

100% SUBMITTAL

INDEX OF SHEETS
SEE SHEET 2

STATE OF TEXAS DEPARTMENT OF TRANSPORTATION

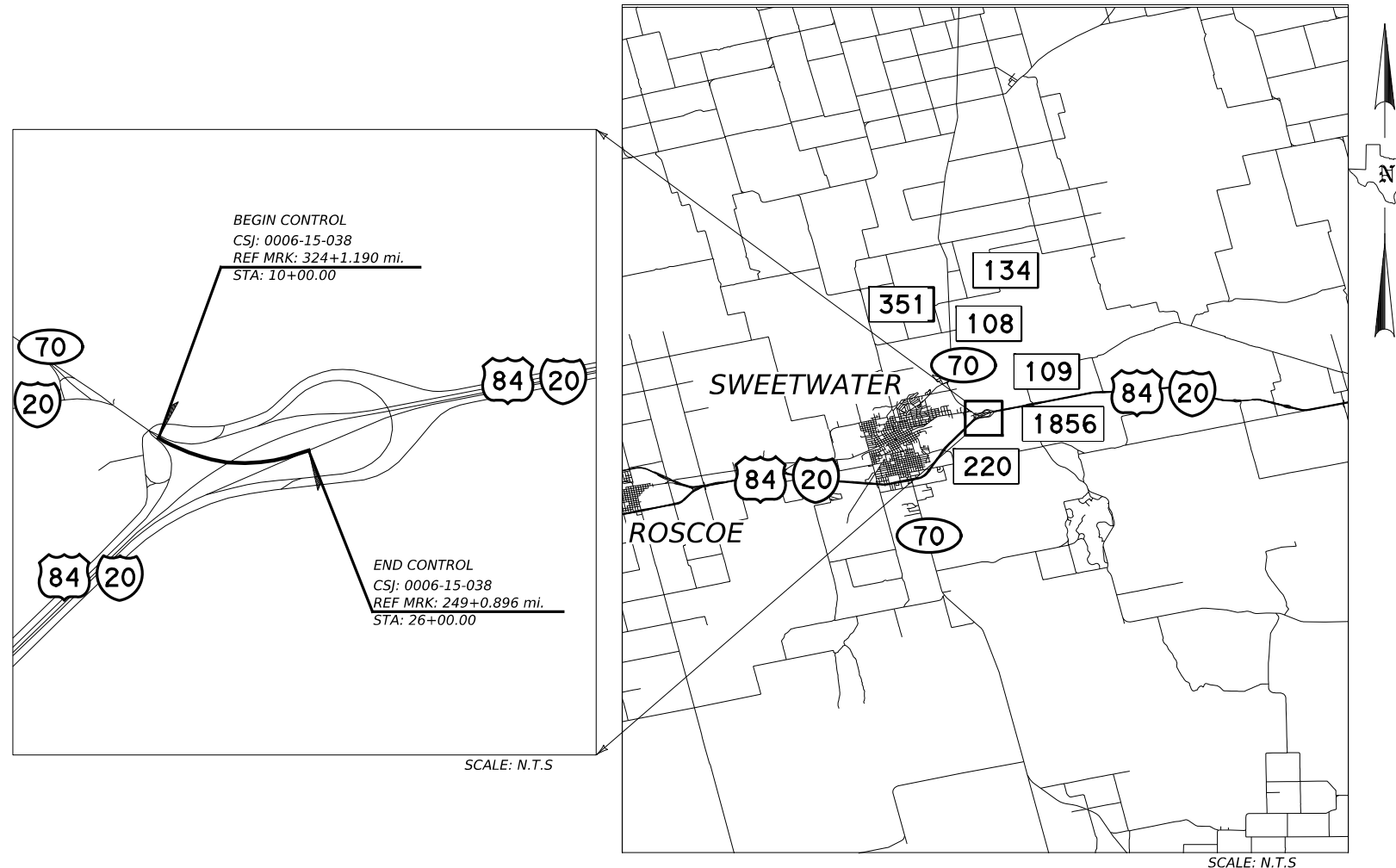
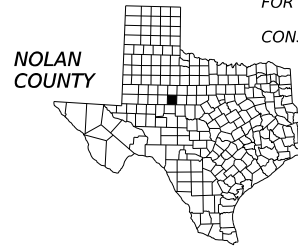
PLANS OF PROPOSED STATE HIGHWAY IMPROVEMENT

PROJECT NO. BR 2024(662)

NET LENGTH OF ROADWAY = 1,330 ft = 0.252 mi
NET LENGTH OF BRIDGE = 270 ft = 0.051 mi
NET LENGTH OF PROJECT = 1,600 ft = 0.303 mi

SH 70 NOLAN COUNTY

LIMITS: FROM SH 70 TO BI 20
FOR THE CONSTRUCTION OF: BRIDGE REPLACEMENT
CONSISTING OF: REPLACING BRIDGE AND APPROACHES



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, OCTOBER 23, 2023).

EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD CROSSINGS: NONE

DESIGN SPEED = 45 MPH
CURRENT A.D.T. (2022) = 5,483 vpd
PROJECTED A.D.T. (2042) = 7,676 vpd
FUNCTIONAL CLASS: RURAL PRINCIPAL ARTERIAL
EXISTING NBI# = 08-177-0-0006-03-190
PROPOSED NBI# = 08-177-0-0006-03-351

FHWA TEXAS DIVISION		PROJECT NO.		SHEET NO.	
		BR 2024(662)		1	
STATE	DISTRICT	COUNTY			
TEXAS	ABL	NOLAN			
CONTROL	SECTION	JOB	HIGHWAY NO.		
0006	15	038	SH 70		

FINAL PLANS

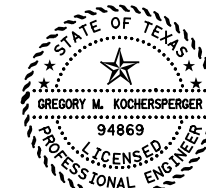
LETTING DATE: 6/5/2024
DATE CONTRACTOR BEGAN WORK: _____
DATE WORK WAS COMPLETED: _____
DATE WORK WAS ACCEPTED: _____
FINAL CONTRACT COST: \$ _____
CONTRACTOR: _____

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: Michael Wittie, P.E. 10/30/2023
62A18080E60241... COMMITTEE CHAIRMAN DATE



HDR ENGINEERING, INC
FIRM REG NO. F-754

SUBMITTED FOR LETTING: 10/25/23
Greg Kochersperger
GREGORY M. KOCHERSPERGER, P.E.
HDR PROJECT MANAGER

RECOMMENDED FOR LETTING: 10/29/2023
DocuSigned by: Natalie Cox
NATALIE COX, E.I.T.
TxDOT PROJECT MANAGER

RECOMMENDED FOR LETTING: 10/31/2023
DocuSigned by: Ryan Sayles
RYAN B. SAYLES, P.E.
AREA ENGINEER

RECOMMENDED FOR LETTING: 10/31/2023
DocuSigned by: Michael Haithcock
MICHAEL A. HAITHCOCK, P.E.
DIRECTOR OF T P & D

APPROVED FOR LETTING: 10/31/2023
DocuSigned by: Thomas G. Allbritton, P.E.
THOMAS G. ALLBRITTON, P.E.
DISTRICT ENGINEER

DATE: _____
FILE: _____

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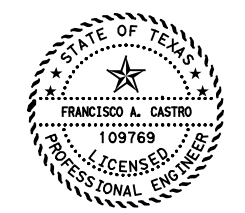
THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

Francisco A. Castro

P.E.

10/25/2023

DATE



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

Alicia Licon-Lozano

P.E.

10/25/2023

DATE



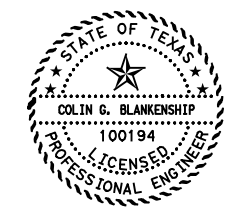
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Colin G. Blankenship

P.E.

10/25/2023

DATE



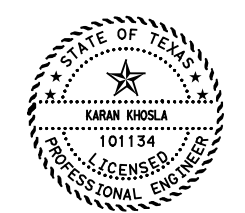
* THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

Karan Khosla

P.E.

10/25/2023

DATE



HDR		HDR Engineering, Inc. Firm Registration No. F-754 17111 Preston Road, Suite 300 Dallas, Texas 75248 972.960.4400	
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DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	2	

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County: NOLAN
Highway: SH 70

**ABILENE DISTRICT GENERAL NOTES
2014 SPECIFICATIONS**

General

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

Ryan R. Sayles, P.E. / Phone: 432-263-4768 / Ryan.Sayles@txdot.gov
LaRissa Halford, E.I.T. / Phone: 806-356-3226 / larissa.halford@txdot.gov
(Big Spring Area Office)

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

For Q&A's on Proposals navigate to <https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors>
Use the dashboard to navigate to the project you are interested in by scrolling or filtering the dashboard using the controls on the left. Hover over the blue hyperlink for the project you want to view the Q&A for and click on the link in the window that pops up.

All relevant project documentation including contract time, cross sections, etc will be posted on the districts FTP website. <https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20Responses/>

Failure to make necessary corrections to SWP3 based on SWP3 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.

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Environmental

Endangered and Protected Species

1. Migratory Birds

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

Best Management Practices

1. Bird BMPs

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

Item 5, "Control of Work"

Use Method C for construction surveying.

All known utilities are identified in the plans, including the crossing of power lines. Use this information to identify potential issues with power poles and power lines prior to bidding.

Make necessary arrangements with utility owners regarding temporary protections such as bracing power poles, and de-energizing power lines. The Department will not reimburse the cost

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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”**

Provide notification to the District Traffic Engineering Section by telephone at 325-676-6991 and 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.

Obtain approval from the Engineer of staked locations for illumination foundations, pull boxes, and power source prior to construction.

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 [Alternate Precast Proposal Submission \(txdot.gov\)](http://www.txdot.gov/alternates). Acceptance or denial of an alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor.

Item 6, “Control of Materials”

Lead abatement will be performed by the Contractor at connection points shown in the demolition plan. Flame cutting or saw cutting will be allowed only at locations shown in the demolition plans.

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

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

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

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

General Notes

Sheet C

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Item 7, “Legal Relations and Responsibilities”

The total area disturbed for this project is 3.3 acres. The disturbed area in this project, all project locations in the Contract, and the Contractor project specific locations (PSLs), within 1 mile of the project limits, for the Contract will further establish the authorization requirements for storm water discharges. The Department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. The Contractor is to obtain required authorization from the TCEQ for Contractor PSLs for construction support activities on or off the ROW. When the total area disturbed in the Contract and PSLs within 1 mile of the project limits exceeds 5 acres, provide a copy of the Contractor NOI for PSLs on the ROW to the Engineer and to the government that operates a separate storm sewer system.

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

The Contractor's attention is directed to the Texas Aggregate Quarry Pit Safety Act. Any pit or quarry meeting the definition of an unacceptable unsafe location as defined in the Act is subject to regulations set forth in this Act. A copy of the Texas Administrative Code, Title 43, Part, 1, Chapter 21, Subchapter M may be viewed at [https://texreg.sos.state.tx.us/public/readtac\\$ext.ViewTAC?tac_view=5&ti=43&pt=1&ch=21&sc h=M&rl=Y](https://texreg.sos.state.tx.us/public/readtac$ext.ViewTAC?tac_view=5&ti=43&pt=1&ch=21&sc h=M&rl=Y)

No significant traffic generator events identified.

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

Patrol vehicles must be clearly marked to correspond with the officer’s agency and equipped with appropriate lights to identify them as law enforcement. For patrol vehicles not owned by a law enforcement agency, markings will be retroreflective and legible from 100 ft. from both sides and the rear of the vehicle. Lights will be high intensity and visible from all angles.

General Notes

Sheet D

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LIGHTING STANDARDS FOR HIGHWAY MAINTENANCE OR CONSTRUCTION VEHICLES AND SERVICE VEHICLES

VEHICLE LIGHTING SUMMARY

Vehicle	Color of Flashing Lights	Transportation Code
Police Vehicles	Red/Blue/White/Amber	547.305 & 547.702
Fire/EMS Vehicles	Red/Blue/White/Amber	547.305 & 547.702
Volunteer Fire/EMS	Red/Blue/White/Amber	547.305 & 547.702
School	Bus Red/White (rooftop) /Amber	547.305 & 547.701
Highway Maintenance or Construction Vehicles and Service Vehicles	Amber/Blue	547.105 & TxDOT Lighting Standards

Item 8 “Prosecution and Progress”

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

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

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

Begin work 60 calendar days after the authorization date to begin work. Do not begin work before or after this period unless authorized in writing by the Engineer. The delay is needed to allow for purchasing Manufactured Items – Bridge Items.

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

Prepare the progress schedule as a Critical Path Method (CPM).

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In addition, per Special Provision 008-006, the contractor will be awarded an incentive as shown in Table 8-1 for each day of early completion of each milestone. Further, the contractor will be assessed a disincentive as shown in Milestone Table 8-1 for each day in excess of the milestone duration as shown in Table 8-1.

Milestone Table 8-1

Milestone No.	Type	Milestone Description	Milestone Duration	Daily Incentive and Disincentive Rate
1	Incentive/ Disincentive	The milestone begins on the first day of the complete closure to traffic of SH 70 SB to IH20 EB. The milestone ends when SH 70 is re-opened to traffic following completion of <u>all work</u> requiring a closure. This includes the demolition of existing bridge, construction of new bridge and approaches, construction of drainage structure, reconstruction of gore tie-in at IH20, construction of illumination, and installation of permanent striping, etc as shown in the plans	59 Days	\$18,000 (Maximum 20 days for Incentive - \$360,000) (Maximum 40 days for disincentive - \$720,000)

Item 9, “Measurement and Payment”

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

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.

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Item 247, "Flexible Base"

If in the opinion of the Engineer, the material is of satisfactory quality the addition of four (4) percent fly ash by weight may be used to meet strength requirements. Modify the construction methods in accordance with Item 265 "Fly Ash or Lime-Fly Ash Treatment (Road Mixed)". Provide materials from an approved source. Meet all other material requirements of item 247. This work is subsidiary to item 247.

Item 416, "Drilled Shaft Foundations"

Place riprap around the illumination foundation as shown on Standard Sheet RID (2)-20.

Riprap will be paid for under item 432.

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

Item 420, "Concrete Substructures"

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

- Bent Concrete

Item 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 tooled contraction joints at a maximum spacing of 25 feet and ½" fiber board every 150 feet when constructing cable median barrier mow strips. The depth for tooled joints shall be sufficient to ensure cracking at the joints. The depth for fiber board joints shall be the full depth of the mow strip.

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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); bridge railing; and approach slab.

Provide Glass Fiber Reinforced Polymer (GFRP) reinforcement for cast-in-place portions of bridge deck (PCP reinforcement and bridge girder reinforcement excluded).

Item 496, "Removing Structures"

The contractor will be required to provide a demo plan for bridge structures to be approved by the engineer.

Item 502, "Barricades, Signs and Traffic Handling"

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

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

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

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

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.

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During construction on all underpass structures erect and maintain accurate clearance signs in accordance with the "Texas Manual on Uniform Traffic Control Device for Streets and Highways". The mounting method for the temporary clearance sign is subject to approval of the Engineer. Temporary clearance signs are considered subsidiary to the various bid items. Movement of construction equipment and haul trucks will be prohibited from crossing the median unless specifically authorized by the Engineer. Ingress and egress to main lanes will be at entrance and exit ramps.

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

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

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

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

Repair barricades within the timeline shown on the barricade inspection report. Failure to comply will cease all work until barricades are repaired to the satisfaction of the Department. Replace all damaged traffic control devices immediately. Remove any damaged traffic control devices from the project within 24 hours.

Conflicting guide signs shall be covered as approved by the Engineer. This work shall be subsidiary to Item 502.

Reduced regulatory speed limit signs should only be posted in the vicinity of ongoing work activity as shown on BC (3)-21 and not throughout the entire project. Removing, relocating or covering speed limit signs shall be considered subsidiary to item 502.

Complete closures of IH 20 are only permitted between the hours of 9 pm and 5 am. Closures that extend beyond that time will be assessed a fee equal to \$10,000 per hour.

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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 512, "Portable Concrete Traffic Barrier"

The state will furnish the portable concrete traffic barrier (PCTB) sections stockpiled southwest of intersection of IH 20 EB and BI 20/SH 70 NB Ramp approx. 0.2 miles from the project limits. All PCTB sections will be hauled by the Contractor to the project site. Upon completion, all PCTB sections will be returned to their original location. Make arrangements at the storage sites for the loading and unloading of the PCTB.

Quick-Bolt (SSCB) joint installation shall be used.

Upon completion of the project, PCTB will become the property of the TxDOT and will be stockpiled as approved by the Engineer at southwest of intersection of IH 20 EB and BI 20/SH 70 NB Ramp approx. 0.2 miles from the project limits.

Item 514, "Permanent Concrete Traffic Barrier"

Use Class "C" concrete with air entrainment for Permanent Concrete Traffic Barrier.

Item 540, "Metal Beam Guard Fence"

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

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

Item 542, "Removing Metal Beam Guard Fence"

Metal beam guard fence and posts shall be disposed of by the Contractor.

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Item 585, “Ride Quality for Pavement Surfaces”

The Engineer reserves the right to prohibit corrective work and assess the penalty for each occurrence of localized roughness per Article 585.3.4.2.3.2.

Use pay adjustment schedule 2 for Ride Quality bonus/penalty calculation.

Item 610, “Roadway Illumination Assemblies”

Ballast for luminaries shall be rated 480 volts.

The Contractor is responsible for fixture testing costs; see Materials and Test Division test method TEX-1110.

Contractor should refer to the Texas Department of Transportation’s Highway Illumination Manual, January 2018, Chapter 6, and Section 7 for additional information on lateral placement of illumination foundations as described in note 6 on RID (2)-17.

<http://onlinemanuals.txdot.gov/txdotmanuals/hwi/index.htm>

Fabricate steel roadway illumination poles in accordance with TxDOT standard RIP-17. Poles fabricated according to RIP-17 require no shop drawings.

Alternate designs to RIP-17 or the use of aluminum to fabricate poles will require the submission of shop drawings electronically.

For instructions on submitting shop drawings electronically go to TxDOT home page, Business with TxDOT, Bridge information, Shop drawings. File is titled: Guide to Electronic Shop Drawing Submittal

Place riprap around the illumination foundation as shown on Standard Sheet RID (2)-17. Riprap will be paid for under item 432.

Item 618, “Conduit”

All conduit shall be SCH 80 PVC.

High density polyethylene (HDPE) may be substituted for schedule 80 PVC in bores.

High density polyethylene (HDPE) may be threaded and used with threaded PVC connectors or couplings.

Conduit elbows will be the long radius variety.

Rigid metal conduit elbows 1” and larger that are required to be installed on conduit system, will not be paid for separately, but will be considered subsidiary to the various bid items.

All couplings and connections shall be tight and waterproof. Each end of every PVC pipe connection and/or coupling shall be cleaned with PVC cleaner and glued thoroughly with PVC

General Notes

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sealer. Proposed and existing conduit shall be brought into a pull box and elbowed unless otherwise shown. Where a rigid metal conduit run terminates, a bushing shall be provided to protect the wire from abrasion.

The conduit shall be placed at a minimum depth of 2 feet unless otherwise shown on the plans or directed by the Engineer. If utility lines or other obstacles are at the 2-foot minimum depth then the conduit shall be routed under the utility or obstacle unless otherwise approved by the Engineer.

The conduit shall be placed on a 2-inch sand cushion and then backfilled with a minimum of 6 inches of sand fill. The remainder of the trench shall be backfilled with flexible base or soil as required by location of conduit on the project. Flexible metal shall not be used on this project.

Use materials from prequalified material producers list as shown on the Texas department of Transportation (TxDOT) – Construction Division’s (CST) material producer list. Category is “Roadway Illumination and Electrical Supplies”.

Item 620, “Electrical Conductors”

A bare copper wire No. 8 AWG or larger will be installed in every conduit throughout the electrical system in accordance with Item 620, the electrical detail sheets, and the latest edition of the National Electric Code (NEC).

Grounding Conductors that share the same conduit, junction box, ground box or structure shall be bonded together at every accessible point in accordance with the current National Electrical Code.

Labeling conductors with label marker is acceptable.

Use ONLY certified persons to perform electrical work. See Item 7.18 “Electrical Requirements” for additional details.

For both transformer and shoe- base type illumination poles, provide double-pole breakaway fuse holder as shown on the Texas department of Transportation (TxDOT) – Construction Division’s (CST) material producer list. Category is “Roadway Illumination and Electrical Supplies”. Fuse holder is shown on the list under Items 610 and 620. Provide 10-amp time delay fuses.

Use breakaway connectors listed on materials from pre-qualified material producers list.

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 Highway: SH 70

Item 628, "Electrical Service"

Coordinate through the inspector or Area Engineer to coordinate new electrical services with the District Traffic Engineering Section by telephone at 325-676-6991 and by email at ABL-ElectricalServiceRequest@txdot.gov to insure the meter is installed under the proper account name.

Provide at least 30 days prior notification for new electrical services to be energized. Provide at least 30 days prior notification for existing electrical service disconnects.

Any service installed by others shall comply with all TxDOT Standards from weather head to fixtures.

Photocell enclosed in pedestal services shall be orientated in a northerly direction unless otherwise directed.

Item 636 "Signs"

Process for getting bridge height for signs.
 Contractor will measure bridge height according to the TxDot Sign Guidelines and Applications Manual (Chap. 6 Sec. 2) and the Engineer or his representative will verify this information for sign manufacturing.

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.
 Deliver and stockpile all signs to be salvaged to the Sweetwater Maintenance Facility, located approximately 2 miles from the South end of the project.

Item 658, "Delineator and Object Marker Assemblies"

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

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Surface Mount posts shall be the three-piece Flexible Delineator Post System, utilizing a 2-3/8" round post with a square to round 5" base. The Base shall have a minimum 2 mounting holes to accommodate for mounting on narrow surfaces. The Posts shall be permanently sealed at the top and have a 3-1/2" wide x 4" flattened surface to accommodate up to a 3" x 4" reflective sheet on both sides.

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

Item 666, "Retro reflectorized Pavement Markings"

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.

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Item 3077, “Superpave Mixtures”

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

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.

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

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

Dilution of tack coat is not allowed.

Do not exceed a laydown width of 16’ per pass.

Substitute Binders will not be allowed unless RAP is used in the production of the mixture.

Do not exceed 10% RAP 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 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.

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

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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.

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.

BASIS OF ESTIMATE FOR STATIONARY TMAs				
Phase	Standard	TMA (Stationary)		
		Required	Additional	TOTAL
1	TCP(2-5)-18	1		1
2	TCP(6-6)-12	1	1	2
3	TCP(2-5)-18, TCP(6-1)-12, TCP(6-9)-14	1	1	2

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DISTRICT Abilene
HIGHWAY SH 70

COUNTY Nolan

Estimate & Quantity Sheet

CONTROL SECTION JOB				0006-15-038		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00135530			
COUNTY				Nolan			
HIGHWAY				SH 70			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	104-6009	REMOVING CONC (RIPRAP)	SY	1,389.000		1,389.000	
	105-6011	REMOVING STAB BASE AND ASPH PAV (2"-6")	SY	5,930.000		5,930.000	
	110-6001	EXCAVATION (ROADWAY)	CY	10,225.000		10,225.000	
	132-6004	EMBANKMENT (FINAL)(DENS CONT)(TY B)	CY	4,065.000		4,065.000	
	164-6033	DRILL SEEDING (PERM) (RURAL) (SANDY)	SY	10,094.000		10,094.000	
	168-6001	VEGETATIVE WATERING	MG	66.000		66.000	
	247-6041	FL BS (CMP IN PLC)(TYA GR1-2)(FNAL POS)	CY	1,480.000		1,480.000	
	275-6001	CEMENT	TON	94.000		94.000	
	275-6010	CEMENT TREAT (SUBGRADE) (8")	SY	4,438.000		4,438.000	
	275-6035	CEMENT TREAT (NEW BASE)(12")	SY	4,438.000		4,438.000	
	310-6009	PRIME COAT (MC-30)	GAL	1,110.000		1,110.000	
	400-6005	CEM STABIL BKFL	CY	137.000		137.000	
	403-6001	TEMPORARY SPL SHORING	SF	280.000		280.000	
	416-6001	DRILL SHAFT (18 IN)	LF	154.000		154.000	
	416-6004	DRILL SHAFT (36 IN)	LF	308.000		308.000	
	416-6005	DRILL SHAFT (42 IN)	LF	156.000		156.000	
	416-6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	32.000		32.000	
	420-6014	CL C CONC (ABUT)(HPC)	CY	60.800		60.800	
	420-6030	CL C CONC (CAP)(HPC)	CY	43.700		43.700	
	420-6038	CL C CONC (COLUMN)(HPC)	CY	40.800		40.800	
	422-6001	REINF CONC SLAB	SF	10,770.000		10,770.000	
	422-6015	APPROACH SLAB	CY	64.200		64.200	
	425-6038	PRESTR CONC GIRDER (TX46)	LF	1,340.400		1,340.400	
	427-6004	SILICONE RESIN PAINT FINISH	SF	1,787.000		1,787.000	
	432-6001	RIPRAP (CONC)(4 IN)	CY	330.400		330.400	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	27.000		27.000	
	450-6023	RAIL (TY SSTR)	LF	602.600		602.600	
	454-6018	SEALED EXPANSION JOINT (4 IN) (SEJ - M)	LF	79.000		79.000	
	464-6005	RC PIPE (CL III)(24 IN)	LF	100.000		100.000	
	465-6128	INLET (COMPL)(PSL)(FG)(4FTX4FT-4FTX4FT)	EA	1.000		1.000	
	467-6394	SET (TY II) (24 IN) (RCP) (6: 1) (C)	EA	1.000		1.000	
	496-6002	REMOV STR (INLET)	EA	1.000		1.000	
	496-6010	REMOV STR (BRIDGE 100 - 499 FT LENGTH)	EA	1.000		1.000	
	496-6016	REMOV STR (PIPE)	EA	1.000		1.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	9.000		9.000	
	506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	444.000		444.000	



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CONTROLLING PROJECT ID 0006-15-038

DISTRICT Abilene
HIGHWAY SH 70

COUNTY Nolan

Estimate & Quantity Sheet

CONTROL SECTION JOB				0006-15-038		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00135530			
COUNTY				Nolan			
HIGHWAY				SH 70			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	444.000		444.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	60.000		60.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	60.000		60.000	
	508-6001	CONSTRUCTING DETOURS	SY	953.000		953.000	
	512-6013	PORT CTB (DES SOURCE)(SGL SLP)(TY 1)	LF	870.000		870.000	
	512-6037	PORT CTB (STKPL)(SGL SLP)(TY 1)	LF	870.000		870.000	
	514-6001	PERM CTB (SGL SLOPE) (TY 1) (42)	LF	79.000		79.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	350.000		350.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	2.000		2.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	300.000		300.000	
	542-6004	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	EA	3.000		3.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	2.000		2.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	4.000		4.000	
	545-6005	CRASH CUSH ATTEN (REMOVE)	EA	2.000		2.000	
	545-6019	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	EA	2.000		2.000	
	610-6004	RELOCATE RD IL ASM (TRANS-BASE)	EA	4.000		4.000	
	618-6023	CONDT (PVC) (SCH 40) (2")	LF	470.000		470.000	
	618-6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	190.000		190.000	
	618-6025	CONDT (PVC) (SCH 40) (2") (CONC ENCSE)	LF	290.000		290.000	
	620-6007	ELEC CONDR (NO.8) BARE	LF	980.000		980.000	
	620-6008	ELEC CONDR (NO.8) INSULATED	LF	1,960.000		1,960.000	
	624-6002	GROUND BOX TY A (122311)W/APRON	EA	2.000		2.000	
	624-6028	REMOVE GROUND BOX	EA	3.000		3.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	3.000		3.000	
	644-6034	IN SM RD SN SUP&AM TYS80(1)SA(U-1EXT)	EA	1.000		1.000	
	644-6065	IN BRIDGE MNT CLEARANCE SGN ASSM(TY 5)	EA	1.000		1.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	7.000		7.000	
	658-6047	INSTL OM ASSM (OM-2Y)(WC)GND	EA	2.000		2.000	
	658-6061	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	EA	3.000		3.000	
	658-6064	INSTL DEL ASSM (D-SY)SZ 1(BRF)GF2	EA	3.000		3.000	
	658-6069	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BR)	EA	4.000		4.000	
	658-6070	INSTL DEL ASSM (D-SY)SZ (BRF)CTB (BR)	EA	4.000		4.000	
	662-6008	WK ZN PAV MRK NON-REMOV (W)6"(SLD)	LF	754.000		754.000	
	662-6037	WK ZN PAV MRK NON-REMOV (Y)6"(SLD)	LF	494.000		494.000	
	662-6067	WK ZN PAV MRK REMOV (W)6"(SLD)	LF	136.000		136.000	
	662-6098	WK ZN PAV MRK REMOV (Y)6"(SLD)	LF	79.000		79.000	
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	533.000		533.000	



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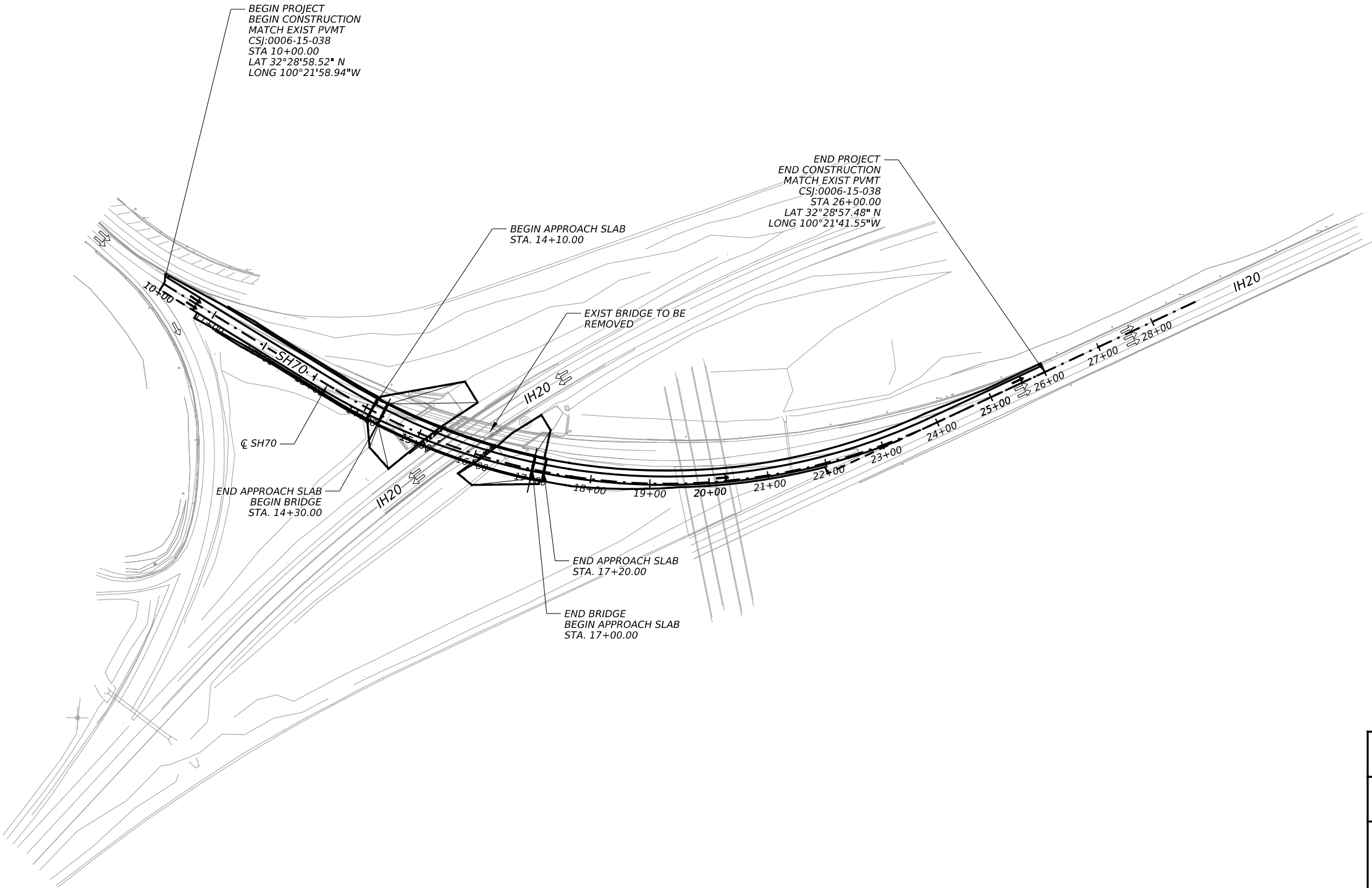
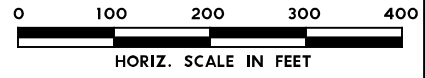
CONTROLLING PROJECT ID 0006-15-038

DISTRICT Abilene
HIGHWAY SH 70

COUNTY Nolan

Estimate & Quantity Sheet

CONTROL SECTION JOB				0006-15-038		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00135530			
COUNTY				Nolan			
HIGHWAY				SH 70			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	666-6225	PAVEMENT SEALER 6"	LF	720.000		720.000	
	666-6306	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	LF	72.000		72.000	
	666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	1,200.000		1,200.000	
	666-6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	1,669.000		1,669.000	
	672-6010	REFL PAV MRKR TY II-C-R	EA	21.000		21.000	
	3077-6033	SP MIXES SP-C SAC-A PG76-22	TON	716.000		716.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	1.000		1.000	
	6185-6002	TMA (STATIONARY)	DAY	52.000		52.000	
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	



HDR HDR Engineering, Inc
 Firm Registration No. F-754
 17111 Preston Road, Suite 300
 Dallas, Texas 75248
 972.960.4400

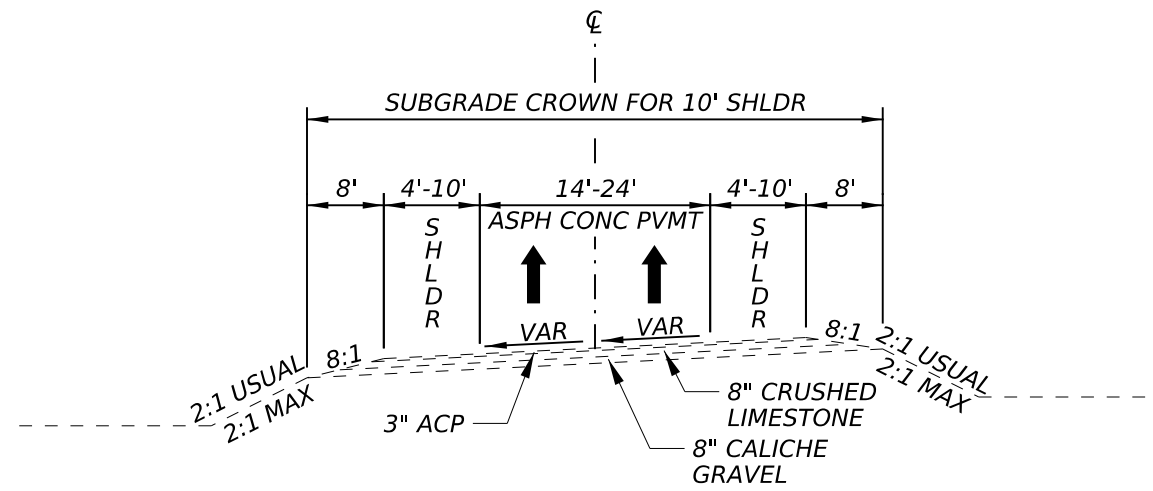
Texas Department of Transportation

SH 70

PROJECT LAYOUT

SCALE: 1"=200' SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	14	



**EXIST SH 70
TYPICAL SECTION**

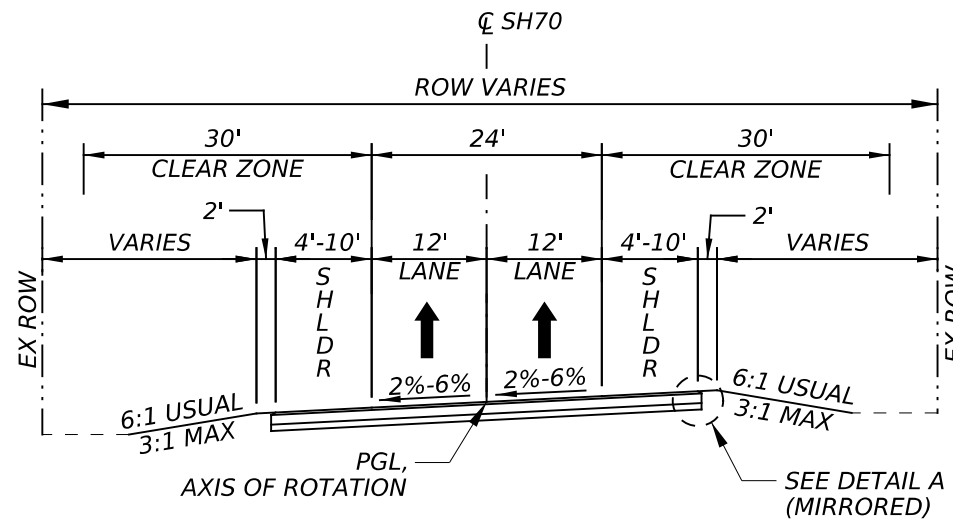
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*SEE BRIDGE TYPICAL SECTIONS SHEET FOR EXISTING BRIDGE TYPICAL SECTION

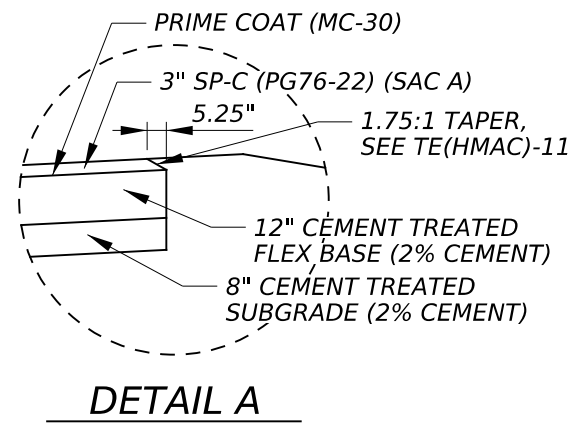


10-13-2023

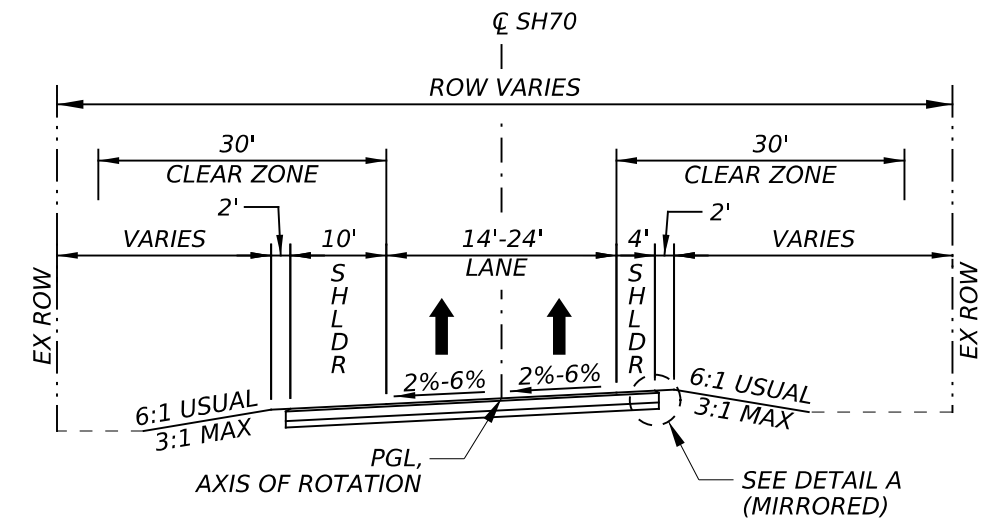
HDR		HDR Engineering, Inc Firm Registration No. F-754 17111 Preston Road, Suite 300 Dallas, Texas 75248 972.960.4400	
Texas Department of Transportation			
SH 70			
EXISTING TYPICAL SECTIONS			
SCALE: N.T.S.		SHEET 1 OF 1	
CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST		SHEET NO.	
ABILENE		15	



**PROPOSED SH 70
 TYPICAL SECTION**
 STA 10+00.00 TO STA 11+94.00

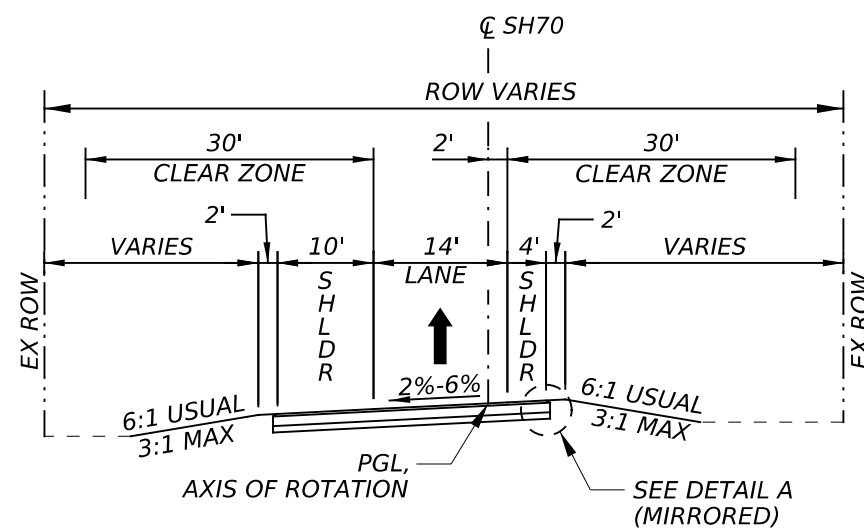


DETAIL A

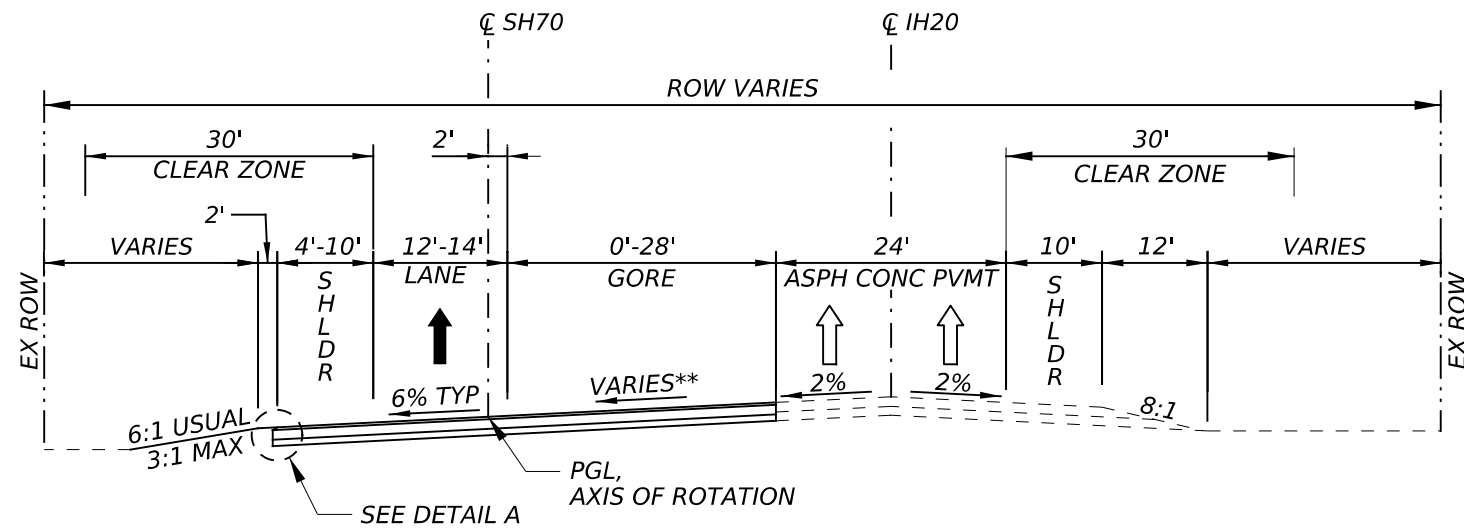


**PROPOSED SH 70
 TYPICAL SECTION**
 STA 11+94.00 TO STA 18+50.00*

*SEE BRIDGE TYPICAL SECTIONS SHEET FOR PROPOSED BRIDGE TYPICAL SECTION



**PROPOSED SH 70
 TYPICAL SECTION**
 STA 18+50.00 TO STA 21+23.00



**PROPOSED SH 70
 TYPICAL SECTION**
 STA 21+23.00 TO STA 26+00.00

**SEE GORE GRADING SHEET FOR ADDITIONAL INFORMATION



HDR HDR Engineering, Inc.
 Firm Registration No. F-754
 1711 Preston Road, Suite 300
 Dallas, Texas 75248
 972.960.4400

Texas Department of Transportation

SH 70

**PROPOSED
 TYPICAL SECTIONS**

CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST		COUNTY	SHEET NO.
ABILENE		NOLAN	16

SCALE: N.T.S. SHEET 1 OF 1

SUMMARY OF BRIDGES																									
CSJ	BRIDGE NBI #		DESIGN		BRIDGE LOCATION	STATION		LENGTH FT	CLEAR RDWY WIDTH FT	LOADING	400 6005	403 6001	416 6001	416 6004	416 6005	420 6014	420 6030	420 6038	422 6001	422 6015	425 6038	427 6004	432 6001	450 6023	454 6018
	EXISTING	PROPOSED	EXISTING	PROPOSED		BEGIN	END				CEM STABIL BKFL	TEMPORARY SPL SHORING	DRILL SHAFT (18 IN)	DRILL SHAFT (36 IN)	DRILL SHAFT (42 IN)	CL C CONC (ABUT)(HPC)	CL C CONC (CAP)(HPC)	CL C CONC (COLUMN)(HPC)	REINF CONC SLAB	APPROACH SLAB	PRESTR CONC GIRDER (TX46)	SILICONE RESIN PAINT FINISH	RIPRAP (CONC)(4 IN)	RAIL (TY SSTR)	SEALED EXPANSION JOINT (4 IN) (SEJ - M)
0006-15-038	08-177-0-0006-03-190	08-177-0-0006-03-351	CONTINUOUS STEEL I-BEAM	PRESTRESSED CONCRETE I-GIRDER	IH20WB	14+30.00	17+00.00	270.00	38.00	HL93	137	280	154	308	156	60.8	43.7	40.8	10770	64.2	1340.4	1787.00	329	602.6	79
TOTALS											137	280	154	308	156	60.8	43.7	40.8	10770	64.2	1340.40	1787	329	602.6	79

SUMMARY OF REMOVALS									
LOCATION	ITEM 104 6009	ITEM 105 6011	ITEM 496 6002	ITEM 496 6010	ITEM 496 6016	ITEM 542 6001	ITEM 542 6004	ITEM 544 6003	ITEM 644 6076
	REMOVING CONC (RIPRAP)	REMOVING STAB BASE AND ASPH PAV (2"-6")	REMOV STR (INLET)	REMOV STR (BRIDGE 100 - 499 FT LENGTH)	REMOV STR (PIPE)	REMOVE METAL BEAM GUARD FENCE	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	GUARDRAIL END TREATMENT (REMOVE)	REMOVE SM RD SN SUP&AM
	SY	SY	EA	EA	EA	LF	EA	EA	EA
SH 70									
CSJ: 0006-15-038									
BEGIN TO END	1389	5930	1	1	1	300	3	4	7
CSJ: 0006-15-038 TOTALS	1389	5930	1	1	1	300	3	4	7
PROJECT TOTALS	1389	5930	1	1	1	300	3	4	7



SUMMARY OF EARTHWORK QUANTITIES		
LOCATION	ITEM 110 6001	ITEM 132 6004
	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL)(DENS CONT)(TY B)
	CY	CY
SH 70		
CSJ: 0006-15-038		
BEGIN TO END	10225	4065
CSJ: 0006-15-038 TOTALS	10225	4065
PROJECT TOTALS	10225	4065

SUMMARY OF METAL BEAM GUARD FENCE & BARRIER					
LOCATION	ITEM 432 6045	ITEM 514 6001	ITEM 540 6001	ITEM 540 6006	ITEM 544 6001
	RIPRAP (MOW STRIP) (4 IN)	PERM CTB (SGL SLOPE) (TY 1) (42)	MTL W-BEAM GD FEN (TIM POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	GUARDRAIL END TREATMENT (INSTALL)
	CY	LF	LF	EA	EA
SH 70					
CSJ: 0006-15-038					
BEGIN TO END	27	79	350	2	2
CSJ: 0006-15-038 TOTALS	27	79	350	2	2
PROJECT TOTALS	27	79	350	2	2

SUMMARY OF SUBGRADES					
LOCATION	AREA	ITEM 247 6041	ITEM 275 6001	ITEM 275 6010	ITEM 275 6035
		FL BS (CMP IN PLC) (TYA GR1-2) (FNAL POS)	CEMENT	CEMENT TREAT (SUBGRADE) (8")	CEMENT TREAT (NEW BASE)(12")
		CY	TON	SY	SY
SH 70					
CSJ: 0006-15-038					
BEGIN TO STA 20+00.00	2787	929	59	2787	2787
STA 20+00.00 TO END	1651	551	35	1651	1651
CSJ: 0006-15-038 TOTALS	4438	1480	94	4438	4438
PROJECT TOTALS	4438	1480	94	4438	4438

SUMMARY OF ASPHALT SURFACE AREAS			
LOCATION	SURFACE AREA	ITEM * 310	ITEM * 3077
		PRIME COAT (MC-30)	SP MIXES SP-C SAC-A PG76-22
		SY	SY
SH 70			
CSJ: 0006-15-038			
BEGIN TO STA 20+00.00	24508	2787	2724
STA 20+00.00 TO END	14508	1651	1612
CSJ: 0006-15-038 TOTALS	4438	4336	
PROJECT TOTALS	4438	4336	

BASIS OF ESTIMATE						
ITEM	DESCRIPTION	RATE	AREA (SY)	QUANTITY	UNIT	
275 6001	CEMENT (BASE) - 2%	25 LB/SY	4438	94	TON	
275 6001	CEMENT (SUBGRADE) - 2%	17 LB/SY	4438			
310 6009	PRIME COAT (MC-30)	0.25 GAL/SY	4438	1110	GAL	
3077 6033	SP MIXES SP-C SAC-A PG76-22	330 LB/SY	4336	716	TON	

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 Texas Department of Transportation			
SH 70			
QUANTITY SUMMARIES			
SHEET 1 OF 2			
CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	17	

SUMMARY OF SIGNING AND PAVEMENT MARKINGS ITEMS														
LOCATION	ITEM 644 6001	ITEM 644 6034	ITEM 644 6065	ITEM 658 6047	ITEM 658 6061	ITEM 658 6064	ITEM 658 6069	ITEM 658 6070	ITEM 666 6036	ITEM 666 6225	ITEM 666 6306	ITEM 666 6309	ITEM 666 6321	ITEM 672 6010
	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	IN SM RD SN SUP&AM TYS80(1)SA(U-1EXT)	IN BRIDGE MNT CLEARANCE SGN ASSM(TY S)	IN STL OM ASSM (OM-2Y)(WC)GND	IN STL DEL ASSM (D-SW)SZ 1(BRF)GF2	IN STL DEL ASSM (D-SY)SZ 1(BRF)GF2	IN STL DEL ASSM (D-SW)SZ (BRF)CTB (BR)	IN STL DEL ASSM (D-SY)SZ (BRF)CTB (BR)	REFL PAV MRK TY I (W)8"(SLD) (100MIL)	PAVEMENT SEALER 6*	RE PM W/RET REQ TY I (W)6*(BRK) (100MIL)	RE PM W/RET REQ TY I (W)6*(SLD) (100MIL)	RE PM W/RET REQ TY I (Y)6*(SLD) (100MIL)	REFL PAV MRKR TY II-C-R
	EA	EA	EA	EA	EA	EA	EA	EA	LF	LF	LF	LF	LF	EA
SH 70														
CSJ: 0006-15-038														
BEGIN TO END	3	1	1	2	3	3	4	4	533	720	72	1200	1669	21
CSJ: 0006-15-038 TOTALS	3	1	1	2	3	3	4	4	533	720	72	1200	1669	21
PROJECT TOTALS	3	1	1	2	3	3	4	4	533	720	72	1200	1669	21

SUMMARY OF ILLUMINATION ITEMS											
LOCATION	ITEM 416 6029	ITEM 432 6001	ITEM 610 6004	ITEM 618 6023	ITEM 618 6024	ITEM 618 6025	ITEM 620 6007	ITEM 620 6008	ITEM 624 6002	ITEM 624 6028	
	DRILL SHAFT (RDWY ILL POLE) (30 IN)	RIPRAP (CONC)(4 IN)	RELOCATE RD IL ASM (TRANS-BASE)	CONDT (PVC) (SCH 40) (2")	CONDT (PVC) (SCH 40) (2") (BORE)	CONDT (PVC) (SCH 40) (2") (CONC ENCSE)	ELEC CONDR (NO.8) BARE	ELEC CONDR (NO.8) INSULATED	GROUND BOX TY A (122311)W/APRON	REMOVE GROUND BOX	
	LF	CY	EA	LF	LF	LF	LF	LF	EA	EA	
SH 70											
CSJ: 0006-15-038											
BEGIN TO STA 20+50	16	0.7	2	255		290	560	1120	2	2	
STA 20+50 TO END	16	0.7	2	215	190		420	840		1	
CSJ: 0006-15-038 TOTALS	32	1.4	4	470	190	290	980	1960	2	3	
PROJECT TOTALS	32	1.4	4	470	190	290	980	1960	2	3	

SUMMARY OF TRAFFIC CONTROL ITEMS											
LOCATION	ITEM 508 6001	ITEM 512 6013	ITEM 512 6037	ITEM 545 6005	ITEM 545 6019	ITEM 662 6008	ITEM 662 6037	ITEM 662 6067	ITEM 662 6098	ITEM** 6001 6002	ITEM 6185 6002
	CONSTRUCTING DETOURS	PORT CTB (DES SOURCE) (SGL SLP) (TY 1)	PORT CTB (STKPL) (SGL SLP) (TY 1)	CRASH CUSH ATTEN (REMOVE)	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	WK ZN PAV MRK NON-REMOV (W)6*(SLD)	WK ZN PAV MRK NON-REMOV (Y)6*(SLD)	WK ZN PAV MRK REMOV (W)6*(SLD)	WK ZN PAV MRK REMOV (Y)6*(SLD)	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)
	SY	LF	LF	EA	EA	LF	LF	LF	LF	EA	DAY
SH70											
CSJ: 0006-15-038											
BEGIN TO END	953	870	870	2	2	754	494	136	79		17
CSJ: 0006-15-038 PHASE 1 TOTALS	953	870	870	2	2	754	494	136	79	0	17
CSJ: 0006-15-038											
BEGIN TO END										1	20
CSJ: 0006-15-038 PHASE 2 TOTALS	0	0	0	0	0	0	0	0	0	1	20
CSJ: 0006-15-038											
BEGIN TO END											15
CSJ: 0006-15-038 PHASE 3 TOTALS	0	0	0	0	0	0	0	0	0	0	15
PROJECT TOTALS	953	870	870	2	2	754	494	136	79	1	52



** THE PCMS REQUIRED FOR PHASE 2 SHALL BE USED IN PHASE 3.

SUMMARY OF EROSION CONTROL ITEMS						
LOCATION	ITEM 164 6033	ITEM 168 6001	ITEM 506 6020	ITEM 506 6024	ITEM 506 6041	ITEM 506 6043
	DRILL SEEDING (PERM) (RURAL) (SANDY)	VEGETATIVE WATERING	CONSTRUCTION EXITS (INSTALL) (TY 1)	CONSTRUCTION EXITS (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (12*)	BIODEG EROSN CONT LOGS (REMOVE)
	SY	MG	SY	SY	LF	LF
SH 70						
CSJ: 0006-15-038						
BEGIN TO END			111			
CSJ: 0437-04-034 PHASE 1 TOTALS	0	0.0	111	0	0	0
CSJ: 0006-15-038						
BEGIN TO END	581	3.8	111	222	30	30
CSJ: 0437-04-034 PHASE 2 TOTALS	581	3.8	111	222	30	30
CSJ: 0006-15-038						
BEGIN TO END	9513	61.9	222	222	30	30
CSJ: 0437-04-034 PHASE 3 TOTALS	9513	61.9	222	222	30	30
PROJECT TOTALS	10094	65.7	444	444	60	60

BASIS OF ESTIMATE*					
ITEM	DESCRIPTION	RATE	AREA (SY)	QUANTITY	UNIT
168	6001 VEGETATIVE WATERING	6.5 GAL/SY	10094	65611	GAL

*FOR CONTRACTOR'S INFORMATION ONLY.



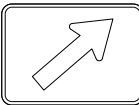




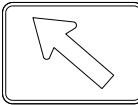
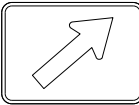

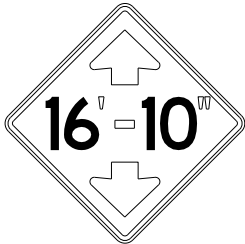
SUMMARY OF DRAINAGE ITEMS			
LOCATION	ITEM 464 6005	ITEM 465 6128	ITEM 467 6394
	RC PIPE (CL III) (24 IN)	INLET (COMPL)(PSL)(FG) (4FTX4FT-4FTX4FT)	SET (TY II) (24 IN) (RCP) (6: 1) (C)
	LF	EA	EA
SH 70			
CSJ: 0006-15-038			
BEGIN TO END	100	1	1
CSJ: 0437-04-034 TOTALS	100	1	1
PROJECT TOTALS	100	1	1

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 Texas Department of Transportation			
SH 70			
QUANTITY SUMMARIES			
SHEET 2 OF 2			
CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	18	

SUMMARY OF SMALL SIGNS

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DATE: 10/12/2023 2:46:13 PM
 FILE: c:\pwworking\centra101\d3297800\SH700TY03.dgn

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)				BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)
							POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION	
							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	PREFABRICATED P = "Plain" T = "T" U = "U"	
		M3-4		24 x 12	X						
		M1-1		24 x 24	X						
		M6-2R		21 x 15	X						
133	1		 	24 x 12 24 x 12	X X						
		M3-2 M3-3	 	24 x 24 24 x 24	X X						
		M1-1 M1-6T	 	21 x 15 21 x 15	X X						
		M6-2L M6-2R									
133	2	W9-2L		36 x 36	X		10BWG	1	SA	P	
133	3	W12-2		36 x 36	X		10BWG	1	SA	P	

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

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.
<http://www.txdot.gov/>

- NOTE:**
- 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.
 - For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS) Standard Sheet.
 - For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD (GEN).



Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: slums16.dgn
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DN: TxDOT
 CONT SECT
 0006 15

CK: TxDOT
 JOB
 038

DW: TxDOT
 HIGHWAY
 SH 70

CR: TxDOT
 SHEET NO.
 19

SUMMARY OF SMALL SIGNS

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DATE: 10/12/2023 2:46:13 PM
 FILE: c:\pwworking\centra101\d3297800\SH700TY03.dgn

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)				BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)
							POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION	
							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	PREFABRICATED P = "Plain" T = "T" U = "U"	
133	4	W9-2R		36 x 36	X		10BWG	1	SA	P	
133	5	W9-2R		84x24	X					BRIDGE MOUNT	S
			NOTE: ENGINEER WILL INFORM THE CONTRACTOR OF THE FINAL VERTICAL CLEARANCE MEASUREMENT PRIOR TO SIGN FABRICATION.								

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

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



Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

SHEET 2 OF 2

FILE: slums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
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REVISIONS	0006	15	038	SH 70
4-16	DIST	COUNTY	SHEET NO.	
8-16	ABL	NOLAN	20	

SEQUENCE OF CONSTRUCTION

PHASE 1 (IH 20 EASTBOUND DETOUR LAYOUT) - CONSTRUCT SH 70 DETOUR ROAD

1. PLACE TRAFFIC CONTROL DEVICES AND ADVANCE WARNING SIGNS, REFER TO TXDOT BC STANDARDS, TCP (2-5)-18, AND IH 20 EASTBOUND DETOUR LAYOUT SHEET.
2. CLOSE SH 70 SOUTHBOUND BRIDGE AND ROADWAY, DETOUR TRAFFIC TO THE IH 20 EASTBOUND FRONTAGE ROAD AS SHOWN ON IH 20 EASTBOUND DETOUR LAYOUT SHEET.
3. IMPLEMENT STORMWATER POLLUTION PREVENTION PLAN (SWP3) AND EROSION CONTROL MEASURES THROUGHOUT PROJECT LIMITS.
4. REMOVE EXISTING PAVEMENT FROM BEGIN LIMITS TO EXISTING NORTH BRIDGE APPROACH ONLY.
5. MAINTAIN EXISTING ILLUMINATION IN OPERATING CONDITION FOR USE THROUGHOUT THIS PHASE. DO NOT DEMO EXISTING ILLUMINATION POLES UNTIL PROPOSED ILLUMINATION IS INSTALLED AND OPERATIONAL.
6. CONSTRUCT TEMPORARY PAVEMENT AS PER SH 70 TCP TEMPORARY PAVEMENT LAYOUT. PLACE PCTB, ETC. AS DIRECTED ON TCP TEMPORARY PAVEMENT LAYOUT. CLOSE RIGHT LANE OF SOUTHBOUND SH 70 TO EASTBOUND IH 20 STARTING AT THE EXISTING GORE.
7. INSTALL TEMPORARY WORK ZONE SPEED LIMIT SIGNS PER BC(3)-21 TO REDUCE WORK ZONE SPEED LIMIT ALONG SH 70 TO 60 MPH. SIGN CW13-1P TO SHOW 40 MPH ADVISORY SPEED LIMIT AS PER TEMPORARY PAVEMENT LAYOUT SHEET.

PHASE 2 (SH 70 TEMPORARY PAVEMENT LAYOUT) - CONSTRUCT PROPOSED BRIDGE AND 50' ROADWAY APPROACHES

1. RESTORE TRAFFIC TO SOUTHBOUND SH 70 UTILIZING DETOUR ROAD CONSTRUCTED IN PREVIOUS PHASE.
2. PLACE TRAFFIC CONTROL DEVICES AND ADVANCED WARNING SIGNS ALONG WESTBOUND IH 20 PER TXDOT BC STANDARDS WHEN REMOVING PORTIONS OF EXISTING BRIDGE SUPERSTRUCTURE AND SUBSTRUCTURE AS SHOWN ON BRIDGE TYPICAL SECTIONS. EXTEND SSCB ALONG RIGHT LANE OF WESTBOUND IH 20 USING TCP (6-1)-12. LIMIT WESTBOUND IH 20 FREEWAY CLOSURE TO NIGHT TIME HOURS BETWEEN 9 P.M AND 5 A.M., REFER TO TXDOT TCP (6-6)-12 AND IH 20 WESTBOUND DETOUR LAYOUT. NO OTHER TYPE OF CLOSURE SHALL BE PERMITTED AT THE SAME TIME AS THE WESTBOUND IH 20 FREEWAY CLOSURE UNLESS APPROVED BY THE ENGINEER. PROVIDE PCMS 5 DAYS PRIOR TO ANY CLOSURES OF WESTBOUND IH 20.
3. CONSTRUCT 50 LF OF PROPOSED ROADWAY APPROACH, APPROACH SLABS, AND BRIDGE IN ACCORDANCE TO THE PLANS AND STANDARDS. PROVIDE LANE CLOSURES ALONG WESTBOUND IH 20 PER TCP(6-1)-12 AS NEEDED. PROVIDE NIGHTLY CLOSURES OF WESTBOUND IH 20 AS NEEDED. REMOVE PCMS FOLLOWING FINAL LANE CLOSURE OF WESTBOUND IH 20.
4. PHASE 2 SHALL BE COMPLETED PRIOR TO STARTING PHASE 3.

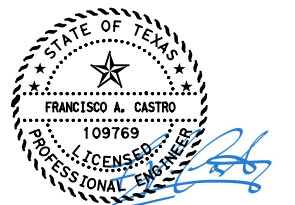
PHASE 3 (IH 20 EASTBOUND DETOUR LAYOUT) - CONSTRUCT ROADWAY APPROACHES

1. PLACE TRAFFIC CONTROL IH 20 EASTBOUND DETOUR SIGNS AND ADVANCE WARNING SIGNS, REFER TO TXDOT BC STANDARDS AND TCP (2-5)-18.
2. CLOSE SH 70 SOUTHBOUND BRIDGE AND ROADWAY, DETOUR TRAFFIC TO THE IH 20 EASTBOUND FRONTAGE ROAD AS SHOWN ON IH 20 EASTBOUND DETOUR LAYOUT SHEET. BEGIN MILESTONE.
3. PLACE TRAFFIC CONTROL DEVICES AND ADVANCED WARNING SIGNS PER TXDOT BC STANDARDS AND IH 20 TCP WESTBOUND DETOUR LAYOUT WHEN REMOVING EXISTING BRIDGE OVER IH 20 WESTBOUND MAINLANES. LIMIT WESTBOUND IH 20 FREEWAY CLOSURE TO NIGHT TIME HOURS BETWEEN 9 P.M AND 5 A.M. REFER TO TXDOT TCP (6-6)-12. NO OTHER TYPE OF CLOSURE SHALL BE PERMITTED AT THE SAME TIME AS THE WESTBOUND IH 20 FREEWAY CLOSURE UNLESS APPROVED BY THE ENGINEER. PROVIDE PCMS 5 DAYS PRIOR TO ANY CLOSURE OF IH 20 WESTBOUND.
4. REMOVE SH 70 SOUTHBOUND SUPERSTRUCTURE AND THE REMAINDER OF THE SUBSTRUCTURE OF THE EXISTING BRIDGE AS SHOWN ON BRIDGE TYPICAL SECTIONS. CONSTRUCT SSCB ALONG LEFT LANE OF WESTBOUND IH 20. PROVIDE LANE CLOSURE PER TCP (6-1)-12. REMOVE PCMS FOLLOWING FINAL LANE CLOSURE OF WESTBOUND IH 20.
5. CONSTRUCT PROPOSED ROADWAY APPROACHES, TIE-INS, MBGF, MOW STRIPS, PERMANENT ILLUMINATION ITEMS AND OUTSTANDING BRIDGE APPURTENANCES IN ACCORDANCE TO THE PLANS AND STANDARDS.
6. CLOSE IH 20 EASTBOUND INSIDE MAIN LANE AND CONSTRUCT GORE AREAS IN ACCORDANCE WITH TCP (6-1)-12.
7. PLACE FINAL PAVEMENT MARKINGS FINAL SIGNS IN ACCORDANCE WITH THE PLANS.
8. REMOVE TRAFFIC CONTROL DEVICES AND RESTORE TRAFFIC TO SH 70. END MILESTONE.
9. REMOVE SWP3 DEVICES, PERFORM FINAL CLEAN UP, AND DEMOBILIZE.

TRAFFIC CONTROL GENERAL NOTES

TRAFFIC CONTROL GENERAL NOTES

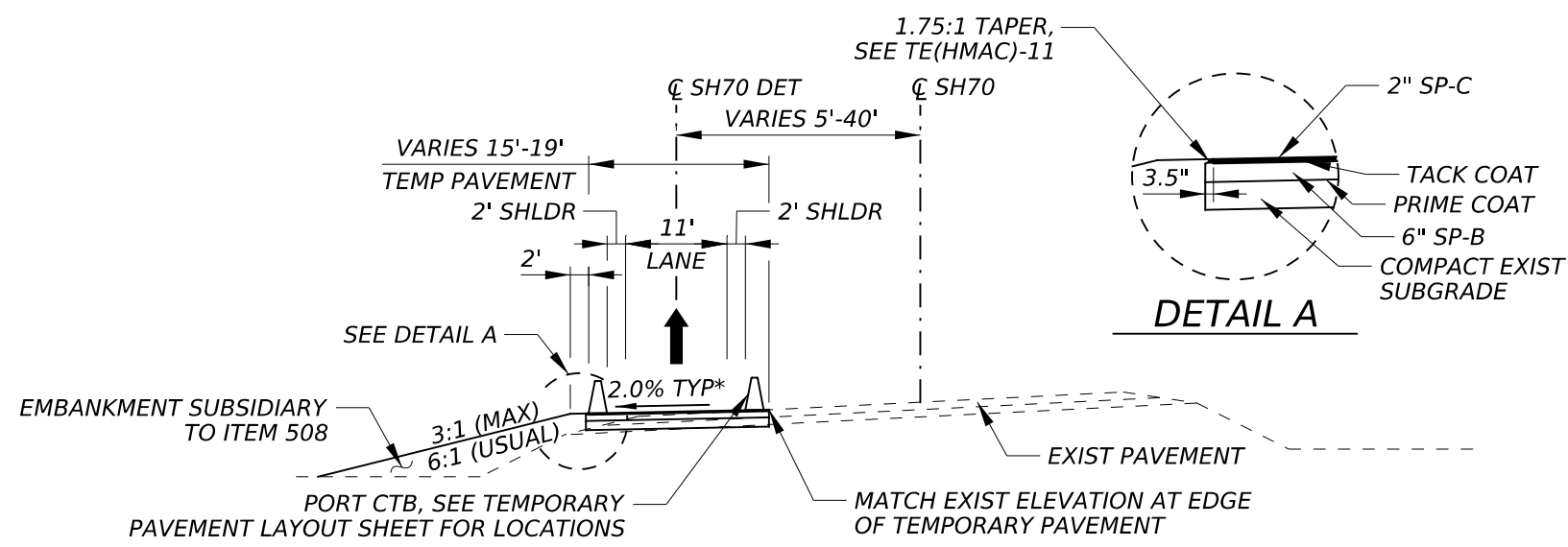
1. ALL SIGNS, BARRICADES, WORK ZONE MARKINGS AND DEVICES AS SHOWN HEREON SHALL BE IN ACCORDANCE WITH THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (T.M.U.T.C.D.), LATEST REVISION.
2. FOR SPACING OF SIGNS AND BARRICADES SEE "BC" AND "TCP" STANDARD SHEETS OR AS DIRECTED BY ENGINEER.
3. BARRICADES, SIGNS, CHANNELIZING DEVICES AND OTHER TRAFFIC HANDLING DEVICES, MAY BE ADJUSTED OR SHIFTED TO FIT FIELD CONDITIONS OR AS REQUIRED FOR CONSTRUCTION AND SET UP, FOR THE VARIOUS PHASES, AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER.
4. ADEQUATE SIGNS AND BARRICADES SHALL BE INSTALLED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER PRIOR TO OPENING ANY SECTION TO TRAFFIC. THE ENGINEER MAY DIRECT THE CONTRACTOR TO FURNISH ADDITIONAL SIGNS, BARRICADES AND CHANNELIZING DEVICES, AS REQUIRED TO MAINTAIN TRAFFIC AND MOTORIST SAFETY DURING CONSTRUCTION. ANY SUCH ADDITIONAL SIGNS AND BARRICADES, ETC. SHALL BE CONSIDERED SUBSIDIARY TO ITEM 502 "BARRICADES, SIGNS, AND TRAFFIC HANDLING".
5. ALL SIGNS, BARRICADES, AND POSTS SHALL BE NEW AND KEPT CLEAN FOR THE DURATION OF THE PROJECTS.
6. IF NIGHT WORK IS REQUIRED, THE CONTRACTOR SHALL MAINTAIN ADEQUATE LIGHTING DURING CONSTRUCTION. A LIGHTING PLAN MUST BE SUBMITTED AND APPROVED BY THE ENGINEER PRIOR TO CONSTRUCTION. LIGHTING NEEDED TO PERFORM WORK SHALL NOT BE PAID FOR DIRECTLY AND SHOULD BE CONSIDERED SUBSIDIARY TO ITEM 502.
7. ALL ARROW BOARDS ARE SUBSIDIARY TO ITEM 502.
8. THE CONTRACTOR SHALL PROVIDE FOR SAFE AND CONVENIENT INGRESS AND EGRESS TO ABUTTING PROPERTY, HIGHWAY, PUBLIC ROAD, AND STREET CROSSINGS WITHIN PROJECT LIMITS AT ALL TIMES. CONTRACTOR SHALL COORDINATE HIGH WORK ACTIVITIES TO MINIMIZE ANY INCONVENIENCE TO THE PUBLIC.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MARKING THE LOCATION OF ALL TRAFFIC CONTROL STRIPING AND PERMANENT STRIPING AS DIRECTED BY THE ENGINEER.
10. PERMANENT STRIPING SHALL THEN BE PLACED IN ACCORDANCE WITH ALL APPLICABLE STANDARDS.
11. SAW CUTS SHALL BE USED AT ALL LONGITUDINAL AND TRANSVERSE JOINTS FOR PAVEMENT WIDENINGS AND ROADWAY OBLITERATIONS.
12. ALL LONGITUDINAL JOINTS SHALL BE CONSTRUCTED ACCORDING TO DISTRICT APPROVED ASPHALT STANDARD.
13. THE CONTRACTOR MAY SUBMIT AN ALTERNATE TCP AND/OR AN ALTERNATE SEQUENCE OF CONSTRUCTION, IN ADVANCED AND IN WRITING, SUBJECT TO THE APPROVAL OF THE ENGINEER. ALL PCTB SHALL BE USED IN ACCORDANCE WITH THE PLANS AND MANUFACTURER'S RECOMMENDATIONS AND SHALL HAVE TY "C" DELINEATOR AS SHOWN ON BC(7)-13.
14. REFER TO PROJECT GENERAL NOTES FOR SPECIFIC MILESTONES AND OTHER REQUIREMENTS.
15. THE CONTRACTOR SHALL MAINTAIN EXISTING DRAINAGE FACILITIES UNTIL THOSE FACILITIES ARE REPLACED BY PERMANENT CONSTRUCTION OR THEIR FLOWS ARE REROUTED.



10-13-2023

NO.	DATE	REVISION	APPR BY
 HDR Engineering, Inc. Firm Registration No. F-754 17111 Preston Road, Suite 300 Dallas, Texas 75248 972.960.4400			
 Texas Department of Transportation			
<h1>SH 70</h1> <h2>TRAFFIC CONTROL NARRATIVE</h2>			
SHEET 1 OF 1			
CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	21	

- NOTES:
1. REFER TO TCP NARRATIVE AND TRAFFIC CONTROL PLAN SHEETS FOR ADDITIONAL INFORMATION.
 2. TEMPORARY PAVEMENT AND ALL ITEMS NEEDED FOR TEMPORARY PAVEMENT CONSTRUCTION SHALL BE PAID FOR UNDER ITEM 508 CONSTRUCTING DETOURS.

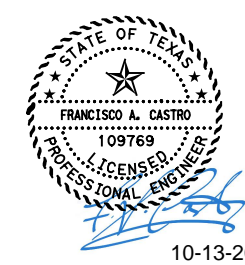


**PROPOSED SH 70 TEMPORARY PAVEMENT
TYPICAL SECTION**

STA 11+48.79 TO 16+40.00

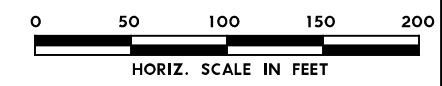
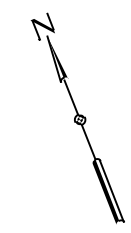
*SEE TCP TEMPORARY PAVEMENT LAYOUT SHEET FOR ADDITIONAL INFORMATION.

NOTE: SEE BRIDGE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION ON EXISTING BRIDGE REMOVAL.



10-13-2023

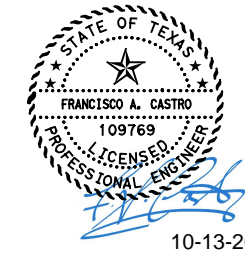
HDR		HDR Engineering, Inc. Firm Registration No. F-754 17111 Preston Road, Suite 300 Dallas, Texas 75248 972.960.4400	
 Texas Department of Transportation			
<h2>SH 70</h2>			
TRAFFIC CONTROL PLAN SH 70 TEMPORARY PAVEMENT TYPICAL SECTIONS			
SCALE: N.T.S.		SHEET 1 OF 1	
CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	22	



LEGEND

- CONSTRUCTION AREA
- PROP TRAFFIC FLOW
- EXIST TRAFFIC FLOW
- PCTB
- CHANNELIZING DEVICE
- TY III BARRICADE
- WK ZN PAV MRK REMOV (W)6"(SLD)
- WK ZN PAV MRK REMOV (Y)6"(SLD)
- WK ZN PAV MRK NON-REMOV (W)6"(SLD)
- WK ZN PAV MRK NON-REMOV (Y)6"(SLD)

- NOTES:**
- TRAFFIC CONTROL PLANS SHALL CONFORM TO THE CURRENT TXDOT STANDARDS AND THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD).
 - SEE BC AND TCP STANDARD SHEETS FOR SIGN SPACING AND MORE INFORMATION ON ADVANCE WARNING SIGNS.
 - ADVANCE WARNING SIGNS SHALL REMAIN UNTIL COMPLETION OF THE WORK.
 - THE ONSITE DETOUR HAS A DESIGN SPEED OF 40 MPH.
 - SEE BRIDGE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION ON EXISTING BRIDGE REMOVAL.
 - CONTRACTOR SHALL VERIFY LOCATIONS OF EXISTING UTILITIES BEFORE ANY TYPE OF CONSTRUCTION. PROTECT IN PLACE ALL EXISTING UTILITIES UNLESS NOTED OTHERWISE.



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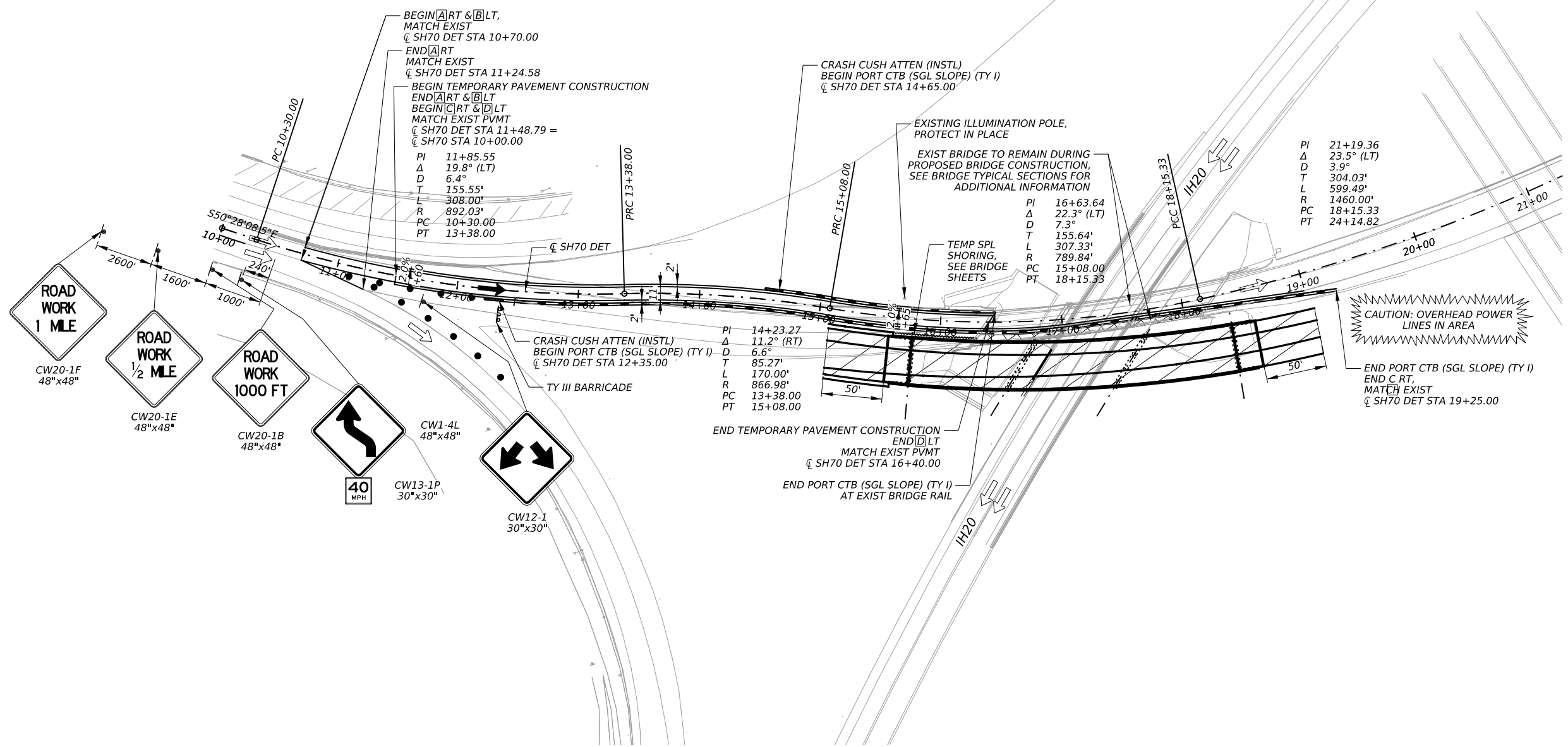
Texas Department of Transportation

SH 70

TRAFFIC CONTROL PLAN
 TEMPORARY PAVEMENT LAYOUT

SCALE: 1"=100' SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	23	

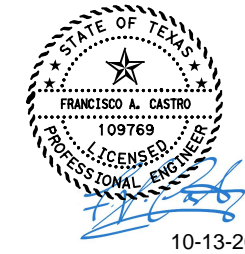




LEGEND

- WORK ZONE
- PROP TRAFFIC FLOW
- DETOUR ROUTE

NOTES:
1. REFER TO TXDOT STANDARD TCP (6-1)-12 FOR ADDITIONAL INFORMATION.



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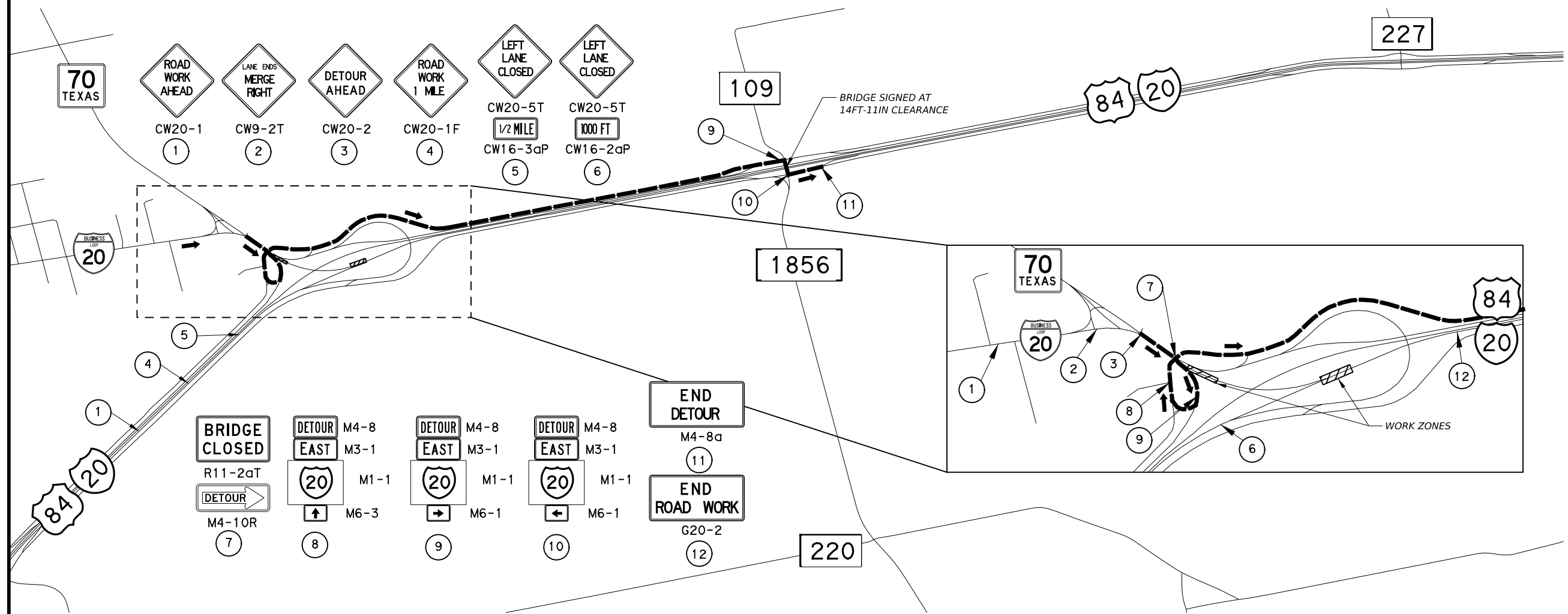
Texas Department of Transportation

SH 70

TRAFFIC CONTROL PLAN
IH 20 EASTBOUND
DETOUR LAYOUT

SCALE: N.T.S. SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	24	



70 TEXAS

ROAD WORK AHEAD
CW20-1
1

LANE ENDS MERGE RIGHT
CW9-2T
2

DETOUR AHEAD
CW20-2
3

ROAD WORK 1 MILE
CW20-1F
4

LEFT LANE CLOSED
1/2 MILE
CW20-5T
CW16-3aP
5

LEFT LANE CLOSED
1000 FT
CW20-5T
CW16-2aP
6

109

BRIDGE SIGNED AT 14FT-11IN CLEARANCE

227

84 20

1856

70 TEXAS

84 20

BRIDGE CLOSED
R11-2aT

DETOUR
M4-10R
7

DETOUR EAST
M4-8
M3-1
M1-1
M6-3
8

DETOUR EAST
M4-8
M3-1
M1-1
M6-1
9

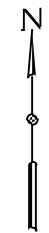
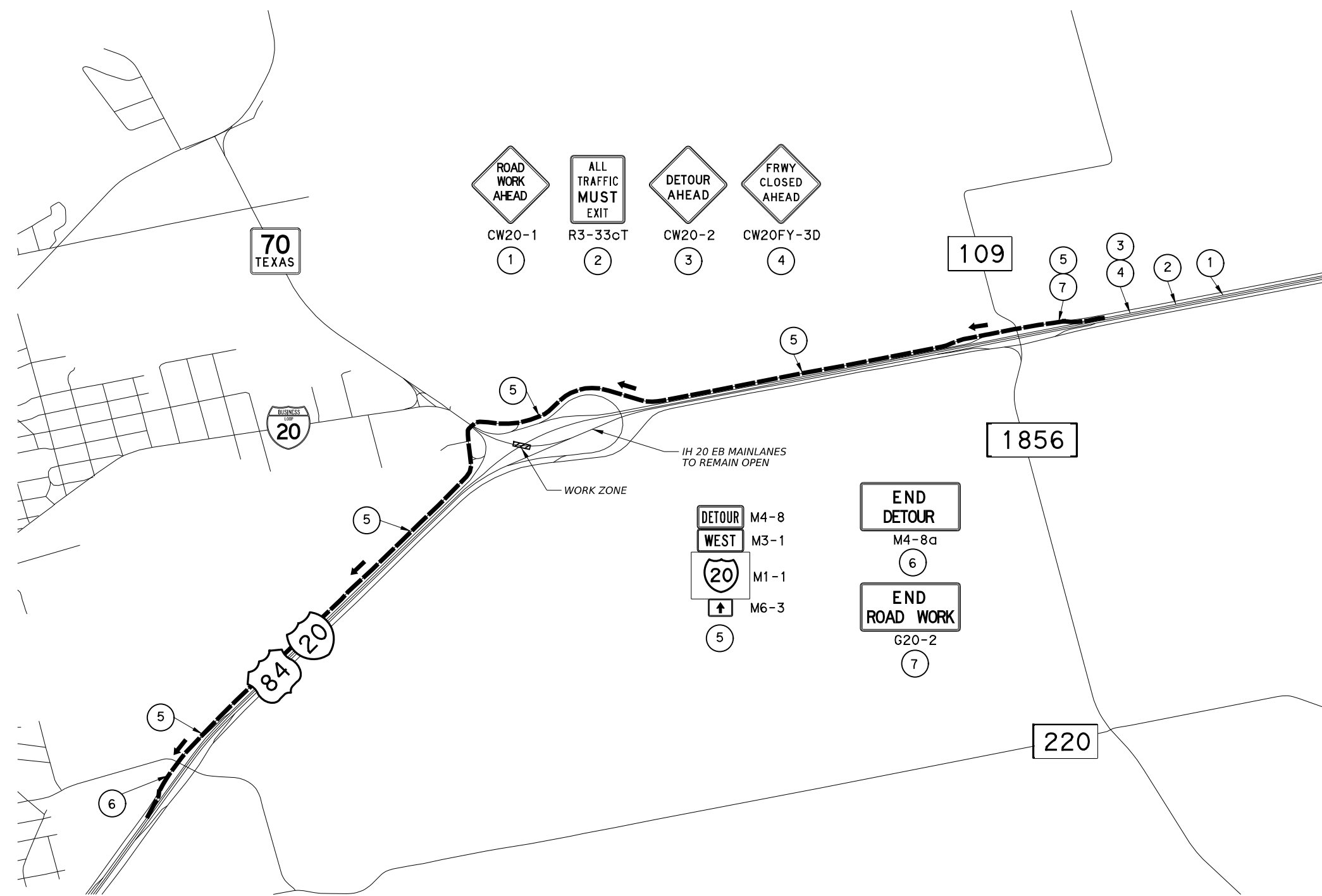
DETOUR EAST
M4-8
M3-1
M1-1
M6-1
10

END DETOUR
M4-8a
11

END ROAD WORK
G20-2
12

220

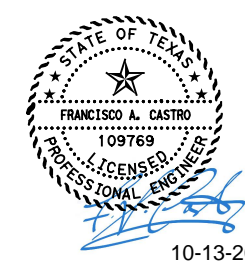
WORK ZONES



LEGEND

- WORK ZONE
- PROP TRAFFIC FLOW
- DETOUR ROUTE

NOTES:
 1. REFER TO TXDOT STANDARD TCP (6-6)-12 FOR ADDITIONAL INFORMATION.

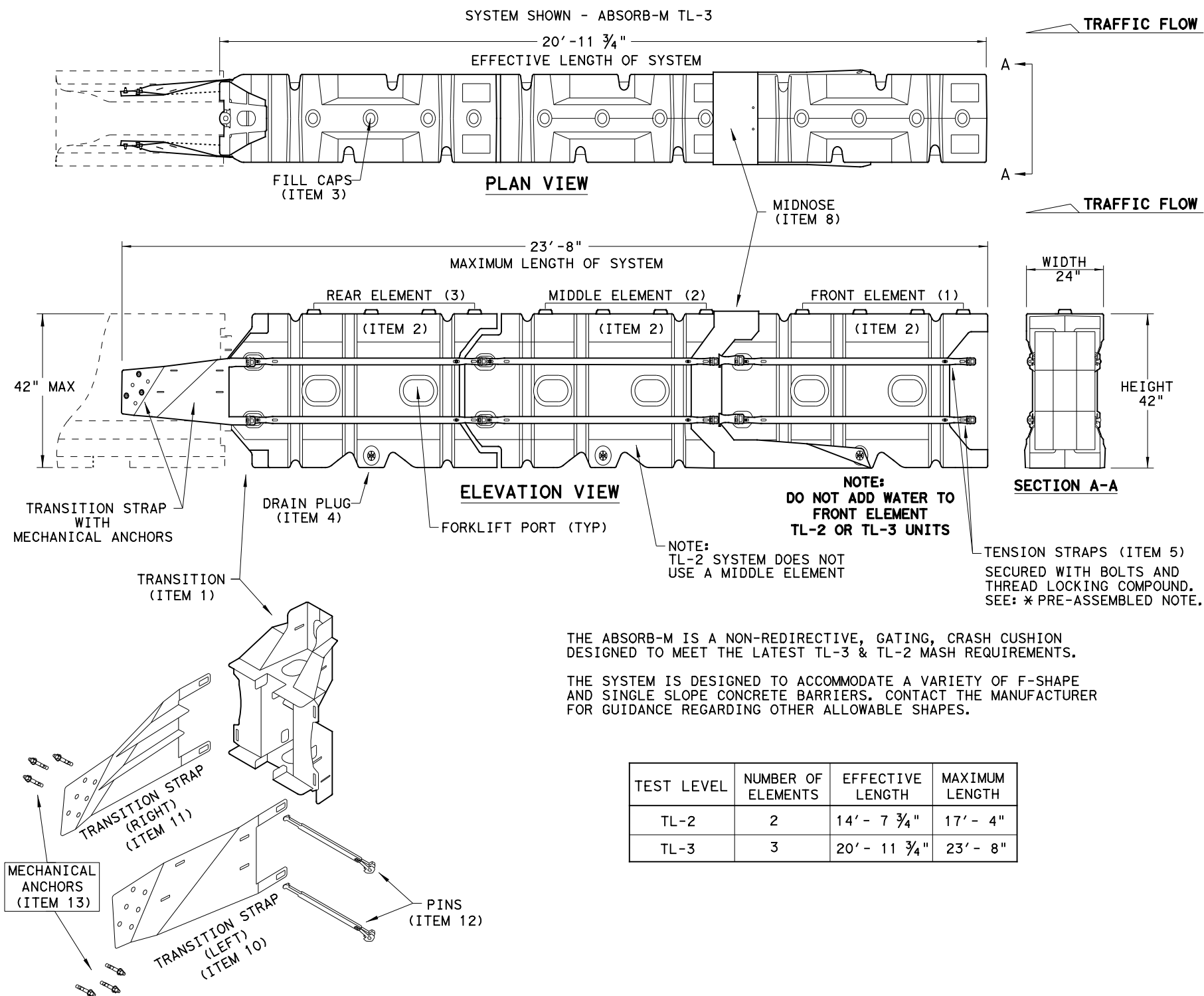


10-13-2023

		HDR Engineering, Inc Firm Registration No. F-754 1711 Preston Road, Suite 300 Dallas, Texas 75248 972.960.4400	
SH 70			
TRAFFIC CONTROL PLAN			
IH 20 WESTBOUND			
DETOUR LAYOUT			
SCALE: N.T.S		SHEET 1 OF 1	
CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	25	

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

DATE: 10/12/2023
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THE ABSORB-M IS A NON-REDIRECTIVE, GATING, CRASH CUSHION DESIGNED TO MEET THE LATEST TL-3 & TL-2 MASH REQUIREMENTS.

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

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

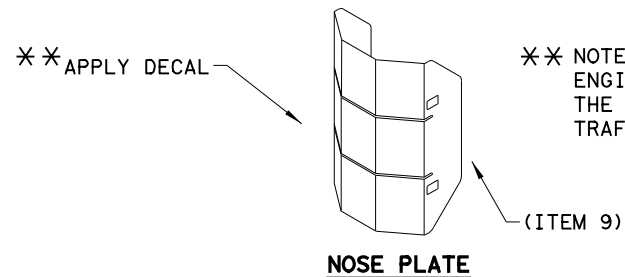
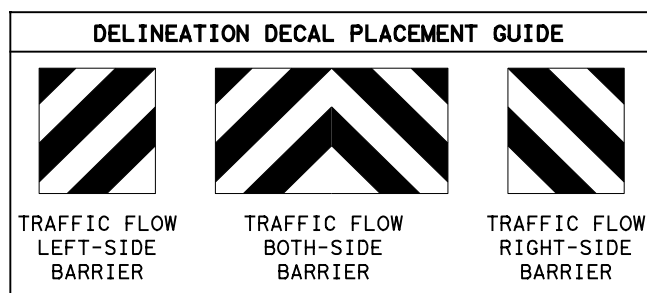
GENERAL NOTES

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

BILL OF MATERIALS (BOM) ABSORB-M TL-3 & TL-2 SYSTEMS

ITEM #	PART NUMBER	PART DESCRIPTION	QTY	
			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



** 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	0006	15	038	SH 70
	DIST	COUNTY	SHEET NO.	
	ABL	NOLAN	27	

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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).

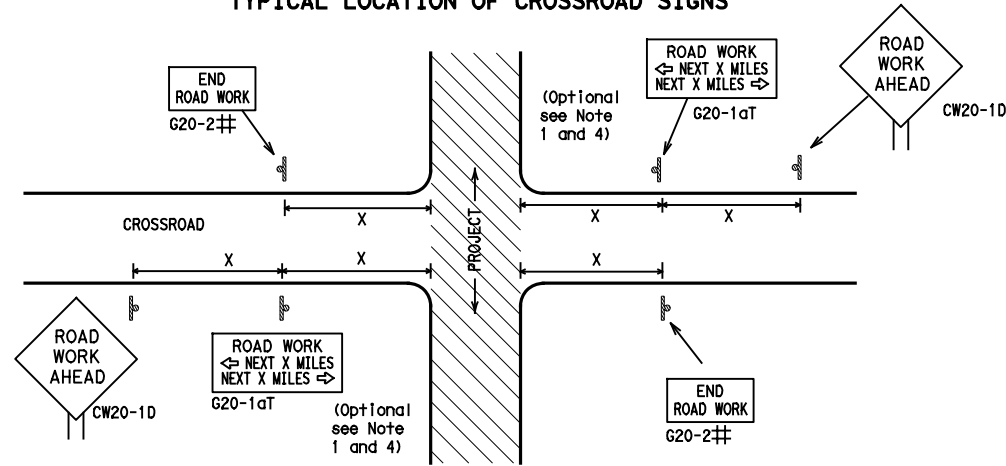
THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS) "
STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)
TEXAS 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			
FILE: bc-21.dgn	DN: TxDOT	CR: TxDOT	DW: TxDOT
© TxDOT November 2002	CONT	SECT	HIGHWAY
	0006	15	038
4-03 7-13			SH 70
9-07 8-14	DIST	COUNTY	SHEET NO.
5-10 5-21	ABL	NOLAN	28

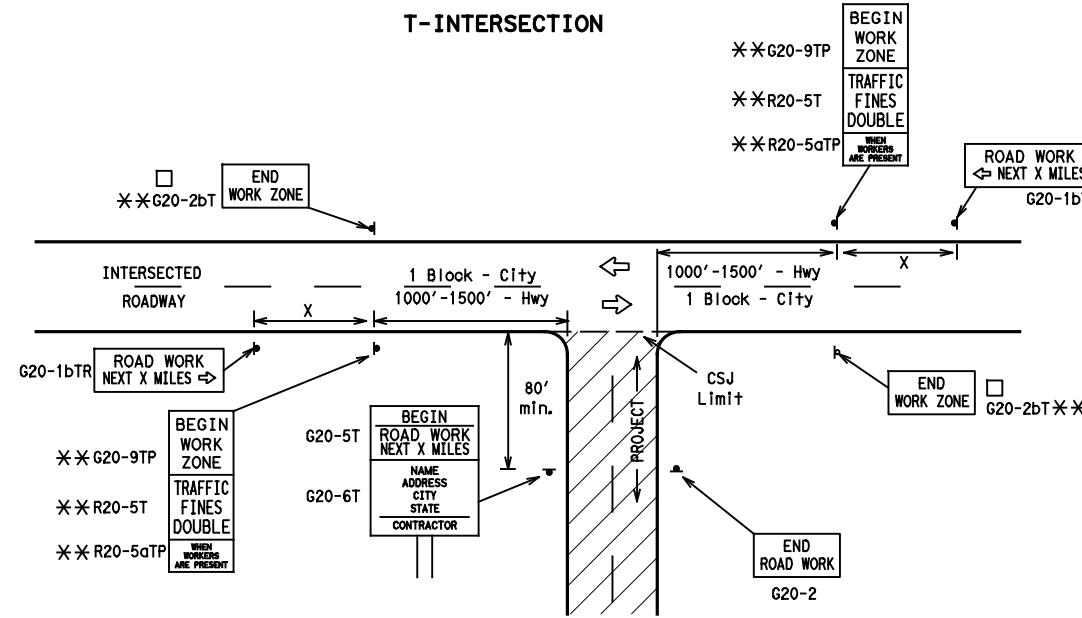
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TYPICAL LOCATION OF CROSSROAD SIGNS



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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING^{1,5,6}

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

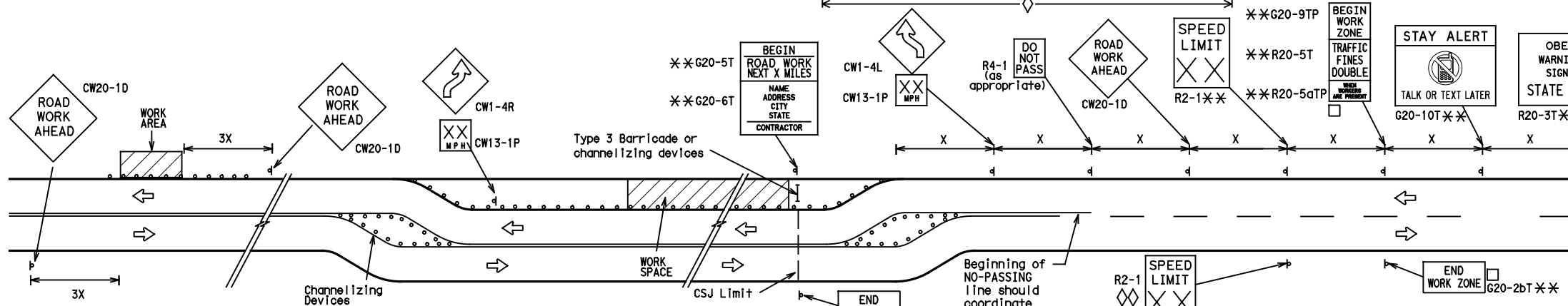
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

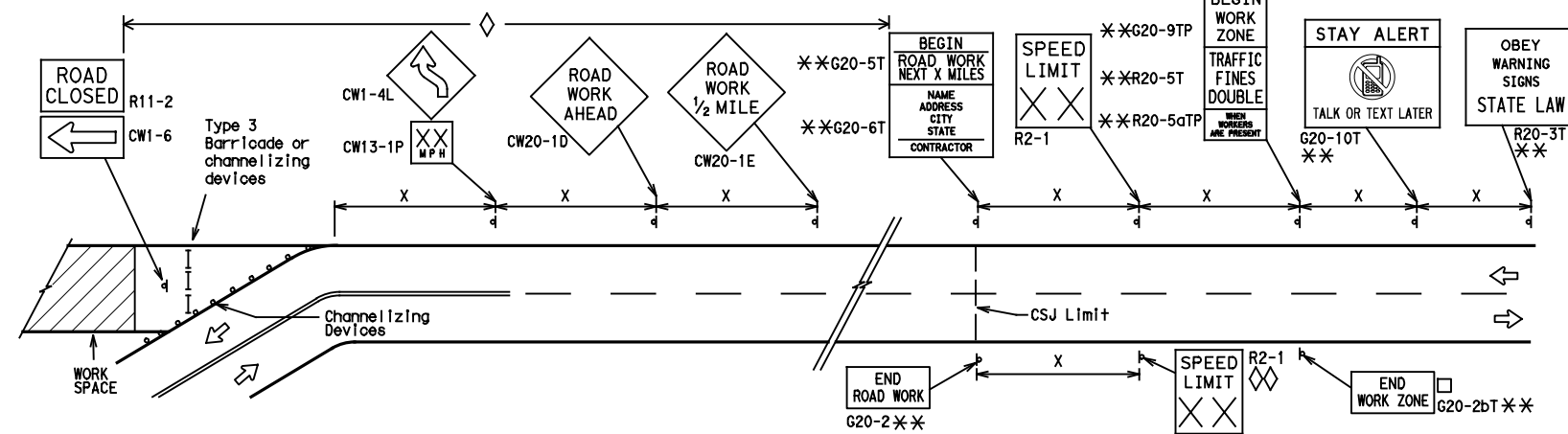
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

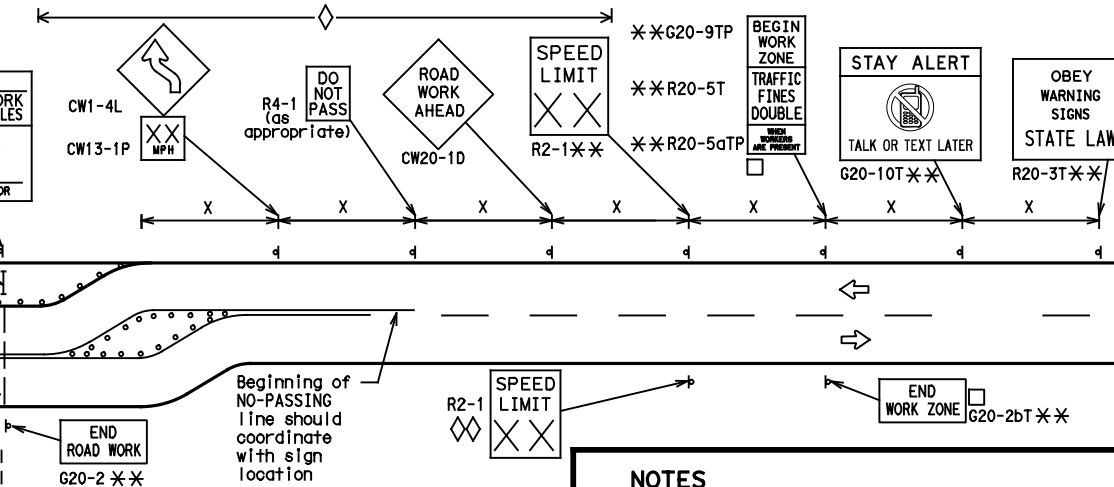


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD" (CW20-1D) signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

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



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



NOTES

- The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES" (G20-5T) sign for each specific project. This distance shall replace the "X" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.
- The "BEGIN WORK ZONE" (G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.
 - 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.

SHEET 2 OF 12



BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

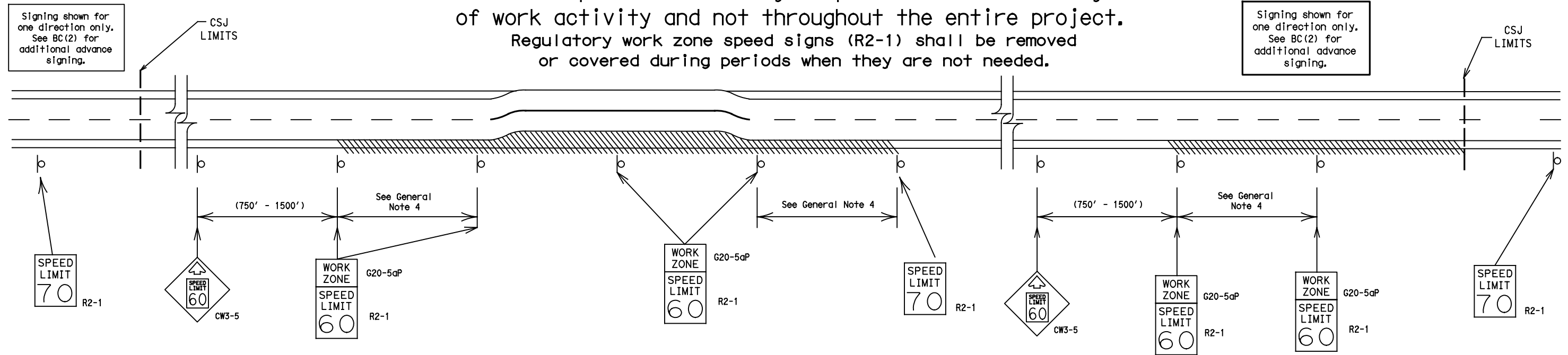
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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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:

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

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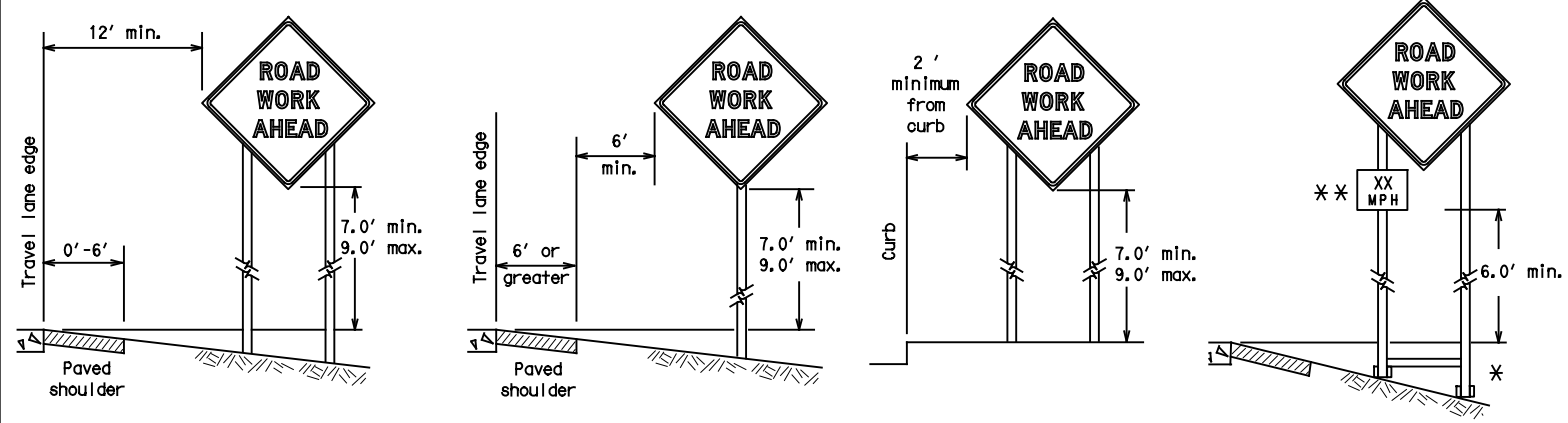
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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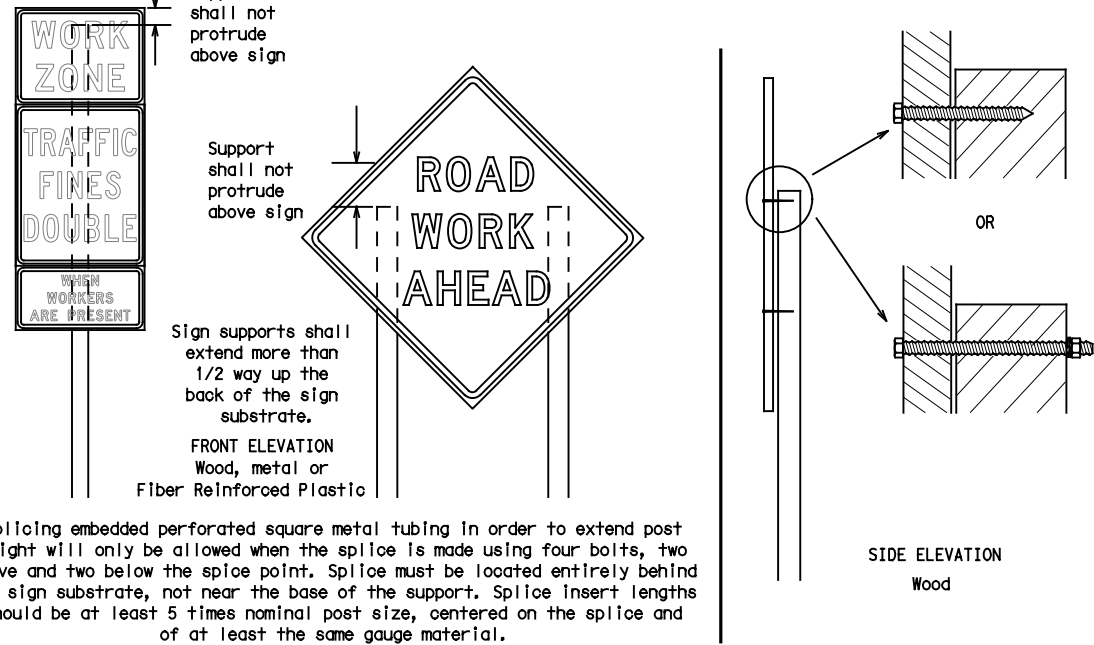
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



* 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



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

GENERAL NOTES FOR WORK ZONE SIGNS

- Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
- Wooden sign posts shall be painted white.
- Barriades shall NOT be used as sign supports.
- All signs shall be installed in accordance with the plans or as directed by the Engineer. Signs shall be used to regulate, warn, and guide the traveling public safely through the work zone.
- The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish other work zone signs that are shown in the TMUTCD but may have been omitted from the plans. Any variation in the plans shall be documented by written agreement between the Engineer and the Contractor's Responsible Person. All changes must be documented in writing before being implemented. This can include documenting the changes in the Inspector's TxDOT diary and having both the Inspector and Contractor initial and date the agreed upon changes.
- The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD) 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.
- The Contractor is responsible for installing signs on approved supports and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
- Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1 inch.
- The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

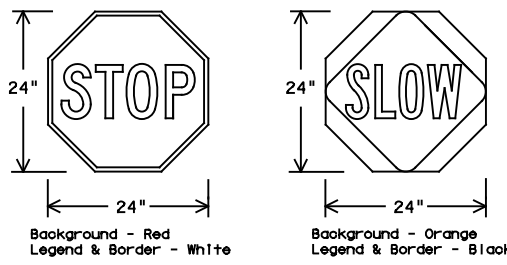
- Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects shall not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

FLAGS ON SIGNS

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

STOP/SLOW PADDLES

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



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

- 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.
- 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.
- When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
- If existing signs are to be relocated on their original supports, they shall be installed on crashworthy bases as shown on the SMD Standard sheets. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards. This work should be paid for under the appropriate pay item for relocating existing signs.
- If permanent signs are to be removed and relocated using temporary supports, the Contractor shall use crashworthy supports as shown on the BC 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.
- 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.



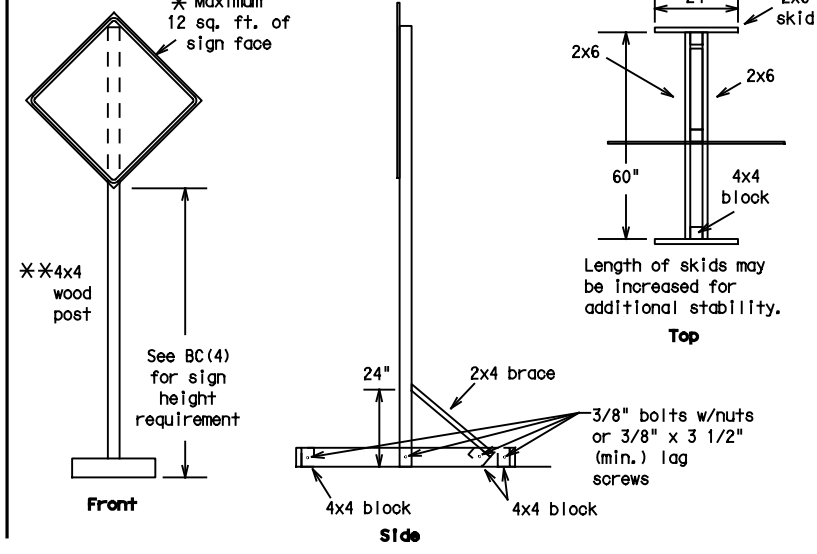
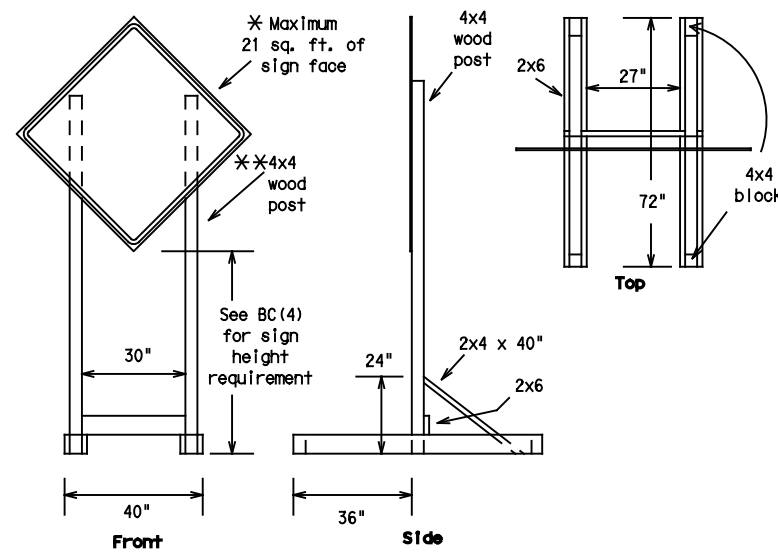
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

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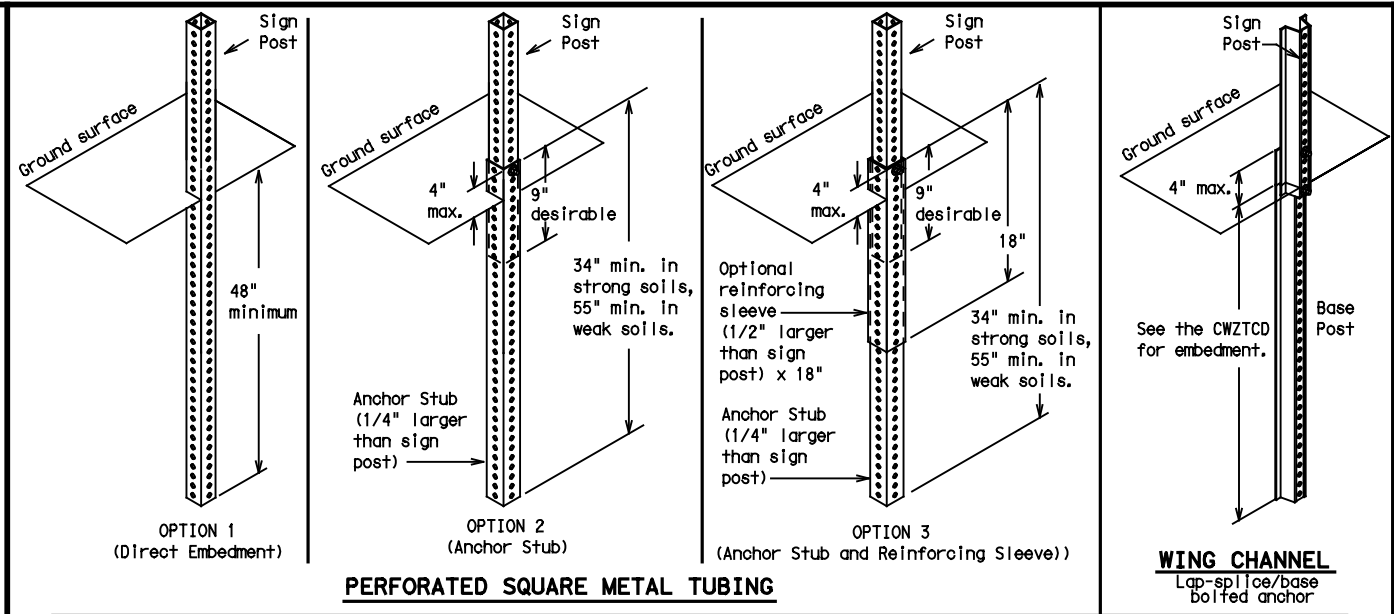
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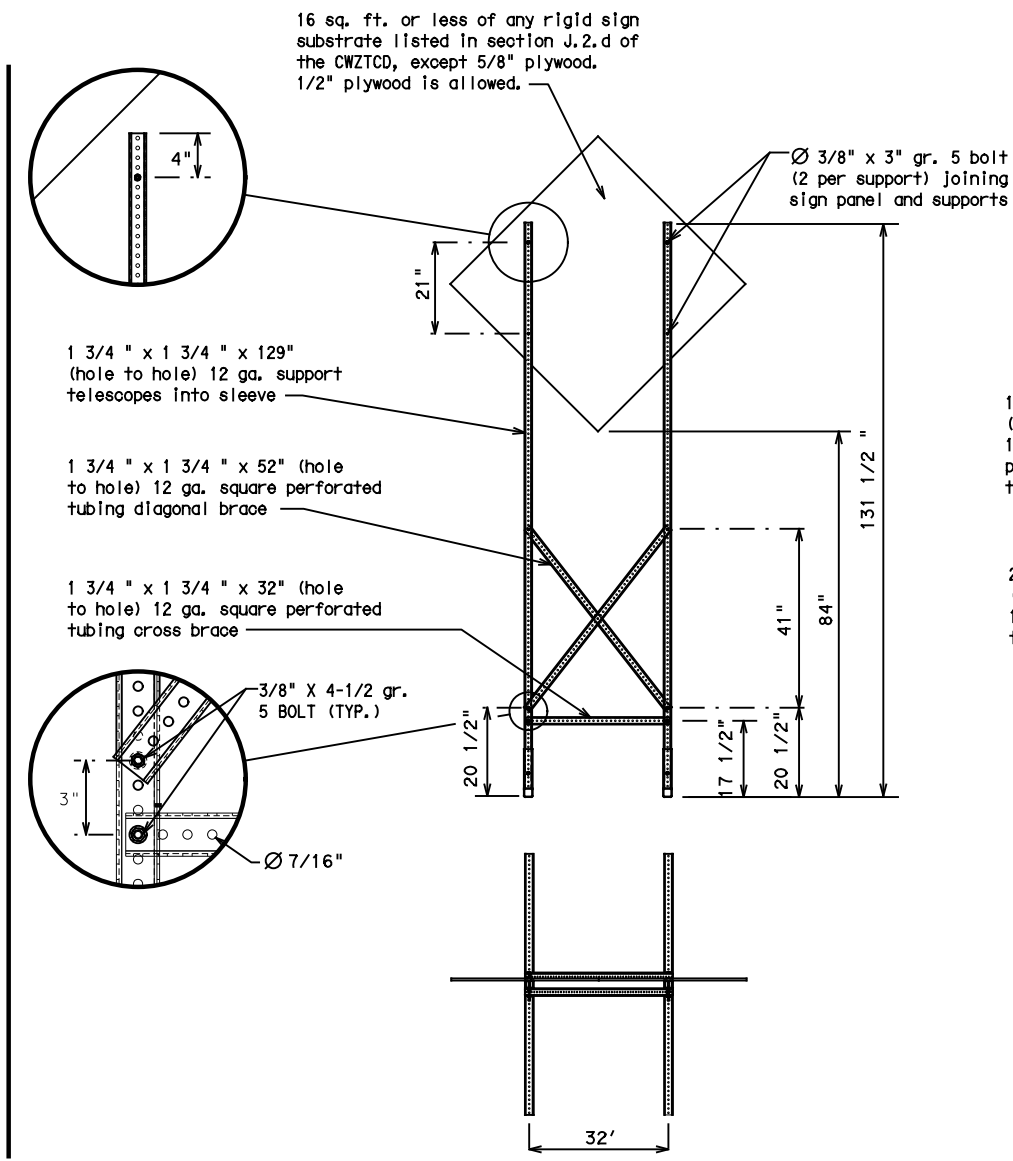
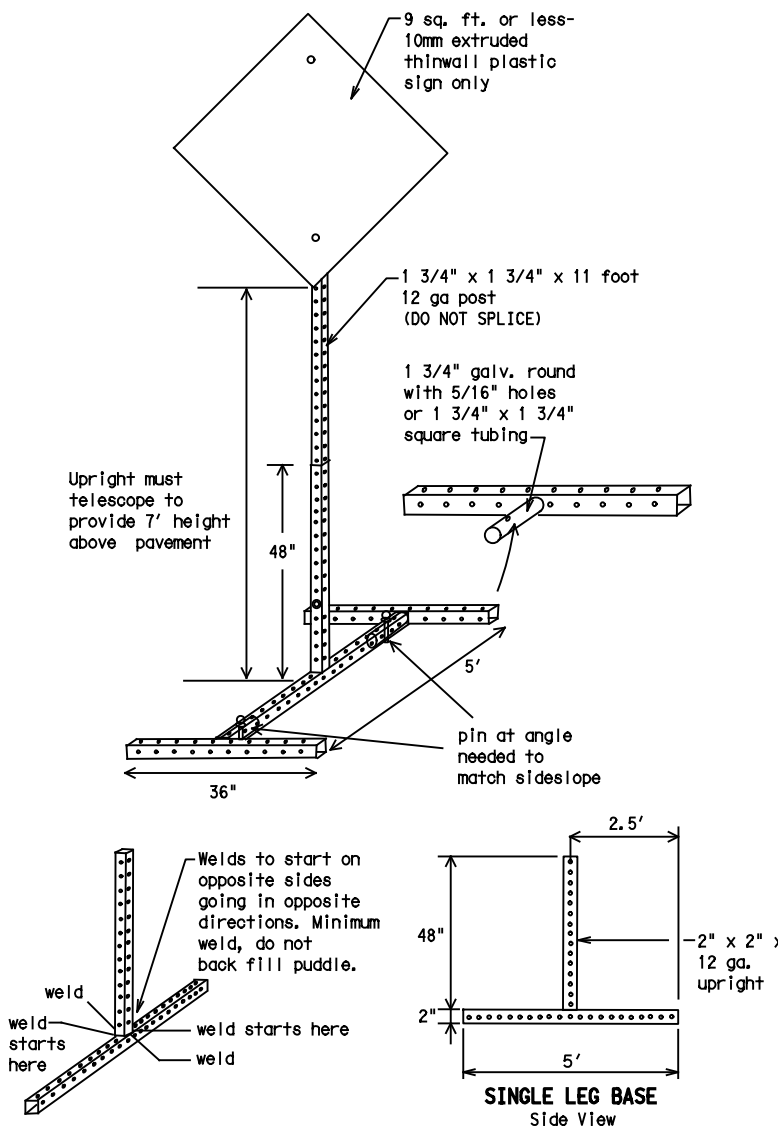
SKID MOUNTED WOOD SIGN SUPPORTS

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



GROUND MOUNTED SIGN SUPPORTS

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



SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

* 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**
- Nails may be used in the assembly of wooden sign supports, but 3/8" bolts with nuts or 3/8" x 3 1/2" lag screws must be used on every joint for final connection.
 - No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
 - When project is completed, all sign supports and foundations shall be removed from the project site. This will be considered subsidiary to Item 502.
- * See BC(4) for definition of "Work Duration."
 - ** Wood sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.
 - See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

SHEET 5 OF 12



BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

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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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

FREEWAY CLOSED X MILE
ROAD CLOSED AT SH XXX
ROAD CLSD AT FM XXXX
RIGHT X LANES CLOSED
CENTER LANE CLOSED
NIGHT LANE CLOSURES
VARIOUS LANES CLOSED
EXIT CLOSED
MALL DRIVEWAY CLOSED
XXXXXXXX BLVD CLOSED

Other Condition List

FRONTAGE ROAD CLOSED
SHOULDER CLOSED XXX FT
RIGHT LN CLOSED XXX FT
RIGHT X LANES OPEN
DAYTIME LANE CLOSURES
I-XX SOUTH EXIT CLOSED
EXIT XXX CLOSED X MILE
RIGHT LN TO BE CLOSED
X LANES CLOSED TUE - FRI
ROADWORK XXX FT
FLAGGER XXXX FT
RIGHT LN NARROWS XXXX FT
MERGING TRAFFIC XXXX FT
LOOSE GRAVEL XXXX FT
DETOUR X MILE
ROADWORK PAST SH XXXX
BUMP XXXX FT
TRAFFIC SIGNAL XXXX FT
ROAD REPAIRS XXXX FT
LANE NARROWS XXXX FT
TWO-WAY TRAFFIC XX MILE
CONST TRAFFIC XXX FT
UNEVEN LANES XXXX FT
ROUGH ROAD XXXX FT
ROADWORK NEXT FRI-SUN
US XXX EXIT X MILES
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
DETOUR NEXT X EXITS
USE EXIT XXX
STAY ON US XXX SOUTH
TRUCKS USE US XXX N
WATCH FOR TRUCKS
EXPECT DELAYS
REDUCE SPEED XXX FT
USE OTHER ROUTES
STAY IN LANE *

Location List

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

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

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

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

SHEET 6 OF 12

<h3>BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)</h3>			
<h2>BC (6) - 21</h2>			
FILE:	bc-21.dgn	DN:	TxDOT
© TxDOT	November 2002	CR:	TxDOT
REVISIONS	0006 15	DW:	TxDOT
9-07	8-14	CR:	TxDOT
7-13	5-21	DW:	TxDOT
CONT	SECT	JOB	HIGHWAY
		038	SH 70
DIST	COUNTY	SHEET NO.	
ABL	NOLAN		33

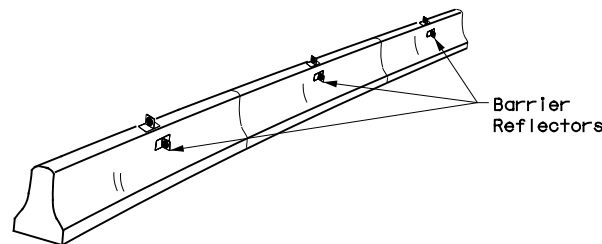
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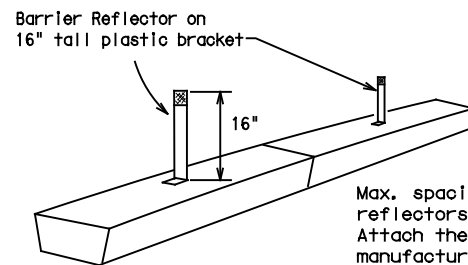
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- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
- Color of Barrier Reflectors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



CONCRETE TRAFFIC BARRIER (CTB)

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

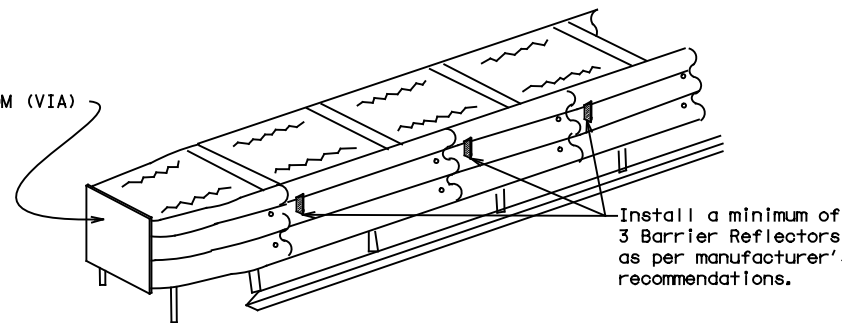


LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

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

LOW PROFILE CONCRETE BARRIER (LPCB)



DELINEATION OF END TREATMENTS

END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS

WARNING LIGHTS

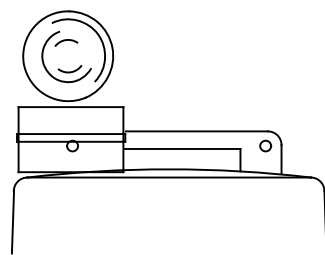
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

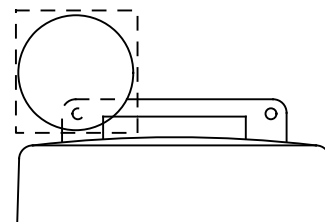
- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- A series of sequential flashing warning lights placed on channelizing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

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

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



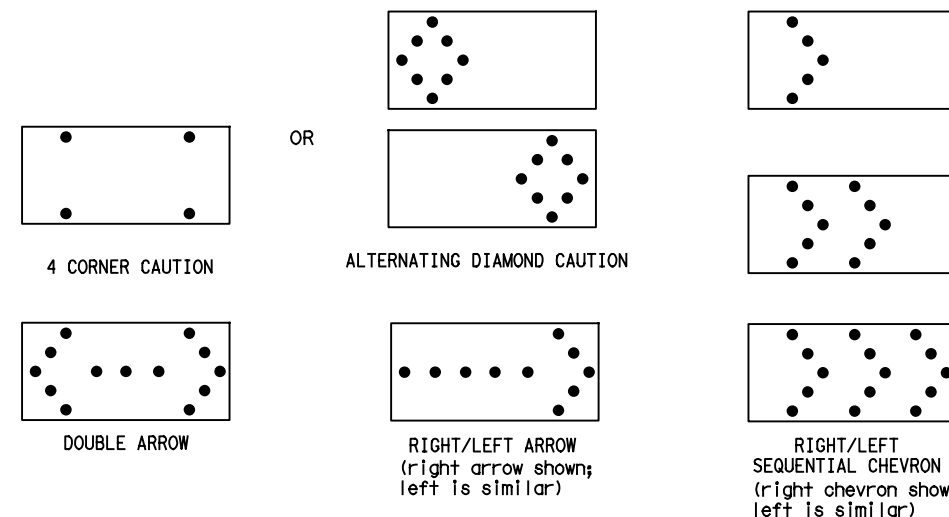
Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.



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

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

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



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

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

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

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

FLASHING ARROW BOARDS

SHEET 7 OF 12

TRUCK-MOUNTED ATTENUATORS

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



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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CR: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0006	15	038	SH 70
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	ABL	NOLAN	34	

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

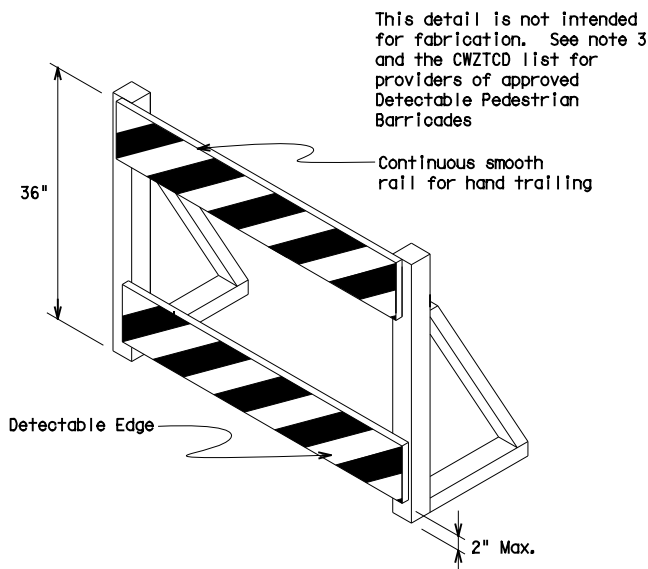
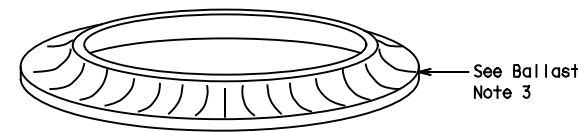
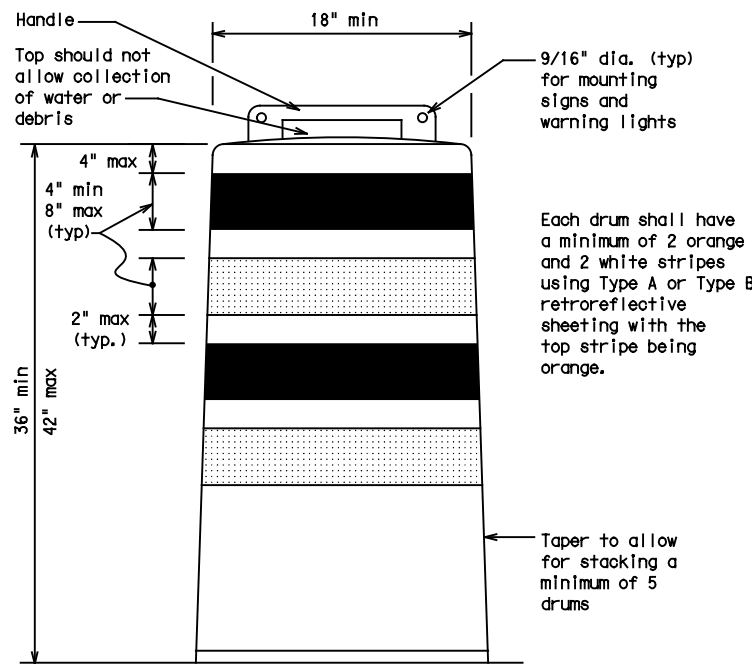
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

RETROREFLECTIVE SHEETING

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

BALLAST

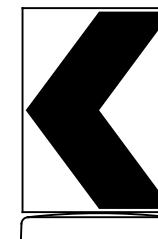
- Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other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



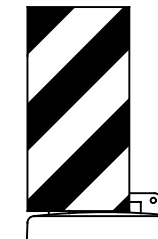
This detail is not intended for fabrication. See note 3 and the CWZTCD list for providers of approved Detectable Pedestrian Barricades

DETECTABLE PEDESTRIAN BARRICADES

- When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility. Refer to WZ(BTS-2) for Pedestrian Control requirements for Sidewalk Diversions, Sidewalk Detours and Crosswalk Closures.
- 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.
- Detectable pedestrian barricades similar to the one pictured above, longitudinal channelizing devices, some concrete barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian path.
- Tape, rope, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines (ADAAG)" and should not be used as a control for pedestrian movements.
- Warning lights shall not be attached to detectable pedestrian barricades.
- Detectable pedestrian barricades 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

- Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
- Chevrons and other work zone signs with an orange background shall be manufactured with Type B_{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.
- 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.
- Other sign messages (text or symbolic) may be used as approved by the Engineer. Sign dimensions shall not exceed 18 inches in width or 24 inches in height, except for the R9 series signs discussed in note 8 below.
- Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
- Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
- Chevrons may be placed on drums on the outside of curves, on merging tapers or on shifting tapers. When used in these locations, they may be placed on every drum or spaced not more than on every third drum. A minimum of three (3) should be used at each location called for in the plans.
- R9-9, R9-10, R9-11 and R9-11a Sidewalk Closed signs which are 24 inches wide may be mounted on plastic drums, with approval of the Engineer.

SHEET 8 OF 12

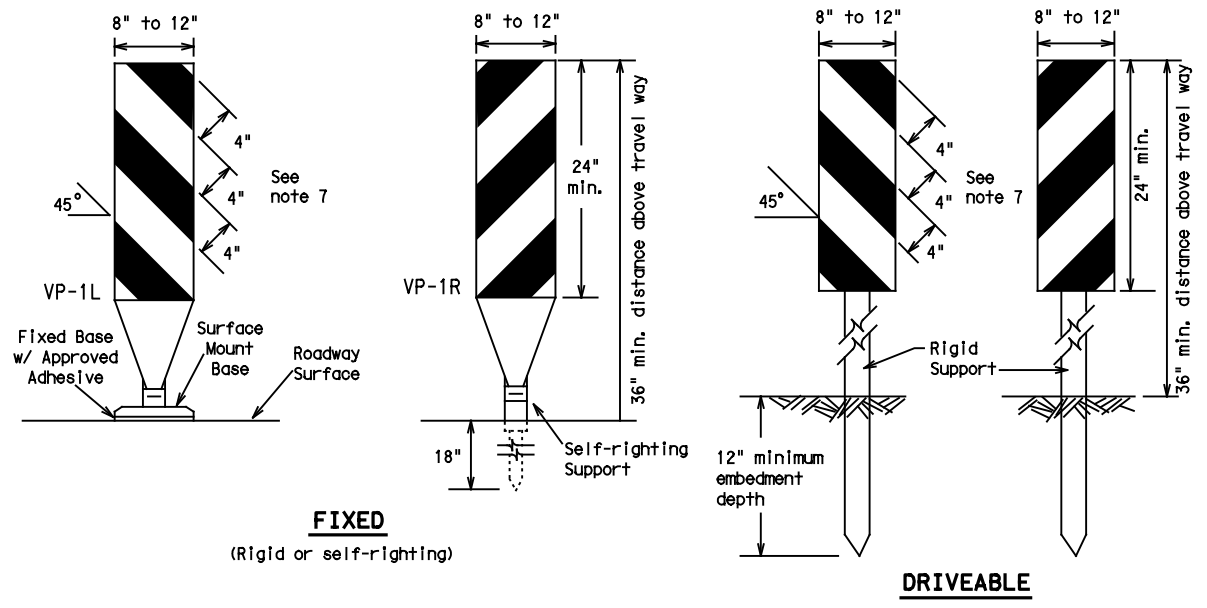


BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

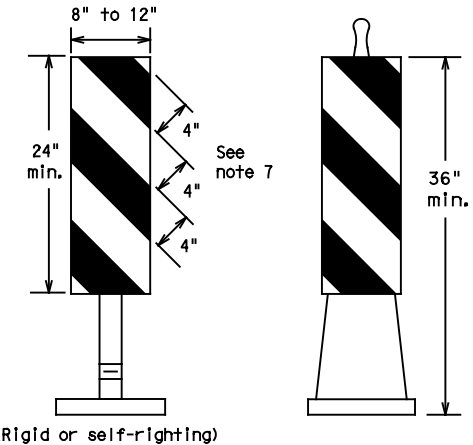
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© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0006	15	038	SH 70				
4-03	8-14	DIST	COUNTY	SHEET NO.					
9-07	5-21	ABL	NOLAN	35					
7-13									

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FIXED
(Rigid or self-righting)

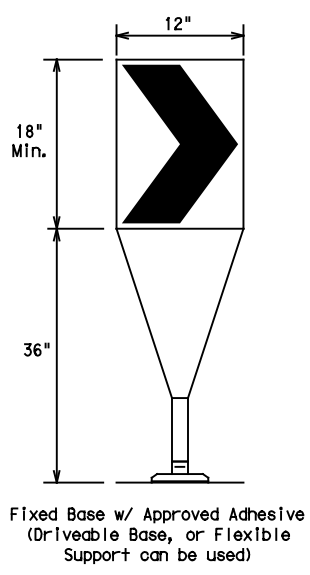
DRIVEABLE



PORTABLE

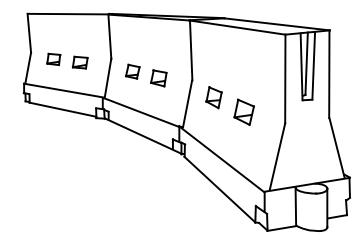
VERTICAL PANELS (VPs)

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



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

CHEVRONS



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

GENERAL NOTES

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

Posted Speed	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices	
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent
30	L = WS 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



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (9) -21

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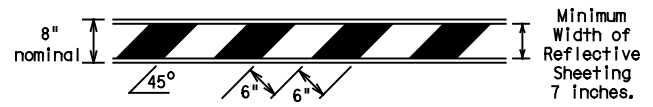
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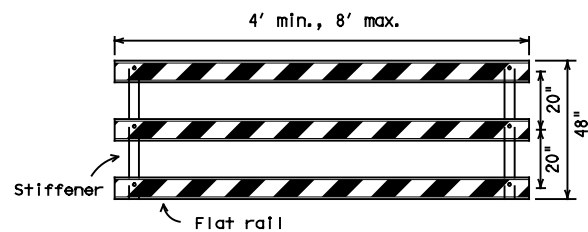
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



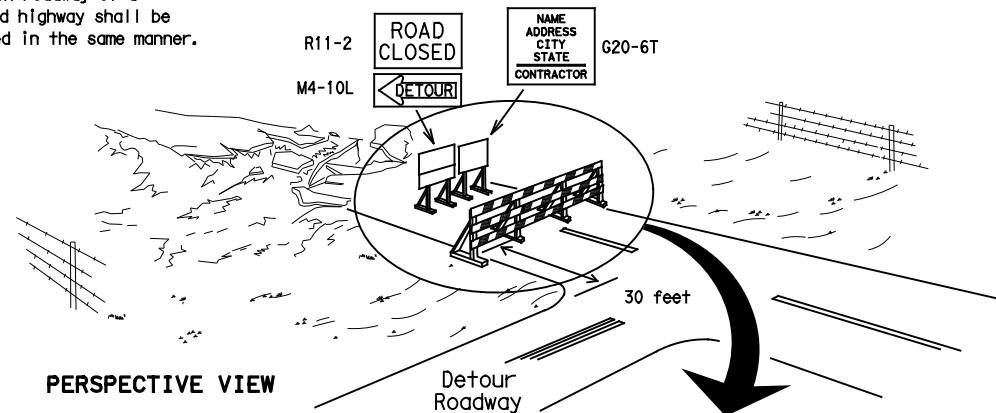
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

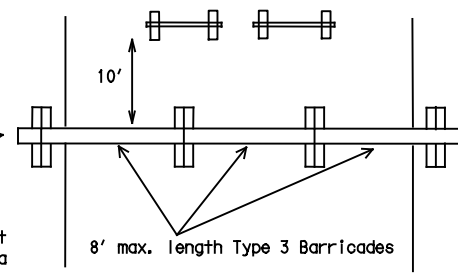
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

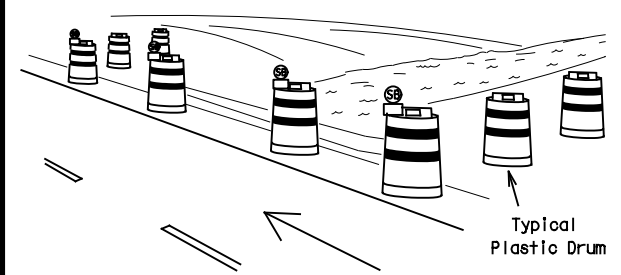
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.



PLAN VIEW

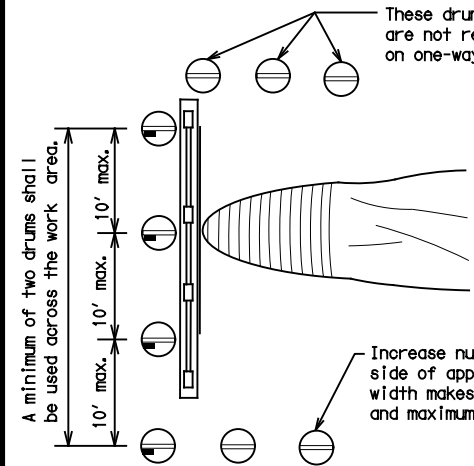
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

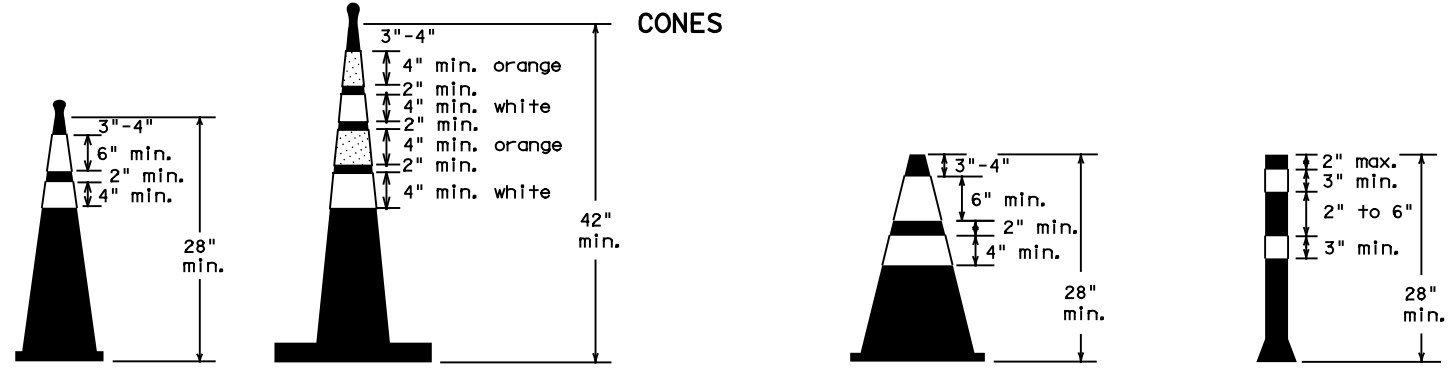
These drums are not required on one-way roadway



PLAN VIEW

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS

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

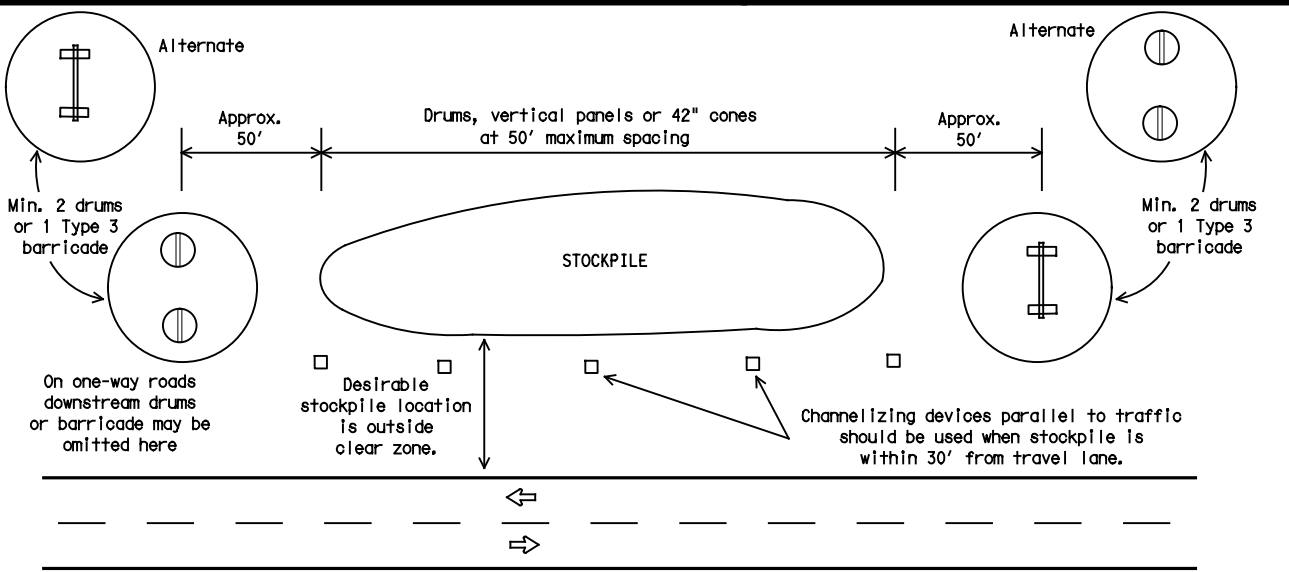


Two-Piece cones

One-Piece cones

Tubular Marker

28" Cones shall have a minimum weight of 9 1/2 lbs.
 42" 2-piece cones shall have a minimum weight of 30 lbs. including base.



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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.



