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STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

PROJECT NUMBER: BR 2B20(044)

NET LENGTH OF ROADWAY=	1,032.00 ft =	0.20 mi
NET LENGTH OF BRIDGE =	220.00 ft =	0.04 mi
NET LENGTH OF PROJECT=	1,252.00 ft =	0.24 mi

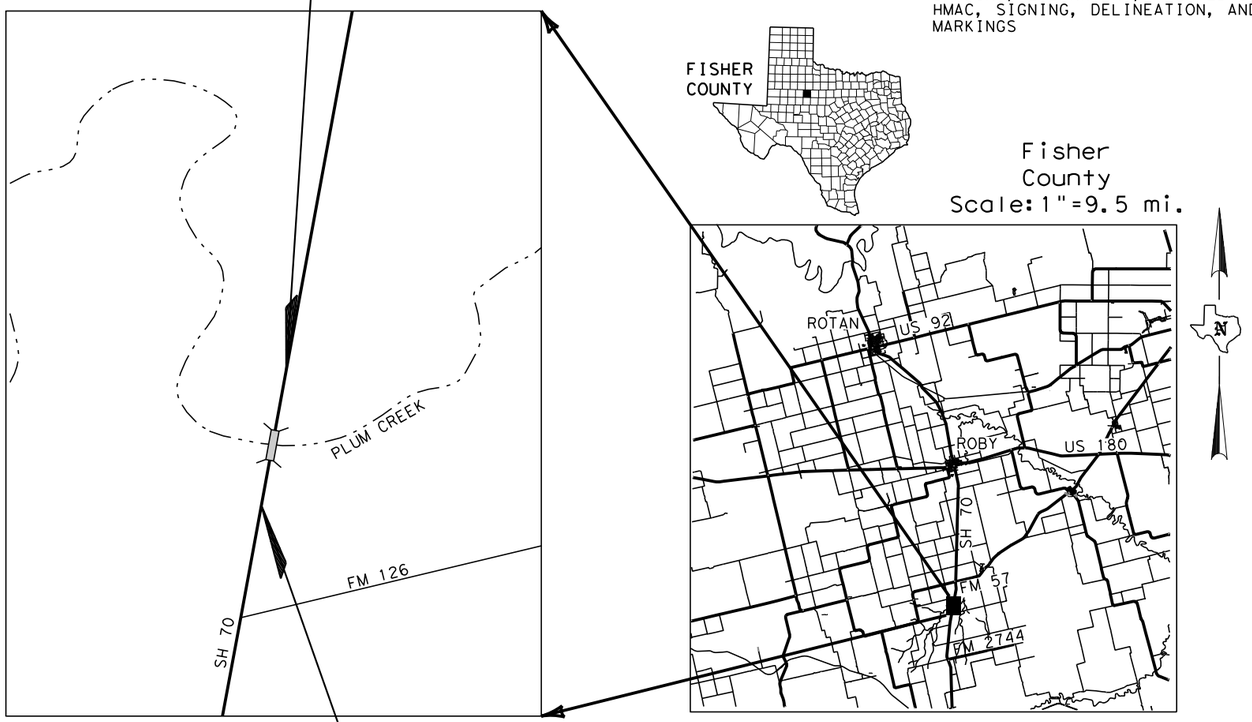
SH 70
FISHER COUNTY

LIMITS: PLUM CREEK

FOR THE CONSTRUCTION OF: BRIDGE REPLACEMENT

CONSISTING OF: REPLACE BRIDGE STRUCTURE AND APPROACHES, GRADING, EMBANKMENT, TREATED SUBGRADE, HMAC, SIGNING, DELINEATION, AND PAVEMENT MARKINGS

END PROJECT
CSJ: 0263-05-024
REF MRK: 314+1.629 mi.
STA: 550+27.00 ft.



Fisher
County
Scale: 1"=9.5 mi.

BEGIN PROJECT
CSJ: 0263-05-024
REF MRK: 314+1.606 mi.
STA: 537+75.00 ft.

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

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).

DESIGN SPEED = (70) mph
CURRENT A.D.T. (2020) = (2,553) vpd
PROJECTED A.D.T. (2040) = (3,574) vpd
FUNCTIONAL CLASS = MINOR ARTERIAL
EXISTING NBI# = 08-077-0-0263-05-015
PROPOSED NBI# = 08-077-0-0263-05-320

FHWA TEXAS DIVISION	PROJECT NO.			SHEET NO.
	BR 2B20(044)			001
STATE	DISTRICT	COUNTY		
TEXAS	ABL	FISHER		
CONTROL	SECTION	JOB	HIGHWAY NO.	
0263	05	024	SH 70	

FINAL PLANS

LETTING DATE: JULY 2022

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 CURRENT TRAFFIC CONTROL STANDARDS.

DocuSigned by: Casey McGee 5/17/2022
COMMITTEE CHAIRMAN DATE

Texas Department of Transportation

RECOMMENDED FOR LETTING: 5/17/2022
DocuSigned by: Stewart J. Chapman, P.E.
STEWART J. CHAPMAN, P.E.
AREA ENGINEER

SUBMITTED FOR LETTING: 5/13/2022
W. Robert Renton Jr.
WLATER R. RENTON JR., P.E.
IEA PROJECT MANAGER

RECOMMENDED FOR LETTING: 5/17/2022
DocuSigned by: Michael Haithcock
MICHAEL A. HAITHCOCK, P.E.
DIRECTOR OF T P & D

RECOMMENDED FOR LETTING: 5/17/2022
DocuSigned by: Michael Roetheli
MICHAEL ROETHELI, EIT
TxDOT PROJECT MANAGER

APPROVED FOR LETTING: 5/17/2022
DocuSigned by: Thomas D. Allbritton, P.E.
THOMAS D. ALLBRITTON, P.E.
DISTRICT ENGINEER

PENTABLE:
DATE: 5/13/2022
FILE: \\PUSCSHMFIL01\J-Jobs\2138C TxDOT SH70 Plum Creek ABL\06.00 Design\06.04 Sheets\06.04.01 General\SH70-RD-TITLE SHEET.DGN

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STATE OF TEXAS
MOHAMMED N. THASLEEM
130455
LICENSED PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED WITH "B" HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

NAME: [signature] DATE: 4/21/2022

STATE OF TEXAS
BRYAN JACOB ALLDREDGE
116211
LICENSED PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED WITH "A" HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

NAME: [signature] DATE: 4/21/2022

Texas Department of Transportation

IEA
18383 PRESTON ROAD
SUITE 500
DALLAS, TEXAS 75252
(214) 884-4253
FIRM REGISTRATION No. F-10161

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STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

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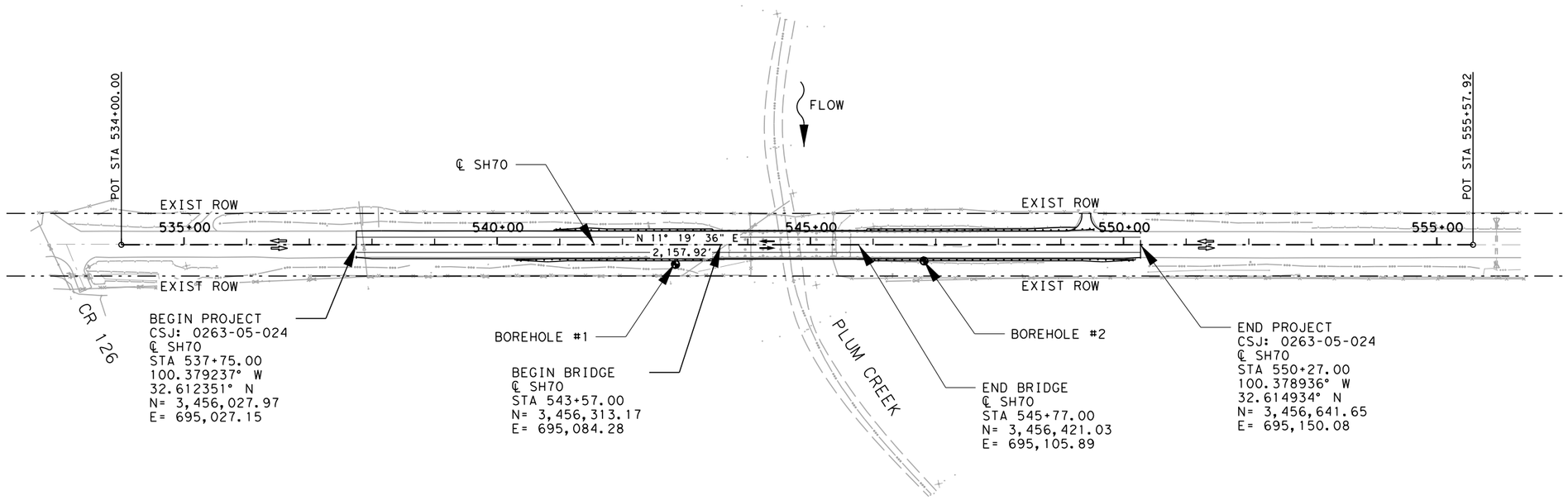

0 100 200
HORIZONTAL SCALE IN FEET

STATE OF TEXAS
BRYAN J. ALLDREDGE
116211
LICENSED PROFESSIONAL ENGINEER

4/11/2022

Texas Department of Transportation

IEA
18383 PRESTON ROAD
SUITE 500
DALLAS, TEXAS 75252
(214) 884-4253
FIRM REGISTRATION No. F-10161

SH 70

PROJECT LAYOUT

SCALE: 1"=200' SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6	SEE COVER SHEET	003

STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

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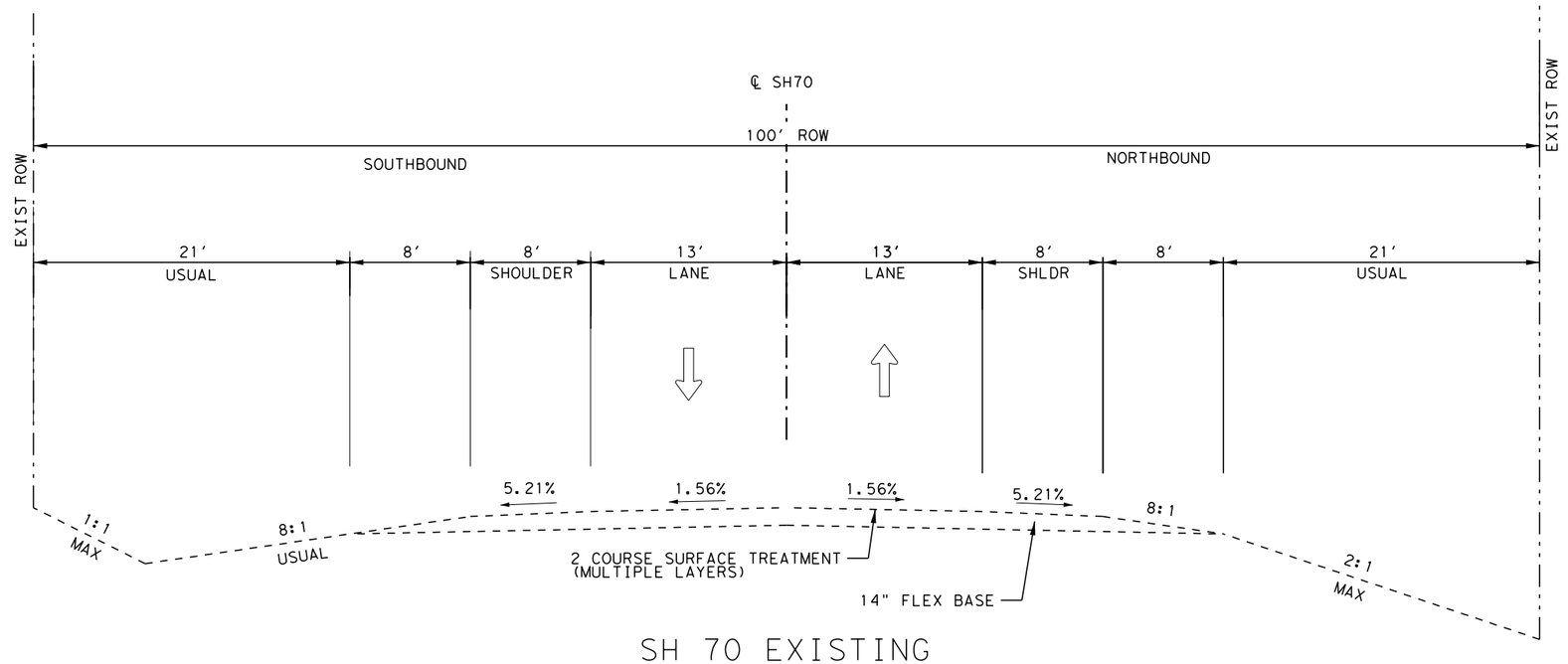
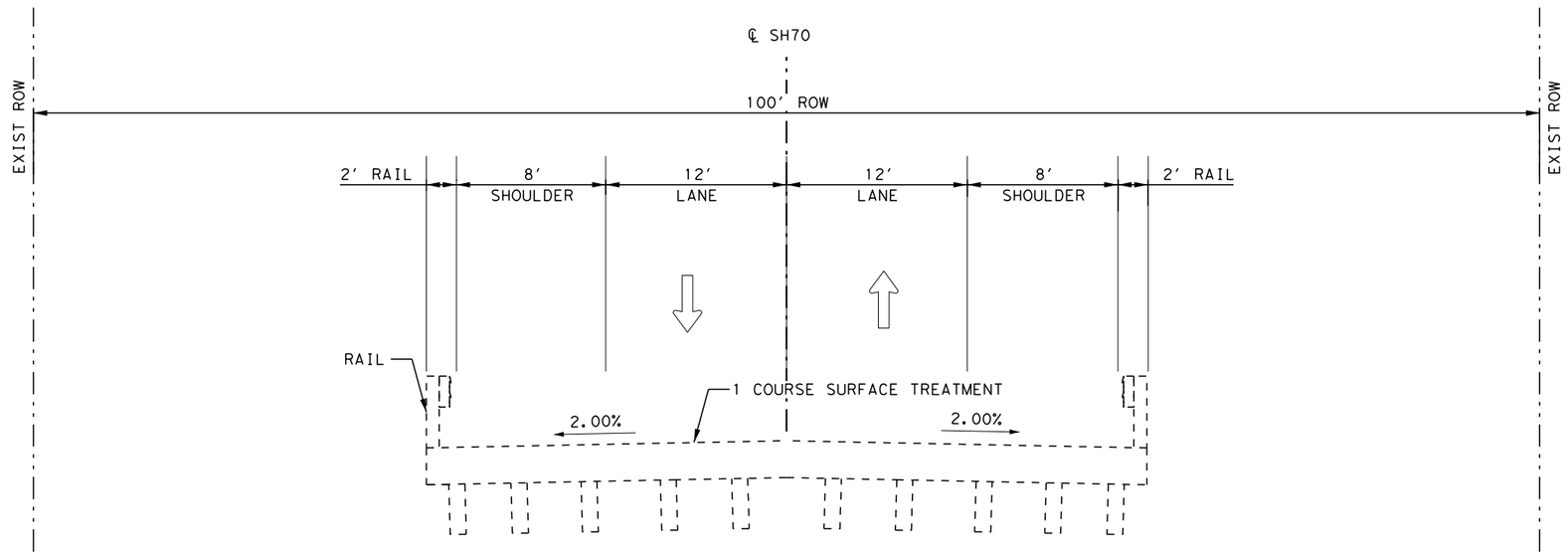


SH 70 EXISTING

STA 537+75.00 TO STA 543+67.02
STA 545+66.52 TO STA 550+27.00



SH 70 EXISTING (BRIDGE)

STA 543+67.02 TO STA 545+66.52

STATE OF TEXAS
BRYAN J. ALLDREDGE
116211
LICENSED PROFESSIONAL ENGINEER

4/11/2022

Texas Department of Transportation

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(214) 884-4253
FIRM REGISTRATION No. F-10161

SH 70

EXISTING TYPICAL SECTIONS

SCALE: NTS

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
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TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

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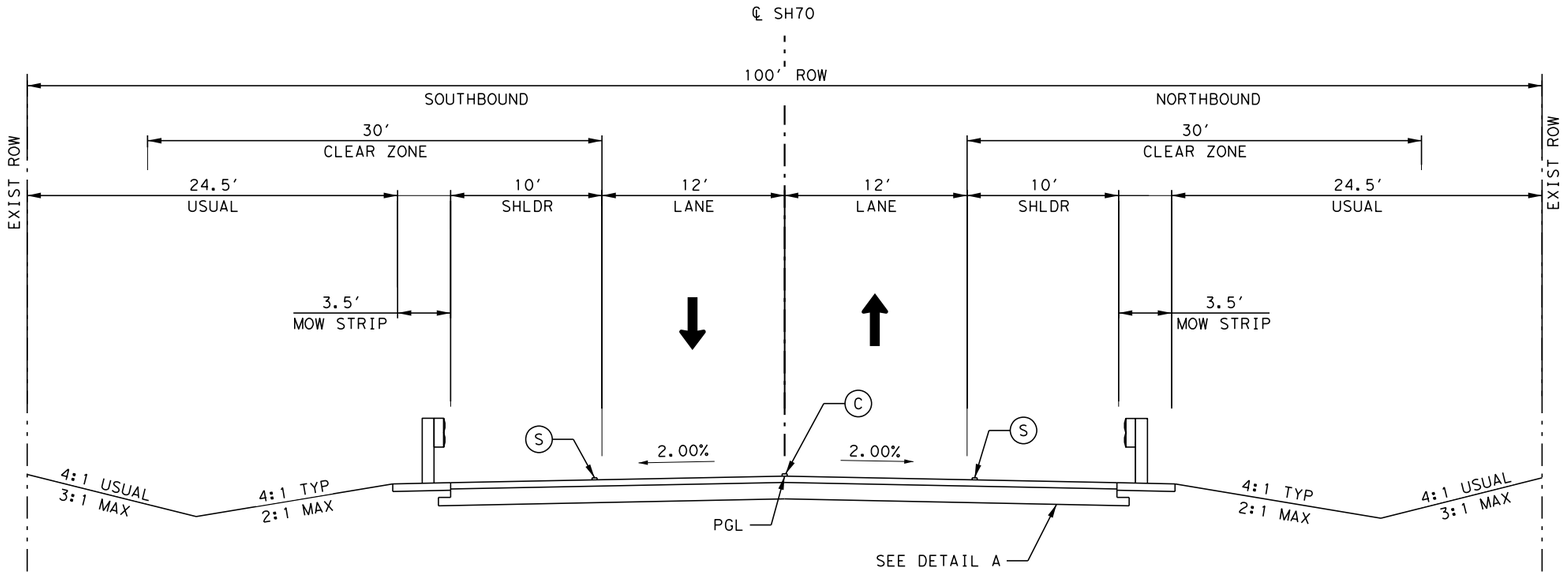
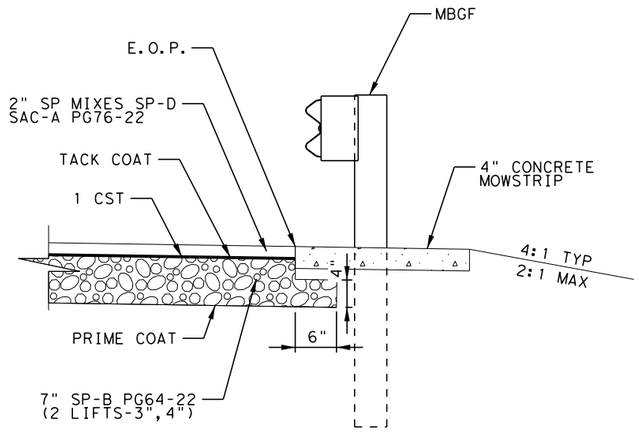


SH 70 PROPOSED

STA 537+75.00 TO STA 543+57.00
STA 545+77.00 TO STA 550+27.00

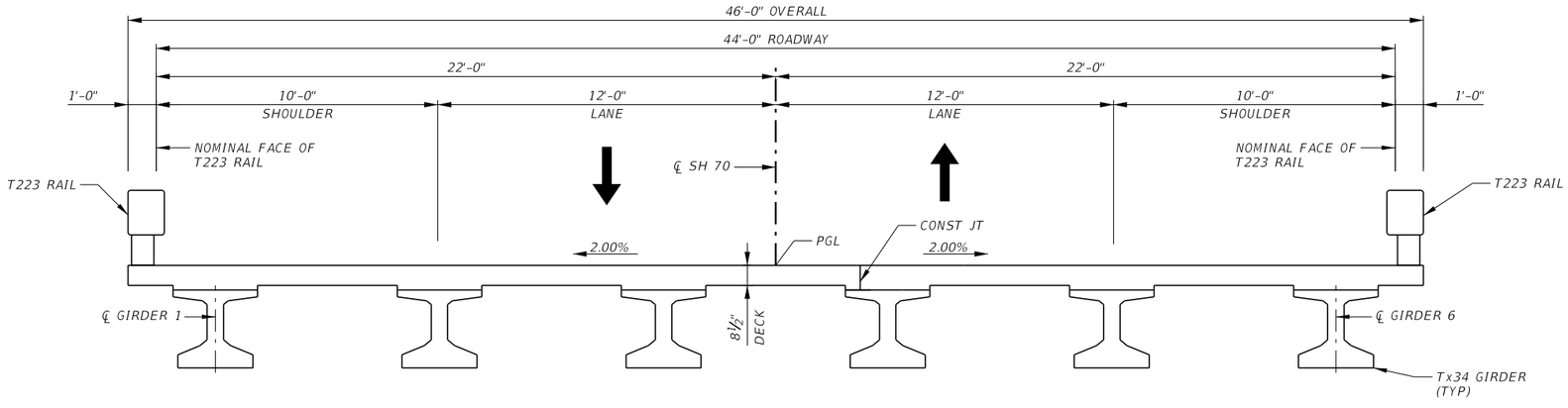
Ⓒ RUMBLE STRIPS ON CENTERLINE

Ⓢ RUMBLE STRIPS ON SHOULDER



DETAIL "A"

NTS



SH 70 PROPOSED (BRIDGE)

STA 543+57.00 TO STA 545+77.00

STATE OF TEXAS
BRYAN J. ALLDREDGE
116211
LICENSED
PROFESSIONAL ENGINEER

4/11/2022

Texas Department of Transportation

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DALLAS, TEXAS 75252
(214) 884-4253
FIRM REGISTRATION No.
F-10161

SH 70

PROPOSED TYPICAL SECTIONS

SCALE: NTS

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FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
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STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

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Project Number: See Title Sheet
Control: 0263-05-024
County: Fisher
Highway: SH 70

ABILENE DISTRICT GENERAL NOTES
2014 SPECIFICATIONS

General

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

Paul Norman, P.E.: Paul.Norman@txdot.gov
Chad Carter, P.E.: Chad.W.Carter@txdot.gov
(Abilene 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.

Environmental

Project Number: See Title Sheet
Control: 0263-05-024
County: Fisher
Highway: SH 70

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"**

Texas Department of Transportation

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18383 PRESTON ROAD
SUITE 500
DALLAS, TEXAS 75252
(214) 884-4253
FIRM REGISTRATION No. F-10161

GENERAL NOTES

SHEET 1 OF 6

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
FRN	SEE COVER SHEET		006
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH70-RD-GN.dgn

Project Number: See Title Sheet
Control: 0263-05-024
County: Fisher
Highway: SH 70

Provide notification to the District Traffic Engineering Section by telephone at 325-676-6991 <u>and</u> by email at ABL_TrafficFix@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 72 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.

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"

The total area disturbed for this project is **<u>2.61</u>** 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.

No significant traffic generator events identified.

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

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.

Project Number: See Title Sheet
Control: 0263-05-024
County: Fisher
Highway: SH 70

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.

The Additional Project Specific Liquidated Damages are $612 per day.

Item 9, "Measurement and Payment"
The progress payment period shall end on the 25^{th} 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.

All trees and brush removed each day will be disposed of within the same day of removal unless otherwise approved. If removed vegetation is burned, ashes from burned vegetation will not be placed or allowed to be transported by storm water into any stream. Burn locations, if approved, will be no closer than 300 feet from a stream. Earth berms must be used around burn areas to keep ash in place.

The limits of preparing right of way will be measured at the following locations:

- SH 70 From Sta. 537+75.00 to Sta. 550+27.00 along the centerline of construction.

The removal of trees and vegetation will be subsidiary to Item 100, "Preparing Right Of Way". Contractor will preserve all trees designated for preservation by whatever means necessary.

The removal of any existing fence will not be paid for directly, but will be considered subsidiary to the bid Item 100, "Preparing Right Of Way".

Prior to starting bridge removals, the Contractor will remove all driftwood and all public trash and dumped materials within the stream channel and property boundaries, with all work and disposal being subsidiary to Item 100, "Preparing Right Of Way" and /or Item 496 "Removing Structures".

IEA
18383 PRESTON ROAD
SUITE 500
DALLAS, TEXAS 75252
(214) 884-4253
FIRM REGISTRATION No. F-10161

GENERAL NOTES

SCALE: SHEET 2 OF 6

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
FRN	SEE COVER SHEET		006A
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH70-RD-GN.dgn

Project Number: See Title Sheet
Control: 0263-05-024
County: Fisher
Highway: SH 70
Item 164, "Seeding 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, "Vegetative Watering"
Water rate for this project shall be ¼" of water per acre every two weeks for a 3-month period.

Item 204, "Sprinkling for Dust Control"
Sprinkle for dust control as directed. Payment for this item will be subsidiary to the various bid items.

Item 316, "Surface Treatments"
When cutback asphalt is used, delay the second surface treatment course or ACP overlay 14 days or as directed by the Engineer.

When cool season emulsion asphalt is used, delay the second surface treatment course or ACP overlay 7 days.

Seal driveways, mailbox turnouts, and intersections prior to sealing the roadway, unless otherwise approved.

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.

Estimated Summer Rates with Grade 4 Aggr.
ASPH (AC-20-5TR) @ .36 GAL/SY
Estimated Winter Rates with Grade 4 Aggr.
ASPH (CRS-2P) @ .40 GAL/SY *

AGGREGATES
AGGR (TY-PB GR-4 SAC –B) – 1 CY/140 SY

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

Project Number: See Title Sheet
Control: 0263-05-024
County: Fisher
Highway: SH 70
Item 416, "Drilled Shaft Foundations"
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 420, 427, "Concrete Substructures" & "Surface Finishes for Concrete"
Provide a Surface Area 1 finish using an Adhesive Grout Coating or Rub Finish as directed.

Item 421, "Hydraulic Cement Concrete"
Use a cement meeting the requirements of Ty II when Mix Design Option 7 is selected for cast in place concrete.

Class C fly ash and Type I cement will not be allowed for any mix unless approved by the Engineer.

As a minimum, curing facility includes concrete curing tank, heater and a concrete recording thermometer. Provide a recorder with the capability to chart temperatures for 24 hours, 7 days and 30 day periods of time.

Air Entrainment requirements are waived with exception to bridge deck concrete, and rails, top slabs of direct traffic culverts and approach slabs. Air Entrainment is required for all slip formed concrete (bridge rail, concrete traffic barrier, pavement, etc.).

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.

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GENERAL NOTES

SCALE: SHEET 3 OF 6

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
FRN	SEE COVER SHEET	006B

STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

Project Number: See Title Sheet
Control: 0263-05-024
County: Fisher
Highway: SH 70

Item 502, "Barricades, Signs and Traffic Handling"

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.

Provide separate attenuators for each work area within a common lane closure as approved or directed by the Engineer.

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

Pilot car is subsidiary to item 502.

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.

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.

Project Number: See Title Sheet
Control: 0263-05-024
County: Fisher
Highway: SH 70

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.

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.

Item 506, "Temporary Erosion, Sedimentation, and Environmental Controls"
On site concrete washout shall not be allowed on this project.

Item 510, "One-way Traffic Control"
The contractor shall use ADDCO PTS-2000 or equivalent, capable of showing wait time, as temporary traffic signals. **2** temporary traffic signals will be required for this project.

Item 512, "Portable Concrete Traffic Barrier
The use of steel PTB is required on this project due to weight restrictions from a partial demolition of the existing bridge.

Item 530, "Intersections, Driveways, and Turnouts"
Excavation and embankment necessary to construct the intersections and driveways according to the details shown elsewhere shall be considered subsidiary to this item.

Item 533, "Milled Rumble Strips"
The milled rumble strips should be placed on shoulder according to rs(1-4)-13 standards and the shoulder widths as shown below.

- Shoulder width of 2 feet or less the rumble strip will begin on the edge line as shown in the standards.
- Shoulder width of greater than 2 feet or less than 6 feet the rumble strip will be centered on the shoulder.
- Shoulder width of greater than 6 feet the rumble strip will begin 2 feet from the edge line.
- Or as directed by the engineer

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GENERAL NOTES

SCALE: SHEET 4 OF 6

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
FRN	SEE COVER SHEET	006C

STATE	DISTRICT	COUNTY
TEXAS	ABL	FISHER

CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH70-RD-GN.dgn

Project Number: See Title Sheet
Control: 0263-05-024
County: Fisher
Highway: SH 70

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.

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"
Delineators and object marker assemblies will use winged channel posts. The winged channel posts will be 1.12 lb/ft and 6.5 ft in length.

All MBGF delineation shall be GF2 mounted on posts.

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.

Project Number: See Title Sheet
Control: 0263-05-024
County: Fisher
Highway: SH 70
All longitudinal pavement markings (including profile pavement markings) must meet minimum retro reflectivity requirements.

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**".

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

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 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.

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GENERAL NOTES

SCALE: SHEET 5 OF 6

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
FRN	SEE COVER SHEET	006D

STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

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Project Number: See Title Sheet
Control: 0263-05-024
County: Fisher
Highway: SH 70

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 1st through March 15th.

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.

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 6001, “Portable Changeable Message Sign”

This project will require “full matrix” type portable changeable message signs.

Ensure that the Contractor’s Responsible Person for traffic control can revise messages within thirty (30) minutes of notification.

Furnish 2 portable changeable message signs. The portable changeable message sign(s) will be used for all lane closures and freeway closures as shown on the traffic control plan standard sheets.

Project Number: See Title Sheet
Control: 0263-05-024
County: Fisher
Highway: SH 70
Supply portable changeable message sign(s) in accordance with the Traffic Control Plan standard sheets and Article 6f.55 of the Texas Manual on Uniform Traffic Control Devices for Streets and Highways Part VI.

Item 6185, “Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)”
Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA) will not be considered a major item of work on this project.

TMA,s will only be paid while workers are present or to protect a blunt object.

BASIS OF ESTIMATE FOR STATIONARY TMAs				
Basis of Estimate for Mobile TMAs				
		TMA (Mobile)		
Phase	Standard	Required	Additional	TOTAL
1	TCP (3-1)-13	2		2
1	TCP (3-3)-14	2		2
1	TCP (2-8)-18 (Set up)		2	2
2	TCP (2-8)-18 (Relocate)		2	2
Final	TCP (2-8)-18 (Remove)		2	2
Final	TCP (3-1)-13	2		2
Final	TCP (3-3)-14	2		2

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.

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GENERAL NOTES

SCALE: SHEET 6 OF 6

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
FRN	SEE COVER SHEET		006E
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH70-RD-GN.dgn

ESTIMATE SUMMARY

		CONTROL SECTION JOB		0263-05-024		TOTAL EST.	TOTAL FINAL
		PROJECT ID		A00067093			
		COUNTY		Fisher			
		HIGHWAY		SH 70			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	100-6002	PREPARING ROW	STA	12.600		12.600	
	110-6001	EXCAVATION (ROADWAY)	CY	78.000		78.000	
	132-6004	EMBANKMENT (FINAL)(DENS CONT)(TY B)	CY	2,180.000		2,180.000	
	164-6009	BROADCAST SEED (TEMP) (WARM)	SY	3,571.000		3,571.000	
	164-6011	BROADCAST SEED (TEMP) (COOL)	SY	3,571.000		3,571.000	
	164-6013	STRAW/HAY MLCH SEED(PERM)(RURAL)(SANDY)	SY	7,142.000		7,142.000	
	168-6001	VEGETATIVE WATERING	MG	11.000		11.000	
	251-6021	REWORK BS MTL (TY A) (6") (ORD COMP)	SY	4,439.000		4,439.000	
	310-6009	PRIME COAT (MC-30)	GAL	1,032.000		1,032.000	
	316-6001	ASPH (MULTI OPTION)	GAL	2,322.000		2,322.000	
	316-6175	AGGR(TY-B GR-4 SAC-B)	CY	37.000		37.000	
	400-6005	CEM STABIL BKFL	CY	78.000		78.000	
	403-6001	TEMPORARY SPL SHORING	SF	1,606.000		1,606.000	
	416-6001	DRILL SHAFT (18 IN)	LF	200.000		200.000	
	416-6004	DRILL SHAFT (36 IN)	LF	880.000		880.000	
	420-6014	CL C CONC (ABUT)(HPC)	CY	57.000		57.000	
	420-6030	CL C CONC (CAP)(HPC)	CY	41.200		41.200	
	420-6038	CL C CONC (COLUMN)(HPC)	CY	30.600		30.600	
	422-6002	REINF CONC SLAB (HPC)	SF	10,120.000		10,120.000	
	422-6016	APPROACH SLAB (HPC)	CY	73.800		73.800	
	425-6036	PRESTR CONC GIRDER (TX34)	LF	1,311.000		1,311.000	
	427-6004	SILICONE RESIN PAINT FINISH	SF	484.000		484.000	
	432-6026	RIPRAP (STONE COMMON)(DRY)(18 IN)	CY	2,006.000		2,006.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	60.000		60.000	
	450-6007	RAIL (TY T223)(HPC)	LF	492.000		492.000	
	454-6018	SEALED EXPANSION JOINT (4 IN) (SEJ - M)	LF	92.000		92.000	
	496-6010	REMOV STR (BRIDGE 100 - 499 FT LENGTH)	EA	1.000		1.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	10.000		10.000	
	506-6003	ROCK FILTER DAMS (INSTALL) (TY 3)	LF	60.000		60.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	60.000		60.000	
	506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	536.000		536.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	536.000		536.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	1,022.000		1,022.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	1,022.000		1,022.000	
	506-6042	BIODEG EROSN CONT LOGS (INSTL) (18")	LF	30.000		30.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	30.000		30.000	
	512-6094	PTB (FUR & INST)(STEEL)	LF	1,715.000		1,715.000	
	512-6095	PTB (MOVE)(STEEL)	LF	1,035.000		1,035.000	
	512-6096	PTB (REMOVE)(STEEL)	LF	1,715.000		1,715.000	

STATE OF TEXAS
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LICENSED PROFESSIONAL ENGINEER

5/18/2022

Texas Department of Transportation

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ESTIMATE AND QUANTITIES

SHEET 1 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
FRN	SEE COVER SHEET		007
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH70-RD-E&Q.dgn

ESTIMATE SUMMARY

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		0263-05-024			
		PROJECT ID		A00067093			
		COUNTY		Fisher			
		HIGHWAY		SH 70			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	530-6005	DRIVEWAYS (ACP)	SY	77.000		77.000	
	533-6001	RUMBLE STRIPS (SHOULDER)	LF	1,804.000		1,804.000	
	533-6002	RUMBLE STRIPS (CENTERLINE)	LF	902.000		902.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	875.000		875.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	4.000		4.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	300.000		300.000	
	542-6002	REMOVE TERMINAL ANCHOR SECTION	EA	1.000		1.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	4.000		4.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	3.000		3.000	
	545-6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	2.000		2.000	
	545-6005	CRASH CUSH ATTEN (REMOVE)	EA	4.000		4.000	
	545-6019	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	EA	4.000		4.000	
	644-6061	IN SM RD SN SUP&AM TYTWT(1)WS(T)	EA	2.000		2.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	1.000		1.000	
	658-6027	INSTL DEL ASSM (D-SY)SZ (BRF)CTB (BI)	EA	8.000		8.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	22.000		22.000	
	662-6050	WK ZN PAV MRK REMOV (REFL) TY II-A-A	EA	105.000		105.000	
	666-6170	REFL PAV MRK TY II (W) 4" (SLD)	LF	5957.000		5957.000	
	666-6205	REFL PAV MRK TY II (Y) 4" (BRK)	LF	55.000		55.000	
	666-6207	REFL PAV MRK TY II (Y) 4" (SLD)	LF	8,400.000		8,400.000	
	666-6303	RE PM W/RET REQ TY I (W)4"(SLD)(100MIL)	LF	14,204.000		14,204.000	
	666-6312	RE PM W/RET REQ TY I (Y)4"(BRK)(100MIL)	LF	1,420.000		1,420.000	
	666-6315	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)	LF	1,550.000		1,550.000	
	668-6018	PREFAB PAV MRK TY B (W)(24")(SLD)	LF	24.000		24.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	96.000		96.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF	18,158.000		18,158.000	
	681-6001	TEMP TRAF SIGNALS	EA	2.000		2.000	
	3077-6003	SP MIXESSP-BSAC-B PG64-22	TON	2,148.000		2,148.000	
	3077-6053	SP MIXESSP-DSAC-B PG70-22	TON	606.000		606.000	
	3077-6075	TACK COAT	GAL	505.000		505.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2.000		2.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	28.000		28.000	
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	

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4/21/2022

Texas Department of Transportation

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FIRM REGISTRATION No. F-10161

ESTIMATE AND QUANTITIES

SCALE:

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
FRN	SEE COVER SHEET		007A
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH70-RD-E&Q.dgn

SUMMARY OF TRAFFIC CONTROL PLAN QUANTITIES

ITEM NUMBER	403	512	512	512	545	545	545	662	666	666	668	677	681	6001	6185
DESC. CODE	6001	6094	6095	6096	6003	6005	6019	6050	6170	6207	6018	6001	6001	6002	6005
SHEET NO.	TEMPORARY SPL SHORING	PTB (FRN&INSTL) (STEEL)	PTB (MOVE) (STEEL)	PTB (REMOVE) (STEEL)	CRASH CUSH ATTEN (MOVE & RESET)	CRASH CUSH ATTEN (REMOVE)	CRASH CUSH ATTEN (INSTL) (S)(N) (TL3)	WK ZN PAV MARK REMOVE (REFL) TY II-A-A	REFL PAV MRK TY II (W) 4"(SLD)	REF PAV MRK TY II (Y) 4"(SLD)	PREFAB PAV MRK TY B (W) (24")(SLD)	ELIM EXT PAV MRK & MRKS (4")	TEMP TRAFFIC SIGNALS	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (MOBILE OPERATION)
	SF	LF	LF	LF	EA	EA	EA	EA	LF	LF	LF	LF	EA	EA	DAY
CSJ: 0263-05-024															
PHASE 1	1,606	1,715					4	105	2,759	8,400	24	6,200	2	2	12
PHASE 2			1,035	680	2	2			2,758						4
FINAL				1,035		2						11,958			12
TOTAL	**1,606**	**1,715**	**1,035**	**1,715**	**2**	**4**	**4**	**105**	**5,517**	**8,400**	**24**	**18,158**	**2**	**2**	**28**

ITEM NUMBER			677	
DESC. CODE			6001	
Begin	End	LT/RT	ELIM EXT PAV MRK & MRKS (4")	Comment
STA	STA	FT	LF	
PHASE 1				
536+50.00	552+50.00	LT	1,600	4" WHITE EDGELINE
514+50.00	537+50.00		2,300	4" YELLOW CENTERLINE
550+27.00	573+27.00		2,300	4" YELLOW CENTERLINE
			6,200	
FINAL				
514+50.00	537+50.00		2,300	4" YELLOW CENTERLINE
514+50.00	537+50.00		2,300	4" YELLOW CENTERLINE
550+27.00	573+27.00		2,300	4" YELLOW CENTERLINE
550+27.00	573+27.00		2,300	4" YELLOW CENTERLINE
536+49.00	551+55.00	RT	1,506	4" WHITE EDGELINE
537+75.00	550+27.00	RT	1,252	4" WHITE EDGELINE
			11,958	
STRIPING REMOVAL TOTAL FOR TCP			18,158	

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SH 70

TCP QUANTITY SUMMARY

SCALE: NTS

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE COVER SHEET		008
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH70-TCP-QTY.dgn

SUMMARY OF REMOVAL ITEMS						
ITEM NUMBER	251	496	542	542	544	644
DESC. CODE	6021	6010	6001	6002	6003	6076
SHEET NO.	REWORK BS MTL (TY A) (6") (ORD COMP)*	REMOV STR (BRIDGE 100 - 499 FT LENGTH)	REMOVE METAL BEAM GUARD FENCE	REMOVE TERMINAL ANCHOR SECTION	GUARDRAIL END TREATMENT (REMOVE)	REMOVE SM RD SN SUP&AM
	SY	EA	LF	EA	EA	EA
CSJ: 0263-05-024						
1 OF 1	4,439	1	300	1	3	1
TOTAL	**4,439**	**1**	**300**	**1**	**3**	**1**

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REMOVAL QUANTITY SUMMARY

SCALE: NTS

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE COVER SHEET		009
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SUMMARY OF ROADWAY ITEMS

ITEM NUMBER	100	110	132	310	316	316	432	432	530	540	540	544	3077	3077	3077
DESC. CODE	6002	6001	6004	6009	6001	6175	6026	6045	6005	6001	6006	6001	6001	6053	6075
SHEET NO.	PREPARING ROW	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY B)	PRIME COAT (MC-30)	ASPH (MULTI OPTION)	AGGR (TY-B GR-4 SAC-B)	RIPRAP (STONE COMMON) (DRY) (18 IN)	RIPRAP (MOW STRIP) (4 IN)	DRIVEWAY (ACP)	MTL W-BEAM GD FEN (TIM POST)	MTL W-BEAM GD FEN TRANS (THRIE-BEAM)	GUARDRAIL END TREATMENT (INSTALL)	SP MIXES SP-B SAC-B PG64-22	SP MIXES SP-D SAC-B PG70-22	TACK COAT
	STA	CY	CY	GAL	GAL	CY	CY	CY	SY	LF	EA	EA	TON	TON	GAL
CSJ: 0263-05-024															
1 OF 1	12.6	78	2,180	1,032	2,322	37	2,006	60	77	875	4	4	2,148	606	505
TOTAL	**12.6**	**78**	**2,180**	**1,032**	**2,322**	**37**	**2,006**	**60**	**77**	**875**	**4**	**4**	**2,148**	**606**	**505**

SUMMARY OF ASPHALT AREAS

ITEM NUMBER		WIDTH							310	316	316	3077	3077	3077	3077
DESC. CODE									6009	6001	6175	6001	6001	6066	6075
LOCATION	LENGTH	PRIME COAT (MC-30)	ASPH (MULTI OPTION)	AGGR (TY-B GR-4 SAC-B)	SP MIXES SP-B SAC-B PG64-22 4"	SP MIXES SP-B SAC-B PG64-22 3"	SP MIXES SP-2 SAC-B PG70-22 2"	TACK COAT	PRIME COAT (MC-30)	ASPH (MULTI OPTION)	AGGR (TY-B GR-4 SAC-B)	SP MIXES SP-B SAC-B PG64-22 4"	SP MIXES SP-B SAC-B PG64-22 3"	SP MIXES SP-2 SAC-B PG70-22 2"	TACK COAT
	LF	LF	LF	LF	LF	LF	LF	LF	SY	SY	SY	SY	SY	SY	SY
CSJ: 0263-05-024															
STA 537+75.00 TO STA 543+57.00	582	45	44	44	45	44	44	44	2,910	2,846	2,846	2,910	2,846	2,846	2,846
STA 545+77.00 TO STA 550+27.00	450	45	44	44	45	44	44	44	2,250	2,200	2,200	2,250	2,200	2,200	2,200
								TOTAL	**5,160**	**5,046**	**5,046**	**5,160**	**5,046**	**5,046**	**5,046**

BASIS OF ESTIMATE

ITEM NUMBER	DESCRIPTION	RATE	AREA (SY)	QUANTITY	UNIT
310-6009	PRIME COAT (MC-30)	0.20 GAL / SY	5,160	**1,032**	GAL
316-6001	ASPH (MULTI OPTION)	0.46 GAL / SY	5,046	**2,322**	GAL
316-6175	AGGR (TY-B GR-4 SAC-B)	1 CY / 140 SY	5,046	**37**	CY
3077-6001	SP MIXES SP-B SAC-B PG64-22 4"	120 LBS / SY / IN	5,160	**1,239**	TON
3077-6001	SP MIXES SP-B SAC-B PG64-22 3"	120 LBS / SY / IN	5,046	**909**	TON
3077-6053	SP MIXES SP-2 SAC-B PG70-22 2"	110 LBS / SY / IN	5,046	**606**	TON
3077-6075	TACK COAT	0.10 GAL / SY	5,046	**505**	GAL

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ROADWAY QUANTITY SUMMARY

SCALE: NTS

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE COVER SHEET		010
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

PLUM CREEK BRIDGE QUANTITY SUMMARY

BID CODES	400-6005	416-6001	416-6004	420-6014	420-6030	420-6038	422-6002	422-6016	425-6036	427-6004	450-6007	454-6018
BID ITEM DESCRIPTION	CEM STABIL BKFL	DRILL SHAFT (18 IN)	DRILL SHAFT (36 IN)	CL C CONC (ABUT) (HPC)	CL C CONC (CAP) (HPC)	CL C CONC (COLUMN) (HPC)	REINF CONC SLAB (HPC)	APPROACH SLAB (HPC)	PRESTR CONC GIRDER (TX34)	SILICON RESIN PAINT FINISH	RAIL (TY T223) (HPC)	SEALED EXPANSION JOINT (4 IN) (SEJ - M)
	CY	LF	LF	CY	CY	CY	SF	CY	LF	SF	LF	LF
PHASE 1												
2 - ABUTMENTS	39	100	300	27.2				32.1		224		
2 - BENTS			140		19.2	15.3						
220' PS CONC I-GIRDER UNIT							4,400		655.50		246	40
PHASE 2												
2 - ABUTMENTS	39	100	300	29.8				41.7		260		
2 - BENTS			140		22.0	15.3						
220' PS CONC I-GIRDER UNIT							5,720		655.50		246	52
TOTAL	**78**	**200**	**880**	**57.0**	**41.2**	**30.6**	**10,120**	**73.8**	**1,311.00**	**484**	**492**	**92**

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SH 70

BRIDGE QUANTITY SUMMARY

SCALE: NTS

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE COVER SHEET		011
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH70-BRG-QTY.dgn

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SUMMARY OF SIGN & PAVEMENT MARKING ITEMS

ITEM NUMBER	533	533	644	658	658	666	666	666	666	666	672
DESC. CODE	6001	6002	6061	6027	6062	6170	6205	6303	6312	6315	6009
SHEET NO.	RUMBLE STRIPS (SHOULDER)	RUMBLE STRIPS (CENTERLINE)	IN SM RD SN SUP&AM TY TWT(1)WS(T)	INSTL DEL ASSM (D-SY)SZ (BRF)CTB(BI)	INSTL DEL ASSM (D-SW)SZ 1 (BRF)GF2(BI)	REFL PAV MRK TY II (W) 4" SLD	REFL PAV MRK TY II (Y) 4" BRK	RE PM W/ RET REQ TY I (W) 4" (SLD) (100MIL)	RE PM W/ RET REQ TY I (Y) 4"(BRK) (100MIL)	RE PM W/ RET REQ TY I (Y) 4"(SLD) (100MIL)	REFL PAV MRKR TY-II-A-A
	LF	LF	LF	EA	EA	LF	LF	LF	LF	LF	EA
CSJ: 0263-05-024											
1 OF 1	1,804	902	2	8	22	440	55	14,204	1,420	1,550	96
TOTAL	**1,804**	**902**	**2**	**8**	**22**	**440**	**55**	**14,204**	**1,420**	**1,550**	**96**

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FIRM REGISTRATION No. F-10161

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SIGN AND PAVEMENT MARKING QUANTITY SUMMARY

SCALE: NTS

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE COVER SHEET		012
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SUMMARY OF SW3P ITEMS

ITEM NUMBER	164	164	164	168	506	506	506	506	506	506	506	506
DESC. CODE	6009	6011	6013	6001	6003	6011	6020	6024	6038	6039	6042	6043
SHEET NO.	BROADCAST SEED (TEMP) (WARM)	BROADCAST COOL (TEMP) (COOL)	STRAW/HAY MLCH SEED (PERM) (RURAL) (SANDY)	VEGETATIVE WATERING	ROCK FILTER DAMS (INSTALL) (TY3)	ROCK FILTER DAMS (REMOVE) (TY3)	CONSTRUCTION EXISTS (INSTALL) (TY 1)	CONSTRUCTION EXISTS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)
	SY	SY	SY	MG	LF	LF	SY	SY	LF	LF	LF	LF
CSJ: 0263-05-024												
1 OF 1	3571	3571	7142	11	60	60	536	536	1022	1022	30	30
TOTAL	**3571**	**3571**	**7142**	**11**	**60**	**60**	**536**	**536**	**1022**	**1022**	**30**	**30**

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SH 70

SW3P
QUANTITY SUMMARY

SCALE: NTS

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE COVER SHEET		013
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH70-SW3P-QTY.dgn

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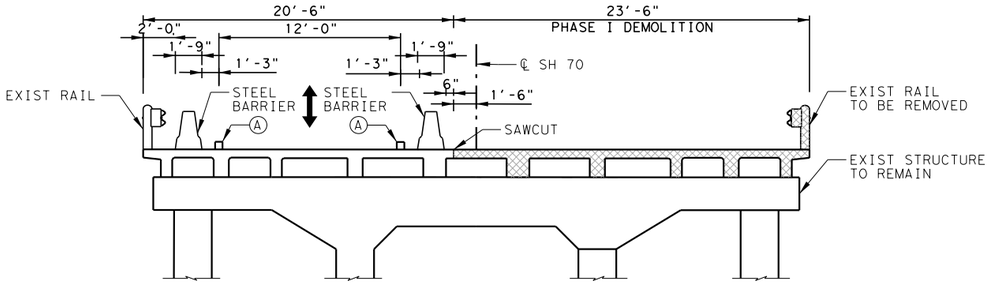
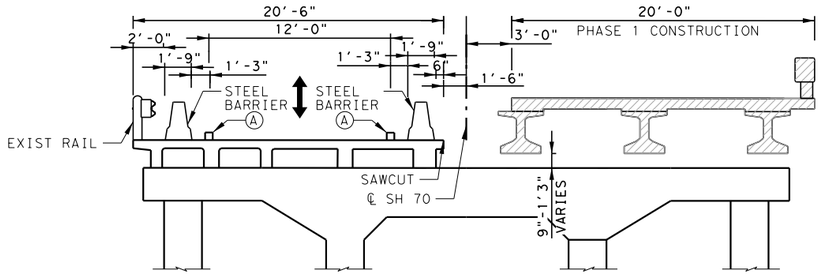
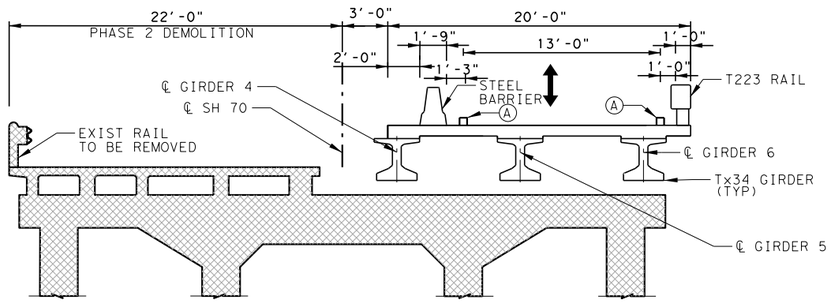
Ⓐ TY II (W) 4" (SLD)



PHASE 1 DEMOLITION



PHASE 1 CONSTRUCTION



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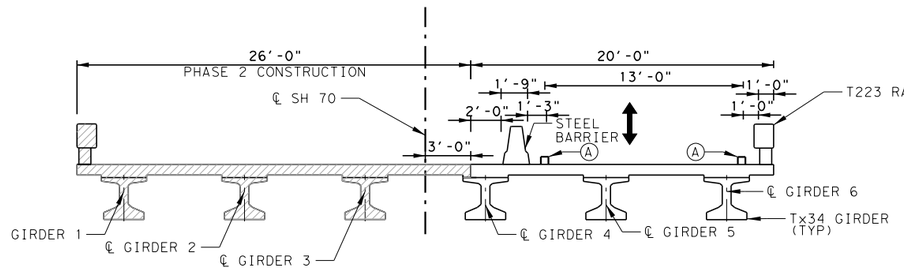
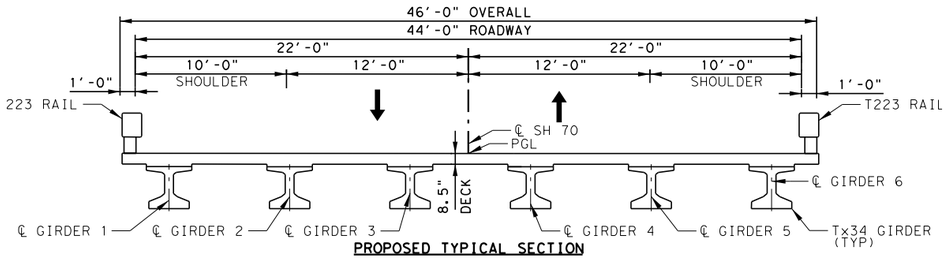


PHASE 2 CONSTRUCTION



PROPOSED TYPICAL SECTION

NOTES

1. STEEL BARRIER TO BE PINNED IN PHASE PER MINIMUM DEFLECTION SYSTEM UNLESS OTHERWISE NOTED. UNPINNED IN PHASE

PHASE 1

1. REMOVE SHOULDER TEXTURING. PLACE TEMPORARY STRIPING.
2. DIVERT TRAFFIC TO SOUTHBOUND LANE IN ACCORDANCE WITH TCP(2-8b)-18.
3. SAWCUT AND REMOVE EAST HALF OF EXISTING BRIDGE DECK AND BEAMS IN ACCORDANCE WITH CONSTRUCTION SEQUENCING PLAN, LEAVING THE EXISTING BENTS IN PLACE.
4. CONSTRUCT EAST HALF OF PROPOSED BRIDGE AND THE PROPOSED PAVEMENT & SUBGRADE LAYERS OF THE ROADWAY IN ACCORDANCE WITH CONSTRUCTION SEQUENCING PLAN.
5. PLACE ONE COURSE SURFACE TREATMENT BEFORE SWITCHING TRAFFIC TO CONSTRUCT SECOND HALF.

PHASE 2

1. MOVE TRAFFIC TO NEWLY CONSTRUCTED BRIDGE SECTION IN ACCORDANCE WITH TCP(2-8b)-18.
2. REMOVE THE REMAINING HALF OF THE EXISTING BRIDGE AND THE EXISTING BENTS IN ACCORDANCE WITH CONSTRUCTION SEQUENCING PLAN.
3. CONSTRUCT REMAINING HALF OF PROPOSED BRIDGE AND THE PROPOSED PAVEMENT & SUBGRADE LAYERS OF THE ROADWAY IN ACCORDANCE WITH CONSTRUCTION SEQUENCING PLAN.
4. PLACE ONE COURSE SURFACE TREATMENT IN PHASE 2 TO HIDE TRAFFIC CONTROL PLAN STRIPING.
5. PLACE FINAL OVERLAY.
6. PLACE FINAL STRIPING AND SIGNS.

4/11/2022

Texas Department of Transportation

SH 70

SEQUENCE OF CONSTRUCTION

SCALE: NTS SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE COVER SHEET		014
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH70-Construction Sequence.dgn

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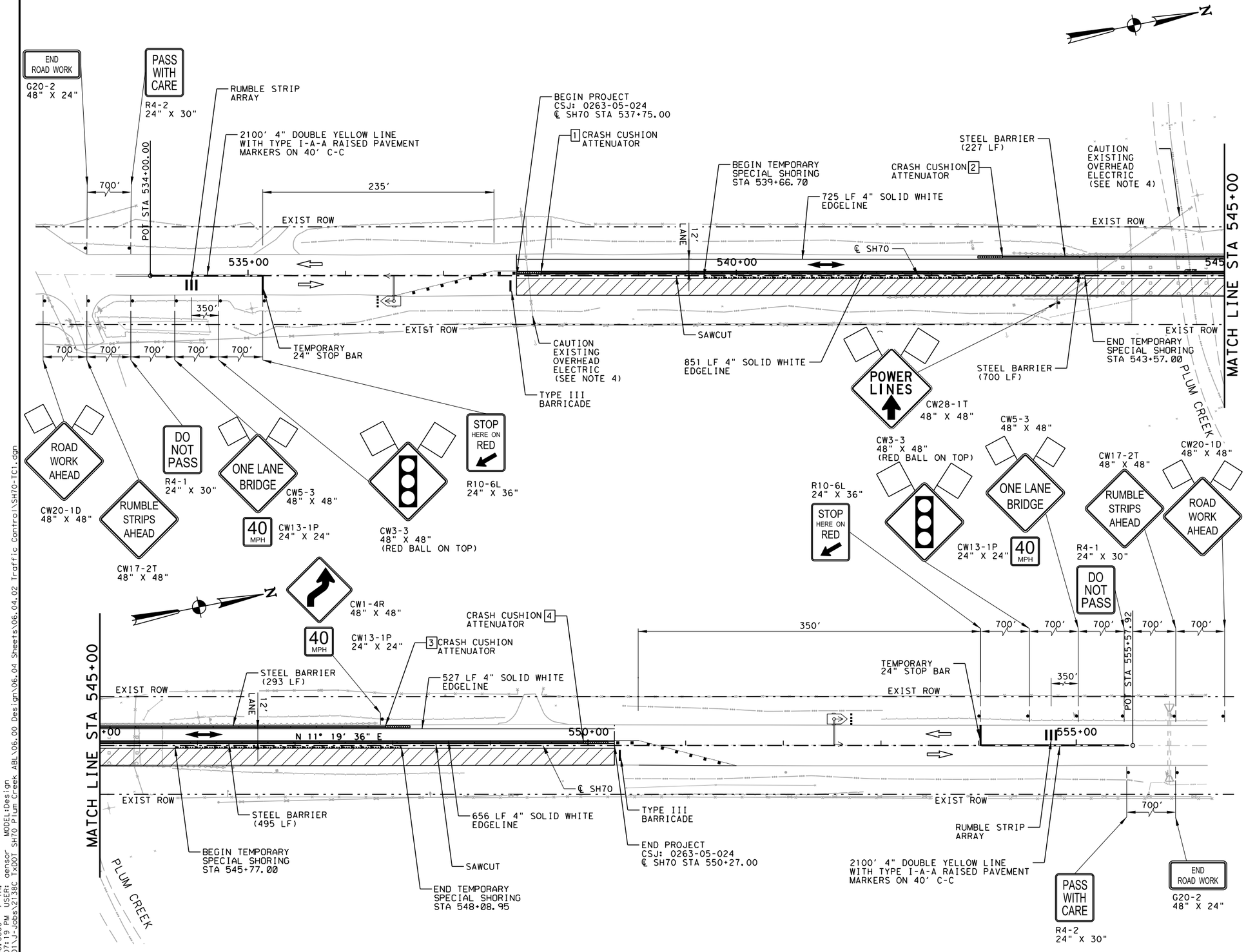

LEGEND

- EXISTING TRAFFIC
- TCP PHASE TRAFFIC
- PAVEMENT PREVIOUSLY CONSTRUCTED
- TCP PHASE CONSTRUCTION
- TEMPORARY TRAFFIC SIGNAL
- SIGN
- STEEL BARRIER
- CHANNELIZING DEVICES
- X CRASH CUSHION LOCATION NO.
- TEMPORARY SPECIAL SHORING

NOTES

1. TRAFFIC CONTROL PLAN IS BASED ON TCP(2-8b)-18.
2. SEE STANDARDS WZ(RS)-16, WZ(UL)-13 AND TREATMENT FOR VARIOUS EDGE CONDITIONS FOR ADDITIONAL INFORMATION.
3. SEE BC(2)-21 FOR ADVANCED WARNING SIGNAGE NEEDED, IN ADDITION TO WHAT IS SHOWN ON THE TCP SHEETS.
4. CONTRACTOR SHALL USE CAUTION WHEN PLACING TEMPORARY SIGNAL DUE TO EXISTING OVERHEAD POWER LINE.
5. REFER TO BC STANDARDS FOR ADDITIONAL SIGNAGE, LOCATIONS AND SPACING OF TRAFFIC CONTROL SIGNS.
6. CONTRACTOR SHALL MAINTAIN REASONABLE AND SAFE ACCESS TO DRIVEWAYS DURING CONSTRUCTION, WHICH INCLUDES PROPER ELEVATION FOR SIGHT DISTANCE.

0 50 100
HORIZONTAL SCALE IN FEET

STATE OF TEXAS
BRYAN J. ALLDREDGE
116211
LICENSED PROFESSIONAL ENGINEER
4/11/2022

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SUITE 500
DALLAS, TEXAS 75252
(214) 884-4253
FIRM REGISTRATION No. F-10161

SH 70

TRAFFIC CONTROL PLAN PHASE 1

SCALE: 1"=100' SHEET 1 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE COVER SHEET		015
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH70-TC1.dgn

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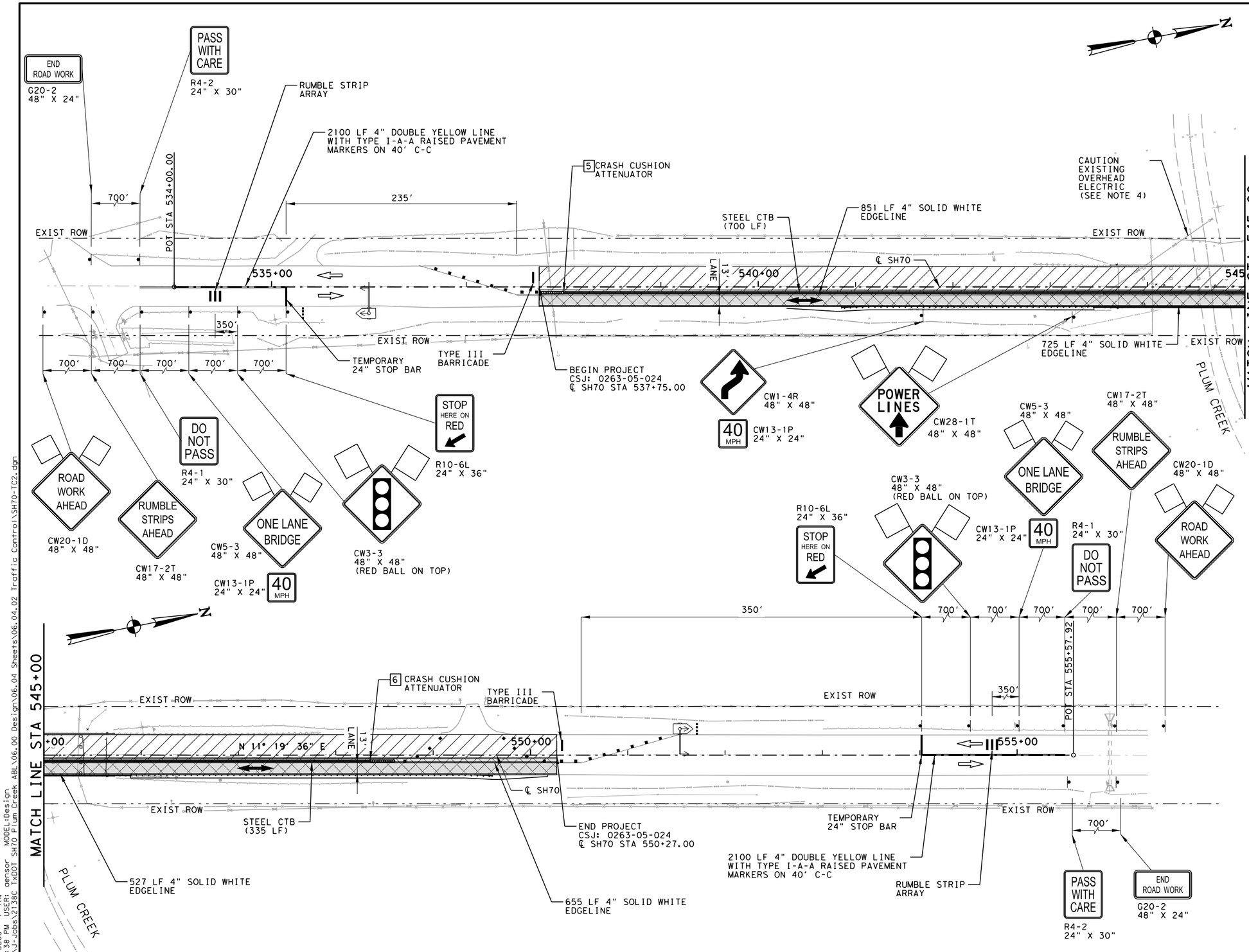

LEGEND

- EXISTING TRAFFIC
- TCP PHASE TRAFFIC
- PAVEMENT PREVIOUSLY CONSTRUCTED
- TCP PHASE CONSTRUCTION
- TEMPORARY TRAFFIC SIGNAL
- SIGN
- STEEL BARRIER
- CHANNELIZING DEVICES
- [X] CRASH CUSHION LOCATION NO.
- TEMPORARY SPECIAL SHORING

NOTES

1. TRAFFIC CONTROL PLAN IS BASED ON TCP(2-8b)-18.
2. SEE STANDARDS WZ(RS)-16, WZ(UL)-13 AND TREATMENT FOR VARIOUS EDGE CONDITIONS FOR ADDITIONAL INFORMATION.
3. SEE BC(2)-21 FOR ADVANCED WARNING SIGNAGE NEEDED, IN ADDITION TO WHAT IS SHOWN ON THE TCP SHEETS.
4. CONTRACTOR SHALL USE CAUTION WHEN PLACING TEMPORARY SIGNAL DUE TO EXISTING OVERHEAD POWER LINE.
5. REFER TO BC STANDARDS FOR ADDITIONAL SIGNAGE, LOCATIONS AND SPACING OF TRAFFIC CONTROL SIGNS.
6. CONTRACTOR SHALL MAINTAIN REASONABLE AND SAFE ACCESS TO DRIVEWAYS DURING CONSTRUCTION, WHICH INCLUDES PROPER ELEVATION FOR SIGHT DISTANCE.

0 50 100
HORIZONTAL SCALE IN FEET

STATE OF TEXAS
BRYAN J. ALLDREDGE
116211
LICENSED PROFESSIONAL ENGINEER
4/11/2022

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SUITE 500
DALLAS, TEXAS 75252
(214) 884-4253
FIRM REGISTRATION No. F-10161

SH 70

TRAFFIC CONTROL PLAN PHASE 2

SCALE: 1"=100' SHEET 2 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE COVER SHEET		016
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH70-TC2.dgn

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TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

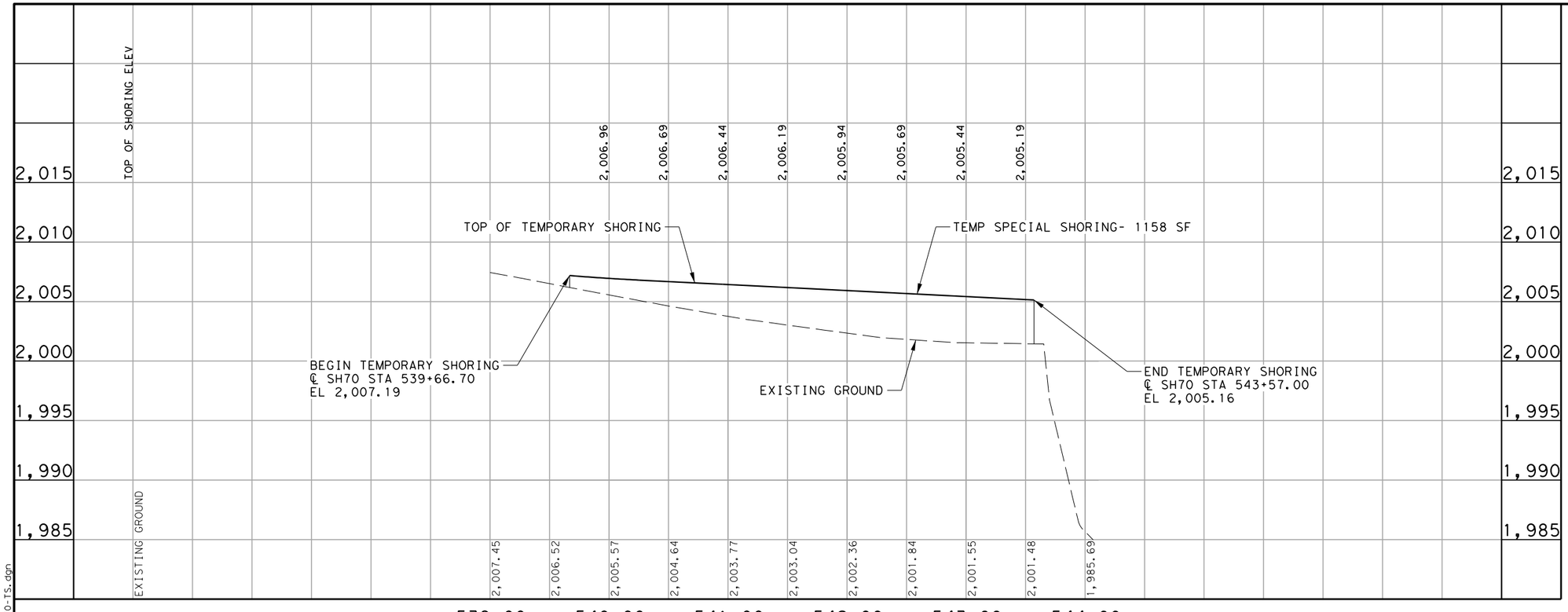
LOC NO.	TCP PHASE	PLAN SHEET NUMBER	LOCATION	STA	TEST LEVEL	DIRECTION OF TRAFFIC (UNI/BI)	FOUNDATION PAD		BACKUP SUPPORT			AVAILABLE SITE LENGTH	CRASH CUSHION									
							PROPOSED MATERIAL	PROPOSED THICKNESS	DESCRIPTION	WIDTH	HEIGHT		INSTALL	REMOVE	MOVE / RESET: MOVE/ RESET	MOVE / RESET: FROM LOC.#	L N	L W	R N	R W	S N	S W
CSJ 0263-05-024																						
1	P1		NORTHBOUND	538+00.25	TL-3	BI			STEEL PTB	24.0"	42.0"	50′	1								1	
2	P1		NORTHBOUND	542+82.61	TL-3	BI			STEEL PTB	24.0"	42.0"	100′	1	1							1	
3	P1		SOUTHBOUND	547+84.67	TL-3	BI			STEEL PTB	24.0"	42.0"	100′	1	1							1	
4	P1		SOUTHBOUND	550+01.75	TL-3	BI			STEEL PTB	24.0"	42.0"	50′	1								1	
5	P2		NORTHBOUND	538+00.25	TL-3	BI			STEEL PTB	24.0"	42.0"	50′		1	1	1					1	
6	P2		NORTHBOUND	548+48.28	TL-3	BI			STEEL PTB	24.0"	42.0"	100′		1	1	4					1	
												TOTALS	4	4	2							

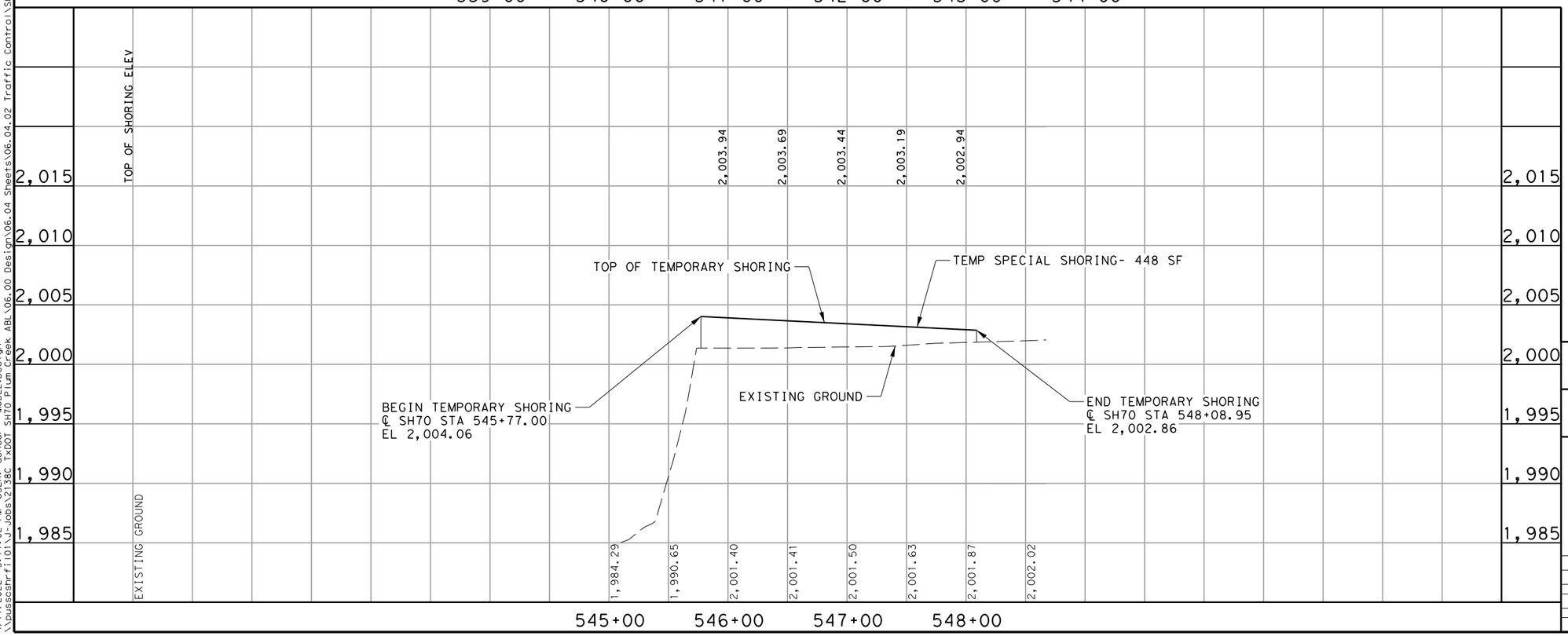
LEGEND:
L=LOW MAINTENANCE
R=REUSABLE
S=SACRIFICIAL
N=NARROW
W=WIDE

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

CRASH CUSHION SUMMARY SHEET

FILE: ccss.dgn	DN: TxDOT	CK:	CK:
© TxDOT	CONT / SECT / JOB		HIGHWAY
REVISIONS	0263 / 05 / 024		SH 70
	DIST	COUNTY	
	ABL	FISHER	
	FEDERAL AID PROJECT		SHEET NO.
			017





NOTES

1. SIDE SLOPES AND TEMPORARY SHORING LIMITS SHOWN ARE APPROXIMATE. ACTUAL SIDE SLOPES AND SHORING LIMITS SHALL BE BASED UPON SOIL CONDITIONS AND MAY VARY AS NEEDED.

2. SEE TCP LAYOUT SHEETS FOR TEMP SHORING LOCATIONS AND LIMITS.

0 50 100
SCALE: 1"=100' H
1"=10' V

STATE OF TEXAS
BRYAN J. ALLDREDGE
116211
LICENSED PROFESSIONAL ENGINEER

4/11/2022

Texas Department of Transportation

IEA
18383 PRESTON ROAD
SUITE 500
DALLAS, TEXAS 75252
(214) 884-4253
FIRM REGISTRATION No. F-10161

SH 70

TRAFFIC CONTROL PLAN TEMPORARY SPL SHORING

SCALE: 1"=100' SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE COVER SHEET		018
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH70-TS.dgn

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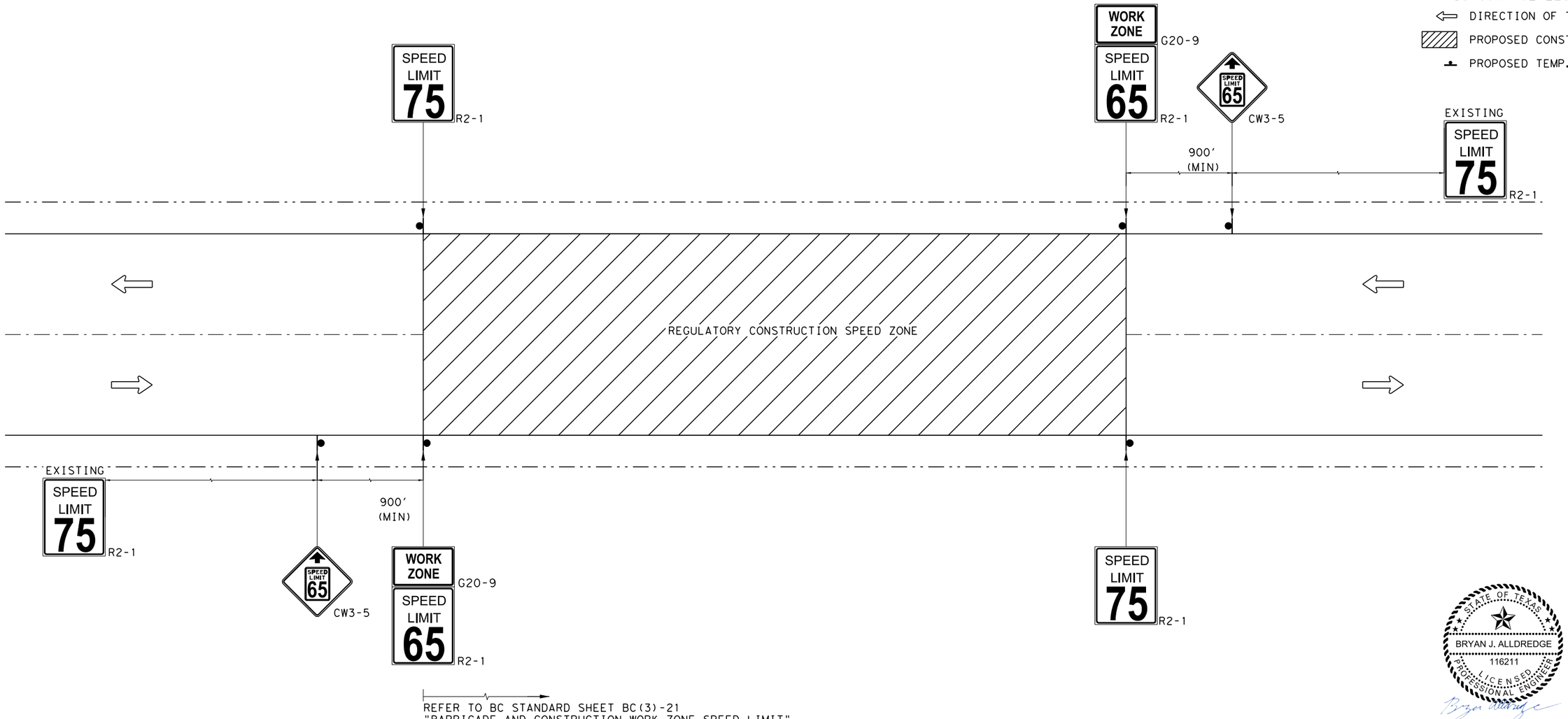
REFER TO BC STANDARD SHEET BC(3)-21
"BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT"
FOR COMPLETE SETUP

TRAFFIC CONTROL LEGEND

- DIRECTION OF TRAVEL
- PROPOSED CONSTRUCTION
- PROPOSED TEMP. SIGNS



REFER TO BC STANDARD SHEET BC(3)-21
"BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT"
FOR COMPLETE SETUP

NOTES:
1. THE PLACEMENT OF THE SPEED REDUCTION SIGNAGE WILL BE 1500' PRIOR TO THE SIGNAGE FOR THE PROJECT LIMIT/ONE-WAY TRAFFIC CONTROL WITH SIGNAL SIGNAGE.

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4/11/2022

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FIRM REGISTRATION No. F-10161

SPEED REDUCTION DETAIL

SCALE: NTS

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6	SEE COVER SHEET	019

STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SPEED REDUCTION DETAIL.dgn

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

SHEET 1 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13	0263	05	024	SH 70
9-07 8-14	DIST	COUNTY		SHEET NO.
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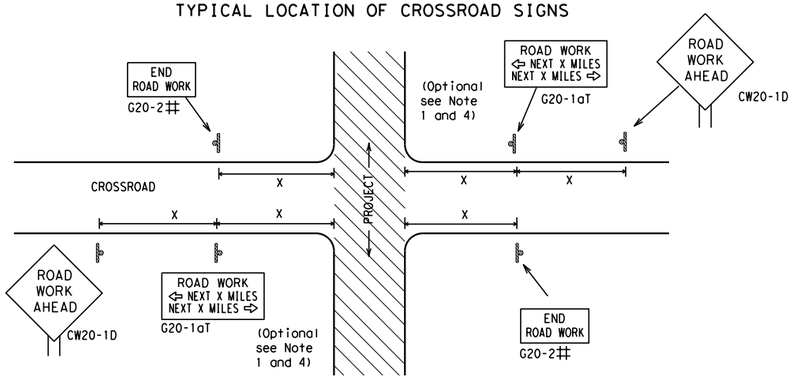
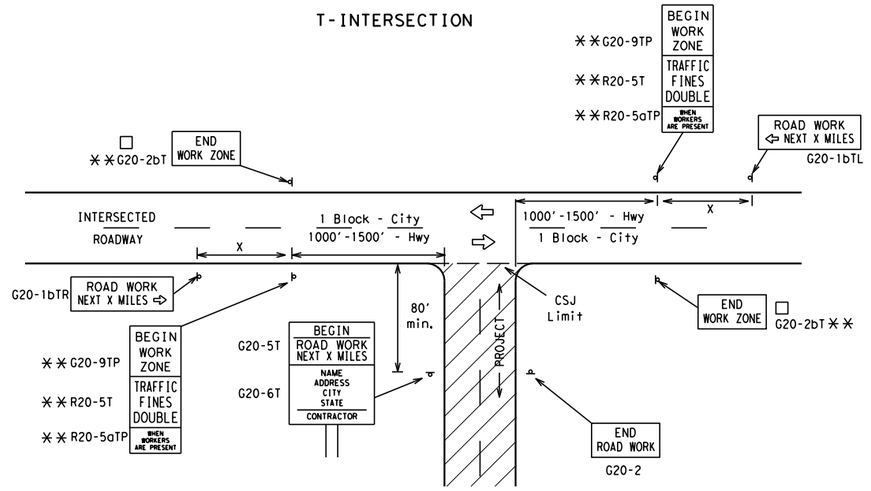
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

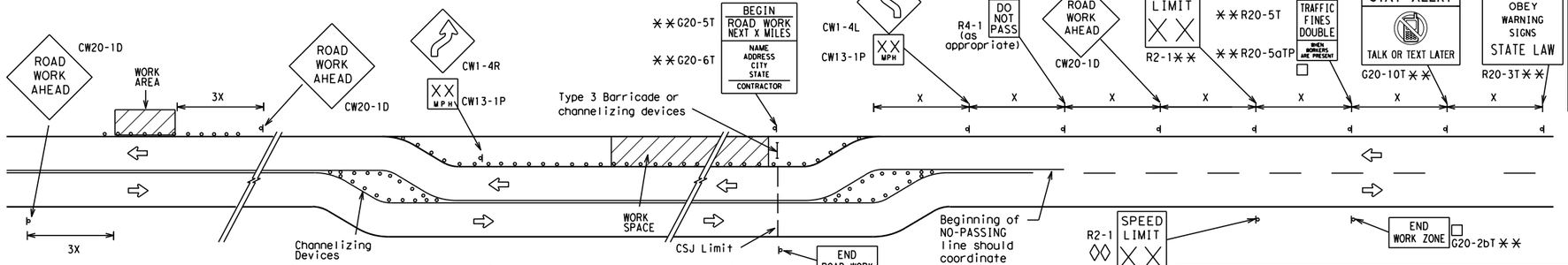
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

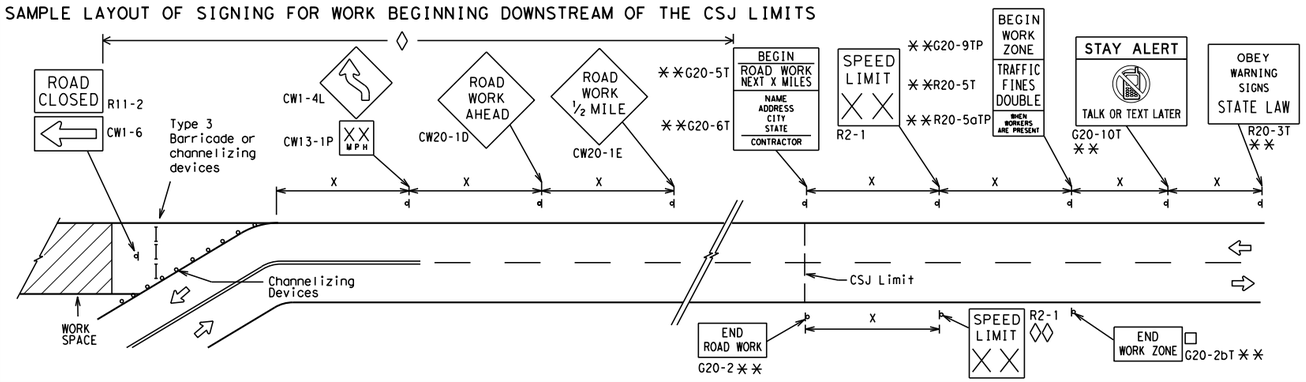
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

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



NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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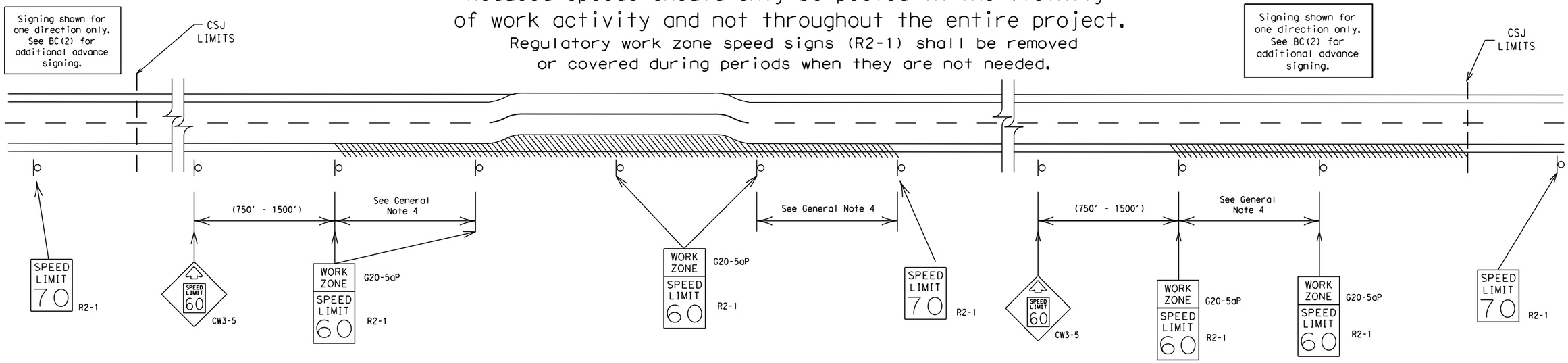
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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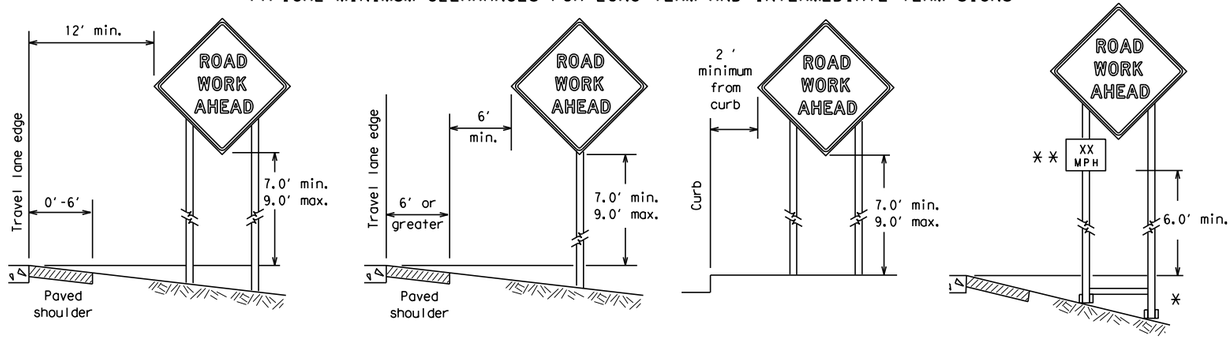
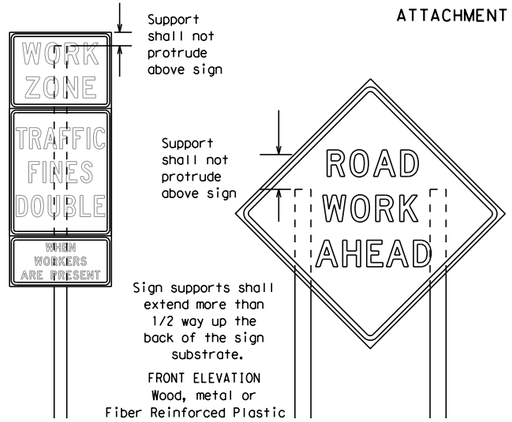
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

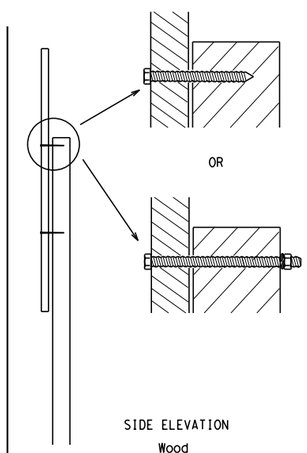


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





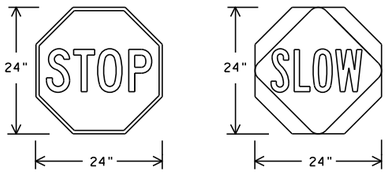
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

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BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0263	05	024	SH 70
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ABL	FISHER		023

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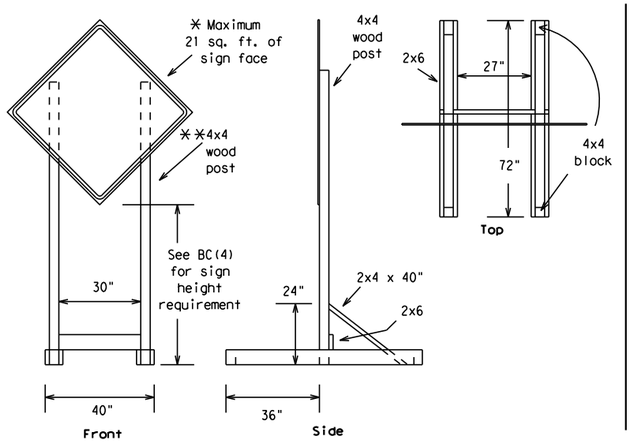
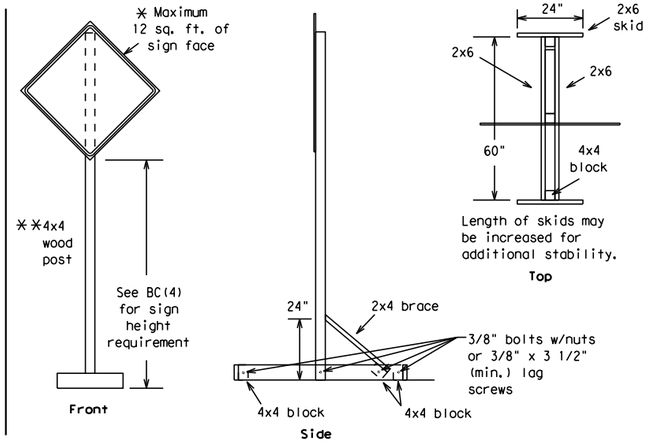
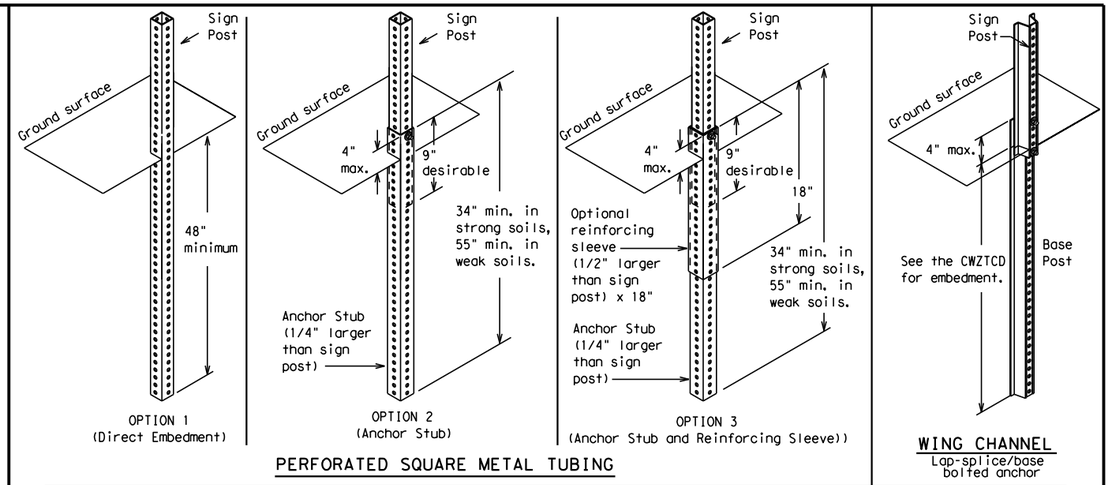




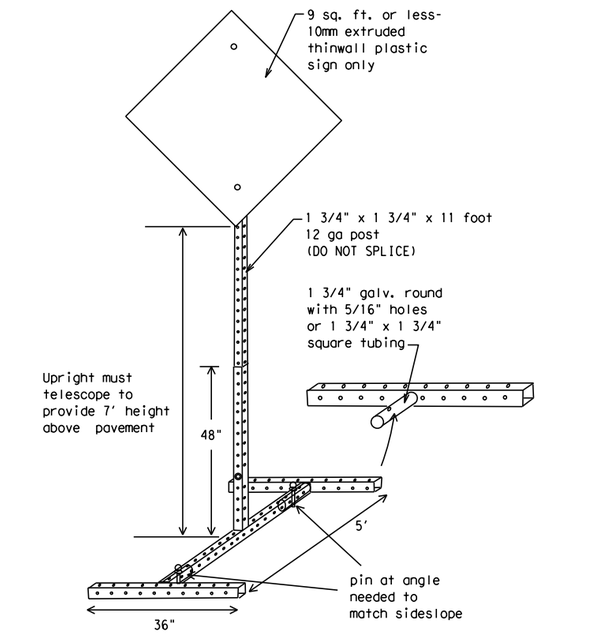
SKID MOUNTED WOOD SIGN SUPPORTS

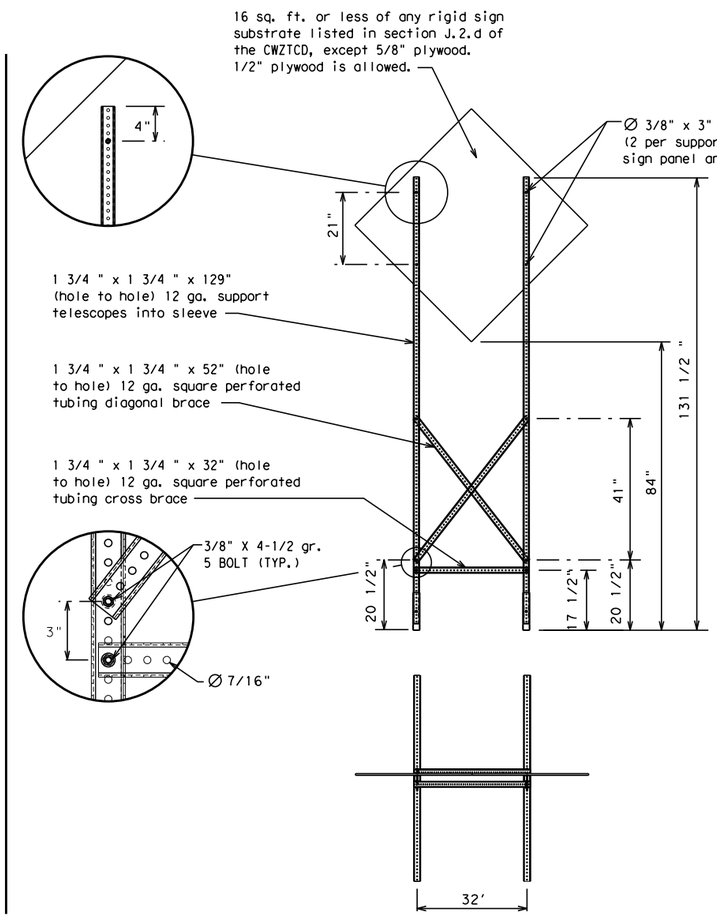
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

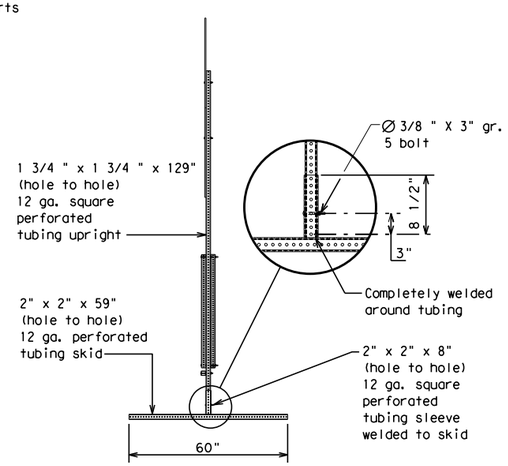


GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

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BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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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 5-21	ABL	FISHER		024

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

* See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

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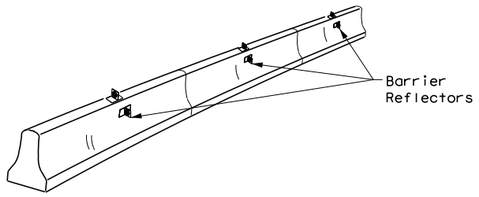
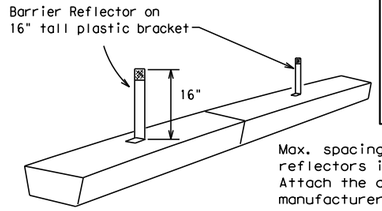
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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



CONCRETE TRAFFIC BARRIER (CTB)

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

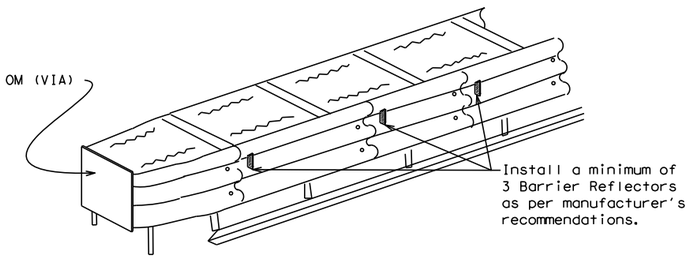


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB)

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

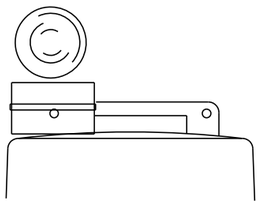


DELINEATION OF END TREATMENTS

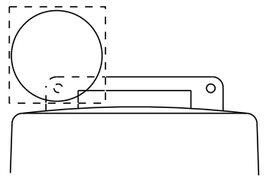
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

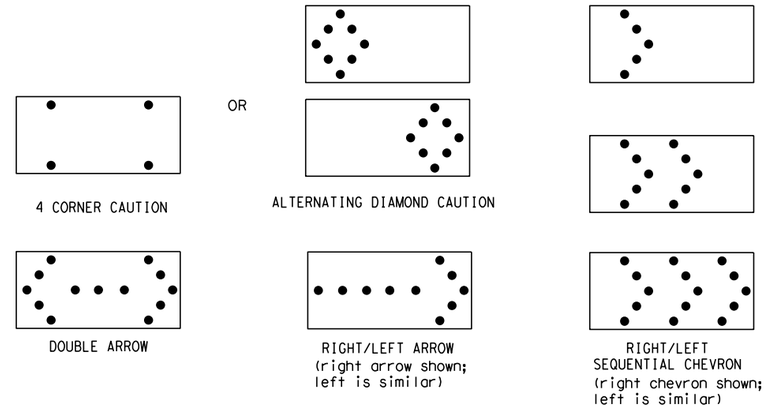
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0263	05	024	SH 70
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ABL	FISHER		026

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

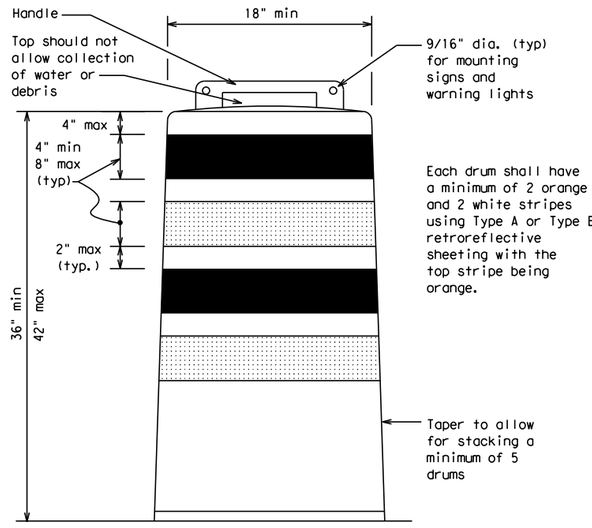
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

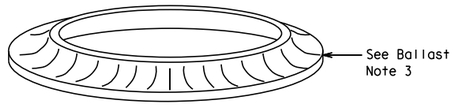
RETROREFLECTIVE SHEETING

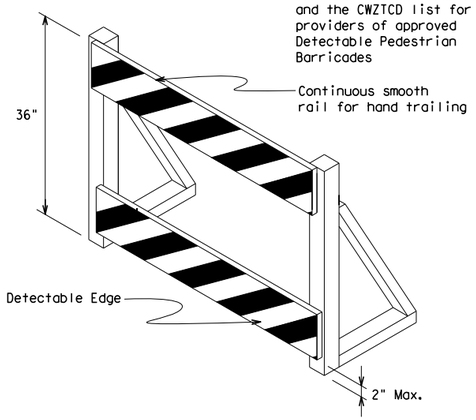
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

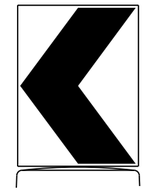




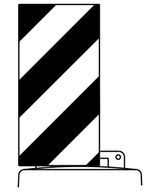


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	ABL	FISHER		027
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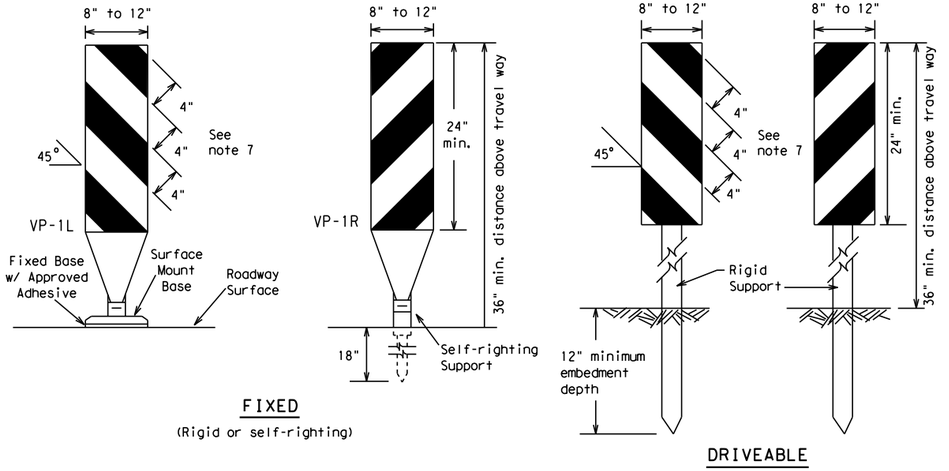
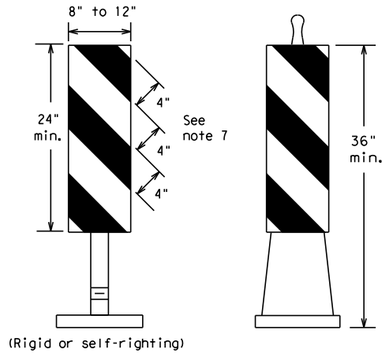


FIXED
(Rigid or self-righting)

DRIVEABLE

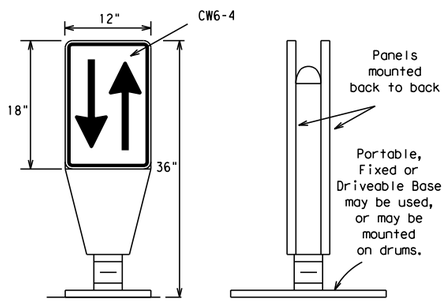


(Rigid or self-righting)

PORTABLE

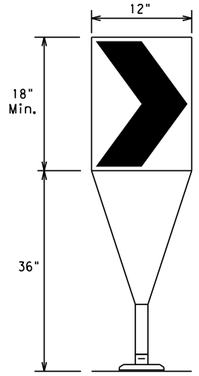
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



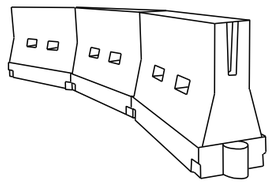
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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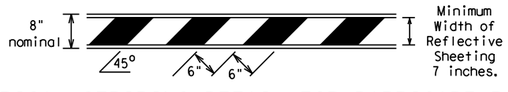
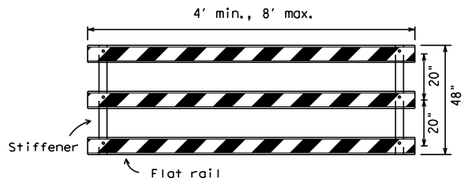
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



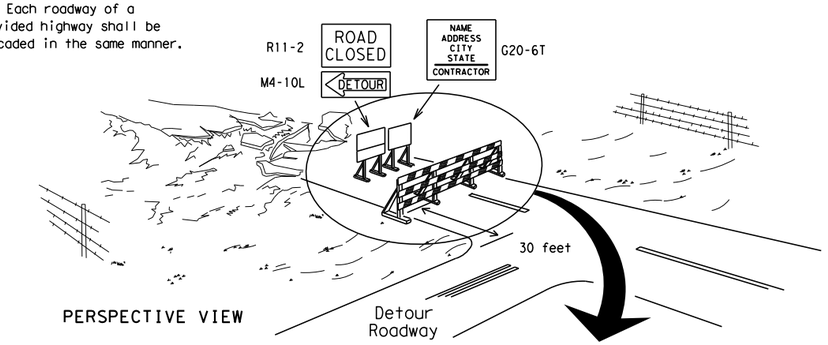
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

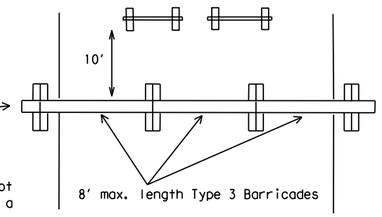
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.

