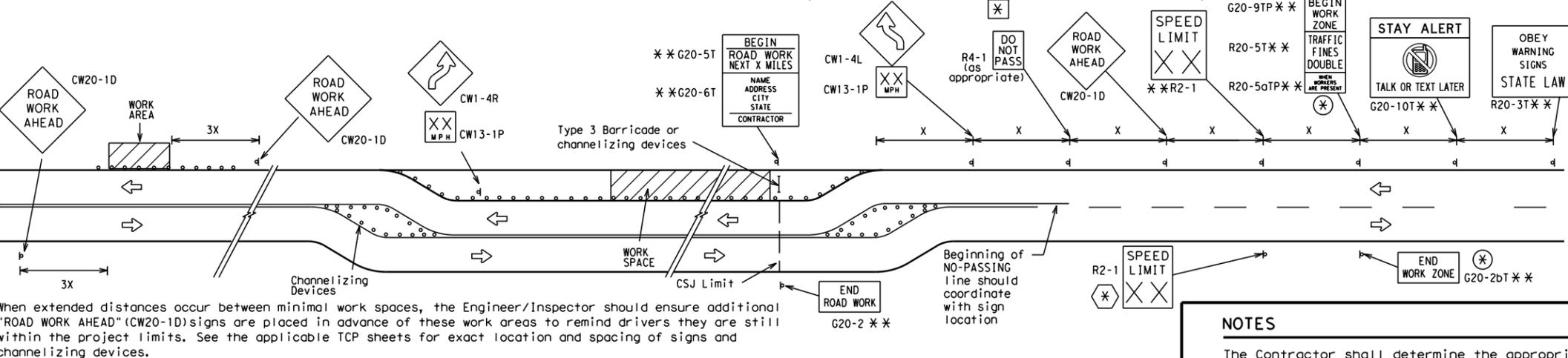
\* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

**GENERAL NOTES**

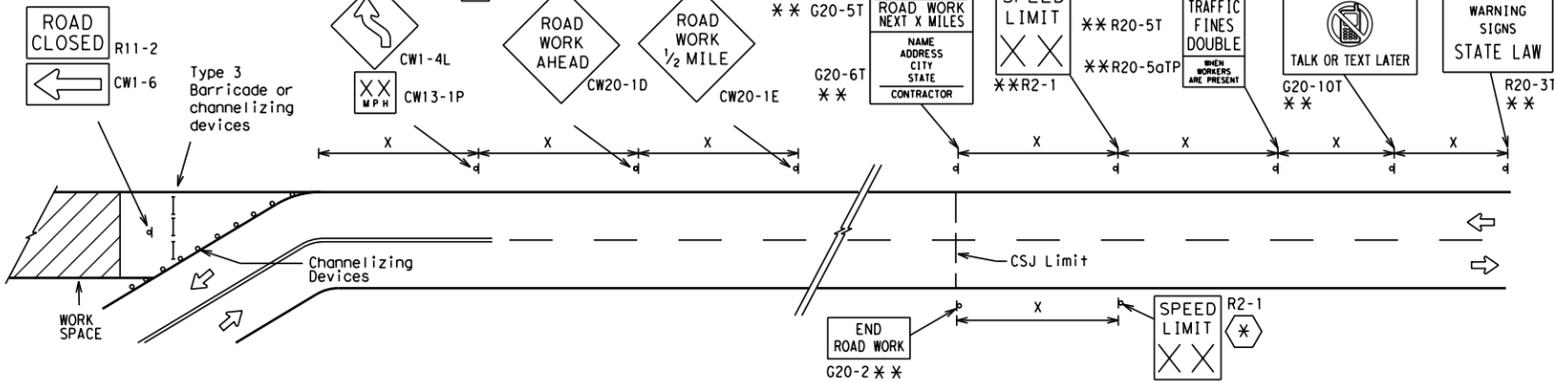
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be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

**WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS**

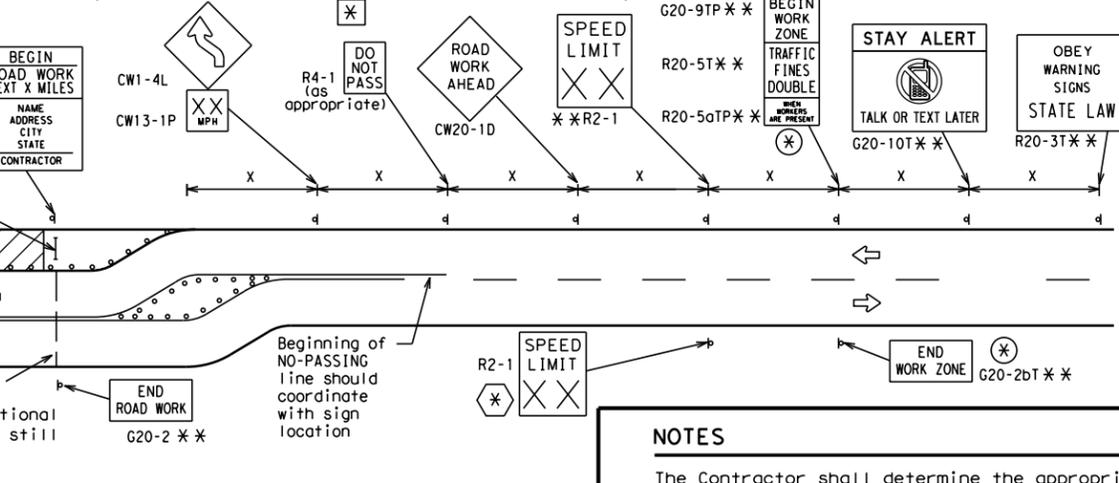


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD" (CW20-1D) signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

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



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



**NOTES**

- The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES" (G20-5T) sign for each specific project. This distance shall replace the "X" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.
- ⊗ The "BEGIN WORK ZONE" (G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.
- \*\* Required CSJ Limit signing. See Note 10 on BC(1). TRAFFIC FINES DOUBLE signs will not be required on projects consisting solely of mobile operations work.
- ⊗ 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.

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**BARRICADE AND CONSTRUCTION PROJECT LIMIT**

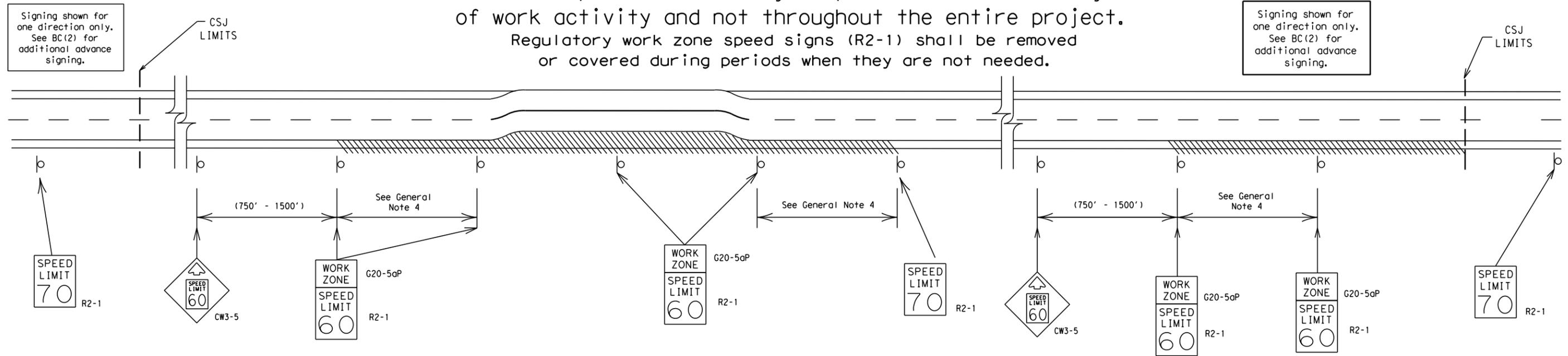
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# TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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:

- rough road or damaged pavement surface
- substantial alteration of roadway geometrics (diversions)
- construction detours
- grade
- width
- other conditions readily apparent to the driver

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

### SHORT TERM WORK ZONE SPEED LIMITS

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

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

## GENERAL NOTES

- Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
- Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
- Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
- Frequency of work zone speed limit signs should be:
 

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

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SHEET 3 OF 12



## BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

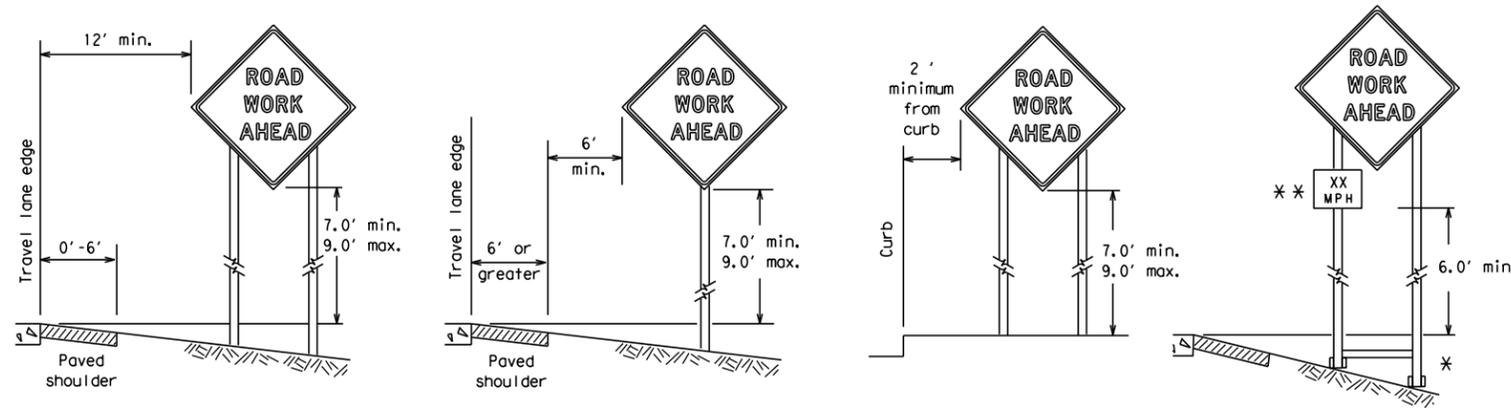
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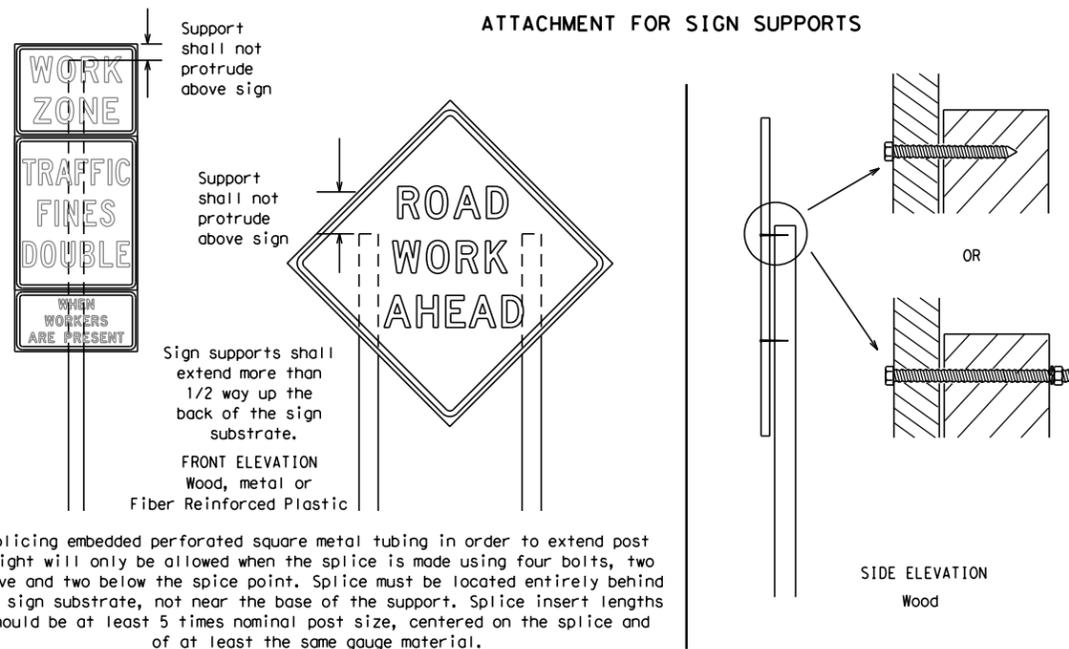
**TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS**



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

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

**ATTACHMENT FOR SIGN SUPPORTS**



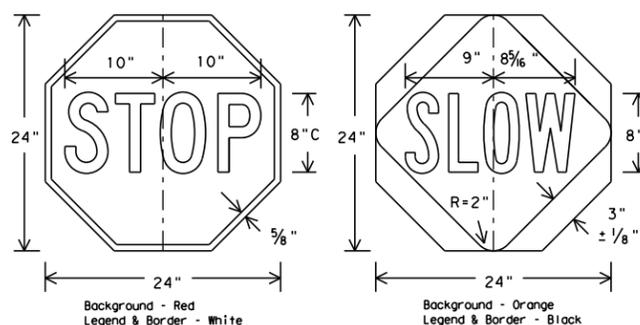
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

**STOP/SLOW PADDLES**

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



**CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS**

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

**GENERAL NOTES FOR WORK ZONE SIGNS**

- Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
  - Wooden sign posts shall be painted white.
  - Barricades shall NOT be used as sign supports.
  - All signs shall be installed in accordance with the plans or as directed by the Engineer. Signs shall be used to regulate, warn, and guide the traveling public safely through the work zone.
  - The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish other work zone signs that are shown in the TMUTCD but may have been omitted from the plans. Any variation in the plans shall be documented by written agreement between the Engineer and the Contractor's Responsible Person. All changes must be documented in writing before being implemented. This can include documenting the changes in the Inspector's TxDOT diary and having both the Inspector and Contractor initial and date the agreed upon changes.
  - The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD). The Contractor shall install the sign support in accordance with the manufacturer's recommendations. If there is a question regarding installation procedures, the Contractor shall furnish the Engineer a copy of the manufacturer's installation recommendations so the Engineer can verify the correct procedures are being followed.
  - The Contractor is responsible for installing signs on approved supports and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
  - Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1 inch.
  - The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.
- DURATION OF WORK (as defined by the "Texas Manual on Uniform Traffic Control Devices" Part 6)**
- The types of sign supports, sign mounting height, the size of signs, and the type of sign substrates can vary based on the type of work being performed. The Engineer is responsible for selecting the appropriate size sign for the type of work being performed. The Contractor is responsible for ensuring the sign support, sign mounting height and substrate meets manufacturer's recommendations in regard to crashworthiness and duration of work requirements.
    - Long-term stationary - work that occupies a location more than 3 days.
    - Intermediate-term stationary - work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than one hour.
    - Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
    - Short, duration - work that occupies a location up to 1 hour.
    - Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

**SIGN MOUNTING HEIGHT**

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

**SIZE OF SIGNS**

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

**SIGN SUBSTRATES**

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

**REFLECTIVE SHEETING**

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

**SIGN LETTERS**

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

**REMOVING OR COVERING**

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

**SIGN SUPPORT WEIGHTS**

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

**FLAGS ON SIGNS**

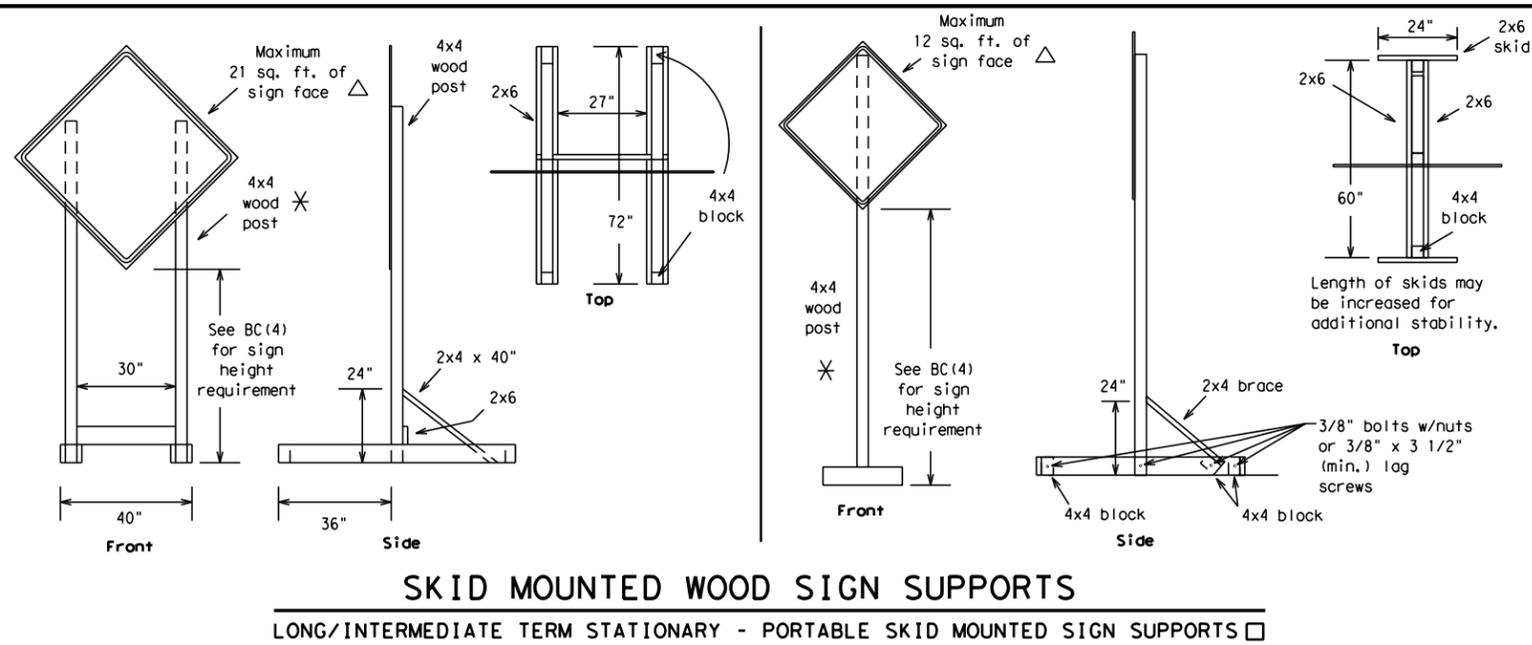
- Flags may be used to draw attention to warning signs. When used the flag shall be 16 inches square or larger and shall be orange or fluorescent red-orange in color. Flags shall not be allowed to cover any portion of the sign face.

SHEET 4 OF 12

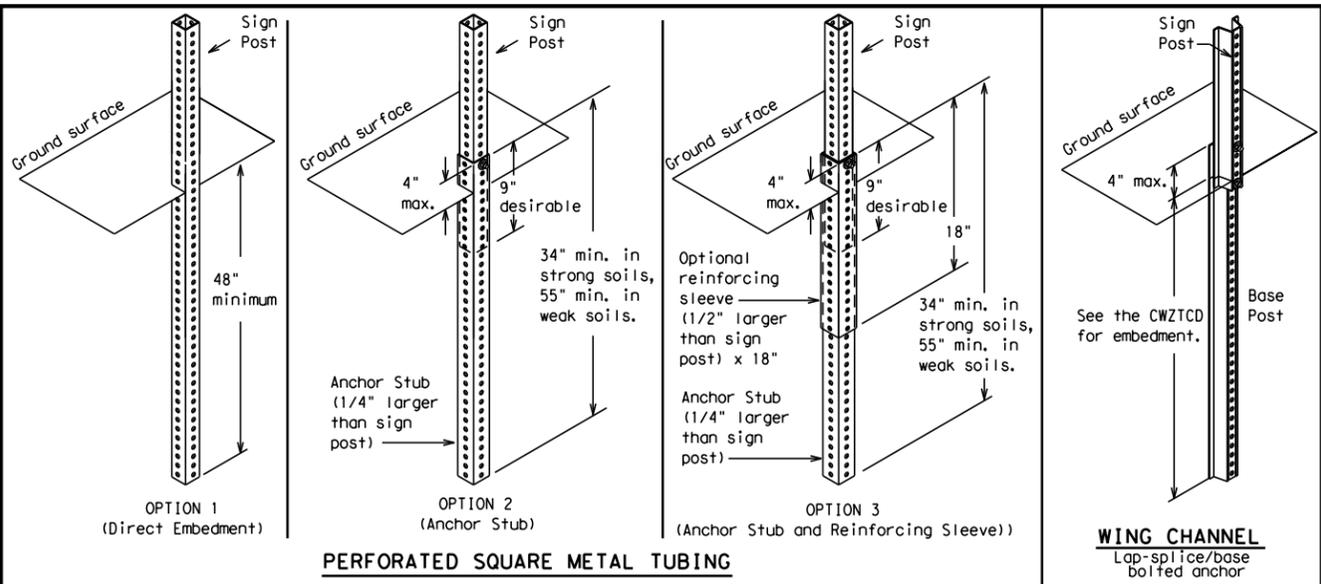
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<h3>BC (4) - 14</h3>			
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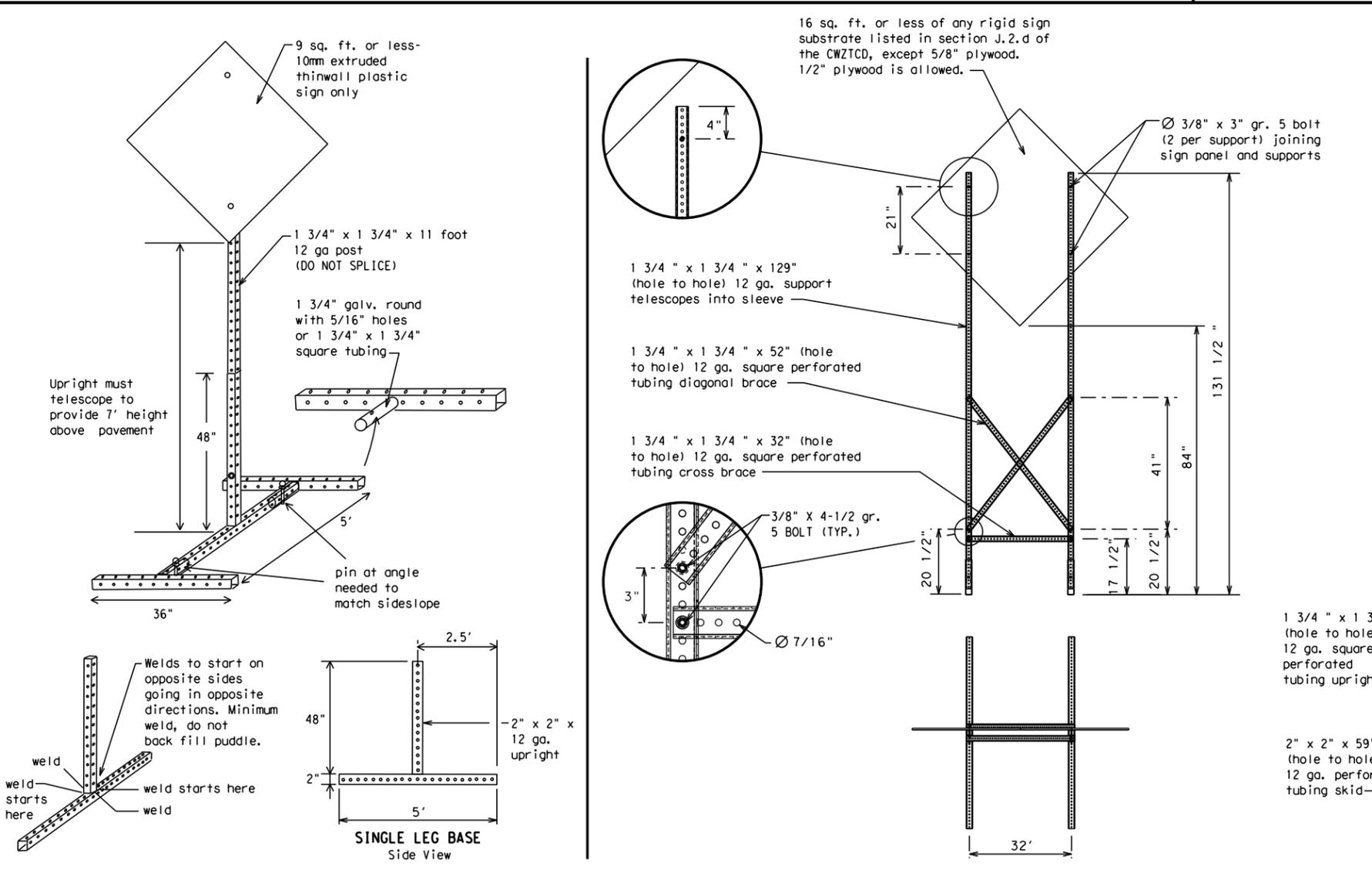
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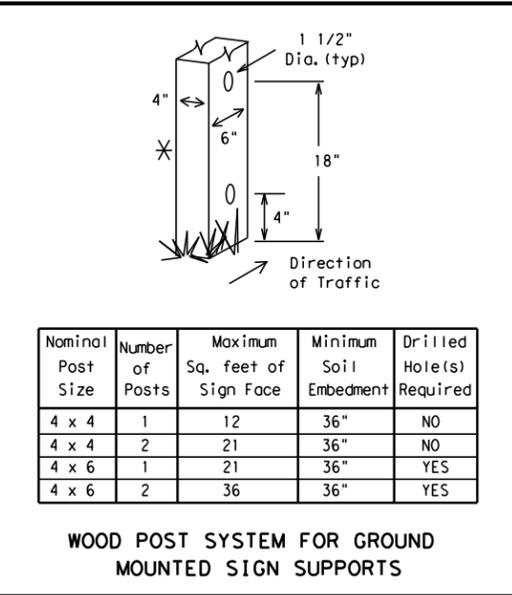
**SKID MOUNTED WOOD SIGN SUPPORTS**  
 LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS □



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

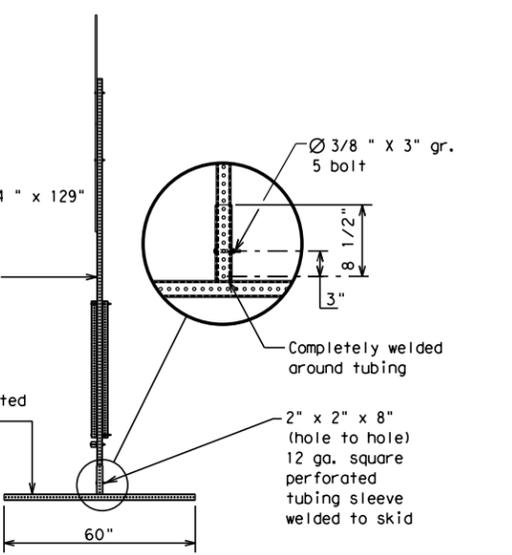


**SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS**



Nominal Post Size	Number of Posts	Maximum Sq. feet of Sign Face	Minimum Soil Embedment	Drilled Hole(s) Required
4 x 4	1	12	36"	NO
4 x 4	2	21	36"	NO
4 x 6	1	21	36"	YES
4 x 6	2	36	36"	YES

**WOOD POST SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS**



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

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

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

- See BC(4) for definition of "Work Duration."
- ✱ Wood sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.
- △ See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

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

# RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

## PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

## 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
XXXXXXXX TO XXXXXXX
US XXX TO FM XXXX

### Warning List

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

### \*\* Advance Notice List

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

\*\* See Application Guidelines Note 6.

## APPLICATION GUIDELINES

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

## WORDING ALTERNATIVES

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

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

## FULL MATRIX PCMS SIGNS

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

SHEET 6 OF 12

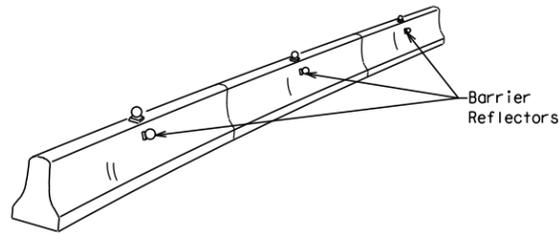
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<h2>BC (6) - 14</h2>			
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© TxDOT November 2002	CONT: 0983	SECT: 02	JOB: 022
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7-13	ABL: FISHER	SHEET NO. 24	

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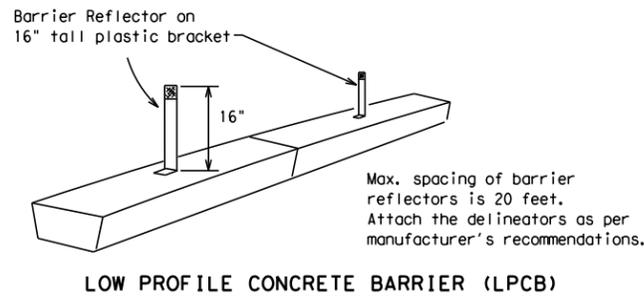
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- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
- Color of Barrier Reflectors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



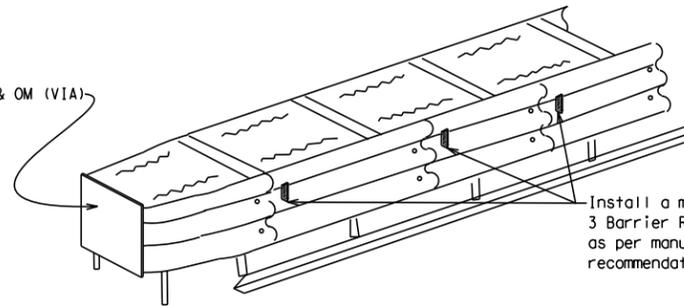
CONCRETE TRAFFIC BARRIER (CTB)



LOW PROFILE CONCRETE BARRIER (LPCB)

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

See D & OM (VIA)



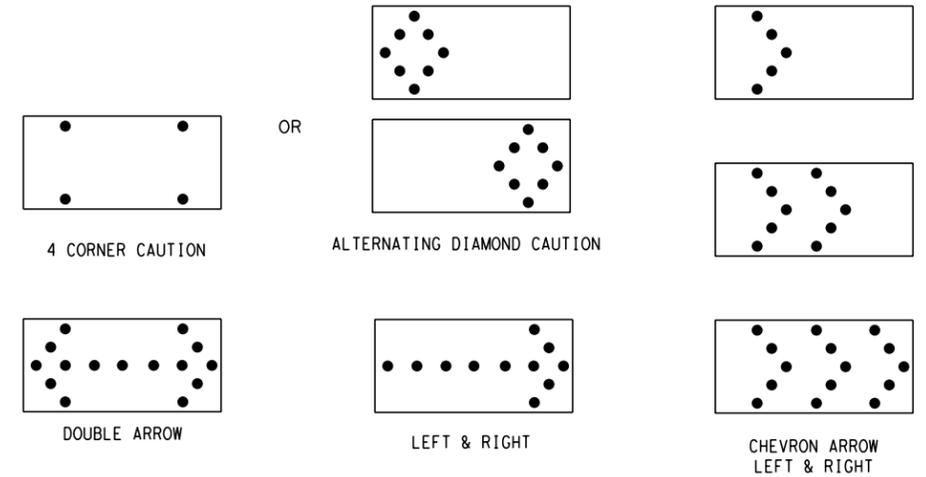
DELINEATION OF END TREATMENTS

END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet crashworthy standards as defined in the National Cooperative Highway Research Report 350. Refer to the CWZTCD List for approved end treatments and manufacturers.

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

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



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

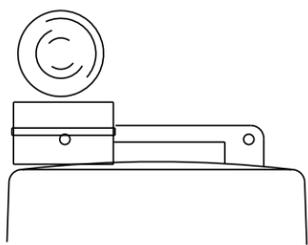
REQUIREMENTS			
TYPE	MINIMUM SIZE	MINIMUM NUMBER OF PANEL LAMPS	MINIMUM VISIBILITY DISTANCE
B	30 x 60	13	3/4 mile
C	48 x 96	15	1 mile

**ATTENTION**  
 Flashing Arrow Boards shall be equipped with automatic dimming devices.

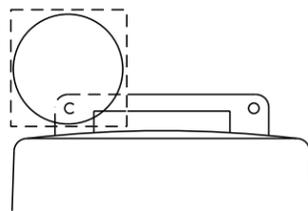
WHEN NOT IN USE, REMOVE THE ARROW BOARD FROM THE RIGHT-OF-WAY OR PLACE THE ARROW BOARD BEHIND CONCRETE TRAFFIC BARRIER OR GUARDRAIL.

FLASHING ARROW BOARDS

SHEET 7 OF 12



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

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

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

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

TRUCK-MOUNTED ATTENUATORS

- Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the National Cooperative Highway Research Report No. 350 (NCHRP 350) or the Manual for Assessing Safety Hardware (MASH).
- Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
- Refer to the CWZTCD for a list of approved TMAs.
- TMAs are required on freeways unless otherwise noted in the plans.
- A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
- The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.



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

BC (7) - 14

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13	ABL	FISHER	25	

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**GENERAL NOTES**

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

**GENERAL DESIGN REQUIREMENTS**

Pre-qualified plastic drums shall meet the following requirements:

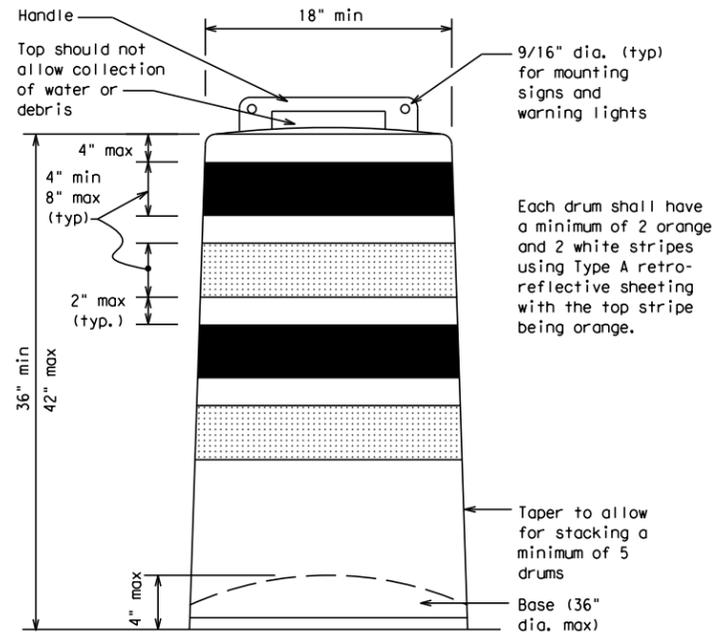
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

**RETROREFLECTIVE SHEETING**

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

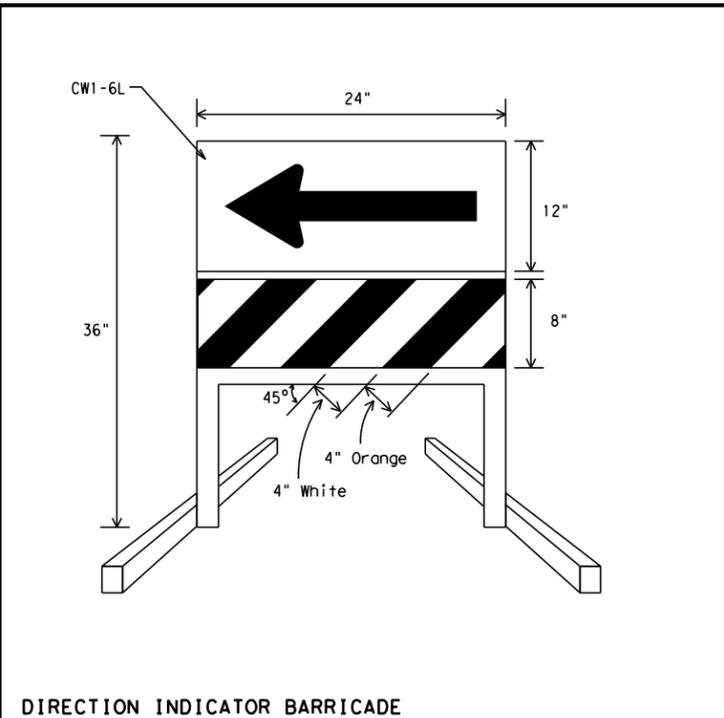
**BALLAST**

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



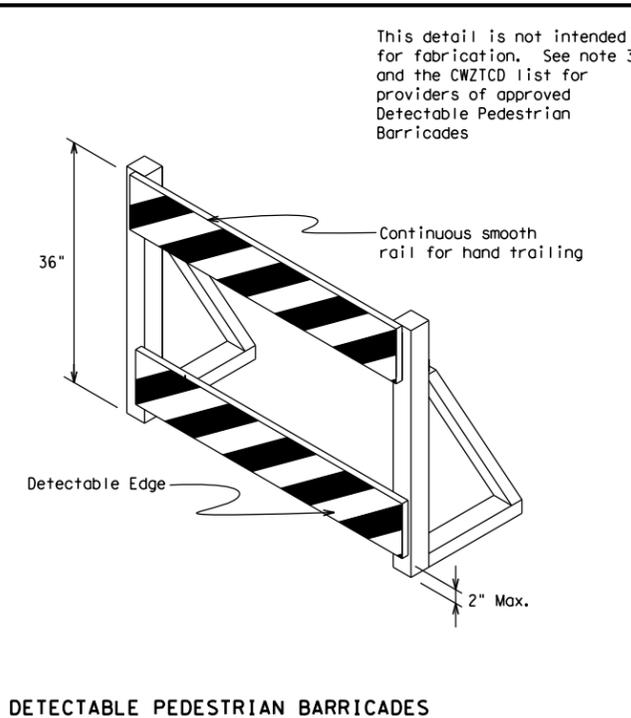
Each drum shall have a minimum of 2 orange and 2 white stripes using Type A retro-reflective sheeting with the top stripe being orange.

Taper to allow for stacking a minimum of 5 drums  
Base (36" dia. max)



**DIRECTION INDICATOR BARRICADE**

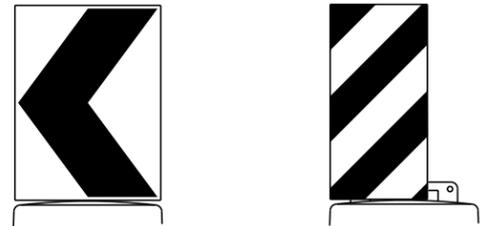
- The Direction Indicator Barricade may be used in tapers, transitions, and other areas where specific directional guidance to drivers is necessary.
- If used, the Direction Indicator Barricade should be used in series to direct the driver through the transition and into the intended travel lane.
- The Direction Indicator Barricade shall consist of One-Direction Large Arrow (CWI-6) sign in the size shown with a black arrow on a background of Type B<sub>FL</sub> or Type C<sub>FL</sub> Orange retroreflective sheeting above a rail with Type A retroreflective sheeting in alternating 4" white and orange stripes sloping downward at an angle of 45 degrees in the direction road users are to pass. Sheeting types shall be as per DMS 8300.
- Double arrows on the Direction Indicator Barricade will not be allowed.
- Approved manufacturers are shown on the CWZTCD List. Ballast shall be as approved by the manufacturers instructions.



**DETECTABLE PEDESTRIAN BARRICADES**

- When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility.
- Where pedestrians with visual disabilities normally use the closed sidewalk, a device that is detectable by a person with a visual disability traveling with the aid of a long cane shall be placed across the full width of the closed sidewalk.
- Detectable pedestrian barricades similar to the one pictured above, longitudinal channelizing devices, some concrete barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian path.
- Tape, rope, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)" and should not be used as a control for pedestrian movements.
- Warning lights shall not be attached to detectable pedestrian barricades.
- Detectable pedestrian barricades may 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.

This detail is not intended for fabrication. See note 3 and the CWZTCD list for providers of approved Detectable Pedestrian Barricades



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**

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

SHEET 8 OF 12



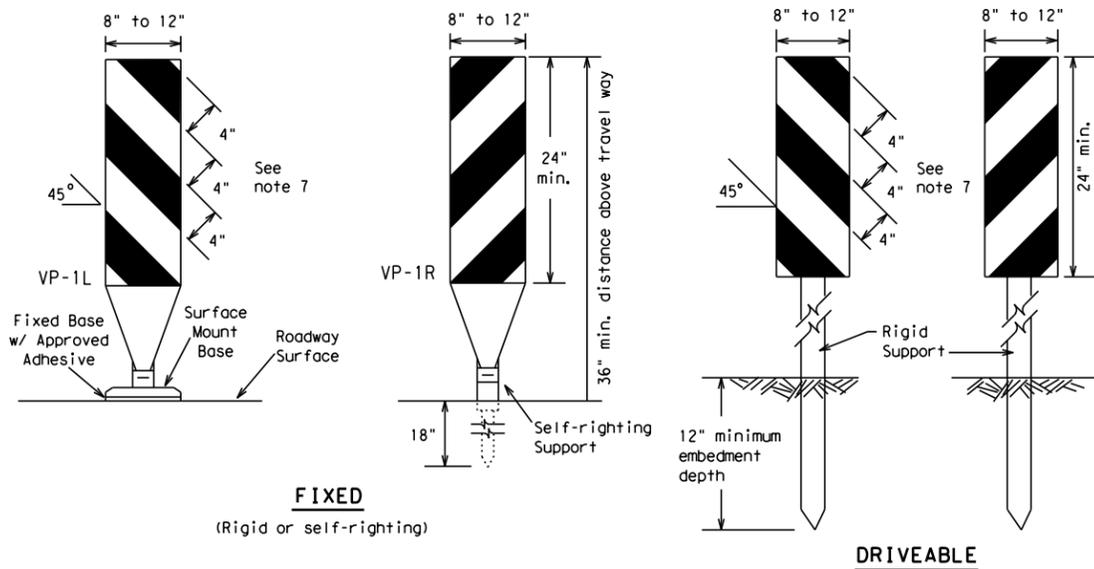
**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC (8) - 14**

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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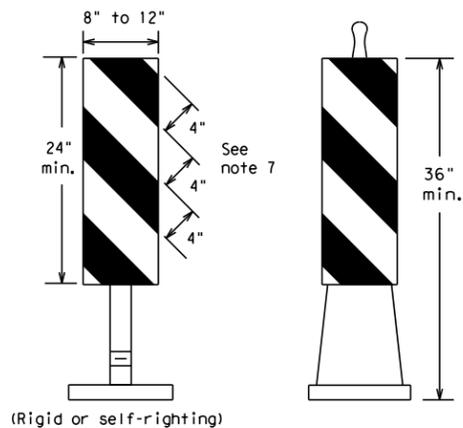
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**FIXED**  
(Rigid or self-righting)

**DRIVEABLE**

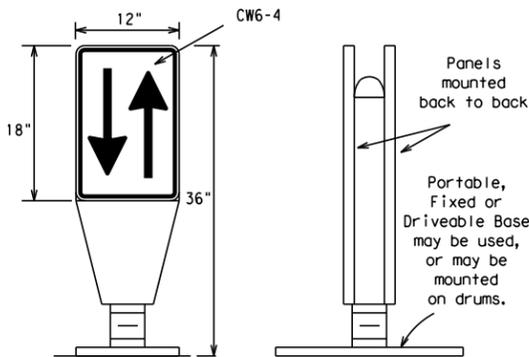


(Rigid or self-righting)

**PORTABLE**

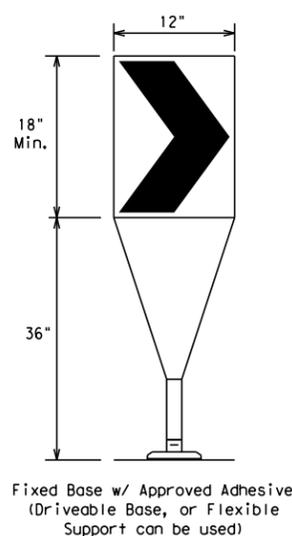
**VERTICAL PANELS (VPs)**

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



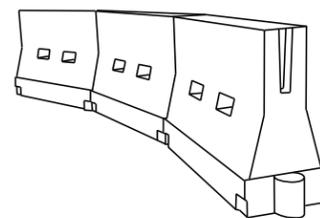
**OPPOSING TRAFFIC LANE DIVIDERS (OTLD)**

- 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.
- The OTLD may be used in combination with 42" cones or VPs.
- Spacing between the OTLD shall not exceed 500 feet. 42" cones or VPs placed between the OTLD's should not exceed 100 foot spacing.
- The OTLD shall be orange with a black non-reflective legend. Sheeting for the OTLD shall be retroreflective Type B<sub>FL</sub> or Type C<sub>FL</sub> conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.



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

**CHEVRONS**



**LONGITUDINAL CHANNELIZING DEVICES (LCD)**

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

**WATER BALLASTED SYSTEMS USED AS BARRIERS**

- Water ballasted systems used as barriers shall not be used solely to channelize road users, but also to protect the work space per the appropriate NCHRP 350 crashworthiness requirements based on roadway speed and barrier application.
- Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
- Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
- Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
- When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

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

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

**GENERAL NOTES**

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

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

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

**SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS**

SHEET 9 OF 12



**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC (9) - 14**

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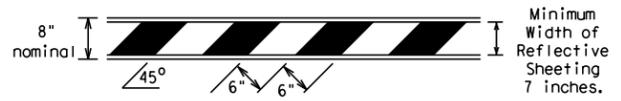
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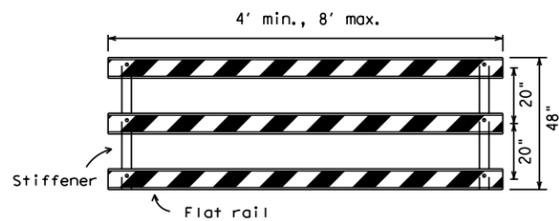
**TYPE 3 BARRICADES**

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

Barricades shall NOT be used as a sign support.

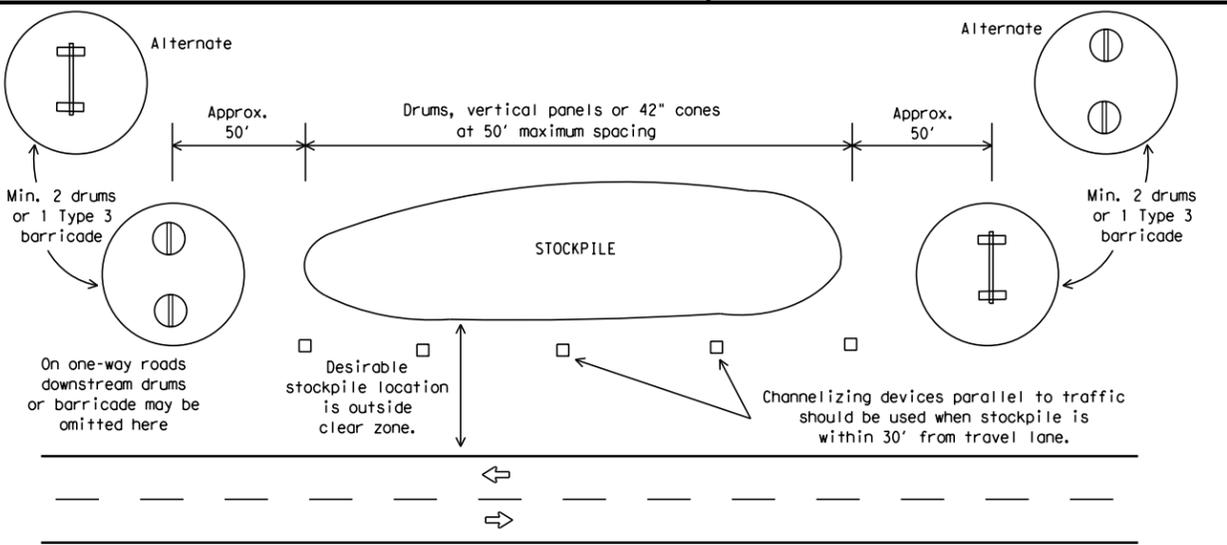


**TYPICAL STRIPING DETAIL FOR BARRICADE RAIL**



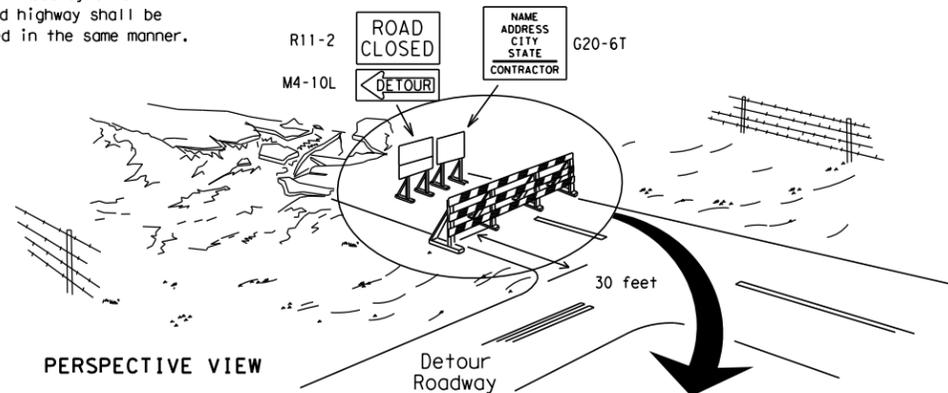
Stiffener may be inside or outside of support, but no more than 2 stiffeners shall be allowed on one barricade.

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



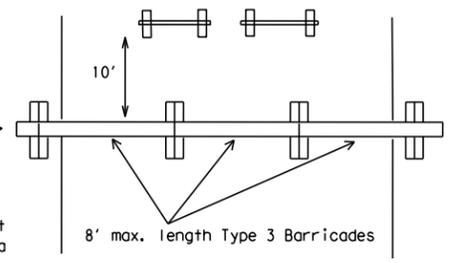
**TRAFFIC CONTROL FOR MATERIAL STOCKPILES**

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



PERSPECTIVE VIEW

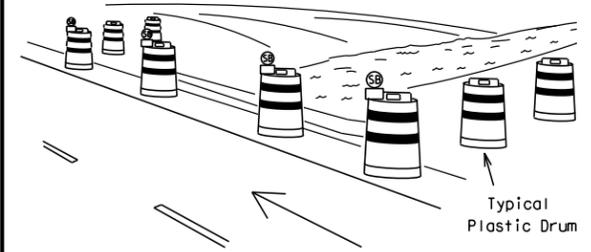
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.



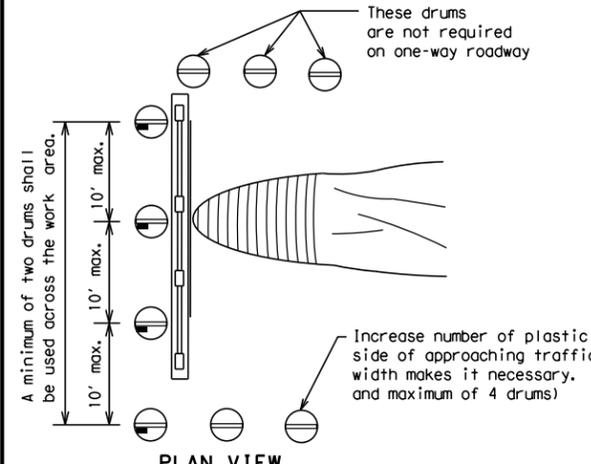
PLAN VIEW

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

**TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION**



PERSPECTIVE VIEW



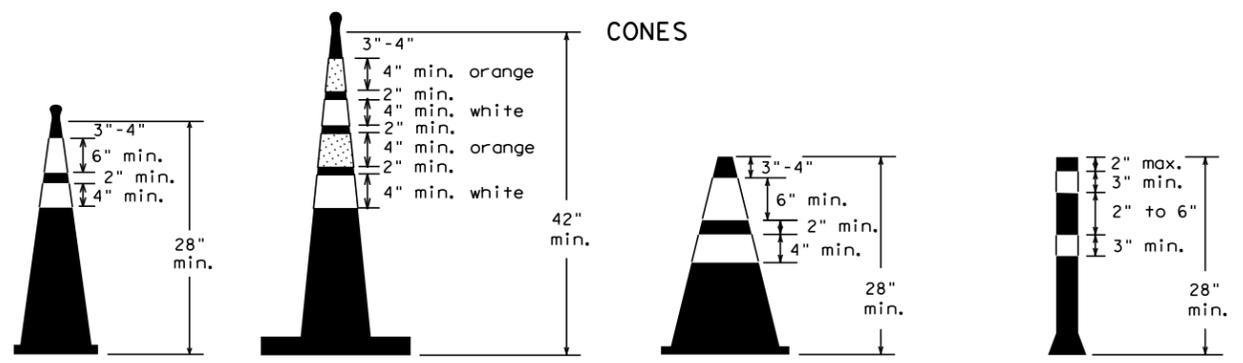
PLAN VIEW

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

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

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

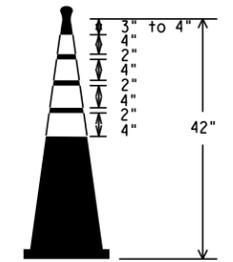
Increase number of plastic drums on the side of approaching traffic if the crown width makes it necessary. (minimum of 2 and maximum of 4 drums)



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 used at night 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.
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.

THIS DEVICE SHALL NOT BE USED ON PROJECTS LET AFTER MARCH 2014.



EDGE LINE CHANNELIZER

1. This device is intended only for use in place of a vertical panel to channelize traffic by indicating the edge of the travel lane. It is not intended to be used in transitions or tapers.
2. This device shall not be used to separate lanes of traffic (opposing or otherwise) or warn of objects.
3. This device is based on a 42 inch, two-piece cone with an alternate striping pattern: four 4 inch retroreflective bands, with an approximate 2 inch gap between bands. The color of the band should correspond to the color of the edgeline (yellow for left edgeline, white for right edgeline) for which the device is substituted or for which it supplements. The reflectorized bands shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300, unless otherwise noted.
4. The base must weigh a minimum of 30 lbs.

**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC (10) - 14**

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## WORK ZONE PAVEMENT MARKINGS

### GENERAL

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

### RAISED PAVEMENT MARKERS

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

### PREFABRICATED PAVEMENT MARKINGS

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

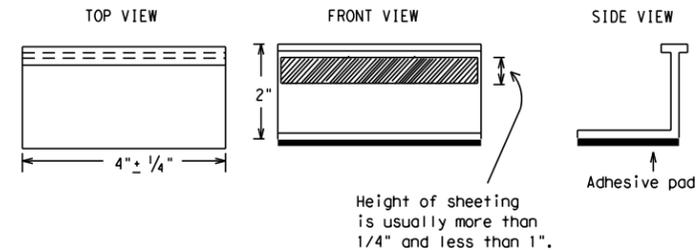
### MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

### REMOVAL OF PAVEMENT MARKINGS

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

## Temporary Flexible-Reflective Roadway Marker Tabs



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

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

### RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

SHEET 11 OF 12



## BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

**BC(11) - 14**

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
	0983	02	022	FM 419
2-98 9-07	DIST	COUNTY	SHEET NO.	
1-02 7-13	ABL	FISHER	29	
11-02 8-14				

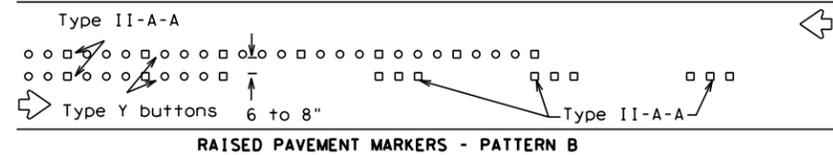
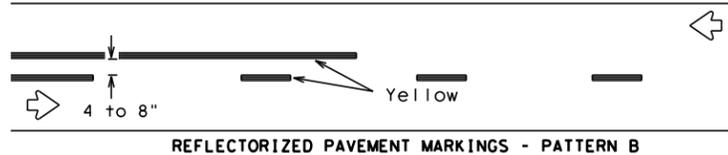
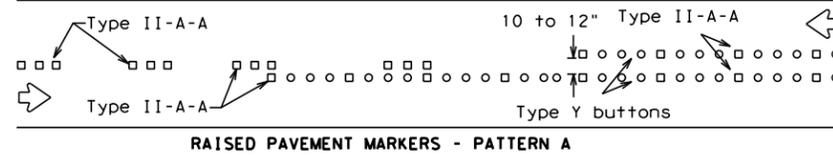
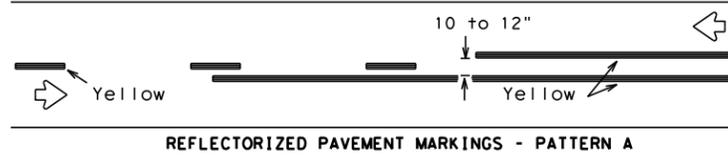
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DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for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

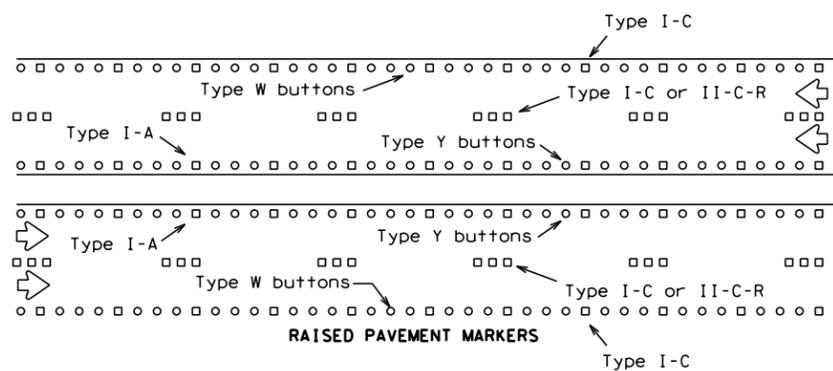
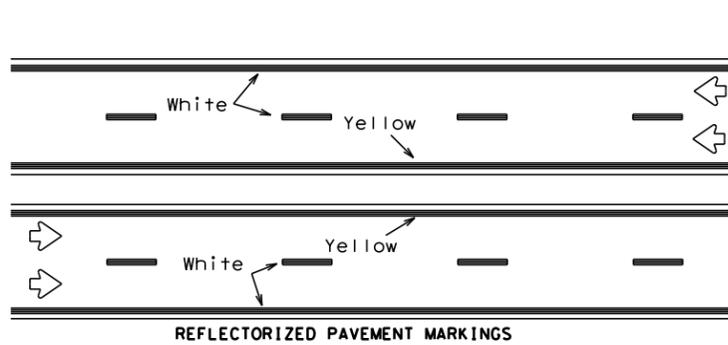
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### PAVEMENT MARKING PATTERNS



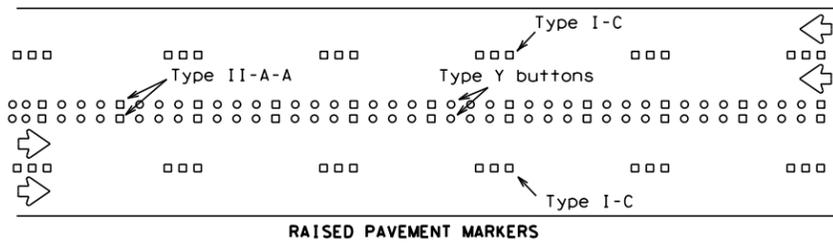
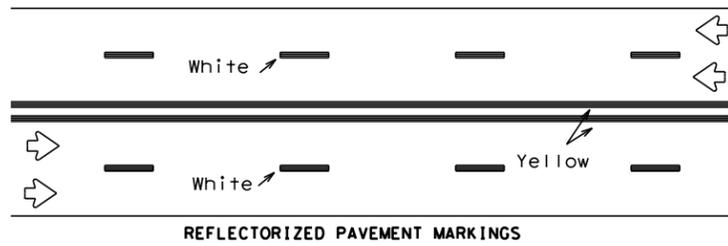
Pattern A is the TxDOT Standard, however Pattern B may be used if approved by the Engineer. Prefabricated markings may be substituted for reflectorized pavement markings.

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



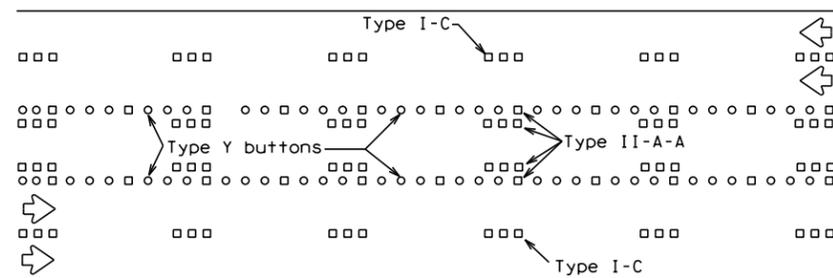
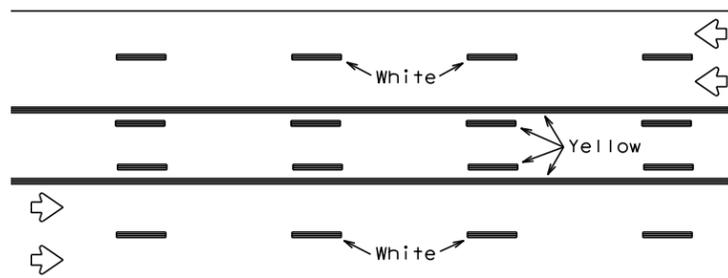
Prefabricated markings may be substituted for reflectorized pavement markings.

### EDGE & LANE LINES FOR DIVIDED HIGHWAY



Prefabricated markings may be substituted for reflectorized pavement markings.

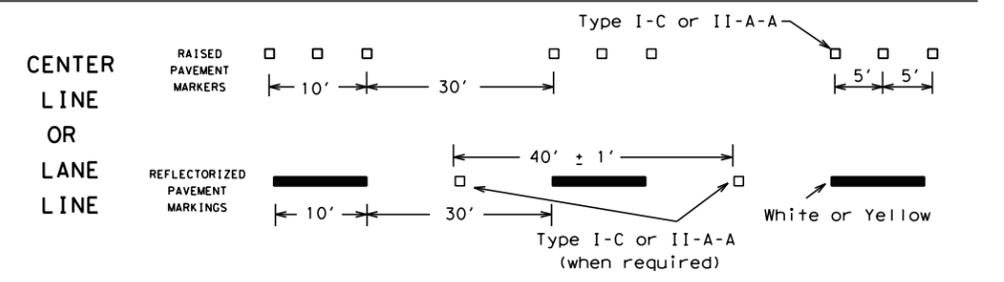
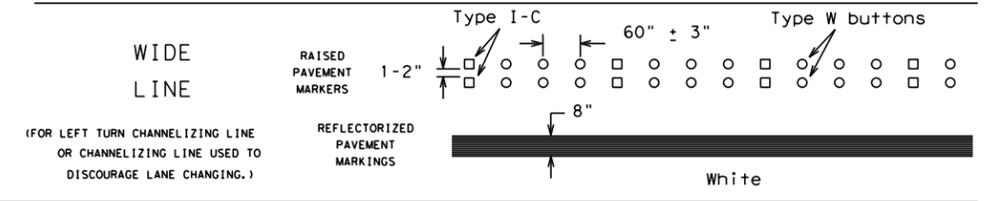
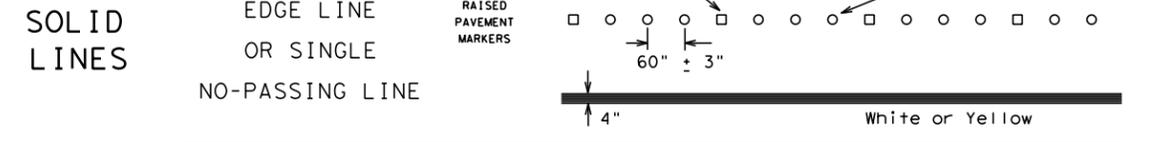
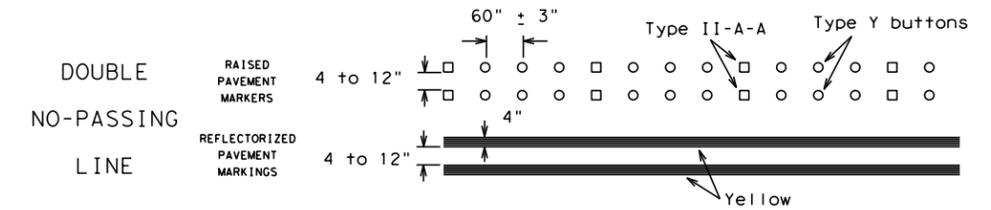
### LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



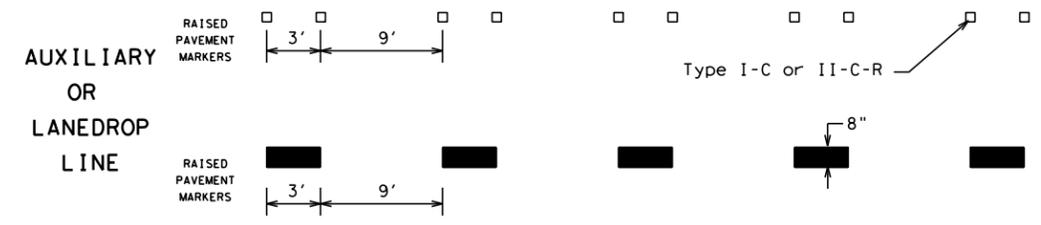
Prefabricated markings may be substituted for reflectorized pavement markings.

### TWO-WAY LEFT TURN LANE

### STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

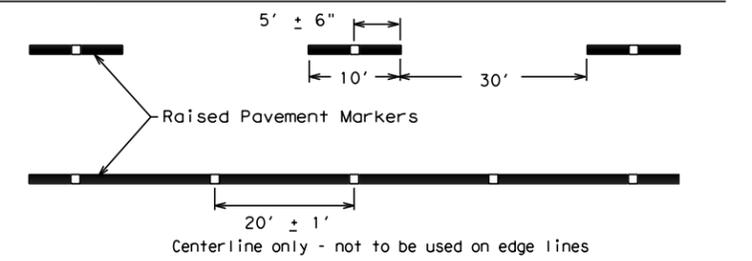


### BROKEN LINES



### REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



SHEET 12 OF 12



### BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

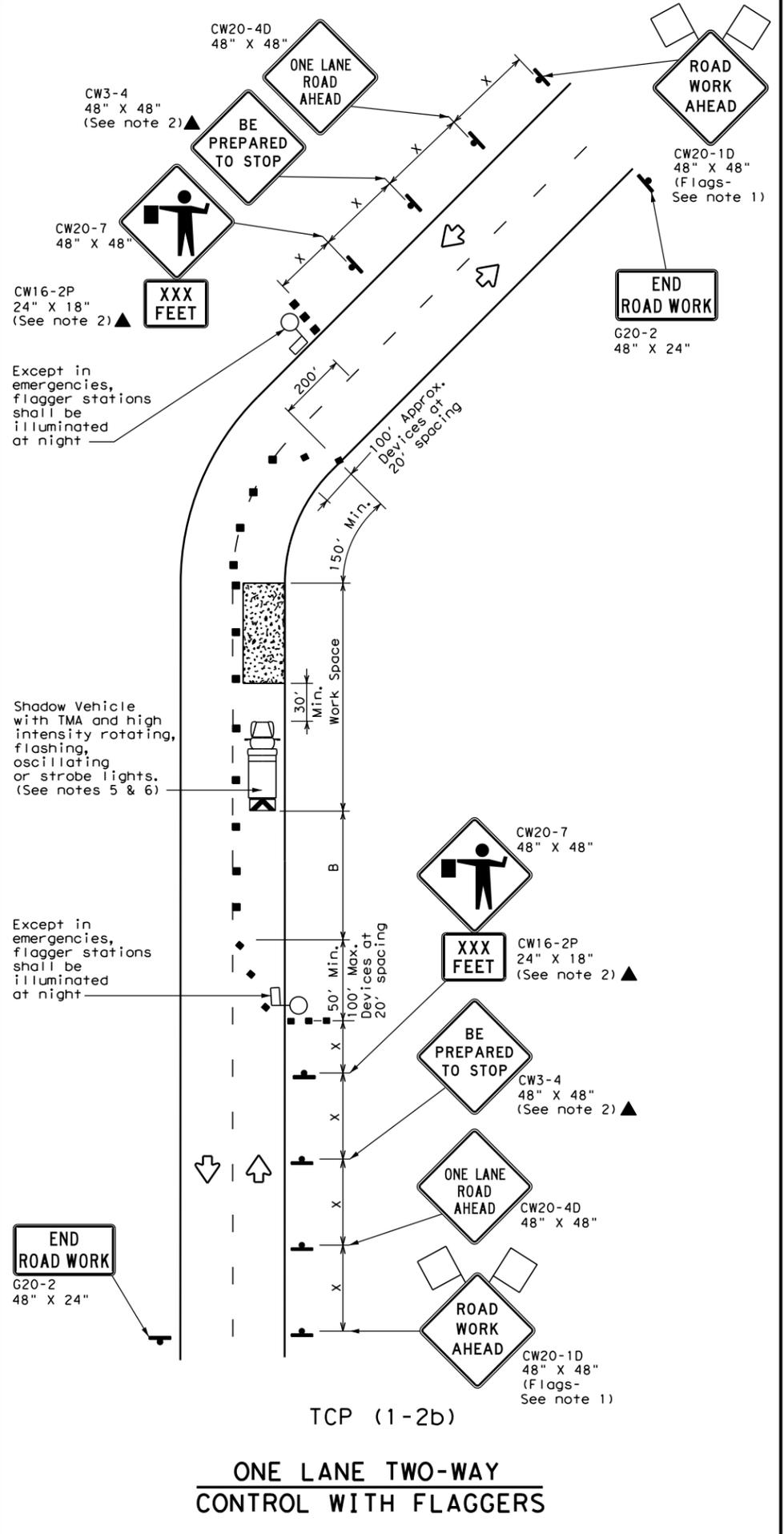
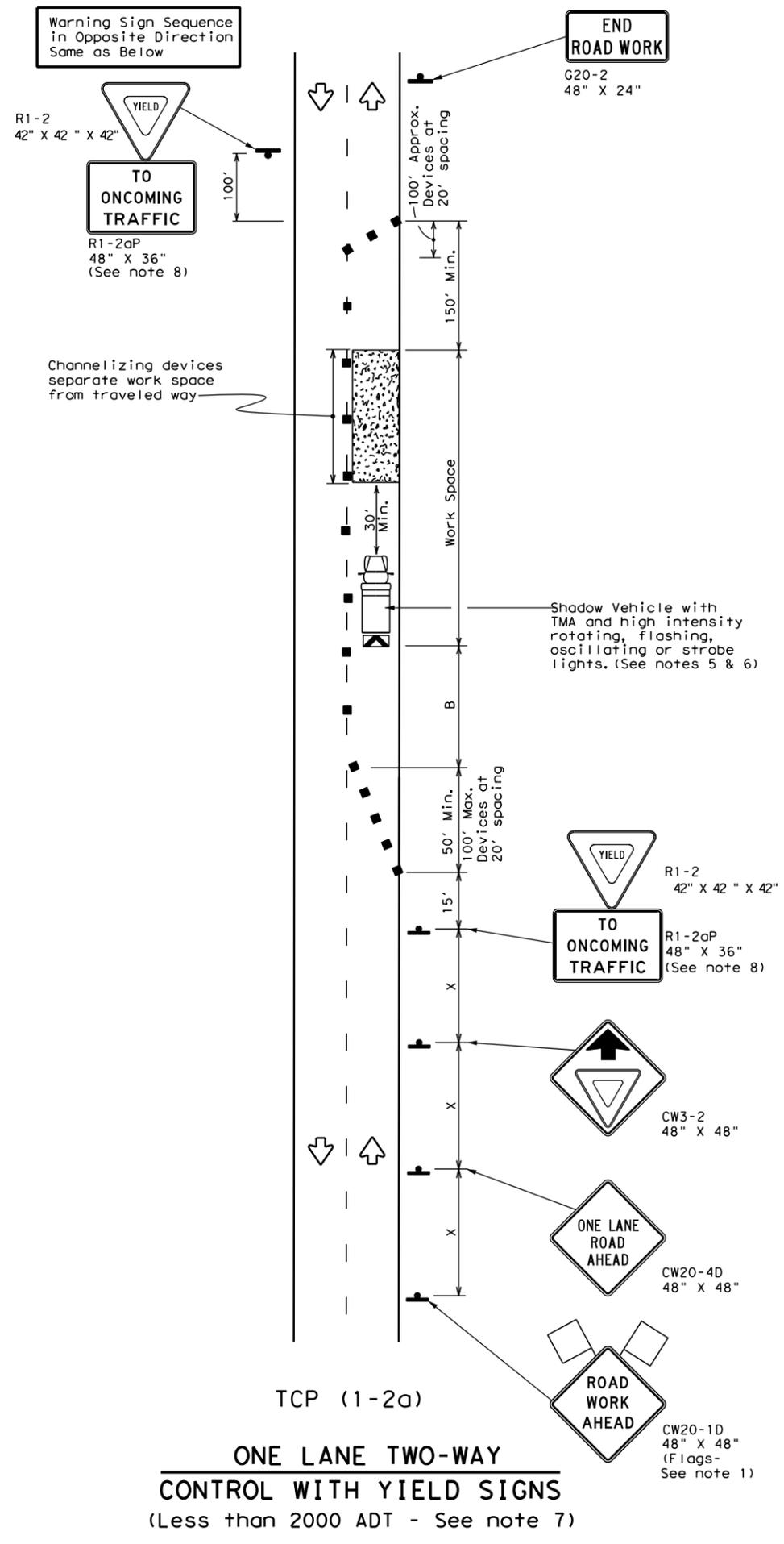
BC (12) - 14

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."

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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1-97 9-07	DIST	COUNTY	SHEET NO.	
2-98 7-13	ABL	FISHER	30	
11-02 8-14				

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 FILE: V:\2142\active\214220136\06-CAD\6.1-Sheets\standards\02 TCP\tcp1-2-18.dgn



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

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

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

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

**GENERAL NOTES**

- Flags attached to signs where shown are REQUIRED.
- All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
- The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign, but proper sign spacing shall be maintained.
- Sign spacing may be increased or an additional CW20-1D "ROAD WORK AHEAD" sign may be used if advance warning ahead of the flagger or R1-2 "YIELD" sign is less than 1500 feet.
- A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
- Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

**TCP (1-2a)**

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

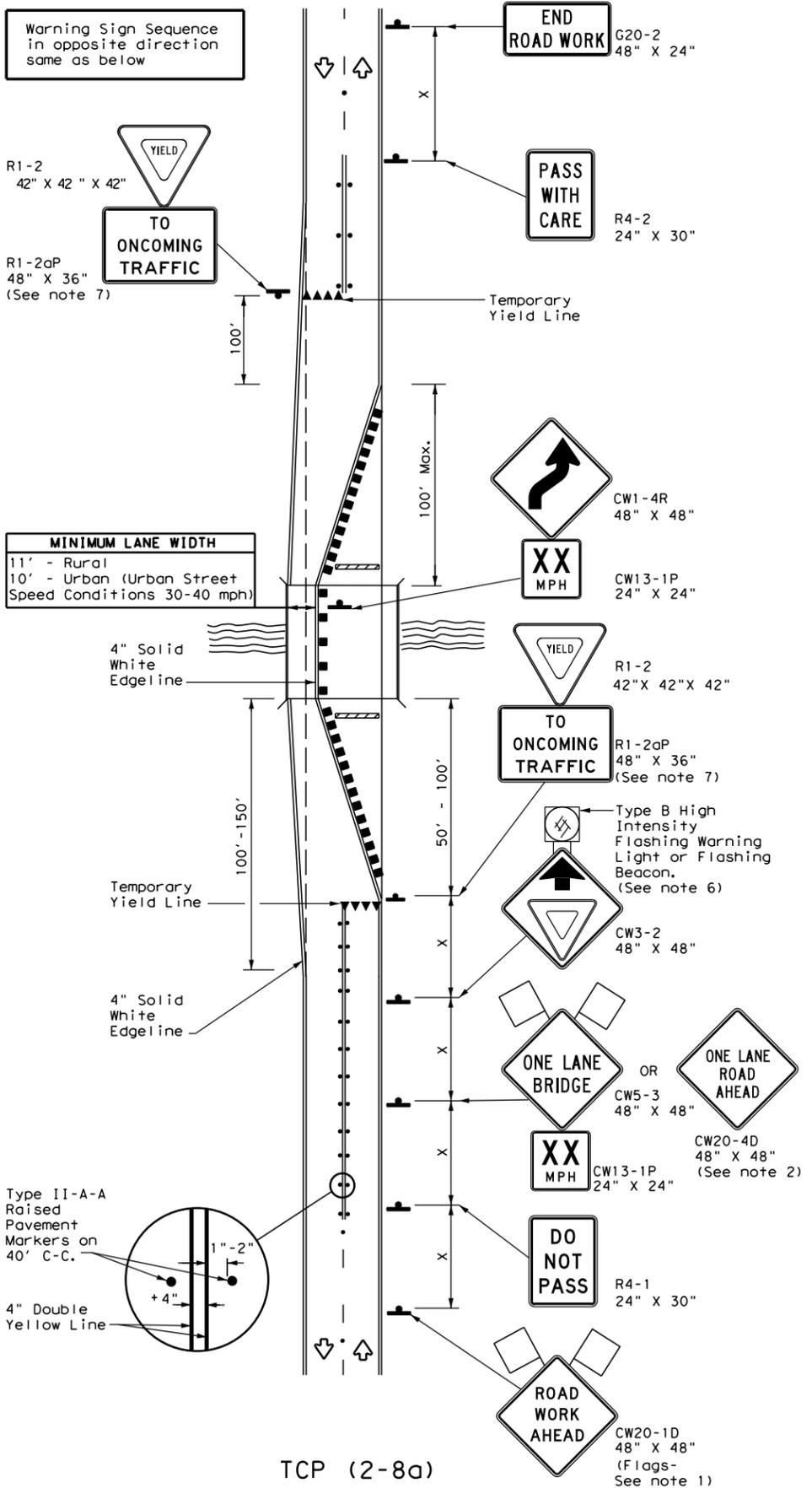
**TCP (1-2b)**

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

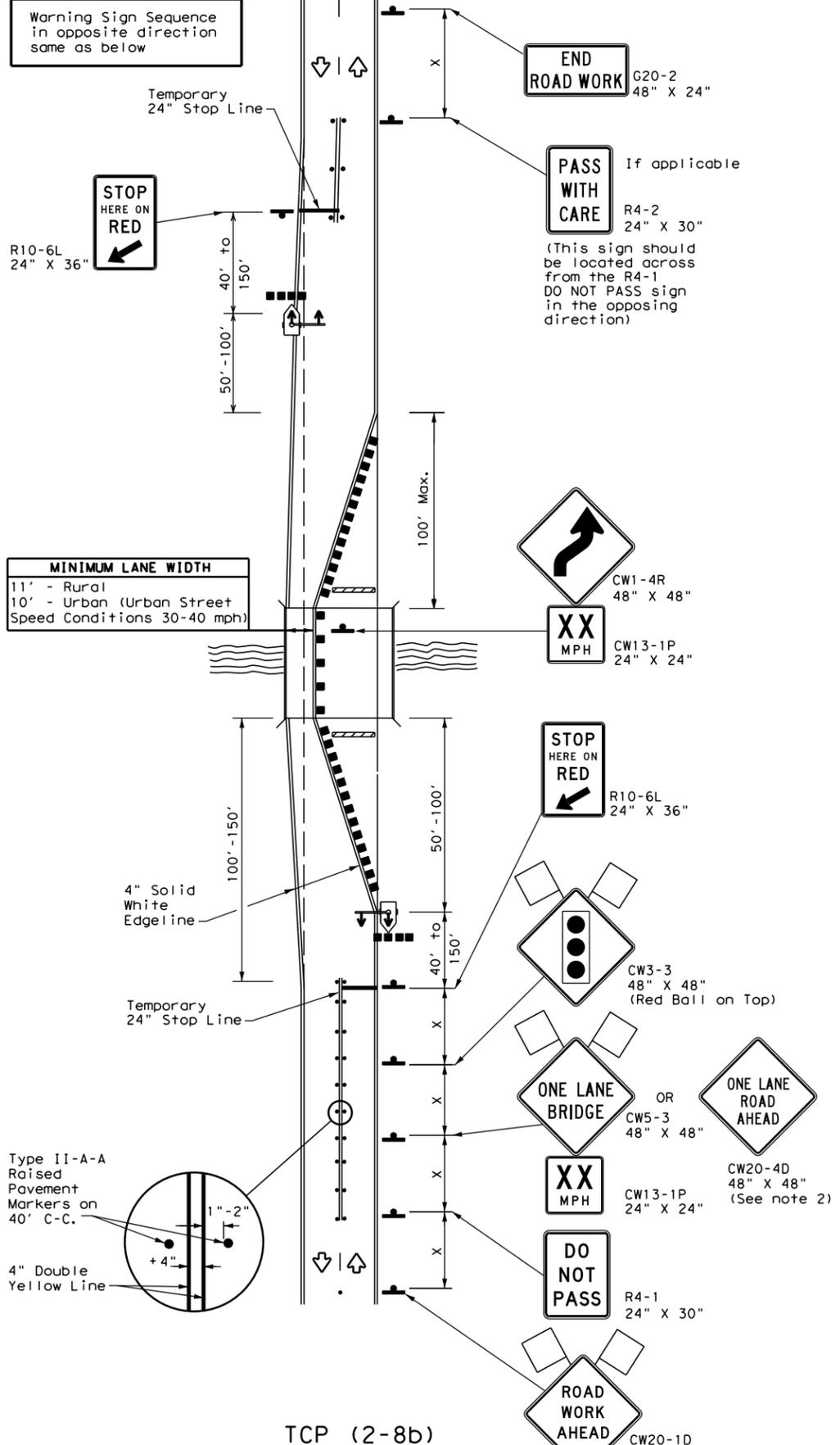
		Traffic Operations Division Standard	
<b>TRAFFIC CONTROL PLAN</b>			
<b>ONE-LANE TWO-WAY</b>			
<b>TRAFFIC CONTROL</b>			
<b>TCP (1-2) - 18</b>			
FILE: tcp1-2-18.dgn	DN:	CK:	DW:
© TxDOT December 1985	CON: 0983	SECT: 02	JOB: 022
REVISIONS	2-94 2-12	DIST: ABL	COUNTY: FISHER
4-90 4-98	2-94 2-12		SHEET NO. 31
1-97 2-18			

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 FILE: V:\2142\active\214220136\06-CAD\6.1-Sheets\standards\02 TCP\tcp2-8-18.dgn



**TCP (2-8a)**  
**ONE LANE TWO-WAY**  
**TRAFFIC CONTROL WITH YIELD SIGNS**  
 (Less Than 2000 ADT-See Note 5)



**TCP (2-8b)**  
**ONE LANE TWO-WAY**  
**TRAFFIC CONTROL WITH TRAFFIC SIGNAL**

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

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

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

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

**GENERAL NOTES**

- Flags attached to signs where shown are REQUIRED.
  - When this TCP is used at a location which does not involve a bridge, a 48" x 48" CW20-4D "ONE LANE ROAD AHEAD" signs should be used in lieu of the CW5-3 "ONE LANE BRIDGE" signs. The CW13-1P Advisory Speed Plaque is required with either warning sign.
  - Raised pavement markers shall be placed 40 feet c-c on centerline between DO NOT PASS signs and stop or yield lines.
  - For intermediate term situations, when it is not feasible to remove and restore pavement markings, the channelization must be made dominant by using a very close spacing. This is especially important in locations of conflicting information, such as where traffic is directed over a double yellow centerline. In such locations a maximum channelizing device spacing of 20 feet is recommended. The 20 foot channelizing device spacing recommendation is intended for the area of conflicting information and not the entire work zone.
- TCP (2-8a)**
- Traffic control by CW3-2 "YIELD AHEAD" symbol signs for one lane two-way traffic control operations should be limited to work spaces less than 400 feet long and roadways with less than 2000 ADT. Otherwise, portable traffic signals should be used.
  - If power is available, a flashing beacon should be attached to the CW3-2 "YIELD AHEAD" symbol sign for emphasis.
  - The R1-2 "YIELD" and R1-2aP "TO ONCOMING TRAFFIC" signs and other regulatory signs shall be installed at 7 foot minimum mounting height.
- TCP (2-8b)**
- A list of approved Portable Traffic Signals can be found in the "Compliant Work Zone Traffic Control Devices" list.
  - Portable traffic signals should be located to provide adequate stopping sight distance for approaching motorist (See table above).

Texas Department of Transportation  
 Traffic Operations Division Standard

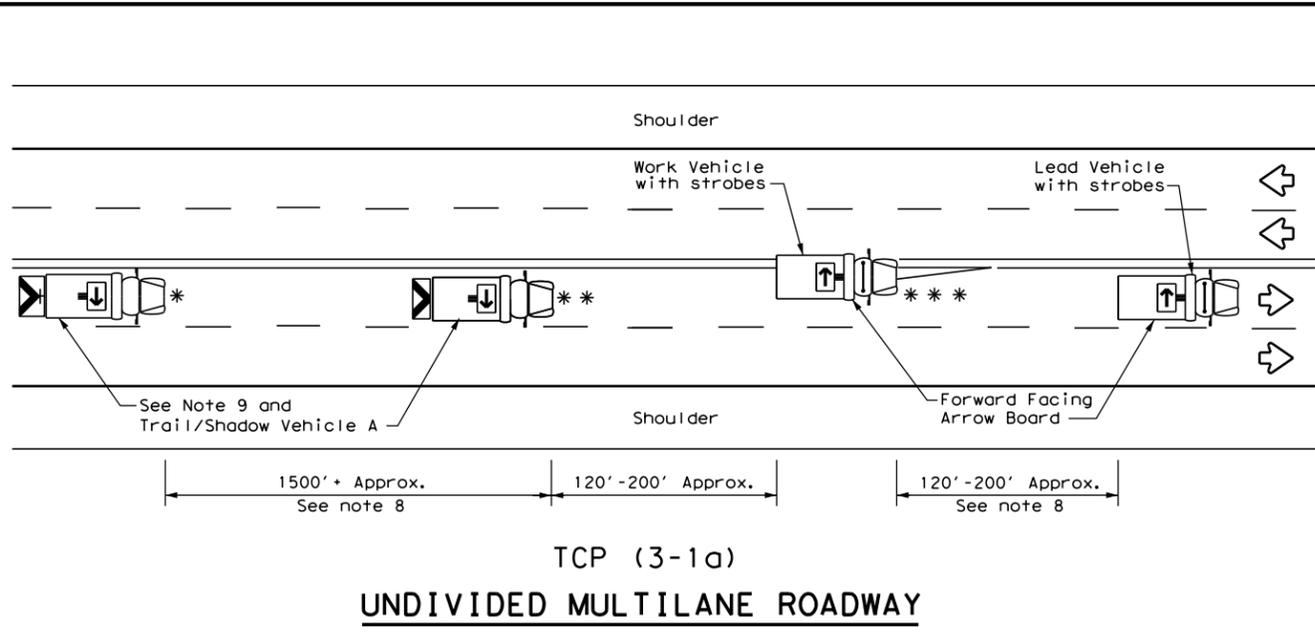
## TRAFFIC CONTROL PLAN LONG TERM ONE-LANE TWO-WAY CONTROL

### TCP (2-8) - 18

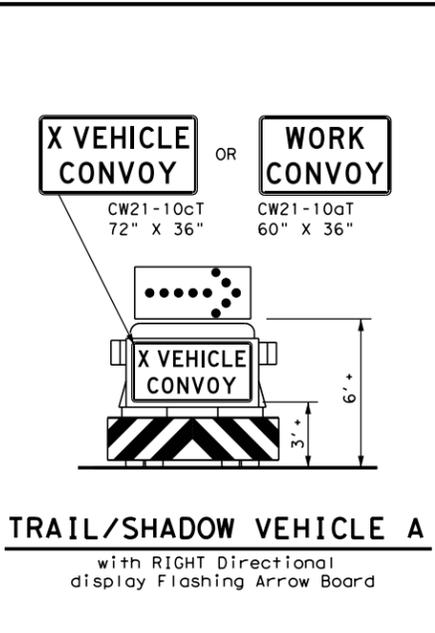
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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0983	02	022	FM 419
8-95 3-03	DIST	COUNTY	SHEET NO.	
1-97 2-12	ABL	FISHER	32	
4-98 2-18				

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



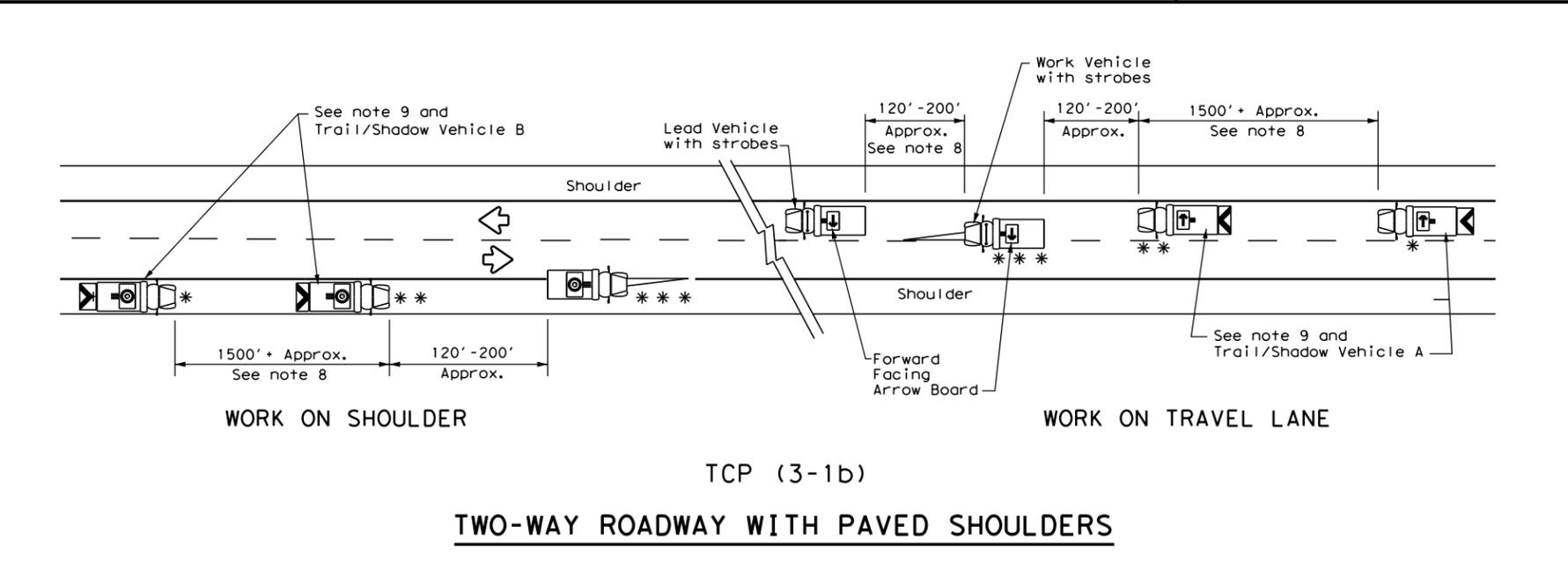
**TRAIL/SHADOW VEHICLE A**  
 with RIGHT Directional display Flashing Arrow Board

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

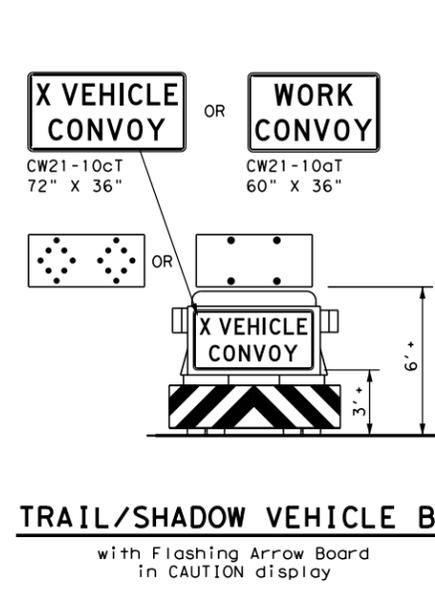
TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
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**GENERAL NOTES**

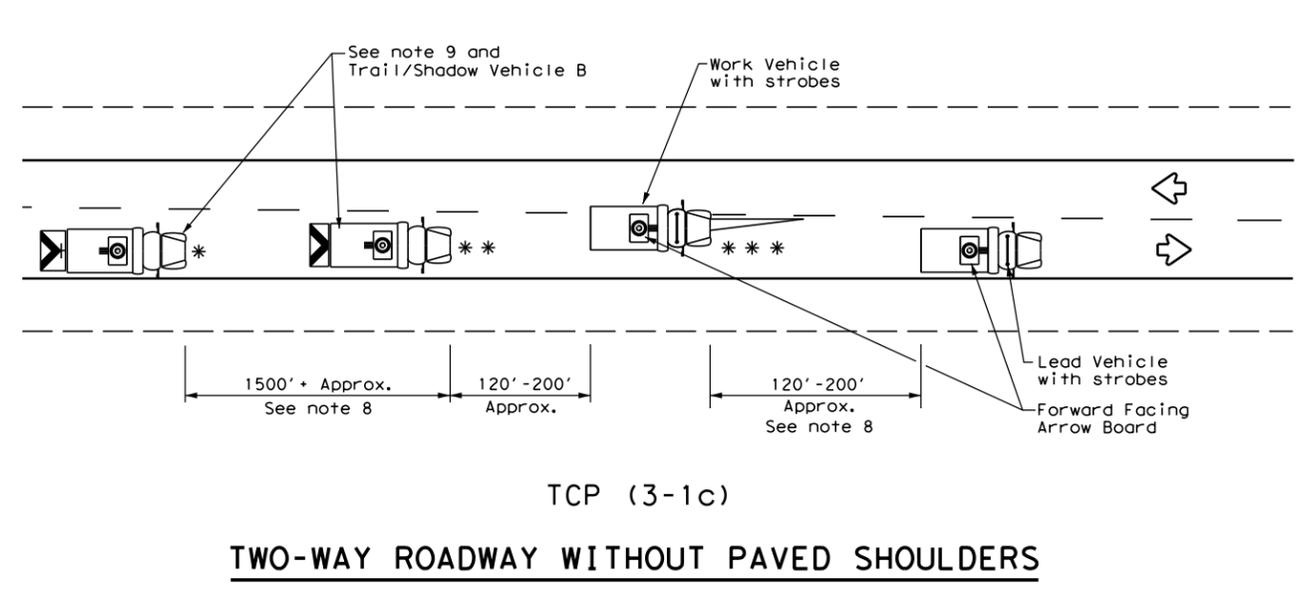
1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used the WORK vehicle must be equipped with an arrow board. The Engineer will determine if the LEAD VEHICLE and/or TRAIL VEHICLE are required based on prevailing roadway conditions, traffic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



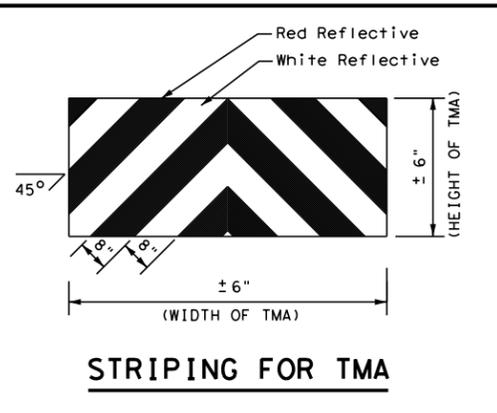
TCP (3-1b)  
**TWO-WAY ROADWAY WITH PAVED SHOULDERS**



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



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



**STRIPING FOR TMA**

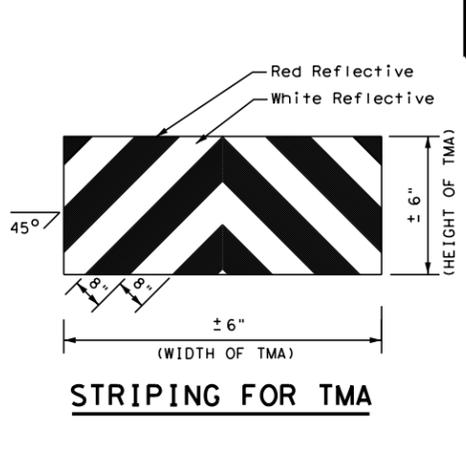
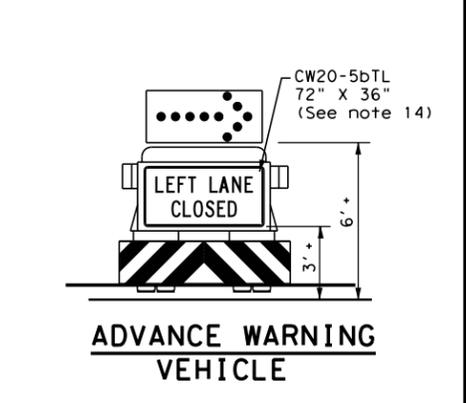
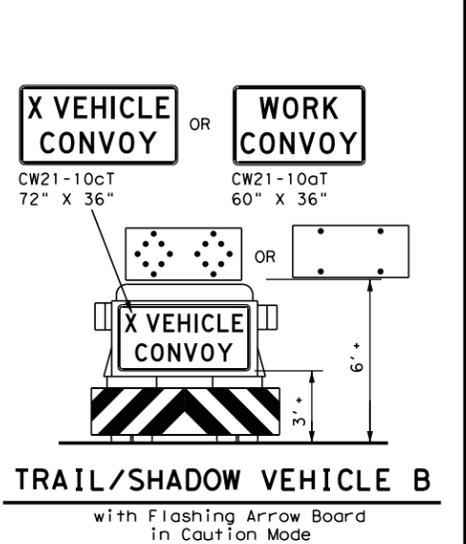
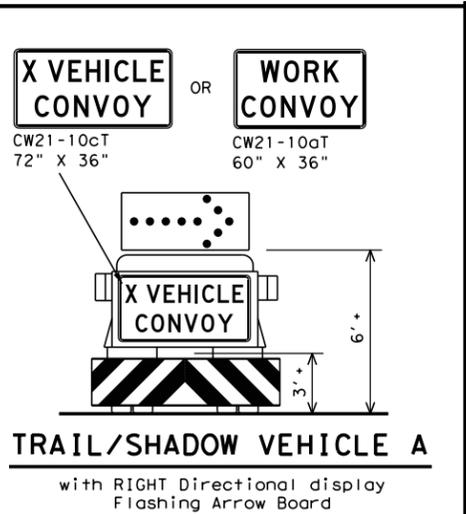
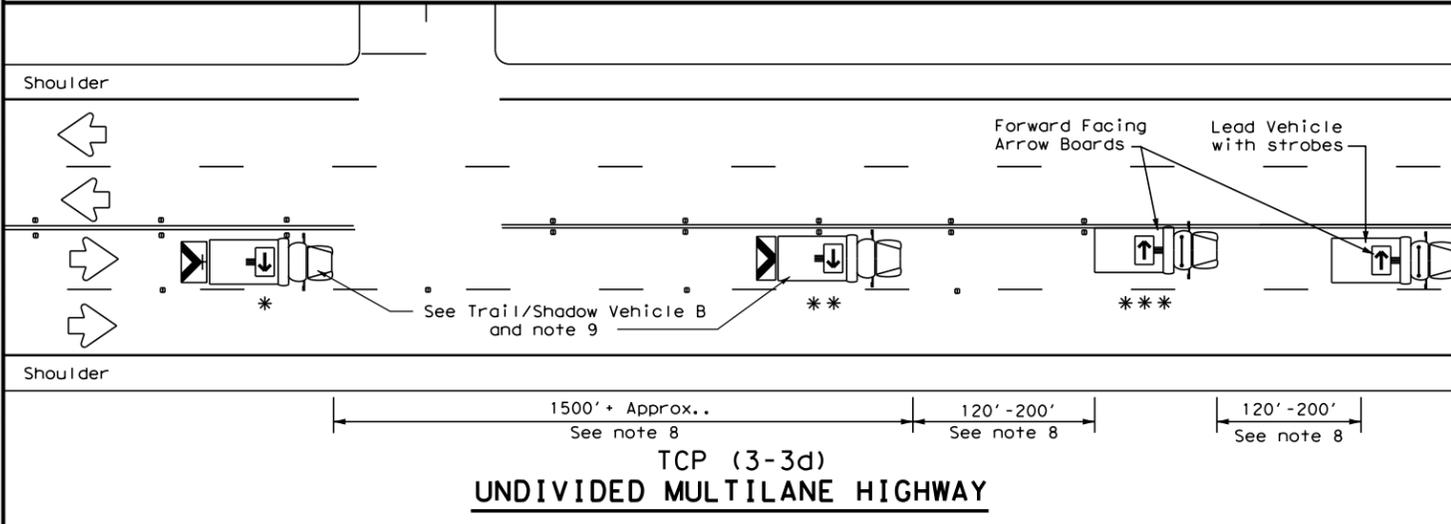
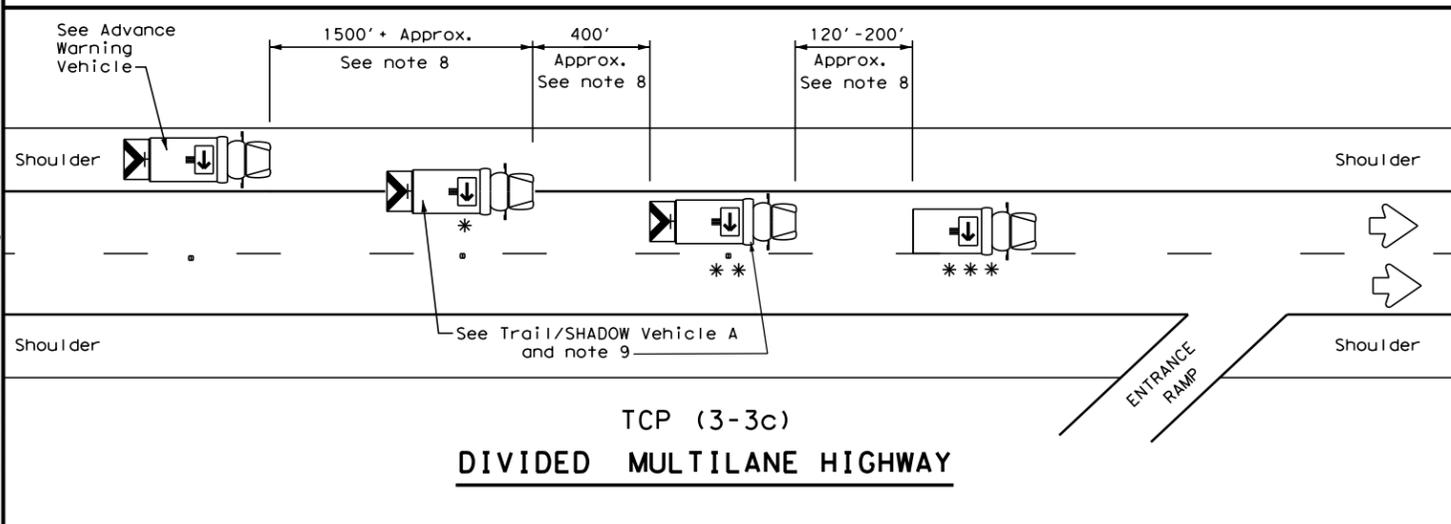
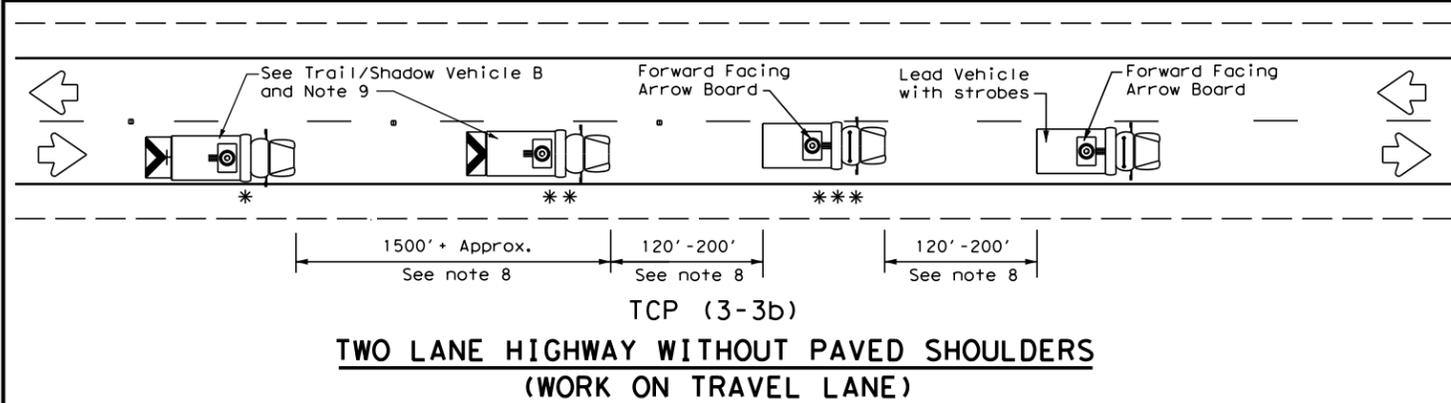
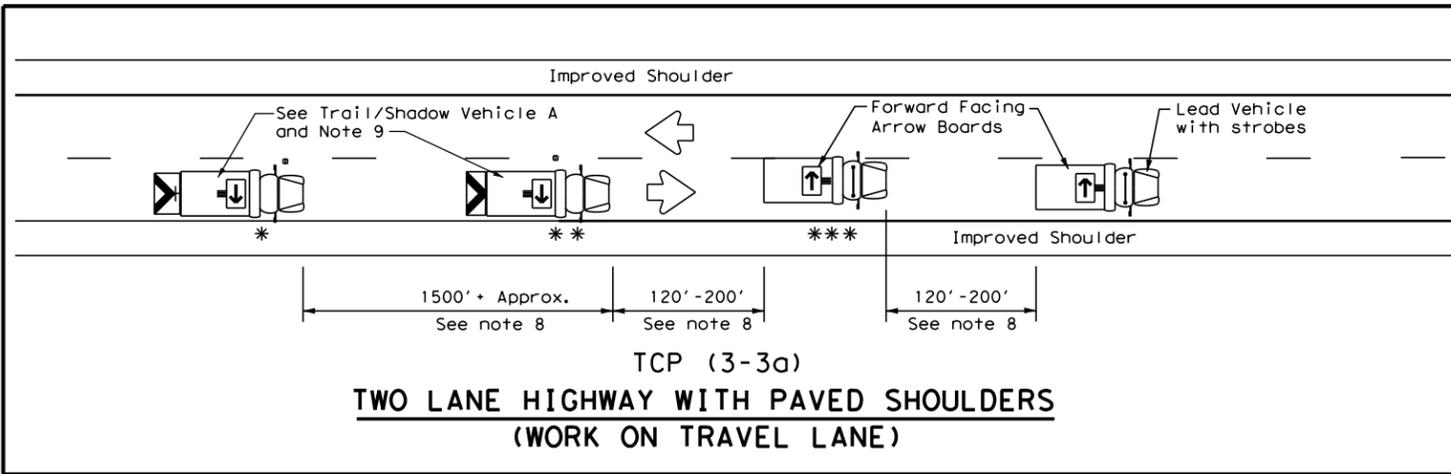
Texas Department of Transportation  
 Traffic Operations Division Standard

**TRAFFIC CONTROL PLAN  
 MOBILE OPERATIONS  
 UNDIVIDED HIGHWAYS**

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

FILE:	tcp3-1.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
© TxDOT	December 1985	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0983	02	022	FM 419				
2-94	4-98	DIST	COUNTY		SHEET NO.				
8-95	7-13	ABL	FISHER		33				
1-97									

DATE: 3/28/2021  
 FILE: V:\2142\active\214220136\06-CAD\6.1-Sheets\standards\02 TCP\tcp3-3.dgn  
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LEGEND		
* Trail Vehicle		ARROW BOARD DISPLAY
** Shadow Vehicle		
*** Work Vehicle	→	RIGHT Directional
Heavy Work Vehicle	←	LEFT Directional
Truck Mounted Attenuator (TMA)	↔	Double Arrow
Traffic Flow	⊠	CAUTION (Alternating Diamond or 4 Corner Flash)

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

**GENERAL NOTES**

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

Texas Department of Transportation

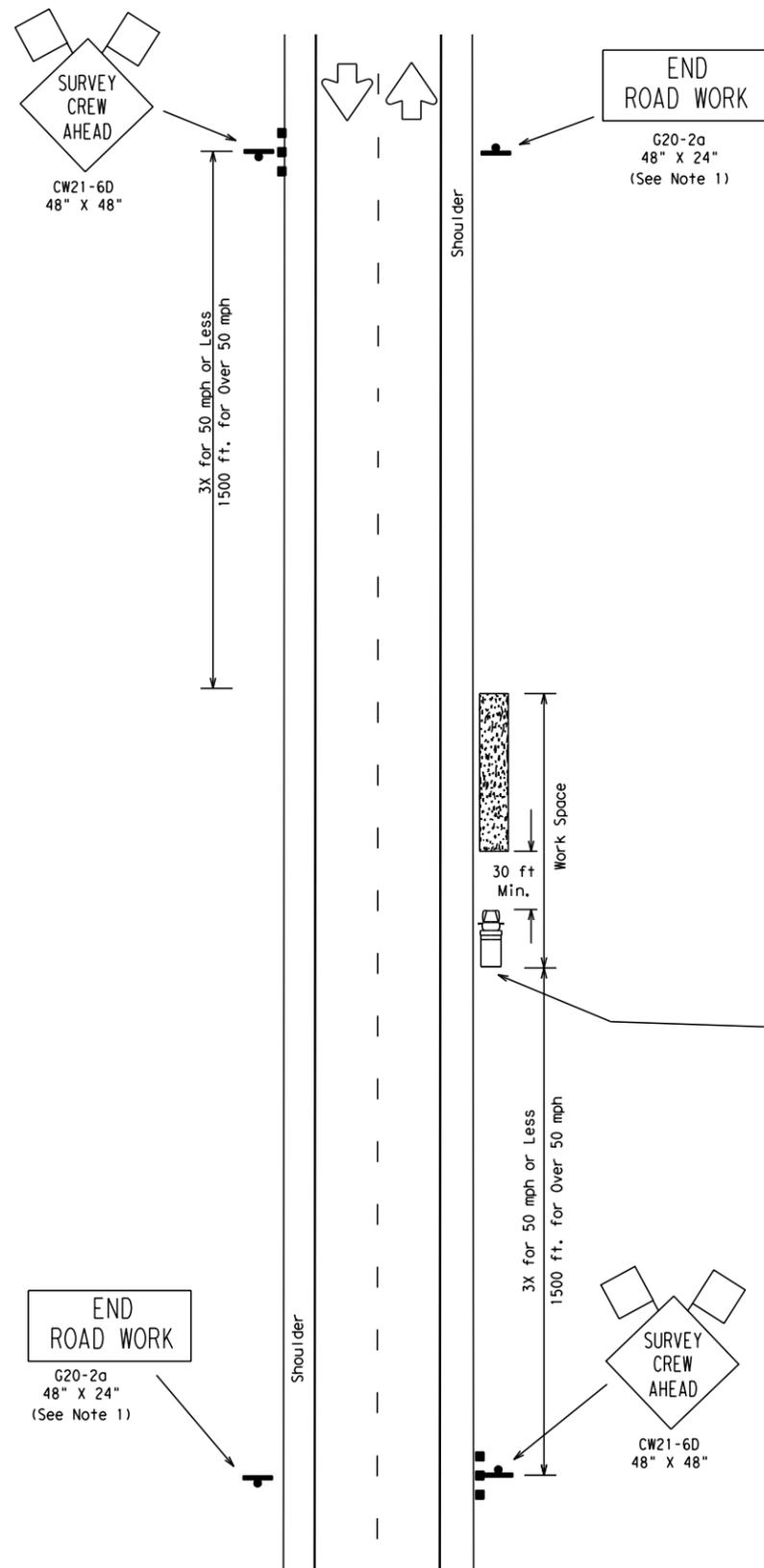
Traffic Operations Division Standard

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

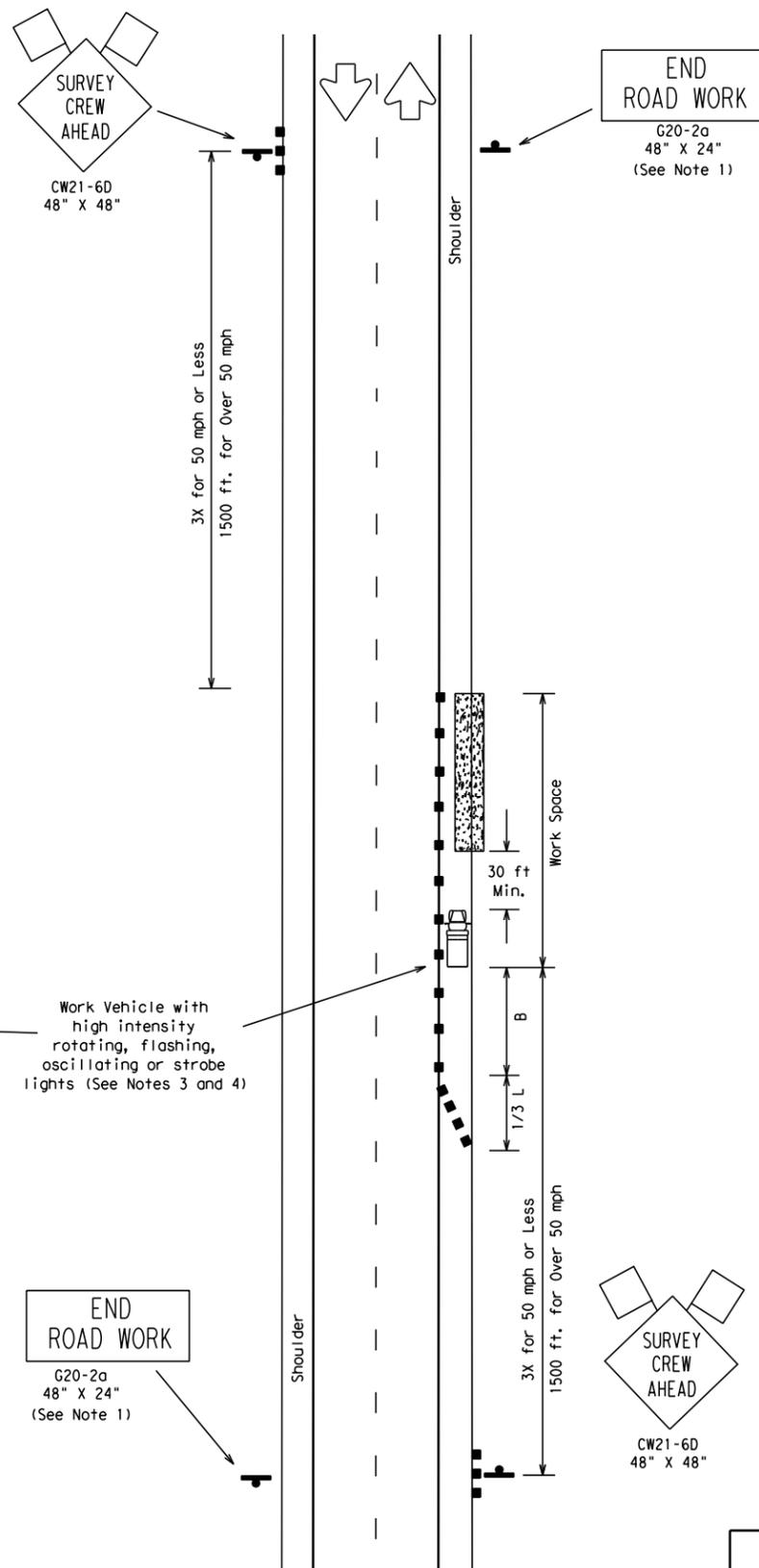
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© TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0983	02	022	FM 419
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	ABL	FISHER		34
1-97 7-14				

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 FILE: V:\2142\active\214220136\06-CAD\6.1-Sheets\standards\02\_TCP\tcps1.dgn



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



TCP (S-1b)  
 WORK ON SHOULDER

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

8-18-08 Revision  
 Corrected misspelling.