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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7-13 5-21	ABL	NOLAN	37	

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

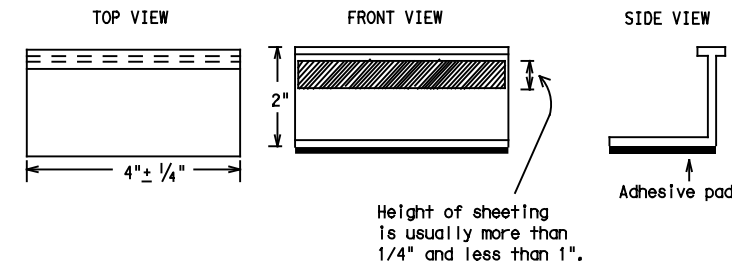
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

SHEET 11 OF 12



BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

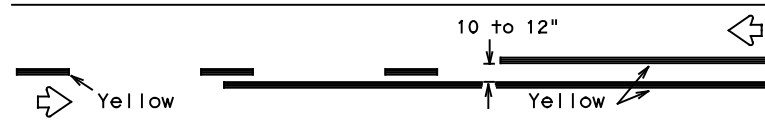
BC(11)-21

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© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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11-02 8-14				

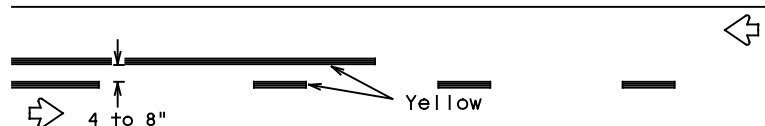
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PAVEMENT MARKING PATTERNS

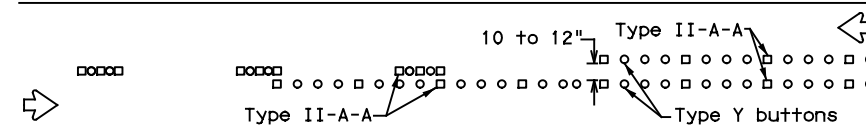


REFLECTORIZED PAVEMENT MARKINGS - PATTERN A

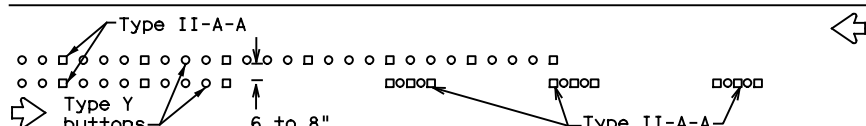


REFLECTORIZED PAVEMENT MARKINGS - PATTERN B

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.

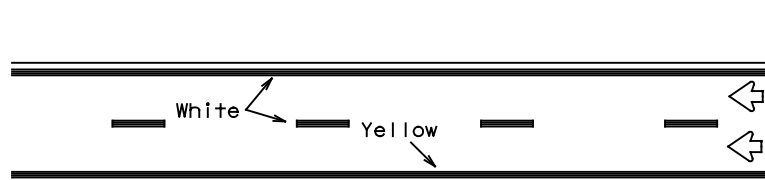


RAISED PAVEMENT MARKERS - PATTERN A



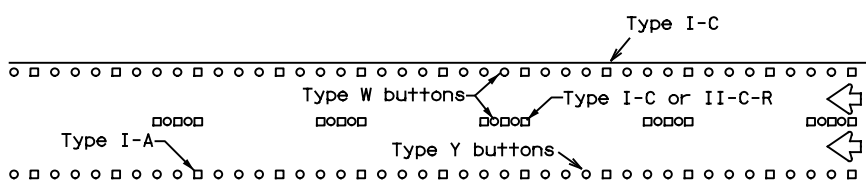
RAISED PAVEMENT MARKERS - PATTERN B

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



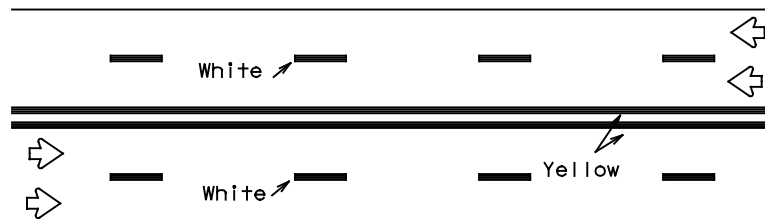
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



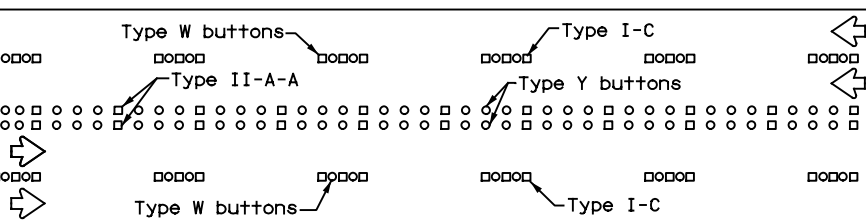
RAISED PAVEMENT MARKERS

EDGE & LANE LINES FOR DIVIDED HIGHWAY



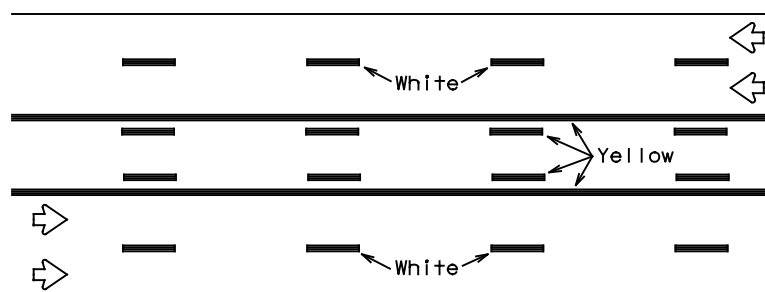
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



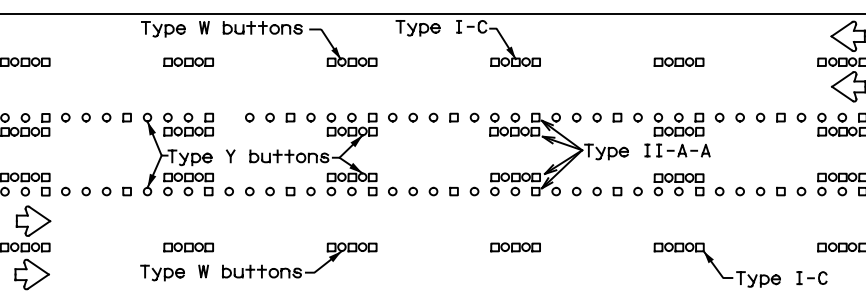
RAISED PAVEMENT MARKERS

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

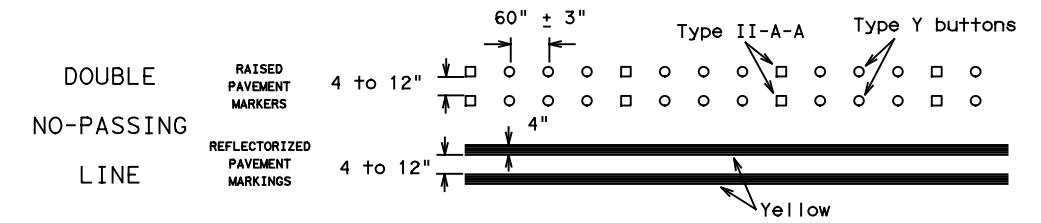
Prefabricated markings may be substituted for reflectORIZED pavement markings.



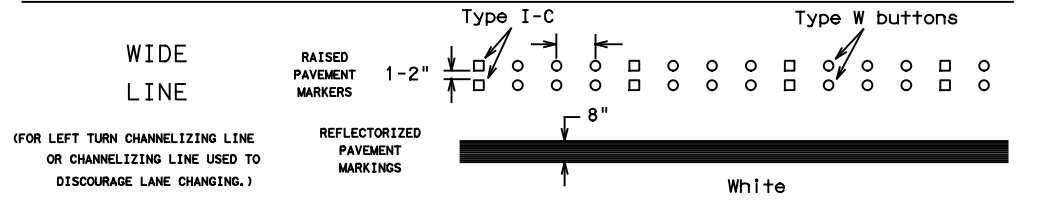
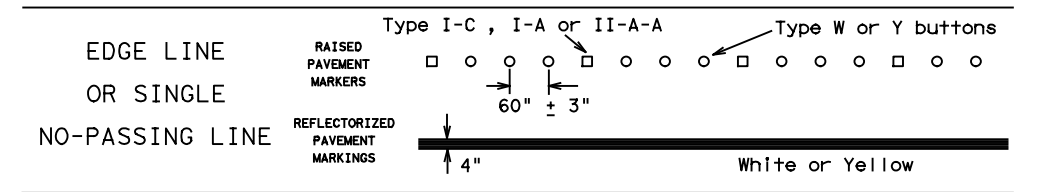
RAISED PAVEMENT MARKERS

TWO-WAY LEFT TURN LANE

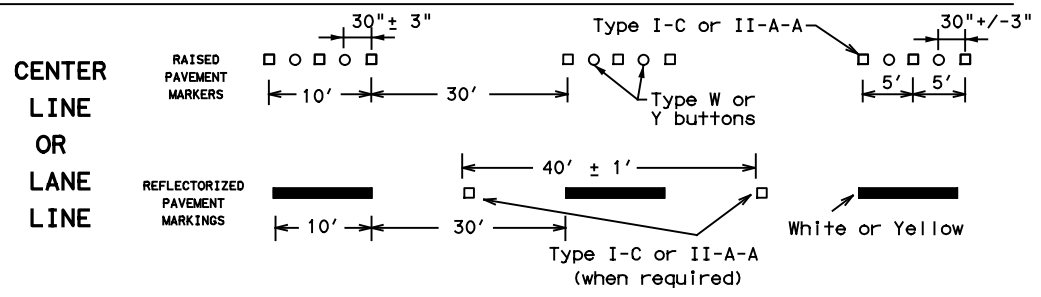
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



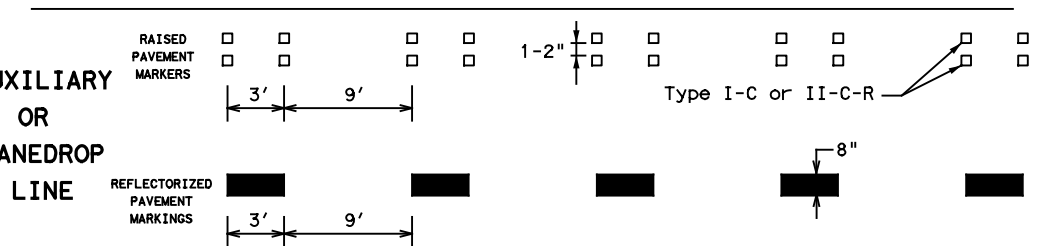
SOLID LINES



BROKEN LINES

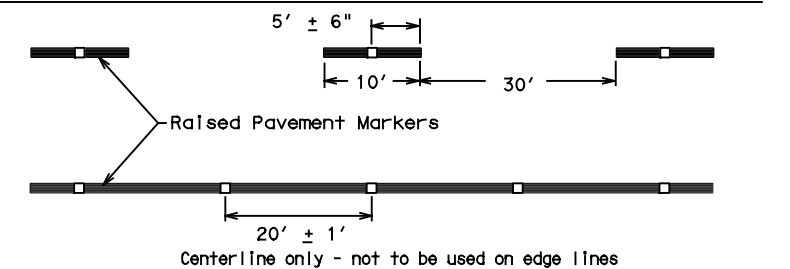


AUXILIARY OR LANEDROP LINE



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.



SHEET 12 OF 12



BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

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."

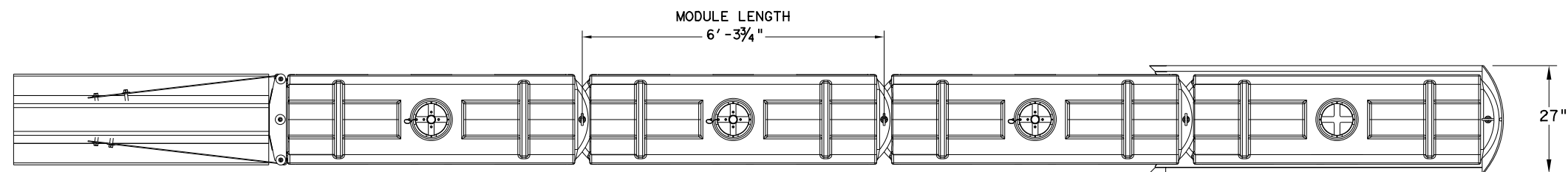
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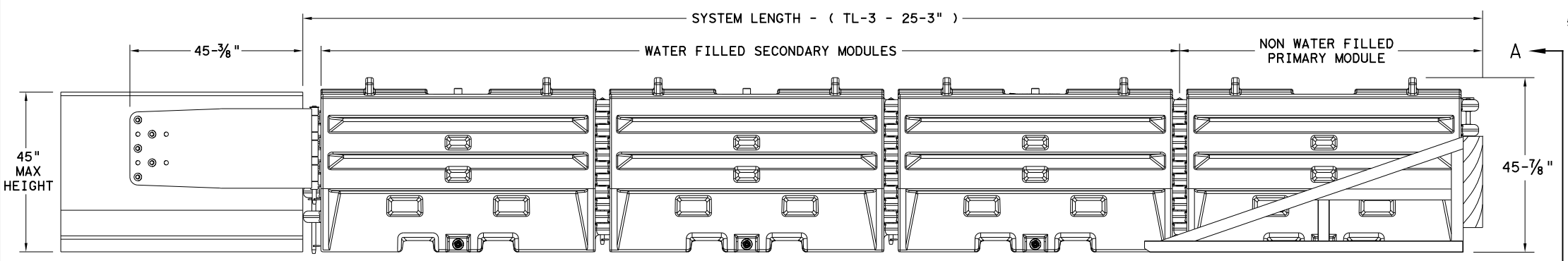
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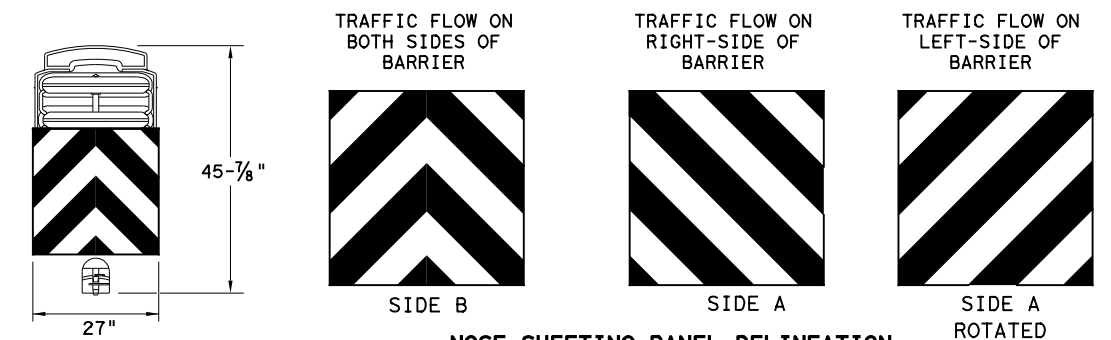
PLAN VIEW



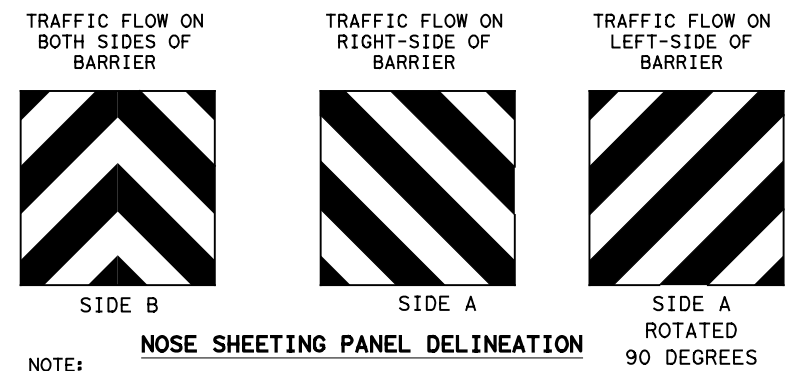
ELEVATION VIEW

GENERAL NOTES

- REFER TO THE INSTALLATION MANUAL FOR SPECIFIC SYSTEM ASSEMBLY AND MODULE ORIENTATION. FOR ADDITIONAL INFORMATION, CONTACT TRAFFIX, INC. AT (949) 361-5663.
- 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.
- MAXIMUM PERMISSIBLE CROSS SLOPE IS 8° (DEGREES) (14%).
- THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
- THE SLED SYSTEM CAN BE ATTACHED TO:
 - CONCRETE BARRIER, TEMPORARY OR PERMANENT, 45" MAXIMUM HEIGHT
 - STEEL BARRIER
 - PLASTIC BARRIER
 - CONCRETE BRIDGE ABUTMENTS
 - W-BEAM GUARD RAIL
 - THRIE BEAM GUARD RAIL



SECTION A-A

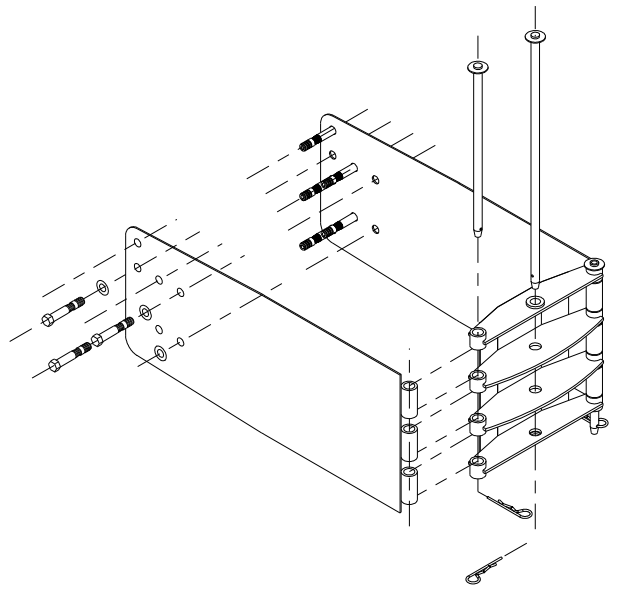


NOSE SHEETING PANEL DELINEATION

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

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

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



SLED TRANSITION COMPONENTS FOR ATTACHMENT TO CMB

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

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

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

SACRIFICIAL

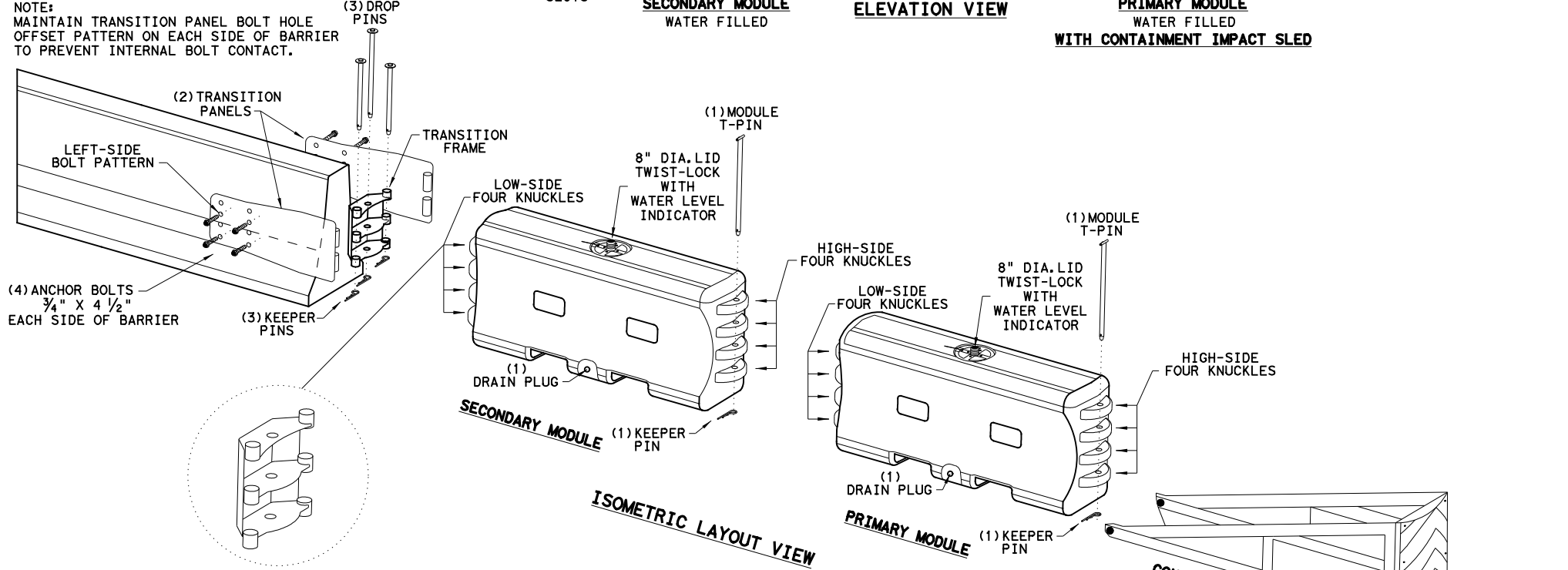
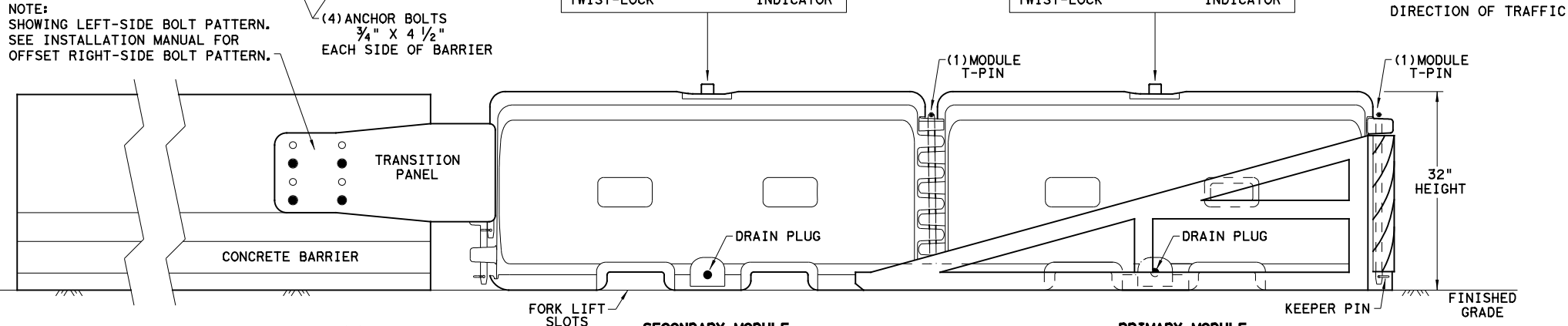
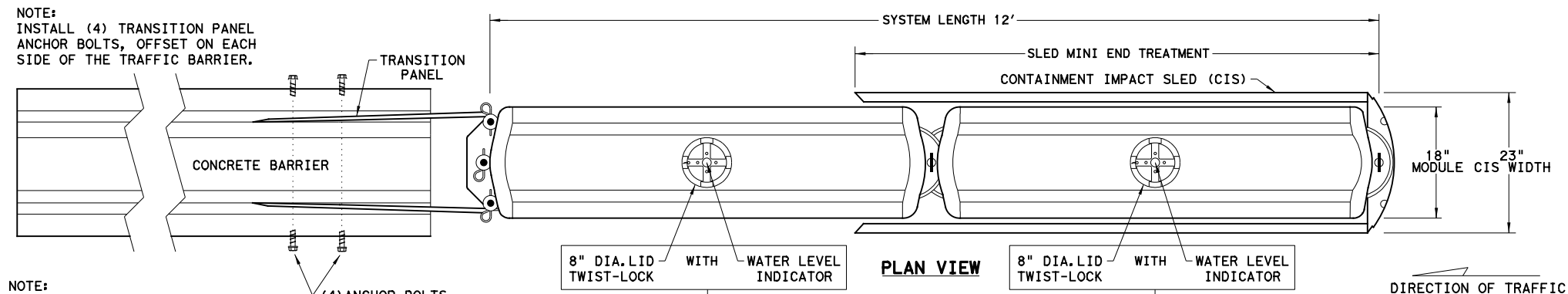
Design Division Standard

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

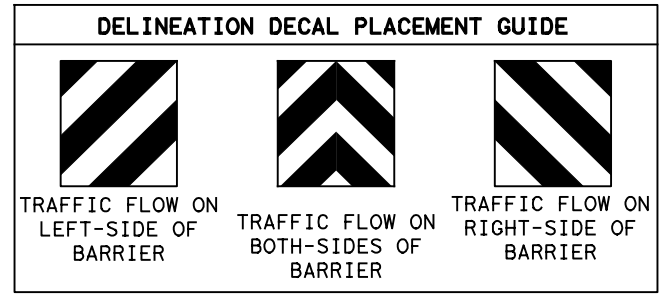
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© TxDOT: DECEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0006	15	038	SH 70
DIST	COUNTY		SHEET NO.	
ABL	NOLAN		40	

DISCLAIMER: 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: 10/12/2023
 FILE: c:\pwworking\centra101\d3297802\stdm\in119.dgn



TRANSITION FRAME
 NOTE: TRANSITION FRAME SITS ON LOW-SIDE (TOP KNUCKLE).



* NOTE: 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. THE ORIENTATION BETWEEN THE LEFT-SIDE AND RIGHT-SIDE TRAFFIC IS CHANGED BY ROTATING THE DECAL 90 DEGREES AND REINSTALLING.

GENERAL NOTES

- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT Traffix Devices, Inc. AT 1(949)361-5663
- THE SLED MINI IS A MASH APPROVED TEST LEVEL 2 (TL-2) CRASH CUSHION APPROVED FOR USE WITHIN TEMPORARY WORK ZONE LOCATIONS. TL-2 IS APPROVED FOR SPEEDS OF 45 MPH OR LESS.
- THE SLED MINI IS A GATING, NON-REDIRECTIVE CRASH CUSHION THAT DOES NOT NEED TO BE BOLTED TO THE GROUND AND CAN BE INSTALLED ON CONCRETE, ASPHALT, GRAVEL OR COMPACTED SOIL.
- THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, AND DEPRESSIONS.
- THE SLED MINI CAN BE ATTACHED TO CONCRETE BRIDGE ABUTMENTS, CONCRETE BARRIER, STEEL BARRIER AND PLASTIC BARRIER.

SLED MINI TL-2 - BILL OF MATERIALS		
QTY:	PART #	PART DESCRIPTIONS
2	45332-MY	WATER FILLED MODULE
2	45032-CPGAL	T-PINS - LENGTH 26" WITH KEEPER PINS - FOR MODULES
2	18009-B-I	WATER LEVEL INDICATOR FLOAT LID
1	45032-S	CONTAINMENT IMPACT SLED (CIS)
2	45151	UNIVERSAL TRANSITION PANELS
1	45132	TRANSITION FRAME
1	45141	DROP PIN - LENGTH 26.50" WITH KEEPER PIN
2	45142	DROP PINS - LENGTH 18.50" WITH KEEPER PINS
8	45050	TRANSITION PANEL ANCHOR BOLTS 3/4" X 4 1/2" (4 EA. SIDE)

MODULE SPECIFICATIONS	(CIS) SPECIFICATIONS
LENGTH: 73" (PIN TO PIN)	LENGTH: 87 7/8"
HEIGHT: 32"	HEIGHT: 32"
WIDTH: 18"	WIDTH: 23"
EMPTY WEIGHT: 110 lbs.	APPROX. WEIGHT: 1250 lbs.
FILLED WEIGHT: 1100 lbs.	
FILL CAPACITY: 118.5 Gal	

* NOTES:
 SEE DELINEATION GUIDE FOR DECAL PLACEMENT.
 SEE INSTALLATION MANUAL FOR CUSTOMIZED DELINEATION NOSE SHEETING FOR DECAL PLACEMENT.

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

SACRIFICIAL

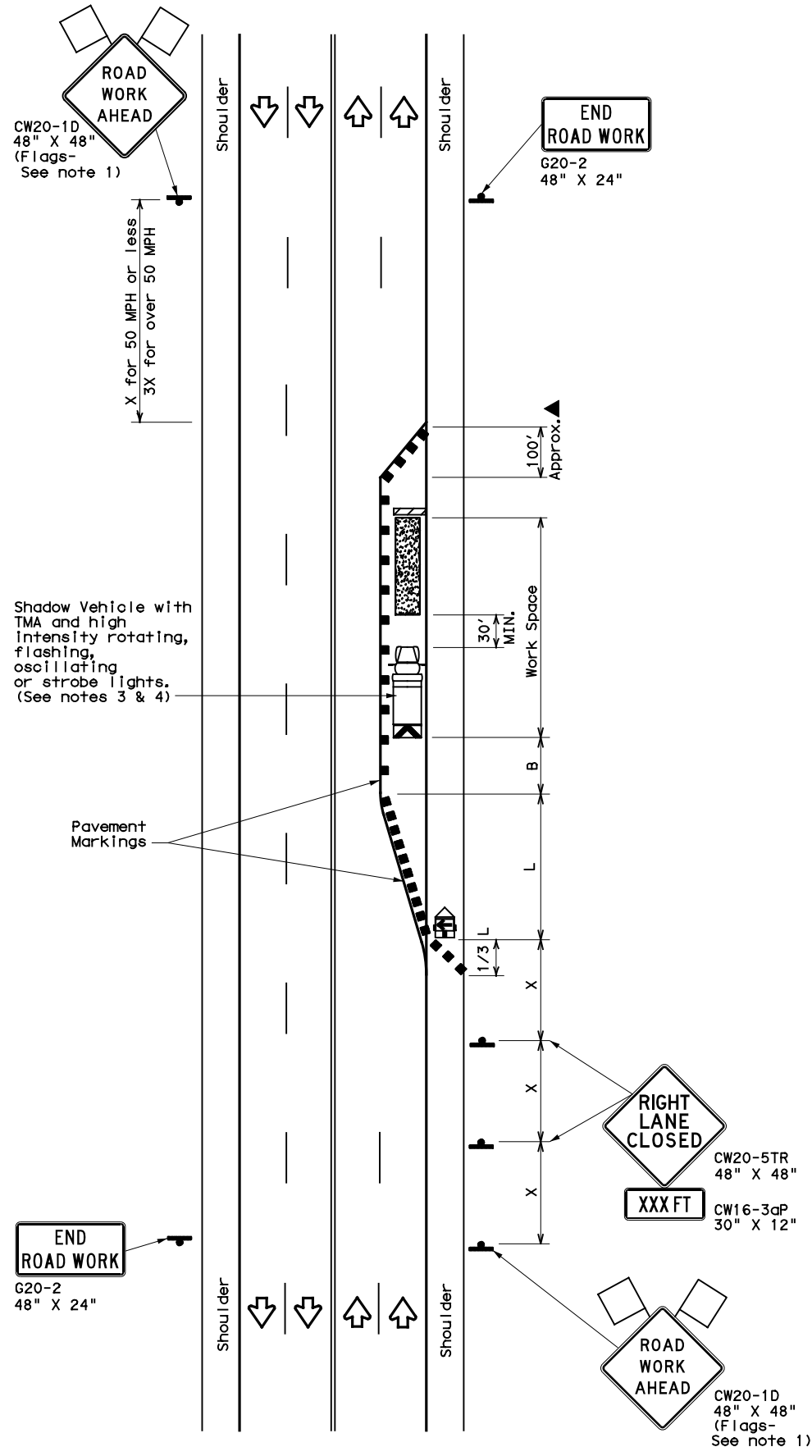
Texas Department of Transportation
 Design Division Standard

**SLED MINI
 END TREATMENT
 TL-2 MASH COMPLIANT
 (TEMPORARY, WORK ZONE)
 SLEDMINI-19**

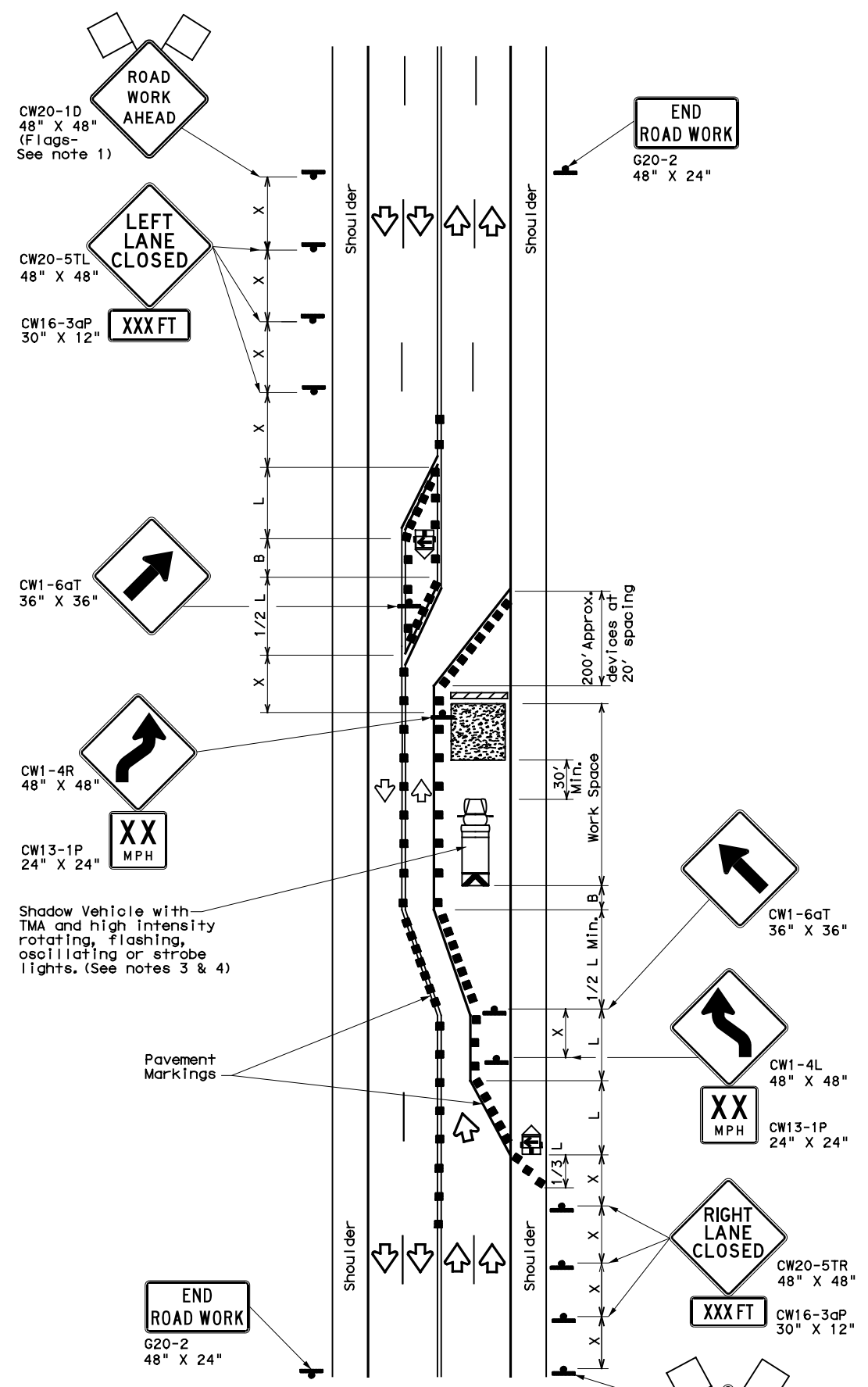
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© TxDOT: DECEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0006	15	038	SH 70
DIST	COUNTY		SHEET NO.	
ABL	NOLAN		41	

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DATE: 10/12/2023 2:49:07 PM
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TCP (2-5a)
ONE LANE CLOSED



TCP (2-5b)
TWO LANES CLOSED

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths X X			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 = WS ² / 60	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L = WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

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

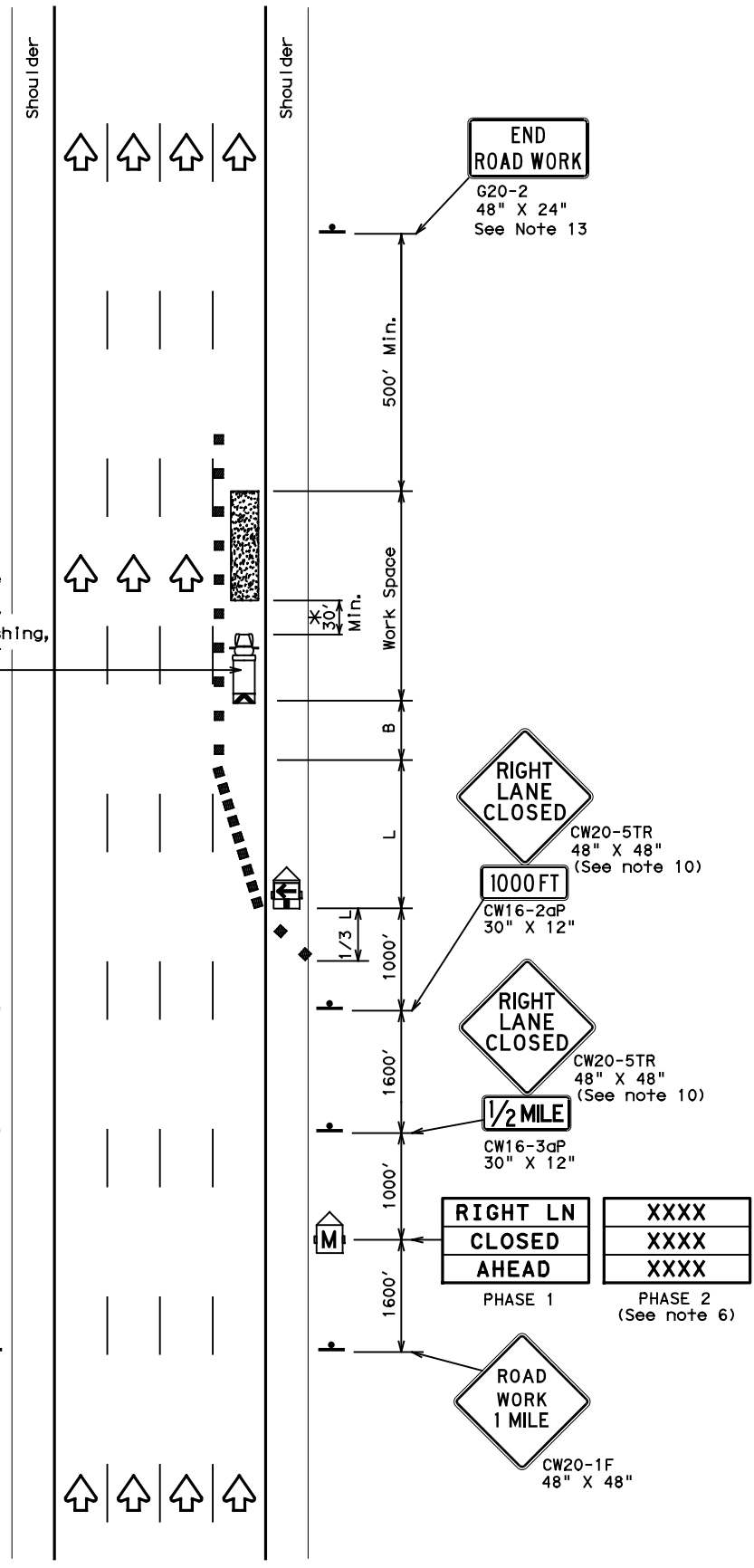
TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
			✓	✓

- GENERAL NOTES**
- Flags attached to signs where shown, are REQUIRED.
 - All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
 - A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
 - Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.
 - The downstream taper is optional. When used, it should be 100 feet approximately per lane, with channelizing devices spaced at 20 feet.
- TCP (2-5a)**
- If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED" signs shall be used and channelizing devices shall be placed on the centerline to protect the work space from opposing traffic, with the arrow board placed in the closed lane near the end of the merging taper.
- TCP (2-5b)**
- Conflicting pavement markings shall be removed for long-term projects.

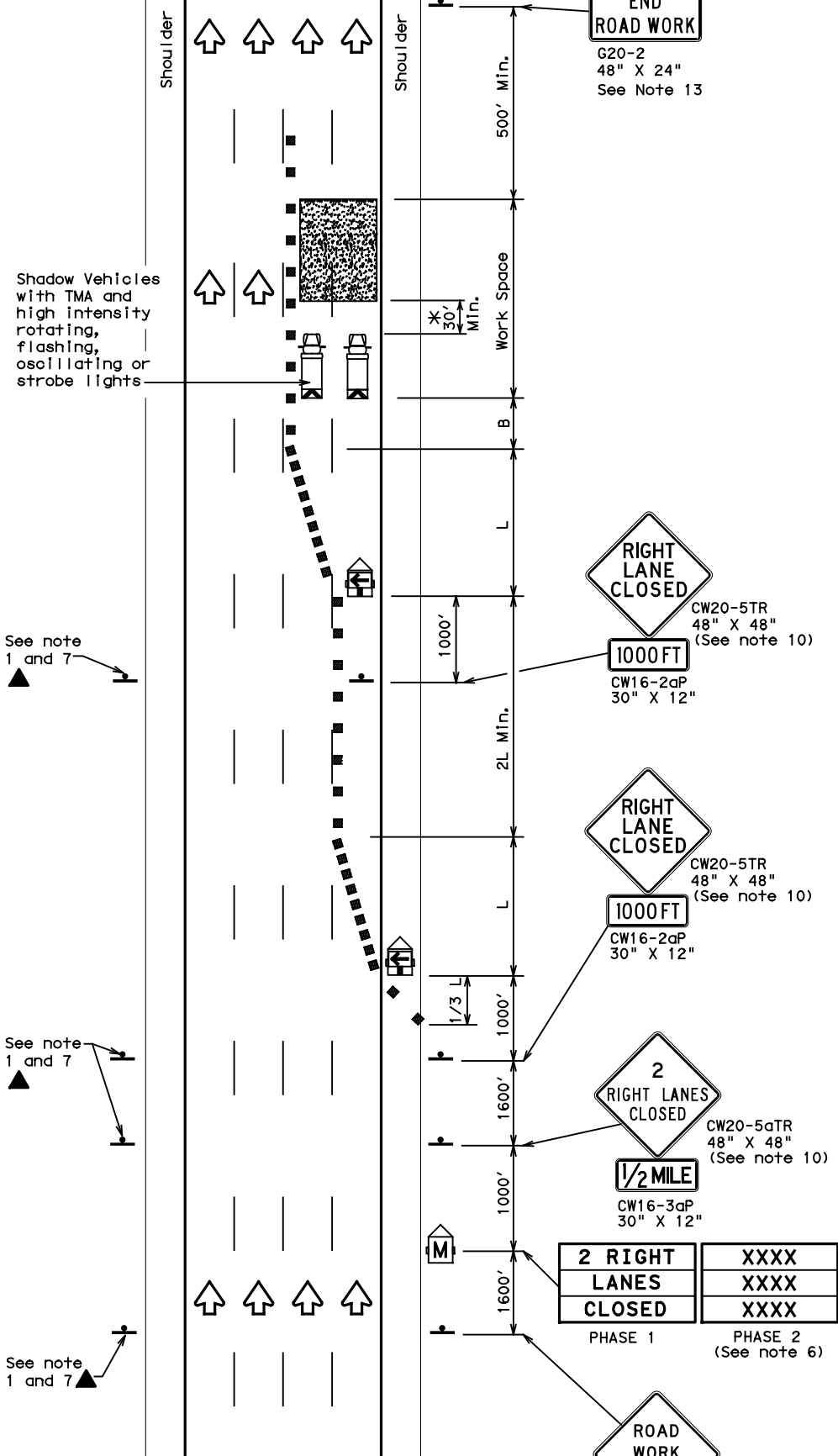
		Traffic Operations Division Standard	
TRAFFIC CONTROL PLAN			
LONG TERM LANE CLOSURES			
MULTILANE CONVENTIONAL RDS.			
TCP (2-5) - 18			
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© TxDOT	December 1985	CONT	SECT
8-95 2-12	REVISIONS	0006	15
1-97 3-03		038	SH 70
4-98 2-18		ABL	NOLAN
			SHEET NO. 42

DATE: 10/12/2023 2:49:18 PM
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TCP (6-1a)
**TYPICAL FREEWAY
 ONE LANE CLOSURE**



TCP (6-1b)
**TYPICAL FREEWAY
 TWO LANE CLOSURE**

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

Posted Speed	Formula	Minimum Desirable Taper Lengths "L"			Suggested Maximum Spacing of Channelizing Devices		Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	
45	L = WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80	800'	880'	960'	80'	160'	615'	

XX 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

- All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
- Drums or 42" cones are the typical channelizing devices. For Intermediate Term Stationary work, drums shall be used on tapers with drums or 42" cones used on tangent sections. Other channelizing devices may be used as directed by the Engineer.
- All construction signs and barricades placed during any phase of work shall remain in place until removal is approved by the Engineer.
- The Engineer may direct the Contractor to furnish additional signs and barricades as required to maintain traffic flow, detours and motorist safety during construction.
- Static message boards or changeable message signs stating the date and duration of ramp or freeway lane closures shall be placed a minimum of seven (7) calendar days in advance of the actual closure.
- Phase 2 of the PCMS message should include appropriate information formatted as shown on BC(6), such as "MERGE LEFT," recommended advisory speed, delay information, or other specific warnings.
- Duplicate construction warning signs should be erected on the medians side of freeways where median width will permit and traffic volume justifies the signing.
- The number of closed lanes may be increased provided the spacing of traffic control devices, taper lengths and tangent lengths meet the requirements of the TMUTCD.
- Warning signs for intermediate term stationary work should be mounted at 7' to the bottom of the sign.
- Warning signs shown shall be appropriately altered for left lane closures. When signs are mounted at 1' height for short term stationary or short duration work, sign versions shown in the SHSD for Texas with distances on the sign face rather than mounted on a plaque below the sign may be used.
- When possible, PCMS units should be located in advance of the last available exit ramp prior to the lane closure to allow motorists an alternate route. They may also be relocated to improve advance warning in case of unanticipated queuing or congestion.
- For Intermediate Term Stationary work at night, floodlights should be used to illuminate the work area and equipment crossings. Floodlights shall not produce a disabling glare condition for road users or workers.
- The END ROAD WORK (G20-2) sign may be omitted when it conflicts with G20-2 signs already in place on the project.

*A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.



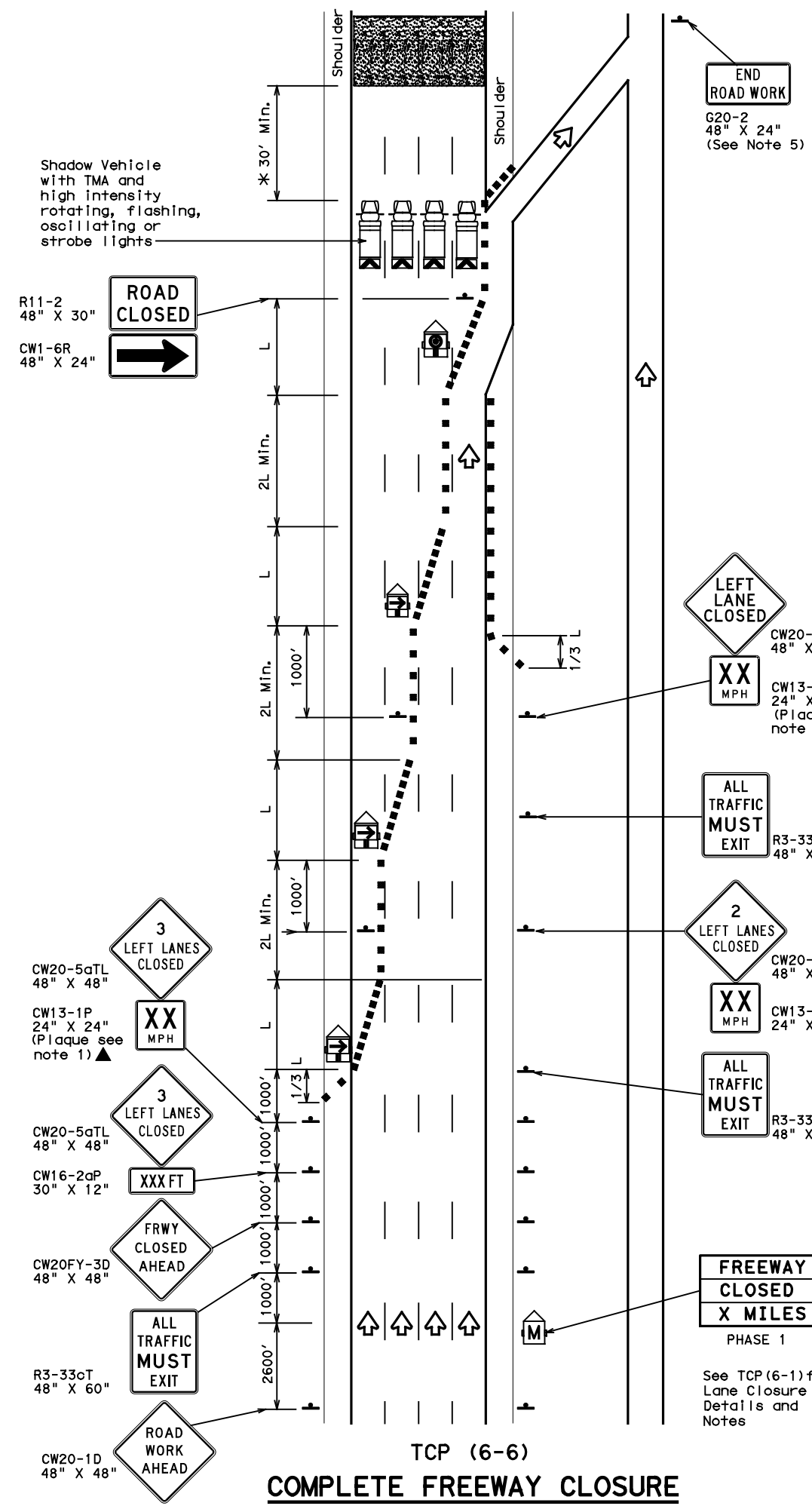
**TRAFFIC CONTROL PLAN
 FREEWAY LANE CLOSURES**

TCP (6-1)-12

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©TxDOT	February 1998	CONT	SECT	JOB	HIGHWAY				
8-12	REVISIONS	0006	15	038	SH 70				
	DIST	COUNTY		SHEET NO.					
	ABL	NOLAN		43					

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DATE: 10/12/2023 2:49:28 PM
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LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
	Flashing Arrow Board in Caution Mode		Traffic Flow
	Sign		

Posted Speed	Formula	Minimum Desirable Taper Lengths "L"			Suggested Maximum Spacing of Channelizing Devices		Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	
45	L = WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

XX 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**
- All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
 - Phase 2 of the PCMS message should include appropriate information formatted as shown on BC(6), such as "MERGE RIGHT," recommended speed, delay, exit information, or other specific warnings.
 - Where queuing is anticipated beyond signing shown, additional PCMS signs, other warning signs, devices or Law Enforcement Officers should be available to warn approaching high speed traffic of the end of the queue, as directed by the Engineer.
 - Entrance ramps located from the advance warning area to the exit ramp should be closed whenever possible.
 - The END ROAD WORK (G20-2) sign may be omitted when it conflicts with G20-2 signs already in place on the project.

XX A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

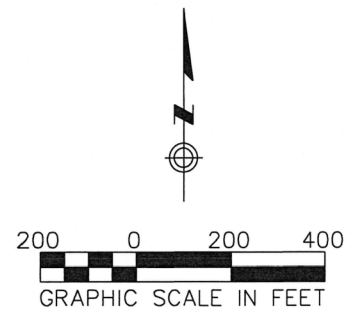


TRAFFIC CONTROL PLAN FREEWAY CLOSURE

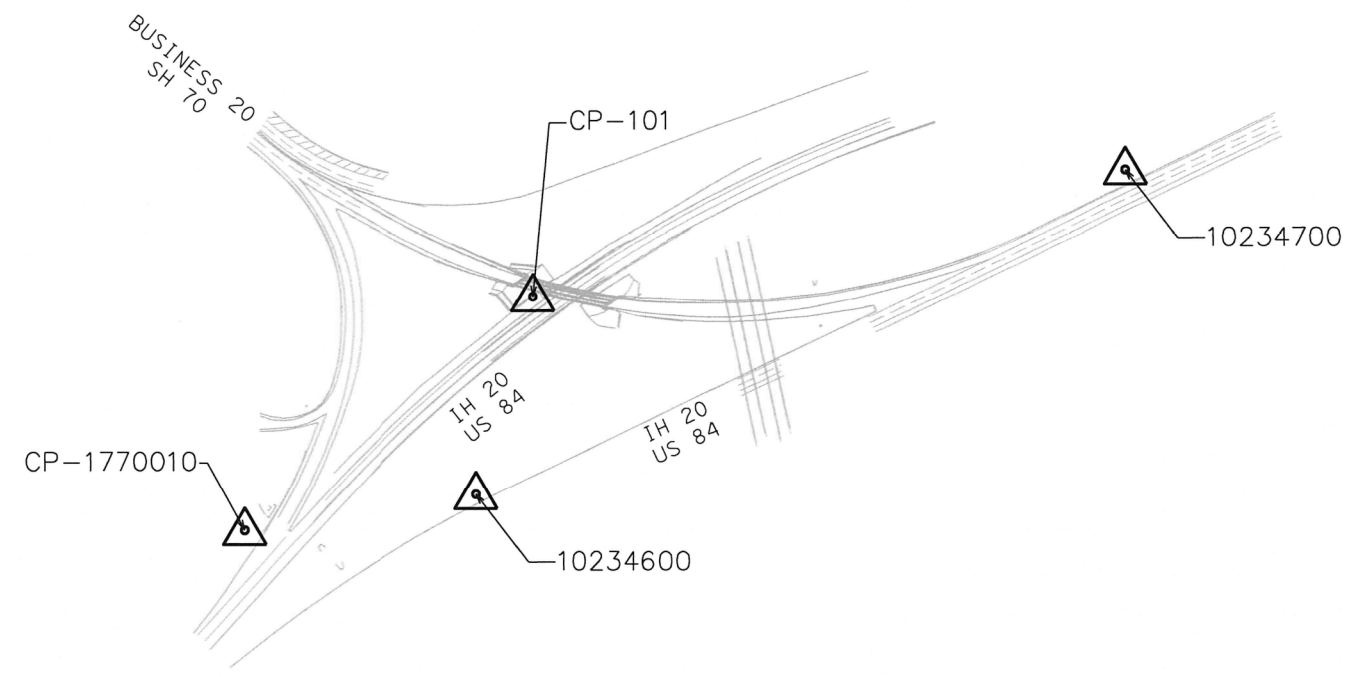
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REVISIONS		0006	15	038	SH 70				
1-97	8-98	DIST	COUNTY	SHEET NO.					
4-98	8-12	ABL	NOLAN	44					

CONTROL POINT	SURFACE COORDINATES			GRID COORDINATES		DESCRIPTION
	NORTHING	EASTING	ELEVATION	NORTHING	EASTING	
1770010	6,863,835.295	1,393,053.959	2,062.17'	6,863,011.734	1,392,886.813	3 1/4" ALUMINUM DISC
CP 101	6,864,323.878	1,393,653.037	2,053.44'	6,863,500.258	1,393,485.819	5/8" IRON ROD
10234600	6,863,910.353	1,393,536.505	2,060.32'	6,863,086.782	1,393,369.301	2" ALUMINUM DISC
10234700	6,864,588.140	1,394,891.231	2,032.91'	6,863,764.488	1,394,723.864	2" ALUMINUM DISC



PLEASE REFER TO BAR SCALE. DRAWING MAY HAVE BEEN REDUCED OR ENLARGED.
IF PRINTED ON A 11 X 17 USE 1" = 400'
IF PRINTED ON A 22 X 34 USE 1" = 200'



- NOTES:
1. ALL BEARINGS AND COORDINATES ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983 TEXAS NORTH CENTRAL ZONE (4202), NAD 83 (2011 ADJ. EPOCH 2010.00) GEOID 12B.
 2. ALL ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988.
 3. ALL DISTANCES AND COORDINATES ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY A SURFACE ADJUSTMENT FACTOR OF 1.00012.
 4. ALL VERTICAL CONTROL VALUES WERE DERIVED FROM TXDOT VRS SYSTEM.
 5. ALL MEASUREMENTS ARE U. S. SURVEY FEET.
 6. THIS SURVEY WAS PERFORMED ON THE GROUND IN JULY 2021 UNDER MY SUPERVISION AND DIRECTION.

DATE: 3/9/2023 3:30:15 PM
FILE: L:\Projects\B20081.06 - HDR - SH 70 over IH 20 - Sweetwater\CAD\Survey\DWG\SH70 AND IH20-CONTROL SHEETS_SURFACE.dgn



Scott M. Posey
Scott M. Posey
Registered Professional Land Surveyor
No. 5350

TBPELS # 10048300

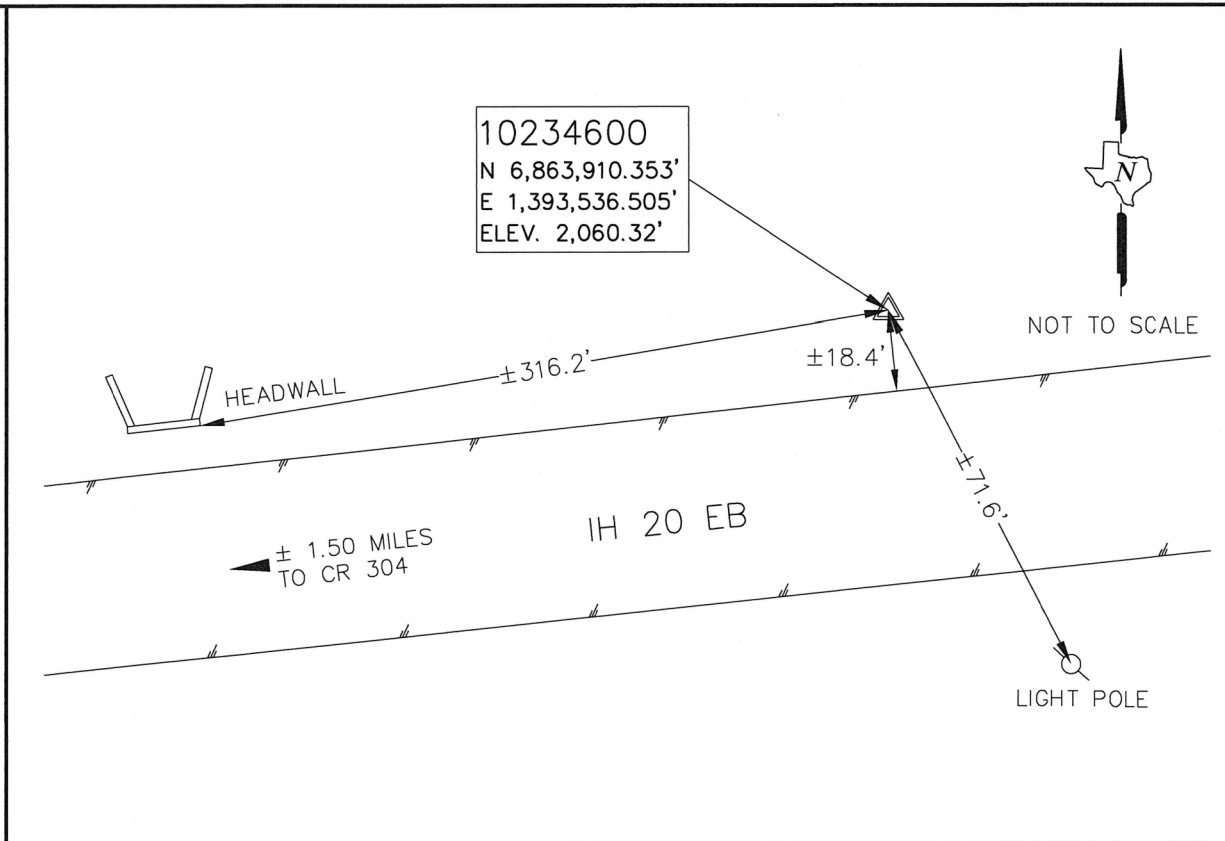
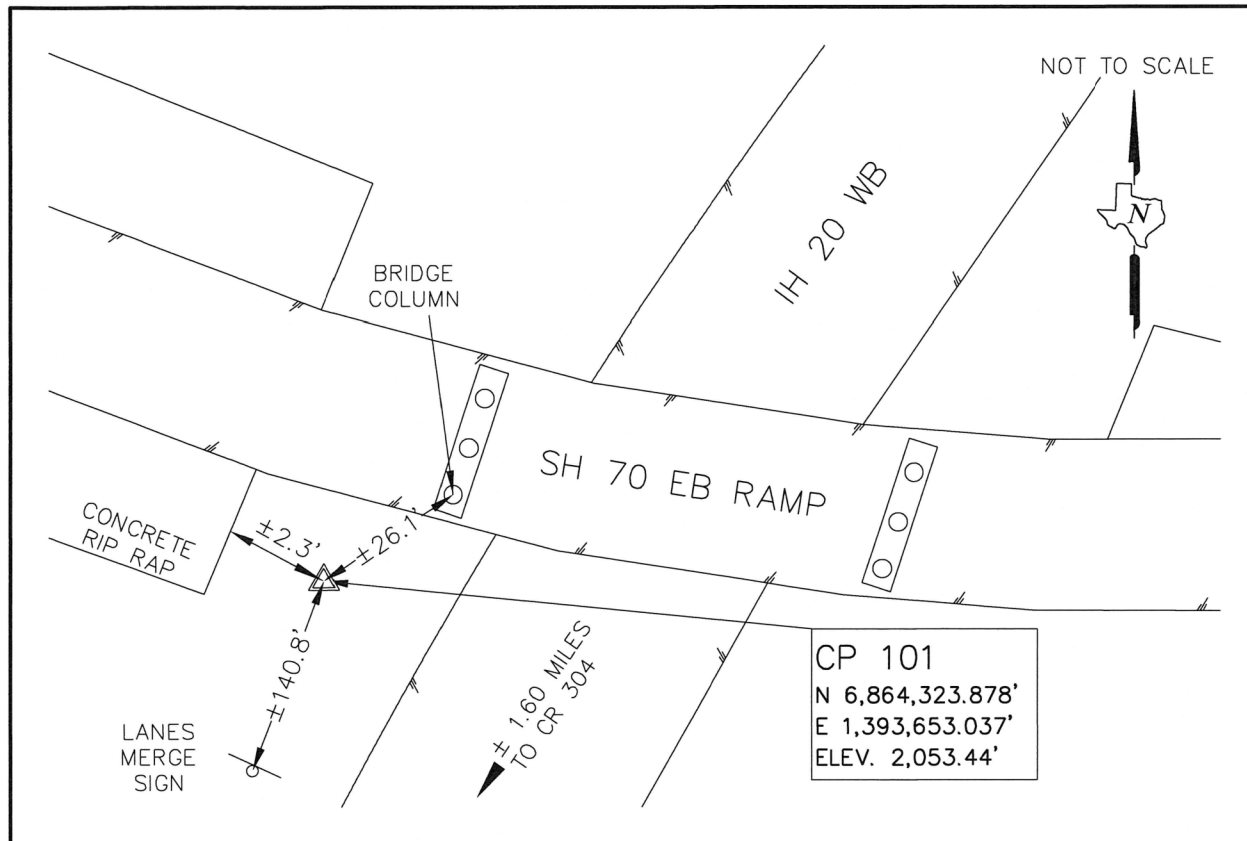
LAMB-STAR ENGINEERING, L.L.C.
3801 PARKWOOD BLVD, SUITE 550
FRISCO, TEXAS 75034
(214) 440-3600
TEXAS REGISTERED ENGINEERING
FIRM F-9073

HDR Engineering, Inc
Firm Registration No. F-754
17111 Preston Road, Suite 300
Dallas, Texas 75248
972.960.4400

Texas Department of Transportation

SH 70
CONTROL DATA
INDEX SHEET

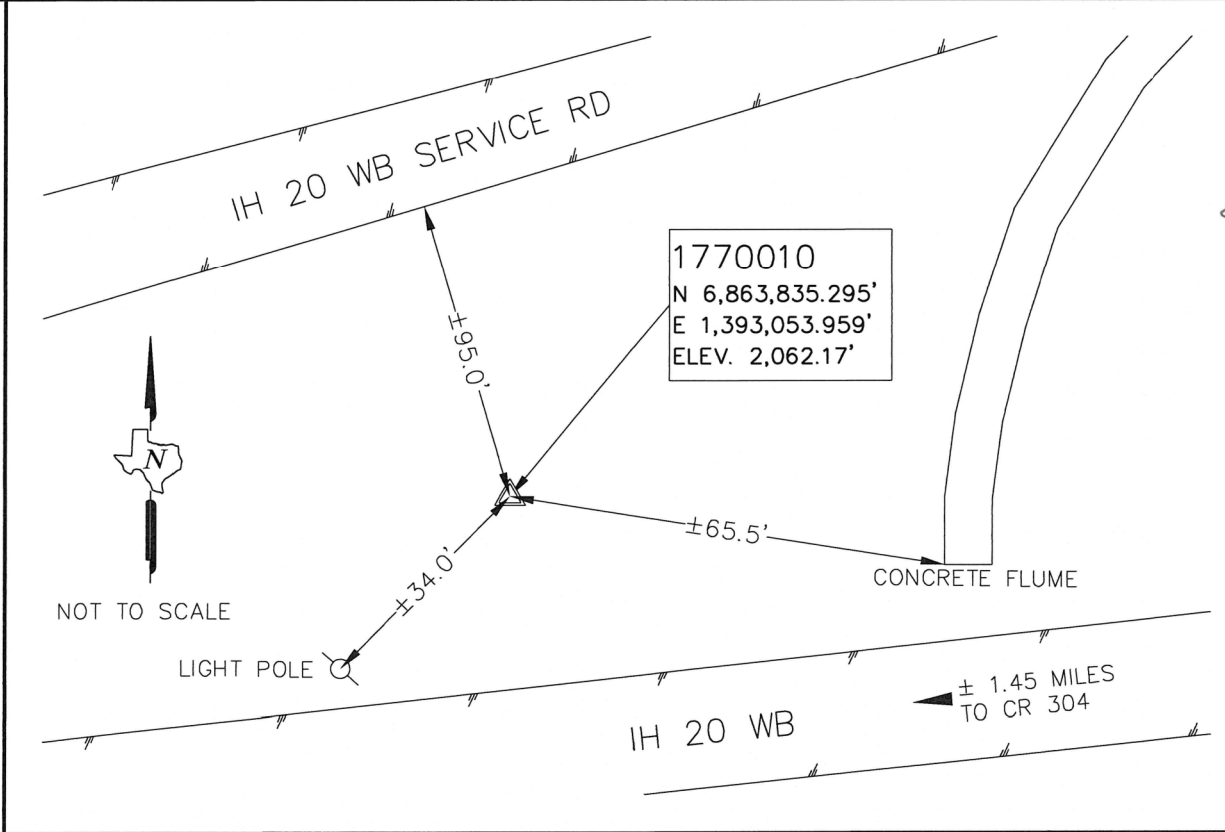
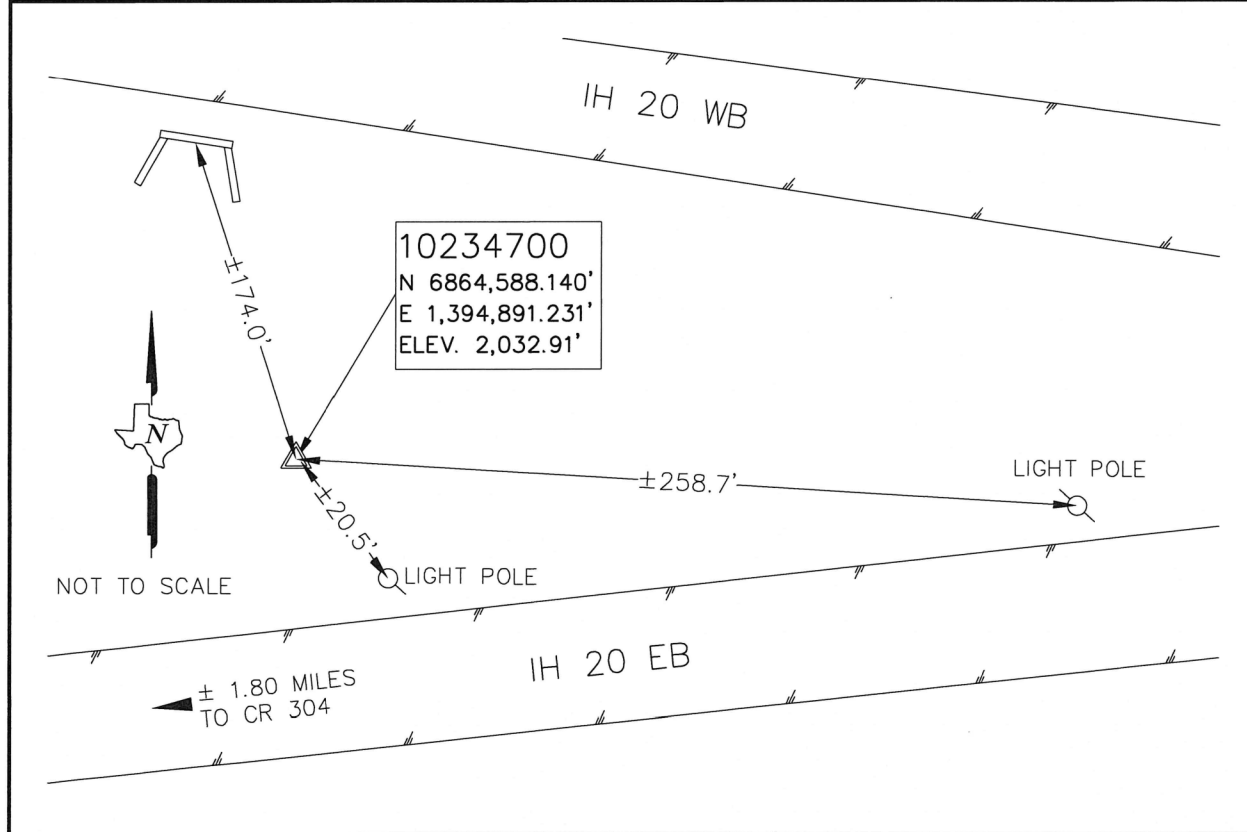
SHEET 1 OF 1			
CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY		SHEET NO.
ABILENE	NOLAN		45



- NOTES:
1. ALL BEARINGS AND COORDINATES ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983 TEXAS NORTH CENTRAL ZONE (4202), NAD 83 (2011 ADJ. EPOCH 2010.00) GEOID 12B.
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 5. ALL MEASUREMENTS ARE U.S. SURVEY FEET.
 6. THIS SURVEY WAS PERFORMED ON THE GROUND IN JULY 2021 UNDER MY SUPERVISION AND DIRECTION.

NOT STAMPED
 A 5/8" IRON ROD FOUND, ±1.60 MILES NE OF THE INTERSECTION OF CR 304, ±140.8' NORTH OF A "LANES MERGE" SIGN, ±2.3' EAST OF THE EDGE OF A CONCRETE RIP RAP, ±26.1' SW OF A BRIDGE COLUMN

NOT STAMPED
 A 3-1/2" ALUMINUM DISC STAMPED "TEXAS DEPARTMENT OF TRANSPORTATION CONTROL MARK", ±1.50 MILES NE OF THE INTERSECTION OF CR 304, ±316.2' EAST OF A HEADWALL, ±71.6' NW OF A LIGHT POLE, ±18.4' NORTH OF THE EDGE OF ASPHALT



NOT STAMPED
 A 3-1/2" ALUMINUM DISC STAMPED "TEXAS DEPARTMENT OF TRANSPORTATION CONTROL MARK", ±1.80 MILES NE OF THE INTERSECTION OF CR 304, ±20.5 FEET NORTH OF A LIGHT POLE, ±258.7' WEST OF A LIGHT POLE, ±174.0' SE OF A HEADWALL

STAMPED 1770010
 A 3-1/2" ALUMINUM DISC STAMPED "TEXAS DEPARTMENT OF TRANSPORTATION CONTROL MARK", ±1.45 MILES NE OF THE INTERSECTION OF CR 304, ±34.0' NE OF A LIGHT POLE, ±65.5' NW OF A CONCRETE FLUME, ±95.0' SOUTH OF THE EDGE OF ASPHALT

Scott M. Posey
 Registered Professional Land Surveyor
 No. 5350
 TBPELS # 10048300

SH 70
 HORIZONTAL AND VERTICAL CONTROL

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST		COUNTY	SHEET NO.
ABILENE		NOLAN	46

BEGIN PROJECT
 BEGIN CONSTRUCTION
 MATCH EXIST PVMT
 CSJ:0006-15-038
 STA 10+00.00
 LAT 32°28'58.52" N
 LONG 100°21'58.94" W

POT
 POT
 TANGENTIAL DIRECTION:
 TANGENTIAL LENGTH:

STATION	X	Y
POT 10+00.00 R1	6864568.65	1393190.47
POT 13+42.00 R1	6864392.69	1393483.74
TANGENTIAL DIRECTION: TANGENTIAL LENGTH:	N59°02'13.22"E 342.00	

EXIST BRIDGE TO BE REMOVED

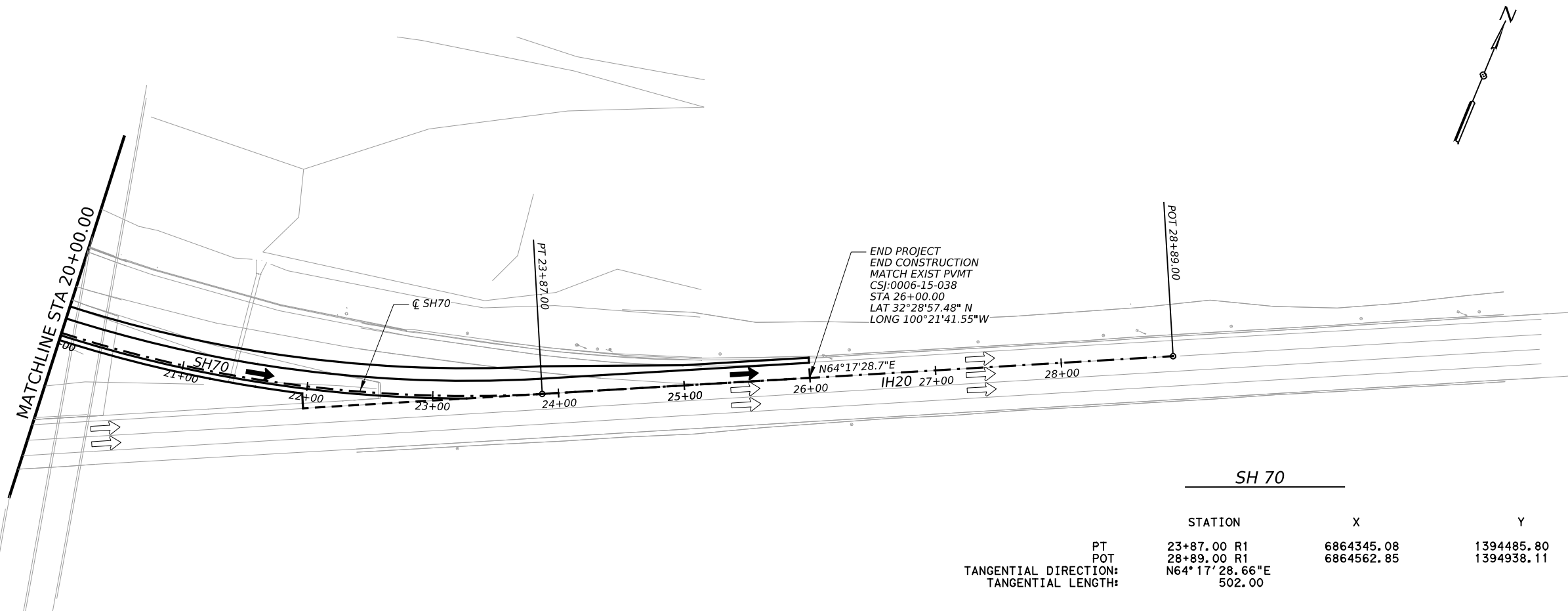
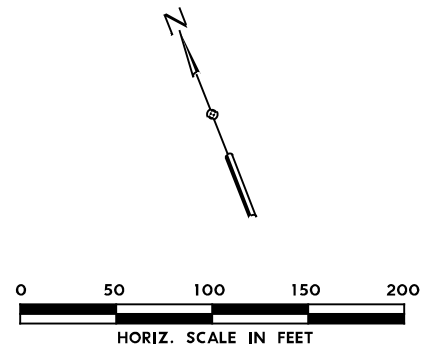
BEGIN APPROACH SLAB
 STA. 14+10.00

END APPROACH SLAB
 BEGIN BRIDGE
 STA. 14+30.00

END BRIDGE
 BEGIN APPROACH SLAB
 STA. 17+00.00

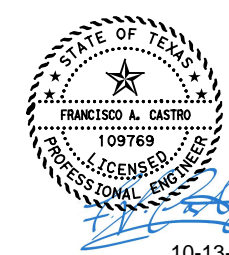
END APPROACH SLAB
 STA. 17+20.00

STATION	X	Y
PC 13+42.00 R1	6864392.69	1393483.74
PI 19+11.38 R1	6864099.76	1393971.98
CC 19+11.38 R1	6865301.64	1394029.09
PT 23+87.00 R1	6864345.08	1394485.80
RADIUS:	1060.00	
DELTA:	56°29'05.97" LEFT	
DEGREE OF CURVATURE (ARC):	05°24'18.94"	
LENGTH:	1045.00	
TANGENT:	569.38	
CHORD:	1003.19	
MIDDLE ORDINATE:	126.19	
EXTERNAL:	143.24	
BACK TANGENT DIRECTION:	S59°02'13.22"E	
BACK RADIAL DIRECTION:	S30°57'46.78"W	
CHORD DIRECTION:	S87°16'46.20"E	
AHEAD RADIAL DIRECTION:	S25°31'19.19"E	
AHEAD TANGENT DIRECTION:	N64°28'40.81"E	



PT
 POT
 TANGENTIAL DIRECTION:
 TANGENTIAL LENGTH:

STATION	X	Y
PT 23+87.00 R1	6864345.08	1394485.80
POT 28+89.00 R1	6864562.85	1394938.11
TANGENTIAL DIRECTION: TANGENTIAL LENGTH:	N64°17'28.66"E 502.00	



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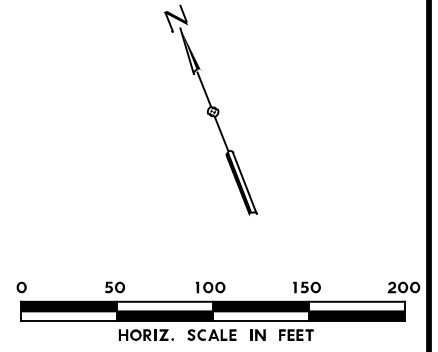
Texas Department of Transportation

SH 70





GEOMETRIC LAYOUT

SCALE: 1"=100' SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	47	

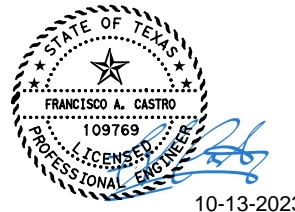
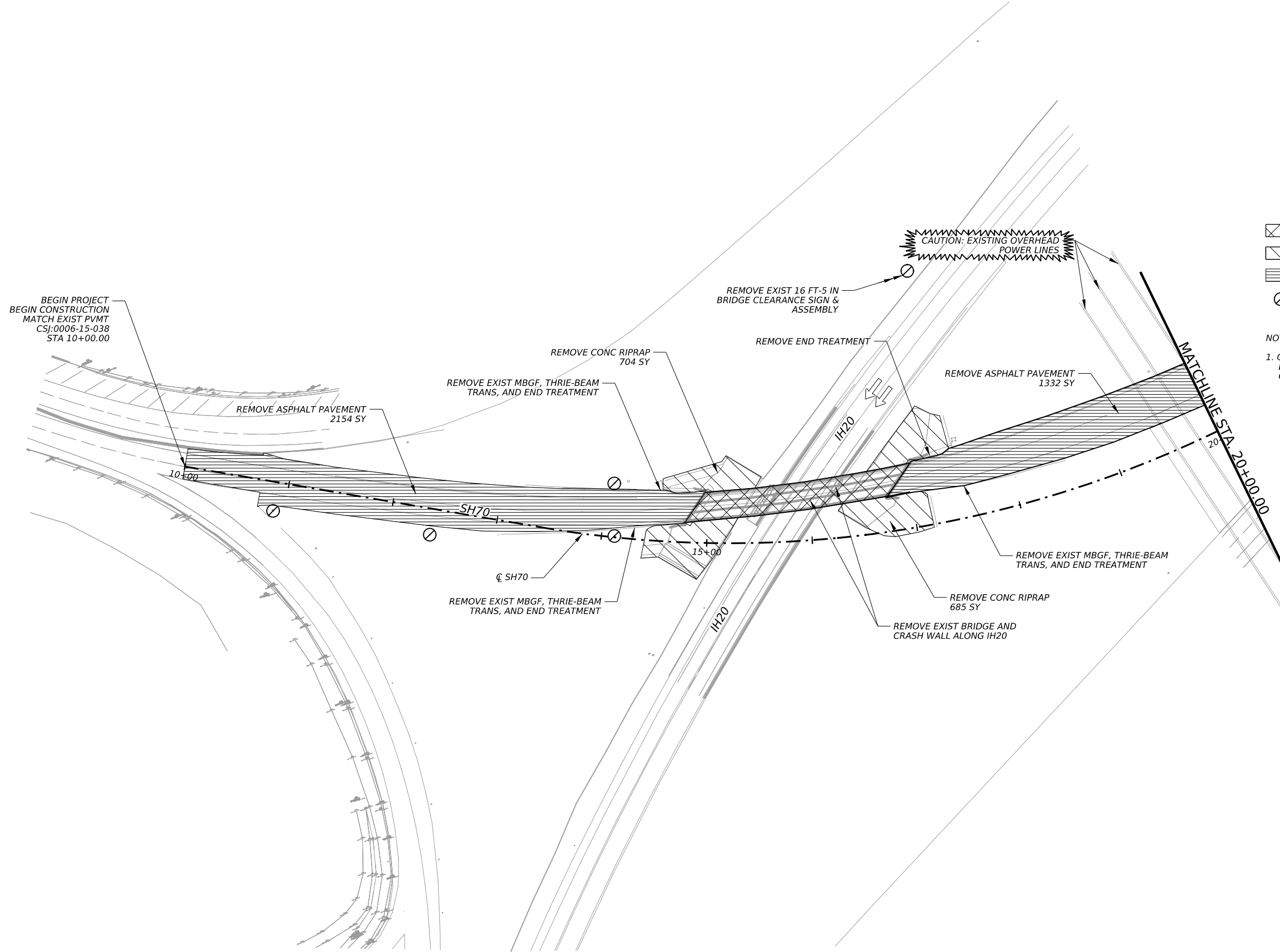


LEGEND



-  REMOVE STR (BRIDGE 100-499 FT LENGTH)
-  REMOVE CONC (RIPRAP)
-  REM STAB BASE AND ASPH PAVMT
-  REMOVE EXIST SIGN

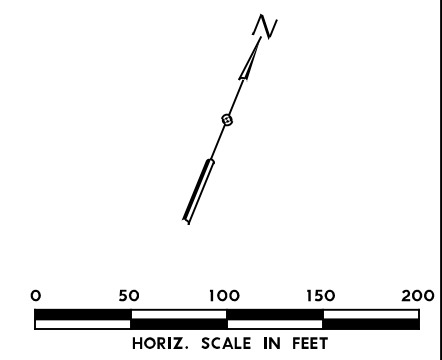
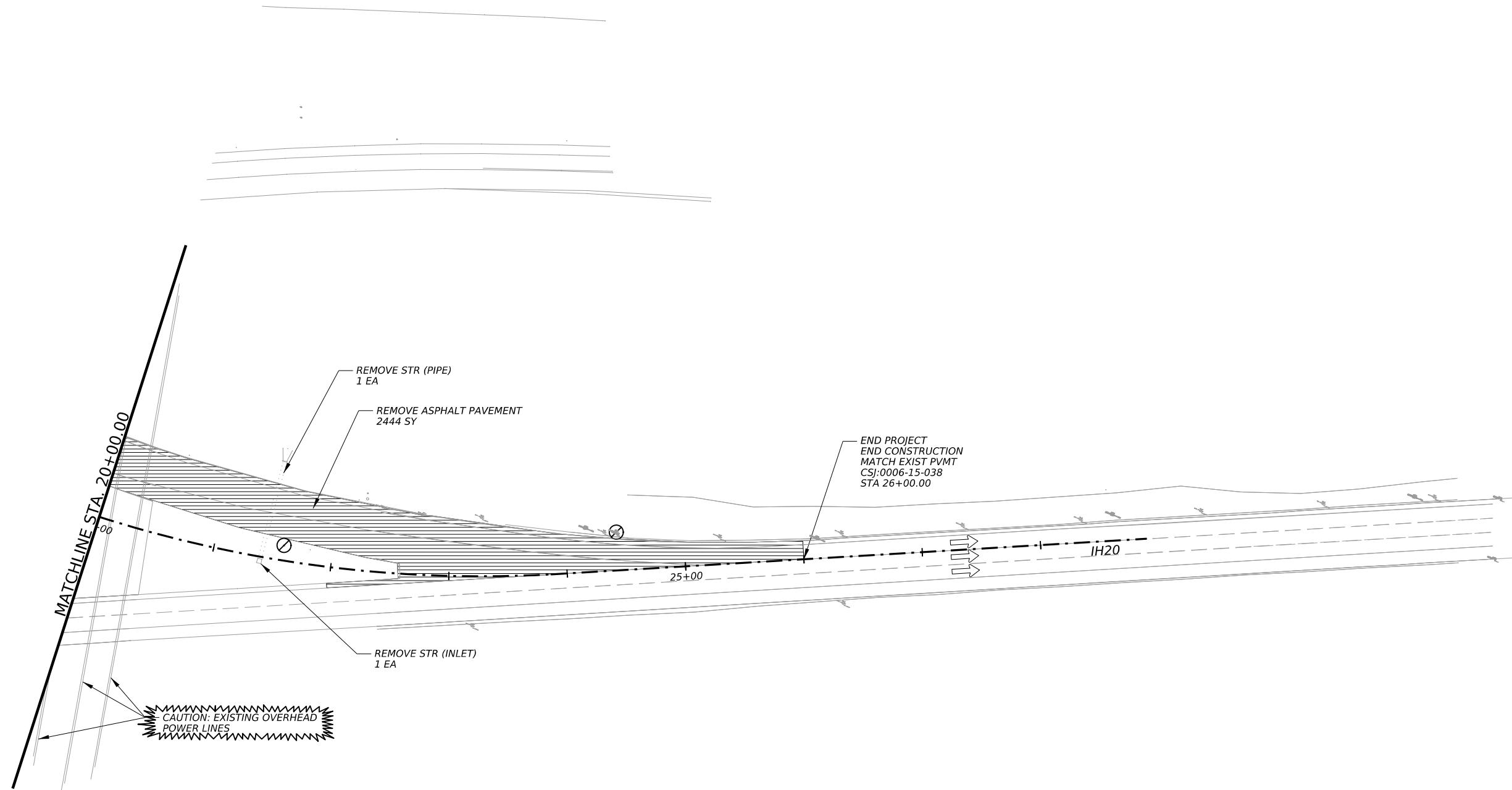
NOTES:

1. CONTRACTOR SHALL VERIFY LOCATIONS OF EXISTING UTILITIES BEFORE ANY TYPE OF CONSTRUCTION.







10-13-2023

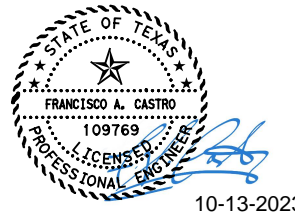
NO.	DATE	REVISION	APPR BY
			
HDR Engineering, Inc. Firm Registration No. F-754 17111 Preston Road, Suite 300 Dallas, Texas 75248 972.960.4400			
			
<h2>SH 70</h2> <h3>REMOVAL LAYOUT</h3>			
SCALE: 1"=100'		SHEET 1 OF 2	
CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	48	



LEGEND

-  REMOVE STR (BRIDGE 100-499 FT LENGTH)
-  REMOVE CONC (RIPRAP)
-  REM STAB BASE AND ASPH PAVMT
-  REMOVE EXIST SIGN

- NOTES:**
- CONTRACTOR SHALL VERIFY LOCATIONS OF EXISTING UTILITIES BEFORE ANY TYPE OF CONSTRUCTION.



10-13-2023

NO.	DATE	REVISION	APPR BY

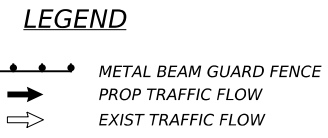
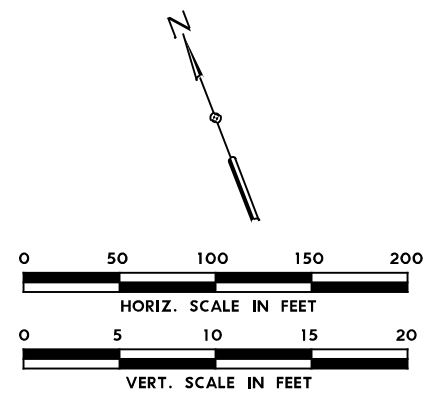
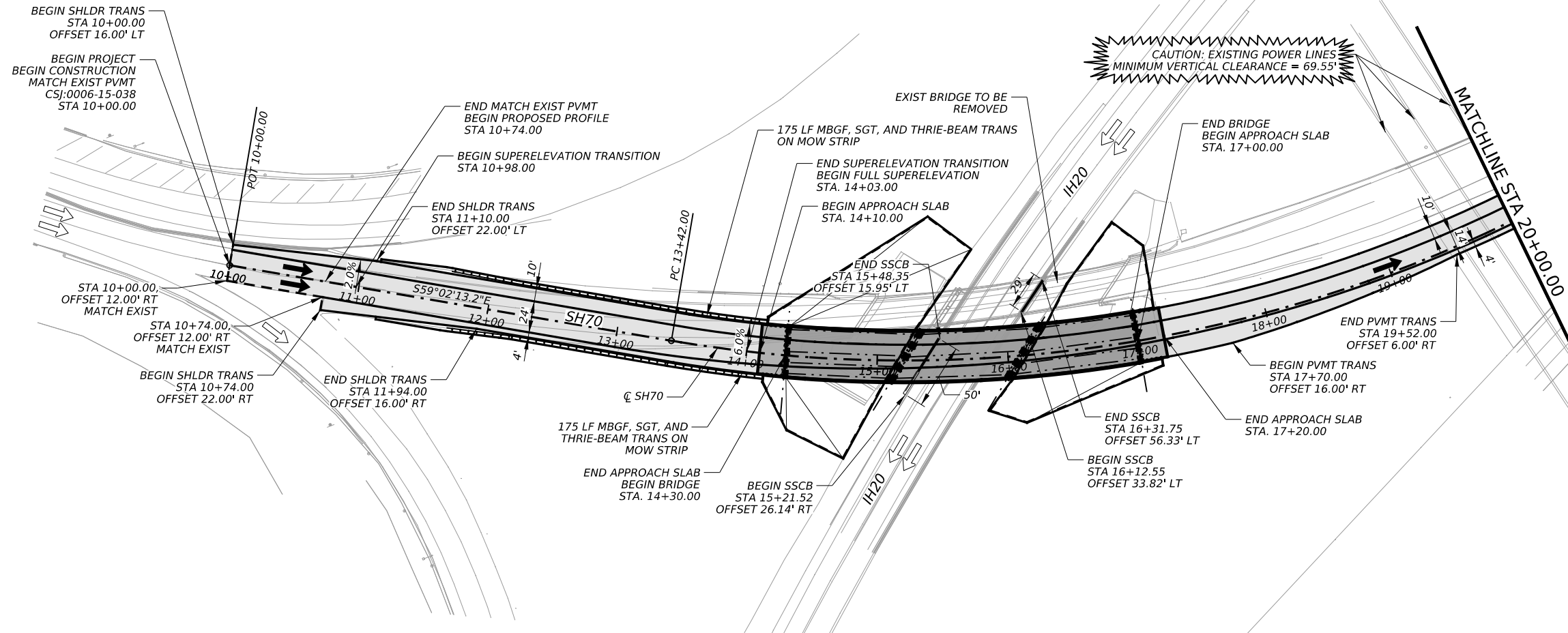


SH 70

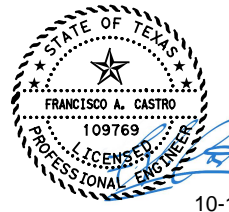
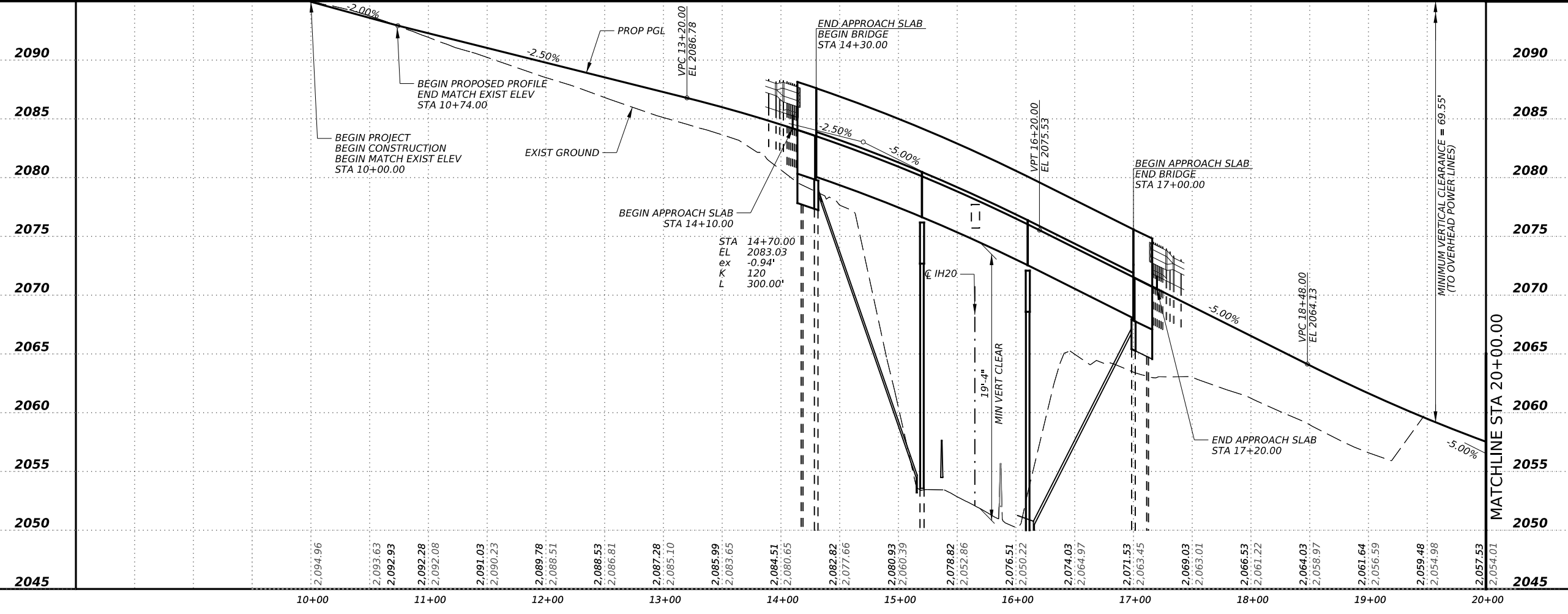
REMOVAL LAYOUT

SCALE: 1"=100' SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	49	



- NOTES:**
1. CONTRACTOR SHALL VERIFY LOCATIONS OF EXISTING UTILITIES BEFORE ANY TYPE OF CONSTRUCTION.
 2. SEE BRIDGE LAYOUT FOR ADDITIONAL DETAILS.



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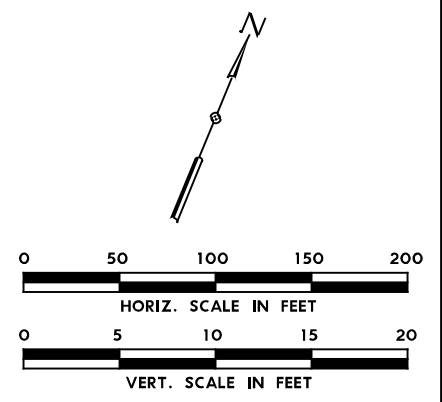
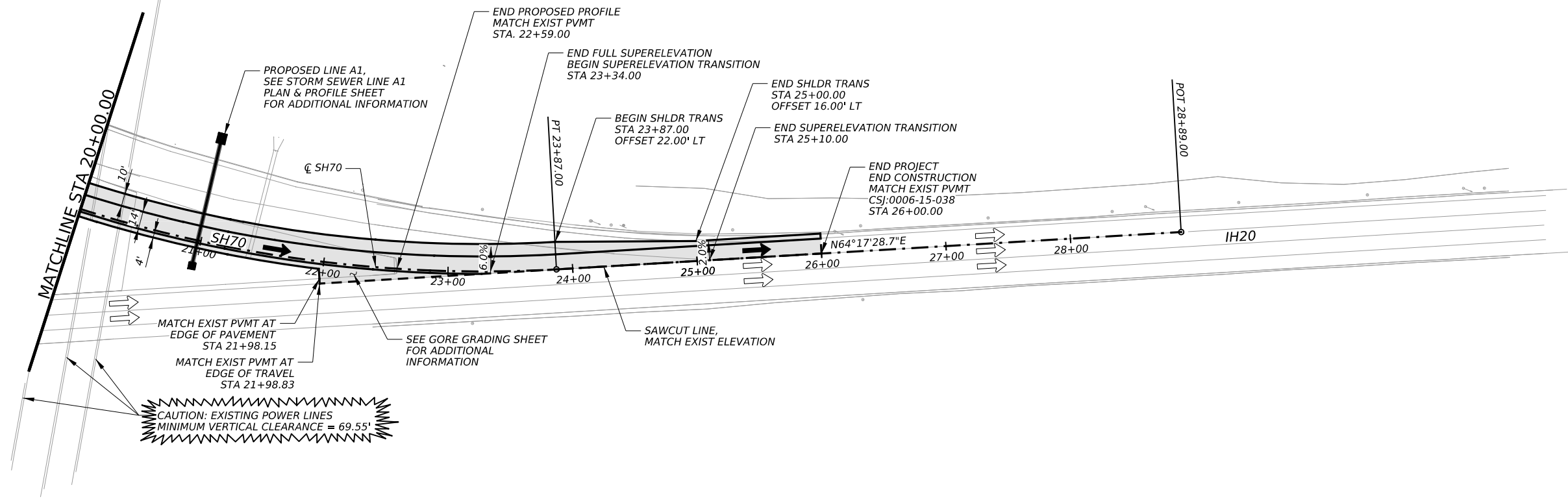
SH 70

PLAN & PROFILE
 BEGIN TO STA 20+00.00

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

SHEET 1 OF 2

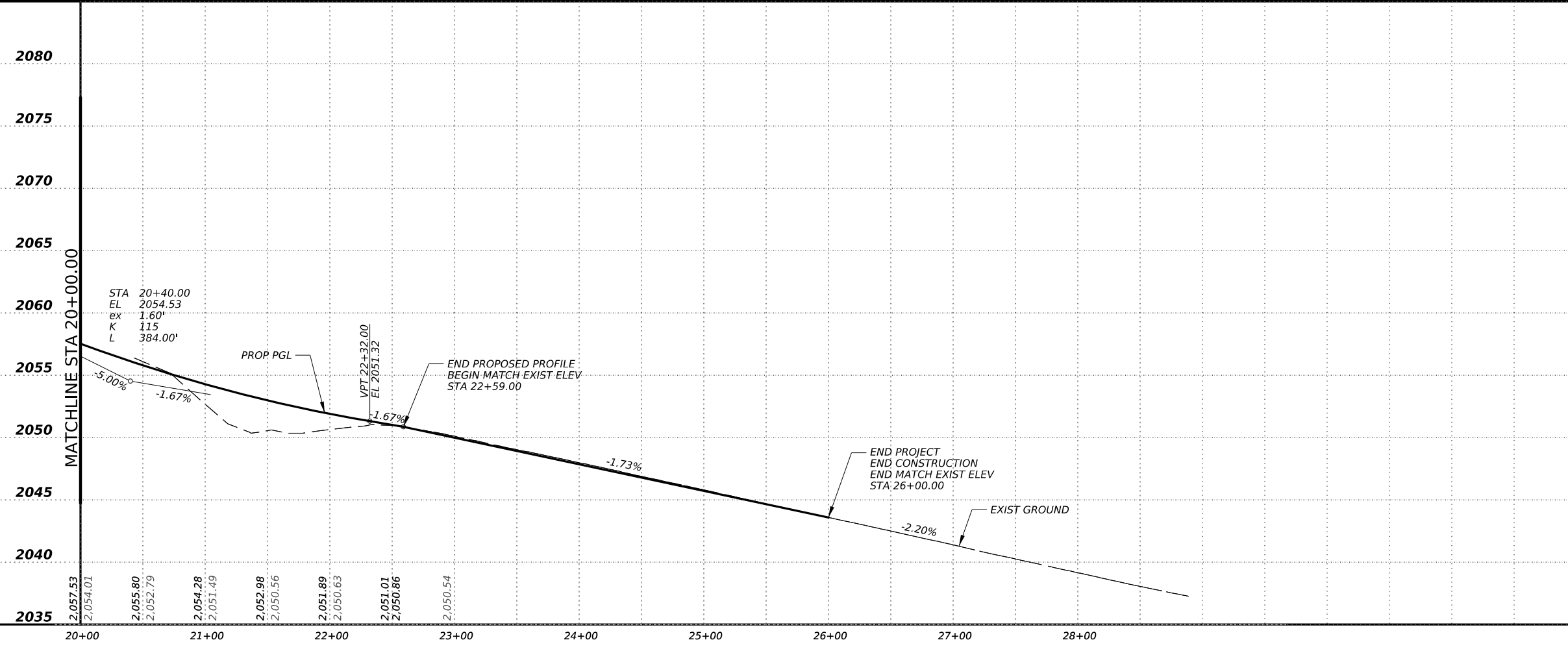
CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	50	



LEGEND

- METAL BEAM GUARD FENCE
- PROP TRAFFIC FLOW
- EXIST TRAFFIC FLOW

- NOTES:**
1. CONTRACTOR SHALL VERIFY LOCATIONS OF EXISTING UTILITIES BEFORE ANY TYPE OF CONSTRUCTION.
 2. SEE BRIDGE LAYOUT FOR ADDITIONAL DETAILS.



2080	2080
2075	2075
2070	2070
2065	2065
2060	2060
2055	2055
2050	2050
2045	2045
2040	2040
2035	2035

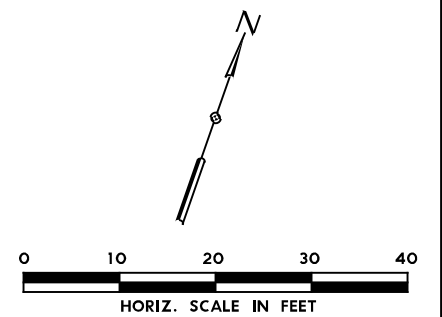
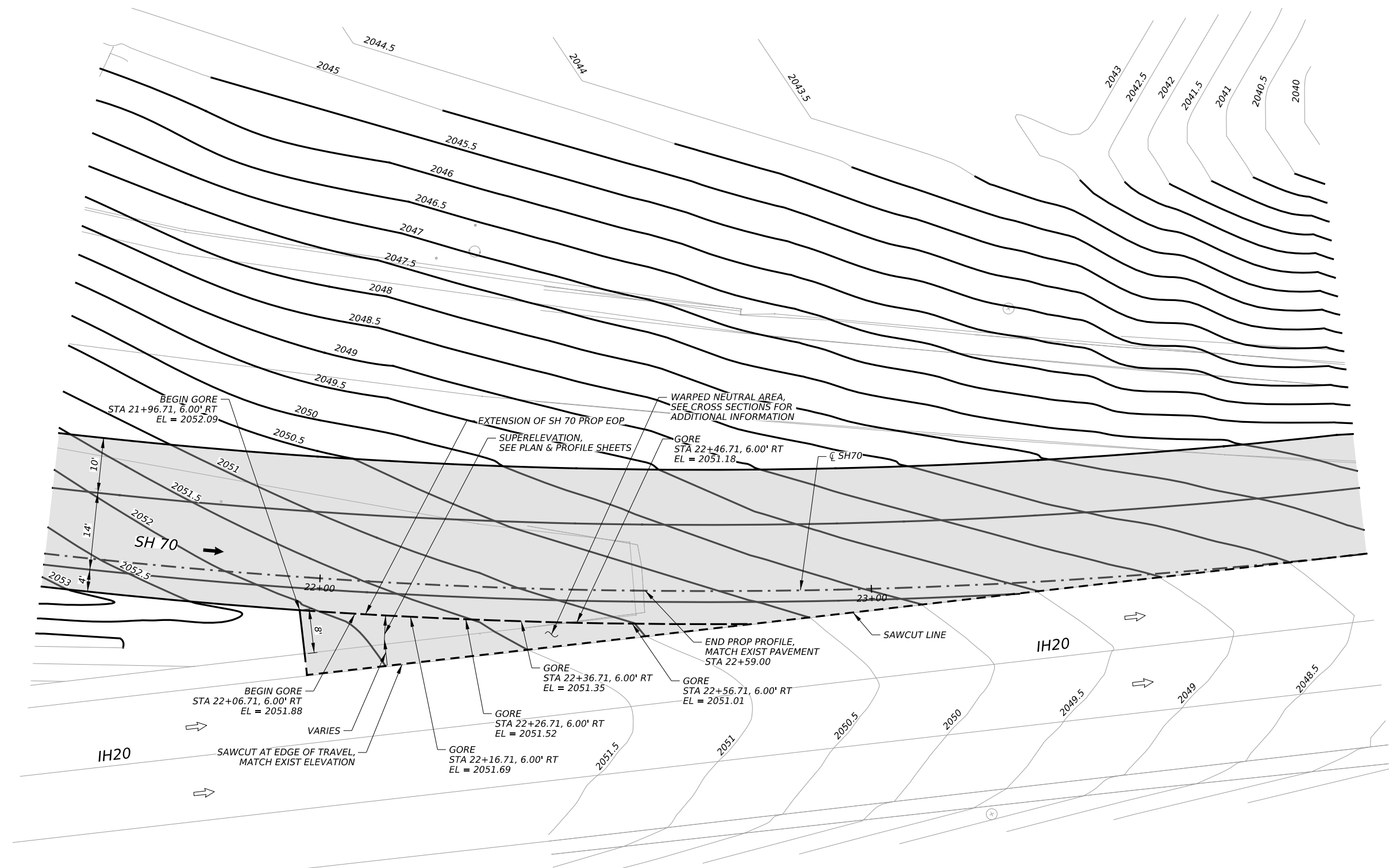
10-13-2023

SH 70

PLAN & PROFILE

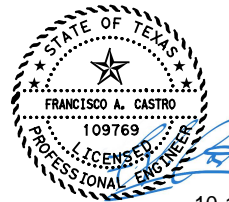
STA. 20+00.00 TO END

SCALE: 1"=100'-H		SHEET 2 OF 2	
1"=10'-V			
CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	51	



- LEGEND**
- PROP TRAFFIC FLOW
 - EXIST TRAFFIC FLOW
 - EXIST CONTOURS
 - PROP CONTOURS
 - SAWCUT

NOTES:
 1. SEE PLAN AND PROFILE SHEET AND CROSS SECTIONS FOR ADDITIONAL INFORMATION.



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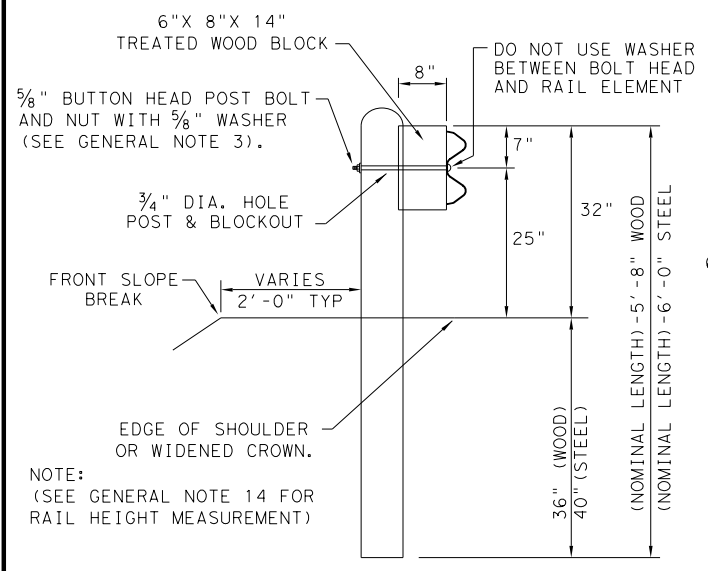
SH 70
GORE GRADING

SCALE: 1"=20' SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	52	

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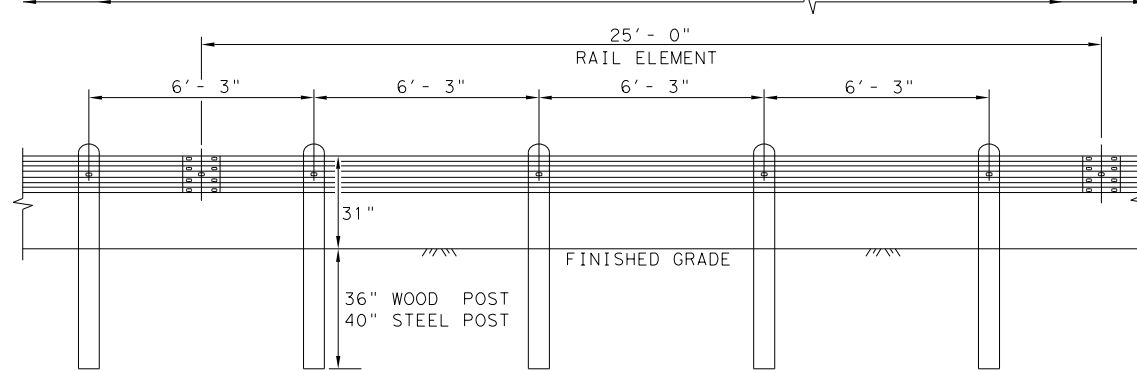
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TYPICAL POST PLACEMENT

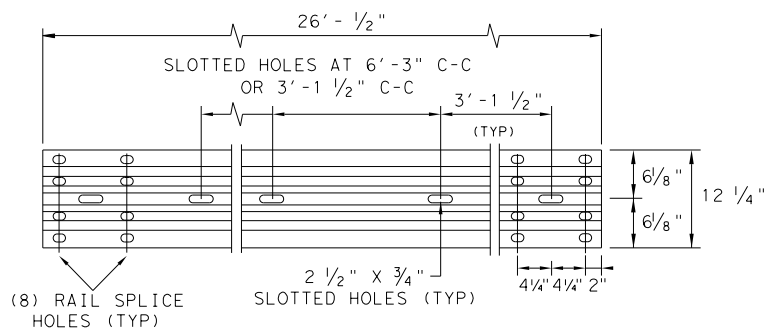
NOTE: ** "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.

MBGF LENGTH OF NEED (L)



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.

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

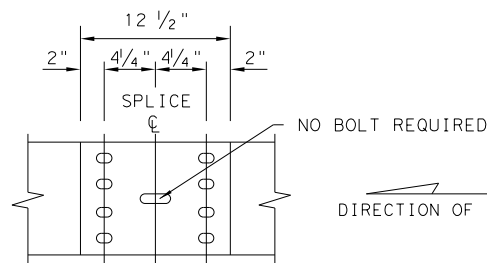
SPLICE BOLT LENGTH VARIES

FBB01 = 1 1/4"
 FBB02 = 2"

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

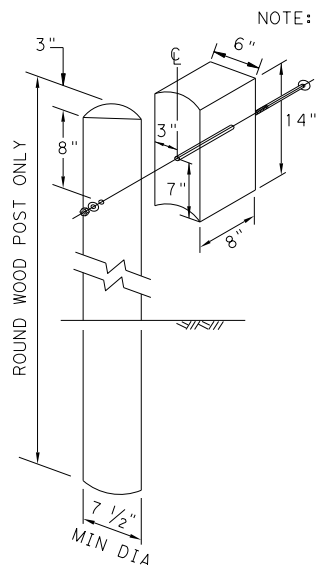
BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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



WOOD BLOCK TO ROUND WOOD POST

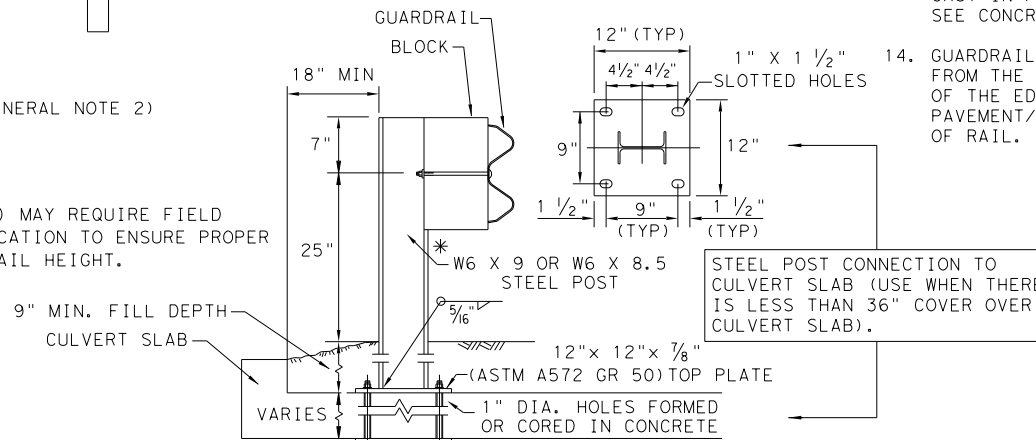
WOOD BLOCK TO RECTANGULAR WOOD POST

ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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

- GENERAL NOTES
1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
 2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25' - 0", OR 12' - 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 1/2" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE DOWNSTREAM ANCHOR TERMINAL (DAT) AND THE TRANSITION SECTIONS OF GUARDRAIL.
 3. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 5/8" WASHER (FWC16g) 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.

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



LOW FILL CULVERT POST

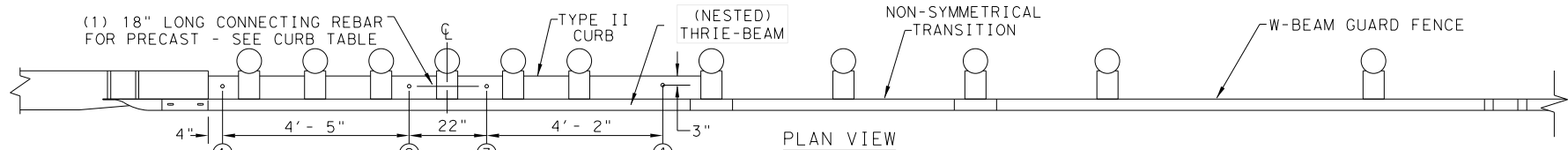
NOTE: TWO INSTALLATION OPTIONS.

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

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

				Design Division Standard
METAL BEAM GUARD FENCE TL-3 MASH COMPLIANT GF(31)-19				
FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
© TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0006	15	038	SH 70
	DIST	COUNTY	SHEET NO.	
	ABL	NOLAN	53	

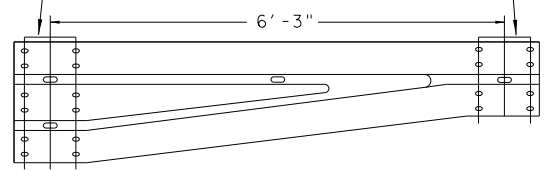
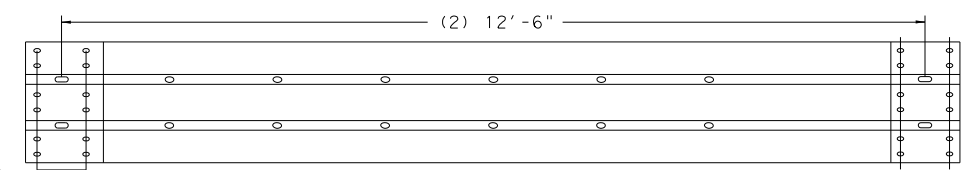
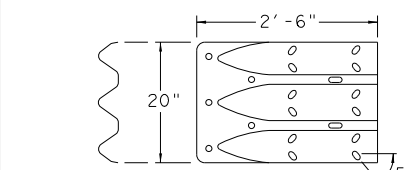
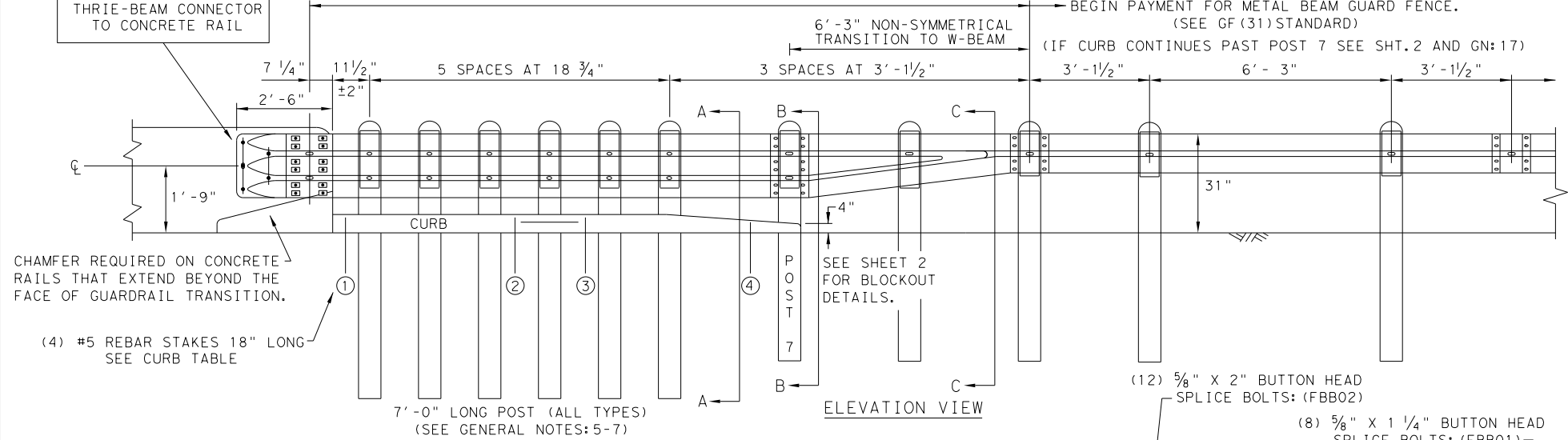
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 DISCLAIMER: THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT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



- (5) 1" DIA. HOLES.
- (5) 7/8" DIA. HEAVY HEX HEAD BOLTS (FACING TRAFFIC SIDE) (ASTM F3125 GR A325 OR A449).
- (10) 1 3/4" O.D. WASHER UNDER EACH HEX BOLT HEAD AND NUT.
- (5) 7/8" DIA. HEAVY HEX NUTS (ASTM A194 OR A563).

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

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



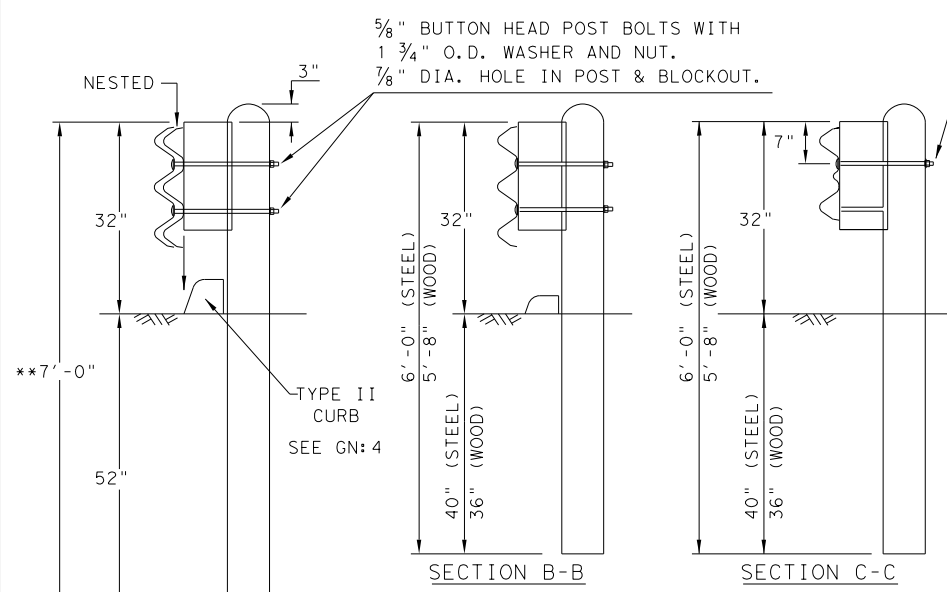
THRIE-BEAM TERMINAL CONNECTOR 10GA.
PART DESIGNATOR RTE01b
NOTE: SEE GENERAL NOTE: 9

NESTED THRIE-BEAM RAIL
PART DESIGNATOR RTM10a
(12) 5/8" X 2" BUTTON HEAD SPLICE BOLTS WITH RECESSED NUTS: (FBB02)
(12) RECTANGULAR GUARDRAIL PLATE WASHERS: (FWR03)

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

PLATE WASHER INSTRUCTIONS

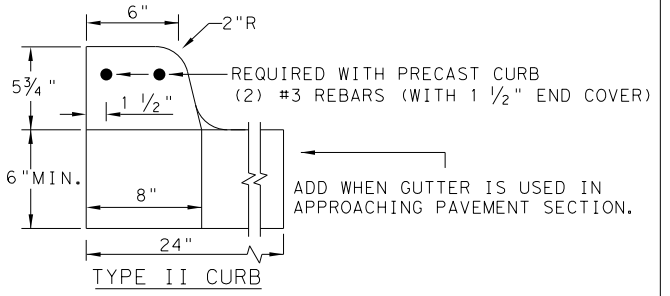
BRIDGE APPROACH - UPSTREAM: THE NESTED RAIL LAPS OVER THE TERMINAL CONNECTOR. PLATE WASHERS ARE INSTALLED UNDER THE SPLICE NUTS AGAINST INSIDE OF CONNECTOR.
BRIDGE EXIT - DOWNSTREAM: THE TERMINAL CONNECTOR LAPS OVER THE NESTED RAIL. PLATE WASHERS ARE INSTALLED UNDER THE BOLT HEAD AGAINST OUTSIDE OF CONNECTOR.



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

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

* 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.



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

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 (5-3/4" HEIGHT); SEE CURRENT CCG 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 1/2" 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 5/8" 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 5/8" 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

		Design Division Standard	
<h2>METAL BEAM GUARD FENCE</h2> <h3>THRIE-BEAM TRANSITION</h3> <h3>TL-3 MASH COMPLIANT</h3> <h2>GF (31) TR TL3-20</h2>			
FILE: gf31tr+1320.dgn	DN: TxDOT	CK: KM	DW: VP
© TXDOT: NOVEMBER 2020	CONT	SECT	JOB
REVISIONS	0006	15	038
DIST	COUNTY	SHEET NO.	
ABL	NOLAN	54	

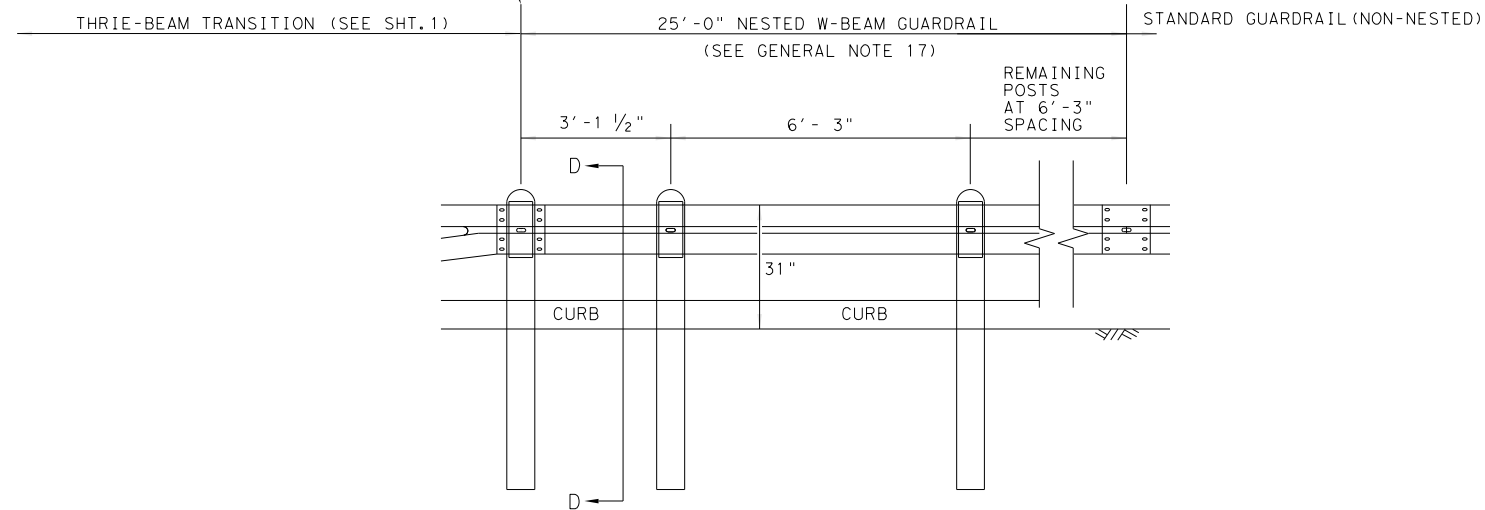
DISCLAIMER:
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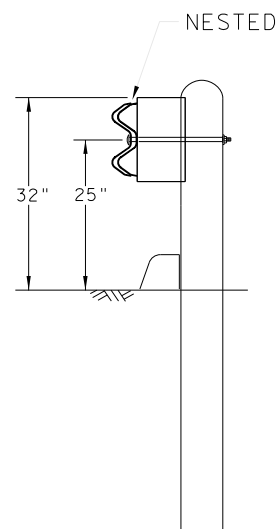
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)

END PAYMENT FOR METAL BEAM GUARD FENCE TRANSITION.
 BEGIN PAYMENT FOR METAL BEAM GUARD FENCE.

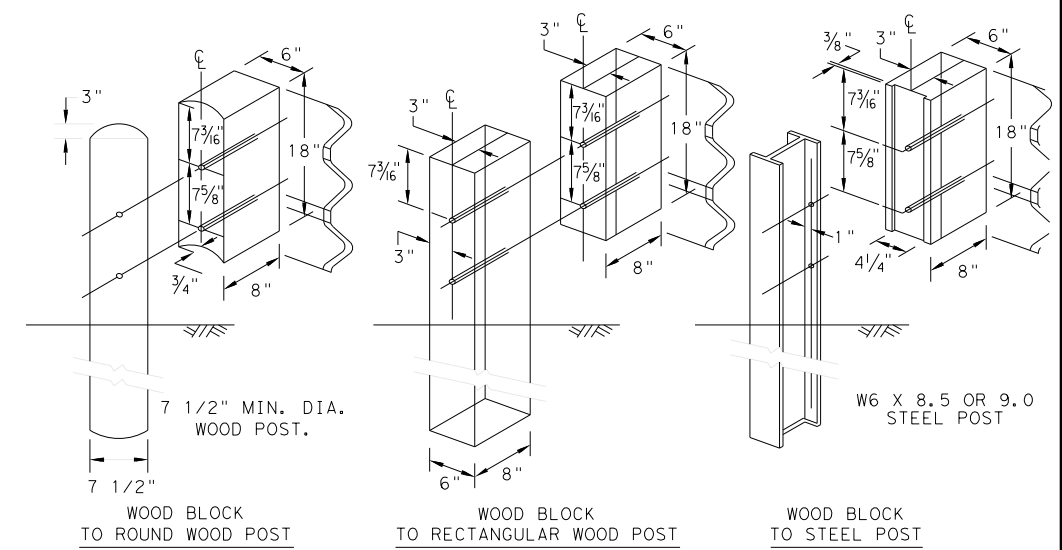
(SEE GF (31) STANDARD SHEET)



ELEVATION VIEW



SECTION D-D



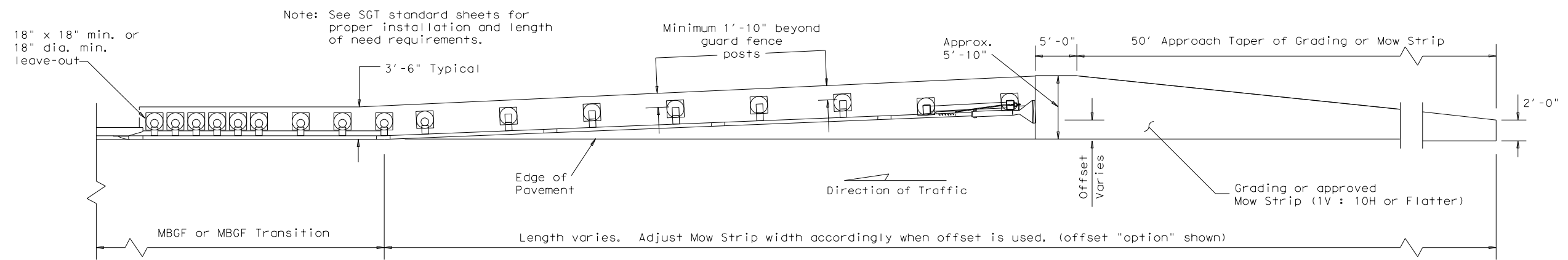
THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

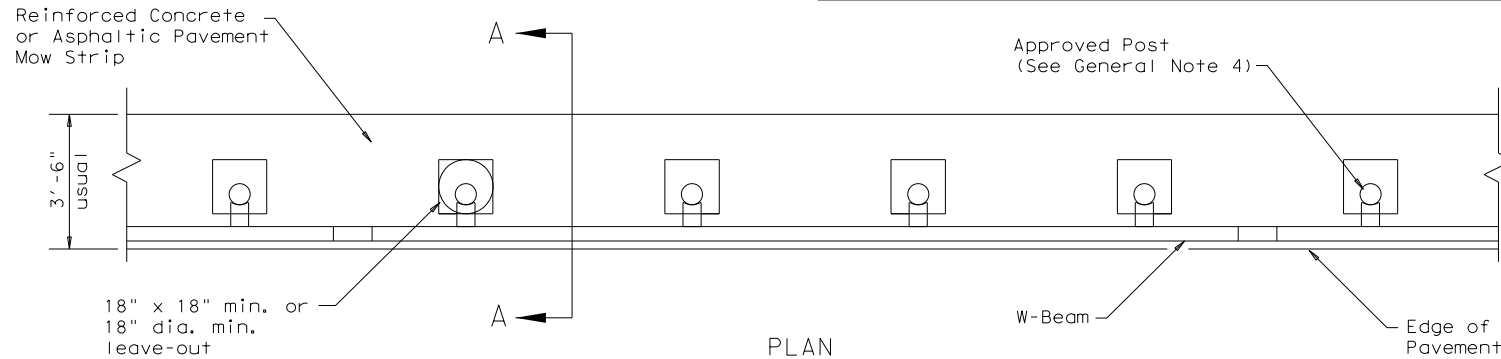
				Design Division Standard
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT GF (31) TR TL3-20				
FILE: gf31tr+1320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG
©TXDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS		0006	15	038 SH 70
DIST	COUNTY		SHEET NO.	
ABL	NOLAN		55	

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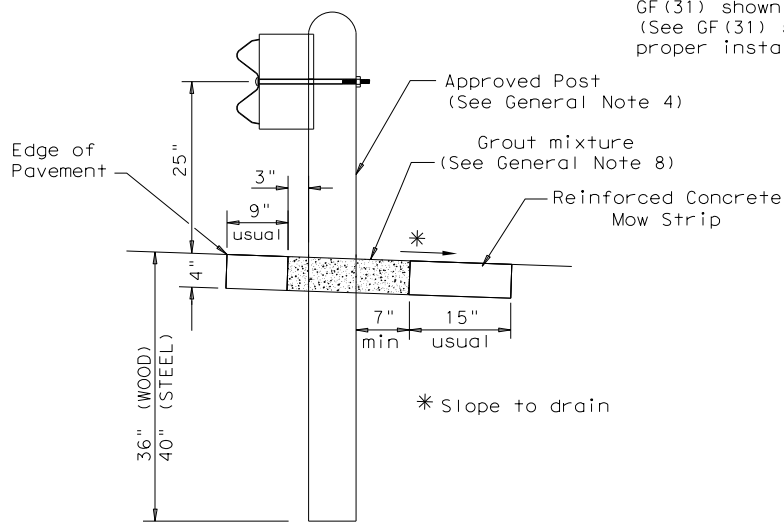
GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS

Note: Site Condition(s)
 Site conditions may exist where grading is required for the proper installation of metal guard fence and end treatments.
 Approach grading or mow strip may be decreased or eliminated, as directed by the Engineer.

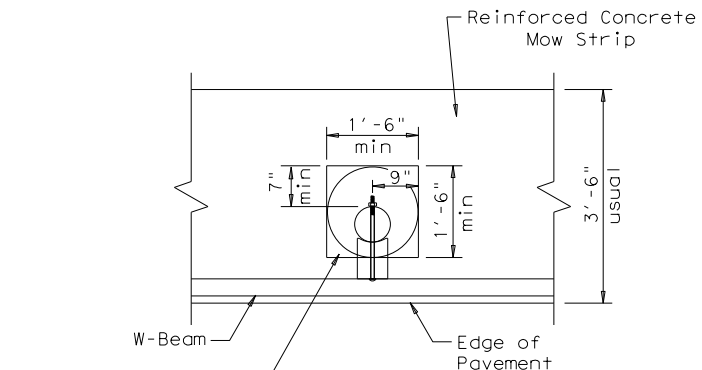


PLAN

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



SECTION A-A
 Typical

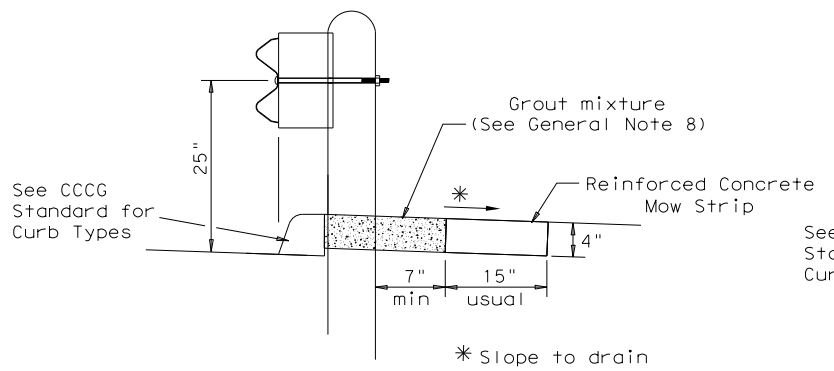


MOW STRIP DETAIL

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

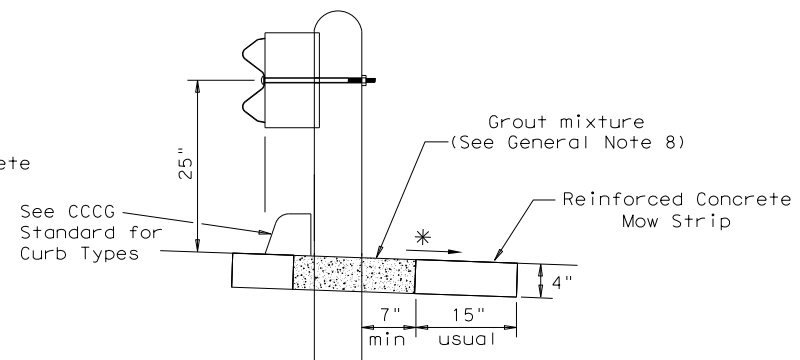
Fill leave-out with Grout mixture
 (See General Note 8)

- GENERAL NOTES**
- 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.
 - 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.
 - The leave-out behind the post shall be a minimum of 7".
 - Only steel (W6 x 8.5 or W6 x 9.0), or 7 1/2" Dia. round wood posts are acceptable for use in the mow strip. See GF(31) Standard for additional details.
 - 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.
 - Thickness of the mow strip will be 4".
 - The limits of payment for reinforced concrete will include leave-outs for the posts.
 - 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.



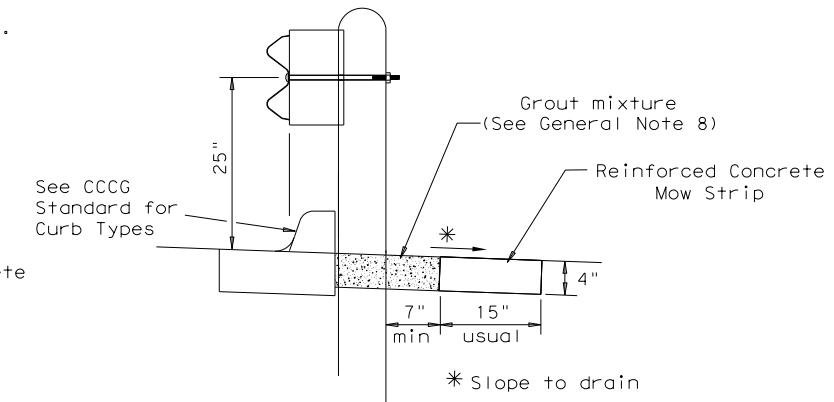
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

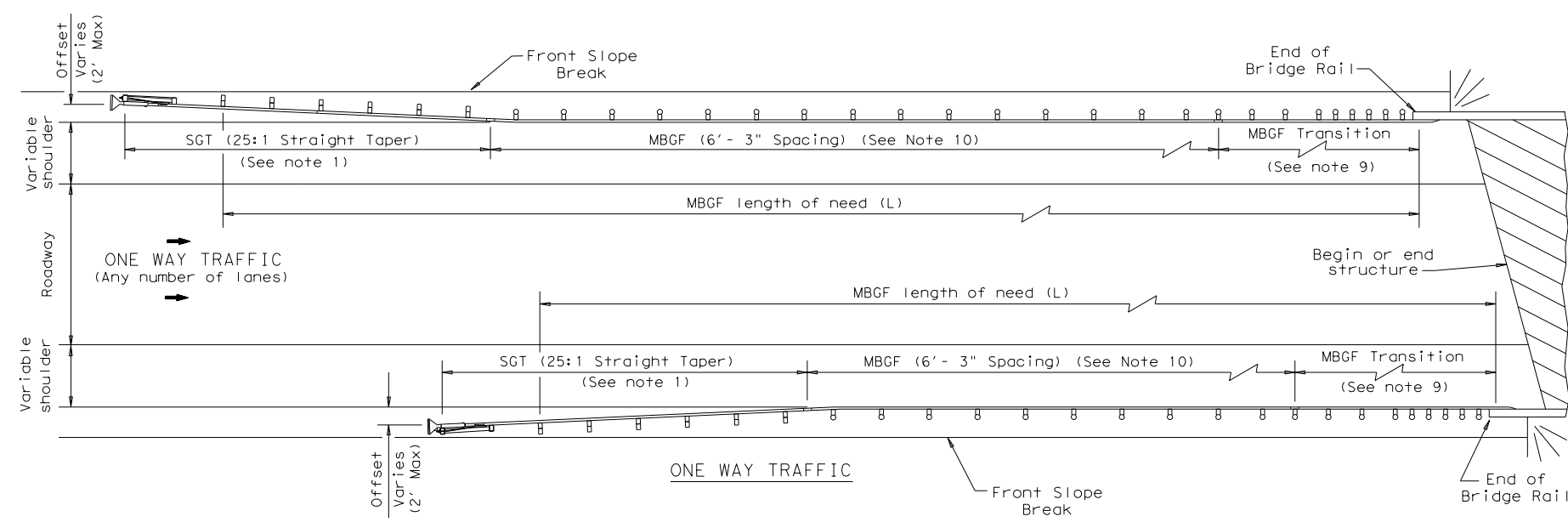
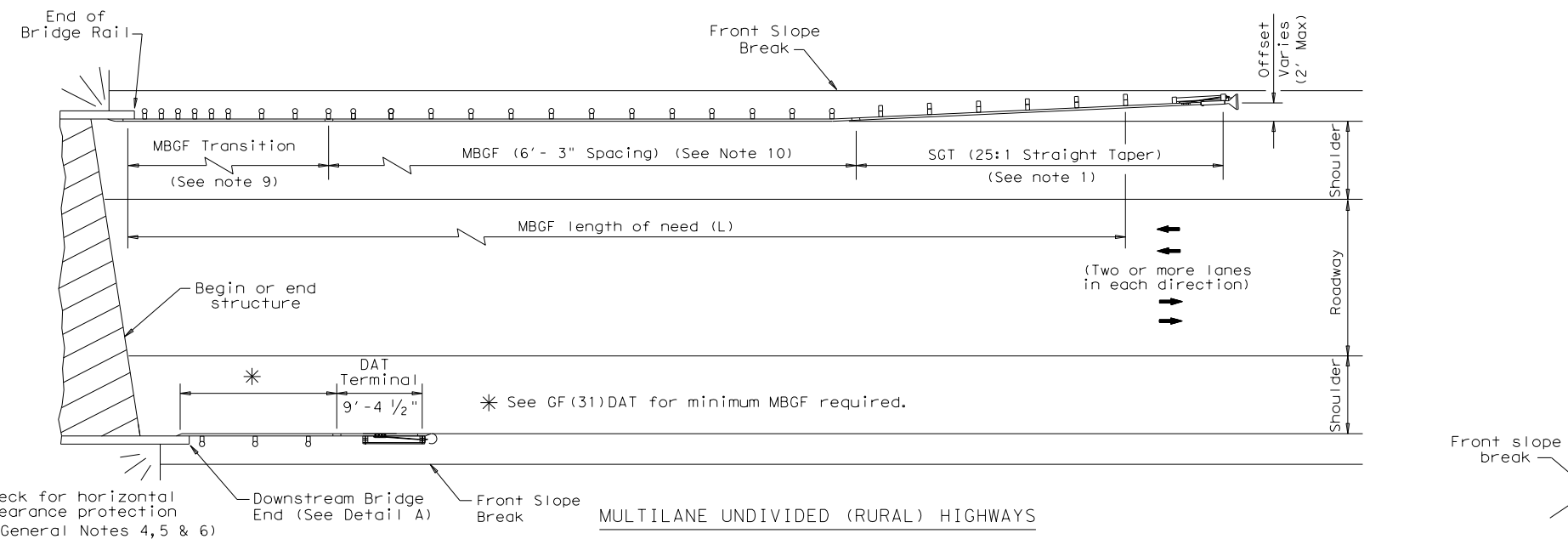
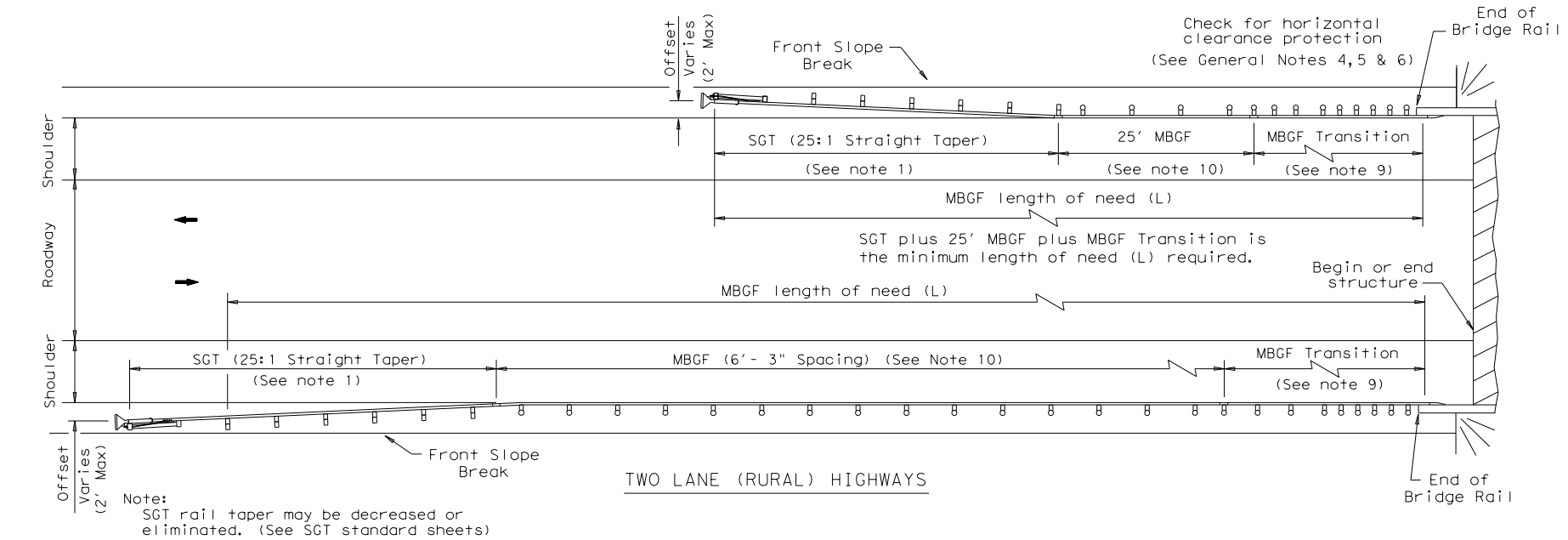


METAL BEAM GUARD FENCE (MOW STRIP) TL-3 MASH COMPLIANT GF(31)MS-19

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©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0006	15	038	SH 70
	DIST	COUNTY	SHEET NO.	
	ABL	NOLAN	56	

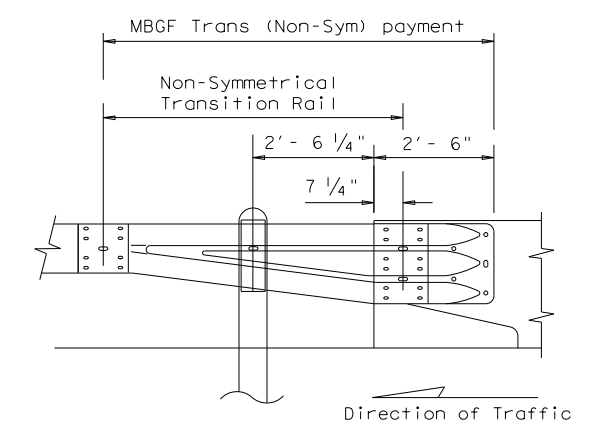
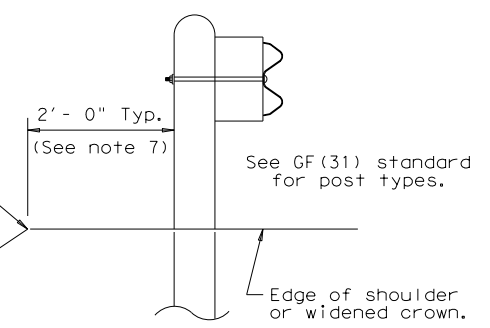
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GENERAL NOTES

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.

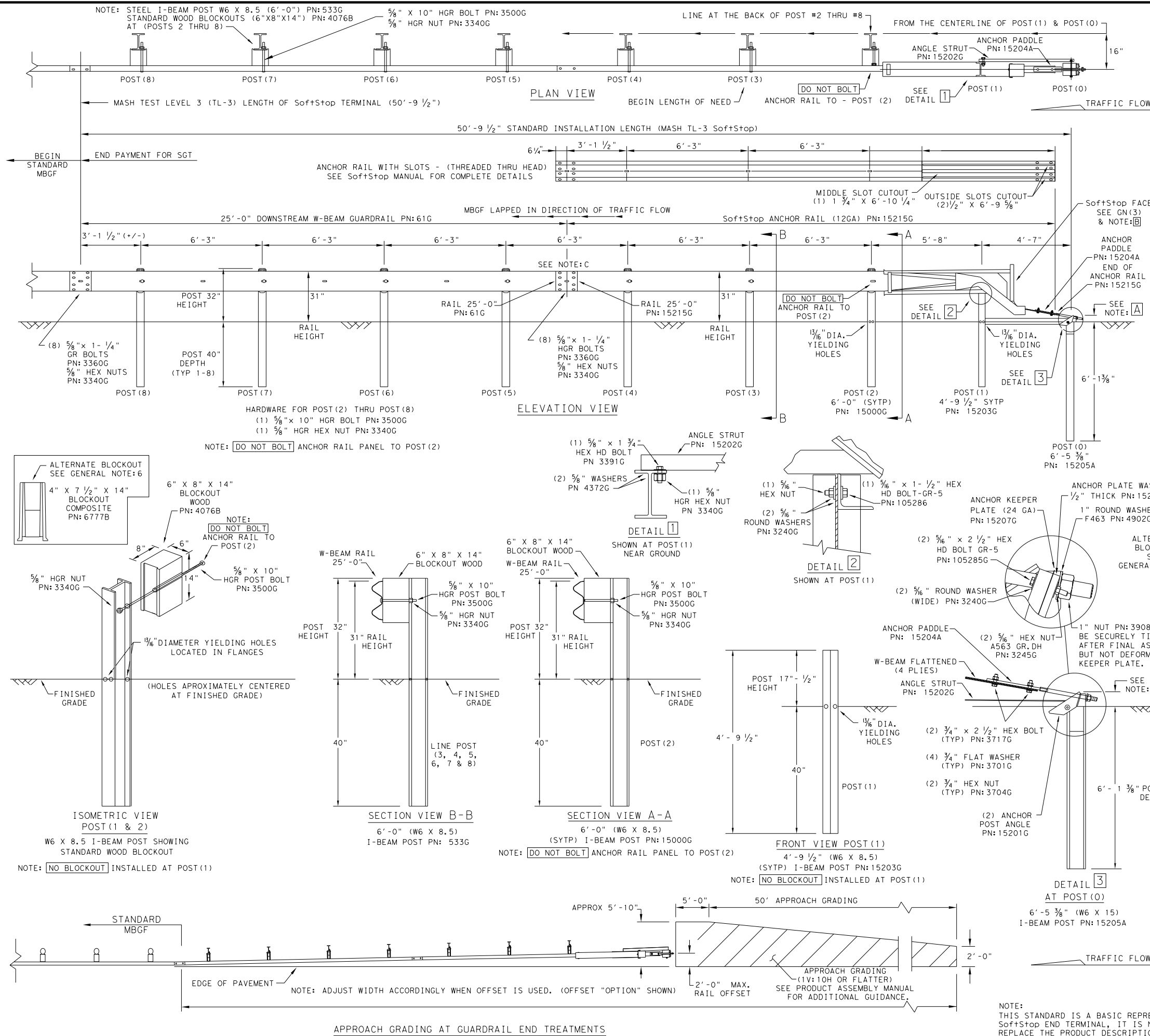


Note: All rail elements shall be lapped in the direction of adjacent traffic.