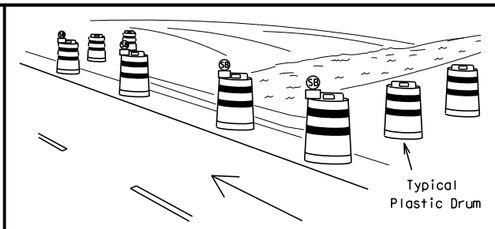
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

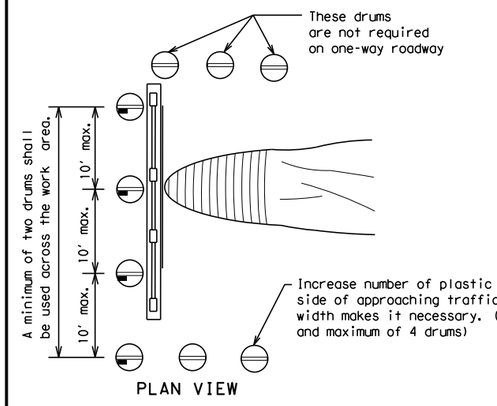
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

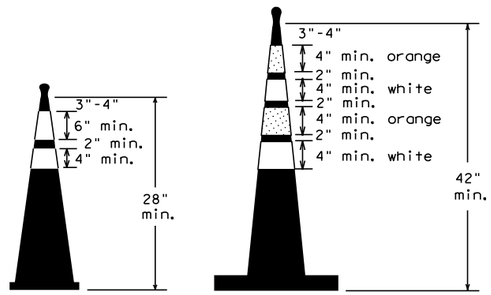
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



PLAN VIEW

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

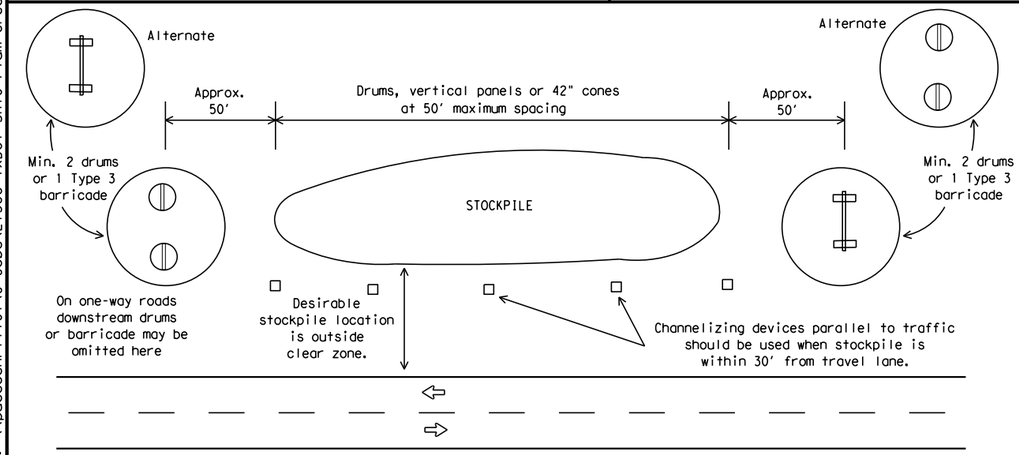
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0263	05	024	SH 70
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7-13 5-21	ABL	FISHER		029

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

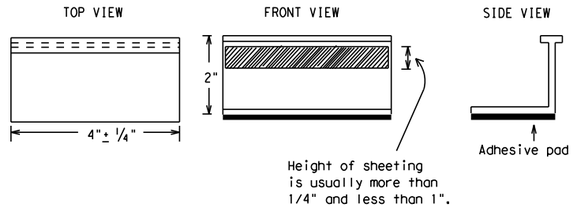
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

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© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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1-02 7-13	ABL	FISHER		030
11-02 8-14				

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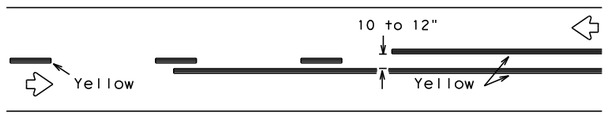
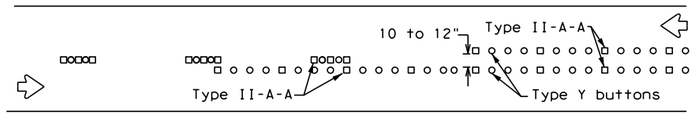
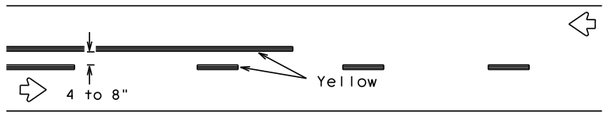
PAVEMENT MARKING PATTERNS



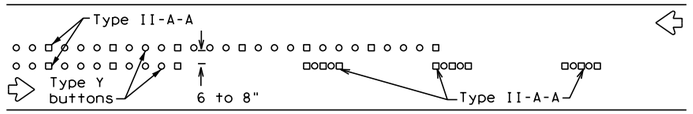
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



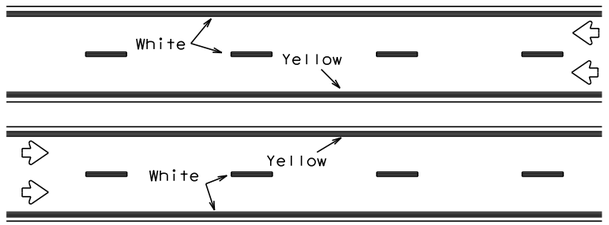
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



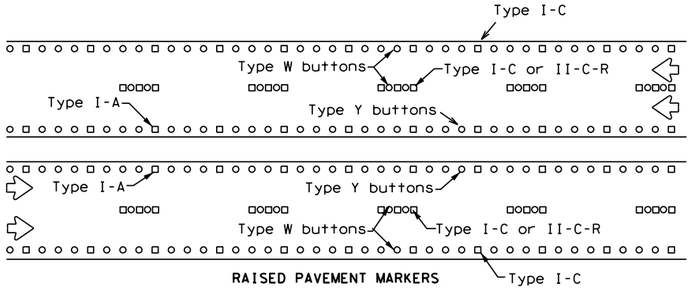
RAISED PAVEMENT MARKERS - PATTERN B

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

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



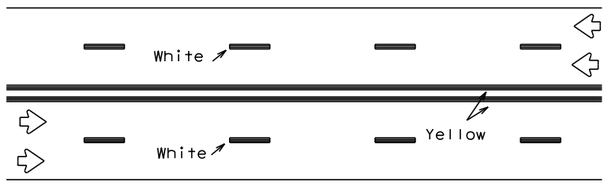
REFLECTORIZED PAVEMENT MARKINGS



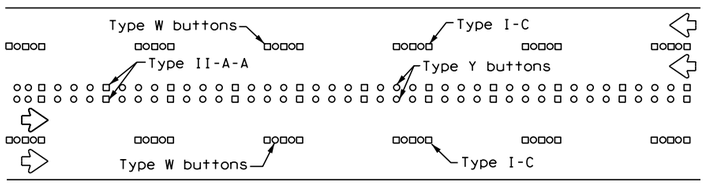
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



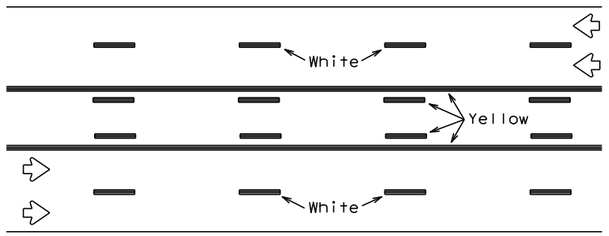
REFLECTORIZED PAVEMENT MARKINGS



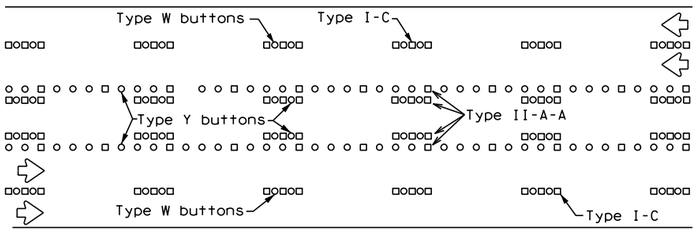
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

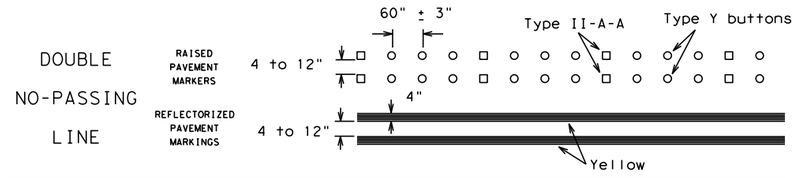
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

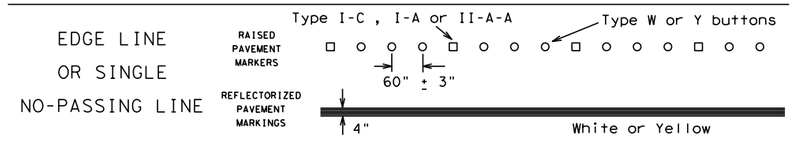
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

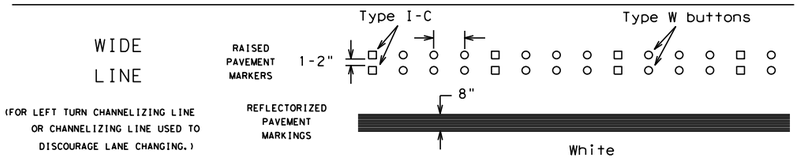


EDGE LINE OR SINGLE NO-PASSING LINE



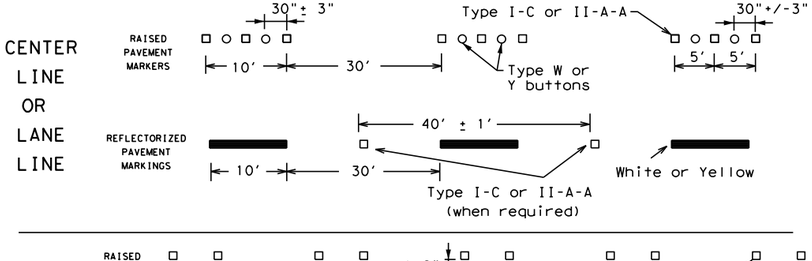
WIDE LINE

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

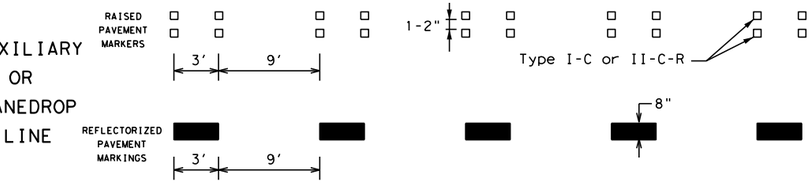


BROKEN LINES

CENTER LINE OR LANE LINE

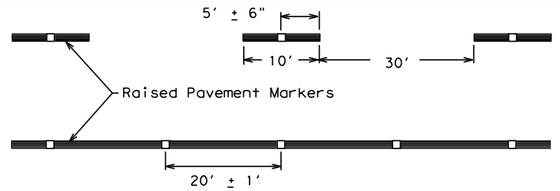


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

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©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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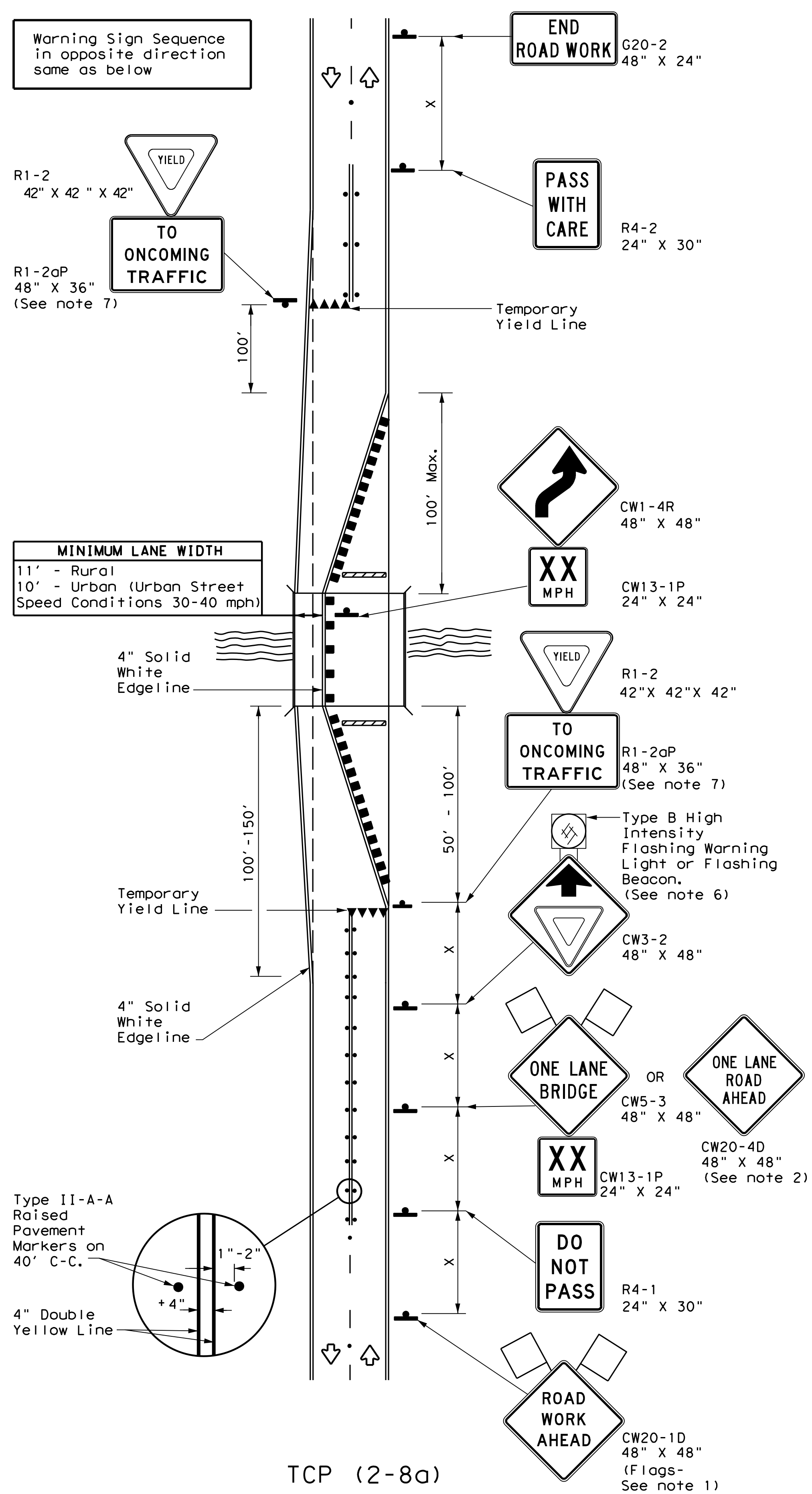
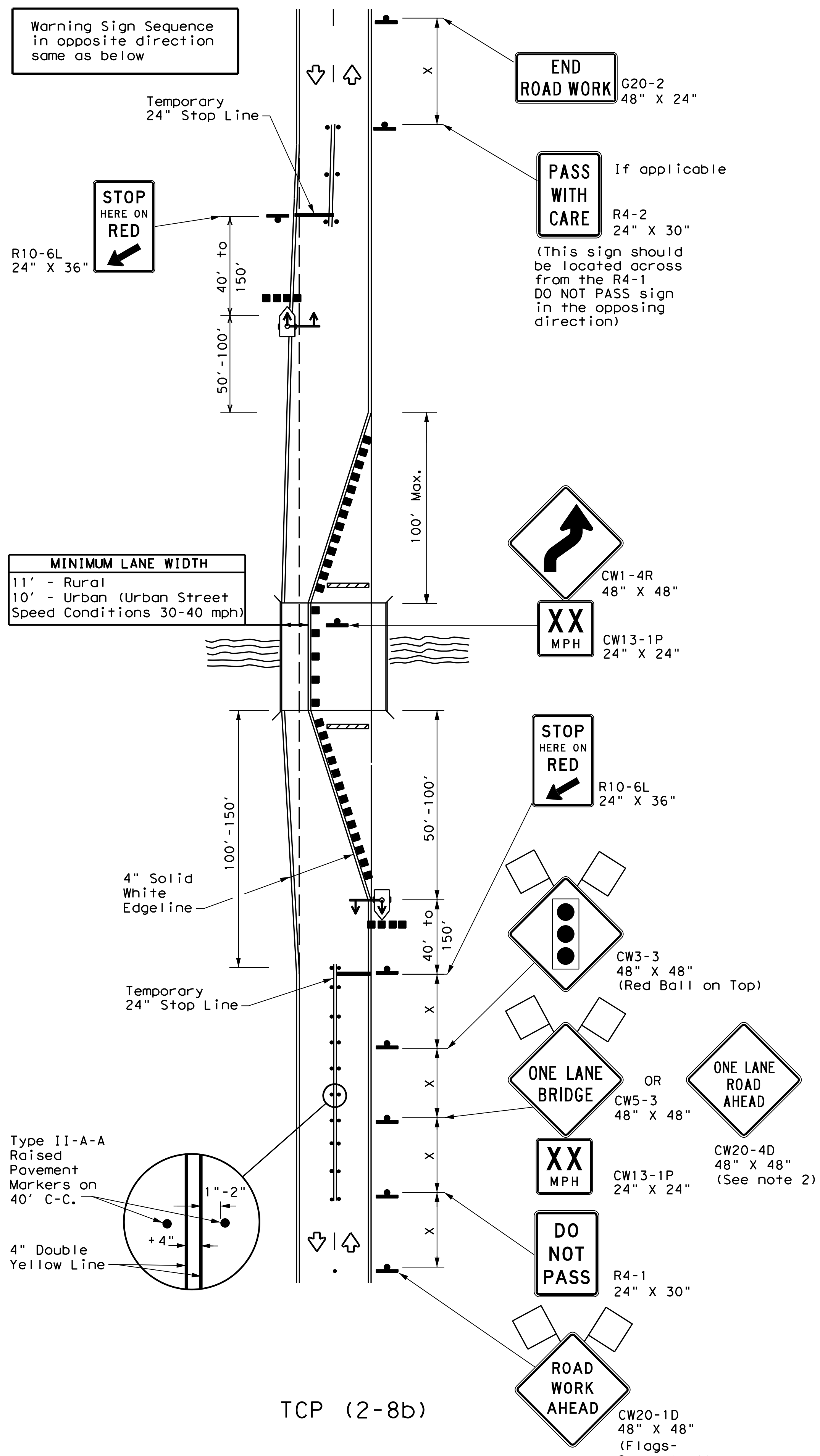


TCP (2-8a)

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



TCP (2-8b)

ONE LANE TWO-WAY
TRAFFIC CONTROL WITH TRAFFIC SIGNAL

LEGEND

(symbol)	Type 3 Barricade	(symbol)	Channelizing Devices
(symbol)	Sign	(symbol)	Traffic Flow
(symbol)	Flag	(symbol)	Flagger
(symbol)	Raised Pavement Markers Ty II-AA	(symbol)	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	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L = WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

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

TYPICAL USAGE

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

GENERAL NOTES

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

TCP (2-8a)

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

TCP (2-8b)

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

Texas Department of Transportation
Traffic Operations Division Standard

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

TCP(2-8)-18

FILE: tcp2-8-18.dgn		DN:	CK:	DW:	CK:
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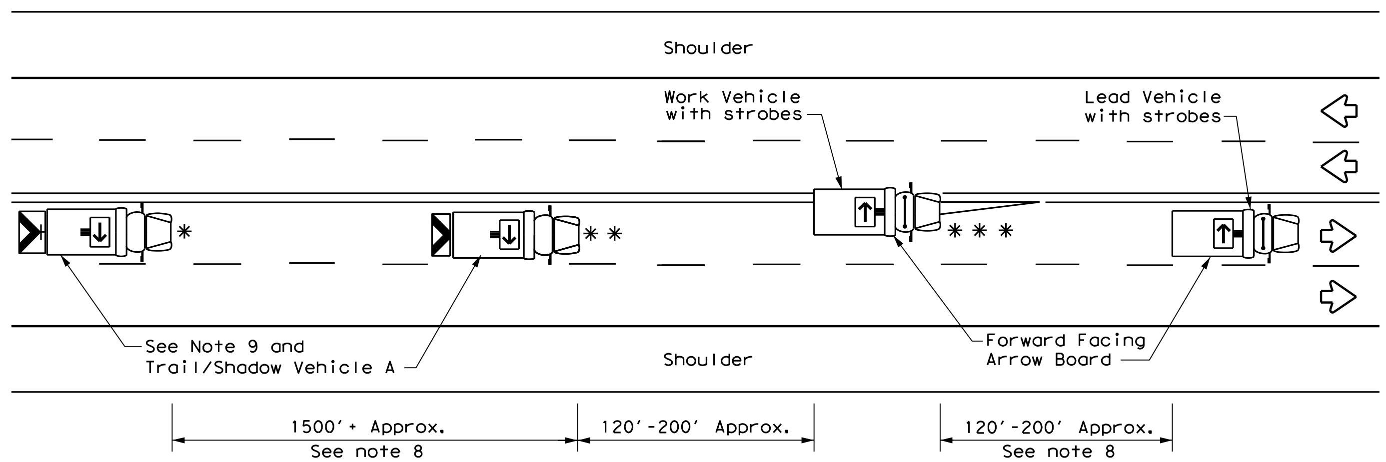
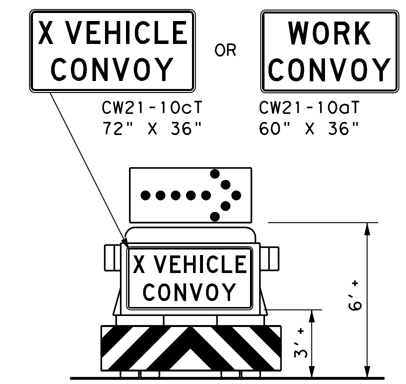


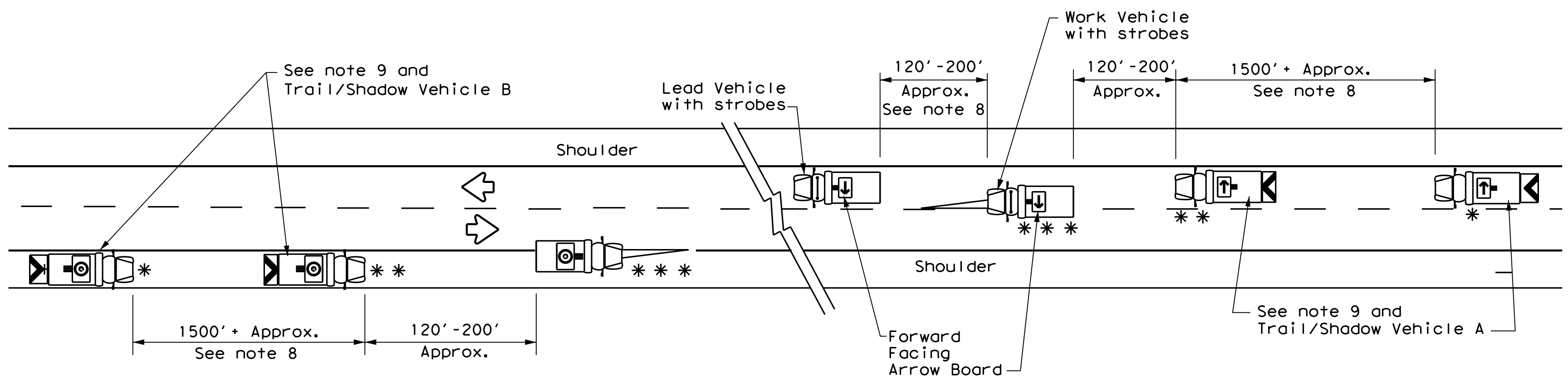
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

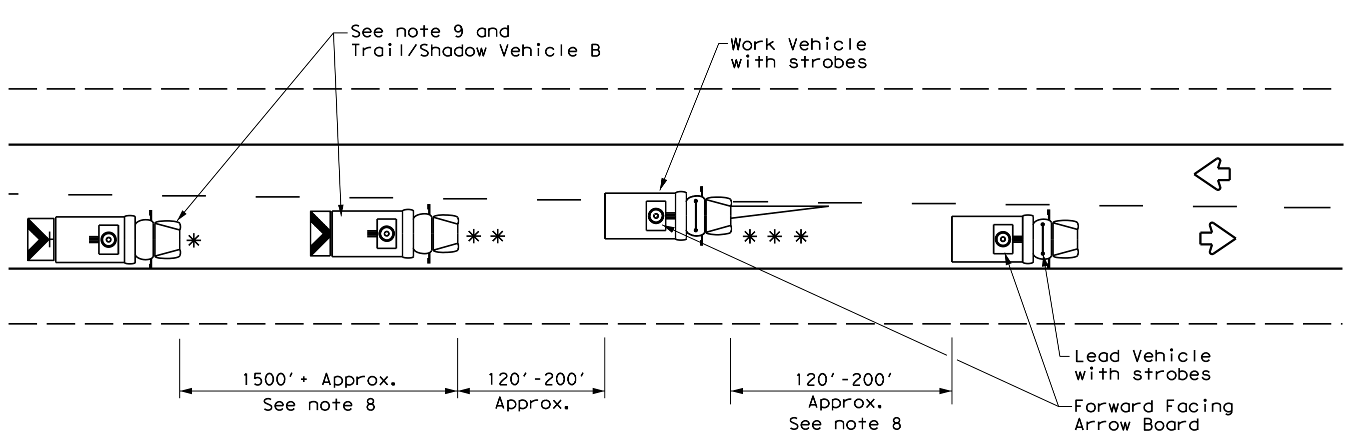


WORK ON SHOULDER

WORK ON TRAVEL LANE

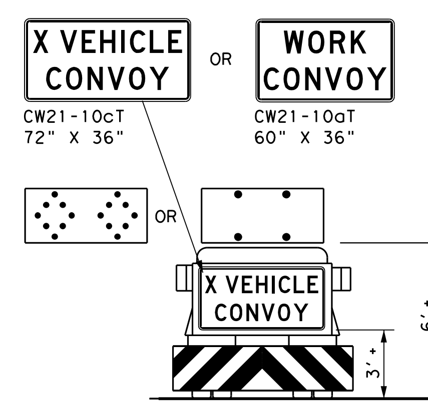
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board in CAUTION display

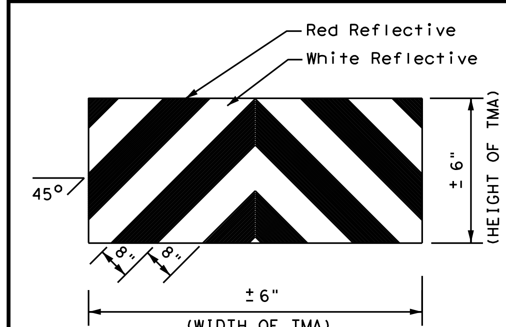
LEGEND

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

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

GENERAL NOTES

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



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

FILE:	tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97		0263	05	024	SH 70
		DIST		COUNTY	SHEET NO.
		ABL		FISHER	033

175

DATE: 4/11/2022 1:46:02 PM
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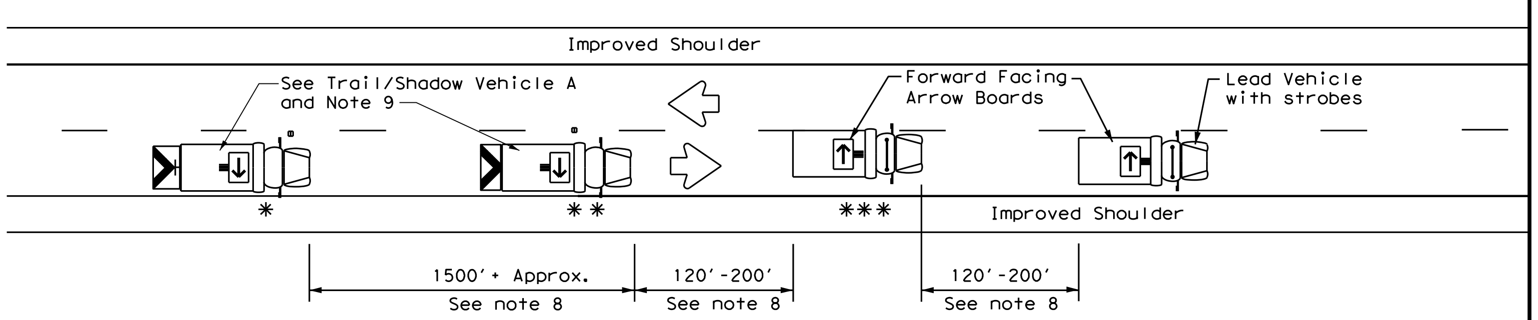
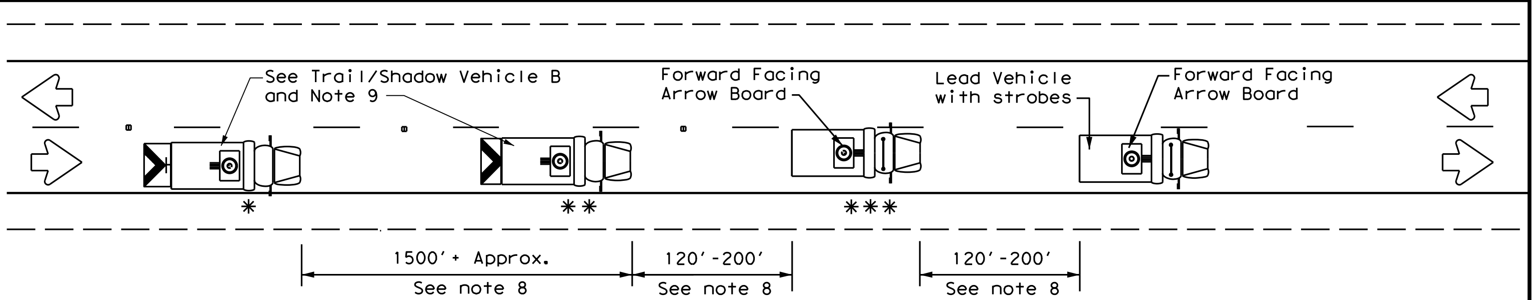
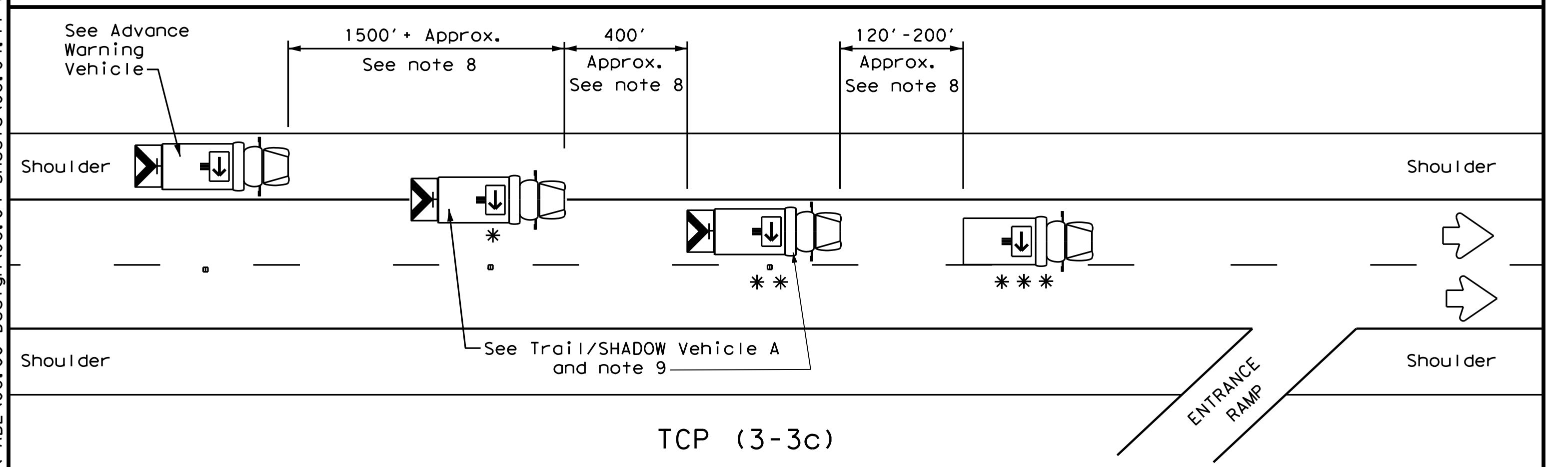


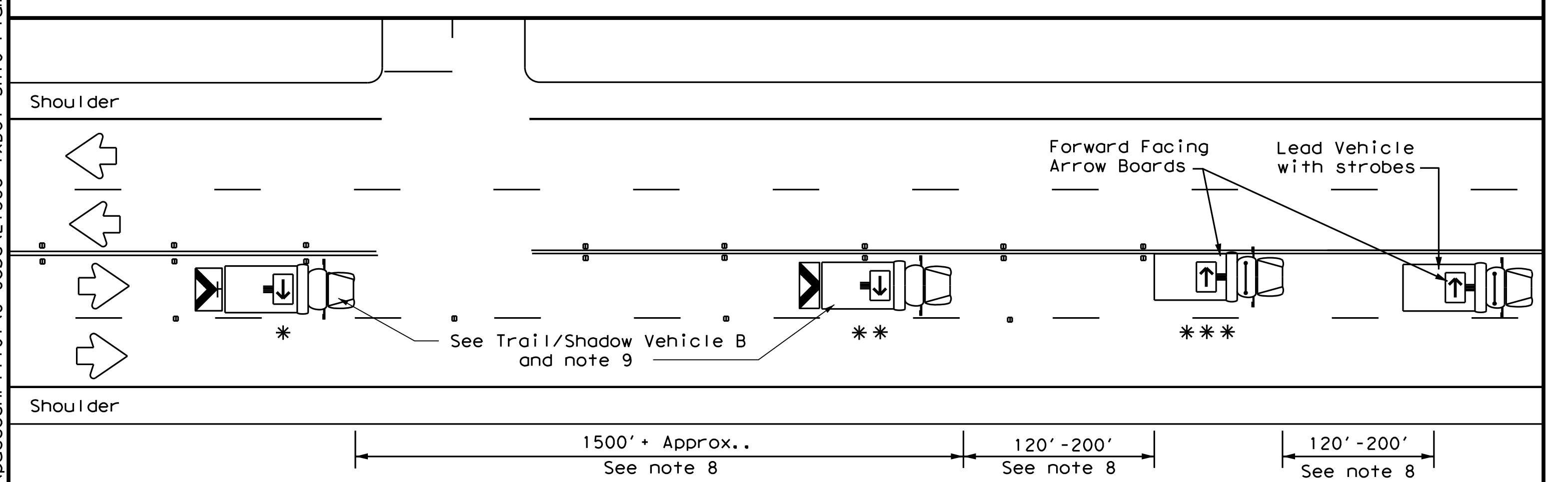
TCP (3-3a)
TWO LANE HIGHWAY WITH PAVED SHOULDERS
(WORK ON TRAVEL LANE)



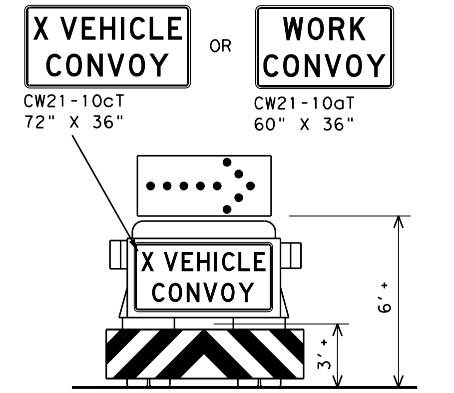
TCP (3-3b)
TWO LANE HIGHWAY WITHOUT PAVED SHOULDERS
(WORK ON TRAVEL LANE)



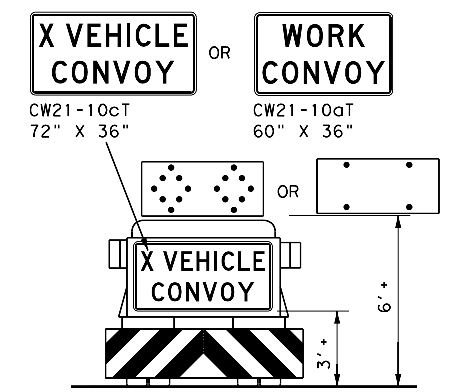
TCP (3-3c)
DIVIDED MULTILANE HIGHWAY



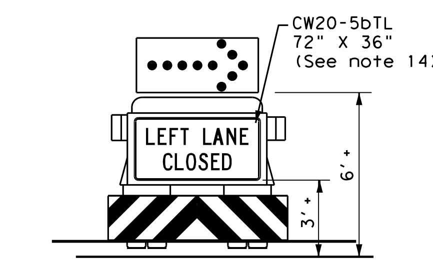
TCP (3-3d)
UNDIVIDED MULTILANE HIGHWAY



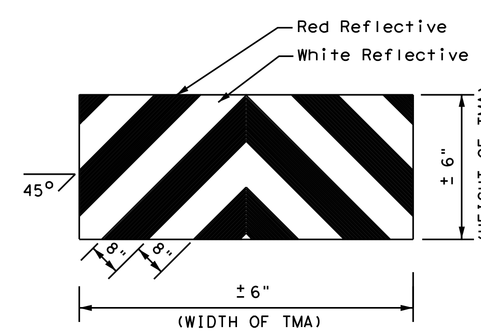
TRAIL/SHADOW VEHICLE A
with RIGHT Directional display Flashing Arrow Board



TRAIL/SHADOW VEHICLE B
with Flashing Arrow Board in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

LEGEND

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

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

GENERAL NOTES

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL

TCP(3-3)-14

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT		CK: TxDOT
© TxDOT September 1987	CONT	SECT	JOB		HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97 7-14	0263	05	024		SH 70
	DIST		COUNTY		SHEET NO.
	ABL		FISHER		034

DATE: 4/11/2022 1:46:05 PM
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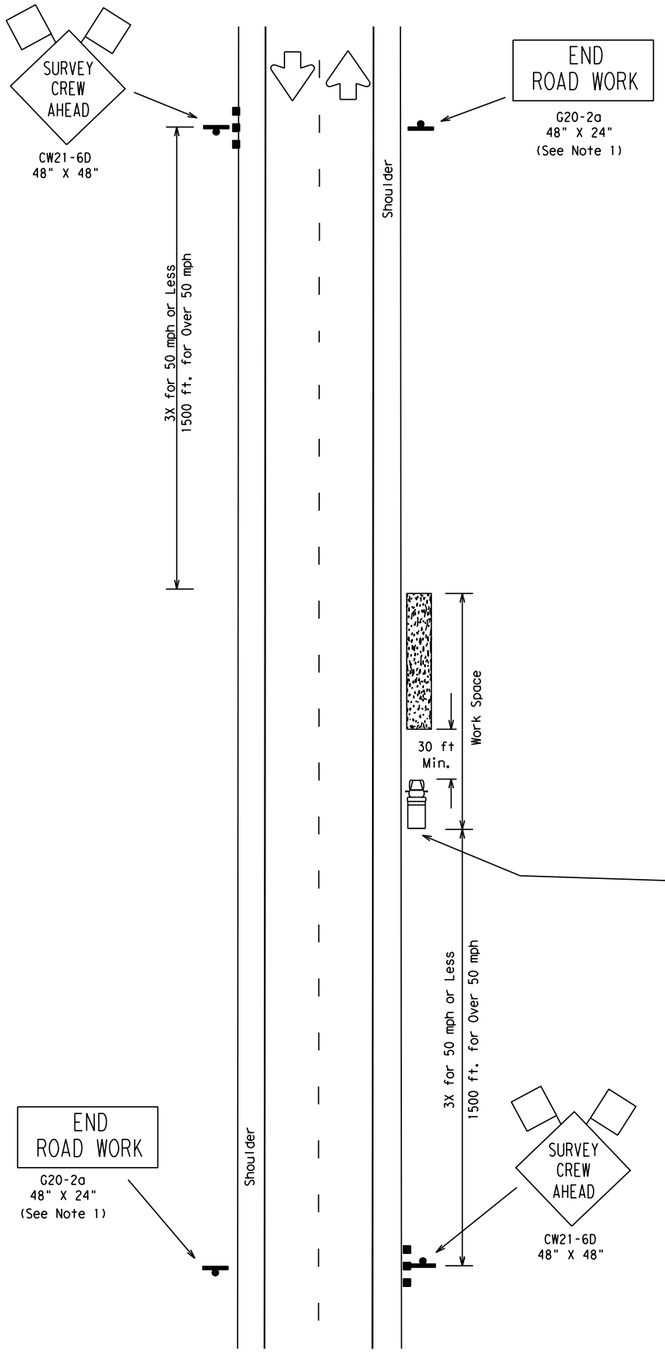
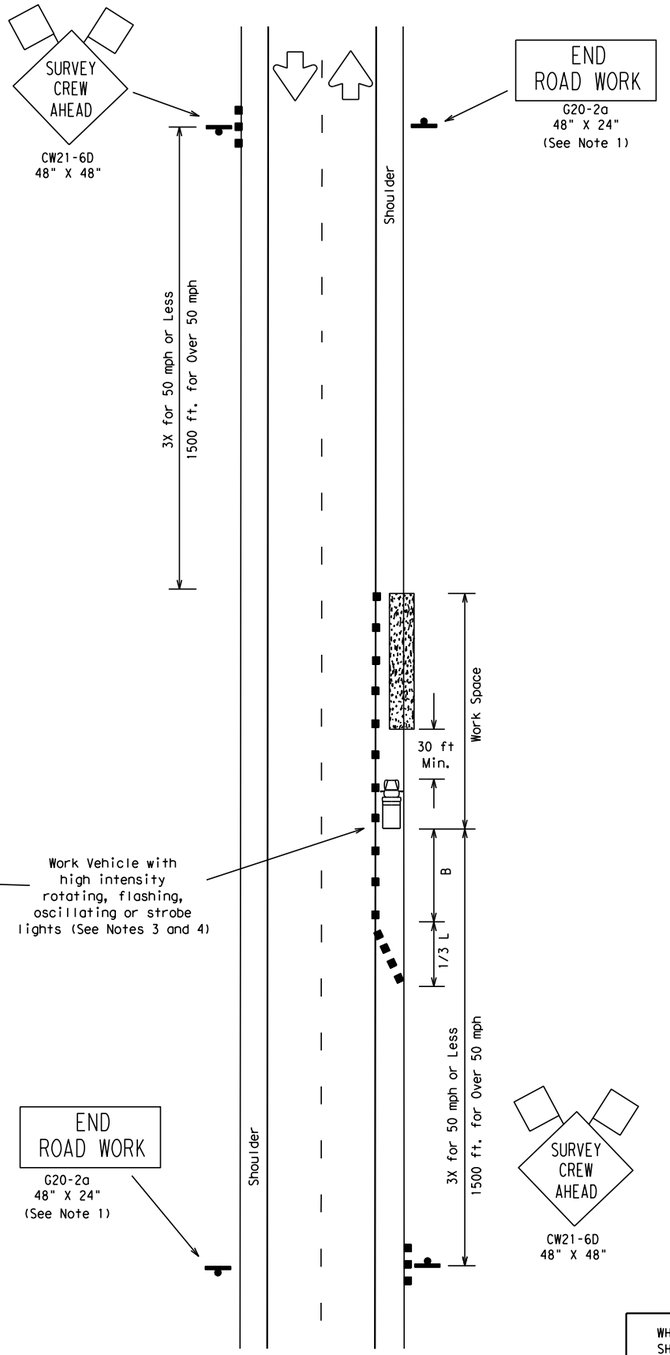


TCP (S-1a)
WORK OFF SHOULDER OR PAVED SURFACE



TCP (S-1b)
WORK ON SHOULDER

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

✳ Conventional Roads Only

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

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

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

GENERAL NOTES:

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

TCP(S-1a)

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

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

8-18-08 Revision
⚠1 Corrected misspelling.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP(S-1)-08A

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

REVISIONS
8-08

CONT	SECT	JOB	HIGHWAY
0263	05	024	SH 70

DIST	COUNTY	SHEET NO.
ABL	FISHER	035

DATE: 4/11/2022 1:46:07 PM
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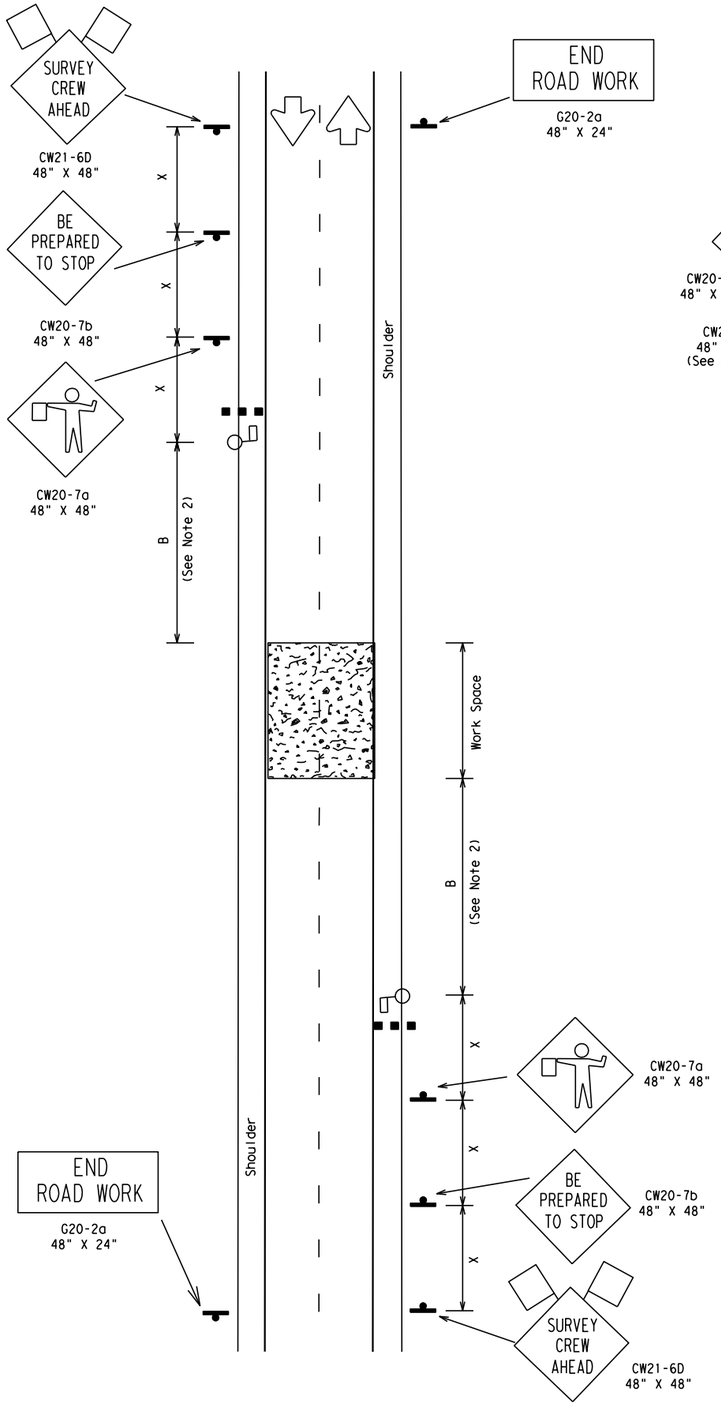
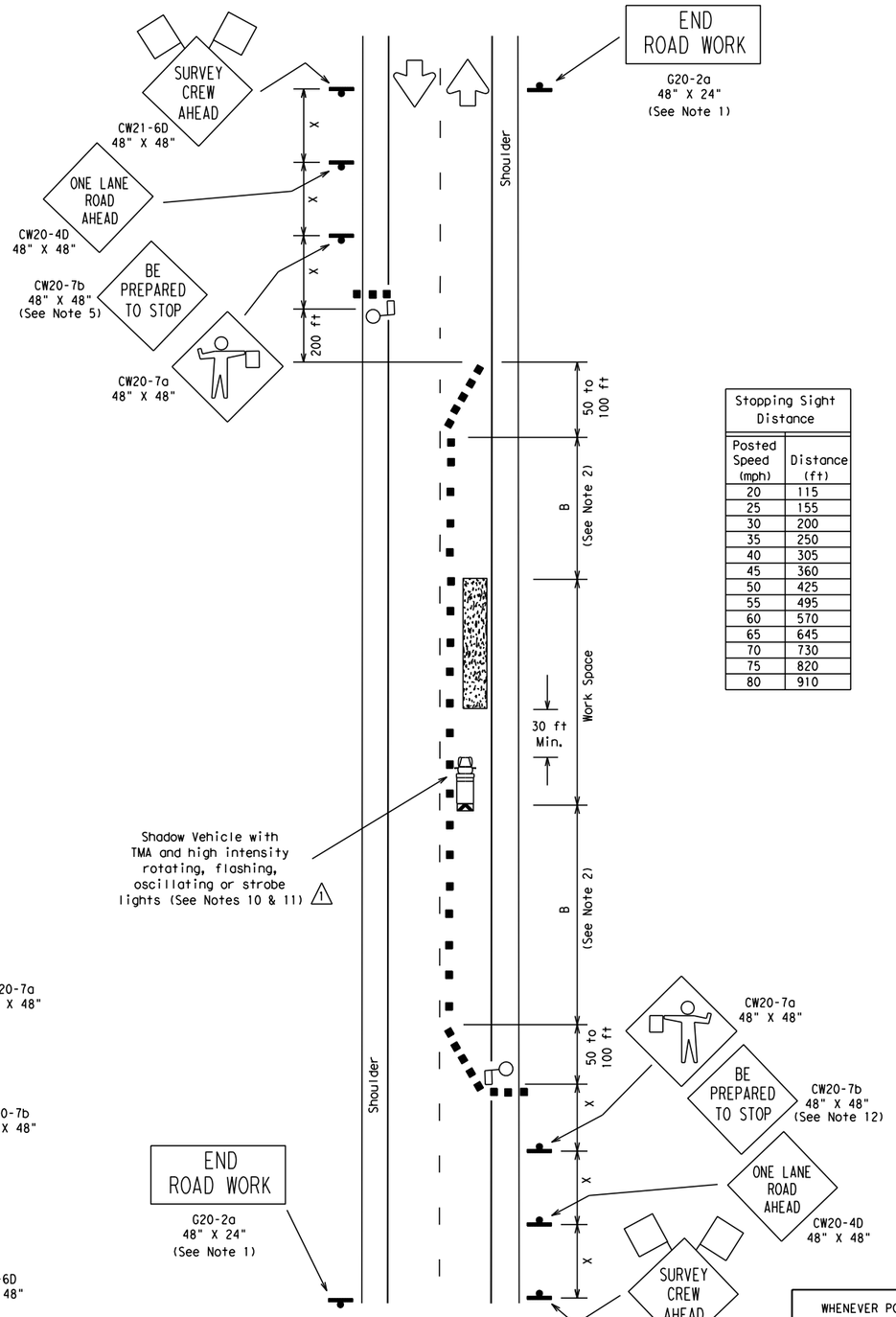


TCP (S-2a)
ROAD CLOSED FOR LESS THAN 20 MINUTES -
OFF PEAK TRAFFIC HOURS
WITH OR WITHOUT SHOULDERS



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

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

✳ Conventional Roads Only

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

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

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

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

TCP(S-2a)

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

TCP (S-2B)

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

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

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

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP(S-2)-08A

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

REVISIONS
8-08

CONT	SECT	JOB	HIGHWAY
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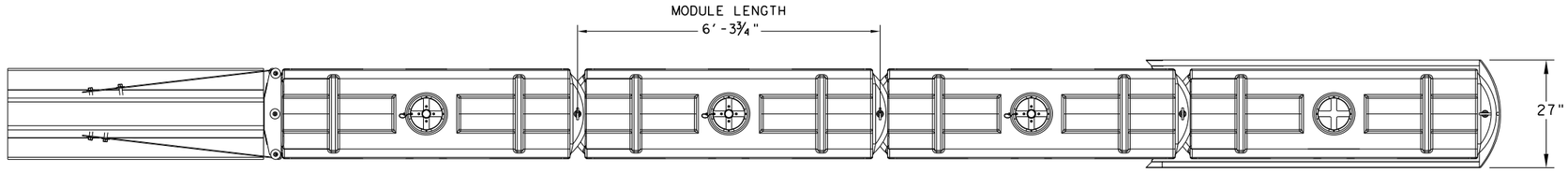
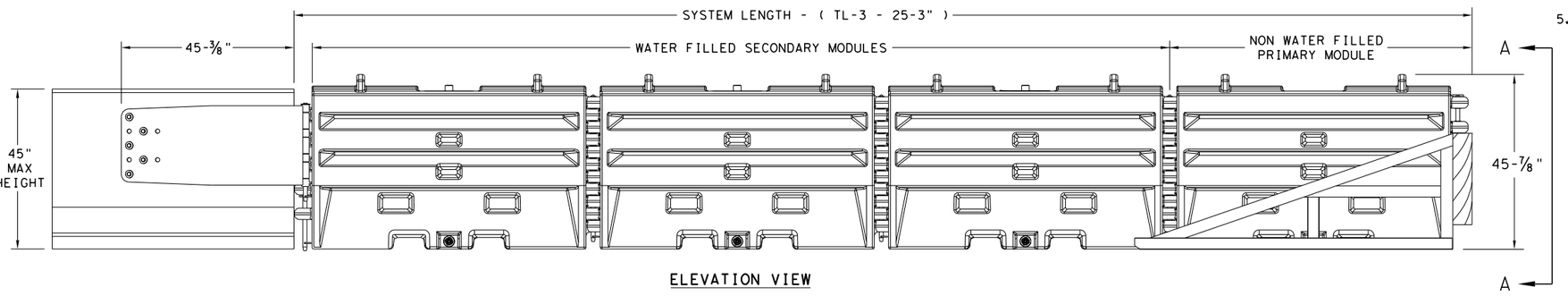
DIST	COUNTY		SHEET NO.
ABL	FISHER		036



PLAN VIEW



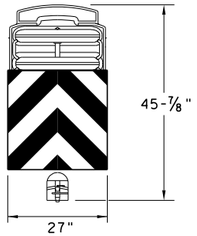
ELEVATION VIEW

GENERAL NOTES

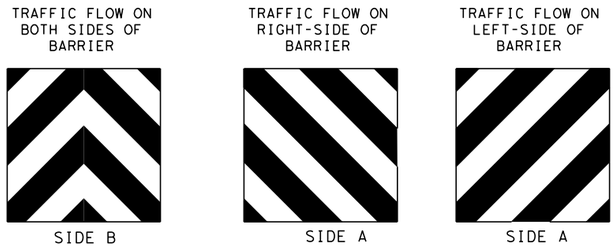
1. REFER TO THE INSTALLATION MANUAL FOR SPECIFIC SYSTEM ASSEMBLY AND MODULE ORIENTATION. FOR ADDITIONAL INFORMATION, CONTACT TRAFFIX, INC. AT (949) 361-5663.
2. THE SLED SYSTEM IS A MASH APPROVED TEST LEVEL 3 (TL-3) CRASH CUSHION APPROVED FOR USE IN TEMPORARY WORK ZONES. THE SLED SYSTEM IS A NON-REDIRECTIVE,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

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

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

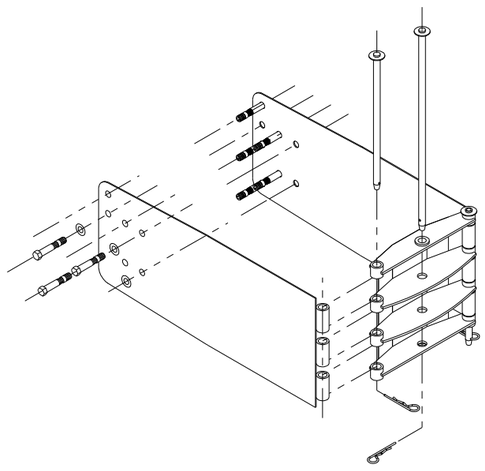


SECTION A-A



NOSE SHEETING PANEL DELINEATION

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



SLED TRANSITION COMPONENTS FOR ATTACHMENT TO CMB

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

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

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

SACRIFICIAL

BILL OF MATERIAL

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

Texas Department of Transportation — Design Division Standard

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

FILE: sled19.dgn	DN: TxDOT	CK: KM	DW: VP	CK:
©TxDOT: DECEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0263	05	024	SH 70
	DIST	COUNTY		SHEET NO.
	ABL	FISHER		037

DATE: 4/11/2022
FILE: \\PUSSCSHRFIL01\J-Jobs\21386 TxDOT SH70 Plum Creek ABL\06.00 Design\06.04 Sheets\06.04.11 Standards\TCP Standards\sled19.dgn

DATE: 4/11/2022 1:46:11 PM
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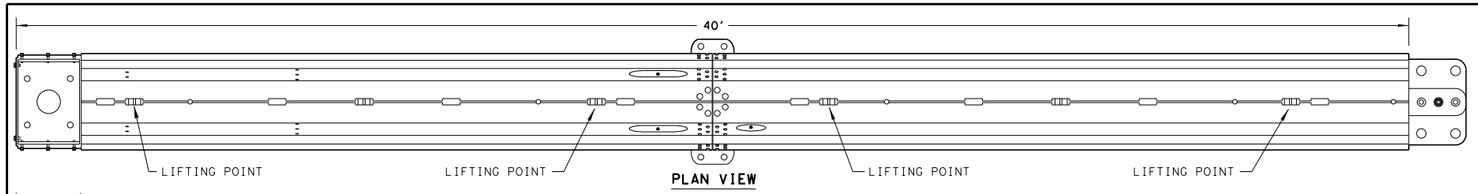
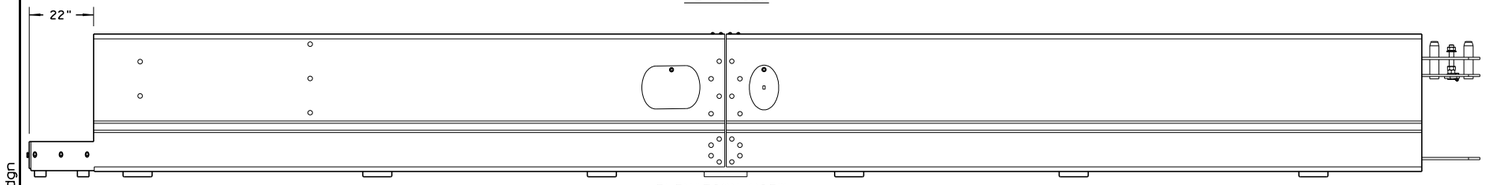
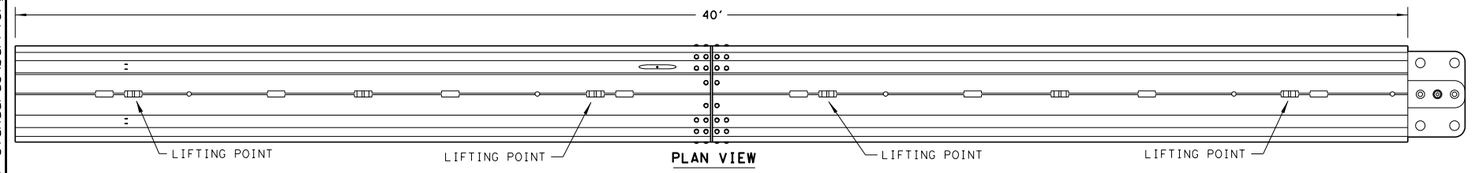


PLAN VIEW

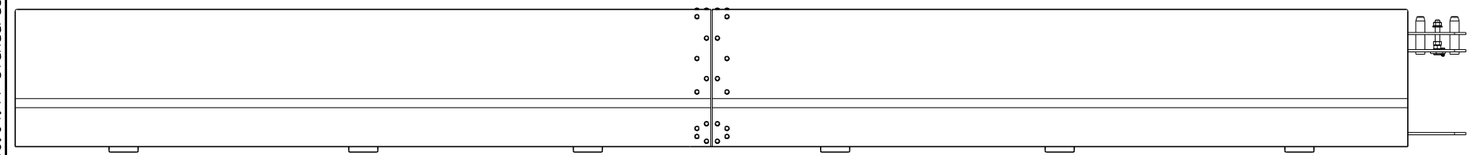


ELEVATION VIEW

BARRIERGUARD END SECTION - 40 FT. MALE OR FEMALE END SECTION



PLAN VIEW

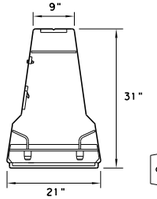


ELEVATION VIEW

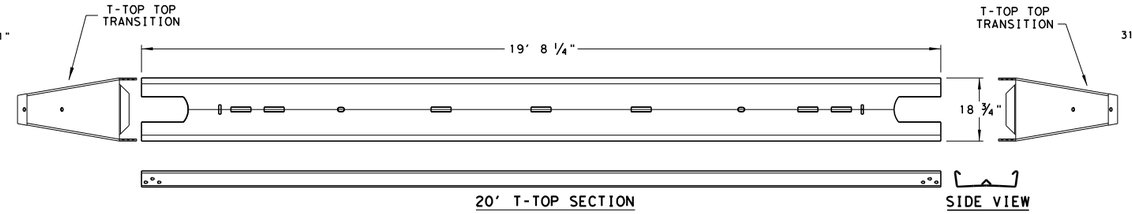
BARRIERGUARD STANDARD SECTION - 40 FT.

GENERAL NOTES

1. THE SYSTEM SHOWN ON THIS DRAWING IS A PROPRIETARY BARRIER TRADED AS BARRIERGUARD 800 AND BARRIERGUARD 800 MDS AND HAS BEEN DESIGNED AND MANUFACTURED BY LAURA METAAL ROAD SAFETY INC. FOR TECHNICAL ASSISTANCE AND APPLICATION SUPPORT CONTACT LEE STUART AT LAURA METAAL ROAD SAFETY INC. AT (702) 664-2009 OR lstuart.laurametaal@outlook.com
2. THE BARRIERGUARD 800 SYSTEM HAS BEEN CRASH TESTED TO MASH AND HAS FHWA APPROVAL AS A TL-3 BARRIER. THE DEFLECTION TABLE OUTLINES BASIC SYSTEM PERFORMANCE AND COMPONENT ANCHORING REQUIREMENTS.
3. THIS DRAWING PACKAGE PROVIDES THE RELEVANT INFORMATION AND GENERAL GRAPHICS REQUIRED TO IDENTIFY THE COMPONENT PARTS OF BARRIERGUARD 800 AND THEIR INCORPORATION AS A WHOLE SYSTEM FOR DEPARTMENTAL STANDARD APPLICATIONS.
4. BARRIERGUARD 800 REQUIRES ANCHORING (PINNING) AT EACH END OF THE INSTALLED LENGTH. (INTERMEDIATE ANCHORS CAN BE USED TO REDUCE DEFLECTION).
5. INSTALLATION OF BARRIERGUARD 800 OR BARRIERGUARD 800 MDS, NORMALLY STARTS WITH A MALE TERMINAL SECTION AND IS FINISHED WITH A FEMALE TERMINAL SECTION. STANDARD SECTIONS ARE USED BETWEEN THE TERMINAL SECTIONS TO OBTAIN THE REQUIRED LENGTH OF POSITIVE BARRIER PROTECTION.
6. THE FULL HEIGHT TERMINAL (FHT) SECTIONS MAY BE CAPPED WITH A FHT COVER, HOWEVER IF EXPOSED TO ON-COMING TRAFFIC THE END SHOULD BE PROTECTED WITH A SUITABLE CRASH CUSHION. THE BARRIERGUARD 800 RANGE IS COMPATIBLE WITH MOST COMMONLY USED CRASH CUSHION END TREATMENTS. FOR DETAILS OF BARRIERGUARD 800 CRASH CUSHION CONNECTIONS THAT ARE NOT DETAILED WITHIN THESE DRAWINGS, PLEASE CONTACT LAURA METAAL ROAD SAFETY INC. FOR MORE DETAILS. THE FULL HEIGHT TERMINAL COVER IS SUITABLE FOR THE "DOWN STREAM" END OF A SYSTEM THAT DOES NOT HAVE EXPOSURE TO ON-COMING TRAFFIC.
7. WHEN INSTALLING THE MINIMUM DEFLECTION SYSTEM (MDS),THE SYSTEM CAN BE INSTALLED WITH ADDITIONAL INTERMEDIATE ANCHORS ALONG THE LENGTH OF THE BARRIER RUN AT INTERVALS SHOWN IN THE DEFLECTION TABLE. EACH BARRIER RUN CAN BE MADE UP OF ANY MIXTURE OF THE SYSTEMS BY THE INTRODUCTION OF INTERMEDIATE ANCHORS AND/OR T-TOP AS REQUIRED.
8. THERE ARE SEVERAL METHODS OF ACHIEVING RADIUS IN A LENGTH OF BARRIERGUARD 800. RADIUS CAN BE ACHIEVED USING VARIOUS METHODS AND THUS ALLOWING THE BARRIERGUARD TO FOLLOW THE DESIRED CURVATURE IN THE INSTALLATION, THESE METHODS ARE, THE MOVEMENT IN THE QUICKLINK, ADJUSTABLE 20FT. SECTIONS OR SHORT ANGLED SECTIONS WHICH ALLOW A RADIUS AS LOW AS 12FT. FOR FURTHER INFORMATION AND ADVICE CONTACT LAURA METAAL ROAD SAFETY INC.
9. A BARRIERGUARD 800 VARIABLE LENGTH BARRIER (VLB) SECTION SHOULD BE USED WHEN BARRIERGUARD 800 OR BARRIERGUARD 800 MDS IS ANCHORED ACROSS A BRIDGE EXPANSION JOINT. IF T-TOP IS TO BE USED IN CONJUNCTION WITH THE VLB, THE T-TOP SHOULD BE USED FOR MINIMUM 40FT ON EITHER SIDE OF THE VLB AND TERMINATED WITH TRANSITIONS. THE VLB SECTION PROVIDES APPROXIMATELY 7in OF EXTENSION AND 7in OF CONTRACTION. MULTIPLE VLB'S CAN BE LINKED TOGETHER TO PROVIDE MORE EXPANSION OR CONTRACTION. THE VLB'S SHOULD BE PLACED IN THE VICINITY OF THE EXPANSION JOINT. THE VLB DOES NOT NEED TO BE PLACED DIRECTLY OVER THE EXPANSION JOINT BUT MUST BE BETWEEN THE NEAREST ANCHORS ON EACH SIDE OF THE JOINT. IT IS RECOMMENDED THAT THE VLB IS PLACED WITHIN 40FT OF THE JOINT.
10. THE T-TOP CAN BE INSTALLED EITHER BEFORE OR AFTER THE BARRIERGUARD 800 HAS BEEN FULLY ASSEMBLED AND ANCHORED IN PLACE. T-TOP IS REQUIRED WHEN THE BARRIERGUARD 800 IS USED AS A MDS, ANCHORED EVERY 20FT, GATE SECTIONS AND VARIABLE LENGTH BARRIERS. THE T-TOP SHOULD EXTEND 40FT ON EITHER SIDE OF THESE CONDITIONS AND BE TERMINATED WITH TRANSITIONS.
11. THE BARRIERGUARD 800 RANGE HAS BEEN DESIGNED TO BE USED ON AND HAS BEEN TESTED ANCHORED ON ASPHALT, CONCRETE AND COMPACTED SUBBASE. CONTACT LAURA METAAL ROAD SAFETY INC. FOR FURTHER INFORMATION.
12. BARRIERGUARD 800 COMPONENTS ARE MANUFACTURED IN SI (METRIC) UNITS. ENGLISH UNITS SHOWN ARE APPROXIMATE. ALL COMPONENTS ARE FULLY GALVANIZED.
13. BARRIERGUARD 800 SYSTEMS SHALL BE ASSEMBLED AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS DETAILED DRAWINGS, PROCEDURES AND SPECIFICATIONS. FOR ANY INSTALATIONS OUTSIDE OF THE SCOPE OF THESE DRAWINGS PLEASE CONTACT LAURA METAAL ROAD SAFETY INC. FOR DETAILS.

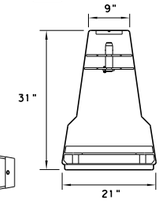


FEMALE END CROSS SECTION

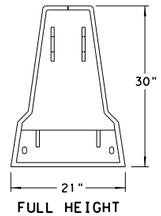


20' T-TOP SECTION

SIDE VIEW



MALE END CROSS SECTION



FULL HEIGHT TERMINAL COVER

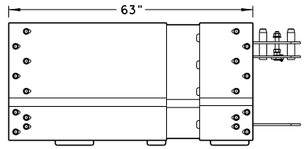
BARRIERGUARD 800 DEFLECTION TABLE

	STANDARD SYSTEM	MINIMUM DEFLECTION SYSTEMS (MDS)
DESCRIPTION	ONLY ANCHORED AT THE EXTREME ENDS OF THE BARRIER LENGTH	ANCHORED EVERY 20 FT.
DEFLECTION AT MASH TL-3	5'-6"	18 1/2"
T-TOP REQUIREMENTS	NONE REQUIRED	REQUIRED FOR MDS SECTIONS

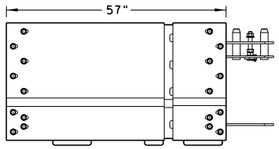
STANDARD ANCHORING REQUIREMENTS (TABLE)

	RESIN STUD ANCHORS			DRIVEN ANCHORS		Hilti HSL-3 SHALLOW MECHANICAL
	CONCRETE *	UNREINFORCED CONCRETE *	ASPHALT	ASPHALT	SUBBASE/SOIL	CONCRETE
ANCHOR DIAMETER	1 in.	1 in.	1 in.	1-3/16 in.	5-1/2 in.	* *
EMBEDMENT DEPTH	6 in.	8 in.	16 in.	16 in.	32 in.	* *
DRILL DIAMETER	1-1/8 in.	1-1/8 in.	1-1/8 in.	1-3/16 in.	DRIVEN	* *
PULL OUT CAPACITY (MIN)	17500 lb	17500 lb	N/A	N/A	N/A	* *
SHEAR CAPACITY (MIN)	25000 lb	25000 lb	N/A	N/A	N/A	* *

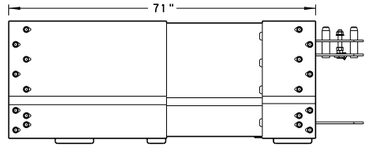
* ALTERNATIVE ANCHORS INCLUDING MECHANICAL ANCHORS FOR CONCRETE MAYBE USED IF THEY MEET THE STRENGTH REQUIREMENTS LISTED, DETAILS WILL BE MANUFACTURER SPECIFIC.
* * CONTACT: LAURA METAAL ROAD SAFETY INC. FOR SPECIFIC APPLICATION.



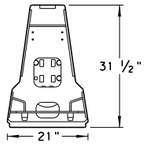
NEUTRAL POSITION



RETRACTED POSITION

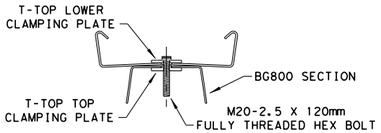


EXTENDED POSITION

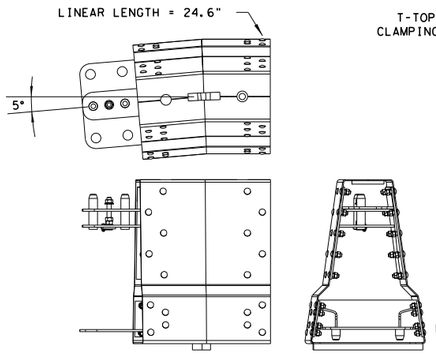


SIDE VIEW

VARIABLE LENGTH BARRIER

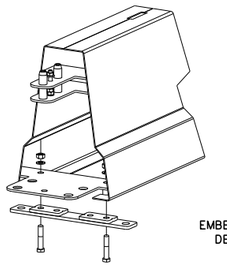


T-TOP MOUNTING DETAIL

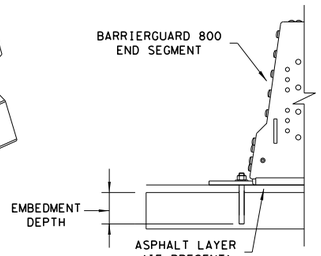


5° (LH) LEFT HAND ANGLE SECTION

NOTE: ADDITIONAL ANGLE SECTION AVAILABLE
5° (RH) RIGHT HAND ANGLE SECTION
10° (LH) LEFT HAND ANGLE SECTION
10° (RH) RIGHT HAND ANGLE SECTION



INTERMEDIATE ANCHOR AT QUICKLINK



SEE ANCHORING TABLE

Texas Department of Transportation — Design Division Standard

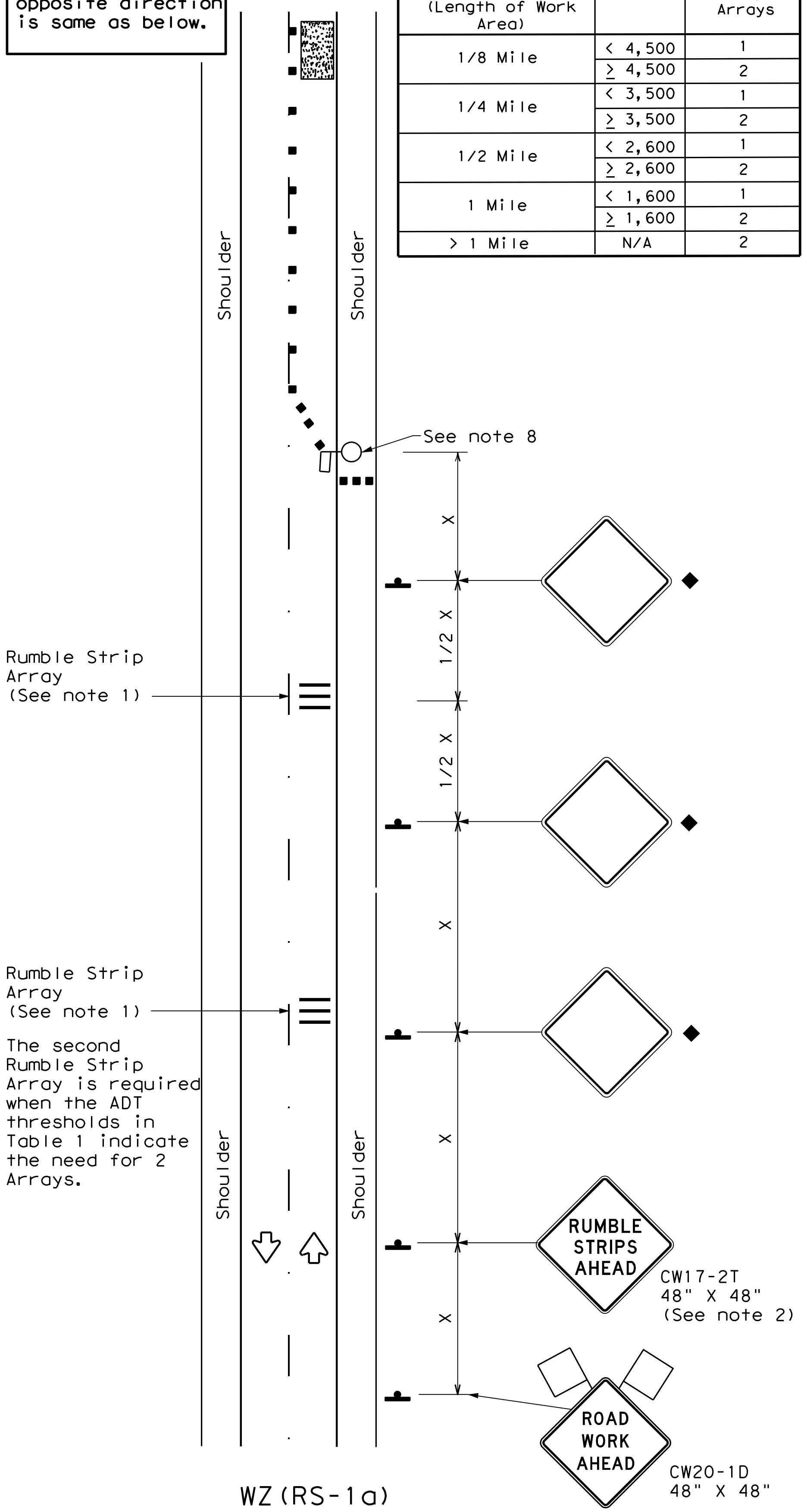
BARRIERGUARD 800 SYSTEM
STEEL BARRIER
MASH TL-3
BARRIERGUARD-19

FILE: barrierguard19.dgn	DN: TxDOT	CK: KM	DW: VP	CK:
© TxDOT: JULY 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0263	05	024	SH 70
	DIST	COUNTY		SHEET NO.
	ABL	FISHER		038

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

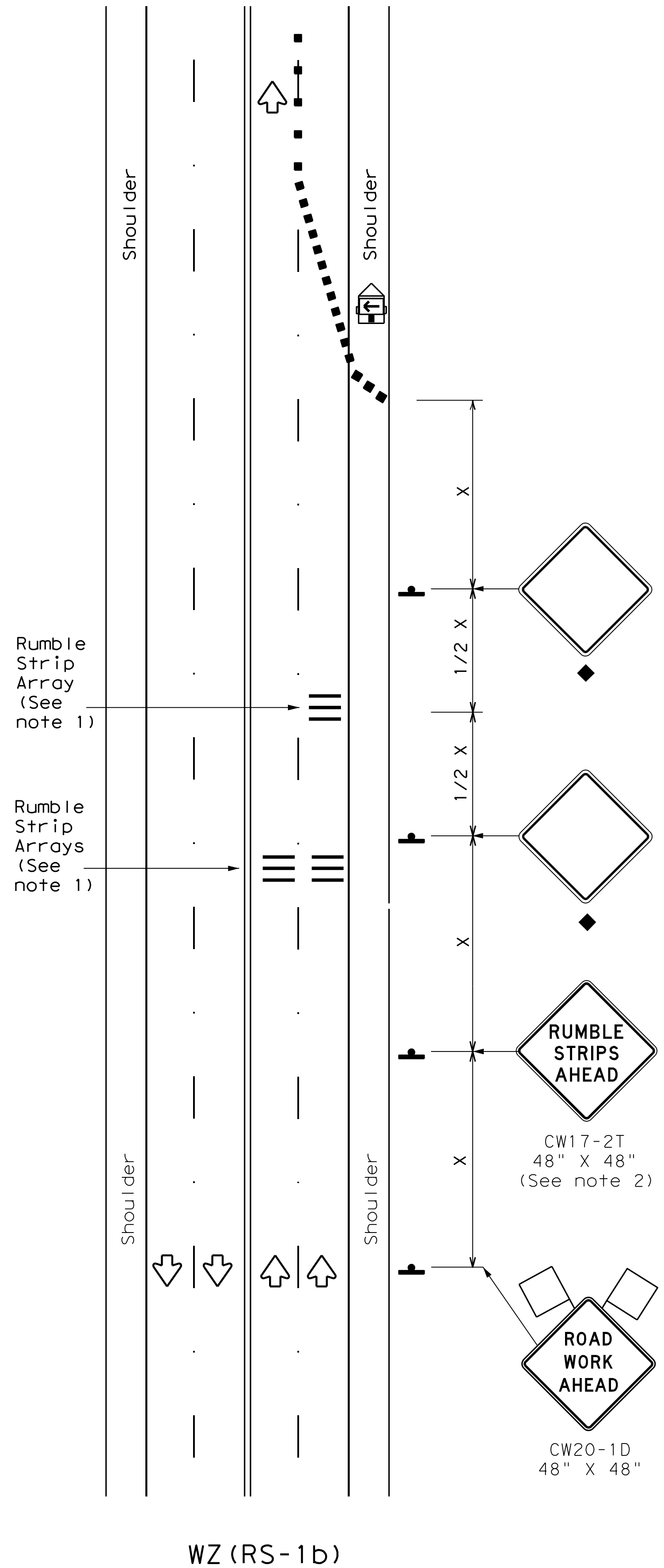
TABLE 1

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



WZ(RS-1a)

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

TABLE 2

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

LEGEND

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

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

✱ Conventional Roads Only

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

TYPICAL USAGE

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-22

FILE: wzrs22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-14 1-22 4-16	0263	05	024	SH 70
	DIST	COUNTY		SHEET NO.
	ABL	FISHER		039

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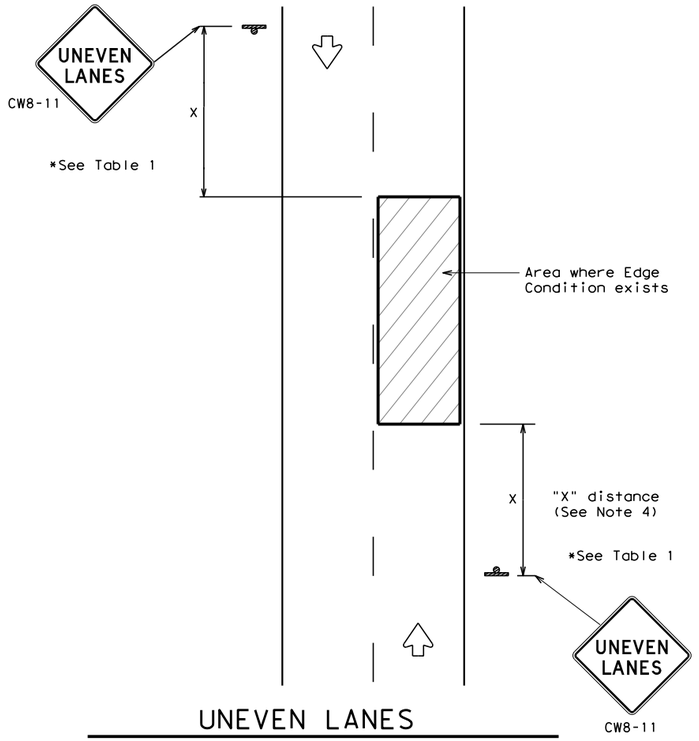
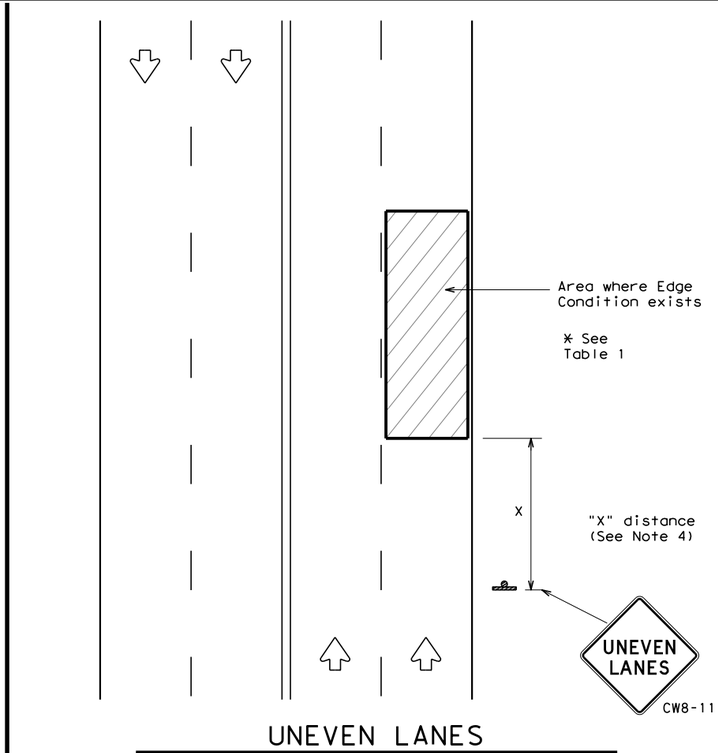
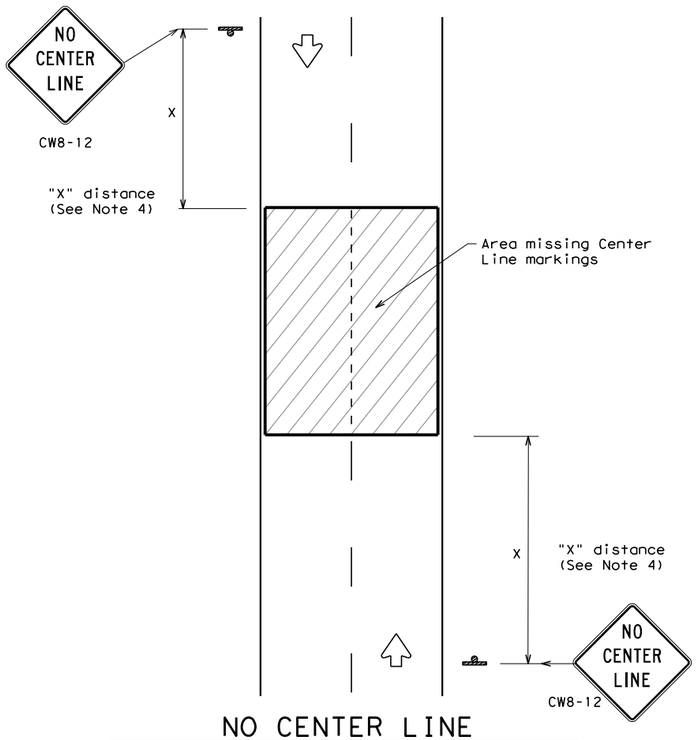


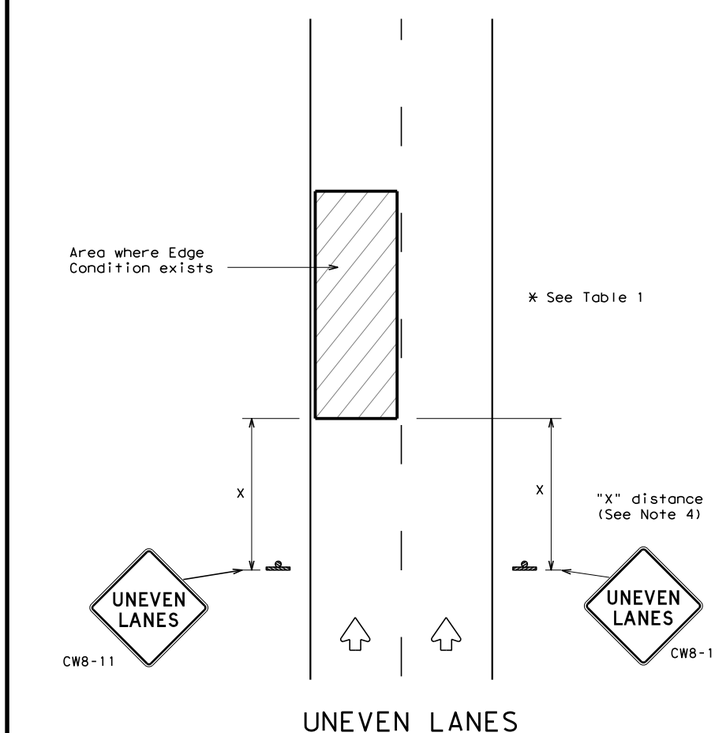
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

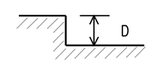
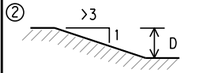
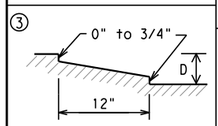
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

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

TABLE 1

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

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

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

Texas Department of Transportation

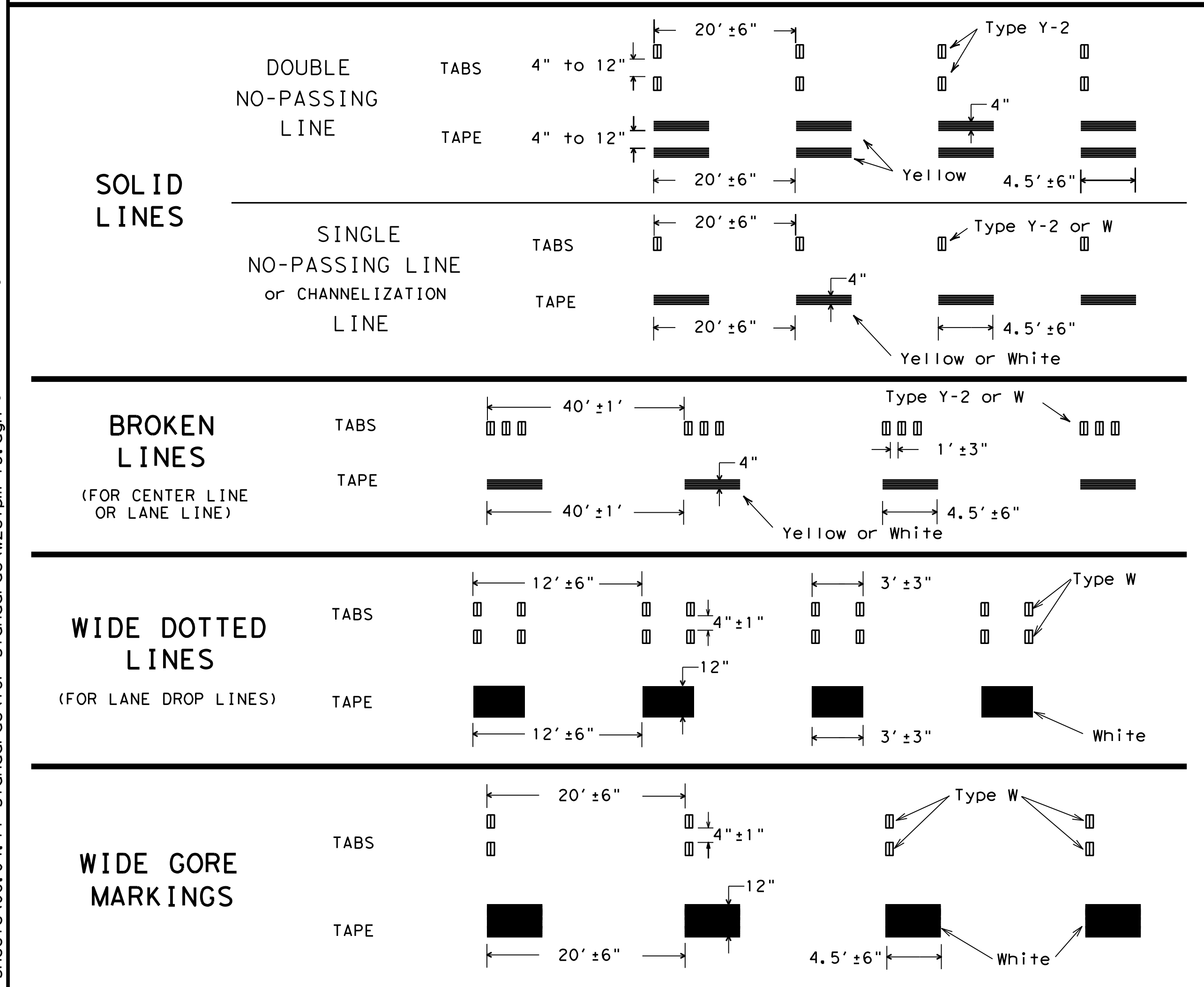
Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

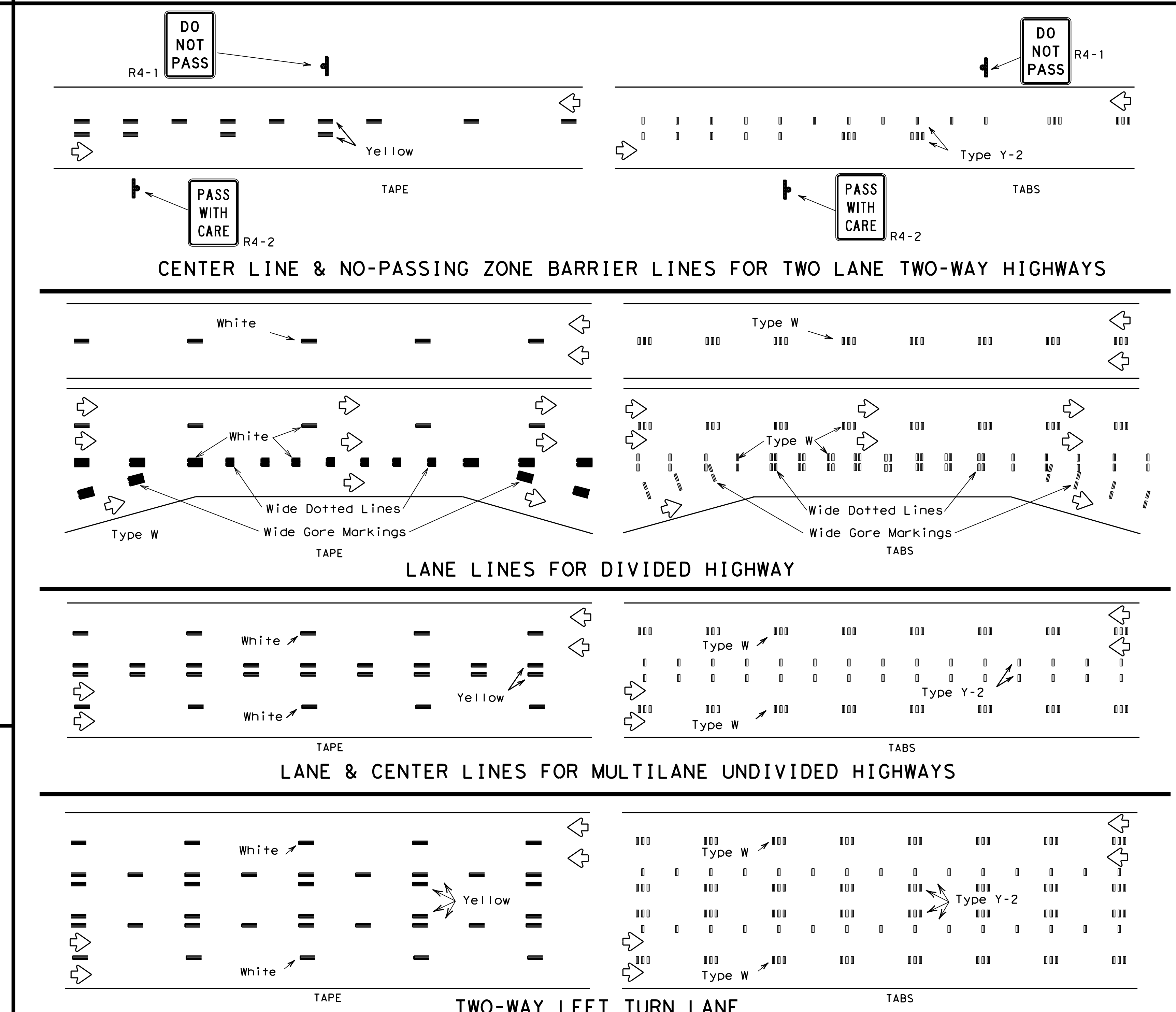
WZ(UL)-13

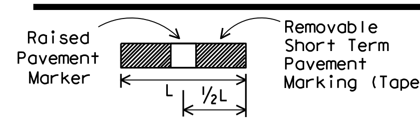
FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0263	05	024	SH 70
8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03	ABL	FISHER		040

WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



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.

NOTES:

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

TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

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

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

1. DMSs referenced above can be found along with embedded links to their respective MPLs at the following website:
http://www.txdot.gov/business/contractors_consultants/material_specifications/default.htm

Texas Department of Transportation — Traffic Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

FILE: wzstpm-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0263	05	024	SH 70
1-97 3-03 7-13	DIST		COUNTY	SHEET NO.
	ABL		FISHER	041

111

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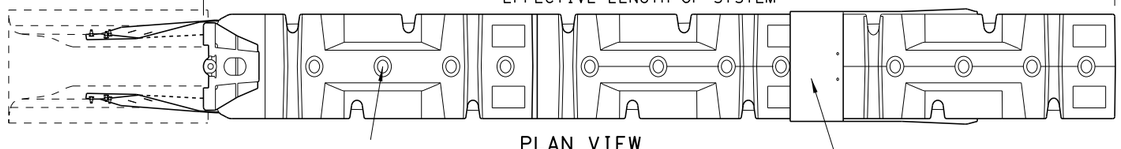
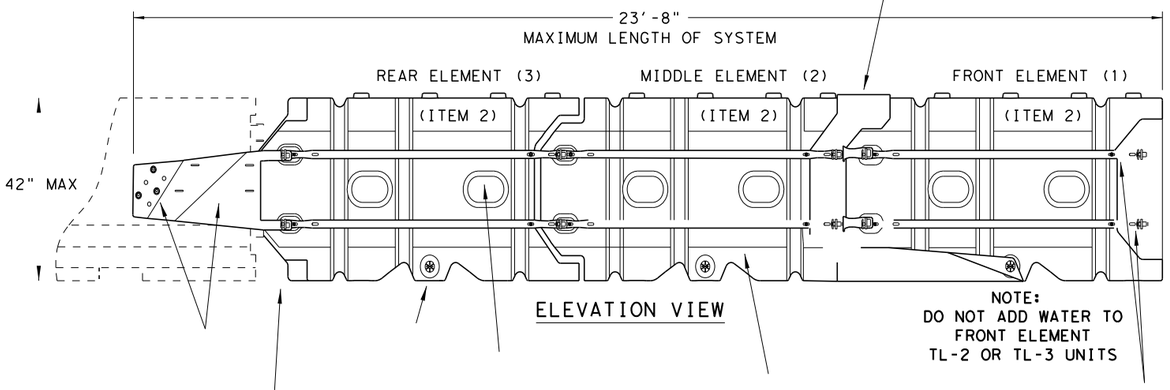
DATE: 4/11/2022
FILE: \\pussc6nrfi101\J-Jobs\2138C TxDOT SH70 Plum Creek ABL\06.00 Design\06.04 Sheets\06.04.11 Standards\TCP Standards\absorbm19.dgn

SYSTEM SHOWN - ABSORB-M TL-3

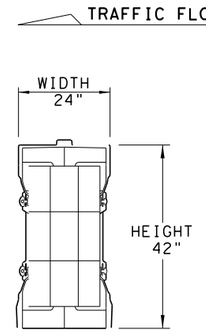


PLAN VIEW



ELEVATION VIEW

NOTE:
DO NOT ADD WATER TO
FRONT ELEMENT
TL-2 OR TL-3 UNITS



SECTION A-A

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"

GENERAL NOTES

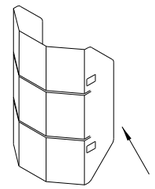
1. FOR SPECIFIC INFORMATION REGARDING THE INSTALLATION AND TECHNICAL GUIDANCE, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800. 180 RIVER ROAD, RIO VISTA, CA 94571
2. THE ABSORB-M SYSTEM IS ONLY APPROVED FOR USE IN (TEMPORARY WORK ZONE) LOCATIONS.
3. THE ABSORB-M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

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

* COMPONENTS PRE-ASSEMBLED WITH ELEMENT ASSEMBLY

DELINEATION DECAL PLACEMENT GUIDE

** APPLY DECAL



NOSE PLATE

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

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

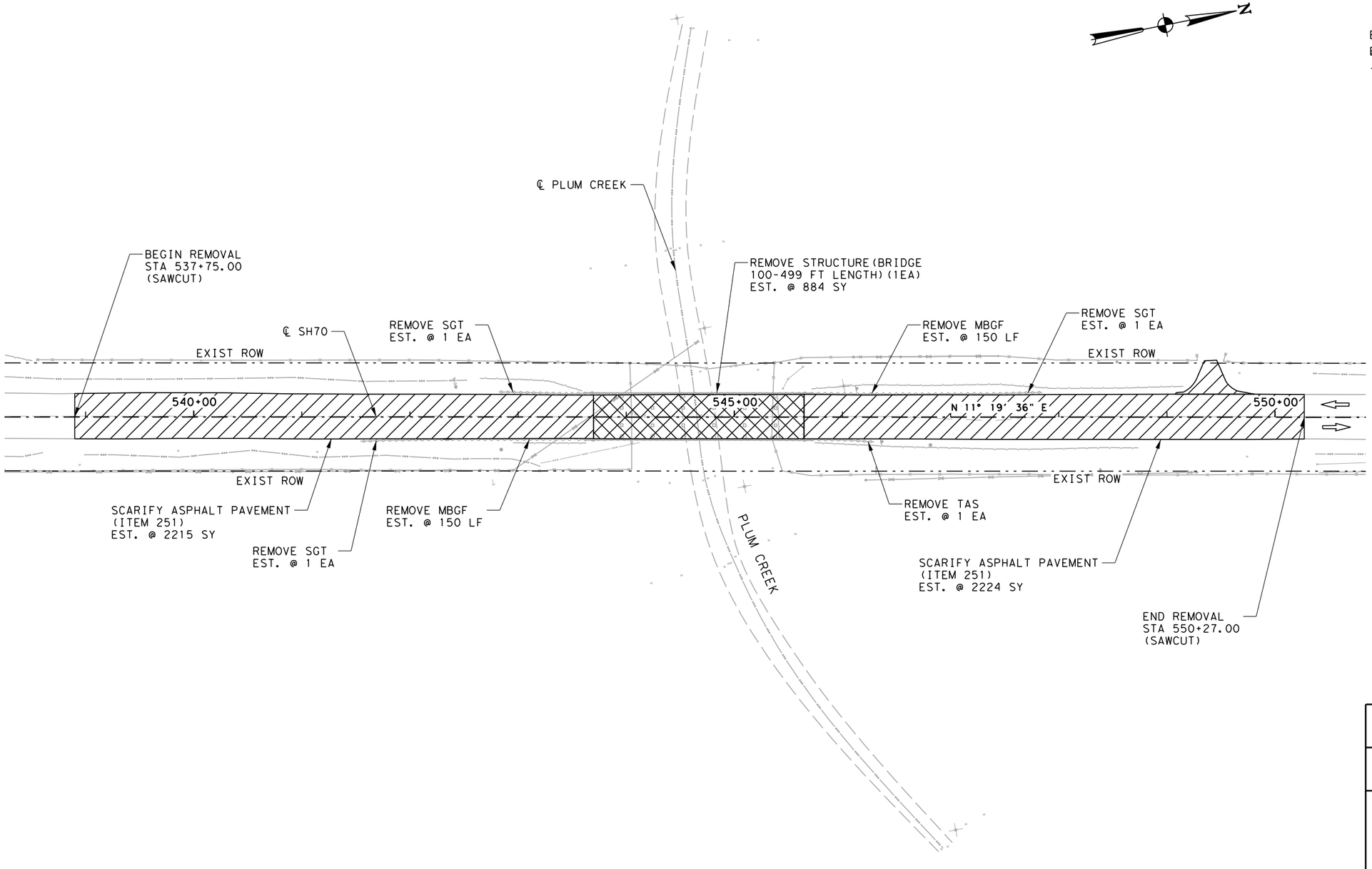
NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE ABSORB-M, IT IS NOT INTENDED TO REPLACE THE INSTALLATION INSTRUCTIONS MANUAL.