LEGEND

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

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

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

TYPICAL USAGE:

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

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

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

**Texas Department of Transportation**  
 Traffic Operations Division

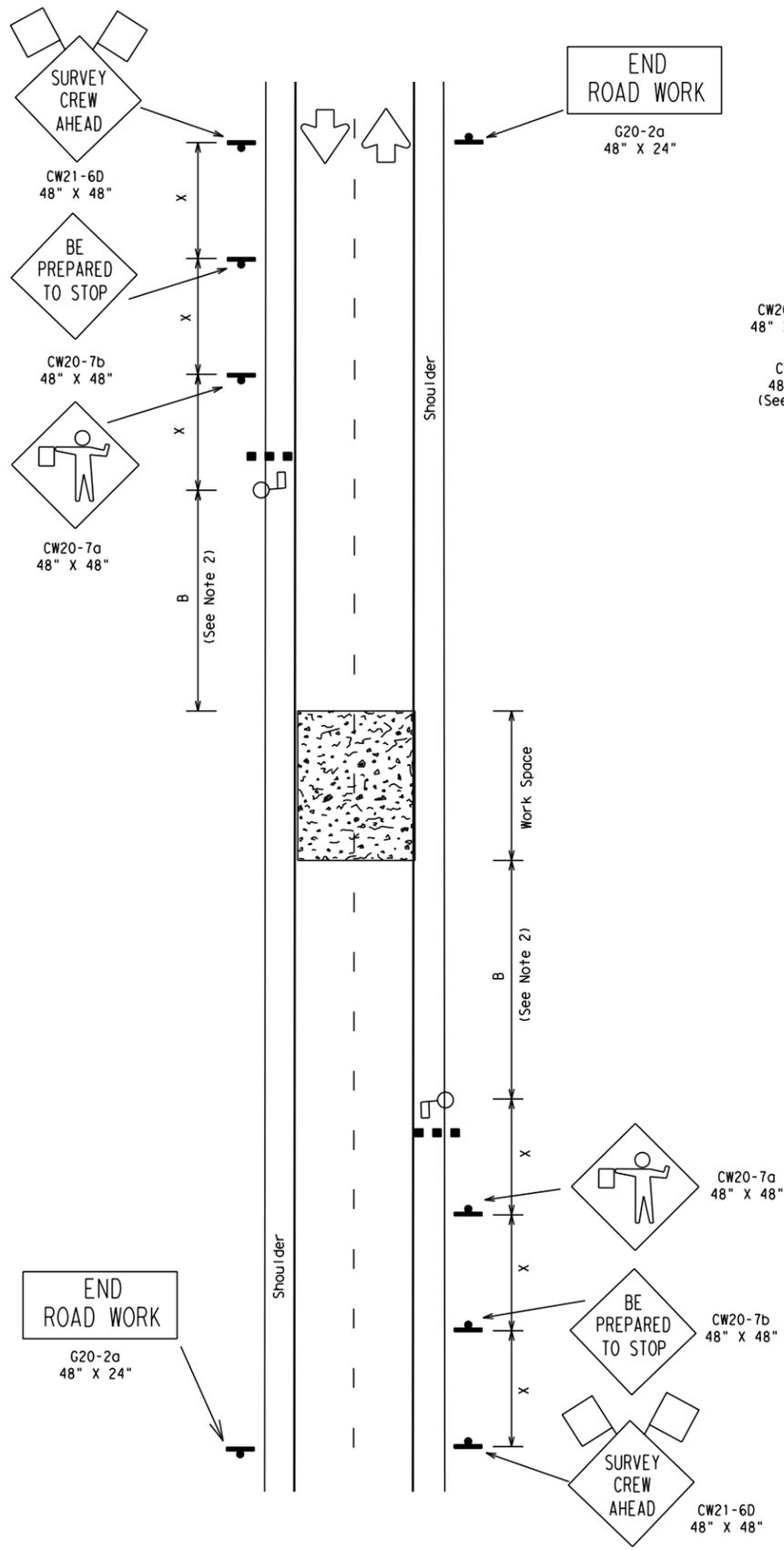
**TRAFFIC CONTROL PLAN  
 FOR SURVEYING  
 OPERATIONS**

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

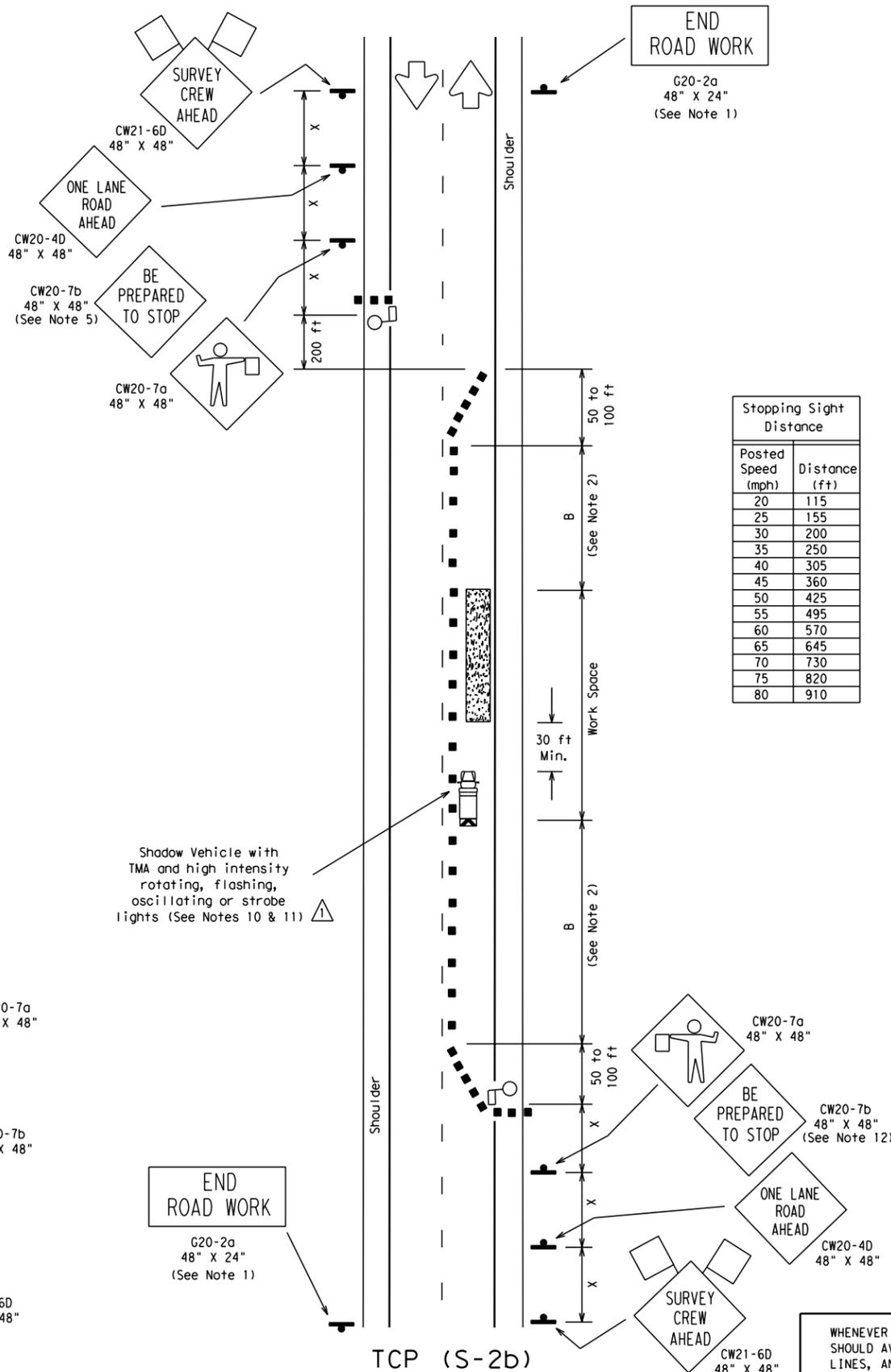
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			0983	02	022
			DIST	COUNTY	SHEET NO.
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TCP (S-2a)  
 ROAD CLOSED FOR LESS THAN 20 MINUTES -  
 OFF PEAK TRAFFIC HOURS  
 WITH OR WITHOUT SHOULDERS



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

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

LEGEND

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

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

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

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

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

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

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

8-18-08 Revision  
 Corrected reference to notes.

**Texas Department of Transportation**  
 Traffic Operations Division

**TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS**

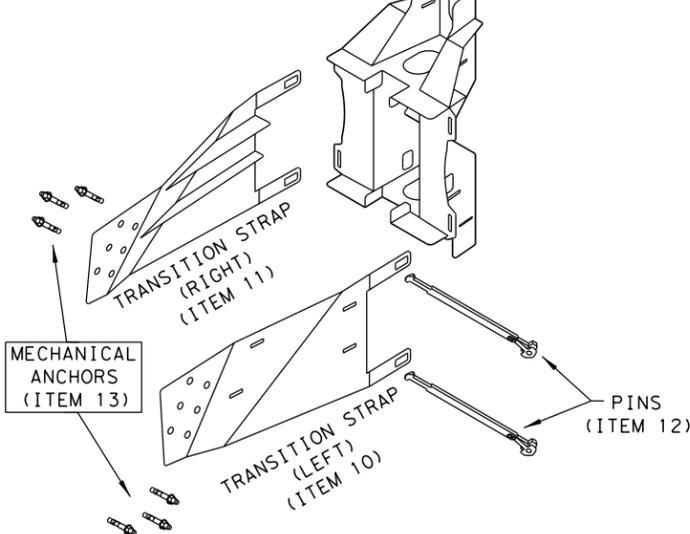
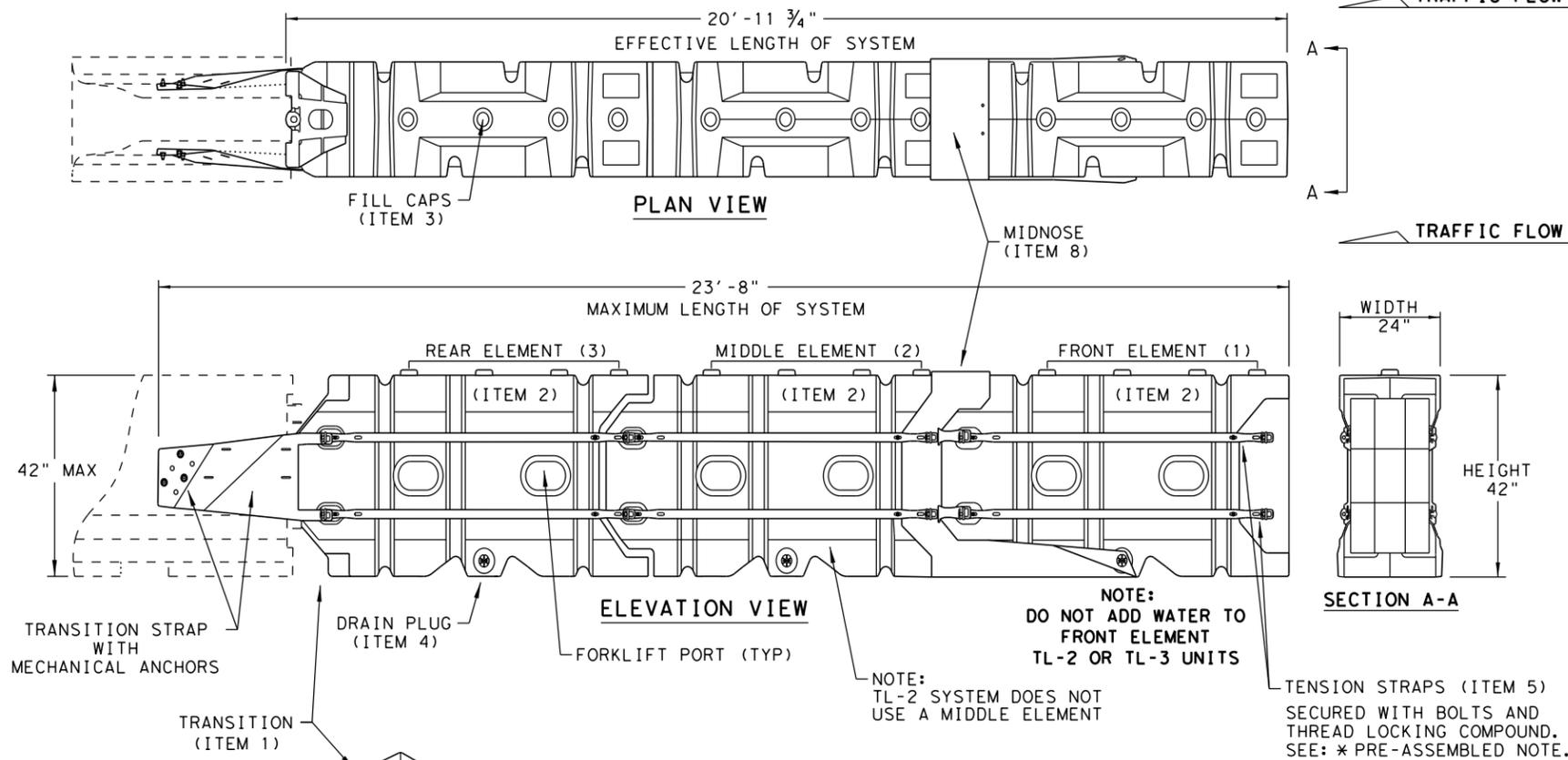
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REVISIONS		CONT	SECT	JOB	HIGHWAY
8-08		0983	02	022	FM 419
		DIST	COUNTY	SHEET NO.	
		ABL	FISHER	36	

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 FILE: V:\2142\active\214220136\06-CAD\6.1-Sheets\standard\02 TCP\absorb\09.dgn

SYSTEM SHOWN - ABSORB-M TL-3

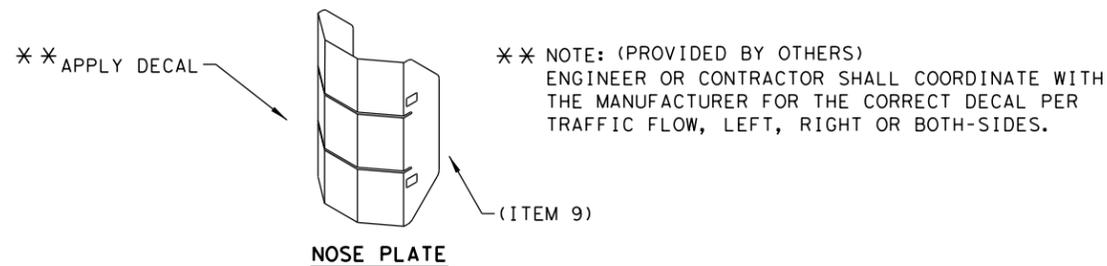


THE ABSORB-M IS A NON-REDIRECTIVE, GATING, CRASH CUSHION DESIGNED TO MEET THE LATEST TL-3 & TL-2 MASH REQUIREMENTS.

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

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

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



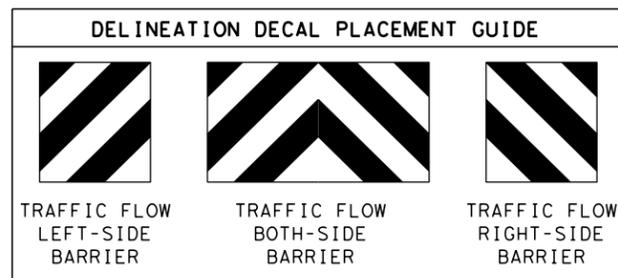
NOTE: APPLY A HIGH REFLECTIVE DECAL TO THE NOSE PLATE. DELINEATION DECAL ORIENTATION IS SHOWN ON THE CONSTRUCTION PLAN SET AND SHALL BE IN ACCORDANCE WITH THE TEXAS MUTCD FOR (TRAFFIC CONTROL DEVICES). DECALS ARE AVAILABLE FOR TRAFFIC FLOW ON THE LEFT-SIDE, BOTH -SIDES AND RIGHT-SIDE.

**GENERAL NOTES**

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

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

\* COMPONENTS PRE-ASSEMBLED WITH ELEMENT ASSEMBLY

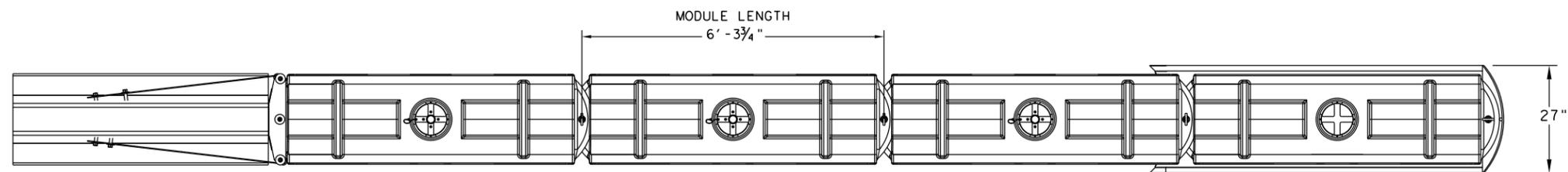


SACRIFICIAL

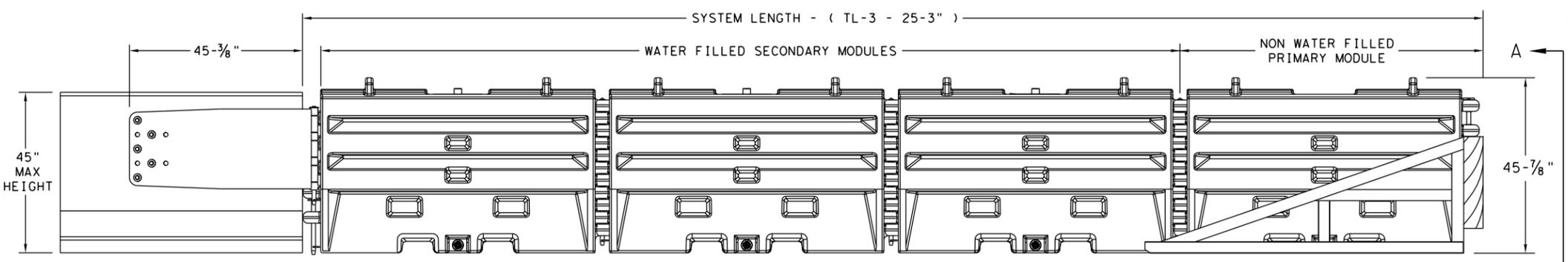
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<b>LINDSAY TRANSPORTATION SOLUTIONS          CRASH CUSHION          (MASH TL-3 &amp; TL-2)          TEMPORARY - WORK ZONE          ABSORB (M) - 19</b>			
FILE: absorbm19	DN: TxDOT	CK: KM	DW: VP
© TxDOT: JULY 2019	CONT	SECT	JOB
REVISIONS	0983	02	022
	DIST	COUNTY	SHEET NO.
	ABL	FISHER	37

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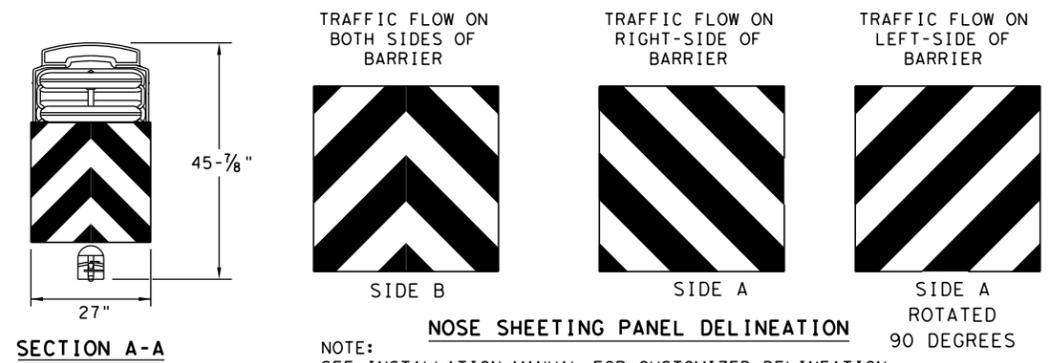
PLAN VIEW



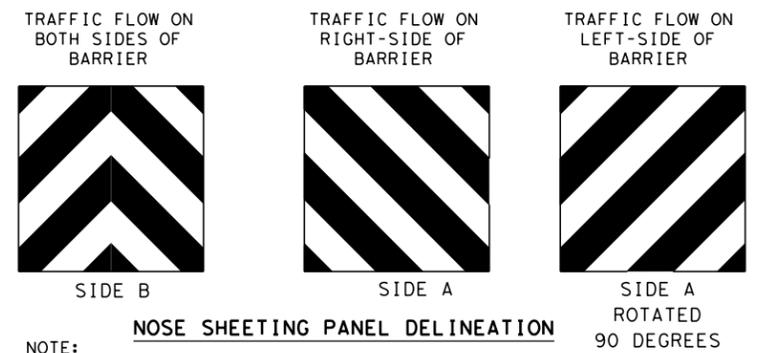
ELEVATION VIEW

**GENERAL NOTES**

1. REFER TO THE INSTALLATION MANUAL FOR SPECIFIC SYSTEM ASSEMBLY AND MODULE ORIENTATION. FOR ADDITIONAL INFORMATION, CONTACT TRAFFIX, INC. AT (949) 361-5663.
2. THE SLED SYSTEM IS A MASH APPROVED TEST LEVEL 3 (TL-3) CRASH CUSHION APPROVED FOR USE IN TEMPORARY WORK ZONES. THE SLED SYSTEM IS A NON-REDIRECTIVE, GATING CRASH CUSHION THAT DOES NOT NEED TO BE ATTACHED TO THE GROUND AND CAN BE INSTALLED ON CONCRETE, ASPHALT, GRAVEL OR COMPACTED SOIL.
3. MAXIMUM PERMISSIBLE CROSS SLOPE IS 8° (DEGREES) (14%).
4. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
5. THE SLED SYSTEM CAN BE ATTACHED TO:
  - CONCRETE BARRIER, TEMPORARY OR PERMANENT, 45" MAXIMUM HEIGHT
  - STEEL BARRIER
  - PLASTIC BARRIER
  - CONCRETE BRIDGE ABUTMENTS
  - W-BEAM GUARD RAIL
  - THRIE BEAM GUARD RAIL



SECTION A-A

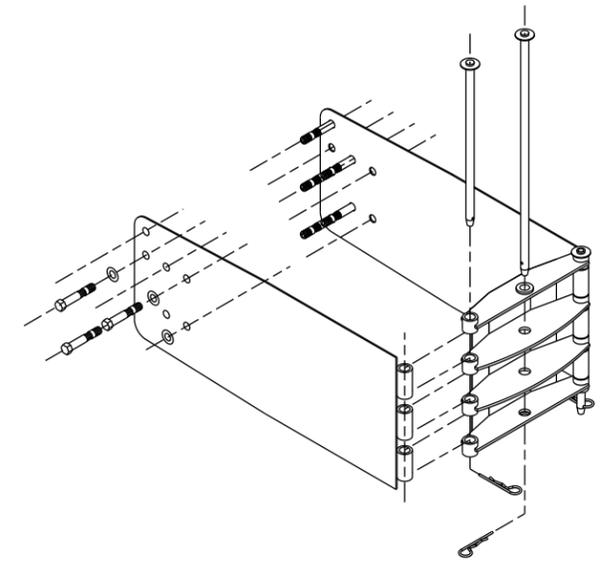


NOSE SHEETING PANEL DELINEATION

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

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

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



SLED TRANSITION COMPONENTS FOR ATTACHMENT TO CMB

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

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

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

SACRIFICIAL

Design Division Standard

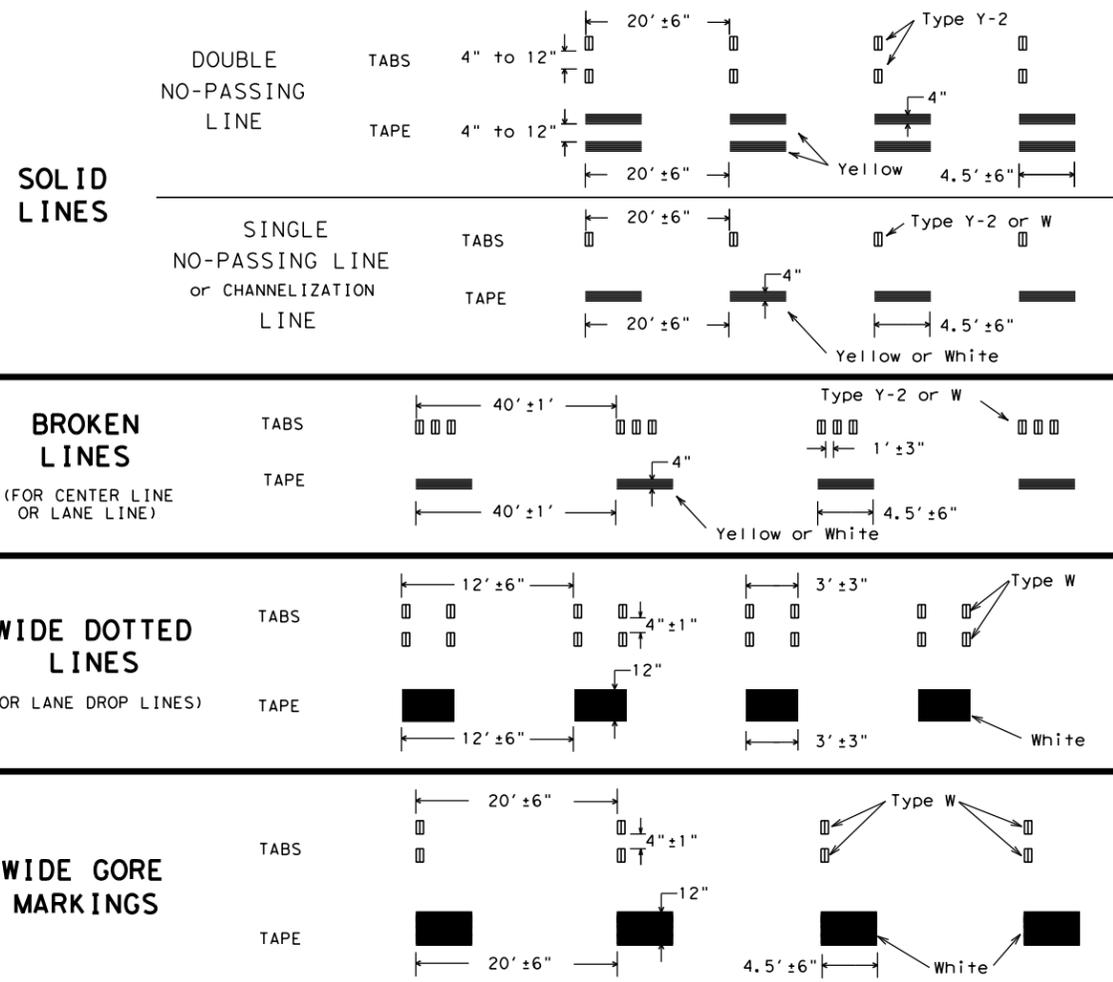
SLED  
 CRASH CUSHION  
 TL-3 MASH COMPLIANT  
 (TEMPORARY, WORK ZONE)  
 SLED-19

FILE: sled19.dgn	DN: TxDOT	CK: KM	DW: VP	CK:
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REVISIONS	0983	02	022	FM 419
DIST	COUNTY	SHEET NO.		
ABL	FISHER			38

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## WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



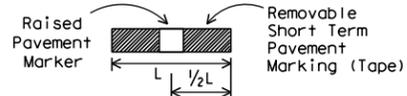
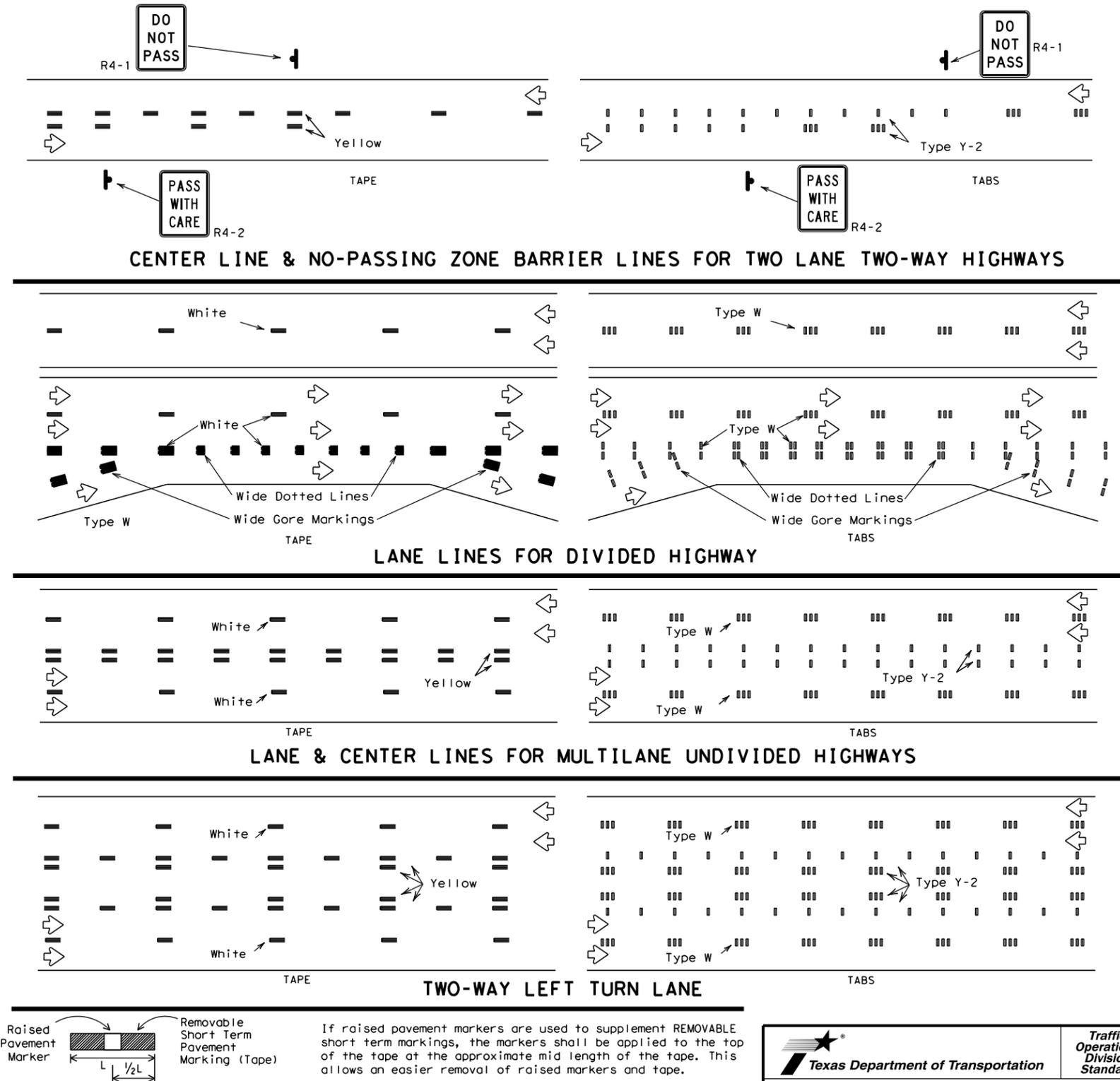
### NOTES:

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

### TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

## WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



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

### PREFABRICATED PAVEMENT MARKINGS

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

### RAISED PAVEMENT MARKERS

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

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

- DMSs referenced above can be found along with embedded links to their respective MPLs at the following website:  
[http://www.txdot.gov/business/contractors\\_consultants/material\\_specifications/default.htm](http://www.txdot.gov/business/contractors_consultants/material_specifications/default.htm)



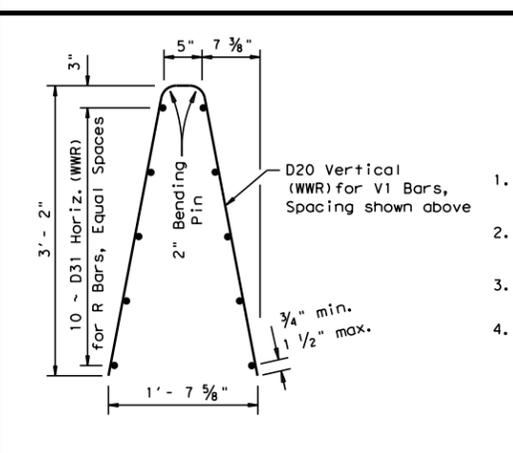
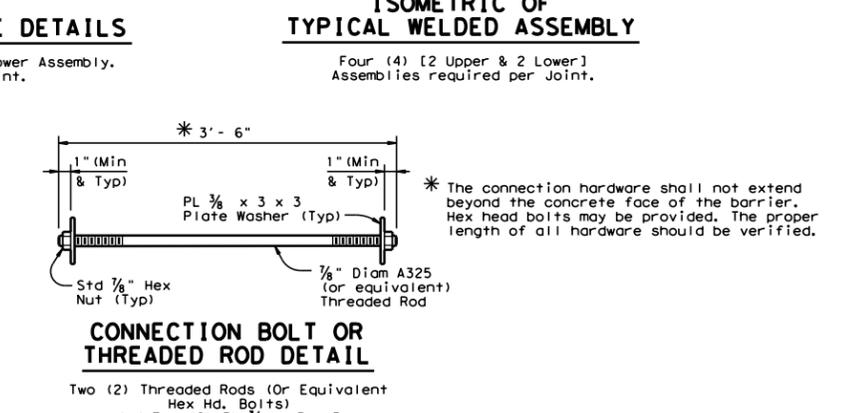
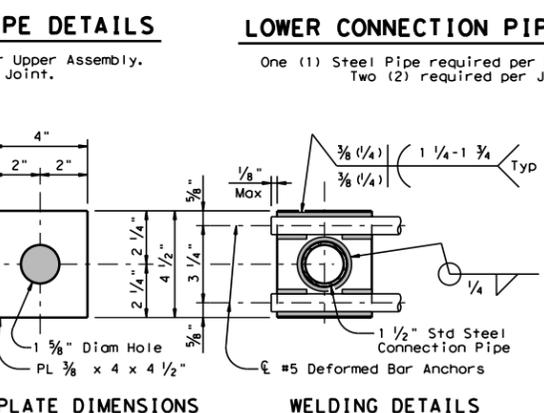
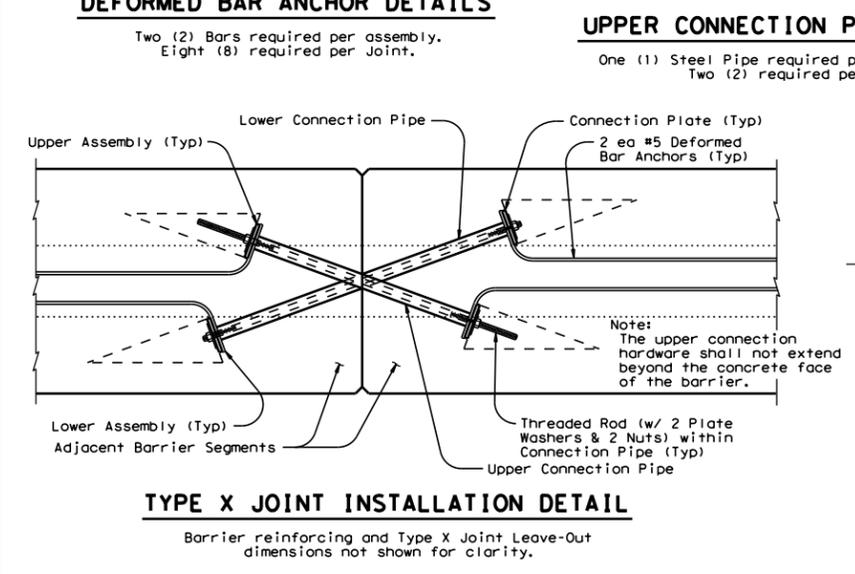
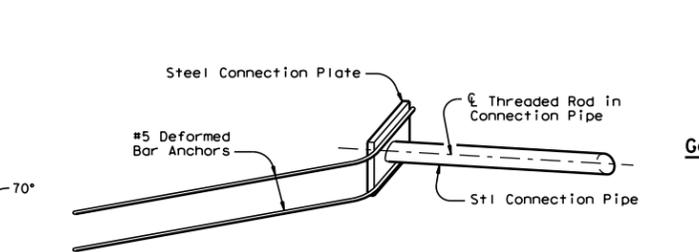
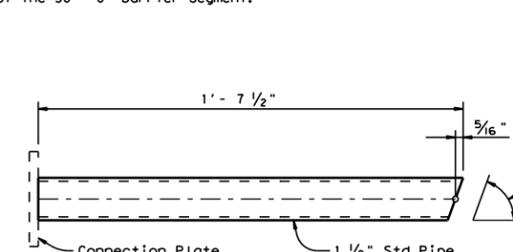
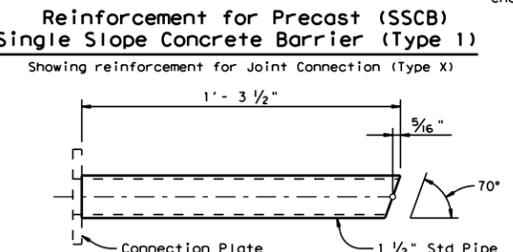
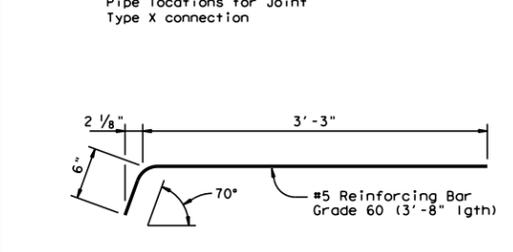
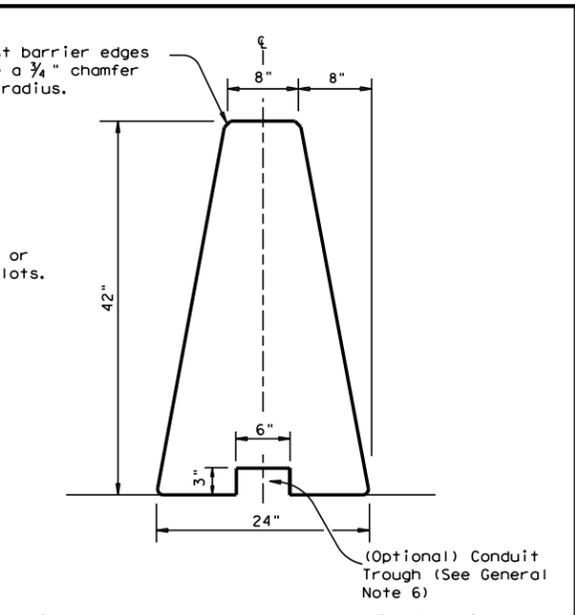
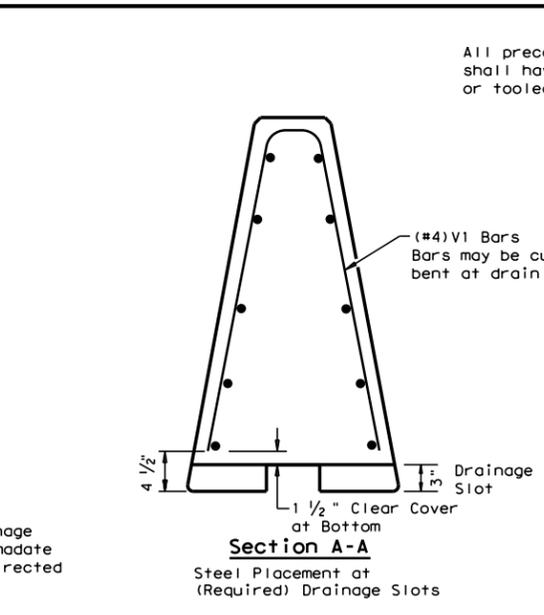
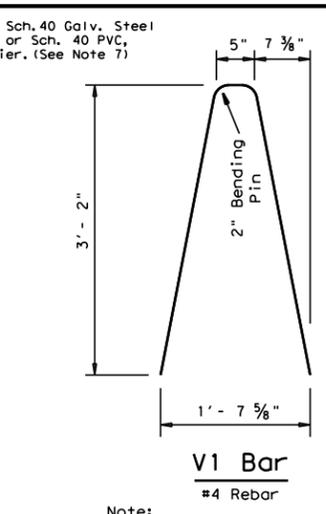
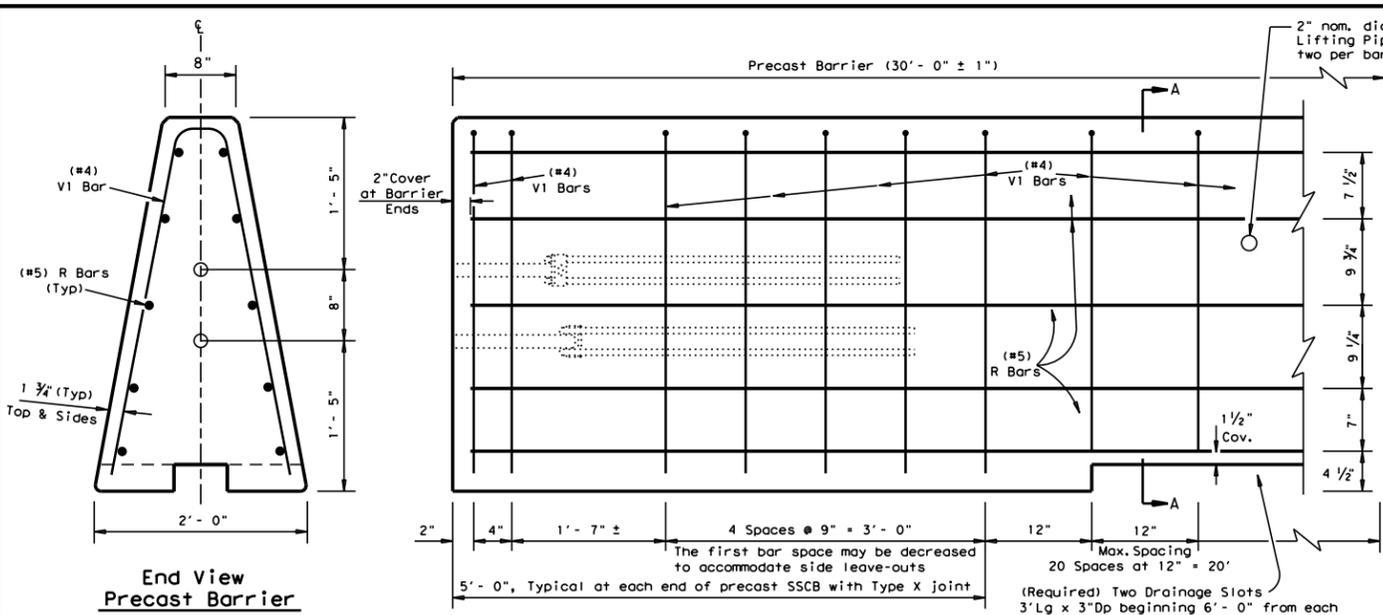
## WORK ZONE SHORT TERM PAVEMENT MARKINGS

### WZ (STPM) - 13

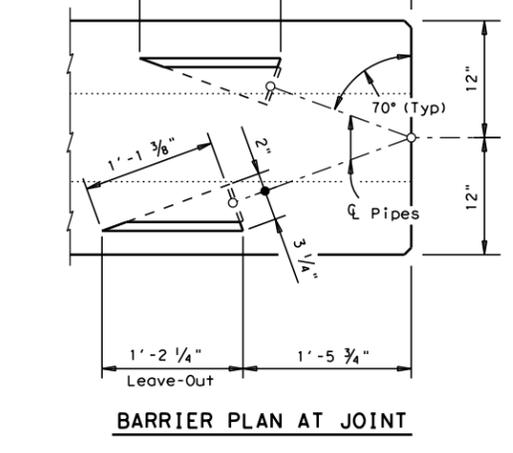
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© TxDOT	April 1992	CONT:	0983	SECT:	02	JOB:	022	FM:	419
REVISIONS		DIST:		COUNTY:		SHEET NO.:			
1-97		ABL:		FISHER					39
3-03									
7-13									

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



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

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

SHEET 1 OF 2

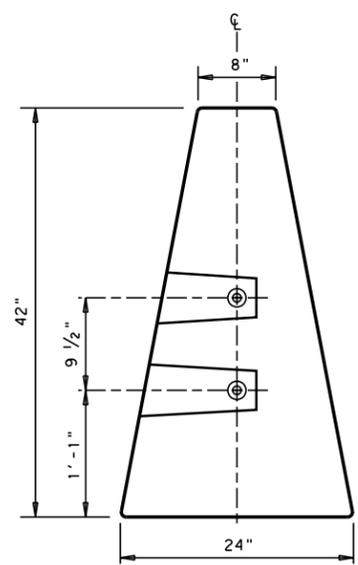
Design Division Standard

**SINGLE SLOPE CONCRETE BARRIER**  
 PRECAST BARRIER (TYPE 1)  
 SSCB(2)-10

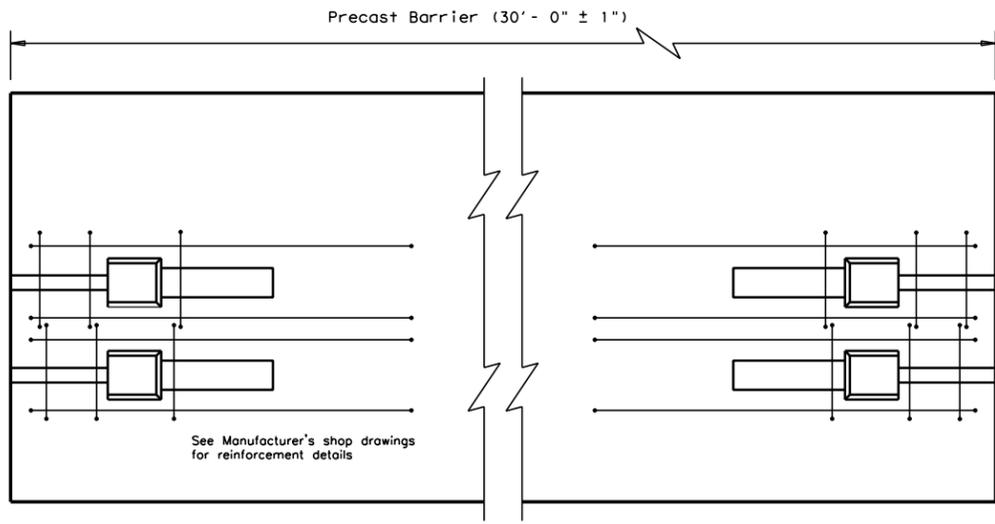
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© TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0983	02	022	FM 419
	DIST	COUNTY		SHEET NO.
	ABL	FISHER		40

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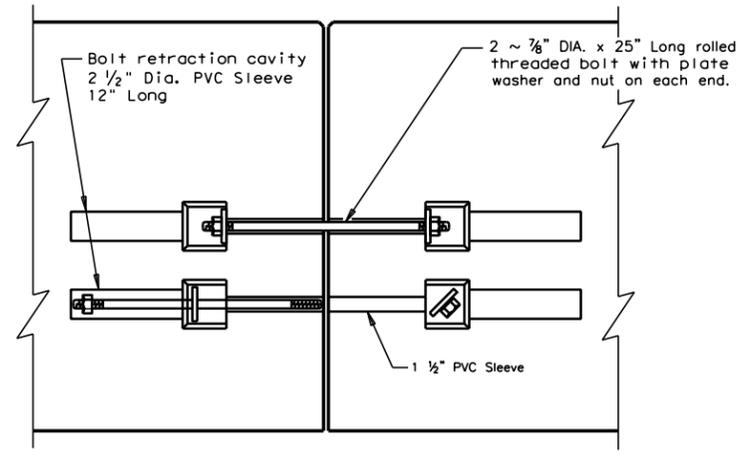
DATE: 3/28/2021  
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**END VIEW**  
"QUICK-BOLT" POCKET LOCATIONS

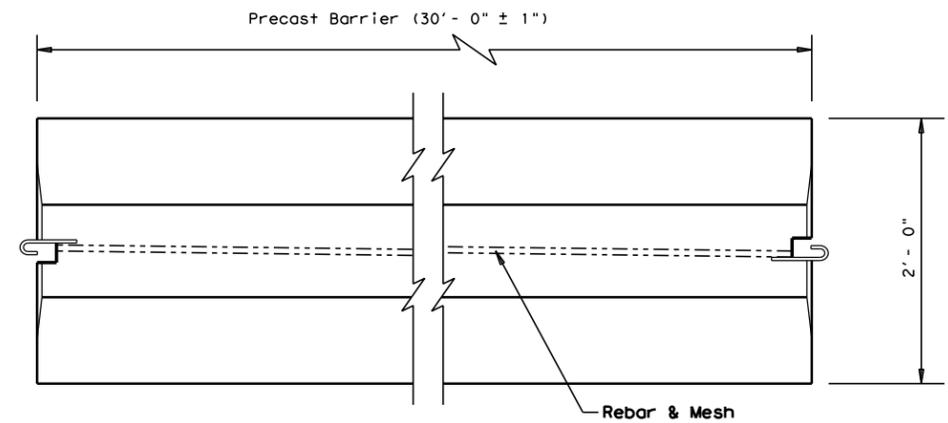


**ELEVATION VIEW**  
"QUICK-BOLT" (SSCB)  
See Manufacturer's shop drawing for additional details

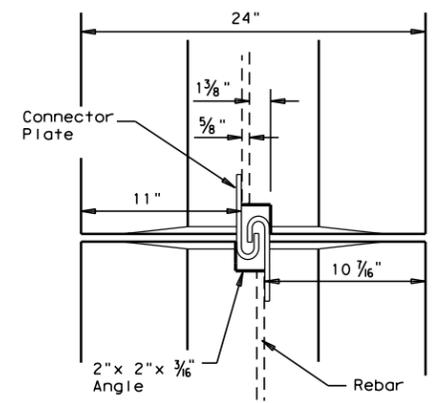


**ELEVATION VIEW SHOWING JOINT CONNECTION**  
"QUICK-BOLT"

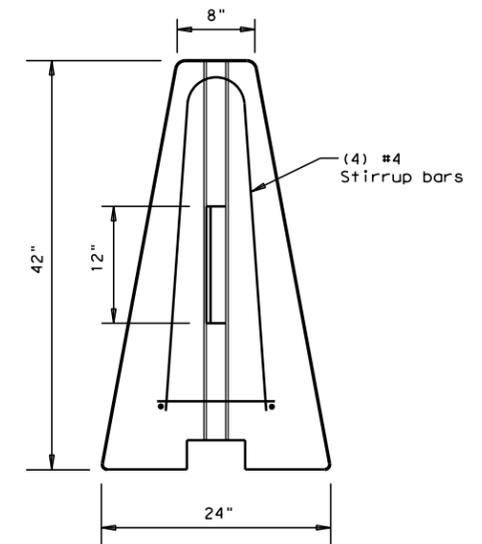
**Joint Connection (Type Q)**



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



**VIEW FROM ABOVE**  
J-J HOOK CONNECTION



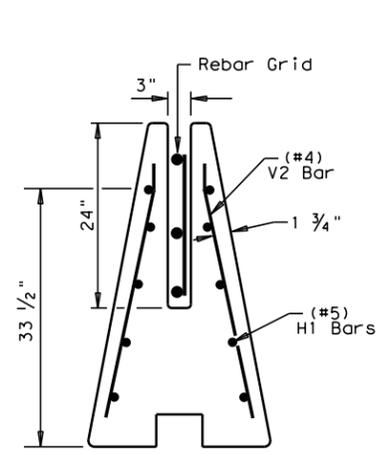
**END VIEW**

**Proprietary Joint Connections (SSCB)**

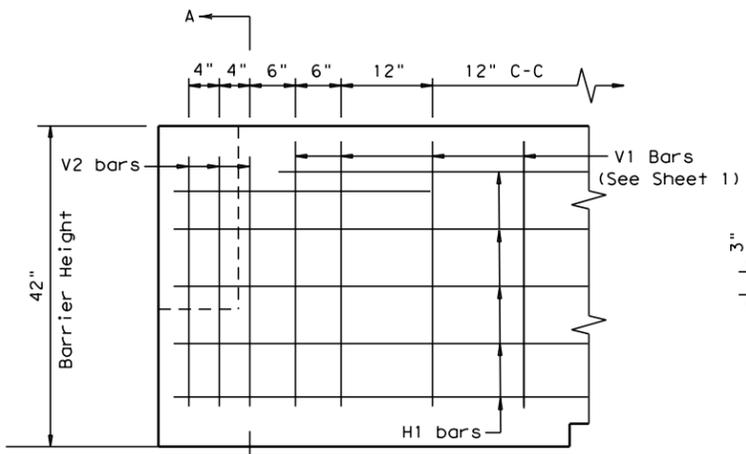
Two proprietary joint connections are acceptable as alternates to the (Type X) connection shown, here on. These joint connections types are:

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

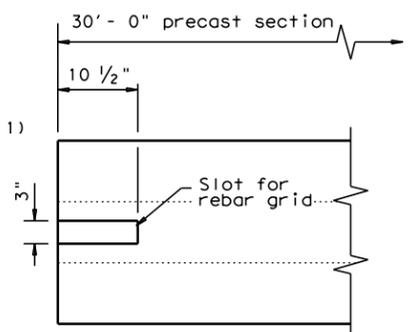
If one of these connection systems are exclusively specified in the plans, prior approval for sole source use must be obtained. Details of the connection components and barrier reinforcement for these systems, will be shown on the manufacturer's shop drawing(s) furnished to the Engineer.



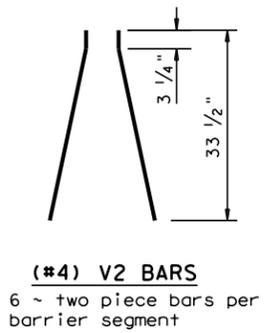
**SECTION A-A**  
Showing (Type R)  
Rebar Grid



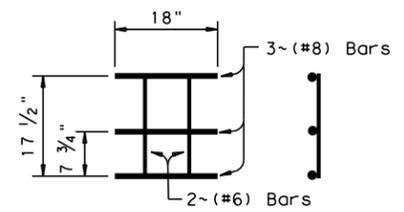
**ELEVATION**  
V1 Bars (See Sheet 1)



**TOP VIEW**  
JOINT CONNECTION  
Typical at both ends of barrier segment



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



**WELDED REBAR GRID**

**Joint Connection (Type R)**

SHEET 2 OF 2

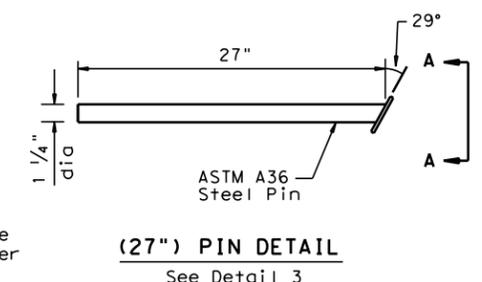
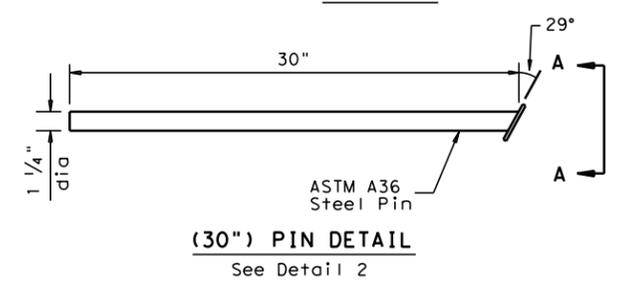
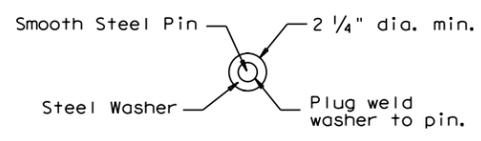
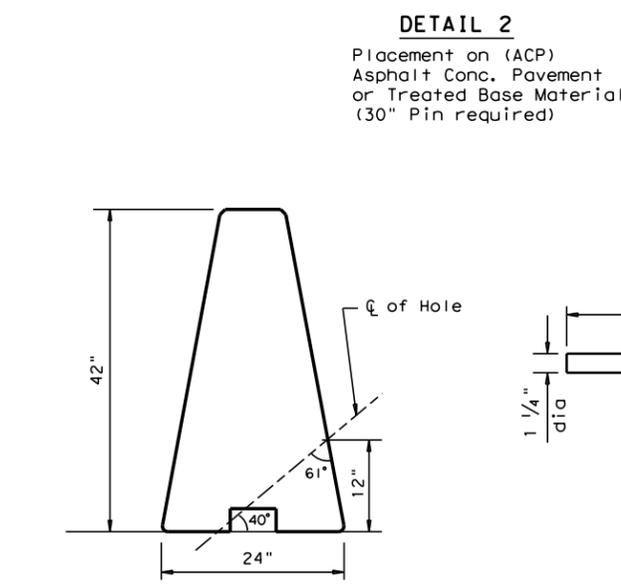
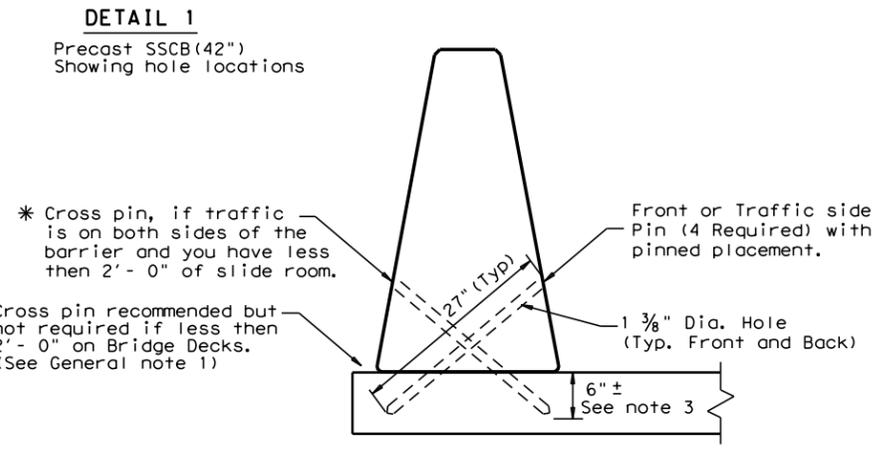
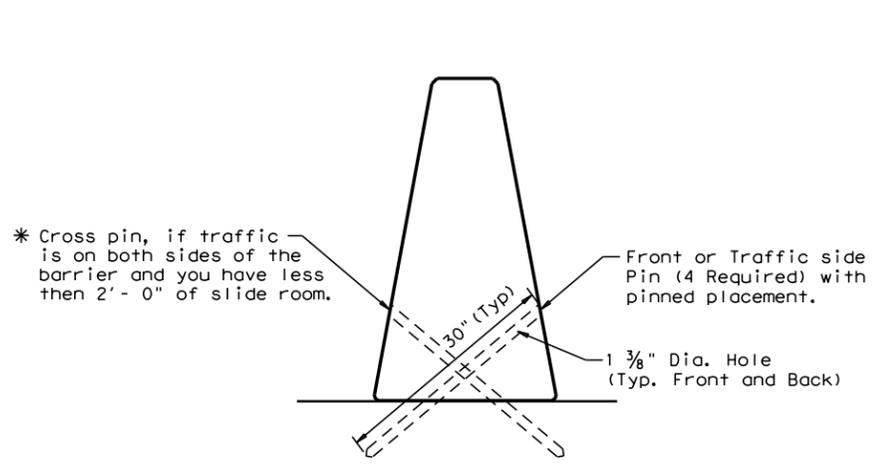
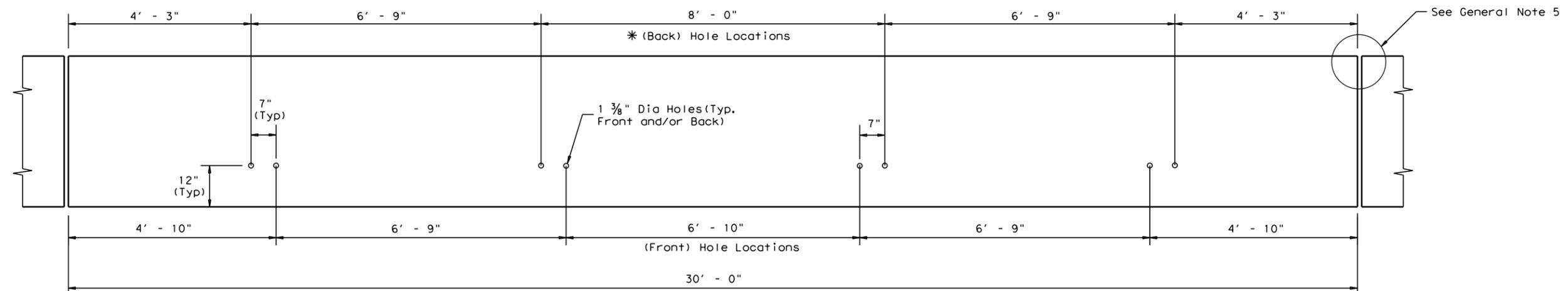
**Design Division Standard**

**SINGLE SLOPE CONCRETE BARRIER**  
PRECAST BARRIER (TYPE 1)  
**SSCB(2) - 10**

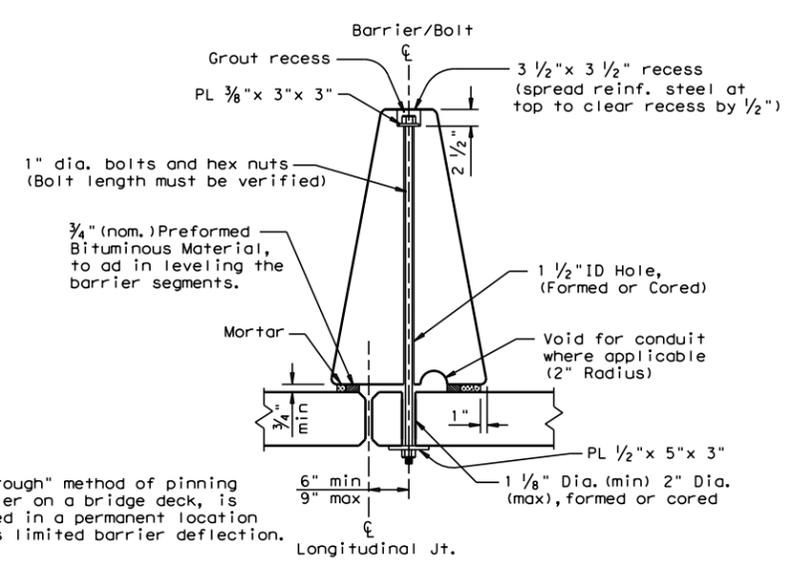
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REVISIONS	0983	02	022	FM 419
DIST	COUNTY		SHEET NO.	
ABL	FISHER		41	

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



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

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

**PRECAST SSCB (BOLT THROUGH) PLACEMENT OVER LONGITUDINAL EXPANSION JOINT**

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

**GENERAL NOTES**

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

		<b>Design Division Standard</b>	
<h2>SINGLE SLOPE CONCRETE BARRIER</h2> <h3>PRECAST BARRIER (TYPE 1) PINNED PLACEMENT</h3> <h2>SSCB(5) - 10</h2>			
FILE: sscb510.dgn	DN: TxDOT	CK: AM	DW: BD
© TxDOT December 2010	CONT: 0983	SECT: 02	JOB: 022
REVISIONS			HIGHWAY: FM 419
	DIST: ABL	COUNTY: FISHER	SHEET NO.: 42

GRID  
 CP 1- 5/8" CIRS  
 MON  
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 E: 6,905,347.747'

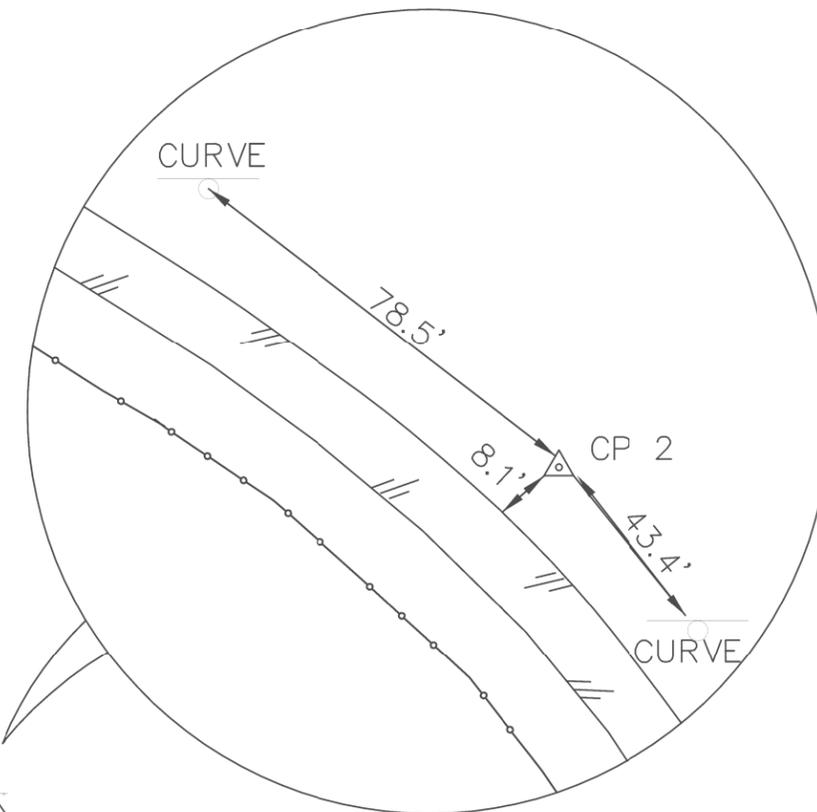
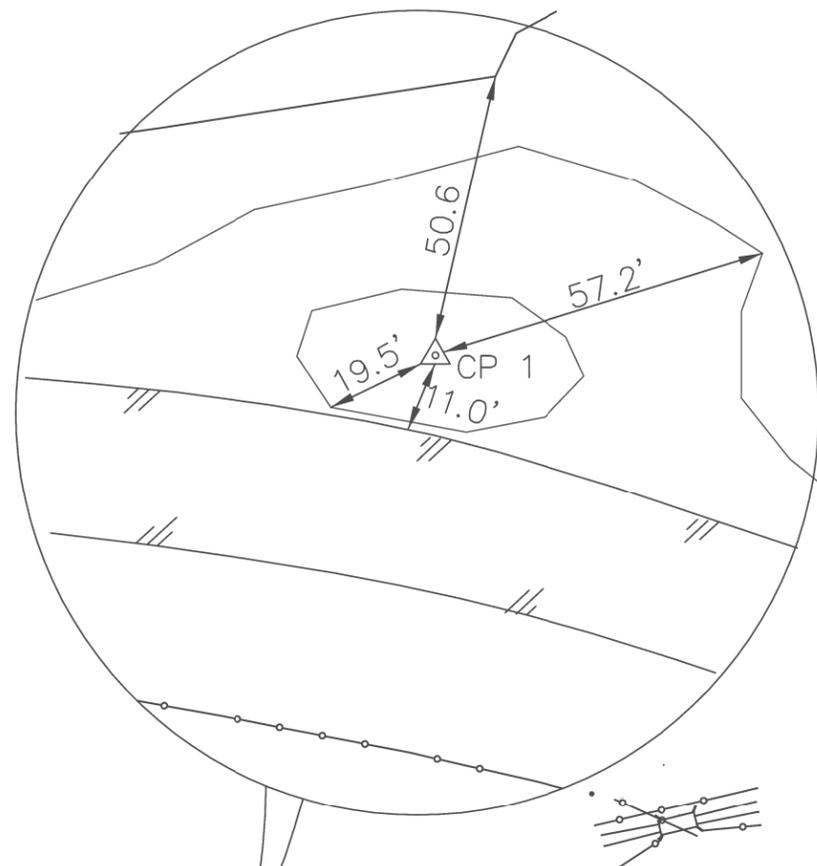
SURFACE  
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 MON  
 N: 1,359,508.135'  
 E: 6,906,797.87'  
 Z: 2106.039'

GRID  
 CP 2- 5/8" CIRS  
 MON  
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 E: 6,904,769.357'

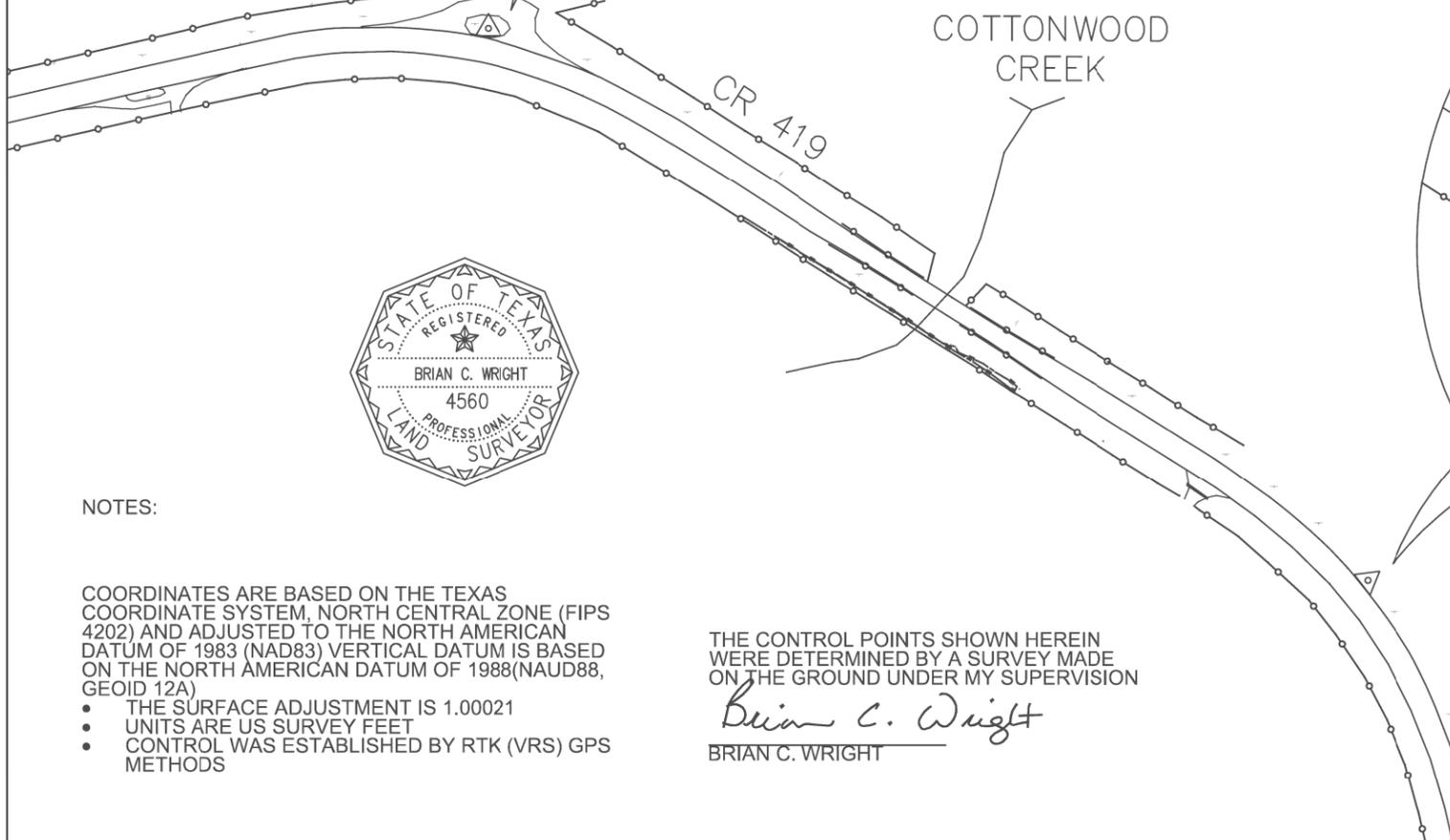
SURFACE  
 CP 2- 5/8" CIRS  
 MON  
 N: 1,360,431.138'  
 E: 6,906,219.359'  
 Z: 2115.628

CP 1 IS LOCATED 11.0' NORTH OF THE EDGE OF ASPHALT OF CR 419, 19.5' NORTHEAST OF A EDGE OF GRAVEL, 50.6' SOUTHEAST OF THE CORNER OF A BARBED WIRE FENCE, AND 57.2' SOUTHWEST FROM THE NORTHEAST CORNER OF A GRAVEL DRIVEWAY.

CP 2 IS LOCATED 8.1' NORTH OF THE EDGE OF ASPHALT OF CR 419, 43.4' NORTHWEST OF ROAD CURVES SIGN AND 78.5' SOUTHWEST OF A ROAD CURVES SIGN



HORIZ. SCALE IN FEET



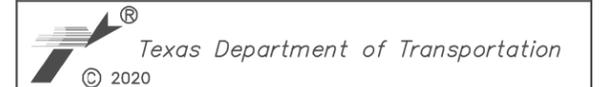
NOTES:

- COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, NORTH CENTRAL ZONE (FIPS 4202) AND ADJUSTED TO THE NORTH AMERICAN DATUM OF 1983 (NAD83) VERTICAL DATUM IS BASED ON THE NORTH AMERICAN DATUM OF 1988 (NAUD88, GEOID 12A)
- THE SURFACE ADJUSTMENT IS 1.00021
- UNITS ARE US SURVEY FEET
- CONTROL WAS ESTABLISHED BY RTK (VRS) GPS METHODS

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION

*Brian C. Wright*  
 BRIAN C. WRIGHT

TEXAS REGISTERED SURVEYING FIRM 10183100



SURVEY CONTROL INDEX  
 FM 419 AT COTTONWOOD CREEK

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		FM419
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	ABILENE	FISHER	43
CONTROL	SECTION	JOB	
0983	02	022	

3/28/2021

# HORIZONTAL ALIGNMENT DATA FM 419

<\* 1 DESCRIBE CHAIN FM419

Chain FM419 contains:  
300 CUR FM-1 CUR FM-2 301

Beginning chain FM419 description

Point 300 X 1,360,629.84 Y 6,905,516.82 Sta 385+34.50

Course from 300 to PC FM-1 N 12° 43' 53.75" W Dist 475.00

Curve Data  
\*-----\*

Curve FM-1  
P.I. Station 392+36.90 X 1,360,475.04 Y 6,906,201.96  
Delta = 44° 55' 34.16" (LT)  
Degree = 10° 25' 02.69"  
Tangent = 227.40  
Length = 431.26  
Radius = 550.00  
External = 45.16  
Long Chord = 420.30  
Mid. Ord. = 41.73  
P.C. Station 390+09.50 X 1,360,525.16 Y 6,905,980.14  
P.T. Station 394+40.76 X 1,360,282.92 Y 6,906,323.61  
C.C. X 1,359,988.68 Y 6,905,858.93  
Back = N 12° 43' 53.75" W  
Ahead = N 57° 39' 27.90" W  
Chord Bear = N 35° 11' 40.82" W

Course from PT FM-1 to PC FM-2 N 57° 39' 27.90" W Dist 706.57

Curve Data  
\*-----\*

Curve FM-2  
P.I. Station 403+76.70 X 1,359,492.17 Y 6,906,824.32  
Delta = 45° 16' 31.18" (LT)  
Degree = 10° 25' 02.69"  
Tangent = 229.37  
Length = 434.61  
Radius = 550.00  
External = 45.91  
Long Chord = 423.39  
Mid. Ord. = 42.37  
P.C. Station 401+47.33 X 1,359,685.96 Y 6,906,701.61  
P.T. Station 405+81.95 X 1,359,268.62 Y 6,906,772.98  
C.C. X 1,359,391.72 Y 6,906,236.93  
Back = N 57° 39' 27.90" W  
Ahead = S 77° 04' 00.91" W  
Chord Bear = N 80° 17' 43.50" W

Course from PT FM-2 to 301 S 77° 04' 00.91" W Dist 285.32

Point 301 X 1,358,990.54 Y 6,906,709.12 Sta 408+67.27

Ending chain FM419 description



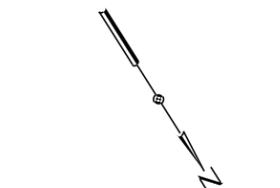
*Kari Ward*

NO.	DATE	REVISION	APPROVED
		12222 Merit Dr Suite 400 Dallas, TEXAS 75251 P 972-991-0011 F 214-468-8266 Firm # F-6324	
<b>Stantec</b>			
Texas Department of Transportation © 2021			
<h2 style="margin: 0;">HORIZONTAL ALIGNMENT DATA</h2> <p style="margin: 0;">FM 419 AT EAST COTTONWOOD CREEK</p>			
SHEET 1 OF 1			
DESIGN KW	FED RD DIV NO 6	FEDERAL AID PROJECT NO. SEE TITLE SHEET	HIGHWAY NO FM 419
GRAPHICS JU	STATE	DISTRICT	COUNTY
CHECK JW	TEXAS	ABL	FISHER
CHECK KW	CONTROL	SECTION	JOB
	0983	02	022
			44

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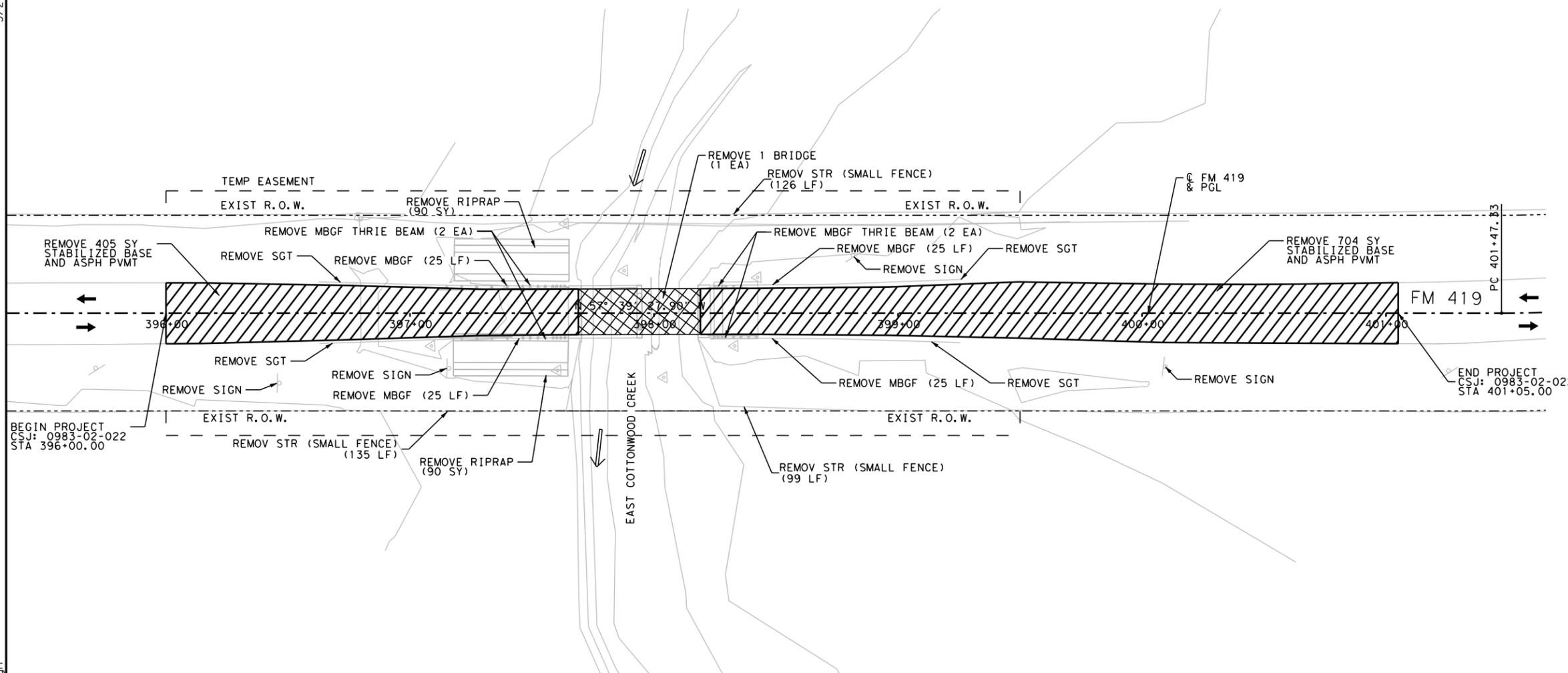
3/28/2021

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**REMOVAL PLAN LEGEND**

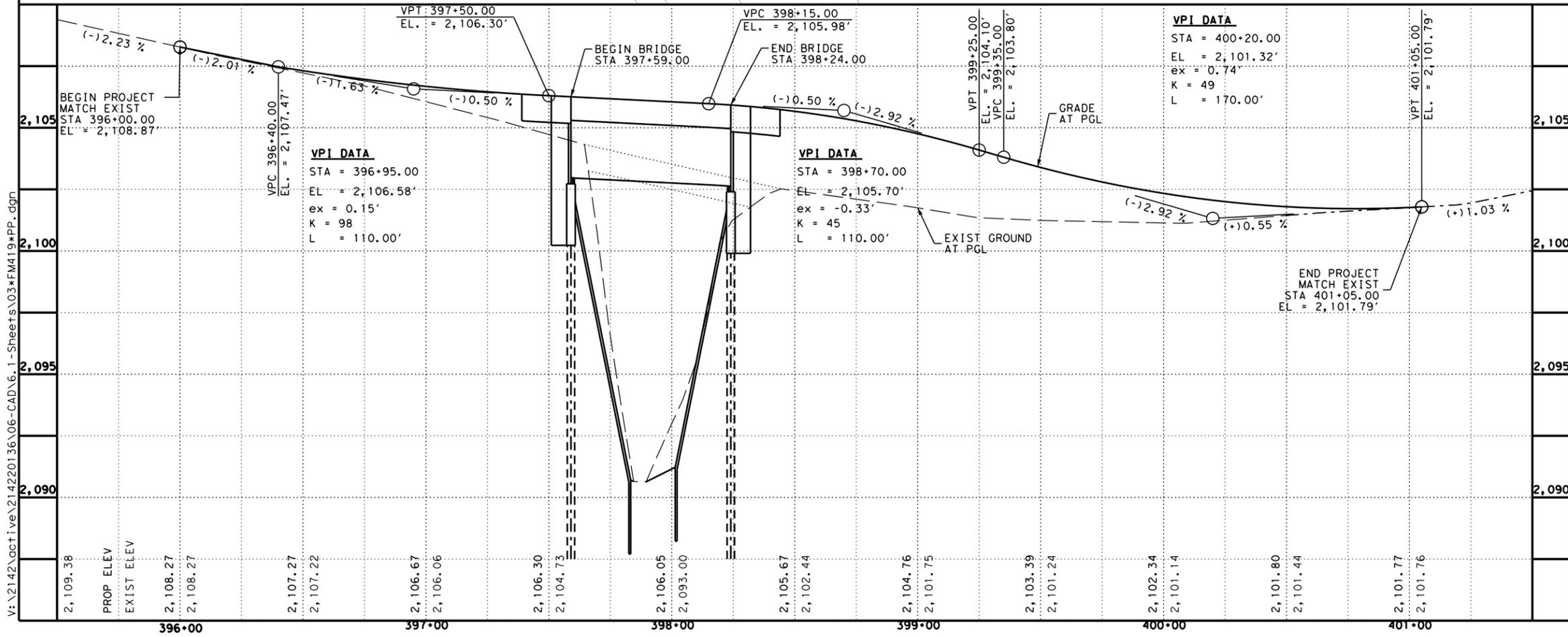
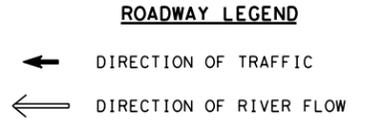
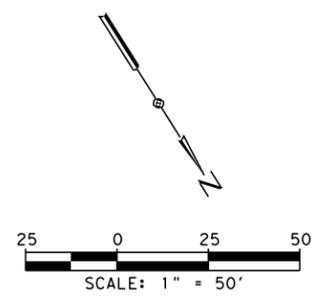
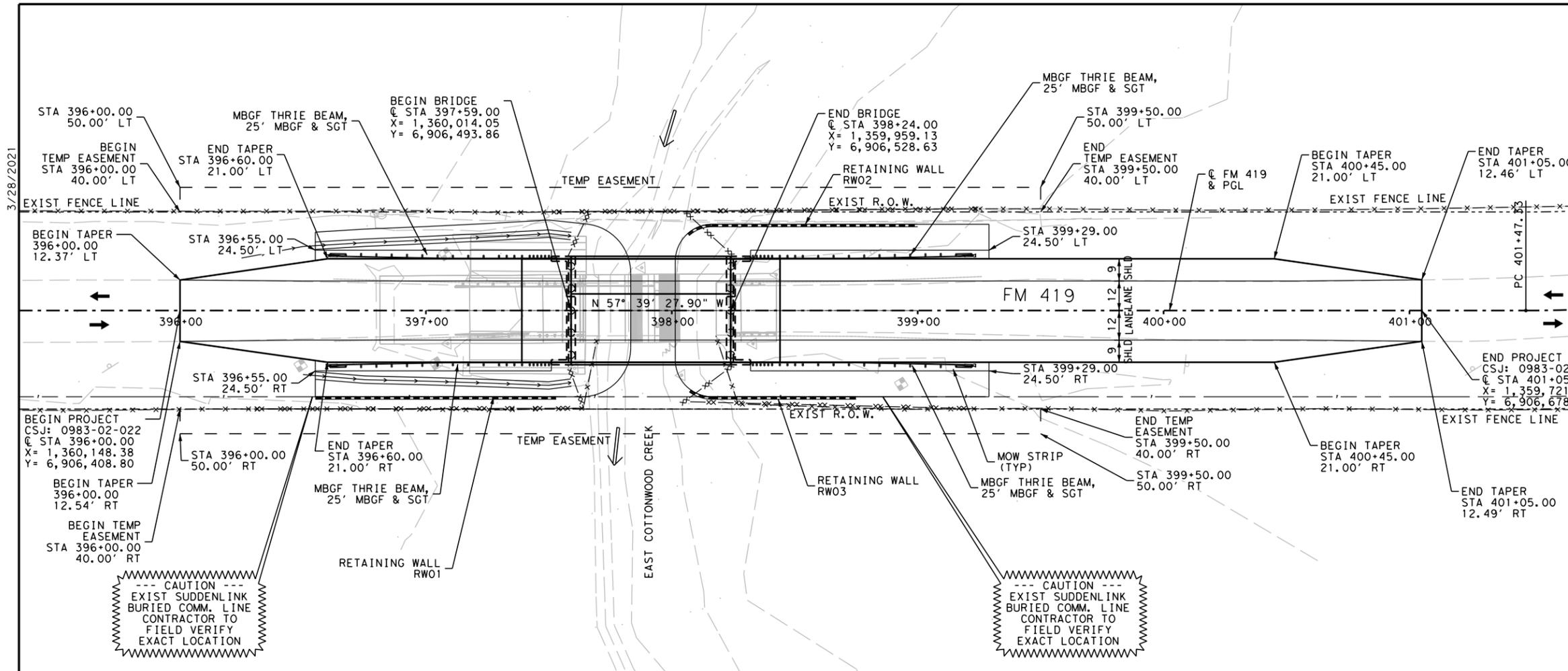
- ← DIRECTION OF TRAFFIC
- ← DIRECTION OF RIVER FLOW
- ASPHALT REMOVAL
- BRIDGE REMOVAL



*Kari Ward*

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			12222 Merit Dr Suite 400 Dallas, TEXAS 75251 P 972-991-0011 F 214-468-8266 Firm # F-6324
<h2>REMOVAL PLAN</h2> <p>FM 419 AT EAST COTTONWOOD CREEK</p>			
SCALE: 1"=50'			SHEET 1 OF 1
DESIGN KW	FED RD DIV NO 6	FEDERAL AID PROJECT NO. SEE TITLE SHEET	HIGHWAY NO FM 419
GRAPHICS JU	STATE TEXAS	DISTRICT ABL	COUNTY FISHER
CHECK JW	CONTROL 0983	SECTION 02	JOB 022
CHECK KW			45

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 P 972-991-0011  
 F 214-468-8266  
 Firm # F-6324

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**PLAN AND PROFILE**

FM 419 AT EAST COTTONWOOD CREEK

SCALE: HORZ 1"=50'  
VERT 1"=5'

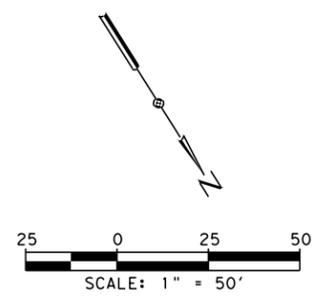
SHEET 1 OF 1

DESIGN	KW	FED RD DIV NO	6	FEDERAL AID PROJECT NO.	SEE TITLE SHEET	HIGHWAY NO	FM 419
GRAPHICS	JU	STATE	TEXAS	DISTRICT	ABL	COUNTY	FISHER
CHECK	JW	CONTROL	0983	SECTION	02	JOB	022
CHECK	KW						46

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3/28/2021

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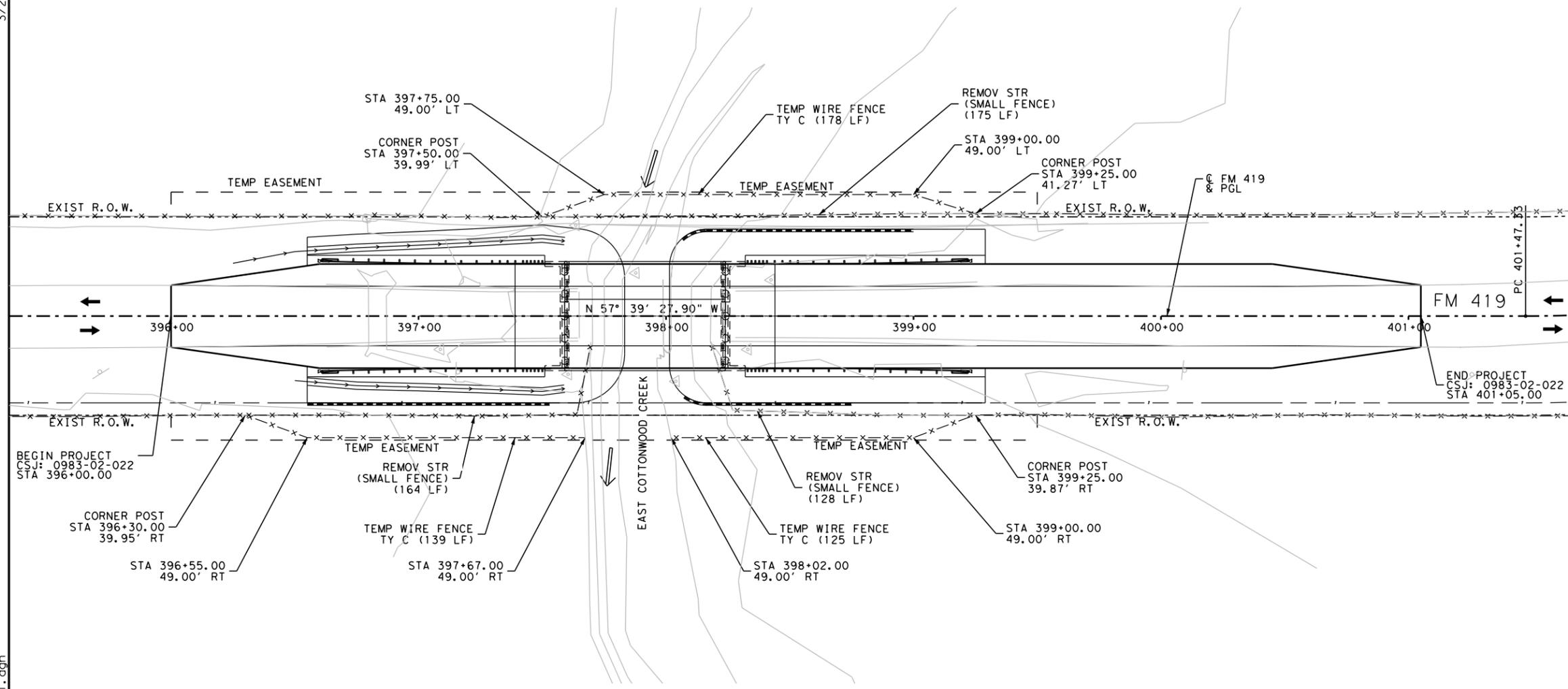
**FENCE LEGEND**

- EXIST R.O.W.
- - - TEMP EASEMENT
- ← DIRECTION OF TRAFFIC
- ⇐ DIRECTION OF RIVER FLOW
- x-x-x TEMP FENCE
- ××× PERMANENT FENCE

- FENCE NOTES:**
- CONTRACTOR SHALL MAINTAIN TEMP WIRE FENCE AND REMOVAL OF TEMP WIRE FENCE SHALL BE SUBSIDIARY TO THE ITEM 552.
  - SEE WF (2)-10 FOR ADDITIONAL DETAILS.

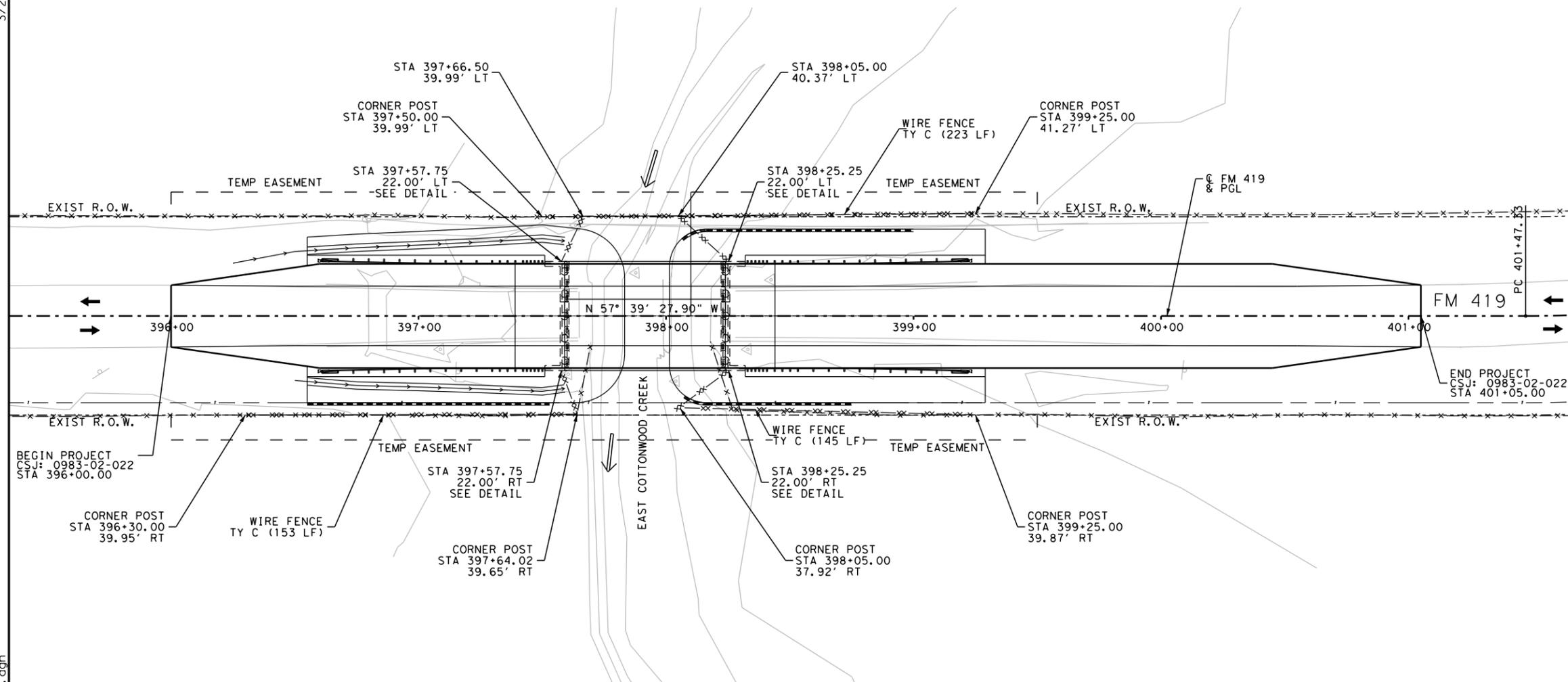
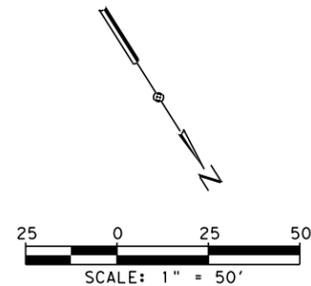


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			12222 Merit Dr Suite 400 Dallas, TEXAS 75251 P 972-991-0011 F 214-468-8266 Firm # F-6324
<p><b>FENCE LAYOUT - TEMPORARY</b></p> <p>FM 419 AT EAST COTTONWOOD CREEK</p>			
SCALE: 1"=50'			SHEET 1 OF 2
DESIGN	FED RD	FEDERAL AID PROJECT NO.	HIGHWAY
KW	DIV NO		NO
GRAPHICS	6	SEE TITLE SHEET	FM 419
JU	STATE	DISTRICT	COUNTY
CHECK	TEXAS	ABL	FISHER
JW	CONTROL	SECTION	JOB
CHECK	KW	0983	02
		022	47

3/28/2021



**FENCE LEGEND**

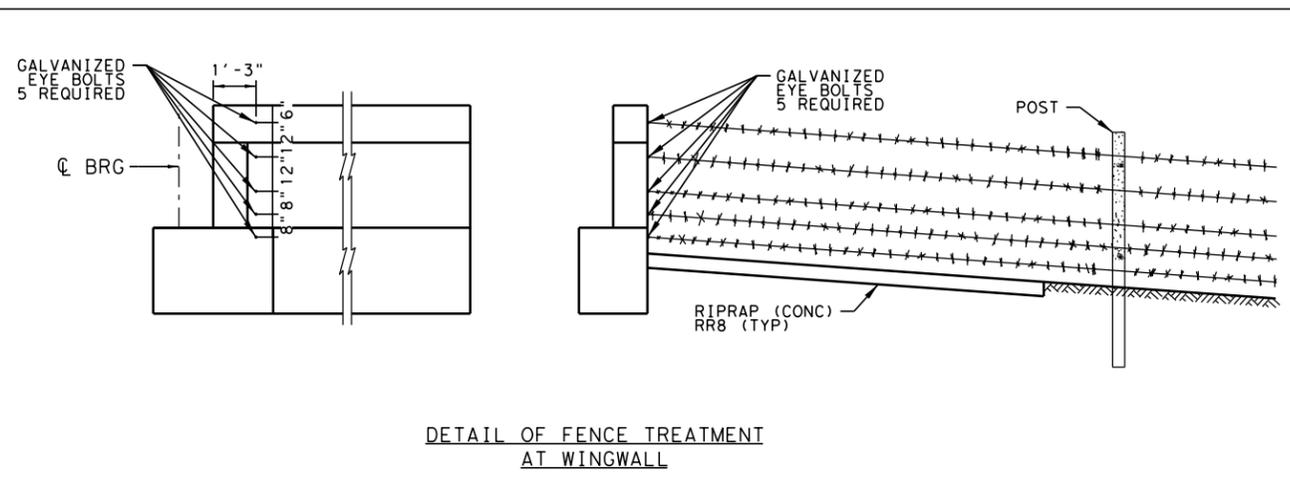
- EXIST R.O.W.
- - - TEMP EASEMENT
- ← DIRECTION OF TRAFFIC
- ⇐ DIRECTION OF RIVER FLOW
- ×-×- TEMP FENCE
- ×××× PERMANENT FENCE

- FENCE NOTES:**
1. FENCE SHALL BE WINGED IN AT WINGWALL, STA 397+57.75 22.00' RT. THIS WILL REQUIRE "CORNER BRACING" AND FIVE - 5/8" EYEBOLTS AT THIS WINGWALL.
  2. EYE BOLTS SHALL BE GALVANIZED TO PREVENT RUSTING.
  3. DIMENSIONS SHOWN FOR EYEBOLT SPACING IS APPROXIMATE. EYEBOLTS SHALL BE PLACED TO AVOID REINFORCING STEEL.
  4. ADDITIONAL MATERIALS NEEDED TO CONNECT FENCING TO WINGWALL SHALL BE SUBSIDIARY TO THE ITEM 552 WIRE FENCE.
  5. SEE WF (2)-10 FOR ADDITIONAL DETAILS.



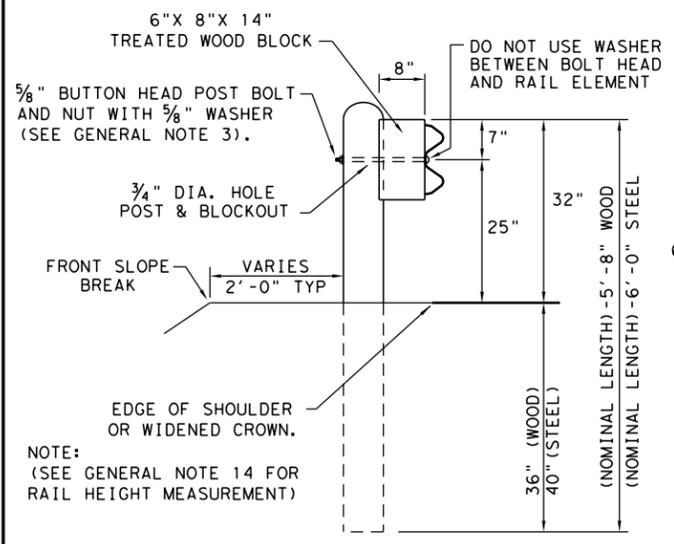
*Kari Ward*

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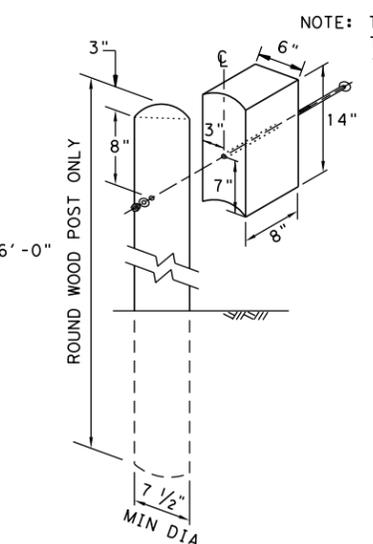


NO.	DATE	REVISION	APPROVED
			12222 Merit Dr Suite 400 Dallas, TEXAS 75251 P 972-991-0011 F 214-468-8266 Firm # F-6324
<b>FENCE LAYOUT - FINAL</b>			
FM 419 AT EAST COTTONWOOD CREEK			
SCALE: 1"=50'			SHEET 1 OF 2
DESIGN KW	FED RD DIV NO 6	FEDERAL AID PROJECT NO. SEE TITLE SHEET	HIGHWAY NO FM 419
GRAPHICS JU	STATE TEXAS	DISTRICT ABL	COUNTY FISHER
CHECK JW	CONTROL 0983	SECTION 02	JOB 022
			<b>48</b>

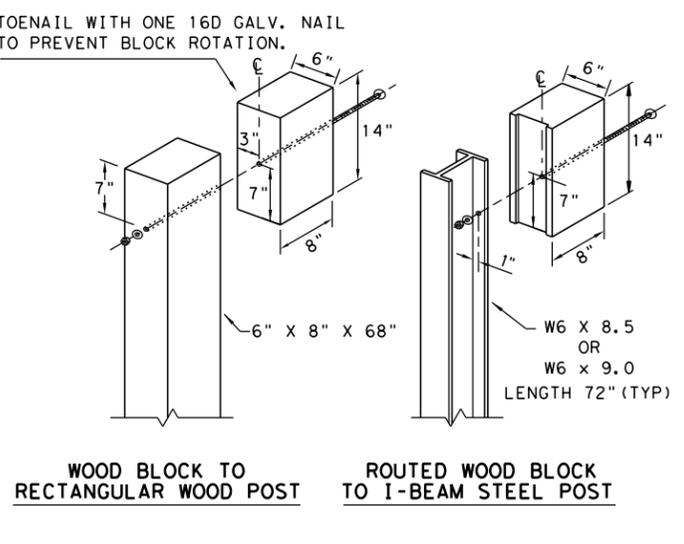
DATE: 3/28/2021  
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 DISCLAIMER: THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.



**TYPICAL POST PLACEMENT**



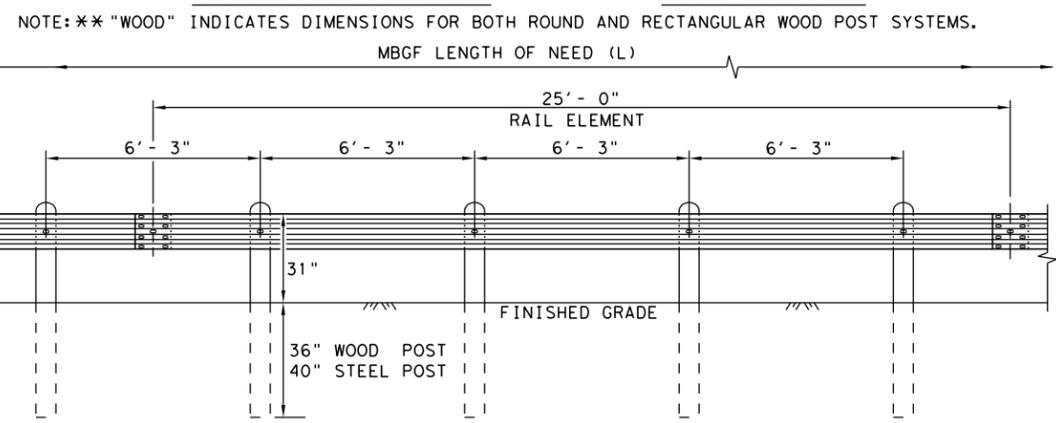
**WOOD BLOCK TO ROUND WOOD POST**



**WOOD BLOCK TO RECTANGULAR WOOD POST**

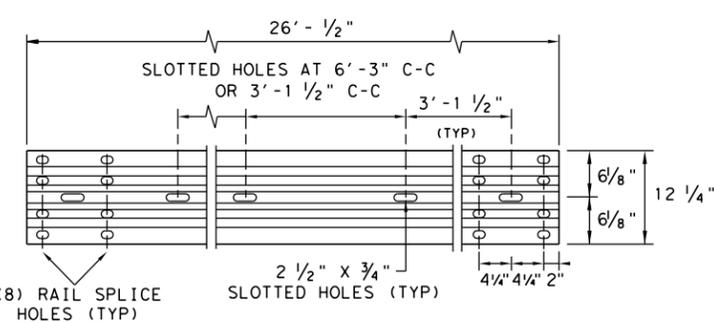
**ROUTED WOOD BLOCK TO I-BEAM STEEL POST**

- GENERAL NOTES**
1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
  2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'-0", OR 12'-6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 1/2" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE DOWNSTREAM ANCHOR TERMINAL (DAT) AND THE TRANSITION SECTIONS OF GUARDRAIL.
  3. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 3/8" WASHER (FWC160) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
  4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
  5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
  6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
  7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED AT A RATE OF 25:1 OR FLATTER.
  8. UNLESS OTHERWISE SHOWN IN THE PLANS, GUARD FENCE PLACED IN THE VICINITY OF CURBS SHALL BE POSITIONED SO THAT THE FACE OF CURB IS LOCATED DIRECTLY BELOW OR BEHIND THE FACE OF THE RAIL. RAIL PLACED OVER CURBS SHALL BE INSTALLED SO THAT THE POST BOLT IS LOCATED APPROXIMATELY 25 INCHES ABOVE THE GUTTER PAN OR EDGE OF SHOULDER.
  9. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. IF SOLID ROCK IS ENCOUNTERED WITHIN 0 TO 18" OF THE FINISHED GRADE, DRILL A 24" DIA. HOLE, 24" INTO THE ROCK. IF SOLID ROCK IS ENCOUNTERED BELOW 18", DRILL A 12" DIA. HOLE, 12" INTO THE ROCK OR TO THE STANDARD EMBEDMENT DEPTH, WHICHEVER MAYBE LESS. ANY EXCESS POST LENGTH, AFTER MEETING THESE DEPTHS, MAY BE FIELD CUT TO ENSURE PROPER GUARDRAIL MOUNTING HEIGHT. BACKFILL WITH COARSE AGGREGATE MATERIAL.
  10. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
  11. SPECIAL FABRICATION WILL BE REQUIRED AT INSTALLATION LOCATIONS HAVING A CURVATURE OF LESS THAN 150 FT. RADIUS.
  12. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210 ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
  13. FOR THE LOW FILL CULVERT OPTION, POSTS LOCATED PARTIALLY OR WHOLLY BETWEEN PRECAST BOX CULVERT UNITS, THE USE OF A CAST-IN-PLACE CONCRETE CLOSURE BETWEEN BOXES IS REQUIRED. THE LENGTH OF THE CAST-IN-PLACE CONCRETE CLOSURE SHALL ACCOMMODATE THE PLACEMENT OF THE LOW FILL CULVERT OPTION. SEE CONCRETE CLOSURE DETAILS ON BRIDGE STANDARD SCP-MD.
  14. GUARDRAIL HEIGHT MEASUREMENT: WHEN THE GUARDRAIL IS LOCATED ABOVE PAVEMENT, MEASURE THE HEIGHT FROM THE PAVEMENT TO THE TOP OF THE W-BEAM RAIL. WHEN THE GUARDRAIL IS LOCATED UP TO 2 FT. OFF OF THE EDGE OF PAVEMENT OR FOR A PAVEMENT OVERLAY, USE A 10-FOOT STRAIGHTEDGE TO EXTEND THE PAVEMENT/SHOULDER SLOPE TO THE BACK OF RAIL, MEASURE FROM THE BOTTOM OF STRAIGHTEDGE TO THE TOP OF RAIL. FOR GUARDRAIL LOCATED DOWN A 10:1 SLOPE, MEASURE FROM THE NOMINAL TERRAIN.



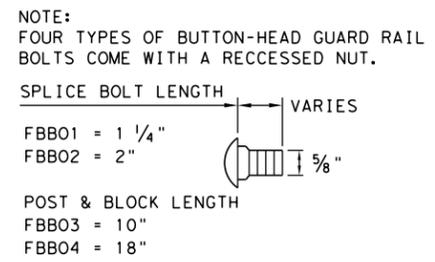
**ELEVATION MID-SPAN RAIL SPLICE**

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



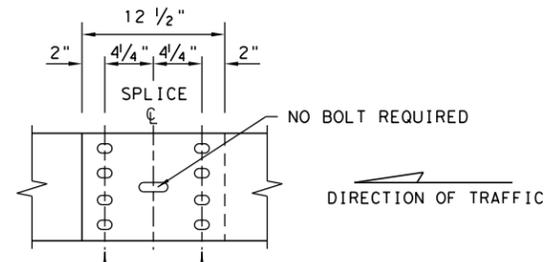
**ELEVATION 25'-0" (NOM.) W-BEAM SECTION**

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



**BUTTON HEAD BOLT**

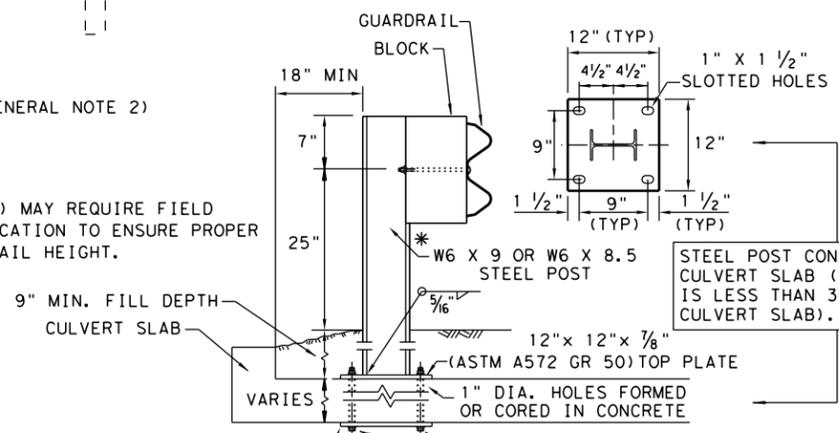
NOTE: SEE GENERAL NOTE 3 FOR SPLICE & POST BOLT DETAILS.



**MID-SPAN RAIL SPLICE DETAIL**

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

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



**LOW FILL CULVERT POST**

NOTE: TWO INSTALLATION OPTIONS.

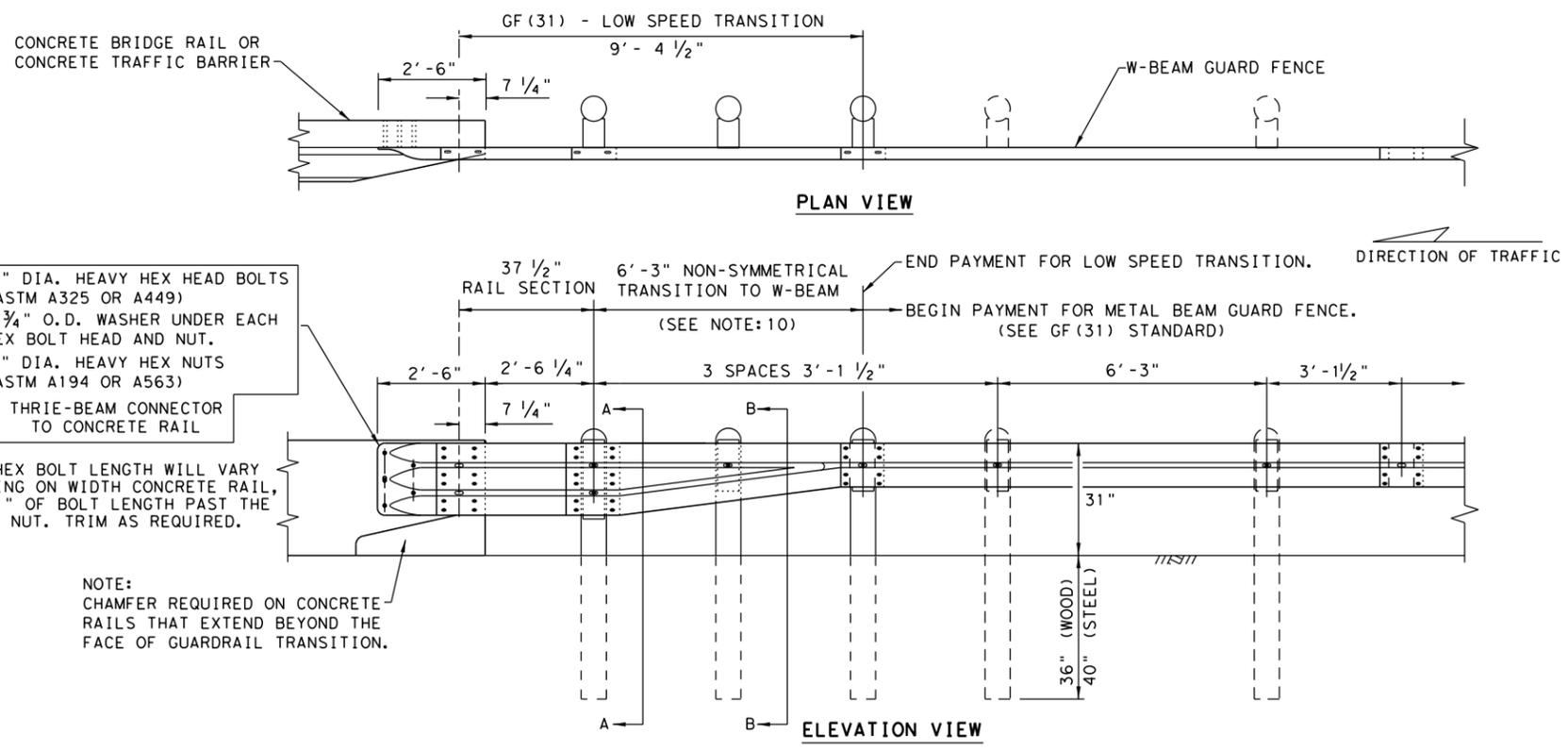
1. **BOLT-THROUGH OPTION:** REQUIRES A 6" MIN. SLAB THICKNESS. 7/8" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS. NOTE: BOLT LENGTH = SLAB PLUS 2 1/4" MIN.
2. **EPOXY ANCHOR OPTION:** THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR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

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

				Design Division Standard
<b>METAL BEAM GUARD FENCE</b> <b>TL-3 MASH COMPLIANT</b> <b>GF(31)-19</b>				
FILE: gf3119.dgn	DN: TXDOT	CK: KM	DW: VP	CK: CGL/AG
© TXDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0983	02	022	FM 419
	DIST	COUNTY		SHEET NO.
	ABL	FISHER		49

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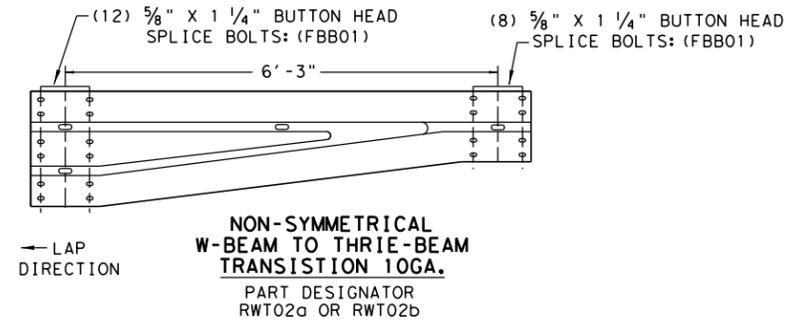
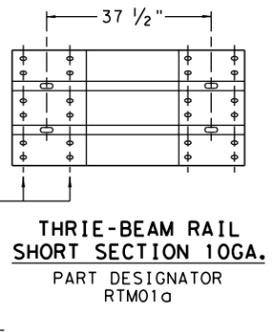
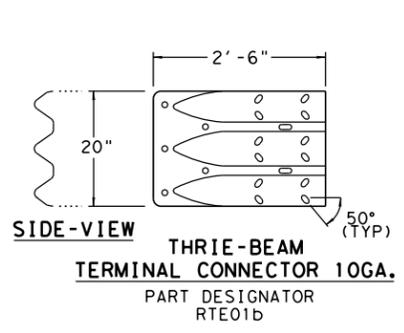
DATE: 3/28/2021  
 FILE: V:\2142\active\214220136\06-CAD\6.1-Sheets\standard\03\_ROAD\gf31tr+1219.dgn



- (5) 7/8" DIA. HEAVY HEX HEAD BOLTS (ASTM A325 OR A449)
  - (10) 1 3/4" O.D. WASHER UNDER EACH HEX BOLT HEAD AND NUT.
  - (5) 7/8" DIA. HEAVY HEX NUTS (ASTM A194 OR A563)
- THRIE-BEAM CONNECTOR TO CONCRETE RAIL

NOTE: HEAVY HEX BOLT LENGTH WILL VARY DEPENDING ON WIDTH CONCRETE RAIL, LEAVE 1" OF BOLT LENGTH PAST THE 7/8" HEX NUT. TRIM AS REQUIRED.