		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
© TxDOT: December 2011	CONT	SECT	JOB
REVISIONS	0006	15	038
REVISED APRIL 2014 SEE (MEMO 0414)	DIST	COUNTY	SHEET NO.
	ABL	NOLAN	57

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- GENERAL NOTES**
- 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
 - FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE; SoftStop END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL. PN: 620237B
 - APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
 - FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TxDOT'S LATEST ROADWAY MOW STRIP STANDARD.
 - HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
 - 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.
 - IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL AND REFER TO THE LATEST ROADWAY MBBG STANDARD FOR INSTALLATION GUIDANCE.
 - POSTS SHALL NOT BE SET IN CONCRETE.
 - IT IS ACCEPTABLE TO INSTALL THE SoftStop IMPACT HEAD PARALLEL TO THE GRADE LINE OR WITH AN UPWARD TILT.
 - DO NOT ATTACH THE SoftStop SYSTEM DIRECTLY TO A RIGID BARRIER.
 - UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE SoftStop SYSTEM BE CURVED.
 - 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

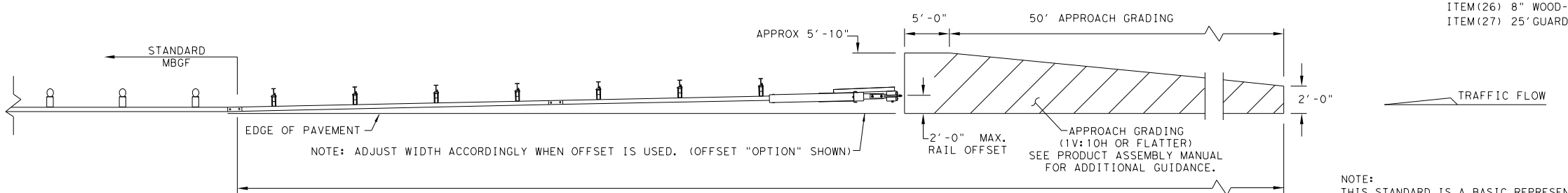
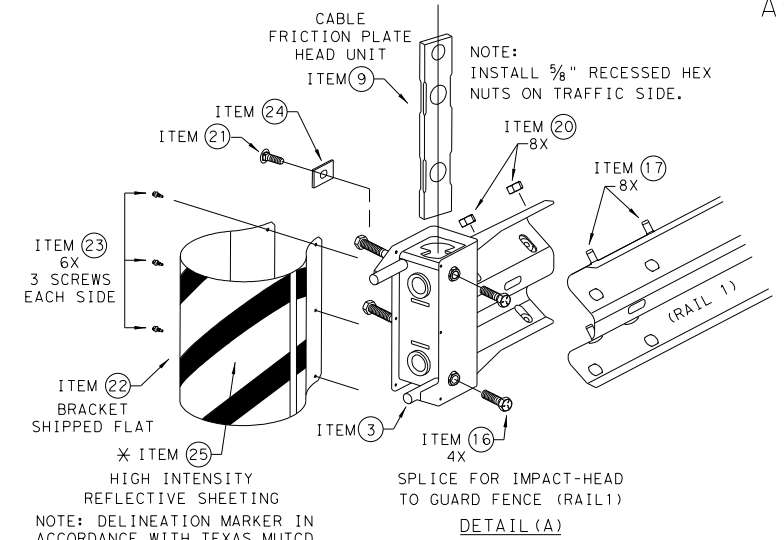
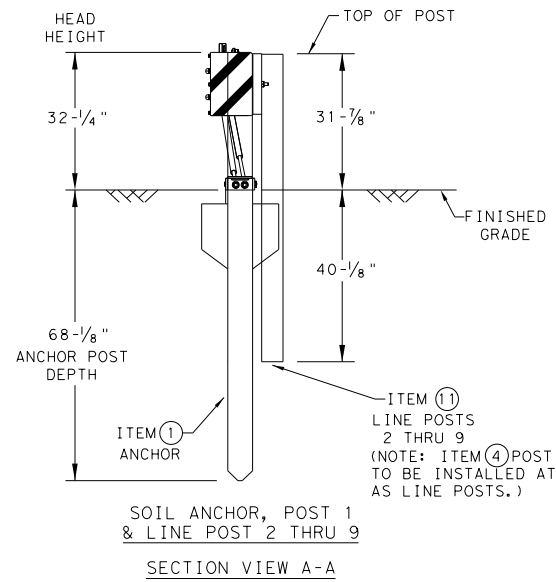
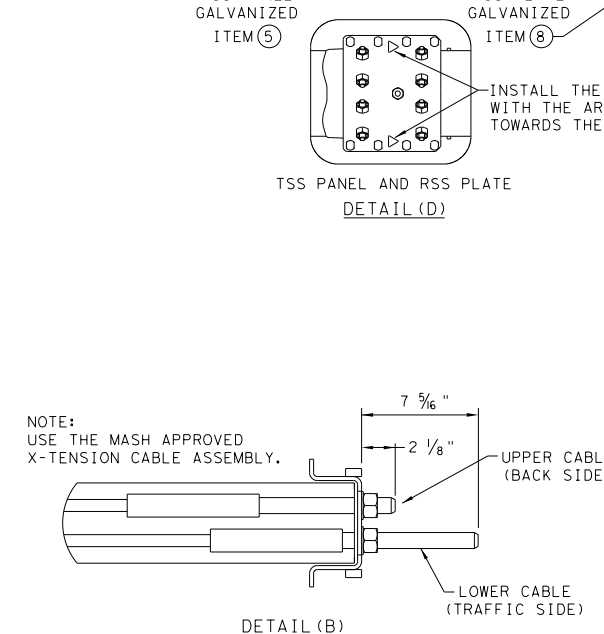
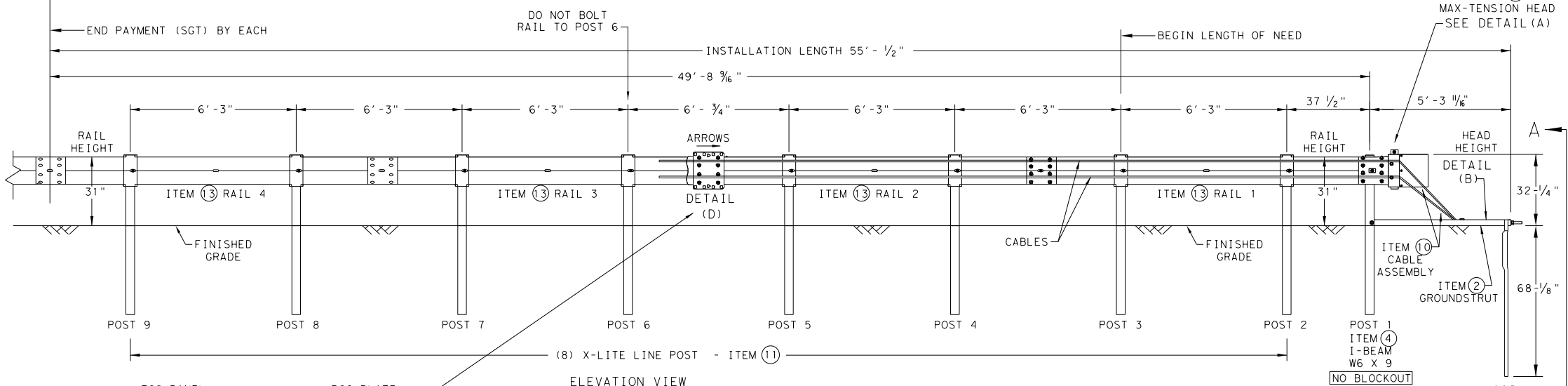
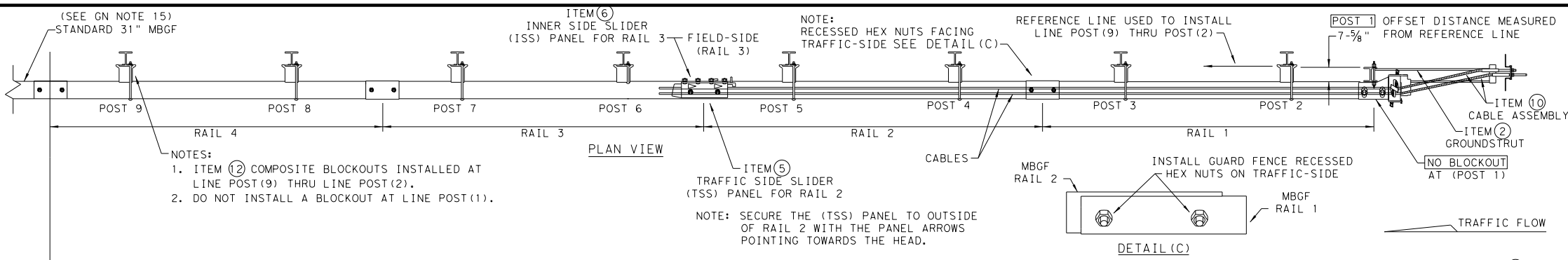
HARDWARE		
4902G	1	1" ROUND WASHER F436
3908G	1	1" HEAVY HEX NUT A563 GR.DH
3717G	2	3/4" x 2 1/2" HEX BOLT A325
3701G	4	3/4" ROUND WASHER F436
3704G	2	3/4" HEAVY HEX NUT A563 GR.DH
3360G	16	5/8" x 1 1/4" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	5/8" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	5/8" x 10" HGR POST 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

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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GENERAL NOTES

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

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

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



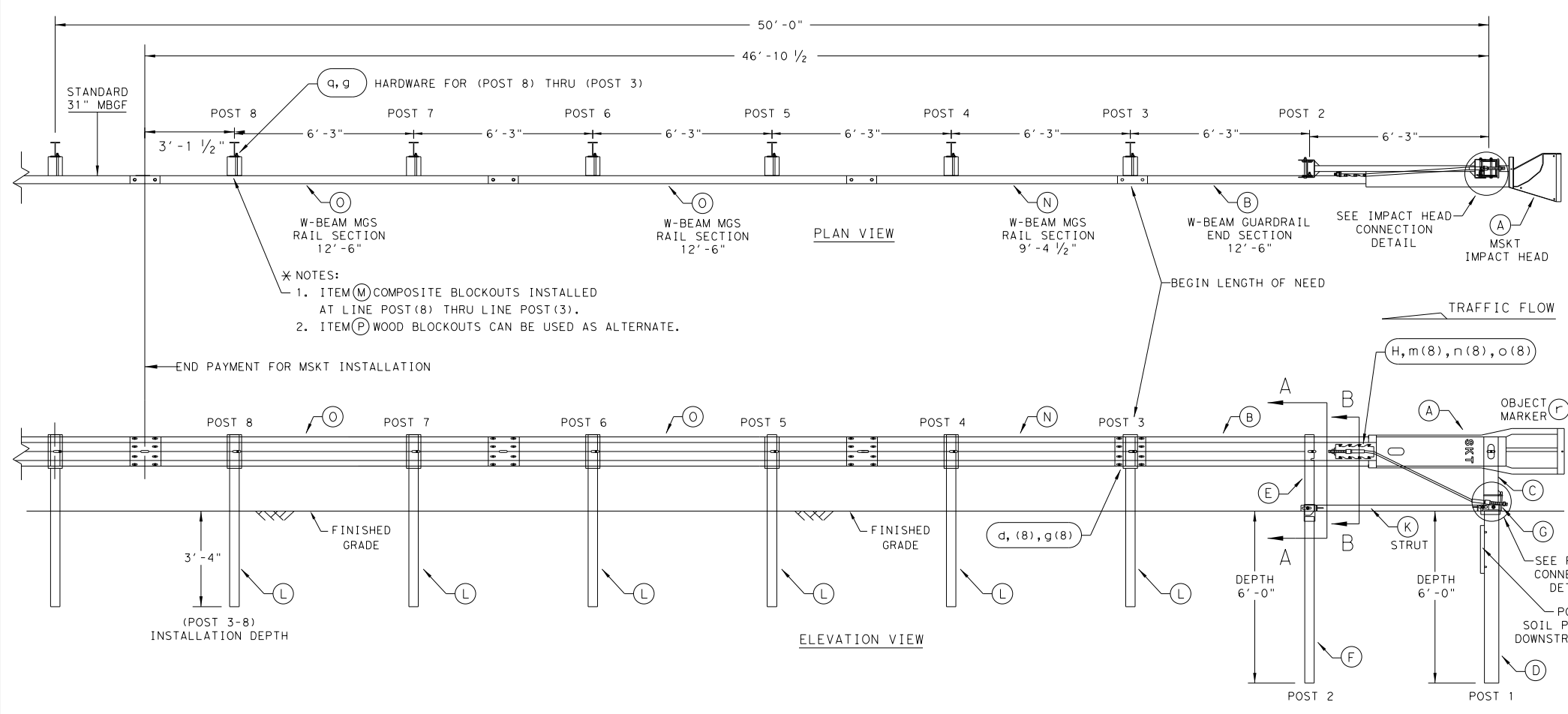
MAX-TENSION END TERMINAL
MASH - TL-3
SGT (11S) 31-18

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0006 15	038	SH 70	
	DIST	COUNTY	SHEET NO.	
	ABL	NOLAN	59	

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

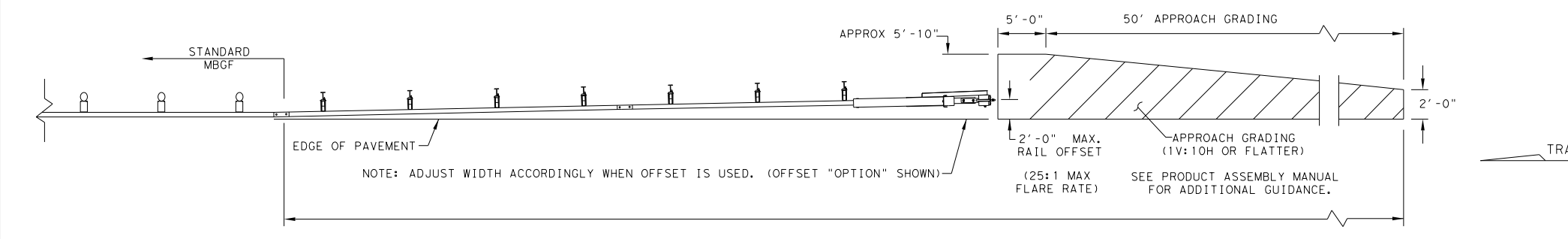
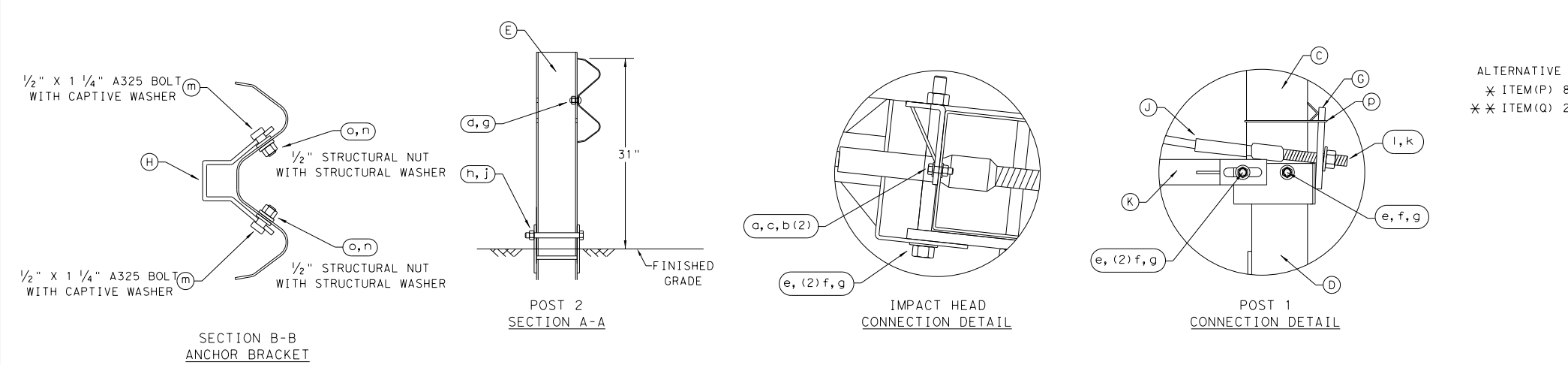
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- GENERAL NOTES**
- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: ROAD SYSTEMS, INC. (432)263-2435. 3616 OLD HOWARD COUNTY AIRPORT, BIG SPRING, TX 79720
 - FOR INSTALLATION, REPAIR AND MAINTENANCE REFER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

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



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.

Design Division Standard

SINGLE GUARDRAIL TERMINAL

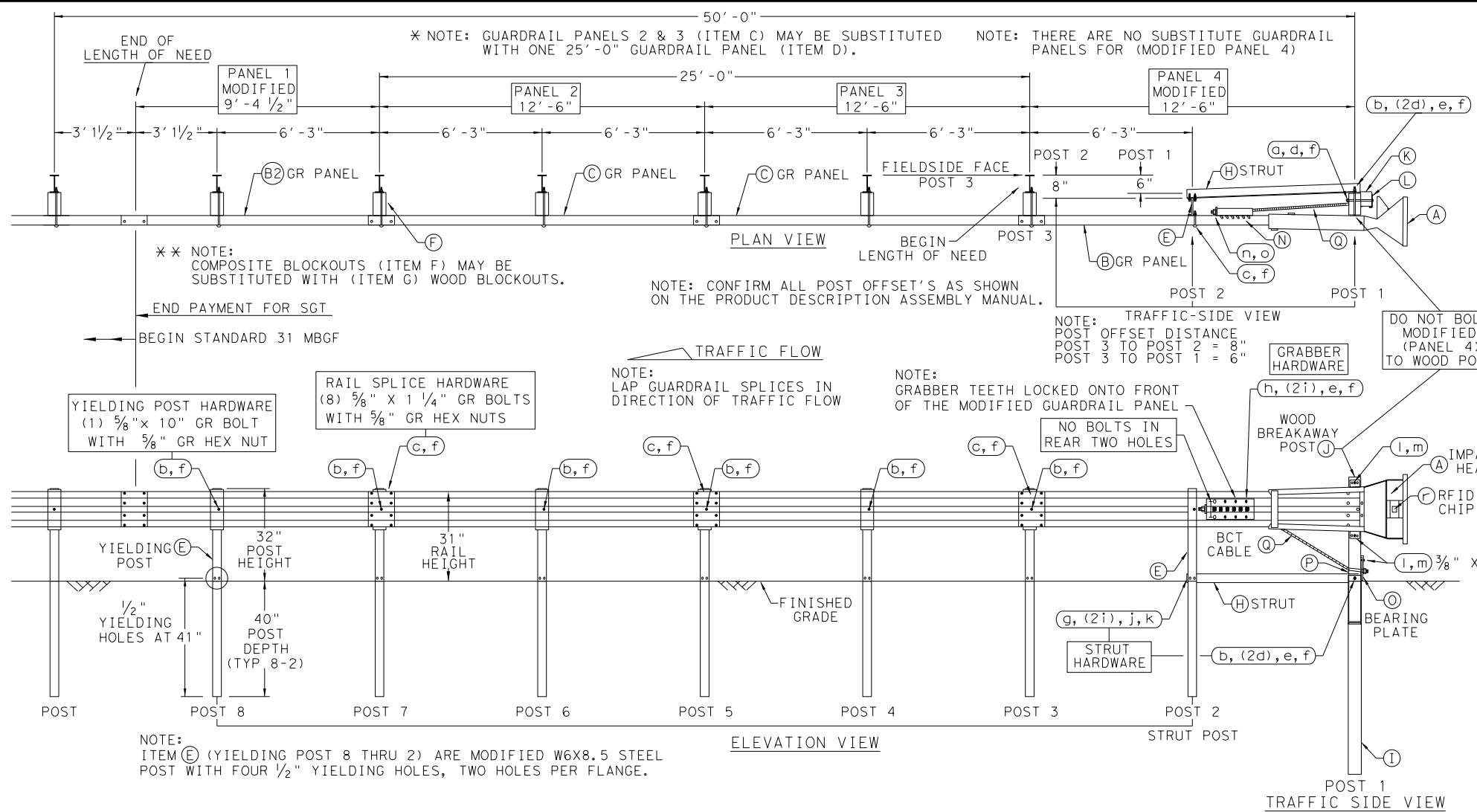
MSKT-MASH-TL-3

SGT (12S) 31-18

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DIST	COUNTY	SHEET NO.		
ABL	NOLAN	60		

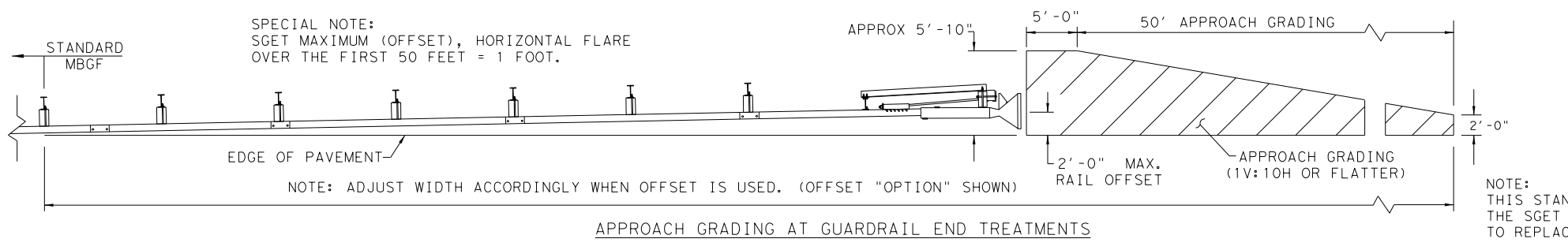
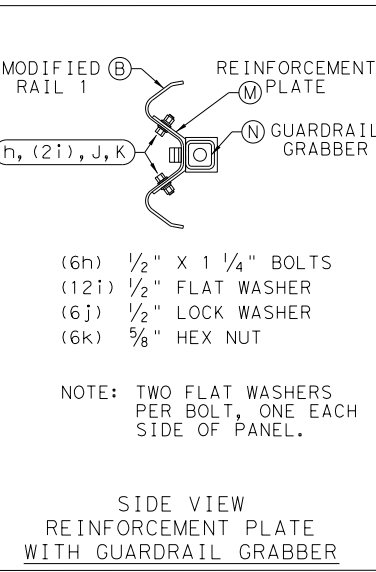
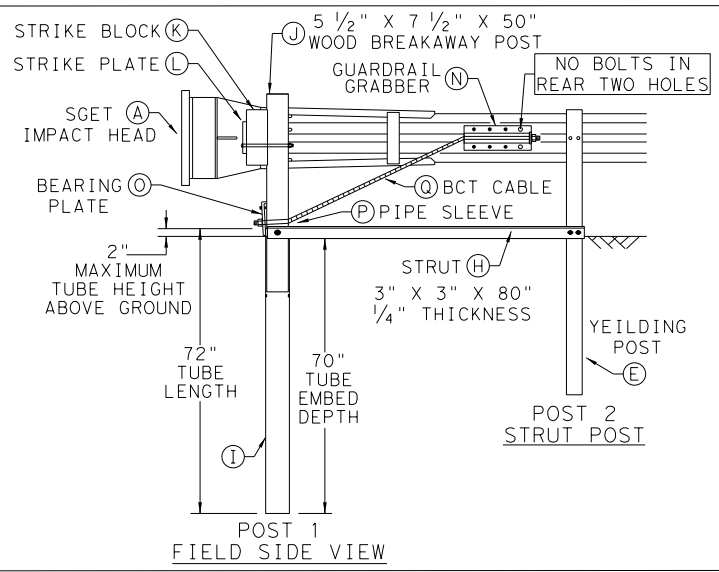
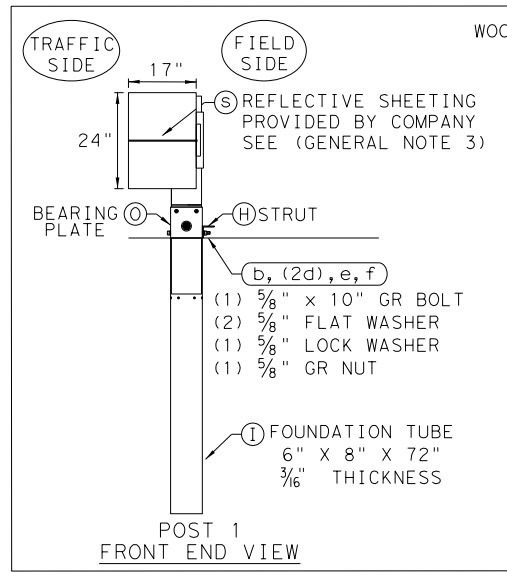
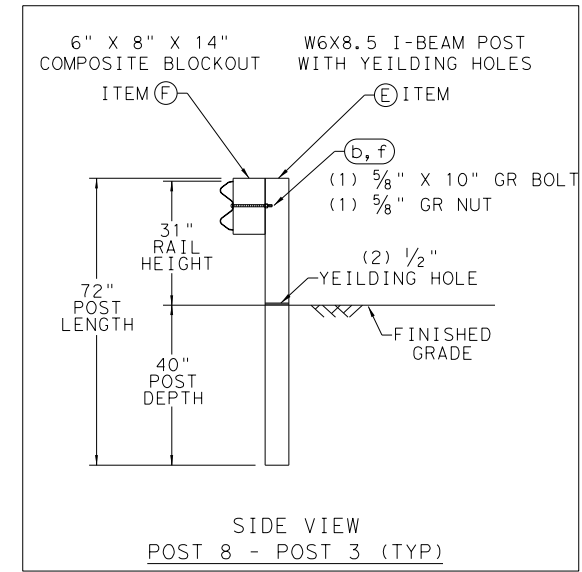
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- GENERAL NOTES**
- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
 - FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL.
 - MANUFACTURER WILL APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" TO THE FACE PLATE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. THE OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
 - THE NOMINAL HEIGHT OF THE GUARDRAIL BEAM IS 31 INCHES WITH A TOLERANCE OF +/- ONE INCH.
 - FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
 - (POST 2 THROUGH POST 8) ARE MODIFIED STEEL-YIELDING POSTS WITH YIELDING HOLES AT GROUND LEVEL. THERE ARE NO SUBSTITUTE POSTS.
 - POSTS SHALL NOT BE SET IN CONCRETE.
 - IF SOLID ROCK IS ENCOUNTERED FOR ANY OF THE POSTS IN THE SYSTEM, CONTACT THE MANUFACTURER FOR SPECIFIC INSTALLATION GUIDANCE.
 - HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
 - A COMPOSITE MATERIAL BLOCKOUT THAT MEETS DMS-7210 REQUIREMENTS MAY BE SUBSTITUTED FOR AN APPROVED WOOD BLOCKOUT. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
 - THE ENTIRE SYSTEM MUST BE INSTALLED IN A STRAIGHT LINE WITHOUT ANY CURVE. HOWEVER, THE SYSTEM CAN BE OFFSET BY TWO FEET AS SHOWN ON THE APPROACH GRADING DETAIL TO HELP OFF-SET THE IMPACT HEAD FROM SHOULDER OF THE ROAD.

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM #
A	1	SGET IMPACT HEAD	SIH1A
B	1	MODIFIED GUARDRAIL PANEL 12'-6" 12GA	126SPZGP
B2	1	MODIFIED GUARDRAIL PANEL 9'-4 1/2" 12GA	GP94
C	2	STANDARD GUARDRAIL PANEL 12'-6" 12GA	GP126
D	1	STANDARD GUARDRAIL PANEL 25'-0" 12GA	GP25
E	7	MODIFIED YIELDING I-BEAM POST W6x8.5	YP6MOD
F	6	COMPOSITE BLOCKOUT 6" X 8" X 14"	CBO8
G	6	WOOD BLOCKOUT 6" X 8" X 14"	WBO8
H	1	STRUT 3" X 3" X 80" X 1/4" A36 ANGLE	STR80
I	1	FOUNDATION TUBE 6" X 8" X 72" X 3/16"	FNDT6
J	1	WOOD BREAKAWAY POST 5 1/2" X 7 1/2" X 50"	WBRK50
K	1	WOOD STRIKE BLOCK	WSBLK14
L	1	STRIKE PLATE 1/4" A36 BENT PLATE	SPLT8
M	1	REINFORCEMENT PLATE 12 GA. GR55	REPLT17
N	1	GUARDRAIL GRABBER 2 1/2" X 2 1/2" X 16 1/2"	GGR17
O	1	BEARING PLATE 8" X 8 5/8" X 5/8" A36	BPLT8
P	1	PIPE SLEEVE 4 1/4" X 2 3/8" O.D. (2 1/8" I.D.)	PSLV4
Q	1	BCT CABLE 3/4" X 81" LENGTH	CBL81
SMALL HARDWARE			
a	1	5/8" X 12" GUARDRAIL BOLT 307A HDG	12GRBLT
b	7	5/8" X 10" GUARDRAIL BOLT 307A HDG	10GRBLT
c	33	5/8" X 1 1/4" GR SPLICE BOLTS 307A HDG	1GRBLT
d	3	5/8" FLAT WASHER F436 A325 HDG	58FW436
e	1	5/8" LOCK WASHER HDG	58LW
f	39	5/8" GUARDRAIL HEX NUT HDG	58HN563
g	2	1/2" X 2" STRUT BOLT A325 HDG	2BLT
h	6	1/2" X 1 1/4" PLATE BOLT A325 HDG	125BLT
i	16	1/2" FLAT WASHER F436 A325 HDG	12FWF436
j	8	1/2" LOCK WASHER HDG	12LW
k	8	1/2" HEX NUT A563 HDG	12HN563
l	4	3/8" X 3" HEX LAG SCREW GR5 HDG	38LS
m	4	3/8" FLAT WASHER F436 A325 HDG	38FW844
n	2	1" FLAT WASHER F436 A325 HDG	1FWF436
o	2	1" HEX NUT A563HD HDG	1HN563
p	1	18" TO 24" LONG ZIP TIE RATED 175-200LB	ZPT18
q	1	1 1/2" X 4" SCH-40 PVC PIPE	PSPCR4
r	1	RFID CHIP RATED MIL-STD-810F	RFID810F
s	1	IMPACT HEAD REFLECTIVE SHEETING	RS30M



NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE SGET TERMINAL SYSTEM AND IS NOT INTENDED TO REPLACE THE MANUFACTURER'S ASSEMBLY MANUAL.

Texas Department of Transportation

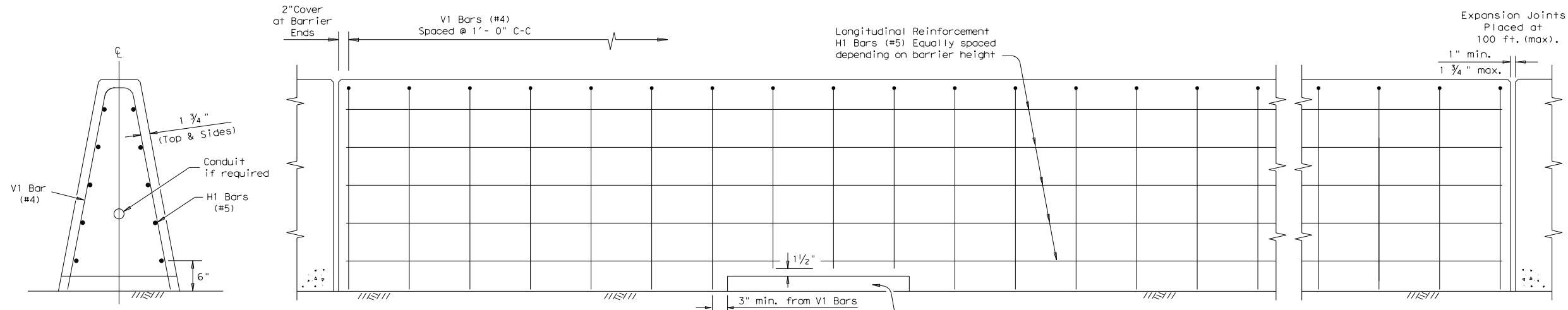
Design Division Standard

SPIG INDUSTRY, LLC
 SINGLE GUARDRAIL TERMINAL
 SGET - TL-3 - MASH
 SGT (15) 31-20

FILE: sgt153120.dgn	DN: TXDOT	CK: KM	DW: VP	CK: VP
© TXDOT: APRIL 2020	CONT: 0006	SECT: 15	JOB: 038	HIGHWAY: SH 70
REVISIONS	0006	15	038	SH 70
DIST: ABL	COUNTY: NOLAN	SHEET NO. 61		

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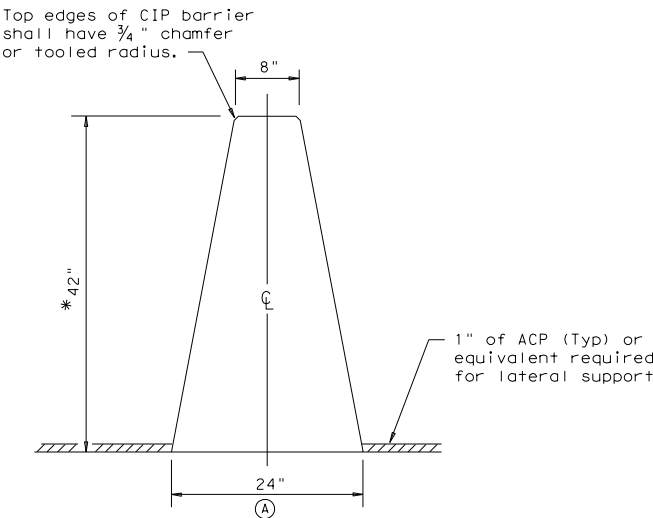


END VIEW
 CAST-IN-PLACE (CIP) BARRIER
 Barrier is Symmetrical About the Center Line

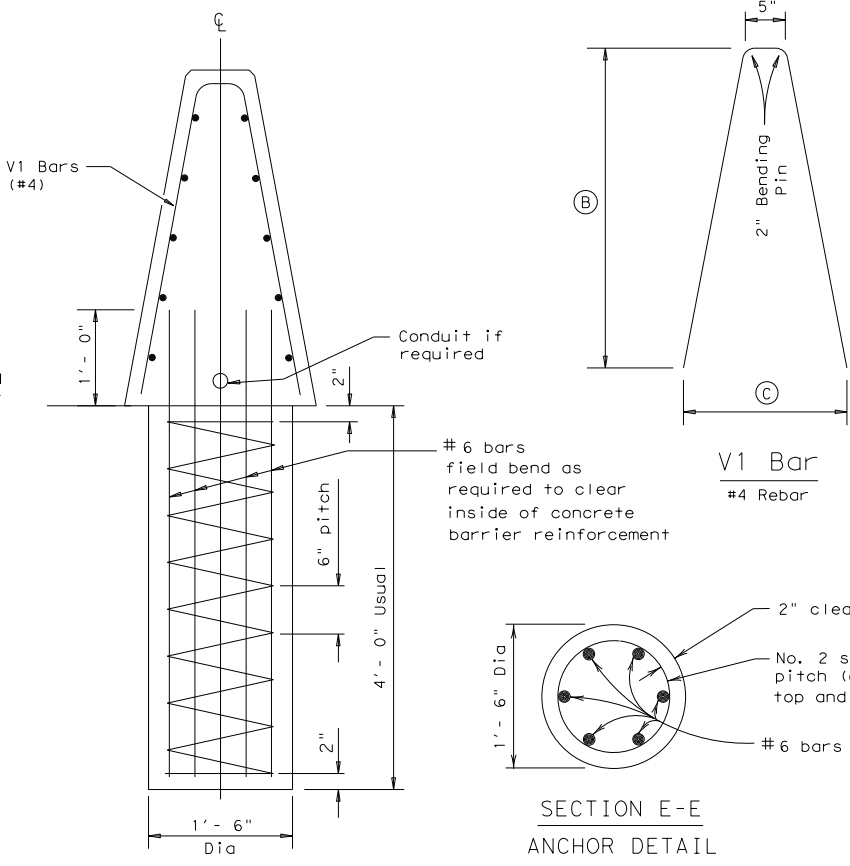
ELEVATION VIEW
 Cast-in-Place (SSCB) (Type 2) on Roadway

GENERAL NOTES

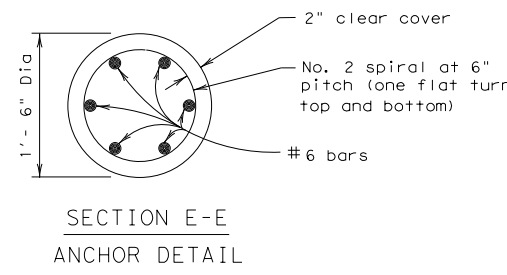
- Concrete shall be Class C. Unless otherwise specified in the plans.
- Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
- These details cover barrier per Item 514, "Permanent Concrete Traffic Barrier".
- The Anchorage shown is considered subsidiary to the bid item.
- Top edges of CIP barrier shall have a 3/4" chamfer or tooled radius.
- Drainage slot locations (12'-0", C-C Min. Spacing) are shown elsewhere, or as directed by the Engineer. Drainage slot heights on the SSCB may be increased to a maximum of 5 inches, without geometric changes to the barrier face.
- Cast-in-place barrier may be slip formed. Bracing may be tied or tack welded to the reinforcement cage to provide cage stability. Do not weld to anchorage.
- For locations where lighting is required, see the SSCB(4) sheet for the proper reinforcement and anchorage.



SINGLE SLOPE CONCRETE BARRIER
 (SSCB) (42")



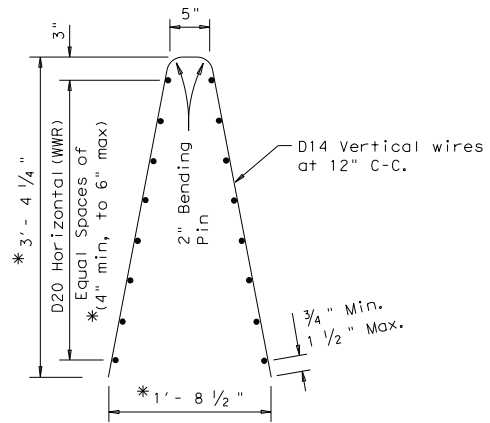
SECTION D-D
 ANCHOR DETAIL



SECTION E-E
 ANCHOR DETAIL

BARRIER HEIGHT (IN.)	* DIMENSIONS (IN.)		
	A	B	C
42	24	40 1/4	20 1/2
48	26 1/4	46 1/4	22 3/4
54	28 1/2	52 1/4	25 1/6

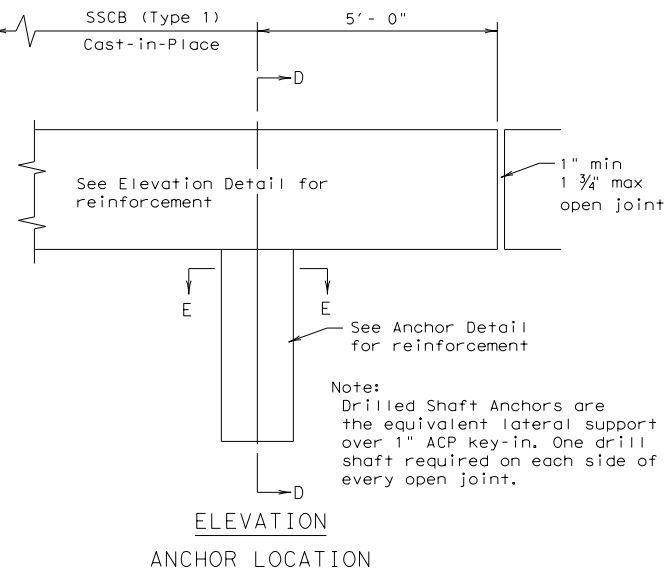
* (SSCB) (42") Barrier height may be increased to 48" or 54". This would increase the barrier and reinforcement dimensions accordingly.



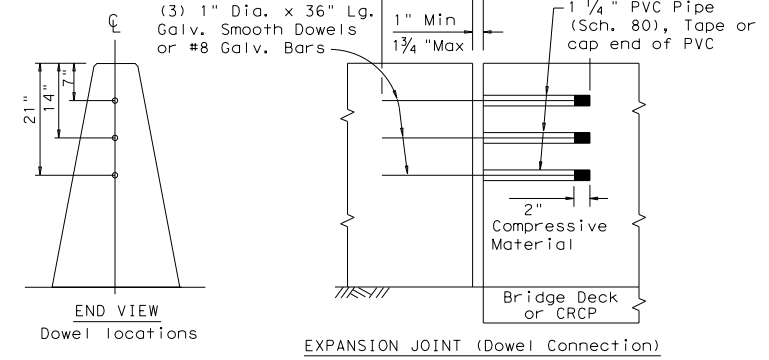
Welded Wire Reinforcement (WWR) Option for Bars V1 and H1

(WWR) General Notes

- Deformed Welded Wire Reinforcement (WWR) shall conform to ASTM A497.
- Welded wire cage may be cut and bent to accommodate the drainage slots, as directed by the Engineer.
- Welded wire splice locations shall have a "minimum" splice lap length of 12".
- Combinations of reinforcing steel and WWR will be permitted, as directed by the Engineer. The dimension from the end of the barrier section to the first wire shall not exceed 3".



ELEVATION
 ANCHOR LOCATION



EXPANSION JOINT (Dowel Connection)
 Dowels may be used, as directed by the Engineer, in locations where the barrier could be laterally displaced.

Cast-In-Place (CIP) or Slip-Formed (SSCB)
 Cast-in-Place barrier may be connected to precast SSCB. Joint connection "Types" may be used in Cast-in-Place barrier, to match the precast barrier connection. (See required connection "Type" elsewhere in the plans)

The weight of Cast-in-Place (SSCB)42" is approx. 717 lbs per ft.

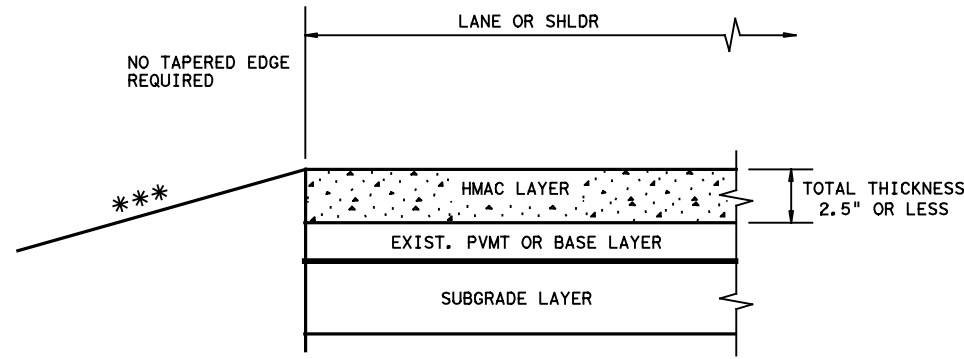
Texas Department of Transportation
 Design Division Standard

SINGLE SLOPE CONCRETE BARRIER
 CAST-IN-PLACE (TYPE 1)
 (FLEXIBLE PAVEMENT)
 SSCB(1F) - 10

FILE: sscb1f10.dgn	DN: TxDOT	CK: AM	DW: BD	CK:
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	ABL	NOLAN		62

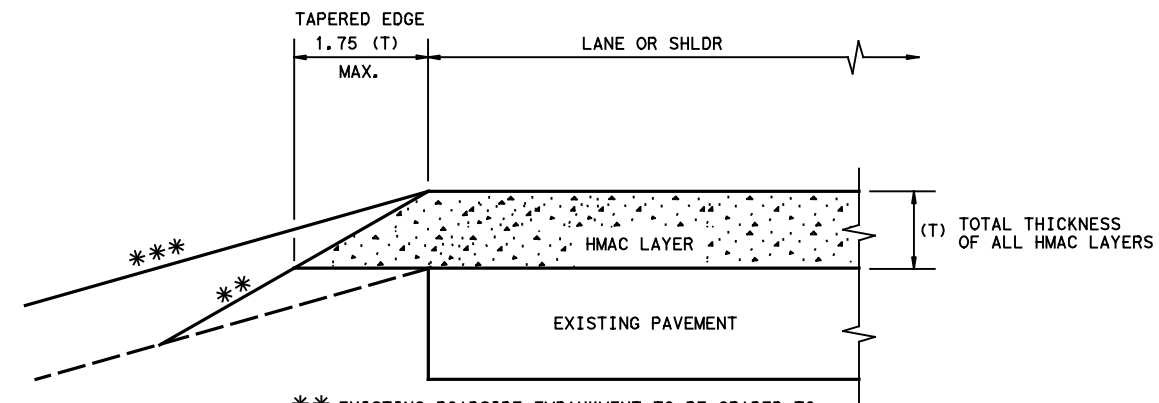
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*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

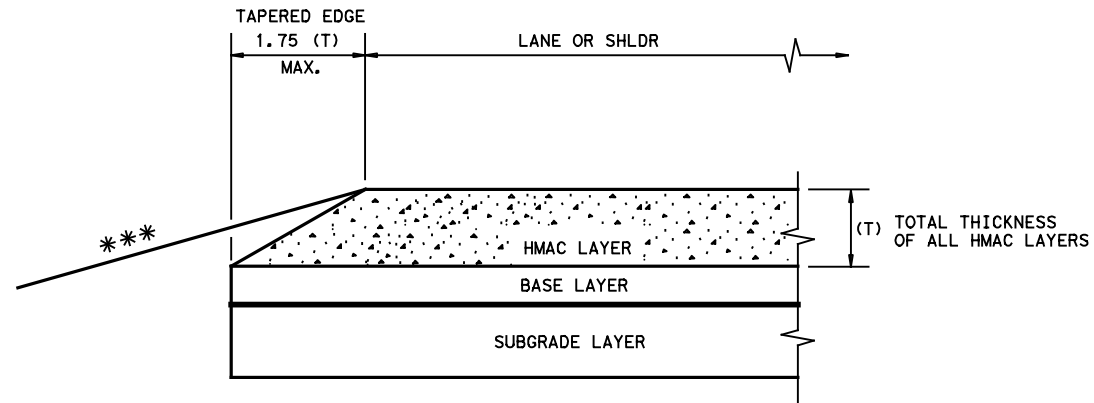
CONDITION - 1
 THIN HMAC SURFACES OR HMAC OVERLAY
 WITH THICKNESS OF 2.5" OR LESS



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

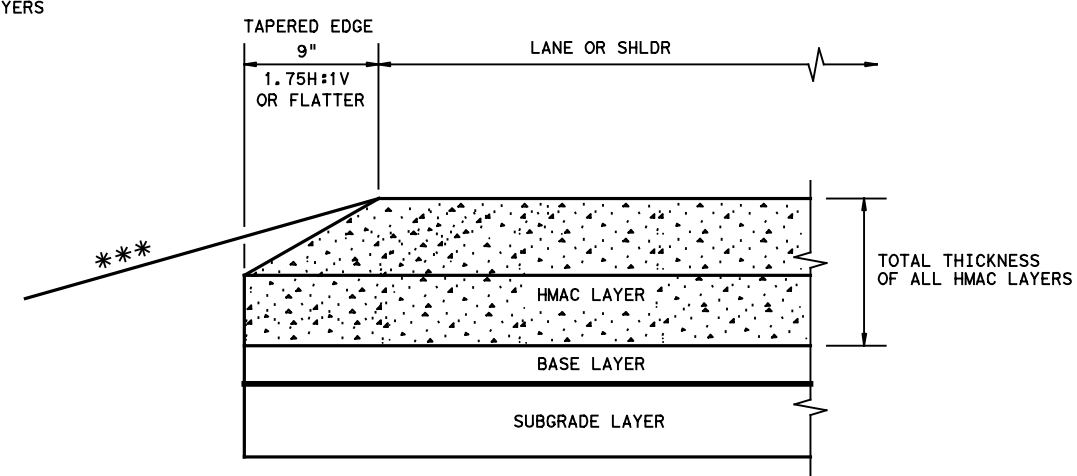
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

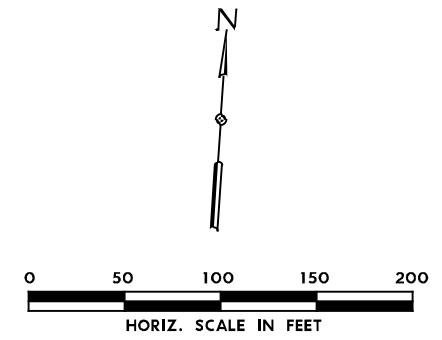
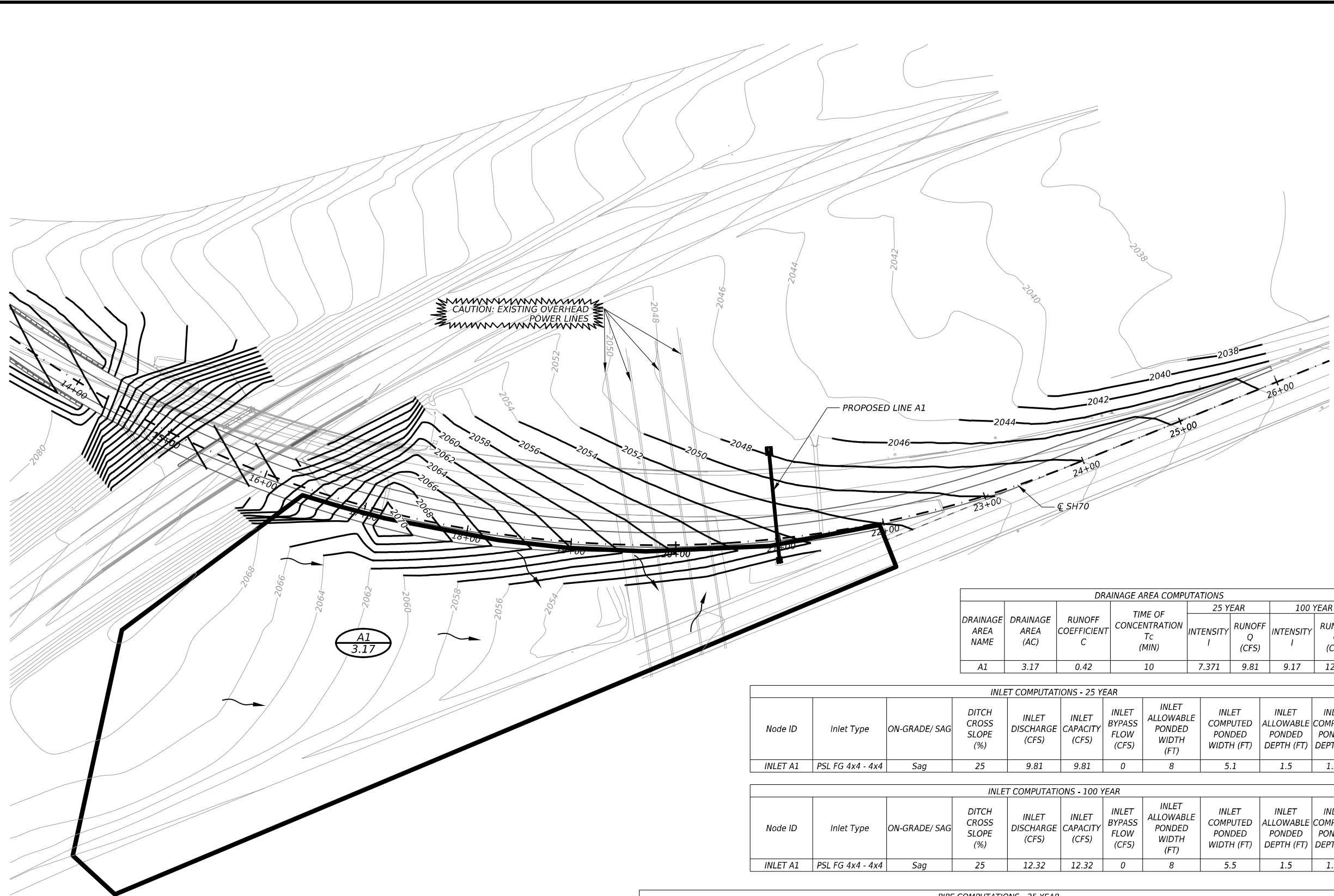
CONDITION - 4
 NEW OR RECONSTRUCTED PAVEMENT
 HMAC THICKNESS 5" OR GREATER

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.

(NOT TO SCALE)

					Design Division Standard
TAPERED EDGE DETAILS HMAC PAVEMENT					
TE (HMAC) - 11					
FILE: tehmac11.dgn	DN: TxDOT	CK: RL	DW: KB	CK:	
© TxDOT January 2011	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0006	15	038	SH 70	
	DIST	COUNTY	SHEET NO.		
	ABL	NOLAN	63		



LEGEND

- DRAINAGE AREA NO. AREA SIZE (ACRES)
- FLOW ARROW
- EXIST CONTOURS
- PROP CONTOURS
- DRAINAGE AREA

NOTES:

1. RUN-OFF CALCULATIONS ARE BASED ON ATLAS 14 RAINFALL DATA.
2. THE RUN-OFF COEFFICIENT, C, IS A WEIGHTED AVERAGE.

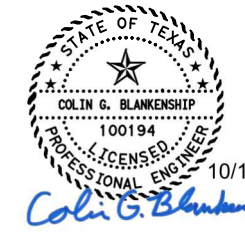
DRAINAGE AREA NAME	DRAINAGE AREA (AC)	RUNOFF COEFFICIENT C	TIME OF CONCENTRATION Tc (MIN)	25 YEAR		100 YEAR	
				INTENSITY I	RUNOFF Q (CFS)	INTENSITY I	RUNOFF Q (CFS)
				A1	3.17	0.42	10

INLET COMPUTATIONS - 25 YEAR										
Node ID	Inlet Type	ON-GRADE/ SAG	DITCH CROSS SLOPE (%)	INLET DISCHARGE (CFS)	INLET CAPACITY (CFS)	INLET BYPASS FLOW (CFS)	INLET ALLOWABLE PONDED WIDTH (FT)	INLET COMPUTED PONDED WIDTH (FT)	INLET ALLOWABLE PONDED DEPTH (FT)	INLET COMPUTED PONDED DEPTH (FT)
INLET A1	PSL FG 4x4 - 4x4	Sag	25	9.81	9.81	0	8	5.1	1.5	1.27

INLET COMPUTATIONS - 100 YEAR										
Node ID	Inlet Type	ON-GRADE/ SAG	DITCH CROSS SLOPE (%)	INLET DISCHARGE (CFS)	INLET CAPACITY (CFS)	INLET BYPASS FLOW (CFS)	INLET ALLOWABLE PONDED WIDTH (FT)	INLET COMPUTED PONDED WIDTH (FT)	INLET ALLOWABLE PONDED DEPTH (FT)	INLET COMPUTED PONDED DEPTH (FT)
INLET A1	PSL FG 4x4 - 4x4	Sag	25	12.32	12.32	0	8	5.5	1.5	1.37

PIPE COMPUTATIONS - 25 YEAR														
PIPE ID	UPSTREAM NODE	DOWNSTREAM NODE	CONDUIT DESCRIPTION	LENGTH (FT)	DISCHARGE (CFS)	CAPACITY (CFS)	SLOPE (%)	UPSTREAM INVERT (FT)	DOWNSTREAM INVERT (FT)	HGL UPSTREAM (FT)	HGL DOWNSTREAM (FT)	ACTUAL DEPTH DOWNSTREAM (FT)	ACTUAL VELOCITY DOWNSTREAM (FT/S)	NORMAL DEPTH (FT)
Line A1	Inlet A1	Outfall A1	RCP	100.10	9.81	15.83	0.49	2,046.75	2,046.25	2,047.89	2,047.37	1.12	5.42	1.14

PIPE COMPUTATIONS - 100 YEAR														
PIPE ID	UPSTREAM NODE	DOWNSTREAM NODE	CONDUIT DESCRIPTION	LENGTH (FT)	DISCHARGE (CFS)	CAPACITY (CFS)	SLOPE (%)	UPSTREAM INVERT (FT)	DOWNSTREAM INVERT (FT)	HGL UPSTREAM (FT)	HGL DOWNSTREAM (FT)	ACTUAL DEPTH DOWNSTREAM (FT)	ACTUAL VELOCITY DOWNSTREAM (FT/S)	NORMAL DEPTH (FT)
Line A1	Inlet A1	Outfall A1	RCP	100.10	12.32	15.83	0.49	2,046.75	2,046.25	2,048.08	2,047.52	1.26	5.90	1.32

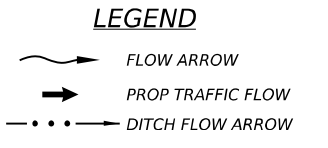
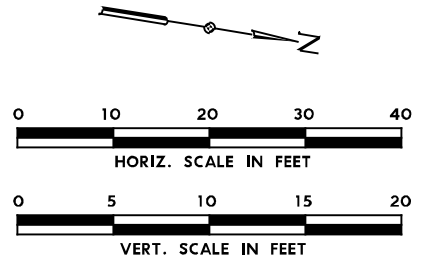
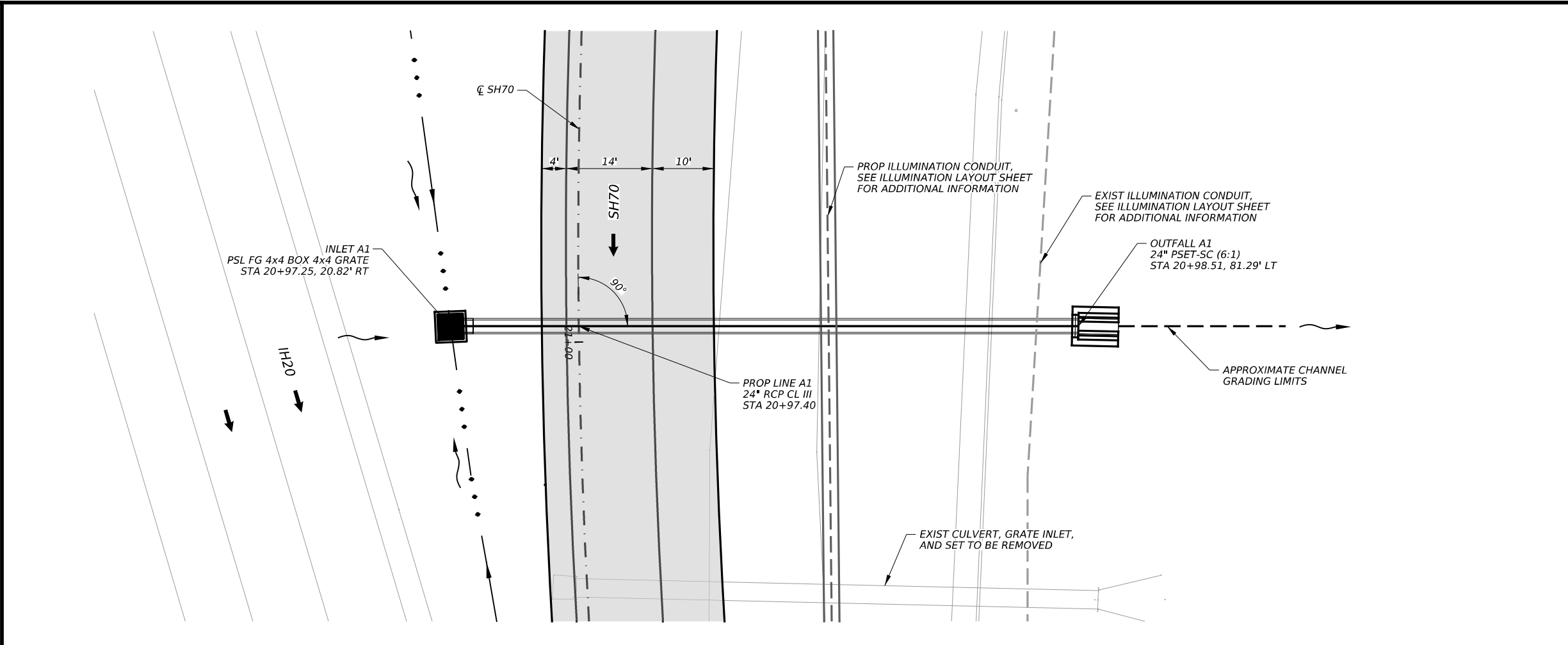


SH 70

DRAINAGE AREA MAP

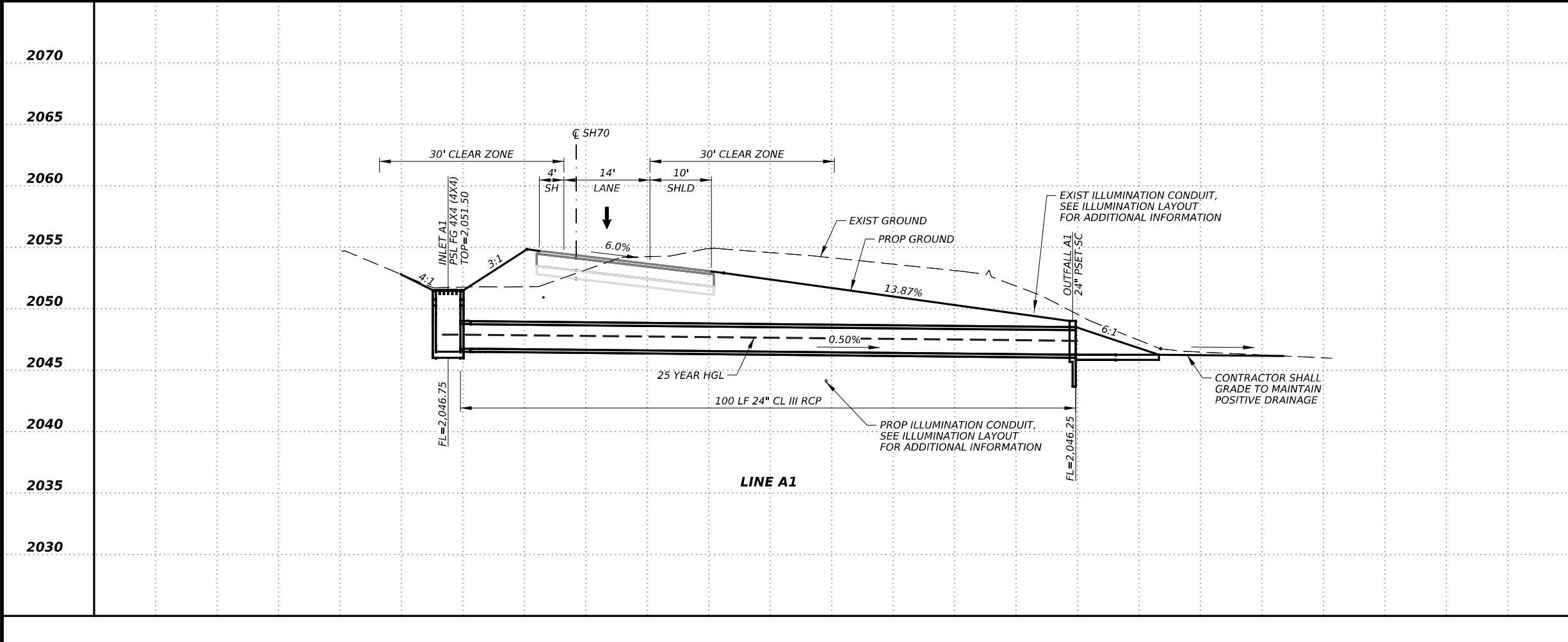
SCALE: 1"=100' SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	64	



NOTES:

- CONTRACTOR SHALL VERIFY LOCATIONS OF EXISTING UTILITIES BEFORE ANY TYPE OF CONSTRUCTION.



SH 70

STORM SEWER LINE A1
PLAN & PROFILE

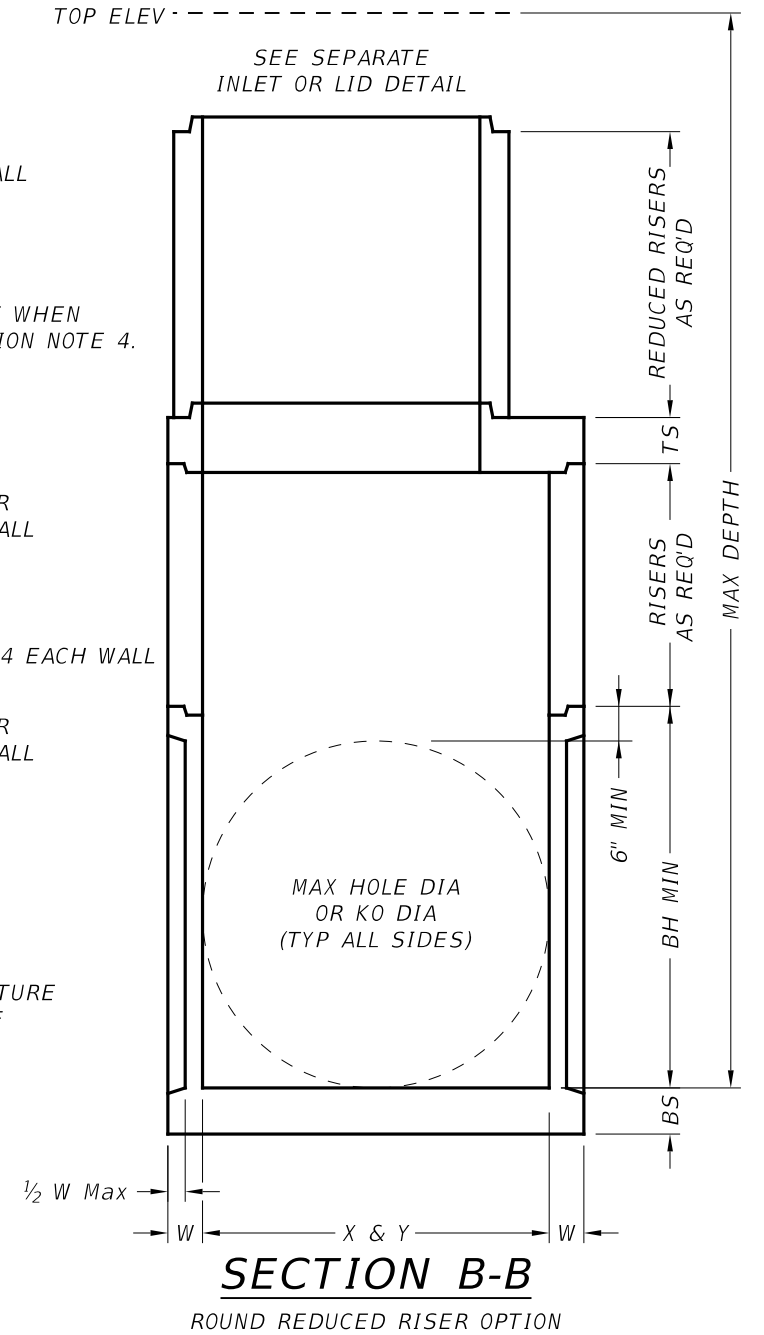
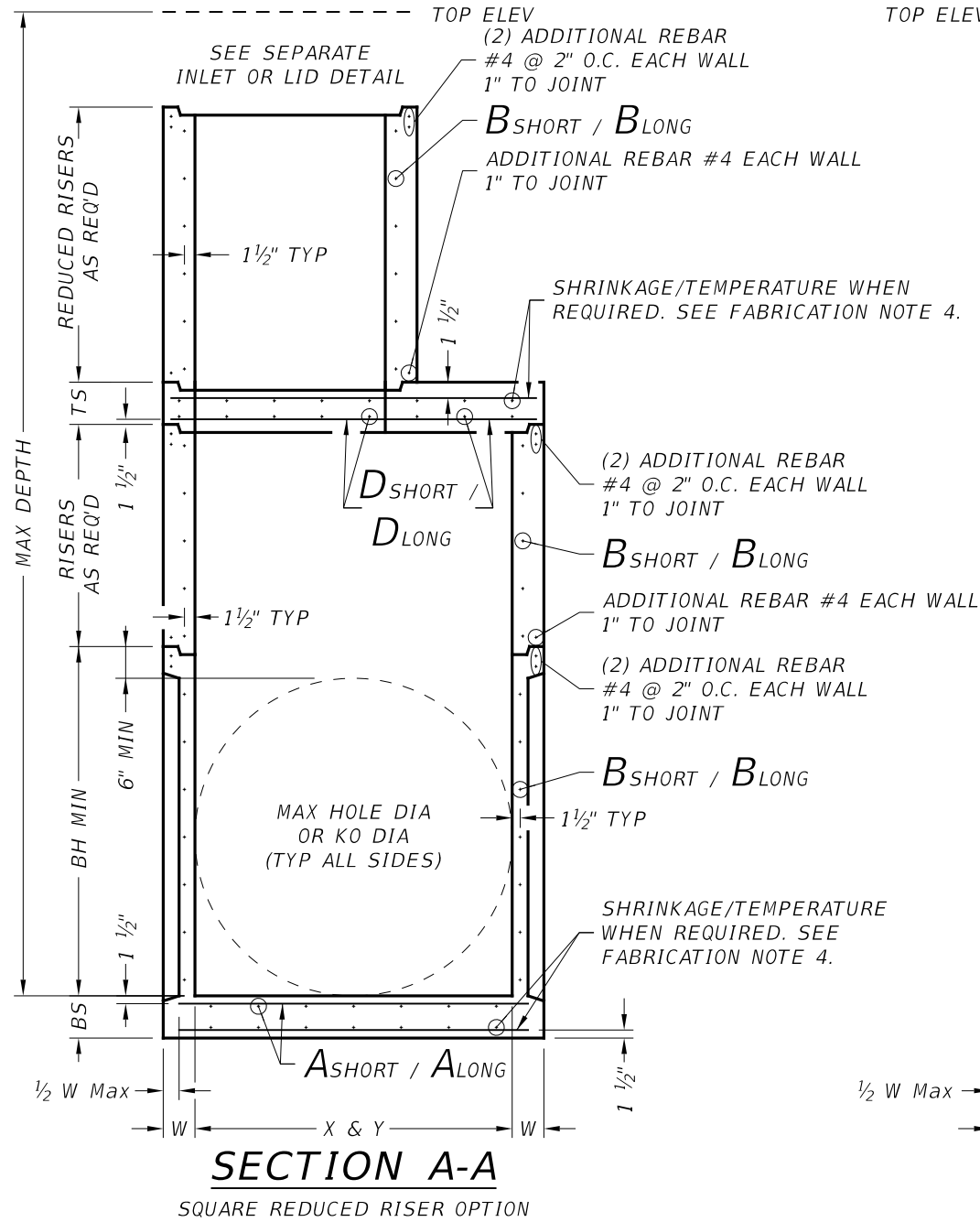
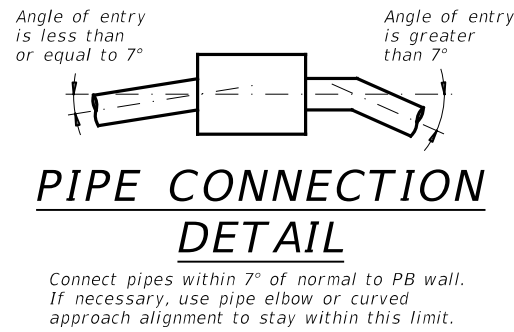
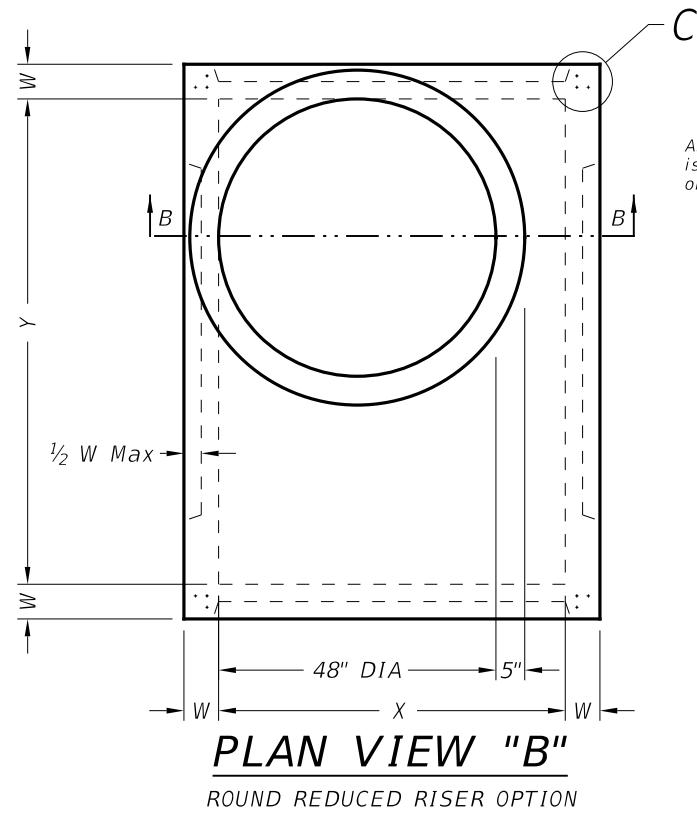
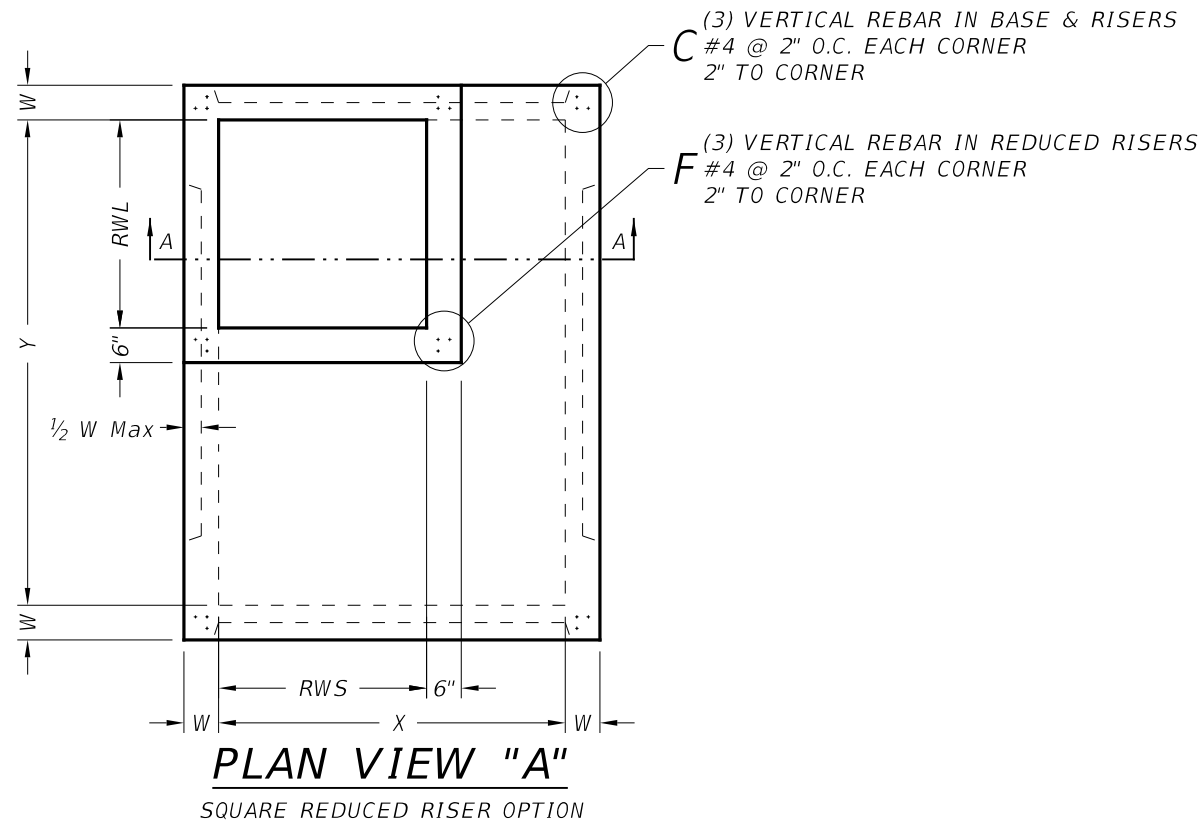
SCALE: 1"=20'-H
 1"=10'-V

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	65	

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FABRICATION NOTES:

1. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
2. Provide Grade 60 reinforcing steel or equivalent area of WWR.
3. Provide typical clear cover of 1 1/2" to reinforcing steel at interior or exterior walls.
4. Walls or slabs with a thickness of 8" or greater require shrinkage and temperature reinforcing steel. Provide steel area = 0.11 in²/ft each way.
5. No substitution is allowed for vertical and horizontal #4 bars in corners.
6. Manufacture base and risers to nearest 3" increment.
7. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is 3/4".
8. Provide lifting devices in conformance with Manufacturer's recommendations.
9. See sheet PDD for sizes, dimensions, and reinforcing steel not shown.

INSTALLATION NOTES:

1. If required elsewhere. Inverts (benching) to be provided by Contractor. Concrete or mortar used for invert is subsidiary to specified inlet or manhole.
2. Seal tongue and groove joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or 1/2 the joint depth, whichever is greater.
3. Do not grout rubber gasket joints without Manufacturer's recommendation.
4. For rigid pipe, cut hole in thin wall panel (KO) 4" Max, 2" Min larger than pipe OD.
5. For flexible pipe, consult boot/seal Manufacturer's specification for placement tolerance and hole size. Center pipe in hole and install boot/seal per Manufacturer's specification.

GENERAL NOTES:

1. Precast Base consists of base slab, base unit, risers (as required), reducing slab (as required), and reduced risers (as required). See sheet PDD for sizes.
2. Designed according to ASTM C913.
3. Payment for precast base is subsidiary to the specified inlet, per Item 465, "Junction Boxes, Manholes, and Inlets."

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING



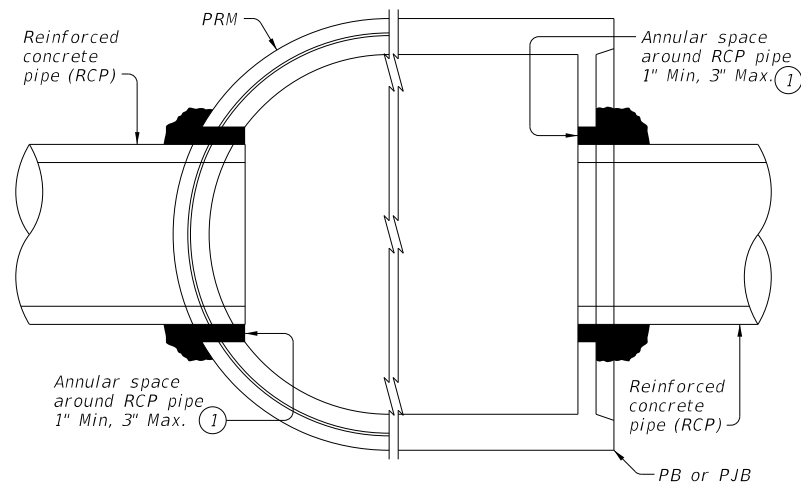
PRECAST BASE

PB

FILE: prest01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0006	15	038	SH 70
	DIST	COUNTY	SHEET NO.	
	ABL	NOLAN	66	

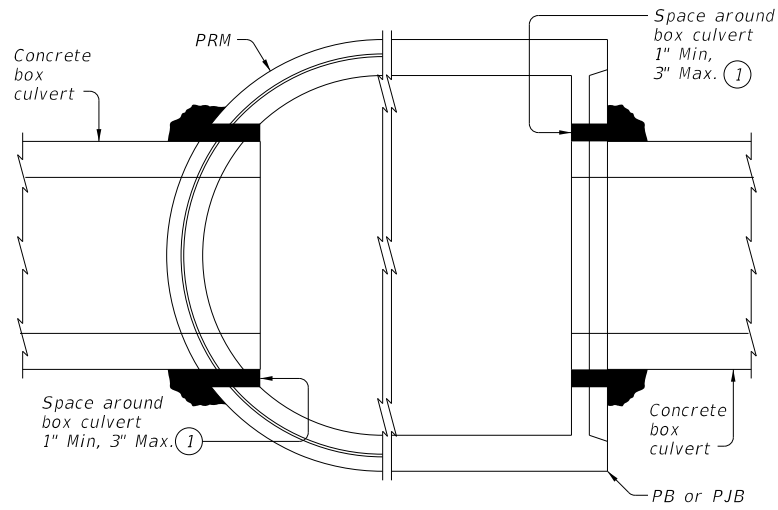
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DATE: 10/12/2023 2:54:52 PM
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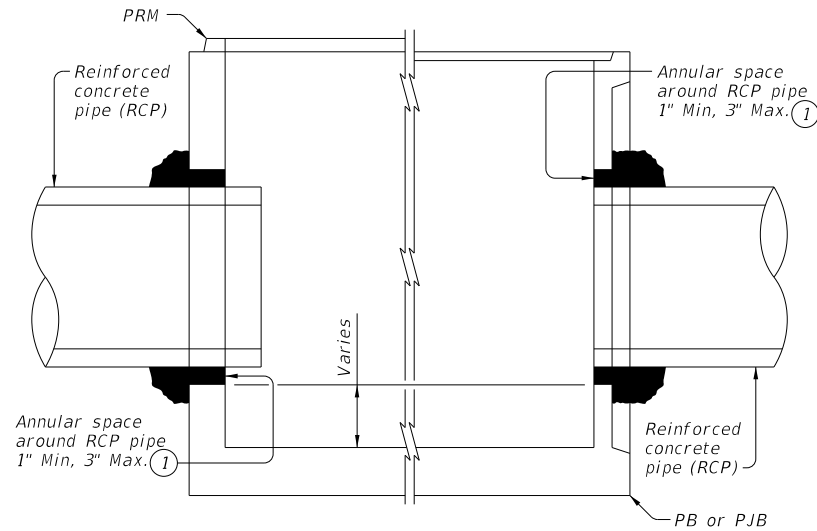
PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE
 PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

TYPICAL HALF PLAN



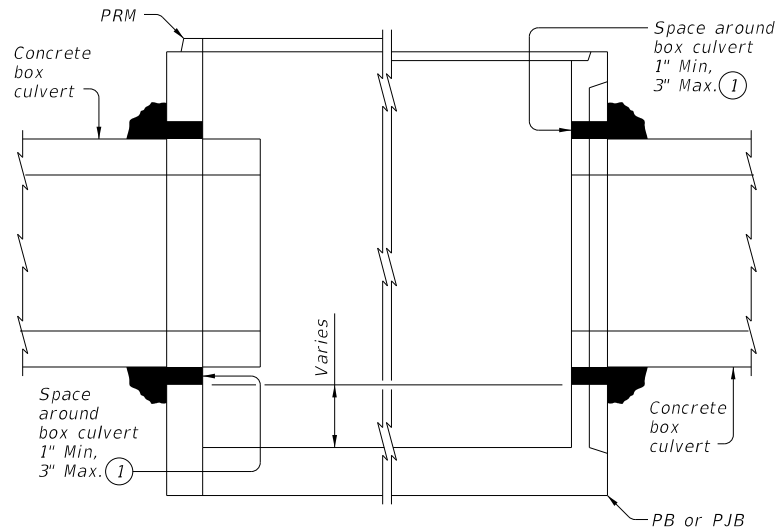
PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE
 PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

TYPICAL HALF PLAN



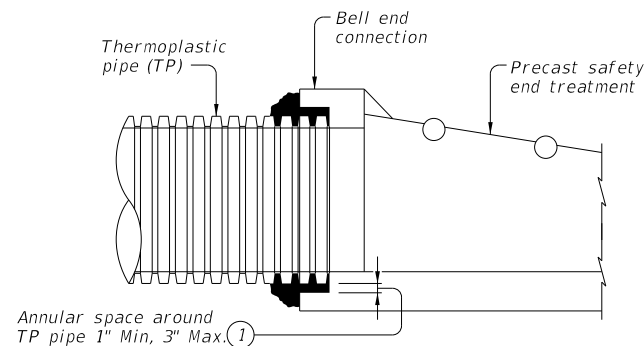
PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE
 PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

TYPICAL HALF ELEVATION



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE
 PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

TYPICAL HALF ELEVATION



TYPICAL PARTIAL ELEVATION OF PRECAST SAFETY END TREATMENTS

Showing square PSET for parallel drainage, cross drainage shown similar.

① Completely fill the void between the precast structure and the connecting pipe or box with cementitious grouts and mortars in accordance with DMS-4675 "Cementitious Grouts and Mortars for Miscellaneous Application".

CONSTRUCTION NOTES:
 Do not grout rubber gasket joints without Manufacturer's recommendations.
 Do not use bricks, masonry blocks, native stone, or similar materials in conjunction with grouted connections when filling void spaces around pipes or box culverts.

MATERIAL NOTES:
 Provide grouted connections in accordance with DMS-4675 "Cementitious Grouts and Mortars for Miscellaneous Application".

GENERAL NOTES:
 See applicable standards for notes and details not shown:
 Precast Base (PB)
 Precast Junction Box (PJB)
 Precast Round Manhole (PRM)
 Precast Safety End Treatments C/D Square (PSET-SC)
 Precast Safety End Treatments P/D Square (PSET-SP)
 Provide Concrete Box Culverts in accordance with Item 462 "Concrete Box Culverts and Drains".
 Provide Reinforced Concrete Pipe (RCP) in accordance with Item 464 "Reinforced Concrete Pipe".
 Provide Thermoplastic Pipe (TP) in accordance with Special Specification Thermoplastic Pipe.
 Payment for grouted connections is considered subsidiary to other bid items.

					Bridge Division Standard	
PIPE AND BOX GROUTED CONNECTIONS FOR PRECAST STRUCTURES						
PBGC						
FILE: pbgcstd1-20.dgn	DN: TxDOT	CK: TAR	DW: JTR	CK: TAR		
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY		
REVISIONS	0006	15	038	SH 70		
	DIST	COUNTY	SHEET NO.			
	ABL	NOLAN	67			

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DATE: 10/12/2023 2:55:03 PM
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Size	MAX DEPTH = 15 ft. to top of BASE SLAB											MAX DEPTH = 25 ft. to top of BASE SLAB											Min Height (See Gen Note 3)	Max HOLE DIA (See Fab Note 2)	Max KO DIA (See Fab Note 2)
	Base Slab			Base Unit or Riser Walls			Below Grade Slab (w/PJB) Reducing Slab (w/PB)					Base Slab			Base Unit or Riser Walls			Below Grade Slab (w/PJB) Reducing Slab (w/PB)							
	Short Span Reinf. Steel Area	Long Span Reinf. Steel Area	Thickness	Short Span Reinf. Steel Area	Long Span Reinf. Steel Area	Thickness	Reduced Riser Size or ID	Short Span Reinf. Steel Area	Long Span Reinf. Steel Area	Thickness	Short Span Reinf. Steel Area	Long Span Reinf. Steel Area	Thickness	Short Span Reinf. Steel Area	Long Span Reinf. Steel Area	Thickness	Reduced Riser Size or ID	Short Span Reinf. Steel Area	Long Span Reinf. Steel Area	Thickness	Reduced Riser Size or ID	Short Span Reinf. Steel Area			
X x Y	Ashort	Along	BS	Bshort	Blong	W	RWSxRWL or ID	Dshort	Dlong	TS	Ashort	Along	BS	Bshort	Blong	W	RWSxRWL or ID	Dshort	Dlong	TS	BH MIN	HOLE DIA	KO DIA		
ft.	in ² /ft	in ² /ft	in.	in ² /ft	in ² /ft	in.	ft. **	in ² /ft	in ² /ft	in.	in ² /ft	in ² /ft	in.	in ² /ft	in ² /ft	in.	ft. **	in ² /ft	in ² /ft	in.	ft.	in.	in.		
Precast Junction Box (PJB)	3x3	0.23	0.23	6	0.19	0.19	6	N/A	0.37	0.37	9	0.29	0.29	6	0.24	0.24	6	N/A	0.37	0.37	9	3.5	36	36	
	4x4	0.29	0.29	6	0.24	0.24	6	N/A	0.41	0.41	9	0.47	0.47	6	0.38	0.38	6	N/A	0.41	0.41	9	4.5	48	48	
	3x5	0.29	0.18	6	0.19	0.35	6	N/A	0.48	0.48	9	0.39	0.18	6	0.23	0.59	6	N/A	0.48	0.48	9	3.5	36/60	36/60	
	4x5	0.36	0.18	6	0.22	0.34	6	N/A	0.42	0.42	9	0.53	0.26	6	0.39	0.59	6	N/A	0.42	0.42	9	4.5	48/60	48/60	
	5x5	0.36	0.36	6	0.34	0.34	6	N/A	0.43	0.43	9	0.62	0.62	6	0.59	0.59	6	N/A	0.43	0.43	9	5.5	60	60	
	5x6	0.27	0.27	9	0.34	0.45	6	N/A	0.48	0.48	9	0.47	0.45	9	0.38	0.54	8	N/A	0.48	0.48	9	5.5	60/72	60/72	
	6x6	0.27	0.27	9	0.45	0.45	6	N/A	0.56	0.56	9	0.52	0.52	9	0.54	0.54	8	N/A	0.56	0.56	9	6.5	72	72	
	8x8	0.46	0.46	9	0.51	0.51	8	N/A	0.45	0.45	12	0.87	0.87	9	0.59	0.59	10	N/A	0.45	0.45	12	8.5	96	72	
Precast Base (PB)	3x3	0.23	0.23	6	0.19	0.19	6	N/A	N/A	N/A	N/A	0.29	0.29	6	0.24	0.24	6	N/A	N/A	N/A	N/A	3.5	36	36	
	4x4	0.29	0.29	6	0.24	0.24	6	N/A	N/A	N/A	N/A	0.47	0.47	6	0.38	0.38	6	N/A	N/A	N/A	N/A	4.5	48	48	
	3x5	0.29	0.18	6	0.19	0.35	6	3x3	0.30	0.34	9	0.39	0.18	6	0.23	0.59	6	3x3	0.40	0.40	9	3.5	36/60	36/60	
	4x5	0.36	0.18	6	0.22	0.34	6	3x3	0.30	0.30	9	0.53	0.26	6	0.39	0.59	6	3x3	0.46	0.37	9	4.5	48/60	48/60	
	4x5	0.36	0.18	6	0.22	0.34	6	4x4	0.30	0.30	9	0.53	0.26	6	0.39	0.59	6	4x4	0.39	0.39	9	4.5	48/60	48/60	
	4x5	0.36	0.18	6	0.22	0.34	6	48"	0.39	0.39	9	0.53	0.26	6	0.39	0.59	6	48"	0.47	0.47	9	4.5	48/60	48/60	
	4x5	0.36	0.18	6	0.22	0.34	6	3x5	0.33	0.40	9	0.53	0.26	6	0.39	0.59	6	3x5	0.48	0.48	9	4.5	48/60	48/60	
	5x5	0.36	0.36	6	0.34	0.34	6	3x3	0.34	0.34	9	0.62	0.62	6	0.59	0.59	6	3x3	0.53	0.53	9	5.5	60	60	
	5x5	0.36	0.36	6	0.34	0.34	6	4x4	0.36	0.36	9	0.62	0.62	6	0.59	0.59	6	4x4	0.64	0.64	9	5.5	60	60	
	5x5	0.38	0.38	6	0.34	0.34	6	48"	0.36	0.36	9	0.62	0.62	6	0.59	0.59	6	48"	0.64	0.64	9	5.5	60	60	
	5x5	0.36	0.36	6	0.34	0.34	6	3x5	0.34	0.40	9	0.62	0.62	6	0.59	0.59	6	3x5	0.53	0.53	9	5.5	60	60	
	5x6	0.31	0.31	9	0.34	0.45	6	3x3	0.34	0.34	9	0.47	0.45	9	0.38	0.54	8	3x3	0.61	0.50	9	5.5	60/72	60/72	
	5x6	0.27	0.27	9	0.34	0.45	6	4x4	0.36	0.45	9	0.47	0.45	9	0.38	0.54	8	4x4	0.74	0.57	9	5.5	60/72	60/72	
	5x6	0.29	0.29	9	0.34	0.45	6	48"	0.36	0.45	9	0.47	0.45	9	0.38	0.54	8	48"	0.74	0.57	9	5.5	60/72	60/72	
	5x6	0.29	0.29	9	0.34	0.45	6	3x5	0.45	0.45	9	0.47	0.45	9	0.38	0.54	8	3x5	0.61	0.61	9	5.5	60/72	60/72	
	6x6	0.29	0.29	9	0.45	0.45	6	3x3	0.41	0.41	9	0.52	0.52	9	0.54	0.54	8	3x3	0.74	0.74	9	6.5	72	72	
	6x6	0.27	0.27	9	0.45	0.45	6	4x4	0.45	0.45	9	0.52	0.52	9	0.54	0.54	8	4x4	0.87	0.87	9	6.5	72	72	
	6x6	0.29	0.29	9	0.45	0.45	6	48"	0.45	0.45	9	0.52	0.52	9	0.54	0.54	8	48"	0.87	0.87	9	6.5	72	72	
	6x6	0.29	0.29	9	0.45	0.45	6	3x5	0.45	0.45	9	0.52	0.52	9	0.54	0.54	8	3x5	0.87	0.87	9	6.5	72	72	
	8x8	0.52	0.52	9	0.51	0.51	8	3x3	0.61	0.61	12	0.91	0.91	9	0.70	0.70	10	3x3	0.85	0.85	12	8.5	96	72	
8x8	0.52	0.52	9	0.51	0.51	8	4x4	0.70	0.70	12	0.87	0.87	9	0.70	0.70	10	4x4	1.01	1.01	12	8.5	96	72		
8x8	0.52	0.52	9	0.51	0.51	8	48"	0.70	0.70	12	0.87	0.87	9	0.70	0.70	10	48"	1.01	1.01	12	8.5	96	72		
8x8	0.52	0.52	9	0.51	0.51	8	3x5	0.70	0.85	12	0.87	0.87	9	0.70	0.70	10	3x5	1.01	1.01	12	8.5	96	72		

** Unless otherwise indicated.


FABRICATION NOTES:

1. Maximum spacing of reinforcement is 8".
2. At manufacturer's option, provide cast or cored holes or thin wall panels (KO) to the maximum diameter shown for each. When no penetration is required, it is acceptable to provide a wall with no sectional reduction.

GENERAL NOTES:

1. Precast Junction Box consists of base slab, base unit, risers (as required), and below grade slab. See sheet PJB for details.
2. Precast Base consists of base slab, base unit, risers (as required), reducing slab (as required), and reduced risers (as required). See sheet PB for details.
3. Min Height shown is for stock base units. Use stock base units whenever practical. Smaller height base units can be used in special installation circumstances, when noted elsewhere in the plans. Absolute minimum height of base units is 2'-6".

HL93 LOADING

		Bridge Division Standard	
<h2>DESIGN DATA FOR PRECAST BASE AND JUNCTION BOX</h2>			
<h3>PDD</h3>			
FILE: prest10-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
©TxDOT February 2020	CONT	SECT	HIGHWAY
REVISIONS	0006	15	038 SH 70
DIST	COUNTY		SHEET NO.
ABL	NOLAN		68

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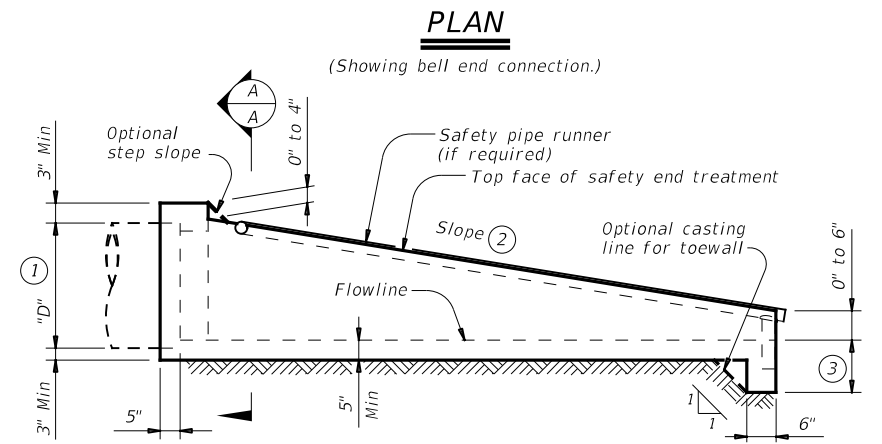
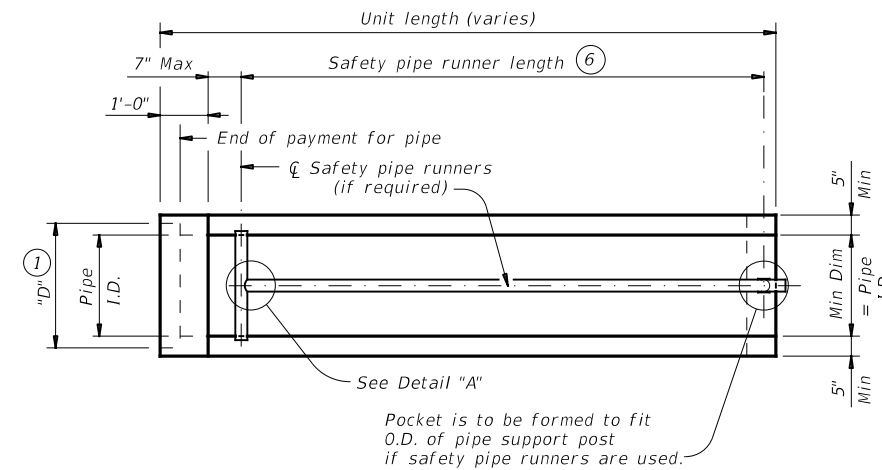
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REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

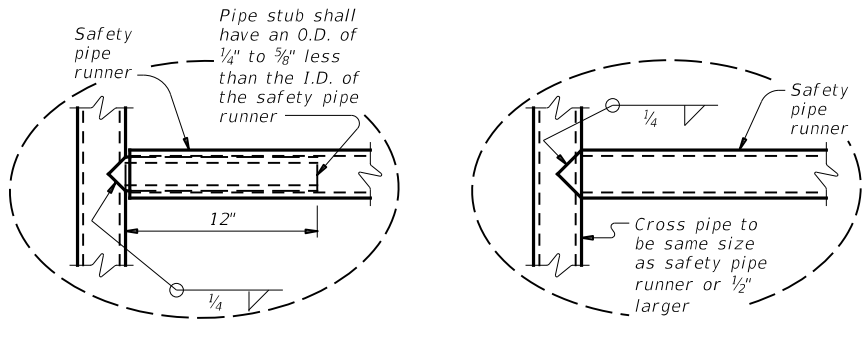
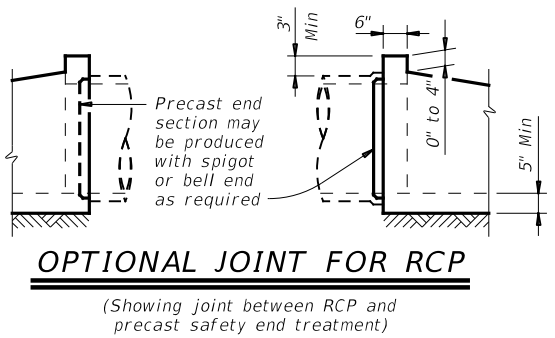
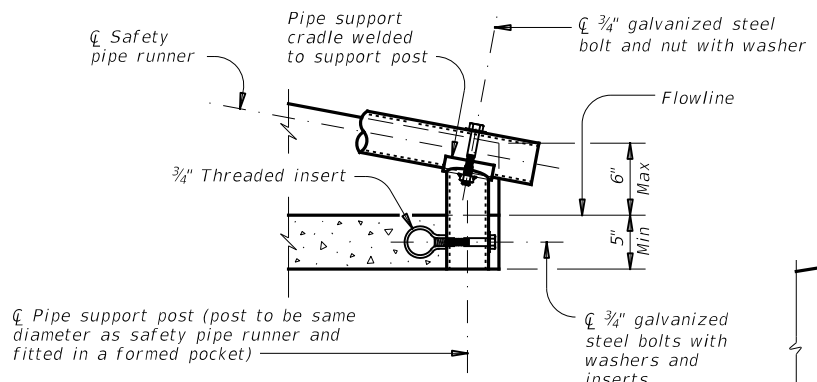
Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (8)	"D" (1)	Slope	Min Length of Unit	Single Pipe		Multiple Pipes	
						Skew	Pipe Runners Required	Skew	Pipe Runners Required
12"	2"	1.15"	17.00"	3:1	2' - 11"	≤ 45°	No	≤ 45°	No
				4:1	3' - 6"				
				6:1	4' - 9"				
15"	2 1/4"	1.30"	20.50"	3:1	3' - 8"	≤ 45°	No	≤ 45°	No
				4:1	4' - 7"				
				6:1	6' - 5"				
18"	2 1/2"	1.60"	24.00"	3:1	4' - 6"	≤ 45°	No	≤ 45°	No
				4:1	5' - 8"				
				6:1	8' - 0"				
24"	3"	1.95"	31.00"	3:1	6' - 2"	≤ 45°	No	= 30°	No
				4:1	7' - 10"				
				6:1	11' - 3"				
30"	3 1/2"	2.65"	38.50"	3:1	7' - 10"	= 15°	No	= 15°	No
				4:1	10' - 1"				
				6:1	14' - 8"				
36"	4"	2.75"	45.50"	3:1	9' - 5"	= 0°	No	≥ 0°	Yes
				4:1	12' - 3"				
				6:1	17' - 11"				
42"	4 1/2"	2.7"	52.50"	3:1	11' - 1"	≥ 0°	Yes	≥ 0°	Yes
				4:1	14' - 5"				
				6:1	21' - 2"				

SAFETY PIPE RUNNER DIMENSIONS

Max Safety Pipe Runner Length	Required Pipe Runner Size		
	Pipe Size	Pipe O.D.	Pipe I.D.
11' - 2"	3" STD	3.500"	3.068"
15' - 6"	3 1/2" STD	4.000"	3.548"
20' - 10"	4" STD	4.500"	4.026"
35' - 4"	5" STD	5.563"	5.047"



- ① Dimension "D" is based on reinforced concrete pipe (RCP) meeting the requirements of ASTM C-76, Class III, (RCP Wall "B" thickness). Adjust "D" for any other wall thickness used. For thermoplastic pipe (TP) take into account the annular space requirements for grouted connections.
- ② Slope as shown elsewhere in plans. Slope of 3:1 or flatter is required for vehicle safety.
- ③ Toewall to be used only when dimension is shown elsewhere in the plans.
- ④ Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment".
- ⑤ Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.
- ⑥ Measured along slope.
- ⑦ Provide cement stabilized bedding and backfill in accordance with the Item 400, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.
- ⑧ Thermoplastic pipe wall thickness may vary. Adjust accordingly. Thermoplastic pipe requires the safety end treatments to have a bell end for grouted connections.



GENERAL NOTES:

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

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

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

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

- A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" - D12 x D12 or 5"x5" - D10 x D10 welded wire reinforcement (WWR).
- B. For precast (steel formed) sections, provide Class "C" concrete ($f'c = 3,600$ psi).

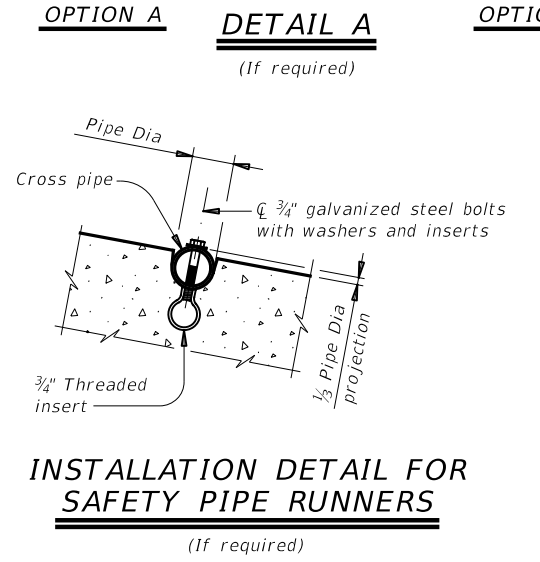
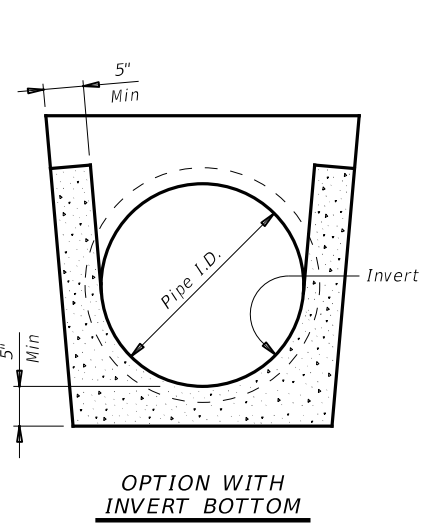
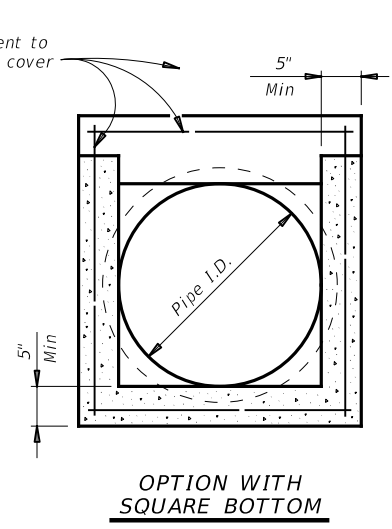
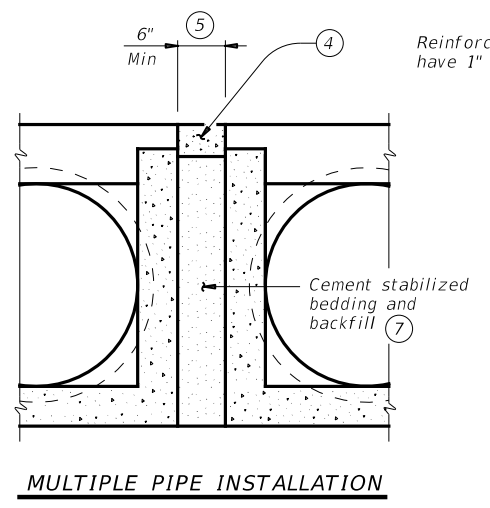
At the option and expense of the Contractor, the next larger size of safety end treatment may be furnished as long as the "D" dimension cast is that of the required size of pipe.

Pipe runners are designed for a traversing load of 1,800 Lbs at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

Provide safety pipe runners, cross pipes, pipe support posts, and pipe stubs meeting the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

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

Connect RCP using the Optional Joint for RCP detail shown or in accordance with Item 464 "Reinforced Concrete Pipe". Connect TP by grouting. See Pipe and Box Grouted Connections (PBG) standard for grouted connections with TP and precast safety end treatment.



Texas Department of Transportation

Bridge Division Standard

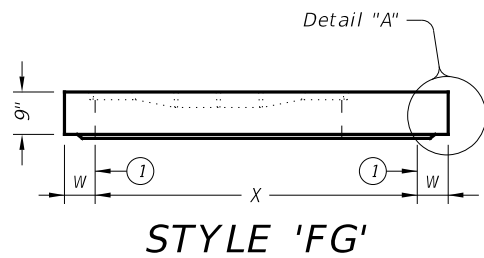
PRECAST SAFETY END TREATMENT TYPE II ~ CROSS DRAINAGE

PSET-SC

FILE: psetscss-21.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-21: Added 42" TP	0006	15	038	SH 70
DIST:	COUNTY:	SHEET NO.		
ABL	NOLAN			69

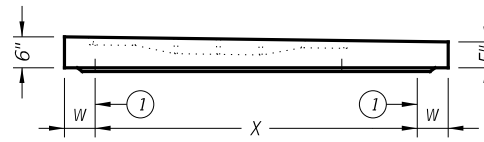
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

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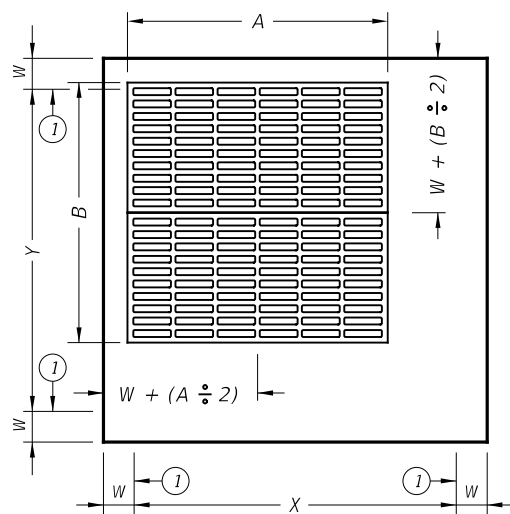


STYLE 'FG'

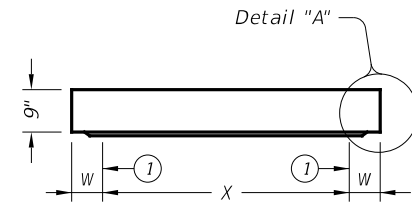
ORIENT TAPER TO CORRESPOND WITH ROADWAY CROSS-SLOPE.



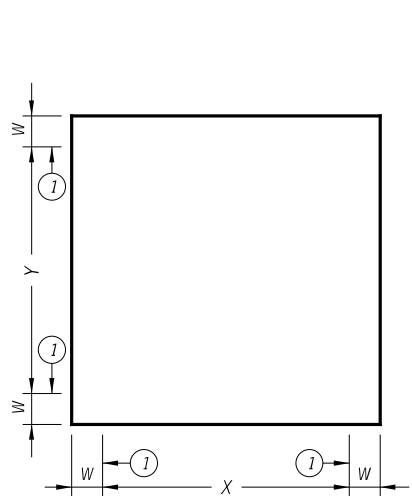
STYLE 'SFG'
ELEVATION VIEW



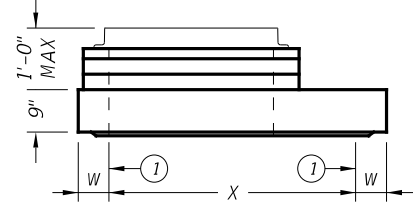
PLAN VIEW
 CAST-IN FRAME & GRATE
STYLES 'FG' & 'SFG'



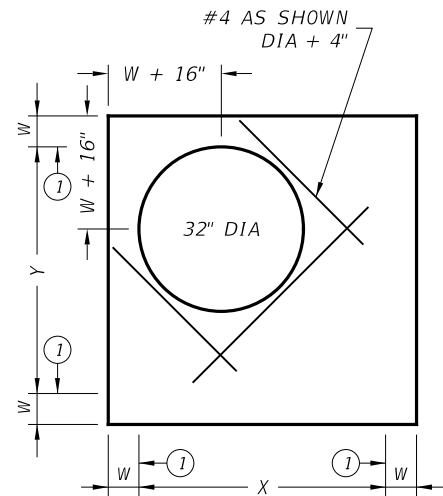
ELEVATION VIEW



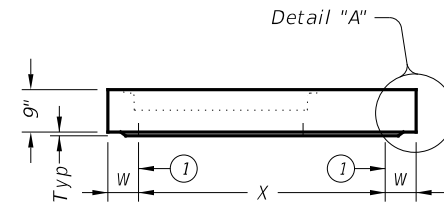
PLAN VIEW
 NO OPENINGS
STYLE 'SL'



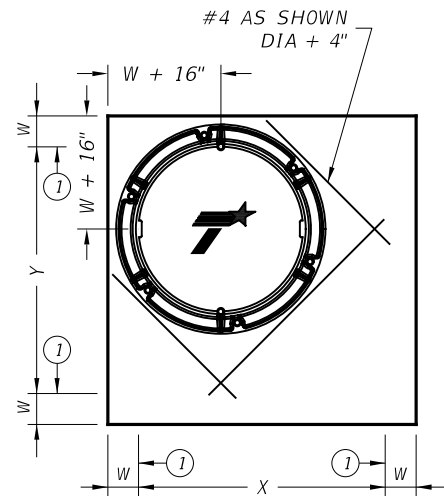
ELEVATION VIEW



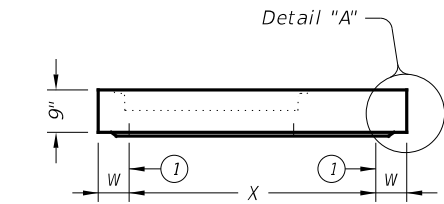
PLAN VIEW
 SHIP LOOSE RING & COVER
STYLE 'RH'



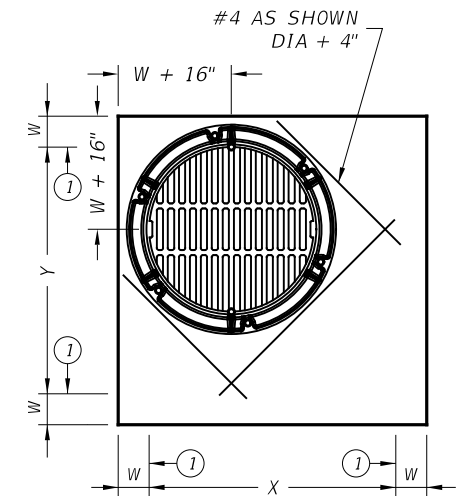
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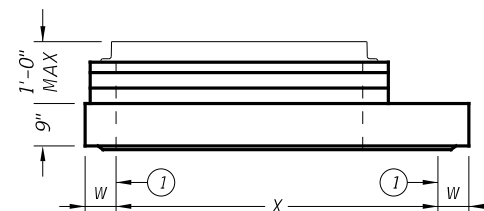
PLAN VIEW
 32" DIA CAST-IN RING & COVER
STYLE 'RC'



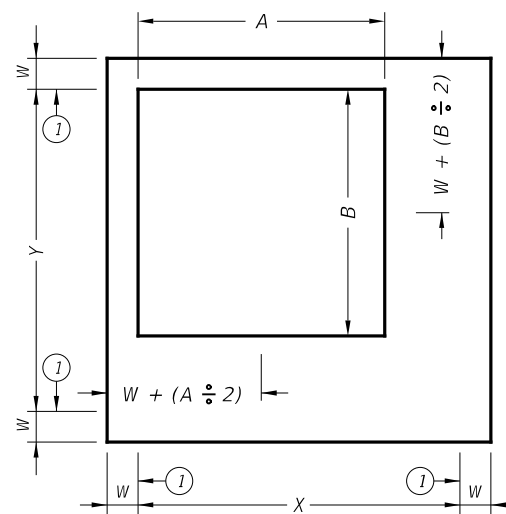
ELEVATION VIEW



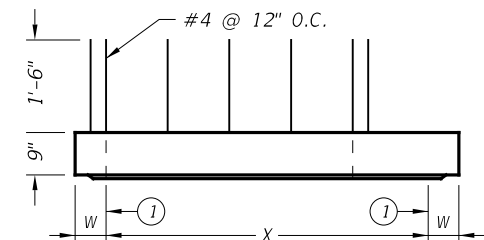
PLAN VIEW
 32" DIA CAST-IN RING & GRATE
STYLE 'RG'



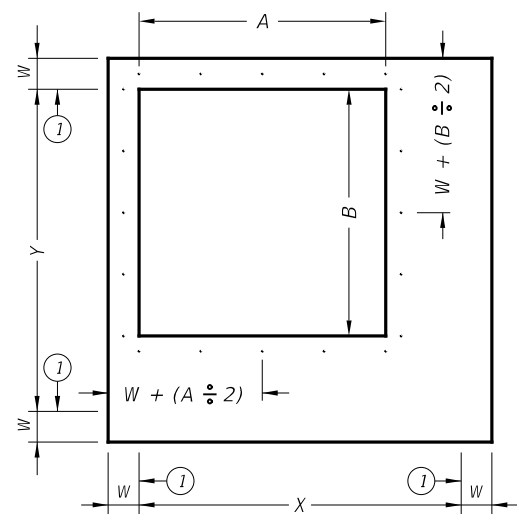
ELEVATION VIEW



PLAN VIEW
 SHIP LOOSE FRAME & GRATE
STYLE 'SH'



ELEVATION VIEW



PLAN VIEW
 EXPOSED REBAR
STYLE 'S1'

① Matches inside face of wall of precast base or riser below inlet.

HL93 LOADING SHEET 1 OF 2



PRECAST SLAB LID

PSL

FILE: prest-d05-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY	SHEET NO.	
	ABL	NOLAN	70	

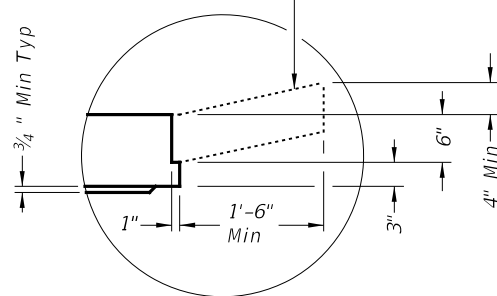
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Style	Size (X x Y)	W (2)	A x B (nominal)	Short Span Reinf Steel Area	Long Span Reinf Steel Area
SL	3'x3'	6"	n/a	0.37 in ² /ft	0.37 in ² /ft
RH,RC,RG,SH,S1,FG	3'x3'	6"	3'x3' or 32" Dia	0.37 in ² /ft	0.37 in ² /ft
SFG	3'x3'	6"	3'x3'	0.32 in ² /ft	0.32 in ² /ft
SL	4'x4'	6"	n/a	0.34 in ² /ft	0.34 in ² /ft
RH,RC,RG,SH,S1,FG	4'x4'	6"	3'x3' or 32" Dia	0.41 in ² /ft	0.41 in ² /ft
SH,S1,FG	4'x4'	6"	4'x4'	0.41 in ² /ft	0.41 in ² /ft
SFG	4'x4'	6"	4'x4'	0.32 in ² /ft	0.32 in ² /ft
SL	3'x5'	6"	n/a	0.39 in ² /ft	0.39 in ² /ft
RH,RC,RG,SH,S1,FG	3'x5'	6"	3'x3' or 32" Dia	0.48 in ² /ft	0.48 in ² /ft
SH,S1,FG	3'x5'	6"	3'x5'	0.48 in ² /ft	0.48 in ² /ft
SFG	3'x5'	6"	3'x5'	0.32 in ² /ft	0.32 in ² /ft
SL	4'x5'	6"	n/a	0.42 in ² /ft	0.42 in ² /ft
RH,RC,RG,SH,S1,FG	4'x5'	6"	3'x3' or 32" Dia	0.42 in ² /ft	0.42 in ² /ft
SH,S1,FG	4'x5'	6"	4'x4'	0.63 in ² /ft	0.63 in ² /ft
SH,S1,FG	4'x5'	6"	3'x5'	0.66 in ² /ft	0.66 in ² /ft
SL	5'x5'	6"	n/a	0.36 in ² /ft	0.36 in ² /ft
RH,RC,RG,SH,S1,FG	5'x5'	6"	3'x3' or 32" Dia	0.43 in ² /ft	0.43 in ² /ft
SH,S1,FG	5'x5'	6"	4'x4'	0.63 in ² /ft	0.63 in ² /ft
SH,S1,FG	5'x5'	6"	3'x5'	0.63 in ² /ft	0.63 in ² /ft
SL	5'x6'	6"/8"	n/a	0.48 in ² /ft	0.48 in ² /ft
RH,RC,RG,SH,S1,FG	5'x6'	6"/8"	3'x3' or 32" Dia	0.48 in ² /ft	0.48 in ² /ft
SH,S1,FG	5'x6'	6"/8"	4'x4'	0.60 in ² /ft	0.60 in ² /ft
SH,S1,FG	5'x6'	6"/8"	3'x5'	0.60 in ² /ft	0.60 in ² /ft
SL	6'x6'	6"/8"	n/a	0.43 in ² /ft	0.43 in ² /ft
RH,RC,RG,SH,S1,FG	6'x6'	6"/8"	3'x3' or 32" Dia	0.56 in ² /ft	0.56 in ² /ft
SH,S1,FG	6'x6'	6"/8"	4'x4'	0.56 in ² /ft	0.56 in ² /ft
SH,S1,FG	6'x6'	6"/8"	3'x5'	0.59 in ² /ft	0.59 in ² /ft
SL	8'x8'	8"/10"	n/a	0.45 in ² /ft	0.45 in ² /ft
RH,RC,RG,SH,S1,FG	8'x8'	8"/10"	3'x3' or 32" Dia	0.45 in ² /ft	0.45 in ² /ft
SH,S1,FG	8'x8'	8"/10"	4'x4'	0.45 in ² /ft	0.45 in ² /ft
SH,S1,FG	8'x8'	8"/10"	3'x5'	0.45 in ² /ft	0.45 in ² /ft

(2) See sheet PDD for corresponding wall thickness (W) of base unit or riser.

Construct cast-in-place reinforced concrete apron, when shown elsewhere in plans. Use Class "A" concrete. Apron is subsidiary to PSL. Apron is 1'-6" Min width around precast zone drain.



DETAIL "A"

(Reinforcing not shown for clarity)
 When an apron is to be cast around PSL, use detail above to create an apron ledge on all 4 sides.

FABRICATION NOTES:

1. Locate penetration (Style 'RH'), ring and cover (Style 'RC'), ring and grate (Style 'RG'), and frame and grate (Style 'FG') in a corner. Only one penetration is allowed per slab lid.
2. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
3. Provide Grade 60 reinforcing steel or equivalent area of WWR.
4. Provide clear cover of 3/4" to reinforcing from lower outside shoulder of slab for structural reinforcement, and 2" from top of slab for shrinkage and temperature reinforcement. Place short span reinforcing closest to surface.
5. Slabs with a thickness of 8" or greater require shrinkage and temperature reinforcing. Provide steel area = 0.11 in²/ft each way.
6. No substitution is allowed for diagonal #4 bars around openings.
7. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is 3/4".
8. Provide lifting devices in conformance with Manufacturer's recommendations.

INSTALLATION NOTES:

1. Precast slab lids are intended for direct traffic and may be placed in roadway.
2. Seal tongue and groove joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or 1/2 the joint depth, whichever is greater.
3. Do not grout rubber gasket joints without Manufacturer's recommendation.
4. Initial installation of grade adjustment rings for Styles 'RH' and 'SH' is limited to 1'-0" Max as shown.
5. Grade adjustment rings for Styles 'RH' and 'SH' may be increased to 2'-0" Max when future construction affects final grade of structure. Make adjustments greater than 2'-0" with additional risers. Adjustments can be made up to Max depth shown on sheet PDD. Structure must be evaluated if Max depth will be exceeded.
6. Orient long dimension of grate slots perpendicular to traffic, unless noted otherwise on plans.

GENERAL NOTES:

1. Designed according to ASTM C913.
2. Payment for lid is per Item 465, "Junction Boxes, Manholes, and Inlets" by type, style, size, and opening size (when applicable).

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

SHEET 2 OF 2

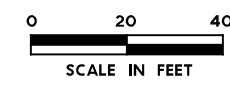


Bridge Division Standard

PRECAST SLAB LID

PSL

FILE: prest-d05-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0006	15	038	SH 70
	DIST	COUNTY	SHEET NO.	
	ABL	NOLAN	71	



GENERAL NOTES:

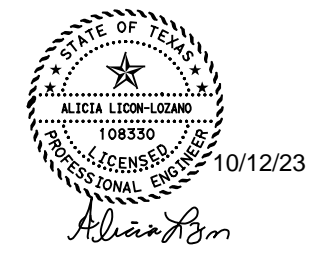
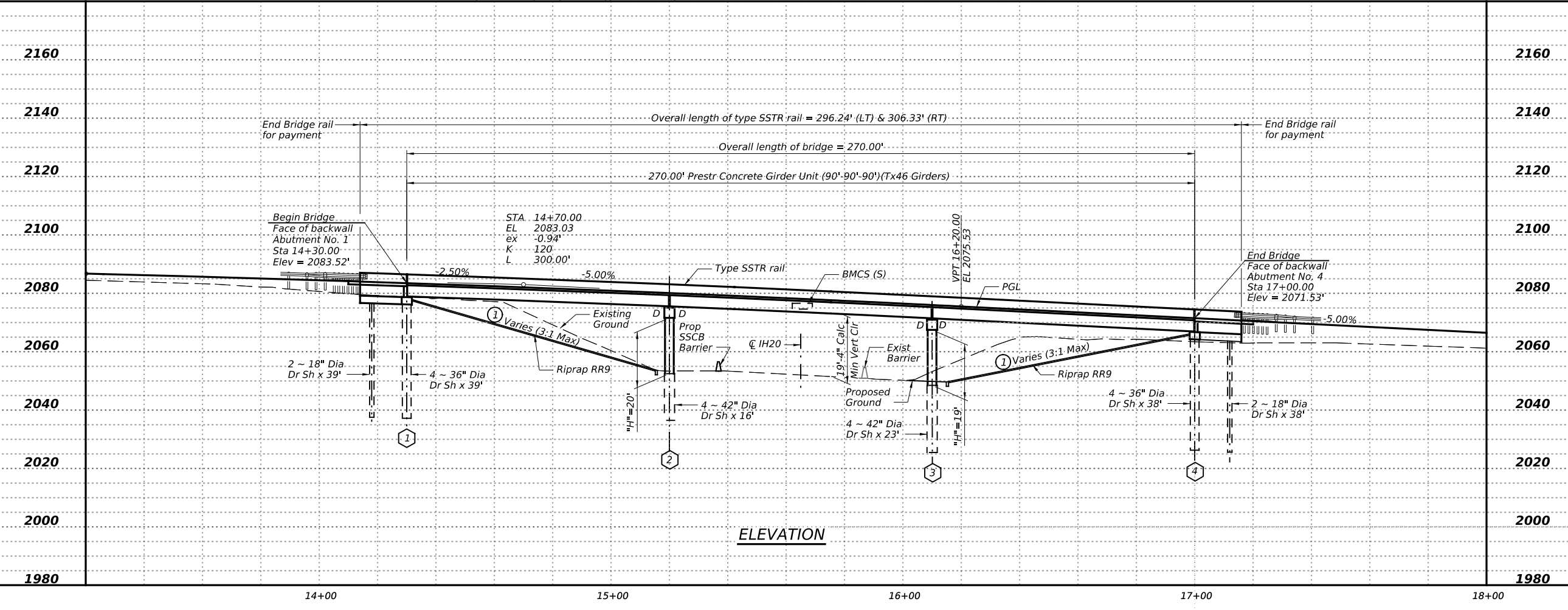
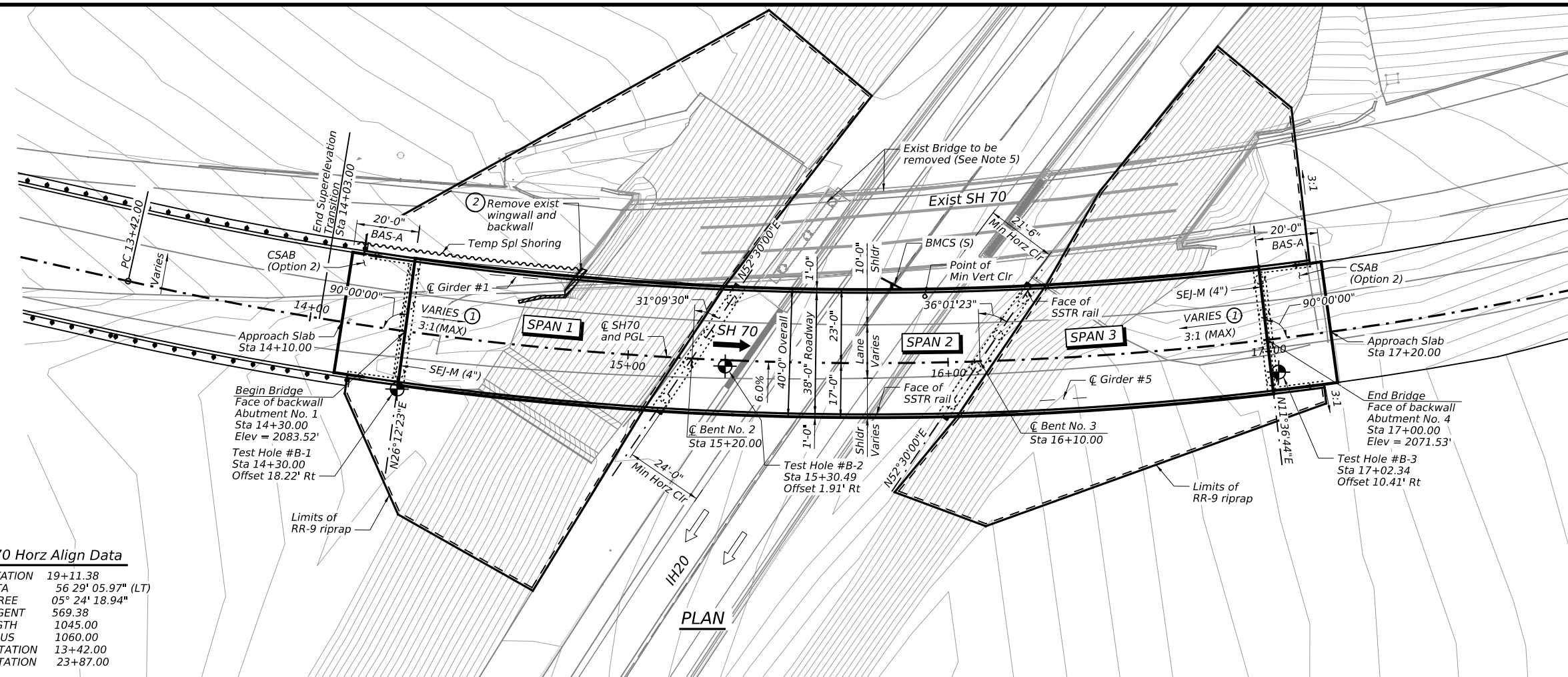
1. Designed in accordance with AASHTO LRFD Bridge Design Specifications, 9th Edition (2020) and TxDOT Bridge Design Manual (Nov 2021).
 2. See IGEB standard for girder end and bearing details. See bent details for dowel locations. "D" denotes doweled end condition.
 3. The "H" values shown are estimated column heights. The Contractor is responsible for calculating the actual column heights based on actual field conditions.
 4. Saw Cut Grooving Final Surface Texture on the Bridge Deck and Approach Slab is required.
 5. Existing Bridge is a three span, 197' long concrete deck on steel beams supported on drilled shafts.
 6. See Test Hole Profile Sheet for subsurface information.
 7. Found drilled shafts at elevations shown or deeper as necessary to penetrate two shaft diameter into very dense sand (SC) or shale.
 8. See Bridge Typical Section sheets for typical transverse section.
- ① See Riprap Layout sheet for dimensions and information not shown.
 ② Remove existing abutment wingwall and portion of backwall conflicting with the proposed bridge during Phase 1 Removal.

Design Speed = 45 mph
 Functional Class = Rural Principal Arterial
 ADT (2022) = 5,483
 ADT (2042) = 7,676
 Exist NBI = 08-177-0-0006-03-190
 Proposed NBI = 08-177-0-0006-03-351

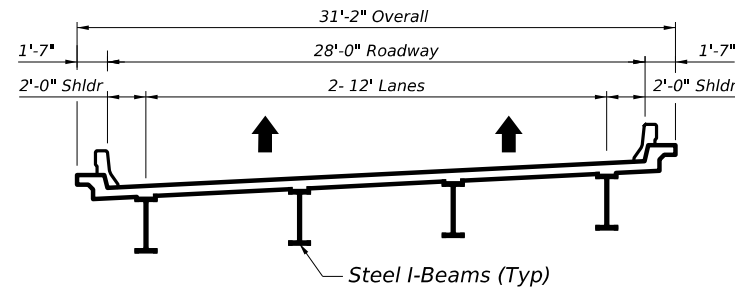
SUPERSTRUCTURE INV/OPR RATINGS: 1.01/1.86
HL93 LOADING

SH 70 Horz Align Data

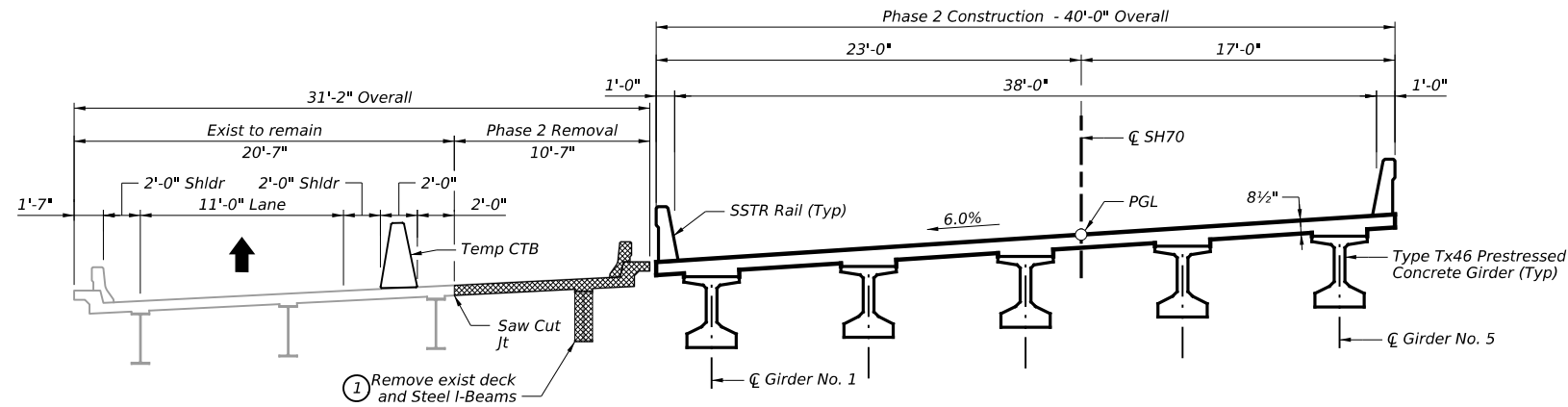
PI STATION	19+11.38
DELTA	56 29' 05.97" (LT)
DEGREE	05° 24' 18.94"
TANGENT	569.38
LENGTH	1045.00
RADIUS	1060.00
PC STATION	13+42.00
PT STATION	23+87.00



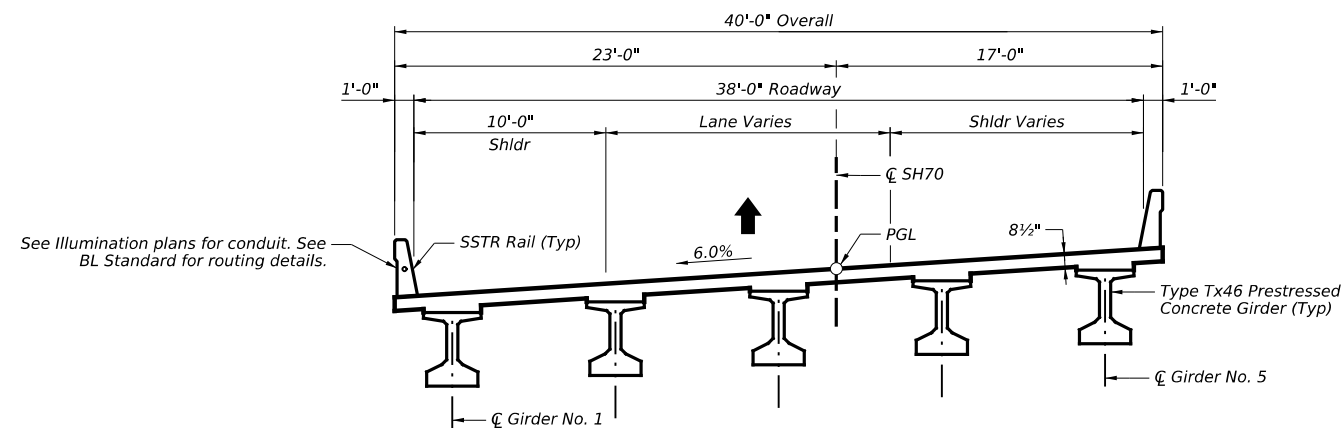
NO.	DATE	REVISION	APPR BY
HDR			
HDR Engineering, Inc Firm Registration No. F-754 17111 Preston Road, Suite 300 Dallas, Texas 75248 972.960.4400			
Texas Department of Transportation			
SH 70			
BRIDGE LAYOUT IH20 UNDERPASS AT SH70 NBI: 08-177-0-0006-03-351			
SCALE: 1"=40'		SHEET 1 OF 1	
CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	72	



EXISTING TRANSVERSE SECTION



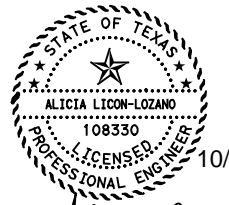
PHASED CONSTRUCTION TRANSVERSE SECTION



FINAL TRANSVERSE SECTION

① Remove existing abutment wingwall and portion of backwall conflicting with the proposed bridge during Phase 2 Removal.

HL93 LOADING



Alicia Licon-Lozano

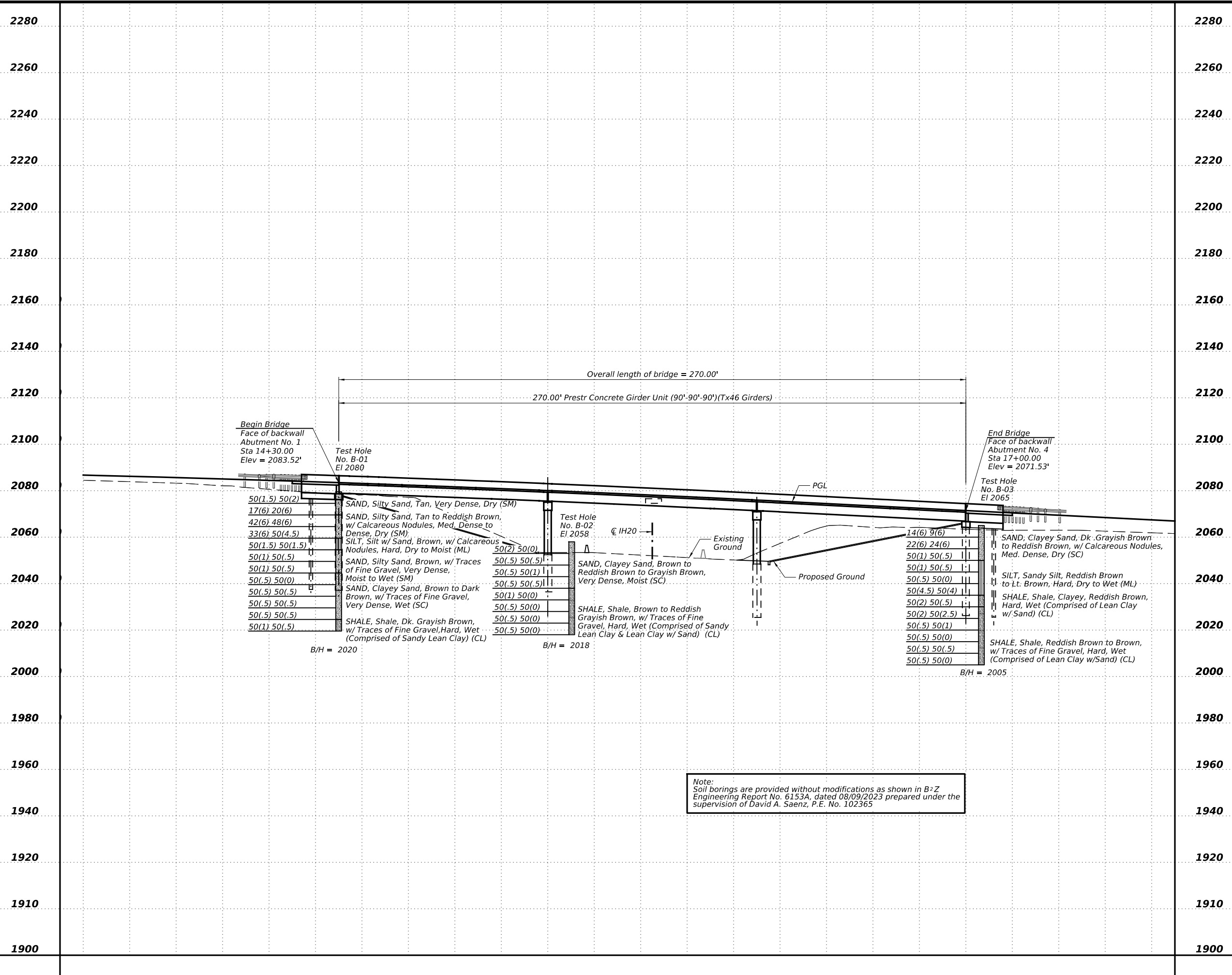
HDR HDR Engineering, Inc.
 Firm Registration No. F-754
 17111 Preston Road, Suite 300
 Dallas, Texas 75248
 972.960.4400



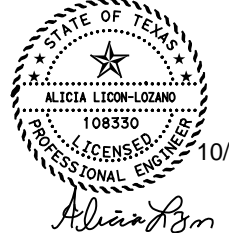
SH 70

**BRIDGE TYPICAL SECTIONS
 IH20 UNDERPASS AT SH70**

N.T.S.		SHEET 1 OF 1	
CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	73	



Note:
 Soil borings are provided without modifications as shown in B-Z
 Engineering Report No. 6153A, dated 08/09/2023 prepared under the
 supervision of David A. Saenz, P.E. No. 102365



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SH 70

TEST HOLE PROFILE
 IH20 UNDERPASS AT SH70

SCALE: 1"=40' SHEET 1 OF 1

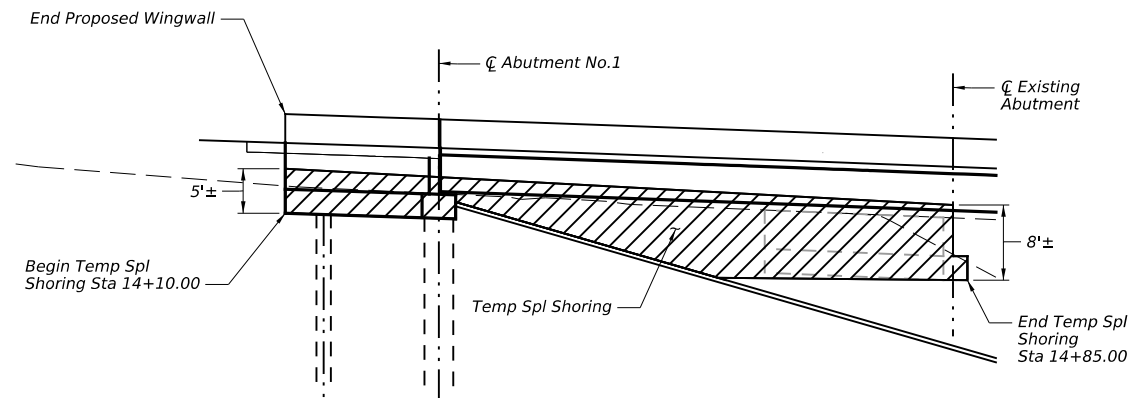
CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	74	

SUMMARY OF ESTIMATED QUANTITIES

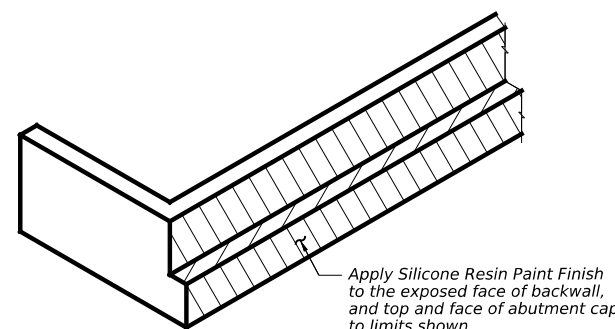
BID CODES	400	403	416	416	416	420	420	420	422	422	425	427	432	450	454
BID ITEM DESCRIPTION	CEM STABIL BKFL	TEMPORARY SPL SHORING	DRILL SHAFT (18 IN)	DRILL SHAFT (36 IN)	DRILL SHAFT (42 IN)	CL C CONC (ABUT)(HPC)	CL C CONC (CAP)(HPC)	CL C CONC (COLUMN)(HPC)	REINF CONC SLAB	APPROACH SLAB	PRESTR CONC GIRDER (TX46)	SILICONE RESIN PAINT FINISH	RIPRAP (CONC) 4 IN)	RAIL (TY SSTR)	SEALED EXPANSION JOINT (4 IN) (SEJ-M)
BRIDGE ELEMENT	CY	SF	LF	LF	LF	CY	CY	CY	SF	CY	LF	SF	CY	LF	LF
2 - ABUTMENTS	137		154	308		60.8				64.2		673	329		79
2 - INTERIOR BENTS		280			156		43.7	40.8				1114			
1 - 270.00' PRESTR CONC GIRDER UNITS									10,770		1,340.40			602.6	
Total	137	280	154	308	156	60.8	43.7	40.8	10,770	64.2	1,340.40	1787	329	602.6	79

BEARING SEAT ELEVATIONS

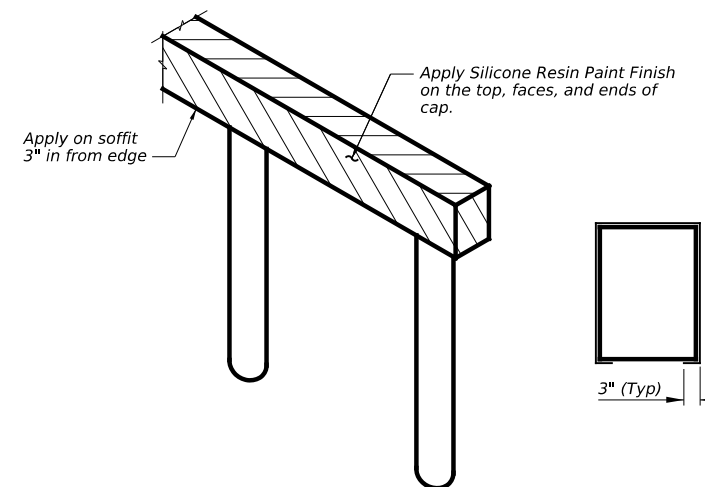
	BEAM 1	BEAM 2	BEAM 3	BEAM 4	BEAM 5
BENT 1 (FWD)	2077.256	2077.770	2078.284	2078.798	2079.312
BENT 2 (BK)	2073.413	2074.150	2074.883	2075.612	2076.336
(FWD)	2073.348	2074.086	2074.821	2075.551	2076.276
BENT 3 (BK)	2069.141	2069.971	2070.796	2071.615	2072.428
(FWD)	2068.852	2069.683	2070.510	2071.330	2072.145
BENT 4 (BK)	2065.180	2065.693	2066.206	2066.719	2067.232



TEMPORARY SHORING DETAIL



ABUTMENT WATERPROOFING DETAIL
Item 427

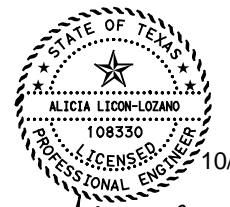


CAP ISOMETRIC

CAP SECTION

CAP WATERPROOFING DETAIL
Item 427

HL93 LOADING



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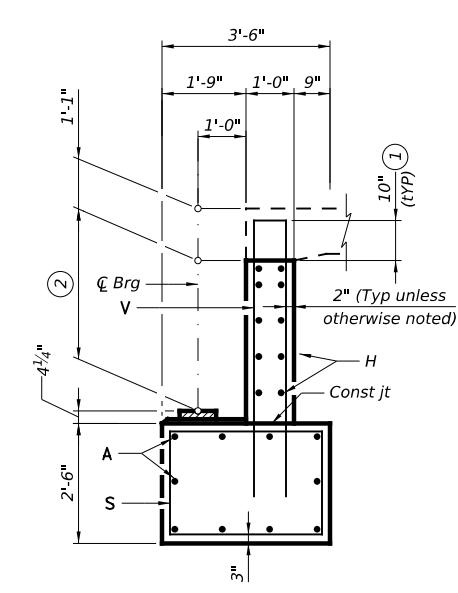
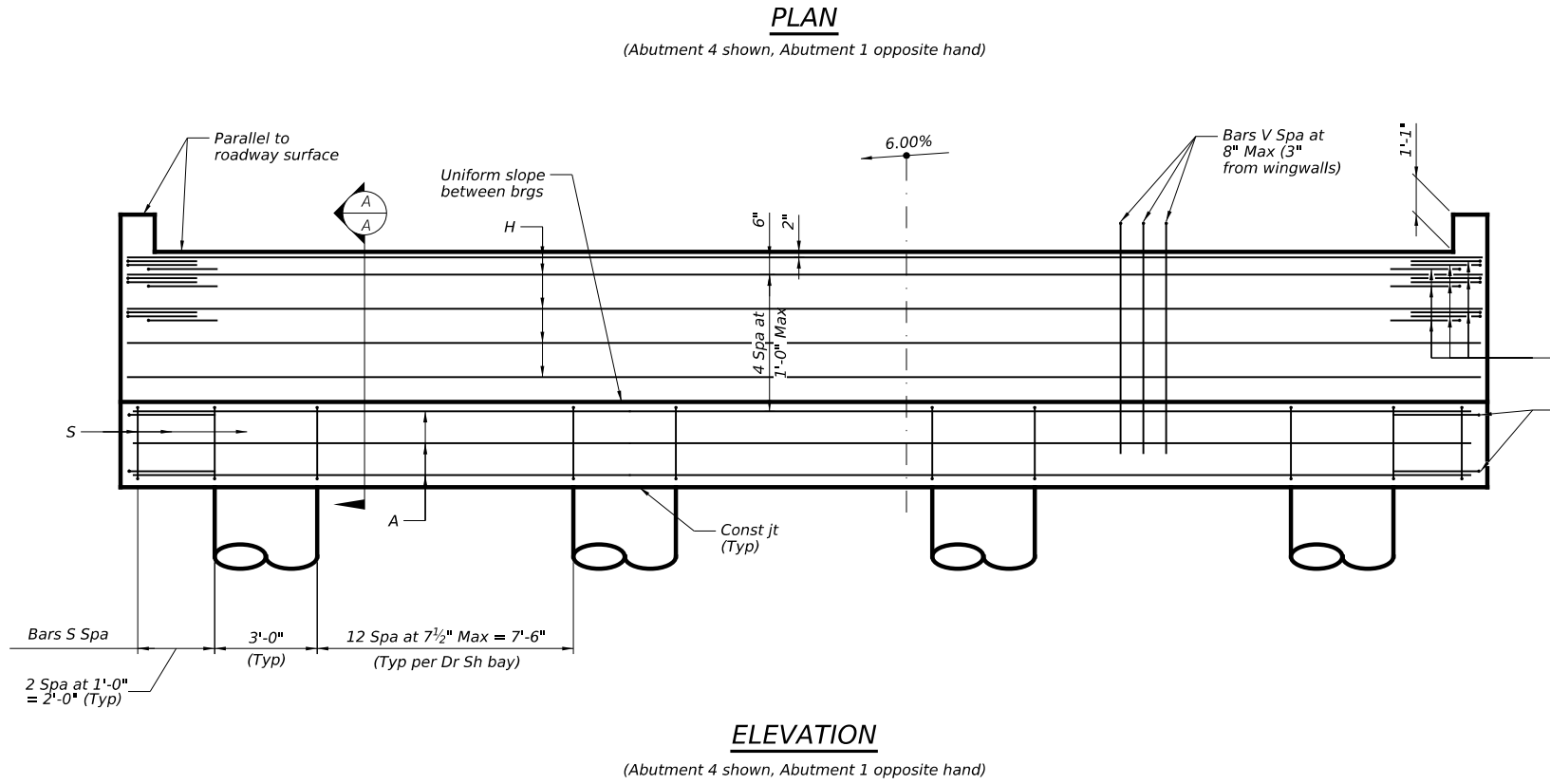
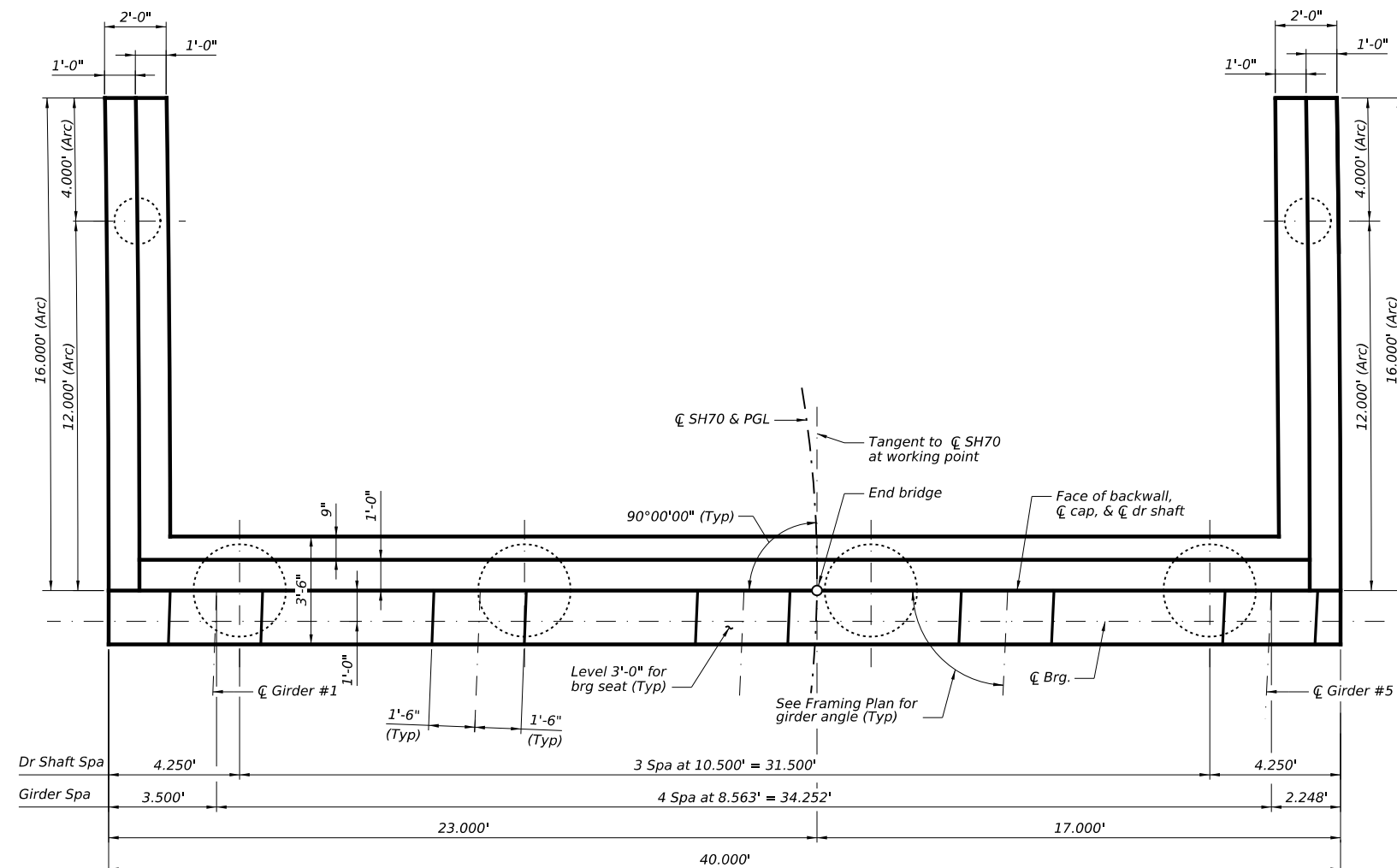
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SH 70

**ESTIMATED QUANTITIES &
 BEARING SEAT ELEVATIONS
 IH20 UNDERPASS AT SH70**

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	75	



- ① Increase as required to maintain 3" from finished grade.
- ② Abutment 1: 3'-9"
Abutment 4: 3'-10"

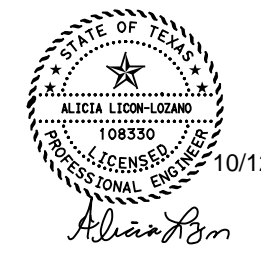
MATERIAL NOTES:
 All concrete shall be Class C (HPC), $f_c = 3600$ psi.
 All reinforcing steel shall be Grade 60, epoxy coated.