SACRIFICIAL

Texas Department of Transportation — Design Division Standard

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

FILE: absorbm19	DN: TxDOT	CK: KM	DW: VP	CK:
© TxDOT: JULY 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0263	05	024	SH 70
	DIST	COUNTY		SHEET NO.
	ABL	FISHER		042



LEGEND

- EXISTING ASPHALT TO BE SCARIFIED
- EXISTING BRIDGE TO BE REMOVED
- EXISITNG ROW

NOTES

1. PREPARING ROW WILL INCLUDE MISCELLANEOUS REMOVAL ITEMS SUCH AS DELINEATORS.

2. MBGF ON BRIDGE IS INCLUDED IN REMOVE STRUCTURE (EA).

0 50 100
HORIZONTAL SCALE IN FEET

STATE OF TEXAS
BRYAN J. ALLDREDGE
116211
LICENSED PROFESSIONAL ENGINEER

4/11/2022

Texas Department of Transportation

IEA
18383 PRESTON ROAD
SUITE 500
DALLAS, TEXAS 75252
(214) 884-4253
FIRM REGISTRATION No.
F-10161

SH 70

REMOVAL PLAN

SCALE: 1"=100' SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6	SEE COVER SHEET	043

STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH70-RD-REMOVAL.dgn

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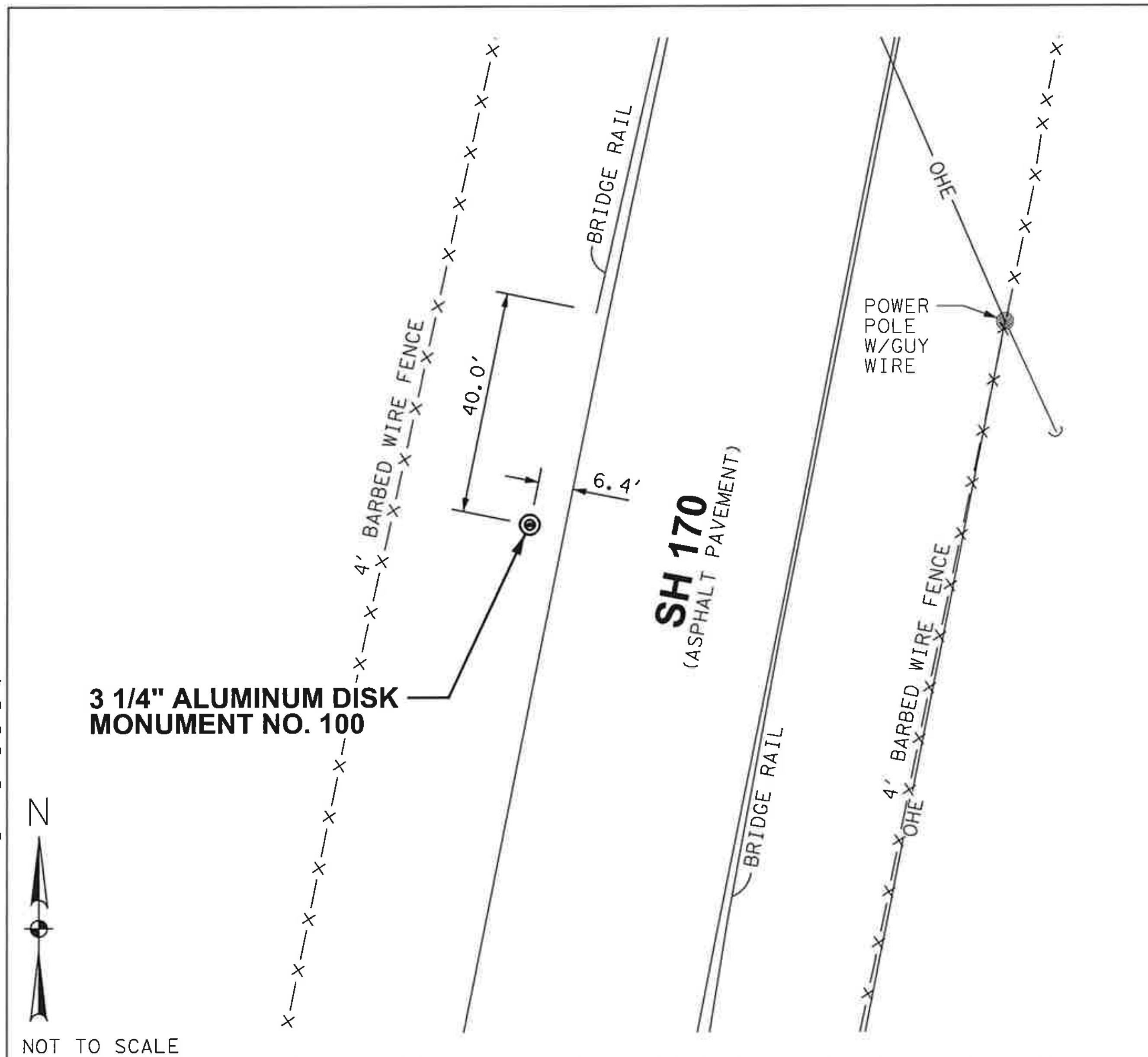
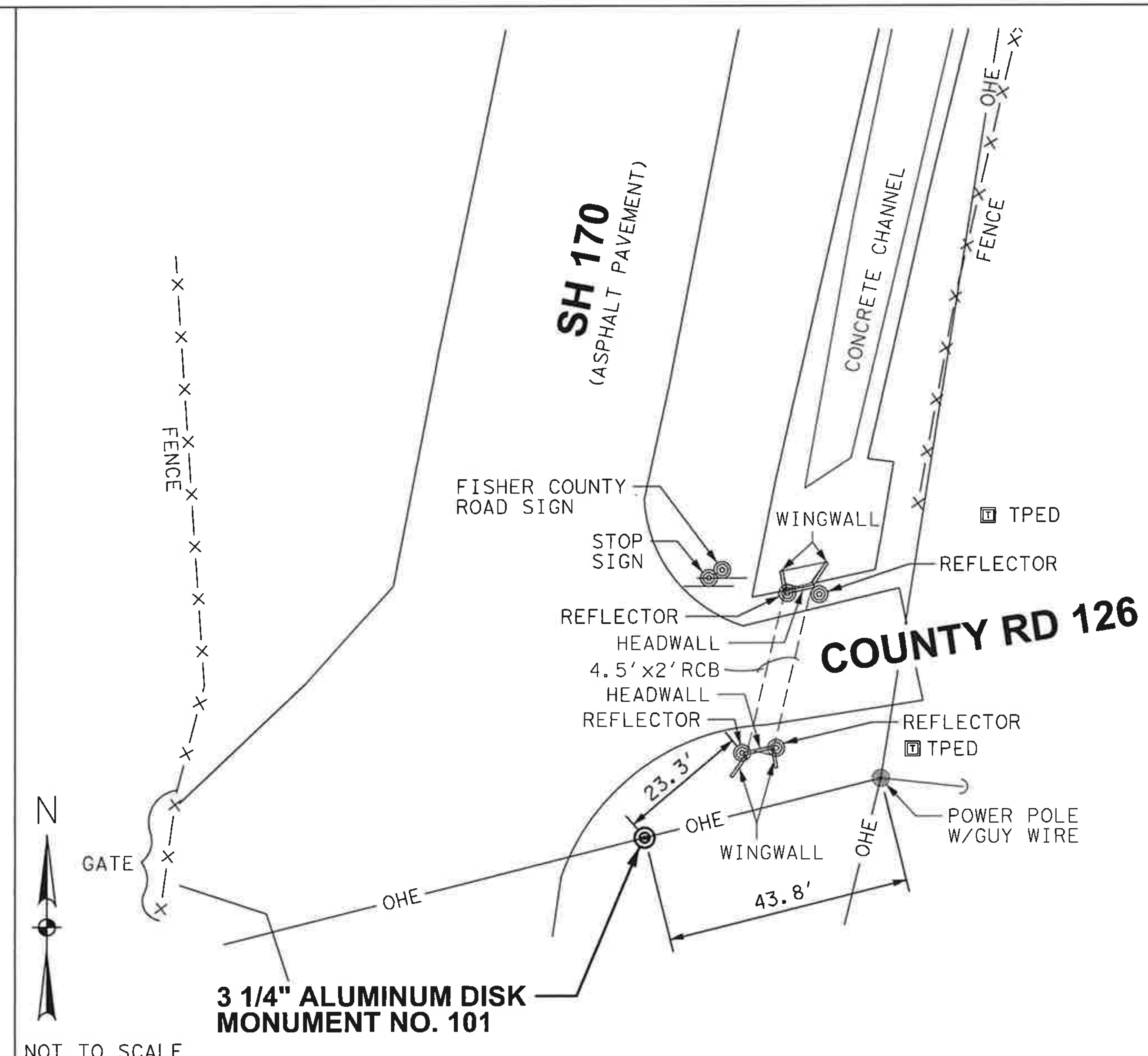




CONTROL POINT NO. 100

Aluminum monument on 5/8-inch iron rod on the west side SH 70, +/- 930' north of County Road 126, +/- 240' south of Plum Creek

Monument type: Aluminum disk stamped "TEXAS DEPT OF TRANSPORTATION CONTROL MARK 100"
Northing: 6912519.4586
Easting: 1390119.0796
Elevation: 2000.8426

All coordinates shown hereon are surface based on the Texas Coordinate System NAD 83, North Central Zone (4202), observed by RTK using Leica SmartNet North America Network on 03/09/2020. Note: TxDOT VRS was unavailable in this area. Scale factor is 1.00021.

All elevations shown hereon are based on RTK observations utilizing Leica SmartNet North America Network and referenced to the North American vertical datum of 1988 (NAVD88) using Geoid 12A

CONTROL POINT NO. 101

Aluminum monument on 5/8-inch iron rod at the southeast corner of the intersection of SH 70 and County Rd. 126

Monument type: Aluminum disk stamped "TEXAS DEPT OF TRANSPORTATION CONTROL MARK 101"
Northing: 6911583.3045
Easting: 1389992.0745
Elevation: 2014.8938

All coordinates shown hereon are surface based on the Texas Coordinate System NAD 83, North Central Zone (4202), observed by RTK using Leica SmartNet North America Network on 03/09/2020. Note: TxDOT VRS was unavailable in this area. Scale factor is 1.00021.

All elevations shown hereon are based on RTK observations utilizing Leica SmartNet North America Network and referenced to the North American vertical datum of 1988 (NAVD88) using Geoid 12A

I HEREBY CERTIFY THAT THE HORIZONTAL AND VERTICAL DATA SHOWN HEREON WAS DETERMINED UTILIZING THE TxDOT VRS NETWORK ON MAY 24, 2018, AND IS CORRECTLY SHOWN HEREON.

2/9/2020

STATE OF TEXAS
REGISTERED
DOUGLAS A. CALHOUN
5619
PROFESSIONAL LAND SURVEYOR

DOUGLAS A. CALHOUN
REGISTERED PROFESSIONAL LAND SURVEYOR
STATE OF TEXAS NO. 5619

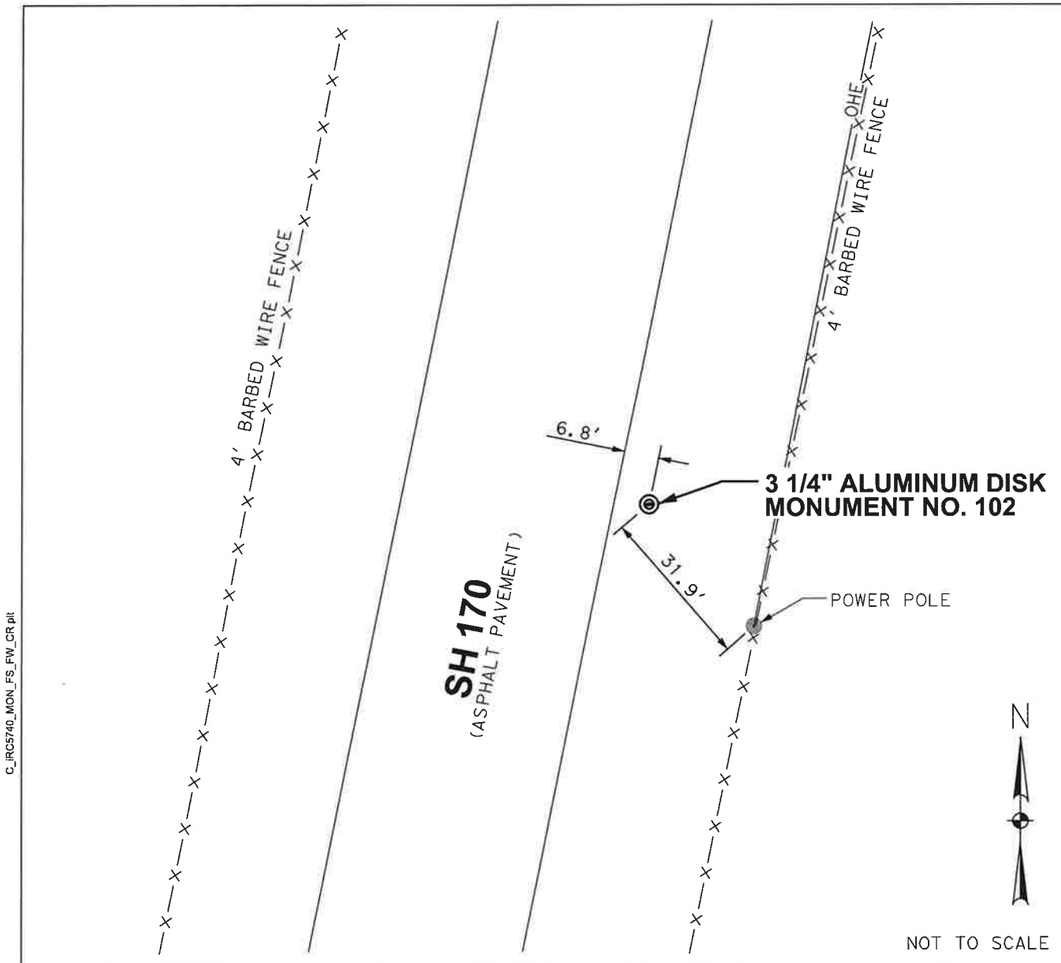
REV	DATE	DESCRIPTION

HALFF
4000 FOSSIL CREEK BLVD
FORT WORTH, TEXAS 76137-2797
TBPELS FIRM NO 10029605
TEL (817) 847-1422

 TEXAS DEPARTMENT OF TRANSPORTATION
DATE OF SUBMITTAL: 4/5/2022

SURVEY CONTROL
SH 70 AT PLUM CREEK

FEDERAL ROAD DIV. NO.	FEDERAL AID PROJECT NO.			SHEET NO.
	STP 2B20(044)			044
STATE	DISTRICT	COUNTY		
TEXAS	6	FISHER		
CONTROL	SECTION	JOB	HIGHWAY NO.	
0263	05	024	SH 70	



CONTROL POINT NO. 102

Aluminum monument on 5/8-inch iron rod on the east side of SH 70, +/- 1893' north of County Road 126, +/- 730' north of Plum Creek

Monument type: Aluminum disk stamped "TEXAS DEPT OF TRANSPORTATION CONTROL MARK 102"
Northing: 6913450.0315
Easting: 1389992.0745
Elevation: 2003.1095

All coordinates shown hereon are surface based on the Texas Coordinate System NAD 83, North Central Zone (4202), observed by RTK using Leica SmartNet North America Network on 03/09/2020. Note: TxDOT VRS was unavailable in this area. Scale factor is 1.00021.

All elevations shown hereon are based on RTK observations utilizing Leica SmartNet North America Network and referenced to the North American vertical datum of 1988 (NAVD88) using Geoid 12A

I HEREBY CERTIFY THAT THE HORIZONTAL AND VERTICAL DATA SHOWN HEREON WAS DETERMINED UTILIZING THE TxDOT VRS NETWORK ON MAY 24, 2018, AND IS CORRECTLY SHOWN HEREON.

2/9/2022

STATE OF TEXAS
REGISTERED
DOUGLAS A. CALHOUN
5619
PROFESSIONAL
LAND SURVEYOR

DOUGLAS A. CALHOUN
REGISTERED PROFESSIONAL LAND SURVEYOR
STATE OF TEXAS NO. 5619

REV	DATE	DESCRIPTION

HALFF
4000 FOSSIL CREEK BLVD
FORT WORTH, TEXAS 76137-2797
TBPELS FIRM NO. 10029605
TEL (817) 847-1422

TEXAS DEPARTMENT OF TRANSPORTATION
DATE OF SUBMITTAL: 4/5/2022

SURVEY CONTROL
SH 70 AT PLUM CREEK

FEDERAL ROAD DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
	STP 2B20(044)	045

STATE	DISTRICT	COUNTY	
TEXAS	6	FISHER	
CONTROL	SECTION	JOB	HIGHWAY NO.
0263	05	024	SH 70

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SH 70

Chain SH70-CL contains:
13 14

Beginning chain SH70-CL description
Feature: Road_Centerline

Point 13	N	6,911,687.9875	E 1,389,980.6027	Sta 534+00.00
Course from 13 to 14 N 11° 19' 36.19" E Dist 2,157.9229				
Point 14	N	6,913,803.8809	E 1,390,404.4261	Sta 555+57.92

Ending chain SH70-CL description

STATE OF TEXAS
BRYAN J. ALLDREDGE
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LICENSED PROFESSIONAL ENGINEER

4/11/2022

Texas Department of Transportation

IEA
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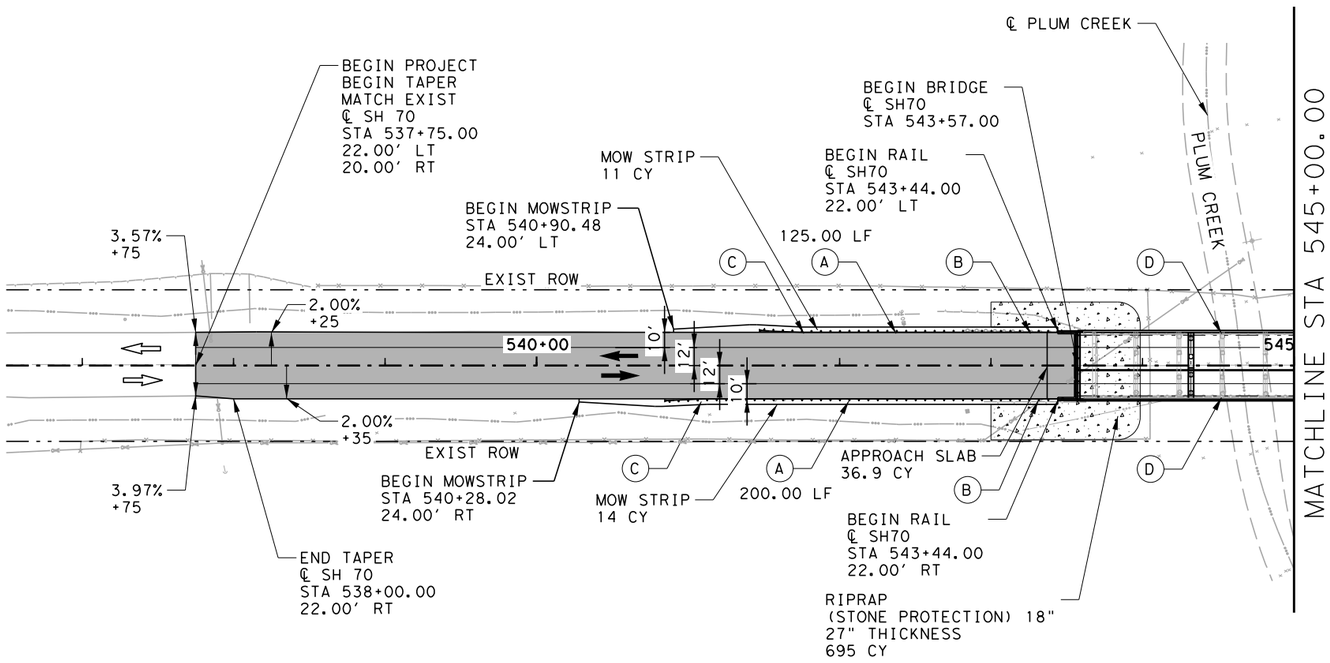
SUITE 500
DALLAS, TEXAS 75252
(214) 884-4253
FIRM REGISTRATION No. F-10161

SH 70

HORIZONTAL ALIGNMENT DATA

SCALE: NTS SHEET 1 OF 1

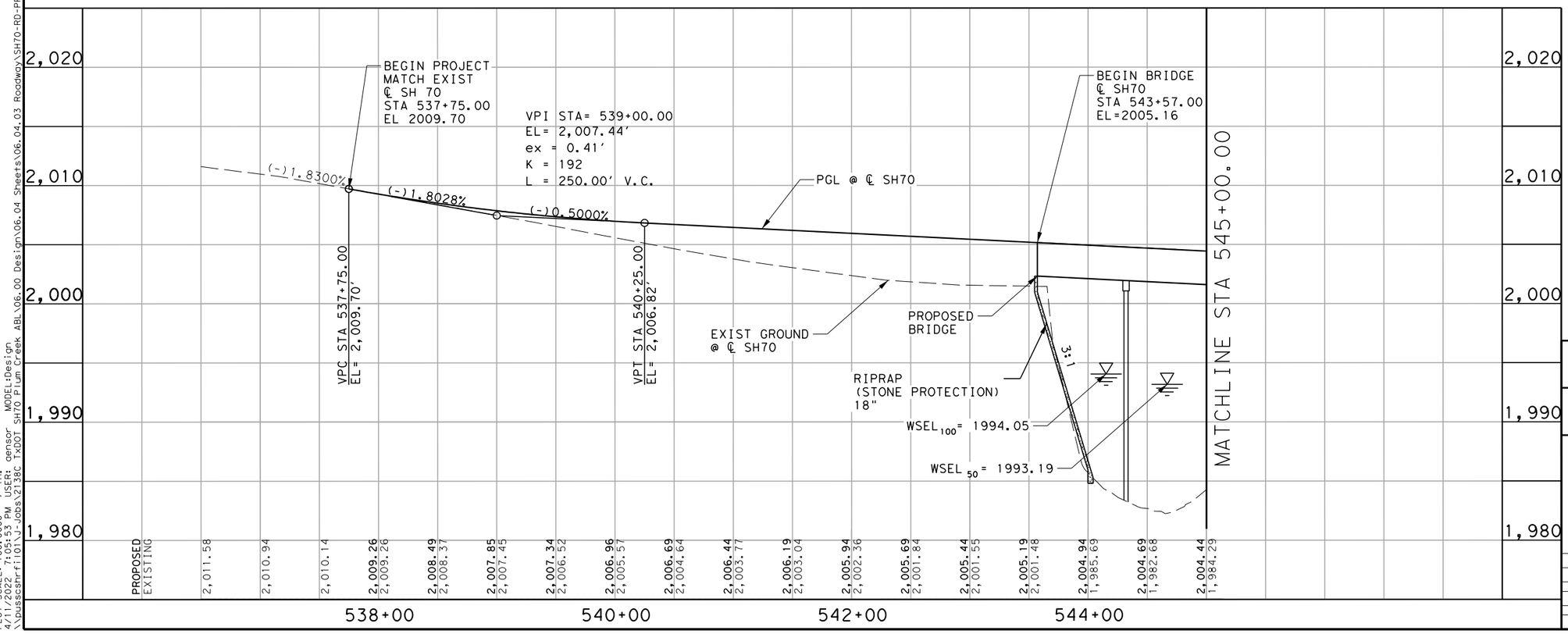
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE COVER SHEET		046
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70



LEGEND

- (A) METAL BEAM GUARD FENCE
- (B) METAL BEAM GUARD FENCE TRANSITION (THRIE BEAM)
- (C) SINGLE GUARDRAIL TERMINAL
- (D) RAIL (T223)
- PAVING LIMITS
- DRIVEWAY ASPHALT
- STONE RIPRAP
- EXISITNG ROW
- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- (#) DRIVEWAY NO.

SCALE: 1"=100' H
1"=10' V



SCALE: 1"=100'

SHEET 1 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6	SEE COVER SHEET	047

STATE	DISTRICT	COUNTY
TEXAS	ABL	FISHER

CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

STATE OF TEXAS
BRYAN J. ALLDREDGE
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4/11/2022

Texas Department of Transportation

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SUITE 500
DALLAS, TEXAS 75252
(214) 884-4253
FIRM REGISTRATION No. F-10161

SH 70

PLAN AND PROFILE

SH70-RD-PP-01.dgn

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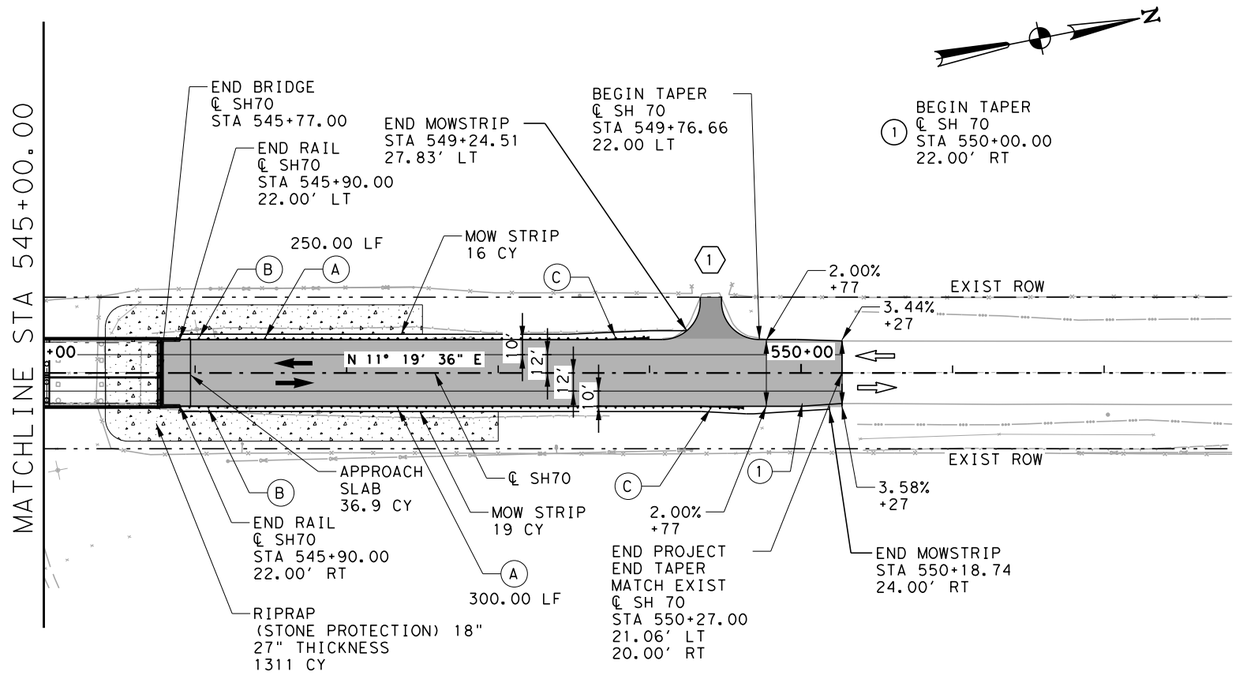
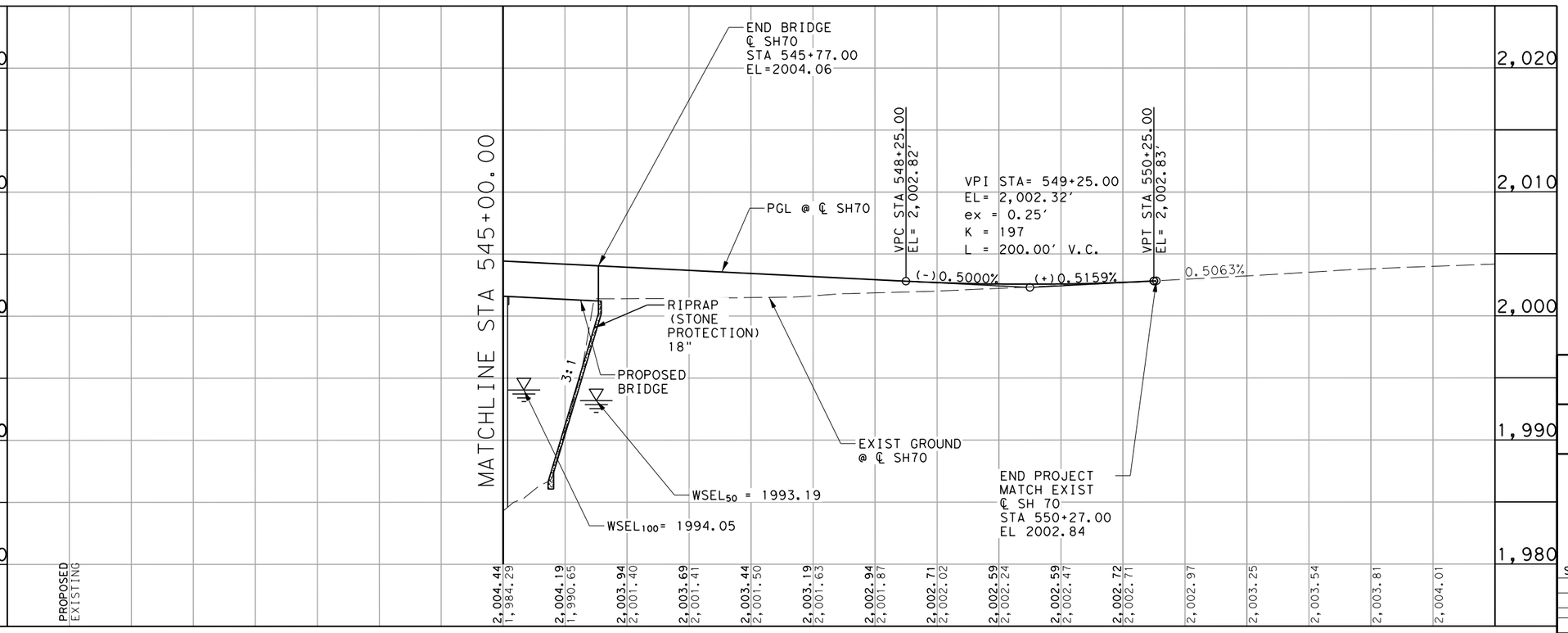


LEGEND

- (A) METAL BEAM GUARD FENCE
- (B) METAL BEAM GUARD FENCE TRANSITION (THRIE BEAM)
- (C) SINGLE GUARDRAIL TERMINAL
- (D) RAIL (T223)
- PAVING LIMITS
- DRIVEWAY ASPHALT
- STONE RIPRAP
- EXISITNG ROW
- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- (#) DRIVEWAY NO.

0 50 100
SCALE: 1"=100' H
1"=10' V



BRYAN J. ALLDREDGE
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STATE OF TEXAS
4/11/2022

Texas Department of Transportation

IEA
18383 PRESTON ROAD
SUITE 500
DALLAS, TEXAS 75252
(214) 884-4253
FIRM REGISTRATION No. F-10161

SH 70

PLAN AND PROFILE

SCALE: 1"=100' SHEET 2 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6	SEE COVER SHEET	048

STATE	DISTRICT	COUNTY
TEXAS	ABL	FISHER

CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH70-RD-PP-02.dgn

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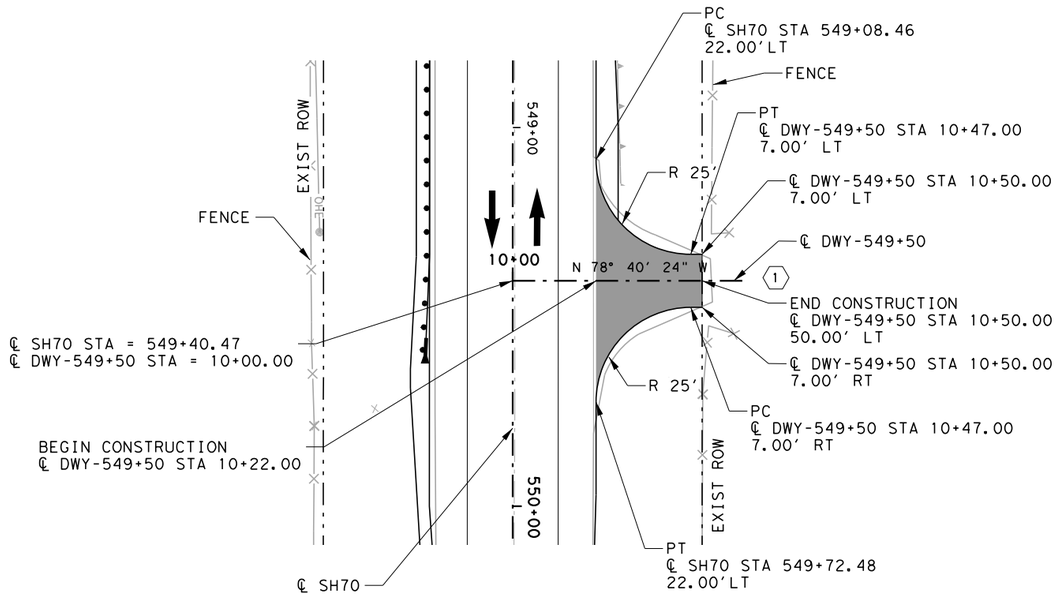
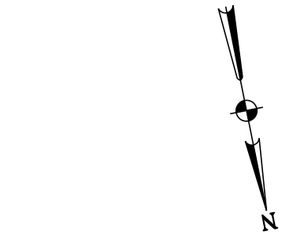
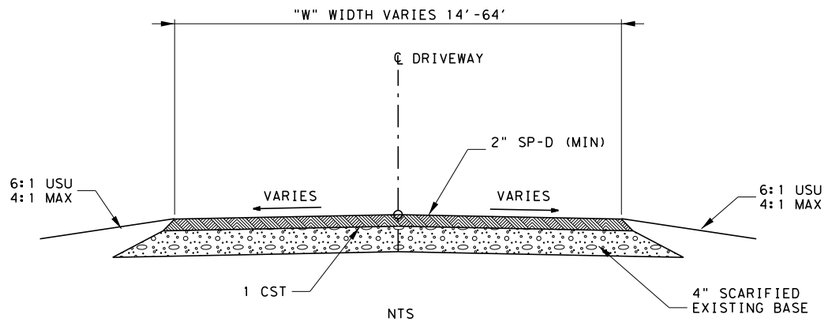




LEGEND

- PAVEMENT (ASPHALT)
- EXISITNG ROW
- PROPOSED TRAFFIC
- (#) DRIVEWAY NO.

DRIVEWAY TYPICAL SECTION



NTS

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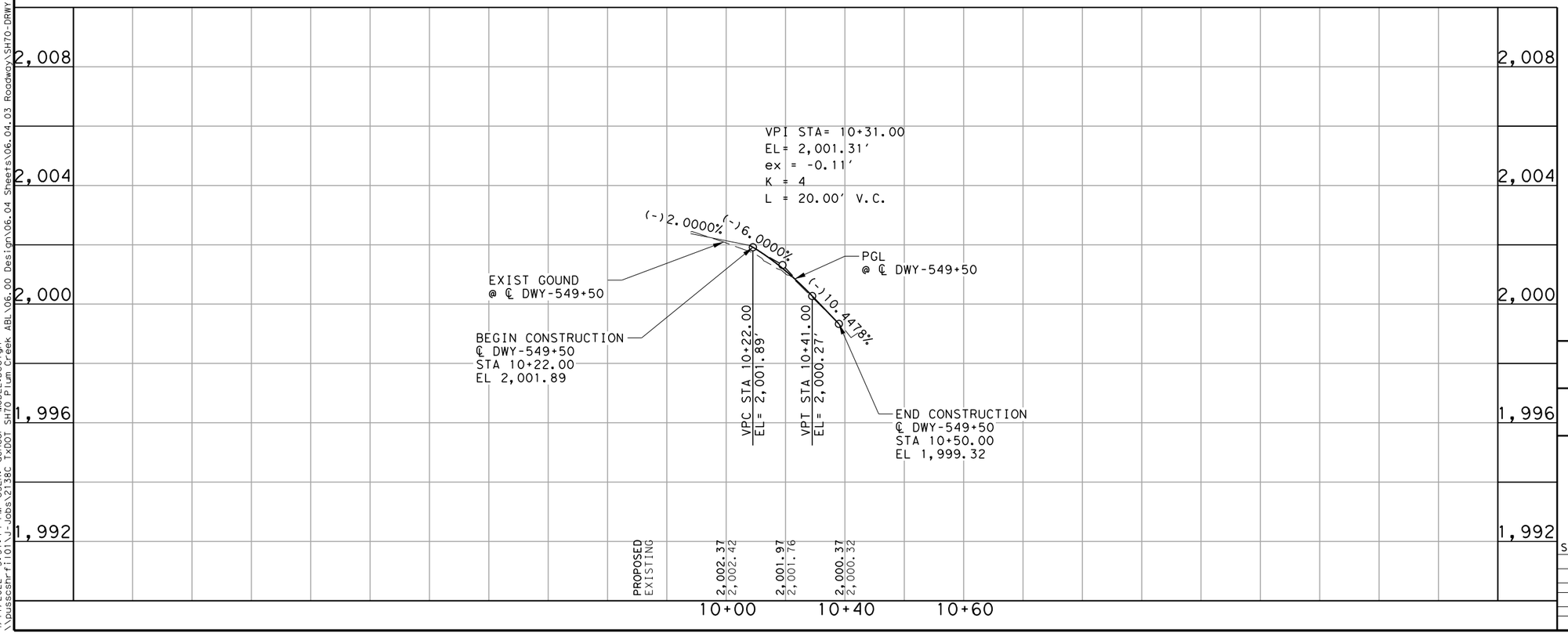
1"=4' V



BRYAN J. ALLDREDGE
116211
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

4/11/2022

Texas Department of Transportation

IEA
18383 PRESTON ROAD
SUITE 500
DALLAS, TEXAS 75252
(214) 884-4253
FIRM REGISTRATION No. F-10161

SH 70

DRIVEWAY PLAN & PROFILE DWY-549+50

SCALE: 1"=40' SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6	SEE COVER SHEET	049
STATE	DISTRICT	COUNTY
TEXAS	ABL	FISHER
CONT	SECT	JOB / HIGHWAY NO
0263	05	024 / SH 70

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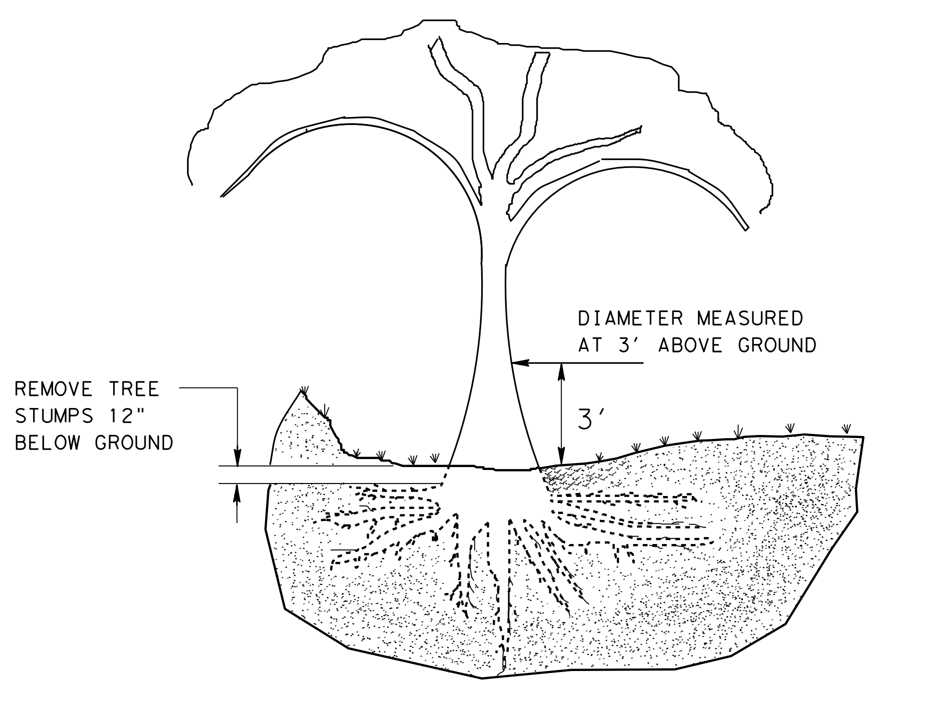
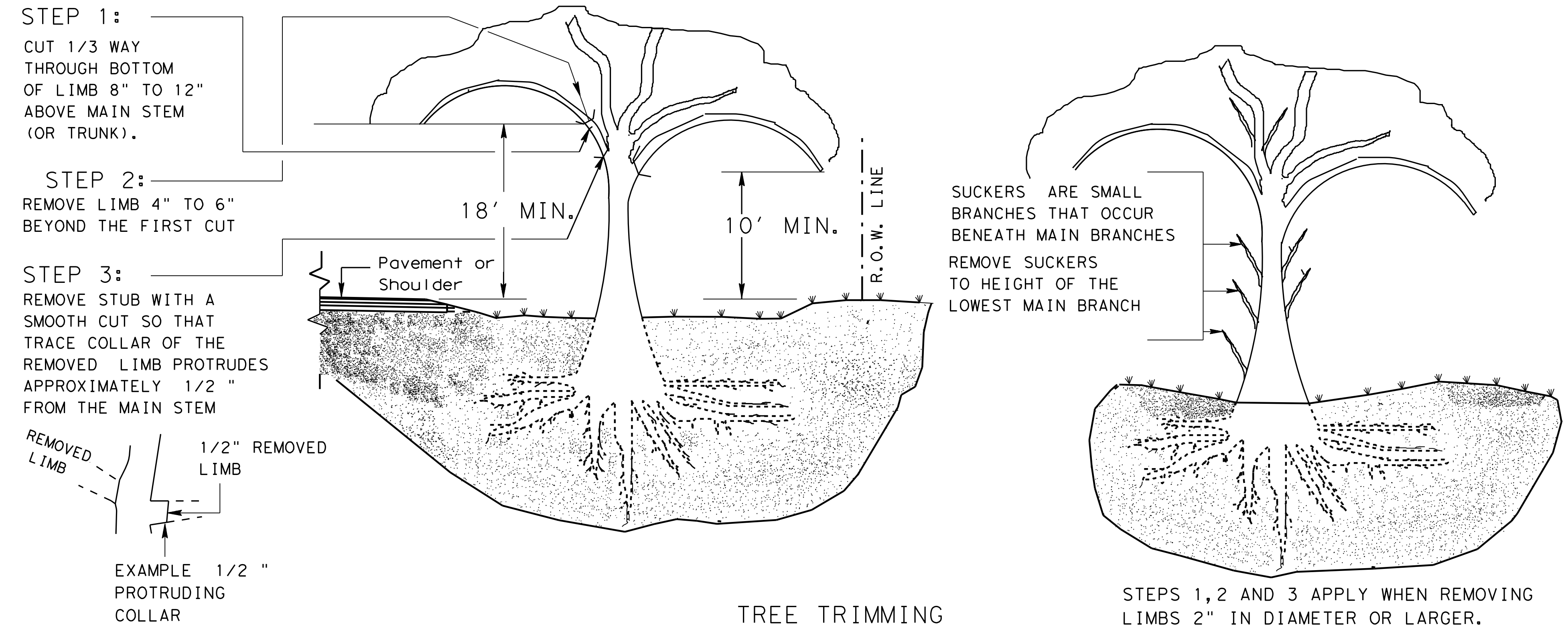
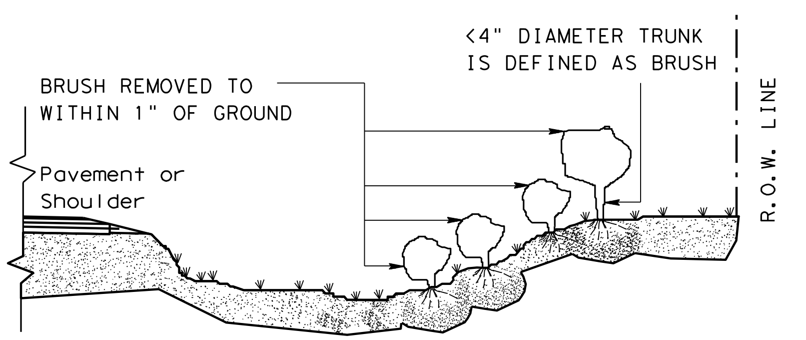


TREE REMOVAL

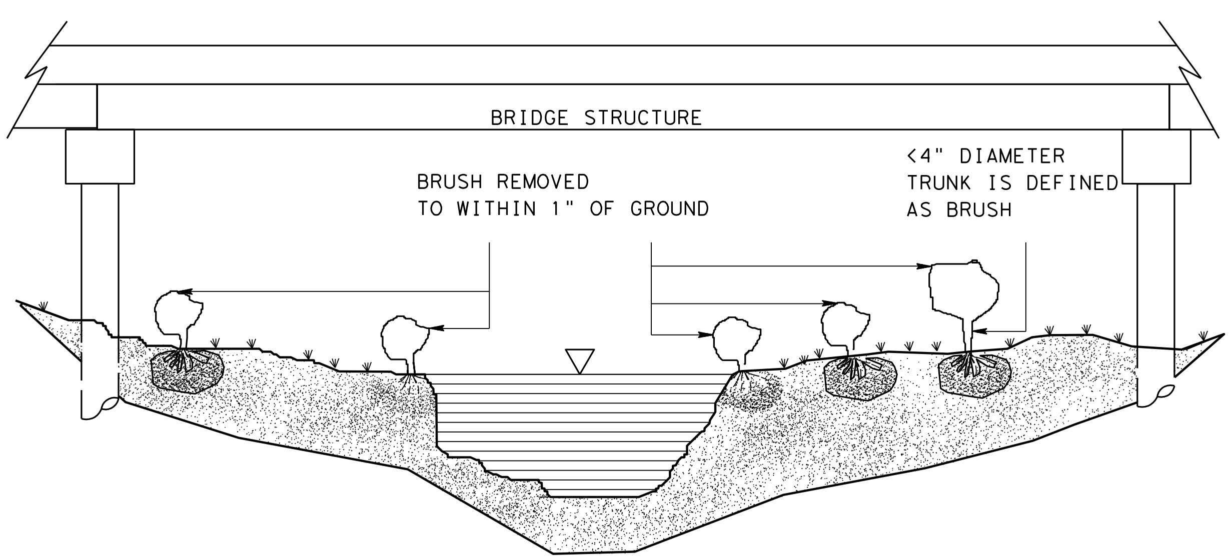


TREE TRIMMING

STEPS 1,2 AND 3 APPLY WHEN REMOVING LIMBS 2" IN DIAMETER OR LARGER.



BRUSH REMOVAL



BRUSH REMOVAL UNDER BRIDGE AND IN CHANNEL

GENERAL NOTES:

TREE TRIMMING

1. TRIM AND REMOVE ALL TREE LIMBS ON THE PAVEMENT SIDE OF THE TRUNK 18' ABOVE THE PAVEMENT OR BRIDGE DECK ELEVATION, UNLESS OTHERWISE SHOWN ON THE PLANS.

2. TRIM AND REMOVE ALL TREE LIMBS BETWEEN THE TRUNK AND R.O.W. LINE 10' ABOVE NATURAL GROUND, TERRAIN OR OTHER STRUCTURE ELEVATION, UNLESS OTHERWISE SHOWN ON THE PLANS.

TREE REMOVAL

3. FOR TREES MARKED FOR REMOVAL, THE DIAMETER OF TREES ARE 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 AND PAID FOR SEPARATELY.

4. MEASUREMENTS FOR PAYMENT OF TREE DIAMETERS ARE DIVIDED INTO THE RANGES SHOWN IN TABLE 1.

TABLE 1
TREE TRUNK SIZE FOR TREE REMOVAL PAYMENT

	RANGE FOR PAY ITEMS			
	TRUNK DIAMETER *		TRUNK CIRCUMFERENCE	
PAY ITEM	LOWER LIMIT IS GREATER THAN	UPPER LIMIT IS LESS THAN OR EQUAL TO	LOWER LIMIT IS GREATER THAN	UPPER LIMIT IS LESS THAN OR EQUAL TO
752 6005	4	12	12 1/2	37 1/2
752 6006	12	18	37 1/2	56 1/2
752 6007	18	24	56 1/2	75 1/2
752 6008	24	30	75 1/2	94
752 6009	30	36	94	113
752 6010	36	42	113	132
752 6011	42	48	132	151
752 6012	48	60	151	188 1/2
752 6013	60	72	188 1/2	226
752 6019	72	84	226	264
	84	GREATER THAN 84	264	NOT APPLICABLE

*SEE GENERAL NOTE #3.

Texas Department of Transportation — Maintenance Division Standard

TREE AND BRUSH REMOVAL

TRB-15(1)

FILE:	DN: JEO	CK: LJB	DW: JEO	CK:
© TxDOT MARCH 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0263	05	024	SH 70
Revised table 1 to 2014 Specification	DIST		COUNTY	SHEET NO.
	ABL		FISHER	050

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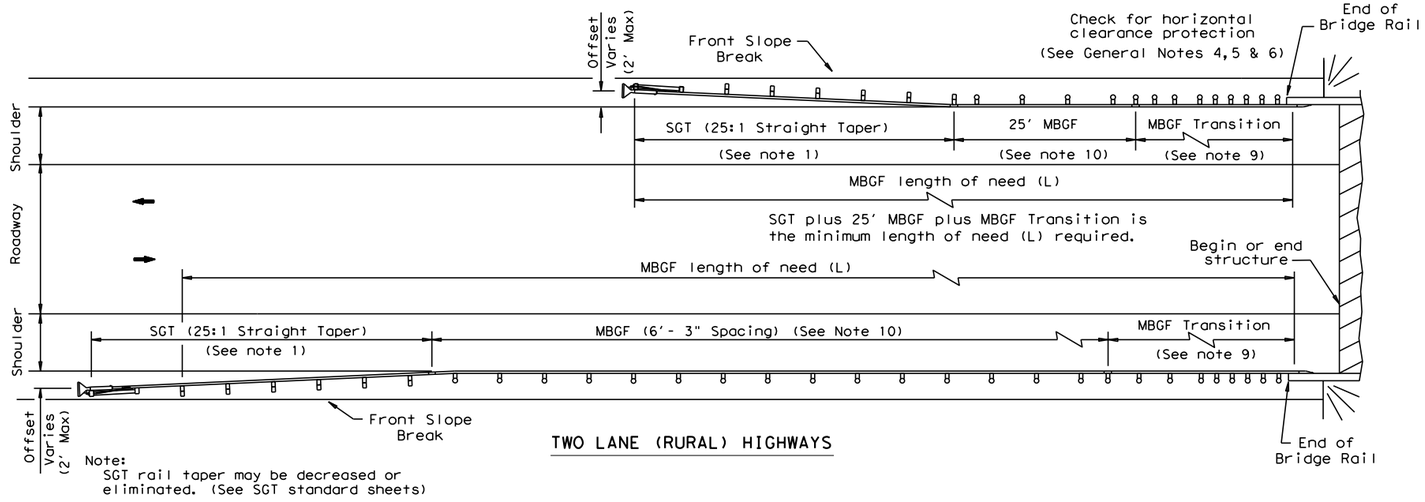
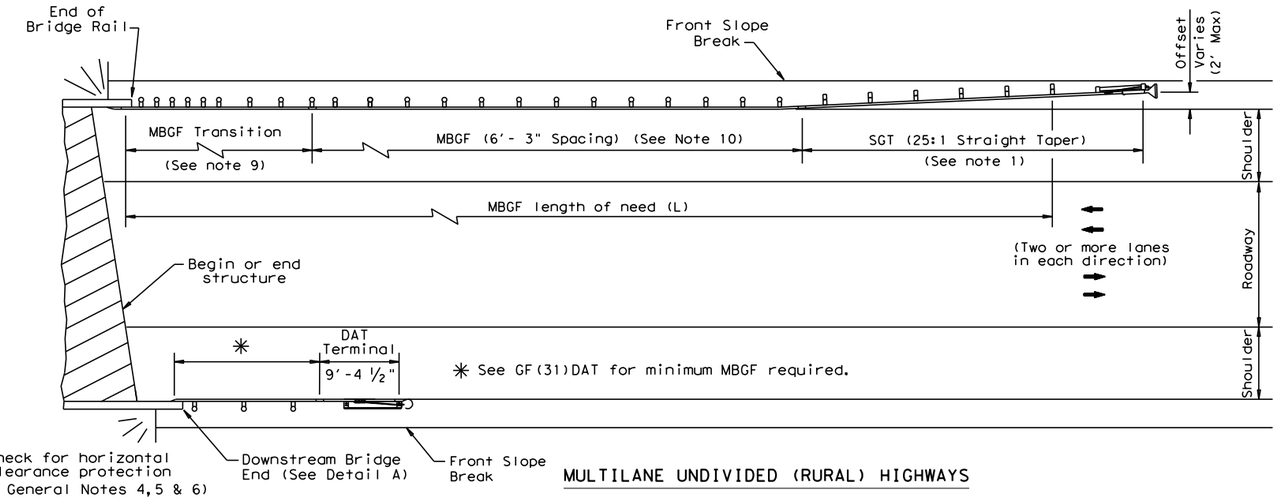
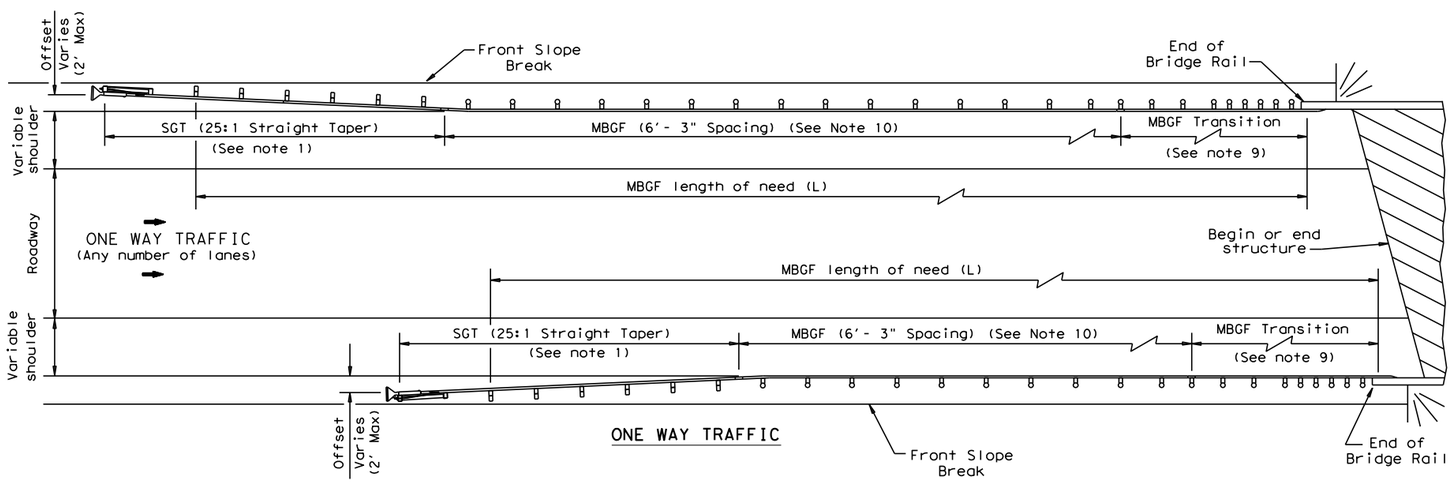


TWO LANE (RURAL) HIGHWAYS

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



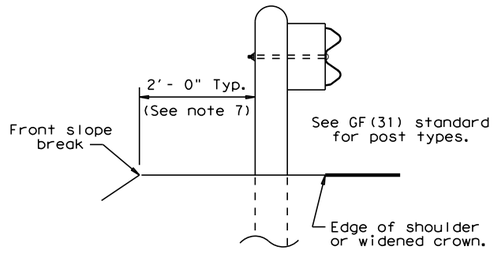
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



ONE WAY TRAFFIC

GENERAL NOTES

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



TYPICAL CROSS SECTION AT MBGF

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

DETAIL A

Showing Downstream Rail Attachment

Texas Department of Transportation

Design Division Standard

BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED APRIL 2014 SEE (MEMO 0414)	0263	05	024	SH 70
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	ABL	FISHER		051

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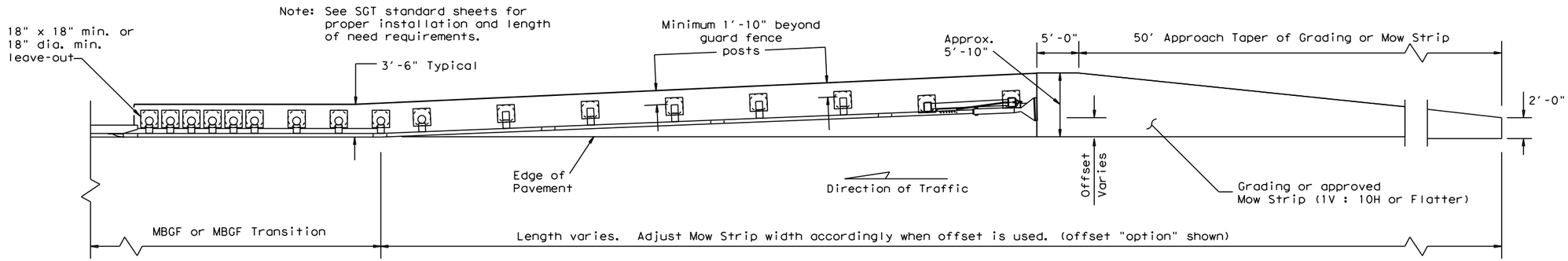
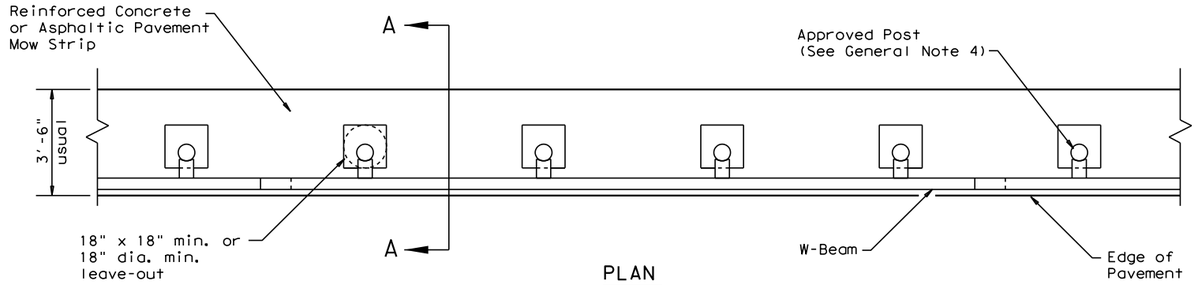


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



PLAN

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

SECTION A-A

Typical

MOW STRIP DETAIL

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

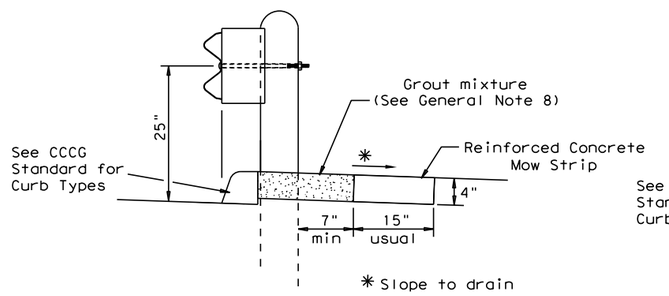
Note: Site Condition(s)

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

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

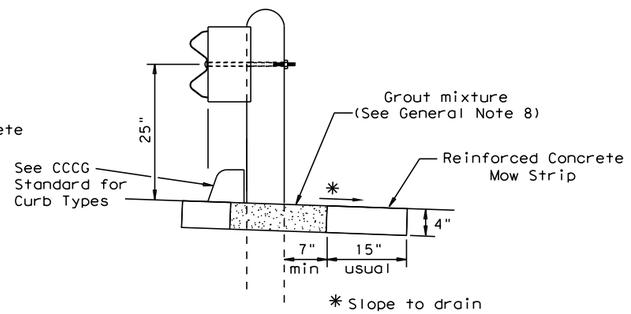
GENERAL NOTES

1. This mow strip design is for use with metal beam guard fence, guard fence transitions, and guard fence end treatments. See applicable GF(31) MBGF or GF(31) Transition Standard sheet for additional information.
2. Mow strips shall be reinforced concrete with (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item. Reinforced concrete shall be placed in accordance with Item 432, "Riprap." The use of the synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Material Producer List (MPL), maintained by TxDOT, Construction Division.
3. The leave-out behind the post shall be a minimum of 7".
4. Only steel (W6 x 8.5 or W6 x 9.0), or 7 ½" Dia. round wood posts are acceptable for use in the mow strip. See GF(31) Standard for additional details.
5. Other curb placement options may be used. Curbs are not considered part of the mow strip and will be paid for under other pertinent bid item.
6. Thickness of the mow strip will be 4".
7. The limits of payment for reinforced concrete will include leave-outs for the posts.
8. The leave-outs shall be filled with a Grout mixture consisting of: 2719 pounds sand, 188 pounds Type 1 or II cement, and 550 pounds of water per cubic yard, with a 28-day compressive strength of approximately 230 psi or less. Provide grout with a consistency that will flow into and completely fill all voids. Due to auger size, larger leave-out dimensions are acceptable from both an impact performance and maintenance repair standpoint (Suggested Maximum leave-out of 20"). Payment for furnishing and placing the grout mixture will be subsidiary to the pay item of riprap mow strip.



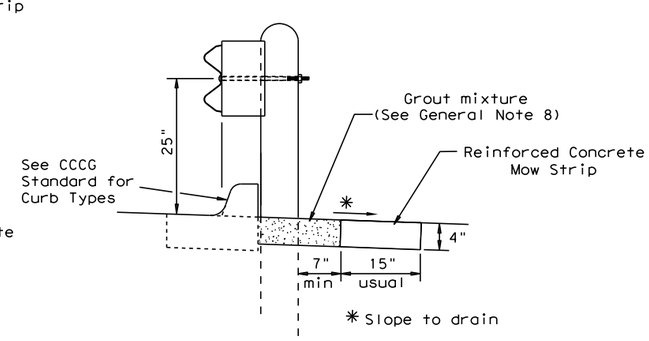
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE (MOW STRIP) TL-3 MASH COMPLIANT

GF(31)MS-19

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	ABL	FISHER		052

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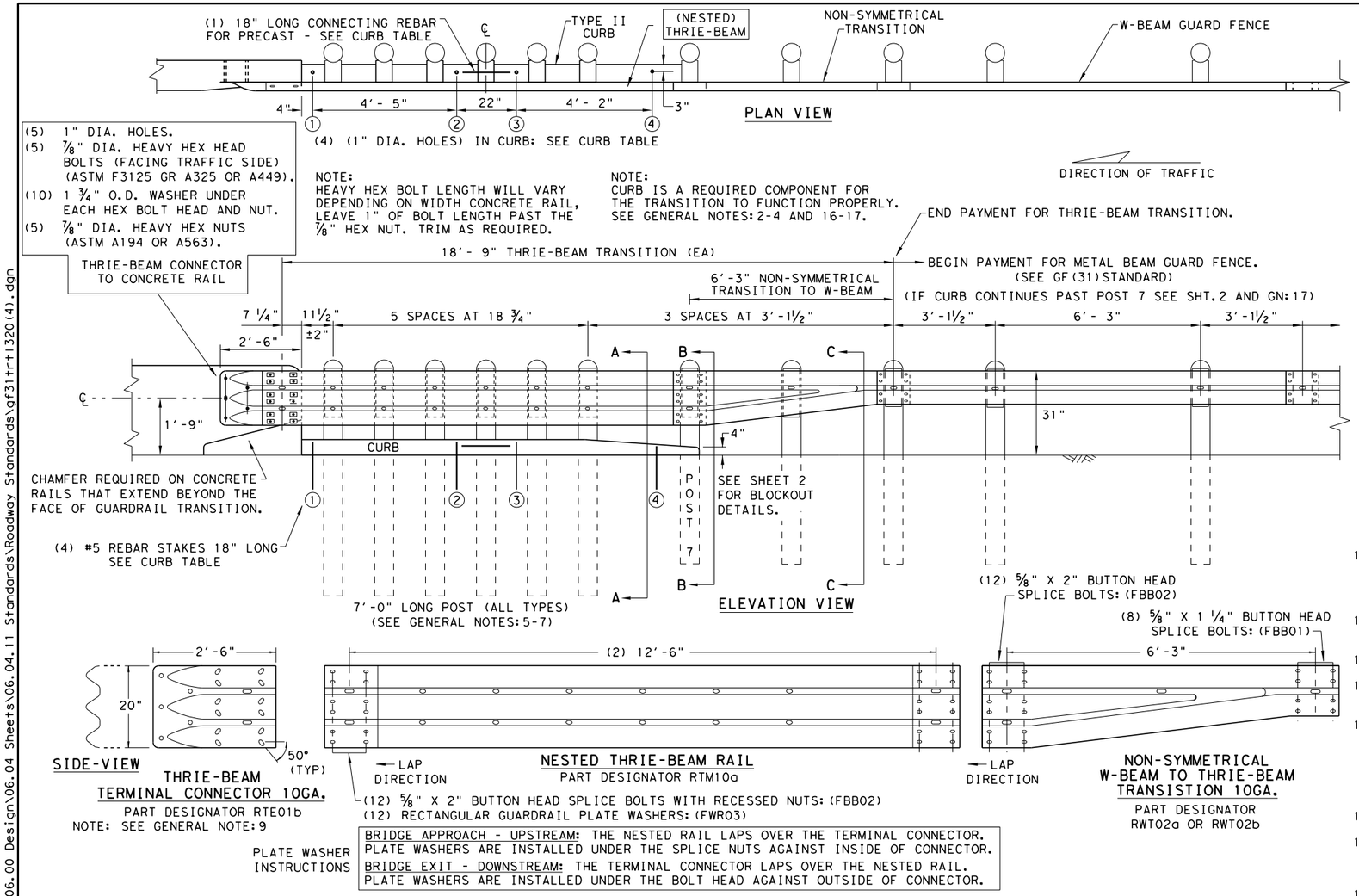
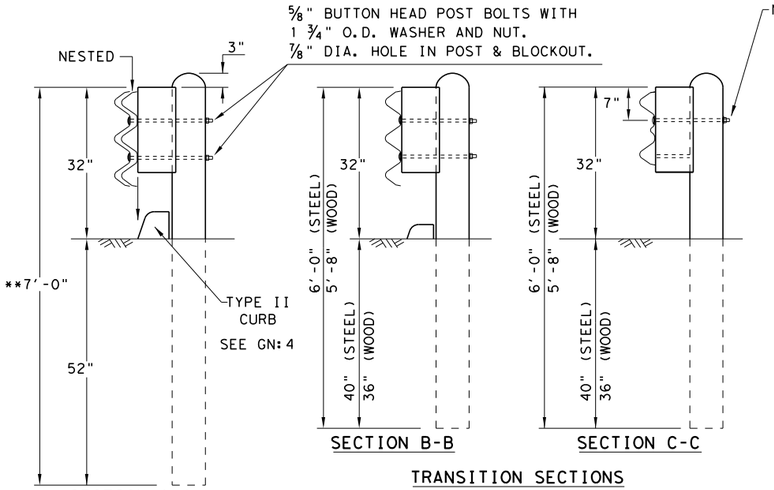
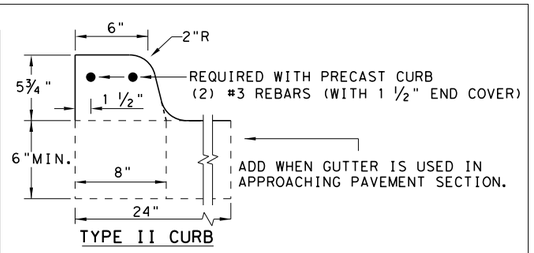


PLATE WASHER INSTRUCTIONS

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



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



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

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

TYPE II CURB DETAILS

GENERAL NOTES

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

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

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

GF(31)TR TL3-20

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	DIST	COUNTY		SHEET NO.
	ABL	FISHER		053

DATE: 4/11/2022
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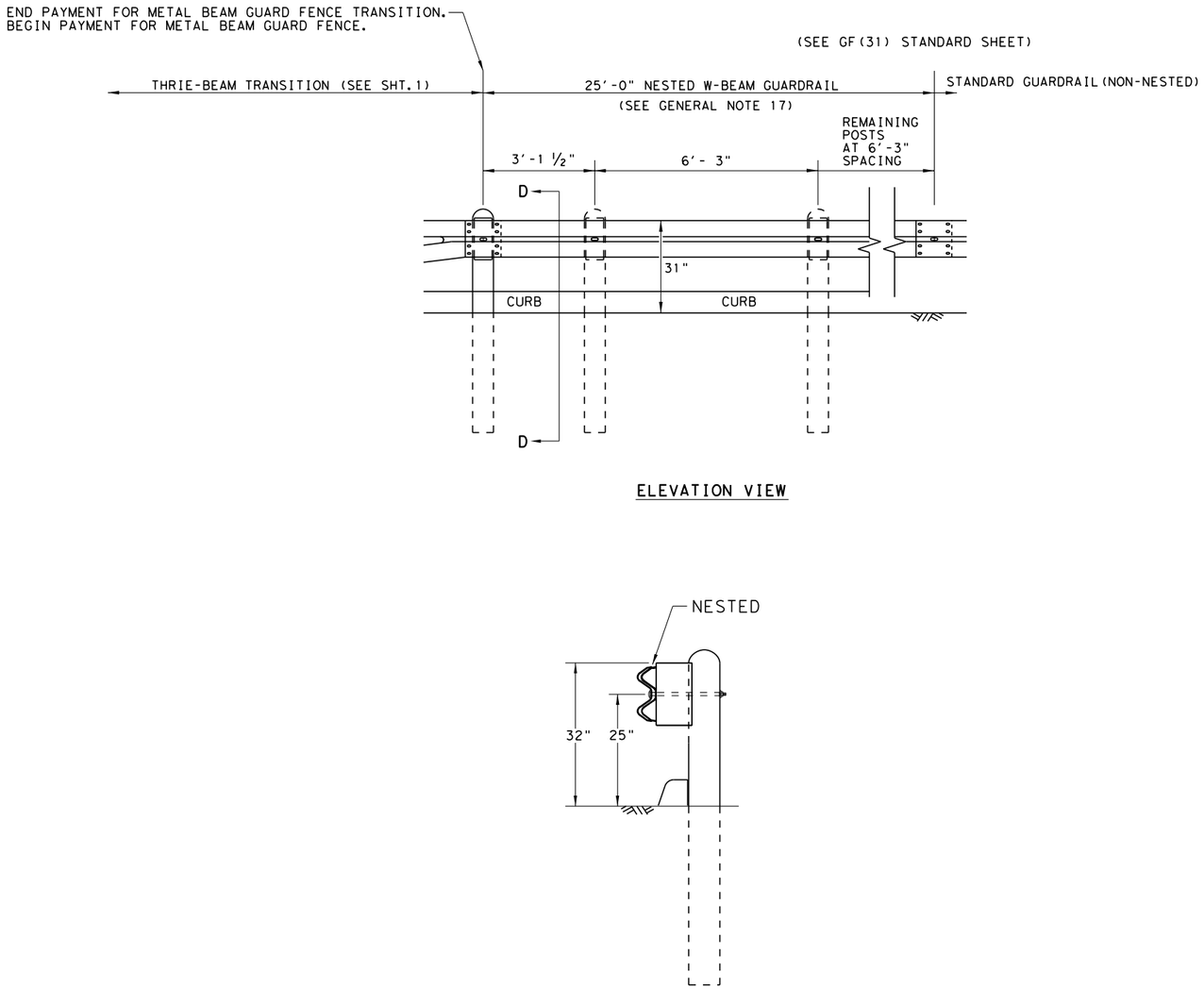
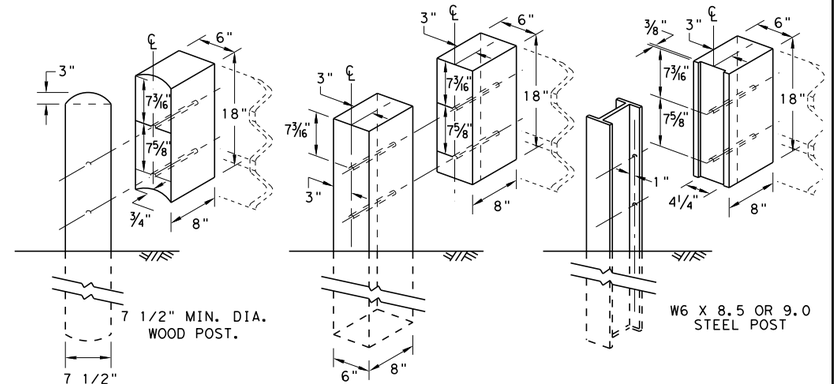
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW

SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation — Design Division Standard

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

GF(31)TR TL3-20

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©TxDOT: NOVEMBER 2020	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0263	05	024		SH 70	
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	ABL	FISHER			054	

DATE: 4/11/2022
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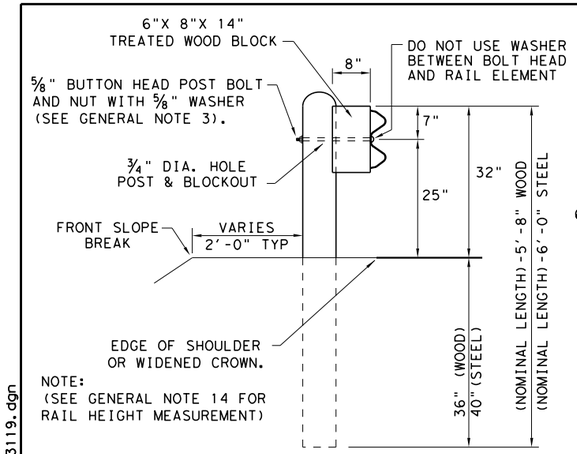
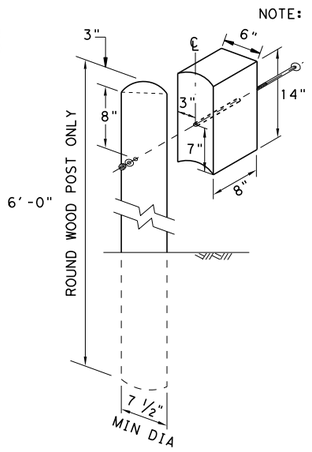
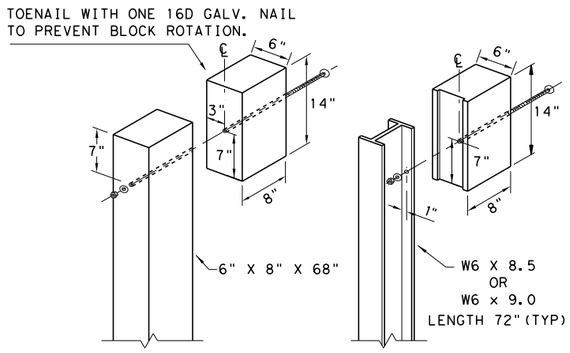


TYPICAL POST PLACEMENT



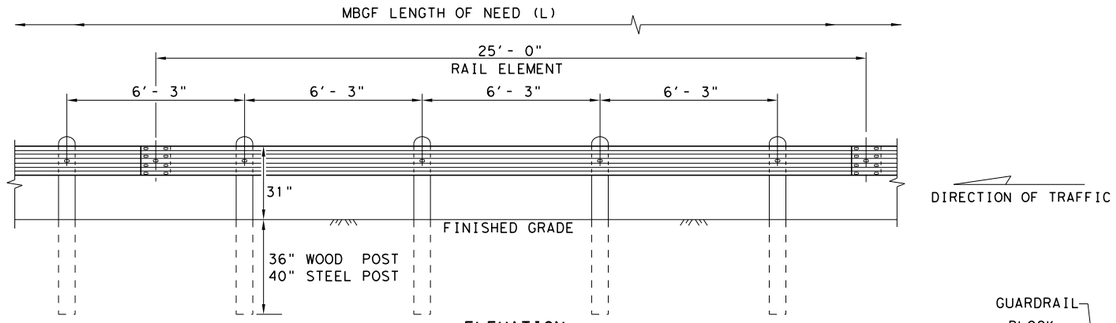
WOOD BLOCK TO
ROUND WOOD POST



WOOD BLOCK TO
RECTANGULAR WOOD POST

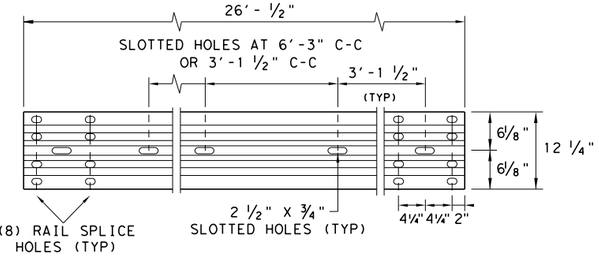
ROUTED WOOD BLOCK
TO I-BEAM STEEL POST

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



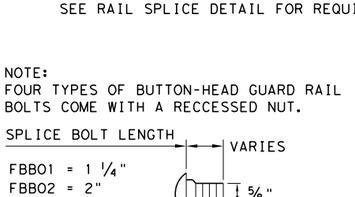
ELEVATION
MID-SPAN RAIL SPLICE

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



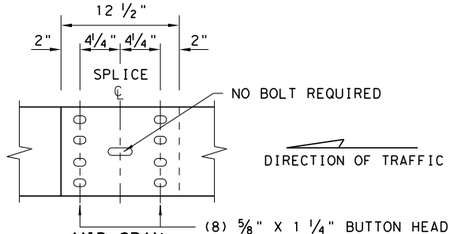
ELEVATION 25'- 0"(NOM.) W-BEAM SECTION

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



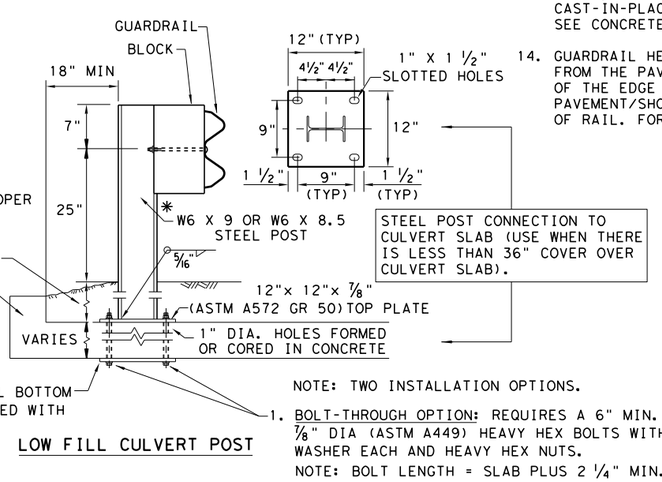
BUTTON HEAD BOLT

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



MID-SPAN
RAIL SPLICE DETAIL

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



LOW FILL CULVERT POST

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

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

NOTE: TWO INSTALLATION OPTIONS.

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

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

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

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

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

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

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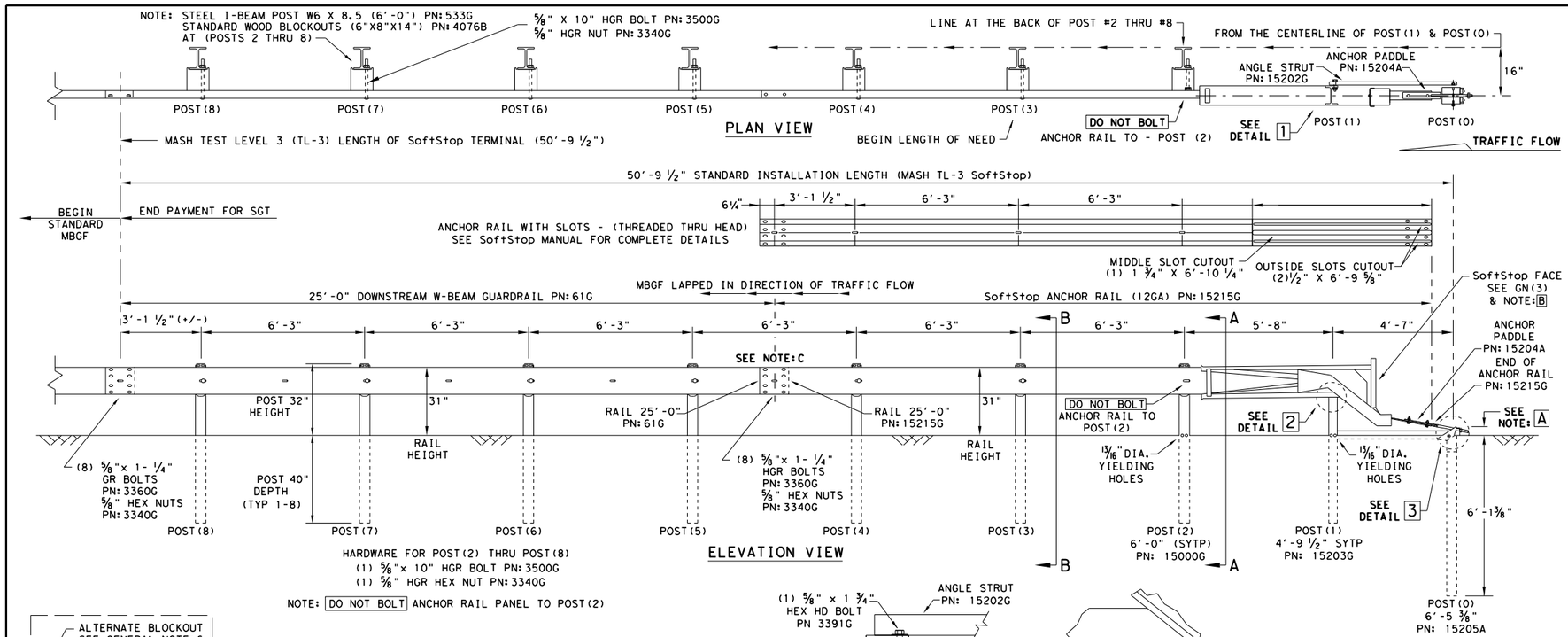

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP	
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	ABL	FISHER		056	

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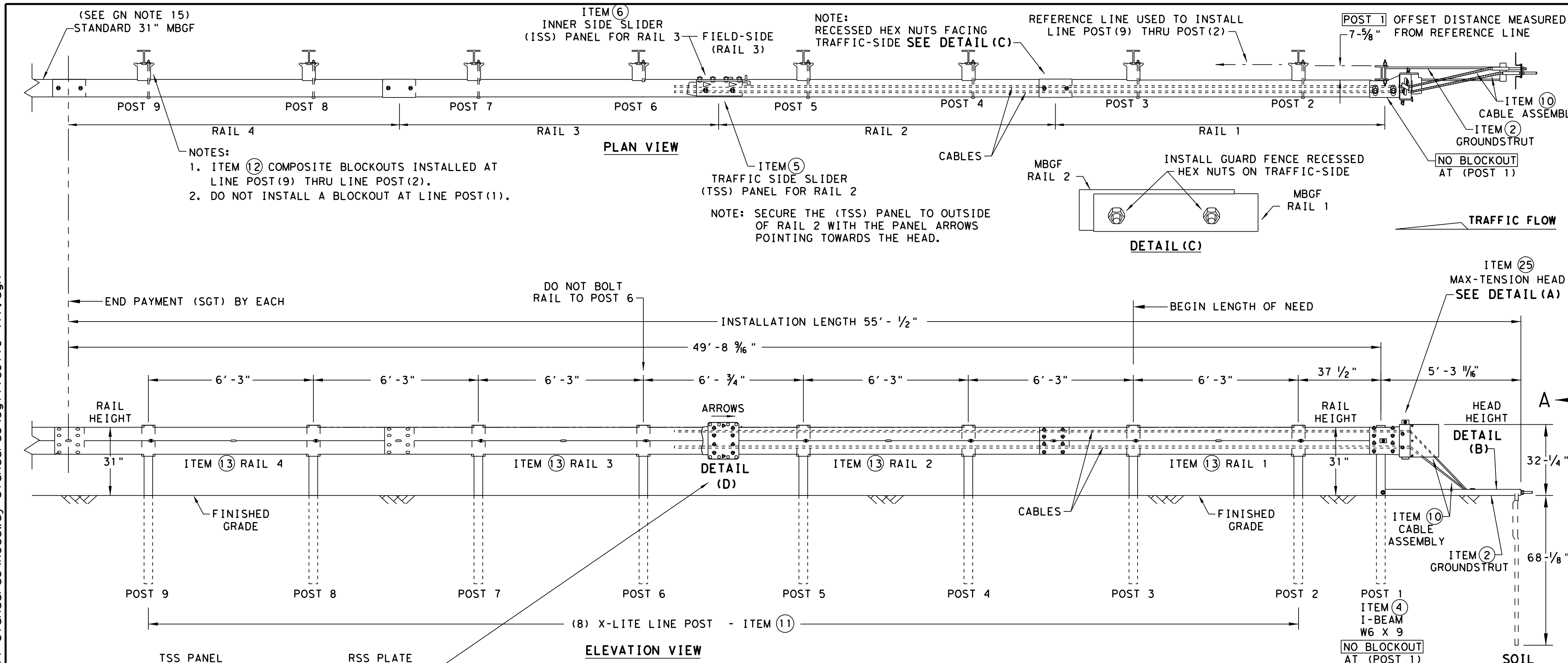
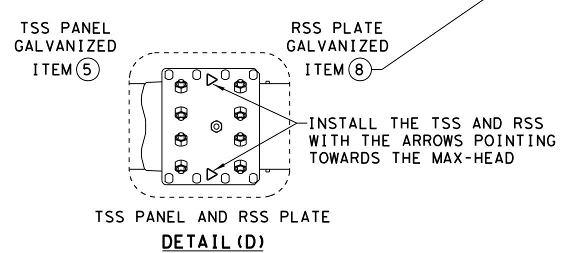
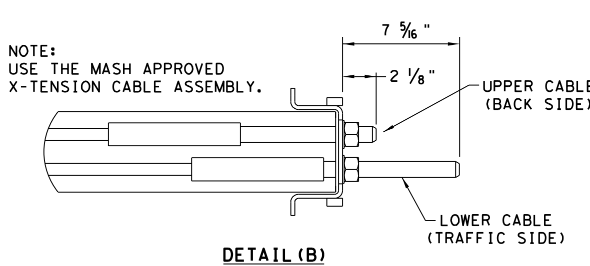
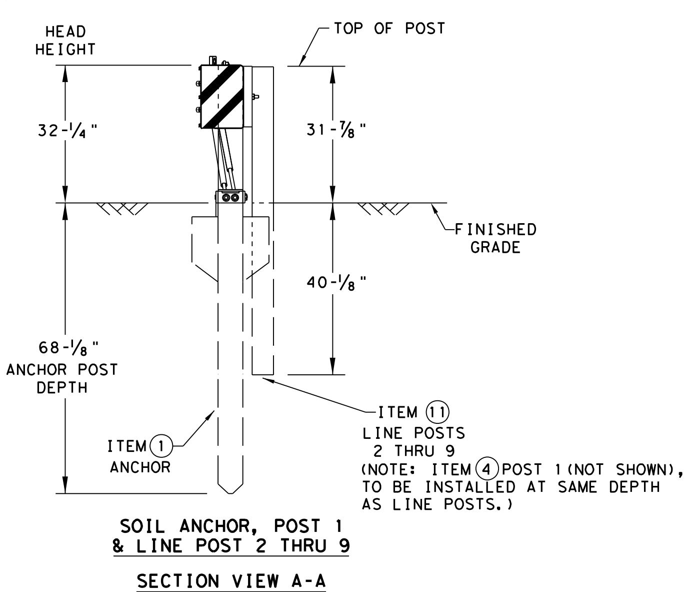
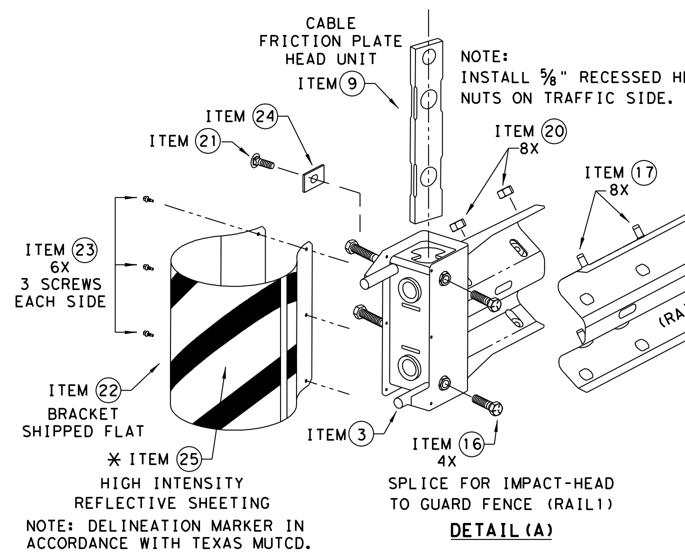










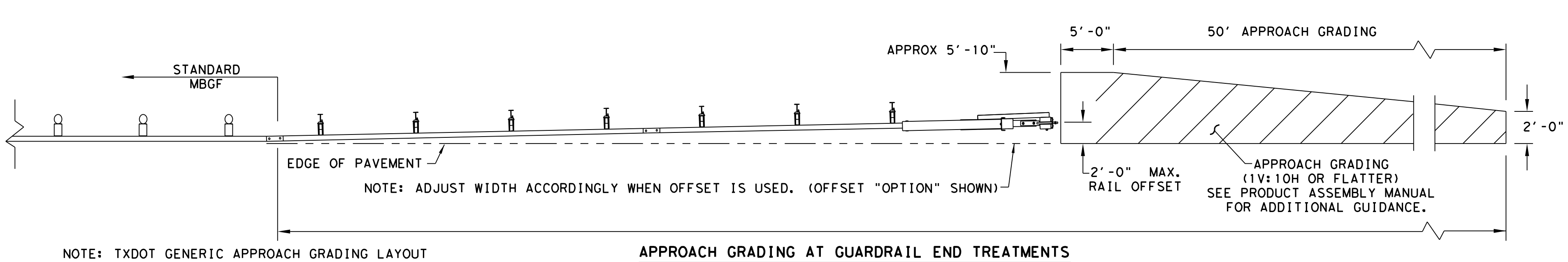
GENERAL NOTES

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

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

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

Texas Department of Transportation — Design Division Standard

MAX-TENSION END TERMINAL MASH - TL-3

SGT(11S)31-18

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	ABL		FISHER	057

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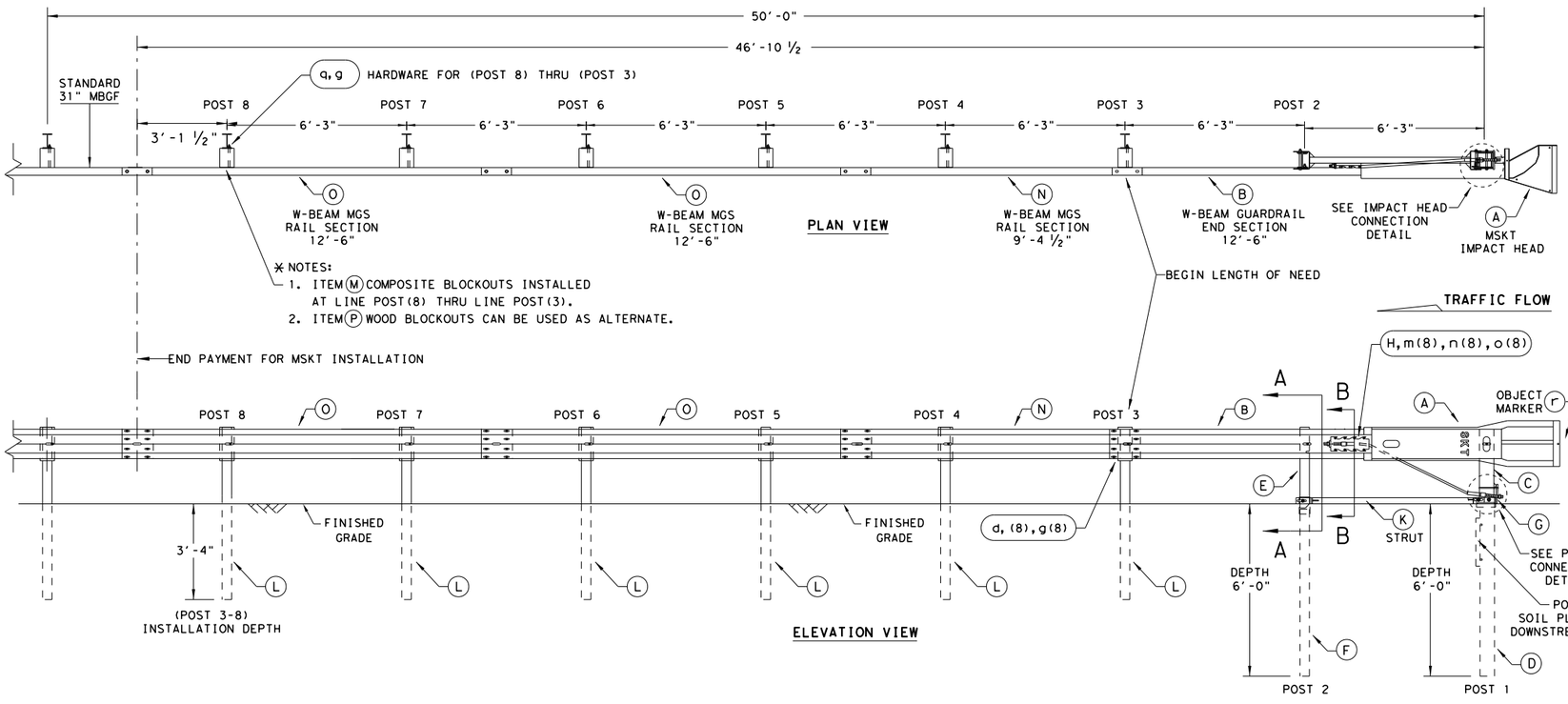
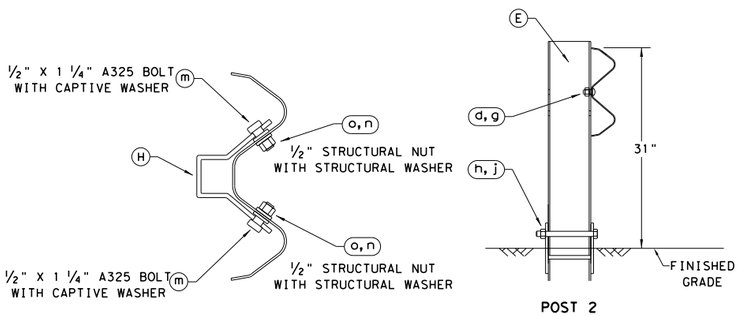
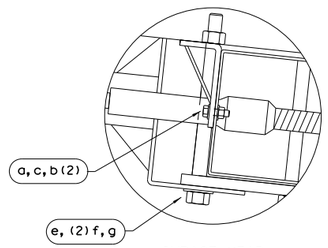
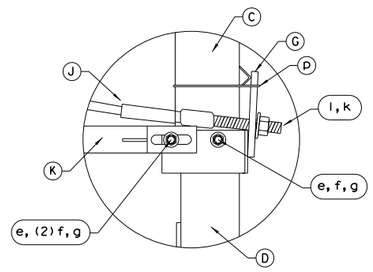
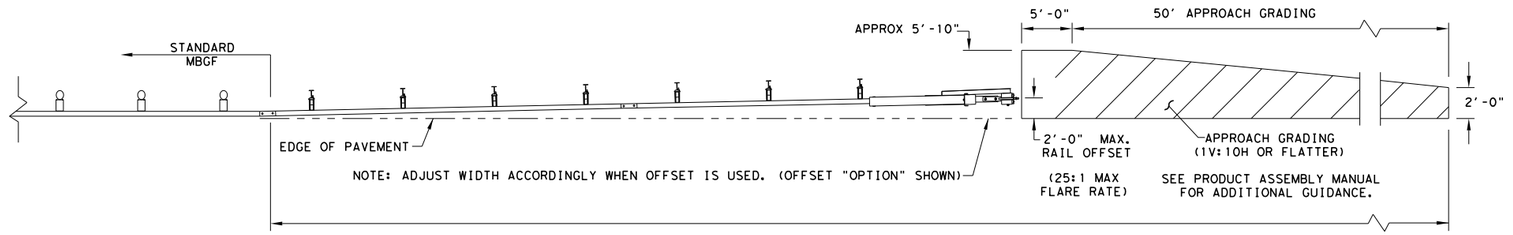


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.









APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

GENERAL NOTES

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

SEE NOTES: ✳

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

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

Texas Department of Transportation

Design Division Standard

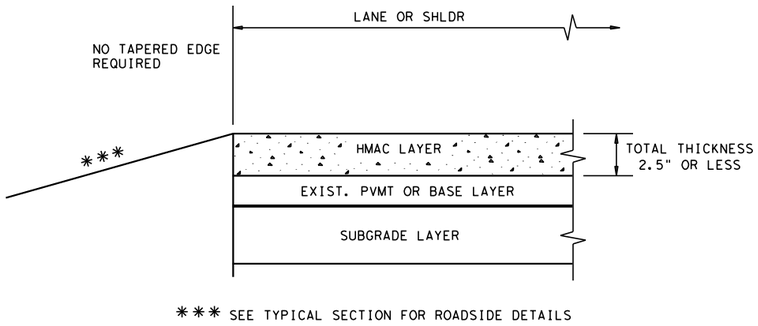
SINGLE GUARDRAIL TERMINAL

MSKT-MASH-TL-3

SGT(12S)31-18

FILE: sgt12s3118.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CL	
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0263	05	024	SH 70	
	DIST	COUNTY		SHEET NO.	
	ABL	FISHER		058	

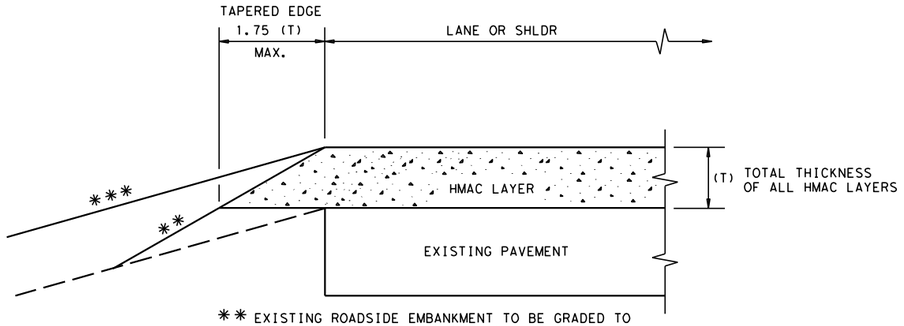
DATE: 4/11/2022
FILE: \\PUSSCSHRFIL01\J-Jobs\2138C TxDOT SH70 Plum Creek ABL\06.00 Design\06.04 Sheets\06.04.11 Standards\Roadway Standards\tehmac11 (1).dgn



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 1

THIN HMAC SURFACES OR HMAC OVERLAY
WITH THICKNESS OF 2.5" OR LESS



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

*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

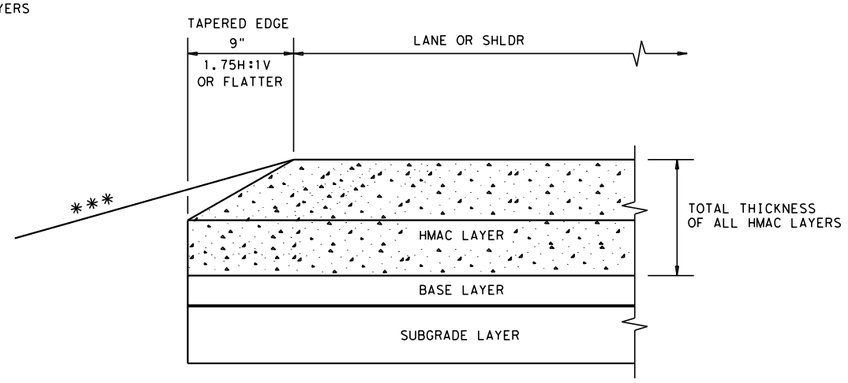
CONDITION - 2

OVERLAY OF EXISTING PAVEMENT
HMAC THICKNESS 2.5" TO 5"

*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 3

NEW OR RECONSTRUCTED PAVEMENT
HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 4

NEW OR RECONSTRUCTED PAVEMENT
HMAC THICKNESS 5" OR GREATER

(NOT TO SCALE)

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

TAPERED EDGE DETAILS
HMAC PAVEMENT

TE(HMAC)-11

FILE: tehmac11.dgn	DN: TxDOT	CK: RL	DW: KB	CK:
© TxDOT January 2011	CONT	SECT	JOB	HIGHWAY
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	ABL	FISHER		059

DATE: 4/11/2022 1:48:08 PM
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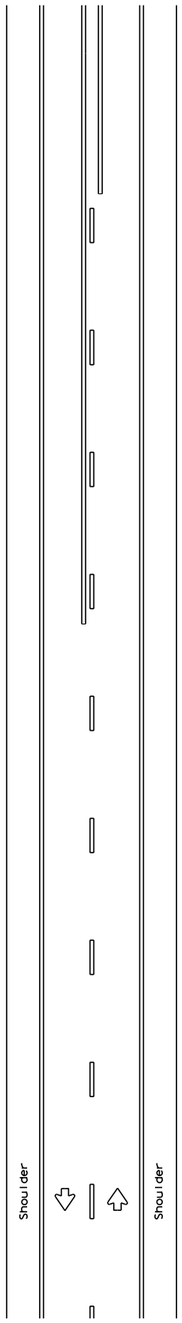
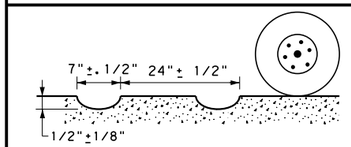
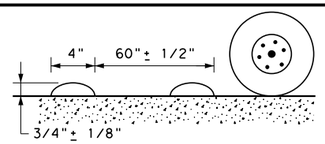


TWO LANE TWO-WAY ROADWAYS

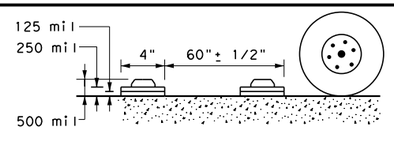
CENTERLINE RUMBLE STRIPS



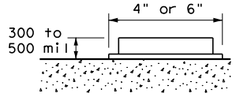
MILLED RUMBLE STRIPS



RAISED TRAFFIC BUTTONS

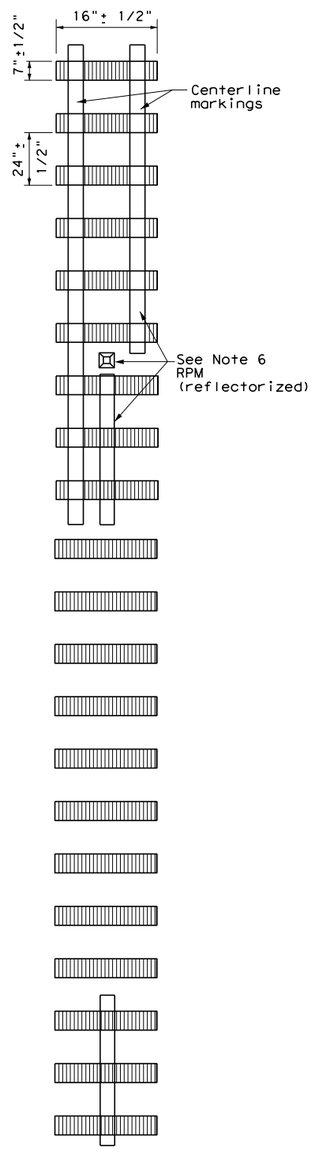


PREFORMED THERMOPLASTIC STRIPS



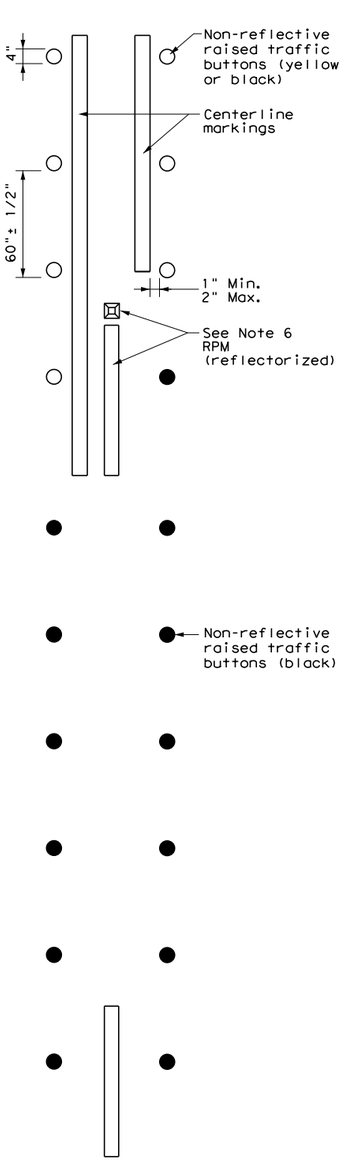
PROFILE MARKINGS

PROFILE VIEW



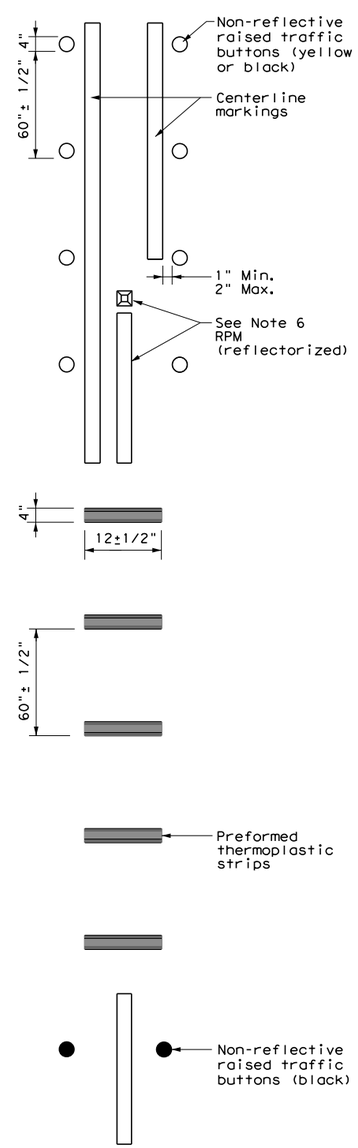
PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS



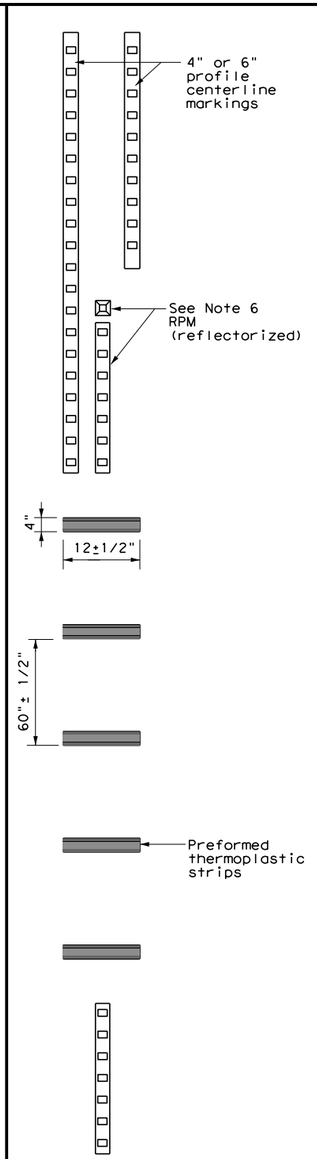
PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS



PLAN VIEW
OPTION 3

RAISED CENTERLINE RUMBLE STRIPS AND PREFORMED THERMOPLASTIC STRIPS



PLAN VIEW
OPTION 4

PROFILE CENTERLINE MARKINGS AND PREFORMED THERMOPLASTIC STRIPS

GENERAL NOTES

1. This standard sheet provides guidelines for installing centerline rumble strips on two-lane highways with or without shoulders.
2. Centerline and edgeline rumble strips or profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
3. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
4. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Operations Division.
5. Breaks in milled centerline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections and driveways with high usage of large trucks.
6. Use Standard Sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, and dimensions pavement markings and profile markings.
7. Consideration should be given to noise levels when centerline rumble strips are installed near residential areas, schools, churches, etc. A minimum of 3/8 inch depth of milled rumble strip may be considered in these areas.
8. Pavement markings must be applied over milled centerline rumble strips.