NOTE: CHAMFER REQUIRED ON CONCRETE RAILS THAT EXTEND BEYOND THE FACE OF GUARDRAIL TRANSITION.



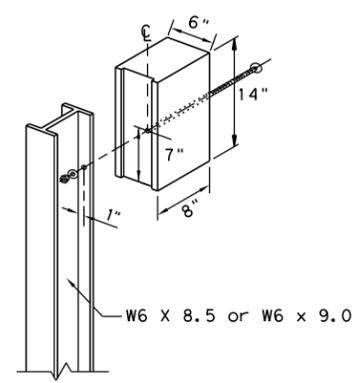
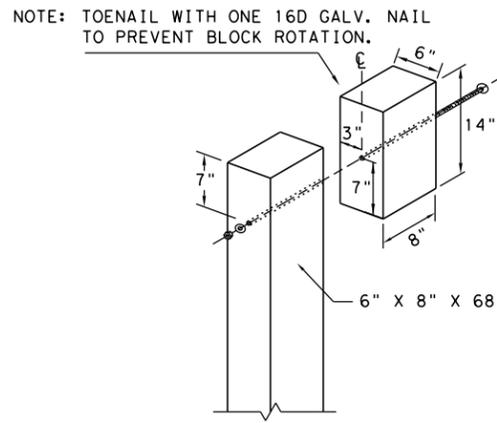
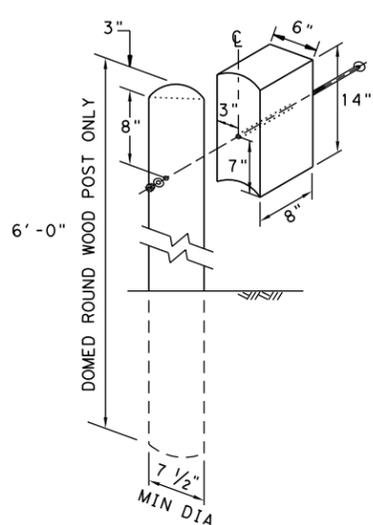
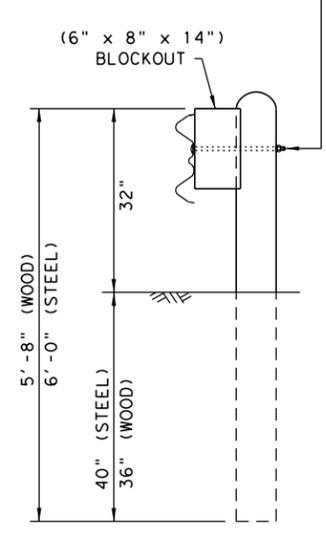
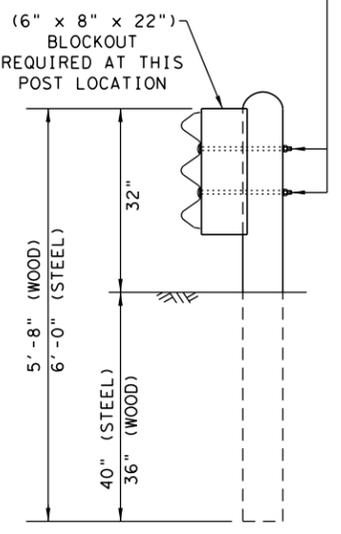
- (2) 5/8" BUTTON HEAD POST BOLTS & NUTS: (FBB04)
- (1) 5/8" FLAT WASHER: (FWC14a) UNDER EACH NUT

- (1) 5/8" BUTTON HEAD POST BOLT & NUT: (FBB04)
- (1) 5/8" FLAT WASHER: (FWC14a) UNDER EACH NUT

**PLATE WASHER INSTRUCTIONS**

BRIDGE APPROACH - UPSTREAM: THE SHORT 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.



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

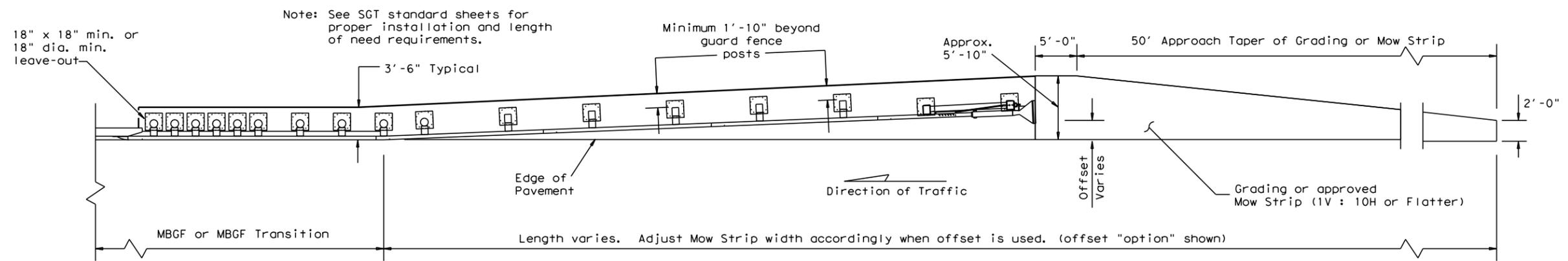
**GENERAL NOTES**

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 TRANSITIONS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. REFER TO GF(31) STANDARD SHEET.
2. RAIL ELEMENT SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS.
3. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM REQUIRING CONSTRUCTION OF THE TRANSITION.
4. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 5/8" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM BOLT LENGTH TO MEET REQUIRED LENGTH.
5. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
6. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
7. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
8. 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 CAN FURNISH COMPOSITE MATERIAL BLOCKS.
9. REFER TO GF(31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
10. FOR ROUND WOOD POSTS SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 1/2" DIA. MINIMUM THROUGHOUT THE TRANSITION.

LOW-SPEED TRANSITION

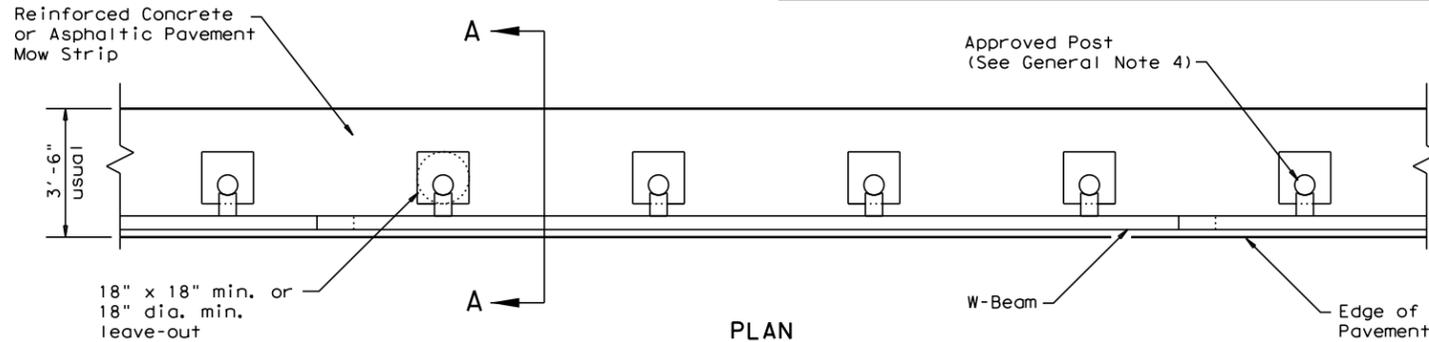
				Design Division Standard
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-2 MASH COMPLIANT GF(31) TR TL2-19				
FILE: gf31tr+1219.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
© TxDOT: NOVEMBER 2019				
REVISIONS	CONT	SECT	JOB	HIGHWAY
	0983	02	022	FM 419
	DIST	COUNTY		SHEET NO.
	ABL	FISHER		50

DATE: 3/28/2021  
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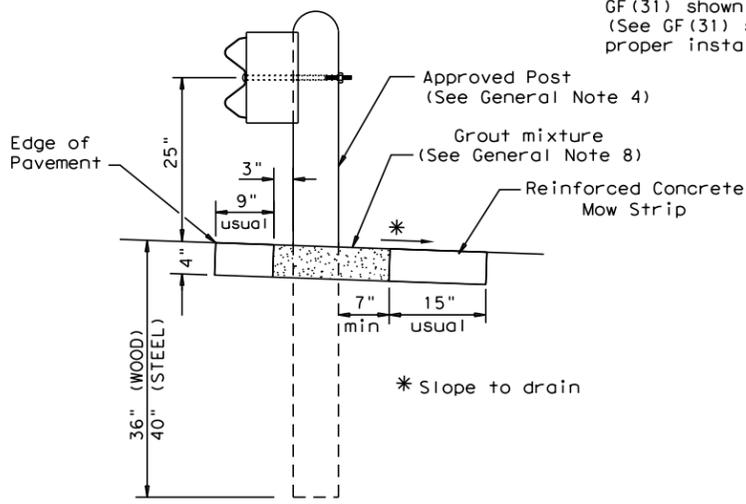
**GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS**

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.



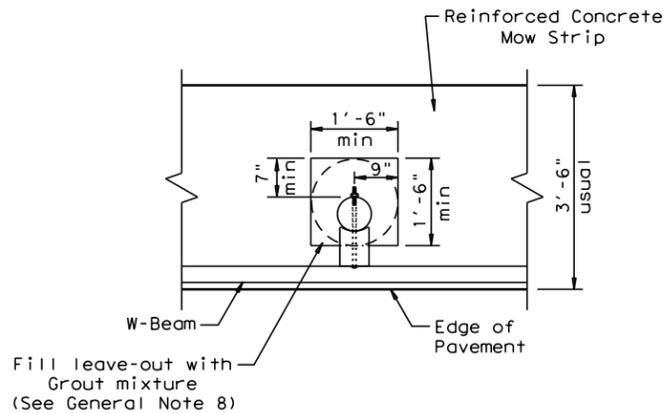
**PLAN**

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



**SECTION A-A**

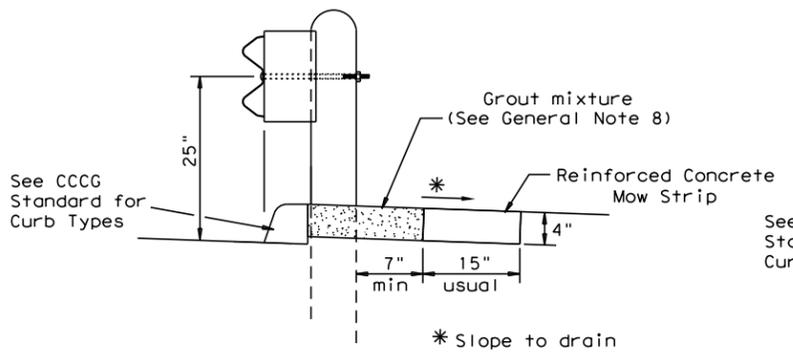
Typical



**MOW STRIP DETAIL**

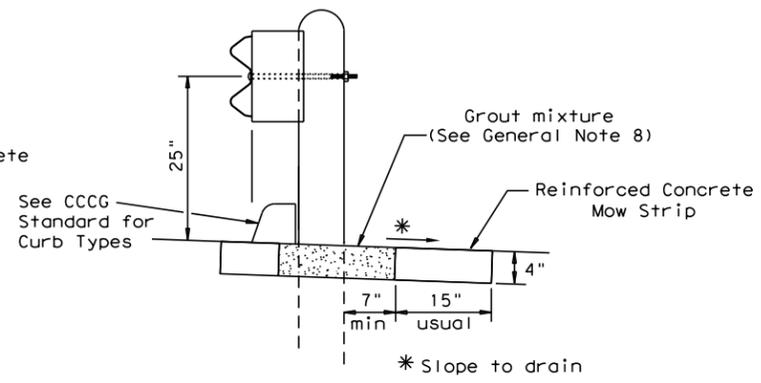
Reinforced Concrete Mow Strip with 18" x 18" Square or 18" Dia. minimum leave-out.

- 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 1/2" Dia. round wood posts are acceptable for use in the mow strip. See GF(31) Standard for additional details.
  5. Other curb placement options may be used. Curbs are not considered part of the mow strip and will be paid for under other pertinent bid item.
  6. Thickness of the mow strip will be 4".
  7. The limits of payment for reinforced concrete will include leave-outs for the posts.
  8. The leave-outs shall be filled with a Grout mixture consisting of: 2719 pounds sand, 188 pounds Type I or II cement, and 550 pounds of water per cubic yard, with a 28-day compressive strength of approximately 230 psi or less. Provide grout with a consistency that will flow into and completely fill all voids. Due to auger size, larger leave-out dimensions are acceptable from both an impact performance and maintenance repair standpoint (Suggested Maximum leave-out of 20"). Payment for furnishing and placing the grout mixture will be subsidiary to the pay item of riprap mow strip.



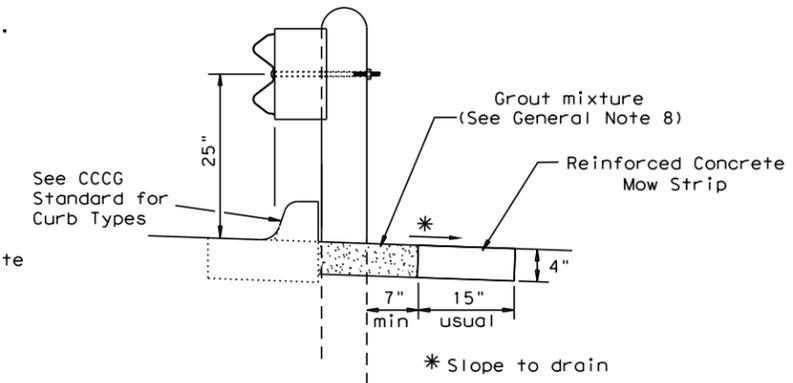
**CURB OPTION (1)**

This option will increase the post embedment throughout the system.



**CURB OPTION (2)**

Curb shown on top of mow strip

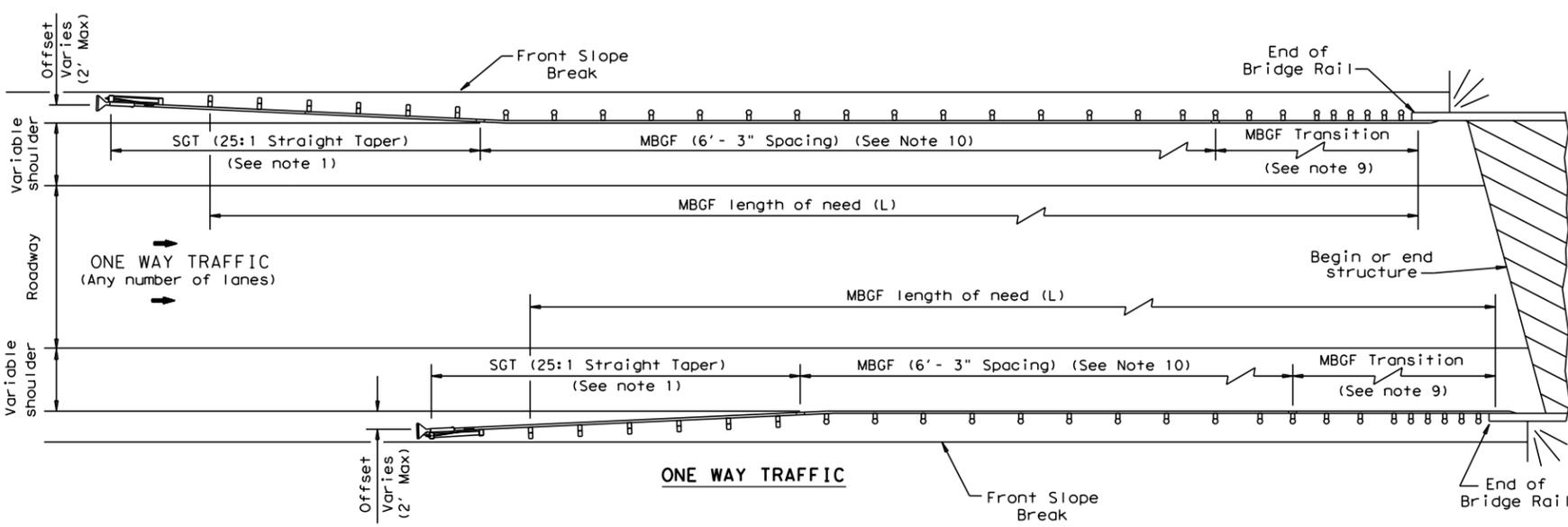
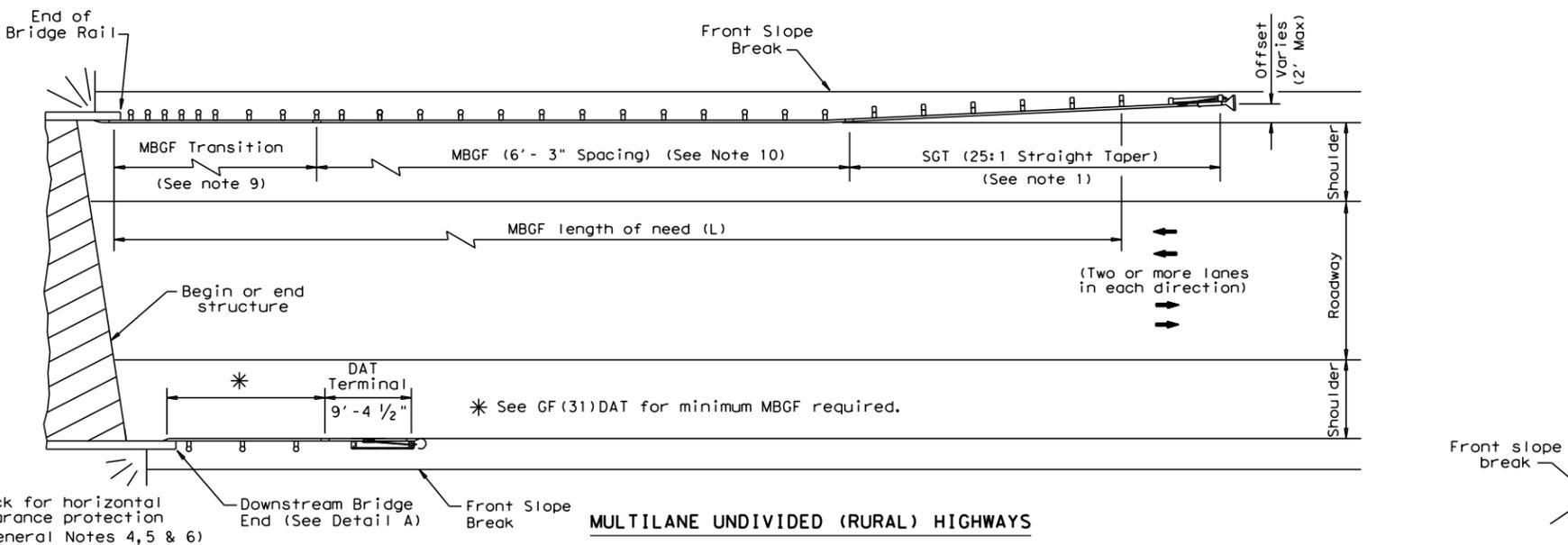
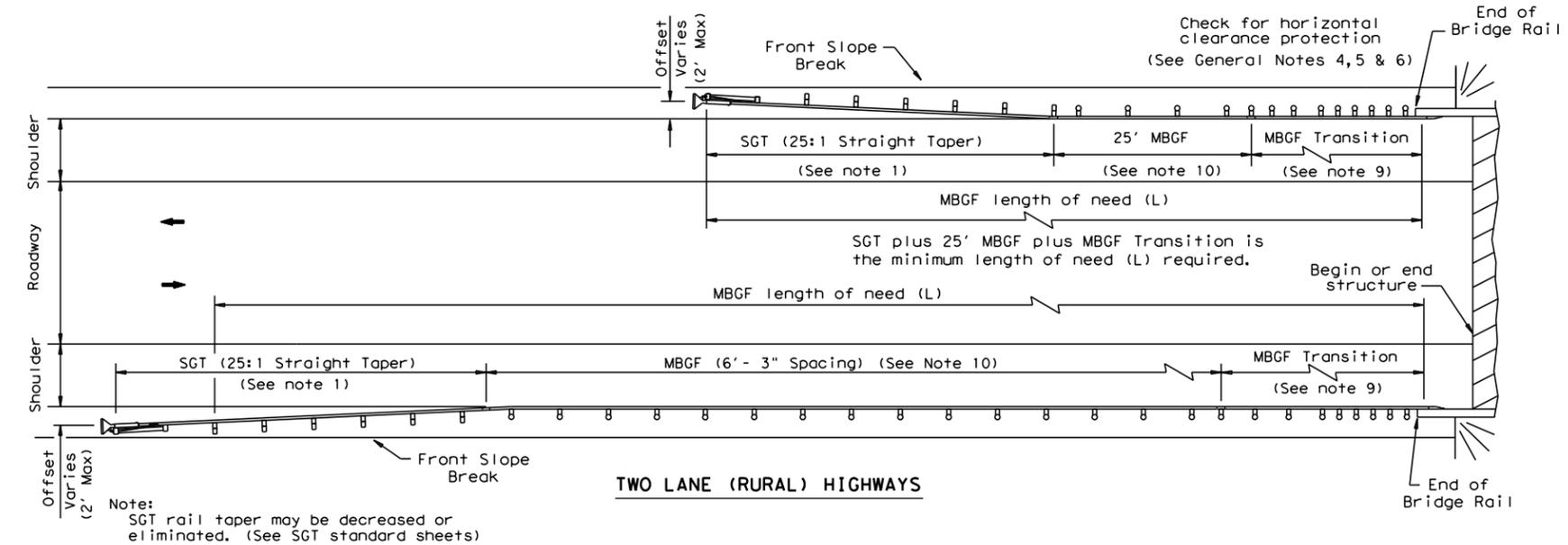


**CURB OPTION (3)**

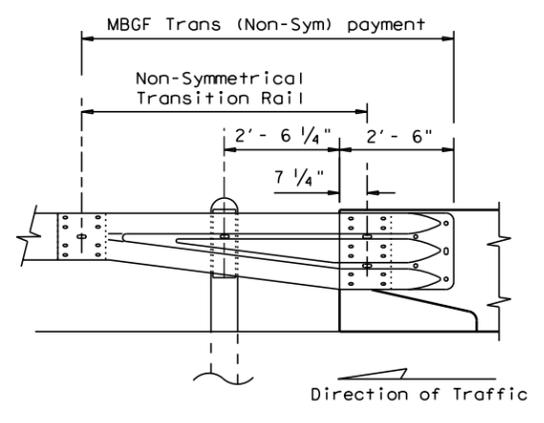
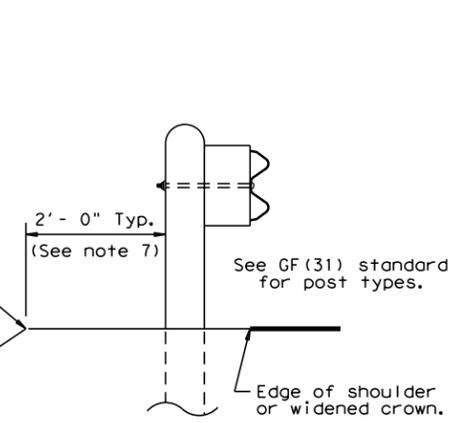
		<b>Design Division Standard</b>	
<b>METAL BEAM GUARD FENCE (MOW STRIP)</b> <b>TL-3 MASH COMPLIANT</b> <b>GF(31)MS-19</b>			
FILE: gf31ms19.dgn	DN: TXDOT	CK: KM	DW: VP
© TXDOT: NOVEMBER 2019	CONT	SECT	JOB
REVISIONS	0983	02	022
	DIST	COUNTY	SHEET NO.
	ABL	FISHER	51

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- GENERAL NOTES**
- For more detail: See GF(31), SGT( )31, GF(31)TR, and GF(31)TL2 standard sheets.
  - Quantities of metal beam guard fence (MBGF) at individual bridge ends are as shown in the plans.
  - Use average daily traffic (ADT) for the current year to determine MBGF length of need in accordance with the Roadway Design Manual unless otherwise specified. Where significant traffic volume growth is anticipated on low volume (0-750 ADT) highways, use length determinations for the higher volume category.
  - MBGF may not be required to shield departure end of bridge unless other obstacles within the horizontal clearance limits or opposing traffic indicate a MBGF consideration.
  - Downstream anchor terminals (DAT) are only for downstream end anchorage use, outside the horizontal clearance area of opposing traffic.
  - Direct connection of MBGF to concrete rails are only for downstream rail connections outside the horizontal clearance area of opposing traffic. (This requires a minimum of three standard line posts plus the DAT terminal, See Detail A)
  - The crown shall be widened to accommodate MBGF. Typically the "front slope" break should be 2'-0" from the back of the MBGF post. This applies to new construction on new alignment or where existing roadway cross section is to be widened to increase roadway width. This does not apply to rehabilitation work where existing roadway crown width is to be retained (See Typical Cross Section at MBGF).
  - For restrictive bridge widths: The MBGF should be properly transitioned from the existing bridge rail to the adjoining MBGF (See MBGF Transition Standards). Metal beam guard fence at these bridge location(s) shall be flared at the rate of 25:1 or flatter, and be of the length necessary to locate the terminal end at the 2 ft. "maximum" offset from the shoulder edge in the approach direction.
  - Transition length and post spacing will vary depending on the transition type. Transition type will be shown elsewhere in the plans.
  - A minimum 25' length of MBGF will be required.



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

**Texas Department of Transportation** Design Division Standard

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

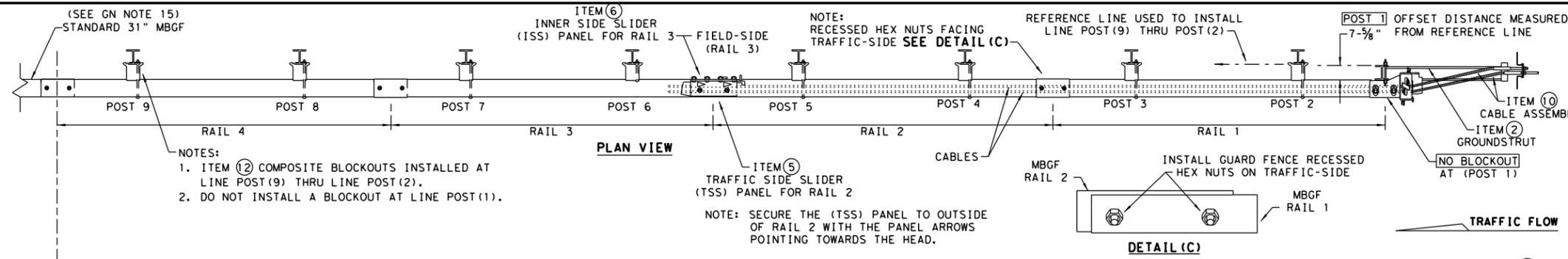
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REVISED APRIL 2014 SEE (MEMO 0414)	0983	02	022	FM 419
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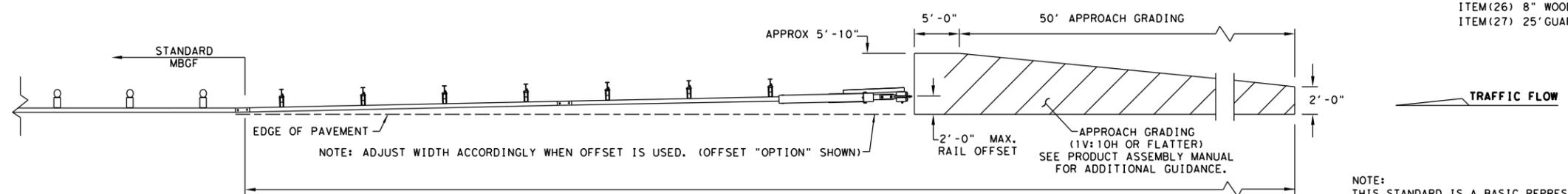
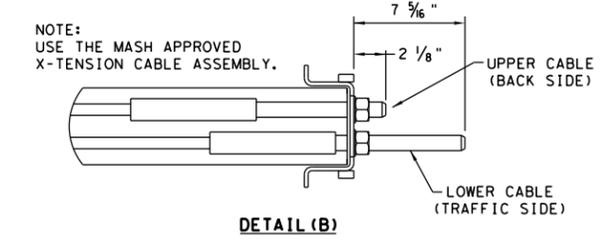
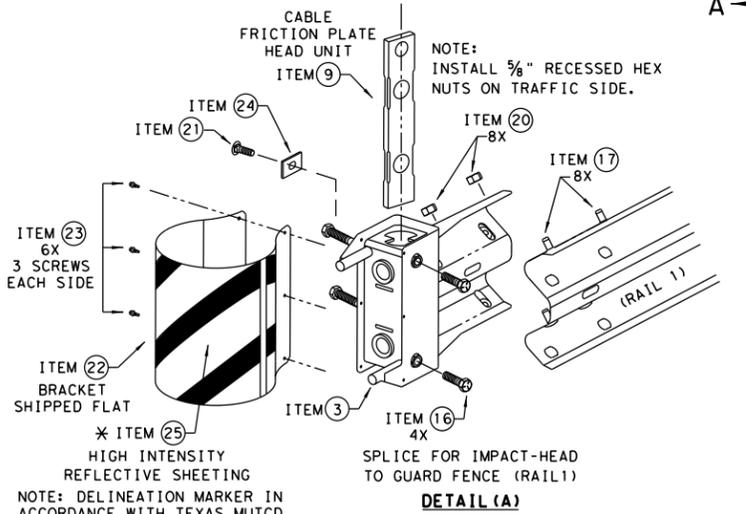
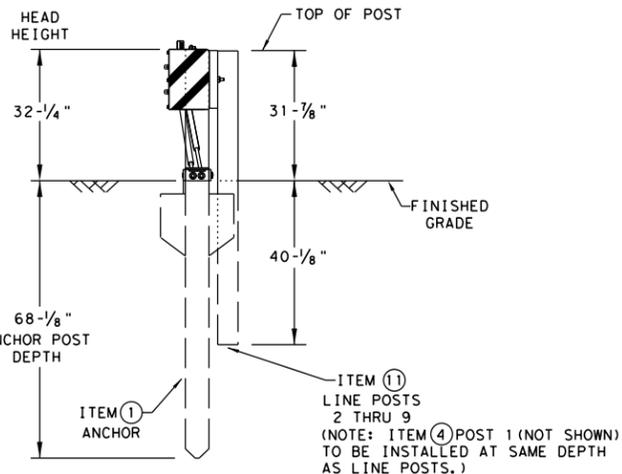
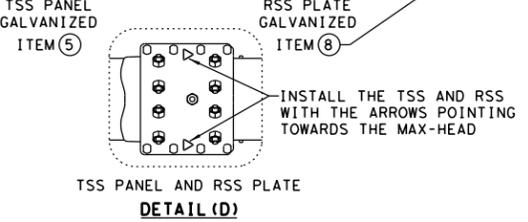
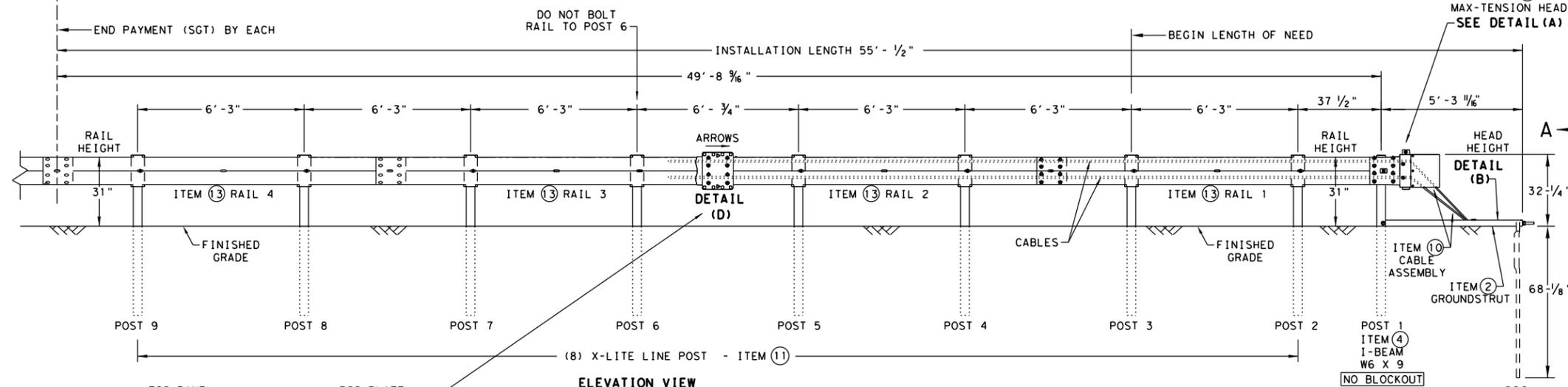
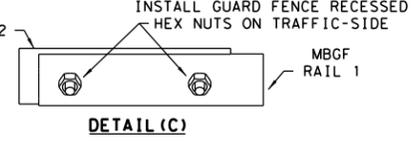
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- NOTES:
- ITEM ② COMPOSITE BLOCKOUTS INSTALLED AT LINE POST (9) THRU LINE POST (2).
  - DO NOT INSTALL A BLOCKOUT AT LINE POST (1).

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



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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

GENERAL NOTES

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

ITEM#	PART NUMBER	DESCRIPTION	QTY
1	BSI-1610060-00	SOIL ANCHOR - GALVANIZED	1
2	BSI-1610061-00	GROUND STRUT - GALVANIZED	1
3	BSI-1610062-00	MAX-TENSION IMPACT HEAD	1
4	BSI-1610063-00	W6x9 I-BEAM POST 6FT. -GALVANIZED	1
5	BSI-1610064-00	TSS PANEL - TRAFFIC SIDE SLIDER	1
6	BSI-1610065-00	ISS PANEL - INNER SIDE SLIDER	1
7	BSI-1610066-00	TOOTH - GEOMET	1
8	BSI-1610067-00	RSS PLATE - REAR SIDE SLIDER	1
9	B061058	CABLE FRICTION PLATE - HEAD UNIT	1
10	BSI-1610069-00	CABLE ASSEMBLY - MASH X-TENSION	2
11	BSI-1012078-00	X-LITE LINE POST-GALVANIZED	8
12	B090534	8" W-BEAM COMPOSITE-BLOCKOUT XT110	8
13	BSI-4004386	12'-6" W-BEAM GUARD FENCE PANELS 12GA.	4
14	BSI-1102027-00	X-LITE SQUARE WASHER	1
15	BSI-2001886	5/8" X 7" THREAD BOLT HH (GR.5)GEOMET	1
16	BSI-2001885	3/4" X 3" ALL-THREAD BOLT HH (GR.5)GEOMET	4
17	4001115	5/8" X 1 1/4" GUARD FENCE BOLTS (GR.2)MGAL	48
18	2001840	5/8" X 10" GUARD FENCE BOLTS MGAL	8
19	2001636	5/8" WASHER F436 STRUCTURAL MGAL	2
20	4001116	5/8" RECESSED GUARD FENCE NUT (GR.2)MGAL	59
21	BSI-2001888	5/8" X 2" ALL THREAD BOLT (GR.5)GEOMET	1
22	BSI-1701063-00	DELINEATION MOUNTING (BRACKET)	1
23	BSI-2001887	1/4" X 3/4" SCREW SD HH 410SS	7
24	4002051	GUARDRAIL WASHER RECT AASHTO FWRO3	1
25	SEE NOTE BELOW	HIGH INTENSITY REFLECTIVE SHEETING	1
26	4002337	8" W-BEAM TIMBER-BLOCKOUT, PDB01B	8
27	BSI-4004431	25' W-BEAM GUARDRAIL PANEL, 8-SPACE, 12GA.	2
28	MANMAX Rev-(D)	MAX-TENSION INSTALLATION INSTRUCTIONS	1

\* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.  
 \*\* ALTERNATIVE ITEMS NOT SHOWN. ITEM(26) 8" WOOD-BLOCKOUTS ITEM(27) 25' GUARD FENCE PANELS

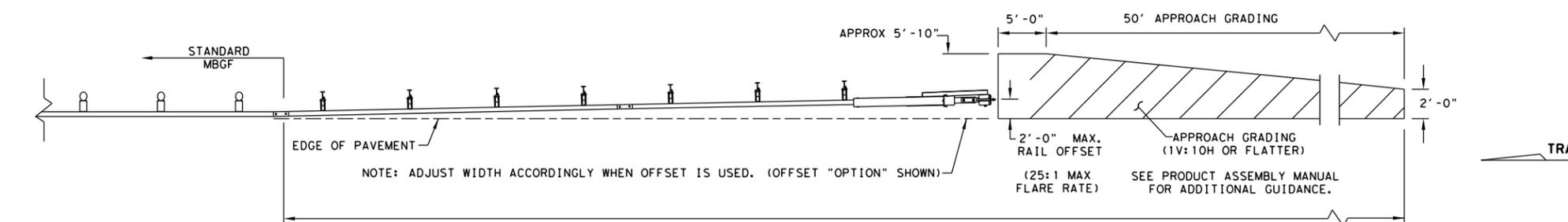
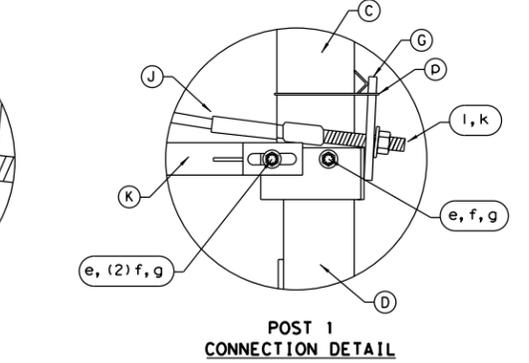
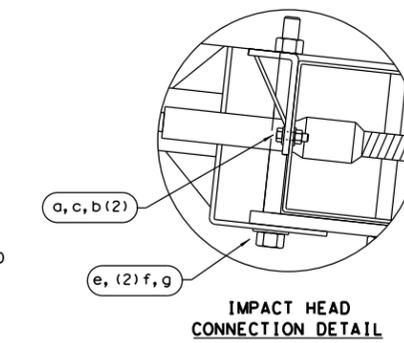
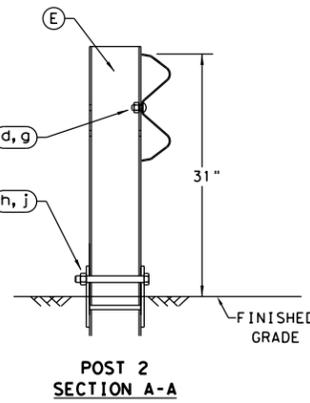
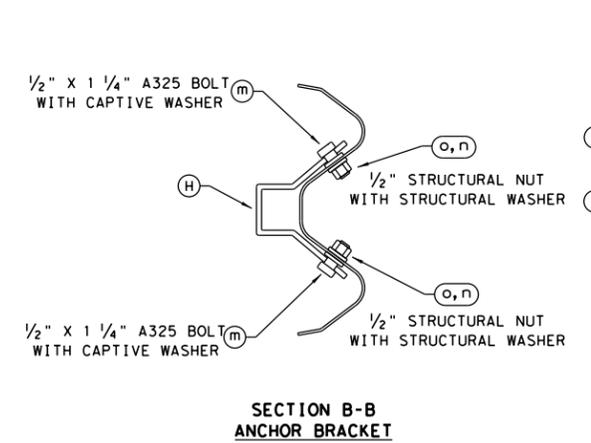
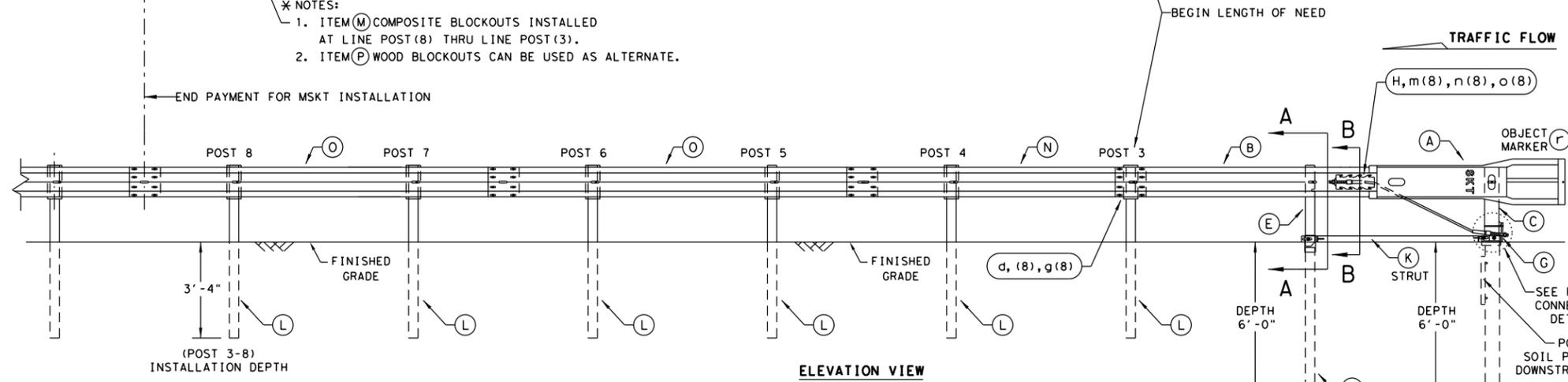
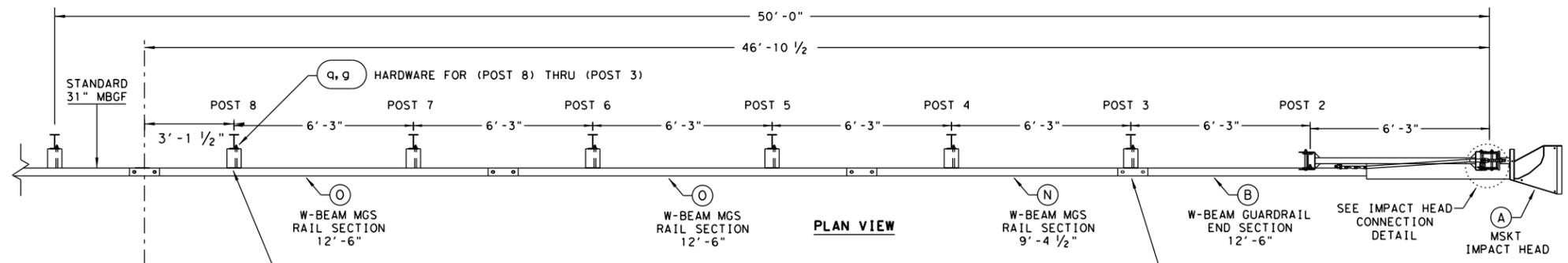
**Texas Department of Transportation**  
 Design Division Standard

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

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	DIST	COUNTY		SHEET NO.
	ABL	FISHER		54

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

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

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

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Go.	SF1303
C	1	POST 1 - TOP (6" X 6" X 1/8" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	GROUND STRUT	MS785
L	6	W6X9 OR W6X8.5 STEEL POST	P621
M	6	COMPOSITE BLOCKOUTS	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9'-4 1/2")	G12025
O	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
Q	1	W-BEAM MGS RAIL SECTION (25'-0")	G1209
SMALL HARDWARE			
a	2	5/8" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	5/8" WASHER	W0516
c	2	5/8" HEX NUT	N0516
d	25	5/8" Dia. x 1 1/4" SPLICE BOLT (POST 2)	B580122
e	2	5/8" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	5/8" WASHER	W050
g	33	5/8" Dia. H.G.R NUT	N050
h	1	3/4" Dia. x 8 1/2" HEX BOLT (GRD A449)	B340854A
j	1	3/4" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	1/2" x 1 1/4" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	1/2" STRUCTURAL NUTS	N012A
o	8	1 1/8" O.D. x 3/8" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	5/8" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151

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

**Design Division Standard**

## SINGLE GUARDRAIL TERMINAL

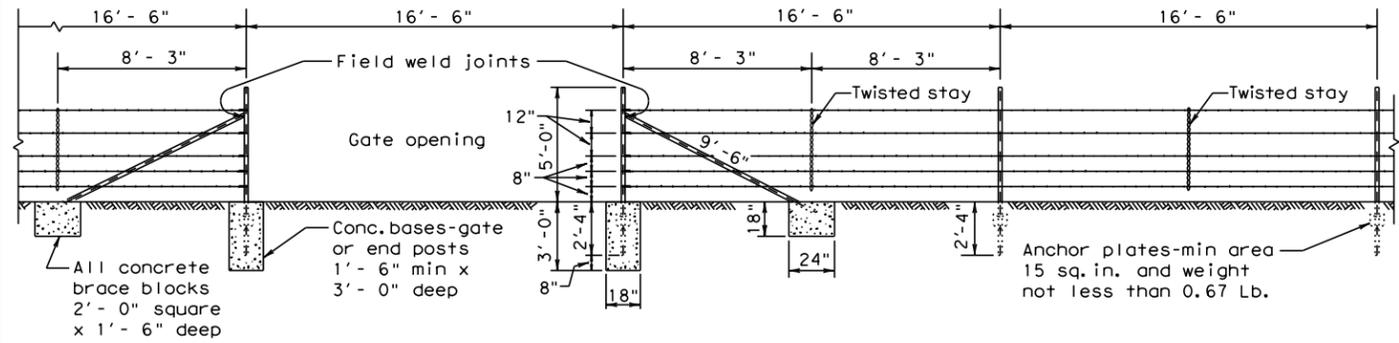
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### SGT (12S) 31-18

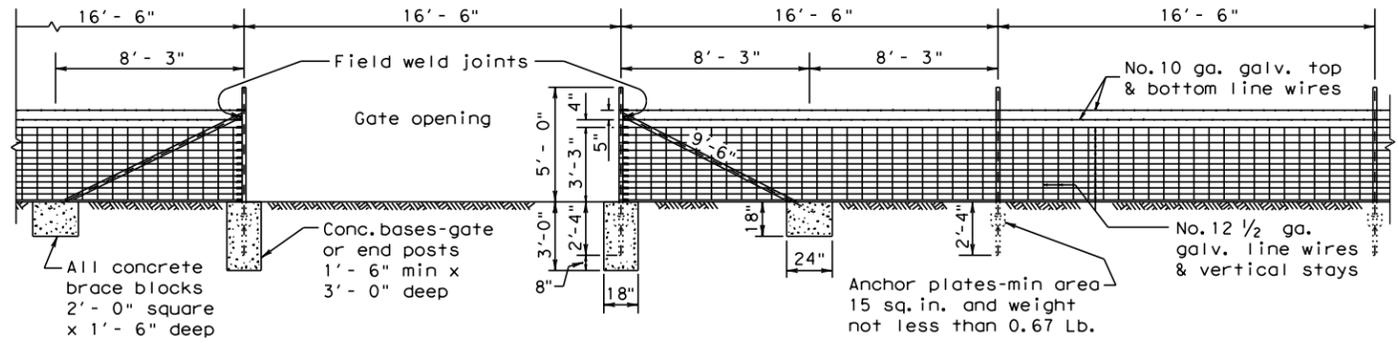
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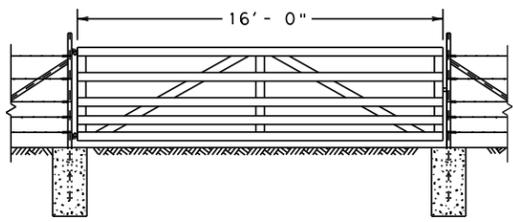
**SECTION GALVANIZED BARBED WIRE FENCE WITH METAL POSTS**  
 BRACING DETAIL USED AT ENDS AND GATES  
**TYPE "C" FENCE**  
 (See General Note 8)



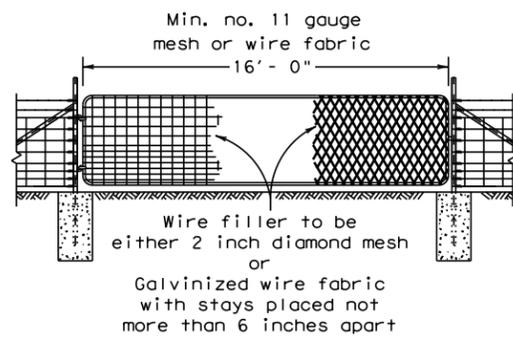
**SECTION GALVANIZED WOVEN WIRE FENCE WITH METAL POSTS**  
 BRACING DETAIL USED AT ENDS AND GATES  
**TYPE "D" FENCE**  
 (See General Note 8)

Note:  
 For Steel pipe and  
 T-Post requirements.  
 (See General Notes 6 & 7)

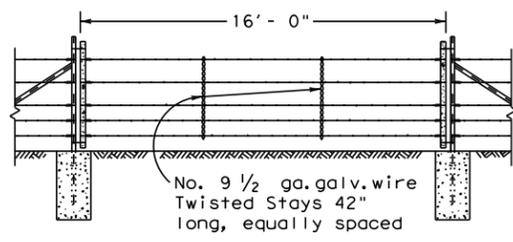
Metal gate shall consist of 5 panels not less than 4'-4" high and shall be aluminum or galvanized metal and of good quality. Gate and hardware shall meet the approval of the engineer.



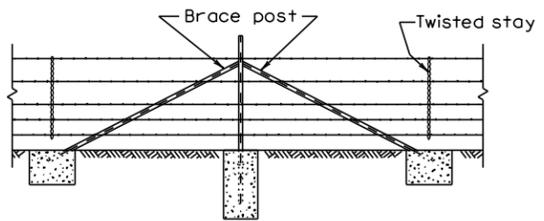
**DETAIL TYPE 1 GATE**



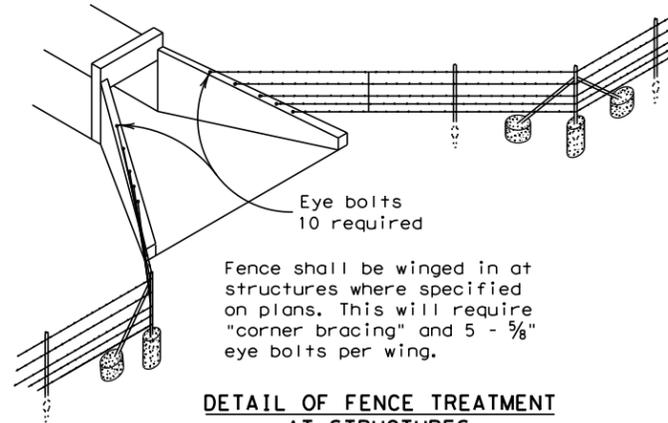
**DETAIL TYPE 2 GATE**



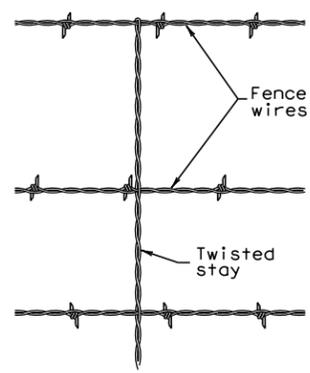
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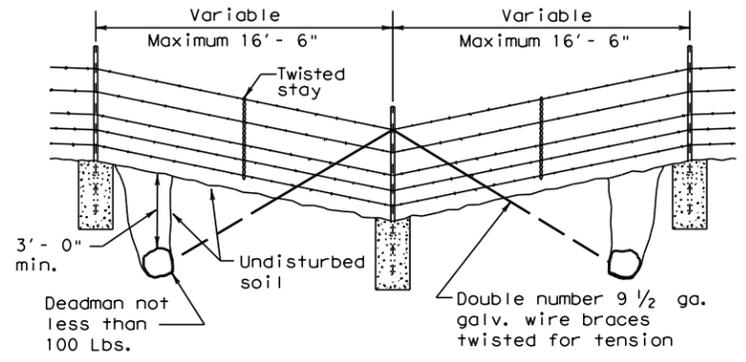
**CORNER OR PULL POST ASSEMBLY**



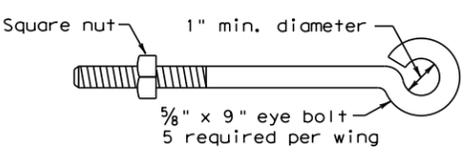
**DETAIL OF FENCE TREATMENT AT STRUCTURES**



**DETAIL OF STAY**  
 (Barbed Wire Fence)



**DETAIL OF FENCE SAG**



**DETAIL OF EYE BOLT**

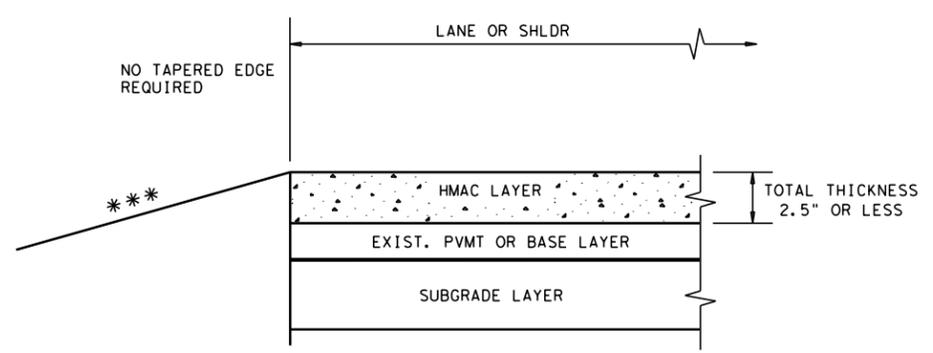
**GENERAL NOTES**

- Any high point which interferes with the placing of wire mesh shall be excavated to provide a 2 inch clearance.
- Latches for Type 1 and Type 2 gates shall be good commercial quality and design latch of the spring, fork or chain type. All latches shall be suitable to the gate and shall be approved by the Engineer.
- Hinges for Type 2 gates shall be a commercial design approved by the Engineer suitable for post and gate.
- Concrete shall be of the design and consistency approved by the Engineer and shall contain not less than 4 sacks of cement per cubic yard. Concrete footings are to be crowned at the top to shed water.
- Steel anchor plates shall be of a design and thickness sufficient to prevent turning of the post in firm soil.
- Steel pipe end posts, corner and pull posts shall be a minimum of 2" Std. pipe (2.375" O.D., 0.154" wall thickness) with a 1/4" Std. pipe brace (1.660" O.D., 0.140" wall thickness), with a 2"x2"x1/4" angle, or other as approved by the Engineer. Fasteners for securing barbed wire or woven wire fence to metal posts shall be a minimum of 11 gauge galvanized steel wire. Tubular posts shall be fitted with water malleable iron caps.
- If Steel pipe is used for posts and braces, use standard pipe in accordance with ASTM A 53, Class B or A 501. For T-Posts use steel that meets ASTM A 702. Metal line posts shall be not less than 6'-6" in length and shall weigh not less than (1.33 lbs./lin.ft.). These items shall be in accordance with Item 552, "Wire Fence."
- Barbed Wire shall be in accordance with ASTM A 121, Class 1 Design designation 12-2-4-1 4R or 12-2-5-1 4R, or as approved by the Engineer.
- Woven Wire Fence (Type D) shall be in accordance with ASTM A 116, Class 1 No. 12-1/2 Grade 60 (See Table 1 ASTM A 116) to the height and design shown on the plans, or as approved by the Engineer.
- The location of gates and corner posts will be as indicated elsewhere in these plans.

		<b>Design Division Standard</b>	
<b>BARBED WIRE AND WOVEN WIRE FENCE (STEEL POSTS)</b> <b>WF (2) - 10</b>			
FILE: wf210.dgn	DN: TxDOT	CK: AM	DW: VP
© TxDOT 1996	CONT	SECT	JOB
REVISIONS	0983	02	022
	DIST	COUNTY	SHEET NO.
	ABL	FISHER	56

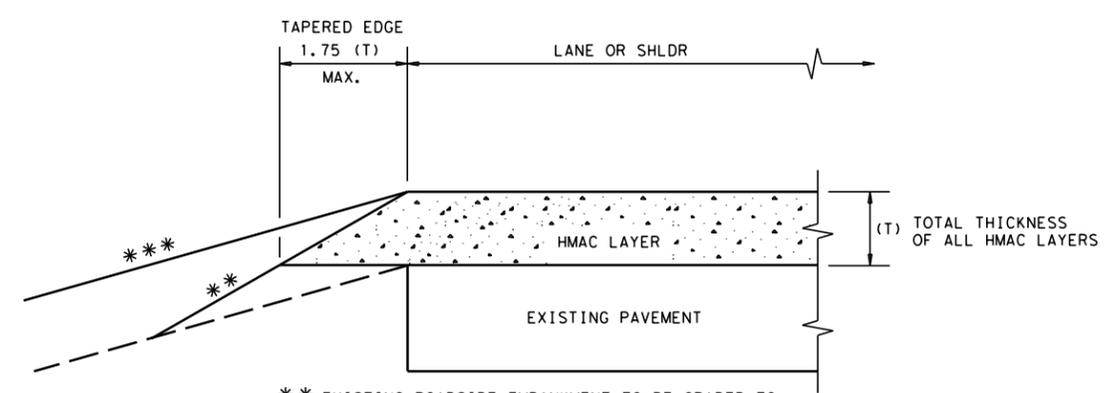
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DATE: 3/28/2021  
 FILE: V:\2142\active\214220136\06-CAD\6.1-Sheets\standard\03\_ROAD\tehm11.dgn



\*\*\* SEE TYPICAL SECTION FOR ROADSIDE DETAILS

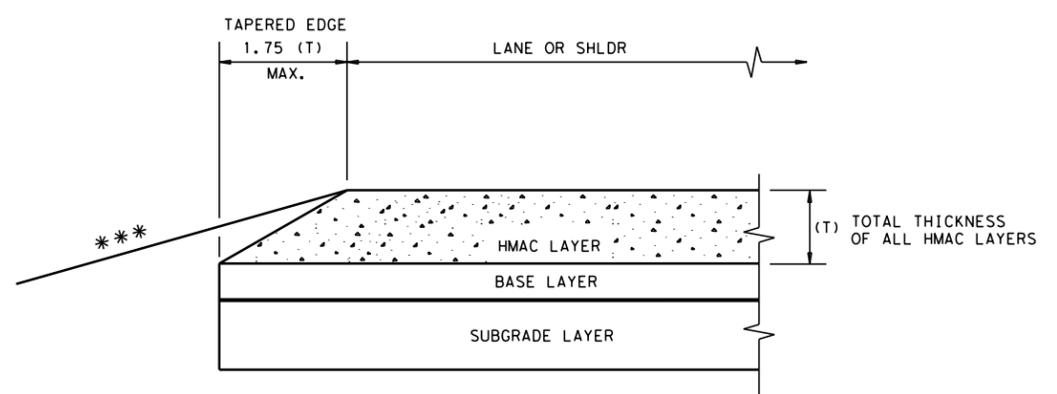
**CONDITION - 1**  
 THIN HMAC SURFACES OR HMAC OVERLAY  
 WITH THICKNESS OF 2.5" OR LESS



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

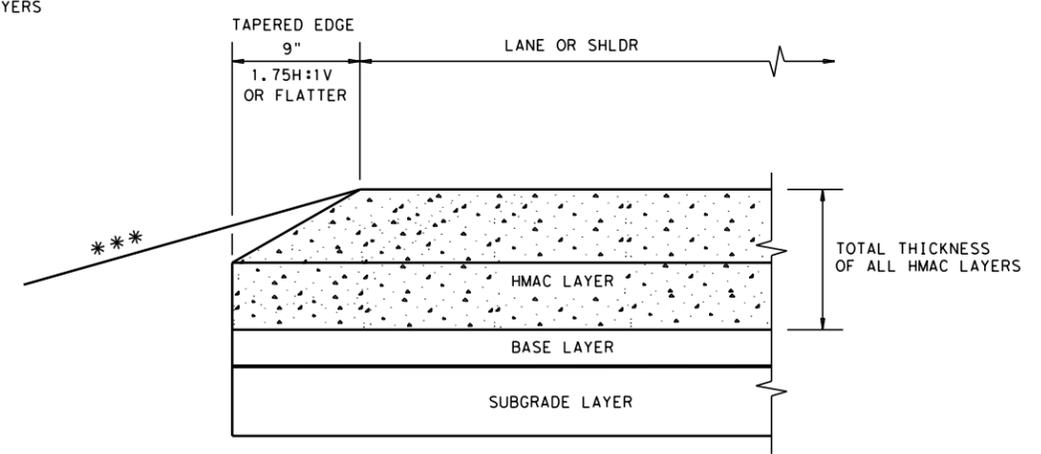
\*\*\* SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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



\*\*\* SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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



\*\*\* SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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

(NOT TO SCALE)

**GENERAL NOTES**

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

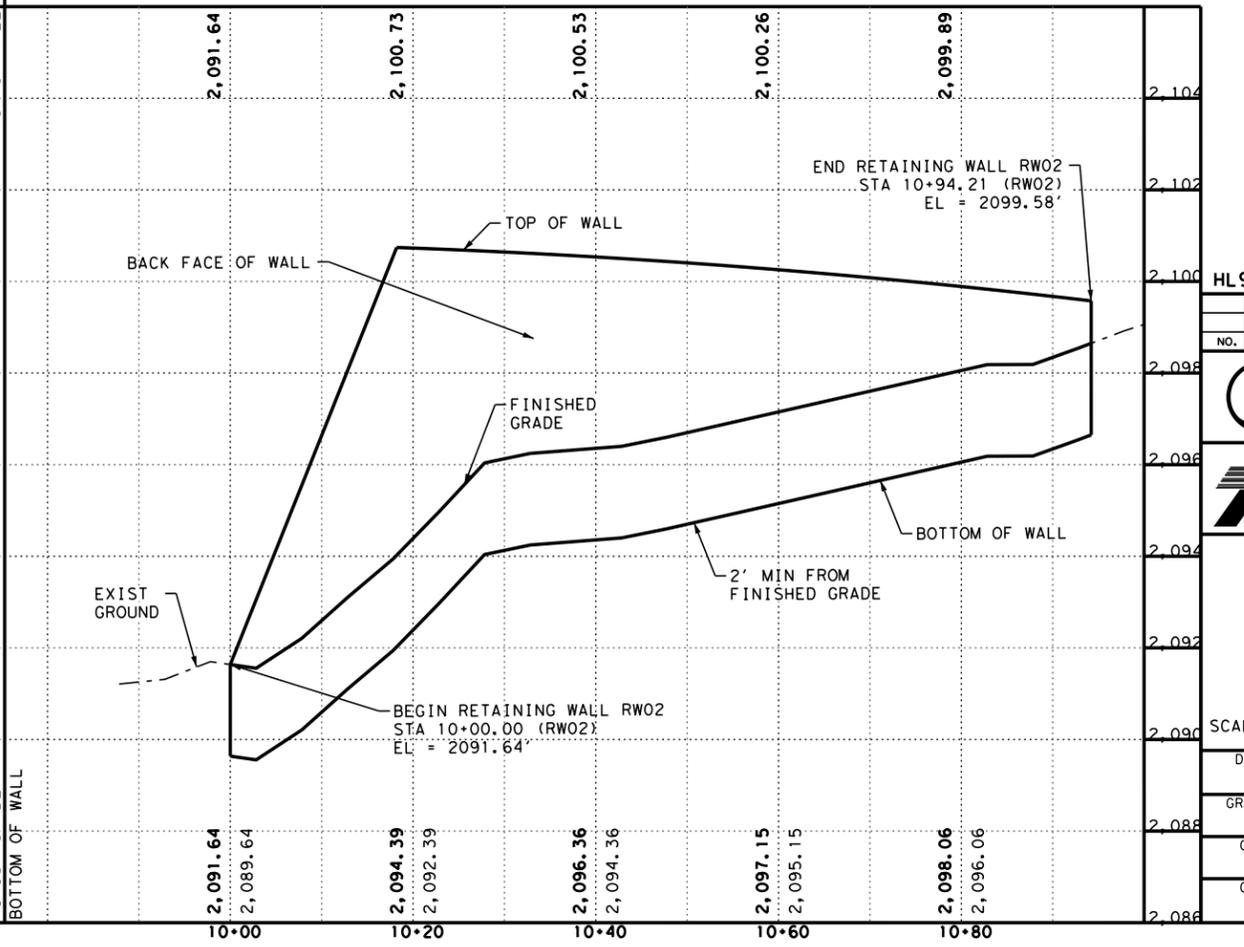
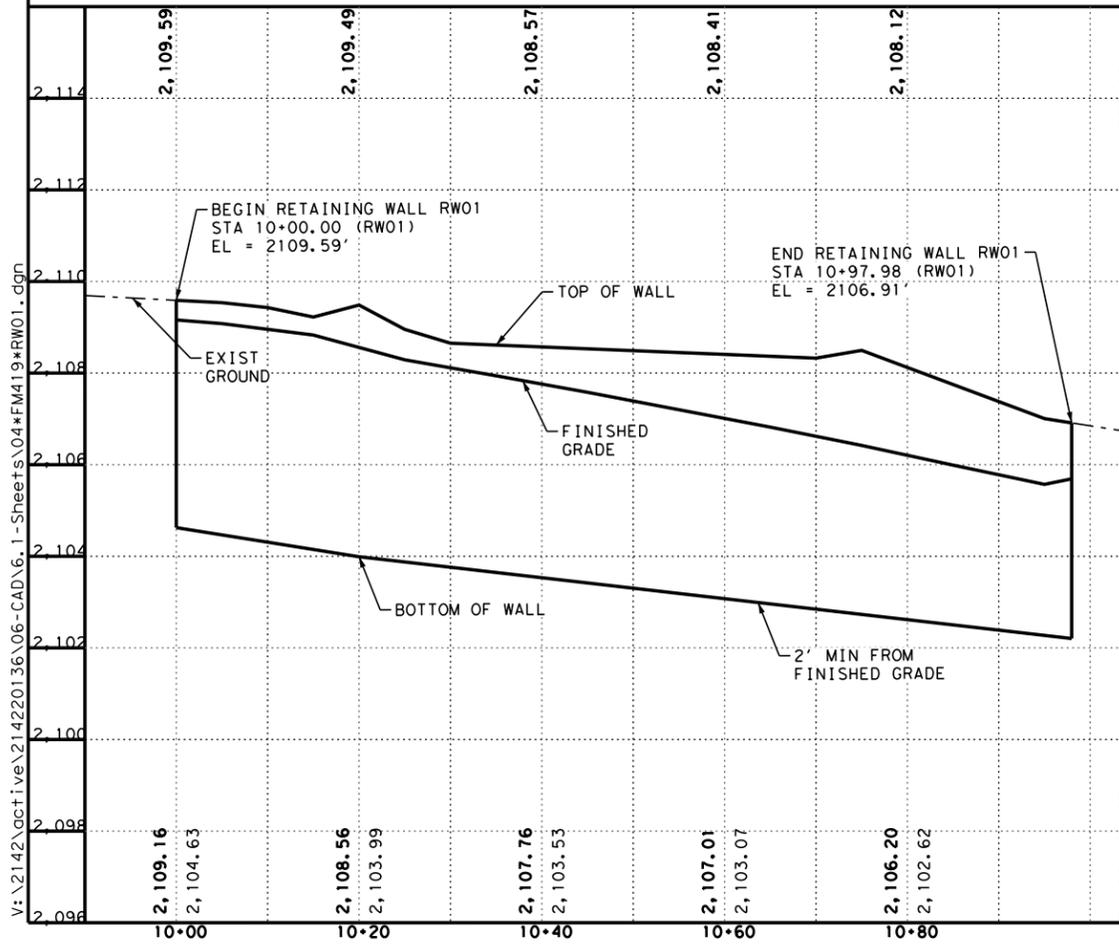
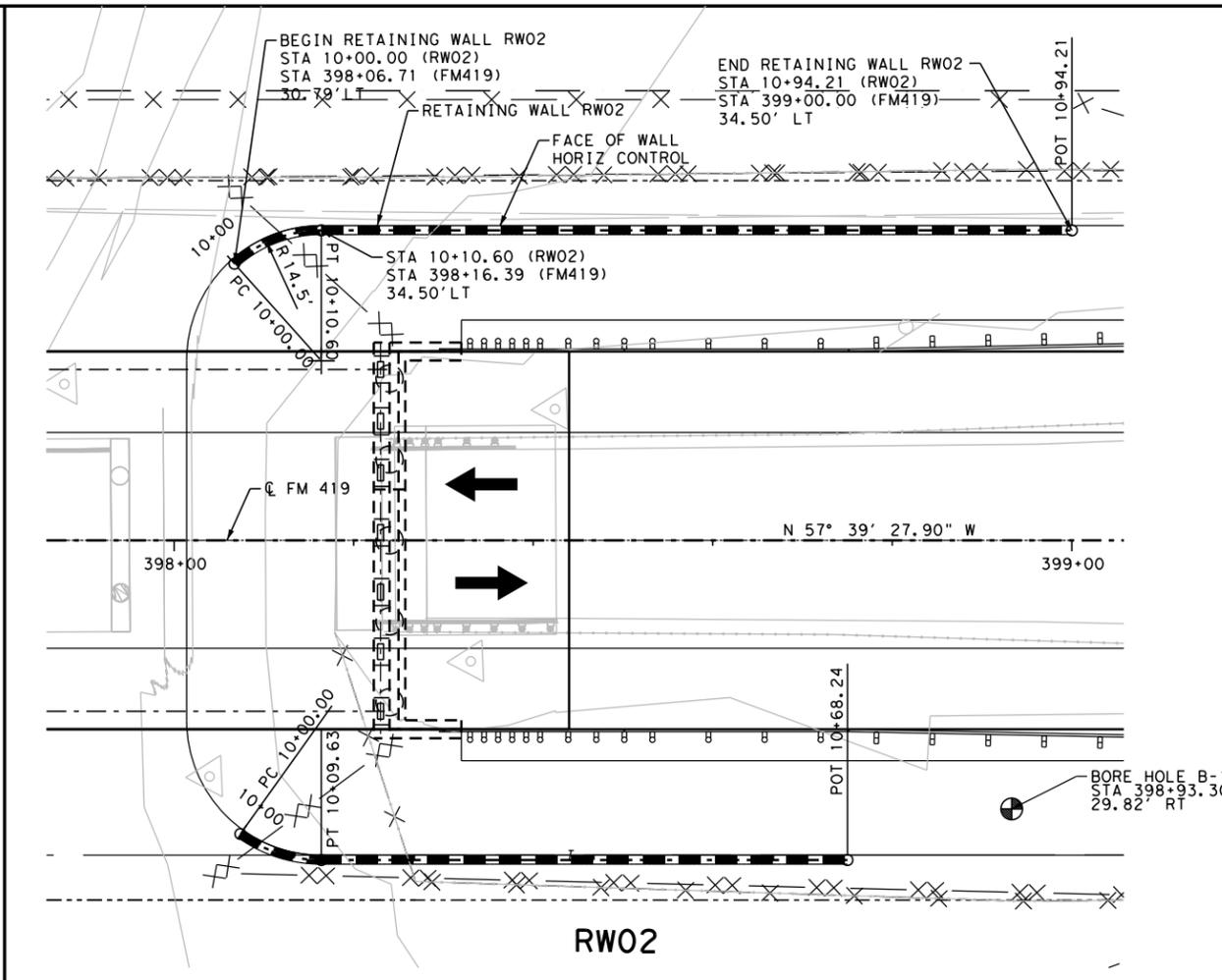
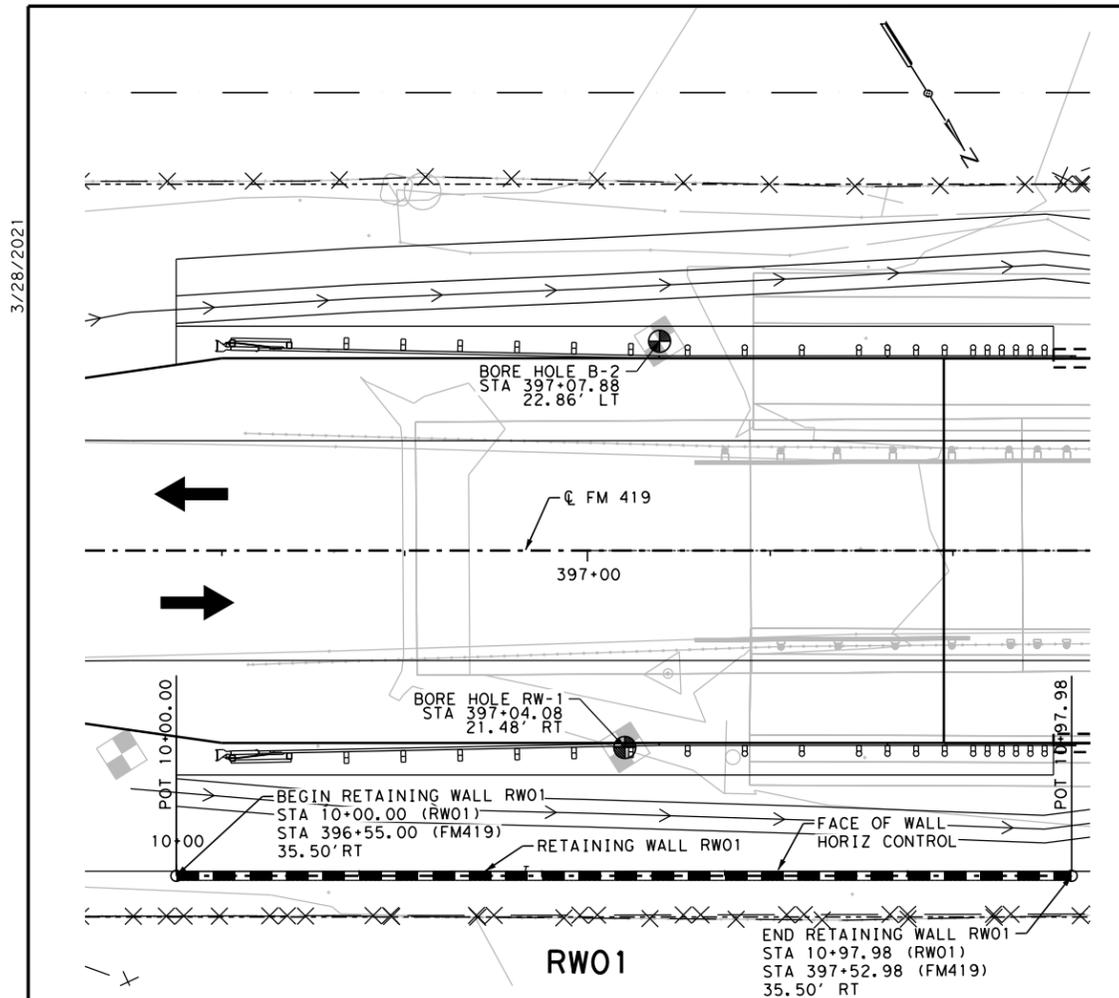
Texas Department of Transportation *Design Division Standard*

**TAPERED EDGE DETAILS  
 HMAC PAVEMENT**

**TE (HMAC) - 11**

FILE: tehm11.dgn	DN: TxDOT	CK: RL	DW: KB	CK:
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REVISIONS	0983	02	022	FM 419
	DIST	COUNTY	SHEET NO.	
	ABL	FISHER	57	

3/28/2021



*Kari Ward*

HL93 LOADING

NO.	DATE	REVISION	APPROVED

12222 Merit Dr Suite 400  
 Dallas, TEXAS 75251  
 P 972-991-0011  
 F 214-468-8266  
 Firm # F-6324

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### RETAINING WALL LAYOUT

FM 419 AT EAST COTTONWOOD CREEK  
RW01 & RW02

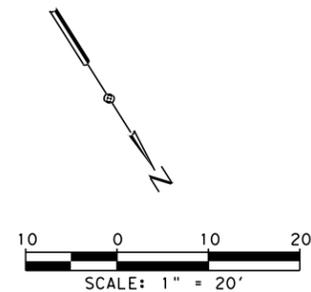
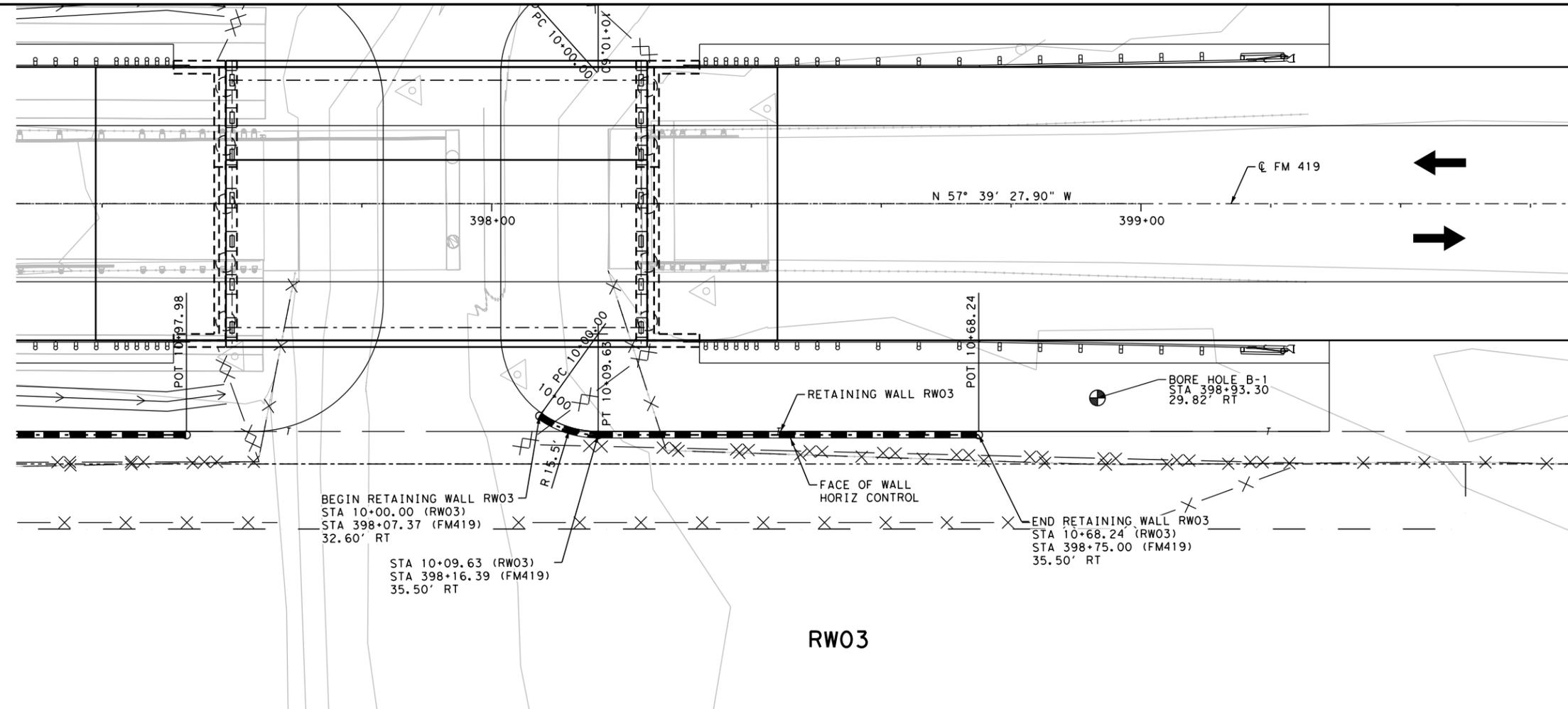
SCALE: HORZ 1"=20'  
VERT 1"=4'

SHEET 1 OF 2

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
LB	6	SEE TITLE SHEET		FM 419
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO
KW	TEXAS	ABL	FISHER	58
CHECK	CONTROL	SECTION	JOB	
LB	0983	02	022	

3/28/2021

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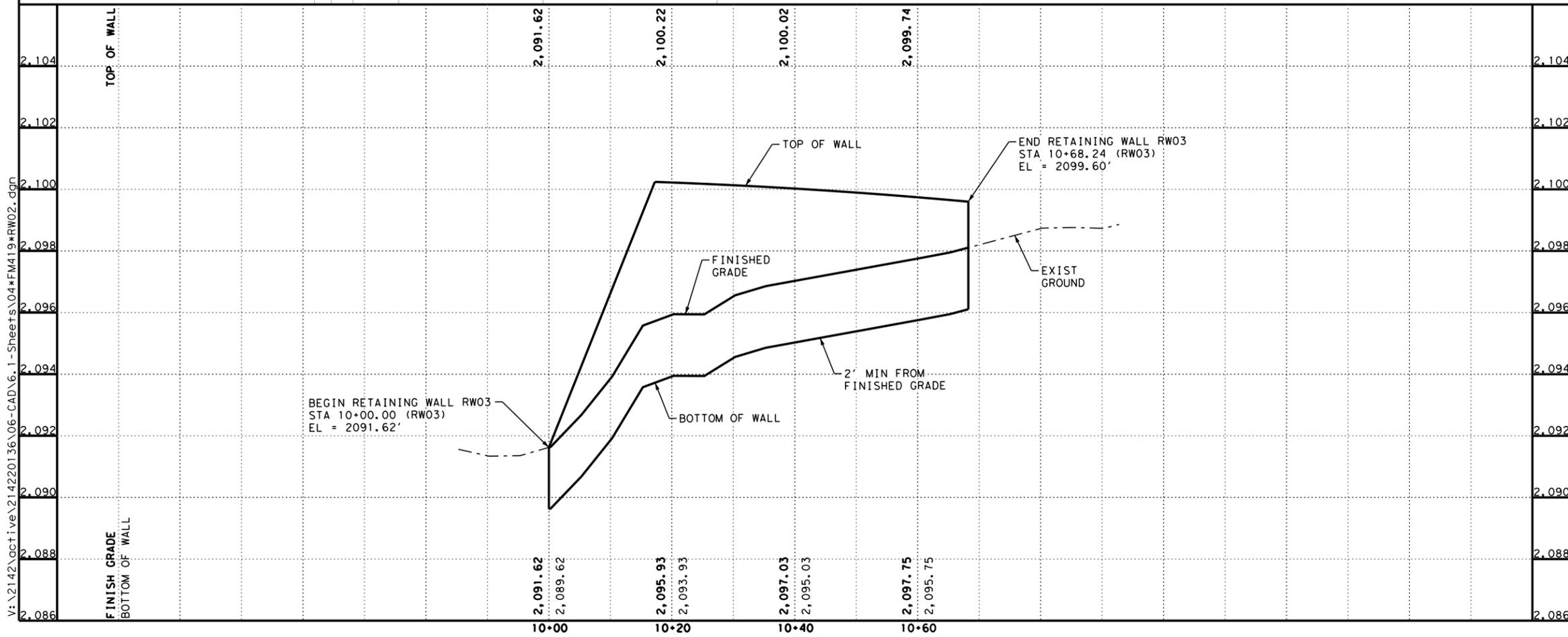


BEGIN RETAINING WALL RW03  
 STA 10+00.00 (RW03)  
 STA 398+07.37 (FM419)  
 32.60' RT

STA 10+09.63 (RW03)  
 STA 398+16.39 (FM419)  
 35.50' RT

END RETAINING WALL RW03  
 STA 10+68.24 (RW03)  
 STA 398+75.00 (FM419)  
 35.50' RT

RW03



*Kari Ward*

HL93 LOADING

NO.	DATE	REVISION	APPROVED

12222 Merit Dr Suite 400  
 Dallas, TEXAS 75251  
 P 972-991-0011  
 F 214-468-8266  
 Firm # F-6324

**Stantec**

Texas Department of Transportation  
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**RETAINING WALL LAYOUT**

FM 419 AT EAST COTTONWOOD CREEK  
 RW03

SCALE: HORZ 1"=20'  
 VERT 1"=4'

SHEET 2 OF 2

DESIGN LB	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
GRAPHICS KW	6	SEE TITLE SHEET		FM 419
CHECK KW	STATE	DISTRICT	COUNTY	SHEET NO
CHECK KW	TEXAS	ABL	FISHER	59
CHECK LB	CONTROL	SECTION	JOB	
	0983	02	022	



RETAINING WALL NOTES:  
CAST-IN-PLACE CONCRETE RETAINING WALL RECOMMENDATIONS

FOR CONTRACTOR INFORMATION ONLY, SEE GEOTECHNICAL INVESTIGATION REPORT FOR ADDITIONAL DETAILS.

WE RECOMMEND THAT THE SITE PREPARATION WORK BE PERFORMED TO IMPROVE THE BEARING, TO PROVIDE A MORE STABLE WORKING SURFACE AND TO MINIMIZE DISTURBANCES OF THE SANDY AND SILTY SOILS AT THE BASE OF CUT DURING CONSTRUCTION ACTIVITIES. WE RECOMMEND THAT THE FOLLOWING SITE PREPARATION WORK BE PERFORMED BENEATH THE PROPOSED FOOTINGS.

NOTE 1: EXCAVATION FOR THE PROPOSED RETAINING WALL STRUCTURES SHOULD BE PERFORMED IN ACCORDANCE WITH OSHA REQUIREMENTS FOR TYPE C SOILS. THIS WILL REQUIRE EXCAVATION SLOPES NO STEEPER THAN 1.5(H): 1(V) FOR SHORT TERM (LESS THAN 8 HOURS) AND NO STEEPER THAN 2(H): 1(V) FOR LONG TERM (GREATER THAN 8 HOURS).

1. EXCAVATED TO A DEPTH OF ONE (1) FOOT BELOW THE BOTTOM OF THE PROPOSED FOOTINGS. THE EXCAVATION LIMITS SHOULD EXTEND A MINIMUM OF 3 FEET BEYOND BOTH EDGES OF THE RETAINING WALLS.

WE RECOMMEND THAT THE BASE OF CUT BE PROOFROLLED UNDER THE DIRECTION OF A QUALIFIED SENIOR ENGINEERING TECHNICIAN AND/OR INSPECTOR. PROOFROLLING SHOULD BE PERFORMED IN ACCORDANCE WITH TXDOT ITEM 216. IF SOFT OR LOOSE SOILS WITH INADEQUATE BEARING CAPACITY ARE ENCOUNTERED IN ANY AREA AS DETERMINED BY A QUALIFIED ENGINEER, THE VERY

1. LOOSE SOILS SHOULD BE OVER-EXCAVATED AND REPLACED WITH COMPACTED CRUSHED STONE FLEX BASE.

2. AFTER PROOFROLLING, THE BASE OF CUT SHOULD BE MOISTENED AND COMPACTED TO A MINIMUM OF 98 PERCENT OF TEX-114E BETWEEN -1% AND +2% OF THE SOIL'S OPTIMUM MOISTURE CONTENT. THE SANDY AND SILTY SOILS WILL POTENTIALLY BE SUSCEPTIBLE TO LOOSENING UPON DRYING AND TO PUMPING AFTER RAIN EVENTS. IT IS IMPERATIVE THAT THE COMPACTED SUBGRADE BE PROTECTED FROM EXCESSIVE WETTING OR DRYING AND LOOSENING UNTIL THE FIRST LIFT OF CRUSHED STONE FLEX BASE IS PLACED AND COMPACTED.

3. FILL TO BOTTOM OF FOOTINGS WITH A MINIMUM OF 12 INCHES OF RECYCLED CRUSHED CONCRETE FLEX BASE AND/OR CRUSHED STONE FLEX BASE. THE FLEX BASE SHOULD BE COMPACTED IN TWO (2) 6 INCH LIFTS AT OPTIMUM TO +2% ABOVE OPTIMUM TO A MINIMUM OF 95% TEX-113E. THE BASE MATERIALS SHOULD COMPLY WITH TXDOT ITEM 247, TYPE D, GRADE 1. THE FLEX BASE SHOULD EXTEND TO THE EXCAVATION LIMITS SPECIFIED IN ITEM 1 ABOVE.

IF THE SITE PREPARATION WORK SPECIFIED ABOVE IS PERFORMED AND A MINIMUM EMBEDMENT DEPTH OF AT LEAST 2 FEET BELOW FINAL ADJACENT GRADE IS SPECIFIED, WE RECOMMEND THAT THE FOLLOWING PARAMETERS BE USED FOR DESIGN OF THE RETAINING WALLS:

NOTE 2: THE RETAINING WALL FOOTING FOR WALL RW01 SHOULD BE FOUNDED 2 FEET BELOW FINAL ADJACENT GRADE OR 1 FOOT BELOW THE BOTTOM OF THE CHANNEL, WHICHEVER IS DEEPER.

ALLOWABLE BEARING CAPACITY 2,500 PSF

NOTE 3: THE ALLOWABLE BEARING CAPACITY PROVIDED ABOVE HAS A FACTOR OF SAFETY OF AT LEAST 2.0 ASSUMING THAT THE SITE PREPARATION WORK AND EMBEDMENT DEPTH SPECIFIED ABOVE IS PERFORMED.

ULTIMATE FRICTION FACTOR FOR SLIDING RESISTANCE: 0.35 (APPROPRIATE FOS SHOULD BE USED)

ALLOWABLE PASSIVE RESISTANCE SHOULD BE NEGLECTED FOR THE FOOTINGS. IF PASSIVE RESISTANCE IS DESIRED FOR SLIDING RESISTANCE, A KEY SHOULD BE USED BENEATH THE FOOTINGS. A PASSIVE RESISTANCE OF 100 PSF PER FOOT OF KEY DEPTH BELOW THE BOTTOM OF THE FOOTING (LINEARLY INCREASING WITH DEPTH) COULD BE USED FOR THAT PORTION OF THE KEY IN DIRECT CONTACT WITH UNDISTURBED COMPACTED FLEX BASE AND NATIVE STIFF / DENSE SOILS AS VERIFIED BY A QUALIFIED ENGINEERING TECHNICIAN / INSPECTOR.

DIFFERENTIAL RETAINING WALL MOVEMENTS SHOULD BE ANTICIPATED DUE TO POST-CONSTRUCTION SETTLEMENTS. DIFFERENTIAL WALL MOVEMENTS ON THE ORDER OF 1 INCH SHOULD BE ANTICIPATED. CLOSELY SPACED VERTICAL CRACK CONTROL JOINTS SHOULD BE USED ALONG THE FULL HEIGHT OF ALL CONCRETE WALLS TO CONTROL CRACKING ASSOCIATED WITH DIFFERENTIAL FOUNDATION MOVEMENTS

ANY EXISTING OR PROPOSED UTILITY TRENCH BACKFILL LOCATED WITHIN THE BEARING INFLUENCE OF THE RETAINING WALL FOOTINGS (APPROXIMATED BY 2:1 SLOPE EXTENDING DOWNWARD FROM EDGE OF FOOTINGS) SHOULD BE TESTED TO VERIFY A COMPACTION LEVEL OF AT LEAST 95% TEX-114E.



County Fisher Hole RW-1  
Highway FM 49 at Cottonwood Cree Structure Retaining Wall  
CSJ 0983-02-022 Station 397+04.08  
Offset 21.48 RT

DRILLING LOG

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
2105.1			SAND, brown & reddish brown, silty, clayey, w/ gravel pieces (SM)			11	25	7		SPT at 0' 29/6 50/5 -#200=39.6%
		40 (6) 27 (6)	SILT, compact to dense, reddish brown, clayey, sandy, w/ sand layers (ML)							
		50 (5.5) 50 (2.5)								Very hard sandstone layers below 6 feet.
						15	21	7		SPT at 6.5' 36/ 50/4 -#200=78.9%
2098.1			SANDSTONE, hard to very hard, reddish brown and light gray, shaley, w/ shale seams and very dense cemented sand layers							SPT at 8' 50/2.5
		50 (2) 50 (1)								
										REC=80% RQD=80%
		50 (0.25) 50 (0.12)								
						16				REC=70% RQD=70%
		50 (0.25) 50 (0.12)								
										REC=100% RQD=98%
2081.125		50 (0.25) 50 (0.12)								

Remarks: Latitude: 32.59472383 Longitude: -100.47668746 Boring was dry to 10 feet prior to adding drilling fluid for wash rotary drilling.

The ground water elevation was not determined during the course of this boring.

Driller: RD Cromeans Logger: Brandon Creeks Organization: AGG

J:\PROJECTS\Engineer\2018\DE18-160 FM 419 @ Cottonwood Creek\Borelogs\DE18-160-RW.CLG



County Fisher Hole RW-2  
Highway FM 49 at Cottonwood Cree Structure Retaining Wall  
CSJ 0983-02-022 Station 396+49.05  
Offset 22.22 RT

DRILLING LOG

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
2105.5			SAND, brown and light gray, silty, clayey, w/ organics (SC)			23	25	9		SPT at 0' 1/1/5 -#200=40.5%
		50 (1) 50 (1)	SILT, very dense, reddish brown, cemented, sandy, clayey, w/ very hard sandstone seams (ML)			18	21	8		SPT at 1.5' 1/2 50/3 -#200=63.9%
2103.			SILT, dense, reddish brown, sandy, clayey (ML)							
		50 (5) 50 (2)								
2101.			SAND, reddish brown, cemented, silty, clayey with very hard sandstone layers (SM-SC)							SPT at 6' 50/5
						14		137		REC=47%, RQD=41% Qu= 4.8 ksf at 2.8%
2099.			SANDSTONE, very hard, reddish brown and light gray, shaley, w/ shale seams							
		50 (0.75) 50 (0.5)								REC=80%, RQD=78%
		50 (0.25) 50 (0.12)								
2087.20		50 (0.5) 50 (0.25)								
25										

Remarks: Latitude: 32.59466144 Longitude: -100.47653071 Boring was dry to 10 feet prior to adding drilling fluid for wash rotary drilling.

The ground water elevation was not determined during the course of this boring.

Driller: RD Cromeans Logger: Brandon Creeks Organization: AGG

J:\PROJECTS\Engineer\2018\DE18-160 FM 419 @ Cottonwood Creek\Borelogs\DE18-160-RW.CLG

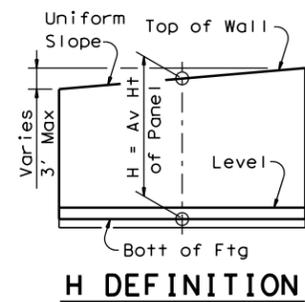
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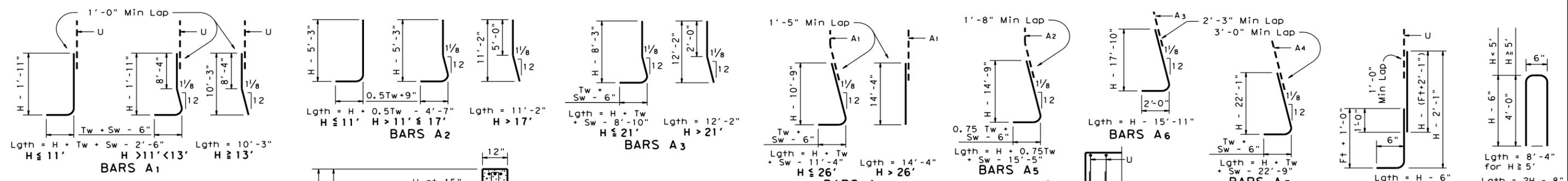
NO.		DATE		REVISION		APPROVED	
				12222 Merit Dr Suite 400 Dallas, TEXAS 75251 P 972-991-0011 F 214-468-8266 Firm # F-6324			
RETAINING WALL BORING LOGS FM 419 AT EAST COTTONWOOD CREEK							
SHEET 1 OF 1							
DESIGN	KW	FED RD DIV NO	6	FEDERAL AID PROJECT NO.		HIGHWAY NO	
GRAPHICS	JU	STATE	TEXAS	DISTRICT	ABL	SEE TITLE SHEET	
CHECK	JW	CONTROL	SECTION	COUNTY	FISHER	SHEET NO	
CHECK	KW	0983	02	JOB	022	61	

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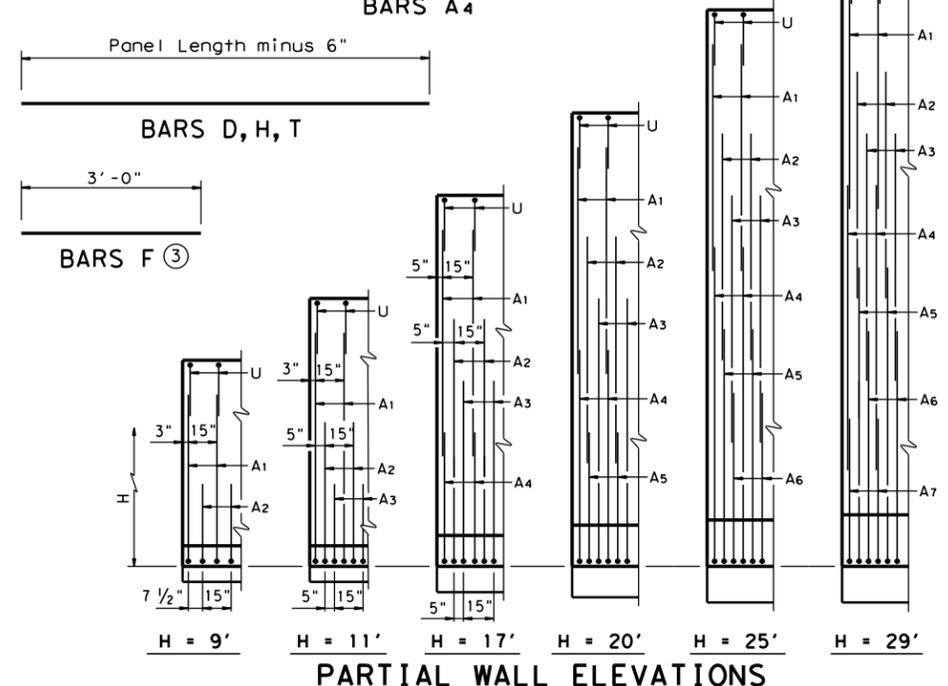
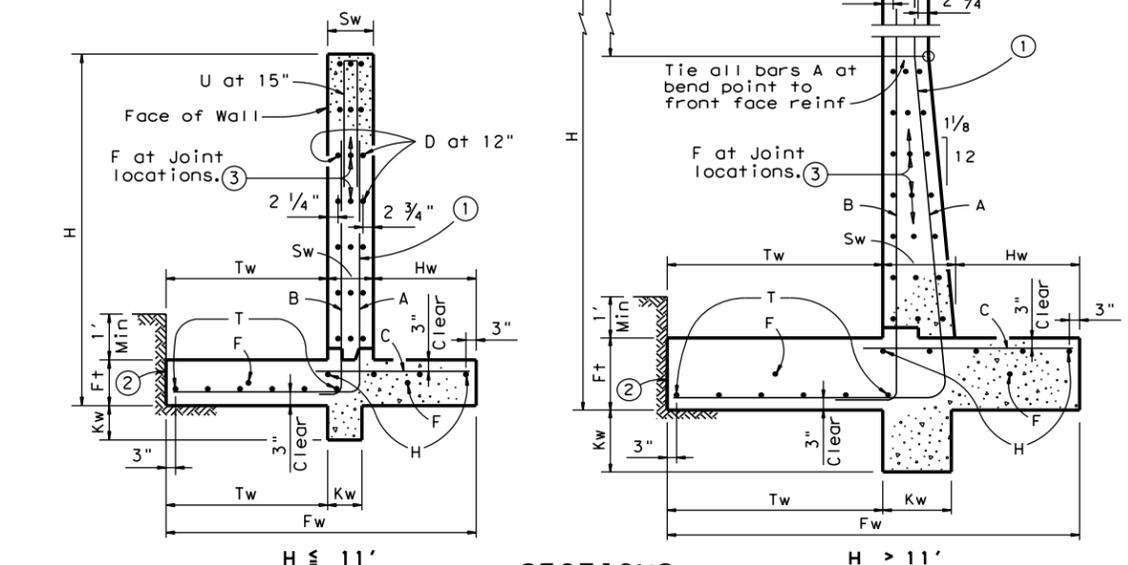
DATE: 3/28/2021  
 FILE: V:\2142\active\214220136\06-CAD\6.1-Sheets\standard\04\_RW-rwstd07.dgn



Wall Height "H"	PROPERTIES								REINFORCING STEEL FOR ONE 32' PANEL (DESIGN C)																				QUANTITY FOR ONE 32' PANEL		Wall Height "H"											
	WALL DIMENSIONS								Max Soil Press	A1 ~ 26 #5 at 15" c-c		A2 ~ 25 #6 at 15" c-c		A3 ~ 25 #7 at 15" c-c		A4 ~ 26 #8 at 15" c-c		A5 ~ 25 #9 at 15" c-c		A6 ~ 25 #11 at 15" c-c		A7 ~ 26 #11 at 15" c-c		B ~ 26 #5 at 15" c-c		C				D (#5) at 12" c-c		F (#5) at 12" c-c		H (#5) at 12" c-c		T (#5) at 12" c-c		U ~ 26 #5 at 15" c-c		CONC (CY)	REINF (LB)	
	(Ft)	Fw	Tw	Sw	Hw	Ft	Kw	T/SF		Lgth	Wt	Lgth	Wt	Lgth	Wt	Lgth	Wt	Lgth	Wt	Lgth	Wt	Lgth	Wt	Size	No	Spa	Lgth	Wt	No	Wt		No	Wt	No	Wt	No	Wt	Lgth	Wt			Lgth
2	3'-6"	1'-9"	1'-0"	9"	1'-0"	9"	0.14																#4	26	15"	2'-3"	39	4	131	4	32	2	66	3	99	3'-4"	90	6.0	458	2		
3	4'-3"	2'-2"	1'-0"	1'-1"	1'-0"	9"	0.17																#4	26	15"	2'-8"	46	6	197	5	40	3	99	3	99	5'-4"	145	8.1	626	3		
4	5'-0"	2'-6"	1'-0"	1'-6"	1'-0"	9"	0.20	5'-0"	136														#4	26	15"	3'-0"	52	8	263	6	48	3	99	3	99	7'-4"	199	10.1	991	4		
5	5'-8"	2'-10"	1'-0"	1'-10"	1'-0"	9"	0.24	6'-4"	172														#4	26	15"	3'-4"	58	10	329	7	56	3	99	4	131	8'-4"	226	12.1	1193	5		
6	6'-4"	3'-2"	1'-0"	2'-2"	1'-0"	9"	0.28	7'-8"	208														#4	26	15"	3'-8"	64	12	394	8	64	3	99	4	131	8'-4"	226	14.1	1336	6		
7	7'-0"	3'-6"	1'-0"	2'-6"	1'-0"	9"	0.32	9'-0"	244	4'-2"	156												#4	38	10"	4'-0"	102	14	460	9	72	4	131	4	131	8'-4"	226	16.1	1698	7		
8	7'-9"	3'-10"	1'-0"	2'-11"	1'-0"	9"	0.35	10'-4"	280	5'-4"	200												#6	38	10"	4'-4"	247	16	526	10	80	4	131	5	164	8'-4"	226	18.1	2056	8		
9	8'-6"	4'-3"	1'-0"	3'-3"	1'-0"	9"	0.37	11'-9"	319	6'-7"	247												#6	38	10"	4'-9"	271	18	591	11	88	4	131	5	164	8'-4"	226	20.2	2268	9		
10	9'-2"	4'-7"	1'-0"	3'-7"	1'-0"	9"	0.41	13'-1"	355	7'-8"	288	6'-9"	345										#7	38	10"	5'-1"	395	20	657	12	96	5	164	6	197	8'-4"	226	22.2	2981	10		
11	9'-10"	4'-11"	1'-0"	3'-11"	1'-0"	1'-0"	0.44	14'-5"	391	8'-11"	335	8'-1"	413										#8	38	10"	5'-5"	550	22	723	13	104	5	164	6	197	8'-4"	226	24.7	3382	11		
12	10'-6"	5'-3"	1'-1 1/8"	4'-1 7/8"	1'-0"	1'-0"	0.45	15'-10"	429	10'-1"	379	9'-6"	485										#9	38	10"	5'-9"	743	24	789	14	112	6	197	6	197	8'-4"	226	26.7	3868	12		
13	11'-2"	5'-7"	1'-2"	4'-5"	1'-3"	1'-3"	0.54	10'-3"	278	11'-2"	419	10'-11"	558	8'-5"	584								#9	38	10"	6'-1"	786	26	854	15	120	6	197	7	230	8'-4"	226	32.5	4591	13		
14	11'-10"	5'-11"	1'-3 1/8"	4'-7 7/8"	1'-3"	1'-3"	0.57	10'-3"	278	12'-5"	466	12'-4"	630	9'-10"	683								#9	38	10"	6'-5"	829	28	920	16	128	7	230	7	230	8'-4"	226	34.9	4986	14		
15	12'-6"	6'-3"	1'-4"	4'-11"	1'-6"	1'-3"	0.63	10'-3"	278	13'-7"	510	13'-9"	703	11'-2"	775								#9	38	10"	6'-9"	872	28	920	16	128	7	230	8	263	8'-4"	226	40.8	5298	15		
16	13'-3"	6'-7"	1'-5"	5'-3"	1'-6"	1'-6"	0.66	10'-3"	278	14'-9"	554	15'-2"	775	12'-8"	879								#9	38	10"	7'-2"	926	30	986	17	136	7	230	8	263	8'-4"	226	44.5	5672	16		
17	13'-10"	6'-11"	1'-6 1/4"	5'-4 3/4"	1'-6"	1'-6"	0.70	10'-3"	278	15'-11"	598	16'-7"	847	14'-1"	978								#10	38	10"	7'-5"	1213	32	1051	18	144	8	263	8	263	8'-4"	226	47.3	6308	17		
18	14'-6"	7'-3"	1'-7"	5'-8"	1'-9"	1'-6"	0.76	10'-3"	278	11'-2"	419	18'-0"	920	15'-5"	1070	9'-7"	815						#10	38	10"	7'-9"	1267	34	1117	19	152	8	263	9	296	8'-4"	226	54.2	7298	18		
19	15'-2"	7'-7"	1'-8 1/8"	5'-10 7/8"	1'-9"	1'-6"	0.79	10'-3"	278	11'-2"	419	19'-5"	992	16'-11"	1174	10'-11"	928						#10	38	10"	8'-1"	1322	36	1183	20	160	8	263	9	296	8'-4"	226	57.5	7743	19		
20	16'-0"	8'-0"	1'-9 1/4"	6'-2 3/4"	1'-9"	1'-6"	0.80	10'-3"	278	11'-2"	419	20'-11"	1069	18'-5"	1278	12'-4"	1048						#10	38	10"	8'-5"	1472	38	1248	21	168	9	296	10	329	8'-4"	226	61.3	8613	20		
21	16'-6"	8'-3"	1'-10 1/8"	6'-4 7/8"	2'-0"	1'-6"	0.88	10'-3"	278	11'-2"	419	22'-3"	1137	19'-9"	1371	13'-7"	1155						#10	38	10"	8'-9"	1776	40	1314	22	176	9	296	10	329	8'-4"	226	68.8	9033	21		
22	17'-3"	8'-7"	1'-11 1/4"	6'-8 3/4"	2'-0"	1'-6"	0.91	10'-3"	278	11'-2"	419	12'-2"	622	21'-2"	1469	15'-0"	1275	6'-1"	808				#10	38	10"	9'-2"	1860	42	1380	23	184	9	296	10	329	8'-4"	226	72.8	9729	22		
23	18'-0"	9'-0"	2'-0 1/8"	6'-11 1/8"	2'-3"	1'-6"	0.95	10'-3"	278	11'-2"	419	12'-2"	622	22'-8"	1574	16'-4"	1388	7'-1"	941				#10	38	10"	9'-6"	1928	44	1446	24	192	10	329	11	361	8'-4"	226	81.7	10314	23		
24	18'-6"	9'-4"	2'-1 1/4"	7'-0 3/4"	2'-3"	1'-6"	0.99	10'-3"	278	11'-2"	419	12'-2"	622	24'-1"	1672	17'-8"	1502	8'-1"	1074				#10	38	10"	9'-10"	2541	46	1511	25	200	10	329	11	361	8'-4"	226	85.4	11372	24		
25	19'-3"	9'-7"	2'-2 3/8"	7'-5 5/8"	2'-3"	1'-9"	1.03	10'-3"	278	11'-2"	419	12'-2"	622	25'-5"	1764	19'-0"	1615	9'-1"	1206				#10	38	10"	10'-1"	2606	48	1577	26	208	10	329	12	394	8'-4"	226	91.0	11909	25		
26	20'-0"	10'-0"	2'-3 1/2"	7'-8 1/2"	2'-3"	1'-9"	1.05	10'-3"	278	11'-2"	419	12'-2"	622	27'-0"	1874	20'-5"	1735	10'-1"	1339				#10	38	10"	10'-5"	2692	50	1643	27	217	11	361	12	394	8'-4"	226	95.6	12491	26		
27	20'-6"	10'-4"	2'-4 5/8"	7'-9 3/8"	2'-3"	1'-9"	1.09	10'-3"	278	11'-2"	419	12'-2"	622	14'-4"	995	21'-9"	1849	11'-1"	1472	17'-0"	2348		#10	38	10"	10'-9"	3516	52	1708	28	225	11	361	12	394	8'-4"	226	99.7	15132	27		
28	21'-3"	10'-7"	2'-5 3/4"	8'-2 1/4"	2'-3"	1'-9"	1.13	10'-3"	278	11'-2"	419	12'-2"	622	14'-4"	995	23'-0"	1955	12'-1"	1605	18'-4"	2533		#10	38	10"	11'-2"	3652	54	1774	29	233	11	361	13	427	8'-4"	226	104.6	15825	28		
29	22'-0"	11'-0"	2'-6 1/2"	8'-5 1/2"	2'-6"	1'-9"	1.17	10'-3"	278	11'-2"	419	12'-2"	622	14'-4"	995	24'-5"	2075	13'-1"	1738	19'-10"	2740		#10	38	10"	11'-6"	3761	54	1774	29	233	12	394	13	427	8'-4"	226	115.3	16454	29		



- Place vertical bars inside of horizontal bars (Typ both faces).
- Place footing toe against undisturbed soil.
- See standard RW 2 for size.



**GENERAL NOTES:**  
 All concrete to be Class "C".  
 All reinforcing steel to be Grade 60.  
 For notes and details not shown on this sheet see sheet RW2.  
 Quantities are based on "H" being average height of panel.  
 Retaining Walls are designed to be coded as follows on Retaining Wall Layout Sheets.  
 HC - 21 - 28  
 LA - 28 - 32  
 Panel Length ~ 32' is standard; 28' requires special quantities  
 Average Height "H" of panel  
 Design - A = no surcharge or slope above wall  
 B = slopes up to 4:1  
 C = traffic surcharge and/or slopes up to 2.5:1  
 Footing pressure design ~ L = low, H = high

Texas Department of Transportation  
 Bridge Division Standard

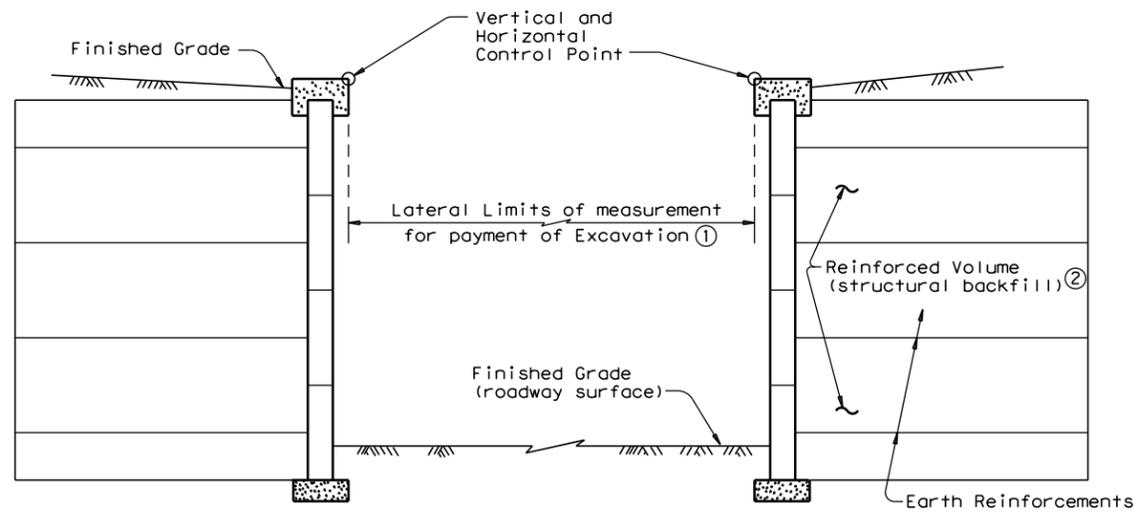
## RETAINING WALLS

### RW 1(L)C

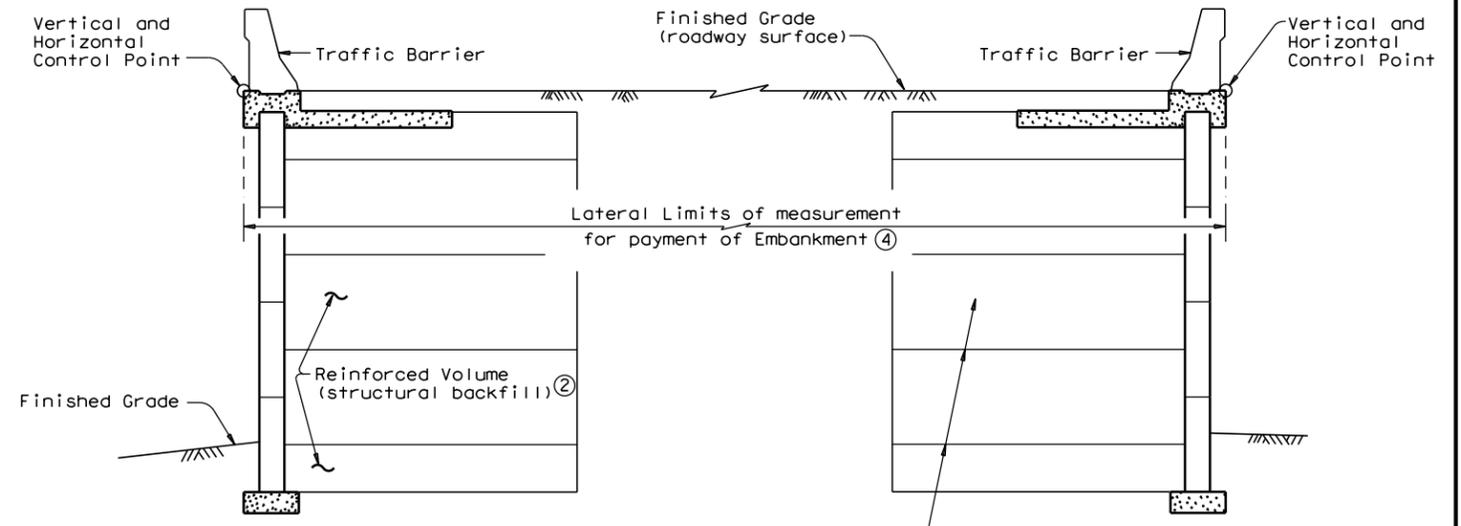
FILE: rwstd07.dgn	DN: TxDOT	CK: TxDOT	DW: GHO	CK: MPM
March 2010	CONTRACT	SECTION	JOB	HIGHWAY
0983	02	022	FM 419	
DIST	COUNTY	SHEET NO.		
ABL	FISHER	62		

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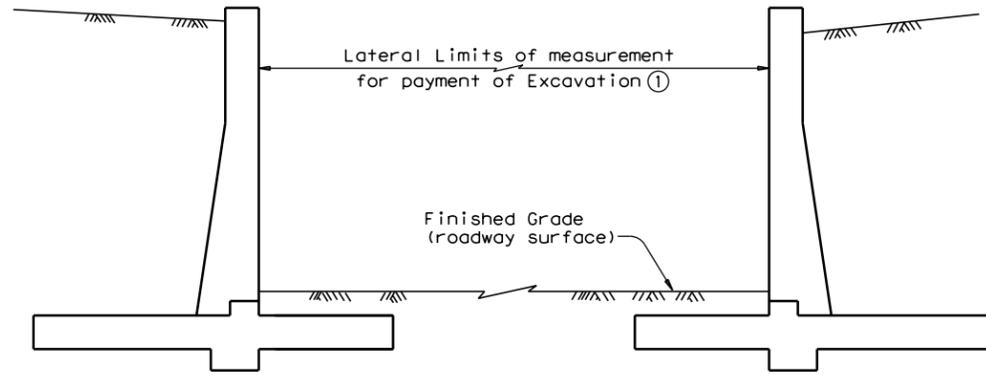
DATE: 3/28/2021  
 FILE: V:\2142\active\214220136\06-CAD\6.1-Sheets\standards\04\_RW\rwstd12.dgn



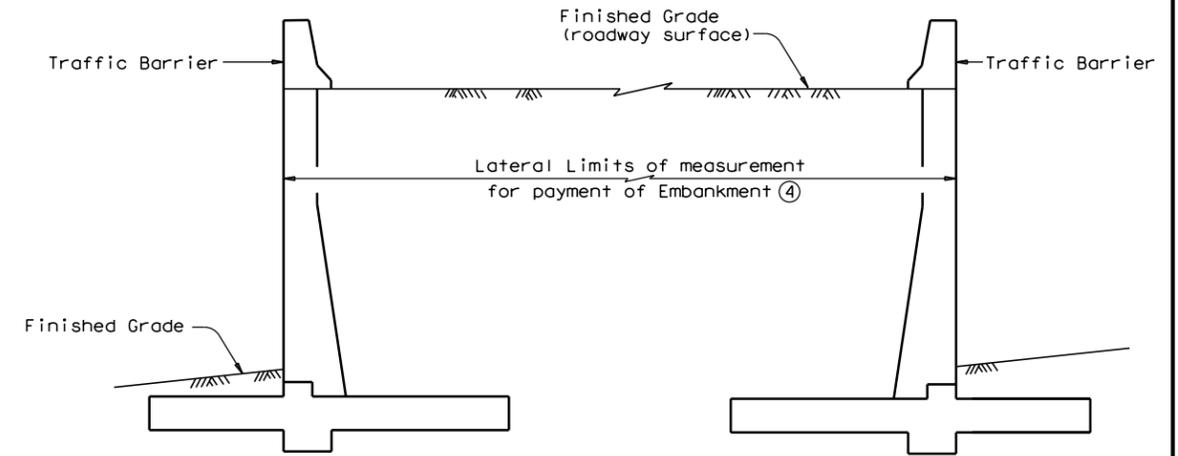
**TYPICAL SECTION**  
 Excavation Between MSE Retaining Walls ③



**TYPICAL SECTION**  
 Embankment Between MSE Retaining Walls ③

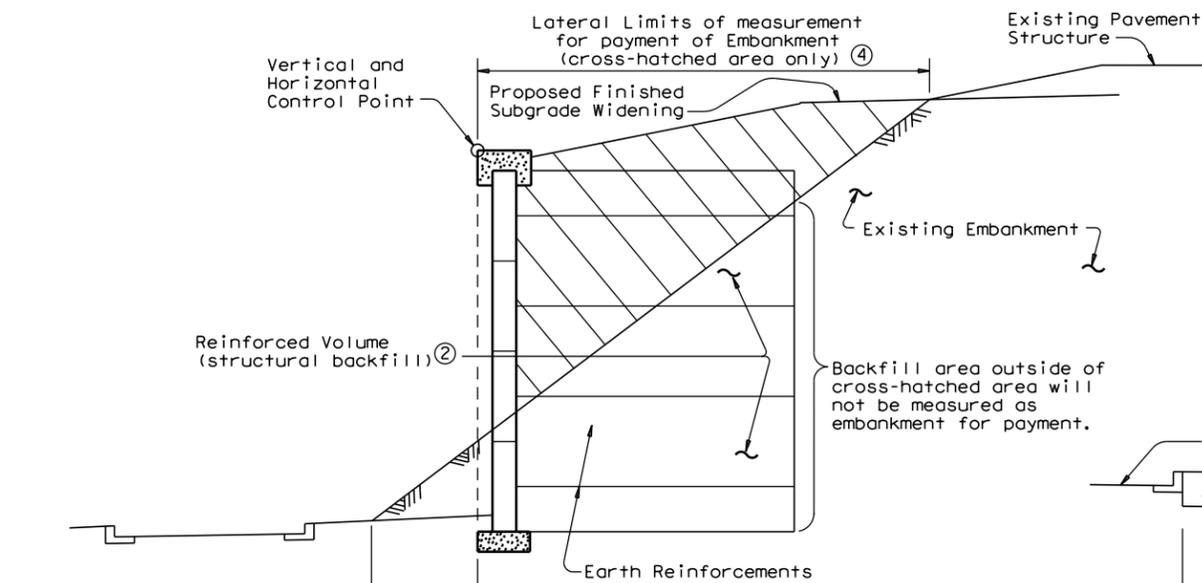


**TYPICAL SECTION**  
 Excavation Between Conventional Retaining Walls

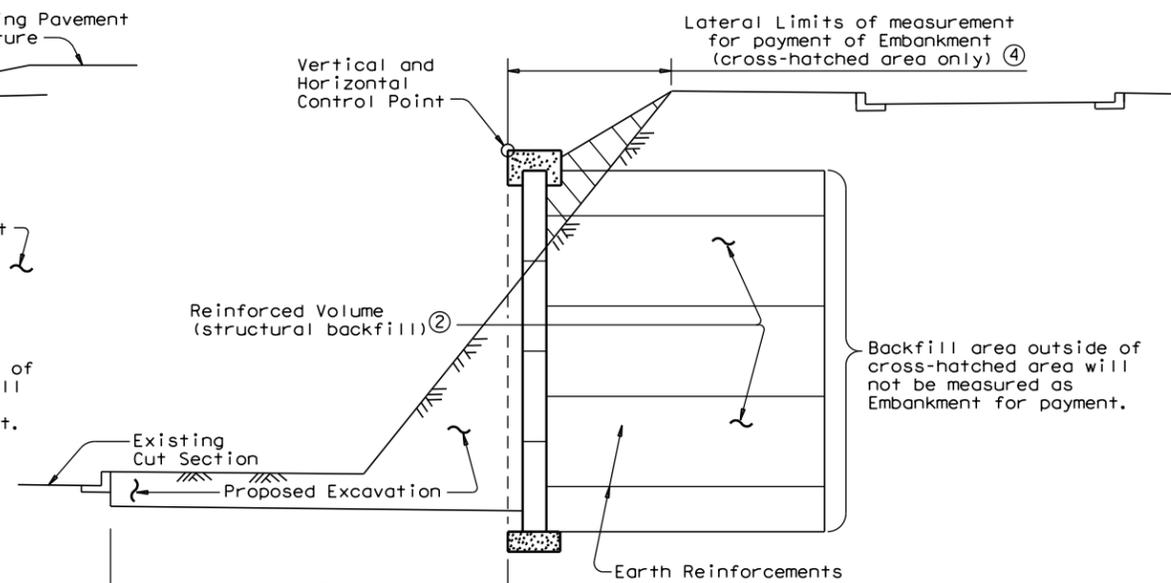


**TYPICAL SECTION**  
 Embankment Between Conventional Retaining Walls

- ① Only the Excavation above the proposed subgrade elevation will be measured for payment.
- ② Meeting requirements of Retaining-Wall Item.
- ③ Earthwork measurement with other designs of retaining walls will be made to the outside finished face in the same manner.
- ④ Only the Embankment above the existing ground line will be measured for payment.