GENERAL NOTES:
 Designed in accordance to AASHTO LRFD Bridge Design Specification, 9th Edition (2020) and TxDOT LRFD Bridge Design Manual (Nov 2021).
 See Bridge Layout for header slope and foundation type, size, and length.
 See Common Foundation Details (FD) standard sheet for all foundation details and notes.
 See SSID for structure ID sign to be affixed to each abutment.
 See Concrete Riprap (CRR) standard sheet for riprap attachment details.
 See SSTR rail details for rail anchorage in wingwalls.

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

Foundation Loads 103 tons/Abutment DS

HL93 LOADING



NO.	DATE	REVISION	APPR BY

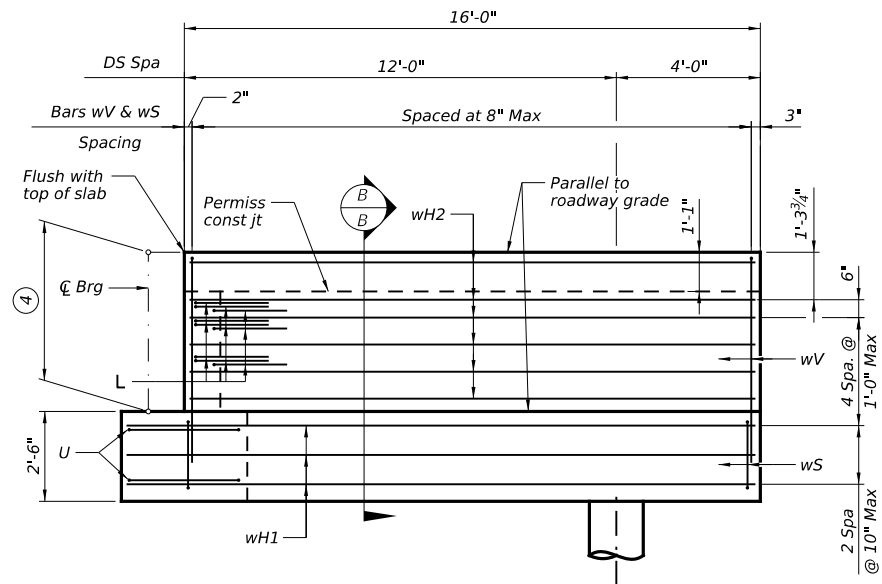
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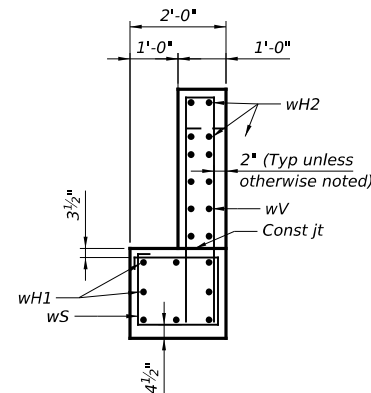
SH70
ABUTMENT NOS. 1 & 4
IH20 UNDERPASS AT SH70

SHEET 1 OF 2

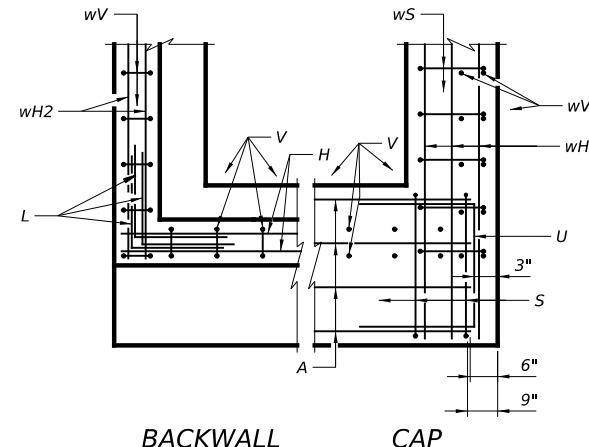
CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	76	



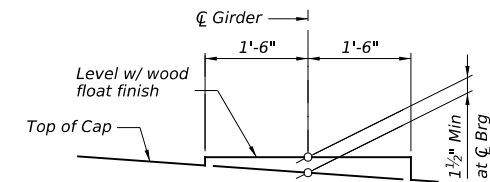
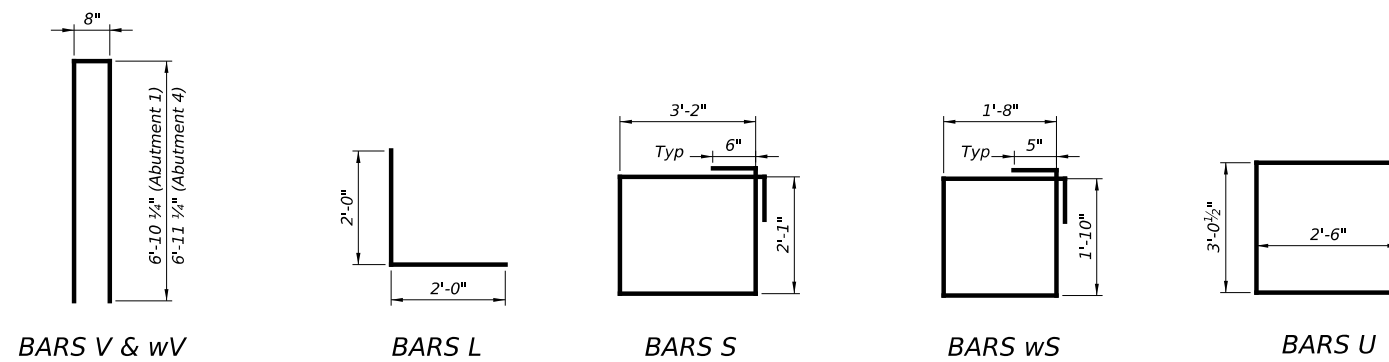
WINGWALL ELEVATION



SECTION B-B
(Not to scale)



BACKWALL CAP
CORNER DETAILS



BEARING SEAT DETAIL
(Bearing surface must be clean and free of all loose material before placing bearing pad.)

TABLE OF ESTIMATED QUANTITIES

Bar	No.	Size	Length	Weight	
A	10	#11	39'-0"	2,072	
H	10	#6	39'-8"	596	
L	18	#6	4'-0"	108	
S	45	#5	11'-6"	540	
U	4	#6	8'-1"	49	
V	58	#5	14'-7"	883	
wH1	14	#6	17'-5"	366	
wH2	24	#6	15'-8"	565	
wS	50	#4	7'-10"	262	
wV	50	#5	14'-7"	761	
Reinforcing Steel				Lb	6,211
Class C (HPC) Concrete				CY	30.5

- ③ Quantities shown are for one abutment only (with approach slab).
- ④ Abutment 1: 5'-2 1/4"
Abutment 4: 5'-3 1/4"

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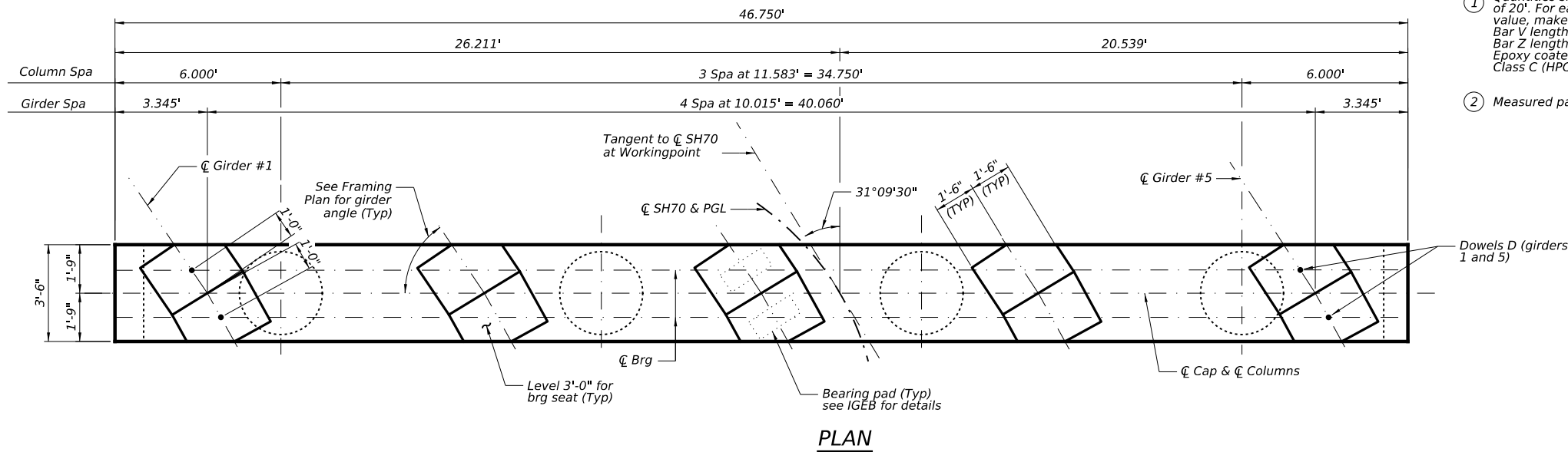


SH70

ABUTMENT NOS. 1 & 4
IH20 UNDERPASS AT SH70

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	77	



- ① Quantities shown are based on an "H" value of 20'. For each linear foot variation in "H" value, make the following adjustments:
 Bar V length, 1'-0"
 Bar Z length, 31'-5"
 Epoxy coated reinforcing steel, 275 LB
 Class C (HPC) conc (col), 1.05 CY
- ② Measured parallel to top of cap cross-slope.

TABLE OF ESTIMATED QUANTITIES ①

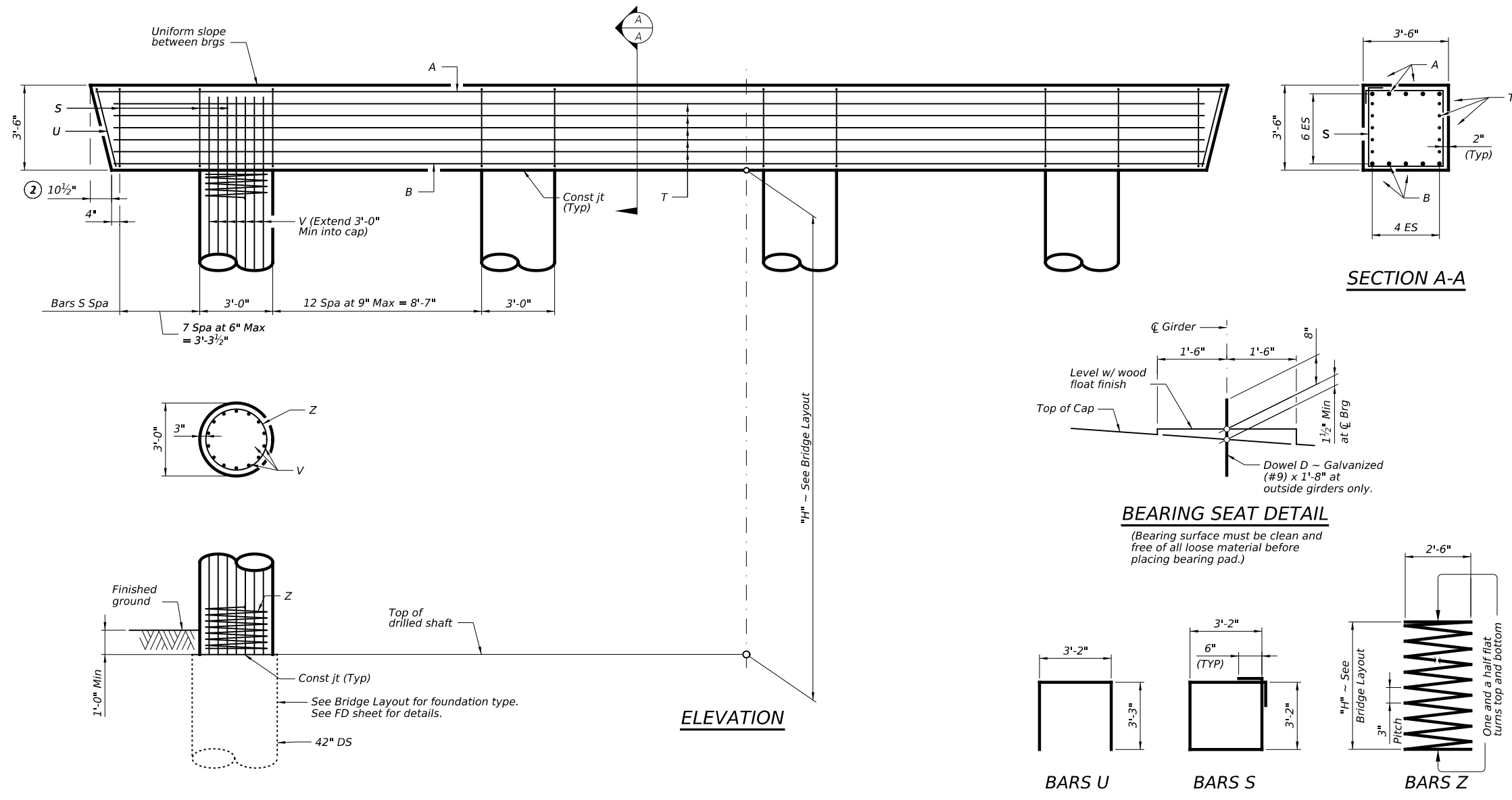
Bar	No.	Size	Length	Weight
A	5	#11	46'-3"	1,229
B	5	#11	44'-9"	1,189
D	4	#9	1'-8"	23
S	55	#5	13'-8"	784
T	10	#5	44'-9"	467
U	2	#5	9'-8"	21
V	56	#9	23'-0"	4,380
Z	4	#4	651'-11"	1,742
Reinforcing Steel			Lb	9,835
Class C (HPC) Concrete (Cap)			CY	21.1
Class C (HPC) Conc (Col)			CY	20.9

MATERIAL NOTES:
 All concrete shall be Class C (HPC), f'c = 3600 psi.
 All reinforcing steel shall be Grade 60 epoxy coated.

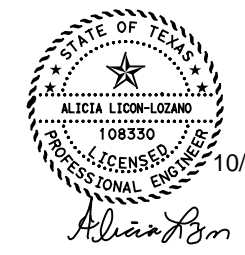
GENERAL NOTES:
 Designed in accordance to AASHTO LRFD Bridge Design Specification, 9th Edition (2020) and TxDOT LRFD Bridge Design Manual (Nov 2021).
 See Bridge Layout for foundation type, size and length.
 See Common Foundation Details FD Standard sheet for all foundation details and notes.

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

Calculated Foundation Loads = 166 tons/Dr Sh.



HL93 LOADING



NO.	DATE	REVISION	APPR BY

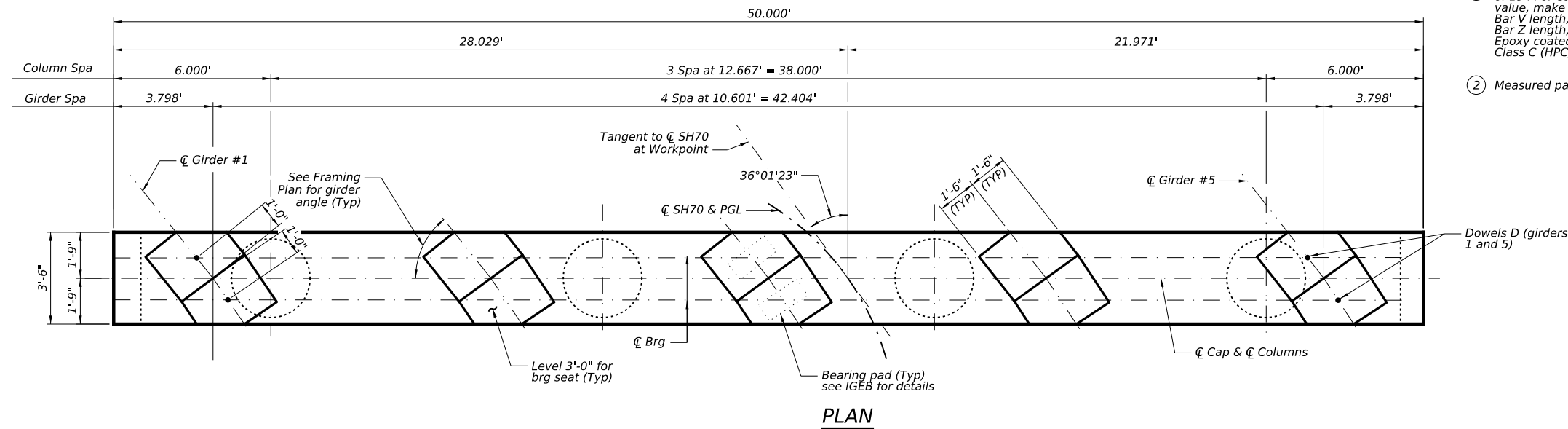
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SH 70
INTERIOR BENT NO. 2
IH20 UNDERPASS AT SH70

SHEET 1 OF 1

COUNT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST		COUNTY	SHEET NO.
ABILENE		NOLAN	78



- ① Quantities shown are based on an "H" value of 19'. For each linear foot variation in "H" value, make the following adjustments:
 Bar V length, 1'-0"
 Bar Z length, 31'-5"
 Epoxy coated reinforcing steel, 275 LB
 Class C (HPC) Conc (Col), 1.05 CY
- ② Measured parallel to top of cap cross-slope.

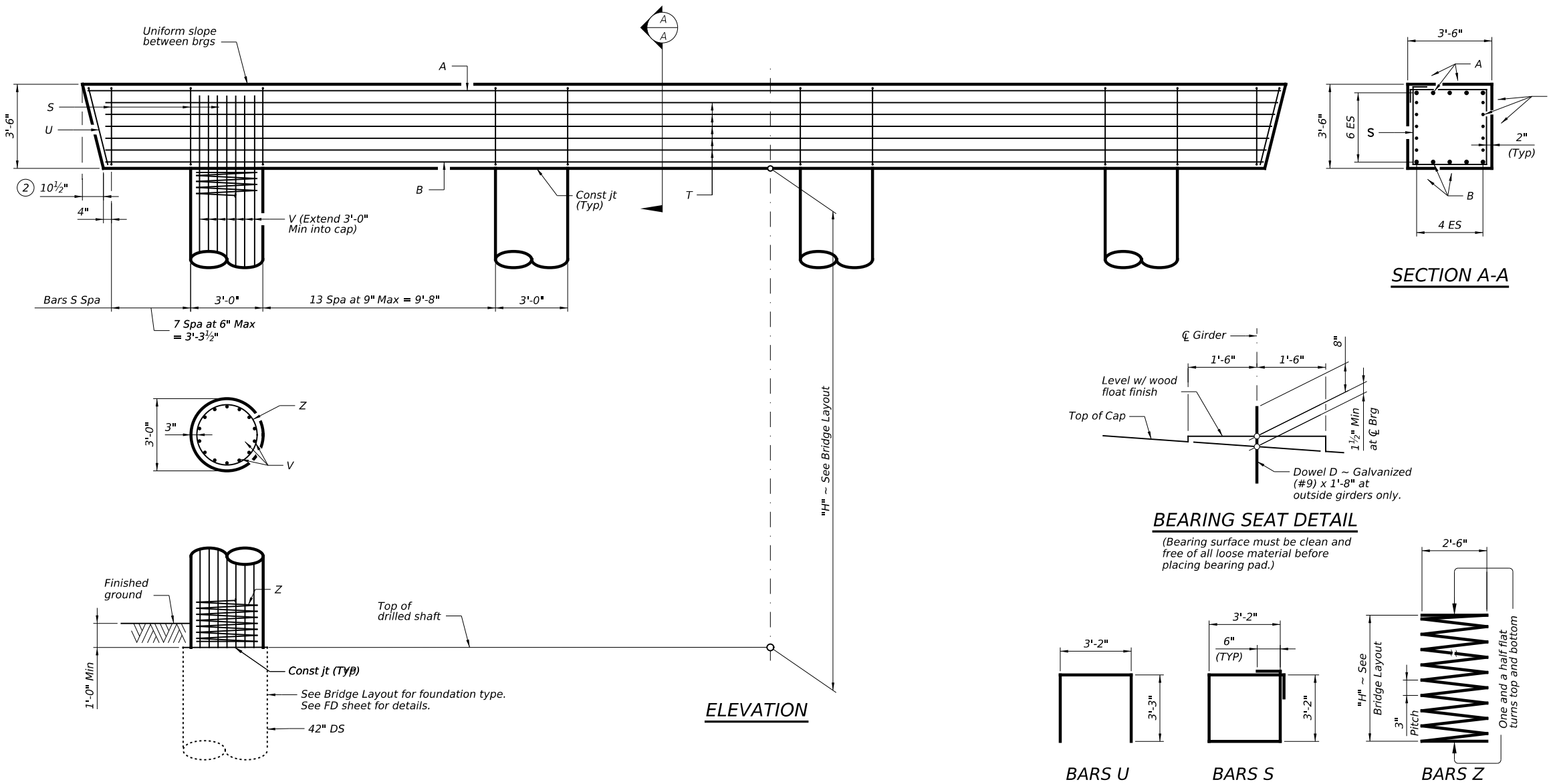
Bar	No.	Size	Length	Weight
A	5	#11	49'-6"	1,315
B	5	#11	48'-0"	1,276
D	4	#9	1'-8"	23
S	58	#5	13'-8"	827
T	10	#5	48'-0"	501
U	2	#5	9'-8"	21
V	56	#9	22'-0"	4,189
Z	4	#4	620'-6"	1,658
Reinforcing Steel			Lb	9,810
Class C (HPC) Concrete (Cap)			CY	22.6
Class C (HPC) Conc (Col)			CY	19.9

MATERIAL NOTES:
 All concrete shall be Class C (HPC), f'c = 3600 psi.
 All reinforcing steel shall be Grade 60 epoxy coated.

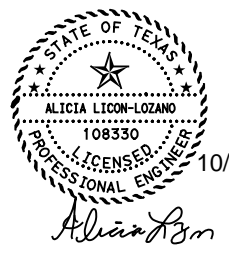
GENERAL NOTES:
 Designed in accordance to AASHTO LRFD Bridge Design Specification, 9th Edition (2020) and TxDOT LRFD Bridge Design Manual (Nov 2021).
 See Bridge Layout for foundation type, size and length.
 See Common Foundation Details FD Standard sheet for all foundation details and notes.

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

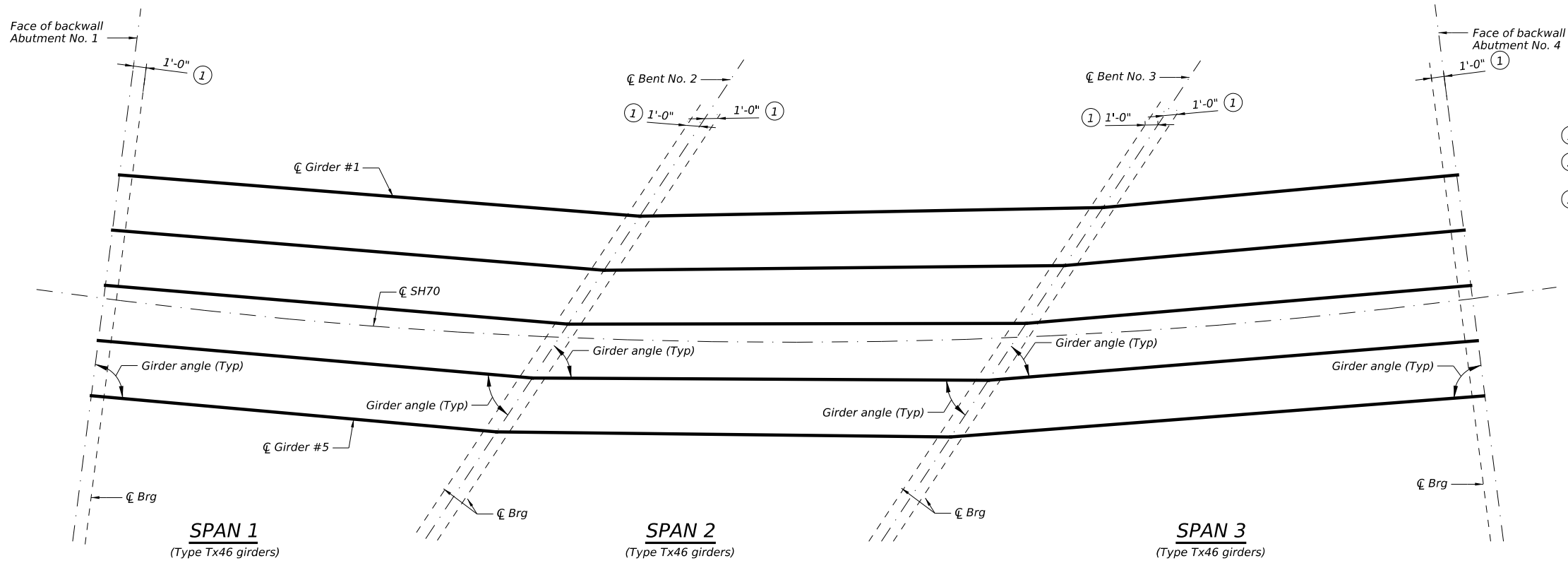
Calculated Foundation Loads = 166 tons/Dr Sh.



HL93 LOADING



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 SH 70 INTERIOR BENT NO. 3 IH20 UNDERPASS AT SH70			
SHEET 1 OF 1			
0006	15	038	SH 70
DIST		COUNTY	SHEET NO.
ABILENE		NOLAN	79



- ① See IGEB standard for orientation of dimension.
- ② Girder lengths shown are bottom girder flange lengths with adjustments for girder slope.
- ③ Provide 1" beveled steel sole plate to all the girder on span No. 3. For additional details, see IGEB standard.

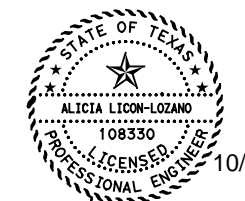
BENT REPORT

BENT NO. 1 (S 26 12 22.91 W)				BENT NO. 2 (N 52 30 0.00 E)				BENT NO. 3 (N 52 30 0.00 E)				BENT NO. 4 (S 11 36 43.76 W)			
DISTANCE BETWEEN STATION LINE AND BEAM 1, 19.500 L				DISTANCE BETWEEN STATION LINE AND BEAM 1, 22.866 L				DISTANCE BETWEEN STATION LINE AND BEAM 1, 24.231 L				DISTANCE BETWEEN STATION LINE AND BEAM 1, 19.500 L			
BEAM SPAC. BEAM ANGLE				BEAM SPAC. BEAM ANGLE				BEAM SPAC. BEAM ANGLE				BEAM SPAC. BEAM ANGLE			
(C.L. BENT) D M S				(C.L. BENT) D M S				(C.L. BENT) D M S				(C.L. BENT) D M S			
SPAN 1	BEAM 1	0.000	87 14 31	SPAN 1	BEAM 1	0.000	60 56 54	SPAN 2	BEAM 1	0.000	55 41 28	SPAN 3	BEAM 1	0.000	87 57 36
	BEAM 2	8.563	87 21 47		BEAM 2	10.015	61 4 10		BEAM 2	10.015	55 59 52		BEAM 2	81.032	79.032
	BEAM 3	8.563	87 29 45		BEAM 3	10.015	61 12 8		BEAM 3	10.015	56 18 24		BEAM 3	87.988	87.60
	BEAM 4	8.563	87 38 33		BEAM 4	10.015	61 20 56		BEAM 4	10.015	56 37 4		BEAM 4	94.944	92.943
	BEAM 5	8.563	87 48 17		BEAM 5	10.015	61 30 40		BEAM 5	10.015	56 55 53		BEAM 5	101.901	99.900
	TOTAL	34.250			TOTAL	40.059			TOTAL	42.403			TOTAL	101.901	101.52

GIRDER REPORT

BEAM REPORT, SPAN 1					BEAM REPORT, SPAN 2					BEAM REPORT, SPAN 3				
HORIZONTAL DISTANCE TRUE DISTANCE BEAM					HORIZONTAL DISTANCE TRUE DISTANCE BEAM					HORIZONTAL DISTANCE TRUE DISTANCE BEAM				
C-C BENT C-C BRG. BOT. BM. FLG. ② SLOPE					C-C BENT C-C BRG. BOT. BM. FLG. ② SLOPE					C-C BENT C-C BRG. BOT. BM. FLG. ② SLOPE ③				
BEAM 1	100.137	98.136	99.71	-0.0392	BEAM 1	90.735	88.735	90.34	-0.0474	BEAM 1	74.078	72.077	73.67	-0.0509
BEAM 2	95.686	93.685	95.26	-0.0386	BEAM 2	90.406	88.406	90.00	-0.0465	BEAM 2	81.032	79.032	80.63	-0.0505
BEAM 3	91.235	89.234	90.80	-0.0381	BEAM 3	90.080	88.080	89.67	-0.0457	BEAM 3	87.988	87.60	87.60	-0.0501
BEAM 4	86.785	84.785	86.35	-0.0376	BEAM 4	89.757	87.757	89.35	-0.0448	BEAM 4	94.944	92.943	94.56	-0.0496
BEAM 5	82.336	80.335	81.89	-0.0370	BEAM 5	89.436	87.436	89.02	-0.0440	BEAM 5	101.901	99.900	101.52	-0.0492

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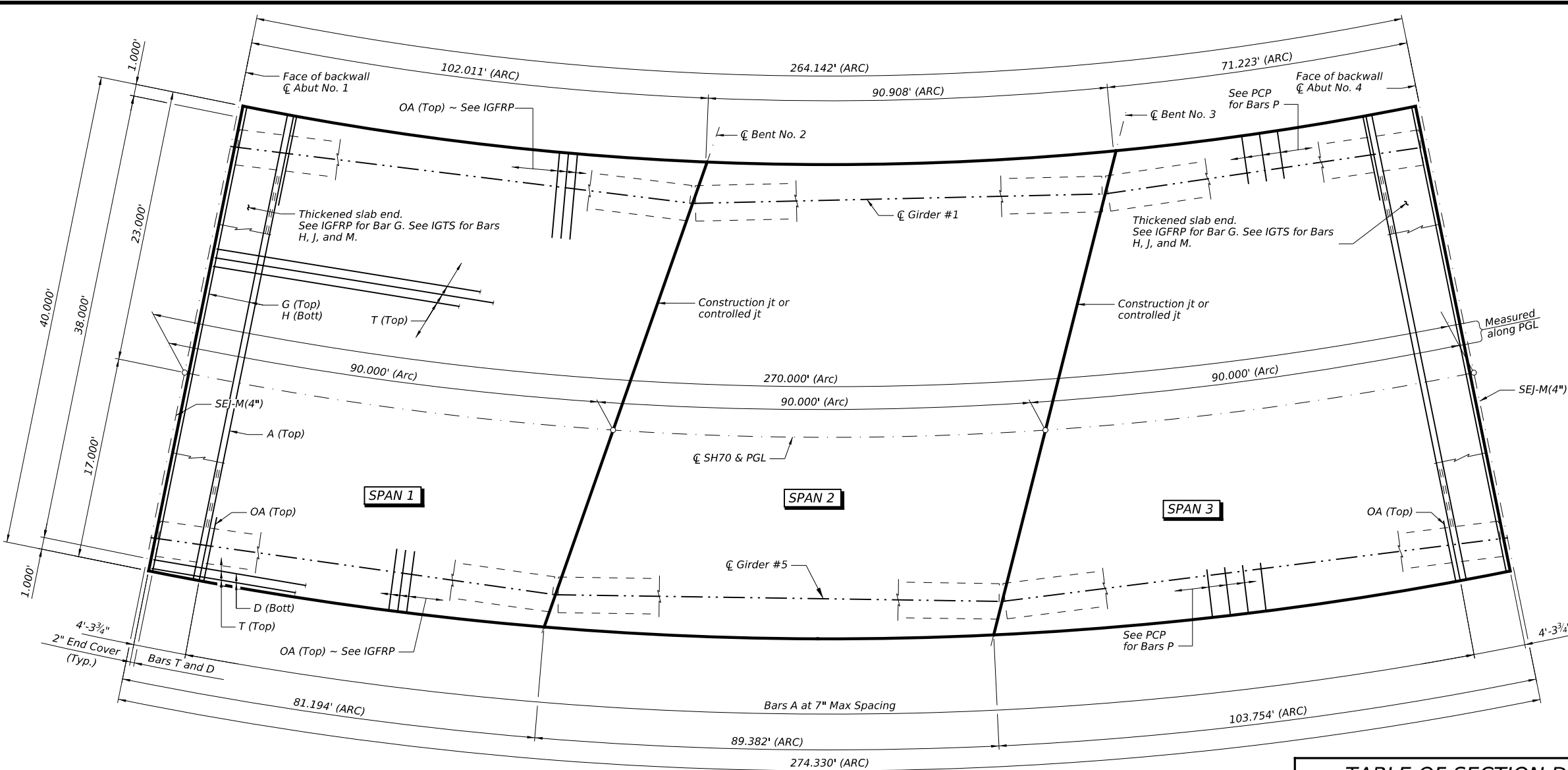


SH 70

FRAMING PLAN
IH20 UNDERPASS AT SH70

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	80	



PLAN

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

TABLE OF ESTIMATED QUANTITIES			
Span	Reinf Concrete Slab	Prestr Concrete Girder (Tx46) ①	
		No.	LF
1	3,663	454.01	
2	3,605	448.39	
3	3,502	438.00	
Total	10,770	1,340.40	

- ① Fabricator will adjust lengths for girder slopes as required. See Framing Plan for girder lengths.
- ② Theoretical value
- ③ Haunch exceeds 3.5", see PCP details for reinforcement.

MATERIAL NOTES:

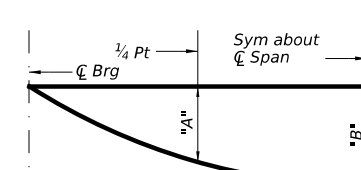
Provide Class S concrete ($f_c = 4000$ psi).
 Provide Grade 60 epoxy coated reinforcing steel for Bars D,H,J,M and P.
 Provide Glass Fiber Reinforcement for all other bars. See IGFRP Standards for details.

GENERAL NOTES:

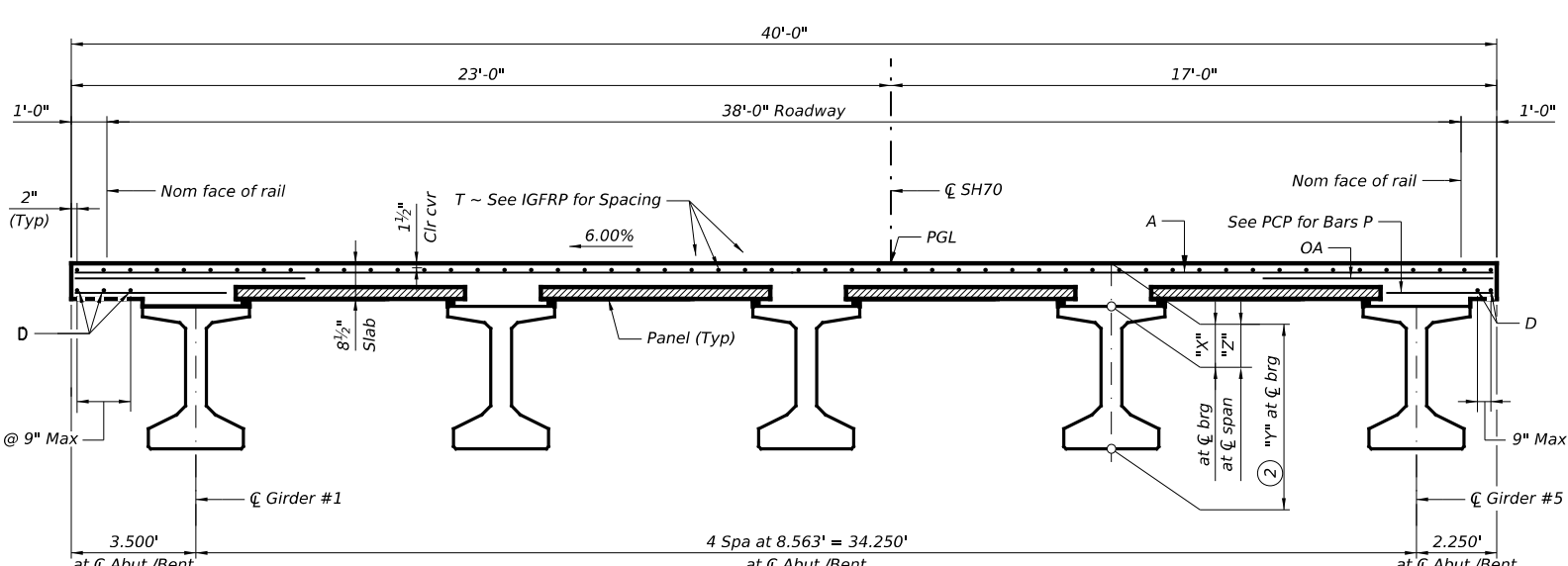
Designed in accordance to AASHTO LRFD Bridge Design Specifications, 9th Edition (2020).
 See IGTS standard for thickened slab end details and quantity adjustments.
 See rail standard for anchorage in slab.
 See PCP and PCP-FAB standards for panel details not shown.
 See IGMS standard for miscellaneous details.
 See PMDF standard for details and quantity adjustments if this option is used.
 Cover dimensions are clear dimensions, unless noted otherwise.

TABLE OF SECTION DEPTHS				
Span No.	Girder No.	"X" at \bar{C} Brg	"Y" at \bar{C} Brg	"Z" at \bar{C} Span ②
1	1, 2			10 1/8"
	3			10 1/8"
	4	1'-0"	4'-10"	10 1/2"
	5			10 1/2"
2	1			10 1/8"
	2, 3, 4	11 3/4"	4'-9 3/4"	10 1/2"
	5			10 1/2"
	1, 3			10 1/4"
3	2	1'-1" ③	4'-11"	10 1/2"
	4 & 5			10 1/4"

Span No.	Girder No.	"A" Ft	"B" Ft
1	1	0.090	0.128
	2	0.094	0.134
	3	0.078	0.111
	4	0.063	0.090
2	1	0.061	0.087
	2	0.074	0.105
	3	0.073	0.104
	4	0.072	0.103
3	1	0.060	0.086
	2	0.027	0.039
	2	0.046	0.066
	3	0.065	0.093
4	0.089	0.127	
5	0.105	0.149	



DEAD LOAD DEFLECTION DIAGRAM
 NOTE: Deflections shown are due to concrete slab only. ($E_c = 5000$ ksi). Calculated deflections shown are theoretical and actual deflection may be less. Deflection shall be adjusted based on field observation.



TYPICAL TRANSVERSE SECTION

Type Tx46

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 108330
 LICENSED PROFESSIONAL ENGINEER
 10/12/23

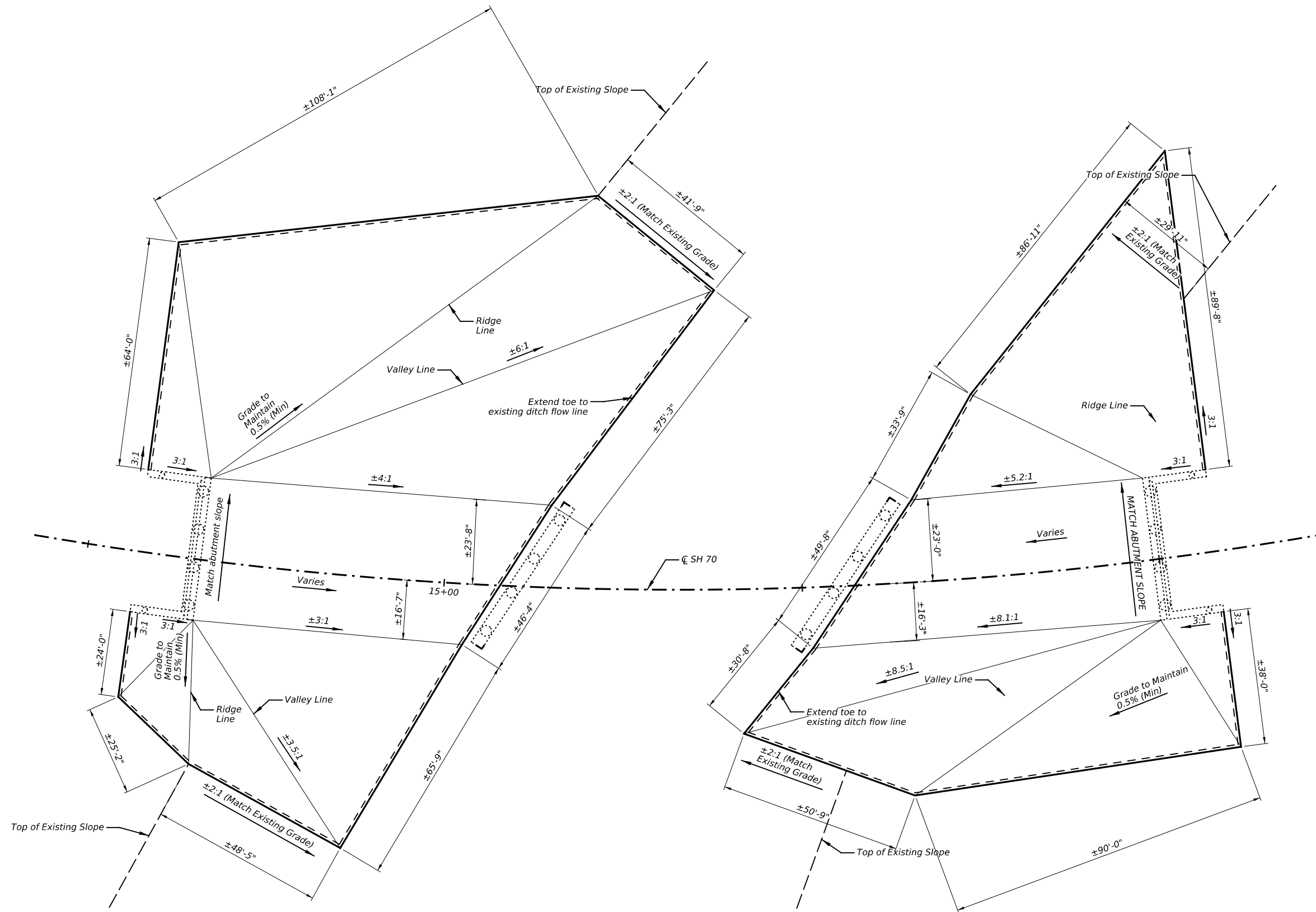
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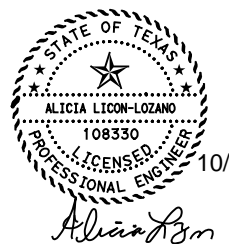
SH 70
 270.00' PRESTRESSED CONCRETE GIRDER UNIT
 IH20 UNDERPASS AT SH70

SHEET 1 OF 1

COUNT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	81	



NOTES:
 1. See CRR standard for details not shown.
 2. Dimensions are approximate. Adjust based on field conditions.



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SH 70			
RIPRAP LAYOUT			
IH20 UNDERPASS AT SH70			
SCALE: 1"=30'		SHEET 1 OF 1	
CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	82	

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STRUCTURE	DESIGNED GIRDERS								DEPRESSED STRAND PATTERN	CONCRETE	OPTIONAL DESIGN				LOAD RATING FACTORS							
	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 ε) (SERVICE I) fct(ksi)	DESIGN LOAD TENSILE STRESS (BOTτ ε) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR (2)		STRENGTH I		SERVICE III
				TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ε (in)	"e" END (in)										Moment	Shear	Inv	Opp	Inv
SH 70	1	1 - 5	Tx46	32	0.6	270	16.23	9.85	6	40.5	5.100	5.800	3.611	-3.673	5892	0.707	0.904	1.36	1.86	1.01		
	2	1 - 5	Tx46	28	0.6	270	16.60	11.18	4	42.5	4.200	5.300	3.102	-3.186	5077	0.656	0.960	1.59	2.06	1.09		
	3	1 - 3 4 - 5	Tx46	28 36	0.6	270	16.60 15.94	11.18 10.27	4 6	42.5 40.5	4.200 5.100	5.300 5.800	2.966 3.790	-3.076 -3.854	4967 6107	0.712 0.667	0.892 0.845	1.63 1.59	2.11 2.13	1.19 1.08		

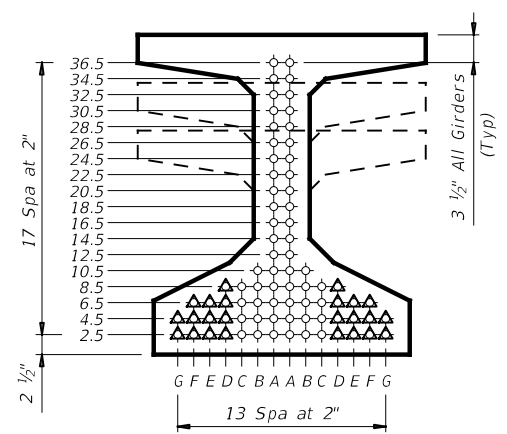
NON-STANDARD STRAND PATTERNS	
PATTERN	STRAND ARRANGEMENT AT ε OF GIRDER

- ① Based on the following allowable stresses (ksi):
 Compression = 0.65 f'ci
 Tension = 0.24 √ f'ci
 Optional designs must likewise conform.
- ② Portion of full HL93.

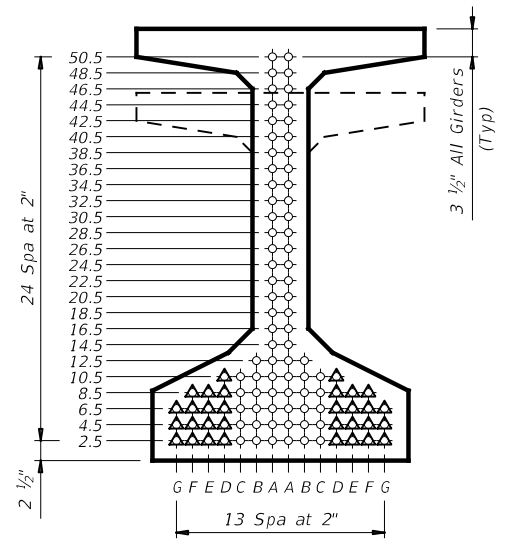
DESIGN NOTES:
 Designed according to AASHTO LRFD Bridge Design Specifications. Load rated using Load and Resistance Factor Rating according to AASHTO Manual for Bridge Evaluation. Optional designs for girders 120 feet or longer must have a calculated residual camber equal to or greater than that of the 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 424.4.2.2.4. 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.

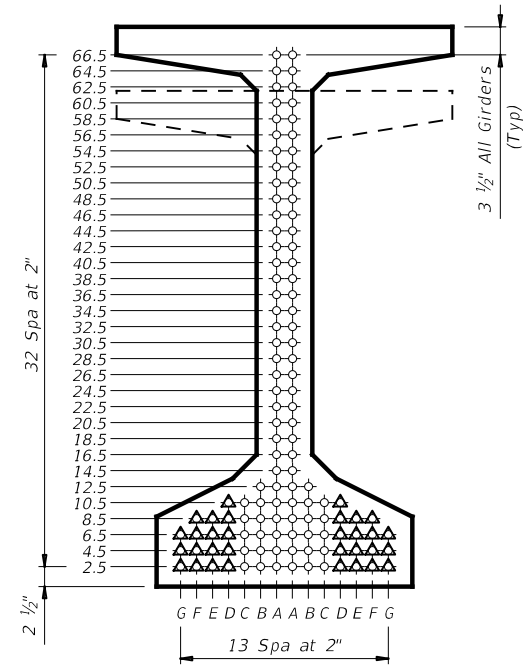
DEPRESSED STRAND DESIGNS:
 Locate strands for the designed girder as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc., beginning each row in the "A" position and working outward until the required number of strands 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

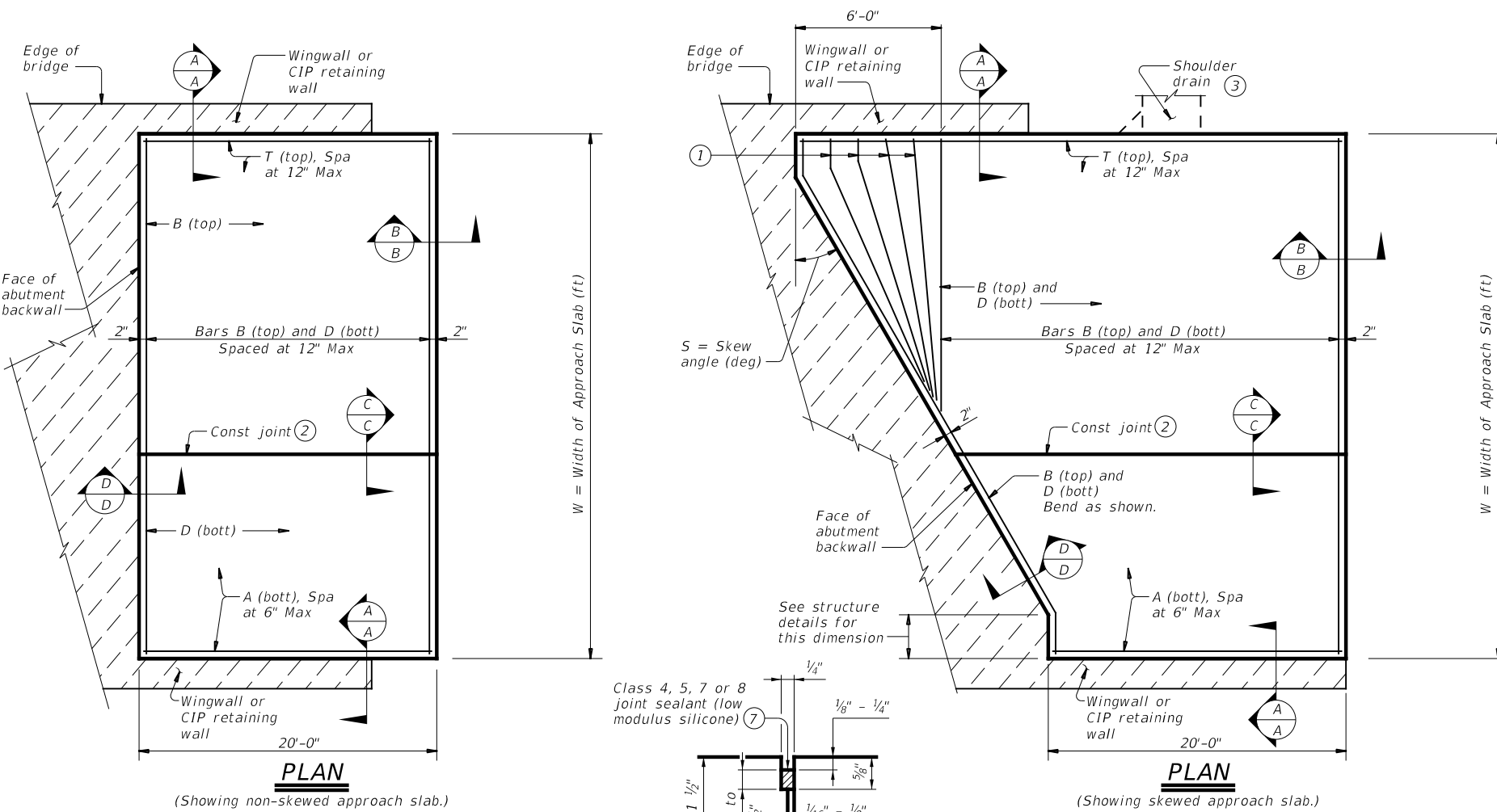


HDR Engineering, Inc
 Firm Registration No. F-754
 10/12/23
 ALICIA LICON-LOZANO
 108330
 LICENSED PROFESSIONAL ENGINEER
 HL93 LOADING

Texas Department of Transportation		Bridge Division Standard	
PRESTRESSED CONCRETE I-GIRDER DESIGNS (NON-STANDARD SPANS)			
IGND			
FILE: igndsts1-22.dgn	DN: TxDOT	CK: TxDOT	DW: EFC
©TxDOT August 2017	CONTRACT	SECTION	JOB
REVISIONS	0006	15	038
10-19: Modified for depressed strands only.	DIST	COUNTY	SHEET NO.
3-22: Added Load Rating.	ABL	NOLAN	83

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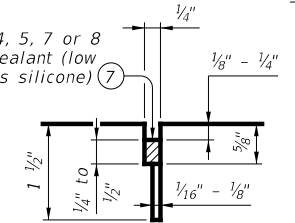


BAR TABLE	
BAR	SIZE
A	#8
B	#5
D	#5
T	#5

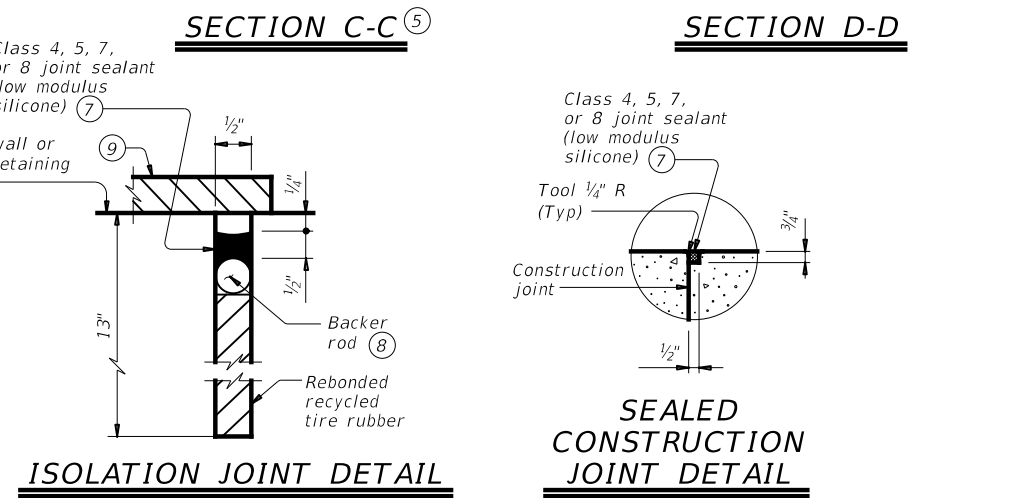
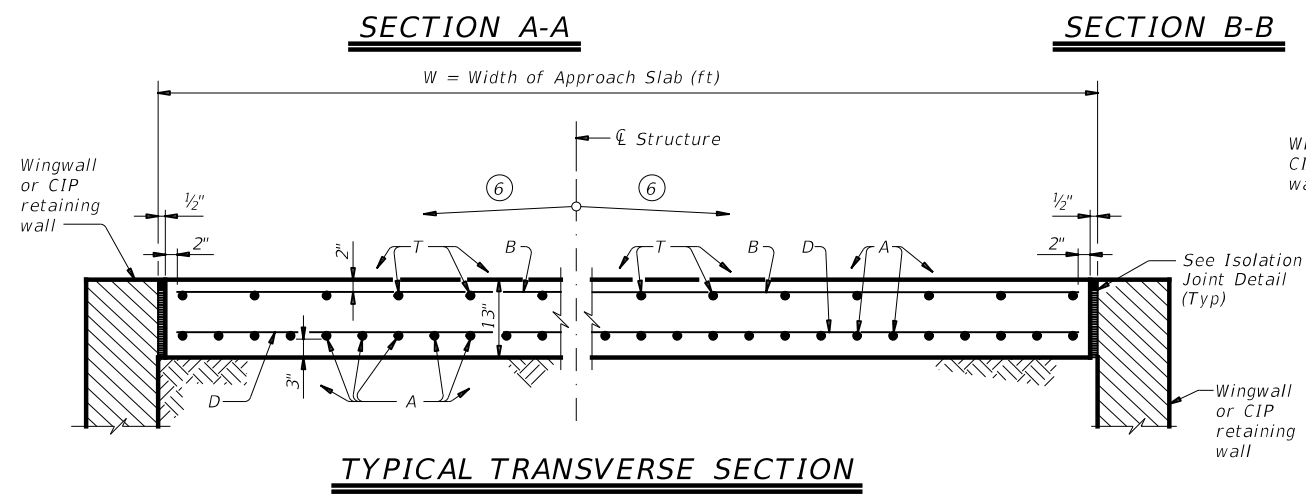
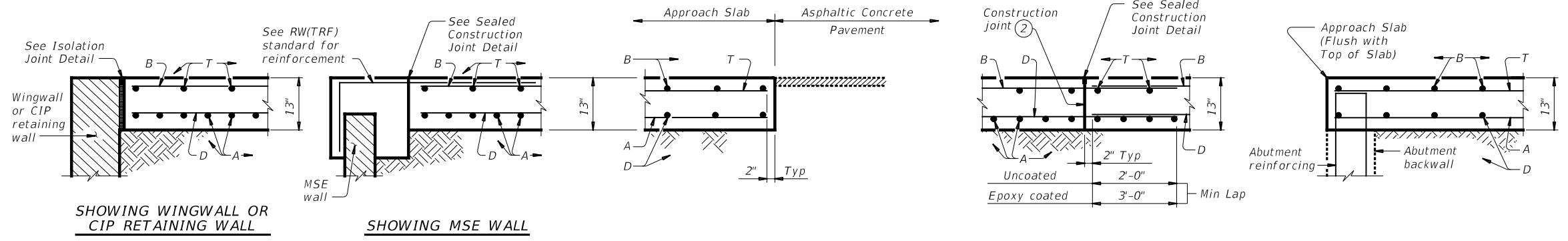
APPROXIMATE QUANTITIES ⁽⁴⁾	
Reinf steel weight = 8.5 Lbs/SF of Approach Slab	
Volume of Appr Slab Conc (CY) = 0.802W + 0.02W ² Tan S	
W = Width of Approach Slab (ft)	
S = Skew Angle (deg)	

- 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 1/2" rebonded recycled tire rubber between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.

LONGITUDINAL SAW CUT JOINT DETAIL



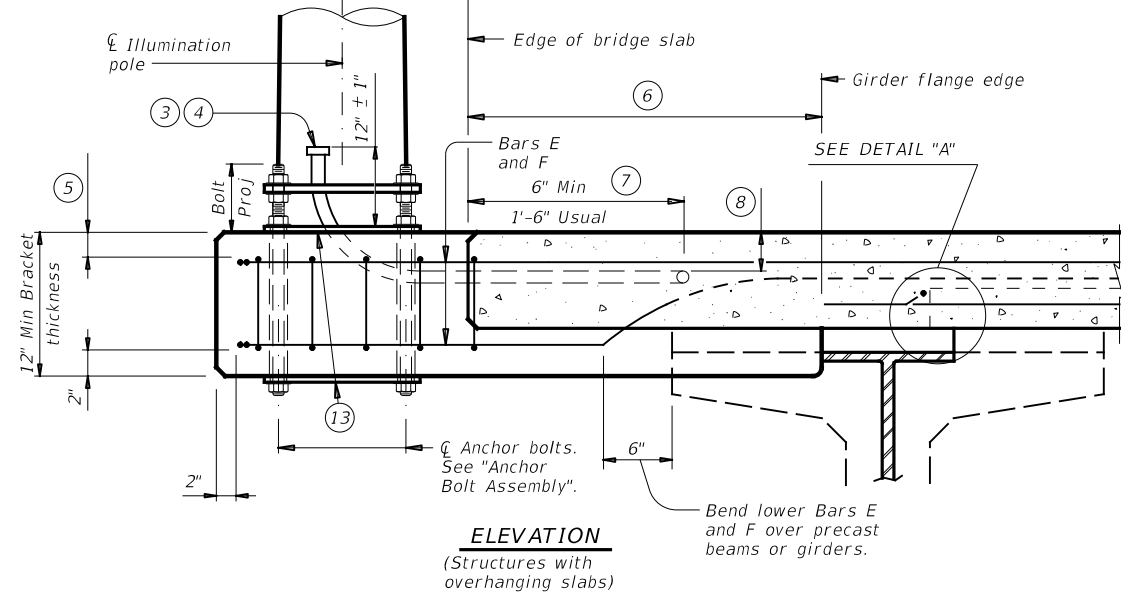
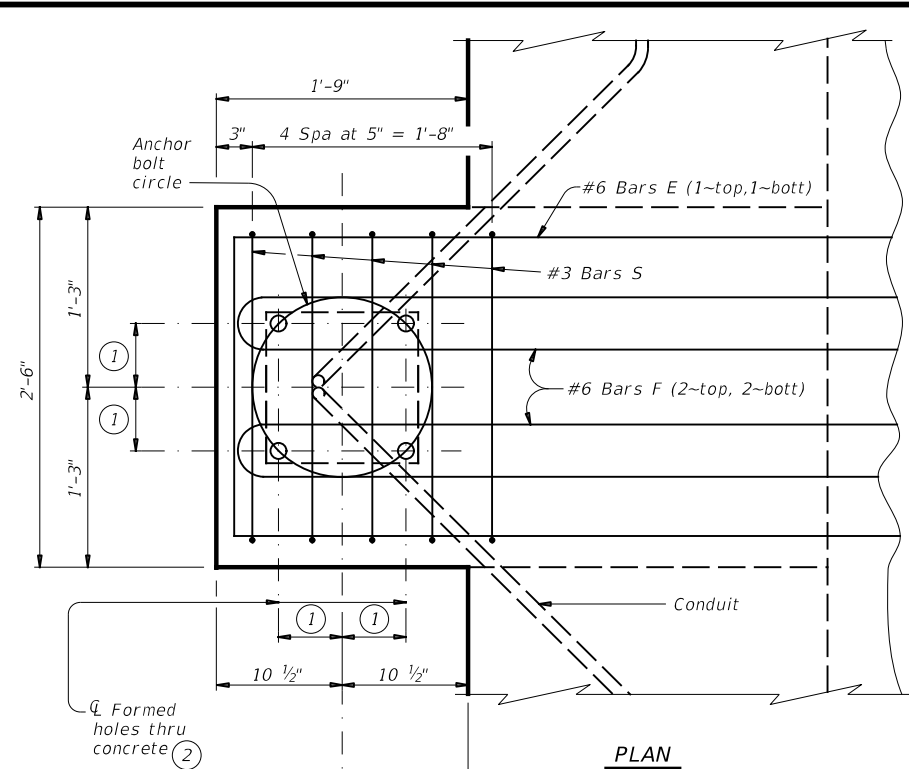
GENERAL NOTES:
 Construct approach slab in accordance with Item 422.
 Provide Class "S" concrete with a minimum compressive strength of 4,000 psi.
 Provide Grade 60 reinforcing steel.
 Provide longitudinal joints as shown on the Longitudinal Saw Cut Joint Detail at lane lines and shoulders when width between longitudinal construction joints or edges of approach slab exceeds 16 feet. Saw cut joints within 24 hours of concrete placement to a depth of 1 1/2" and seal in accordance with Item 438. Alternately, provide a controlled joint consisting of 1 1/2" vinyl or plastic joint former (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)
 Provide rebonded recycled tire rubber joint filler that meets the requirements of DMS-6310. "Joint Sealants and Fillers."
 Construct the subgrade or subbase away from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.
 Compact and finish the subgrade or foundation for the approach slab to the typical cross-section and to the lines and grades shown on the plans.
 Cure for 4 days using water or membrane curing per Item 422.
 All details shown herein are subsidiary to bridge approach slab.
 Cover dimensions are clear dimensions, unless noted otherwise.



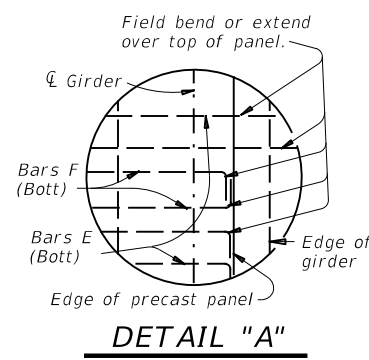
		Bridge Division Standard	
BRIDGE APPROACH SLAB ASPHALTIC CONCRETE PAVEMENT			
BAS-A			
FILE: basaste1-20.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT
©TxDOT April 2019	CONTRACT	SECTION	HIGHWAY
REVISIONS	0006	15	038 SH 70
02-20: Removed stress relieving pad.	DIST.	COUNTY	SHEET NO.
	ABL	NOLAN	84

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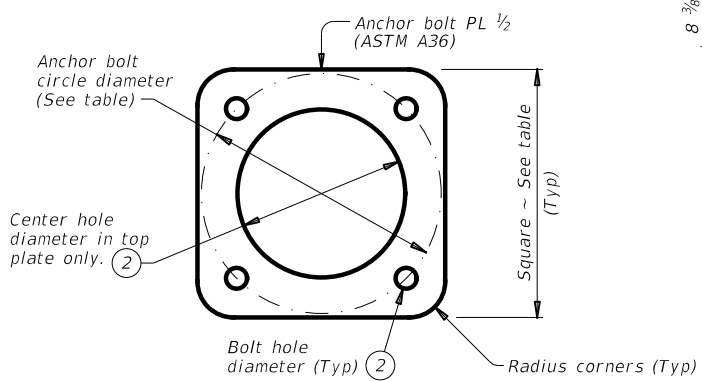
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ILLUMINATION POLE BRACKET LOCATION AND REINFORCING



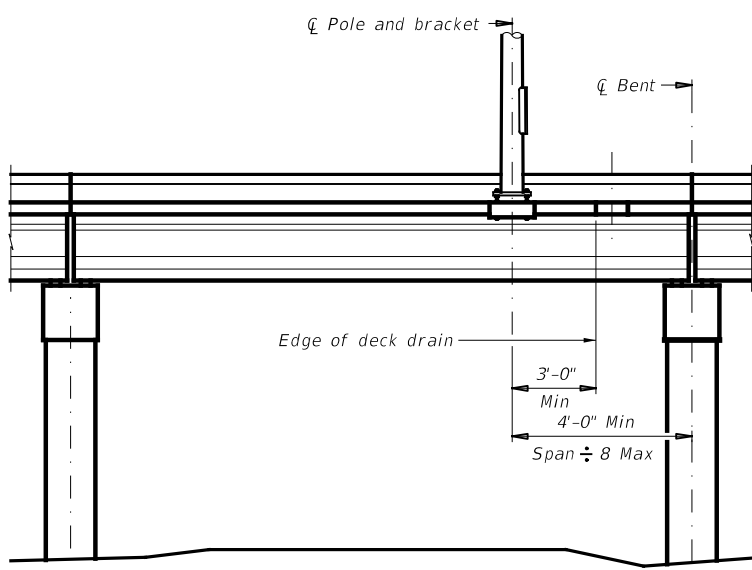
DETAIL "A"



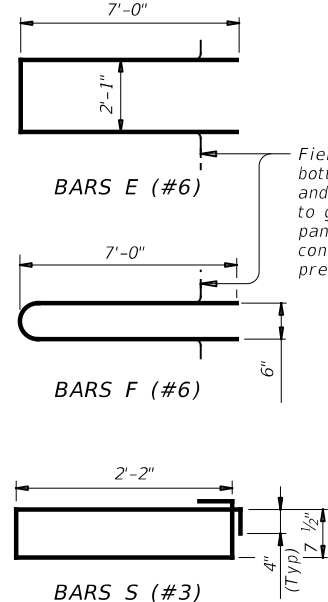
ANCHOR BOLT PLATE

TABLE OF ANCHOR BOLT AND ANCHOR BOLT PLATE INFORMATION						
ANCHOR BOLT CIRCLE DIAMETER	ANCHOR BOLT OFFSET	ANCHOR BOLT DIAMETER	ANCHOR BOLT HOLE SIZE		TOP AND BOTTOM ANCHOR BOLT PLATE SIZE	CENTER HOLE DIAMETER IN TOP ANCHOR BOLT PLATE
			CONCRETE	STEEL		
13	4 5/8	1	1 1/4	1 1/4	PL 1/2 X 13 X 1'-1"	9 1/2
15	5 5/16	1 1/4	1 1/2	1 1/2	PL 1/2 X 15 1/2 X 1'-3 1/2"	10 1/2

ESTIMATED QUANTITIES~ONE BRACKET			
ITEM	UNIT	QUANTITY	
CONCRETE	(9)(10) CY	0.2	
REINFORCING STEEL	(10) LB	146	
STRUCTURAL STEEL	(10)(11) LB	112	
CONDUIT	(12) LF	4	



TYPICAL BRIDGE ELEVATION

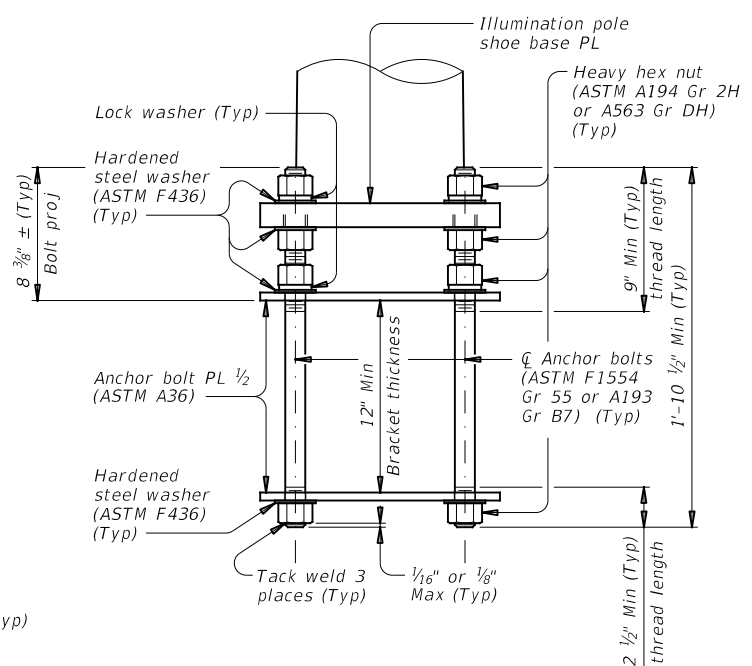


- 1 See table for anchor bolt offset dimension.
- 2 See table for hole diameter size.
- 3 If lighting is to be placed on future contract, extend conduit only 6" and provide water tight cap.
- 4 Ream burrs and install bell ends or bushings on all conduit ends.
- 5 Provide same clear cover required for bridge slab. Place Bars E and F beneath top slab reinforcing only if necessary to provide this cover.
- 6 If slab edge to girder flange edge exceeds 3'-11", lengthen Bars E and F proportionally to ensure Bars E and F extend 1'-6" Min beyond girder flange edge.
- 7 Clear rail anchors, drains, etc 1 1/2" Min.
- 8 1 1/2" Min cover and always beneath top layer slab reinforcing.
- 9 Variation due to slab thickness is insignificant.
- 10 For Contractor's information only.
- 11 Anchor bolts, nuts, washers, and 2 plates. Verify anchor bolt lengths prior to ordering.
- 12 Additional to main run (size and type as shown elsewhere on the plans).
- 13 See "Anchor Bolt Assembly", "Anchor Bolt Plate", and table for anchor bolt, and anchor bolt plate information.

MATERIAL NOTES:
 Galvanize anchor bolts, nuts, washers, and anchor bolt plates. Repair galvanizing damage from tack welding per Item 445, "Galvanizing".
 Provide Grade 60 reinforcing steel.
 Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.
 Concrete for Illumination Pole Brackets must be of the same type and placed monolithically with the bridge slab. The bracket quantity is considered subsidiary to the Item "Reinforced Concrete Slab".

GENERAL NOTES:
 Designed for up to 50 ft light pole with one 12 ft arm, 60 lb luminaire with 1.6 sq ft EPA at maximum design wind speed of 110 mph (3 second gusts). A special design is required if luminaire mounting height exceeds 100 ft above average surrounding terrain.
 The anchor bolts, nuts, washers, and anchor bolt plates are subsidiary to the Item "Roadway Illumination Assemblies".
 The type and size of conduit, the anchor bolt circle diameter, and the number and location of brackets is shown elsewhere on the plans. Brackets found to conflict with other components of the bridge may be relocated as necessary.
 See Roadway Illumination Poles standard for details and notes not shown.

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



ANCHOR BOLT ASSEMBLY

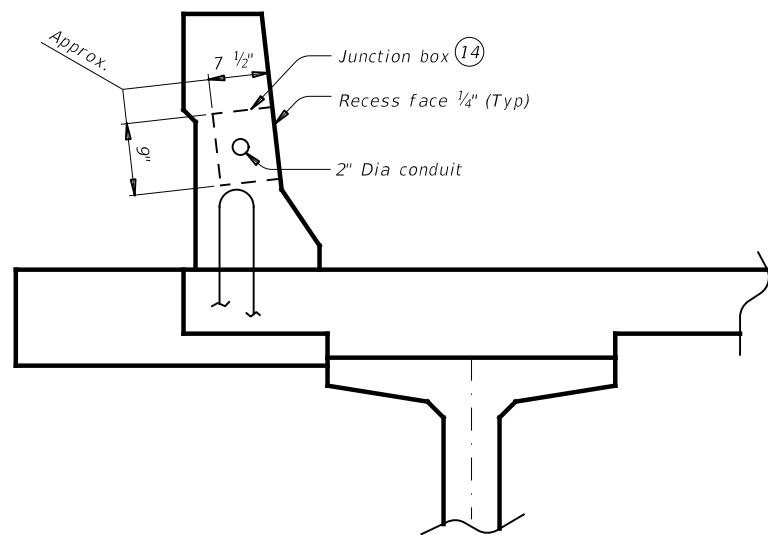
(See table for anchor bolt diameter)

SHEET 1 OF 2

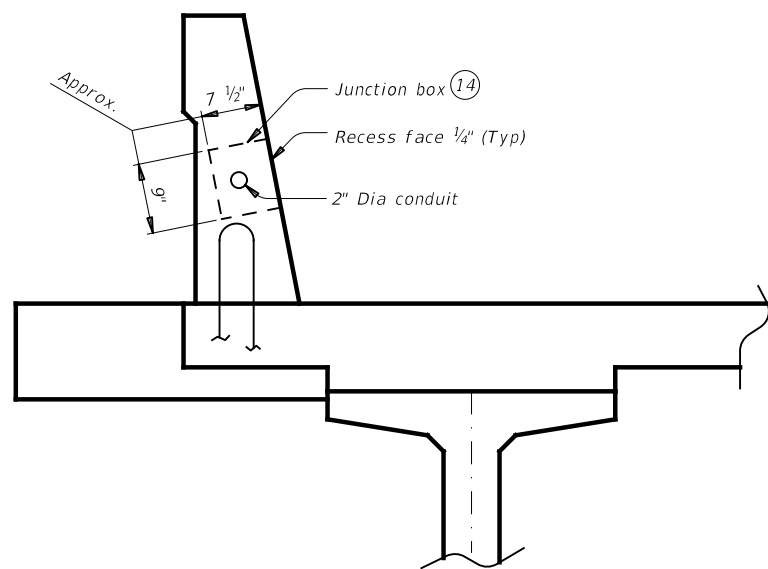
		Bridge Division Standard	
<h2>BRIDGE LIGHTING DETAILS</h2>			
<h3>BL</h3>			
FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT
©TxDOT	April 2019	REVISED	
CONTRACT	SECTION	JOB	HIGHWAY
0006	15	038	SH 70
DIST.	COUNTY	SHEET NO.	
ABL	NOLAN	85	

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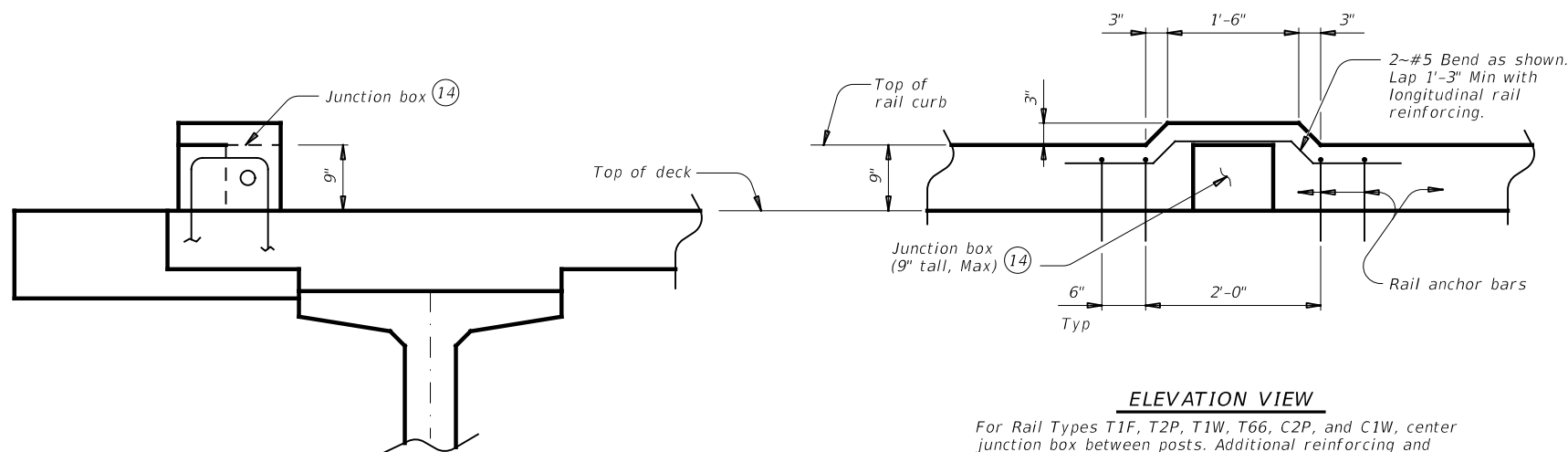
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SHOWING T551, T552, AND T80HT



SHOWING SSTR AND T80SS



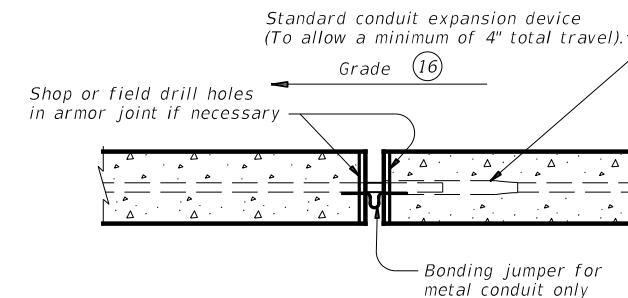
SHOWING T1F, T2P, T1W, T66, C2P, AND C1W CURB

See Elevation View for curb modifications

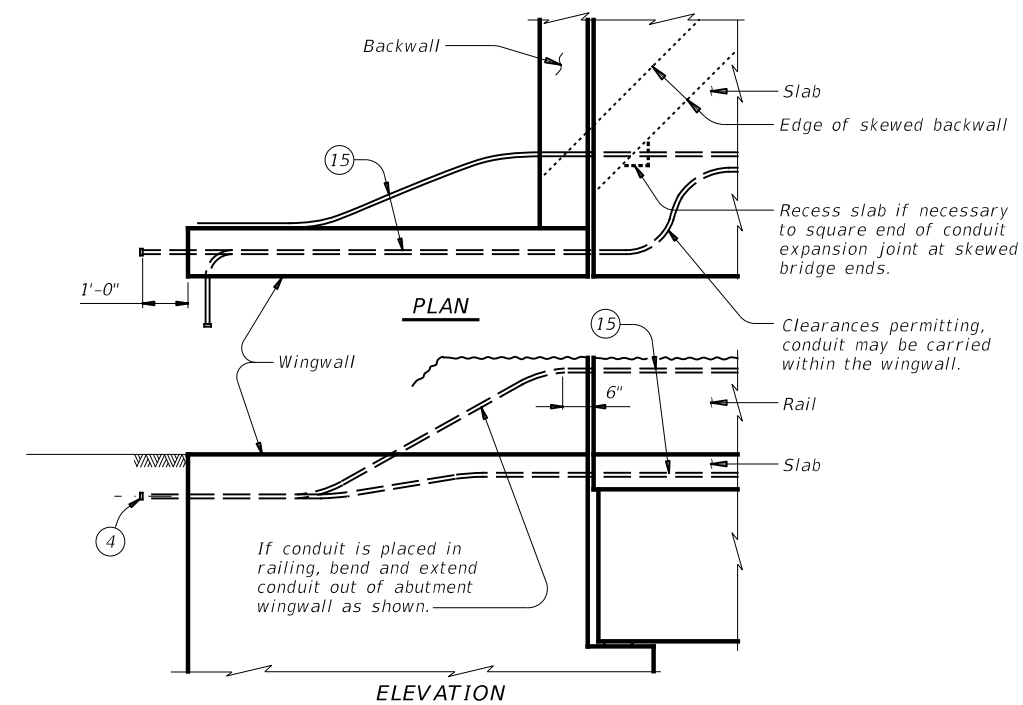
JUNCTION BOX LOCATION

Use these details as a guide in locating junction boxes in rail types not shown.

- ④ Ream burrs and install bell ends or bushings on all conduit ends.
- ⑭ Provide polymer concrete junction boxes meeting the requirements of DMS 11030.
- ⑮ Position of conduit shown elsewhere on the plans or as directed by the Engineer.
- ⑯ Place conduit expansion device on high side of expansion joint.



CONDUIT EXPANSION JOINT



TREATMENT AT END OF BRIDGE

SHEET 2 OF 2



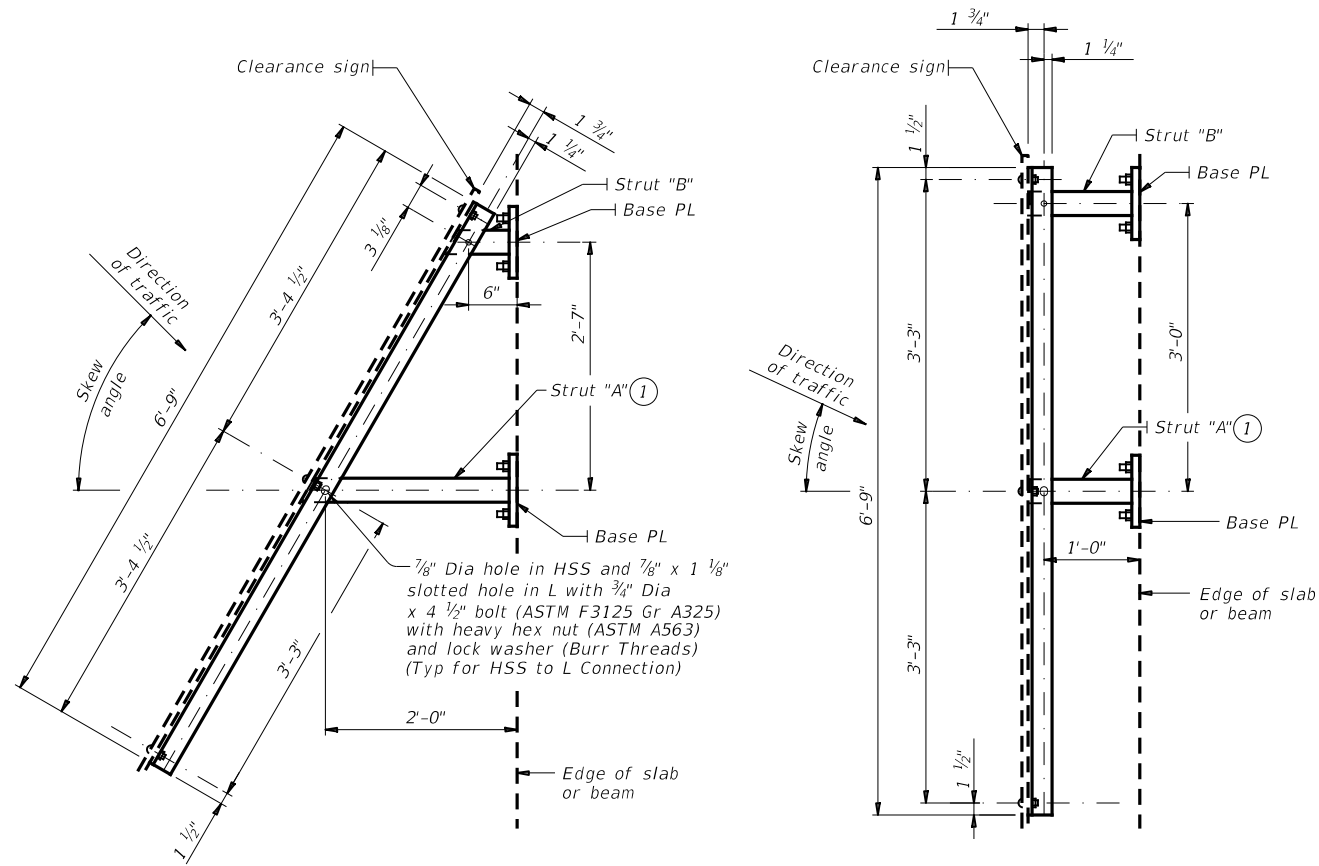
BRIDGE LIGHTING DETAILS

BL

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	April 2019	REVISIONS	0006 15	038
			JOB	SH 70
			DIST	SHEET NO.
			ABL	86

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PLAN OF TYPE S MOUNT
 (Used for skews over 30°)

PLAN OF TYPE N MOUNT
 (Used for 0° to 30° skews)

- ① Locate centerline of Strut A no closer than 12" from a vertical concrete edge.
- ② 5/8" Dia x 2" Hexagon socket button head cap screws (ASTM A574) with hex nuts. Attach hex nuts to L 3 x 3 x 1/2 by tack welding in two places. Threads must have Class 3A fit tolerance in accordance ASME B1.1. Six screws required.
- ③ At the Contractor's option fully threaded adhesive anchors may be used instead of cast-in-place anchor bolts. Expansion anchors are not allowed. Provide adhesive anchors that are 3/4" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). Embed fully threaded rods using a Type III, Class C, D, E, or F anchor adhesive. Adhesive anchor embedment depth is 8". Anchor adhesive chosen must be able to achieve a factored bond strength in tension of 2.2 kips per anchor (edge distance and spacing must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing".
- ④ For decked slab beams topped with a 2 course surface treatment and ACP overlay.
- ⑤ Anchor bolts to be cast into decked slab beams topped with a 2 course surface treatment or ACP overlay. Anchor bolts with heavy hex nuts, regular lock washers, hardened washers and anchor plate that is embedded in the beam will be provided by the beam Fabricator.

CONSTRUCTION NOTES:

Install the vertical face of clearance sign plumb unless otherwise approved by the Engineer.
 Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 1 anchor per bridge mounted clearance sign installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.

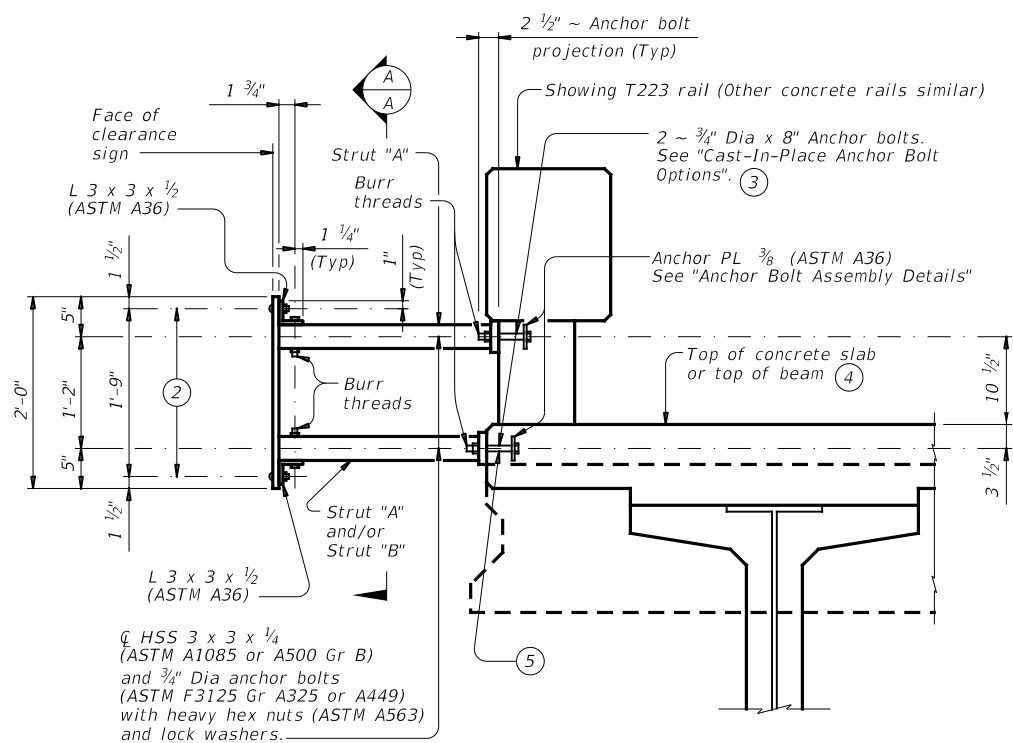
MATERIAL NOTES:

Galvanize all steel components after fabrication unless otherwise noted.

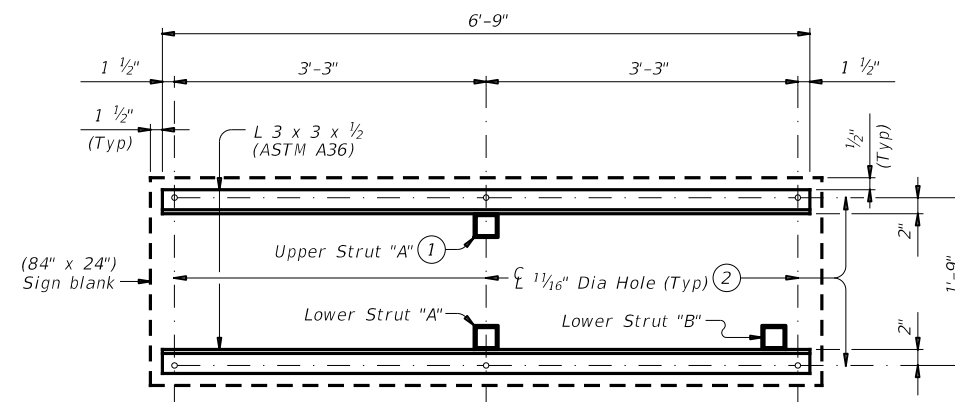
GENERAL NOTES:

This standard provides details to mount a vertical clearance sign (84" x 24") on bridges. Rail Types T631, T631LS, PR11, PR22 and PR3 are not accommodated. The Engineer will furnish the clearance to be shown on the sign.
 See Bridge Layout for sign location and mounting type (Type N or S).
 Cost of furnishing, installing, relocating or removing a clearance sign, including structural steel for sign mount, is included in unit price bid for Item 644, "Small Roadside Sign Assemblies".
 One Sign Blank (84" x 24") is 14 SF.
 Average steel weight for one complete Type N Mount is 219 Lb.
 Average steel weight for one complete Type S Mount is 233 Lb.

SHEET 1 OF 3



SECTION

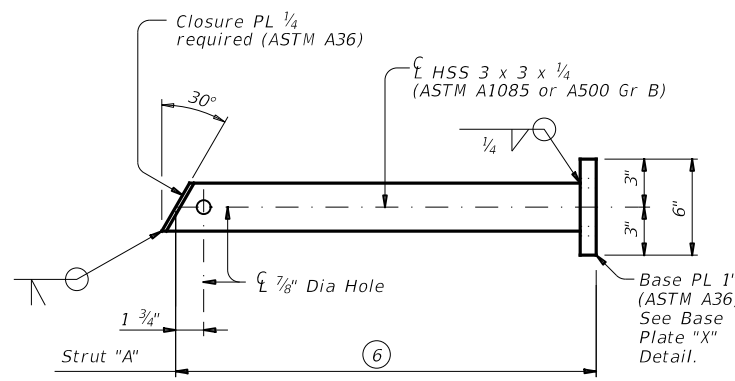


SECTION A-A

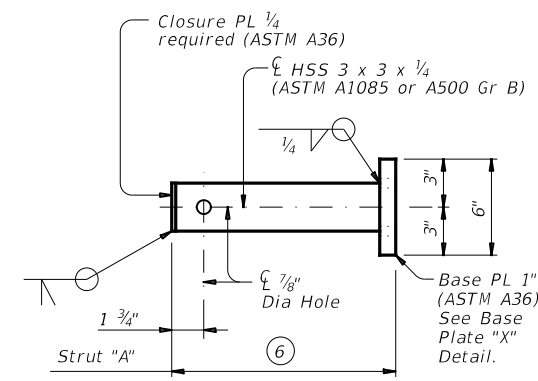
		Bridge Division Standard	
BRIDGE MOUNTED CLEARANCE SIGN ASSEMBLY			
BMCS			
FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT
CONTRACT:	0006	15	038
SECTION:	SH 70		
DIST:	COUNTY:	SHEET NO.	
ABL	NOLAN	87	

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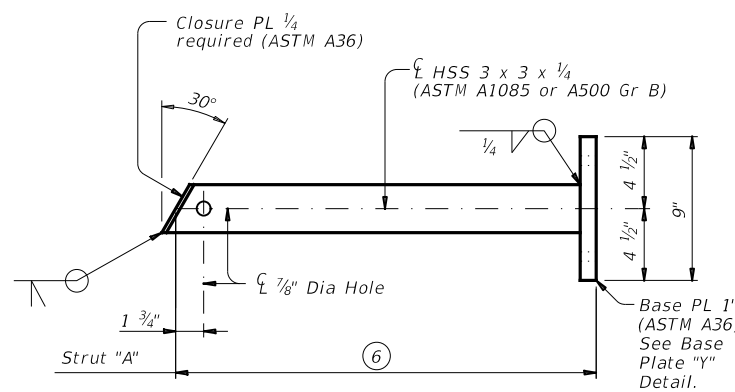
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FOR T411 AND C411 RAIL TYPES

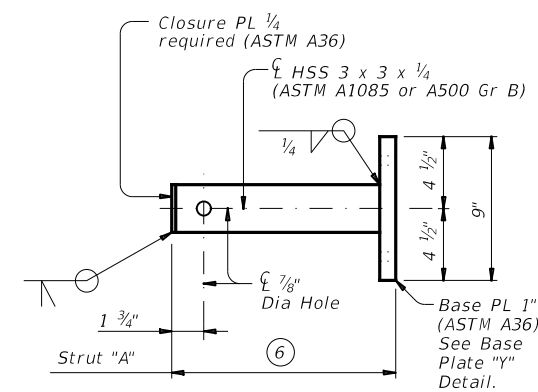


FOR T411 AND C411 RAIL TYPES



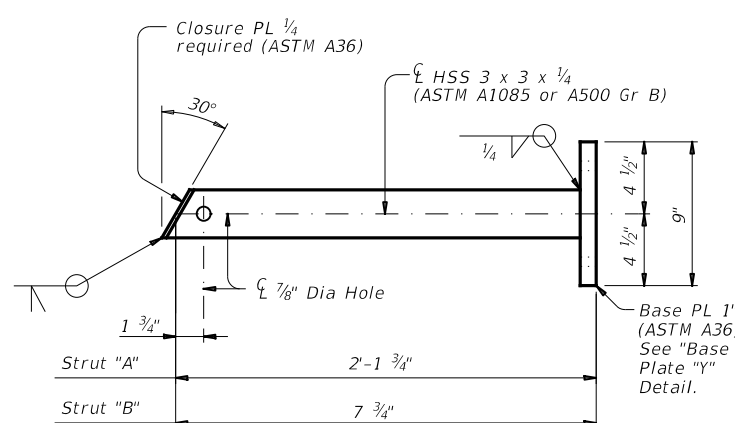
FOR T221, C221, T222, T223, C223, T401, T402, C402, T551, T552, T80HT, T80SS AND SSTR RAIL TYPES

UPPER STRUT DETAIL FOR (TYPE S MOUNT)
 (Used for skews over 30°)

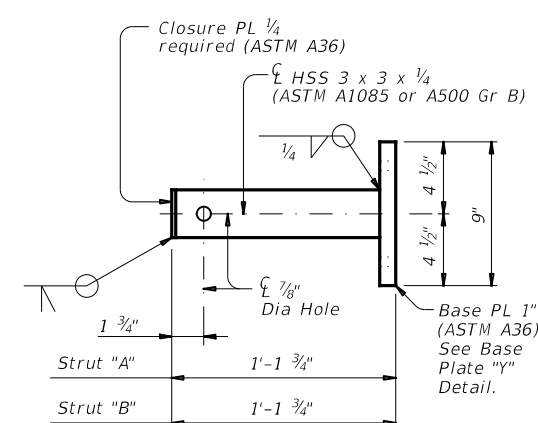


FOR T221, C221, T222, T223, C223, T401, T402, C402, T551, T552, T80HT, T80SS AND SSTR RAIL TYPES

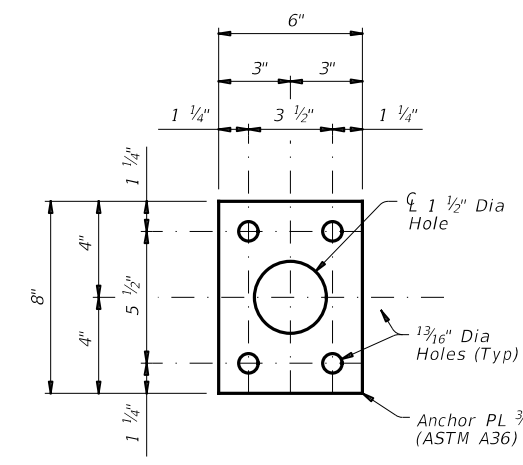
UPPER STRUT DETAIL FOR (TYPE N MOUNT)
 (Used for 0° to 30° skews)



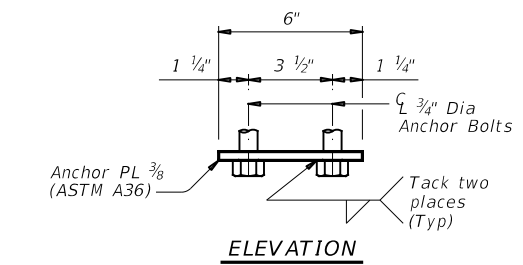
LOWER STRUT DETAILS FOR (TYPE S MOUNT)
 (Used for skews over 30°)



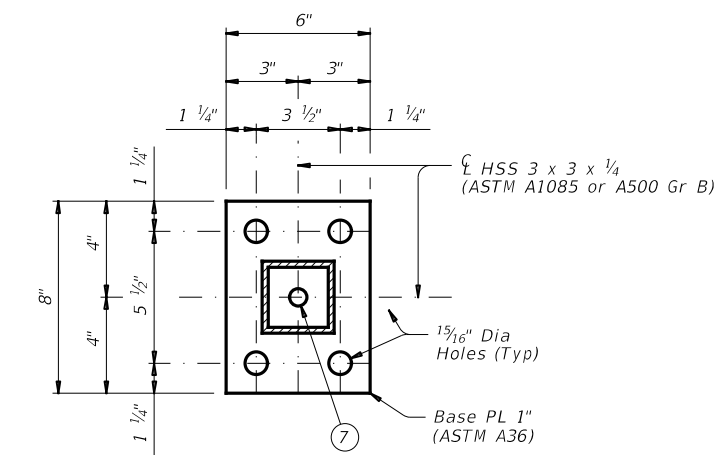
LOWER STRUT DETAILS FOR (TYPE N MOUNT)
 (Used for 0° to 30° skews)



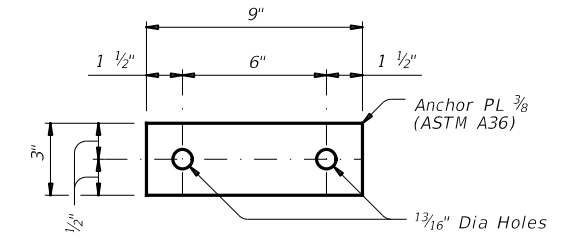
PLAN OF ANCHOR PLATE



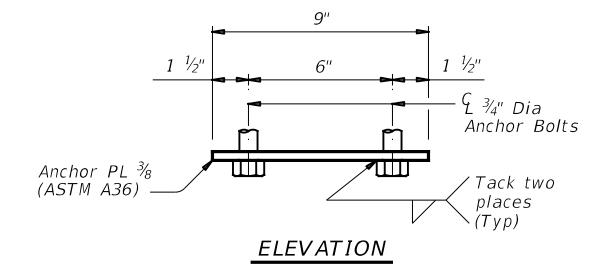
ANCHOR BOLT ASSEMBLY DETAILS ③
 (Used on Base Plate "X" with T411 and C411 rail types.)



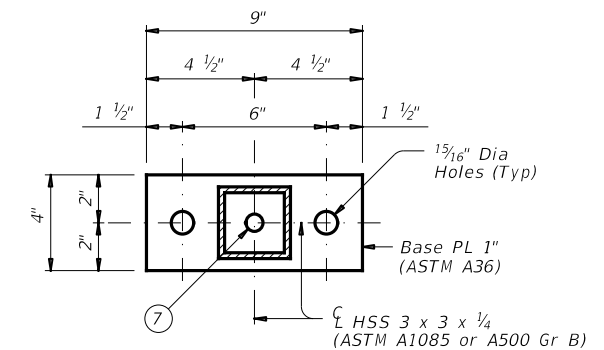
BASE PLATE "X" DETAIL



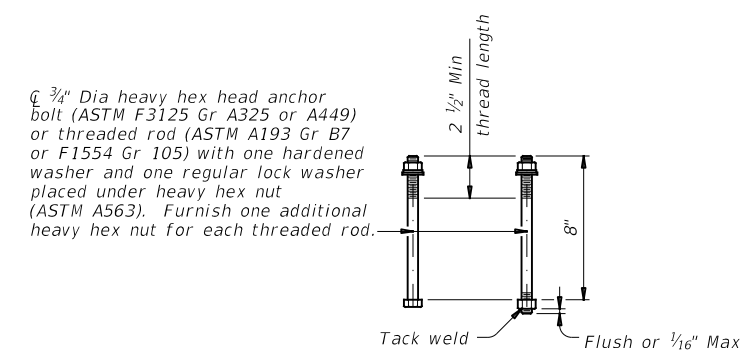
PLAN OF ANCHOR PLATE



ANCHOR BOLT ASSEMBLY DETAILS ③
 (Used on Base Plate "Y" and with T1F, T2P, C2P, T1W, C1W, T66 and C66 rail types.)



BASE PLATE "Y" DETAIL



CAST-IN-PLACE ANCHOR BOLT OPTIONS ③

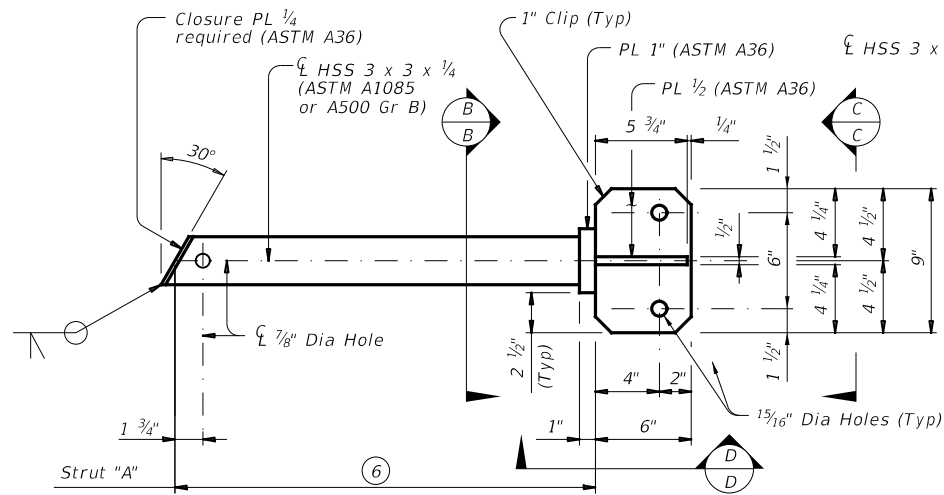
- ③ At the Contractor's option fully threaded adhesive anchors may be used instead of cast-in-place anchor bolts. Expansion anchors are not allowed. Provide adhesive anchors that are 3/4" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). Embed fully threaded rods using a Type III, Class C, D, E, or F anchor adhesive. Adhesive anchor embedment depth is 8". Anchor adhesive chosen must be able to achieve a factored bond strength in tension of 2.2 kips per anchor (edge distance and spacing must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing".
- ⑥ Adjust length to accommodate edge of slab to back of rail for specific project conditions and to help plumb the vertical face of clearance sign.
- ⑦ Hole required to drain zinc from base plate during galvanizing.

SHEET 2 OF 3

		Bridge Division Standard	
BRIDGE MOUNTED CLEARANCE SIGN ASSEMBLY			
BMCS			
FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT
©TxDOT	April 2019	CONTRACT	HIGHWAY
REVISIONS	0006	15	038 SH 70
DIST:	COUNTY:	SHEET NO.	
ABL	NOLAN	88	

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DATE: 10/12/2023 2:59:55 PM
 FILE: o:\pwork\king\centra\01\3297774\MS-BMCS-19.dgn

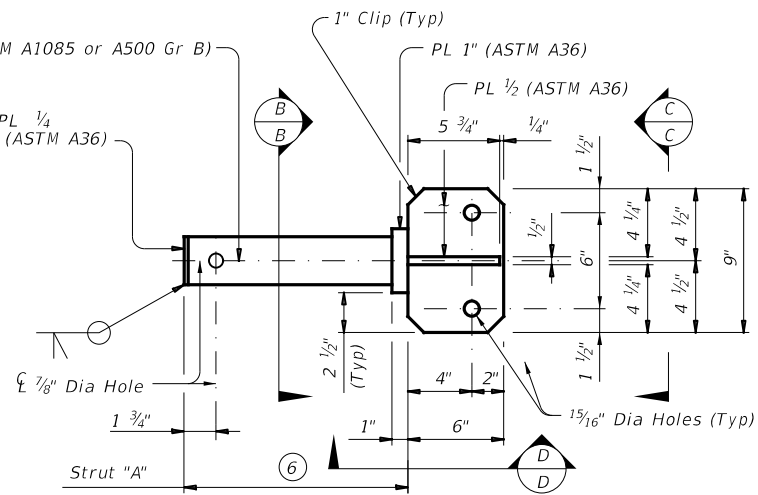


FOR T1F, T2P, C2P, T1W, C1W, T66 AND C66 RAIL TYPES

UPPER STRUT DETAIL FOR (TYPE S MOUNT)

(Used for skews over 30°)

- ② 3/8" Dia x 2" Hexagon socket button head cap screws (ASTM A574) with hex nuts. Attach hex nuts to L 3 x 3 x 1/2 by tack welding in two places. Threads must have Class 3A fit tolerance in accordance ASME B1.1. Six screws required.
- ③ At the Contractor's option fully threaded adhesive anchors may be used instead of cast-in-place anchor bolts. Expansion anchors are not allowed. Provide adhesive anchors that are 3/4" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). Embed fully threaded rods using a Type III, Class C, D, E, or F anchor adhesive. Adhesive anchor embedment depth is 8". Anchor adhesive chosen must be able to achieve a factored bond strength in tension of 2.2 kips per anchor (edge distance and spacing must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing".

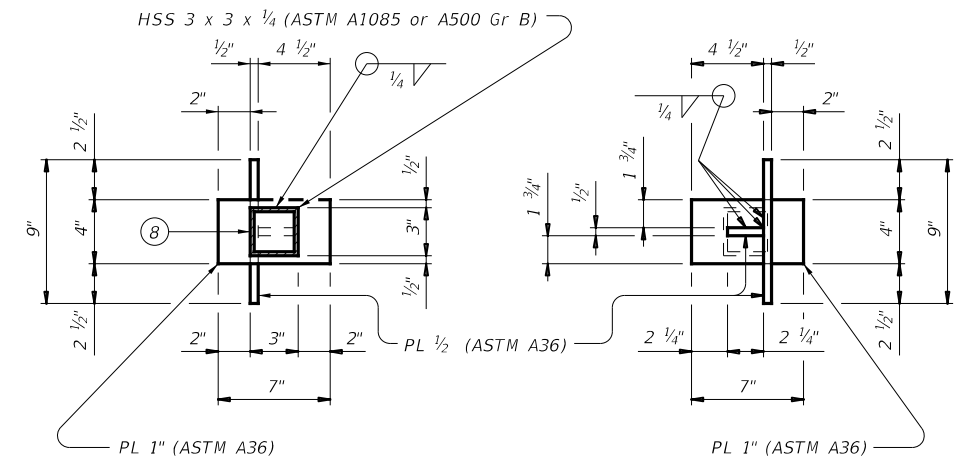


FOR T1F, T2P, C2P, T1W, C1W, T66 AND C66 RAIL TYPES

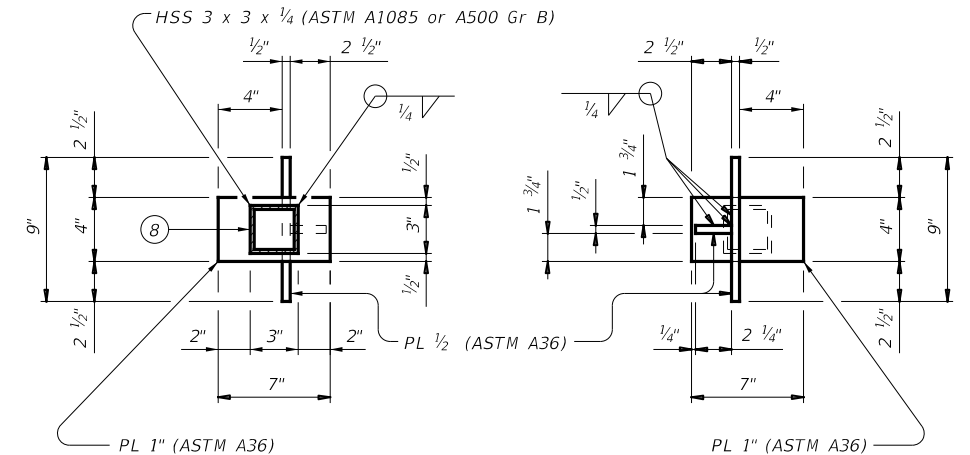
UPPER STRUT DETAIL FOR (TYPE N MOUNT)

(Used for 0° to 30° skews)

- ④ For decked slab beams topped with a 2 course surface treatment and ACP overlay.
- ⑥ Adjust length to accommodate edge of slab to back of rail for specific project conditions and to help plumb the vertical face of clearance sign.
- ⑧ Hole required in bottom of HSS to drain zinc during galvanizing.
- ⑨ 11" curb is for structures with 2" ACP overlay.



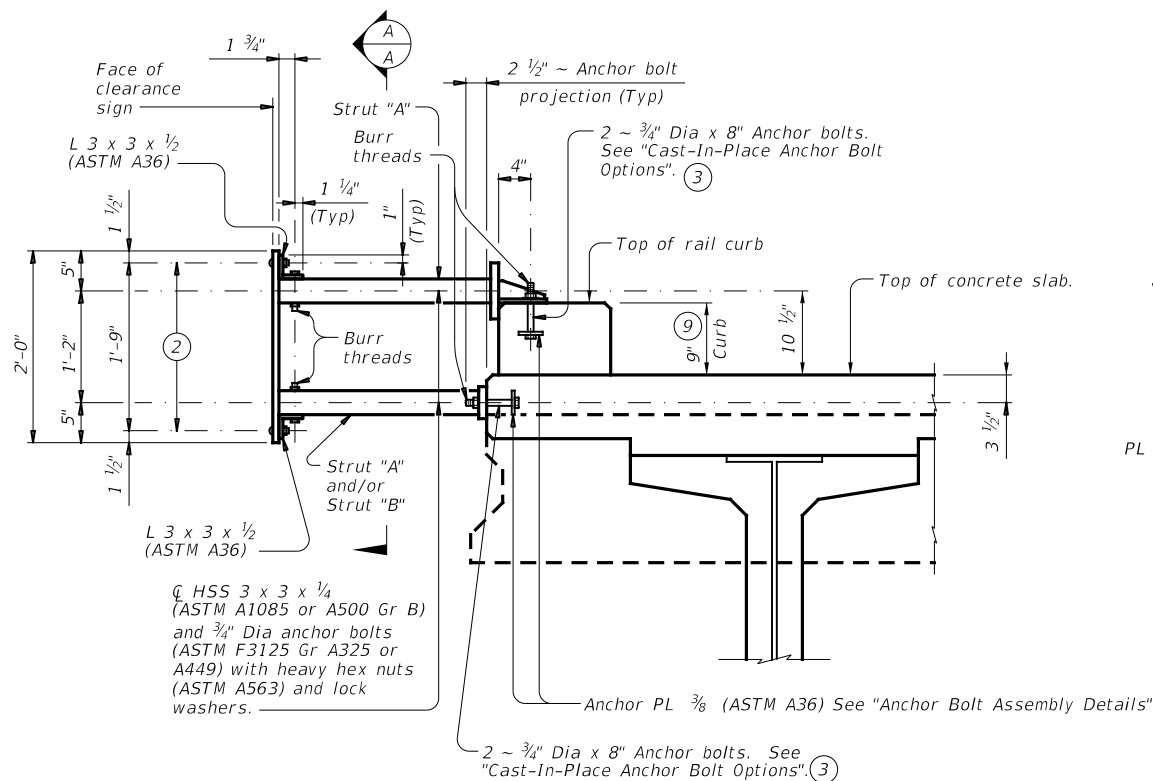
FOR 9" HIGH CURBS



FOR 11" HIGH CURBS

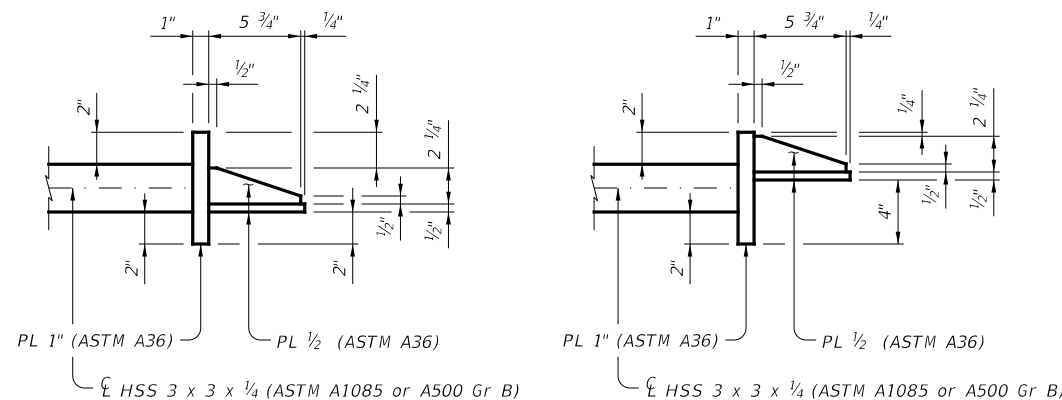
SECTION B-B

VIEW C-C



SECTION THRU T1F, T2P, C2P, T1W, C1W, T66 AND C66 RAIL CURB

Showing sign mount on a 9" high curb, 11" high curb similar.



FOR 9" HIGH CURBS

FOR 11" HIGH CURBS

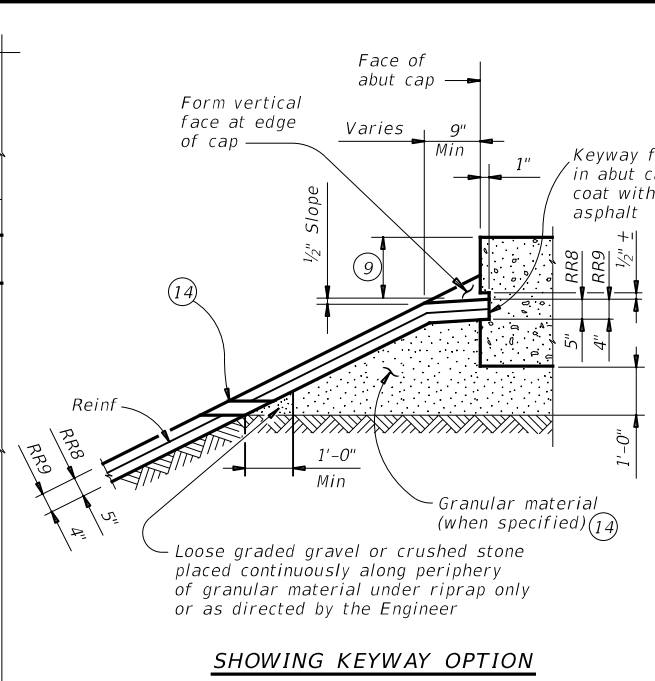
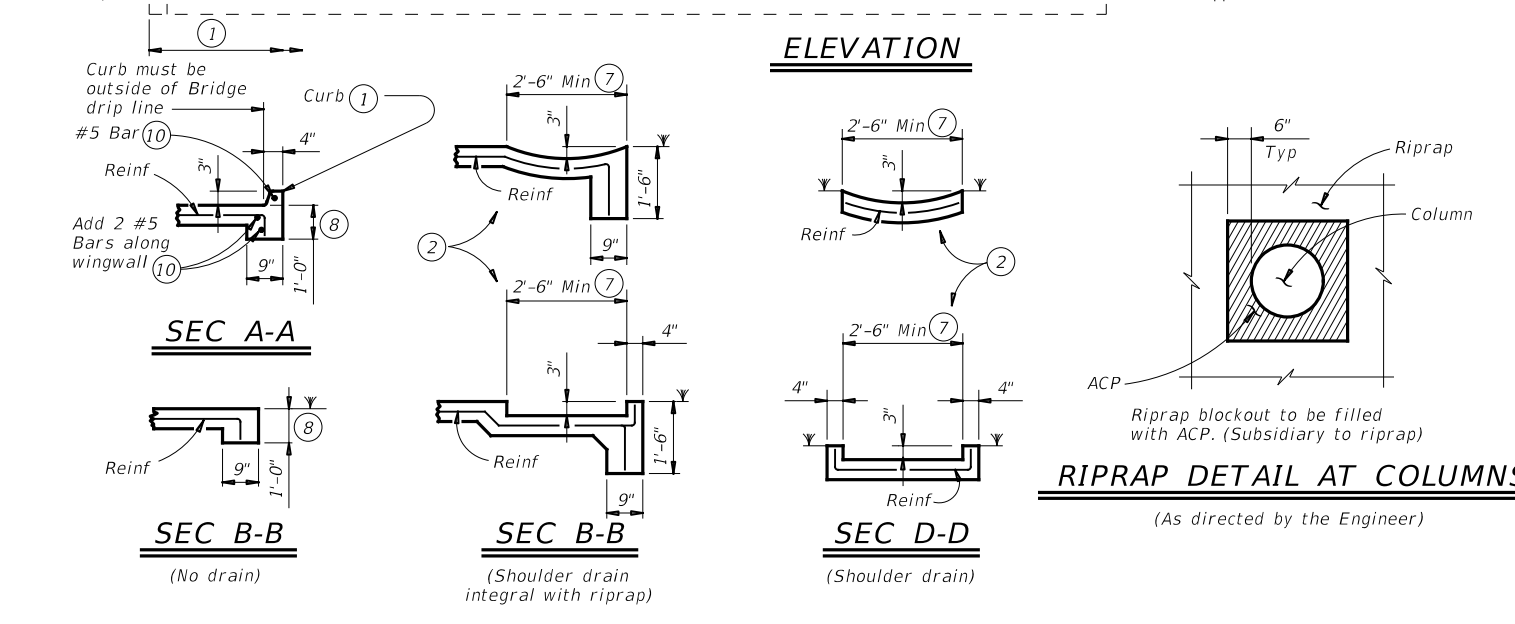
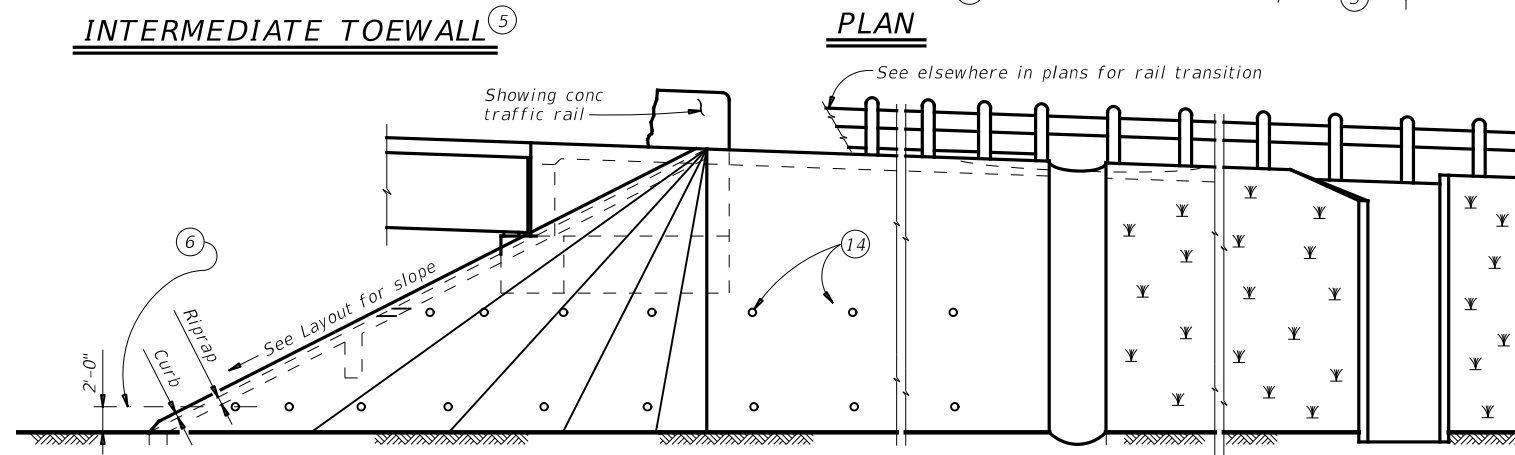
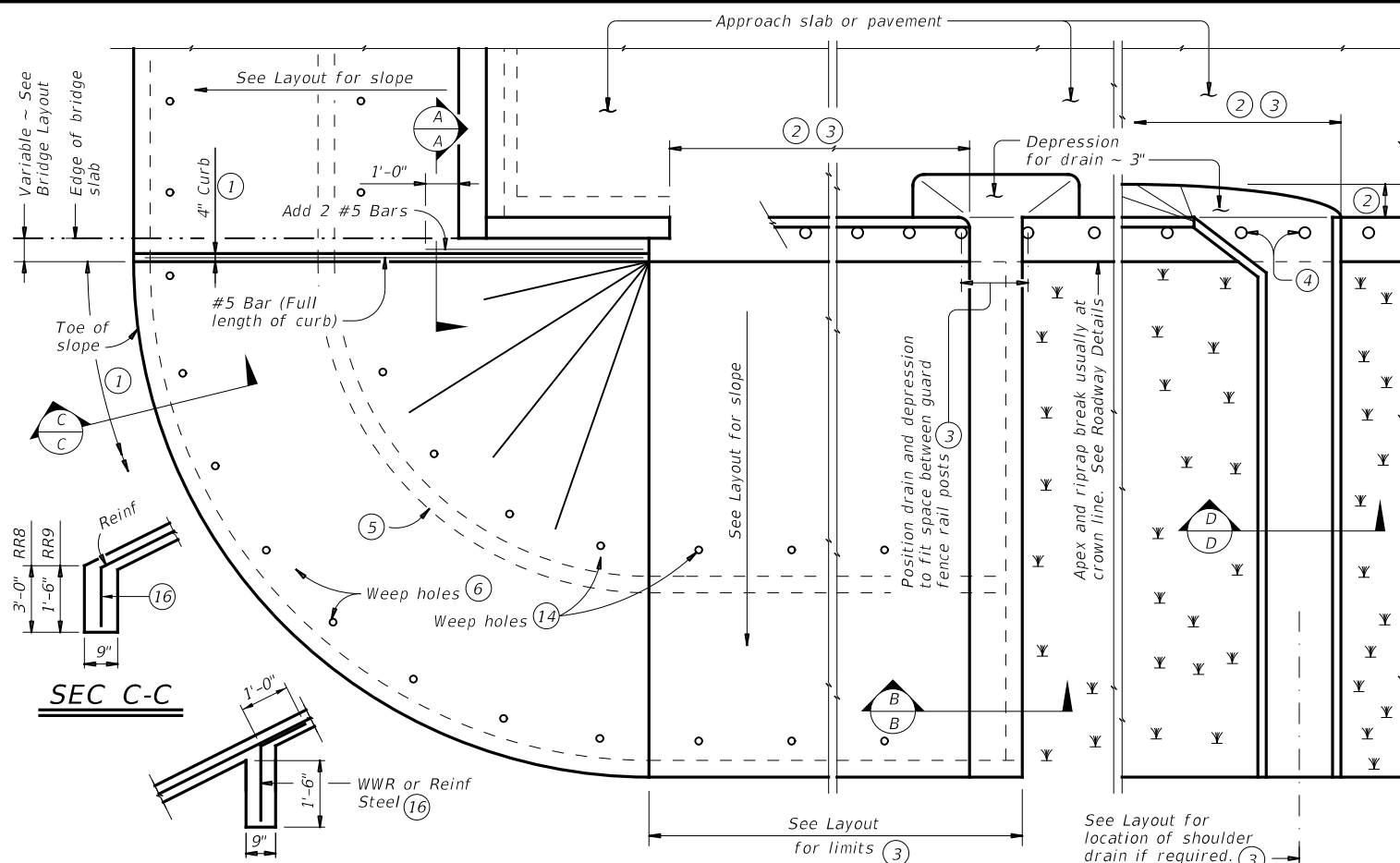
VIEW D-D

SHEET 3 OF 3

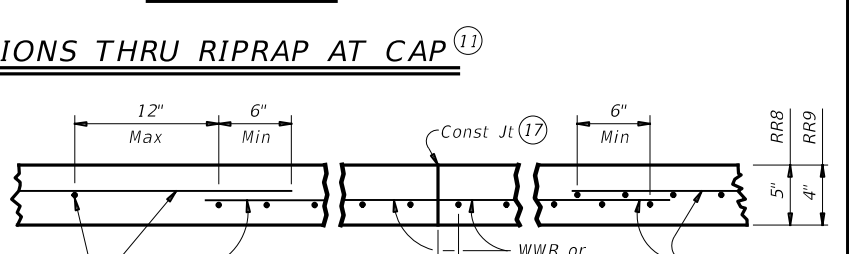
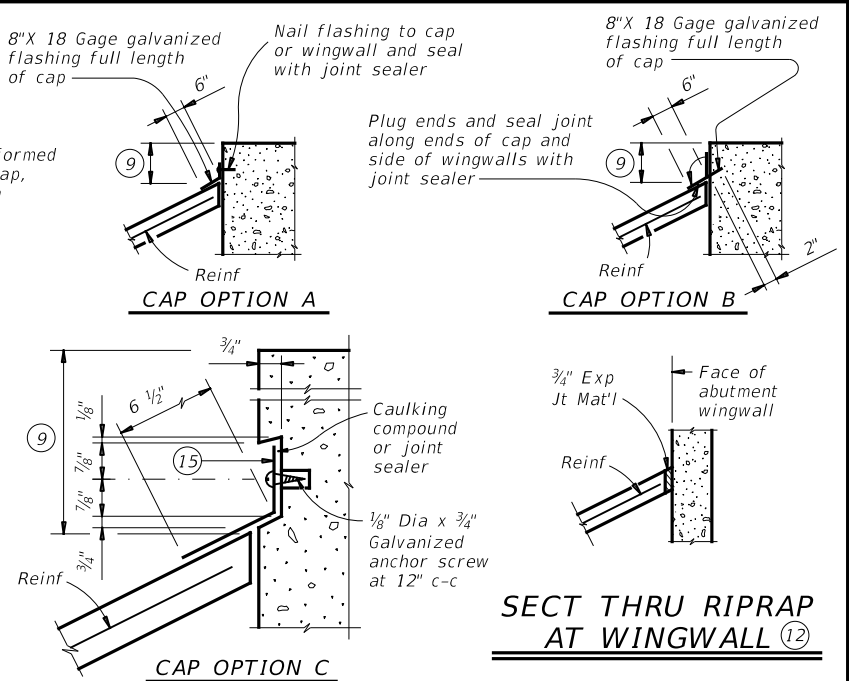
		Bridge Division Standard	
BRIDGE MOUNTED CLEARANCE SIGN ASSEMBLY			
BMCS			
FILE: 000615	DN: TxDOT	CK: TxDOT	DW: TxDOT
CONTRACT: 000615	SECTION: 15	JOB: 038	HIGHWAY: SH 70
DIST: ABL	COUNTY: NOLAN	SHEET NO. 89	

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



- REINFORCEMENT DETAILS**
- See General Notes for optional synthetic fiber reinforcement.

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

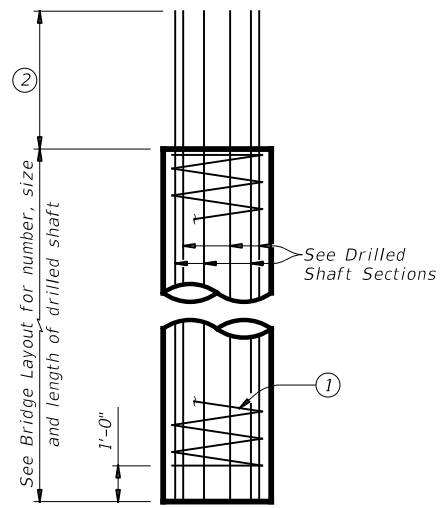
FOR CONTRACTOR'S INFORMATION ONLY:

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

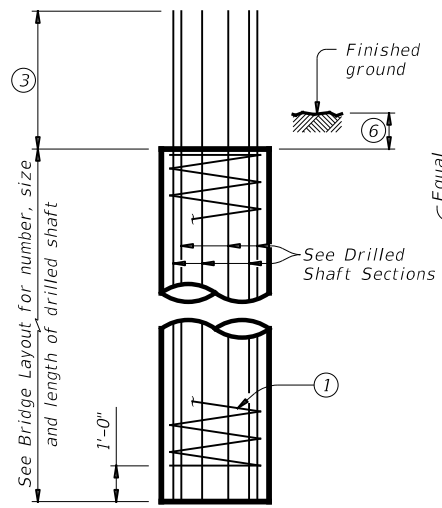
		Bridge Division Standard	
CONCRETE RIPRAP AND SHOULDER DRAINS EMBANKMENTS AT BRIDGE ENDS (TYPES RR8 & RR9)			
CRR			
FILE: crrstdel-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
©TxDOT April 2019	CONV: 0006	SECT: 15	JOB: 038
REVISIONS			SH 70
	DIST: ABL	COUNTY: NOLAN	SHEET NO: 90

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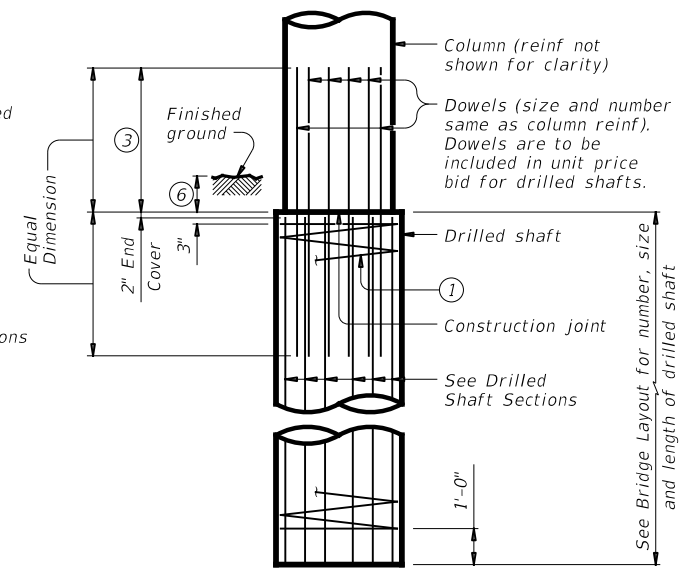
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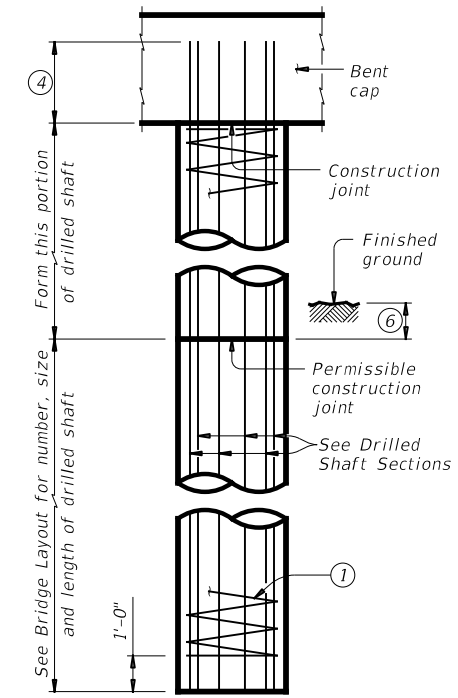
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



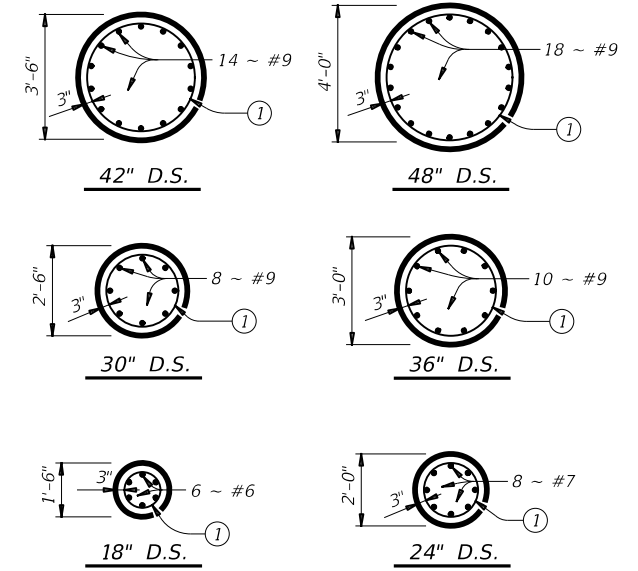
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL

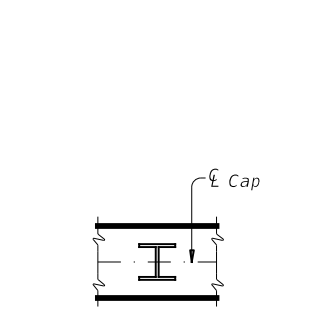


DRILLED SHAFT SECTIONS

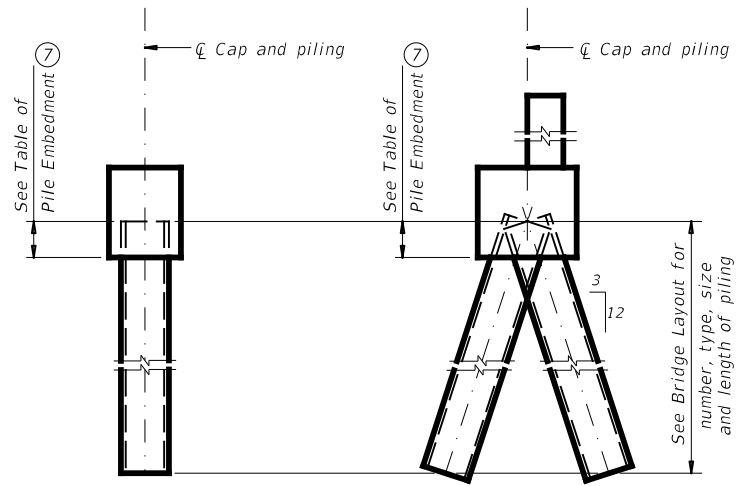
DRILLED SHAFT DETAILS

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.

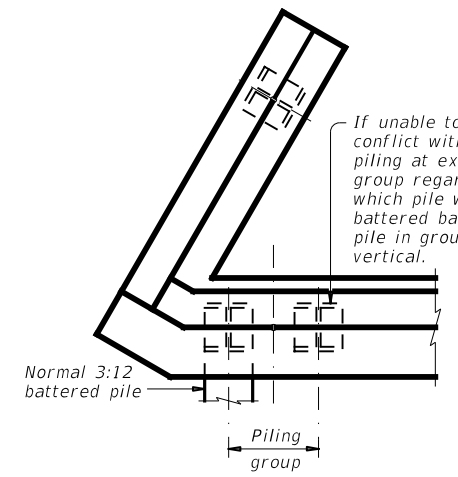


ORIENTATION OF STEEL H-PIILING



VERTICAL PILE BATTERED PILE

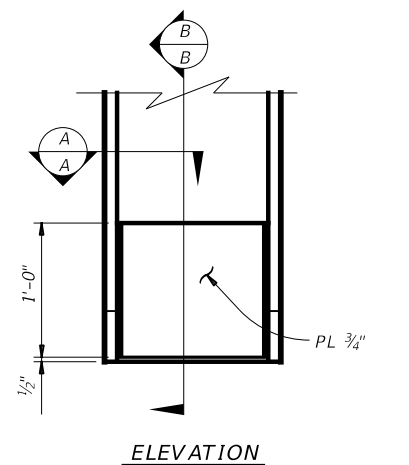
PIILING DETAILS
(Concrete or steel H)



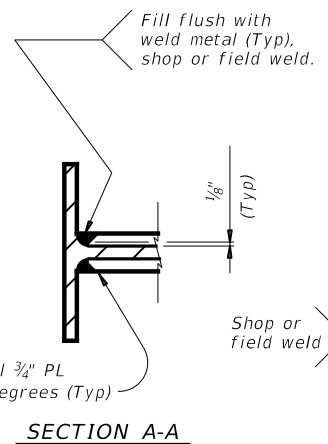
DETAIL "A"

(Showing plan view of a 30° skewed abutment)

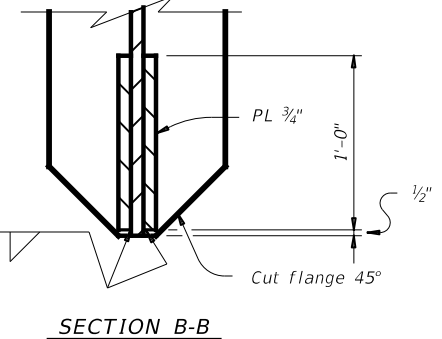
- ① #3 spiral at 6" pitch (one and a half flat turns top and bottom).
- ② Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-0"
#9 Bars = 2'-3"
- ③ Min lap with column reinf:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"
- ④ Min extension into supported element:
#6 Bars = 1'-11"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



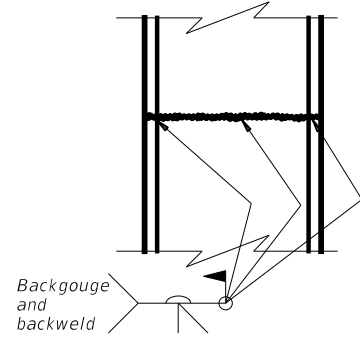
ELEVATION



SECTION A-A



SECTION B-B



SECTION THRU FLANGE OR WEB

STEEL H-PILE TIP REINFORCEMENT

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

STEEL H-PILE SPLICE DETAIL

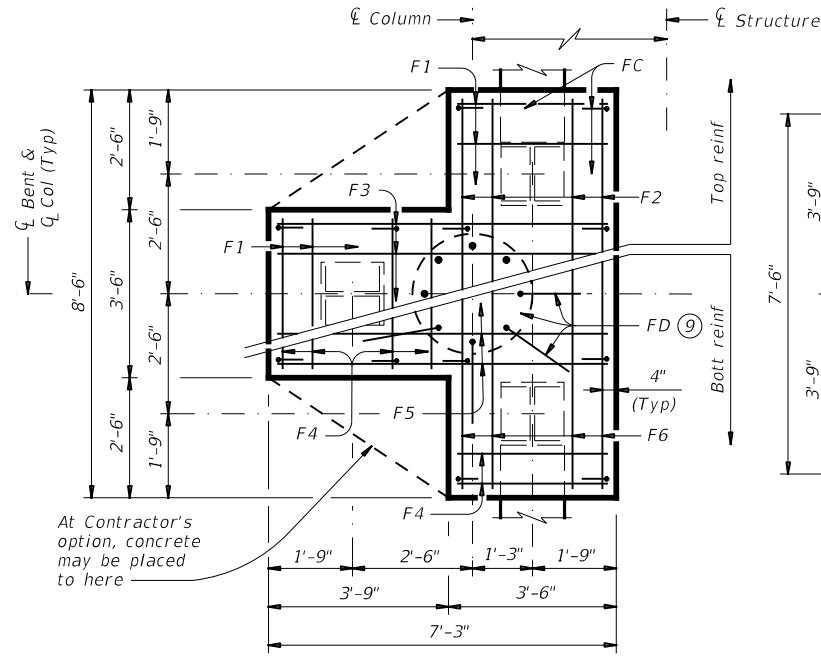
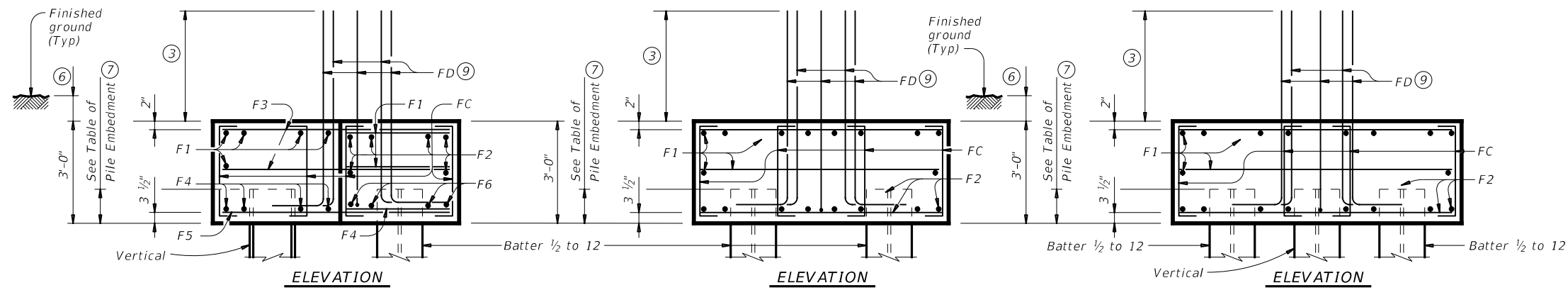
Use when required.