WHEN INSTALLING CENTERLINE RUMBLE STRIPS:

9. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per manufacturer's recommendations.
10. When using non-reflective raised traffic buttons as a centerline rumble strip, the button shall be placed adjacent to the pavement marking delineating the centerline. The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
11. The color of the button should be yellow for a continuous no passing roadway. Black buttons should be used in areas where passing is allowed.

WHEN INSTALLING EDGELINE RUMBLE STRIPS WITH OR WITHOUT CENTERLINE RUMBLE STRIPS ON UNDIVIDED HIGHWAYS:

12. See standard sheet RS(4).

Texas Department of Transportation®
Traffic Operations Division Standard

CENTERLINE RUMBLE STRIPS ON TWO LANE TWO-WAY HIGHWAYS

RS(3)-13

FILE: rs(3)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	0263	05	024	SH 70
	DIST	COUNTY		SHEET NO.
	ABL	FISHER		060

DATE: 4/11/2022 1:48:10 PM
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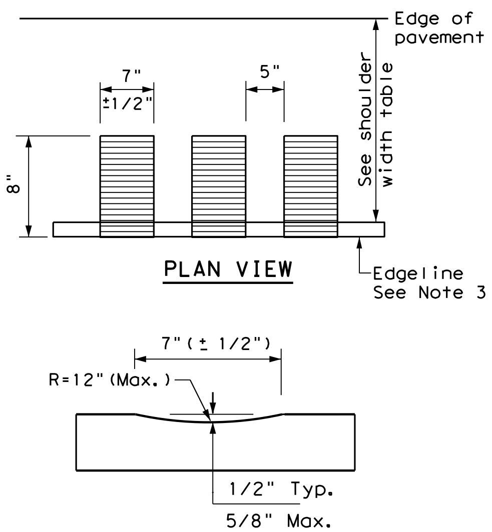
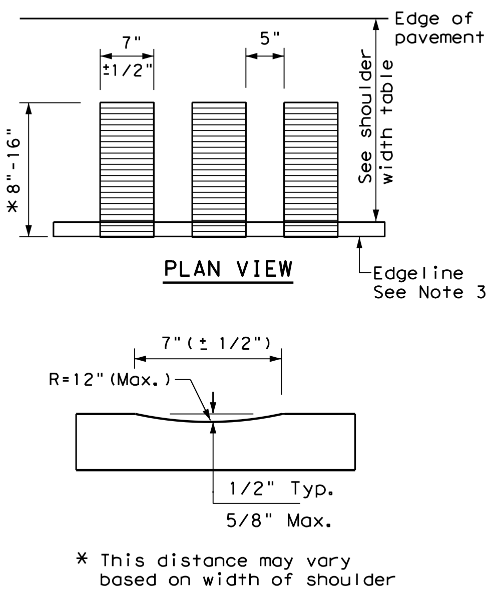


PROFILE VIEW
OPTION 1

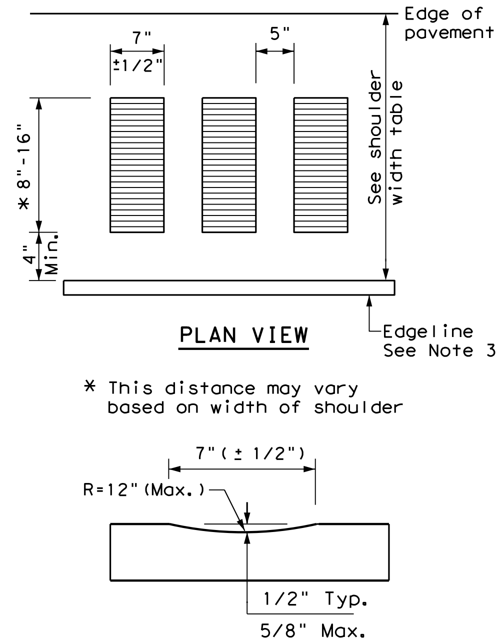
CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



* This distance may vary based on width of shoulder

PROFILE VIEW
OPTION 2

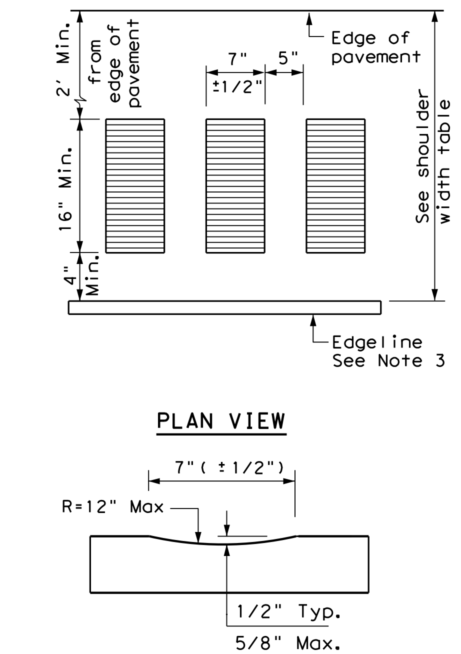
CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



* This distance may vary based on width of shoulder

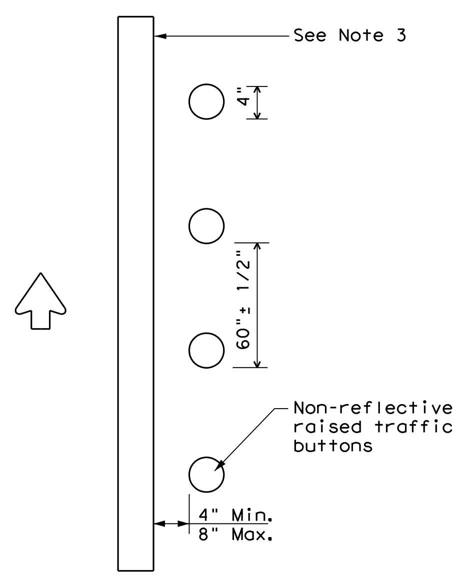
PROFILE VIEW
OPTION 3

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



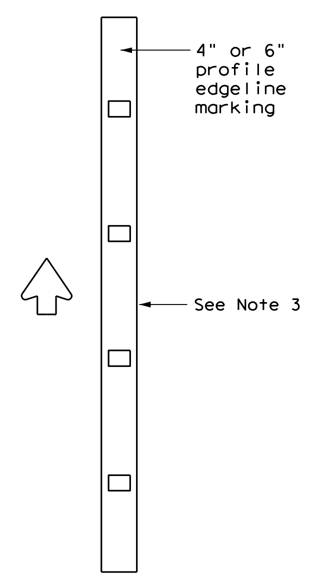
PROFILE VIEW
OPTION 4

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



PLAN VIEW
OPTION 5

RAISED EDGELINE RUMBLE STRIPS



PLAN VIEW
OPTION 6

PROFILE EDGELINE MARKINGS

SHOULDER WIDTH TABLE		
EQUAL TO OR LESS THAN 2 FEET	GREATER THAN 2 FEET LESS THAN 4 FEET	EQUAL TO OR GREATER THAN 4 FEET
Option 1, 5 OR 6	Option 1, 2, 3 5 OR 6	Option 2, 4, 5 OR 6

GENERAL NOTES

1. Rumble strips and profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
2. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
3. Use Standard Sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
4. See the table below for determining what options may be used for edgeline rumble strips.

WHEN INSTALLING MILLED DEPRESSION EDGELINE RUMBLE STRIPS:

5. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Operations Division.
6. Pavement markings can be applied over milled shoulder rumble strips to create an edgeline rumble stripe.
7. Breaks in edgeline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections and driveways with high usage of large trucks when installed on conventional highways.
8. Rumble strips shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
9. Consideration should be given to noise levels when edgeline rumble strips are installed near residential areas, schools, churches, etc. A minimum of 3/8 inches depth of milled rumble strip may be considered in these areas.
10. On roadways with high bicycle activity, consideration should be given before the installation of edgeline rumble strips. Things to consider include size of rumble strips, rumble strip material and location of rumble strips on the shoulder. If the designer determines that gaps are needed in the rumble strips due to bicycle use of the road, then follow the requirement shown in FHWA Technical Advisory T5040.39, or latest version. A detail of the spacing shall be included in the plans.

WHEN INSTALLING RAISED OR PROFILE EDGELINE RUMBLE STRIPS:

11. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per the manufacturer's recommendations.
12. Non-reflective traffic buttons shall be placed adjacent to the pavement marking delineating the edgeline when used as a rumble strip. The color of the button should match the color of the adjacent edgeline marking (white or yellow). The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
13. Non-reflective traffic buttons shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
14. Breaks in edgeline rumble strips using raised traffic buttons shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossing, intersections and driveways with high usage of large trucks when installed on conventional highways.
15. The minimum distance between the edgeline and the buttons should be used if the shoulder is less than 8 feet in width.
16. Raised profile thermoplastic markings used as edgelines may substitute for buttons.

Texas Department of Transportation
Traffic Operations Division Standard

EDGELINE RUMBLE STRIPS ON UNDIVIDED OR TWO LANE HIGHWAYS
RS(4)-13

FILE: rs(4)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2013	CONT	SECT	JOB	HIGHWAY
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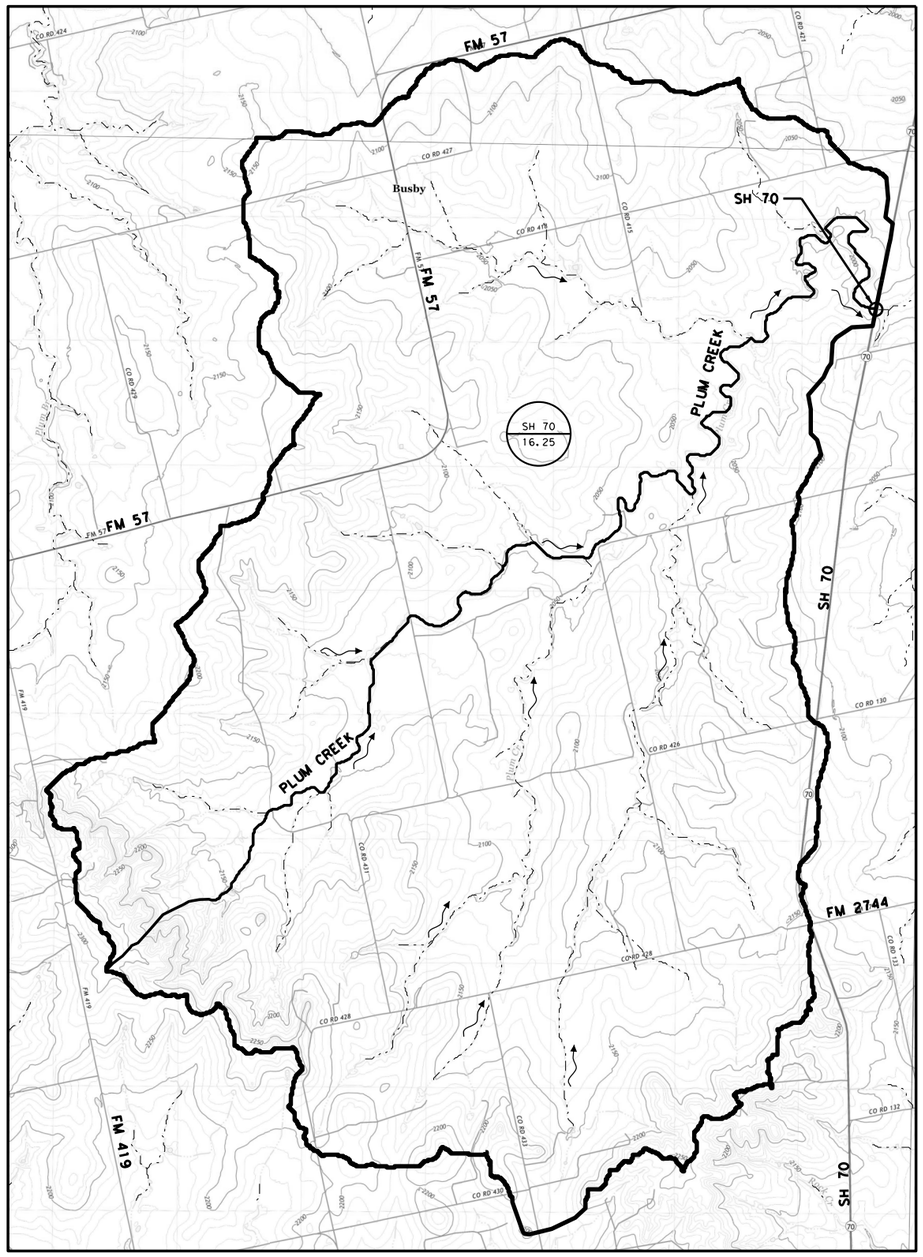
	DIST		COUNTY	SHEET NO.
	ABL		FISHER	061



DRAINAGE AREA PARAMETERS						
CROSSING ROAD	STREAM	AREA (AC)	AREA (SQ.MI.)	IMP (%)	CN	SCS PRF
SH 70	PLUM	10,401	16.25	1%	60	484

TIME OF CONCENTRATION							
OVERLAND			CHANNEL				
LENGTH (FT)	SLOPE (FT/FT)	MANNING'S	LENGTH (FT)	SLOPE (FT/FT)	Tc (MIN)	LAG (MIN)	LAG (HR)
473	0.0791	0.2	44840	0.0072	212	127	2.12

COMPUTED FLOWS									
CROSSING ROAD	STREAM	AREA (AC)	AREA (SQ.MI.)	Q2 (CFS)	Q5 (CFS)	Q10 (CFS)	Q25 (CFS)	Q50 (CFS)	Q100 (CFS)
SH 70	PLUM	10,401	16.25	762	1668	2652	4322	5796	7478

LEGEND

DA-X / 0.0 — DRAINAGE AREA ID / DRAINAGE AREA (SQ MI)

DRAINAGE AREA BOUNDARY

PROP CROSSING

FLOW ARROW

NOTE

1. HYDROLOGY COMPUTATIONS ARE DETAILED IN "SH 70 BRIDGE REPLACEMENT BRIDGE HYDRAULIC REPORT, FISHER COUNTY, TX" DATED APRIL 2022 BY CIVIL SYSTEMS ENGINEERING, INC.
2. RUNOFF COMPUTATIONS PERFORMED USING NRCS HYDROGRAPH METHOD. STANDARD PEAK RATING FACTOR (PRF) OF 484 WAS USED BASED ON COMPARISON WITH OMEGA-EM REGRESSION EQUATION RESULTS.
3. NRCS CURVE NUMBER (CN) LOSS METHOD WAS USED FOR INFILTRATION CALCULATIONS. CN VALUE ADJUSTMENT OF -20 WAS APPLIED WITH A MINIMUM VALUE OF CN= 60, BASED ON TXDOT HYDRAULIC DESIGN MANUAL 2019.
4. TIME OF CONCENTRATION WAS COMPUTED USING KERBY-KIRPICH METHOD.

0′ 2,000′ 4,000′

SCALE: 1"=4,000′

STATE OF TEXAS
KURT E KILLIAN
95742
LICENSED PROFESSIONAL ENGINEER
4/6/2022

Texas Department of Transportation

IEA
18383 PRESTON ROAD
SUITE 500
DALLAS, TEXAS 75252
(214) 884-4253
FIRM REGISTRATION No. F-10161

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

FISHER COUNTY

SH-70 OVER PLUM CREEK

DRAINAGE AREA MAP

SCALE:

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
	SEE COVER SHEET		062
STATE	DISTRICT	COUNTY	
TX	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

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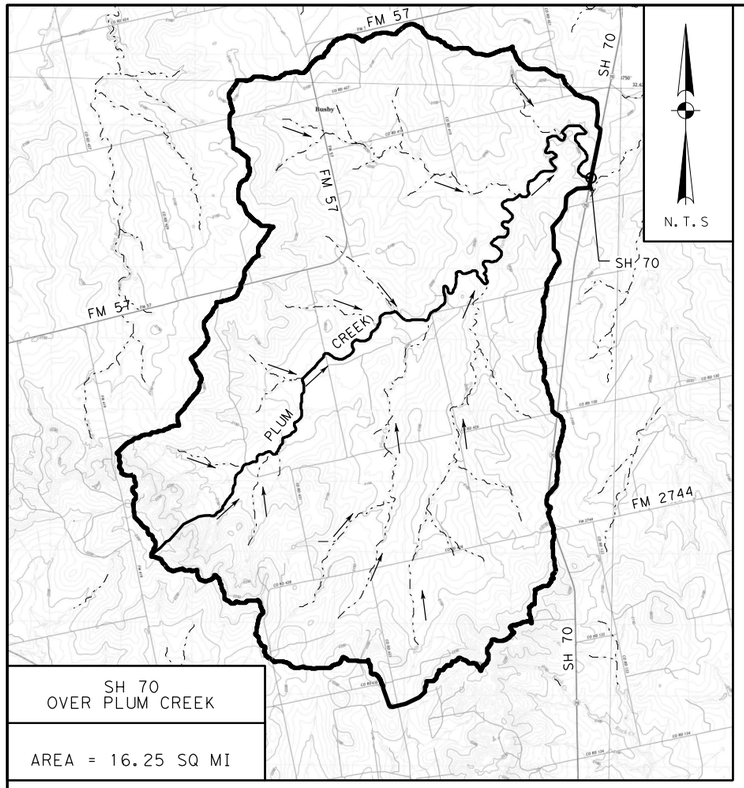


SH 70
OVER PLUM CREEK

AREA = 16.25 SQ MI

HEC-RAS STATION	D/S REACH LENGTH (FT)	FREQUENCY	FLOWS (CFS)	COMPUTED WATER SURFACE ELEVATIONS (NAVD 1988) (FT)			VELOCITIES	
				EXISTING	PROPOSED	DIFFERENCE (PROP-EX)	EXISTING	PROPOSED
1430	338.2	10Y	2652	1990.33	1990.33	0.00	3.1	3.1
		25Y	4322	1991.54	1991.54	0.00	3.8	3.8
		50Y	5796	1992.38	1992.38	0.00	4.3	4.3
		100Y	7478	1993.15	1993.15	0.00	4.9	4.9
1515	85.3	10Y	2652	1990.58	1990.52	-0.06	3.0	3.0
		25Y	4322	1991.83	1991.77	-0.06	3.8	3.7
		50Y	5796	1992.69	1992.63	-0.06	4.3	4.3
		100Y	7478	1993.51	1993.44	-0.07	4.9	4.8
1570	PROPOSED SH 70 BRIDGE							
1617	24.5	10Y	2652	1991.09	1990.96	-0.13	2.8	2.9
		25Y	4322	1992.42	1992.27	-0.15	3.5	3.6
		50Y	5796	1993.36	1993.19	-0.17	4.0	4.1
		100Y	7478	1994.25	1994.05	-0.20	4.5	4.6
1736	119.4	10Y	2652	1991.40	1991.32	-0.08	2.2	2.3
		25Y	4322	1992.82	1992.75	-0.07	2.5	2.5
		50Y	5796	1993.84	1993.75	-0.09	2.7	2.7
		100Y	7478	1994.81	1994.70	-0.11	2.9	2.9
1949	213.5	10Y	2652	1991.71	1991.65	-0.06	2.4	2.5
		25Y	4322	1993.12	1993.05	-0.07	2.6	2.7
		50Y	5796	1994.12	1994.05	-0.07	2.7	2.7
		100Y	7478	1995.10	1995.00	-0.10	2.8	2.9

NOTES:

1. STREAM MODELING DATA PRESENTED IS FROM "SH 70 BRIDGE REPLACEMENT BRIDGE HYDRAULIC REPORT, FISHER COUNTY, TX" DATED APRIL 2022 BY CIVIL SYSTEMS ENGINEERING, INC.
2. PROPOSED BRIDGE IS LOCATED AT PROJECT STA. 534+55 - STA. 545+78.
3. PROPOSED BRIDGE CONSISTS OF A 3-SPAN (75'-70'-75') TX34 PRESTRESSED CONCRETE I-GIRDER BEAM STRUCTURE WITH A TOTAL LENGTH OF 220 FEET.
4. PROPOSED BRIDGE WIDTH IS 42 FEET, NORMAL TO THE STREAM.
5. PROPOSED BRIDGE IS SUPPORTED BY 36-INCH CIRCULAR PIERS.
6. BOUNDARY CONDITION SET TO NORMAL DEPTH SLOPE = 0.0029 FT/FT.
7. ELEVATIONS PRESENTED ARE REFERENCED TO NAVD88 DATUM.
8. BRIDGE DESIGNED FOR 50YR STORM EVENT.
9. ROADWAY OVERTOPPED DURING EVENTS GREATER THAN 100YR STORM EVENT.
10. BRIDGE REFERENCED NBI# 08-077-0-0263-05-320

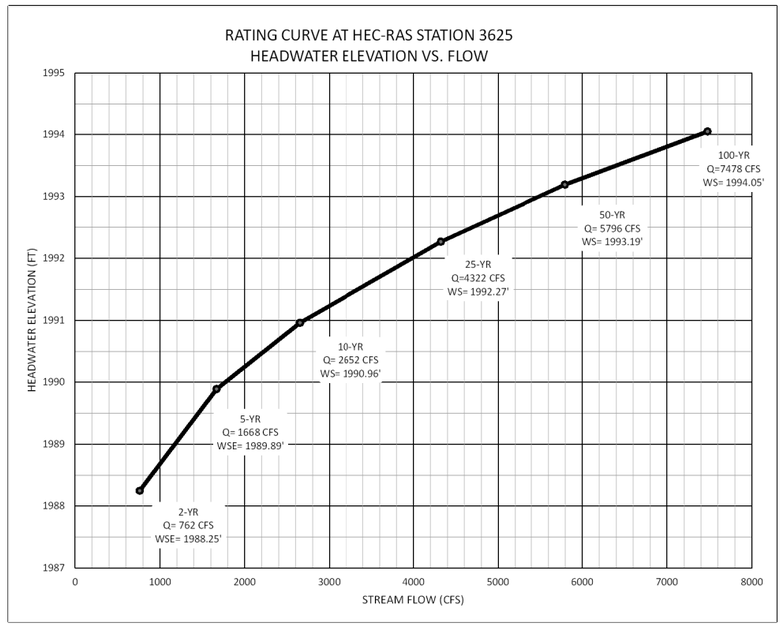
FEMA:

PROJECT IS LOCATED WITHIN THE UNINCORPORATED AREAS OF FISHER COUNTY, A NON-PARTICIPATING COMMUNITY WITHIN THE NATIONAL FLOOD INSURANCE PROGRAM.

LOCAL COMMUNITY NOTIFICATION WAS PERFORMED ON 4/6/2022.

HYDROLOGIC METHOD:

FLOWS WERE COMPUTED WITHIN HEC-HMS(V.4.2), FILENAME: PLUM.HMS.
DRAINAGE AREAS WERE DELINEATED USING LIDAR AND USGS DEM TOPOGRAPHY AND AERIALS WITHIN ARCGIS v10.7 USING ARCHYDRO TOOLS.
RAINFALL WAS TAKEN FROM NOAA ATLAS 14 "PRECIPIRATION-FREQUENCY ATLAS OF THE UNITED STATES", VOLUME 11, VERSION 2.3-TEXAS, DATED SEPTEMBER 27, 2018
FLOWS COMPUTED USING NRCS HYDROGRAPH METHOD.
UNIT HYDROGRAPH PEAK RATING FACTOR (PRF) WAS SET TO 484.
TIME OF CONCENTRATION WAS COMPUTED USING KERBY-KERPICH METHOD.
SOIL INFILTRATION COMPUTATION USED NRCS CN LOSS METHOD.



STATE OF TEXAS
KURT E KILLIAN
95742
LICENSED PROFESSIONAL ENGINEER
4/6/2022

Texas Department of Transportation

IEA
18383 PRESTON ROAD
SUITE 500
DALLAS, TEXAS 75252
(214) 884-4253
FIRM REGISTRATION No. F-10161

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

HYDRAULIC DATA SHEET

SH 70
OVER PLUM CREEK

SCALE:

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
	SEE COVER SHEET		063
STATE	DISTRICT	COUNTY	
TX	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

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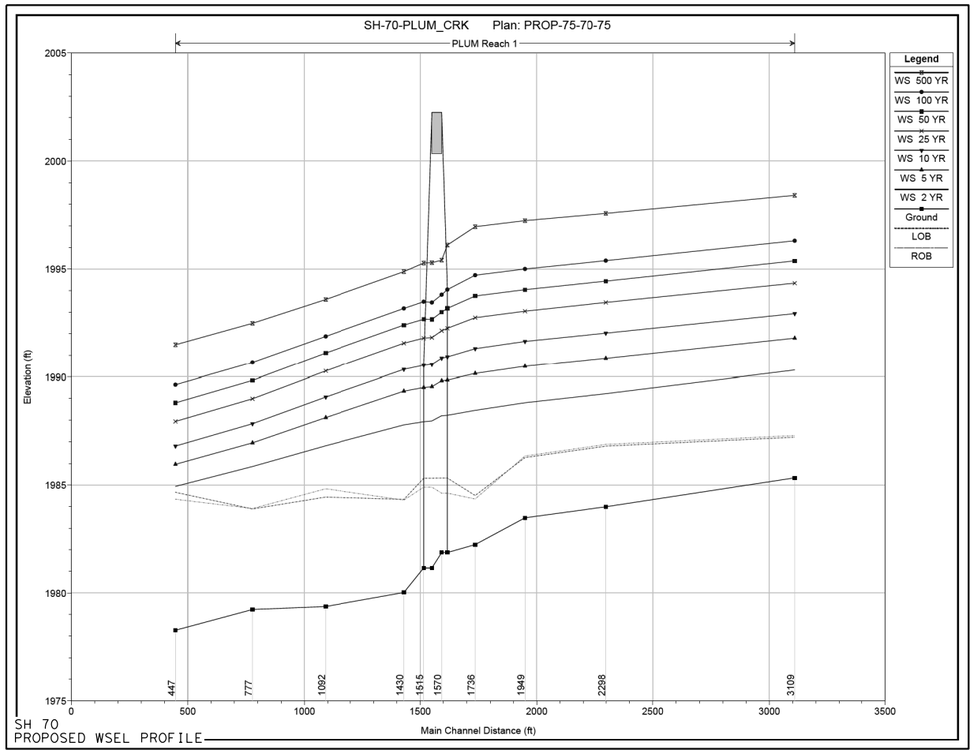
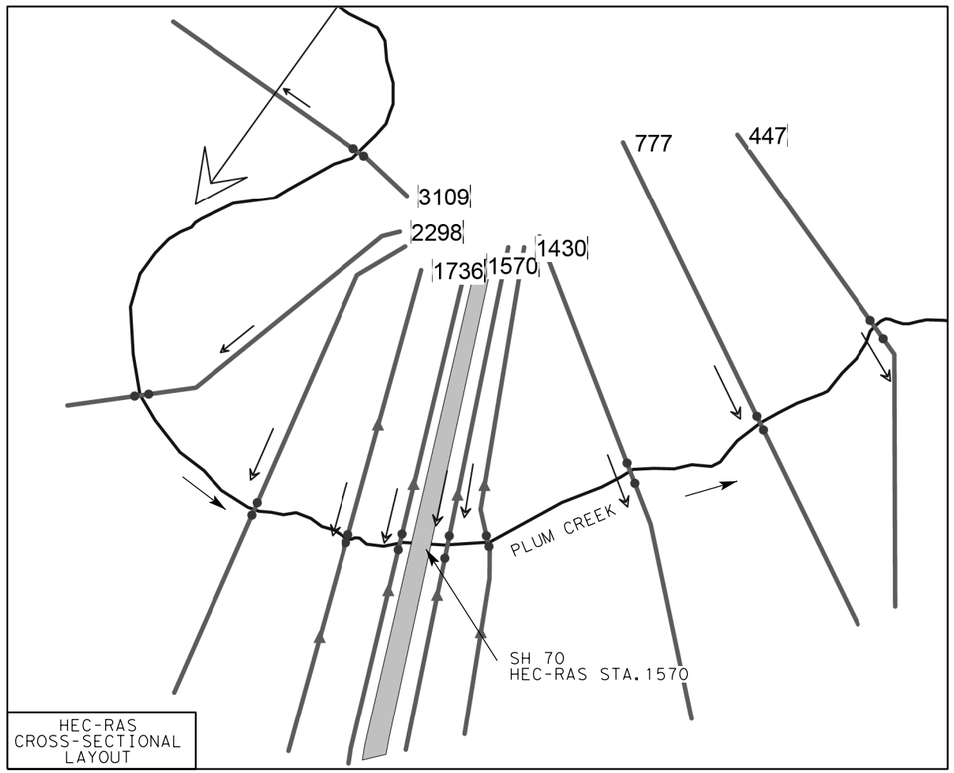
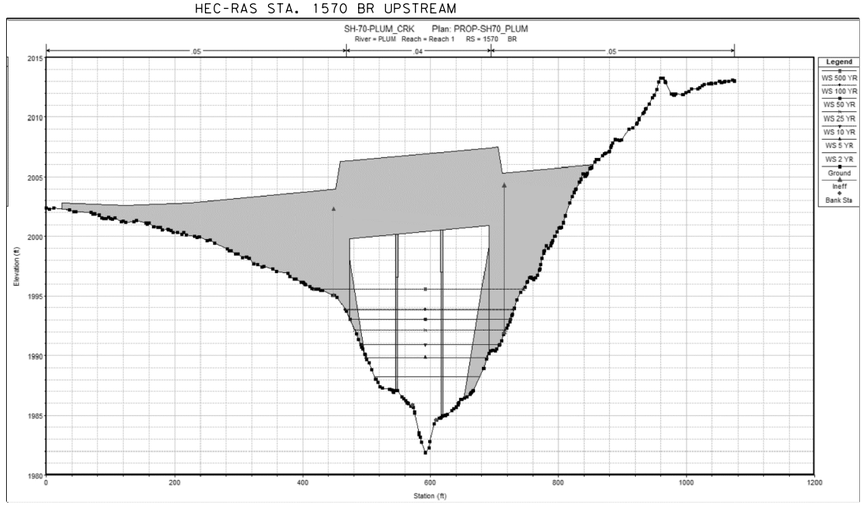


SH 70
PROPOSED WSEL PROFILE

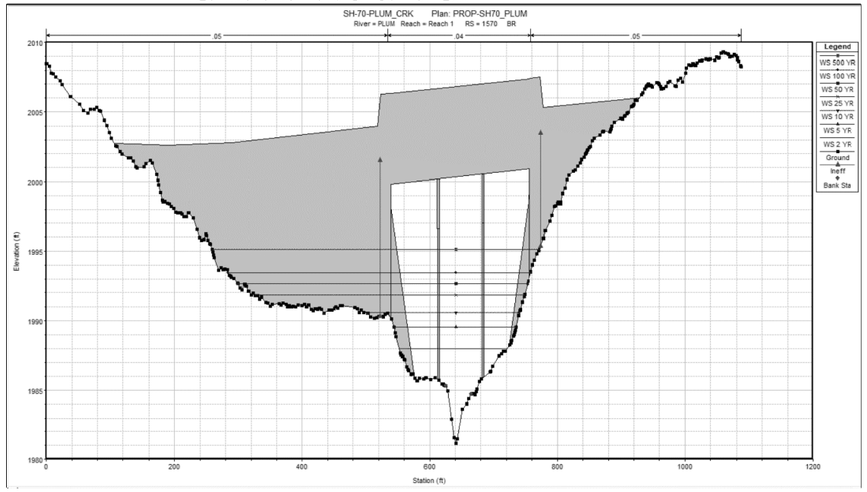


HEC-RAS
CROSS-SECTIONAL
LAYOUT

HEC-RAS STA. 1570 BR UPSTREAM



HEC-RAS STA. 1570 BR DOWNSTREAM



HYDRAULIC METHOD:

WATER SURFACE ELEVATION RESULTS FROM HYDRAULIC MODELING ANALYSIS PRESENTED WITHIN "SH 70 BRIDGE REPLACEMENT BRIDGE HYDRAULIC REPORT" DATED APRIL 2022 BY CIVIL SYSTEMS ENGINEERING, INC.

WATER SURFACE ELEVATIONS COMPUTED USING HEC-RAS (V.5.0.7). HEC-RAS MODEL WAS GENERATED FROM PROJECT FIELD SURVEY, LIDAR TOPO, AND PRELIMINARY BRIDGE LAYOUTS.

HEC-RAS FILENAME: SH-70-PLUM_CRK.PRJ.
EXISTING (PRE-PROJECT) CONDITION WATER SURFACE ELEVATIONS ARE FROM:
- PLAN: "EXIST", "*.P01"
- GEOMETRY: "PLUM-EXIST", "*.G01"
- FLOW: "PLUM-EXIST", "*.F01"

PROPOSED (POST PROJECT) CONDITION WATER SURFACE ELEVATIONS ARE FROM:
- PLAN: "PROP-75-70-75", "*.P04"
- GEOMETRY: "PROP-75-70-75", "*.G04"
- FLOW: "PLUM-EXIST", "*.F01"

STREAM MODELED WITH REPRESENTATIVE MANNING'S VALUES OF:
- CHANNEL AREA: 0.045 - 0.06
- OVERBANK AREA: 0.04 - 0.08

0' 5' 10' 20'
SCALE: 1"=20'

STATE OF TEXAS
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LICENSED
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4/6/2022

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TPBE REGISTRATION NO. F-5246

HYDRAULIC DATA SHEET

SH 70
OVER PLUM CREEK

SCALE: SHEET 2 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
	SEE COVER SHEET		064
STATE	DISTRICT	COUNTY	
TX	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