**TYPICAL SECTION**  
 Widening Embankment with MSE Retaining Walls ③



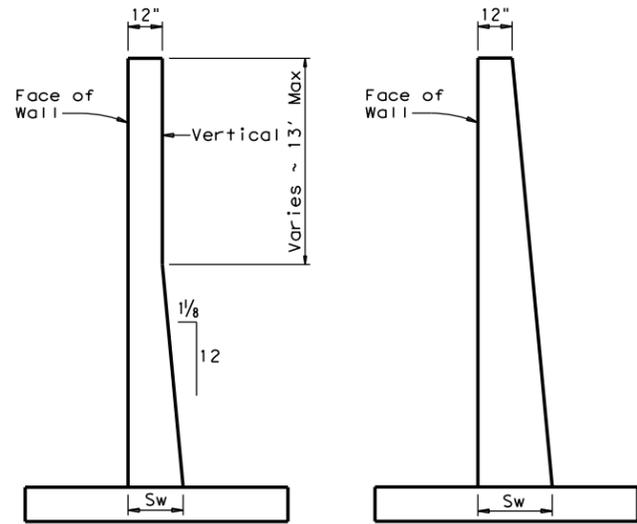
**TYPICAL SECTION**  
 Widening Cut Section with MSE Retaining Walls ③

Backfill area outside of cross-hatched area will not be measured as Embankment for payment.

		<b>Bridge Division Standard</b>	
<b>EARTHWORK MEASUREMENT AT RETAINING WALLS</b>			
<b>RW(EM)</b>			
FILE: rwstd12.dgn	DN: TxDOT	CK: TxDOT	DW: BWH
©TxDOT March 2010	CONTRACT: 0983	SECTION: 02	JOB: 022
REVISIONS			HIGHWAY: FM 419
	DIST: ABL	COUNTY: FISHER	SHEET NO.: 63

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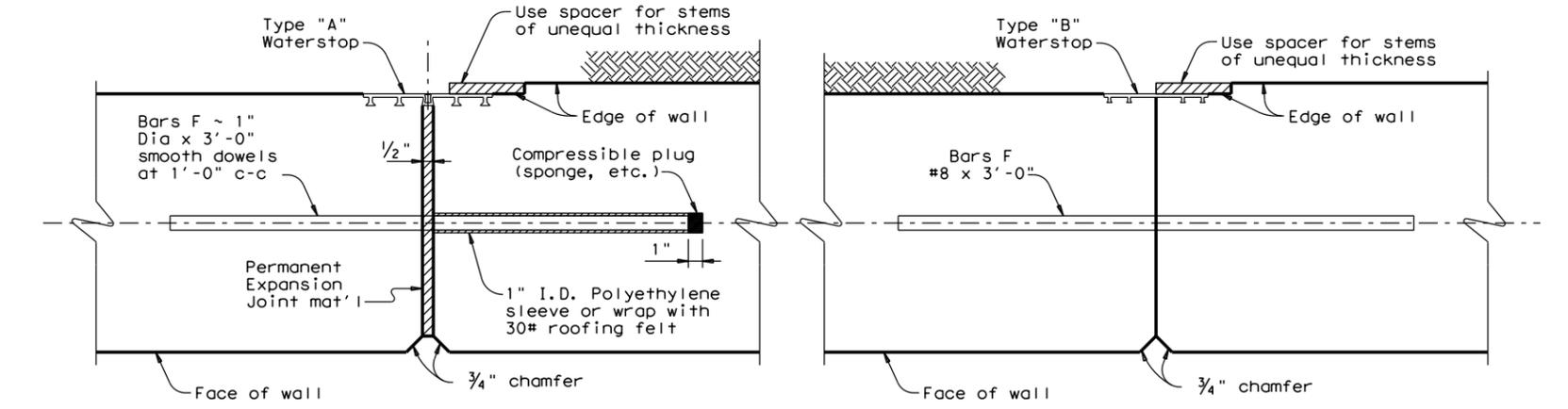
DATE: 3/28/2021  
 FILE: V:\2142\active\214220136\06-CAD\6.1-Sheets\standards\04\_RW\rwstd11.dgn



**AS DETAILED ALL HEIGHTS**  
 (Basis for payment)  
**FRONT FACE VERTICAL BACK FACE SLOPED**

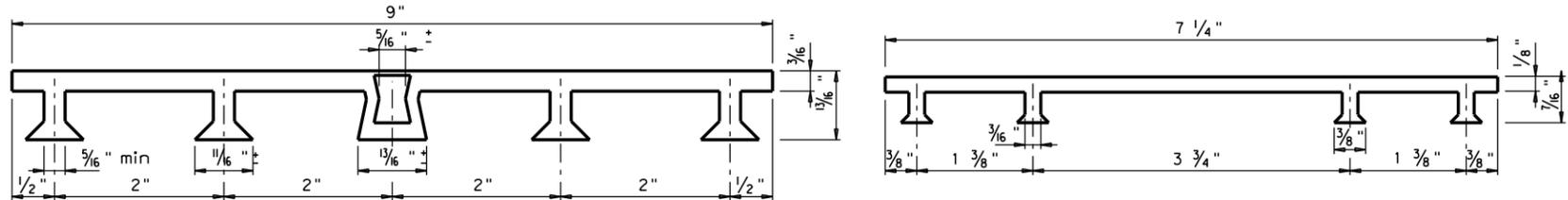
**ALTERNATE STEM SLOPE DETAILS**

Walls with slopes other than those shown may be used after approval by the Engineer. Sw shall not be less than shown in Table on Sheet 1. No payment will be made for excess concrete due to changing of slope of wall stem.



**EXPANSION JOINT**

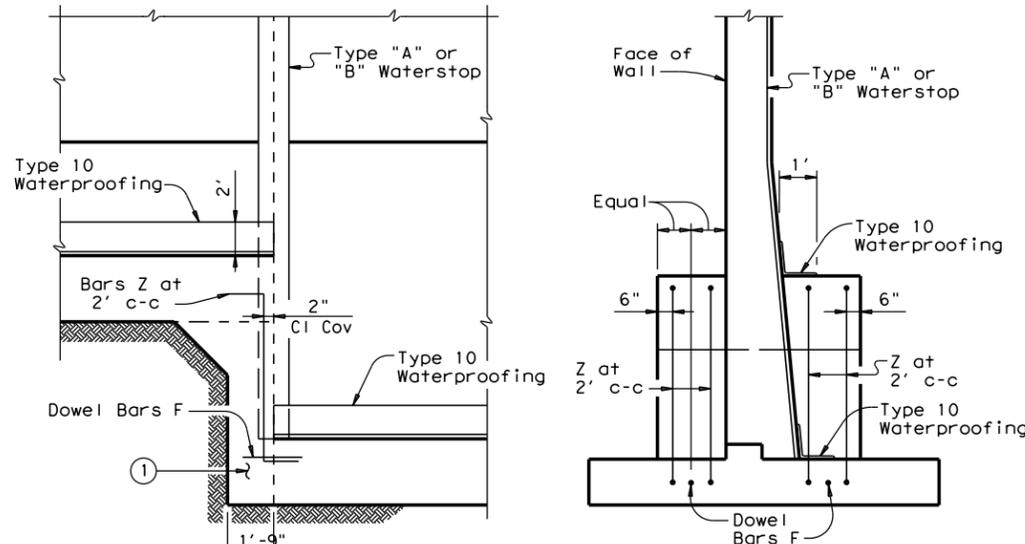
**CONSTRUCTION JOINT**



**PVC WATERSTOP TYPE "A"**

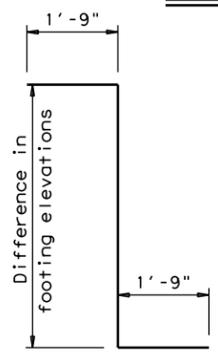
**PVC WATERSTOP TYPE "B"**

Note: Dimensions and shapes may vary slightly depending on manufacturer.

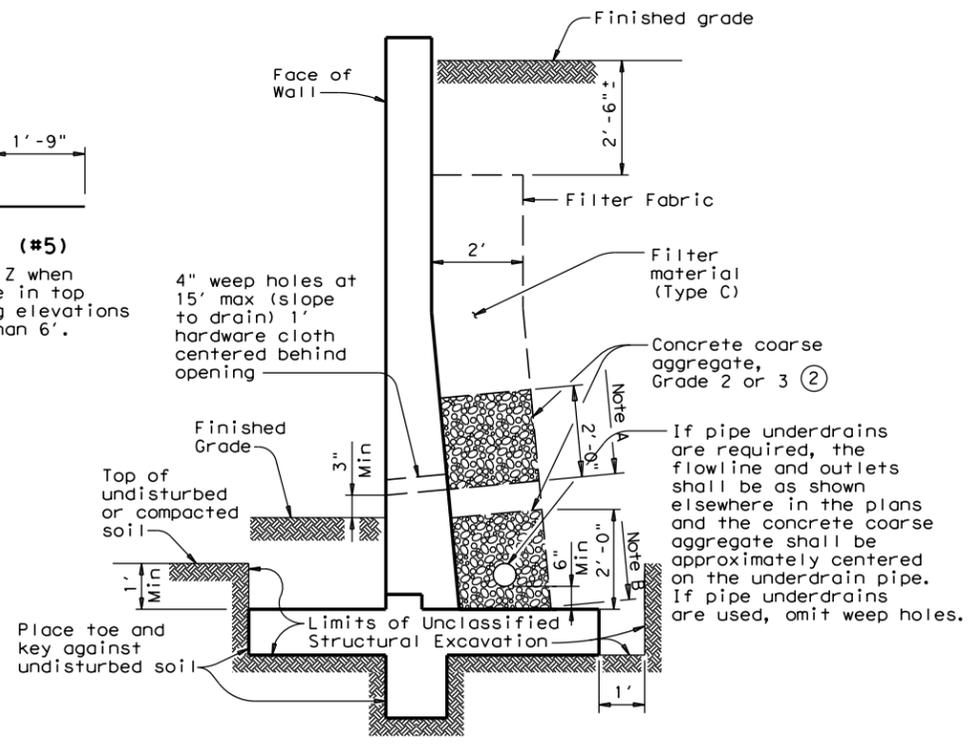


**SHOWING WATERSTOP AT FOOTING JOINT**

① Unreinforced Class "C" Concrete when difference in top of footing elevations is less than 6'. Omit when Dowel Bars F can be placed between adjacent footings with 4" cover top and bottom.



**BARS Z (#5)**  
 Omit Bars Z when difference in top of footing elevations is less than 6'.

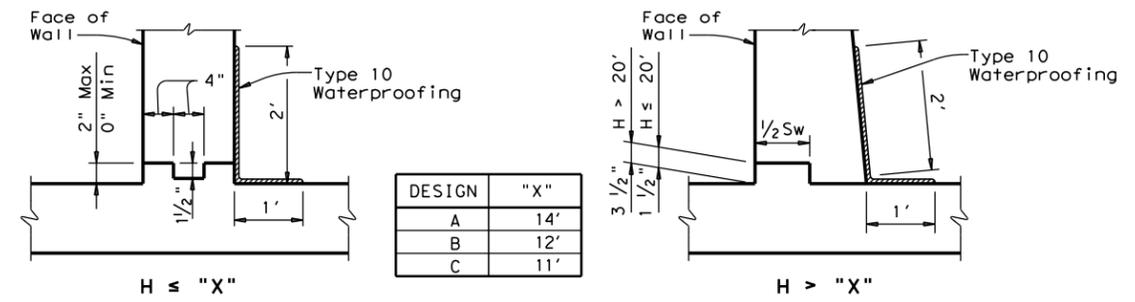


**DRAINAGE DETAILS AND EXCAVATION DIAGRAM**

Note A: Stop coarse aggregate at this level when weep holes are used.  
 Note B: Use coarse aggregate to here with filter material above when underdrains are used.

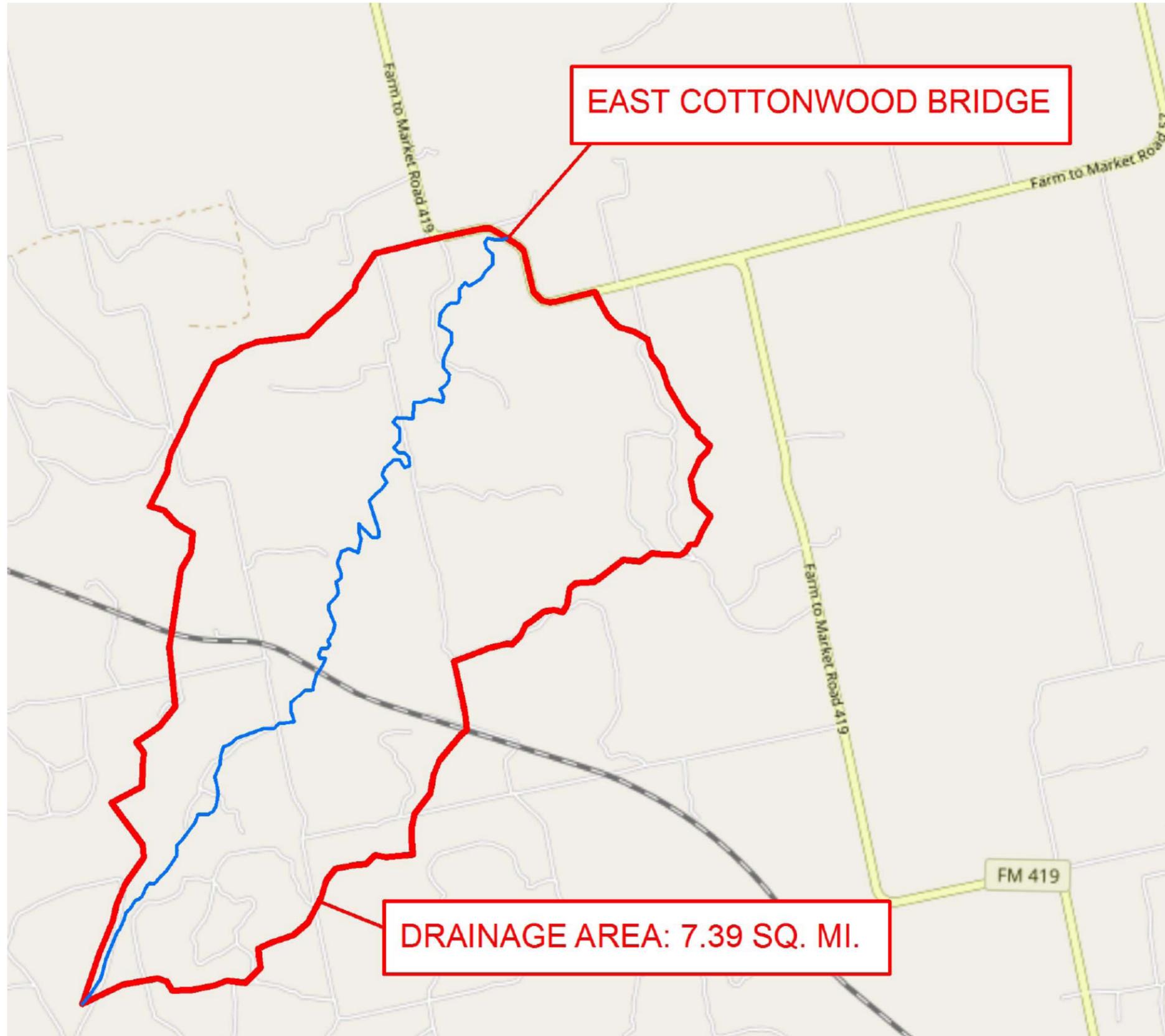
**GENERAL NOTES:**

Walls are designed assuming unit weight of soil = 120 pcf, and coefficient of horizontal earth pressure = 0.33.  
 Walls are designed to provide a minimum factor of safety against sliding of 1.5. The undisturbed or compacted soil depth in front of walls, from bottom of Key up, shall not be less than  $K_w + Ft + 1'$ .  
 Retaining walls are detailed to be placed on grades up thru 10% with footing level, with no changes in reinforcing steel. Steeper grades can be accommodated by shortening Bars A1 and B and increasing length of legs of Bars U by the same amount. No change in Quantities will be involved.  
 Retaining walls may be placed on Horizontal Curves by adjusting lengths of footing Bars T and H. Minor revisions of Concrete Quantities may be required.  
 Designed in accordance with current AASHTO Standard and Interim Specifications.  
 All concrete to be Class "C".  
 All reinforcing steel to be Grade 60.



**JOINT AND WATERSTOP DETAILS**

				Bridge Division Standard	
<b>RETAINING WALL MISCELLANEOUS DETAILS</b>					
<b>RW 2</b>					
FILE: rwstd11.dgn	DN: TxDOT	CK: TxDOT	DW: JGD	CK: MJG	
©TxDOT March 2010	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0983	02	022	FM 419	
04-11: Added Note 2.	DIST	COUNTY		SHEET NO.	
	ABL	FISHER			64

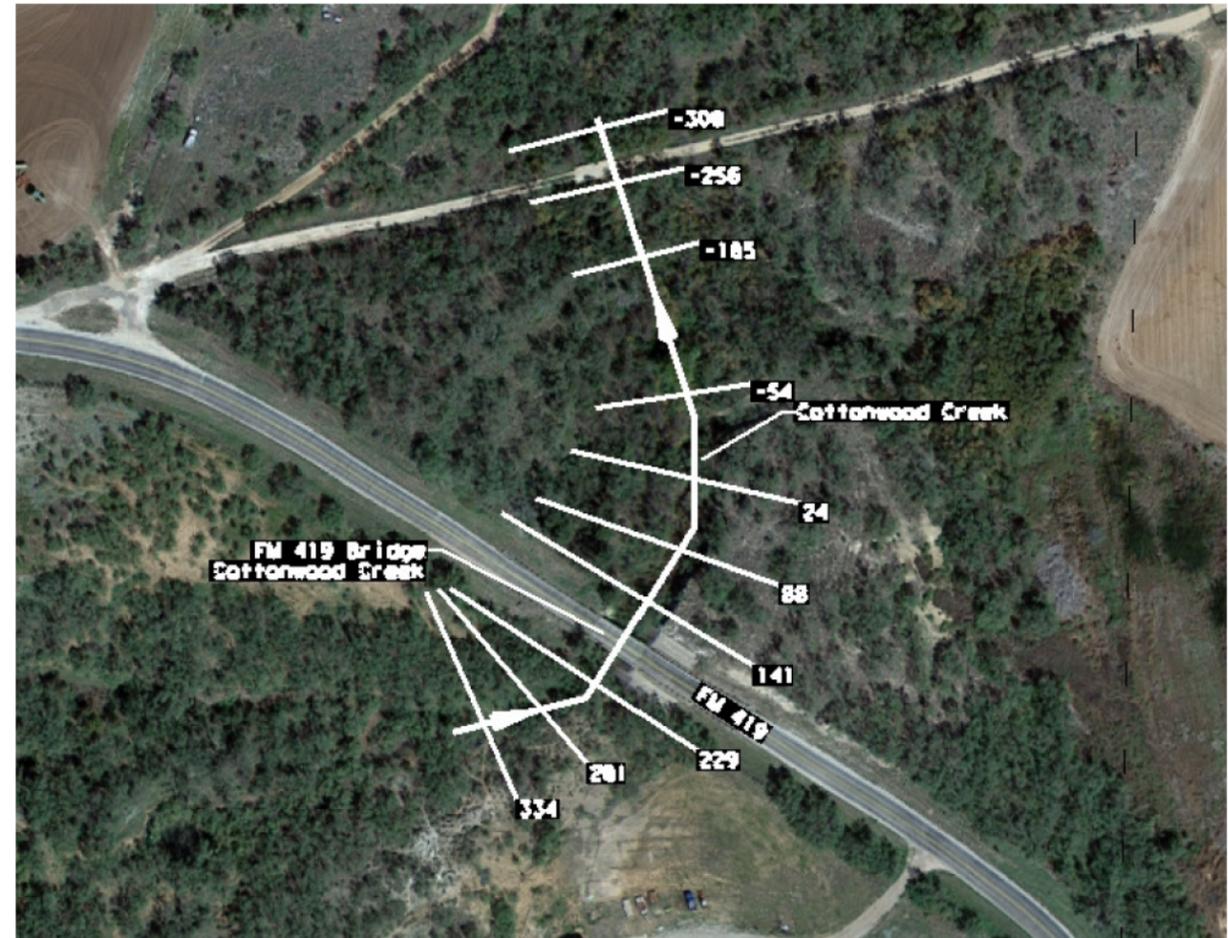
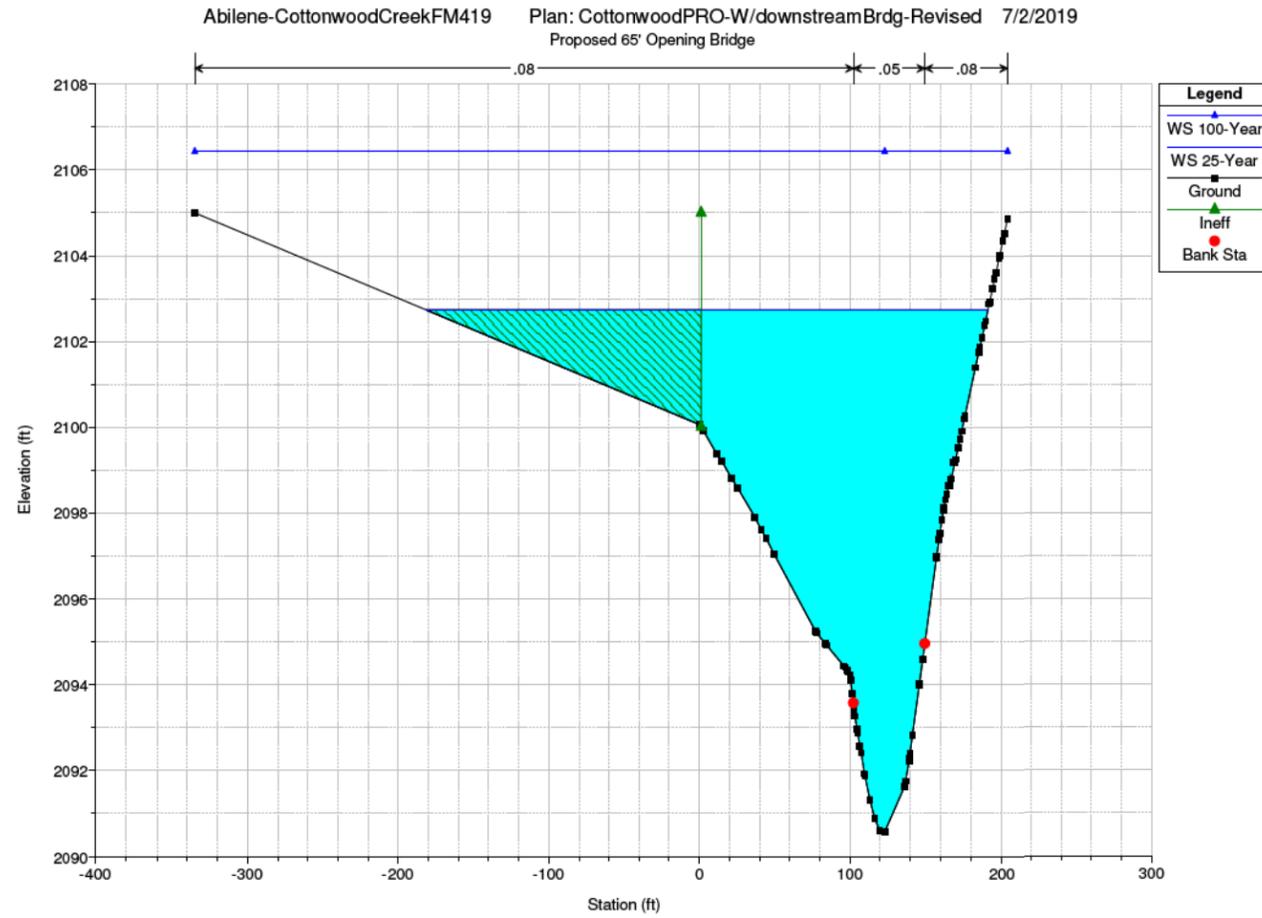


USING SCS UH CN METHOD	
FOR ESTIMATION OF PEAK STREAMFLOW FREQUENCY FROM STREAM GAGE DATA	
DRAINAGE AREA	7.39 SQ. MI
TOTAL FLOW LENGTH	102,718 FEET
BASIN SLOPE	0.00370 FT/FT
CN	68
FLOW FREQUENCY	FLOW RATE (CFS)
10% AEP (10-YEAR)	2,696
4% AEP (25-YEAR)	3,979
2% AEP (50-YEAR)	5,050
1% AEP (100-YEAR)	6,224



PLOT DRIVER: TXDOT\_PDF\_BW.plt  
 USER: CLINDSAY DATE: 4/23/2020 TIME: 12:05:30 PM SCALE: 1/2  
 FILE: TXDOT\_36\_DMEC.dgn

NO.	DATE	REVISION	APPROVED
			04/23/20
		HDR Firm Registration No. F-754 710 Hesters Crossing, Suite 150 Round Rock, Texas 78681 512.685.2900	
<b>FM 419</b> <b>DRAINAGE AREA MAP</b>			
SHEET 1 OF 1			
FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM419
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	ABL	FISHER	<b>65</b>
CONTROL	SECTION	JOB	
0983	02	022	



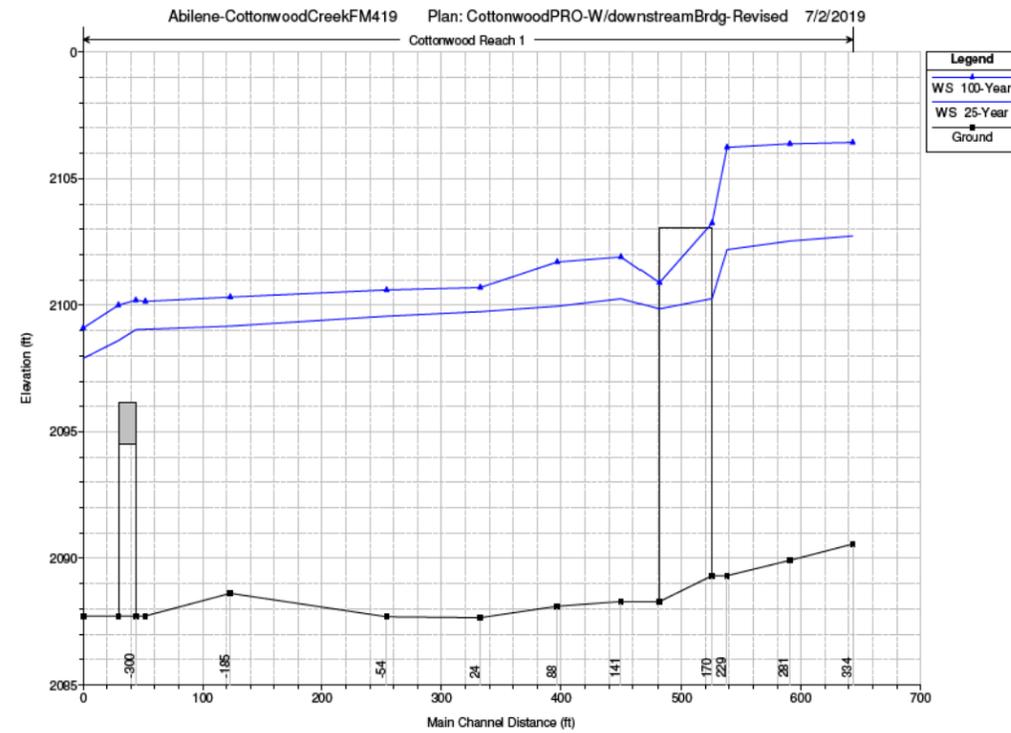
NOTES:

1. HEC-RAS 5.0.6 WAS USED TO MODEL STORM WATER FLOWS OF THE FM 419 BRIDGE
2. TAILWATER: NORMAL DEPTH: 0.6%
3. FEMA ZONE UNMAPPED AREA
4. FLOODPLAIN ADMINISTER: JUDGE KEN HOLT, (325) 776-2151

TABLE 1: Profile Output Table												
River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W. S. Elev (ft)	Crit W. S. (ft)	E. G. Elev (ft)	E. G. Slope (ft/ft)	Vel Chnl (ft/sec)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
229	25-Year	CottonEXwdwnstrBrdg	3979	2089.31	2102.22	2098.59	2102.9	0.002868	7.25	699.18	276.77	0.39
229	25-Year	Proposed-revised	3979	2089.31	2102.19	2098.32	2102.82	0.001661	6.81	750.18	280.08	0.38
229	100-Year	CottonEXwdwnstrBrdg	6224	2089.31	2106.2	2100.28	2106.41	0.000918	5.07	2702.2	515.68	0.23
229	100-Year	Proposed-revised	6224	2089.31	2106.24	2099.97	2106.49	0.000612	5.19	2793.77	518.31	0.24
Bridge												
141	25-Year	CottonEXwdwnstrBrdg	3979	2088.29	2100.12	2097.34	2101.17	0.004774	8.7	544.63	184.88	0.5
141	25-Year	Proposed-revised	3979	2088.29	2100.25	2097.23	2101.09	0.003884	7.75	599	202.45	0.46
141	100-Year	CottonEXwdwnstrBrdg	6224	2088.29	2101.83	2099.25	2102.94	0.004858	9.8	1175.7	329.41	0.52
141	100-Year	Proposed-revised	6224	2088.29	2101.9	2098.92	2102.83	0.004006	8.81	1255.89	341.49	0.48
88	25-Year	CottonEXwdwnstrBrdg	3979	2088.1	2099.96	2097.04	2100.86	0.004218	8.06	586.53	225.18	0.46
88	25-Year	Proposed-revised	3979	2088.1	2099.96	2097.04	2100.86	0.004218	8.06	586.53	225.18	0.46
88	100-Year	CottonEXwdwnstrBrdg	6224	2088.1	2101.71	2098.78	2102.6	0.00406	8.85	1273.53	331.47	0.47
88	100-Year	Proposed-revised	6224	2088.1	2101.71	2098.78	2102.6	0.00406	8.85	1273.53	331.47	0.47

PROPOSED BOTTOM OF DECK ELEVATION: 2102.72 FT; EXISTING BOTTOM OF DECK ELEVATION: 2101.53 FT

CONTRACTION SCOUR		
Y <sub>1</sub>	Q <sub>1</sub>	Y <sub>CS</sub>
(ft)	(cfs)	(ft)
Q <sub>25</sub> (Scour Design)		
10	3,375	1.9
Q <sub>50</sub> (Scour Check)		
11.4	4174.6	2.000



NO.	DATE	REVISION	APPROVED

RODRIGO VIZCAINO  
95939  
REGISTERED PROFESSIONAL ENGINEER

04/23/20

HDR  
Firm Registration No. F-754  
710 Hesters Crossing, Suite 150  
Round Rock, Texas 78681  
512.685.2900

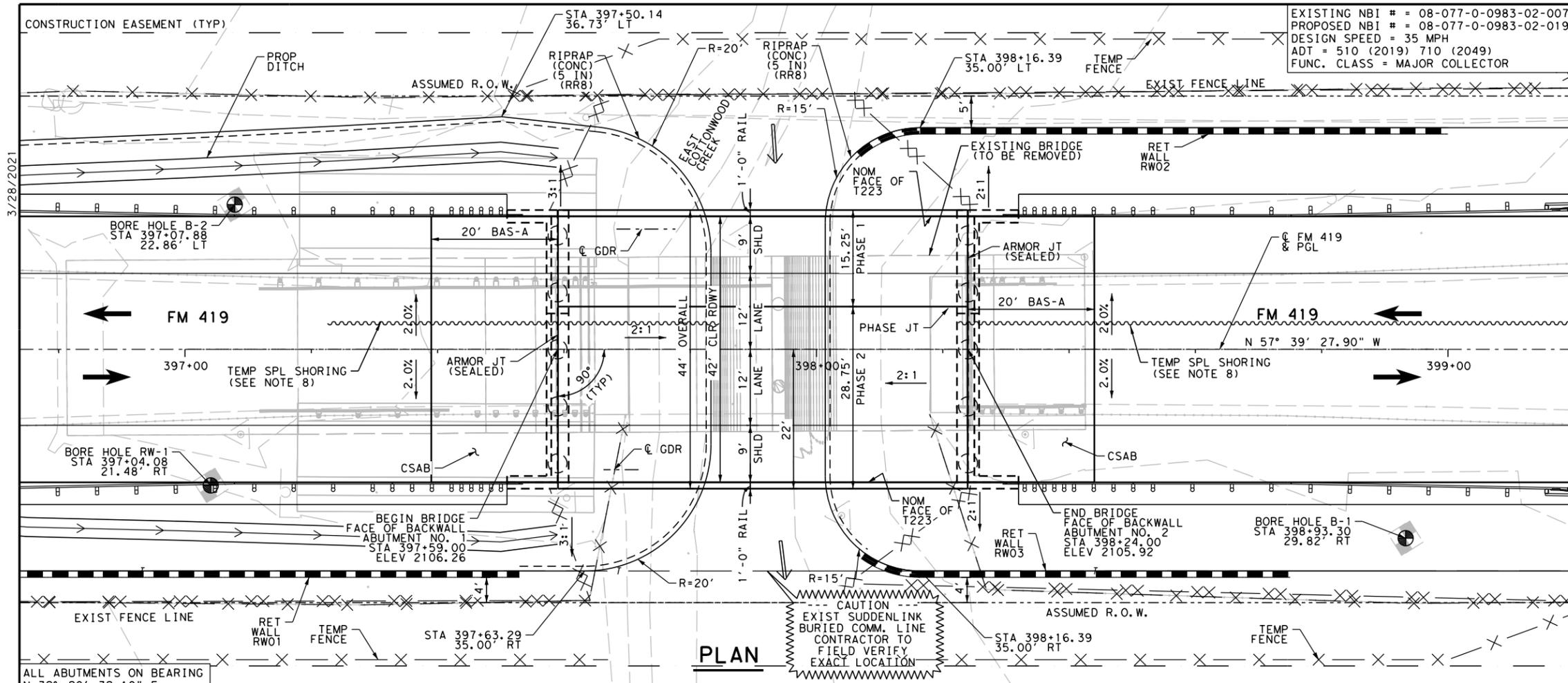
Texas Department of Transportation  
© 2020

## FM 419

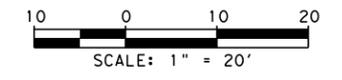
### HYDRAULIC DATA

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL PROJECT NO.	HIGHWAY NO.	
6	SEE TITLE SHEET	FM419	
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	ABL	FISHER	66
CONTROL	SECTION	JOB	
0983	02	022	



EXISTING NBI # = 08-077-0-0983-02-007  
 PROPOSED NBI # = 08-077-0-0983-02-019  
 DESIGN SPEED = 35 MPH  
 ADT = 510 (2019) 710 (2049)  
 FUNC. CLASS = MAJOR COLLECTOR



- GENERAL NOTES:**
- BRIDGE DESIGNED FOR HL 93 LOADING UNDER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, EIGHTH EDITION (2017).
  - HORIZONTAL DIMENSIONS ARE SHOWN. LENGTHS MUST BE CORRECTED FOR GRADE OR CROSS SLOPE WHERE APPROPRIATE.
  - CONTRACTOR SHALL FIELD VERIFY UTILITY LOCATIONS.
  - CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND ELEVATIONS IN THE FIELD PRIOR TO ORDERING MATERIALS.
  - EXISTING BRIDGE SECTION: 2-25' CONCRETE SPANS WITH TWO ABUTMENTS AND ONE BENT SUPPORTED ON DRILLED SHAFTS. STA 397+69 TO 398+19.
  - SEE "CONSTRUCTION STAGING & TYPICAL SECTIONS" SHEET FOR TYPICAL SECTIONS.
  - SEE RETAINING WALL LAYOUTS AND TYPICAL SECTIONS FOR RETAINING WALL DETAILS.
  - SEE "TRAFFIC CONTROL PLAN TEMP SPCL WALL/SHORING" SHEET FOR TEMPORARY SHORING LAYOUT AND QUANTITIES.
  - PROVIDE HPC CONCRETE. PROVIDE GRADE 60 EPOXY COATED REINFORCING STEEL.
  - THE USE OF TEMPORARY CASING AND/OR DRILLING SLURRY MAY BE NECESSARY TO INSTALL DRILLED SHAFTS TO THE REQUIRED LENGTH AND WILL BE CONSIDERED SUBSIDIARY TO ITEM 416 DRILLED SHAFTS.

**PLAN**

**HYDRAULIC DATA**

DRAINAGE AREA = 7.4 MI<sup>2</sup>  
 Q25 = 3,979 CFS  
 Q100 = 6,224 CFS  
 EXISTING STRUCTURE:  
 HW25E ELEV = 2,102.22 FT  
 HW100E ELEV = 2,106.20 FT  
 V25 = 7.3 FT/S  
 V100 = 5.1 FT/S  
 PROPOSED STRUCTURE:  
 HW25 ELEV = 2,102.19 FT  
 HW100 ELEV = 2,106.24 FT  
 V25 = 6.8 FT/S  
 V100 = 5.2 FT/S

BORE HOLE B-2  
 STA 397+07.88  
 ELEV 2105.90

BORE HOLE B-1  
 STA 398+93.30  
 ELEV 2098.60

50(0.5)50(0.25)

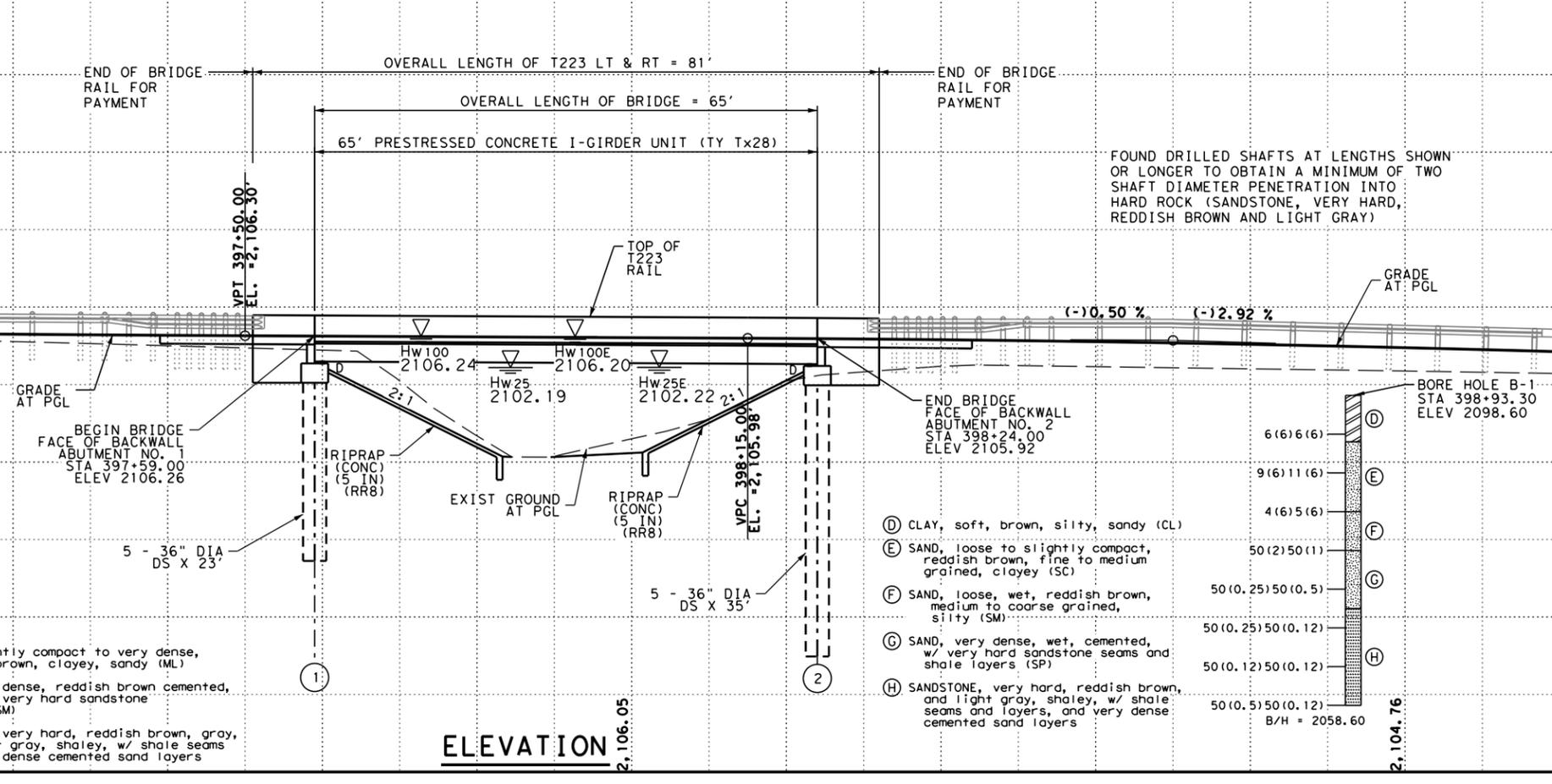
50(2)50(1.5)

50(0.12)50(0.12)

50(0.5)50(0.25)

50(0.25)50(0.12)

50(0.5)50(0.12)



**ELEVATION**



*Lauren Brod*



**BRIDGE LAYOUT**

FM 419 AT EAST COTTONWOOD CREEK

SCALE: HORIZ 1"=20'  
 VERT 1"=20'

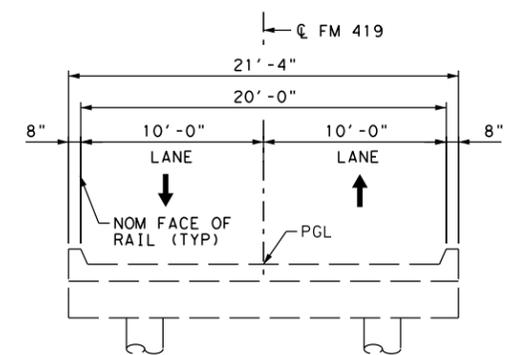
SHEET 1 OF 1

DESIGN LB	FED RD DIV NO 6	FEDERAL AID PROJECT NO. SEE TITLE SHEET	HIGHWAY NO FM 419
GRAPHICS KW	STATE TEXAS	DISTRICT ABL	COUNTY FISHER
CHECK TS	CONTROL	SECTION	JOB
CHECK LB	0983	02	022

67

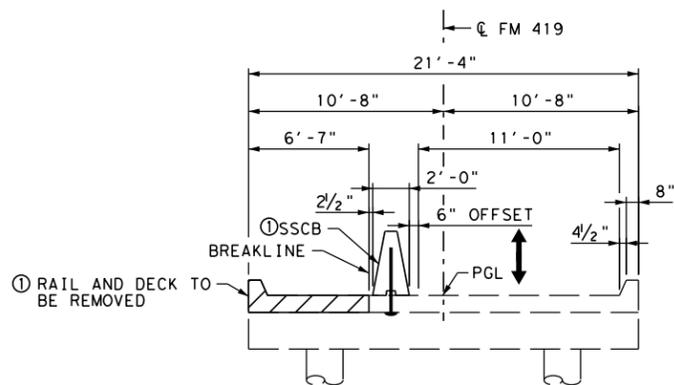
3/28/2021

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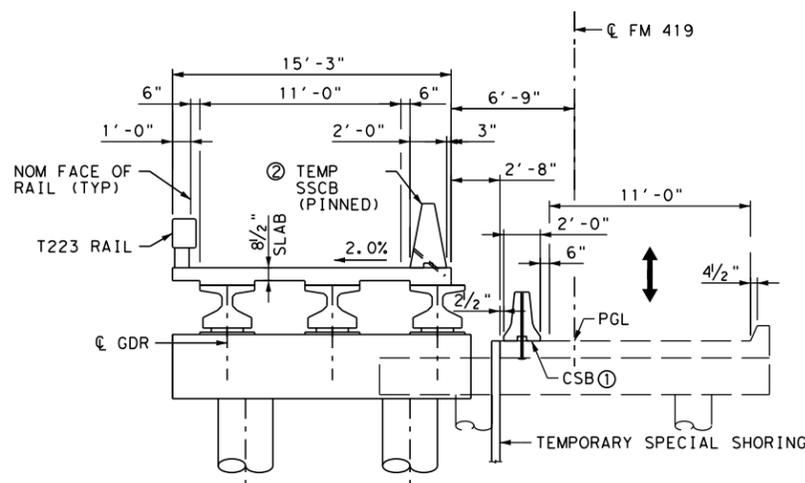


EXISTING BRIDGE TYPICAL SECTION

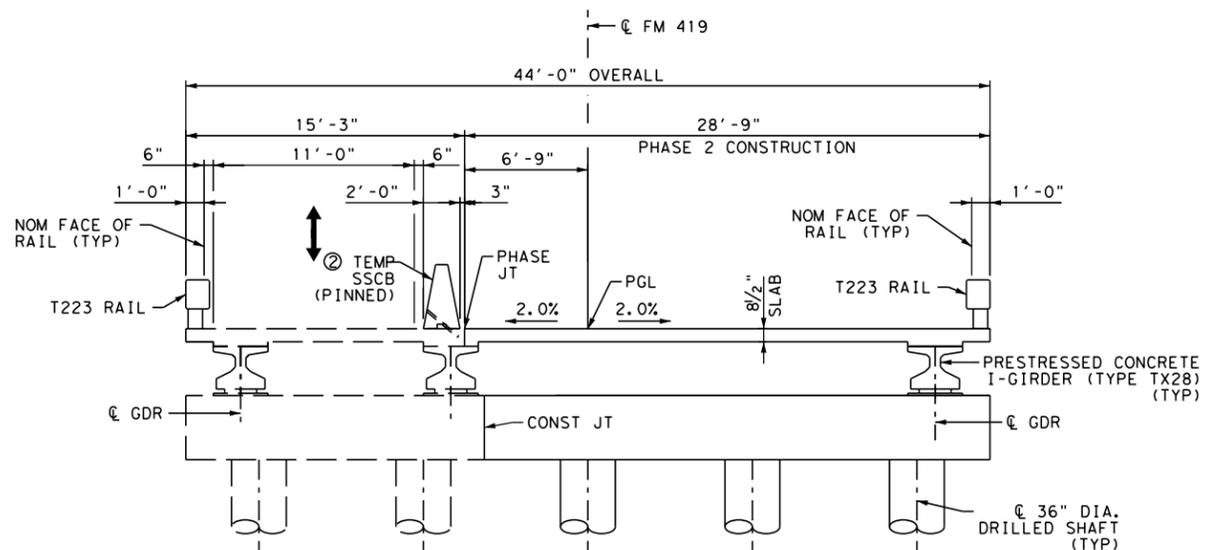
① BARRIER TO BE PINNED. SLAB EDGE MUST BE SUPPORTED PRIOR TO REMOVING EDGE BEAM.



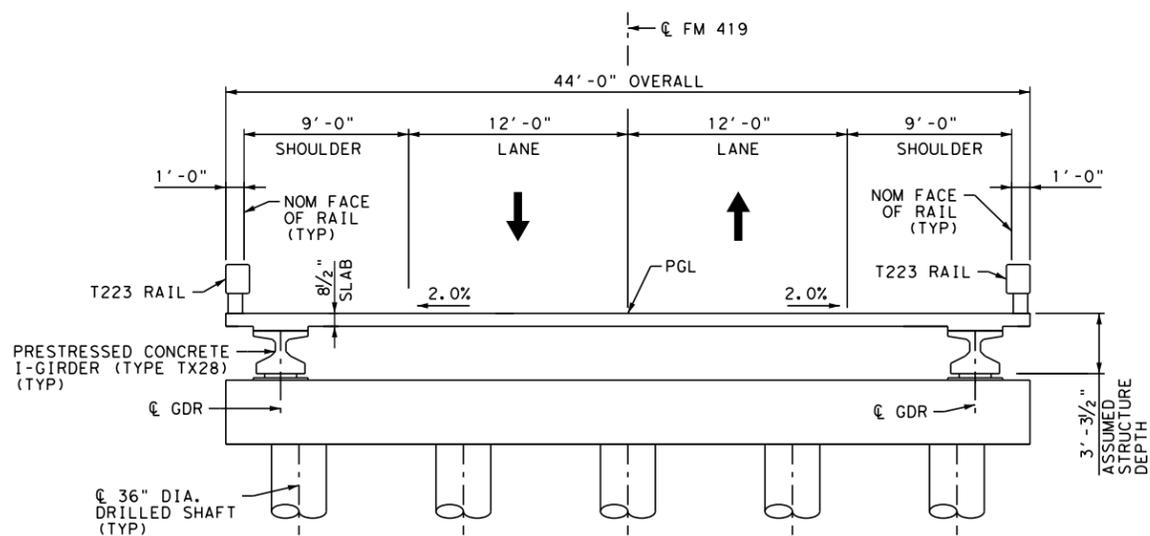
BREAKOUT FOR PHASE 1 CONSTRUCTION



PHASE 1A CONSTRUCTION



PHASE 2 CONSTRUCTION



PROPOSED FINAL TYPICAL SECTION

② PINNED IN ACCORDANCE WITH SSCB (5)-10 STANDARD SHEET. UPON REMOVAL OF SSCB, PATCH DOWEL HOLES PER ITEM 420. USE CL VIII EPOXY GROUT PER DMS-6100.



*Lauren Brod*

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			12222 Meritt Dr Suite 400 Dallas, TEXAS 75251 P 972-991-0011 F 214-468-8266 Firm # F-6324
<p><b>CONSTRUCTION STAGING &amp; TYPICAL SECTIONS</b></p> <p>FM 419 AT EAST COTTONWOOD CREEK</p>			
SCALE: NTS		SHEET 1 OF 1	
DESIGN LB	FED RD DIV NO 6	FEDERAL AID PROJECT NO. SEE TITLE SHEET	HIGHWAY NO FM 419
GRAPHICS DN	STATE TEXAS	DISTRICT ABL	COUNTY FISHER
CHECK TS	CONTROL	SECTION	JOB
CHECK LB	0983	02	022
			<b>68</b>

SUMMARY OF BRIDGES

CSJ	PLAN PROFILE SHEET	BRIDGE NBI #		DESIGN		BRIDGE LOCATION	STATION		LENGTH	CLEAR RDWY WIDTH	LOADING	0400	0403	0416	0420
		EXISTING	PROPOSED	EXISTING	PROPOSED		BEGIN	END				FT	FT	CY	SF
0983-02-022	67	08-077-0-0983-02-007	08-077-0-0983-02-019	H-10	HL-93	FM 419 AT EAST COTTONWOOD CREEK	397+59	398+24	65'	42'	HL-93	120	682	290	46.2
														①	②

- ① PROVIDE SULFATE RESISTANT CONCRETE
- ② INCLUDES SHEAR KEY QUANTITY
- ③ USE RR8 RIPRAP, SEE STANDARD DRAWING CRR

SUMMARY OF BRIDGES CONTINUED

0422 REINF CONC SLAB (HPC)	0422 APPROACH SLAB (HPC)	0425 PRESTR CONC GIRDER (TX28)	0427 SILICONE RESIN PAINT FINISH	0432 RIPRAP (CONC) (CL B) (5 IN)	0450 RAIL (TY T223) (HPC)	0454 ARMOR JOINT (SEALED)
SF	CY	LF	SF	CY	LF	LF
2860	67.4	451.50	382	146.6 ③	162	80

BEARING SEAT ELEVATIONS

		GIRDER 1	GIRDER 2	GIRDER 3	GIRDER 4	GIRDER 5	GIRDER 6	GIRDER 7
ABUTMENT 1	FWD	2102.349	2102.464	2102.579	2102.712	2102.614	2102.482	2102.349
ABUTMENT 2	BK	2102.027	2102.142	2102.257	2102.390	2102.292	2102.160	2102.027

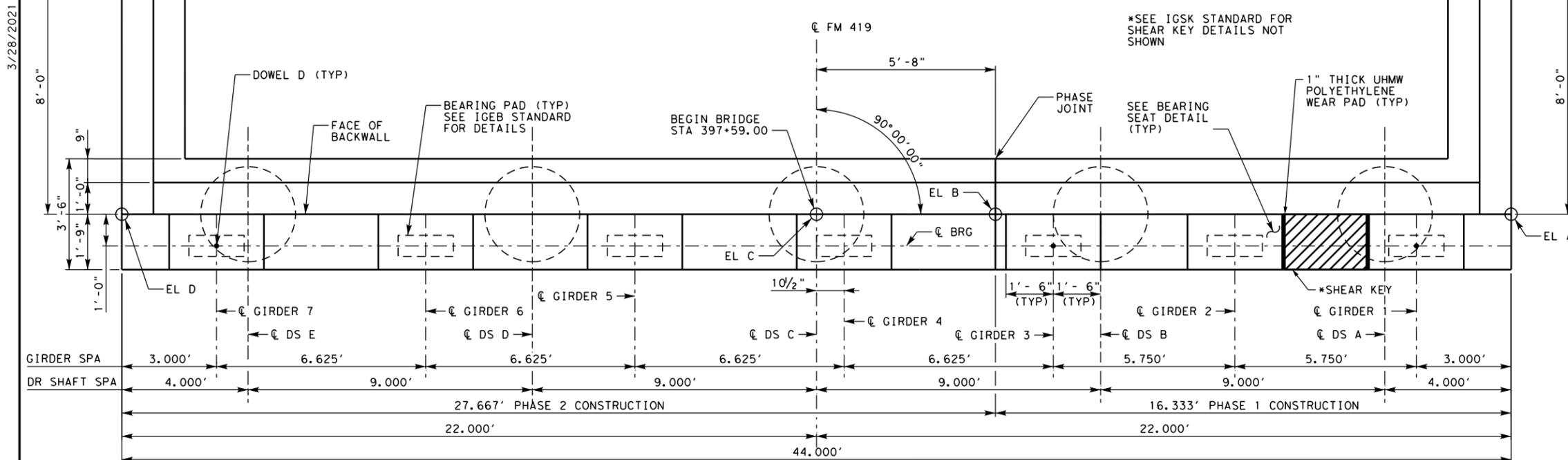


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ESTIMATED QUANTITIES & BEARING SEAT ELEVATIONS FM 419 AT EAST COTTONWOOD CREEK			
SHEET 1 OF 1			
DESIGN LB	FED RD DIV NO	FEDERAL AID PROJECT NO.	HIGHWAY NO
GRAPHICS DN	6	SEE TITLE SHEET	FM 419
CHECK TS	STATE	DISTRICT	COUNTY
CHECK LB	TEXAS	ABL	FISHER
	CONTROL	SECTION	JOB
	0983	02	022
			69

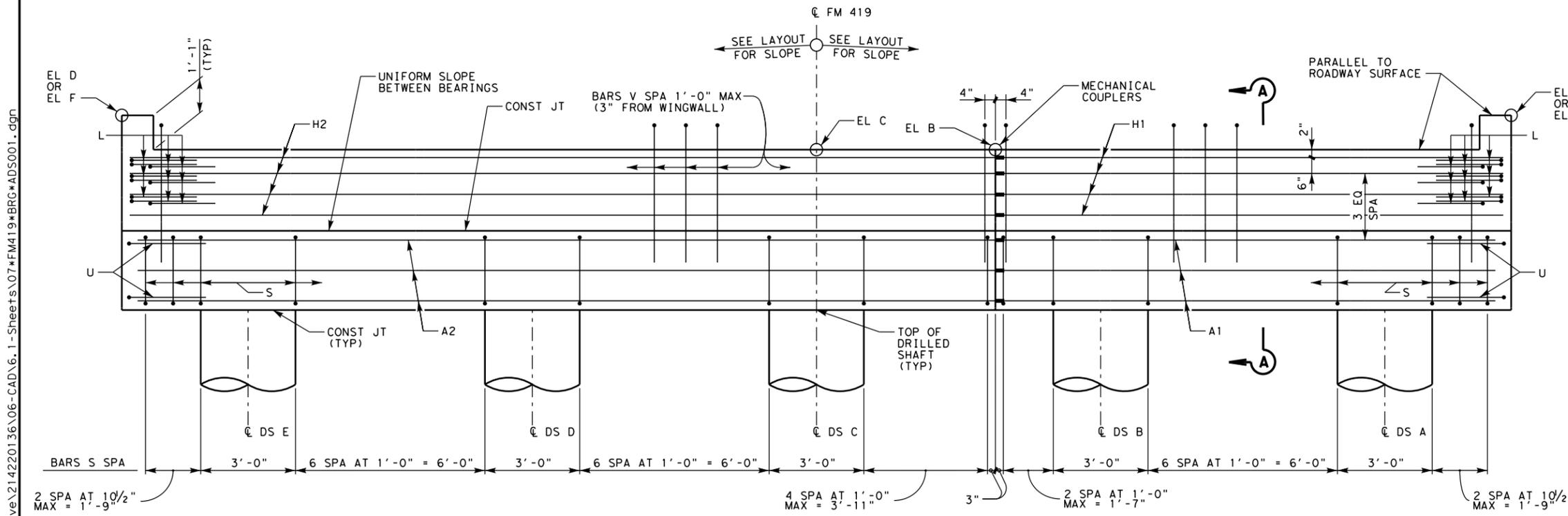
3/28/2021

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3/28/2021



**PLAN**  
SCALE: 1/4" = 1'-0"



**ELEVATION**  
SCALE: 1/4" = 1'-0"

CONTROL ELEVATIONS					
EL A	EL B	EL C	EL D	EL E	EL F
2105.816	2105.059	2105.173	2105.816	2105.856	2105.856

TOP OF DS ELEV				
DS A	DS B	DS C	DS D	DS E
2099.750	2099.930	2100.110	2099.930	2099.750

- GENERAL NOTES:**
- DESIGNED FOR HL 93 LOADING UNDER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, EIGHTH EDITION (2017).
  - PROVIDE CLASS C (HPC) CONCRETE STRENGTH  $f'_c = 3,600$  PSI.
  - PROVIDE GRADE 60 EPOXY COATED REINFORCING STEEL.
  - COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE. REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.
  - SEE BRIDGE LAYOUT FOR FOUNDATION TYPE, SIZE AND LENGTH.
  - SEE COMMON FOUNDATION DETAILS (FD) STANDARD SHEET FOR ALL FOUNDATION DETAILS AND NOTES NOT SHOWN.
  - SEE CONCRETE RIPRAP (CRR) STANDARD SHEET, CRR, FOR RIPRAP ATTACHMENT DETAILS.
  - SEE RAILING STANDARDS FOR RAIL ANCHORAGE IN WINGWALLS.
  - CALCULATED DRILLED SHAFT FOUNDATION LOAD = 102 TONS/DRILLED SHAFT.



*Lauren Brod*

HL-93 LOADING

NO.	DATE	REVISION	APPROVED

12222 Merit Dr Suite 400  
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Firm # F-6324

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**ABUTMENT 1**  
FM 419 AT EAST COTTONWOOD CREEK

SCALE: 1/4" = 1'-0" SHEET 1 OF 1

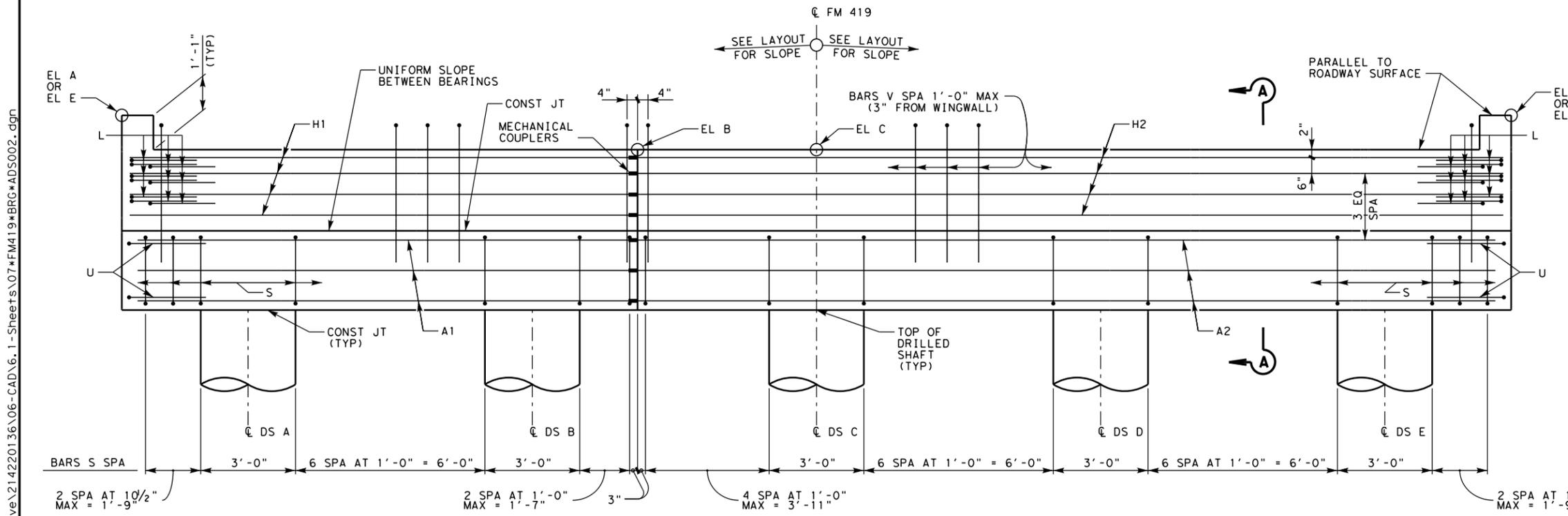
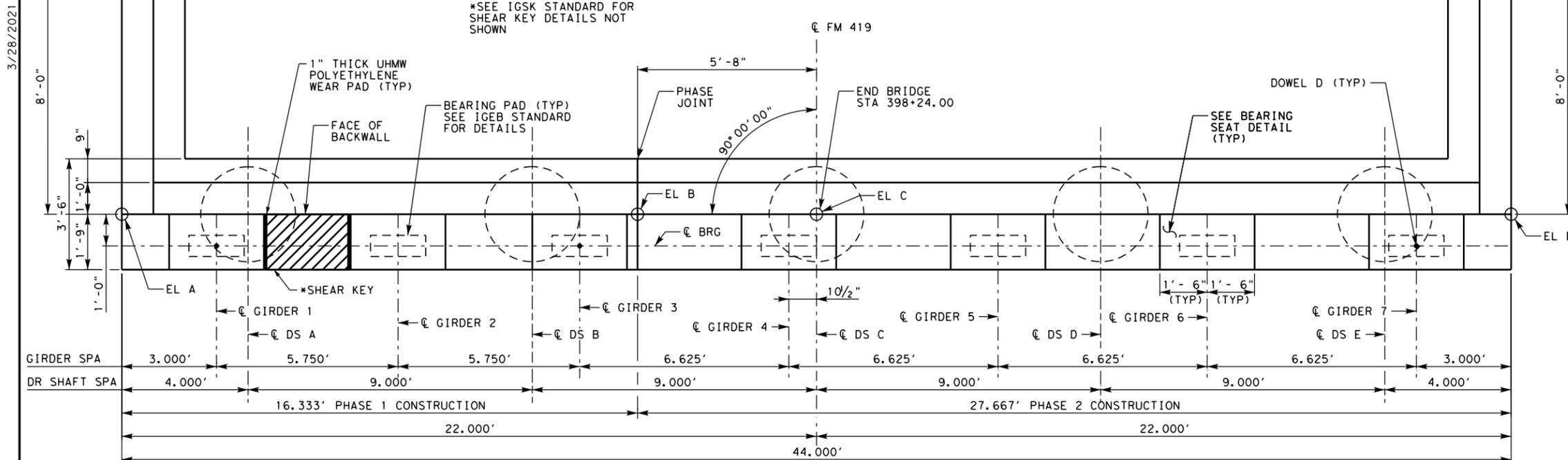
DESIGN LB	FED RD DIV NO	FEDERAL AID PROJECT NO.	HIGHWAY NO
6			FM 419

CHECK TS	STATE	DISTRICT	COUNTY	SHEET NO
	TEXAS	ABL	FISHER	

CHECK LB	CONTROL	SECTION	JOB	
	0983	02	022	70

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3/28/2021



CONTROL ELEVATIONS					
EL A	EL B	EL C	EL D	EL E	EL F
2105.482	2104.725	2104.839	2105.482	2105.419	2105.419

TOP OF DS ELEV				
DS A	DS B	DS C	DS D	DS E
2099.416	2099.596	2099.776	2099.596	2099.416

GENERAL NOTES:

DESIGNED FOR HL 93 LOADING UNDER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, EIGHTH EDITION (2017).

PROVIDE CLASS C (HPC) CONCRETE STRENGTH  $f'_c = 3,600$  PSI.

PROVIDE GRADE 60 EPOXY COATED REINFORCING STEEL.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE. REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.

SEE BRIDGE LAYOUT FOR FOUNDATION TYPE, SIZE AND LENGTH.

SEE COMMON FOUNDATION DETAILS (FD) STANDARD SHEET FOR ALL FOUNDATION DETAILS AND NOTES NOT SHOWN.

SEE CONCRETE RIPRAP (CRR) STANDARD SHEET, CRR, FOR RIPRAP ATTACHMENT DETAILS.

SEE RAILING STANDARDS FOR RAIL ANCHORAGE IN WINGWALLS.

CALCULATED DRILLED SHAFT FOUNDATION LOAD = 102 TONS/DRILLED SHAFT.



*Lauren Brod*

HL-93 LOADING

NO.	DATE	REVISION	APPROVED

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**ABUTMENT 2**

FM 419 AT EAST COTTONWOOD CREEK

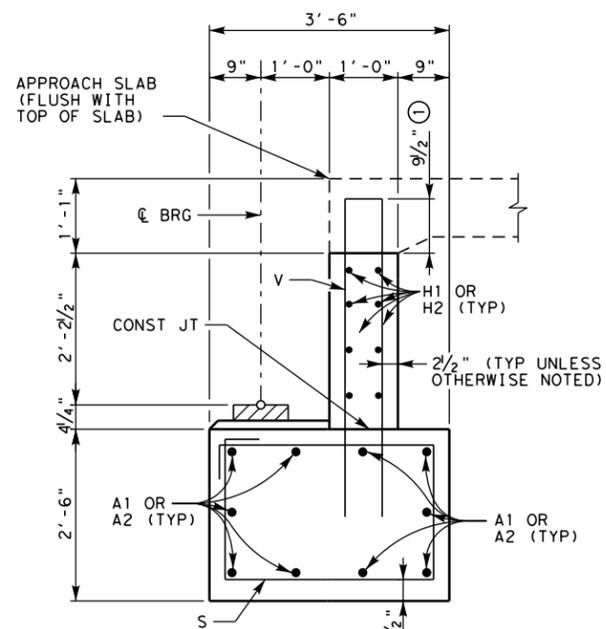
SCALE: 1/4" = 1'-0" SHEET 1 OF 1

DESIGN LB	FED RD DIV NO	FEDERAL AID PROJECT NO.	HIGHWAY NO
6			FM 419
GRAPHICS DN	STATE	DISTRICT	COUNTY
	TEXAS	ABL	FISHER
CHECK TS	CONTROL	SECTION	JOB
	0983	02	022

71

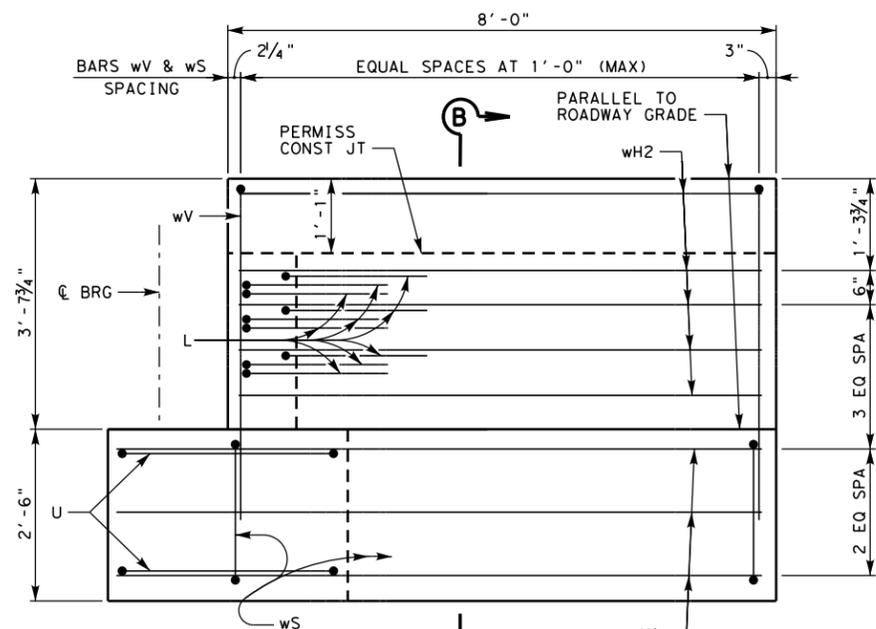
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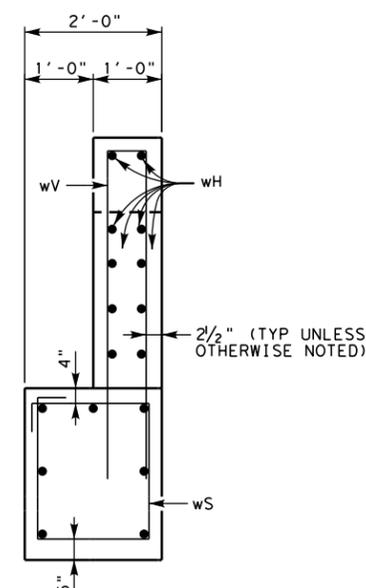


**SECTION A-A**  
SCALE: 3/8" = 1'-0"

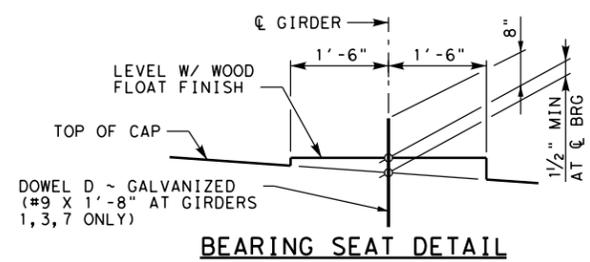
① INCREASE AS REQUIRED TO MAINTAIN 3/2" FROM FINISHED GRADE.



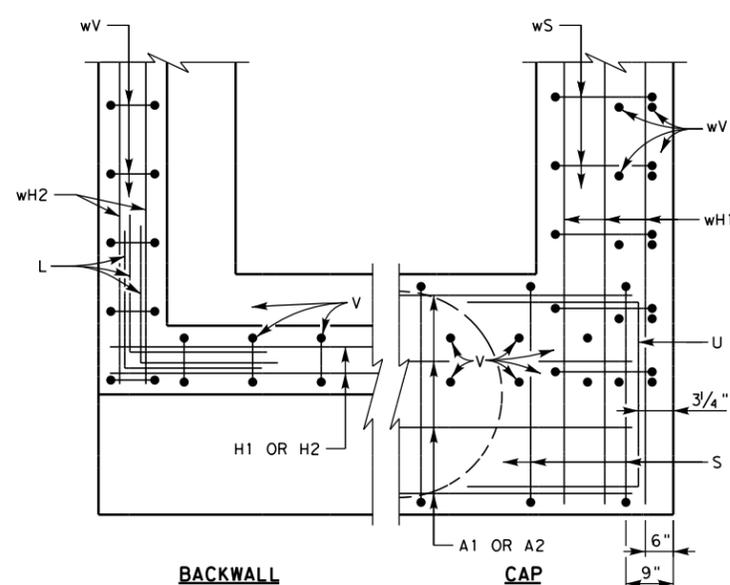
**WINGWALL ELEVATION**  
SCALE: 3/8" = 1'-0"



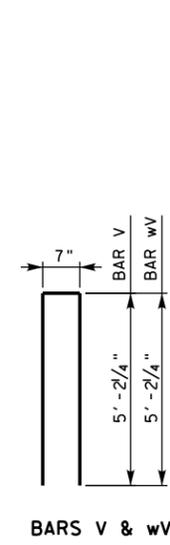
**SECTION B-B**  
SCALE: 3/8" = 1'-0"



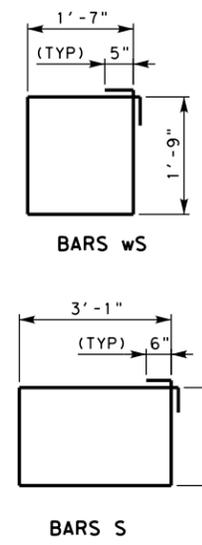
**BEARING SEAT DETAIL**  
NOT TO SCALE  
(BEARING SURFACE MUST BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE PLACING BEARING PAD.)



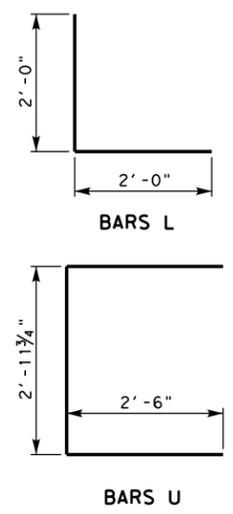
**CORNER DETAILS**  
SCALE: 3/8" = 1'-0"



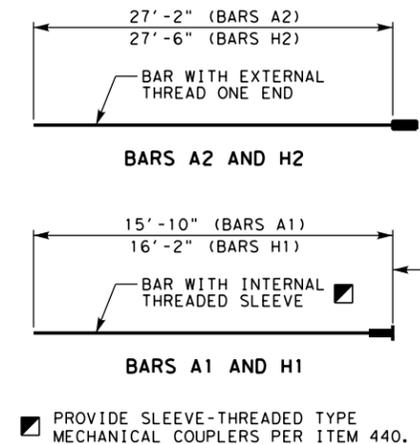
**BARS V & wV**



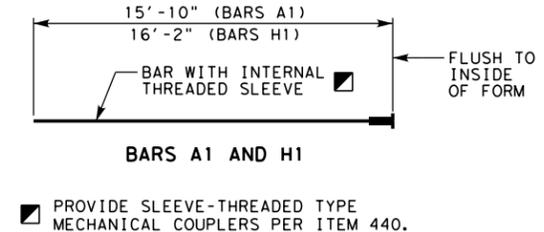
**BARS S**



**BARS U**



**BARS A2 AND H2**



**BARS A1 AND H1**

☑ PROVIDE SLEEVE-THREADED TYPE MECHANICAL COUPLERS PER ITEM 440.

**TABLES OF ESTIMATED QUANTITIES - PHASE 1**

BAR	NO.	SIZE	LENGTH	WEIGHT
A1	10	#11	15'-10"	841
D	2	#9	1'-8"	11
H1	8	#6	16'-2"	194
L	9	#6	4'-0"	54
S	13	#5	11'-2"	151
U	2	#6	8'-0"	24
V	17	#5	11'-0"	195
wH1	7	#6	9'-5"	99
wH2	10	#6	7'-8"	115
wS	9	#4	7'-6"	45
wV	9	#5	11'-0"	103

② REINFORCING STEEL LB 1832  
③ CL "C" CONC (ABUT) (HPC) CY 9.2

**TABLES OF ESTIMATED QUANTITIES - PHASE 2**

BAR	NO.	SIZE	LENGTH	WEIGHT
A2	10	#11	27'-2"	1443
D	1	#9	1'-8"	6
H2	8	#6	27'-6"	330
L	9	#6	4'-0"	54
S	22	#5	11'-2"	256
U	2	#6	8'-0"	24
V	29	#5	11'-0"	333
wH1	7	#6	9'-5"	99
wH2	10	#6	7'-8"	115
wS	9	#4	7'-6"	45
wV	9	#5	11'-0"	103

② REINFORCING STEEL LB 2808  
③ CL "C" CONC (ABUT) (HPC) CY 13.9

② FOR CONTRACTOR INFORMATION ONLY  
③ INCLUDES SHEAR KEY QUANTITY



*Lauren Brod*

HL-93 LOADING

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**ABUTMENTS 1 & 2  
MISCELLANEOUS DETAILS**

FM 419 AT EAST COTTONWOOD CREEK

SCALE: AS SHOWN SHEET 1 OF 1

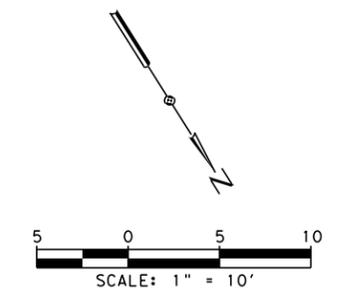
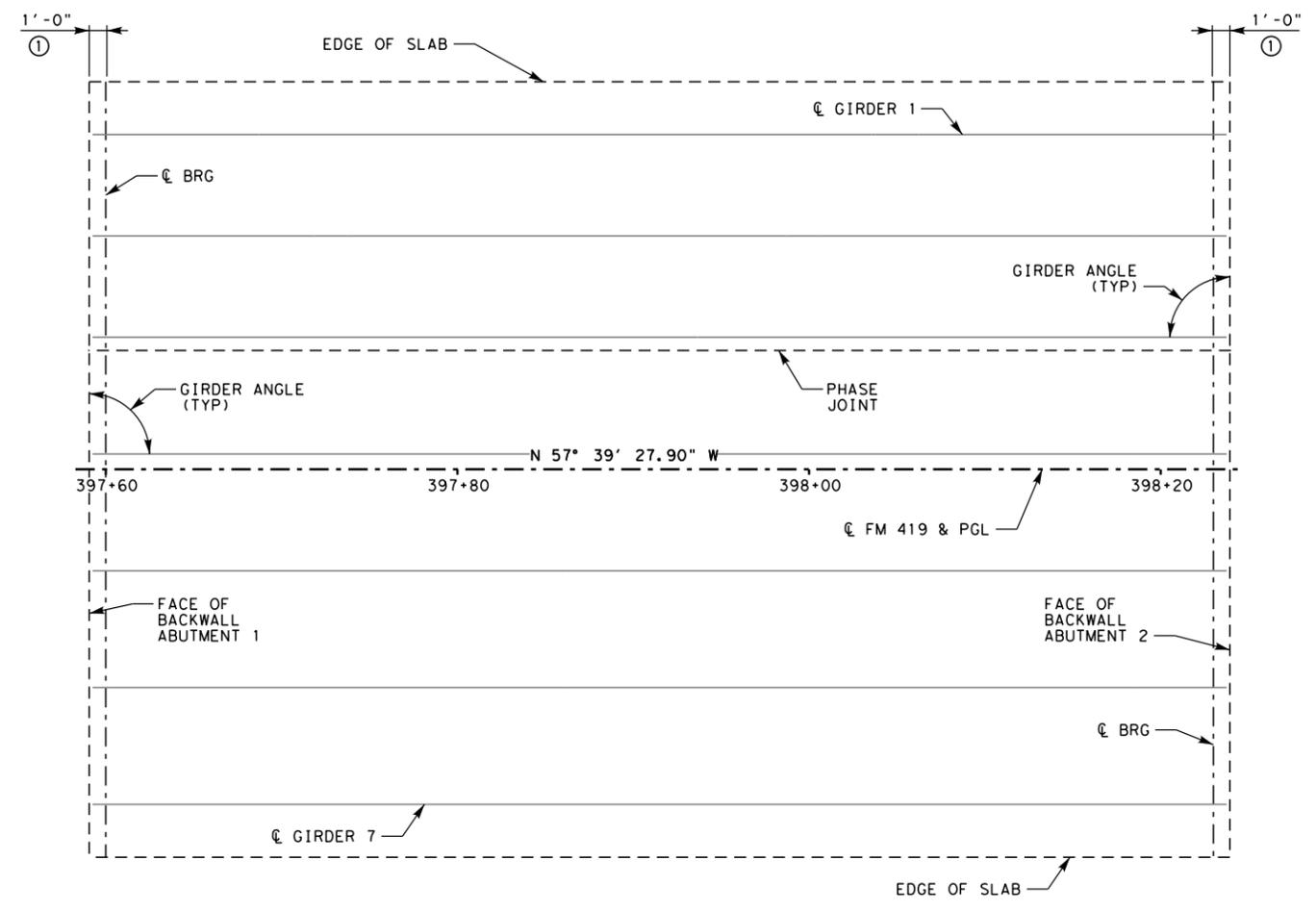
DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.	HIGHWAY NO
LB	6	SEE TITLE SHEET	FM 419
GRAPHICS	STATE	DISTRICT	COUNTY
DN	TEXAS	ABL	FISHER
CHECK	CONTROL	SECTION	JOB
TS	CONTROL	SECTION	JOB
CHECK	LB	0983	02
LB	0983	02	022

72

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3/28/2021

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SPAN 1  
(TX28 GIRDERS)  
**FRAMING PLAN**  
SCALE: 1" = 10'



*Lauren Brod*

HL-93 LOADING

NO.	DATE	REVISION	APPROVED

**Stantec**  
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Firm # F-6324



**FRAMING PLAN**

FM 419 AT EAST COTTONWOOD CREEK

SCALE: 1" = 10' SHEET 1 OF 1

DESIGN LB	FED RD DIV NO 6	FEDERAL AID PROJECT NO.	HIGHWAY NO FM 419
GRAPHICS DN	STATE TEXAS	DISTRICT ABL	COUNTY FISHER
CHECK TS	CONTROL 0983	SECTION 02	JOB 022
CHECK LB			

73

**BENT REPORT**

ABUT NO. 1 (S 32 20 32.10 W)  
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 19.000 L

SPAN	GIRDER	GIRDER SPAC. ALONG CL BENT	GIRDER ANGLE		
			D	M	S
1	1	0.000	90	0	0
	2	5.750	90	0	0
	3	5.750	90	0	0
	4	6.625	90	0	0
	5	6.625	90	0	0
	6	6.625	90	0	0
	7	6.625	90	0	0
	TOTAL	38.000			

ABUT NO. 2 (S 32 20 32.10 W)  
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 19.000 L

SPAN	GIRDER	GIRDER SPAC. ALONG CL BENT	GIRDER ANGLE		
			D	M	S
1	1	0.000	90	0	0
	2	5.750	90	0	0
	3	5.750	90	0	0
	4	6.625	90	0	0
	5	6.625	90	0	0
	6	6.625	90	0	0
	7	6.625	90	0	0
	TOTAL	38.000			

**GIRDER REPORT**

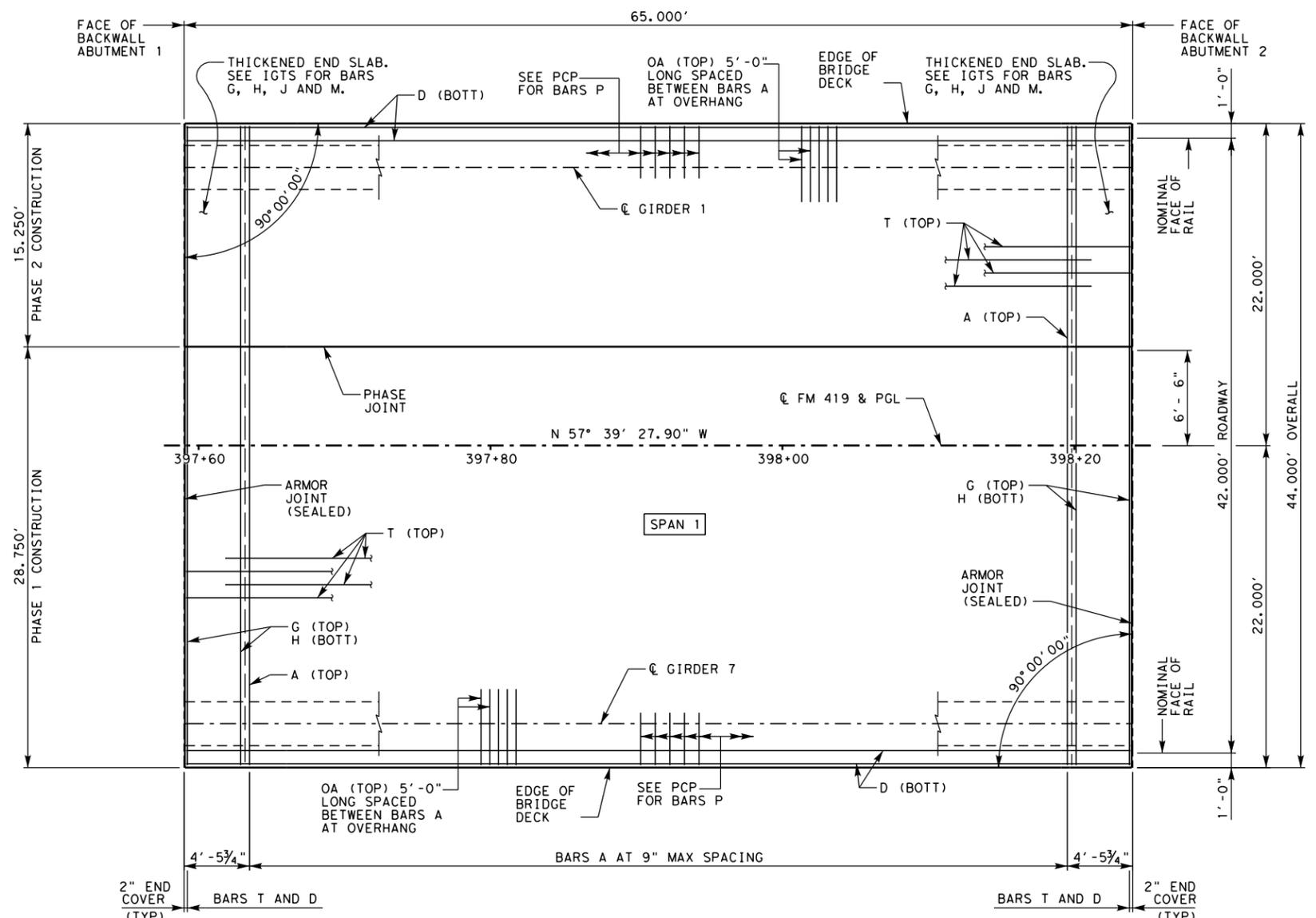
GIRDER REPORT AT CENTER OF GIRDER, SPAN 1

GIRDER	GIRDER REPORT AT CENTER OF GIRDER, SPAN 1		GIRDER SLOPE
	HORIZONTAL DISTANCE C-C BENT	TRUE DISTANCE C-C BRG. BOT. GDR. FLG. ②	
GIRDER 1	65.000	63.000	-0.0051
GIRDER 2	65.000	63.000	-0.0051
GIRDER 3	65.000	63.000	-0.0051
GIRDER 4	65.000	63.000	-0.0051
GIRDER 5	65.000	63.000	-0.0051
GIRDER 6	65.000	63.000	-0.0051
GIRDER 7	65.000	63.000	-0.0051

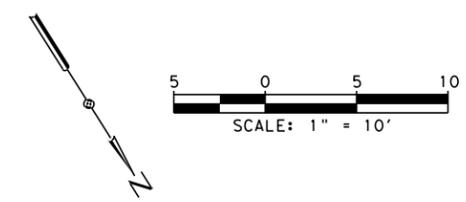
① SEE IGBE STANDARD FOR ORIENTATION OF DIMENSIONS.  
② GIRDER LENGTHS SHOWN ARE BOTTOM GIRDER FLANGE LENGTHS WITH ADJUSTMENTS MADE FOR GIRDER SLOPE.

3/28/2021

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**SLAB PLAN**  
SCALE: 1" = 10'



GENERAL NOTES:

DESIGNED FOR HL 93 LOADING UNDER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, EIGHTH EDITION (2017).

SEE IGTS STANDARD FOR THICKENED SLAB END DETAILS AND QUANTITY ADJUSTMENTS.

SEE PCP AND PCP-FAB FOR PANEL DETAILS NOT SHOWN.

SEE PCP(O) AND PCP(O)-FAB FOR PRECAST OVERHANG PANEL DETAILS IF THIS OPTION IS USED.

SEE IGMS STANDARD FOR MISCELLANEOUS DETAILS.

SEE RAILING STANDARD FOR RAIL ANCHORAGE IN SLAB.

SEE PMDF STANDARD FOR DETAILS AND QUANTITY ADJUSTMENTS IF THIS OPTION IS USED.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.

PROVIDE CLASS S (HPC) CONCRETE (f'c = 4,000 PSI).

PROVIDE GRADE 60 EPOXY COATED REINFORCING STEEL.

PROVIDE BAR LAPS, WHERE REQUIRED, AS FOLLOWS:  
EPOXY COATED ~ #4 = 2'-5"

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



*Lauren Brod*

BAR TABLE	
BAR	SIZE
A	#4
D	#4
G	#4
H	#4
J	#4
M	#4
OA	#5
P	#4
T	#4

TABLE OF ESTIMATED QUANTITIES PHASE 1			
SPAN	REINF CONCRETE SLAB (HPC) (CL S)	PRESTR CONCRETE I-GIRDER (TX28)	TOTAL REINF STEEL
		①	②
NO.	SF	LF	LB
1	991	193.50	2,282

TABLE OF ESTIMATED QUANTITIES PHASE 2			
SPAN	REINF CONCRETE SLAB (HPC) (CL S)	PRESTR CONCRETE I-GIRDER (TX28)	TOTAL REINF STEEL
		①	②
NO.	SF	LF	LB
1	1,869	258.00	4,299

① QUANTITY SHOWN ARE BOTTOM GIRDER FLANGE LENGTHS WITH ADJUSTMENTS MADE FOR GIRDER SLOPE. SEE GIRDER LAYOUT FOR GIRDER LENGTHS.

② REINFORCING STEEL WEIGHT IS CALCULATED USING AN APPROXIMATE FACTOR OF 2.3 LBS/SF.

HL-93 LOADING

NO.	DATE	REVISION	APPROVED

12222 Merit Dr Suite 400  
Dallas, TEXAS 75251  
P 972-991-0011  
F 214-468-8266  
Firm # F-6324

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**SLAB DETAILS**

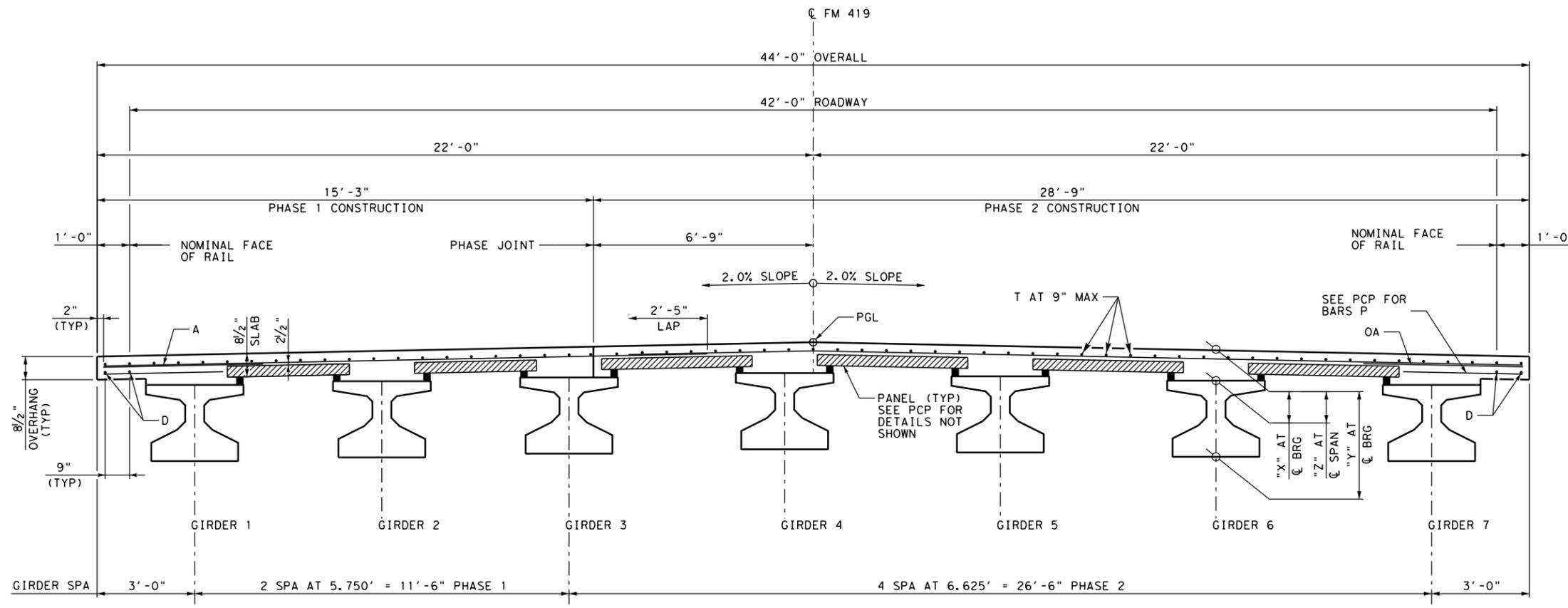
FM 419 AT EAST COTTONWOOD CREEK

SCALE: 1" = 10' SHEET 1 OF 2

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
LB	6	SEE TITLE SHEET		FM 419
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO
DN	TEXAS	ABL	FISHER	74
CHECK	CONTROL	SECTION	JOB	
TS	LB	0983	02	022

3/28/2021

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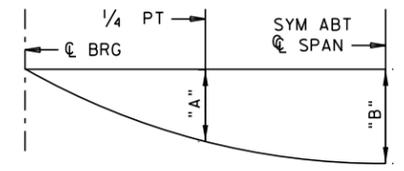


TYPICAL SECTION PHASE 1

TYPICAL SECTION PHASE 2

TYPICAL TRANSVERSE SECTION - SPAN 1

SCALE: 1/4" = 1'-0"



DEAD LOAD DEFLECTION DIAGRAM

CALCULATED DEFLECTIONS SHOWN ARE DUE TO THE CONCRETE SLAB ON INTERIOR GIRDERS ONLY (EC = 5,000 KSI). ADJUST VALUES AS REQUIRED FOR EXTERIOR GIRDERS AND IF OPTIONAL SLAB FORMING IS USED. THESE VALUES MAY REQUIRE FIELD VERIFICATION.

SPAN NO.	GIRDER NO.	"X" AT C BRG FT/IN	"Y" AT C BRG FT/IN	"Z" AT C SPAN ① FT/IN
1	1-2	11 1/2"	3'-3 1/2"	9 7/8"
1	3-7	11 1/2"	3'-3 1/2"	9 5/8"

① THEORETICAL DIMENSION

SPAN NO.	GIRDER NO.	"A" FT	"B" FT
1	1	0.070	0.098
1	2	0.069	0.096
1	3	0.053	0.074

SPAN NO.	GIRDER NO.	"A" FT	"B" FT
1	4	0.076	0.107
1	5	0.076	0.107
1	6	0.076	0.107
1	7	0.073	0.103



Lauren Brod

HL-93 LOADING

NO.	DATE	REVISION	APPROVED
			12222 Merit Dr Suite 400 Dallas, TEXAS 75251 P 972-991-0011 F 214-468-8266 Firm # F-6324
Stantec		Texas Department of Transportation	
		© 2021	

SLAB DETAILS

FM 419 AT EAST COTTONWOOD CREEK

DESIGN LB	FED RD DIV NO	FEDERAL AID PROJECT NO.	HIGHWAY NO
DN <td>6 <td>SEE TITLE SHEET <td>FM 419 </td></td></td>	6 <td>SEE TITLE SHEET <td>FM 419 </td></td>	SEE TITLE SHEET <td>FM 419 </td>	FM 419
CHECK TS <td>STATE</td> <td>DISTRICT</td> <td>COUNTY</td>	STATE	DISTRICT	COUNTY
CHECK LB <td>TEXAS</td> <td>ABL</td> <td>FISHER</td>	TEXAS	ABL	FISHER
	CONTROL	SECTION	JOB
	0983	02	022

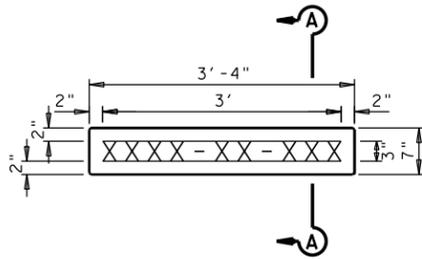
SCALE: AS SHOWN SHEET 2 OF 2

75



FILE: V:\2142\octive\214220136\CAD\6. 1-Sheets\07\*FM419\*BRG\*SIDD.dgn  
 DATE: 3/28/2021

**STRUCTURE ID TEMPLATES**



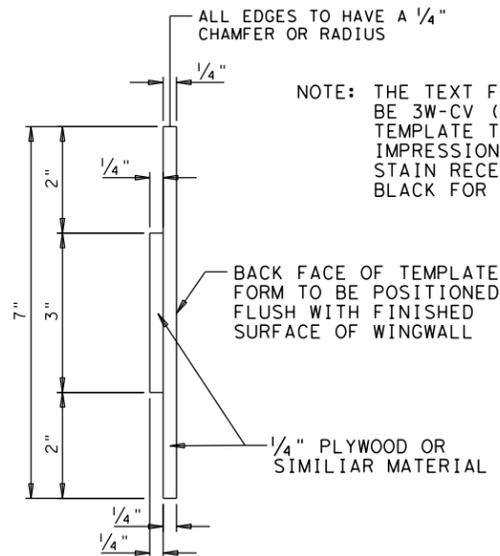
NOTE: THE SYMBOLS XXXX-XX-XXX REPRESENT THE STRUCTURE NUMBER WHICH IS SHOWN IN THE TABLE TO THE RIGHT.

ALL CHARACTERS ARE REQUIRED, AND ARE TO BE FORMATTED EXACTLY AS SHOWN IN THE STRUCTURE NUMBER COLUMN TO THE RIGHT.

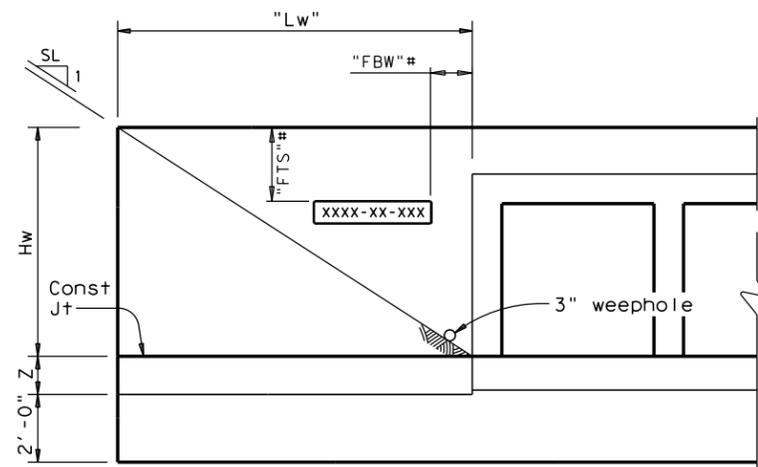
STRUCTURE ID TEMPLATE NUMBERS							
NBI NUMBER	LOCATION	STRUCTURE NUMBER	"WL"	"Lw"	"Hw"	"FBW" #	"FTS" #
08-077-0-0983-02-019	FM 419 AT EAST COTTONWOOD CREEK	0983-02-019	8'	NA	3' - 7 <sup>3</sup> / <sub>4</sub> "	VARIOUS	VARIOUS



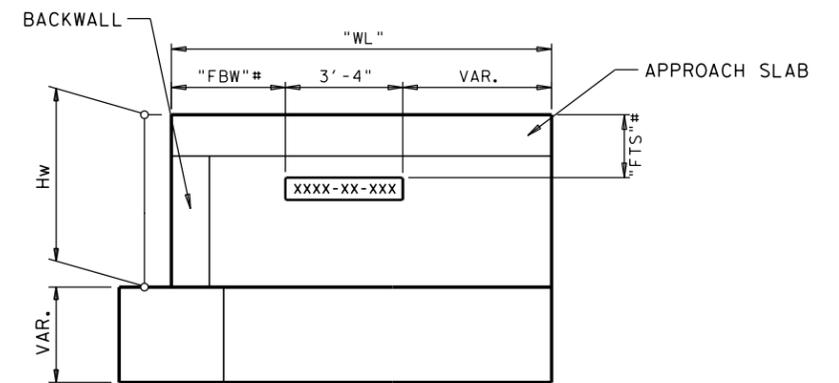
*Lauren Brod*



NOTE: THE TEXT FOR ALL TEMPLATES SHOULD BE 3W-CV (3") CLEAR VIEW FONT. TEMPLATE TO PROVIDE A RECESSED IMPRESSION INTO CAST CONCRETE. STAIN RECESSED NUMERAL SURFACES BLACK FOR CONTRAST.

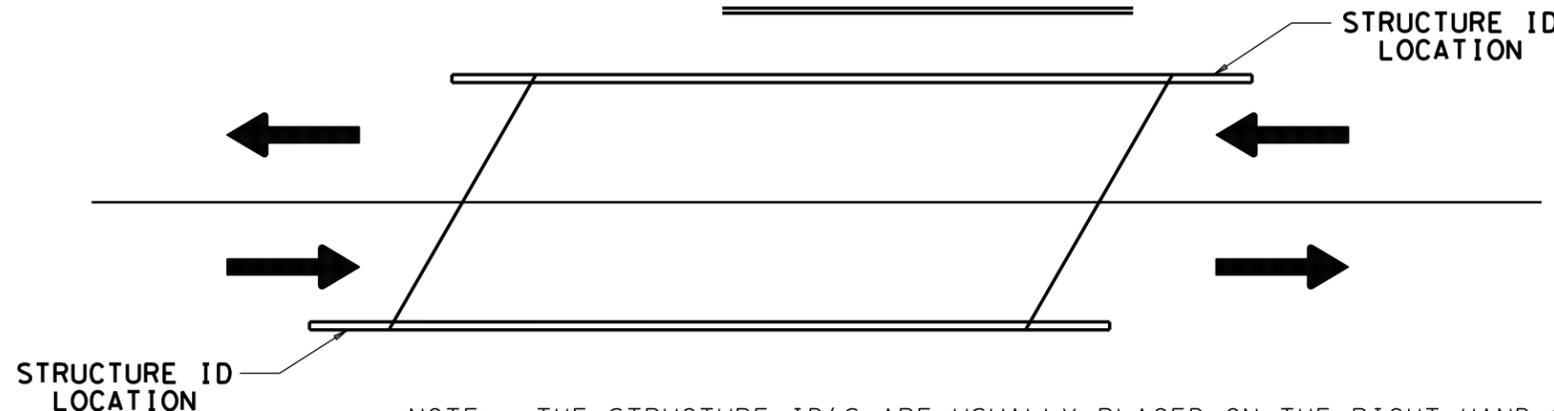


**PARALLEL WING ELEVATION**



**WINGWALL ELEVATION**

# FIELD LOCATE TO AVOID CONFLICT WITH REINFORCEMENT AND RIPRAP. THE ENGINEER SHALL APPROVE INSTALLATION LOCATION PRIOR TO PLACEMENT.



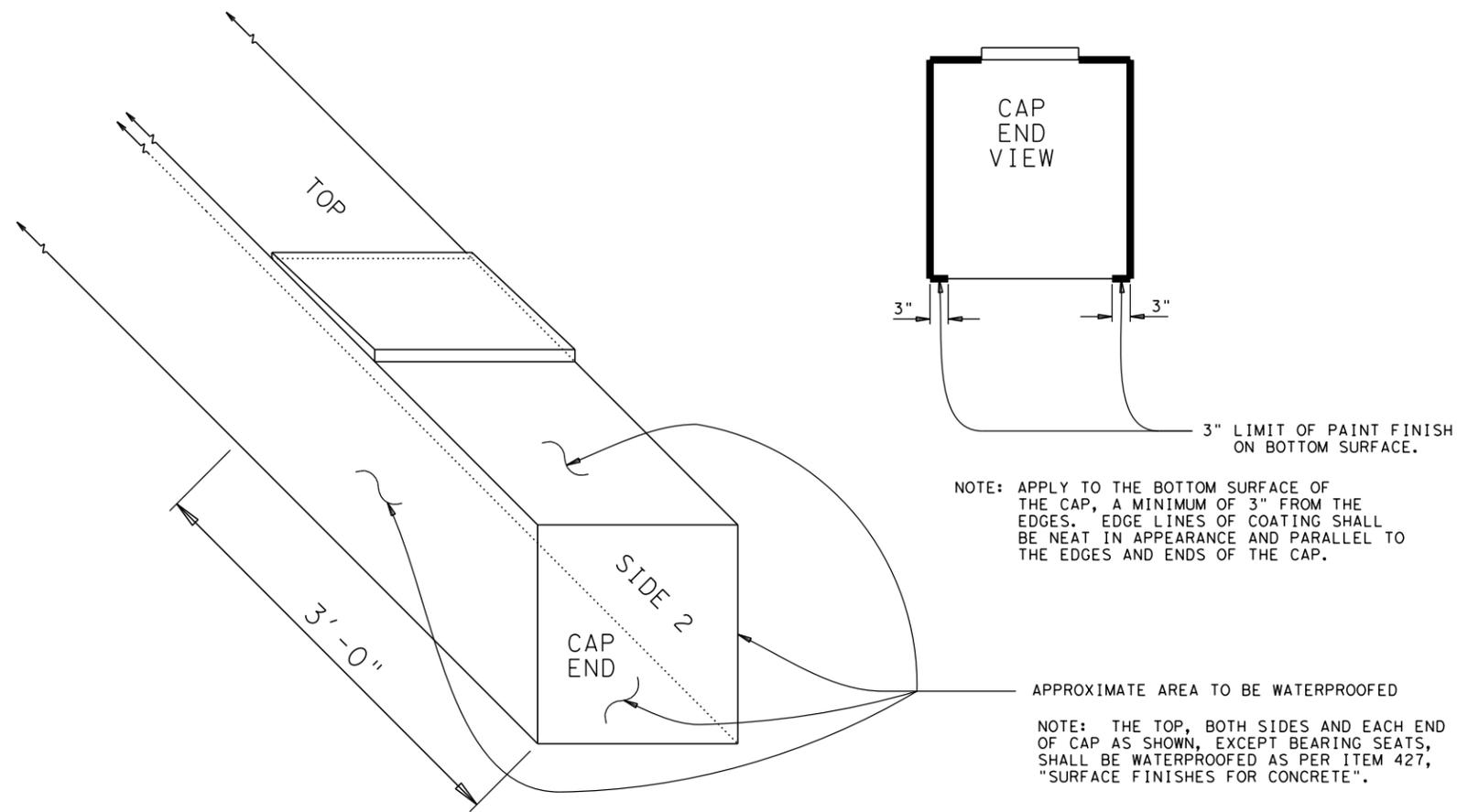
NOTE: THE STRUCTURE ID'S ARE USUALLY PLACED ON THE RIGHT HAND SIDE OF APPROACHES. THIS PLACES THE ID'S ON DIAGONAL CORNERS. THE STRUCTURE ID'S WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE CONSIDERED SUBSIDIARY TO THE VARIOUS BRIDGE ITEMS.

**STRUCTURE ID DETAILS  
SIDD-11**

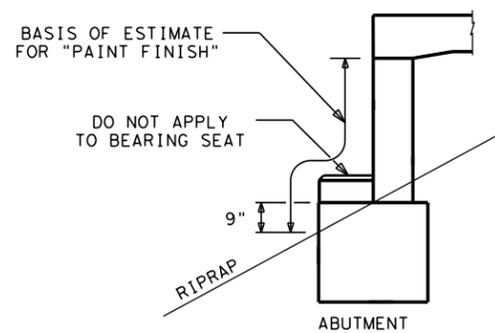


NO SCALE				SHEET 1 OF 1	
FHWA DIVISION	PROJECT NO.		HIGHWAY NO.		
6	SEE TITLE SHEET		FM 419		
STATE	COUNTY			SHEET NO.	
TEXAS	FISHER			77	
DISTRICT	CONTROL	SECTION	JOB		
ABL	0983	02	022		

FILE: V:\2142\active\214220136\06-CAD\6. 1-Sheets\07\*FM419\*BRG\*CWD15.dgn  
 DATE: 3/28/2021



**TYPICAL WATERPROOFING DETAIL OF INTERIOR BENTS**



NOTE: THE FACE OF BACKWALL AND THE TOP, FRONT AND ENDS OF THE CAP AS SHOWN, EXCEPT BEARING SEATS, SHALL BE WATERPROOFED AS PER ITEM 427, "SURFACE FINISHES FOR CONCRETE".