SHEET 1 OF 2

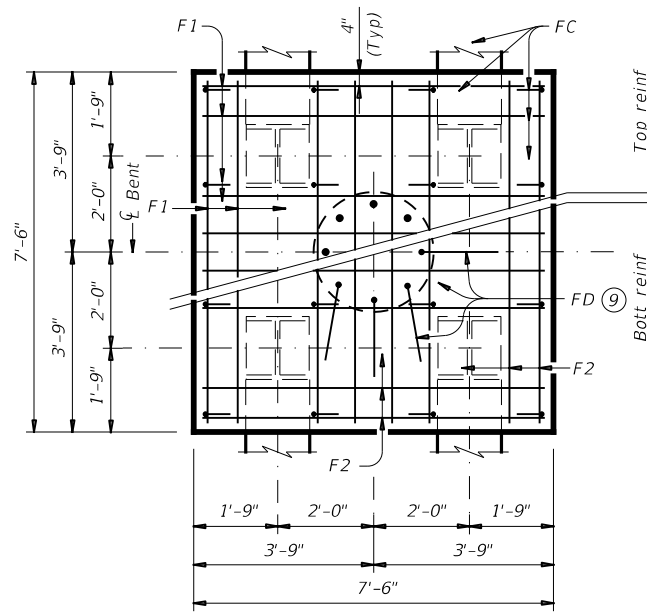
		Bridge Division Standard	
COMMON FOUNDATION DETAILS			
FD			
FILE: fdstd01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
©TxDOT April 2019	CONTRACT	SECTION	HIGHWAY
0006	15	038	SH 70
REVISIONS 01-20: Added #11 bars to the FD bars.		DIST:	COUNTY
		ABL	NOLAN
			SHEET NO.
			91

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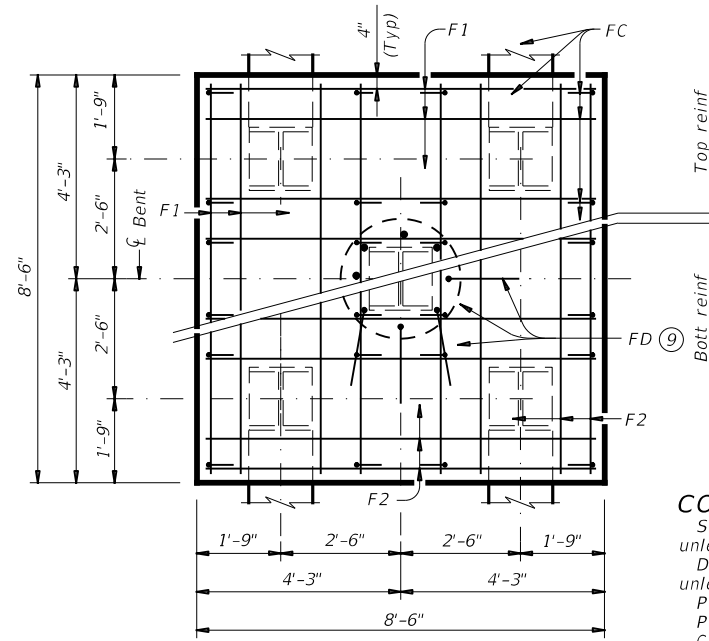
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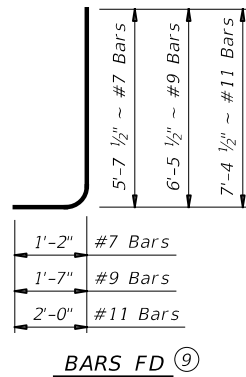
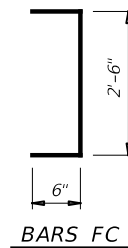
THREE PILE FOOTING^⑧
 For 36" Dia and smaller columns.



FOUR PILE FOOTING^⑧
 For 42" Dia and smaller columns.



FIVE PILE FOOTING^⑧
 For 42" Dia and smaller columns.



- 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

SHEET 2 OF 2



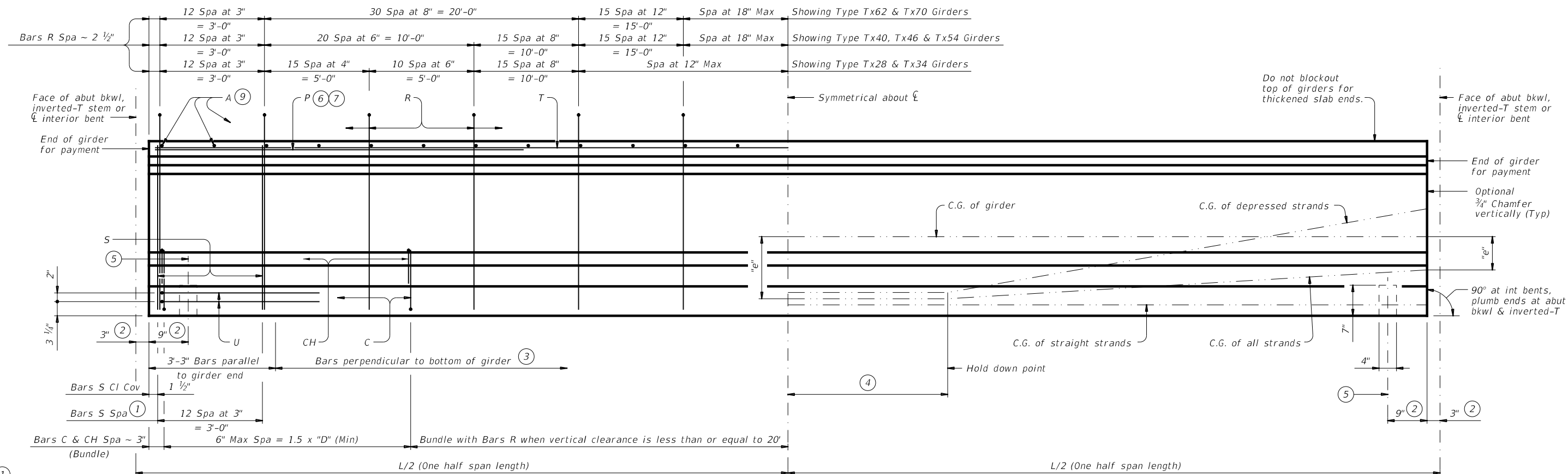
COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0006	15	038	SH 70
01-20: Added #11 bars to the FD bars.	DIST	COUNTY	SHEET NO.	
	ABL	NOLAN	92	

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DATE: 10/12/2023 3:00:28 PM
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- 1 Bundle with Bars R.
- 2 Measured along ϵ 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).

GIRDER ELEVATION

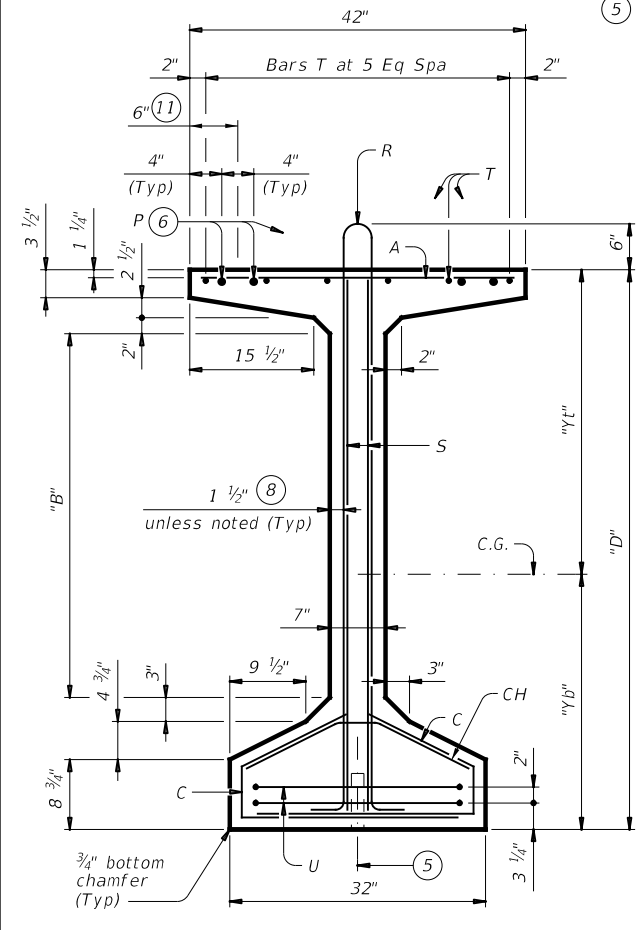
- 6 Bars P (#6 x 15'-0") required in Tx62 and Tx70 girders. At the fabricator's option bars larger than #6 may be used. When L is less than 50 ft, Bars P are to be the same length as Bars T.
- 7 Bars P (#6 x 15'-0") are only required in Tx28, Tx34, Tx40, Tx46, and Tx54 girders when "e" at girder ends 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 3/8" 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.

GIRDER DIMENSIONS AND SECTION PROPERTIES

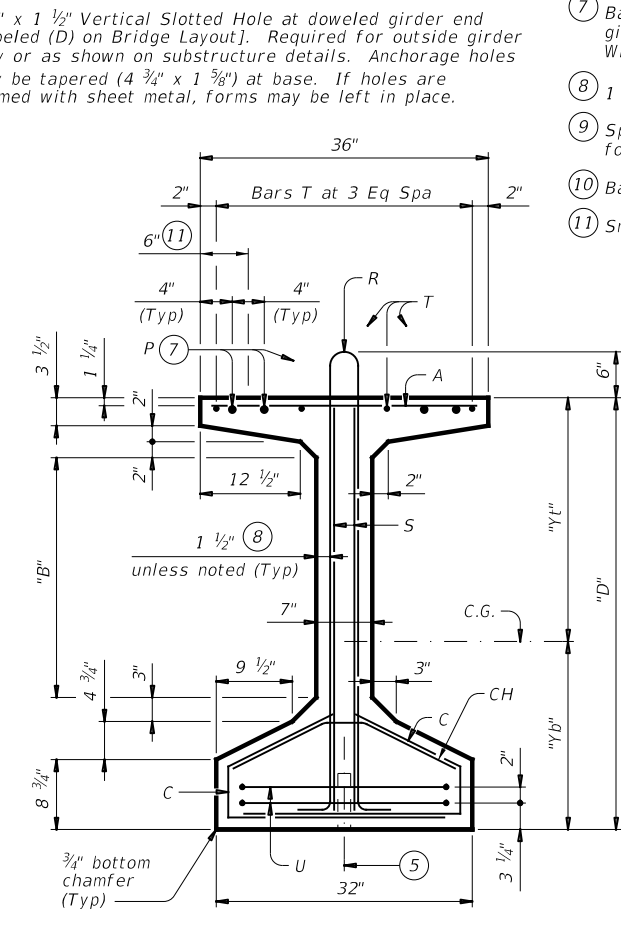
Girder Type	"D" (in.)	"B" (in.)	"Yt" (in.)	"Yb" (in.)	Area (in. ²)	"Ix" (in. ⁴)	"Iy" (in. ⁴)	Weight (10) (plf)
Tx28	28	6	15.02	12.98	585	52,772	40,559	630
Tx34	34	12	18.49	15.51	627	88,355	40,731	675
Tx40	40	18	21.90	18.10	669	134,990	40,902	720
Tx46	46	22	25.90	20.10	761	198,089	46,478	819
Tx54	54	30	30.49	23.51	817	299,740	46,707	880
Tx62	62	37 1/2	33.72	28.28	910	463,072	57,351	980
Tx70	70	45 1/2	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. When vertical clearance of the span is less than or equal to 20', provide additional Bars C and CH in every girder of that span.

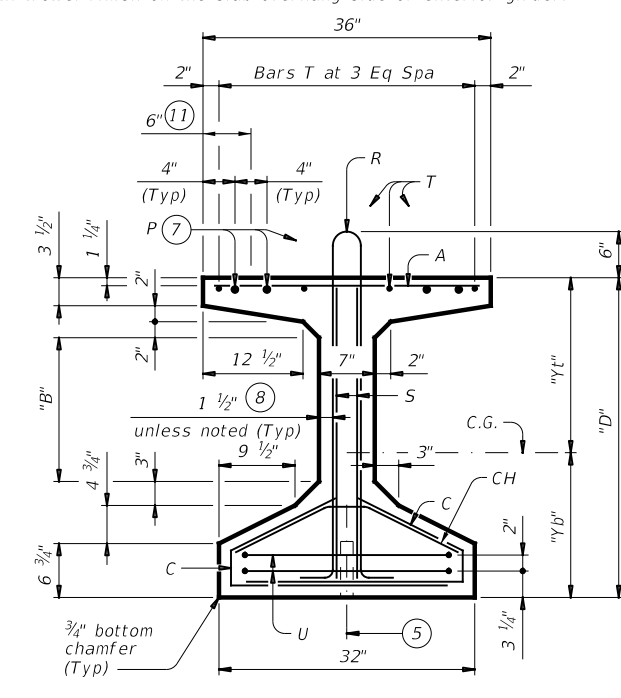
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.



TYPE Tx62 & Tx70



TYPE Tx46 & Tx54



TYPE Tx28, Tx34 & Tx40

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation Bridge Division Standard

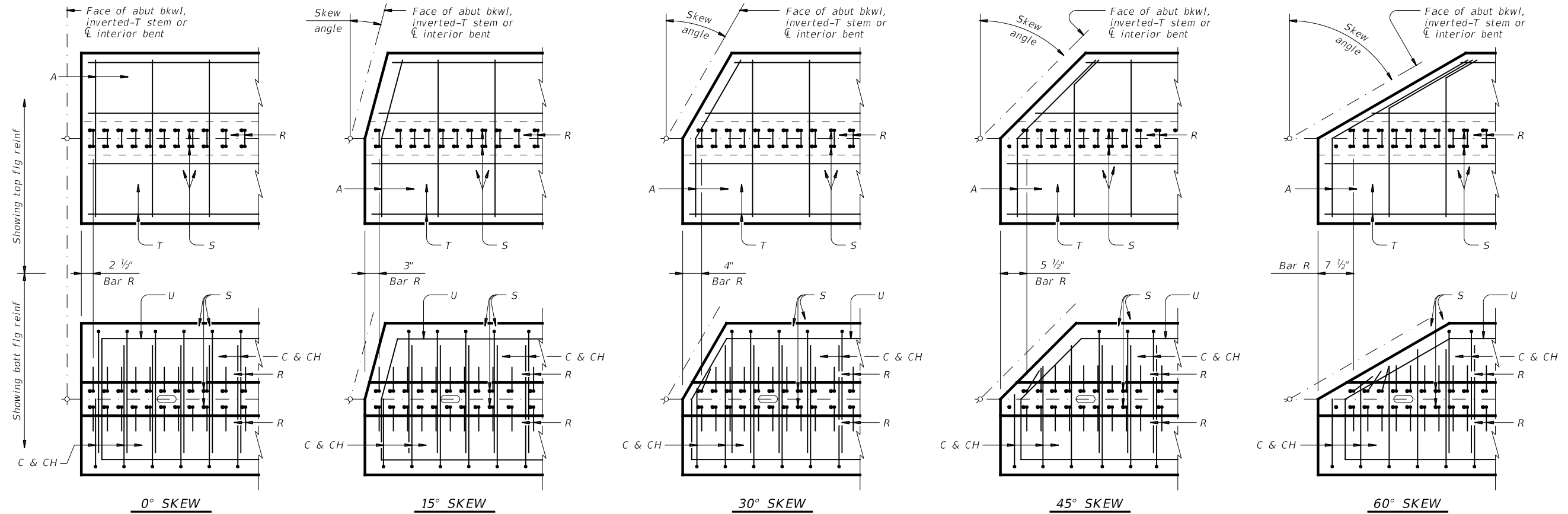
PRESTRESSED CONCRETE I-GIRDER DETAILS

IGD

FILE: IG-IGD-23.dgn	DN: TxDOT	CK: JMH	DW: JTR	CK: TAR
©TxDOT REVISIONS	CONT	SECT	JOB	HIGHWAY
10-19: Added Bars C and CH full length for VC<= 20'	0006	15	038	SH 70
3-23: Clarified C and CH requirement	DIST	COUNTY	SHEET NO.	
	ABL	NOLAN		93

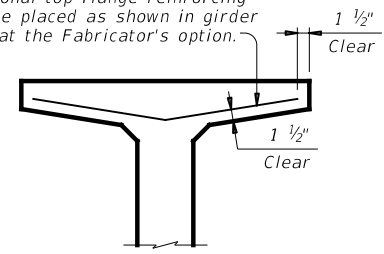
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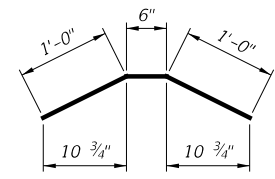


PLAN OF GIRDER ENDS (12)

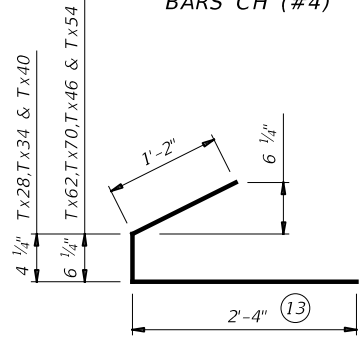
To control top flange cracking that may occur during form removal, additional top flange reinforcing may be placed as shown in girder ends at the Fabricator's option.



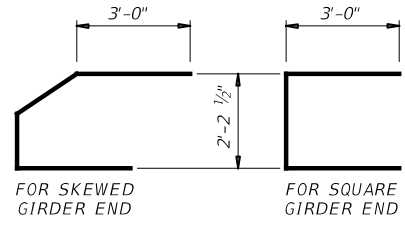
OPTIONAL TOP FLANGE REINFORCING DETAIL



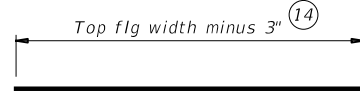
BARS CH (#4)



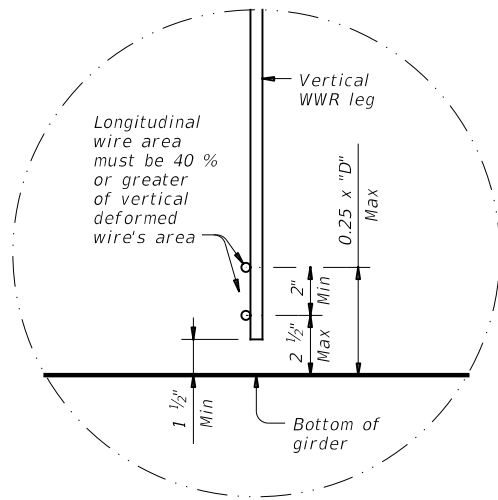
BARS C (#4)



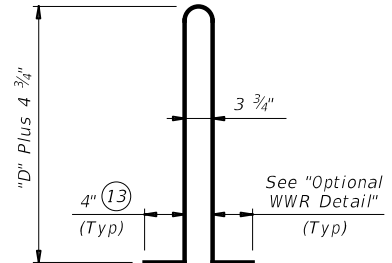
BARS U (#5)



BARS A (#3)



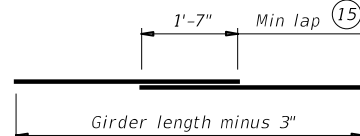
OPTIONAL WELDED WIRE REINFORCEMENT (WWR) DETAIL



BARS R (#4) (16)



BARS S (#6)



BARS T (#4)

- (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.



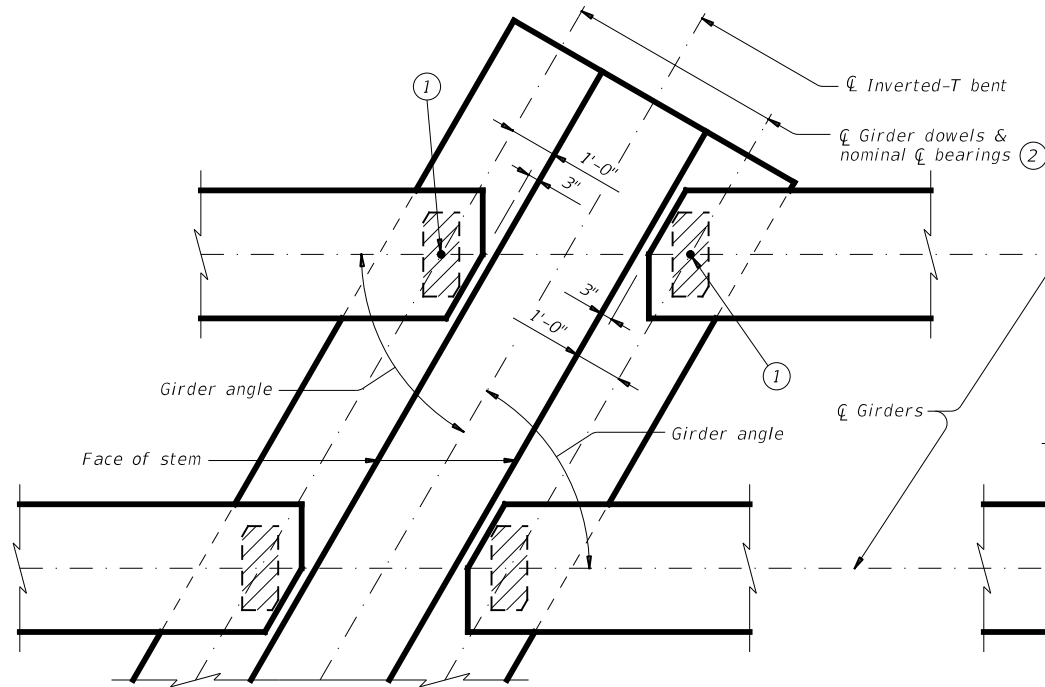
PRESTRESSED CONCRETE I-GIRDER DETAILS

IGD

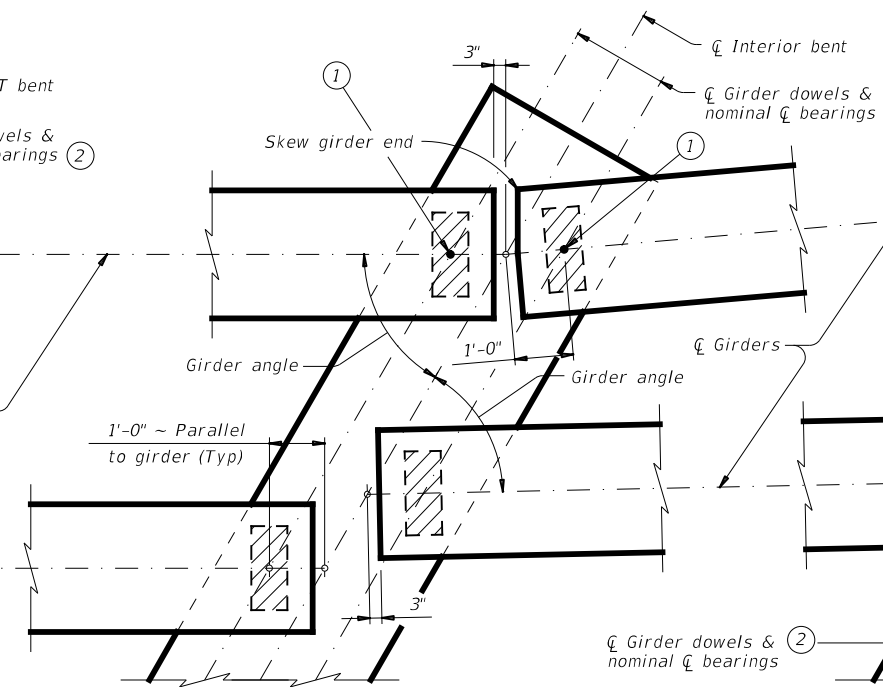
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©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0006	15	038	SH 70
10-19: Added Bars C and CH full length for VC <= 20'	DIST	COUNTY	SHEET NO.	
3-23: Clarified C and CH requirement	ABL	NOLAN	94	

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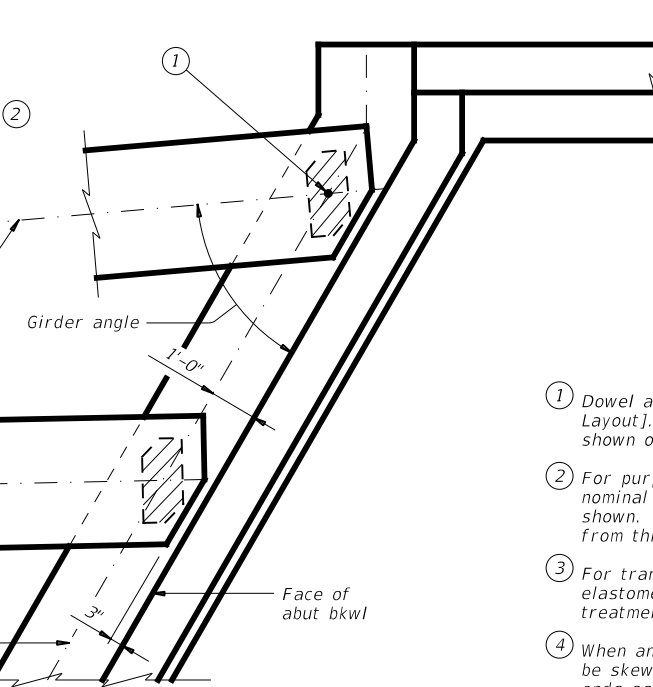
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AT INVERTED-T BENT W/SKEW

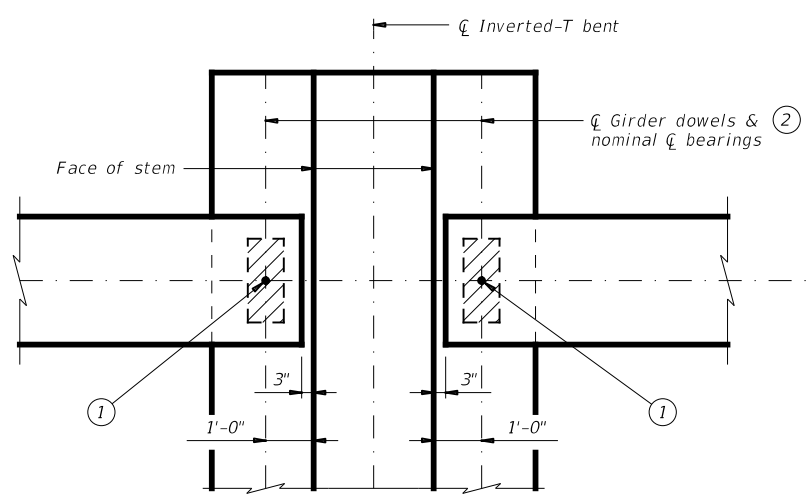


AT CONVENTIONAL INTERIOR BENT W/SKEW

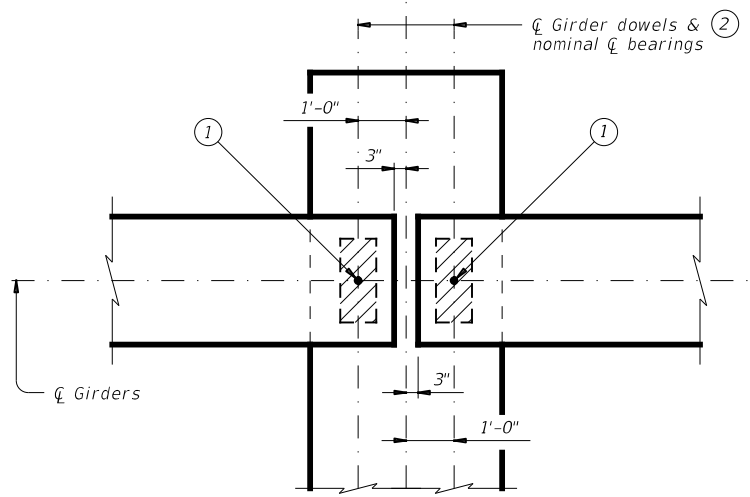


AT ABUTMENT W/SKEW

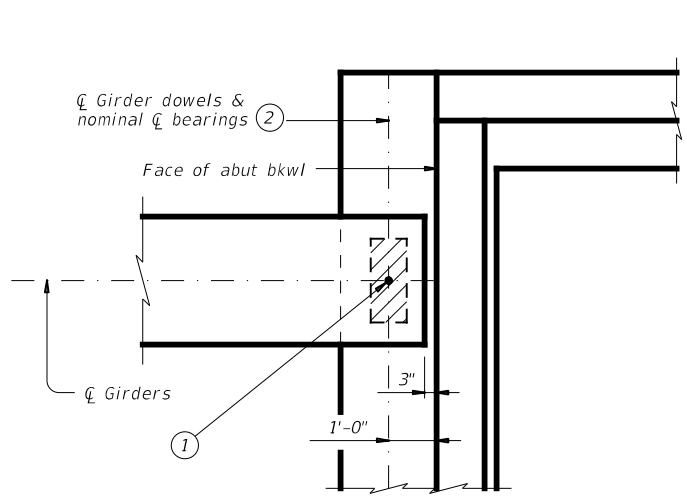
- ① Dowel at doweled girder end [labeled (D) on Bridge Layout]. Required for outside girder only or as shown on substructure details.
- ② For purposes of computing bearing seat elevations, nominal centerline of bearing must be defined as shown. The actual center of bearing pad may vary from this line.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



AT INVERTED-T BENT



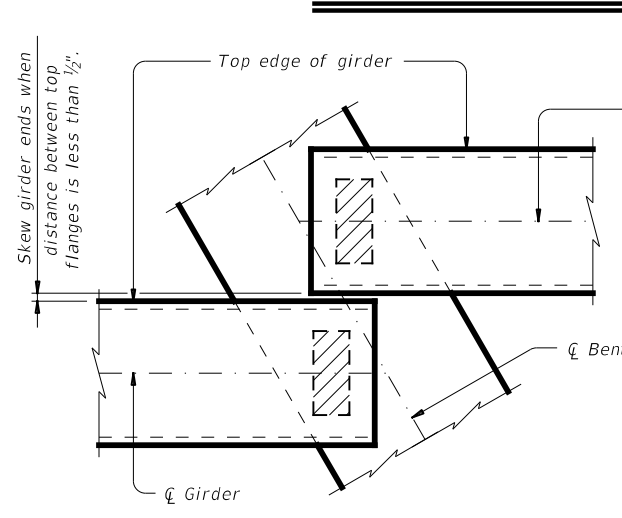
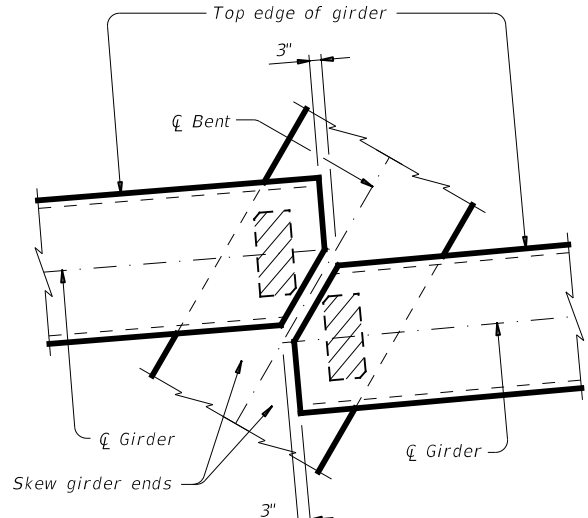
AT CONVENTIONAL INTERIOR BENT



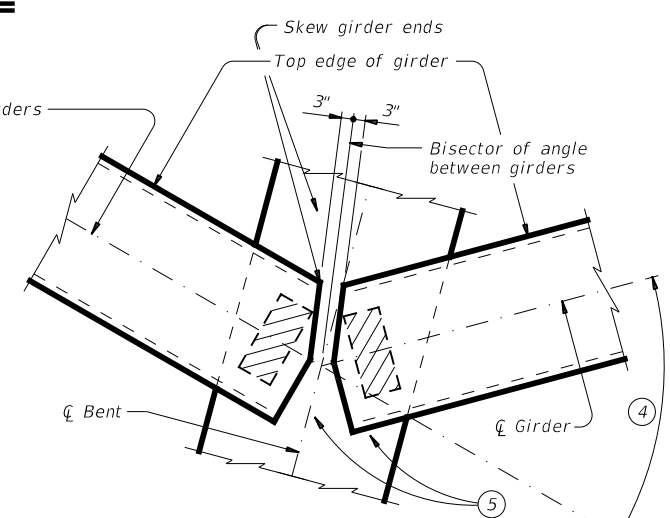
AT ABUTMENT

GENERAL NOTES:
 These details accommodate skew angles up to 60°. Shop drawings for approval are required. A bearing layout which identifies location and orientation of all bearings must be developed by the bearing fabricator. Permanently mark each bearing in accordance with the bearing layout. A copy of the bearing layout is to be provided to the Engineer. Cost of furnishing and installing elastomeric bearings, including beveled and embedded steel plates, must be included in unit price bid for "Prestressed Concrete Girders".

GIRDER END DETAILS



GIRDER CONFLICT DETAILS



HL93 LOADING SHEET 1 OF 3

Texas Department of Transportation Bridge Division Standard

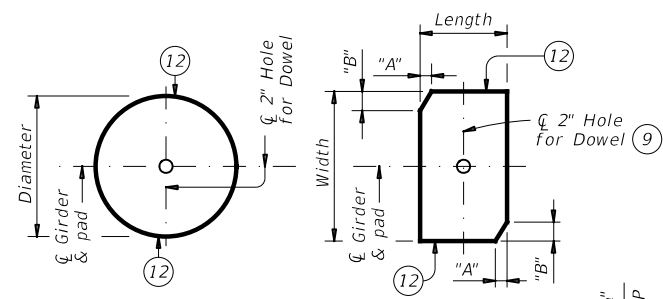
ELASTOMERIC BEARING AND GIRDER END DETAILS
 PRESTR CONCRETE I-GIRDERS

IGEB

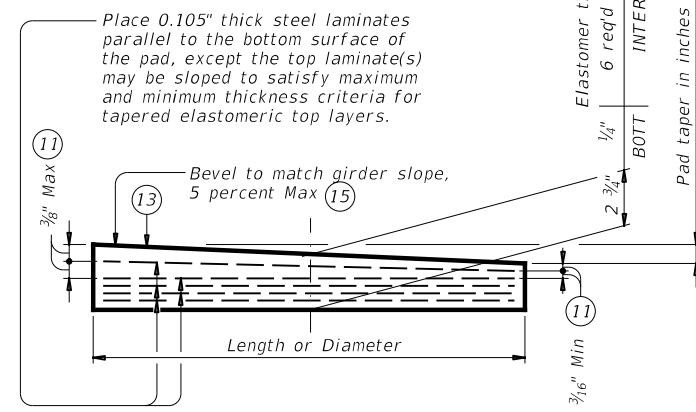
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©TxDOT August 2017	CONT SECT	JOB	HIGHWAY	
REVISIONS	0006 15	038	SH 70	
	DIST	COUNTY	SHEET NO.	
	ABL	NOLAN	95	

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PLANS (10)



ELEVATION

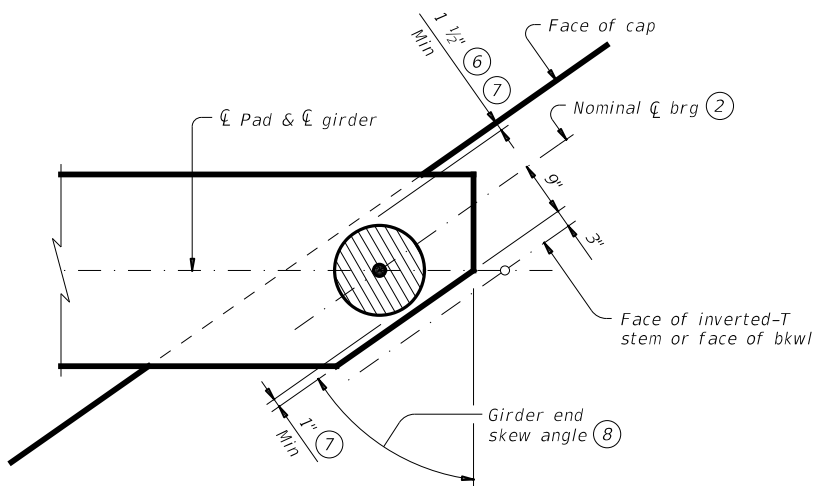
LAMINATED ELASTOMERIC BEARING PAD
 (50 DUROMETER)

TABLE OF MINIMUM SUBSTRUCTURE DIMENSIONS (14)

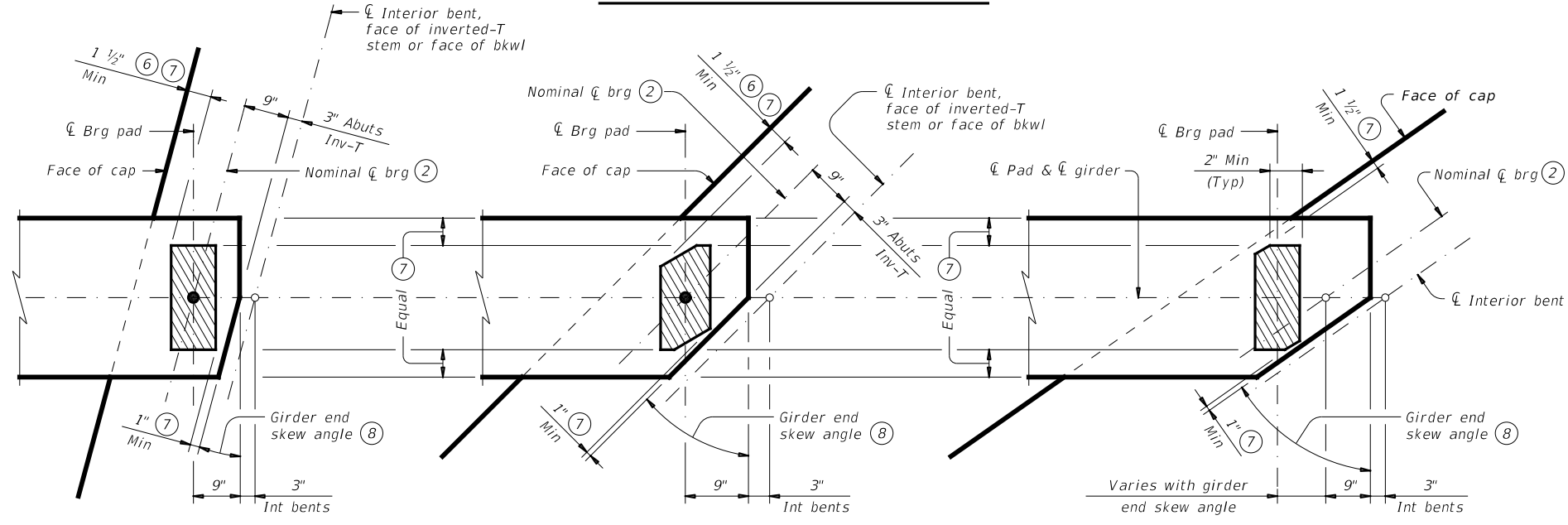
Girder Type	Abutments	Int Bents	Inv-T Bents
	Face of Bkwl to Face of Cap	Overall Cap Width	Corbel Width
Tx28 thru Tx54	1'-9"	3'-6"	1'-10 1/2"
Tx62 & Tx70	2'-0"	4'-0"	2'-1 1/2"

TABLE OF BEARING PAD DIMENSIONS

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



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



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

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

BEARING PAD PLACEMENT DIAGRAMS

- (2) For purposes of computing bearing seat elevations, nominal centerline of bearing must be defined as shown. The actual center of bearing pad may vary from this line.
- (6) 3" for inverted-T.
- (7) Place centerline pad as near nominal centerline bearing as possible between limits shown.
- (8) Girder end skew angle is equal to 90° minus the girder angle except at some conflicting girders.
- (9) Provide 2" dia hole only at locations required. See Substructure details for location.
- (10) See Table of Bearing Pad Dimensions for dimensions.
- (11) Maximum and minimum layer thicknesses shown are for elastomer only, on tapered layers.
- (12) Locate Permanent Mark here.
- (13) Indicate BEARING TYPE on all pads. For tapered pads, locate BEARING TYPE on the high side. The Fabricator must include the value of "N" (amount of taper in 1/8" increments) in this mark.
 Examples: N=0, (for 0" taper)
 N=1, (for 1/8" taper)
 N=2, (for 1/4" taper)
 (etc.)
 Fabricated pad top surface slope must not vary from plan girder slope by more than (0.0625" / Length or Dia) 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.



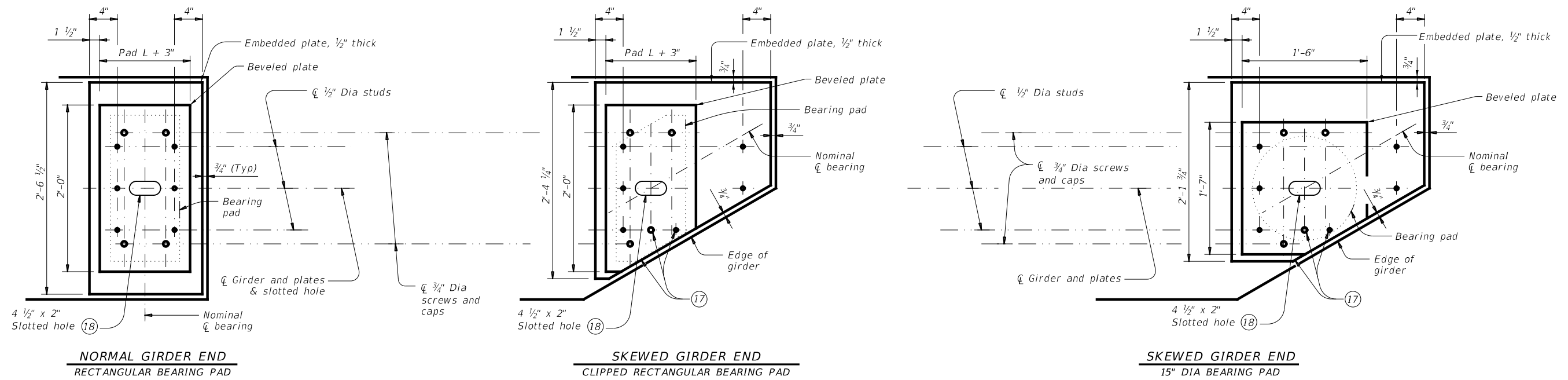
ELASTOMERIC BEARING AND GIRDER END DETAILS PRESTR CONCRETE I-GIRDERS

IGEB

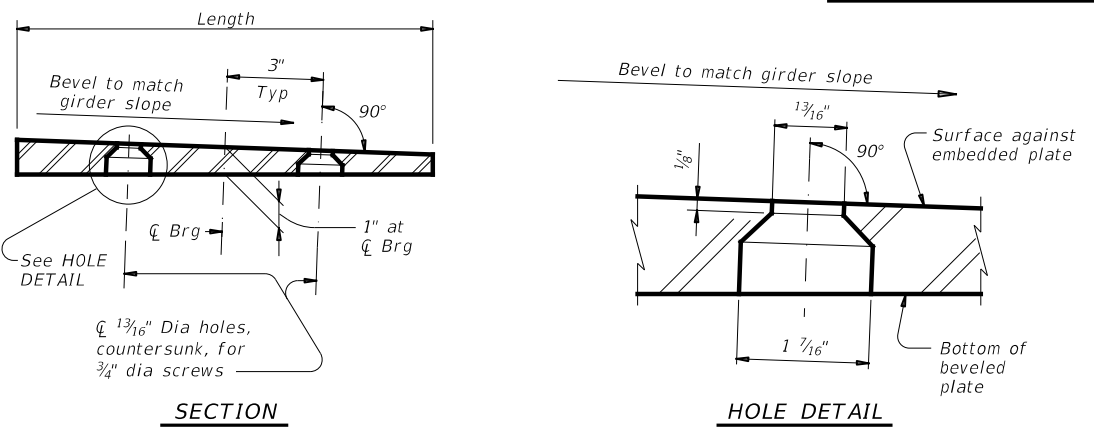
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©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0006	15	038	SH 70
DIST	COUNTY		SHEET NO.	
ABL	NOLAN		96	

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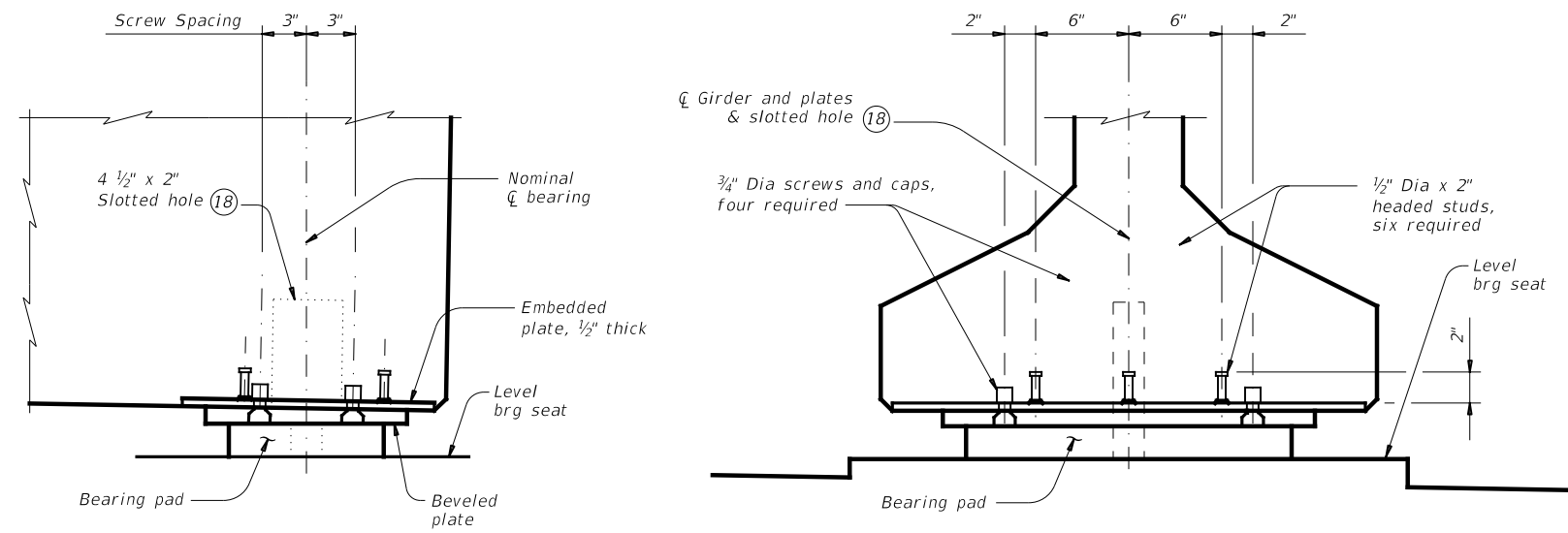
PLAN VIEW OF SOLE PLATE DETAILS



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



GIRDER DETAILS

HL93 LOADING SHEET 3 OF 3

Texas Department of Transportation
 Bridge Division Standard

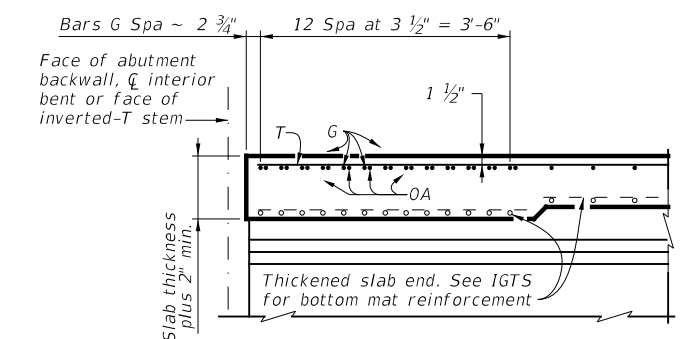
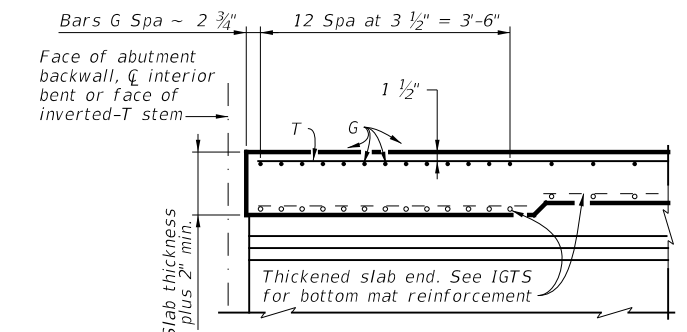
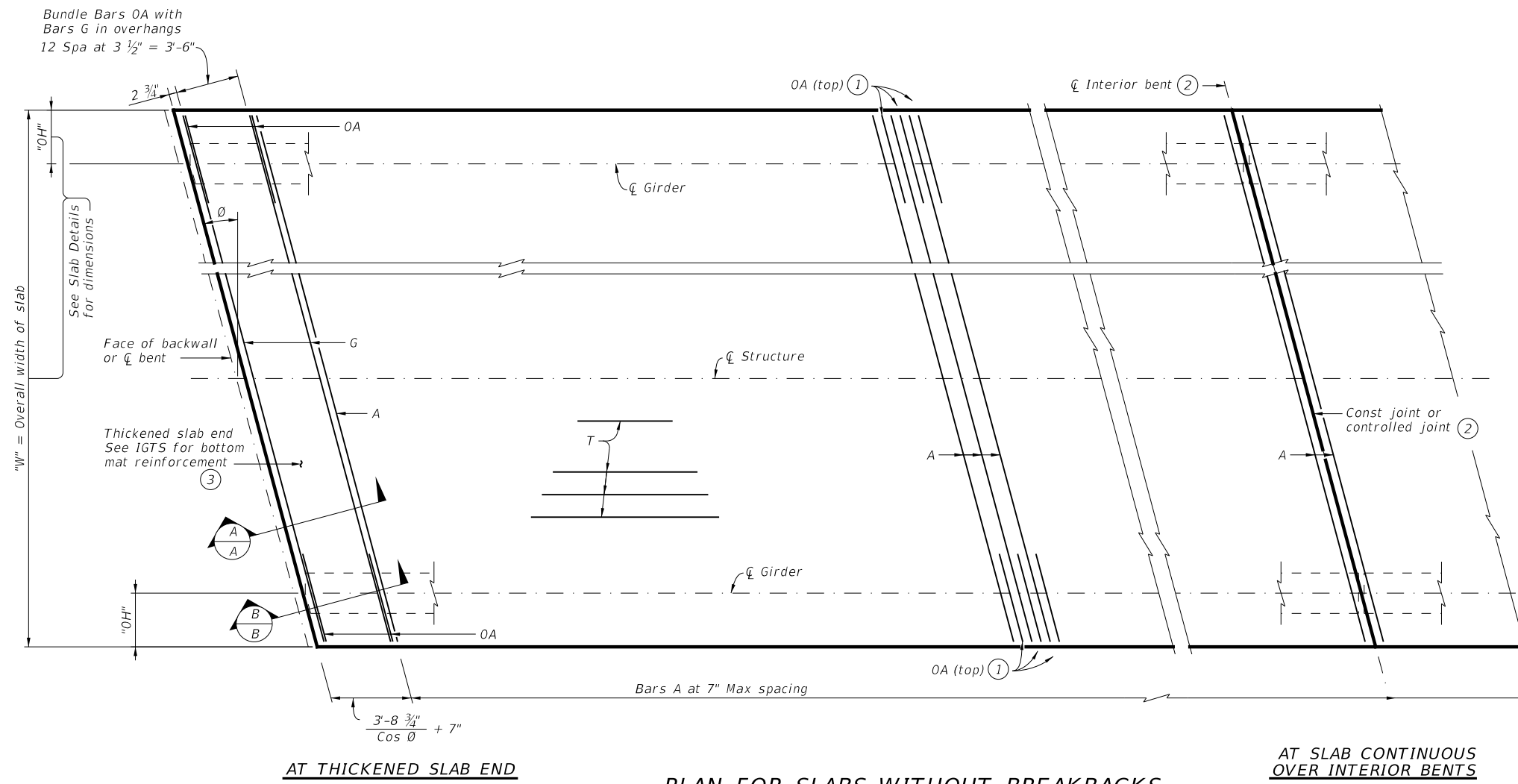
**ELASTOMERIC BEARING AND GIRDER END DETAILS
 PRESTR CONCRETE I-GIRDERS**

IGEB

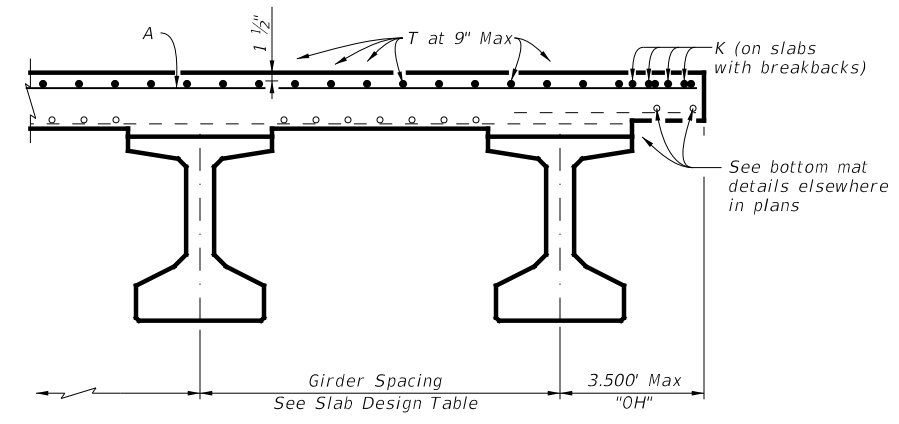
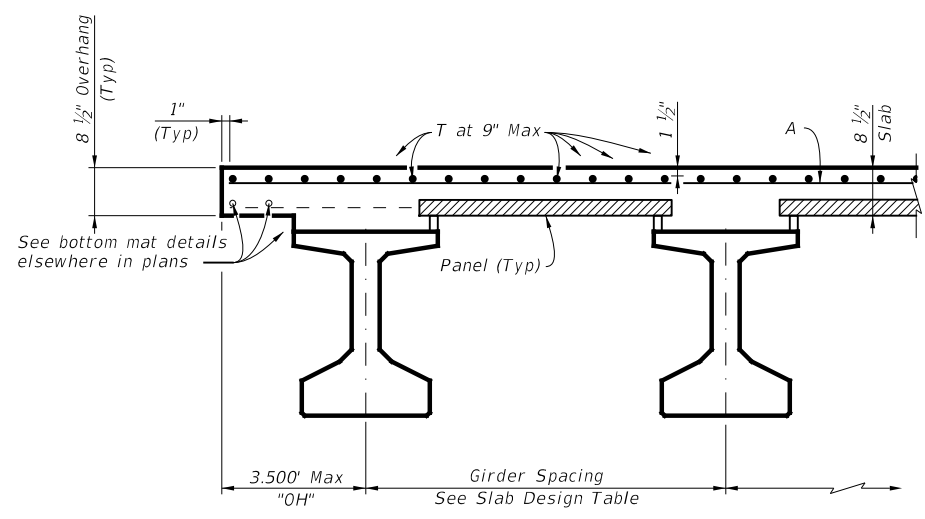
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CONT: August 2017	SECT:	JOB:	HIGHWAY:	
REVISIONS	0006 15	038	SH 70	
DIST: ABL	COUNTY: NOLAN	SHEET NO.:	97	

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- 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.



HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation Bridge Division Standard

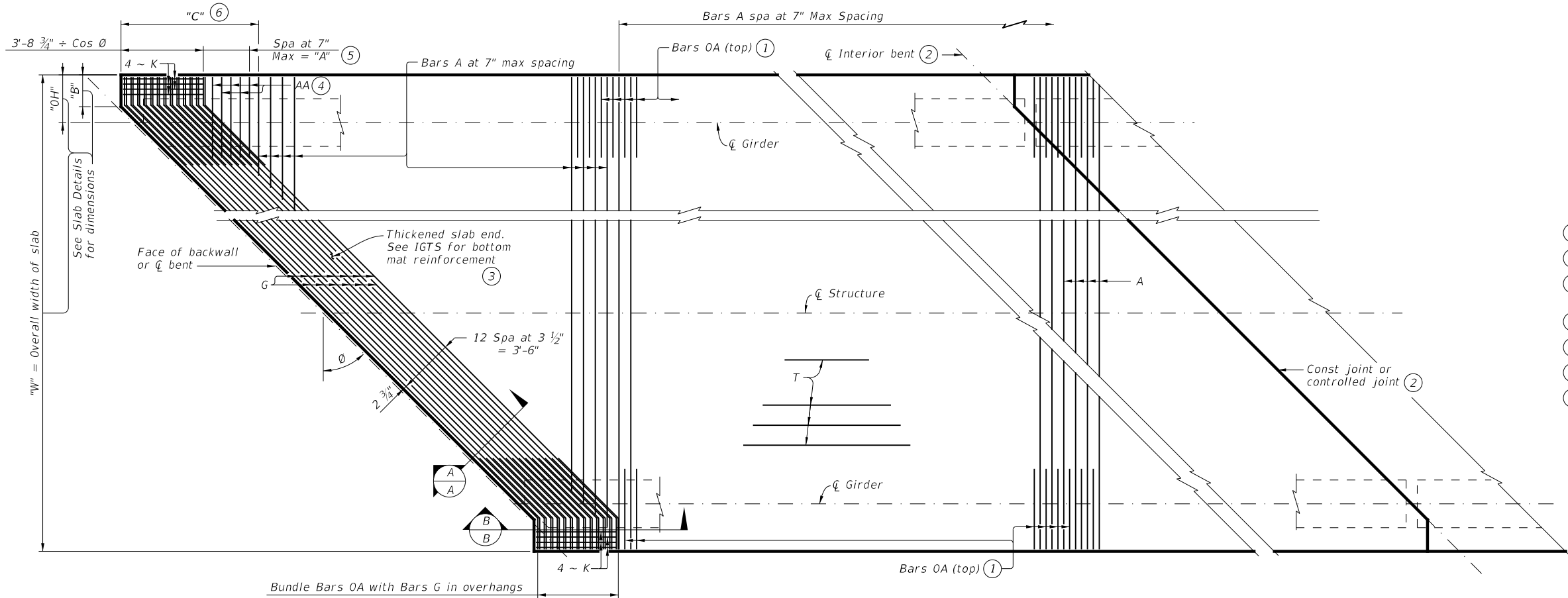
GFRP SLAB TOP MAT REINFORCEMENT
PRESTRESSED CONC I-GIRDER SPANS

IGFRP

FILE: igfrp001-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0006	15	038	SH 70
10-19: Updated to latest design specification.	DIST	COUNTY	SHEET NO.	
ABL	NOLAN	98		

BAR TABLE

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



- 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 $A = (OH + 2.333 - B) \times \tan \theta$
- ⑥ $C = \frac{3.729}{\cos \theta} + A + \text{Bar A spacing}$
- 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.

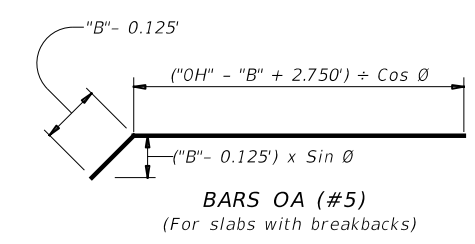
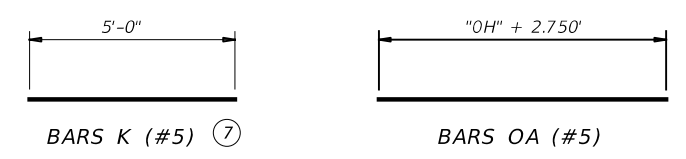
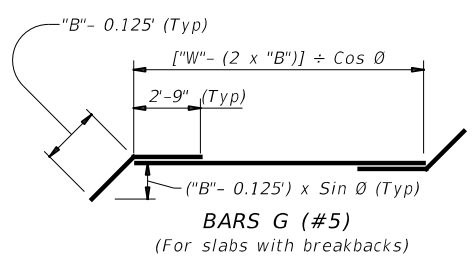
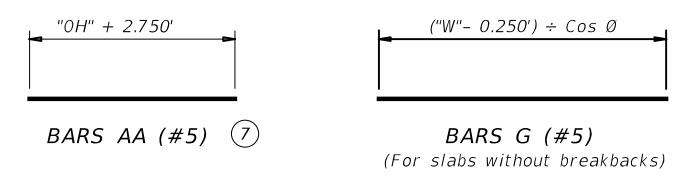
Cover dimensions are clear dimensions, unless noted otherwise.
 Reinforcing bar dimensions shown are out-to-out of bar.

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"

AT THICKENED SLAB END

PLAN FOR SLABS WITH BREAKBACKS

Showing top mat reinforcement only.



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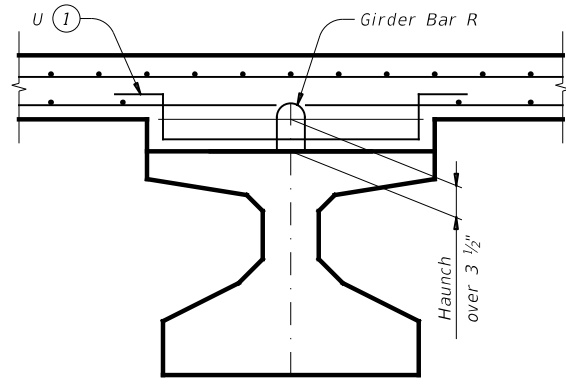
GFRP SLAB TOP MAT REINFORCEMENT PRESTRESSED CONC I-GIRDER SPANS

IGFRP

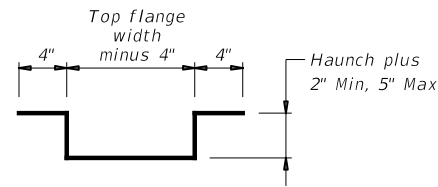
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©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0006	15	038	SH 70
10-19: Updated to latest design specification.	DIST	COUNTY	SHEET NO.	
	ABL	NOLAN	99	

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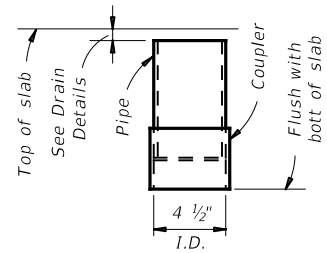
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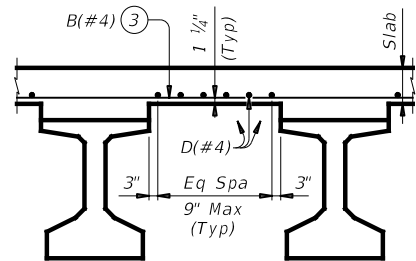
HAUNCH REINFORCING DETAIL



BARS U (#4)

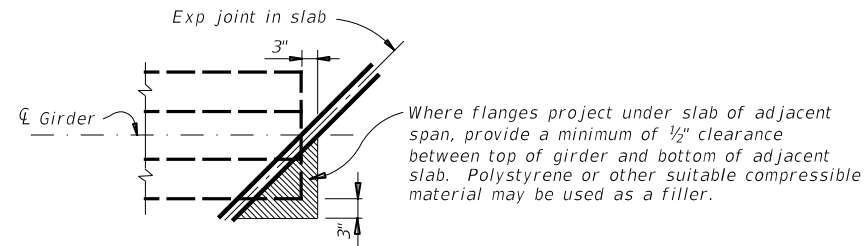


C-I-P DRAIN DETAIL

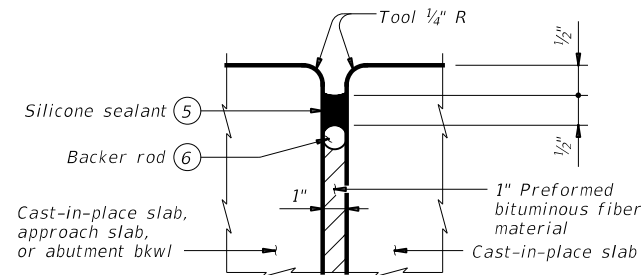


TYPICAL PART TRANSVERSE SLAB SECTION WITHOUT PCP

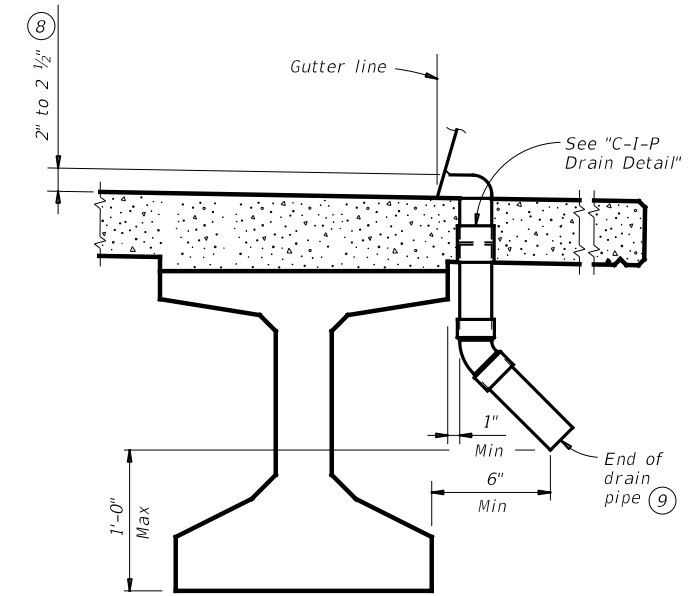
Top reinforcing steel not shown for clarity.



TREATMENT AT GIRDER END FOR SKEWED SPANS



TYPE A JOINT DETAIL



DRAIN DETAIL

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

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

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

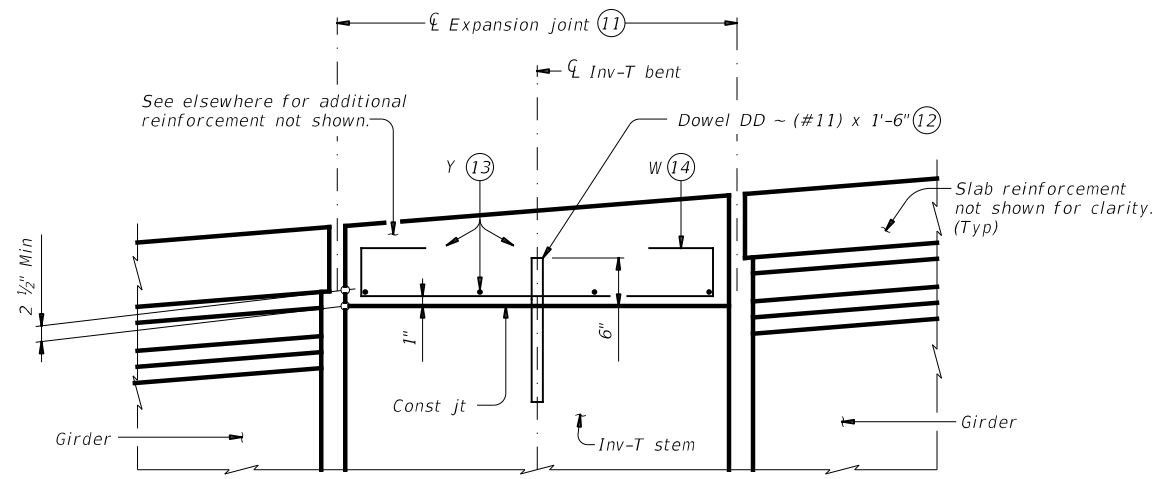
- ① Space Bars U with girder Bars R in all areas where measured haunch exceeds 3 1/2".
- ② Roughen outside of PVC with coarse rasp or equal to ensure bond with cast-in-place concrete.
- ③ Bars B(#4) spaced at 9" Max with 2" end cover. Overhang option, Contractor's may end alternating bars B(#4) at centerline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

SHEET 1 OF 2

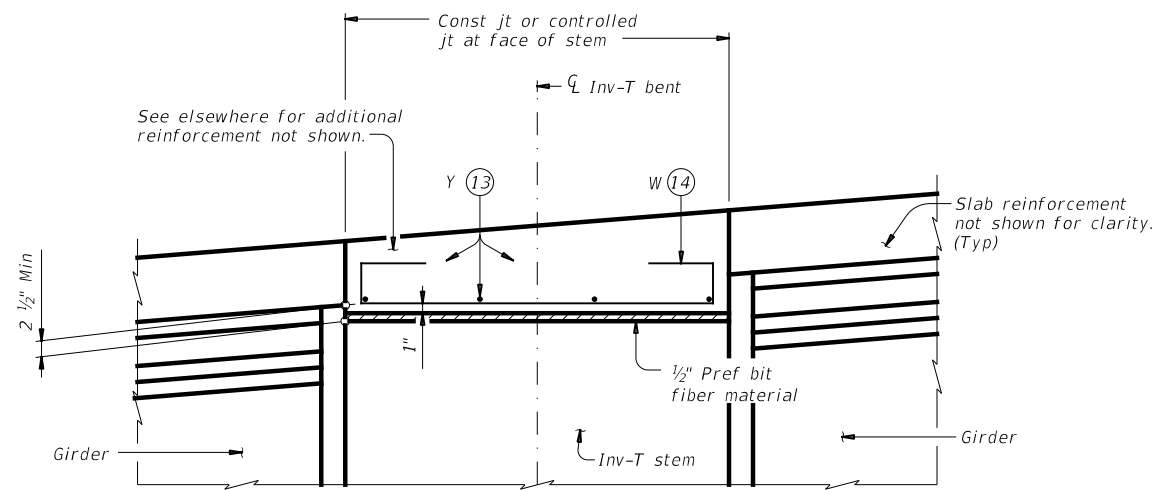
				Bridge Division Standard	
MISCELLANEOUS SLAB DETAILS PRESTR CONCRETE I-GIRDERS					
IGMS					
FILE: igmssts1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT	
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0006	15	038	SH 70	
10-19: Modified Note 7. Type A now a pay item.	DIST	COUNTY	SHEET NO.		
	ABL	NOLAN	100		

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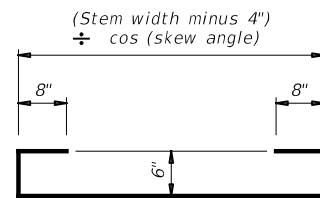
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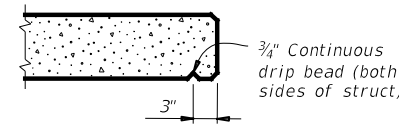
SHOWING EXPANSION JOINTS



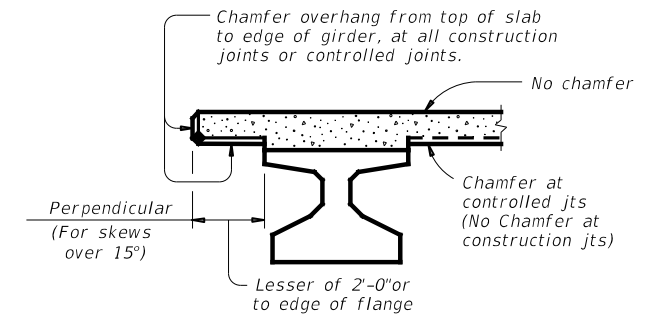
**SHOWING CONST JTS OR CONTROLLED JTS
 REINFORCEMENT OVER INV-T BENTS**



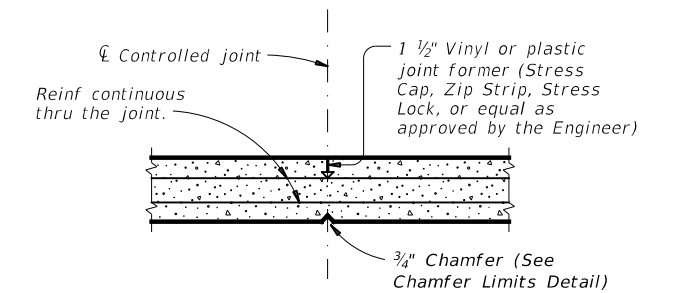
BARS W (#4)



DRIP BEAD DETAIL



CHAMFER LIMITS DETAIL (15)



CONTROLLED JOINT DETAIL

(Saw-cutting is not allowed)

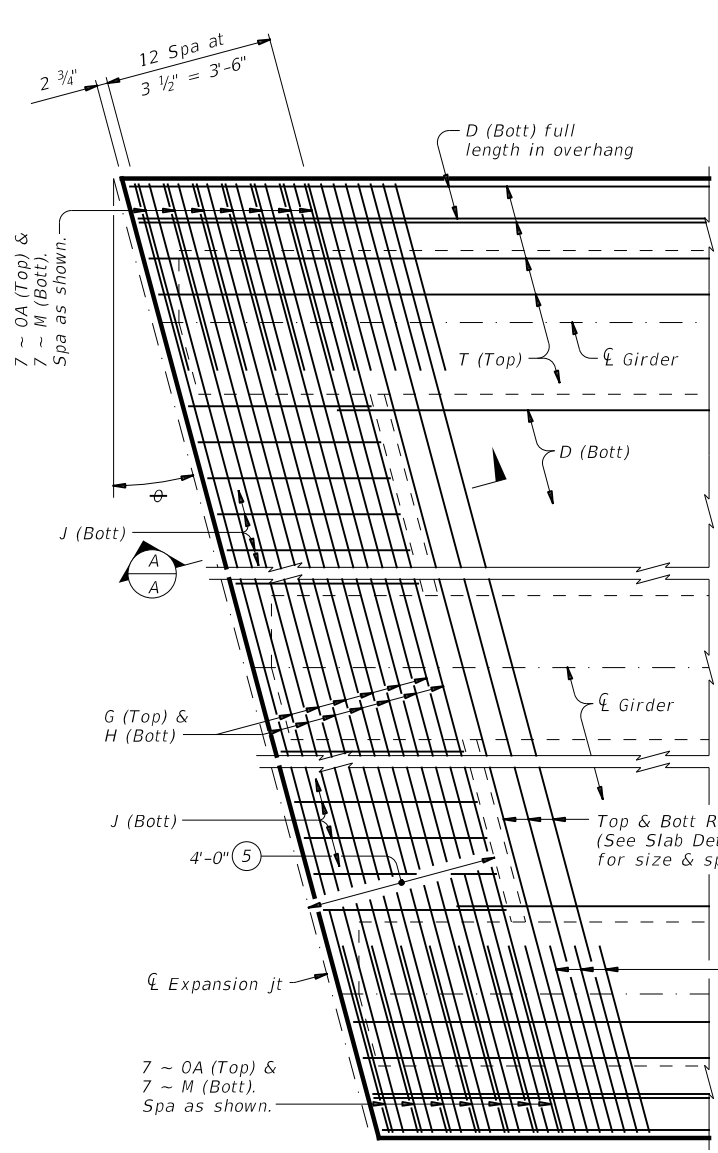
- (11) See Layout for joint type.
- (12) Dowels DD (#11) spaced at 5 Ft Max. See Inv-T bents for quantity and location.
- (13) Space Bars Y (#4) at 12" Max. Use 2" end cover. Number of Bars Y must satisfy spacing limit. Place parallel to bent.
- (14) Space Bars W at 12" Max (3" from end of cap). Tilt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

SHEET 2 OF 2

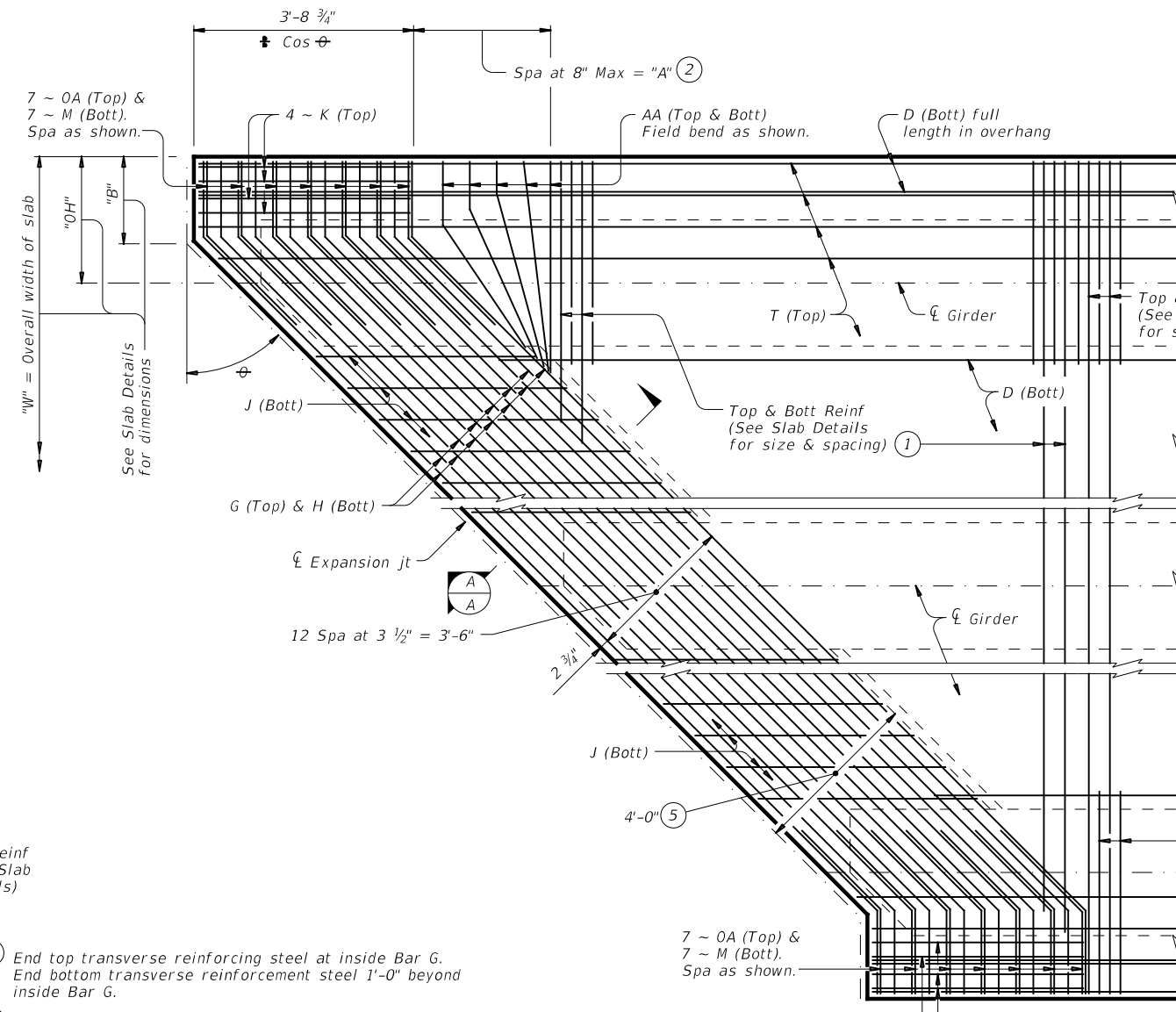
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MISCELLANEOUS SLAB DETAILS PRESTR CONCRETE I-GIRDERS			
IGMS			
FILE: igmssts1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR
©TxDOT August 2017	CONT	SECT	JOB
REVISIONS	0006	15	038
10-19: Modified Note 7, Type A now a pay item.	DIST	COUNTY	SHEET NO.
	ABL	NOLAN	101

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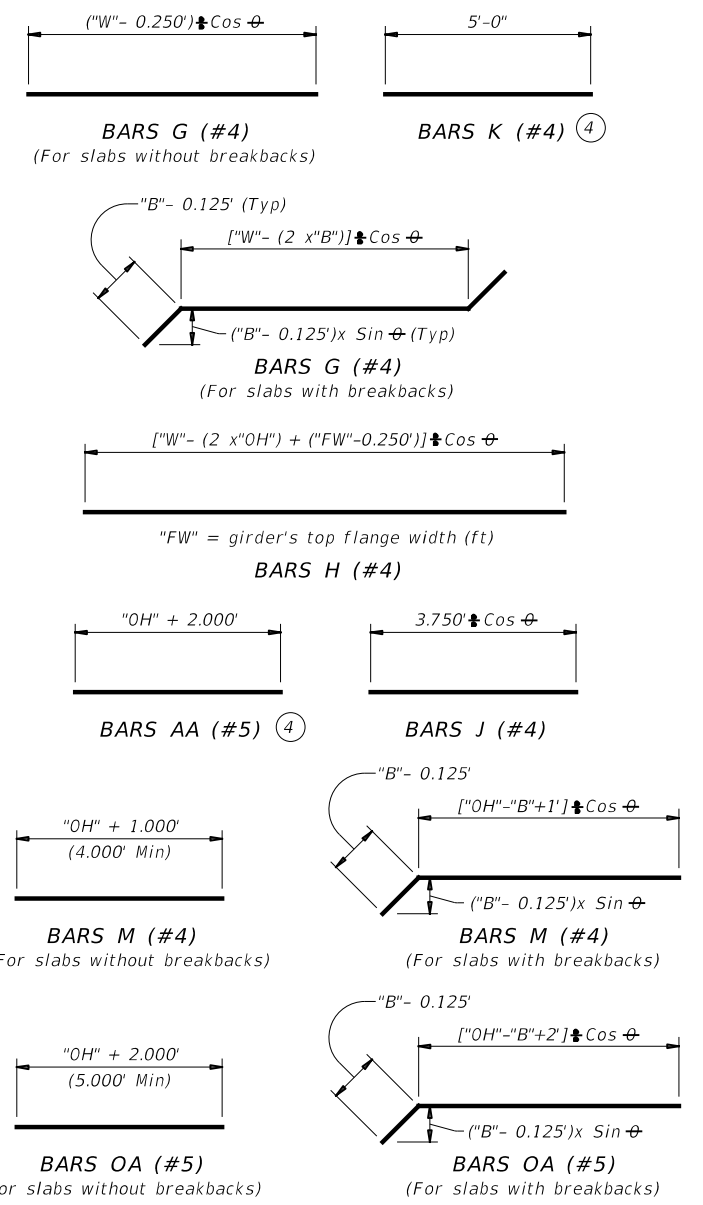
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PARTIAL PLAN FOR SLABS WITHOUT BREAKBACK



PARTIAL PLAN FOR SLABS WITH BREAKBACK

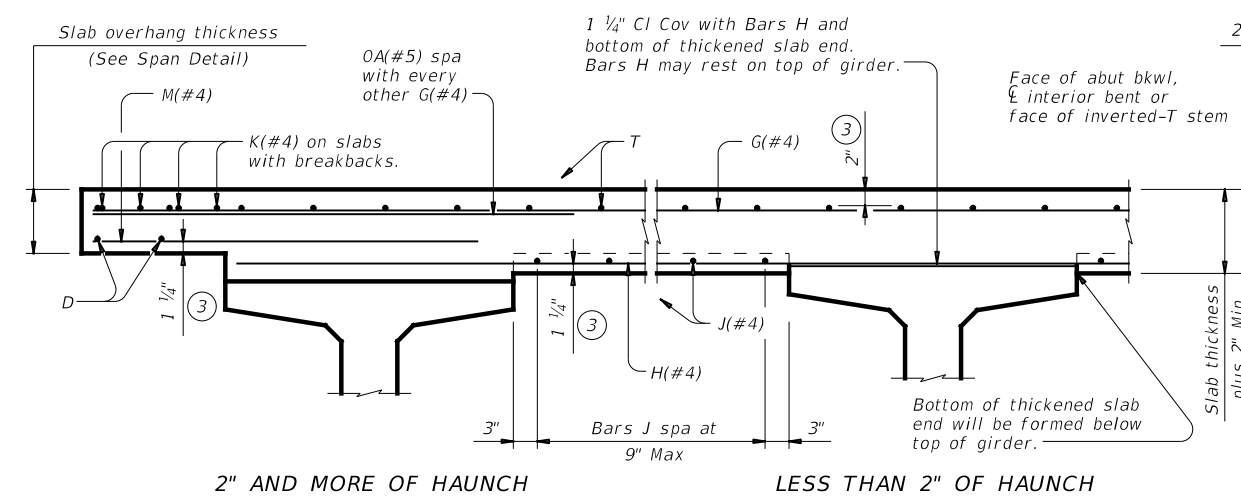


- ① End top transverse reinforcing steel at inside Bar G. End bottom transverse reinforcement steel 1'-0" beyond inside Bar G.
- ② $A = (OH + 2.333 \cdot B) \times \tan \phi$
- ③ Provide clear cover as indicated unless otherwise shown on Span Details.
- ④ Only required on slabs with breakbacks.
- ⑤ Thickened slab end dimensioned perpendicular to face of bkw, centerline interior bent or face of inverted-T stem.

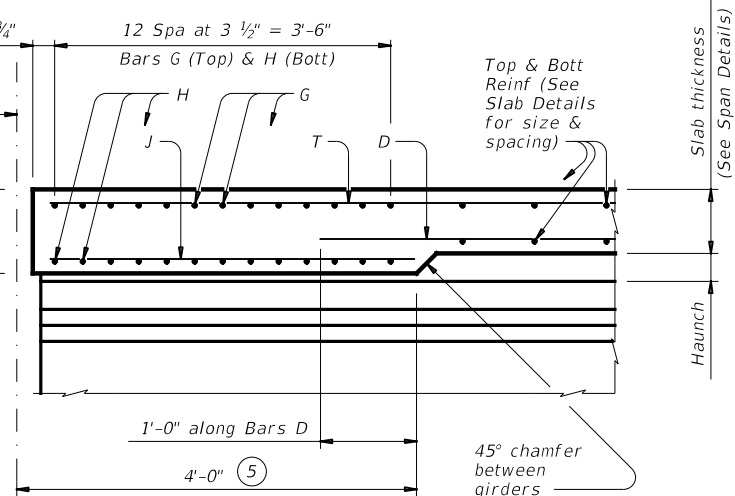
GENERAL NOTES:
 Designed according to AASHTO LRFD Bridge Design Specifications. These details are restricted to Prestressed Concrete I-Girder Spans. These details are to be used in conjunction with the Span Details and PCP standard (if prestressed concrete panels are used). When Option 2 from PCP standard is used, provide Bars AA, G, K and OA in the slab.

MATERIAL NOTES:
 Provide Grade 60 reinforcing steel. If slab reinforcing steel is shown on the Slab Details to be epoxy coated, then Bars AA, G, K, H, J, M and OA must be epoxy coated. Provide bar laps, where required, as follows:
 Uncoated ~ #4 = 1'-7"
 Epoxy Coated ~ #4 = 2'-5"

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



TYPICAL TRANSVERSE SECTION
 (Showing Prestressed Conc I-Girders at ϕ Brg)

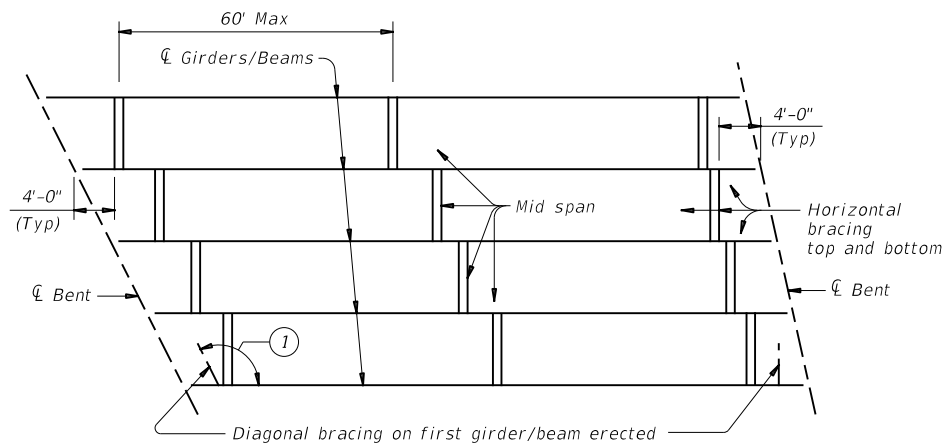


SECTION A-A
 (Showing with 2" and more of haunch)

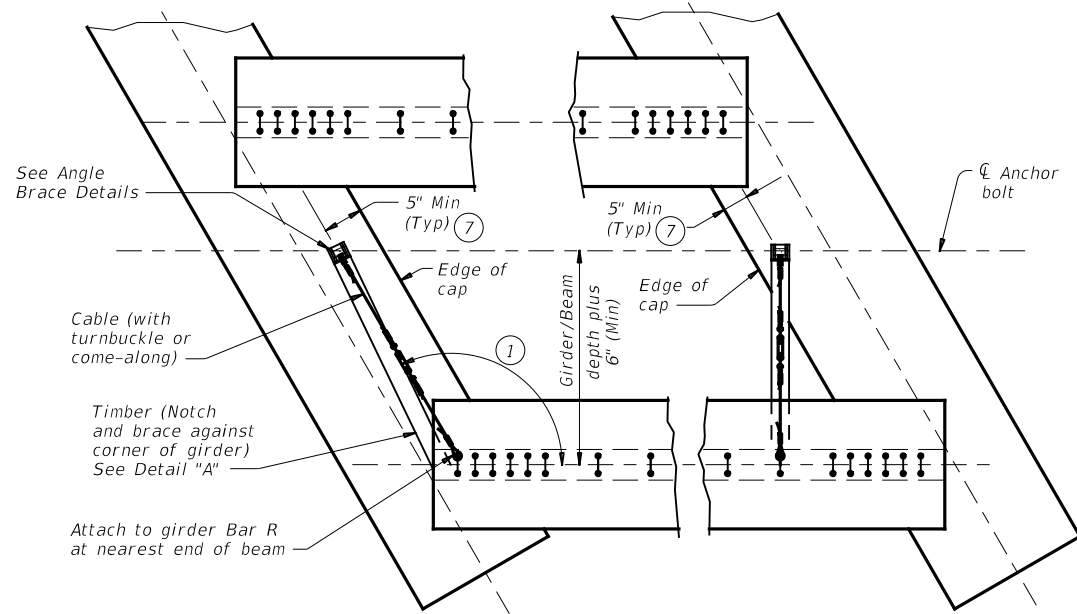
HL93 LOADING		Bridge Division Standard	
THICKENED SLAB END DETAILS			
PRESTRESSED CONCRETE I-GIRDER SPANS			
IGTS			
FILE: igtss1-17.dgn	DN: TxDOT	CK: TxDOT	DW: JTR
©TxDOT August 2017	CONT SECT	JOB	HIGHWAY
REVISIONS	0006 15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABL	NOLAN	102	

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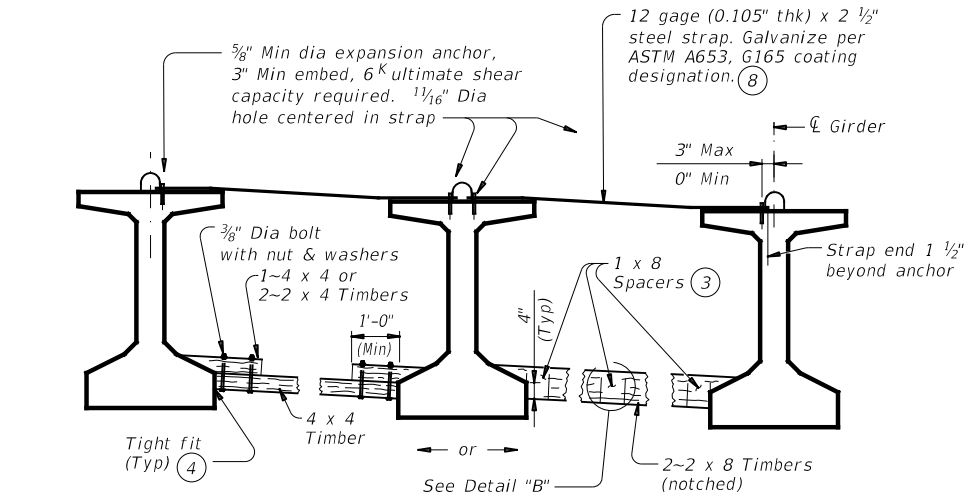
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ERECTOR BRACING

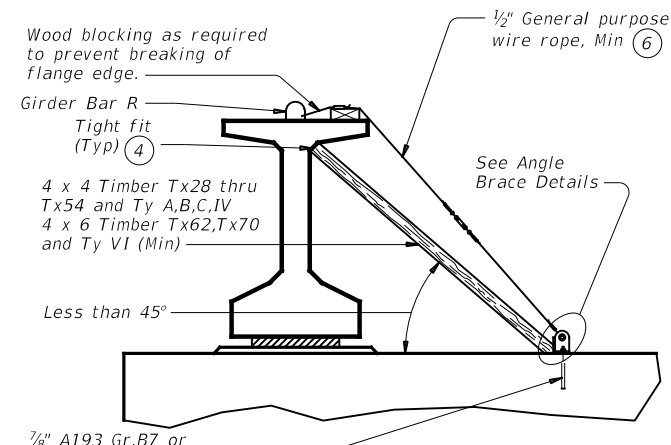


PLAN



FOR ERECTOR BRACING, OPTION 1

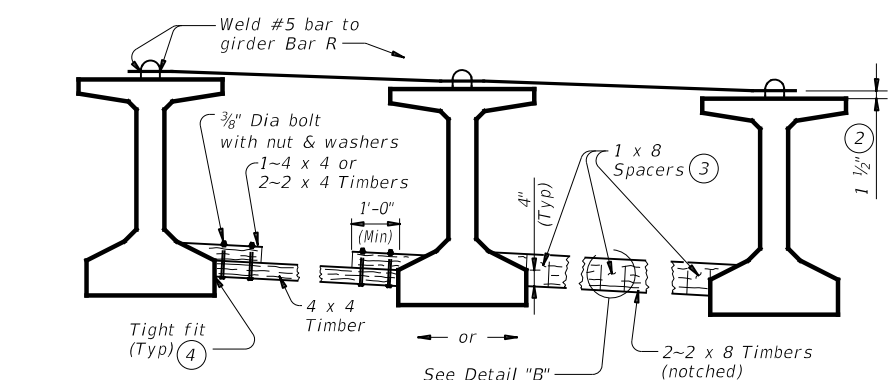
(This option is not allowed when slab is formed with PMDF or plywood.)



END VIEW

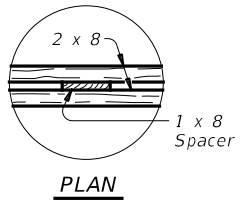
DIAGONAL BRACING DETAILS

(To be used on both ends of the first girder/beam erected in the span in each phase.)



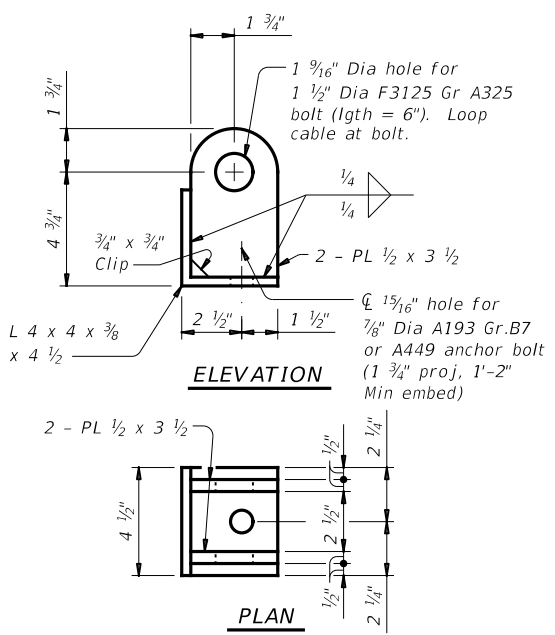
FOR ERECTOR BRACING, OPTION 2

HORIZONTAL BRACING DETAILS



PLAN

DETAIL "B"



ELEVATION

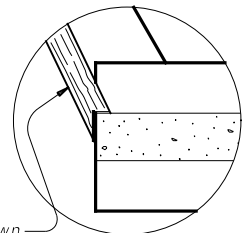
PLAN

ANGLE BRACE DETAILS

HAULING & ERECTION:
 The Contractor's attention is directed to the possible lateral instability of prestressed concrete girders and beams over 130' long, especially during hauling and erection. The use of the following methods to improve stability is encouraged: Locate lifting devices at the maximum practical distance from girder ends; use external lateral stiffening devices during hauling and erection; lift with vertical lines using two machines; and take care in handling to minimize inertial and impact forces.

ERECTOR BRACING:
 Erection bracing details shown are considered the minimum for fulfilling the bracing requirements of Item 425. Required erection bracing must be placed immediately after erection of each girder and remain in place until additional bracing as required for slab placement is in place. This standard is needed in all cases to meet requirements for Slab Placement Bracing.

PHASED CONSTRUCTION:
 Place erection and slab placement bracing for all girders in a phase as shown in these details. For phases after first, also place erection and slab placement bracing between outer girder of completed phase and adjacent girder of current phase. When the phase construction joint is between girders, top bracing can be omitted.



DETAIL "A"

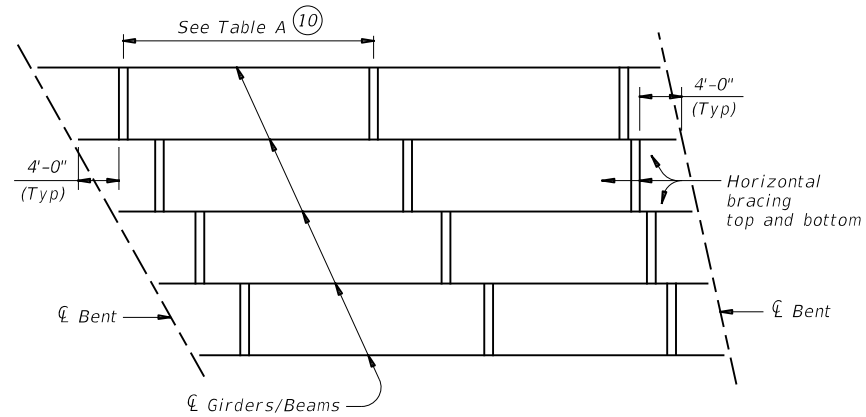
- 1 If angle shown exceeds 120 degrees, move diagonal brace to other side of girder/beam and place square to girder/beam. This may prevent exterior girder from being erected first.
- 2 Place and weld #5 bars as shown during erection. If forming deck with prestressed panels, bars can be temporarily removed, one at a time, during panel erection. Re-install bar prior to additional panel erection. Bars can rest on panels and be bent down and welded to girder Bars R (See Sheet 2 of 2).
- 3 Clear distance between spacers must not exceed 3'. Nail together with 16d nails.
- 4 Use wedges as necessary to obtain tight fit. Nail wedges to timbers.
- 5 Pressure treated landscape timbers can not be used.
- 6 All hardware used with cable must be able to develop a minimum 25 kips breaking strength. Use thimbles at all loops in cable. Install cable clamps with saddles bearing against the live end and U-bolts bearing against the dead end.
- 7 It is acceptable to tie anchor bolts to cap reinforcement.
- 8 Prior to installing, field bend strap to lay flush on both girders' top flange and slope between flange tips.
- 9 Anchor bolt may be drilled and epoxied in place. Provide 25k minimum pullout. Core drill hole.

SHEET 1 OF 2

		Bridge Division Standard	
MINIMUM ERECTOR AND BRACING REQUIREMENTS PRESTRESSED CONCRETE I-GIRDERS AND I-BEAMS			
MEBR(C)			
FILE: mebcsts1-17.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT
©TxDOT August 2017	CONTRACT NO: 000615	SECTION: 038	HIGHWAY: SH 70
DIST: ABL	COUNTY: NOLAN	SHEET NO: 103	

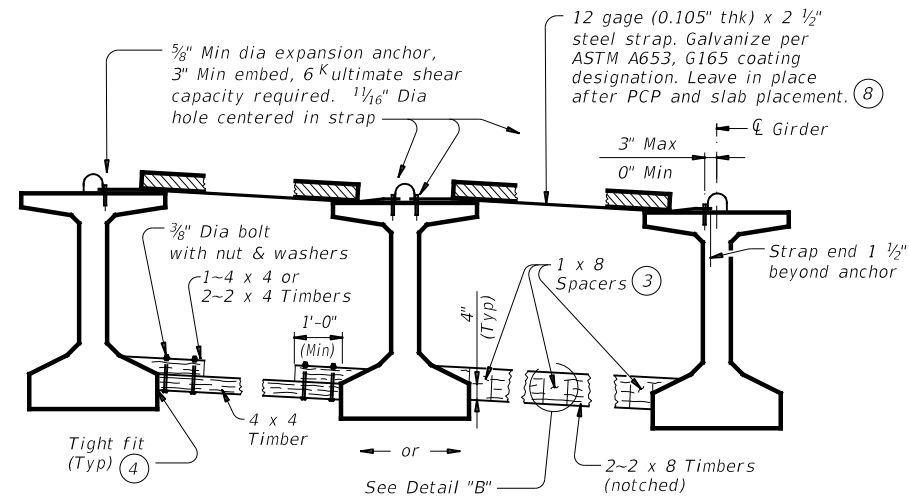
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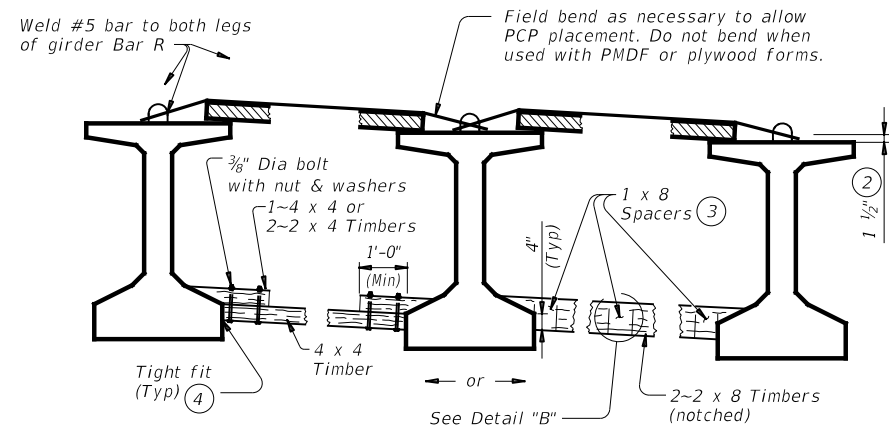
SLAB PLACEMENT BRACING

TABLE A				
Girder or Beam Type	OPTION 1-RIGID BRACING (STEEL STRAP)		OPTION 2-FLEXIBLE BRACING (NO. 5 OVER PCP)	
	Maximum Bracing Spacing		Maximum Bracing Spacing	
	Slab Overhang less than 4'-0" (11)	Slab Overhang 4'-0" and greater (11)	Slab Overhang less than 4'-0" (11)	Slab Overhang 4'-0" and greater (11)
Tx28	1/4 points	1/4 points	Tx28	1/4 points
Tx34	1/4 points	1/4 points	Tx34	1/4 points
Tx40	1/4 points	1/8 points	Tx40	1/4 points
Tx46	1/4 points	1/8 points	Tx46	1/4 points
Tx54	1/4 points	1/8 points	Tx54	1/8 points
Tx62	1/4 points	1/8 points	Tx62	1/8 points
Tx70	1/4 points	1/8 points	Tx70	1/8 points
A	1/8 points	1/8 points	A	2.0 ft
B	1/8 points	1/8 points	B	3.0 ft
C	1/8 points	1/8 points	C	4.5 ft
IV	1/4 points	1/8 points	IV	1/4 points
VI	1/4 points	1/8 points	VI	1/4 points



FOR SLAB PLACEMENT BRACING, OPTION 1 - RIGID

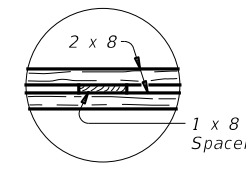
(Showing slab formed with PCP. This option is not allowed when slab is formed with PMDF or plywood.)



FOR SLAB PLACEMENT BRACING, OPTION 2 - FLEXIBLE

(Showing slab formed with PCP.)

HORIZONTAL BRACING DETAILS (5)



**PLAN
DETAIL "B"**

- (2) Place and weld #5 bars as shown during erection. If forming deck with prestressed panels, bars can be temporarily removed, one at a time, during panel erection. Re-install bar prior to additional panel erection. Bars can rest on panels and be bent down and welded to girder Bars R.
- (3) Clear distance between spacers must not exceed 3'. Nail together with 16d nails.
- (4) Use wedges as necessary to obtain tight fit. Nail wedges to timbers.
- (5) Pressure treated landscape timbers can not be used.
- (8) Prior to installing, field bend strap to lay flush on both girders' top flange and slope between flange tips.
- (10) Bracing spacing (1/4 and 1/8 points) measured between first and last typical brace location.
- (11) Measure slab overhang from centerline of girder or beam. When overhang varies in span, determine bracing spacing based on largest overhang.

SLAB PLACEMENT BRACING:

The details for slab placement bracing are considered minimum for fulfilling the requirements of Specification Items 422 and 425. Required slab placement bracing must remain in place until slab concrete has attained a compressive strength of 3000 psi.

GENERAL NOTES:

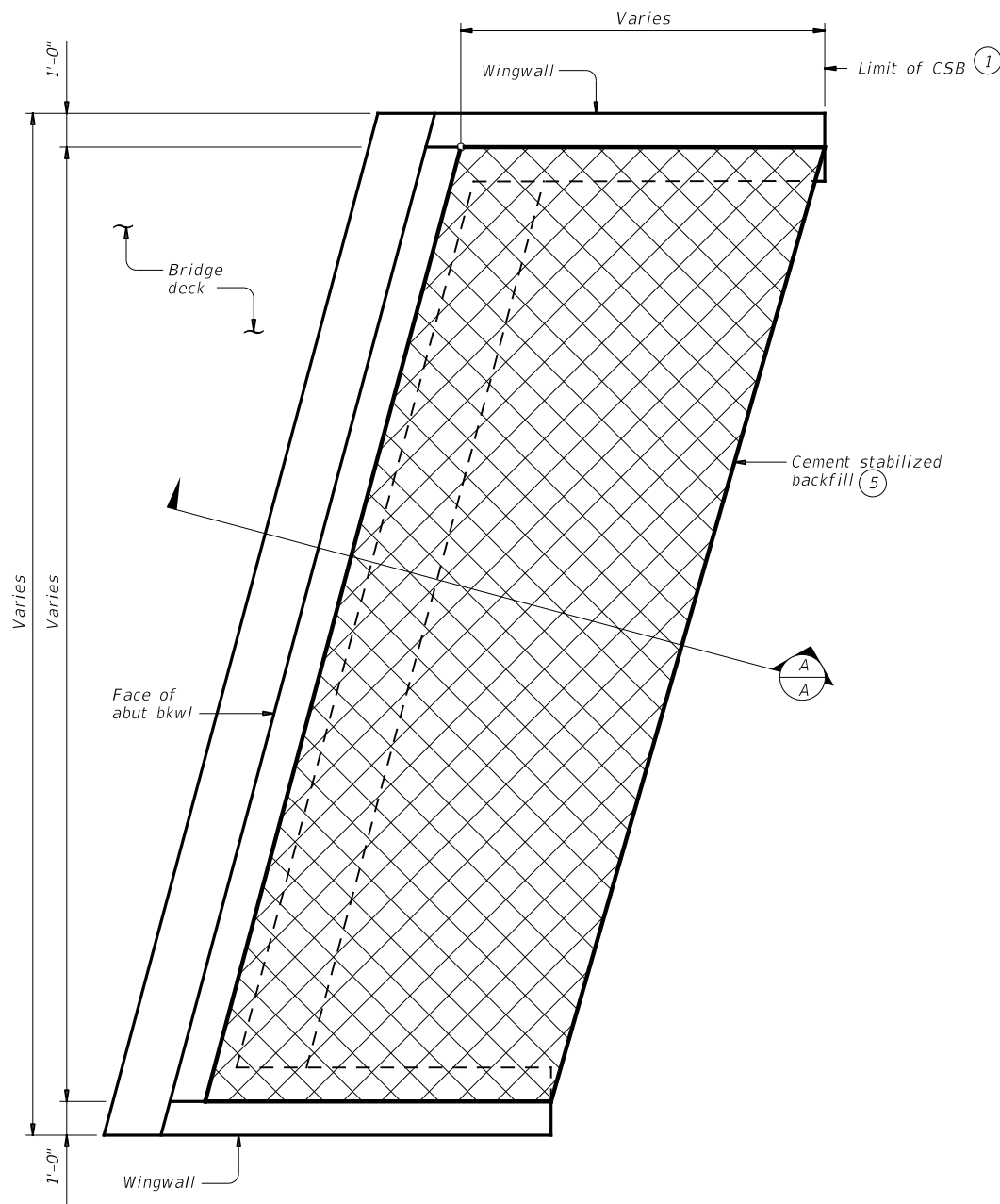
Bracing details for spans longer than 150' are not provided. The Contractor must submit proposed bracing details for such conditions to the Engineer for approval prior to erection. Systems equal to or better than those shown may be used provided details of such systems are submitted to and approved by the Engineer prior to erection. Use of these systems or details does not relieve the Contractor of the responsibility for the adequacy of the bracing and the safety of the structure. Removal of bracing for short periods of time to align girders and beams is permissible. All turn-buckles, come-alongs, anchors and other connections must be capable of developing the full strength of the cable shown. Furnish anchor bolts and nuts in accordance with Item 449, "Anchor Bolts".

SHEET 2 OF 2

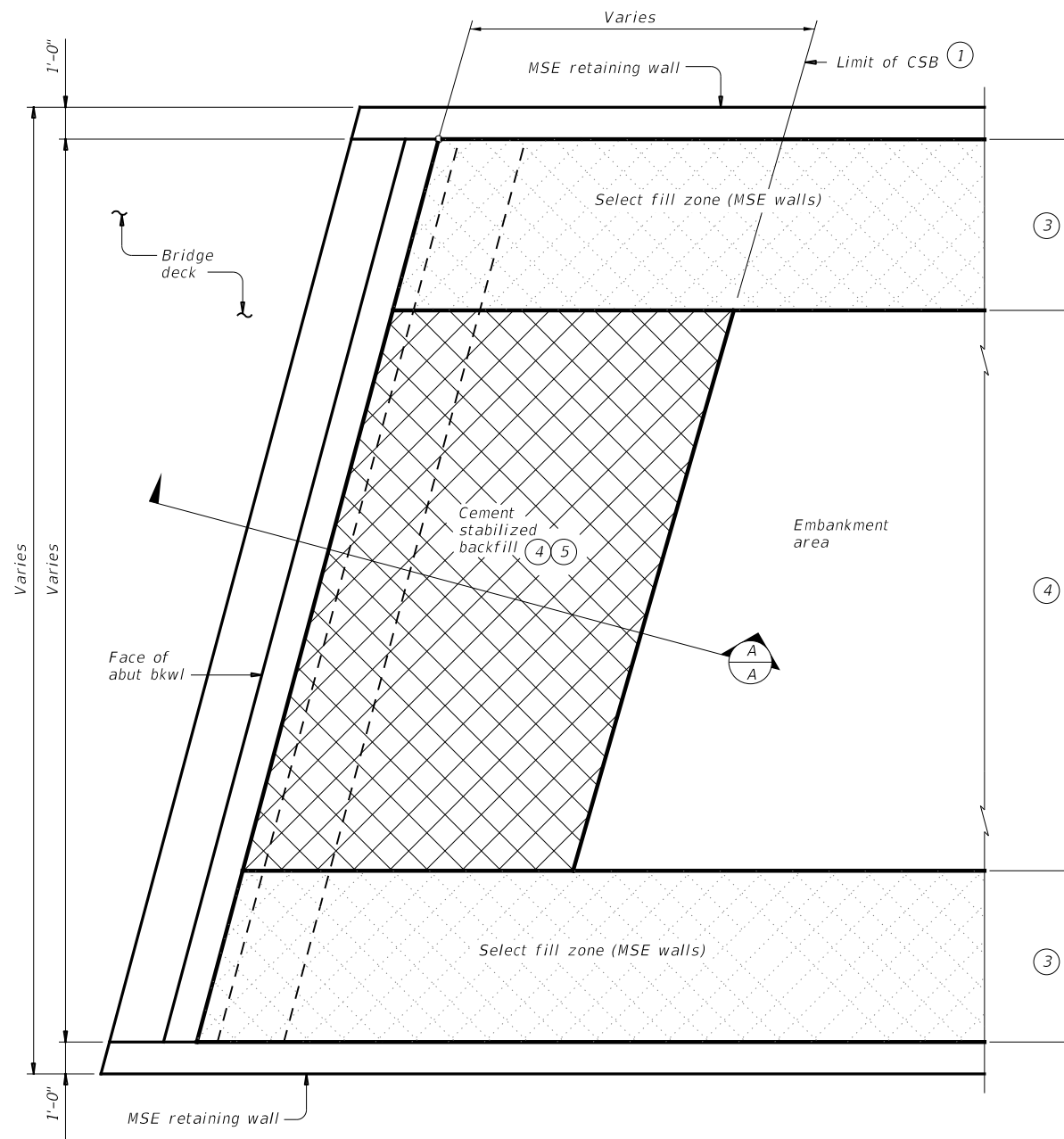
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MINIMUM ERECTION AND BRACING REQUIREMENTS PRESTRESSED CONCRETE I-GIRDERS AND I-BEAMS			
MEBR(C)			
FILE: mbcsts1-17.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT
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REVISIONS	0006 15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABL	NOLAN	104	

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OPTION 1 ~ PLAN WITH WINGWALLS
 Cast-in-place retaining walls similar.



OPTION 1 ~ PLAN WITH MSE RETAINING WALLS

- ① Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.
- ② Bench backfill as shown with 12" (approximate) bench depths.
- ③ Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.
- ④ When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.
- ⑤ If shown in the plans, flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
 - a) If flowable backfill is to be placed over MSE backfill, then a filter fabric will be placed over the 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 1 is intended for construction only requiring plasticity index (PI) controlled embankment fill or excavation in competent soils/rocks in order to construct the abutment. Option 2 is intended for new construction requiring high plasticity embankment fill with a PI greater than 30 or pavement built in poor native soil. Poor soils are defined as high plasticity clays or expansive clays.

Construct abutment backfill in accordance with Item 400, "Excavation and Backfill for Structures".

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

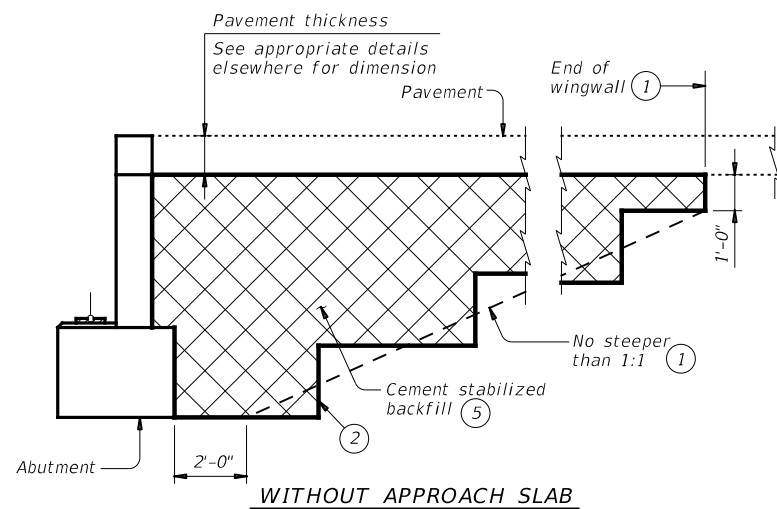
If required elsewhere in the plans, provide Flowable Backfill meeting the requirements of Item 401, "Flowable Backfill", to the limits shown at bridge abutments.

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

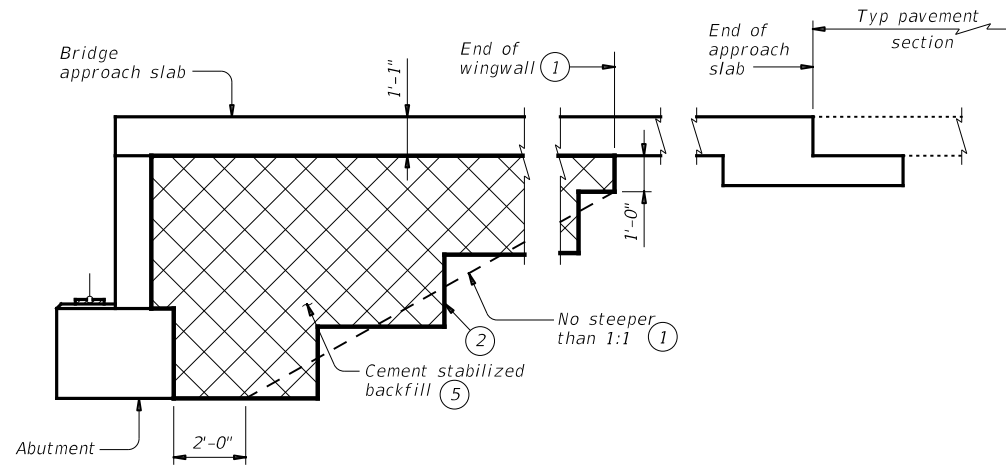
These details do not apply when Concrete Block retaining walls are used in lieu of wingwalls.

SHEET 1 OF 2

		Bridge Division Standard	
CEMENT STABILIZED ABUTMENT BACKFILL BRIDGE ABUTMENT			
CSAB			
FILE: MS-CSAB-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
©TxDOT	CONTRACT: 000615	SECTION: 038	HIGHWAY: SH 70
02-20: Added Option 2.	DIST: ABL	COUNTY: NOLAN	SHEET NO: 105
03-23: Updated General Notes.			



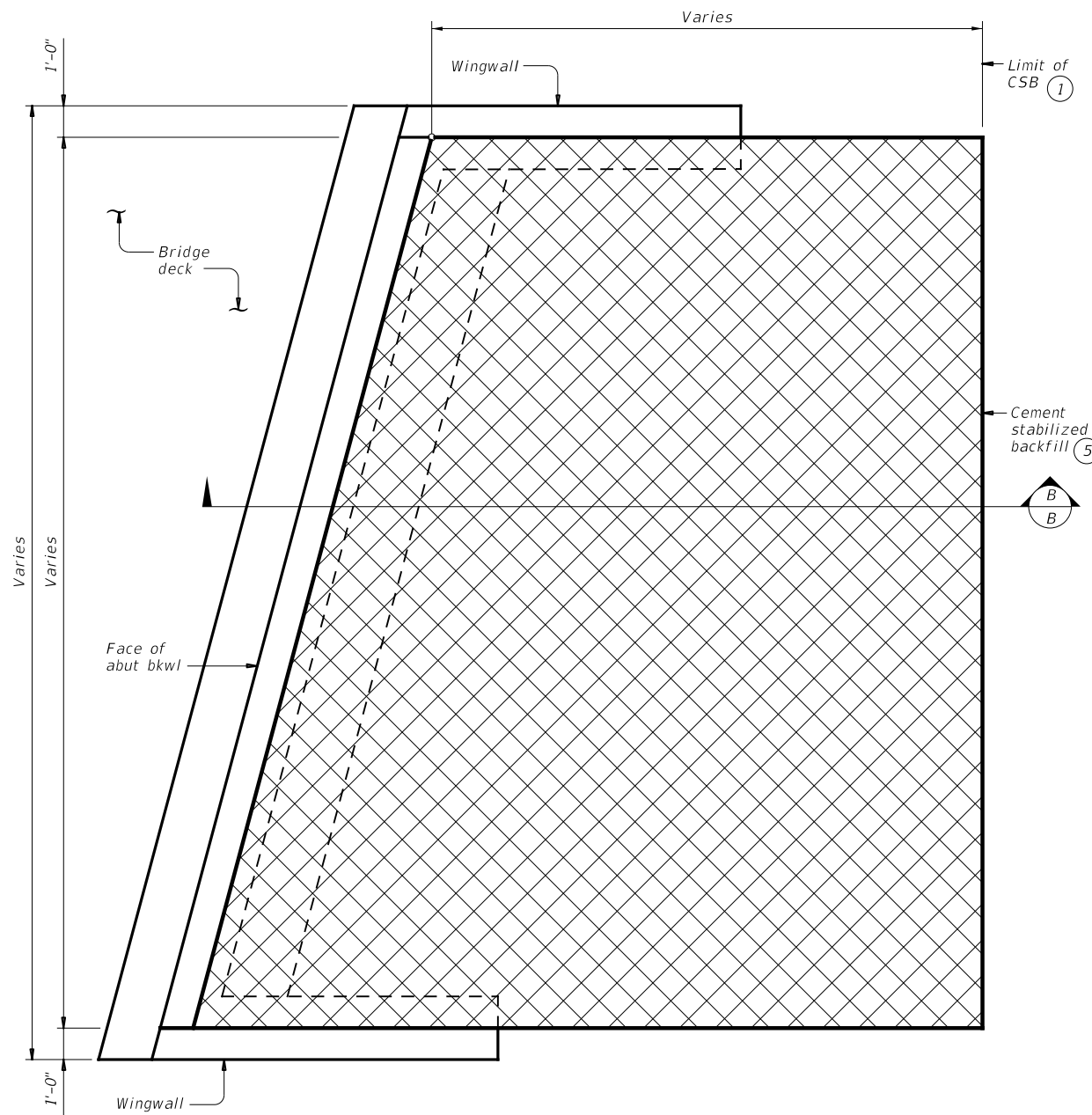
WITHOUT APPROACH SLAB



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

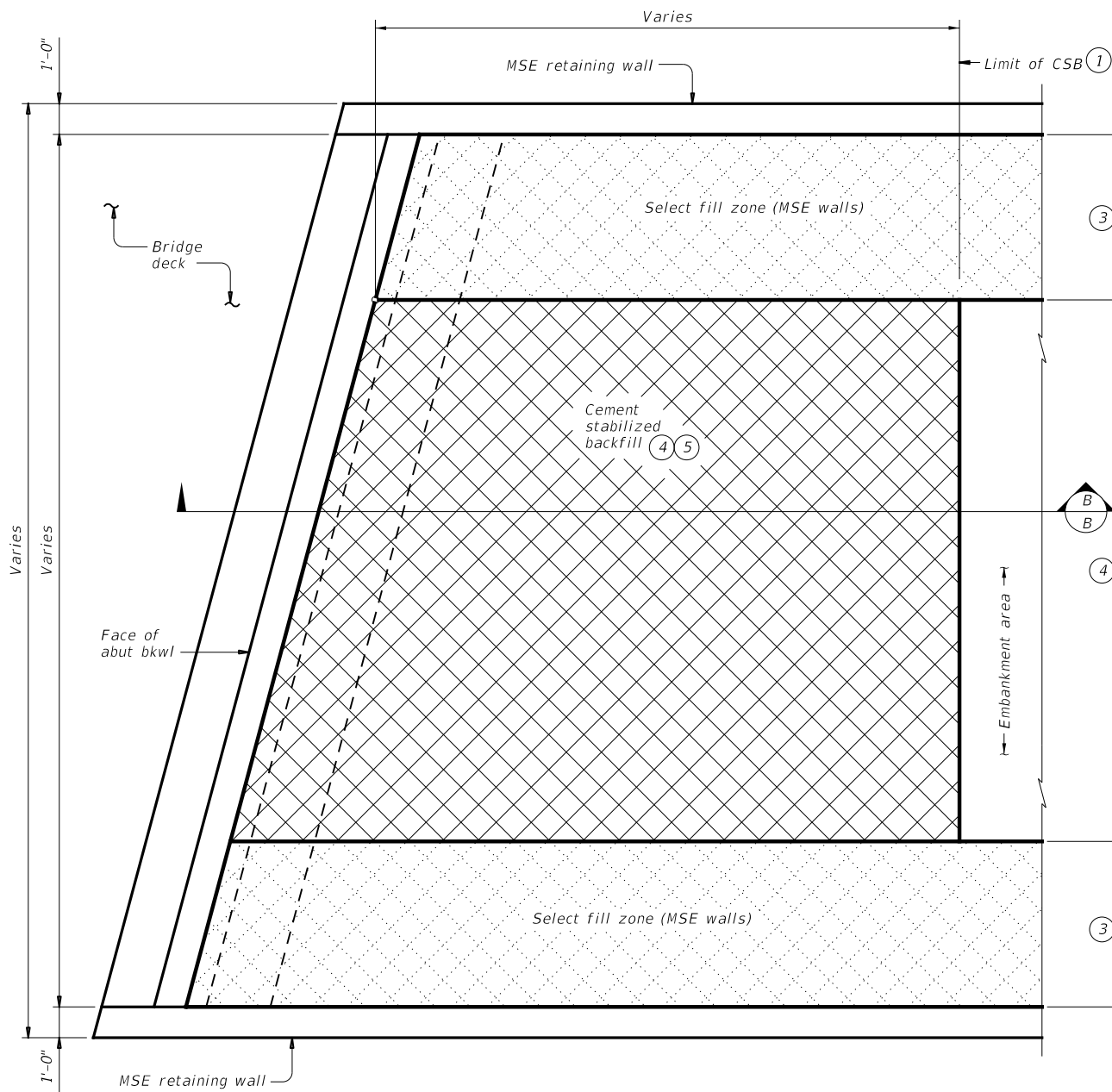
SECTION A-A

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OPTION 2 ~ PLAN WITH WINGWALLS

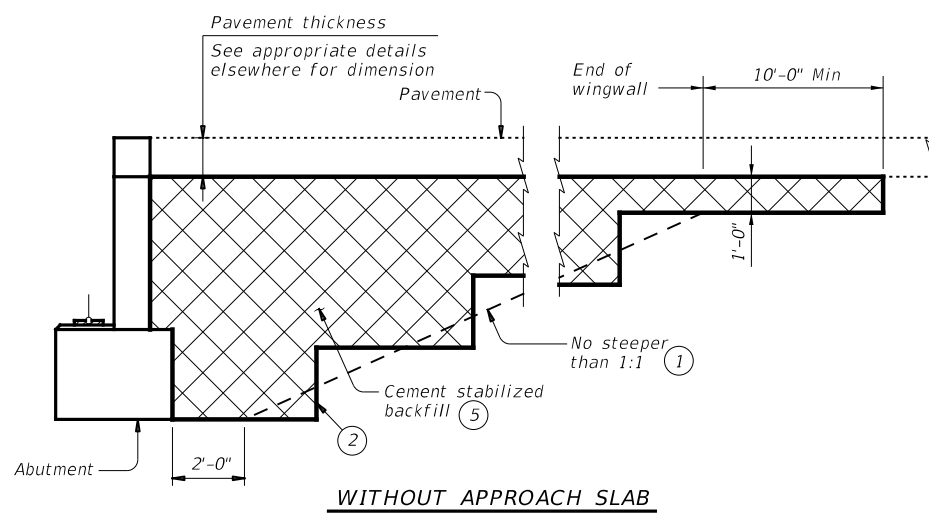
Cast-in-place retaining walls similar.



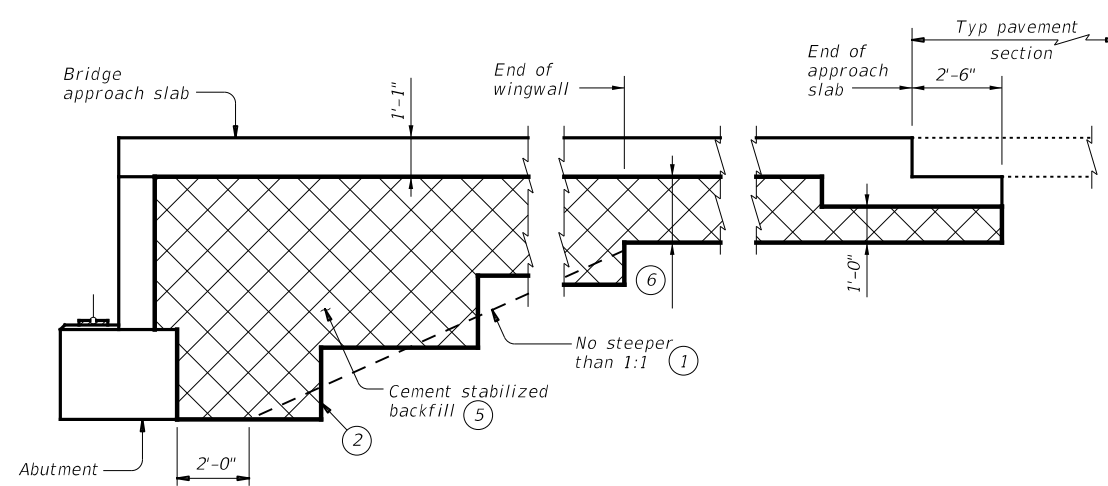
OPTION 2 ~ PLAN WITH MSE RETAINING WALLS

- ① Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.
- ② Bench backfill as shown with 12" (approximate) bench depths.
- ③ Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.
- ④ When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.
- ⑤ If shown in the plans, flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
 - a). If flowable backfill is to be placed over MSE backfill, then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
 - b). Place flowable fill in lifts not exceeding 2 feet in height. Place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).
- ⑥ 1'-0" for BAS-A
1'-10" for BAS-C

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WITHOUT APPROACH SLAB



SECTION B-B

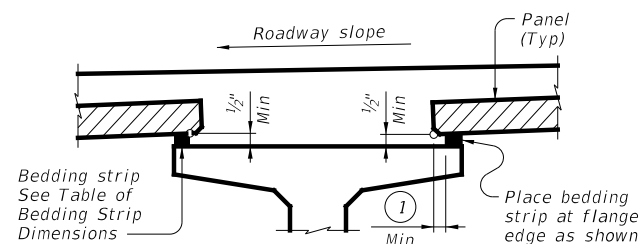
WITH APPROACH SLAB
(Showing BAS-C, BAS-A similar.)

SHEET 2 OF 2

		Bridge Division Standard	
CEMENT STABILIZED ABUTMENT BACKFILL BRIDGE ABUTMENT			
CSAB			
FILE: MS-CSAB-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
©TxDOT	CONTRACT: 000615	SECTION: 038	HIGHWAY: SH 70
REVISIONS:	DIST: ABL	COUNTY: NOLAN	SHEET NO: 106
<small>02-20: Added Option 2. 03-23: Updated General Notes.</small>			

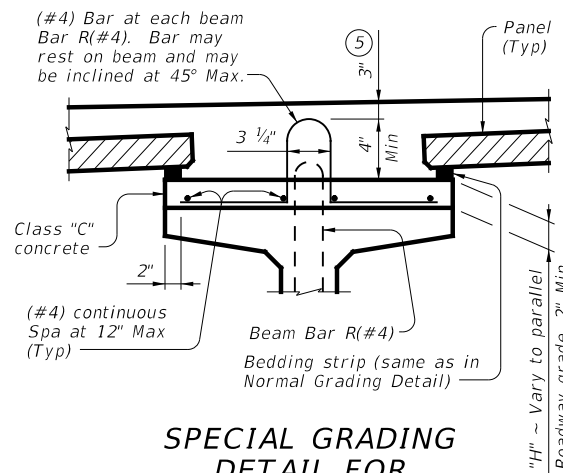
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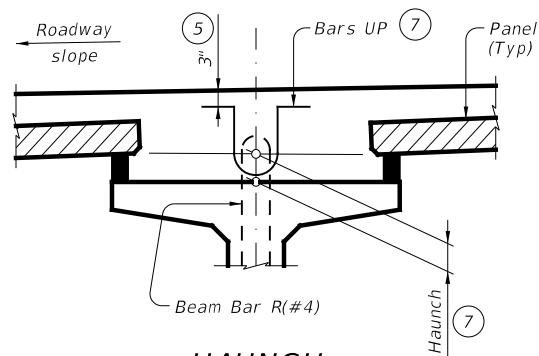
NORMAL GRADING DETAIL ③

Showing prestressed concrete I-girders. (Other beam types similar)



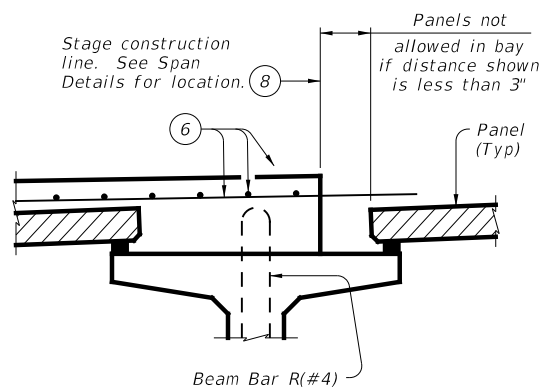
SPECIAL GRADING DETAIL FOR CONCRETE BEAMS

Showing prestressed concrete I-girders. (Other beam types similar)



HAUNCH REINFORCING DETAIL

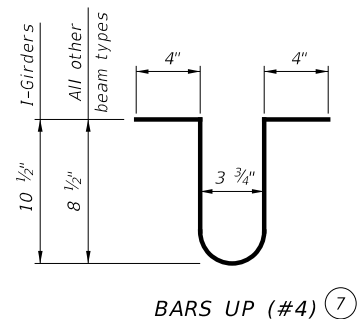
Showing prestressed concrete I-girders. (Other beam types similar)



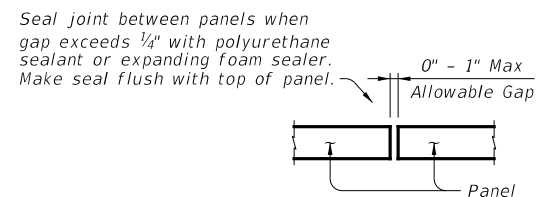
PRESTR CONC I-GIRDERS

WIDTH	HEIGHT ④	
	Min	Max
1" (Min)	1 1/2"	2"
1 1/4"	1 1/2"	2 1/2"
1 1/2"	1 1/2"	3"
1 3/4"	1 1/2"	3 1/2"
2"	1 1/2"	4"
2 1/4"	1 1/2"	4 1/2" ②
2 1/2"	1 1/2"	5" ②
2 3/4"	1 1/2"	5 1/2" ②
3" (Max)	1 1/2"	6" ②

- ① 2" Min for I-girders, 1 1/2" Min for all other beam types.
- ② Allowed for prestressed concrete I-girders, not allowed on other beam types.
- ③ To reduce the quantity of cast-in-place concrete, bedding strip thickness may be increased in 1/4" increments. Bedding strips must be comprised of one layer. Bond bedding strips to the beams with an adhesive compatible with bedding strips. Bedding strips over 2.5" high may need to be bonded to panels. The same thickness strip must be used under any one panel edge and the maximum change in thickness between adjacent panels is 1/4". Alternatively, bedding strips may be cut to grade. Panels may be supported by an alternate method, using a commercial product, if approved by the Engineer of Bridge Design, Bridge Division. If bedding strips exceed 6" high for I-Girders, 4" high for all other beam types, use Special Grading Detail for Concrete Beams or submit an alternate method to the Bridge Division for approval.
- ④ Height must not exceed twice the width.
- ⑤ Provide clear cover as indicated unless otherwise shown on Span Details.
- ⑥ See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.
- ⑦ Space Bars UP(#4) with Beam Bars R(#4) in all areas where measured haunch exceeds 3 1/2" with I-girders, and 3" for all other beam types. Epoxy coating for Bars UP is not required.
- ⑧ Do not locate construction joints on top of a panel.
- ⑨ Butt adjacent bedding strips together with adhesive. Cut v-notches, approx 1/4" deep, in the top of the bedding strips at 8' o.c..

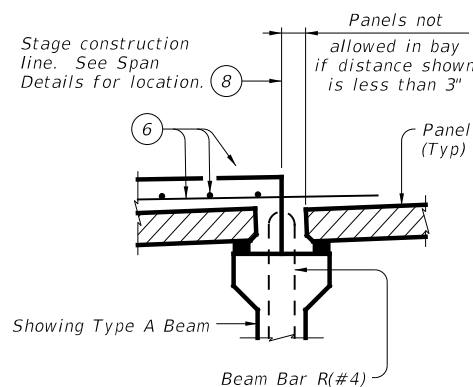


BARS UP (#4) ⑦

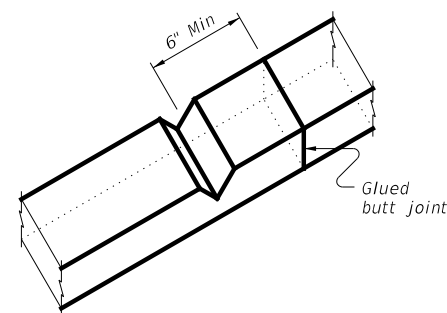


PANEL JOINTS

(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-BEAMS



BEDDING STRIP DETAIL ⑨

CONSTRUCTION NOTES:
 Erected panels must bear uniformly on bedding strips of extruded polystyrene placed along top flange edges. Placing panels to minimize joint openings is recommended. If additional blocking is needed, special grading details for supporting the panels and extra reinforcing between beam and slab will be considered subsidiary to deck construction. Bars U, shown on PCP-FAB, may be bent over or cut off if necessary. Care must be taken to ensure proper cleaning of construction debris and consolidation of concrete material under the edges of the panels. Bedding strips must be placed at beam flange edges so that adequate space is provided for the mortar to flow a minimum of 1 1/2" under the panels as the slab concrete is placed. To allow the proper amount of mortar to flow between beam and panel, the minimum vertical opening must be at least 1/2". Roadway cross-slope reduces the opening available for entry of the mortar. Bedding strips varying in thickness across the beam are therefore required. For clear span between U-beams less than or equal to 18", see Permissible Slab Forming Detail on Miscellaneous Slab Detail sheets, UBMS.

MATERIAL NOTES:
 Provide Grade 60 reinforcing steel in the cast-in-place slab. See Table of Reinforcing Steel for size and spacing of reinforcement. If the top and bottom layer of reinforcing steel is shown on the Span Details to be epoxy coated, then the D, E, P, & Z bars must be epoxy coated. Provide bar Laps, where required, as follows:
 Uncoated ~ #4 = 1'-7"
 Epoxy Coated ~ #4 = 2'-5"

GENERAL NOTES:
 Designed according to AASHTO LRFD Bridge Design Specifications. Panel placement may follow either Option 1 or Option 2 except Option 1 must be used if the skew exceeds 45 degrees. Use of Prestressed Concrete Panels is not permitted for horizontally curved steel plate or tub girders. See Span Details for other possible restrictions on their use. These details are to be used in conjunction with the Span Details, PCP-FAB and other applicable standard drawings. When panel support (bedding strips) deviates from what is shown herein, provide details signed and sealed by a professional Engineer. Any additional reinforcing or concrete required on this standard is considered subsidiary to the bid item "Reinforced Concrete Slab".

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

HL93 LOADING SHEET 1 OF 4

Texas Department of Transportation Bridge Division Standard

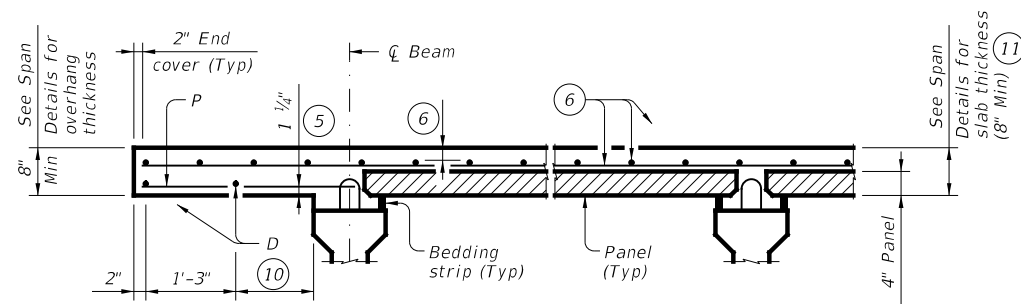
PRESTRESSED CONCRETE PANELS DECK DETAILS

PCP

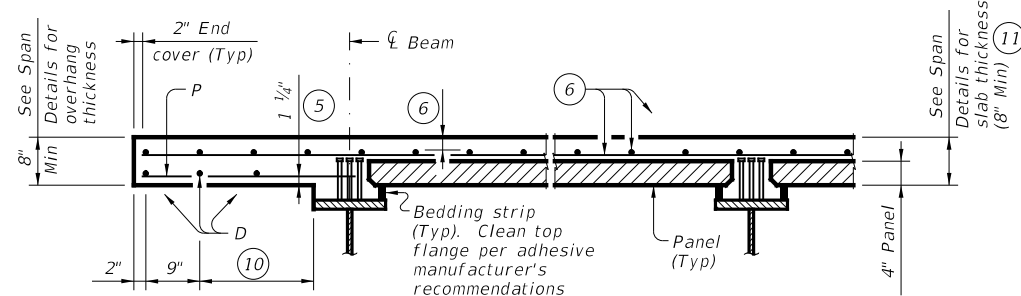
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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0006	15	038	SH 70
3/2023: Removed top flange tension limit.	DIST	COUNTY	SHEET NO.	
	ABL	NOLAN	107	

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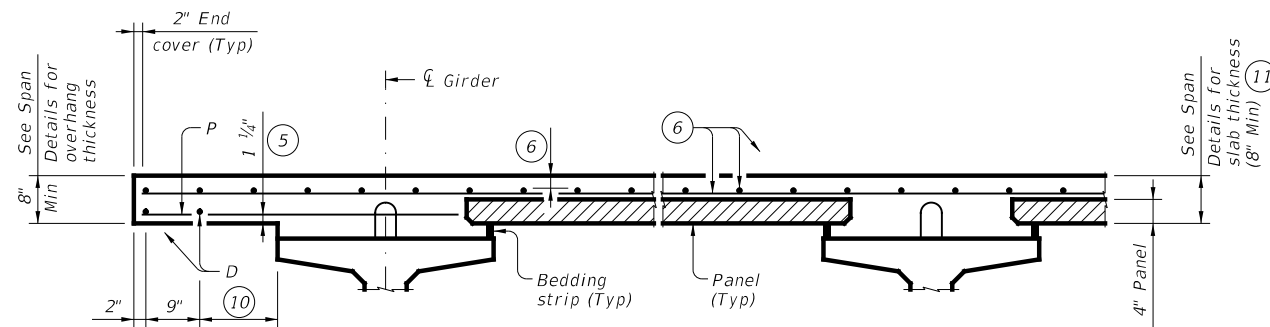
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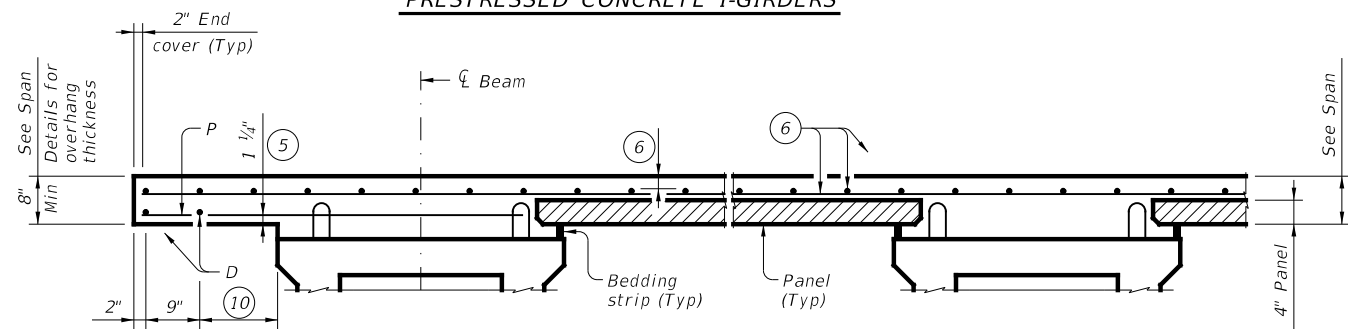
PRESTRESSED CONCRETE I-BEAMS



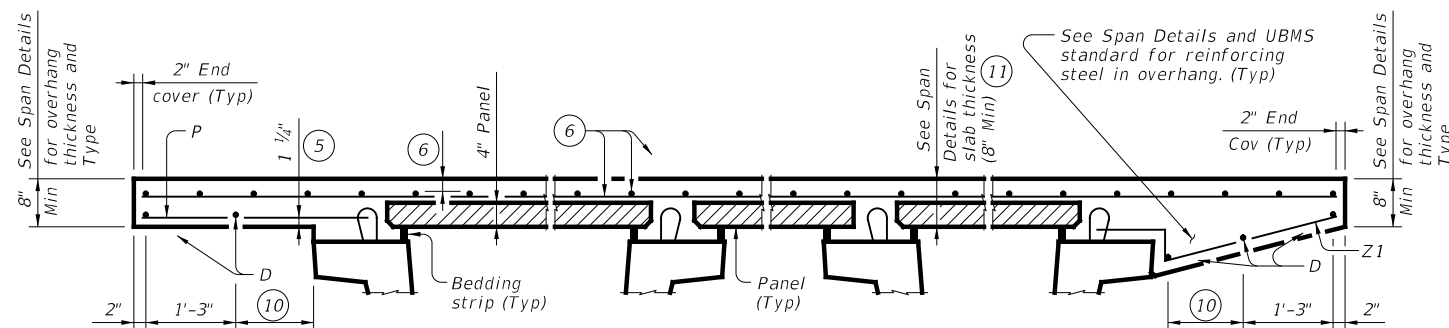
STEEL BEAMS



PRESTRESSED CONCRETE I-GIRDERS



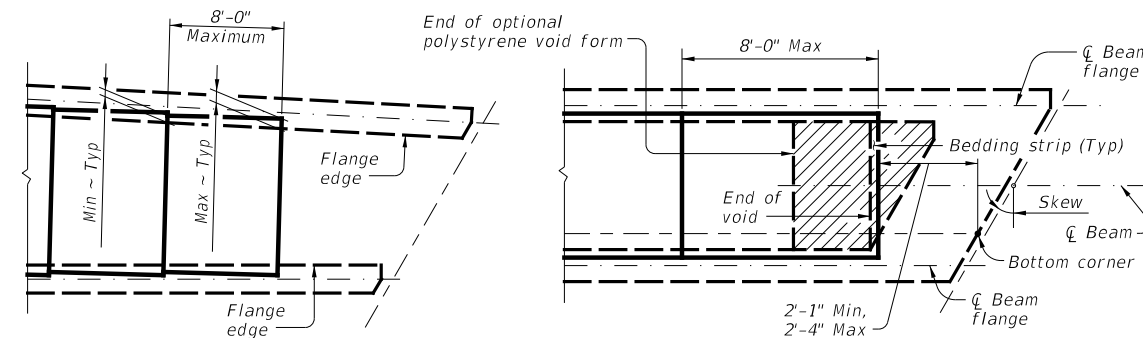
PRESTRESSED CONCRETE X-BEAMS



NORMAL OVERHANG WITH PRESTR CONC U-BEAMS

TYPICAL PART TRANSVERSE SECTIONS

SLOPED OVERHANG WITH PRESTR CONC U-BEAMS



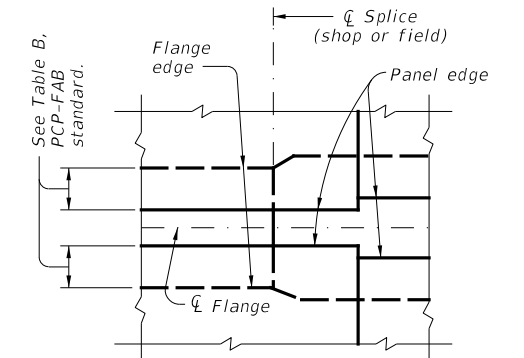
AT FLARED BEAMS OR GIRDERS

OVER CONC U-BEAMS

See PCP-FAB standard for Min and Max dimensions based on beam/girder type.

PART PLANS OF PANEL PLACEMENT

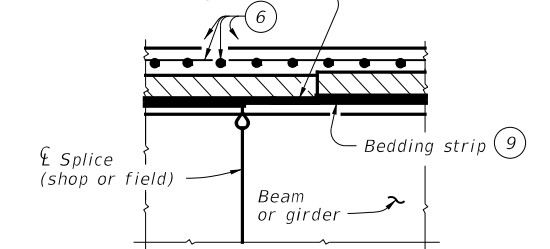
- 5 Provide clear cover as indicated unless otherwise shown on Span Details.
- 6 See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.
- 9 Butt adjacent bedding strips together with adhesive. Cut v-notches, approx 1/4" deep, in the top of the bedding strips at 8' o.c..
- 10 Equally space additional bar if more than 1'-3" Max.
- 11 The actual thickness constructed may exceed the slab thickness shown on the Span Details but the extra thickness may be no more than 2" (1" for prestressed concrete U-beams and steel beams). Bearing seat elevations or finished grade may be adjusted.
- 12 Field adjust Bars Z1(#4) to match actual slope of slab overhangs. Width of slab overhang will vary along span with curved slab edges. Adjust Bar Z1(#4) dimensions to maintain proper cover. Bars Z2(#4) are located at Inverted-Tee stems only.
- 13 Panels are allowed over top tension flanges, as approved by the Engineer. See Span Details for additional top mat reinforcement required in tension zones. Location of concrete placement sequence boundaries and bolted field splices should be considered by the contractor in determining panel limits.



PLAN AT SPLICE

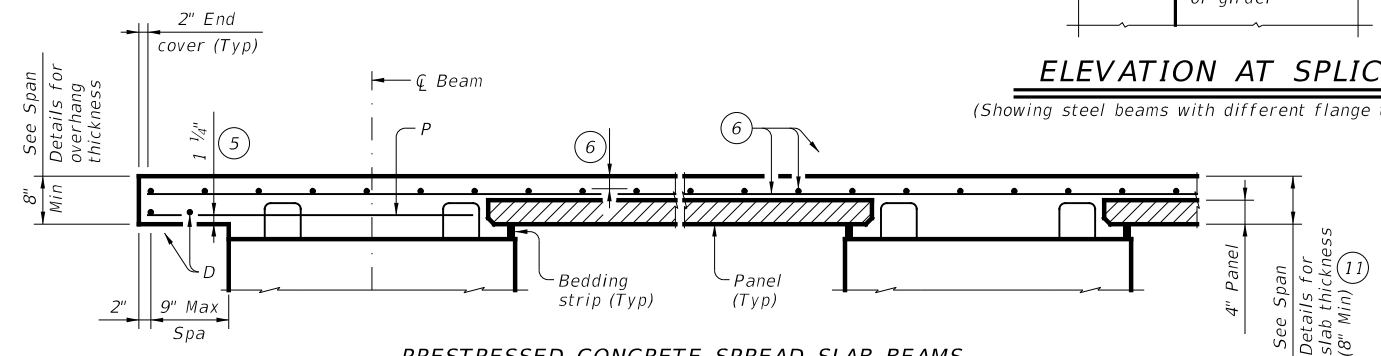
(Showing steel beams with flange width transition)

Cut bedding strip to adjust for difference in flange thickness.



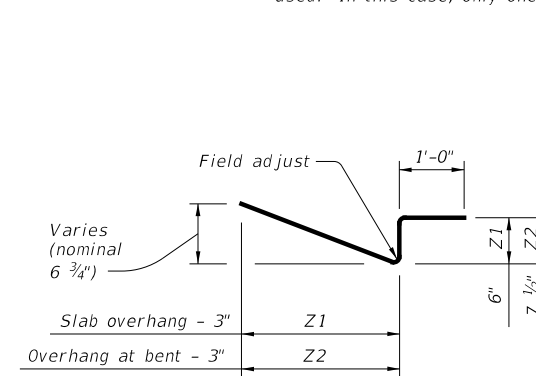
ELEVATION AT SPLICE

(Showing steel beams with different flange thickness)



PRESTRESSED CONCRETE SPREAD SLAB BEAMS

Bars P over exterior beams are still required when no overhang is used. In this case, only one Bar D, 2" from slab edge, is required.