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HEC-RAS HEC-RAS 5.0.7 March 2019
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X     X
X     X  X             X      X   X    X    X    X
XXXXXXX  XXXX         X      XXX XXXX   XXXXXX    XXXX
X     X  X            X          X  X   X    X       X
X     X  X        X    X          X   X  X    X       X
X     X  XXXXXX    XXXX          X    X X    X   XXXXX
```

PROJECT DATA
Project Title: SH-70-PLUM_CRK
Project File : SH-70-PLUM_CRK.prj

Project in English units

Project Description:
SH-70 OVER PLUM CREEK

PLAN DATA

Plan Title: PROP-75-70-75
Plan File : \RAS\SH-70-PLUM_CRK.p04

Geometry Title: PROP-75-70-75
Geometry File : \RAS\SH-70-PLUM_CRK.g04

Flow Title : PLUM-EXIST
Flow File : \RAS\SH-70-PLUM_CRK.f01

Plan Summary Information:

Number of:	Cross Sections =	10	Multiple Openings =	0
	Culverts =	0	Inline Structures =	0
	Bridges =	1	Lateral Structures =	0

Computational Information

Water surface calculation tolerance	= 0.01
Critical depth calculation tolerance	= 0.01
Maximum number of iterations	= 20
Maximum difference tolerance	= 0.3
Flow tolerance factor	= 0.001

Computation Options

Critical depth computed only where necessary	
Conveyance Calculation Method:	At breaks in n values only
Friction Slope Method:	Average Conveyance
Computational Flow Regime:	Subcritical Flow

FLOW DATA

Flow Title: PLUM-EXIST
Flow File : \RAS\SH-70-PLUM_CRK.f01

Flow Data (cfs)

River	Reach	RS	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR	500 YR
PLUM	Reach 1	3109	762	1668	2652	4322	5796	7478	12152

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
PLUM	Reach 1	2 YR	Normal S = 0.0017	Normal S = 0.0029
PLUM	Reach 1	5 YR	Normal S = 0.0017	Normal S = 0.0029
PLUM	Reach 1	10 YR	Normal S = 0.0017	Normal S = 0.0029
PLUM	Reach 1	25 YR	Normal S = 0.0017	Normal S = 0.0029
PLUM	Reach 1	50 YR	Normal S = 0.0017	Normal S = 0.0029
PLUM	Reach 1	100 YR	Normal S = 0.0017	Normal S = 0.0029
PLUM	Reach 1	500 YR	Normal S = 0.0017	Normal S = 0.0029

BRIDGE

RIVER: PLUM
REACH: Reach 1 RS: 1570

BRIDGE OUTPUT Profile #50 YR

			Inside BR US	Inside BR DS
E.G. US. (ft)	1993.57	Element		
W.S. US. (ft)	1993.19	E.G. Elev (ft)	1993.51	1993.14
Q Total (cfs)	5796.00	W.S. Elev (ft)	1993.04	1992.67
Q Bridge (cfs)	5796.00	Crit W.S. (ft)	1989.76	1989.39
Q Weir (cfs)		Max Chl Dpth (ft)	11.17	11.50
Weir Sta Lft (ft)		Vel Total (ft/s)	5.08	5.13
Weir Sta Rgt (ft)		Flow Area (sq ft)	1141.25	1129.32
Weir Submerg		Froude # Chl	0.39	0.29
Weir Max Depth (ft)		Specif Force (cu ft)	5199.44	5117.73
Min El Weir Flow (ft)	2002.61	Hydr Depth (ft)	6.44	6.46
Min El Prs (ft)	2000.90	W.P. Total (ft)	207.90	210.06
Delta EG (ft)	0.48	Conv. Total (cfs)	140713.7	138676.4
Delta WS (ft)	0.56	Top Width (ft)	177.08	174.85
BR Open Area (sq ft)	2586.21	Frctn Loss (ft)		
BR Open Vel (ft/s)	5.13	C & E Loss (ft)		
BR Sluice Coef		Shear Total (lb/sq ft)	0.58	0.59
BR Sel Method	Momentum	Power Total (lb/ft s)	2.95	3.01

Note: Multiple critical depths were found at this location.
The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #100 YR

			Inside BR US	Inside BR DS
E.G. US. (ft)	1994.52	Element		
W.S. US. (ft)	1994.05	E.G. Elev (ft)	1994.45	1994.07
Q Total (cfs)	7478.00	W.S. Elev (ft)	1993.84	1993.45
Q Bridge (cfs)	7478.00	Crit W.S. (ft)	1990.49	1990.10
Q Weir (cfs)		Max Chl Dpth (ft)	11.97	12.29
Weir Sta Lft (ft)		Vel Total (ft/s)	5.82	5.90
Weir Sta Rgt (ft)		Flow Area (sq ft)	1285.11	1267.62
Weir Submerg		Froude # Chl	0.32	0.32
Weir Max Depth (ft)		Specif Force (cu ft)	6630.50	6520.96
Min El Weir Flow (ft)	2002.61	Hydr Depth (ft)	7.07	7.06
Min El Prs (ft)	2000.90	W.P. Total (ft)	217.63	219.68
Delta EG (ft)	0.50	Conv. Total (cfs)	166617.4	163498.7
Delta WS (ft)	0.61	Top Width (ft)	181.89	179.53
BR Open Area (sq ft)	2586.21	Frctn Loss (ft)		
BR Open Vel (ft/s)	5.90	C & E Loss (ft)		
BR Sluice Coef		Shear Total (lb/sq ft)	0.74	0.75
BR Sel Method	Momentum	Power Total (lb/ft s)	4.32	4.45

Note: Multiple critical depths were found at this location.
The critical depth with the lowest, valid, water surface was used.

NOTES:

1. BRIDGE HYDRAULICS PERFORMED USING HEC-RAS (V.5.0.7) STEADY STATE MODEL.
2. CHANNEL GEOMETRY EXTRACTED FROM USGS DEM TOPO, PROJECT FIELD SURVEY, AND PRELIMINARY BRIDGE LAYOUTS.
3. ELEVATIONS REFERENCE TO NAVD88 DATUM.
4. SEE "DRAINAGE AREA MAP" SHEET FOR FLOWS AND COMPUTATION PARAMETERS.
5. STREAM MODELING & WATERSHED DATA DETAILED IN "SH 70 BRIDGE REPLACEMENT BRIDGE HYDRAULIC REPORT, FISHER COUNTY, TX", DATED APRIL 2022 BY CIVIL SYSTEMS ENGINEERING, INC.

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	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/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach 1	447	50 YR	5796.00	1978.27	1988.80	1985.89	1988.97	0.002903	4.62	1901.20	403.27	0.31
Reach 1	447	100 YR	7478.00	1978.27	1989.64	1986.30	1989.85	0.002900	4.99	2250.66	426.78	0.32
Reach 1	777	50 YR	5796.00	1979.23	1989.84		1990.14	0.004512	6.37	1531.54	413.03	0.40
Reach 1	777	100 YR	7478.00	1979.23	1990.67		1990.99	0.004320	6.66	1897.83	469.67	0.40
Reach 1	1092	50 YR	5796.00	1979.37	1991.10		1991.40	0.003801	5.96	1561.84	417.50	0.37
Reach 1	1092	100 YR	7478.00	1979.37	1991.87		1992.20	0.003671	6.22	1896.84	446.52	0.37
Reach 1	1430	50 YR	5796.00	1980.02	1992.38	1989.71	1992.76	0.004267	7.01	1338.29	464.76	0.39
Reach 1	1430	100 YR	7478.00	1980.02	1993.15	1990.26	1993.63	0.004858	7.86	1527.49	482.64	0.42
Reach 1	1515	50 YR	5796.00	1981.16	1992.63	1989.70	1993.10	0.003175	7.29	1360.65	453.38	0.42
Reach 1	1515	100 YR	7478.00	1981.16	1993.44	1990.31	1994.02	0.003627	8.24	1549.20	473.40	0.46
Reach 1	1570		Bridge									
Reach 1	1617	50 YR	5796.00	1981.87	1993.19	1990.02	1993.57	0.002573	6.69	1431.68	252.94	0.38
Reach 1	1617	100 YR	7478.00	1981.87	1994.05	1990.78	1994.52	0.002862	7.46	1643.78	266.85	0.40
Reach 1	1736	50 YR	5796.00	1982.24	1993.75	1989.73	1993.88	0.001648	4.53	2136.22	583.62	0.25
Reach 1	1736	100 YR	7478.00	1982.24	1994.70	1990.85	1994.85	0.001618	4.77	2550.69	642.50	0.25
Reach 1	1949	50 YR	5796.00	1983.48	1994.05		1994.21	0.001488	5.24	2116.71	513.22	0.31
Reach 1	1949	100 YR	7478.00	1983.48	1995.00		1995.18	0.001446	5.54	2627.93	578.45	0.31
Reach 1	2298	50 YR	5796.00	1983.99	1994.44		1994.55	0.000936	4.32	2476.56	526.01	0.25
Reach 1	2298	100 YR	7478.00	1983.99	1995.38		1995.51	0.000923	4.59	3028.14	613.49	0.26
Reach 1	3109	50 YR	5796.00	1985.33	1995.38		1995.60	0.001974	5.71	1775.40	374.48	0.33
Reach 1	3109	100 YR	7478.00	1985.33	1996.31		1996.56	0.002012	6.15	2138.24	406.59	0.34

STATE OF TEXAS
KURT E KILLIAN
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LICENSED PROFESSIONAL ENGINEER
4/6/2022

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FIRM REGISTRATION No. F-10161

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

BRIDGE HYDRAULIC COMPUTATIONS

SH 70 OVER PLUM CREEK

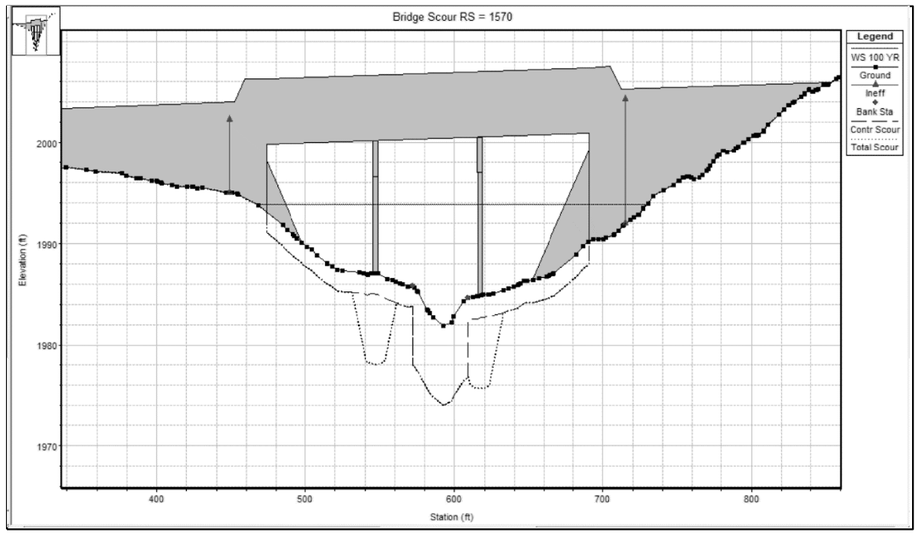
SCALE:

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
	SEE COVER SHEET	065

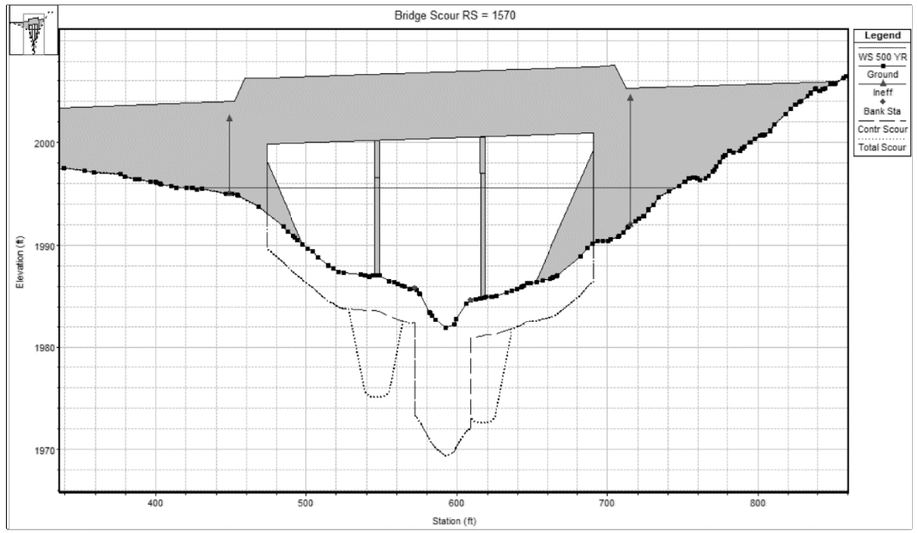
STATE	DISTRICT	COUNTY	
TX	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH 70 AT PLUM CREEK SCOUR COMPUTATIONS

100-YEAR (DESIGN) SCOUR ENVELOPE



500-YEAR (CHECK & MAX) SCOUR ENVELOPE



Hydraulic Design Data
100-yr (Design Depth Frequency)
Contraction Scour

	Left	Channel	Right
Input Data			
Average Depth (ft):	5.70	11.04	5.27
Approach Velocity (ft/s):	2.78	4.77	2.79
Br. Opening Depth (ft):	5.82	10.42	6.71
Br. Opening Flow (cfs):	2354.37	3036.25	2087.37
Br. Top WD (ft):	82.66	37.10	62.12
Grain Size D50 (mm):	0.10	0.10	0.10
Approach Flow (cfs):	3847.06	925.65	2705.30
Approach Top WD (ft):	243.10	17.60	184.16
K1 Coefficient:	0.69	0.69	0.69
Results			
Scour Depth Ys (ft):	2.06	7.85	2.22
Critical Velocity (ft/s)	1.03	1.15	1.02
Equation:	Live	Live	Live

Pier Scour All piers have the same scour depth

Input Data	
Pier Shape:	Group of Cylinders
Pier Width (ft):	3.00
Grain Size D50 (mm):	0.10
Depth Upstream (ft):	10.63
Velocity Upstream (ft/s):	7.46
K1 Nose Shape:	1.00
Pier Angle:	0.00
Pier Length (ft):	42.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	
K4 Armoouring Coef:	1.00
Results	
Scour Depth Ys (ft):	6.95
Froude #:	0.40
Equation:	CSU Equation
Pier Scour + Contraction Scour (ft):	
Left Bank:	9.01
Right Bank:	9.17

Hydraulic Design Data
500-yr (Design Depth Frequency)
Contraction Scour

	Left	Channel	Right
Input Data			
Average Depth (ft):	7.87	13.20	6.35
Approach Velocity (ft/s):	3.40	5.26	3.13
Br. Opening Depth (ft):	7.18	12.18	7.88
Br. Opening Flow (cfs):	4087.81	4630.03	3434.17
Br. Top WD (ft):	87.95	37.10	67.41
Grain Size D50 (mm):	0.10	0.10	0.10
Approach Flow (cfs):	6510.40	1222.54	4419.07
Approach Top WD (ft):	243.10	17.60	221.90
K1 Coefficient:	0.69	0.69	0.69
Results			
Scour Depth Ys (ft):	3.47	12.52	3.76
Critical Velocity (ft/s)	1.09	1.19	1.05
Equation:	Live	Live	Live

Pier Scour All piers have the same scour depth

Input Data	
Pier Shape:	Group of Cylinders
Pier Width (ft):	3.00
Grain Size D50 (mm):	0.10
Depth Upstream (ft):	12.58
Velocity Upstream (ft/s):	9.09
K1 Nose Shape:	1.00
Pier Angle:	0.00
Pier Length (ft):	42.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	
K4 Armoouring Coef:	1.00
Results	
Scour Depth Ys (ft):	7.74
Froude #:	0.45
Equation:	CSU Equation
Pier Scour + Contraction Scour (ft):	
Left Bank:	11.22
Right Bank:	11.50

HYDRAULIC NOTES:

1. HYDRAULIC COMPUTATIONS COMPUTED USING HEC-RAS V.5.0.7
2. HYDRAULIC MODEL FILENAME: SH-70-PLUM_CRK.PRJ.
3. HYDRAULIC MODELING PRESENTED IN "SH 70 BRIDGE REPLACEMENT HYDRAULIC BRIDGE REPORT" DATED APRIL 2022 BY CIVIL SYSTEMS ENGINEERING, INC.
4. SCOUR ANALYSIS DETAILS ARE PRESENTED IN "SH 70 BRIDGE REPLACEMENT SCOUR ANALYSIS" DATED APRIL 2022 BY CIVIL SYSTEMS ENGINEERING, INC.

STATE OF TEXAS
KURT E KILLIAN
95742
LICENSED PROFESSIONAL ENGINEER
4/6/2022

CHANNEL MATERIAL

Channel Bed Material Description	Channel soil strata includes layer of sand, very dense, gray to light gray, clayey (SC)
D50	Measured D50 less than 0.20 mm; therefore, Minimum D50 = 0.20mm (0.00066 ft) was used.
Basis of Channel Bed Material Description	Labotary testing of boring material
Non-Erobile Strata	Non-erosive layers are listed within 1 - 10 ft of potential scour limits, consisting of sandstone, very hard stratum

SUMMARY OF RETURN PERIOD

BRIDGE DESIGN FLOOD	50-YEAR
SCOUR DESIGN FLOOD	100-YEAR
SCOUR DESIGN CHECK FLOOD	500-YEAR

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SUITE 500
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FIRM REGISTRATION No. F-10161

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

SCOUR DATA SHEET

SH 70
OVER PLUM CREEK

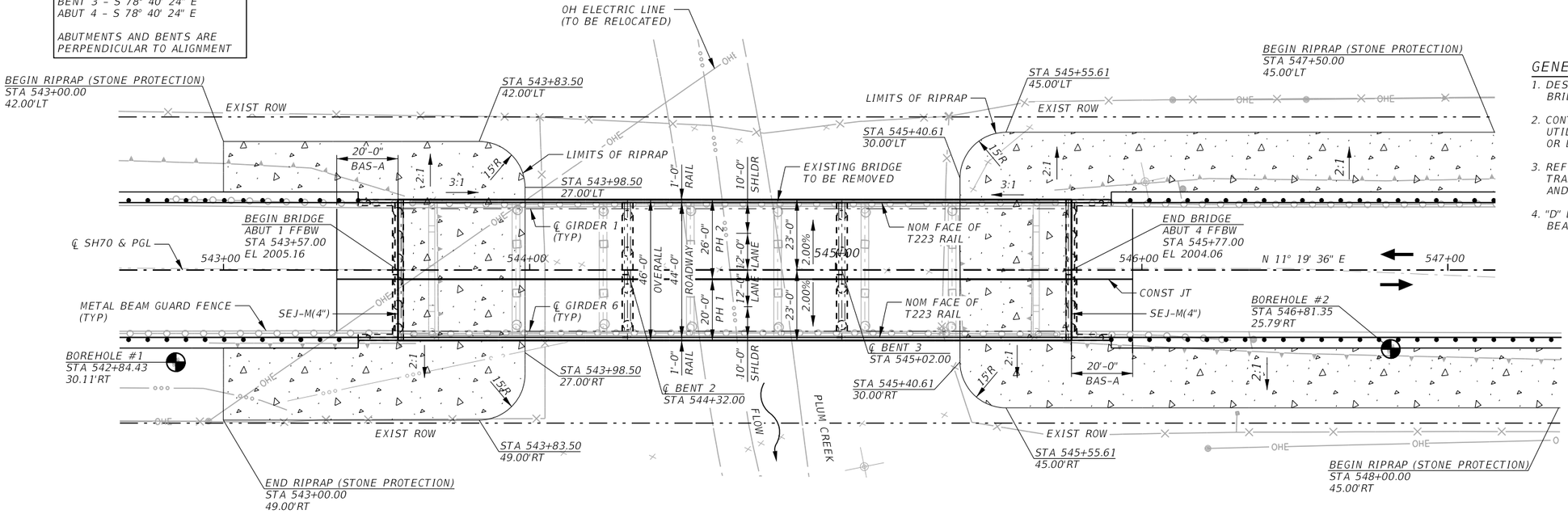
SCALE:

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
	SEE COVER SHEET		66
STATE	DISTRICT	COUNTY	
TX	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

C:\1CSE_PROJECTS\245069B_IEA_SH70_PLUM\CAD\SH70-SHT_SCR.DGN

NOTE: ABUTMENTS AND INTERIOR BENTS PLACED ALONG BEARING:
ABUT 1 – S 78° 40' 24" E
BENT 2 – S 78° 40' 24" E
BENT 3 – S 78° 40' 24" E
ABUT 4 – S 78° 40' 24" E

ABUTMENTS AND BENTS ARE PERPENDICULAR TO ALIGNMENT



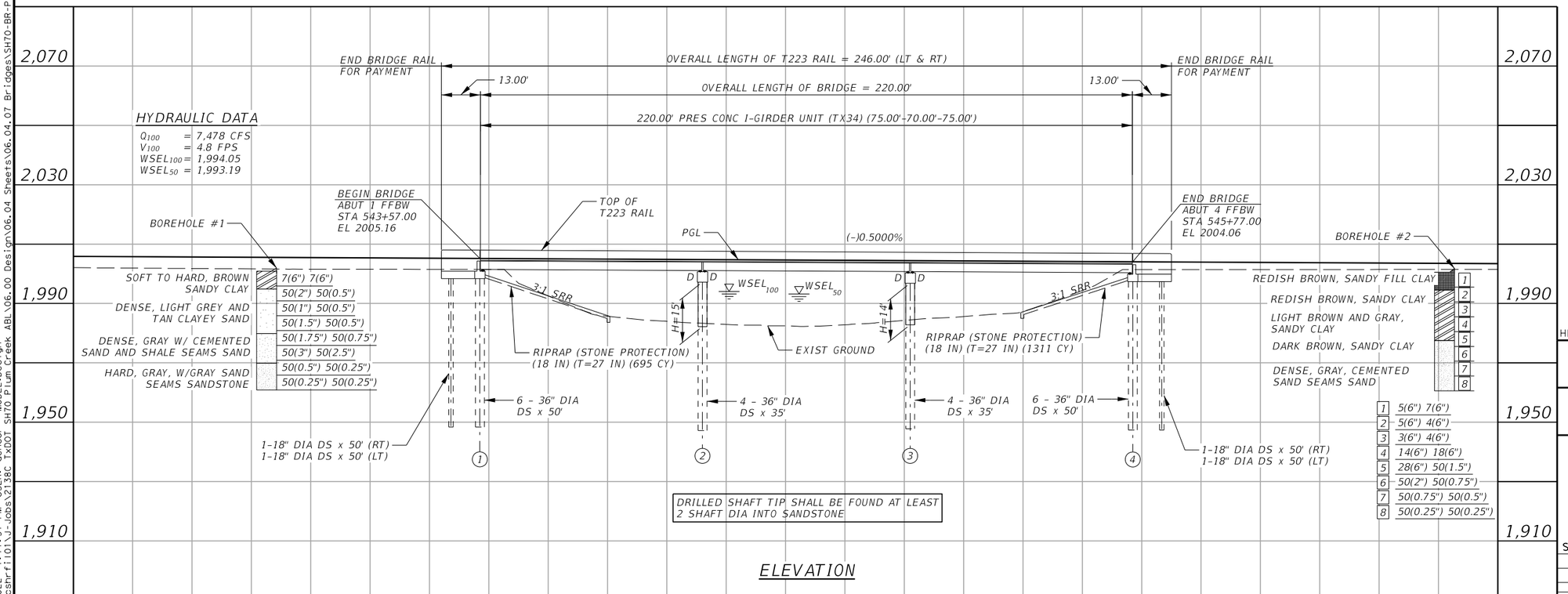
PLAN

FOR PHASED CONSTRUCTION DETAILS SEE SEQUENCE OF CONSTRUCTION SHEET

0 20 40
HORIZONTAL SCALE IN FEET
0 20 40
VERTICAL SCALE IN FEET

GENERAL NOTES

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION.
2. CONTRACTOR SHALL VERIFY LOCATIONS OF ALL UTILITIES PRIOR TO CONSTRUCTION, EXCAVATION OR DRILLING.
3. REFER TO TYPICAL SECTION SHEETS FOR TRANSVERSE SECTIONS, CONSTRUCTION PHASING, AND DEMOLITION LIMITS.
4. "D" DENOTES BENTS WITH D BARS FOR EXTERIOR BEAMS WITH SLOTTED HOLES.



DRILLED SHAFT TIP SHALL BE FOUND AT LEAST 2 SHAFT DIA INTO SANDSTONE

ELEVATION

DESIGN SPEED: 70 MPH
FUNCTIONAL CLASS: MINOR ARTERIAL
EXIST NBI NO: 08-077-0-0263-05-015
PROPOSED NBI NO: 08-077-0-0263-05-320
ADT (2018): 2,709
ADT (2043): 5,290

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SH 70

PLUM CREEK BRIDGE BRIDGE LAYOUT

SCALE: 1"=40' SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE COVER SHEET		067
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH70-BR-PE_01.dgn

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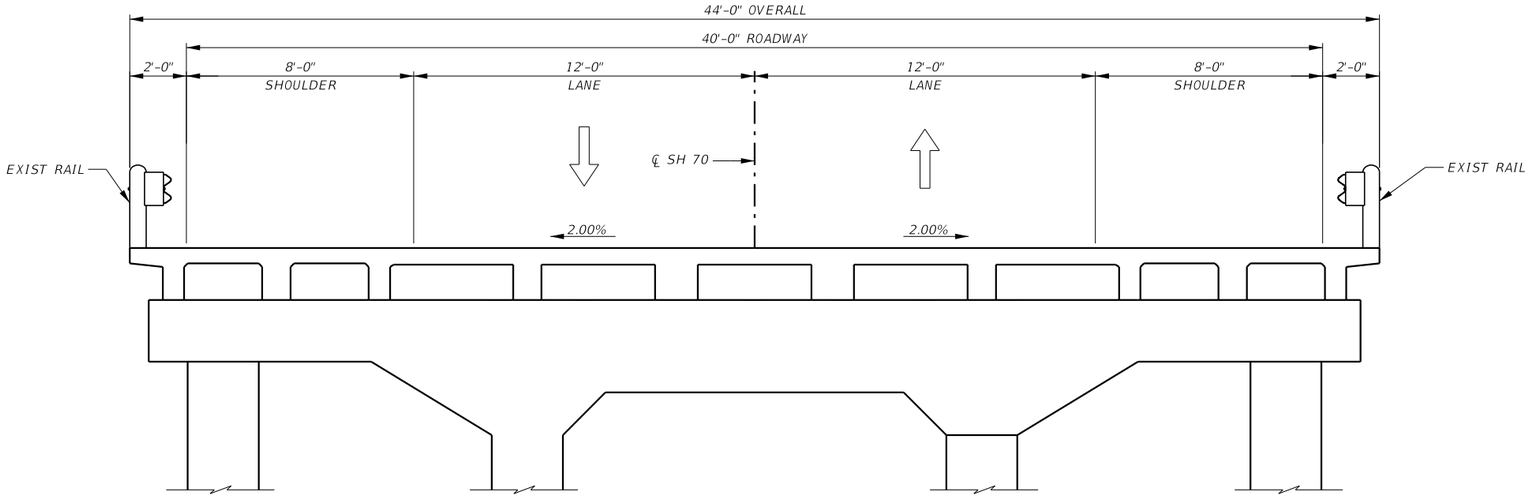
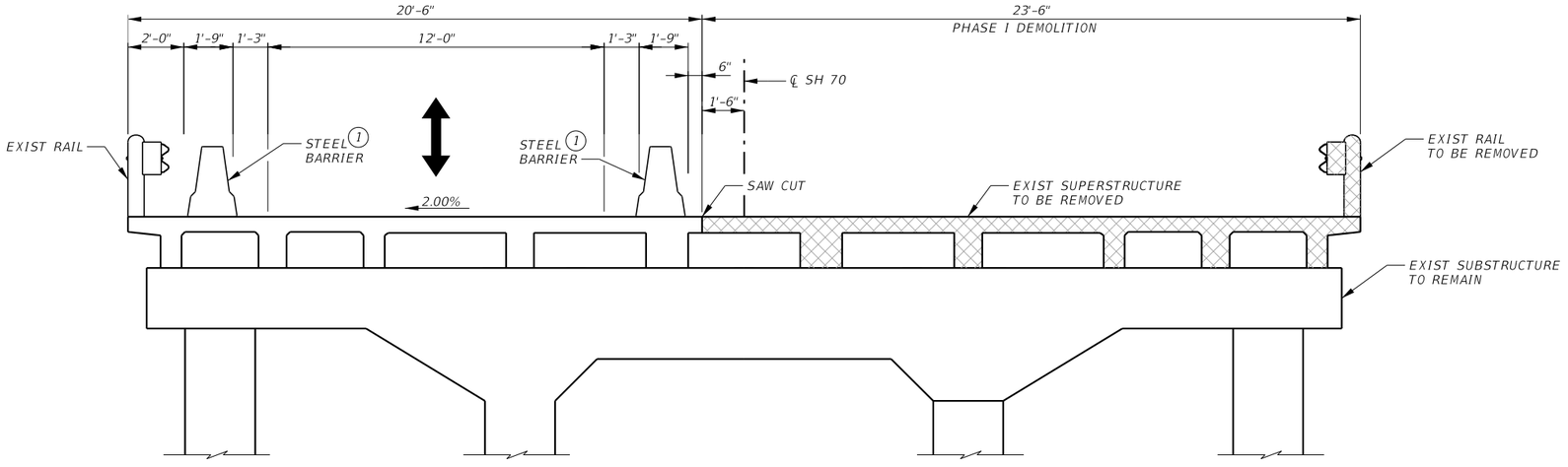


EXISTING TYPICAL SECTION

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



PHASE 1 DEMOLITION

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

(1) STEEL BARRIER TO BE PINNED PER MINIMUM DEFLECTION SYSTEM UNLESS OTHERWISE NOTED.

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SH 70

PLUM CREEK BRIDGE TYPICAL SECTION

SHEET 1 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE COVER SHEET		068
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH70-BR-TS_01.dgn

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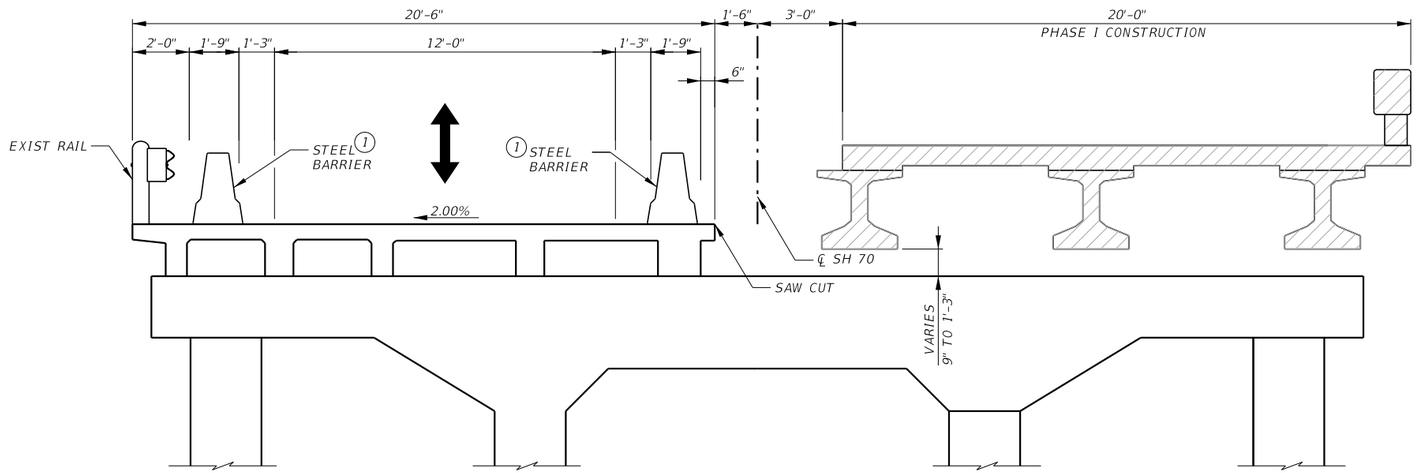
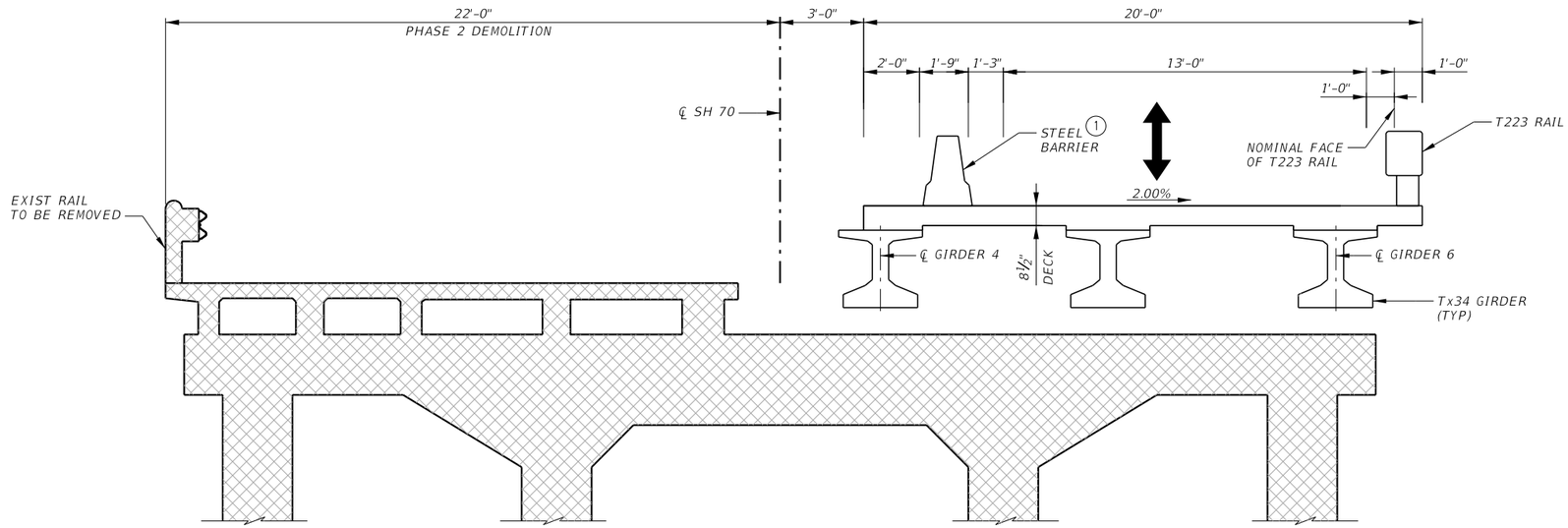


PHASE 1 CONSTRUCTION

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

(1) STEEL BARRIER TO BE PINNED PER MINIMUM DEFLECTION SYSTEM UNLESS OTHERWISE NOTED.



PHASE 2 DEMOLITION

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

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PLUM CREEK BRIDGE TYPICAL SECTION

SHEET 2 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE COVER SHEET		069
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

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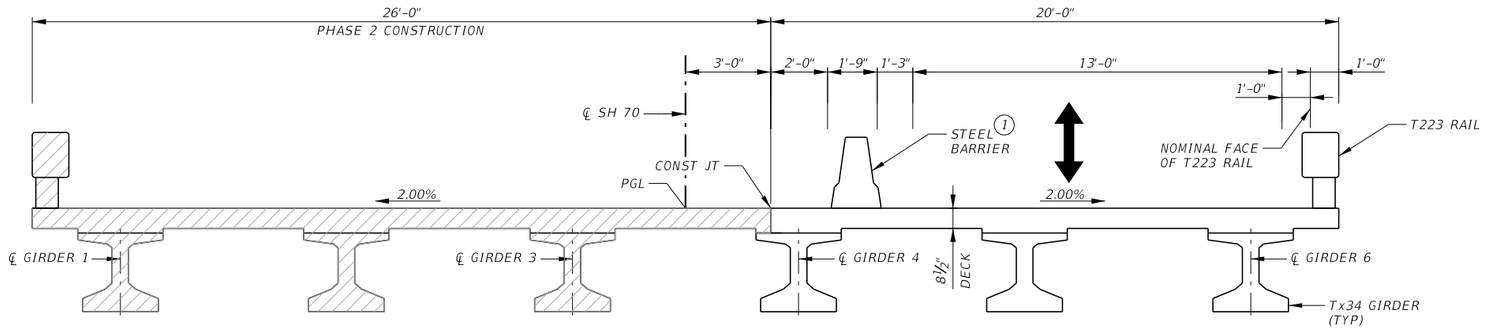
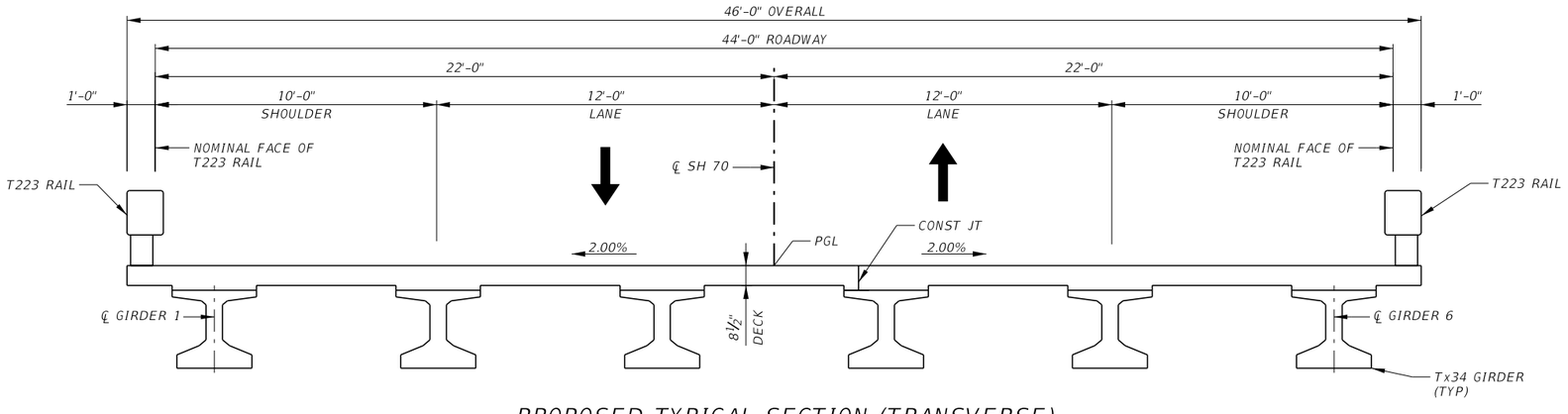


PHASE 2 CONSTRUCTION

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

1 STEEL BARRIER TO BE PINNED PER MINIMUM DEFLECTION SYSTEM UNLESS OTHERWISE NOTED.



PROPOSED TYPICAL SECTION (TRANSVERSE)

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

STATE OF TEXAS
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FIRM REGISTRATION No. F-10161

SH 70

PLUM CREEK BRIDGE TYPICAL SECTION

SHEET 3 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE COVER SHEET		070
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

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MODEL:Design

SUMMARY OF ESTIMATED QUANTITIES

CSJ	PLAN PROFILE SHEET	BRIDGE NBI # EXISTING	BRIDGE NBI # PROPOSED	DESIGN EXISTING	DESIGN PROPOSED	BRIDGE LOCATION	STATION BEGIN	STATION END	LENGTH	CLEAR RDWY WIDTH	LOADING	BID ITEM NO / ITEM DESCRIPTION	400 CEM STABIL BKFL	416 DRILL SHAFT (18 IN)	416 DRILL SHAFT (36 IN)	420 CL C CONC (ABUT) (HPC)	420 CL C CONC (CAP) (HPC)	420 CL C CONC (COLUMN) (HPC)	422 REINF CONC SLAB (HPC)	422 APPROACH SLAB (HPC)
									FT	FT		UNIT	CY	LF	LF	CY	CY	CY	SF	CY
												PHASE 1								
												2 - ABUTMENTS	39	100	300	27.2				
												2 - BENTS			140		19.2	15.3		
												220.00' PS CONC I-GIRDER UNIT							4,400	32.1
0263-05-024	057	08-077-0-0263-05-015	08-077-0-0263-05-320	H-20	HL-93	SH 70 OVER PLUM CREEK	543+57.00	545+77.00	220'	44'	HL-93									
												PHASE 2								
												2 - ABUTMENTS	39	100	300	29.8				
												2 - BENTS			140		22.0	15.3		
												220.00' PS CONC I-GIRDER UNIT							5,720	41.7
												TOTAL	78	200	880	57.0	41.2	30.6	10,120	73.8

SUMMARY OF ESTIMATED QUANTITIES

CSJ (CONT'D FROM ABOVE)	BID ITEM NO / ITEM DESCRIPTION	425 PRESTR CONC GIRDER (Tx34)	427 SILICON RESIN PAINT FINISH	450 RAIL (TY T223) (HPC)	454 SEALED EXPANSION JOINT (4 IN) (SEJ-M)	
	UNIT	LF	SF	LF	LF	
	PHASE 1					
	2 - ABUTMENTS		224			
	2 - BENTS					
	220.00' PS CONC I-GIRDER UNIT	655.50		246.0	40	
0263-05-024						
	PHASE 2					
	2 - ABUTMENTS		260			
	2 - BENTS					
	220.00' PS CONC I-GIRDER UNIT	655.50		246.0	52	
	TOTAL	1,311.00	484	492.0	92	

BEARING SEAT ELEVATIONS

	BEAM 1	BEAM 2	BEAM 3	BEAM 4	BEAM 5	BEAM 6
ABUT 1 (FWD)	2000.669	2000.826	2000.982	2001.040	2000.875	2000.710
BENT 2 (BK)	2000.304	2000.461	2000.618	2000.676	2000.511	2000.346
BENT 2 (FWD)	2000.294	2000.451	2000.608	2000.666	2000.501	2000.336
BENT 3 (BK)	1999.955	2000.111	2000.268	2000.326	2000.161	1999.996
BENT 3 (FWD)	1999.945	2000.101	2000.258	2000.316	2000.151	1999.986
ABUT 4 (BK)	1999.580	1999.737	1999.893	1999.952	1999.787	1999.622

STATE OF TEXAS
MOHAMMED N. THASLEEM
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4/11/2022

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DALLAS, TEXAS 75252
(214) 884-4253
FIRM REGISTRATION No. F-10161

SH 70

PLUM CREEK BRIDGE
QUANTITY / BEARING SEAT

SCALE: NTS
SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE COVER SHEET		071
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH70-BR-QE_01.dgn

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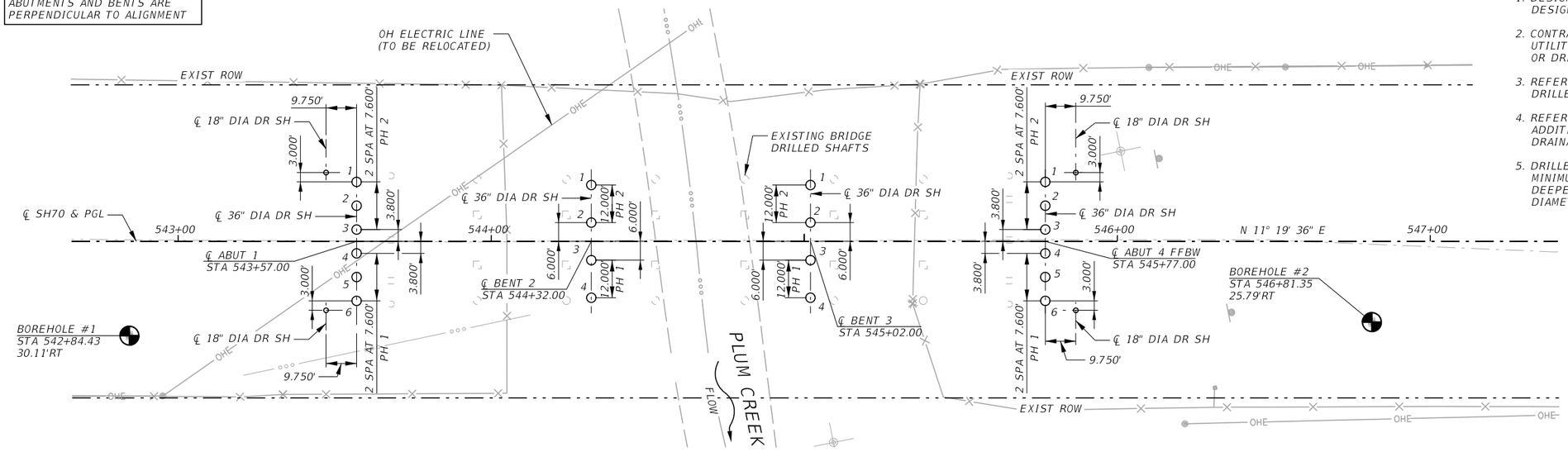
NOTE: ABUTMENTS AND INTERIOR BENTS PLACED ALONG BEARING:
ABUT 1 – S 78° 40' 24" E
BENT 2 – S 78° 40' 24" E
BENT 3 – S 78° 40' 24" E
ABUT 4 – S 78° 40' 24" E

ABUTMENTS AND BENTS ARE PERPENDICULAR TO ALIGNMENT



PLAN

FOR PHASED CONSTRUCTION DETAILS
SEE CONSTRUCTION SEQUENCE PLAN SHEETS

0 20 40
HORIZONTAL SCALE IN FEET

GENERAL NOTES

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION.
2. CONTRACTOR SHALL VERIFY LOCATIONS OF ALL UTILITIES PRIOR TO CONSTRUCTION, EXCAVATION OR DRILLING.
3. REFER TO BRIDGE LAYOUT FOR BORING LOGS AND DRILLED SHAFT LENGTHS.
4. REFER TO UTILITY AND DRAINAGE PLANS FOR ADDITIONAL INFORMATION ON UTILITIES AND DRAINAGE.
5. DRILLED SHAFT LENGTHS SHALL BE THE MINIMUM SHOWN ON THE LAYOUT SHEET OR DEEPER AS REQUIRED TO OBTAIN 2 SHAFT DIAMETERS INTO SANDSTONE.

STATE OF TEXAS
MOHAMMED N. THASLEEM
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4/11/2022

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(214) 884-4253
FIRM REGISTRATION No. F-10161

SH 70

PLUM CREEK BRIDGE FOUNDATION LAYOUT

SCALE: 1"=40' SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE COVER SHEET		072
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

PLOT SCALE: 40.0000 ' / in.
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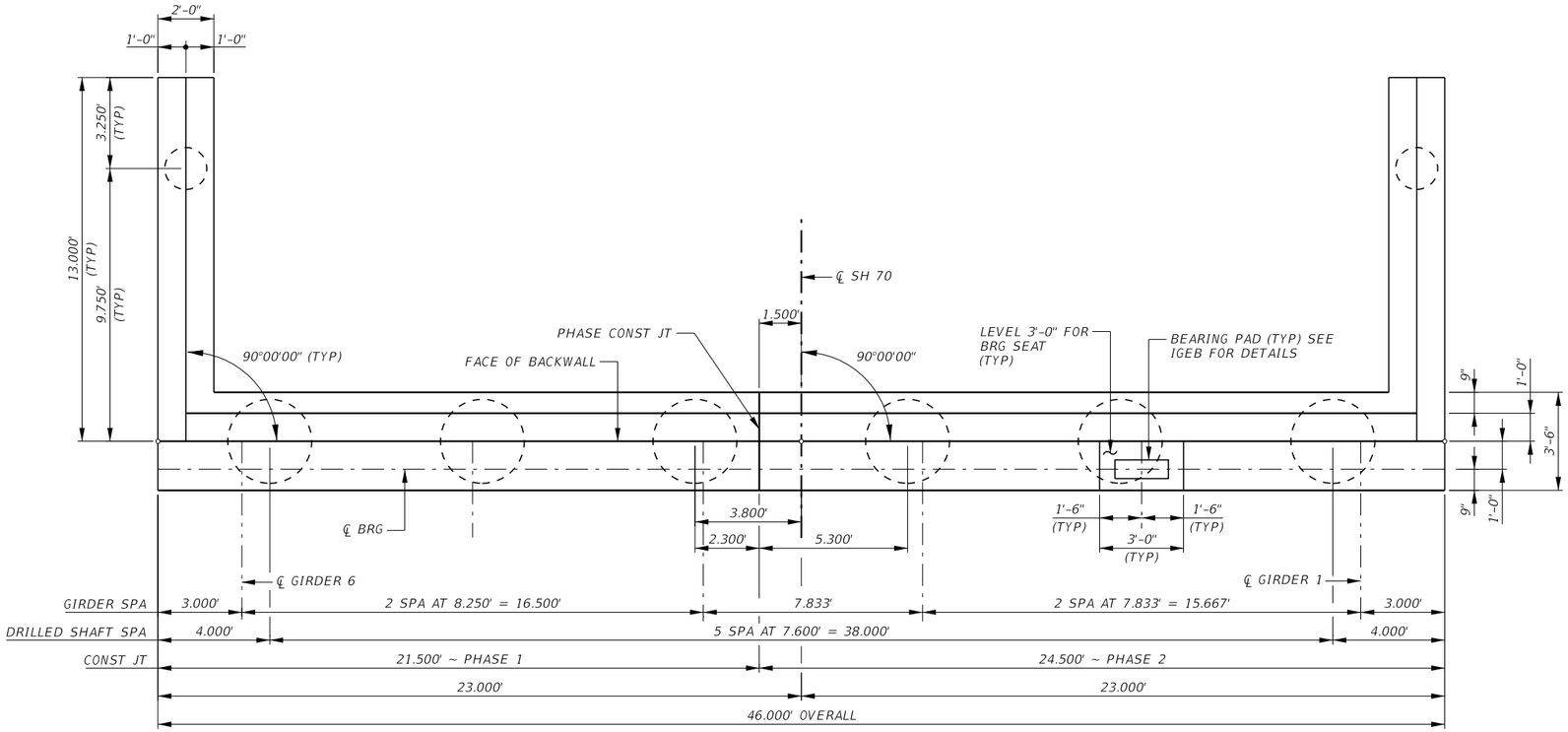
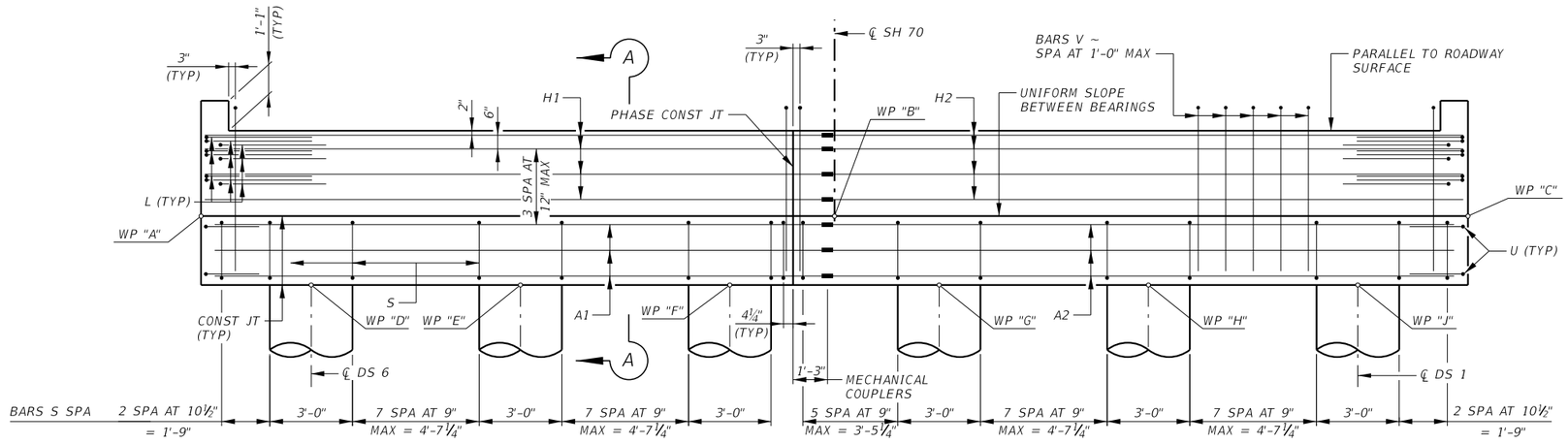


PLAN

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



ELEVATION

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

WORK POINT ELEVATIONS

ABUT NO	WP "A"	WP "B"	WP "C"	WP "D"	WP "E"	WP "F"	WP "G"	WP "H"	WP "J"
1	2000.484	2000.944	2000.484	1998.064	1998.216	1998.368	1998.368	1998.216	1998.064

STATE OF TEXAS
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FIRM REGISTRATION No. F-10161

SH 70

PLUM CREEK BRIDGE ABUTMENT 1 DETAILS

SCALE: SHEET 1 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE COVER SHEET		073
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH70-BR-AB_01.dgn

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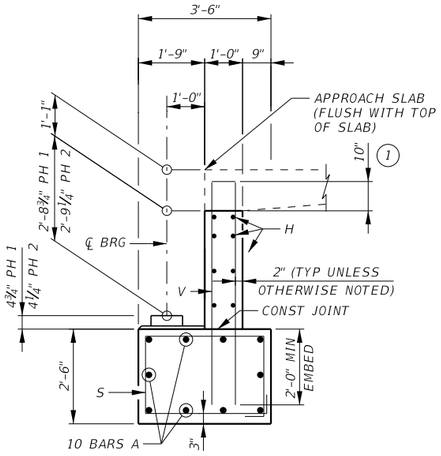
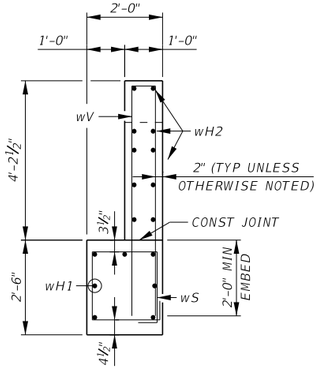


SECTION A-A

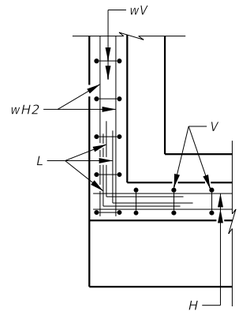
SCALE: ¼"=1'-0"



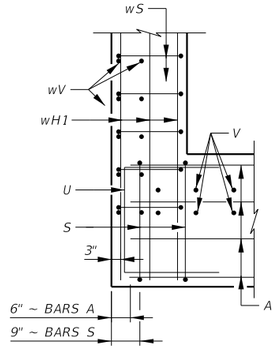
SECTION B-B

SCALE: ¼"=1'-0"

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



BACKWALL



CAP

CORNER DETAILS

SCALE: ¼"=1'-0"

TABLE OF ABUTMENT 1 QUANTITIES - PHASE 1

A1	10	#11	22'-3"	1,183
H1	8	#6	22'-7"	272
L	9	#6	4'-0"	55
S	21	#5	11'-6"	252
U	2	#6	8'-1"	25
V	21	#5	12'-7"	276
wH1	7	#6	14'-5"	152
wH2	10	#6	12'-8"	191
wS	14	#4	7'-10"	74
wV	14	#5	12'-9"	187
REINFORCING STEEL		LB		2,667
CLASS "C" CONCRETE (ABUT)		CY		13.6

TABLE OF ABUTMENT 1 QUANTITIES - PHASE 2

A2	10	#11	22'-9"	1,209
H2	8	#6	23'-1"	278
L	9	#6	4'-0"	55
S	25	#5	11'-6"	300
U	2	#6	8'-1"	25
V	24	#5	12'-7"	315
wH1	7	#6	14'-5"	152
wH2	10	#6	12'-8"	191
wS	14	#4	7'-10"	74
wV	14	#5	12'-9"	187
REINFORCING STEEL		LB		2,786
CLASS "C" CONCRETE (ABUT)		CY		14.9

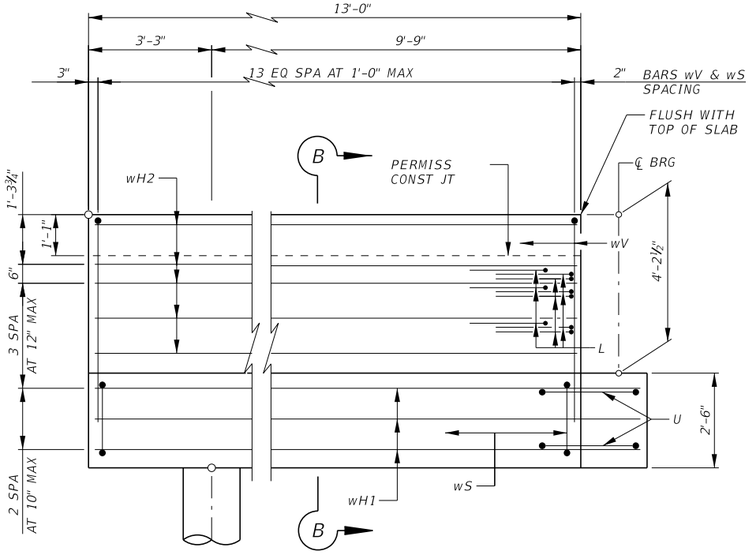
COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE. REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.

GENERAL NOTES:

1. DESIGNED PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS 8TH EDITION.
2. SEE COMMON FOUNDATION DETAILS (FD) STANDARD SHEET FOR ALL FOUNDATION DETAILS AND NOTES NOT SHOWN.
3. THE BEARING SEATS SHALL RECEIVE A WOOD FLOAT FINISH.
4. CALCULATED DRILLED SHAFT FOUNDATION LOAD = 140 TONS/SHAFT.

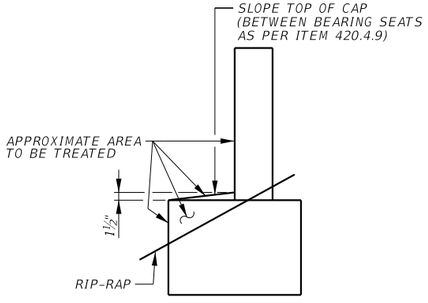
MATERIAL NOTES:

1. PROVIDE CLASS C CONCRETE (f'c = 3,600psi)
2. PROVIDE GRADE 60 REINFORCING STEEL.
3. EPOXY COAT ALL BARS EXCEPT DRLLED SHAFT BARS.



WINGWALL ELEVATION

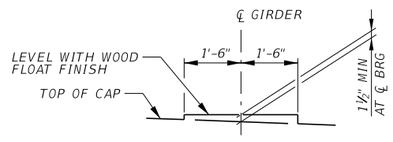
SCALE: ¼"=1'-0"



WATERPROOFING DETAIL

SCALE: NTS

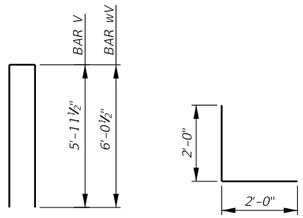
NOTE: THE FACE OF BACKWALL AND TOP, FRONT AND ENDS OF THE CAP AS SHOWN, EXCEPT BEARING SEATS, SHALL BE WATERPROOFED AS PER ITEM 427, "SURFACE FINISHES FOR CONCRETE".



BEARING SEAT DETAIL

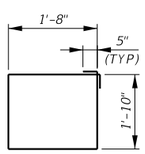
SCALE: NTS

(BEARING SURFACE MUST BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE PLACING BEARING PAD.)

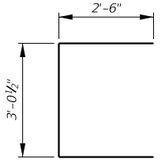


BARS V & wV

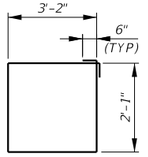
BARS L



BARS wS



BARS U



BARS S

STATE OF TEXAS
MOHAMMED N. THASLEEM
130455
LICENSED PROFESSIONAL ENGINEER
4/11/2022

HL93 LOADING

Texas Department of Transportation

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SUITE 500
DALLAS, TEXAS 75252
(214) 884-4253
FIRM REGISTRATION No. F-10161

SH 70

PLUM CREEK BRIDGE ABUTMENT 1 DETAILS

SCALE:

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE COVER SHEET		074
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH70-BR-AB_02.dgn

PLOT SCALE: 5.3333 ' / in.
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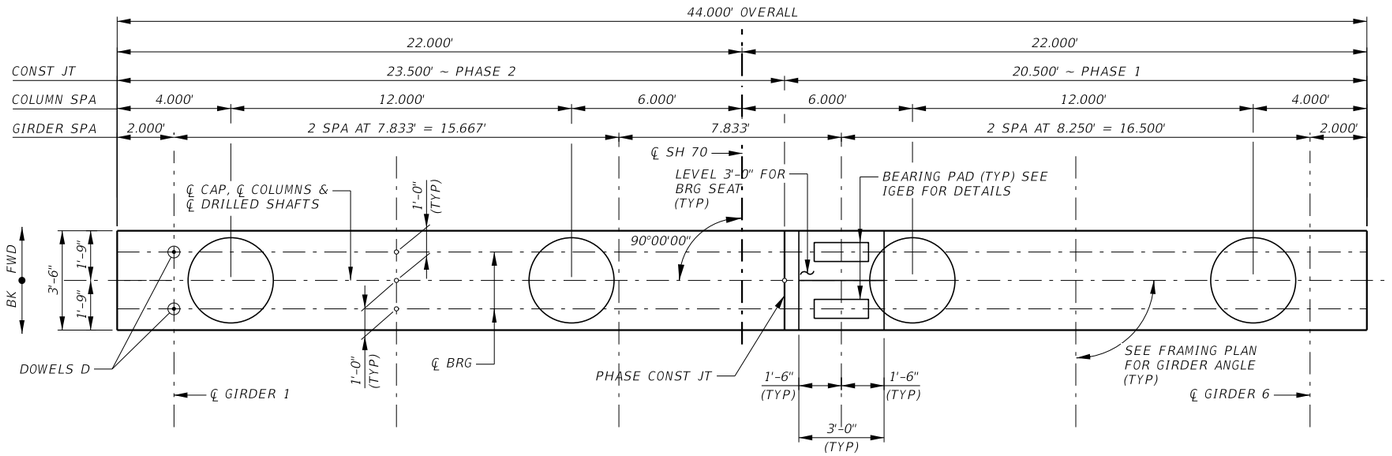
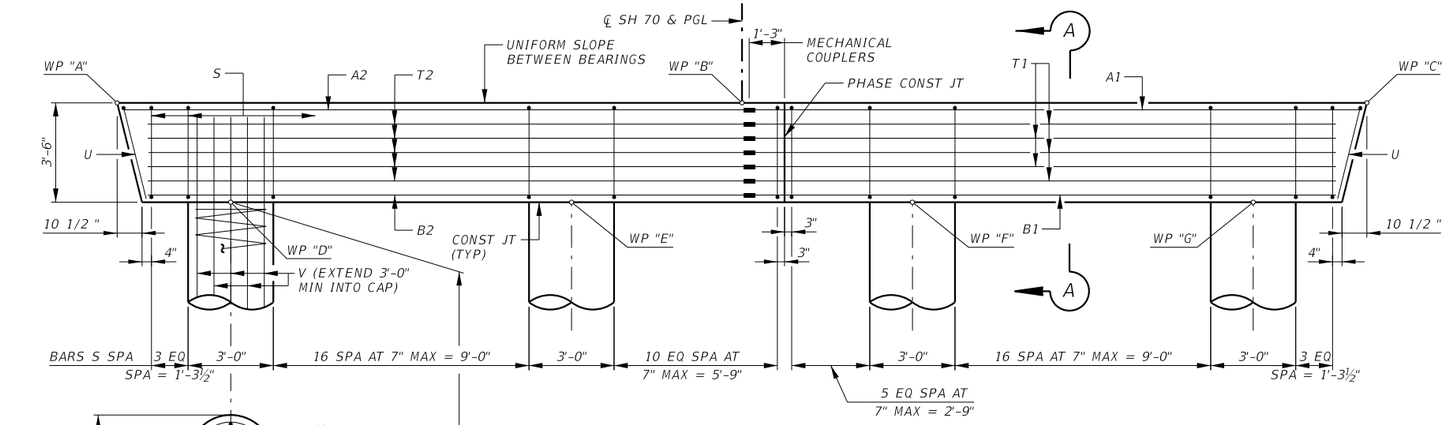


PLAN

SCALE: $^{3}/_{16}$"=1'-0"



ELEVATION

SCALE: $^{3}/_{16}$"=1'-0"

WORK POINT ELEVATIONS							
BENT NO	WP "A"	WP "B"	WP "C"	WP "D"	WP "E"	WP "F"	WP "G"
2	2000.129	2000.569	2000.129	1996.709	1996.949	1996.949	1996.709
3	1999.779	2000.219	1999.779	1996.359	1996.599	1996.599	1996.359

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FIRM REGISTRATION No. F-10161

SH 70

PLUM CREEK BRIDGE BENTS 2 & 3 DETAILS

SHEET 1 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE COVER SHEET		075
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH70-BR-BT_01.dgn

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MODEL:Design

TABLE OF COLUMN QUANTITIES

BENT NO	COL NO	HEIGHT "H"	BARS "V" 10-#9 (PER COL)		BARS "Z" #4 (PER COL)		REINF STEEL	CL "C" CONC COLUMN	TOTAL REINF STEEL PER PHASE	CL "C" CONC COLUMN PER PHASE
			LENGTH	WEIGHT	LENGTH	WEIGHT				
		FT	FT-IN	LBS	FT-IN	LBS	LB	CY	LB	CY
2 (PHASE 1)	3	15'-0"	18'-0"	612	479'-2"	321	933	3.93	1,866	7.9
	4	15'-0"	18'-0"	612	479'-2"	321	933	3.93		
2 (PHASE 2)	1	15'-0"	18'-0"	612	479'-2"	321	933	3.93	1,866	7.9
	2	15'-0"	18'-0"	612	479'-2"	321	933	3.93		
3 (PHASE 1)	3	14'-0"	17'-0"	578	447'-9"	300	878	3.67	1,756	7.4
	4	14'-0"	17'-0"	578	447'-9"	300	878	3.67		
3 (PHASE 2)	1	14'-0"	17'-0"	578	447'-9"	300	878	3.67	1,756	7.4
	2	14'-0"	17'-0"	578	447'-9"	300	878	3.67		

* QUANTITIES SHOWN ARE BASED ON "H" VALUE SHOWN. CONTRACTOR IS RESPONSIBLE FOR CALCULATING, THE ACTUAL COLUMN HEIGHTS BASED ON FIELD CONDITIONS. FOR EACH LINEAR FOOT VARIATION IN "H" VALUE, MAKE THE FOLLOWING ADJUSTMENTS:

BARS V LENGTH 1'-0"
BARS Z LENGTH 31'-5"
REINFORCING STEEL 67lb
CLASS "C" CONC (COL) 0.3 CY

TABLE OF CAP QUANTITIES - PHASE 1

BAR	NO	SIZE	LENGTH	WEIGHT
A1	6	#11	21'-6"	686
B1	6	#11	20'-8"	659
D	2	#9	1'-8"	12
S	27	#5	13'-8"	385
T1	10	#5	20'-8"	216
U	1	#5	9'-8"	11
REINFORCING STEEL			LB	1,969
CL C CONC (CAP)			CY	9.6

QUANTITIES SHOWN ARE PER BENT

TABLE OF CAP QUANTITIES - PHASE 2

BAR	NO	SIZE	LENGTH	WEIGHT
A2	6	#11	22'-6"	702
B2	6	#11	21'-2"	675
D	2	#9	1'-8"	12
S	32	#5	13'-8"	457
T2	10	#5	21'-2"	221
U	1	#5	9'-8"	21
REINFORCING STEEL			LB	2,078
CL C CONC (CAP)			CY	11.0

QUANTITIES SHOWN ARE PER BENT

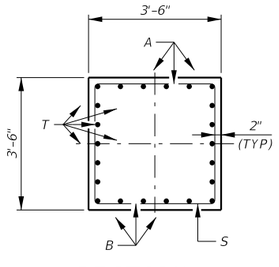
GENERAL NOTES:

1. DESIGNED PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS 8TH EDITION.
2. THE PRICE BID PER FOOT OF COLUMN SHALL INCLUDE THE REINFORCING EXTENDING FROM THE COLUMN INTO THE CAP.
3. THE BEARING SEATS SHALL RECEIVE A WOOD FLOAT FINISH.
4. SEE COMMON FOUNDATION DETAILS (FD) STANDARD SHEET FOR ALL FOUNDATION DETAILS AND NOTES NOT SHOWN.
5. CALCULATED DRILLED SHAFT FOUNDATION LOAD = 280 TONS/SHAFT.

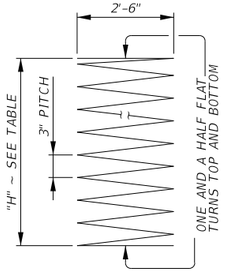
MATERIAL NOTES:

1. PROVIDE CLASS C CONCRETE (f'c = 3,600psi)
2. PROVIDE GRADE 60 REINFORCING STEEL FOR BARS V AND Z.
3. PROVIDE GRADE 60 EPOXY COATED REINFORCING STEEL FOR BARS A, B, S, T, AND U.
4. GALVANIZE DOWELS D.

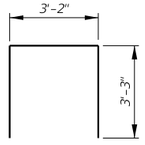
COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE. REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.



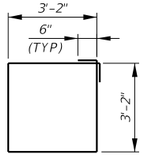
SECTION A-A
SCALE: 1/4"=1'-0"



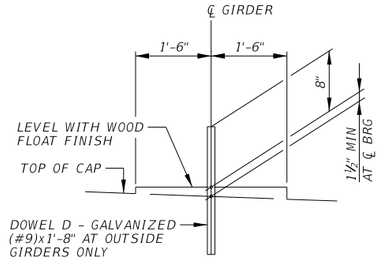
BARS Z



BARS U



BARS S



BEARING SEAT DETAIL
SCALE: NTS

(BEARING SURFACE MUST BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE PLACING BEARING PAD.)

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FIRM REGISTRATION No. F-10161

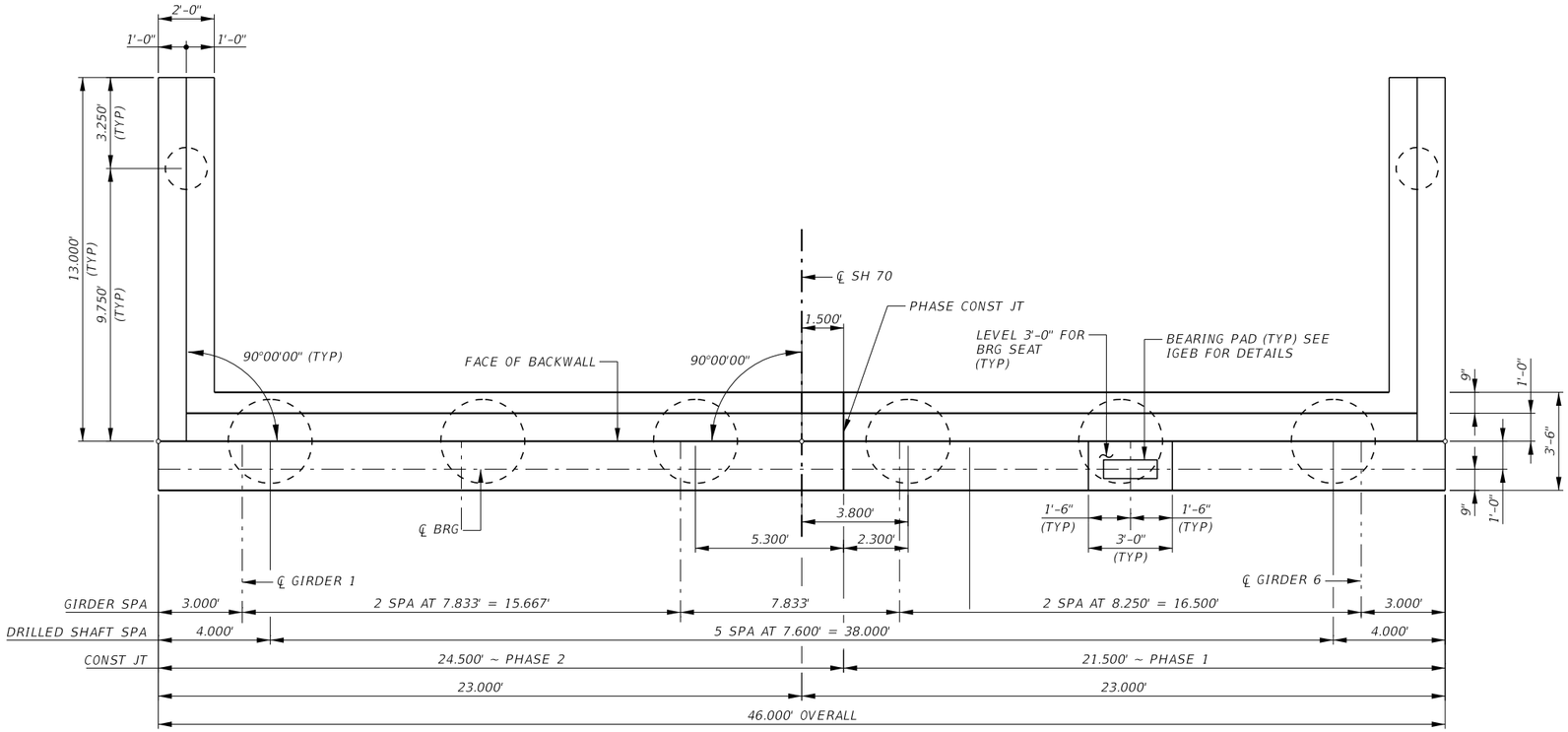
SH 70

PLUM CREEK BRIDGE BENTS 2 & 3 DETAILS

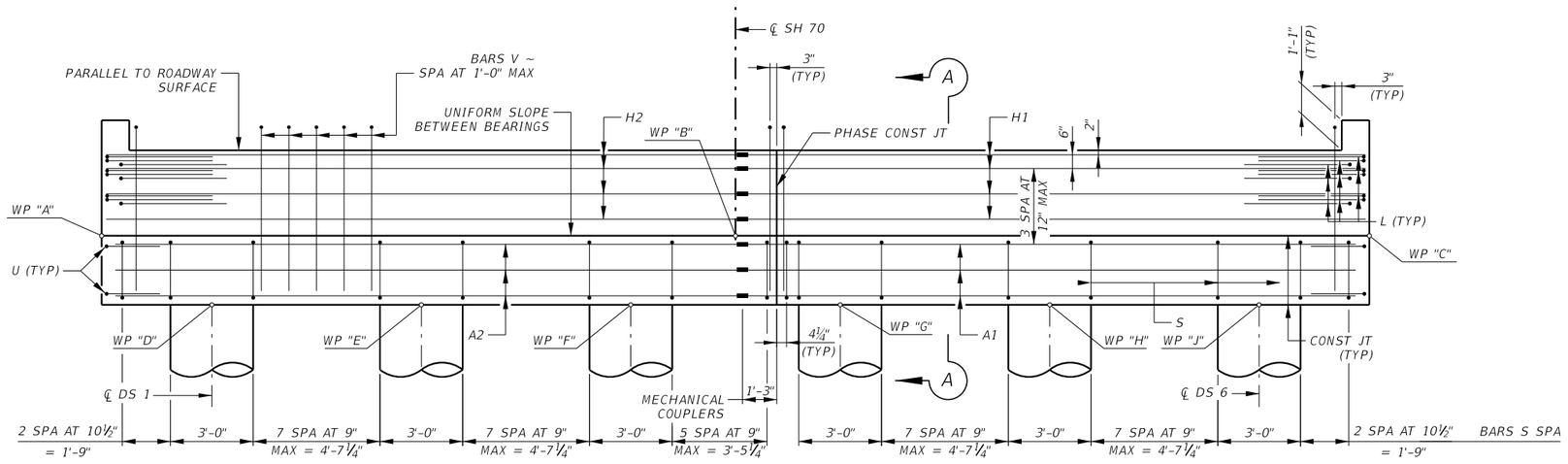
SHEET 2 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE COVER SHEET		076
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH70-BR-BT_02.dgn



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



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

WORK POINT ELEVATIONS

ABUT NO	WP "A"	WP "B"	WP "C"	WP "D"	WP "E"	WP "F"	WP "G"	WP "H"	WP "J"
4	1999.395	1999.855	1999.395	1996.975	1997.127	1997.279	1997.279	1997.127	1996.975

STATE OF TEXAS
MOHAMMED N. THASLEEM
130455
LICENSED PROFESSIONAL ENGINEER
4/11/2022

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FIRM REGISTRATION No. F-10161

SH 70

PLUM CREEK BRIDGE ABUTMENT 4 DETAILS

SHEET 1 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE COVER SHEET		077
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

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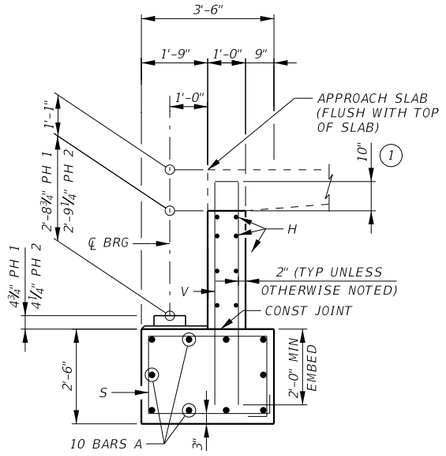
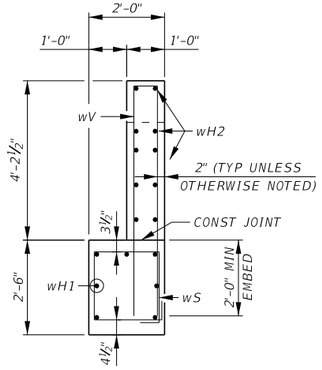


SECTION A-A

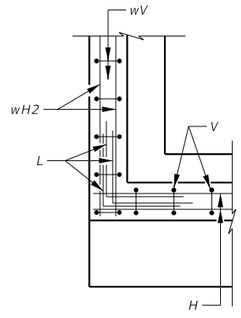
SCALE: ¼"=1'-0"

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

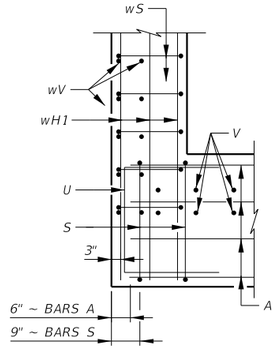


SECTION B-B

SCALE: ¼"=1'-0"



BACKWALL



CAP

CORNER DETAILS

SCALE: ¼"=1'-0"

TABLE OF ABUTMENT 4 QUANTITIES - PHASE 1				
A1	10	#11	22'-3"	1,183
H1	8	#6	22'-7"	272
L	9	#6	4'-0"	55
S	21	#5	11'-6"	252
U	2	#6	8'-1"	25
V	21	#5	12'-7"	276
wH1	7	#6	14'-5"	152
wH2	10	#6	12'-8"	191
wS	14	#4	7'-10"	74
wV	14	#5	12'-9"	187
REINFORCING STEEL			LB	2,667
CLASS "C" CONCRETE (ABUT)			CY	13.6

TABLE OF ABUTMENT 4 QUANTITIES - PHASE 2				
A2	10	#11	22'-9"	1,209
H2	8	#6	23'-1"	278
L	9	#6	4'-0"	55
S	25	#5	11'-6"	300
U	2	#6	8'-1"	25
V	24	#5	12'-7"	315
wH1	7	#6	14'-5"	152
wH2	10	#6	12'-8"	191
wS	14	#4	7'-10"	74
wV	14	#5	12'-9"	187
REINFORCING STEEL			LB	2,786
CLASS "C" CONCRETE (ABUT)			CY	14.9

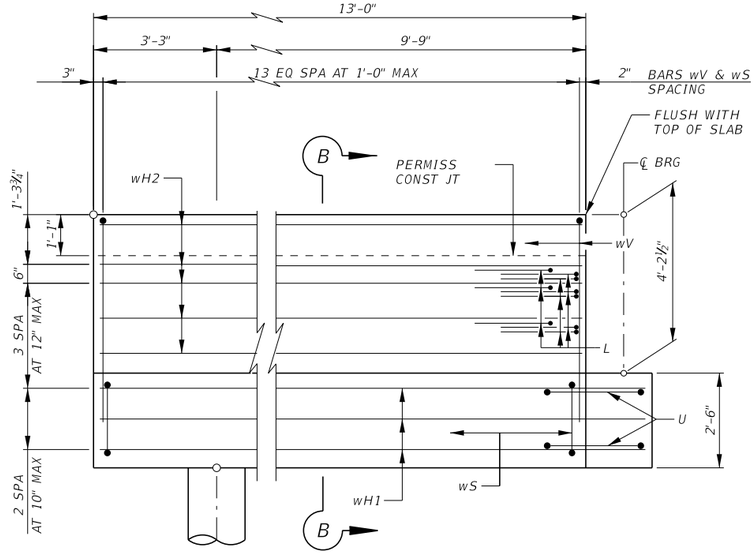
COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE. REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.

GENERAL NOTES:

1. DESIGNED PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS 8TH EDITION.
2. SEE COMMON FOUNDATION DETAILS (FD) STANDARD SHEET FOR ALL FOUNDATION DETAILS AND NOTES NOT SHOWN.
3. THE BEARING SEATS SHALL RECEIVE A WOOD FLOAT FINISH.
4. CALCULATED DRILLED SHAFT FOUNDATION LOAD = 140 TONS/SHAFT.

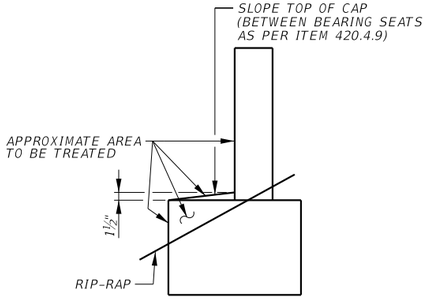
MATERIAL NOTES:

1. PROVIDE CLASS C CONCRETE (f'c = 3,600psi)
2. PROVIDE GRADE 60 REINFORCING STEEL.
3. EPOXY COAT ALL BARS EXCEPT DRLLED SHAFT BARS.



WINGWALL ELEVATION

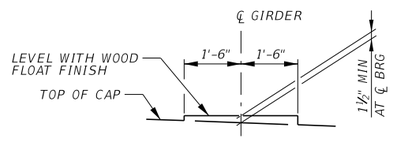
SCALE: ¼"=1'-0"



WATERPROOFING DETAIL

SCALE: NTS

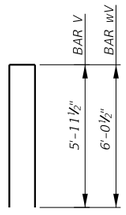
NOTE: THE FACE OF BACKWALL AND TOP, FRONT AND ENDS OF THE CAP AS SHOWN, EXCEPT BEARING SEATS, SHALL BE WATERPROOFED AS PER ITEM 427, "SURFACE FINISHES FOR CONCRETE".



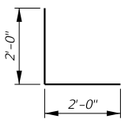
BEARING SEAT DETAIL

SCALE: NTS

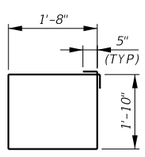
(BEARING SURFACE MUST BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE PLACING BEARING PAD.)



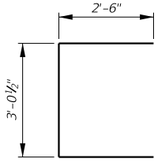
BARS V & wV



BARS L



BARS wS



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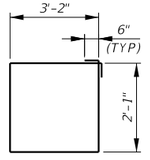

BARS S

HL93 LOADING

Texas Department of Transportation

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DALLAS, TEXAS 75252
(214) 884-4253
FIRM REGISTRATION No. F-10161

SH 70

PLUM CREEK BRIDGE ABUTMENT 4 DETAILS

SHEET 2 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE COVER SHEET		078
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH70-BR-AB_04.dgn

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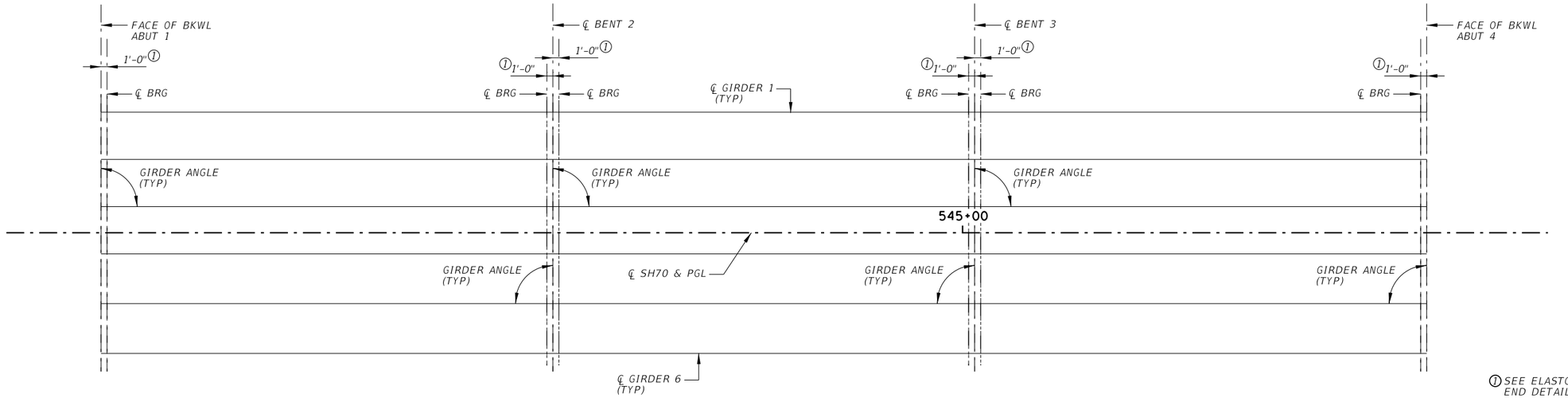

Ⓘ SEE ELASTOMERIC BEARING AND GIRDER END DETAILS (IGEB) STANDARD SHEET FOR ORIENTATION OF DIMENSIONS.

② GIRDER LENGTHS SHOWN ARE BOTTOM GIRDER FLANGE LENGTHS WITH ADJUSTMENTS MADE FOR GIRDER SLOPE.

BENT REPORT

ABUT NO. 1 (S 78 40 23.81 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 20.000 L

			GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D M S
SPAN 1	GIRDER	1	0.000	90 0 0
	GIRDER	2	7.833	90 0 0
	GIRDER	3	7.833	90 0 0
	GIRDER	4	7.833	90 0 0
	GIRDER	5	8.250	90 0 0
	GIRDER	6	8.250	90 0 0
	TOTAL		40.000	

BENT NO. 2 (S 78 40 23.81 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 20.000 L

			GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D M S
SPAN 1	GIRDER	1	0.000	90 0 0
	GIRDER	2	7.833	90 0 0
	GIRDER	3	7.833	90 0 0
	GIRDER	4	7.833	90 0 0
	GIRDER	5	8.250	90 0 0
	GIRDER	6	8.250	90 0 0
	TOTAL		40.000	
SPAN 2	GIRDER	1	0.000	90 0 0
	GIRDER	2	7.833	90 0 0
	GIRDER	3	7.833	90 0 0
	GIRDER	4	7.833	90 0 0
	GIRDER	5	8.250	90 0 0
	GIRDER	6	8.250	90 0 0
	TOTAL		40.000	

BENT NO. 3 (S 78 40 23.81 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 20.000 L

			GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D M S
SPAN 2	GIRDER	1	0.000	90 0 0
	GIRDER	2	7.833	90 0 0
	GIRDER	3	7.833	90 0 0
	GIRDER	4	7.833	90 0 0
	GIRDER	5	8.250	90 0 0
	GIRDER	6	8.250	90 0 0
	TOTAL		40.000	
SPAN 3	GIRDER	1	0.000	90 0 0
	GIRDER	2	7.833	90 0 0
	GIRDER	3	7.833	90 0 0
	GIRDER	4	7.833	90 0 0
	GIRDER	5	8.250	90 0 0
	GIRDER	6	8.250	90 0 0
	TOTAL		40.000	

ABUT NO. 4 (S 78 40 23.81 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 20.000 L

			GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D M S
SPAN 3	GIRDER	1	0.000	90 0 0
	GIRDER	2	7.833	90 0 0
	GIRDER	3	7.833	90 0 0
	GIRDER	4	7.833	90 0 0
	GIRDER	5	8.250	90 0 0
	GIRDER	6	8.250	90 0 0
	TOTAL		40.000	

GIRDER REPORT

GIRDER REPORT, SPAN 1

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. GDR. FLG.	GIRDER SLOPE
GIRDER 1	75.000	73.000	74.50 ②	-0.0050
GIRDER 2	75.000	73.000	74.50	-0.0050
GIRDER 3	75.000	73.000	74.50	-0.0050
GIRDER 4	75.000	73.000	74.50	-0.0050
GIRDER 5	75.000	73.000	74.50	-0.0050
GIRDER 6	75.000	73.000	74.50	-0.0050

GIRDER REPORT, SPAN 2

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. GDR. FLG.	GIRDER SLOPE
GIRDER 1	70.000	68.000	69.50 ②	-0.0050
GIRDER 2	70.000	68.000	69.50	-0.0050
GIRDER 3	70.000	68.000	69.50	-0.0050
GIRDER 4	70.000	68.000	69.50	-0.0050
GIRDER 5	70.000	68.000	69.50	-0.0050
GIRDER 6	70.000	68.000	69.50	-0.0050

GIRDER REPORT, SPAN 3

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. GDR. FLG.	GIRDER SLOPE
GIRDER 1	75.000	73.000	74.50 ②	-0.0050
GIRDER 2	75.000	73.000	74.50	-0.0050
GIRDER 3	75.000	73.000	74.50	-0.0050
GIRDER 4	75.000	73.000	74.50	-0.0050
GIRDER 5	75.000	73.000	74.50	-0.0050
GIRDER 6	75.000	73.000	74.50	-0.0050

HL93 LOADING

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FIRM REGISTRATION No. F-10161

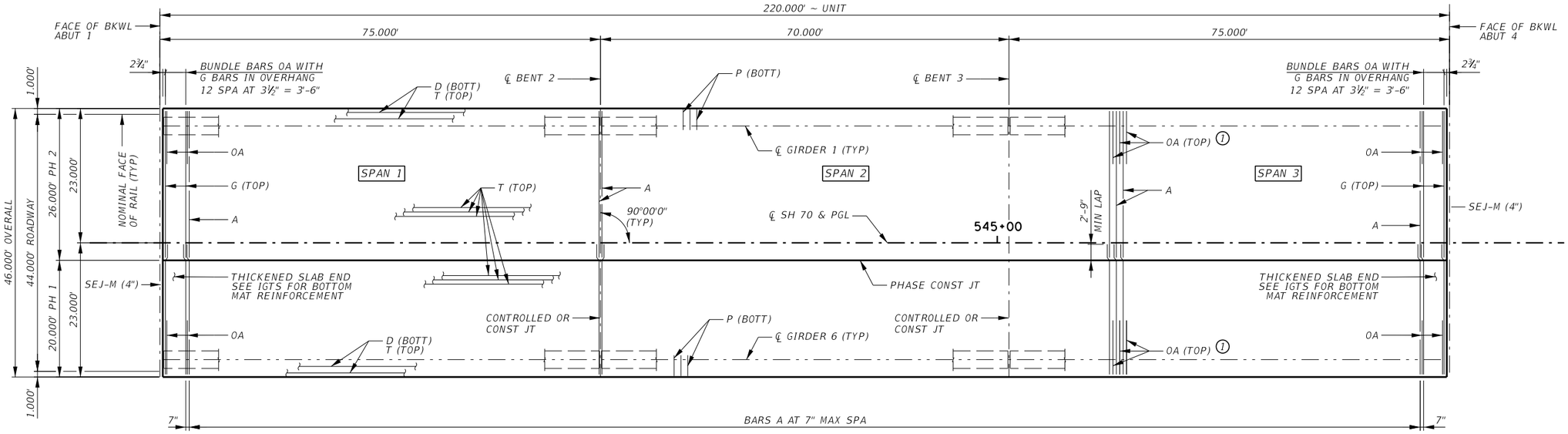
SH 70

PLUM CREEK BRIDGE FRAMING PLAN

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE COVER SHEET		079
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH70-BR-FR_01.dgn



PLAN

(1) PLACE BARS OA MIDWAY BETWEEN BARS A AT OVERHANG.

GENERAL NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION.
2. SEE PRESTRESSED CONCRETE PANELS (PCP) AND PRECAST CONCRETE PANEL FABRICATION DETAILS (PCP-FAB) STANDARD SHEETS FOR PANEL DETAILS NOT SHOWN.
3. SEE THICKENED SLAB END DETAILS (IGTS) STANDARD SHEET FOR THICKENED SLAB END DETAILS AND QUANTITY ADJUSTMENTS.
4. SEE MISCELLANEOUS SLAB DETAILS (IGMS) STANDARD SHEET FOR MISCELLANEOUS SLAB DETAILS NOT SHOWN.
5. SEE RAILING STANDARD SHEETS FOR RAIL ANCHORAGE IN SLAB.