**TYPICAL WATERPROOFING DETAIL AT ABUTMENTS**



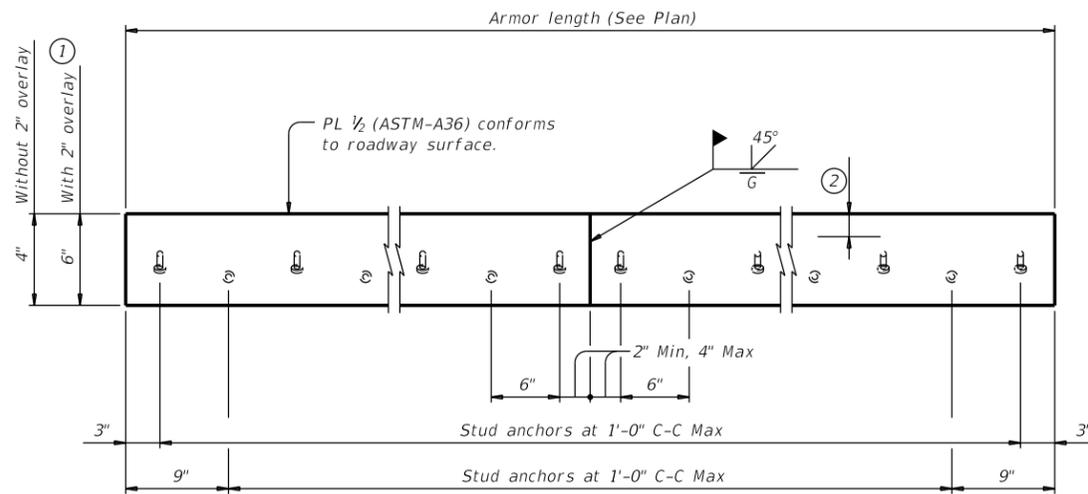
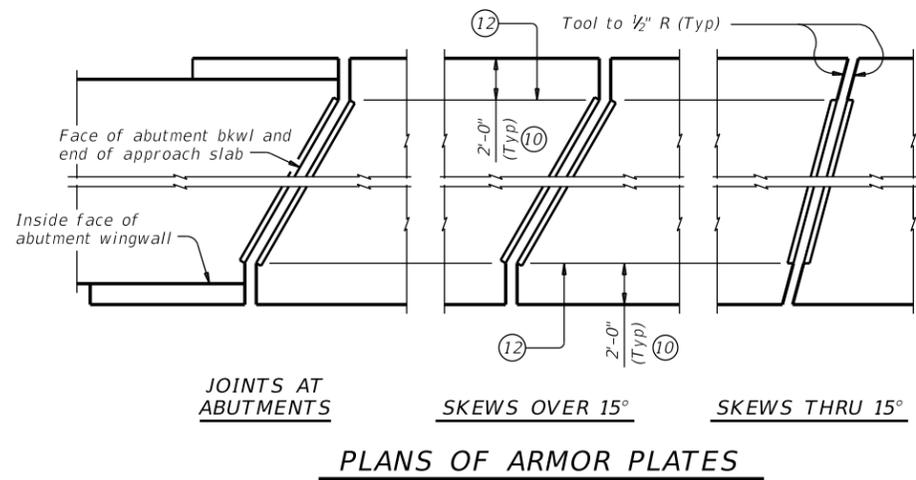
**CONCRETE WATERPROOFING DETAILS  
 CWD-15**



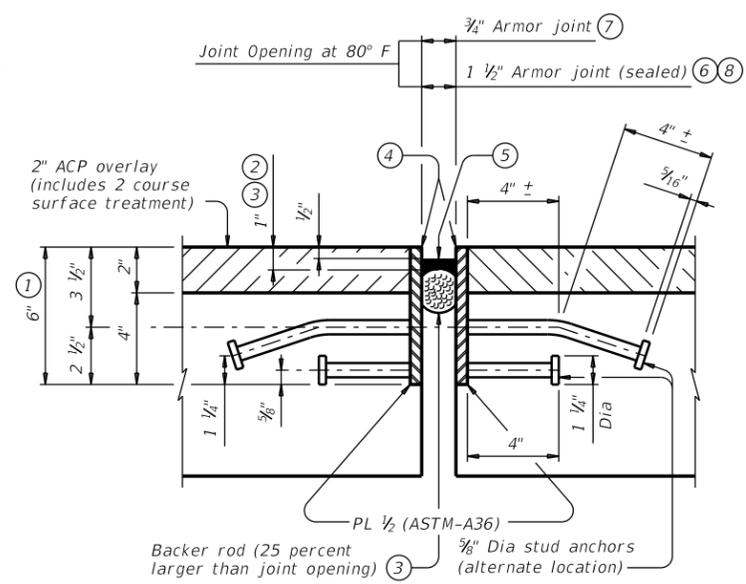
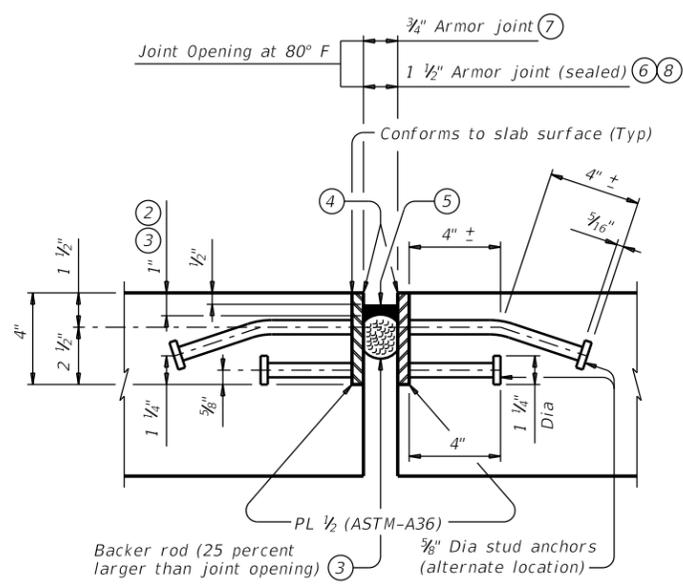
NO SCALE		SHEET 1 OF 1	
FHWA DIVISION	PROJECT NO.	HIGHWAY NO.	
6	SEE TITLE SHEET	FM 419	
STATE	COUNTY	SHEET NO.	
TEXAS	FISHER	78	
DISTRICT	CONTROL	SECTION	JOB
ABL	0983	02	022

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DATE: 3/28/2021  
 FILE: V:\2142\active\214220136\06-CAD\6.1-Sheets\standards\06\_BRG\ajstd01-19.dgn



- ① Adjust 6" plate height for overlay thicknesses other than the 2" shown. Adjust weight by 1.70 plf for each 1/2" variation in thickness.
- ② Do not paint top 1/2" of plate if using sealed armor joint.
- ③ Set top of backer rod 1" below top of armor plate. Backer rod must be compatible with joint sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.
- ④ Blast clean entire contact area between sealant and plate (SSPC-SP10) before installing sealant. Light brush blast and thoroughly clean all dust and debris from concrete surfaces in contact with joint sealant before application of silicone seal.
- ⑤ Use Class 7 joint sealant that conforms to DMS-6310.
- ⑥ Place sealant while ambient temperature is between 55°F and 80°F and is rising.
- ⑦ Armor joint does not include joint sealant or backer rod.
- ⑧ Armor joint (sealed) includes Class 7 joint sealant and backer rod.
- ⑨ Form vertical leg of seal as per the Manufacturer's recommendations. Use Class 4 joint sealant if Class 7 cannot be installed correctly. Install according to Manufacturer's recommendations.
- ⑩ Unless shown otherwise, terminate armor plate at slab break point if break is more than 2'-0" from slab edge.
- ⑪ See "Plans of Armor Plates".
- ⑫ At Fabricator's option, armor plate may extend up to 6" beyond this point for skews through 15°.
- ⑬ Align shipping angle perpendicular to joint.

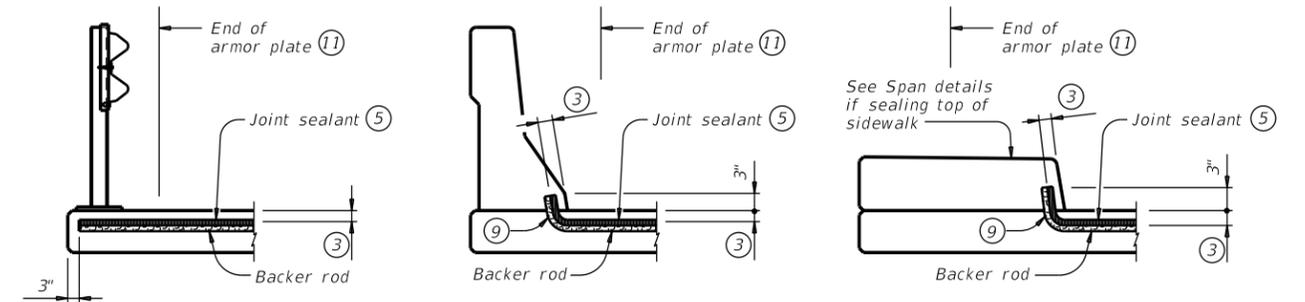


**FABRICATION NOTES:**  
 Match mark corresponding plate sections and secure together for shipment with shipping angle. Do not use erection bolts.  
 Ship armor joints in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for stage construction or widenings. One shop splice is permitted 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.  
 Use groove welds for all shop and field butt splices. Grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop.  
 Paint the entire steel section, except as stated in Note 2, with System II or IV primer in accordance with Item 446 "Field Cleaning and Painting Steel." Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Items 446.4.7.3 and 446.4.7.4.  
 Shop drawings for the fabrication of armor joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

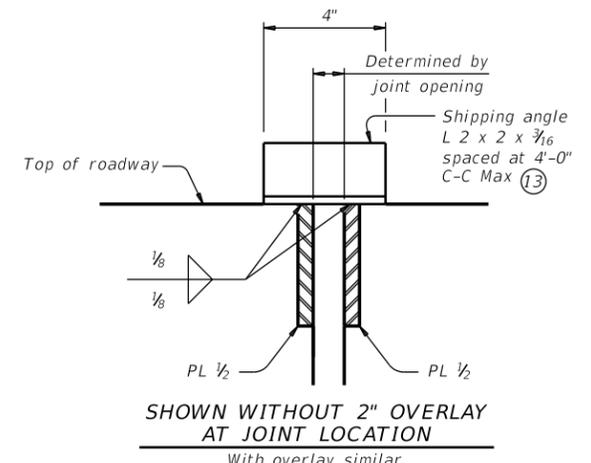
**CONSTRUCTION NOTES:**  
 Secure armor joints in position and place to proper grade and alignment by welding braces to adjacent reinforcing steel, to prestressed beam stirrups, or to anchors cast in concrete diaphragms. Include cost of temporary bracing in the price bid for Armor Joint.  
 Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

**GENERAL NOTES:**  
 Provide armor joints at locations shown on the plans. Provide the seal when "Armor Joint (Sealed)" is noted on the plans. These joint details accommodate a joint movement range of 1 3/8" ( 3/4" opening movement and 3/8" closure movement).  
 Payment for armor joint, with or without seal, is based on length of armor plate.

SHOWN WITHOUT 2" OVERLAY AT JOINT LOCATION  
 SHOWN WITH 2" OVERLAY AT JOINT LOCATION  
**ARMOR JOINT SECTIONS**  
 Showing Armor Joint (Sealed)



**JOINT SEALANT TERMINATION DETAILS**  
 Armor joint (sealed) only. Armor plate is not shown for clarity.



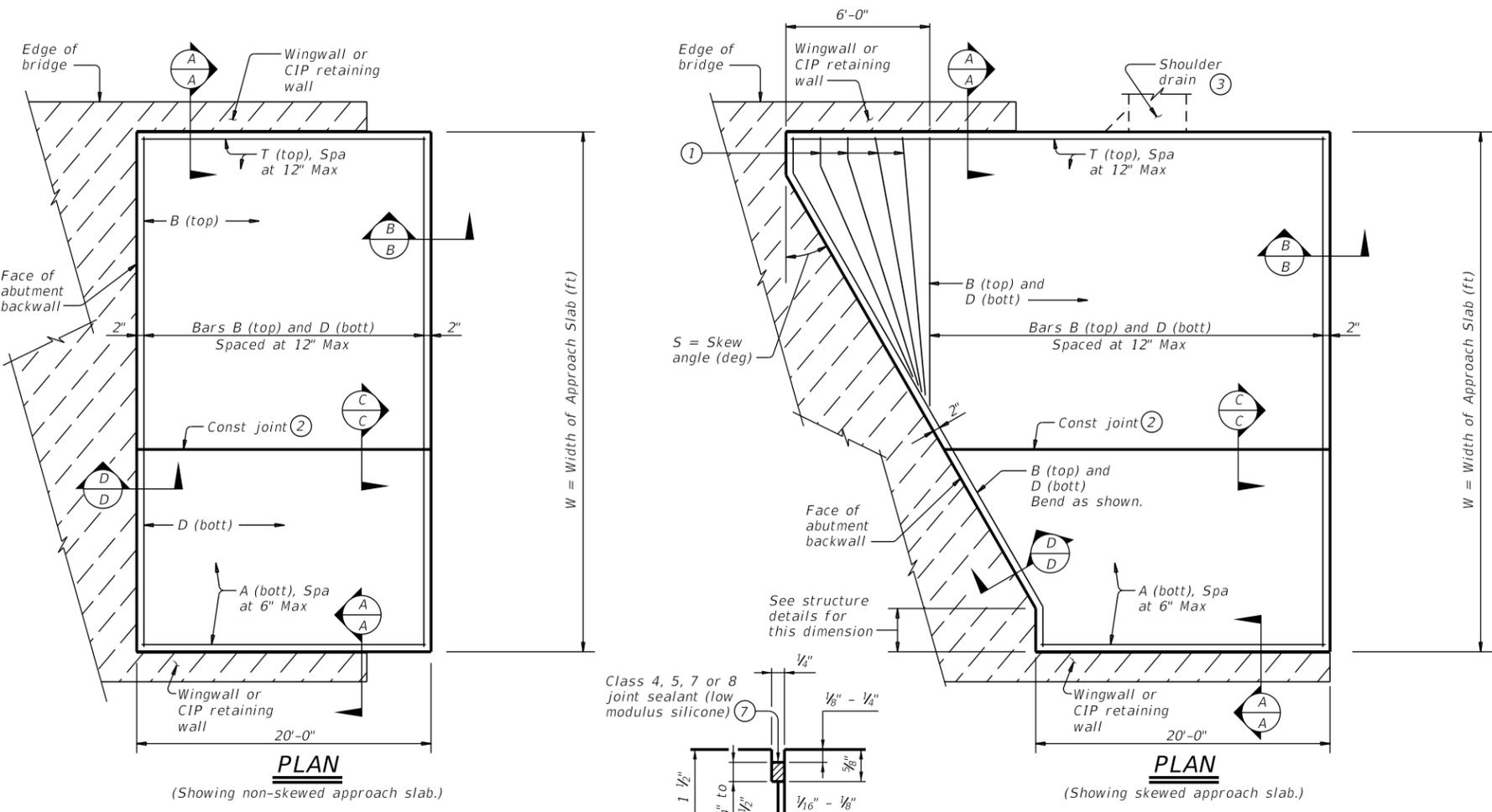
**SHIPPING ANGLE**  
 An alternate method of securing joint sections may be used if approved by the Bridge Division.  
 Erection bolts are not allowed.

WEIGHTS FOR ONE ARMOR JOINT (2 PLATES)	
WITHOUT OVERLAY	16.10 plf
WITH 2" OVERLAY ①	22.90 plf

				<b>Bridge Division Standard</b>	
<b>ARMOR JOINT DETAILS</b>					
<b>AJ</b>					
FILE: ajstd01-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	
0983	April 2019	02	022	FM 419	
ABL	FISHER			79	

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DATE: 3/28/2021  
 FILE: V:\2142\oct1ve\214220136\06-CAD\6.1-Sheets\standard\06\_BRG\basaste1-20.dgn



BAR TABLE	
BAR	SIZE
A	#8
B	#5
D	#5
T	#5

**APPROXIMATE QUANTITIES** ④

Reinf steel weight = 8.5 Lbs/SF of Approach Slab

Volume of Appr Slab Conc (CY) = 0.802W + 0.02W<sup>2</sup> Tan S

W = Width of Approach Slab (ft)

S = Skew Angle (deg)

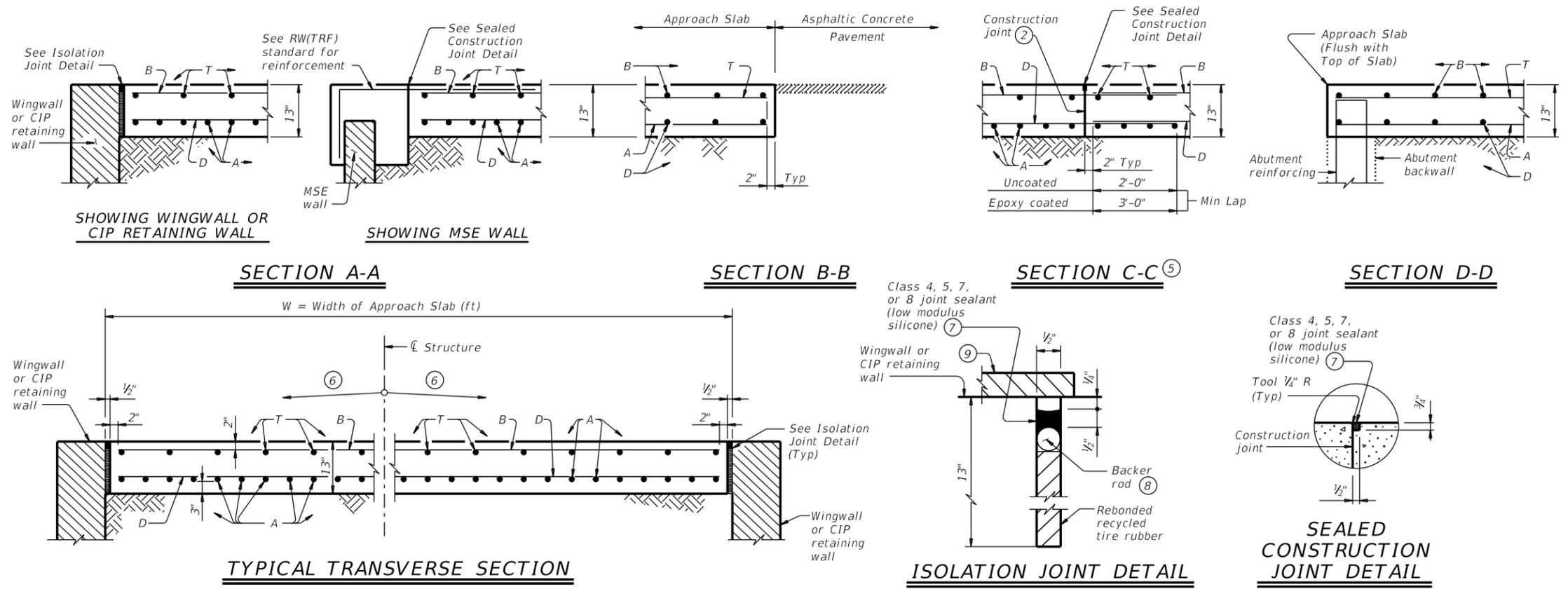
- ① Flare Bars B and D in this region (1'-6" Max Spa, 3" Min Spa). Minimum flared bar length = 2'-6". Bend bars as necessary.
- ② Provide longitudinal construction joints that align with longitudinal construction joints in the bridge slab with bridges built in stages. Other longitudinal construction joints must receive approval of the Engineer.
- ③ See details elsewhere in plans for shoulder drain location and details.
- ④ For Contractor's information only. Quantities shown are for one approach slab.
- ⑤ Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.
- ⑥ See details elsewhere in plans for required cross-slope.
- ⑦ Place in accordance with Item 438.
- ⑧ Provide backer rod that is 25% larger than joint opening and compatible with the sealant.
- ⑨ If bridge rail is present at the wingwall or CIP retaining wall, place 1/2" rebonded recycled tire rubber between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.

**GENERAL NOTES:**

Construct approach slab in accordance with Item 422. Provide Class "S" concrete with a minimum compressive strength of 4,000 psi. Provide Grade 60 reinforcing steel. Provide longitudinal joints as shown on the Longitudinal Saw Cut Joint Detail at lane lines and shoulders when width between longitudinal construction joints or edges of approach slab exceeds 16 feet. Saw cut joints within 24 hours of concrete placement to a depth of 1 1/2" and seal in accordance with Item 438. Alternately, provide a controlled joint consisting of 1 1/2" vinyl or plastic joint former (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.) Provide rebonded recycled tire rubber joint filler that meets the requirements of DMS-6310. "Joint Sealants and Fillers."

Construct the subgrade or subbase away from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans. Compact and finish the subgrade or foundation for the approach slab to the typical cross-section and to the lines and grades shown on the plans. Cure for 4 days using water or membrane curing per Item 422. All details shown herein are subsidiary to bridge approach slab.

Cover dimensions are clear dimensions, unless noted otherwise.



Texas Department of Transportation  
 Bridge Division Standard

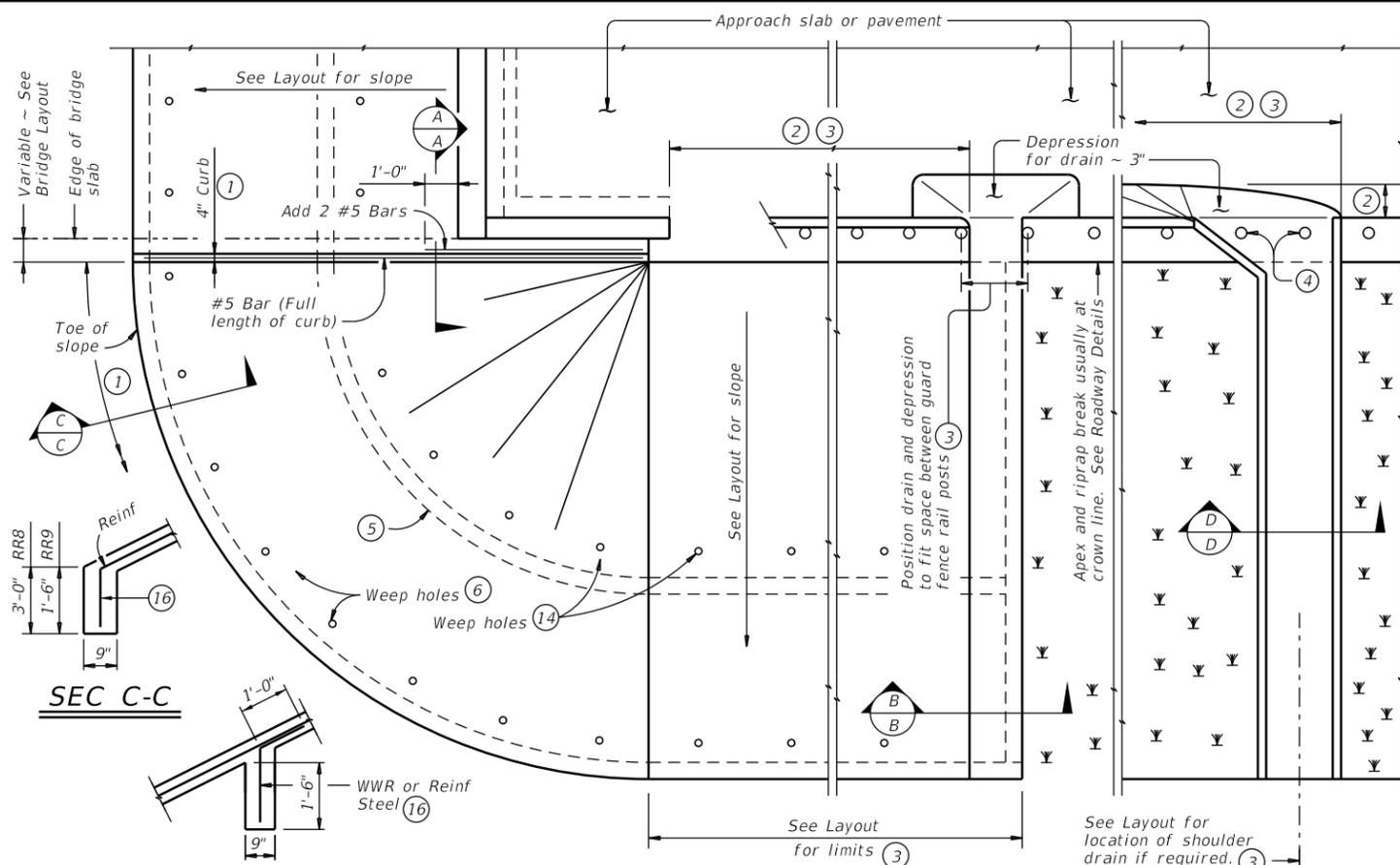
**BRIDGE APPROACH SLAB ASPHALTIC CONCRETE PAVEMENT**

**BAS-A**

FILE: basaste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0983	02	022	FM 419
02-20: Removed stress relieving pad.	DIST	COUNTY	SHEET NO.	
ABL	FISHER	80		

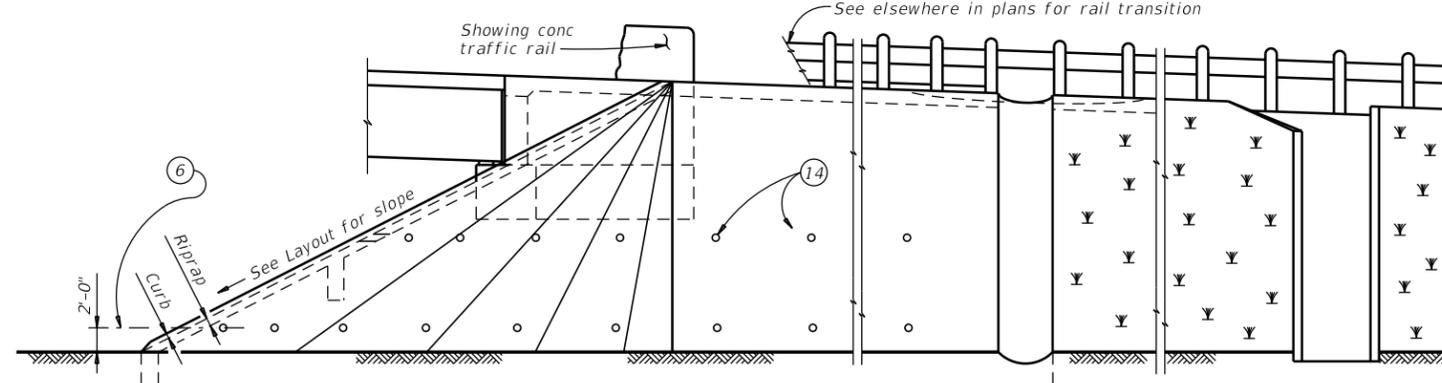
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DATE: 3/28/2021  
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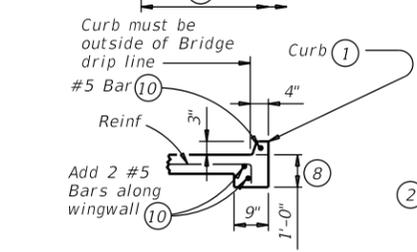


**INTERMEDIATE TOEWALL** 5

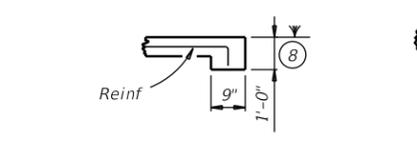
**PLAN**



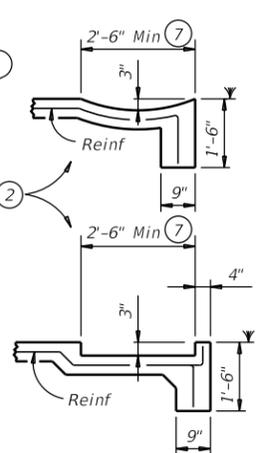
**ELEVATION**



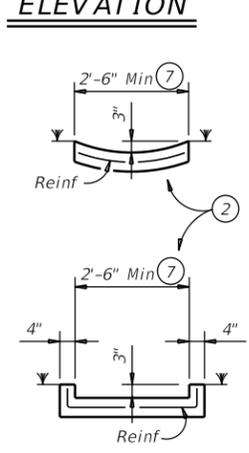
**SEC A-A**



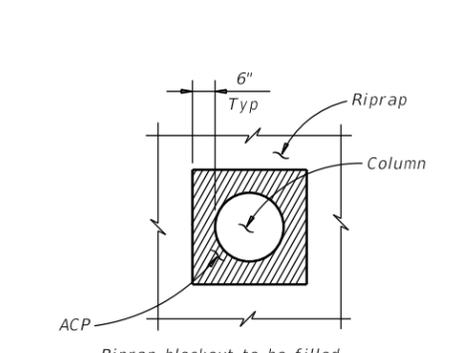
**SEC B-B**  
(No drain)



**SEC B-B**  
(Shoulder drain integral with riprap)

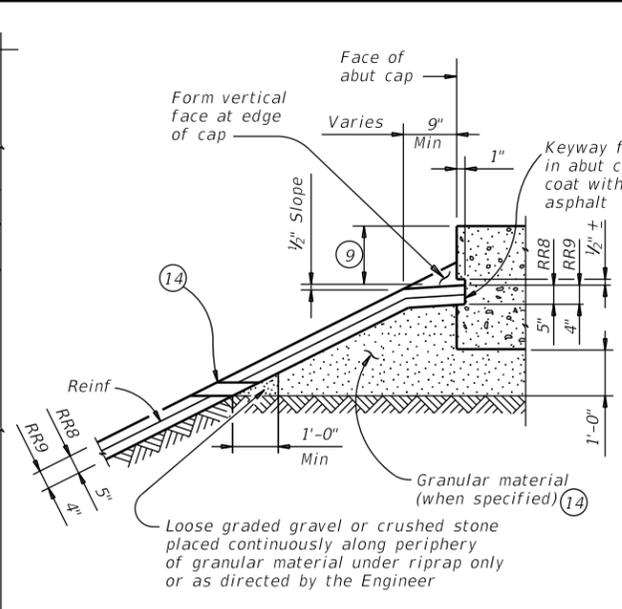


**SEC D-D**  
(Shoulder drain)

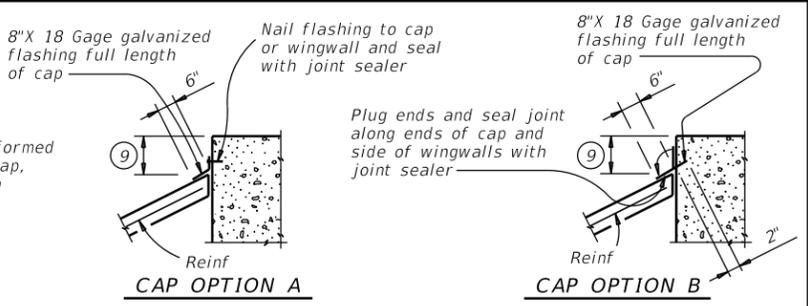


**RIPRAP DETAIL AT COLUMNS**

(As directed by the Engineer)

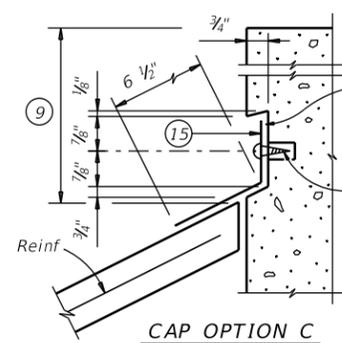


**SHOWING KEYWAY OPTION**

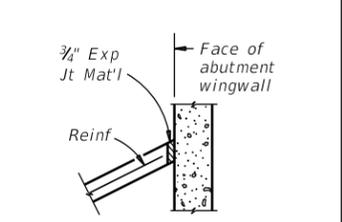


**CAP OPTION A**

**CAP OPTION B**

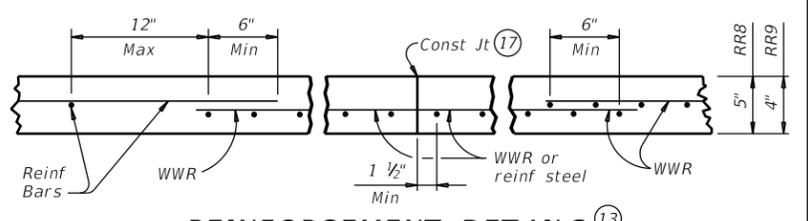


**CAP OPTION C**



**SECT THRU RIPRAP AT WINGWALL** 12

**SECTIONS THRU RIPRAP AT CAP** 11



**REINFORCEMENT DETAILS** 13

See General Notes for optional synthetic fiber reinforcement.

- 1 When riprap is shown extended around header on layout, extend slab and toewall as shown and eliminate 4" curb.
- 2 Limits and configuration of drains and depressions are as shown elsewhere in plans or as directed by the Engineer.
- 3 Location of shoulder drain must consider limitations imposed by rail transition. Do not locate shoulder drains at expansion joints between approach slab and concrete pavement.
- 4 See details elsewhere in plans for installation of guard fence posts through concrete riprap.
- 5 Provide intermediate toewall only when designated elsewhere in the plans or included in the specifications.
- 6 Provide lower level of 2" Dia weep holes at 10' c-c backed by 1 CF packet of gravel and galvanized hardware cloth at all locations unless directed by the Engineer to eliminate.
- 7 Use wider or other drain configurations if shown elsewhere in plans or if directed by the Engineer.
- 8 Wall extension may be reduced or modified if approved by the Engineer. Increase wall extension to 1'-6" whenever the optional intermediate toewall is called for in the plans.
- 9 Top of cap to top of riprap dimension varies as directed by the Engineer. Should be 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.
- 10 #5 bars shown are required even when synthetic fiber reinforcing option is selected.
- 11 Provide sealing option for joint between the face of cap and riprap as designated by the Engineer or as shown elsewhere on plans.
- 12 Flashing (shown in Cap Option A) may be used at wingwall in addition to Exp Jt Mat'l if shown on plans or directed by the Engineer.
- 13 Provide #3 reinforcing bars at 18" Spa c-c. Provide Welded Wire Reinforcement (WWR) as 6x6-D2.9xD2.9 or D3xD3. Combinations of WWR and reinforcing bars may be used if both are permitted. Use lap splices of a minimum 6 inches, measured from the transverse wire of WWR, and the ends of reinforcing bars.
- 14 If granular material is specified, provide upper level of 2" Dia weep holes at 10' c-c backed by galvanized hardware cloth.
- 15 8" x 18 Gage Galv Sheet Metal
- 16 Provide WWR or #3 bars, with 1'-0" extension into slope.
- 17 WWR or reinforcing steel is continuous through riprap construction joints. Provide WWR or reinforcing steel that extends 1'-1" minimum into adjacent riprap on each side of construction joint even if synthetic reinforcing fiber is utilized.

**GENERAL NOTES:**

- Provide Class "B" concrete (f'c = 2,000 psi) unless noted elsewhere in plans.
- Provide Grade 60 reinforcing steel.
- Provide deformed welded wire reinforcement (WWR) meeting ASTM A1064, unless otherwise shown.
- Provide reinforcing bars, deformed WWR, or any suitable combination of both types for riprap reinforcing, unless specified elsewhere in the plans.
- Optionally synthetic fibers may be used if approved by the Engineer. Provide synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) in lieu of steel reinforcing in riprap concrete.
- Install construction joints or grooved joints extending the full slant slope height at intervals of approximately 20 feet unless otherwise directed by the Engineer.
- Hardware cloth, loose grade stone behind weep holes, flashing, or other sealing material are subsidiary to the bid item "Riprap". See Layout for limits of riprap.
- RR8 is to be used on stream crossings.
- RR9 is to be used on other embankments.

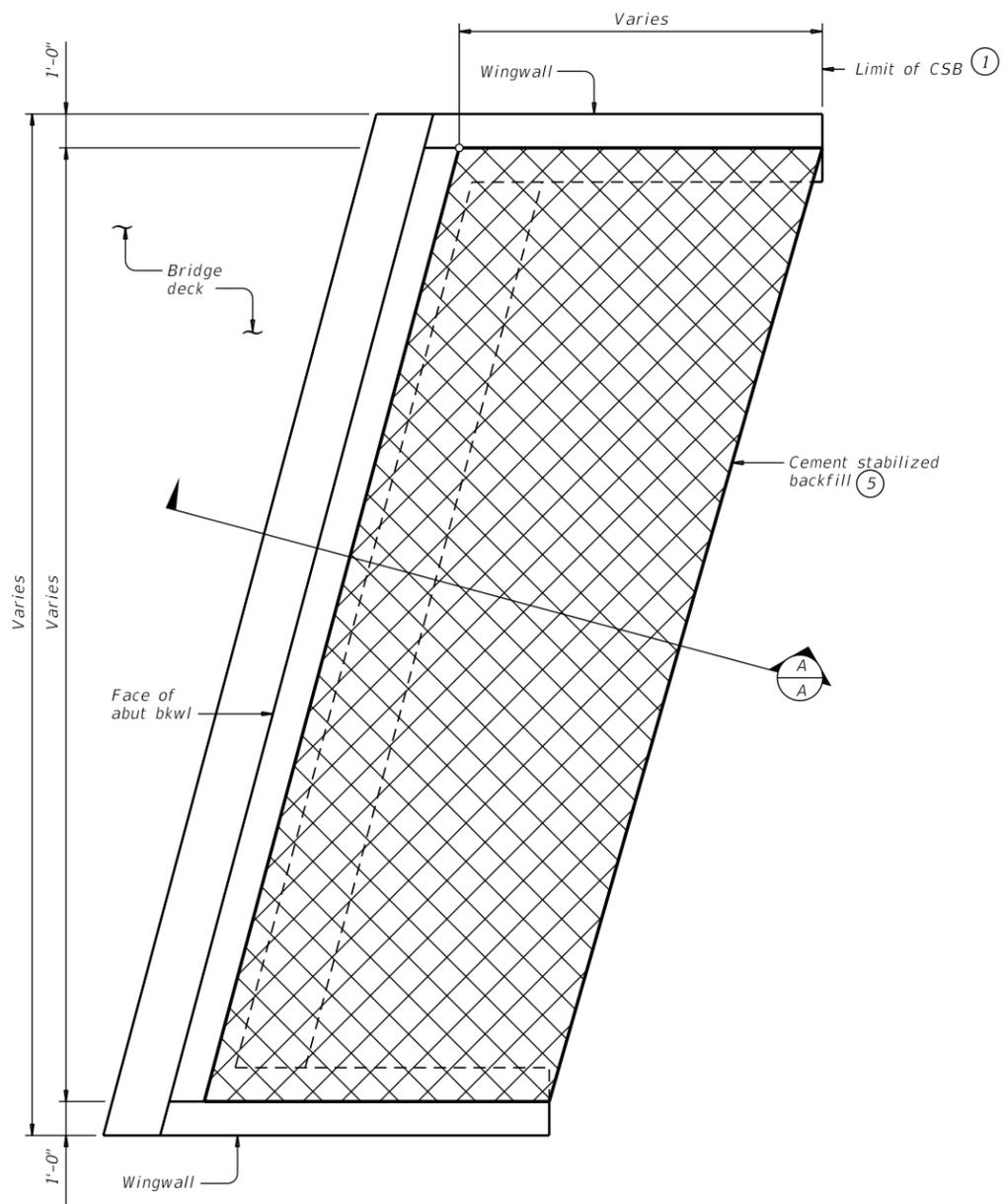
**FOR CONTRACTOR'S INFORMATION ONLY:**

5" of RR8	= 0.015 CY/SF
4" of RR9	= 0.012 CY/SF
#3 Reinf at 18" c-c	= 0.501 Lbs/SF
6x6-D3xD3	= 0.408 Lbs/SF

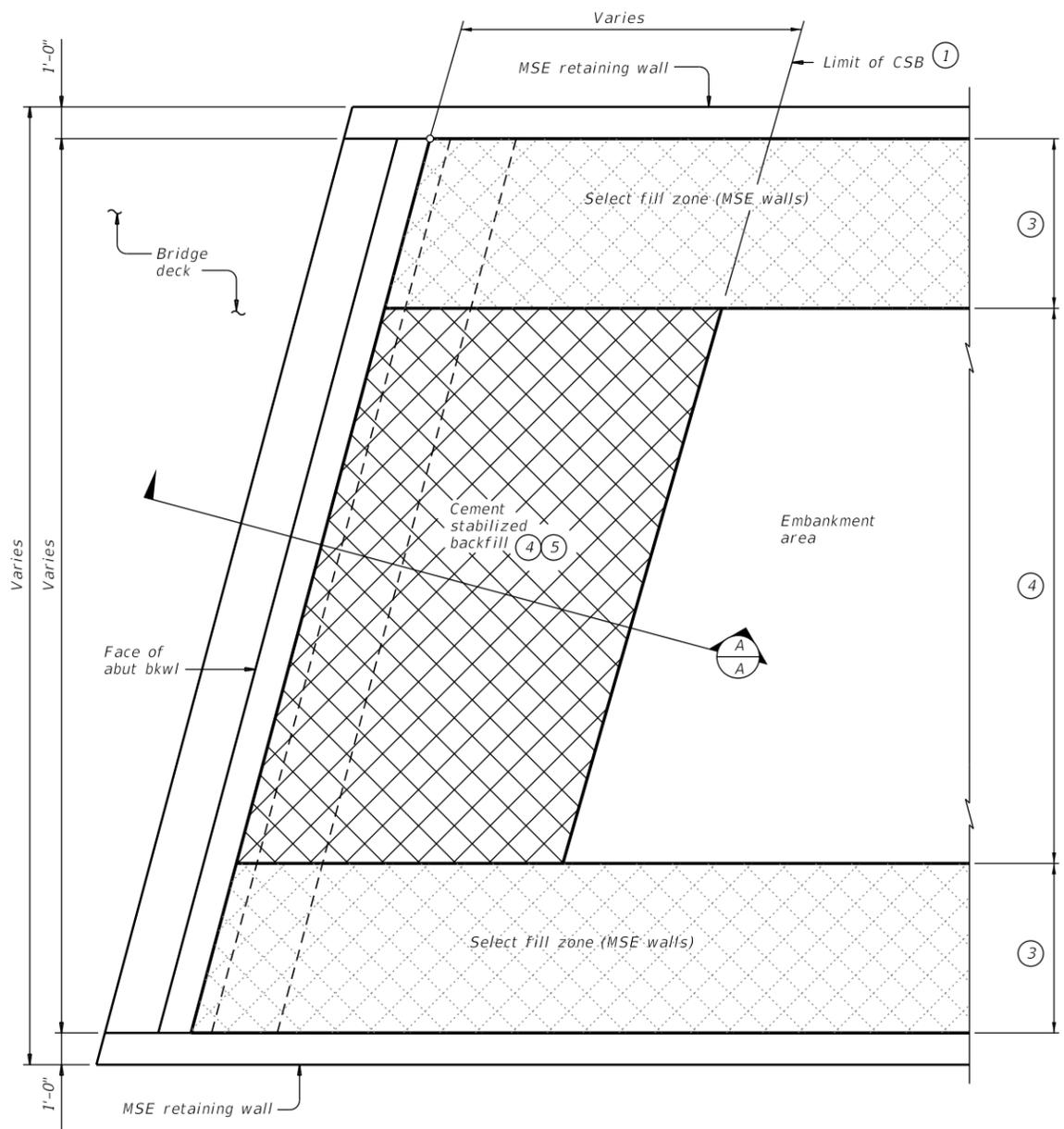
		<b>Bridge Division Standard</b>	
<b>CONCRETE RIPRAP AND SHOULDER DRAINS EMBANKMENTS AT BRIDGE ENDS (TYPES RR8 &amp; RR9)</b>			
<b>CRR</b>			
FILE: crrstd1-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
©TxDOT April 2019	CONTRACT NO: 0983 02	JOB NO: 022	HIGHWAY NO: FM 419
REVISIONS	DIST: ABL	COUNTY: FISHER	SHEET NO: 81

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DATE: 3/28/2021  
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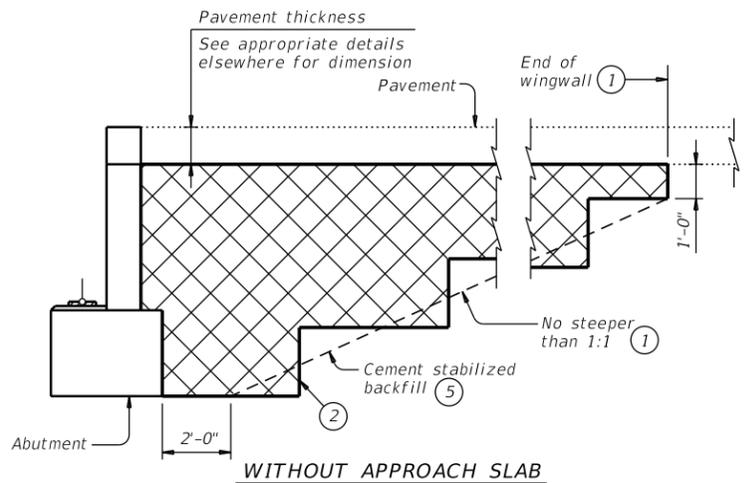
**OPTION 1 ~ PLAN WITH WINGWALLS**  
 Cast-in-place retaining walls similar.



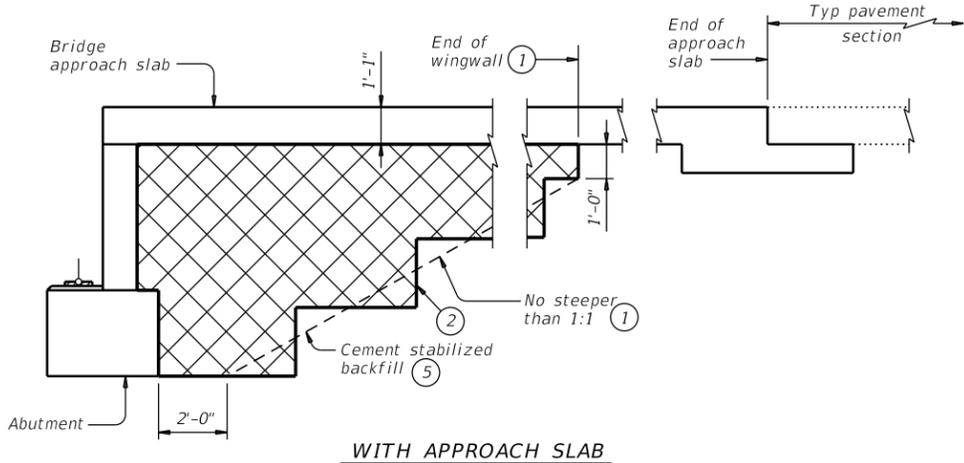
**OPTION 1 ~ PLAN WITH MSE RETAINING WALLS**

- ① Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.
- ② Bench backfill as shown with 12" (approximate) bench depths.
- ③ Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.
- ④ When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.
- ⑤ If shown in the plans flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
  - a) If flowable backfill is to be placed over MSE backfill then a filter fabric will be placed over the 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.



**WITHOUT APPROACH SLAB**



**SECTION A-A**

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

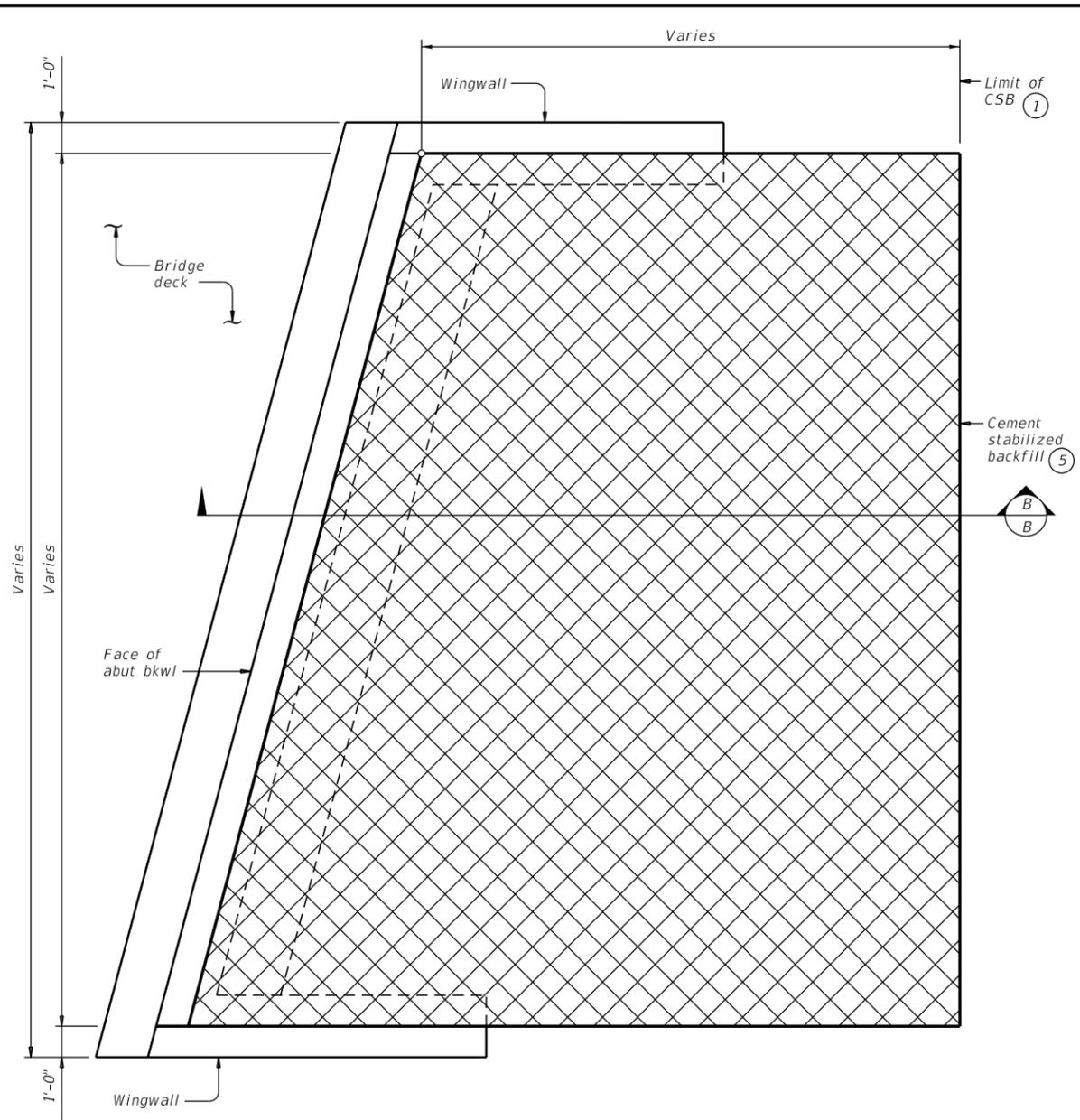
**CEMENT STABILIZED ABUTMENT BACKFILL BRIDGE ABUTMENT**

**CSAB**

FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
0983	02	022	FM 419	
02-20: Added Option 2.	DIST	COUNTY	SHEET NO.	
ABL	FISHER		82	

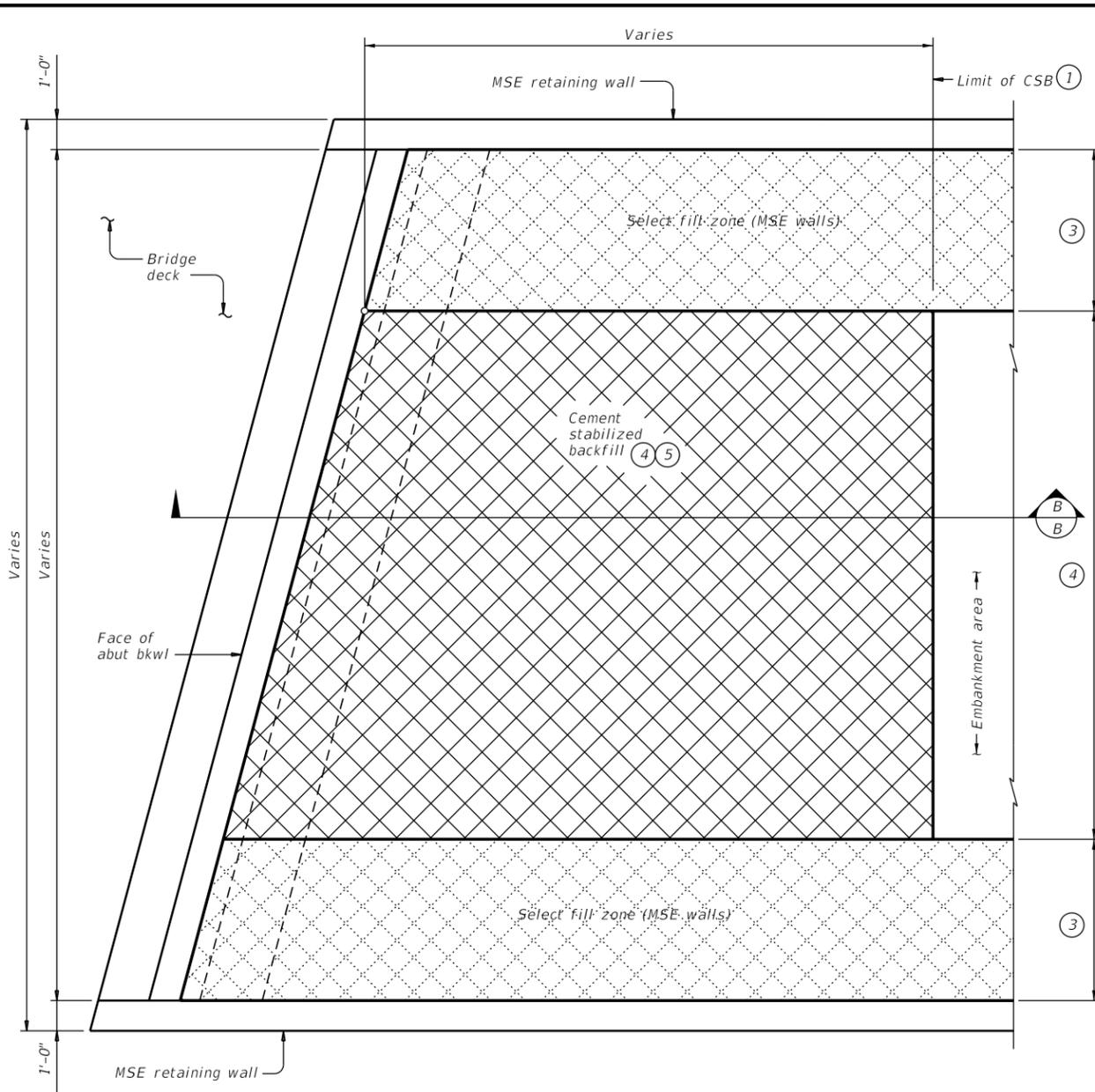
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of any standard to other formats or for incorrect results or damages resulting from its use.

DATE: 3/28/2021  
 FILE: V:\2142\oct1ve\214220136\06-CAD\6.1-Sheets\standards\06\_BRG\csabste1-20.dgn



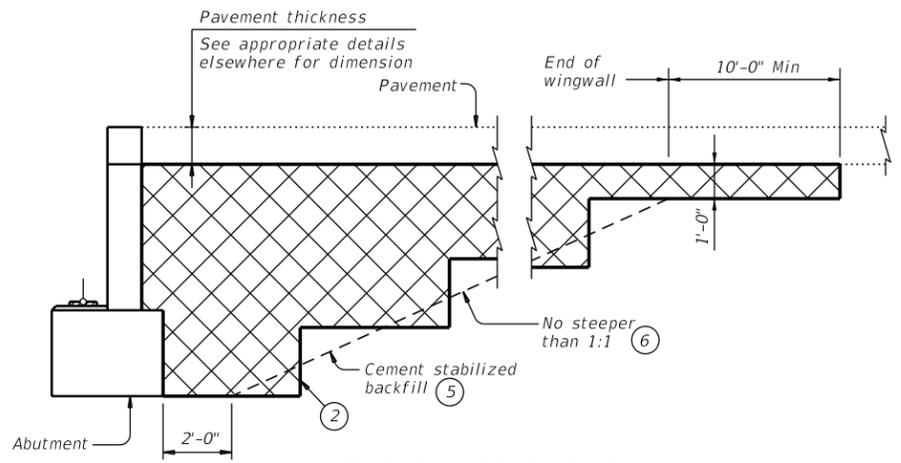
**OPTION 2 ~ PLAN WITH WINGWALLS**

Cast-in-place retaining walls similar.

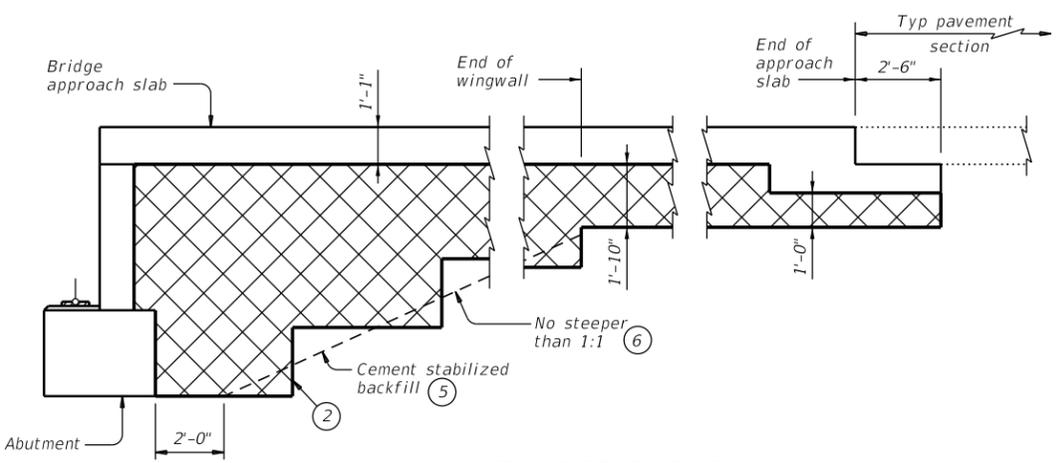


**OPTION 2 ~ PLAN WITH MSE RETAINING WALLS**

- 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).



**WITHOUT APPROACH SLAB**



**SECTION B-B**

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

SHEET 2 OF 2



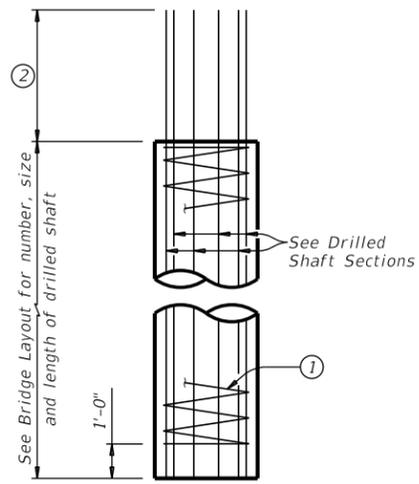
**CEMENT STABILIZED  
 ABUTMENT BACKFILL  
 BRIDGE ABUTMENT**

**CSAB**

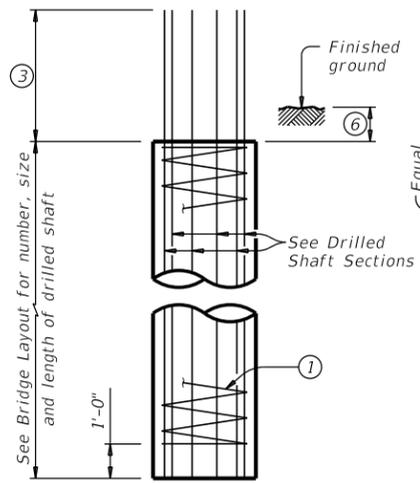
FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONTRACT	SECTION	JOB	HIGHWAY
REVISIONS	0983	02	022	FM 419
02-20: Added Option 2.	DIST	COUNTY	SHEET NO.	
	ABL	FISHER	83	

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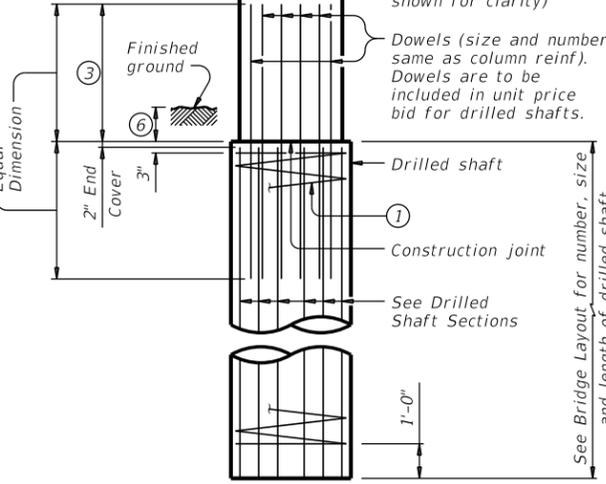
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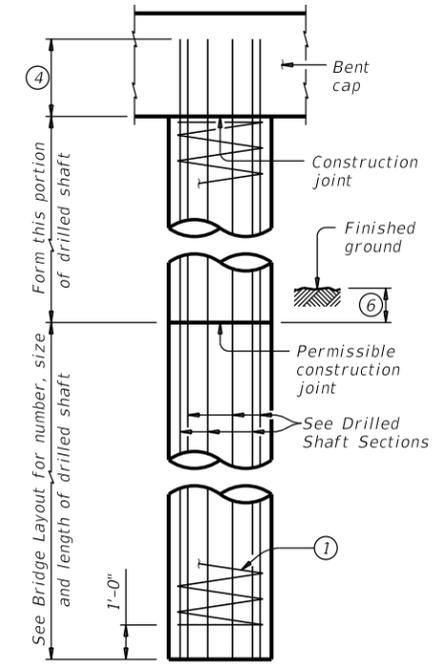
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



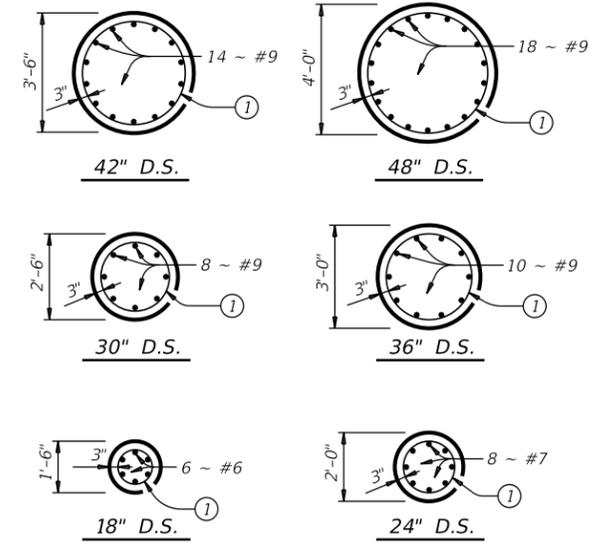
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL 5

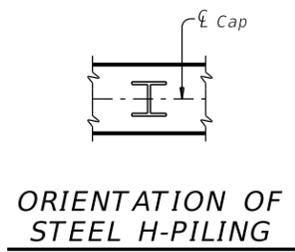


DRILLED SHAFT SECTIONS

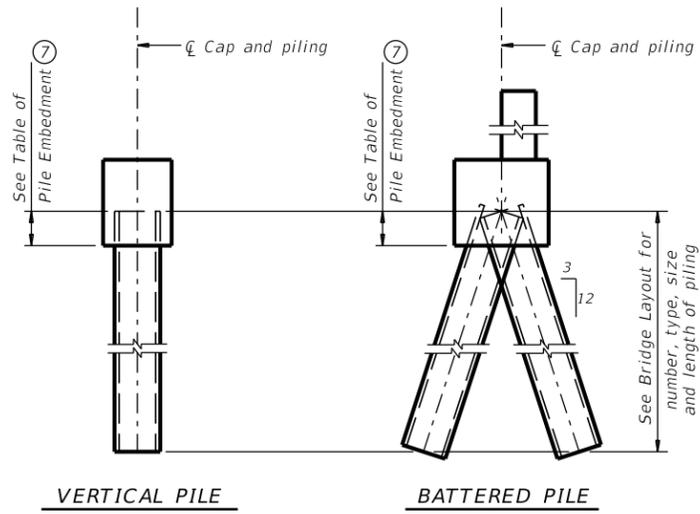
**DRILLED SHAFT DETAILS**

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"

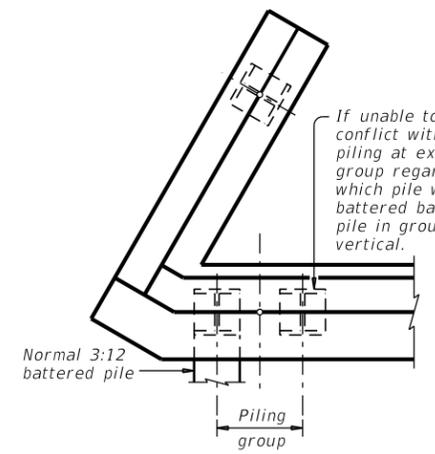
See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.



ORIENTATION OF STEEL H-PILING

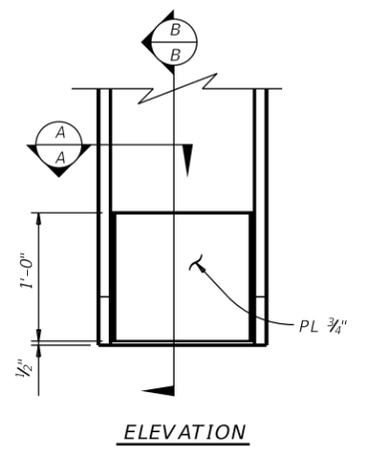


PILING DETAILS (Concrete or steel H)

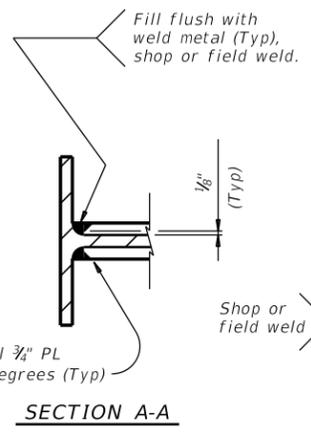


DETAIL "A" (Showing plan view of a 30° skewed abutment)

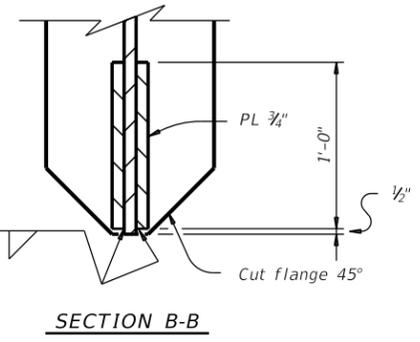
- 1 #3 spiral at 6" pitch (one and a half flat turns top and bottom).
- 2 Min extension into supported element:  
#6 Bars = 1'-11"  
#7 Bars = 2'-0"  
#9 Bars = 2'-3"
- 3 Min lap with column reinf:  
#7 Bars = 2'-11"  
#9 Bars = 3'-9"  
#11 Bars = 4'-8"
- 4 Min extension into supported element:  
#6 Bars = 1'-11"  
#7 Bars = 2'-3"  
#9 Bars = 2'-9"
- 5 Drilled shafts may extend to the bottom of bent caps for "H" heights of 6 ft and less (as shown on the Bridge Layout), if approved. This option can only be used when the drilled shaft diameter equals the column diameter. Obtain approval of the forming method above the ground line prior to construction. No adjustments in payment will be made if this option is used.
- 6 1'-0" Min, unless shown otherwise on plans.
- 7 Or as shown on plans.



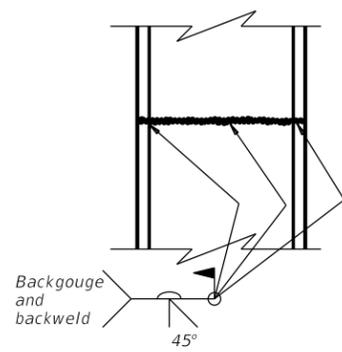
ELEVATION



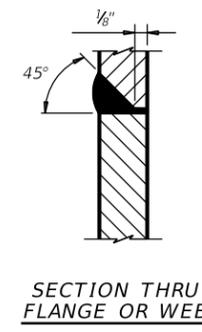
SECTION A-A



SECTION B-B



STEEL H-PILE SPLICE DETAIL Use when required.



SECTION THRU FLANGE OR WEB

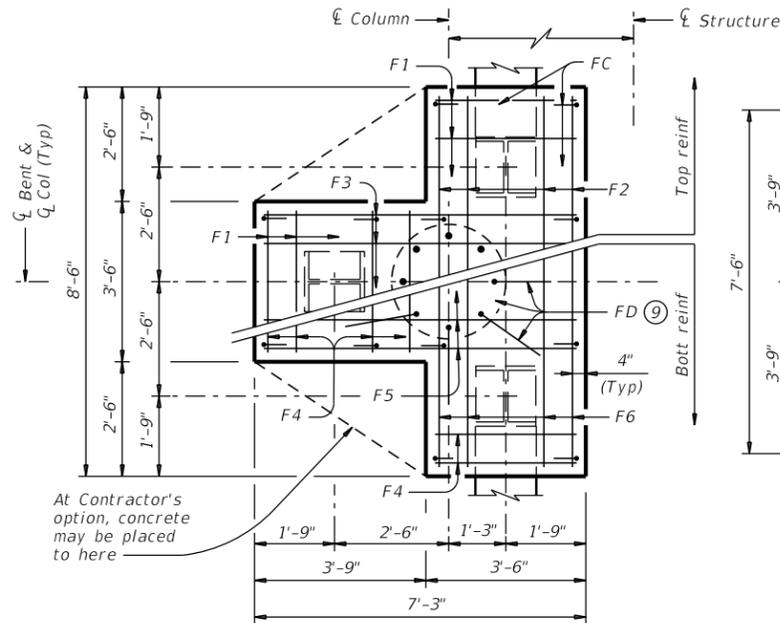
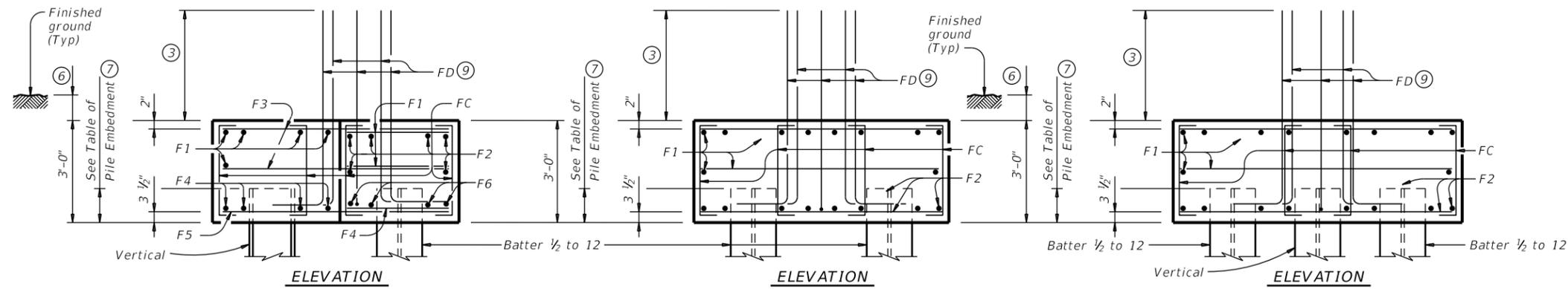
STEEL H-PILE TIP REINFORCEMENT See Item 407 "Steel Piling" to determine when tip reinforcement is required and for options to the details shown.

SHEET 1 OF 2

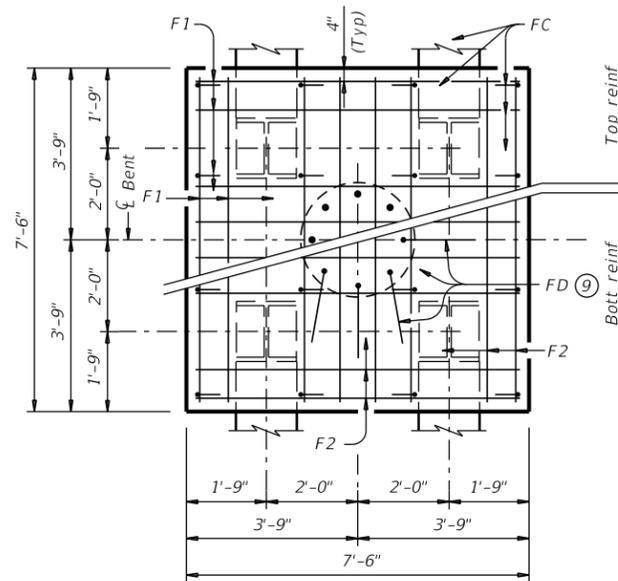
		<b>Bridge Division Standard</b>	
<h3>COMMON FOUNDATION DETAILS</h3>			
<b>FD</b>			
FILE: fdstd01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
©TxDOT April 2019	CONTRACT	SECTION	JOB
0983	02	022	FM 419
01-20: Added #11 bars to the FD bars.	DIST	COUNTY	SHEET NO.
ABL	FISHER		84

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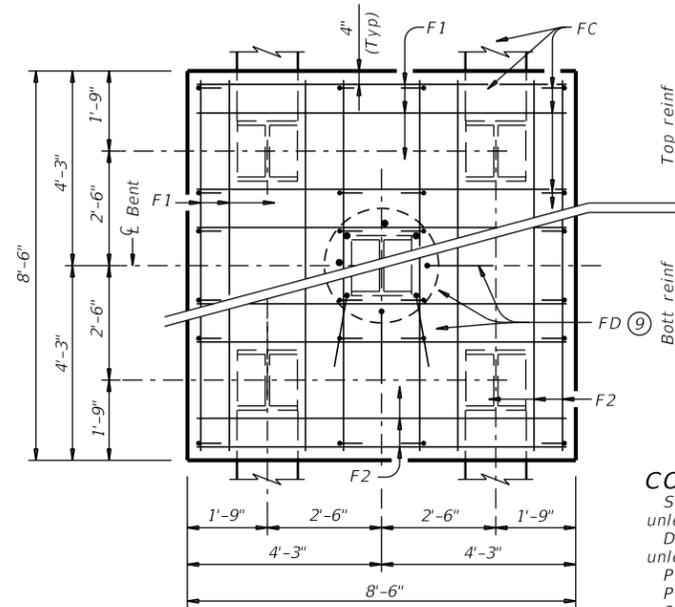
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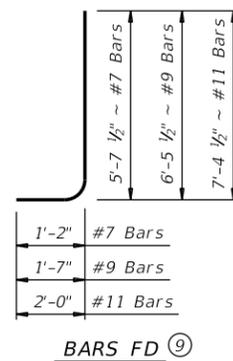
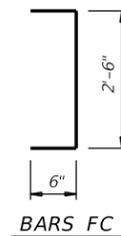
**THREE PILE FOOTING**<sup>⑧</sup>  
 For 36" Dia and smaller columns.



**FOUR PILE FOOTING**<sup>⑧</sup>  
 For 42" Dia and smaller columns.



**FIVE PILE FOOTING**<sup>⑧</sup>  
 For 42" Dia and smaller columns.



- 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 <sup>⑩</sup>	8	#9	8'- 1"	220	
Reinforcing Steel				Lb	623
Class "C" Concrete				CY	4.8
ONE 4 PILE FOOTING					
Bar	No.	Size	Length	Weight	
F1	20	#4	7'- 2"	96	
F2	16	#8	7'- 2"	306	
FC	16	#4	3'- 6"	37	
FD <sup>⑩</sup>	8	#9	8'- 1"	220	
Reinforcing Steel				Lb	659
Class "C" Concrete				CY	6.3
ONE 5 PILE FOOTING					
Bar	No.	Size	Length	Weight	
F1	20	#4	8'- 2"	109	
F2	16	#9	8'- 2"	444	
FC	24	#4	3'- 6"	56	
FD <sup>⑩</sup>	8	#9	8'- 1"	220	
Reinforcing Steel				Lb	829
Class "C" Concrete				CY	8.0

**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

SHEET 2 OF 2



**COMMON FOUNDATION DETAILS**

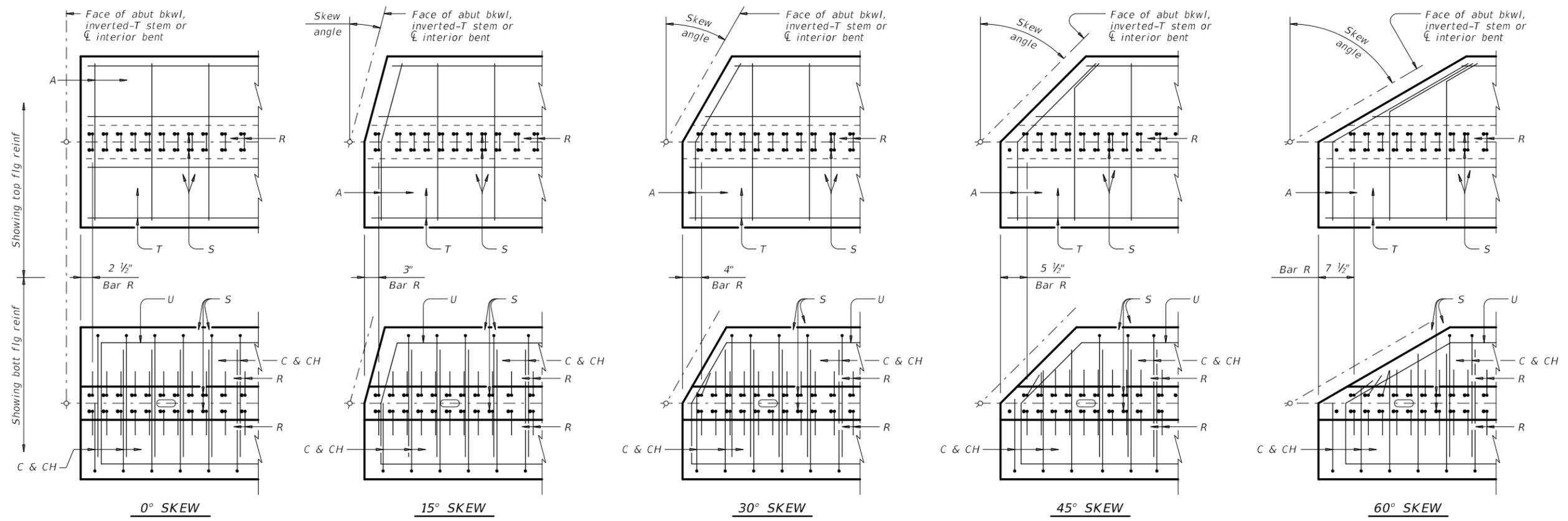
FD

FILE: fstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
CONTRACT: 0983	SECTION: 02	JOB: 022	HIGHWAY: FM 419	
REVISIONS		DIST: ABL	COUNTY: FISHER	SHEET NO: 85



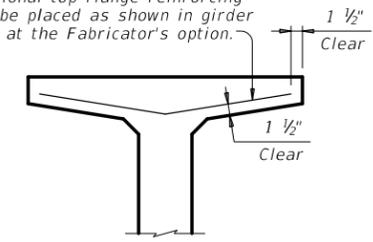
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DATE: 4/28/2021  
 FILE: V:\2142\act\1ve\214220136\06-CAD\6.1-Sheets\standard\ds\06\_BRG.igdstds1.dwg

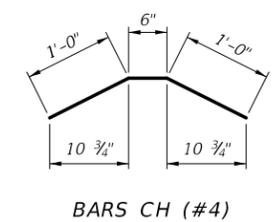


**PLAN OF GIRDER ENDS** <sup>(12)</sup>

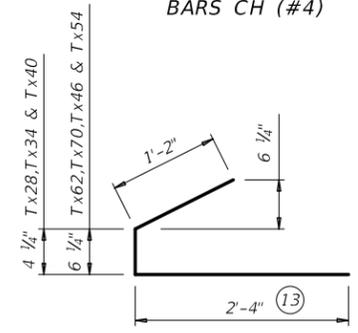
To control top flange cracking that may occur during form removal, additional top flange reinforcing may be placed as shown in girder ends at the Fabricator's option.



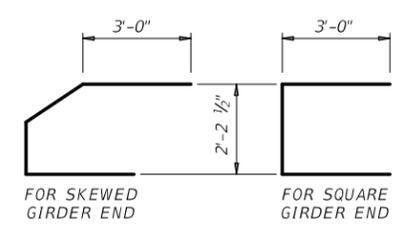
**OPTIONAL TOP FLANGE REINFORCING DETAIL**



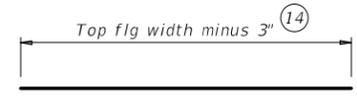
BARS CH (#4)



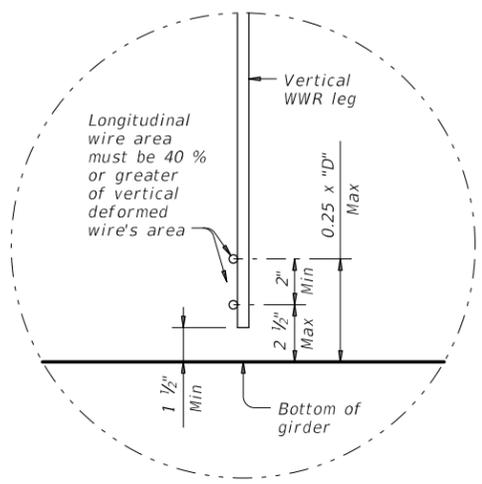
BARS C (#4)



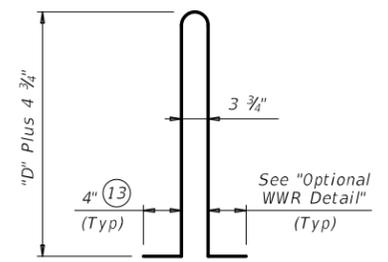
BARS U (#5)



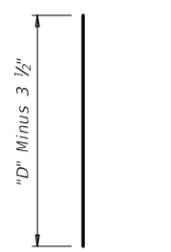
BARS A (#3)



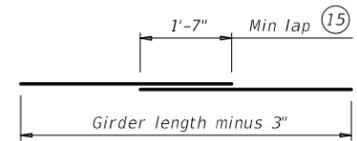
**OPTIONAL WELDED WIRE REINFORCEMENT (WWR) DETAIL**



BARS R (#4) <sup>(16)</sup>



BARS S (#6)



BARS T (#4)

- <sup>(12)</sup> Reinforcing patterns shown are provided as guides to determine reinforcement placement in skewed ends. Place Bars S as close to girder end as cover requirements permit, which may prevent them to be bundled with Bars R.
- <sup>(13)</sup> Bars may be cut or bent at skewed end as required.
- <sup>(14)</sup> Increase as necessary for bars at skewed end.
- <sup>(15)</sup> No portion of bar less than 10 ft.
- <sup>(16)</sup> For Welded Wire Reinforcement (WWR) option, area of Bars R may be reduced in proportion to the increase in reinforcement yield strength over 60 ksi. Yield strength of WWR is limited to 75 ksi.



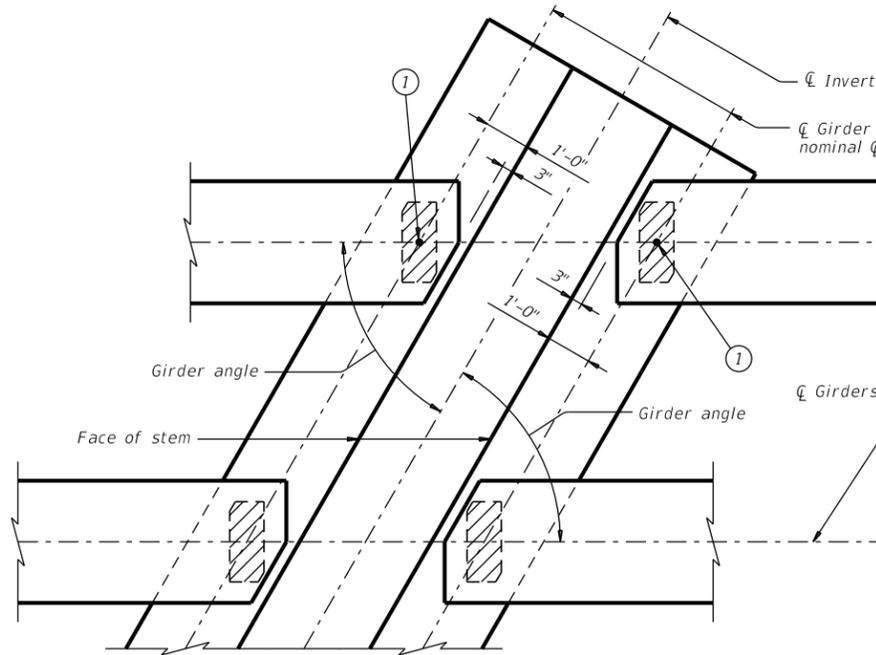
**PRESTRESSED CONCRETE I-GIRDER DETAILS**

**IGD**

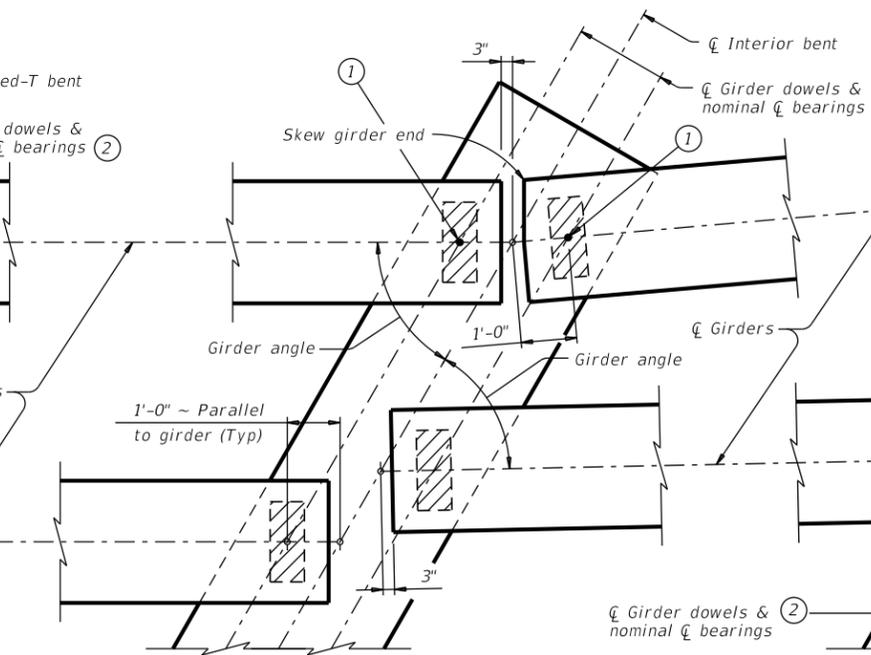
FILE: igdstds1-19.dgn	DN: TxDOT	CK: JMH	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0983	02	022	FM 419
10-19: Added Bars C and CH full length for VC <= 20'	DIST	COUNTY	SHEET NO.	
	ABL	FISHER	87	

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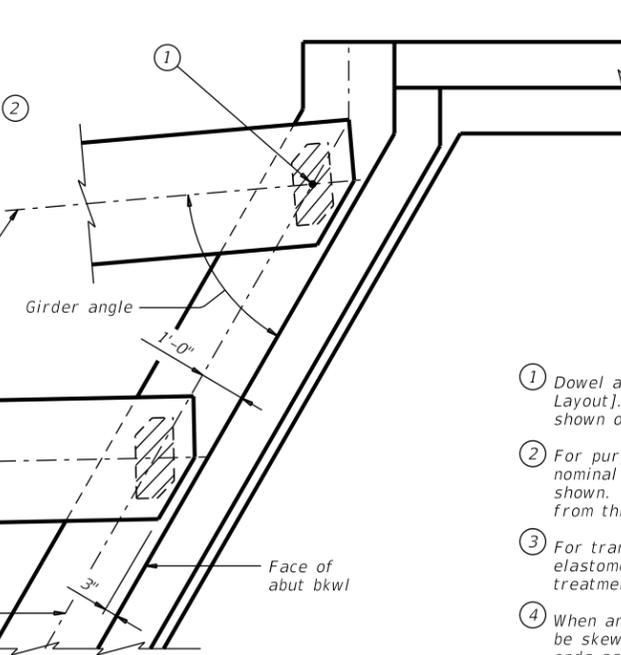
DATE: 3/28/2021  
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AT INVERTED-T BENT W/SKEW

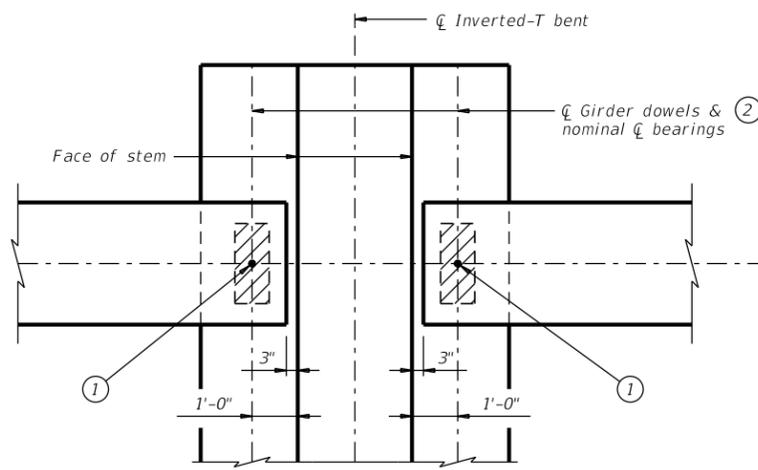


AT CONVENTIONAL INTERIOR BENT W/SKEW

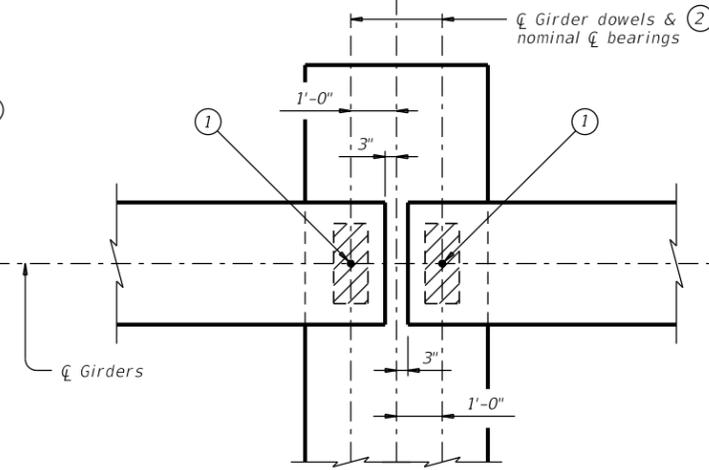


AT ABUTMENT W/SKEW

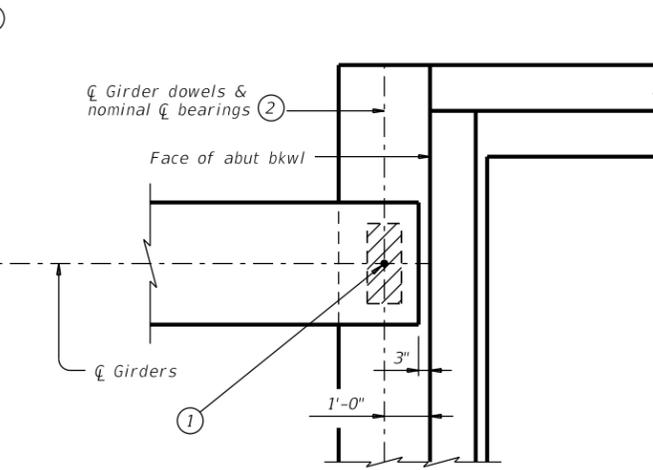
- ① Dowel at doweled girder end [labeled (D) on Bridge Layout]. Required for outside girder only or as shown on substructure details.
- ② For purposes of computing bearing seat elevations, nominal centerline of bearing must be defined as shown. The actual center of bearing pad may vary from this line.
- ③ For transition bents with backwall, girder and elastomeric bearings must receive the same treatment as shown for abutments.
- ④ When angle exceeds 0°, one or both girder ends must be skewed to maintain the clearance between girder ends as shown in view.
- ⑤ See Table of Bearing Pad Dimensions for bearing size. Girder end skew angles in Table not applicable for this situation. Table reflects girder conflicts of this type on radial bents only.



AT INVERTED-T BENT



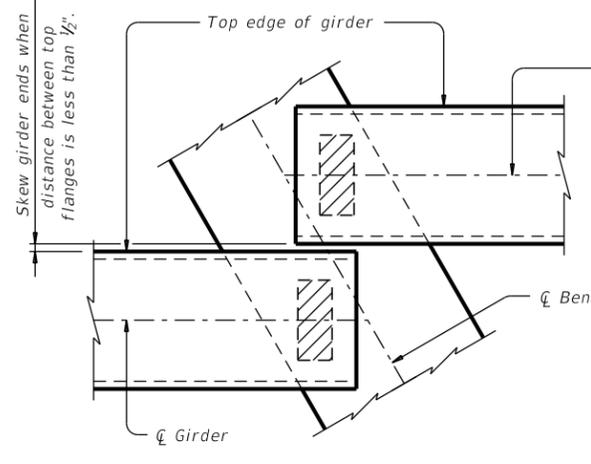
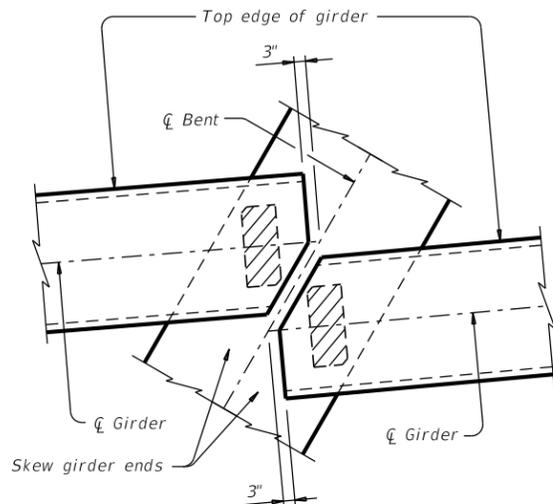
AT CONVENTIONAL INTERIOR BENT



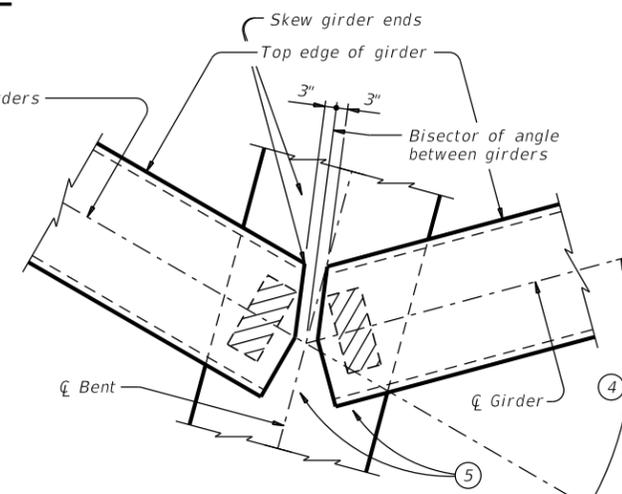
AT ABUTMENT

**GENERAL NOTES:**  
 These details accommodate skew angles up to 60°. 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, including beveled and embedded steel plates, must be included in unit price bid for "Prestressed Concrete Girders".

**GIRDER END DETAILS**



**GIRDER CONFLICT DETAILS**



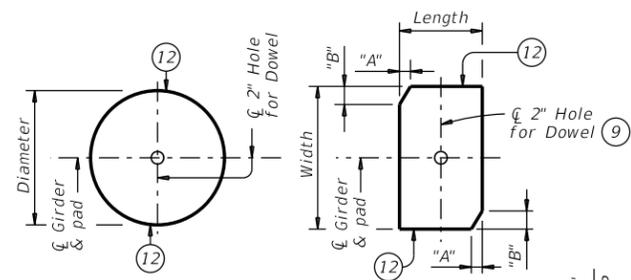
**ELASTOMERIC BEARING AND GIRDER END DETAILS PRESTR CONCRETE I-GIRDERS**

**IGEB**

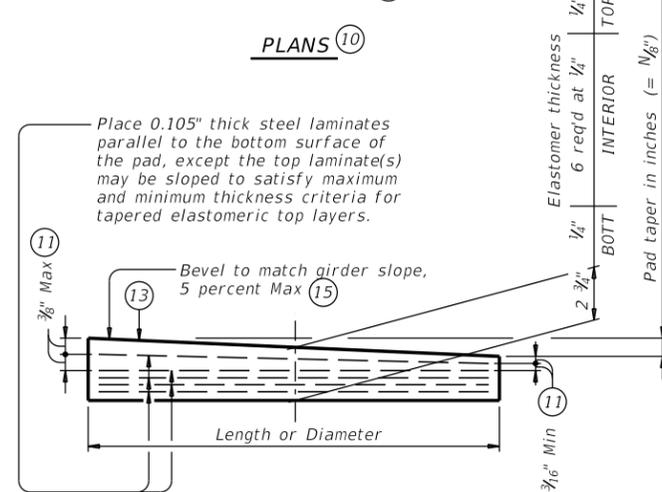
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REVISIONS	0983	02	022	FM 419
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	ABL	FISHER	88	

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PLANS (10)



ELEVATION

**LAMINATED ELASTOMERIC BEARING PAD**

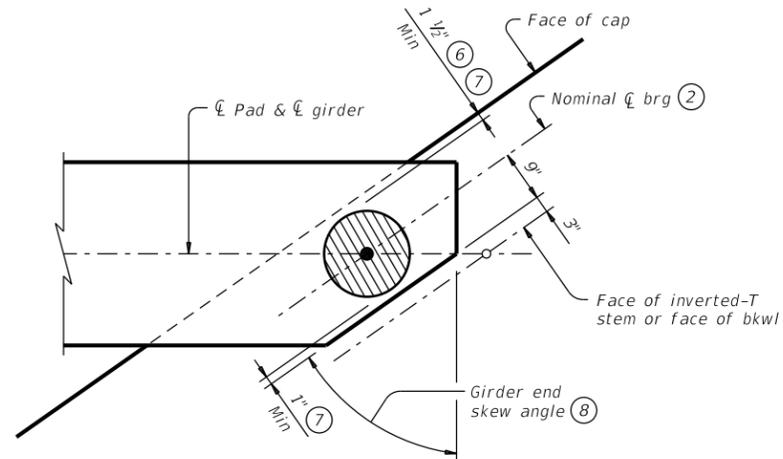
(50 DUROMETER)

**TABLE OF MINIMUM SUBSTRUCTURE DIMENSIONS (14)**

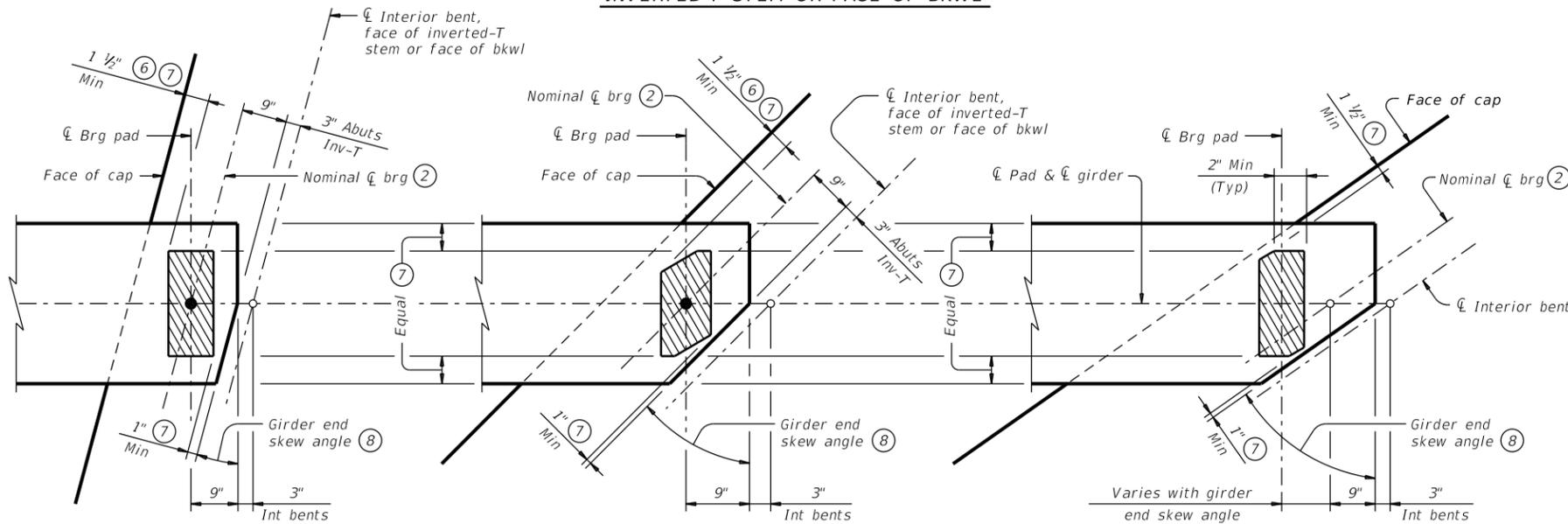
Girder Type	Abutments	Int Bents	Inv-T Bents
	Face of Bkwl to Face of Cap	Overall Cap Width	Corbel Width
Tx28 thru Tx54	1'-9"	3'-6"	1'-10 1/2"
Tx62 & Tx70	2'-0"	4'-0"	2'-1 1/2"

**TABLE OF BEARING PAD DIMENSIONS**

Bent Type	Girder Type	Bearing Type (13)	Girder End Skew Angle Range	Pad Size Lgth x Wdth	Pad Clip Dimensions	
					"A"	"B"
ABUTMENTS, INVERTED-T AND TRANSITION BENTS WITH BACKWALLS	Tx28, Tx34, Tx40, Tx46 & Tx54	G-1-"N"	0° thru 21°	8" x 21"	---	---
		G-2-"N"	21°+ thru 30°	8" x 21"	1 1/2"	2 1/2"
		G-3-"N"	30°+ thru 45°	9" x 21"	4 1/2"	4 1/2"
		G-4-"N"	45°+ thru 60°	15" Dia	---	---
		G-5-"N"	0° thru 21°	9" x 21"	---	---
		G-6-"N"	21°+ thru 30°	9" x 21"	1 1/2"	2 1/2"
CONVENTIONAL INTERIOR BENTS	Tx28, Tx34, Tx40, Tx46 & Tx54	G-7-"N"	30°+ thru 45°	10" x 21"	4 1/2"	4 1/2"
		G-8-"N"	45°+ thru 60°	10" x 21"	7 1/4"	4 1/4"
CONVENTIONAL INTERIOR BENTS WITH SKEWED GIRDER ENDS (GIRDER CONFLICTS) (16)	Tx62 & Tx70	G-9-"N"	0° thru 60°	9" x 21"	---	---
		G-10-"N"	0° thru 60°	9" x 21"	---	---
CONVENTIONAL INTERIOR BENTS WITH SKEWED GIRDER ENDS (GIRDER CONFLICTS) (16)	Tx28, Tx34, Tx40, Tx46 & Tx54	G-1-"N"	0° thru 18°	8" x 21"	---	---
		G-2-"N"	18°+ thru 30°	8" x 21"	1 1/2"	2 1/2"
		G-9-"N"	30°+ thru 45°	8" x 21"	3"	3"
		G-10-"N"	45°+ thru 60°	9" x 21"	6"	3 1/2"
		G-5-"N"	0° thru 18°	9" x 21"	---	---
		G-11-"N"	18°+ thru 30°	9" x 21"	---	---
CONVENTIONAL INTERIOR BENTS WITH SKEWED GIRDER ENDS (GIRDER CONFLICTS) (16)	Tx62 & Tx70	G-12-"N"	30°+ thru 45°	9" x 21"	1 1/2"	1 1/2"
		G-12-"N"	45°+ thru 60°	9" x 21"	3"	1 3/4"



ROUND BEARINGS FOR SKEWED GIRDER ENDS AT FACE OF INVERTED-T STEM OR FACE OF BKWL



SKewed GIRDER ENDS AT INT BENTS, FACE OF INVERTED-T STEM OR FACE OF BKWL

SKewed GIRDER ENDS AT CONVENTIONAL INTERIOR BENTS (NO GIRDER DOWELS)

**BEARING PAD PLACEMENT DIAGRAMS**

- (2) For purposes of computing bearing seat elevations, nominal centerline of bearing must be defined as shown. The actual center of bearing pad may vary from this line.
- (6) 3" for inverted-T.
- (7) Place centerline pad as near nominal centerline bearing as possible between limits shown.
- (8) Girder end skew angle is equal to 90° minus the girder angle except at some conflicting girders.
- (9) Provide 2" dia hole only at locations required. See Substructure details for location.
- (10) See Table of Bearing Pad Dimensions for dimensions.
- (11) Maximum and minimum layer thicknesses shown are for elastomer only, on tapered layers.
- (12) Locate Permanent Mark here.
- (13) Indicate BEARING TYPE on all pads. For tapered pads, locate BEARING TYPE on the high side. The Fabricator must include the value of "N" (amount of taper in 1/8" increments) in this mark.  
 Examples: N=0, (for 0" taper)  
 N=1, (for 1/8" taper)  
 N=2, (for 1/4" taper)  
 (etc.)  
 Fabricated pad top surface slope must not vary from plan girder slope by more than (0.0625" / IN) IN/IN.
- (14) Substructure dimensions must satisfy the minimums provided to accommodate the elastomeric bearings shown on this standard.
- (15) See sheet 3 of 3 for beveled plate use when slopes exceed 5 percent.
- (16) If girder end is skewed for a girder conflict at an interior bent and a beveled sole plate is required, use bearing type for abutments at this location. Location of bearing centerline is to be set as for abutments in this case.

HL93 LOADING SHEET 2 OF 3

**Texas Department of Transportation** Bridge Division Standard

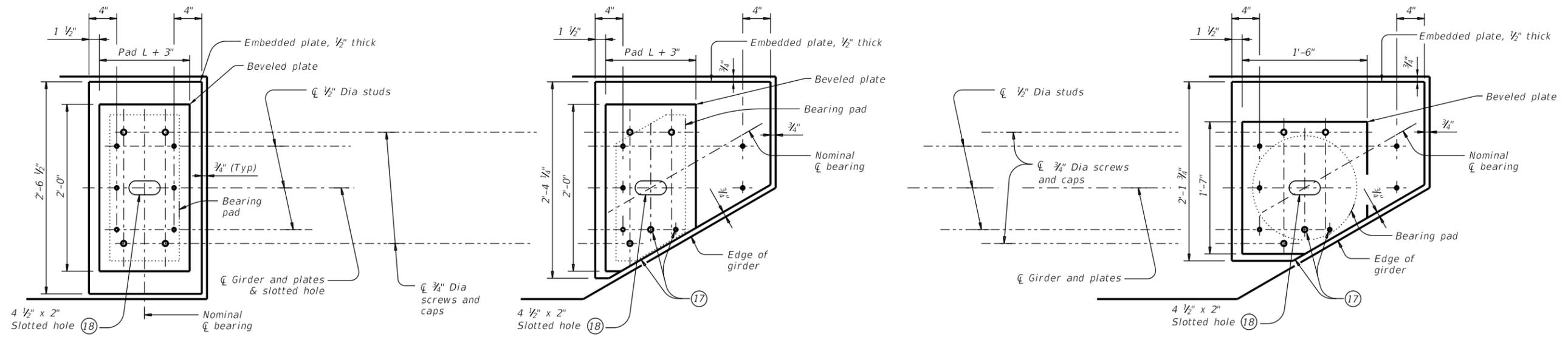
**ELASTOMERIC BEARING AND GIRDER END DETAILS PRESTR CONCRETE I-GIRDERS**

**IGEB**

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	DIST	COUNTY	SHEET NO.	
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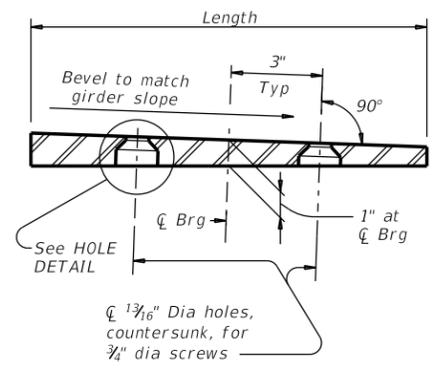


**NORMAL GIRDER END**  
 RECTANGULAR BEARING PAD

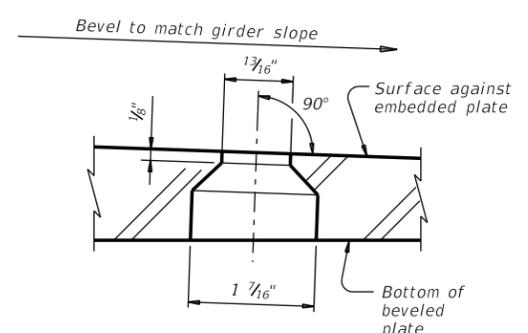
**SKewed GIRDER END**  
 CLIPPED RECTANGULAR BEARING PAD

**SKewed GIRDER END**  
 15" DIA BEARING PAD

**PLAN VIEW OF SOLE PLATE DETAILS**



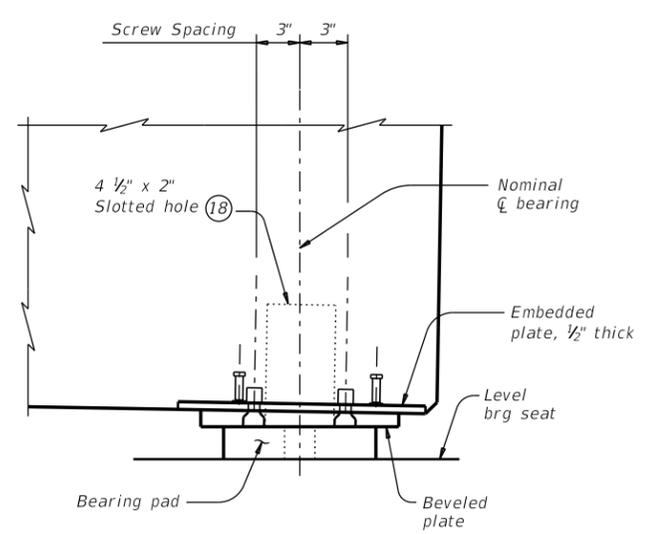
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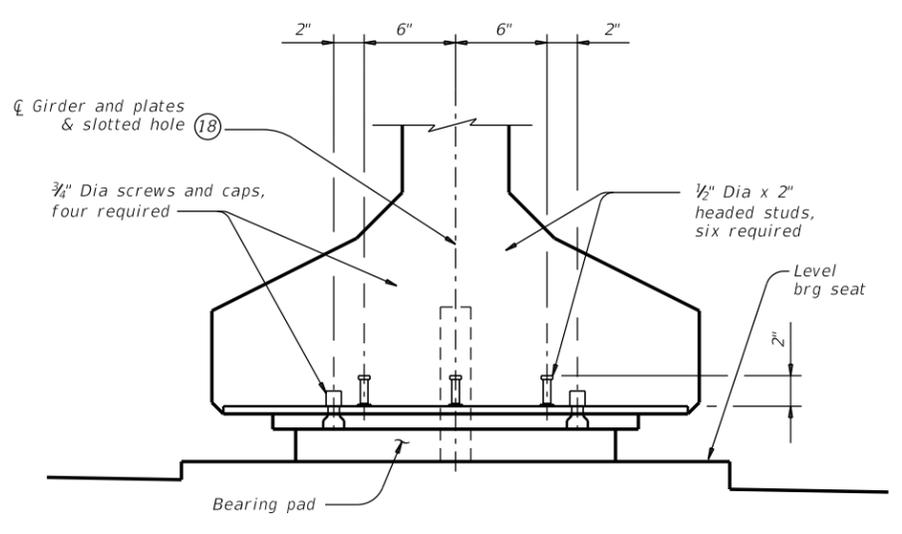
**HOLE DETAIL**

- 17 Cut beveled and embedded plates to match girder end skew. Adjust location of screw and stud as shown when necessary.
- 18 Slotted hole is required at doweled girder end locations.

**BEVELED PLATE DETAILS**



**SIDE ELEVATION**



**END ELEVATION**  
 Showing normal girder end.

**GIRDER DETAILS**

**SOLE PLATE NOTES:**

Provide constant thickness elastomeric bearings with beveled and embedded steel sole plates in accordance with these details when the girder slope exceeds 5 percent or if otherwise required in the plans. Provide for all girders in the span.

On the shop drawings, dimension sole plates to the nearest 1/16" based on required thickness at centerline of bearing and slope of girder. Thickness tolerance variation from the approved shop drawings is 1/16" +/-, except variation from a plane parallel to the theoretical top surface can not exceed 1/16" total. Bearing surface tolerances listed in Item 424 apply to embedded and beveled plates.

Steel plate must conform to ASTM A36, A572 Gr 50, or A709 Gr 36 or Gr 50. Hot dip galvanize both the embedded plate and beveled sole plate after fabrication. Seal weld caps to embedded plate before galvanizing.

When determining if relocation of screw holes and studs are necessary for skewed girder ends, minimum clearance from screw or stud centerline to plate edge is 1.25".

Tap threads in the embedded plate only. Drill and tap prior to galvanizing.

3/4" Dia screws must be electroplated, socket flat head countersunk cap screws conforming to ASTM F835. Electroplating must conform to ASTM B633, SC 2, Type I. Provide screws long enough to maintain a 3/4" minimum embedment into the embedded plate and galvanized cap. Provide galvanized steel caps (16 ga Min) with a nominal 1" inside diameter and deep enough to accommodate the screws, but not less than 1/2" deep or deeper than 1".

Install beveled sole plates prior to shipping girders. Installed screw heads must not protrude below the bottom of the beveled plate.

HL93 LOADING SHEET 3 OF 3



**ELASTOMERIC BEARING AND GIRDER END DETAILS**  
**PRESTR CONCRETE I-GIRDERS**

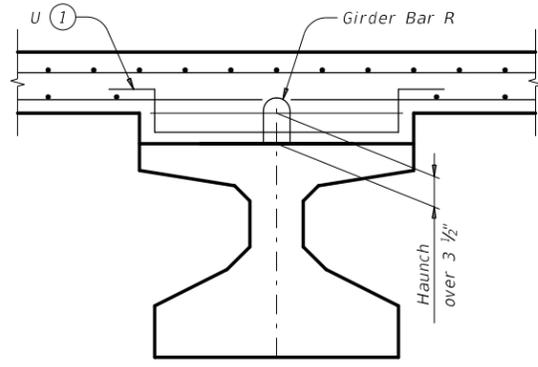
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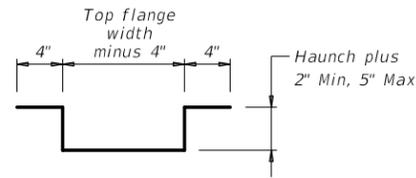
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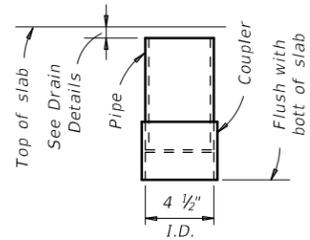
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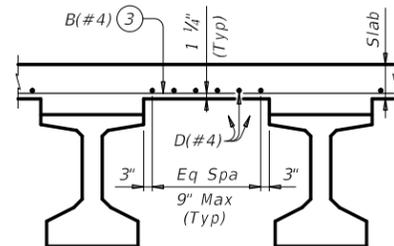
**HAUNCH REINFORCING DETAIL**



**BARS U (#4)**

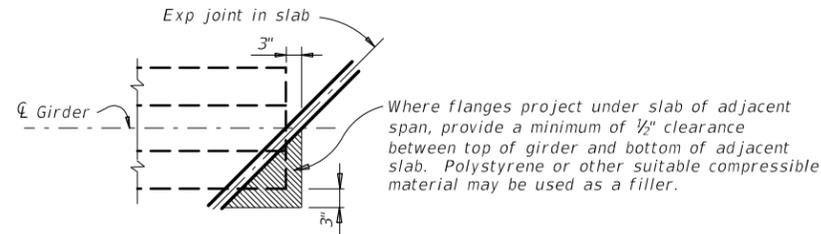


**C-I-P DRAIN DETAIL**

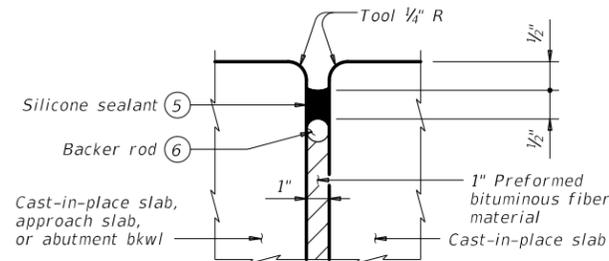


**TYPICAL PART TRANSVERSE SLAB SECTION WITHOUT PCP**

Top reinforcing steel not shown for clarity.

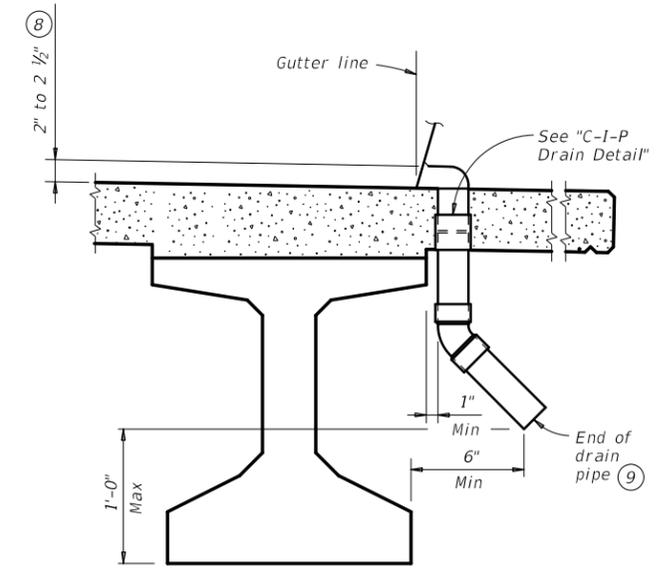


**TREATMENT AT GIRDER END FOR SKEWED SPANS**



**TYPE A JOINT DETAIL**

- ① Space Bars U with girder Bars R in all areas where measured haunch exceeds 3 1/2".
- ② Roughen outside of PVC with coarse rasp or equal to ensure bond with cast-in-place concrete.
- ③ Bars B(#4) spaced at 9" Max with 2" end cover. Overhang option, Contractor's may end alternating bars B(#4) at centerline outside girder.
- ④ Provide Grade 60 reinforcing steel. Provide bar laps, where required, as follows:  
Uncoated ~ #4 = 1'-7"  
Epoxy coated ~ #4 = 2'-5"
- ⑤ Class 7 silicone sealant that conforms to DMS-6310. Install when ambient temperature is between 55°F and 85°F and rising. Engineer to determine allowable hours for sealant application.
- ⑥ 1 1/4" backer rod must be compatible with joint sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.
- ⑦ The maximum distance between Type A expansion joints is 100'. See Bridge Layout for location of joints.
- ⑧ Drain entrance formed in rail or sidewalk.
- ⑨ Water may not be discharged onto girders.
- ⑩ All drain pipe and fittings to be 4" diameter (Sch 40) PVC. See Item 481 "Pipe for Drains" for pipe, connections and solvent welding. Bend reinforcing steel to clear PVC 1". Drain length and location is as directed by the Engineer. Drains are not permitted over roadways or railroads, or within 10'-0" of bent caps. Degrease outside of exposed PVC, apply acrylic water base primer, then coat with same surface finishing material as used for outside girder face. Variations of the above designs, as required for the type of rail used and its location on the structure, may be installed with the approval and direction of the Engineer.



**DRAIN DETAIL**

**GENERAL NOTES:**  
Designed according to AASHTO LRFD Bridge Design Specifications.  
Payment for Type A joint will be as per Item 454, "Bridge Expansion Joints."  
All other items (reinforcing steel, drains, etc.) shown on this sheet are subsidiary to other bid items.