BARS Z (#4)

HL93 LOADING

SHEET 2 OF 4



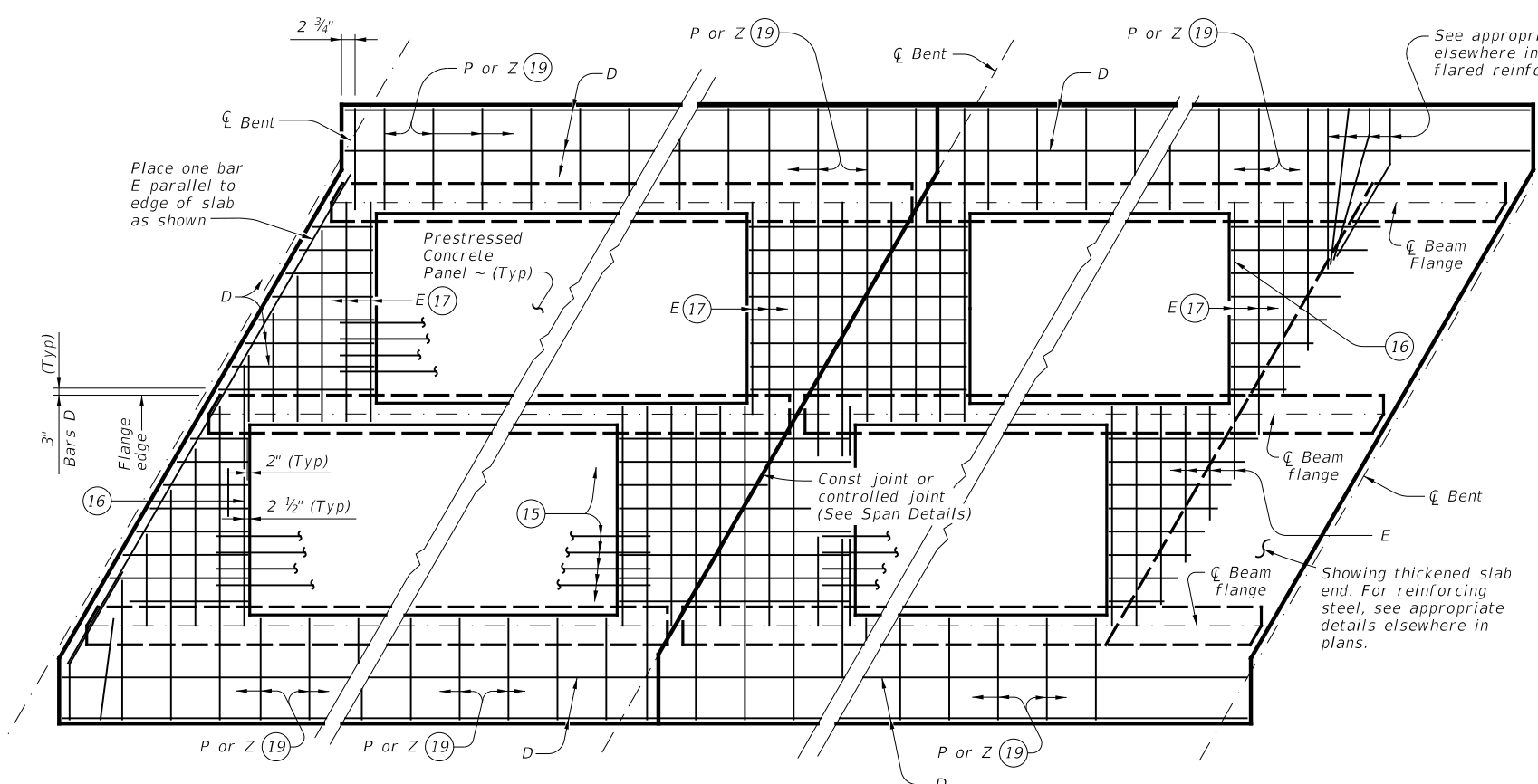
PRESTRESSED CONCRETE PANELS DECK DETAILS

PCP

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3/2023: Removed top flange tension limit.	DIST	COUNTY	SHEET NO.	
	ABL	NOLAN	108	

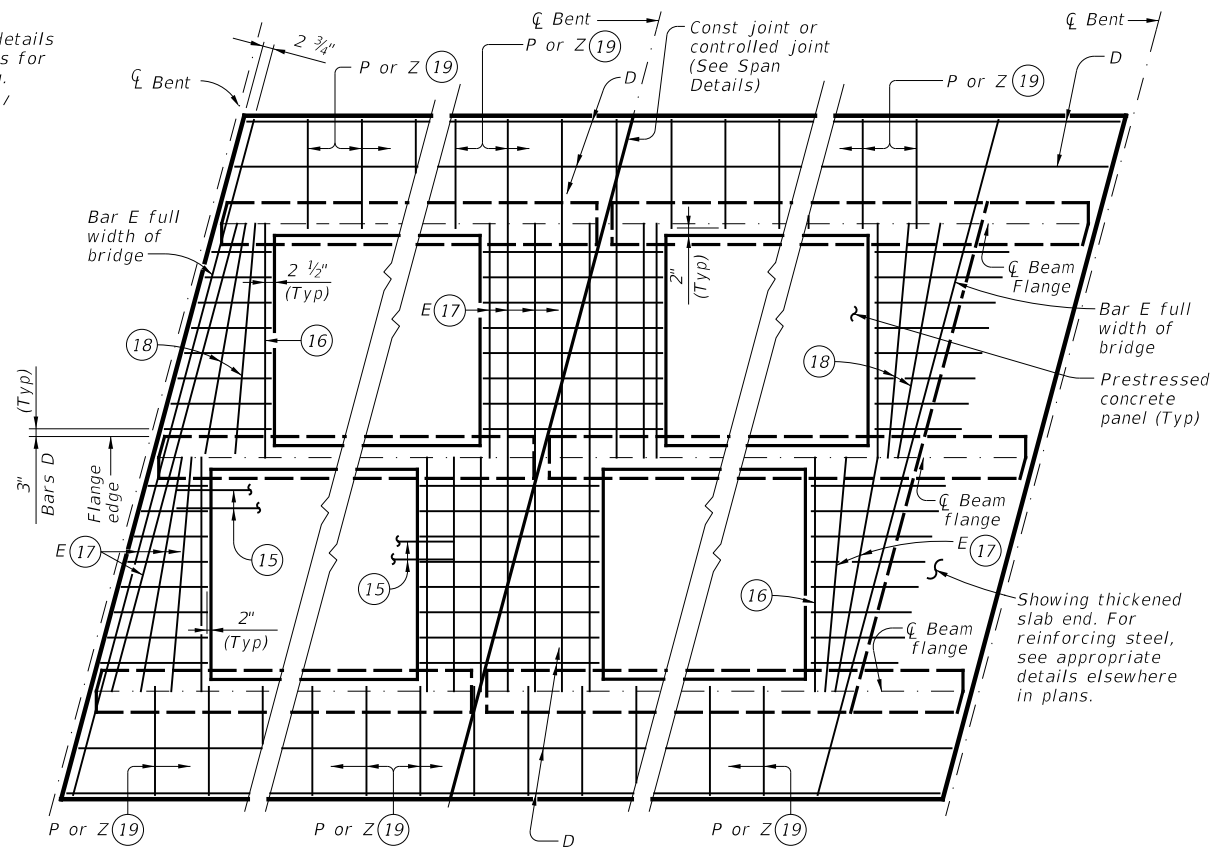
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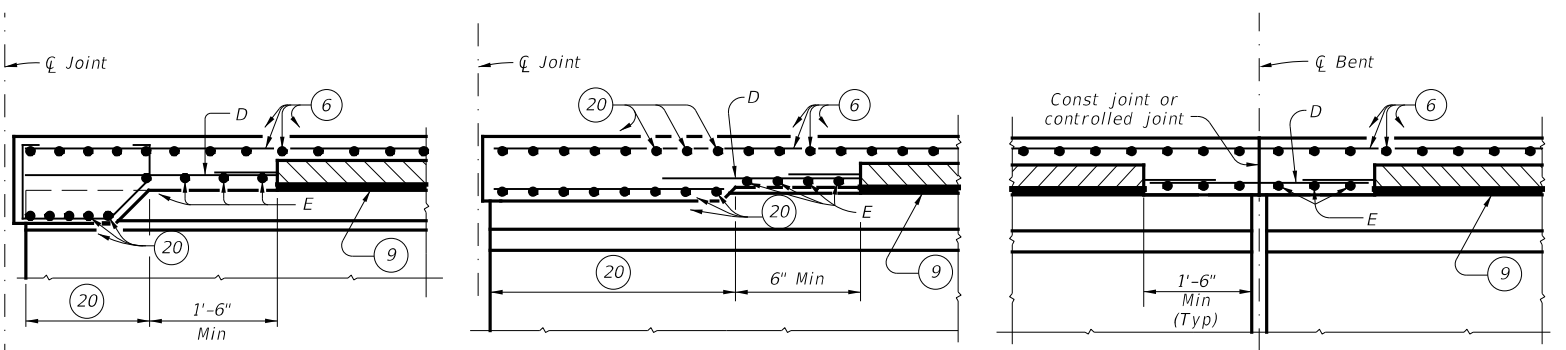
AT ALL SPAN ENDS UNLESS NOTED OTHERWISE
 AT INTERIOR BENTS
 AT THICKENED END SLABS

OPTION 1 ~ PLAN OF SLABS WITH NORMAL REINFORCEMENT

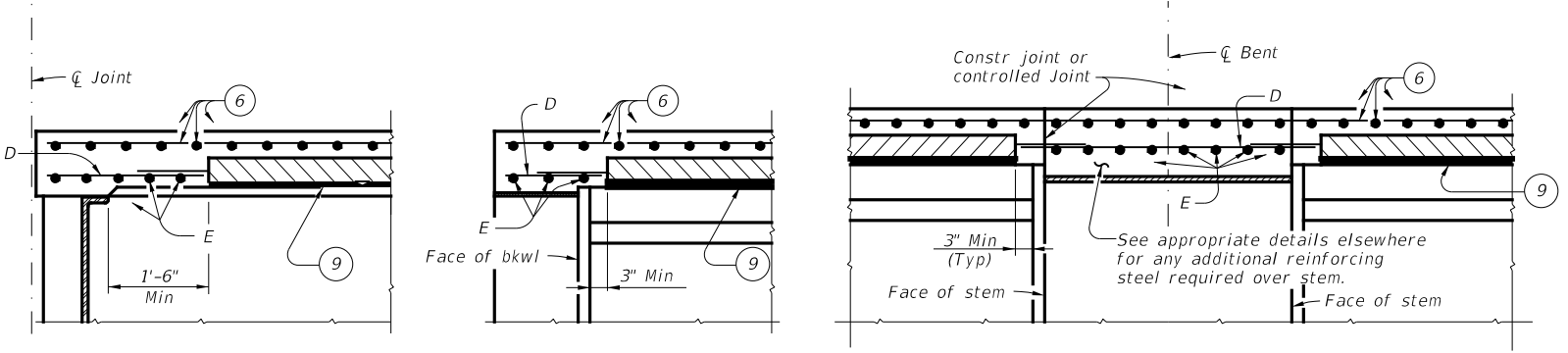


AT ALL SPAN ENDS UNLESS NOTED OTHERWISE
 AT INTERIOR BENTS
 AT THICKENED END SLABS

OPTION 1 ~ PLAN OF SLABS WITH SKEWED REINFORCEMENT



AT THICKENED SLAB ENDS FOR PRESTR CONC U-BMS
 AT THICKENED SLAB ENDS FOR PRESTR CONC I-BMS AND STEEL BMS
 AT SLAB CONTINUOUS OVER CONVENTIONAL INTERIOR BENTS FOR ALL SIMPLE SPAN BMS



AT CONVENTIONAL END DIAPHRAGMS FOR STEEL BMS
 AT SLAB OVER ABUTMENT BACKWALL FOR ALL BMS
 AT SLAB CONTINUOUS OVER INVERTED-T BENTS FOR ALL BMS

OPTION 1 ~ ELEVATIONS AT BEAM ENDS

- 6 See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.
- 9 Butt adjacent bedding strips together with adhesive. Cut v-notches, approx 1/4" deep, in the top of the bedding strips at 8' o.c.
- 14 Max Spacing as listed unless otherwise shown.
- 15 At connection with cast-in-place slab, extend longitudinal panel reinforcement. See PCP-FAB for details.
- 16 Maintain one Bar E(#4) parallel to panel ends (Typ).
- 17 Bars E(#4) not continuous over beam flanges must overlap beam flange 6" Min.
- 18 Add flared Bars E(#4) (Min Spa = 6", Max Spa = 12") as required at panel ends.
- 19 Where possible, Bars E(#4) may be extended into overhangs to replace Bars P(#4). Bars Z(#4) are required for sloped overhangs with U-Beams.
- 20 See appropriate thickened slab end details for reinforcing and limits of thickened slab end.

TABLE OF REINFORCING STEEL (14)		
BAR	SIZE	Max Spa (in.)
D	#4	9
E	#4	9
P	#4	18
UP	#4	~
Z	#4	18

HL93 LOADING SHEET 3 OF 4



PRESTRESSED CONCRETE PANELS DECK DETAILS

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ABL	NOLAN	109		

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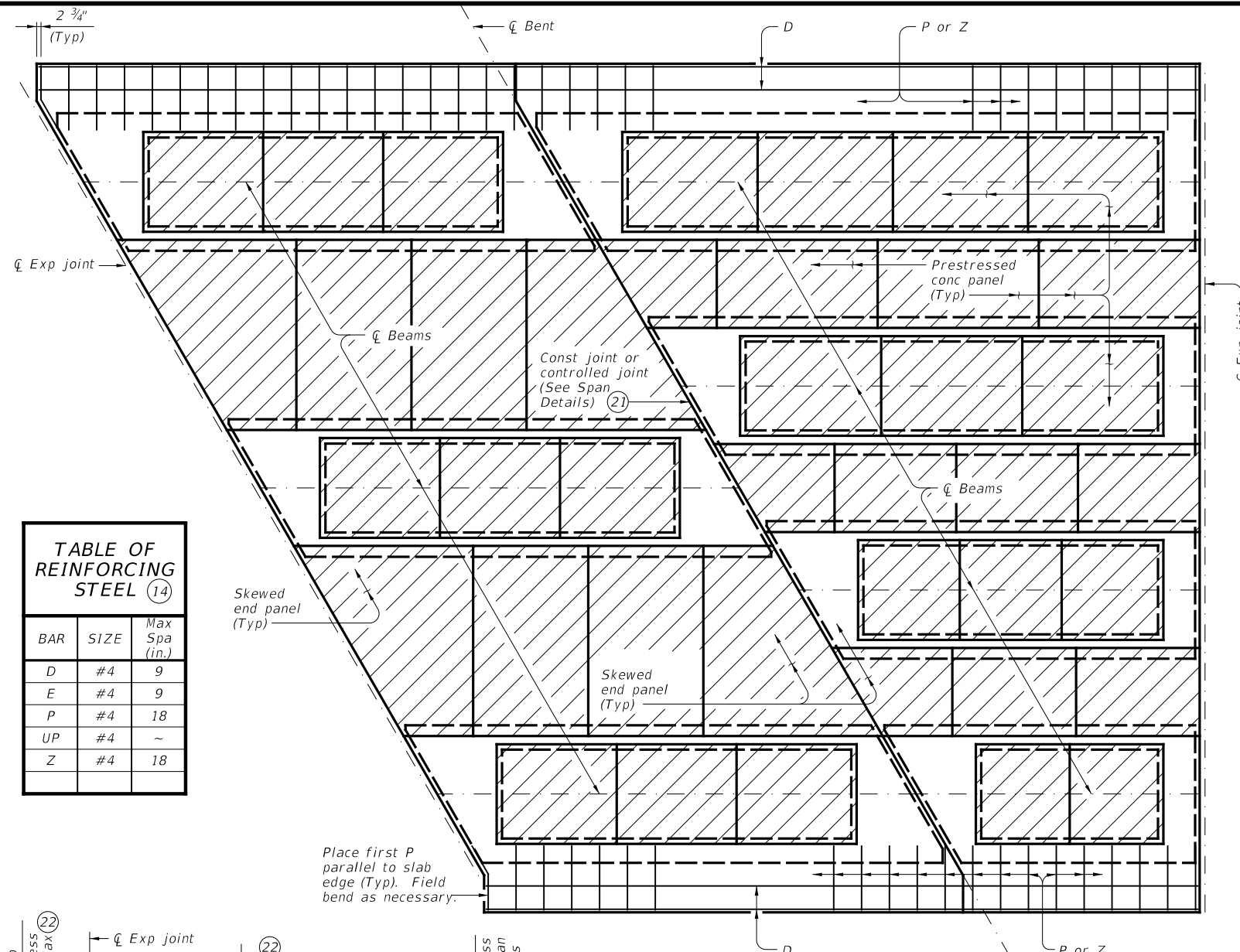
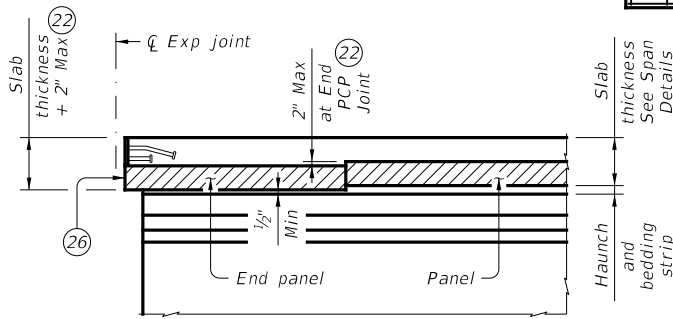
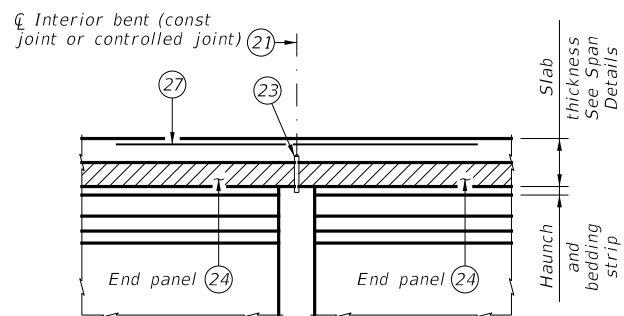


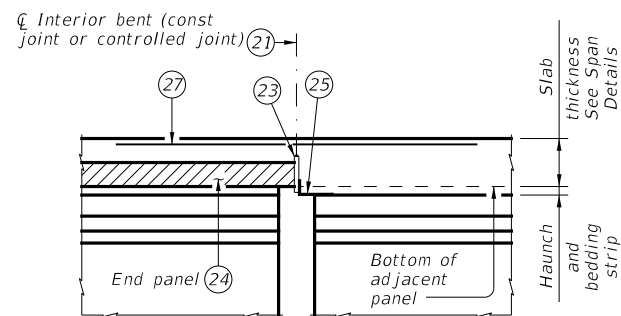
TABLE OF REINFORCING STEEL (14)		
BAR	SIZE	Max Spa (in.)
D	#4	9
E	#4	9
P	#4	18
UP	#4	~
Z	#4	18



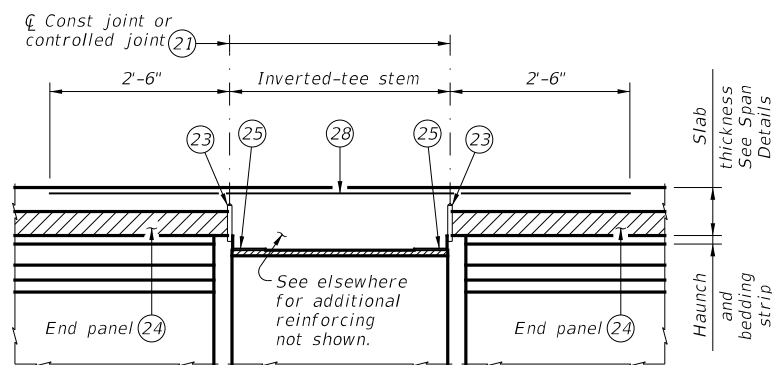
JOINTS (BETWEEN BEAMS/GIRDERS OR AT INV-T STEM)
 For SEJ-B, SEJ-M, SEJ-S(0), AJ, and Type A expansion joints only.



CONVENTIONAL INTERIOR BENT
 Panel against panel between beams/girders.



CONVENTIONAL INTERIOR BENT
 Panel against beam/girder end in adjacent span.



INVERTED-T BENT
 Panels against inverted-tee stem

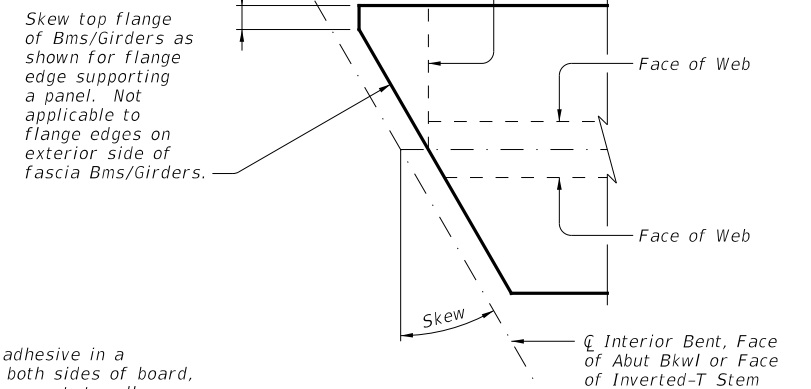
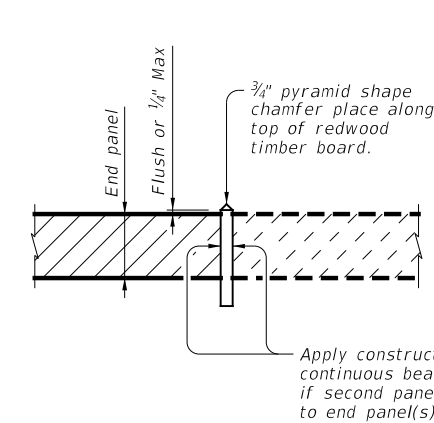
OPTION 2 ~ ELEVATIONS AT BEAM ENDS (6)

OPTION 2 ~ PLAN OF SLAB
 (Showing U-Beams; other beams similar)

ELEVATION EXAMPLE OF END PANEL AND TIMBER BOARD (23)

See "Option 2 ~ Elevation At Beam Ends".

- (6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.
- (14) Max Spacing as listed unless otherwise shown.
- (21) 1 1/2" Vinyl or plastic joint former at controlled joints (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)
- (22) End panel may be set up to 2" lower to accommodate expansion joint hardware, provided bedding strip is not less than 1/2" thick.
- (23) 3/4" thick redwood timber board, leave in place. Redwood timber board placed flush with top of panel or within 1/4" Max above panel. Place 3/4" pyramid shape chamfer along top of timber board. See "Elevation Example of End Panel and Timber Board". Place straight, within 1/2" of centerline of bent or face of inverted-tee, across bridge width and end board at exterior flange edge of fascia beams/girders. Do not extend into overhang.
- (24) Place panel within 1/2" of 3/4" thick board.
- (25) Permanent galvanized steel sheet form. Removable formwork is acceptable.
- (26) Place end panel within 1/2" of expansion joint opening. End panel cannot encroach on required expansion joint opening.
- (27) Place additional (#4) bar 5'-0" in length between every slab Bars T. Center (#4) bar on Joint.
- (28) Place additional (#4) bar continuous 2'-6" beyond each side of Inverted-T Stem between every slab bars T.



OPTION 2 ~ SHOWING MODIFICATION TO BEAM/GIRDER TOP FLANGE FOR SKEWS OVER 5°

Showing I-Beam/I-Girder, U-Beams and Steel Beams similar.

SPECIAL OPTION 2 CONSTRUCTION NOTES:

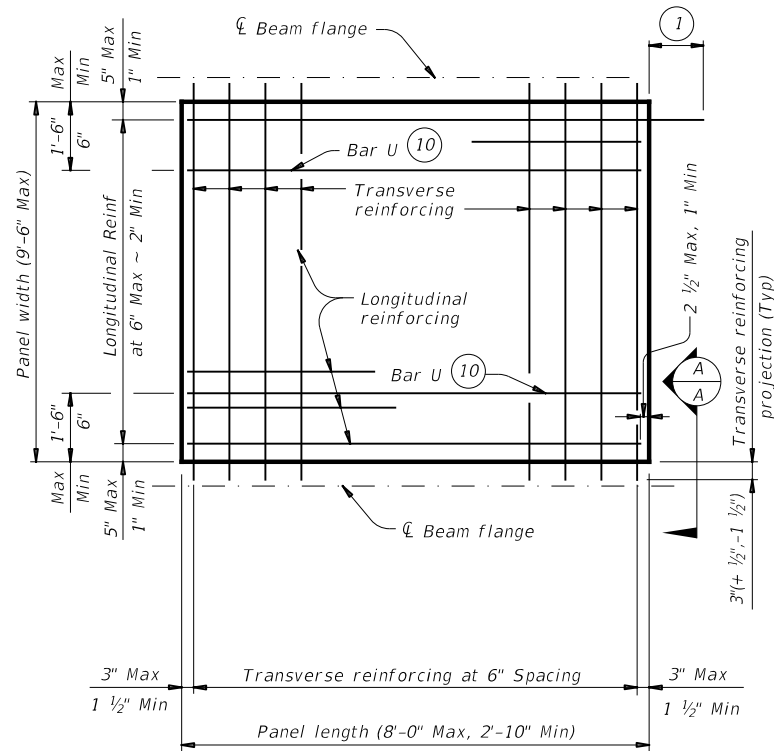
- When Option 2 is chosen bottom mat of thickened end slab reinforcing is not required. Use the same top mat as shown on the Thickened Slab End Details sheet.
- Placing panels adjacent to expansion joints and bent centerlines prior to completing interior panel placement is recommended. Saw cutting panels to fit is acceptable when approved by the Engineer. Minimum distance from a saw cut edge to a panel strand is 1 1/2". Do not extend the longitudinal panel reinforcement into the cast-in-place slab.
- Top flanges of beams and girders on skewed bridges must be modified as shown on this drawing. The Contractor is responsible for coordinating this modification with the beam fabricator prior to submitting shop drawings for approval.
- Fabricator may optionally skew the whole end. When electing to skew whole end, girder end details and bearing type at conventional interior bent must be changed to use condition at abutment. Fabricator must coordinate change in bearing type, bearing centerline location, and dowel location with Engineer and Contractor. Show appropriate changes on girder and bearing shop drawings.
- Bending of anchor studs of expansion joints shown on standards AJ, SEJ-B, SEJ-M, and SEJ-S(0) is permissible if necessary to clear top of end panels. The Contractor is responsible for coordinating modifications with the joint fabricator. Submit shop drawings for approval when modifications to expansion joint hardware are made.
- Bedding strips under skewed end panels must conform to the requirements of Item 422 except their minimum compressive strength must be 60 psi.
- Provide Bars AA, G, K and OA from standard IGTS in the slab.

HL93 LOADING SHEET 4 OF 4

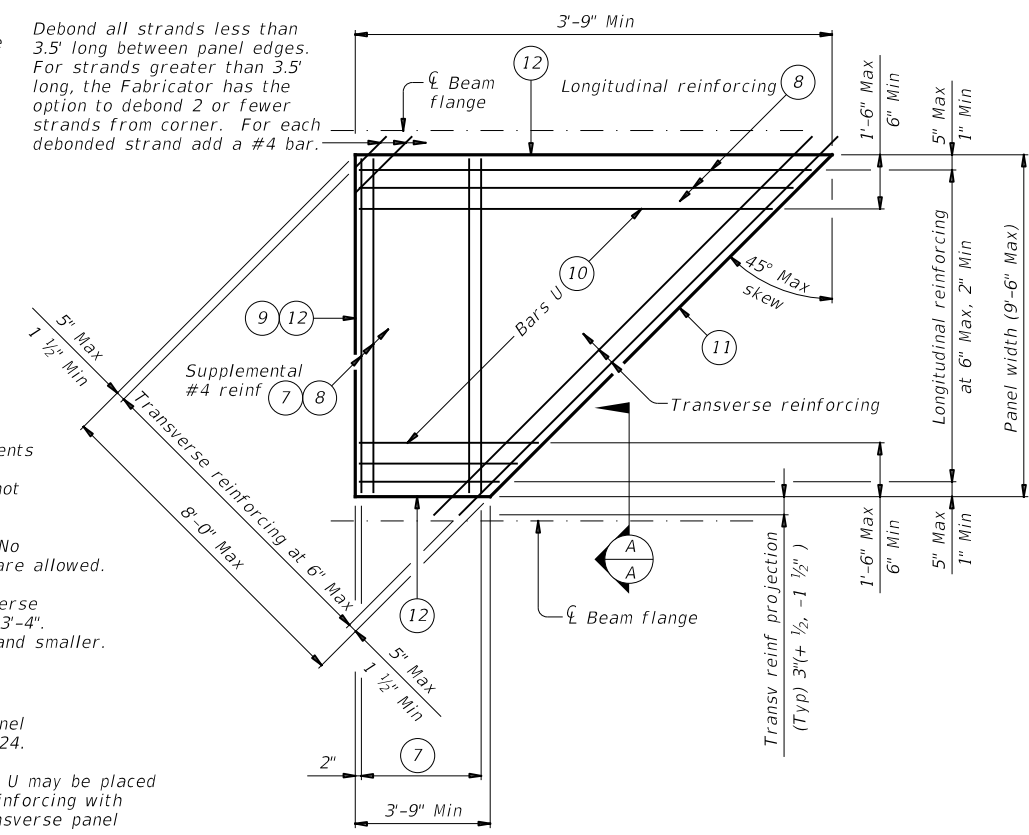
		Bridge Division Standard	
PRESTRESSED CONCRETE PANELS DECK DETAILS			
PCP			
FILE: MS-PCP-23.dgn	DN: TxDOT	CK: TxDOT	DW: JTR
©TxDOT April 2019	CONT	SECT	JOB
REVISIONS	0006	15	038
3/2023: Removed top flange tension limit.	DIST	COUNTY	SHEET NO.
	ABL	NOLAN	110

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TYPICAL NON-SKEWED PANEL PLAN



TYPICAL SKEWED END PANEL PLAN

(Only to be used with details shown elsewhere in the plans.)

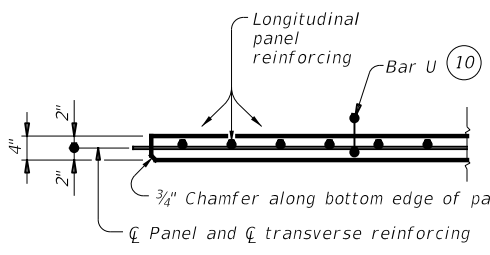
- 1 At connection with cast-in-place slab, extend longitudinal panel reinforcement 1'-0" (+2", -0") past panel end. Alternatively, provide (#3) x 2'-0" dowels at 6" Max Spacing and extend dowels 1'-0" past panel end.
- 2 Four loops required per panel.
- 3 Four loops required per panel. 3/8" or 1/2" strands may be used.
- 4 Normal dimensions must be used on spans with parallel beams. Maximum and Minimum dimensions apply only to spans with flared beams.
- 5 See Normal Grading Detail on PCP standard for lap requirements and bedding strip dimensions. Some laps shown in tables cannot utilize all bedding strip widths.
- 6 One Splice allowed per panel. No more than two sheets of WWR are allowed.
- 7 Provide (#4) bars under transverse reinforcing, 10 Spaces at 4" = 3'-4". Omit for 5 degree (1:12) skew and smaller.
- 8 End Cover 2 1/2" Max, 1" Min.
- 9 Recess strands on indicated panel edge in accordance with Item 424.
- 10 At the fabricator's option, Bars U may be placed parallel to transverse panel reinforcing with horizontal legs in plane of transverse panel reinforcing.
- 11 Use length of indicated panel edge as panel width for purpose of determining type of transverse reinforcing.
- 12 Timber form work permissible this edge.

TABLE A (4) (5)				TABLE B (4) (5)			
Beam Type	Normal (In.)	Min (In.)	Max (In.)	Top Flange Width	Normal (In.)	Min (In.)	Max (In.)
A	3	2 1/2	3 1/2	11" to 12"	2 3/4	2 1/2	2 3/4
B	3	2 1/2	3 1/2	Over 12" to 15"	3 1/4	3	3 1/4
C	4	3	4 1/2	Over 15" to 18"	4	3	4 3/4
IV	6	4	7 1/2	Over 18"	5	3 1/2	6 1/4
VI	6 1/2	4 1/2	8 1/2				
U40 - 54	5 1/2	5 1/2	7				
Tx28-70	6	5	7 1/2				
XB20 - 40	4	3	4 1/2				
XSB12 - 15	4	3	4 1/2				

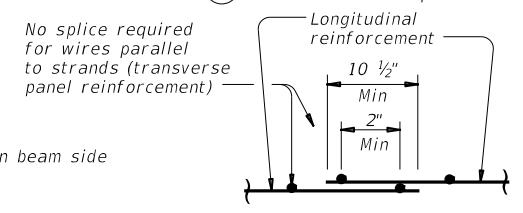
GENERAL NOTES:
 Provide Class H concrete for panels. Release strength $f'ci=3,500$ psi. Minimum 28 day strength $f'c=5,000$ psi.
 Provide 3/4" chamfer along bottom edge of panel on beam side. Do not use epoxy-coated reinforcing steel bar or strand in panels. Remove laitance from top panel surface. Finish top of panel to a roughness between a No. 6 and No. 9 concrete surface profile, inclusive, as specified by the International Concrete Repair Institute (ICRI).
 Shop drawings for the fabrication of panels will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.
 A panel layout which identifies location of each panel must be developed by the Fabricator. Permanently mark each panel in accordance with the panel layout. A copy of the layout is to be provided to the Engineer.

TRANSVERSE PANEL REINFORCEMENT:
 For panel widths over 5', use 3/8" or 1/2" Dia (270k) prestressing strands with a tension of 14.4 kips per strand.
 For panel widths over 3'-6" up to and including 5', use 3/8" or 1/2" Dia (270k) prestressing strands with a tension of 14.4 kip per strand. Optionally, (#4) Grade 60 reinforcing bars may be used in lieu of prestressed strands.
 For panel widths up to 3'-6", use (#4) Grade 60 reinforcing bars (prestressed strands alone are not allowed).
 Place transverse panel reinforcement at panel centroid and space at 6" Max.

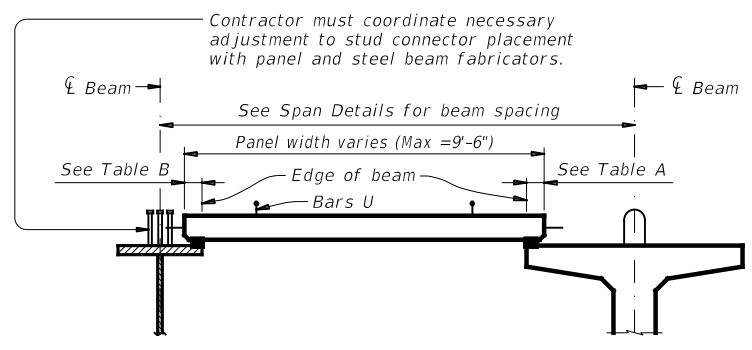
LONGITUDINAL PANEL REINFORCEMENT:
 Any of the following options may be used for longitudinal panel reinforcement:
 1. (#3) Grade 60 reinforcing steel at 6" Max Spacing. No splices allowed.
 2. 3/8" Dia prestressing strands at 4 1/2" Max Spacing (unstressed). No splices allowed.
 3. 1/2" Dia prestressing strands at 6" Max Spacing (unstressed). No splices allowed.
 4. Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) providing 0.22 sq in per foot of panel width. Wires larger than D11 not permitted. Provide transverse wires to ensure proper handling of reinforcing. One splice per panel is allowed. See WWR Splice Detail.
 No combination of longitudinal reinforcement options in a panel is allowed. Place longitudinal panel reinforcement above or below transverse panel reinforcement. Must be placed above transverse panel reinforcement for skewed end panels with supplemental (#4) reinforcement.



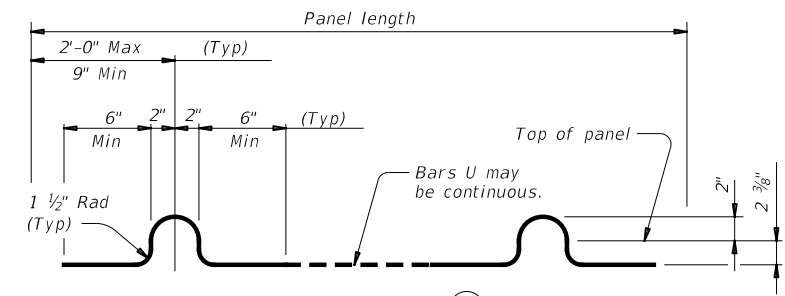
SECTION A-A
 (Not showing supplemental #4 bars for skewed end panels.)



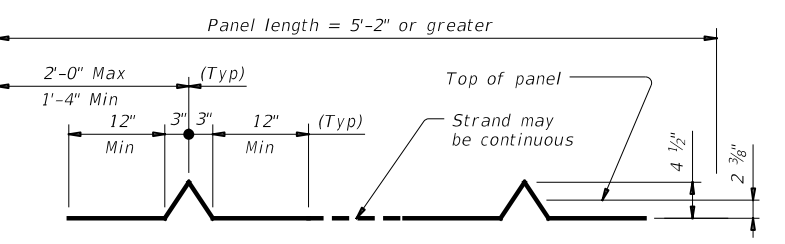
WELDED WIRE REINFORCEMENT (WWR) SPLICE DETAIL (6)



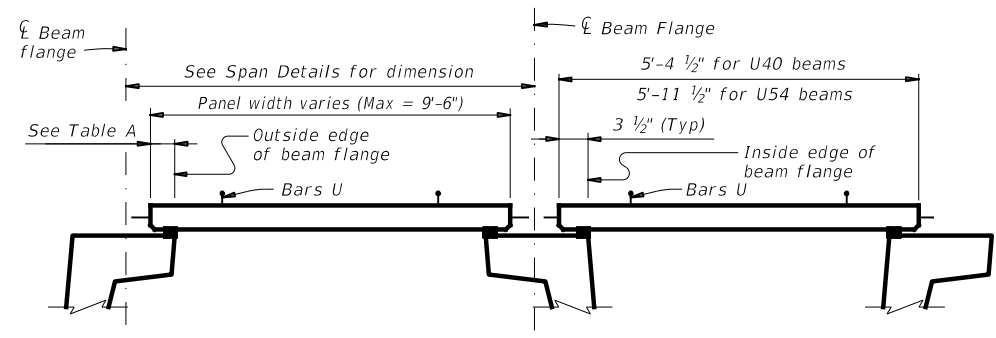
TYPICAL SECTIONS FOR DETERMINING PANEL WIDTH



BARS U (#3) (2)



OPTIONAL STRAND FOR BARS U (3)



PRESTRESSED CONCRETE U-BEAMS

TYPICAL SECTIONS FOR DETERMINING PANEL WIDTH

HL93 LOADING

Texas Department of Transportation
 Bridge Division Standard

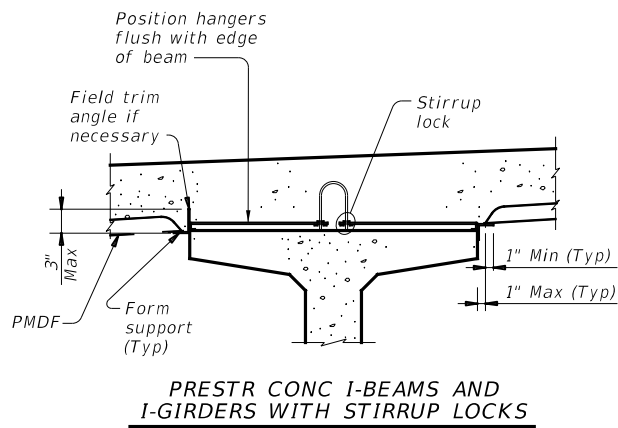
PRESTRESSED CONCRETE PANEL FABRICATION DETAILS

PCP-FAB

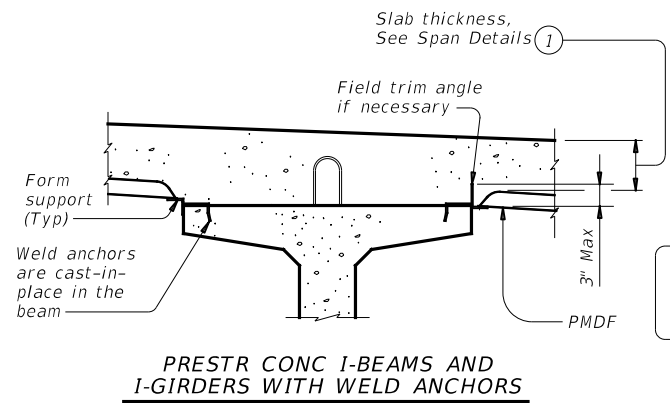
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	DIST.	COUNTY	SHEET NO.	
	ABL	NOLAN	111	

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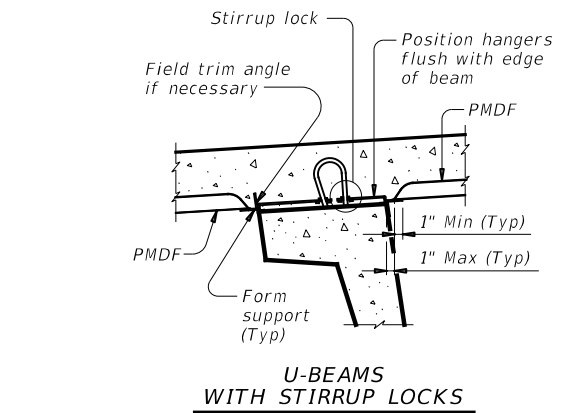
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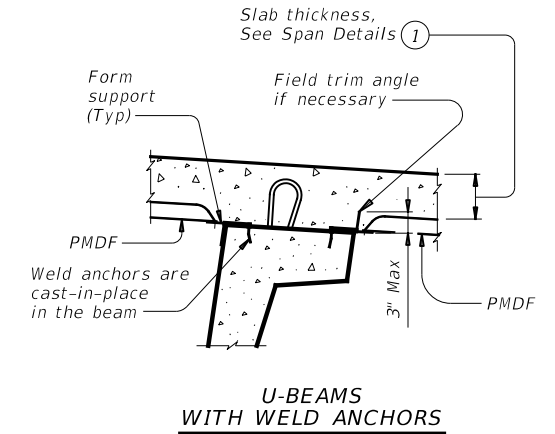
PRESTR CONC I-BEAMS AND I-GIRDERS WITH STIRRUP LOCKS



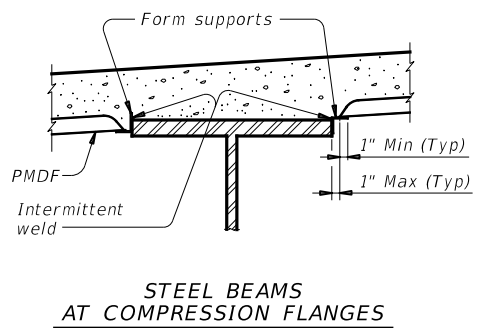
PRESTR CONC I-BEAMS AND I-GIRDERS WITH WELD ANCHORS



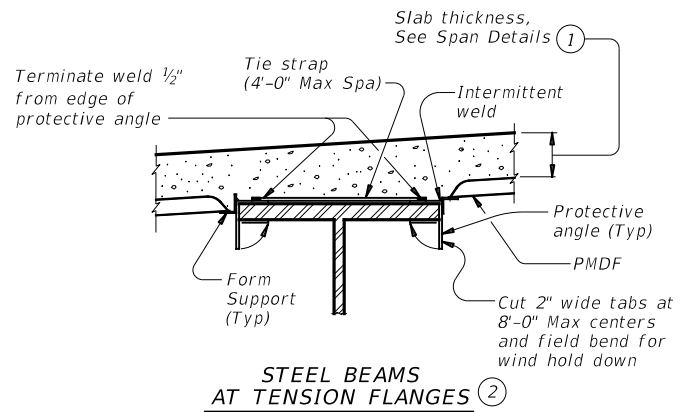
U-BEAMS WITH STIRRUP LOCKS



U-BEAMS WITH WELD ANCHORS

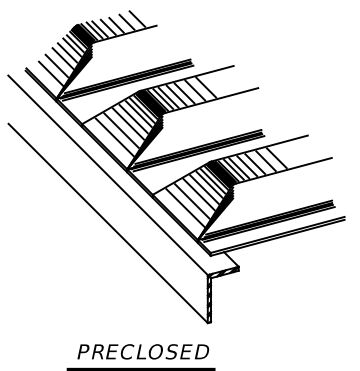


STEEL BEAMS AT COMPRESSION FLANGES

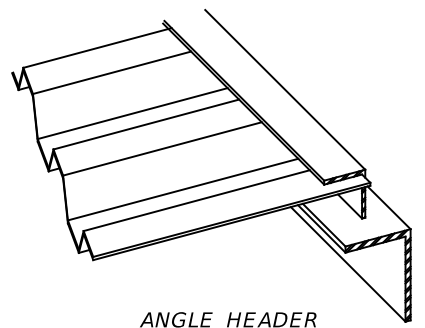


STEEL BEAMS AT TENSION FLANGES

TYPICAL TRANSVERSE SECTIONS



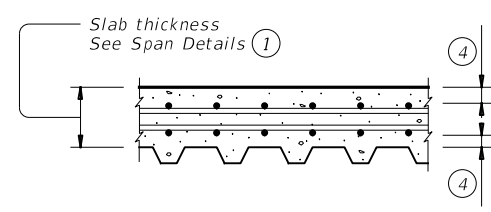
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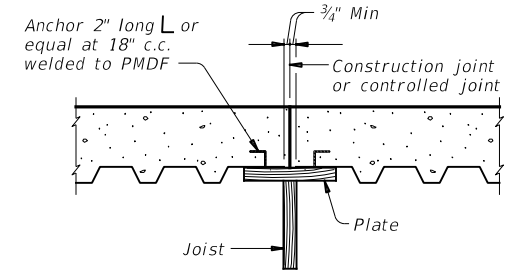
ANGLE HEADER

NOTE: This type is to be used for skewed ends only.

TYPES OF END CLOSURES



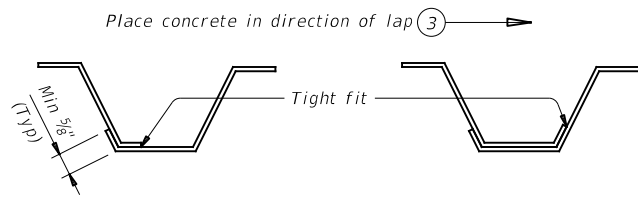
TYP LONGITUDINAL SLAB SECTION



Note: In spans where PMD forms are used, timber forms must be used at construction joints. Adequate provision must be made to support edge of metal form and to provide anchorage of metal form to slab concrete where joined to wood forms.

SECTION THRU CONSTRUCTION JOINT

FOR PRESTR CONC U-BEAM AND STEEL GIRDER BRIDGES:
 Unless shown elsewhere in the plans, size, spacing, and orientation of bottom mat of slab reinforcement must match the top mat of reinforcing shown on the span details except all bottom mat bars are to be #5. Bottom mat reinforcement and additional concrete is subsidiary to Item 422 "Concrete Superstructures."
FOR PRESTR CONC TX-GIRDER BRIDGES:
 See Miscellaneous Slab Details, Prestr Concrete I-Girders (IGMS) standard sheet for bottom mat reinforcing.



SIDE LAP DETAILS

- Slab thickness minus 5/8" if corrugations match reinforcing bars.
- 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.
- The direction of concrete placement will be such that the upper layer of the form overlap is loaded first.
- See Span details for cover requirements.

GENERAL NOTES:

Steel for Permanent Metal Deck Forms (PMDF) and support angles shall conform to ASTM A653, structural steel (SS), with coating designation G165. Steel must have a minimum yield strength of 33 ksi. Minimum thickness of PMDF is 20 gage and that of support angles and protective angles is 12 gage.
 Submit two copies of forming plans for PMDF to the Engineer. These plans must show all essential details of proposed form sheets, closures, fasteners, supports, connectors, special conditions and size and location of welds. These plans must clearly show areas of tension flanges for steel beams and provisions for protecting the tension flanges from welding notch effects by inclusion of separating sheet metal or other positive method. These plans must be designed, signed, and sealed by a licensed professional engineer. Department approval of these plans is not required, but the Department reserves the right to require modifications to the plans. The Contractor is responsible for the adequacy of these plans. The details and notes shown on this standard are to be used as a guide in preparation of the forming plans.
 All material, labor, tools and incidentals necessary to form a bridge deck with Permanent Metal Deck Forms is considered subsidiary to Item 422, "Concrete Superstructures".

DESIGN NOTES:
 As a minimum, PMDF and support angles must be designed for the dead load of the form, reinforcement and concrete plus 50 psf for construction loads. Flexural stresses due to these design loads must not exceed 75 percent of the yield strength of the steel. Allowable stress for weld metal must be 12,400 psi. Maximum deflection under the weight of forms, reinforcement and concrete or 120 psf, whichever is greater, shall not exceed the following:

- 1/180 of the form design span, but not more than 0.50", for design spans of 10' or less.
- 1/240 of the form design span, but not more than 0.75", for design spans greater than 10'.
- 1/240 of the form design span, but not more than 0.75", for all design spans of railroad overpass bridge spans fully or partially over railroad right-of-way, and for all bridge spans of railroad underpass structures.

The form design span must not be less than the clear distance between beam flanges, measured parallel to the form flutes, minus 2".

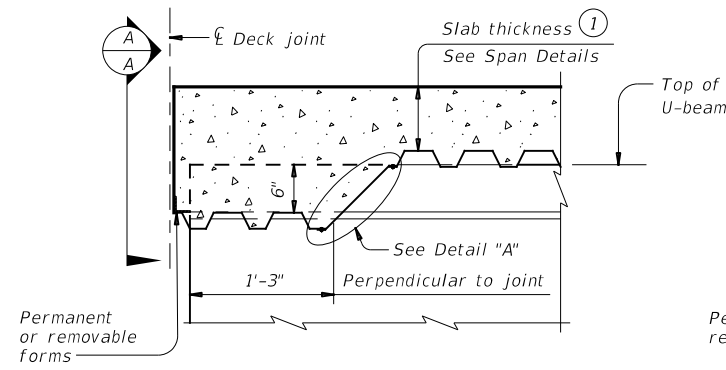
CONSTRUCTION NOTES:

Form sheets must not be permitted to rest directly on the top of beam flanges. Form sheets must be securely fastened to form supports and must have a minimum bearing length of one inch at each end. Form supports must be placed in direct contact with beam flanges.
 All attachments must be made by permissible welds, screws, bolts, clips or other means shown on the the forming plans. All sheet metal assembly screws must be installed with torque-limiting devices to prevent stripping. Only welds or bolts must be used to support vertical loads.
 Welding and welds must be in accordance with the provisions of Item 448, "Structural Field Welding", pertaining to fillet welds. All welds must be made by a qualified welder in accordance with Item 448.
 All permanently exposed form metal, where the galvanized coating has been damaged, must be thoroughly cleaned and repaired in accordance with Item 445, "Galvanizing". Minor heat discoloration in areas of welds need not be touched up.
 Flutes must line up uniformly across the entire width of the structure where main reinforcing steel is located in the flute.
 Construction joints will not be permitted unless shown on the plans. The location of and forming details for any construction joint used must be shown on the forming plans. Forms below a construction joint must be removed after curing of the slab.
 A sequence for uniform vibration of concrete must be approved by the Engineer prior to concrete placement. Attention must be given to prevent damage to the forms, yet provide proper vibration to prevent voids or honeycomb in the flutes and at headers and/or construction joints.

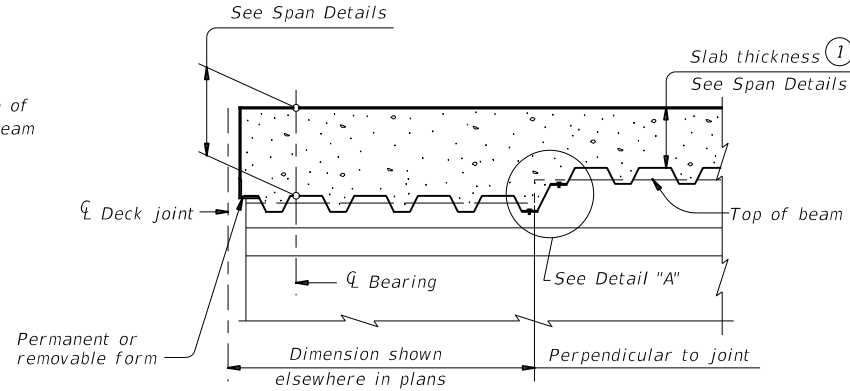
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<h3>PMDF</h3>			
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©TxDOT April 2019	CONF	SECT	HIGHWAY
REVISIONS	0006 15	038	SH 70
02-20: Modified box note by adding steel beams/girders and subsidiary	DIST	COUNTY	SHEET NO.
12-21: Updated max deflection for RR.	ABL	NOLAN	112

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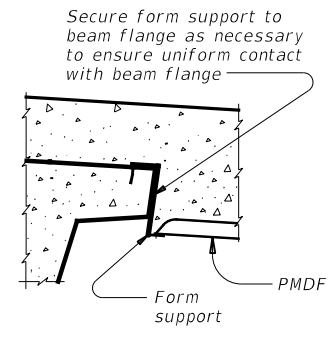
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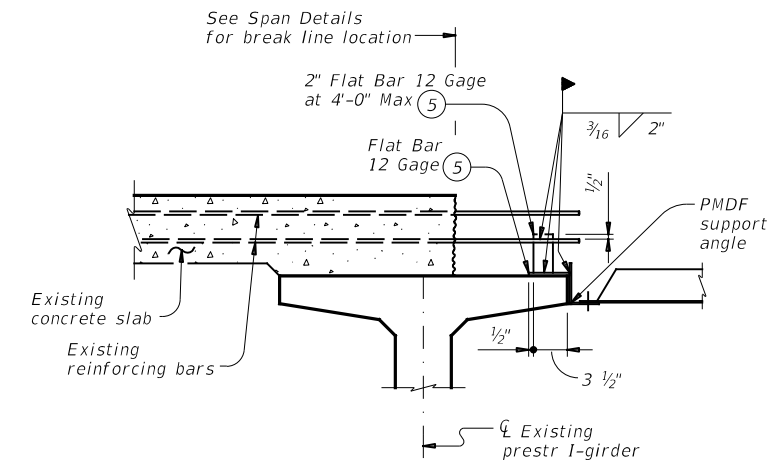
AT THICKENED SLAB END FOR U-BEAMS



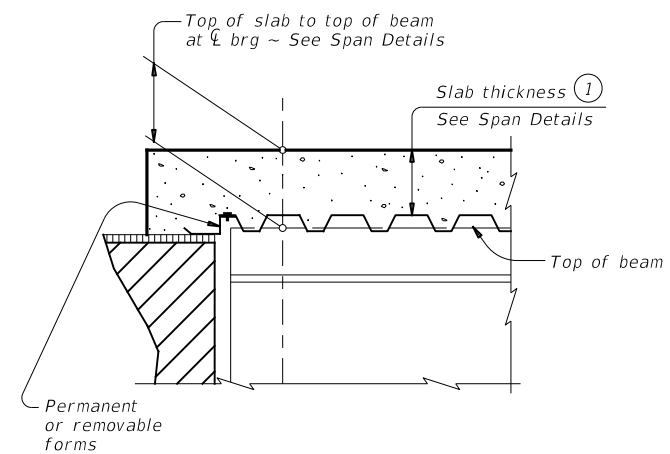
AT THICKENED SLAB END FOR PRESTRESSED I-BEAMS, I-GIRDERS AND STEEL BEAMS
 Showing I-beam block-out. No block-out for I-girders or steel beams.



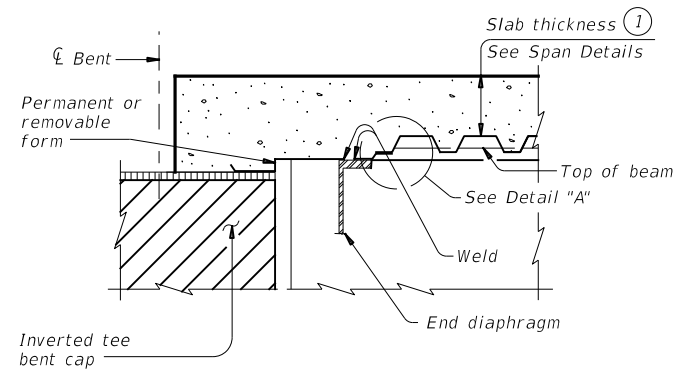
SECTION A-A



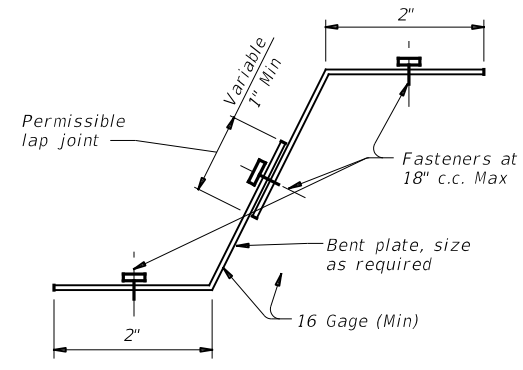
SHOWING PRESTRESSED CONCRETE I-BEAMS, I-GIRDERS AND U-BEAMS



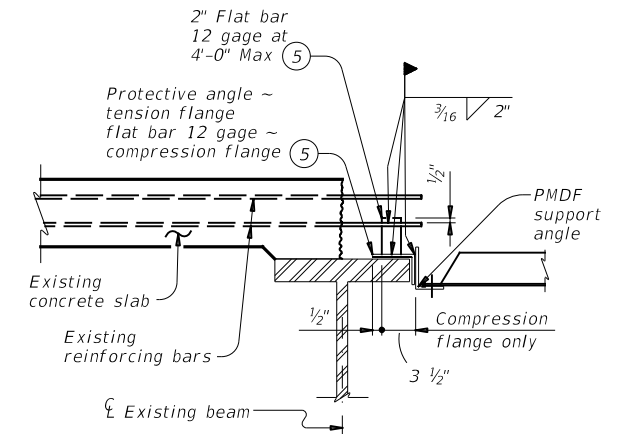
AT SLAB OVER ABUT BKWL OR INV TEE STEM FOR CONC BEAMS WITHOUT THICKENED SLAB END



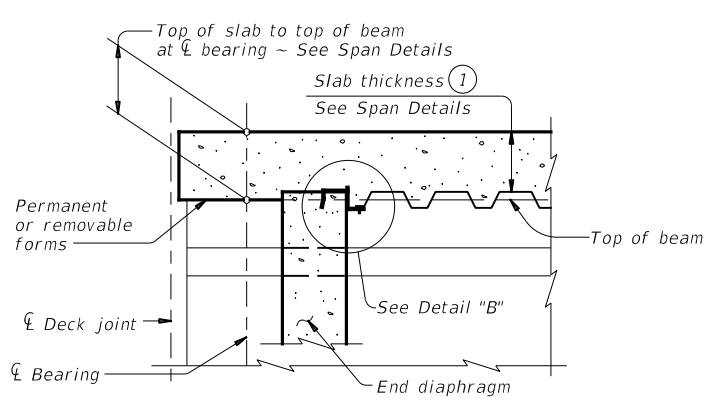
AT SLAB OVER INV TEE STEM FOR STEEL BEAMS WITHOUT THICKENED SLAB END



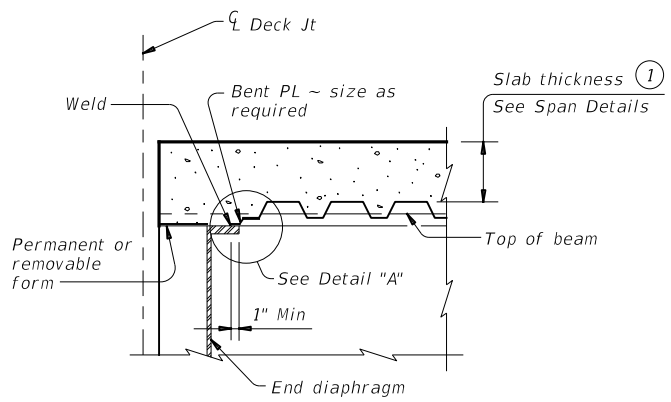
DETAIL "A"



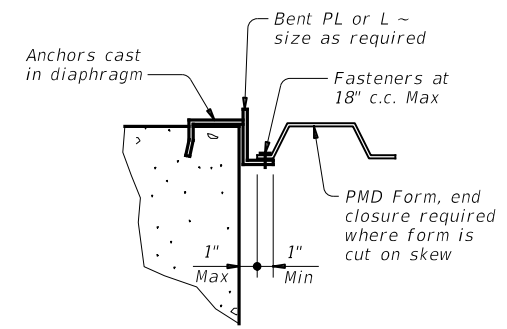
SHOWING STEEL BEAMS



AT CONC END DIAPHRAGM FOR PRESTRESSED I-BEAMS AND STEEL BEAMS



AT END DIAPHRAGM FOR STEEL BEAMS WITHOUT THICKENED SLAB END



DETAIL "B"

WIDENING DETAILS

DETAILS AT ENDS OF BEAMS

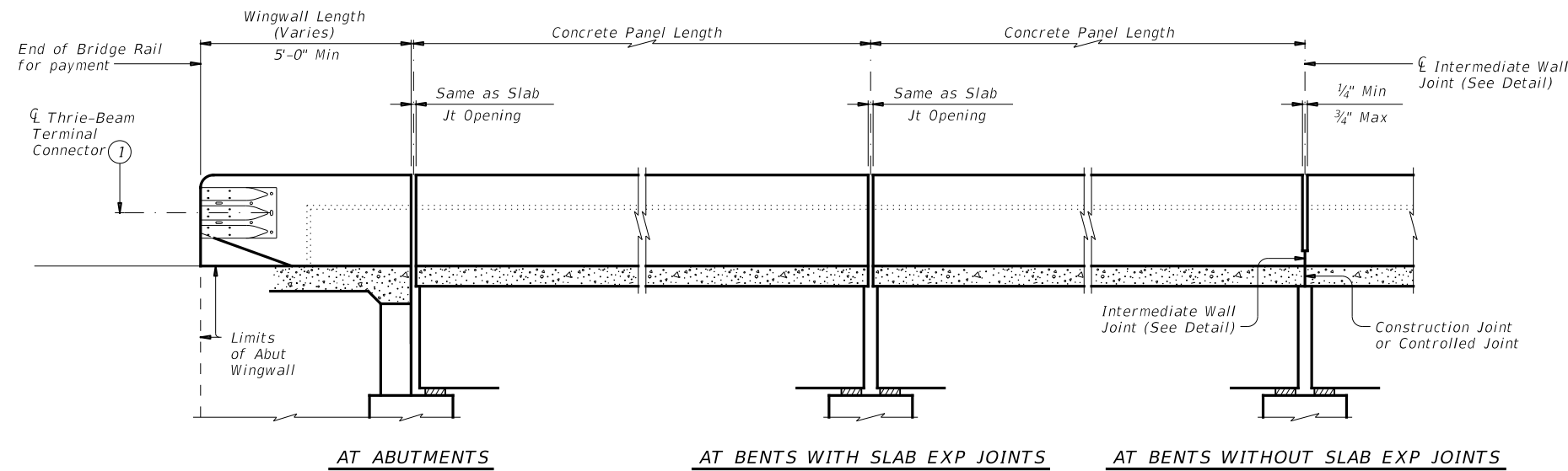
- ① Slab thickness minus 5/8" if corrugations match reinforcing bars
- ⑤ Minimum yield stress of 12 gage bars shall be 40 ksi

SHEET 2 OF 2

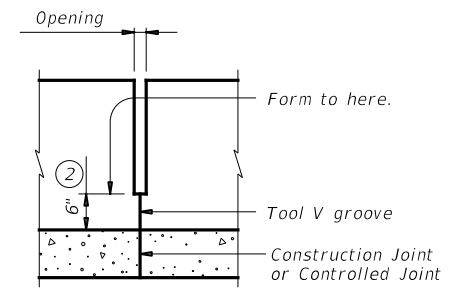
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©TxDOT April 2019	CONT	SECT	HIGHWAY
REVISIONS	0006	15	038 SH 70
02-20: Modified box note by adding steel beams/girders and subsidiary	DIST	COUNTY	SHEET NO.
12-21: Updated max deflection for RR.	ABL	NOLAN	113

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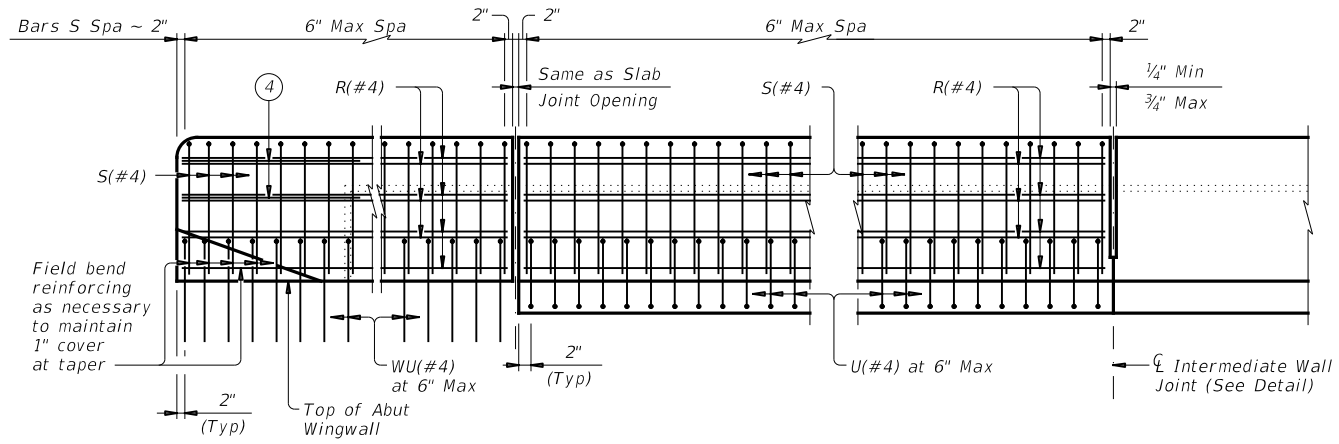


ROADWAY ELEVATION OF RAIL

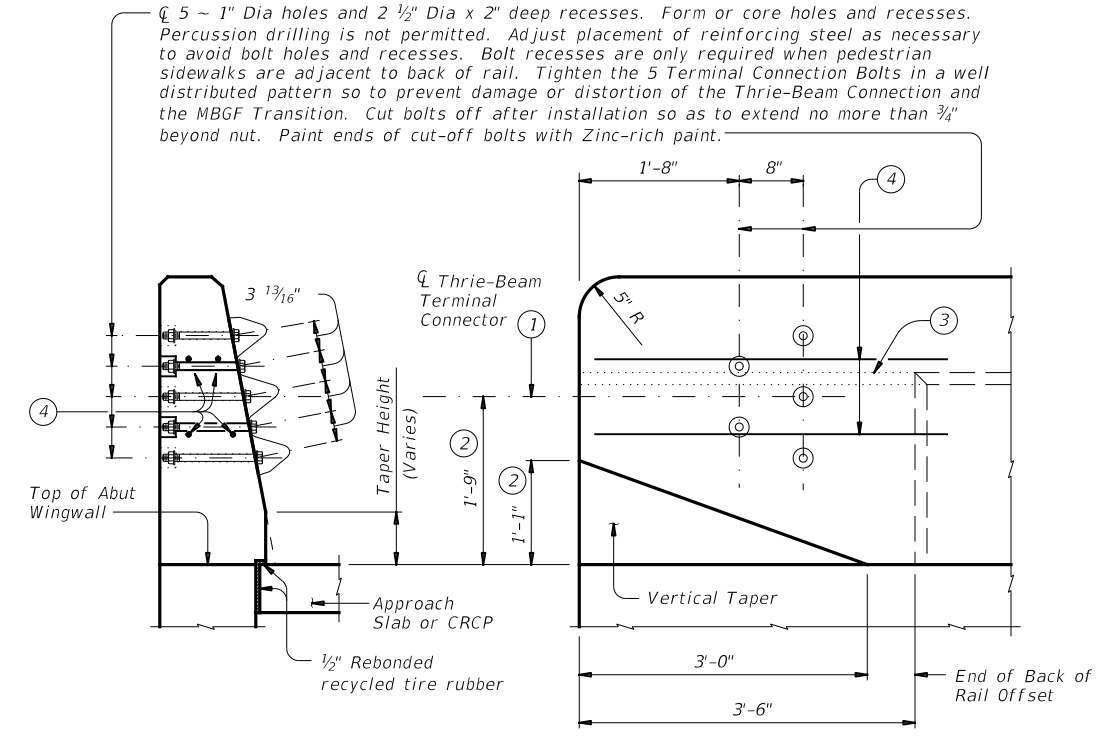


INTERMEDIATE WALL JOINT DETAIL

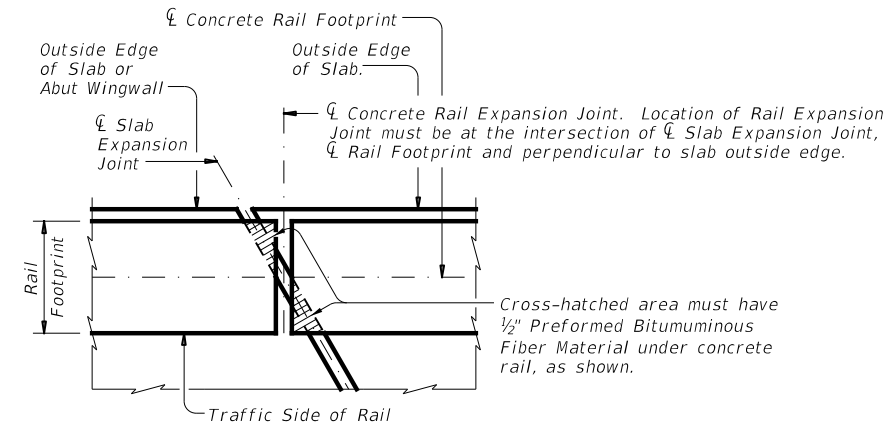
Provide at all interior bents without slab expansion joints.



ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT



**SECTION
 ELEVATION
 TERMINAL CONNECTION DETAILS**



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

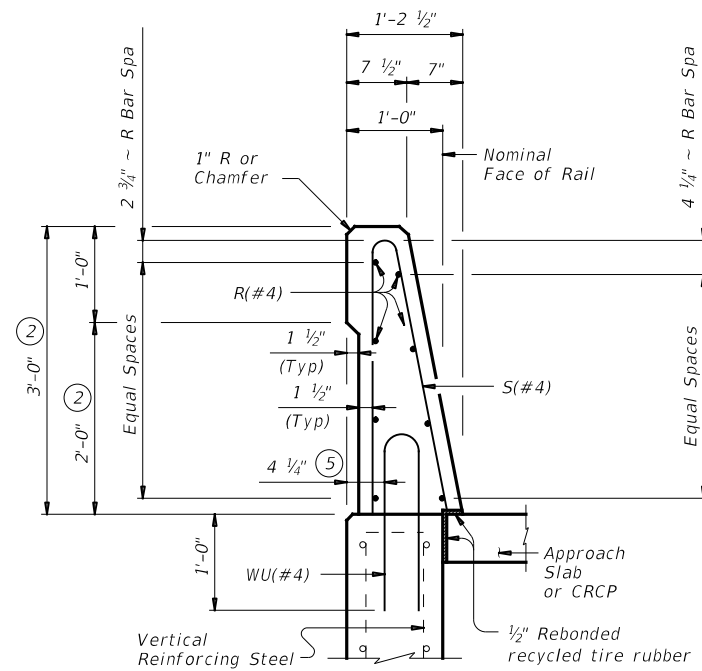
- ① Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.
- ② Increase 2" for structures with Overlay.
- ③ Back of rail offset may, with Engineer's approval, be continued to the end of the railing.
- ④ Place 4 additional Bars R(#4) 3'-8" in length inside Bars S(#4) and centered 2'-0" from end of rail when Terminal Connections are required.

SHEET 1 OF 2

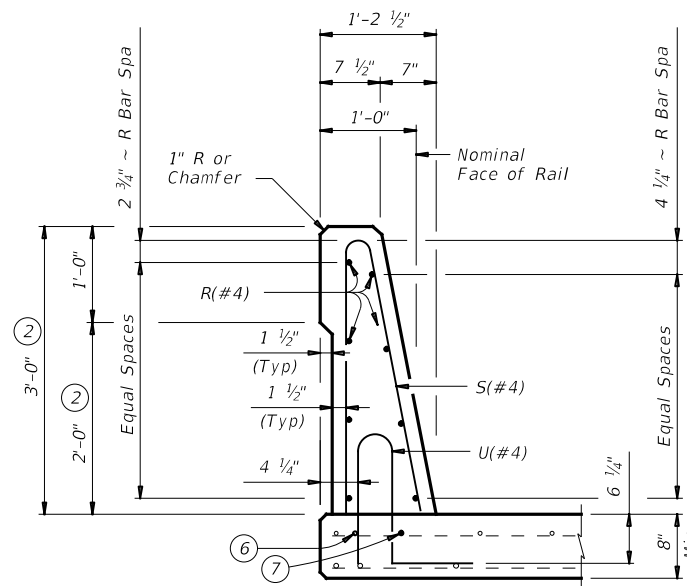
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TRAFFIC RAIL SINGLE SLOPE					
TYPE SSTR					
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©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0006	15	038	SH 70	
	DIST	COUNTY	SHEET NO.		
	ABL	NOLAN	114		

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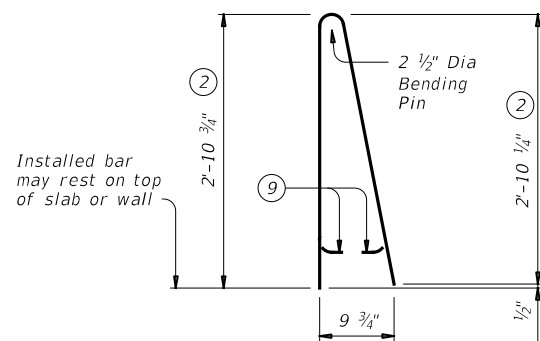


ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS

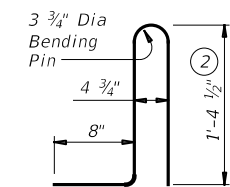


ON BRIDGE SLAB

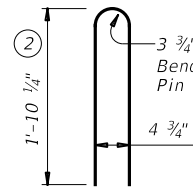
SECTIONS THRU RAIL



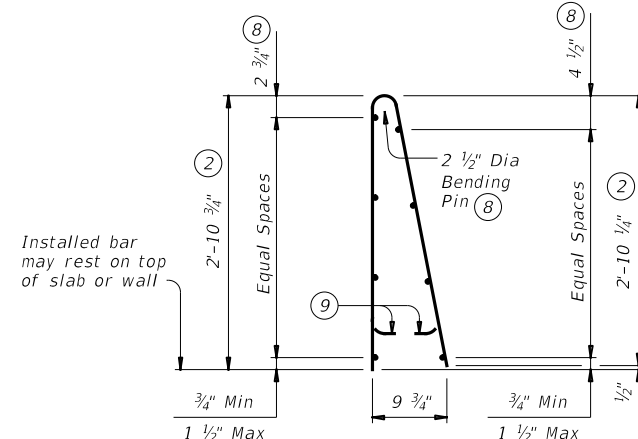
BARS S (#4)



BARS U (#4)



BARS WU (#4)



OPTIONAL WELDED WIRE REINFORCEMENT (WWR)

- ② Increase 2" for structures with Overlay.
- ⑤ 5 1/4" when vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls or retaining walls on traffic side of wall.
- ⑥ As an aid in supporting reinforcement, additional longitudinal bars may be used in the slab with the approval of the Engineer. Such bars must be furnished at the Contractor's expense.
- ⑦ Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.
- ⑧ No longitudinal wires may be within upper bend.
- ⑨ Bend or cut as required to clear drain slots.
- ⑩ Space U(#4) bars at 4" Max when end region of panel length is less than 6'-0" to side slot drain. Space U(#4) bars at 6" Max when end region of panel length is 6'-0" and greater to side slot drain.

CONSTRUCTION NOTES:

This railing may be constructed by the slipform process when approved by the Engineer, with equipment approved by the Engineer. Provide sensor control for both line and grade. Tack welding to provide bracing for slipform operations is acceptable. Welding may be performed at a minimum spacing of 3 ft between the cage and the anchorage. It is permissible to weld to bars U, WU and S at any location on the cage. If increased bracing is needed, provide additional anchorage devices and weld in the upper two thirds of the cage. Paint welded areas on epoxy coated and/or galvanized reinforcing with an organic zinc rich paint in accordance with Item 445 "Galvanizing".
 If rail is slipformed, apply a heavy epoxy bead 1" behind toe of traffic side of rail to concrete deck just prior to slip forming. Provide a 3/8" width x 1/4" tall heavy epoxy bead with Type III, Class C or a Type V epoxy.
 The back of railing must be vertical unless otherwise shown in the plans or approved by the Engineer.

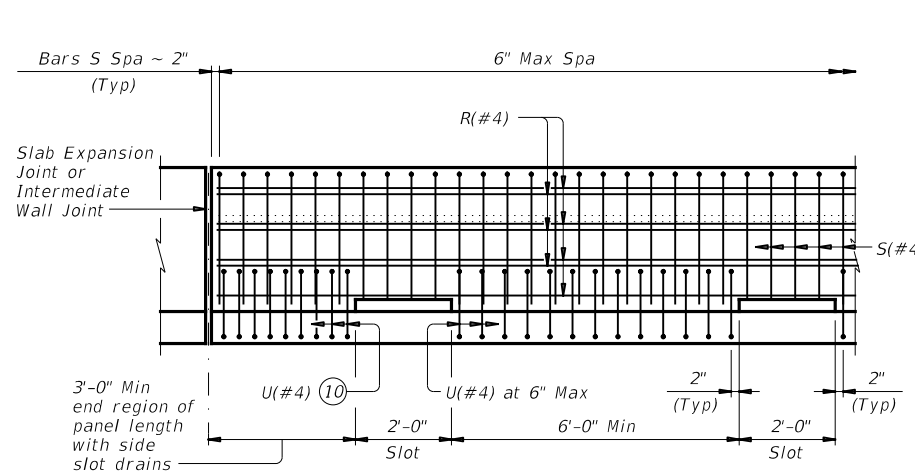
MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.
 Provide Grade 60 reinforcing steel.
 Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.
 Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U and WU unless noted otherwise. Deformed WWR (ASTM A1064) may be substituted for Bars R and S, as shown. Combinations of reinforcing steel and WWR or configurations of WWR other than shown are permitted if conditions in the table are satisfied. Provide the same laps as required for reinforcing bars.
 Provide bar laps, where required, as follows:
 Uncoated or galvanized ~ #4 = 1'-7"
 Epoxy coated ~ #4 = 2'-5"

GENERAL NOTES:

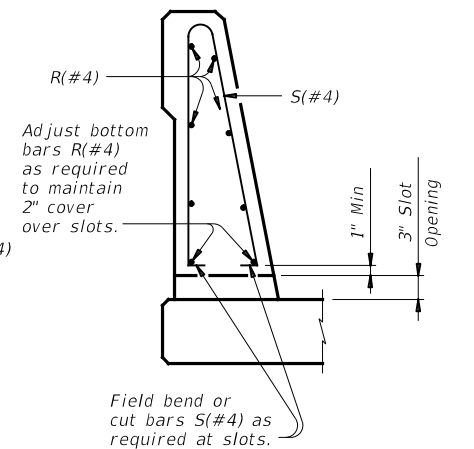
This rail has been successfully evaluated by full-scale crash test to meet MASH TL-4 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.
 Do not use this railing on bridges with expansion joints providing more than 5" movement.
 Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.
 Shop drawings will not be required for this rail.
 Average weight of railing with no overlay is 376 pcf.

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



OPTIONAL SIDE SLOT DRAIN DETAIL

Note: Side Slot Drains may be used where shown elsewhere on the plans or as directed by the Engineer. Drains should not be placed over railroad tracks, lower roadways, or sidewalks. When this rail is used as a separator between a roadway surface and a sidewalk surface, side drain slots will not be permitted.



SECTION THRU
OPTIONAL SIDE SLOT DRAIN

DESCRIPTION	LONGITUDINAL WIRES	VERTICAL WIRES
Minimum (Cumulative Total) Wire Area	1.067 Sq In.	0.267 Sq In. per Ft
Minimum	No. of Wires	Spacing
Maximum	8	4"
Maximum Wire Size Differential	10	8"
	The smaller wire must have an area of 40% or more of the larger wire.	

Texas Department of Transportation
 Bridge Division Standard

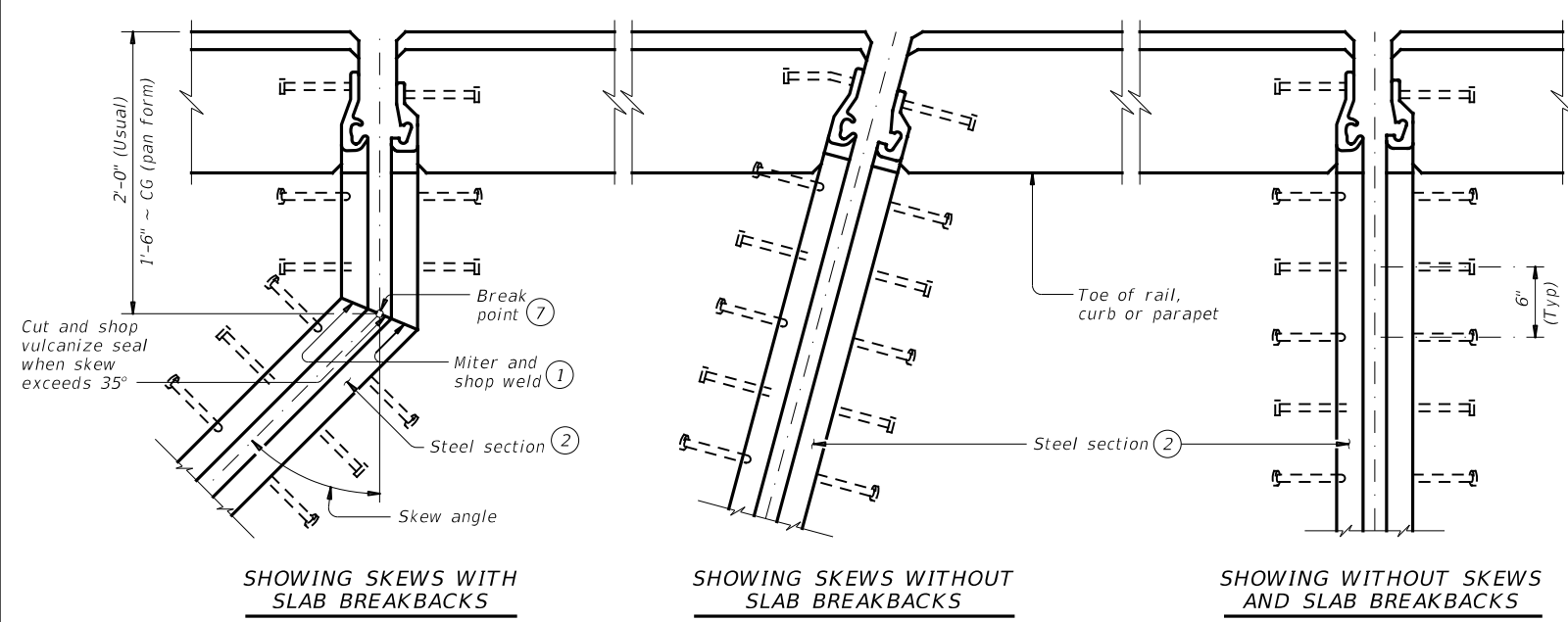
**TRAFFIC RAIL
SINGLE SLOPE**

TYPE SSTR

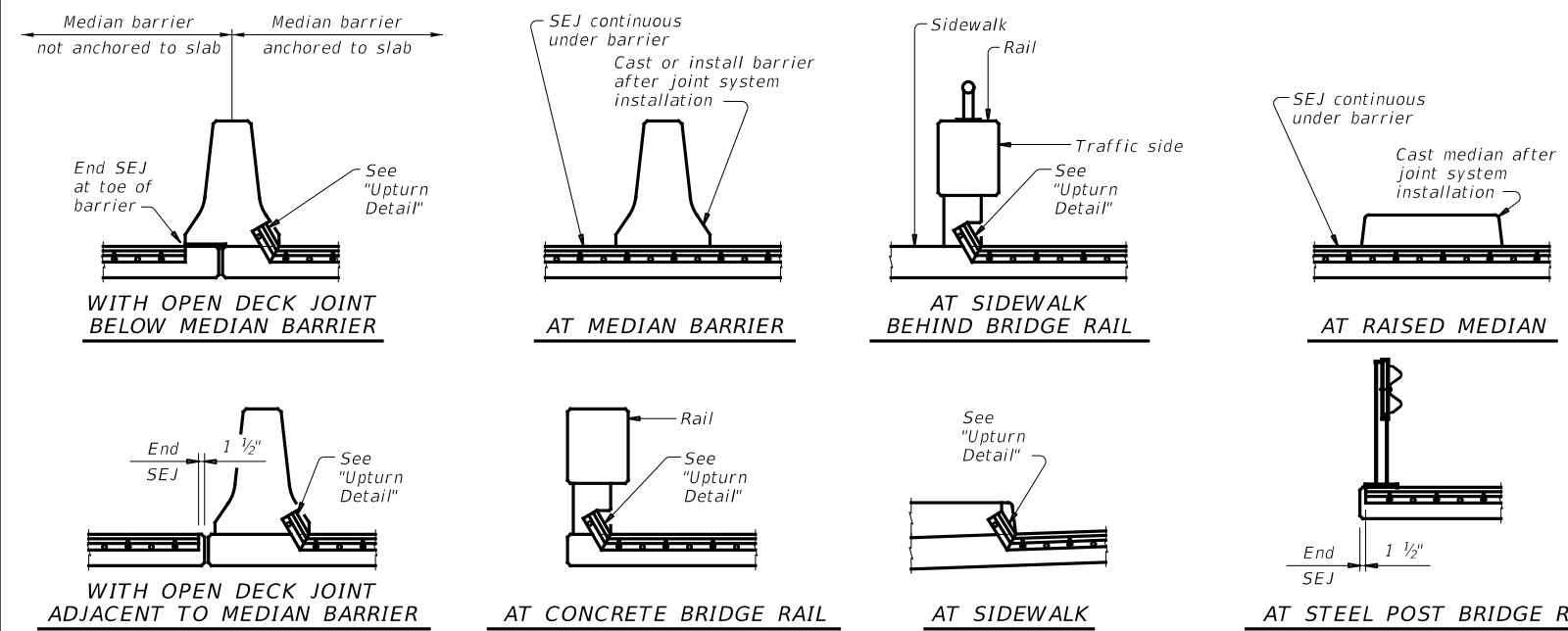
FILE: r1std014-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0006	15	038	SH 70
DIST.	COUNTY	SHEET NO.		
ABL	NOLAN	115		

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

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PLANS OF END CONDITIONS



TYPICAL SECTIONS 5

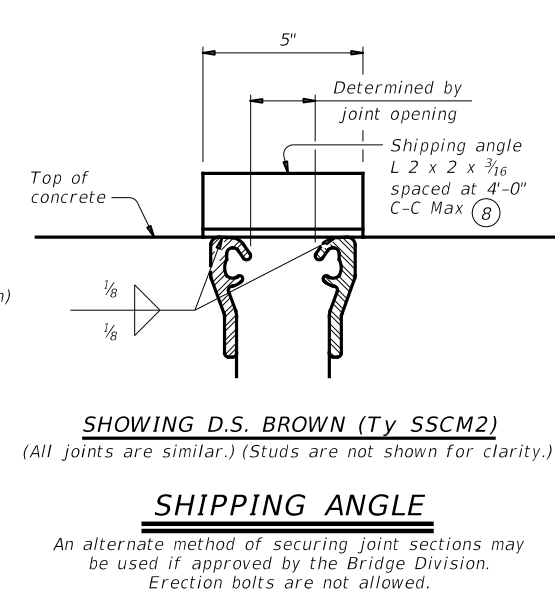
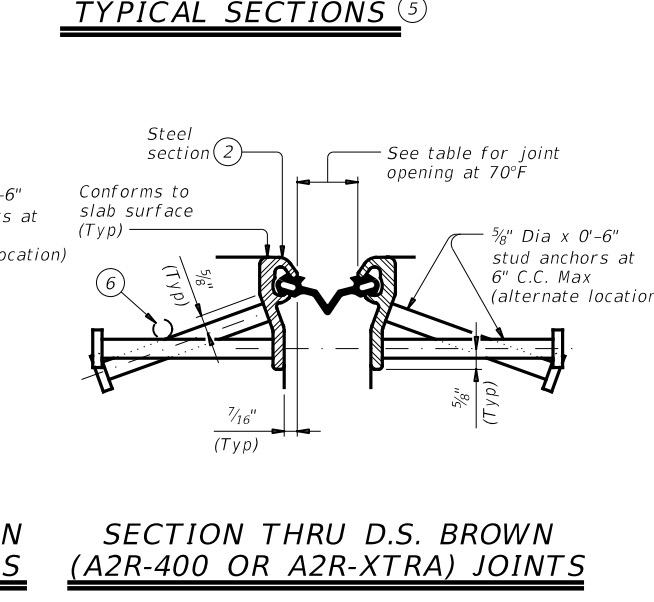
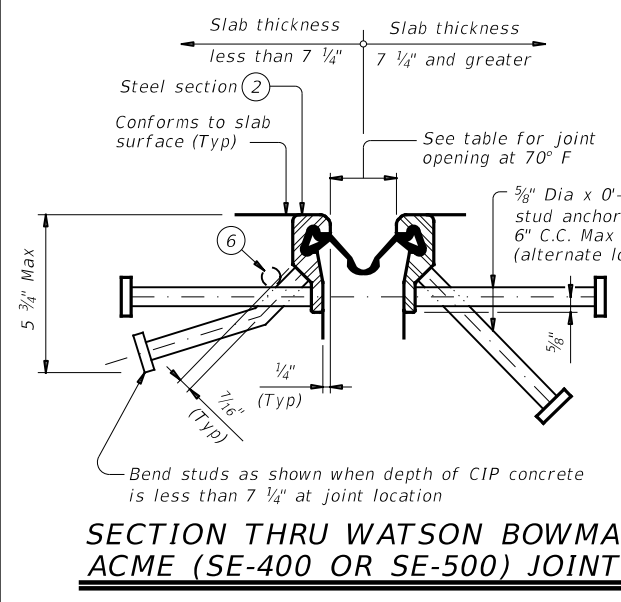
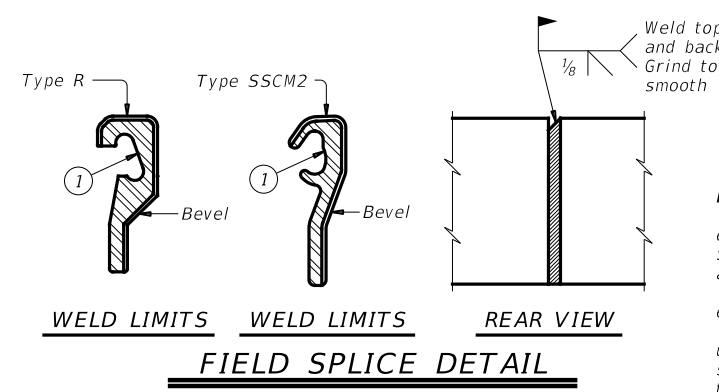


TABLE OF SEALED EXPANSION JOINT INFORMATION					
MANUFACTURER	STEEL SECTION 2	STRIP SEAL			
		4" JOINT		5" JOINT	
		Seal Type	Joint Opening 3	Seal Type	Joint Opening 3
D.S. Brown	Type SSCM2	A2R-400	1 3/4"	A2R-XTRA	2"
Watson Bowman Acme	Type R	SE-400	1 3/4"	SE-500	2"

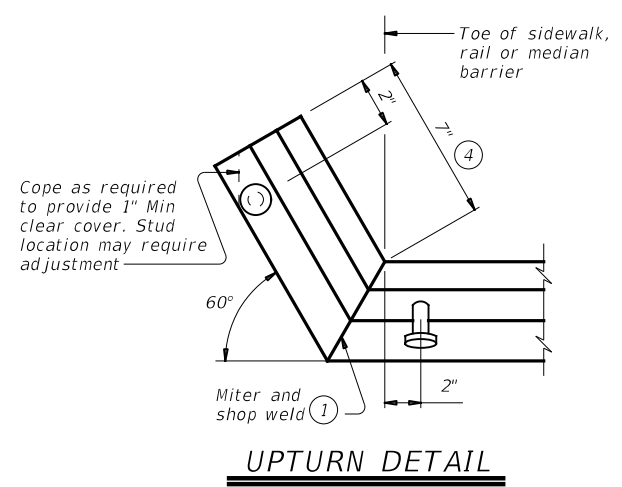
SKEW (deg)	JOINT SIZE	
	4"	5"
0	4.0"	5.0"
15	4.0"	5.0"
30	3.5"	4.3"
45	2.8"	3.5"

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).

- Remove all burrs which will be in contact with seal prior to making splice.
- Shape of steel section shown is typical. Variations in sections must be approved by the Engineer.
- These openings are also the recommended minimum installation openings.
- Reduce for sidewalk or parapet heights less than 6".
- Other conditions affecting the joint profile should be noted elsewhere.
- 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.
- See Span details for location of break point.
- Align shipping angle perpendicular to joint.



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, "Field 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 446.7.3 and 446.7.4.
 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.



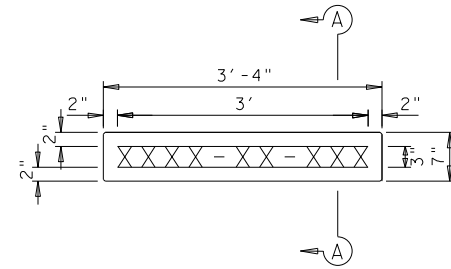
UPTURN DETAIL

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".

		Bridge Division Standard	
SEALED EXPANSION JOINT TYPE M WITHOUT OVERLAY			
SEJ-M			
FILE: sejmste1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR
©TxDOT April 2019	CONTRACT: 000615	JOB: 038	HIGHWAY: SH 70
REVISIONS	DIST: ABL	COUNTY: NOLAN	SHEET NO: 116

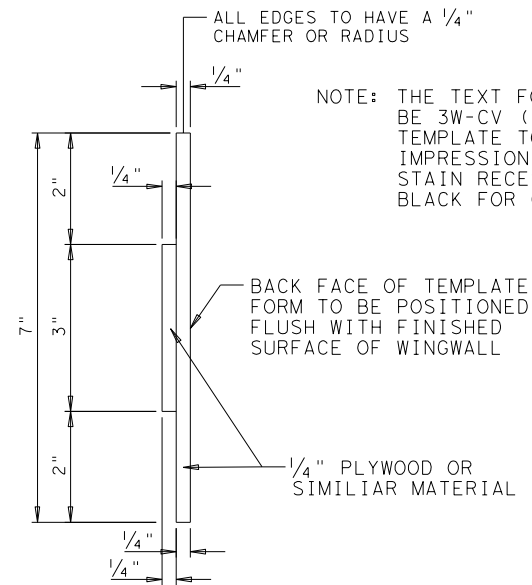
STRUCTURE ID TEMPLATE NUMBERS							
NBI NUMBER	LOCATION	STRUCTURE NUMBER	"WL"	"Lw"	"Hw"	"FBW" #	"FTS" #
08-177-0-0006-03-351	IH20 UNDERPASS AT SH70	0006-03-351	16'	NA	VARIES	VARIOUS	VARIOUS



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

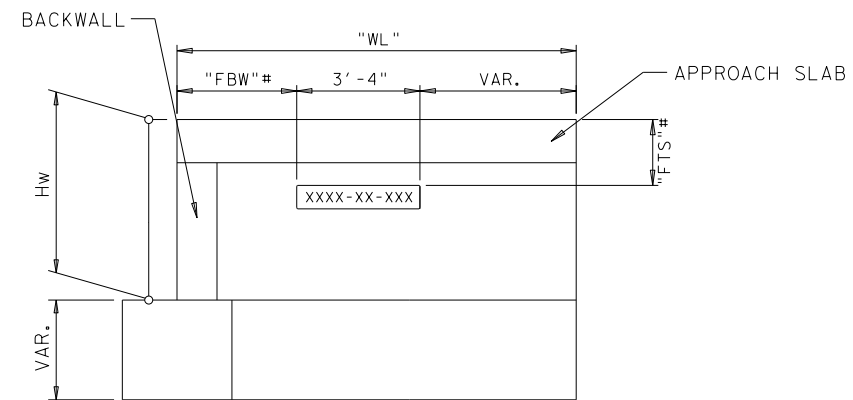
ALL CHARACTERS ARE REQUIRED, AND ARE TO BE FORMATTED EXACTLY AS SHOWN IN THE STRUCTURE NUMBER COLUMN TO THE RIGHT.

STRUCTURE ID TEMPLATES



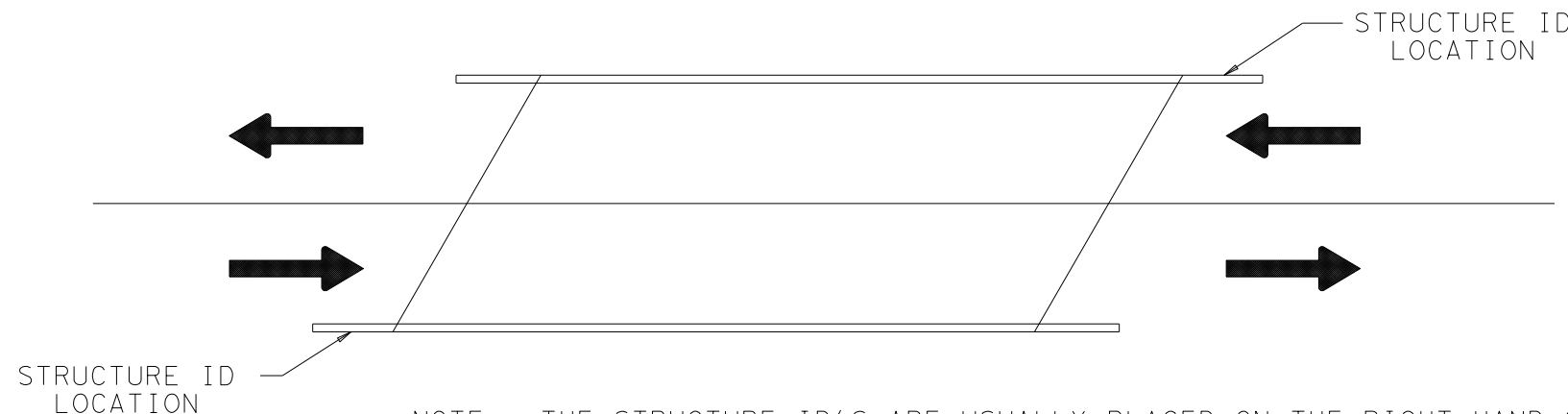
NOTE: THE TEXT FOR ALL TEMPLATES SHOULD BE 3W-CV (3") CLEAR VIEW FONT. TEMPLATE TO PROVIDE A RECESSED IMPRESSION INTO CAST CONCRETE. STAIN RECESSED NUMERAL SURFACES BLACK FOR CONTRAST.

SECTION A-A

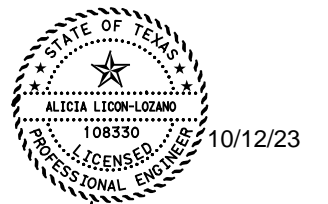


WINGWALL ELEVATION

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



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

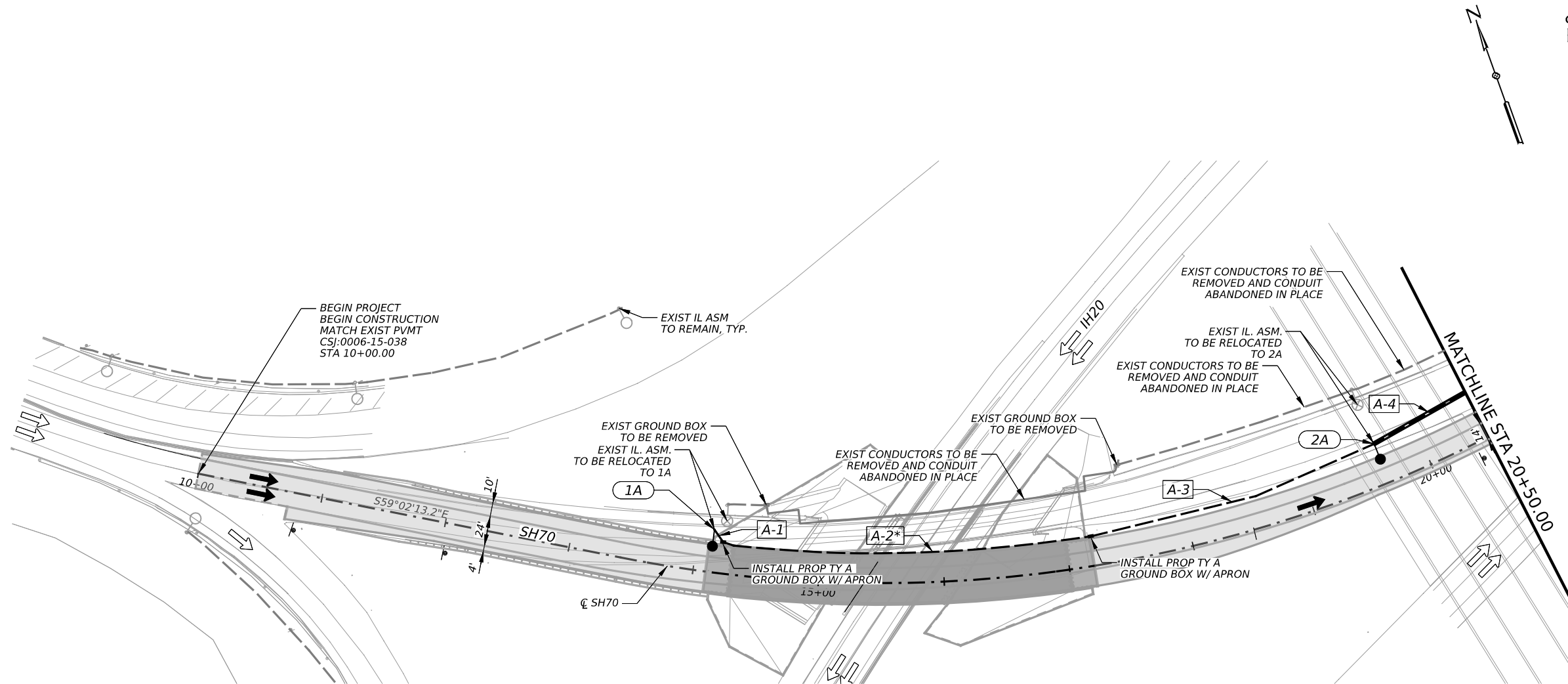


HDR Engineering, Inc
Firm Registration No. F-754



STRUCTURE ID DETAILS
SIDD-14

NO SCALE		SHEET 1 OF 1	
FHWA DIVISION	PROJECT NO.	HIGHWAY NO.	
6	SEE TITLE SHEET	SH 70	
STATE	COUNTY	SHEET NO.	
TEXAS	NOLAN	117	
DISTRICT	CONTROL	SECTION	JOB
ABL	0006	15	038



LEGEND

- EXIST. RD IL ASM - REMAIN
- ⊗ EXIST. RD IL ASM - RELOCATE
- RD IL ASM - T BASE
- - - EXIST. CONDUIT
- EXIST. RIGID METAL CONDUIT
- - - CONDT (2") (SCH 40 PVC)
- ▬ CONDT (2") (SCH 40 PVC) (BORE)
- EXIST. GROUND BOX
- TY A GROUND BOX W/ APRON
- - - EXIST. R.O.W.
- [X-#] CONDUIT RUN CALLOUT
- [#X] RD IL ASM CALLOUT

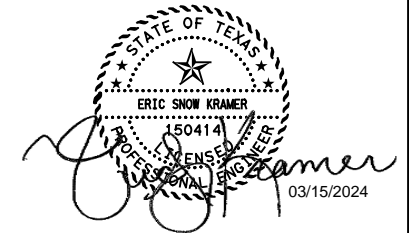
- NOTES:**
- THE EXISTENCE OF UTILITIES, EITHER UNDERGROUND OR OVERHEAD, INDICATED ON THE PLANS ARE TAKEN FROM THE BEST RECORDS AVAILABLE AND ARE APPROXIMATE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO LOCATE ALL UTILITIES (PRIVATE AND PUBLIC) PRIOR TO COMMENCING WORK. THE CONTRACTOR IS FULLY RESPONSIBLE FOR ANY DAMAGE CAUSED BY HIS/HER FAILURE TO LOCATE, PRESERVE, AND PROTECT THESE UTILITIES.
 - CONTRACTOR IS RESPONSIBLE FOR MAINTAINING OPERATION OF ALL EXISTING LIGHTING SYSTEMS DURING CONSTRUCTION. EXISTING LIGHTING ASSEMBLIES BEING REMOVED PER THESE PLANS SHALL REMAIN IN SERVICE UNTIL ALL PROPOSED LIGHTING ASSEMBLIES PER THESE PLANS HAVE BEEN CONSTRUCTED AND ARE IN OPERATION.
 - EXISTING LIGHTING CIRCUITS IMPACTED BY THE DESIGN AS SHOWN IN THESE PLANS SHALL HAVE CONDUCTORS REMOVED AND CONDUITS ABANDONED IN PLACE. REMOVE ANY ABANDONED EXISTING CONDUIT IF UNBURIED DUE TO CONSTRUCTION.
 - EXISTING LIGHTING CONDUIT RUNS ARE ASSUMED TO CARRY A SINGLE CIRCUIT OF #8 SIZE WIRE. CONTRACTOR TO VERIFY SIZE AND QUANTITY OF EXISTING LIGHTING CIRCUITS PRIOR TO CONSTRUCTION AND NOTIFY THE ENGINEER IF EXISTING CONDUCTORS ARE OF ANOTHER SIZE.

CIRCUIT NO.	RUN NO.	CONDUIT SIZE AND LENGTH (FT)		CONDUCTOR SIZE AND LENGTH (FT)	
		2" PVC SCHD 40	2" PVC SCHD 40 (CONC ENCSE)	#8 BARE	#8 XHHW
A	A-1	15		1	20
A	A-2*		290	1	295
A	A-3	240		1	245
A	A-4	SEE SHEET 2 OF 2 FOR QUANTITIES			
TOTAL		255	290	560	1120

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
416	6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	16
432	6001	RIPRAP (CONC)(4 IN)	CY	0.7
610	6004	RELOCATE RD IL ASM (TRANS-BASE)	EA	2
618	6023	CONDT (PVC) (SCH 40) (2")	EA	255
618	6025	CONDT (PVC) (SCH 40) (2") (CONC ENCSE)	LF	290
620	6007	ELEC CONDR (NO.8) BARE	LF	560
620	6008	ELEC CONDR (NO.8) INSULATED	LF	1120
624	6002	GROUND BOX TY A (122311)W/APRON	LF	2
624	6028	REMOVE GROUND BOX	LF	2

*CONDUIT TO BE EMBEDDED IN BRIDGE RAIL. REFER TO BRIDGE PLANS AND TXDOT BRIDGE STANDARDS FOR ADDITIONAL INFO.

STD.	STATION.	LOCATION	LIGHT STD. SCHEDULE
1A	14+12.85	SH70, 33.79' LT, GROUND MOUNTED	IN RD IL (TY SA) 40T-8 (250W EQ) LED, TYPE III
2A	19+64.23	SH70, 32.85' LT, GROUND MOUNTED	IN RD IL (TY SA) 40T-8 (250W EQ) LED, TYPE III



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 Firm Registration No. F-754
 17111 Preston Road, Suite 300
 Dallas, Texas 75248
 972.960.4400

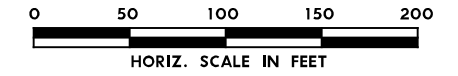
Texas Department of Transportation

SH 70

ILLUMINATION LAYOUT
 BEGIN TO STA 20+50

SCALE: 1"=100' SHEET 1 OF 2

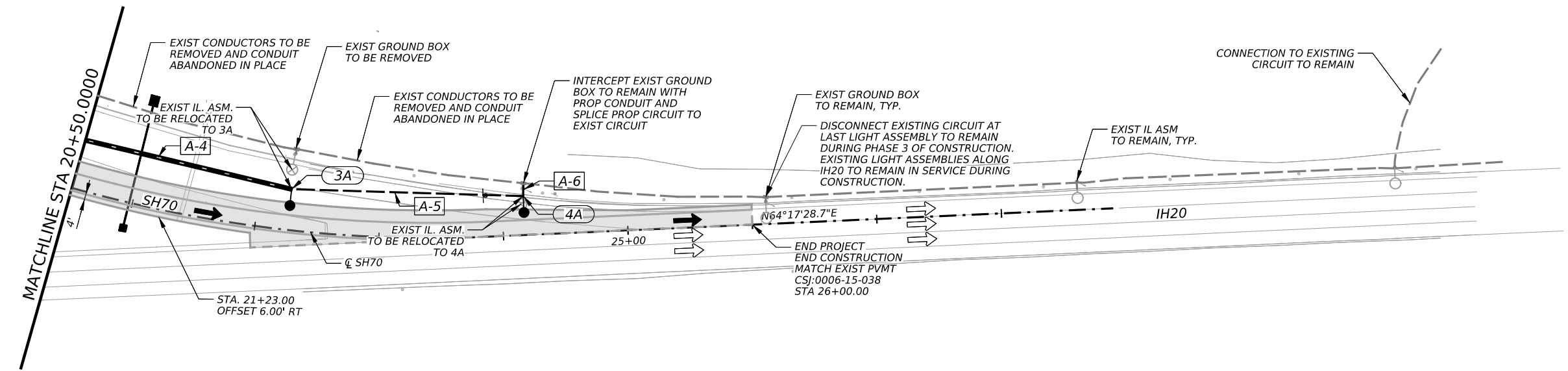
CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	118	



LEGEND

- EXIST. RD IL ASM - REMAIN
- ⊗ EXIST. RD IL ASM - RELOCATE
- RD IL ASM - T BASE
- EXIST. CONDUIT
- EXIST. RIGID METAL CONDUIT
- - - CONDT (2") (SCH 40 PVC)
- ▬ CONDT (2") (SCH 40 PVC) (BORE)
- EXIST. GROUND BOX
- TY A GROUND BOX W/ APRON
- · - · - EXIST. R.O.W.
- [X-#] CONDUIT RUN CALLOUT
- [#X] RD IL ASM CALLOUT

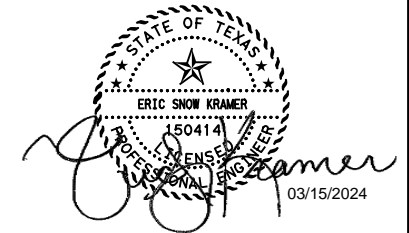
- NOTES:
- THE EXISTENCE OF UTILITIES, EITHER UNDERGROUND OR OVERHEAD, INDICATED ON THE PLANS ARE TAKEN FROM THE BEST RECORDS AVAILABLE AND ARE APPROXIMATE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO LOCATE ALL UTILITIES (PRIVATE AND PUBLIC) PRIOR TO COMMENCING WORK. THE CONTRACTOR IS FULLY RESPONSIBLE FOR ANY DAMAGE CAUSED BY HIS/HER FAILURE TO LOCATE, PRESERVE, AND PROTECT THESE UTILITIES.
 - CONTRACTOR IS RESPONSIBLE FOR MAINTAINING OPERATION OF ALL EXISTING LIGHTING SYSTEMS DURING CONSTRUCTION. EXISTING LIGHTING ASSEMBLIES BEING REMOVED PER THESE PLANS SHALL REMAIN IN SERVICE UNTIL ALL PROPOSED LIGHTING ASSEMBLIES PER THESE PLANS HAVE BEEN CONSTRUCTED AND ARE IN OPERATION.
 - EXISTING LIGHTING CIRCUITS IMPACTED BY THE DESIGN AS SHOWN IN THESE PLANS SHALL HAVE CONDUCTORS REMOVED AND CONDUITS ABANDONED IN PLACE. REMOVE ANY ABANDONED EXISTING CONDUIT IF UNBURIED DUE TO CONSTRUCTION.
 - EXISTING LIGHTING CONDUIT RUNS ARE ASSUMED TO CARRY A SINGLE CIRCUIT OF #8 SIZE WIRE. CONTRACTOR TO VERIFY SIZE AND QUANTITY OF EXISTING LIGHTING CIRCUITS PRIOR TO CONSTRUCTION AND NOTIFY THE ENGINEER IF EXISTING CONDUCTORS ARE OF ANOTHER SIZE.



CABLE AND CONDUIT SUMMARY							
CIRCUIT NO.	RUN NO.	CONDUIT SIZE AND LENGTH (FT)		CONDUCTOR SIZE AND LENGTH (FT)			
		2" PVC SCHED 40	2" PVC SCHED 40 (BORE)	#8 BARE	#8 XHHW		
A	A-4		190	1	195	2	195
A	A-5	205		1	210	2	210
A	A-6	10		1	15	2	15
TOTAL		215	190	420		840	

SHEET TOTAL				
ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
416	6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	16
432	6001	RIPRAP (CONC)(4 IN)	CY	0.7
610	6004	RELOCATE RD IL ASM (TRANS-BASE)	EA	2
618	6023	CONDT (PVC) (SCH 40) (2")	LF	215
618	6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	190
620	6007	ELEC CONDR (NO.8) BARE	LF	420
620	6008	ELEC CONDR (NO.8) INSULATED	LF	840
624	6028	REMOVE GROUND BOX	EA	1

ROADWAY ILLUMINATION ASSEMBLY RELOCATION SUMMARY			
STD.	STATION.	LOCATION	LIGHT STD. SCHEDULE
3A	22+26.20	SH70, 32.85' LT, GROUND MOUNTED	IN RD IL (TY SA) 40T-8 (250W EQ) LED, TYPE III
4A	24+17.32	SH70, 10.83' LT, GROUND MOUNTED	IN RD IL (TY SA) 40T-8 (250W EQ) LED, TYPE III



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 Dallas, Texas 75248
 972.960.4400

Texas Department of Transportation

SH 70
 ILLUMINATION LAYOUT
 STA 20+50 TO END

SCALE: 1"=100' SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	119	

GENERAL NOTES FOR ALL ELECTRICAL WORK

- The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.
- Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Where reference is made to NEMA listed devices, International Electrotechnical Commission (IEC) listed devices will not be considered an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection. Replace or reinstall rejected material or equipment at no additional cost to the Department.
- Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is 1/2 in. or less in diameter.
- Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: voltmeter, ammeter, megohm meter (1000 volt DC), ground resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated within the last year. Provide calibration certification to the Engineer upon request. Operate test equipment during inspection as requested by the Engineer.
- Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits; metal poles; luminaires; and metal enclosures are bonded to the equipment grounding conductor. Provide stranded bare copper or green insulated grounding conductors. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.
- When required by the Engineer, notify the Department in writing of materials from the Material Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL on TxDOT's website under "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

CONDUIT

A. MATERIALS

- Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification (DMS) 11030 "Conduit" and Item 618 "Conduit" of TxDOT's "Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges," latest edition. Provide conduits listed under Item 618 on the MPL under "Roadway Illumination and Electrical Supplies." Provide conduit types according to the descriptive code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for on galvanized steel rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for on polyvinyl chloride (PVC) systems.
- Provide galvanized steel RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.
- Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with no more than four conduits per box. When a mixture of conductor sizes is present, count the conductors as if all are of the larger size. For situations not applicable to the table, size junction boxes in accordance with NEC.

AWG	3 CONDUCTORS	5 CONDUCTORS	7 CONDUCTORS
#1	10" x 10" x 4"	12" x 12" x 4"	16" x 16" x 4"
#2	8" x 8" x 4"	10" x 10" x 4"	12" x 12" x 4"
#4	8" x 8" x 4"	10" x 10" x 4"	10" x 10" x 4"
#6	8" x 8" x 4"	8" x 8" x 4"	10" x 10" x 4"
#8	8" x 8" x 4"	8" x 8" x 4"	8" x 8" x 4"

- Junction boxes with an internal volume of less than 100 cu. in. and supported by entering raceways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.
- Provide hot dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only 10 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.
- Do not use intermediate metal conduit (IMC) or electrical metallic tubing (EMT) unless specifically required by the plan sheets. When EMT is called for, provide junction boxes made from galvanized steel sheeting, listed and approved for outdoor use, unless otherwise noted on the plans. Size all galvanized steel junction boxes in accordance with the NEC. Provide junction boxes for IMC conduit systems that meet the same requirements for junction boxes used with RMC systems.
- Provide PVC junction boxes intended for outdoor use on PVC conduit systems, unless otherwise noted on the plans.



- Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the PVC conduit system. When galvanized steel RMC elbows are specifically called for in the plans and any portion of the RMC elbow is buried less than 18 in., ground the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.
- When required, provide High-Density Polyethylene (HDPE) conduit with factory installed internal conductors according to Item 622 "Duct Cable." At the Contractor's request and with approval by the Engineer, substitute HDPE conduit with no conductors for bored schedule 40 or schedule 80 PVC conduit bid under Item 618. Ensure bored HDPE substituted for PVC is schedule 40 and of the same size PVC called for in the plans. Ensure the substituted HDPE meets the requirements of Item 622, except that the conduit is supplied without factory-installed conductors. Make the transition of the HDPE conduit to PVC (or RMC elbow when required) at the bore pit. Provide conduit of the size and schedule as shown on the plans. Do not extend substituted conduit into ground boxes or foundations. Provide PVC or galvanized steel RMC elbows as called for at all ground boxes and foundations.
- Use two-hole straps when supporting 2 in. and larger conduits. On electrical service poles, properly sized stainless steel or hot dipped galvanized one-hole standoff straps are allowed on the service riser conduit.

B. CONSTRUCTION METHODS

- Provide and install expansion joint conduit fittings on all structure-mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint conduit fittings. Repair or replace expansion joint fittings that do not allow for movement at no additional cost to the Department. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFMC or LFNC as a substitute for the required expansion conduit fittings.
- Space all conduit supports at maximum intervals of 5 ft. Install conduit spacers when attaching metal conduit to surface of concrete structures. See "Conduit Mounting Options" on ED(2). Install conduit support within 3 ft. of all enclosures and conduit terminations.
- Do not attach conduit supports directly to pre-stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.
- Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or after the base or surfacing operation has begun. Backfill and compact the bore pits below the conduit per Item 476 "Jacking, Boring, or Tunneling Pipe or Box" prior to installing conduit or duct cable to prevent bending of the connections.
- When placing conduit in the sub-grade of new roadways, backfill all trenches with excavated material unless otherwise noted on the plans. When placing conduit in the sub-base of new roadways, backfill all trenches with cement-stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Shoring."
- Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.
- During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.
- Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on water tight sealing hubs are not required.
- Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.
- Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a casing under roadways for duct cable is not required, if the duct extends the full length through the casing.
- At all electrical services, install a 6 AWG solid copper grounding electrode conductor.
- Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box detail on sheet ED(4).
- Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.
- File smooth the out ends of all mounting strut and conduit. Before installing, paint the field out ends of all mounting strut and RMC (threaded or non-threaded) with zinc rich paint (94% or more zinc content) to alleviate overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.

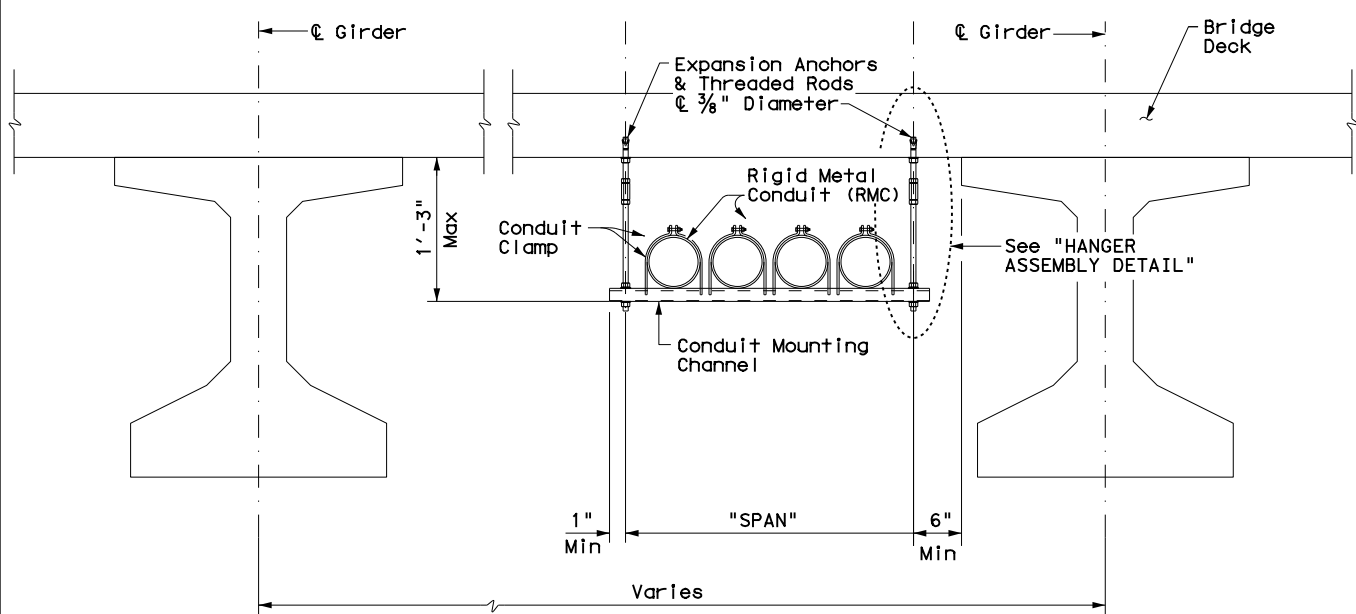
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<h2>ELECTRICAL DETAILS CONDUITS & NOTES</h2>			
<h3>ED(1)-14</h3>			
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REVISIONS	0006	15	038
	DIST	COUNTY	SHEET NO.
	ABL	NOLAN	120

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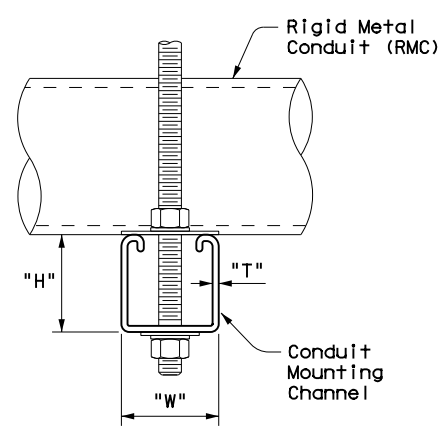
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CONDUIT HANGING DETAIL

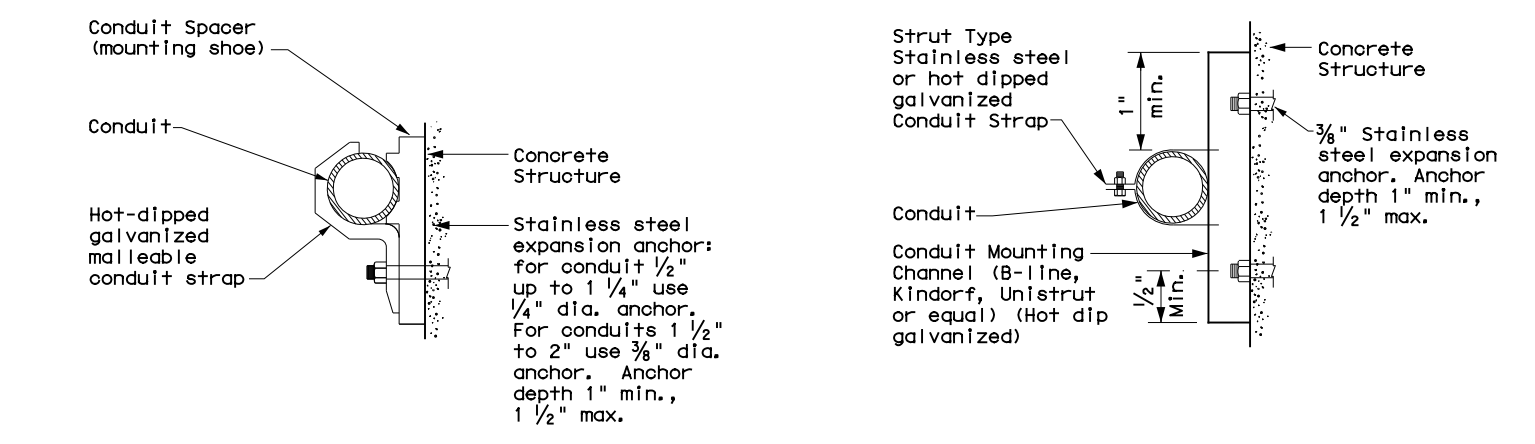
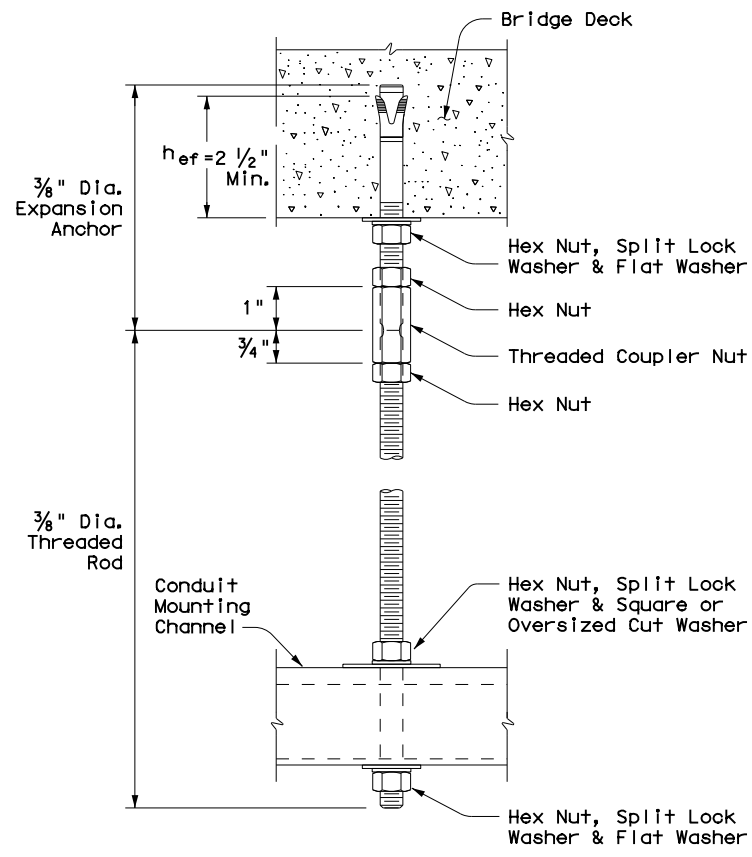
CONDUIT MOUNTING CHANNEL		
"SPAN"	"W" x "H"	"T"
less than 2'	1 5/8" x 1 3/8"	12 Ga.
2'-0" to 2'-6"	1 5/8" x 1 5/8"	12 Ga.
>2'-6" to 3'-0"	1 5/8" x 2 7/16"	12 Ga.

Channels with round or short slotted hole patterns are allowed, if the load carrying capacity is not reduced by more than 15%.



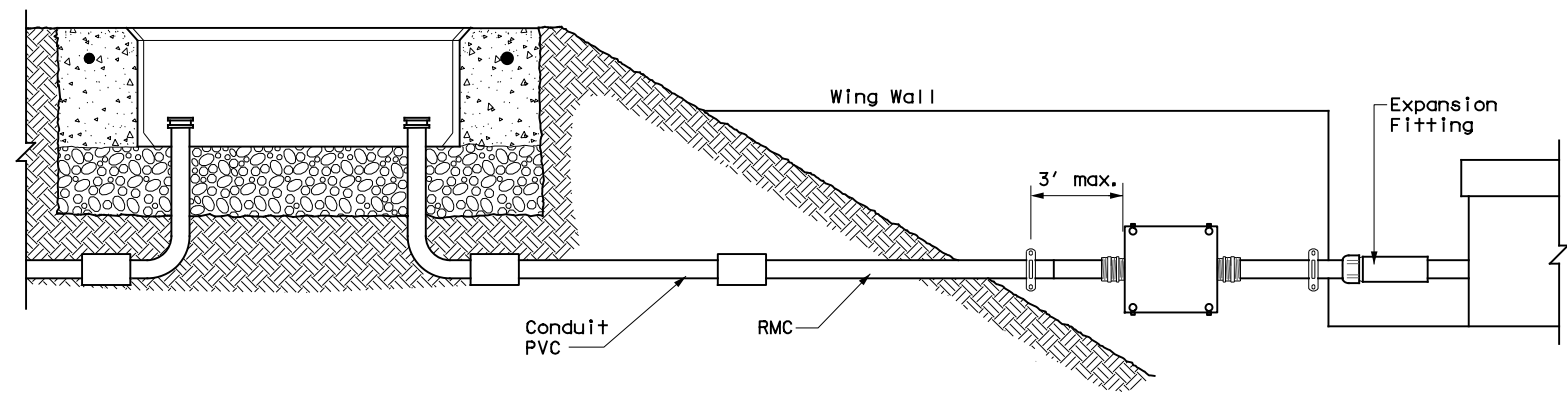
HANGER ASSEMBLY DETAIL

ELECTRIC CONDUIT TO BRIDGE DECK ATTACHMENT



CONDUIT MOUNTING OPTIONS

Attachment to concrete surfaces
 See ED(1)B.2



TYPICAL CONDUIT ENTRY TO BRIDGE STRUCTURE DETAIL

EXPANSION ANCHOR NOTES FOR BRIDGE DECK ATTACHMENT

1. Use torque controlled mechanical expansion anchors that are approved for use in cracked concrete by the International Code Council, Evaluation Service (ICC-ES). The chosen anchor product shall have a designated ICC-ES Evaluation Report number, and its approval status shall be maintained on the ICC-ES website under Division 031600 for Concrete Anchors.
2. Unless otherwise approved by the Engineer: do not use adhesive anchors; do not use expansion anchors that are not included in the ICC-ES approval list; and do not use expansion anchors that are only approved for use in uncracked concrete.
3. Use anchors manufactured with stainless steel expansion wedges. Anchors manufactured with carbon steel expansion wedges are not allowed. Anchor bodies can be either zinc-plated carbon steel or stainless steel. For application in marine environment, both the anchor body and expansion wedge shall be stainless steel.
4. Install anchors as shown on the plans and in accordance with the anchor manufacturer's published installation instructions. Arrange a field demonstration test to evaluate the procedures and tools. The test shall be witnessed and approved by the Engineer prior to furnishing anchors on the structure.
5. Prior to hole drilling, use rebar locator to ensure clearing of existing deck strands or reinforcement. Install anchors to ensure a minimum effective embedment depth, (h_{ef}), as shown. Increase (h_{ef}) as needed to ensure sufficient thread length for proper torquing and tightening of anchors.
6. Use anchors of minimum 1600 Lbs tensile capacity (minimum of steel, concrete breakout, and concrete pullout strengths as determined by ACI 318 Appendix D) at the required minimum embedment depth (h_{ef}). No lateral loads shall be introduced after conduit installation.

		Traffic Operations Division Standard	
<h2>ELECTRICAL DETAILS CONDUIT SUPPORTS</h2>			
<h3>ED(2)-14</h3>			
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© TxDOT October 2014	CONT SECT	JOB	HIGHWAY
REVISIONS	0006 15	038	SH 70
	DIST	COUNTY	SHEET NO.
	ABL	NOLAN	121

ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

1. Provide Type XHHW insulated conductors in accordance with Departmental Material Specification (DMS) 11040 "Conductors" and Item 620 "Electrical Conductors." Provide conductors as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 620. Color code insulated conductors in conformance with the NEC. Identify grounded (neutral) conductors with white insulation. Identify grounding conductors (ground wires) with green insulation or bare conductors. Identify ungrounded (hot) conductors with any color insulation except green, white, or gray. Keep color scheme consistent throughout the wiring system. Identify conductors 6 American Wire Gauge (AWG) and smaller by continuous color jacket. Identify electrical conductors 4 AWG and larger by continuous color jacket or by colored tape. When identifying conductors with colored tape, mark at least 6 in. of the conductor's insulation with half laps of tape.
2. Provide a solid copper 6 AWG grounding electrode conductor to bond the electrical service equipment to the concrete encased grounding electrode or the ground rod at the service location. Connect the grounding electrode conductor to the ground rod with a UL listed connector in accordance with DMS 11040. Connect the grounding electrode conductor to the concrete encased grounding electrode as shown in the plans.
3. Where two or more circuits are present in one conduit or enclosure, permanently identify the conductors of each branch circuit by attaching a non-metallic tag around both circuit conductors at each accessible location. Provide tags with two straps, large enough to indicate circuit number, letter, or other identification as shown in the plans. Print circuit identification on the tag with a permanent marker.
4. Use listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors for splicing as specified in DMS 11040. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Provide UL listed gel-filled insulating splice covers. Splicing materials, insulating materials, breakaway disconnects, splice covers, and fuse holders are subsidiary to various bid items.

B. CONSTRUCTION METHODS

1. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the conduit system. After installing conductors in conduit, perform conductor pull test. If a conductor cannot be freely pulled, make any needed alterations or repairs at no additional cost to the department. Perform insulation resistance tests in accordance with Item 620. Coordinate with the Engineer to witness the tests.
2. Leave 2 ft. minimum, 3 ft. maximum length for each conductor up to the splice in ground boxes. Leave 3 ft. minimum, 4 ft. maximum length of conductor in ground boxes when pulled through with no splice. Leave 1 ft. minimum, 1.5 ft. maximum length of conductor at enclosures, weatherheads and pole bases.
3. Make splices only in junction boxes, ground boxes, pole bases, or electrical enclosures and use only listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or gel-filled insulating splice covers to provide a watertight splice. Overlap conductor insulation with heat shrink tubing a minimum of 2 in. past both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, increase the diameter of the conductor insulation using hot melt adhesive tape to provide a watertight seal between the individual conductors and the heat shrink tubing. Ensure the tape extends past the heat shrink tubing. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Heat shrink tubing that appears to have been burned, or overheated, is considered defective and must be replaced.
4. Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.
5. Wire nuts with factory applied waterproof sealant may be used for 8 AWG or smaller conductors in above ground junction boxes, but not in pole bases or ground boxes. Install wire nuts in an upright position to prevent the accumulation of water.
6. Support conductors in illumination poles with a J-hook at the top of the pole.
7. When terminating conductors, remove the insulation and jacketing material without nicking the individual strands of the conductor. Conductors with nicked individual conductor strands or removed strands will be considered damaged.
8. Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.
9. Do not repair damaged conductors with duct tape, electrical tape, or wire nuts. Use only approved splicing methods.
10. Do not terminate more than one conductor under a single connector, unless the connector is rated for multiple conductors. Do not exceed the pressure connector's listing for maximum number and size of conductors allowed.
11. Install breakaway connectors on conductors bid under Item 620 whenever those conductors pass through a breakaway support device. Follow manufacturer's instructions when terminating conductors to breakaway connectors. Properly torque threaded connections. Proper terminations are critical to the safe operation of breakaway devices. Trim waterproofing boots on breakaway connectors to fit snugly around the conductor to ensure waterproof connection. Only one conductor may enter a single opening in a boot. Provide waterproof boots with the correct number of openings. Leave unused openings factory sealed. Use prequalified breakaway connectors as shown on the MPL.

12. Provide and install a separate stranded equipment grounding conductor (EGC) in all conduits that contain circuit wiring of 50 volts or more. Unless shown elsewhere, size the EGC to be the same size as the largest current carrying conductor contained in the conduit. Ensure all EGCs are bonded together at every accessible location. For traffic signal installations, provide a minimum size 8 AWG EGC. The EGC is paid for under Item 620.

C. TEMPORARY WIRING

1. Install temporary conductors and electrical equipment in accordance with the NEC article "Temporary Installations" and Department standard sheets.
2. Provide a ground fault circuit interrupter (GFCI) for power outlets for portable electrical equipment, power tools, ice machines, ice storage bins and refrigerators located outdoors at grade. GFCI may be any one of the following: molded cord and plug set, receptacle, or circuit breaker type.
3. Use listed wire nuts with factory applied sealant for temporary wiring where approved.
4. Enclose conductor splices within a listed enclosure or ground box, or ensure the splices are more than 10 ft. above grade vertically and more than 5 ft. horizontally from any metal structure. Where installing temporary conductors in areas subject to vehicle traffic or mobile construction equipment, ensure the vertical clearance to ground is at least 18 ft. when measured at the lowest point. Ground messenger wires that support power conductors in conformance with the NEC.
5. Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

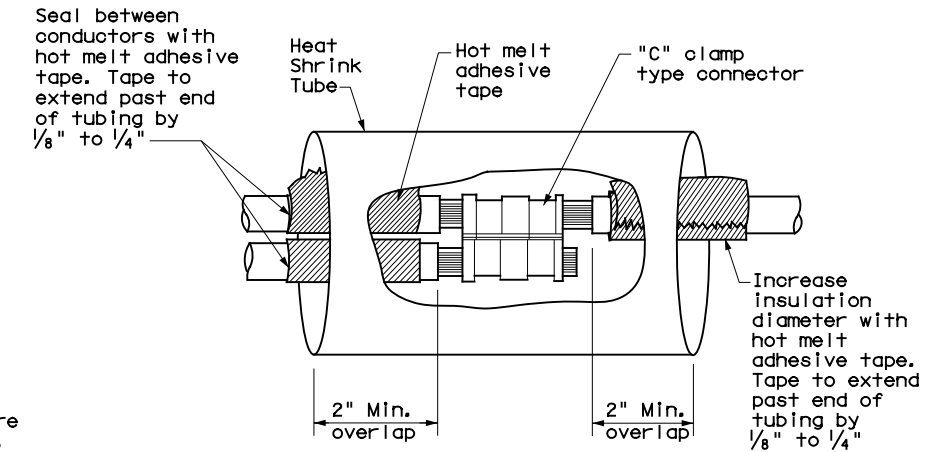
GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

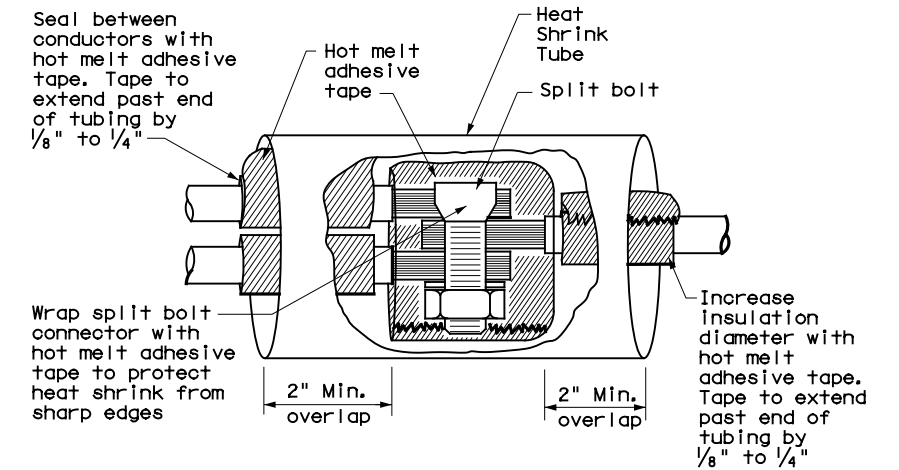
1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in specific locations including electrical service, see individual plan sheets.

B. CONSTRUCTION METHODS

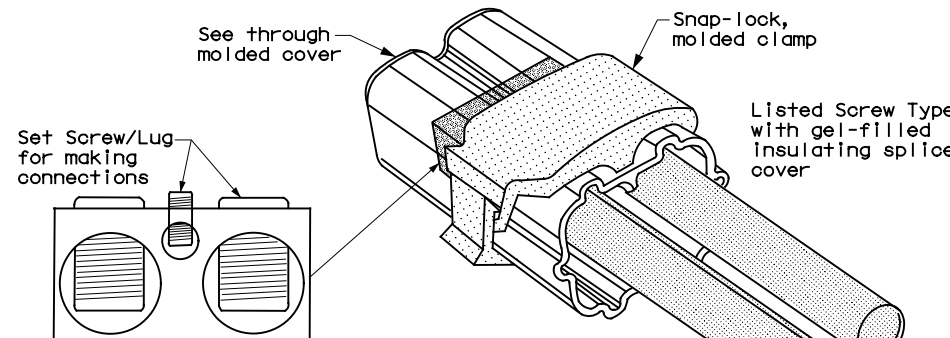
1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, ensure that the upper end is between 2 to 4 in. below finished grade.
2. Do not place ground rods in the same drilled hole as a timber pole.
3. Install ground rods so the imprinted part number is at the upper end of the rod.
4. Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.
6. Unless otherwise called for in the plans, protect grounding electrode conductors with non-metallic conduit. When protecting grounding electrode conductors with metal conduit, provide and install a grounding type bushing and properly sized bonding jumper on each end of the metal conduit.
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



**SPLICE OPTION 1
Compression Type**



**SPLICE OPTION 2
Split Bolt Type**



**SPLICE OPTION 3
Listed Screw Type**

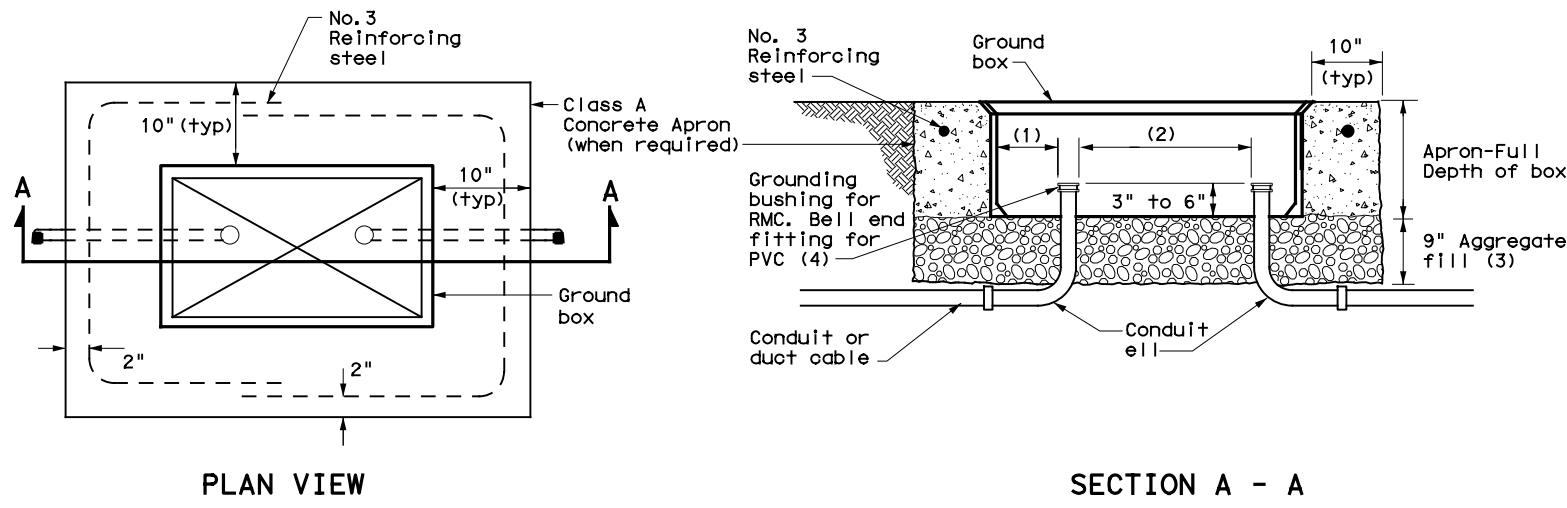
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		Traffic Operations Division Standard	
<h1>ELECTRICAL DETAILS CONDUCTORS</h1>			
<h2>ED(3)-14</h2>			
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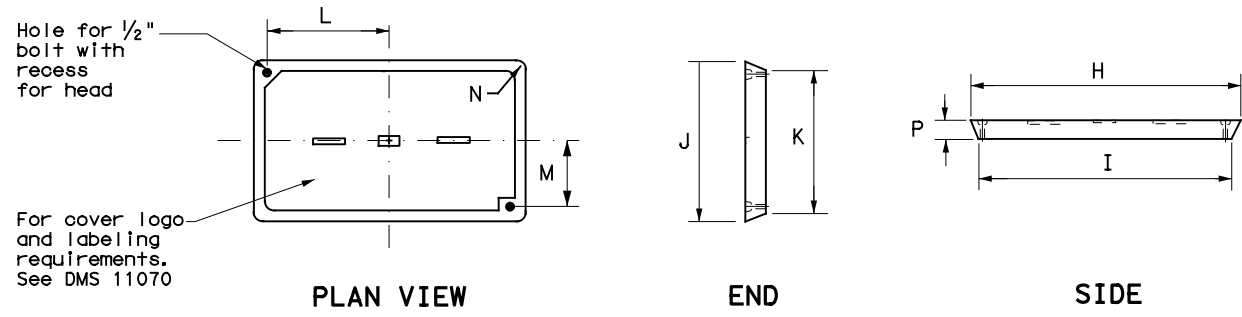


APRON FOR GROUND BOX

- (1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.
- (2) Maintain sufficient space between conduits to allow for proper installation of bushing.
- (3) Place aggregate under the box, not in the box. Aggregate should not encroach on the interior volume of the box.
- (4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

GROUND BOX DIMENSIONS	
TYPE	OUTSIDE DIMENSIONS (INCHES) (Width x Length X Depth)
A	12 X 23 X 11
B	12 X 23 X 22
C	16 X 29 X 11
D	16 X 29 X 22
E	12 X 23 X 17

GROUND BOX COVER DIMENSIONS								
TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2



GROUND BOX COVER

GROUND BOXES

A. MATERIALS

1. Provide polymer concrete ground boxes measuring 16x30x24 in. (WxLxD) or smaller in accordance with Departmental Material Specification (DMS) 11070 "Ground Boxes" and Item 624 "Ground Boxes."
2. Provide Type A, B, C, D, and E ground boxes as shown in the plans, and as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 624.
3. Ensure ground box cover is correctly labeled in accordance with DMS 11070.
4. Provide larger ground boxes in accordance with Item 624 and as shown in the plans.

B. CONSTRUCTION METHODS

1. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure aggregate bed is in place and at least 9 inches deep, prior to setting the ground box. Install ground box on top of aggregate.
2. Cast ground box aprons in place. Reinforcing steel may be field bent. Ensure the depth of concrete for the apron extends from finished grade to the top of the aggregate bed under the box. Ground box aprons, including concrete and reinforcing steel, are subsidiary to ground boxes when called for by descriptive code.
3. Keep bolt holes in the box clear of dirt. Bolt covers down when not working in ground boxes.
4. Install all conduits and ells in a neat and workmanlike manner. Uniformly space conduits so grounding bushings and bell end fittings can easily be installed.
5. Temporarily seal all conduits in the ground box until conductors are installed.
6. Permanently seal conduits immediately after the completion of conductor installation and pull tests. Permanently seal the ends of all conduits with duct seal, expandable foam, or other method as approved. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a sealant.
7. When a ground rod is present in a ground box, bond all equipment grounding conductors together and to the ground rod with listed connectors.
8. When a type B or D ground box is stacked to meet volume requirements, it is allowable to cut an appropriately sized hole for conduit entry in the side wall at least 18 inches below grade.
9. If an existing ground box in the contract has a metal cover, bond the cover to the equipment grounding conductor with a 3 ft. long stranded bonding jumper the same size as the grounding conductor. The bonding jumper is subsidiary to various bid items. Verify existing ground boxes with metal covers are shown on the plans, with notes fully describing the work required.
10. If other ground boxes with metal covers are within the project limits but are not part of the contract, the Engineer may direct the Contractor to bond the metal covers, identifying the specific boxes in writing. This work will be paid for separately.
11. Bond metal ground box covers to the grounding conductor with a tank ground type lug.