6. SEE PERMANENT METAL DECK FORMS (PMDF) STANDARD SHEET FOR DETAILS AND QUANTITY ADJUSTMENTS IF THIS OPTION IS USED.
7. COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.

MATERIAL NOTES:

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

PROVIDE GFRP BARS FOR ALL TOP MAT REINFORCEMENT, CONFORMING TO ASTM D7957/7957M, EXCEPT PROVIDE A MINIMUM MODULUS OF ELASTICITY OF 7,500 KSI.

PROVIDE GRADE 60 EPOXY COATED REINFORCING STEEL FOR ALL BOTTOM MAT REINFORCEMENT .

PROVIDE BAR LAPS, WHERE REQUIRED, AS FOLLOWS:
GFRP ~ #5 = 2'-9"
EPOXY COATED ~ #4 = 2'-5"

STATE OF TEXAS
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130455
LICENSED PROFESSIONAL ENGINEER
4/11/2022

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PLUM CREEK BRIDGE 220.00' CONC I-GIRDER UNIT DETAILS

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE COVER SHEET		080
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH70-BR-DP_01.dgn

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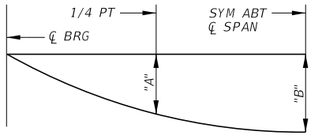


DEAD LOAD DEFLECTION DIAGRAM

NOTE
DEFLECTIONS SHOWN ARE DUE TO PRESTRESSED CONCRETE PANELS AND CAST-IN-PLACE SLAB ONLY. (Ec =5,000 ksi) ADJUST DEFLECTIONS BASED ON FIELD OBSERVATIONS AS NEEDED.

SPAN	GIRDER NO	"A" FT	"B" FT
1	1	0.064	0.089
	2	0.072	0.100
	3	0.072	0.100
	4	0.043	0.059
	5	0.076	0.106
	6	0.065	0.091
2	1	0.048	0.067
	2	0.055	0.076
	3	0.055	0.076
	4	0.033	0.045
	5	0.057	0.080
	6	0.050	0.069
3	1	0.064	0.089
	2	0.072	0.100
	3	0.072	0.100
	4	0.043	0.059
	5	0.076	0.106
	6	0.065	0.091

BAR TABLE

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

TABLE OF SECTION DEPTHS

SPAN NO	GIRDER NO	"X" AT ℄ BRG	"Y" AT ℄ BRG	① "Z" AT ℄ SPAN
1	1	12¼"	3'-10¼"	10¼"
	2	12¼"	3'-10¼"	10⅜"
	3	12¼"	3'-10¼"	10⅜"
	4	11¾"	3'-9¾"	9½"
	5	11¾"	3'-9¾"	9⅞"
	6	11¾"	3'-9¾"	9¾"
2	1	12¼"	3'-10¼"	10¼"
	2	12¼"	3'-10¼"	10¼"
	3	12¼"	3'-10¼"	10¼"
	4	11¾"	3'-9¾"	9½"
	5	11¾"	3'-9¾"	9⅞"
	6	11¾"	3'-9¾"	9¾"
3	1	12¼"	3'-10¼"	10¼"
	2	12¼"	3'-10¼"	10⅜"
	3	12¼"	3'-10¼"	10⅜"
	4	11¾"	3'-9¾"	9½"
	5	11¾"	3'-9¾"	9⅞"
	6	11¾"	3'-9¾"	9¾"

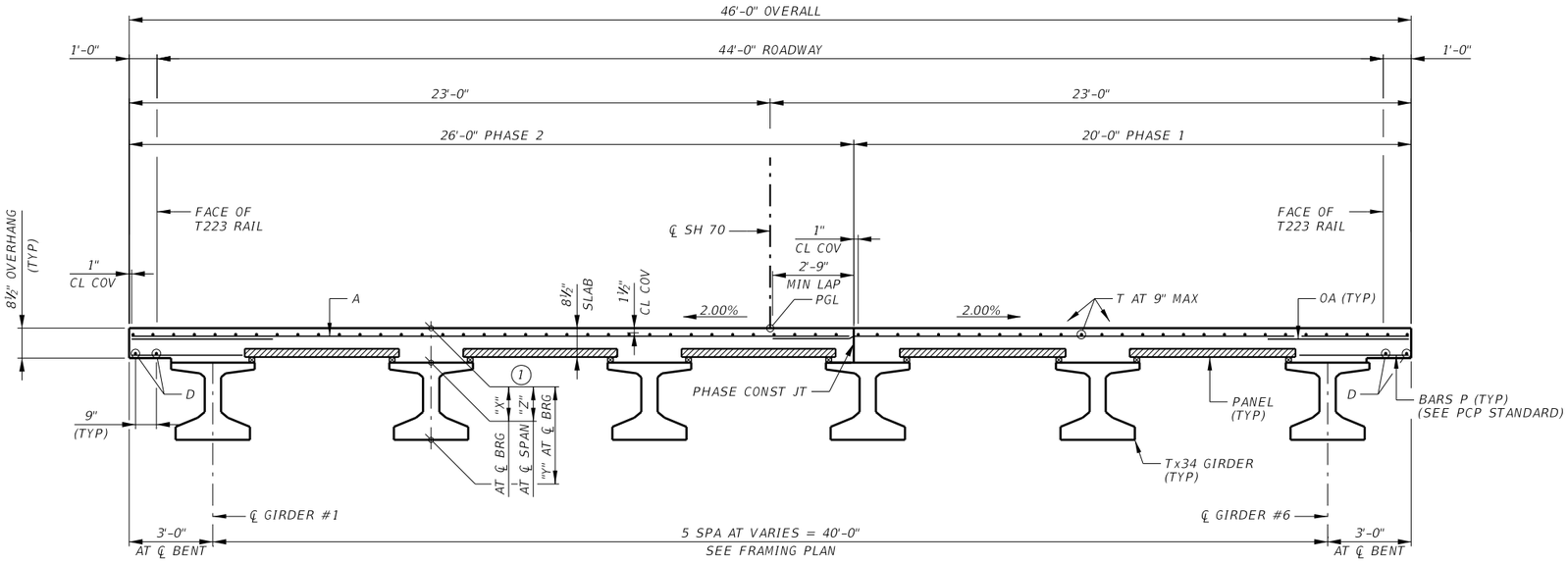
① THEORETICAL DIMENSION (SHOWN TO NEAREST 1/8")

TABLE OF ESTIMATED QUANTITIES

SPAN	REINF CONCRETE SLAB	PRESTR ③ CONCRETE GIRDERS (Tx34)	② REINF STEEL
NO	SF	LF	LB
SPAN 1 PHASE 1	1,500	223.50	1,950
SPAN 2 PHASE 1	1,400	208.50	1,820
SPAN 3 PHASE 1	1,500	223.50	1,950
SPAN 1 PHASE 2	1,950	223.50	2,535
SPAN 2 PHASE 2	1,820	208.50	2,366
SPAN 3 PHASE 2	1,950	223.50	2,535
TOTAL PHASE 1	4,400	655.50	5,720
TOTAL PHASE 2	5,720	655.50	7,436
TOTAL	10,120	1,311.00	13,156

② GFRP AND EPOXY COATED REINFORCING STEEL WEIGHT IS CALCULATED USING AN APPROXIMATE FACTOR OF 1.3 LBS/SF.

③ LENGTHS SHOWN ARE BOTTOM FLANGE LENGTHS WITH ADJUSTMENTS MADE FOR GIRDER SLOPE.



TYPICAL TRANSVERSE SECTION

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

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SH 70

PLUM CREEK BRIDGE
PS CONC I-GIRDER UNIT

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE COVER SHEET		081
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH70-BR-DS_02.dgn

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MODEL:Design

STRUCTURE	DESIGNED GIRDERS									DEPRESSED STRAND PATTERN		CONCRETE		OPTIONAL DESIGN				
	SPAN NO.	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS						NO.	TO END (in)	RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct(ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR (2)	
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)								Moment	Shear
PLUM CREEK BRIDGE	ALL	ALL	Tx34		26	0.6	270	12.09	8.40	4	28.5	4.8	5.4	3.048	-3.562	3530	0.666	0.832

NON-STANDARD STRAND PATTERNS	
PATTERN	STRAND ARRANGEMENT AT ℄ OF GIRDER

(1) Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

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

Optional designs must likewise conform.

(2) Portion of full HL93.

DESIGN NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Optional designs for girders 120 feet or longer must have a calculated residual camber equal to or greater than that of the designed girder.

Prestress losses for the designed girders have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel bars.

Use low relaxation strands, each pretensioned to 75 percent of fpu.

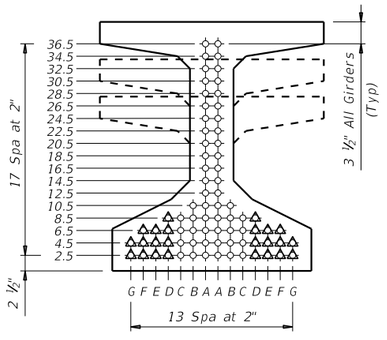
Strand debonding must comply with Item 424.4.2.2.2.4. Full-length debonded strands are only permitted in positions marked Δ. Double wrap full-length debonded strands in outer most position of each row.

When shown on this sheet, the Fabricator has the option of furnishing either the designed girder or an approved optional design. All optional design submittals must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.

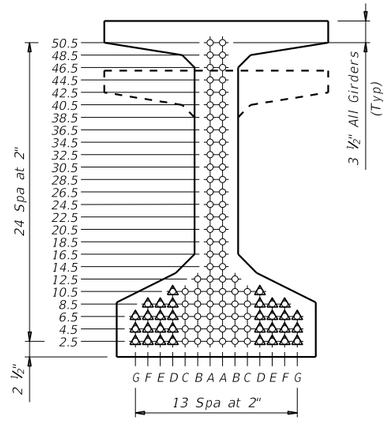
Seal cracks in girder ends exceeding 0.005" in width as directed by the Engineer. The fabricator is permitted to decrease the spacing of Bars R and S by providing additional bars to help limit crack width provided the decreased spacing results in no less than 1" clear between bars. The fabricator must take an approved corrective action if cracks greater than 0.005" form on a repetitive basis.

DEPRESSED STRAND DESIGNS:

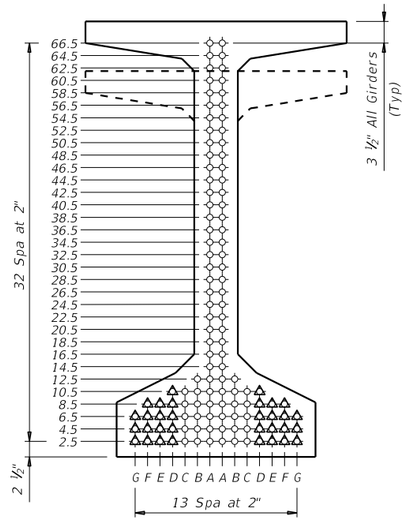
Locate strands for the designed girder as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc., beginning each row in the "A" position and working outward until the required number of strands is reached. All strands in the "A" position must be depressed, maintaining the 2" spacing so that, at the girder ends, the upper two strands are in the position shown in the table.



TYPE Tx28, Tx34 & Tx40



TYPE Tx46 & Tx54



TYPE Tx62 & Tx70

STATE OF TEXAS
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130455
LICENSED PROFESSIONAL ENGINEER
4/11/2022

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SH 70

PLUM CREEK BRIDGE IGND

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE COVER SHEET		082
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH70-BR-IG_01.dgn

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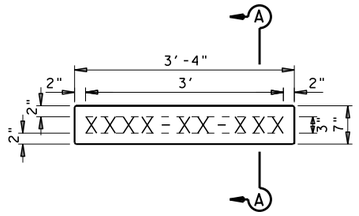
STRUCTURE ID TEMPLATES

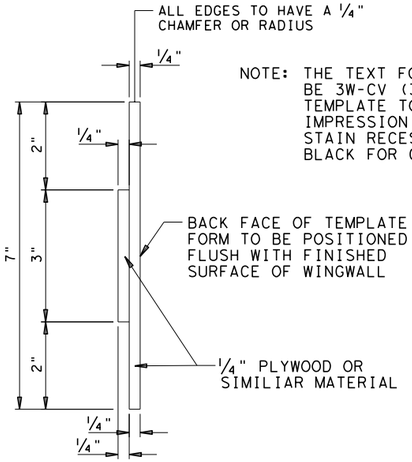


NOTE: THE SYMBOLS XXXX-XX-XXX REPRESENT THE STRUCTURE NUMBER WHICH IS SHOWN IN THE TABLE TO THE RIGHT.

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

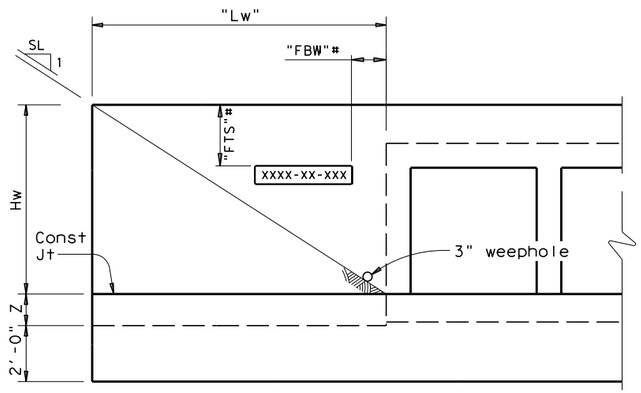
STRUCTURE ID TEMPLATE NUMBERS

NBI NUMBER	LOCATION	STRUCTURE NUMBER	"WL"	"Lw"	"Hw"	"FBW"#	"FTS"#
08-077-0-0263-05-320	SH 70 OVER PLUM CREEK	0263-05-320	13'	NA	4'-2¼"	VARIOUS	VARIOUS

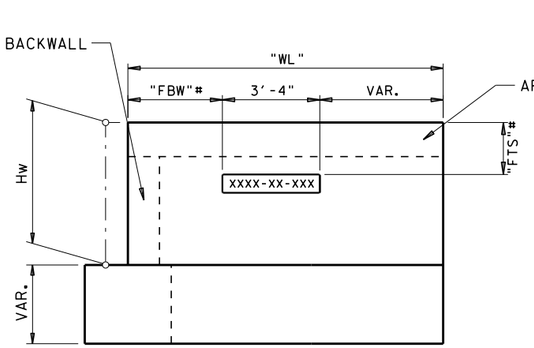


NOTE: THE TEXT FOR ALL TEMPLATES SHOULD BE 3W-CV (3") CLEAR VIEW FONT. TEMPLATE TO PROVIDE A RECESSED IMPRESSION INTO CAST CONCRETE. STAIN RECESSED NUMERAL SURFACES BLACK FOR CONTRAST.

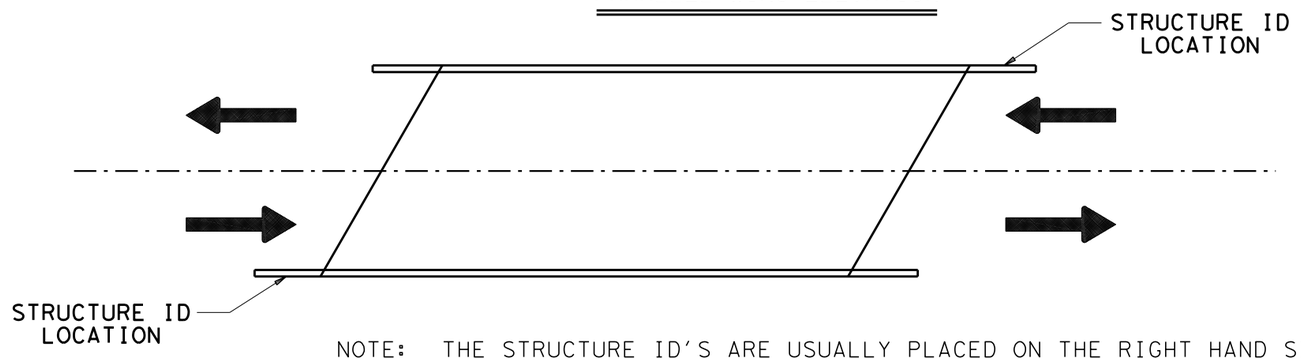
SECTION A-A



PARALLEL WING ELEVATION



WINGWALL ELEVATION



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.

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

STATE OF TEXAS
MOHAMMED N. THASLEEM
130455
LICENSED PROFESSIONAL ENGINEER
4/11/2022

P.E. SEAL REQUIRED

PRELIMINARY
SUBJECT TO REVISION
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STRUCTURE ID DETAILS
SIDD-14

Texas Department of Transportation

NO SCALE SHEET 1 OF 1

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH 70
STATE	COUNTY		SHEET NO.
TEXAS	FISHER		083
DISTRICT	CONTROL	SECTION	JOB
ABL	0263	05	024

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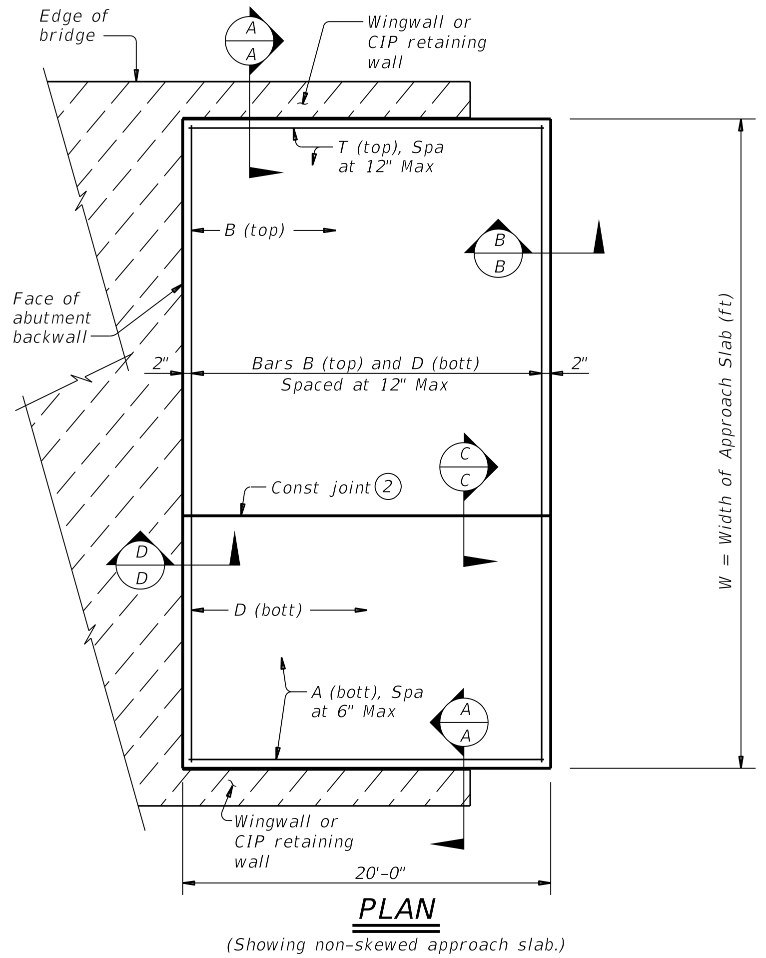
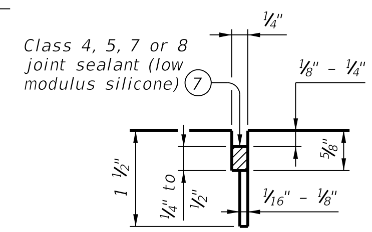
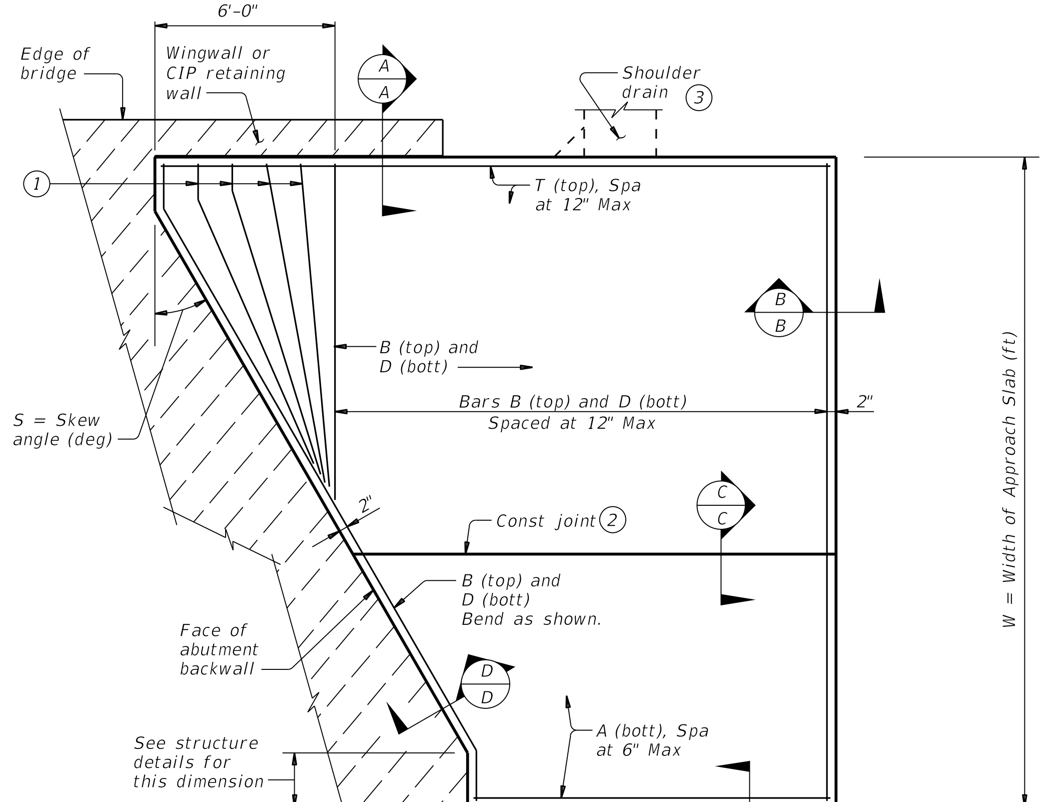


PLAN
(Showing non-skewed approach slab.)



LONGITUDINAL SAW CUT JOINT DETAIL



PLAN
(Showing skewed approach slab.)

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) = $0.802W + 0.02W^2$ 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 ½" 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 ½" and seal in accordance with Item 438. Alternately, provide a controlled joint consisting of 1 ½" 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."

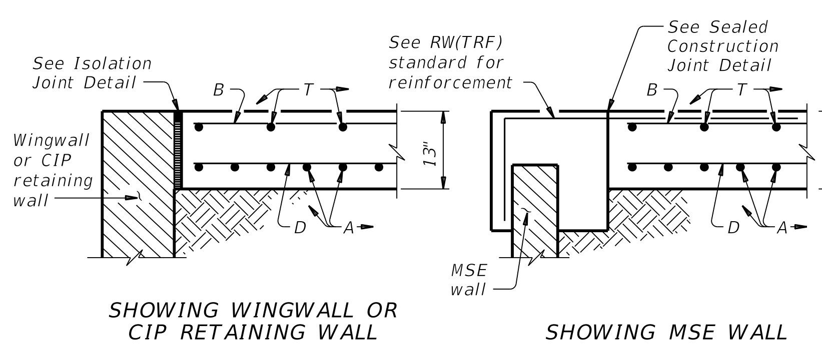
Construct the subgrade or subbase away from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.

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.

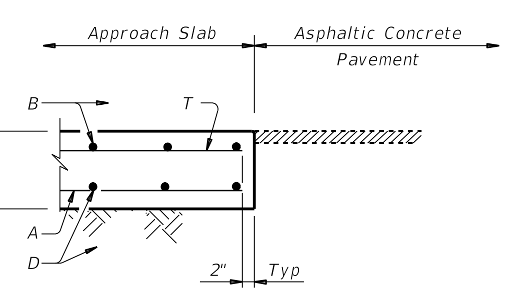
Cure for 4 days using water or membrane curing per Item 422.

All details shown herein are subsidiary to bridge approach slab.

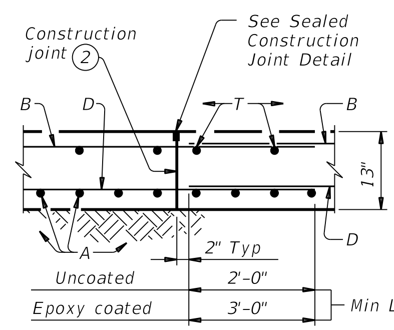
Cover dimensions are clear dimensions, unless noted otherwise.



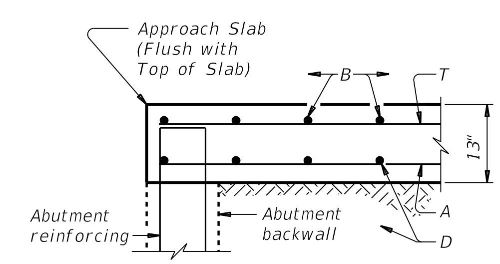
SECTION A-A



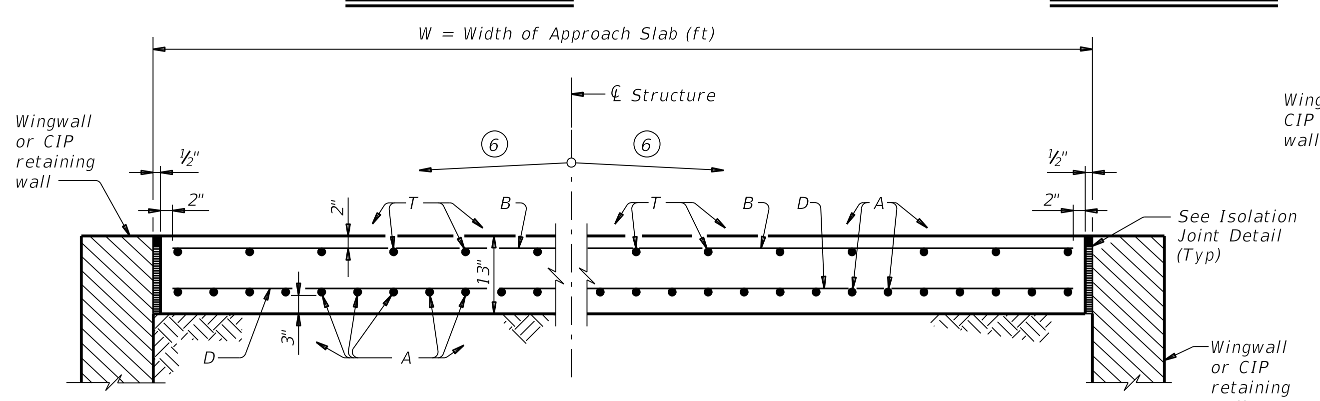
SECTION B-B



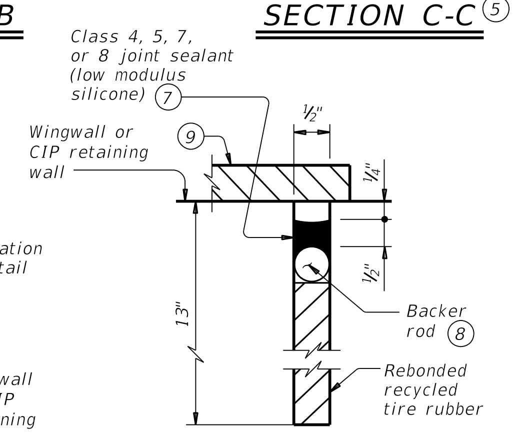
SECTION C-C 5



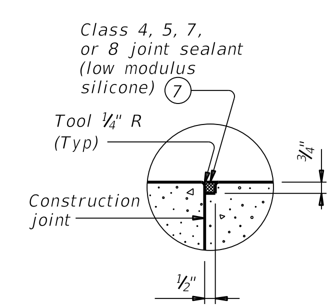
SECTION D-D



TYPICAL TRANSVERSE SECTION



ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOINT DETAIL

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	0263	05	024	SH 70
02-20: Removed stress relieving pad.	DIST		COUNTY	SHEET NO.
	ABL		FISHER	084

DATE: 4/11/2022 3:48:31 PM
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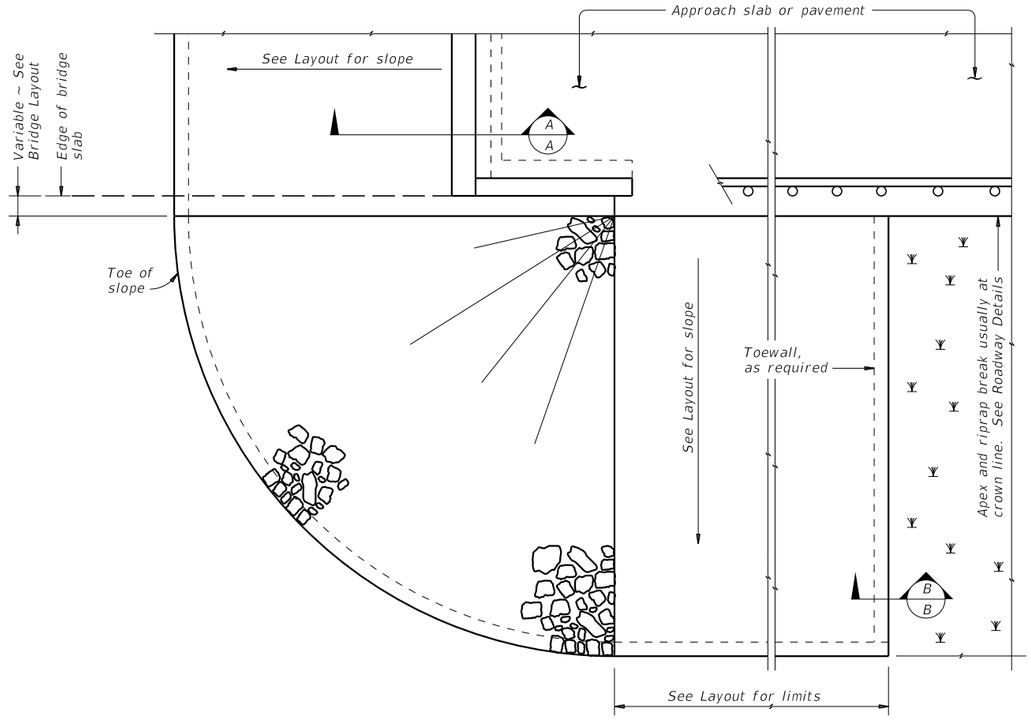
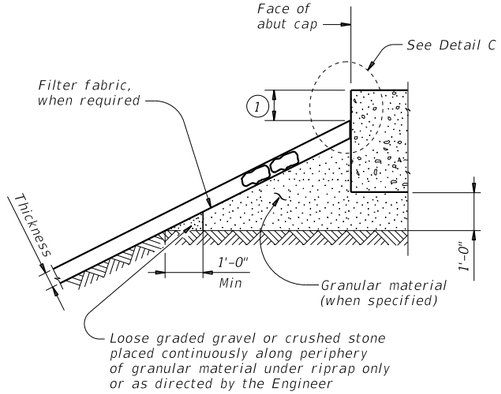
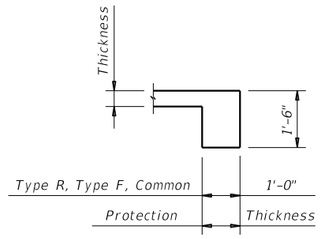


PLAN

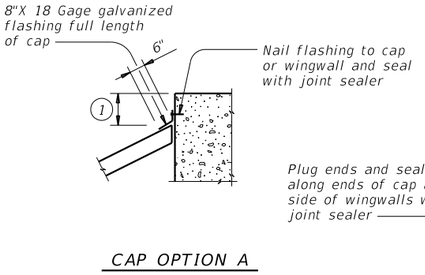


SECTION A-A AT CAP

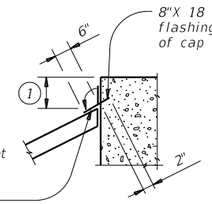


SECTION B-B

Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".

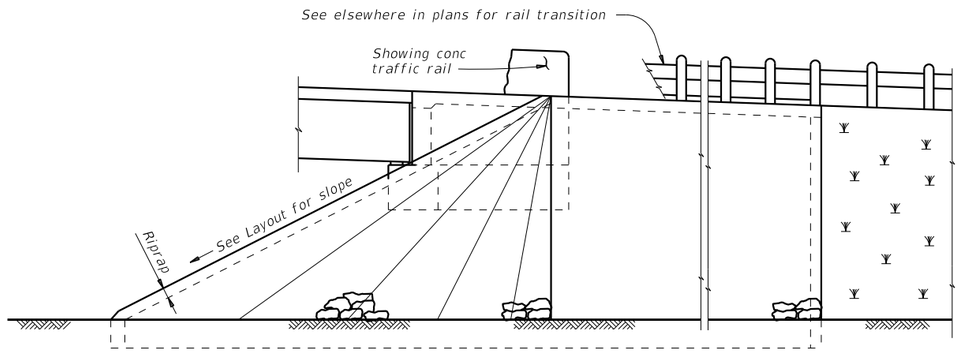


CAP OPTION A



CAP OPTION B

DETAIL C



ELEVATION

(1) Top of cap to top of riprap dimension varies as directed by the Engineer. Provide 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.

GENERAL NOTES:
Refer to Item 432, "Riprap" for stone size and gradation, and construction details. See Layout for limits and thickness of riprap specified.
See elsewhere in plans for locations and details of shoulder drains.

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0263	05	024	SH 70
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DATE: 4/11/2022 3:48:44 PM
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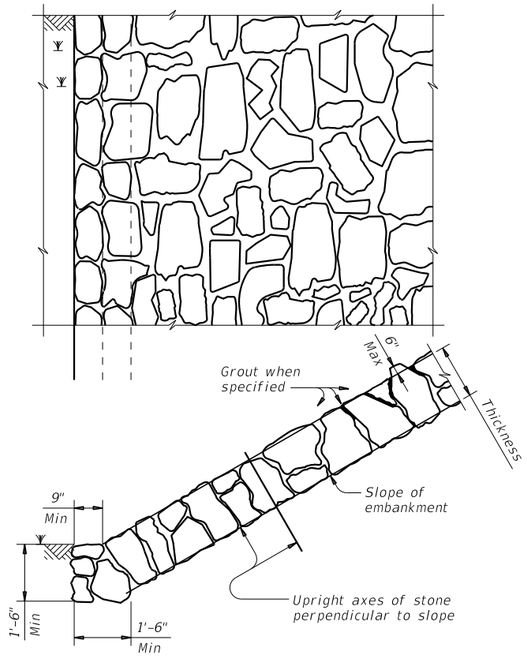


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

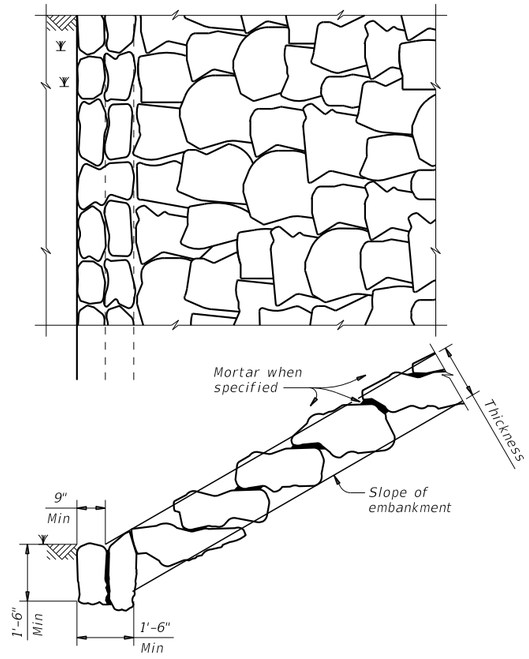


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

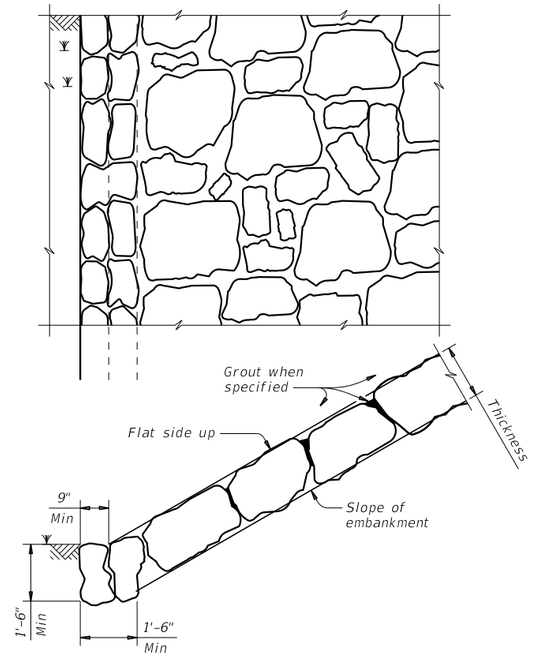


FIGURE 3 ~ TYPE F STONE RIPRAP

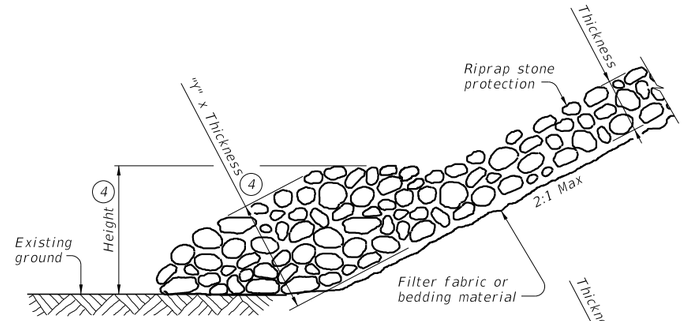
grouted

(2) Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.

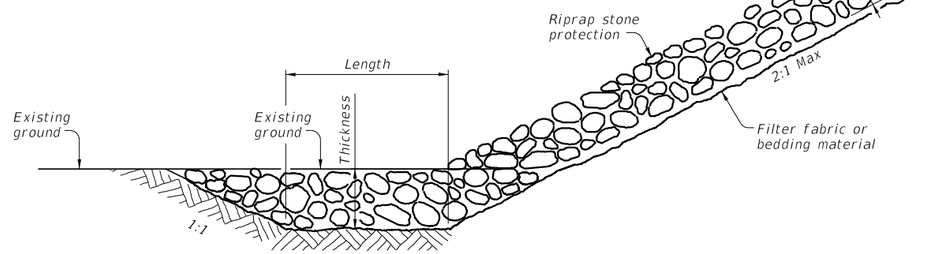
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

(4) "Y" and Height need to be defined. See layout or detail sheet for values if this option is used.

(5) List Stone Protection as size (XX inch) and thickness (YY inch) on the layout.
Example: Riprap (Stone Protection) XX inch, Thickness = YY inch.



MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS (5)

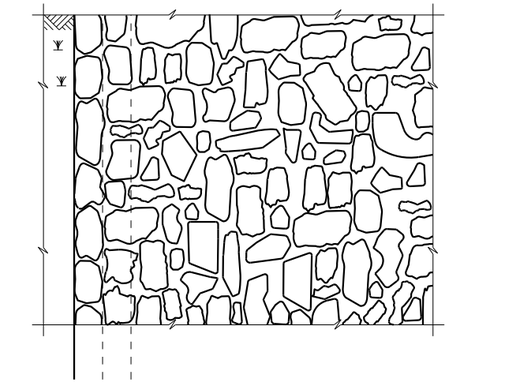


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

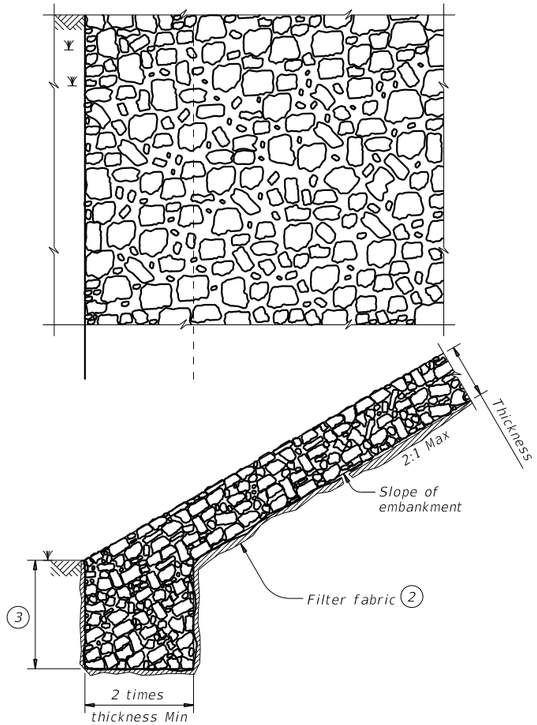


FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0263	05	024	SH 70
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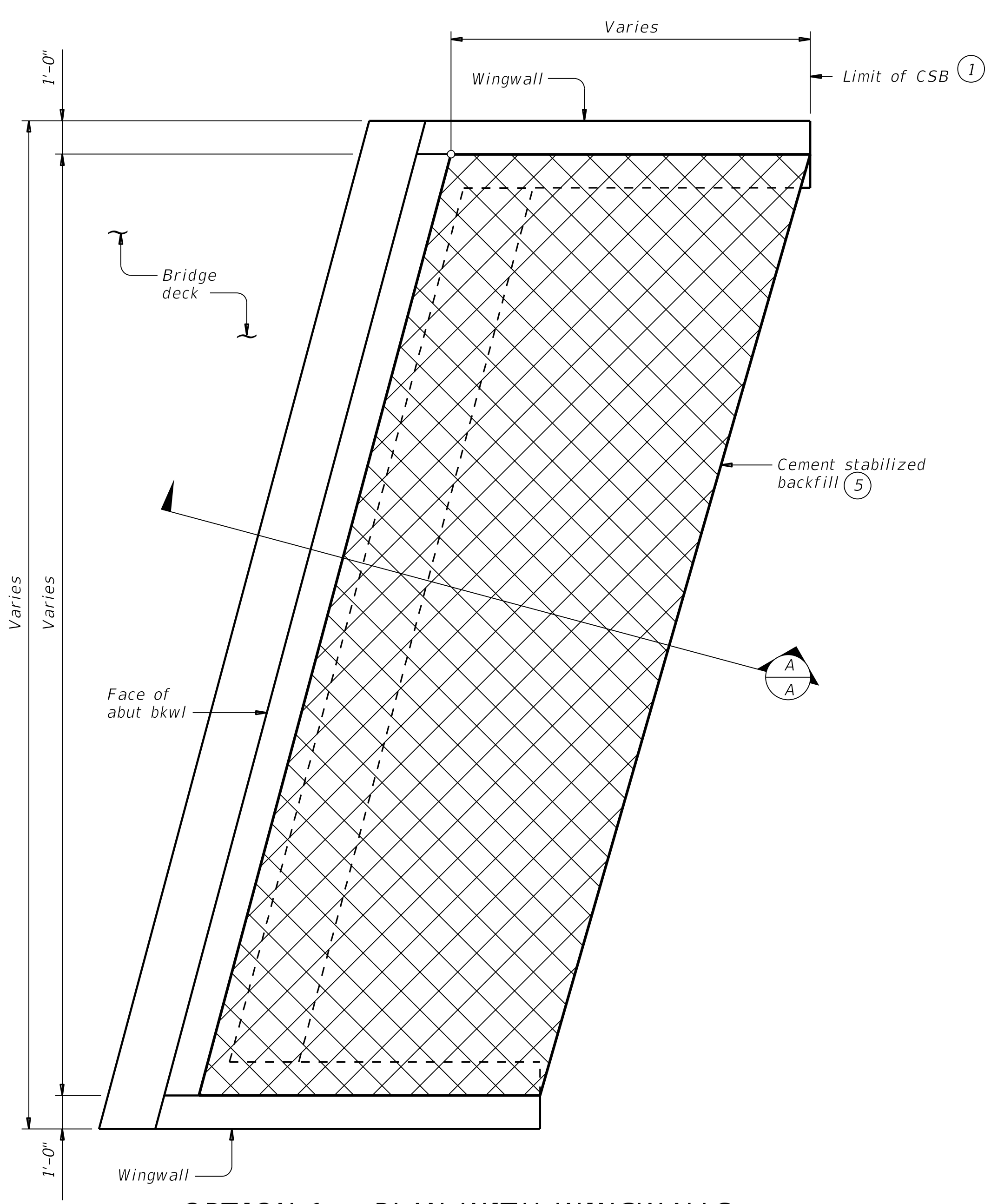
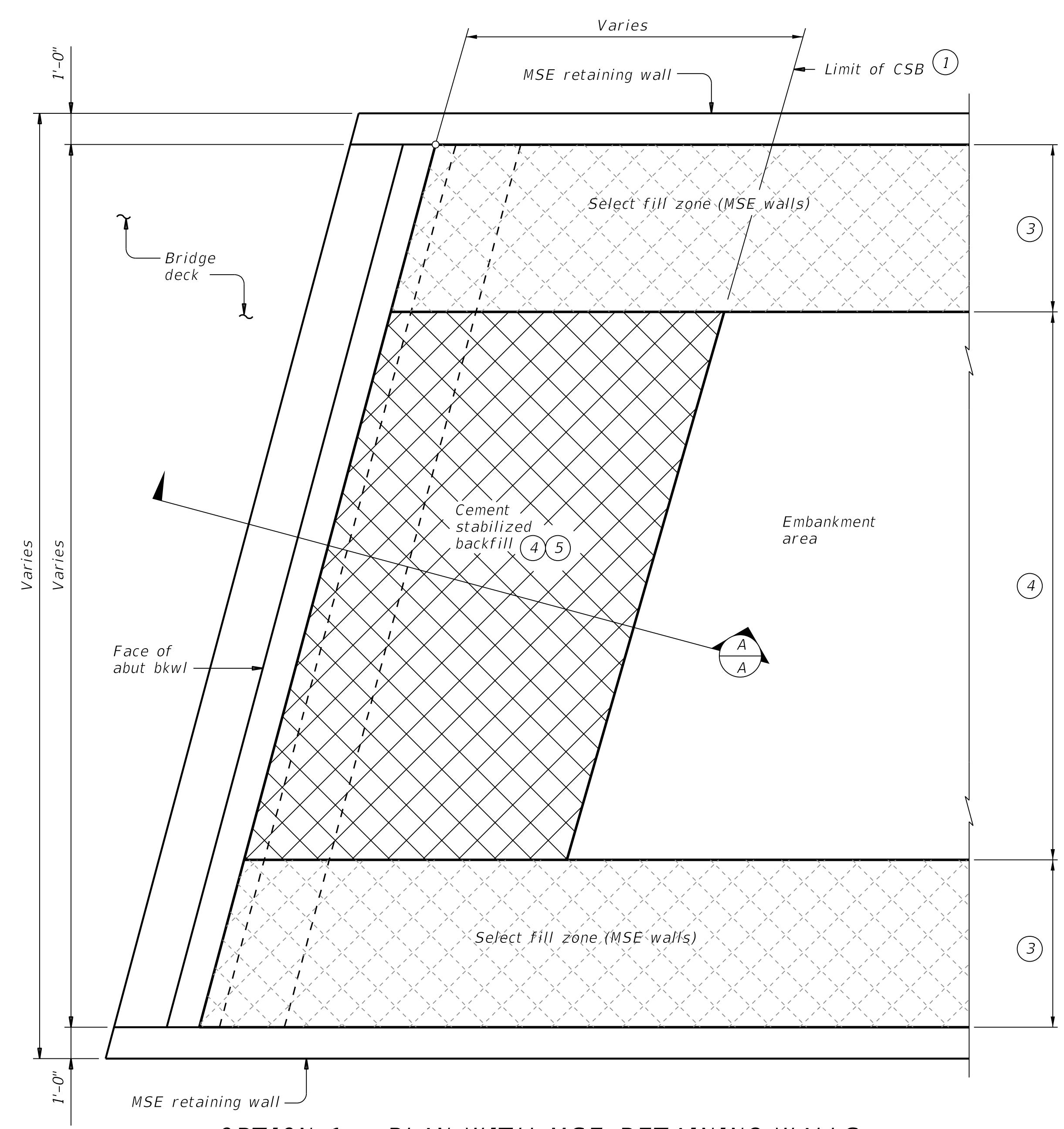
	ABL	FISHER		086



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 MSE backfill prior to placement of the flowable fill; and
b). Place flowable fill in lifts not exceeding 2 feet in height, place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).

GENERAL NOTES:

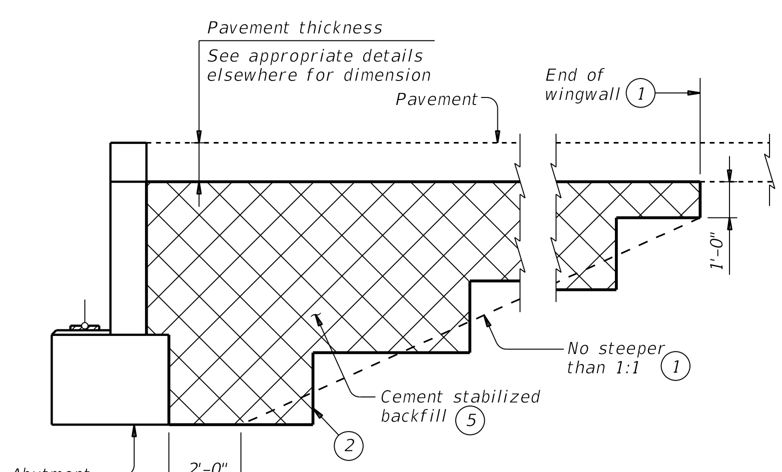
See the Bridge Layout for selected Option. Option 2 is intended for new construction requiring high plasticity embankment fill with a plasticity index (PI) greater than 30 or pavement built in poor native soil. Poor soils are defined as high plasticity clays or expansive clays. Option 1 is intended for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

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

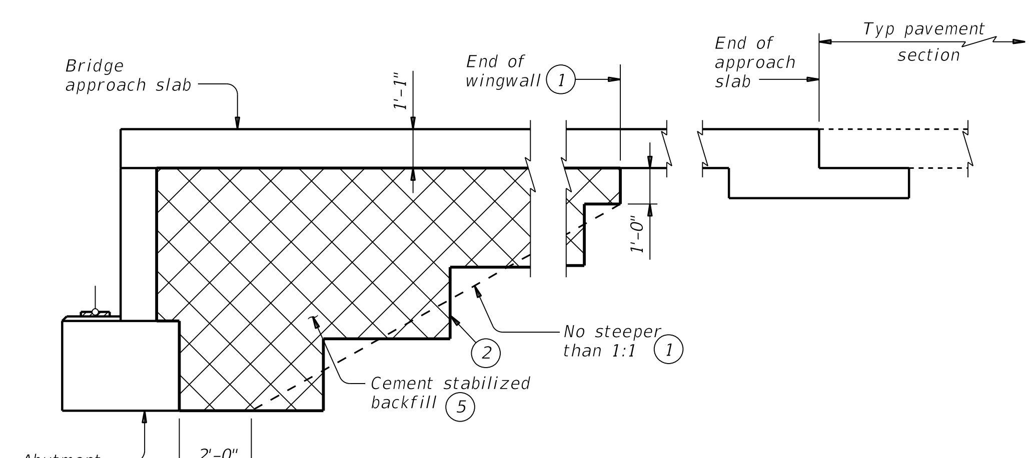
If required elsewhere in the plans, provide Flowable Backfill meeting the requirements of Item 401, "Flowable Backfill", to the limits shown at bridge abutments.

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

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



WITHOUT APPROACH SLAB



WITH APPROACH SLAB

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

SECTION A-A

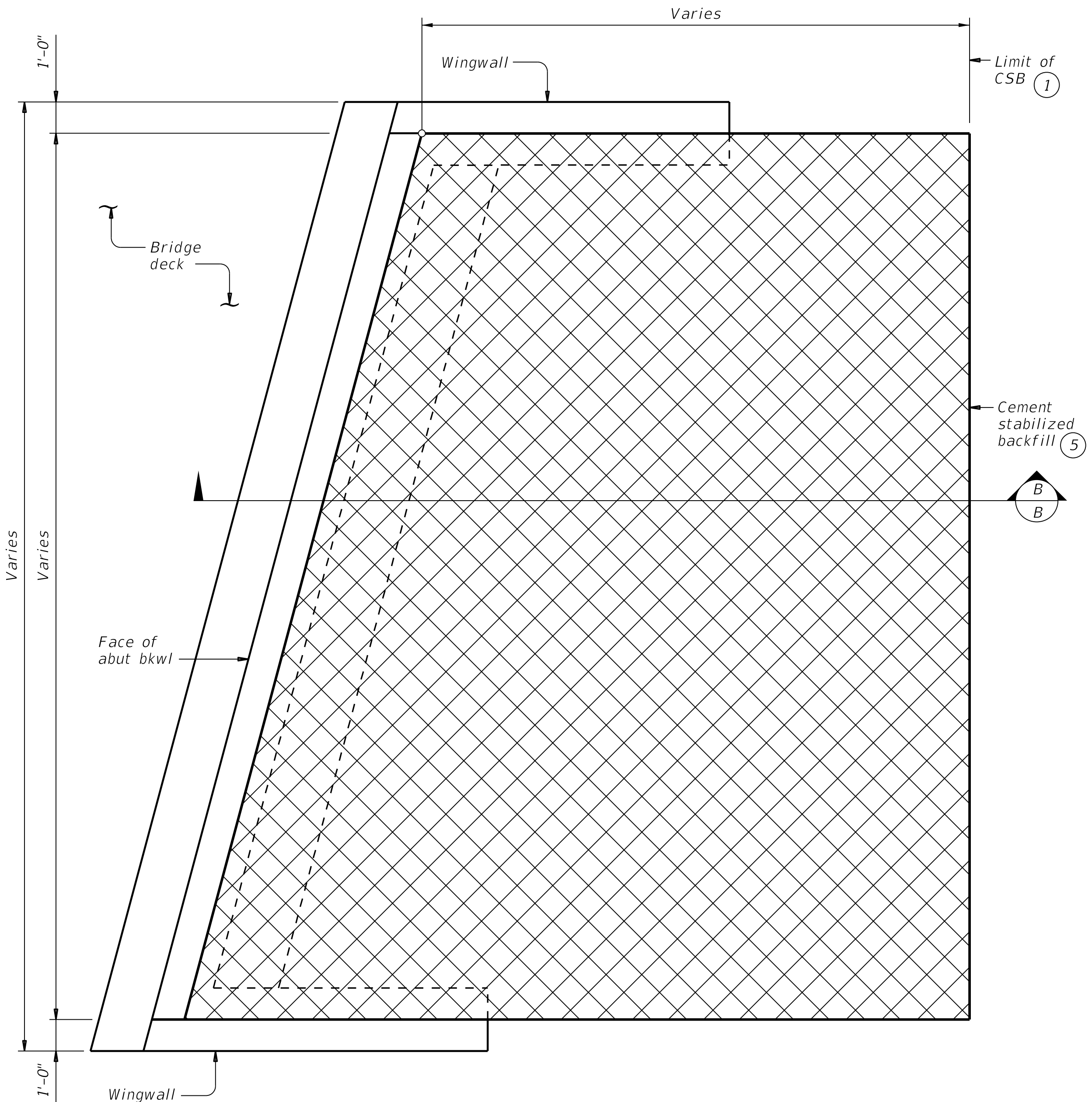
SHEET 1 OF 2

Texas Department of Transportation | Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL
BRIDGE ABUTMENT

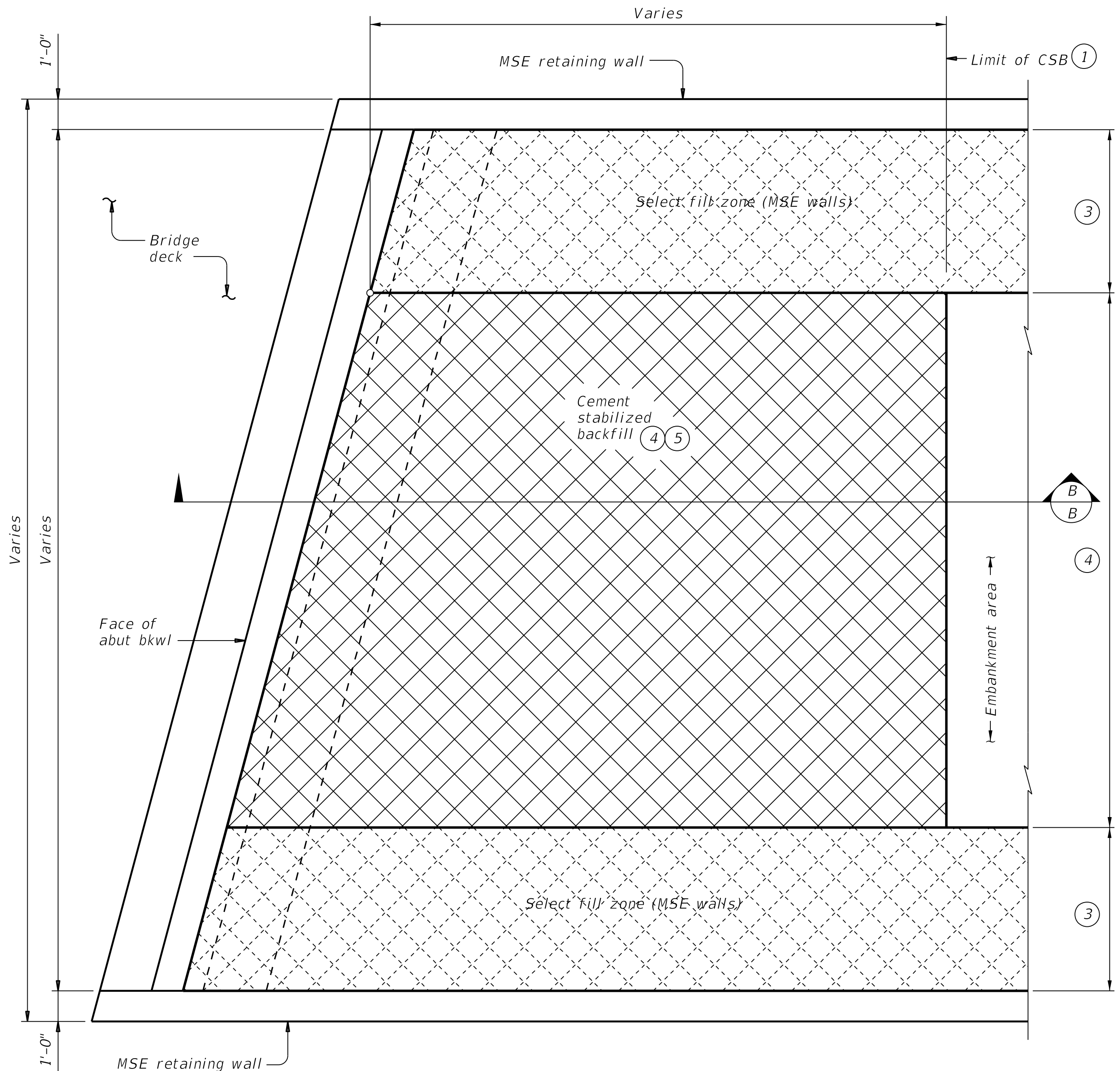
CSAB

FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0263	05	024	SH 70
02-20: Added Option 2.	DIST		COUNTY	SHEET NO.
	DST		FISHER	087



OPTION 2 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 2 ~ PLAN WITH MSE RETAINING WALLS

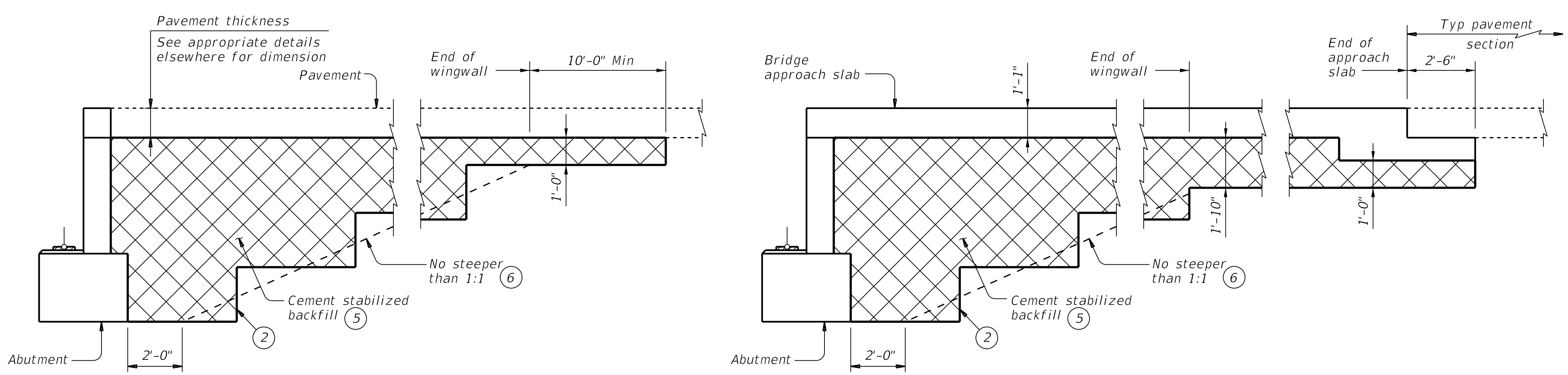
1 Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.

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

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

SECTION B-B

SHEET 2 OF 2

Texas Department of Transportation | Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL
BRIDGE ABUTMENT

CSAB

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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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02-20: Added Option 2.	DIST		COUNTY	SHEET NO.
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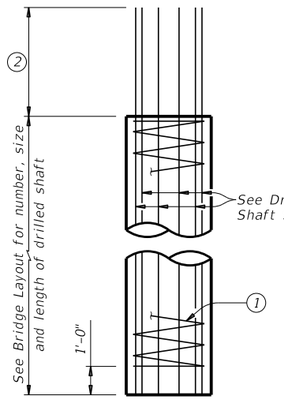
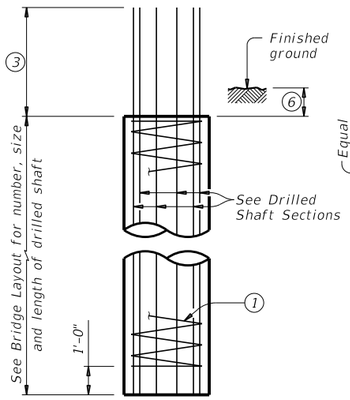
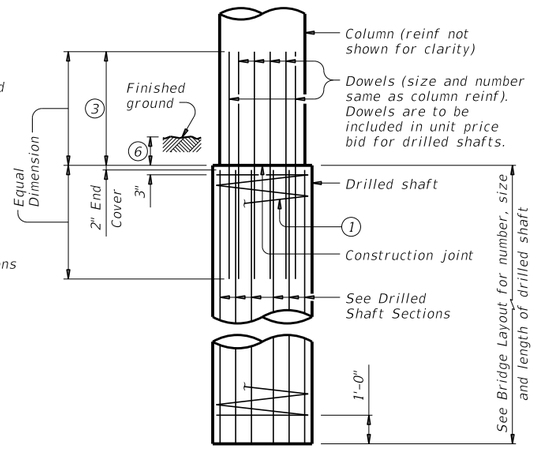


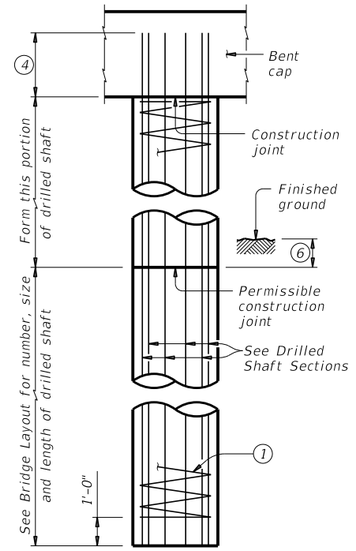
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



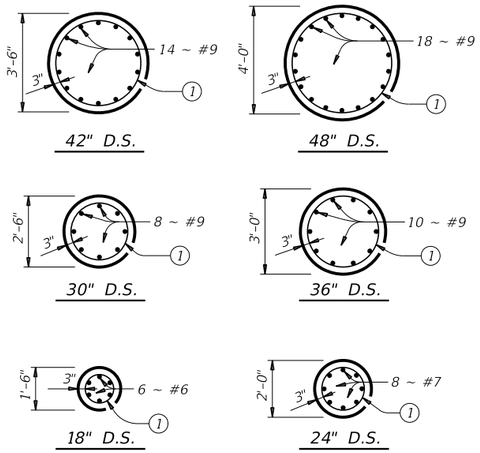
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

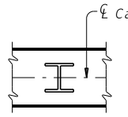


DRILLED SHAFT SECTIONS

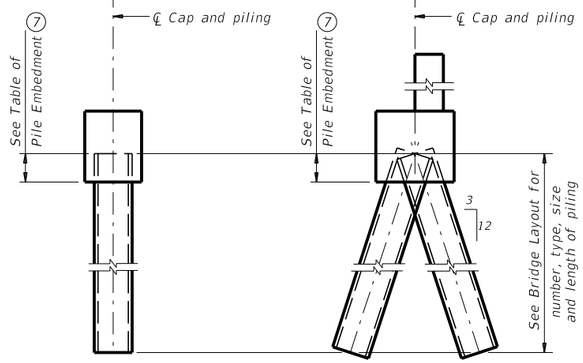
DRILLED SHAFT DETAILS

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

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

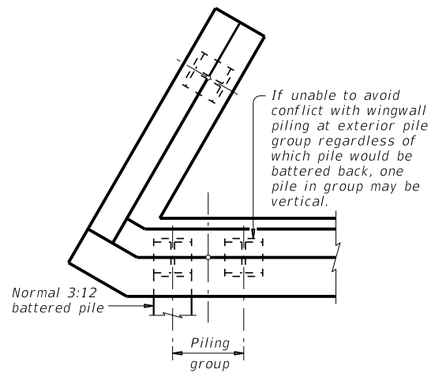


ORIENTATION OF STEEL H-PILING

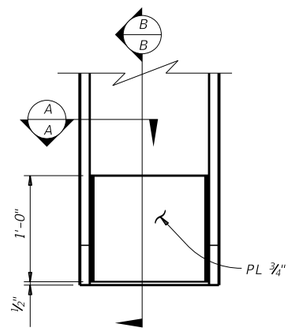


VERTICAL PILE BATTERED PILE

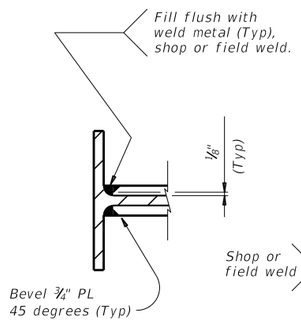
PILING DETAILS
(Concrete or steel H)



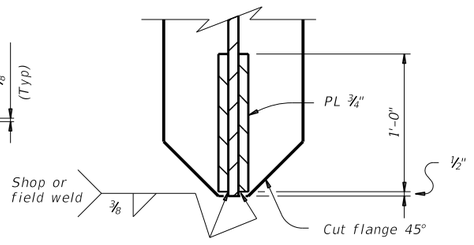
DETAIL "A"
(Showing plan view of a 30° skewed abutment)



ELEVATION



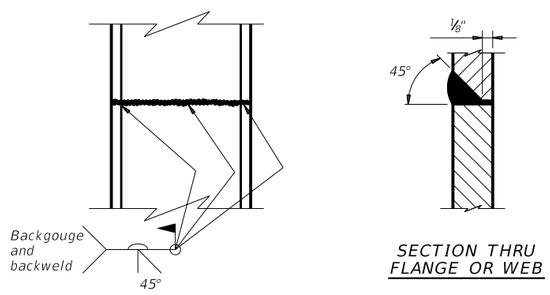
SECTION A-A



SECTION B-B

STEEL H-PILE TIP REINFORCEMENT

See Item 407 "Steel Piling" to determine when tip reinforcement is required and for options to the details shown.



SECTION THRU FLANGE OR WEB

STEEL H-PILE SPLICE DETAIL

Use when required.

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

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

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

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

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

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

(7) Or as shown on plans.

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	ABL	FISHER		089

DATE: 4/11/2022 3:48:57 PM
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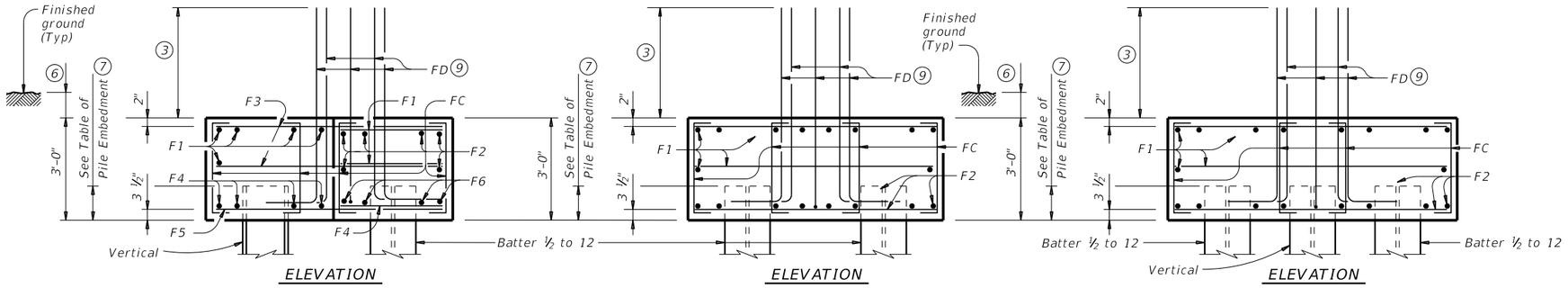
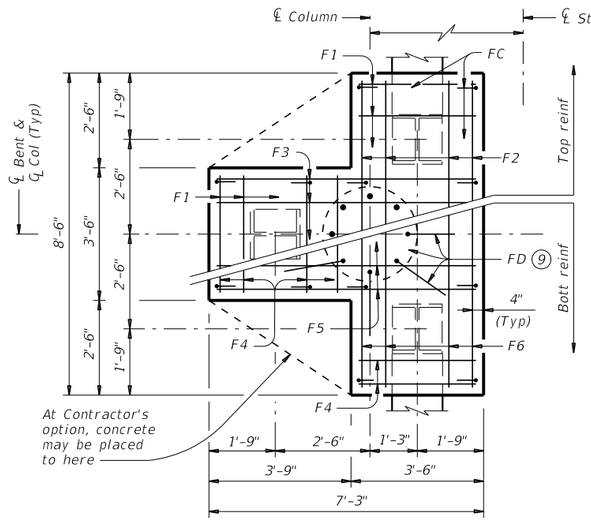
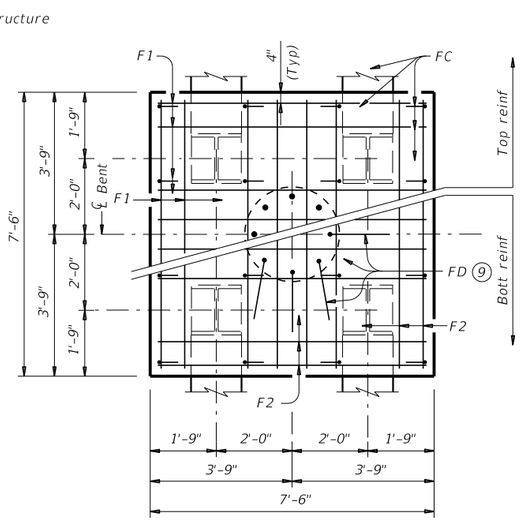




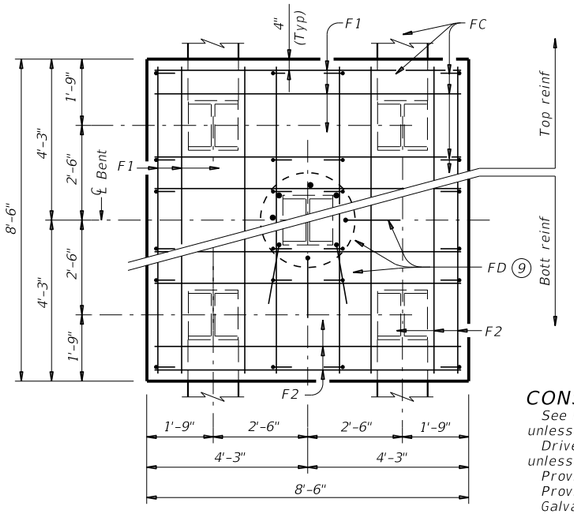
THREE PILE FOOTING (8)

For 36" Dia and smaller columns.



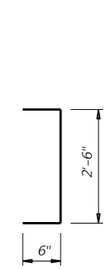
FOUR PILE FOOTING (8)

For 42" Dia and smaller columns.

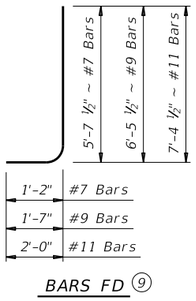


FIVE PILE FOOTING (8)

For 42" Dia and smaller columns.



BARS FC



BARS FD (9)

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

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

(7) Or as shown on plans.

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

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

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

TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

ONE 3 PILE FOOTING

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

ONE 4 PILE FOOTING

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

ONE 5 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	20	#4	8'- 2"	109
F2	16	#9	8'- 2"	444
FC	24	#4	3'- 6"	56
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	829
Class "C" Concrete			CY	8.0

CONSTRUCTION NOTES:

See Bridge Layout for foundation type required. Use these foundation details unless shown otherwise.

Drive piling under abutment wingwalls to a minimum resistance of 10 Tons/Pile unless shown otherwise.

Provide Class C Concrete (f'c = 3,600 psi), unless shown otherwise.

Provide Grade 60 reinforcing steel.

Galvanize reinforcing if shown elsewhere in the plans.

Provide bar laps for drilled shaft reinforcing, where required, as follows:

Uncoated or galvanized (#6) ~ 2'-6"
Uncoated or galvanized (#7) ~ 2'-11"
Uncoated or galvanized (#9) ~ 3'-9"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

DESIGNER NOTES:

Do not use the drilled shaft details shown on this standard for retaining wall, noise wall, barrier, or sign foundations without structural evaluation.

Do not use the footings shown on this standard in direct contact with salt water or exposed to salt water spray.

Maximum allowable pile loads for the footings shown are:

72 Tons/Pile with 24" Dia Columns
80 Tons/Pile with 30" Dia Columns
100 Tons/Pile with 36" Dia Columns
120 Tons/Pile with 42" Dia Columns

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0263	05	024	SH 70
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	ABL	FISHER		090

DATE: 4/11/2022 3:48:59 PM
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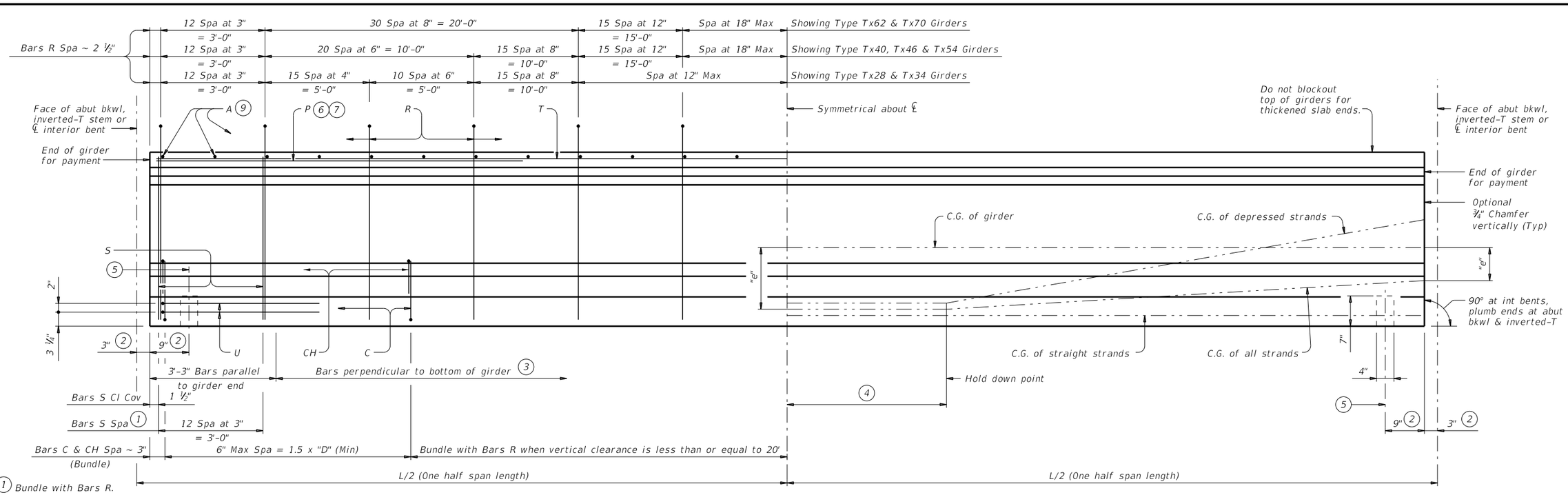


GIRDER ELEVATION

(1) Bundle with Bars R.

(2) Measured along ℄ Girder at interior bents; perpendicular to abutment bkwl or inverted-T stem.

(3) The average of the top and bottom spacing of Bars R cannot exceed the required spacing.

(4) L/20, but not less than 5'-0" (-0,+2').

(5) ℄ 4" x 1 ½" Vertical Slotted Hole at doweled girder end [labeled (D) on Bridge Layout]. Required for outside girder only or as shown on substructure details. Anchorage holes may be tapered (4 ¾" x 1 ⅝") at base. If holes are formed with sheet metal, forms may be left in place.

(6) Bars P (#6 x 15'-0") required in Tx62 and Tx70 girders. At the fabricator's option bars larger than #6 may be used. When L is less than 50 ft, Bars P are to be the same length as Bars T.

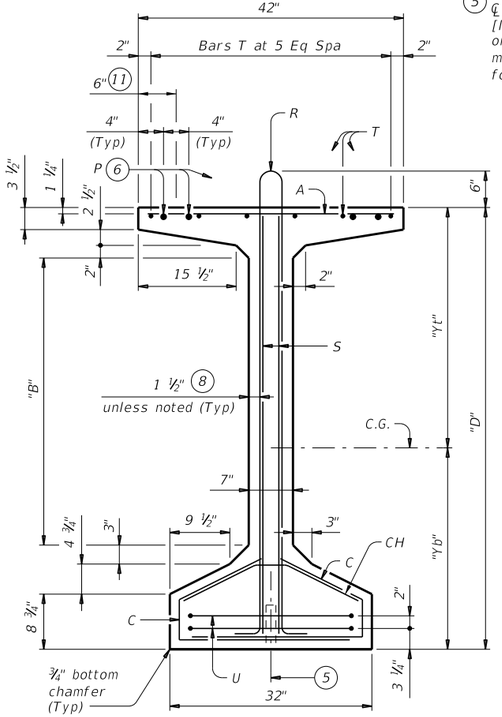
(7) Bars P (#6 x 15'-0") are only required in Tx28, Tx34, Tx40, Tx46, and Tx54 girders when "e" at girder ends exceeds 0.25 x "D". At the fabricator's option bars larger than #6 may be used. When L is less than 50 ft, Bars P are to be the same length as Bars T.

(8) 1 ⅜" Clear Cover to Bars S.

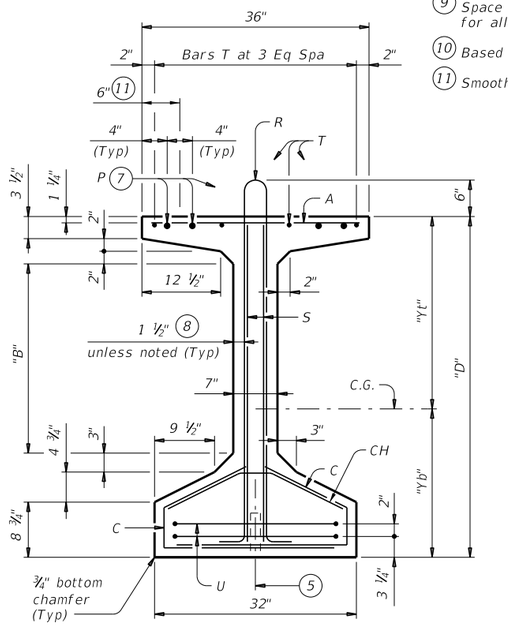
(9) Space Bars A at 6" Max for girders requiring overhang bracket hangers. Space at 12" Max for all other girders. Tie to Bars R as necessary. See standard IGMS for "Deck Forming Notes".

(10) Based on 155 pcf total weight of concrete and reinforcing steel.

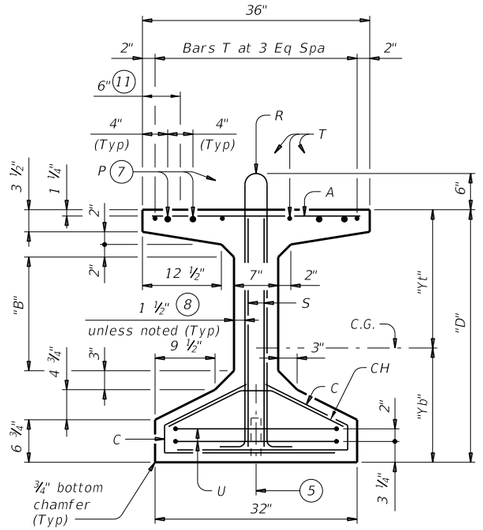
(11) Smooth trowel finish on the slab overhang side of exterior girder.



TYPE Tx62 & Tx70



TYPE Tx46 & Tx54



TYPE Tx28, Tx34 & Tx40

GIRDER DIMENSIONS AND SECTION PROPERTIES

Girder Type	"D" (in.)	"B" (in.)	"Yt" (in.)	"Yb" (in.)	Area (in.²)	"Ix" (in.⁴)	"Iy" (in.⁴)	Weight (10) (plf)
Tx28	28	6	15.02	12.98	585	52,772	40,559	630
Tx34	34	12	18.49	15.51	627	88,355	40,731	675
Tx40	40	18	21.90	18.10	669	134,990	40,902	720
Tx46	46	22	25.90	20.10	761	198,089	46,478	819
Tx54	54	30	30.49	23.51	817	299,740	46,707	880
Tx62	62	37 ½"	33.72	28.28	910	463,072	57,351	980
Tx70	70	45 ½"	38.09	31.91	966	628,747	57,579	1,040

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Provide Class H concrete.
Provide Grade 60 reinforcing steel.
An equal area of deformed Welded Wire Reinforcement (WWR) (ASTM A1064) may be substituted for Bars A, C, R or T unless otherwise noted.
It is permissible for bars or strands to come in contact with materials used in forming anchor holes.

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

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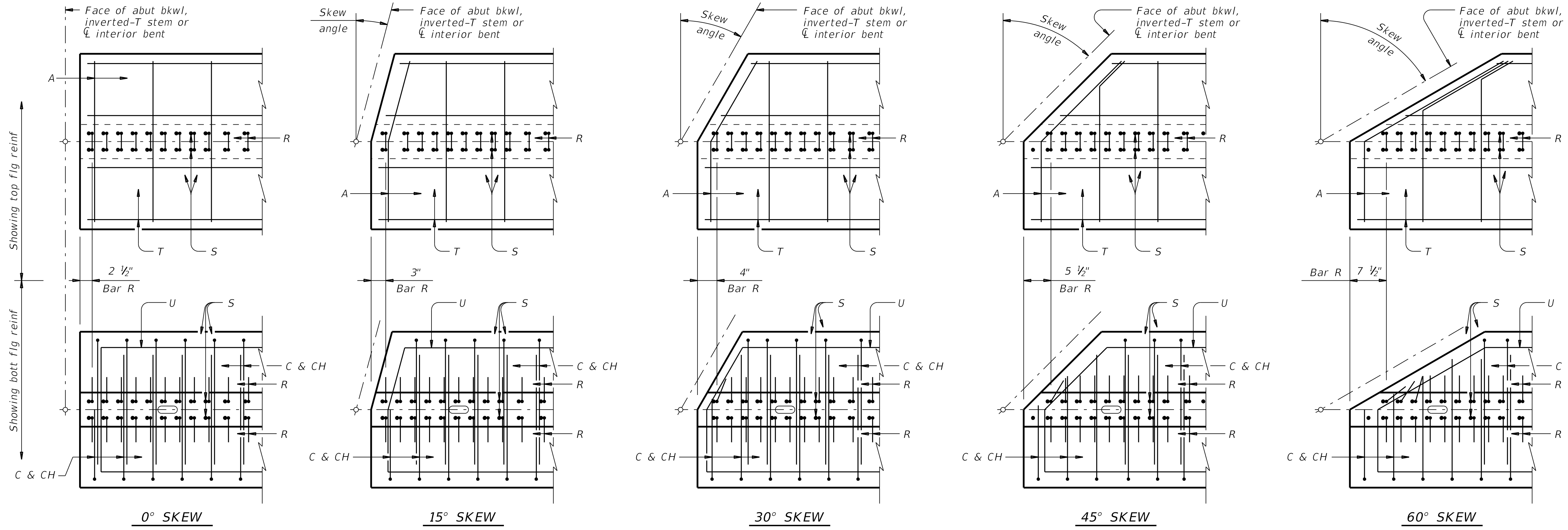
PRESTRESSED CONCRETE I-GIRDER DETAILS

IGD

FILE: igdstds1-19.dgn	DN: TxDOT	CK: JMH	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0263	05	024	SH 70
10-19: Added Bars C and CH full length for VC<= 20'	DIST	COUNTY		SHEET NO.
	ABL	FISHER		091



PLAN OF GIRDER ENDS (12)

(12) 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.

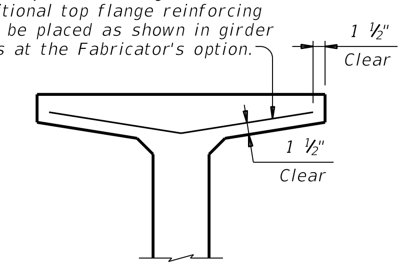
(13) Bars may be cut or bent at skewed end as required.

(14) Increase as necessary for bars at skewed end.

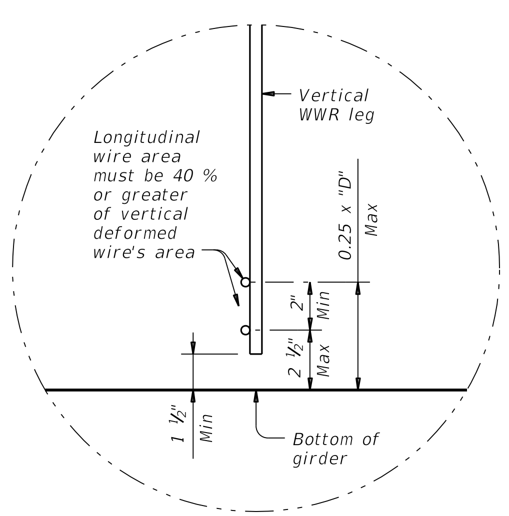
(15) No portion of bar less than 10 ft.

(16) 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.

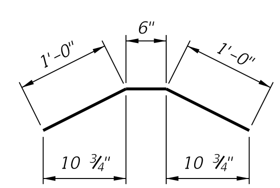
To control top flange cracking that may occur during form removal, additional top flange reinforcing may be placed as shown in girder ends at the Fabricator's option.



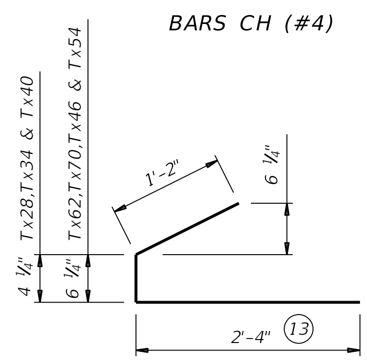
OPTIONAL TOP FLANGE REINFORCING DETAIL



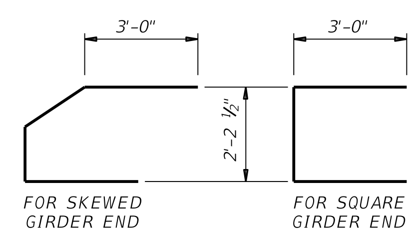
OPTIONAL WELDED WIRE REINFORCEMENT (WWR) DETAIL



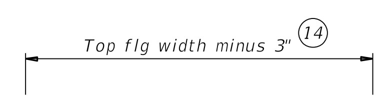
BARS CH (#4)



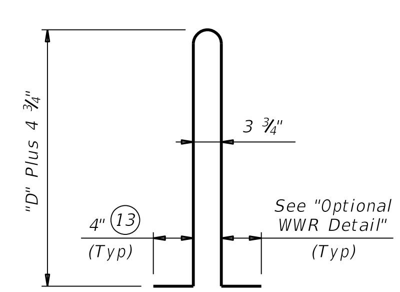
BARS C (#4)



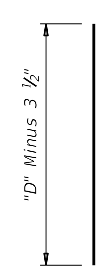
BARS U (#5)



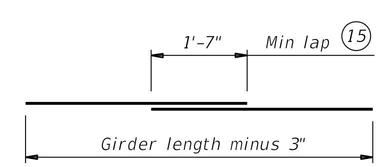
BARS A (#3)



BARS R (#4) (16)



BARS S (#6)



BARS T (#4)

HL93 LOADING

SHEET 2 OF 2

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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	0263	05	024	SH 70
10-19: Added Bars C and CH full length for VC<= 20'	DIST	COUNTY		SHEET NO.
	ABL	FISHER		092

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DATE: 4/11/2022 3:49:00 PM
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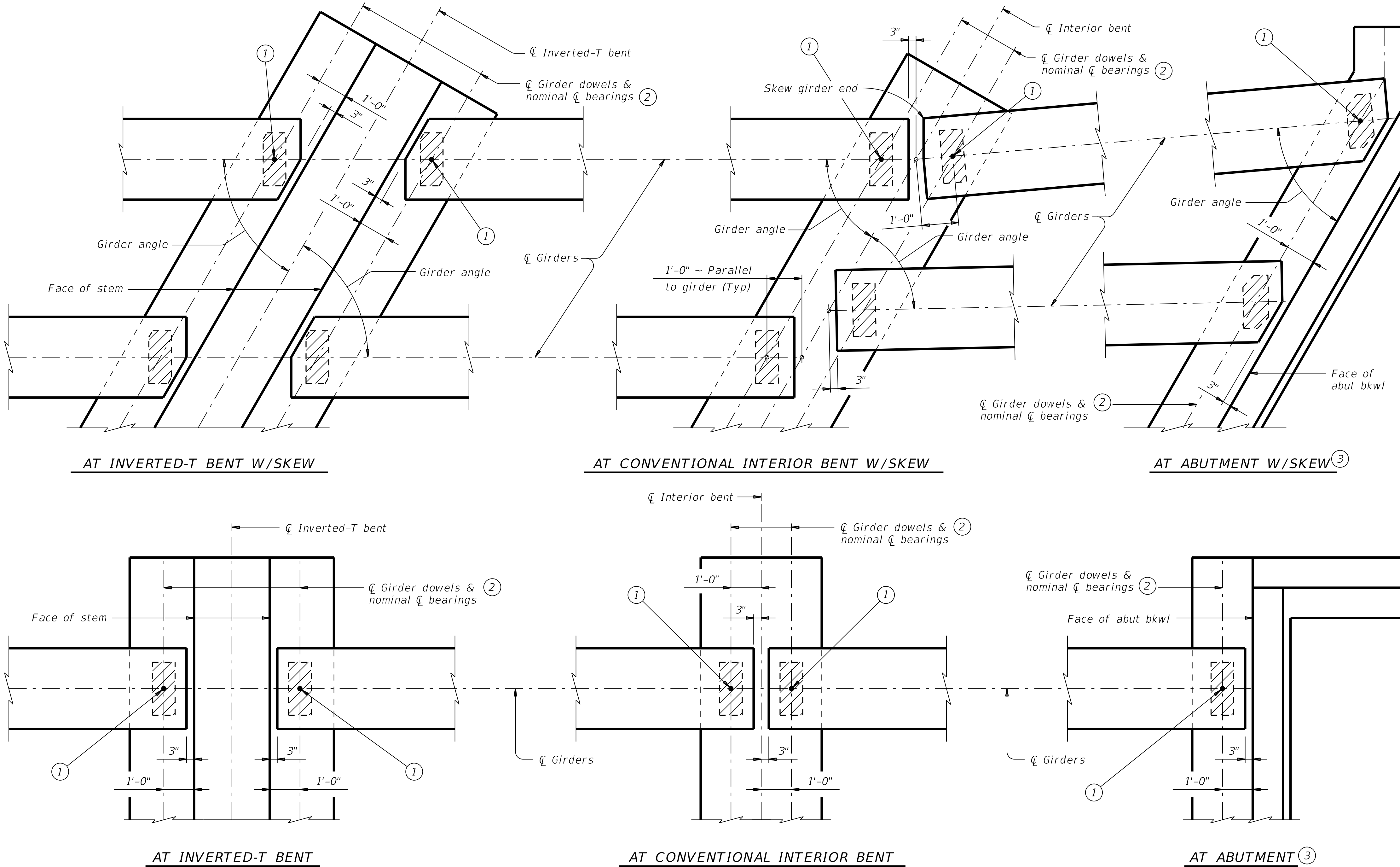
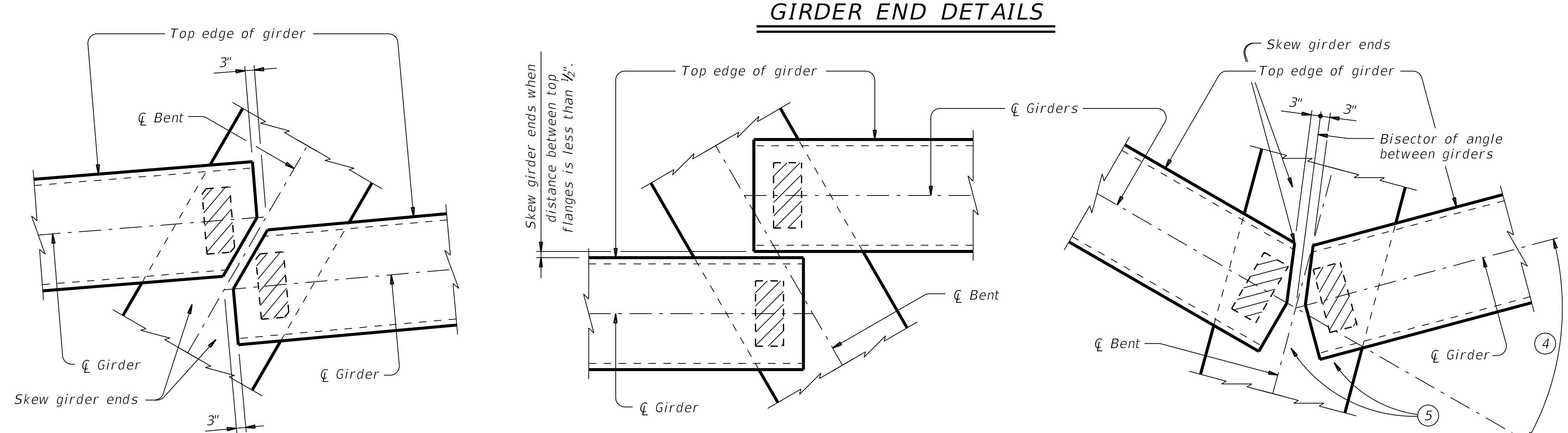


GIRDER END DETAILS



GIRDER CONFLICT DETAILS

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 girders 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.

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".

HL93 LOADING

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ELASTOMERIC BEARING AND GIRDER END DETAILS
PRESTR CONCRETE I-GIRDERS

IGEB

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©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
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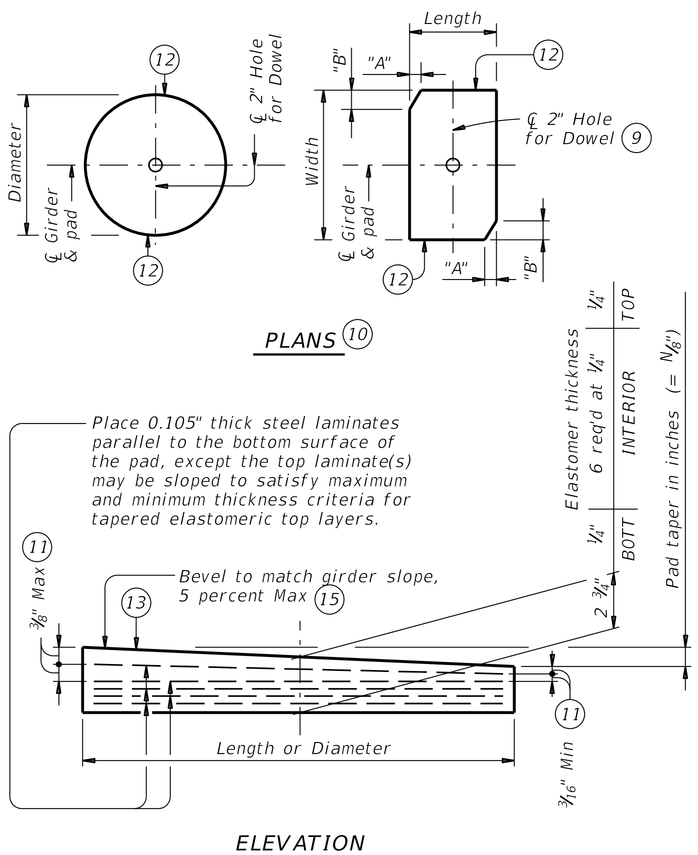
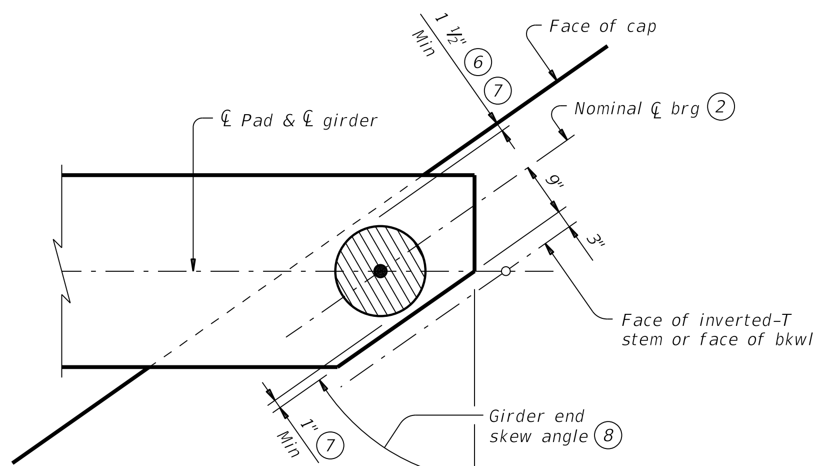
	DST		FISHER	093

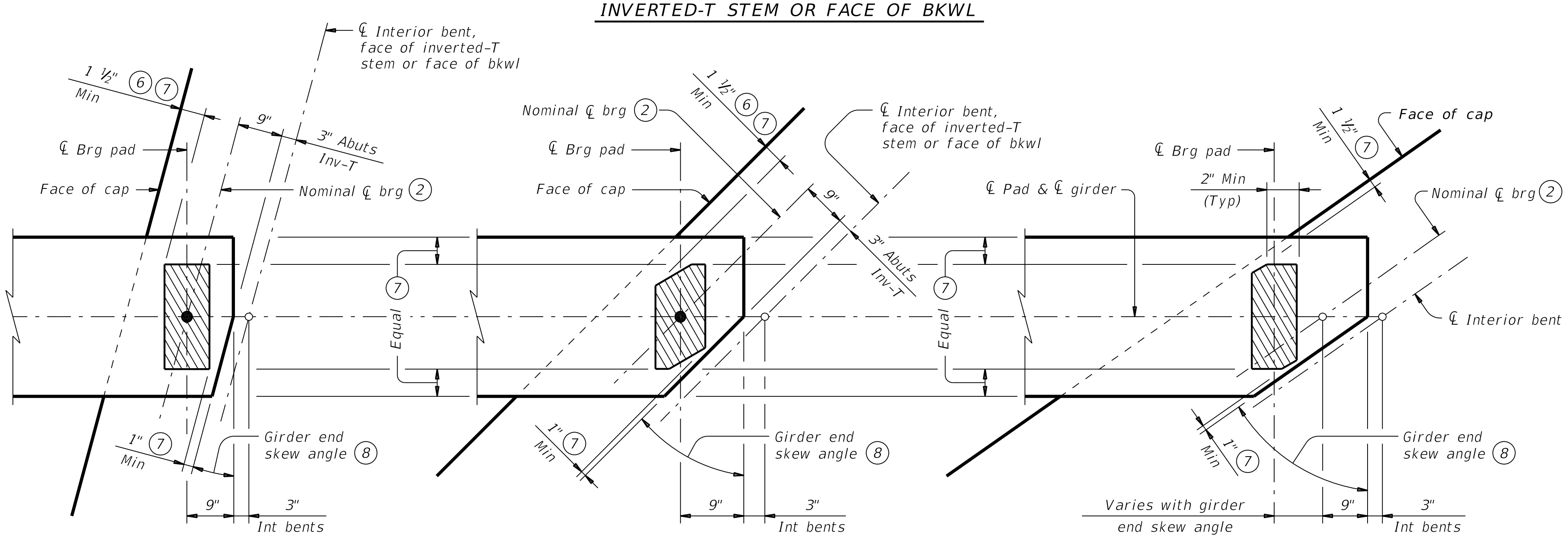


LAMINATED ELASTOMERIC BEARING PAD

(50 DUROMETER)



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 16

(NO GIRDER DOWELS)

BEARING PAD PLACEMENT DIAGRAMS

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	---	---
	Tx62 & Tx70	G-5-"N"	0° thru 21°	9" x 21"	---	---
		G-6-"N"	21°+ thru 30°	9" x 21"	1 1/2"	2 1/2"
		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	Tx28,Tx34, Tx40,Tx46 & Tx54	---	---	---	---	---
		---	---	---	---	---
		G-1-"N"	0° thru 60°	8" x 21"	---	---
	Tx62 & Tx70	G-5-"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"
	Tx62 & Tx70	G-5-"N"	0° thru 18°	9" x 21"	---	---
		G-5-"N"	18°+ thru 30°	9" x 21"	---	---
		G-11-"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"

(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 $\left(\frac{0.0625"}{\text{Length or Dia}}\right)$ 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.

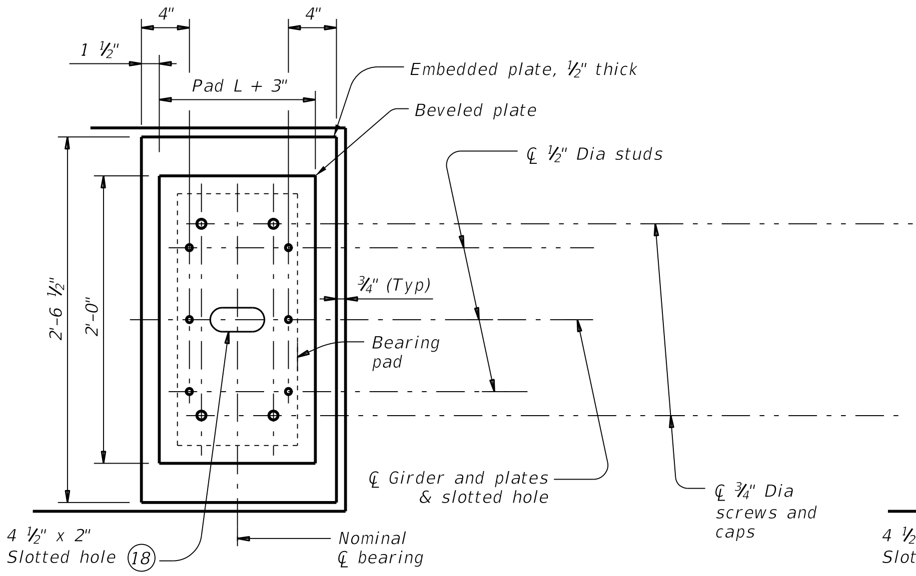
HL93 LOADING SHEET 2 OF 3

Texas Department of Transportation — Bridge Division Standard

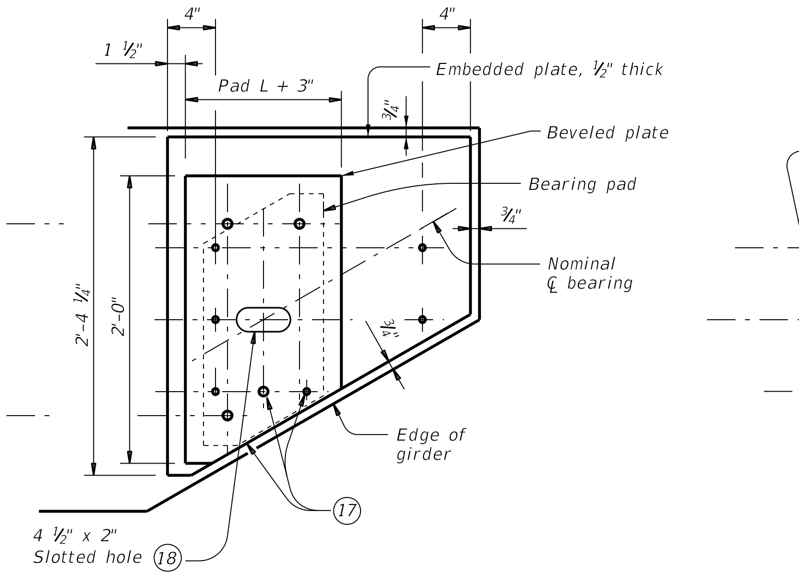
ELASTOMERIC BEARING AND GIRDER END DETAILS
PRESTR CONCRETE I-GIRDERS

IGEB

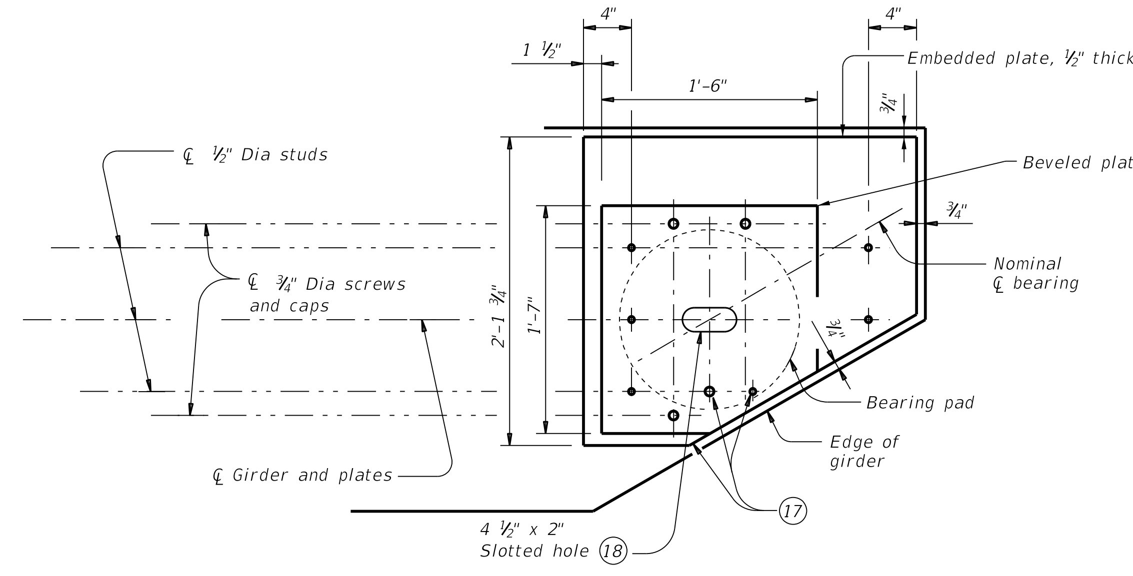
FILE: igebsts1-17.dgn	DN: AEE	CK: JMH	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0263	05	024	SH 70
	DIST		COUNTY	SHEET NO.
	ABL		FISHER	094



NORMAL GIRDER END
RECTANGULAR BEARING PAD

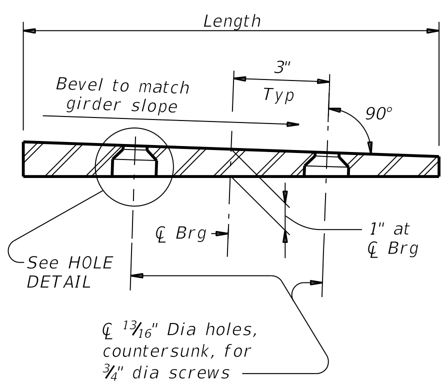


SKEWED GIRDER END
CLIPPED RECTANGULAR BEARING PAD

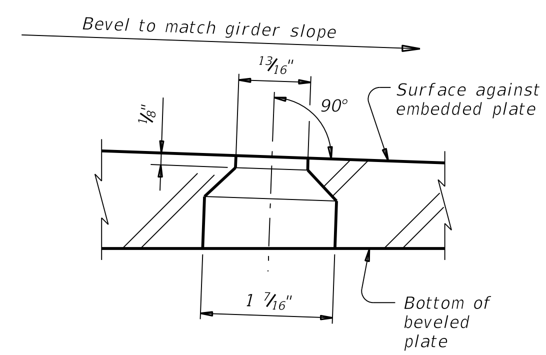


SKEWED GIRDER END
15" DIA BEARING PAD

PLAN VIEW OF SOLE PLATE DETAILS



SECTION



HOLE DETAIL

BEVELED PLATE DETAILS

(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.

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.

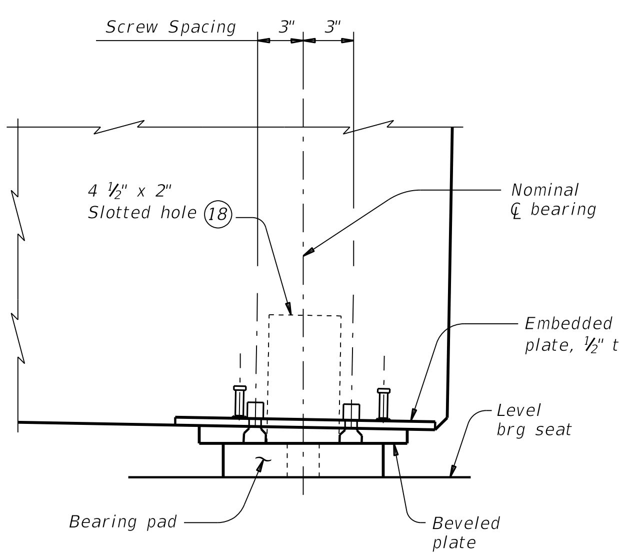
Steel plate must conform to ASTM A36, A572 Gr 50, or A709 Gr 36 or Gr 50. Hot dip galvanize both the embedded plate and beveled sole plate after fabrication. Seal weld caps to embedded plate before galvanizing.

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".

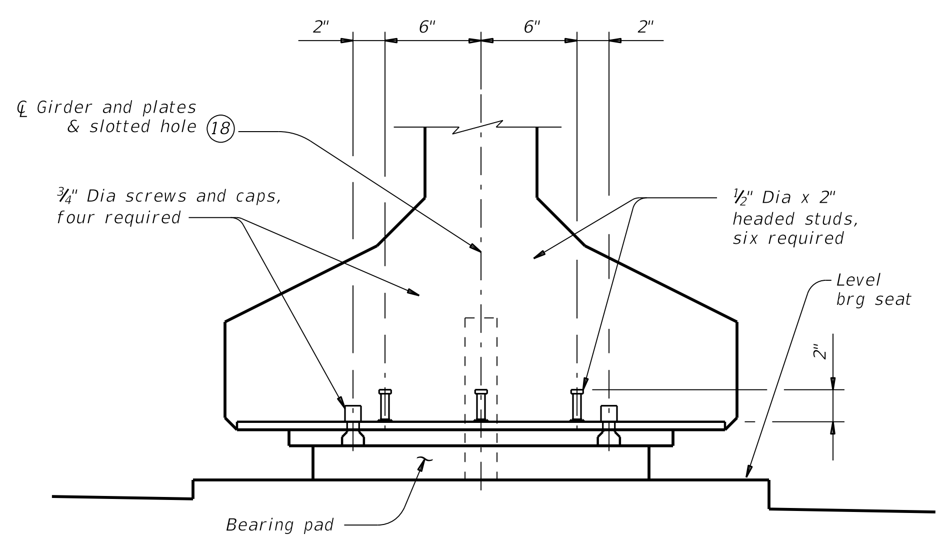
Tap threads in the embedded plate only. Drill and tap prior to galvanizing.

¾" 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 ¾" 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 ½" 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.



SIDE ELEVATION



END ELEVATION
Showing normal girder end.

GIRDER DETAILS

HL93 LOADING   SHEET 3 OF 3

Texas Department of Transportation | Bridge Division Standard

ELASTOMERIC BEARING AND GIRDER END DETAILS
PRESTR CONCRETE I-GIRDERS

IGEB

FILE: igebsts1-17.dgn	DN: AEE	CK: JMH	DW: JTR	CK: TxDOT
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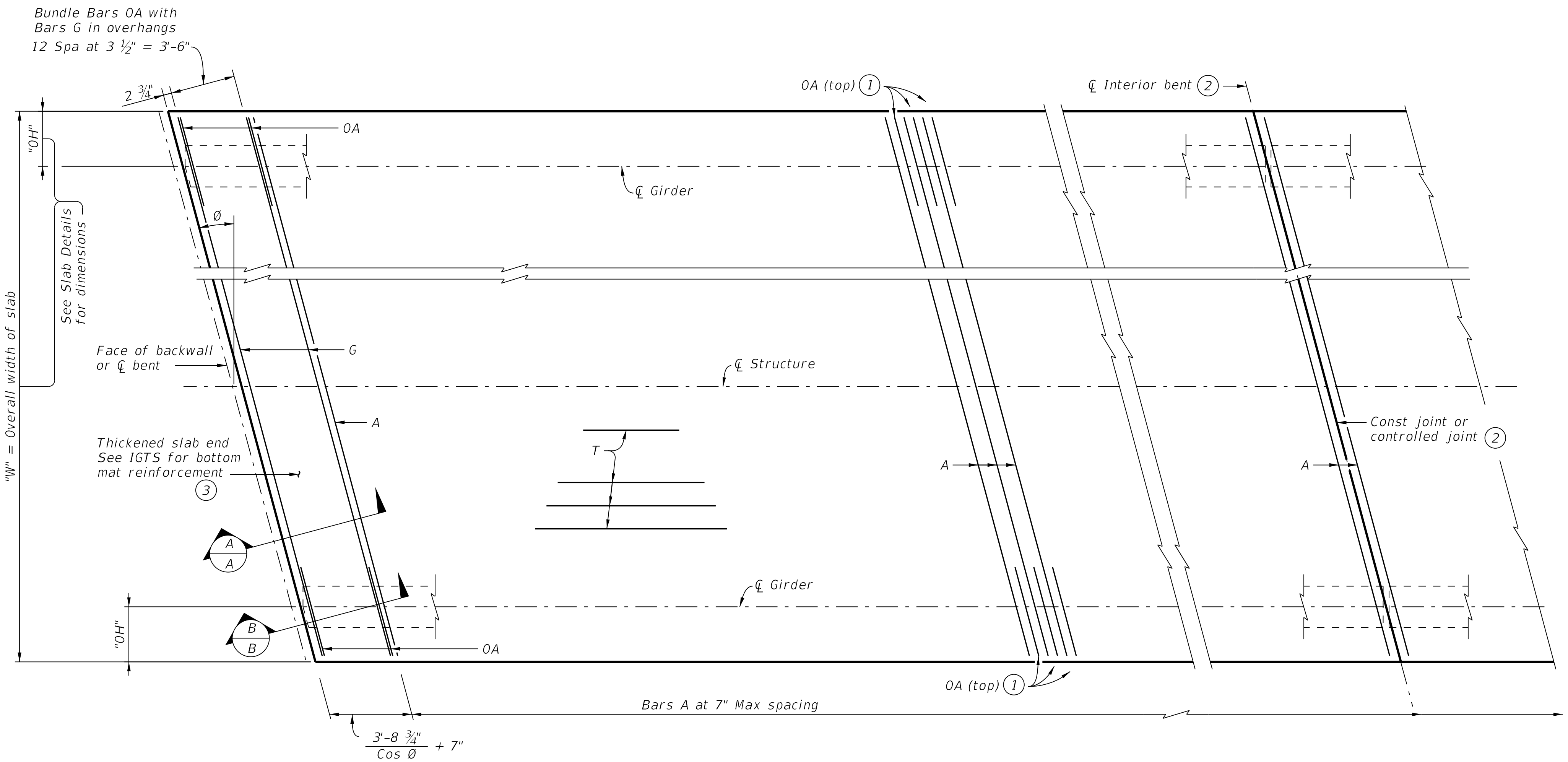
REVISIONS	0263	05	024	SH 70
	DIST	COUNTY		SHEET NO.
	ABL	FISHER		095

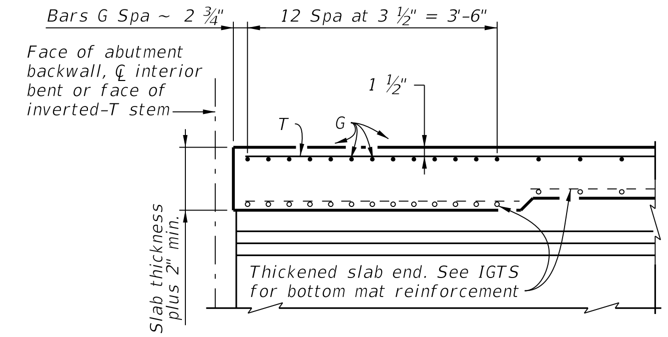


AT THICKENED SLAB END

AT SLAB CONTINUOUS OVER INTERIOR BENTS

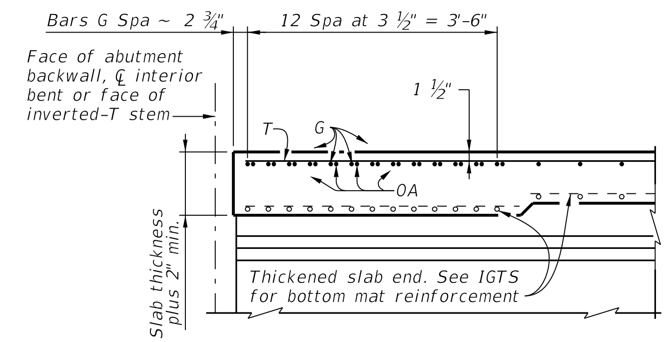
PLAN FOR SLABS WITHOUT BREAKBACKS

Showing top mat reinforcement only.



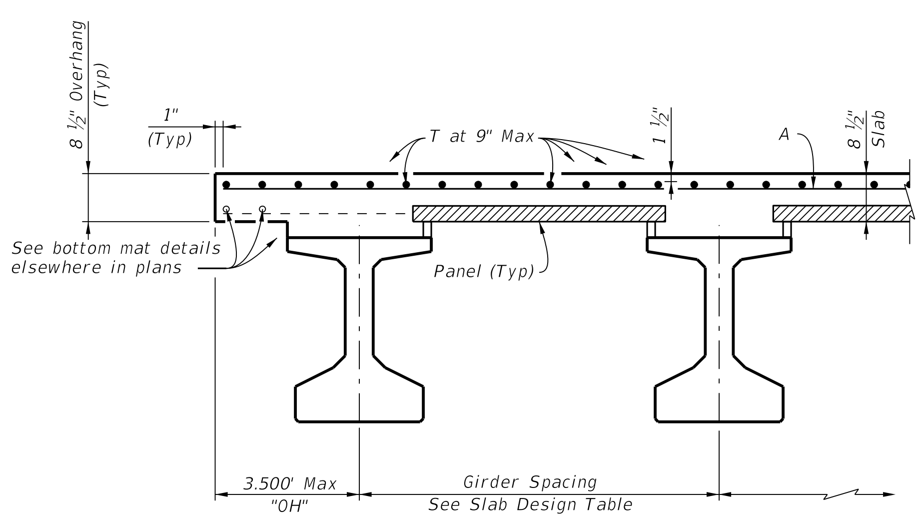
SECTION A-A

Showing Thickened Slab End with PCP Option 1. Option 2 similar.

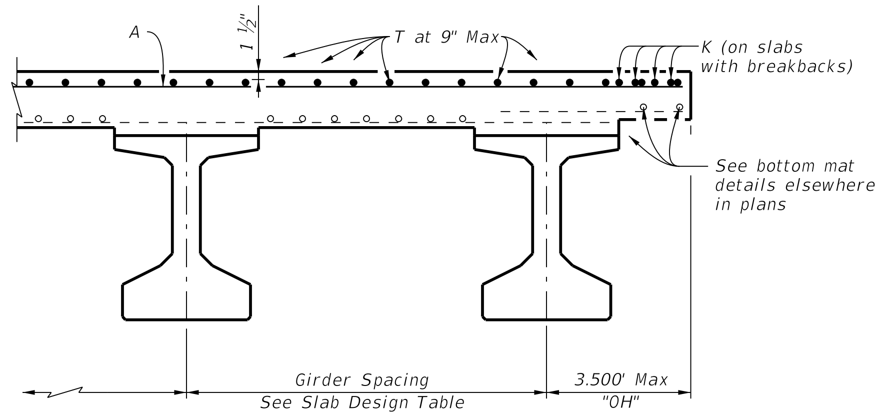


SECTION B-B

Showing Thickened Slab End with PCP Option 1. Option 2 similar.



PARTIAL TYPICAL TRANSVERSE SECTION



SECTION OF THICKENED SLAB END

Showing PCP Option 1. Option 2 similar.

1. Place Bars 0A midway between Bars A at overhang.
2. Bars are continuous through joint.
3. Thickened slab end dimensioned perpendicular to face of bkwl, centerline interior bent or face of inverted-T stem.

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GFRP SLAB TOP MAT REINFORCEMENT
PRESTRESSED CONC I-GIRDER SPANS
IGFRP

FILE: igfrp001-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0263	05	024	SH 70
10-19: Updated to latest design specification.	DIST		COUNTY	SHEET NO.
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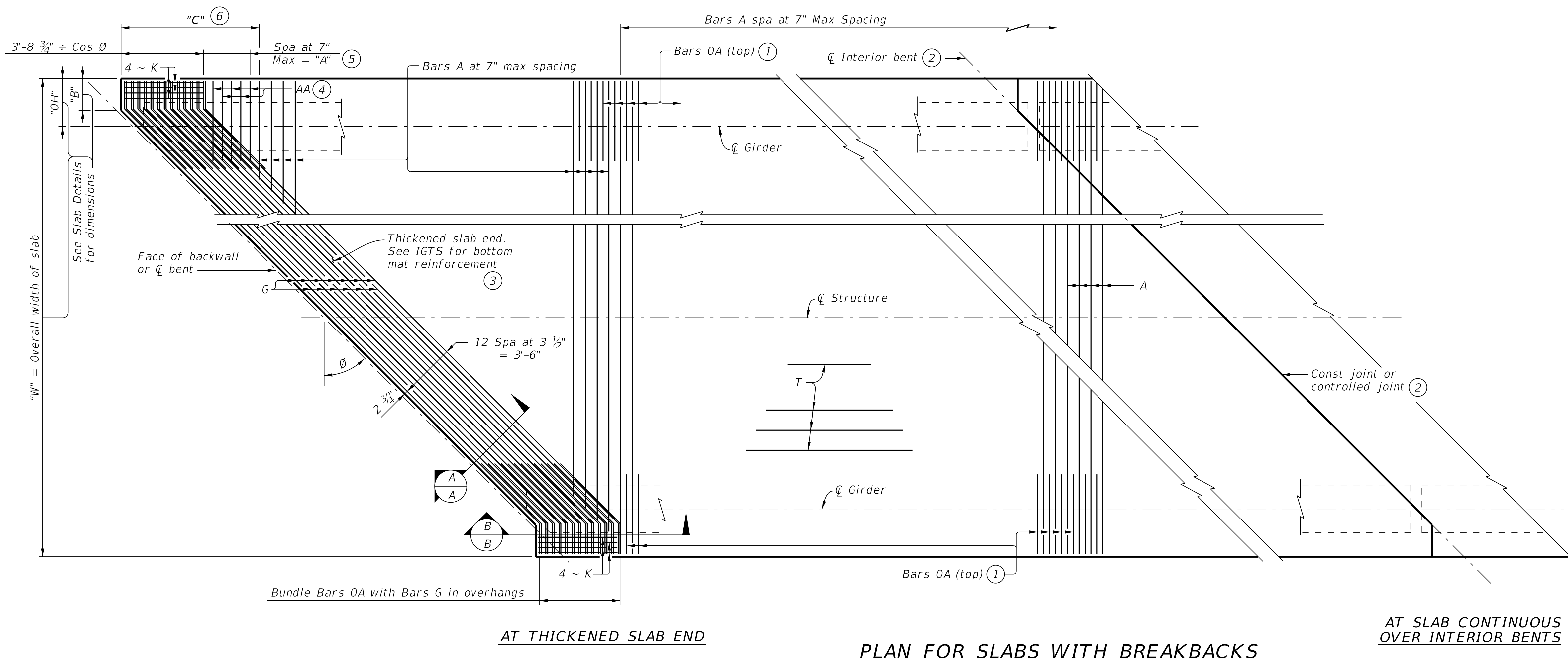
FILE: \\pusscshrfil01\J-Jobs\2138C TxDOT SH70 Plum Creek ABL\06.00 Design\06.04 Sheets\06.04.11 Standards\Bridge Standards\igfrp001-19.dgn

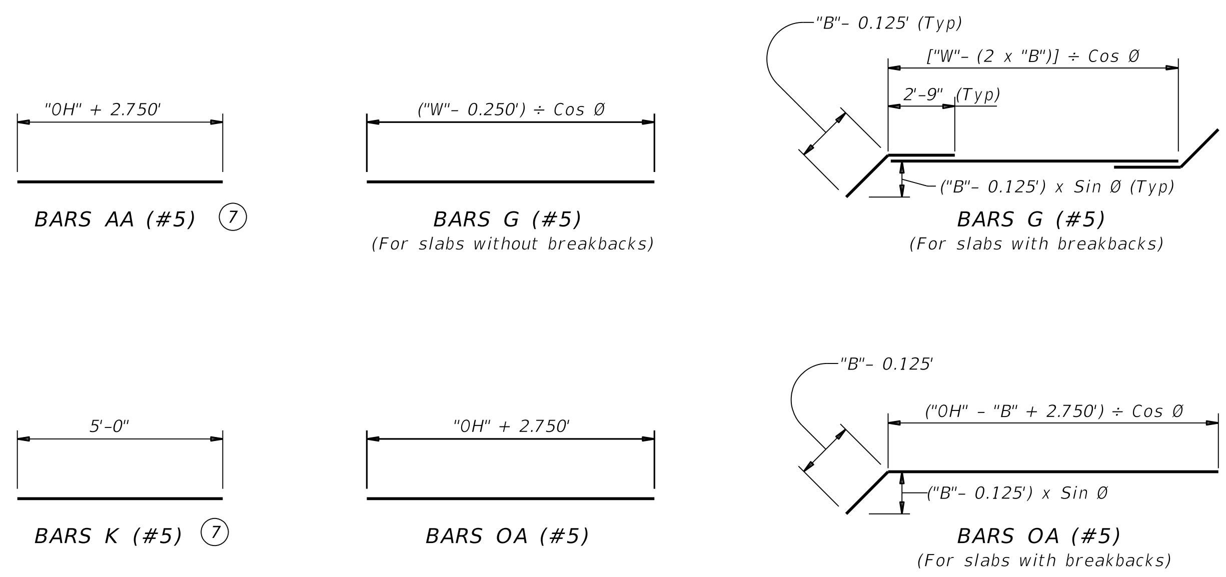
BAR TABLE	
BAR	SIZE
A	#5
AA	#5
G	#5
K	#5
OA	#5
T	#5



PLAN FOR SLABS WITH BREAKBACKS

Showing top mat reinforcement only.

1. Place Bars OA midway between Bars A at overhang.
2. Bars are continuous through joint.
3. Thickened slab end dimensioned perpendicular to face of bkwl, centerline interior bent or face of inverted-T stem.
4. Tie Bars AA to bottom of Bars G in this location.
5. A = ("OH" + 2.333' - "B") x Tan Ø
6. $C = \frac{3.729'}{\text{Cos } Ø}$ + "A" + Bar A spacing
7. Only required on slabs with breakbacks.



GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications and AASHTO LRFD Bridge Design Guide Specifications for GFRP-Reinforced Concrete, 2nd Edition.

These details are restricted to Prestressed Concrete I-Girder spans with an 8 1/2" slab and up to a 10'-0" girder spacing.

These details are to be used in conjunction with the Span Details and PCP Standard (if prestressed concrete panels are used).

This standard provides Glass Fiber Reinforced Polymer (GFRP) reinforcement details for the top mat of slab reinforcement. The bottom mat reinforcement and other slab details are as shown elsewhere in the plans.

The Contractor has the option to provide GFRP reinforcement, in accordance with the details shown, when epoxy-coated steel bars are specified for the deck slab. The Contractor may provide an alternate GFRP slab design with calculations signed and sealed by a Professional Engineer.

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

MATERIAL NOTES:

Provide GFRP bars, conforming to ASTM D7957/7957M, except provide a minimum modulus of elasticity of 7,500 ksi.

Provide Grade 60 steel bars for all bottom mat reinforcement as shown elsewhere in plans.

Provide bar laps, where required, as follows:
#5 GFRP bar = 2'-9"

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation — Bridge Division Standard

GFRP SLAB TOP MAT REINFORCEMENT
PRESTRESSED CONC I-GIRDER SPANS
IGFRP

FILE: igfrp001-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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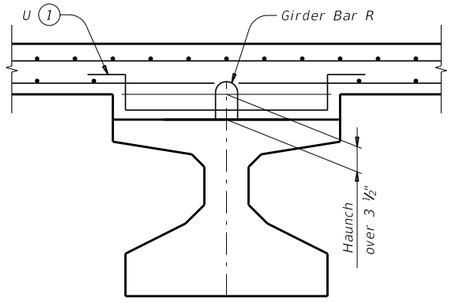
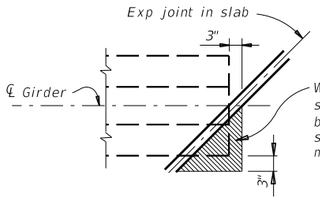
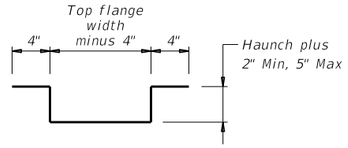


HAUNCH REINFORCING DETAIL

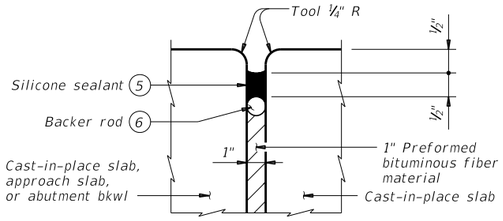


Where flanges project under slab of adjacent span, provide a minimum of ½" clearance between top of girder and bottom of adjacent slab. Polystyrene or other suitable compressible material may be used as a filler.

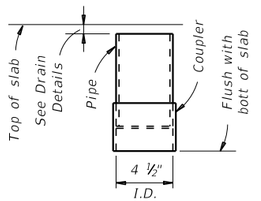
TREATMENT AT GIRDER END FOR SKEWED SPANS



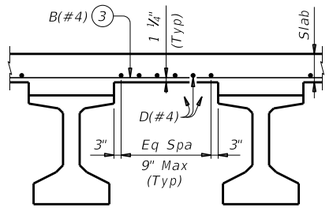
BARS U (#4)



TYPE A JOINT DETAIL (7)

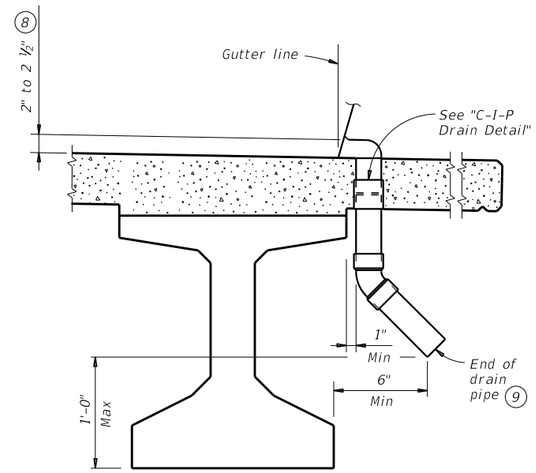


C-I-P DRAIN DETAIL (2)



TYPICAL PART TRANSVERSE SLAB SECTION WITHOUT PCP (4)

Top reinforcing steel not shown for clarity.



DRAIN DETAIL (10)

(1) Space Bars U with girder Bars R in all areas where measured haunch exceeds 3 ½".

(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 ¼" 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 railways, 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.

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.

Texas Department of Transportation

Bridge Division Standard

MISCELLANEOUS SLAB DETAILS

PRESTR CONCRETE I-GIRDERS

IGMS

FILE: igmssts1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
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REVISIONS	0263	05	024	SH 70
10-19: Modified Note 7. Type A now a pay item.	DIST	COUNTY		SHEET NO.
	ABL	FISHER		098

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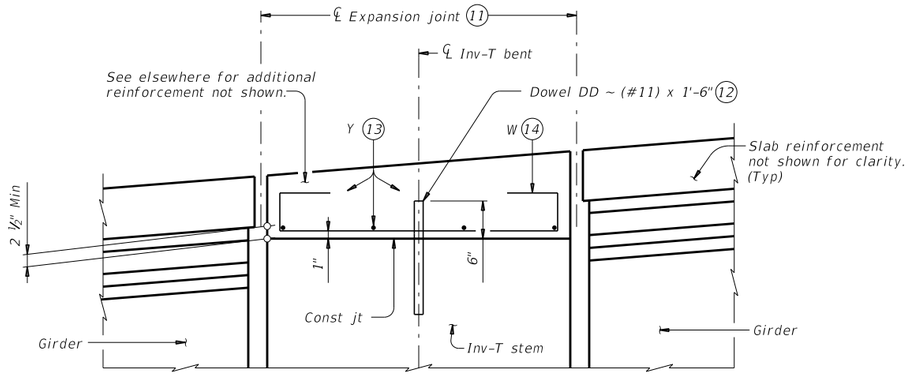
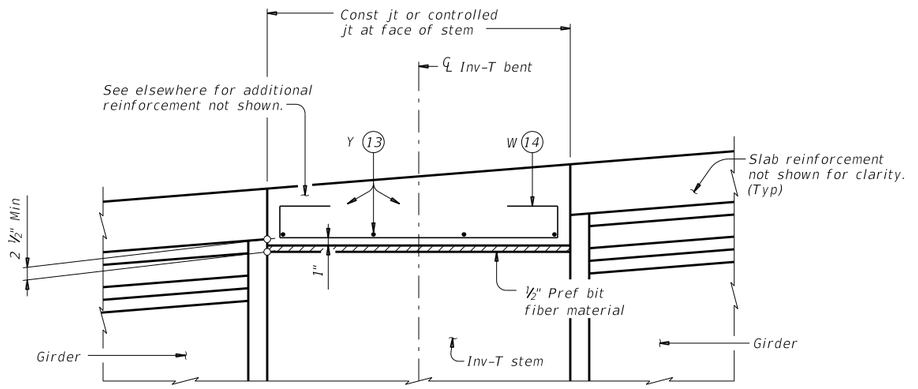
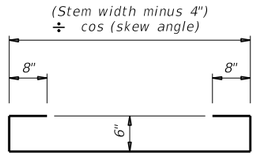


SHOWING EXPANSION JOINTS

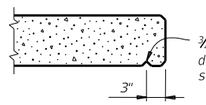


SHOWING CONST JTS OR CONTROLLED JTS

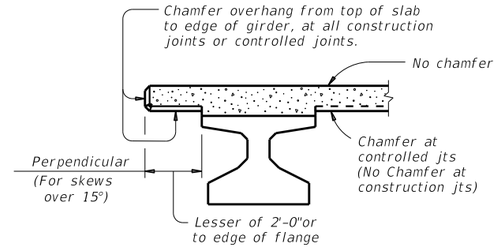
REINFORCEMENT OVER INV-T BENTS



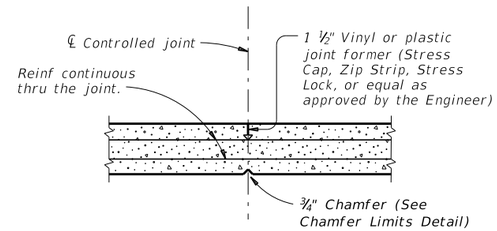
BARS W (#4)



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.

Texas Department of Transportation

Bridge Division Standard

MISCELLANEOUS SLAB DETAILS

PRESTR CONCRETE I-GIRDERS

IGMS

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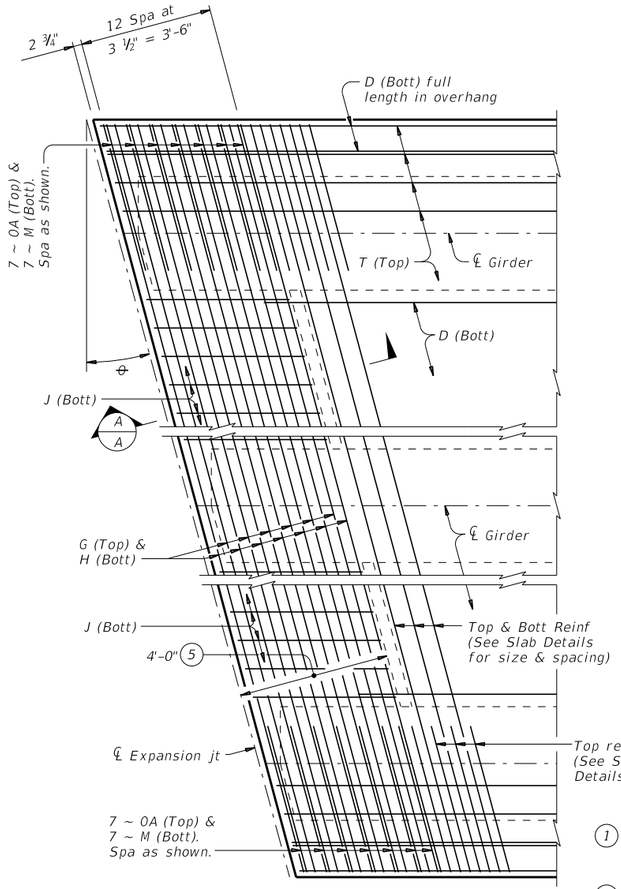
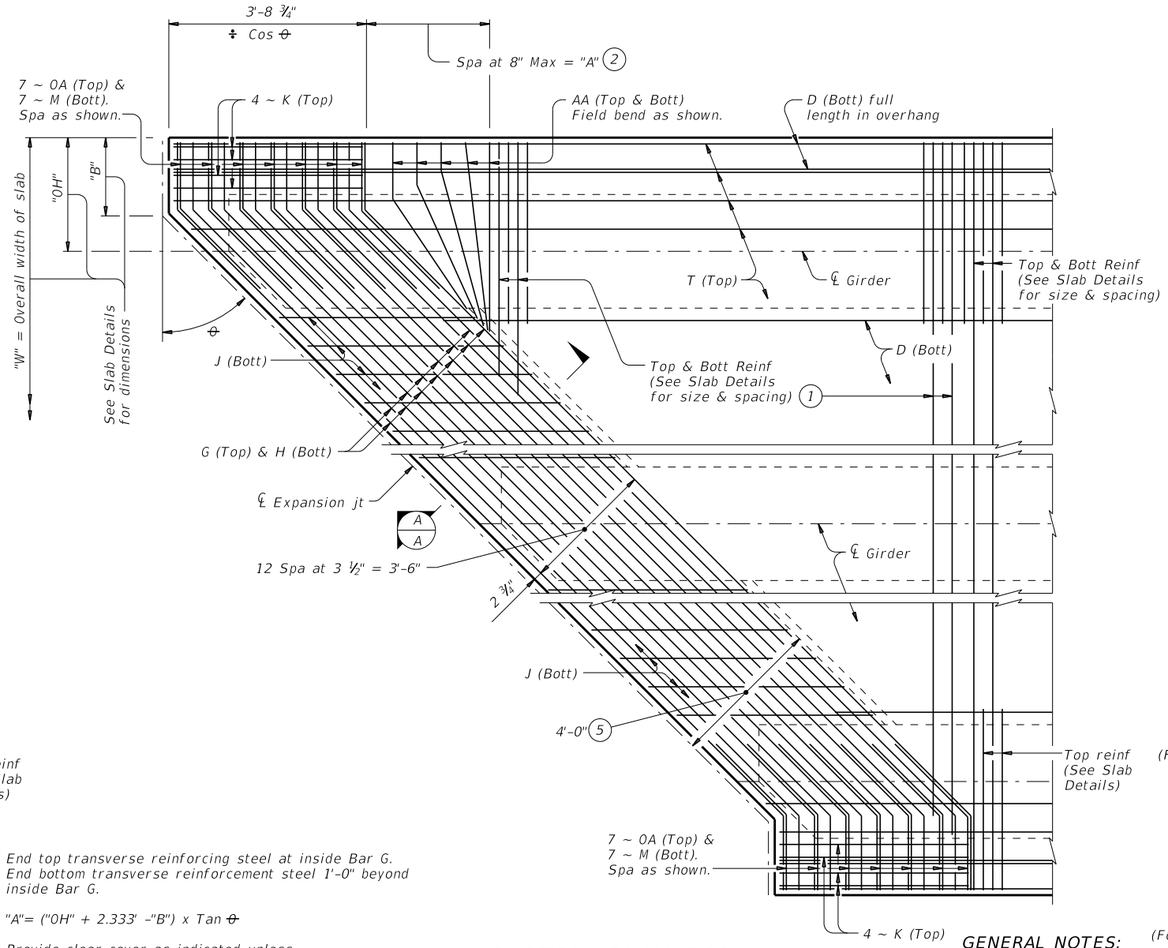
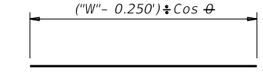


PARTIAL PLAN FOR SLABS WITHOUT BREAKBACK

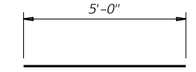


PARTIAL PLAN FOR SLABS WITH BREAKBACK

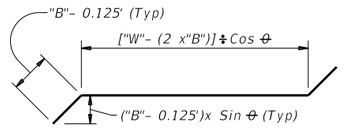
1. End top transverse reinforcing steel at inside Bar G. End bottom transverse reinforcement steel 1'-0" beyond inside Bar G.
2. "A"= ("0H" + 2.333' -"B") x Tan θ
3. Provide clear cover as indicated unless otherwise shown on Span Details.
4. Only required on slabs with breakbacks.
5. Thickened slab end dimensioned perpendicular to face of bkwl, centerline interior bent or face of inverted-T stem.



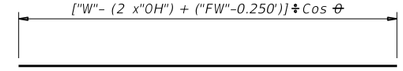
BARS G (#4)
(For slabs without breakbacks)



BARS K (#4) (4)

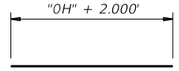


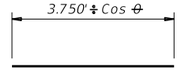
BARS G (#4)
(For slabs with breakbacks)



"FW" = girder's top flange width (ft)

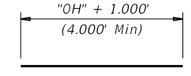
BARS H (#4)



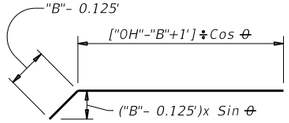


BARS AA (#5) (4)

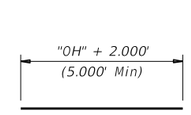
BARS J (#4)



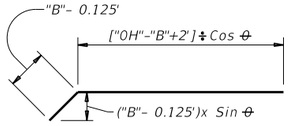
BARS M (#4)
(For slabs without breakbacks)



BARS M (#4)
(For slabs with breakbacks)



BARS OA (#5)
(For slabs without breakbacks)



BARS OA (#5)
(For slabs with breakbacks)

GENERAL NOTES:

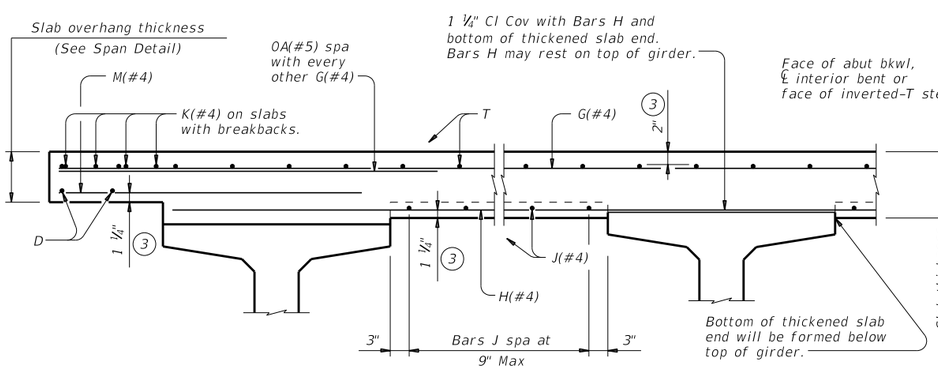