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

**DECK FORMWORK NOTES:**  
Overhang bracket hangers are limited to a safe working load of 3,600 lbs, applied to and along the axis of a coil rod at 45 degrees from vertical, regardless of higher loads permitted by hanger manufacturers. Do not place a hanger less than 12" from girder end. Space hangers accordingly.

SHEET 1 OF 2



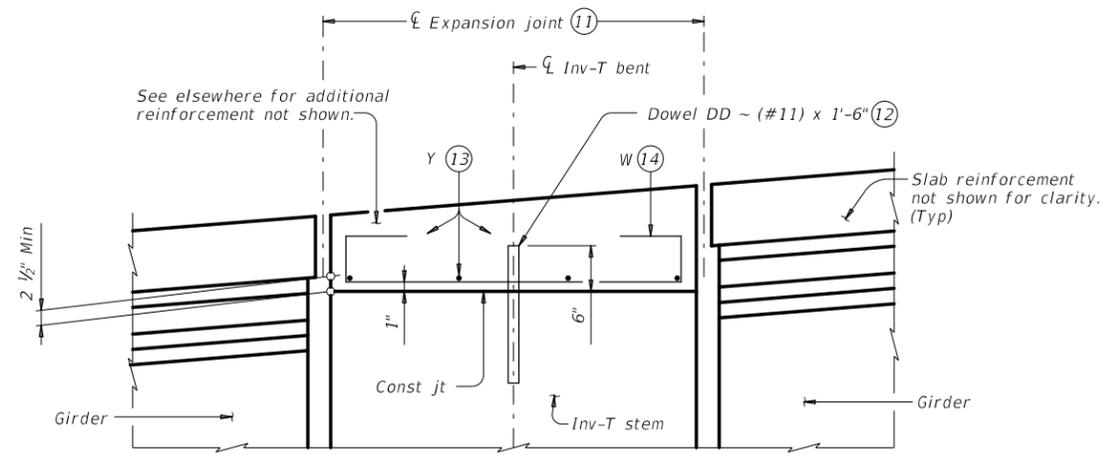
**MISCELLANEOUS SLAB DETAILS PRESTR CONCRETE I-GIRDERS**

**IGMS**

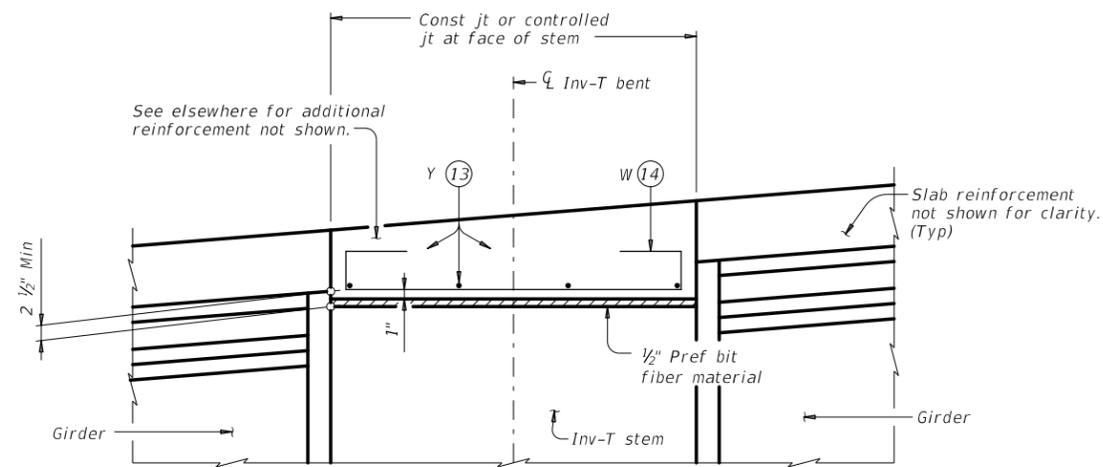
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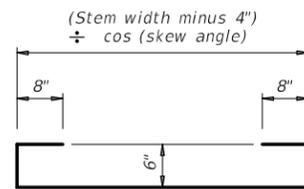
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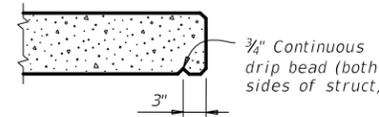
**SHOWING EXPANSION JOINTS**



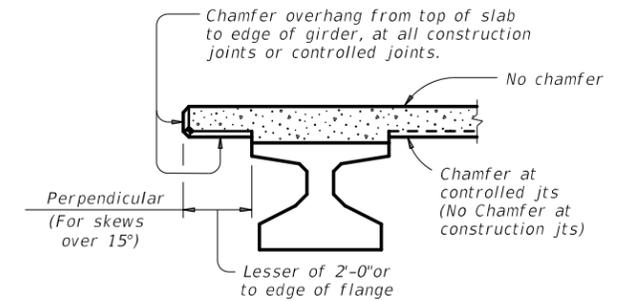
**SHOWING CONST JTS OR CONTROLLED JTS  
 REINFORCEMENT OVER INV-T BENTS**



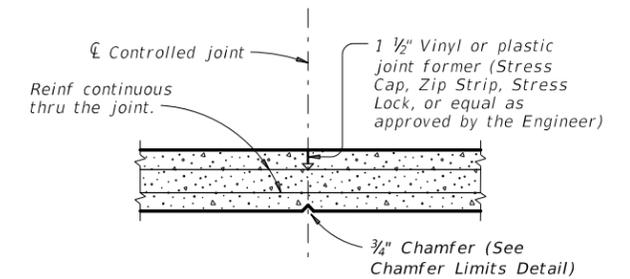
**BARS W (#4)**



**DRIP BEAD DETAIL**



**CHAMFER LIMITS DETAIL (15)**



**CONTROLLED JOINT DETAIL**

(Saw-cutting is not allowed)

- (11) See Layout for joint type.
- (12) Dowels DD (#11) spaced at 5 Ft Max. See Inv-T bents for quantity and location.
- (13) Space Bars Y (#4) at 12" Max. Use 2" end cover. Number of Bars Y must satisfy spacing limit. Place parallel to bent.
- (14) Space Bars W at 12" Max (3" from end of cap). Tilt if necessary to maintain cover requirements. Place parallel to longitudinal slab reinforcement.
- (15) See Span details for type of joint and joint locations.

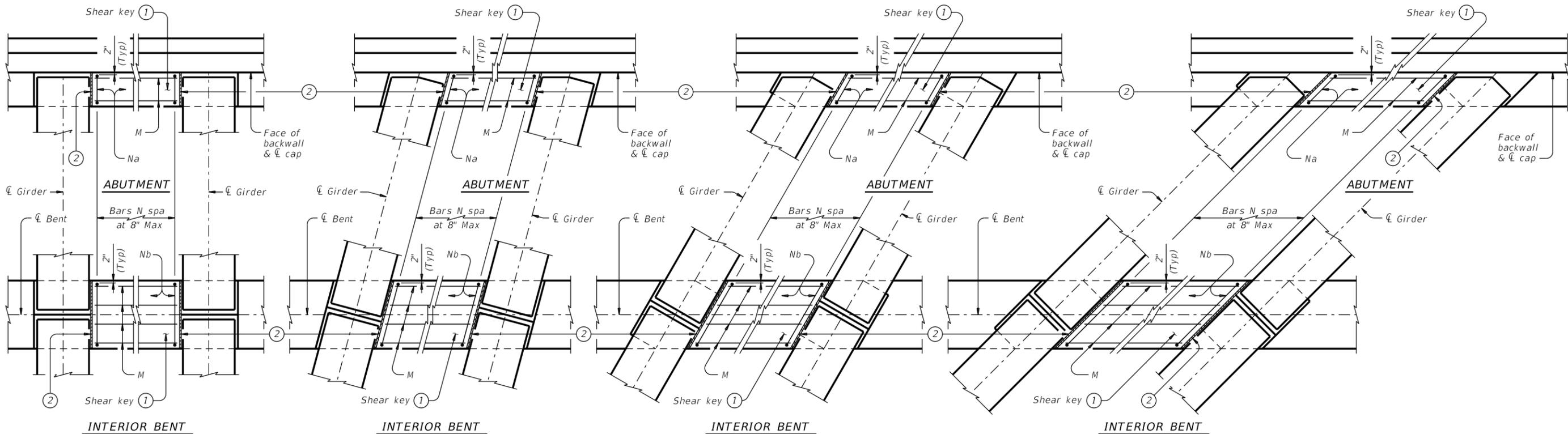
**MISCELLANEOUS  
 SLAB DETAILS  
 PRESTR CONCRETE I-GIRDERS**

**IGMS**

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**PARTIAL PLANS WITH NO SKEW**

Showing shear keys on 3'-6" wide caps. 4'-0" caps similar.

**PARTIAL PLANS WITH 15° SKEW**

Showing shear keys on 3'-6" wide caps. 4'-0" caps similar.

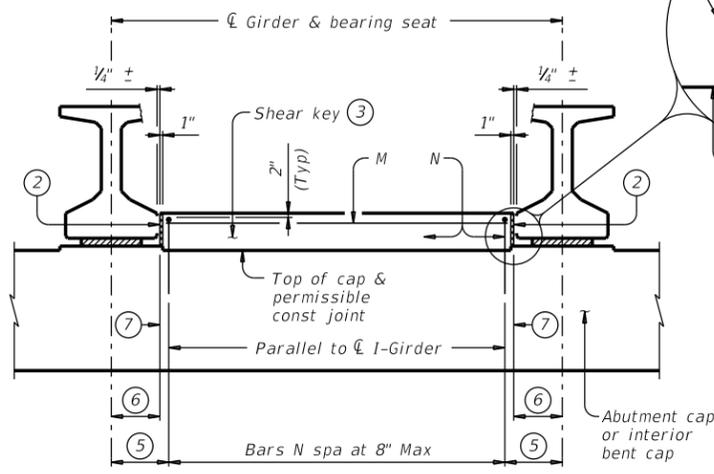
**PARTIAL PLANS WITH 30° SKEW**

Showing shear keys on 3'-6" wide caps. 4'-0" caps similar.

**PARTIAL PLANS WITH 45° SKEW**

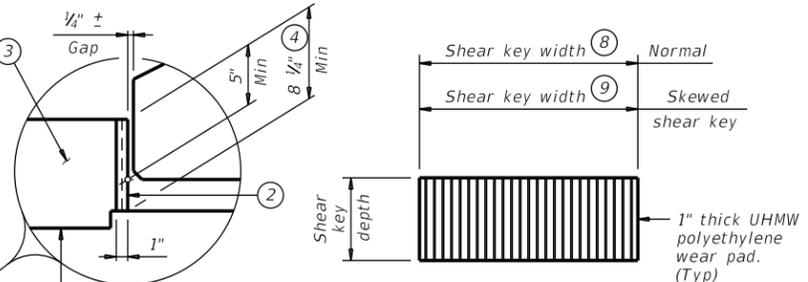
Showing shear keys on 3'-6" wide caps. 4'-0" caps similar.

- ① Place shear keys on the upstream side of structure between outside girder and next adjacent girder, unless shown otherwise on plans.
- ② UHMW polyethylene wear pad. (Typ)
- ③ Leave a 1/4" gap plus or minus between girder and face of wear pad. Cast wear pad with shear key, smooth side facing girder. Care must be taken to keep concrete from flowing under girder. Slope top of shear keys in accordance with Item 420.4.9, "Treatment and Finishing of Horizontal Surfaces."
- ④ Measure at higher bearing seat elevation forward or back. Dimension based on typical bearing pad and bearing seat. Increase as necessary to maintain 5" overlap.
- ⑤ With No Skew = 1'-8 1/4", measured along cap. With Skew = 1'-8 1/4" \* Cos Skew, measured along cap.
- ⑥ With No Skew = 1'-4 1/4", measured along cap. With Skew = 1'-4 1/4" \* Cos Skew, measured along cap.
- ⑦ Face of UHMW polyethylene wear pad. Smooth side of pad facing girder.
- ⑧ Abutments = 1/2 Cap width. Interior bents = Cap width.
- ⑨ Abutments = 1/2 Cap width \* Cos Skew. Interior bents = Cap width \* Cos Skew.

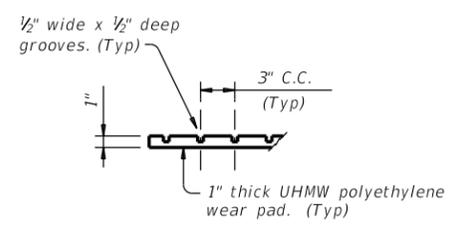


**PARTIAL ELEVATION OF ABUTMENT OR INTERIOR BENT CAP**

Showing shear key with girder Type Tx46. Other I-Girder types similar.

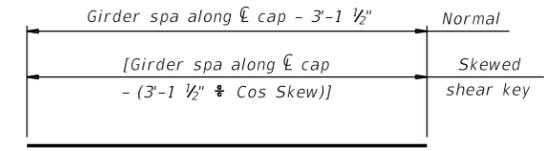


**ELEVATION**

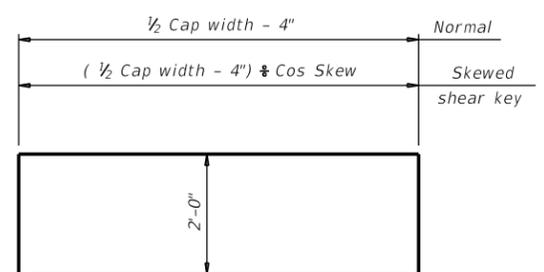


**PART SECTION**

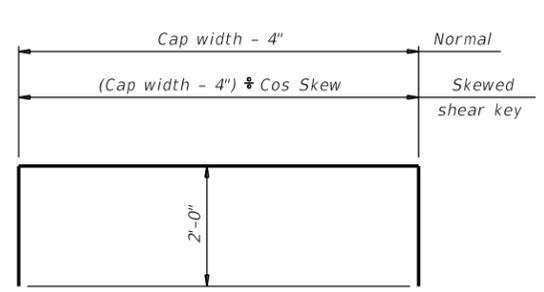
**ULTRA HIGH MOLECULAR WEIGHT (UHMW) POLYETHYLENE WEAR PAD DETAILS**



**BARS M (#5)**



**BARS Na (#5) (For abutments)**



**BARS Nb (#5) (For interior bents)**

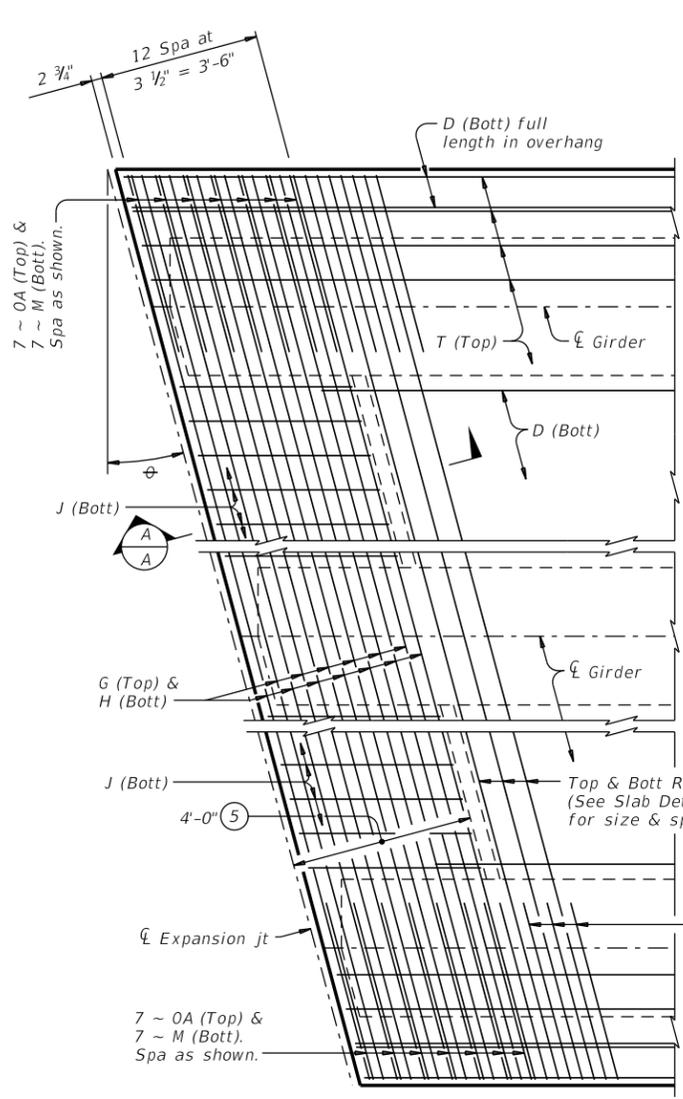
**CONSTRUCTION NOTES:**  
 Provide Class "C" concrete (f'c = 3,600 psi). Provide Class "C" (HPC) if shown elsewhere on the plans.  
 Provide Grade 60 reinforcing steel.  
 Provide epoxy coated reinforcing steel for shear key if abutment or interior bent reinforcing steel is epoxy coated.  
 Provide Ultra High Molecular Weight (UHMW) polyethylene wear pads in accordance with ASTM D6712.

**GENERAL NOTES:**  
 Designed according to AASHTO LRFD Bridge Design Specifications. Details showing skew are drawn showing right forward skew. See Bridge Layout for actual skew direction.  
 These details are limited to bridges skewed 45 degrees and less. This standard is only applicable for I-Girders.  
 Modify details for bearing conditions, and girder spacing not shown on this standard. Details do not account for sole plate or pedestal bearing seat.  
 Include shear key concrete in abutment or bent concrete for payment.  
 UHMW polyethylene wear pads are subsidiary to Class "C" concrete.  
 Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.

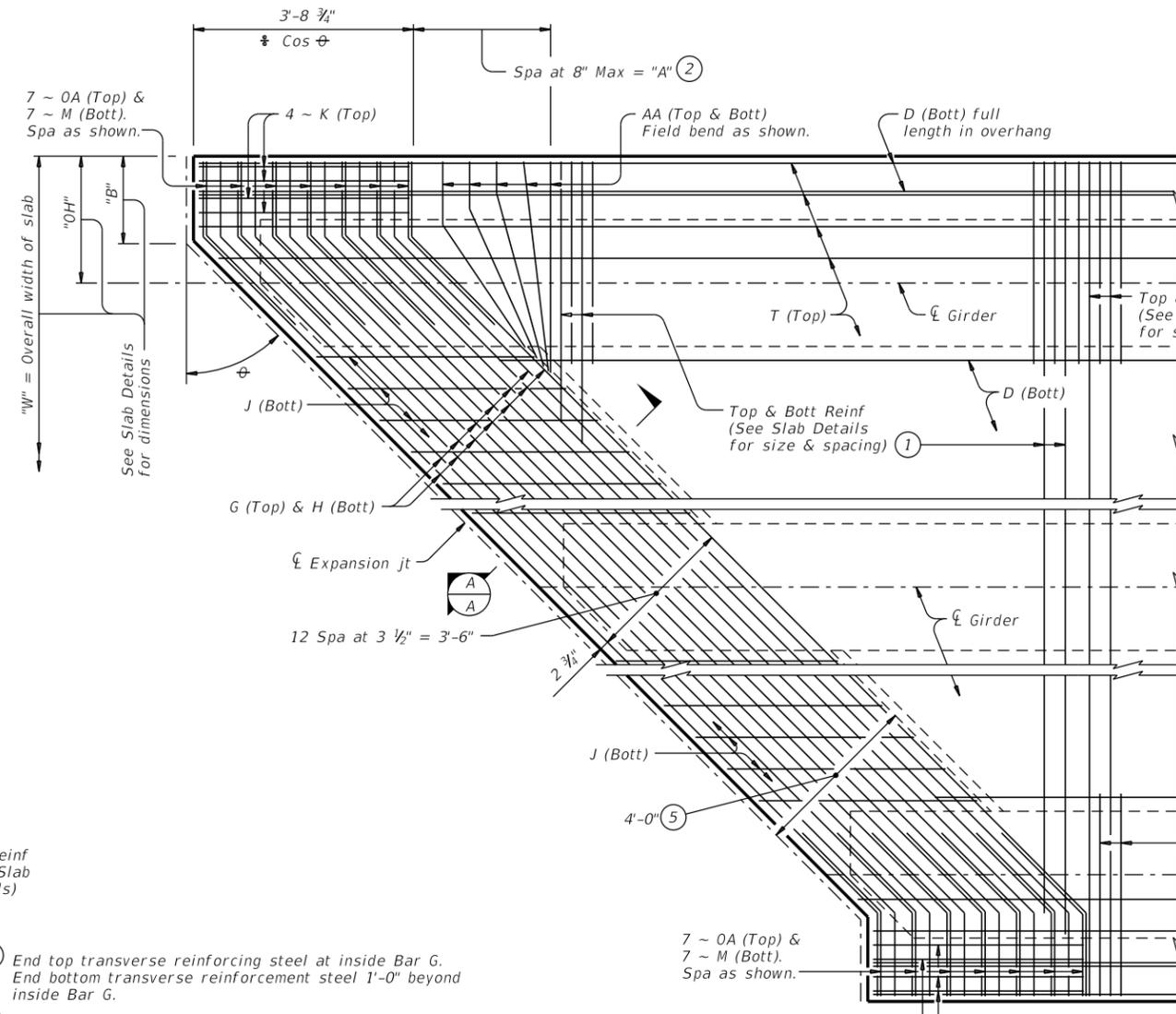
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<b>SHEAR KEY DETAILS</b> <b>PRESTR CONCRETE I-GIRDERS</b>			
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REVISIONS			HIGHWAY: FM 419
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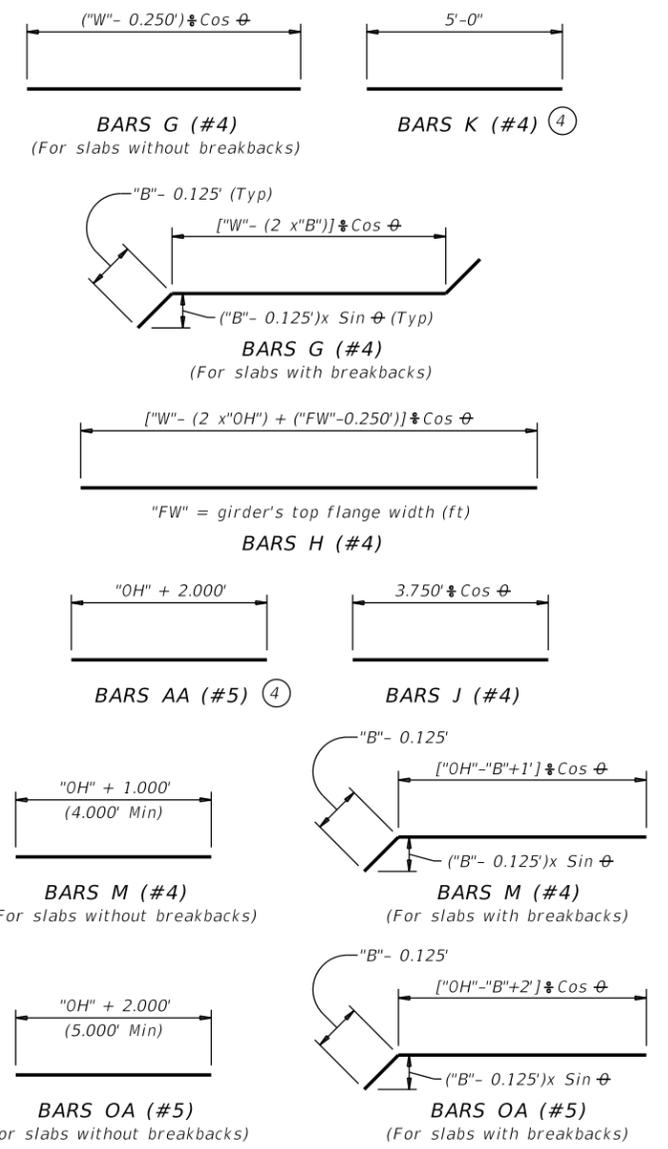


**PARTIAL PLAN FOR SLABS WITHOUT BREAKBACK**



**PARTIAL PLAN FOR SLABS WITH BREAKBACK**

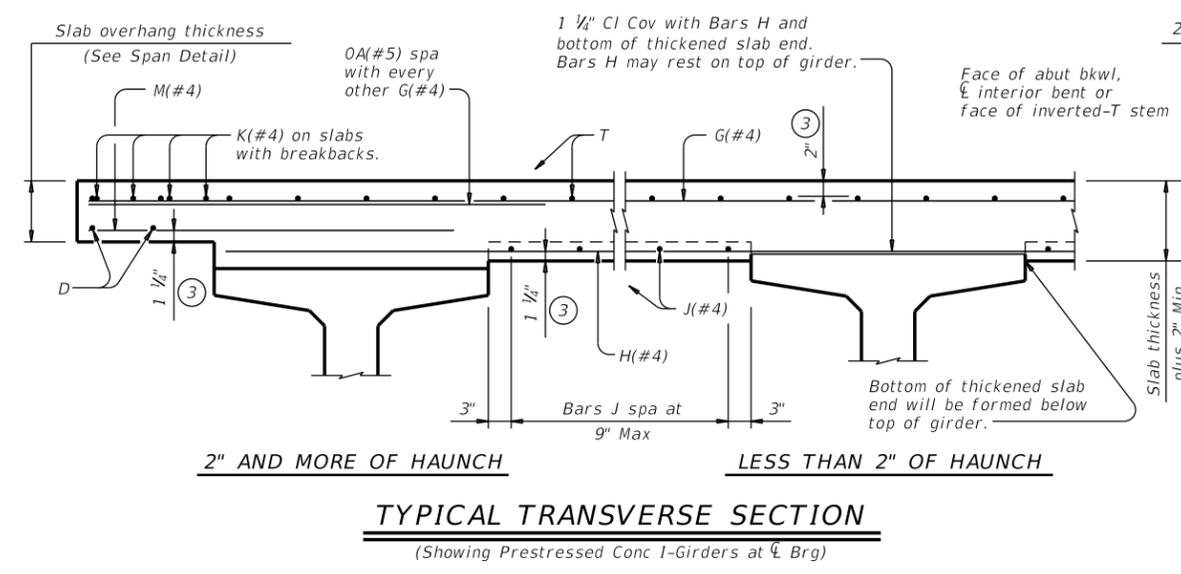
- ① End top transverse reinforcing steel at inside Bar G. End bottom transverse reinforcement steel 1'-0" beyond inside Bar G.
- ② "A" = ("OH" + 2.333 "B") x Tan ϕ
- ③ Provide clear cover as indicated unless otherwise shown on Span Details.
- ④ Only required on slabs with breakbacks.
- ⑤ Thickened slab end dimensioned perpendicular to face of bkwl, centerline interior bent or face of inverted-T stem.



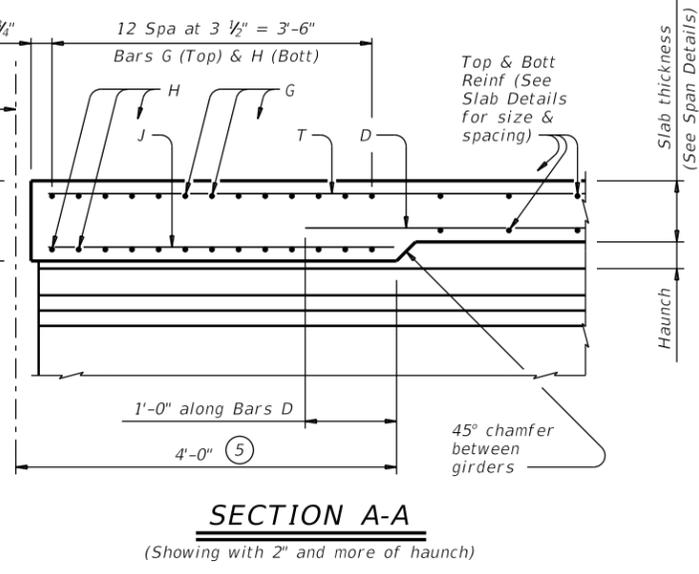
**GENERAL NOTES:**  
 Designed according to AASHTO LRFD Bridge Design Specifications. These details are restricted to Prestressed Concrete I-Girder Spans. These details are to be used in conjunction with the Span Details and PCP standard (if prestressed concrete panels are used). When Option 2 from PCP standard is used, provide Bars AA, G, K and OA in the slab.

**MATERIAL NOTES:**  
 Provide Grade 60 reinforcing steel. If slab reinforcing steel is shown on the Slab Details to be epoxy coated, then Bars AA, G, K, H, J, M and OA must be epoxy coated. Provide bar laps, where required, as follows:  
 Uncoated ~ #4 = 1'-7"  
 Epoxy Coated ~ #4 = 2'-5"

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



**TYPICAL TRANSVERSE SECTION**  
 (Showing Prestressed Conc I-Girders at 1/2 Brg)

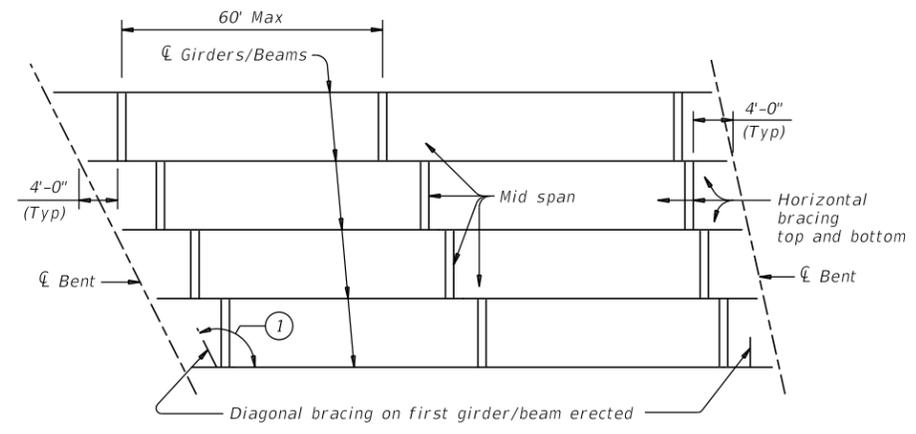


**SECTION A-A**  
 (Showing with 2" and more of haunch)

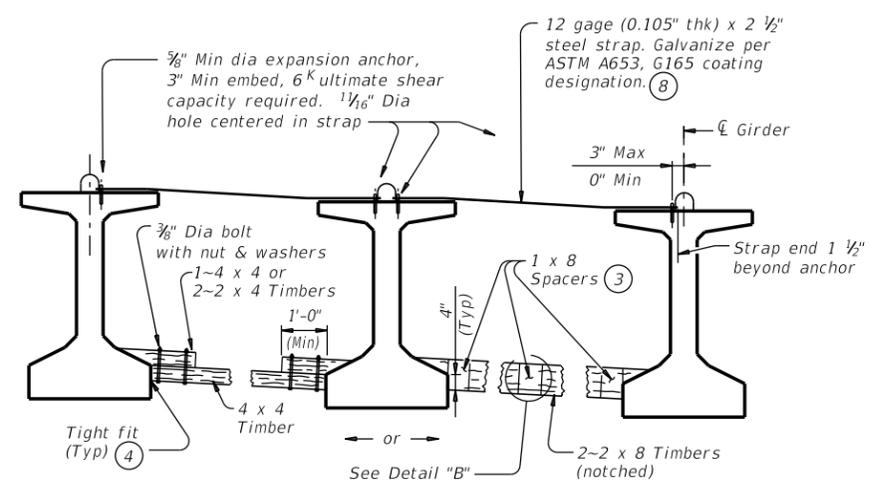
HL93 LOADING

Texas Department of Transportation		Bridge Division Standard	
<b>THICKENED SLAB END DETAILS</b>			
<b>PRESTRESSED CONCRETE I-GIRDER SPANS</b>			
<b>IGTS</b>			
FILE: igssts1-17.dgn	DN: TxDOT	CK: TxDOT	DW: JTR
©TxDOT August 2017	CONT SECT	JOB	HIGHWAY
REVISIONS	0983 02	022	FM 419
DIST	COUNTY	SHEET NO.	
ABL	FISHER	94	

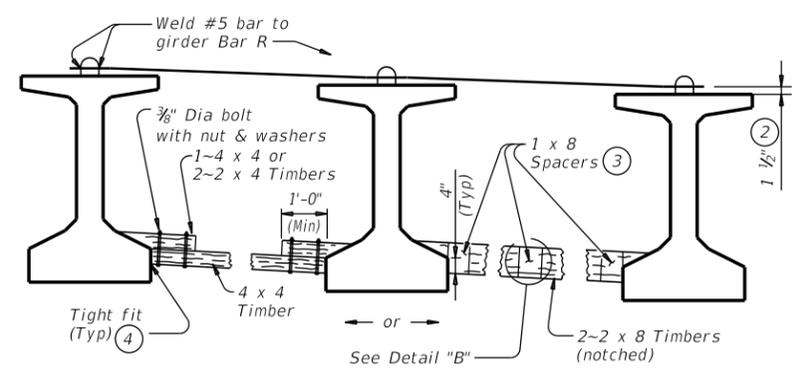
DATE: 3/28/2021  
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**ERECTOR BRACING**

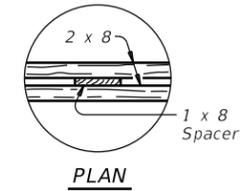


**FOR ERECTOR BRACING, OPTION 1**  
 (This option is not allowed when slab is formed with PMDF or plywood.)

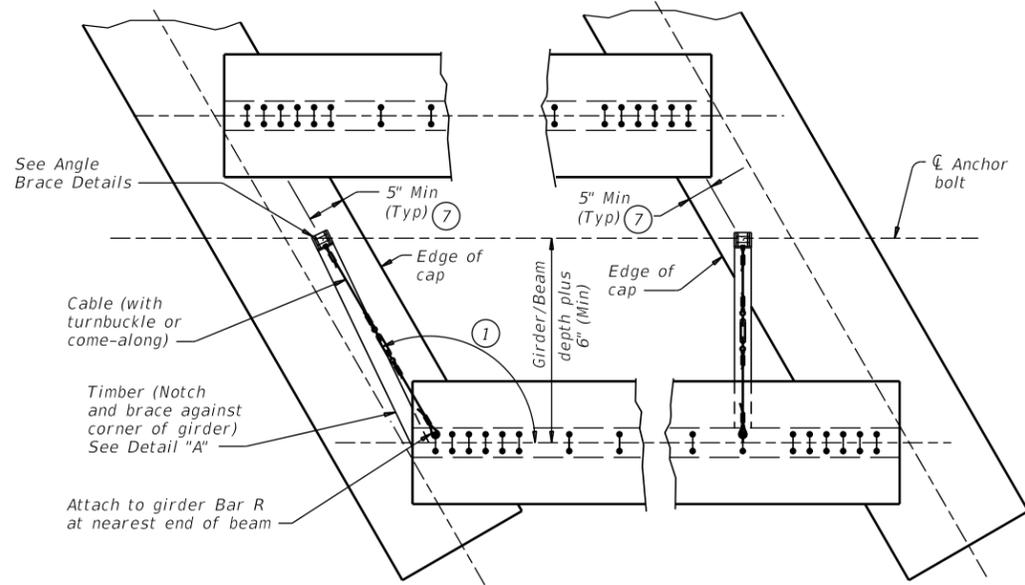


**FOR ERECTOR BRACING, OPTION 2**

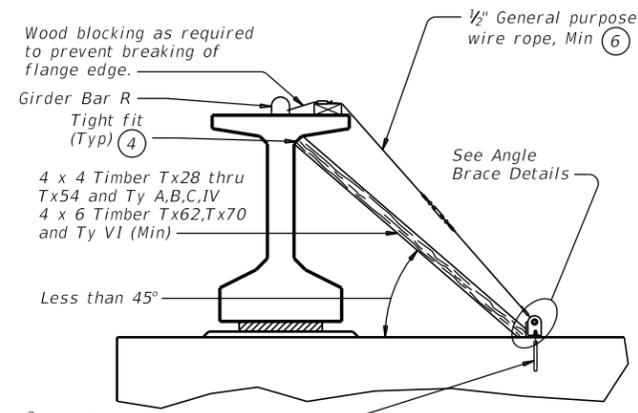
**HORIZONTAL BRACING DETAILS**



**DETAIL "B"**



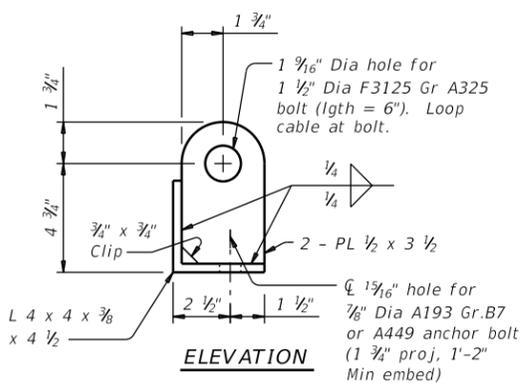
**PLAN**



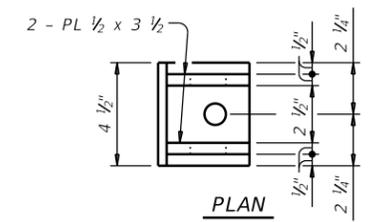
**END VIEW**

**DIAGONAL BRACING DETAILS**

(To be used on both ends of the first girder/beam erected in the span in each phase.)



**ELEVATION**



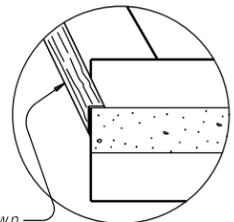
**PLAN**

**ANGLE BRACE DETAILS**

**HAULING & ERECTION:**  
 The Contractor's attention is directed to the possible lateral instability of prestressed concrete girders and beams over 130' long, especially during hauling and erection. The use of the following methods to improve stability is encouraged: Locate lifting devices at the maximum practical distance from girder ends; use external lateral stiffening devices during hauling and erection; lift with vertical lines using two machines; and take care in handling to minimize inertial and impact forces.

**ERECTOR BRACING:**  
 Erection bracing details shown are considered the minimum for fulfilling the bracing requirements of Item 425. Required erection bracing must be placed immediately after erection of each girder and remain in place until additional bracing as required for slab placement is in place. This standard is needed in all cases to meet requirements for Slab Placement Bracing.

**PHASED CONSTRUCTION:**  
 Place erection and slab placement bracing for all girders in a phase as shown in these details. For phases after first, also place erection and slab placement bracing between outer girder of completed phase and adjacent girder of current phase. When the phase construction joint is between girders, top bracing can be omitted.



**DETAIL "A"**

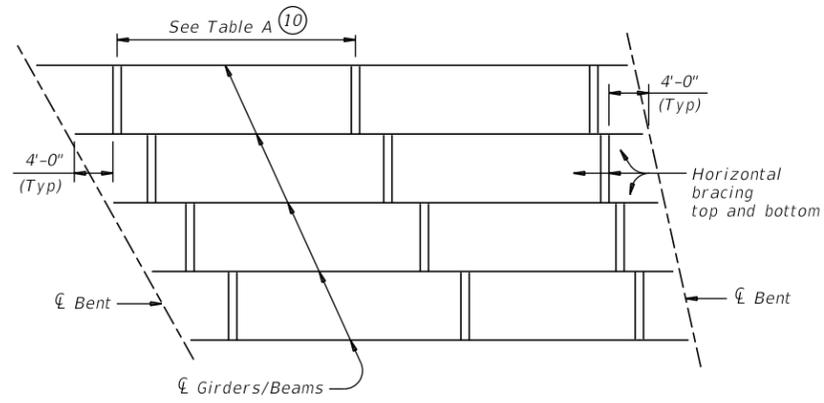
- 1 If angle shown exceeds 120 degrees, move diagonal brace to other side of girder/beam and place square to girder/beam. This may prevent exterior girder from being erected first.
- 2 Place and weld #5 bars as shown during erection. If forming deck with prestressed panels, bars can be temporarily removed, one at a time, during panel erection. Re-install bar prior to additional panel erection. Bars can rest on panels and be bent down and welded to girder Bars R (See Sheet 2 of 2).
- 3 Clear distance between spacers must not exceed 3'. Nail together with 16d nails.
- 4 Use wedges as necessary to obtain tight fit. Nail wedges to timbers.
- 5 Pressure treated landscape timbers can not be used.
- 6 All hardware used with cable must be able to develop a minimum 25 kips breaking strength. Use thimbles at all loops in cable. Install cable clamps with saddles bearing against the live end and U-bolts bearing against the dead end.
- 7 It is acceptable to tie anchor bolts to cap reinforcement.
- 8 Prior to installing, field bend strap to lay flush on both girders' top flange and slope between flange tips.
- 9 Anchor bolt may be drilled and epoxied in place. Provide 25k minimum pullout. Core drill hole.

SHEET 1 OF 2

		<b>Bridge Division Standard</b>	
<b>MINIMUM ERECTOR AND BRACING REQUIREMENTS PRESTRESSED CONCRETE I-GIRDERS AND I-BEAMS</b>			
<b>MEBR(C)</b>			
FILE: mebcsts1-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
0983	02	022	FM 419
DIST: ABL	COUNTY: FISHER	SHEET NO. 95	

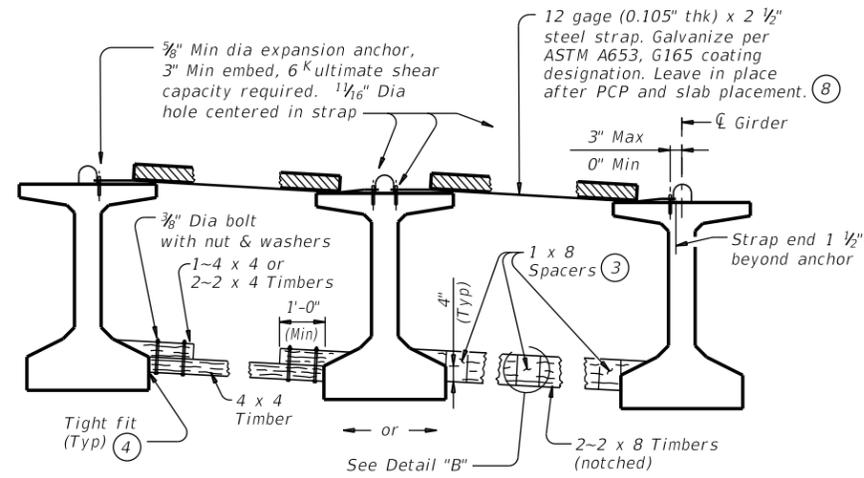
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DATE: 3/28/2021  
 FILE: V:\2142\oct1ve\214220136\06-CAD\6.1-Sheets\standard\06\_BRC\mebcsts1-17.dgn



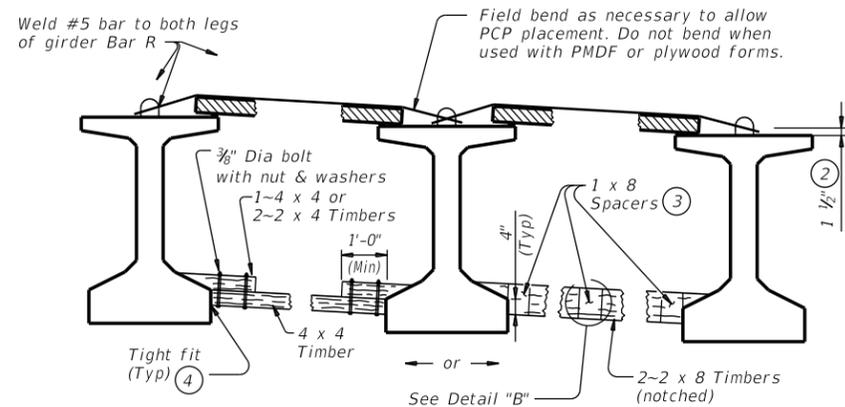
**SLAB PLACEMENT BRACING**

TABLE A				
Girder or Beam Type	OPTION 1-RIGID BRACING (STEEL STRAP)		OPTION 2-FLEXIBLE BRACING (NO. 5 OVER PCP)	
	Maximum Bracing Spacing		Maximum Bracing Spacing	
	Slab Overhang less than 4'-0" (11)	Slab Overhang 4'-0" and greater (11)	Slab Overhang less than 4'-0" (11)	Slab Overhang 4'-0" and greater (11)
Tx28	1/4 points	1/4 points	Tx28	1/4 points
Tx34	1/4 points	1/4 points	Tx34	1/4 points
Tx40	1/4 points	1/8 points	Tx40	1/4 points
Tx46	1/4 points	1/8 points	Tx46	1/4 points
Tx54	1/4 points	1/8 points	Tx54	1/8 points
Tx62	1/4 points	1/8 points	Tx62	1/8 points
Tx70	1/4 points	1/8 points	Tx70	1/8 points
A	1/8 points	1/8 points	A	2.0 ft
B	1/8 points	1/8 points	B	3.0 ft
C	1/8 points	1/8 points	C	4.5 ft
IV	1/4 points	1/8 points	IV	1/4 points
VI	1/4 points	1/8 points	VI	1/4 points



**FOR SLAB PLACEMENT BRACING, OPTION 1 - RIGID**

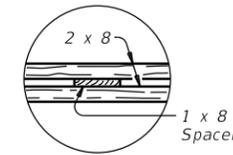
(Showing slab formed with PCP. This option is not allowed when slab is formed with PMDF or plywood.)



**FOR SLAB PLACEMENT BRACING, OPTION 2 - FLEXIBLE**

(Showing slab formed with PCP.)

**HORIZONTAL BRACING DETAILS (5)**



**PLAN  
 DETAIL "B"**

- (2) Place and weld #5 bars as shown during erection. If forming deck with prestressed panels, bars can be temporarily removed, one at a time, during panel erection. Re-install bar prior to additional panel erection. Bars can rest on panels and be bent down and welded to girder Bars R.
- (3) Clear distance between spacers must not exceed 3'. Nail together with 16d nails.
- (4) Use wedges as necessary to obtain tight fit. Nail wedges to timbers.
- (5) Pressure treated landscape timbers can not be used.
- (8) Prior to installing, field bend strap to lay flush on both girders' top flange and slope between flange tips.
- (10) Bracing spacing (1/4 and 1/8 points) measured between first and last typical brace location.
- (11) Measure slab overhang from centerline of girder or beam. When overhang varies in span, determine bracing spacing based on largest overhang.

**SLAB PLACEMENT BRACING:**

The details for slab placement bracing are considered minimum for fulfilling the requirements of Specification Items 422 and 425. Required slab placement bracing must remain in place until slab concrete has attained a compressive strength of 3000 psi.

**GENERAL NOTES:**

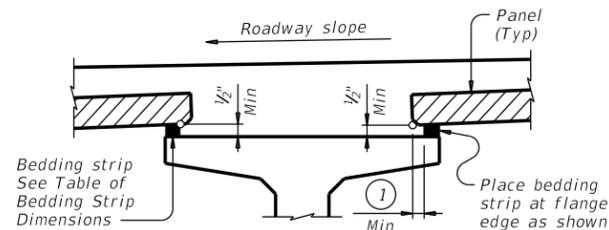
Bracing details for spans longer than 150' are not provided. The Contractor must submit proposed bracing details for such conditions to the Engineer for approval prior to erection. Systems equal to or better than those shown may be used provided details of such systems are submitted to and approved by the Engineer prior to erection. Use of these systems or details does not relieve the Contractor of the responsibility for the adequacy of the bracing and the safety of the structure. Removal of bracing for short periods of time to align girders and beams is permissible. All turn-buckles, come-alongs, anchors and other connections must be capable of developing the full strength of the cable shown. Furnish anchor bolts and nuts in accordance with Item 449, "Anchor Bolts".

SHEET 2 OF 2

		<b>Bridge Division Standard</b>	
<b>MINIMUM ERECTION AND BRACING REQUIREMENTS          PRESTRESSED CONCRETE I-GIRDERS AND I-BEAMS</b>			
<b>MEBR(C)</b>			
FILE: mebcsts1-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
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ABL	FISHER		96

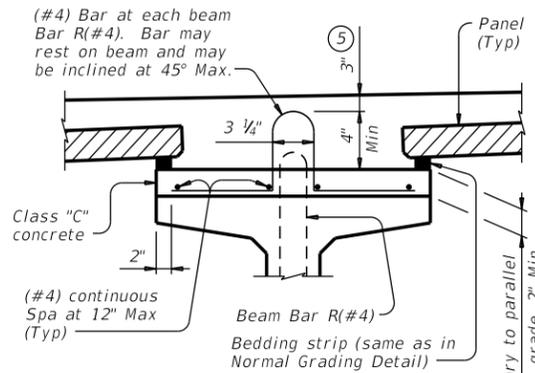
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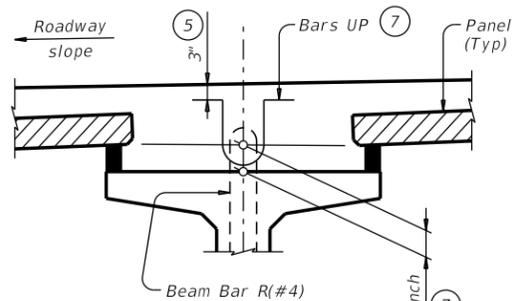
**NORMAL GRADING DETAIL** ③

Showing prestressed concrete I-girders.  
 (Other beam types similar)



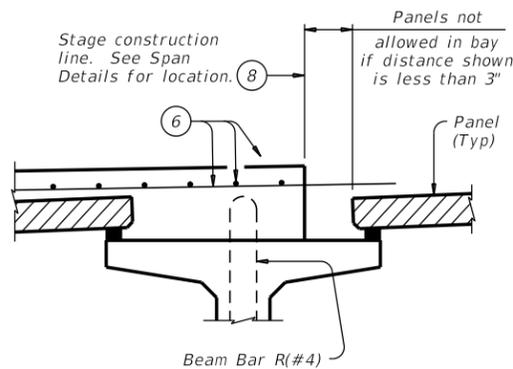
**SPECIAL GRADING DETAIL FOR CONCRETE BEAMS**

Showing prestressed concrete I-girders.  
 (Other beam types similar)



**HAUNCH REINFORCING DETAIL**

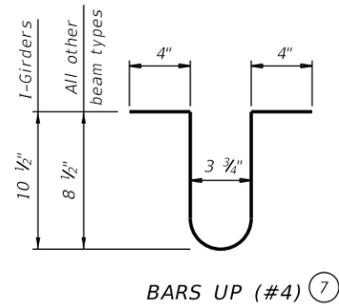
Showing prestressed concrete I-girders.  
 (Other beam types similar)



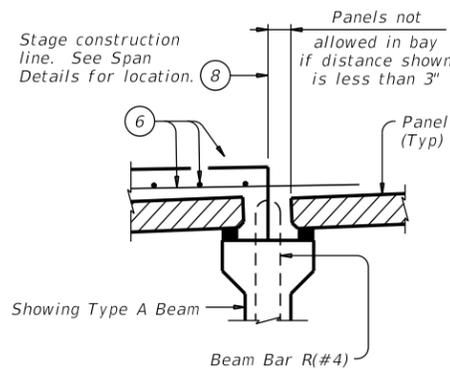
**PRESTR CONC I-GIRDERS**

**TABLE OF BEDDING STRIP DIMENSIONS**

WIDTH	HEIGHT ④	
	Min	Max
1" (Min)	1/2"	2"
1 1/4"	1/2"	2 1/2"
1 1/2"	1/2"	3"
1 3/4"	1/2"	3 1/2"
2"	1/2"	4"
2 1/4"	1/2"	4 1/2" ②
2 1/2"	1/2"	5" ②
2 3/4"	1/2"	5 1/2" ②
3" (Max)	1/2"	6" ②



**BARS UP (#4) ⑦**



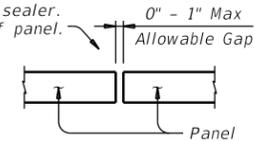
**PRESTR CONC I-BEAMS**

**STAGE CONSTRUCTION LIMITATIONS**

(Other beam types similar)

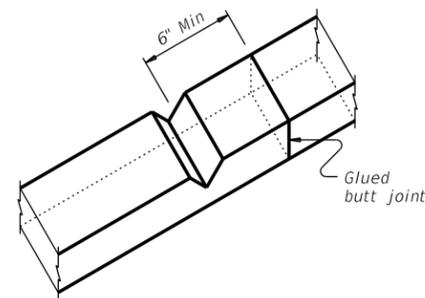
- ① 2" Min for I-girders, 1 1/2" Min for all other beam types.
- ② Allowed for I-girders, not allowed on other beam types.
- ③ To reduce the quantity of cast-in-place concrete, bedding strip thickness may be increased in 1/4" increments. Bedding strips must be comprised of one layer. Bond bedding strips to the beams with an adhesive compatible with bedding strips. Bedding strips over 2.5" high may need to be bonded to panels. The same thickness strip must be used under any one panel edge and the maximum change in thickness between adjacent panels is 1/4". Alternatively, bedding strips may be cut to grade. Panels may be supported by an alternate method, using a commercial product, if approved by the Engineer of Bridge Design, Bridge Division. If bedding strips exceed 6" high for I-Girders, 4" high for all other beam types, use Special Grading Detail for Concrete Beams or submit an alternate method to the Bridge Division for approval.
- ④ Height must not exceed twice the width.
- ⑤ Provide clear cover as indicated unless otherwise shown on Span Details.
- ⑥ See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.
- ⑦ Space Bars UP(#4) with Beam Bars R(#4) in all areas where measured haunch exceeds 3 1/2" with I-girders, and 3" for all other beam types. Epoxy coating for Bars UP is not required.
- ⑧ Do not locate construction joints on top of a panel.
- ⑨ Butt adjacent bedding strips together with adhesive. Cut v-notches, approx 1/4" deep, in the top of the bedding strips at 8" o.c..

Seal joint between panels when gap exceeds 1/4" with polyurethane sealant or expanding foam sealer. Make seal flush with top of panel.



**PANEL JOINTS**

(Panel reinforcing not shown for clarity. The gap cannot be considered as a panel fabrication tolerance. Adjust panel placement to minimize joint openings.)



**BEDDING STRIP DETAIL** ⑨

**CONSTRUCTION NOTES:**  
 Erected panels must bear uniformly on bedding strips of extruded polystyrene placed along top flange edges. Placing panels to minimize joint openings is recommended. If additional blocking is needed, special grading details for supporting the panels and extra reinforcing between beam and slab will be considered subsidiary to deck construction. Bars U, shown on PCP-FAB, may be bent over or cut off if necessary. Care must be taken to ensure proper cleaning of construction debris and consolidation of concrete material under the edges of the panels. Bedding strips must be placed at beam flange edges so that adequate space is provided for the mortar to flow a minimum of 1 1/2" under the panels as the slab concrete is placed. To allow the proper amount of mortar to flow between beam and panel, the minimum vertical opening must be at least 1/2". Roadway cross-slope reduces the opening available for entry of the mortar. Bedding strips varying in thickness across the beam are therefore required. For clear span between U-beams less than or equal to 18", see Permissible Slab Forming Detail on Miscellaneous Slab Detail sheets, UBMS.

**MATERIAL NOTES:**  
 Provide Grade 60 reinforcing steel in the cast-in-place slab. See Table of Reinforcing Steel for size and spacing of reinforcement. If the top and bottom layer of reinforcing steel is shown on the Span Details to be epoxy coated, then the D, E, P, & Z bars must be epoxy coated. Provide bar Laps, where required, as follows:  
 Uncoated ~ #4 = 1'-7"  
 Epoxy Coated ~ #4 = 2'-5"

**GENERAL NOTES:**  
 Designed according to AASHTO LRFD Bridge Design Specifications. Panel placement may follow either Option 1 or Option 2 except Option 1 must be used if the skew exceeds 45 degrees. Use of Prestressed Concrete Panels is not permitted for horizontally curved steel plate or tub girders. See Span Details for other possible restrictions on their use. These details are to be used in conjunction with the Span Details, PCP-FAB and other applicable standard drawings. When panel support (bedding strips) deviates from what is shown herein, provide details signed and sealed by a professional Engineer. Any additional reinforcing or concrete required on this standard is considered subsidiary to the bid item "Reinforced Concrete Slab".

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

HL93 LOADING SHEET 1 OF 4

Texas Department of Transportation Bridge Division Standard

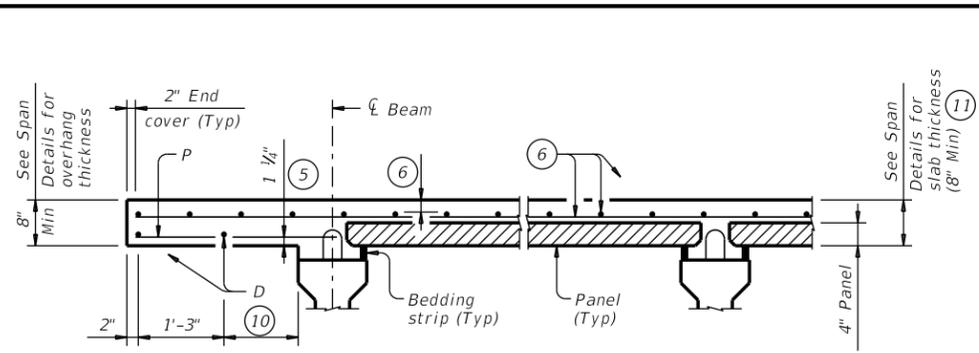
**PRESTRESSED CONCRETE PANELS DECK DETAILS**

PCP

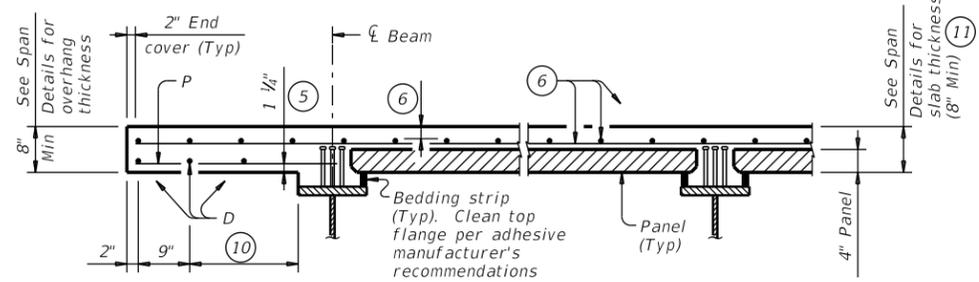
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	ABL	FISHER	97	

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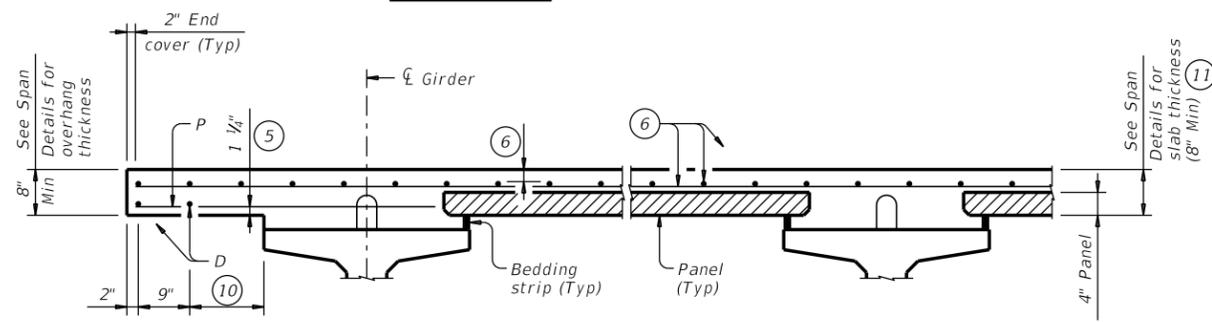
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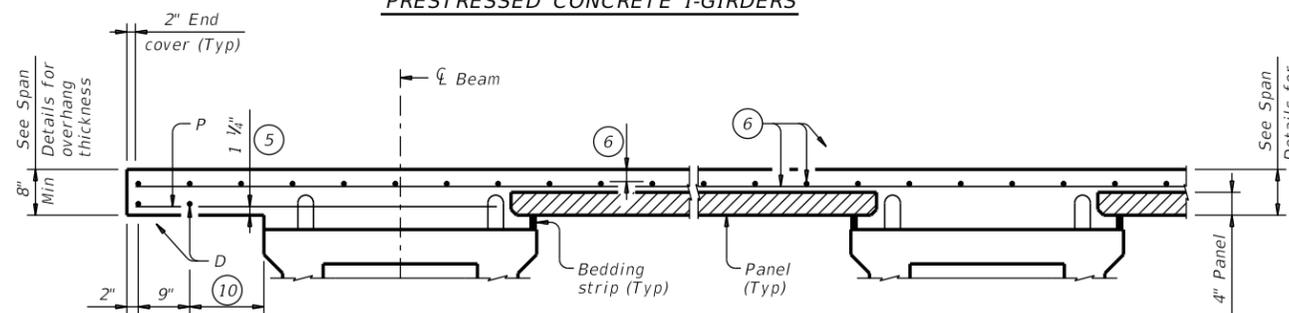
**PRESTRESSED CONCRETE I-BEAMS**



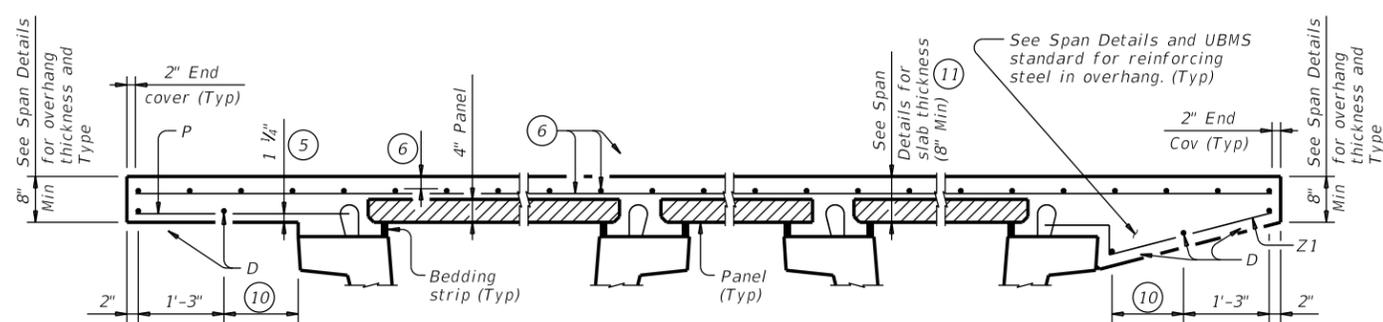
**STEEL BEAMS**



**PRESTRESSED CONCRETE I-GIRDERS**



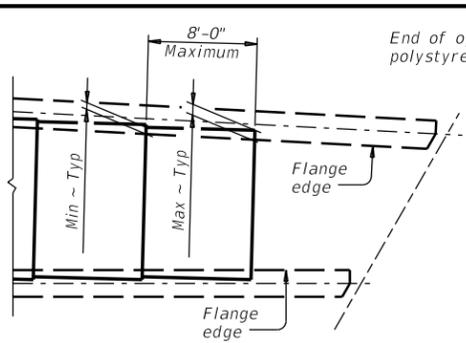
**PRESTRESSED CONCRETE X-BEAMS**



**NORMAL OVERHANG WITH PRESTR CONC U-BEAMS**

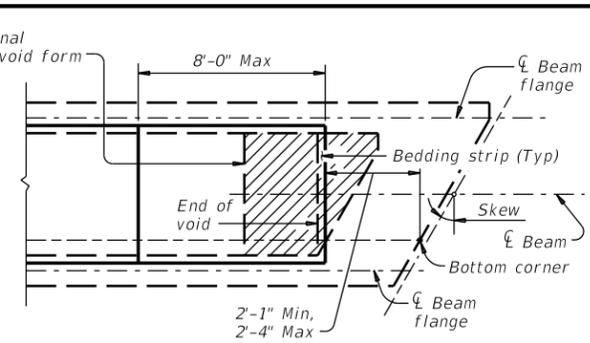
**TYPICAL PART TRANSVERSE SECTIONS**

**SLOPED OVERHANG WITH PRESTR CONC U-BEAMS**

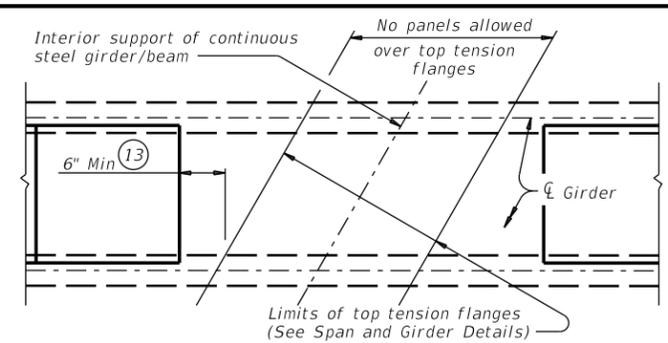


**AT FLARED BEAMS OR GIRDERS**

See PCP-FAB standard for Min and Max dimensions based on beam/girder type.



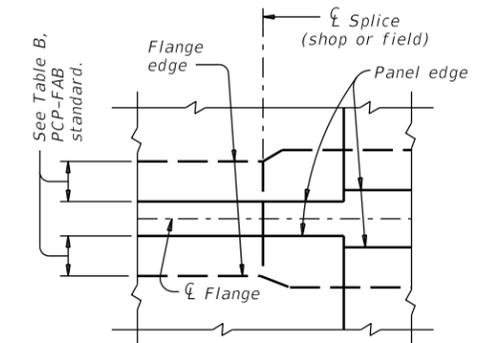
**OVER CONC U-BEAMS**



**AT INT SUPPORTS OF CONTINUOUS STEEL GIRDERS**

**PART PLANS OF PANEL PLACEMENT**

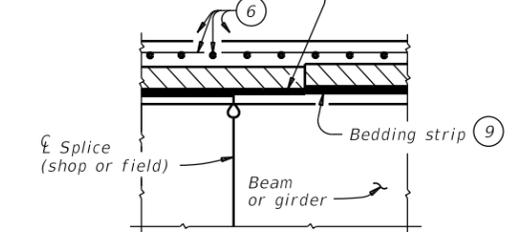
- 5 Provide clear cover as indicated unless otherwise shown on Span Details.
- 6 See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.
- 9 Butt adjacent bedding strips together with adhesive. Cut v-notches, approx 1/4" deep, in the top of the bedding strips at 8' o.c..
- 10 Equally space additional bar if more than 1'-3" Max.
- 11 The actual thickness constructed may exceed the slab thickness shown on the Span Details but the extra thickness may be no more than 2" (1" for prestressed concrete U-beams and steel beams). Bearing seat elevations or finished grade may be adjusted.
- 12 Field adjust Bars Z1(#4) to match actual slope of slab overhangs. Width of slab overhang will vary along span with curved slab edges. Adjust Bar Z1(#4) dimensions to maintain proper cover. Bars Z2(#4) are located at Inverted-Tee stems only.
- 13 Location of concrete placement sequence boundaries and bolted field splices should be considered by the contractor in determining panel limits.



**PLAN AT SPLICE**

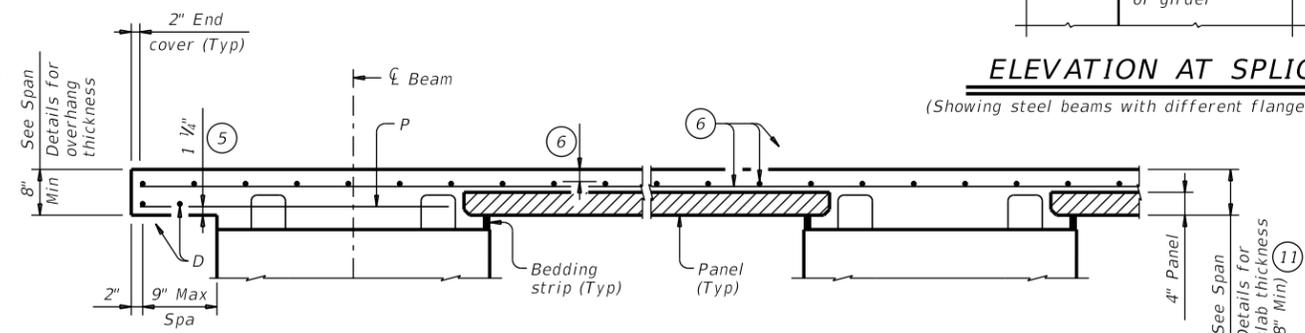
(Showing steel beams with flange width transition)

Cut bedding strip to adjust for difference in flange thickness.



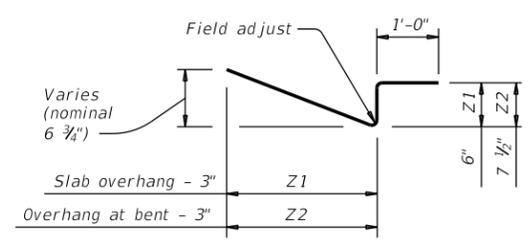
**ELEVATION AT SPLICE**

(Showing steel beams with different flange thickness)



**PRESTRESSED CONCRETE SPREAD SLAB BEAMS**

Bars P over exterior beams are still required when no overhang is used. In this case, only one Bar D, 2" from slab edge, is required.



**BARS Z (#4) (12)**

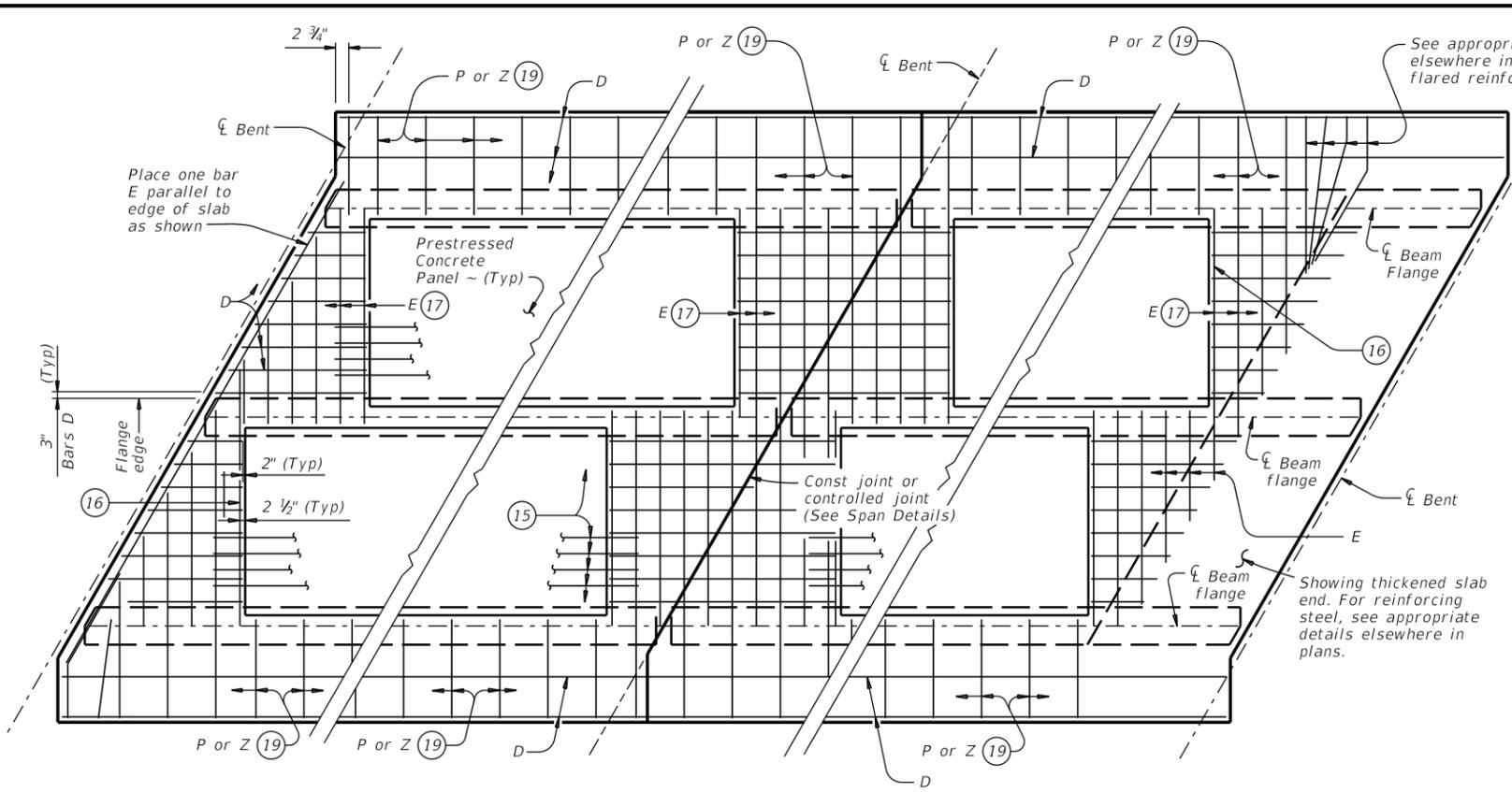
**PRESTRESSED CONCRETE PANELS DECK DETAILS**

PCP

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REVISIONS	DIST: ABL	COUNTY: FISHER	SHEET NO. 98	

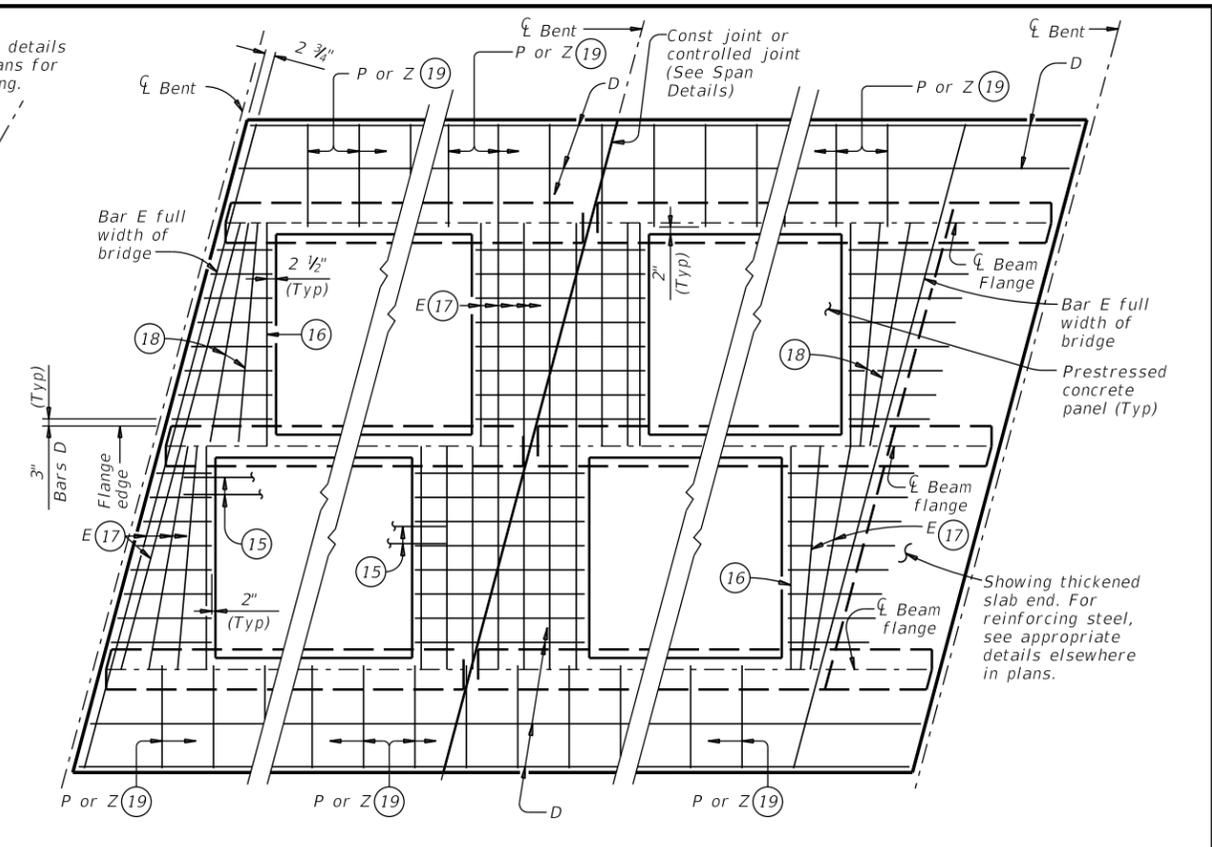
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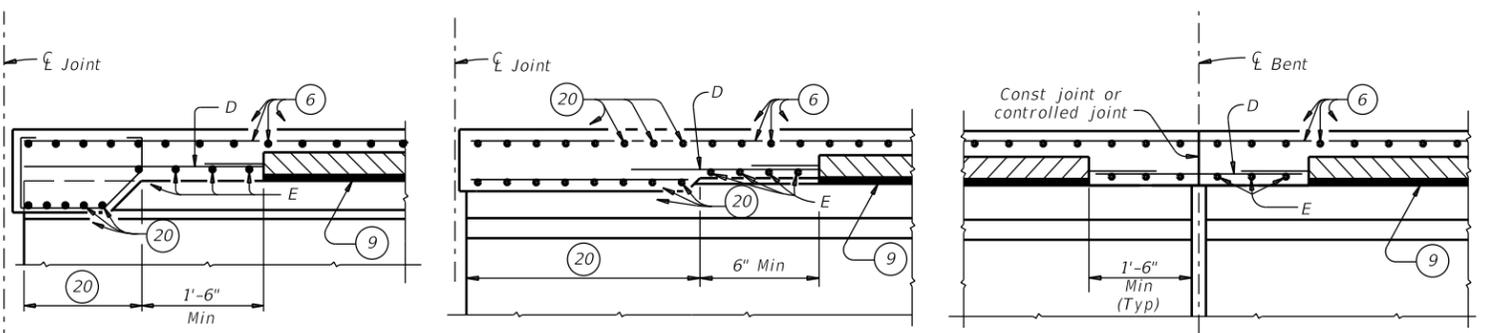
AT ALL SPAN ENDS UNLESS NOTED OTHERWISE  
 AT INTERIOR BENTS  
 AT THICKENED END SLABS

**OPTION 1 ~ PLAN OF SLABS WITH NORMAL REINFORCEMENT**

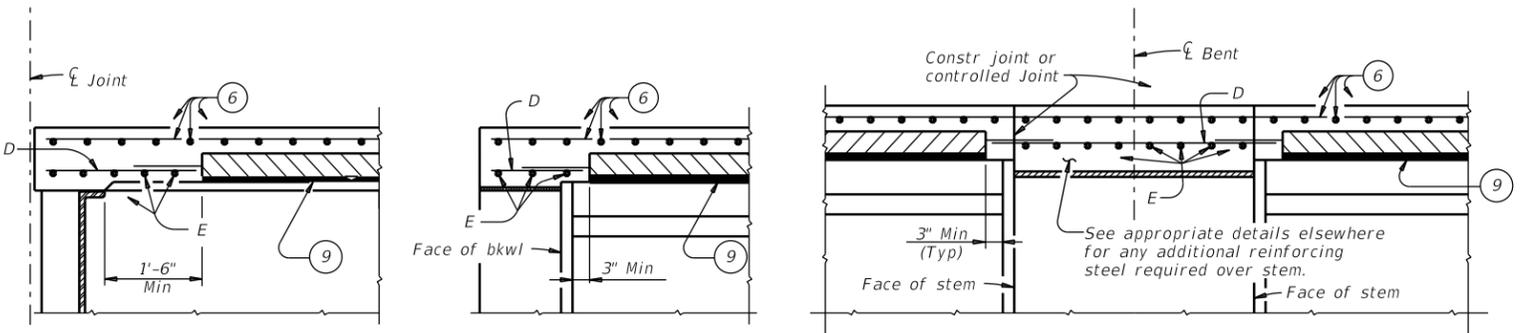


AT ALL SPAN ENDS UNLESS NOTED OTHERWISE  
 AT INTERIOR BENTS  
 AT THICKENED END SLABS

**OPTION 1 ~ PLAN OF SLABS WITH SKEWED REINFORCEMENT**



AT THICKENED SLAB ENDS FOR PRESTR CONC U-BMS  
 AT THICKENED SLAB ENDS FOR PRESTR CONC I-BMS AND STEEL BMS  
 AT SLAB CONTINUOUS OVER CONVENTIONAL INTERIOR BENTS FOR ALL SIMPLE SPAN BMS



AT CONVENTIONAL END DIAPHRAGMS FOR STEEL BMS  
 AT SLAB OVER ABUTMENT BACKWALL FOR ALL BMS  
 AT SLAB CONTINUOUS OVER INVERTED-T BENTS FOR ALL BMS

**OPTION 1 ~ ELEVATIONS AT BEAM ENDS**

- 6 See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.
- 9 Butt adjacent bedding strips together with adhesive. Cut v-notches, approx 1/4" deep, in the top of the bedding strips at 8' o.c.
- 14 Max Spacing as listed unless otherwise shown.
- 15 At connection with cast-in-place slab, extend longitudinal panel reinforcement. See PCP-FAB for details.
- 16 Maintain one Bar E(#4) parallel to panel ends (Typ).
- 17 Bars E(#4) not continuous over beam flanges must overlap beam flange 6" Min.
- 18 Add flared Bars E(#4) (Min Spa = 6", Max Spa = 12") as required at panel ends.
- 19 Where possible, Bars E(#4) may be extended into overhangs to replace Bars P(#4). Bars Z(#4) are required for sloped overhangs with U-Beams.
- 20 See appropriate thickened slab end details for reinforcing and limits of thickened slab end.

TABLE OF REINFORCING STEEL (14)		
BAR	SIZE	Max Spa (in.)
D	#4	9
E	#4	9
P	#4	18
UP	#4	~
Z	#4	18

HL93 LOADING SHEET 3 OF 4



**PRESTRESSED CONCRETE PANELS DECK DETAILS**

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REVISIONS	0983	02	022	FM 419
DIST	COUNTY		SHEET NO.	
ABL	FISHER		99	

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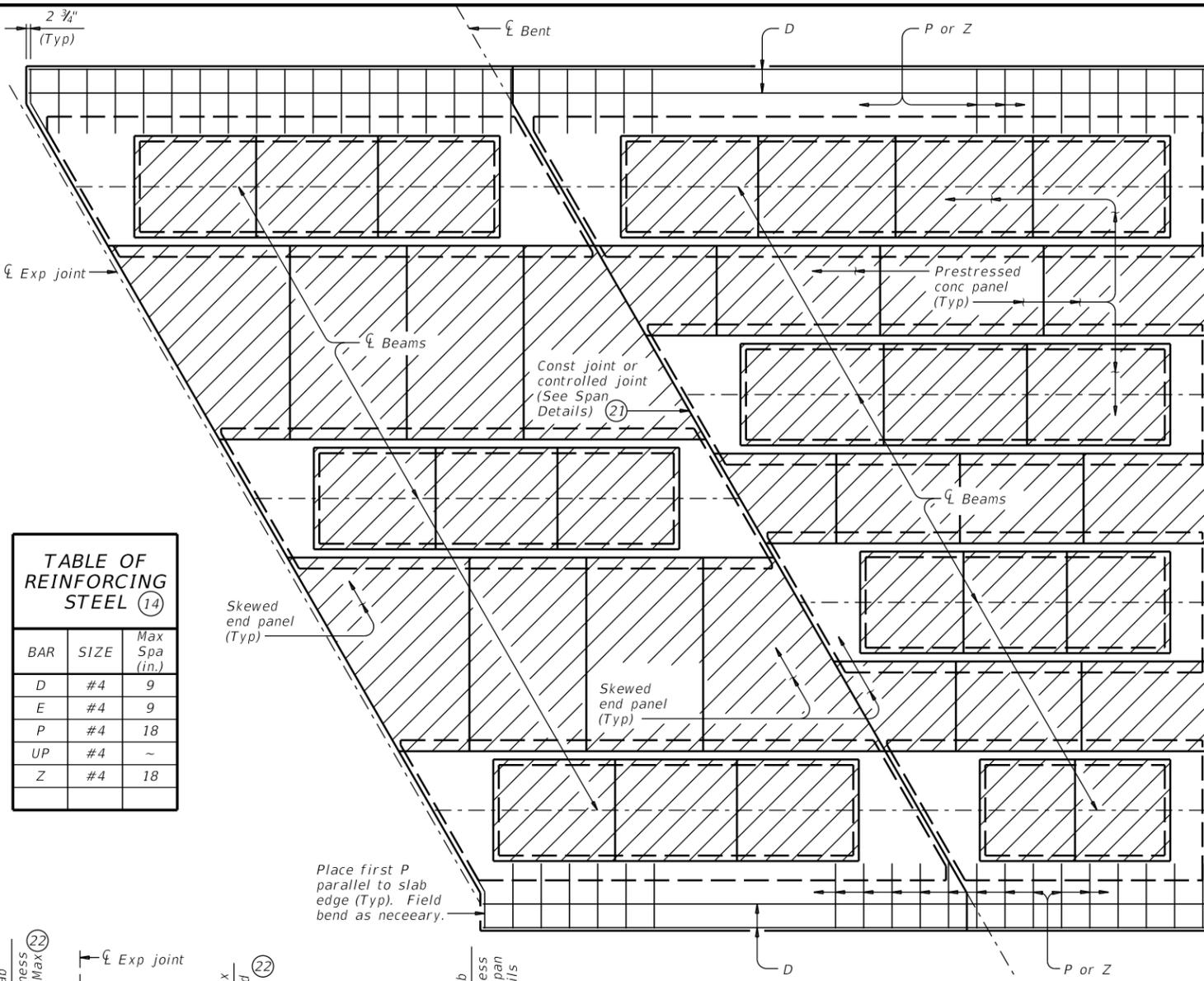
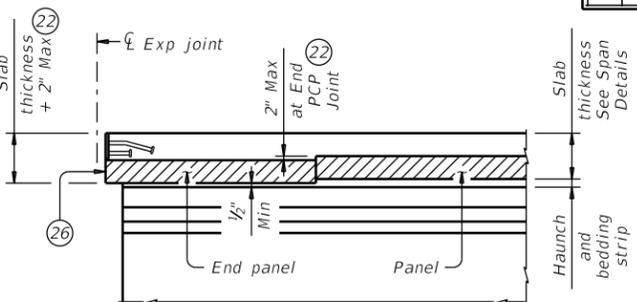
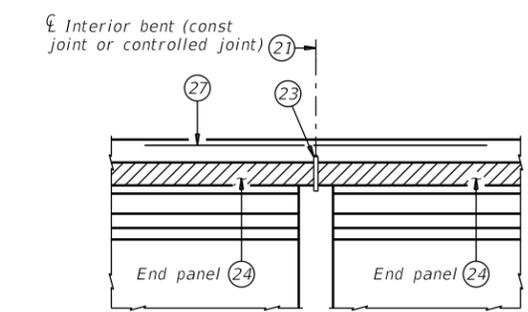


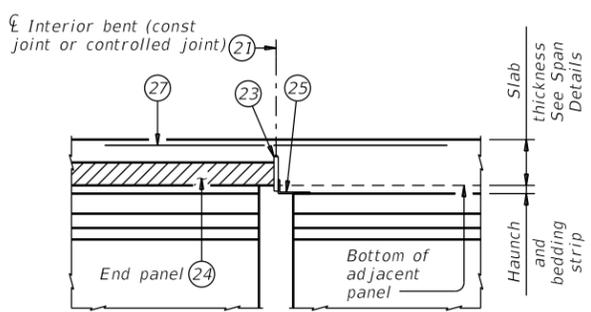
TABLE OF REINFORCING STEEL (14)		
BAR	SIZE	Max Spa (in.)
D	#4	9
E	#4	9
P	#4	18
UP	#4	~
Z	#4	18



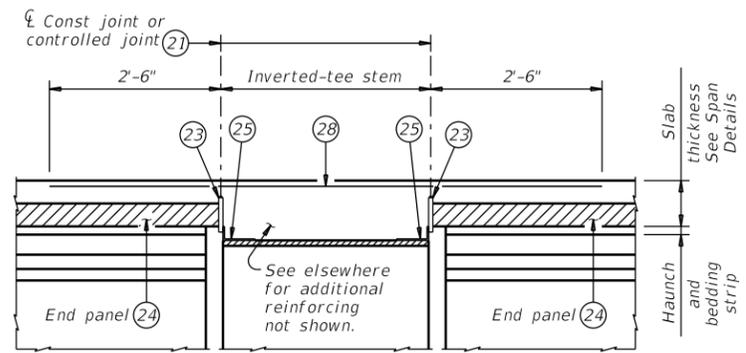
**JOINTS (BETWEEN BEAMS/GIRDERS OR AT INV-T STEM)**  
 For SEJ-A, SEJ-S(0), AJ, and Type A expansion joints only.



**CONVENTIONAL INTERIOR BENT**  
 Panel against panel between beams/girders.



**CONVENTIONAL INTERIOR BENT**  
 Panel against beam/girder end in adjacent span.



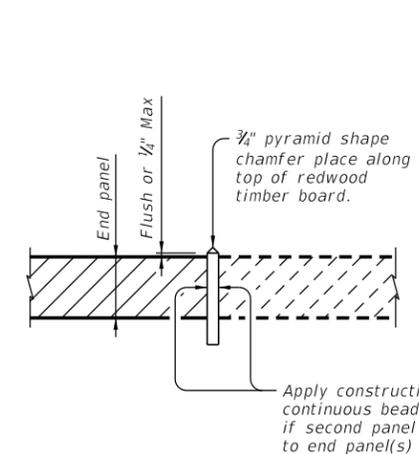
**INVERTED-T BENT**  
 Panels against inverted-tee stem

**OPTION 2 ~ ELEVATIONS AT BEAM ENDS (6)**

**ELEVATION EXAMPLE OF END PANEL AND TIMBER BOARD (23)**

See "Option 2 ~ Elevation At Beam Ends".

- (6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.
- (14) Max Spacing as listed unless otherwise shown.
- (21) 1 1/2" Vinyl or plastic joint former at controlled joints (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)
- (22) End panel may be set up to 2" lower to accommodate expansion joint hardware, provided bedding strip is not less than 1/2" thick.
- (23) 3/4" thick redwood timber board, leave in place. Redwood timber board placed flush with top of panel or within 1/4" Max above panel. Place 3/4" pyramid shape chamfer along top of timber board. See "Elevation Example of End Panel and Timber Board". Place straight, within 1/4" of centerline of bent or face of inverted-tee, across bridge width and end board at exterior flange edge of fascia beams/girders. Do not extend into overhang.
- (24) Place panel within 1/2" of 3/4" thick board.
- (25) Permanent galvanized steel sheet form. Removable formwork is acceptable.
- (26) Place end panel within 1/2" of expansion joint opening. End panel cannot encroach on required expansion joint opening.
- (27) Place additional (#4) bar 5'-0" in length between every slab bars T. Center (#4) bar on joint.
- (28) Place additional (#4) bar continuous 2'-6" beyond each side of Inverted-T Stem between every slab bars T.

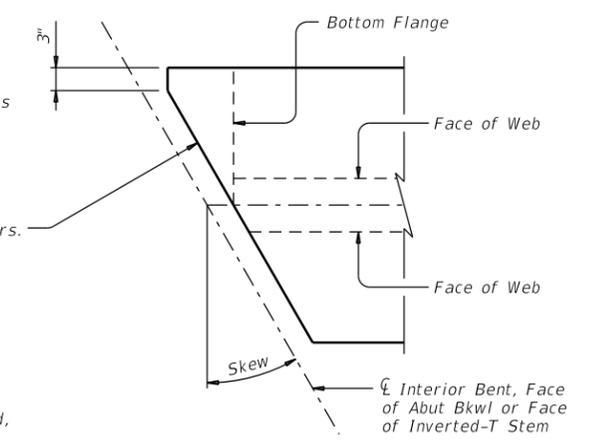


Skew top flange of Bms/Girders as shown for flange edge supporting a panel. Not applicable to flange edges on exterior side of fascia Bms/Girders.

Apply construction adhesive in a continuous bead to both sides of board, if second panel is present, to adhere to end panel(s) and seal interface.

**OPTION 2 ~ SHOWING MODIFICATION TO BEAM/GIRDER TOP FLANGE FOR SKEWS OVER 5°**

Showing I-Bm/I-Girder, U-Bms and Steel Bms similar.



**SPECIAL OPTION 2 CONSTRUCTION NOTES:**

- When Option 2 is chosen bottom mat of thickened end slab reinforcing is not required. Use the same top mat as shown on the Thickened Slab End Details sheet.
- Placing panels adjacent to expansion joints and bent centerlines prior to completing interior panel placement is recommended. Saw cutting panels to fit is acceptable when approved by the Engineer. Minimum distance from a saw cut edge to a panel strand is 1 1/2".
- Do not extend the longitudinal panel reinforcement into the cast-in-place slab.
- Top flanges of beams and girders on skewed bridges must be modified as shown on this drawing. The Contractor is responsible for coordinating this modification with the beam fabricator prior to submitting shop drawings for approval.
- Fabricator may optionally skew the whole end. When electing to skew whole end, girder end details and bearing type at conventional interior bent must be changed to use condition at abutment. Fabricator must coordinate change in bearing type, bearing centerline location, and dowel location with Engineer and Contractor. Show appropriate changes on girder and bearing shop drawings.
- Bending of anchor studs of expansion joints shown on standards AJ, SEJ-A and SEJ-S(0) is permissible if necessary to clear top of end panels. The Contractor is responsible for coordinating modifications with the joint fabricator. Submit shop drawings for approval when modifications to expansion joint hardware are made.
- Bedding strips under skewed end panels must conform to the requirements of Item 422 except their minimum compressive strength must be 60 psi.
- Provide Bars AA, G, K and OA from standard IGTS in the slab.

HL93 LOADING SHEET 4 OF 4

Texas Department of Transportation Bridge Division Standard

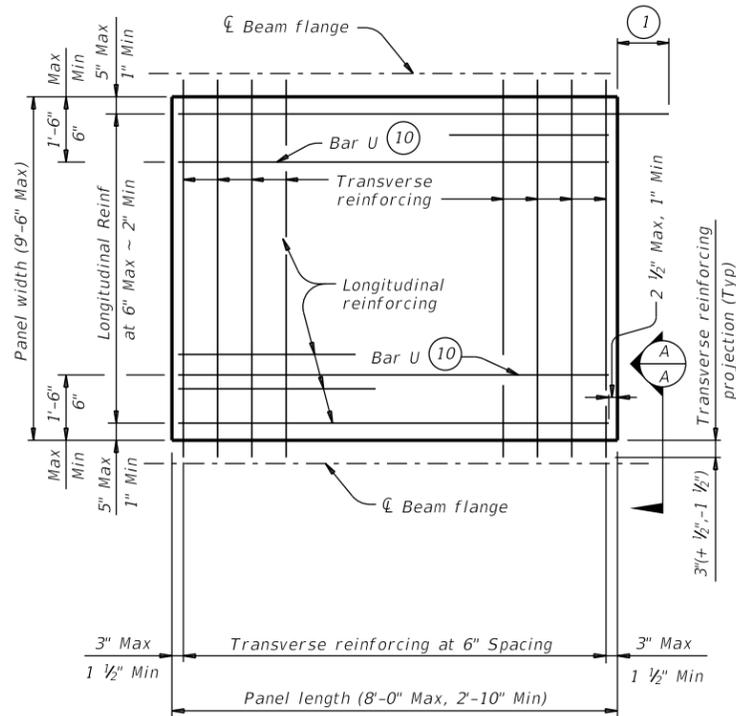
**PRESTRESSED CONCRETE PANELS DECK DETAILS**

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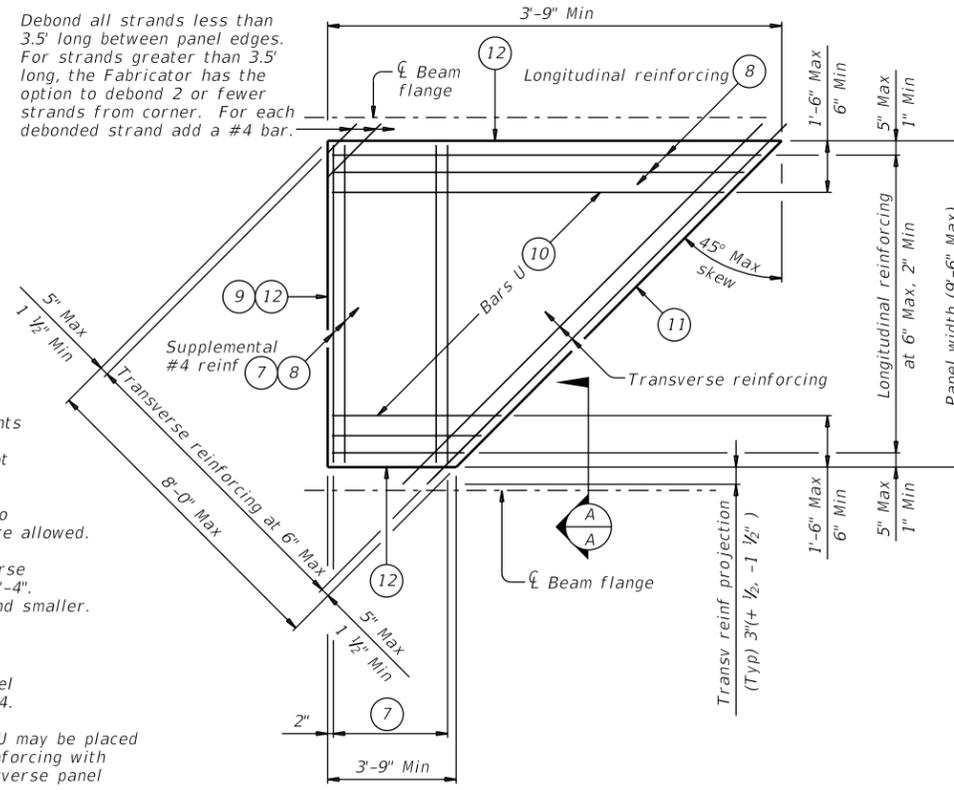
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DIST: ABL	COUNTY: FISHER	SHEET NO: 100		

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**TYPICAL NON-SKEWED PANEL PLAN**



**TYPICAL SKEWED END PANEL PLAN**

(Only to be used with details shown elsewhere in the plans.)

- 1 At connection with cast-in-place slab, extend longitudinal panel reinforcement 1'-0" (+2", -0") past panel end. Alternatively, provide (#3) x 2'-0" dowels at 6" Max Spacing and extend dowels 1'-0" past panel end.
- 2 Four loops required per panel.
- 3 Four loops required per panel. 3/8" or 1/2" strands may be used.
- 4 Normal dimensions must be used on spans with parallel beams. Maximum and Minimum dimensions apply only to spans with flared beams.
- 5 See Normal Grading Detail on PCP standard for lap requirements and bedding strip dimensions. Some laps shown in tables cannot utilize all bedding strip widths.
- 6 One Splice allowed per panel. No more than two sheets of WWR are allowed.
- 7 Provide (#4) bars under transverse reinforcing, 10 Spaces at 4" = 3'-4". Omit for 5 degree (1:12) skew and smaller.
- 8 End Cover 2 1/2" Max, 1" Min.
- 9 Recess strands on indicated panel edge in accordance with Item 424.
- 10 At the fabricator's option, Bars U may be placed parallel to transverse panel reinforcing with horizontal legs in plane of transverse panel reinforcing.
- 11 Use length of indicated panel edge as panel width for purpose of determining type of transverse reinforcing.
- 12 Timber form work permissible this edge.

TABLE A (4) (5)				TABLE B (4) (5)			
Beam Type	Normal (In.)	Min (In.)	Max (In.)	Top Flange Width	Normal (In.)	Min (In.)	Max (In.)
A	3	2 1/2	3 1/2	11" to 12"	2 3/4	2 1/2	2 3/4
B	3	2 1/2	3 1/2	Over 12" to 15"	3 1/4	3	3 1/4
C	4	3	4 1/2	Over 15" to 18"	4	3	4 3/4
IV	6	4	7 1/2	Over 18"	5	3 1/2	6 1/4
VI	6 1/2	4 1/2	8 1/2				
U40 - 54	5 1/2	5 1/2	7				
Tx28-70	6	5	7 1/2				
XB20 - 40	4	3	4 1/2				
XSB12 - 15	4	3	4 1/2				

**GENERAL NOTES:**

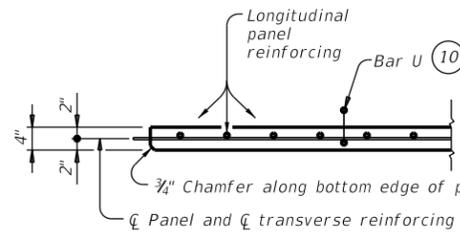
Provide Class H concrete for panels. Release strength  $f'_{ci}=3,500$  psi. Minimum 28 day strength  $f'_{c}=5,000$  psi.  
 Provide 3/4" chamfer along bottom edge of panel on beam side. Do not use epoxy-coated reinforcing steel bar or strand in panels. Remove laitance from top panel surface. Finish top of panel to a roughness between a No. 6 and No. 9 concrete surface profile, inclusive, as specified by the International Concrete Repair Institute (ICRI).  
 Shop drawings for the fabrication of panels will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.  
 A panel layout which identifies location of each panel must be developed by the Fabricator. Permanently mark each panel in accordance with the panel layout. A copy of the layout is to be provided to the Engineer.

**TRANSVERSE PANEL REINFORCEMENT:**

For panel widths over 5', use 3/8" or 1/2" Dia (270k) prestressing strands with a tension of 14.4 kips per strand.  
 For panel widths over 3'-6" up to and including 5', use 3/8" or 1/2" Dia (270k) prestressing strands with a tension of 14.4 kip per strand. Optionally, (#4) Grade 60 reinforcing bars may be used in lieu of prestressed strands.  
 For panel widths up to 3'-6", use (#4) Grade 60 reinforcing bars (prestressed strands alone are not allowed).  
 Place transverse panel reinforcement at panel centroid and space at 6" Max.

**LONGITUDINAL PANEL REINFORCEMENT:**

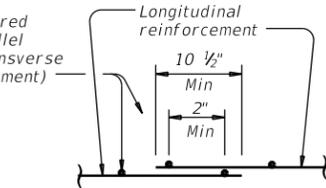
Any of the following options may be used for longitudinal panel reinforcement:  
 1. (#3) Grade 60 reinforcing steel at 6" Max Spacing. No splices allowed.  
 2. 3/8" Dia prestressing strands at 4 1/2" Max Spacing (unstressed). No splices allowed.  
 3. 1/2" Dia prestressing strands at 6" Max Spacing (unstressed). No splices allowed.  
 4. Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) providing 0.22 sq in per foot of panel width. Wires larger than D11 not permitted. Provide transverse wires to ensure proper handling of reinforcing. One splice per panel is allowed. See WWR Splice Detail.  
 No combination of longitudinal reinforcement options in a panel is allowed. Place longitudinal panel reinforcement above or below transverse panel reinforcement. Must be placed above transverse panel reinforcement for skewed end panels with supplemental (#4) reinforcement.



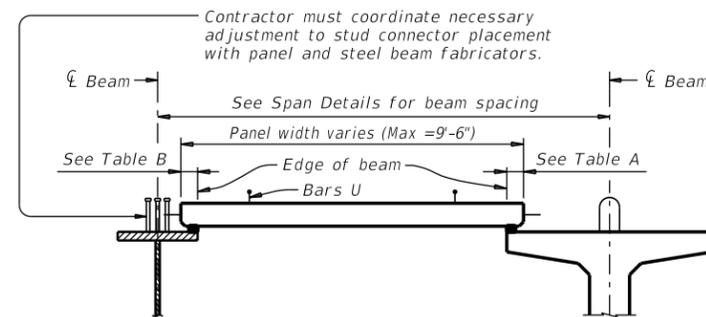
**SECTION A-A**

(Not showing supplemental #4 bars for skewed end panels.)

No splice required for wires parallel to strands (transverse panel reinforcement)

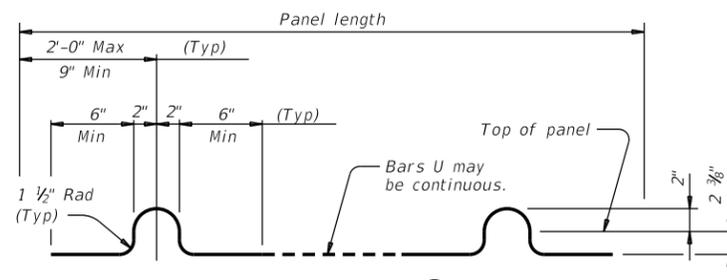


**WELDED WIRE REINFORCEMENT (WWR) SPLICE DETAIL**

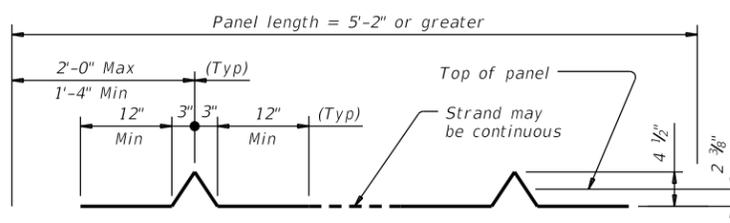


**STEEL BEAMS**

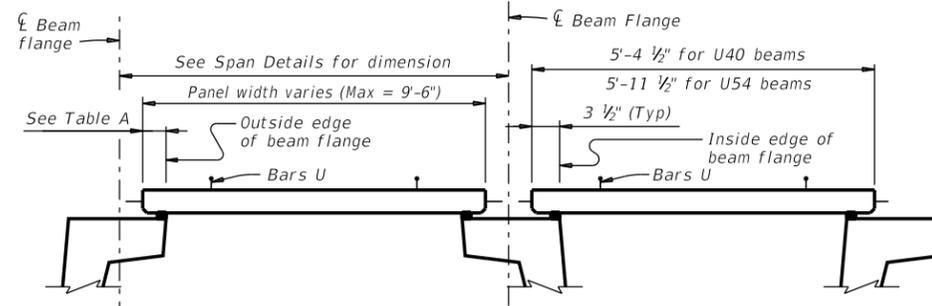
**PRESTRESSED CONCRETE BEAMS OR GIRDERS**  
 Typ unless noted otherwise



**BARS U (#3)**



**OPTIONAL STRAND FOR BARS U**



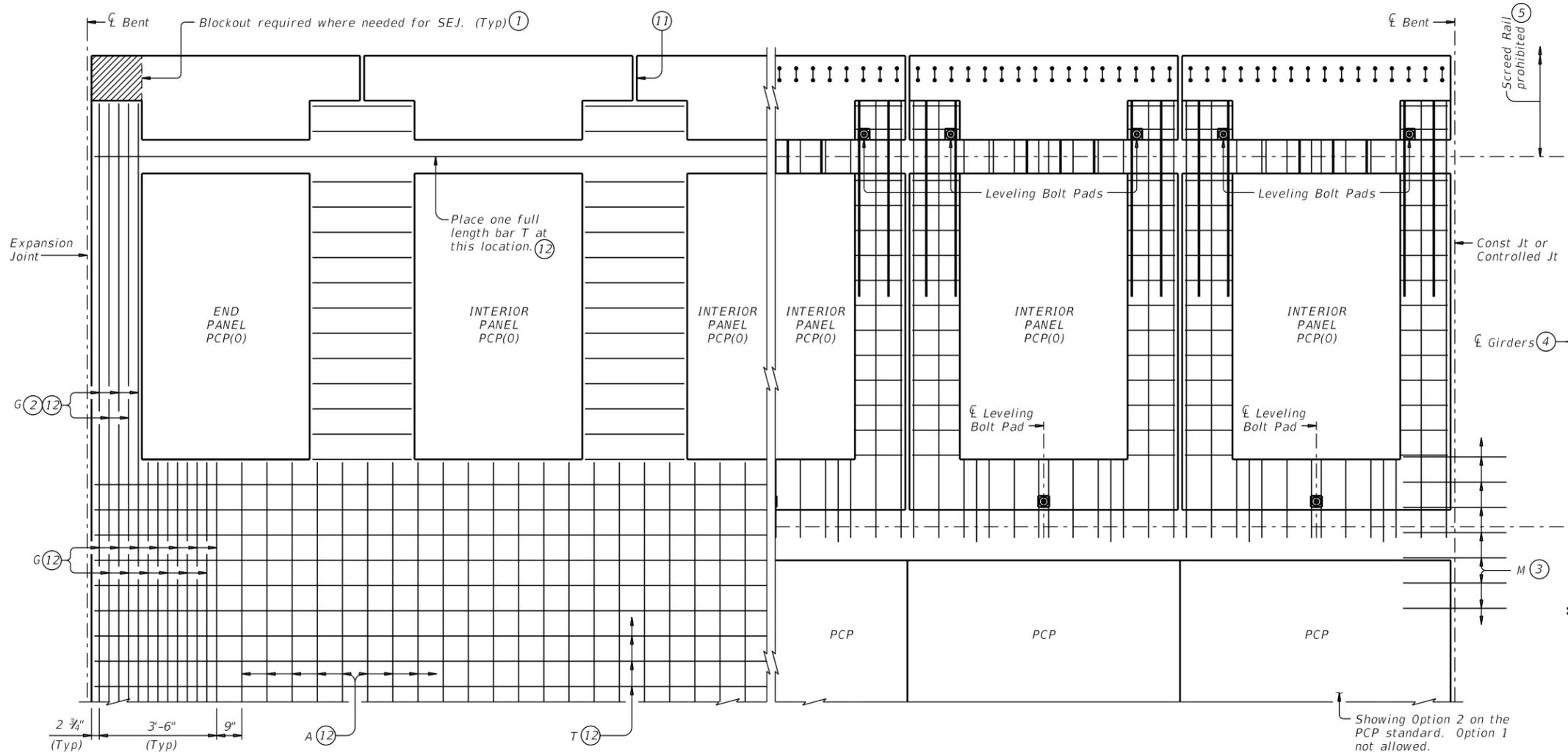
**PRESTRESSED CONCRETE U-BEAMS**

**TYPICAL SECTIONS FOR DETERMINING PANEL WIDTH**

HL93 LOADING

		<b>Bridge Division Standard</b>	
<b>PRESTRESSED CONCRETE PANEL FABRICATION DETAILS</b>			
<b>PCP-FAB</b>			
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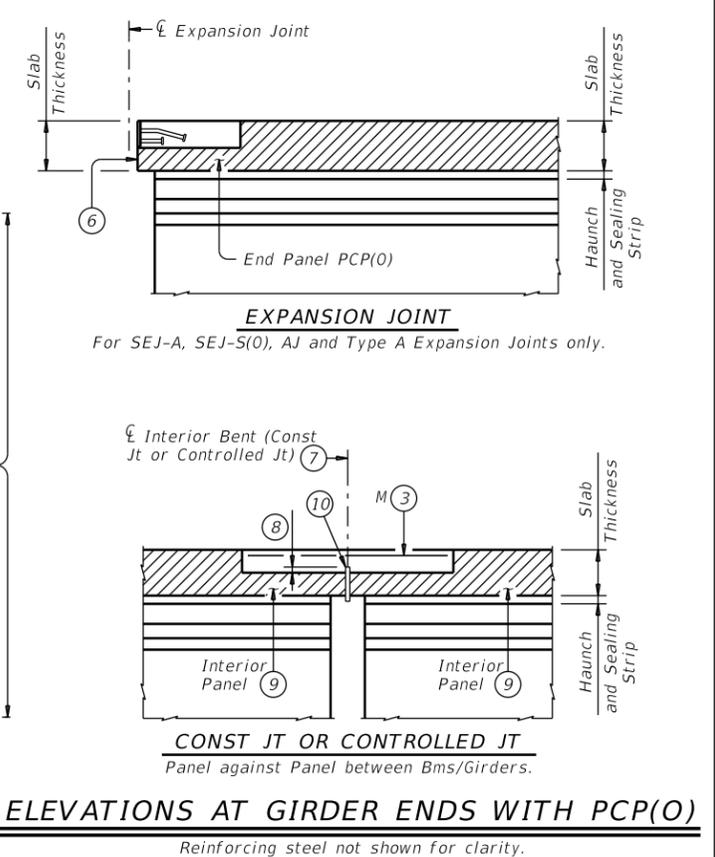
SHOWING FIELD PLACEMENT OF TOP REINFORCING STEEL

SHOWING PCP(O) EXPOSED REINFORCING STEEL

**PANEL LAYOUT**

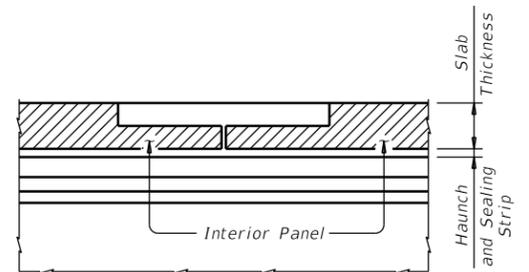
PCP(O) shown with gaps between panels for clarity. The gap cannot be considered as a panel fabrication tolerance.

- ① 1'-4" x 1'-6" x 4 1/2" blockout to accommodate SEJ that require an upturn. Contractor to communicate with fabricator the location and type of SEJ to be utilized.
- ② When blockout is required, extend bars G into blockout.
- ③ Place additional bars M 2'-11" in length on top of bars A and between every bar T. Center bars M at center of bent. Located at bents with construction joints or controlled joints only. Bars M may replace additional (#4) bars 5'-0" in length as shown on PCP standard in Option 2 ~ Elevations At Beam Ends. Option 1 not allowed.
- ④ It is recommended to profile every 4 ft by surveying each girder under PCP(O) for proper grading of panels.
- ⑤ Screed rail used to set grade for paving machine is not allowed past exterior girder as shown.
- ⑥ Place end panel PCP(O) within 1/2" of expansion joint opening. Do not encroach on required expansion joint opening.
- ⑦ Top Plastic Joint Former at Controlled Joints (Stress Cap, Zip Strip, Stress Lock, etc.) is not required with these Details.
- ⑧ 0" Min, 3/4" Max, support as necessary.
- ⑨ Place panel within 1/2" of 3/4" thick board.
- ⑩ 3/4" thick wood/timber board, leave in place. Place straight, within 1/4" of Centerline of Bent, across bridge width and end board at exterior flange edge of fascia girders. Do not extend into overhang.
- ⑪ Seal top of panel only, with a Class 4 sealant prior to rail construction. Typical between panels. Do not seal at Expansion Joints.
- ⑫ 1 1/2" End Cover. (Typ)



**ELEVATIONS AT GIRDER ENDS WITH PCP(O)**

Reinforcing steel not shown for clarity.



**ELEVATION BETWEEN PCP(O)**

The gap cannot be considered as a panel fabrication tolerance. Reinforcing steel not shown for clarity.