				Traffic Operations Division Standard	
<h2>ELECTRICAL DETAILS</h2> <h3>GROUND BOXES</h3> <h4>ED(4)-14</h4>					
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DIST	COUNTY	SHEET NO.			
ABL	NOLAN	123			

ELECTRICAL SERVICES NOTES

- Provide new materials. Ensure installation and materials comply with the applicable provisions of the National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards. Ensure material is Underwriters Laboratories (UL) listed. Provide and install electrical service conduits, conductors, disconnects, contactors, circuit breaker panels, and branch circuit breakers as shown on the Electrical Service Data chart in the plans. Faulty fabrication or poor workmanship in material, equipment, or installation is justification for rejection. Where manufacturers provide warranties and guarantees as a customary trade practice, furnish these to the State.
- Provide electrical services in accordance with Electrical Details standard sheets, Departmental Material Specification (DMS) 11080 "Electrical Services," DMS 11081 "Electrical Services-Type A," DMS 11082 "Electrical Services-Type C," DMS 11083 "Electrical Services-Type D," DMS 11084 "Electrical Services-Type T," DMS 11085 "Electrical Services-Pedestal (PS)", and Item 628 "Electrical Services" of the Standard Specifications. Provide electrical service types A, C, and D, as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 628. Provide other service types as detailed on the plans.
- Provide all work, materials, services, and any incidentals needed to install a complete electrical service as specified in the plans.
- Coordinate with the Engineer and the utility provider for metering and compliance with utility requirements. Primary line extensions, connection charges, meter charges, and other charges by the utility company to provide power to the location are paid for in accordance with Item 628. Get approval for the costs associated with these charges prior to engaging the utility company to do the work. Consult with the utility provider to determine costs and requirements, and coordinate the work as approved.
- The enclosure manufacturer will provide Master Lock Type 2 with brass tumblers keyed #2195 for all custom electrical enclosures. Installing Contractor is to provide Master Lock #2195 Type 2 with brass tumblers for "off the shelf" enclosures. Master Lock #2195 keys and locks become property of the State. Unless otherwise approved, do not energize electrical service equipment until locks are installed.
- Enclosures with external disconnects that de-energize all equipment inside the enclosure do not need a dead front trim. Protect incoming line terminations from incidental contact as required by the NEC.
- When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used.
- Provide wiring and electrical components rated for 75°C. Provide red, black, and white colored XHHW service entrance conductors of minimum size 6 American Wire Gauge (AWG). Identify size 6 AWG conductors by continuous color jacket. Identify electrical conductors sized 4 AWG and larger by continuous color jacket or by colored tape. Mark at least 6 inches of the conductor's insulation with half laps of colored tape, when identifying conductors. Ensure each service entrance conductor exits through a separately bushed non-metallic opening in the weatherhead. The lengths of the conductors outside the weatherhead are to be 12 inches minimum, 18 inches maximum, or as required by utility.
- All electrical service conduit and conductors attached to the electrical service including the riser or the elbow below ground are subsidiary to the electrical service. For an underground utility feed, all service conduit and conductors after the elbow, including service conduit and conductors for the utility pole riser when furnished by the Contractor, will be paid for separately.
- Provide rigid metal conduit (RMC) for all conduits on service, except for the 1/2 in. PVC conduit containing the electrical service grounding electrode conductor. Size the service entrance conduit as shown in the plans. Ensure conduit for branch circuit entry to enclosure is the same size as that shown on the layout sheets for branch circuit conduit. Extend all rigid metal conduits a minimum of 6 inches underground and then couple to the type and schedule of the conduit shown on the layout for that particular branch circuit. Install a grounding bushing on the RMC where it terminates in the service enclosure.
- Use of liquidtight flexible metal conduit (LFMC) is allowed between the meter and service enclosure when they are mounted 90 to 180 degrees to each other. Size the LFMC the same size as service entrance conduit. LFMC must not exceed 3 feet in length. Strap LFMC within 1 foot of each end. LFMC less than 12 inches in length need not be strapped. Each end of LFMC must have a grounding bushing or be terminated with a grounding fitting. The LFMC must contain a grounded (neutral) conductor. Ensure any bend in LFMC never exceeds 180 degrees. A pull test is required on all installed conductors, with at least six inches of free conductor movement demonstrated to the satisfaction of the Engineer.
- Ensure all mounting hardware and installation details of services conform to utility company specifications.
- For all electrical service enclosures listed under Item 628 on the MPL, the UL 508 enclosure manufacturers will prepare and submit a schematic drawing unique to each service. Before shipment to the job site, place the applicable laminated schematic drawings and the laminated plan sheet showing the electrical service data chart used to build the enclosure in the enclosure's data pocket. The installing contractor will copy and laminate the actual project plan sheets detailing all equipment and branch circuits supplied by that service. The laminated plan sheets are to be placed in the service enclosure's document pocket. Reduce 11 in. x 17 in. plan sheets to 8 1/2 in. x 11 in. before laminating. If the installation differs from the plan sheets, the installing contractor is to redline plan sheets before laminating.
- When providing an "Off The Shelf" Type D or Type T service, provide laminated plan sheets detailing equipment and branch circuits supplied by that service. Reduce 11 in. x 17 in. plan sheets to 8 1/2 in. x 11 in before laminating. Deliver these drawings before completion of the work to the Engineer, instead of placing in enclosure that has no door pocket.
- Do not install conduit in the back wall of a service enclosure where it would penetrate the equipment mounting panel inside the enclosure. Provide grounding bushings on all metal conduits, and terminate bonding jumpers to grounding bus. Grounding bushings are not required when the end of the metal conduit is fitted with a conduit sealing nut or threaded boss, such as a meter base hub.

SERVICE ASSEMBLY ENCLOSURE

- Provide threaded hub for all conduit entries into the top of enclosure.
- Type galvanized steel (GS) enclosures may be used for Type C panelboards and for Type D and T services that do not use an enclosure mounted photoceiling or lighting contactor. Provide GS enclosures in accordance with DMS 11080, 11082, 11083, and 11084.
- Provide aluminum (AL) and stainless steel (SS) enclosures for Types A, C, and D in accordance with DMS 11080, 11081, 11082, 11083, and 11084. Do not paint stainless steel.
- Provide pedestal service (PS) enclosures in accordance with ED(9) and DMS 11080 and 11085. Do not provide GS pedestal services. If GS is shown in the PS descriptive code, provide an AL enclosure.

MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

- Field drill flange-mounted remote operator handle if needed, to ensure handle is lockable in both the "On" and "Off" positions.
- When the utility company provides a transformer larger than 50 KVA, verify that the available fault current is less than the circuit breaker's ampere interrupting capacity (AIC) rating and provide documentation from the electric utility provider to the Engineer.

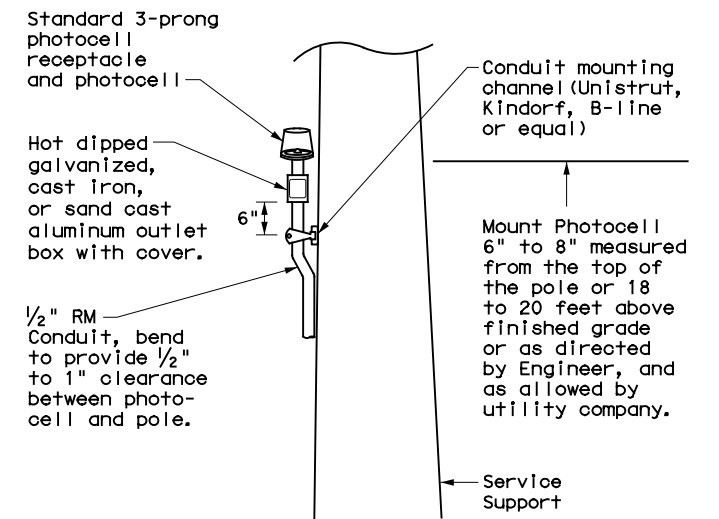
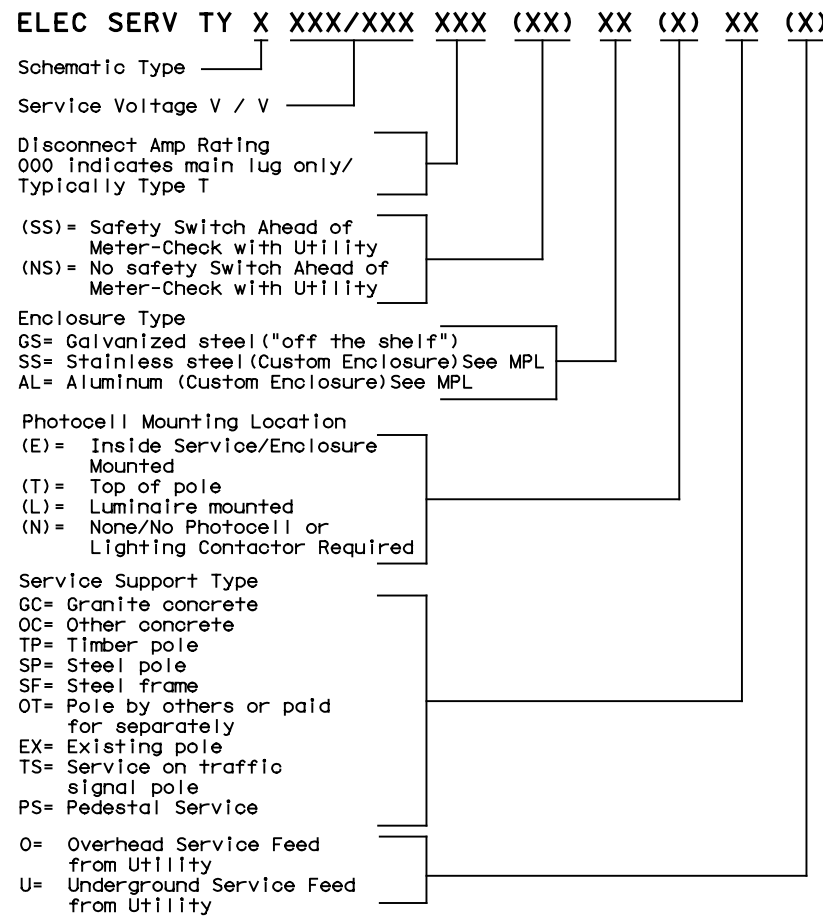
PHOTOELECTRIC CONTROL

- Provide photoceiling as listed on the MPL. Move, adjust, or shield the photoceiling from stray or ambient night time light to ensure proper operation. Mount photoceiling facing north when practical. Mount top of pole photoceiling as shown on Top Mounted Photoceiling Detail.

* ELECTRICAL SERVICE DATA												
Elec. Service ID	Plan Sheet Number	Electrical Service Description	Service Conduit *xS Size	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amps	Two-Pole Contractor Amps	Panelbd/ Loadcenter Amp Rating	Branch Circuit ID	Branch Ckt. Bkr. Pole/Amps	Branch Circuit Amps	KVA Load
SB 183	289	ELC SRV TY A 240/480 100(SS)AL(E)SF(U)	2"	3/#2	100	2P/100	100	N/A	Lighting NB	2P/40	26	28.1
									Lighting SB	2P/40	25	
									Underpass	1P/20	15	
NB Access	30	ELC SRV TY D 120/240 060(NS)SS(E)TS(O)	1 1/4"	3/#6	N/A	2P/60		100	Sig. Controller	1P/30	23	5.3
							30		Luminaires	2P/20	9	
									CCTV	1P/20	3	
2nd & Main	58	ELC SRV TY T 120/240 000(NS)GS(N)SP(O)	1 1/4"	3/#6	N/A	N/A	N/A	70	Flashing Beacon 1	1P/20	4	1.0
									Flashing Beacon 2	1P/20	4	

* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.
 ** Verify service conduit size with utility. Size may change due to utility meter requirements. Ensure conduit size meets the National Electrical Code.

EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE



TOP MOUNTED PHOTOCELL

Install conduit strap maximum 3 feet from box. 5 foot maximum spacing between straps supporting conduit.

Texas Department of Transportation Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE NOTES & DATA

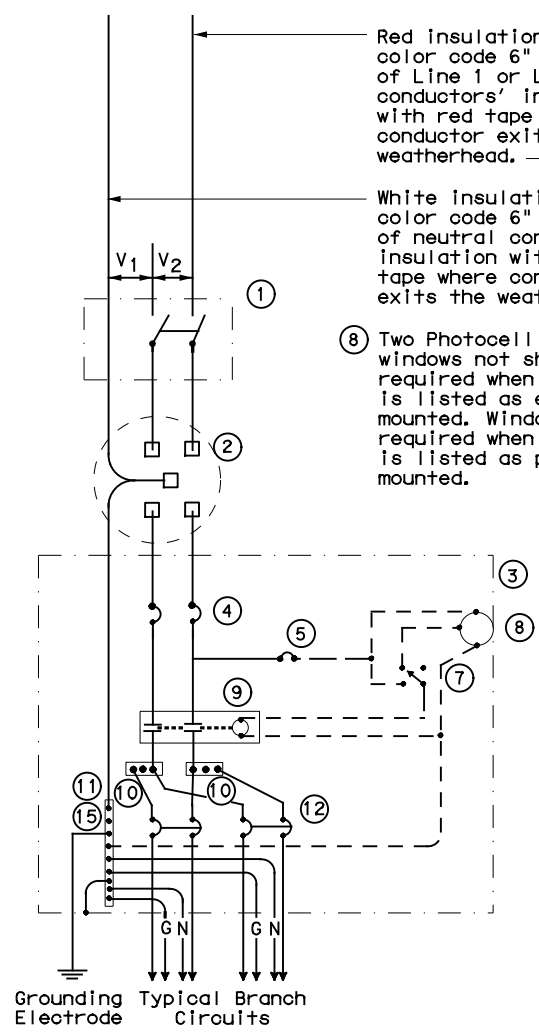
ED(5) - 14

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© TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
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	ABL	NOLAN	124	

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**SCHEMATIC TYPE A
THREE WIRE**

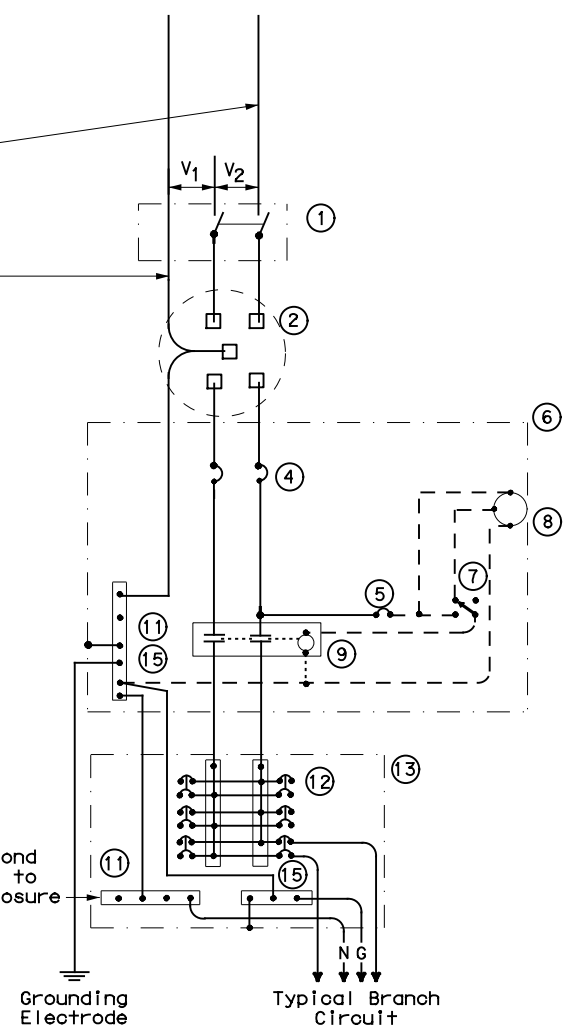
Red insulation or color code 6" length of Line 1 or Line 2 conductors' insulation with red tape where conductor exits the weatherhead.

White insulation or color code 6" length of neutral conductors' insulation with white tape where conductor exits the weatherhead.

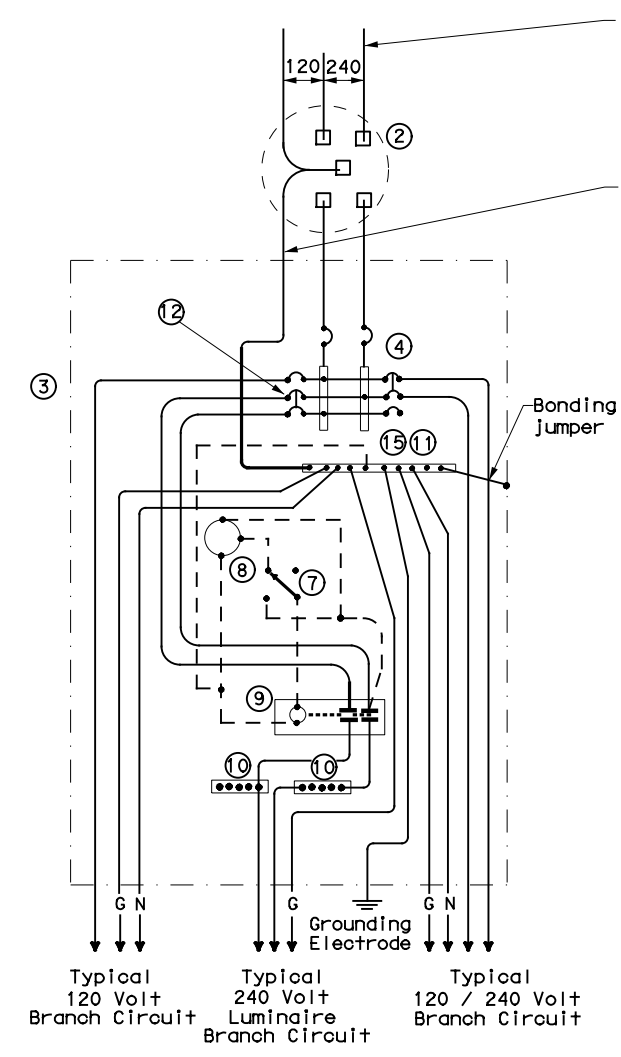
⑧ Two Photocell viewing windows not shown but required when photocell is listed as enclosure mounted. Windows not required when photocell is listed as pole top mounted.

Do not bond this bus to the enclosure

WIRING LEGEND	
————	Power Wiring
- - - -	Control Wiring
—N—	Neutral Conductor
—G—	Equipment grounding conductor-always required



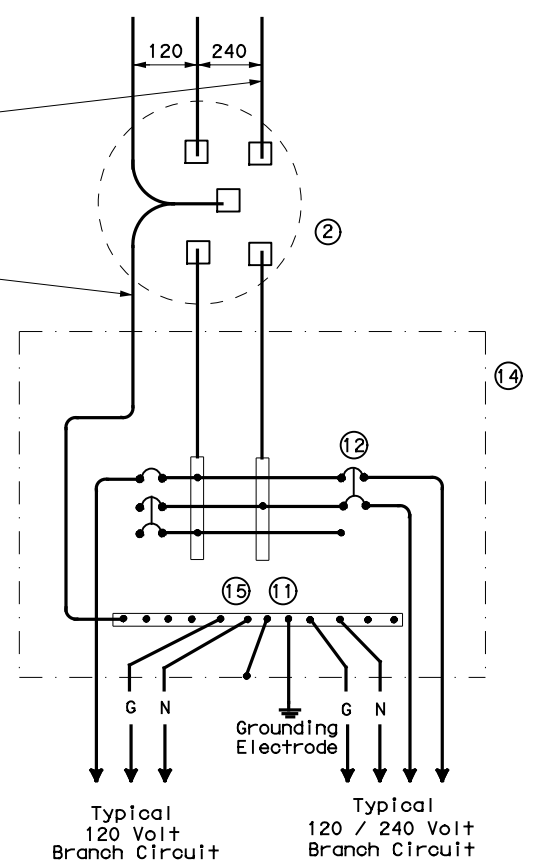
**SCHEMATIC TYPE C
THREE WIRE**



**SCHEMATIC TYPE D - CUSTOM
120/240 VOLTS - THREE WIRE**

Red insulation or color code 6" length of Line 1 or Line 2 conductors' insulation with red tape where conductor exits the weatherhead.

White insulation or color code 6" length of neutral conductors' insulation with white tape where conductor exits the weatherhead.



**SCHEMATIC TYPE T
120/240 VOLTS - THREE WIRE**
 Galvanized steel-"Buy Off The Shelf" only. When required install photocell top of the pole or on luminaire only, no lighting contractor will be installed.

SCHEMATIC LEGEND	
1	Safety Switch (when required)
2	Meter (when required-verify with electric utility provider)
3	Service Assembly Enclosure
4	Main Disconnect Breaker (See Electrical Service Data)
5	Circuit Breaker, 15 Amp (Control Circuit)
6	Auxiliary Enclosure
7	Control Station ("H-O-A" Switch)
8	Photo Electric Control (enclosure-mounted shown)
9	Lighting Contactor
10	Power Distribution Terminal Blocks
11	Neutral Bus
12	Branch Circuit Breaker (See Electrical Service Data)
13	Separate Circuit Breaker Panelboard
14	Load Center
15	Ground Bus

				Traffic Operations Division Standard	
ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES					
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DIST	COUNTY	SHEET NO.			
ABL	NOLAN	125			

ROADWAY ILLUMINATION ASSEMBLY NOTES

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1. Details apply to roadway lighting installations bid or referenced under Item 610, "Roadway Illumination Assemblies." Provide, furnish, and install all other materials not shown on the plans which may be necessary for complete and proper construction. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the State such warranties or guarantees.
2. The locations of poles and fixtures may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry and utility safety practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.
3. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association, Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection.
4. Provide Roadway Illumination Light Fixtures as per TxDOT Departmental Material Specification (DMS) 11010, Item 610, and as shown on the Material Producers List (MPL) for Roadway Illumination and Electrical Supplies.
5. Fabricate steel roadway illumination poles in accordance with Roadway Illumination Poles (RIP) standards and Item 610. Poles fabricated according to RIP standards do not require shop drawing submittals.
 - a. Alternate designs to RIP standards or the use of aluminum to fabricate poles will require the submission of shop drawings electronically. For instructions on submitting shop drawings electronically see "Guide to Electronic Shop Drawing Submittal" on the TxDOT web site.
 - b. Limitations on use of the RIP standard: The RIP standard details were developed for installations in locations where the 3-second gust basic maximum wind speed is 110 mph, and where the elevation of the base of the pole is less than (i.e. not more than) 25' above the elevation of the surrounding terrain, in accordance with the "AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals," 6th Edition (2013) of the AASHTO Design Specifications. For poles to be installed in regions where the maximum basic wind speed exceeds 110 mph or to be mounted more than 25' above the surrounding terrain, provide poles meeting the following requirements:
 - i. Submittals. Following the electronic shop drawing submittal process (see Guide to Electronic Shop Drawing Submittal on the TxDOT web site), submit to the Engineer for approval fabrication drawings and calculations for the poles, sealed by a Texas licensed professional engineer (P.E.).
 - ii. Luminaire Structural Support Requirements. Provide light poles, arms, and anchor bolt assemblies with a 25 year design life to safely resist dead loads, ice loads and the required basic wind speeds at the location of installation in accordance with the 6th edition (2013) of the AASHTO Design Specifications. For transformer base poles, include transformer base and connecting hardware in calculations and shop drawing submittals. Structurally test all transformer bases to resist the theoretical plastic moment capacity of the pole. Submit certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished with the shop drawings. Show breakaway base model number, manufacturer's name, and logo on shop drawings. Include on manufacturer's shop drawings the ASTM designations for all materials to be used.
6. For both transformer and shoe-base type illumination poles, provide and install double-pole breakaway fuse holders as specified by DMS-11040. Breakaway fuse holders are listed on the MPL for Roadway Illumination and Electrical Supplies under Items 610 & 620. Provide 10 amp time delay fuses for breakaway connectors in light poles, or inside the light fixture for underpass luminaires. In each pole, connect luminaires to the breakaway connector with continuous stranded 12 AWG copper conductors as listed on the MPL. Bond all equipment grounding conductors together and to the ground lug in the transformer base or hand hole.
7. Tighten anchor bolts for shoe base, concrete traffic barrier base, and bridge mount roadway illumination poles, in accordance with Item 449.
8. Install T-Base with following procedure:
 - a. Anchor Bolt Tightening.
 - i. Coat the threads of the anchor bolts with electrically conductive lubricant.
 - ii. Place the T-base over the anchor bolts. Foundation must be level and flat. The maximum permissible gap under any one corner of the t-base is 1/8" before nuts are tightened.
 - iii. Coat the bearing surfaces of the nuts and washers with electrically conductive lubricant. Install (1) 1/2" hold down washer, (1) lock washer, and (1) nut on each anchor bolt. Turn the nuts onto the bolts so that each is hand-tight against the washer.
 - iv. Using a torque wrench, tighten each nut to 150 ft-lb. Uniform contact is required between the foundation and the T-base in the corner regions of the T-base, and all corner gaps must be closed after applying torque. If a gap still exists after torquing to 150 ft-lbs, continue torquing each bolt incrementally until gap is closed or maximum allowable torque of 250 ft. pound is reached, whichever comes first. If 250 ft-lbs is not enough to close the gap the foundation must be leveled. Gaps along the straight sides of the T-bases and the foundation are permissible. Ensure that no high point of contact occurs between the straight sides of the T-base and the foundation.
 - v. Check top of T-base for level. If not level then foundation must be leveled.
 - b. Top Bolt Procedure
 - i. Erect pole over T-base with crane. Coat bolts, nuts, washers, and lock washers with electrically conductive lubricant.

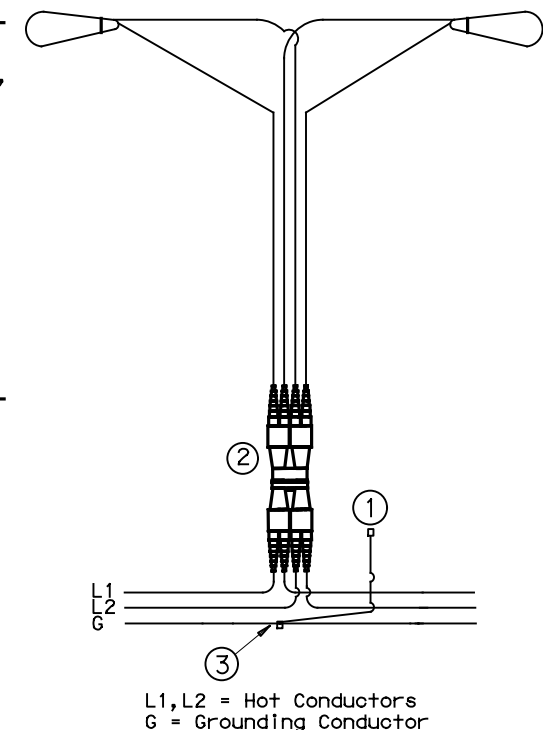
- ii. Install bolts and 1/2" connecting washers from the inside of the T-base, thread up through the pole base. Install flat washers, lock washers and nuts snug tight according to Item 447, "Structural Bolting."
 - iii. Tighten each nut to 150 ft-lb. using a torque wrench.
- c. Level and Plumb
- i. Ensure pole is plumb and mast arm is perpendicular to the roadway according to plans to within 5 degrees.
9. Construct luminaire pole foundations in accordance with Item 416, "Drilled Shaft Foundations," and TxDOT standard sheet RID(2).
 10. Provide and install underpass luminaires in accordance with Item 610, DMS-11010, and TxDOT standard sheet RID(3). Typical luminaire size for underpass luminaires is 150W HPS or 150W EQ LED.
 11. Mount luminaires on arms level as shown by the luminaire level indicator.
 12. Orient luminaires perpendicular to the roadway intended to be lit unless otherwise shown on the plans.

Wiring Diagram Notes:

- ① Use 1/2 in. -13 UNC threaded, copper or tin-plated copper, pole bonding connector, sized appropriately for conductors, bonded to T-base, or use ground lug in handhole as available.
- ② Use pre-qualified two-pole breakaway connectors for all luminaire pole installations. For luminaires fed by a circuit with a neutral conductor, use double pole breakaway connectors with the neutral side unfused and marked white.
- ③ Split Bolt or other connector.

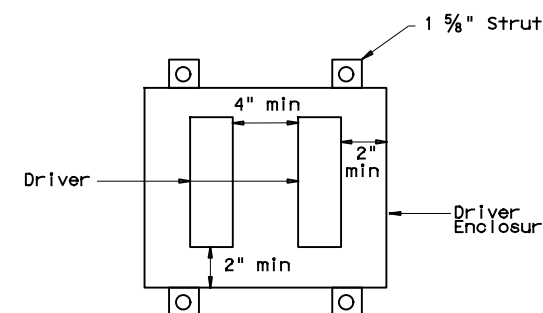
Decorative LED Lighting Notes:

1. LED Drivers in Remote Outdoor enclosures (for drivers that do not include an enclosure as part of a factory assembly):
 - a. Provide NEMA 3R outdoor enclosure or as approved.
 - b. Install enclosure at least 12" above ground or other horizontal surface. Mount vertically or on ceiling, and avoid direct sun where possible.
 - c. Install drivers with at least 2 inches of space from enclosure walls.
 - d. For multiple drivers in an enclosure, provide at least 4 inches side to side and 1 inch end to end from other drivers or electronic equipment
 - e. For drivers mounted on back wall of enclosure, mount enclosure on 1 5/8" strut or other standoff to dissipate heat, or mount driver to side of the enclosure or to the metal cover.
 - f. Provide remote drivers with a maximum of 100 watts
 - g. Provide drivers with documentation of 100,000 hr lifetime at Ta of 65C or higher.



TYPICAL WIRING DIAGRAM

LUMINAIRES SERVED AT 480V ON 240/480 VOLT SERVICE OR LUMINAIRES SERVED AT 240V FOR 120/240 VOLT SERVICE.

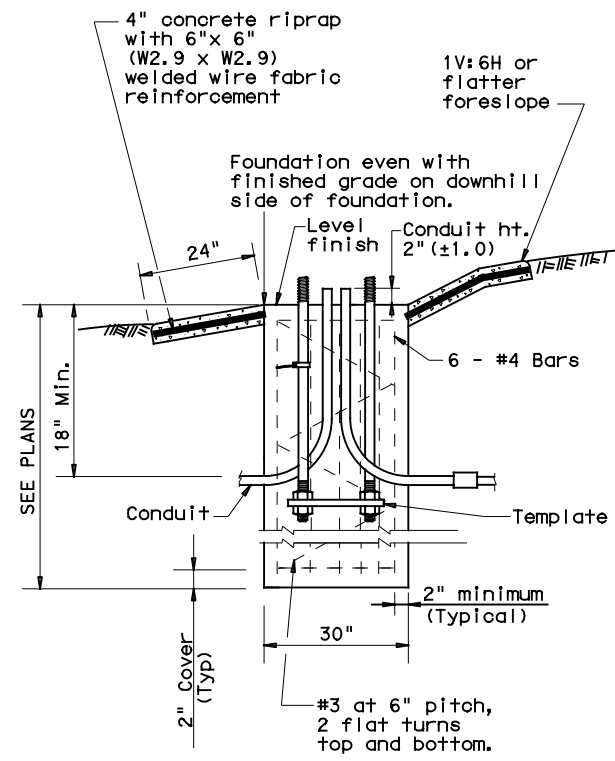


Driver Spacing In Remote Enclosure

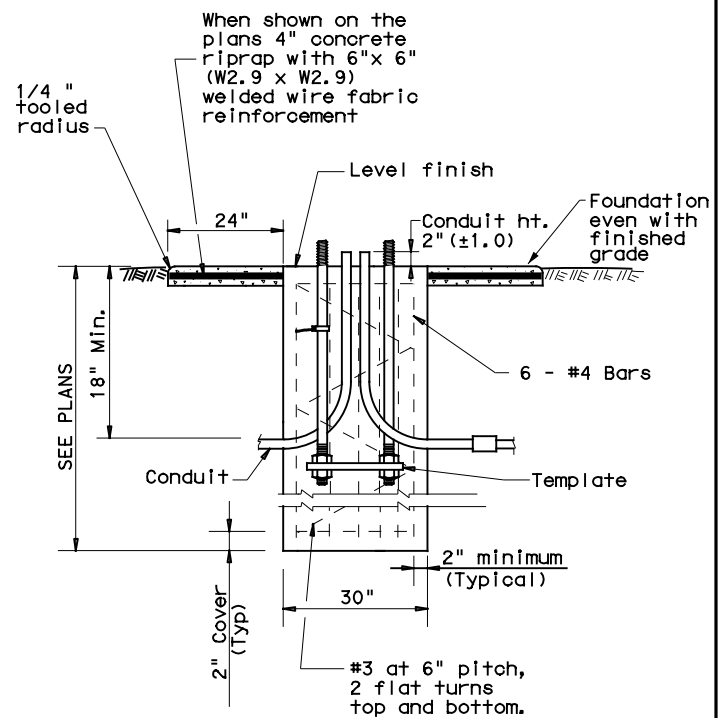
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SECTION A-A
SHOWING SLOPED GRADE



SECTION A-A
SHOWING CONSTANT GRADE

TABLE 1

ANCHOR BOLTS

POLE MOUNTING HEIGHT	BOLT CIRCLE		ANCHOR BOLT SIZE
	Shoe Base	T-Base	
<40 ft.	13 in.	14 in.	1 in. x 30 in.
40-50 ft.	15 in.	17 1/4 in.	1 1/4 in. x 30 in.

TABLE 2

RECOMMENDED FOUNDATION LENGTHS
(See note 1)

MOUNTING HEIGHT	TEXAS CONE PENETROMETER N Blows/ft		
	10	15	40
<20 ft.	6'	6'	6'
>20 ft. to 30 ft.	8'	6'	6'
>30 ft. to 40 ft.	8'	8'	6'
>40 ft. to 50 ft.	10'	8'	6'

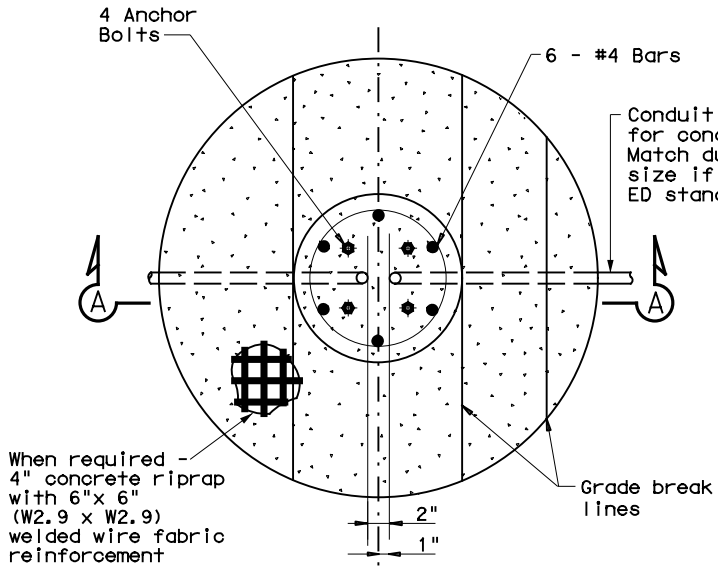
TABLE 3

PAY QUANTITY OF RIPRAP PER FOUNDATION
(Install only when shown on the plans)

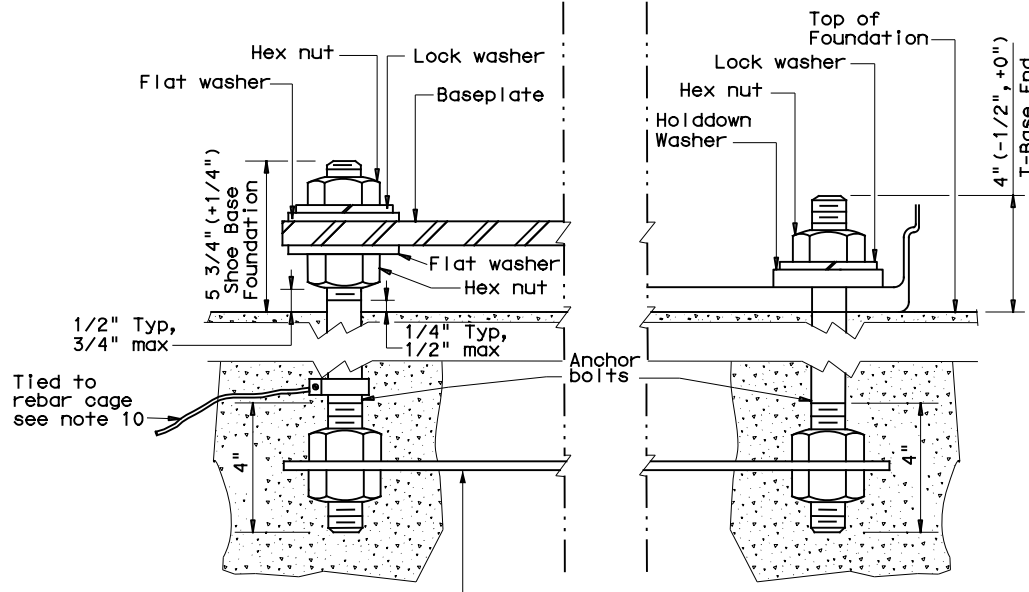
Foundation Diameter	RIPRAP DIAMETER	RIPRAP (CONC) (CL B)
30 in.	78 in.	0.35 CY

GENERAL NOTES:

1. "Recommended Foundation Lengths" table is for information purposes only. Foundation lengths shall be as shown on the plans, or as directed by the Engineer. Foundations will be paid for under Item 416, "Drilled Shaft Foundations," unless otherwise shown on the plans.
2. Erect roadway illumination assembly poles plumb and true. Form and level the top 6" of the foundation so the pole will be plumb. Use leveling nuts to plumb shoe base poles. Do not use shims or leveling nuts under transformer bases. Do not grout between baseplate and the foundation.
3. Ensure Class 2A and 2B fit for anchor bolts and nuts. Tap and chase nuts after galvanizing. Anchor bolt body with rolled threads need not be full size.
4. Use appropriate class of concrete as specified in Items 416 and 432. Concrete for riprap may be upgraded to Class C at no extra cost to the Department.
5. Place riprap around the foundation when called for elsewhere in the plans. Riprap will be paid for under Item 432.
6. Locate breakaway roadway illumination assemblies as shown in the placement table, unless otherwise dimensioned on the plans. Protect non-breakaway illumination assemblies from vehicular impact (i.e. 2.5 ft. behind guard rail or mounted on traffic barrier), or located outside the clear zone, except that 2.5 ft. from curb face is minimum desired for light poles on city streets, 45 mph or less. See Roadway Design Manual for further information.
7. Use 4 hold down and 4 connecting washers on transformer base poles as recommended by the manufacturer and supplied with base.
8. Install a minimum of 2 conduits in each foundation. See lighting layout sheets for locations of foundations with more than 2 conduits. Cap unused conduits in foundations on both ends.
9. Conduit location in foundations is critical for breakaway devices. Place conduits 2 in. apart on centerline as shown.
10. Bond anchor bolt to rebar cage with #6 bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete. The bonded steel in the foundation creates a concrete encased grounding electrode which replaces the ground rod.
11. Grade earthwork around T-base foundations even with the finished grade as shown in Section A-A to ensure proper function of the breakaway device. Use riprap on T-base foundations that are located on sloped grades, and as shown on the plans for level grades.



FOUNDATION DETAIL



ANCHOR BOLT DETAIL

TABLE 4

BREAKAWAY POLE PLACEMENT (See note 6)

ROADWAY FUNCTIONAL CLASSIFICATION	** POLE OFFSET (DISTANCE TO FACE OF TRANSFORMER BASE)
Freeway Mainlanes (roadway with full control of access)	15 ft. (minimum and typical) from lane edge
All curbed, 45 mph or less design speed	2.5 ft. minimum (15 ft. desirable) from curb face
All others	10 ft. minimum*(15 ft. desirable) from lane edge

* or as close to ROW line as is practical

** provide 2/5 of the luminaire mounting height behind the pole for "falling area" to prevent encroachment on the other travel lanes. See design guidelines.

Texas Department of Transportation
 Traffic Safety Division Standard

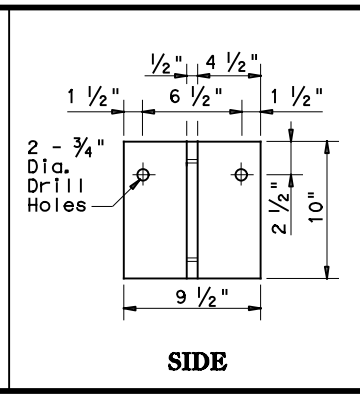
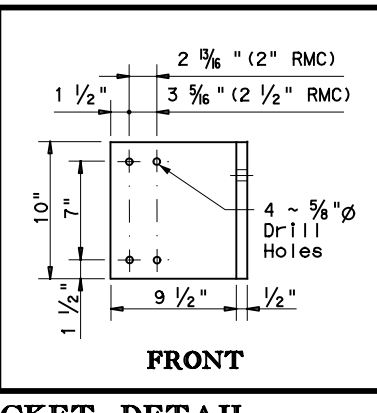
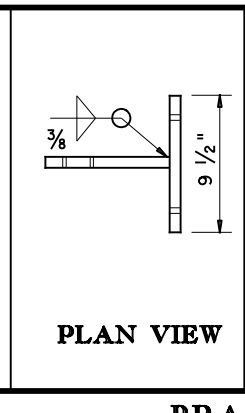
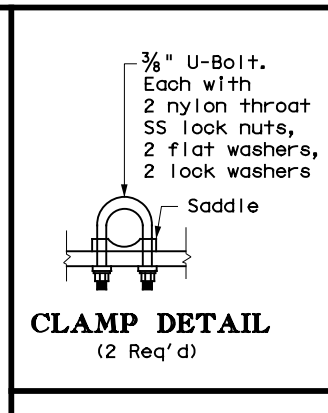
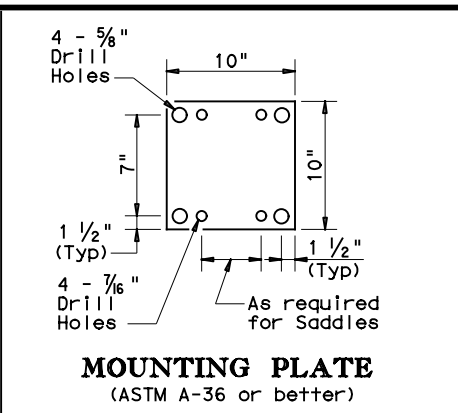
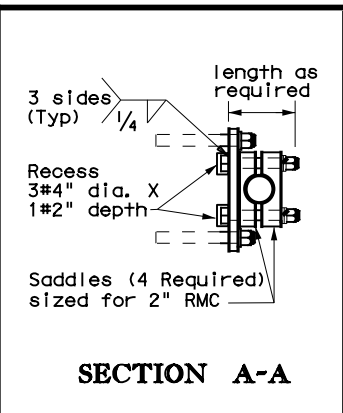
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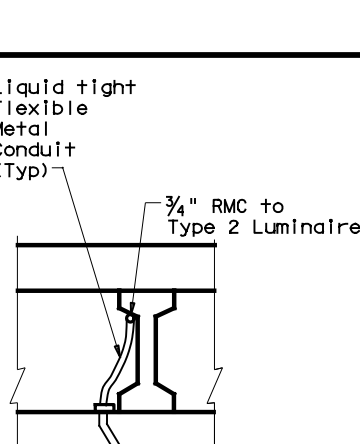
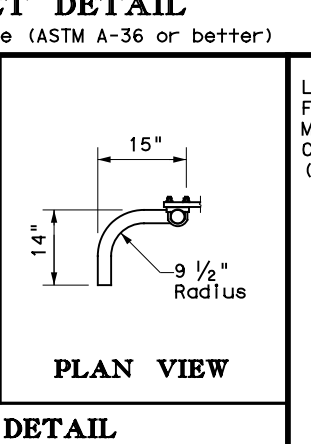
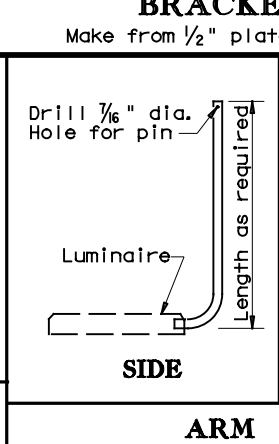
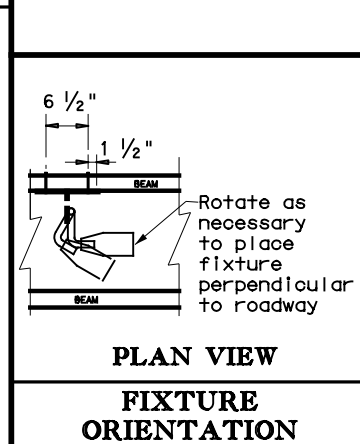
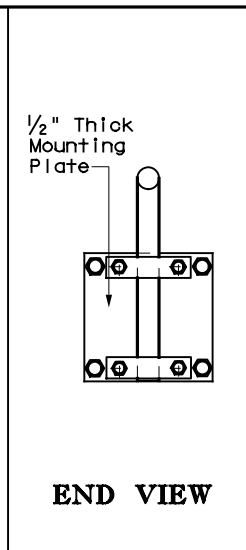
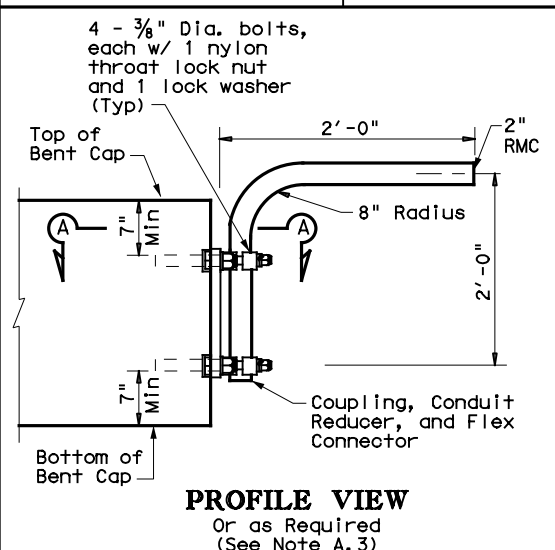
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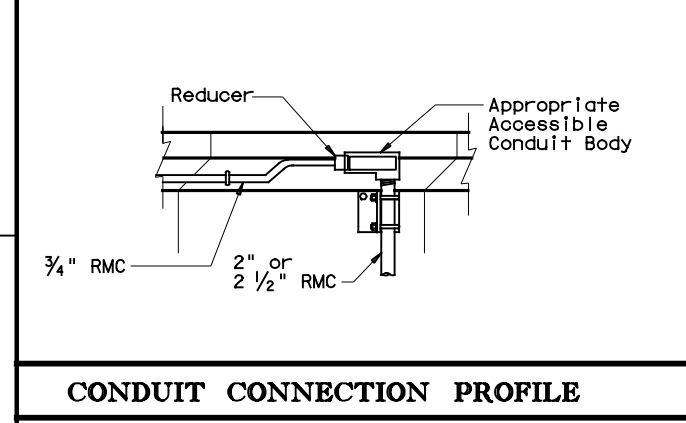
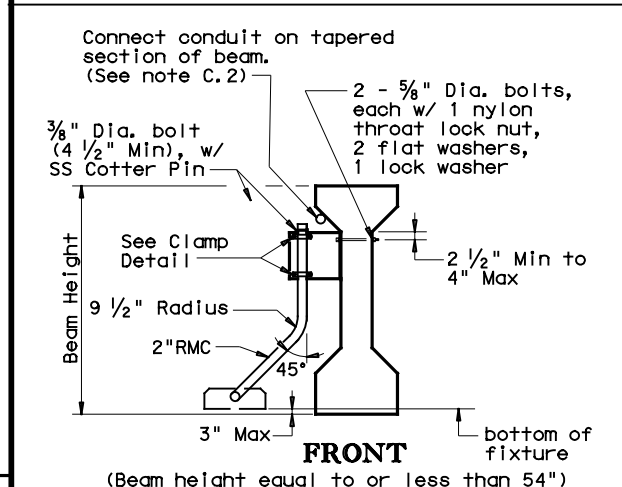
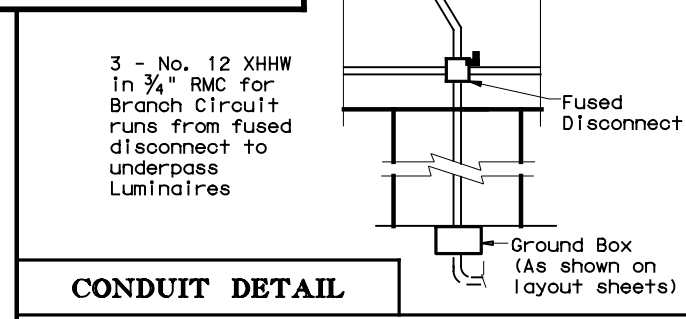
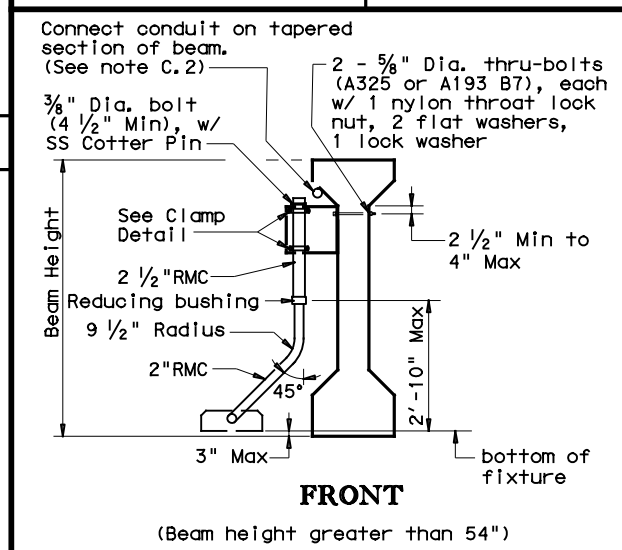
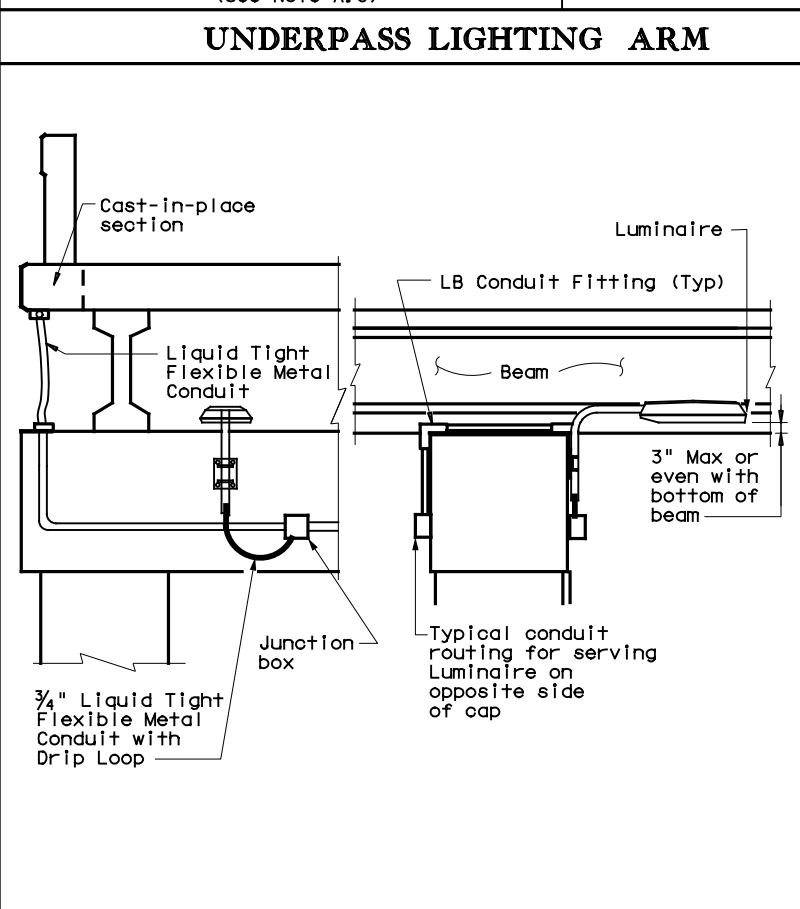
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- GENERAL NOTES:**
- A. ALL 150 watt HPS and 150 watt equivalent LED Luminaires**
- Luminaire locations, conduit and conductor sizes and routing are typical and diagrammatic only. See project layout sheets for specific details.
 - Conduit will be paid for under Item 618, "Conduit" and conductors will be paid for under Item 620, "Electrical Conductors," unless otherwise shown on the plans.
 - Adjust conduit in saddles to place fixture height and orientation as required. See fixture orientation detail and plans. Where practicable, place luminaires so the bottom of luminaire is above the bottom of the beam, maximum of 3 in. (See detail UNDERPASS LIGHTING ARM TYPE 2)
 - Except as noted, galvanize all structural steel and exposed bolts, nuts, and washers in accordance with Item 445 "Galvanizing".
 - Fabrication of brackets and support arms will not be paid for directly but is subsidiary to Item 610, "Roadway Illumination Assemblies."
 - Install a heavy duty NEMA 3R fused disconnect or breaker enclosure rated at 30 amps and 480 volts to switch underpass luminaires as shown on plans, with at least one per bridge circuit. Install 20 amp time-delay fuses or inverse-time circuit breakers. Mount disconnect or breaker enclosure 10 ft. (min) above grade on columns or bent caps as approved by the Department. Modify disconnect to allow padlocking in the "ON" and "OFF" positions. Padlocks and disconnect switches or circuit breakers for underpass fixtures will not be paid for directly but are subsidiary to the various bid items of the contract.
 - Conduit on columns, caps, and slab is shown surface mounted. For new columns and caps, embed PVC conduit in concrete. Bond and ground metal junction boxes and conduit.



- B. TYPE 1**
- Provide 2 in. rigid metal conduit (2.375" O.D., 0.146" wall) for Type 1 arm shaft.
 - Use 3/8 in. stainless steel bolt or stud non-epoxy type expansion anchors for concrete for Type 1 mounting. Except as noted, provide an allowable 2650 lbs minimum pull-out force (after consideration of adjustment factors for edge distance and bolt spacing) for each anchor. Install each anchor to the embedment depth recommended by the manufacturer.
 - Attach conduit to plate with 4 saddles, four - 3/8 in. diameter bolts, nylon throat lock nuts, and lock washers.



- C. TYPE 2**
- Provide 2 in. rigid metal conduit (2.375" O.D., 0.146" wall) or provide a combination of 2 1/2 in. (2.875" O.D., 0.193" wall) and 2 in. (2.375" O.D., 0.146" wall) rigid metal conduits with a reducing bushing as beam height stipulated for Type 2 arm shaft. Field cutting and threading will be permitted. Paint cut and threaded areas with zinc rich paint after conduit is connected to adjacent fitting.
 - Connecting conduit may be strapped to tapered section only of precast beams as shown. Anchor as approved by the Engineer. Maximum anchor depth is 1 in.
 - Indiscriminate drilling into precast concrete beams may result in reduced beam strength. Use drilling location and method as directed by the Engineer. See Location of Underpass Lighting Mounting Bracket detail. The locations shown in the table are such that reinforcing strands will not be damaged.

IN RD IL AM (U/P) (TY 1)
 If bridge has pre-cast panels under deck, run circuit under deck edge.
UNDERPASS LIGHTING TYPE 1

IN RD IL AM (U/P) (TY 2)

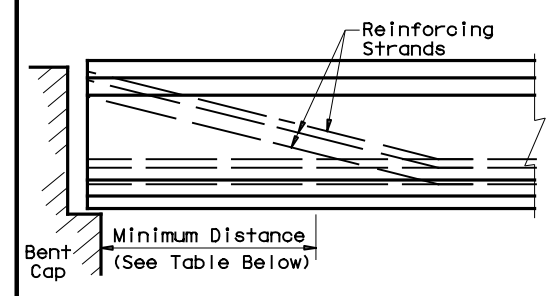


TABLE 5

LOCATION OF UNDERPASS LIGHT MOUNTING BRACKET TABLE

SPAN LENGTH	MINIMUM DISTANCE
≤ 50'	10'-0"
50' - 70'	15'-0"
70' - 90'	20'-0"
> 90'	25'-0"

LOCATION OF UNDERPASS LIGHT MOUNTING BRACKET

ROADWAY ILLUMINATION DETAILS (UNDERPASS LIGHT FIXTURES)

RID(3)-20

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 REVISIONS

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ABL	NOLAN	128	

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 7-17
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SHIPPING PARTS LIST - POLES AND LUMINAIRE ARMS

Nominal Mounting Ht. (ft)	Shoe Base					T-Base					CSB/SSCB Mounted				
	Designation				Quantity	Designation				Quantity	Designation				Quantity
	Pole	A1	A2	Luminaire		Pole	A1	A2	Luminaire		Pole	A1	A2	Luminaire	
20	(Type SA 20 S - 4)			(150W EQ) LED		(Type SA 20 T - 4)			(150W EQ) LED						
	(Type SA 20 S - 4 - 4)			(150W EQ) LED		(Type SA 20 T - 4 - 4)			(150W EQ) LED						
30	(Type SA 30 S - 4)			(250W EQ) LED		(Type SA 30 T - 4)			(250W EQ) LED			(Type SP 28 S - 4)	(250W EQ) LED		
	(Type SA 30 S - 4 - 4)			(250W EQ) LED		(Type SA 30 T - 4 - 4)			(250W EQ) LED			(Type SP 28 S - 4 - 4)	(250W EQ) LED		
40	(Type SA 40 S - 4)			(250W EQ) LED		(Type SA 40 T - 4)			(250W EQ) LED			(Type SP 38 S - 4)	(250W EQ) LED		
	(Type SA 40 S - 4 - 4)			(250W EQ) LED		(Type SA 40 T - 4 - 4)			(250W EQ) LED			(Type SP 38 S - 4 - 4)	(250W EQ) LED		
50	(Type SA 50 S - 4)			(400W EQ) LED		(Type SA 50 T - 4)			(400W EQ) LED			(Type SP 48 S - 4)	(400W EQ) LED		
	(Type SA 50 S - 4 - 4)			(400W EQ) LED		(Type SA 50 T - 4 - 4)			(400W EQ) LED			(Type SP 48 S - 4 - 4)	(400W EQ) LED		

OTHER				
Designation				Quantity
Pole	A1	A2	Luminaire	

GENERAL NOTES:

- All work, materials and services not shown on the plans which may be necessary for complete and proper construction shall be performed, furnished and installed by the Contractor. Faulty fabrication or poor workmanship in any material, equipment or installation will be considered justification for rejection. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the Department such warranties or guarantees.
- The location of poles and fixtures are diagrammatic only and may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry and utility safety practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.
- Standard Steel Pole Designs. Steel poles fabricated in accordance with the details and dimensions shown herein, shall be considered standard designs. Submission of shop drawings and design calculations for standard designs is not required.
- Optional Steel Pole Designs. Multi-sided steel poles may be allowed as optional designs, if steel poles are permitted or required, pending approval by the Department as outlined below.
 - Shop Drawings. Optional designs require submission of shop drawings and design calculations bearing the seal of an engineer licensed in the State of Texas, in accordance with Item 441, "Steel Structures." The Department may elect to pre-approve some shop drawings for optionally designed poles. Submission of shop drawings and design calculations is not required for structures fabricated in accordance with the details of shop drawings on the pre-approved list maintained by the TxDOT Traffic Operations Division. Any deviation from the pre-approved shop drawings will require submission of shop drawings of the complete assembly and design calculations as described above.
 - Structural Support Design for Luminaires. Lighting support structures shall be designed for a 25 year design life in accordance with the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 6th Edition (2013) and Interim Revisions thereto. All poles shall be designed for 110 mph 3-second gust wind speeds. The Gust Factor, G, and Wind Importance Factor, Ir, shall be applied as per the AASHTO Specifications assuming a 25-year design life. The design wind pressure for hurricane wind velocities greater than 100 mph shall not be less than the design wind pressure using 100 mph with the non-hurricane Wind Importance Factor, Ir, value. For transformer base poles, fabricator shall include transformer base and connecting hardware in design calculations and shop drawing submittals. All transformer bases shall have been structurally tested to resist the theoretical plastic moment capacity of the pole. Certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished shall be submitted with the shop drawings. Shop drawings shall show breakaway base model number, and manufacturer's name and logo. Manufacturer's shop drawings shall include the ASTM designations for all materials to be used.
 - Mast Arm Attachments. All poles and attachments shall be structurally designed to support two 12-foot mast arms and luminaires. Poles shall be supplied with mast arm combinations as shown in the plans. All mast arms shall be designed for a 60-pound luminaire having an effective projected area of 1.6 square feet.
 - Anchor Bolt Assembly. Anchor bolt assemblies for optionally designed poles shall be the same as those shown herein.
- Aluminum Pole Designs. Aluminum pole designs may be allowed, if aluminum poles are permitted or required, pending approval by the Department as outlined below.
 - Meet all of the requirements stated above for optional steel pole designs and the following:
 - Aluminum poles shall be fabricated in accordance with "Structural Welding Code-Aluminum" AWS D1.2.
 - Aluminum pole designs shall use the same anchor bolt assembly and be subject to the same geometric restraints and other requirements for steel poles specified herein.
 - Aluminum poles shall be equipped with vibration mitigation devices, as approved by the engineer.
 - Pole components shall be constructed using the following material:
 - Shaft: ASTM B221 or B241 Alloy 6063-T6, ASTM B209 Alloy 5086-H34, ASTM B221 Alloy 6005-T5.
 - Base Flange: ASTM B26 Alloy 356.0-T6 or ASTM B108 Alloy 356.0-T6 (Yield strength test required).
 - Mast Arm Fitting: ASTM B209 Alloy 6061-T6 or ASTM B221 Alloy 6005-T5.
 - Mast Arms: ASTM B241 Alloy 6061-T6 or Alloy 6063-T6.
 - Pole Cap: ASTM B209 Alloy 5086-H32 or ASTM B108 or B26 Alloy 356.0-T6.
 - Bolts: Stainless Steel AISI 300 series. Bolts threading into aluminum threads shall be treated with anti-seize compound, Never-Seez Compound, Permatex 133K or equal.
- Special Designs. Poles with architectural treatments shall meet the requirements shown elsewhere in the plans.
- Luminaire Mounting Height. Actual luminaire mounting height shall be the nominal mounting height given on RIP(2) for all pole-arm combinations except for poles with 4 ft. luminaire arms, which shall be 3'-0" lower than the nominal height, unless otherwise shown or directed.

EXPLANATION OF ROADWAY ILLUMINATION ASSEMBLY DESIGNATIONS

(TYPE SA 50 T - X - X) (400W EQ) LED

SA: Pole and mast arm may be steel or aluminum.
 ST: Pole and mast arm must be steel.
 AL: Pole and mast arm must be aluminum.
 SP: Special (ovalized) steel or aluminum pole for installing on CSB or SSCB. See standard sheet CSB (4), or SSCB (4).

Two numerical digits denote nominal mounting height in feet.

Next letter denotes type of base, (S-Shoe Base, T-Transformer Base, or B-Bridge/Ret.Wall Mount)

First number denotes length of mast arm in feet.

Use of second mast arm is indicated by second dashed number which denotes length in feet.

Luminaire rating in watts (i.e. 400W). Equivalent wattage LED fixtures will include EQ (i.e. 400W EQ)

Last letters indicate light source (S - High Pressure Sodium; LED - LED luminaire)

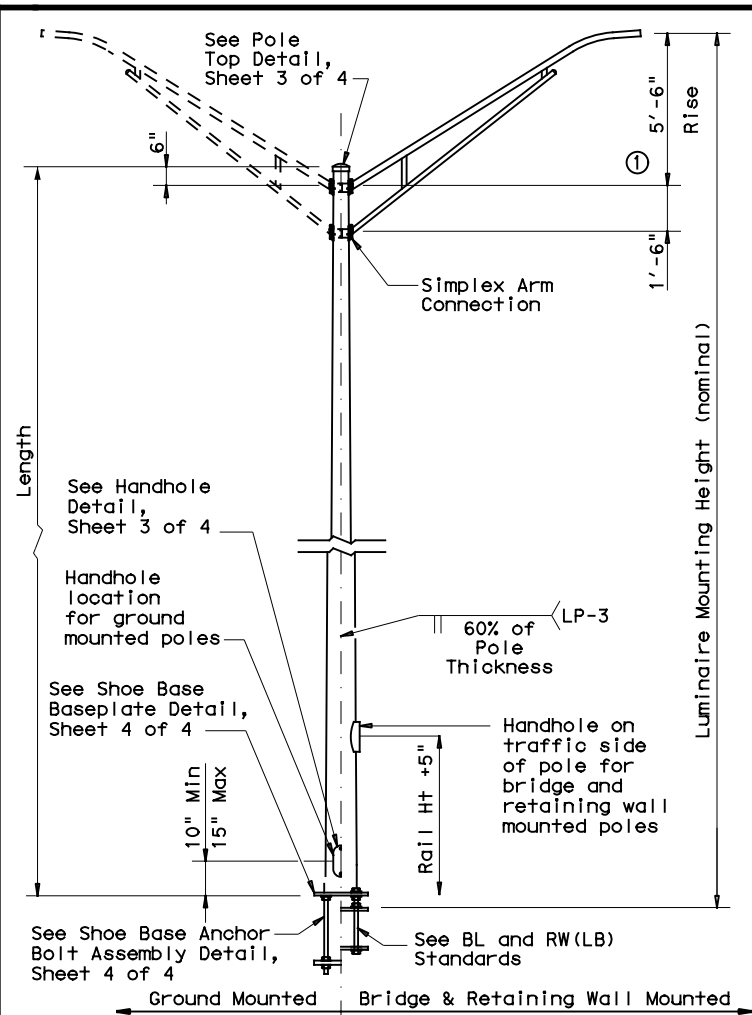
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7-17 12-19	DIST	COUNTY	SHEET NO.
	ABL	NOLAN	129

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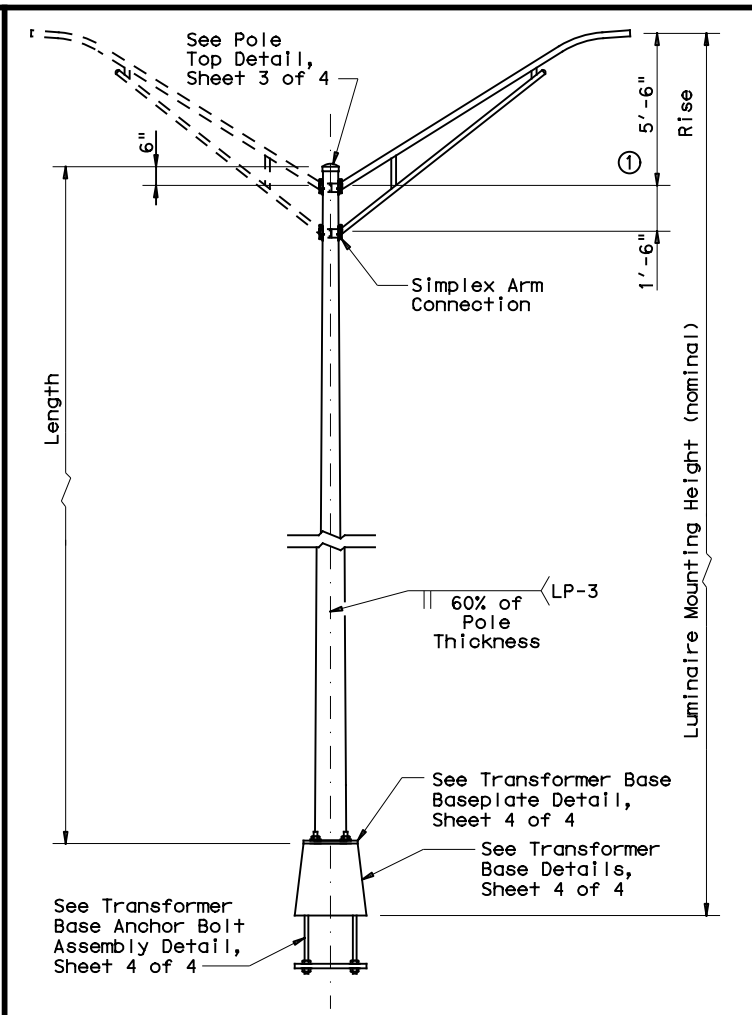
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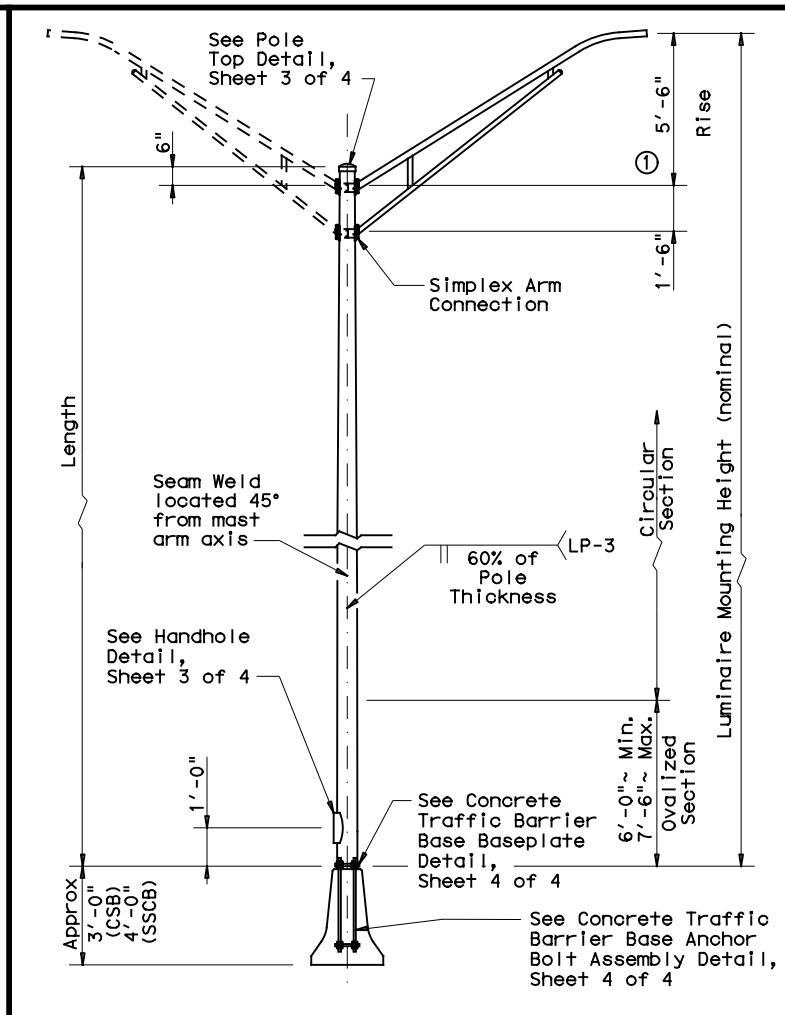
SHOE BASE POLE

SHOE BASE POLE					
Luminaire Mounting Height (Nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)
20.00	7.00	4.90	15.00	0.1196	7.1
30.00	7.50	4.00	25.00	0.1196	13.2
31.00-39.00	8.00	4.36-3.24	26.00-34.00	0.1196	20.7
40.00	8.50	3.60	35.00	0.1196	20.7
50.00	10.50	4.20	45.00	0.1196	30.3



TRANSFORMER BASE POLE

TRANSFORMER BASE POLE					
Luminaire Mounting Height (Nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)
20.00	7.00	5.11	13.50	0.1196	7.1
30.00	7.50	4.21	23.50	0.1196	13.2
31.00-39.00	8.00	4.57-3.45	24.50-32.50	0.1196	20.7
40.00	8.50	3.81	33.50	0.1196	20.7
50.00	10.00	3.91	43.50	0.1196	30.3



CONCRETE TRAFFIC BARRIER BASE POLE

CONCRETE TRAFFIC BARRIER BASE POLE (CSB/SSCB)						
Luminaire Mounting Height (Nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)	
					About C of Rail	Perp. to Rail
28.00	9.00	5.78	23.00	0.1196	10.3	13.2
38.00	9.00	4.38	33.00	0.1196	16.6	20.8
48.00	10.50	4.48	43.00	0.1345	25.1	30.5

GENERAL NOTES:

- Designs conform to AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, 6th Edition (2013) and Interim Revisions thereto. Design 3-Second Gust Wind Speed equals 110 mph with a 1.14 gust factor. A wind importance factor of 0.80 is applied to adjust the wind speed to a 25 year recurrence interval. Design moments listed in tables assume base of pole is 25' above natural ground level.
- Structures are designed to support two 12' luminaire mast arms and luminaires. Mast arms are designed to support a 60-pound luminaire having an effective projected area of 1.6 square feet.
- Fabrication shall be in accordance with the Specifications and with the details, dimensions, and weld procedures shown herein. Do not submit shop drawings for roadway illumination pole assemblies fabricated in accordance with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of these sheets and the Specifications. In the absence of specified fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.
- For mounting heights between values shown in the tables, use base diameter and thickness values for the larger height.
- Unless otherwise noted, all steel parts shall be galvanized in accordance with Item 445, "Galvanizing."
- Steel poles shall be fabricated in accordance with Item 441, "Steel Structures." Longitudinal seam welds for pole sections shall have 60% minimum penetration. All welding shall be in accordance with AWS D1.1, Structural Welding Code-Steel.
- Two-section poles joined by circumferential welds will not be permitted, unless otherwise shown on the plans. Poles may be fabricated in two sections and field-assembled by the lap-joint method. The two sections shall telescope together with a lap length of not less than 1-1/2 times the shaft diameter at the lap joint.
- Alternate material equal to or better than material specified may be substituted with the approval of the Engineer.
- Lubricate and tighten anchor bolts, when erecting shoe base poles and concrete traffic barrier base poles, in accordance with Item 449, "Anchor Bolts."
- All poles, except Transformer Base Poles, shall have hand holes with reinforcing frames and covers. For ground mounted shoe base poles, hand holes shall be placed 90 degrees to mast arm unless otherwise noted on the plans. For poles mounted on a concrete traffic barrier with one luminaire arm, hand holes shall be located 180 degrees from luminaire arm. For poles mounted on a concrete traffic barrier with two luminaire arms, all hand holes shall be on the same side of the barrier. For poles mounted on a bridge lighting bracket or a retaining wall lighting bracket, hand hole shall be on traffic side of the pole, at a height that will clear the barrier.
- The finished pole shall have a smooth, uniform finish free of pits, blisters, or other defects. Scratched, chipped, and other damaged galvanized areas on poles and mast arms shall be repaired in accordance with Item 445, "Galvanizing."
- Pole length is based on a 5'-6" luminaire arm rise. 4 ft. luminaire arms have a 2'-6" rise. A pole with 4 ft. luminaire arms will have an actual mounting height 3'-0" less than the nominal mounting height. Increasing the pole length to meet the nominal mounting height is allowed, but unnecessary unless otherwise directed by the engineer.
- Erect transformer base poles in accordance with sheet RID(1).

MATERIAL DATA

COMPONENT	ASTM DESIGNATION	MIN. YIELD (ksi)
Pole Shaft (0.14"/ft. Taper)	A572 Gr 50, A595 Gr A, A1011 HSLAS Gr 50 Cl 2 ③, or A1008 HSLAS Gr 50 Cl 2	50
Base Plate and Handhole Frame	A572 Gr.50, or A36	36
T-Base Connecting Bolts	F3125 Gr A325	92
Anchor Bolts	F1554 Gr 55, A193-B7 or A321	55 105
Anchor Bolt Templates	A36	36
Heavy Hex (H.H.) Nuts	A194 Gr 2H, or A563 Gr DH	
Flat Washers	F436	

NOTES:

- 2'-6" rise for 4 ft. luminaire arms.
- Before ovalized as shown on Concrete Traffic Barrier Base Baseplate details, Sheet 4 of 4.
- A1011 SS Gr 50 may be used instead of HSLAS, provided the material meets the elongation requirements for HSLAS.

POLE ASSEMBLY FABRICATION TOLERANCES TABLE

DIMENSION	TOLERANCE
Shaft length	+1"
I.D. of outside piece of slip fitting pieces	+1/8", -1/16"
O.D. of inside piece of slip fitting pieces	+1/32", -1/8"
Shaft diameter: other	+3/16"
Out of "round"	1/4"
Straightness of shaft	±1/4" in 10 ft
Twist in multi-sided shaft	4° in 50 ft
Perpendicular to baseplate	1/8" in 24"
Pole centered on baseplate	±1/4"
Location of Attachments	±1/4"
Bolt hole spacing	±1/16"

Texas Department of Transportation
 Traffic Safety Division Standard

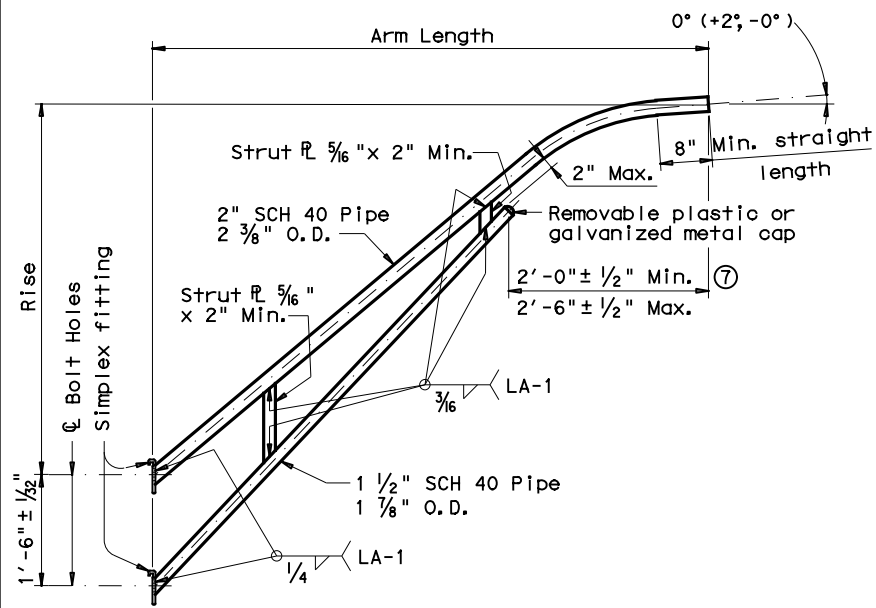
ROADWAY ILLUMINATION POLES

RIP(2)-19

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 COUNTY: NOLAN
 HIGHWAY: SH 70
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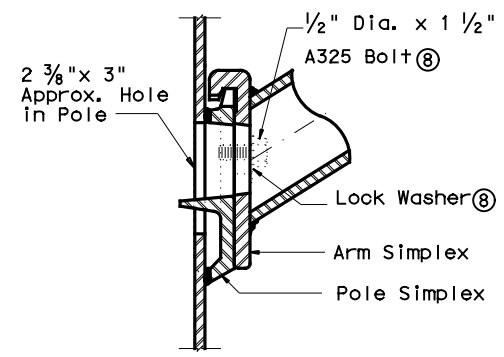
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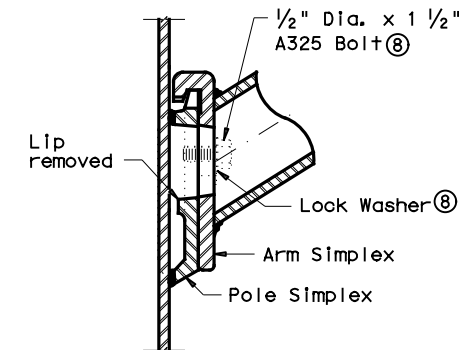
LUMINAIRE ARM

LUMINAIRE ARM DIMENSIONS		
Nominal Arm Length	Arm Length	Rise
4'-0"	3'-6"	2'-6"
6'-0"	5'-6"	5'-6"
8'-0"	7'-6"	5'-6"
10'-0"	9'-6"	5'-6"
12'-0"	11'-6"	5'-6"

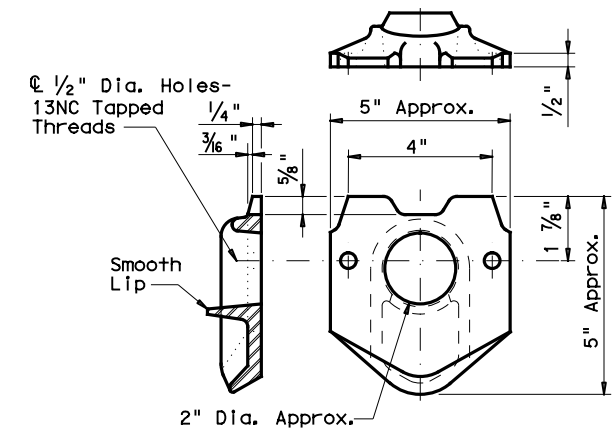
ARM ASSEMBLY FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Arm Length	±1"
Arm Rise	±1"
Deviation from flat	1/8" in 12"
Spacing between holes	±1/32"



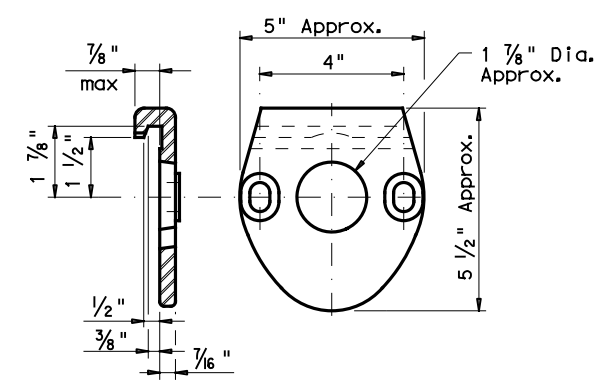
UPPER SIMPLEX FITTING
 (Gusset not shown for clarity)



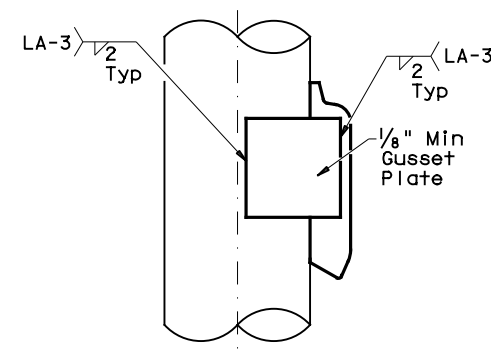
LOWER SIMPLEX FITTING
 (Gusset not shown for clarity)
SECTION B-B



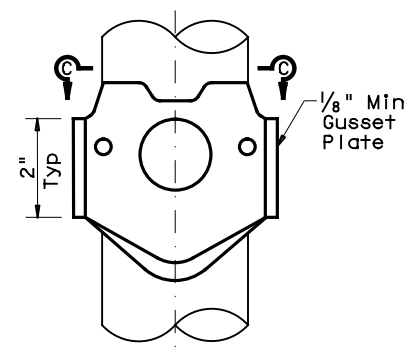
POLE SIMPLEX DETAIL



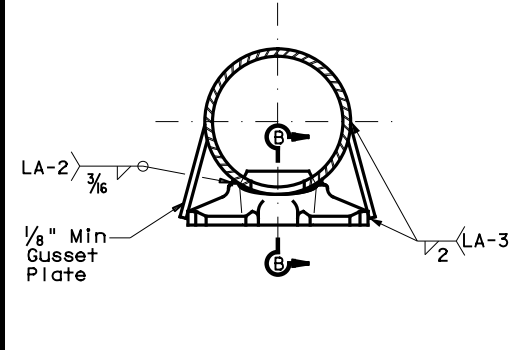
ARM SIMPLEX DETAIL



SIDE

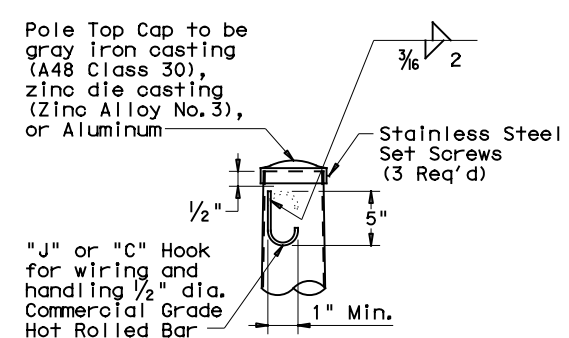


ELEVATION

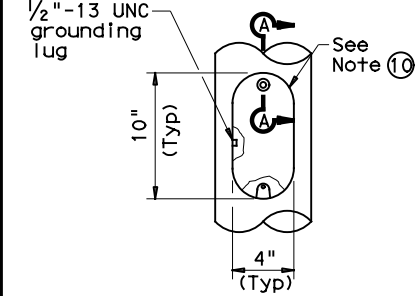


SECTION C-C

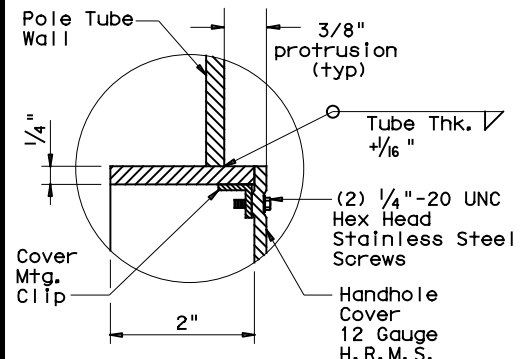
SIMPLEX ATTACHMENT DETAIL



POLE TOP



ELEVATION



SECTION A-A

HANDHOLE

NOTES:

- ④ Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.
- ⑤ A576 must be suitable for forging and also meet minimum tensile strength of 65 ksi, minimum yield of 35 ksi, and elongation in 2 inches of 22 percent.
- ⑥ A572, A1008 HSLAS-F, and A1011 HSLAS-F materials may have higher yield strengths but shall not have less elongation than the grade indicated.
- ⑦ Dimensional limits are given to show acceptable variation in design. All of a Fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.
- ⑧ Each pole simplex fitting shall be supplied with 2 bolts and 2 lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans.
- ⑨ Proposed deviations in arm simplex dimensions or materials must be submitted to the Department for approval.
- ⑩ A welded handhole frame is permissible. Maximum of two (2) CJP weld splices is allowed.

MATERIALS

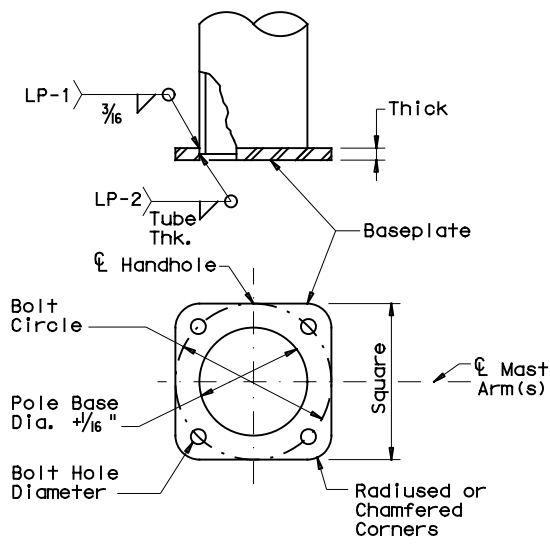
Pole or Arm Simplex	ASTM A27 Gr 65-35 or Gr 70-36, A148 Gr 80-50, A576 Gr 1021 ⑤, or A36 (Arm only)
Arm Pipes	ASTM A53 Gr A or B, A500 Gr B, A501, A 1008 HSLAS-F Gr 50 ⑥, or A1011 HSLAS-F Gr 50 ⑥
Arm Struts and Gusset Plates ④	ASTM A36, A572 Gr 50 ⑥, or A588
Misc.	ASTM designations as noted

ROADWAY ILLUMINATION POLES
RIP (3) - 19

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12-19	ABL	NOLAN	131	

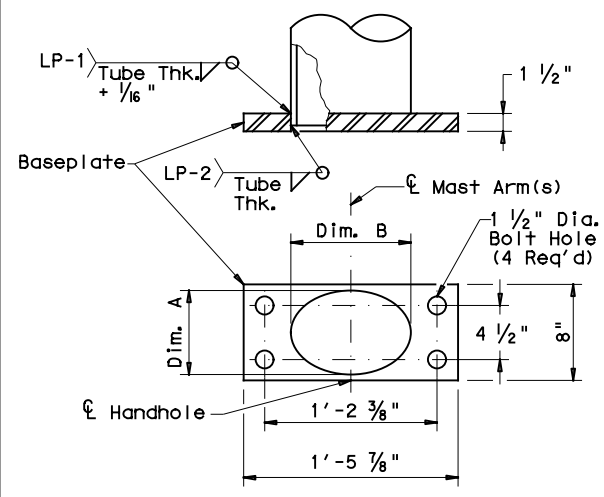
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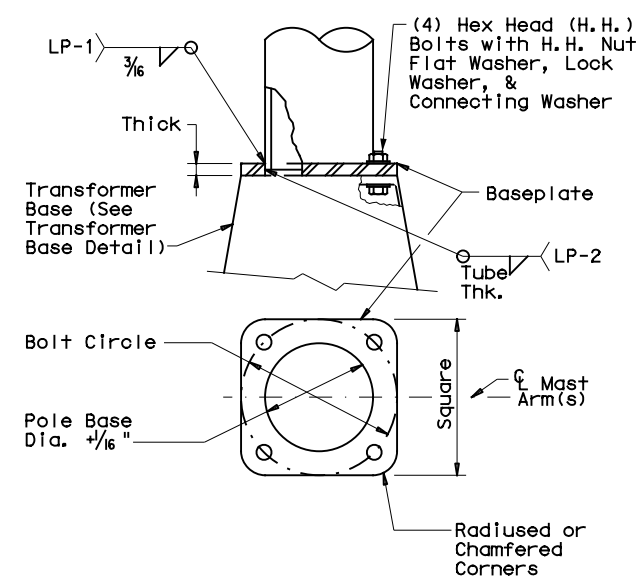
SHOE BASE BASEPLATE

SHOE BASE BASEPLATE TABLE				
MOUNTING HEIGHTS (nominal)	BOLT CIRCLE	SQUARE	THICK	BOLT HOLE DIAMETER
20' - 39'	13"	13"	1 1/4"	1 1/4"
40'	15"	15"	1 1/4"	1 1/2"
50'	15"	15"	1 1/2"	1 1/2"



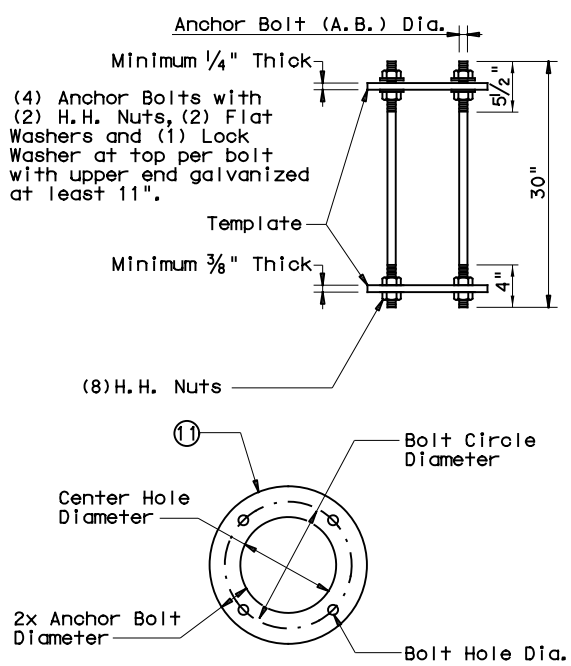
CONCRETE TRAFFIC BARRIER BASE BASEPLATE

CONCRETE TRAFFIC BARRIER BASE BASEPLATE TABLE			
MOUNTING HEIGHTS (nominal)	POLE DIA. (12)	DIM. A	DIM. B
28' - 38'	9"	7" ± 1/4"	10" ± 1/4"
48'	10 1/2"	7" ± 1/4"	13" ± 1/4"



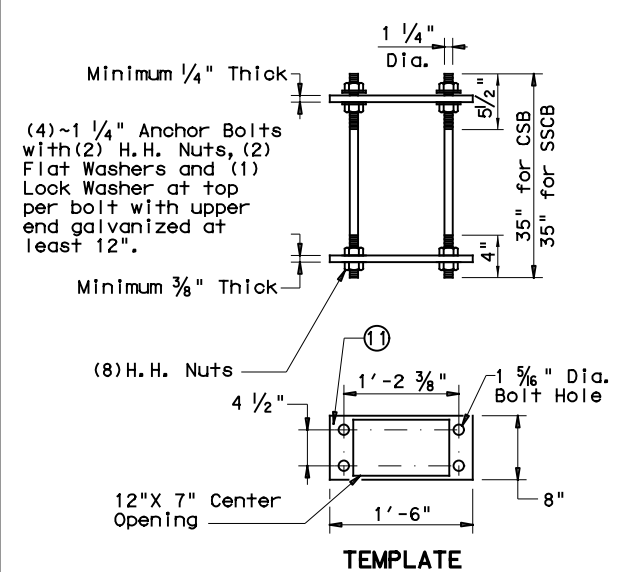
TRANSFORMER BASE BASEPLATE

TRANSFORMER BASE BASEPLATE TABLE						
MOUNTING HEIGHTS (nominal)	BOLT CIRCLE	SQUARE	THICK	CONNECTING BOLT DIA.	BOLT HOLE DIAMETER	TRANSFORMER BASE TYPE
20' - 39'	13"	13"	1 1/4"	1"	1 1/4"	A
40'	15"	15"	1 1/4"	1 1/4"	1 1/2"	B
50'	15"	15"	1 1/2"	1 1/4"	1 1/2"	B



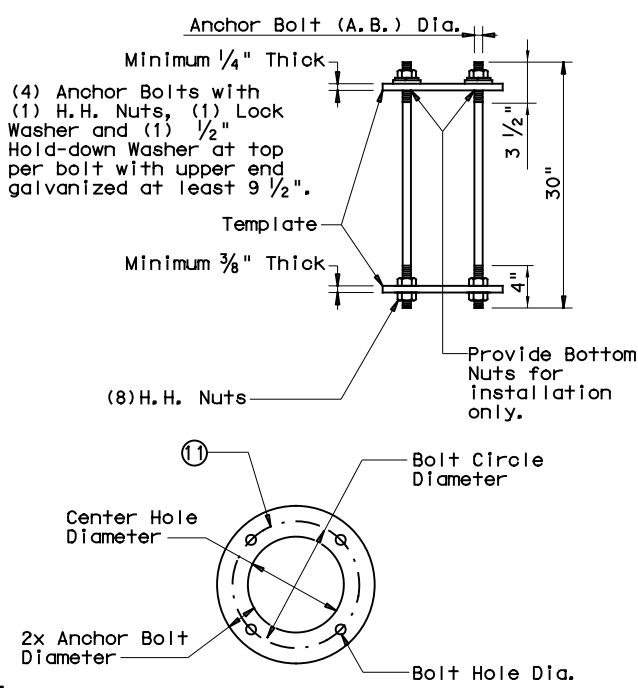
SHOE BASE ANCHOR BOLT ASSEMBLY

SHOE BASE ANCHOR BOLT ASSEMBLY TABLE				
MOUNTING HEIGHTS (nominal)	A.B. Dia.	BOLT CIRCLE DIAMETER	CTR. HOLE DIAMETER	BOLT HOLE DIAMETER
20' - 39'	1"	13"	11"	1 1/16"
40' - 50'	1 1/4"	15"	12 1/2"	1 5/16"



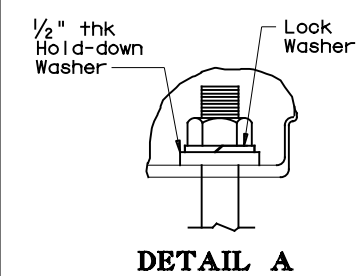
CONCRETE TRAFFIC BARRIER BASE ANCHOR BOLT ASSEMBLY

TRANSFORMER BASE ANCHOR BOLT ASSEMBLY TABLE				
MOUNTING HEIGHTS (nominal)	A.B. Dia.	BOLT CIRCLE DIAMETER	CTR. HOLE DIAMETER	BOLT HOLE DIAMETER
20' - 39'	1"	14"	12"	1 1/16"
40' - 50'	1 1/4"	17 1/4"	14 3/4"	1 5/16"

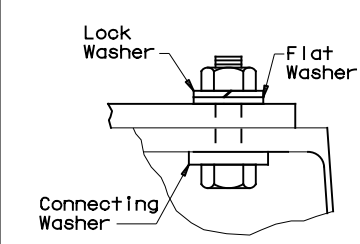


TRANSFORMER BASE ANCHOR BOLT ASSEMBLY

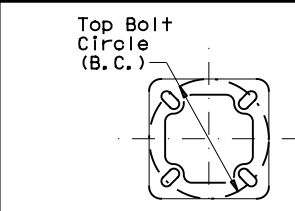
TRANSFORMER BASE TABLE		
TYPE	TOP B.C.	BTM. B.C.
A	13"	14"
B	15"	17 1/4"



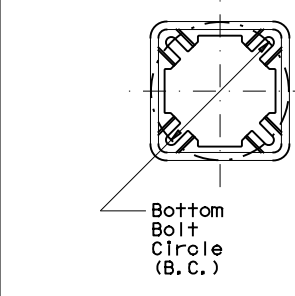
DETAIL A



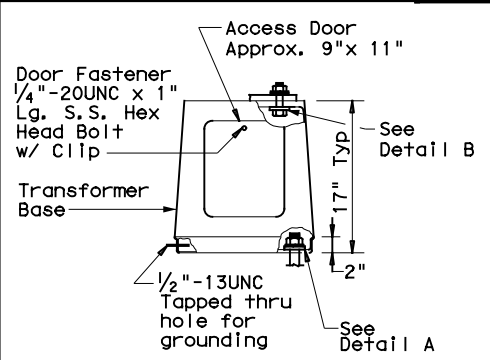
DETAIL B



TOP PLAN



BOTTOM PLAN



ELEVATION

TRANSFORMER BASE DETAILS

GENERAL NOTES:

- For mounting heights between those shown in the table, use the values in the table for the larger mounting height.
- All breakaway bases shall meet the breakaway requirements of the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 6th Edition (2013) and Interim Revisions thereto, and shall have been tested by FHWA-approved methods. All bases shall have been structurally tested to resist 150% of the design moment.
- Transformer bases shall be cast from aluminum, ASTM B108 or B26 Alloy 356.0-T6, or other material approved by the Engineer. Four Hex Head (H.H.) bolts with four H.H. nuts, four lock washers, four flat washers, and connecting and hold-down washers as recommended by the manufacturer, galvanized to ASTM A153 Class C or D, or B695 Class 50, shall be provided with each transformer base for connecting the pole. Bolts shall be ASTM A325 or approved equal. Nuts shall be ASTM A563 grade DH galvanized.
- Bases shall be stamped, incised or by other approved permanent means, marked to show fabricator's name or logo, and model number. Such information shall be placed in a readily seen location, inside or outside the base, but shall not be placed on the door.
- Doors for transformer bases shall be made of plastic, fiberglass or other non-metallic material approved by the Engineer and shall be attached with stainless steel screws or bolts. Transformer bases shall be cleaned by grit blast cleaning after heat treatment. Certification by the manufacturer of heat treatment shall be furnished with transformer bases. The certification shall show the metal alloy and temper and that the base meets those requirements, chemical and physical. The certification shall also show the material ASTM specification. Transformer bases shall be cast with a removable tab bar for material testing. Some bars may have been removed by the manufacturer for testing.

NOTES:

- Anchor Bolt Templates do not need to be galvanized.
- Pole diameter before ovalized.

ANCHOR BOLT FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Length	± 1/2"
Threaded length	± 1/2"
Galvanized length (if required)	- 1/4"



**ROADWAY ILLUMINATION POLES
 RIP (4) - 19**

FILE: rip-19.dgn	DN:	CK:	DW:	CK:
© TxDOT January 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS	0006	15	038	SH 70
7-17	DIST	COUNTY	SHEET NO.	
12-19	ABL	NOLAN	132	

100% SUBMITTAL

DATE: 10/12/2023 3:07:04 PM
FILE: c:\pwworking\central\01\03297786\SH70S1.01.dgn

WEST M3-4

INTERSTATE 20 M1-1

M6-2R

M3-2 EAST

SOUTH M3-3

INTERSTATE 20 M1-1

70 TEXAS M1-6T

M6-2L

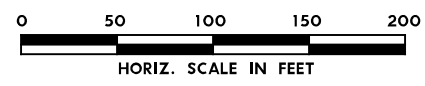
M6-2R

LANE ENDS MERGE LEFT
W9-2L
2

16' = 10"
W12-2
3

XX FT X IN
W12-2a
5

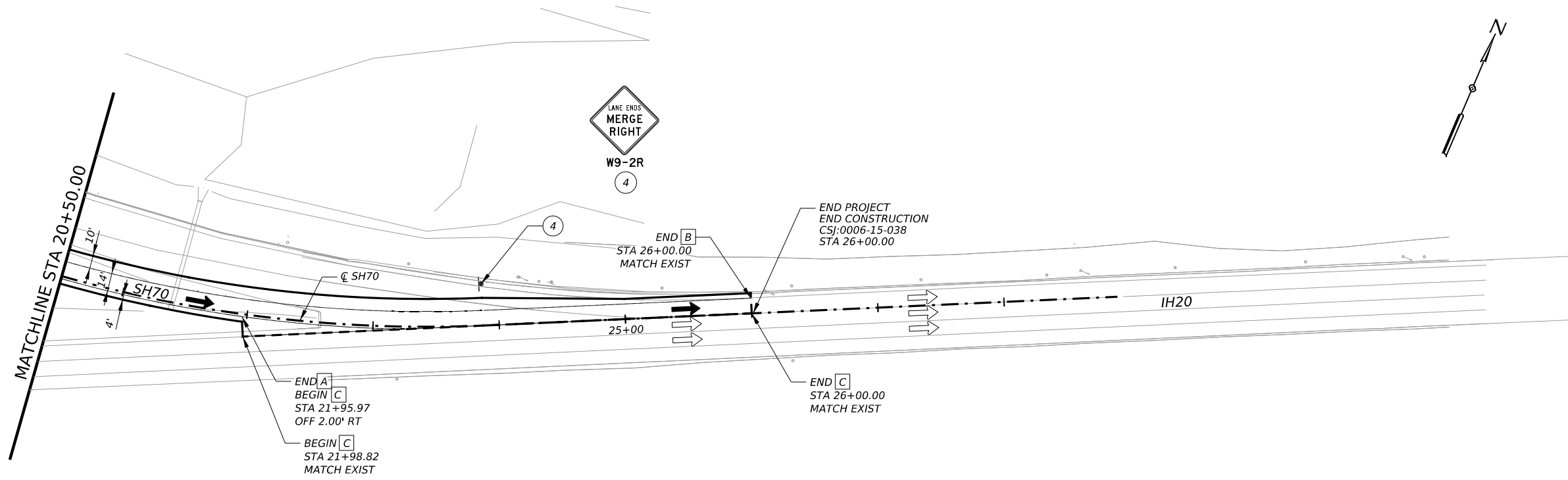
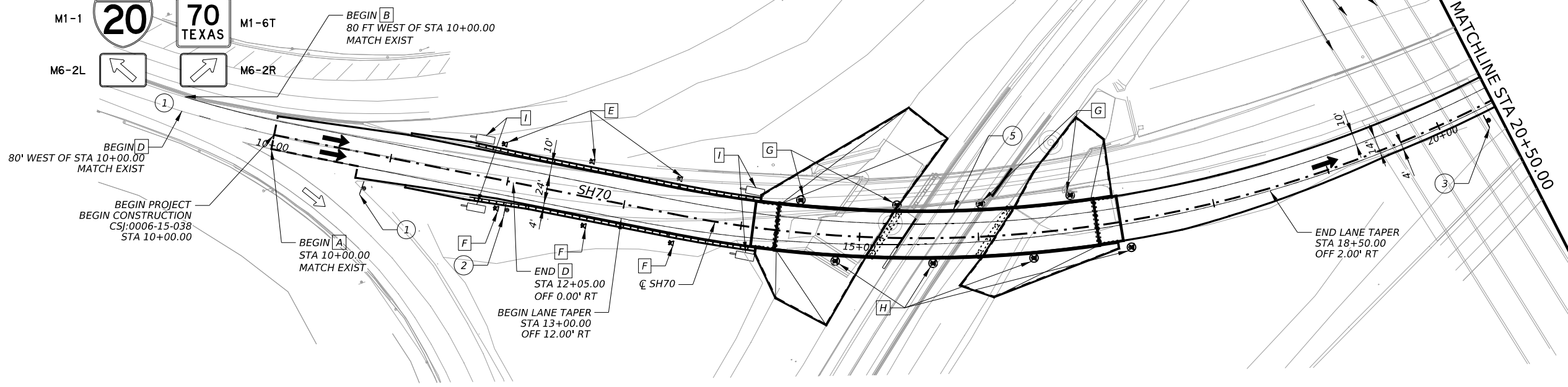
CAUTION: EXISTING POWER LINES



LEGEND

- ➔ PROP TRAFFIC FLOW
- PROPOSED SIGN
- (X) SIGN ID
- [A] REFL PAV MRK TY I(W)6"(SLD)
- [B] REFL PAV MRK TY I(Y)6"(SLD)
- [C] REFL PAV MRK TY I(W)8"(SLD)
- [D] REFL PAV MRK TY I(W)6"(BRK) WITH RPMs AT 80' SPACING
- [E] INSTL DEL ASSM (D-SY) SZ1 (BRF) GF2
- [F] INSTL DEL ASSM (D-SW) SZ1 (BRF) GF2
- [G] INSTL DEL ASSM (D-SY) SZ (BRF) CTB (BR)
- [H] INSTL DEL ASSM (D-SW) SZ (BRF) CTB (BR)
- [I] INSTL OM ASSM (OM-2Y) (WC)GND

- NOTES:
- REFER TO SUMMARY OF SMALL SIGNS FOR SMALL SIGN DETAIL.
 - ALL SIGNING & PAVEMENT MARKING SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD), UNLESS OTHERWISE APPROVED BY THE ENGINEER.
 - ALL SMALL SIGN LOCATIONS ARE APPROXIMATE UNLESS OTHERWISE NOTED. FIELD ADJUSTMENTS MAY BE NECESSARY TO COMPLY WITH APPLICABLE TXDOT STANDARDS.



HDR HDR Engineering, Inc.
Firm Registration No. F-754
1711 Preston Road, Suite 300
Dallas, Texas 75248
972.960.4400

Texas Department of Transportation

SH 70

SIGNING & PAVEMENT MARKINGS LAYOUT

SCALE: 1"=100' SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	133	

DATE: 10/12/2023 3:07:48 PM
 FILE: c:\pwworking\centra101\d3297787\dom1-20.dgn

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REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS				DELINEATORS				D & OM DESCRIPTIVE CODES	
DEVICE	SIZE 1	SIZE 2	SIZE 3	SIZE 4	SINGLE		DOUBLE		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 BRFL = 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
						SHEETING Yellow, White or Red Type B or C reflective sheeting		SHEETING Yellow, White or Red Type B or C Reflective Sheeting	
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (fix). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.				POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
					MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

OBJECT MARKERS								D & OM DESCRIPTIVE CODES	
DEVICE	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)	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
		OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	
SHEETING	Yellow-Type B _{FL} or C _{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroreflective yellow - Type B _{FL} or C _{FL} Sheeting			Red -Type B _{FL} or C _{FL} Sheeting	
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT	
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP	

DEPARTMENTAL MATERIAL SPECIFICATIONS	
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

BARRIER REFLECTORS (BRF)			CHEVRONS				ONE DIRECTION LARGE ARROW		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.
DEVICE	GF1	GF2	CTB						
NOTE	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.			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).				MOUNTING HEIGHT 7'-0"	
SHEETING	Yellow, White, Red			NOTE					

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	CR: TxDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0006	15	038	SH 70
10-09 3-15	DIST	COUNTY	SHEET NO.	
4-10 7-20	ABL	NOLAN	134	

20A

DATE: 10/12/2023 3:07:59 PM
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POST TYPE AND SUPPORT FOUNDATION DETAILS

TYPE OF BARRIER MOUNTS

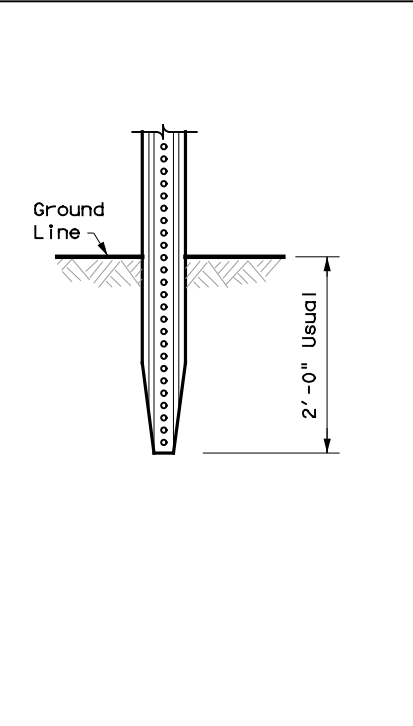
WING CHANNEL (WC)

FLEXIBLE POSTS (YFLX, WFLX)

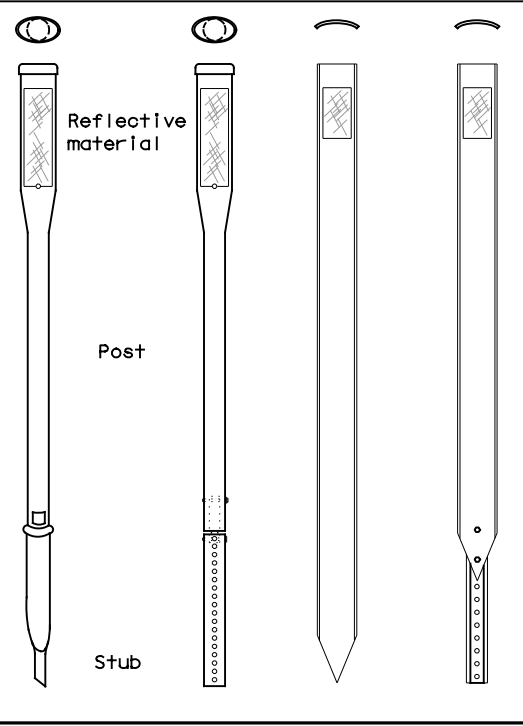
WEDGE ANCHOR SYSTEMS

GUARD FENCE ATTACHMENT

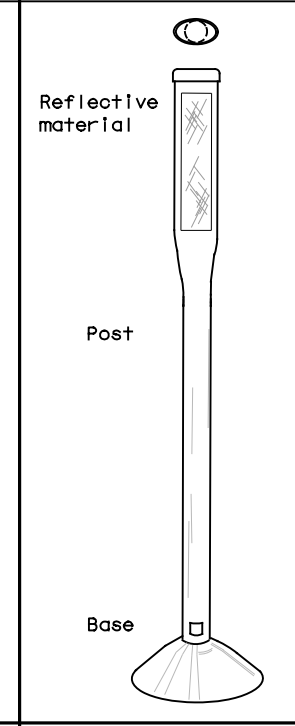
GND



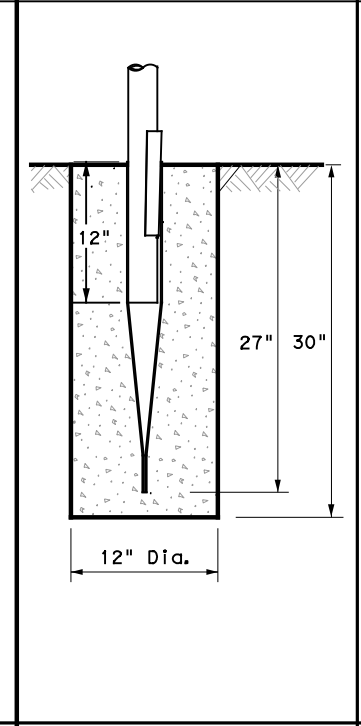
GND



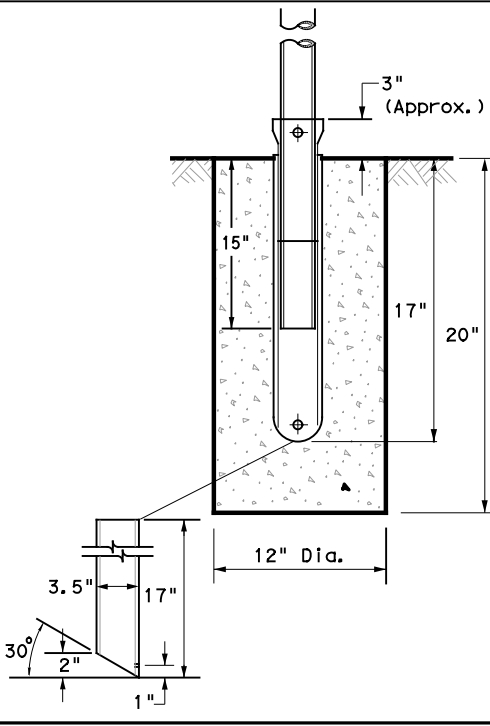
SRF



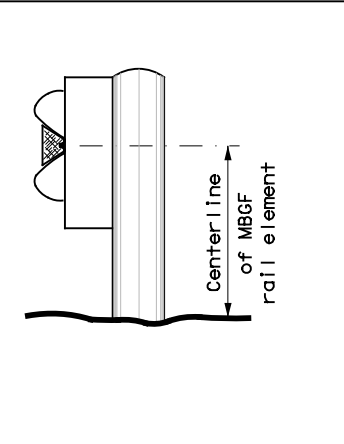
WAS



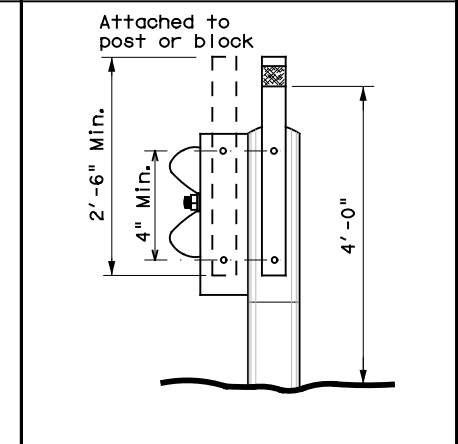
WAP



GF1



GF2



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.

EMBEDDED

SURFACE MOUNT

STEEL

PLASTIC

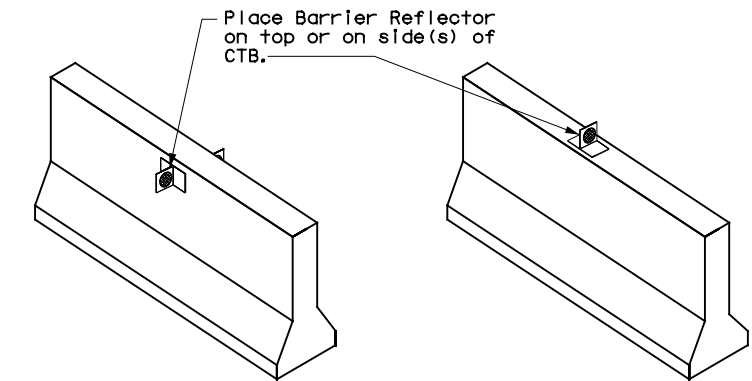
NOTES

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.

NOTE

1. Install per manufacturer's recommendations.

CONCRETE TRAFFIC BARRIER (CTB)



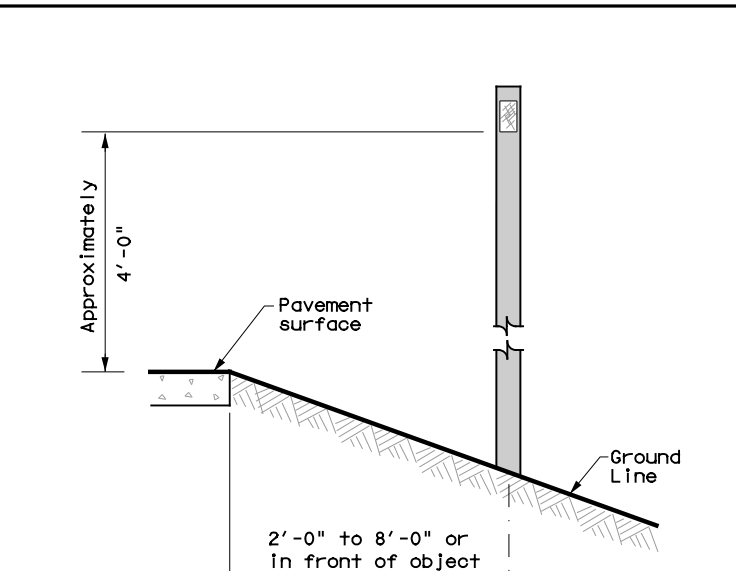
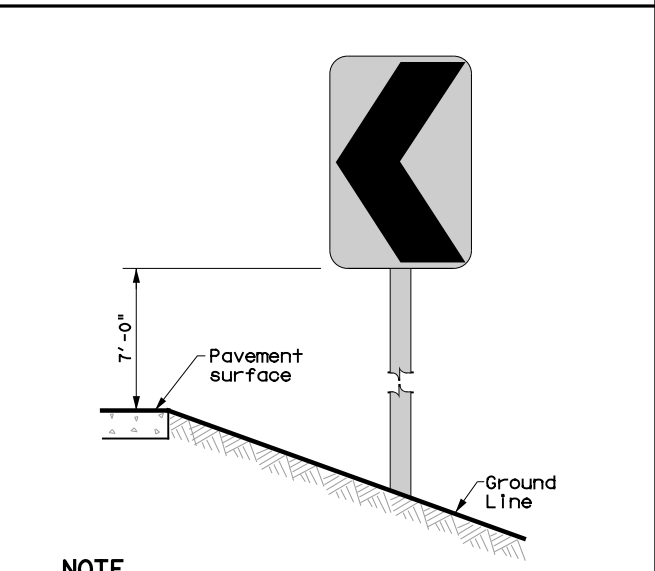
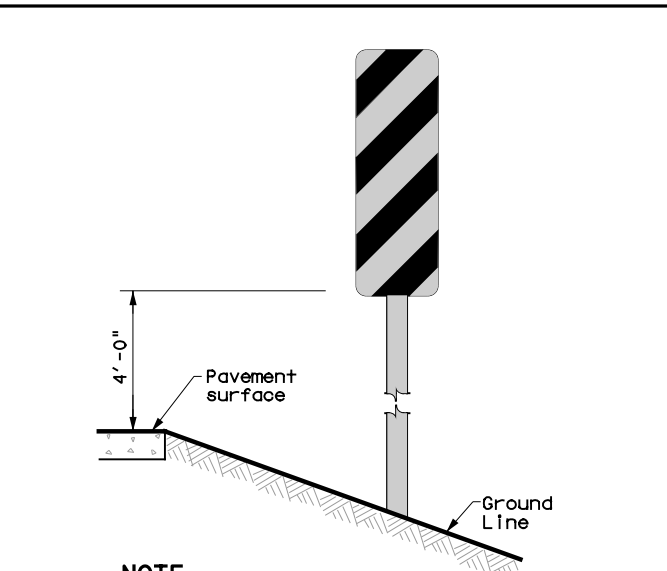
GENERAL NOTES

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

CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN

DELINEATORS AND TYPE 2 OBJECT MARKERS



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)

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.

See general notes 1, 2 and 3.



DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0006	15	038	SH 70
10-09 3-15	DIST	COUNTY	SHEET NO.	
4-10 7-20	ABL	NOLAN	135	

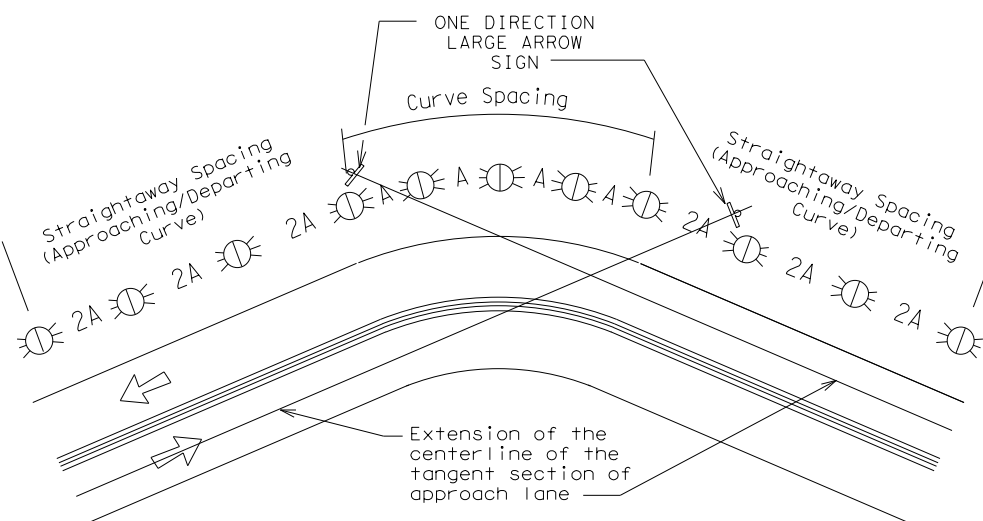
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MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	● RPMs	● RPMs
15 MPH & 20 MPH	● RPMs and One Direction Large Arrow sign	● RPMs and Chevrons; or ● RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	● RPMs and Chevrons; or ● RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	● RPMs and Chevrons

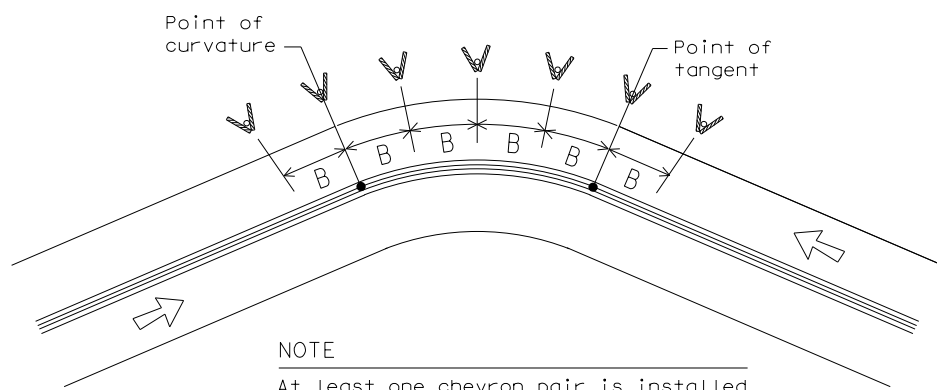
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN				
Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
		A	2A	B
1	5730	225	450	—
2	2865	160	320	—
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN			
Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp. Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete) and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100' max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100' max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

- Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
- Barrier reflectors may be used to replace required delineators.
- Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

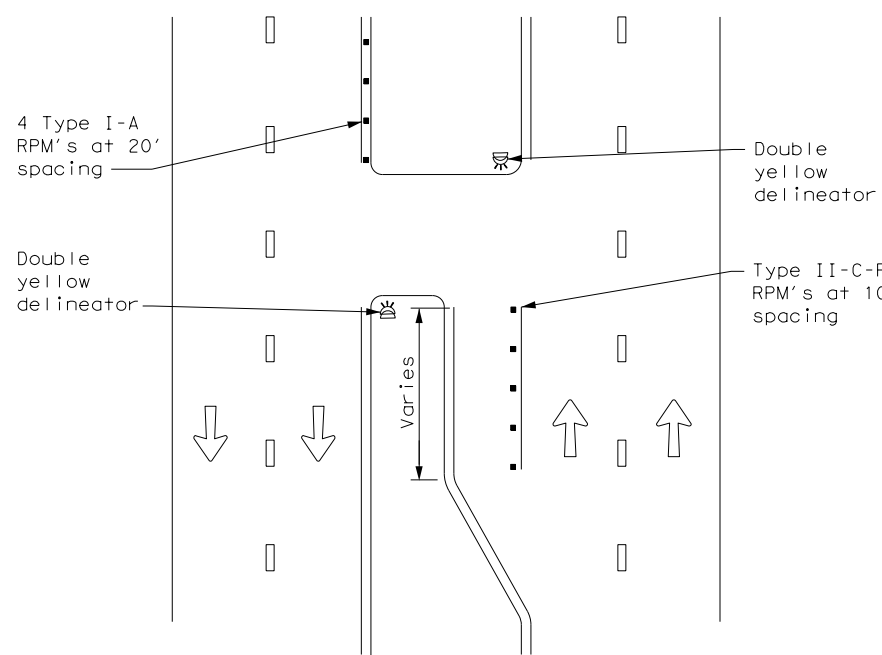
LEGEND	
	Bi-directional Delineator
	Delineator
	Sign

				Traffic Safety Division Standard	
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS					
D & OM(3)-20					
FILE: dom3-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT	
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0006	15	038	SH 70	
3-15 8-15	DIST	COUNTY	SHEET NO.		
8-15 7-20	ABL	NOLAN	136		

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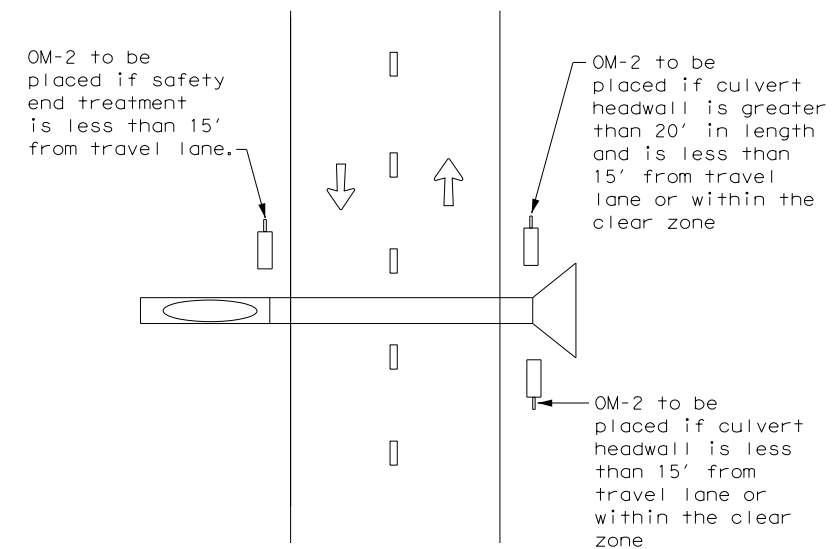
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CROSSOVERS



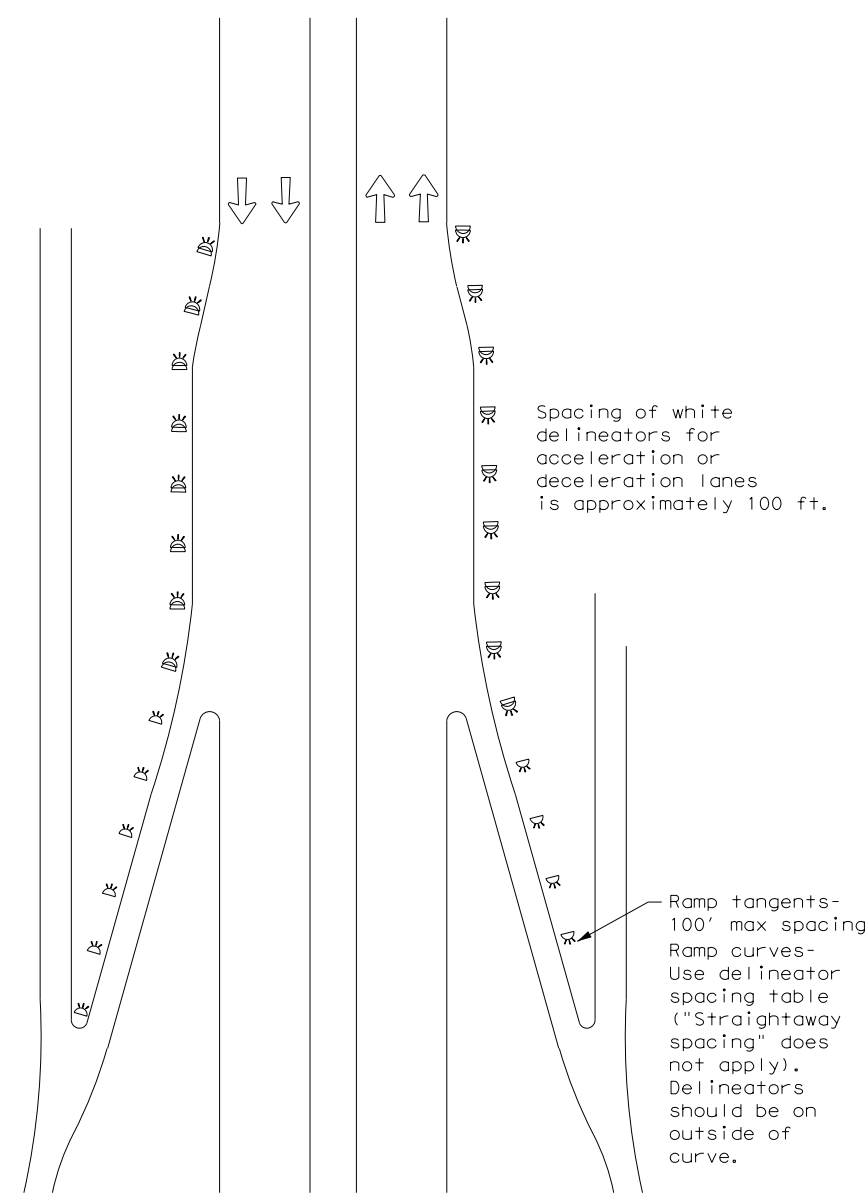
DETAIL 1

FOR CULVERTS WITHOUT MBGF



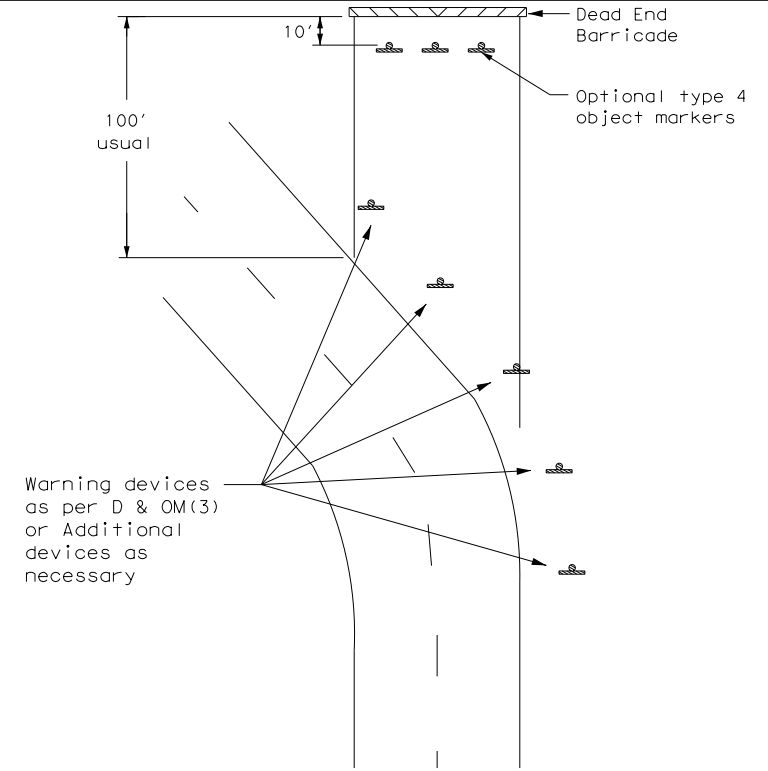
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



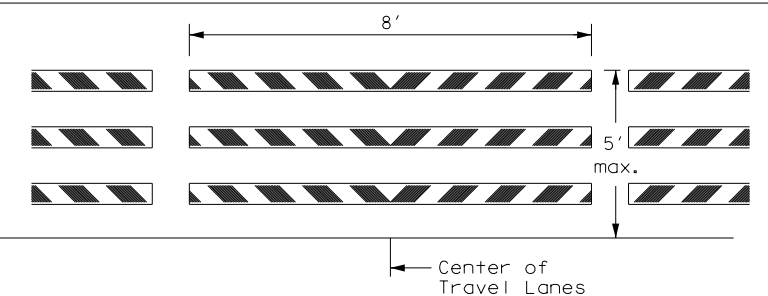
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

- Barricade striping shall be red and white reflective sheeting for all permanent road closures.
- Barricade striping is red and white sloping toward the center of the roadway.
- Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

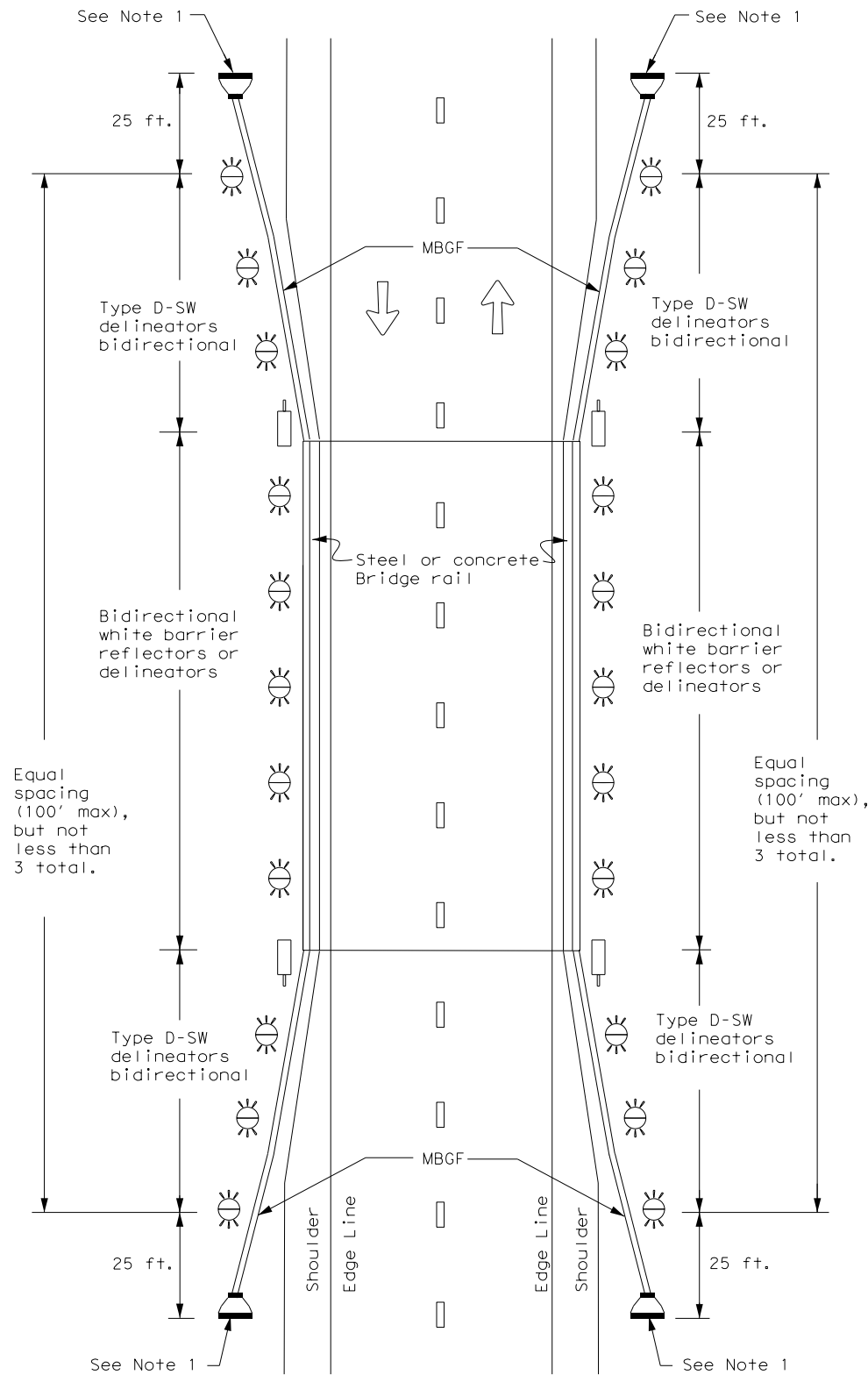


DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4) - 20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CR: TXDOT
© TXDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0006	15	038	SH 70
3-15	DIST	COUNTY	SHEET NO.	
7-20	ABL	NOLAN	137	

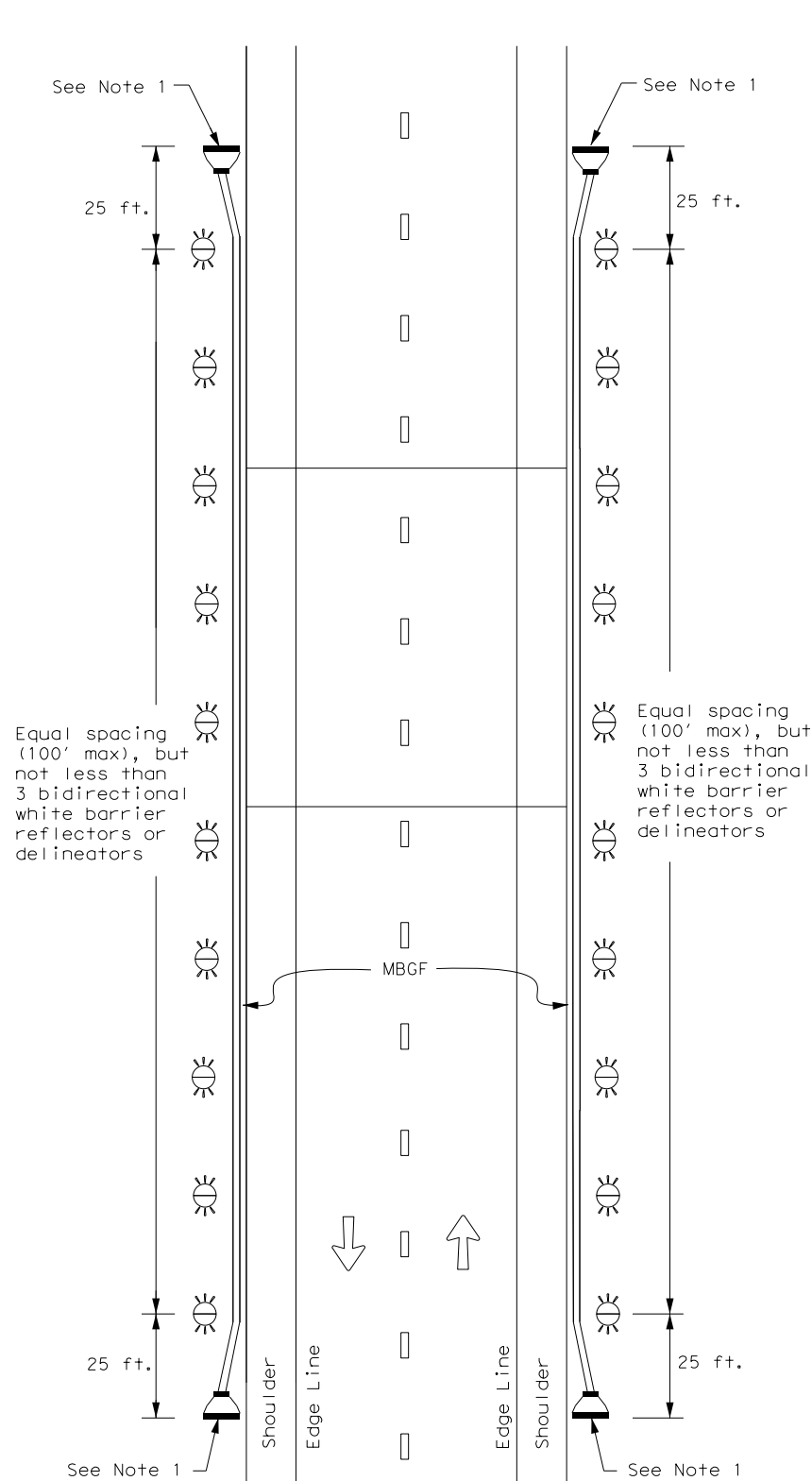
**TWO-WAY, TWO LANE ROADWAY
WITH REDUCED WIDTH APPROACH RAIL**



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

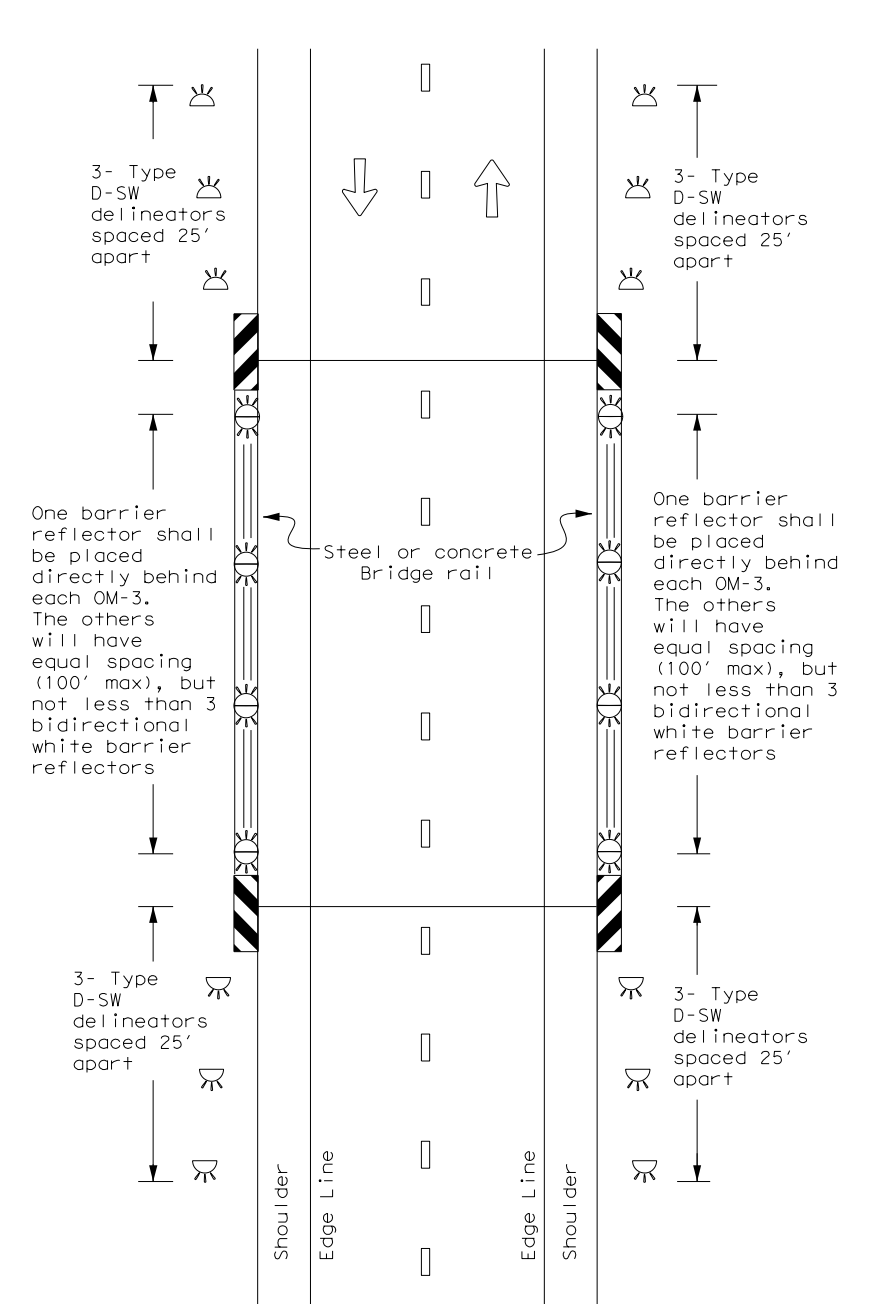
**TWO-WAY, TWO LANE ROADWAY
WITH METAL BEAM GUARD FENCE (MBGF)**



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

**TWO-WAY, TWO LANE ROADWAY
BRIDGE WITH NO APPROACH RAIL**



LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation
Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(5) - 20

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0006	15	038	SH 70
7-20	DIST	COUNTY	SHEET NO.	
	ABL	NOLAN	138	

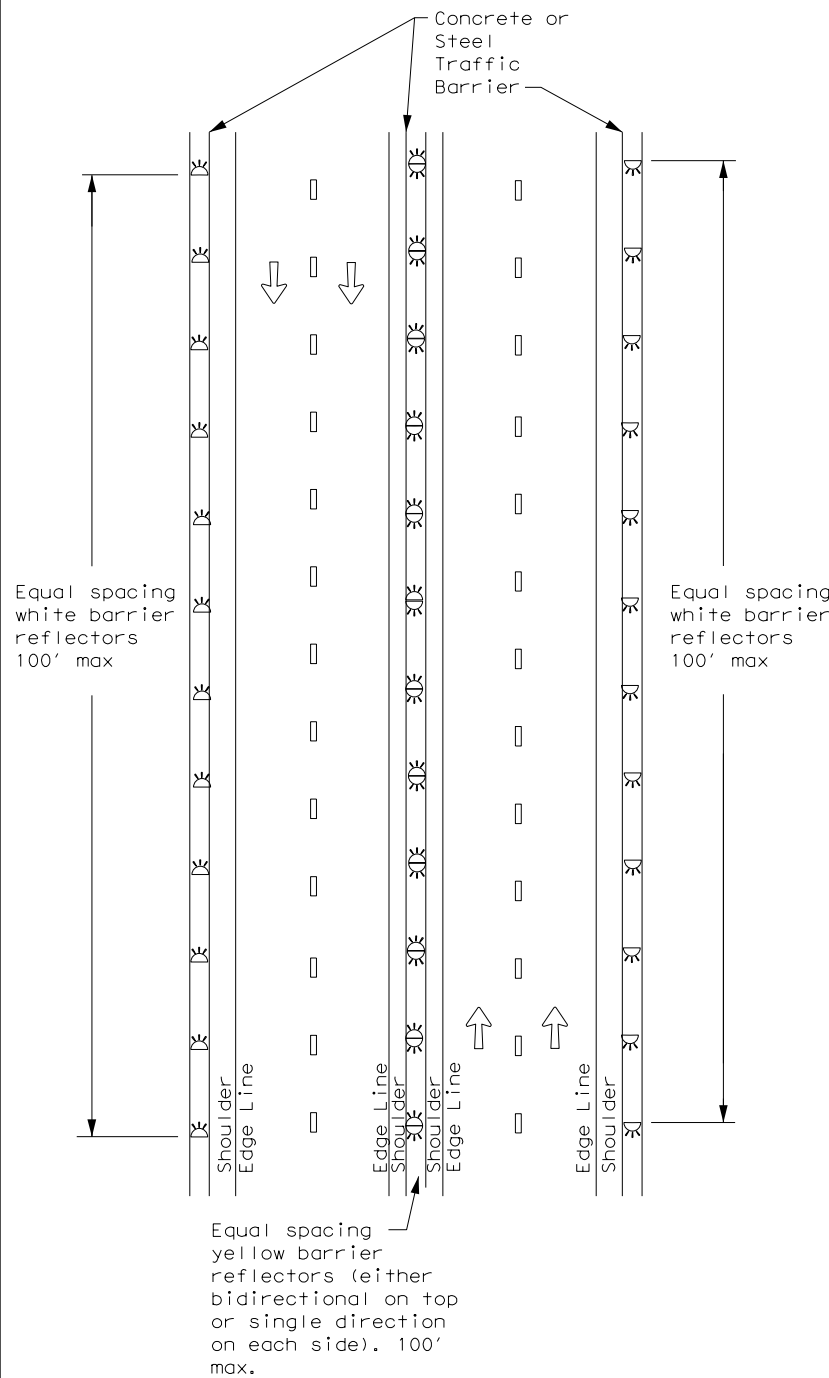
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DATE: 10/12/2023 3:08:29 PM
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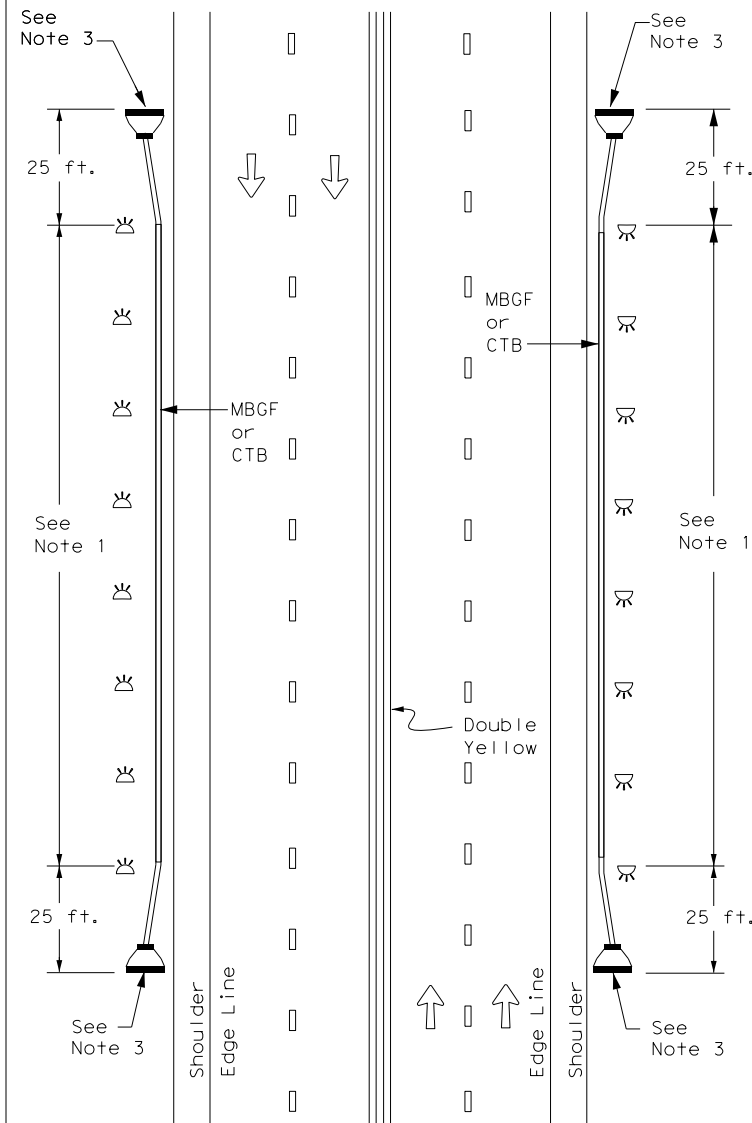
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

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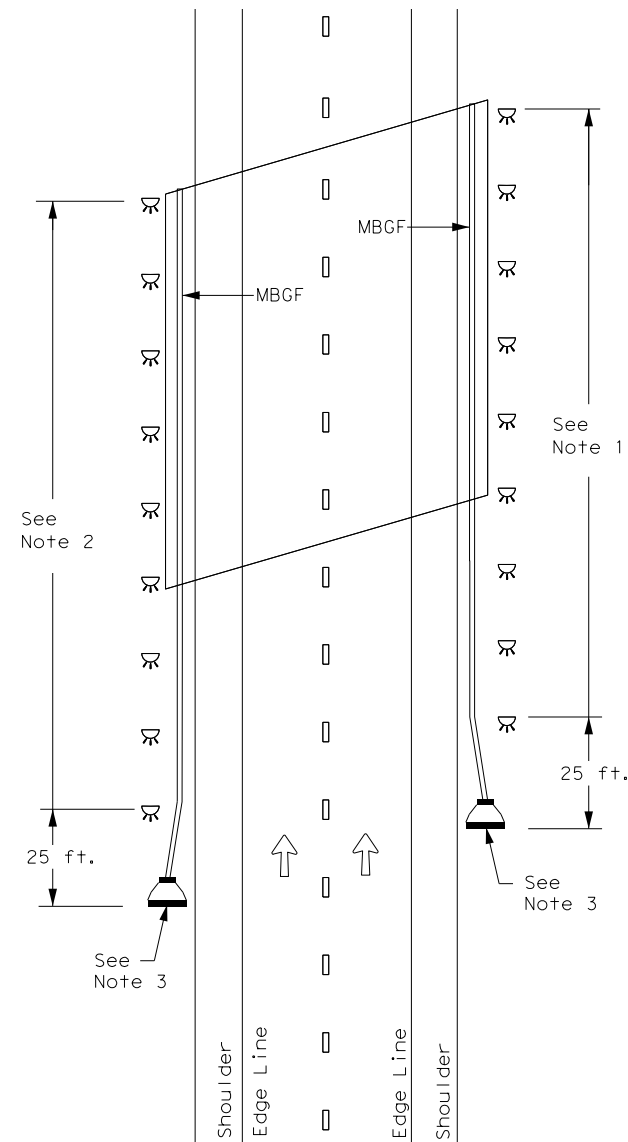
CONTINUOUS CONCRETE OR STEEL BARRIER



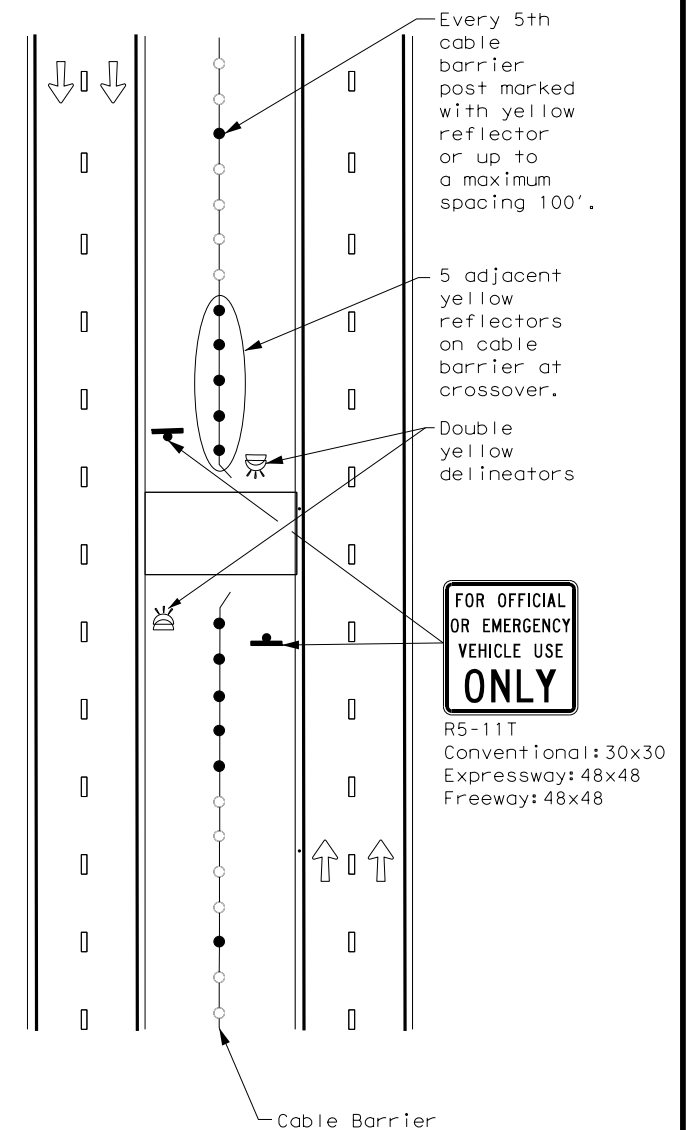
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



EMERGENCY CROSSOVER



NOTES

1. Equal spacing (100' max), but not less than 3 single directional white barrier reflectors or delineators. On Continuous 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

Texas Department of Transportation
 Traffic Safety Division Standard

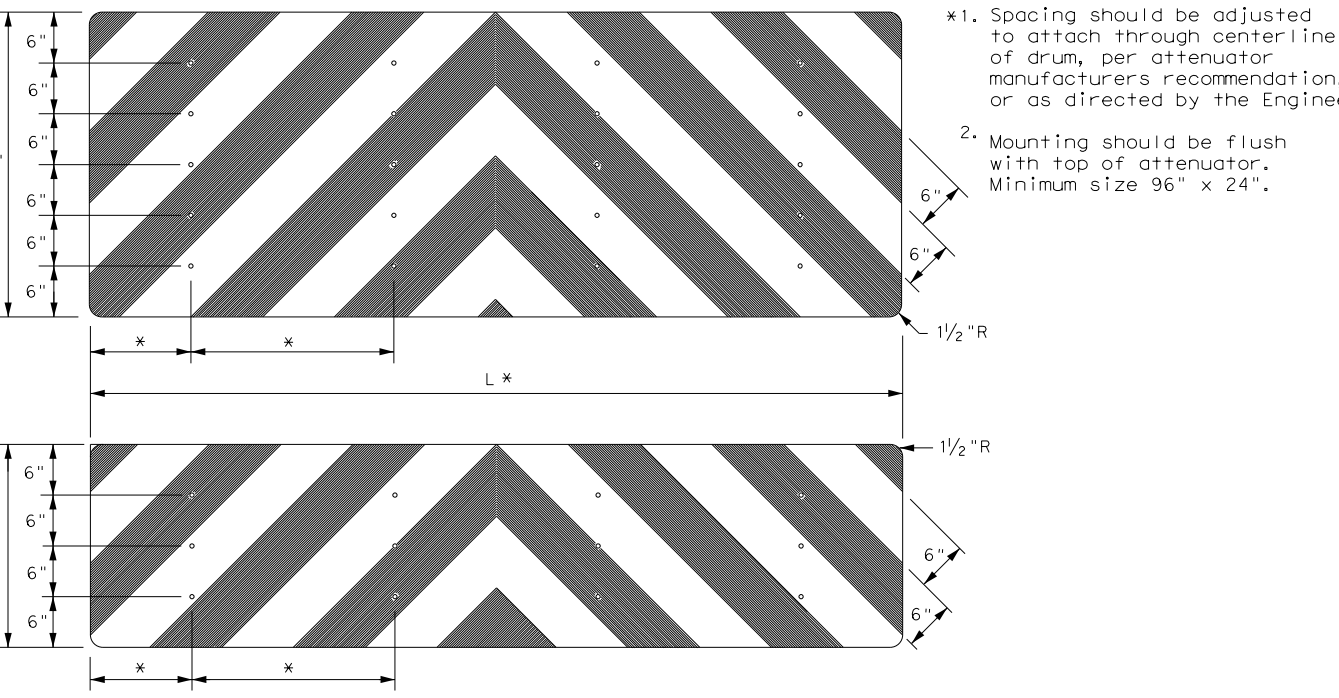
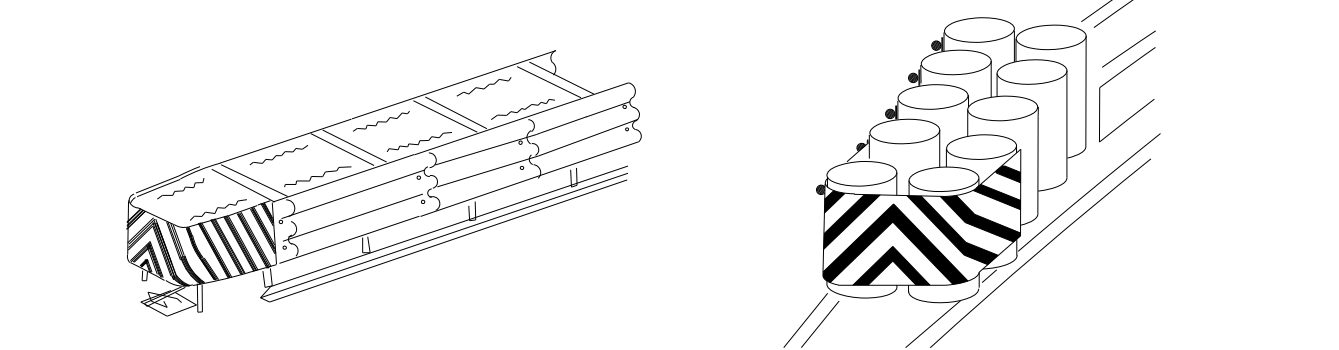
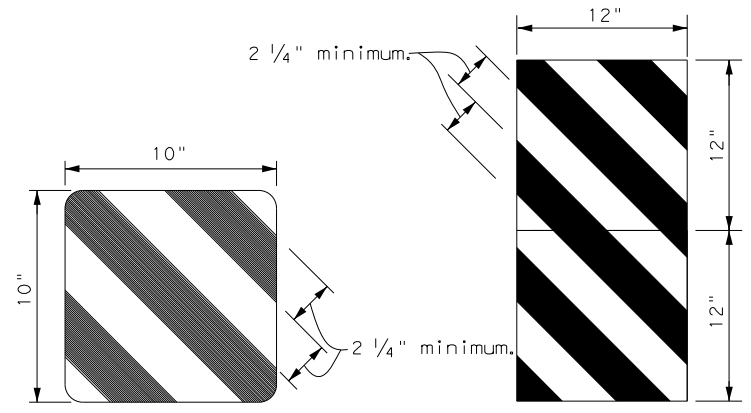
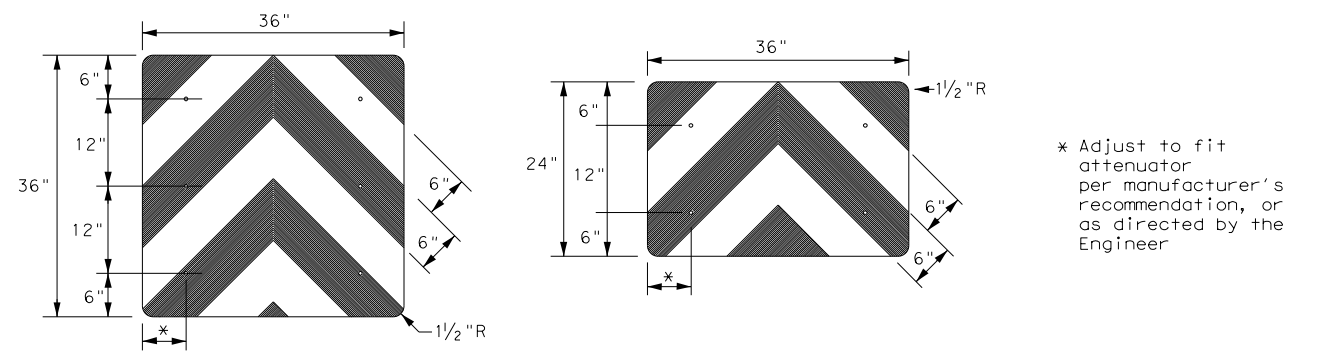
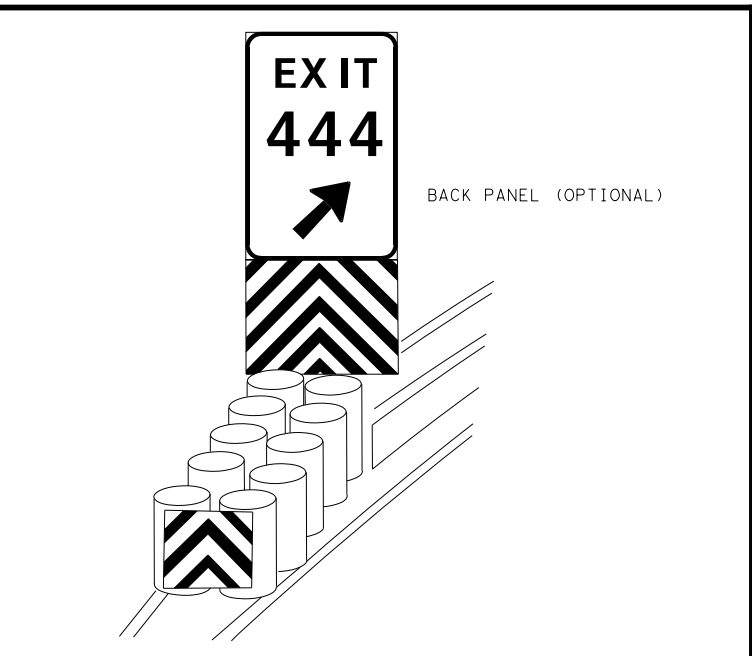
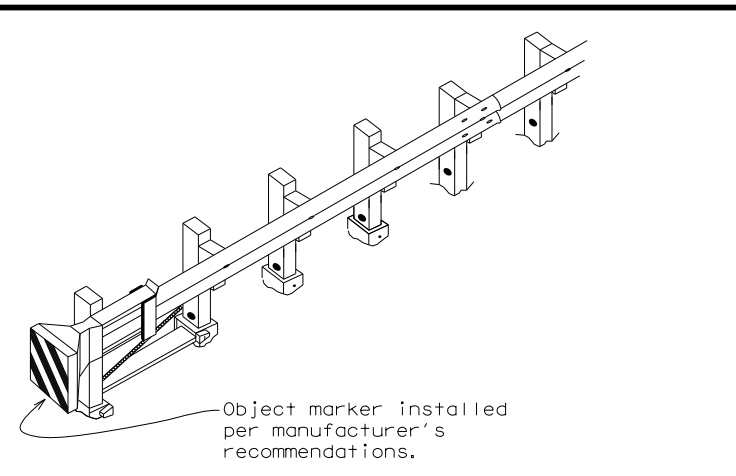
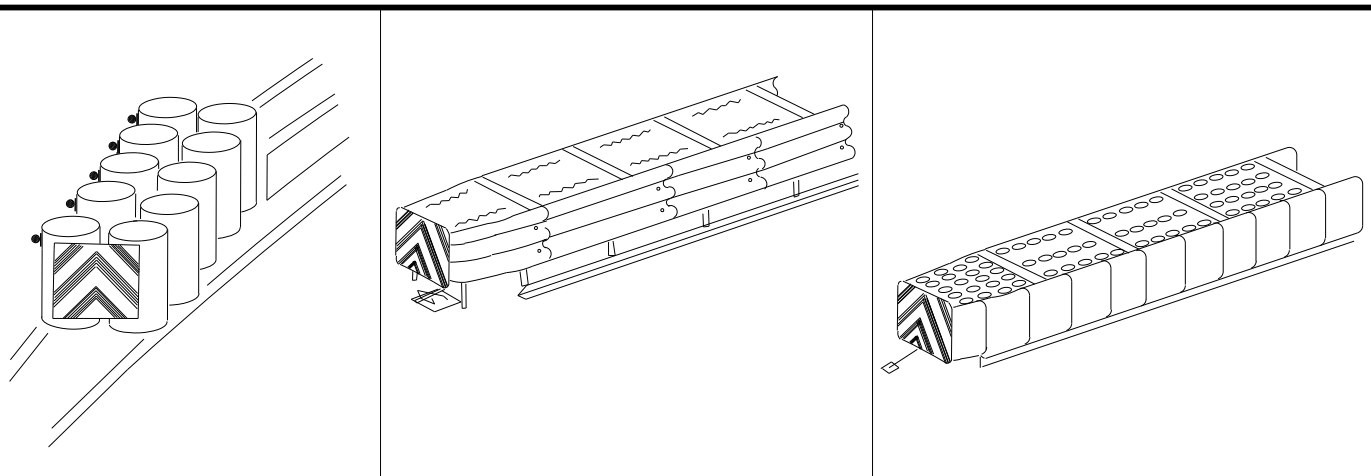
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(6)-20

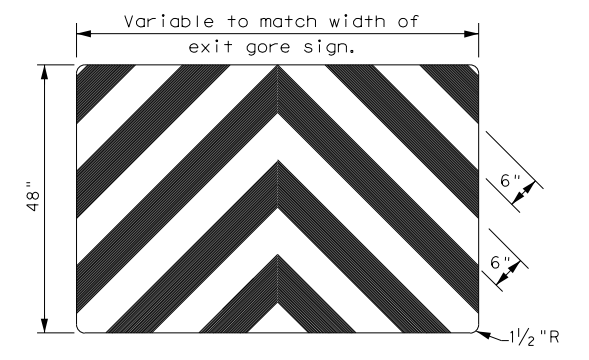
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©TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
7-20	0006	15	038	SH 70
REVISIONS	DIST	COUNTY	SHEET NO.	
	ABL	NOLAN	139	

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DATE: 10/12/2023 3:08:50 PM
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OBJECT MARKERS SMALLER THAN 3 FT²



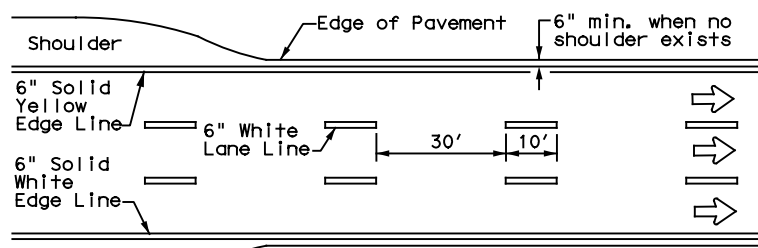
NOTES

- 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.
- 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.
- 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".
- 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.
- Object Marker at nose of attenuator is subsidiary to the attenuator.
- See D & OM (1-4) for required barrier reflectors.