Designed according to AASHTO LRFD Bridge Design Specifications.
These details are restricted to Prestressed Concrete I-Girder Spans.
These details are to be used in conjunction with the Span Details and PCP standard (if prestressed concrete panels are used).
When Option 2 from PCP standard is used, provide 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.

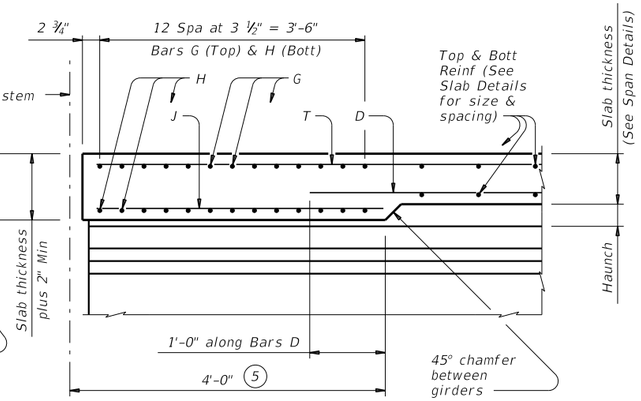
HL93 LOADING



2" AND MORE OF HAUNCH — LESS THAN 2" OF HAUNCH

TYPICAL TRANSVERSE SECTION

(Showing Prestressed Conc I-Girders at ℄ Brg)



SECTION A-A

(Showing with 2" and more of haunch)

Texas Department of Transportation — Bridge Division Standard

THICKENED SLAB END DETAILS

PRESTRESSED CONCRETE I-GIRDER SPANS

IGTS

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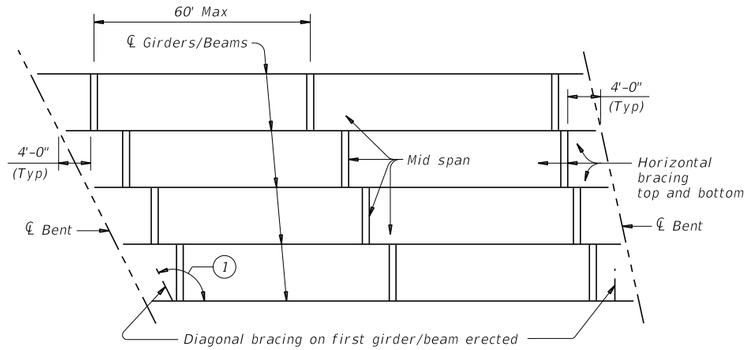
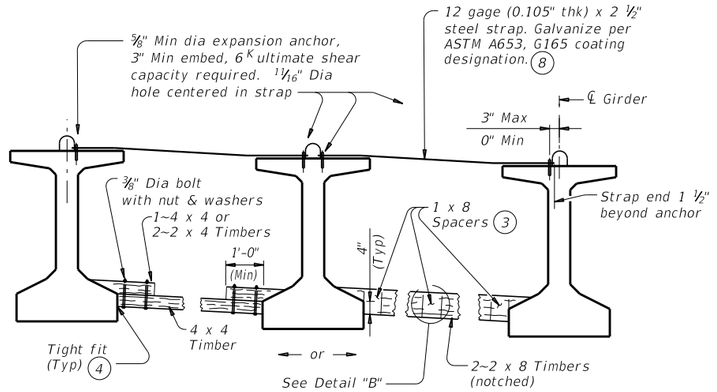
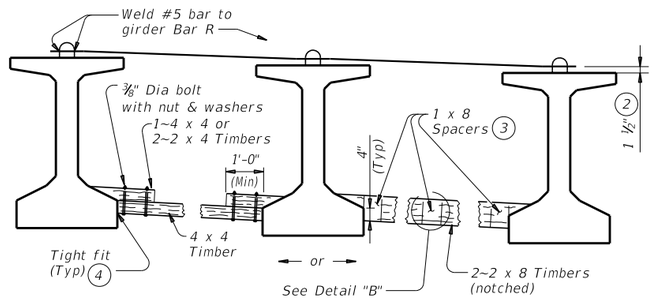


ERECTION BRACING



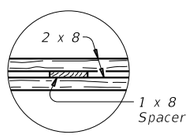
FOR ERECTION BRACING, OPTION 1

(This option is not allowed when slab is formed with PMDF or plywood.)



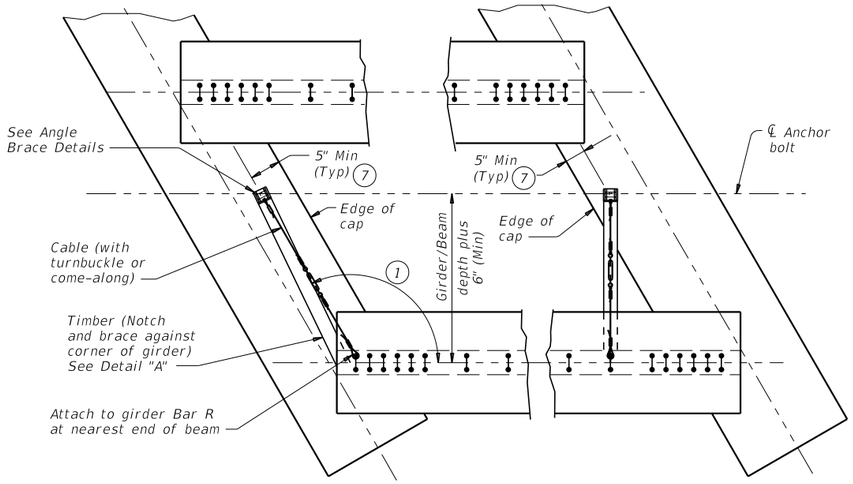
FOR ERECTION BRACING, OPTION 2

HORIZONTAL BRACING DETAILS (5)

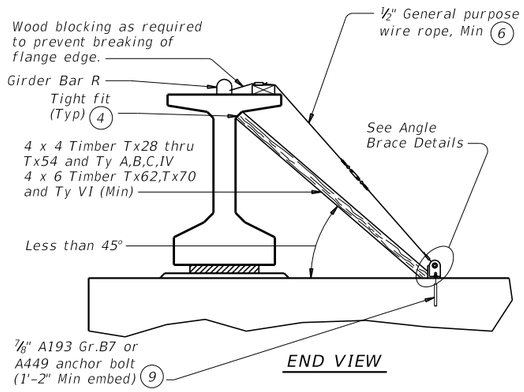


PLAN

DETAIL "B"



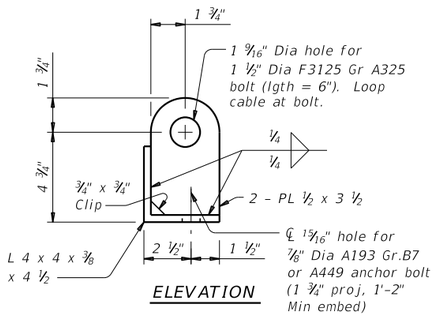
PLAN



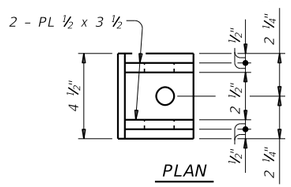
END VIEW

DIAGONAL BRACING DETAILS (5)

(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.

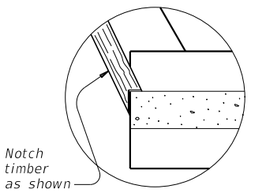
ERECTION BRACING:

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 aginst 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.

Texas Department of Transportation

Bridge Division Standard

MINIMUM ERECTION AND BRACING REQUIREMENTS
PRESTRESSED CONCRETE I-GIRDERS AND I-BEAMS

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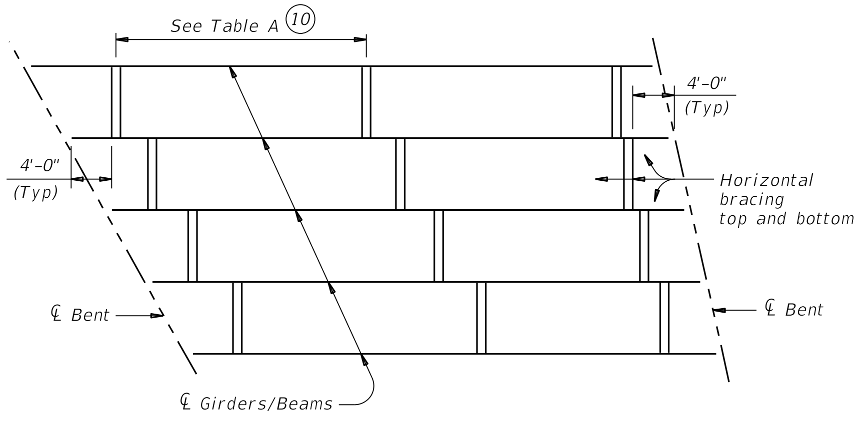
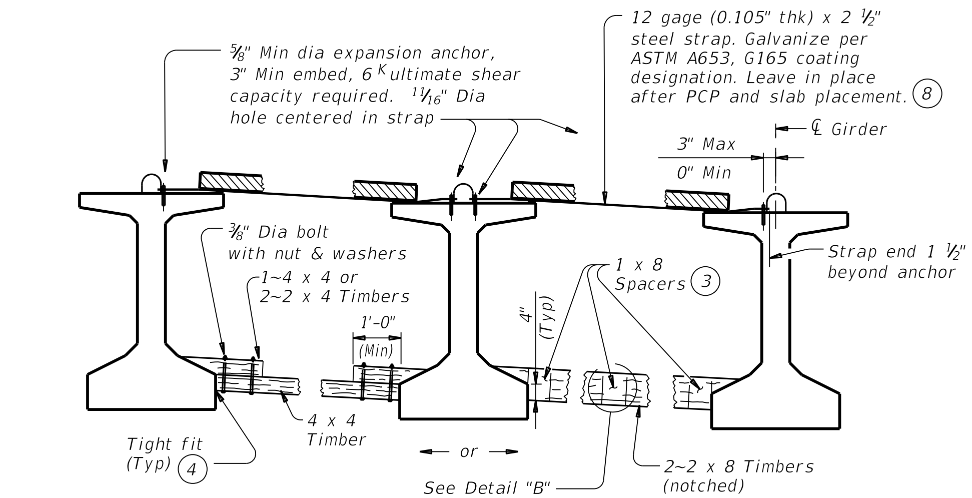


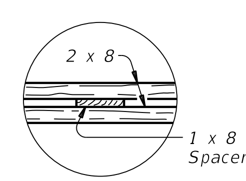
SLAB PLACEMENT BRACING

TABLE A

Girder or Beam Type	OPTION 1-RIGID BRACING (STEEL STRAP) Maximum Bracing Spacing: Slab Overhang less than 4'-0" (11)	OPTION 1: Slab Overhang 4'-0" and greater (11)	OPTION 2-FLEXIBLE BRACING (NO. 5 OVER PCP) Maximum Bracing Spacing: Slab Overhang less than 4'-0" (11)	OPTION 2: Slab Overhang 4'-0" and greater (11)
Tx28	¼ points	¼ points	¼ points	⅛ points
Tx34	¼ points	¼ points	¼ points	⅛ points
Tx40	¼ points	⅛ points	¼ points	⅛ points
Tx46	¼ points	⅛ points	¼ points	⅛ points
Tx54	¼ points	⅛ points	¼ points	⅛ points
Tx62	¼ points	⅛ points	¼ points	⅛ points
Tx70	¼ points	⅛ points	¼ points	⅛ points
A	⅛ points	⅛ points	2.0 ft	1.5 ft
B	⅛ points	⅛ points	3.0 ft	2.0 ft
C	⅛ points	⅛ points	4.5 ft	2.0 ft
IV	¼ points	⅛ points	¼ points	4.0 ft
VI	¼ points	⅛ points	¼ points	4.0 ft

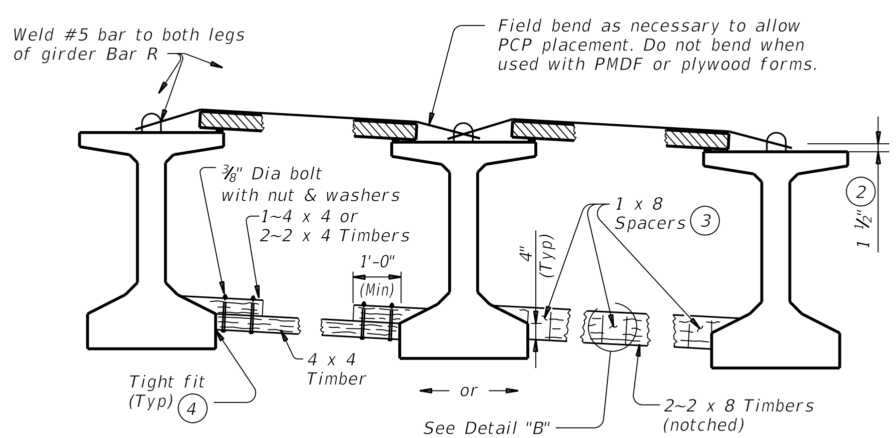


FOR SLAB PLACEMENT BRACING, OPTION 1 - RIGID
(Showing slab formed with PCP. This option is not allowed when slab is formed with PMDF or plywood.)



PLAN

DETAIL "B"



FOR SLAB PLACEMENT BRACING, OPTION 2 - FLEXIBLE
(Showing slab formed with PCP.)

HORIZONTAL BRACING DETAILS (5)

(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 (¼ and ⅛ 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".

Texas Department of Transportation — Bridge Division Standard

MINIMUM ERECTION AND BRACING REQUIREMENTS

PRESTRESSED CONCRETE I-GIRDERS AND I-BEAMS

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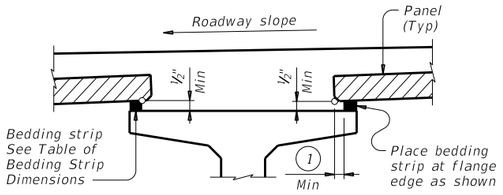
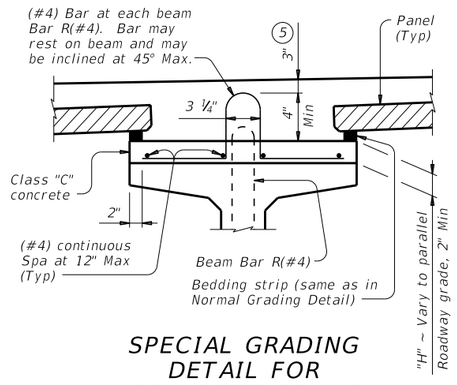


NORMAL GRADING DETAIL (3)

Showing prestressed concrete I-girders. (Other beam types similar)



SPECIAL GRADING DETAIL FOR CONCRETE BEAMS

Showing prestressed concrete I-girders. (Other beam types similar)

TABLE OF BEDDING STRIP DIMENSIONS		
WIDTH	HEIGHT (4)	
	Min	Max
1" (Min)	½"	2"
1 ¼"	½"	2 ½"
1 ½"	½"	3"
1 ¾"	½"	3 ½"
2"	½"	4"
2 ¼"	½"	4 ½" (2)
2 ½"	½"	5" (2)
2 ¾"	½"	5 ½" (2)
3" (Max)	½"	6" (2)

(1) 2" Min for I-giders, 1 ½" 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 ¼" 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 ¼". 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.

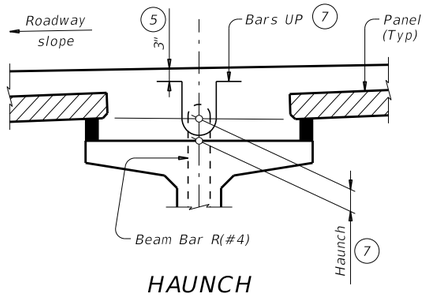
(5) Provide clear cover as indicated unless otherwise shown on Span Details.

(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 ½" with I-girders, and 3" for all other beam types. Epoxy coating for Bars UP is not required.

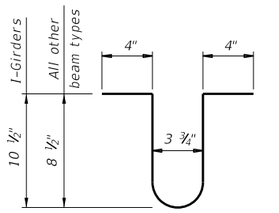
(8) Do not locate construction joints on top of a panel.

(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c..

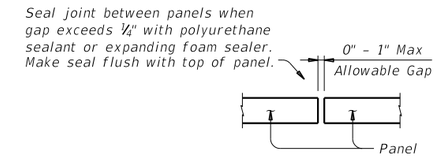


HAUNCH REINFORCING DETAIL

Showing prestressed concrete I-girders. (Other beam types similar)

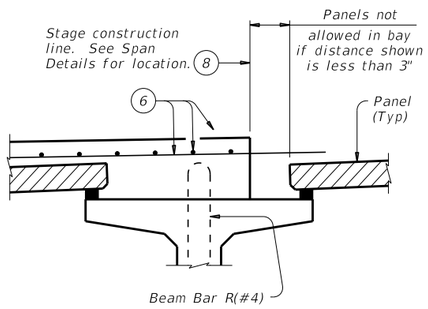


BARS UP (#4) (7)

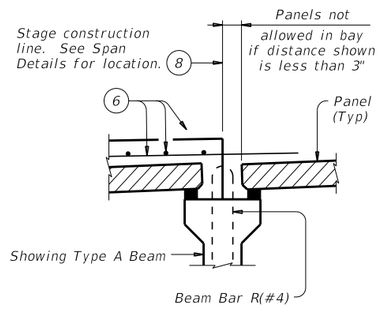


PANEL JOINTS

(Panel reinforcing not shown for clarity. The gap cannot be considered as a panel fabrication tolerance. Adjust panel placement to minimize joint openings.)



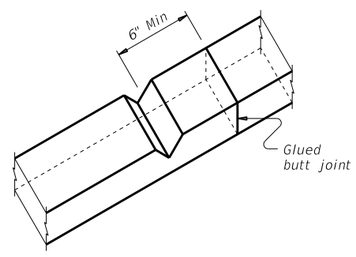
PRESTR CONC I-GIRDERS



PRESTR CONC I-BEAMS

STAGE CONSTRUCTION LIMITATIONS

(Other beam types similar)



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 ½" 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 ½". 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 reinforcement 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

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS DECK DETAILS

PCP

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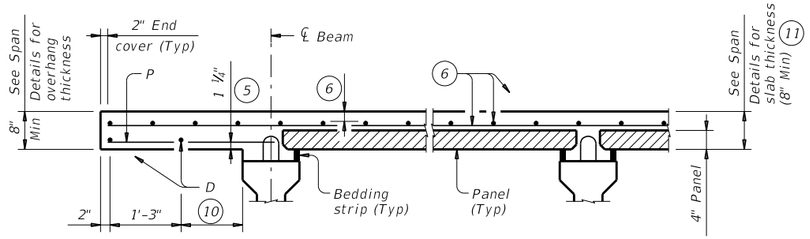
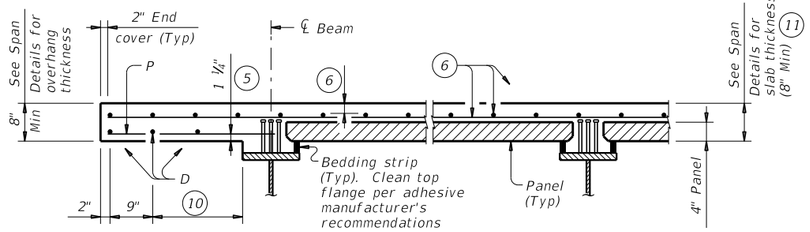
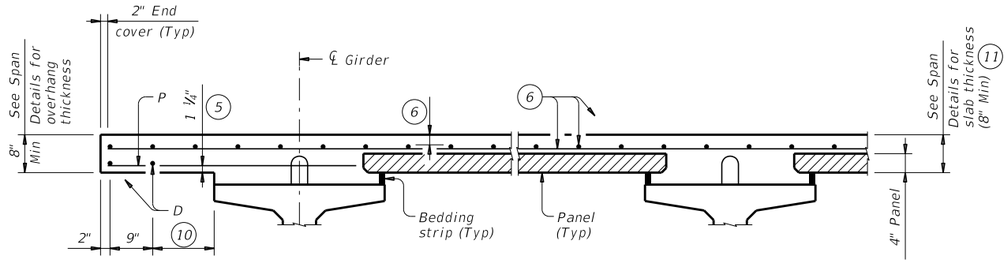


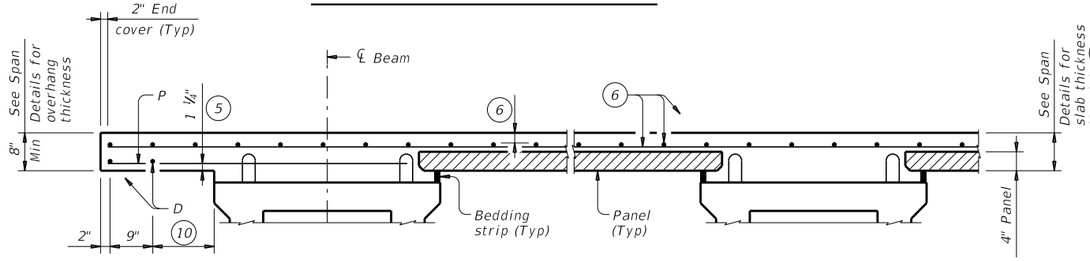
PRESTRESSED CONCRETE I-BEAMS



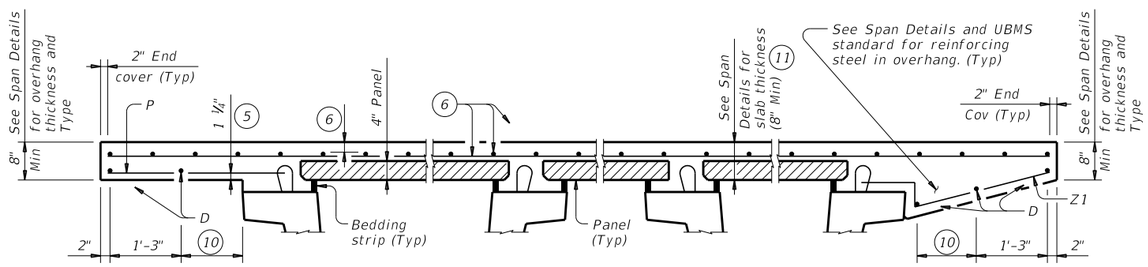
STEEL BEAMS



PRESTRESSED CONCRETE I-GIRDERS



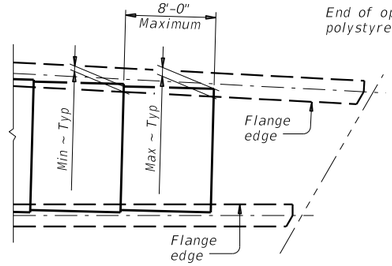
PRESTRESSED CONCRETE X-BEAMS



NORMAL OVERHANG WITH PRESTR CONC U-BEAMS

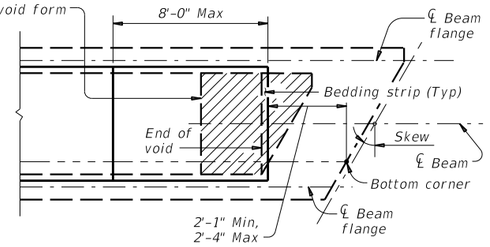
SLOPED OVERHANG WITH PRESTR CONC U-BEAMS

TYPICAL PART TRANSVERSE SECTIONS

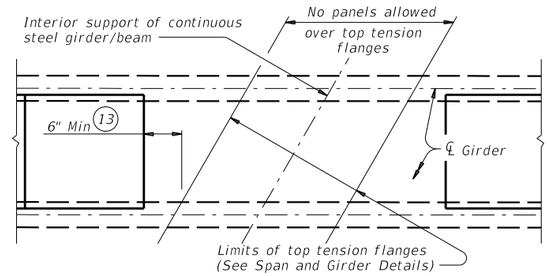


AT FLARED BEAMS OR GIRDERS

See PCP-FAB standard for Min and Max dimensions based on bemm/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.

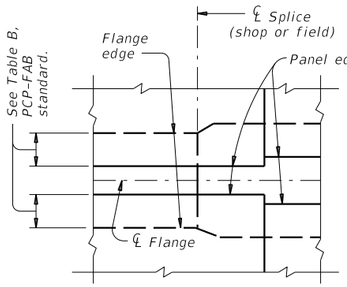
(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c..

(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.

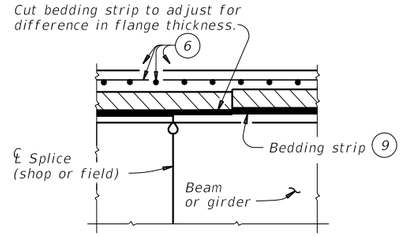
(12) Field adjust Bars Z1(#4) to match actual slope of slab overhangs. Width of slab overhang will vary along span with curved slab edges. Adjust Bar Z1(#4) dimensions to maintain proper cover. Bars Z2(#4) are located at Inverted-Tee stems only.

(13) Location of concrete placement sequence boundaries and bolted field splices should be considered by the contractor in determining panel limits.



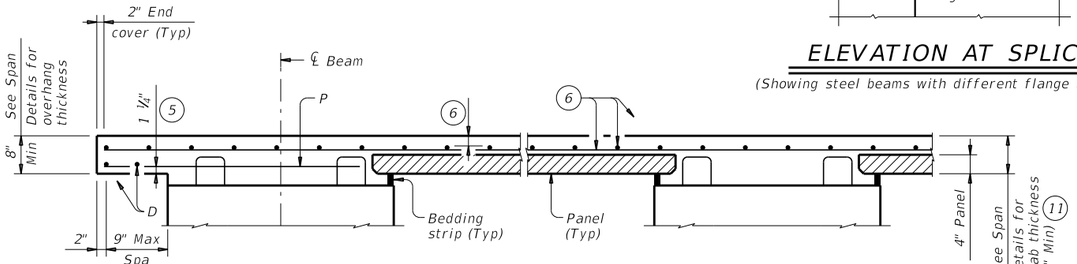
PLAN AT SPLICE

(Showing steel beams with flange width transition)



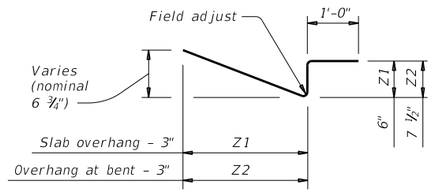
ELEVATION AT SPLICE

(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)

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Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE PANELS DECK DETAILS

PCP

FILE: pcpstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
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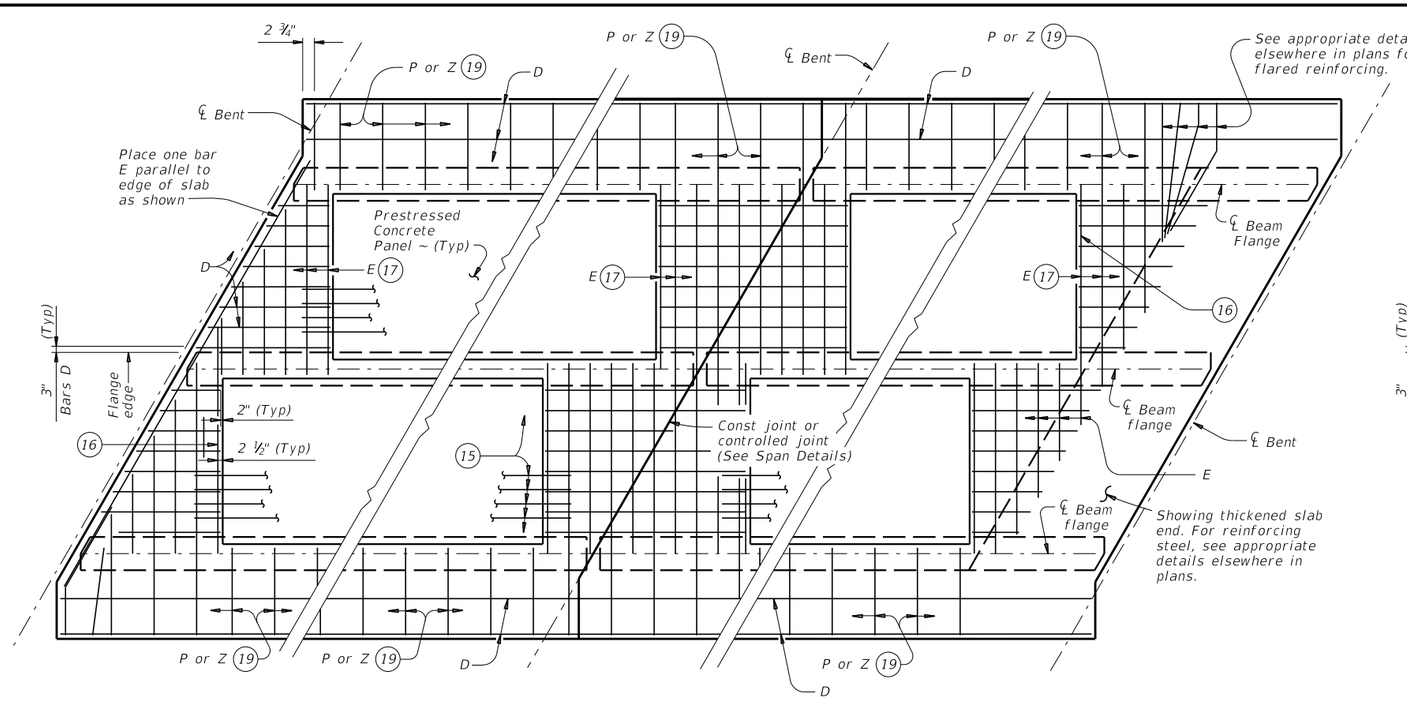
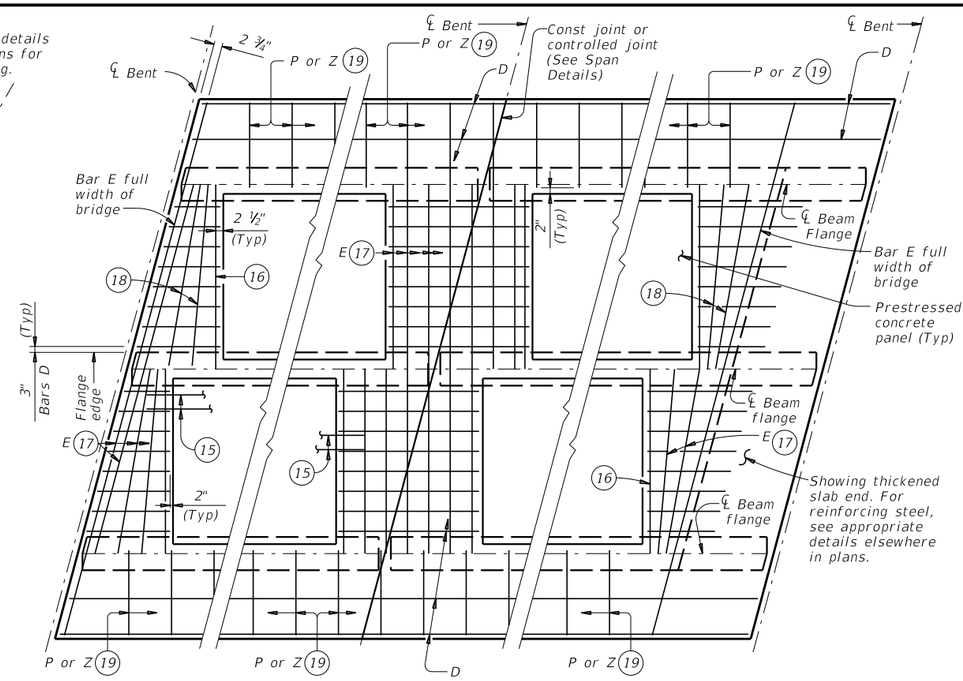


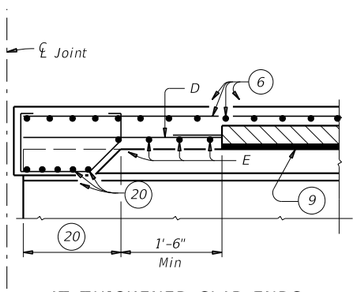
AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

OPTION 1 ~ PLAN OF SLABS WITH NORMAL REINFORCEMENT

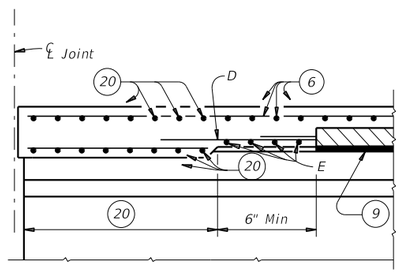


AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

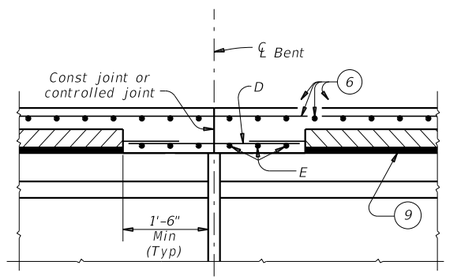
OPTION 1 ~ PLAN OF SLABS WITH SKEWED REINFORCEMENT



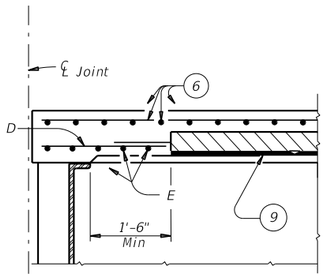
AT THICKENED SLAB ENDS FOR PRESTR CONC U-BMS



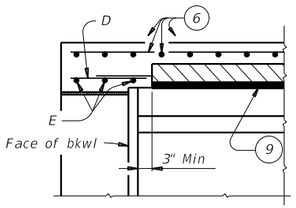
AT THICKENED SLAB ENDS FOR PRESTR CONC I-BMS AND STEEL BMS



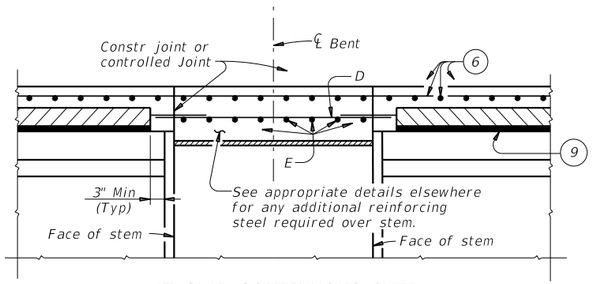
AT SLAB CONTINUOUS OVER CONVENTIONAL INTERIOR BENTS FOR ALL SIMPLE SPAN BMS



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 ¼" 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

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SHEET 3 OF 4

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS DECK DETAILS

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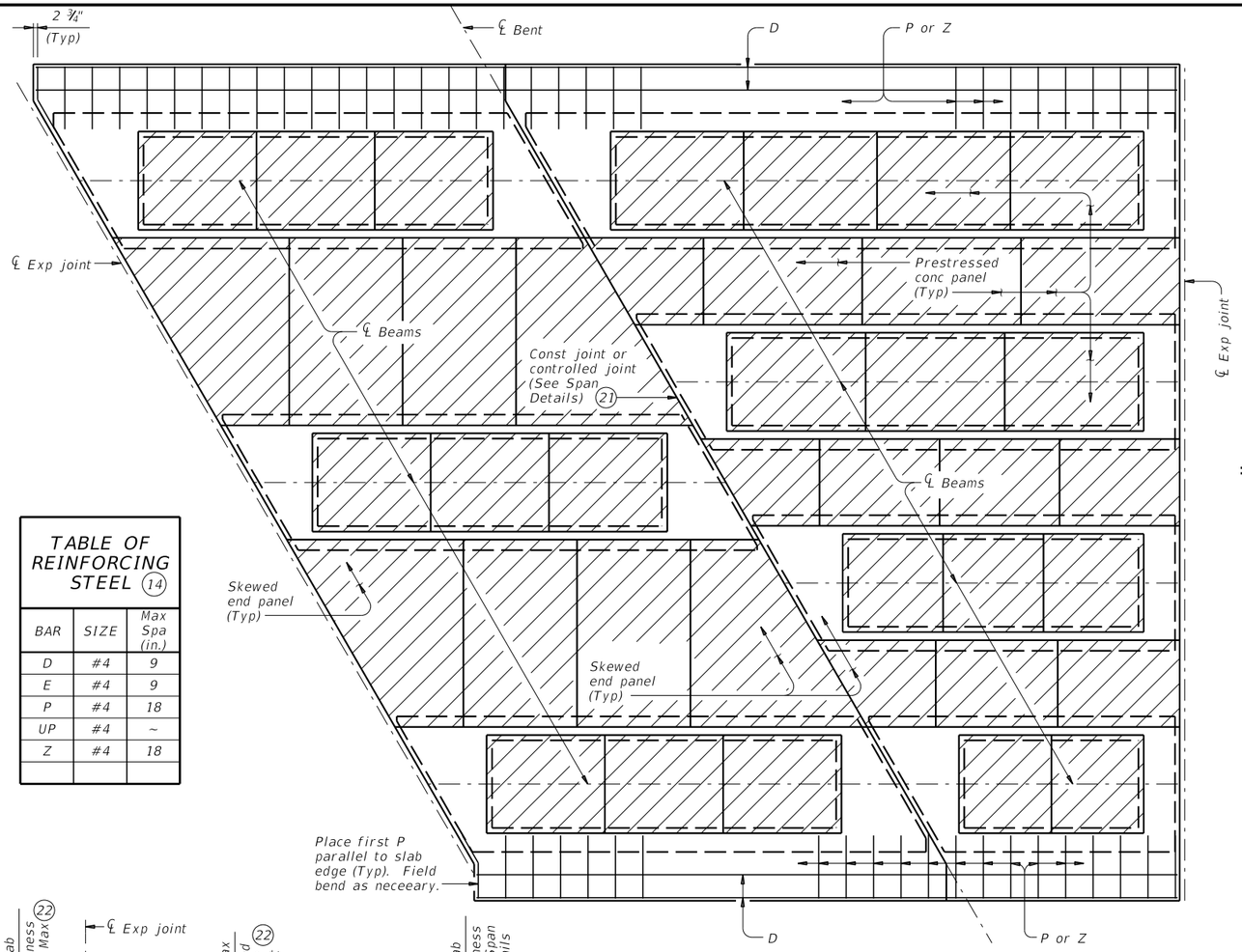
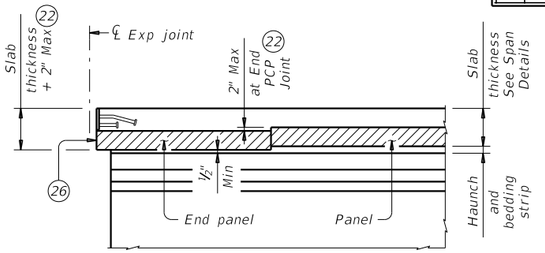


OPTION 2 ~ PLAN OF SLAB

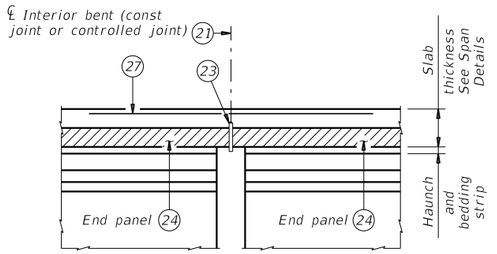
(Showing U-Beams; other beams similar)

TABLE OF REINFORCING STEEL (14)		
BAR	SIZE	Max Spa (in.)
D	#4	9
E	#4	9
P	#4	18
UP	#4	~
Z	#4	18



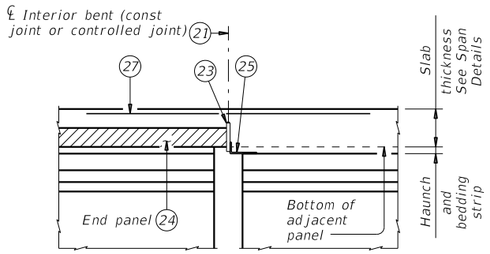
JOINTS (BETWEEN BEAMS/GIRDERS OR AT INV-T STEM)

For SEJ-A, SEJ-S(0), AJ, and Type A expansion joints only.



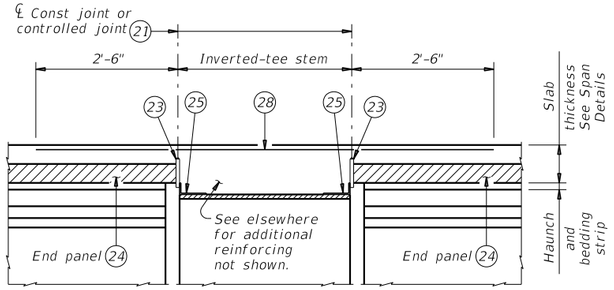
CONVENTIONAL INTERIOR BENT

Panel against panel between beams/girders.



CONVENTIONAL INTERIOR BENT

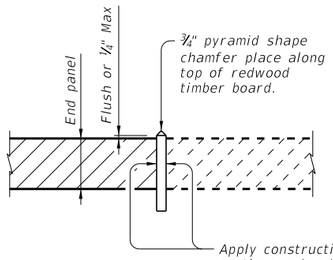
Panel against beam/girder end in adacent span.



INVERTED-T BENT

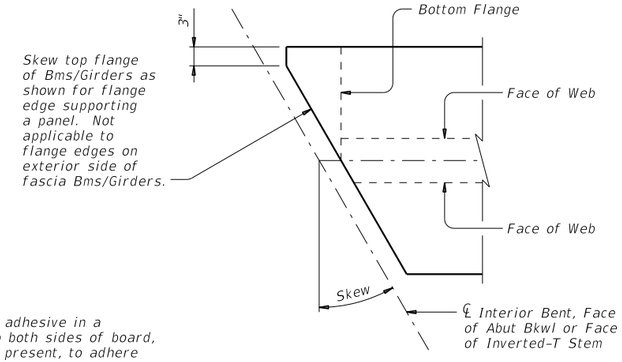
Panels against inverted-tee stem

OPTION 2 ~ ELEVATIONS AT BEAM ENDS (6)



ELEVATION EXAMPLE OF END PANEL AND TIMBER BOARD (23)

See "Option 2 ~ Elevation At Beam Ends".



OPTION 2 ~ SHOWING MODIFICATION TO BEAM/GIRDER TOP FLANGE FOR SKEWS OVER 5°

Showing I-Bm/I-Girder, U-Bms and Steel Bms similar.

(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 ½" 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 ½" thick.

(23) ¾" thick redwood timber board, leave in place. Redwood timber board placed flush with top of panel or within ¼" Max above panel. Place ¾" pyramid shape chamfer along top of timber board. See "Elevation Example of End Panel and Timber Board". Place straight, within ¼" 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 ½" of ¾" thick board.

(25) Permanent galvanized steel sheet form. Removable formwork is acceptable.

(26) Place end panel within ½" 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.

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 ½".

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 0A from standard IGTS in the slab.

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Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

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	ABL	FISHER		106

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. ⅜" or ½" 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.

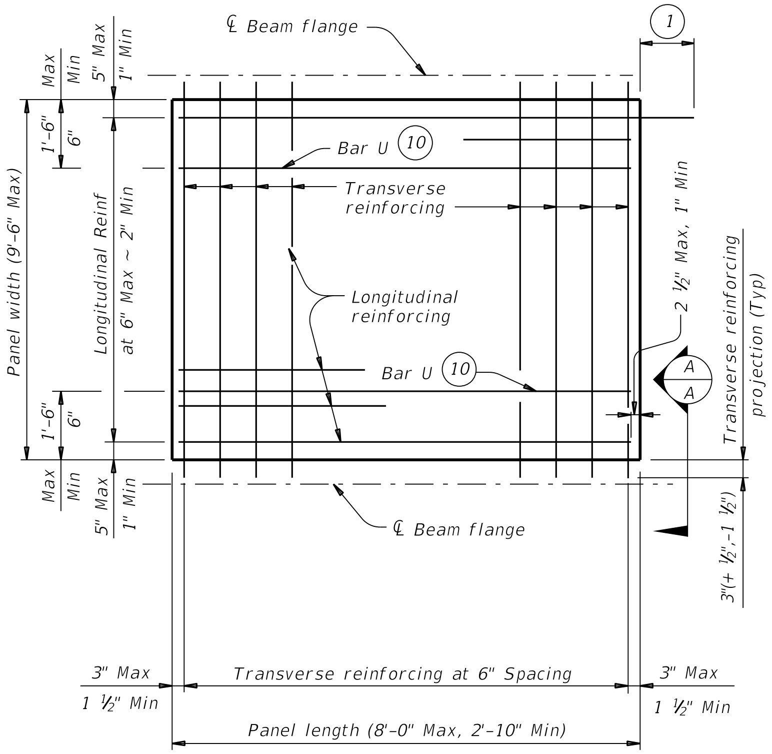
8 End Cover 2 ½" Max, 1" Min.

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.

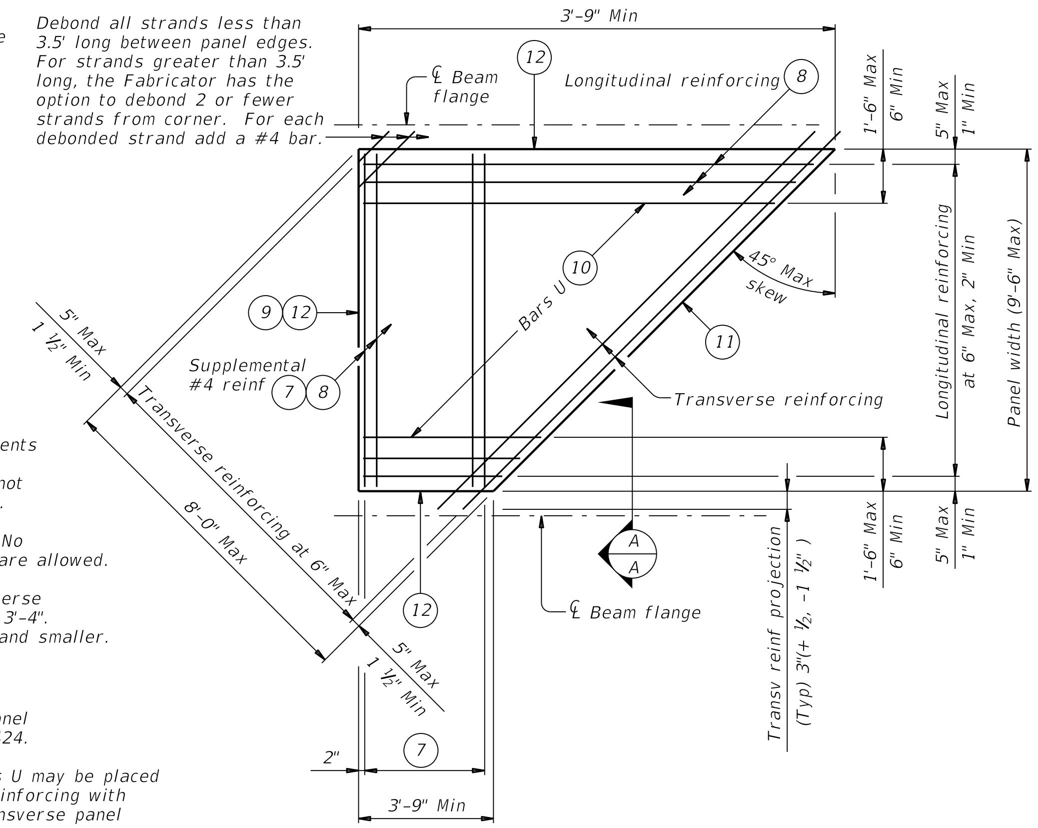
11 Use length of indicated panel edge as panel width for purpose of determining type of transverse reinforcing.

12 Timber form work permissible this edge.



TYPICAL NON-SKEWED PANEL PLAN

Debond all strands less than 3.5' long between panel edges. For strands greater than 3.5' long, the Fabricator has the option to debond 2 or fewer strands from corner. For each debonded strand add a #4 bar.

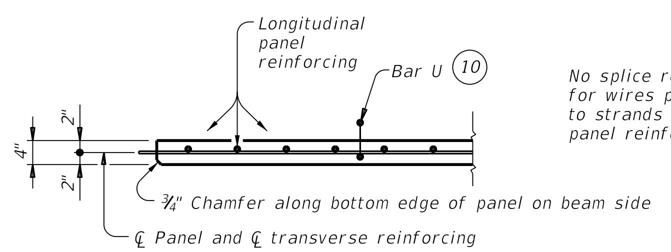


TYPICAL SKEWED END PANEL PLAN

(Only to be used with details shown elsewhere in the plans.)

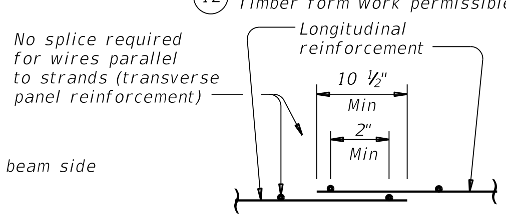
TABLE A (4) (5)			
Beam Type	Normal (In.)	Min (In.)	Max (In.)
A	3	2 ½	3 ½
B	3	2 ½	3 ½
C	4	3	4 ½
IV	6	4	7 ½
VI	6 ½	4 ½	8 ½
U40 - 54	5 ½	5 ½	7
Tx28-70	6	5	7 ½
XB20 - 40	4	3	4 ½
XSB12 - 15	4	3	4 ½

TABLE B (4) (5)			
Top Flange Width	Normal (In.)	Min (In.)	Max (In.)
11" to 12"	2 ¾	2 ½	2 ¾
Over 12" to 15"	3 ¼	3	3 ¼
Over 15" to 18"	4	3	4 ¾
Over 18"	5	3 ½	6 ¼

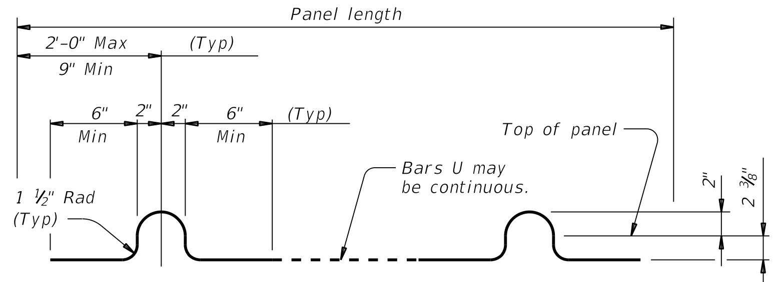


SECTION A-A

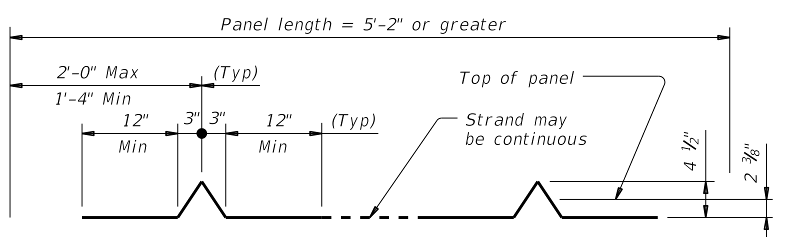
(Not showing supplemental #4 bars for skewed end panels.)



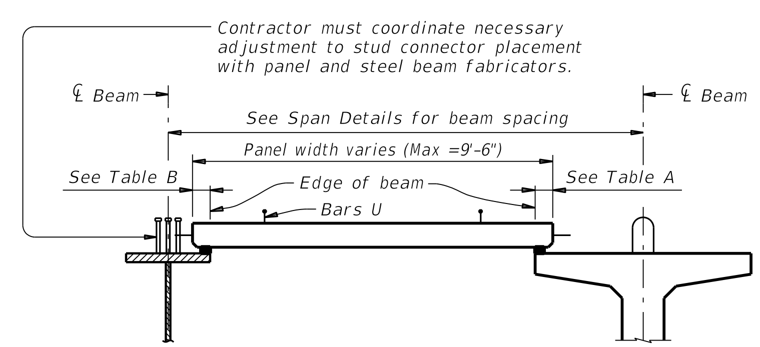
WELDED WIRE REINFORCEMENT (WWR) SPLICE DETAIL (6)



BARS U (#3) (2)



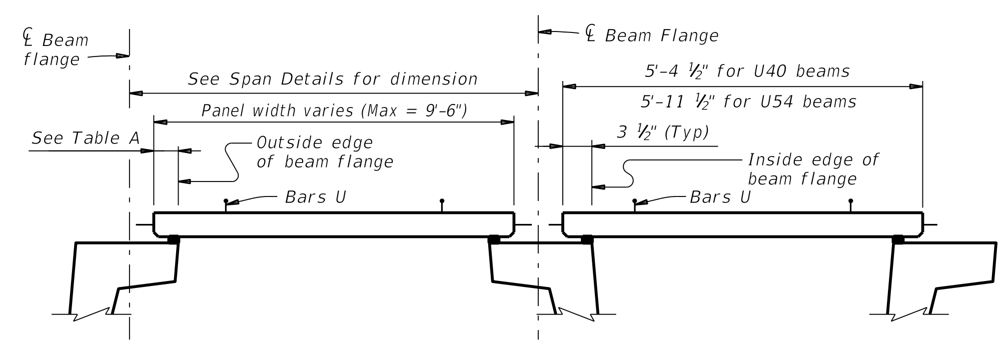
OPTIONAL STRAND FOR BARS U (3)



STEEL BEAMS

PRESTRESSED CONCRETE BEAMS OR GIRDERS

Typ unless noted otherwise



PRESTRESSED CONCRETE U-BEAMS

TYPICAL SECTIONS FOR DETERMINING PANEL WIDTH

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 ¾" 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 ⅜" or ½" 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 ⅜" or ½" 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. ⅜" Dia prestressing strands at 4 ½" Max Spacing (unstressed). No splices allowed.
3. ½" 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.

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HL93 LOADING

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE PANEL FABRICATION DETAILS

PCP-FAB

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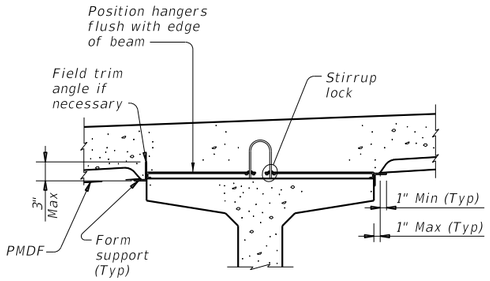
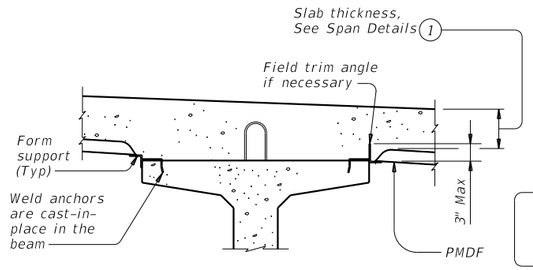
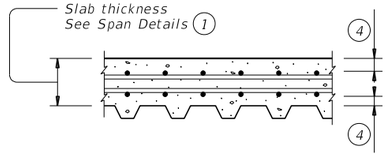


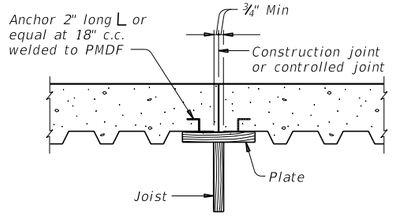
PRESTR CONC I-BEAMS AND I-GIRDERS WITH STIRRUP LOCKS



PRESTR CONC I-BEAMS AND I-GIRDERS WITH WELD ANCHORS

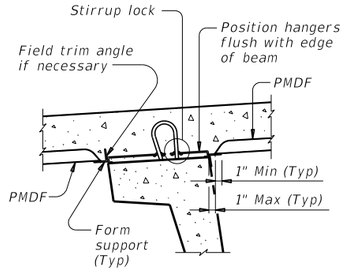


TYP LONGITUDINAL SLAB SECTION

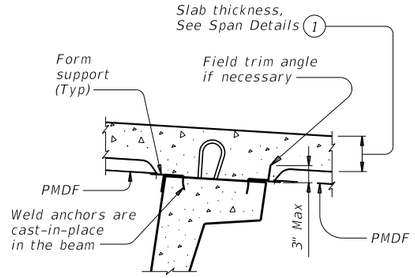


Note: In spans where PMD forms are used, timber forms must be used at construction joints. Adequate provision must be made to support edge of metal form and to provide anchorage of metal form to slab concrete where joined to wood forms.

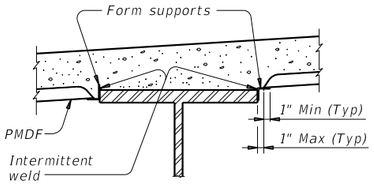
SECTION THRU CONSTRUCTION JOINT



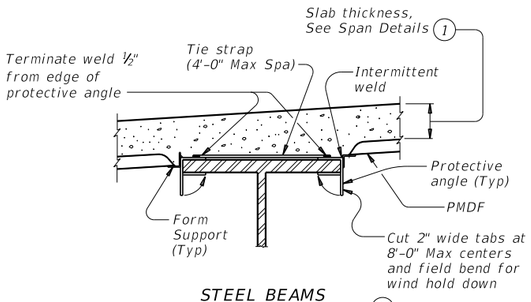
U-BEAMS WITH STIRRUP LOCKS



U-BEAMS WITH WELD ANCHORS

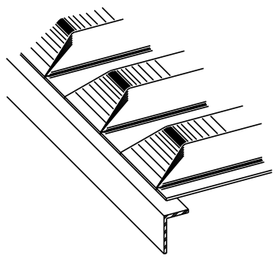


STEEL BEAMS AT COMPRESSION FLANGES

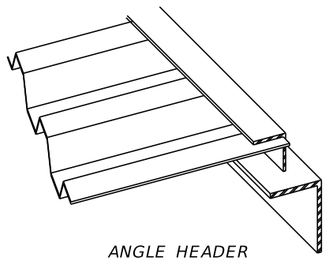


STEEL BEAMS AT TENSION FLANGES (2)

TYPICAL TRANSVERSE SECTIONS



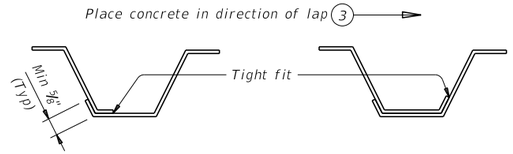
PRECLOSED



ANGLE HEADER

NOTE: This type is to be used for skewed ends only.

TYPES OF END CLOSURES



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.

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.

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.

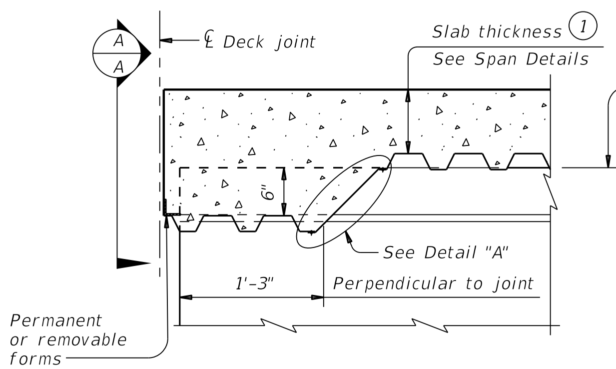
Texas Department of Transportation

Bridge Division Standard

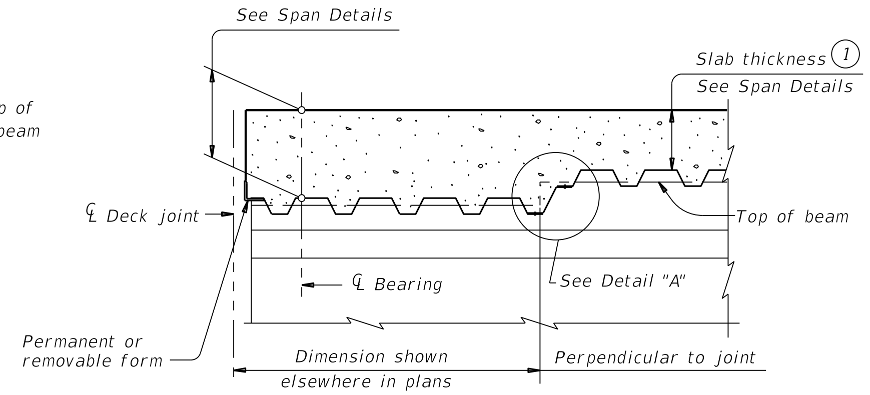
PERMANENT METAL DECK FORMS

PMDF

FILE: pmdfste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0263	05	024	SH 70
02-20: Modified box note by adding steel beams/girders and subsidiary.	DIST	COUNTY		SHEET NO.
	ABL	FISHER		108

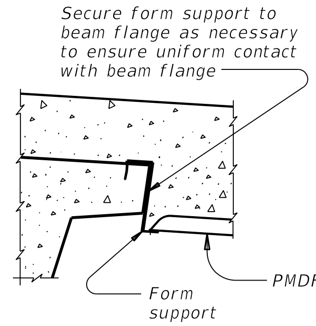


AT THICKENED SLAB END FOR U-BEAMS

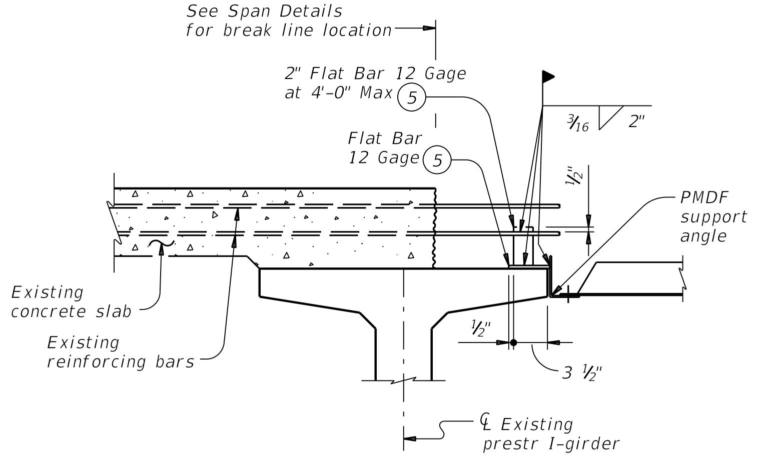


AT THICKENED SLAB END FOR PRESTRESSED I-BEAMS, I-GIRDERS AND STEEL BEAMS

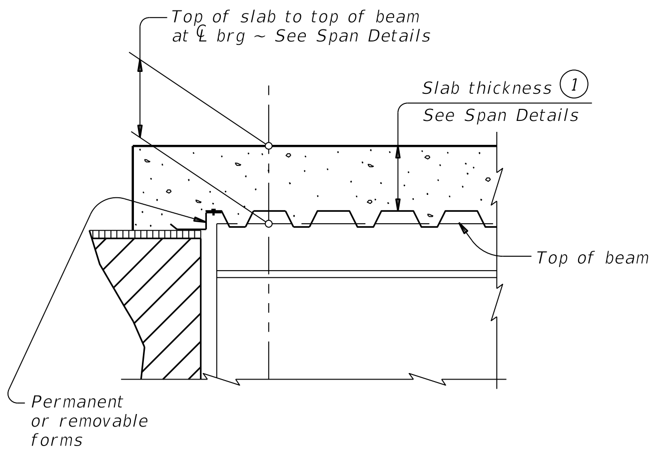
Showing I-beam block-out. No block-out for I-girders or steel beams.



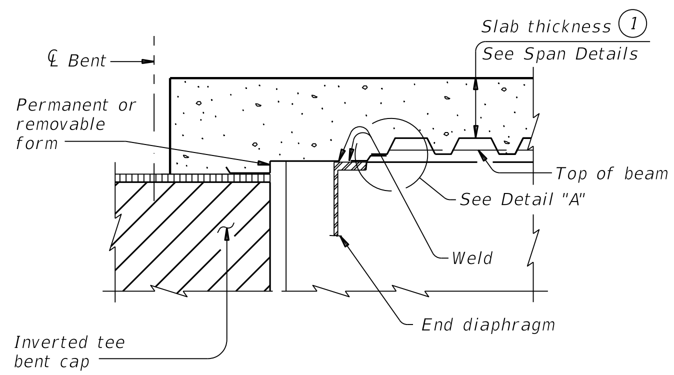
SECTION A-A



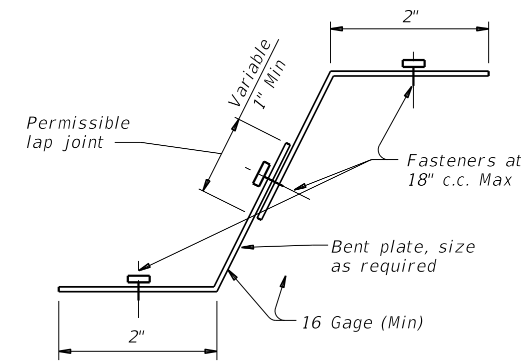
SHOWING PRESTRESSED CONCRETE I-BEAMS, I-GIRDERS AND U-BEAMS



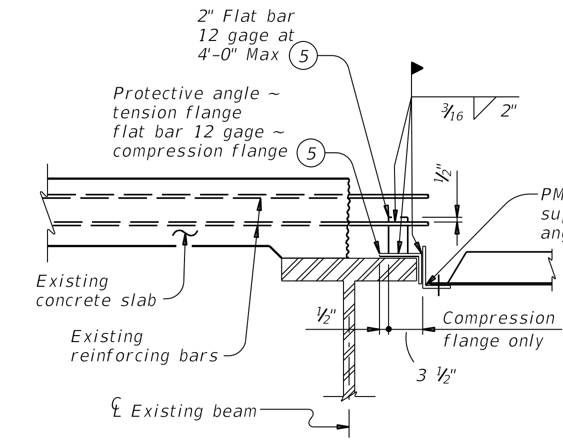
AT SLAB OVER ABUT BKWL OR INV TEE STEM FOR CONC BEAMS WITHOUT THICKENED SLAB END



AT SLAB OVER INV TEE STEM FOR STEEL BEAMS WITHOUT THICKENED SLAB END

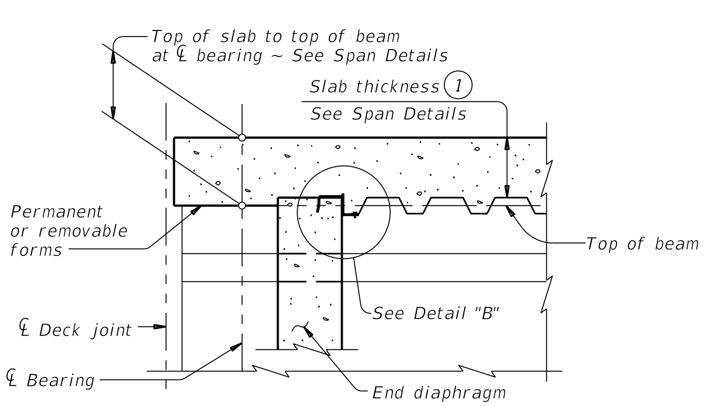


DETAIL "A"

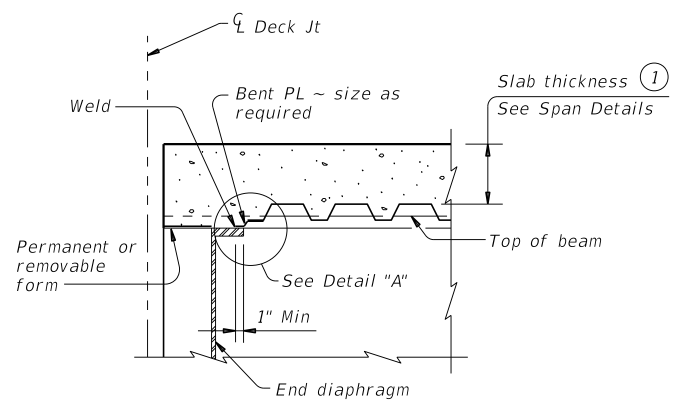


SHOWING STEEL BEAMS

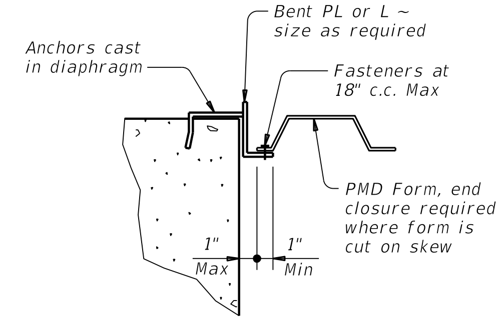
WIDENING DETAILS



AT CONC END DIAPHRAGM FOR PRESTRESSED I-BEAMS AND STEEL BEAMS



AT END DIAPHRAGM FOR STEEL BEAMS WITHOUT THICKENED SLAB END



DETAIL "B"

DETAILS AT ENDS OF BEAMS

(1) Slab thickness minus 3/8" if corrugations match reinforcing bars

(5) Minimum yield stress of 12 gage bars shall be 40 ksi

Texas Department of Transportation | Bridge Division Standard

PERMANENT METAL DECK FORMS

PMDF

FILE: pmdfste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0263	05	024	SH 70
02-20: Modified box note by adding steel beams/girders and subsidiary.	DIST		COUNTY	SHEET NO.
	ABL		FISHER	109

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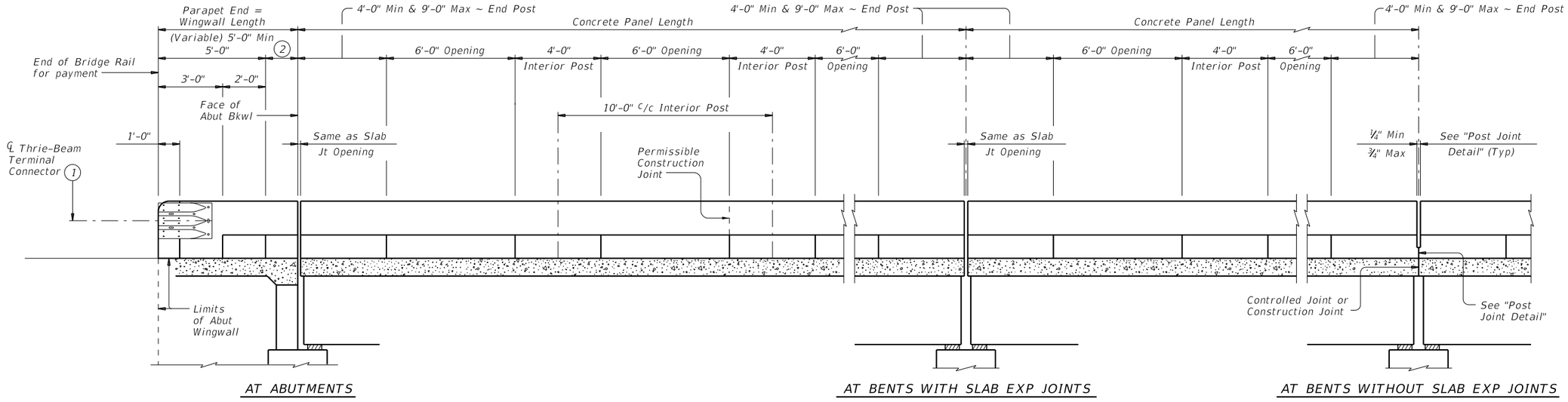
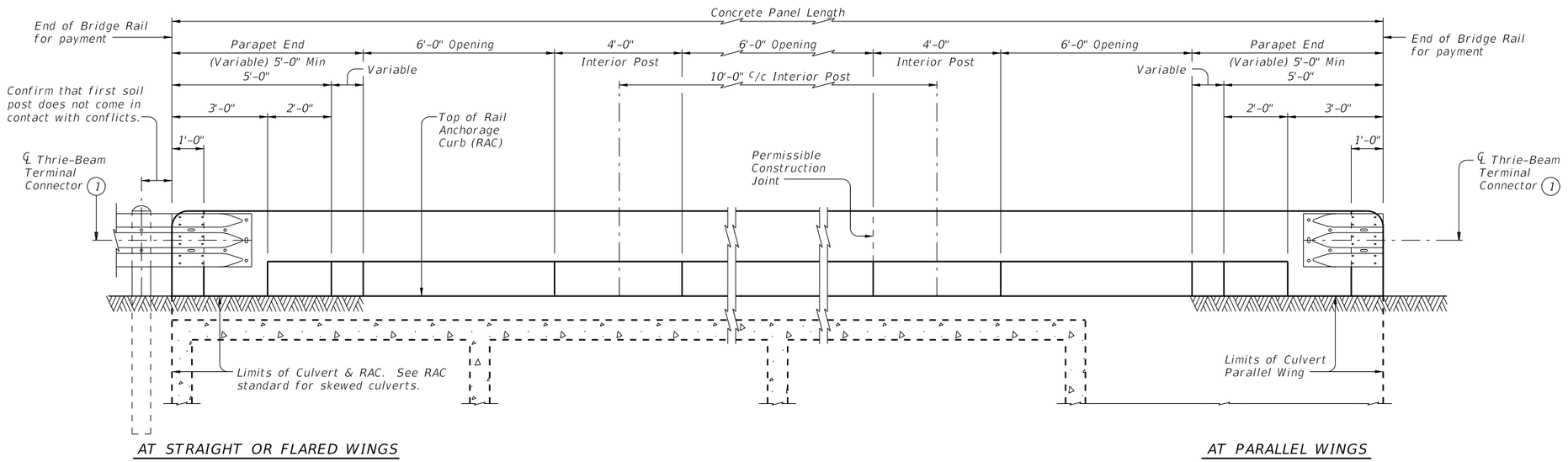


ROADWAY ELEVATION OF RAIL ON BRIDGE



ROADWAY ELEVATION OF RAIL ON BOX CULVERTS

Showing 0° skew culvert. Skewed culverts similar. See RAC standard for details not shown. Vertical joints in concrete rail are not required, unless shown elsewhere.

(1) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.

(2) Wingwall Length minus 5'-0" (Varies)

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T223

FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0263	05	024	SH 70
	DIST	COUNTY		SHEET NO.
	ABL	FISHER		110

DATE: 4/11/2022 3:49:31 PM
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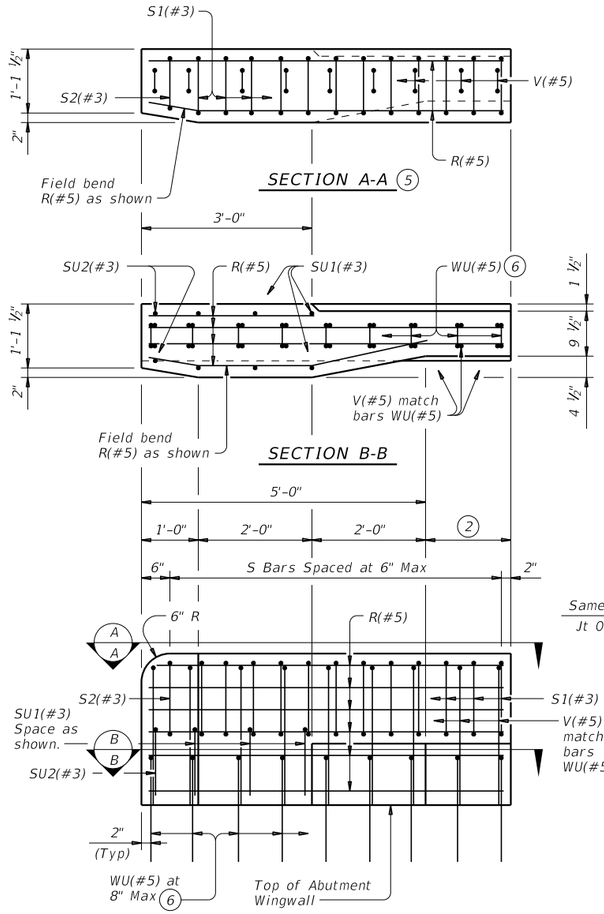
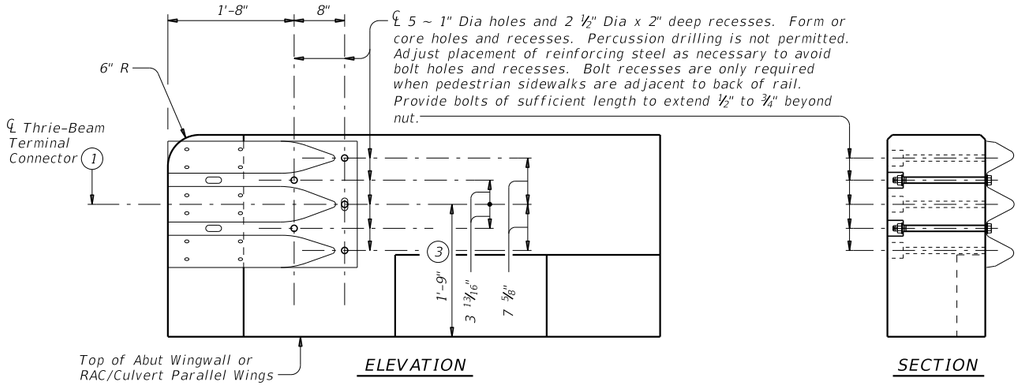
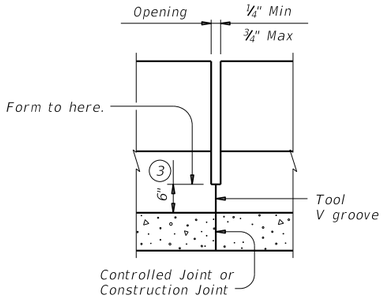


PARAPET END AT ABUT WINGWALL (6)

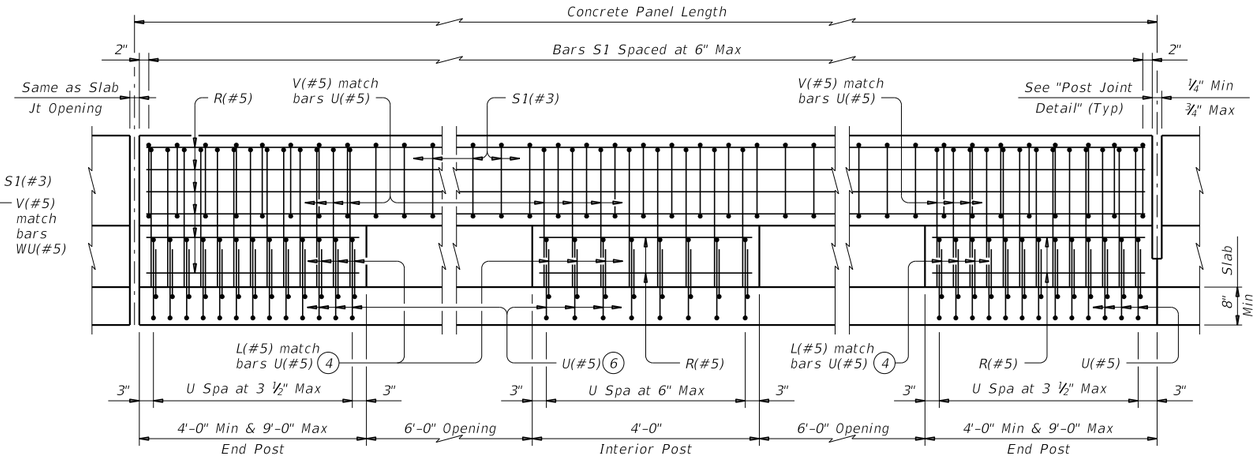


TERMINAL CONNECTION DETAILS



POST JOINT DETAIL

Provide at all interior bents without slab expansion joints.



AT SLAB EXPANSION JOINTS | AT 4' INTERIOR POST | AT BENTS WITHOUT SLAB EXPANSION JOINTS

ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

Showing rail on slab. Rail on box culvert similar.

(1) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.

(2) Wingwall Length minus 5'-0" (Varies)

(3) Increase 2" for structures with overlay.

(4) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.

(5) Bars SU1(#3), SU2(#3) and WU(#5) not shown for clarity.

(6) Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on achorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

Texas Department of Transportation | Bridge Division Standard

TRAFFIC RAIL

TYPE T223

FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
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REVISIONS	0263	05	024	SH 70
	DIST	COUNTY		SHEET NO.
	ABL	FISHER		111

DATE: 4/11/2022 3:49:33 PM
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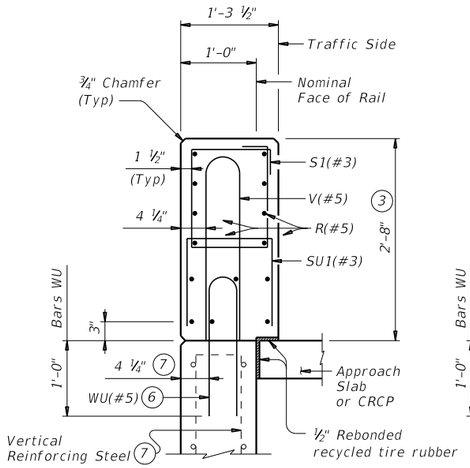
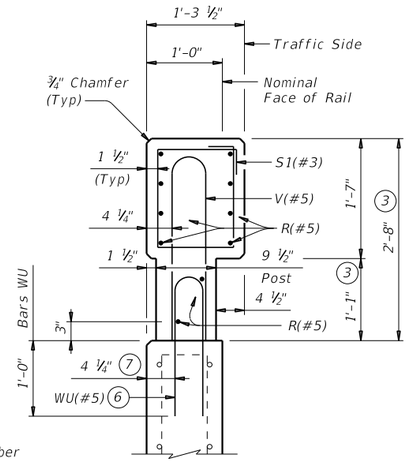
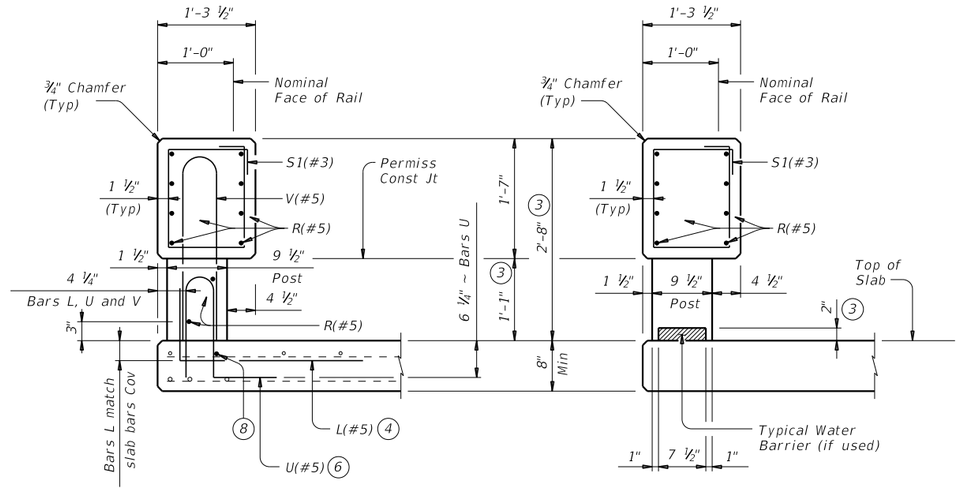


SECTION C-C
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



SECTION D-D
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS

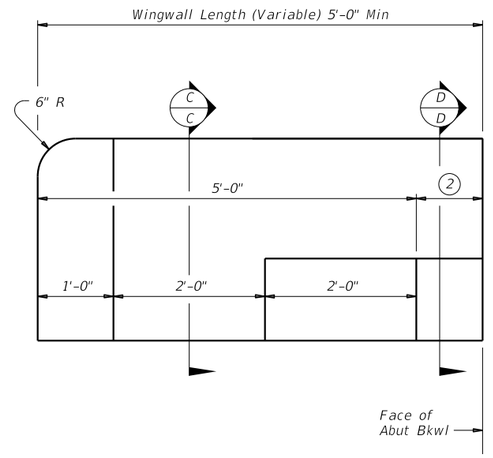


AT POST
ON BRIDGE SLAB

AT OPENING
ON BRIDGE SLAB

SECTIONS THRU RAIL

Sections on box culverts similar.



ELEVATION AT ABUTMENT WINGWALL

Box culvert parallel wings or rail anchorage curb similar.

(2) *Wingwall Length minus 5'-0" (Varies)*

(3) *Increase 2" for structures with overlay.*

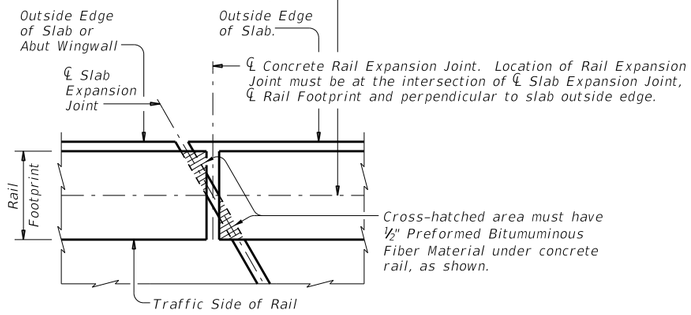
(4) *Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.*

(6) *Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.*

(7) *When vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls on traffic side of wall, move the horizontal wingwall/retaining wall reinforcing to the inside of Bars WU where bars conflict.*

(8) *Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.*

(9) *At the Contractor's option, Bars V may be replaced by extending Bars U to 2'-5 ¼" above the roadway surface without overlay.*



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

CONSTRUCTION NOTES:

Face of rail and parapet must be vertical transversely unless otherwise shown in the plans or approved by the Engineer.

Provide water barriers at openings draining onto undercrossing roadways and sidewalks. They may be cast-in-place or precast in convenient lengths and bonded to the bridge deck with an approved epoxy cement.

Chamfer all exposed corners.

MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.

Deformed Welded Wire Reinforcing (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U, V, and WU unless noted otherwise. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #5 = 2'-0"
Epoxy coated ~ #5 = 3'-0"

GENERAL NOTES:

This rail has been evaluated by full-scale crash test to meet MASH TL-3 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

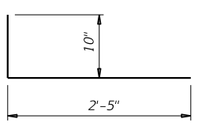
Do not use this railing on bridges with expansion joints providing more than 5" movement.

Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

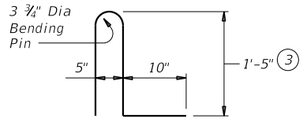
Shop drawings are not required for this rail.

Average weight of railing with no overlay is 358 plf.

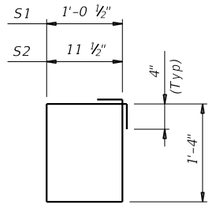
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.



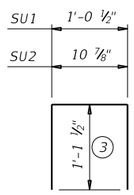
BARS L (#5)



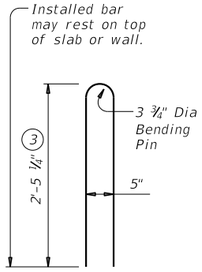
BARS U (#5) (9)



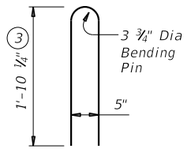
BARS S (#3)



BARS SU (#3)



BARS V (#5) (9)



BARS WU (#5)

SHEET 3 OF 3

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T223

FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
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REVISIONS	0263	05	024	SH 70
	DIST	COUNTY		SHEET NO.
	ABL	FISHER		112

TABLE OF SEALED EXPANSION JOINT INFORMATION

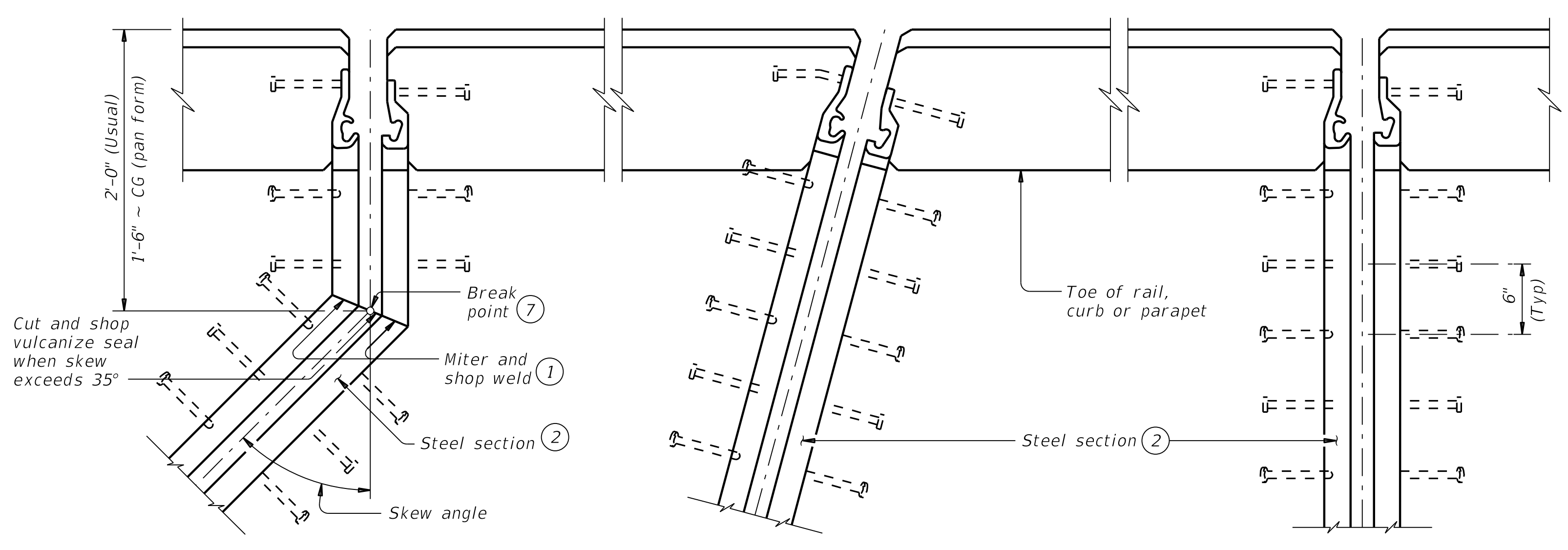
MANUFACTURER	STEEL SECTION (2)	STRIP SEAL 4" JOINT Seal Type	STRIP SEAL 4" JOINT Joint Opening (3)	STRIP SEAL 5" JOINT Seal Type	STRIP SEAL 5" JOINT Joint Opening (3)
D.S. Brown	Type SSCM2	A2R-400	1 3/4"	A2R-XTRA	2"
Watson Bowman Acme	Type R	SE-400	1 3/4"	SE-500	2"

REDUCED LONGITUDINAL MOVEMENT RANGE

SKEW (deg)	JOINT SIZE 4"	JOINT SIZE 5"
0	4.0"	5.0"
15	4.0"	5.0"
30	3.5"	4.3"
45	2.8"	3.5"

DESIGN NOTES:
Joints installed on a skew have reduced ability to accommodate longitudinal movement. Use table values to determine the correct joint size for skewed installations.
For other skews over 25 degrees, calculate reduced movement range by multiplying joint size by cosine (skew).

1. Remove all burrs which will be in contact with seal prior to making splice.
2. Shape of steel section shown is typical. Variations in sections must be approved by the Engineer.
3. These openings are also the recommended minimum installation openings.
4. Reduce for sidewalk or parapet heights less than 6".
5. Other conditions affecting the joint profile should be noted elsewhere.
6. Move transverse bars that are in conflict with SEJ studs, in either the bridge slab or approach slab, to rest at the junction of the studs.
7. See Span details for location of break point.
8. Align shipping angle perpendicular to joint.

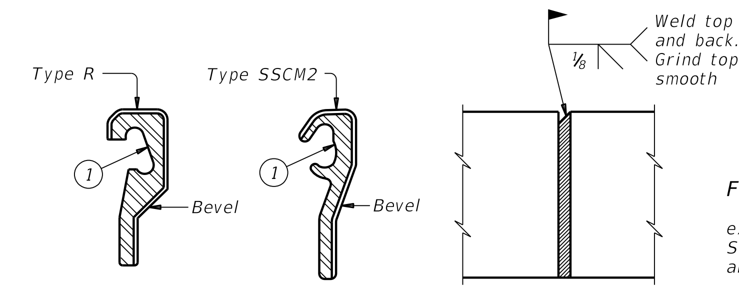


SHOWING SKEWS WITH SLAB BREAKBACKS

SHOWING SKEWS WITHOUT SLAB BREAKBACKS

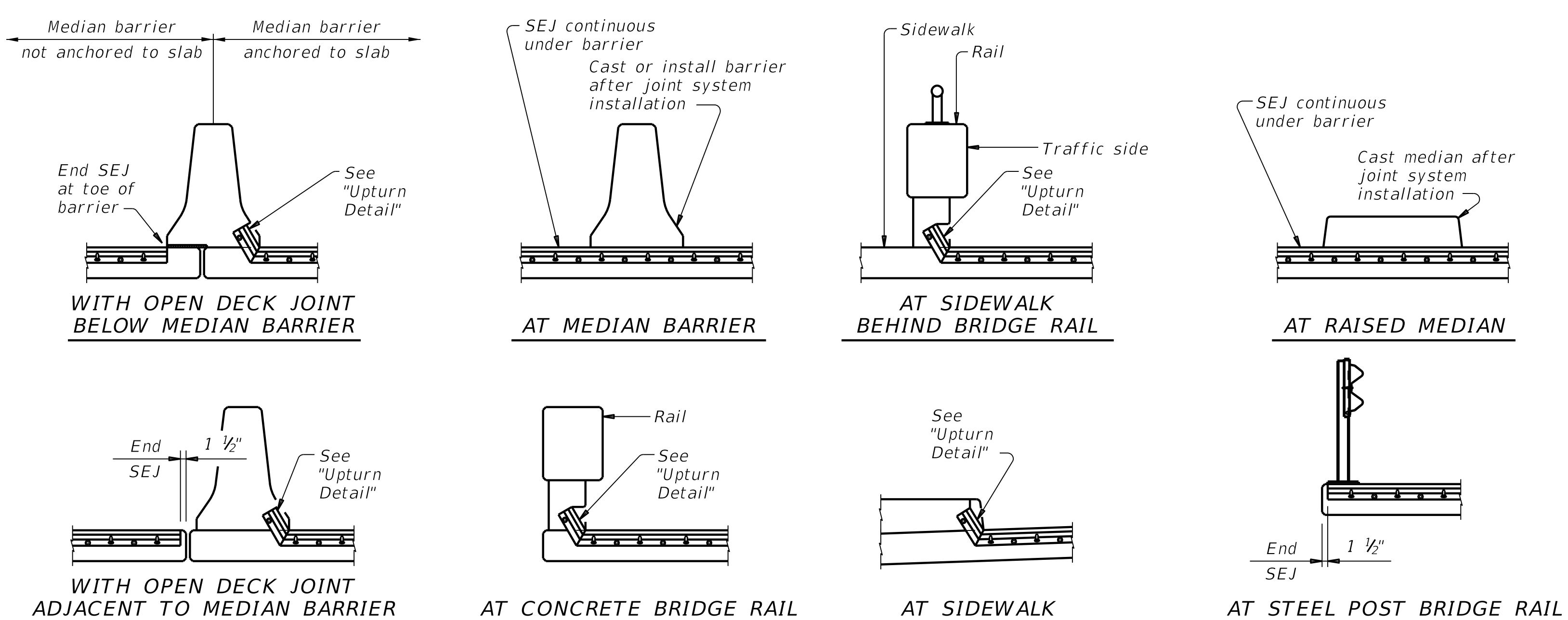
SHOWING WITHOUT SKEWS AND SLAB BREAKBACKS

PLANS OF END CONDITIONS

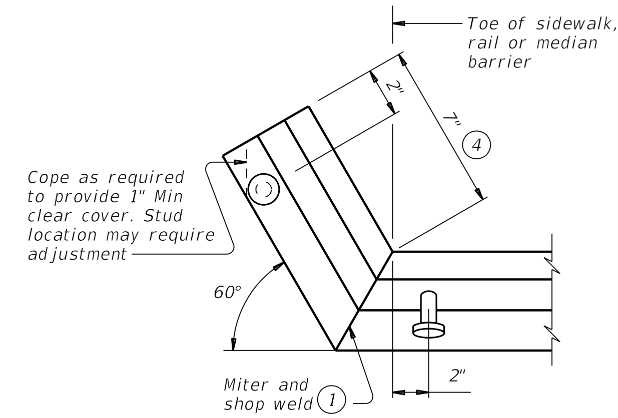


WELD LIMITS　　WELD LIMITS　　REAR VIEW

FIELD SPLICE DETAIL



TYPICAL SECTIONS (5)

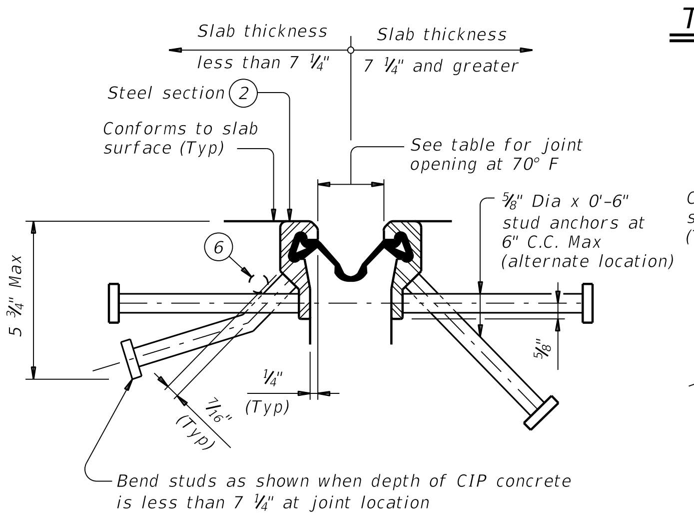


UPTURN DETAIL

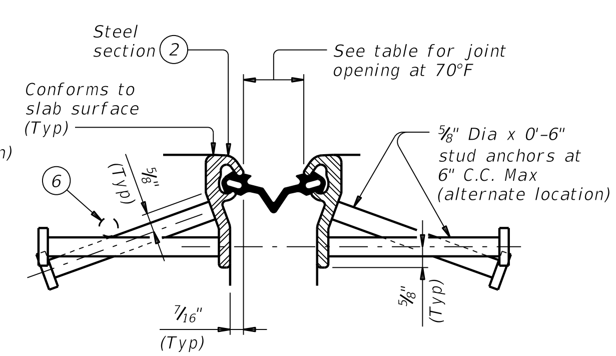
FABRICATION NOTES:
Temporarily shop assemble corresponding sections of sealed expansion joints (SEJ), check for fit, and match mark for shipment. Secure corresponding sections together for shipment with shipping angle. Do not use erection bolts.
The seal must be continuous and included in the price bid for sealed expansion joint.
Ship steel sections in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for staged construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and sufficient studs are added to limit the stud to shop splice distance to 2" Min and 4" Max.
Weld studs in accordance with AWS D1.1.
Butt weld all shop and field splices and grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop.
Paint the entire steel section with System II or IV primer in accordance with Item 446, "Feild Cleaning and Painting Steel", unless required to galvanize when shown in the plans. Provide galvanizing in accordance with Item 445, "Galvanizing". Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Item 446.4.7.3 and 446.4.7.4.
Shop drawings for the fabrication of sealed expansion joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

CONSTRUCTION NOTES:
Secure the sealed expansion joint in position and place to the proper grade and alignment by welding braces to adjacent reinforcing steel, to prestressed beam stirrups, or to anchors cast in concrete diaphragms. Include cost of temporary bracing in the price bid for sealed expansion joint.
Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.
Clean and prepare seal cavity for seal installation as per the Manufacturer's installation procedures.

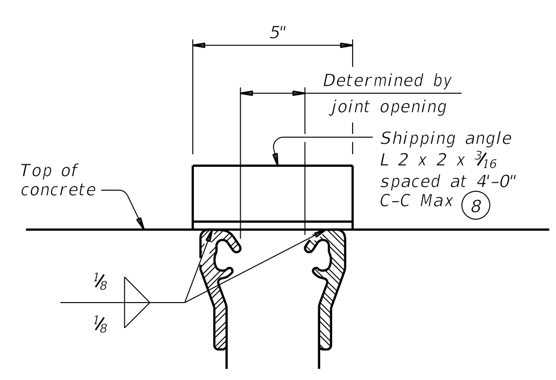
GENERAL NOTES:
Provide sealed expansion joints in the size and at locations shown on the plans.
Minimum slab and overhang thickness required for the use of SEJ-M is 6 1/2".



SECTION THRU WATSON BOWMAN ACME (SE-400 OR SE-500) JOINTS



SECTION THRU D.S. BROWN (A2R-400 OR A2R-XTRA) JOINTS



SHOWING D.S. BROWN (Ty SSCM2)
(All joints are similar.) (Studs are 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.

Texas Department of Transportation — Bridge Division Standard

SEALED EXPANSION JOINT TYPE M
WITHOUT OVERLAY

SEJ-M

FILE: sejmste1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019	CONT 0263	SECT 05	JOB 024	HIGHWAY SH 70
REVISIONS	DIST ABL	COUNTY FISHER		SHEET NO. 113

DATE: 4/11/2022 3:49:35 PM
FILE: \\pusscshrfil01\J-Jobs\2138C TxDOT SH70 Plum Creek ABL\06.00 Design\06.04 Sheets\06.04.11 Standards\Bridge Standards\sejmste1-19.dgn

1 BEGIN Ⓐ & SHOULDER RUMBLE STRIPS
℄ SH70 STA 537+75.00

2 BEGIN ⒷⒸ & CENTERLINE RUMBLE STRIPS
℄ SH70 STA 537+75.00

3 END Ⓐ & SHOULDER RUMBLE STRIPS
℄ SH70 STA 550+27.00

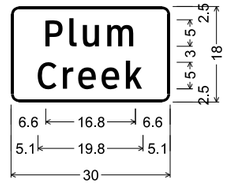
4 END ⒷⒸ & CENTERLINE RUMBLE STRIPS
℄ SH70 STA 550+27.00

5 END SHOULDER RUMBLE STRIPS
℄ SH70 STA 543+00.00

6 END CENTERLINE RUMBLE STRIPS
℄ SH70 STA 543+00.00

7 BEGIN SHOULDER RUMBLE STRIPS
℄ SH70 STA 546+50.00

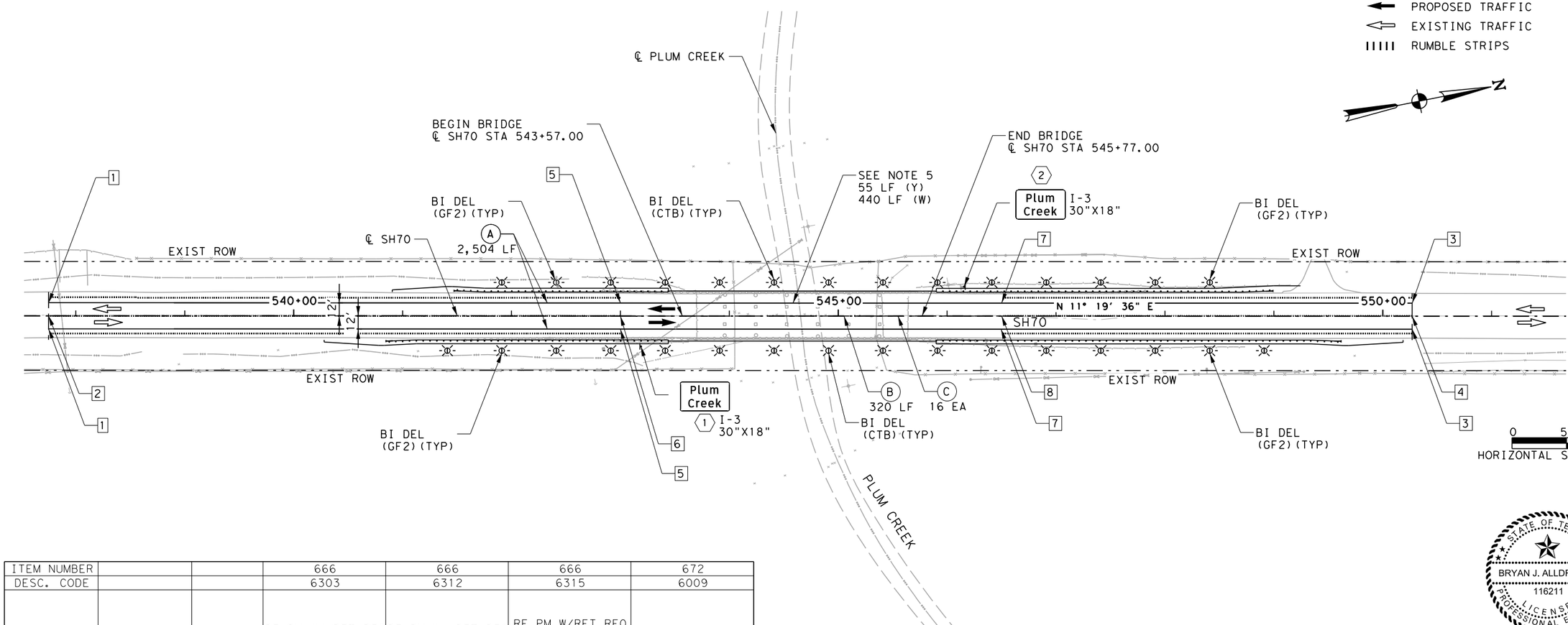
8 BEGIN CENTERLINE RUMBLE STRIPS
℄ SH70 STA 546+50.00



I-3 5in;
1.5" Radius, 0.5" Border, White on Green;
"Plum", ClearviewHwy-3-W;
"Creek", ClearviewHwy-3-W;

LEGEND

- (A) 4" SLD (W)
- (B) 4" BRK (Y)
- (C) REFL PAV MRKR TY II-A-A
- BIDIRECTIOINAL DELINEATOR (GF2 OR CTB)
- SIGN
- (X) SIGN NUMBER
- EXISITNG ROW
- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RUMBLE STRIPS



ITEM NUMBER			666	666	666	672
DESC. CODE			6303	6312	6315	6009
Begin	End	LT/RT	RE PM W/ RET REQ TY I (W)4"(SLD) (100MIL)	RE PM W/ RET REQ TY I (Y) 4"(BRK) (100MIL)	RE PM W/RET REQ TY I (Y)4"(SLD) (100MIL)	REFL PAV MRKR TY-II-A-A
STA	STA	FT	LF	LF	LF	EA
514+50.00	537+50.00	LT	2,300			
514+50.00	516+50.00	LT	200			3
514+50.00	537+50.00		2,300	575		29
514+50.00	537+50.00	RT	2,300			
550+27.00	573+27.00	LT	2,300			
550+27.00	571+27.00			525		27
559+77.00	571+27.00	RT			1,150	15
571+27.00	573+27.00	LT			200	3
571+27.00	573+27.00	RT			200	3
550+27.00	573+27.00	RT	2,300			
Additional Total for TCP			**11,700**	**1,100**	**1,550**	**80**

NOTES

1. ALL UTILITIES TO BE LOCATED AND CONFIRMED BY THE CONTRACTOR IN THE FIELD PRIOR TO CONSTRUCTION.

2. EXISTING DELINEATORS AND OBJECT MARKERS TO BE REMOVED UNLESS NOTED OTHERWISE.

3. ALL PROPOSED SIGN LOCATIONS ARE APPROXIMATE AND CAN BE ADJUSTED TO ACCOMODATE SITE CONDITIONS AS APPROVED BY THE ENGINER.

4. ALL SIGNS SHALL BE CONSTRUCTED IN ACCORDANCE WITH DETAILS FOUND IN "TMUTCD" & "STANDARD HIGHWAY SIGN DETAILS FOR TEXAS", LATEST EDITIONS.

5. TYPE II PAV MRK (W) AND (Y) TO BE USED AS A SEALER ON THE NEW BRIDGE DECK ONLY.

STATE OF TEXAS
BRYAN J. ALLDREDGE
116211
LICENSED PROFESSIONAL ENGINEER

4/11/2022

Texas Department of Transportation

IEA
18383 PRESTON ROAD
SUITE 500
DALLAS, TEXAS 75252
(214) 884-4253
FIRM REGISTRATION No.
F-10161

SH 70

SIGN & PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6	SEE COVER SHEET	114

STATE	DISTRICT	COUNTY
TEXAS	ABL	FISHER

CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH70-RD-SGN & PM.dgn

PLOT SCALE: 100.0000 ' / in.
4/11/2022 6:11:13 PM USER: gensor MODEL:Design
\\pusscsmrfil01\VJ-Jobs\2138C TxDOT SH70 Plum Creek ABL\06.00 Design\06.04 Sheets\06.04.03 Roadway\SH70-RD-SGN & PM.dgn

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DATE:
FILE:

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TYPE N	TYPE S
114	1	I-3	Plum Creek	30"X18"	✓		TWT	1	WS	T			
114	2	I-3	Plum Creek	30"X18"	✓		TWT	1	WS	T			

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

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

http://www.txdot.gov/

NOTE:

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

Texas Department of Transportation

Traffic Operations Division Standard

SH 70 AT PLUM CREEK

SUMMARY OF SMALL SIGNS SOSS

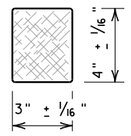
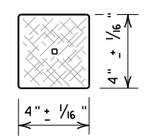
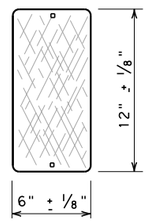
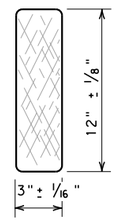
Sheet 1 of 1

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0263	05	024	SH 70
		DIST	COUNTY		SHEET NO.
		ABL	FISHER		115

18

DATE: 4/11/2022 1:49:14 PM
FILE: \\pussesnrfil01\J-Jobs\2138C TxDOT SH70 Plum Creek ABL\06.00 Design\06.04 Sheets\06.04.01 Sheets\dom1-20.dgn

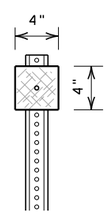
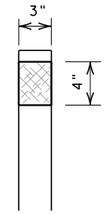
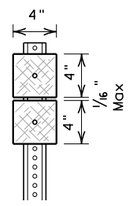
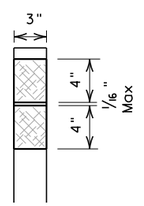
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			

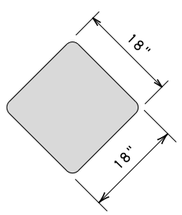
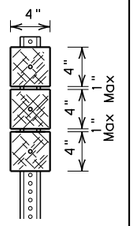
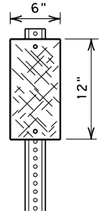
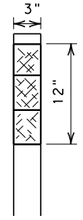
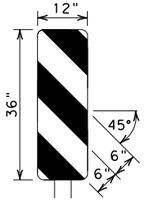
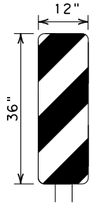
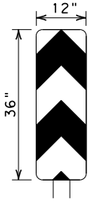
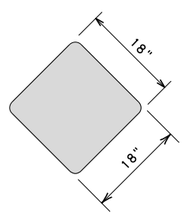
NOTE

1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx).
2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.

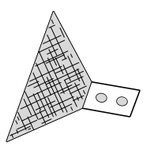
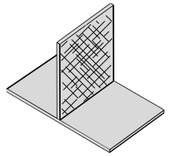
DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			

1. Barrier reflectors shall meet the requirements of DMS 8600.
2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.

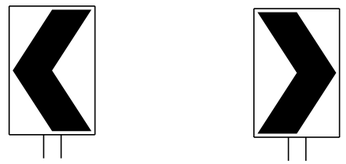
SHEETING: Yellow, White, Red

NOTE

1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.

CHEVRONS

DEVICE



W1-8

SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

NOTE

1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

ONE DIRECTION LARGE ARROW

DEVICE

W1-6

SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

DEPARTMENTAL MATERIAL SPECIFICATIONS	
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	ABL	FISHER		116

20A

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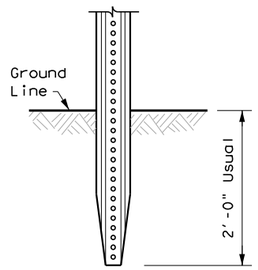
POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

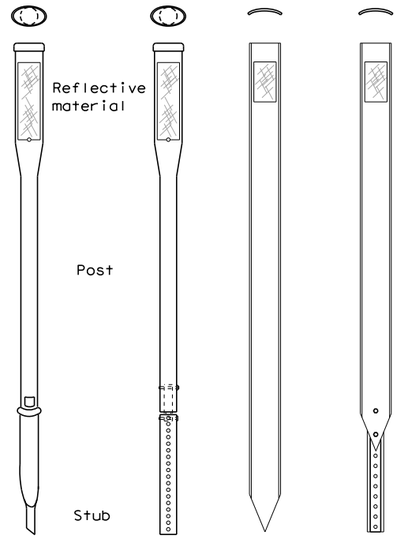


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

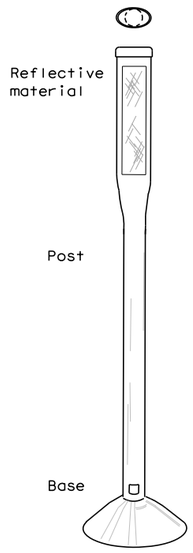
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



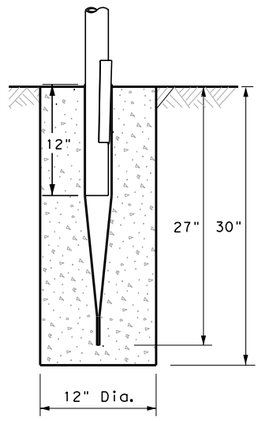
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

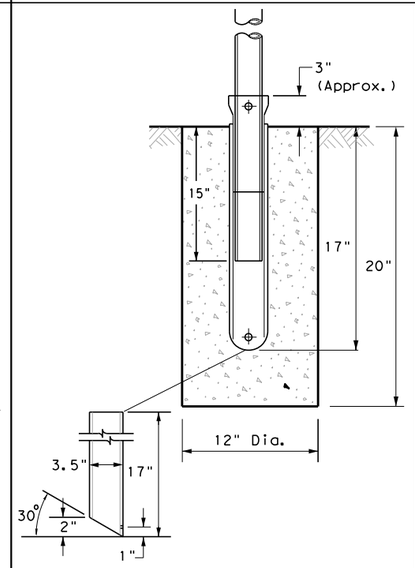
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

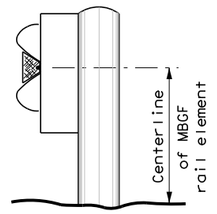
NOTE

1. Install per manufacturer's recommendations.

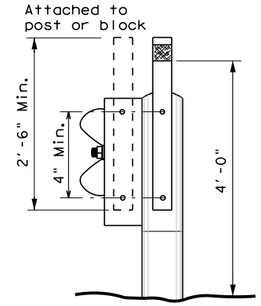
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

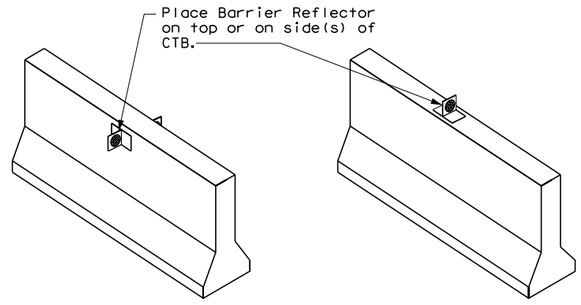
GF1



GF2



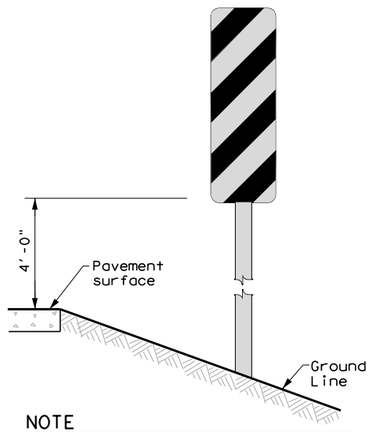
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

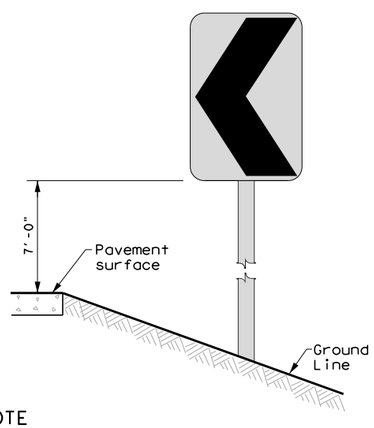
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

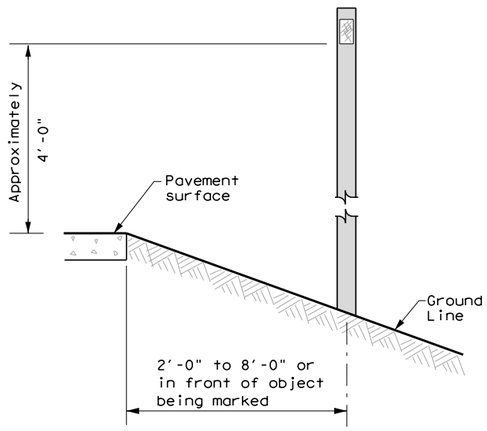
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

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DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

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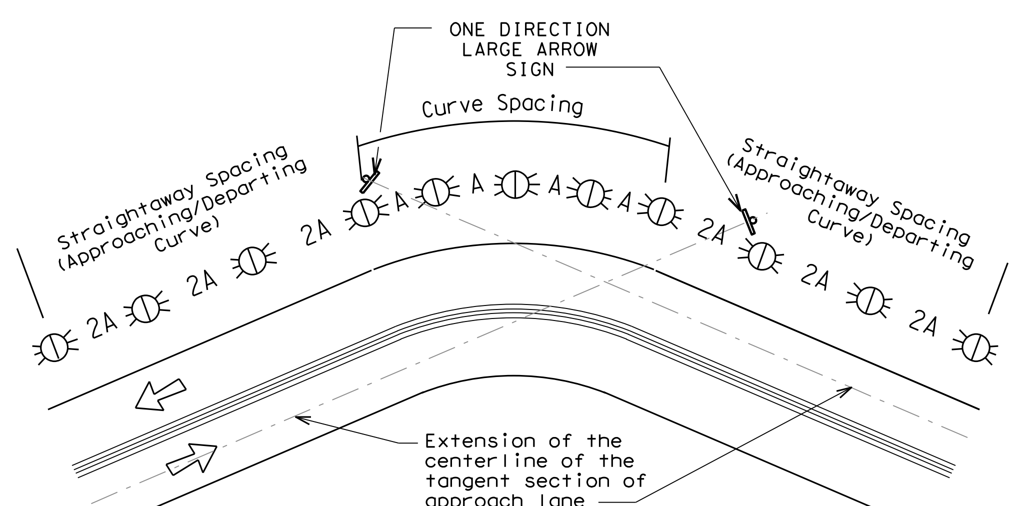
20B

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

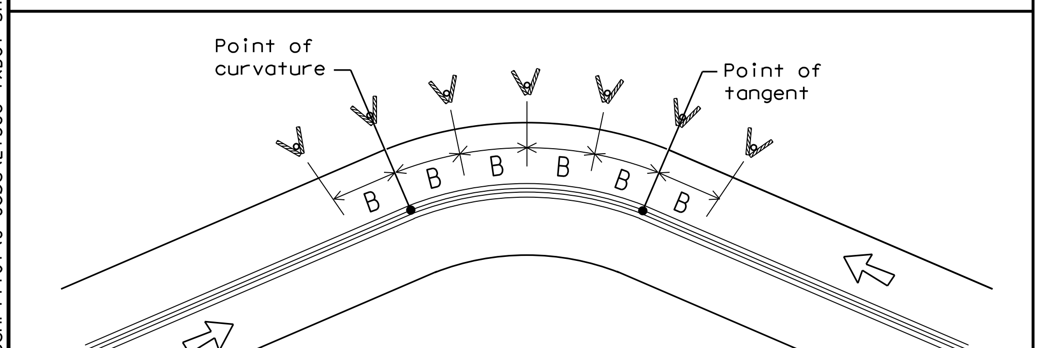
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

Degree of Curve	Radius of Curve (FEET)	Spacing in Curve (FEET)	Spacing in Straightaway (FEET)	Chevron Spacing in Curve (FEET)
		A	2A	B
1	5730	225	450	——
2	2865	160	320	——
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp. Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete)and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100'max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100'max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND

- Bi-directional Delineator
- Delineator
- Sign

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DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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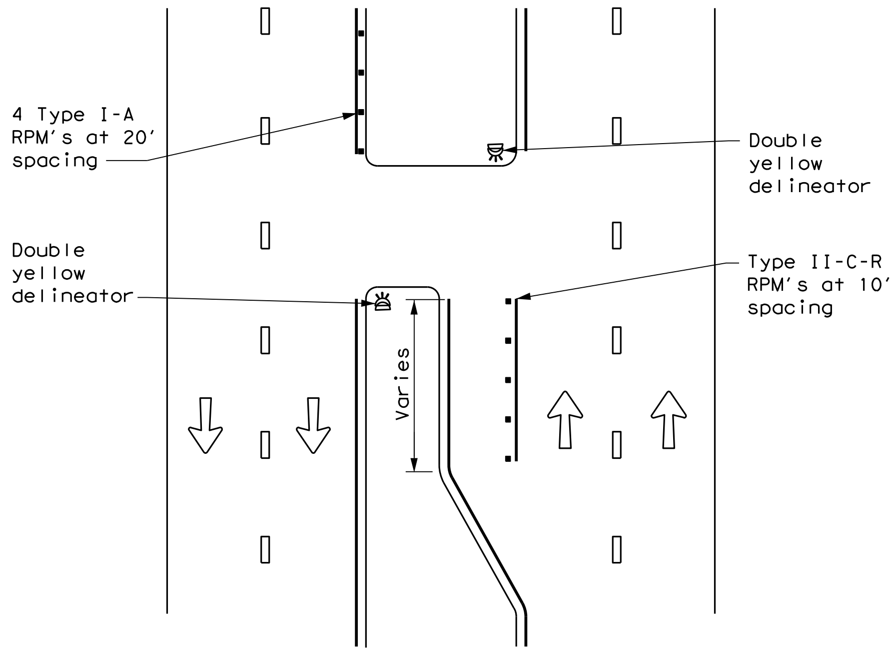
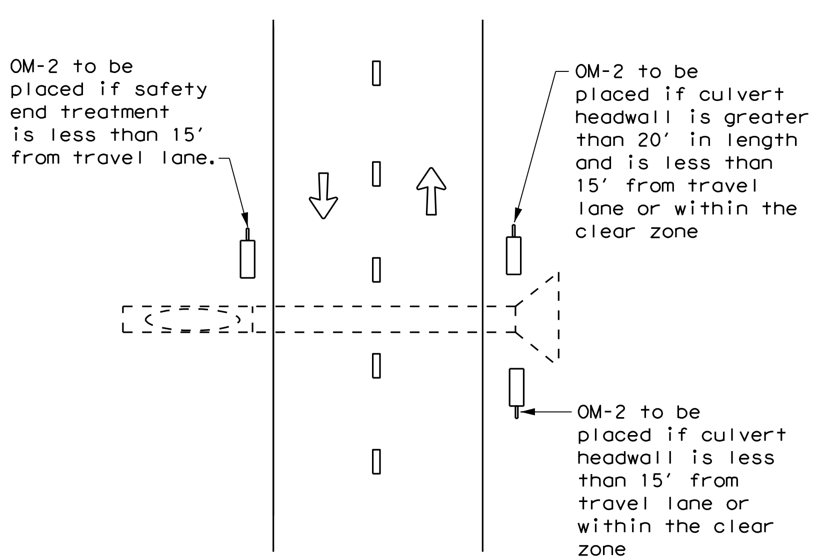
CROSSOVERS



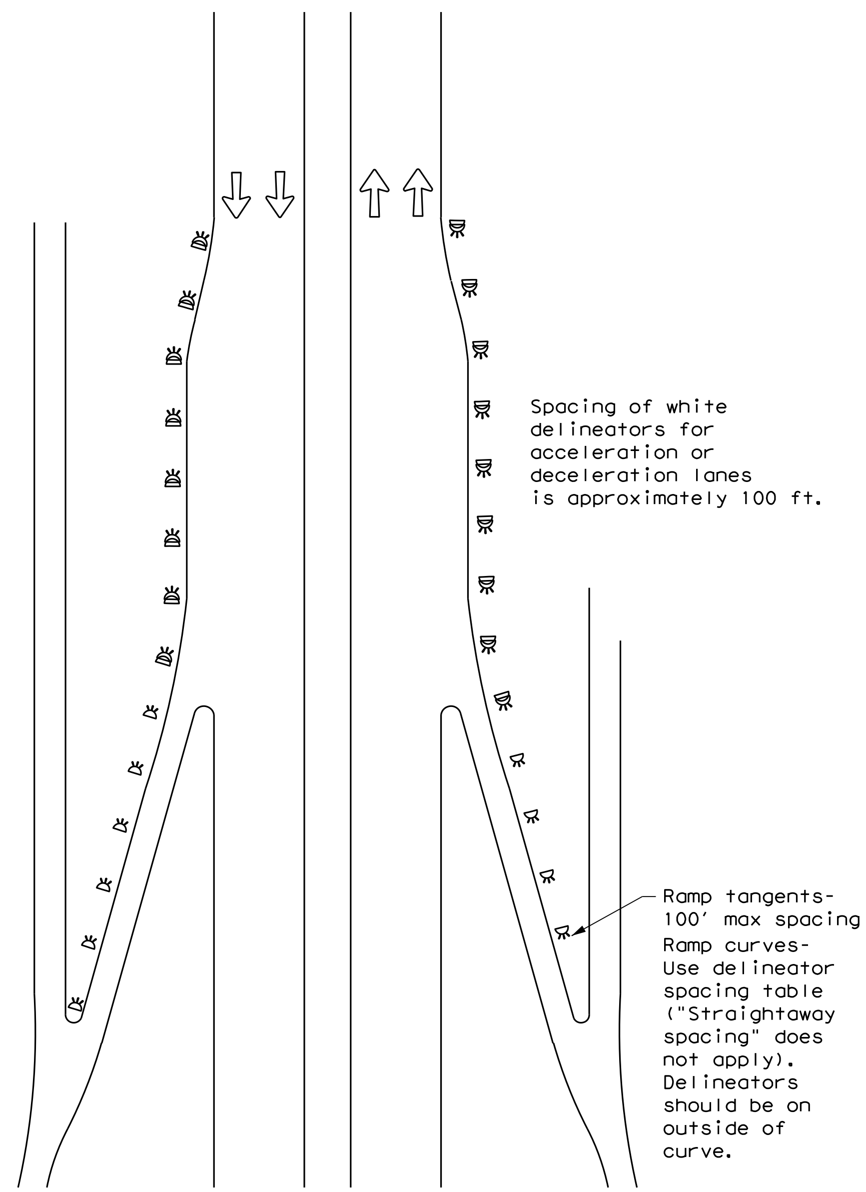
DETAIL 1

FOR CULVERTS WITHOUT MBGF