HL93 LOADING SHEET 1 OF 2



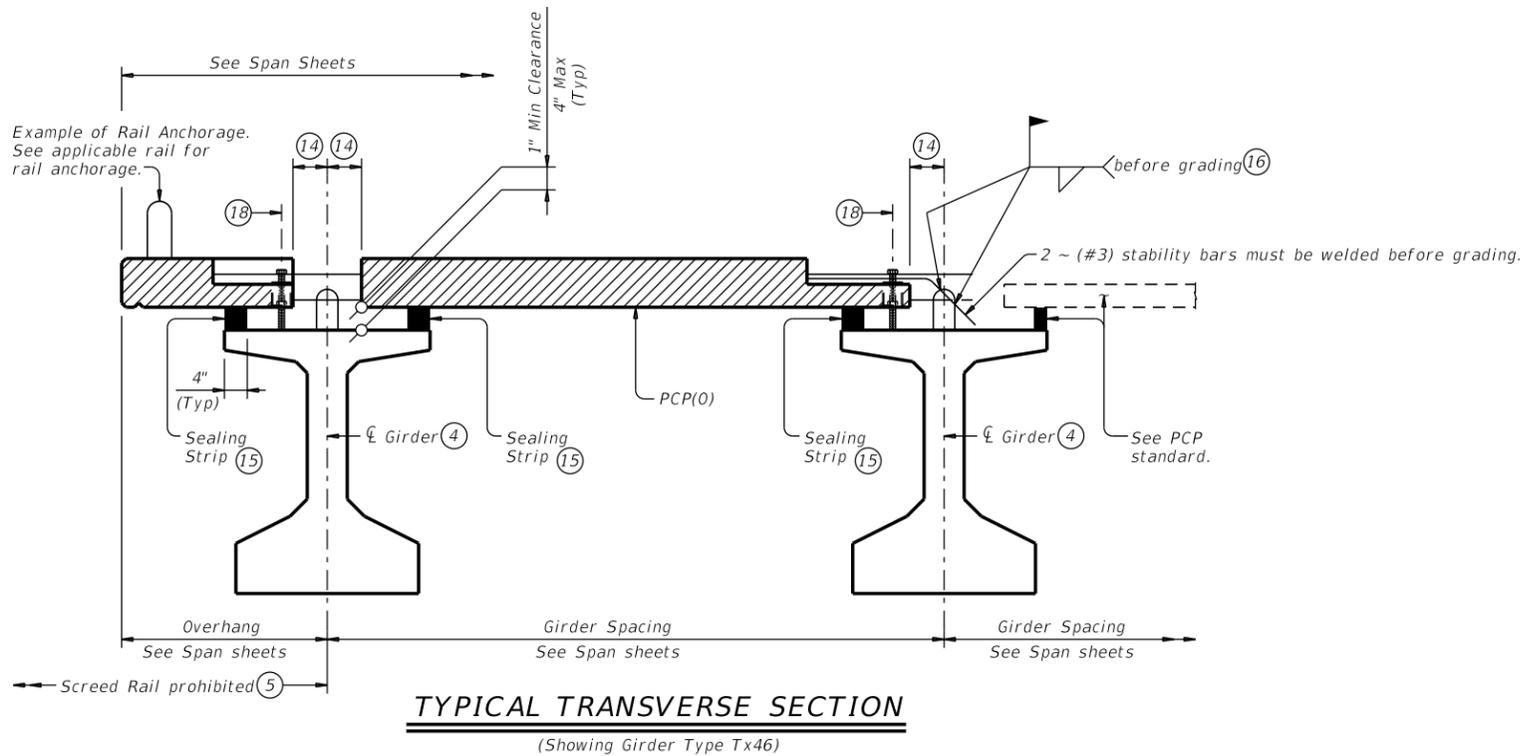
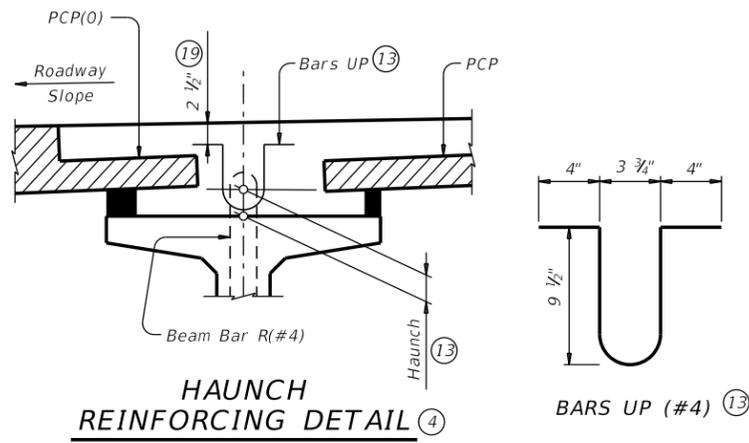
**PRECAST CONCRETE PANELS FOR OVERHANGS**

**PCP(O)**

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©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0983	02	022	FM 419
DIST	COUNTY		SHEET NO.	
ABL	FISHER		102	

BAR TABLE		
BAR	SIZE	MAX SPA (IN)
A (12/17)	#4	9"
G (12/17)	#4	3 1/2"
M	#4	9"
T (12/17)	#4	9"

- ④ It is recommended to profile every 4 ft by surveying each girder under PCP(0) for proper grading of panels.
- ⑤ Screed rail used to set grade for paving machine is not allowed past exterior girder as shown.
- ⑫ 1 1/2" End Cover on bars. (Typ)
- ⑬ Space bars UP(#4) with girder bars R(#4) in all areas where measured haunch exceeds 3 1/2" with Prestressed Concrete I-Girders. Epoxy coating for Bars UP is not required.
- ⑭ 6" plus or minus.
- ⑮ Place sealing strip at flange edge as shown. Butt adjacent sealing strips longitudinally together with adhesive. Use pencil vibrators with concrete placement over girder and between sealing strips to avoid rupturing sealing strips. Cut sealing strips 2" higher than anticipated haunch thickness and compress to grade.
- ⑯ (#3) Panel bars F must be field bent and welded to the R bars in girder. Two bars F per panel.
- ⑰ Field placed bars that are allowed to be lapped. Reinforcing steel that protrudes from panels are not considered bars to be lapped. See "Material Notes" for applicable bar laps.
- ⑱ Leveling Bolt Pad. 1" Dia Coil Rod or 1" Dia Coil Bolt shown, are furnished by the contractor. After grading each PCP(0) panel with the 1" Dia coil rods or coil bolts, secure each panel in its final resting position (plastic shims, welding, etc) and remove all 1" Dia coil rods or coil bolts for the cast-in-place concrete. Coil rods/bolts may be left in place at contractor's option. If coil rods/bolts are left in place, coil rods/bolts must have at least 2 1/2" of cover to top of finish grade. Grading bolts are inadequate to carry all conceivable screed/construction loads. Panel support method must be calculated, location identified, and placed on shop drawings. Method chosen to support panels must be adequate for all construction loads. Panel support method must be placed/constructed after final grading and before screed rail placement.
- ⑲ Unless shown otherwise on Span Details.



**CONSTRUCTION NOTES:**

Placing panels adjacent to expansion joints and bent centerlines prior to completing interior panel placement is recommended. Ensure proper cleaning of construction debris and consolidation of concrete mortar under the edges of the panels. Place sealing strips at girder flange edges so that adequate space is provided for the mortar to flow a minimum of 8" transversely under the panels as the slab concrete is placed. Panel placement with Option 1 on the PCP standard is not allowed. It is recommended to profile every 4 ft by surveying each girder under PCP(0) for proper grading of panels. To allow the proper amount of mortar to flow between girder and panel, maintain a minimum vertical opening of 1". Roadway cross-slope reduces the opening available for entry of the mortar. Sealing strips vary in thickness along girder are therefore required. Seal the top panel with a Class 4 sealant as shown in the Panel Layout.

**MATERIAL NOTES:**

Provide Grade 60 reinforcing steel in cast-in-place slab. See Table of Reinforcing Steel for size and spacing of reinforcement. If the reinforcing steel is shown on the Span Details to be epoxy coated, then epoxy coat bars A, G, M, & T. Provide bar laps, where required, as follows:  
 Uncoated ~ #4 = 1'-7"  
 Epoxy Coated ~ #4 = 2'-5"  
 Provide sealing strips comprised of one layer low density polyurethane (1.0 Lbs density) foam sealing strips or equivalent. Oversize the height of sealing strips by 2". Bond sealing strips to the girder with 3M Scotch® 4693 or equivalent adhesive compatible with sealing strips.

**GENERAL NOTES:**

Designed according to AASHTO LRFD Specifications. These details can be used as an option to construct the deck overhang when noted on the Span details and in conjunction with the PCP(0)-FAB, PCP and applicable Standard sheets. These details are only applicable for Prestr Conc I-Girders. Any additional reinforcement or concrete required on these details is subsidiary to the bid Item "Reinforced Concrete Slab".

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



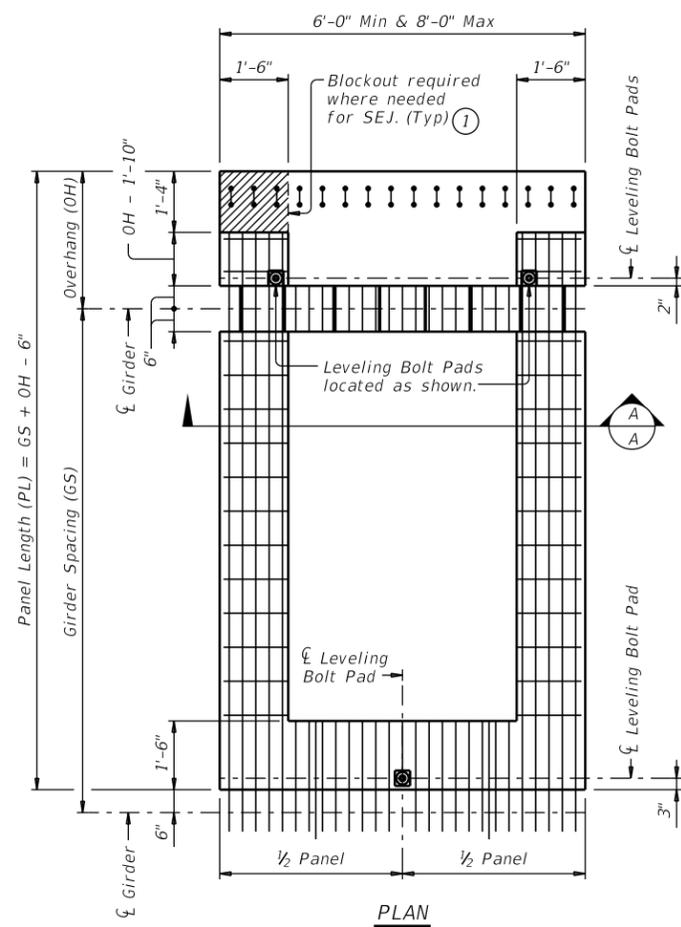
**PRECAST CONCRETE PANELS FOR OVERHANGS**

**PCP(0)**

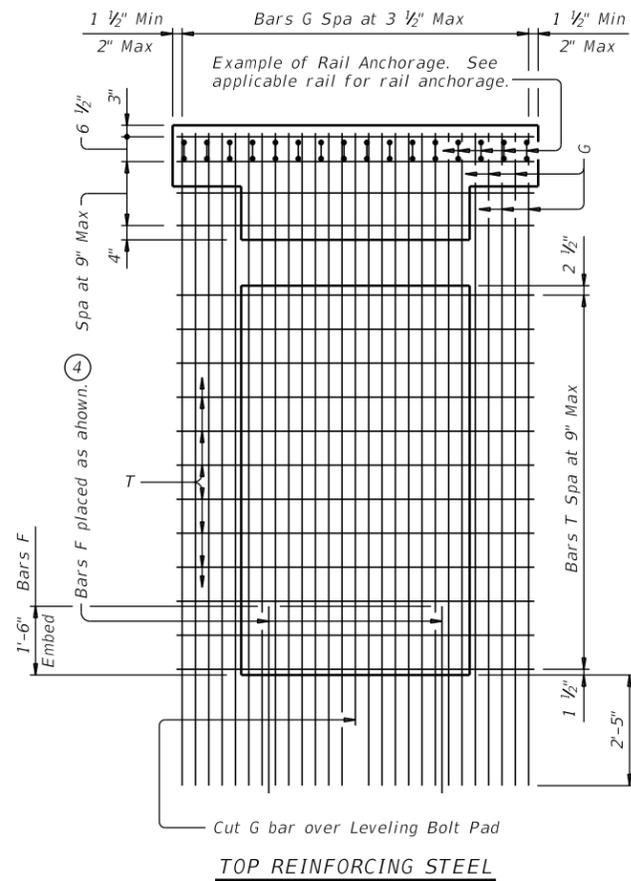
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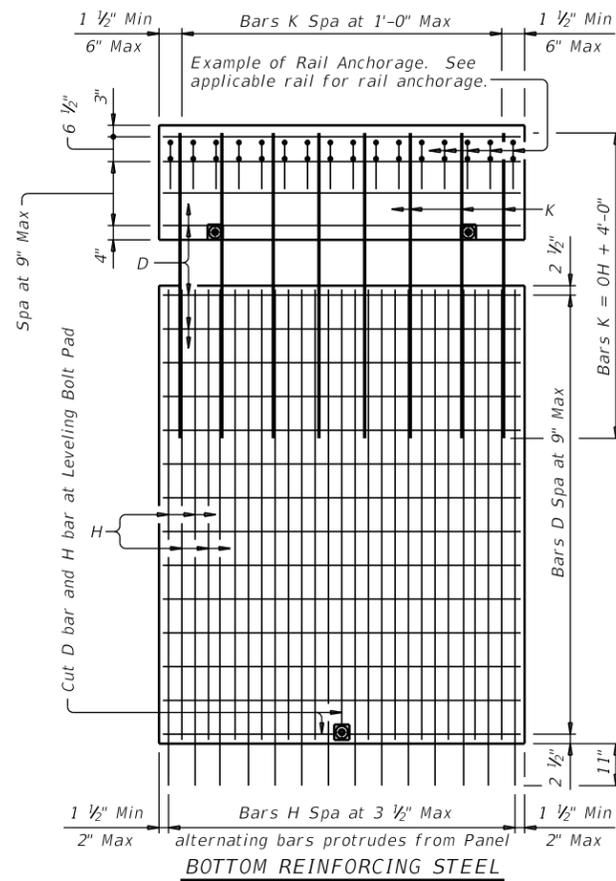
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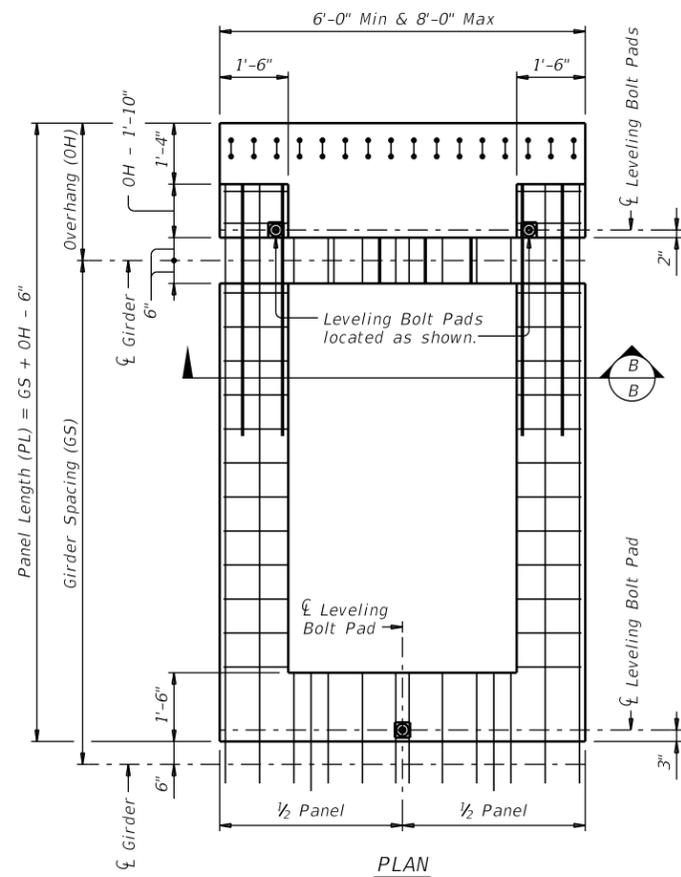
PLAN



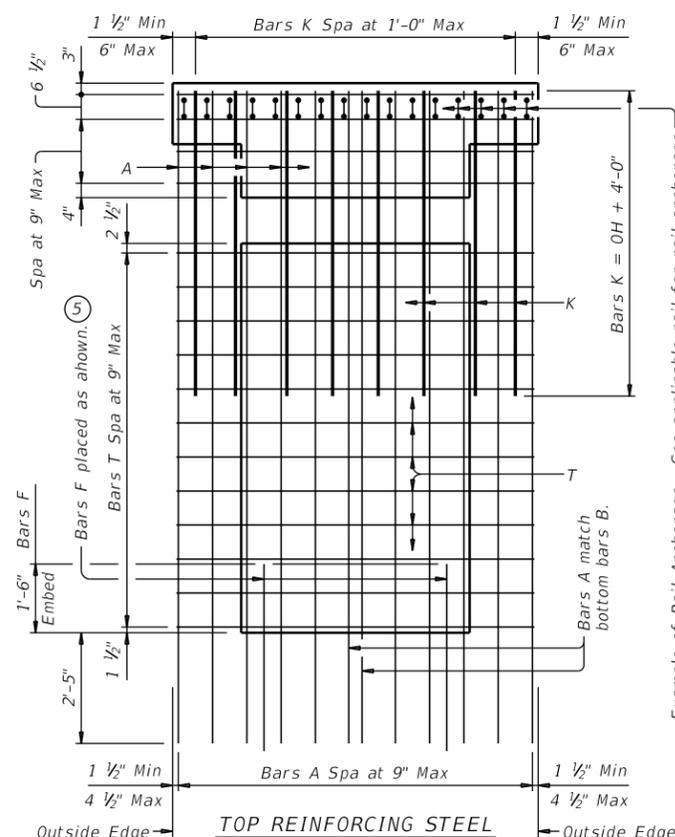
TOP REINFORCING STEEL  
 END PANEL



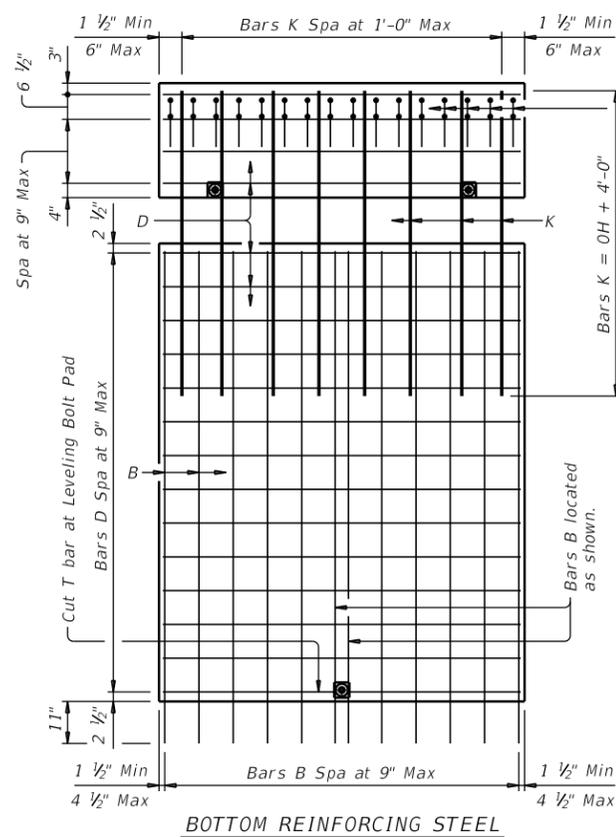
BOTTOM REINFORCING STEEL  
 END PANEL



PLAN



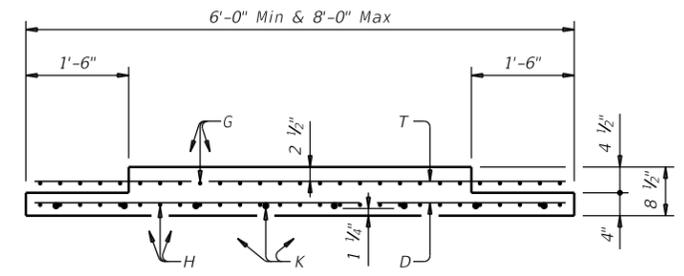
TOP REINFORCING STEEL  
 INTERIOR PANEL



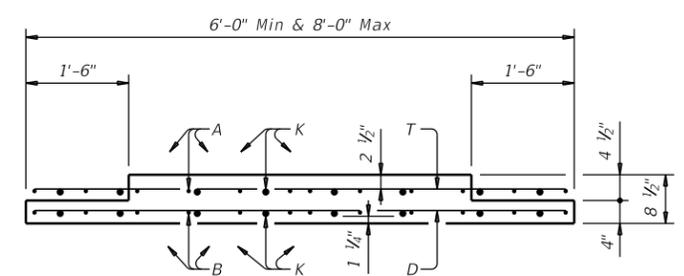
BOTTOM REINFORCING STEEL  
 INTERIOR PANEL

BAR TABLE	
BAR	SIZE
A (2)	#4
B (2)	#4
D (2, 3)	#4
F (3)	#3
G (2)	#4
H (2)	#4
K (2, 3)	#8
T (2, 3)	#4

- ① 1'-4" x 1'-6" x 4 1/2" blockout to accommodate SEJ that require an upturn. Contractor to communicate with fabricator the location and type of SEJ to be utilized.
- ② 1 1/2" End Cover on bars. (Typ)
- ③ Bars that are not allowed to have lap splices.
- ④ Place F bars under bars T and against bars G.
- ⑤ Place F bars under bars T and between bars A.



SECTION A-A



SECTION B-B

HL93 LOADING SHEET 1 OF 2

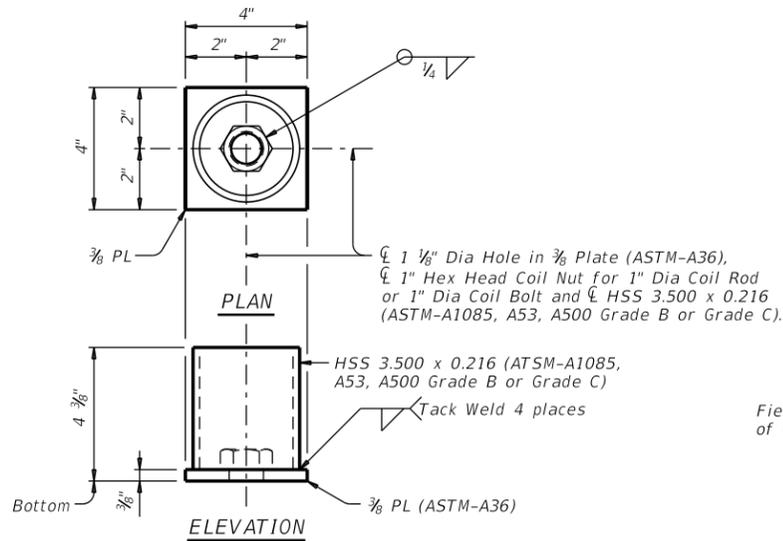


PRECAST CONCRETE  
 PANELS FOR OVERHANGS  
 FABRICATION DETAILS

PCP(O)-FAB

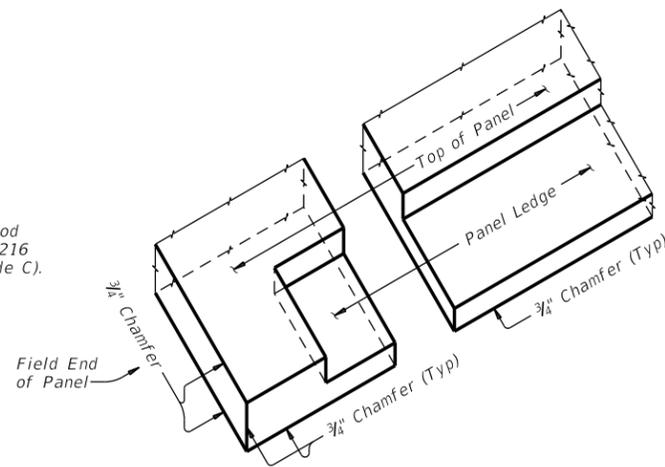
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©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0983	02	022	FM 419
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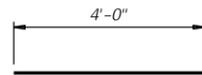
**LEVELING BOLT PAD DETAILS**

Galvanize if epoxy coated reinforcing steel is used in slab. Do not oil this assembly.

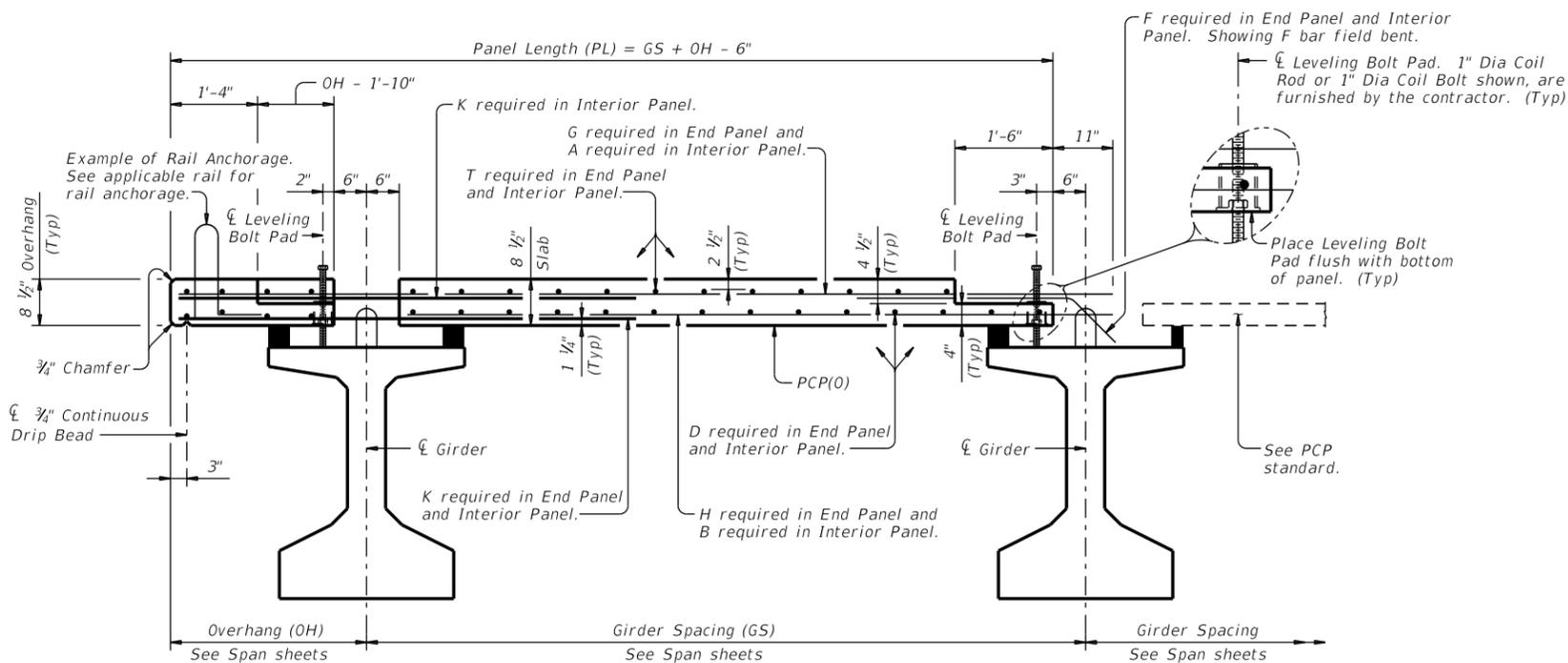


**ISOMETRIC VIEW AT CORNER OF PANEL**

Showing Typical Chamfers on Panel. Drip Bead and reinforcing steel not shown for clarity.



BARS F



**TYPICAL TRANSVERSE SECTION**

(Showing Girder Type Tx46)

**CONSTRUCTION/FABRICATION NOTES:**

- Remove laitance from top panel surface.
- Finish top surface area of panel with a broom finish.
- Finish top ledge of panel to a roughness between a No. 6 and No. 9 concrete surface profile, inclusive, as specified by the International Concrete Repair Institute (ICRI).
- Provide 3/4" concrete chamfers as shown on these details.
- Do not lap splice bars D, F, K & T. Bars A, B, G & H, may be spliced with only one lap splice allowed on each bar.
- Panels must be fabricated by a fabricator meeting the requirements of DMS 7300 for Multi-Project Nonstressed Member Fabrication Plant.

**MATERIAL NOTES:**

- Provide Class H concrete ( $f'c=4000$  psi) in panels. Provide Class H (HPC) concrete for panels if required elsewhere in plans. Maximum large aggregate size is 1".
- Provide material as shown on this standard for the Leveling Bolt Pad.
- Provide Grade 60 conventional reinforcing steel.
- Provide epoxy coated reinforcement for bars A, B, D, G, H, K & T if slab reinforcement is epoxy coated.
- An equal area and spacing of deformed Welded Wire Reinforcement (WWR) ASTM-A1064 may be substituted for bars A, B, D, G, H & T, unless otherwise noted. Bars F and K can not be replaced with WWR.
- Galvanize leveling bolt pad assembly if epoxy-coated reinforcing steel is used in slab.

**GENERAL NOTES:**

- Designed according to AASHTO LRFD Specifications.
- These details are only applicable for Prestr Conc I-Girders.
- Any additional reinforcement, lifting devices or epoxy coated reinforcement required on these details are subsidiary to the bid Item "Reinforced Concrete Slab".
- See railing details for rail anchorage in panel overhang.
- A panel layout which identifies location of each panel must be developed by the fabricator. Permanently mark each panel in accordance with the panel layout. A copy of the layout is to be provided to the Engineer.
- Submit stable lifting methods and devices to the Engineer for approval.
- Shop drawings for the fabrication of panels will require the Engineer's approval.

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

HL93 LOADING SHEET 2 OF 2



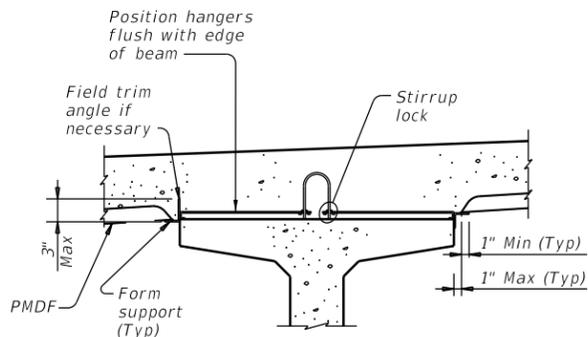
**PRECAST CONCRETE PANELS FOR OVERHANGS FABRICATION DETAILS**

**PCP(O)-FAB**

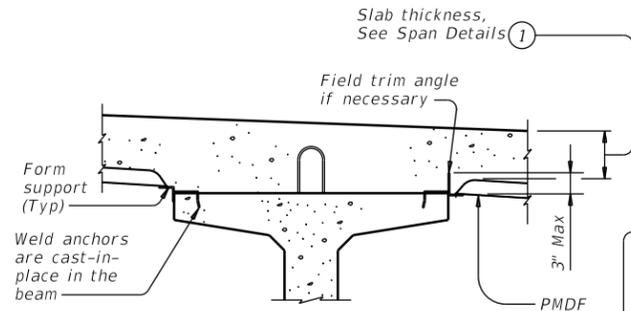
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	ABL	FISHER	105	

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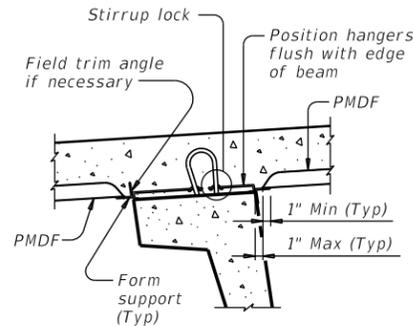
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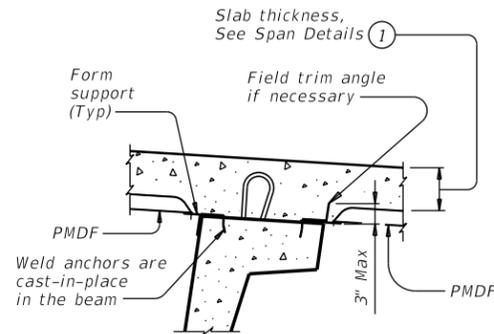
**PRESTR CONC I-BEAMS AND I-GIRDERS WITH STIRRUP LOCKS**



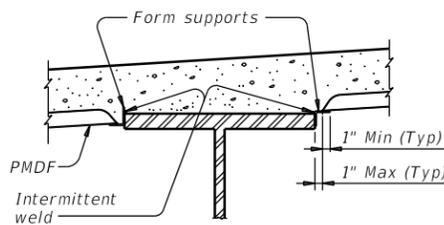
**PRESTR CONC I-BEAMS AND I-GIRDERS WITH WELD ANCHORS**



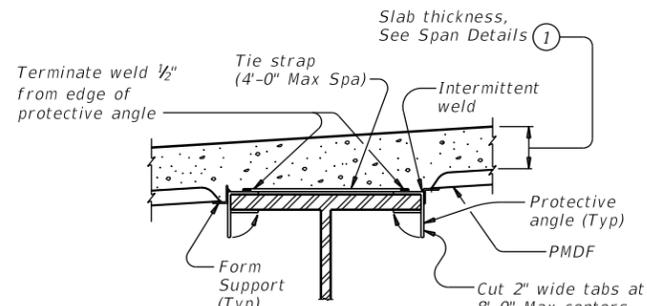
**U-BEAMS WITH STIRRUP LOCKS**



**U-BEAMS WITH WELD ANCHORS**

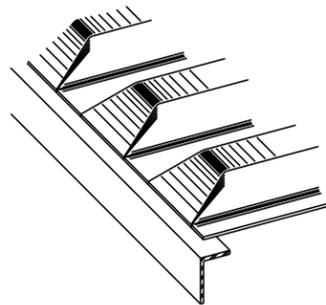


**STEEL BEAMS AT COMPRESSION FLANGES**

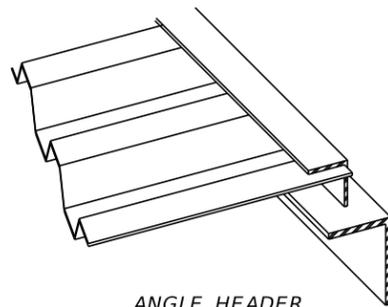


**STEEL BEAMS AT TENSION FLANGES (2)**

**TYPICAL TRANSVERSE SECTIONS**



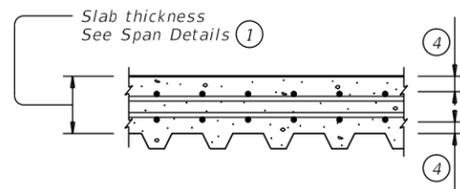
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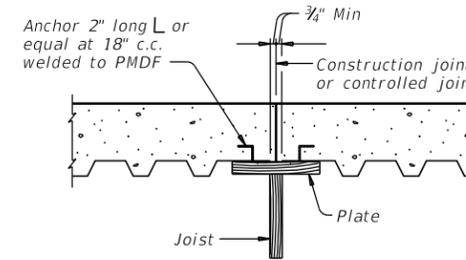
**ANGLE HEADER**

NOTE: This type is to be used for skewed ends only.

**TYPES OF END CLOSURES**



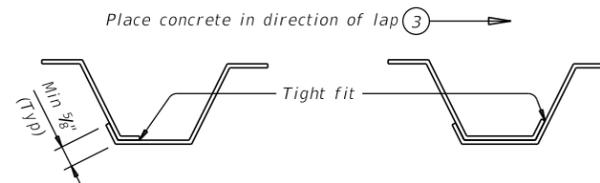
**TYP LONGITUDINAL SLAB SECTION**



Note: In spans where PMD forms are used, timber forms must be used at construction joints. Adequate provision must be made to support edge of metal form and to provide anchorage of metal form to slab concrete where joined to wood forms.

**SECTION THRU CONSTRUCTION JOINT**

**FOR PRESTR CONC U-BEAM AND STEEL GIRDER BRIDGES:**  
 Unless shown elsewhere in the plans, size, spacing, and orientation of bottom mat of slab reinforcement must match the top mat of reinforcing shown on the span details except all bottom mat bars are to be #5. Bottom mat reinforcement and additional concrete is subsidiary to Item 422 "Concrete Superstructures."  
**FOR PRESTR CONC TX-GIRDER BRIDGES:**  
 See Miscellaneous Slab Details, Prestr Concrete I-Girders (IGMS) standard sheet for bottom mat reinforcing.



**SIDE LAP DETAILS**

- ① Slab thickness minus 5/8" if corrugations match reinforcing bars.
- ② Welding of form supports to tension flanges will not be permitted. Other methods of providing wind hold down resistance for PMDF in tension flange zones will be considered. At least one layer of sheet metal must be provided between the flange and the weld joint.
- ③ The direction of concrete placement will be such that the upper layer of the form overlap is loaded first.
- ④ See Span details for cover requirements.

**GENERAL NOTES:**

Steel for Permanent Metal Deck Forms (PMDF) and support angles shall conform to ASTM A653, structural steel (SS), with coating designation G165. Steel must have a minimum yield strength of 33 ksi. Minimum thickness of PMDF is 20 gage and that of support angles and protective angles is 12 gage.  
 Submit two copies of forming plans for PMDF to the Engineer. These plans must show all essential details of proposed form sheets, closures, fasteners, supports, connectors, special conditions and size and location of welds. These plans must clearly show areas of tension flanges for steel beams and provisions for protecting the tension flanges from welding notch effects by inclusion of separating sheet metal or other positive method. These plans must be designed, signed, and sealed by a licensed professional engineer. Department approval of these plans is not required, but the Department reserves the right to require modifications to the plans. The Contractor is responsible for the adequacy of these plans. The details and notes shown on this standard are to be used as a guide in preparation of the forming plans.  
 All material, labor, tools and incidentals necessary to form a bridge deck with Permanent Metal Deck Forms is considered subsidiary to Item 422, "Concrete Superstructures".

**DESIGN NOTES:**  
 As a minimum, PMDF and support angles must be designed for the dead load of the form, reinforcement and concrete plus 50 psf for construction loads. Flexural stresses due to these design loads must not exceed 75 percent of the yield strength of the steel. Allowable stress for weld metal must be 12,400 psi.  
 Maximum deflection under the weight of forms, reinforcement and concrete or 120 psf, whichever is greater, shall not exceed the following:

1/180 of the form design span, but not more than 0.50", for design spans of 10' or less.

1/240 of the form design span, but not more than 0.75", for design spans greater than 10'.

The form design span must not be less than the clear distance between beam flanges, measured parallel to the form flutes, minus 2".

**CONSTRUCTION NOTES:**

Form sheets must not be permitted to rest directly on the top of beam flanges. Form sheets must be securely fastened to form supports and must have a minimum bearing length of one inch at each end. Form supports must be placed in direct contact with beam flanges.

All attachments must be made by permissible welds, screws, bolts, clips or other means shown on the the forming plans. All sheet metal assembly screws must be installed with torque-limiting devices to prevent stripping. Only welds or bolts must be used to support vertical loads.

Welding and welds must be in accordance with the provisions of Item 448, "Structural Field Welding", pertaining to fillet welds. All welds must be made by a qualified welder in accordance with Item 448.

All permanently exposed form metal, where the galvanized coating has been damaged, must be thoroughly cleaned and repaired in accordance with Item 445, "Galvanizing". Minor heat discoloration in areas of welds need not be touched up.

Flutes must line up uniformly across the entire width of the structure where main reinforcing steel is located in the flute.

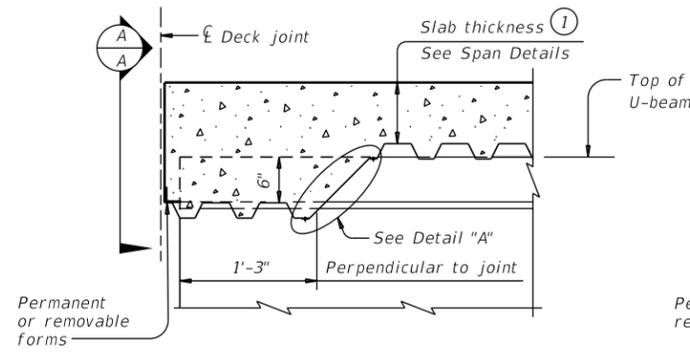
Construction joints will not be permitted unless shown on the plans. The location of and forming details for any construction joint used must be shown on the forming plans. Forms below a construction joint must be removed after curing of the slab.

A sequence for uniform vibration of concrete must be approved by the Engineer prior to concrete placement. Attention must be given to prevent damage to the forms, yet provide proper vibration to prevent voids or honeycomb in the flutes and at headers and/or construction joints.

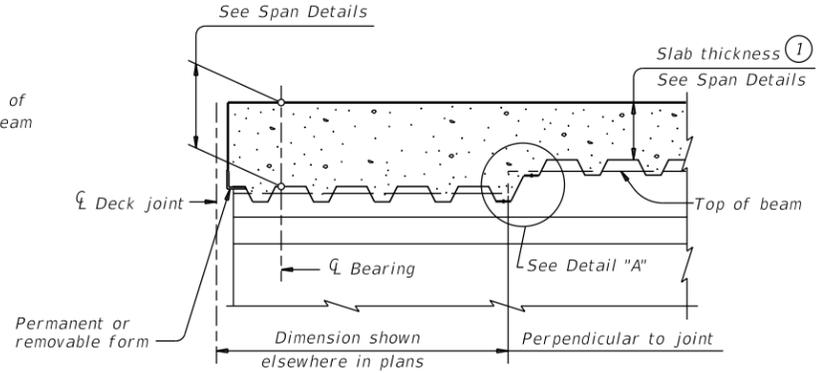
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<b>PERMANENT METAL DECK FORMS</b>					
<b>PMDF</b>					
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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0983	02	022	FM 419	
02-20: Modified box note by adding steel beams/girders and subsidiary.	DIST	COUNTY		SHEET NO.	
	ABL	FISHER		106	

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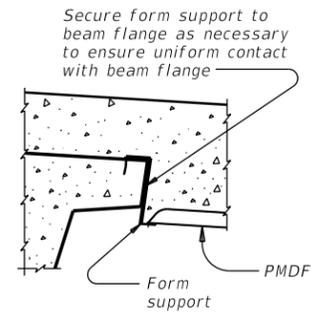
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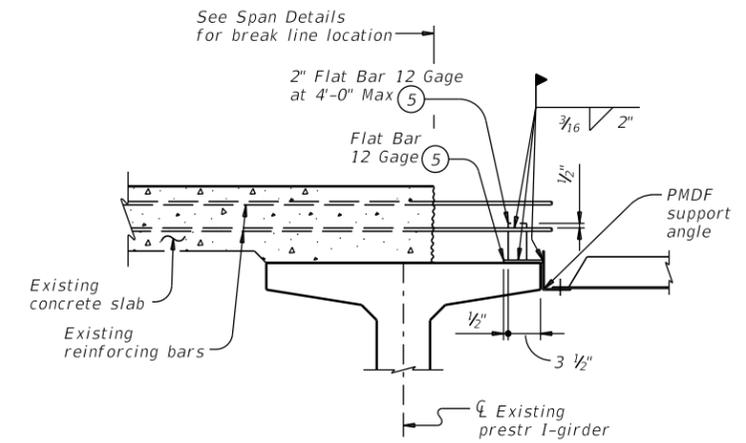
**AT THICKENED SLAB END FOR U-BEAMS**



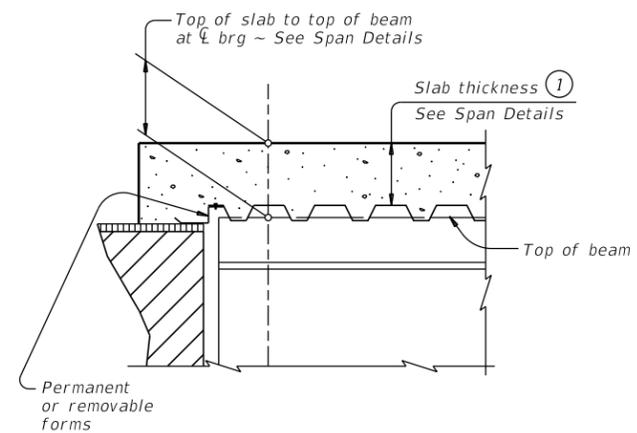
**AT THICKENED SLAB END FOR PRESTRESSED I-BEAMS, I-GIRDERS AND STEEL BEAMS**  
 Showing I-beam block-out. No block-out for I-girders or steel beams.



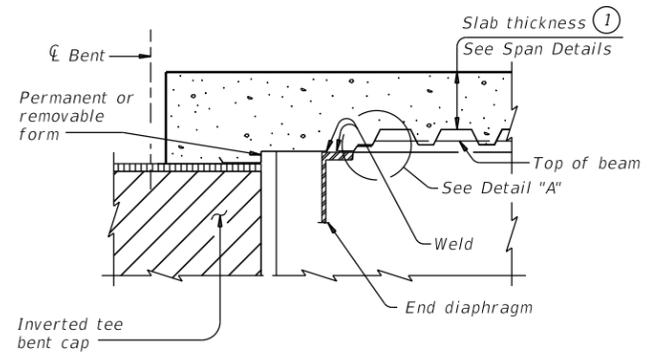
**SECTION A-A**



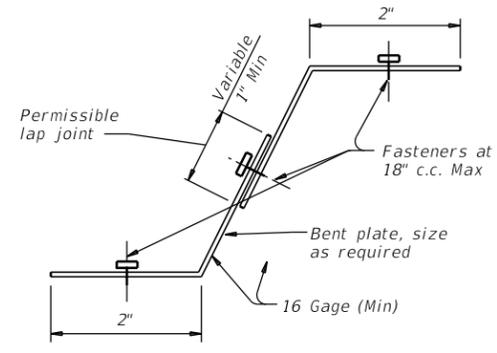
**SHOWING PRESTRESSED CONCRETE I-BEAMS, I-GIRDERS AND U-BEAMS**



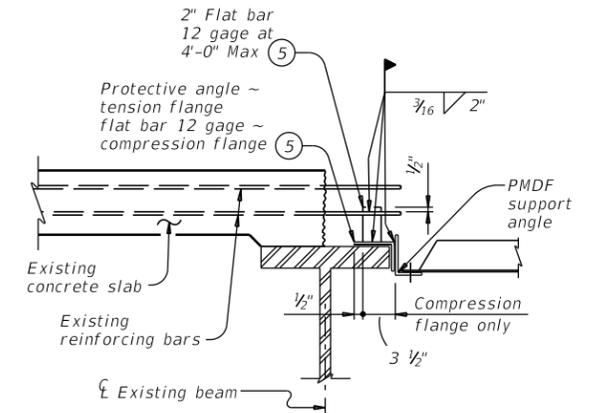
**AT SLAB OVER ABUT BKWL OR INV TEE STEM FOR CONC BEAMS WITHOUT THICKENED SLAB END**



**AT SLAB OVER INV TEE STEM FOR STEEL BEAMS WITHOUT THICKENED SLAB END**

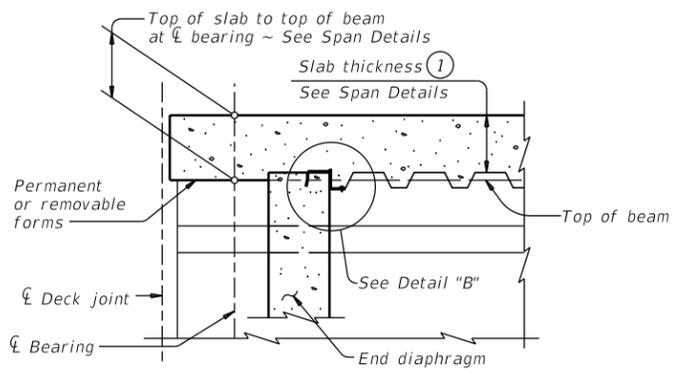


**DETAIL "A"**

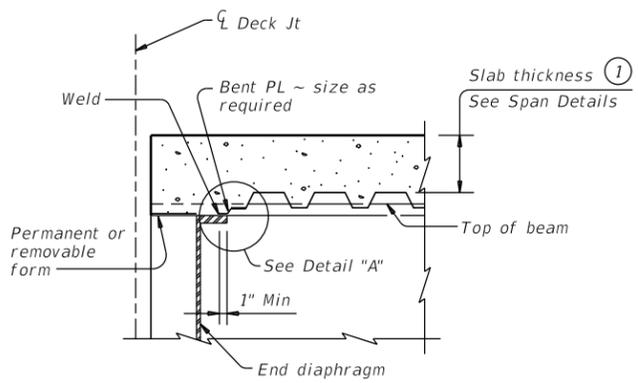


**SHOWING STEEL BEAMS**

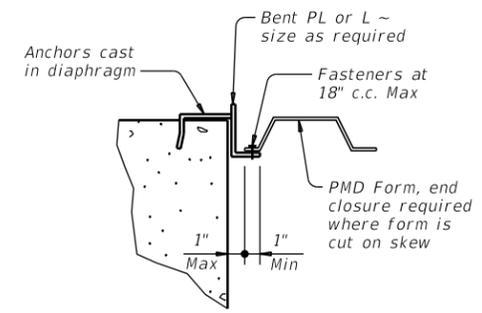
**WIDENING DETAILS**



**AT CONC END DIAPHRAGM FOR PRESTRESSED I-BEAMS AND STEEL BEAMS**



**AT END DIAPHRAGM FOR STEEL BEAMS WITHOUT THICKENED SLAB END**



**DETAIL "B"**

- ① Slab thickness minus 3/8" if corrugations match reinforcing bars
- ⑤ Minimum yield stress of 12 gage bars shall be 40 ksi

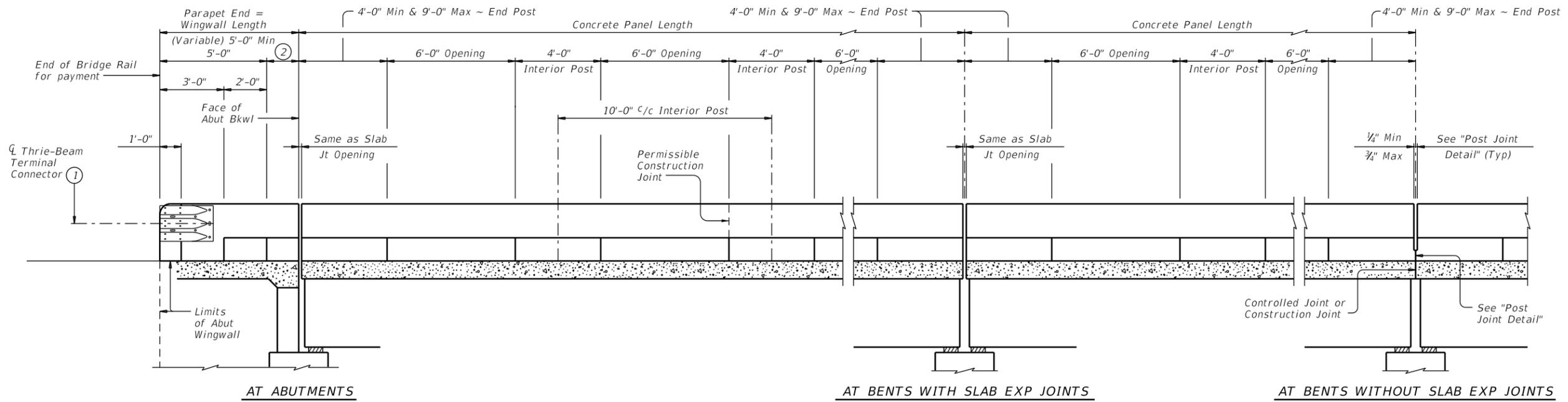
**DETAILS AT ENDS OF BEAMS**

SHEET 2 OF 2

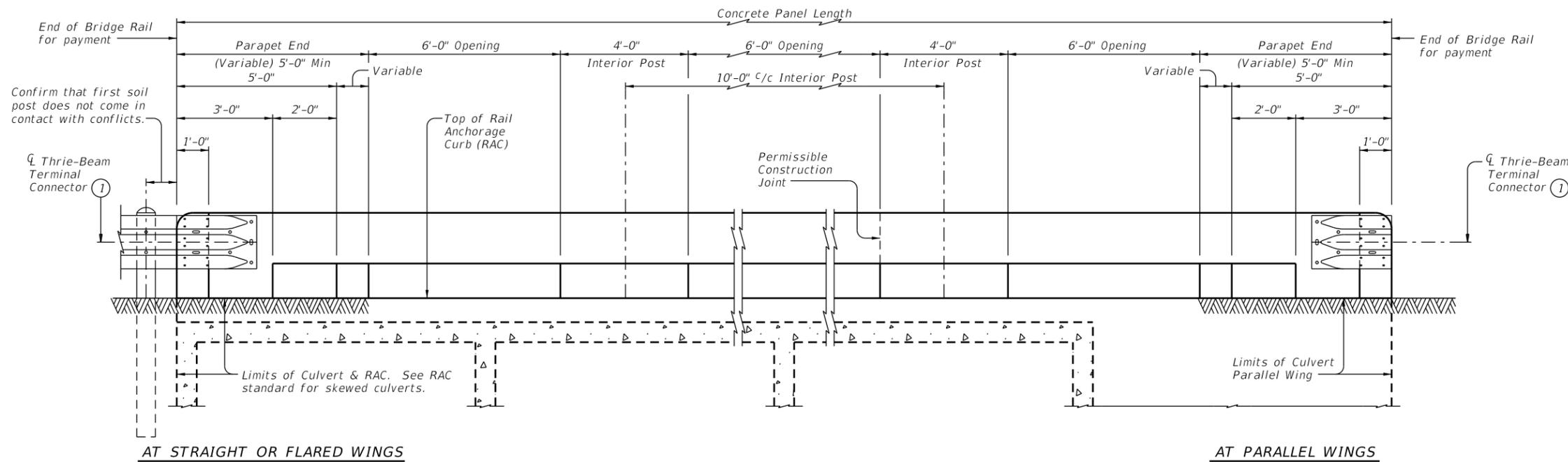
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<b>PERMANENT METAL DECK FORMS</b>			
<b>PMDF</b>			
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<small>02-20: Modified box note by adding steel beams/girders and subsidiary.</small>		DIST.	COUNTY
		ABL	FISHER
		SHEET NO.	
		107	

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**ROADWAY ELEVATION OF RAIL ON BRIDGE**



**ROADWAY ELEVATION OF RAIL ON BOX CULVERTS**

Showing 0° skew culvert. Skewed culverts similar. See RAC standard for details not shown. Vertical joints in concrete rail are not required, unless shown elsewhere.

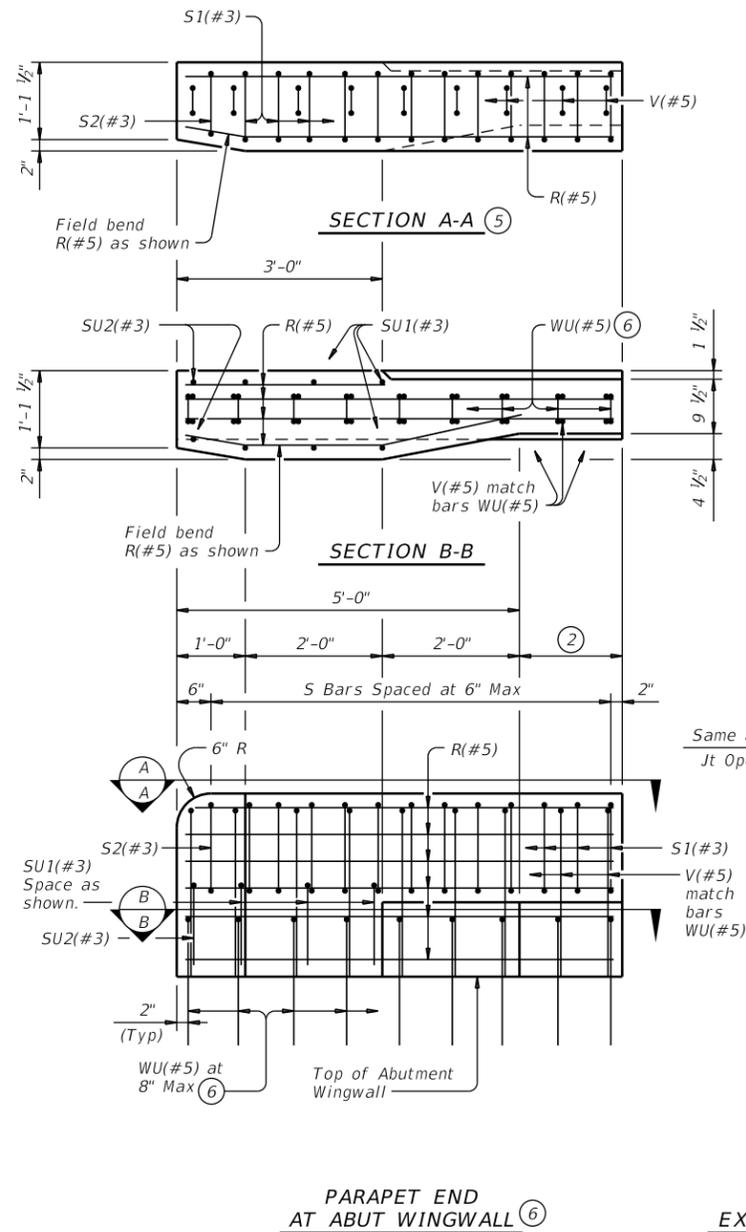
- ① Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.
- ② Wingwall Length minus 5'-0" (Varies)

SHEET 1 OF 3

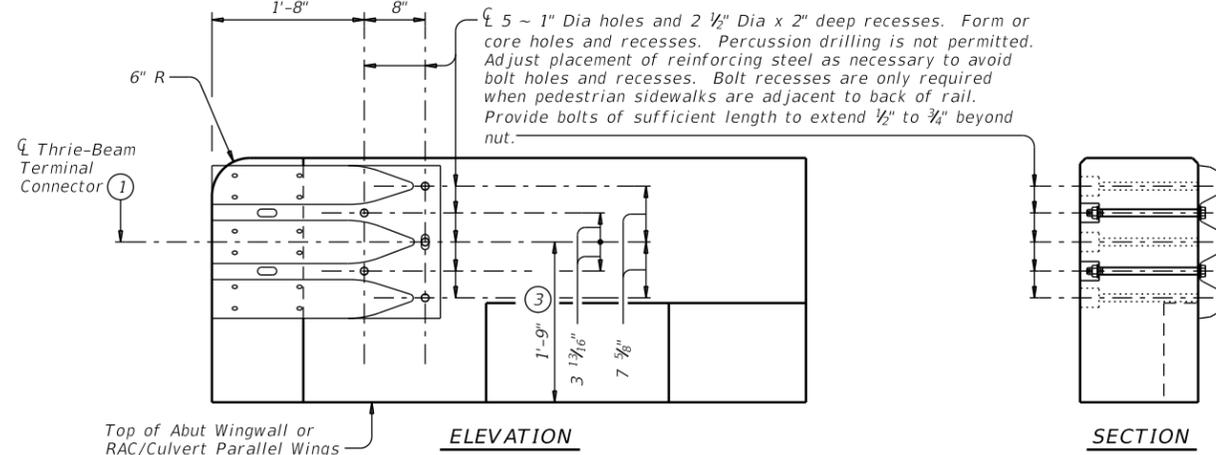
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<h2>TRAFFIC RAIL</h2>					
<h3>TYPE T223</h3>					
FILE: r1std005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES	
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REVISIONS	0983	02	022	FM 419	
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	ABL	FISHER	108		

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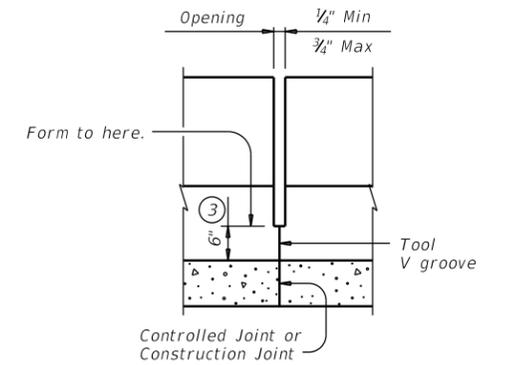
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PARAPET END AT ABUT WINGWALL ⑥

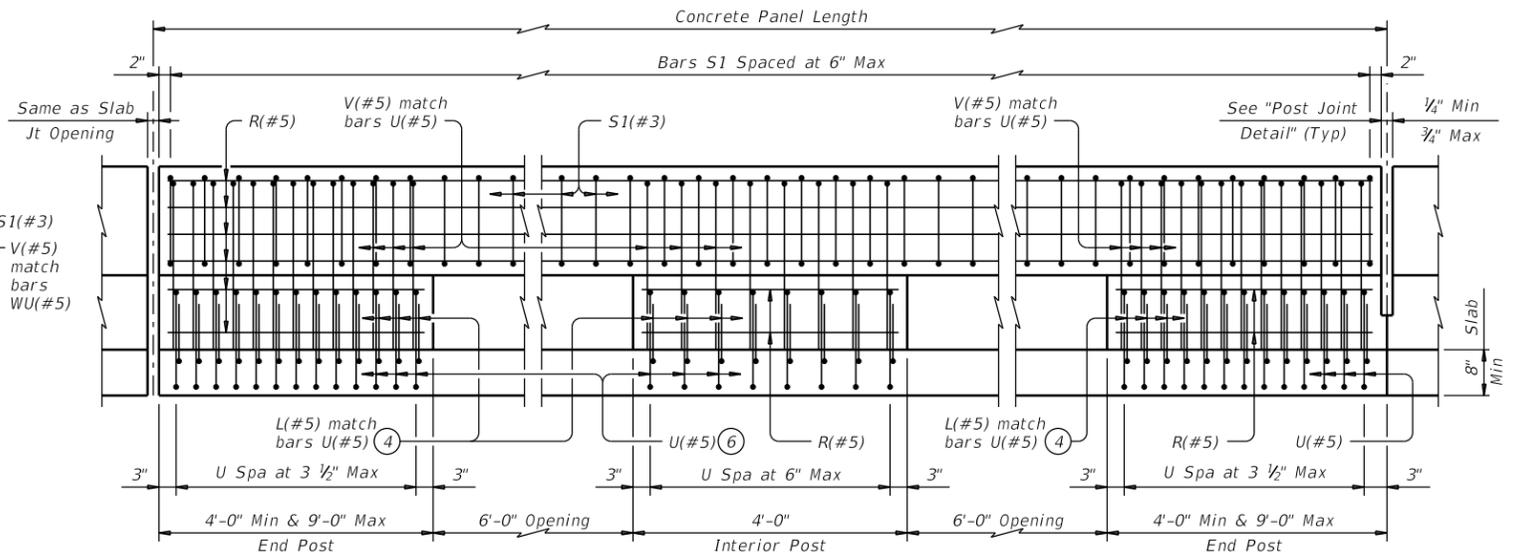


TERMINAL CONNECTION DETAILS



POST JOINT DETAIL

Provide at all interior bents without slab expansion joints.



ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

- ① Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.
- ② Wingwall Length minus 5'-0" (Varies)
- ③ Increase 2" for structures with overlay.
- ④ Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.
- ⑤ Bars SU1(#3), SU2(#3) and WU(#5) not shown for clarity.
- ⑥ Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

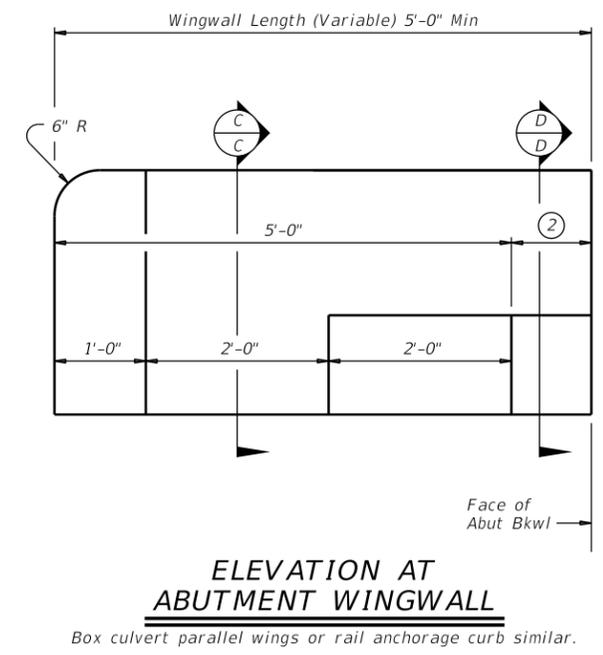
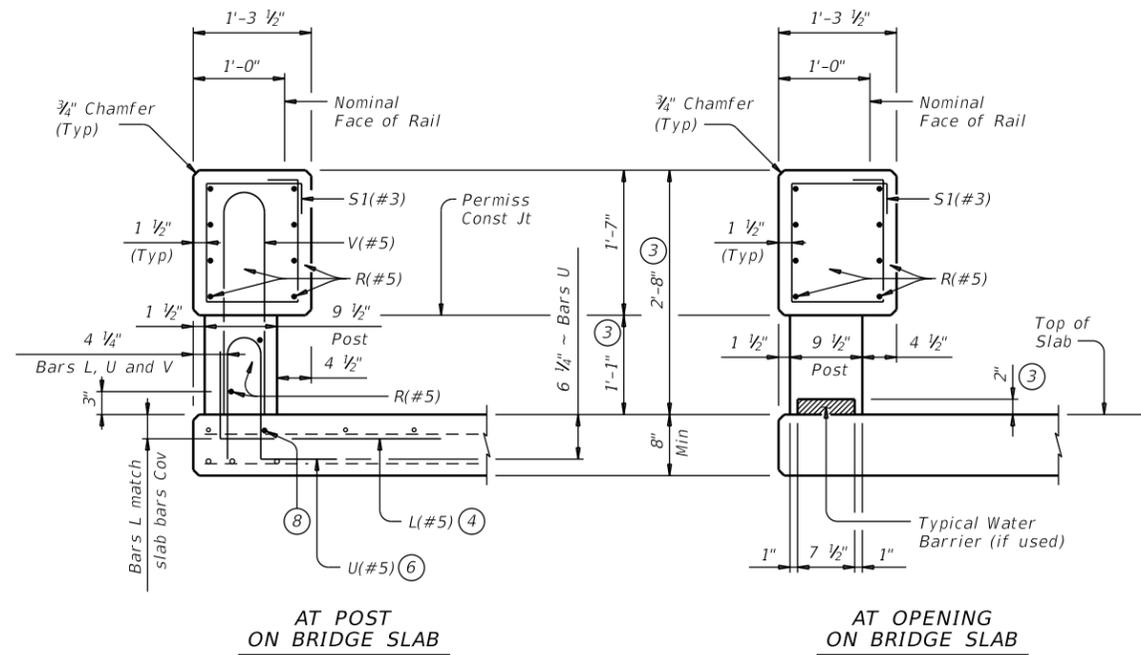
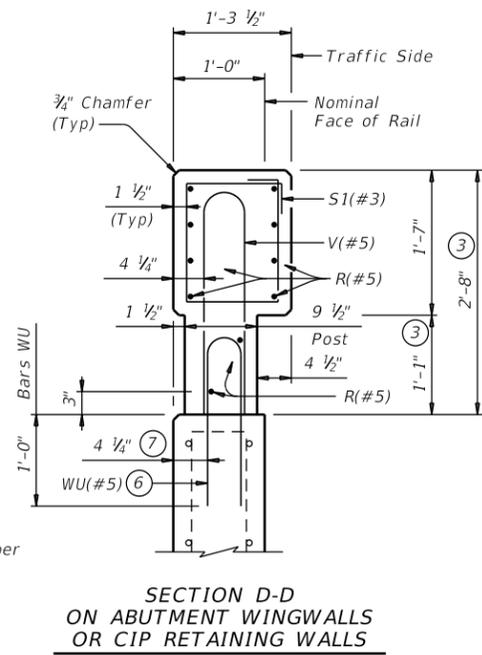
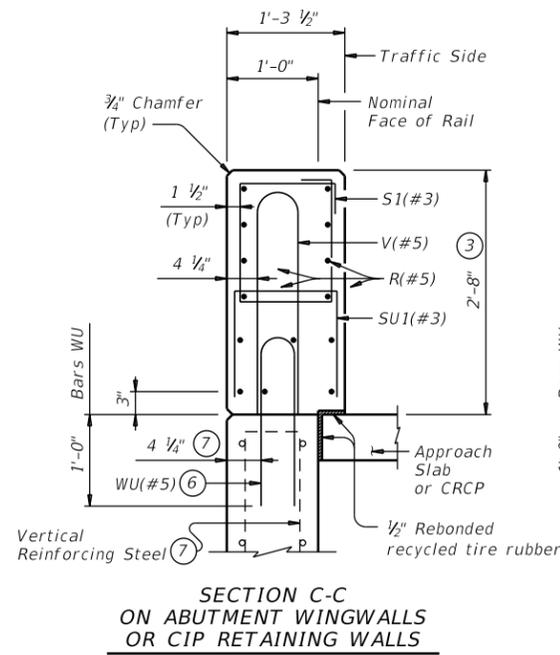
TRAFFIC RAIL

TYPE T223

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	DIST	COUNTY	SHEET NO.	
	ABL	FISHER	109	

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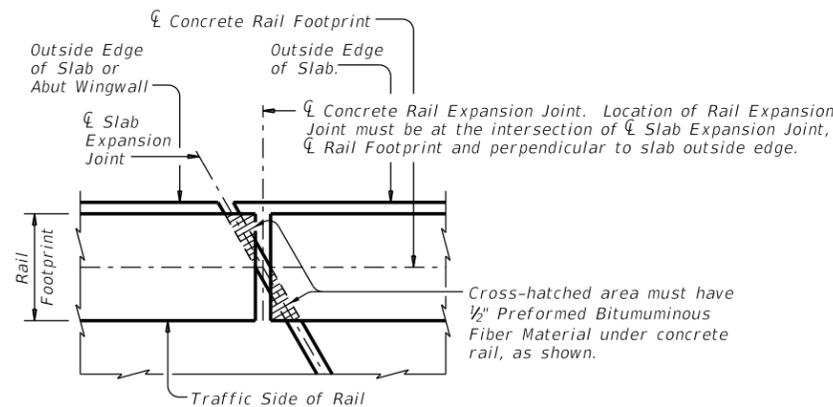
DATE: 3/28/2021  
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**SECTIONS THRU RAIL**

Sections on box culverts similar.

- ② Wingwall Length minus 5'-0" (Varies)
- ③ Increase 2" for structures with overlay.
- ④ Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.
- ⑥ Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.
- ⑦ When vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls on traffic side of wall, move the horizontal wingwall/retaining wall reinforcing to the inside of Bars WU where bars conflict.
- ⑧ Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.
- ⑨ At the Contractor's option, Bars V may be replaced by extending Bars U to 2'-5 1/4" above the roadway surface without overlay.



**PLAN OF RAIL AT EXPANSION JOINTS**

Example showing Slab Expansion Joints without breakbacks.

**CONSTRUCTION NOTES:**

Face of rail and parapet must be vertical transversely unless otherwise shown in the plans or approved by the Engineer.  
 Provide water barriers at openings draining onto undercrossing roadways and sidewalks. They may be cast-in-place or precast in convenient lengths and bonded to the bridge deck with an approved epoxy cement.  
 Chamfer all exposed corners.

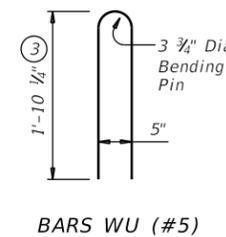
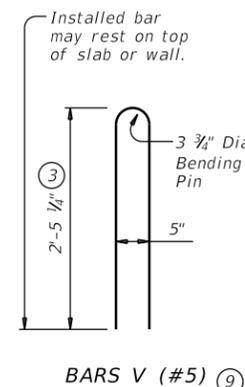
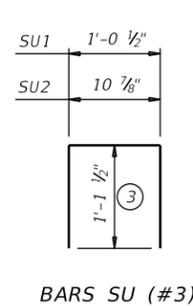
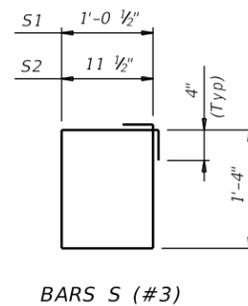
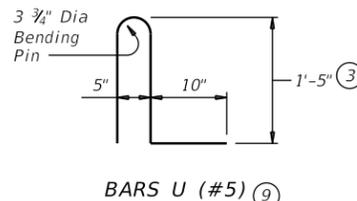
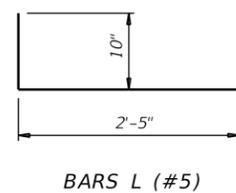
**MATERIAL NOTES:**

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.  
 Provide Grade 60 reinforcing steel.  
 Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.  
 Deformed Welded Wire Reinforcing (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U, V, and WU unless noted otherwise. Provide the same laps as required for reinforcing bars.  
 Provide bar laps, where required, as follows:  
 Uncoated or galvanized ~ #5 = 2'-0"  
 Epoxy coated ~ #5 = 3'-0"

**GENERAL NOTES:**

This rail has been evaluated by full-scale crash test to meet MASH TL-3 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.  
 Do not use this railing on bridges with expansion joints providing more than 5" movement.  
 Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.  
 Shop drawings are not required for this rail.  
 Average weight of railing with no overlay is 358 plf.

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

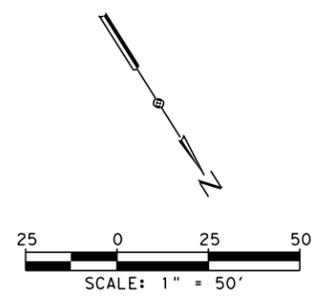


SHEET 3 OF 3

		<b>Bridge Division Standard</b>	
<h1>TRAFFIC RAIL</h1>			
<h2>TYPE T223</h2>			
FILE: r1std005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR
REV: 0983	SECT: 02	JOB: 022	HIGHWAY: FM 419
DIST: ABL	COUNTY: FISHER	SHEET NO. 110	

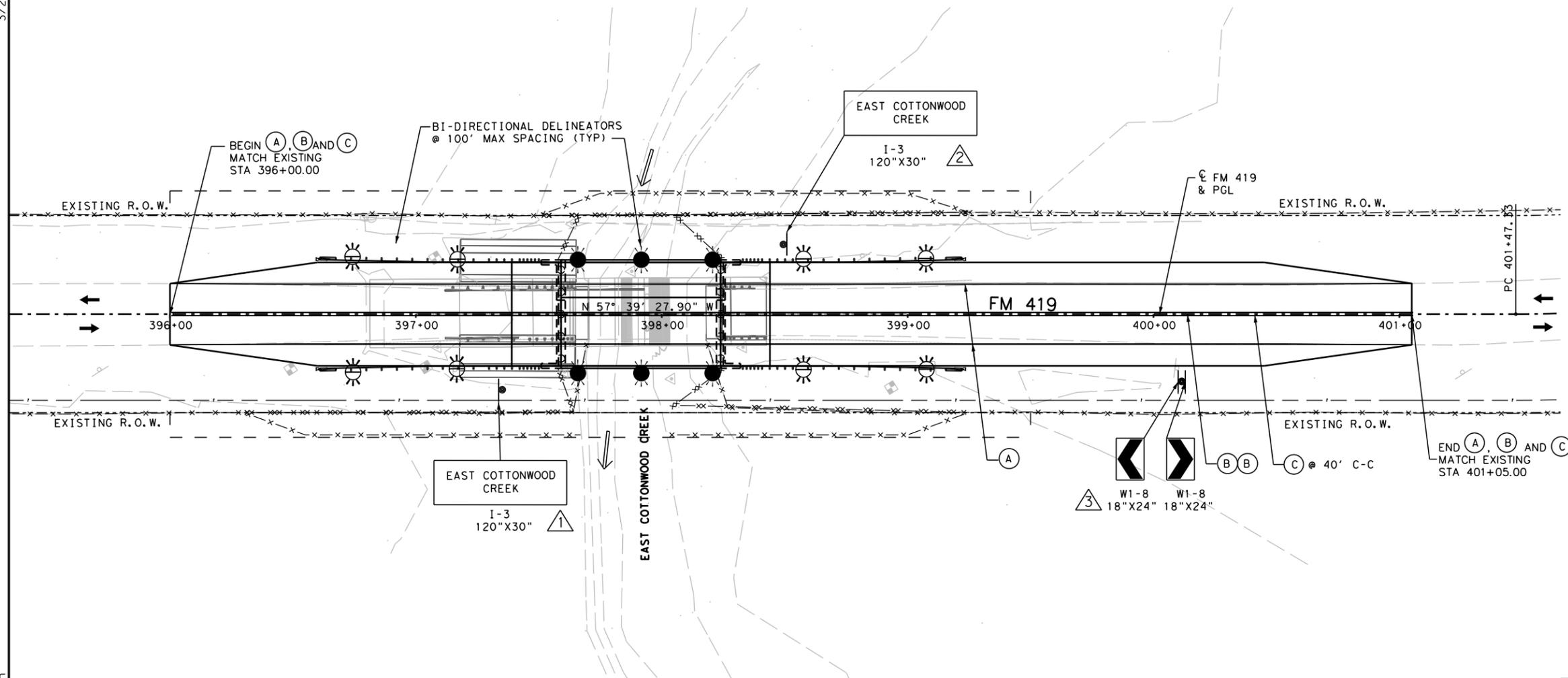
3/28/2021

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**SIGNING AND MARKINGS LEGEND**

- SIGN
- ⊗ INSTL DEL ASSM (D-SW)SZ(BRF)GF2(BI)
- ⊗ INSTL DEL ASSM (D-SW)SZ(BRF)CTB(BI)
- (A) RE PM W/RET REQ TY I (W) 4" (SLD) (100MIL)
- (B) RE PM W/RET REQ TY I (Y) 4" (SLD) (100MIL)
- (C) REFL PAV MRKR TY-II-A-A
- ⚠ SIGN NUMBER



*Kari Ward*

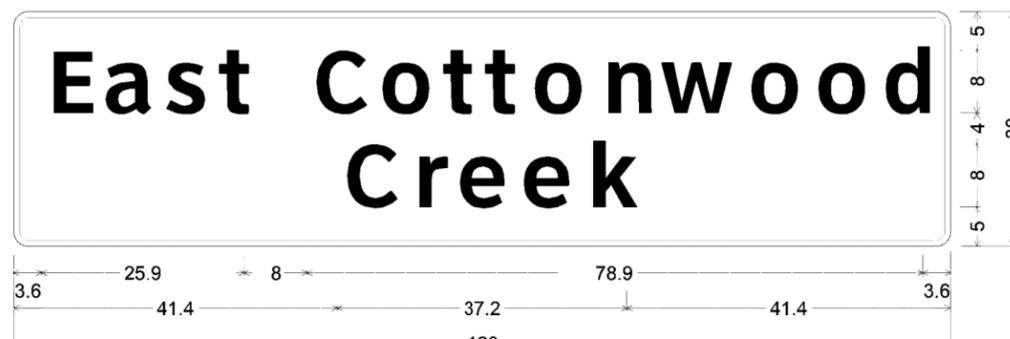
NO.	DATE	REVISION	APPROVED
			 12222 Merit Dr Suite 400 Dallas, TEXAS 75251 P 972-991-0011 F 214-468-8266 Firm # F-6324
			 © 2021

**SIGNING AND PAVEMENT MARKING PLAN**  
FM 419 AT EAST COTTONWOOD CREEK

SCALE: 1"=50' SHEET 1 OF 1

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
KW	6	SEE TITLE SHEET		FM 419
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO
JU	TEXAS	ABL	FISHER	
CHECK	CONTROL	SECTION	JOB	111
JW	0983	02	022	

3/28/2021



I-3 G(6) 8in; 1.9" Radius, 0.8" Border, White on Green;  
 [East] ClearviewHwy-5-W-R; [Cottonwood] ClearviewHwy-5-W-R  
 [Creek] ClearviewHwy-5-W-R



*Kari Ward*

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NO.	DATE	REVISION	APPROVED
			 2435 N CENTRAL EXPY, SUITE 750 RICHARDSON, TEXAS 75080 P 214-468-8200 F 214-468-8266 Firm # F-6324
			 © 2020
<h2>SIGN DETAIL</h2> <p>FM 419 AT EAST COTTONWOOD CREEK</p>			
SCALE: 1"=50'			SHEET 1 OF 1
DESIGN KW	FED RD DIV NO 6	FEDERAL AID PROJECT NO. SEE TITLE SHEET	HIGHWAY NO FM 419
GRAPHICS JU	STATE TEXAS	DISTRICT ABL	COUNTY FISHER
CHECK JW	CONTROL 0983	SECTION 02	JOB 022
CHECK KW			112



DATE: 3/28/2021  
 FILE: V:\2142\active\214220136\06-CAD\6.1-Sheets\standard\07-SIGN\dom1-20.dgn  
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REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS				DELINEATORS				D & OM DESCRIPTIVE CODES	
DEVICE	SIZE 1	SIZE 2	SIZE 3	SIZE 4	SINGLE		DOUBLE		
									<b>INSTL DEL ASSM</b> (D-XX)SZ X (XXXX)XXX (XX) <b>NUMBER OF REFLECTORS</b> S = Single D = Double <b>COLOR OF REFLECTORS</b> W = White Y = Yellow R = Red <b>REFLECTOR UNIT SIZE</b> 1 or 2 <b>TYPE OF POST OR DELINEATOR</b> WC = Wing Channel Post YFLX = Yellow Flexible Post WFLX = White Flexible Post <b>TYPE OF MOUNT</b> GND = Embedded (drivable or set in concrete) CTB = Concrete Barrier Mount GF1 or GF2 = Guard Fence Attachment SRF = Surface Mount <b>DIRECTION</b> If Required BI = Bi-Directional BR = Bi-Directional with red on back
SHEETING: Yellow, White or Red Type B or C reflective sheeting				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 (fix). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.				POST TYPE: WC, YFLX, WFLX, GND					
				MOUNT TYPE: GND, SRF					

OBJECT MARKERS								
DEVICE	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
SHEETING: Yellow-Type B <sub>FL</sub> or C <sub>FL</sub> Sheeting		SHEETING: Yellow - Type B or C Sheeting			SHEETING: Alternating acrylic black and retroreflective yellow - Type B <sub>FL</sub> or C <sub>FL</sub> Sheeting			SHEETING: Red -Type B <sub>FL</sub> or C <sub>FL</sub> Sheeting
POST TYPE: TWT		POST TYPE: WC			POST TYPE: WFLX			POST TYPE: TWT
MOUNT TYPE: WAS, WAP		MOUNT TYPE: GND			MOUNT TYPE: GND, SRF			MOUNT TYPE: WAS, WAP

DEPARTMENTAL MATERIAL SPECIFICATIONS	
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

BARRIER REFLECTORS (BRF)			CHEVRONS				ONE DIRECTION LARGE ARROW	
  	 <b>W1-8</b>				 <b>W1-6</b>			
NOTE: 1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.			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).					
SHEETING: Yellow, White, Red			SIZE (W x L): 18"x 24" (Conventional), 24"x 30" (Conventional Oversize), 30"x 36" (Expressway), 36" x 48" (Freeway)				SIZE (W x L): 48" x 24" (Conventional), 60" x 30" (Expressway & Freeway)	
MOUNTING HEIGHT: 4'-0" or 7'-0"			MOUNTING HEIGHT: 7'-0" Only				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.

Traffic Safety Division Standard

### DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

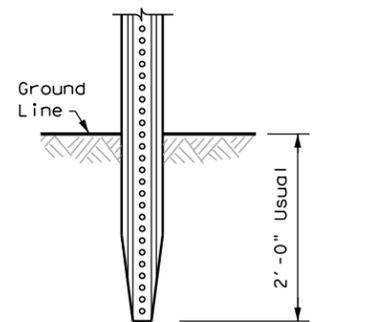
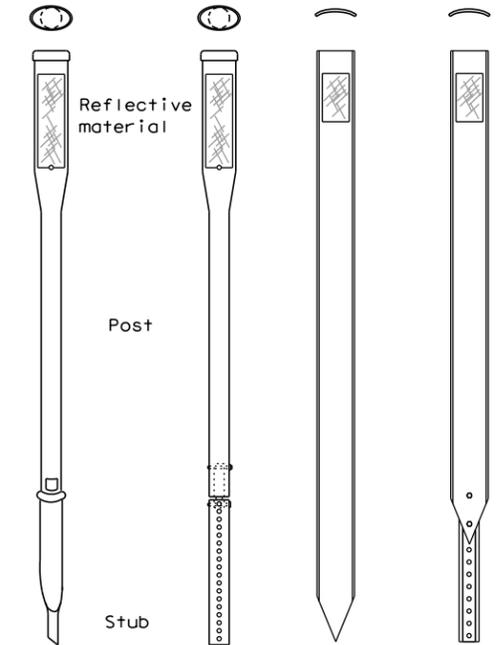
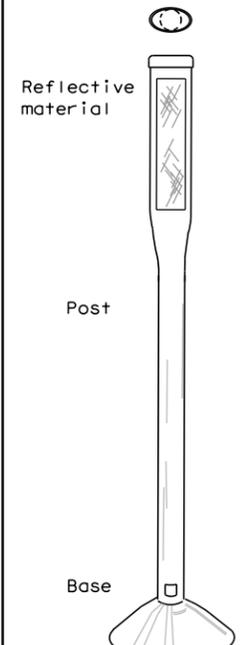
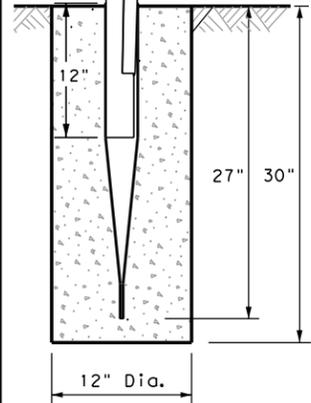
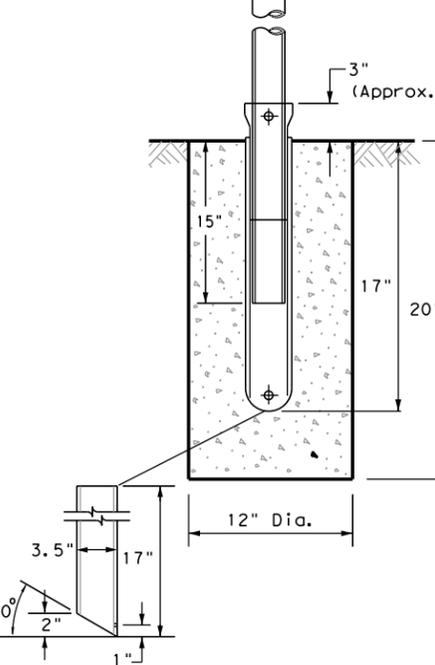
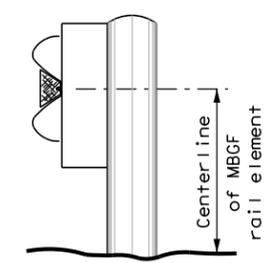
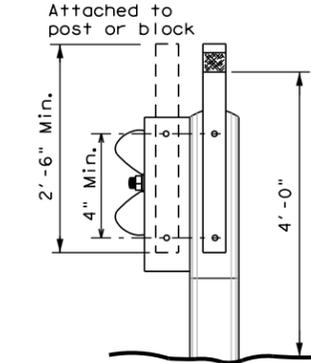
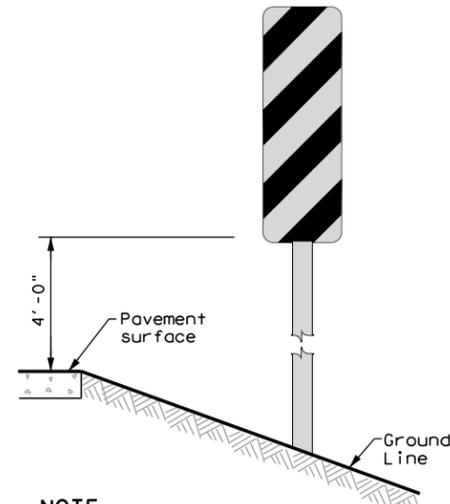
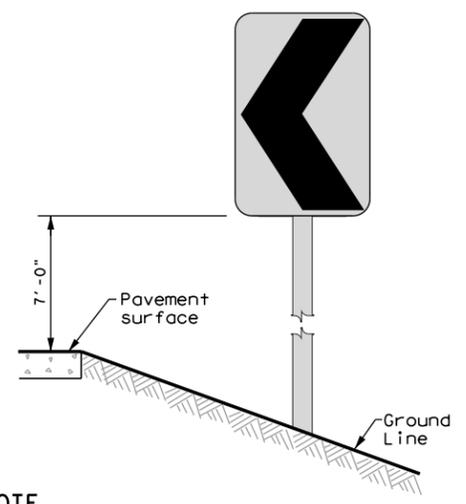
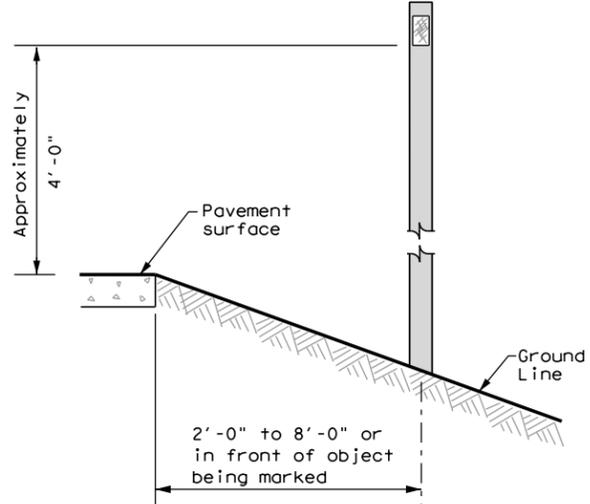
#### D & OM(1)-20

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© TXDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0983	02	022	FM 419
10-09 3-15	DIST	COUNTY	SHEET NO.	
4-10 7-20	ABL	FISHER	114	

20A

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DATE: 3/28/2021  
 FILE: V:\2142\active\214220136\06-CAD\6.1-Sheets\standard.s07\_SIGN\dom2-20.dgn

POST TYPE AND SUPPORT FOUNDATION DETAILS				TYPE OF BARRIER MOUNTS		
WING CHANNEL (WC)	FLEXIBLE POSTS (YFLX, WFLX)		WEDGE ANCHOR SYSTEMS		GUARD FENCE ATTACHMENT	
GND	GND	SRF	WAS	WAP	GF 1	
 <p style="text-align: center;">2'-0" Usual</p>	 <p style="text-align: center;">Reflective material</p> <p style="text-align: center;">Post</p> <p style="text-align: center;">Stub</p>	 <p style="text-align: center;">Reflective material</p> <p style="text-align: center;">Post</p> <p style="text-align: center;">Base</p>	 <p style="text-align: center;">12" Dia.</p> <p style="text-align: center;">27" 30"</p>	 <p style="text-align: center;">3" (Approx.)</p> <p style="text-align: center;">15" 17" 20"</p> <p style="text-align: center;">12" Dia.</p> <p style="text-align: center;">3.5" 17" 30° 2" 1"</p>	 <p style="text-align: center;">Centerline of MBSF rail element</p>	 <p style="text-align: center;">Attached to post or block</p> <p style="text-align: center;">2'-6" Min. 4" Min. 4'-0"</p>
	EMBEDDED	SURFACE MOUNT	STEEL	PLASTIC	CONCRETE TRAFFIC BARRIER (CTB)	
<p><b>NOTES</b></p> <ol style="list-style-type: none"> <li>1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.</li> <li>2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.</li> </ol>			<p><b>NOTE</b></p> <ol style="list-style-type: none"> <li>1. Install per manufacturer's recommendations.</li> </ol>		<p><b>GENERAL NOTES</b></p> <ol style="list-style-type: none"> <li>1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.</li> <li>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.</li> <li>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.</li> <li>4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.</li> <li>5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.</li> <li>6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.</li> </ol>	
<p><b>NOTES</b></p> <ol style="list-style-type: none"> <li>1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.</li> <li>2. Install per manufacturer's recommendations.</li> <li>3. Post length may vary to meet field conditions.</li> <li>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.</li> </ol>						
<b>TYPES 1,3, AND 4 OBJECT MARKERS AND CHEVRONS</b>		<b>CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN</b>		<b>DELINEATORS AND TYPE 2 OBJECT MARKERS</b>		
 <p style="text-align: center;">4'-0" Pavement surface Ground Line</p>		 <p style="text-align: center;">7'-0" Pavement surface Ground Line</p>		 <p style="text-align: center;">Approximately 4'-0" Pavement surface Ground Line</p> <p style="text-align: center;">2'-0" to 8'-0" or in front of object being marked</p>		
<p><b>NOTE</b></p> <p>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)</p>		<p><b>NOTE</b></p> <p>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.</p>		<p>See general notes 1, 2 and 3.</p>		



**Texas Department of Transportation**

*Traffic Safety Division Standard*

## DELINEATOR & OBJECT MARKER INSTALLATION

### D & OM(2)-20

FILE: dom2-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0983	02	022	FM 419
10-09 3-15	DIST	COUNTY	SHEET NO.	
4-10 7-20	ABL	FISHER	115	

20B

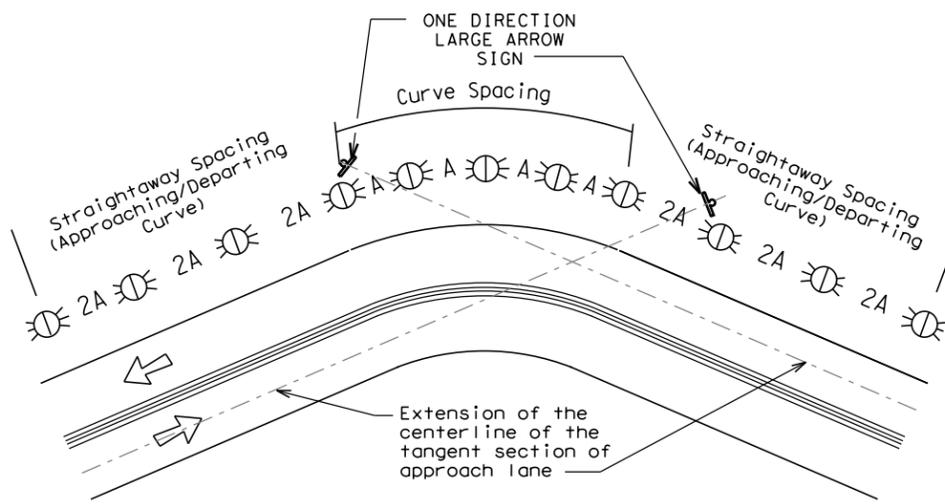
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DATE: 3/28/2021  
 FILE: V:\2142\active\214220136\06-CAD\6.1-Sheets\standards\07\_SIGN\dom3-20.dgn

### MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

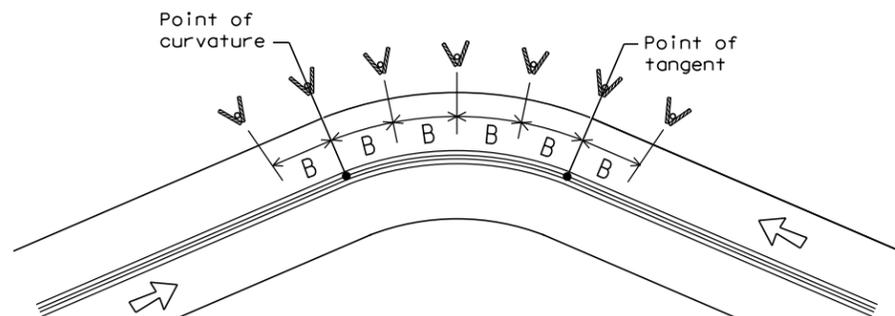
### SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



**NOTE**

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

### SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



**NOTE**

At least one chevron pair is installed beyond the point of tangent in tangent section.

### DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN				
Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
		A	2A	B
1	5730	225	450	—
2	2865	160	320	—
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

### DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN			
Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

### DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp. Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete) and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100' max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100' max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

**NOTES**

- Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
- Barrier reflectors may be used to replace required delineators.
- Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND	
	Bi-directional Delineator
	Delineator
	Sign



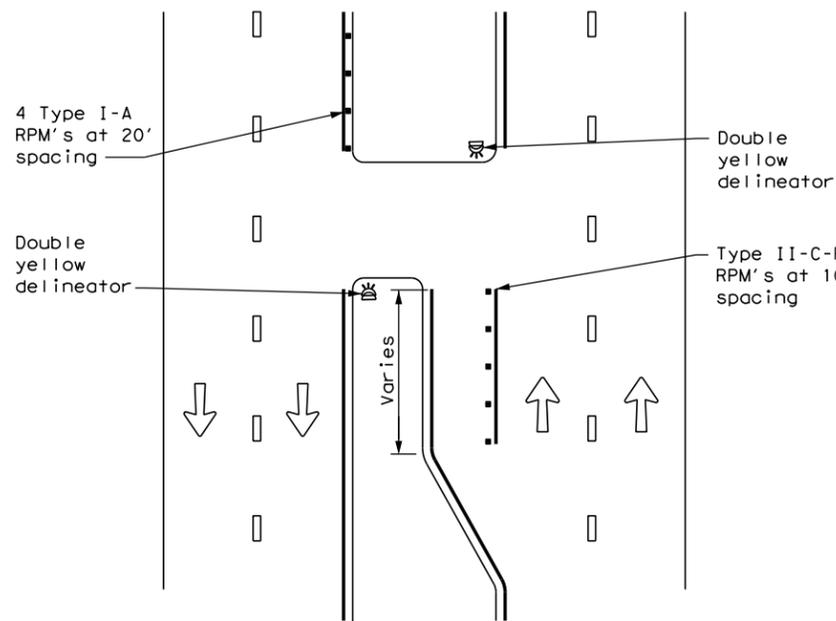
### DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

#### D & OM(3)-20

FILE: dom3-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0983	02	022	FM 419
3-15 8-15	DIST	COUNTY	SHEET NO.	
8-15 7-20	ABL	FISHER	116	

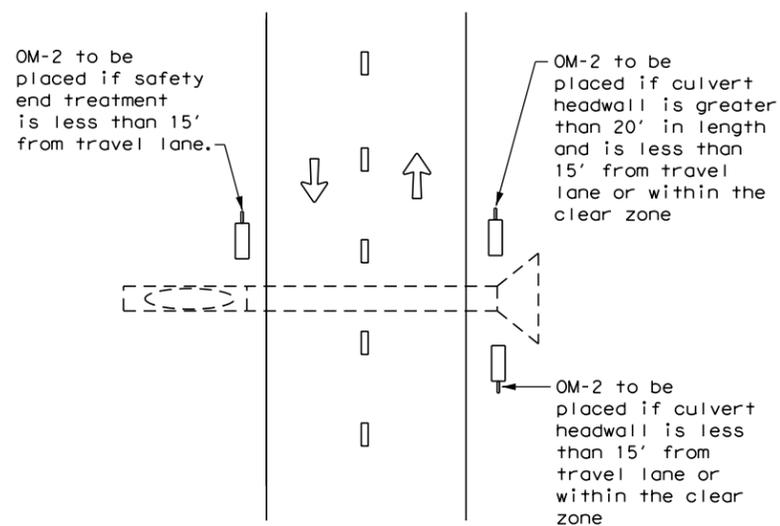
DATE: 3/28/2021  
 FILE: V:\2142\active\214220136\06-CAD\6.1-Sheets\standards\07\_SIGN\dom4-20.dgn  
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**CROSSOVERS**



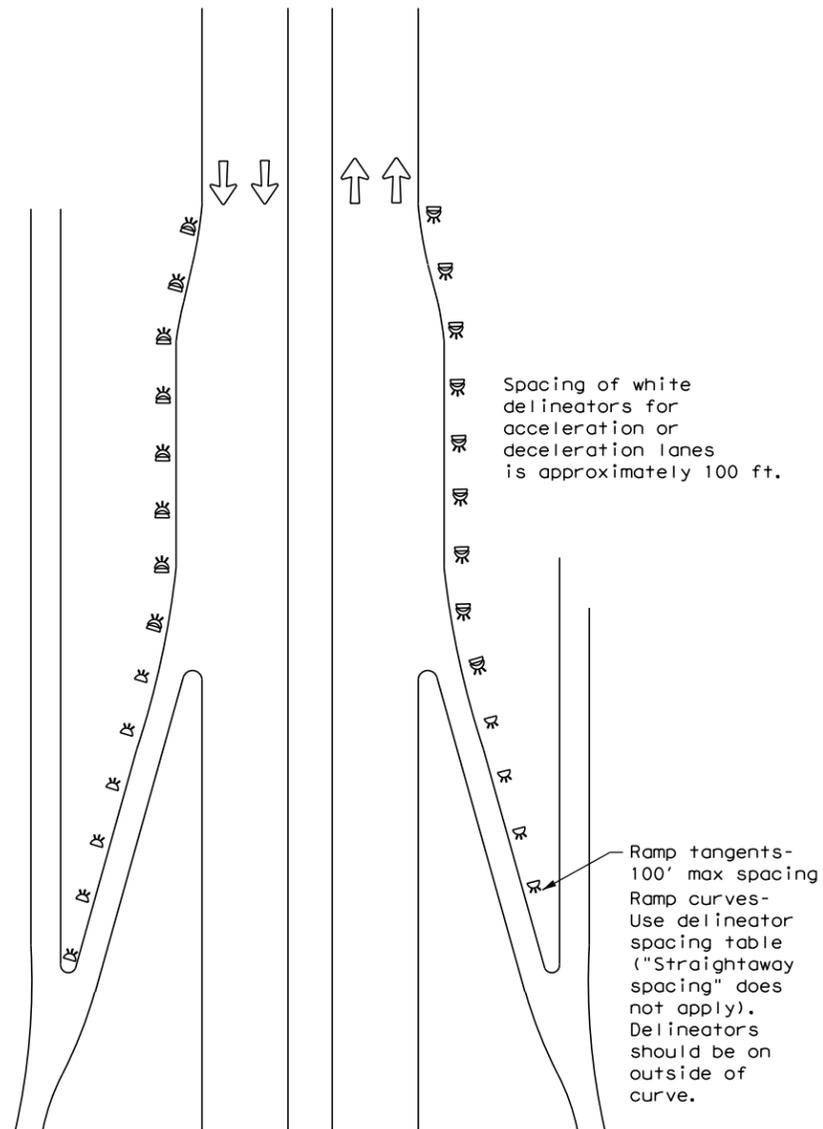
**DETAIL 1**

**FOR CULVERTS WITHOUT MBGF**



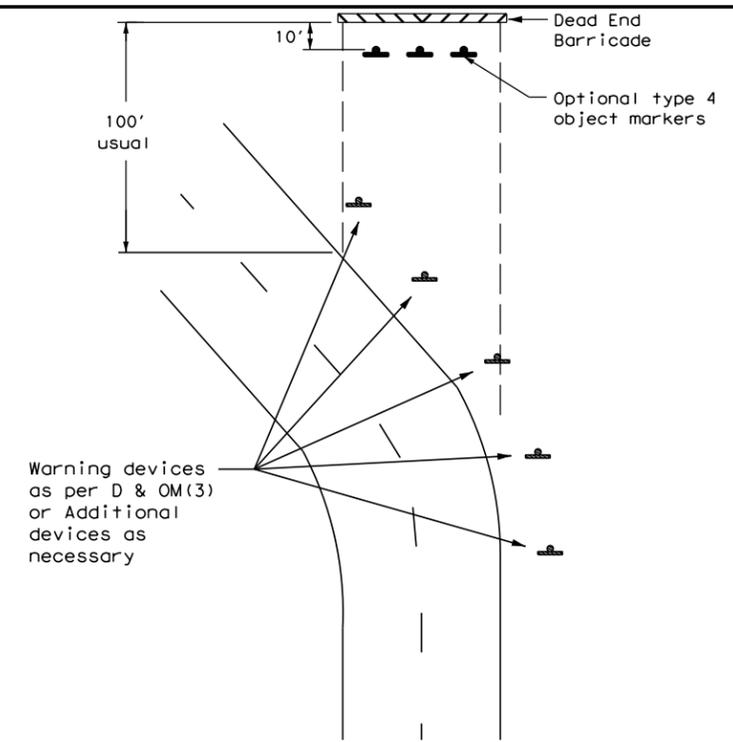
**DETAIL 2**

**FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES**



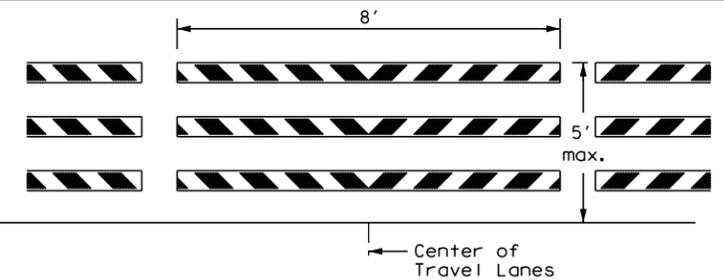
**DETAIL 3**

**TYPICAL APPLICATION OF DEAD END BARRICADE**



**DETAIL 4**

**TYPICAL DEAD END BARRICADE INSTALLATION**



**NOTES**

- Barricade striping shall be red and white reflective sheeting for all permanent road closures.
- Barricade striping is red and white sloping toward the center of the roadway.
- Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

**DETAIL 5**

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

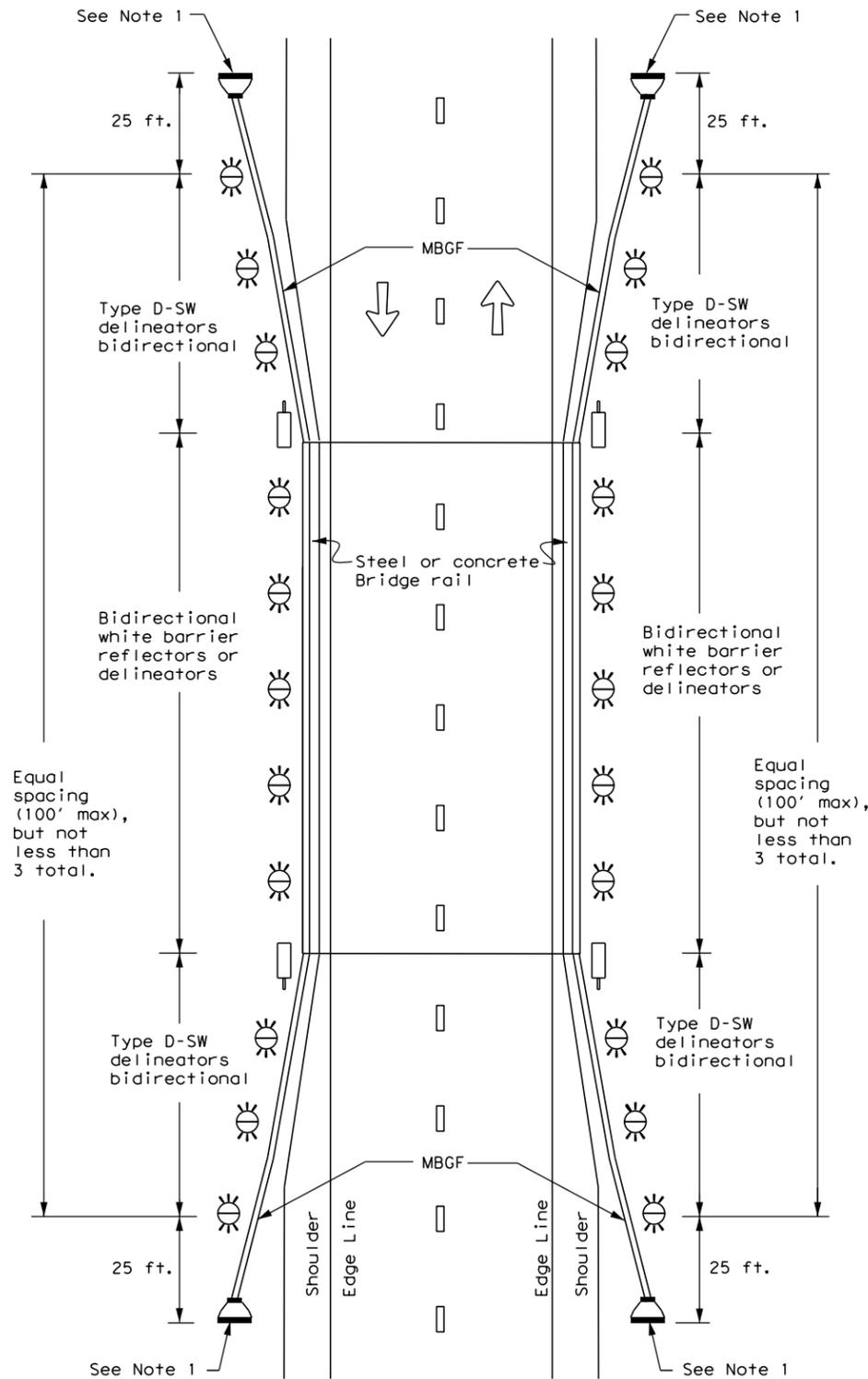


**DELINEATOR & OBJECT MARKER PLACEMENT DETAILS**

**D & OM(4) -20**

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	OW: TXDOT	CK: TXDOT
© TXDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0983	02	022	FM 419
3-15	DIST	COUNTY	SHEET NO.	
7-20	ABL	FISHER	117	

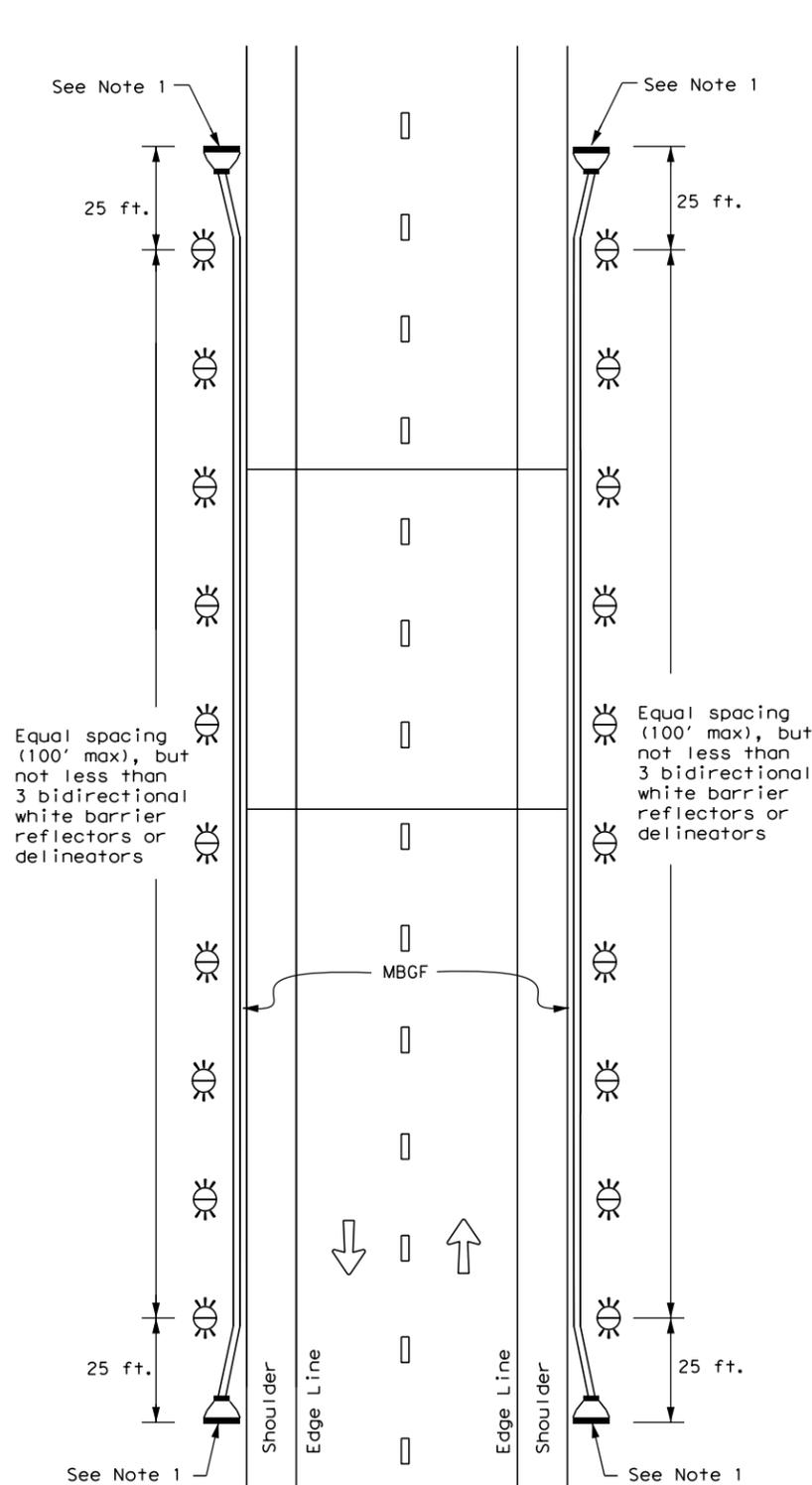
**TWO-WAY, TWO LANE ROADWAY  
WITH REDUCED WIDTH APPROACH RAIL**



**NOTE:**

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

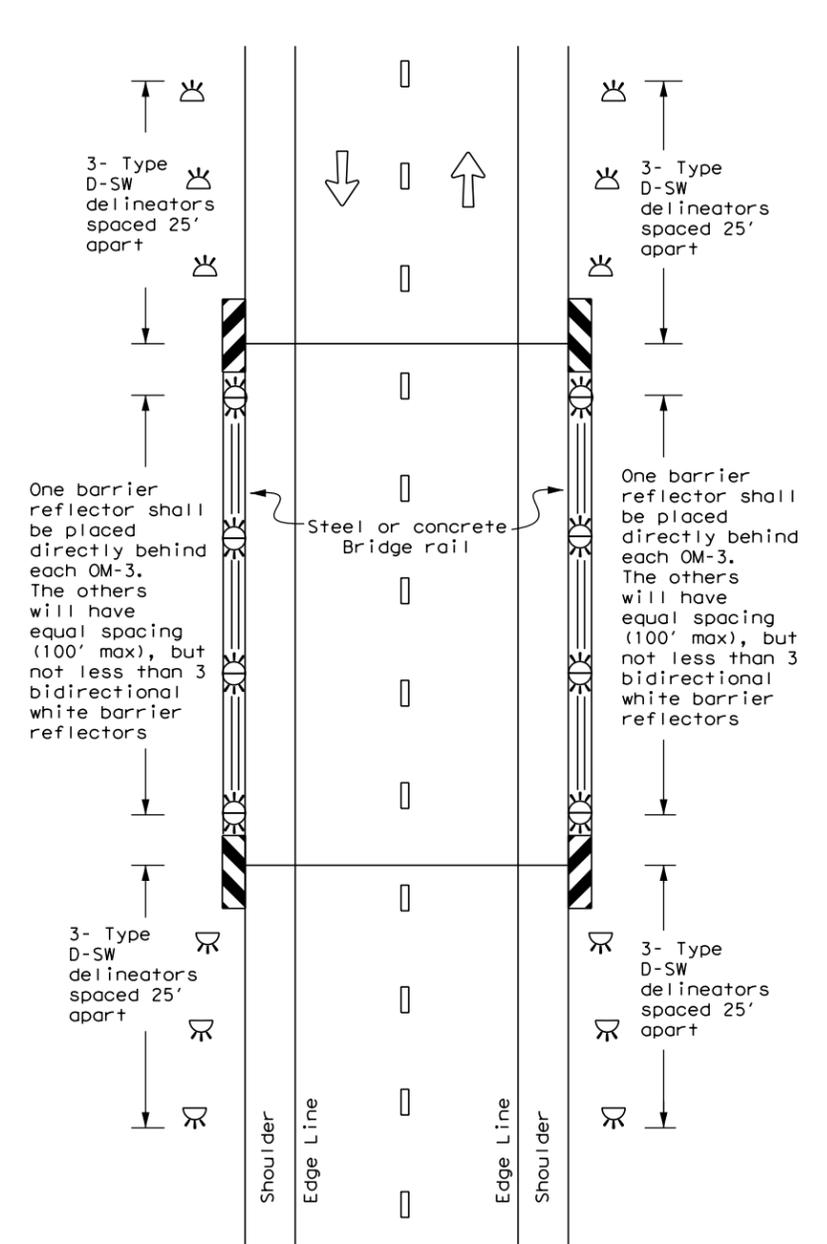
**TWO-WAY, TWO LANE ROADWAY  
WITH METAL BEAM GUARD FENCE (MBGF)**



**NOTE:**

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

**TWO-WAY, TWO LANE ROADWAY  
BRIDGE WITH NO APPROACH RAIL**



**LEGEND**

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow



**DELINEATOR &  
OBJECT MARKER  
PLACEMENT DETAILS**

**D & OM(5) - 20**

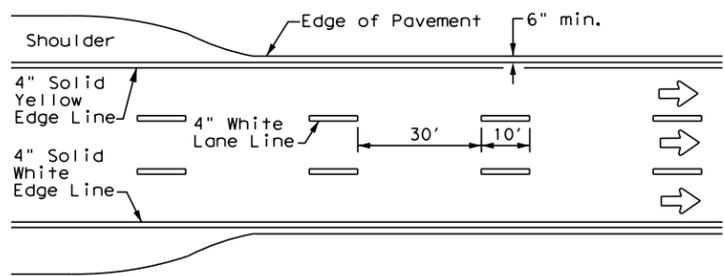
FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0983	02	022	FM 419
7-20	DIST	COUNTY	SHEET NO.	
	ABL	FISHER	118	

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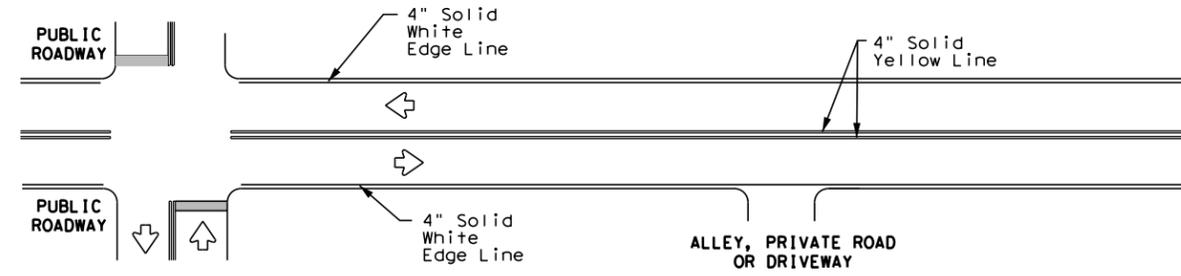
DATE: 3/28/2021  
 FILE: V:\2142\active\214220136\06-CAD\6.1-Sheets\standard\07\_SIGN\dom5-20.dgn

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

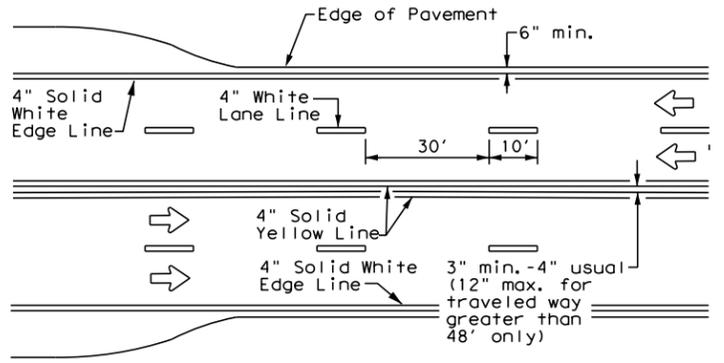
DATE: 3/28/2021  
 FILE: V:\2142\active\214220159\06-CAD\6.1-Sheets\standards\07\_SIGN\pm1-20.dgn



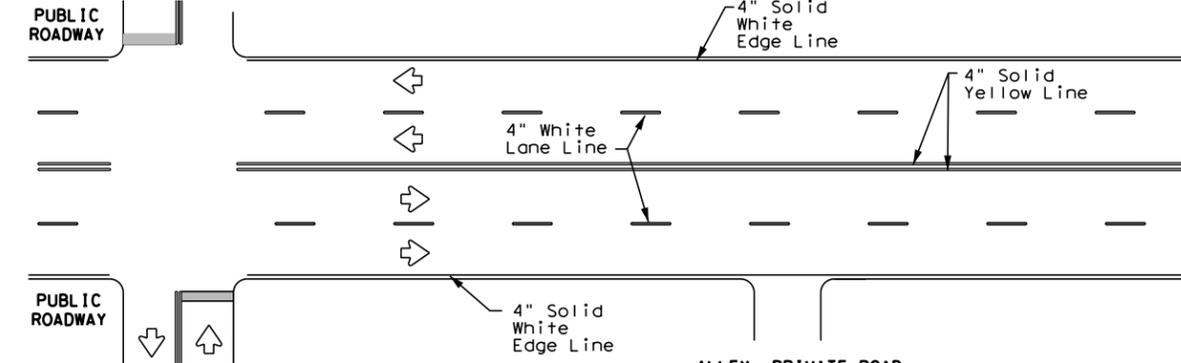
**EDGE LINE AND LANE LINES  
ONE-WAY ROADWAY  
WITH OR WITHOUT SHOULDERS**



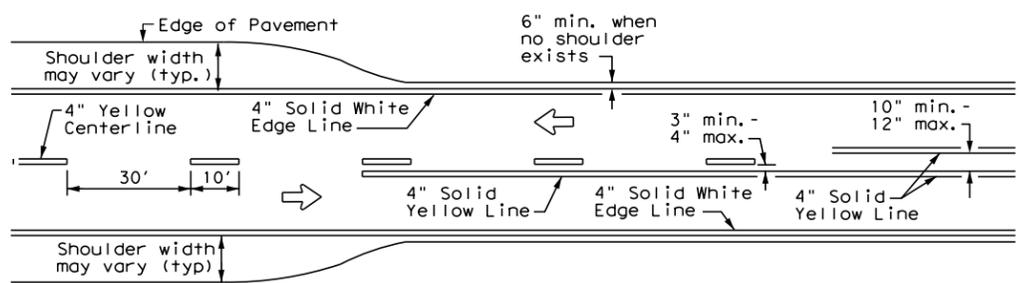
**TYPICAL TWO-LANE, TWO-WAY PAVEMENT  
MARKINGS THROUGH INTERSECTIONS**



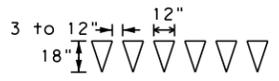
**CENTERLINE AND LANE LINES  
FOUR LANE TWO-WAY ROADWAY  
WITH OR WITHOUT SHOULDERS**



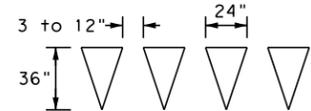
**TYPICAL MULTI-LANE, TWO-WAY PAVEMENT  
MARKINGS THROUGH INTERSECTIONS**



**TWO LANE TWO-WAY ROADWAY  
WITH OR WITHOUT SHOULDERS**

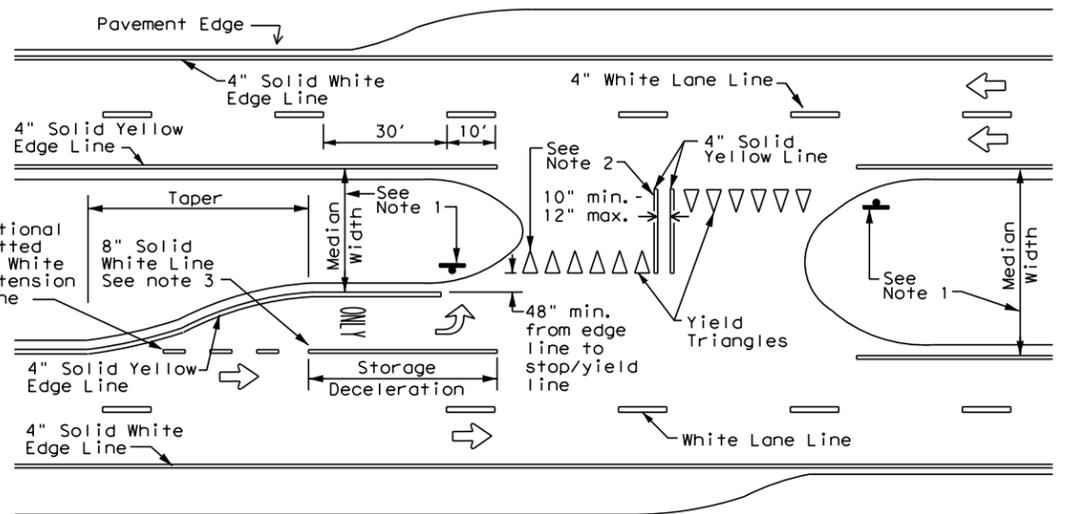


For posted speed on road being marked equal to or less than 40 MPH.