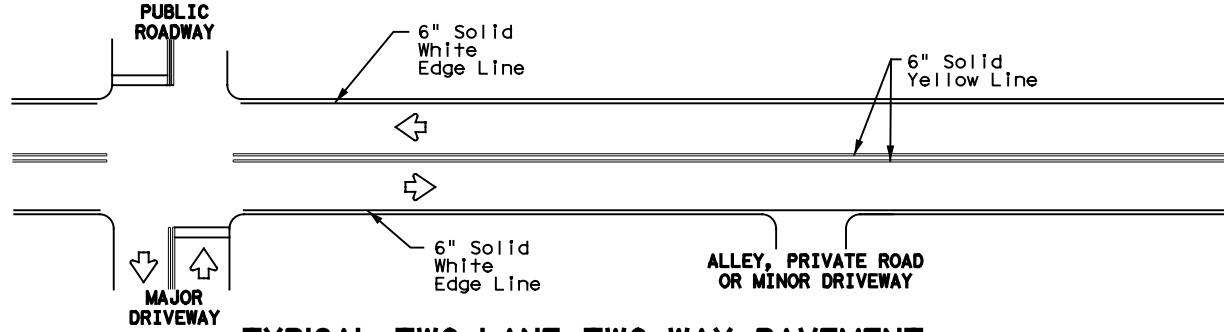
<p>DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS D & OM(VIA) - 20</p>			
FILE: domv1a20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT
© TXDOT December 1989	CONT	SECT	HIGHWAY
REVISIONS		0006 15	038 SH 70
4-92 8-04	DIST	COUNTY	SHEET NO.
8-95 3-15	ABL	NOLAN	140
4-98 7-20			
206			

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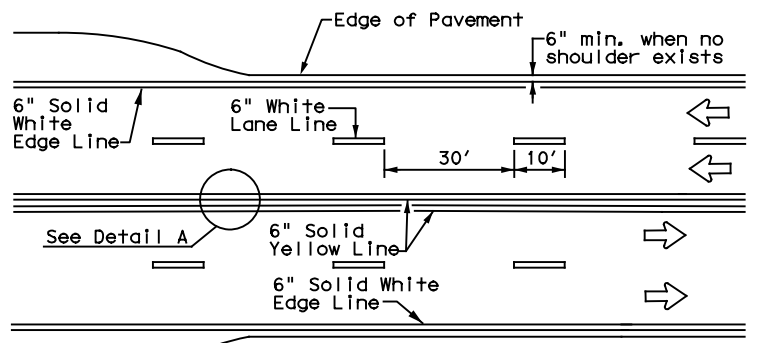
DISCLAIMER:
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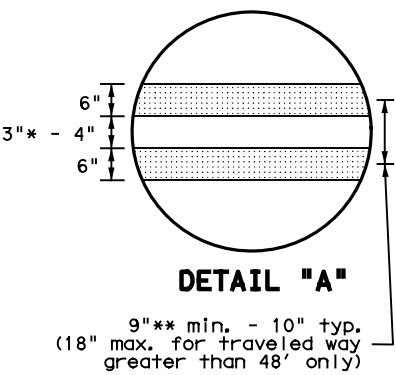
**EDGE LINE AND LANE LINES
 ONE-WAY ROADWAY
 WITH OR WITHOUT SHOULDERS**



**TYPICAL TWO-LANE, TWO-WAY PAVEMENT
 MARKINGS THROUGH INTERSECTIONS**

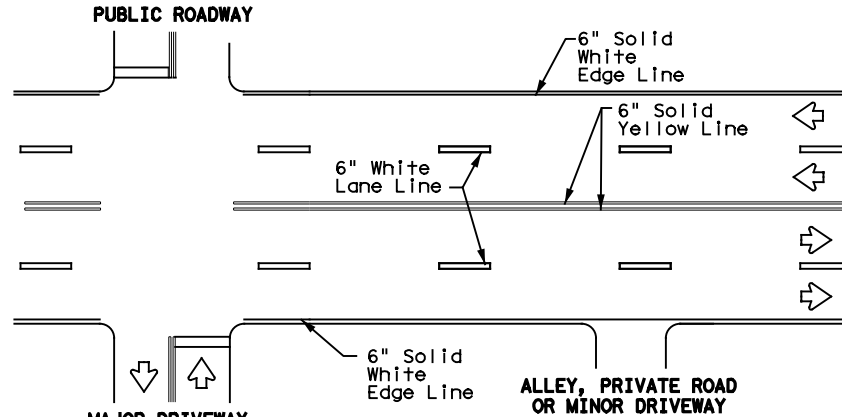


**CENTERLINE AND LANE LINES
 FOUR LANE TWO-WAY ROADWAY
 WITH OR WITHOUT SHOULDERS**

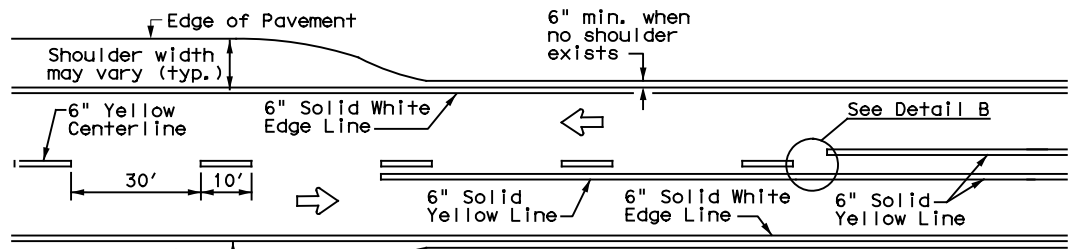


DETAIL "A"
 9" min. - 10" typ.
 (18" max. for traveled way
 greater than 48' only)

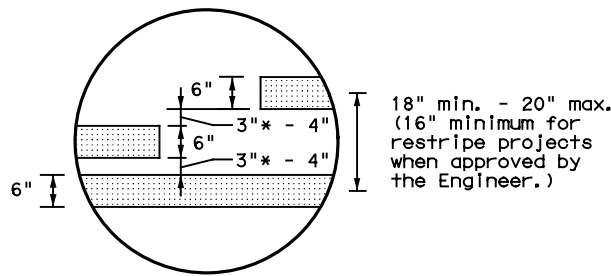
* 2" minimum for restripe projects when approved by the Engineer.
 ** 8" minimum for restripe projects when approved by the Engineer.



**TYPICAL MULTI-LANE, TWO-WAY PAVEMENT
 MARKINGS THROUGH INTERSECTIONS**

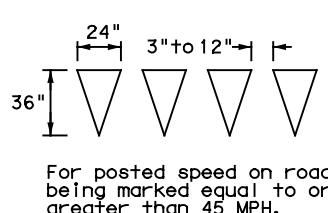


**TWO LANE TWO-WAY ROADWAY
 WITH OR WITHOUT SHOULDERS**



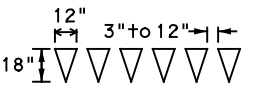
DETAIL "B"
 16" min. - 20" max.
 (16" minimum for
 restripe projects
 when approved by
 the Engineer.)

* 2" minimum for restripe projects when approved by the Engineer.



YIELD LINES

For posted speed on road being marked equal to or greater than 45 MPH.



For posted speed on road being marked equal to or less than 40 MPH.

NOTES

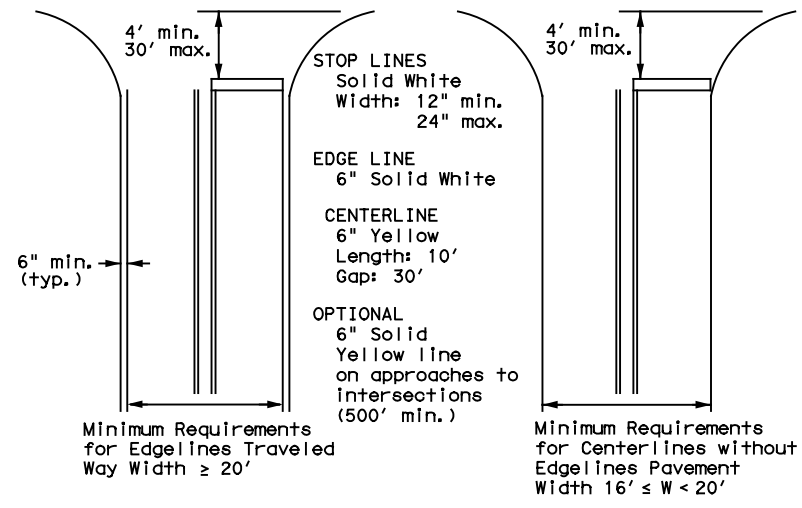
- Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
- Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
- 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

- Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
- The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

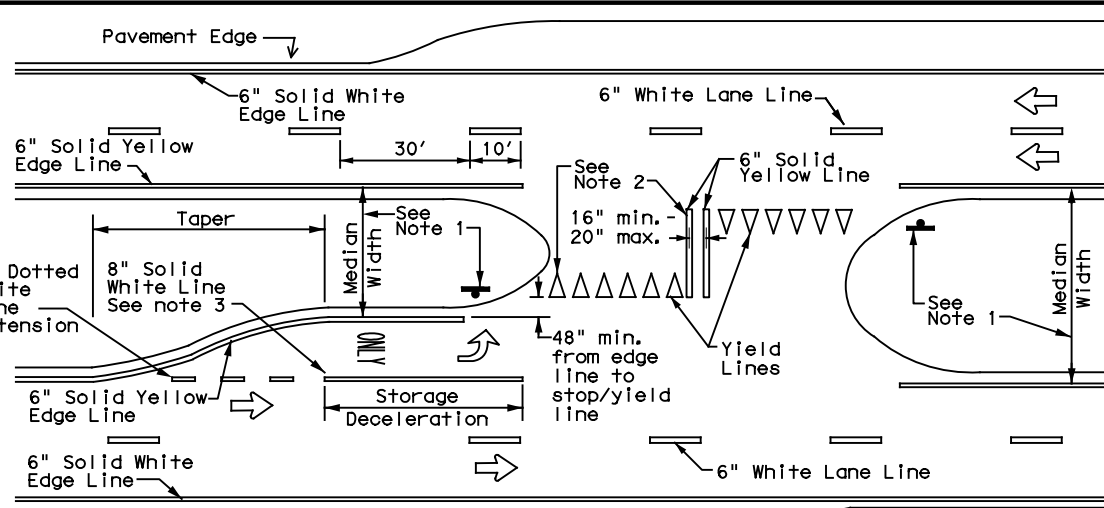
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

**GUIDE FOR PLACEMENT OF STOP LINES,
 EDGE LINE & CENTERLINE**

Based on Traveled Way and Pavement Widths for Undivided Roadways



FOUR LANE DIVIDED ROADWAY CROSSOVERS

Texas Department of Transportation
 Traffic Safety Division Standard

**TYPICAL STANDARD
 PAVEMENT MARKINGS**

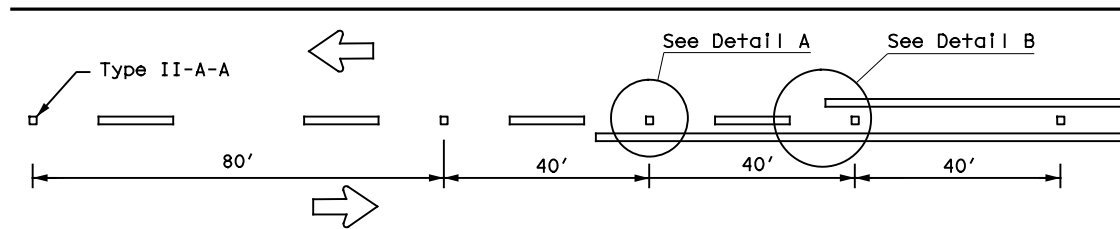
PM(1)-22

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© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
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8-95 3-03 12-22	ABL	NOLAN	141	
5-00 2-12				

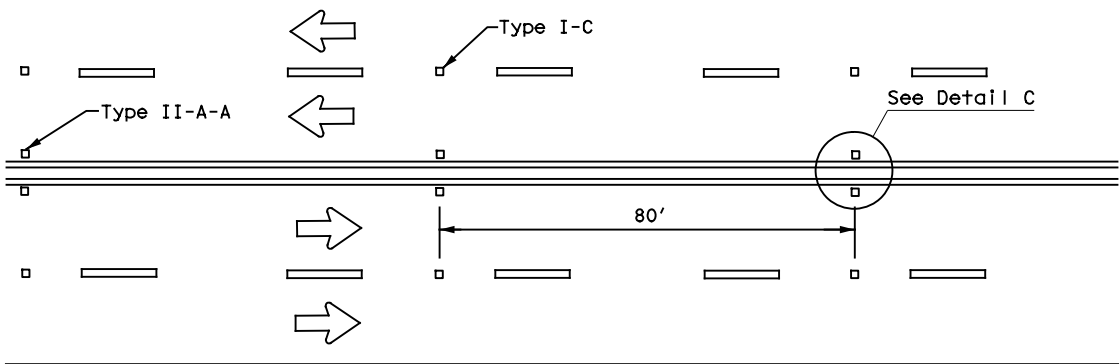
22A

REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

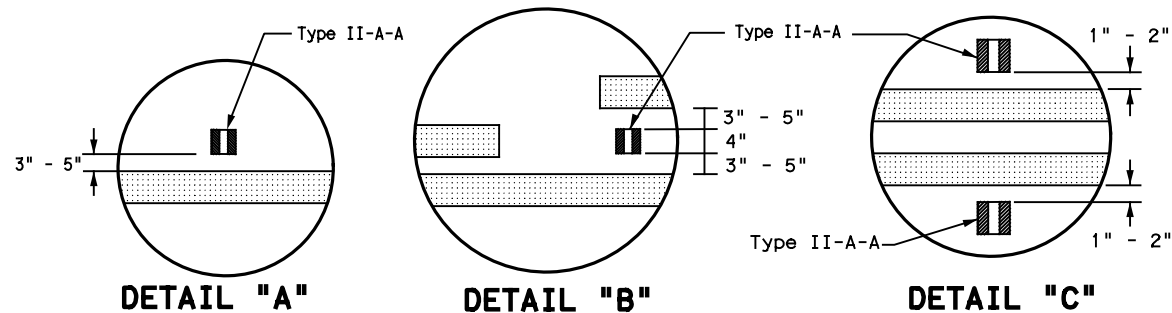
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CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS



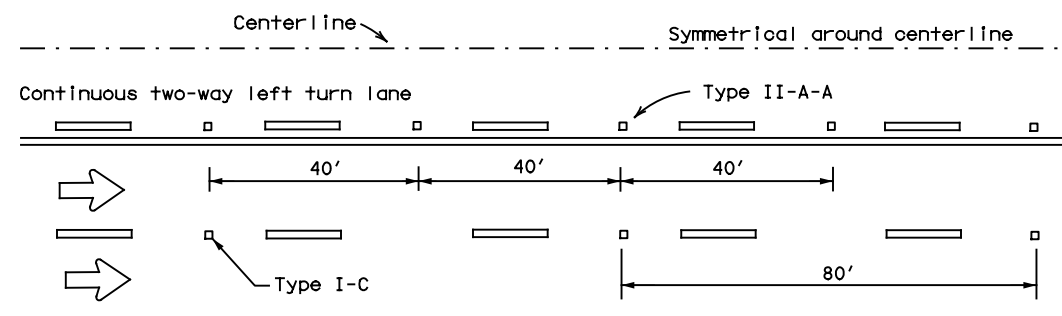
**CENTERLINE & LANE LINES
FOR FOUR LANE TWO-WAY ROADWAYS**



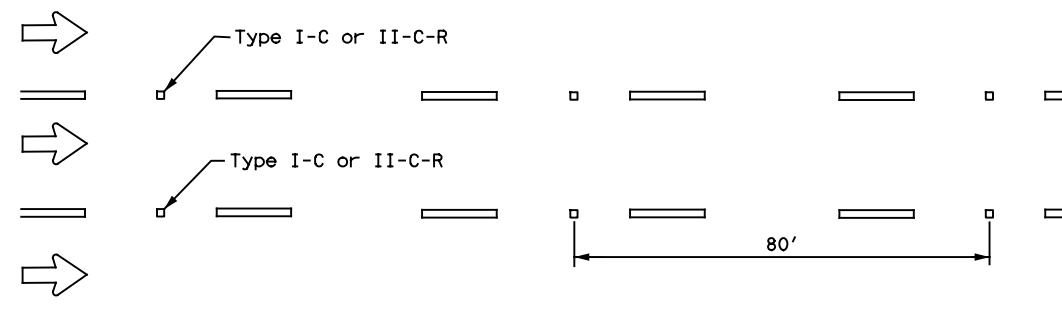
DETAIL "A"

DETAIL "B"

DETAIL "C"

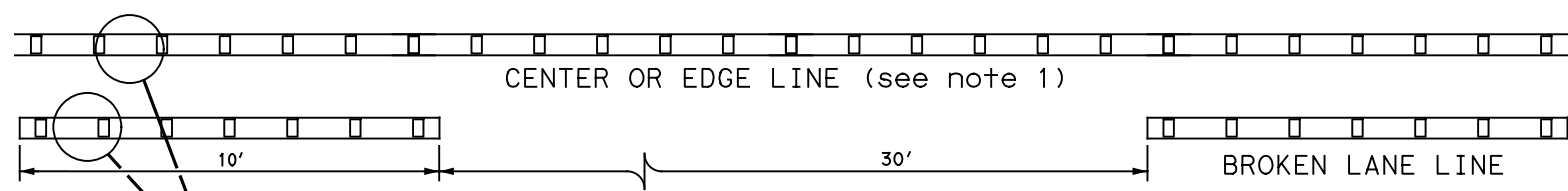


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

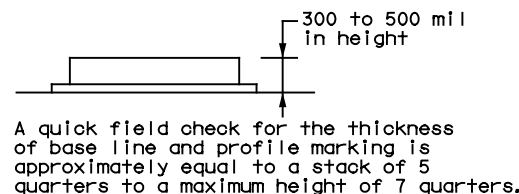
Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.
See Note 3.



**REFLECTORIZED PROFILE
PATTERN DETAIL**

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

6" EDGE LINE, 6" CENTERLINE
OR 6" LANE LINE



NOTES

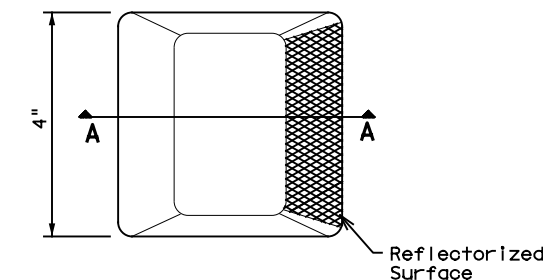
- Edge lines should typically be 6" wide and the materials shall be specified in the plans.
- Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

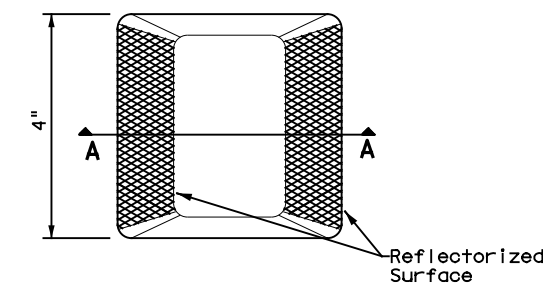
- All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
- On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.
- Use raised pavement marker Type I-C with undivided roadways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

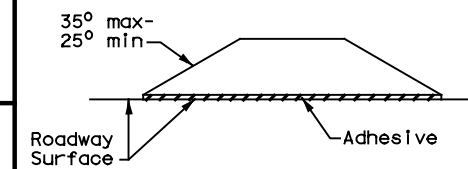
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



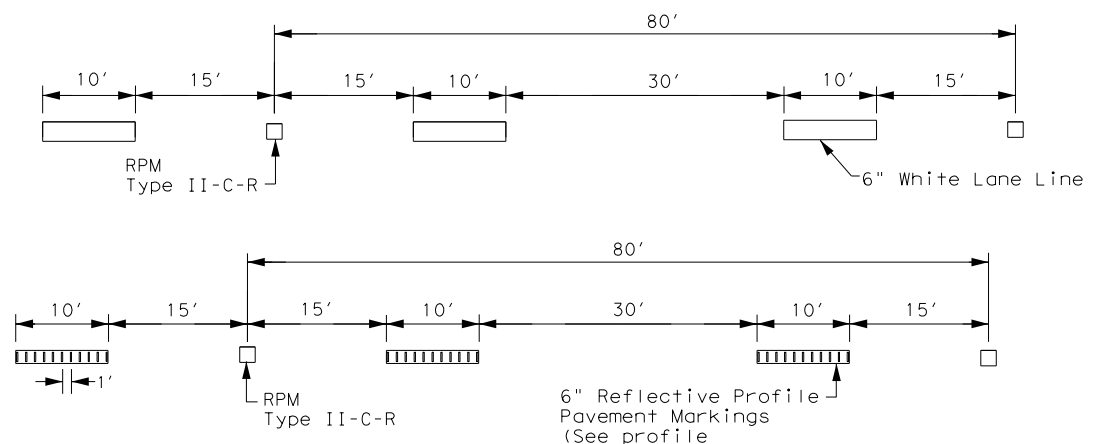
**POSITION GUIDANCE USING
RAISED MARKERS
REFLECTORIZED PROFILE
MARKINGS
PM(2) - 22**

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0006	15	038	SH 70
4-77 8-00 6-20	DIST	COUNTY	SHEET NO.	
4-92 2-10 12-22	ABL	NOLAN	142	
5-00 2-12				

DATE: 10/12/2023 3:09:13 PM
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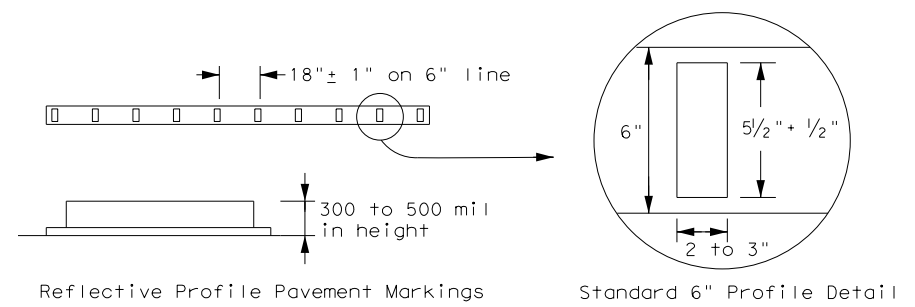
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DATE: 10/12/2023 3:09:24 PM
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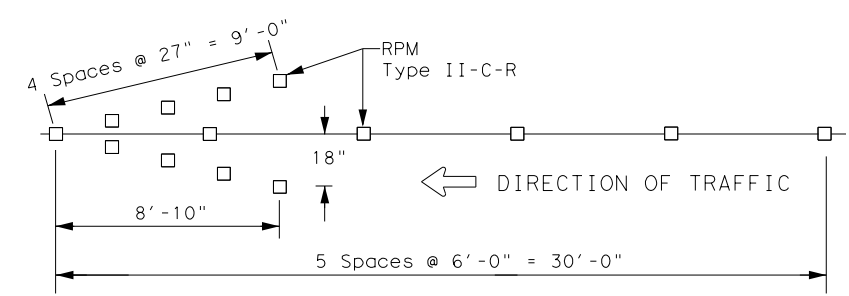
NOTE
 Reflectorized raised pavement markers Type II-C-R shall be spaced on 80' centers with the clear face toward normal traffic and the red face toward wrong way traffic. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.

TRAFFIC LANE LINES PAVEMENT MARKING



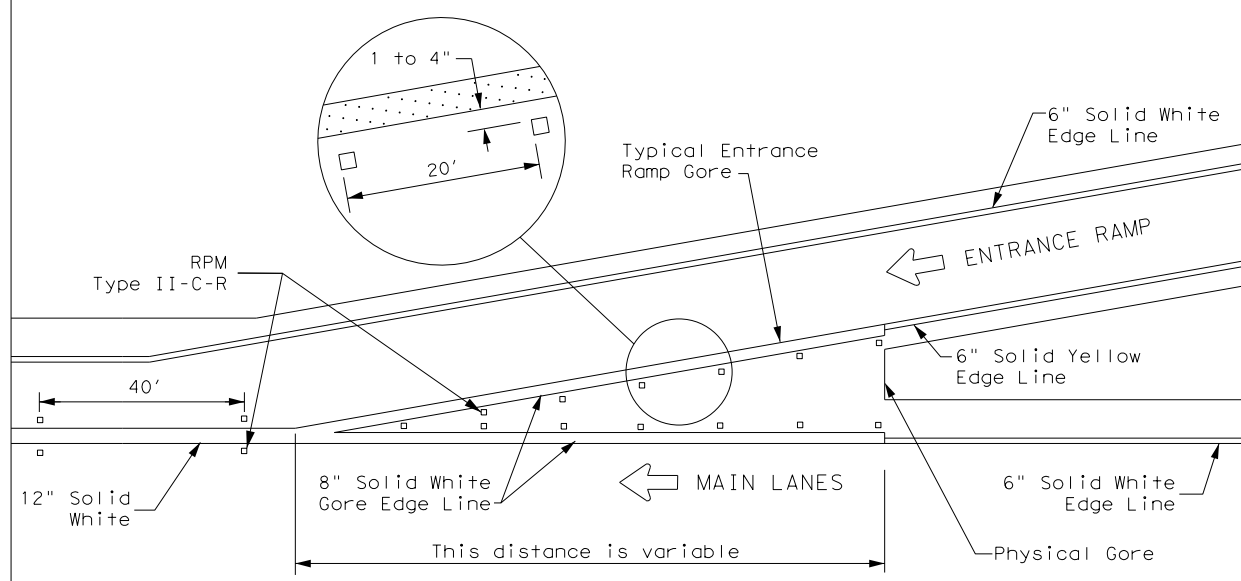
NOTE
 Edge lines should typically be 6" wide and the materials shall be as specified in the plans. See details above if reflective profile pavement markings are to be used.

EDGE LINE PAVEMENT MARKINGS

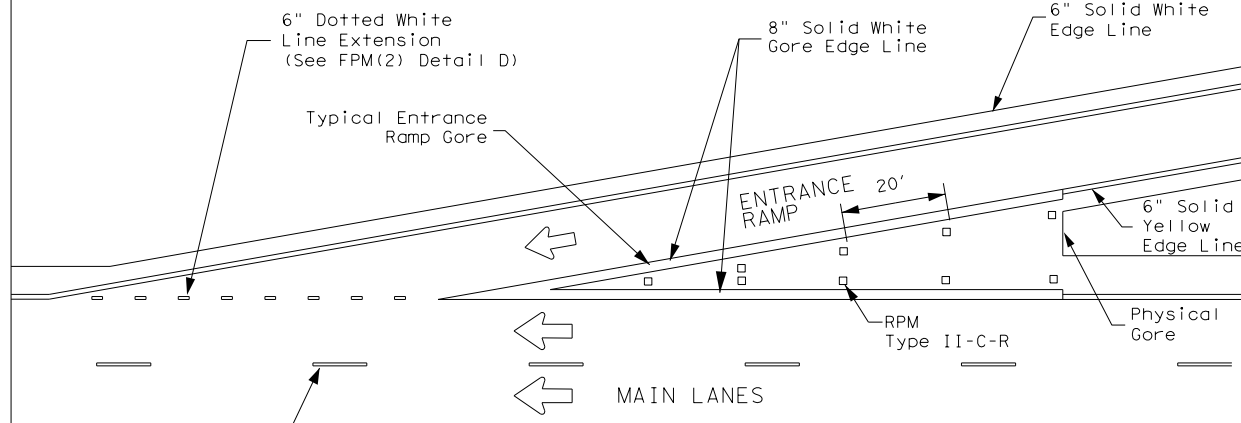


NOTES
 1. Reflectorized raised pavement markers Type-II-C-R in the wrong way arrow shall have the clear face toward normal traffic and the red face toward the wrong way traffic.
 2. Red reflectorized wrong way arrows, not to exceed two, may be placed on exit ramps. Locations of the arrows shall be as shown in the plans or as directed by the engineer.

WRONG WAY ARROW

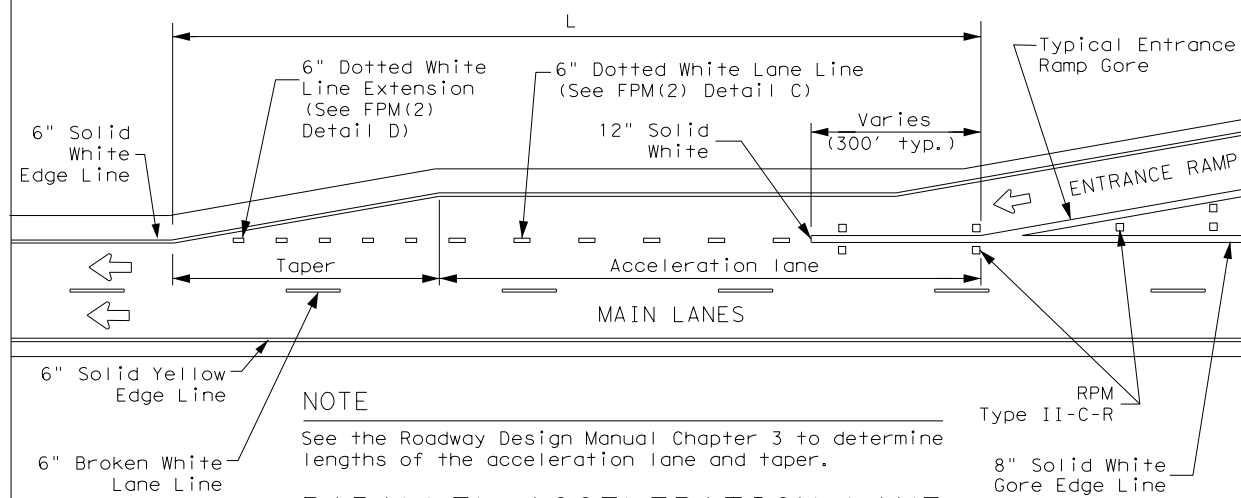


TYPICAL ENTRANCE RAMP GORE MARKING



NOTE
 See the Roadway Design Manual Chapter 3 to determine if a tapered acceleration lane may be used.

TAPERED ACCELERATION LANE



NOTE
 See the Roadway Design Manual Chapter 3 to determine lengths of the acceleration lane and taper.

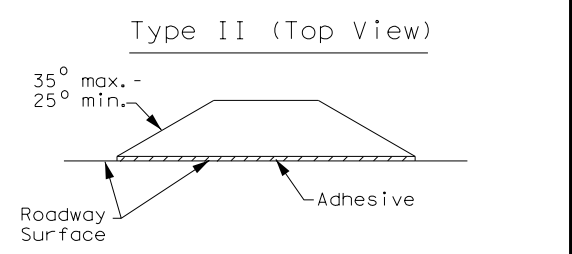
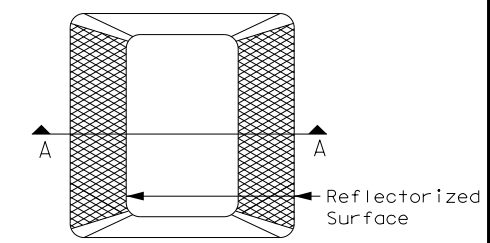
PARALLEL ACCELERATION LANE

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.

LEGEND	
←	Traffic flow
↩	Pavement marking arrows (white)
□	Reflectorized Raised Markers (RPM) Type II-C-R

GENERAL NOTE
 On concrete pavements the raised pavement markers shall be placed to one side of the longitudinal joints.



SECTION A REFLECTORIZED RAISED PAVEMENT MARKER (RPM)



TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS WITH RAISED PAVEMENT MARKERS FPM(1)-22

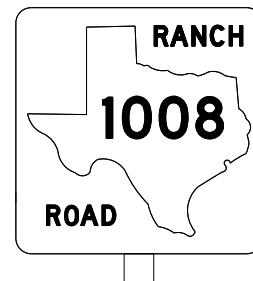
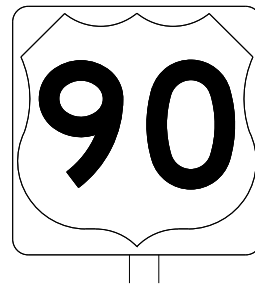
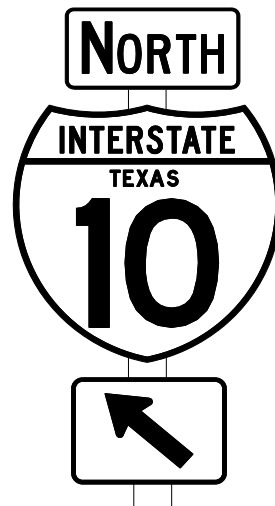
FILE: fpm(1)-22.dgn	DN:	CK:	DW:	CK:
©TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0006	15	038	SH 70
5-74 8-00 2-12	DIST	COUNTY	SHEET NO.	
4-92 2-08 10-22	ABL	NOLAN	143	
5-00 2-10				

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DATE: 10/12/2023 3:09:36 PM
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REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

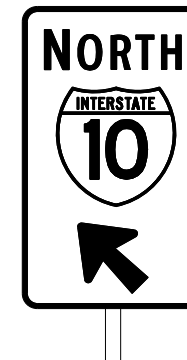
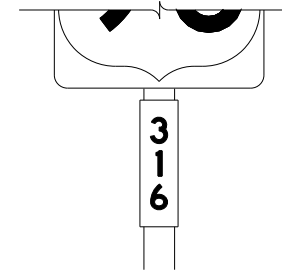
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B OR C SHEETING



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

- 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).
- 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

- 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).
- 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.
- 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.
- 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.
- Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
- 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/>

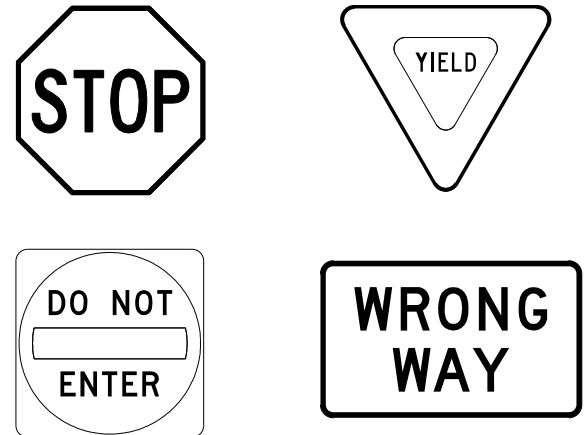
Texas Department of Transportation	<i>Traffic Operations Division Standard</i>
<h1 style="margin: 0;">TYPICAL SIGN REQUIREMENTS</h1> <h2 style="margin: 0;">TSR (3) -13</h2>	
FILE: tsr3-13.dgn © TxDOT October 2003 12-03 7-13 9-08	DN: TxDOT CONT SECT 0006 15 DIST COUNTY ABL NOLAN
CR: TxDOT DW: TxDOT JOB 038 SHEET NO. 144	HIGHWAY SH 70

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 FILE: c:\pwworking\centra101\d3297787\tsr4-13.dgn

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

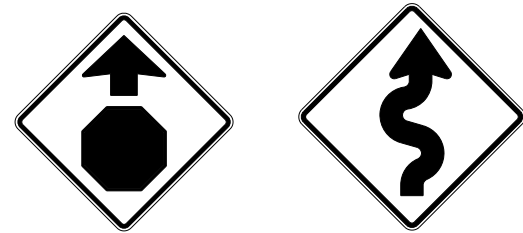
(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B _{FL} OR C _{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B _{FL} OR C _{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

- 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).
- Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
- 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.
- Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
- White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
- Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
- Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
- Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

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

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

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website:
<http://www.txdot.gov/>

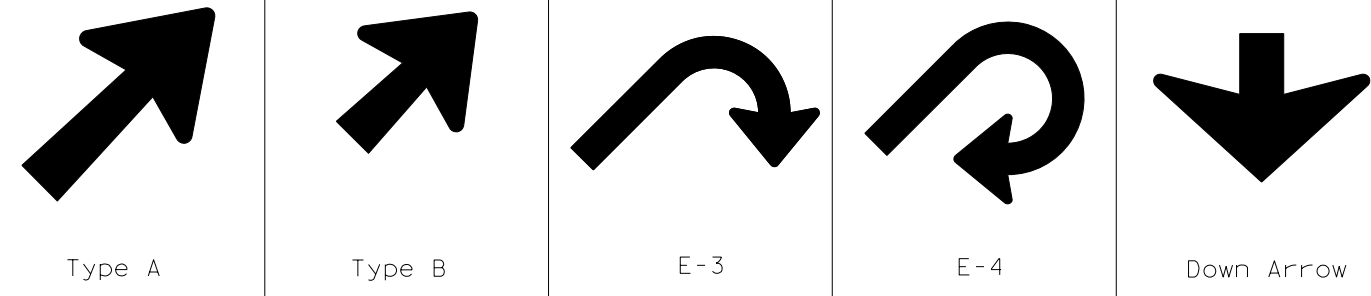
				Traffic Operations Division Standard	
<h2>TYPICAL SIGN REQUIREMENTS</h2> <h3>TSR (4) - 13</h3>					
FILE:	tsr4-13.dgn	DN:	TxDOT	CK:	TxDOT
© TxDOT	October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS		0006	15	038	SH 70
12-03	7-13	DIST	COUNTY	SHEET NO.	
9-08		ABL	NOLAN	145	

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 FILE: c:\pwworking\centra101\d3297787\tsr5-13.dgn

ARROW DETAILS

for Large Ground-Mounted and Overhead Guide Signs



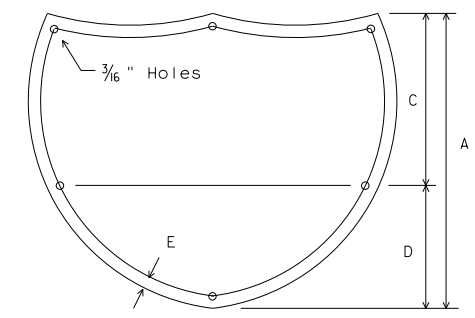
TYPE	LETTER SIZE	USE
A-1	10.67" U/L and 10" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 20" U/L	
B-1	10.67" U/L and 10" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 20" U/L	

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.

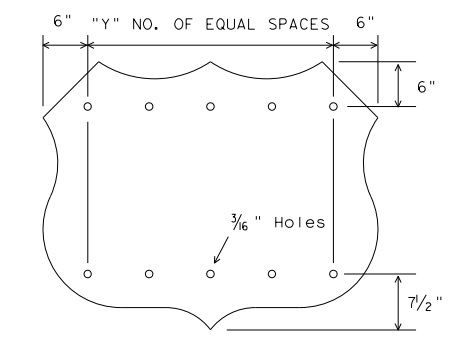
The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website:
<http://www.txdot.gov/>

SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)



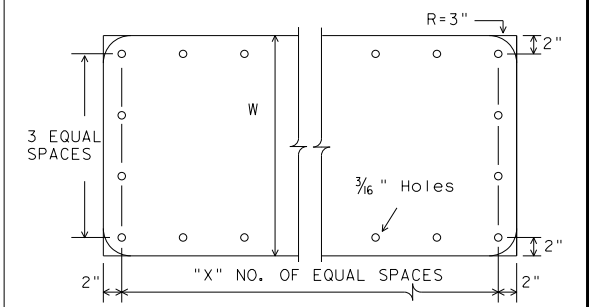
INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1 1/2
48	28	20	1 3/4



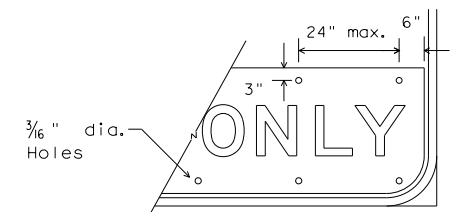
U.S. ROUTE MARKERS

Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



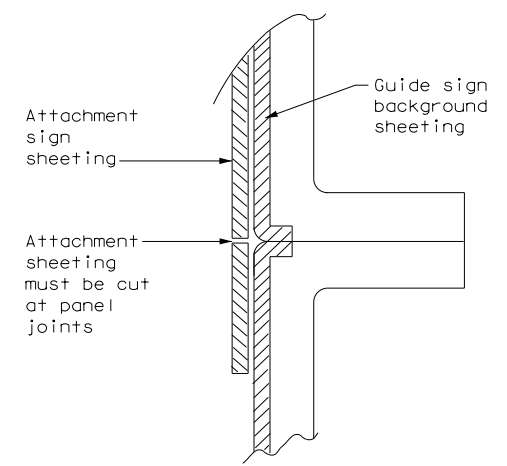
STATE ROUTE MARKERS

No. of Digits	W	X
4	24	4
4	36	5
4	48	6
3	24	3
3	36	4
3	48	5

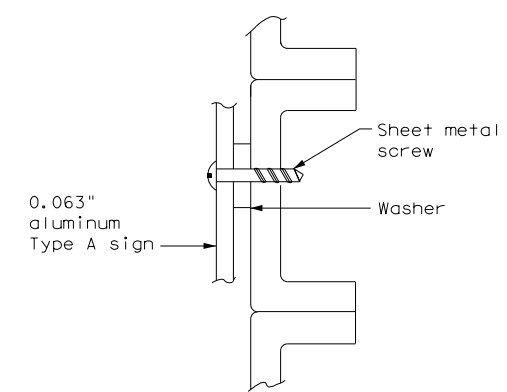


EXIT ONLY PANEL

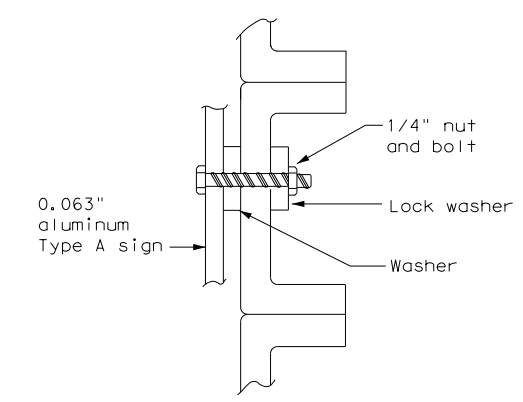
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



DIRECT APPLIED ATTACHMENT



SCREW ATTACHMENT

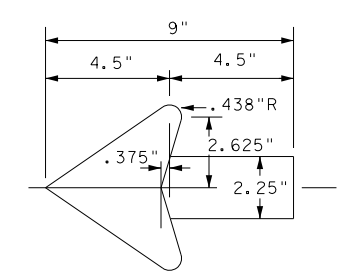


NUT/BOLT ATTACHMENT

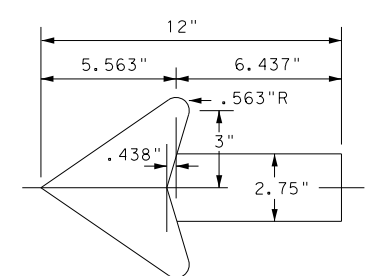
- NOTE:
- Sheeting for legend, symbols, and borders must be cut at panel joints.
 - Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".

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.



TYPICAL SIGN REQUIREMENTS

TSR (5) - 13

FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0006	15	038	SH 70
12-03 7-13	DIST	COUNTY	SHEET NO.	
9-08	ABL	NOLAN	146	

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 FILE: c:\pwworking\centra101\43297787\smngen.dgn

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

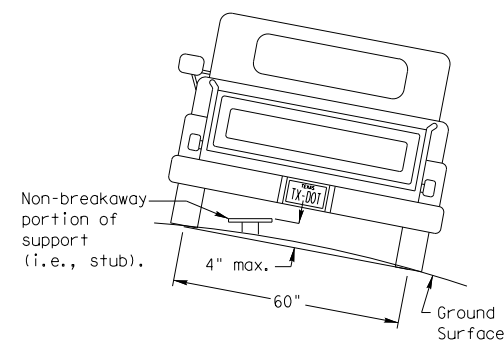
Post Type _____
 FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
 TWT = Thin-Walled Tubing (see SMD(TWT))
 10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
 S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2) _____

Anchor Type _____
 UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
 UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
 WS = Wedge Anchor Steel - (see SMD(TWT))
 WP = Wedge Anchor Plastic (see SMD(TWT))
 SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
 SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation
 P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
 T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
 U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
 IF REQUIRED
 1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
 BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
 WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
 EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-3))

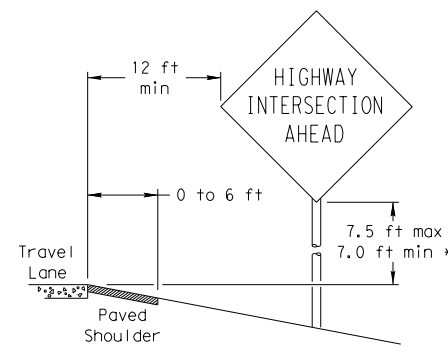
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

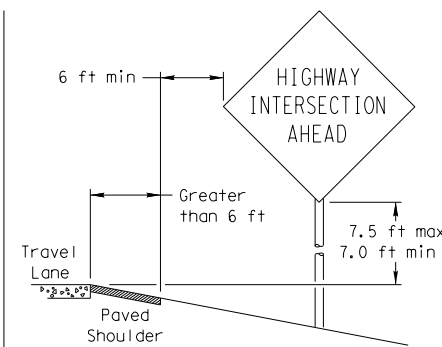
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

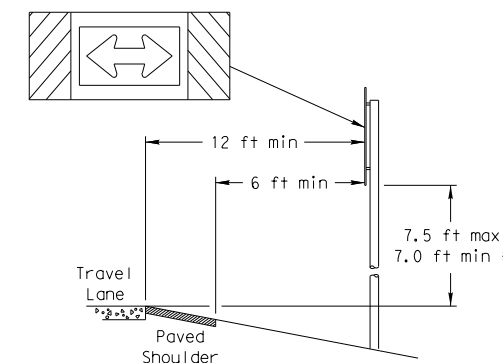
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



GREATER THAN 6 FT. WIDE

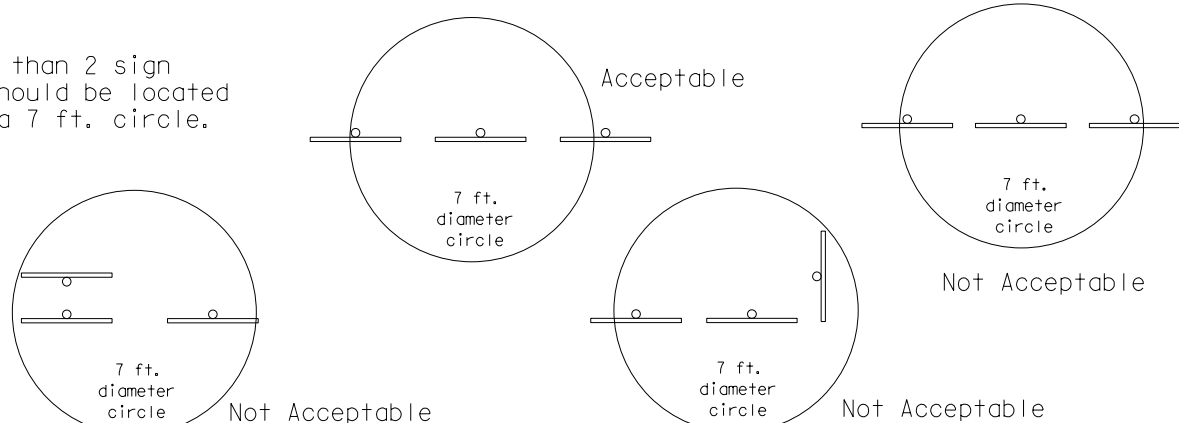
When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

T-INTERSECTION

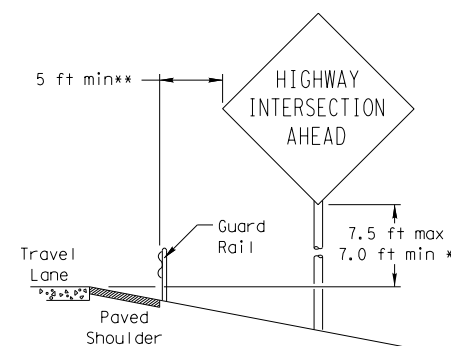


When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.

No more than 2 sign posts should be located within a 7 ft. circle.

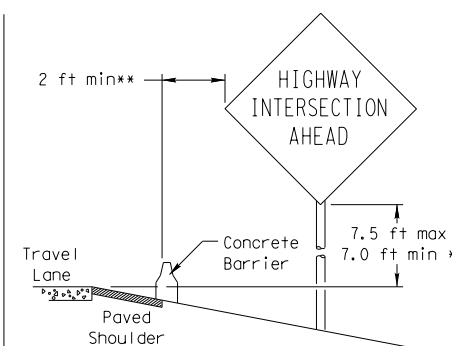


BEHIND BARRIER



BEHIND GUARDRAIL

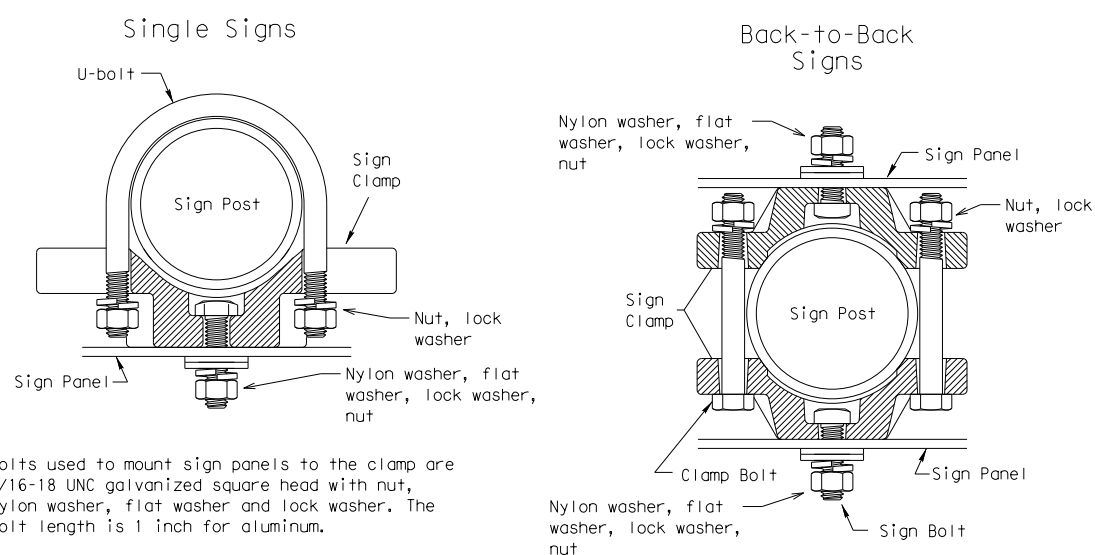
**Sign clearance based on distance required for proper guard rail or concrete barrier performance.



BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

TYPICAL SIGN ATTACHMENT DETAIL



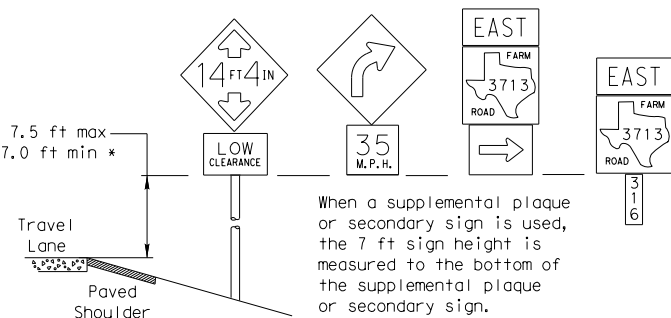
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

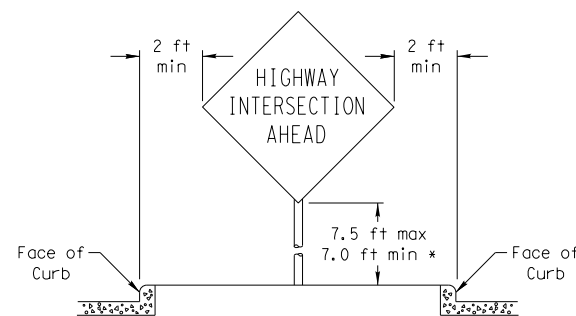
Sign clamps may be either the specific size clamp or the universal clamp.

Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

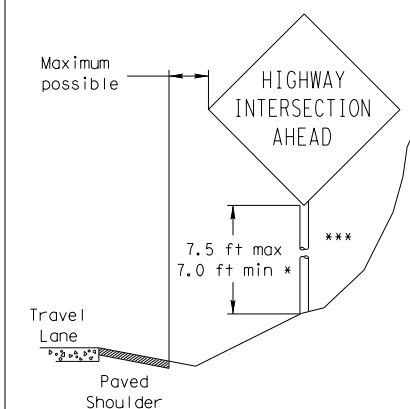
SIGNS WITH PLAQUES



CURB & GUTTER OR RAISED ISLAND



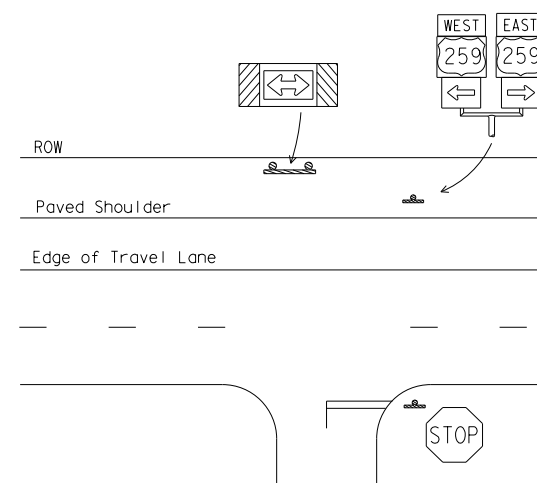
RESTRICTED RIGHT-OF-WAY (When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.



* Signs shall be mounted using the following condition that results in the greatest sign elevation:

- (1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or
- (2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

The website address is:
<http://www.txdot.gov/publications/traffic.htm>



SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

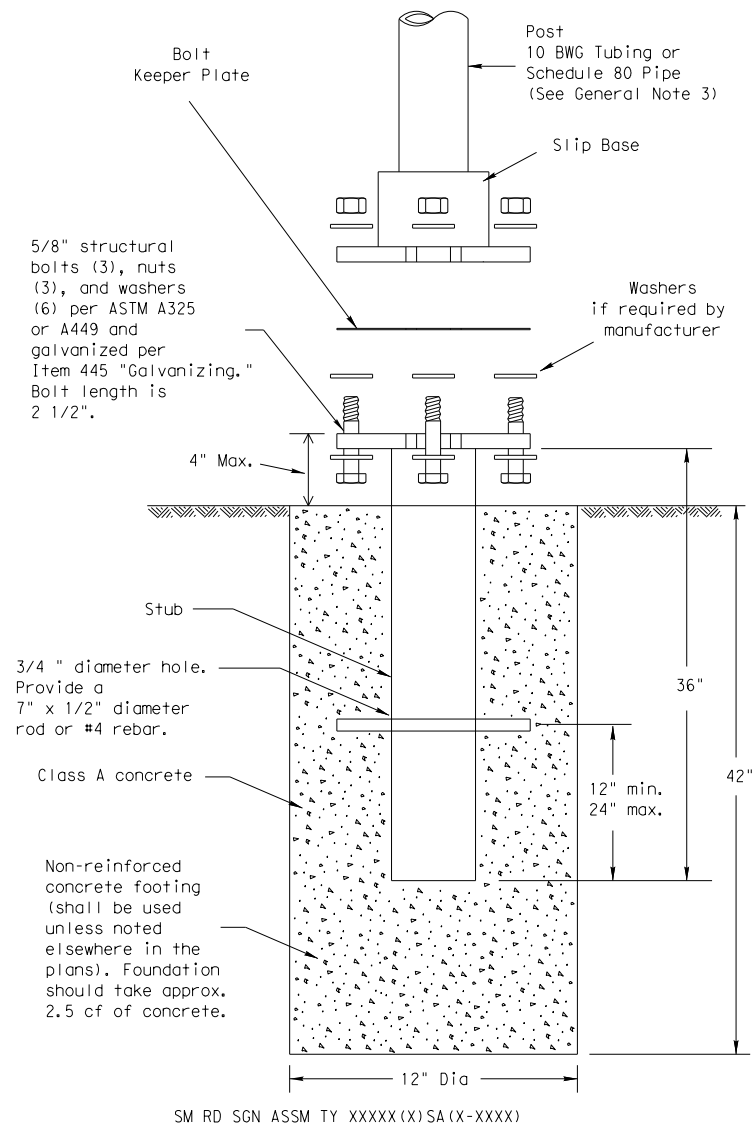
SMD(GEN)-08

© TxDOT July 2002		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
9-08	REVISIONS	CONT	SECT	JOB	HIGHWAY
		0006	15	038	SH 70
		DIST	COUNTY		SHEET NO.
		ABL	NOLAN		147

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TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

- Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
- Material used as post with this system shall conform to the following specifications:
 - 10 BWG Tubing (2.875" outside diameter)
 - 0.134" nominal wall thickness
 - Seamless or electric-resistance welded steel tubing or pipe
 - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
 - Other steels may be used if they meet the following:
 - 55,000 PSI minimum yield strength
 - 70,000 PSI minimum tensile strength
 - 20% minimum elongation in 2"
 - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
 - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
 - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
 - Schedule 80 Pipe (2.875" outside diameter)
 - 0.276" nominal wall thickness
 - Steel tubing per ASTM A500 Gr C
 - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
 - 46,000 PSI minimum yield strength
 - 62,000 PSI minimum tensile strength
 - 21% minimum elongation in 2"
 - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
 - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
 - Galvanization per ASTM A123
- See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: <http://www.txdot.gov/publications/traffic.htm>
- Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

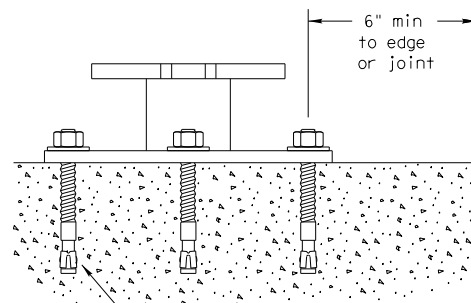
Foundation

- Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
- The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
- Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
- Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
- The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support

- Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
- Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



5/8" diameter Concrete Anchor - 8 places (embed a minimum of 5 1/2" and torque to min. of 50 ft-lbs). Anchor may be expansion or adhesive type.

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

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxyes and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.



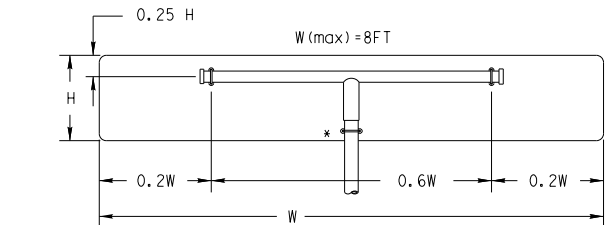
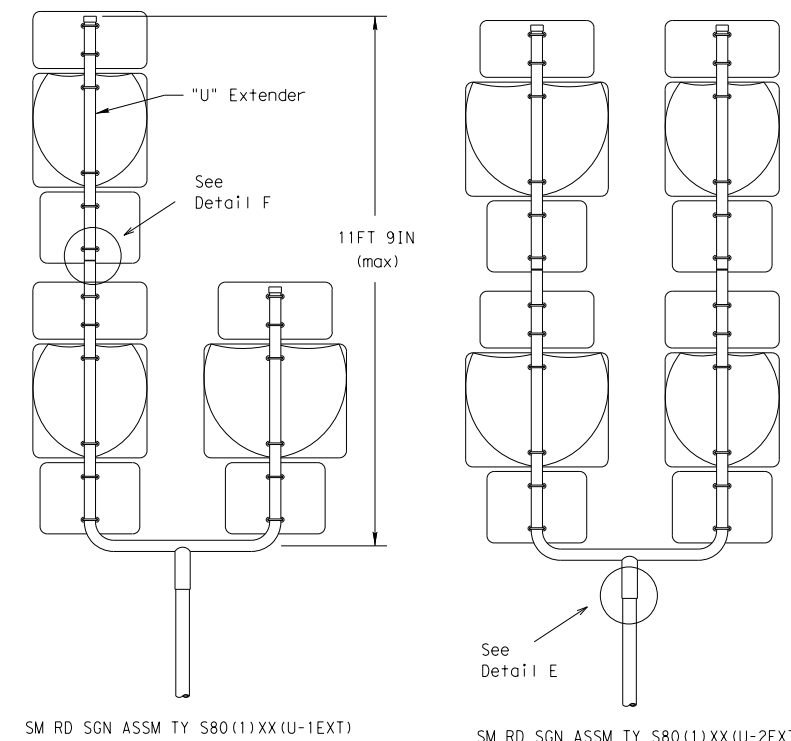
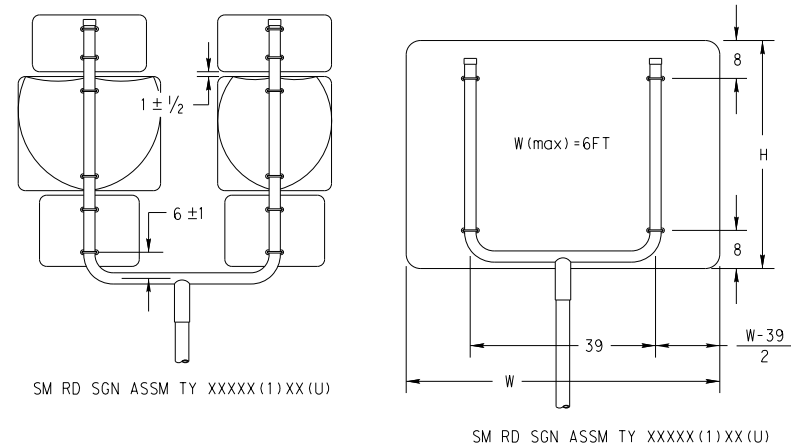
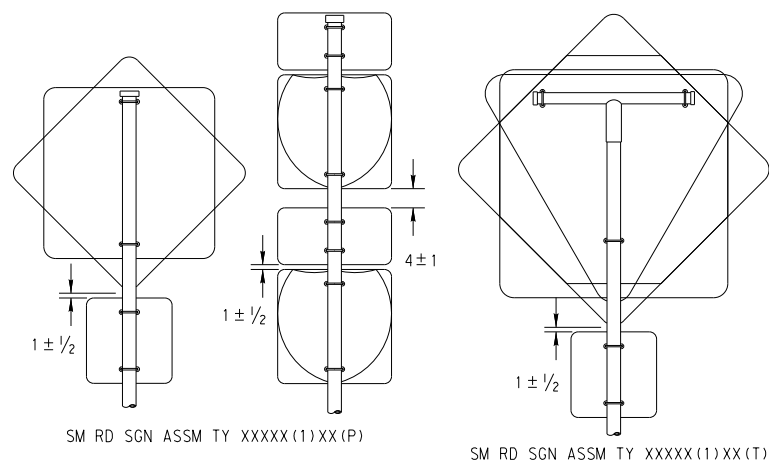
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

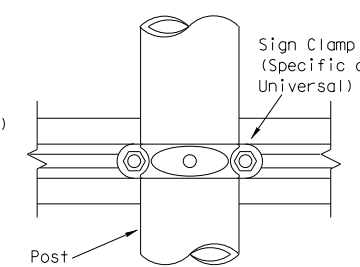
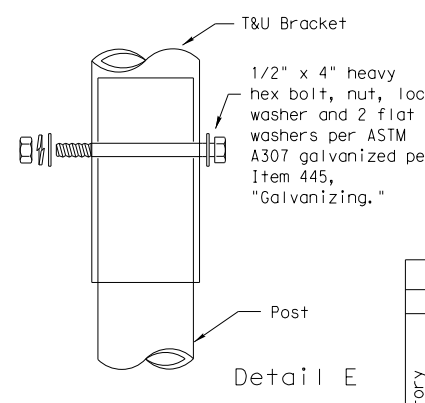
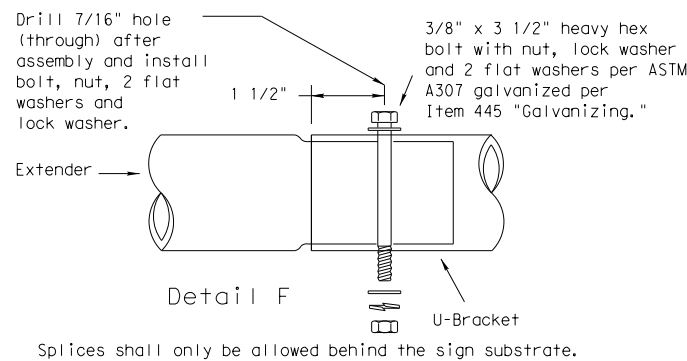
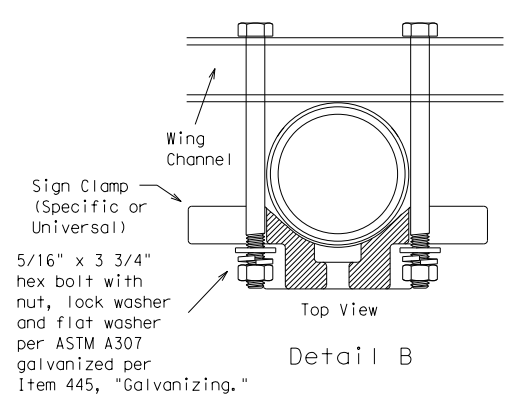
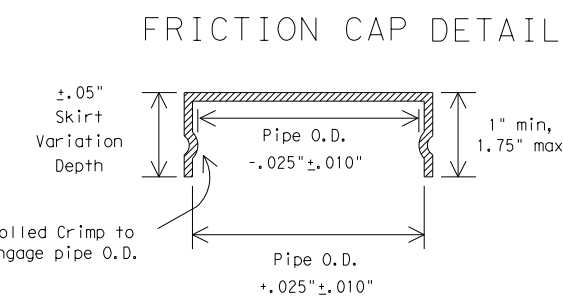
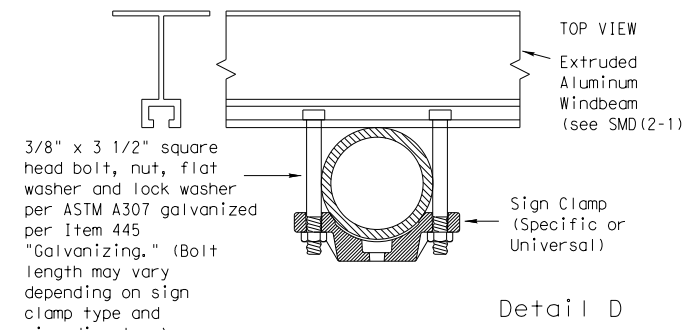
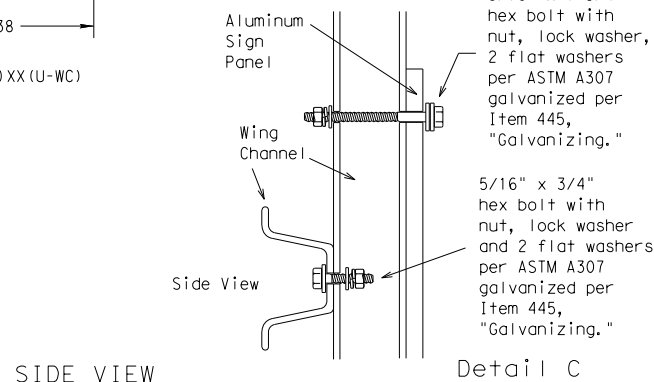
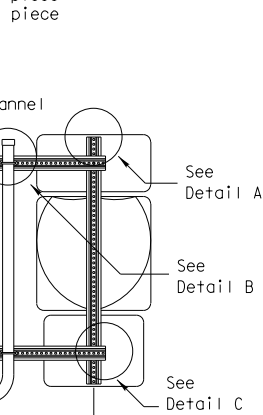
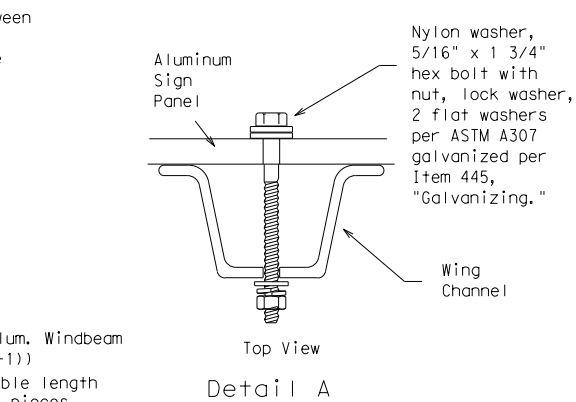
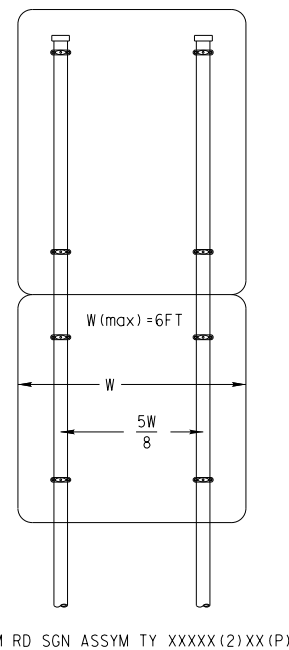
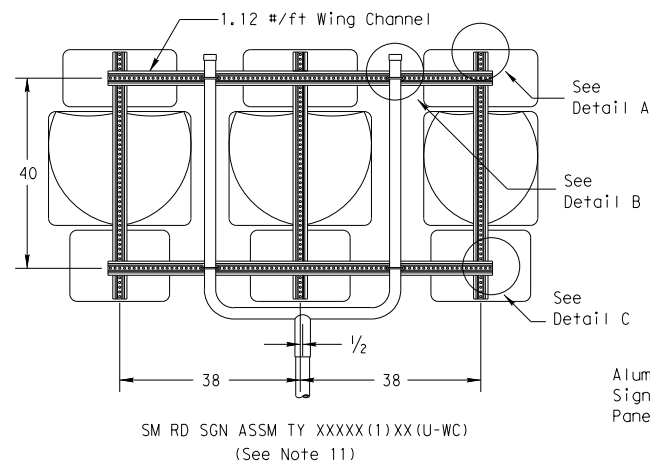
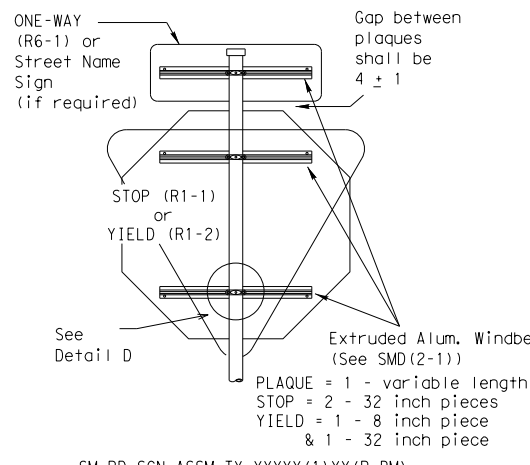
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All dimensions are in english unless detailed otherwise.



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:

- | SIGN SUPPORT | # OF POSTS | MAX. SIGN AREA |
|--------------|------------|----------------|
| 10 BWG | 1 | 16 SF |
| 10 BWG | 2 | 32 SF |
| Sch 80 | 1 | 32 SF |
| Sch 80 | 2 | 64 SF |
- The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
- Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
- Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
- Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
- For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
- When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
- Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
- Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
- Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
- Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
- Post open ends shall be fitted with Friction Caps.
- Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
Warning	48x60-inch signs	TY S80(1)XX(T)
	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

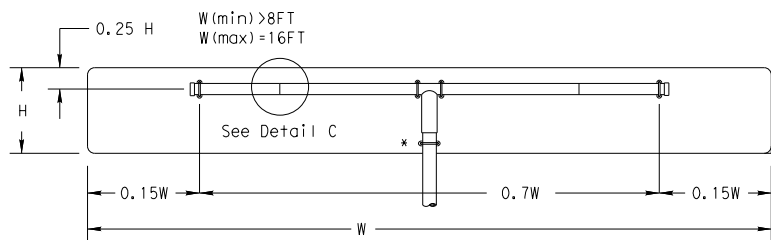


SIGN MOUNTING DETAILS
 SMALL ROADSIDE SIGNS
 TRIANGULAR SLIPBASE SYSTEM
 SMD(SLIP-2) - 08

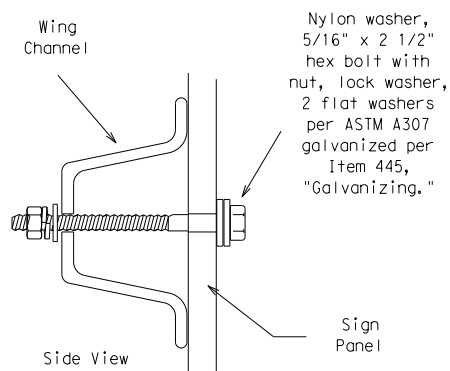
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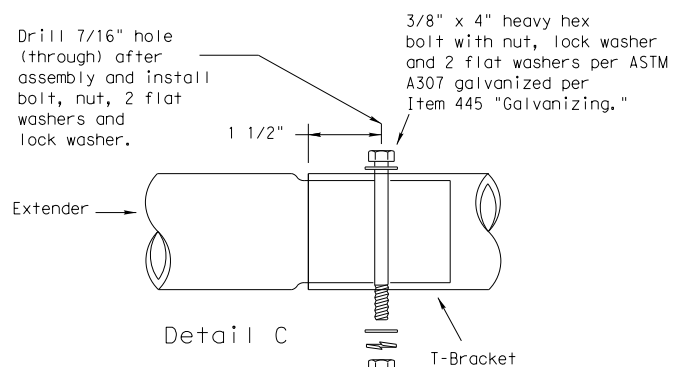
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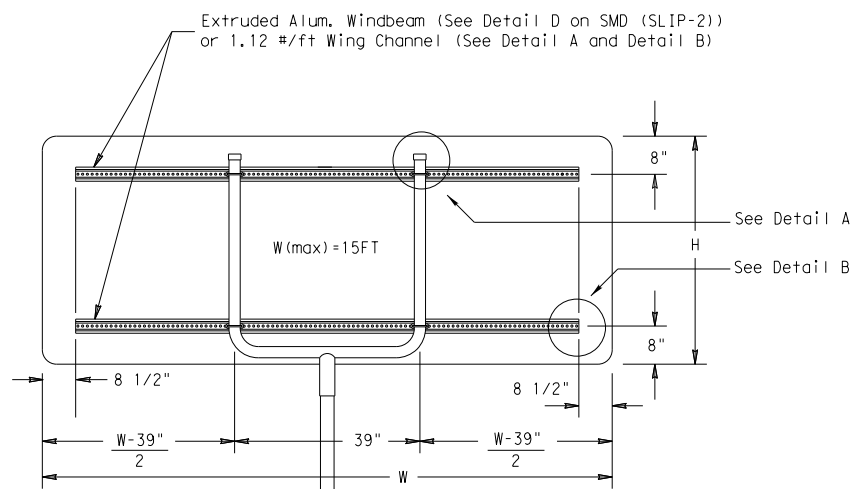
SM RD SGN ASSM TY XXXX(1)XX(T-2EXT)
 (* - See Note 12)



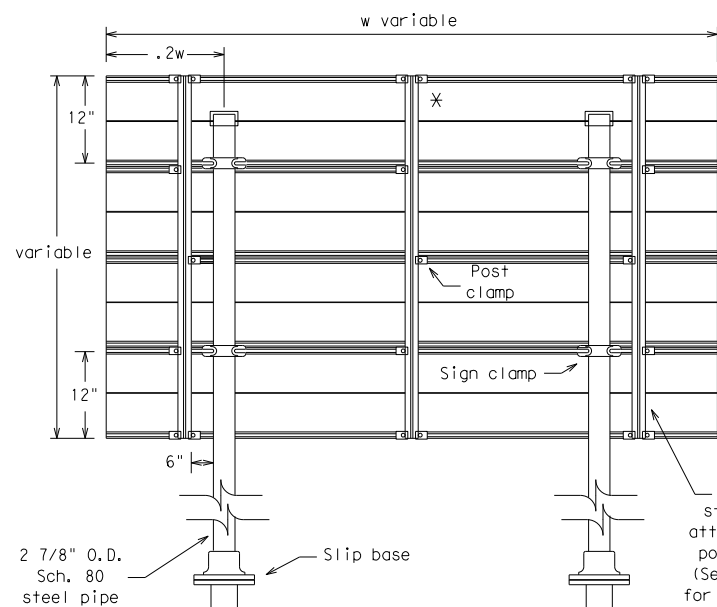
Detail B



Splices shall only be allowed behind the sign substrate.



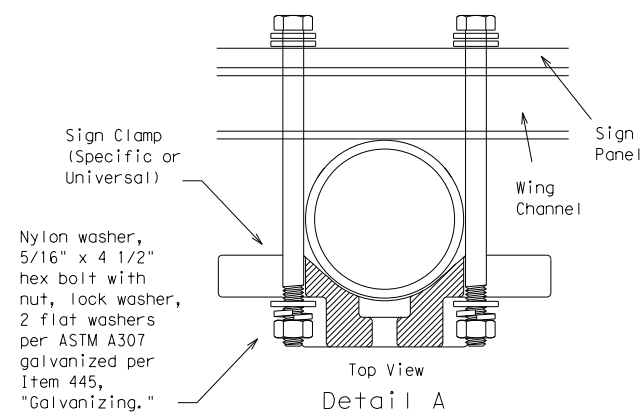
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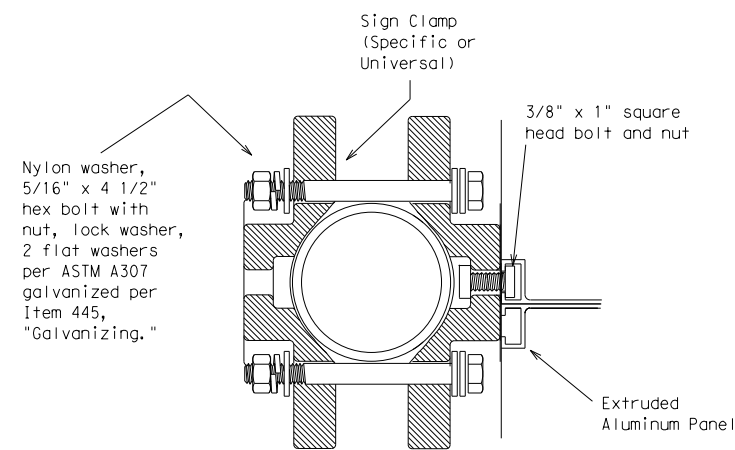
Typical Sign Mount

SM RD SGN ASSM TY S80(2)XX(EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

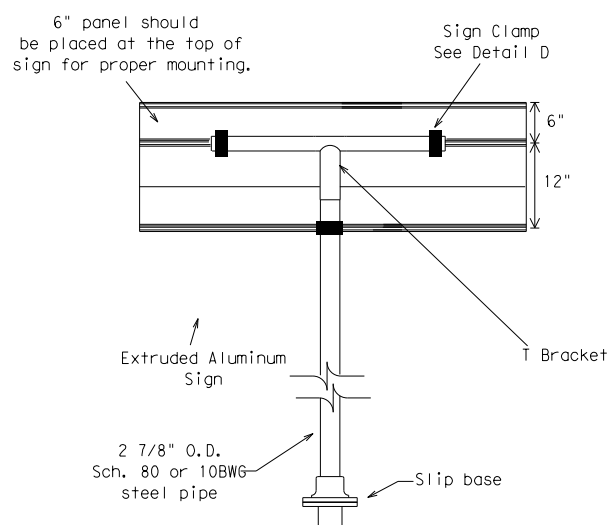


Detail A

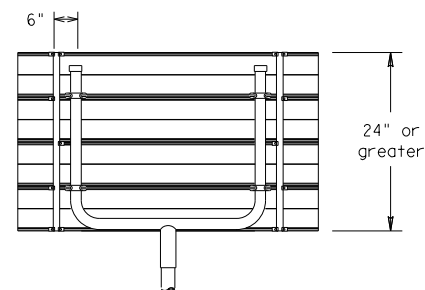


Detail D

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 |
- The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
- Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
- Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
- Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
- For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
- When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
- Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
- Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
- Sign blanks shall be the sizes and shapes shown on the plans.
- 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.
- 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)
Warning	48x60-inch signs	TY S80(1)XX(T)
	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
 Traffic Operations Division

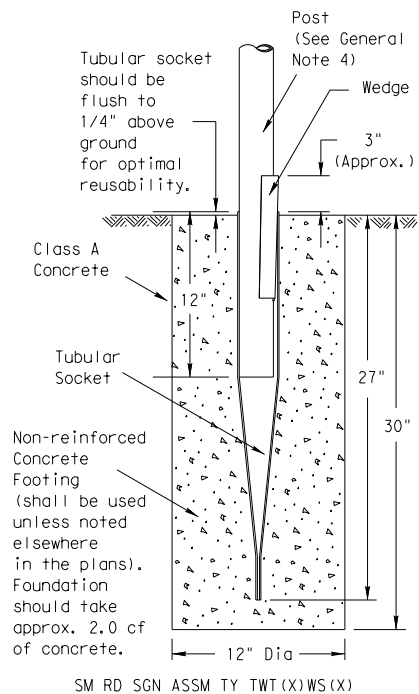
SIGN MOUNTING DETAILS
 SMALL ROADSIDE SIGNS
 TRIANGULAR SLIPBASE SYSTEM
 SMD(SLIP-3) -08

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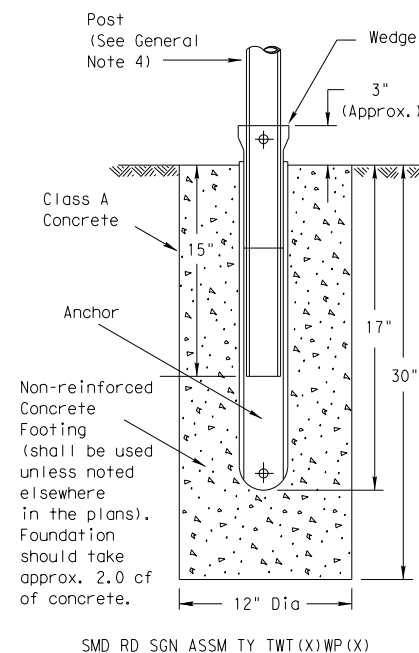
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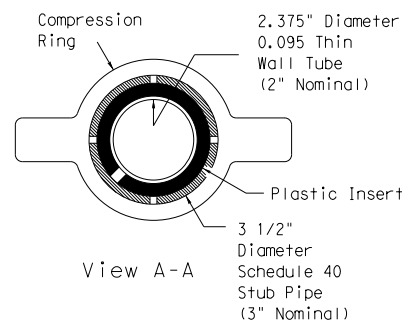
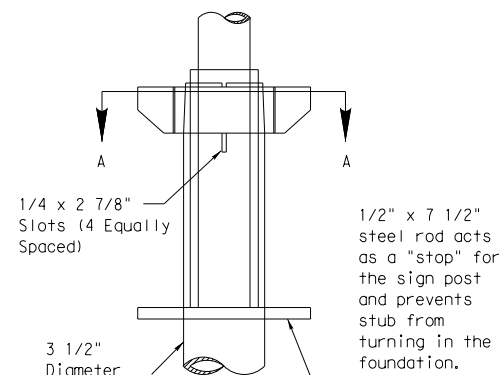
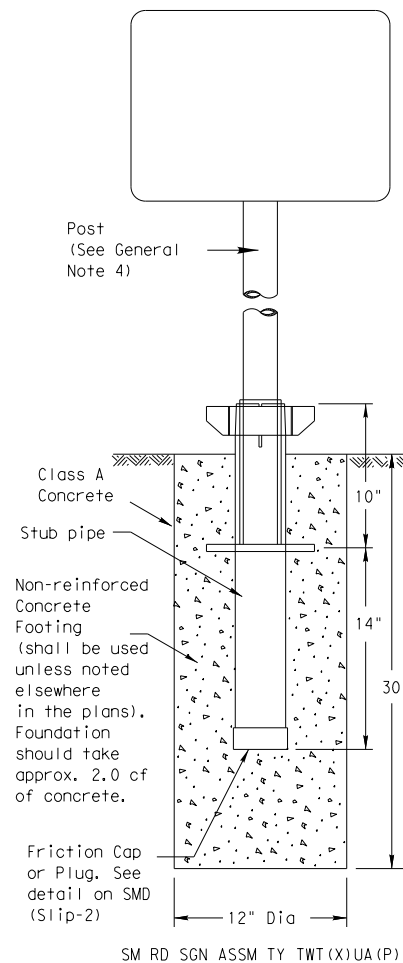
Wedge Anchor Steel System



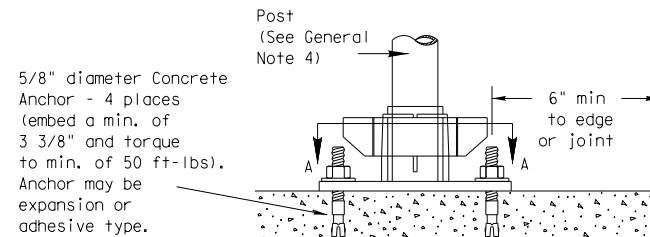
Wedge Anchor High Density Polyethylene (HDPE) System



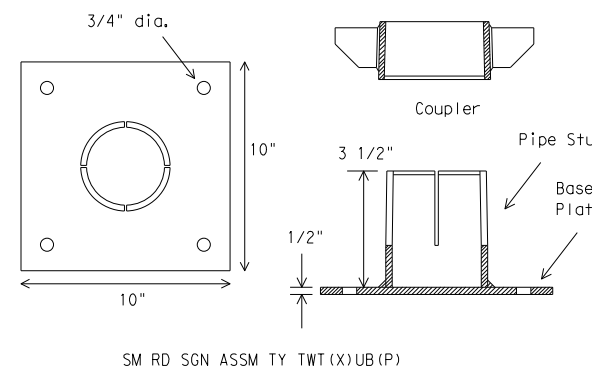
Universal Anchor System with Thin-Walled Tubing Post



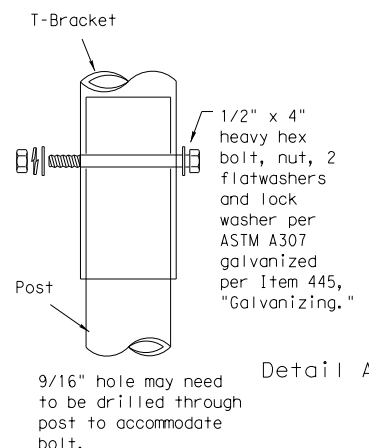
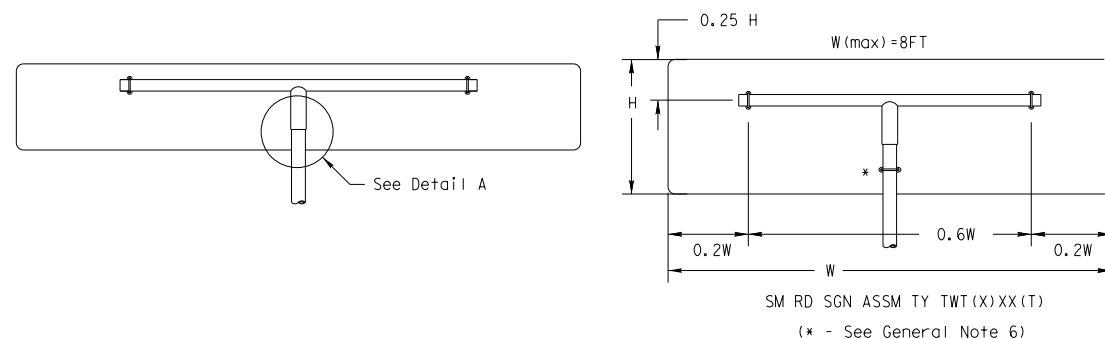
Plastic insert must be used when using the TWT with either the Universal Anchor System or the Bolt Down Universal Anchor System. The insert should be approx. 10" long and cover the tubing from just above the top of the stub pipe to the bottom of the sign post when using the Universal Anchor System. The 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, "Epoxyes and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations.



Sign Installation Using a Prefabricated T-Bracket for Thin-Wall Tubing Post



NOTE
 The devices shall be installed per manufacturer's recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

- 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.
- 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.
- 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
- 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 HSLA 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 metalizing with zinc wire per ASTM B833.
- Sign blanks shall be the sizes and shapes shown on the plans.
- Additional sign clamp required on the "T-bracket" post for 24" high signs. Place clamp at least 3" above bottom of sign when possible.
- Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
- 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

- 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.
- 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.
- Insert tubular socket into concrete until top of socket is approximately 1/4" above the concrete footing.
- Plumb the socket. Allow a minimum 4 days for concrete to set, unless otherwise directed by Engineer.
- Attach the sign to the sign post.
- Insert the sign post into socket and align sign face with roadway.
- Drive the wedge into the socket to secure post. This will leave approximately 3 inches of the wedge exposed.

UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

- 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.
- Insert base post in hole to depths shown and backfill hole with concrete.
- 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.
- Attach the sign to the sign post.
- Install plastic insert around bottom of post.
- Insert sign post into base post. Lower until the post comes to rest on steel rod.
- Seat compression ring using a hammer. Typically, the top of compression ring will be approximately level with top of stub post when optimally installed.
- Check sign post by hand to ensure it is unable to turn. If loose, increase the tightening of the compression ring.



SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS WEDGE & UNIVERSAL ANCHOR WITH THIN WALL TUBING POST SMD(TWT) - 08

© TxDOT July 2002	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
9-08	REVISIONS			
	CONT	SECT	JOB	HIGHWAY
	0006	15	038	SH 70
	DIST	COUNTY	SHEET NO.	
	ABL	NOLAN	151	

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with the TPDES Construction General Permit TXR150000 (CGP). The Texas Department of Transportation (TxDOT) ensures that project specifications include adequate best management practices (BMPs) for this project.

For all projects with soil disturbing activity and for projects that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

This SWP3 is consistent with requirements specified in applicable stormwater plans and the projects environmental permits, issues, and commitments (EPICs). A copy of the CGP is included in Attachment 2.12 of the SWP3 binder.

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):

0006-15-038

1.2 PROJECT LIMITS:

From: SH 70

To: BI 20

1.3 PROJECT COORDINATES:

BEGIN: (Lat) 32.4829° N, (Long) 100.3664° W

END: (Lat) 32.4826° N, (Long) 100.3616° W

1.4 TOTAL PROJECT AREA (Acres): 3.433

1.5 TOTAL AREA TO BE DISTURBED (Acres): 3.300

1.6 NATURE OF CONSTRUCTION ACTIVITY:

Bridge replacement consisting of replacing bridge and approaches.

1.7 MAJOR SOIL TYPES:

Soil Type	Description
Woodward loam, 3-5% slopes	100% loam, well drained, low rate of runoff, slight erosion potential
Burson-Quinlan association, hilly	19% loam and 81% bedrock, well drained, medium rate of runoff, slight erosion potential
Woodward loam, 1-3% slopes	100% loam, well drained, low rate of runoff, slight erosion potential
Texroy loam, 0-1% slopes	100% loam and clay loam, well drained, negligible rate of runoff, slight erosion potential

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):

PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

- PSLs determined during preconstruction meeting
- PSLs determined during construction
- No PSLs planned for construction

Type	Sheet #s
Concrete Washout	See Environmental Layout Sheets

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:

(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.5.)

- Mobilization
- Install sediment and erosion controls
- Blade existing topsoil into windrows, prep ROW, clear and grub
- Remove existing pavement
- Grading operations, excavation, and embankment
- Excavate and prepare subgrade for proposed pavement widening
- Remove existing culverts, safety end treatments (SETs)
- Remove existing metal beam guard fence (MBGF), bridge rail
- Install proposed pavement per plans
- Install culverts, culvert extensions, SETs
- Install mow strip, MBGF, bridge rail
- Place flex base
- Rework slopes, grade ditches
- Blade windrowed material back across slopes
- Revegetation of unpaved areas
- Achieve site stabilization and remove sediment and erosion control measures
- X Other: Remove existing bridge and riprap
- X Other: Install bridge and riprap
- Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

- Sediment laden stormwater from stormwater conveyance over disturbed area
- Fuels, oils, and lubricants from construction vehicles, equipment, and storage
- Solvents, paints, adhesives, etc. from various construction activities
- Transported soils from offsite vehicle tracking
- Construction debris and waste from various construction activities
- Contaminated water from excavation or dewatering pump-out water
- Sanitary waste from onsite restroom facilities
- Trash from various construction activities/receptacles
- Long-term stockpiles of material and waste
- Discharges from concrete washout activities, runoff from concrete cutting activities, and other concrete related activities.
- Other: _____
- Other: _____
- Other: _____

1.11 RECEIVING WATERS:

Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
Sweetwater Creek	Clear Fork of the Brazos River, 1232* (Bacteria)
No TMDLs or I-Plans Identified	

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

- Development of plans and specifications
- Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- Post Construction Site Notice
- Submit NOI/CSN to local MS4
- Perform SWP3 inspections
- Maintain SWP3 records and update to reflect daily operations
- Complete and submit Notice of Termination to TCEQ
- Maintain SWP3 records for 3 years
- Other: _____
- Other: _____
- Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

- Day To Day Operational Control
- Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- Post Construction Site Notice
- Submit NOI/CSN to local MS4
- Maintain schedule of major construction activities
- Install, maintain and modify BMPs
- Complete and submit Notice of Termination to TCEQ
- Maintain SWP3 records for 3 years
- Other: _____
- Other: _____
- Other: _____

1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:

MS4 Entity



10-13-2023

STORMWATER POLLUTION PREVENTION PLAN (SWP3)



Sheet 1 of 2

FED. RD. DIV. NO.	PROJECT NO.			SHEET NO.
	SEE TITLE SHEET			152
STATE	STATE DIST.	COUNTY		
TEXAS	ABL	NOLAN		
CONT.	SECT.	JOB	HIGHWAY NO.	
0006	15	038	SH 70	

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- Protection of Existing Vegetation
- Vegetated Buffer Zones
- Soil Retention Blankets
- Geotextiles
- Mulching/ Hydromulching
- Soil Surface Treatments
- Temporary Seeding
- Permanent Planting, Sodding or Seeding
- Biodegradable Erosion Control Logs
- Rock Filter Dams/ Rock Check Dams
- Vertical Tracking
- Interceptor Swale
- Riprap
- Diversion Dike
- Temporary Pipe Slope Drain
- Embankment for Erosion Control
- Paved Flumes
- Other: _____
- Other: _____
- Other: _____
- Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- Biodegradable Erosion Control Logs
- Dewatering Controls
- Inlet Protection
- Rock Filter Dams/ Rock Check Dams
- Sandbag Berms
- Sediment Control Fence
- Stabilized Construction Exit
- Floating Turbidity Barrier
- Vegetated Buffer Zones
- Vegetated Filter Strips
- Other: _____
- Other: _____
- Other: _____
- Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

T / P

- Sediment Trap
 - Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
 - 3,600 cubic feet of storage per acre drained
- Sedimentation Basin
 - Not required (<10 acres disturbed)
 - Required (>10 acres) and implemented.
 - Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
 - 3,600 cubic feet of storage per acre drained
 - Required (>10 acres), but not feasible due to:
 - Available area/Site geometry
 - Site slope/Drainage patterns
 - Site soils/Geotechnical factors
 - Public safety
 - Other: _____

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To
Riprap	See Bridge Layout Sheet	
Seeding	See Environmental Layout Sheets	

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- Excess dirt/mud on road removed daily
- Haul roads dampened for dust control
- Loaded haul trucks to be covered with tarpaulin
- Stabilized construction exit
- Daily street sweeping
- Other: _____
- Other: _____
- Other: _____
- Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- Chemical Management
- Concrete and Materials Waste Management
- Debris and Trash Management
- Dust Control
- Sanitary Facilities
- Other: _____
- Other: _____
- Other: _____
- Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To
Natural ditch along westbound IH 20	Within IH 20 existing ROW	

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- Fire hydrant flushings
- Irrigation drainage
- Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- Potable water sources
- Springs
- Uncontaminated groundwater
- Water used to wash vehicles or control dust
- Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 DEWATERING:

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

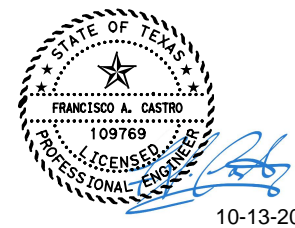
2.9 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

When dewatering activities are present, a daily inspection will be conducted once per day during those activities and documented in accordance with CGP and TxDOT requirements.

2.10 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.



STORMWATER POLLUTION PREVENTION PLAN (SWP3)

© 2023 Sheet 2 of 2

FED. RD. DIV. NO.	PROJECT NO.			SHEET NO.
	SEE TITLE SHEET			153
STATE	STATE DIST.	COUNTY		
TEXAS	ABL	NOLAN		
CONT.	SECT.	JOB	HIGHWAY NO.	
0006	15	038	SH 70	

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X

PREPARED BY (NAME OF DESIGNER)
 DATE: 10/12/2023
 FILE: c:\pwworking\central\01\3297778\EPIC.dgn

I. STORM WATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Storm water Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1. No Action Required Required Action

Action No.

- The project disturbs less than one acre of surface area. The contractor is responsible for the PSL as defined in the Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges (2014 Edition, Section 7.6., Page 44). The total disturbed acreage is the combined acreage to be disturbed on the project and the contractors PSL.
- Prevent storm water pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
- Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
- Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
- When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATER BODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

- No Permit Required
- Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)
- Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)
- Individual 404 Permit Required
- Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

-
-

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
<input type="checkbox"/> Temporary Vegetation	<input type="checkbox"/> Silt Fence	<input type="checkbox"/> Vegetative Filter Strips
<input type="checkbox"/> Blankets/Matting	<input type="checkbox"/> Rock Berm	<input type="checkbox"/> Retention/Irrigation Systems
<input type="checkbox"/> Mulch	<input type="checkbox"/> Triangular Filter Dike	<input type="checkbox"/> Sedimentation Basin
<input checked="" type="checkbox"/> Sodding	<input type="checkbox"/> Sand Bag Berm	<input type="checkbox"/> Constructed Wetlands
<input type="checkbox"/> Interceptor Swale	<input type="checkbox"/> Straw & Hay Bale Dike	<input type="checkbox"/> Wet Basin
<input type="checkbox"/> Diversion Dike	<input type="checkbox"/> Brush Berms	<input type="checkbox"/> Erosion Control Compost & Mulch
<input type="checkbox"/> Erosion Control Compost	<input type="checkbox"/> Erosion Control Compost	<input type="checkbox"/> Compost Filter Berm and Socks
<input type="checkbox"/> Compost Filter Berm and Socks	<input type="checkbox"/> Compost Filter Berm and Socks	<input type="checkbox"/> Sand Filter Systems
<input checked="" type="checkbox"/> Temporary Erosion Control Logs (BIOLOGS)	<input checked="" type="checkbox"/> Temporary Erosion Control Logs (BIOLOGS)	<input type="checkbox"/> Temporary Erosion Control Logs (BIOLOGS)
<input checked="" type="checkbox"/> Preservation of Natural Resources	<input type="checkbox"/> Sediment Traps	<input type="checkbox"/> Permanent Vegetation (Planting, Sodding, or Seeding)
<input checked="" type="checkbox"/> Construction Exits	<input type="checkbox"/> Sediment Basins	<input type="checkbox"/> Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

- No Action Required Required Action

Action No.

-
-
-
-

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical. Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

- No Action Required Required Action

Action No.

- Comply with E.O. 13112 on use of native vegetation.
-
-
-

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

- No Action Required Required Action

Action No.

- Comply with Migratory Bird Treaty Act on protection of Birds, their young, and nests.
- Refer to General Notes for further details.
-
-

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.

- Positive for lead.
- Proper abatement should be presented in demo plan.
-

VII. OTHER ENVIRONMENTAL ISSUES


(includes regional issues such as Edwards Aquifer District, etc.)

- No Action Required Required Action

Action No.

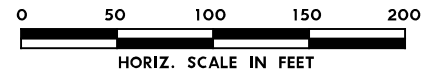
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SH 70
 ENVIRONMENTAL PERMITS,
 ISSUES AND COMMITMENTS
 EPIC



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NO SCALE		SHEET 1 OF 1	
FHWA DIVISION	PROJECT NO.	HIGHWAY NO.	
6	SEE TITLE SHEET	SH 70	
STATE	COUNTY	SHEET NO.	
TEXAS	NOLAN	154	
DISTRICT	CONTROL	SECTION	JOB
ABL	0006	15	038

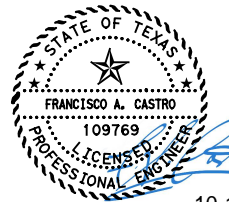
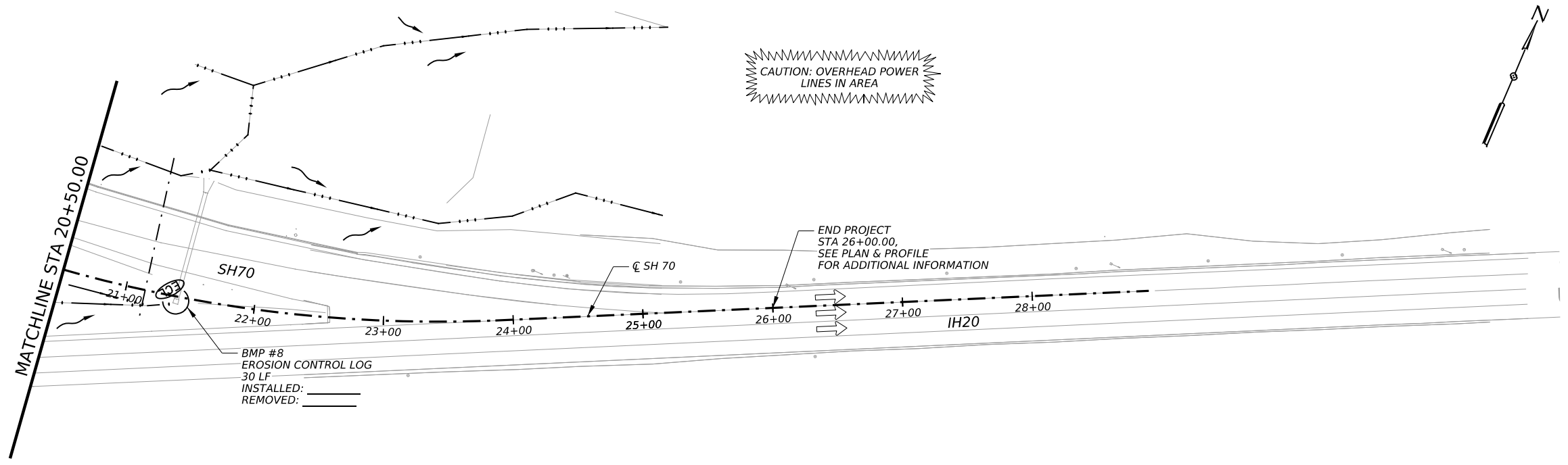
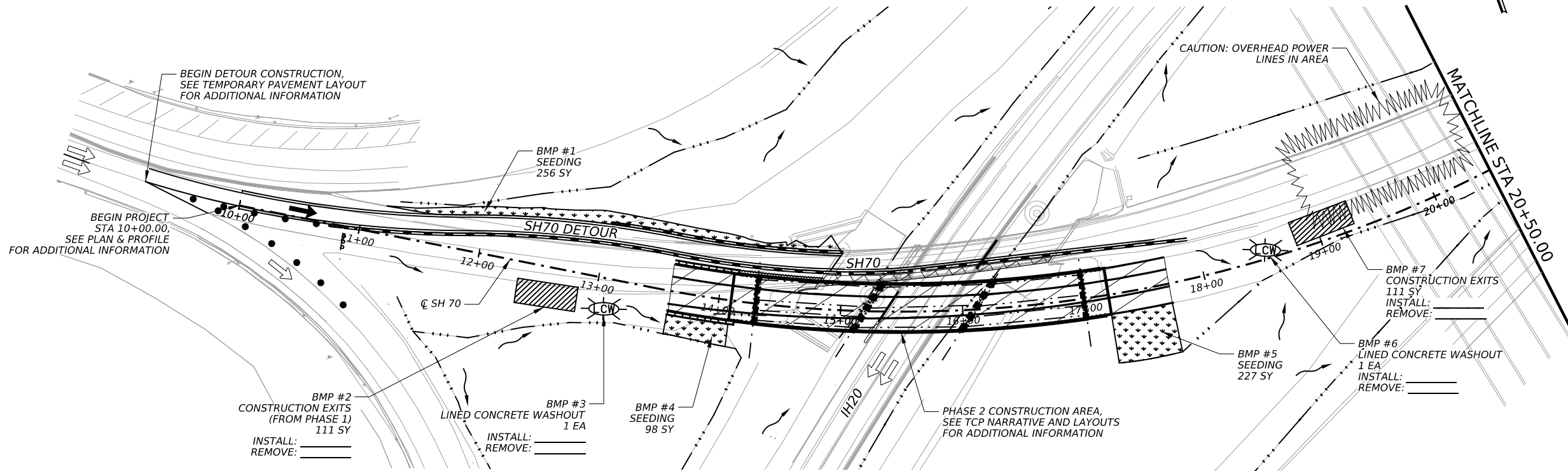


LEGEND

- FLOW ARROW
- DITCH FLOW ARROW
- SEEDING
- CONSTRUCTION EXIT
- LINED CONCRETE WASHOUT
- BIODEGRADABLE EROSION CONTROL LOGS

NOTES:

1. REFER TO SW3P STANDARDS FOR DETAILS.
2. INSTALLED MEASURES SHALL BE PLACED PRIOR TO COMMENCING ANY SOIL DISTURBING ACTIVITIES, REMAIN IN PLACE AND BE MAINTAINED THROUGHOUT THE DURATION OF THE PROJECT OR AS DIRECTED BY THE ENGINEER.
3. SW3P MEASURES SHOWN ARE MINIMUM REQUIREMENTS BASED UPON PROJECT DESIGN. INSTALLATION OF SW3P MEASURES WILL BE AS SHOWN AND MODIFIED TO ACCOMMODATE ACTUAL FIELD CONDITIONS.
4. CONSTRUCTION EXITS TO BE LOCATED IN THE FIELD AND APPROVED BY THE ENGINEER. THE SIZE OF THE CONSTRUCTION EXIT WILL BE 111 SY (50' X 20'). REFER TO STANDARD EC(3)-16 FOR DETAILS.
5. LINED CONCRETE WASHOUT SHALL BE PAID SUBSIDIARY TO PERTINENT CONCRETE ITEMS.



10-13-2023

NO.	DATE	REVISION	APPR BY

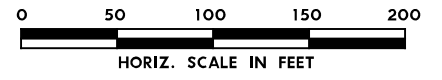
HDR Engineering, Inc.
 Firm Registration No. F-754
 1711 Preston Road, Suite 300
 Dallas, Texas 75248
 972.960.4400



SH 70
ENVIRONMENTAL LAYOUT
PHASE 1 & 2

SCALE: 1"=100' SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	155	

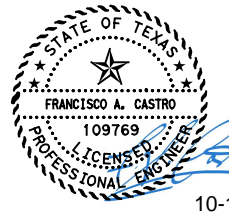
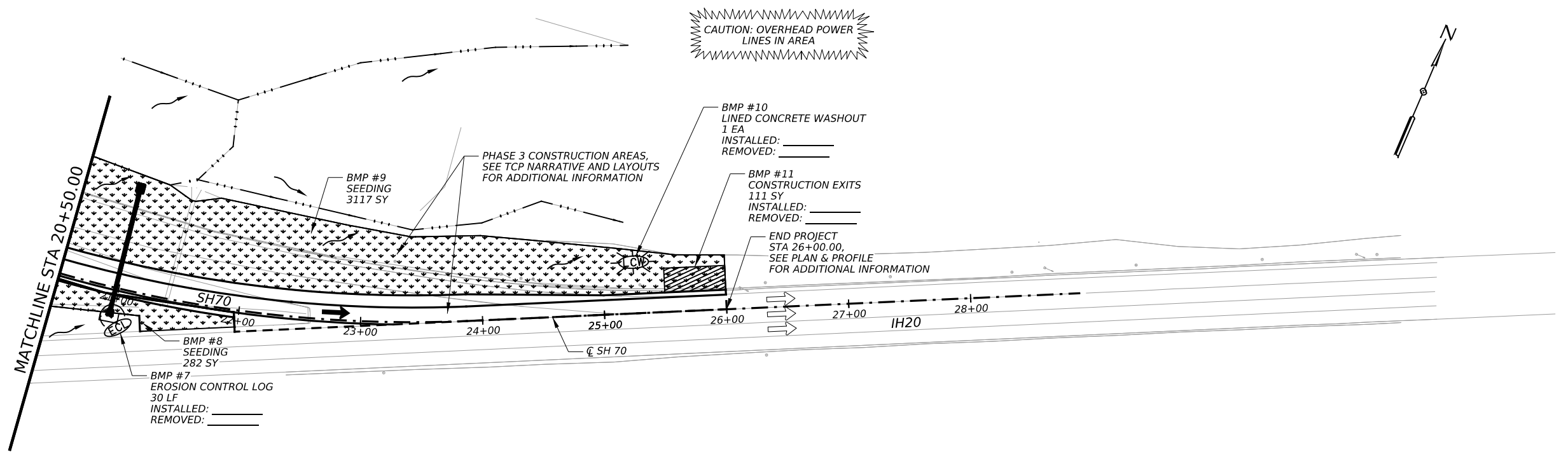
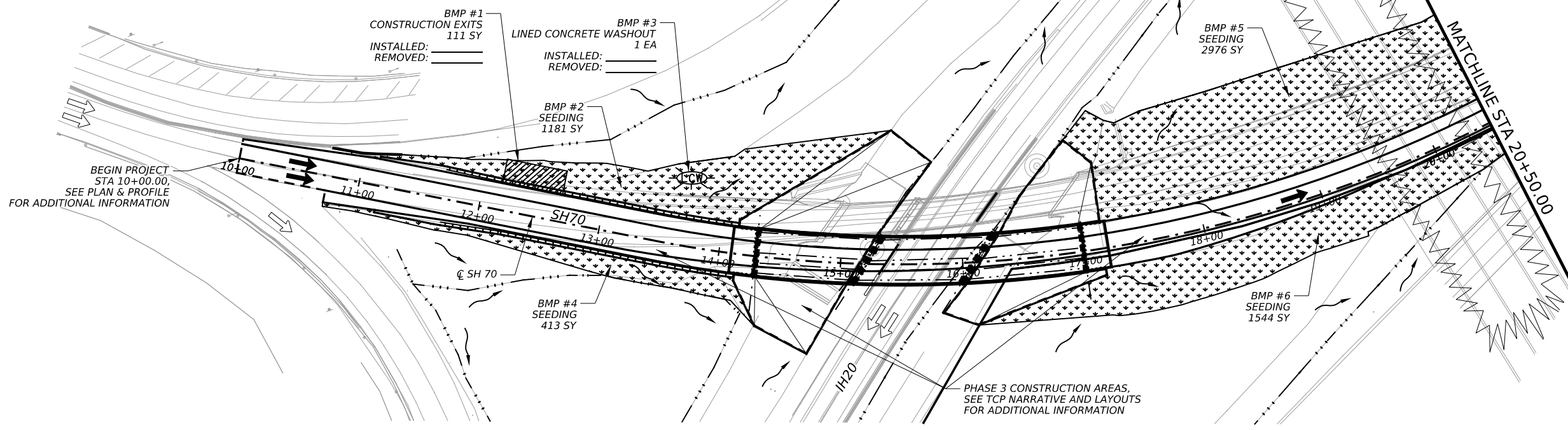


LEGEND

- FLOW ARROW
- DITCH FLOW ARROW
- SEEDING
- CONSTRUCTION EXIT
- LINED CONCRETE WASHOUT
- BIODEGRADABLE EROSION CONTROL LOGS

NOTES:

1. REFER TO SW3P STANDARDS FOR DETAILS.
2. INSTALLED MEASURES SHALL BE PLACED PRIOR TO COMMENCING ANY SOIL DISTURBING ACTIVITIES, REMAIN IN PLACE AND BE MAINTAINED THROUGHOUT THE DURATION OF THE PROJECT OR AS DIRECTED BY THE ENGINEER.
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10-13-2023

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 1711 Preston Road, Suite 300
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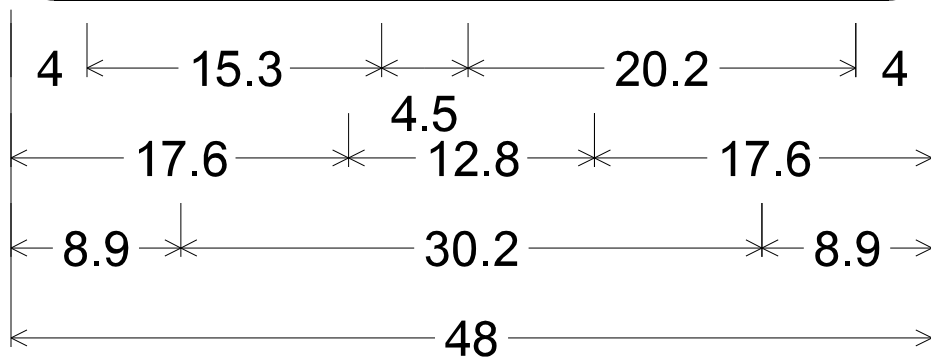
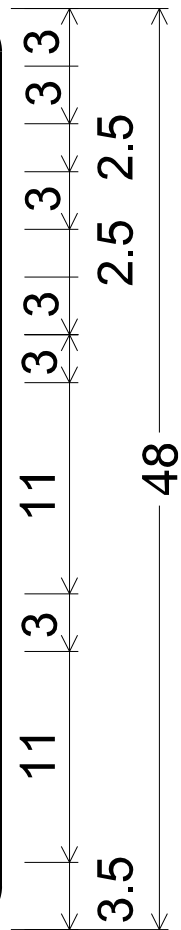
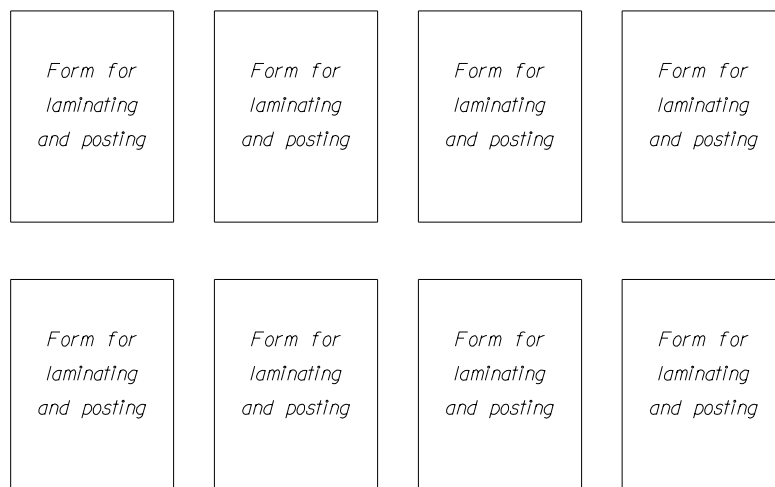


SH 70
ENVIRONMENTAL LAYOUT
PHASE 3

SCALE: 1"=100' SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0006	15	038	SH 70
DIST	COUNTY	SHEET NO.	
ABILENE	NOLAN	156	

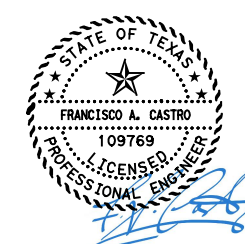
Tx DOT PROJECT SWP3 INFORMATION



2.3" Radius, 0.9" Border, White on Blue;
 [TxDOT PROJECT] E Mod;
 [SWP3] E Mod;
 [INFORMATION] E Mod;

NOTE:

The Forms needed for laminating and posting to the SWP3 Notification Board will be provided by the Engineer. The total number of forms may vary. Notification Boards are to be constructed from Plywood, 1/2 or 5/8-inch thick, in accordance with TxDOT Departmental Material Specification (DMS)-7100. The Contractor shall ensure the sign substrate is installed in accordance with the manufacturer's recommendations for the type of sign support that is being used. The sign will be placed at a location within the right-of-way but outside the clear zone as directed by the Engineer. This work will not be paid for directly, but will be considered subsidiary to other items.



10-25-2023

SWP3 NOTIFICATION BOARD DETAIL

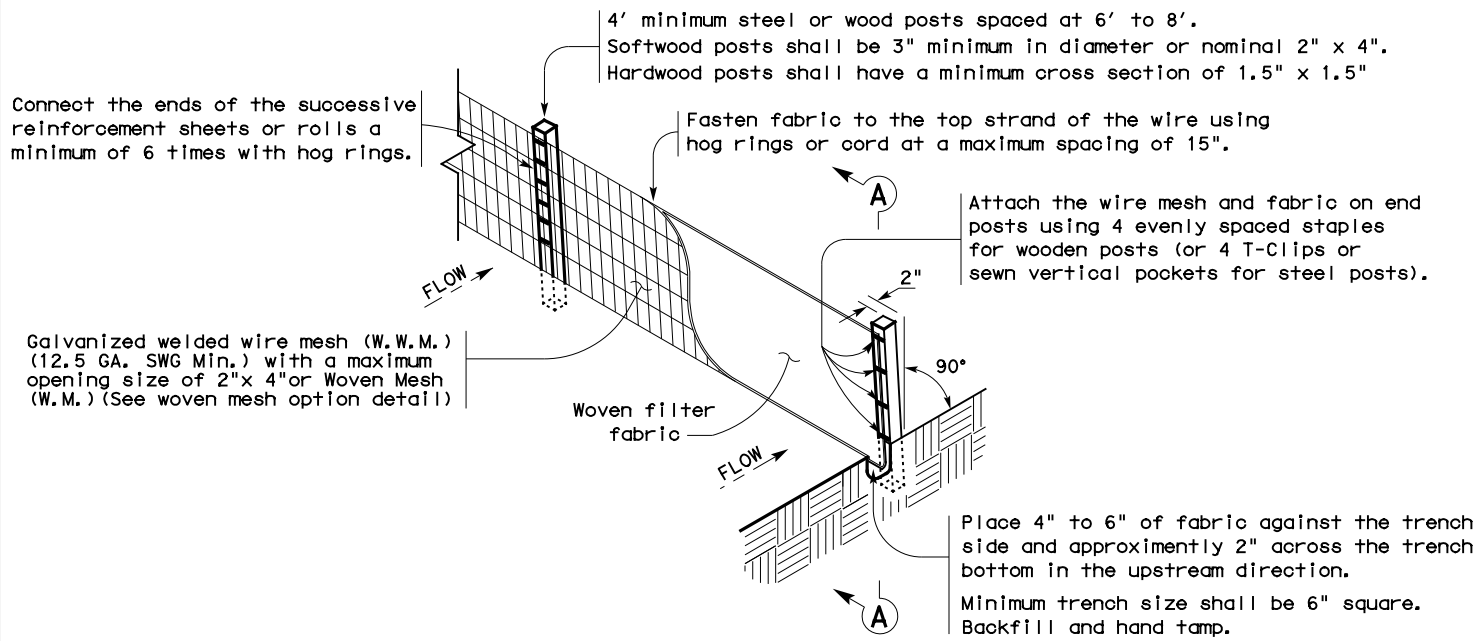


NO SCALE SHEET 1 OF 1

FHWA DIVISION	PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	SH 70
STATE	COUNTY	SHEET NO.
TEXAS	NOLAN	157
DISTRICT	CONTROL SECTION JOB	
ABL	0006 15 038	

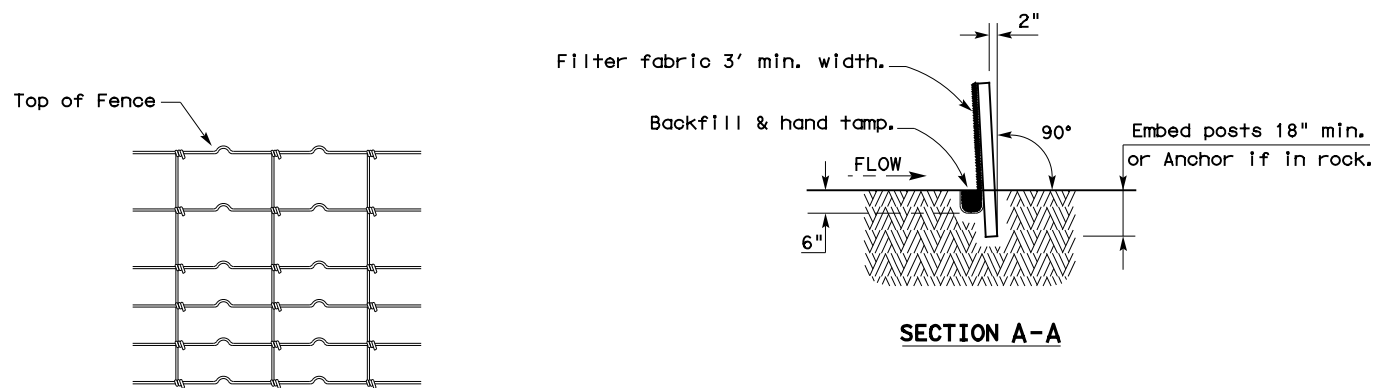
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10/25/2023
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TEMPORARY SEDIMENT CONTROL FENCE

SCF



HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA. SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT². Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

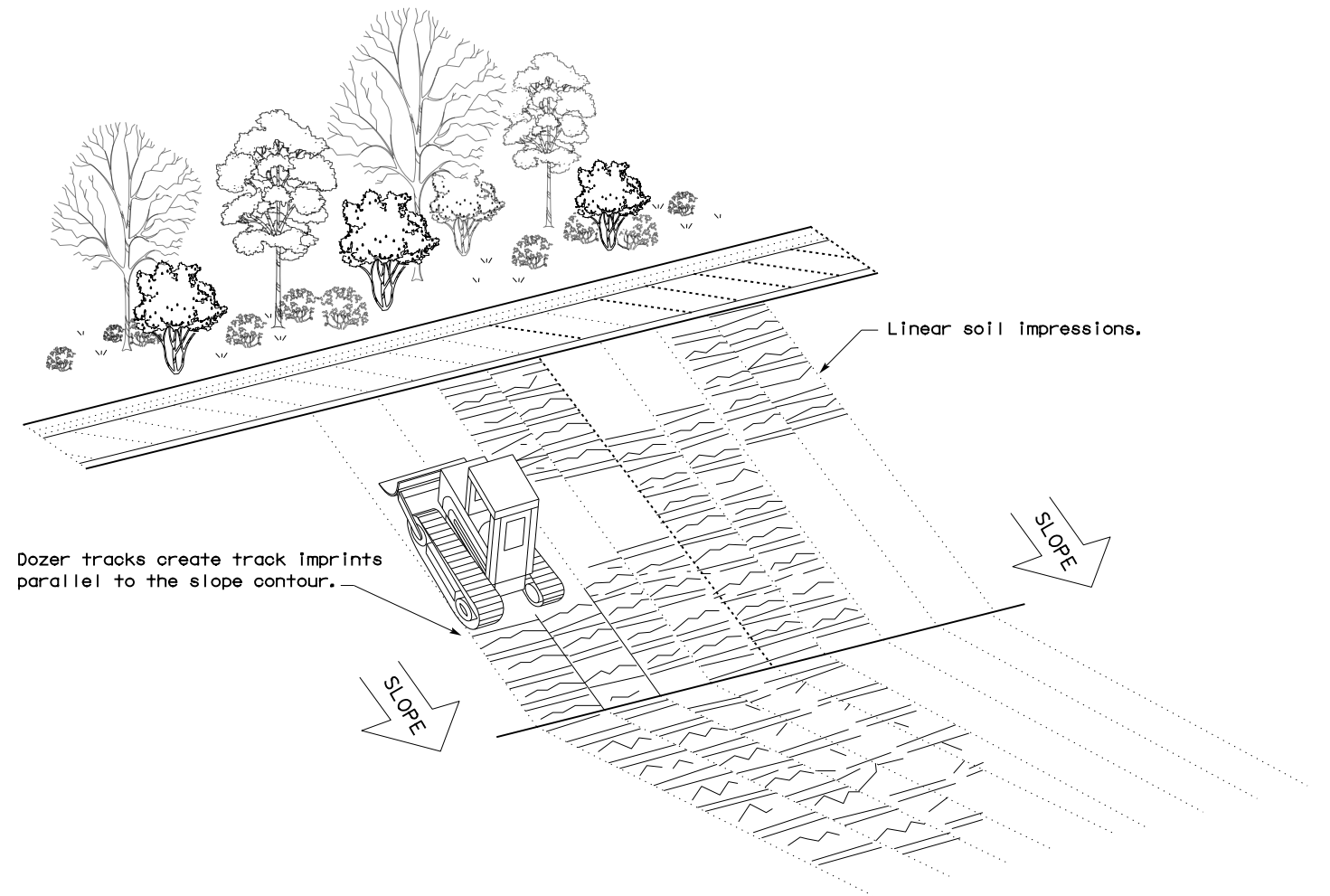
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continuous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.

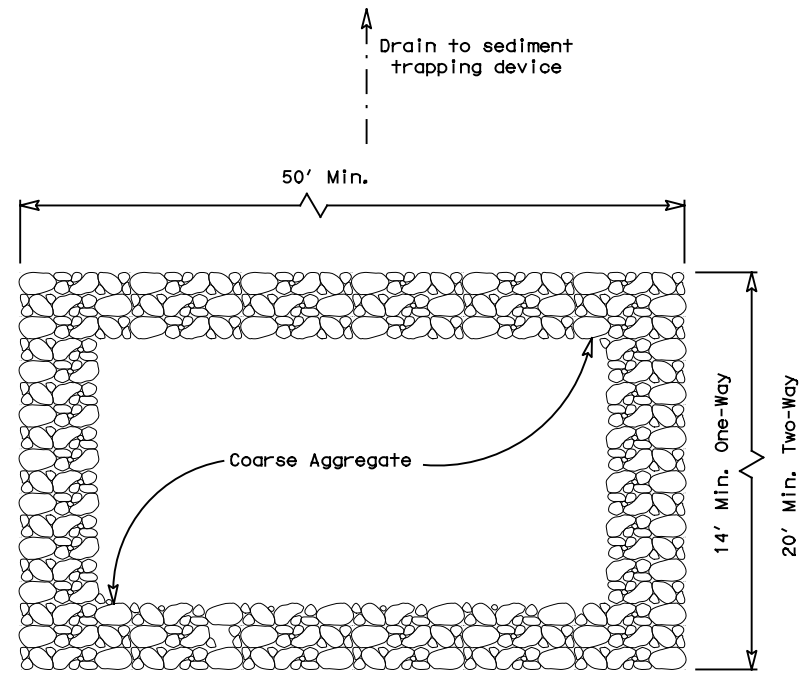


VERTICAL TRACKING

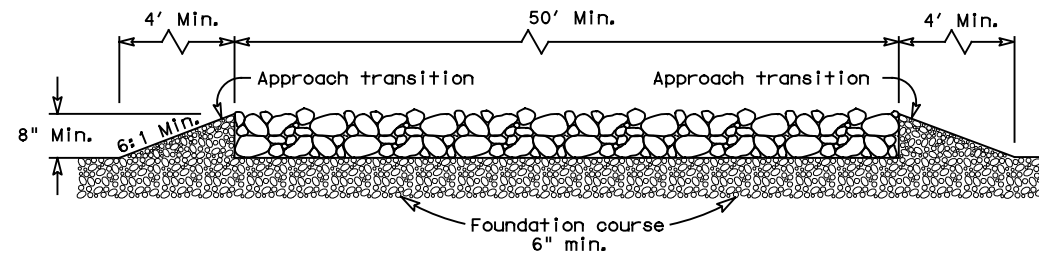
				Design Division Standard
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES FENCE & VERTICAL TRACKING EC(1)-16				
FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0006	15	038	SH 70
	DIST	COUNTY	SHEET NO.	
	ABL	NOLAN	158	

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DATE: 10/25/2023
 FILE: c:\pwworking\centra101\d3297779\ec316.dgn



PLAN VIEW

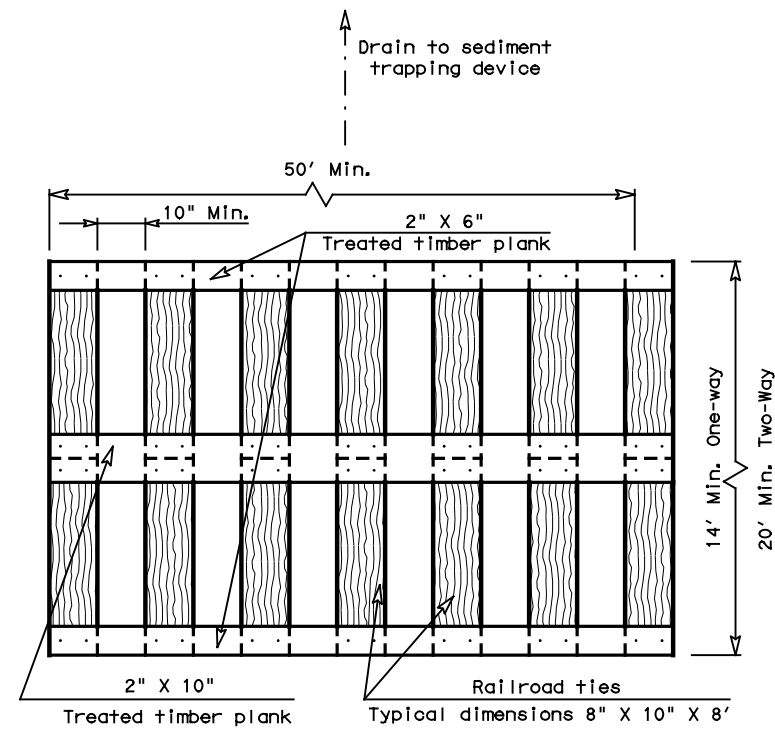


ELEVATION VIEW

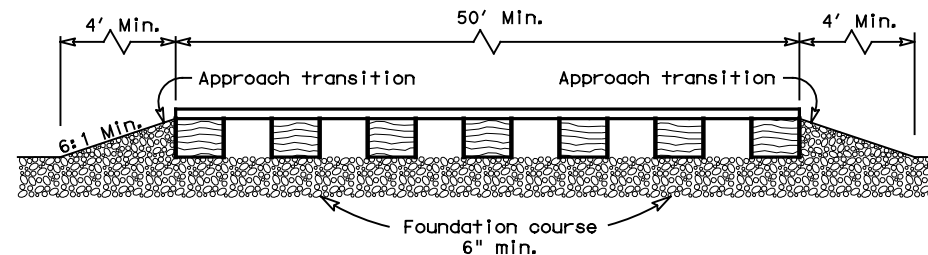
CONSTRUCTION EXIT (TYPE 1)
 ROCK CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

- The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
- The coarse aggregate should be open graded with a size of 4" to 8".
- The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
- The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materials approved by the Engineer.
- The construction exit shall be graded to allow drainage to a sediment trapping device.
- The guidelines shown hereon are suggestions only and may be modified by the Engineer.
- Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.



PLAN VIEW

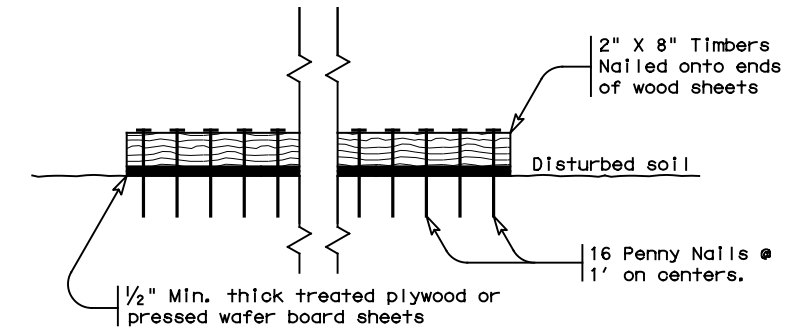
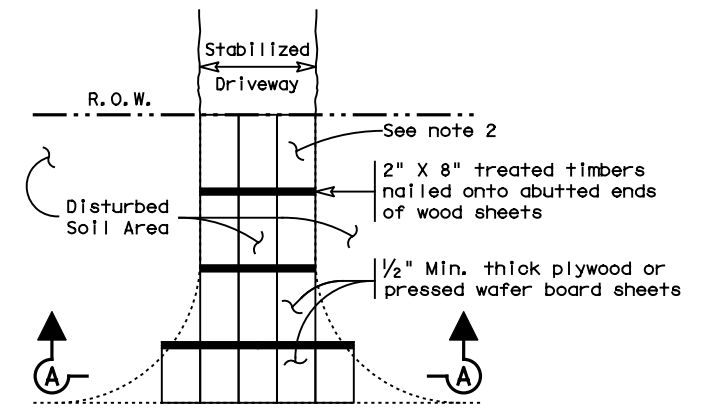


ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)
 TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 2)

- The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
- The treated timber planks shall be attached to the railroad ties with 1/2" x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
- The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
- The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
- The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
- The construction exit should be graded to allow drainage to a sediment trapping device.
- The guidelines shown hereon are suggestions only and may be modified by the Engineer.
- Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.



CONSTRUCTION EXIT (TYPE 3)
 SHORT TERM

GENERAL NOTES (TYPE 3)

- The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
- The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
- The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
- The guidelines shown hereon are suggestions only and may be modified by the Engineer.



TEMPORARY EROSION,
 SEDIMENT AND WATER
 POLLUTION CONTROL MEASURES
 CONSTRUCTION EXITS
 EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
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REVISIONS	0006	15	038	SH 70
	DIST	COUNTY	SHEET NO.	
	ABL	NOLAN	159	