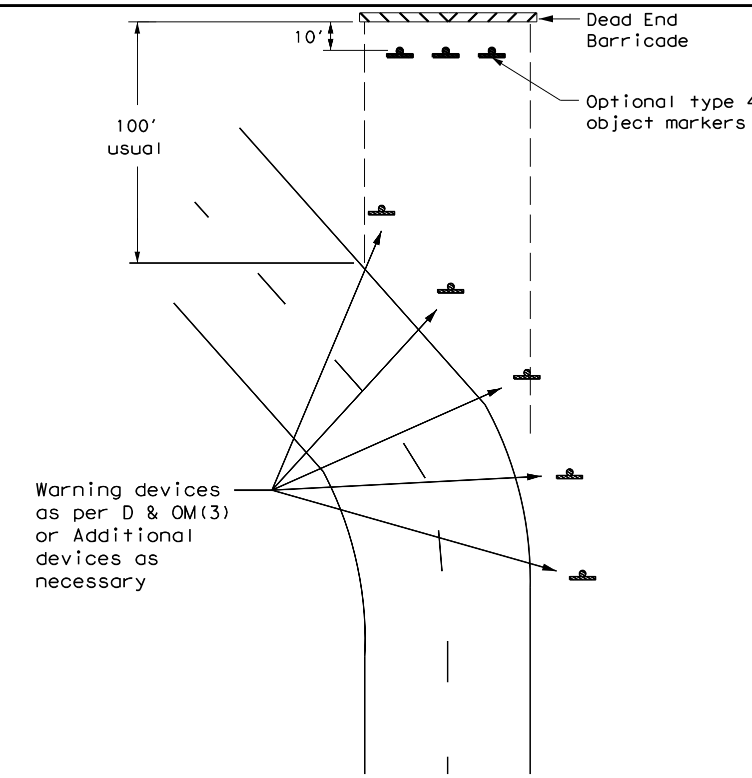
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



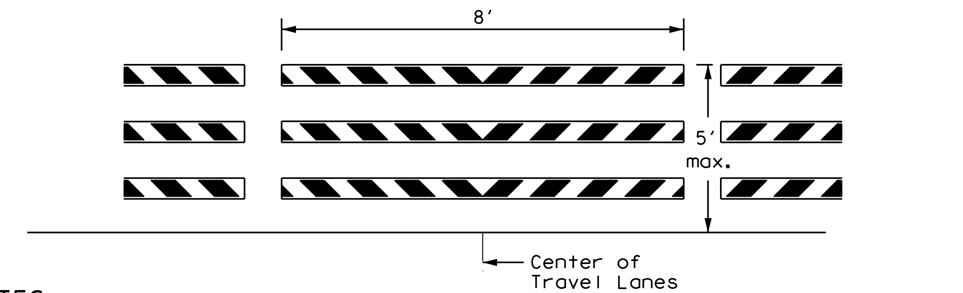
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND

Symbol	Description
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

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DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

FILE: dom4-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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	DIST		COUNTY	SHEET NO.
	ABL		FISHER	119

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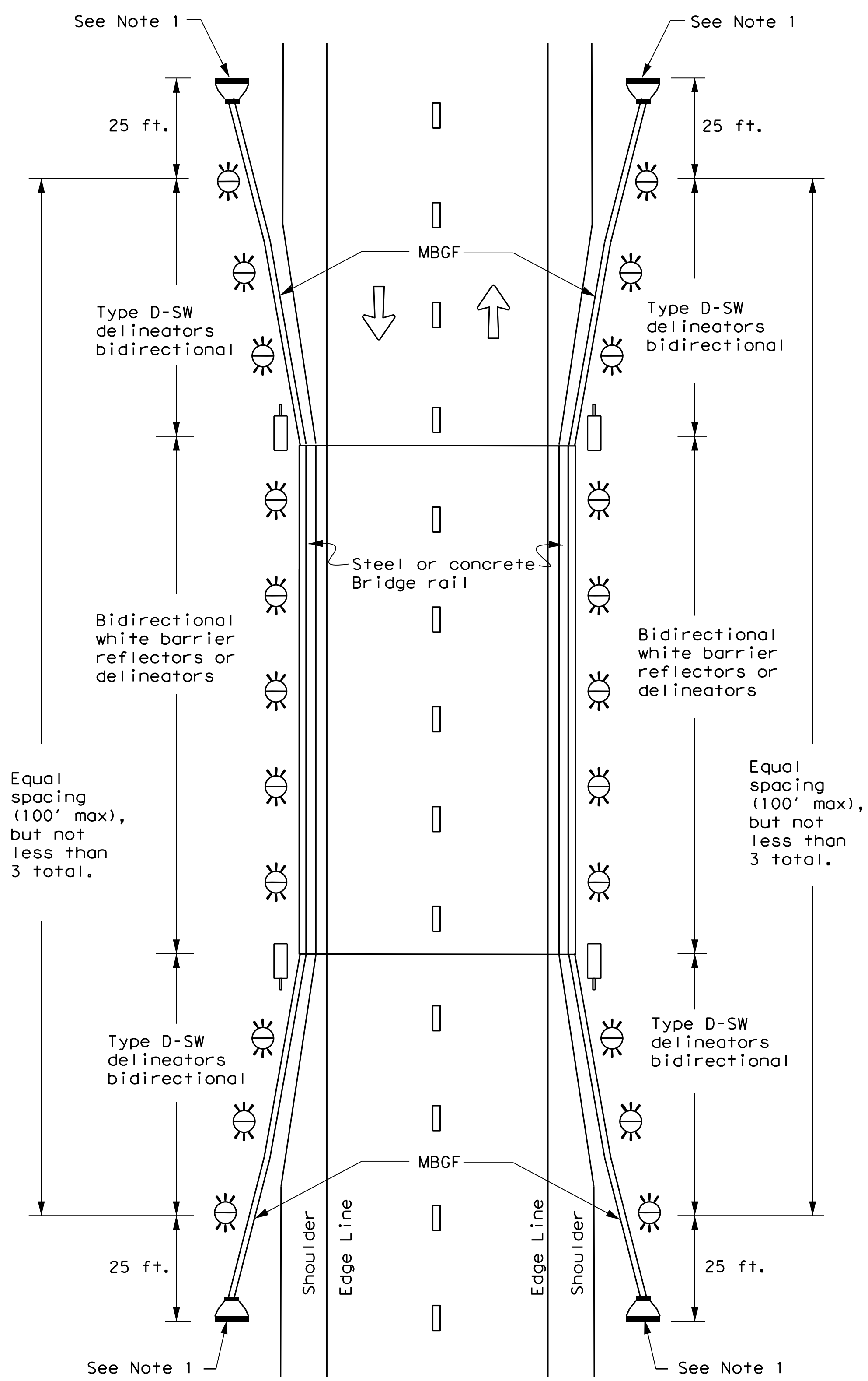
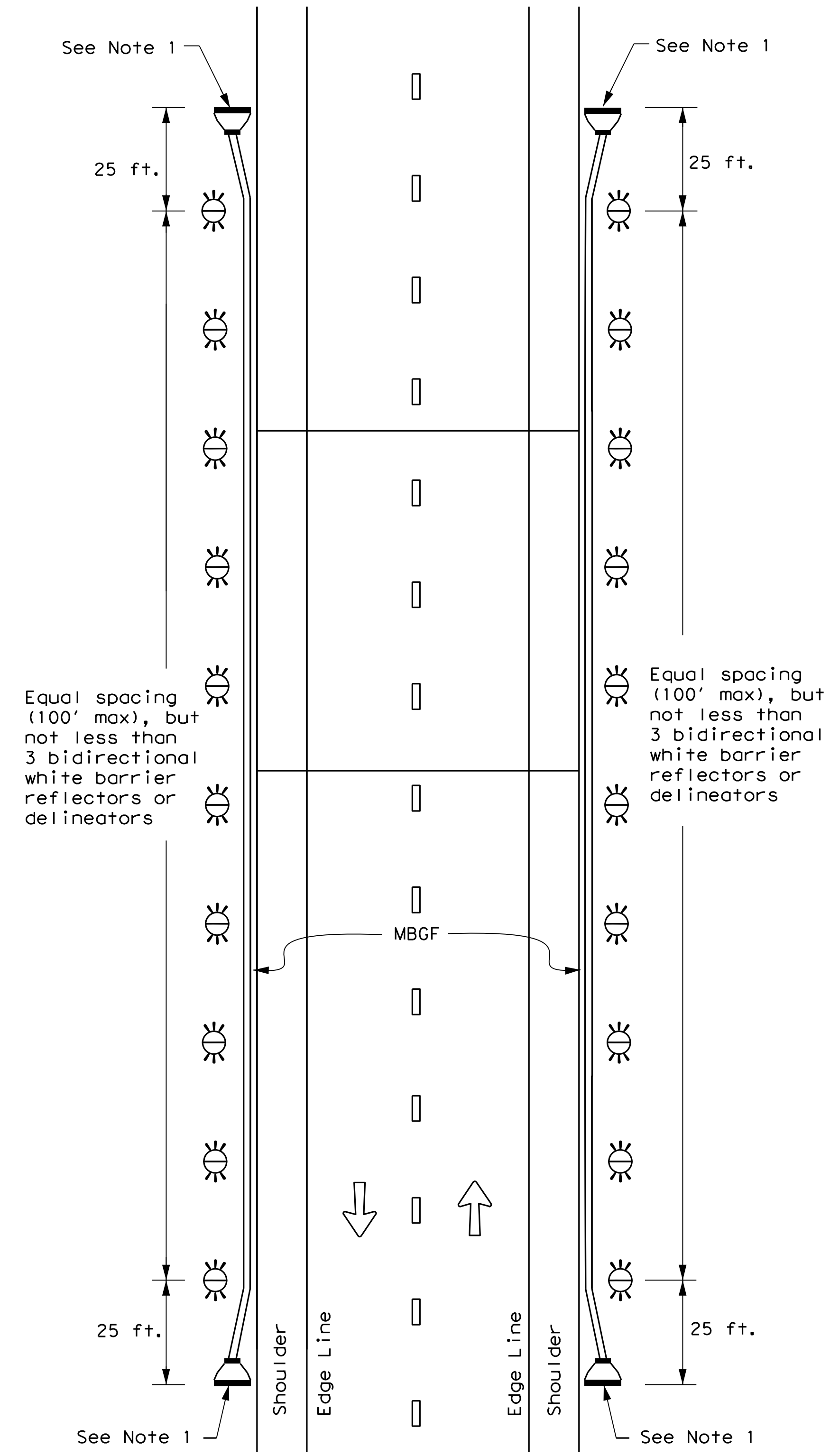
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

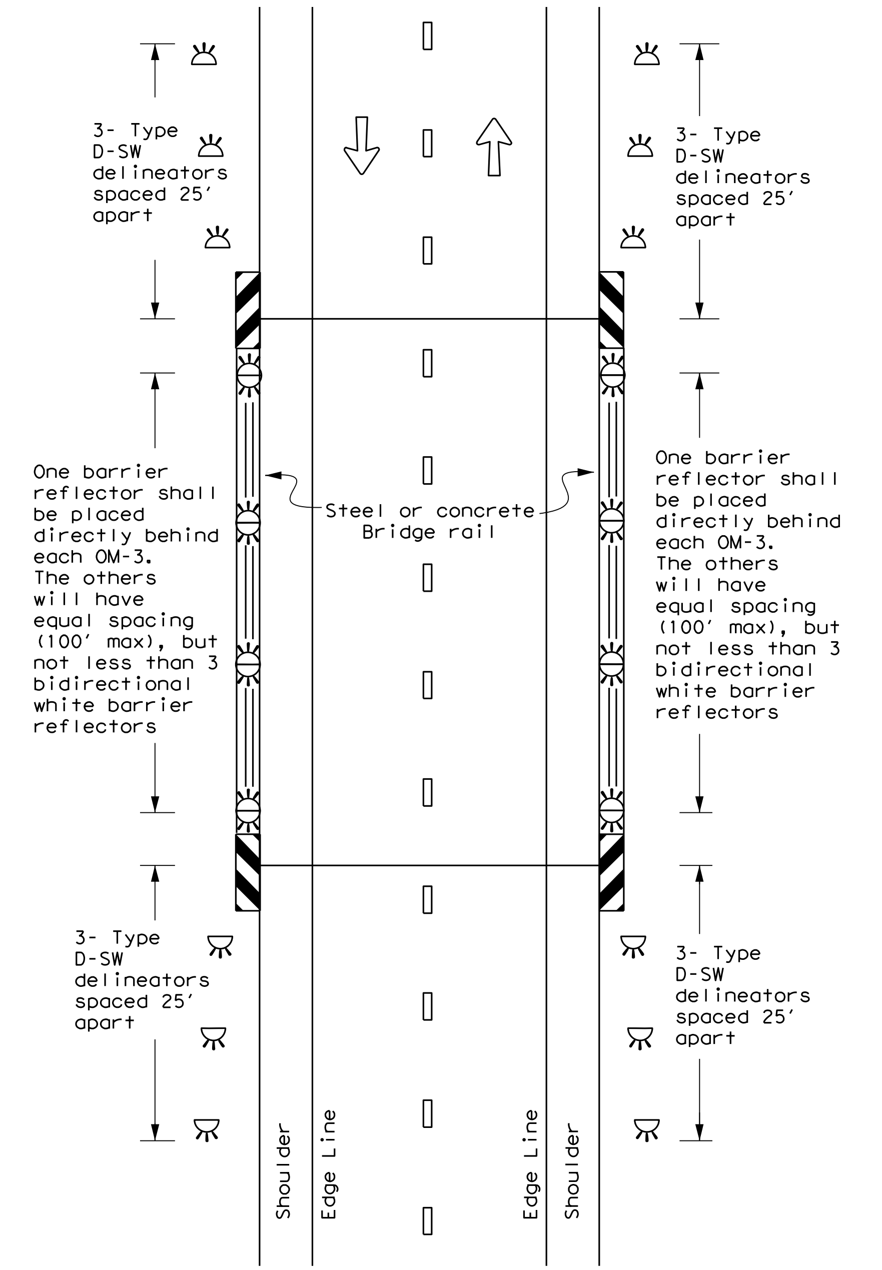
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

Symbol	Description
	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(5)-20

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	ABL		FISHER	120

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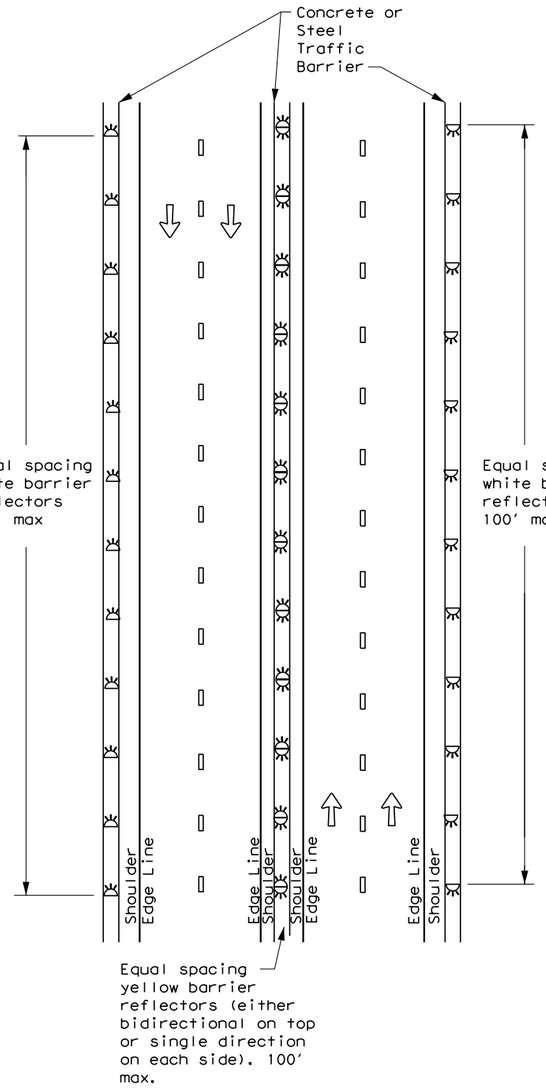
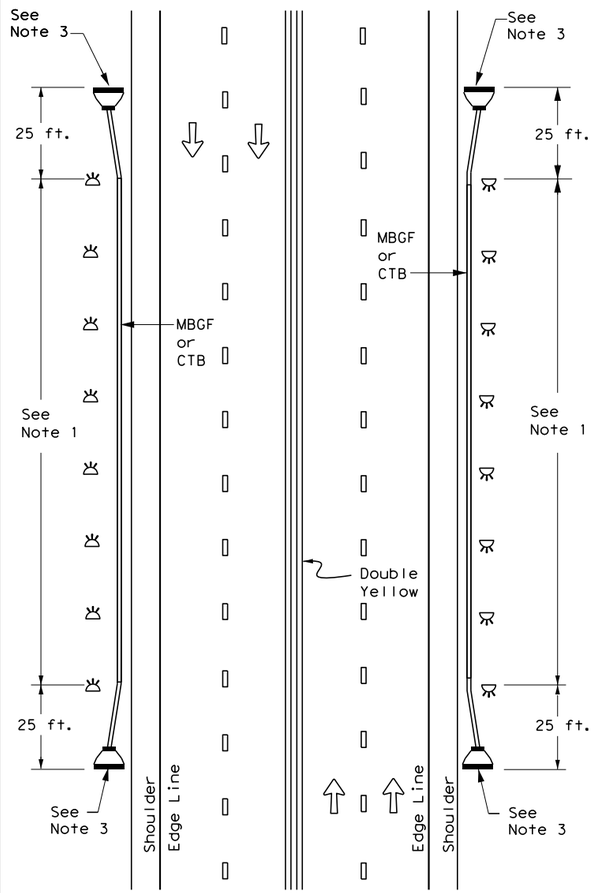
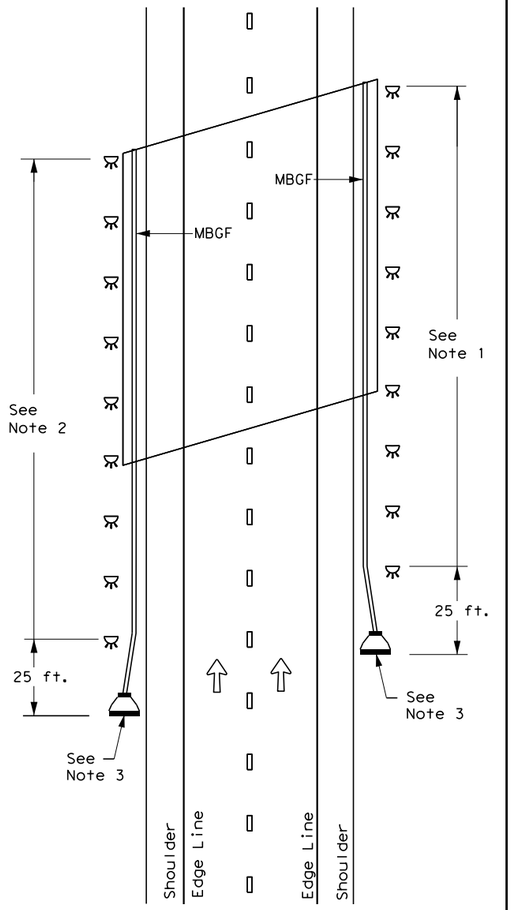
CONTINUOUS CONCRETE OR STEEL BARRIER



MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



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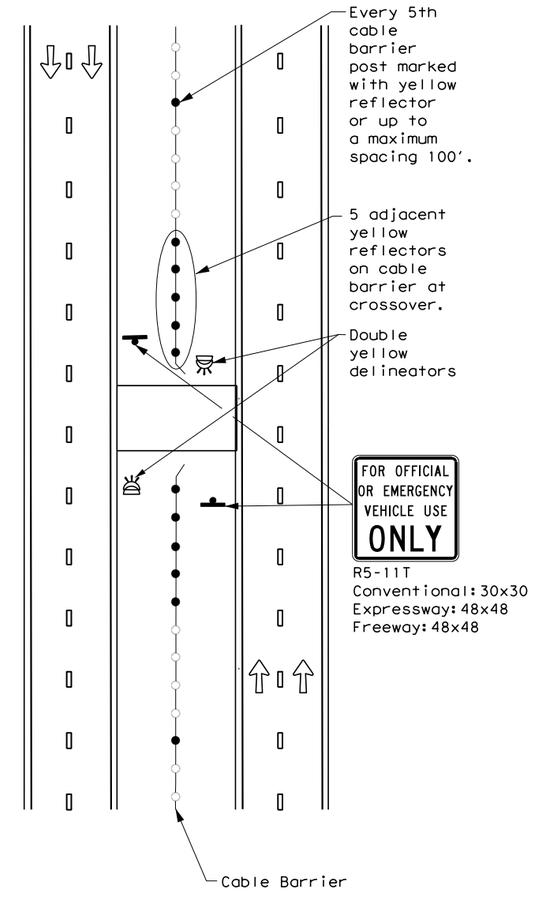

NOTES

1. Equal spacing (100′ max), but not less than 3 single directional white barrier reflectors or delineators. On Continuos Barrier, equal spacing (100′ max.)
2. Equal spacing (100′ max), but not less than 3 single directional yellow barrier reflectors or delineators.
3. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3)in front of the terminal end.

LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

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DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(6)-20

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7-20	DIST	COUNTY		SHEET NO.
	ABL	FISHER		121

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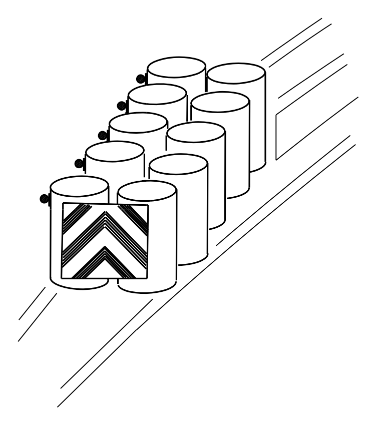
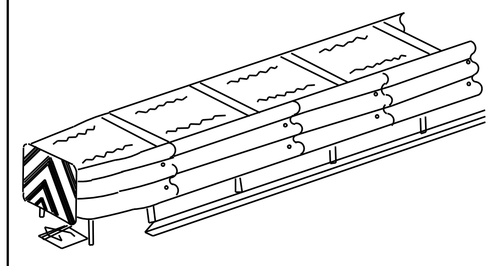
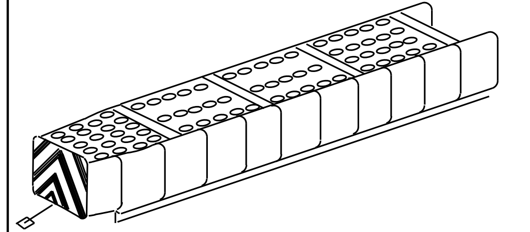
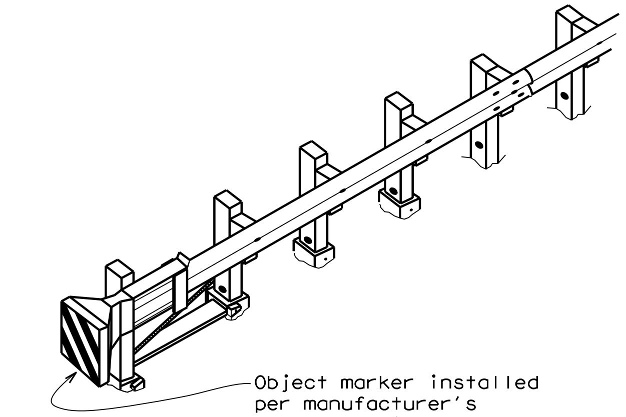
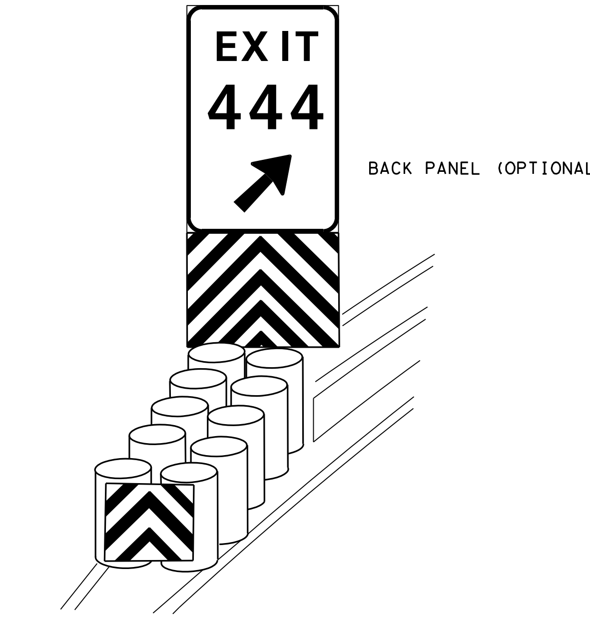




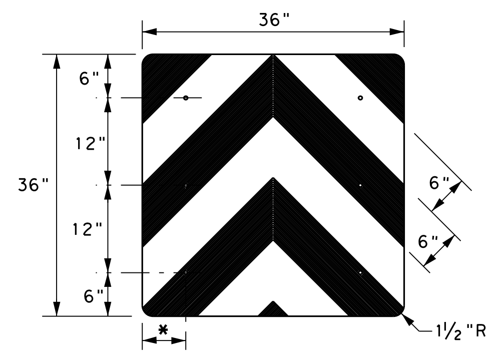


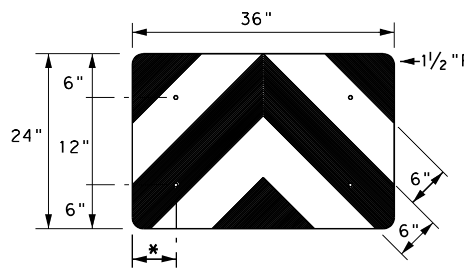


Object marker installed per manufacturer's recommendations.

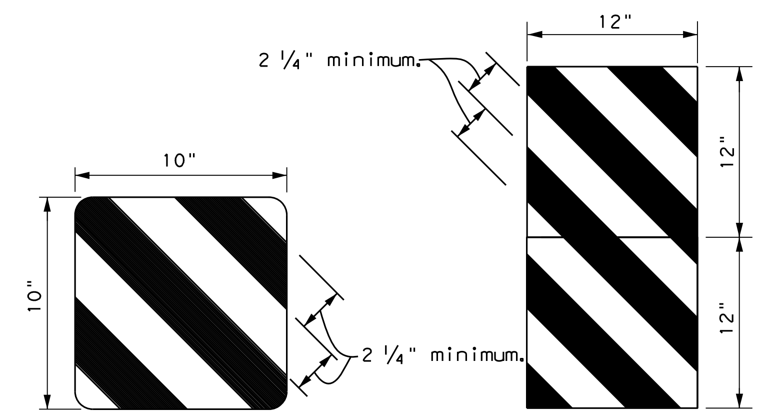


BACK PANEL (OPTIONAL)

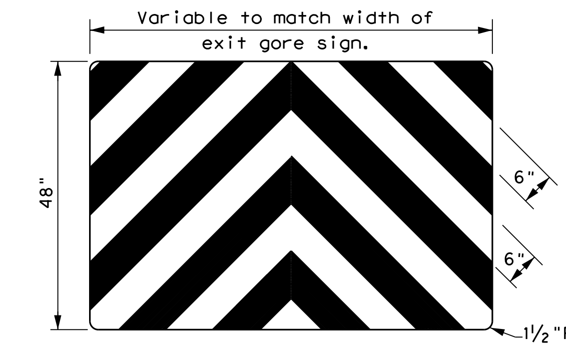


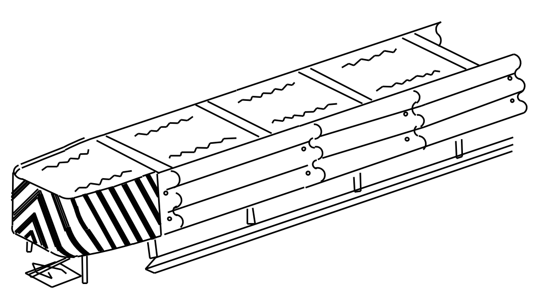


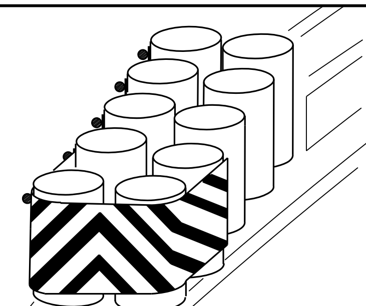
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

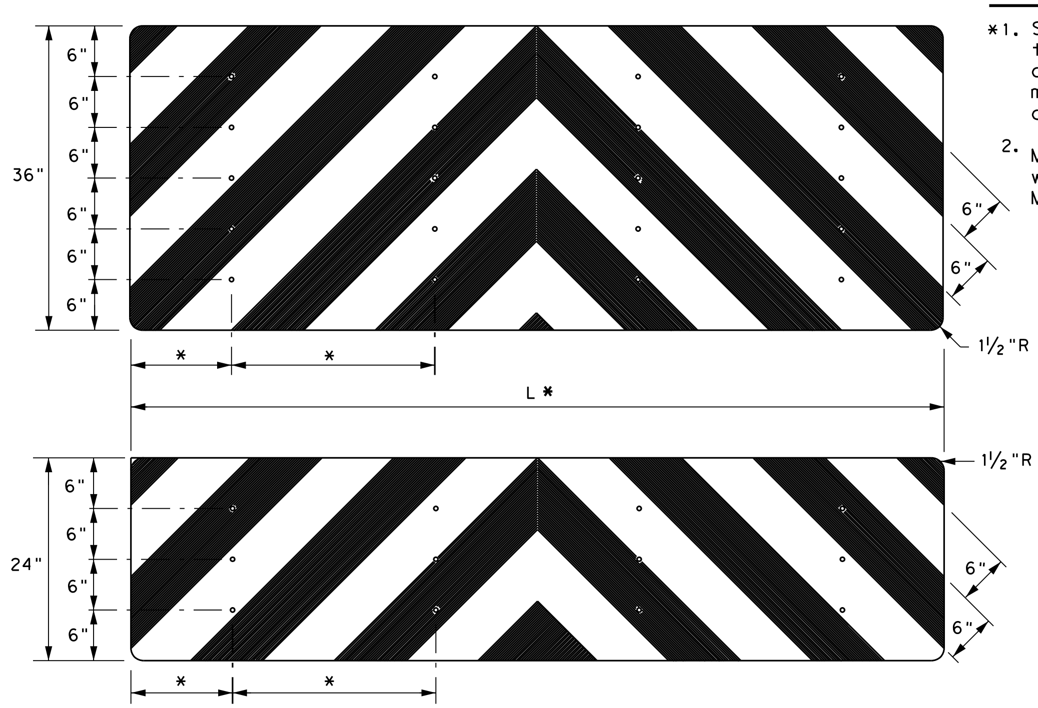


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 1/4".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 8-04 8-95 3-15 4-98 7-20	0263	05	024	SH 70
	DIST		COUNTY	SHEET NO.
	ABL		FISHER	122

20G

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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: 4/11/2022 1:49:29 PM
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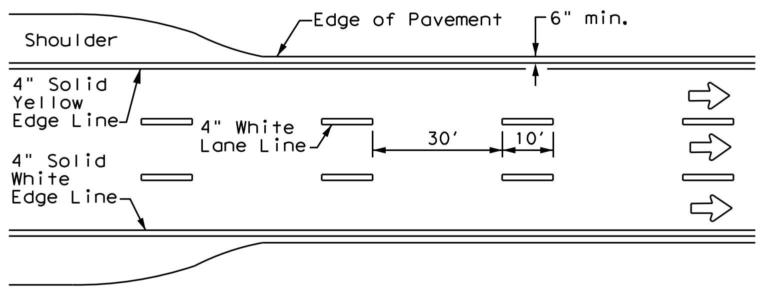
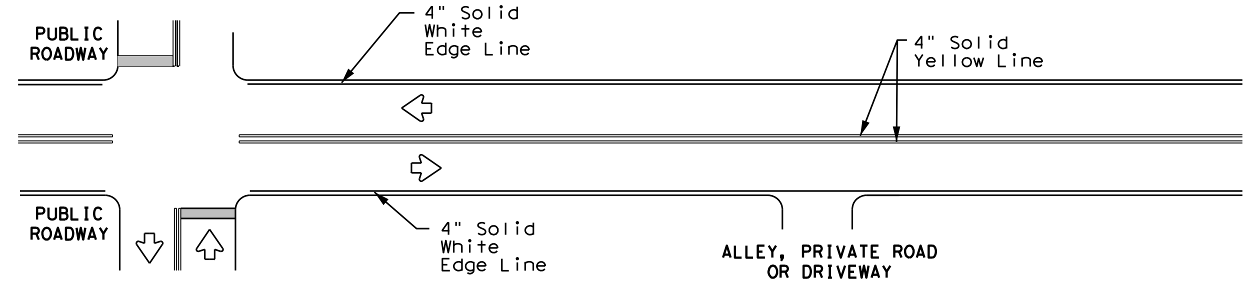
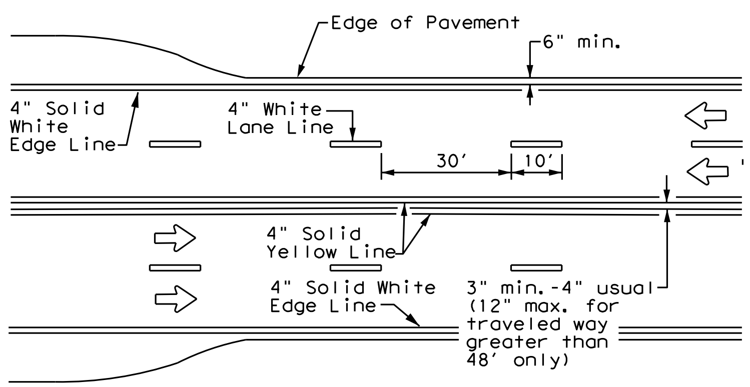


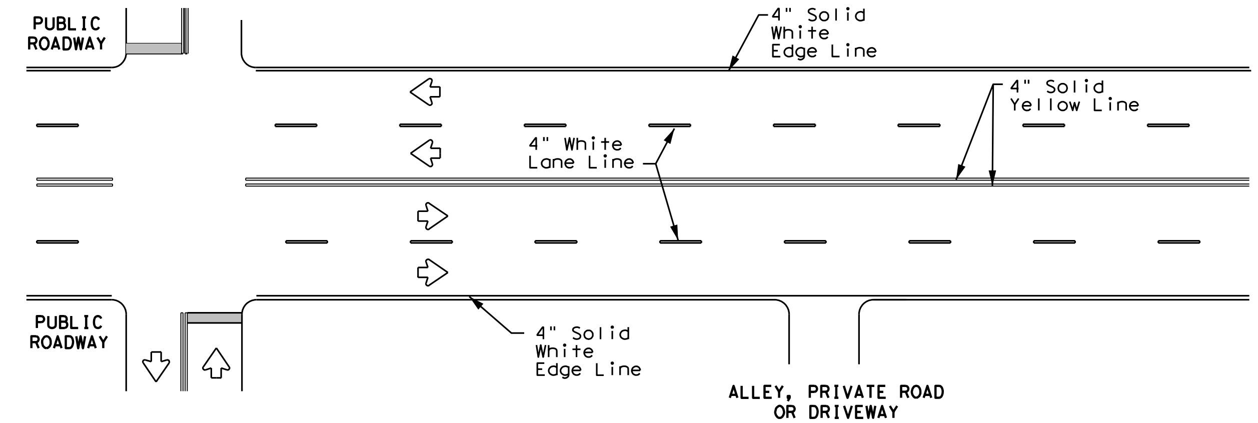
EDGE LINE AND LANE LINES
ONE-WAY ROADWAY
WITH OR WITHOUT SHOULDERS



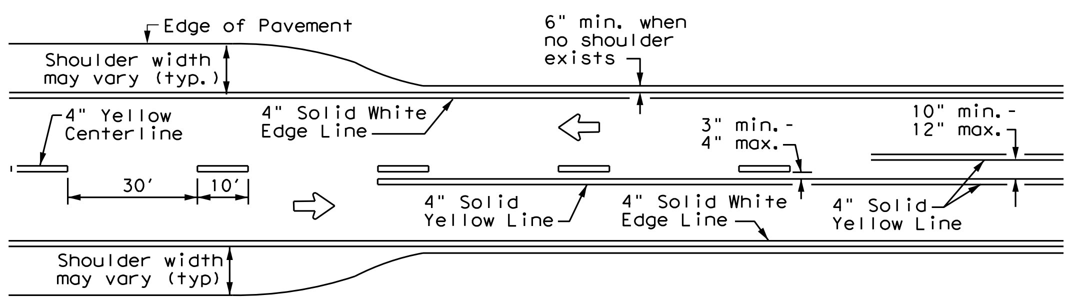
TYPICAL TWO-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS



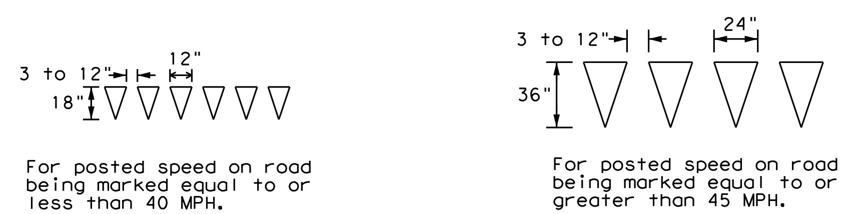
CENTERLINE AND LANE LINES
FOUR LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS



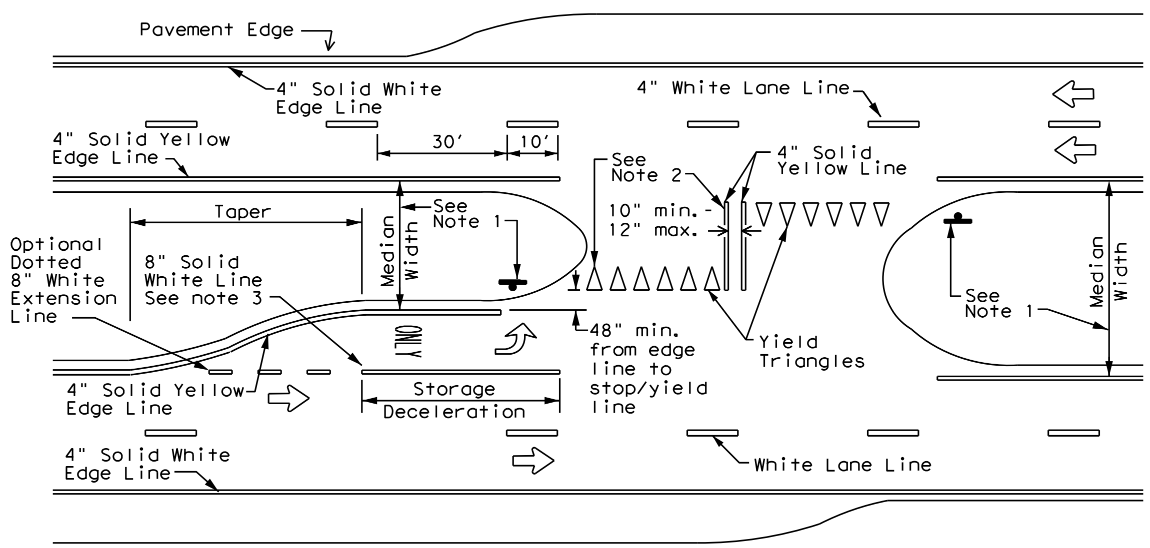
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS



YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

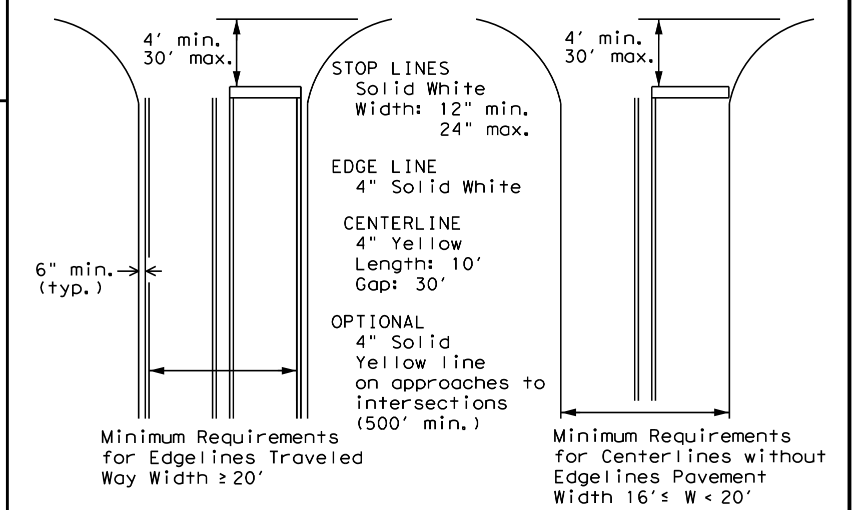
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield traingles shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to the inside of edgeline of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



GUIDE FOR PLACEMENT OF STOP LINES,
EDGE LINE & CENTERLINE
Based on Traveled Way and Pavement Widths for Undivided Highways

Texas Department of Transportation — Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-20

FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
© TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03 5-00 2-12 8-00 6-20	0263	05	024	SH 70
	DIST		COUNTY	SHEET NO.
	ABL		FISHER	123

22A

DATE: 4/11/2022 1:49:32 PM
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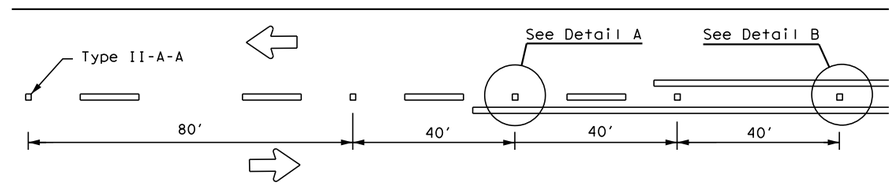
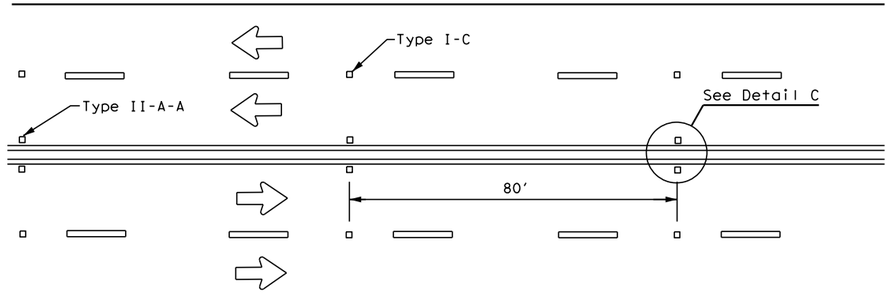
FILE: \\pusscshrfil01\J-Jobs\2138C TxDOT SH70 Plum Creek ABL\06.00 Design\06.04 Signing\06.04.01 Sheets\pm2-20.dgn

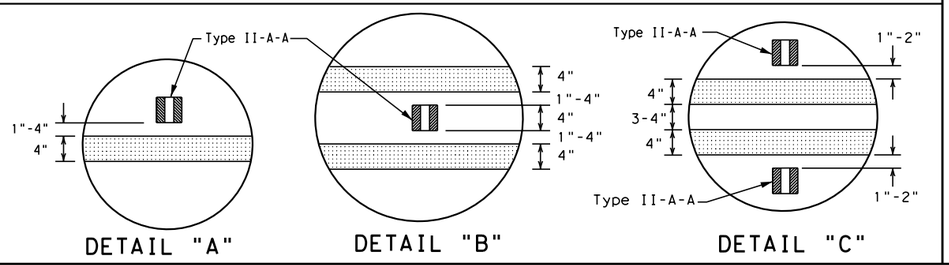
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



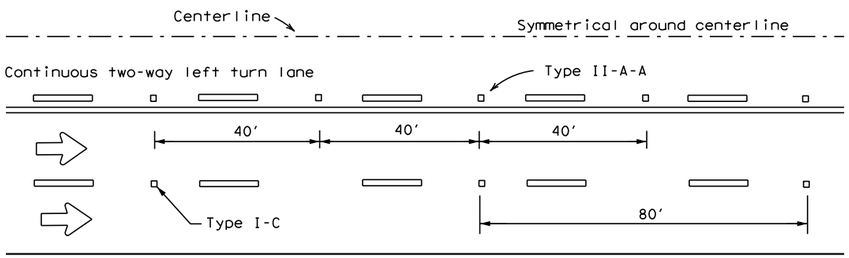
CENTERLINE FOR ALL TWO LANE ROADWAYS



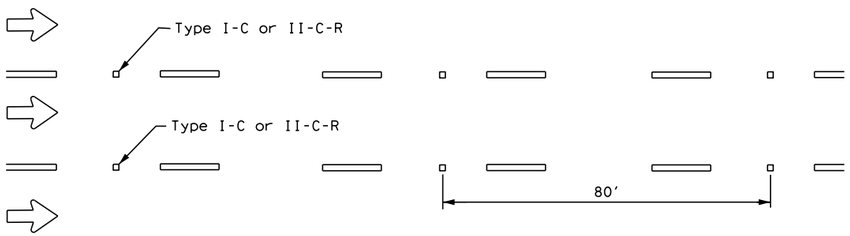
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



DETAIL "A" DETAIL "B" DETAIL "C"



CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE

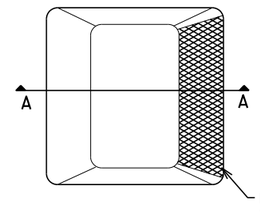


LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

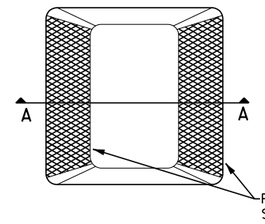
Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

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

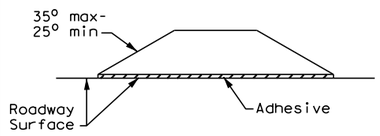
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

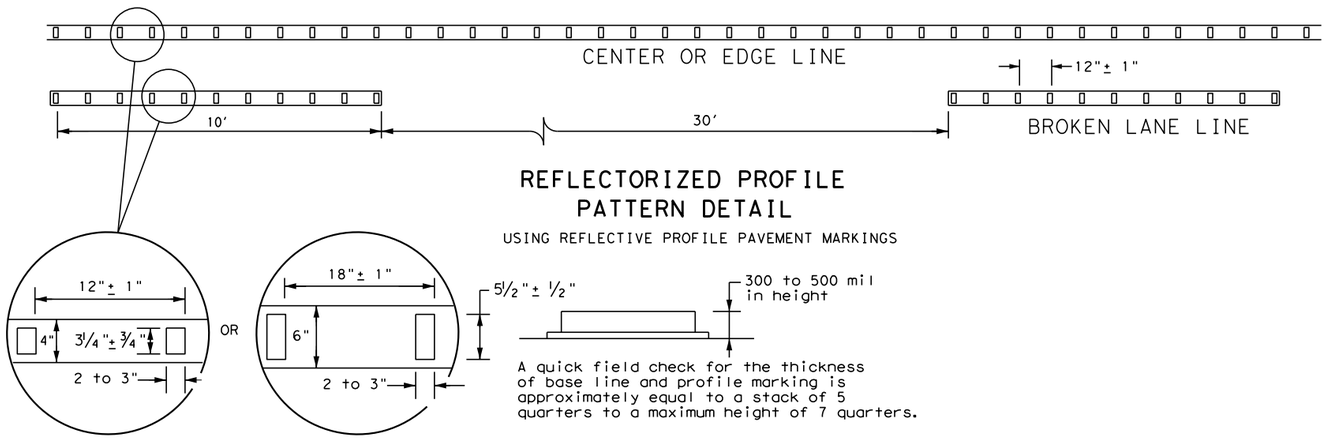


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

NOTE

Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-20

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
©TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10 5-00 2-12 8-00 6-20	0263	05	024	SH 70
	DIST	COUNTY		SHEET NO.
	ABL	FISHER		124

22B

DATE: 4/11/2022 1:49:52 PM
FILE: \\PUSSCSHRFILO1\J-Jobs\2138C TxDOT SH70 Plum Creek ABL\06.00 Design\06.04 Sheets\06.04.11 Standards\PM and Small Signs Standards\smdgen.dgn

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

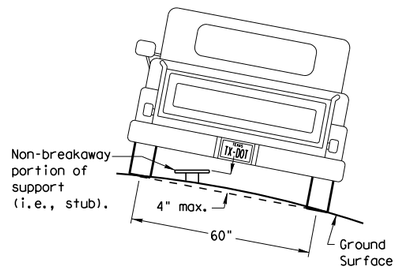
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

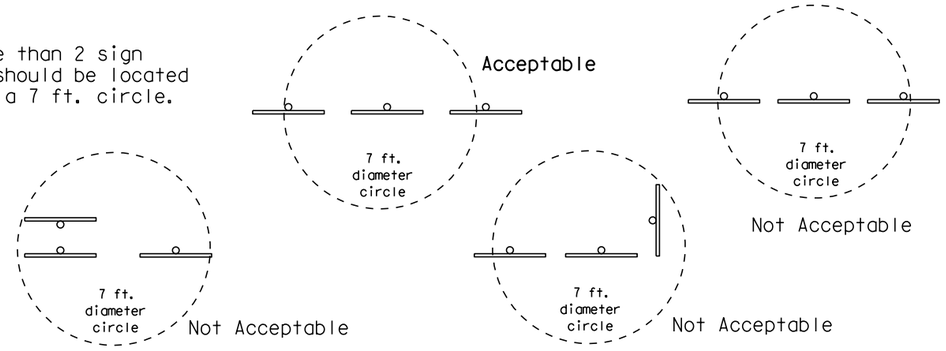
P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1))

REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



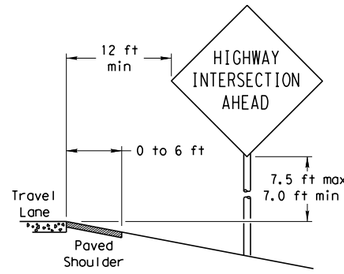
To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

No more than 2 sign posts should be located within a 7 ft. circle.



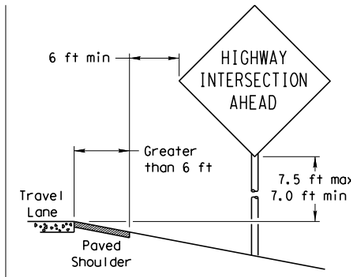
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

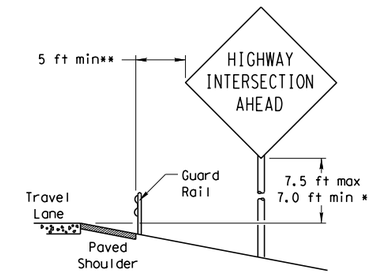
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



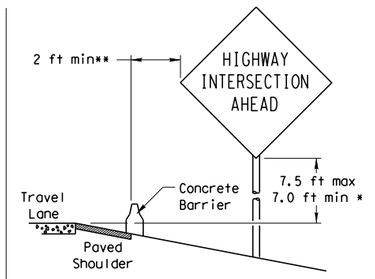
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

BEHIND BARRIER



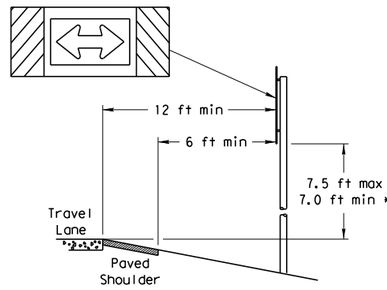
BEHIND GUARDRAIL



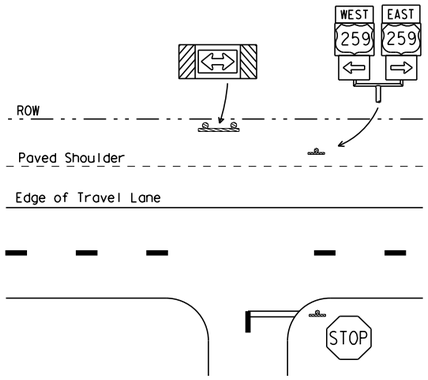
BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

T-INTERSECTION



When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

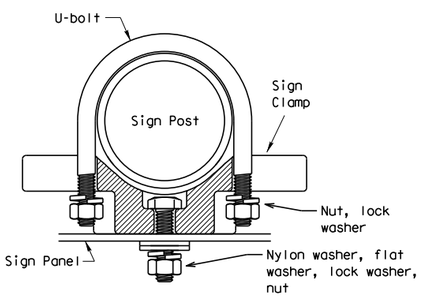
The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

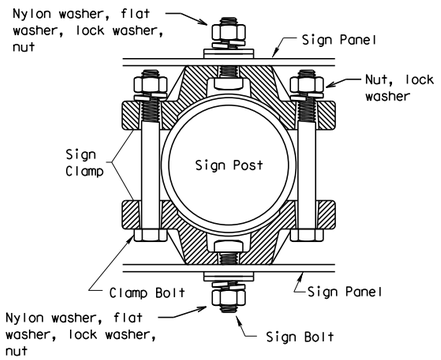
The website address is:
http://www.txdot.gov/publications/traffic.htm

TYPICAL SIGN ATTACHMENT DETAIL

Single Signs



Back-to-Back Signs



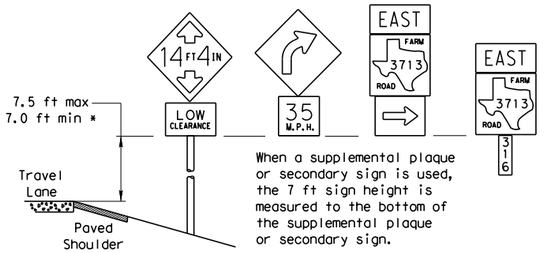
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

Sign clamps may be either the specific size clamp or the universal clamp.

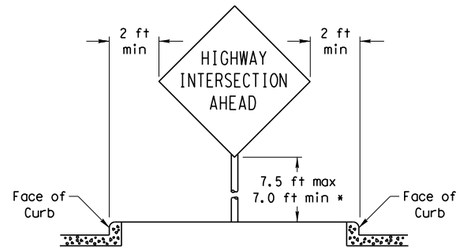
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



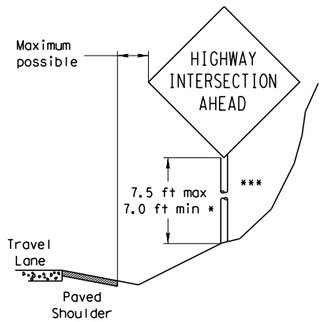
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0263	05	024	SH 70
	DIST	COUNTY		SHEET NO.
	ABL	FISHER		125

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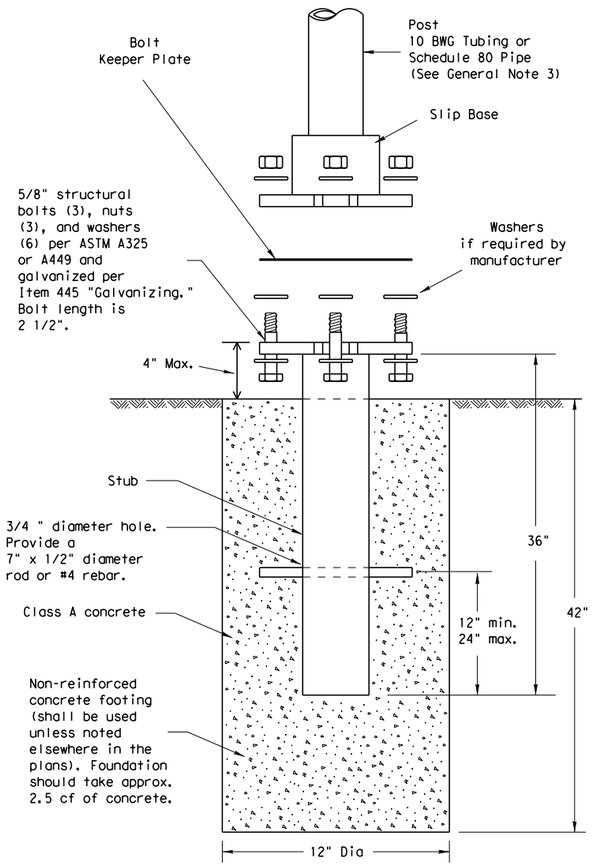
FILE: \\PUSSCSHARFIL01\J-Jobs\2138C TxDOT SH70 Plum Creek ABL\06.00 Design\06.04 Sheets\06.04.11 Standards\PM and Small Signs Standards\smdsi.dgn

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

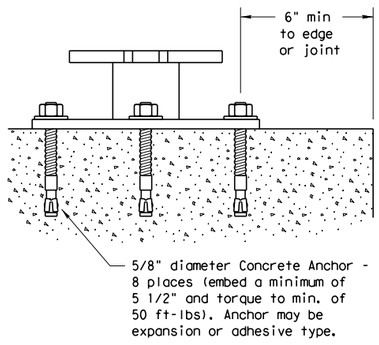
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

Foundation
1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



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

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

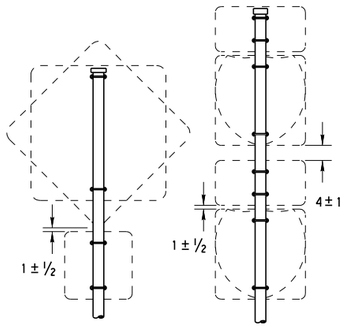
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
9-08

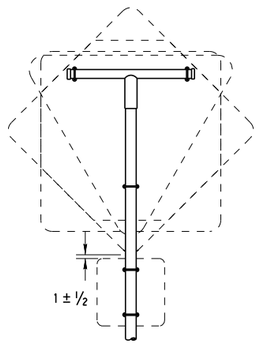
CONT	SECT	JOB	HIGHWAY
0263	05	024	SH 70

DIST	COUNTY	SHEET NO.
ABL	FISHER	126

DATE: 4/11/2022 1:49:56 PM
FILE: \\PUSSCSHRFIL01\J-Jobs\21380 TxDOT SH70 Plum Creek ABL\06.00 Design\06.04 Sheets\06.04.11 Standards\PM and Small Signs Standards\smds2.dgn



SM RD SGN ASSM TY XXXXX(1)XX(P)



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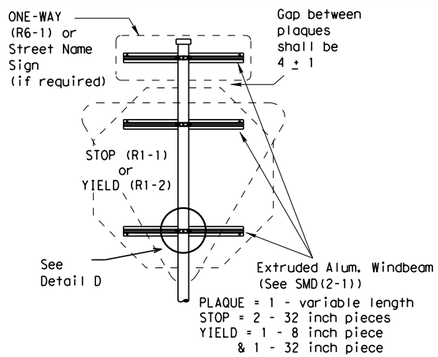

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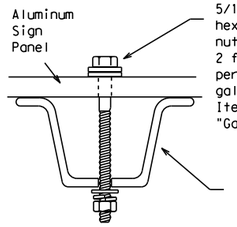
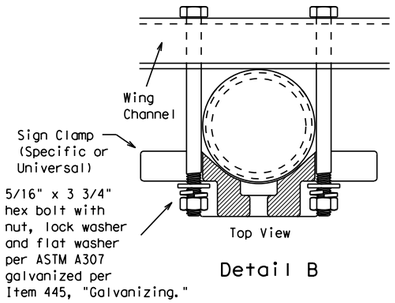
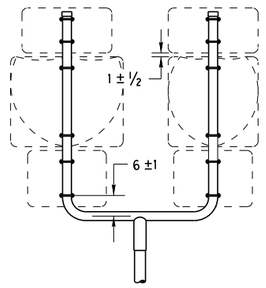


Detail A



Detail B



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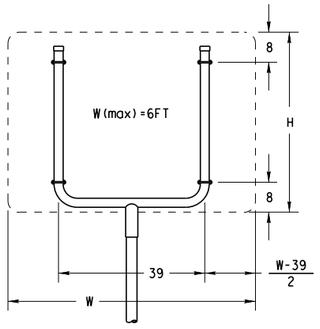

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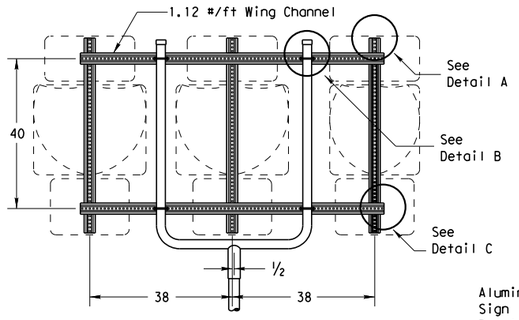
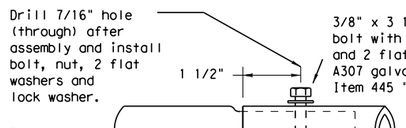
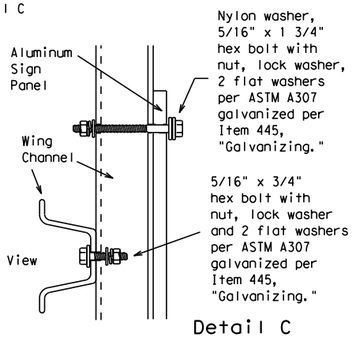


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

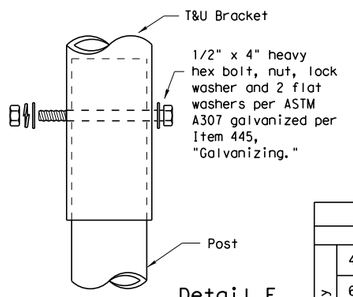


Detail F

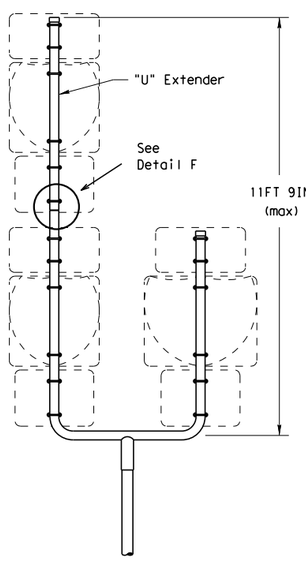
Splices shall only be allowed behind the sign substrate.



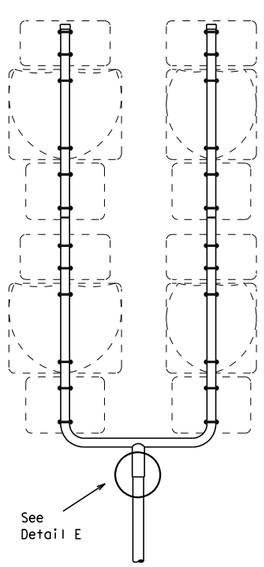
Detail C



Detail E



SM RD SGN ASSM TY S80(1)XX(U-1EXT)



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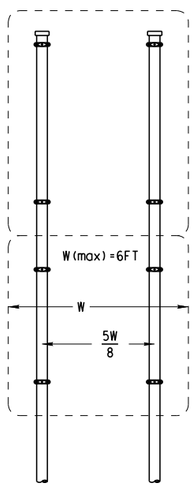
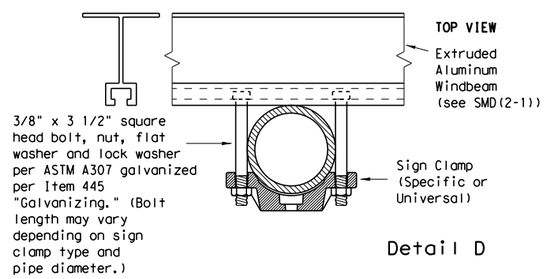
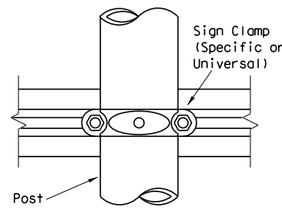


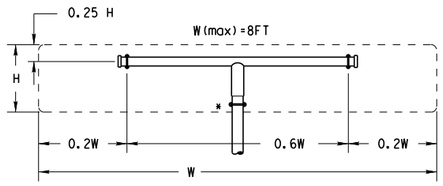
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

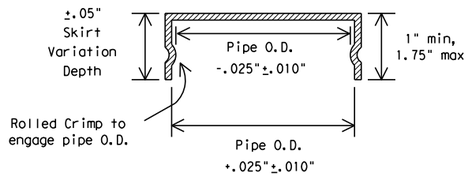




SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0263	05	024	SH 70
	DIST	COUNTY		SHEET NO.
	ABL	FISHER		127

26C

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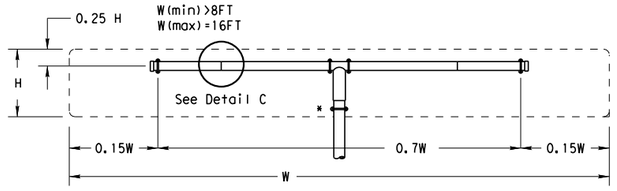
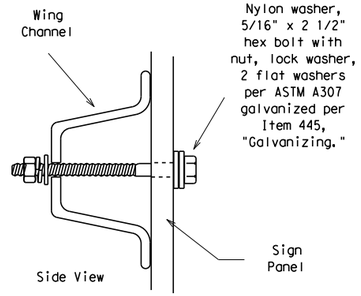
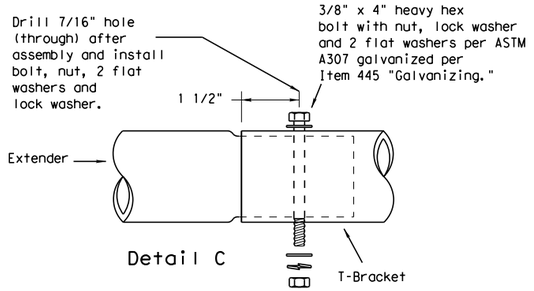


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)

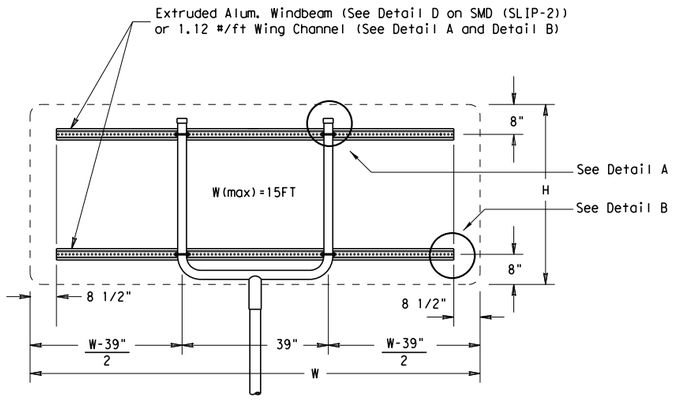


Detail B

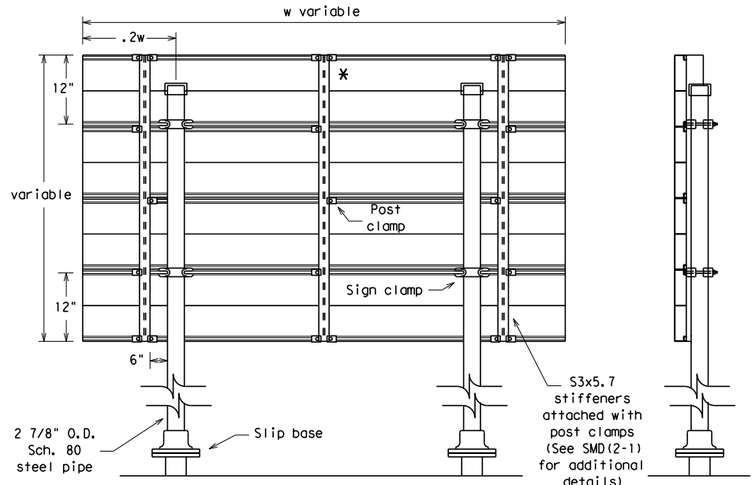


Detail C

Splices shall only be allowed behind the sign substrate.



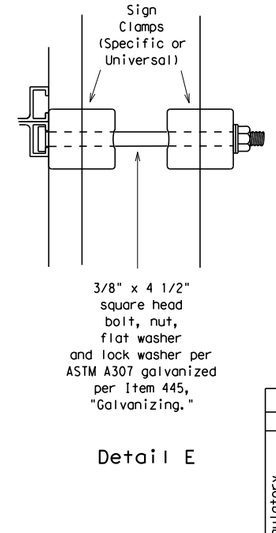
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



Typical Sign Mount

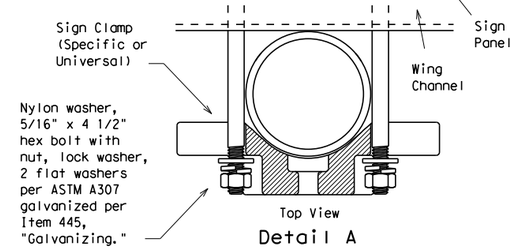
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

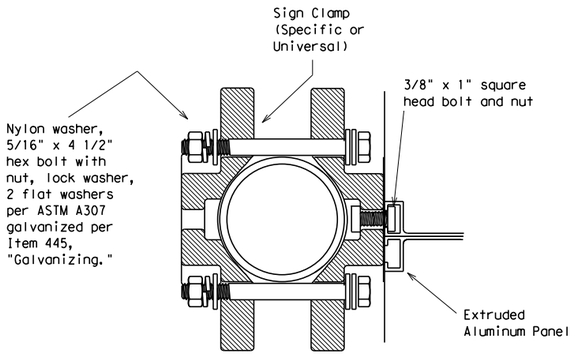


Detail E

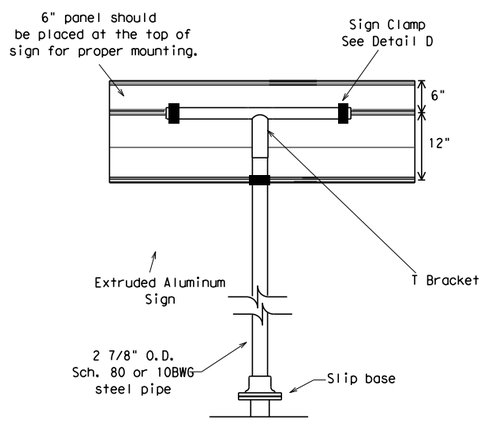
See Detail E for clamp installation



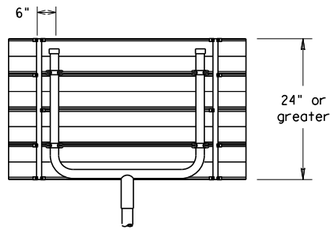
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

1. See table above.
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Sign blanks shall be the sizes and shapes shown on the plans.
11. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

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

REVISIONS
9-08

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DIST	COUNTY		SHEET NO.
ABL	FISHER		128

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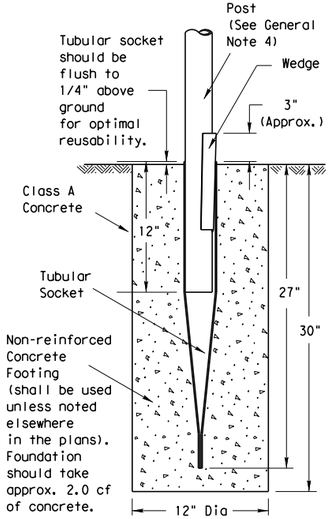
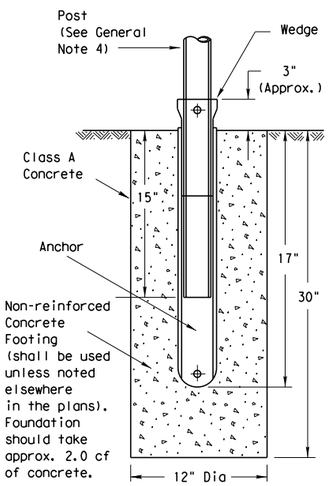
Wedge Anchor Steel System



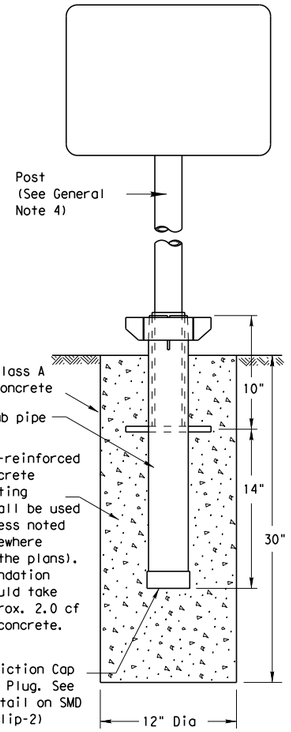
SM RD SGN ASSM TY TWT(X)WS(X)

Wedge Anchor High Density Polyethylene (HDPE) System

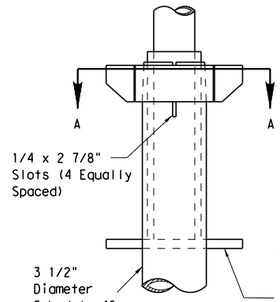


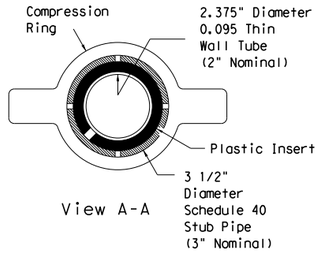
SMD RD SGN ASSM TY TWT(X)WP(X)

Universal Anchor System with Thin-Walled Tubing Post



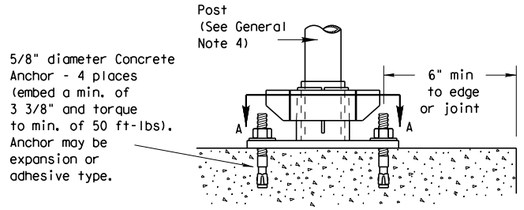
SM RD SGN ASSM TY TWT(X)UA(P)



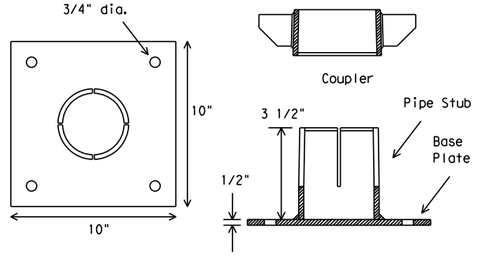


View A-A

Plastic insert must be used when using the TWT with either the Universal Anchor System or the Bolt Down Universal Anchor System. The insert should be approx. 10" long and cover the tubing from just above the top of the stub pipe to the bottom of the sign post when using the Universal Anchor System. The insert should be cut to approx. 4 1/2" when used with the Bolt Down Universal Anchor System.

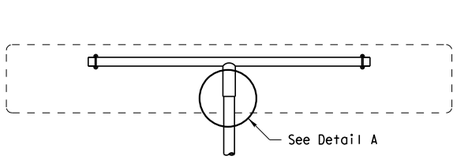


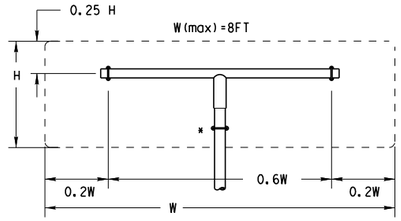
Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations.



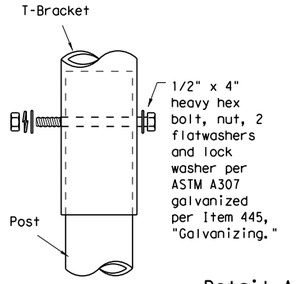
SM RD SGN ASSM TY TWT(X)UB(P)

Sign Installation Using a Prefabricated T-Bracket for Thin-Wall Tubing Post





SM RD SGN ASSM TY TWT(X)XX(T)
(* - See General Note 6)



Detail A

9/16" hole may need to be drilled through post to accommodate bolt.

NOTE

The devices shall be installed per manufacturer's recommendations.
Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. The Wedge Anchor System and the Universal Anchor System with thin wall tubing post may be used to support up to 10 square feet of sign area.
2. The tubular socket, wedge and prefabricated T-bracket shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to the approval of the TxDOT Traffic Standards Engineer.
3. Except for posts (13 BWG Tubing), clamps, nuts and bolts, all components shall be prequalified. A list of prequalified vendors may be obtained from the Material Producer List web page. The website address is: http://www.txdot.gov/business/producer list.htm
4. Material used as post with this system shall conform to the following specifications:
   13 BWG Tubing (2.375" outside diameter) (TWT)
   0.095" nominal wall thickness
   Seamless or electric-resistance welded steel tubing
   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
   18% minimum elongation in 2"
   Wall thickness (uncoated) shall be within the range of .083" to .099"
   Outside diameter (uncoated) shall be within the range of 2.369" to 2.381"
   Galvanization per ASTM 123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
5. Sign blanks shall be the sizes and shapes shown on the plans.
6. Additional sign clamp required on the "T-bracket" post for 24" high signs. Place clamp at least 3" above bottom of sign when possible.
7. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
8. See the Traffic Operations Division website for detailed drawings of sign clamps and Wedge Anchor System components. The website address is: http://www.txdot.gov/publications/traffic.htm

WEDGE ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Place concrete into hole until it is approximately flush with the ground. Concrete shall be Class A.
3. Insert tubular socket into concrete until top of socket is approximaely 1/4 " above the concrete footing.
4. Plumb the socket. Allow a minimum 4 days for concrete to set, unless otherwise directed by Engineer..
5. Attach the sign to the sign post.
6. Insert the sign post into socket and align sign face with roadway.
7. Drive the wedge into the socket to secure post. This will leave approximately 3 inches of the wedge exposed.

UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. Insert base post in hole to depths shown and backfill hole with concrete.
3. Level and plumb the base post using a torpedo level and allow concrete adequate time to set. The bottom of the slots provided in the stub pipe shall remain above the top of the concrete foundation.
4. Attach the sign to the sign post.
5. Install plastic insert around bottom of post.
6. Insert sign post into base post. Lower until the post comes to rest on steel rod.
7. Seat compression ring using a hammer. Typically, the top of compression ring will be approximately level with top of stub post when optimally installed.
8. Check sign post by hand to ensure it is unable to turn. If loose, increase the tightening of the compression ring.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS WEDGE & UNIVERSAL ANCHOR WITH THIN WALL TUBING POST

SMD(TWT)-08

9-08 REVISIONS

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

CONT	SECT	JOB	HIGHWAY
0263	05	024	SH 70

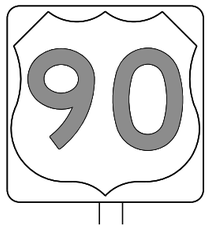
DIST	COUNTY	SHEET NO.
ABL	FISHER	129

26E

DATE: DATE/TIME: 1:50:02 PM
FILE: DOCUMENT NAME: 01\J-Jobs\2138C TxDOT SH70 Plum Creek ABL\06.00 Design\06.04 Sheeting\tsr3-13.dgn

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING

TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

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

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

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(3)-13

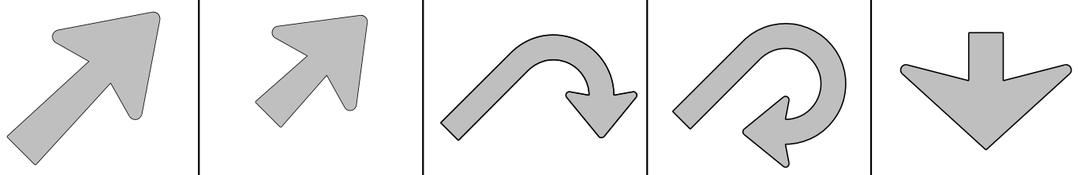
FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0263	055	024	SHWY 0
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	DBIC	FISHER		130

3

DATE: 4/11/2022 1:50:04 PM
FILE: \\pussscshrfil01\J-Jobs\21386 TxDOT SH70 Plum Creek ABL\06.00 Design\06.04 Sheets\tsr5-13.dgn

ARROW DETAILS

for Large Ground-Mounted and Overhead Guide Signs



TYPE	LETTER SIZE	USE
A-1	10.67" U/L and 10" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 20" U/L	
B-1	10.67" U/L and 10" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 20" U/L	

CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

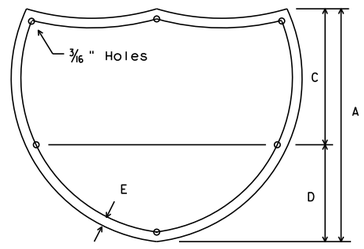
NOTE

Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

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

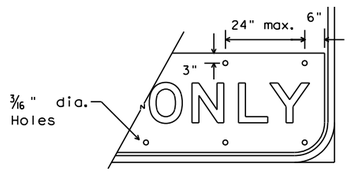
http://www.txdot.gov/

SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)

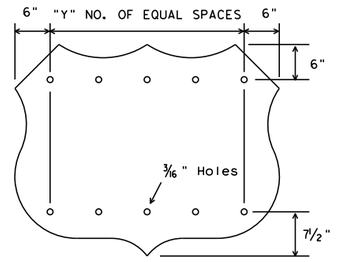


INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1 1/2
48	28	20	1 3/4

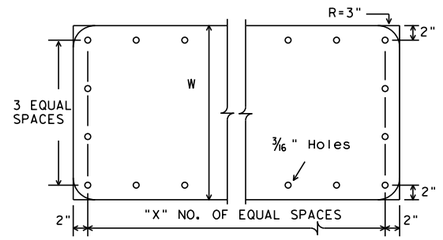


EXIT ONLY PANEL



U.S. ROUTE MARKERS

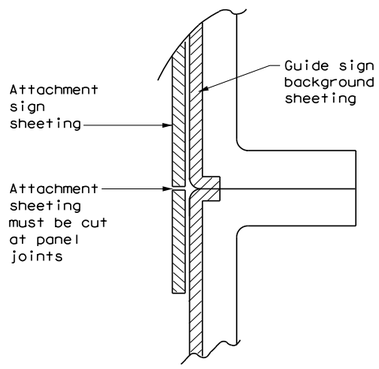
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



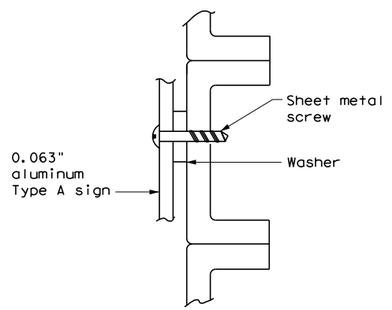
STATE ROUTE MARKERS

No. of Digits	W	X
4	24	4
4	36	5
4	48	6
3	24	3
3	36	4
3	48	5

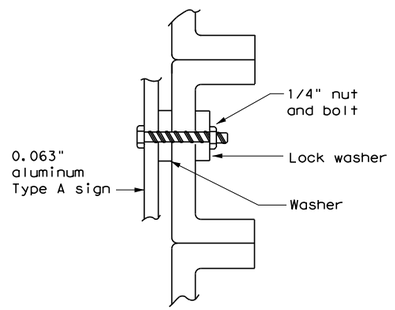
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



DIRECT APPLIED ATTACHMENT



SCREW ATTACHMENT



NUT/BOLT ATTACHMENT

NOTE:

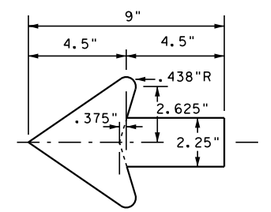
1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".

NOTE:

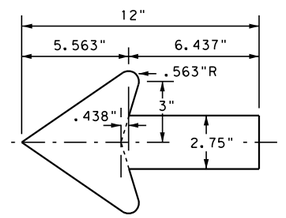
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(5)-13

FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0263	05	024	SH 70
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	ABL	FISHER		131

\\pusscshrfil01\J-Jobs\2138C TxDOT SH70 Plum Creek ABL\06.00 Design\06.04 Sheets\06.04.09 Environmental\SW3P.DGN
4/11/2022 6:04:15 PM

SITE DESCRIPTION

PROJECT LIMITS:
THE PROJECT LIMITS SHOWN ON THE TITLE SHEET AND LIMITS OF TXDOT RIGHT OF WAY SHALL ALSO BE THE LIMITS OF COVERAGE OF THE SW3P.

PROJECT LOCATION MAPS: TITLE SHEET

DRAINAGE PATTERNS: DRAINAGE AREA MAPS
<OR POSSIBLY SW3P SITE PLAN>

APPROX. SLOPES ANTICIPATED AFTER MAJOR GRADING AND AREAS OF SOIL DISTURBANCE: TYPICAL SECTIONS

MAJOR CONTROLS AND LOCATIONS OF STABILIZATION PRACTICES: 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:
DRAINAGE AND CULVERT LAYOUT SHEETS

TYPICAL AREAS WHICH WILL NOT BE DISTURBED: SW3P SITE PLAN

ENDANGERED SPECIES, DESIGNATED CRITICAL HABITAT AND HISTORIC PROPERTY: EPIC SHEET

ESTIMATED START DATES AND DURATION OF ACTIVITIES IN THE INTENDED SCHEDULE/SEQUENCE OF EARTH-DISTURBING ACTIVITIES: CONTRACT TIME ESTIMATE

NATURE OF ACTIVITY:
REPLACE BRIDGE STRUCTURE AND APPROACHES, GRADING, EMBANKMENT, TREATED SUBGRADE, HMAC, SIGNING, DELINEATION, AND PAVEMENT MARKINGS
MAJOR SOIL DISTURBING ACTIVITIES:
GRADING, EMBANKMENT, DRILL SHAFTS

TOTAL PROJECT AREA:
2.87 ACRES

TOTAL AREA TO BE DISTURBED (AT EACH SITE):
2.61 ACRES

WEIGHTED RUNOFF COEFFICIENT BEFORE CONSTRUCTION:
0.69

WEIGHTED RUNOFF COEFFICIENT AFTER CONSTRUCTION:
0.69

EXISTING CONDITION OF SOIL & VEGETATIVE COVER:
CLAY; FAIR

% OF EXISTING VEGETATIVE COVER:
40%

NAME OF RECEIVING WATERS:
PLUM CREEK
CLEAR FORK OF THE BRAZOS SECTION 1232

EROSION AND SEDIMENT CONTROLS

USE "T" OR "P" IN THE BLANKS BELOW IF APPLICABLE (T= TEMPORARY, P= PERMANENT)

SOIL STABILIZATION PRACTICES:

P	BUFFER ZONES	P	PERMANENT PLANTING, SODDING, OR SEEDING
	MULCHING	P	PRESERVATION OF NATURAL RESOURCES
T	TEMPORARY SEEDING		SOIL RETENTION BLANKET
	OTHER		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 ACTIVITES, TEMPORARY OR PERMANENT CESSATION OF CONSTRUCTION AND STABILIZATION MEASURE IS PART OF THIS SYSTEM AND IS INCORPORATED BY REFERENCE INTO THIS SW3P.

STRUCTURAL PRACTICES:

	CHANNEL LINERS		DIVERSION DIKE AND SWALE COMBINATIONS
	CURBS AND GUTTERS		DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
	HAY BALES		DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
T	PAVED FLUMES	T	ROCK BEDDING AT CONSTRUCTION EXIT
	PIPE SLOPE DRAINS		STONE OUTLET STRUCTURES
	STORM SEWERS		STORM INLET SEDIMENT TRAP
	SEDIMENT BASINS		TEMPORARY EROSION CONTROL LOGS (BIOLOGS)
	SEDIMENT TRAPS		TIMBER MATTING AT CONSTRUCTION EXIT
T	SILT FENCES		VEGETATIVE FILTER STRIPS
T	ROCK FILTER DAMS		VELOCITY CONTROL DEVICES
T	EROSION CONTROL LOGS	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
T	STABILIZED CONSTRUCTION ENTRANCE
	OTHER

NARRATIVE - SEQUENCE OF CONSTRUCTION (STORM WATER MANAGEMENT) ACTIVITIES:

THE ORDER OF ACTIVITIES WILL BE AS FOLLOWS:
1. Placement of Erosion Control BMPs.
2. Removal of Existing Plum Creek Bridge.
3. Construction of Proposed SH 70 Bridge and approaches.
4. Removal of Erosion Control BMPs.

STORM WATER MANAGEMENT:

A. Storm water drainage will be provided by ditches which carry drainage within the R.O.W. to the lows within the project site which drain to natural facilities.

B. Other permanent erosion controls include grading design consisting of 4:1 or flatter slopes with permanent vegetative cover and in instances consisting of 3:1 or greater slopes with permanent concrete riprap.

STATE OF TEXAS
BRYAN J. ALLDREDGE
116211
LICENSED PROFESSIONAL ENGINEER
4/11/2022

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.

Texas Department of Transportation

NO SCALE

TxDOT STORM WATER POLLUTION PREVENTION PLAN (SW3P)

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH 70
STATE	COUNTY		SHEET NO.
TEXAS	FISHER		132
DISTRICT	CONTROL	SECTION	JOB
ABL	0263	05	024

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 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.

STATE OF TEXAS
BRYAN J. ALLDREDGE
116211
LICENSED PROFESSIONAL ENGINEER
4/11/2022

Texas Department of Transportation

NO SCALE

TxDOT STORM WATER POLLUTION PREVENTION PLAN (SW3P)

REV. DATE: 02/27/2014

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH 70
STATE	COUNTY		SHEET NO.
TEXAS	FISHER		133
DISTRICT	CONTROL	SECTION	JOB
ABL	0263	05	024

(1) CONSTRUCTION EXIT (TY1) - 134 SY
PHASE 2
20 FT X 60 FT
INSTALL DATE _____
REMOVAL DATE _____

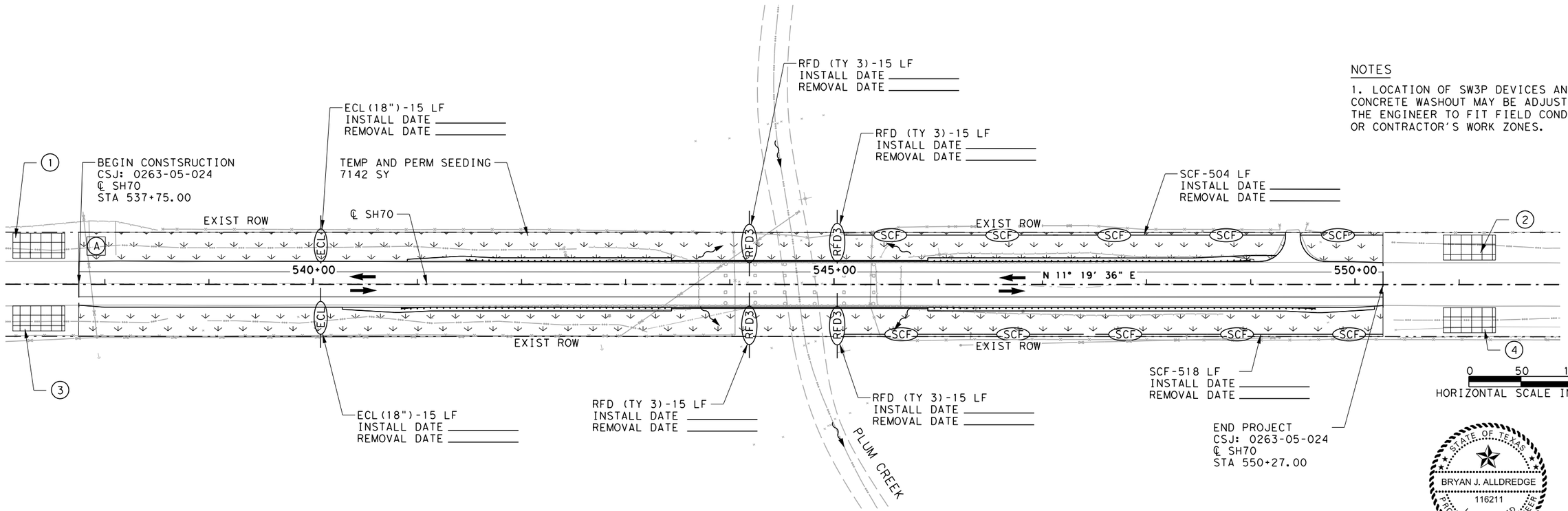
(2) CONSTRUCTION EXIT (TY1) - 134 SY
PHASE 2
20 FT X 60 FT
INSTALL DATE _____
REMOVAL DATE _____

(3) CONSTRUCTION EXIT (TY1) - 134 SY
PHASE 1
20 FT X 60 FT
INSTALL DATE _____
REMOVAL DATE _____

(4) CONSTRUCTION EXIT (TY1) - 134 SY
PHASE 1
20 FT X 60 FT
INSTALL DATE _____
REMOVAL DATE _____

LEGEND

- EXISITNG ROW
- TRAFFIC FLOW
- WATER FLOW ARROW
- SCF — SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOG (18")
- RFD3 — ROCK FILTER DAM (TY 3)
- TEMP AND PERM SEEDING
- CONSTRUCTION EXIT
- A — CONCRETE WASHOUT



NOTES

1. LOCATION OF SW3P DEVICES AND CONCRETE WASHOUT MAY BE ADJUSTED BY THE ENGINEER TO FIT FIELD CONDITIONS OR CONTRACTOR'S WORK ZONES.

STATE OF TEXAS
BRYAN J. ALLDREDGE
116211
LICENSED PROFESSIONAL ENGINEER

4/11/2022

Texas Department of Transportation

IEA
18383 PRESTON ROAD
SUITE 500
DALLAS, TEXAS 75252
(214) 884-4253
FIRM REGISTRATION No. F-10161

SH 70

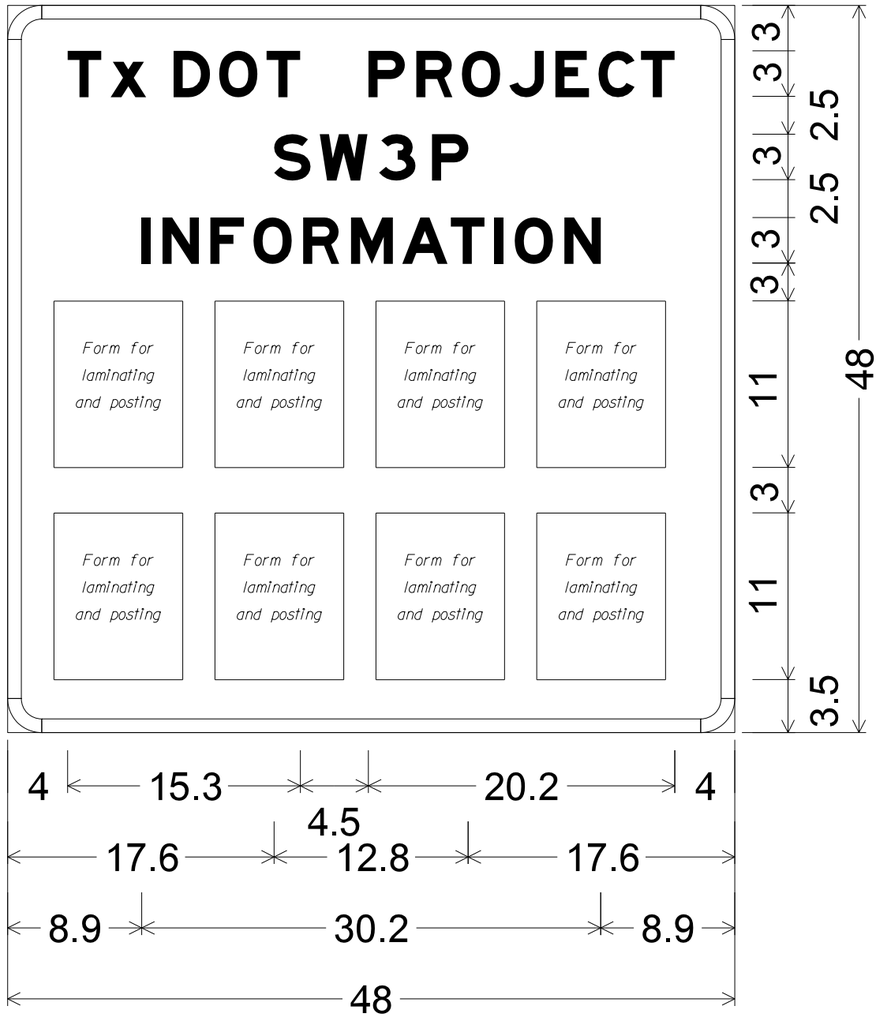
SW3P SITE PLAN

SCALE: 1"=100' SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE COVER SHEET		134
STATE	DISTRICT	COUNTY	
TEXAS	ABL	FISHER	
CONT	SECT	JOB	HIGHWAY NO
0263	05	024	SH 70

SH70-RD-SW3P.dgn

PLOT SCALE: 100.0000 ' / in.
4/11/2022 6:07:43 PM USER: aensor MODEL:Design
\\pusascshr-f101\J-Jobs\2138c TxDOT SH70 Plum Creek ABL\06.00 Design\06.04 Sheets\06.04.03 Roadway\SH70-RD-SW3P.dgn



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, ½ or ⅝-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.

STATE OF TEXAS
BRYAN J. ALLDREDGE
116211
LICENSED PROFESSIONAL ENGINEER
4/11/2022

SW3P NOTIFICATION BOARD DETAIL

NO SCALE SHEET 1 OF 1

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH 70
STATE	COUNTY		SHEET NO.
TEXAS	FISHER		135
DISTRICT	CONTROL	SECTION	JOB
ABL	0263	05	024

FILE: \\pusscshrfil01\J-Jobs\21380 TxDOT SH70 Plum Creek ABL\06.00 Design\06.04 Sheets\06.04.09 Environmental\SW3P NOTIFICATION BOARD DETAIL.DGN
DATE: 4/11/2022 6:18:38 PM

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.

1. The project disturbs more than one acre but less than five acres 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.
2. Prevent storm water pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
3. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
4. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
5. 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. PLUM CREEK

2.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☒ Temporary Vegetation	☒ Silt Fence	☐ Vegetative Filter Strips
☐ Blankets/Matting	☒ Rock Berm	☐ Retention/Irrigation Systems
☐ Mulch	☐ Triangular Filter Dike	☐ Sedimentation Basin
☐ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw & Hay Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost & Mulch
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☐ Sand Filter Systems
☒ Temporary Erosion Control Logs (BIOLOGS)	☐ Temporary Erosion Control Logs (BIOLOGS)	☐ Temporary Erosion Control Logs (BIOLOGS)
☐ Preservation of Natural Resources	☐ Sediment Traps	☒ Permanent Vegetation (Planting, Sodding, or Seeding)
☒ Construction Exits	☐ Sediment Basins	☐ Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☐ No Action Required ☒ Required Action

Action No.

1. Minimize construction activities in the creeks and ditches to those activities shown in the plans.
2.
3.
4.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☒ No Action Required ☐ Required Action

Action No.

1.
2.
3.
4.

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.

1.
2.
3.
4.

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.

1.
2.
3.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☒ No Action Required ☐ Required Action

Action No.

1.
2.
3.

SH 70 ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS EPIC

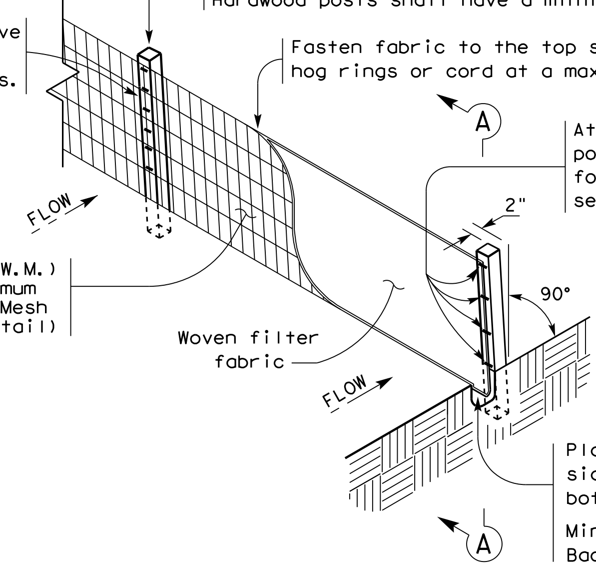
NO SCALE SHEET 1 OF 1

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH 70
STATE	COUNTY		SHEET NO.
TEXAS	FISHER		136

DISTRICT	CONTROL	SECTION	JOB
ABL	0263	05	024

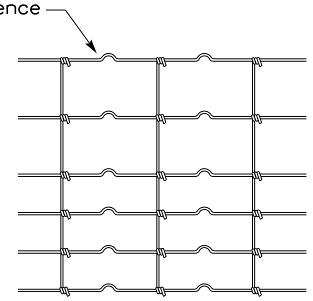
PREPARED BY (NAME OF DESIGNER)
DATE: 4/11/2022
FILE: \\pusscshrfil01\J-Jobs\2138C TxDOT SH70 Plum Creek ABL\06...

REV. DATE: 02/2015



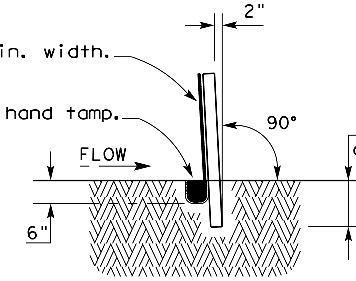
TEMPORARY SEDIMENT CONTROL FENCE

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.



SECTION A-A

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

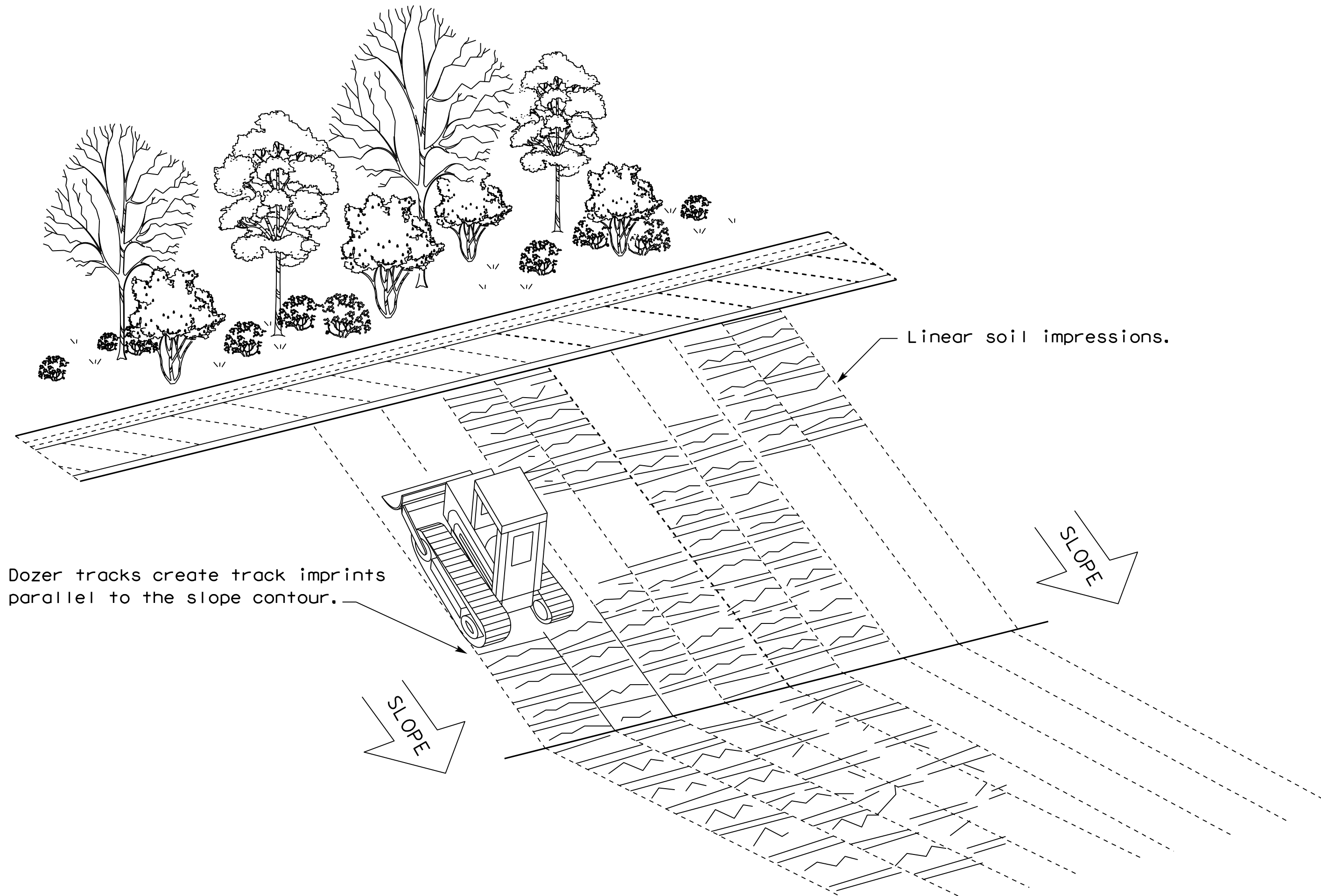
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

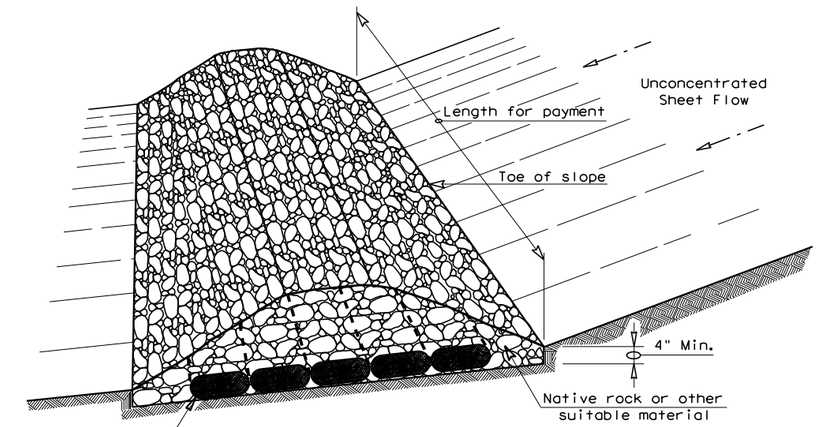
FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0263	05	024	SH 70
	DIST		COUNTY	SHEET NO.
	ABL		FISHER	137

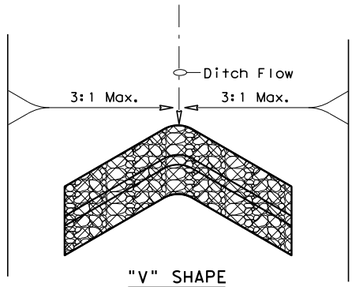
\\RUSCSHRFIL01\J-Jobs\2138C TxDOT SH70 Plum Creek ABL\06.00 Design\06.04 Sheets\06.04.11 Standards\SW3P Standards\ec116.dgn

4DATE2022



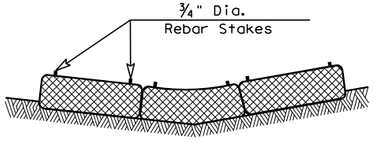
FILTER DAM AT TOE OF SLOPE

RFD1

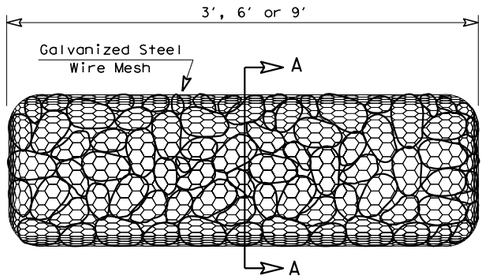


"V" SHAPE
PLAN VIEW

PLAN VIEW

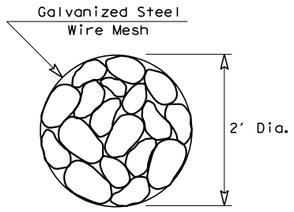


SECTION B-B

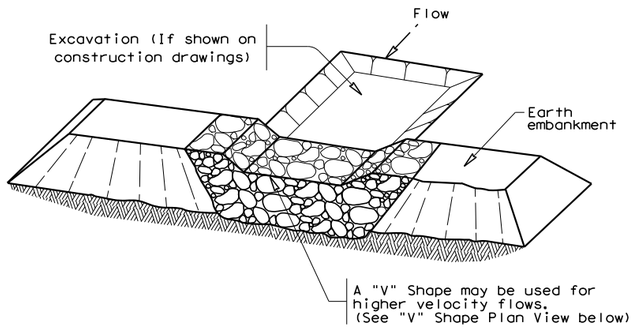


TYPE 4 (SACK GABIONS)

RFD4

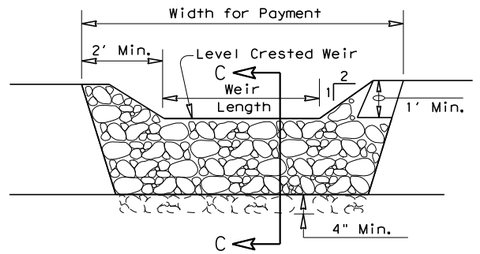


SECTION A-A

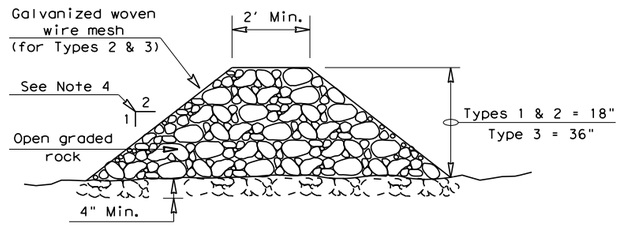


FILTER DAM AT SEDIMENT TRAP

RFD1 OR RFD2



PROFILE



SECTION C-C

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

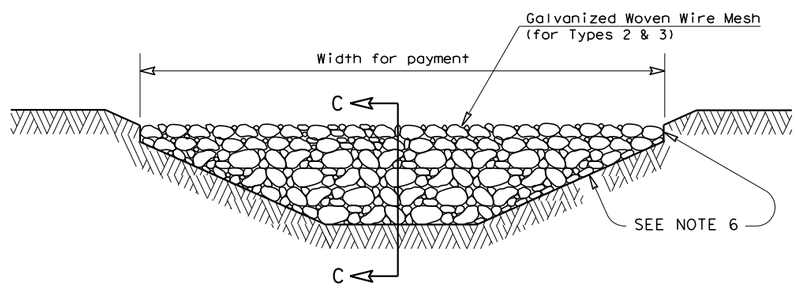
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.



FILTER DAM AT CHANNEL SECTIONS

RFD1 OR RFD2 OR RFD3

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam — RFD1
Type 2 Rock Filter Dam — RFD2
Type 3 Rock Filter Dam — RFD3
Type 4 Rock Filter Dam — RFD4

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

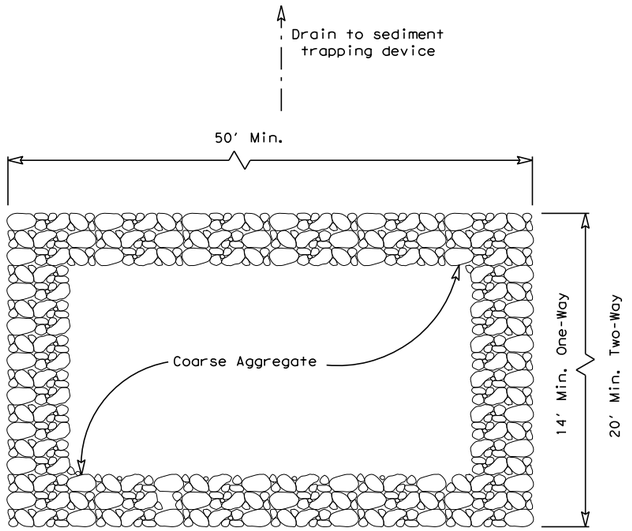
ROCK FILTER DAMS

EC(2)-16

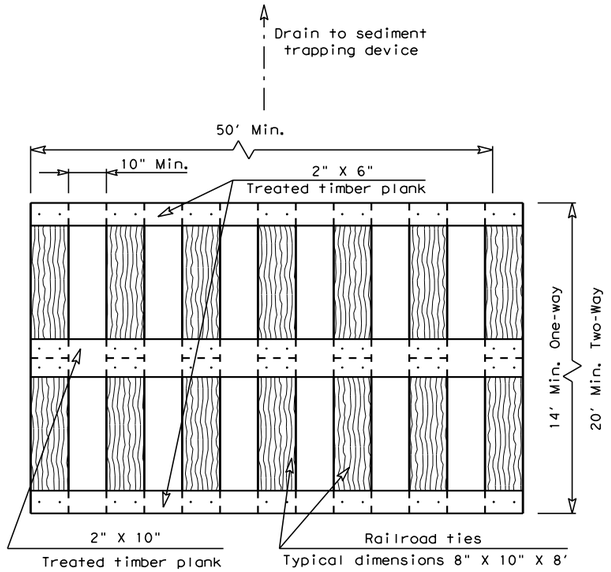
FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0263	05	024	SH 70
	DIST	COUNTY		SHEET NO.
	ABL	FISHER		138

DATE: 4/11/2022
FILE: \\PUSSCSHRFIL01\J-Jobs\2138C TxDOT SH70 Plum Creek ABL\06.00 Design\06.04 Sheets\06.04.11 Standards\SW3P Standards\ec216 (1).dgn

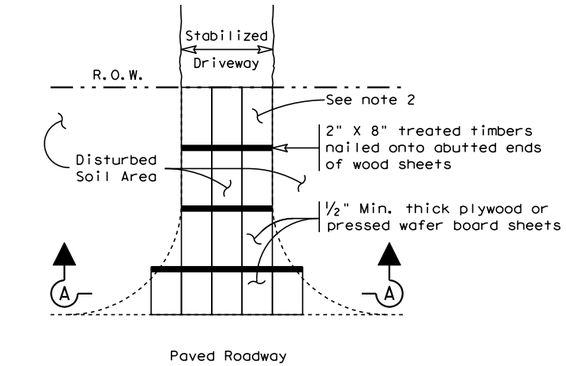
DATE: 4/11/2022
FILE: \\PUSSCSHRFIL01\J-Jobs\2138C TxDOT SH70 Plum Creek ABL\06.00 Design\06.04 Sheets\06.04.11 Standards\SW3P Standards\ec316.dgn



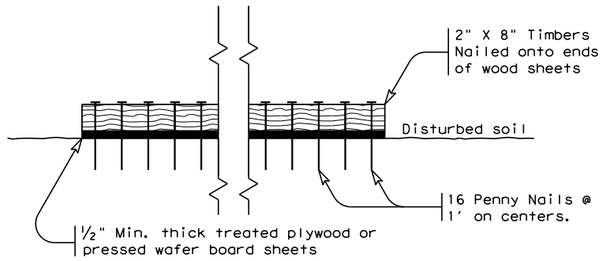
PLAN VIEW



PLAN VIEW



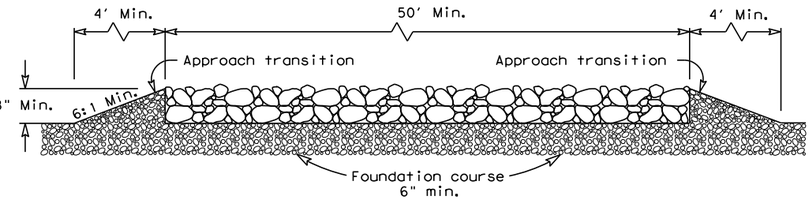
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

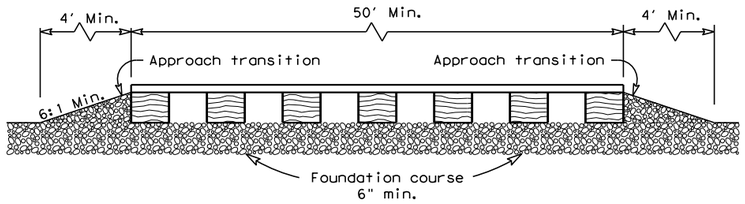
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

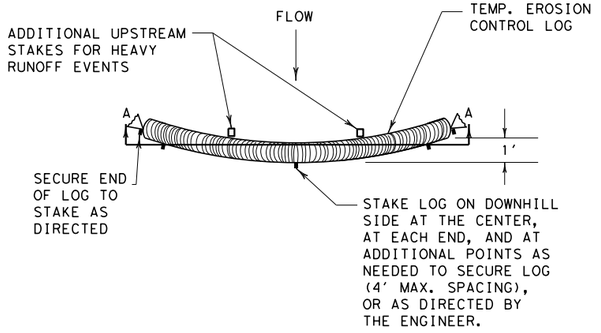
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

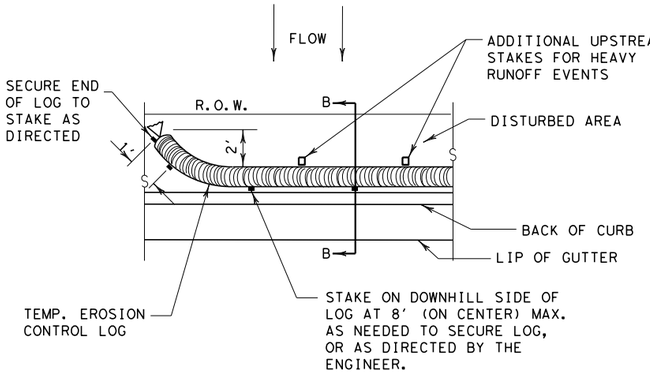
EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
	CONT	SECT	JOB	HIGHWAY
REVISIONS	0263	05	024	SH 70
	DIST	COUNTY		SHEET NO.
	ABL	FISHER		139

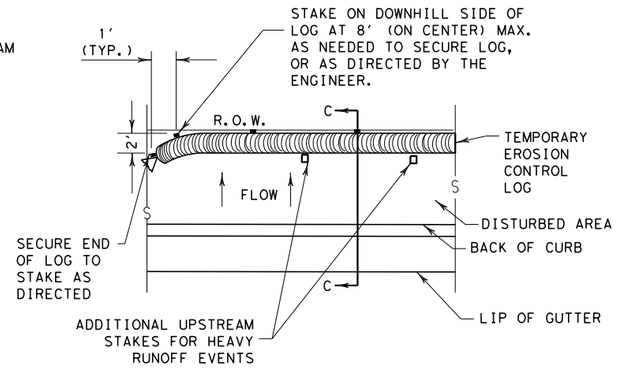
DATE: 4/11/2022
FILE: \\PUSSCSHRFIL01\J-Jobs\2138C TxDOT SH70 Plum Creek ABL\06.00 Design\06.04 Sheets\06.04.11 Standards\SW3P Standards\ec916 (1).dgn



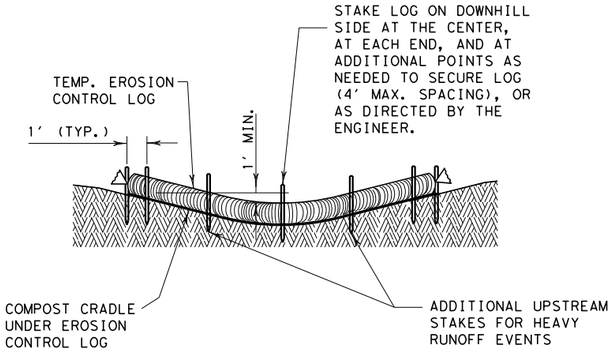
PLAN VIEW



PLAN VIEW



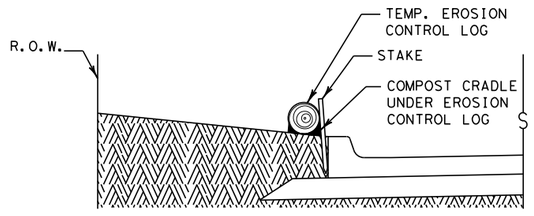
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

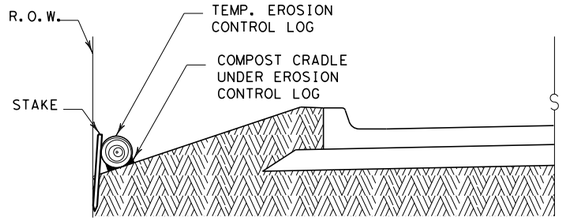
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

CL-BOC



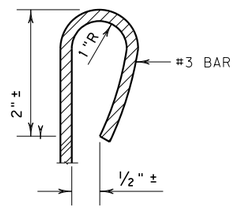
SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW

LEGEND

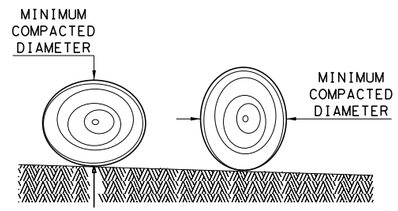
- CL-D — EROSION CONTROL LOG DAM
- CL-BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW — EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI — EROSION CONTROL LOG AT DROP INLET
- CL-CI — EROSION CONTROL LOG AT CURB INLET
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET



REBAR STAKE DETAIL

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.

Texas Department of Transportation

Design Division Standard

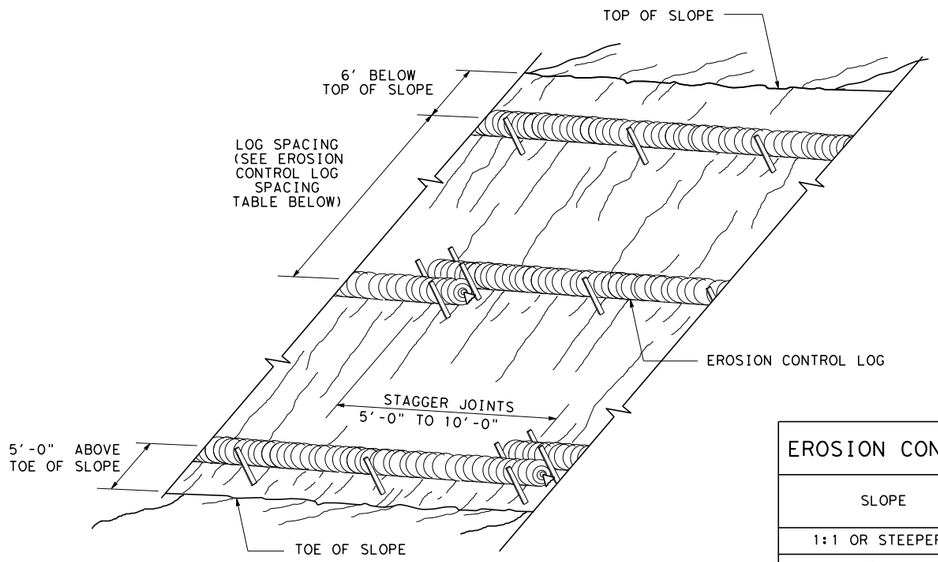
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

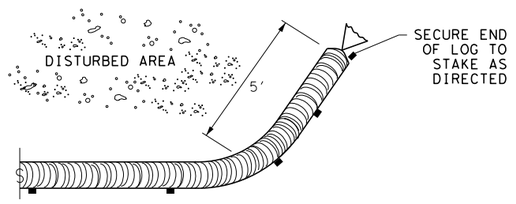
FILE: ec916		DN: TxDOT		CK: KM	DW: LS/PT		CK: LS
© TxDOT: JULY 2016		CONT	SECT	JOB		HIGHWAY	
REVISIONS		0263	05	024		SH 70	
		DIST		COUNTY			SHEET NO.
		ABL		FISHER			140

DATE: 4/11/2022
FILE: \\PUSSCSHRFIL01\J-Jobs\2138C TxDOT SH70 Plum Creek ABL\06.00 Design\06.04 Sheets\06.04.11 Standards\SW3P Standards\ec916 (1).dgn



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

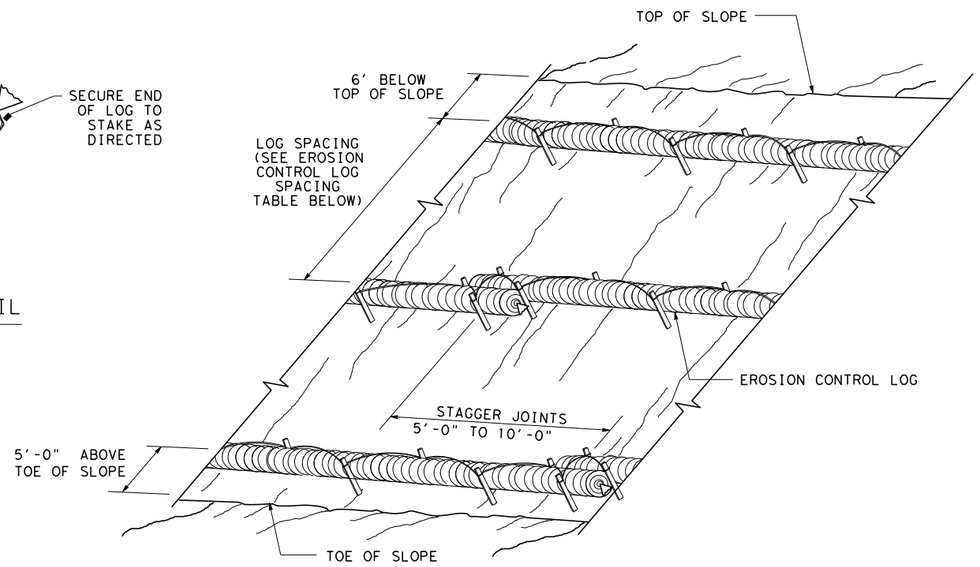
CL-SST



END SECTION RAP DETAIL

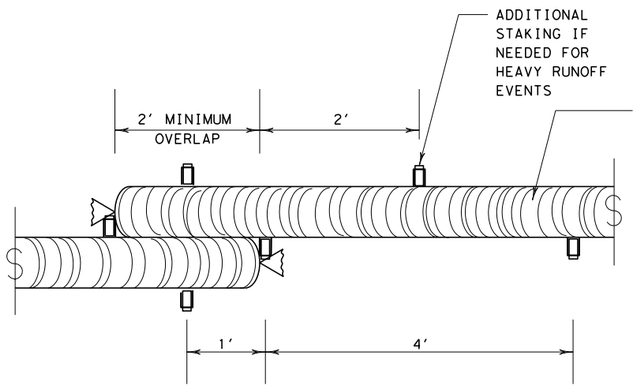
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

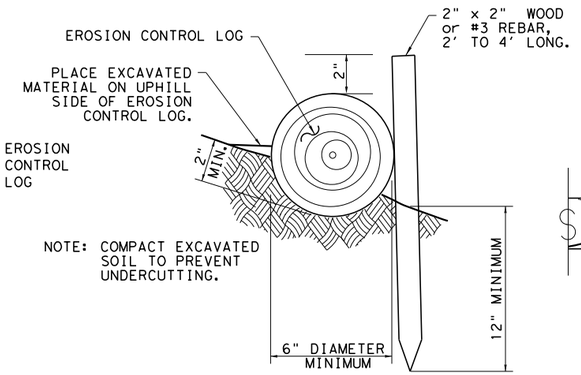
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

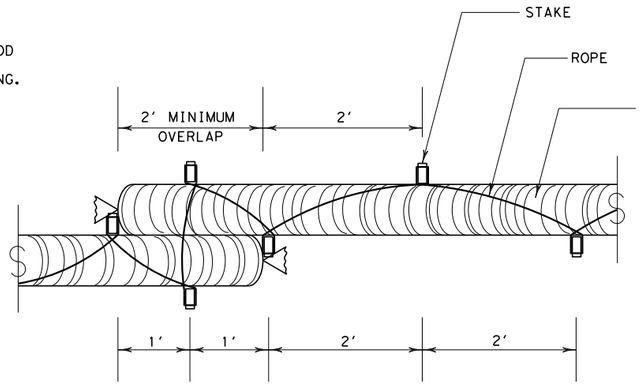


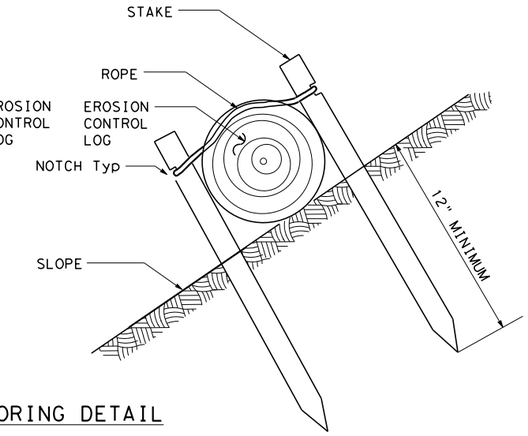


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

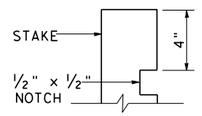
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

SHEET 2 OF 3

Texas Department of Transportation

Design Division Standard

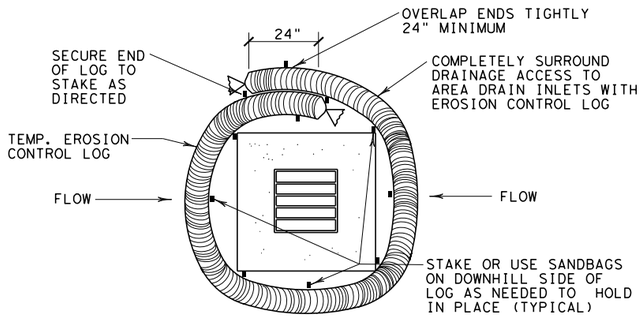
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

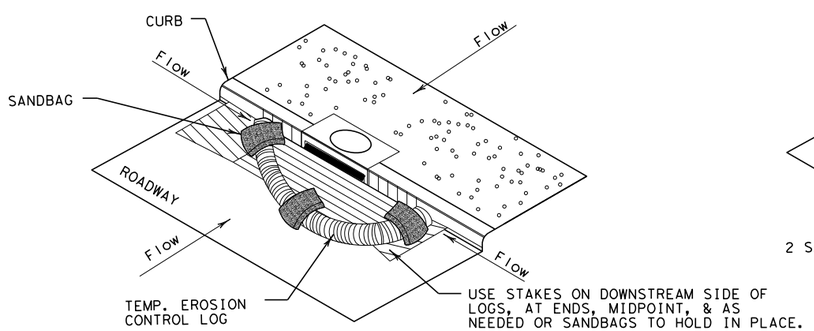
FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0263	05	024	SH 70
	DIST	COUNTY		SHEET NO.
	ABL	FISHER		141

DATE: 4/11/2022
FILE: \\PUSSCSHRFIL01\J-Jobs\21138C TxDOT SH70 Plum Creek ABL\06.00 Design\06.04 Sheets\06.04.11 Standards\SW3P Standards\ec916 (1).dgn



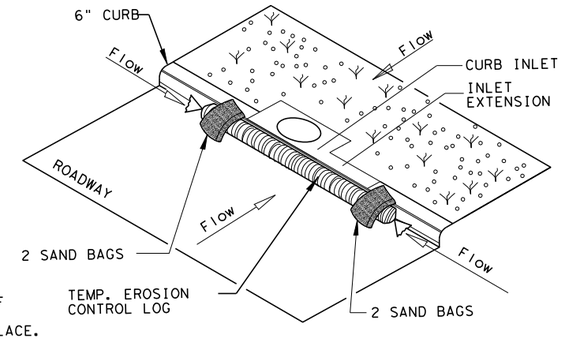
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

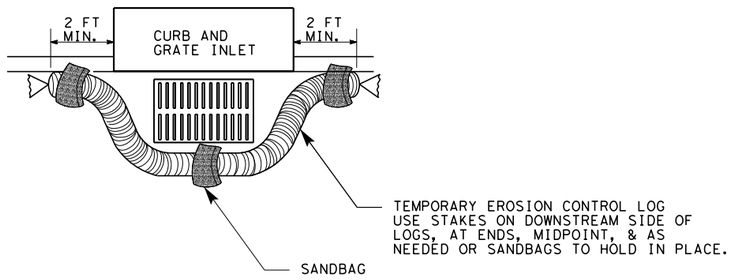
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

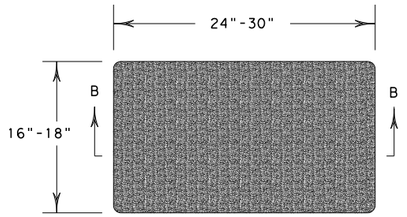
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT		CK: KM	DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
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	DIST	COUNTY				SHEET NO.
	ABL	FISHER				142