For posted speed on road being marked equal to or greater than 45 MPH.

**YIELD LINES**



**FOUR LANE DIVIDED ROADWAY CROSSOVERS**

**NOTES**

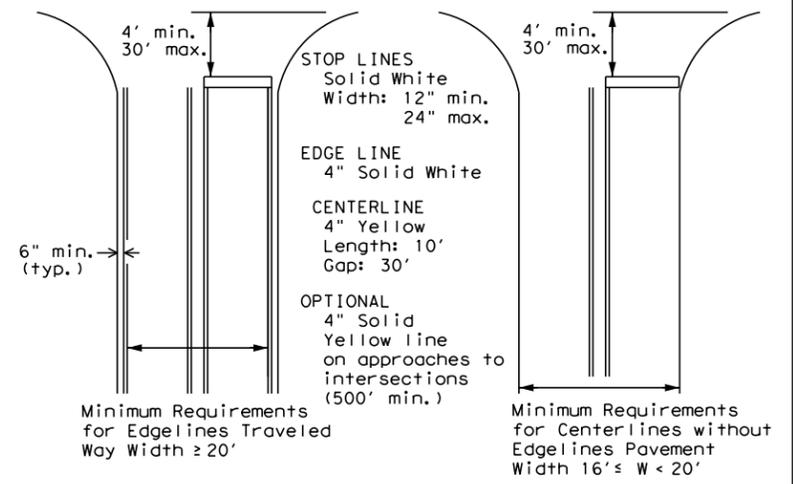
- Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs are optional as determined by the Engineer.
- Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield triangles shall only be used with yield signs.
- 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**

- Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines are not required in curb and gutter sections of roadways.
- The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to the inside of edgeline of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



**GUIDE FOR PLACEMENT OF STOP LINES,  
EDGE LINE & CENTERLINE**

Based on Traveled Way and Pavement Widths for Undivided Highways



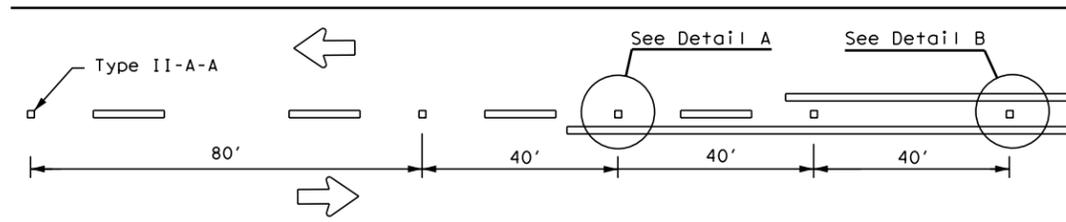
**TYPICAL STANDARD  
PAVEMENT MARKINGS**

**PM(1) - 20**

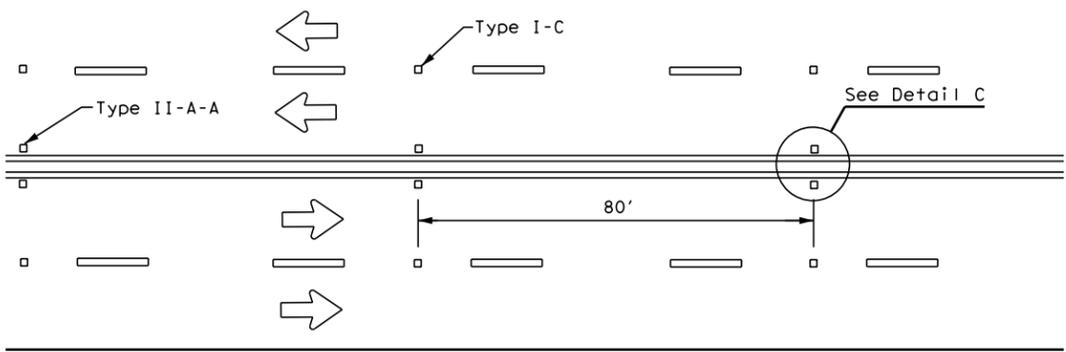
FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
© TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
8-95 3-03 REVISIONS	0983	02	022	FM 419
5-00 2-12	DIST	COUNTY	SHEET NO.	
8-00 6-20	ABL	FISHER	119	

# REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

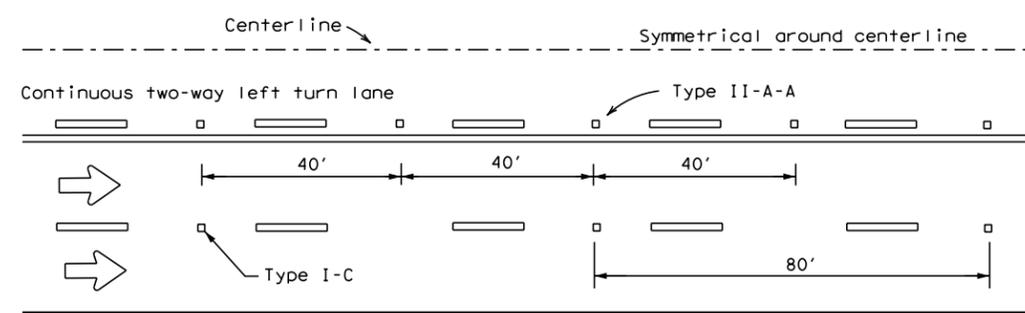
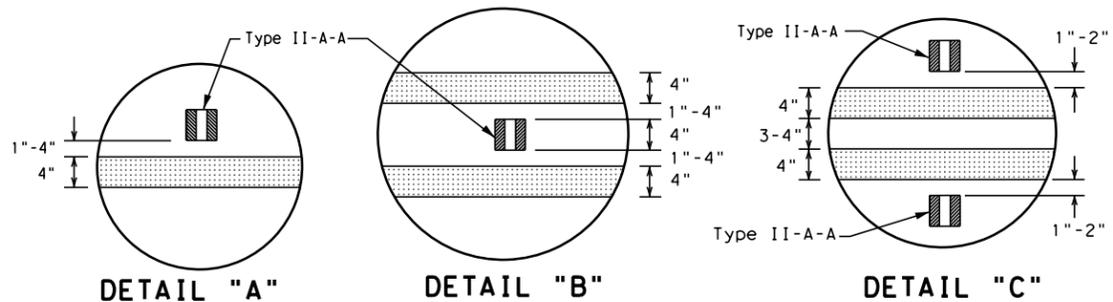
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



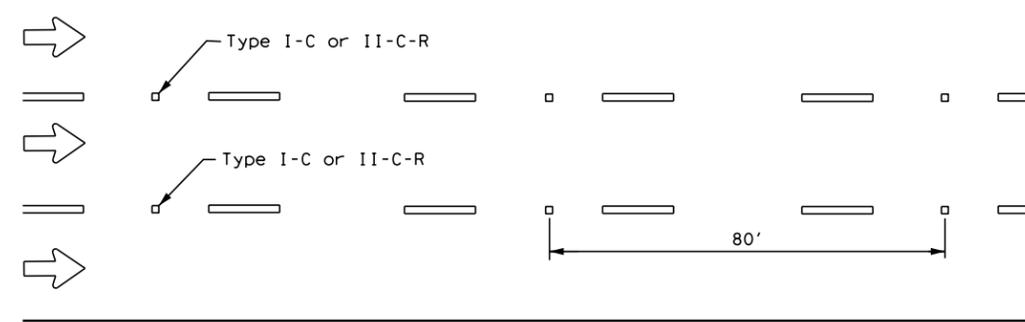
**CENTERLINE FOR ALL TWO LANE ROADWAYS**



**CENTERLINE & LANE LINES  
FOR FOUR LANE TWO-WAY HIGHWAYS**



**CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE**

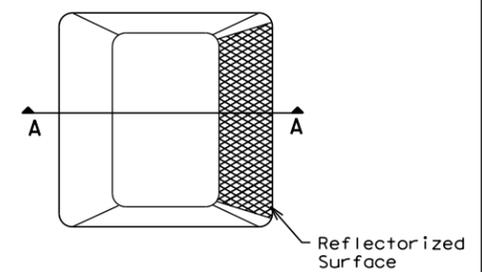


**LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)**

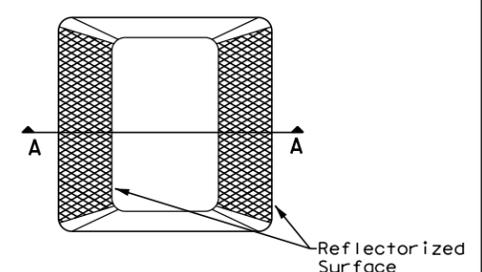
Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

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

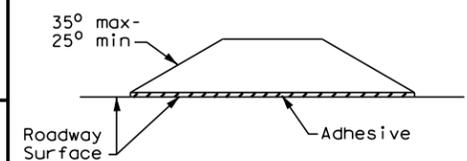
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



**Type I (Top View)**



**Type II (Top View)**



**SECTION A**

**RAISED PAVEMENT MARKERS**

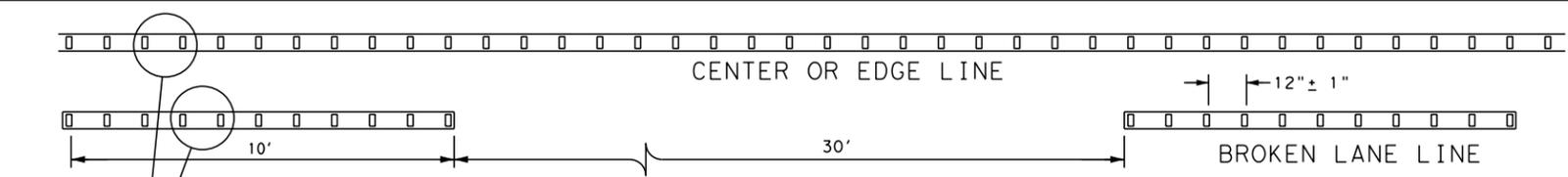


## POSITION GUIDANCE USING RAISED MARKERS REFLECTORIZED PROFILE MARKINGS PM(2) - 20

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
© TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
4-92 2-10 REVISIONS	0983	02	022	FM 419
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	ABL	FISHER		120

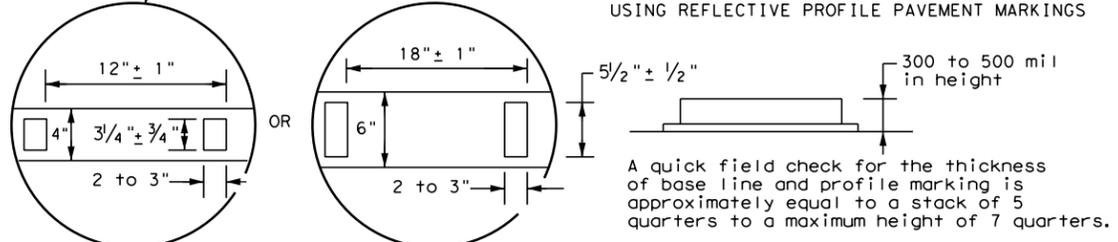
**GENERAL NOTES**

- All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
- On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.



**REFLECTORIZED PROFILE  
PATTERN DETAIL**

USING REFLECTIVE PROFILE PAVEMENT MARKINGS



**NOTE**

Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

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DATE: 3/28/2021  
 FILE: V:\2142\active\214220159\06-CAD\6.1-Sheets\standard\07\_SIGN\smgden.dgn

### SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

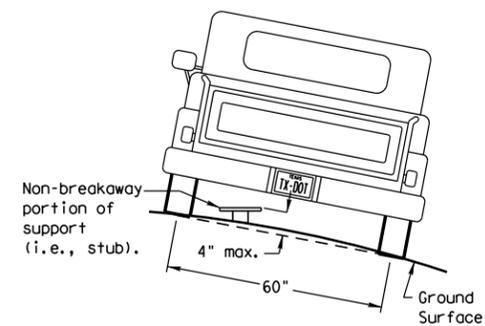
SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)

**Post Type**  
 FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))  
 TWT = Thin-Walled Tubing (see SMD(TWT))  
 10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))  
 S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

**Number of Posts (1 or 2)**  
**Anchor Type**  
 UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))  
 UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))  
 WS = Wedge Anchor Steel - (see SMD(TWT))  
 WP = Wedge Anchor Plastic (see SMD(TWT))  
 SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))  
 SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

**Sign Mounting Designation**  
 P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))  
 T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))  
 U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))  
 IF REQUIRED  
 1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))  
 BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))  
 WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))  
 EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-3))

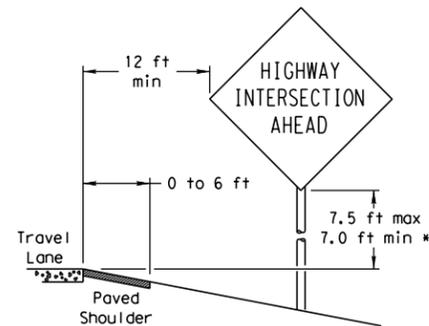
### REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

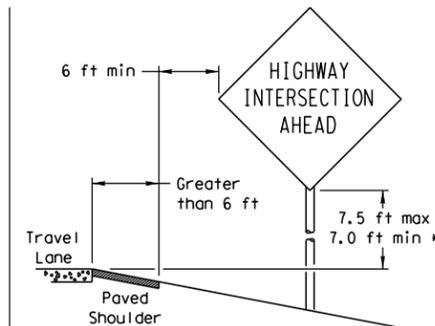
### SIGN LOCATION

#### PAVED SHOULDERS



#### LESS THAN 6 FT. WIDE

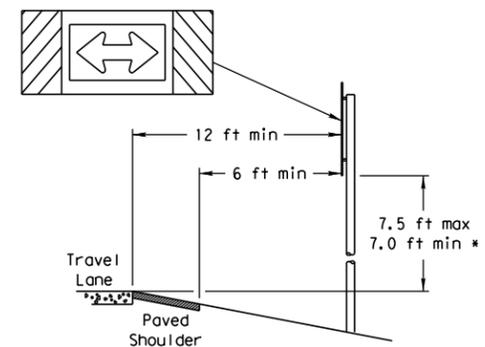
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



#### GREATER THAN 6 FT. WIDE

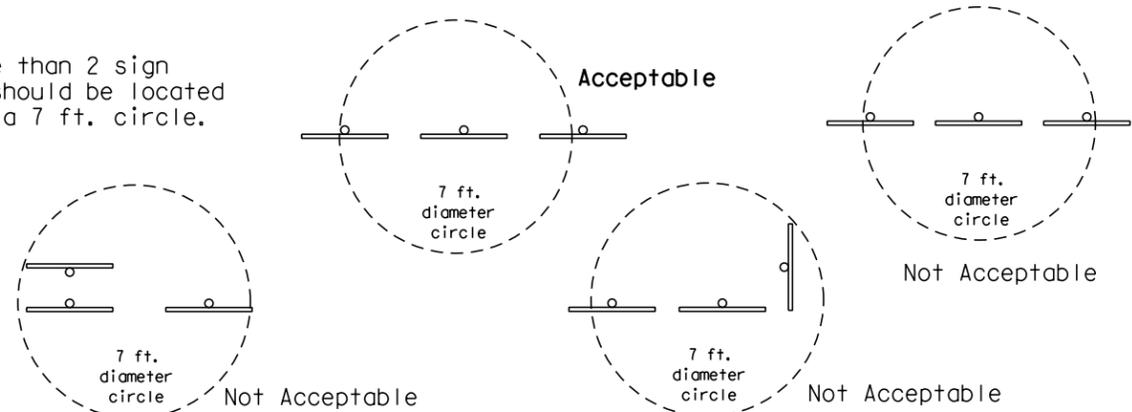
When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

#### T-INTERSECTION

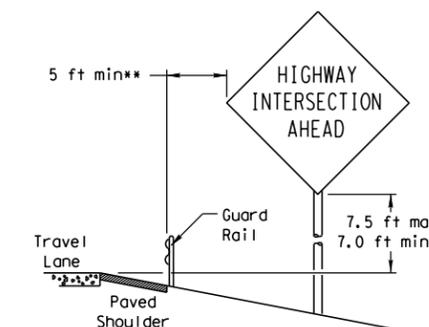


When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.

No more than 2 sign posts should be located within a 7 ft. circle.

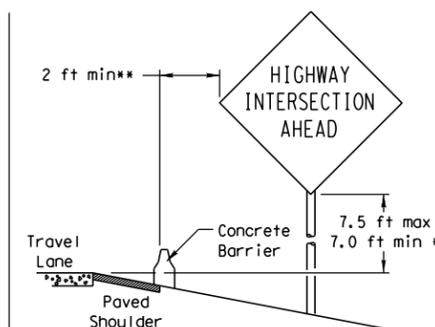


#### BEHIND BARRIER

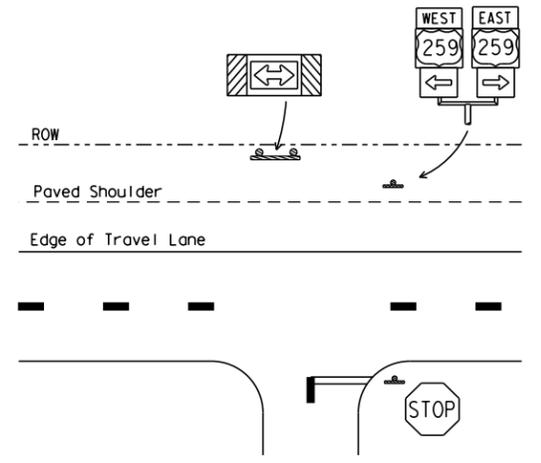


#### BEHIND GUARDRAIL

\*\*Sign clearance based on distance required for proper guard rail or concrete barrier performance.



#### BEHIND CONCRETE BARRIER



\* Signs shall be mounted using the following condition that results in the greatest sign elevation:

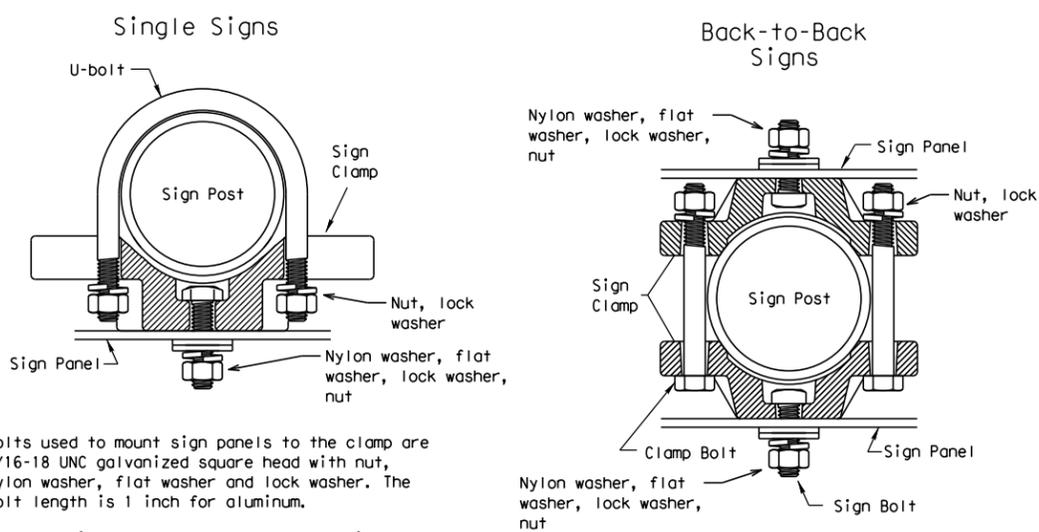
- (1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or
- (2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

The website address is:  
<http://www.txdot.gov/publications/traffic.htm>

### TYPICAL SIGN ATTACHMENT DETAIL



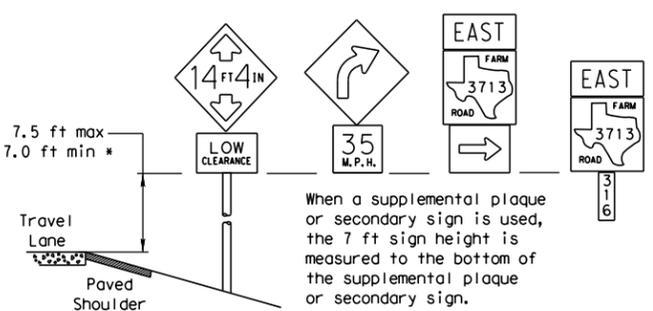
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

Sign clamps may be either the specific size clamp or the universal clamp.

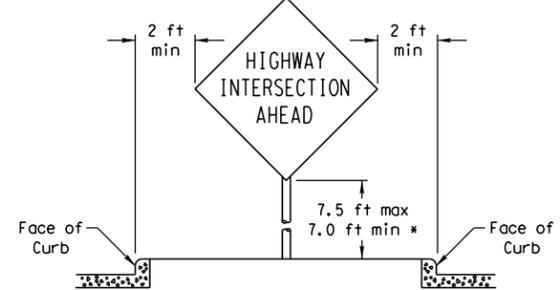
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

### SIGNS WITH PLAQUES

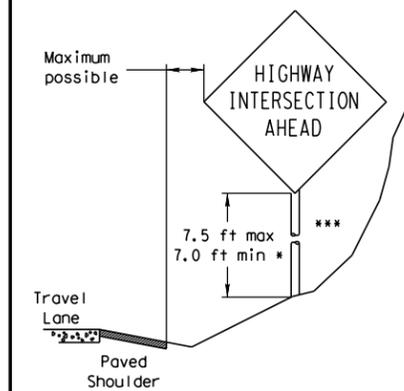


When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

### CURB & GUTTER OR RAISED ISLAND



### RESTRICTED RIGHT-OF-WAY (When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

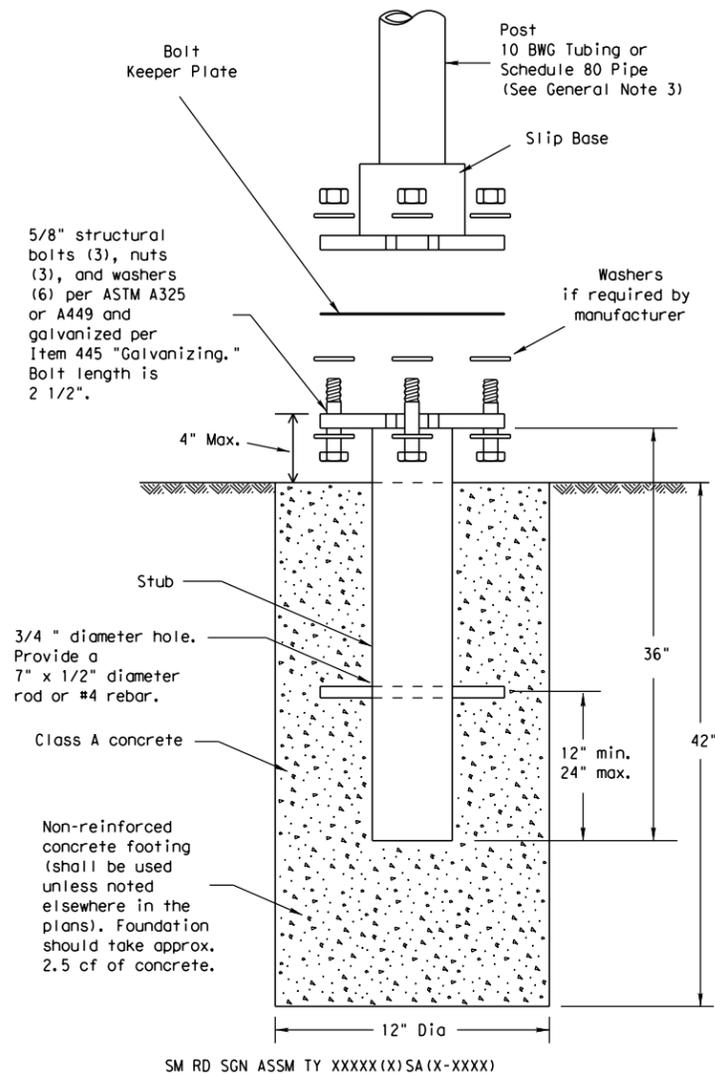
\*\*\* Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.



## SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS SMD(GEN) - 08

© TxDOT July 2002	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
9-08	REVISIONS	CONT	SECT	JOB
		0983	02	022
		DIST	COUNTY	HIGHWAY
		ABL	FISHER	FM 419
				SHEET NO.
				121

# TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



5/8" structural bolts (3), nuts (3), and washers (6) per ASTM A325 or A449 and galvanized per Item 445 "Galvanizing." Bolt length is 2 1/2".

3/4" diameter hole. Provide a 7" x 1/2" diameter rod or #4 rebar.

Non-reinforced concrete footing (shall be used unless noted elsewhere in the plans). Foundation should take approx. 2.5 cf of concrete.

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

## NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. [http://www.txdot.gov/business/producer\\_list.htm](http://www.txdot.gov/business/producer_list.htm) The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

## GENERAL NOTES:

- Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
- Material used as post with this system shall conform to the following specifications:
  - 10 BWG Tubing (2.875" outside diameter)
    - 0.134" nominal wall thickness
    - Seamless or electric-resistance welded steel tubing or pipe
    - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
    - Other steels may be used if they meet the following:
      - 55,000 PSI minimum yield strength
      - 70,000 PSI minimum tensile strength
      - 20% minimum elongation in 2"
    - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
    - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
    - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
  - Schedule 80 Pipe (2.875" outside diameter)
    - 0.276" nominal wall thickness
    - Steel tubing per ASTM A500 Gr C
    - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
      - 46,000 PSI minimum yield strength
      - 62,000 PSI minimum tensile strength
      - 21% minimum elongation in 2"
    - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
    - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
    - Galvanization per ASTM A123
- See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: <http://www.txdot.gov/publications/traffic.htm>
- Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

## ASSEMBLY PROCEDURE

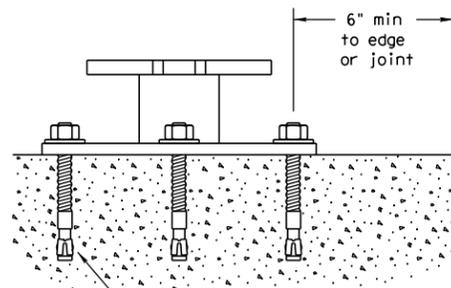
### Foundation

- Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
- The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
- Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
- Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
- The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

### Support

- Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
- Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

## CONCRETE ANCHOR



5/8" diameter Concrete Anchor - 8 places (embed a minimum of 5 1/2" and torque to min. of 50 ft-lbs). Anchor may be expansion or adhesive type.

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

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxyes and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

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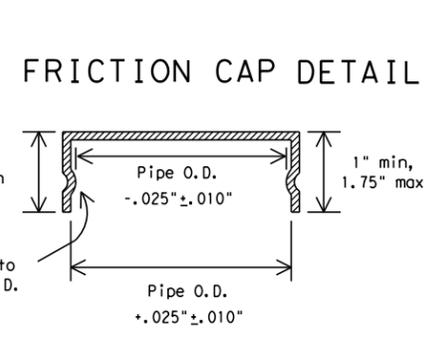
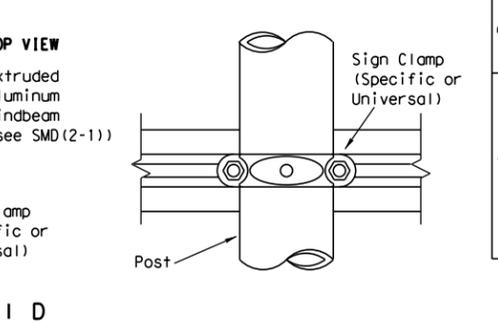
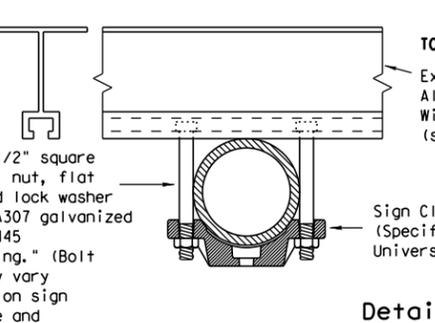
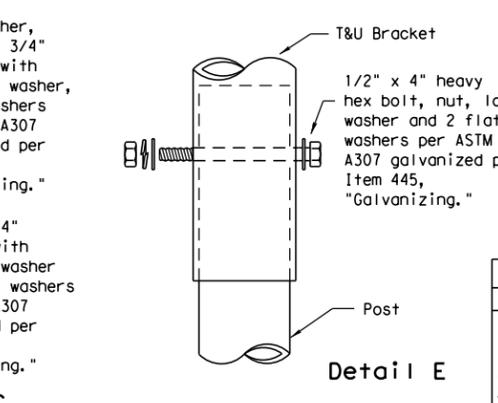
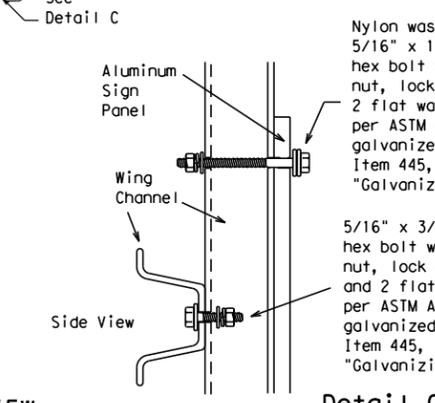
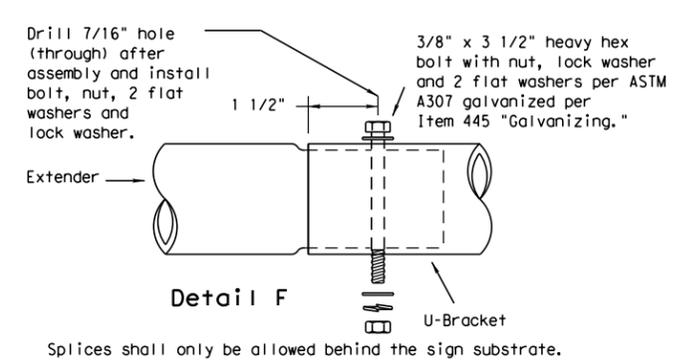
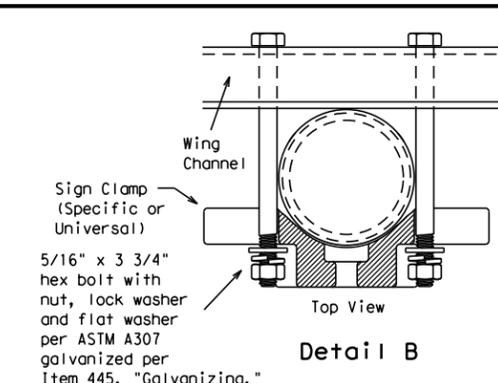
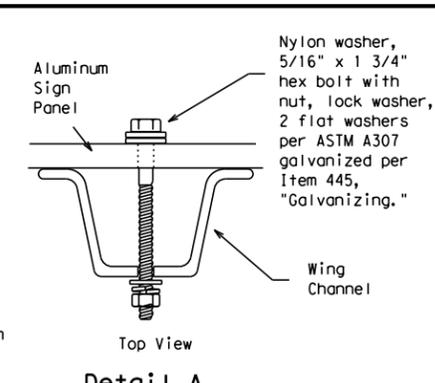
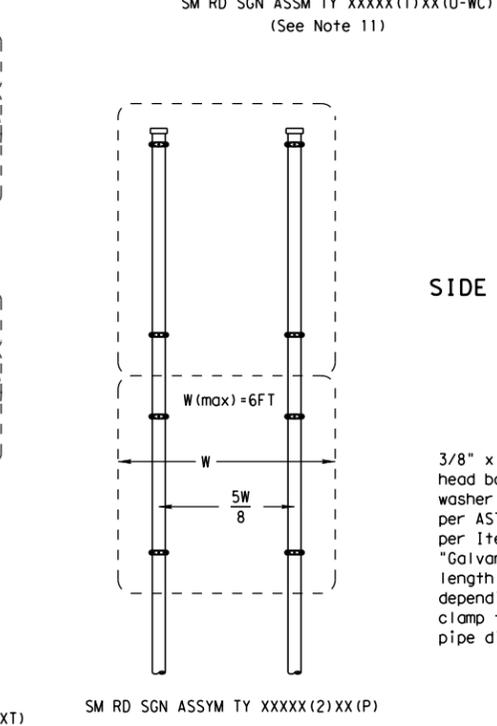
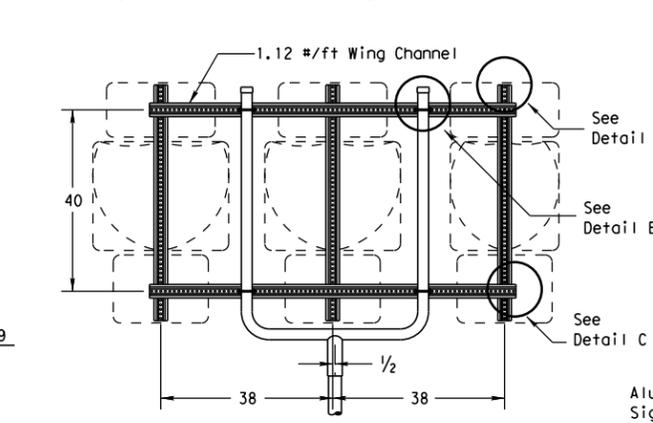
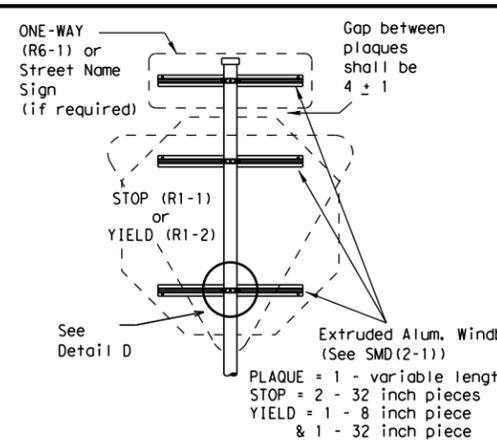
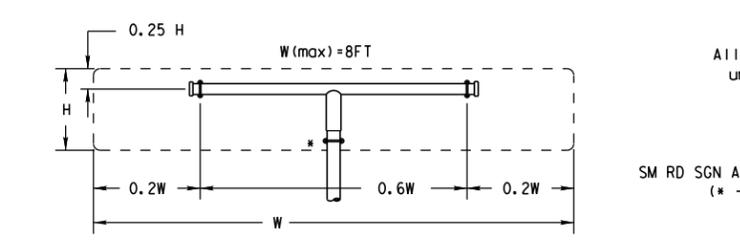
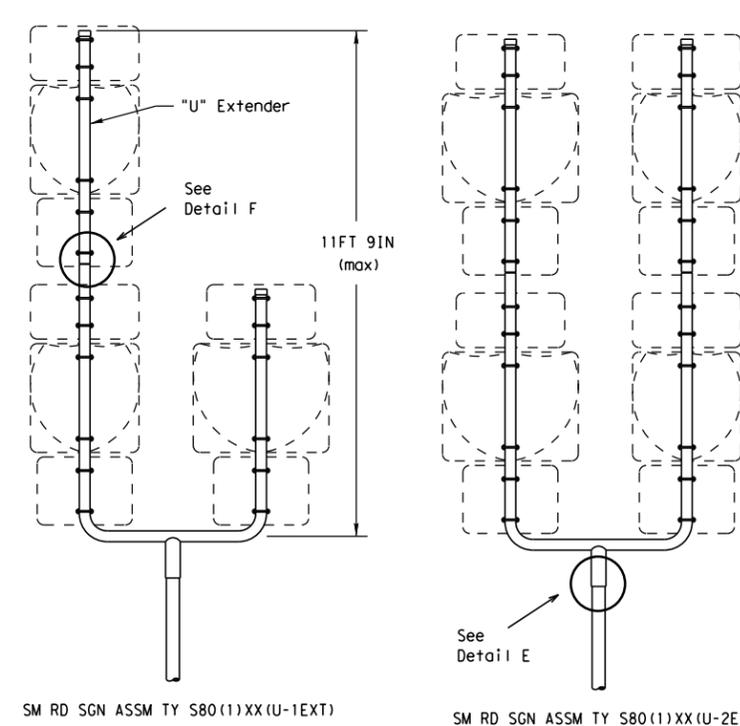
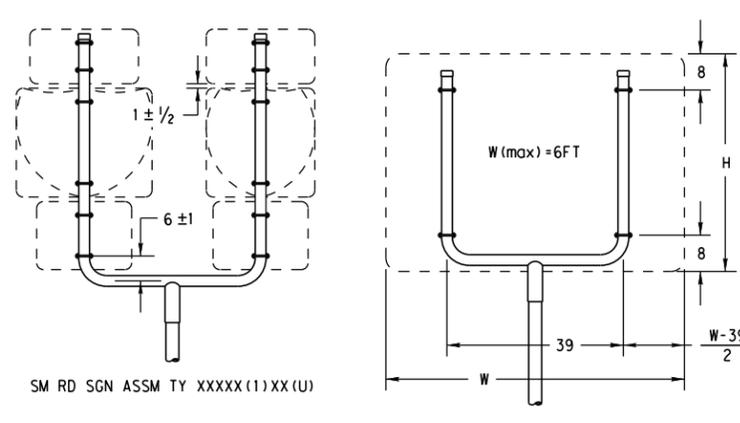
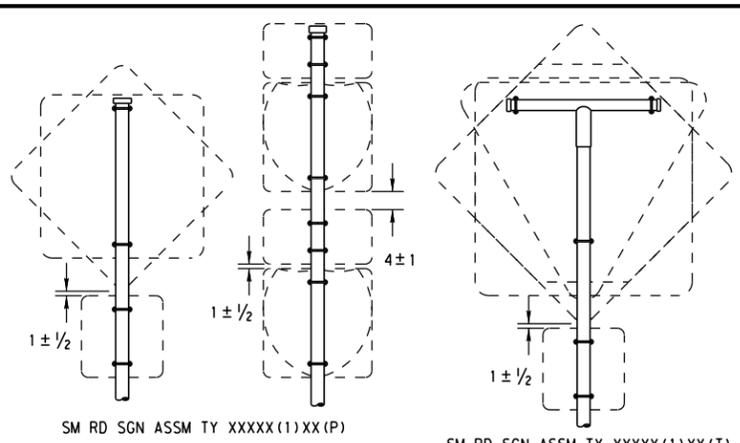


## SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM SMD(SLIP-1)-08

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9-08	REVISIONS		CONT	SECT	JOB	HIGHWAY
			0983	02	022	FM 419
			DIST	COUNTY		SHEET NO.
		ABL	FISHER		122	

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All dimensions are in english unless detailed otherwise.

SM RD SGN ASSM TY XXXX(1)XX(T) (\* - See Note 12)

GENERAL NOTES:

- | SIGN SUPPORT | # OF POSTS | MAX. SIGN AREA |
|--------------|------------|----------------|
| 10 BWG       | 1          | 16 SF          |
| 10 BWG       | 2          | 32 SF          |
| Sch 80       | 1          | 32 SF          |
| Sch 80       | 2          | 64 SF          |
- The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
- Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
- Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
- Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
- For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
- When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
- Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
- Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
- Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
- Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
- Post open ends shall be fitted with Friction Caps.
- Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
Warning	48x60-inch signs	TY S80(1)XX(T)
	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes. The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture. Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

**Texas Department of Transportation**  
 Traffic Operations Division

**SIGN MOUNTING DETAILS**  
**SMALL ROADSIDE SIGNS**  
**TRIANGULAR SLIPBASE SYSTEM**  
**SMD(SLIP-2) -08**

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9-08	REVISIONS	CONT	SECT	JOB	HIGHWAY
		0983	02	022	FM 419
		DIST	COUNTY		SHEET NO.
		ABL	FISHER		123

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 DATE: 3/28/2021

**SITE DESCRIPTION**

PROJECT LIMITS:  
 FM 419 AT EAST COTTONWOOD CREEK

PROJECT LOCATION MAPS: SEE TITLE SHEET

DRAINAGE PATTERNS: SEE SW3P SITE PLAN

APPROX. SLOPES ANTICIPATED AFTER MAJOR GRADING AND AREAS OF SOIL DISTURBANCE:  
 SEE TYPICAL SECTIONS

MAJOR CONTROLS AND LOCATIONS OF STABILIZATION PRACTICES: SEE SW3P SITE PLAN

PROJECT SPECIFIC LOCATIONS: TO BE SPECIFIED BY PROJECT FIELD OFFICE AND LOCATED IN THE PROJECT SW3P FILE.

SURFACE WATERS AND DISCHARGE LOCATIONS:  
 SEE HYDRAULIC DATA SHEET

TYPICAL AREAS WHICH WILL NOT BE DISTURBED:  
 SEE SW3P SITE PLAN

ENDANGERED SPECIES, DESIGNATED CRITICAL HABITAT AND HISTORIC PROPERTY: SEE EPIC SHEET

ESTIMATED START DATES AND DURATION OF ACTIVITIES IN THE INTENDED SCHEDULE/SEQUENCE OF EARTH-DISTURBING ACTIVITIES: SEE CONTRACT TIME ESTIMATE

NATURE OF ACTIVITY:  
 BRIDGE REPLACEMENT

MAJOR SOIL DISTURBING ACTIVITIES:  
 ROADWAY CONSTRUCTION AND BRIDGE REPLACEMENT

TOTAL PROJECT AREA:  
 1.3 ACRES

TOTAL AREA TO BE DISTURBED (AT EACH SITE):  
 0.5 ACRE

WEIGHTED RUNOFF COEFFICIENT BEFORE CONSTRUCTION:  
 0.90

WEIGHTED RUNOFF COEFFICIENT AFTER CONSTRUCTION:  
 0.90

EXISTING CONDITION OF SOIL & VEGETATIVE COVER:  
 CLAY; FAIR

% OF EXISTING VEGETATIVE COVER:  
 70%

NAME OF RECEIVING WATERS:  
 COTTONWOOD CREEK DRAINS TO CLEAR FORK BRAZOS RIVER (SEGMENT 1232)

**EROSION AND SEDIMENT CONTROLS**

USE "T" OR "P" IN THE BLANKS BELOW IF APPLICABLE (T= TEMPORARY, P= PERMANENT)

**SOIL STABILIZATION PRACTICES:**

<u>  </u> P	BUFFER ZONES	<u>  </u> P	PERMANENT PLANTING, SODDING, OR SEEDING
<u>  </u> P	MULCHING	<u>  </u> P	PRESERVATION OF NATURAL RESOURCES
<u>  </u> P	TEMPORARY SEEDING	<u>  </u> P	SOIL RETENTION BLANKET
<u>  </u> P	OTHER	<u>  </u> P	OTHER

**OTHER:**

DISTURBED AREAS ON WHICH CONSTRUCTION ACTIVITY HAS CEASED (TEMPORARILY OR PERMANENTLY) SHALL BE STABILIZED WITHIN 14 DAYS UNLESS ACTIVITIES ARE SCHEDULED TO RESUME WITHIN 14 DAYS.

FOR CONSTRUCTION PROJECTS, THIS DISTRICT OF THE TEXAS DEPARTMENT OF TRANSPORTATION USES SITEMANAGER, A COMPUTER BASED CONSTRUCTION RECORD-KEEPING SYSTEM, AS PART OF RECORD FOR PROJECT WORK INCLUDING ENVIRONMENTAL RELATED ACTIVITIES. DOCUMENTATION DESCRIBING MAJOR GRADING ACTIVITIES, TEMPORARY OR PERMANENT CESSATION OF CONSTRUCTION AND STABILIZATION MEASURE IS PART OF THIS SYSTEM AND IS INCORPORATED BY REFERENCE INTO THIS SW3P.

**STRUCTURAL PRACTICES:**

<u>  </u>	CHANNEL LINERS	<u>  </u>	DIVERSION DIKE AND SWALE COMBINATIONS
<u>  </u>	CURBS AND GUTTERS	<u>  </u>	DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
<u>  </u>	HAY BALES	<u>  </u>	DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
<u>  </u>	PAVED FLUMES	<u>  </u>	ROCK BEDDING AT CONSTRUCTION EXIT
<u>  </u>	PIPE SLOPE DRAINS	<u>  </u>	STONE OUTLET STRUCTURES
<u>  </u> T	ROCK FILTER DAMS	<u>  </u>	STORM INLET SEDIMENT TRAP
<u>  </u>	SEDIMENT BASINS	<u>  </u>	TEMPORARY EROSION CONTROL LOGS (BIOLOGS)
<u>  </u>	SEDIMENT TRAPS	<u>  </u>	TIMBER MATTING AT CONSTRUCTION EXIT
<u>  </u> T	SILT FENCES	<u>  </u>	VEGETATIVE FILTER STRIPS
<u>  </u>	STORM SEWERS	<u>  </u>	VELOCITY CONTROL DEVICES
<u>  </u>	OTHER	<u>  </u> T	LINED CONCRETE WASHOUT

**OFFSITE VEHICLE TRACKING CONTROLS:**

   HAUL ROADS DAMPENED FOR DUST CONTROL  
   EXCESS DIRT ON ROAD REMOVED DAILY  
   LOADED HAUL TRUCKS TO BE COVERED WITH TARPAULIN  
   STABILIZED CONSTRUCTION ENTRANCE  
   OTHER

**NARRATIVE - SEQUENCE OF CONSTRUCTION (STORM WATER MANAGEMENT) ACTIVITIES:**

THE ORDER OF ACTIVITIES WILL BE AS FOLLOWS:  
 SEE TRAFFIC CONTROL PLAN NARRATIVE

**STORM WATER MANAGEMENT:**

STORM WATER DRAINAGE WILL BE PROVIDED BY ROADSIDE DITCHES THAT CARRY DRAINAGE WITHIN ROW TO THE CREEK CROSSING UNDER THE ROADWAY.

NO RETENTION PONDS WILL BE USED.



**OTHER EROSION AND SEDIMENT CONTROLS:**

**MAINTENANCE:**

ALL EROSION AND SEDIMENT CONTROLS WILL BE MAINTAINED IN GOOD WORKING ORDER. IF A REPAIR IS NECESSARY, IT WILL BE DONE AT THE EARLIEST DATE POSSIBLE, BUT NO LATER THAN 7 CALENDAR DAYS AFTER THE SURROUNDING EXPOSED GROUND HAS DRIED SUFFICIENTLY TO PREVENT FURTHER DAMAGE FROM HEAVY EQUIPMENT. THE AREAS ADJACENT TO CREEKS AND DRAINAGE WAYS SHALL HAVE PRIORITY FOLLOWED BY DEVICES PROTECTING STORM SEWER INLETS.

**INSPECTION:**

AN INSPECTION WILL BE PERFORMED BY A TXDOT INSPECTOR EVERY 7 DAYS. AN INSPECTION AND MAINTENANCE REPORT WILL BE MADE PER EACH INSPECTION. BASED ON THE INSPECTION RESULTS, THE CONTROLS SHALL BE REVISED PER THE INSPECTION REPORT.

**WASTE MATERIALS:**

ALL WASTE MATERIALS WILL BE COLLECTED AND STORED IN A SECURELY LIDDED METAL DUMPSTER. THE DUMPSTER WILL MEET ALL STATE AND LOCAL CITY SOLID WASTE MANAGEMENT REGULATIONS. ALL TRASH AND CONSTRUCTION DEBRIS FROM THE SITE WILL BE DEPOSITED IN THE DUMPSTER. THE DUMPSTER WILL BE EMPTIED AS NECESSARY OR AS REQUIRED BY LOCAL REGULATION AND THE TRASH WILL BE HAULED TO A PERMITTED LANDFILL. NO CONSTRUCTION WASTE MATERIAL WILL BE BURIED ON SITE. CONSTRUCTION DEBRIS AND LITTER SHOULD BE PICKED UP ON A DAILY BASIS UNLESS OTHERWISE DIRECTED BY THE ENGINEER. WASTE AND DIRT PILES SHOULD BE REMOVED ON A WEEKLY BASIS.

**HAZARDOUS WASTE (INCLUDING SPILL REPORTING):**

NO LONG TERM WATER QUALITY IMPACTS ARE EXPECTED AS A RESULT OF THE PROPOSED PROJECT. SEE THE NEXT PLAN SHEET FOR A LIST OF POTENTIAL POLLUTANTS. IN THE EVENT OF A MAJOR SPILL, NOTIFY THE TXDOT ENGINEER IMMEDIATELY. ALL PERSONNEL WILL BE INSTRUCTED IN THE PROCEDURES FOR SPILL HANDLING AND DISPOSING OF ANY HAZARDOUS MATERIALS THEY WILL BE USING. ALL SPILLS, INCLUDING THOSE OF LESS THAN 25 GALLONS SHALL BE CLEANED IMMEDIATELY AND ANY CONTAMINATED SOIL SHALL BE IMMEDIATELY REMOVED FROM THE SITE AND BE DISPOSED OF PROPERLY. DESIGNATED AREAS SHALL BE DETERMINED BY THE AREA ENGINEER FOR SPOILS DISPOSAL AND MATERIAL STORAGE. THESE AREAS SHALL BE PROTECTED FROM RUN-ON AND RUN-OFF. MATERIALS RESULTING FROM THE DESTRUCTION OF EXISTING ROADS AND BEING REMOVED AND/OR DISPOSED OF BY THE CONTRACTOR WILL BE DONE SO IN ACCORDANCE WITH ALL FEDERAL, STATE, AND LOCAL LAWS, ORDINANCES AND REGULATIONS AND WITH THE APPROVAL OF THE PROJECT ENGINEER. ANY CHANGES TO AMBIENT WATER QUALITY DURING CONSTRUCTION OF THE PROPOSED PROJECT SHALL BE PROHIBITED AND MAY RESULT IN ADDITIONAL WATER QUALITY CONTROL MEASURES, WHICH SHALL BE MITIGATED AS SOON AS POSSIBLE AND SHALL BE REPORTED TO THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) WITHIN 24 HOURS OF BECOMING AWARE OF IMPACTS.

**SANITARY WASTE:**

ALL SANITARY WASTE WILL BE COLLECTED FROM THE PORTABLE UNITS AS NECESSARY OR AS REQUIRED BY LOCAL REGULATION BY A LICENSED SANITARY WASTE MANAGEMENT CONTRACTOR.

**REMARKS:**

CONSTRUCTION STAGING AREAS AND VEHICLE MAINTENANCE AREAS SHALL BE CONSTRUCTED BY THE CONTRACTOR IN A MANNER TO MINIMIZE THE RUNOFF OF POLLUTANTS. ALL WATERWAYS SHALL BE CLEARED AS SOON AS PRACTICABLE OF TEMPORARY EMBANKMENT, TEMPORARY BRIDGES, MATTING, FALSEWORK PILING, DEBRIS OR OTHER OBSTRUCTIONS PLACED DURING CONSTRUCTION OPERATIONS THAT ARE NOT PART OF THE FINISHED WORK. DISPOSAL AREAS, STOCKPILES, AND HAUL ROADS SHALL BE CONSTRUCTED IN A MANNER THAT WILL MINIMIZE AND CONTROL THE AMOUNT OF SEDIMENT THAT MAY ENTER RECEIVING WATERS. DISPOSAL AREAS SHALL NOT BE LOCATED IN ANY WETLAND, WATER BODY OR STREAMBED.



NO SCALE SHEET 1 OF 2

**TxDOT STORM WATER POLLUTION PREVENTION PLAN (SW3P)**

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.	
6	SEE TITLE SHEET		FM 419	
STATE	COUNTY		SHEET NO.	
TEXAS	FISHER		124	
DISTRICT	CONTROL	SECTION		JOB
ABL	0983	02		022

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 DATE: 3/28/2021

LIST OF POTENTIAL POLLUTANTS

POTENTIAL POLLUTANT	RELATED SOURCE	CONTROLS
CEMENTATEOUS MATERIAL AND CEMENTATEOUS AGGREGATES (BROKEN CONCRETE)	REMOVAL OF CONCRETE RIPRAP, CULVERT COMPONENTS, BRIDGE COMPONENTS, ETC.	THIS CONSTRUCTION WASTE SHALL BE PROPERLY DISPOSED OF IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS. WHEN STORED ON SITE PRIOR TO DISPOSAL, IT SHALL BE CONTAINED SO AS TO ENSURE THAT IT CANNOT ENTER SURFACE RUNOFF.
MILLED ASPHALTIC CEMENT PAVEMENT (MILLINGS)	OBLITERATION OF ABANDONED ROAD AND PLANING OF ASPHALT	THIS CONSTRUCTION WASTE SHALL BE PROPERLY DISPOSED OF IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS. WHEN STORED ON SITE PRIOR TO DISPOSAL, IT SHALL BE CONTAINED SO AS TO ENSURE THAT IT CANNOT ENTER SURFACE RUNOFF.
VIRGIN ASPHALTIC MATERIAL INCLUSIVE OF PRIME OILS, PRECOAT AGGREGATES, AND HOT MIX BITUMINOUS MIXTURES	APPLICATIONS OF PRIME COATS, SEAL COAT, AND PAVING OPERATIONS	THIS MATERIAL SHALL BE APPLIED AT APPROPRIATE RATES FOR CONSTRUCTION PURPOSES WHICH WILL PRECLUDE THESE MATERIALS FROM ENTERING RUNOFF. IN THE EVENT OF ANY UNINTENDED DISCHARGE, CONTROLS TO CONTAIN RUNOFF WILL BE IMMEDIATELY PLACED AND TCEQ WILL BE IMMEDIATELY NOTIFIED.
CONCRETE, REBAR, WIRE, WIRE FABRIC LUMBER, NAILS, STYROFOAM BLOCK, FIBERBOARD, CURING COMPOUND AND LINSEED OIL	CONSTRUCTION OF CONCRETE BRIDGE COMPONENTS SUCH AS DRILLED SHAFTS, CULVERTS, ABUTMENTS, BENTS, REINFORCED CONCRETE SLABS, RAIL, INLET, CONCRETE TRAFFIC BARRIERS, CURB AND GUTTER, RIPRAP AND SIGN FOUNDATIONS	THIS CONSTRUCTION WASTE SHALL BE PROPERLY DISPOSED OF IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS. WHEN STORED ON SITE PRIOR TO DISPOSAL, IT SHALL BE CONTAINED SO AS TO ENSURE THAT IT CANNOT ENTER SURFACE RUNOFF. ANY TEMPORARY FILLS MUST BE REMOVED IN THEIR ENTIRETY AND THE AFFECTED AREAS RETURNED TO THEIR PREEXISTING CONDITION/ELEVATION.
MASONRY CONCRETE BLOCK, GEOGRID FABRIC, CARDBOARD, AND PLASTIC RAP	CONSTRUCTION OF MODULAR RETAINING WALL SYSTEMS	THIS CONSTRUCTION WASTE SHALL BE PROPERLY DISPOSED OF IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS. WHEN STORED ON SITE PRIOR TO DISPOSAL, IT SHALL BE CONTAINED SO AS TO ENSURE THAT IT CANNOT ENTER SURFACE RUNOFF.
WOOD POSTS, STEEL POSTS, BARRELS, CONES, SIGN BOARDS (ALUMINUM AND PLYBOARD), FASTENERS, NUTS, BOLTS, AND WASHERS	PLACEMENT AND/OR REMOVAL OF BARRICADES, SIGNS AND TRAFFIC CONTROL DEVICES	THIS CONSTRUCTION WASTE SHALL BE PROPERLY DISPOSED OF IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS. WHEN STORED ON SITE PRIOR TO DISPOSAL, IT SHALL BE CONTAINED SO AS TO ENSURE THAT IT CANNOT ENTER SURFACE RUNOFF.
WOOD POST, STEEL POST, STEEL FASTENERS, NUTS, BOLTS, AND WASHERS	CONSTRUCTION OF METAL BEAM GUARD FENCE	THIS CONSTRUCTION WASTE SHALL BE PROPERLY DISPOSED OF IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS. WHEN STORED ON SITE PRIOR TO DISPOSAL, IT SHALL BE CONTAINED SO AS TO ENSURE THAT IT CANNOT ENTER SURFACE RUNOFF.
STRUCTURAL STEEL I-BEAM, SIGN BOARDS, AND CONCRETE FOUNDATIONS	REMOVAL OF ROADSIDE SIGN ASSEMBLIES LARGE AND SMALL	THIS CONSTRUCTION WASTE SHALL BE PROPERLY DISPOSED OF IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS. WHEN STORED ON SITE PRIOR TO DISPOSAL, IT SHALL BE CONTAINED SO AS TO ENSURE THAT IT CANNOT ENTER SURFACE RUNOFF.
THERMOPLASTIC PAINT, GLASS BEADS, REFLECTIVE TABS, AND RAISED REFLECTIVE PAVEMENT MARKERS	APPLICATION OF PAVEMENT MARKINGS/MARKERS	THIS CONSTRUCTION WASTE SHALL BE PROPERLY DISPOSED OF IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS. WHEN STORED ON SITE PRIOR TO DISPOSAL, IT SHALL BE CONTAINED SO AS TO ENSURE THAT IT CANNOT ENTER SURFACE RUNOFF.
PETROLEUM PRODUCTS (SMALL QUANTITIES INTRODUCED BY CONTRACTOR)	EQUIPMENT FAILURE, MAINTENANCE AND REPAIR	ALL EQUIPMENT AND VEHICLE MAINTENANCE SHALL BE PERFORMED IN A DESIGNATED AREA WITH APPROPRIATE MEASURES FOR CONTAINMENT AND PROPER DISPOSAL OF ALL WASTE MATERIALS INCLUDING HYDRAULIC OIL AND OTHER LIQUIDS IN ACCORDANCE WITH STATE AND LOCAL WASTE MANAGEMENT REGULATIONS. ALL MATERIAL STORED PRIOR TO DISPOSAL SHALL BE CONTAINED IN A CONTAINER WITH A SECURE COVER MEETING ALL STATE AND LOCAL WASTE MANAGEMENT REGULATIONS.
ELIGIBLE NON-STORM WATER DISCHARGES INCLUDING BUT NOT LIMITED TO NON-POTABLE WATER AND NON-STORM WATER DISCHARGE	MOISTURE APPLICATIONS FOR DUST CONTROL, DENSITY, VEGETATION WATERING, NON-DETERGENT VEHICLE WASHING, AND AIR CONDITIONING CONDENSATE	THIS MATERIAL SHALL BE APPLIED AT APPROPRIATE RATES FOR CONSTRUCTION PURPOSES WHICH WILL PRECLUDE THESE MATERIALS FROM ENTERING RUNOFF. IN THE EVENT OF ANY UNINTENDED DISCHARGE, CONTROLS TO CONTAIN RUNOFF WILL BE IMMEDIATELY PLACED AND THE NON-POTABLE WATER WILL BE RECOVERED AND PROPERLY STORED FOR REUSE.
SURVEY STAKE, FLAGGING TAPE AND PAINT	SURVEY STAKING, ALIGNMENT ESTABLISHMENT	THIS CONSTRUCTION WASTE SHALL BE PROPERLY DISPOSED OF IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS. WHEN STORED ON SITE PRIOR TO DISPOSAL, IT SHALL BE CONTAINED SO AS TO ENSURE THAT IT CANNOT ENTER SURFACE RUNOFF.
WASTEWATER	WASHOUT AND CLEANOUT OF STUCCO, PAINT, FORM RELEASE OILS, CURING COMPOUNDS AND OTHER CONSTRUCTION MATERIALS	THIS CONSTRUCTION WASTE SHALL BE PROPERLY DISPOSED OF IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS. WHEN STORED ON SITE PRIOR TO DISPOSAL, IT SHALL BE CONTAINED SO AS TO ENSURE THAT IT CANNOT ENTER SURFACE RUNOFF.
SOAPS AND SOLVENTS	VEHICLE AND EQUIPMENT WASHING	THIS CONSTRUCTION WASTE SHALL BE PROPERLY DISPOSED OF IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS. WHEN STORED ON SITE PRIOR TO DISPOSAL, IT SHALL BE CONTAINED SO AS TO ENSURE THAT IT CANNOT ENTER SURFACE RUNOFF.
UNSUITABLE FILL MATERIAL	EXCAVATION - ROADWAY, SPECIAL AND EROSION CONTROL	THIS CONSTRUCTION WASTE SHALL BE PROPERLY DISPOSED OF IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS. WHEN STORED ON SITE PRIOR TO DISPOSAL, IT SHALL BE CONTAINED SO AS TO ENSURE THAT IT CANNOT ENTER SURFACE RUNOFF.



*Kari Ward*



NO SCALE SHEET 2 OF 2

TxDOT STORM WATER POLLUTION PREVENTION PLAN (SW3P)

REV. DATE: 02/27/2014

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 419
STATE	COUNTY		SHEET NO.
TEXAS	FISHER		125
DISTRICT	CONTROL	SECTION	
ABL	0983	02	JOB 022

PREPARED BY (NAME OF DESIGNER) DATE: 3/28/2021 FILE: V:\2142\active\214220136\CAD\6. 1-Sheets\09\*FM419\*EPIC.kid  
 DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

**I. STORM WATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402**

TPDES TXR 150000: Storm water Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1.  No Action Required  Required Action

Action No.

- The project disturbs less than one acre of surface area. The contractor is responsible for the PSL as defined in the Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges (2014 Edition, Section 7.6., Page 44). The total disturbed acreage is the combined acreage to be disturbed on the project and the contractors PSL.
- Prevent storm water pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
- Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
- Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
- When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

**II. WORK IN OR NEAR STREAMS, WATER BODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404**

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

- No Permit Required
- Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)
- Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)
- Individual 404 Permit Required
- Other Nationwide Permit Required: NWP# \_\_\_\_\_

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1. EAST COTTONWOOD CREEK - CLEAR FORK OF BRAZOS SEG ID. 1232

2.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
<input type="checkbox"/> Temporary Vegetation	<input checked="" type="checkbox"/> Silt Fence	<input type="checkbox"/> Vegetative Filter Strips
<input checked="" type="checkbox"/> Blankets/Matting	<input checked="" type="checkbox"/> Rock Berm	<input type="checkbox"/> Retention/Irrigation Systems
<input type="checkbox"/> Mulch	<input type="checkbox"/> Triangular Filter Dike	<input type="checkbox"/> Sedimentation Basin
<input type="checkbox"/> Sodding	<input type="checkbox"/> Sand Bag Berm	<input type="checkbox"/> Constructed Wetlands
<input type="checkbox"/> Interceptor Swale	<input type="checkbox"/> Straw & Hay Bale Dike	<input type="checkbox"/> Wet Basin
<input type="checkbox"/> Diversion Dike	<input type="checkbox"/> Brush Berms	<input type="checkbox"/> Erosion Control Compost & Mulch
<input type="checkbox"/> Erosion Control Compost	<input type="checkbox"/> Erosion Control Compost	<input type="checkbox"/> Compost Filter Berm and Socks
<input type="checkbox"/> Compost Filter Berm and Socks	<input type="checkbox"/> Compost Filter Berm and Socks	<input type="checkbox"/> Sand Filter Systems
<input type="checkbox"/> Temporary Erosion Control Logs (BIOLOGS)	<input type="checkbox"/> Temporary Erosion Control Logs (BIOLOGS)	<input type="checkbox"/> Temporary Erosion Control Logs (BIOLOGS)
<input type="checkbox"/> Preservation of Natural Resources	<input type="checkbox"/> Permanent Traps	<input checked="" type="checkbox"/> Permanent Vegetation (Planting, Sodding, or Seeding)
<input type="checkbox"/> Construction Exits	<input type="checkbox"/> Sediment Basins	<input type="checkbox"/> Grassy Swales

**III. CULTURAL RESOURCES**

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

- No Action Required  Required Action

Action No.

- 
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- 

**IV. VEGETATION RESOURCES**

Preserve native vegetation to the extent practical. Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

- No Action Required  Required Action

Action No.

- COMPLY WITH EO 13112 ON USE OF NATIVE VEGETATION
- 
- 
- 

**V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.**

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

- No Action Required  Required Action

Action No.

- COMPLY WITH MBTA FOR PROTECTION OF BIRDS AND NESTS
- 
- 
- 

LIST OF ABBREVIATIONS

BMP: Best Management Practice	SPCC: Spill Prevention Control and Countermeasure
CGP: Construction General Permit	SW3P: Storm Water Pollution Prevention Plan
DSHS: Texas Department of State Health Services	PCN: Pre-Construction Notification
FHWA: Federal Highway Administration	PSL: Project Specific Location
MOA: Memorandum of Agreement	TCEQ: Texas Commission on Environmental Quality
MOU: Memorandum of Understanding	TPDES: Texas Pollutant Discharge Elimination System
MS4: Municipal Separate Storm water Sewer System	TPWD: Texas Parks and Wildlife Department
MBTA: Migratory Bird Treaty Act	TxDOT: Texas Department of Transportation
NOT: Notice of Termination	T&E: Threatened and Endangered Species
NWP: Nationwide Permit	USACE: U.S. Army Corps of Engineers
NOI: Notice of Intent	USFWS: U.S. Fish and Wildlife Service

**VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES**

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

- \* Dead or distressed vegetation (not identified as normal)
- \* Trash piles, drums, canister, barrels, etc.
- \* Undesirable smells or odors
- \* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

- Yes  No

If "No", then no further action is required.

If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

- Yes  No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

- No Action Required  Required Action

Action No.

- 
- 
- 

**VII. OTHER ENVIRONMENTAL ISSUES**

(includes regional issues such as Edwards Aquifer District, etc.)

- No Action Required  Required Action

Action No.

- 
- 
- 

FM 419 E. COTTONWOOD CREEK  
ENVIRONMENTAL PERMITS,  
ISSUES AND COMMITMENTS  
EPIC



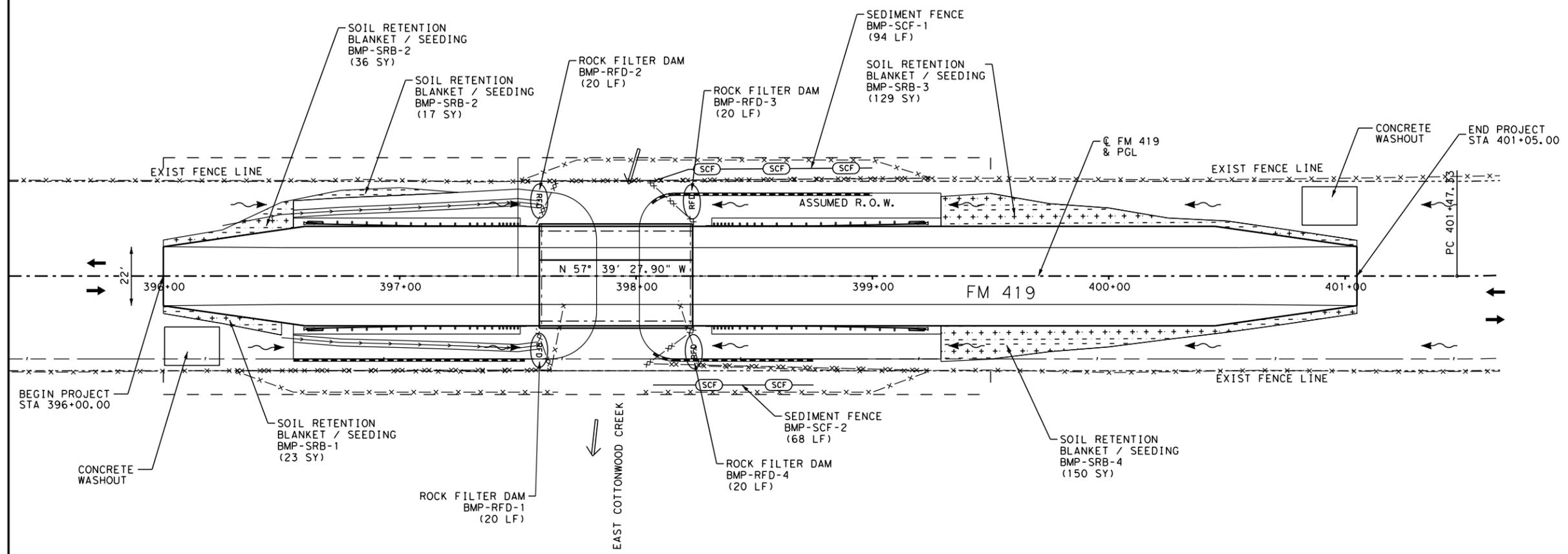
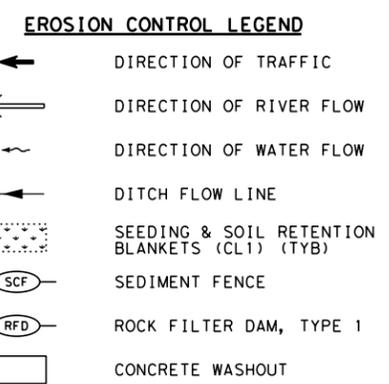
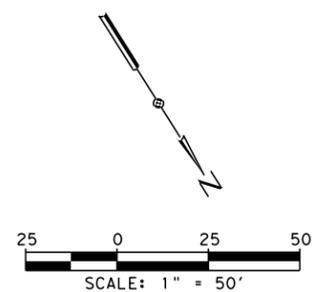
NO SCALE SHEET 1 OF 1

FHWA DIVISION	PROJECT NO.	HIGHWAY NO.	
6	SEE TITLE SHEET	FM 419	
STATE	COUNTY	SHEET NO.	
TEXAS	FISHER	126	
DISTRICT	CONTROL	SECTION	JOB
ABL	0983	02	022

3/28/2021

S. NO	BMP ID	LOCATION	INSTALL DATE	REMOVED DATE
3	BMP-SRB-2			
4	BMP-RFD-2	397+59.00		

S. NO	BMP ID	LOCATION	INSTALL DATE	REMOVED DATE
5	BMP-SRB-3			
6	BMP-RFD-3	398+23.61		
7	BMP-SCF-1			



*Kari Ward*

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2	BMP-RFD-1	397+59.00		

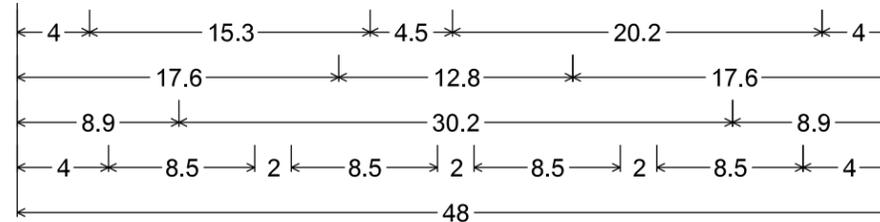
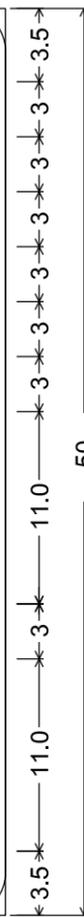
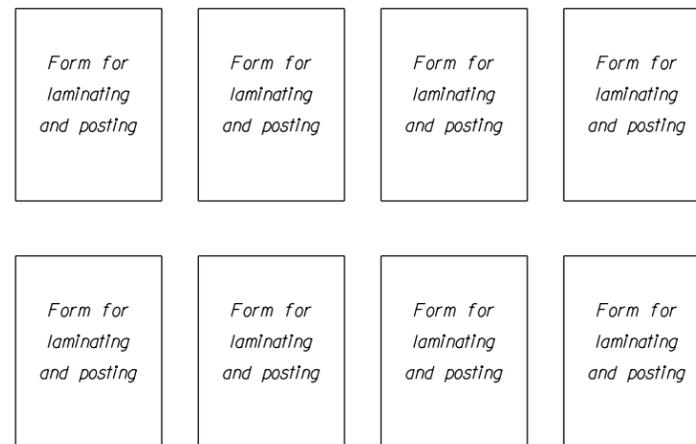
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9	BMP-SRB-4			
10	BMP-RFD-4	398+24.43		
11	BMP-SCF-2			

NO.	DATE	REVISION	APPROVED
			12222 Merit Dr Suite 400 Dallas, TEXAS 75251 P 972-991-0011 F 214-468-8266 Firm # F-6324
			© 2021

**SW3P SITE PLAN**  
FM 419 AT EAST COTTONWOOD CREEK

SCALE: 1"=50'			SHEET 1 OF 1
DESIGN KW	FED RD DIV NO 6	FEDERAL AID PROJECT NO. SEE TITLE SHEET	HIGHWAY NO FM 419
GRAPHICS JU	STATE DISTRICT	COUNTY FISHER	SHEET NO
CHECK JW	TEXAS	ABL	
CHECK KW	CONTROL 0983	SECTION 02	JOB 022
			127

# Tx DOT PROJECT SW3P INFORMATION



2.3" Radius, 0.9" Border, White on Blue;  
[TxDOT PROJECT] E Mod; [SW3P] E Mod; [INFORMATION] E Mod;

**NOTE:**

The Forms needed for laminating and posting to the SW3P Notification Board will be provided by the Engineer. The total number of forms may vary. Notification Boards are to be constructed from Plywood, 1/2 or 5/8-inch thick, in accordance with TxDOT Departmental Material Specification (DMS)-7100. 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 sign will be placed at a location within the right-of-way but outside the clear zone as directed by the Engineer. This work will not be paid for directly, but will be considered subsidiary to other items.



*Kari Ward*

## SW3P NOTIFICATION BOARD DETAIL

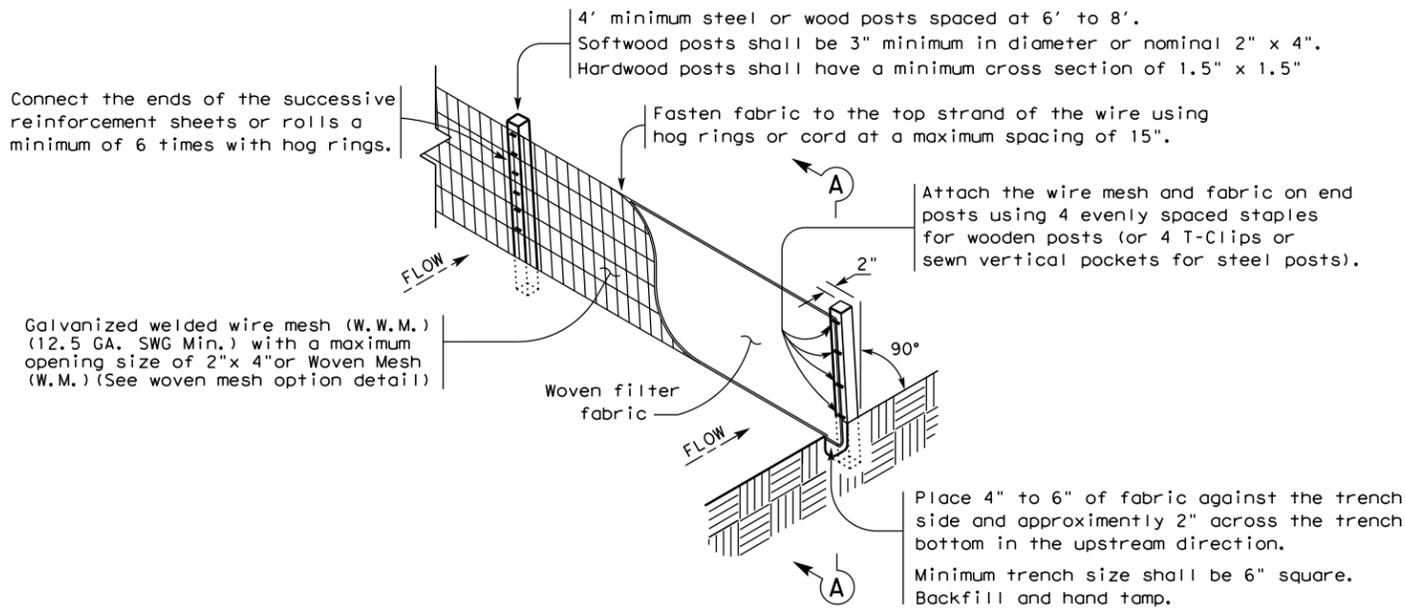


NO SCALE SHEET 1 OF 1

FHWA DIVISION	PROJECT NO.	HIGHWAY NO.		
6	SEE TITLE SHEET	FM 419		
STATE	COUNTY		SHEET NO.	
TEXAS	FISHER		128	
DISTRICT	CONTROL	SECTION		JOB
ABL	0983	02		022

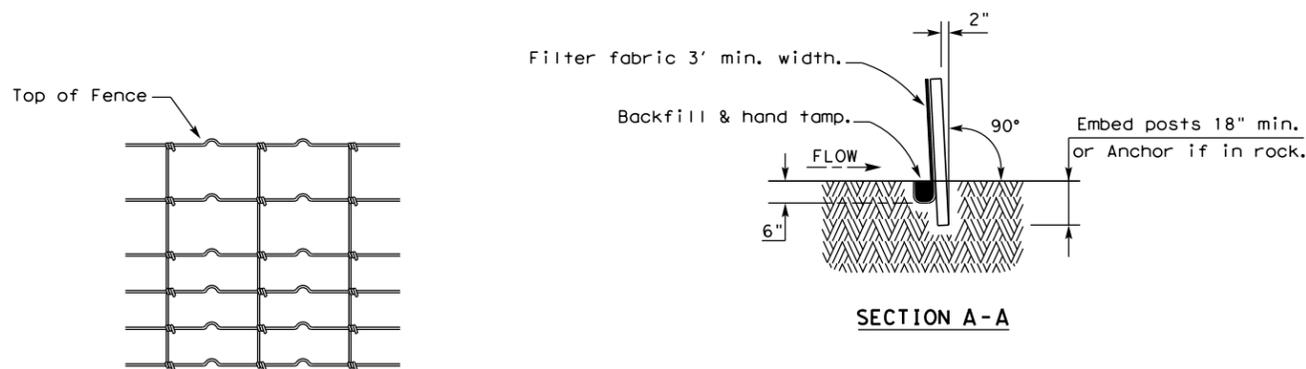
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**TEMPORARY SEDIMENT CONTROL FENCE**

SCF



**HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL**

Galvanized hinge joint knot woven mesh (12.5 GA. SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

**SEDIMENT CONTROL FENCE USAGE GUIDELINES**

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT<sup>2</sup>. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

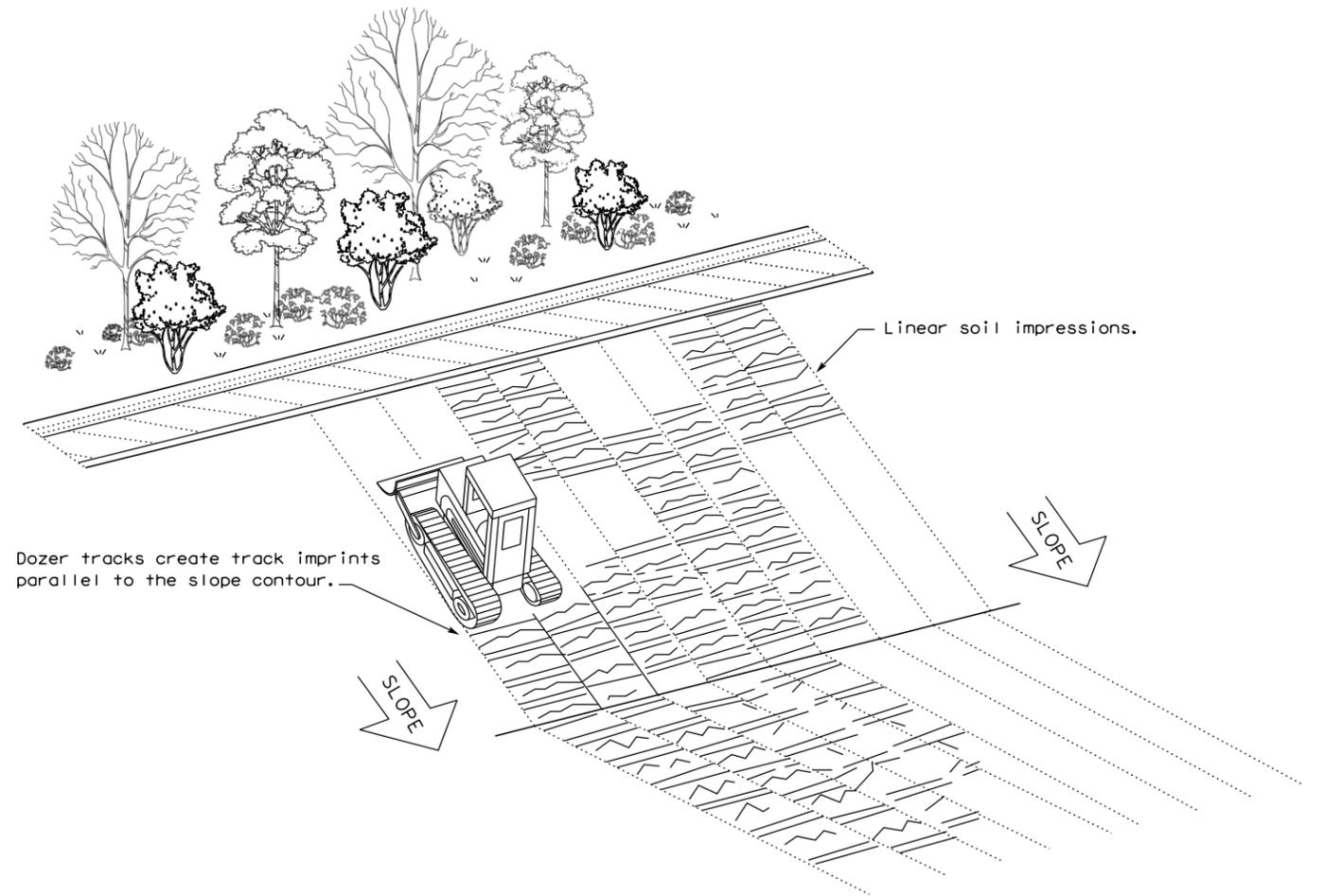
**LEGEND**

Sediment Control Fence

SCF

**GENERAL NOTES**

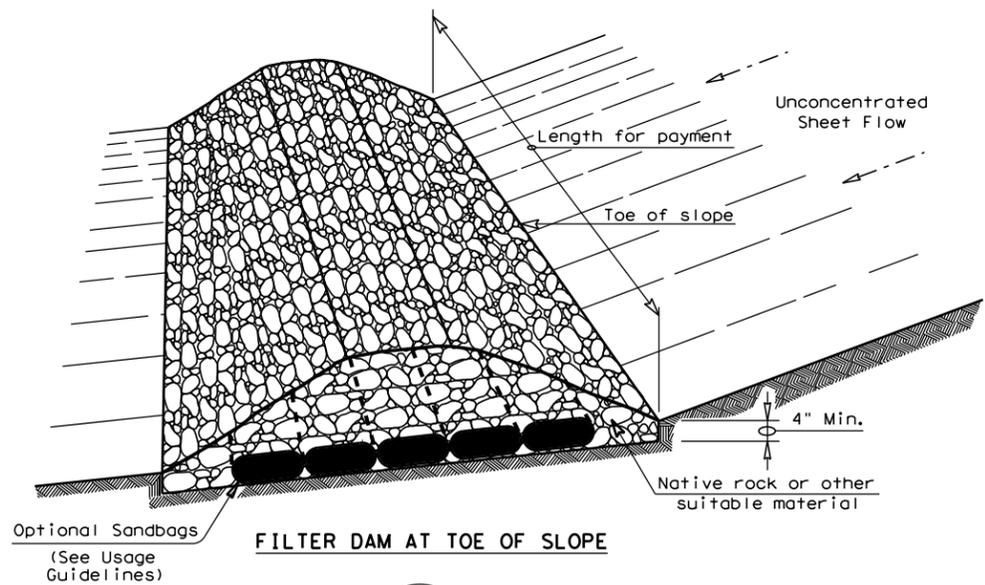
1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continuous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



**VERTICAL TRACKING**

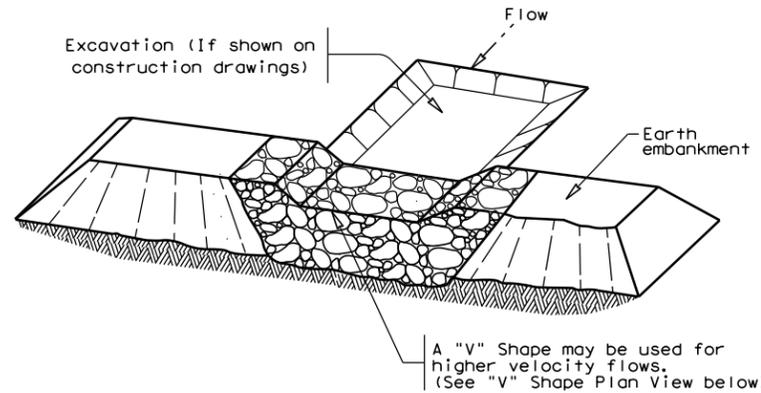
				Design Division Standard	
<b>TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES FENCE &amp; VERTICAL TRACKING EC(1)-16</b>					
FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS	
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0983	02	022	FM 419	
	DIST	COUNTY	SHEET NO.		
	ABL	FISHER	129		

DATE: 3/28/2021  
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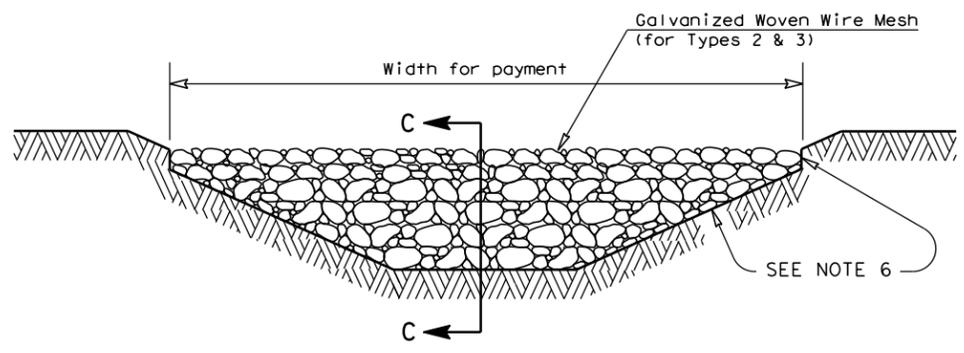
**FILTER DAM AT TOE OF SLOPE**

(RFD1)



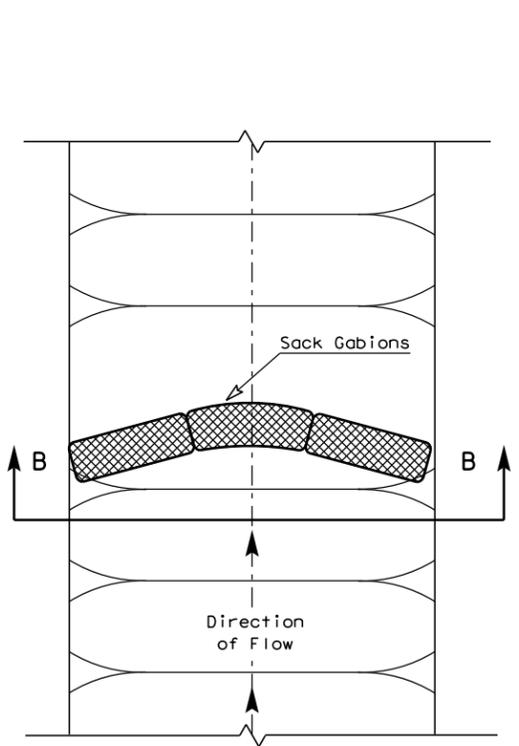
**FILTER DAM AT SEDIMENT TRAP**

(RFD1) OR (RFD2)

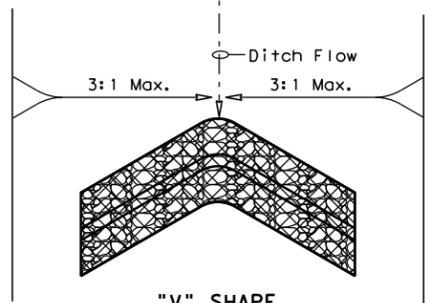


**FILTER DAM AT CHANNEL SECTIONS**

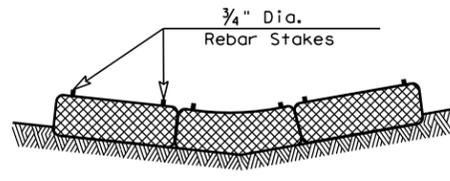
(RFD1) OR (RFD2) OR (RFD3)



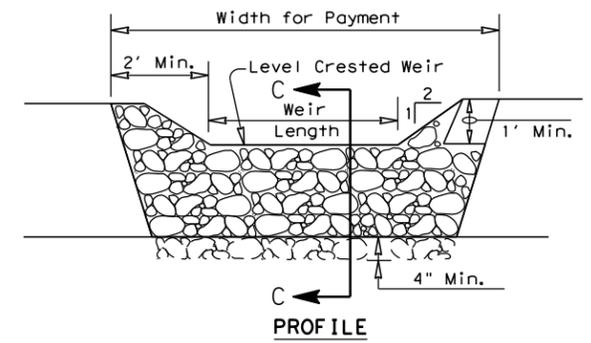
**PLAN VIEW**



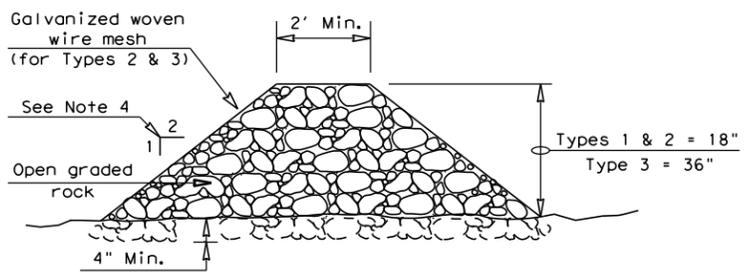
**"V" SHAPE PLAN VIEW**



**SECTION B-B**



**PROFILE**



**SECTION C-C**

**ROCK FILTER DAM USAGE GUIDELINES**

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT<sup>2</sup> of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

**Type 1 (18" high with no wire mesh) (3" to 6" aggregate):** Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximately 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

**Type 2 (18" high with wire mesh) (3" to 6" aggregate):** Type 2 may be used in ditches and at dike or swale outlets.

**Type 3 (36" high with wire mesh) (4" to 8" aggregate):** Type 3 may be used in stream flow and should be secured to the stream bed.

**Type 4 (Sack gabions) (3" to 6" aggregate):** Type 4 May be used in ditches and smaller channels to form an erosion control dam.

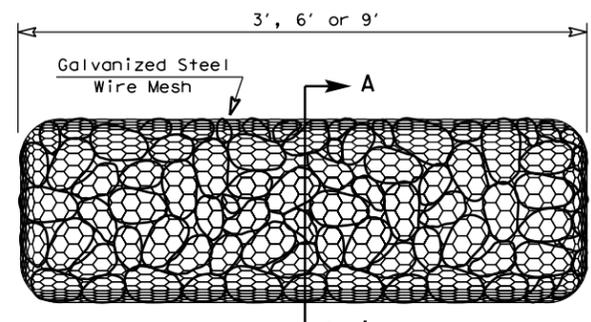
**Type 5:** Provide rock filter dams as shown on plans.

**GENERAL NOTES**

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with 3/4" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 1/2" x 3 1/4".
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

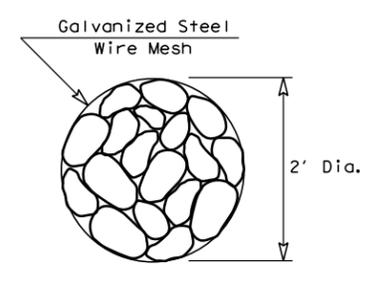
**PLAN SHEET LEGEND**

- Type 1 Rock Filter Dam (RFD1)
- Type 2 Rock Filter Dam (RFD2)
- Type 3 Rock Filter Dam (RFD3)
- Type 4 Rock Filter Dam (RFD4)



**TYPE 4 (SACK GABIONS)**

(RFD4)

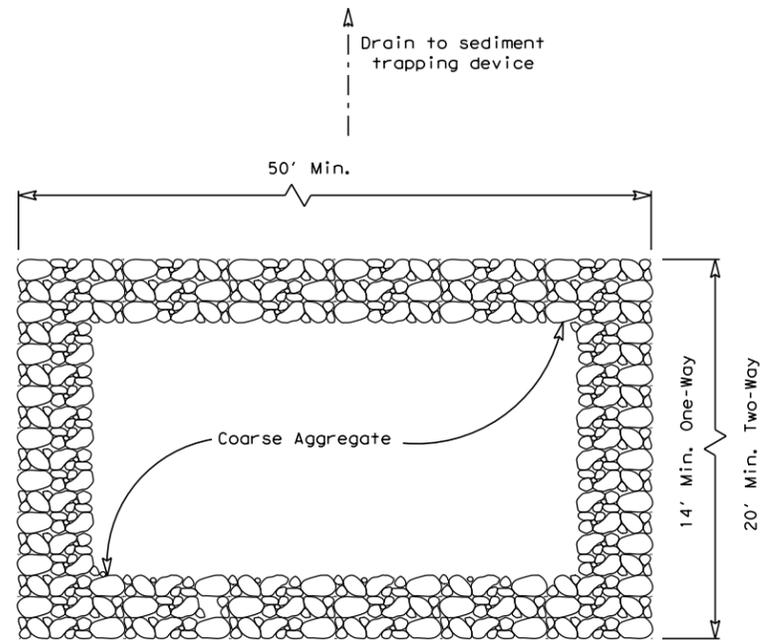


**SECTION A-A**

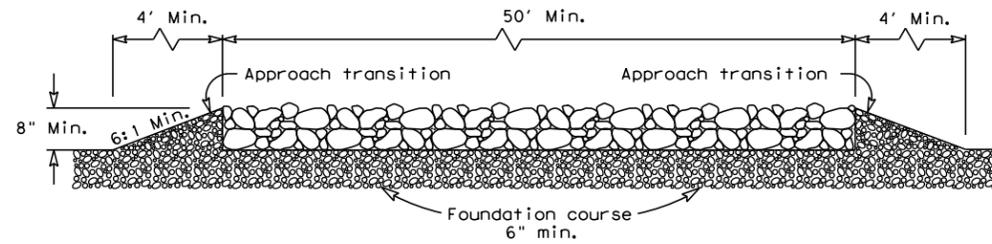
		<b>Design Division Standard</b>	
<b>TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES</b>			
<b>ROCK FILTER DAMS</b>			
<b>EC (2) - 16</b>			
FILE: ec216	DN: TxDOT	CK: KM	DW: VP
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REVISIONS	0983	02	022
DIST	COUNTY		SHEET NO.
ABL	FISHER		130

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DATE: 3/28/2021  
FILE: V:\2142\active\214220136\06-CAD\6.1-Sheets\standards\08\_ENV\ec316.dgn



PLAN VIEW

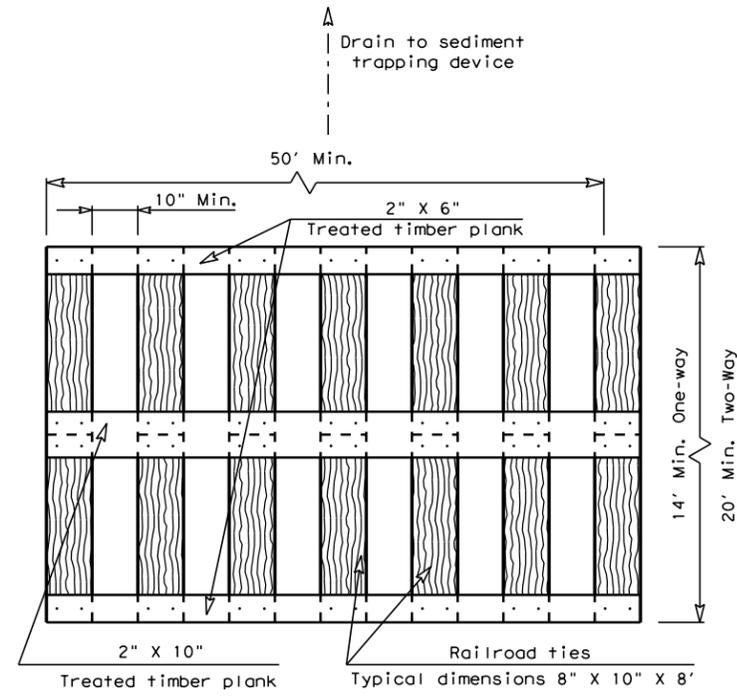


ELEVATION VIEW

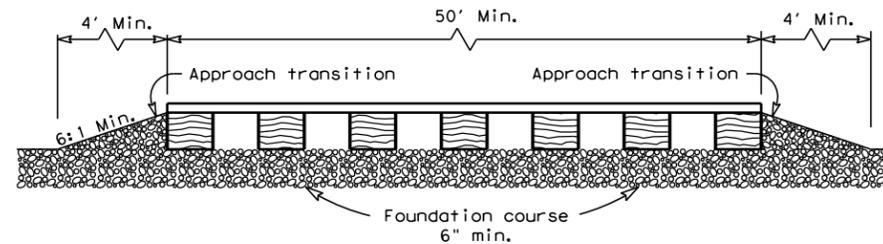
CONSTRUCTION EXIT (TYPE 1)  
ROCK CONSTRUCTION (LONG TERM)

**GENERAL NOTES (TYPE 1)**

- The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
- The coarse aggregate should be open graded with a size of 4" to 8".
- The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
- The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materials approved by the Engineer.
- The construction exit shall be graded to allow drainage to a sediment trapping device.
- The guidelines shown hereon are suggestions only and may be modified by the Engineer.
- Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.



PLAN VIEW

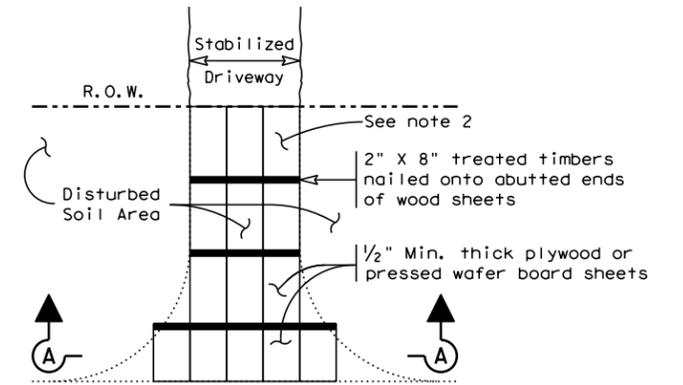


ELEVATION VIEW

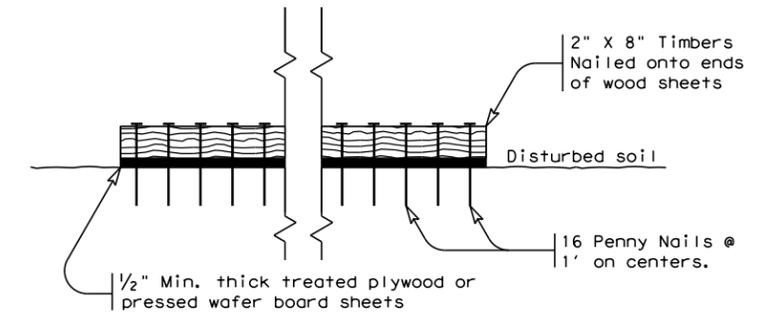
CONSTRUCTION EXIT (TYPE 2)  
TIMBER CONSTRUCTION (LONG TERM)

**GENERAL NOTES (TYPE 2)**

- The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
- The treated timber planks shall be attached to the railroad ties with 1/2" x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
- The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
- The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
- The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
- The construction exit should be graded to allow drainage to a sediment trapping device.
- The guidelines shown hereon are suggestions only and may be modified by the Engineer.
- Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.



PLAN VIEW



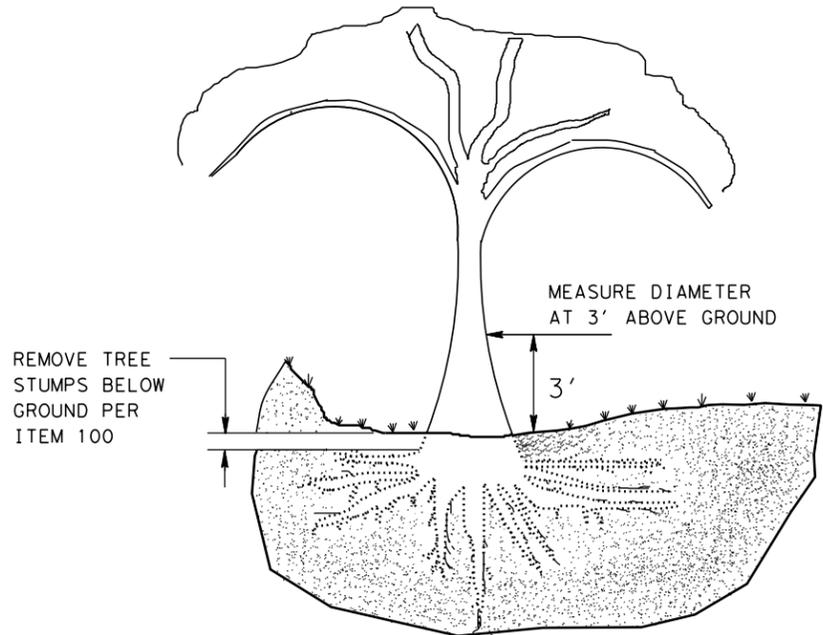
SECTION A-A  
CONSTRUCTION EXIT (TYPE 3)  
SHORT TERM

**GENERAL NOTES (TYPE 3)**

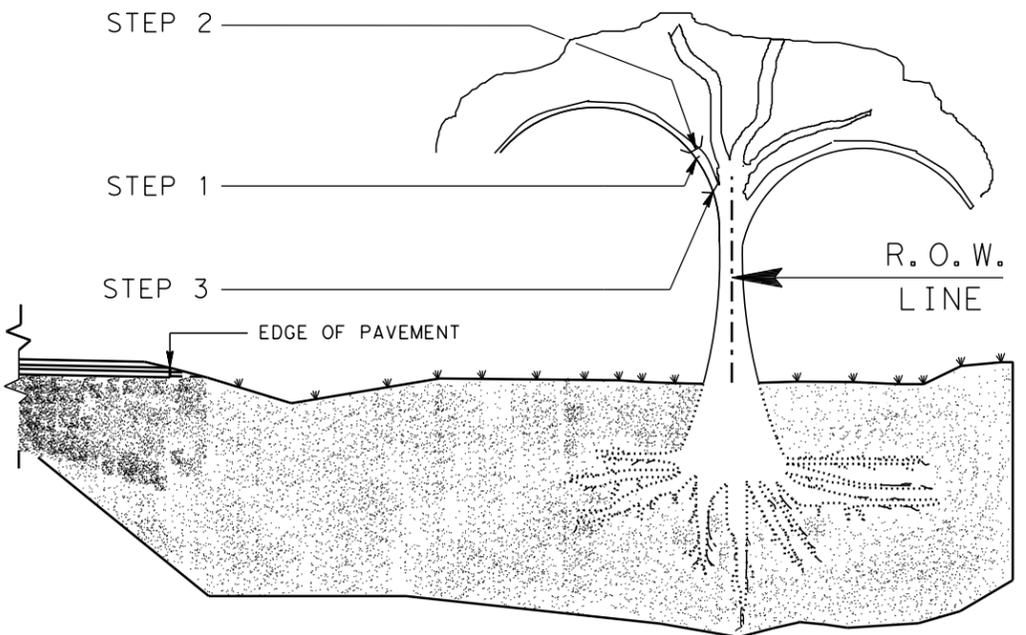
- The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
- The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
- The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
- The guidelines shown hereon are suggestions only and may be modified by the Engineer.

		<b>Design Division Standard</b>	
<b>TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES CONSTRUCTION EXITS EC(3)-16</b>			
FILE: ec316	DN: TxDOT	CK: KM	DW: VP
© TxDOT: JULY 2016	CONT	SECT	JOB
	0983	02	022
	DIST	COUNTY	SHEET NO.
	ABL	FISHER	131

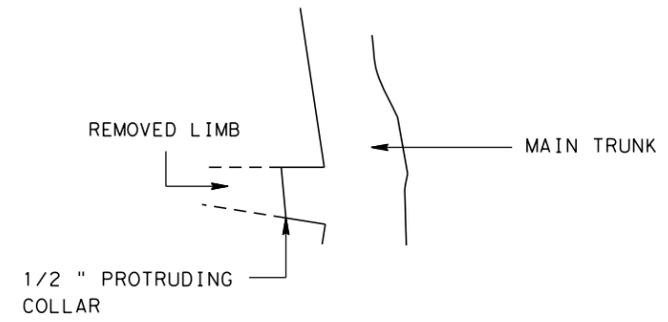
V:\2142\active\214220136\06-CAD\6. 1-Sheets\standards\08 ENV\ABILENE DISTRICT TREE AND BRUSH REMOVAL\*Revision\*7-29.dgn 3/28/2021



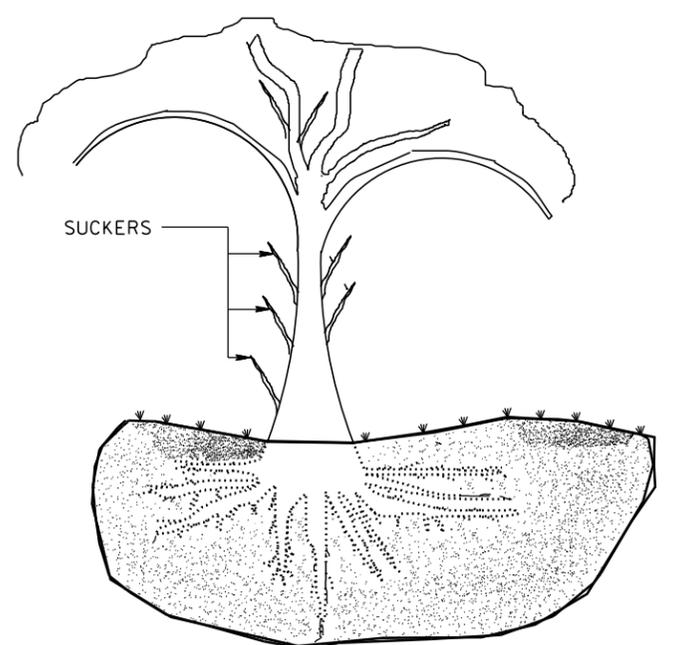
TREE REMOVAL



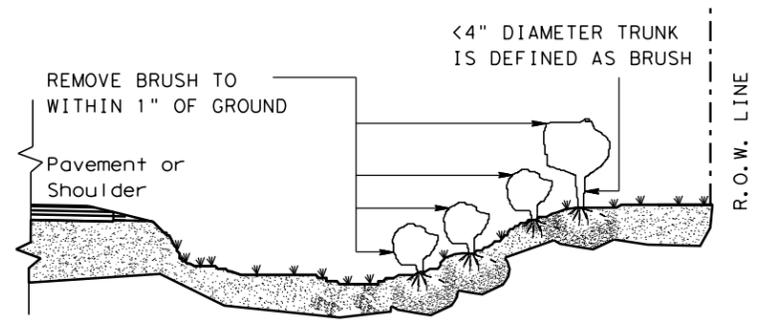
- STEP 1:**  
CUT 1/3 WAY THROUGH BOTTOM OF LIMB 8" TO 12" ABOVE MAIN STEM (OR TRUNK).
- STEP 2:**  
REMOVE LIMB 4" TO 6" BEYOND THE FIRST CUT
- STEP 3:**  
REMOVE STUB WITH A SMOOTH CUT SO THAT TRACE COLLAR OF THE REMOVED LIMB PROTRUDES APPROXIMATELY 1/2" FROM THE MAIN STEM



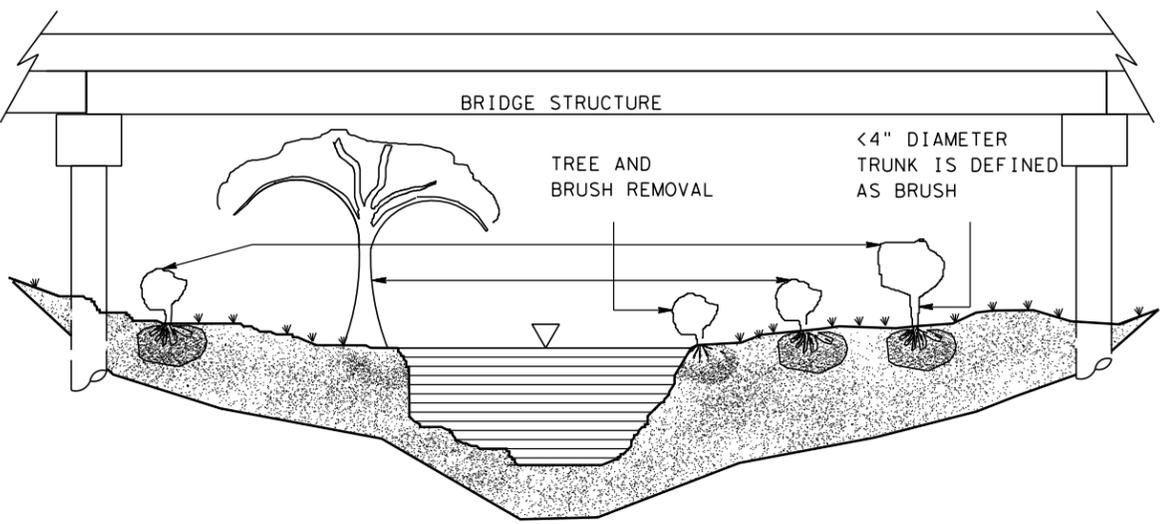
TREE TRIMMING ON THE RIGHT OF WAY LINE



NOTE: SUCKERS ARE SMALL BRANCHES, LESS THAN 2" IN DIAMETER, THAT OCCUR BENEATH MAIN BRANCHES. REMOVE SUCKERS TO THE HEIGHT OF THE LOWEST MAIN BRANCH. STEPS 1, 2 AND 3 APPLY TO MAIN BRANCHES (2" IN DIAMETER OR LARGER).



BRUSH REMOVAL



TREE AND BRUSH REMOVAL UNDER BRIDGES AND IN CHANNELS

GENERAL NOTES:

- TREE AND BRUSH REMOVAL AND TREE TRIMMING
- FOR TREES ON THE R.O.W. LINE, TRIM AND REMOVE ALL LIMBS ON THE PAVEMENT SIDE OF THE TRUNK 18' ABOVE THE PAVEMENT UNLESS OTHERWISE SHOWN ON THE PLANS.
  - TREES WITH TRUNKS FULLY CONTAINED WITHIN THE R.O.W. SHALL BE REMOVED UNLESS OTHERWISE SHOWN IN THE PLANS.
  - THE DIAMETER SHALL BE DETERMINED BY MEASUREMENT OF THE TRUNK CIRCUMFERENCE 3' ABOVE THE GROUND. TREES WITH TRUNKS OF LESS THAN 4" DIAMETER ARE CONSIDERED TO BE BRUSH. TREES WITH MULTIPLE TRUNKS AT THE POINT OF MEASUREMENT ARE MEASURED SEPARATELY.
  - PREP ROW (ITEM 100) BY THE STATION INCLUDES ALL TREE AND BRUSH REMOVAL AND TREE TRIMMING IN THE RIGHT OF WAY ON BOTH SIDES OF THE HIGHWAY. FOR DIVIDED HIGHWAYS THE MEDIAN IS INCLUDED. FOR HIGHWAYS WITH FRONTAGE ROADS, THE AREAS BETWEEN THE FRONTAGE ROADS AND MAIN LANES, AND THE AREAS OUTSIDE OF THE FRONTAGE ROADS ARE INCLUDED.
  - TREE AND BRUSH REMOVAL AND TRIMMING UNDER BRIDGES, IN AND ALONG CHANNELS, AND WITHIN TxDOT EASEMENTS SPECIFIED IN THE PLANS SHALL BE INCLUDED FOR PAYMENT UNDER ITEM 100 BY THE STATION. PRIOR TO PERFORMING THIS WORK, THE ENGINEER'S APPROVAL SHALL BE REQUIRED FOR METHOD AND EXTENT OF THIS REMOVAL. SOME LOCATIONS, SUCH AS SPECIAL AQUATIC SITES, SPRINGS, WETLANDS, AND OTHER LOCATIONS SCPECIFIED ELSEWHERE IN THE PLANS, MAY BE EXCLUDED.



*Kari Ward*

ABILENE DISTRICT  
TREE AND BRUSH REMOVAL



NOT TO SCALE		SHEET 1 OF 1	
FHWA DIVISION	PROJECT NO.	HIGHWAY NO.	
6	SEE TITLE SHEET	FM 419	
STATE	COUNTY	SHEET NO.	
TEXAS	FISHER	132	
DISTRICT	CONTROL	SECTION	JOB
ABL	0983	02	022